HINO
BUS

WORKSHOP MANUAL

RB 14

CHASSIS ELECTRICAL

Hino HINO MOTORS, LTD.

Hino

HINO MOTORS, LTD.
OVERSEAS OPERATIONS
TECHNICAL DIVISION
7-17, NIHONBASHI 1-CHOME, CHUO-KU, TOKYO, 103 JAPON

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FOREWORD

This workshop manual has been prepared to provide information regarding repair procedures on Hino Vehicle.

Applicable models: RB14 series, equipped with W04C-T engine

When making any repair on your vehicle, be careful not to be injured through improper procedures.
As for maintenance items, refer to the Driver's Hand Book and Maintenance Guide.
All information and specifications in this manual are based upon the latest product information available at the time of printing.
Hino Motors reserves the right to make changes at any time without prior notice.
For matters regarding the engine, refer to manual No. S5-W04E04A

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WORKSHOP MANUAL

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GI-107E-04

CHAPTER GI

GENERAL INTRODUCTION

GENERAL PRECAUTIONS

Some recommended and standard maintenance services for your vehicle are mentioned in this section.
When performing maintenance on your vehicle be careful not to get injured by improper work.
Improper or incomplete work can cause a malfunction of the vehicle which may result in personal injury and/or property damage. If you have any question about performing maintenance, please consult your Hino dealer.

WARNING

When working on your vehicle, observe the following general precautions to prevent personal injury and/or property damage in addition to the particular NOTES or WARNINGS.
Most threaded fasteners are metric.
Be careful not to mix with threaded fasteners using the inch system.

- Always wear safety glasses or goggles to protect your eyes.
- Remove rings, watches, ties, loose hanging jewelry and loose clothing before starting work on the vehicle.
- Bind long hair securely behind the head.
- When working on the vehicle, apply the parking brake firmly, place the transmission shift lever in neutral or "N", and block the wheels.
- Use safety stands to support the vehicle whenever you need to work under it. It is dangerous to work under a vehicle supported only by a jack.
- To avoid serious burns, keep yourself away from hot metal parts such as the engine, exhaust manifold, radiator, muffler, exhaust pipe and tail pipe.
- Keep yourself, your clothing and your tools away from moving parts such as the cooling fan and V-belts when the engine is running.
- Always stop the engine by pulling out the engine stop knob. Leave the knob pulled out as long as the engine is stopped. And turn off the starter switch, unless the operation requires the engine running. Removing the key from the switch is recommended.
- If it is necessary to run the engine, make sure that the parking brake is firmly applied, the wheels are blocked, and the transmission shift lever is in "Neutral" before starting the engine.
- Run the engine only in a well-ventilated area to avoid inhaling of carbon monoxide.
- Do not smoke while working on the truck since fuel and gages from the battery are flammable.
- Take utmost care when working on the battery. It contains corrosive sulfuric acid.
- Large electric current flows through the battery cable and starter cable. Be careful not to cause a short which can result in personal injury and/or property damage.
- Be careful not to leave any tool in the engine compartment. The tool may be hit by moving parts and can cause personal injury.
- Read carefully and observe the instructions placed on the jack when using it.
- Be careful not to damage lines and hoses by stepping or holding your feet on them.

TOWING

When being toward, always place the transmission shift lever in Neutral and release the parking brake completely.
In order to protect the bumper, fit a protection bar against the lower edge of the bumper and put a wood block under the frame near the No. 1 crossmember when attaching the towing chain. Never lift or tow the vehicle if the chain is in direct contact with the bumper.

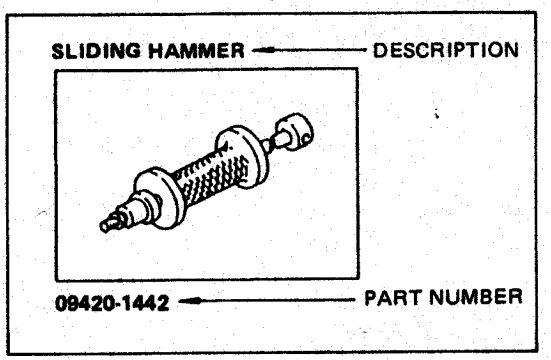
1) Front end towing (with front wheels raised off the ground)
   When towing from the front end with the front wheels raised off the ground remove the rear axle shafts to protect the transmission and differential gears from being damaged. The hub openings should be covered to prevent the loss of axle lubricant or the entry of dirt or foreign matter.

   The above-mentioned precautions should be observed for vehicles equipped with either the manual or automatic transmission, and for even short distance towing. After being toward, check and refill the rear axle housing with lubricant if necessary.

2) Rear end towing
   When being towed with the rear wheels raised off the ground, fasten and secure the steering wheel in a straight-ahead position.

HOW TO USE THIS WORKSHOP MANUAL.

This workshop manual is designed as a guide for servicing vehicle.
An INDEX is provided on the first page of each chapter.
TROUBLESHOOTING is dealt with each chapter.
When beginning operations, refer to the sections on for a guide to appropriate diagnoses.



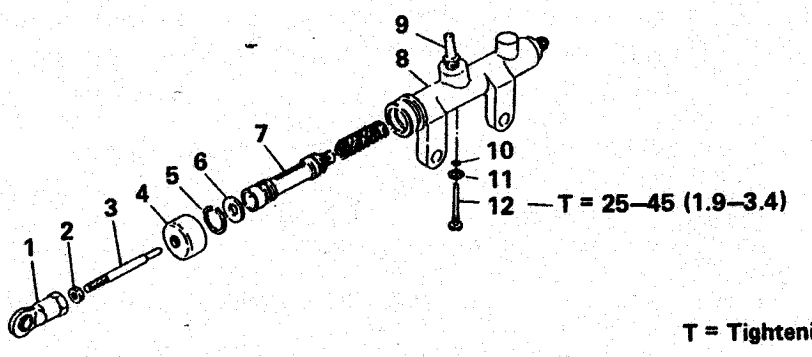
SPECIAL TOOLS are dealt with in each chapter.
When ordering a special tool, make sure that the parts number is correct.

REPAIR PROCEDURES

Repair procedures which are self-explanatory such as simple installation and removal of parts have been omitted. Illustrations such as the one below have been provided to make such simple procedures clear. Only essential procedures requiring directions have been dealt with explicitly.

MAIN CYLINDER

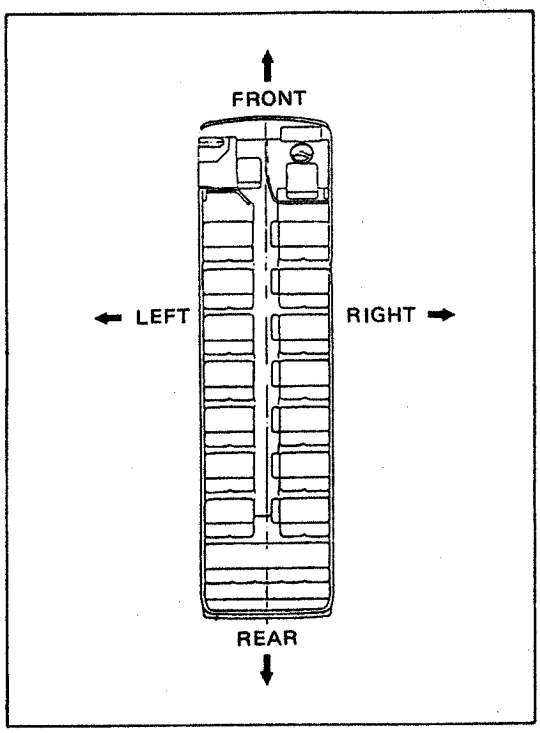
EXAMPLE:



T = Tightening torque kg-cm (lb.ft)

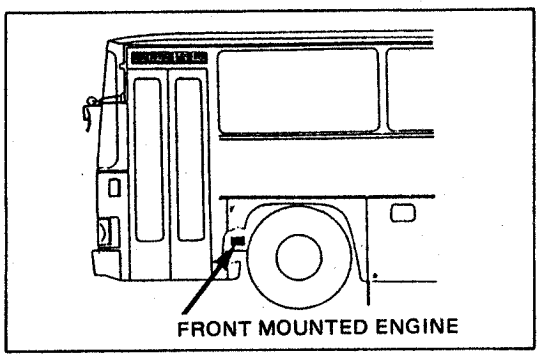
1. Clevis
2. Lock nut
3. Push rod
4. Boot
5. Retainer ring
6. Thrust washer
7. Piston assembly
8. Cylinder body
9. Pipe joint
10. O-ring
11. Soft washer
12. Bolt

In some cases, illustrations may be of parts which differ in some nonessential way from the parts found on your particular vehicle. In such cases, however, the principale or procedure being illustrated applies regardless of such nonessential differences.



DEFINITION OF TERMS

Definition of vehicle left and right.
Left and right refers to the left and right sides of the vehicle as seen while looking down the center line from the rear towards the front.



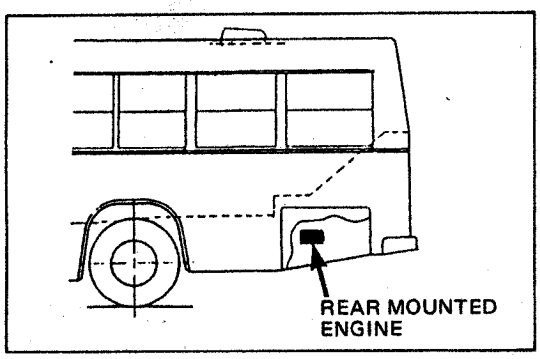
IDENTIFICATION INFORMATION

CHASSIS SERIAL NUMBERS

Please quote these numbers when ordering spare parts or reporting technical matter as they will give you prompt service attention.

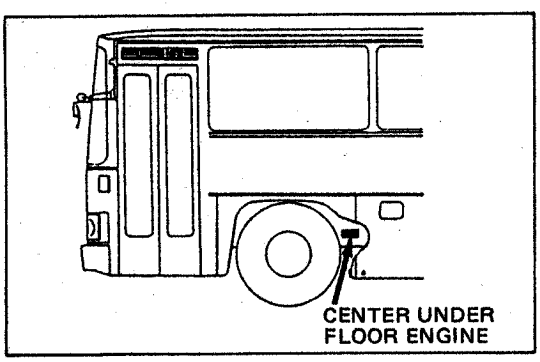
FRONT MOUNTED ENGINE

The chassis serial number is engraved on the left side frame near the front wheel.



REAR MOUNTED ENGINE

The chassis serial number is engraved on the left side frame at rear overhang.



CENTER UNDER FLOOR ENGINE

The chassis serial number is engraved on the left side frame near the front wheel.

TIGHTENING TORQUE OF STANDARD BOLT

Unit: kg·cm (lb.ft)

Bolt identification	Tightening conditions \ Bolt diameter (mm)	4	6	8	10	12	14	16	18	20	22	24
4 5	Even tightening area. Bolt nut, coating, naked bolt, lubricant, etc. Optimum conditions.	10 ~ 15 (0.8 ~ 1.0)	36 ~ 53 (2.7 ~ 3.8)	88 ~ 128 (7 ~ 9)	174 ~ 255 (13 ~ 18)	304 ~ 445 (22 ~ 32)	486 ~ 712 (36 ~ 51)	758 ~ 1,110 (55 ~ 80)	1,840 ~ 1,530 (76 ~ 110)	1,480 ~ 2,170 (108 ~ 156)	2,030 ~ 2,980 (147 ~ 215)	2,560 ~ 3,750 (186 ~ 271)
	Cast iron or aluminum tightening surface. Washers. Medium conditions.	14 ~ 20 (1.1 ~ 1.4)	48 ~ 71 (3.5 ~ 5.1)	117 ~ 172 (9 ~ 12)	232 ~ 340 (17 ~ 24)	405 ~ 592 (30 ~ 42)	647 ~ 950 (47 ~ 68)	1,010 ~ 1,480 (74 ~ 107)	1,390 ~ 2,040 (101 ~ 147)	1,970 ~ 2,900 (143 ~ 209)	2,700 ~ 3,970 (196 ~ 287)	3,410 ~ 5,000 (247 ~ 361)
	Tightening area having black coarse surface. Rusty. Naked bolt or lubricant unavailable. Poor tightening conditions.	17 ~ 25 (1.3 ~ 1.8)	60 ~ 88 (4.4 ~ 6.3)	146 ~ 214 (11 ~ 15)	290 ~ 425 (21 ~ 30)	506 ~ 742 (37 ~ 53)	809 ~ 1,180 (59 ~ 85)	1,260 ~ 1,850 (92 ~ 133)	1,740 ~ 2,540 (126 ~ 183)	2,460 ~ 3,620 (178 ~ 261)	3,380 ~ 4,950 (245 ~ 358)	4,260 ~ 6,250 (309 ~ 452)
6 7	Even tightening area. Bolt nut, coating, naked bolt, lubricant, etc. Optimum conditions.	16 ~ 24 (1.2 ~ 1.7)	58 ~ 83 (4.2 ~ 6.0)	138 ~ 201 (10 ~ 14)	273 ~ 400 (20 ~ 28)	477 ~ 700 (35 ~ 50)	764 ~ 1,120 (56 ~ 81)	1,190 ~ 1,750 (87 ~ 126)	1,640 ~ 2,400 (119 ~ 173)	2,320 ~ 3,410 (168 ~ 246)	3,180 ~ 4,680 (231 ~ 338)	4,020 ~ 5,360 (291 ~ 387)
	Cast iron or aluminum tightening surface. Washers. Medium conditions.	22 ~ 32 (1.6 ~ 2.3)	75 ~ 110 (5.5 ~ 7.9)	183 ~ 270 (14 ~ 19)	364 ~ 533 (27 ~ 38)	636 ~ 932 (47 ~ 67)	1.020 ~ 1,500 (74 ~ 108)	1,590 ~ 2,330 (116 ~ 168)	2,180 ~ 3,200 (158 ~ 231)	3,100 ~ 4,550 (225 ~ 329)	4,250 ~ 6,210 (308 ~ 449)	5,360 ~ 7,850 (388 ~ 567)
	Tightening area having black coarse surface. Rusty. Naked bolt or lubricant unavailable. Poor tightening conditions.	27 ~ 40 (2.0 ~ 2.8)	94 ~ 138 (6.8 ~ 9.9)	229 ~ 336 (17 ~ 24)	455 ~ 667 (33 ~ 48)	795 ~ 1,165 (58 ~ 84)	1,270 ~ 1,870 (92 ~ 135)	1,990 ~ 2,920 (144 ~ 211)	2,730 ~ 4,000 (198 ~ 289)	3,870 ~ 5,680 (280 ~ 410)	5,310 ~ 7,800 (385 ~ 564)	6,700 ~ 9,850 (485 ~ 712)
8 9 10 11	Even tightening area. Bolt nut, coating, naked bolt, lubricant, etc. Optimum conditions.	24 ~ 32 (1.8 ~ 2.3)	82 ~ 110 (6.0 ~ 7.9)	200 ~ 267 (15 ~ 19)	397 ~ 574 (29 ~ 41)	694 ~ 925 (51 ~ 66)	1,010 ~ 1,480 (74 ~ 107)	1,730 ~ 2,310 (126 ~ 167)	2,380 ~ 3,170 (173 ~ 229)	3,380 ~ 4,510 (244 ~ 326)	4,630 ~ 6,170 (335 ~ 446)	5,850 ~ 7,790 (424 ~ 563)
	Cast iron or aluminum tightening surface. Washers. Medium conditions.	32 ~ 42 (2.4 ~ 3.0)	110 ~ 146 (8.0 ~ 10.5)	267 ~ 356 (19 ~ 25)	529 ~ 706 (39 ~ 51)	925 ~ 1,230 (67 ~ 88)	1,480 ~ 1,970 (108 ~ 142)	2,310 ~ 3,080 (168 ~ 222)	3,170 ~ 4,230 (230 ~ 305)	4,510 ~ 6,010 (327 ~ 434)	6,170 ~ 8,230 (447 ~ 595)	7,790 ~ 10,390 (564 ~ 751)
	Tightening area having black coarse surface. Rusty. Naked bolt or lubricant unavailable. Poor tightening conditions.	40 ~ 53 (2.9 ~ 3.8)	137 ~ 183 (10.0 ~ 13.2)	334 ~ 445 (25 ~ 32)	662 ~ 882 (48 ~ 63)	1,160 ~ 1,540 (84 ~ 111)	1,850 ~ 2,470 (134 ~ 178)	2,890 ~ 3,850 (210 ~ 278)	3,970 ~ 5,290 (288 ~ 382)	5,640 ~ 7,510 (408 ~ 543)	7,720 ~ 10,290 (559 ~ 744)	9,740 ~ 12,990 (705 ~ 939)

NOTE: The torque values given in this table should be applied where bolt torque is not specified.

(KV)

CL-55E-01

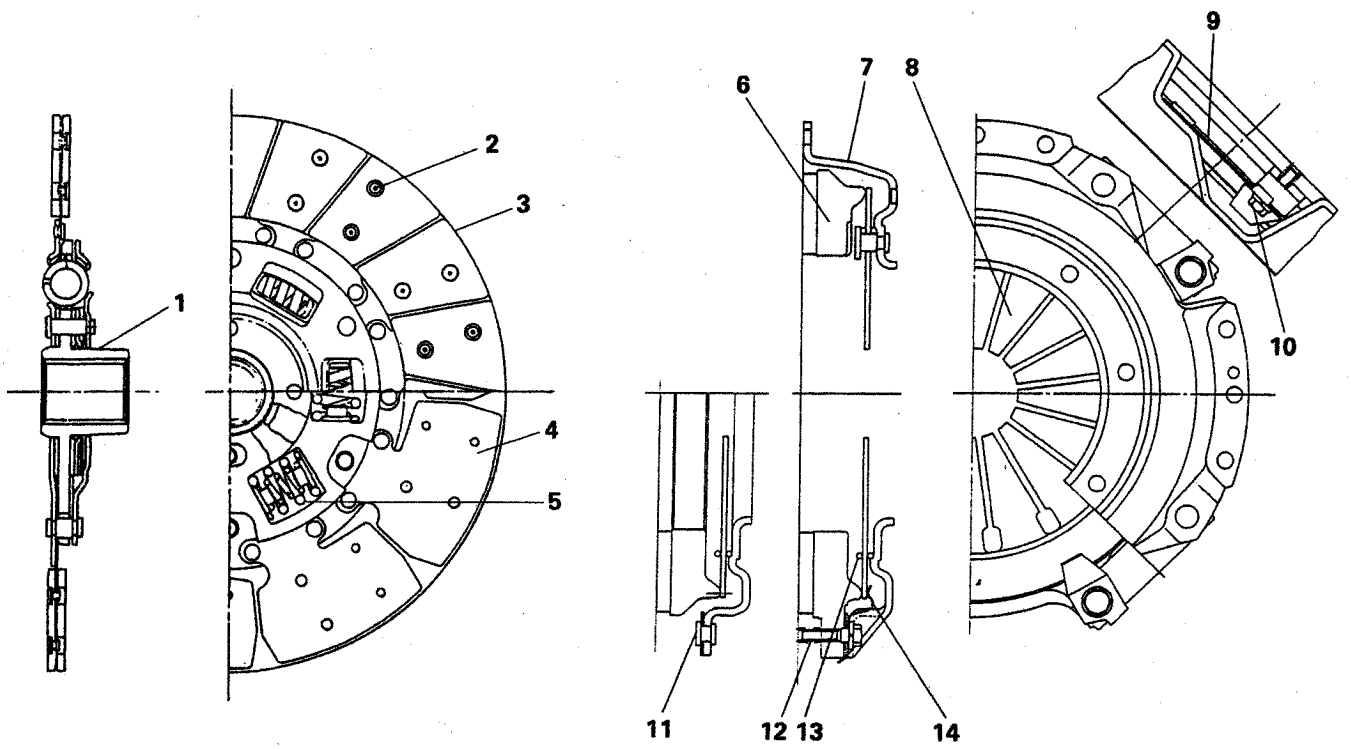
CHAPTER CL

CLUTCH
(DS300)

DATA AND SPECIFICATIONS

CLUTCH FACING	
Type	Dry single plate with damper spring
Outside diameter	300 mm (11.811 in)
Inside diameter	190 mm (7.480 in)
Thickness	4.0 mm (0.1575 in)
Area of engagement	423 cm^3 (65.565 sq.in) x 2
Material	Semi-moulded asbestos
CLUTCH SPRING	
Spring type	Diaphragm spring
Pressure force	750 kg (1,653 lb)
RELEASE BEARING	Single thrust ball

DESCRIPTION



1. Clutch disc hub
2. Rivet
3. Clutch facing
4. Clutch plate
5. Damper spring
6. Pressure plate
7. Cover
9. Strap plate
10. Strap plate bolt
11. Rivet
12. Compression spring
13. Pivot ring
14. Clip

TROUBLESHOOTING

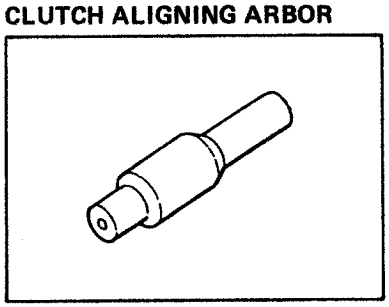
Symptom	Possible cause	Remedy/Prevention
Clutch dragging	Clutch disc runout or warped	Replace clutch disc.
	Transmission input shaft worn	Replace input shaft and check clutch hub for excessive wear. If worn, replace disc. Check flywheel housing alignment.
Clutch slipping	Diaphragm spring and release bearing clearance incorrectly adjusted.	Adjust clearance.
	Clutch disc facing gummed with oil or grease.	Replace facing or disc assembly.
	Release bearing worn	Replace bearing.
	Clutch pedal free-play incorrectly adjusted.	Adjust free-play.
	Diaphragm spring weak or damaged	Replace clutch cover assembly.
	Clutch facing worn	Replace facing or disc assembly.
	Flywheel or pressure plate warped	Repair or replace.
Vehicle vibrates when starting	Clutch control incorrectly adjusted	Adjust clutch control.
	Clutch disc facing gummed with oil or grease.	Replace facing or disc assembly.
	Glazed flywheel friction surface	Deglaze flywheel surface with coarse emery cloth, stroking parallel to machining lines.
	Clutch disc distroted or warped	Replace disc.
	Improper clutch cover tightening	Tighten bolts.
	Flywheel housing misalignment	Replace flywheel housing.
Noisy clutch	Release bearing worn or dry	Replace release bearing.
	Pilot bearing worn	Replace pilot bearing.
	Clutch disc runout or warped	Replace clutch disc.
	Flywheel housing misalignment	Replace flywheel housing.
	Transmission input shaft or clutch disc spline worn.	Clean and lubricate or replace.
	Insufficient lubrication of pedal and its accessories.	Lubricate.
	Insufficient lubrication of release bearing hub.	Lubricate.
	Insufficient lubrication of clutch release lever and supporting parts.	Lubricate.

Symptom	Possible cause	Remedy/Prevention
Noisy clutch	Clutch pedal free-play incorrectly adjusted	Adjust free-play.
	Clutch disc damper springs fatigued	Replace the clutch disc.
Clutch pedal can not be depressed	Clutch control incorrectly adjusted	Adjust clutch control.
	Insufficient lubricant and release bearing hub.	Lubricate.
Change in clutch pedal give	Air trapped in clutch fluid	Bleed air.

SPECIAL TOOLS

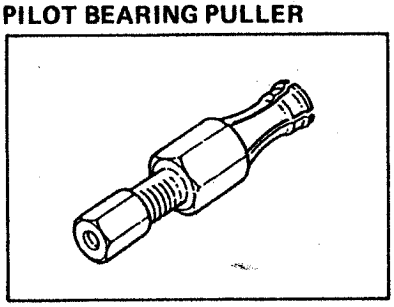
Prior to start the clutch overhaul, it is necessary to prepare following special tools.

CLUTCH ALIGNING ARBOR



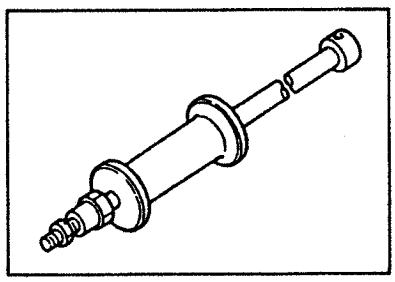
09662-1020

PILOT BEARING PULLER



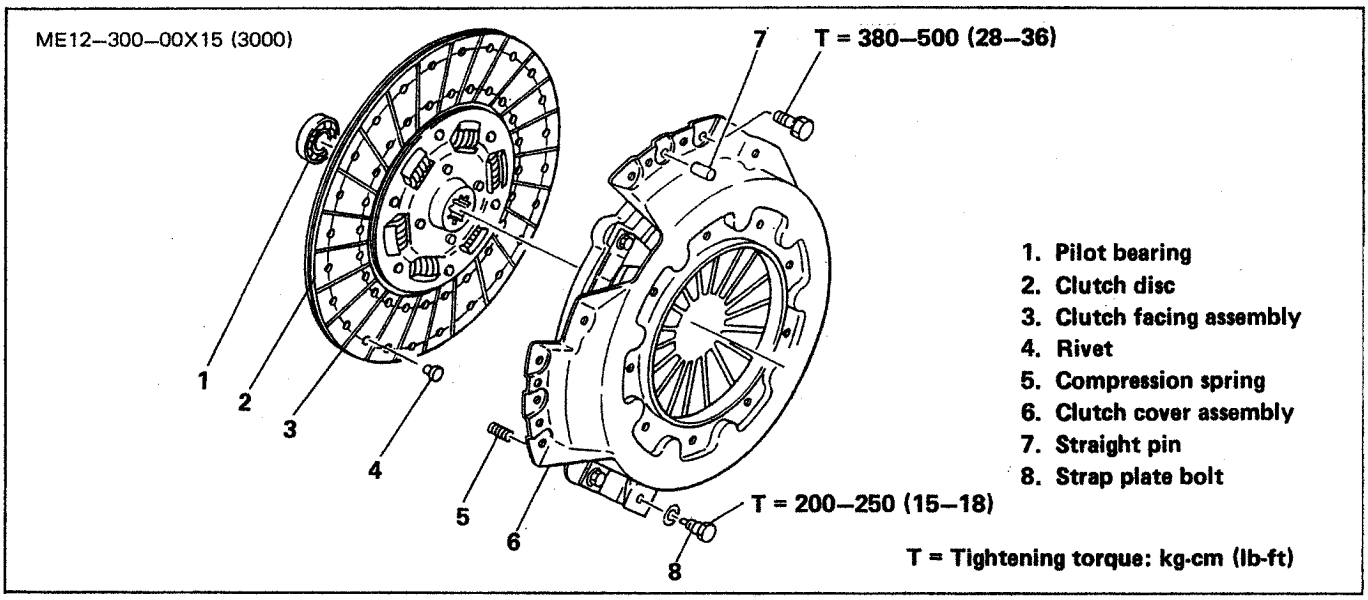
09650-1030

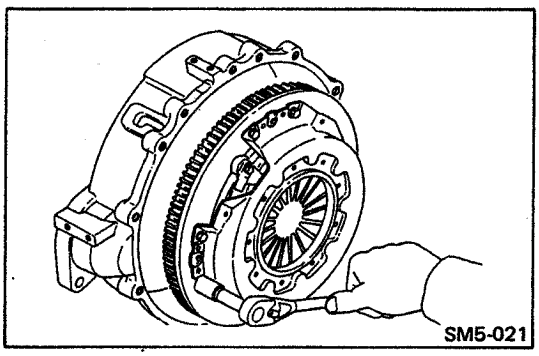
SLIDING HAMMER



09420-1442

CLUTCH UNIT





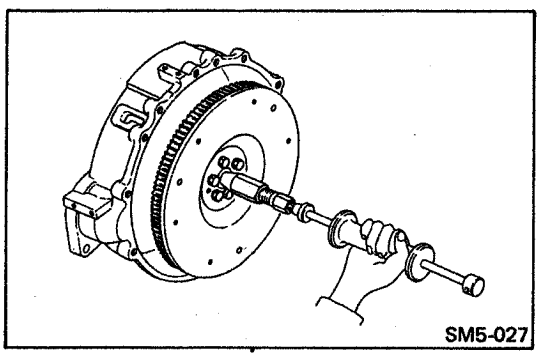
IMPORTANT POINT (S) – DISASSEMBLY

REMOVE THE CLUTCH COVER AND DISC.

Loosen the fitting bolts one turn at a time until spring tension is released.

WARNING

When removing the clutch cover and clutch disc, be careful not to drop them on your foot.

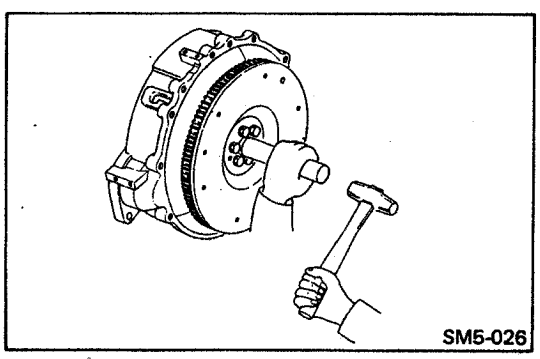


IMPORTANT POINT (S) – ASSEMBLY

REPLACE THE PILOT BEARING.

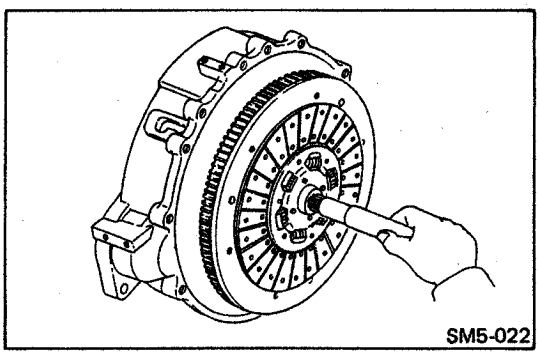
1. Remove the pilot bearing.

Special Tools: Pilot Bearing Puller (09650-1030)
Sliding Hammer (09420-1442)



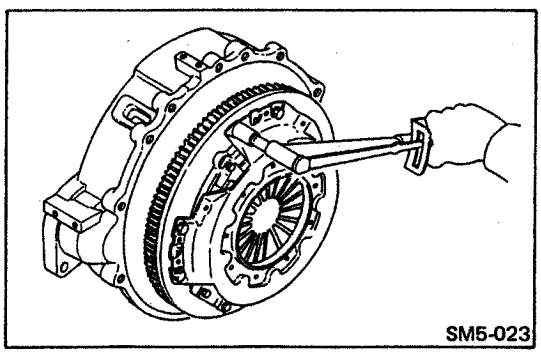
2. Using a suitable tapping rod, install the pilot bearing.

NOTE: After installing the pilot bearing, insure that it rotates smoothly.


SM5-022

INSTALL THE CLUTCH DISC ON THE FLYWHEEL.

Special Tool: Clutch Aligning Arbor (09662-1020)

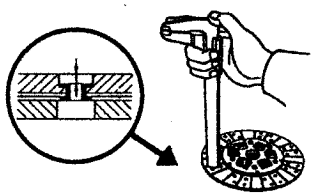
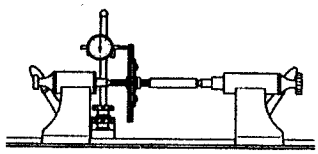
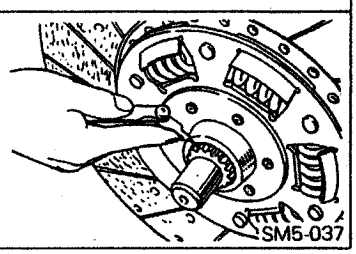

SM5-023

INSTALL THE CLUTCH COVER ASSEMBLY.

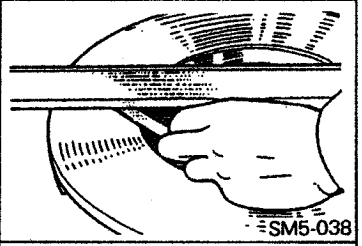
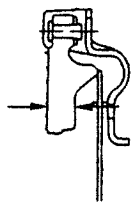
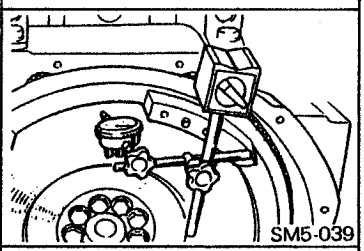
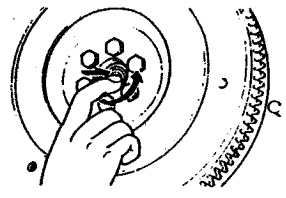
1. Insert the clutch cover aligning pins into the each place of clutch cover.
2. Tighten the bolts evenly. Make several presses around the cover until it is snug.

NOTE: Do not forget to install the four compression springs to the strap plate bolts.

INSPECTION AND REPAIR

Inspection Item	Standard	Limit	Remedy	Inspection Procedure
Rivet head depth.	1.5 mm (0.0591 in)	0.1 mm (0.0039 in)	Replace disc assembly or facings.	
Clutch disc runout.	0 – 1.0 mm (0 – 0.0393 in)	More than 1.0 mm (0.0393 in)	Replace disc assembly.	
Oily facings. Loose rivets. Broken or loose damper spring.			Replace facings or disc assembly, if necessary.	Visual check
Clearance between clutch disc hub and transmission input shaft spline.	0.05 – 0.15 mm (0.0020–0.0059 in)	0.3 mm (0.0118 in)	Replace the clutch disc or the transmission input shaft.	 SM5-037

INSPECTION AND REPAIR

Inspection Item	Standard	Limit	Remedy	Inspection Procedure
Pressure plate runout.	Less than 0.1 mm (0.0039 in)	0.3 mm (0.0118 in)	Regrind friction surface or replace the clutch cover assembly.	 SM5-038
Pressure plate thickness.	20 mm (0.787 in)	19 mm (0.748 in)	Replace the clutch cover assembly.	
Pressure plate friction surface scoring or roughness.			Regrind the pressure plate friction surface or replace clutch cover assembly, if necessary.	Visual check
Flywheel runout.		0.1 mm (0.0039 in)	Regrind friction surface or replace.	 SM5-039
Flywheel friction surface scoring or roughness.			Repair the friction surface or replace, if necessary.	Visual check
Pilot bearing improper rotation.			Replace, if necessary.	

CC-68E-01

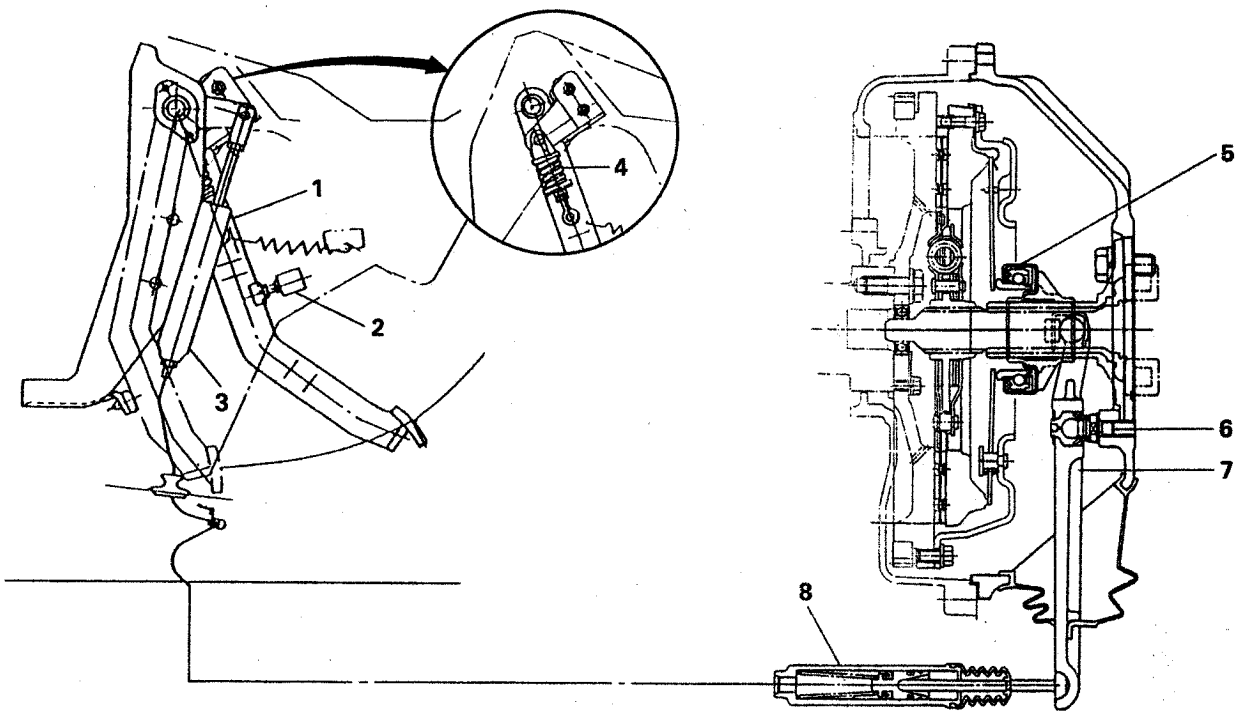
CHAPTER CC

CLUTCH CONTROL

DATA AND SPECIFICATIONS

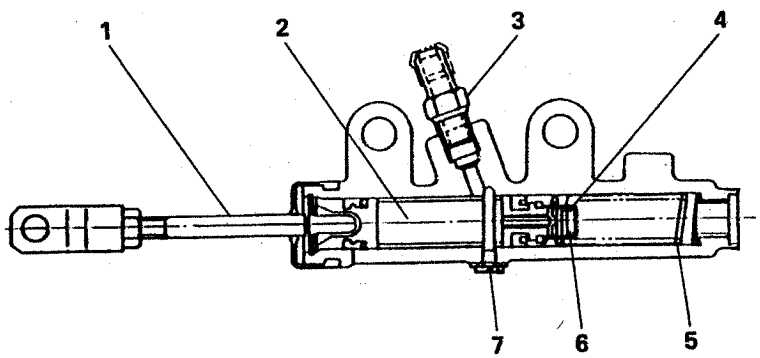
Main cylinder inside diameter	19.05 mm (3/4 in)
Slave cylinder inside diameter	22.22 mm (7/8 in)
Release bearing type	Single thrust ball

DESCRIPTION



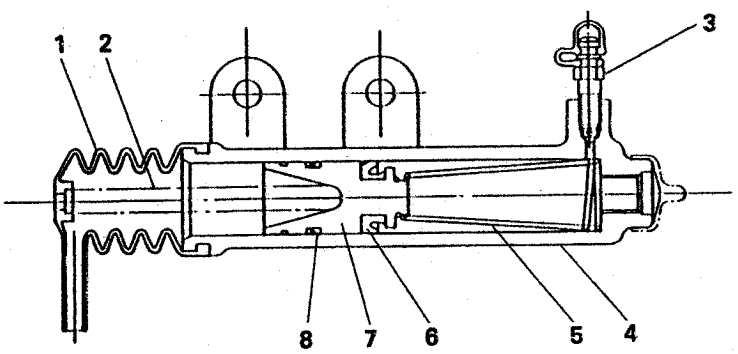
1. Clutch pedal
2. Switch
3. Main cylinder
4. Spring assembly
5. Release bearing
6. Pivot
7. Release lever
8. Slave cylinder

MAIN CYLINDER



1. Push rod
2. Piston
3. Pipe joint
4. Conical spring
5. Return spring
6. Check valve
7. Stopper bolt

SLAVE CYLINDER

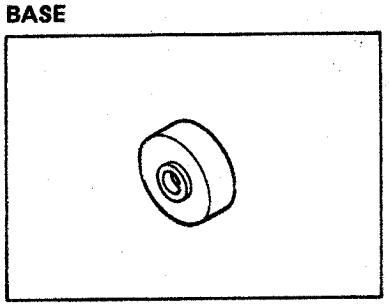


1. Boot
2. Push rod
3. Bleeder screw
4. Cylinder
5. Conical spring
6. Piston cup
7. Piston
8. Piston seal

SPECIAL TOOLS

Prior to starting a clutch control overhaul, it is necessary to have these special tools.

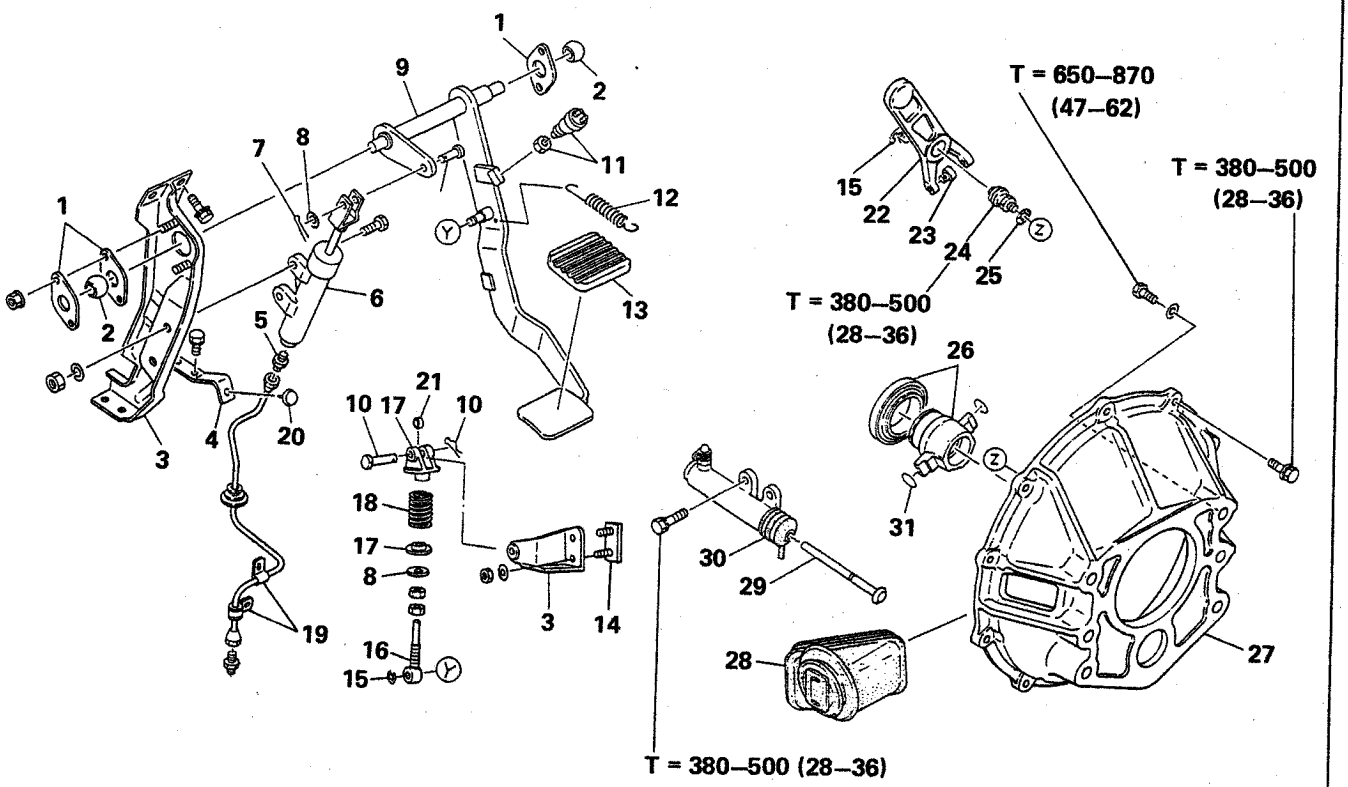
BASE



09655-1060

CLUTCH PEDAL AND RELEASE UNIT

BC31–507–00X01
MM13–301–00X05



T = Tightening torque kg-cm (lb-ft)

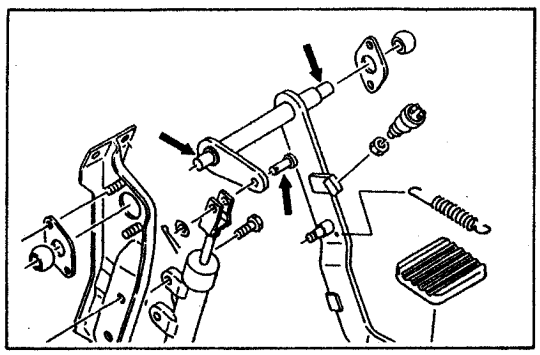
Tightening torque: kg-cm (lb-ft)

Flare nut
- 6.35 mm dia. pipe: 160–240 (12–17)
- 8 mm dia. pipe: 330–360 (24–26)
- 10 mm dia. pipe: 400–500 (29–36)

Bolt and nut
- 8 mm dia.: 190–260 (14–18)
- 10 mm dia.: 380–500 (28–36)
- 12 mm dia.: 650–870 (47–62)

Joint with copper washer
450–550 (33–39)

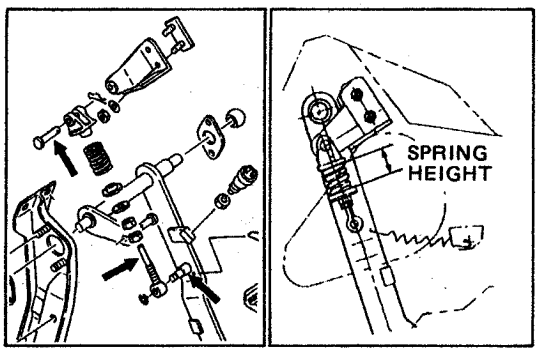
1. Friction plate
2. Control tube bushing
3. Clutch pedal bracket
4. Pedal stopper
5. Connector
6. Main cylinder
7. Cotter pin
8. Plain washer
9. Clutch pedal
10. Pin
11. Switch
12. Tension spring
13. Pedal pad
14. Setting plate
15. Spring retainer
16. Adjuster rod
17. Spring seat
18. Compression spring
19. Clip
20. Clutch pedal buffer
21. Bushing
22. Release fork
23. Needle roller bearing
24. Pivot
25. Internal tooth lockwasher
26. Release bearing
27. Clutch bearing
28. Boot
29. Push rod
30. Slave cylinder
31. Antirattle spring



IMPORTANT POINT (S) – ASSEMBLY

INSTALL THE CLUTCH PEDAL AND MAIN CYLINDER.

NOTE: Coat the bushing and clevis with lithium base grease.



INSTALL THE SPRING ASSEMBLY.

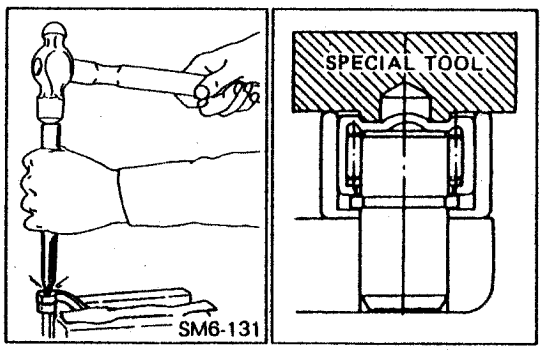
1. Assemble the spring and related parts.

NOTE: Coat the sliding surface with the chassis grease.

2. Install the spring assembly on the pedal pin and pedal bracket.
3. Adjust the spring height with the nut, when the pedal is released.

Assembly Standard: 31.7 mm (1.248 in)

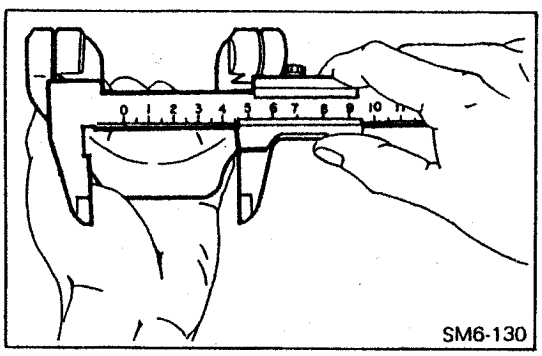
4. Secure the nut with the nut.



REPLACE THE RELEASE FORK BEARING.

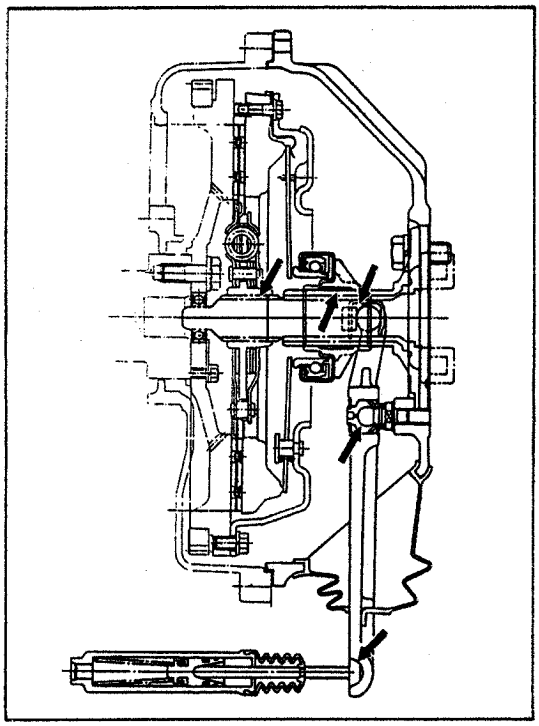
1. Remove the release fork bearings.
2. Using a special tool and a press, press in the bearing to the release fork.

Special Tool: Base (09655-1060)



3. Check the distance between both bearing.

Assembly Standard: More than 50 mm (1.968 in)



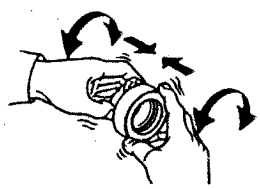
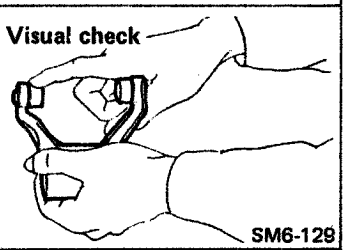
COAT CHASSIS GREASE OR HEAT RESISTANCE GREASE IN THE FOLLOWING POINTS.

1. Chassis grease
a. Release fork and release bearing contact point.
b. Release bearing hub inner groove.
c. Release fork pivot bushing.
d. Release fork and push rod contact point.

2. Heat registance grease
a. Transmission input shaft spline.

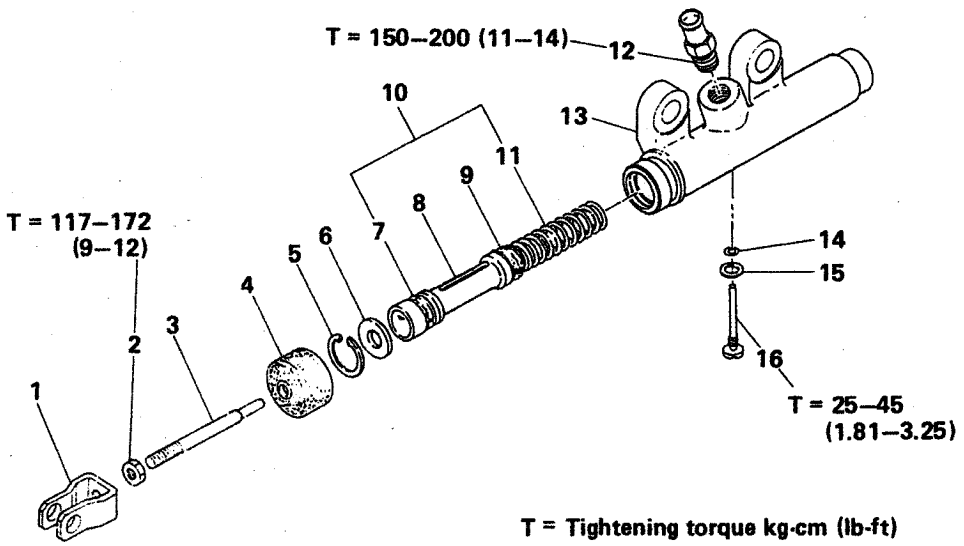
NOTE: Coat a small amount of grease to the spline.

INSPECTION AND REPAIR

Inspection Item	Standard	Limit	Remedy	Inspection Procedure
Release bearing improper rotation	–	–	Replace, if necessary.	Visual check 
Pivot, pivot bushing wear and damage.	–	–	Replace, if necessary.	Visual check
Release fork bearing improper rotation, wear and damage.	–	–	Replace, if necessary.	Visual check  SM6-129
Release fork and push rod contact point, wear and damage.	–	–	Replace, if necessary.	Visual check

CLUTCH MAIN CYLINDER

1. Control rod end
2. Lock nut
3. Push rod
4. Boot
5. Retaining ring
6. Thrust washer
7. Piston seal
8. Piston
9. Piston cup
10. Piston assembly
11. Return spring
12. Hose joint
13. Body
14. O-ring
15. Soft washer
16. Bolt

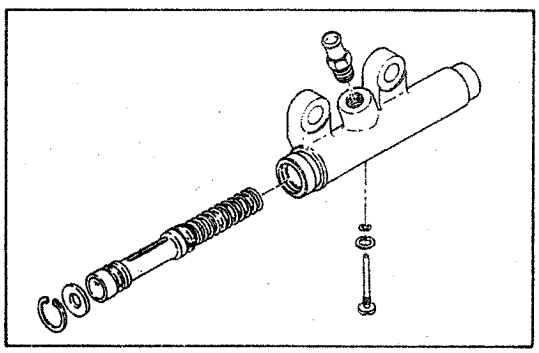


T = Tightening torque kg-cm (lb-ft)

IMPORTANT POINT (S) – DISMOUNTING

REMOVE THE MAIN CYLINDER.

NOTE: ○ Before remove the main cylinder, drain the clutch fluid from the hydraulic line.
○ Place a small drain pan under the main cylinder to catch the hydraulic fluid. Do not let clutch fluid remain on a painted floor. Wash it off immediately.



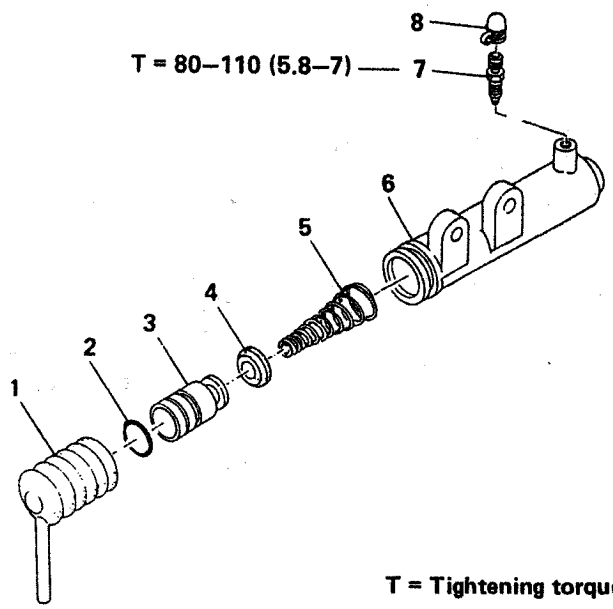
IMPORTANT POINT (S) – ASSEMBLY

INSTALL THE RETURN SPRING AND PISTON TO THE MAIN CYLINDER.

NOTE: Lubricate the cylinder bore and piston with clean clutch fluid.

Inspection Item	Standard	Limit	Remedy	Inspection Procedure
Piston seal and cup wear, damage. Cylinder bore scoring, corrosion.			Replace the piston assembly and/or cylinder body, if necessary.	Visual check

CLUTCH SLAVE CYLINDER



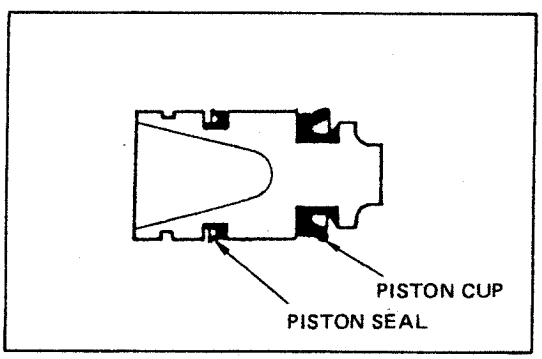
1. Boot
2. Piston seal
3. Piston
4. Piston cup
5. Conical spring
6. Cylinder
7. Bleeder screw
8. Bleeder screw cup

T = Tightening torque: kg-cm (lb-ft)

IMPORTANT POINT (S) – DISMOUNTING

REMOVE THE SLAVE CYLINDER.

NOTE: ○ Before remove the slave cylinder, drain the clutch fluid from the hydraulic line.



IMPORTANT POINT (S) – ASSEMBLY

1. REPLACE SLAVE CYLINDER PISTON CUP AND PISTON SEAL.

   NOTE: ○ Lubricate the new piston with clean clutch fluid. Take care not to damage the piston cup and seal, when installing them on the piston.

2. INSTALL THE PISTON TO THE SLAVE CYLINDER.

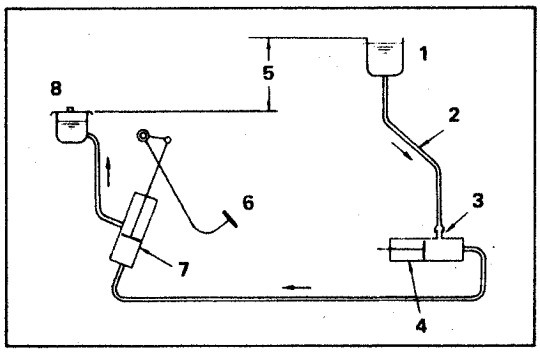
   NOTE: Lubricate the cylinder bore and piston with clean clutch fluid.

Inspection Item	Standard	Limit	Remedy	Inspection Procedure
Piston cup and seal wear, damage. Cylinder bore scoring, corrosion.			Replace the cup, seal, and/or cylinder body, if necessary.	Visual check

BLEEDING AND ADJUSTMENT

BLEED THE AIR FROM HYDRAULIC LINE.

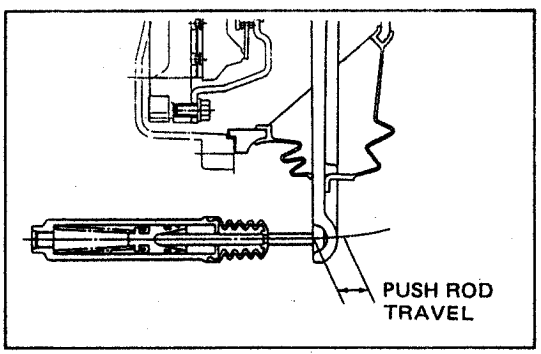
NOTE: ○ **Do not mix the clutch fluid with different types or brands.**
○ **Be careful not to spill clutch fluid from the reservoir or from the air bleeder during air bleeding. Clutch fluid can damage the paint finish on the body or floor.**
○ **There are two methods of air bleeding, gravity air bleeding and pressure air bleeding. If a pressure air bleeding equipment is on hand, its use is recommended.**



1. **Funnel filled with clutch fluid**
2. **Vinyl tube (inside diameter: ϕ6)**
3. **Bleeder**
4. **Slave cylinder**
5. **About 1.5 m**
6. **Clutch pedal**
7. **Main cylinder**
8. **Reservoir tank**

Gravity bleeding

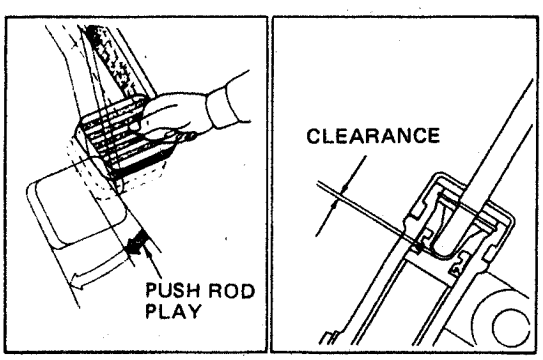
1. Connect a funnel to a bleeder hose.
2. Connect the other end of the bleeder hose to the bleeder screw.
3. Hold the funnel about 1.5m (4.92 ft) higher than the reservoir tank.
4. Loosen the bleeder screw and pour the clutch fluid into the funnel.
5. Observe the flow of clutch fluid into the reservoir tank.
6. When the air bubbles cease, close the bleeder screw.
7. Check the fluid level. If necessary, add or remove clutch fluid in order to match the "MAXI" level.



AFTER BLEEDING, MAKE SURE THE TRAVEL OF THE SLAVE CYLINDER PUSH ROD IS AS SPECIFIED.

Depress the clutch pedal fully and measure the push rod traval. If travel is less than standard, re-bleed the hydraulic system.

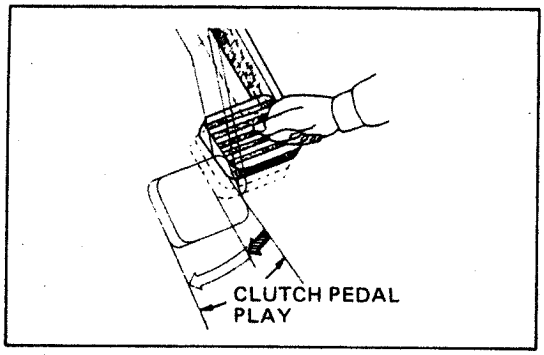
Standard: More than 21 mm (0.827 in)



CHECK THE PUSH ROD PLAY. IF NECESSARY, ADJUST THE PUSH ROD PLAY.

Standard:

Clearance Between Push Rod and Piston
0.5 mm (0.0197 in)
Push Rod Play at Pedal Top
2–4 mm (0.079–0.157 in)

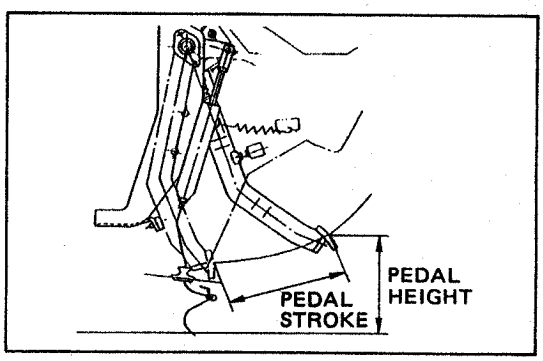


CHECK THE CLUTCH PEDAL PLAY.

Push in on the pedal until the beginning of clutch resistance is felt.

Assembly Standard: 15–30 mm (1.969–2.559 in)

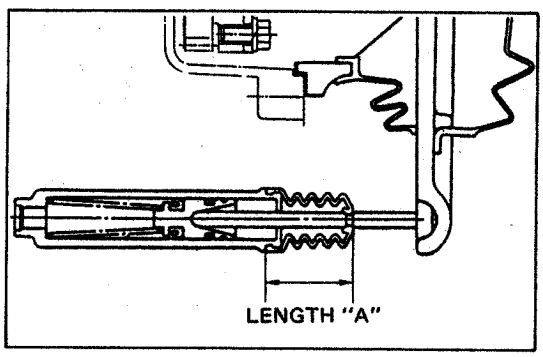
NOTE: The clutch pedal play is automatically maintained at normal operating conditions.



CHECK THE CLUTCH PEDAL HEIGHT AND STROKE.

Assembly Standard:

Pedal Height: 182–196 mm (7.166–7.716 in)
Pedal Stroke: 180–200 mm (7.087–7.874 in)



CHECK THE LENGTH "A". IF ITS LENGTH IS BELOW THE SERVICE LIMIT, IT IS TIME TO REPLACE THE CLUTCH FACING.

Service Limit: 23 mm (0.906 in)

(K.P.)

TM-96E-01

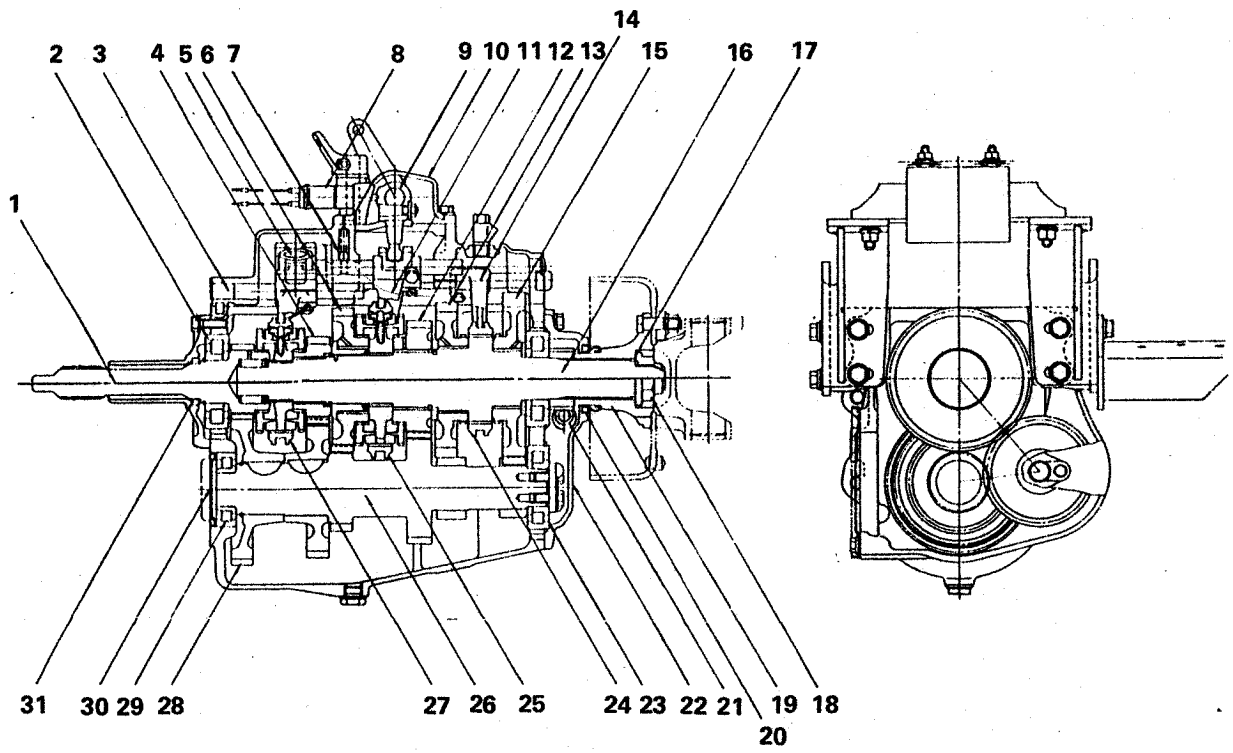
CHAPTER TM

TRANSMISSION
(LE05S)

DATA AND SPECIFICATIONS

Type		Five forward speeds, one reverse, 2, 3, 4, 5th Synchromesh, 1st and Reverse, Constantmesh.
Series No		LE05S [TYPE I]
Gear ratios:	1st	7.134
	2nd	3.914
	3rd	2.271
	4th	1.419
	5th	1.000
	Reverse	6.151
Number of teeth-		
Input shaft		24
Counter shaft:	1st gear	13
	2nd gear	22
	3rd gear	35
	4th gear	42
	Counter drive gear	53
	Reverse gear	14
Output shaft:	1st gear	42
	2nd gear	39
	3rd gear	36
	4th gear	27
	Reverse gear	39
Reverse idle gear		29
Power take-off opening		On left side of gear case
Oil capasity, gear box		Approx 5.3 liters (1.17 Imp. gal./1.40 us gal)
Lubricant, type		Gear oil (APL GL-4, MIL-L-2105)
Viscosity: between –12 and 32°C (10 and 90°F)		SAE 90
above 32°C (90°F)		SAE 140

DESCRIPTION



1. Input shaft
2. Front bearing retainer
3. Shift shaft
4. 4th gear
5. 4th-5th shift fork
6. 2nd gear
7. Steel ball
8. Neutral switch
9. Shift lever shaft
10. Shift lever shaft housing
11. 2nd-3rd shift fork
12. 3rd gear
13. 1st gear
14. 1st-Reverse shift fork
15. Reverse gear
16. Output shaft
17. O-ring
18. Nut
19. Universal joint flange
20. Oil seal
21. Speedometer driven gear
22. Transmission case
23. Rear bearing
24. 1st-Reverse constant sleeve
25. 2nd-3rd synchronizer sleeve
26. Counter shaft
27. 4th-5th synchronizer sleeve
28. Counter drive gear
29. Front bearing
30. Seal cover
31. Oil seal

TROUBLESHOOTING

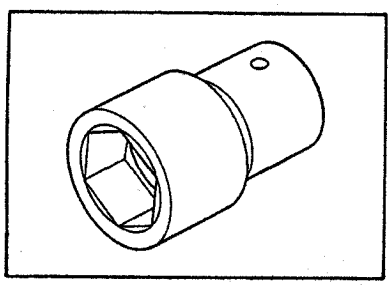
Symptom	Possible cause	Remedy/Prevention
Gear slip-off	**Control system**	
	• Joint worn and/or damaged	Replace joint.
	• Bolts and nuts loose	Tighten bolts and nuts.
	• Improper link rod adjustment	Adjust link rod.
	Gear shift housing	
	• Lock ball and spring distorted and/or broken	Repair or replace as required.
	• Groove for shift shaft worn	Replace shift fork.
	Transmission gear	
	• Synchronizer hub and sleeve worn	Replace as required.
	• Synchronizer sleeve and gear clutch teeth worn or damaged	Replace as required.
	• Input shaft and/or output shaft bearing worn and/or broken	Replace bearing.
	• Retainer ring and/or thrust washer worn and/or broken	Replace as required.
	• Loose transmission to engine mounting bolts	Tighten bolts.
Difficult gear engagement	**Engine**	
	• Engine idling speed too high	Adjust engine idling.
	Clutch	
	• Improper, disengagement of clutch	Adjust clutch.
	• Clutch disc sticking	Repair or replace.
	• Clutch shifter sleeve bent	Replace shifter sleeve.
Difficult gear engagement	**Transmission**	
	• Input shaft and/or output shaft bearing worn and/or damaged	Replace bearing.
	• Engine crankshaft pilot bearing worn and/or damaged	Replace bearing.
	• Synchronizer cone and ring worn	Replace as required.

Symptom	Possible cause	Remedy/Prevention
	Control system	
	• Looseness of control system and/or improper adjustment	Tighten and adjust control system.
	• Improper motion of gear shift lever	Adjust shift lever.
	• Shift and select rod worn	Replace shift and select rod.
	• Rigid relay shaft nylon bushing and/or sticking of shafts	Replace as required.
	Lubrication	
	• Improper lubrication of control lever	Lubricate as required.
	• Shortage gear oil and/or low oil viscosity	Add oil or change oil as required.
Noise	**Transmission**	
	• Grinding in transmission	Check for screws, bolts or other foreign materials in transmission.
	• Loose transmission to engine mounting bolts	Tighten bolts.
	• Worn or damaged gear and bearing	Replace as required.
	Lubrication	
	• Shortage of gear oil and/or low oil viscosity	Add oil or change oil as required.
Gear oil leaks	**Transmission**	
	• Leaks at the front and rear bearing retainer seal and gasket, case cover gasket, sand hole of case or shift shaft expansion plug.	Repair and replace as required.
	• Improper amount of gear oil and lack of oil viscosity	Check oil level and type.
Unable to shift the gear or very difficult to shift when the engine is stopping.	Improper adjustment of the gear control rod.	Adjust the control rod.
	Looseness	Inspect and tighten each bolt and nut.
Gear slip-off when driving bumpy roads.	Improper adjustment of the gear control rod.	Adjust the control rod.
The play of the lever is excessive.	A joint is seriously worn	Replace the joint.
	The looseness of tightening bolt and nut.	Inspect and tighten each bolt and nut.

SPECIAL TOOL

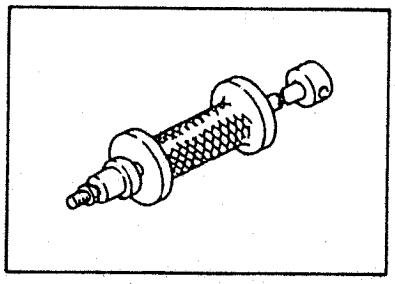
Prior to starting a transmission overhaul, it is necessary to have these special tools.

SOCKET WRENCH



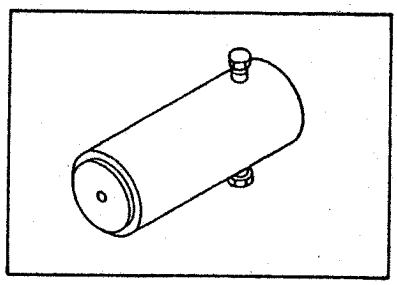
09839-4104

SLIDING HAMMER



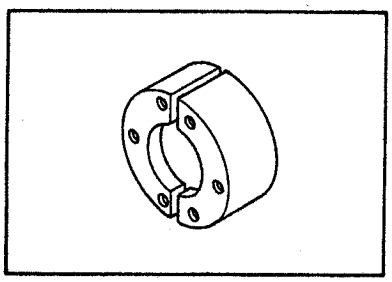
09420-1442

INPUT SHAFT PULLER



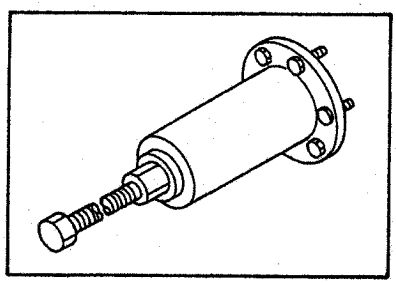
09650-1240

HOOK



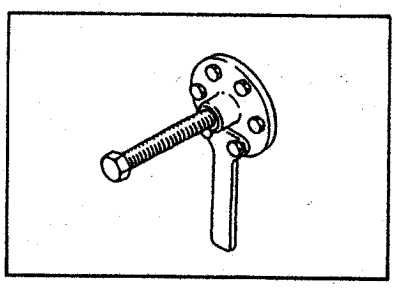
09653-1170
09653-1160

PULLER



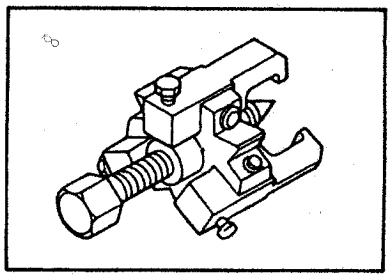
09650-1870

PULLER



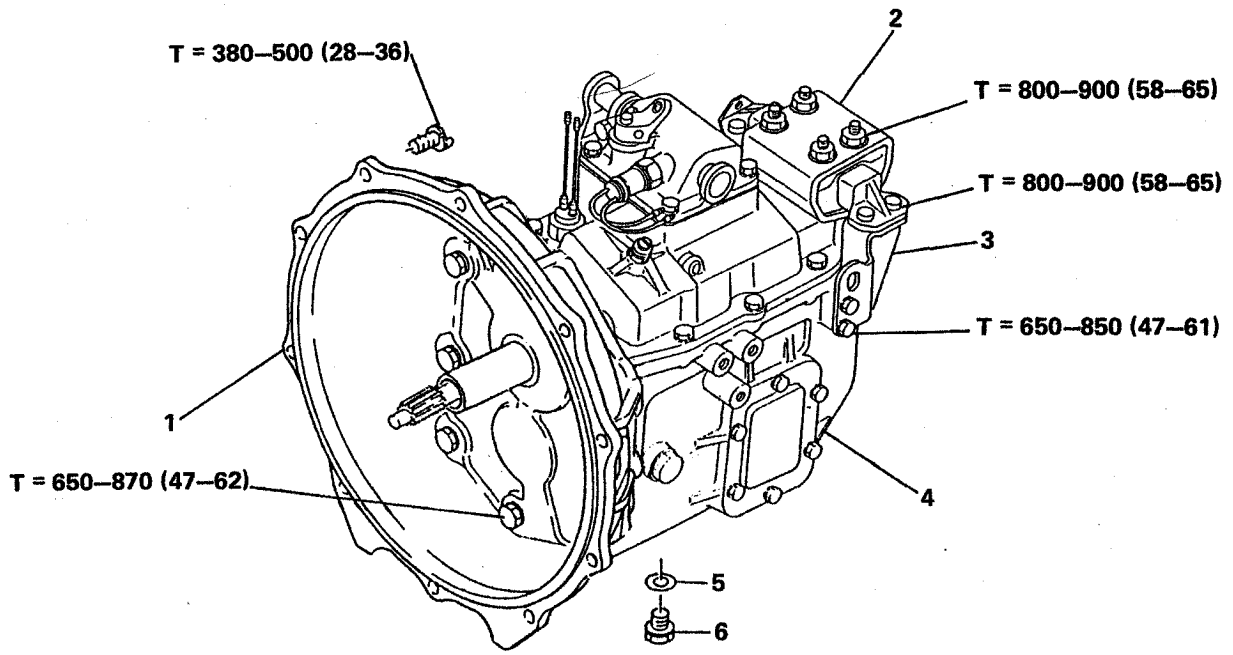
09650-2080

PULLER



09650-1491

DISMOUNTING & MOUNTING



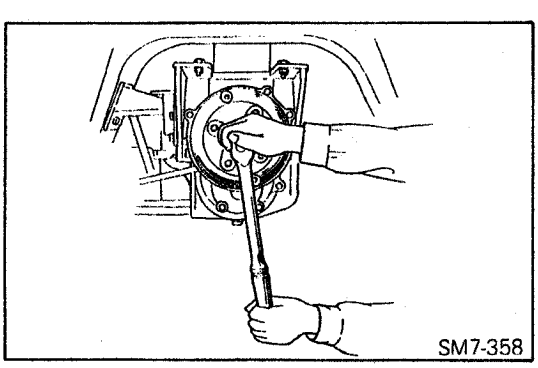
T = Tightening torque kg·cm (lb.ft)

1. Clutch housing
2. Engine rear mounting subassembly
3. Engine rear mounting LH
4. Transmission assembly
5. Saft washer
6. Drain plug

IMPORTANT POINT (S) – DISMOUNTING

WARNING
Do not work on the transmission while it is still hot. This can result in personal injury.

BLOCK THE WHEELS.
DRAIN THE TRANSMISSION OIL.
DISCONNECT THE PROPELLER SHAFT.

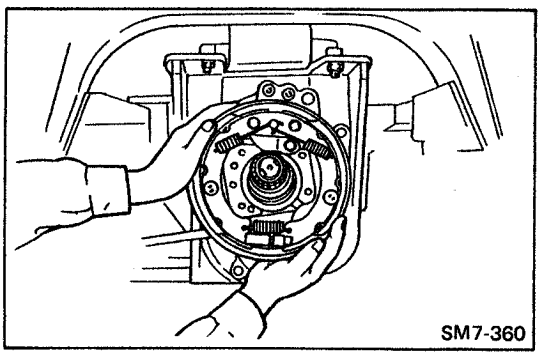


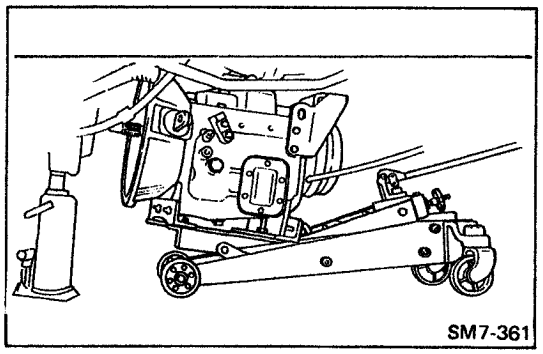
REMOVE THE TRANSMISSION FLANGE LOCK NUT.

1. Lift the caulked part completely out of the shaft groove.
2. Using a special tool or commercial tool, remove the lock nut.

NOTE: **Before loosening the lock nut, apply the parking brake so that the output shaft can not be turned.**

Special Tool: Socket Wrench (09839-4104)


SM7-360


SM7-361

REMOVE THE PARKING BRAKE DRUM.
REMOVE THE FLANGE COUPLING.
REMOVE THE PARKING BRAKE WITH PARKING BRAKE CABLE.

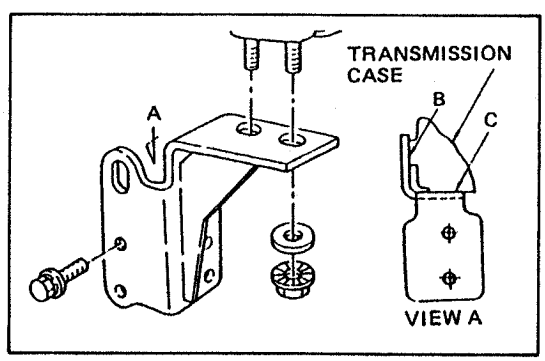
1. Remove the parking brake fitting nuts.
2. Remove the parking brake with cable.

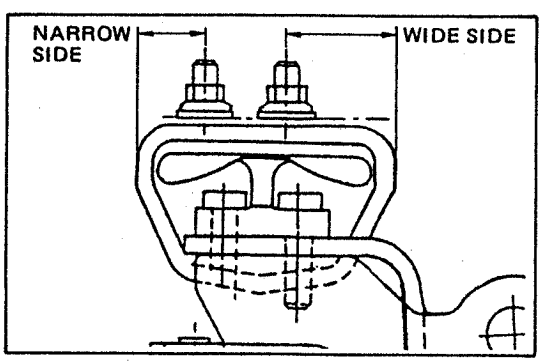
DISCONNECT THE ELECTRIC HARNESS AND THE SPEEDOMETER CABLE FROM THE TRANSMISSION.
DISCONNECT THE TRANSMISSION CONTROL CABLES WITH THE CABLE BRACKET.
DISCONNECT THE CLUTCH SLAVE CYLINDER.
DISCONNECT THE EXHAUST PIPE FROM THE EXHAUST MANIFOLD.
REMOVE THE TRANSMISSION.

1. Remove the lower bolts around the clutch housing.
2. Place a transmission jack under the transmission.
3. Remove the rear engine mounting fitting nuts.
4. Lower the transmission jack until the rear eninge mounting stud bolts come out from the cross member.
5. Support the engine by locating a jack or a safety stand under the flywheel housing.
6. Remove the remaining bolts around the clutch housing.
7. Pull the transmission backwards. Lower the transmission jack and pull the transmission out.

WARNING

The engine should be suspended with a hoist before removing the transmission from the vehicle.



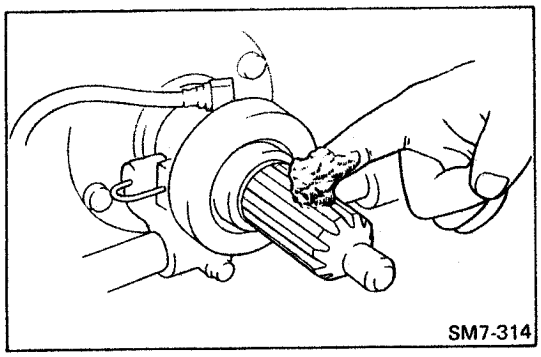


IMPORTANT POINT (S) – MOUNTING

INSTALL THE REAR ENGINE MOUNTING ON THE TRANSMISSION.

1. Clean the contact surface of the mounting brackets and the transmission case.
2. Install the mounting bracket on both sides of the transmission case.
3. Finger tighten the fitting bolts.
4. Check that B and C are flush with the transmission case, then tighten completely.
5. Install the rear mounting on the mounting bracket and tighten the fitting bolts.

NOTE: **Make sure to position the wide side of the rear engine mounting rearward.**


SM7-314

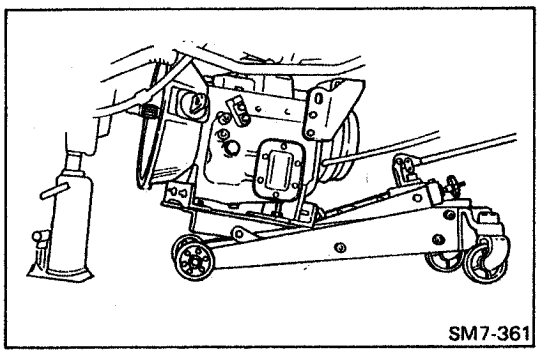
APPLY A HEAT-RESISTANT GREASE TO THE INPUT SHAFT SPLINE.

INSTALL THE TRANSMISSION.

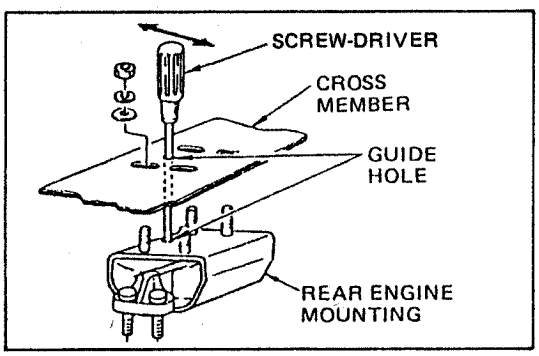
1. Jack up the transmission until the input shaft and the clutch disc spline align.
2. Slip the transmission in and attach the clutch housing to the engine.
3. Install the upper fitting bolts around the clutch housing.
4. Install the rear engine mounting on the cross member by lifting the transmission with a jack.

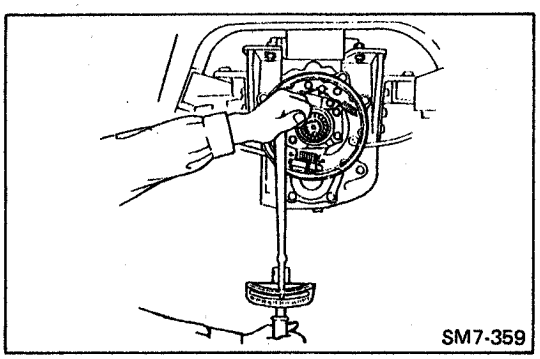
NOTE: **When installing the mounting on the cross member, install it by inserting a screw-driver through the guide holes on the mounting and the cross member and positioning the long holes on the cross member with the stud bolts of the mounting. If the stud bolts are damaged by accident be sure to rethread them or replace the rear engine mounting.**

5. Install the mounting fitting nuts.
6. Lower the transmission jack and pull the jack out.
7. Install the remaining bolts around the clutch housing.
8. Tighten the transmission fitting bolts around the clutch housing.


SM7-361

INSTALL THE CLUTCH SLAVE CYLINDER.
CONNECT THE TRANSMISSION CONTROL CABLES.
CONNECT THE ELECTRIC HARNESS AND THE SPEEDOMETER CABLE TO THE TRANSMISSION.
CONNECT THE EXHAUST PIPE TO THE EXHAUST MANIFOLD.




SM7-359

INSTALL THE PARKING BRAKE.

Install the parking brake with the cable and tighten the fitting nuts.

INSTALL THE FLANGE COUPLING.
INSTALL THE PARKING BRAKE DRUM.

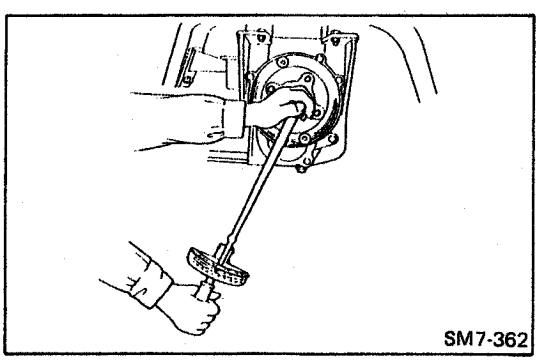
NOTE: **Secure the parking brake drum with a propeller shaft fitting bolts and nuts.**

INSTALL THE TRANSMISSION FLANGE LOCK NUT.

1. Install the O-ring in the flange coupling.
2. Install the lock nut on the output shaft and tighten it.

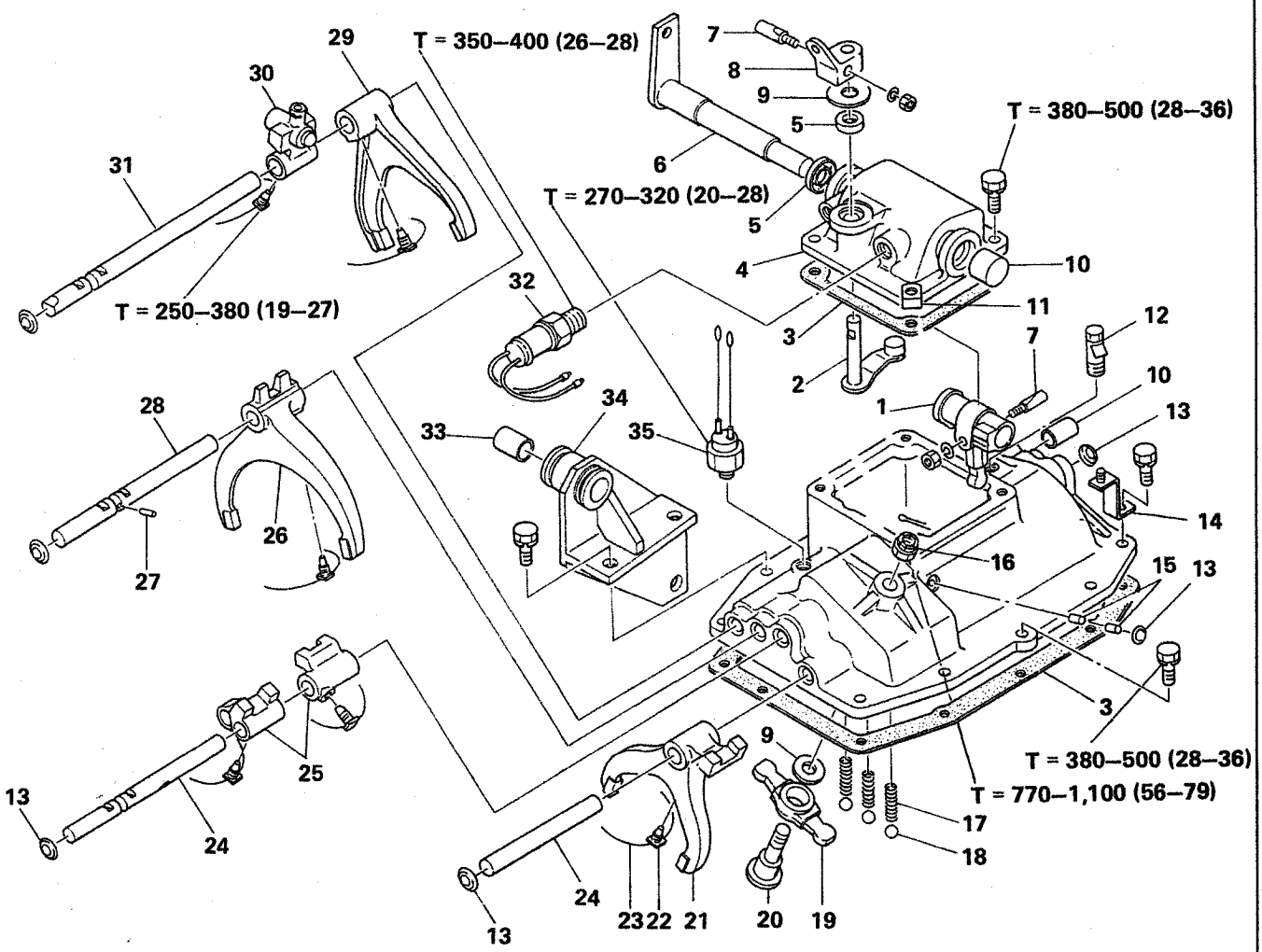
NOTE: ○ **Before tightening the lock nut, apply the parking brake so that shaft can not be turned.**
○ **Do not damage the O-ring.**

Special Tool: Socket Wrench (09839-4104)


SM7-362

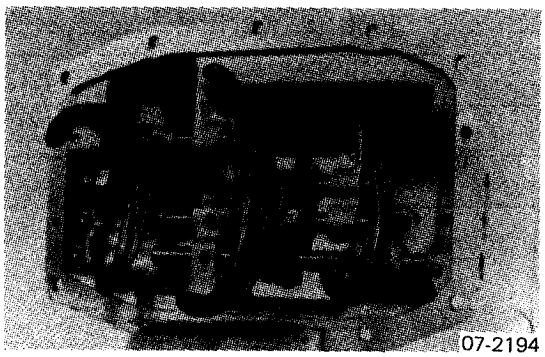
GEAR SHIFT HOUSING

MM12-049-00X00
(3231)



T = Tightening torque kg-cm (lb.ft)

1. Inner shift lever
2. Select lever shaft
3. Gasket
4. Shift lever shaft housing
5. Oil seal
6. Shift lever shaft
7. Shift lever pin
8. Outer select lever
9. Plain washer
10. Shaft hole cover
11. Clip
12. Air breather
13. Expansion plug
14. Clip holder
15. Interlock plunger
16. Slotted nut
17. Compression spring
18. Steel ball
19. Inversion lever
20. Inversion pin
21. 4th-5th speed shift fork
22. Set screw
23. Wire
24. 4th-5th speed shift shaft
25. 4th-5th speed shift head
26. 2nd-3rd speed shift fork
27. Interlock pin
28. 2nd-3rd speed shift shaft
29. 1st-reverse speed shift fork
30. 1st-reverse speed shift head
31. 1st-reverse speed shift shaft
32. Neutral switch
33. Bushing
34. Cross shaft bracket
35. Back-up lamp switch
36. Transmission case cover



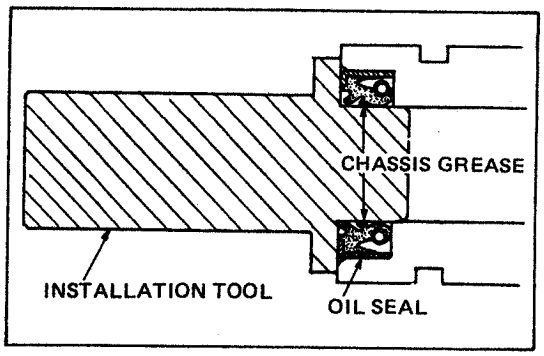
IMPORTANT POINT (S) – DISASSEMBLY

DISASSEMBLE THE TRANSMISSION CASE COVER.

WARNING

The steel ball may fly out from the hole when removing the shift shaft. Wear safety glasses during removal.

1. Clamp the case cover in a soft jaws vise.
2. Remove the Back-up lamp switch.
3. Set each shift shaft in the neutral position.
4. Remove the lock wires and remove the set screws from each shift fork and shift head.
5. Using a tapping rod and hammer, remove the expansion plugs from the ends of the case cover.

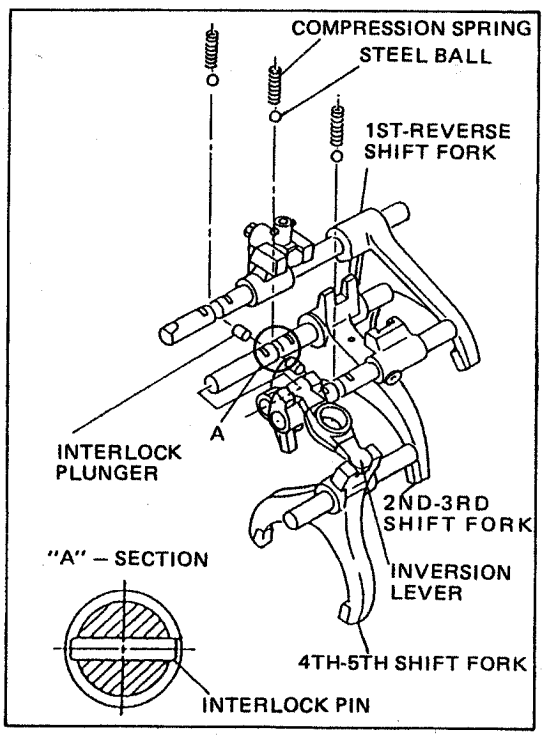


IMPORTANT POINT (S) – ASSEMBLY

INSTALL THE OIL SEAL.

1. Coat the sealing surface between the seal lips with chassis grease.
2. Drive the new oil seal into the shift lever shaft housing with the installation tool.

NOTE: ○ **Take care not to damage the seal lip.**
○ **Be sure the oil seal is inserted in the proper direction.**



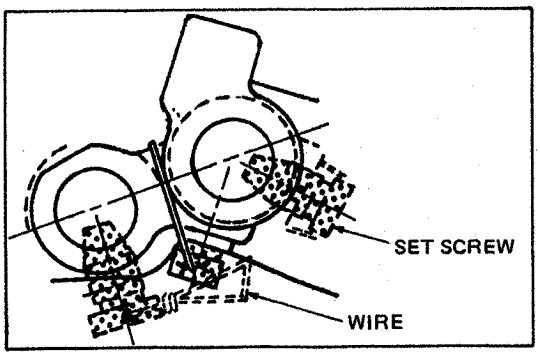
INSTALL THE STEEL BALL, COMPRESSION SPRING, SHIFT SHAFT, SHIFT FORK AND SHIFT HEAD.

1. Place the ball and spring in the hole.
2. Depress the ball and spring with a suitable tool.
3. Apply gear oil to the shift shaft.
4. Align the shift fork and head and put the shift shaft through, and then slide the shift shaft over the ball.
5. Place the shift shaft in neutral.

NOTE: ○ **Pay special attention to the position and direction of the shift fork and shift head.**
○ **For 2nd-3rd shift shaft, insert the interlock pin. Apply grease to the interlock pin.**

WARNING

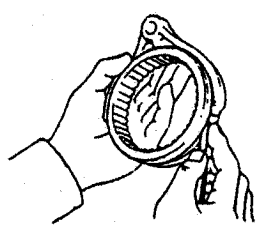
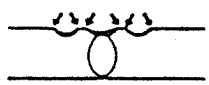
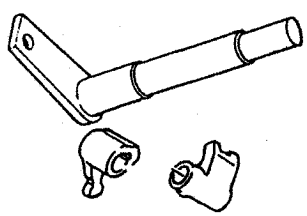
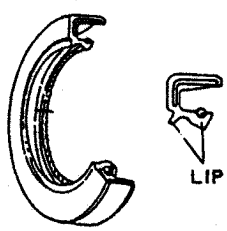
The steel ball may fly out of the hole when installing the shift shaft. Wear safety glasses during installation.



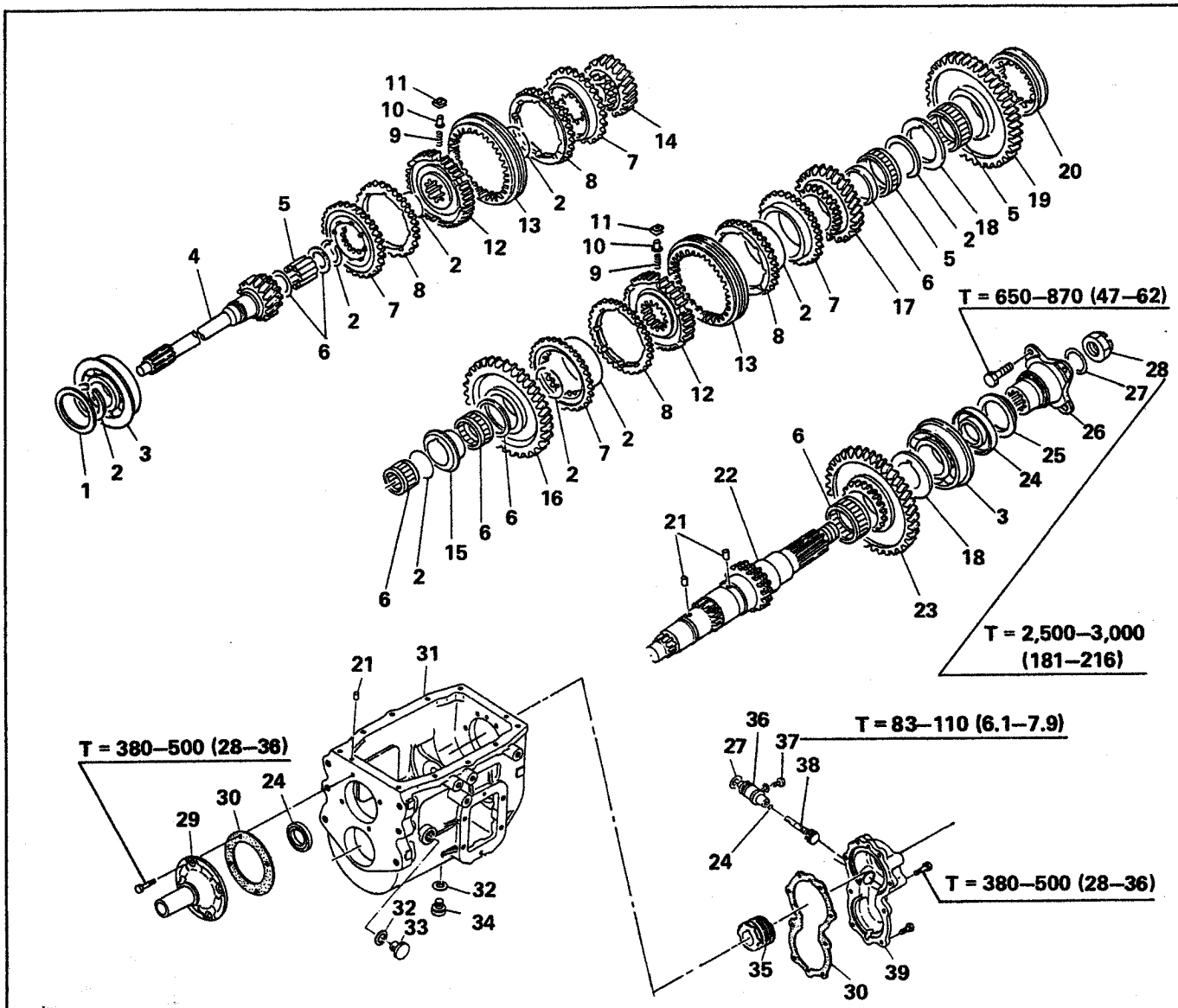
INSTALL THE SET SCREW.

1. Align the shift head hole and shift fork hole with the shift shaft hole
2. Secure the shift head and shift fork to the shift shaft with the set screws.
3. Secure the set screw with wire.

INSPECTION AND REPAIR

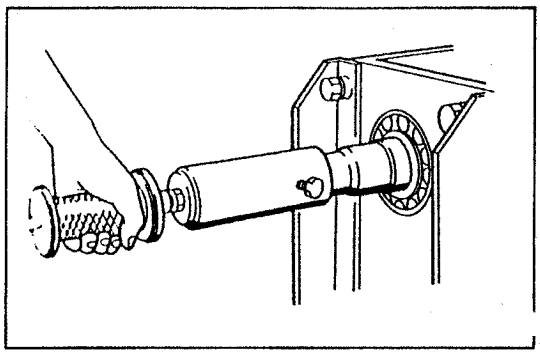
Inspection Item	Standard	Limit	Remedy	Inspection Procedure
Clearance between shift fork and sleeve.	0.2–0.45 mm (0.0079–0.0177 in)	1.0 mm (0.0394 in)	Replace.	
Shift shaft, interlock pin and interlock plunger wear or damage.	–	–	Replace, if necessary.	
Shift head and inner shift lever wear or damage.	–	–	Replace, if necessary.	
Oil seal lip wear or damage.	–	–	Replace, if necessary.	

INPUT SHAFT, OUTPUT SHAFT, GEARS AND RELATED PARTS



T = Tightening torque : kg-cm (lb.ft)

1. Shim
2. Retainer ring
3. Cylindrical roller bearing
4. Input shaft
5. Needle roller bearing
6. Spacer
7. Synchronizer cone
8. Synchronizer ring
9. Compression spring
10. Synchronizer head
11. Synchronizer key
12. Synchronizer hub
13. Synchronizer sleeve
14. 4th gear
15. Bushing
16. 2nd gear
17. 3rd gear
18. Thrust washer
19. Reverse gear
20. Constant sleeve
21. Straight pin
22. Output shaft
23. 1st gear
24. Oil seal
25. Dust deflector
26. Universal joint flange
27. O-ring
28. Lock nut
29. Front bearing retainer
30. Gasket
31. Transmission case
32. Soft washer
33. Filler plug
34. Drain plug
35. Speedometer drive gear
36. Speedometer driven gear bushing
37. Set screw
38. Speedometer driven gear
39. Rear bearing retainer

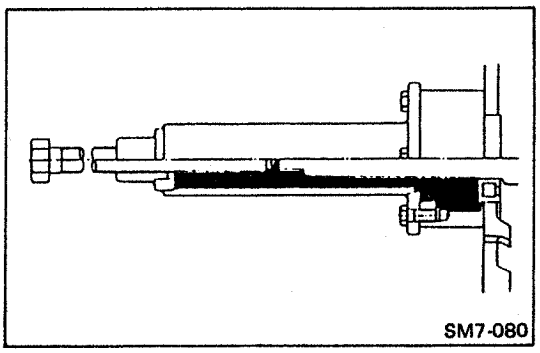


IMPORTANT POINT (S) – DISASSEMBLY

REMOVE THE INPUT SHAFT.

1. Using a special tools, pull out the input shaft with the accompanying bearings.

Special Tool: Input Shaft Puller (09650-1240)
Sliding Hammer (09420-1442)

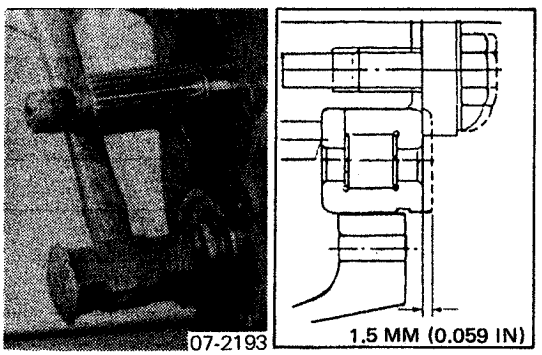


REMOVE THE OUTPUT SHAFT REAR BEARING.

1. Remove the retainer ring from the output shaft rear bearing.
2. Attach special tools to the bearing.

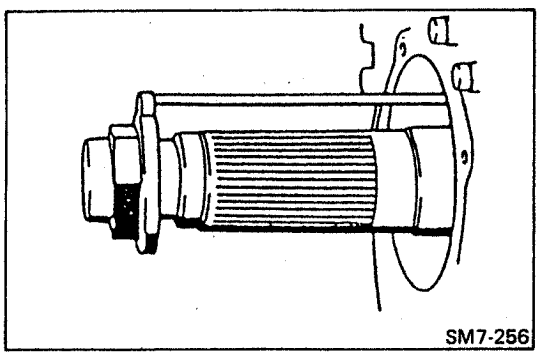
Special Tools: Hook (09653-1170)
Puller (09650-1870)

NOTE: Insert the hook's click into the groove for the retainer ring, then secure the puller to the hook with bolts. Secure the puller so that it does not turn, then rotate the bolt to pull the bearing out.



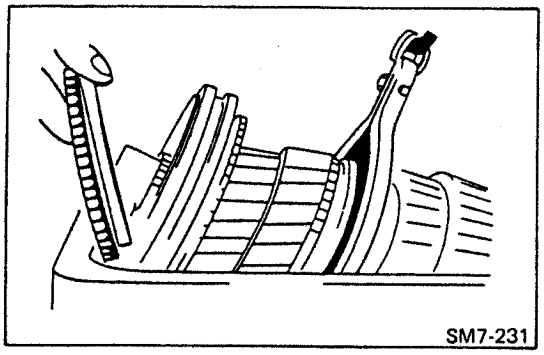
DRIVE THE COUNTER SHAFT INTO THE TRANSMISSION CASE.

1. Remove the retainer ring from the counter shaft rear bearing.
2. Using a soft hammer, drive the rear end of the counter shaft into the transmission case [approximately 1.5 mm (0.059 in)].



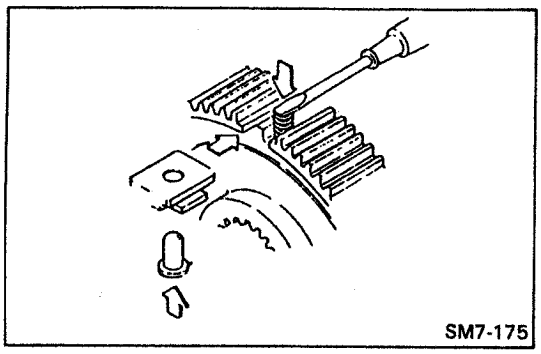
ATTACH A JIG TO THE END OF THE OUTPUT SHAFT.

WARNING
If the output shaft assembly is removed from the transmission without a jig, the 1st gear will drop from the shaft and possibly result in personal injury.


SM7-231

REMOVE THE OUTPUT SHAFT ASSEMBLY FROM THE CASE.

1. Attach a suitable hook or other lifting device around the 2nd-3rd speed synchronizer sleeve and carefully lift the output shaft assembly from the transmission case.
2. When removing the output shaft assembly, remove the synchronizer ring and the cone of the input shaft gear.

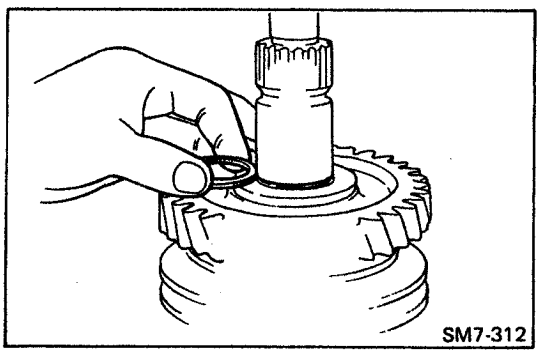

SM7-175

IMPORTANT POINT (S) – ASSEMBLY

ASSEMBLE THE SYNCHRONIZER UNIT.

1. Install the compression spring.

WARNING
The compression spring is spring steel and may fly out of the hole during assembly. Wear safety glasses during assembly.

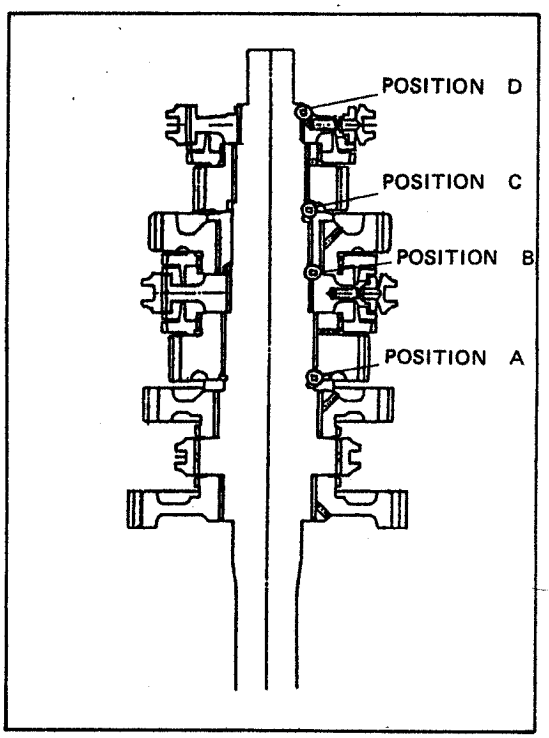

SM7-312

INSTALL THE RETAINER RINGS TO RING GROOVE OF EACH POSITION ON THE OUTPUT SHAFT.

1. Select a retainer ring that will provide tight fit.

NOTE: Always use a new retainer ring.
Make sure that the retainer ring seats in the groove.

Retainer rings are available in the following sizes.



Position A

Thickness	Color code
2.45 mm (0.0965 in)	None
2.55 mm (0.1004 in)	Blue

Position B

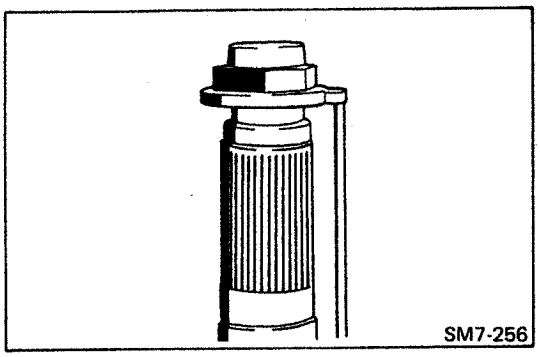
Thickness	Color code
2.45 mm (0.0965 in)	None
2.55 mm (0.1004 in)	Blue
2.65 mm (0.1043 in)	Green

Position C

Thickness	Color code
1.9 mm (0.0748 in)	None
2.0 mm (0.0787 in)	White
2.1 mm (0.0827 in)	Green

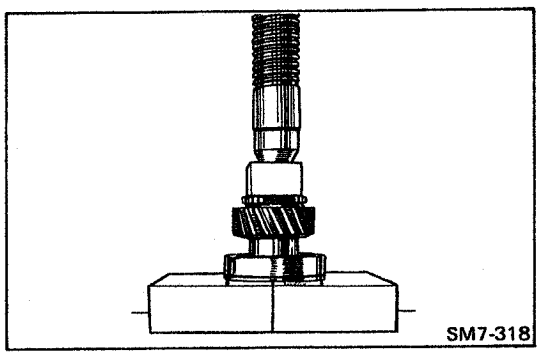
Position D

Thickness	Color code
1.95 mm (0.0768 in)	None
2.05 mm (0.0807 in)	White
2.15 mm (0.0846 in)	Green


SM7-256

ATTACH A JIG TO THE END OF OUTPUT SHAFT.

WARNING
If the output shaft assembly is installed into the transmission without a jig, the 1st gear will drop from the shaft and possibly result in personal injury.


SM7-318

INSTALL THE CYLINDRICAL BEARING.

1. Using a press, install the cylindrical bearing to the input shaft.

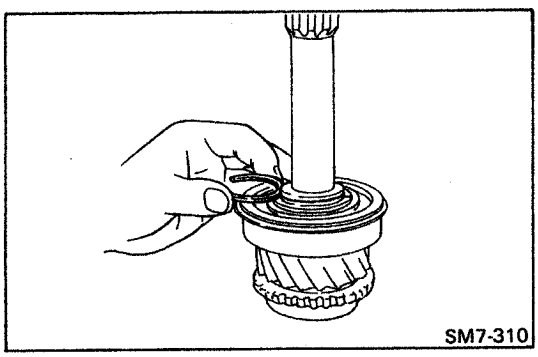
NOTE: ○ **When installing the bearing side ring, place the side with the larger chamfering closest to the gear.**
○ **Do not put any pressure on the outer race.**

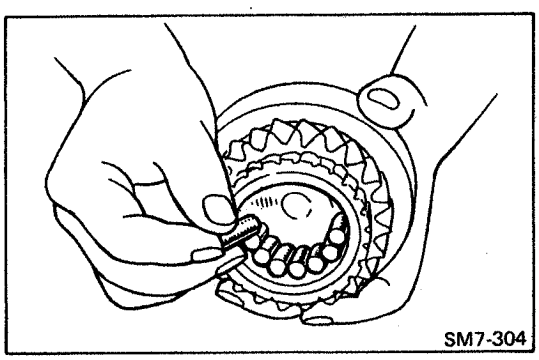
2. Select a retainer ring that will provide tight fit.

NOTE: **Always use a new retainer ring.**
Make sure that the retainer ring seats in the groove.

Retainer rings are available in the following sizes.

Thickness	Color code
1.90 mm (0.0748 in)	None
2.00 mm (0.0787 in)	White
2.10 mm (0.0827 in)	Red
2.20 mm (0.0866 in)	Yellow
2.30 mm (0.0906 in)	Blue

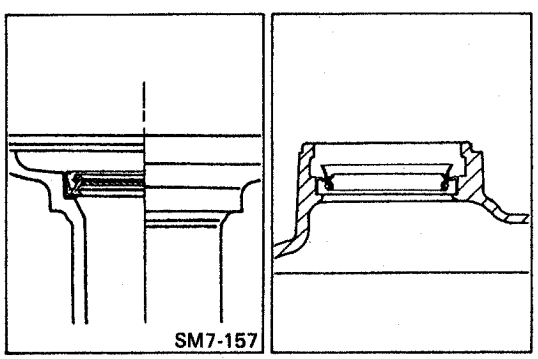

SM7-310


SM7-304

INSTALL THE ROLLER BEARING IN THE COUNTERBORE OF THE INPUT SHAFT.

1. Apply gear oil to the bearings.
2. Place spacers at both ends of the bearings.
3. Install the retainer ring.

NOTE: **Always use roller bearings of uniform diameter (14 pieces by set). There are 3 types of roller bearings in different diameters. These are distinguished by the colors red, blue, and white.**

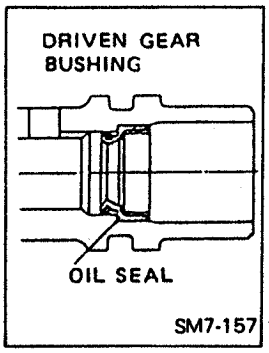

SM7-157

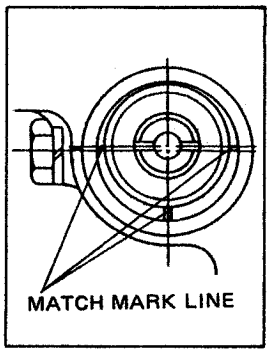
REPLACE THE OIL SEAL OF THE FRONT BEARING RETAINER AND REAR BEARING RETAINER.

1. Using a screw driver, remove the oil seal from bearing retainer.
2. Using a press and a suitable installing tool, press the oil seal into the bearing retainer.

NOTE: ○ **Coat gear oil to oil seal surface.**
○ **Be sure the oil seal is installed in the proper direction.**

3. Coat chassis grease to the sealing surface between the seal lips.





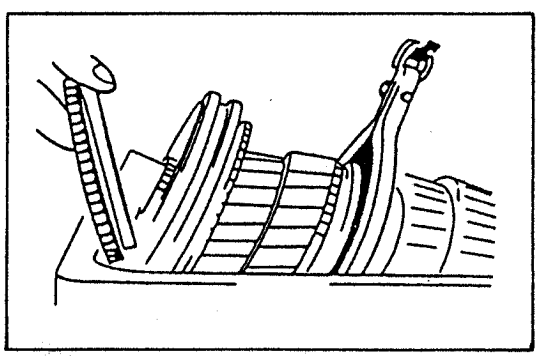
ASSEMBLE THE REAR BEARING RETAINER.

1. Install the speedometer driven gear with bushing into the retainer.

NOTE: ○ **Coat chassis grease to the O-ring, oil seal and driven gear.**
○ **Be sure the oil seal is installed in the proper direction when replacing it.**

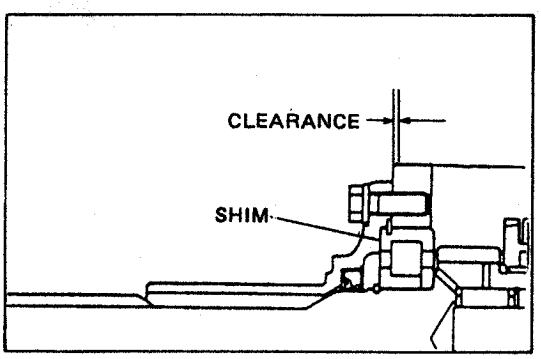
2. Match the mark line on the speedometer drive gear bushing with the mark line on the bearing retainer.

No. of the drive gear teeth	No. of the driven gear teeth	The mark should be matched to the mark on rear cover
4	11	One line
	14	Two lines
	12, 13	Three lines
6	17	One line
	15, 16	Two lines
	19, 20	Three lines



INSTALL THE OUTPUT SHAFT ASSEMBLY IN THE TRANSMISSION CASE.

1. Attach a suitable hook around the 2nd-3rd synchronizer sleeve and carefully lower the output shaft assembly into the case.
2. Position the output shaft gears so that they mesh with mating countershaft gears.
3. When installing the output shaft assembly, install the synchronizer ring and cone of the input shaft gear.



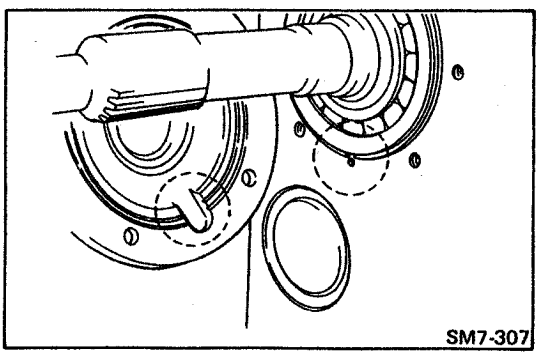
CHECK THE CLEARANCE BETWEEN FRONT BEARING RETAINER AND FRONT SURFACE OF CASE.

1. Tighten bolts temporarily by hand without gasket.
2. Check the clearance and adjust the clearance with shims.

Assembly Standard: 0.25–0.4 mm (0.0099–0.0157 in)

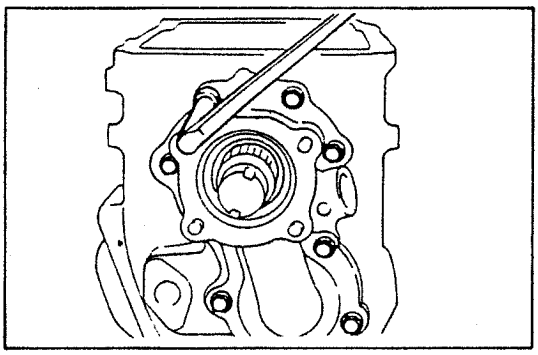
Shims are abailable in following sizes.

Shim thickness		
0.05 mm (0.0019 in)	0.10 mm (0.0039 in)	0.20 mm (0.0078 in)



INSTALL THE FRONT BEARING RETAINER.

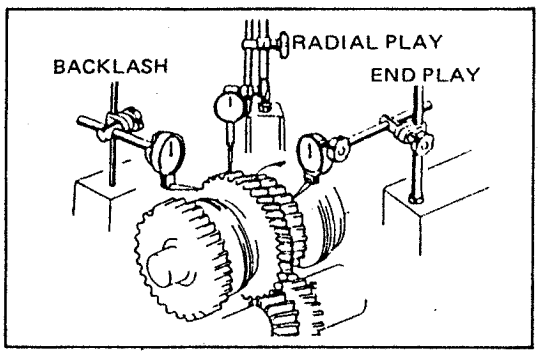
NOTE: ○ **When installing the bearing retainer, the gasket must be installed in such a way that the gasket notch matches the oil drain hole on the case so as not to block the hole.**
○ **Apply liquid sealer or sealing tape to bolt thread.**
○ **Apply sealing compound to both sides of gasket.**



INSTALL THE REAR BEARING RETAINER.

Install the rear bearing retainer.

NOTE: ○ **Apply liquid sealer or sealing tape to bolt thread.**
○ **Apply sealing compound to both sides of gasket.**



MEASURE THE GEAR BACKLASH. (A)

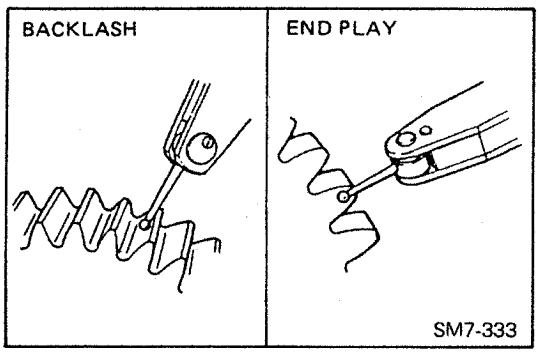
1. Block the countershaft with a ply bar when measuring.
2. Measure the gear backlash at four points of each gear.

Assembly Standard

Input shaft gear 3rd gear 4th gear	0.04—0.10 mm (0.0016—0.0039 in)
1st gear 2nd gear Reverse gear	0.06—0.14 mm (0.0024—0.0055 in)

Service Limit

All gears : 0.4 mm (0.0157 in)



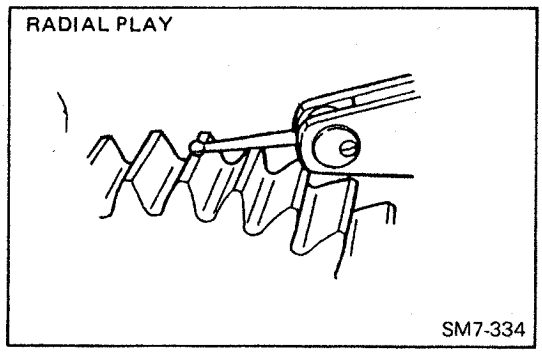
MEASURE THE GEAR END PLAY. (B)

Assembly Standard

1st gear :	0.16—0.31 mm (0.0063—0.0122 in)
2nd gear :	0.15—0.30 mm (0.0060—0.0118 in)
3rd gear :	0.15—0.33 mm (0.0060—0.0129 in)
4th gear :	0.15—0.40 mm (0.0060—0.0157 in)
Reverse gear :	0.15—0.30 mm (0.0060—0.0118 in)

Service Limit

All gears : 0.5 mm (0.0197 in)

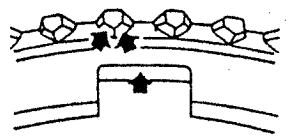
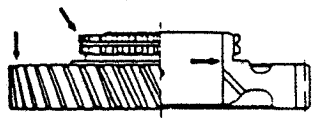
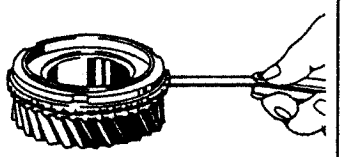
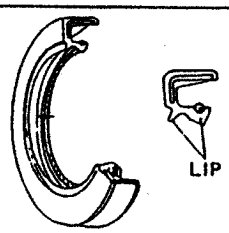
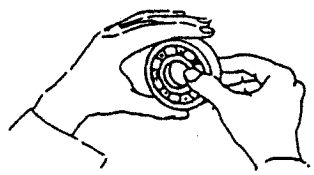
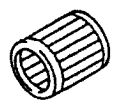


MEASURE THE RADIAL PLAY OF EACH GEAR. (C)

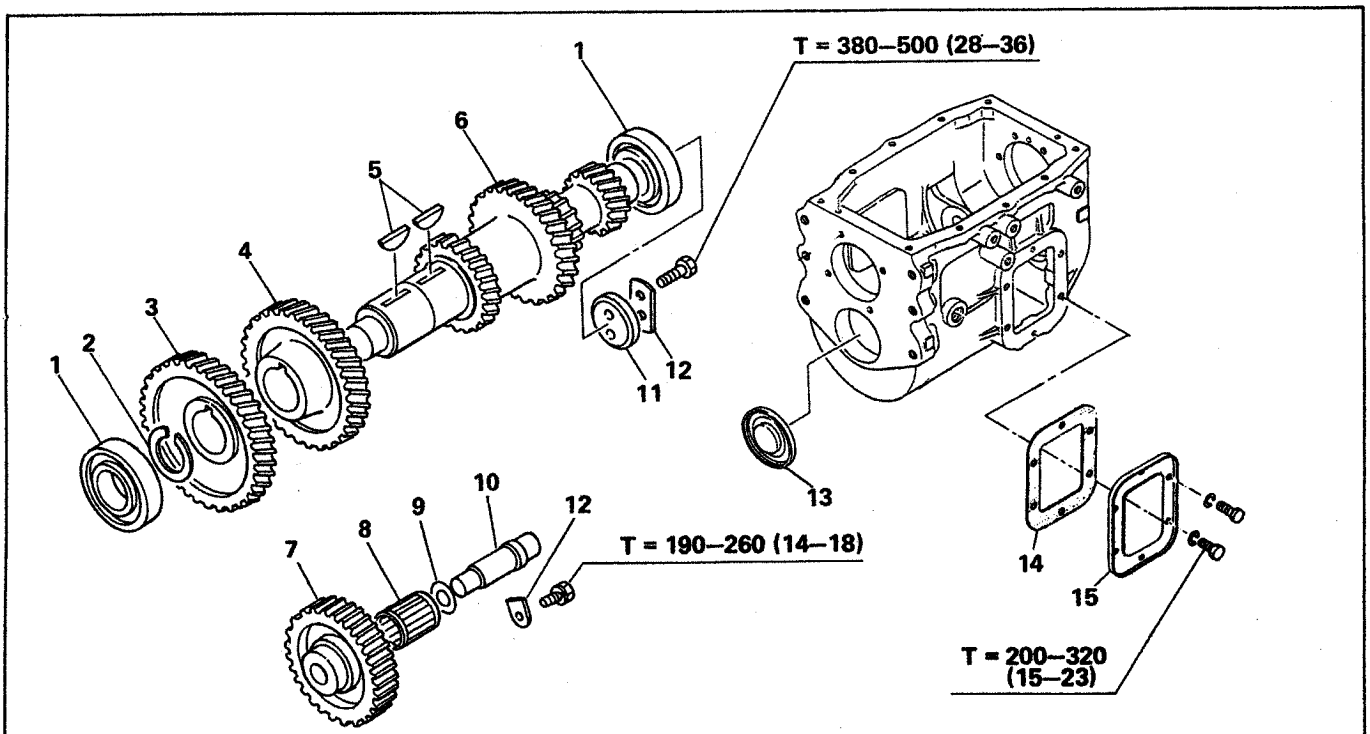
Assembly Standard

1st gear :	0.024—0.070 mm (0.0010—0.0027 in)
2nd gear :	0.020—0.111 mm (0.0008—0.0043 in)
3rd gear :	0.024—0.070 mm (0.0010—0.0027 in)
4th gear :	0.018—0.062 mm (0.0008—0.0024 in)
Reverse gear :	0.020—0.070 mm (0.0008—0.0027 in)

INSPECTION AND REPAIR

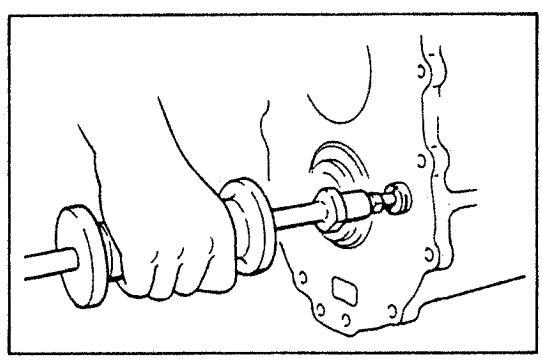
Inspection Item	Standard	Limit	Remedy	Inspection Procedure
Synchronizer ring, deformity, crack, or excessive damage.			Replace, if necessary.	
Gear excessive wear, chips. or cracks.			Replace, if necessary.	 SM7-092
Clearance between synchronizering and synchronizer cone.	1.7–2.3 mm (0.0670–0.0905 in)	0.2 mm (0.0079 in)	Replace the synchronizer ring and/or cone.	 SM7-253
Oil seal lip wear or damage.			Replace, if necessary.	
Cylindrical bearing, and ball bearing improper rotation.			Replace the parts, if necessary.	
Needle roller bearing out-of round or rough.			Replace the parts, if necessary.	Visual check 

COUNTER SHAFT, REVERSE IDLER SHAFT AND GEARS



T = Tightening torque kg·cm (lb.ft)

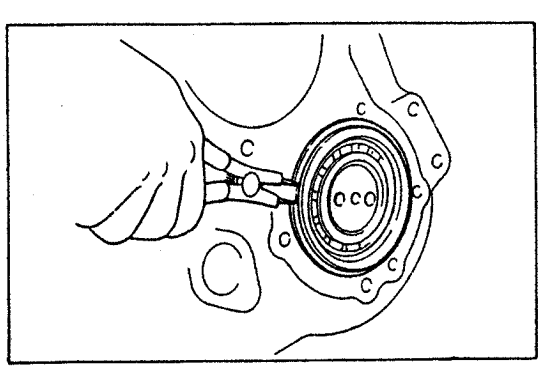
1. Cylindrical roller bearing
2. Retainer ring
3. Counter drive gear
4. Counter 4th gear
5. Woodruff key
6. Counter shaft
7. Reverse idler gear
8. Needle roller bearing
9. O-ring
10. Reverse idler gear shaft
11. Thrust washer
12. Lock plate
13. Seal cover
14. Gasket
15. Power take-off cover



IMPORTANT POINT (S) – DISASSEMBLY

REMOVE THE REVERSE IDLER SHAFT.

Special Tools: Sliding hummer (09420-1442)

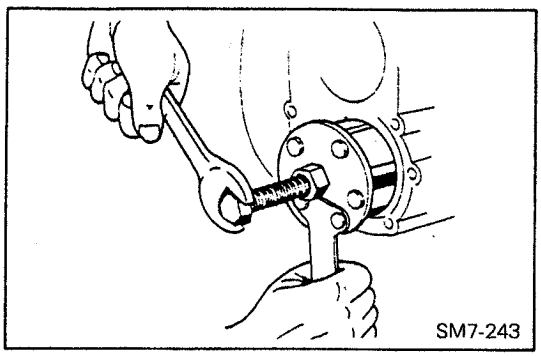


REMOVE THE COUNTER SHAFT REAR BEARING.

1. Remove the retainer ring.

WARNING

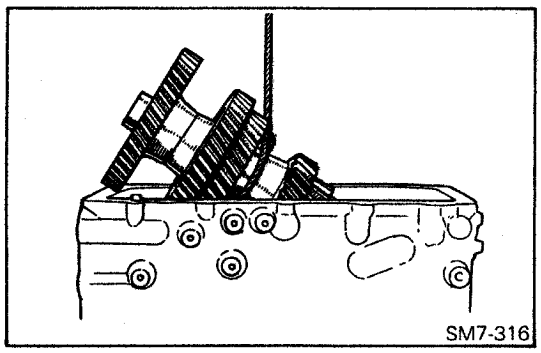
The retainer ring is spring steel and may fly out of the groove during removal. Wear safety glasses during removal.


SM7-243

2. Install special tools on the rear cylindrical bearing.

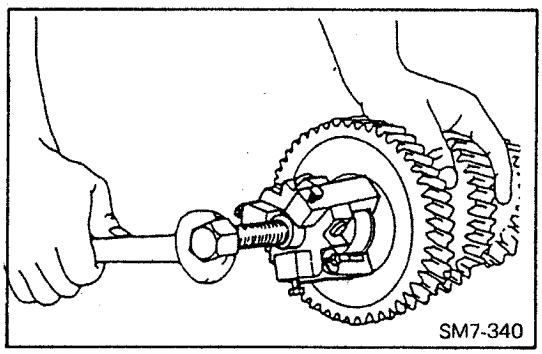
Specail Tools: Hook (09653-1160)
Puller (09650-2080)

NOTE: Insert the hook's click into the groove for the retainer ring then secure the puller to the hook with bolts. Secure the puller so that it does not turn, then rotate the bolt to pull the bearing out.


SM7-316

REMOVE THE COUNTER SHAFT FROM THE TRANSMISSION CASE.

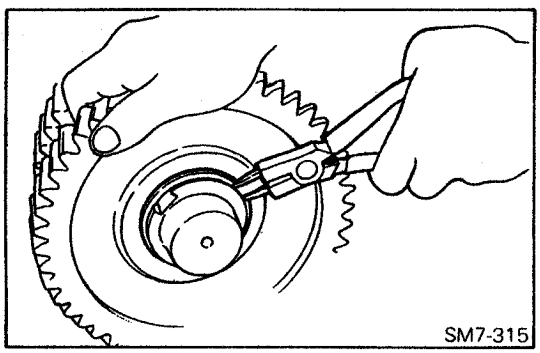
1. Tie a rope or hook around the countershaft and carefully pry the countershaft assembly rearward until the front end of the shaft is clear of the front cylindrical bearing.
2. Carefully lift the countershaft assembly from the case.


SM7-340

REMOVE THE INNER RACE.

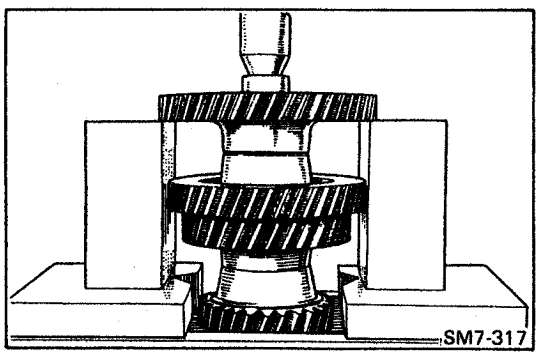
1. Using a special tool on the inner race, pull out the front cylindrical bearing inner race from the counter shaft.

Special Tools: Puller (09650-1491)


SM7-315

REMOVE THE RETAINER RING.

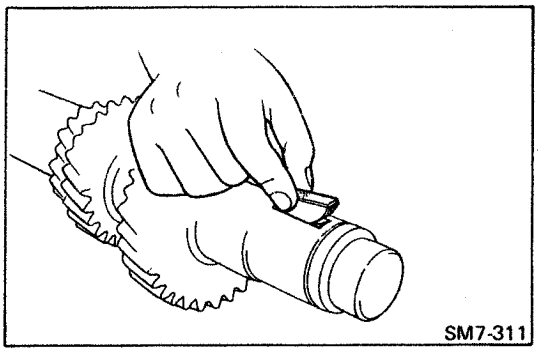
WARNING
The retainer ring is spring steel and may fly out of the groove during removal. Wear safety glasses during removal.


SM7-317

REMOVE THE COUNTER SHAFT GEARS.

1. Support the counter shaft drive gear as close as possible to the gear hub and press the counter shaft front end until it is free of the drive gear.
2. Support the counter 4th gear under the gear teeth and press the counter shaft out of the gear.

WARNING
Stay out from under the shaft during removal.
The shaft could drop suddenly resulting in personal injury.


SM7-311

IMPORTANT POINT (S) – ASSEMBLY

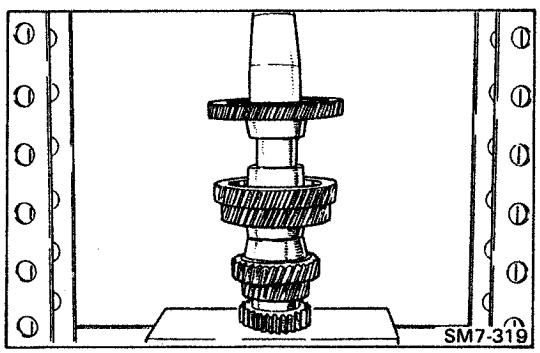
INSTALL THE COUNTER DRIVE GEAR AND COUNTER 4TH GEAR.

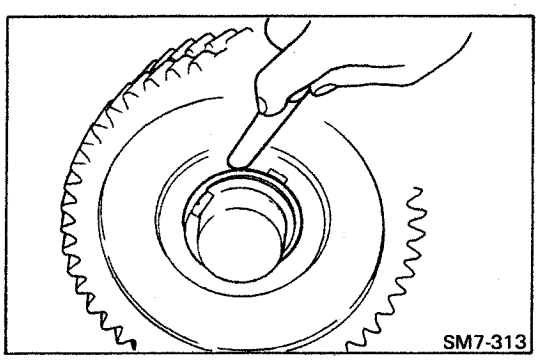
1. Select the proper size key according to the condition of the key groove.

Thickness (T)	Shape
7.015–7.024 mm (0.2762–0.2765 in)	
7.055–7.065 mm (0.2778–0.2781 in)	

2. Press the counter shaft into the gears making certain that the key and keyway are aligned.

NOTE: Be sure the gears are installed in the proper direction.


SM7-319

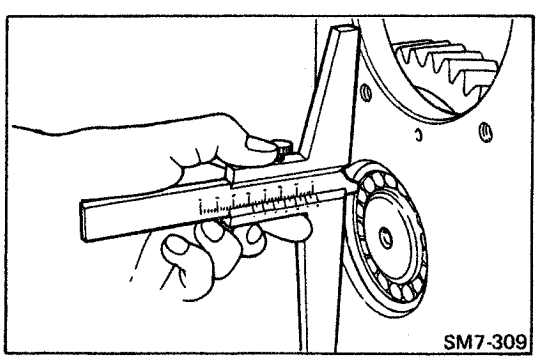

SM7-313

SELECT A RETAINER RING THAT WILL PROVIDE A TIGHT FIT AND INSTALL IT ON THE SHAFT.

NOTE: Always use a new retainer ring.
Make sure that the retainer ring seats in place.

Retainer rings are available in the following size.

Thickness	Color code
2.25 mm (0.0886 in)	None
2.35 mm (0.0925 in)	White
2.45 mm (0.0965 in)	Green
2.55 mm (0.1004 in)	Brown
2.65 mm (0.1043 in)	Skyblue

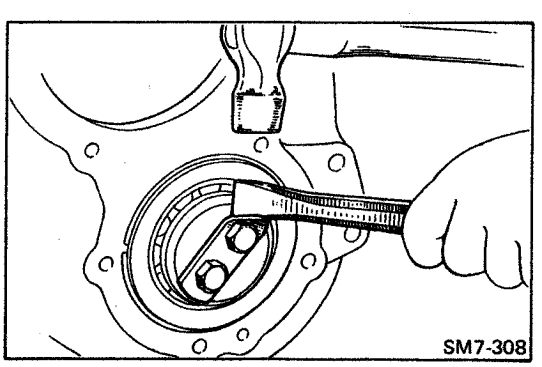

SM7-309

POSITION DISTANCE, INSPECT THE "A", OF THE FRONT BEARING OUTER RACE FROM THE GEAR CASE FRONT SURFACE.

Assembly Standard: 5.7 – 6.2 mm (0.2245 – 0.2440 in)

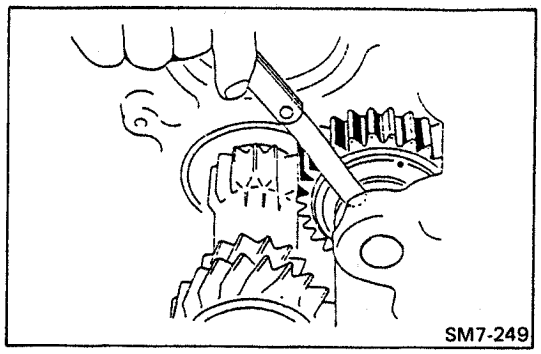
NOTE: Before place the counter shaft in position, install the input shaft and output shaft into the transmission case.

PRESS IN THE COUNTER FRONT COVER AND BEARING IT FLUSH WITH THE CASE FRONT.


SM7-308

INSTALL THE THRUST WASHER AND LOCK PLATE.

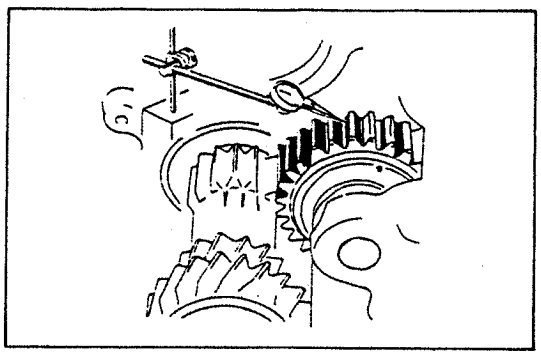
1. Install the thrust washer and lock plate or rear end of counter shaft.
2. Tighten the bolts and secure the bolts by folding the lock plate.



MEASURE THE REVERSE IDLER GEAR END PLAY.

Assembly Standard: 0.15 – 0.40 mm (0.0060 – 0.0157 in)

Service Limit: 0.5 mm (0.0197 in)



MEASURE THE BACKLASH BETWEEN THE REVERSE IDLER GEAR AND THE COUNTER SHAFT REVERSE GEAR.

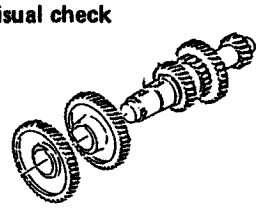
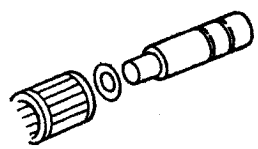
Assembly Standard: 0.06 – 0.14 mm (0.0023 – 0.0055 in)

Service Limit: 0.40 mm (0.0157 in)

MEASURE THE REVERSE IDLER GEAR RADIAL PLAY.

Assembly Standard: 0.009 – 0.050 mm (0.0004 – 0.0019 in)

INSPECTION AND REPAIR

Inspection Item	Standard	Limit	Remedy	Inspection Procedure
All gears for cracks or defects.			Replace, if necessary.	Visual check 
Idler gear, shaft, and needle roller bearing for wear or damage.			Replace, if necessary.	Visual check 
Counter shaft wear, chips or cracks.			Replace, if necessary.	Visual check
Counter shaft key way and damage or looseness.			Replace the counter shaft and/or key. If necessary.	Visual check

(KY)

TC-55E-01

CHAPTER TC

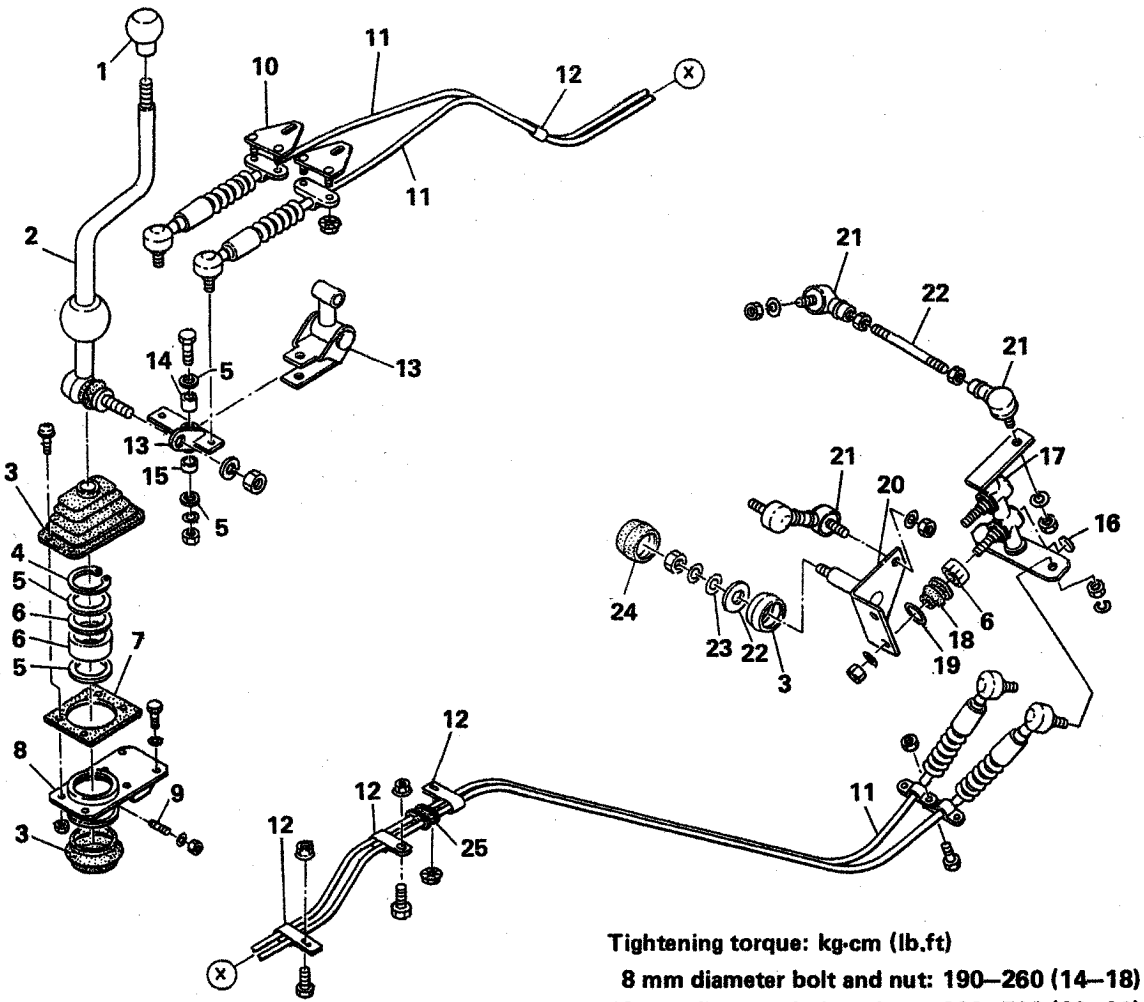
TRANSMISSION CONTROL

TROUBLESHOOTING

Symptom	Possible cause	Remedy/Prevention
Unable or difficult to shift gears when engine is off.	Improper adjustment of gear control linkage.	Adjust control linkage.
	Loose bolts and nuts	Inspect and tighten each bolt and nut.
	Joints and pins worn and/or damaged	Replace joints and pins.
	Control cable damaged	Replace control cable.
Slips out of gears when driving bumpy roads.	Improper adjustment of gear control linkage.	Adjust control linkage.
Lever play is excessive	Seriously worn joints or cable	Replace joints or cable .
	Loose bolts and nuts	Inspect and tighten each bolt and nut.

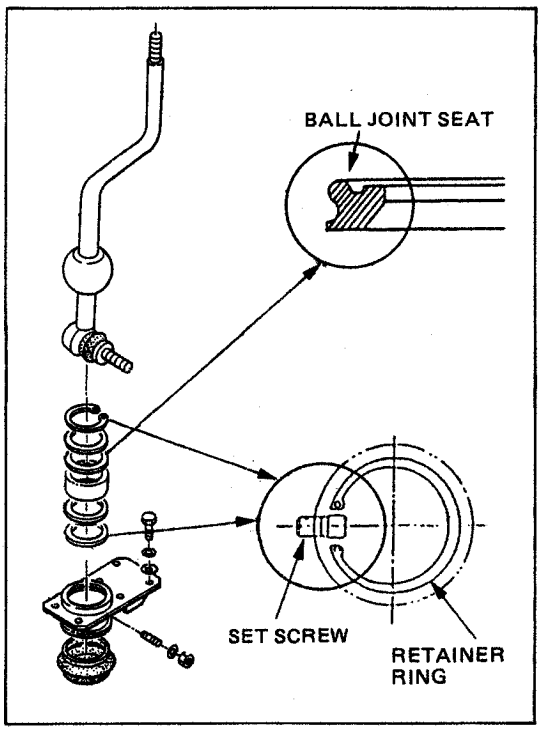
TRANSMISSION CONTROL

BC33-507-00X01
(3240)



Tightening torque: kg·cm (lb.ft)
8 mm diameter bolt and nut: 190–260 (14–18)
10 mm diameter bolt and nut: 380–500 (28–36)
12 mm diameter bolt and nut: 650–870 (47–62)

1. Shift lever knob
2. Shift lever
3. Shift lever boot
4. Retainer ring
5. Thrust washer
6. Ball joint seat
7. Gasket
8. Shift lever housing
9. Set screw
10. Setting plate
11. Transmission control cable
12. Clip
13. Shift lever sub-assembly
14. Collar
15. Bushing
16. Expansion plug
17. Gear control lever assembly
18. Dust cover
19. Retainer
20. Cross shaft bracket sub-assembly
21. Control rod end
22. Link rod
23. Spacer
24. Dust boot
25. Grommet



IMPORTANT POINT(S) – ASSEMBLY

ASSEMBLE THE GEAR SHIFT LEVER.

Install the lower thrust washer.
Install the lower retainer ring using a snap ring plier.

NOTE: Retainer rings are installed as shown illustration.

WARING

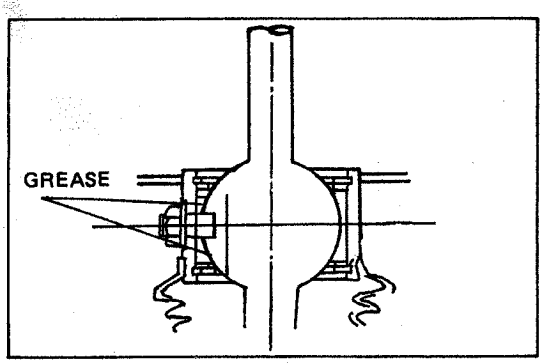
The retainer ring is spring steel and may fly out of the ring groove during installation. Wear safety glasses during installation.

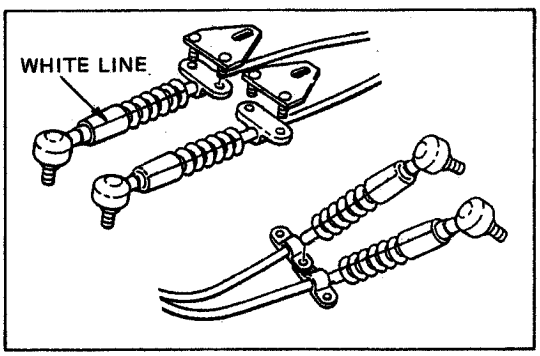
Install the lower boot.
Install the upper ball joint seat.

NOTE:
- **The upper ball joint seat is installed as shown illustration.**
- **Apply chassis grease on both sides of the ball joint sests.**

Install the upper thrust washer and retainer ring.

NOTE: Apply chassis grease 40 g (1.4 oz) in the shift lever housing.

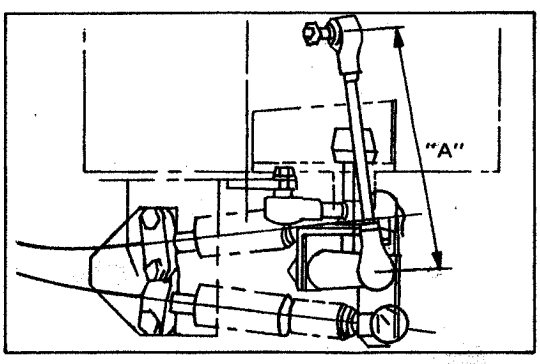




IMPORTANT POINT(S) – MOUNTING

INSTALL THE CONTROL CABLES.

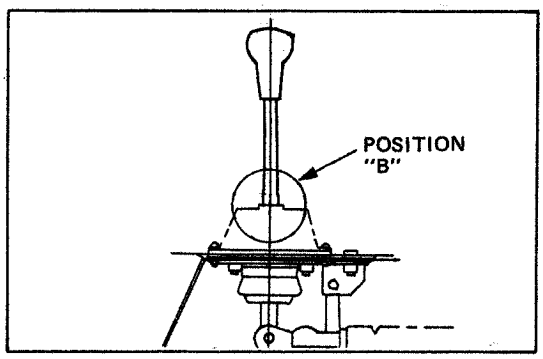
NOTE: Make sure that white lines on the cable end boots are straight, not twisted.



ADJUST THE NEUTRAL POSITION OF THE SHIFT LEVER.

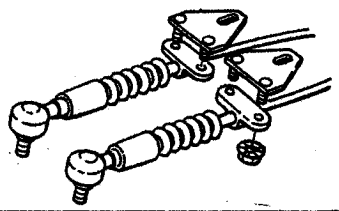
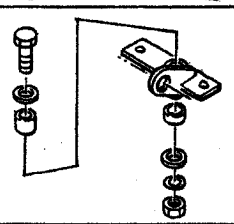
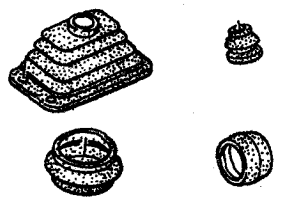
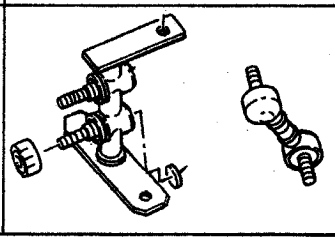
1. Adjust the link rod length "A".

Assembly Standard: 196 mm (7.717 in)



2. Check the position "B" of shift lever exactly perpendicular at its neutral position.

INSPECTION AND REPAIR

Inspection Item	Standard	Limit	Remedy	Inspection Procedure
Control cable boot crack or damage	—	—	Replace, if necessary	
Shift lever sub-assembly bush wear	—	—	Replace, if necessary	
Rubber boots crack or damage	—	—	Replace, if necessary	
Ball joint seat, control rod end wear or damage	—	—	Replace, if necessary	

PP-66E-01

CHAPTER PP

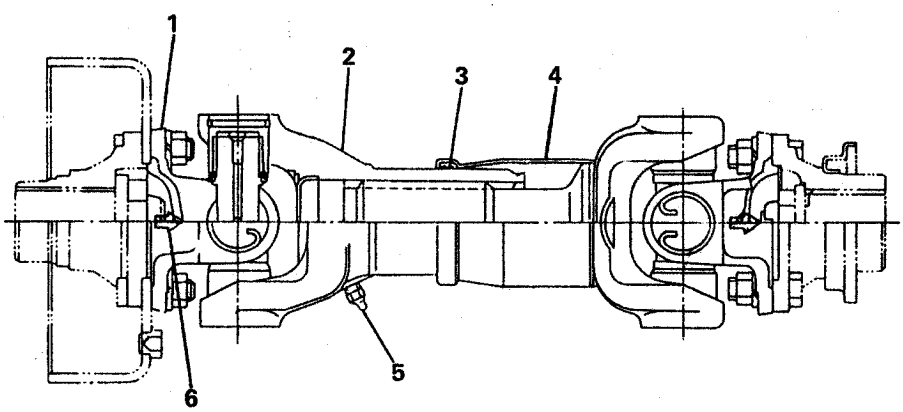
PROPELLER SHAFT

DATA AND SPECIFICATIONS

Type	Tubeless shaft type
Universal joint	All metal, round bearing type with needle roller bearing.
Series No.	LC0000
Needle roller bearing:	
Outer diameter	2.5 mm (0.0984 in)
Length	19.8 mm (0.7795 in)
Q'ty	33

DESCRIPTION

37120-8390 ~ 8400



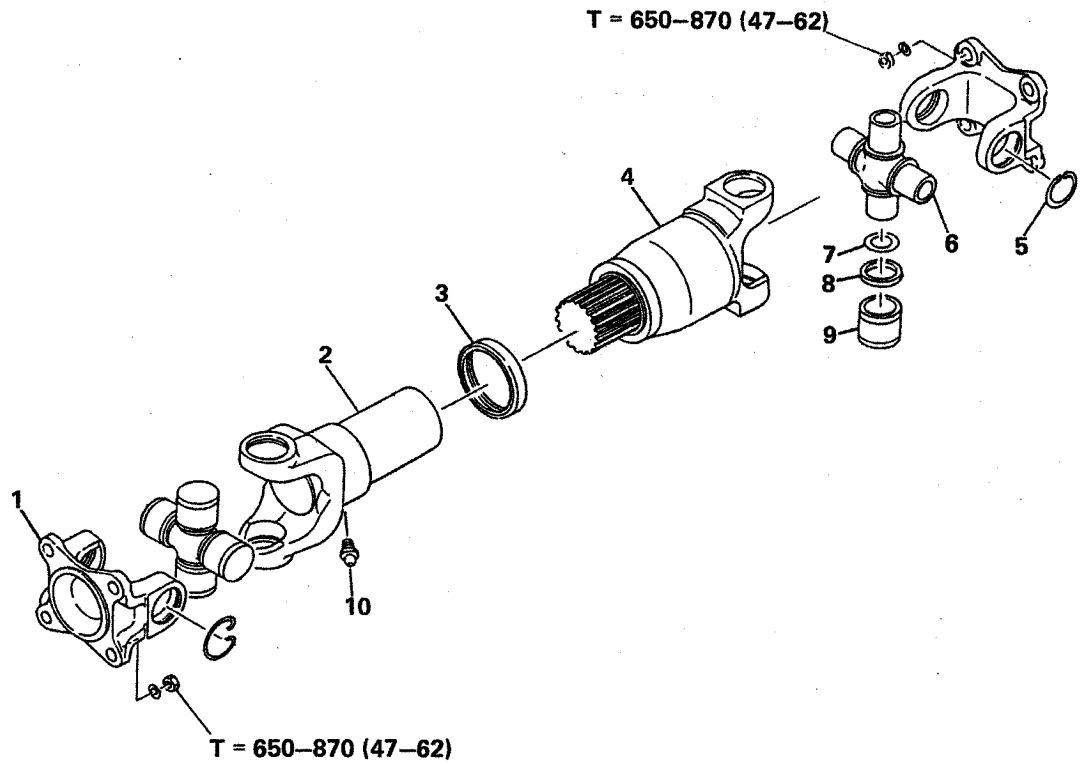
1. Universal joint yoke
2. Sliding yoke sub assembly
3. Dust seal
4. Sleeve yoke sub assembly
5. Lubrication ftting
6. Phasing arrow

TROUBLESHOOTING

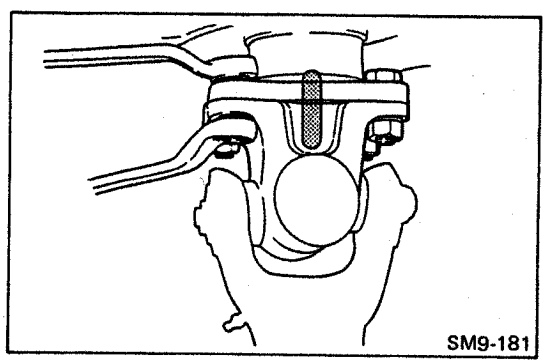
Symptom	Possible cause	Remedy/Prevention
Abnormal vibration when driving	Looseness of universal joint yoke and flange tightening nuts.	Tighten the nuts.
	Excessive propeller shaft runout	Replace the shaft.
	Worn or damaged universal joint	Replace the universal joint.
	Incorrect phasing of the yokes	Match the phasing arrows correctly.

PROPELLER SHAFT

BP11-000-00X04X05
(C340-060-00)



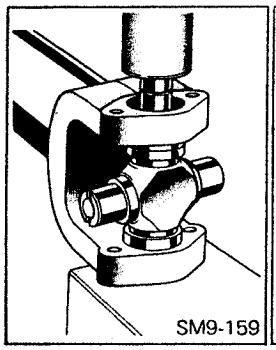
1. Universal joint yoke
2. Sliding yoke sub assembly
3. Dust seal
4. Sleeve yoke sub assembly
5. Retainer ring
6. Universal joint spider
7. Thrust washer
8. Oil seal
9. Needle roller bearing
10. Lubrication fitting

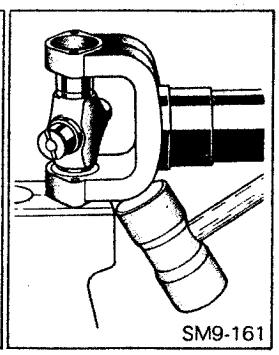


IMPORTANT POINT – DISMOUNTING

DISCONNECT THE PROPELLER SHAFT FROM THE FLANGE ON THE DIFFERENTIAL AND TRANSMISSION.

1. Draw the match marks on the flange and yoke.
2. Remove nuts and bolts.

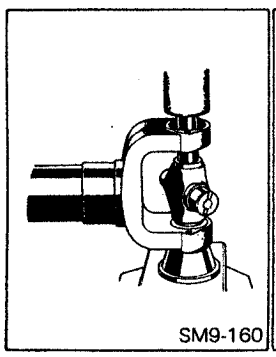

SM9-159

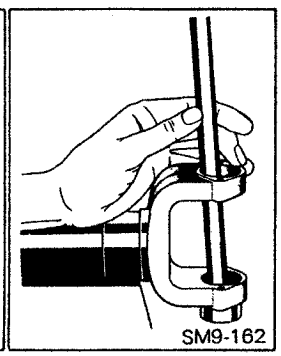

SM9-161

IMPORTANT POINT – DISASSEMBLY

DISASSEMBLE THE UNIVERSAL JOINT.

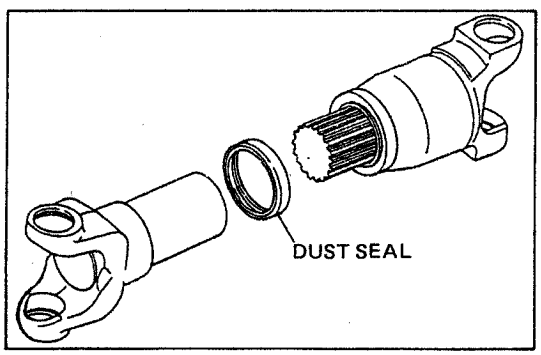
1. Remove the retainer ring from the yoke.
2. Position the yoke under the arbor press and push universal joint partially out of the yoke lug.
   The bearing is protruded from the yoke.
3. Place the propeller shaft assembly in a vice, gripping protruding bearing with vice. Tap on the yoke in area shown to achieve removal of universal joint bearing.


SM9-160


SM9-162

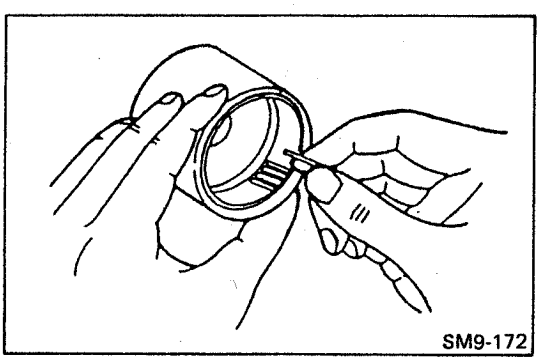
4. Place the yoke under arbor press with opposite side of universal joint spider in up position and place small push tool on the universal joint spider end.
5. Press the opposite bearing out of the yoke lug.
6. Remove the spider from the yoke.
7. Remove the bearing from the yoke lug.

NOTE: Keep the original location of the bearings, thrust washers, spider and retainer rings in mind. These parts have to be replaced in the same position as before disassembly when re-assembly.



DISASSEMBLE THE DUST SEAL.

1. Remove the sliding yoke.
2. Remove the dust seal.

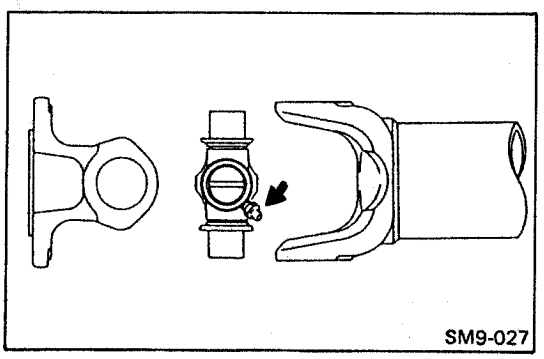

SM9-172

IMPORTANT POINT – ASSEMBLY

ASSEMBLE THE UNIVERSAL JOINT BEARINGS.

1. After the universal joint bearing assemblies are thoroughly clean, apply clean lubricant to the rollers.
2. Check each bearing for missing rollers.

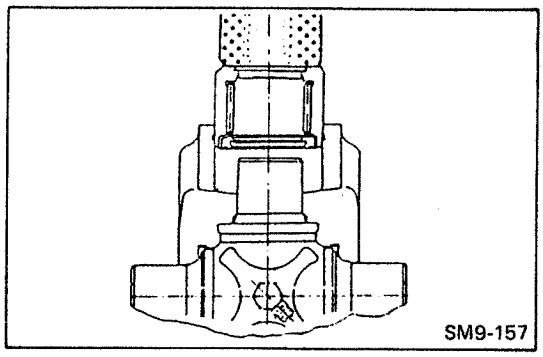
NOTE: Remove the stale grease from the bearing cage. Lubricate grease containing molybdenum disulfide on the needle roller, seal lip and the both surface of thrust washer.


SM9-027

INSTALL THE SPIDER AND UNIVERSAL JOINT BEARINGS INTO THE YOKES.

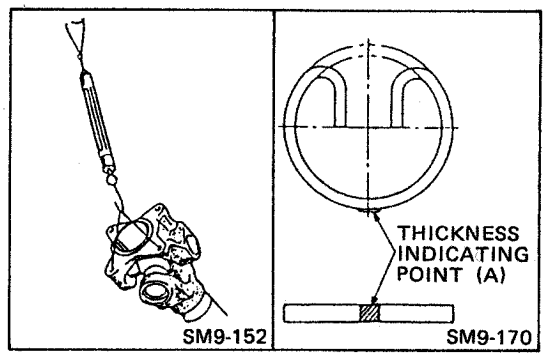
1. Put the spider into the yoke and then set the universal joint bearings on the yoke.

NOTE: When assembling the universal joint spider to the sliding yoke, position the lubrication fitting so that it is to the yoke side as shown in figure.



2. Press the universal joint bearings into the yokes.

NOTE: ○ **Play attention not to damage the seal lip of the universal joint bearing when installation.**
○ **Align the phasing arrow on the universal joint yoke and the phasing arrow on the sliding yoke.**

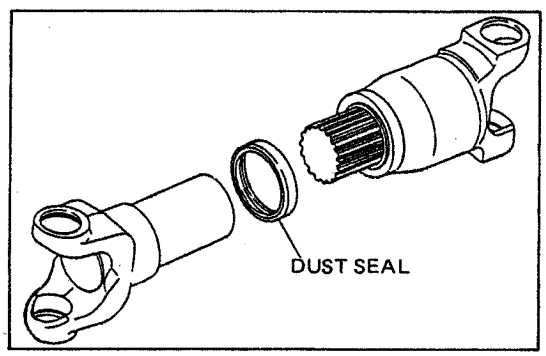


CHECK THE STARTING TORQUE OF THE UNIVERSAL JOINT USING A SPRING BALANCER.

Assembly Standard: 15—50 kg·cm (13—43 lb.in)

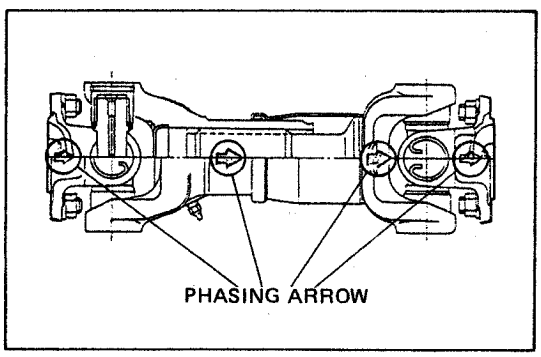
1. If the torque is below 15 kg·cm (13 lb.in), replace the thrust washer to the thicker one.
2. If the torque is below 50 kg·cm (43 lb.in), replace the thrust washer to the thinner one.

Color code (A)	Gray	Blue	Pink
Thickness mm (in)	2.22 (0.0874)	2.30 (0.0905)	2.38 (0.0937)

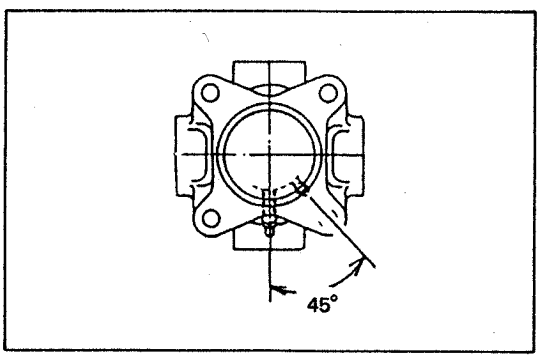


ASSEMBLE THE SLIDING YOKE AND PROPELLER SHAFT SUB ASSEMBLY.

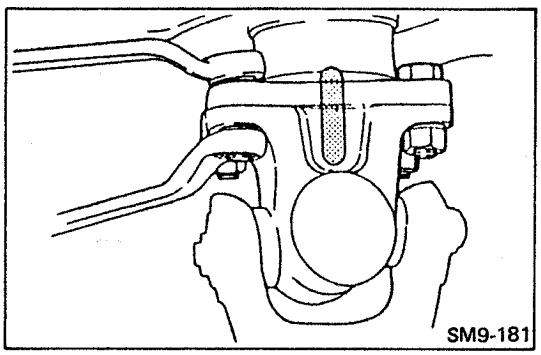
1. Remove the stale grease from the spline of the propeller shaft.
2. Install the new dust seal on the shaft by pushing it in the seal groove.
3. Apply the grease containing molybdenum disulfide on the spline and sliding area of the dust seal.



4. Align the phasing arrow on the shaft sub assembly and the phasing arrow on the sliding yoke.
5. After assembling the propeller shaft, check the phasing arrow as whon in the figure.



6. Adjust the direction of lubrication fitting for sliding yoke side and propeller shaft side as shown in figure.


SM9-181

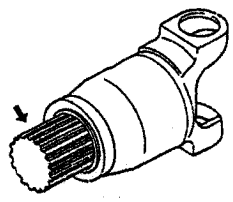
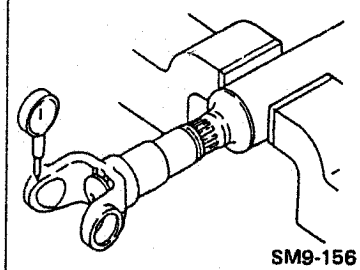
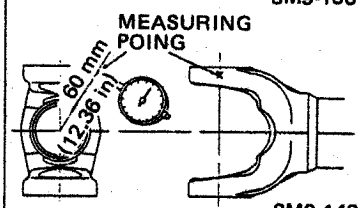
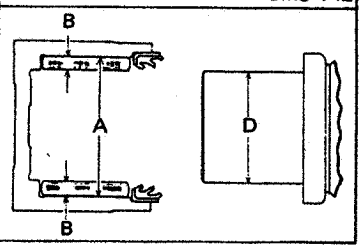
IMPORTANT POINT – MOUNTING

CONNECT THE PROPELLER SHAFT TO THE FLANGE ON THE DIFFERENTIAL AND TRANSMISSION.

1. Align the match marks on the flange and yoke.
2. Tighten the bolts and nuts.
3. Lubricate the universal joints and sliding spline.

Grease: Refer to recommended lubricants list.

INSPECTION AND REPAIR

Inspection Item	Standard	Limit	Remedy	Inspection Procedure
Sliding spline Damage	—	—	Replace, if necessary.	Visual check 
Sliding spline backlash At spline	0.062–0.174 (0.0025–0.0068)	0.25 (0.0098)	Replace	 SM9-156
At yoke lug 60 mm (2.36 in) from shaft center	0.155–0.435 (0.0061–0.0171)	0.63 (0.024)		 SM9-142
Clearance (C) between universal joint spider and needle roller bearing (C = A – 2B – D)	0.024–0.064 (0.0010–0.0025)	0.1 (0.0039)	Replace	

DC-07E-01

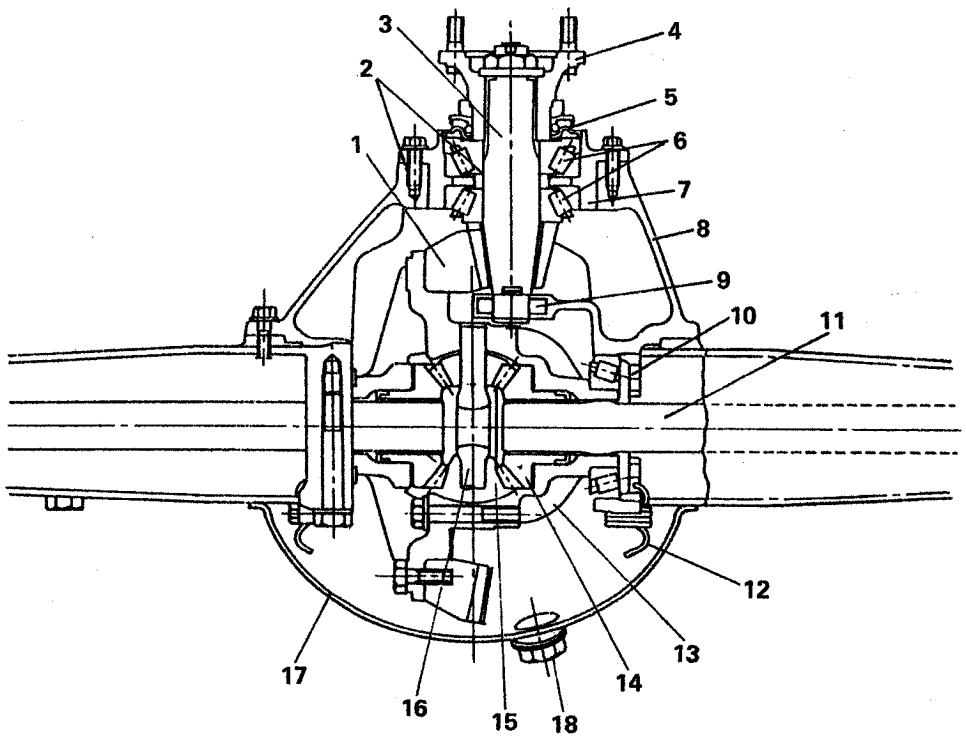
CHAPTER DC

DIFFERENTIAL CARRIER
(SS12-2 Series)

DATA AND SPECIFICATIONS

1. Type	Single-reduction single-speed by spiral bevel gearing
2. Gear ratios	4.100 4.857 6.142
3. Oil capacity	3.5 liters (0.92 U.S.gal/0.77 Imp.gal)

DESCRIPTION



K-5170

1. Spiral bevel ring gear
2. Adjusting shim
3. Spral bevel pinion
4. Flange yoke coupling
5. Oil seal
6. Taper roller bearing
7. Bearing cage
8. Differential carrier
9. Cylindrical roller bearing
10. Adjusting nut
11. Axle shaft
12. Lock plate
13. Differential case
14. Side gear
15. Differential pinion
16. Differential spider
17. Axle housing
18. Oil filler plug

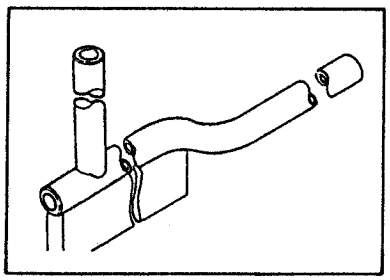
TROUBLESHOOTING

Symptom	Possible cause	Remedy/Prevention
Abnormal noise	**Bearing system**	
	• Worn or damaged pinion bearings	Replace bearings.
	• Worn or damaged differential side bearings	Replace bearings.
	• Loose pinion bearings	Adjust bearing preload.
	• Loose differential side bearings	Adjust bearing preload.
	Gear system	
	• Inadequate backlash on ring gear and pinion gear	Adjust backlash.
	• Worn thrust washers	Replace.
	• Worn differential spider	Replace.
	• Worn damaged ring gear and pinion	Replace.
	• Worn or damaged differential side gears and pinions	Replace.
	• Loose ring gear tightening bolts	Tighten bolts.
	• Inadequate tooth contact of ring gear and pinion gear	Replace or adjust tooth contact.
	• Worn pinion spline	Replace.
	Rear axle system	
	• Worn rear axle shaft spline	Replace.
	• Worn hub bearings	Replace.
	• Loose hub bearings	Adjust bearing preload.
	• Loose differential case tightening bolts	Tighten bolts.
	Oil system, etc.	
	• Insufficient oil	Add.
	• Poor oil quality	Change.
	• Abnormal noise of propeller shaft	Refer to **CHAPTER FOR PROPELLER SHAFT.**

SPECIAL TOOL

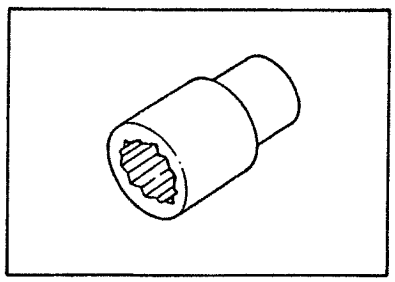
Prior to start of differential carrier overhaul, it is necessary to have these special tools.

ADJSUTING TOOL



09665-1190

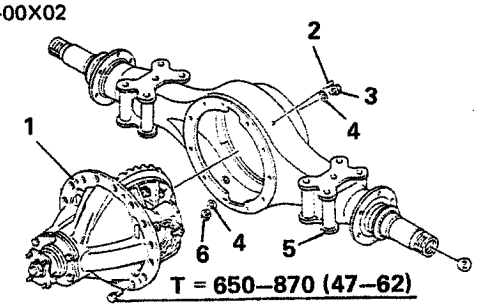
SOCKET WRENCH



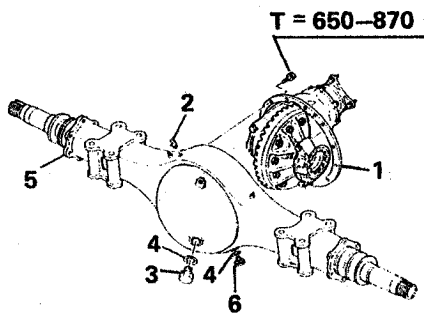
09839-3606

OVERHAUL

MR11-102-00X02
(6800)

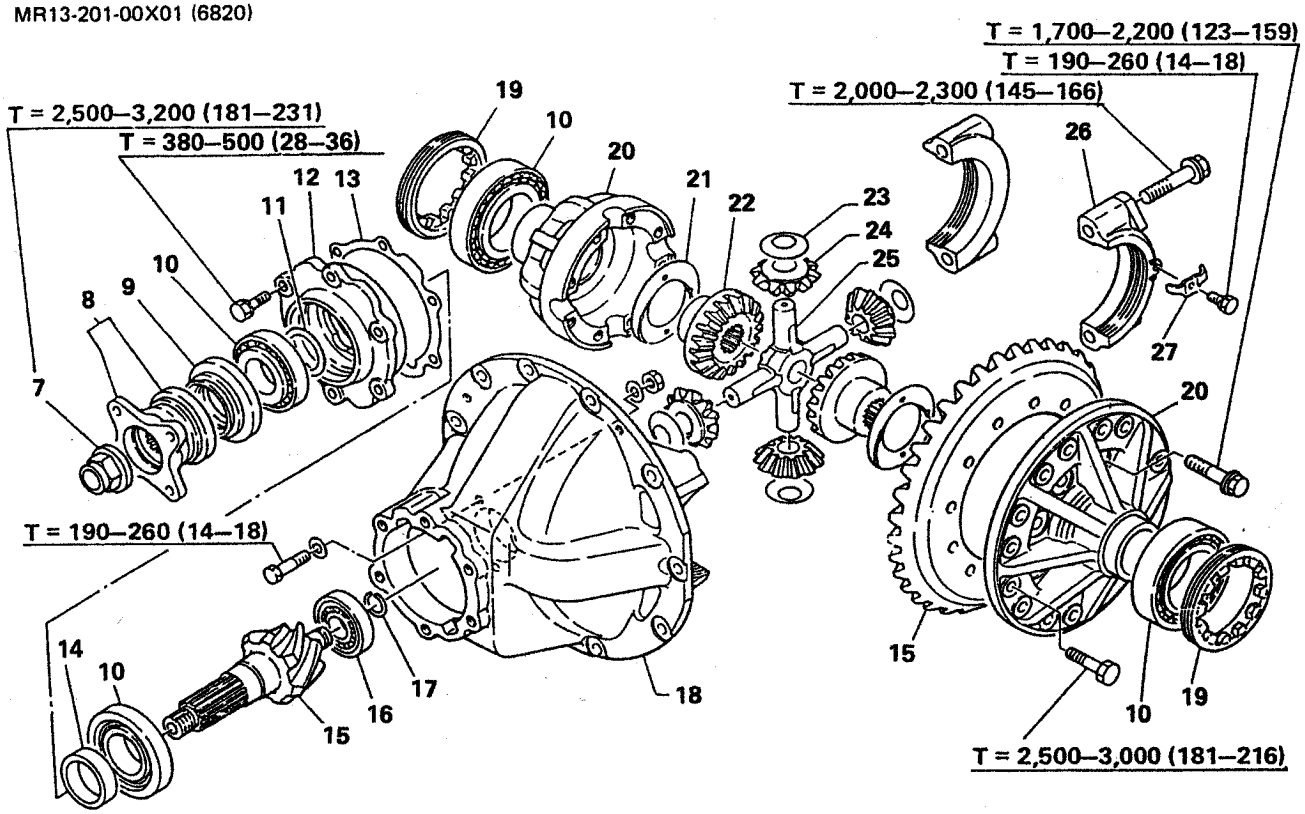


— For Front-engine model —



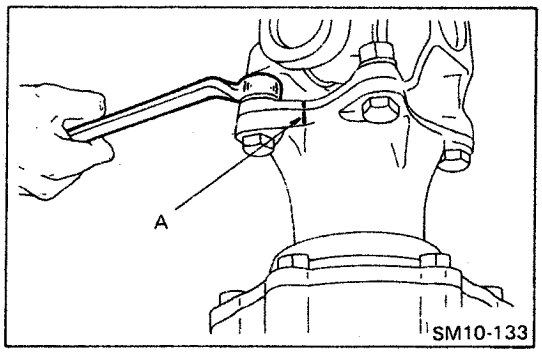
— For Rear-engine model —

MR13-201-00X01 (6820)



T = Tightening torque: kg·cm (lb.ft)

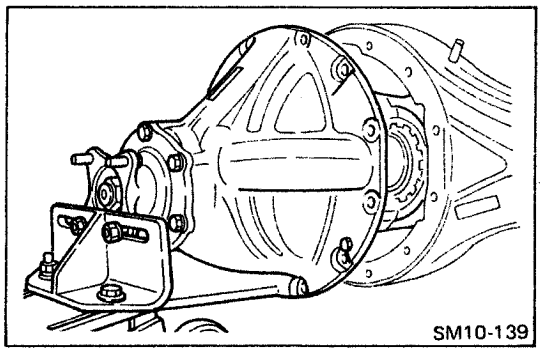
1. Differential carrier assembly
2. Air bleather
3. Oil filler plug
4. Gasket
5. Axle housing assembly
6. Oil drain plug
7. Lock nut
8. Flange yoke coupling
9. Oil seal
10. Taper roller bearing
11. Adjusting shim
12. Bearing cage
13. Adjusting shim
14. Bearing spacer
15. Spiral bevel gear
16. Cylindrical roller bearing
17. Retainer ring
18. Differential carrier case
19. Adjusting nut
20. Differential case assembly
21. Side gear trust washer
22. Side gear
23. Pinion thrust washer
24. Pinion gear
25. Spider
26. Bearing cap
27. Lock plate



IMPORTANT POINT (S) – DISMOUNTING

DISCONNECT THE PROPELLER SHAFT.

NOTE: Apply an aligning mark A before disassembling.

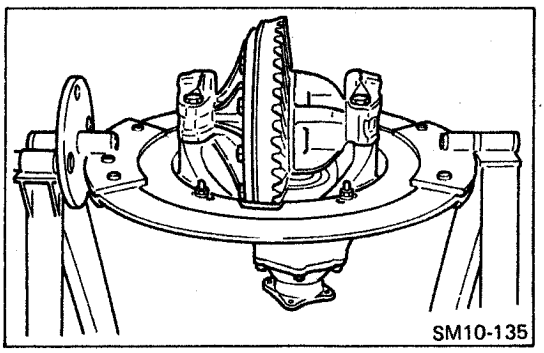


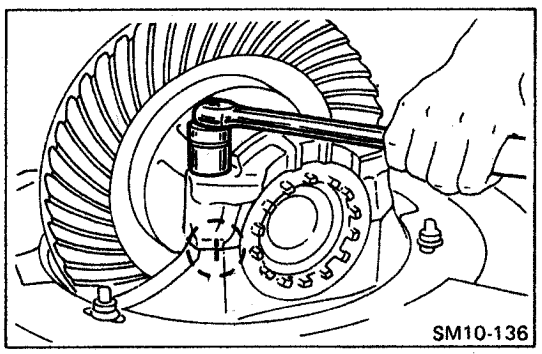
DISMOUNT THE DIFFERENTIAL CARRIER ASSEMBLY.

1. Drain the gear oil and remove the axle shaft.
2. Using a jack, dismount the differential carrier assembly.

IMPORTANT POINT (S) – DISASSEMBLY

MOUNT THE DIFFERENTIAL CARRIER ASSEMBLY ON A WORK STAND.

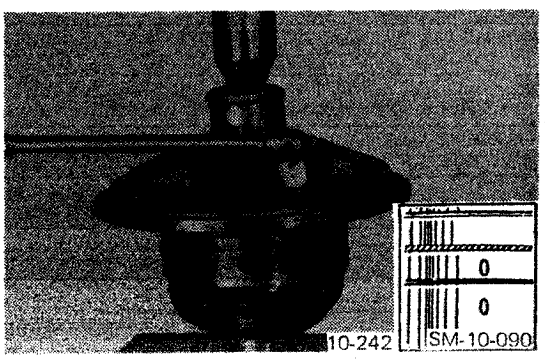




DIFFERENTIAL CASE

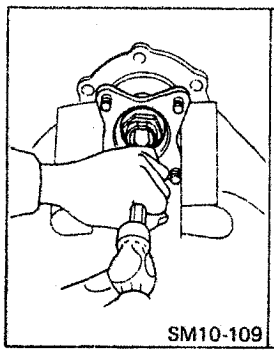
1. Remove the bearing cap.

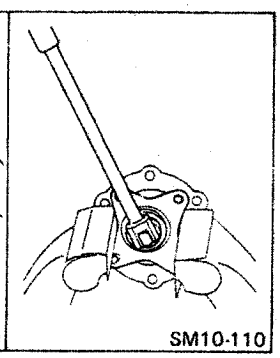
NOTE: Confirm the aligning mark on the cap and carrier case. If no mark is seen, apply an aligning mark before disassembling.



2. To remove the taper roller bearing. Using a puller.
3. Disassemble the differential case.

NOTE: Be sure to check the aligning marks on the differential case before disassembly.


SM10-109

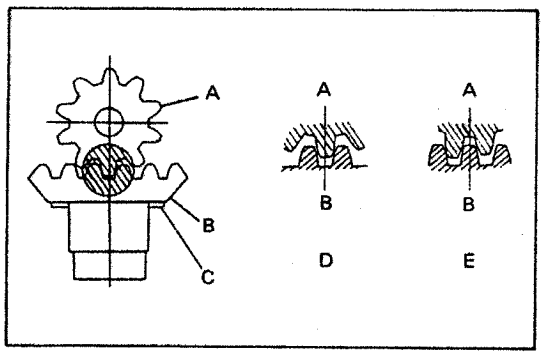

SM10-110

PINION CASE

1. Unlock the staked parts of the lock nut and remove the nut.

Special Tool: Socket Wrench (09839-3606)

2. To remove the inner taper roller bearing and cylindrical roller bearing, use a puller.



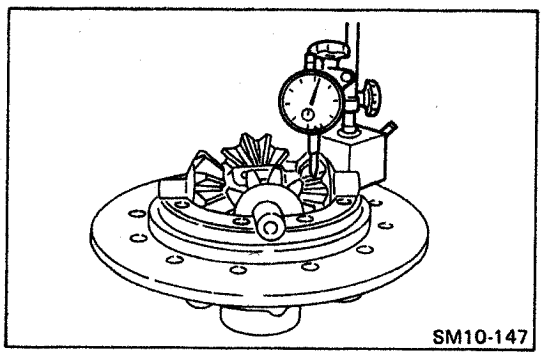
IMPORTANT POINT (S) – ASSEMBLY

DIFFERENTIAL CASE

1. Measure the pinion backlash.

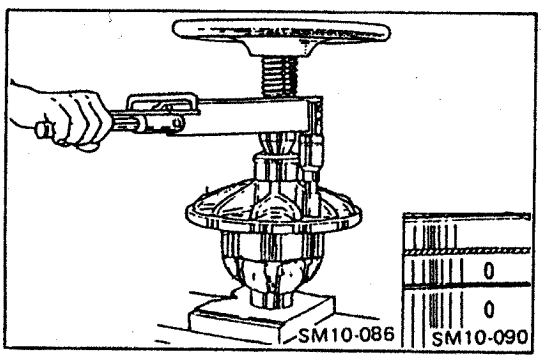
NOTE: ○ Be sure to set the chamfering side of the thrust washer for the side gear face to the gear side.
○ Gear meshing should be as D.

A: Pinion
B: Side gear
C: Thrust washer
D: Correct mesh
E: Incorrect mesh


SM10-147

2. If the backlash is more than service limit, replace the thrust washer for side gear and/or for pinion.

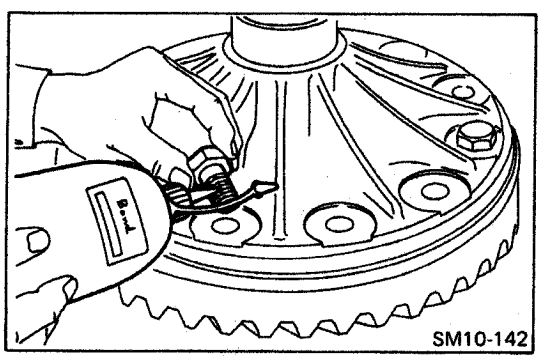
Assembly standard: 0.20 – 0.60 mm (0.0079 – 0.0236 in)
Service limit: 0.9 mm (0.354 in)


SM10-086

SM10-090

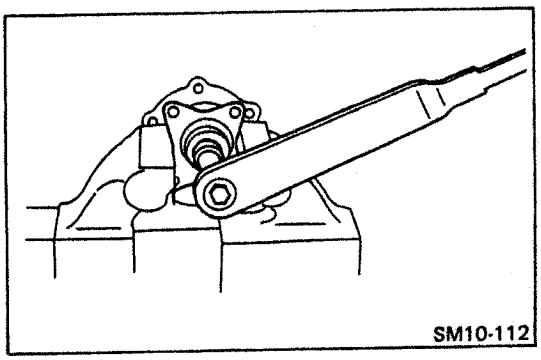
3. Assemble the differential case.

NOTE: ○ Coincide these aligning marks when assembling.
○ Apply the adhesive (THREE BOND 1360K or equivalent) on the bolt threads.


SM10-142

4. Install the ring gear to the differential case and tighten them with bolts.

NOTE: Apply the adhesive (THREE BOND 1360K or equivalent) on the bolt threads.

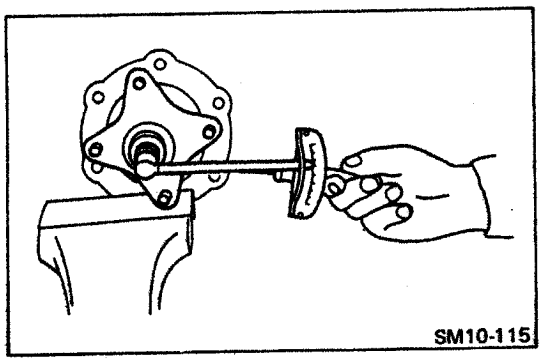

SM10-112

PINION BEARING PRELOAD ADJUSTMENT

1. Assemble pinion case and tighten the flange yoke coupling provisionaly.

NOTE: The oil seal be set in the pinion after measurement of the preload.

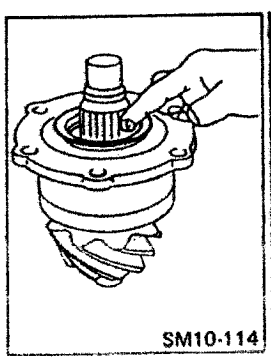
Special Tool: Socket Wrench (09839-3606)

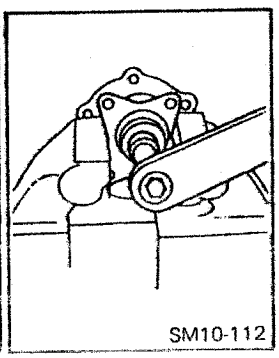

SM10-115

2. Using the torque wrench, measure the preload of the bearings and if the preload is out of specific value shown below, adjust by shims.

Assembly standard: Starting torque
New bearing: 20 – 25 kg·cm (1.4 – 1.8 lb.ft)
Re-used bearing: 15 – 20 kg·cm (1.1 – 1.4 lb.ft)

Adjusting shim thickness: 0.40 mm (0.0157 in)
0.45 mm (0.0177 in)
0.50 mm (0.0197 in)


SM10-114


SM10-112

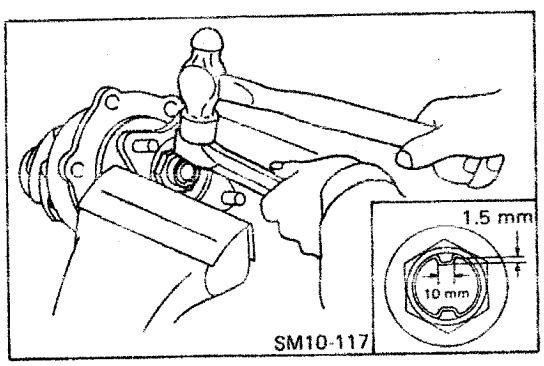
3. After adjusting the preload install the new oil seal.

NOTE: Apply the wheel bearing grease for oil seal lip part.

4. Install the flange yoke coupling and tighten the lock nut.

Special Tool: Socket Wrench (09839-3606)

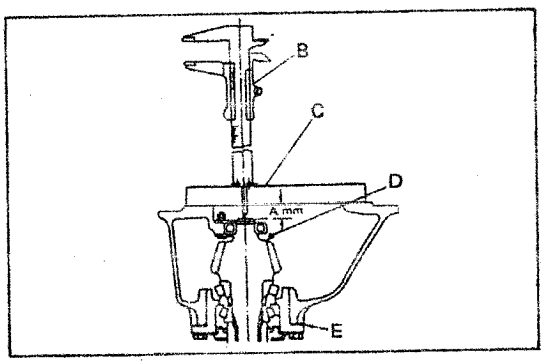
5. Measure the preload and record it for measuring the total preload at the differential carrier bearings later.



SM10-117

6. Caulk the lock nut.

NOTE: ○ More than 1.5 mm (0.06 in)
○ Caulked portion shall be fitted in the groove thoroughly.
○ Caulking shall be done wihtout rift.

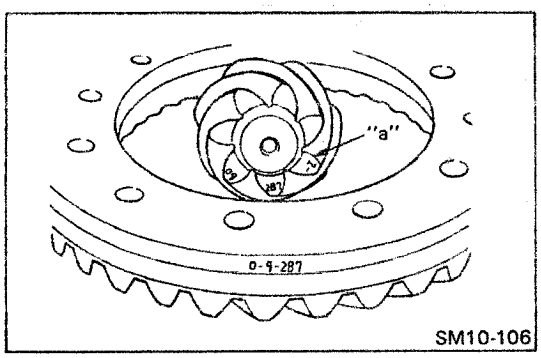


ADJUSTMENT OF PINION FITTING HEIGHT (CONICAL DISTANCE)

1. Install the pinion case assembly and adjust the height "A" by the shims "E".

Standard pinion height: 24.25 mm (0.954 in)

A: Pinion Height
B: Vernier calipers
C: Straight edge
D: Engraved value for gear toothing adjustment
E: Adjust shims



SM10-106

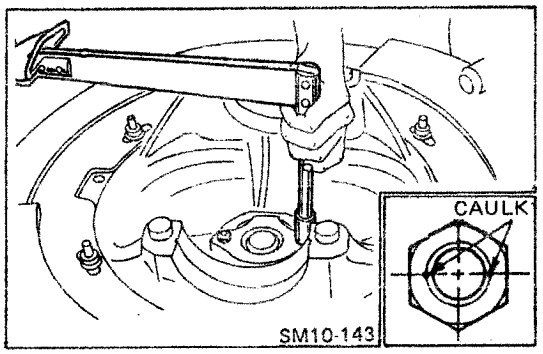
EXAMPLE: If the engraved value at the surface of the pinion gear is –2 (–2 means –0.2 mm).

The engraved value "a"

24.25 mm – 0.2 mm = 24.05 mm

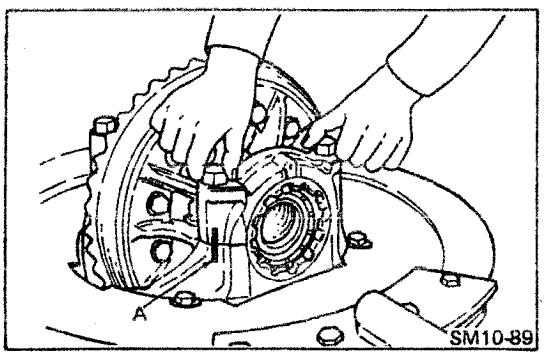
Measuring part A

Standard pinion height



SM10-143

2. Install the bearing lock plate and caulk the lock nut as shown.

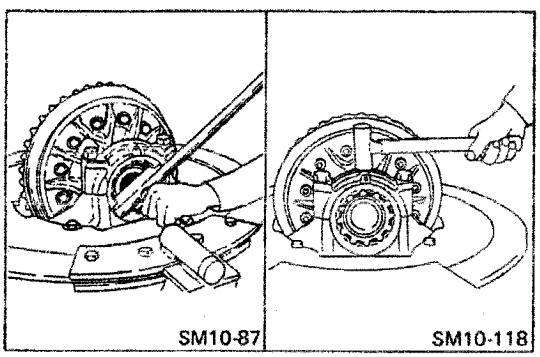


SM10-89

ADJUSTMENT OF SPIRAL BEVEL GEAR BACKLASH

1. Set the differential case assembly on the carrier case and install the adjusting nut and bearing cap.

NOTE: Coincide these aligning marks A.

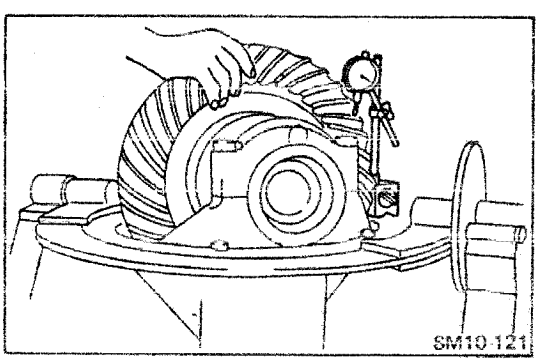

SM10-87

SM10-118

2. Adjust the preload of the side bearing provisionally.
   1) Tightening the adjusting nut, fully then loosen the adjusting nut by 1/4 + 1 notch.

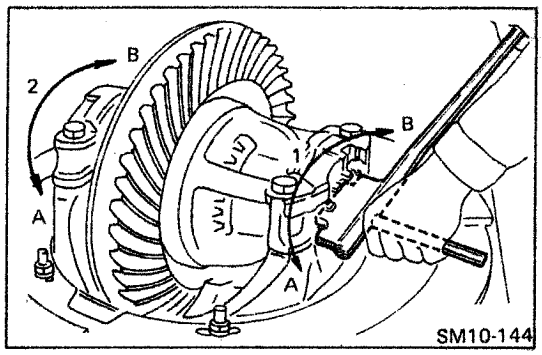
Special Tool: Adjuster Tool (09665-1190)

   2) Hit the bearing cap by copper hammer.


SM10-121

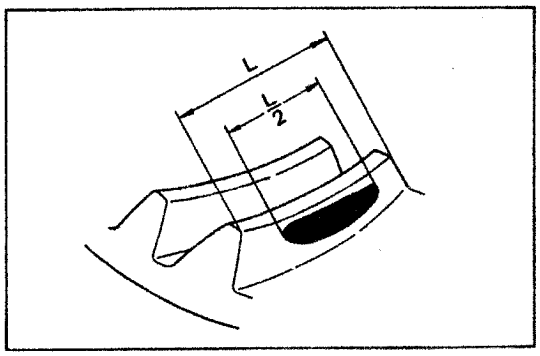
3. Measure the gear backlash for four points.

Assembly Standard: 0.20 – 0.25 mm (0.0079 – 0.0098 in)



4. Adjust the backlash by turning the adjusting nuts.
   Turn the both nuts by same angle.
   BACKLASH: A – Decrease B – Increase

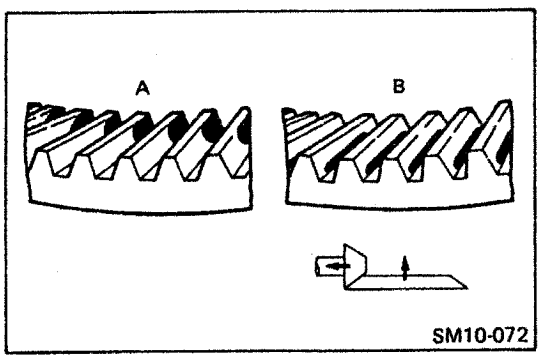
Special Tool: Adjuster Tool (09665-1190)



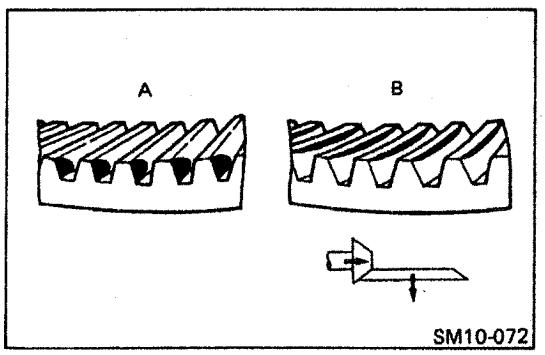
INSPECTION AND ADJUSTMENT OF GEAR MESHING.

1. Satisfactory gear meshing.

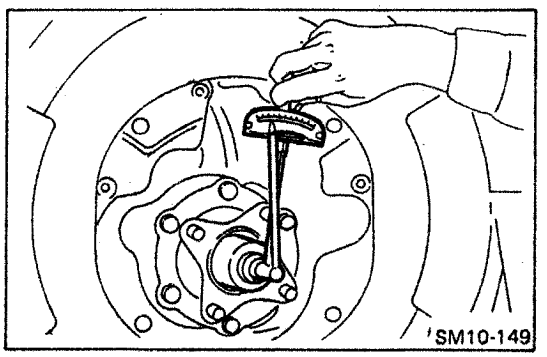
NOTE: There is remaining blade-applying mark at the lapping time of new part (spare part), thus make adjustment of the same blade-application as that of the remained mark.



2. Example of the unsatisfactory engagement.
   1) Toe and Flank contact.
      A: Toe contact – Replace
      B: Flank contact – Adjust



   2) Heel and face contact.
      A: Heel contact – Replace
      B: Face contact – Adjust.



MEASURE AND ADJUST OF DIFFERENTIAL CARRIER BEARING AND SIDE BEARING.

1. Measure and adjust the total preload at the differential carrier bearings.

NOTE: Total preload = pinion bearing preload (Refer to item 5 in page DC-08) + side bearing preload (Refer to the table below).

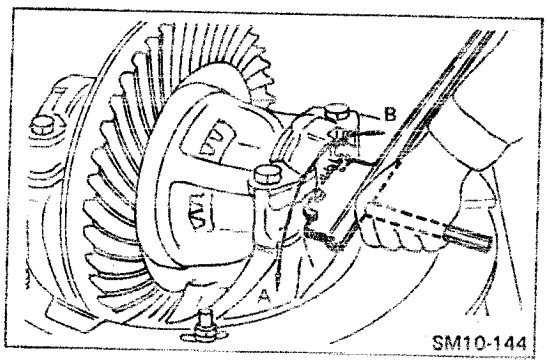
   1) Using a torque wrench.

Assembly standard: Starting torque

Unit: kg-cm (lb.ft)

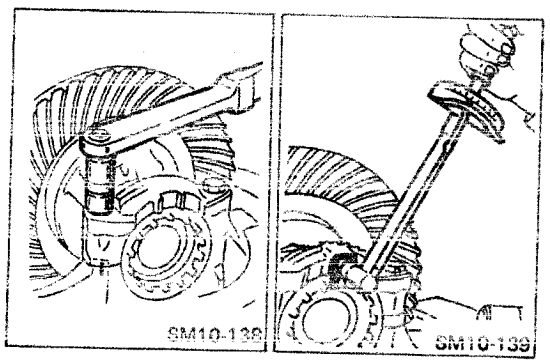
Gear ratio	4.100	5.857	6.142
New bearing	3.66 – 4.87 (0.265 – 0.352)	2.57 – 3.14 (0.186 – 0.246)	2.45 – 3.25 (0.177 – 0.235)
Re-Used bearing	2.44 – 3.65 (0.177 – 0.264)	1.71 – 2.56 (0.124 – 0.185)	1.63 – 2.44 (0.118 – 0.176)

NOTE: The gear ratio is indicated on the bearing cage.

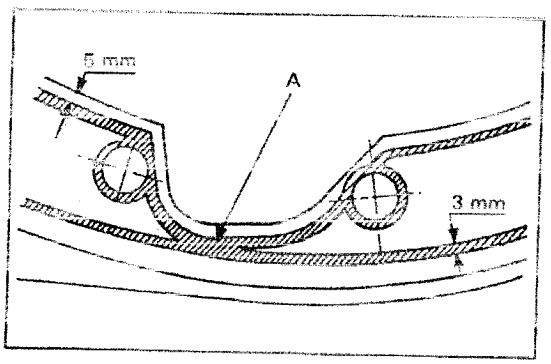


2. Adjust the side bearing preload.
PRELOAD: A – Decrease B – Increase

Special Tool: Adjuster Tool (09665-1190)



3. Tighten the bearing cap and install the lock plate.



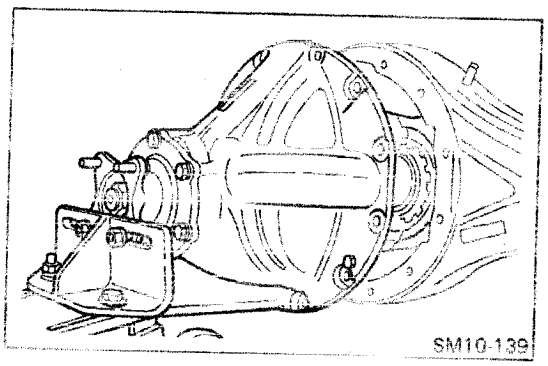
IMPORTANT POINT (S) – MOUNTING

MOUNTING

1. Apply a sealing compound on the face of housing flange.

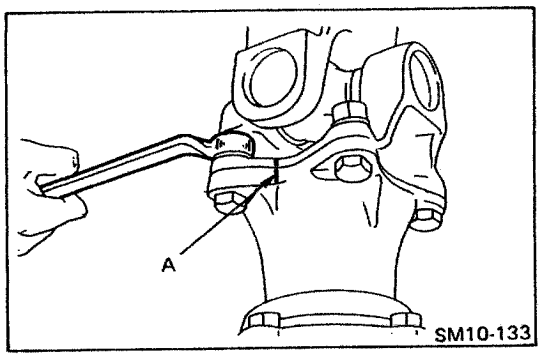
NOTE: ○ The trace of the sealing compound should not be discontinued.
○ Applying width should be approx. 3 mm, 5 mm away from the edge.

A: Sealing Compound



2. Using a jack, install the differential carrier assembly to the axle housing.

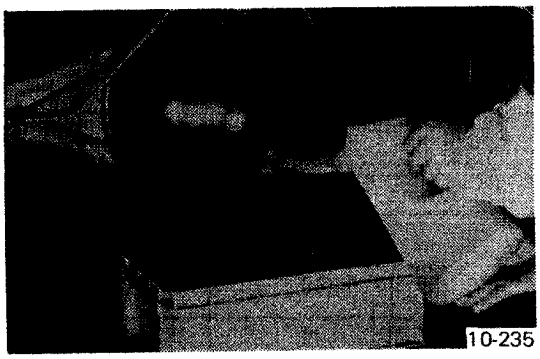
NOTE: Place the carrier assembly so that the ring gear teeth face toward the Right-hand side of vehicle.



3. Connect the propeller shaft.

NOTE: Coincide these aligning marks A.

Tightening torque: ϕ12 bolt – 650 – 870 kg·cm (47 – 62 lb.ft)
ϕ14 bolt – 1,300 – 1,600 kg·cm (94 – 115 lb.ft)
ϕ16 bolt – 1,700 – 2,300 kg·cm (123 – 166 lb.ft)

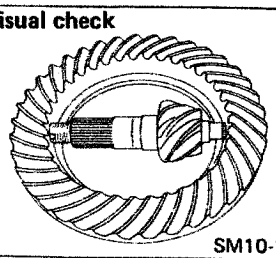
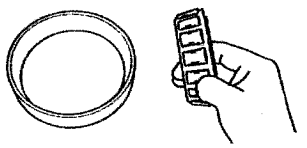
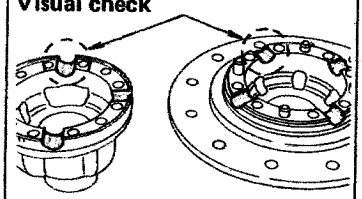
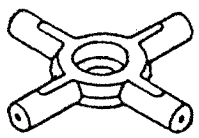
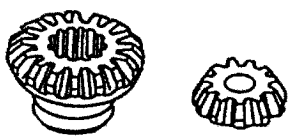
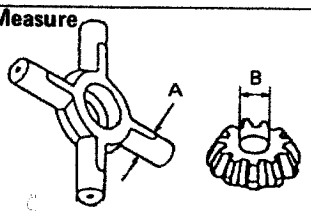
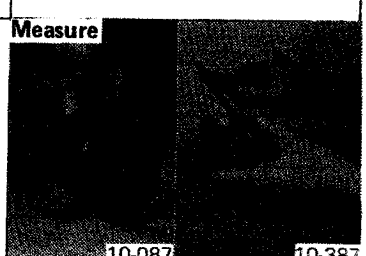


4. Fill the axle housing with specified gear oil up to the filler plug hole.

NOTE: Refer to recommended lubricants list.

INSPECTION AND REPAIR

Unit: mm (in)

Inspection Item	Standard	Limit	Remedy	Inspection Procedure
Pinion and Ring Gear Wear and Damage			Replace, if necessary	Visual check  SM10-154
Bearing and Race Burns or Pitting			Replace, if necessary	Visual check  SM11-064 SM11-063
Differential Case Spider Holes Wear and Damage			Replace, if necessary	Visual check  SM10-137
Spider Wear and Damage			Replace, if necessary	Visual check 
Differential Side Gear and Pinion Gear Wear or Damage			Replace, if necessary	Visual check 
Spider and Pinion Clearance	B—A: 0.145—0.19 mm (0.006—0.007 in)	0.4 mm (0.016 in)	Replace	Measure 
Thrust Washers Thickness	For Side Gear 2.1—1.9 (0.083—0.075) For Pinion Gear 1.7—1.5 (0.067—0.059)	—	Replace	Measure  10-087 10-383

RA-82E-01

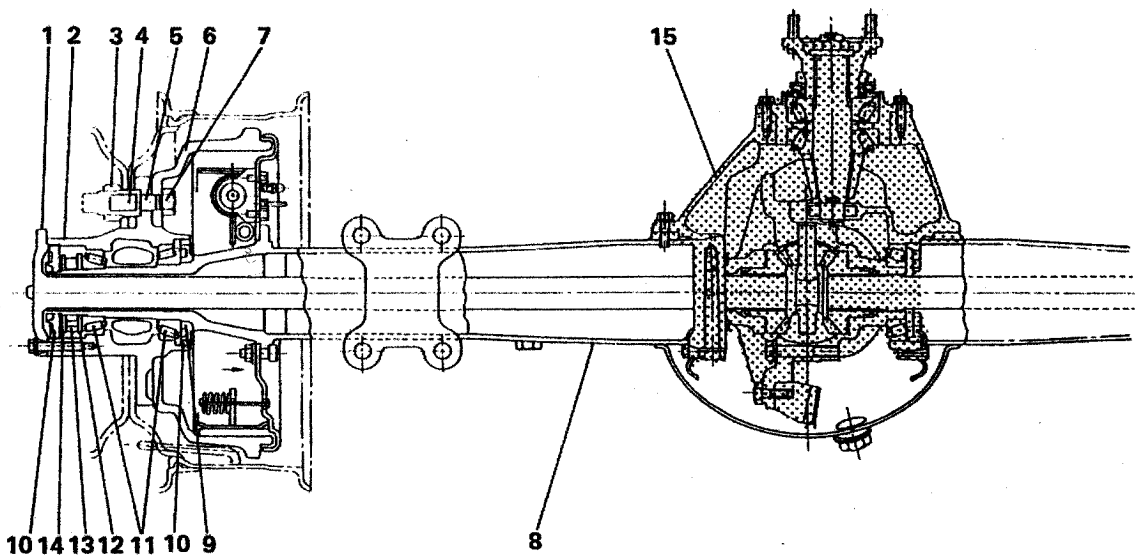
CHAPTER RA

REAR AXLE

DATA AND SPECIFICATIONS

1. Type	Full-floating axle shaft.
2. Housing	Banjo type, with extension tubes welded on both ends.
3. Type of drive	Hotchikiss drive.

DESCRIPTION



1. Axle shaft
2. Wheel hub
3. Wheel nut outer
4. Wheel nut inner
5. Hub bolt
6. Brake drum
7. Hub bolt nut
8. Axle housing
9. Oil seal collar
10. Oil seal
11. Taper roller bearing
12. Lock washer
13. Lock nut
14. Lock plate
15. Differential carrier ass'y

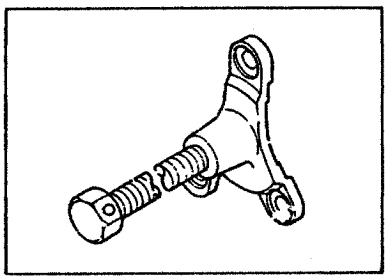
TROUBLESHOOTING

Symptom	Possible cause	Remedy/Prevention
Abnormal noise	**Bearing system**	
	• Worn or damaged pinion bearings	Replace bearings.
	• Worn or damaged differential side bearings	Replace bearings.
	• Loose pinion bearings	Adjust bearing preload.
	• Loose differential side bearings	Adjust bearing preload.
	Gear system	
	• Inadequate backlash on ring gear and pinion gear	Adjust backlash.
	• Worn thrust washers	Replace.
	• Worn differential spider	Replace.
	• Worn damaged ring gear and pinion	Replace.
	• Worn or damaged differential side gears and pinions	Replace.
	• Loose ring gear tightening bolts	Tighten bolts.
	• Inadequate tooth contact of ring gear and pinion gear	Replace or adjust tooth contact.
	• Worn pinion spline	Replace.
	Rear axle system	
	• Worn rear axle shaft spline	Replace.
	• Worn hub bearings	Replace.
	• Loose hub bearings	Adjust bearing preload.
	• Loose differential case tightening bolts	Tighten bolts.
	Oil system, etc.	
	• Insufficient oil	Add.
	• Poor oil quality	Change
	• Abnormal noise of propeller shaft	Refer to **CHAPTER 9 PROPELLER SHAFT.**

SPECIAL TOOL

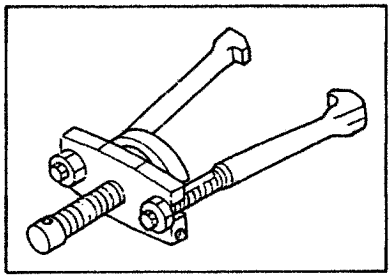
Prior to start of rear axle overhaul, it is necessary to have these special tools.

WHEEL HUB PULLER



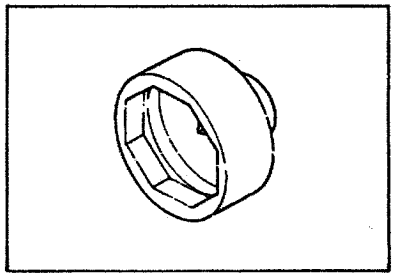
09650-2110

HUB BEARING PULLER



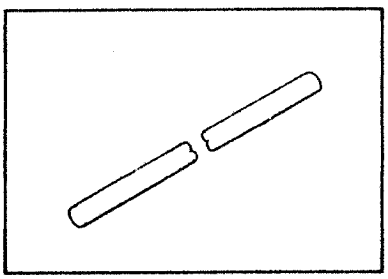
09650-2120

SOCKET WRENCH



09839-8203

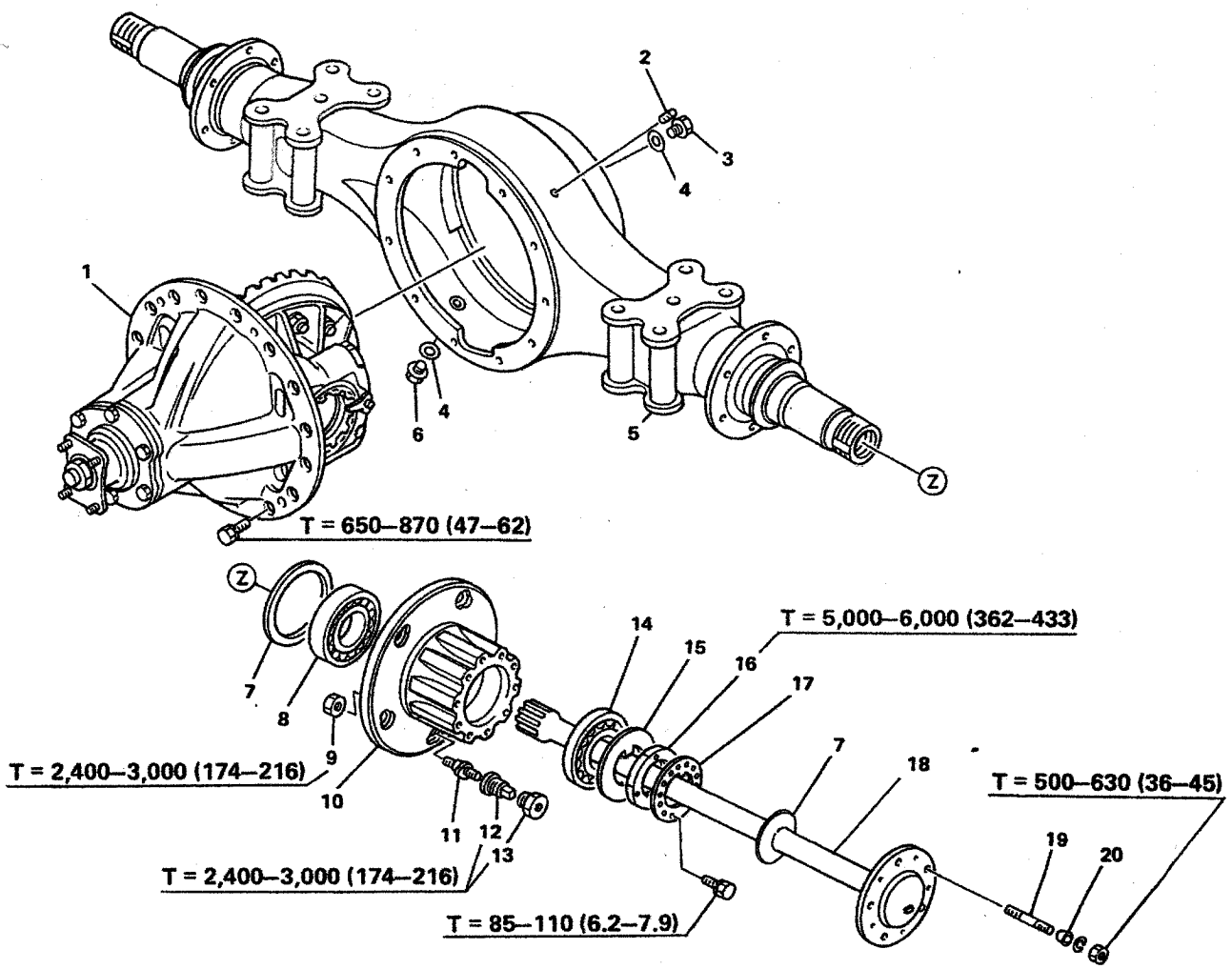
HANDLE



09849-2001

OVERHAUL

MR11-102-00-02
(6800)



T = Tightening torque: kg-cm (lb.ft.)

1. Differential carrier assembly
2. Air breather
3. Oil filter plug
4. Plug gasket
5. Rear axle housing assembly
6. Oil drain plug
7. Oil seal
8. Taper roller bearing (inner)
9. Hub bolt nut
10. Wheel hub
11. Hub bolt
12. Hub nut, inner
13. Hub nut, outer
14. Taper roller bearing (outer)
15. Lock washer
16. Lock nut
17. Lock plate
18. Axle shaft
19. Stud bolt
20. Taper coller


10-849

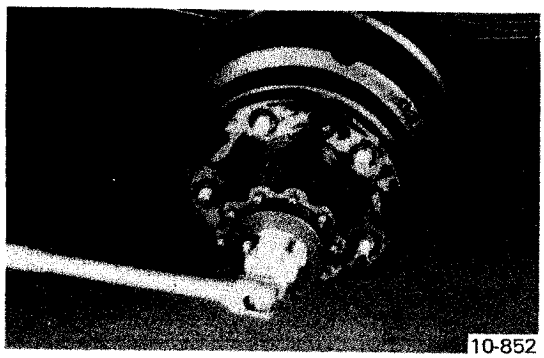

10-850

IMPORTANT POINT(S) – DISASSEMBLY

REMOVAL OF AXLE-SHAFT.

1. Loosen the axle shaft lock nuts, strike the axle shaft end with a hammer to remove the taper collers, then pull out the axle shaft.

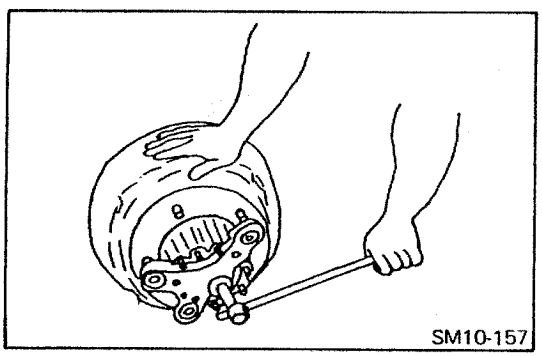
NOTE: When striking the axle shaft end, do not damage stud bolts.


10-852

REMOVAL OF WHEEL HUB BEARING LOCK NUT.

1. Remove the taper roller bearing lock nut using a special tool, and then remove the lock washer.

Special Tool: Hub nut wrench (09839-8203)

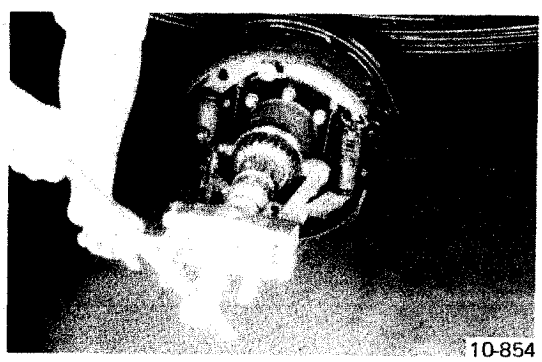

SM10-157

REMOVAL OF WHEEL HUB ASSEMBLY.

1. Using a special tool, remove the wheel hub with the outer taper roller bearing from the axle housing.

Special Tool: Wheel hub puller (09650-2110)
Handle (09849-2001)

NOTE: The wheel hub is heavy, therefore be careful to handle it.


10-854

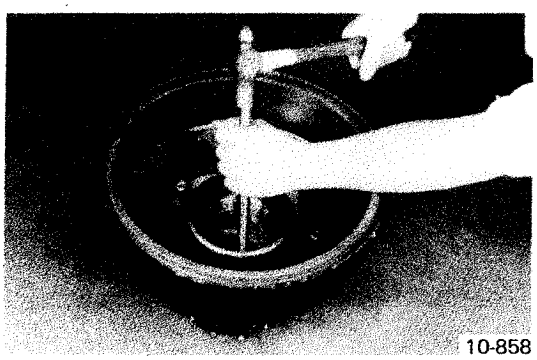
REMOVAL OF INNER TAPER ROLLER BEARING AND COLLAR.

1. Using a special tool, remove the inner taper roller bearing with oil seal collar from the axle housing.

Special Tool: Hub bearing puller (09650-2120)
Handle (09849-2001)

REMOVAL OF WHEEL BRAKE ASSEMBLY

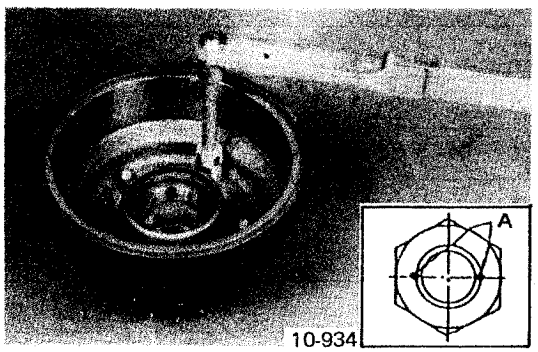
1. See chapter for SERVICE BRAKE.


10-858

IMPORTANT POINT (S) – ASSEMBLY

REPLACEMENT OF TAPER ROLLER BEARING RACE.

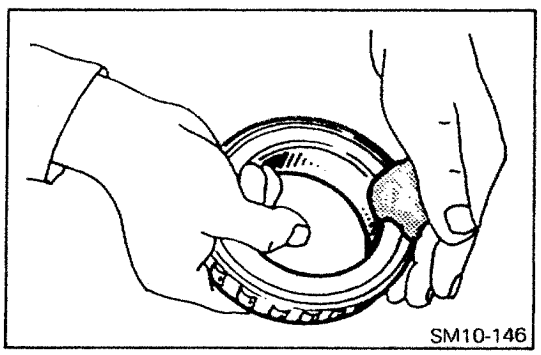
1. Remove the outer race of bearing by striking the race lightly and evenly through the 4 access holes in the wheel hub, using a tapping rod.
2. To install the outer race, use a tapping rod and a hummer or a press.



10-934

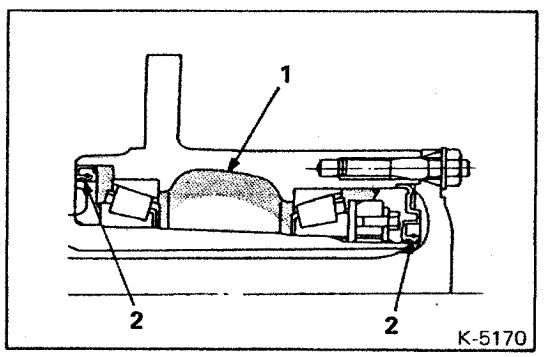
MOUNTING OF HUB BLOT.

NOTE: Satake the lock nuts at the two points after tightened to the specified torque.
A: Stake


SM10-146

GREASING

1. Pack enough wheel bearing grease between the bearing rollers.



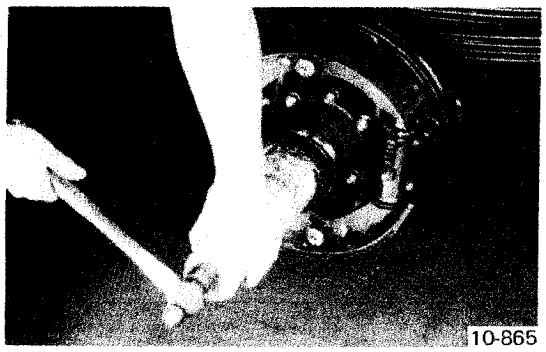
K-5170

2. Apply wheel bearing grease for the wheel hub 1 and lip part of the oil seal 2.

Hub grease capacity: 410 g (14.46 oz) per wheel

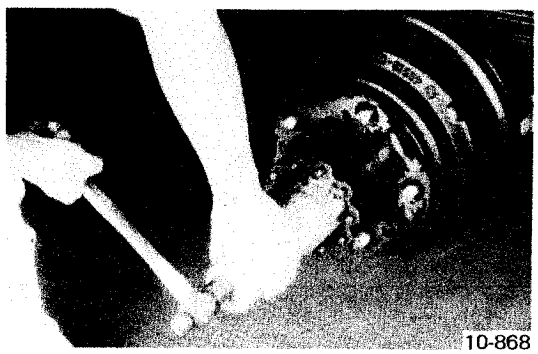
MOUNTING OF WHEEL BRAKE ASSEMBLY.

1. See chapter for SERVICE BRAKE.


10-865

INSTALLATION OF THE OIL SEAL COLLAR AND TAPER ROLLER BEARING.

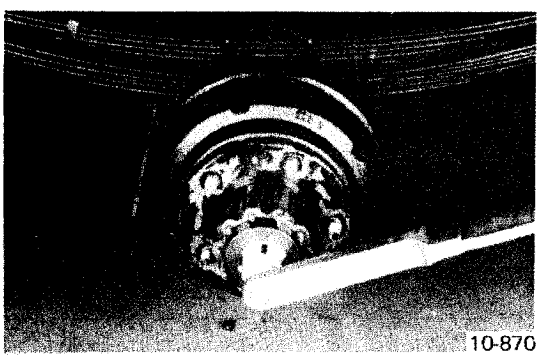
1. If the collar is warmed up with hot water, it can easily be installed.
2. Using a tool as shown, makes the work easier.


10-868

INSTALLATION OF WHEEL HUB ASSEMBLY.

1. Install the wheel hub assembly and taper roller bearing (outer).
2. Using a tool as shown, makes the work easier.

NOTE: **The wheel hub assembly is heavy, therefor be careful to handle it.**


10-870

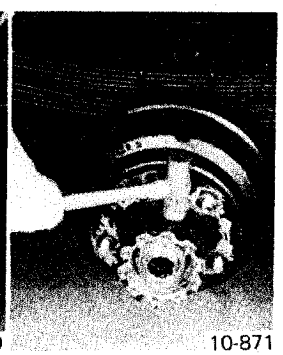
ADJSUTMENT OF WHEEL BEARING PRELOAD.

1. Tighten the nut using a special tool while turning the wheel hub.

Special Tool: Hub Nut Wrench **(09839-8203)**

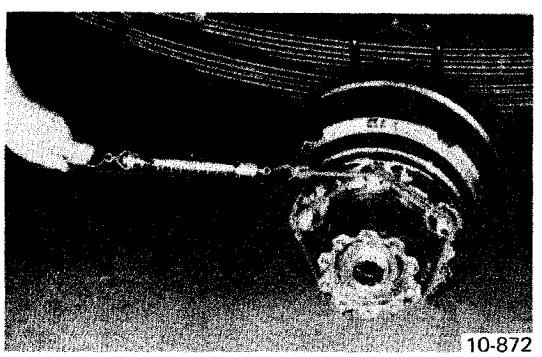
Tightening Torque: **5,000 – 6,000 kg-cm (362 – 433 lb.ft.)**


10-869


10-871

2. Loosen the lock nut by 1/4 to 1/3 turn.
   Then strike the wheel hub with a copper hammer.

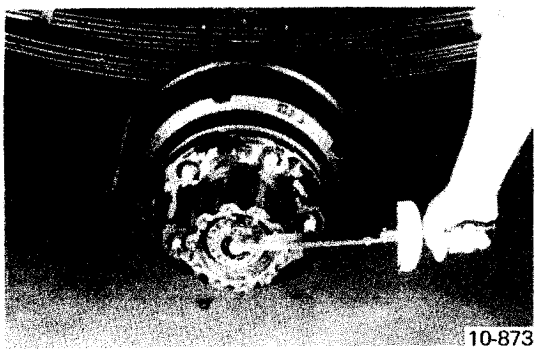
Special Tool: **Hub Nut Wrench (09603-8203)**


10-872

3. Measure the wheel bearing preload.
   Adjust the preload with the lock nut, if it exceeds or less than specification.

Starting Torque: **40 – 60 kg-cm (2.9 – 4.3 lb.ft.)**

Standard Preload: **3.9 – 5.9 kg (8.6 – 13.0 lb)**


10-873

INSTALLATION OF LOCK PLATE.

Install the lock plate to the lock nut.

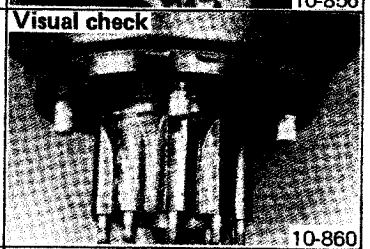
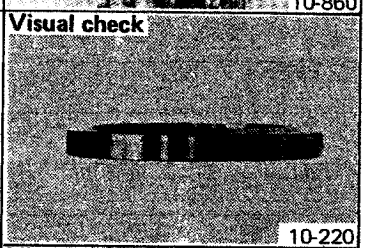
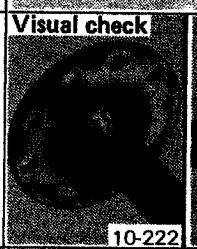
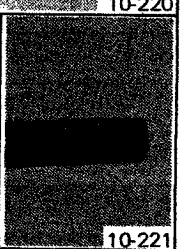
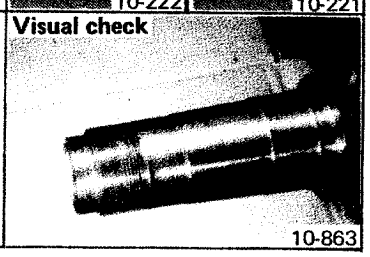
NOTE: ○ **If the holes of the plate are not aligned with screw holes of the nut, turn over the plate.**

○ **If alignment is still unattainable, loosen or tighten the lock nut within the specified wheel bearing preload.**

BRAKE SYSTEM AIR BLEEDING AND BRAKE SHOE CLEARANCE ADJUSTMENT.

1. On completion of the wheel hub and related parts reassembly, conduct the followings.
   a. Bleed the air from the brake lines according to the section BRAKE SYSTEM AIR BLEEDING in the chapter SERVICE BRAKE.
   b. Adjust the brake shoe clearance according to the section WHEEL BRAKE ADJUSTMENT in the chapter SERVICE BRAKE.

INSPECTION AND REPAIR

Inspection Item	Standard	Limit	Remedy	Inspection Procedure
Bearing Burns or Pitting			Replace, if necessary.	Visual check  10-185
Bearing Race Burns, Cracks and Brinelling			Replace, if necessary.	Visual check  10-856
Hub Bolts Worn or Damage			Replace, if necessary.	Visual check  10-860
Oil Seal Collar Wear			Replace, if necessary.	Visual check  10-220
Axle Shaft Wear or Damage			Replace, if necessary.	Visual check  10-222  10-221
Axle Tube Wear or Damage			Replace, if necessary.	Visual check  10-863

FA-50E-02

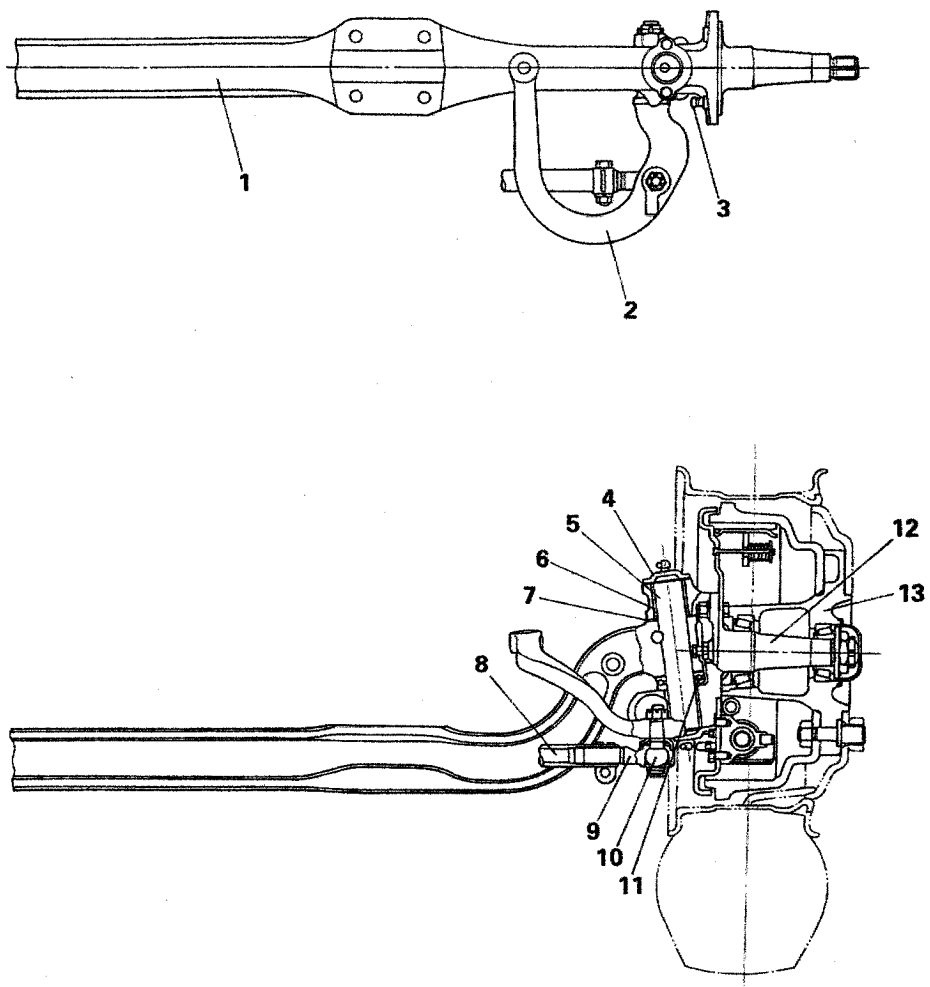
CHAPTER FA

FRONT AXLE

DATA AND SPECIFICATIONS

1. Type	Reversed Elliot "I" beam		
2. Axle beam material	Heat-treated carbon steel		
3. Wheel alignment, Toe in	1 – 3 mm (0.04 – 0.118 in)		
Camber	1°		
King pin angle	7°		
Caster	Without power steering	0°	
	With power steering	1°	
4. Knuckle turning angle (Tire size)	(7.00–16)	(7.50–16)	(225–80R)
Inner turn	50°	47°	47°
Outer turn	36°30′	35°	35°
5. King pin thrust bearing	Ball bearing or taper roller bearing		
6. Wheel bearings	Two tapered rollers		
7. Amount of grease in a hub	350 g (12.3 oz) at one wheel		

DESCRIPTION

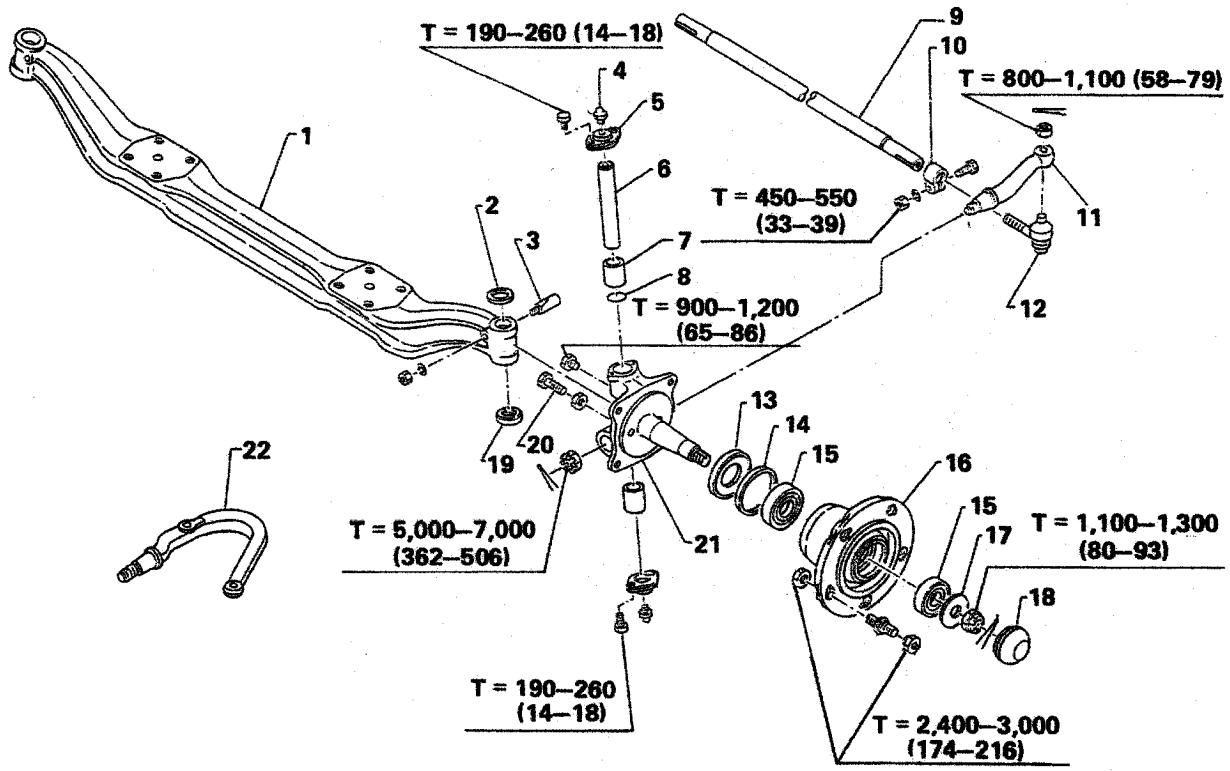


SM11-051

1. Axle beam
2. Knuckle arm
3. Stopper bolt
4. Grease cup
5. King pin
6. King pin bush
7. Thrust washer
8. Tie-rod
9. Tie-rod end
10. Ball stud
11. Thrust bearing
12. Knuckle
13. Wheel hub

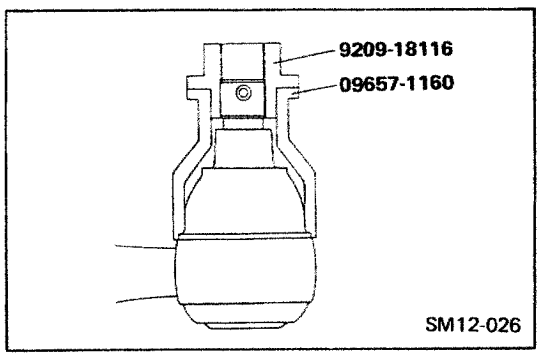
FRONT AXLE

MF11-201-00X01 (6600)
BF11-104-00X00X02



T = Tightening torque: kg-cm (lb.ft.)

1. Axle beam
2. Thrust washer
3. Lock pin
4. Lubricating fitting
5. Oil seal cover
6. King pin
7. Bushing
8. O-ring
9. Tie rod
10. Clamp
11. Tie rod arm
12. Tie rod end assembly
13. Oil seal guide
14. Oil seal
15. Tapered roller bearing
16. Wheel hub
17. Washer
18. Hub cap
19. Thrust bearing
20. Stopper bolt
21. Knuckle
22. Knuckle arm

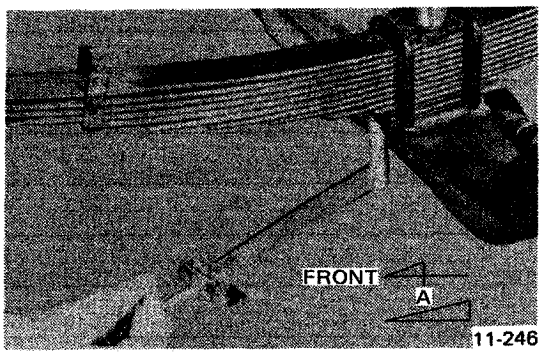


IMPORTANT POINT (S) – ASSEMBLY

1. Install the dust cover.

NOTE: Fill in the sufficient grease into dust cover.

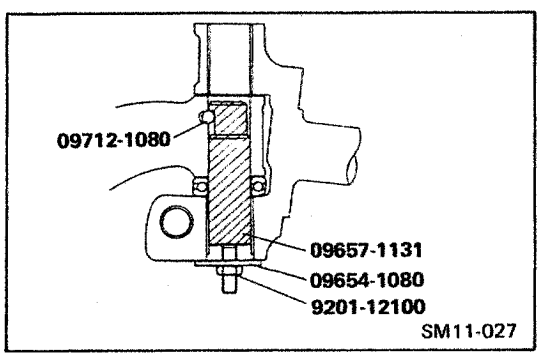
Special Tool: 9209-14142, 09657-1420



2. Secure the axle to the leaf springs by means of "U" bolt.

NOTE: Confirm the direction of caster shim. (With power steering)

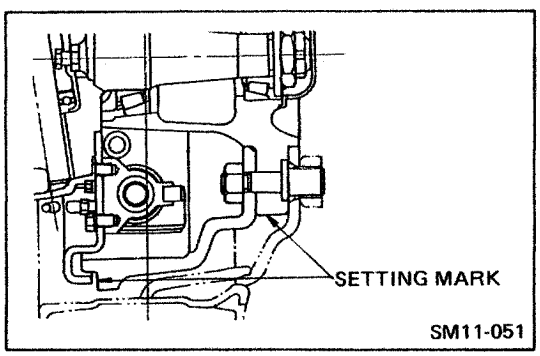
Caster shim A: With power steering.
Non Caster Shim: Without power steering.



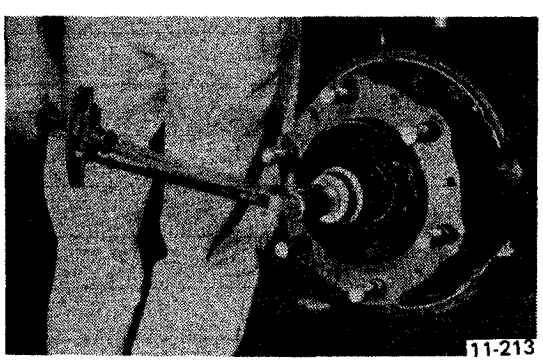
3. Adjust the clearance between thrust washer and knuckle. Adjust by thrust washer.
Thickness of the thrust whaser: 1.9, 2.0, 2.1, 2.2, 2.3, 2.4, 2.5, 2.6 mm (0.0748, 0.0787, 0.0827, 0.0866, 0.0906, 0.0945, 0.0984, 0.1024 in).

Standard Clearance: Less than 0.1 mm (0.00393 in)

Special Tool: 09657-1131, 09654-1080
09712-1080, 9201-12100



4. Align the setting marks on the drum and wheel hub.



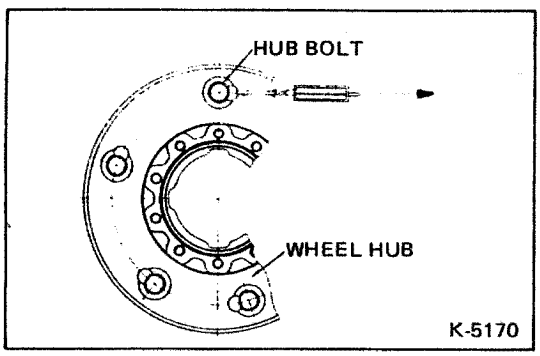
MEASURE THE WHEEL BEARING PRELOAD.

1. Tighten the nut while turning the wheel hub.

Tightening torque: 1,100 – 1,300 kg·cm (80 – 93 lb.ft.)

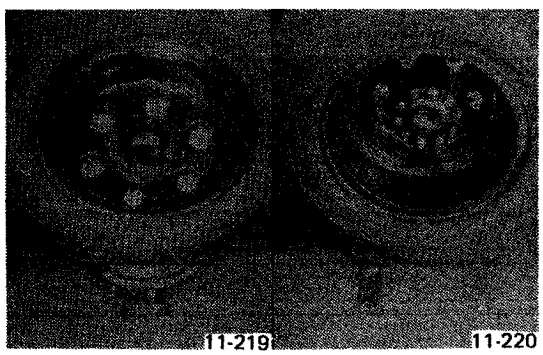

11-214

2. Make 1/6 ~ 1/4 return-rotation for the nut, and tap the hub by a copper hammer.



3. Adjust the preload with the lock nut, if it exceeds specifications.

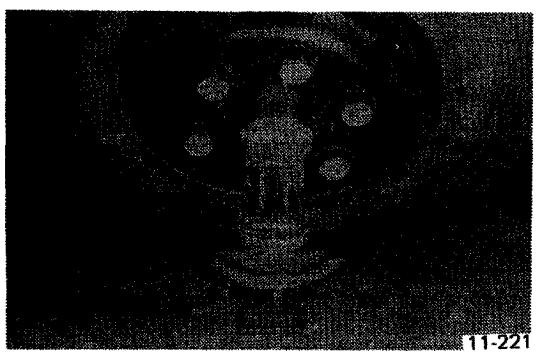
Standard Preload: 1.8 – 4.4 kg (4.0 – 9.7 lb)


11-219

11-220

INSPECT THE FRONT WHEEL ALIGNMENT.

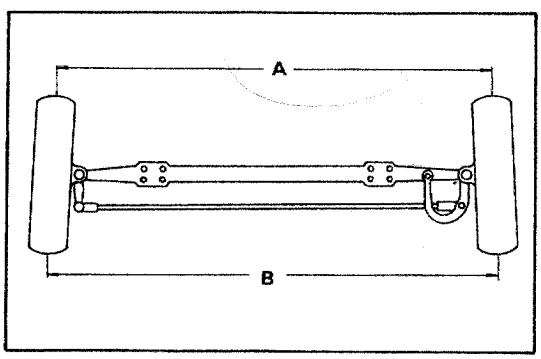
1. Park the vehicle on a level surface and check the tire pressure.


11-221

2. King pin inclination, Caster, and Camber.

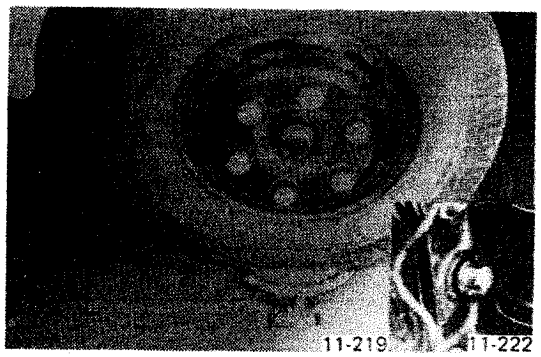
Kingpin Inclination: 7°

	AB	FB, RB
Caster:	**1°, 0° (Without power steering)**	
	1° (With power steering)	
Camber:	**1°**	



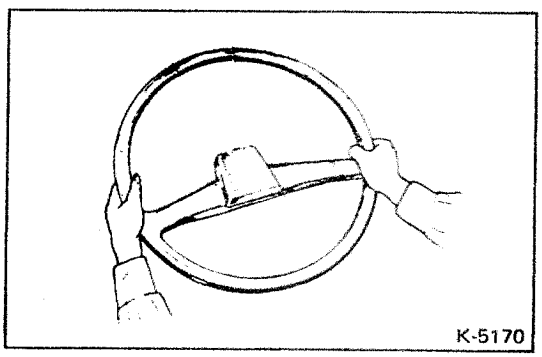
3. Check the toe-in

B – A: 1.0 – 3.0 mm (0.0394 – 0.118 in)



4. Adjust the wheel turning angle.
Adjust by stopper bolts.

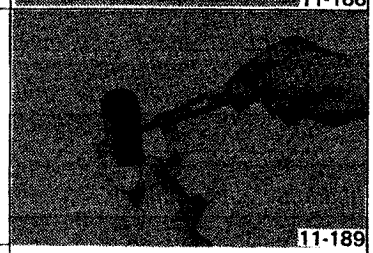
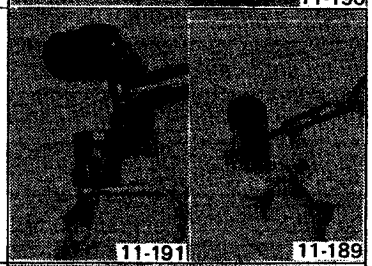
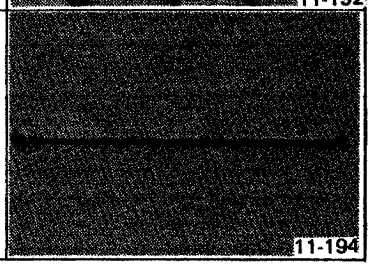
Tire Size	7.00–16	7.50–16	225–80R
Inside	50°	47°	
Outside	36°30′	35°	



5. Turn the steering wheel to the full rang of right and left, and confirm there is no contact of each linkage (especially between ball stud and ball stud socket).

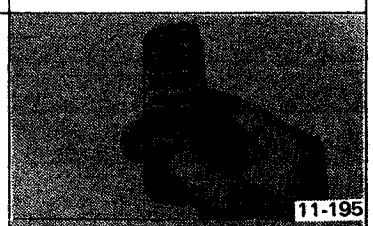
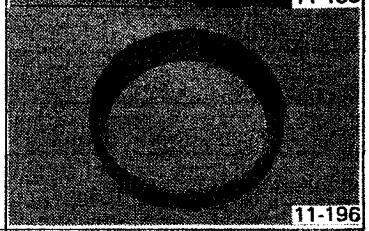
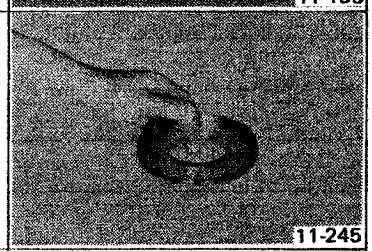
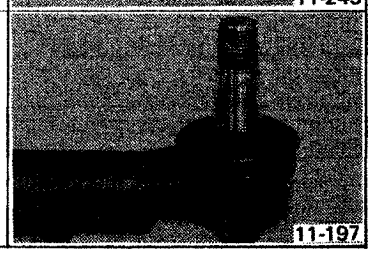
INSPECTION AND REPAIR

Unit: mm (in)

Inspection Item	Standard	Limit	Remedy	Inspection Procedure
Kingpin Wear or Damage			Replace, if necessary	Use the magnetic flaw derector or color checking instrument.  11-188
Kingpin Diameter	35 (1.378)	34.85 (1.373)	Replace	 11-189
Knuckle Wear or Damage			Replace, if necessary	Use the magnetic flaw derector or color checking instrument.  11-190
Kingpin Clearance	0.025–0.08 (0.001–0.0031)		Replace	 11-191 11-189
Thrust Bearing Burns or Pitting			Replace, if necessary.	 11-192
Tir-rod Distortion			Replace, if necessary.	 11-194

INSPECTION AND REPAIR

Unit: mm (in)

Inspection Item	Standard	Limit	Remedy	Inspection Procedure
Bearing and Race Burns or Pitting			Replace, if necessary.	 11-195  11-196
Oil Seal Collar Wear			Replace, if necessary.	 11-245
Dust Cover Wear			Replace, if necessary	 11-197

SR-78E-01

CHAPTER SR

STEERING

BC6410400X05
BC6550600X03
MZ6410000X15

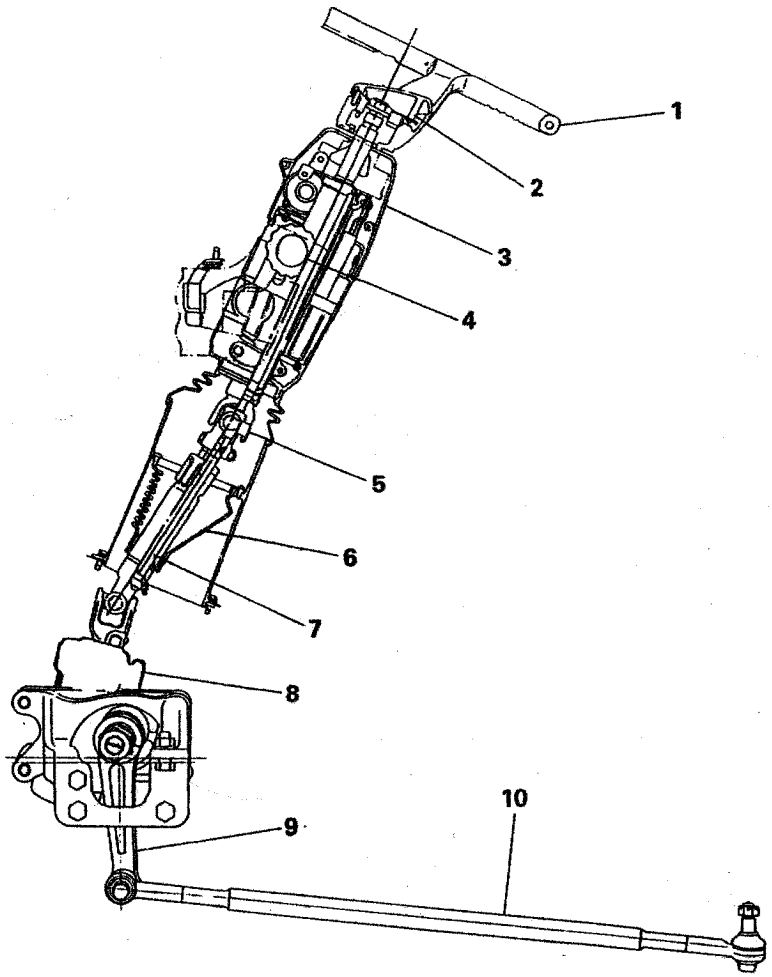
TROUBLESHOOTING

Symptom	Possible causes	Remedy
Hard steering or poor return of steering wheel to center.	Bent steering shaft, sliding shaft or column.	Replace parts.
	Universal joint oscillates or catches.	Replace universal joint in the assembly.
	Column bearing does not revolve or catch.	Replace parts.
	Lack of lubrication in steering linkage	Lubricate.
	Wheel alignment is incorrect.	Refer to **CHAPTER 11 "FRONT AXLE".**
	Power steering system is faulty.	Refer to **CHAPTER 67 "POWER STEERING".**
	Tire air pressure is too low.	Adjust properly.
Steering wheel shimmies.	Steering system linkage is loose.	Tighten properly.
	Too much wear or play in steering linkage (spline and ball joints).	Replace parts.
	Other front axle problems.	Refer to **CHAPTER 11 "FRONT AXLE".**
	Power steering gear badly adjusted.	Refer to **CHAPTER 67 "POWER STEERING".**
	The tires out of balanced.	Balance tire.
	Tire runout is off.	Correct runout.
	Tire air pressure not unifom or sufficient	Adjust tire pressure.
	Distorted disc wheel.	Replace parts.
Abnormal noises.	Lack of lubrication in steering linkage	Lubricate.
	Power steering system is faulty	Refer to **CHAPTER 67 "POWER STEERING".**

STEERING LINKAGE

DESCRIPTION

00455–1720

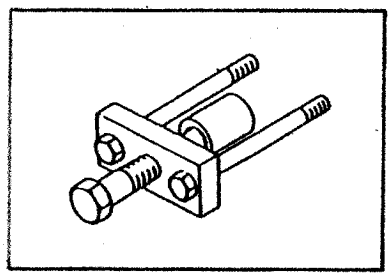


1. Steering wheel
2. Horn button assembly
3. Steering column cover
4. Column adjusting knob
5. Universal joint
6. Steering shaft dust cover
7. Sliding shaft
8. Steering gear unit
9. Pitman arm
10. Drag link

SPECIAL TOOL

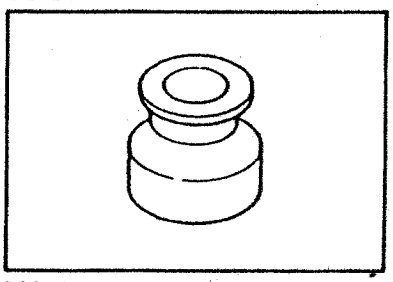
Prior to starting a steering linkage overhaul, it is necessary to have these special tools.

STEERING WHEEL PULLER



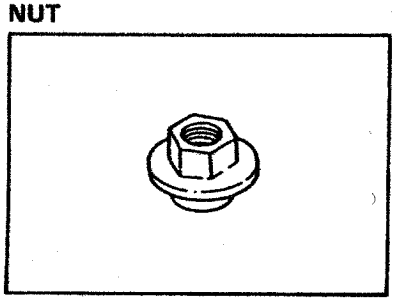
09650-1340

GUIDE



09657-1420

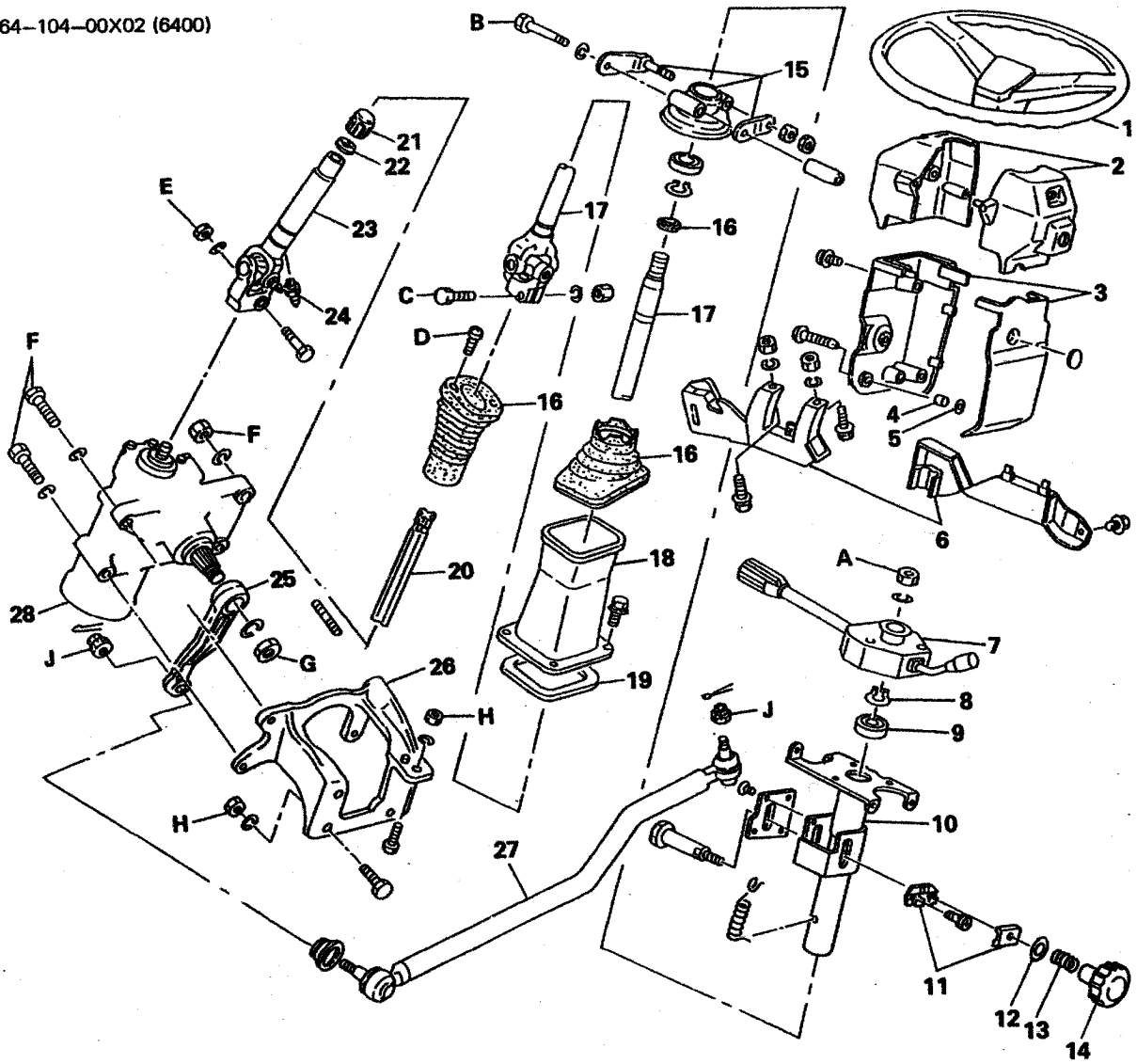
NUT



920914-142

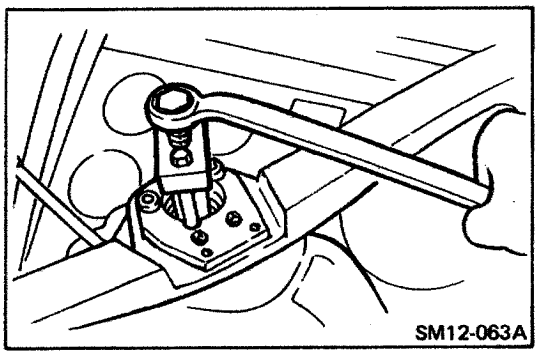
OVERHAUL

BC64–104–00X02 (6400)



1. Steering wheel
2. Column cover upper
3. Column cover lower
4. Collar
5. Cushion
6. Cable protector
7. Combination switch
8. Retainer ring
9. Ball bearing
10. Column tube
11. Adjusting plate
12. Thrust washer
13. Spring
14. Column adjusting knob
15. Column bracket
16. Dust cover
17. Steering shaft
18. Column cover
19. Weatherstrip
20. Sliding shaft
21. Oil seal
22. Dust seal
23. Sliding yoke
24. Lubrication fitting
25. Pitman arm
26. Steering gear bracket
27. Drag link
28. Steering gear unit

A : 500–800 kg-cm (37–57 lb.ft)
B : 150–220 kg-cm (11–15 lb.ft)
C : 400–500 kg-cm (29–36 lb.ft)
D : 5–10 kg-cm(5–8 lb.in)
E : 500–600 kg-cm (37–43 lb.ft)
F : 1,100–1,500 kg-cm (80–108 lb.ft)
G : 2,200–3,000 (160–217 lb.ft)
H : 1,100–1,500 (80–108 lb.ft)
J : 800–1,100 (58–79 lb.ft)


SM12-063A

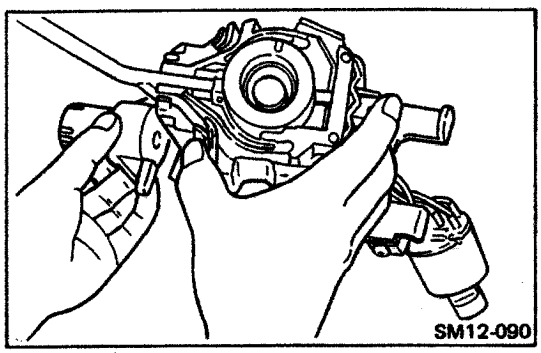
IMPORTANT POINT – DISASSEMBLY

REMOVE THE STEERING WHEEL.

1. Remove the horn button by hand.
2. Using special tool, remove the steering wheel as shown in figure.

NOTE: Place the match marks on the steering wheel and steering shaft.

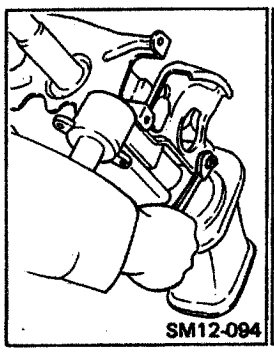
Special Tool: Steering wheel puller (09650-1340)

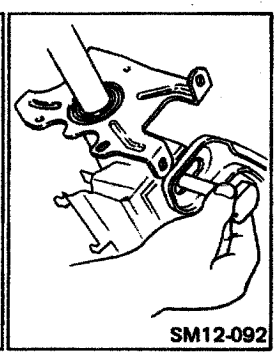

SM12-090

REMOVE THE STEERING SHAFT.

1. Remove the column adjusting knob and the both upper and lower column cover.
2. Remove the wiper and combination switch.

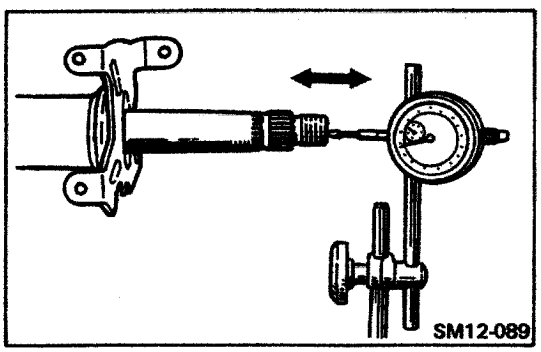
NOTE: At this time, disconnect the ground cable to cause a short which can result in personal injury and/or property damage.


SM12-094


SM12-092

3. Remove the pivot bolt and lock bolt then pull out the steering shaft.

NOTE: When pull out the steering shaft, be careful not to scratch on the nylon coating of sliding shaft.


SM12-089

IMPORTANT POINT – ASSEMBLY

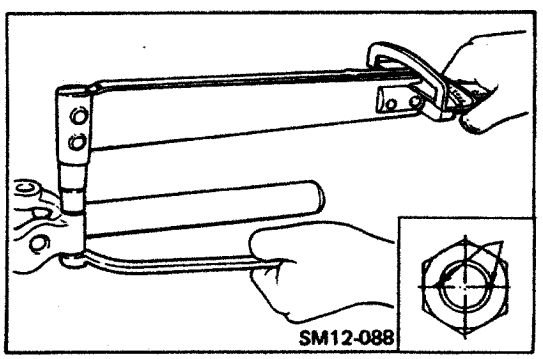
ASSEMBLE THE STEERING SHAFT.

1. Measure the thrust play and adjust by retainer ring.

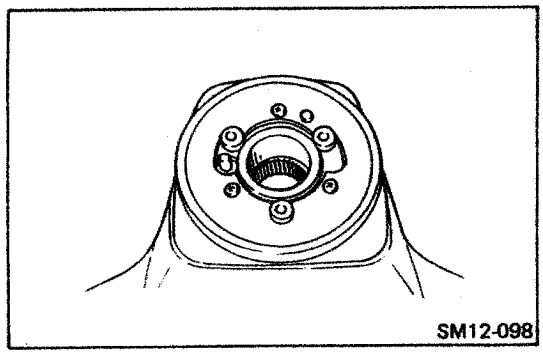
NOTE: Choose a retainer ring that will set the thrust play to the standard. Thrust play must be within 0.1 mm (0.0039 in) with 30 kg (66.1 lb) force in shaft direction.

Retainer rings are available in the following thickness. Unit: mm (in)

1.40 (0.055)	1.45 (0.057)	1.50 (0.059)	1.55 (0.061)	1.60 (0.063)
1.65 (0.065)	1.70 (0.067)	1.80 (0.071)	2.00 (0.079)	2.20 (0.087)

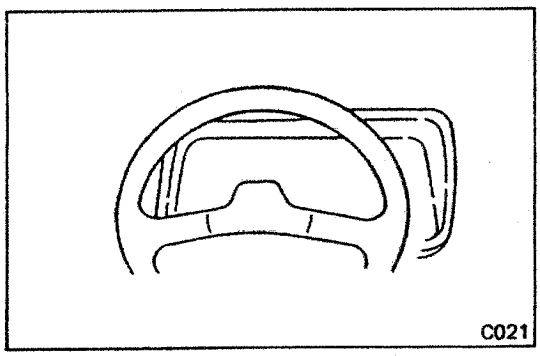

SM12-088

2. Lock the yoke and sliding shaft with clamp bolt and then stake the nut bolt as shown in figure.


SM12-098

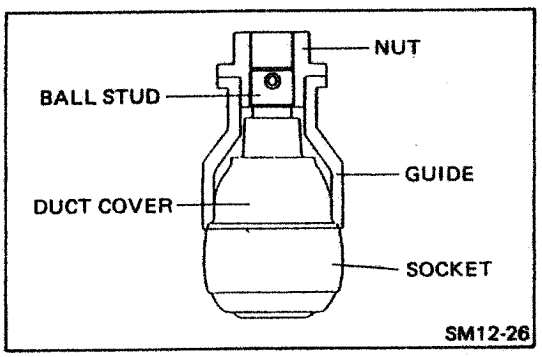
INSTALL THE STEERING WHEEL.

1. Apply chassis grease to the contact plate on the lower side of the steering wheel.


C021

2. Install the steering wheel on the steering shaft, making sure to align the match marks.

NOTE: Check that the steering wheel is in the correct position when the wheels point straight ahead. If the steering wheel is not positoned properly, the various meters will not be easily visible.

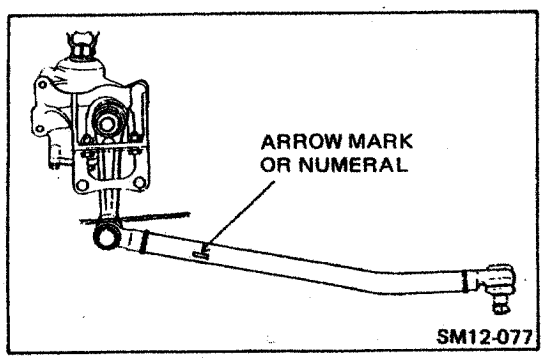


SM12-26

IF NECESSARY, REPLACE THE DRAG LINK DUST SEAL.

1. Observe the following order when changing the dust cover.
a. Pry off the dust cover with a screw driver.
b. Put 6.5 g (0.23 oz) of lithium molybdenum grease in the cover.
c. Using the special tool and install the dust cover onto the socket without damaging it.

Special Tool: Guide (09657-1420)
Nut (920914-142)



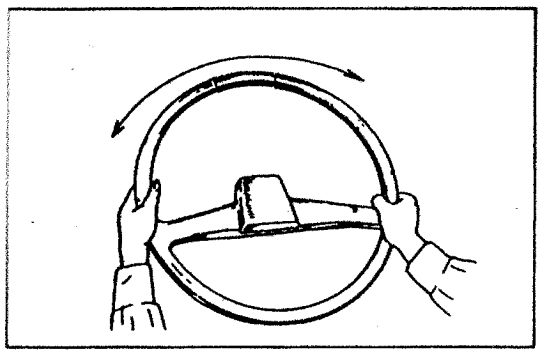
SM12-077

INSTALL THE DRAG LINK.

1. Connect the drag link with the pitman arm and with the knuckle arm.

NOTE: ○ At this time, make sure that the arrow mark ⟨FRONT⟩ or numeral on the drag link is positioned toward the front of vehicle.
○ When handling the drag link, take care not to damage the dust cover.

2. Tighten the slotted nuts of the ball studs at both ends of the link to the specified torque and then secure the nuts with the cotter pins.



INSPECT THE STEERING SYSTEM FOR OPERATING ABILITY.

1. Place the front wheels on the turn tables.
2. To be revolved smoothly without any shocks or abnormal resistance when the steering wheel is turned full range.
3. Check the steering wheel freeplay.

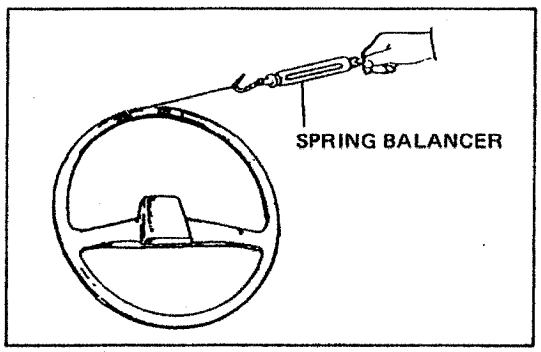
NOTE: In case of the vehicle is equipped power steering, check the steering wheel freeplay while engine is running. (Idling)

Wheel Freeplay: 15–35 mm (0.6–1.37 in)

If wheel freeplay is exceed the 15–35 mm (0.6–1.37 in), turn the set screw clockwise to decrease wheel freeplay and counterclockwise to increase it.

WARNING

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

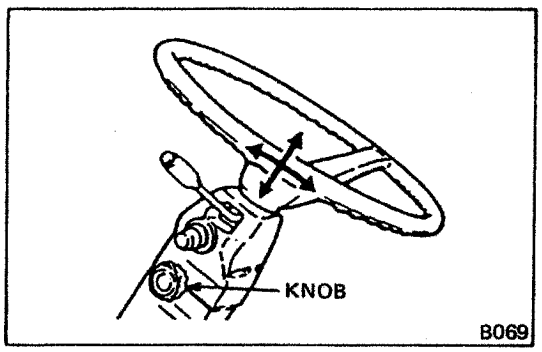


4. Measure the steering wheel turning force.
   Using a spring balancer, measure the steering wheel turning force.

NOTE: In case of the vehicle is equipped power steering, measure the steering wheel turning force while engine is running. (Idling)

Turning force

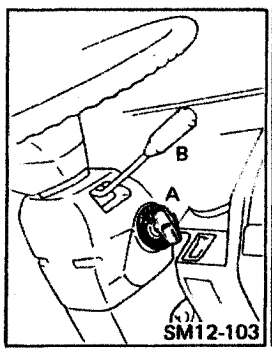
With power steering	**2.0 kg (4.4 lb)**
Without power steering	**2.5 kg (5.5 lb)**

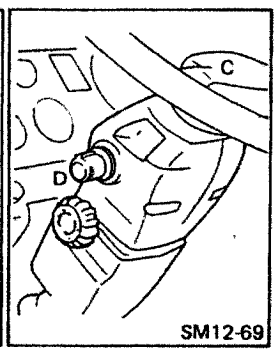


5. In case of vehicle is equipped adjustable steering column, the steering wheel must lock securely in any position up, down, forward and backward.

WARNING

Before moving the vehicle, tighten the knob securely and try to move the steering wheel up and down, and forward and backward to make sure that it is locked securely. Never try to adjust the steering wheel position while the vehicle is moving. Any adjustment of the steering wheel while driving can cause the driver to lose control, and result in personal injury and/or property damage.

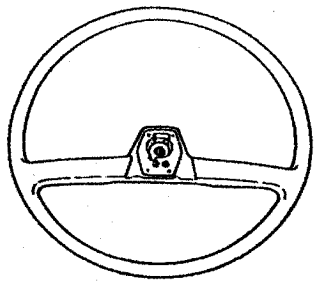
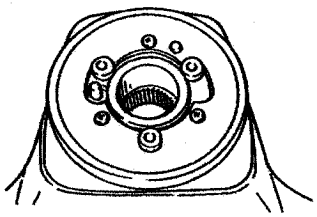
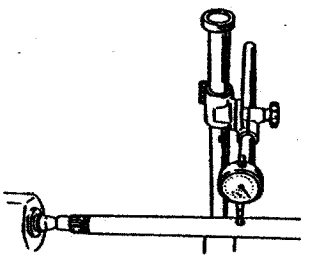
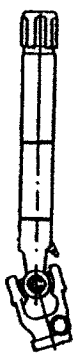
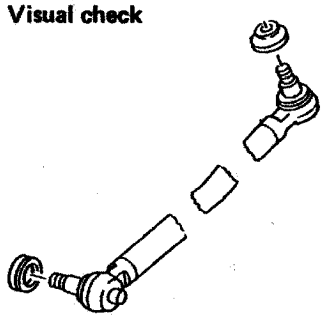




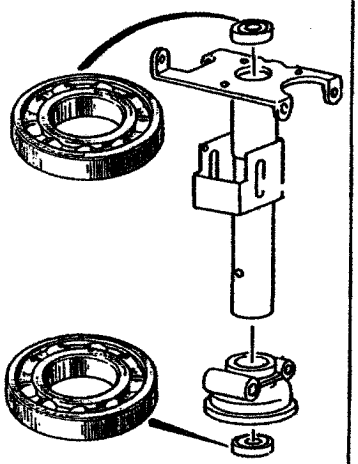
6. Check that the switches are operating properly.

A : Starter switch
B : Combination switch
C : Horn switch
D : Wiper switch

INSPECTION AND REPAIR

Inspection Item	Standard	Limit	Remedy	Inspection Procedure
Steering wheel Cracks, Distortion, Damage			Replace, if necessary.	Visual check  SM12-087A
Steering wheel serrations Wear, Damage			Replace, if necessary.	Visual check  SM12-098
Steering shaft Bend			Replace	 SM12-082
Universal joint assembly Oscillation Oil seal Damage			Replace, if necessary.	Visual check  SM12-109
Drag link, Cracks, Damage Ball joint, Play Dust seal, Damage			Replace the whole drag link assembly or replace only dust cover	Visual check 

INSPECTION AND REPAIR

Inspection Item	Standard	Limit	Remedy	Inspection Procedure
Column tube, Cracks, Bends Ball bearing, Play, Poor rotation			Replace, if necessary.	

PS-63E-01

CHAPTER PS

POWER STEERING

BC6410400X05
BC6550600X03
ME1103800X06
MZ6410000X15

TROUBLESHOOTING

Symptom	Possible cause	Remedy/Prevention
Fluid leakage To locate fluid leaks clean leaked fluid and check fluid level first.	Pump	Replace pump.
	Gear box	
	• Oil seal, O-ring other than seal lock nut and drain plug	Replace oil seal or O-ring.
	• Seal lock nut, drain plug	Repair lock nut or plug.
	Line joints	Repair leaky parts.
Hard steering (Excessive steering effort) Basic inspection items • Fluid level, Fluid cleanliness • Air in fluid • Tire pressure • Front alignment • Steering linkage • Universal joint	One side is hard	
	• Steering gear is faulty	Hydraulic test. Replace piston subassembly.
	Both sides are hard	
	• Steering gear pump faulty	Hydraulic test. Measure pump discharge pressure. — Replace pump. Measure system hydraulic pressure. — Replace piston subassembly.
	• Incorrect preload of the sector shaft bearing.	Adjust sector shaft preload.
	Hard, when starting to steer	
	• Incorrect preload of the sector shaft bearing.	Adjust sector shaft preload.
Abnormal noise Basic inspection items • Fluid level, fluid cleanliness • Air mixed in fluid • Pump piping • Steering linkage	Pump	
	• Air sucked in at input pipe	Repair and bleed air or replace pump.
	Gear	Replace piston subassembly.

POWER STEERING GEAR UNIT

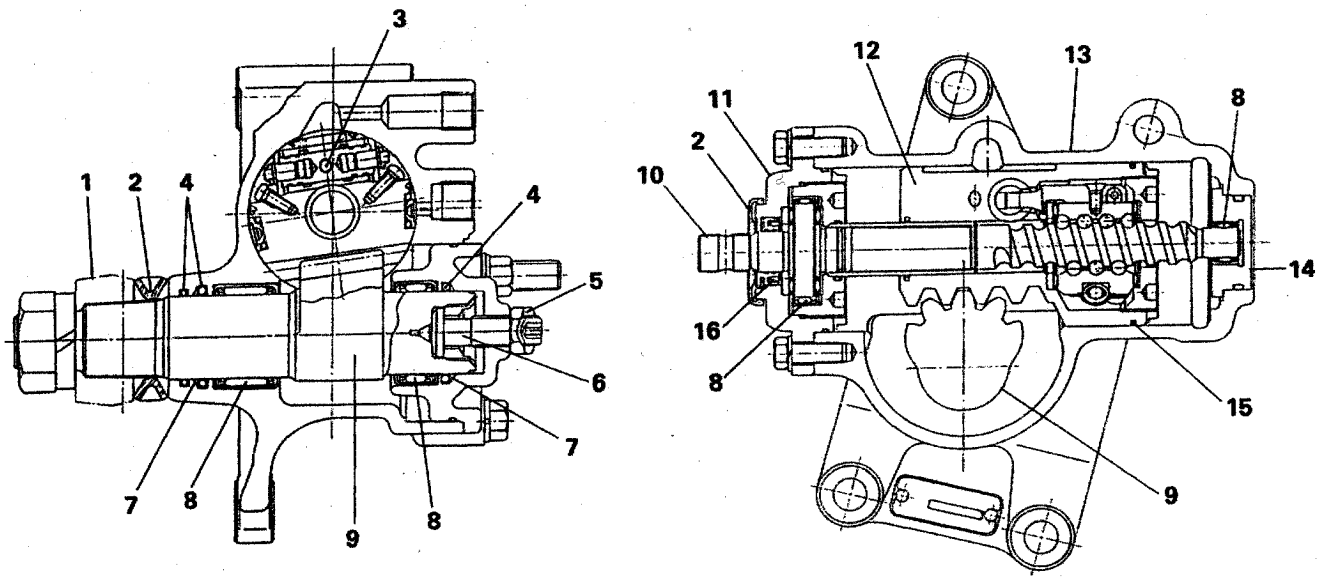
DATA AND SPECIFICATION

Model	8032
Type	Integral type power steering
Gear ratio	19.79 : 1
Cylinder inside diameter	78 mm (3.07 in)

DESCRIPTION

Construction

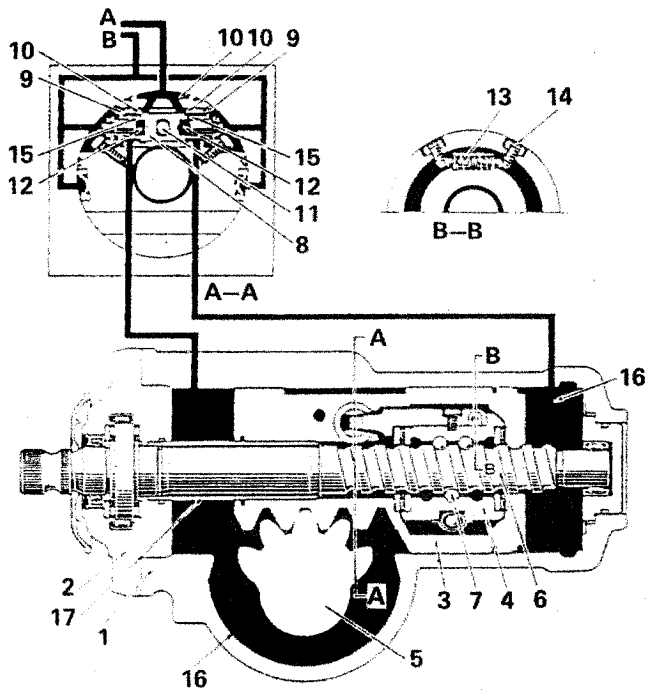
44110–1400



1. Pitman arm
2. Dust cover
3. Valve pin
4. O-ring
5. Seal lock nut
6. Adjusting bolt
7. Back up ring
8. Needle roller bearing
9. Sector shaft
10. Worm shaft
11. Top cover
12. Power piston
13. Gear housing
14. End plug
15. Slipper seal
16. Oil seal

Operation

Neutral (no steering action)

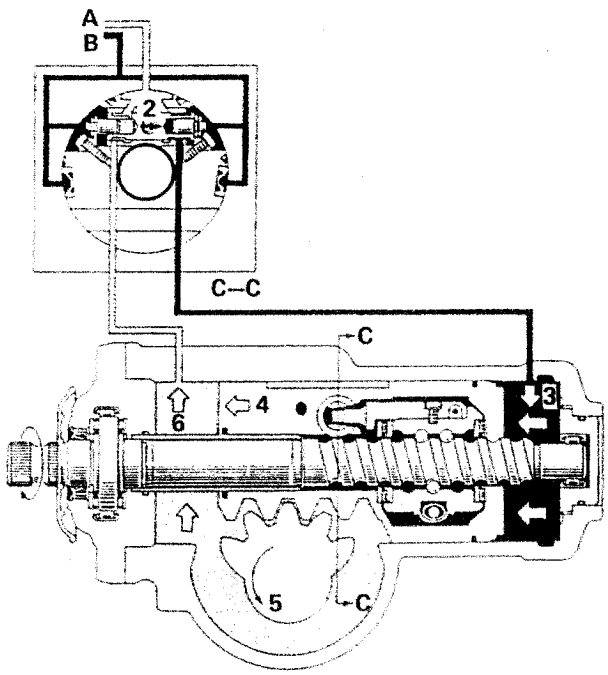


1. Housing
2. Top cover
3. Power piston
4. Steering nut
5. Sector shaft
6. Warm shaft
7. Ball
8. Valve piston
9. Inlet port
10. Return groove
11. Valve pin
12. Reaction chamber
13. Centering spring
14. Centering bolt
15. Orifice
16. Cylinder chamber
17. Sleeve

A. To reservoir
B. From oil pump

SM67-049

State at right turn of worm shaft
(Left turn is reverse operating of right turn)



A: To reservoir
B: From oil pump

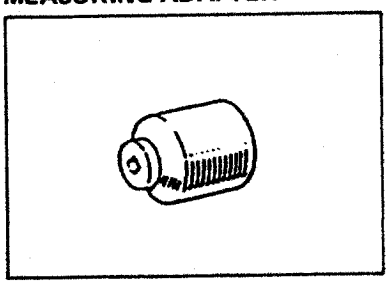
NOTE: Numbers with arrow mark indicate the operation order.

SM67-048

SPECIAL TOOLS

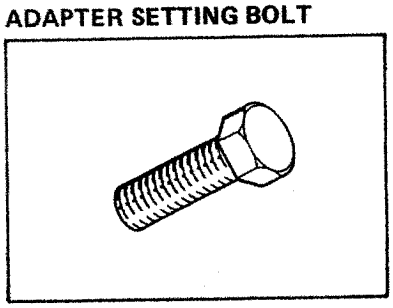
Prior to starting a power steering gear unit overhaul, it is necessary to have these special tool.

MEASURING ADAPTER



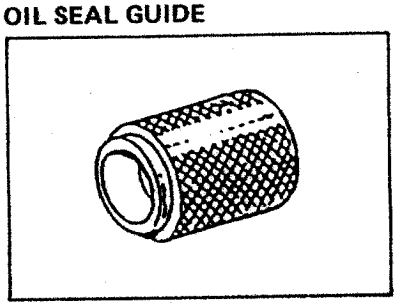
09659-1060

ADAPTER SETTING BOLT



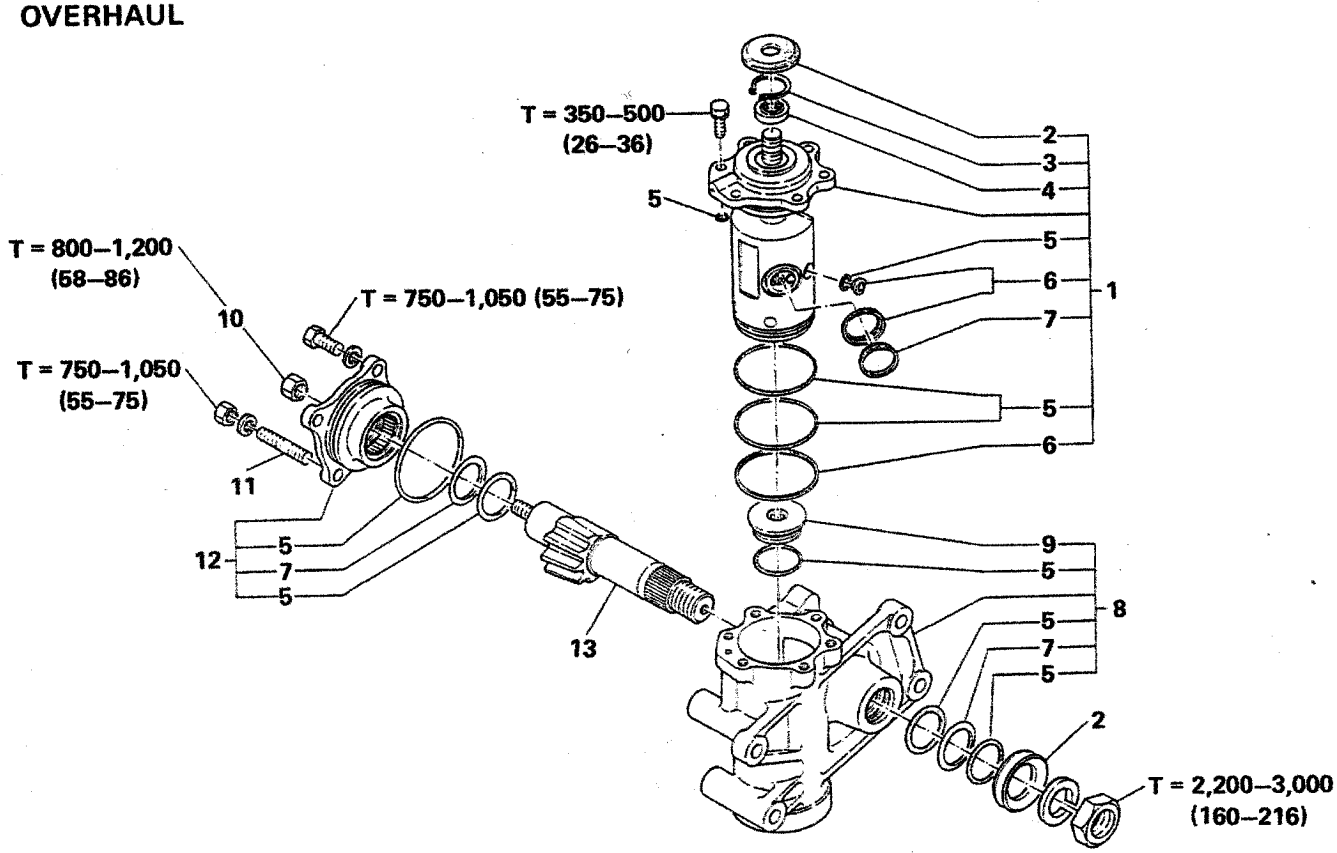
9010-06200

OIL SEAL GUIDE



09657-1290

OVERHAUL

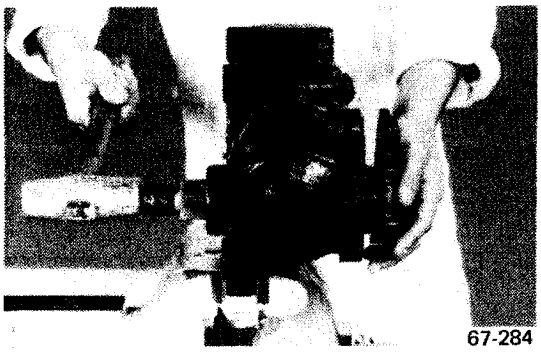


T = Tightening torque: kg-cm (lb.ft)

1. Power piston assembly
2. Dust cover
3. Retainer ring
4. Oil seal
5. O-ring
6. Slipper seal
7. Back up ring
8. Gear housing assembly
9. End plug assembly
10. Seal lock nut
11. Stud
12. Side cover assembly
13. Sector shaft assembly

OBSERVE THE FOLLOWING INSTRUCTIONS BEFORE DISASSEMBLY AND ASSEMBLY.

1. The piston subassembly 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 the brushes or clothes.
3. Handle rubber parts, seals, etc., in clean conditions. Any worn parts should be replaced immediately. Volatile metal cleanser may attack rubber parts, so they should never be used. Always use fluid.
4. For disassembling and assembling, only use the fluid specified.
5. Standard tools can generally be used for assembling and disassembling, through special tools may also be required. When using special tools, read the instruction carefully, and never use standard tools in place of special tools.

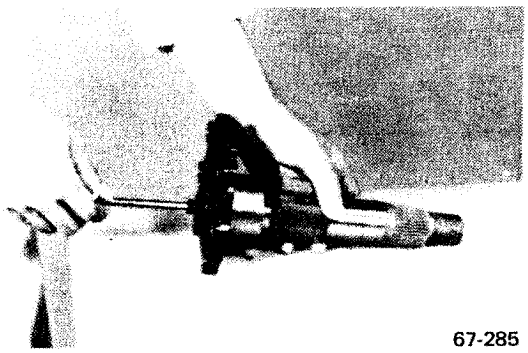


67-284

IMPORTANT POINT – DISASSEMBLY

REMOVE THE SIDE COVER WITH SECTOR SHAFT.

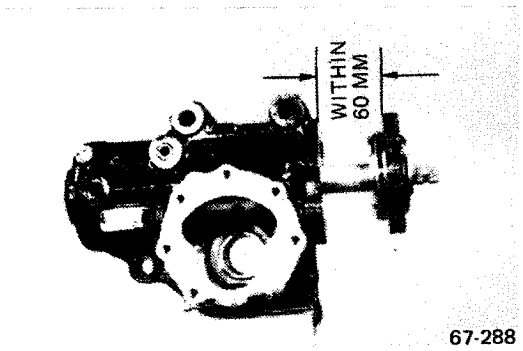
1. Position the sector shaft mark at right angle to the housing. Using a plastic hammer, drive out the head of the sector shaft.



67-285

2. Turn the adjusting bolt to the clockwise using a hexagonal wrench and pull the sector shaft out of the side cover.

NOTE: The side cover and needle roller bearing must not be disassembled.



67-288

REMOVE THE PISTON ASSEMBLY.

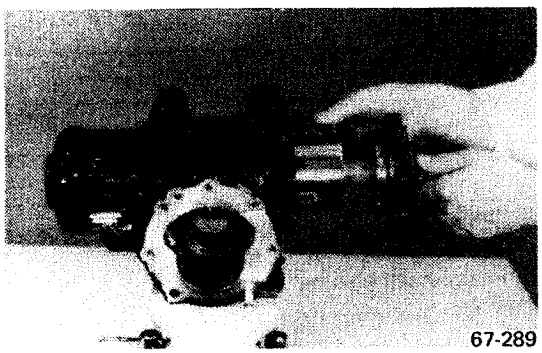
FOR RIGHT HAND DRIVE

1. Turn the worm shaft to the clockwise until it locks, then to the counterclockwise until the top cover raised.

FOR LEFT HAND DRIVE

1. Turn the worm shaft to the counterclockwise until it locks, then to the clockwise until the top cover raised.

NOTE: The top cover should not be raised more than 60 mm (2.36 in).



67-289

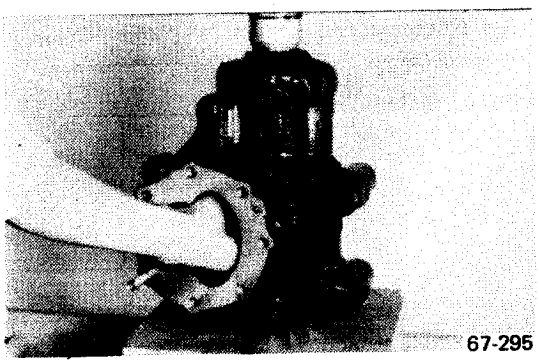
FOR RIGHT HAND DRIVE

2. Set a spacer between the top cover and the housing. Turn the worm shaft to the counterclockwise and pull out the piston to the top cover end face.

FOR LEFT HAND DRIVE

2. Set a spacer between the top cover and the housing. Turn the worm shaft to the counter clockwise and pull out the power piston to the top cover end face.
3. Pull out the piston subassembly by hand.

NOTE: Take special care not to pull the worm shaft out of the power piston.

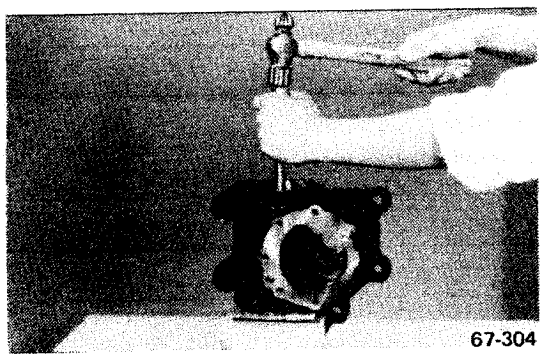


67-295

REMOVE THE END PLUG ASSEMBLY.

Using a press, remove the end plug subassembly.

NOTE: **Needle roller bearing must not be removed from the plug. Always replace them as a set.**

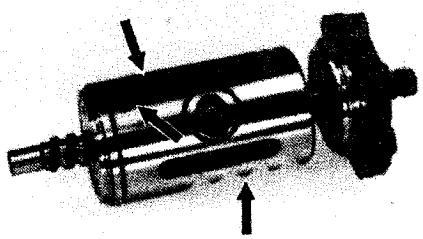


67-304

IMPORTANT POINT – ASSEMBLY

INSTALL THE END PLUG ASSEMBLY.

1. Check the needle roller bearing for any damage.
2. If found a problem on the needle roller bearing, replace the plug subassembly.
3. Using a brass rod and hammer, install the plug subassembly into the housing.



67-301

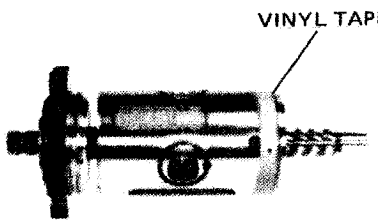
INSTALL THE PISTON ASSEMBLY.

1. Check the power piston outer rim and rack for any damage.

NOTE: **If any damage is found, replace the piston subassembly.**

2. Check that the screws and lock nuts of centering bolts are tight enough and must not be turned by hand.

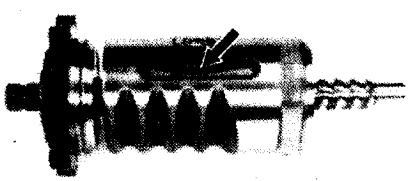
NOTE: ○ **Never adjust the centering bolt.**
○ **If screws or centering bolts turn by hand, replace with the piston subassembly.**



67-307

3. Install the slipper seal to the power piston and leave them a while for 5–7 minutes as shown in figure.

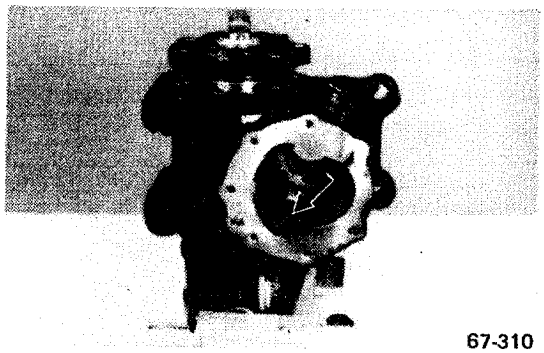
NOTE: **Tighten the slipper seal with a piston ring holder or vinyl tape to fit it in the groove.**



67-309

4. Attach the seal rings, back-up ring and O-ring to the power piston and top cover.

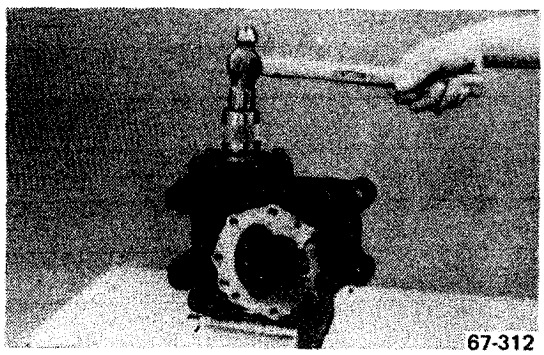
NOTE: **Do not assemble as shown in the figure.**



67-310

5. Place the piston assembly into the housing and tighten the bolts to specified torque.

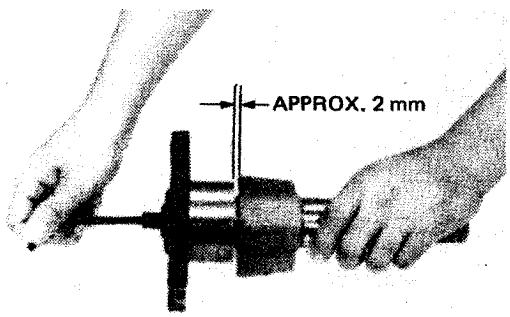
NOTE: Be careful not to damage the slipper seal.



67-312

6. Check the oil seal for any damage.
   If necessary, replace it.
7. If replace the oil seal, tap in the oil seal into the top cover using the special tool.

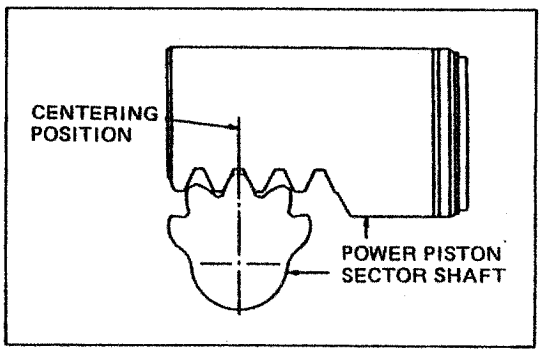
Special Tool: Guide (09657-1290)



67-315

ASSEMBLE THE SECTOR SHAFT AND SIDE COVER SUB-ASSEMBLY.

Turn the adjusting bolt to the counter clockwise using a hexagonal wrench, so that pull the sector shaft into the side cover.



INSTALL THE SECTOR SHAFT ASSEMBLY.

When install the sector shaft assembly, align the center of the power piston rack and the sector shaft center tooth.

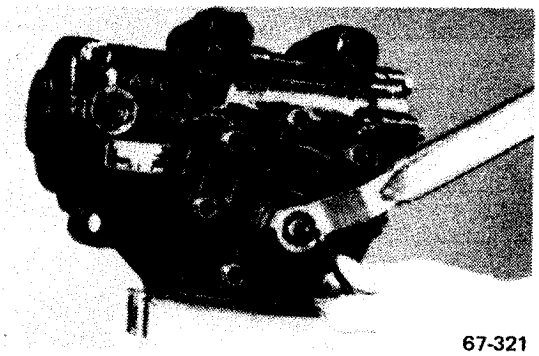
NOTE: ○ Apply fluid on the sector shaft serrated part so that the housing oil sea will not be damaged.
○ Always use a new lock nut.

67-319

PRELOAD ADJUSTMENT.

1. Using special tool, measure the friction torque of the worm shaft when the piston is moved at both ends of cylinder.

Special Tool: Measuring adapter (09659-1060)
Friction Torque: Less than 15 kg-cm (13.1 lb.in)



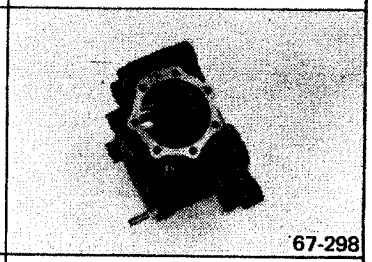
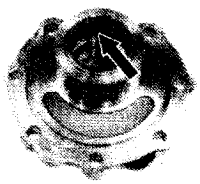
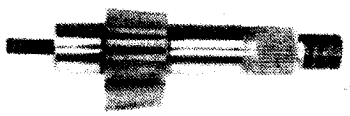
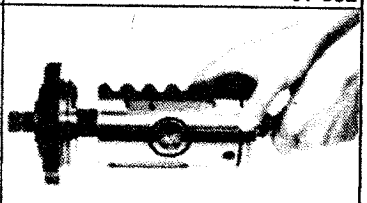
67-321

2. Measure the maximum friction torque when the worm shaft is half-turned to the right and left from the center position of the power piston. Adjust the torque to 4—6 kg·cm (3.48—5.22 lb.in) higher than the torque obtained in 1 above, by turning the adjusting bolt.
3. Tighten the seal lock nut to the specified torque and check friction torque again.

NOTE: Use a hexagonal wrench to lock the adjusting bolt, when tighten the seal lock nut.

INSPECTION AND REPAIR

Unit: mm (in)

Inspection Item	Standard	Limit	Remedy	Inspection Procedure
Housing. Wear or damage. Bearing damage.			Replace, if necessary.	 67-298
Side cover. Bearing damage.			Replace, if necessary.	 67-299
Ring screw. Staked for looseness.	No play and turn smoothly.		Replace, if necessary.	 67-303
Sector shaft assembly. Teeth for wear and damage. Serration for damage. Adjust bolt treads for damage.			Replace, if necessary.	 67-302
Piston subassembly. Worm shaft and power piston.	No play and turn smoothly.		Replace as a set, if necessary.	 67-300

POWER STEERING PUMP

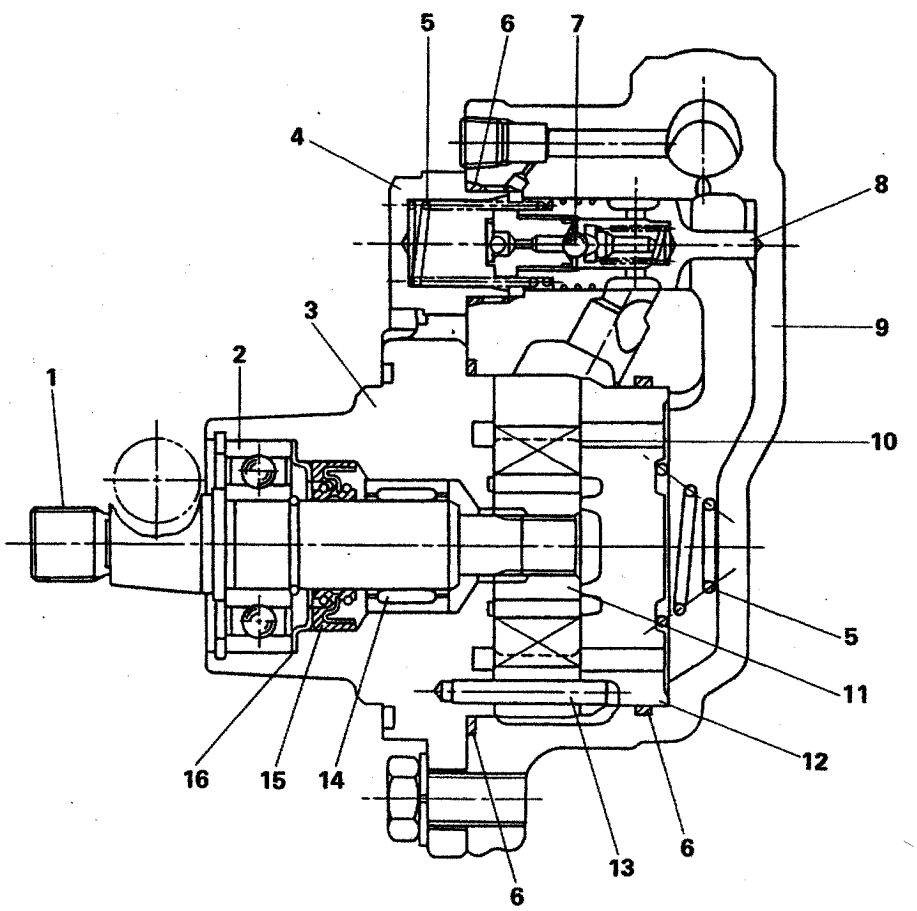
DATA AND SPECIFICATION

Type	Vane type
Speed range	500–6,000 r.p.m.
Relief pressure	97–105 kg/cm^2
Flow rate	9 liters/min.

DESCRIPTION

Construction

44310–1720

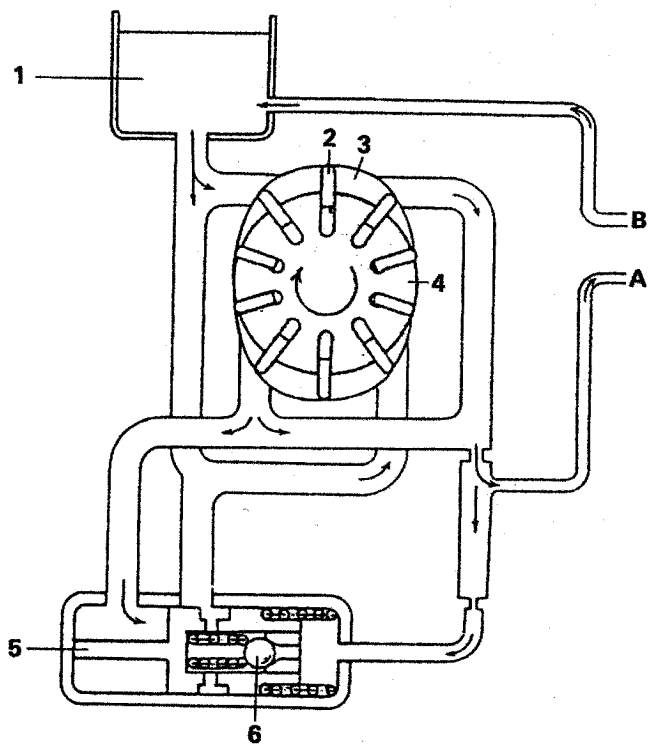


SM67-070

1. Drive shaft
2. Ball bearing
3. Front body
4. Plug
5. Spring
6. O-ring
7. Relief valve
8. Flow control valve assembly
9. Rear body
10. Vane
11. Rotor
12. Side plate
13. Knock pin
14. Needle roller bearing
15. Oil seal
16. Oil seal retainer

Operation

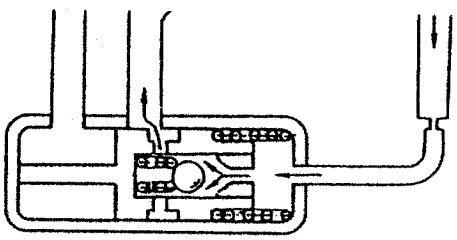
Neutral (Flow control valve and relief valve are not action)



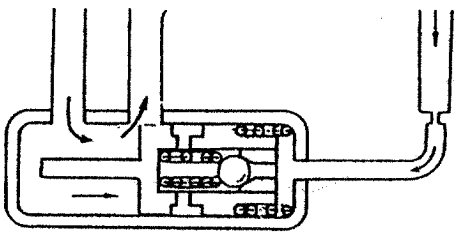
1. Reservoir
2. Vane
3. Cam ring
4. Rotor
5. Flow control valve assembly
6. Relief valve

A: To booster
B: From booster

Relief valve operation



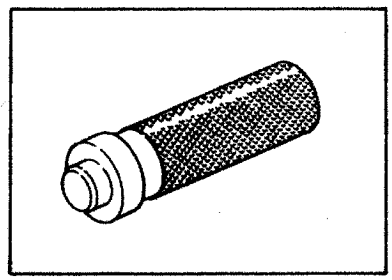
Flow control valve operation



SPECIAL TOOL

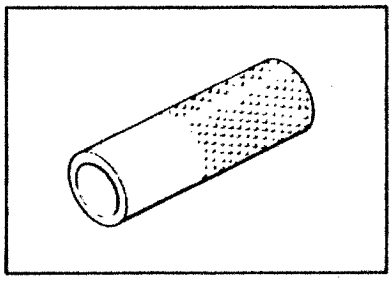
Prior to starting a power steering pump overhaul, it is necessary to have these special tool.

OIL SEAL PRESS



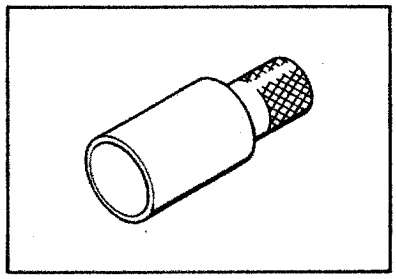
09434-1110

BEARING PRESS



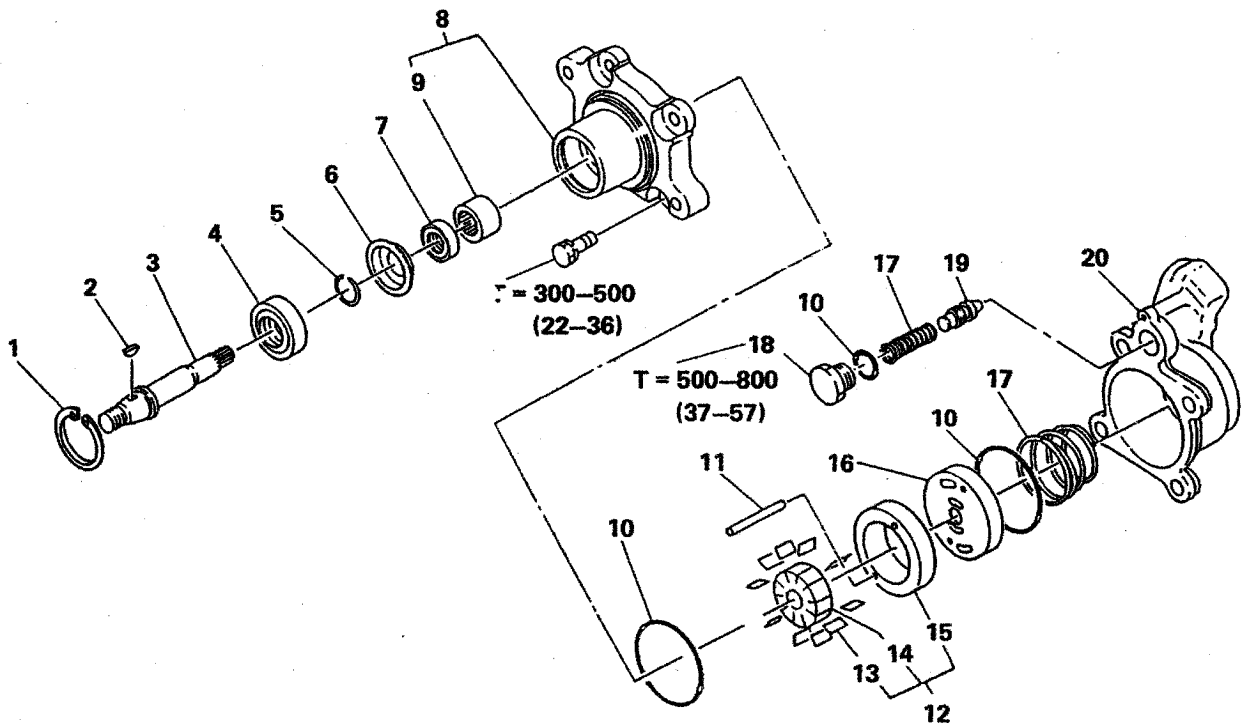
09434-1130

BEARING PRESS



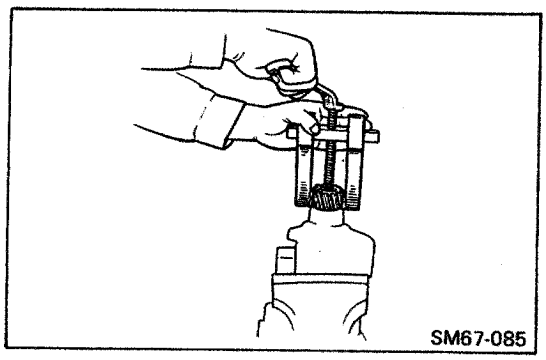
09434-1140

OVERHAUL



T = Tightening torque: kg-cm (lb.ft)

1. Retainer ring
2. Woodruff key
3. Pump shaft
4. Ball bearing
5. Snap ring
6. Oil seal retainer
7. Oil seal
8. Front body
9. Needle roller bearing
10. O-ring
11. Dowel
12. Cartridge assembly
13. Vane
14. Rotor
15. Cam ring
16. Side plate
17. Spring
18. Plug
19. Flow control valve
20. Rear body

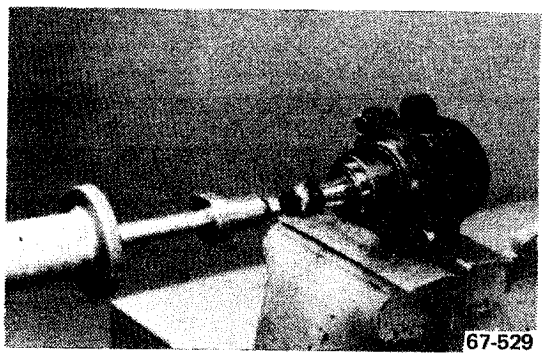

SM67-085

IMPORTANT POINT – DISASSEMBLY

REMOVE THE DRIVE GEAR.

Using a commercial puller, remove the drive gear.

NOTE: Do not tighten vise too tight when clamp the pump in vise.

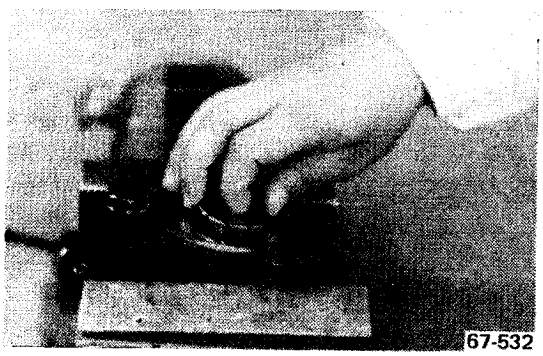

67-529

REMOVE THE PUMP SHAFT.

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

> **WARNING**
> **Retainer ring is spring steel and may pop out from the groove when removing. Wear safety glasses during removal.**

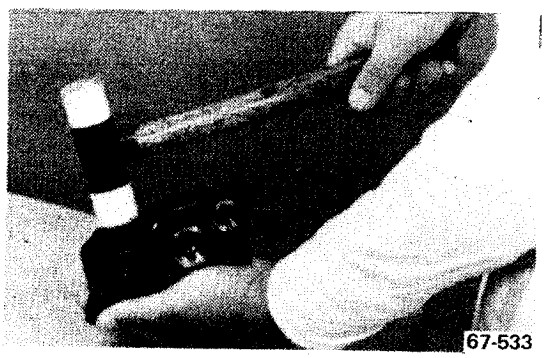
2. Using a sliding hammer and adapter, remove the pump shaft with bearing.


67-532

REMOVE THE ROTOR, VANES, CAM RING AND SIDE PLATE.

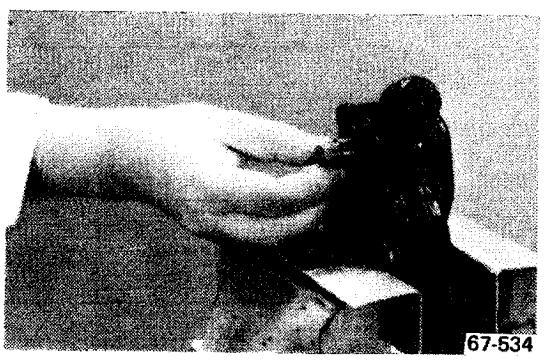
1. Remove the front body, rotor and vanes.

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


67-533

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

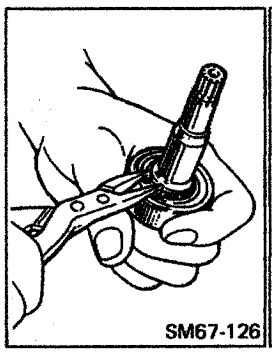
NOTE: Avoid gripping the side plate with pliers at this could mar it.

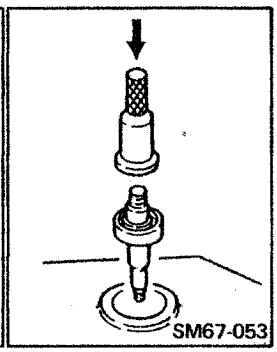

67-534

REMOVE THE FLOW CONTROL VALVE ASSEMBLY.

Remove the plug, spring and flow control valve assembly.

NOTE: Be careful not to drop, scratch or nick the flow control valve.


SM67-126

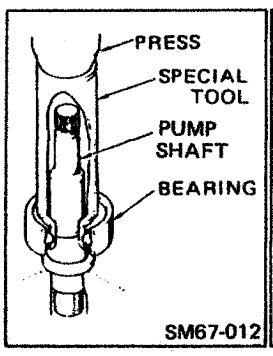

SM67-053

REPLACEMENT

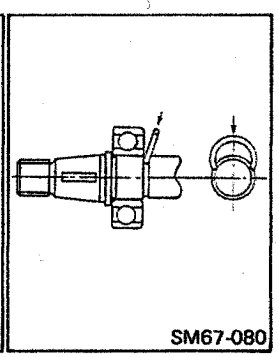
REPLACE THE PUMP SHAFT BEARING, IF NECESSARY.

1. Using a snap ring pliers, remove the snap ring.
2. Using a press or special tool, press out bearing.

Special Tool: Bearing press (09434-1140)



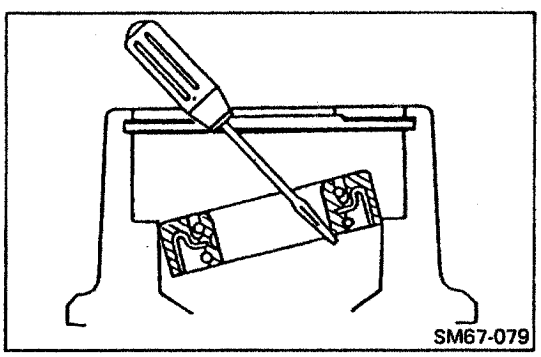
SM67-012


SM67-080

3. Using a press or special tool, press in bearing.

Special Tool: Bearing press (09434-1130)

4. Install the snap ring.

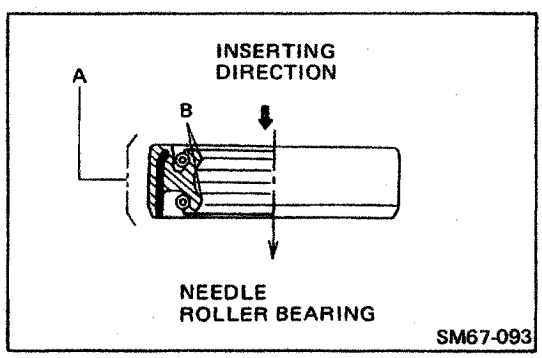

SM67-079

REPLACE THE OIL SEAL, AND NEEDLE ROLLER BEARING, IF NECESSARY.

1. Using a screw driver, remove the oil seal.

NOTE: Do not to scrape or damage the front body inside.

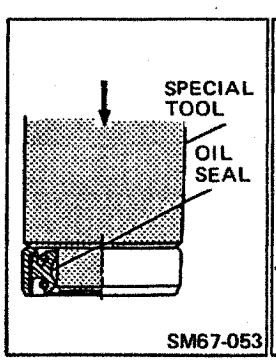
2. Remove the needle roller bearing.
3. Using a press, press in the needle roller bearing.



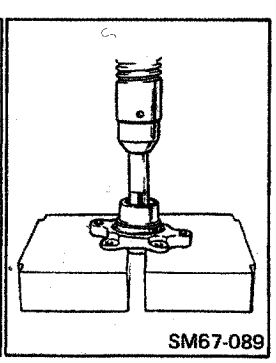
SM67-093

4. Oil seal inserting direction.
   Insert the oil seal as shown in figure.

NOTE: To prevent oil leakage from oil seal due to lip wear, apply lithium base grease to A and B.



SM67-053

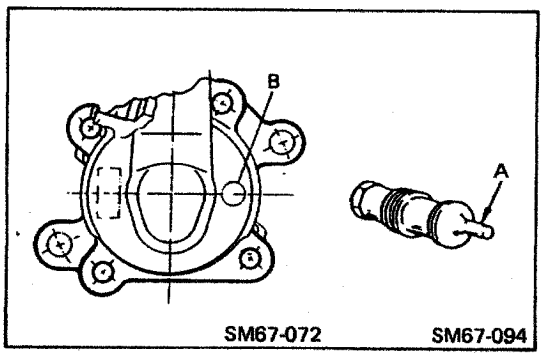

SM67-089

5. Using special tool and press, press in the oil seal into the front body.

Special Tool: Oil seal press (09434-1110)

IMPORTANT POINT – ASSEMBLY

NOTE: ○ Before assembling, clean all the parts and lubricate them with fluid.
○ When assembling the pump, should be replaced with new O-ring.

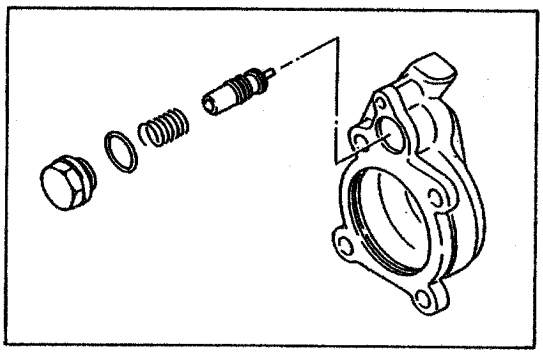


INSTALL THE FLOW CONTROL VALVE ASSEMBLY.

1. Apply fluid to the valve and check that it falls smoothly into the valve hole by its own weight.
   If a problem is detected, replace the flow control valve assembly.

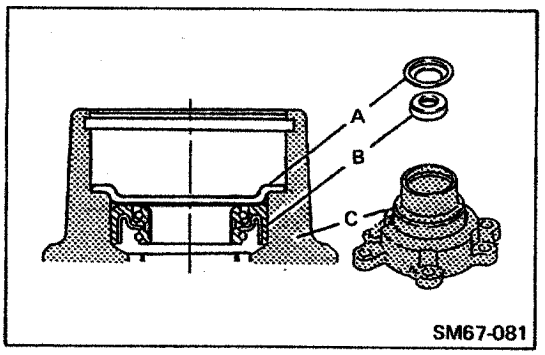
NOTE: There are three different valves in diameter, therefore the careful that the mark on both valve and the pump body are always matched.
A–Valve: Number of lines B–Body: Numeral

Match mark	A	II	I	
	B	0	1	2



2. Install the flow control valve assembly and spring as shown in figure, and then tighten the plug.

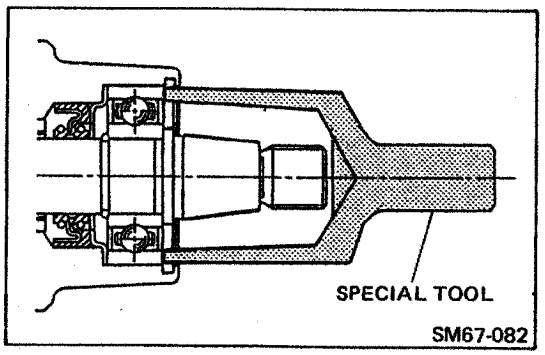
Tightening Torque: 500–800 kg-cm (36–57 lb.ft)



INSTALL THE PUMP SHAFT INTO THE FRONT BODY.

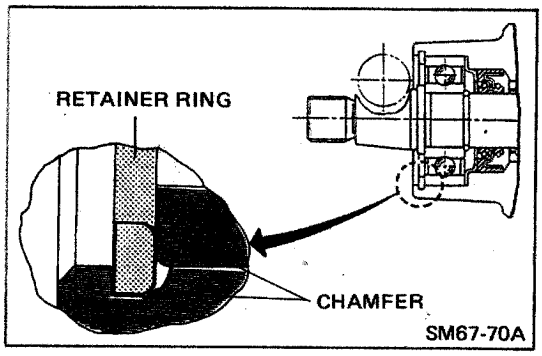
1. Install the washer as shown in figure.

A – Washer
B – Oil seal
C – Front body



2. Using special tool or press, press in pump shaft with bearing into the front body.

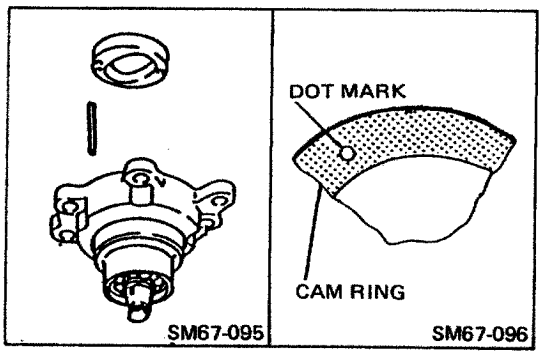
Special Tool: Bearing press (09434-1140)



3. Using a snap ring pliers, install the retainer ring.

NOTE: When install the retainer ring, chamfer side face toward ball bearing as shown in figure.

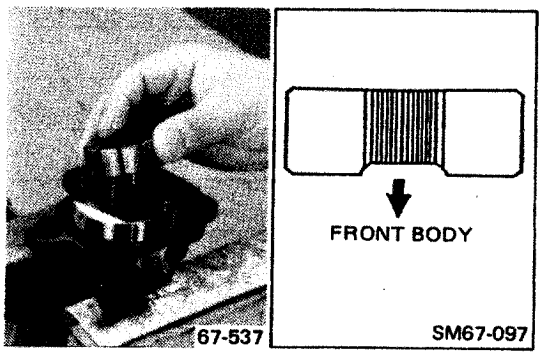
WARNING
Retainer ring is spring steel and may pop out from the groove when installing. Wear safety glasses during installation.



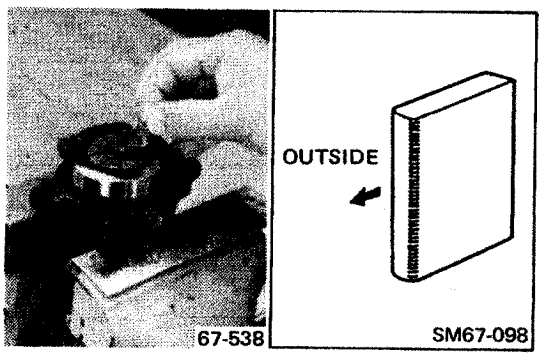
INSTALL THE CAM RING, ROTOR AND VANE.

1. Install the dowel into the front body.
2. Install the cam ring with the dowel hole aligned with dowel.

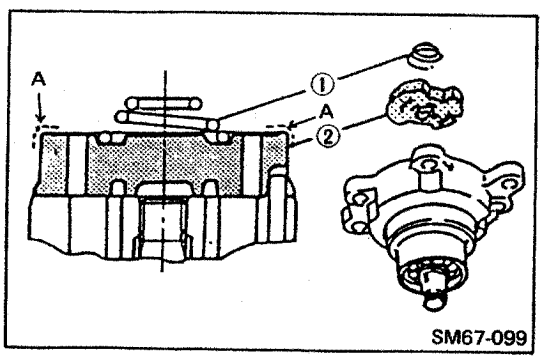
NOTE: At this time, make sure that the dot mark in the side surface is positioned toward the rear body.



3. Install the rotor with the cut spline side facing towards the front body.



4. Install the vane with the round end facing outward.

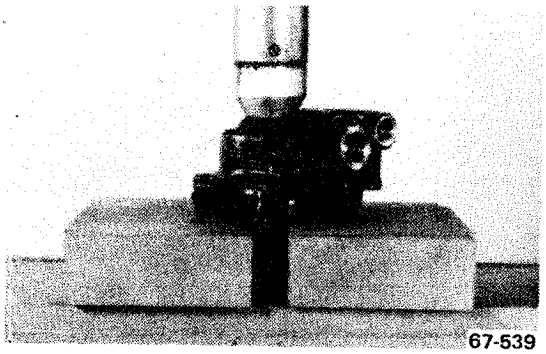


INSTALL THE SIDE PLATE AND SPRING.

1. Place the side plate on the cam ring with dowel hole aligned with the dowel.
2. Place the spring on the side plate hole as shown in figure.

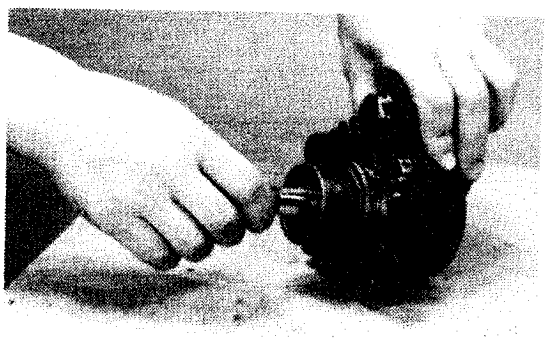
① ..... Spring
② ..... Side plate

NOTE: Apply the lithium-base grease to A


67-539

INSTALL THE REAR BODY.

1. Apply the lithium-base grease to the O-ring and install the O-ring into the rear body.
2. Using a press, press the rear body until contact the rear body and front body.
3. Tighten the bolts to specified torque.


67-541

INSPECT PUMP SHAFT ROTATION CONDITION.

Check that the pump shaft rotates smoothly without abnormal noise.

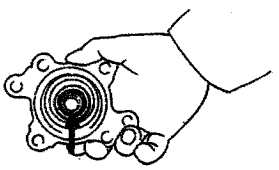
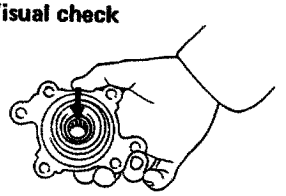
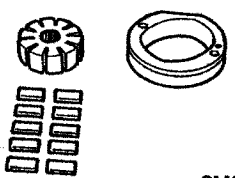
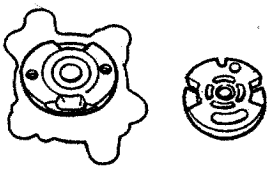
INSTALL THE GEAR TO THE PUMP SHAFT.

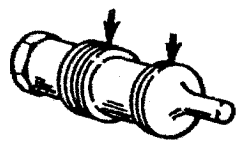
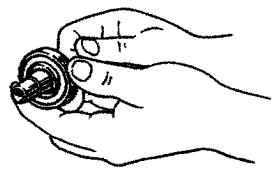
Tighten the lock nut to specified torque.

Tightening Torque: 700—800 kg.cm (51—57 lb.ft)

INSPECTION AND REPAIR

Unit: mm (in)

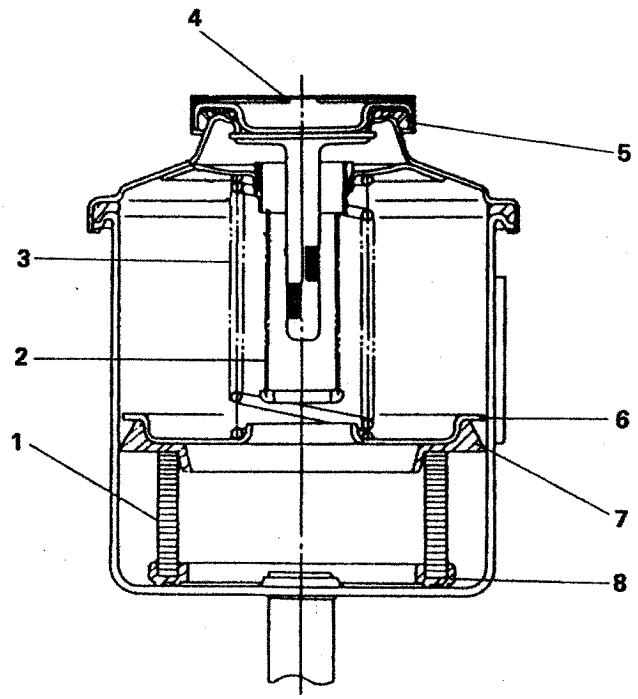
Inspection Item	Standard	Limit	Remedy	Inspection Procedure
Oil seal. Wear or damage.			Replace, if necessary.	Visual check  SM67-087
Needle roller bearing. Scratched or damage.			Replace, if necessary	Visual check  SM67-086
Cam ring inner surface. Rotor surface. Vanes. Wear, scratches or scoring.			Replace the cartridge assembly, if necessary.	Visual check  SM67-140
Side plate and front body. Abrasions or flows.			Replace, if necessary.	Visual check  SM67-083

Inspection Item	Standard	Limit	Remedy	Inspection Procedure
Flow control valve assembly. Wear or damage.			Replace, if necessary.	Visual check  SM67-103
Pump shaft bearing. Scratched or damage.			Replace, if necessary.	Visual check  SM67-125

OIL RESERVOIR

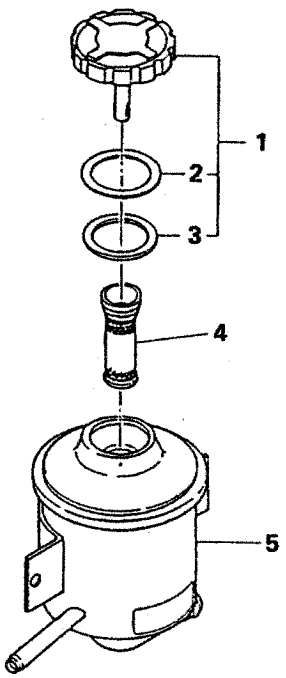
DESCRIPTION

44360–1910



1. Oil filter
2. Oil strainer
3. Spring
4. Cap with oil level gauge
5. Dust seal
6. Filter cover
7. Filter cover seal
8. Filter gasket

OVERHAUL



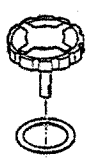
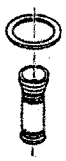
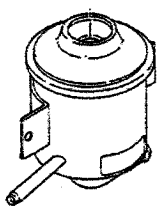
1. Cap sub assembly
2. Spacer
3. Dust seal
4. Oil strainer
5. Reservoir subassembly

IMPORTANT POINT – ASSEMBLY

NOTE: ○ Using only compressed air to cleaning the filter.
○ The filter is made of synthetic resin, so never wash it with hot water or solvent detergent.
○ Before assembling, clean all the parts.

INSPECTION AND REPAIR

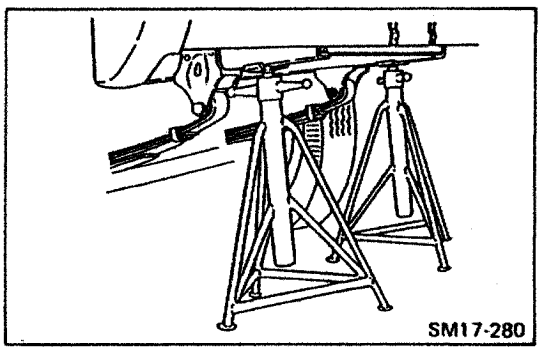
Unit: mm (in)

Inspection Item	Standard	Limit	Remedy	Inspection Procedure
Level gauge Damage			Replace, if necessary.	Visual check 
Dust seal Damage Oil strainer Clog or damage			Clean or replace, if necessary.	
Reservoir Damage			Replace, if necessary.	

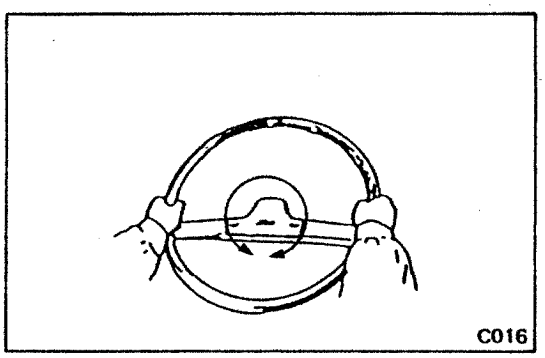
AIR BLEEDING OF POWER STEERING SYSTEM

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

   NOTE: ○ Using only specified fluid.
   ○ Check that the fluid level is within COLD LEVEL of the level gauge.
   ○ Replace old fluid with new fluid after overhauling gear unit or pump.
   ○ Specified fluid . . . Refer to recommended lubricant list.


SM17-280

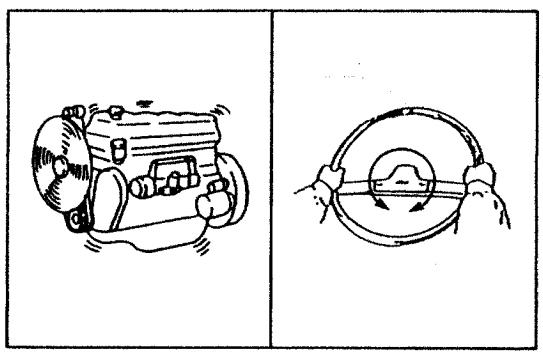
2. **JACK UP THE FRONT AXLE AND SUPPORT THE FRAME WITH STAND.**


C016

3. **TURN THE STEERING WHEEL FULLY BOTH DIRECTIONS SEVEL TIMES.**
4. **CHECK THE FLUID LEVEL IN THE RESERVOIR.**

   Check the fluid level and add fluid if necessary.

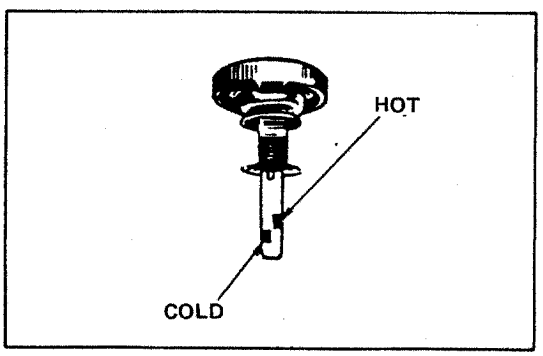
   NOTE: Check that the fluid level is within the COLD LEVEL of the level gauge.



5. **START THE ENGINE AND TURN THE STEERING WHEEL FULLY BOTH DIRECTIONS SEVERAL TIMES WITH ENGINE IDLING.**

   NOTE: The fluid in the reservoir should be continuously replenished while air bleeding so that the reservoir never become empty.

6. **RETURN THE STEERING WHEEL TO AHEAD STRAIGHT.**



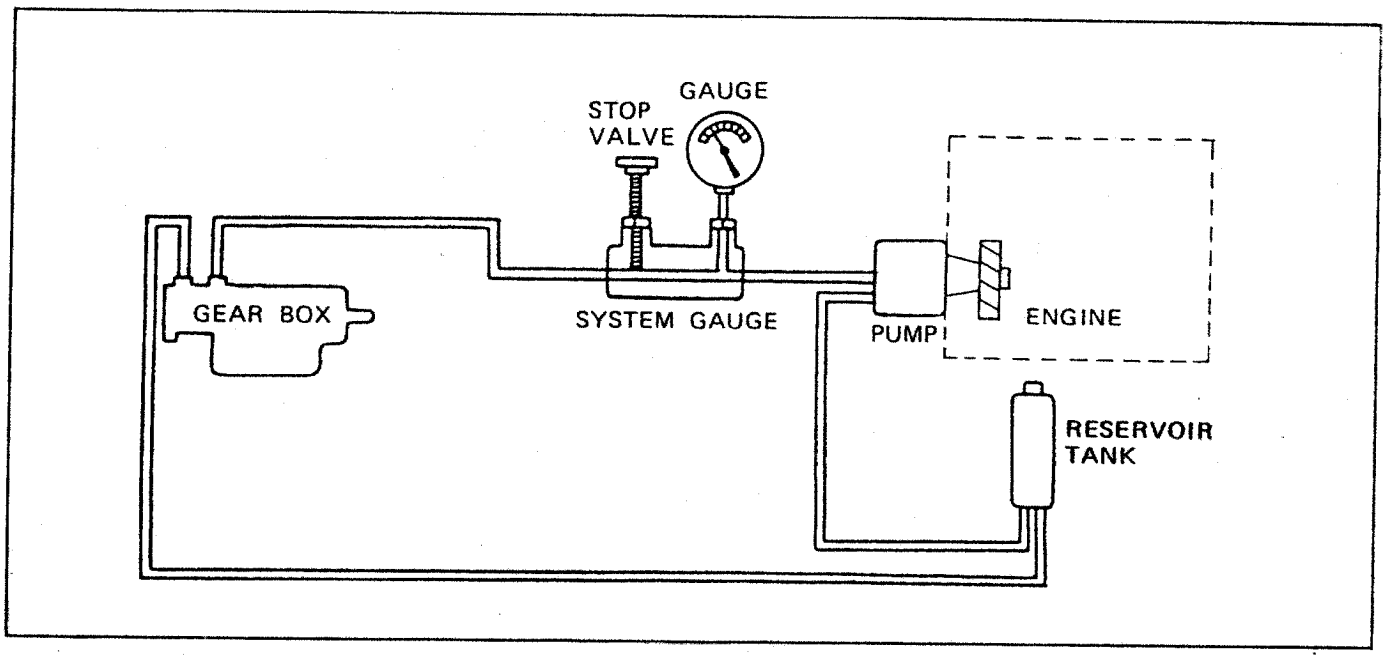
7. **RECHECK THE FLUID LEVEL WHEN ENGINE IS STOPPED.**

   Check the fluid level and add fluid if necessary.

   NOTE: Check that the fluid level is within the HOT LEVEL of the level gauge. If the fluid is cold, check that it is within the COLD LEVEL of the level gauge.

   If a problem is found, repeat steps 4 and 5. Repair the vane pump if the problem persists.

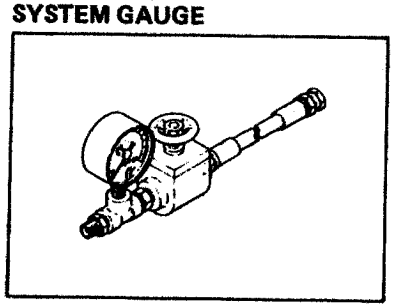
HYDRAULIC TEST



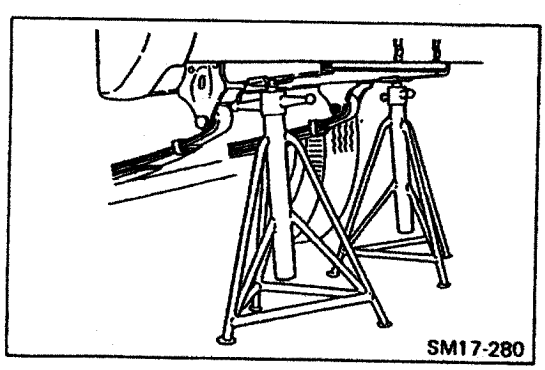
SPECIAL TOOL

Prior to starting a hydraulic test, it is necessary to have this special tool.

SYSTEM GAUGE



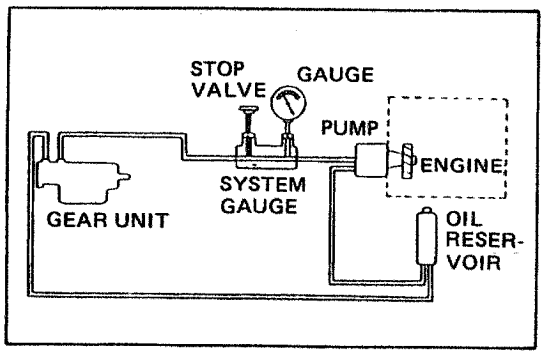
09470-1010



HYDRAULIC TEST

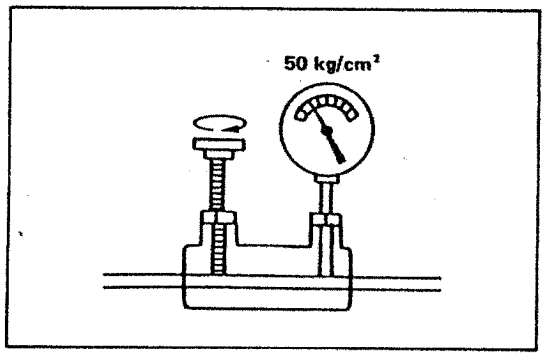
JACK UP THE FRONT AXLE AND SUPPORT THE FRAME WITH STANDS.

NOTE: Block the rear wheels.



SET THE SYSTEM GAUGE AS SHOWN IN FIGURE.

NOTE: After setting the system gauge, perform the bleeding air in the system according to "AIR BLEEDING OF POWER STEERING SYSTEM".

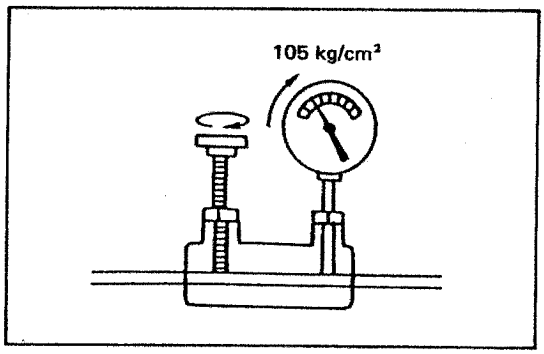


CHECK THE FLOW CONTROL VALVE OPERATION.

1. Start the engine with idling then close the stop valve to set the fluid pressure at 50 kg/cm² (711 lb/sq.in).
2. Run the engine up to 1,500 rpm, then reduce the engine speed suddenly.

NOTE: This operation should be repeated more than 5 times.

3. Good, if the set pressure 50±0.5 kg/cm² (711±7.11 lb/sq.in) is recovered immediately.
   If not recovered the setting pressure, replace the flow control valve assembly.
4. Open the stop valve fully.

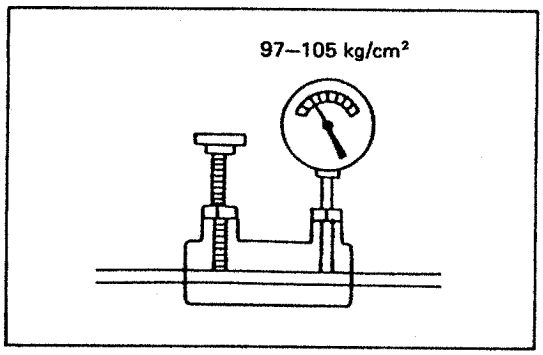


CHECK THE RELIEF VALVE OPERATION.

1. Run the engine up to 2,000 rpm.
2. Close the stop valve to set the fluid pressure at 105 kg/cm² (1,493 lb/sq.in).

NOTE: Be careful not to exceed 105 kg/cm² (1,493 lb/sq.in).

3. Good, if the fluid pressure is maintained at 97–105 kg/cm² (1,479–1,493 lb/sq.in).
4. If pressure is high, replace the flow control valve assembly.

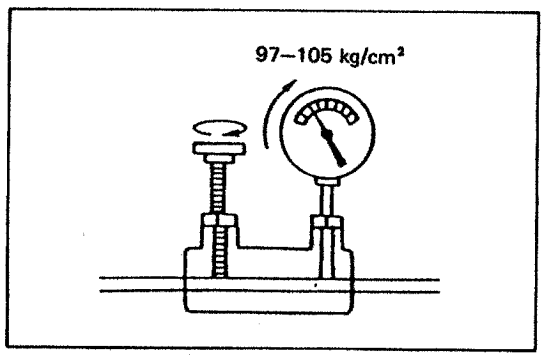


MEASURE THE SYSTEM HYDRAULIC PRESSURE.

1. Make sure that the stop valve is fully open.
2. Start the engine with idling and then turn the steering wheel to a full stop.
3. Apply a force of approx. 15 kg (33 lb) to the steering wheel and measure the hydraulic pressure both directions.

Hydraulic Pressure: 97–105 kg/cm² (1,379–1,493 lb/sq.in)

If the above pressure is not attained, measure the discharge pressure or repair the steering gear unit.



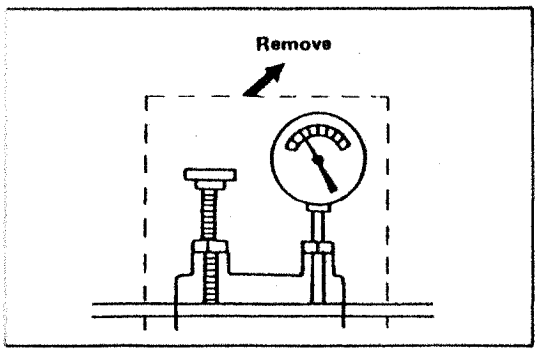
MEASURE THE DISCHARGE PRESSURE.

1. Make sure that the stop valve is fully open.
2. Start the engine with idling and measure the discharge pressure with the stop valve fully close.

Discharge Pressure: 97–105 kg/cm² (1,379–1,493 lb/sq.in)

NOTE: Do not the stop valve to remain closed more than 15 seconds.

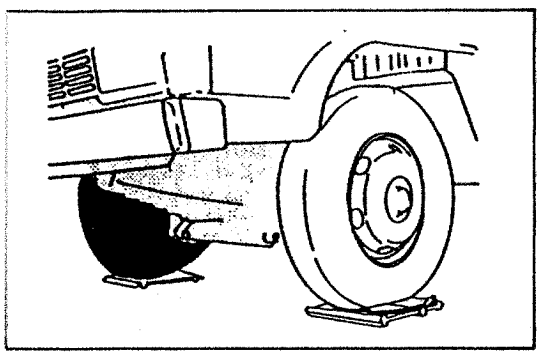
3. Open the stop valve fully.



REMOVE THE SYSTEM GAUGE.

1. Stop the engine and remove the system gauge.

NOTE: After removed system gauge, perform the bleeding air in according to "AIR BLEEDING OF POWER STEERING SYSTEM".



INSPECT THE STEERING SYSTEM FOR OPERATION ABILITY.

1. Place the front wheels on turn tables then start the engine with idling.
2. Check that the steering wheel turned smoothly without any shocks or abnormal resistance, when it is turned fully both directions.
3. Measure the steering wheel turning face.

Turning Face: Less than 2 kg (4.41 lb)

SB-129E-01

CHAPTER SB

SERVICE BRAKE
(VACUUM SERVO HYDRAULIC SYSTEM)

BC3550900X07
ME1103800X06
MF1215000X02
MR1215000X00
MZ3510000X10

INTRODUCTION

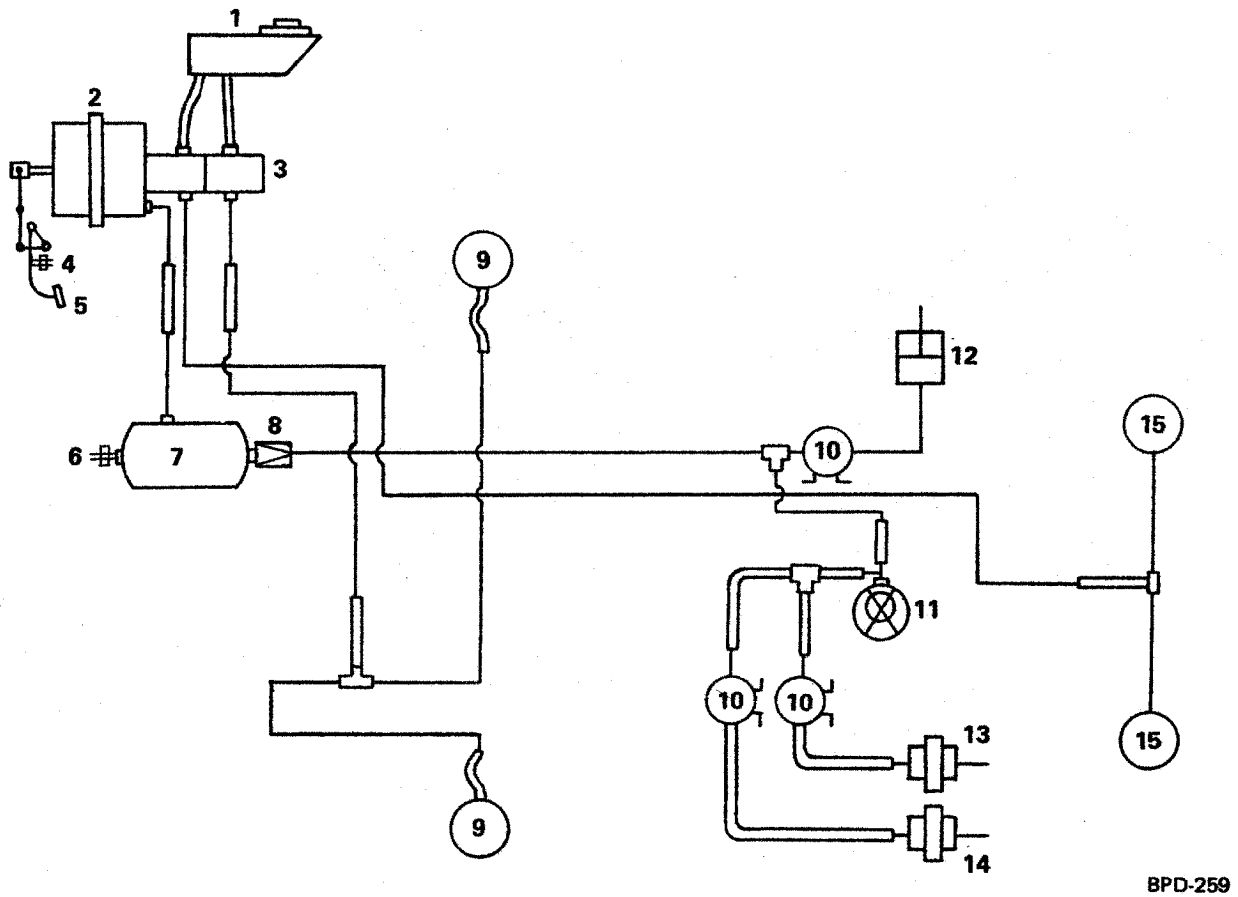
DESCRIPTION

Type of service brake	Vacuum servo hydraulic system with drum shoe type wheel brake.
Vacuum charging system	Evacuation is from movable four blades rotary type vacuum pump through two check valves. Vacuum pressure warning switch is used for indicating the vacuum level in the system.
Service brake control system	Two independent lines for front and rear wheels with a master cylinder, brake vacuum booster. A stop lamp switch is used to operate the stop lamps.
Wheel brake	Drum brake with hydraulically actuated, internally expanding two-leading shoes in front wheels and dual two-leading shoes in rear wheels.

NOTE: See Section "BRAKE PIPING DIAGRAM" for the component parts (valves, switches, etc) used in the each system.

BRAKE PIPING DIAGRAM

00468–6980



BPD-259

1. Brake fluid reservoir
2. Brake vacuum booster (MASTER VAC)
3. Master cylinder
4. Stop lamp switch
5. Brake pedal
6. Vacuum warning switch (Below 400mmHg–15.75 inHg)
7. Vacuum tank
8. Check valve
9. Front wheel brake
10. Magnetic valve
11. Vacuum pump
12. Exhaust brake cylinder
13. Idle up valve
14. Fuel cut valve
15. Rear wheel brake

NOTE: The pressure in the bracket means the switch operating pressure.

TROUBLESHOOTING

Symptom	Possible cause	Remedy/Prevention
No response upon working the pedal or there is the feeling of stepping on sponge.	Air trapped in the brake lines	Bleed air from brake system.
	Seal insufficient master cylinder piston cup.	Replace cup.
	Vapor lock in brake system	Bleed air from brake system.
	Leakage of fluid from brake system	Tighten further or replace gasket, O-ring, cup, etc.
Pedalling allowance is large (though there is response upon working the pedal).	Excessive clearance between drum and lining.	Adjust the clearance.
	Excessive play of pedal	Adjust the clearance between push rod and vacuum booster.
Brake fluid decreases.	Leakage of fluid from brake system	Tighten further or replace gasket, O-ring, etc.
	Leakage of brake fluid from cylinder	Replace cup.
Unequal or unstable braking.	Lining is wet with oil	Replace the lining.
	Defective lining material (improper combination)	Replace the lining.
	Nouniform lining contact	Correct.
	Improper adjustment of brake shoe	Adjust.
	Nouniform shoe clearance	Adjust the clearance.
	Excessively in abrasion loss of drums	Correct or replace.
	Deformation of drum	Correct or replace.
	Loose hub bearing	Adjust or replace the bearing. (See Chapter RA and/or FA)
	Nouniform pneumatic pressure of tire	Adjust to proper pneumatic pressure. (See Chapter WT)
	Clogging of brake system	Replace.
Not enough braking, or too much pedal resistance.	Wheel brake and drum	
	• Lining is wet with oil	Replace the lining.
	• Contact failure of drum and lining	Correct.
	• Improper lining material or hardening of lining.	Correct.
	• Deformation or hardening of drum	Correct or replace.

Symptom	Possible cause	Remedy/Prevention
	• Excessive wear of lining	Replace.
	Control system	
	• Leakage of brake fluid from brake system	Tighten further or replace gasket.
	Lack of brake fluid	Supply brake fluid periodically.
	Not enough vacuum, or too slow a rise of vacuum.	
	• Check the pipe joints for tightness	Repair.
	• Is there a rupture or twise in the pipe leading to the manifold?	Replace.
	• Is the hose ruptured or collapsed?	Replace.
	• Lack of vacuum pressure excessive use	Use properly.
	• Suction of air	Correct.
	• Improper operation of vacuum pump	Repair or replace.
	• Clogging of brake system	Replace pipe, hose, etc.
	Vacuum is available but does not hold up.	
	• Check the pipe joints and hose joints	Repair or replace.
	For vacuum booster	
	• Check the valve face and seat face in the atmosphere valve for damage or soiling.	Repair or replace.
	• Check the valve face and seat face in the vacuum valve for damage or soiling.	Repair or replace.
	• Check packing and diaphragm for damage.	Replace.
Brake drags or does not release.	Improper adjustment of shoe clearance	Adjust the clearance.
	Defective shoe retracting spring	Replace
	No play in the pedal, and the return hole of master cylinder is blocked up.	Adjust the clearance between push rod and piston.
	Improper return of master cylinder piston	Replace retracting spring or cup.
	Defective check valve of master cylinder	Replace.
	Improper operation of vacuum booser	Repair or replace.
	Clogging of brake system	Replace pipe, hose, etc.

Symptom	Possible cause	Remedy/Prevention
Brake Squeal.	Improper lining material or surface hardening	Replace lining.
	Loose lining clamping rivet	Replace or tighten the rivet further.
	Clamping rivet in contact with drum	Replace lining and rivet.
	Deformation of wear of drum	Repair or replace.
	Instrusion of foreign matter between drum and lining.	Clean the surface of lining or replace.
	Loose wheel bearing	Adjust or replace bearing. (See Chapter RA and/or FA)
Brake applies but too slowly.	Vacuum booster loss of air tightness.	
	• Check the valve face and seat face in the poppet valve for damage or soiling.	Repair or replace.
	• Check, packing and diaphragm for damage.	Replace.
	Restriction of passage.	
	• Check for clogged air filter, and for twisted or clogged air lines.	Repair or replace.
Impossible to bleed air completely.	Piston cup of master cylinder sucks in air	Replace the cup.
	Oil hose between master cylinder and oil reservoir bends and air is trapped.	Correct the bend of feed pipe and let air out of the oil reservoir.
	Improper tightness of joints of brake system	Tighten further or replace gasket.
	Improper operation of master cylinder check valve.	Repair or replace.
Oil leak air leak in vacuum pump.	Lubricating bolt section. — Loose screw	Tighten it.
	Lubricating bolt section. — Fatigue of gasket	Replace it.
	Front cover section — Loose bolt	Tighten it.
	Front cover section — Fatigue of gasket	Replace it.
	Delivery line section — Loose pipe	Tighten it.
	Delivery line section — Fatigue of gasket	Replace it.
	Front oil seal section — Damaged oil seal	Replace it.
	Front oil seal section — Fatigue of oil seal	Replace it.
	Suction section — Loose bolt	Tighten it.
	Suction section — Fatigue of gasket	Replace it.

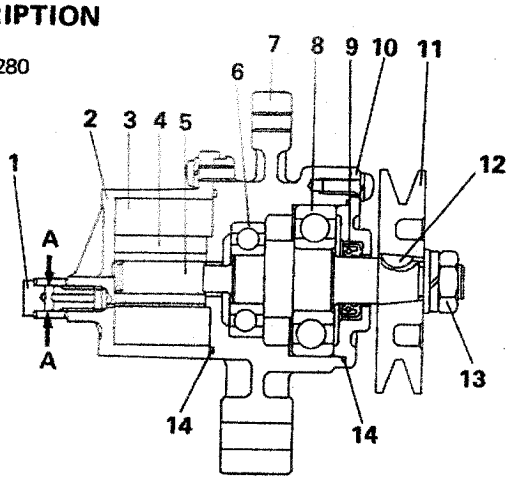
VACUUM PUMP

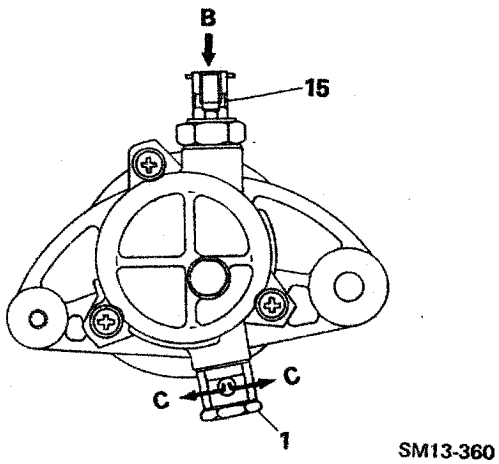
DATA AND SPECIFICATIONS

Type	A rotor with movable four blades
Logical discharging volume	50 cm^3/rev.
Allowable max. revolution	7,200 r.p.m. with oil pressure of 4.5 kg/cm^2 (63.99 lb/sp.in)

DESCRIPTION

29300–1280



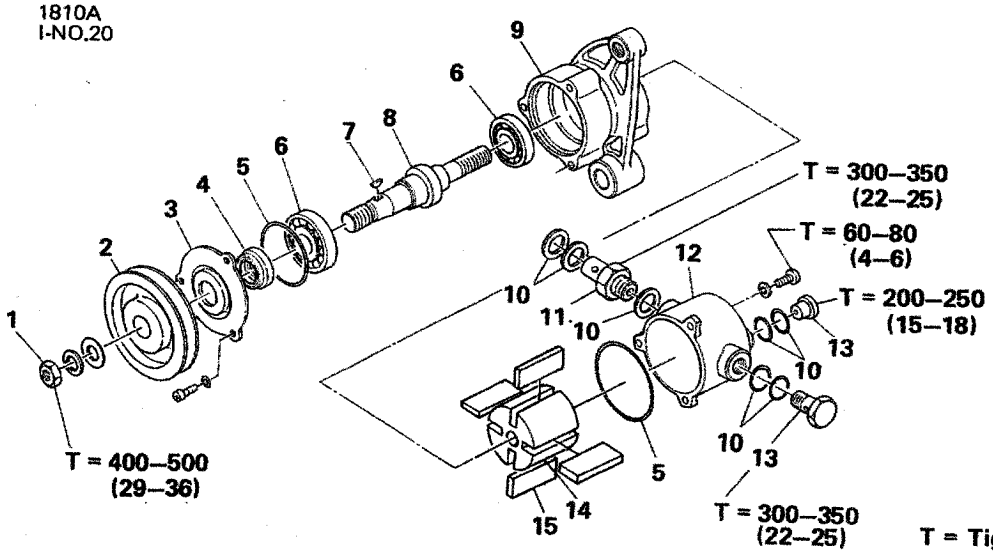


SM13-360

1. Hollow screw
2. Casing
3. Blade
4. Rotor
5. Rotor shaft
6. Inner bearing
7. Vacuum pump housing
8. Outer bearing
9. Oil seal
10. End cover
11. Pulle
12. Woodruff key
13. Lock nut
14. O-ring
15. Check valve assembly
- A. Lubrication
- B. Suction (From vacuum tank)
- C. Discharging (Air, oil)

OVERHAUL

1810A
I-NO.20



1. Lock nut
2. Pulley
3. End cover
4. Oil seal
5. O-ring
6. Bearing
7. Woodruff key
8. Rotor shaft
9. Vacuum pump housing
10. Gasket
11. Check valve assembly
12. Casing
13. Hollow screw
14. Rotor
15. Blades

T = Tightening torque: kg-cm (lb.ft)

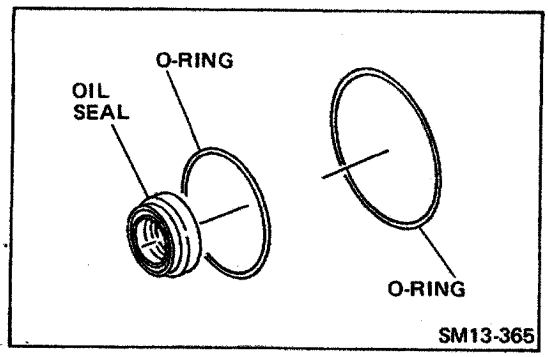
SM13-364

IMPORTANT POINT (S) – ASSEMBLY

MEASURE THE WEAR OF THE SPLINE.

1. Remove the check valve assembly on the suction side. Check the play of the pulley side by holding the rotor with a screw-driver with a piece of rubber set at its end in order not to damage the rotor.

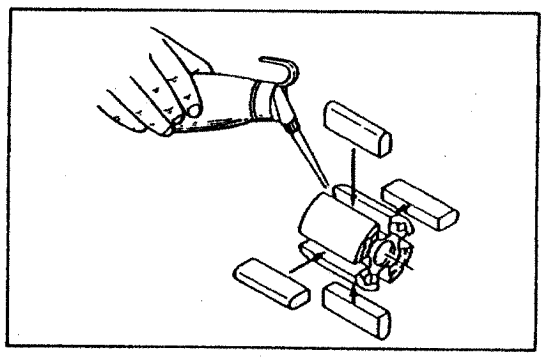
Service limit: 7.0 mm (0.276 in)



IMPORTANT POINT (S) – ASSEMBLY

REPLACING PARTS

1. On reassembling the vacuum pump, the O-ring and oil seal should be replaced with new ones.



BLADES AND ROTOR

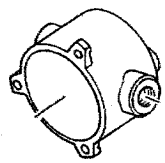
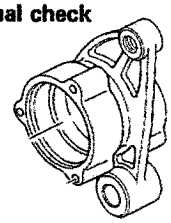
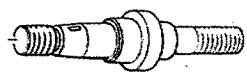
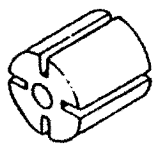
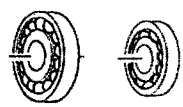
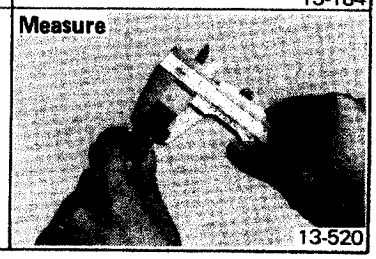
1. Place the blades into grooves of the rotor, with their rounded end facing outward.
2. Apply adequate amount of engine oil for blades and rotor before installing the casing.

PERFORMANCE CHARACTERISTIC

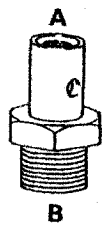
Oil Pressure – 4.5 kg/cm^2 (63.99 lb/sq.in)
Tank Capacity – 8.0 liters (1.76 Imp.gal/2.11 US gal)

The vacuum pump evacuate a 8 liters tank to 500 mmHg from 0 mmHg at 1,000 r.p.m., within 21 seconds.

INSPECTION AND REPAIR

Inspection Item	Standard	Limit	Remedy	Inspection Procedure
Inner surface of the casing. Wear, damages (scorings, scratch, seizing, etc)			Replace, if necessary.	Visual check 
Inner surface of end cover to contact with rotor and blades. Wear, damages (scoring scratch, seizing, etc)			Replace, if necessary.	Visual check 
Rotor shaft. Wear, damage (scoring, scratch, seizing, etc)			Replace, if necessary.	Visual check 
External surface of rotor. Wear, damage (scoring, scratch, seizing, etc)			Replace, if necessary.	Visual check 
Bearing Burn, Pitting			Replace,	Visual check 
Blades Wear damages (scoring, scratch, seizing)			Replace, if necessary.	Visual check  13-184
Height of blades	17.5 mm (0.689 in)	16.5 mm (0.649 in)	Replace	Measure  13-520

INSPECTION AND REPAIR

Inspection Item	Standard	Limit	Remedy	Inspection Procedure
Function of check valve.	Air flow A to B and not flows B to A.		Replace, if air flows B to A.	Air blow 

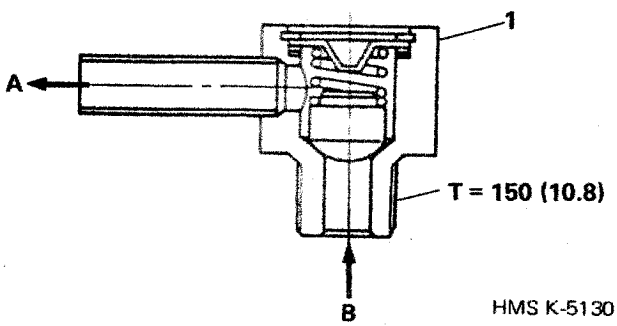
CHECK VALVE

DATA AND SPECIFICATIONS

Type	Spring type.
Valve opening pressure	35 mm Hg.

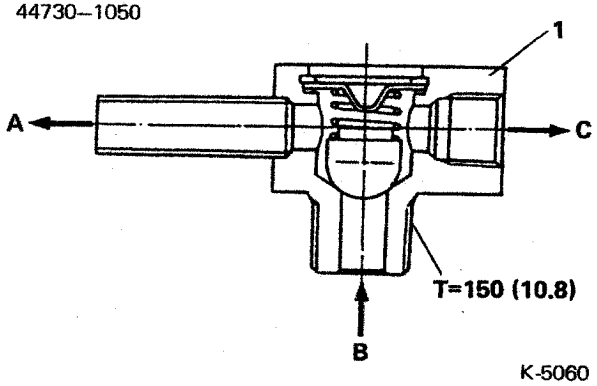
DESCRIPTION

44730–1080



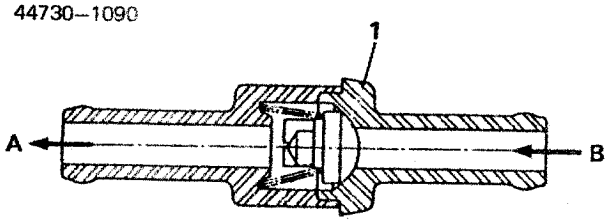
HMS K-5130

44730–1050



K-5060

44730–1090

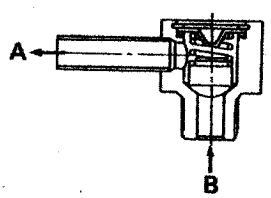
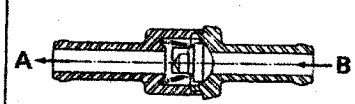


HMS K-5170

T = Tightening Torque kg-cm (lb-ft)

1. Check valve assembly
A. To vacuum pump
B. From vacuum tank
C. To spare line

INSPECTION AND REPAIR

Inspection Item	Standard	Limit	Remedy	Inspection Procedure
Function of check valve.	Air flows B to A and not flows A to B.		Replace, if air flows A to B.	Air blow  HMS K-5130  HMS K-5170

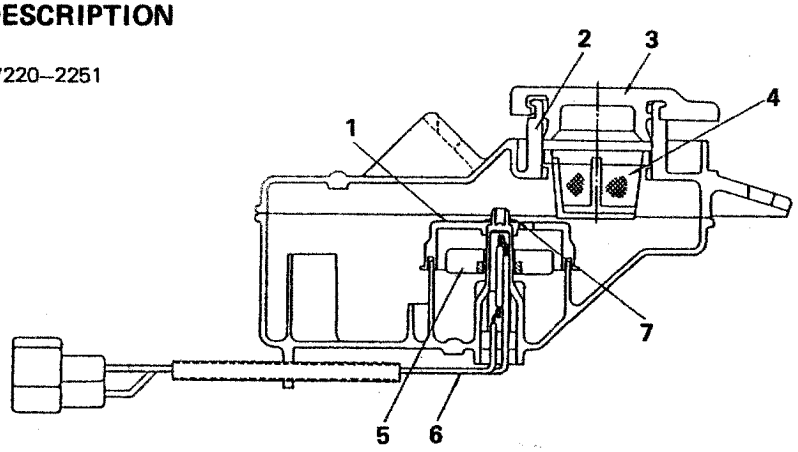
BRAKE FLUID RESERVOIR

DATA AND SPECIFICATIONS

Type	A combined type for both service brake and clutch control.
Low flowed level warning switch operating range	Below 30 mm (1.18 in) Below 42 mm (1.65 in) stroke FB L.H.D.

DESCRIPTION

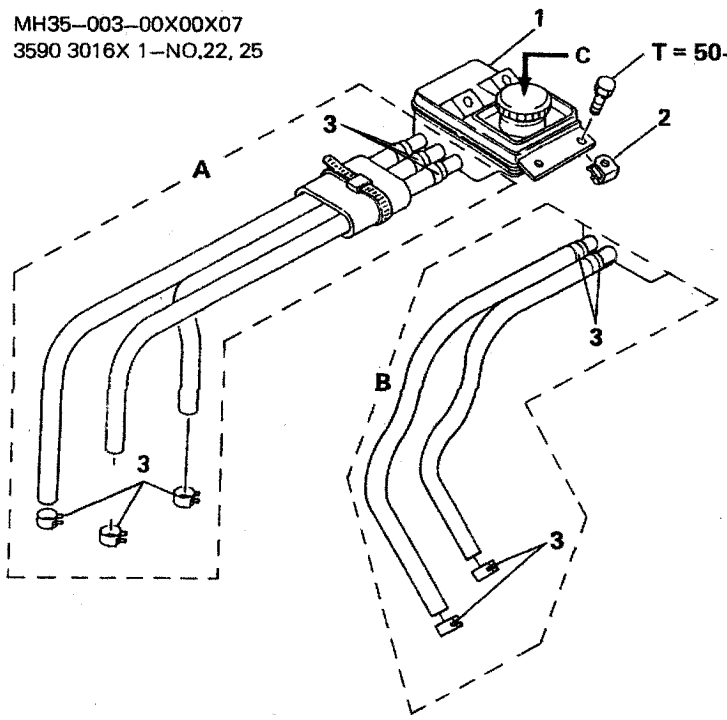
47220–2251

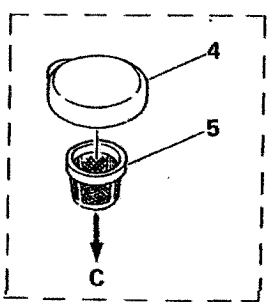


1. Float stopper
2. Reservoir body
3. Cap
4. Strainer
5. Float
6. Fluid level warning switch
7. Retainer ring

OVERHAUL

MH35–003–00X00X07
3590 3016X 1–NO.22, 25





T = Tightening torque: kg-cm (lb.ft)

1. Reservoir assembly
2. Spring nut
3. Clip
4. Cap
5. Strainer

A. For 2-independent lines brake
B. For single line brake

IMPORTANT POINT (S) – DISMOUNTING

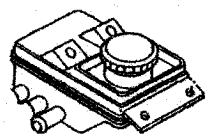
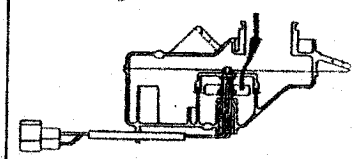
REMOVE THE RESERVOIR.

NOTE: ○ Before remove the reservoir, drain the brake fluid from the hydraulic line.

○ Place a small drain pan under the reservoir to receive the fluid. Do not let brake fluid remain on a painted floor. Wash if off immediately.

INSPECTION AND REPAIR

NOTE: Brake fluid or Isopropyl alchol only be used to wash the fluid reservoir.

Inspection Item	Standard	Limit	Remedy	Inspection Procedure
Brake fluid reservoir. Cracks, damages, leakage.			Replace, if necessary.	Visual check 
Operating of fluid level Warning switch	The warning lamp and buzzer should be turned on. When the float is submerged lower than MIN. level.		Replace, reservoir assembly, if necessary.	When the reservoir is filled Submerge the float. 

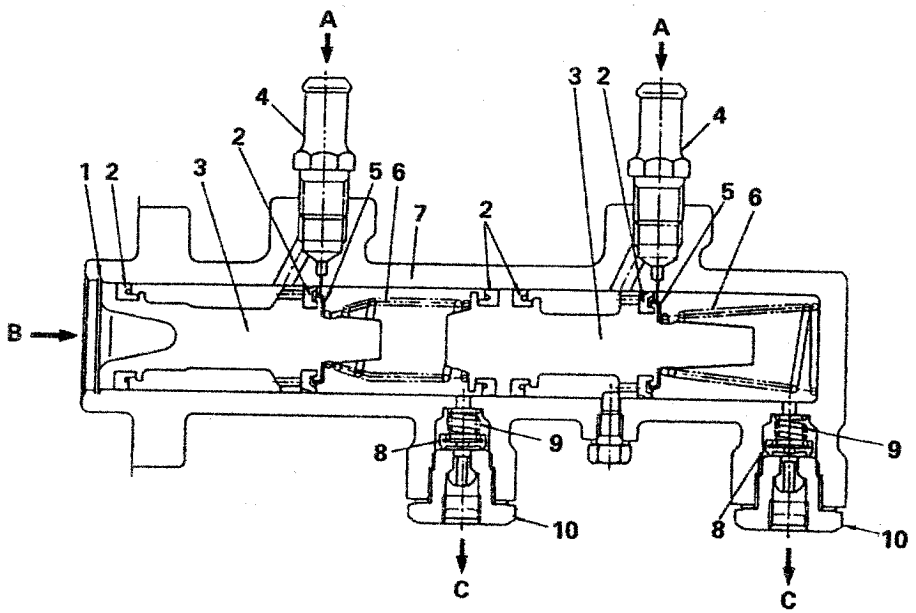
MASTER CYLINDER

DATA AND SPECIFICATIONS

Type	Dual piston
Cylinder bore	28.57 mm (1.13 in)
Max. piston stroke	35.0 mm (1.38 in)

DESCRIPTION

47200–1380A



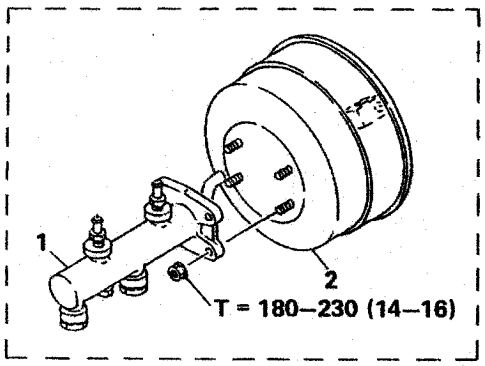
HMS K-5170

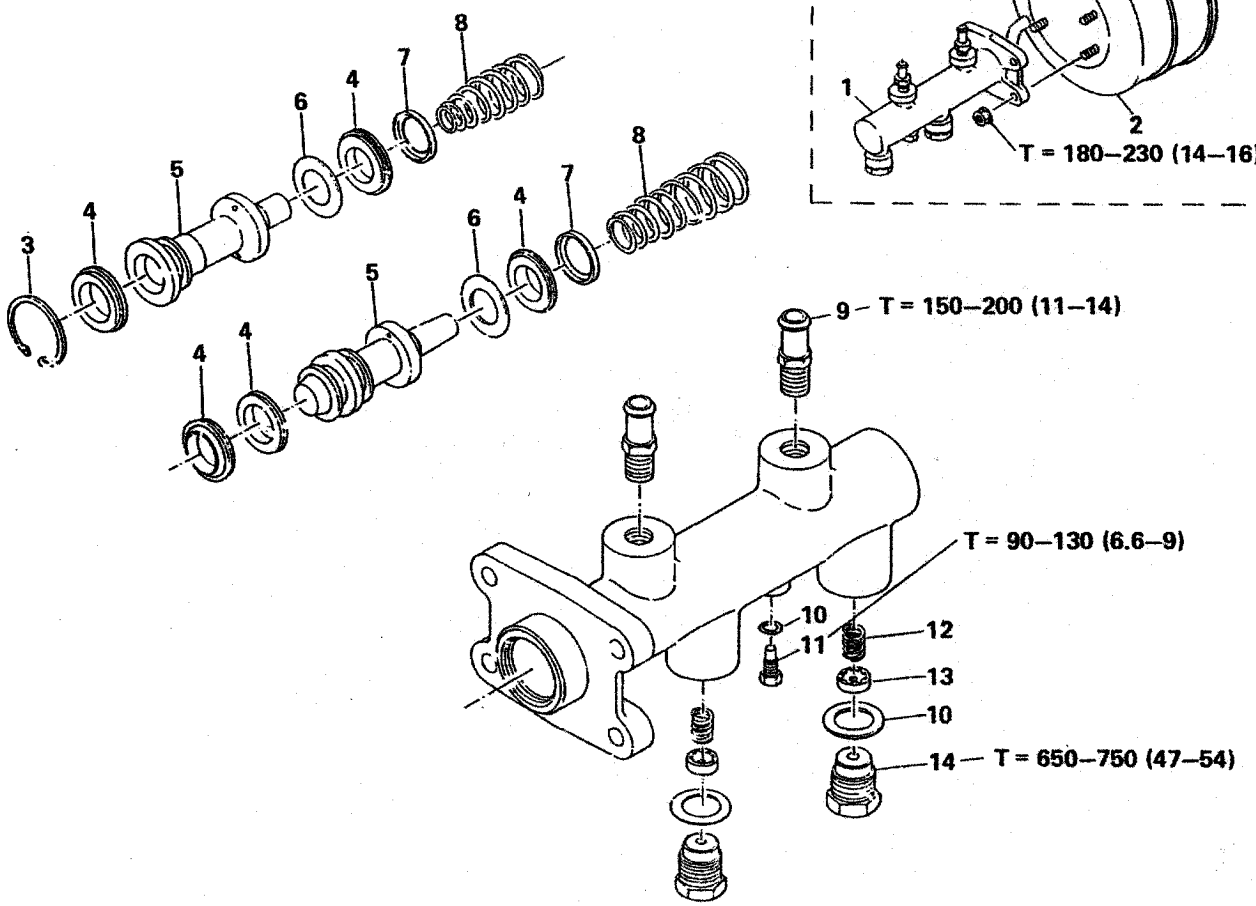
1. Retainer ring
2. Piston cup
3. Piston
4. Joint pipe
5. Piston cup retainer
6. Conical spring
7. Cylinder
8. Check valve
9. Compression spring
10. End plug

A. From reservoir
B. From booster
C. To wheel cylinder

OVERHAUL

MH35–003–00X00
3516T 1–NO. 20





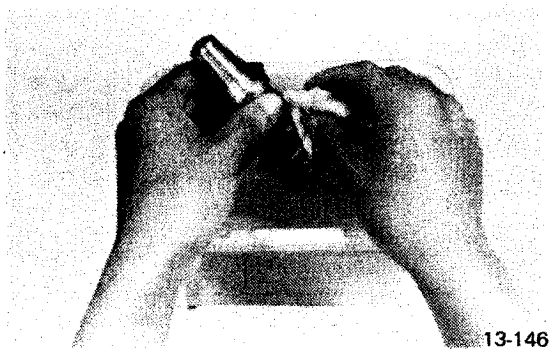
1. Master cylinder assembly
2. Brake vacuum booster
3. Retainer ring
4. Piston cup
5. Piston
6. Shim
7. Piston cup retainer
8. Conical spring
9. Joint pipe
10. Gasket
11. Set screw
12. Compression spring
13. Check valve
14. End plug

IMPORTANT POINT (S) – DISMOUNTING

REMOVAL OF MASTER CYLINDER.

NOTE: ○ **Before removing the cylinder, drain the brake fluid from the hydraulic lines.**

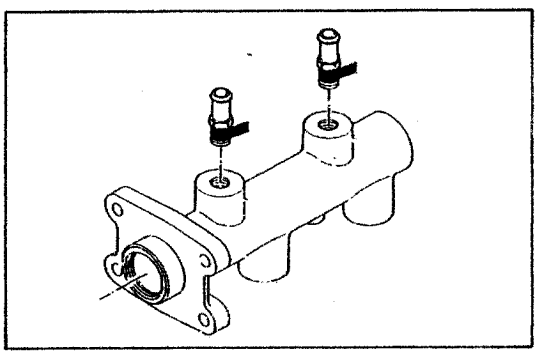
○ **Place a small pan under the master cylinder to receive the brake fluid. Do not let fluid remain on a painted floor. Wash it off immediately.**


13-146

IMPORTANT POINT (S) – DISASSEMBLY

WASHING (CLEANING) OF PARTS

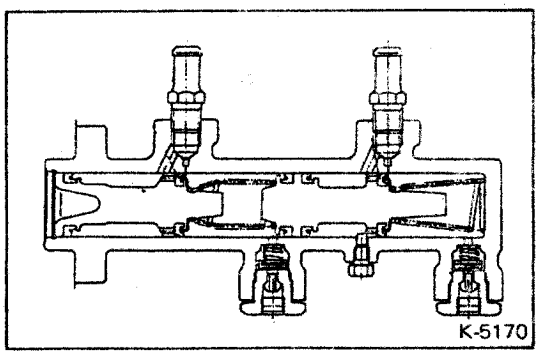
To washing the respective parts, the brake fluid or isopropyl alchol should only be used.



IMPORTANT POINT (S) – ASSEMBLY

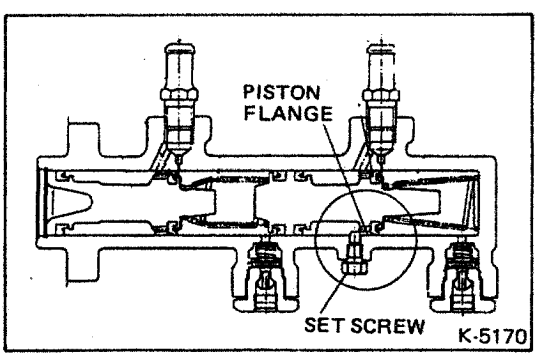
WHEN ASSEMBLING THE MASTER CYLINDER ALL RUBBER PARTS SHOULD BE REPLACED WITH NEW ONES.

BEFORE INSTALLING THE JOINT PIPE, APPLY A SEAL TAPE FOR TAPERED THREADS EXCEPT FIRST ONE OR TWO THREADS.


K-5170

ON ASSEMBLING, APPLY RUSTPROOF OIL TO THE INTERNAL SURFACE OF THE CYLINDER, THE OUTER CIRCUMFERENCE OF THE PISTON AND CUPS.

Rust proof oil (CCI No. 20): 04156-1010

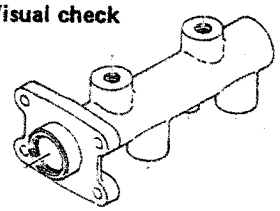
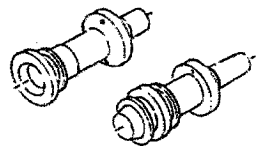
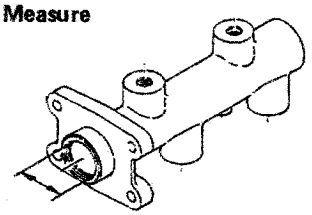
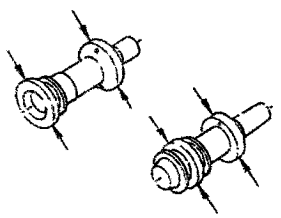


K-5170

INSTALLING OF SET SCREW.

Install the screw so that the mutual position of the piston and screw will be as shown.

INSPECTION AND REPAIR

Inspection Item	Standard	Limit	Remedy	Inspection Procedure
Inner surface of cylinder. Corrosion, wear			Clean or replace, if necessary.	Visual check 
Outer circumference of piston. Corrosion, wear.			Clean or replace, if necessary.	Visual check 
Clearance between cylinder and piston.	0.03–0.13 mm (0.0012–0.005 in)	0.2 mm (0.0078 in)	Replace, cylinder and/or piston.	Measure  

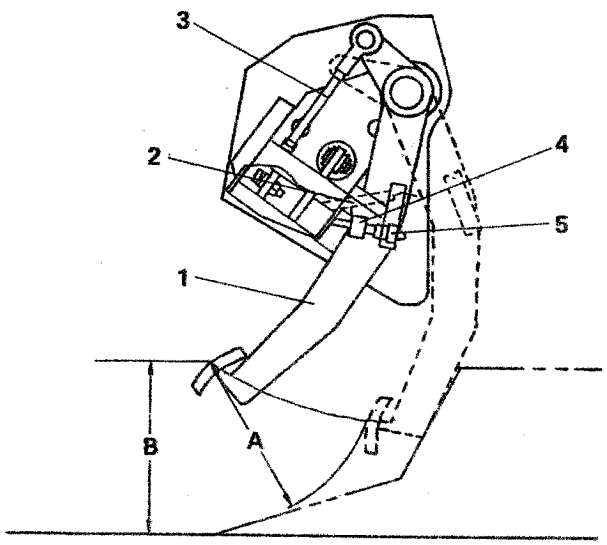
BRAKE PEDAL AND LINKAGE

DATA AND SPECIFICATIONS

Type	Pendulum type
Pedal height (From cab floor)	Model RB, AB — 190 mm (7.48 in)
	Model FB — 183 mm (7.20 in)
Max. pedal stroke	180 mm (7.08 in)

DESCRIPTION

00468–6980



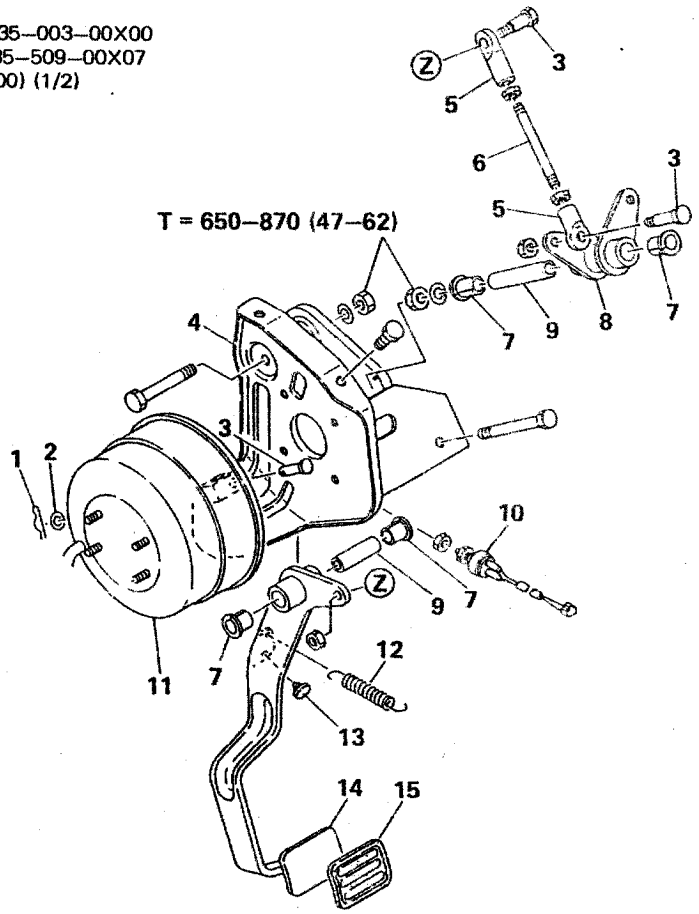
1. Brake pedal
2. Pedal return spring
3. Link rod
4. Stop lamp switch
5. Pedal buffer

A. Pedal stroke
B. Pedal height

SM13-363

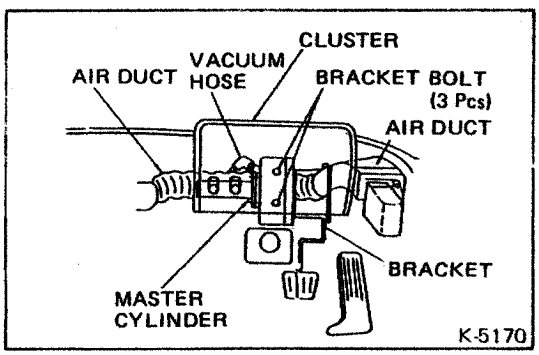
OVERHAUL

MH35–003–00X00
BC35–509–00X07
(3500) (1/2)



1. Lock pin
2. Plain washer
3. Pin
4. Pedal bracket
5. Rod end
6. Link rod
7. Bushing
8. Brake pedal lever
9. Pedal shaft
10. Stop lamp switch
11. Brake vacuum booster
12. Tension spring
13. Pedal buffer
14. Pedal
15. Pedal pad

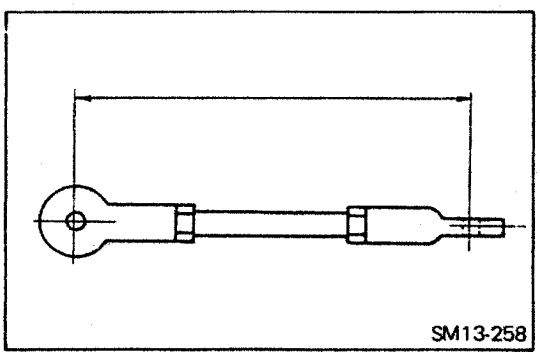
T = Tightening torque: kg-cm (lb.ft)



IMPORTANT POINT (S) – DISMOUNTING

BRAKE PEDAL AND LINKAGE, BRAKE VACUUM BOOSTER SHOULD BE DISMOUNTED AS A SET WITH PEDAL BRACKET.

Prior to dismounting the set, remove the meter cruster, combination meter, speed meter, air duct, master cylinder, etc.

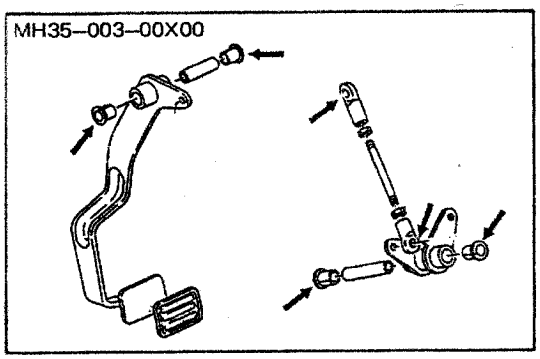


IMPORTANT POINT (S) – ASSEMBLY

LENGTH OF THE LINK ROD.

Adjust the link rod length for specified length.

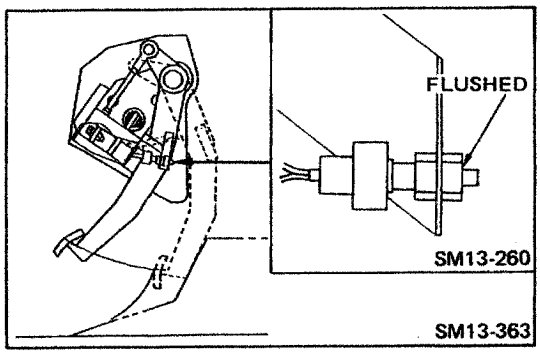
Assembly Standard: 164–166 mm (6.45–6.53 in)



IMPORTANT POINT (S) – ASSEMBLY

BUSHING

Apply adequate amount of chassis grease to the bushing.



STOP LAMP SWITCH.

Install the stop lamp switch to the bracket, so that the end of the switch threads parts and lock nut will be flush.
(This will set the pedal height and correct function of the switch).

BRAKE PEDAL PLAY

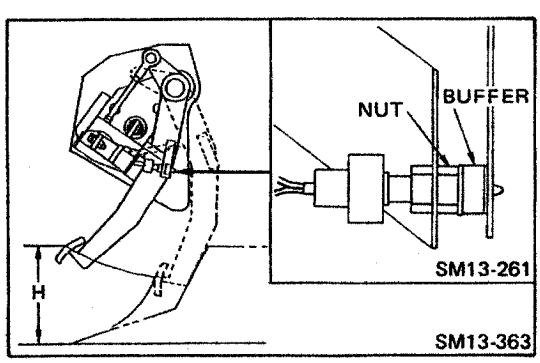
Adjust the booster operating-rod clevis so that the play of the pedal is within standard play and tighten the lock nut.

Standard Cleanrace: 0.5 mm (0.020 in)
Standard Play: 5–10 mm (0.20–0.39 in)

IMPORTANT POINT (S) – MOUNTING

BRAKE PEDAL AND LINKAGE SHOULD BE MOUNTED AS A SET WITH PEDAL BRACKET AND BOOSTER.

MOUNTING IS A REVERSED SEQUENCE OF DISMOUNTING.



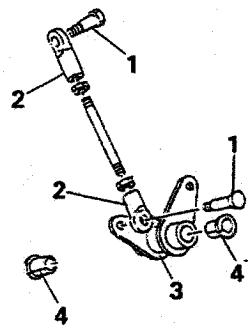
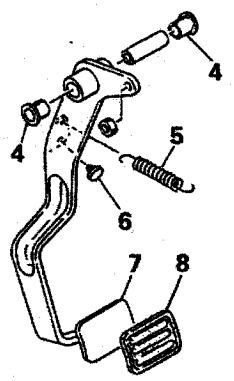
CHECK AFTER MOUNTING

BRAKE PEDAL HEIGHT

1. Check that the pedal buffer is flushed with stop lamp switch nut.
2. Check that the pedal height H from the floor is within the standard dimension.

Standard: Model AB and RB 185–195 mm (7.3–7.7 in)
Model FB 178–188 mm (7.0–7.4 in)

INSPECTION AND REPAIR

Inspection Item	Standard	Limit	Remedy	Inspection Procedure
Pin 1, Rod end 2, Lever 3. Wear.			Replace, if necessary.	Visual check  
Bushing 4. Wear.			Replace, if necessary.	
Tension spring 5. Elastic strength distortion and any other damages.			Replace, if necessary.	
Pedal buffer 6 and pedal pad 8. Wear and any other damages.			Replace, if necessary.	
Brake pedal 7. Deformation (bend, twist)			Replace, if necessary.	

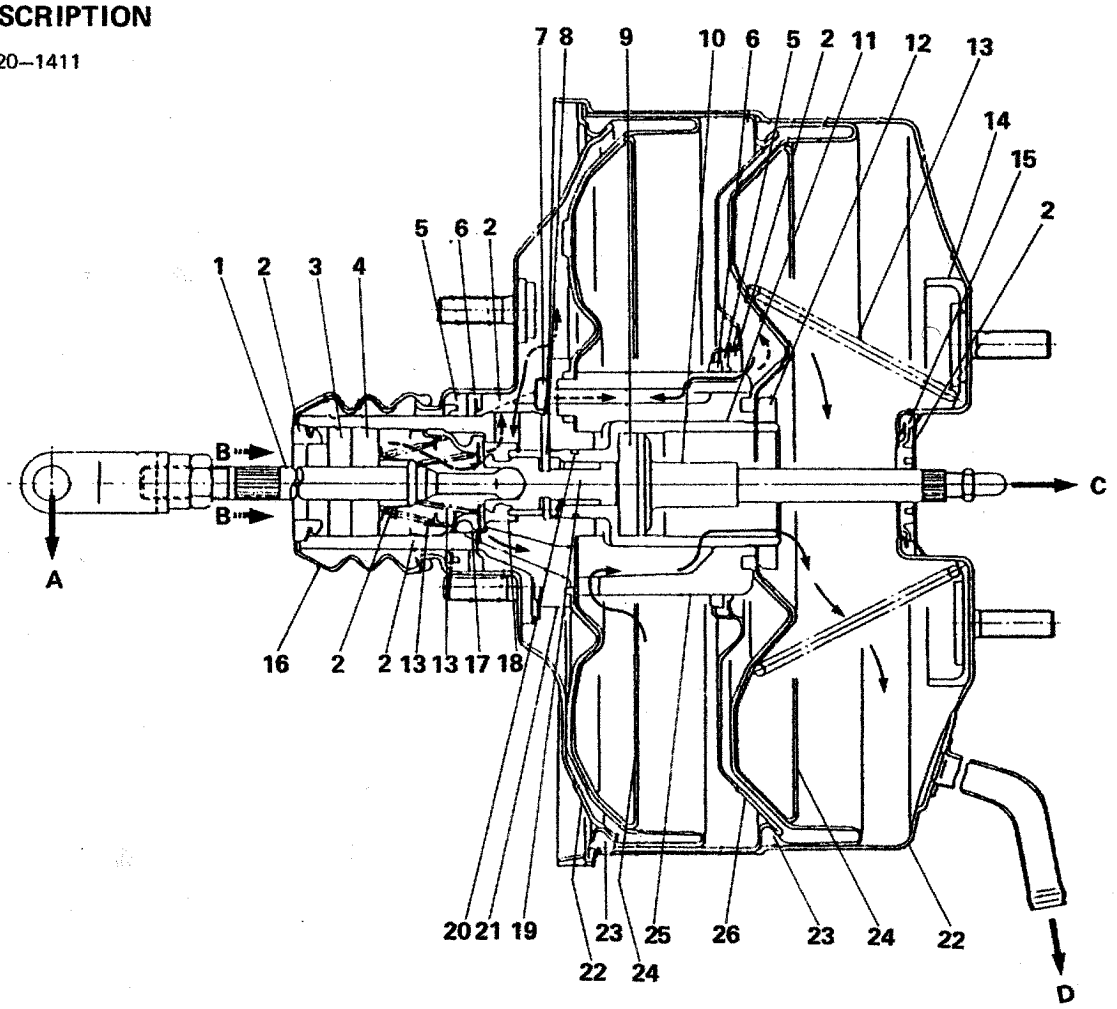
BRAKE VACUUM BOOSTER (MASTER VAC)

DATA AND SPECIFICATIONS

Type	Link rod control vacuum booster
Effective diameter of diaphragm	205 mm (8.07 in)

DESCRIPTION

44620–1411



HMS T8150

BRAKE VACUUM BOOSTER (MASTER VAC)

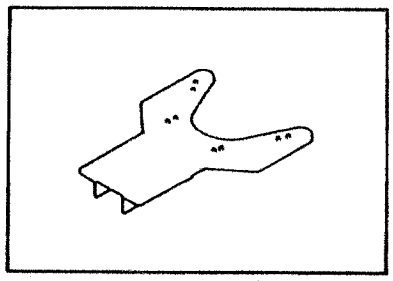
1. Operating rod
2. Retainer
3. Silencer
4. Filter
5. Seal
6. Bearing
7. Key retainer
8. Key
9. Reaction disc
10. Push rod
11. Hub reaction disc
12. Lock nut
13. Spring
14. Support plate
15. Plate and seal
16. Boot
17. Poppet valve
18. Hub retainer
19. Plunger
20. O-ring
21. Valve body
22. Shell
23. Diaphragm
24. Diaphragm plate
25. Center body
26. Center plate

A. Brake pedal lever
B. Atmospheric pressure
C. To master cylinder
D. To vacuum tank

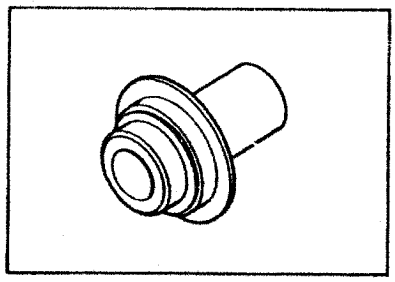
SPECIAL TOOLS

Prior to starting a vacuum booster overhaul, it is necessary to have these special tools.

DIAPHRAGM PLATE HOLDER

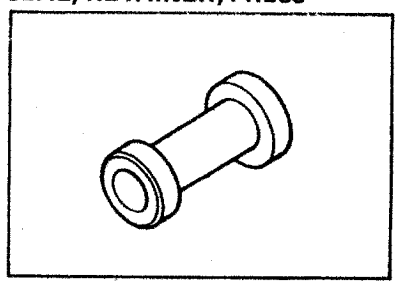


SEAL, BEARING, RETAINER, PRESS



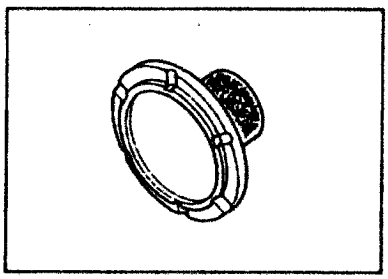
910-21542

SEAL, RETAINER, PRESS



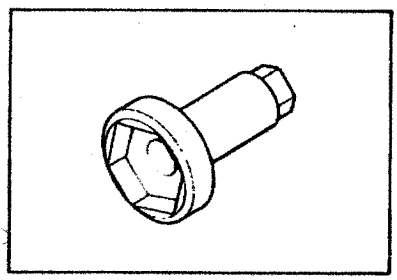
910-22450

SEAL, BEARING, RETAINER, PRESS



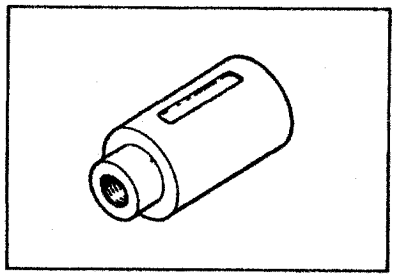
910-21543

BRAKE BOOSTER INNER NUT SOCKET WRENCH



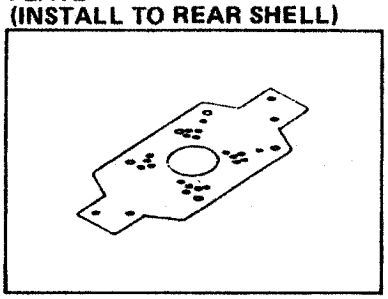
910-22111

BRAKE BOOSTER AND PLATE HOLD NUT



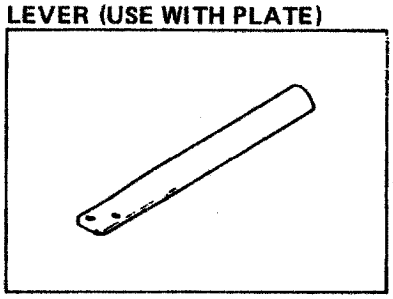
1113-0191

PLATE
(INSTALL TO REAR SHELL)



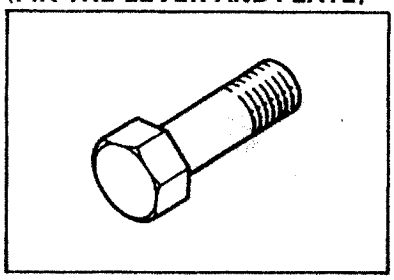
910-22092

LEVER (USE WITH PLATE)



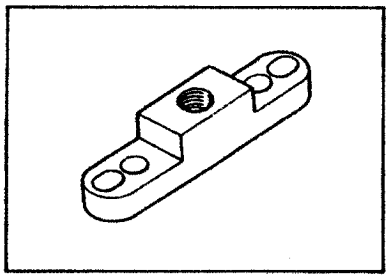
910-22100

BOLT
(FIX THE LEVER AND PLATE)



1100-0630

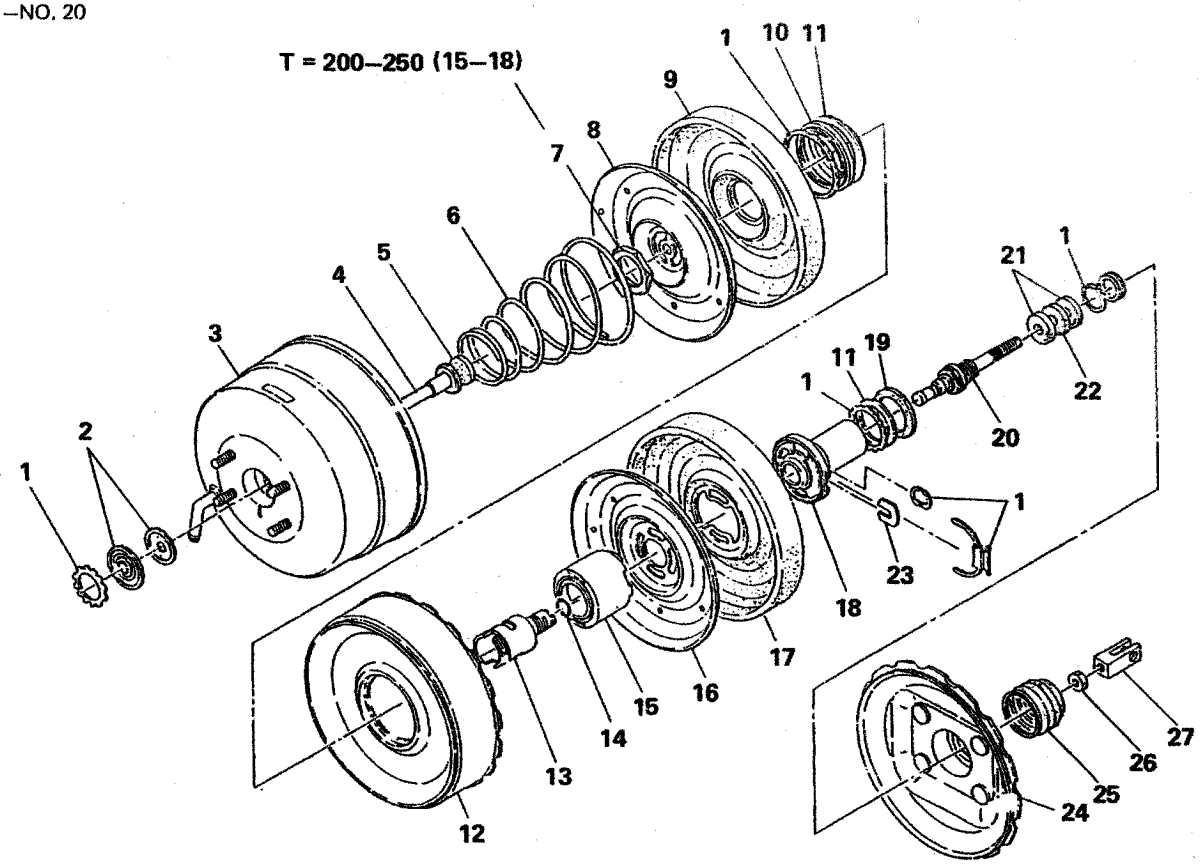
BRACKET
(INSTALL TO FRONT SHELL)



1340-0055

OVERHAUL

3590–3536G
1–NO. 20

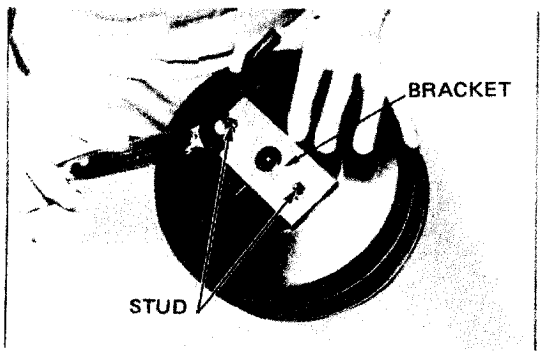


T = Tightening torque: kg-cm (lb.ft)

1. Retainer
2. Dust seal
3. Front shell
4. Push rod
5. Reaction disc
6. Conical spring
7. Piston nut
8. Front push plate
9. Front diaphragm
10. Piston seal
11. Bearing
12. Distance plate
13. Reaction disc hub
14. O-ring
15. Piston spacer
16. Rear push plate
17. Rear diaphragm
18. Poppet valve body
19. Dust seal
20. Operating rod
21. Filter
22. Silencer
23. Key
24. Rear shell
25. Boot
26. Lock nut
27. Clevis

IMPORTANT POINT (S) – DISMOUNTING.

SEE SECTION FOR BRAKE PEDAL AND LINKAGE.

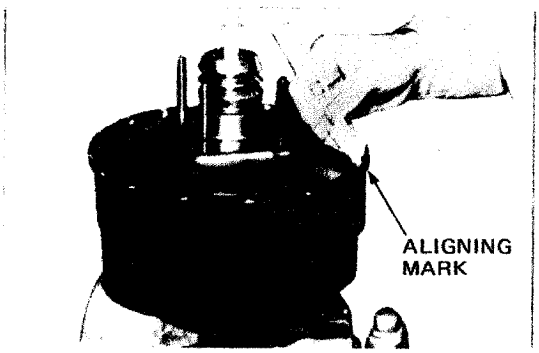


IMPORTANT POINT (S) – DISASSEMBLY

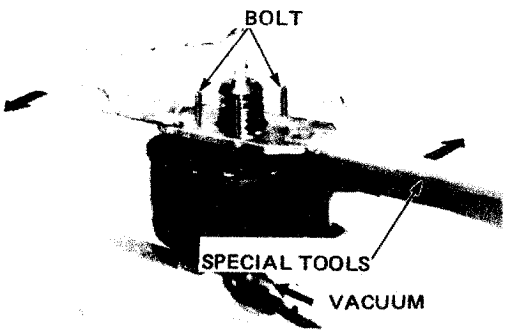
PREPARATION.

1. Install the bracket (special tool) to the front shell.

Special Tool: Bracket (1340-0055)



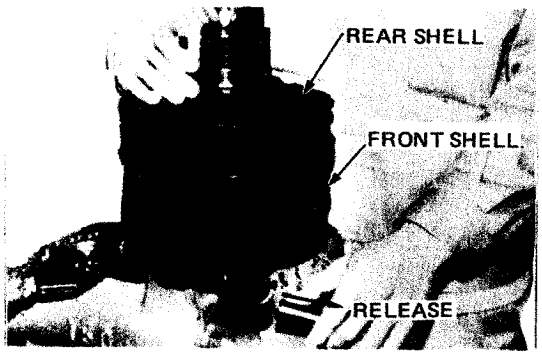
2. Set the bracket with the booster assembly on a vise.
3. Apply a aligning marks for the front and rear shell.



FRONT SHELL AND REAR SHELL.

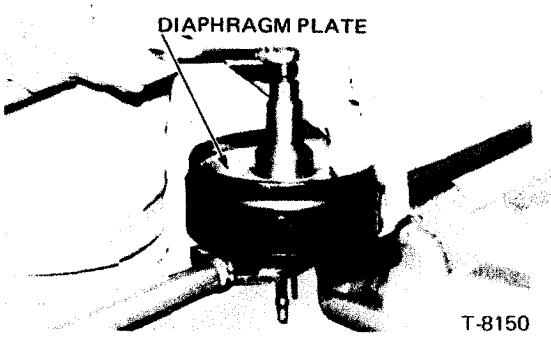
1. Apply vacuum pressure (Approx. 500 mmHg) for the brake vacuum booster.
2. Turn the rear shell counter clockwise until the notches of the rear shell align with its of the front shell.

Special Tool: Plate (910-22092)
Levers (910-22100)
Bolts (1100-0630)
Hold nut (1113-0191)



3. Release the vacuum pressure from the booster gradually so that the rear shell assembly will come out.

NOTE: Be carefull that the rear shell may jump out by tension of spring.



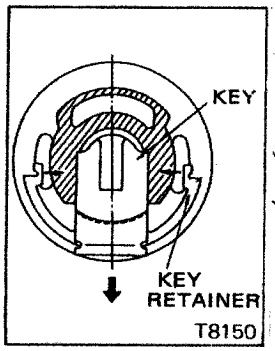
LOCK NUT

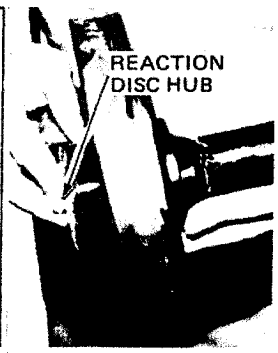
1. Set the plate (special tool) with the rear shell and center plate assembly on a vise.

Special Tool: Plate (910-22092)
Hold Nut (1113-0191)

2. Loosen the lock nut.

Special Tool: Socket Wrench (910-22111)
Plate holder. (———)





KEY AND KEY RETAINER.

1. Push the key retainer hooks toward the center and remove the key retainer.
2. Set the key inserting port down, then push the operating rod so that the key will be dropped off and the valve (operating rod) can be removed.

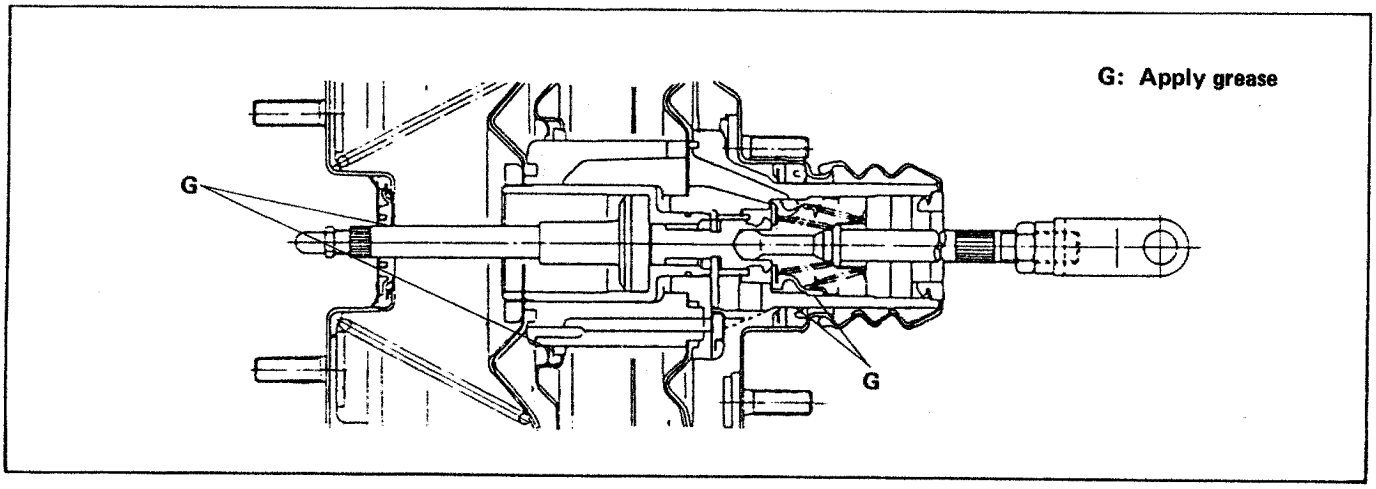
REACTION DISC HUB.

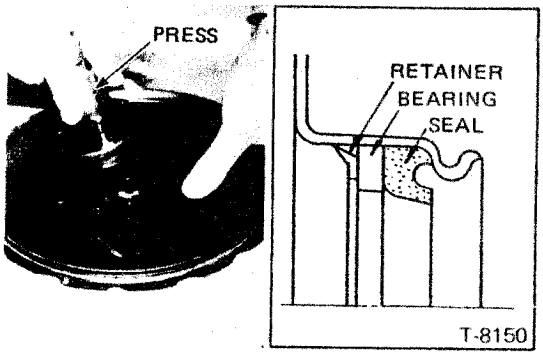
Turn the reaction disc hub for 90°, so that the reaction disc hub, center body, and valve body can be separated.

IMPORTANT POINT (S) – ASSEMBLY

ALL RUBBER PARTS SUCH AS SEALS, O-RINGS, DIAPHRAGMS VALVE (OPERATING ROD) ETC. AND RETAINERS SHOULD BE REPLACED WITH NEW ONES. (Repair kit is available)

ON ASSEMBLING, APPLY THE SILICON GREASE FOR FOLLOWING PARTS.

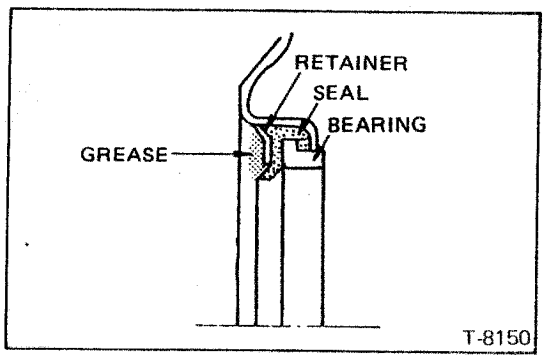




REAR SHELL.

Install the seal, bearing and retainer to the rear shell.

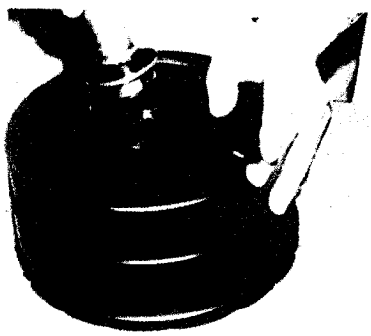
Special Tool: Press (910-21542)



CENTER PLATE.

Assemble the bearing and seal then install them to the center plate.

Special Tool: Press (910-21543)

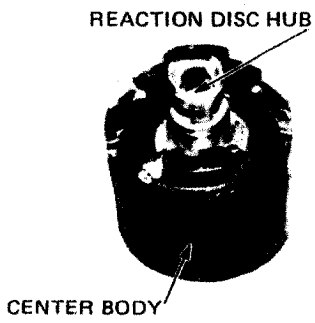


FRONT SHELL.

Install the plate and seal to the front shell then the retainer.

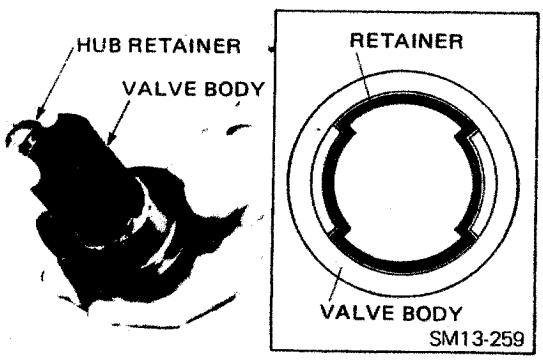
Special Tool: Press (910-22450)

NOTE: **Lip of the seal should be facing upward.**



REACTION DISC HUB AND CENTER BODY.

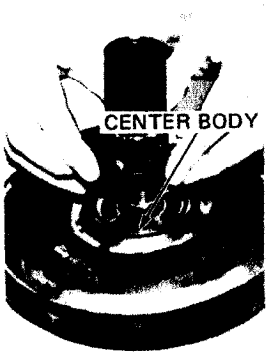
Set the reaction disc hub and center body as shown, then place the diaphragm plate and diaphragm on the center body.

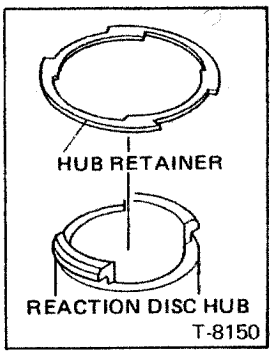


REACTION DISC HUB RETAINER.

Place the retainer into the valve body.

NOTE: **Make sure that the notches in the valve body and its of the retainer are aligned.**

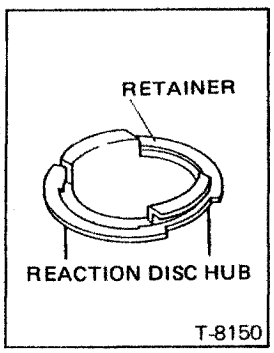




VALVE BODY AND CENTER BODY.

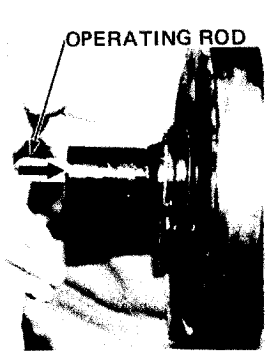
Set the valve body on the center body.

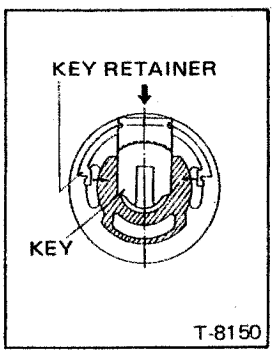
NOTE: **Notches of the retainer in the valve body and its of the reaction disc hub should be aligned.**



RETAINING OF REACTION DISC HUB WITH VALVE BODY.

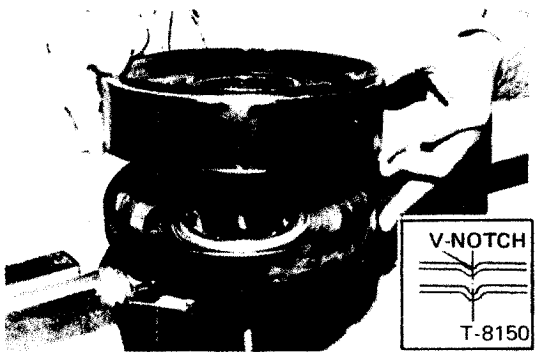
Turn the reaction disc hub for 90° with a screw driver and confirm that the reaction disc hub is securely hold by the retainer.





VALVE (OPERATING ROD)

Insert the valve (operating rod) into the valve body, and push the rod then insert the key and key retainer in position of the valve body.

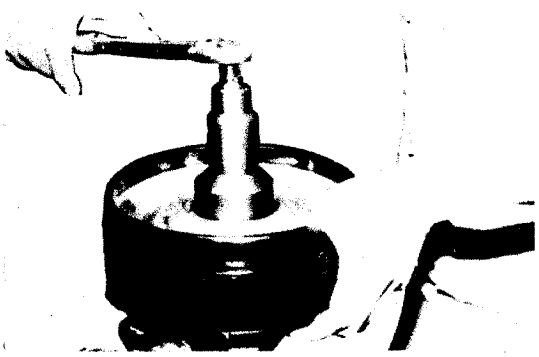


REAR SHELL AND CENTER PLATE.

1. Set the plate (special tool) on a vise then install the rear shell assembly to the plate.

Special Tool: Plate (910-22092)
Hold Nut (1113-0191)

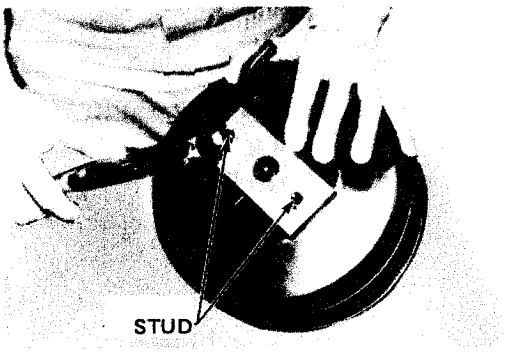
NOTE: **Align the V notches of Rear shell and its of center plate.**



LOCK NUT.

Tighten the lock nut.

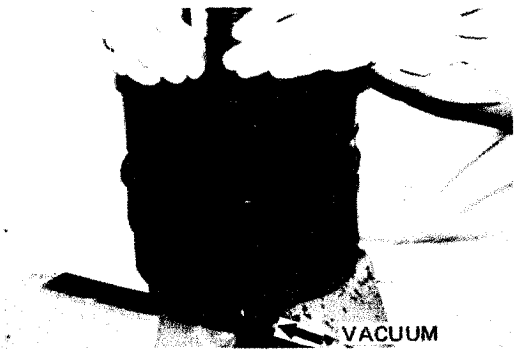
Special Tool: Socket Wrench (910-22111)
Plate Holder (—)



FINAL ASSEMBLY.

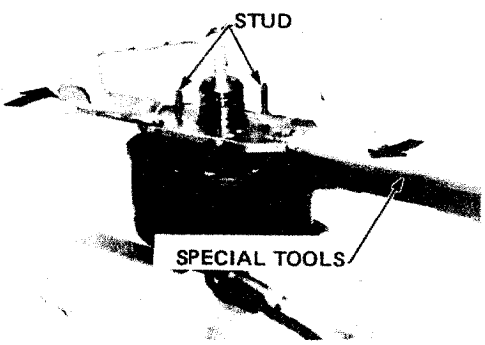
1. Install the bracket (special tool) to the front shell and set them on a vise.

Special Tool: Bracket (1340-0055)



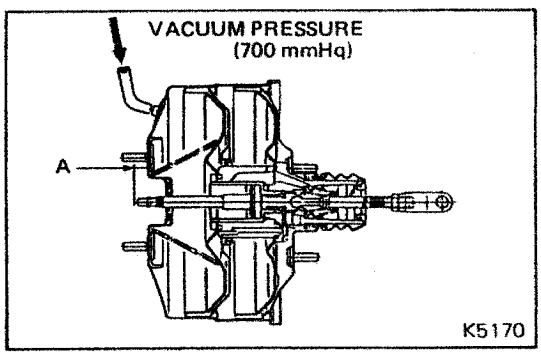
2. Set the rear shell assembly on the front shell and spring to align the V notches of both shells (Aligning marks differ by 16°), then apply vacuum pressure (Approx. 500 mmHg) for front shell.

NOTE: Be careful so that your hands are not caughted by the shells.



3. Turn the rear shell clockwise until the match marks are aligned.

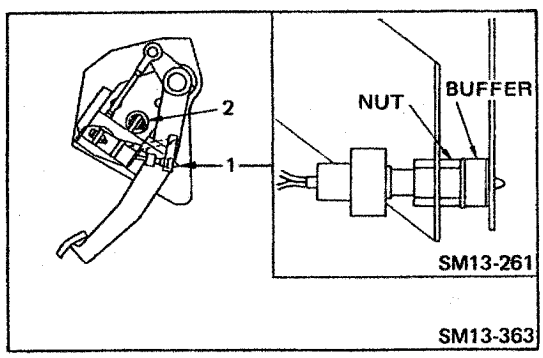
Special Tool: Plate (910-22092)
Hold Nut (1113-0191)
Lever (910-22100)
Bolt (1100-0630)



PUSH ROD PROTRUSION

Apply vacuum pressure of 700 mmHg and measure the protrusion A. Adjust if necessary.

Assembly Standard: 10.375 – 10.625 mm (0.408–0.418 in)



IMPORTANT POINT (S) – MOUNTING

MOUNTING TO THE BRAKE PEDAL BRACKET AND PEDAL LINKAGE.

1. Set the brake pedal so that the buffer on the pedal will be flushed with stop lamp switch nut.
2. Adjust the operating rod clevis to align the holes of the clevis and of the brake pedal lever.
   Then connect the clevis and lever with pin.

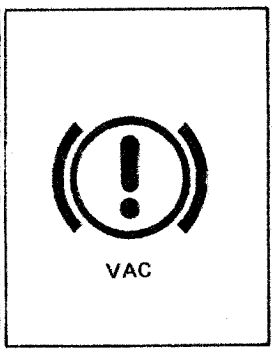
BRAKE BOOSTER SHOULD BE MOUNTED AS A SET WITH PEDAL BRACKET, BRAKE PEDAL AND LINKAGE.

MOUNTING IS A REVERSED SEQUENCE OF DISMOUNTING.

CHECK AFTER MOUNTING.

BRAKE PEDAL HEIGHT AND PEDAL PLAY.

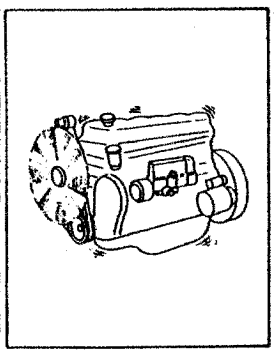
See section for brake pedal and linkage.



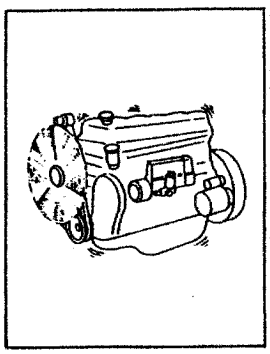
CHECKING OF THE VACUUM BOOSTER FUNCTION.

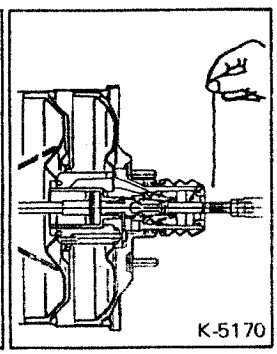
CHECK THE FUNCTION OF THE VACUUM BOOSTER

1. Pump the brake pedal until the vacuum tank pressure becomes zero (Vacuum warning lamp lights up).



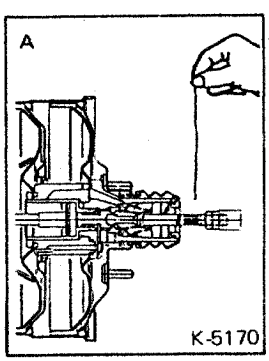
2. Press the brake pedal and keep it dpressed then run the engine. If the pedal moves down, the booster is operating normally.

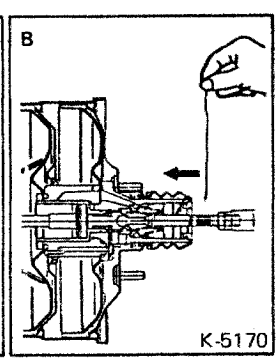




POPPET VALVE FUNCTION.

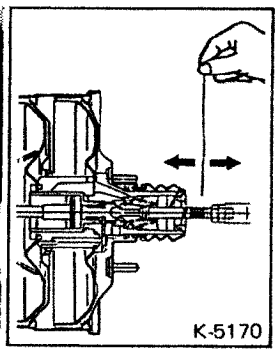
1. Keep the engine in idling and place a thread at air inlet.





2. If the thread is drawn in, the poppet valve is defective.

A: Normal
B: Defect



3. Press the brake pedal repeatedly.
If the thread is drawn in by each stroke, the poppet valve is operating normally.

INSPECTION AND REPAIR

Inspection Item	Standard	Limit	Remedy	Inspection Procedure
All component Parts. Deformation, wear, scrathes, scoring and/or any other damages.			**Repair or Replace, if necessary.**	**Visual check.**

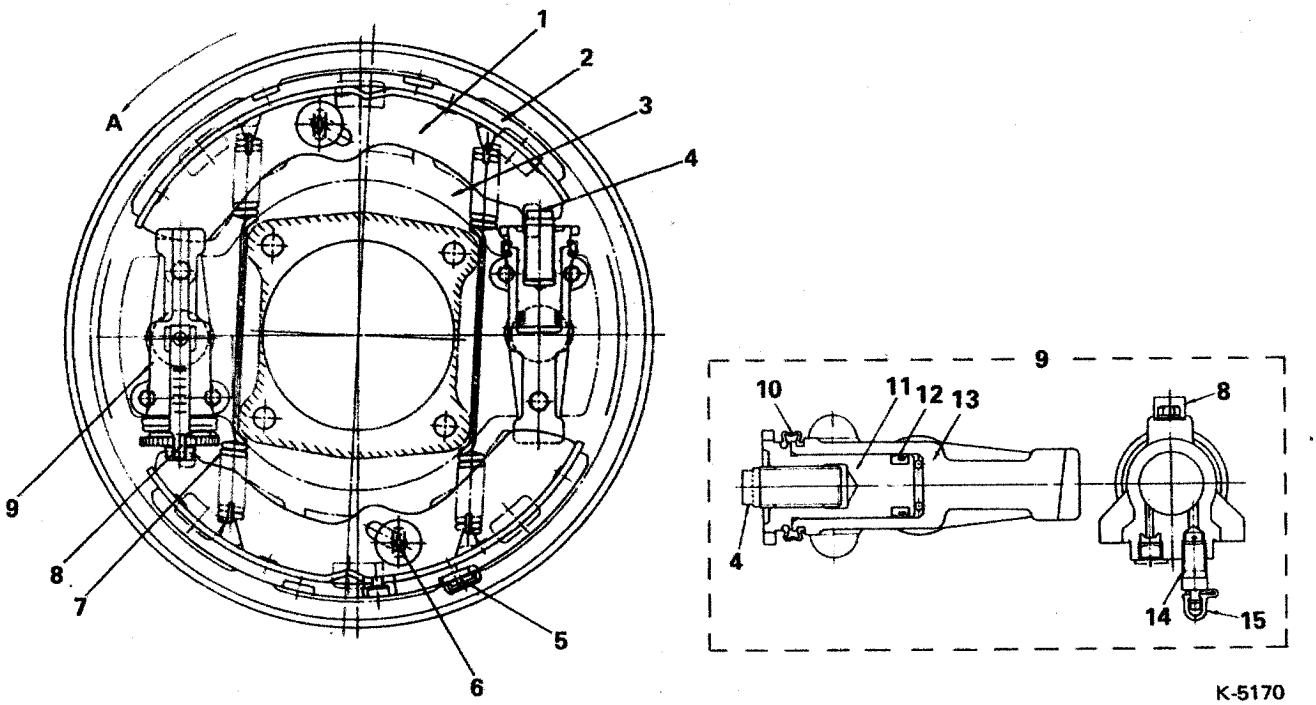
WHEEL BRAKE

DATA AND SPECIFICATIONS

Type	Drum brake with hydraulically actuated, internally expanding two-leading shoes in front wheels and dual two-leading shoes in rear wheels
Brake drum inside diameter	320.0 mm (12.59 in) for both front and rear.
Brake lining:	Width x Length x Thickness
Front:	75 x 321.1 x 8 mm (2.95 x 12.64 x 0.315 in)
Rear	75 x 321.1 x 8 mm (2.95 x 12.64 x 0.315 in)
Wheel cylinder bore diameter, Front	26.99 mm (1.0625 in)
Rear	26.99 mm (1.0625 in)

DESCRIPTION

47020–1591



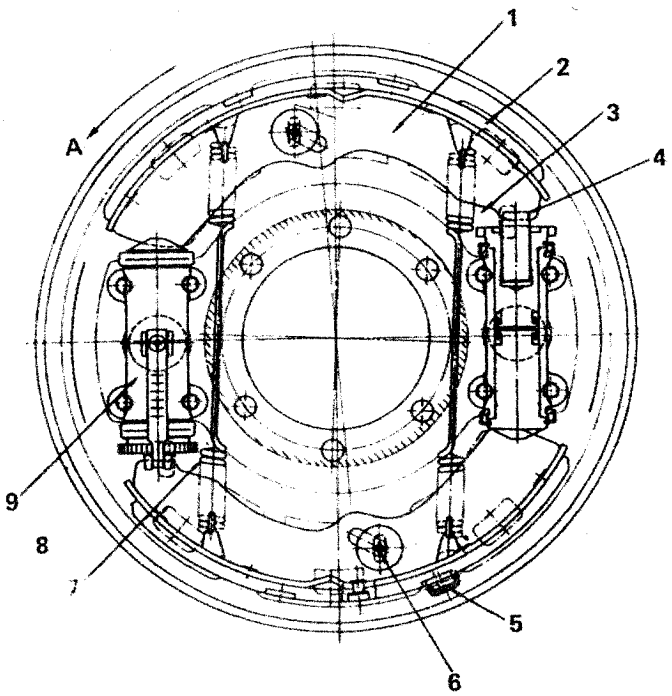
K-5170

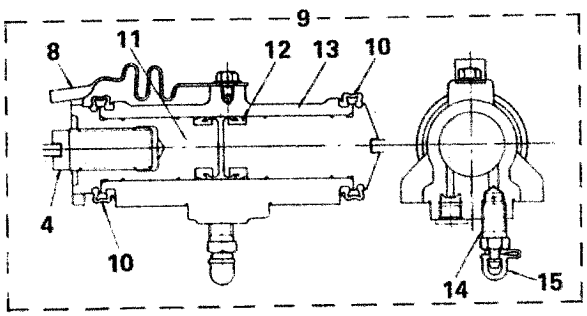
FRONT

1. Brake shoe
2. Brake lining
3. Backing plate
4. Shoe adjusting screw
5. Hole plug
6. Hold down pin
7. Shoe retracting spring
8. Adjuster lock spring
9. Wheel cylinder assembly
10. Boots
11. Piston
12. Piston cup
13. Cylinder
14. Air bleeder screw
15. Bleeder cap

A. Forward turning

47040–1721





HMS K-5170

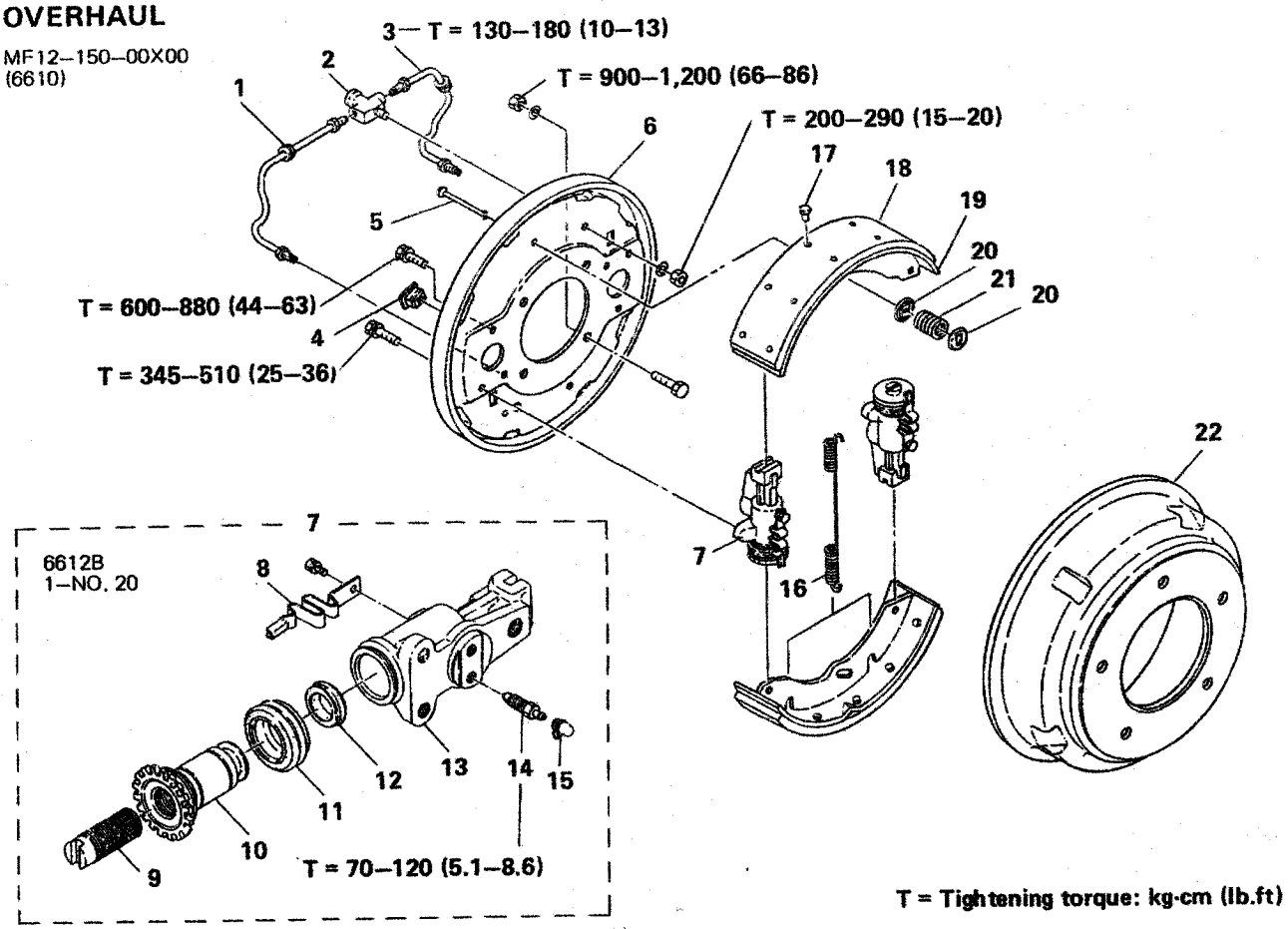
REAR

1. Brake shoe
2. Brake lining
3. Backing plate
4. Shoe adjusting screw
5. Hole plug
6. Hold down pir
7. Shoe retracting spring
8. Adjuster lock spring
9. Wheel cylinder assembly
10. Boots
11. Piston
12. Piston cup
13. Cylinder
14. Air Bleeder screw
15. Bleeder cap

A. Forward turning

OVERHAUL

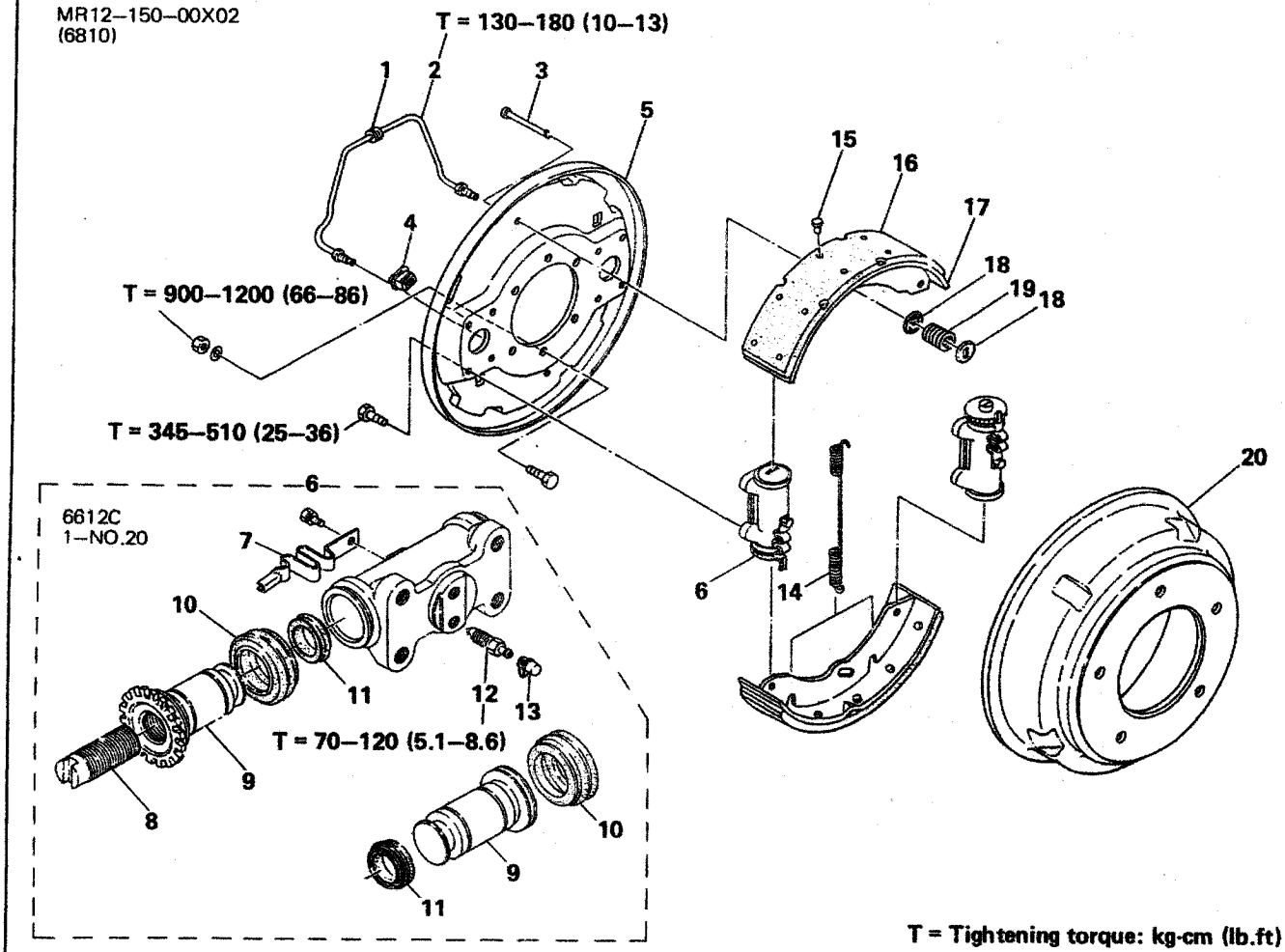
MF12–150–00X00
(6610)



T = Tightening torque: kg-cm (lb.ft)

FRONT

1. Grommet
2. Oil pipe joint
3. Oil pipe
4. Hole plug
5. Shoe hold down pin
6. Backing plate
7. Wheel cylinder assembly
8. Adjuster lock spring
9. Shoe adjust bolt
10. Piston
11. Boot
12. Piston cup
13. Cylinder
14. Air bleeder screw
15. Cap
16. Shoe retracting spring
17. Rivet
18. Brake lining
19. Brake shoe
20. Shoe hold down spring seat
21. Shoe hold down spring
22. Brake drum



T = Tightening torque: kg-cm (lb.ft)

REAR

1. Grommet
2. Oil pipe
3. Shoe hold down pin
4. Hole plug
5. Backing plate
6. Wheel cylinder assembly
7. Agjuster lock spring
8. Shoe adjust bolt
9. Piston
10. Boot
11. Piston cup
12. Air bleeder screw
13. Bleeder cap
14. Tension spring
15. Rivet
16. Brake lining
17. Brake shoe
18. Shoe hold down spring seat
19. Shoe hold down spring
20. Brake drum

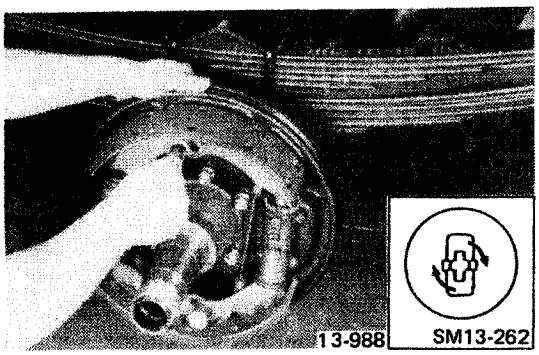
IMPORTANT POINT (S) – DISASSEMBLY

REMOVAL OF TIRE.

Refer to chapter for WHEEL AND TIRE.

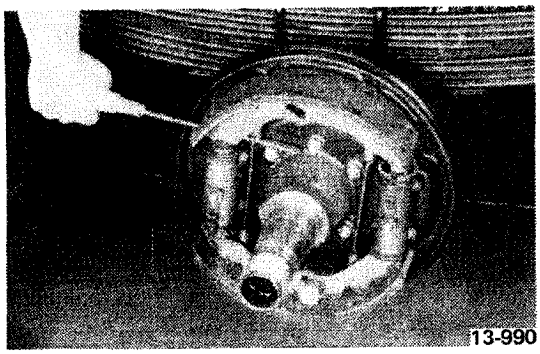
REMOVAL OF BRAKE DRUM WITH WHEEL HUB AND WHEEL HUB BEARINGS.

Refer to chapter for FRONT AXLE and for REAR AXLE.



REMOVING OF BRAKE SHOE AND RETRACTING SPRING.

1. Push in the shoe hold down spring seat and turn the shoe hold down pin 90° to remove the pin, spring, and spring seats.



2. Using a screw driver, dislocate the upper brake shoe web from the wheel cylinder anchor side, then remove the shoe and brake shoe retracting springs.
3. Remove the lower shoe hold down pin, spring, spring seats, and then lower brake shoe. See procedure 1 above.

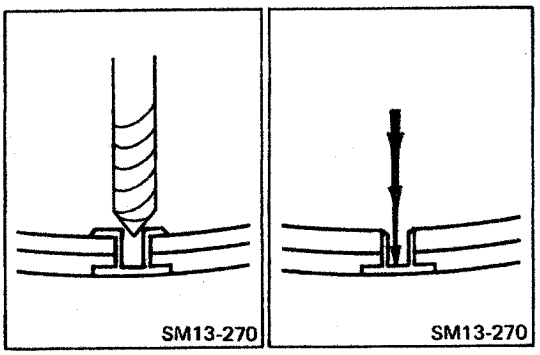
IMPORTANT POINT (S) – ASSEMBLY

REMOVING OF BRAKE LINING FROM BRAKE SHOE.

1. Drill the rivet caulking section with a drill smaller than the rivet diameter.

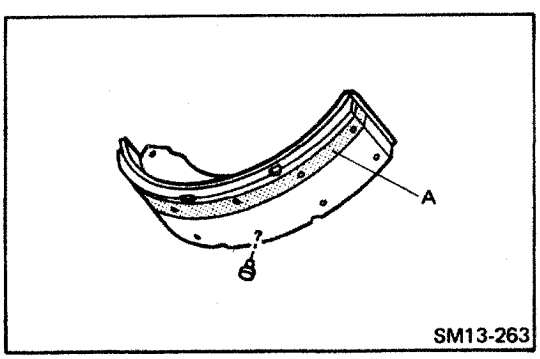
NOTE: At this time, be careful not to scratch the brake shoe.

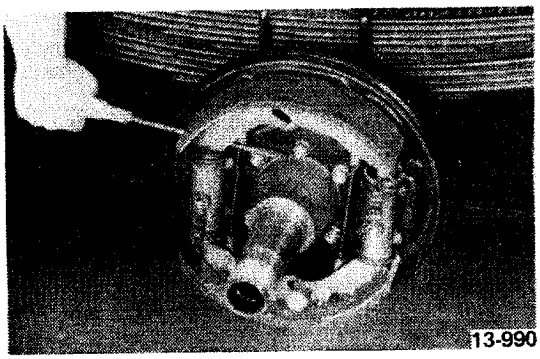
2. After drilling, remove the remaining rivet with a fine chisel or a riveting machine.



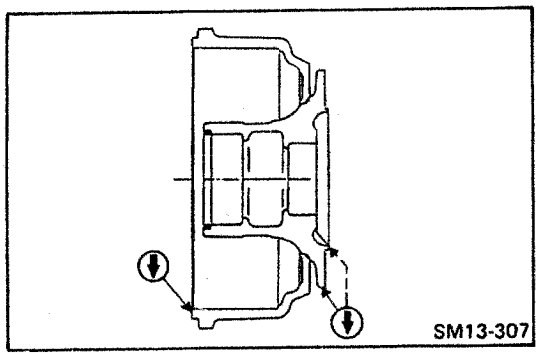
RE-LINING OF BRAKE SHOE.

1. Set the lining with shoe and insert the rivets into all holes, then hold them with an adhesive tape A.




13-990

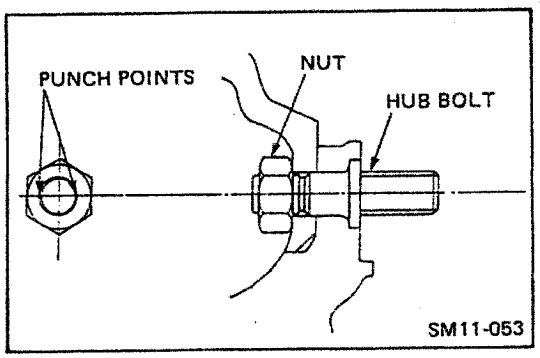
3. Install the upper brake shoe and brake shoe retracting spring.
a. Hook the retracting springs on the brake shoes and fit the shoe web end to the shoe adjusting bolt.
b. Using a screw driver, fit the other end shoe web to the wheel cylinder piston groove.
4. Install the upper shoe hold down pin, spring, and spring seats.
See procedure 2 above.


SM13-307

BRAKE DRUM AND WHEEL HUB.

1. When assembling the front brake drum and wheel hub, make sure that their aligning marks are oriented as closely to each other as possible.
(FRONT WHEEL)

NOTE: Position of marks are shown in Fig. (Broken line shows alternative position).



SM11-053

2. Caulk the hub bolts and nuts as shown in Fig., after tightening the brake drum and wheel hub.

Tightening torque: 2,400–3,000 kg-cm (174–216 lb.ft)

MOUNTING OF WHEEL HUB WITH BRAKE DRUM.

Refer to chapter for FRONT AXLE and for REAR AXLE.

MOUNTING OF TIRE.

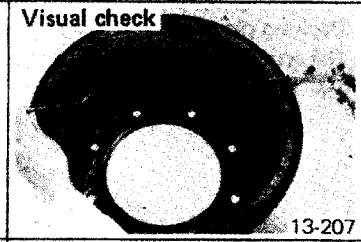
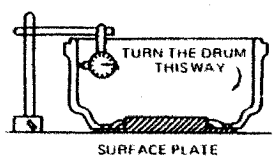
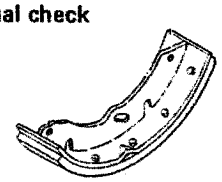
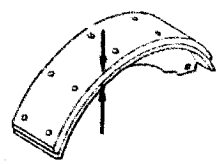
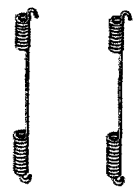
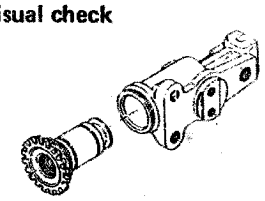
Refer to chapter for WHEEL AND TIRE.

ADJUSTMENT.

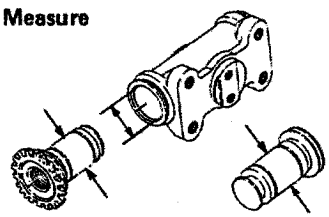
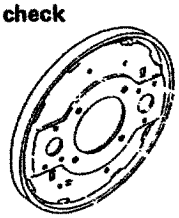
Finally adjust the clearance between the brake lining and the brake drum explained in Section "WHEEL BRAKE ADJUSTMENT".

INSPECTION AND REPAIR

NOTE: Brake fluid or Isopropyl alchol should only be used to wash the wheel cylinder components.

Inspection Item	Standard	Limit	Remedy	Inspection Procedure
Brake drum inner surface. Crack, scoring and/or any other damage.			Regrind or replace, if necessary.	Visual check  13-206
Brake drum inner diameter.	320.0 mm (12.60 in)	322.0 mm (12.67 in)	Replace	Visual check  13-207
Brake drum runout.	0 – 0.1 mm (0 – 0.039 in)	0.2 mm (0.078 in)	Regrind or replace.	Measure  SM13-173
Brake shoe with lining. Crack, wear deformation and/or any other damages.			Re-lining or Replace, if necessary.	Visual check 
Remaining thickness of brake lining.	8.0 mm (0.315 in)	4.0 mm (0.157 in)	Replace	Measure 
Brake shoe retracting spring. Elastic strength distortion and/or any damage.			Replace, if necessary.	Visual check 
Wheel cylinder and piston. Corrosion and/or any damage.			Clean or replace, if necessary.	Visual check 

NOTE: Brake fluid or Isopropyl alchol should only be used to wash the wheel cylinder components.

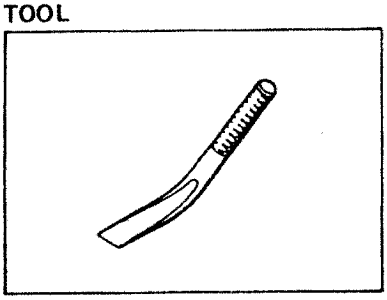
Inspection Item	Standard	Limit	Remedy	Inspection Procedure
Clearance between piston and wheel cylinder.	0.03 – 0.13 mm (0.00118–0.0051 in)	0.25 mm (0.0098 in)	Replace	Measure 
Backing plate. Deformation, damage and any other abnormality.			Replace, if necessary.	Visual check 

WHEEL BRAKE ADJUSTMENT

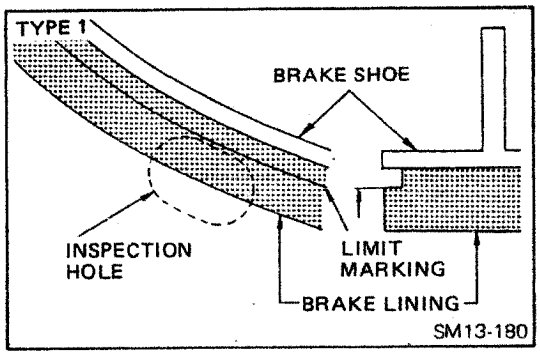
SPECIAL TOOL

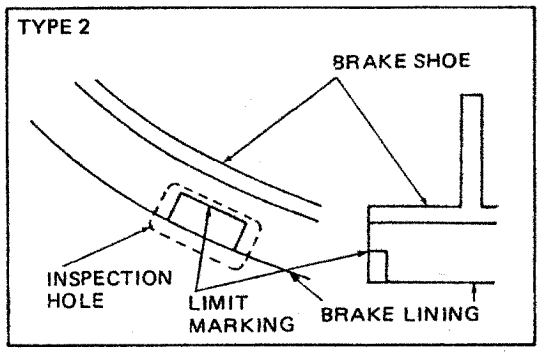
Prior to starting a wheel brake adjustment, it is necessary to have the special tool.

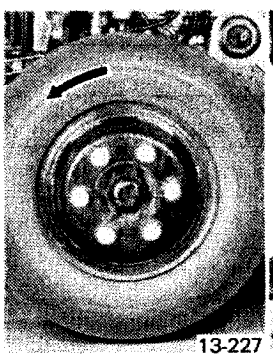
BRAKE SHOE ADJUSTING TOOL



09665-1130







WHEEL BRAKE ADJUSTMENT

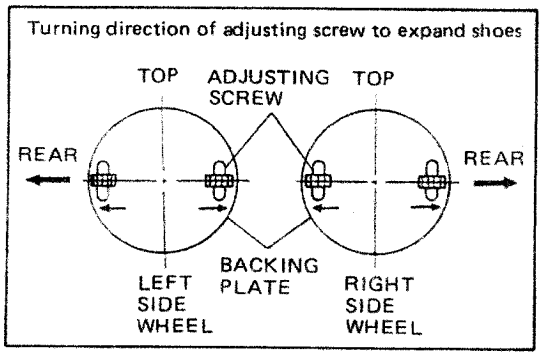
REMAINING THICKNESS OF THE BRAKE LINING.

Check remaining thickness of lining through the inspection hole of the backing plate. If the lining has been worn to the limit marking or if it is foreseen that the lining will be worn to the limit by the time of next inspection, replace the lining.

CLEARANCE BETWEEN BRAKE LINING AND BRAKE DRUM.

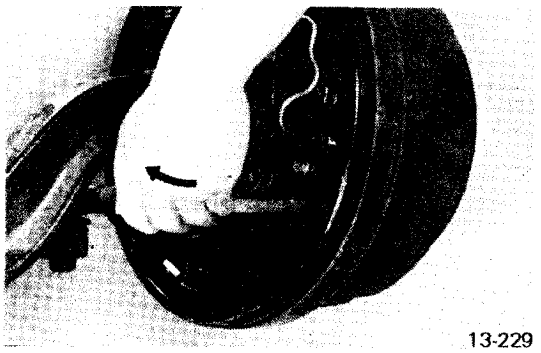
1. Lift the wheel off the ground.
2. Turn the brake drum in the forward direction and stabilize the brake shoe by stepping on the brake pedal.

NOTE: If the spring brake is equipped, set the spring brake control valve for OFF position.



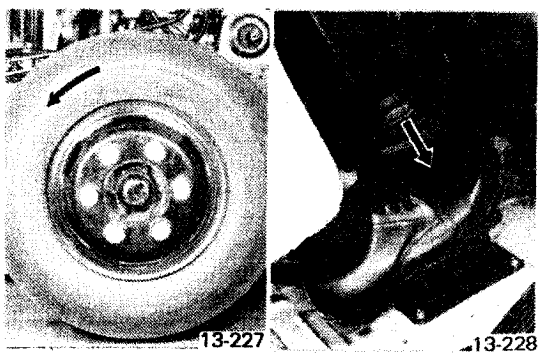
3. Turn the adjusting screw with an adjusting tool in the arrow direction, (The arrows are marked near the hole on the backing plate), to expand the shoe until the drum rubs with shoe and hardly be rotated by hand.

Special Tool: Brake Shoe Adjusting Tool (09665-1130)

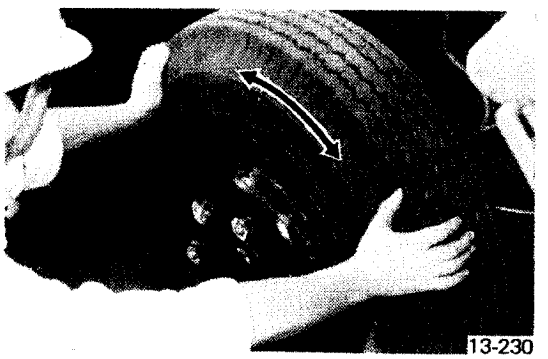


4. Return the adjusting screw in the reverse arrow direction.
   Front 5–7 notches
   Rear 5–7 notches

Special Tool: **Brake Shoe Adjusting Tool (09665-1130)**



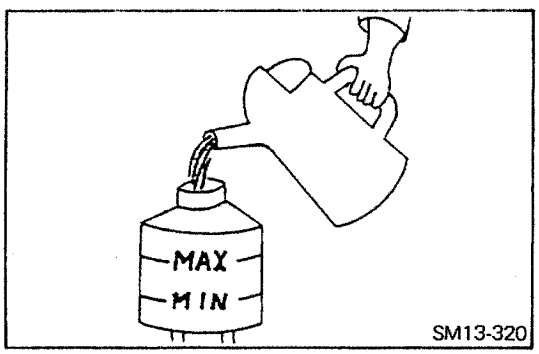
5. Turn the brake drum by hand in the forward direction, then step on the brake pedal and stabilize the shoe.



6. See to it that there is no dragging, by turning the drum by hand. If there was any dragging, repeat the operation over again from 3.

NOTE: In the same procedure above, adjust the clearance for all wheels.

BRAKE SYSTEM AIR BLEEDING



BRAKE SYSTEM AIR BLEEDING

BRAKE FLUID RESERVOIR.

Fill the brake fluid reservoir with brake fluid up to MAX. level.

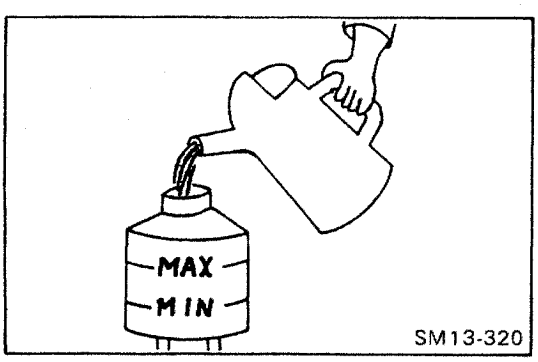
NOTE: **The brake fluid in the reservoir should be continuously replenished all during air bleeding so that the reservoir never becomes empty.**

WHEEL CYLINDER

1. Connect a clear vinyl hose to the air bleeder.
2. Step on the pedal 4 or 5 times, and loosen the air bleeder of the wheel cylinder while stepping down on the pedal, then tighten it before bringing the pedal back to original position.

3. Repeat above 2 until no more bubbles comes up in the overflowing brake fluid.

NOTE: **in the same procedure above, bleed the air from the all wheel cylinders.**



BRAKE FLUID RESERVOIR

Finally fill the brake fluid reservoir with brake fluid up to MAX. level.

(K.P.)

PB-40E-02

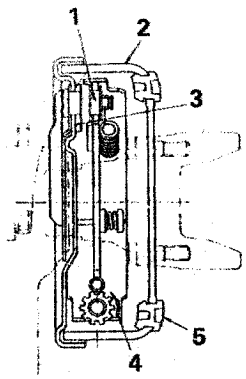
CHAPTER PB

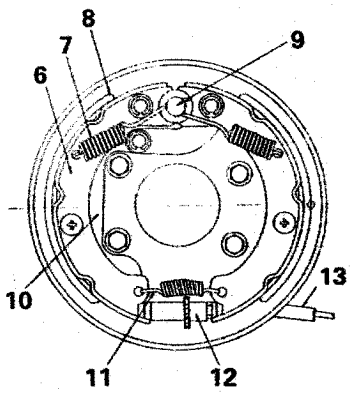
PARKING BRAKE

DATA AND SPECIFICATIONS

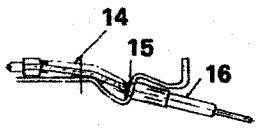
Type	Internally expanding, duo-servo type
Drum inside diameter	203.2 mm (8.0 in)
Lining material	Resin mold
Lining dimensions	45 mm (1.772 in) wide, 5 mm (0.197 in) thick, 195 mm (7.677 in) length.
Standard lever stroke	3 — 5 teeth of ratchet

DESCRIPTION





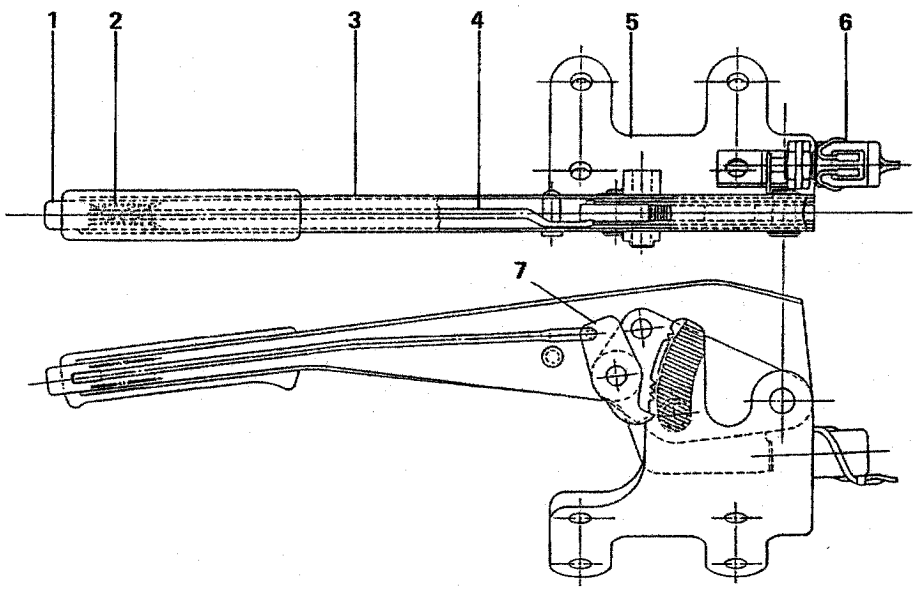
K-5130



14-2E-05

PARKING BRAKE

1. Anchor pin
2. Brake drum
3. Backing plate
4. Extension direction of shoe
5. Grommet
6. Brake shoe
7. Tension spring
8. Brake lining
9. Anchor pin
10. Brake lever
11. Tension spring
12. Shoe adjuster
13. Parking cable
14. Return spring
15. Stopper washer
16. Parking cable



SM14-057

PARKING BRAKE LEVER

1. Release rod knob
2. Compression spring
3. Parking brake lever
4. Pawl release rod
5. Brake lever bracket
6. Parking brake switch
7. Pawl

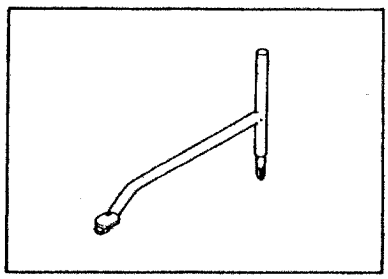
TROUBLESHOOTING

Symptom	Possible cause	Remedy/Prevention
Too much play noted on parking brake lever	Excessively large drum-to-lining clearance.	Re-adjust the brake properly.
	Maladjusted control linkage	Re-adjust.
Not enough braking force	Excessively large drum-to-lining clearance	Re-adjust.
	Maladjusted control linkage	Re-adjust.
	Burnt lining	Repair or replace.
	Worn lining	Replace.
	Shoe are too dirty with water, dust, etc.	Disassemble and clean
	Linings are soaked with oil	Replace.
Linings get burnt easily	Not enough drum-to-lining clearance	Re-adjust.
	Shoe or drum is distorted	Repair or replace.
	Spring are broken	Replace.
Can not keep the lever in full stroke position	Over stroke of lever	Adjust cable length.
	Wear or broken of ratchet	Replace parts.
Not return the lever to running position, when cold weather. (below zero)	Water inside the cable	Replace the cable.

SPECIAL TOOL

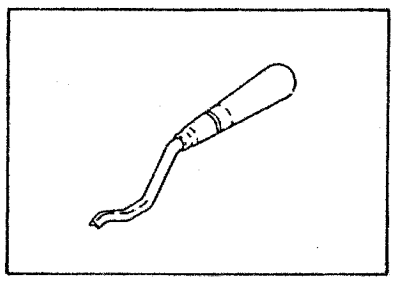
Prior to starting a parking brake overhaul, it is necessary to have these special tools.

RETURN SPRING REMOVER



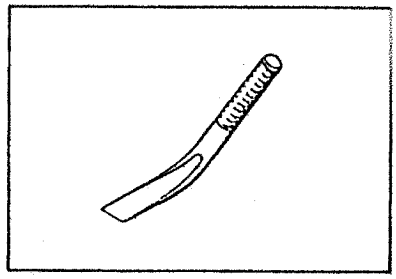
09606-1050

RETURN SPRING HOOK



09653-1110

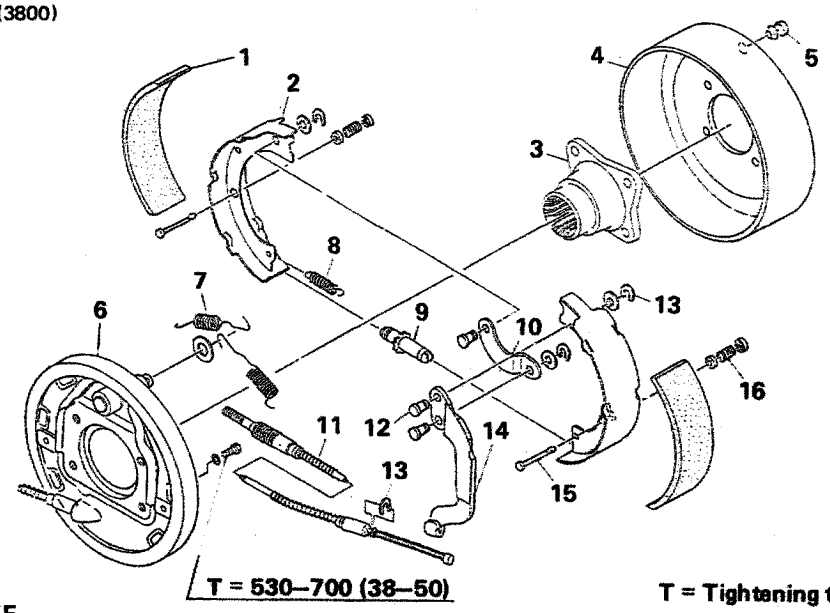
BRAKE SHOE ADJUSTING TOOL



09665-1130

PARKING BRAKE AND CONTROL

MM14-100-00X03 (3800)

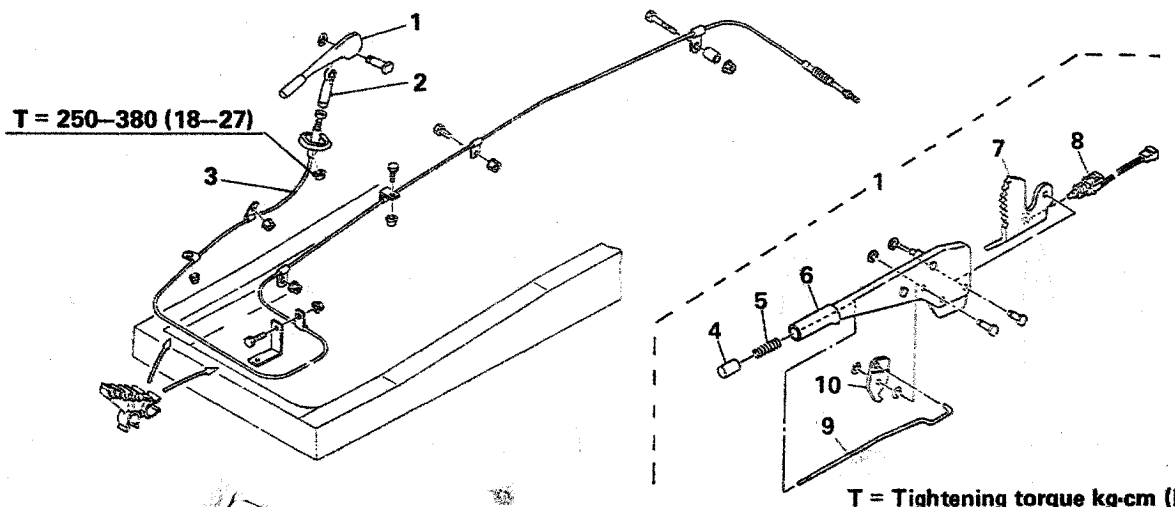


T = Tightening torque kg-cm (lb.ft.)

PARKING BRAKE

1. Brake lining
2. Brake shoe
3. Flange yoke
4. Brake drum
5. Grommet
6. Backing plate
7. Tension spring
8. Tension spring
9. Shoe adjuster
10. Strut
11. Parking cable
12. Pin
13. Retainer ring
14. Shoe lever
15. Shoe hold-down pin
16. Shoe hold-down spring

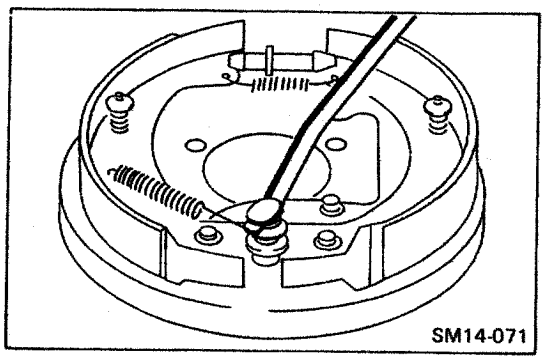
MC38-009-00X00X02 (3820)
MH38-001-00X08



T = Tightening torque kg-cm (lb.ft.)

PARKING BRAKE LEVER AND CONTROL

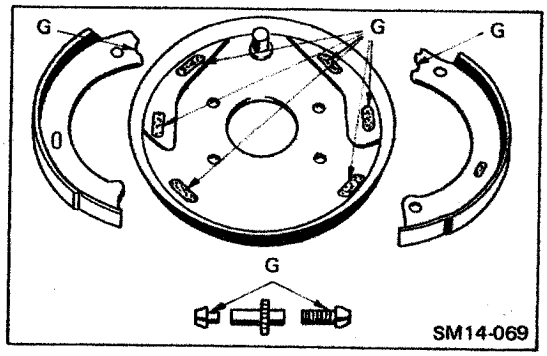
1. Parking brake lever ass'y
2. Rod
3. Parking brake cable
4. Release rod knob
5. Compression spring
6. Parking brake lever
7. Brake lever bracket
8. Parking brake switch
9. Pawl release rod
10. Pawl



IMPORTANT POINT – DISASSEMBLY

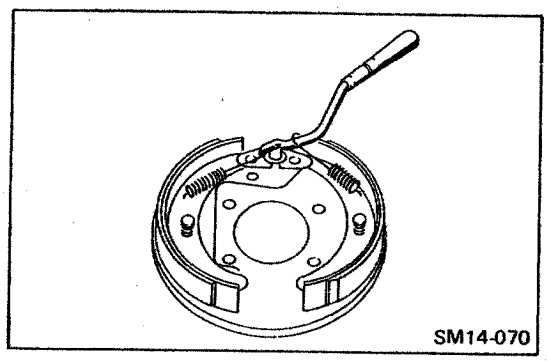
REMOVE THE RETURN SPRING.

Special Tool: Return Spring Remove (09606-1050)



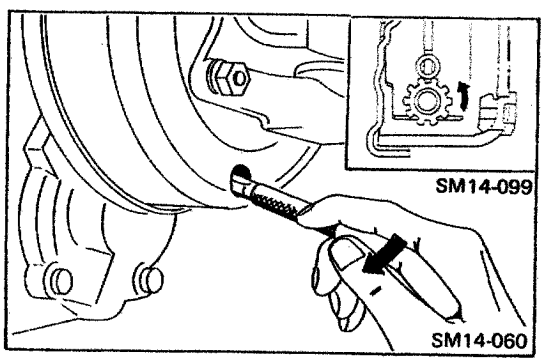
IMPORTANT POINT (S) – ASSEMBLY

APPLY THE HEAT RESISTANCE GREASE FOR G.



INSTALL THE RETURN SPRING.

Special Tool: Return Spring Hook (09653-1110)

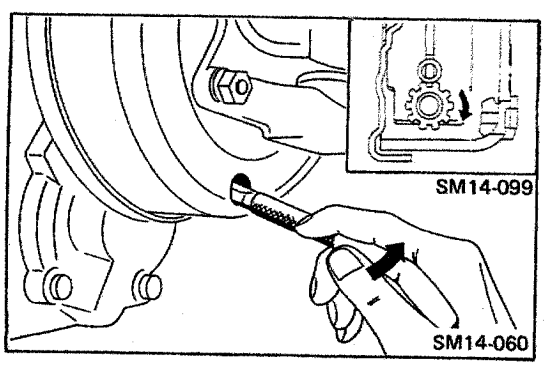


ADJUSTMENT

CLEARANCE BETWEEN DRUM AND LINING.

1. Turn the adjusting nut to reduce the clearance to zero.

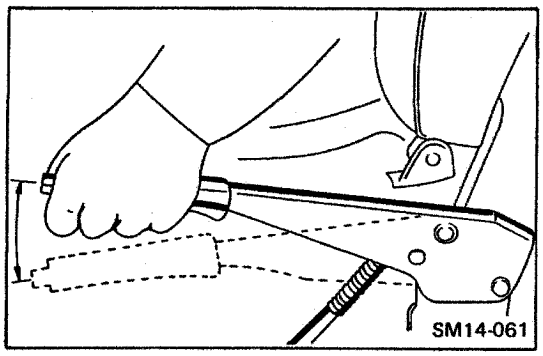
Special Tool: Brake Shoe Adjusting Tool (09665-1130)



2. Turn it back 8 – 10 notches.

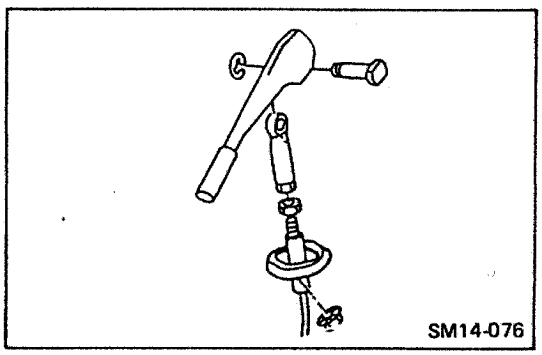
Standard: 0.3 – 0.35 mm (0.0118 – 0.0137 in)

Service Limit: 0.5 mm (0.0197 in)

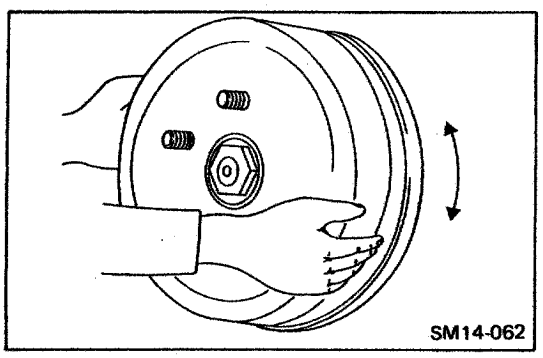


CONTROL CABLE

1. Pull the parking brake lever fully two to three times and release the lever.



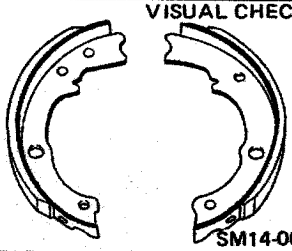
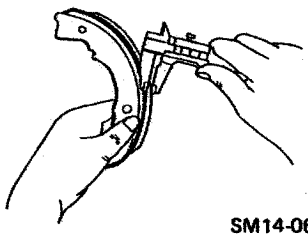
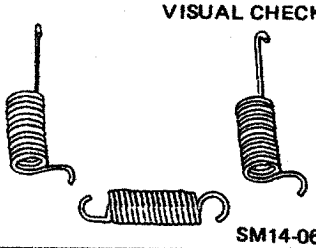
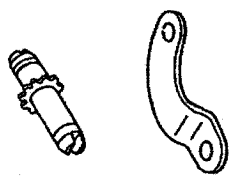
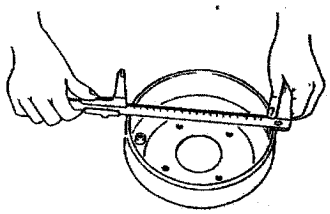
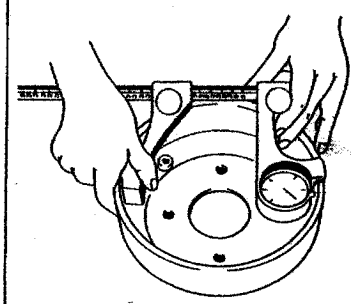
2. Adjust the rod so that the parking brake stroke will be three to five notches, when the parking brake lever is pulled by 30 kg.



3. See to it that there is no dragging, by turning the drum by hand. If there was any dragging repeat the operation over again from 1.

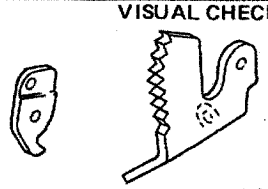
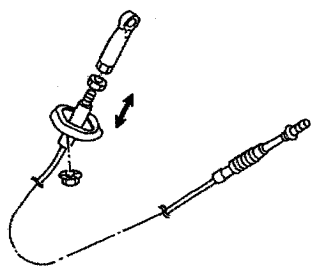
INSPECTION AND REPAIR

Unit: mm (in)

Inspection Item	Standard	Limit	Remedy	Inspection Procedure
Brake Shoe Distorsion, Cracks			Replace, if necessary.	VISUAL CHECK  SM14-063
Brake Lining Lining Thickness	5.0 (0.197)	1.0 (0.039)	Replace.	 SM14-064
Return Spring Elastic Strength Distortion, Any Other Damage			Replace, if necessary.	VISUAL CHECK  SM14-065
Adjusting Screw and Strut Cracks, Abnormal Wear			Replace, if necessary.	VISUAL CHECK  SM14-075
Brake Drum Inside Diameter	203.2 (8.0)	204.2 (8.039)	Replace.	 SM14-067
Brake Drum Run Out	0–0.1 (0–0.0039)	0.2 (0.0078)	Replace.	 SM14-068

INSPECTION AND REPAIR

Unit: mm (in)

Inspection Item	Standard	Limit	Remedy	Inspection Procedure
Ratchet of Parking Brake Lever Abnormal Wear, Any Other Damage.			Replace, if necessary.	VISUAL CHECK  SM14-073
Control Cable Rusting, Any Other Damage Inner Cable should be Slided Smoothly.			Replace, if necessary.	VISUAL CHECK  SM14-074

EB-29E-02

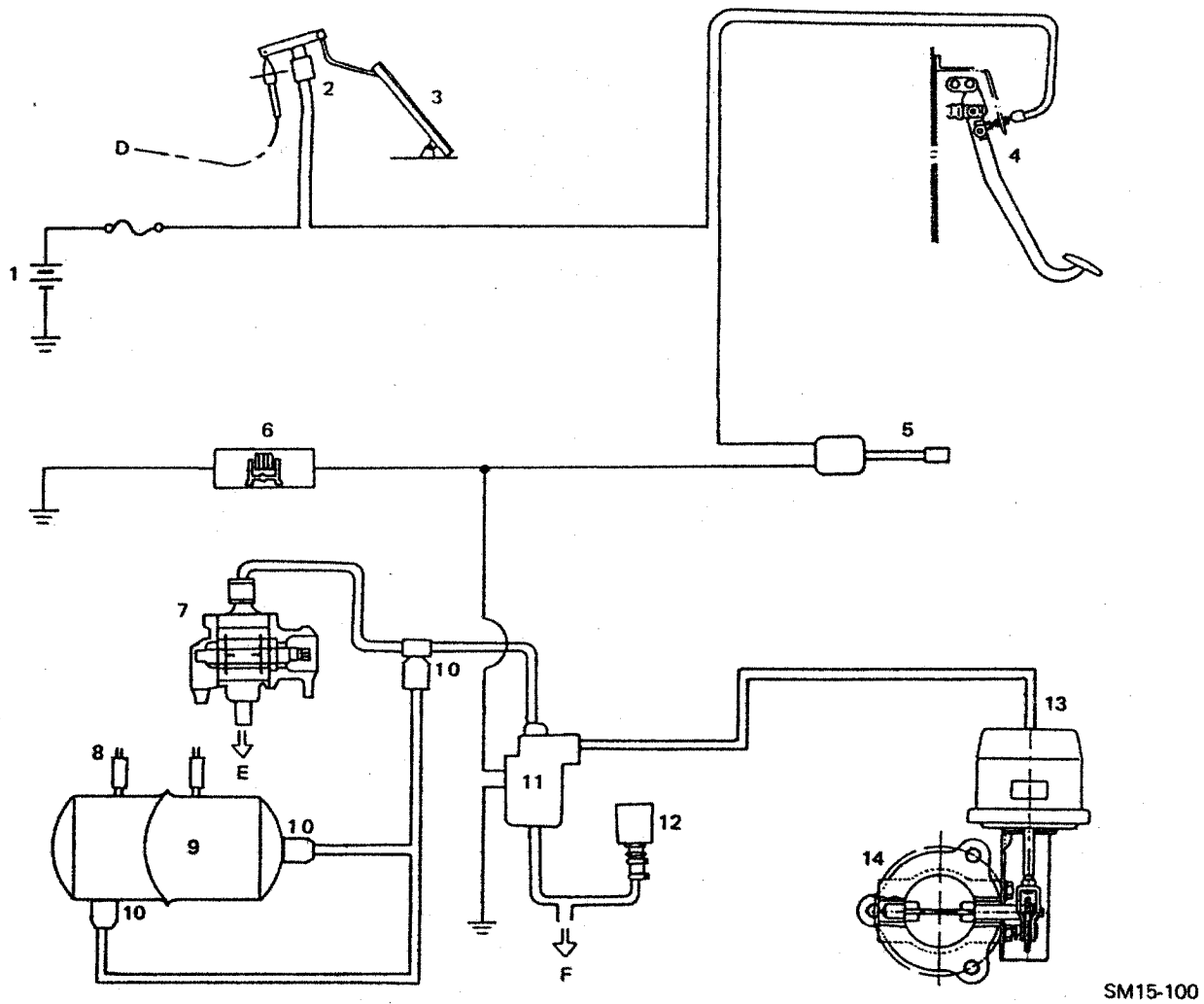
CHAPTER EB

EXHAUST BRAKE
(W04D, VACUUM CONTROL)

DATA AND SPECIFICATIONS

Control method	Electric-vacuum
Valve type	Butterfly valve
Applicable to	W04D

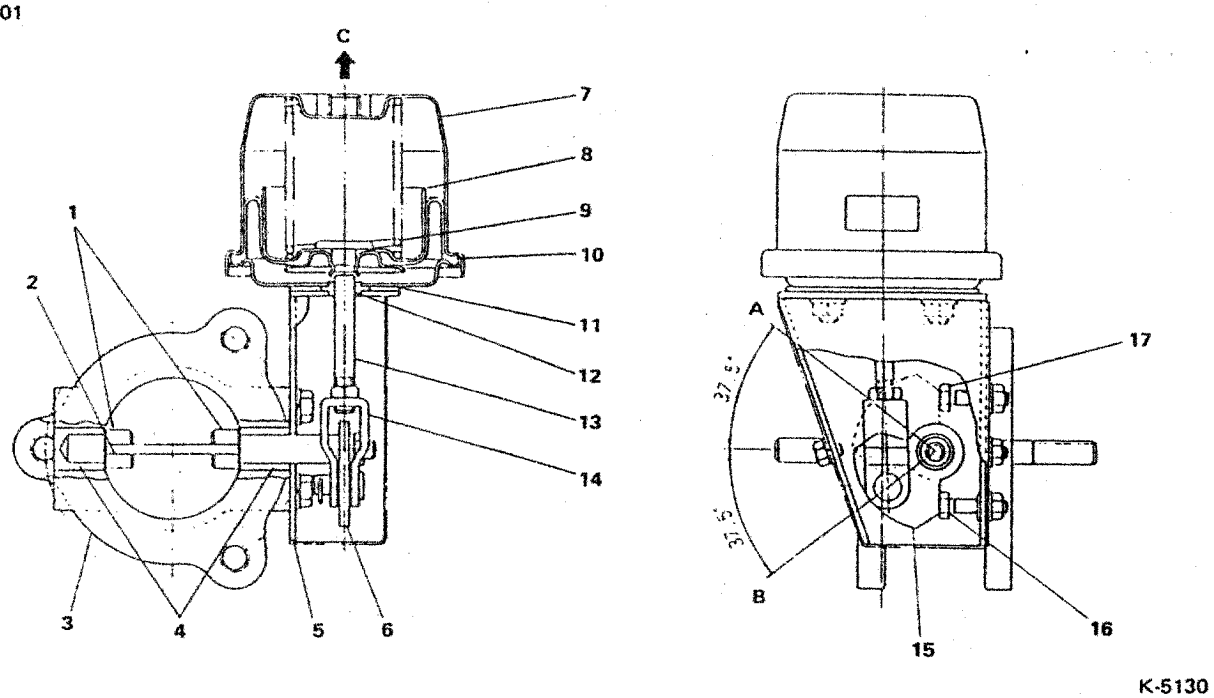
DESCRIPTION



1. Battery
2. Accelerator switch
3. Accelerator pedal
4. Clutch switch
5. Exhaust brake switch
6. Exhaust brake indicator lamp
7. Vacuum pump
8. Vacuum switch
9. Vacuum tank
10. Check valve
11. Magnetic valve
12. Air cleaner
13. Vacuum cylinder
14. Brake cylinder

A. Electric line
B. Air line
C. Accelerator cable
D. To injection pump

17470-2201



BRAKE CYLINDER AND VACUUM CYLINDER

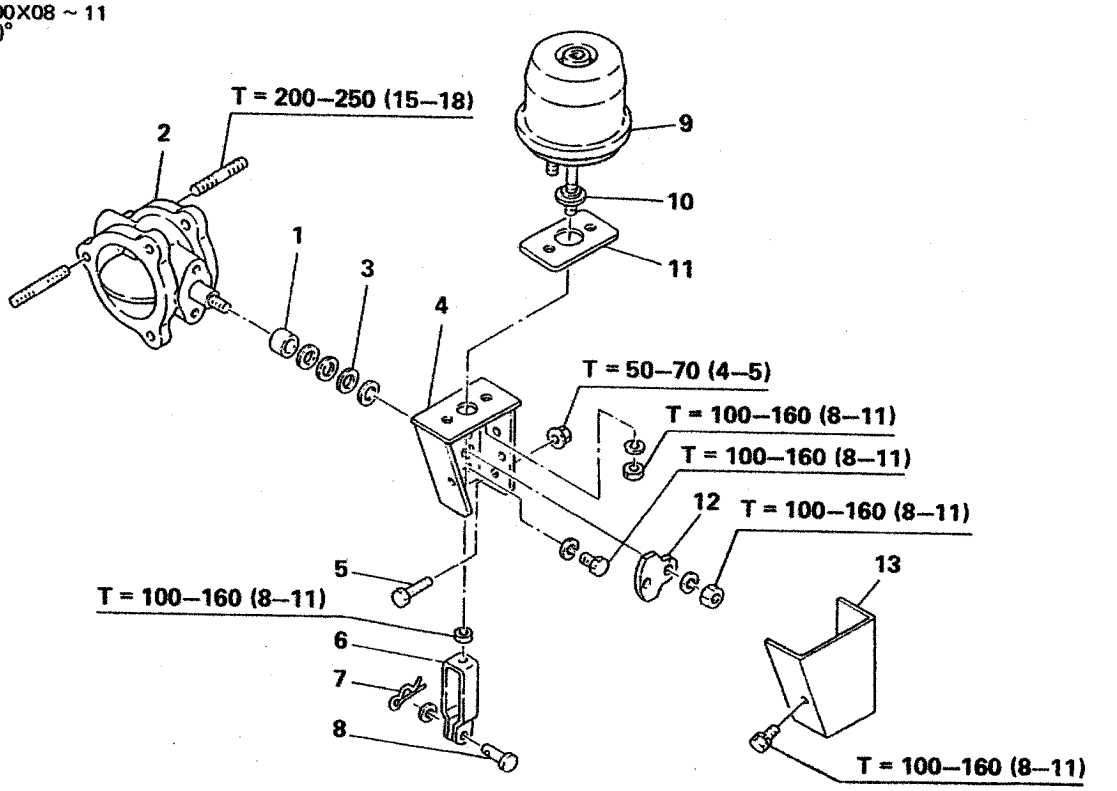
1. Spindle
2. Valve
3. Body
4. Bush
5. Bracket
6. Lever
7. Shell cylinder
8. Diaphragm plate
9. Spring
10. Diaphragm
11. Gasket
12. Bearing
13. Push-rod
14. Clevis
15. Lever
16. Adjust screw (open side)
17. Adjust screw (close side)
- A. Close side
- B. Open side
- C. To magnetic valve

TROUBLESHOOTING

Symptom	Possible cause	Remedy/Prevention
Switch does not work	Defective contacts	Check and correct.
	Open circuit in harness	Check and correct.
Valve does not close	Valve clogged with carbon	Remove carbon.
	Burnt shaft	Check and correct.

BRAKE CYLINDER AND VACUUM CYLINDER

MC24-103-00X08 ~ 11
(2400) (2/2)°

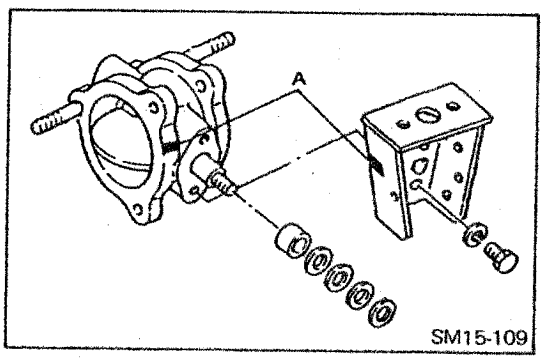


T = Tightening torque kg-cm (lb.ft.)

1. Bushing
2. Brake cylinder
3. Sealing
4. Bracket
5. Adjust screw
6. Clevis
7. Pin
8. Clevis pin
9. Control cylinder
10. Bushing
11. Gasket
12. Lever
13. Dust cover

IMPORTANT POINT(S) — DISMOUNTING

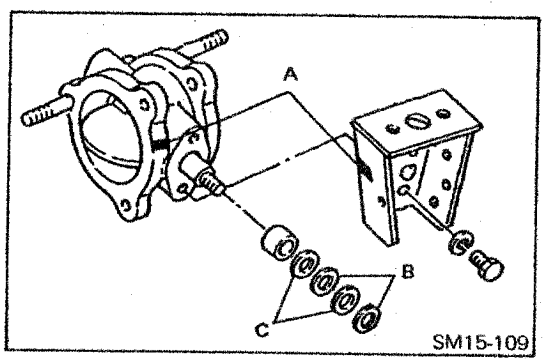
WARNING
Do not work on the exhaust brake cylinder while it is still hot. This can result in personal injury.



IMPORTANT POINT(S) — DISASSEMBLY

REMOVAL OF THE BRACKET FROM THE BRAKE CYLINDER.

NOTE: Before removing the bracket, make aligning marks "A" on the brake cylinder and bracket.

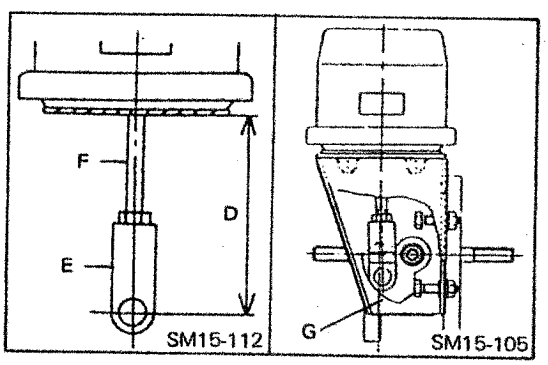


IMPORTANT POINT(S) — ASSEMBLY

INSTALLATION OF THE SEAL RING AND BRACKET.

1. Install the bushing, seal rings, and bracket on the brake cylinder.

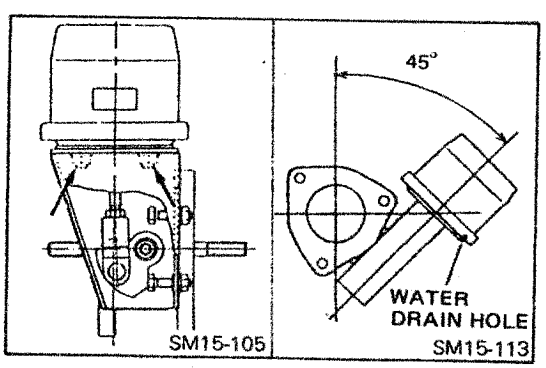
NOTE: ○ The small seal rings "B" and large seal rings "C" must be installed alternately.
○ Align the aligning marks "A" of the brake cylinder and bracket.



INSTALLATION OF THE VACUUM CYLINDER ON THE BRACKET.

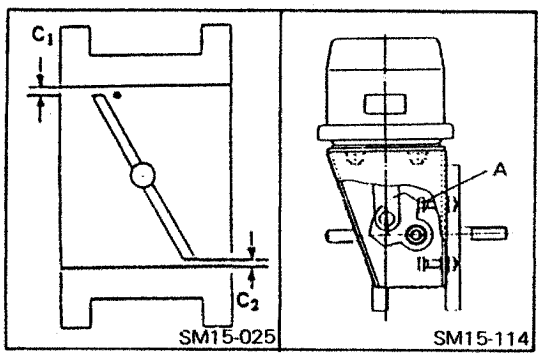
1. Adjust the dimension "D" by turning the clevis "E" so that the push rod "F" is pushed into the control cylinder more than 2 mm (0.079 in), when the clevis "E" and the lever "G" are connected.

NOTE: This setting must be provided to prevent malfunction of the exhaust brake caused by looseness of linkage.



2. Install the vacuum cylinder on the braket.

NOTE: Make sure that the water drain hole in the vacuum cylinder faces down.

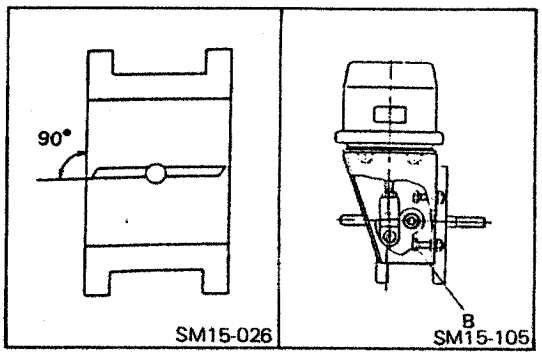


ADJUSTMENT OF THE CLEARANCE BETWEEN THE BRAKE CYLINDER AND THE BUTTERY VALVE(CLOSED SIDE).

1. Apply 650 – 750 mmHg (25.60 – 27.55 inHg) of vacuum to the vacuum cylinder and set the butterfly valve to the closed position.
2. Adjust the clearance between the brake cylinder and the butterfly valve C_1 and C_2 with the adjusting screw "A".

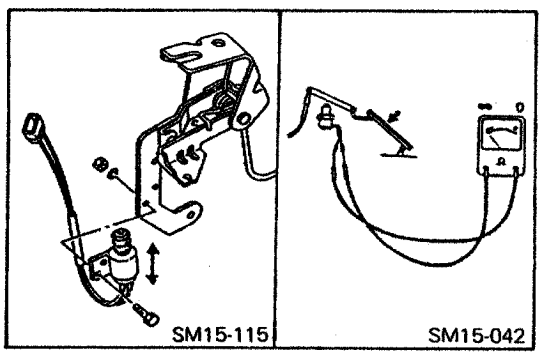
Assembly Standard: 0.2 – 0.4 mm (0.008 – 0.015 in)

3. Lock the adjusting screw "A" with a lock nut.



ADJUSTMENT OF THE BUTTERFLY VALVE ANGLE(OPENED SIDE).

1. Set the lever to the opened position.
2. Adjust the butterfly valve may be right angle (90°) to the flange of the brake cylinder with the adjusting screw "B".
3. Lock the adjusting screw "B" with a lock nut.



ADJUSTMENT OF THE EXHAUST BRAKE ACTING ENGINE SPEED.

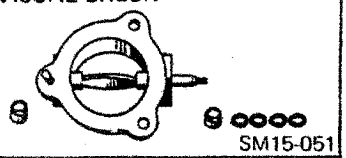
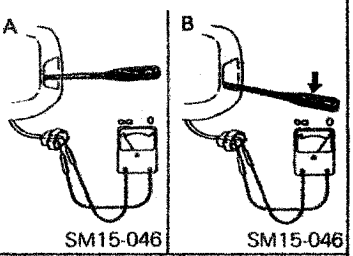
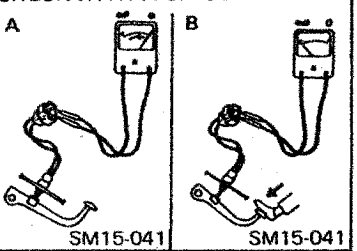
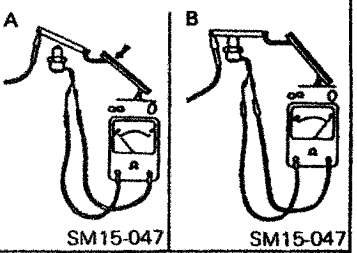
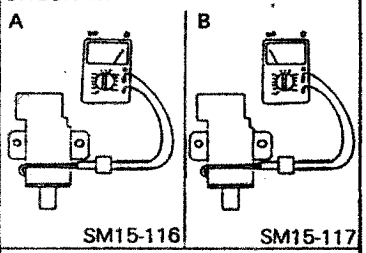
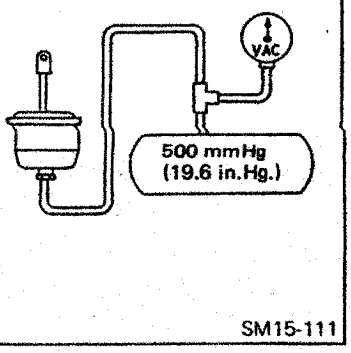
1. Adjust the engine idling speed by turning the throttle button.

Engine Idling Speed: 600 – 650 r.p.m.

2. Adjust the exhaust brake acting engine speed by moving the accelerator switch body.

Acting Engine Speed: 700 – 800 r.p.m.

INSPECTION AND REPAIR

Inspection Item	Standard	Limit	Remedy	Inspection Procedure
Brake Cylinder, Bushing and Seal ring. Wear, Any Other Damage	—	—	Replace, if necessary	VISUAL CHECK  SM15-051
Exhaust Brake Switch Function	A : OFF-Insulation B : ON-Continuity	—	Replace, if necessary	CHECK WITH A CIRCUIT TESTER  SM15-046 SM15-046
Clutch Switch Function	A : ON-Continuity B : OFF-Insulation	—	Replace, if necessary	CHECK WITH A CIRCUIT TESTER  SM15-041 SM15-041
Accelerator Switch Function	A : OFF-Insulation B : ON-Continuity	—	Replace, if necessary	CHECK WITH A CIRCUIT TESTER  SM15-047 SM15-047
Magnetic Valve Function	A: Normal -Continuity B: Defect -Insulation	—	Replace, if necessary	CHECK WITH A CIRCUIT TESTER  SM15-116 SM15-117
Vacuum Cylinder Air Tight.	Non air tight.	More than 25 mmHg (0.98 in. Hg.) in 15 seconds	Replace the vacuum cylinder assembly.	 SM15-111

WT-20E-04

CHAPTER WT

WHEELS AND TIRES

DATA AND SPECIFICATIONS

In case of using below table, see first the nominal dimension (Tire size) of the tire applied to the model which you are concerned with in the chassis specification filed in the Chap. 1, General Instruction.

The values given in the table are dependent on Japan Automobile Tire Manufacturers' Association, (J.A.T.M.A.).

*(1) The values given are for dual tires and for single tire, deduct 1.0 mm from the value given.

*(2) The rims with mark (•) are standard and others are allowable to use.

*(3) The max. air pressure and max. load are referring to European Tire and Rim Technical Organization (E.T.R.T.O.)

1. Diagonal tires

Tire size	Max. air press. kg/cm² (lb/in²)	Allowable max. load kg (lb)		*(1) Tire dynamic effective radius mm (in)	*(2) Applicable rim size
		Single	Dual		
7.00-16-12PR	5.75 (82.0)	1,230 (2,712)	1,170 (2,579)	368 (14.49)	• 5.50F x 16 SDC
7.50-16-12PR	6.00 (85.0)	1,440 (3,175)	1,370 (3,020)	383 (15.08)	• 6.00GS x 16 SDC
7.50-16-14PR	6.50 (92.0)	1,510 (3,329)	1,440 (3,175)		
7.50-20-10PR	5.75 (82.0)	1,650 (3,637)	1,550 (3,417)	448 (17.64)	• 6.00S x 20
7.50-20-12PR	6.75 (96.0)	1,800 (3,968)	1,700 (3,747		
8.25-16-14PR	5.75 (82.0)	1,710 (3,770)	1,630 (3,593)	404 (15.91)	• 6.50H x 16 6.00S x 16 SDC
8.25-20-12PR	6.25 (89.0)	1,940 (4,277)	1,845 (4,067)	468 (18.43)	• 6.50T x 20
8.25-20-14PR	6.75 (96.0)	2,030 (4,475)	1,930 (4,277)		6.00S x 20
9.00-20-12PR	6.00 (85.0)	2,255 (4,971)	2,145 (4,729)	490 (19.29)	• 7.00T x 20
9.00-20-14PR	6.75 (96.0)	2,415 (5,324)	2,300 (5,071)		6.50T x 20
10.00-20-12PR	5.75 (82.0)	2,450 (5,401)	2,210 (4,872)	506 (19.92)	• 7.50V x 20
10.00-20-14PR	6.75 (96.0)	2,700 (5,952)	2,425 (5,346)		7.00T x 20
*(3) 10.00-20-16PR	7.70 (109)	3,000 (6,614)	2,725 (6,008)		8.00V x 20
11.00-20-12PR	5.75 (82.0)	2,585 (5,699)	2,435 (5,368)	520 (20.47)	• 8.00V x 20
11.00-20-14PR	6.75 (96.0)	2,840 (6,261)	2,670 (5,886)		7.50V x 20
11.00-20-16PR	7.25 (103)	3,100 (6,834)	2,785 (6,140)		8.50V x 20
12.00-20-14PR	5,75 (82,0)	2,900 (6,393)	2,760 (6,085)	539 (21.22)	• 8.50V x 20
12.00-20-16PR	6.50 (92.0)	3,115 (6,867)	2,965 (6,537)		8.00V x 20
*(3) 12.00-20-18PR	7.95 (112.5)	3,750 (8,267)	3,250 (7,165)		9.00V x 20
12.00-24-16PR	6.50 (92.0)	3,505 (7,727)	3,340 (7,363)	593 (23.35)	• 8.50V x 24 8.00V x 24 9.00V x 24
*(3) 12.00-24-18PR	7.95 (112.5)	4,000 (8,888)	3,650 (8,111)		
14.00-24-20PR	6.75 (96.0)	4,990 (11,001)	4,755 (10,483)	642 (25.28)	• 10.00WI x 24 9.00V x 24

Tire size	Max. air press. kg/cm² (lb/in²)	Allowable max. load kg (lb)		*(1) Tire dynamic effective radius mm (in)	*(2) Applied rim size
		Single	Dual		
7.50-16-14PR	6.50 (92.0)	1,510 (3,328)	1,440 (3,174)	383 (15.08)	6.0GS x 16SDC
7.50-20-10PR	5.75 (83.0)	1,650 (3,637)	1,550 (3,417)	448 (17.64)	6.00X x 20IR
8.25-20-14PR	6.75 (96.0)	2,030 (4,466)	1,930 (4,255)	468 (48.43)	6.50T x 20IR
9.00-20-14PR	6.75 (96.0)	2,415 (5,313)	2,300 (5,070)	490 (19.29)	7.00T x 20IR
10.00-20-14PR	6.75 (96.0)	2,700 (5,952)	2,425 (5,346)	506 (19.92)	7.00T x 20IR 7.50V x 20IR
12.00-20-14PR	5.75 (82.0)	2,900 (6,393)	2,760 (6,072)	539 (21.22)	8.50V x 20IR

Disc wheel is applied on Deutsche Industrie Norman (DIN).

2. Radial tires (with tube)

Tire size	Max. air press. kg/cm² (lb/in²)	Allowable max. load kg (lb)		*(1) Tire dynamic effective radius mm (in)	*(2) Applicable rim size
		Single	Dual		
7.50R-16-14PR	7.0 (100)	1,510 (3,329)	1,440 (3,175)	387 (15.24)	• 6.00GS x 16SDC
7.50R-20-12PR	7.25 (103)	1,800 (3,968)	1,700 (3,747)	452 (17.80)	• 600S x 20 6.50T x 20
8.25R-16-14PR	6.25 (89)	1,710 (3,770)	1,630 (3,594)	409 (16.10)	• 6.50H x 16SDC 6.00GS x 16SDC
8.25R-20-14PR	7.25 (103)	2,030 (4,475)	1,930 (4,255)	470 (18.50)	• 6.50T x 20 7.00T x 20
9.00R-20-14PR	7.25 (103)	2,415 (5,324)	2,300 (5,071)	492 (19.37)	• 7.00T x 20 7.50V x 20 6.50T x 20
10.00R-20-14PR	7.25 (103)	2,700 (5,952)	2,425 (5,346)	508 (20.0)	• 7.50V x 20 8.00V x 20 7.00T x 20
11.00R-20-14PR	7.25 (103)	2,840 (6,261)	2,670 (5,886)	523 (20.59)	• 8.00V x 20 8.50V x 20 7.50V x 20
12.00R-20-16PR	7.25 (103)	3,115 (6,867)	2,965 (6,537)	542 (21.34)	• 8.50V x 20 9.00V x 20
*(3) 12.00R-20-18PR	8.7 (123)	3,750 (8,267)	3,250 (7,165)	–	• 8.50V x 20 8.50 x 20
*(3) 14.00R-20-18PR	7.1 (102)	4,500 (9,921)	4,125 (9,094)	–	10.00V x 20 10.00W x 20

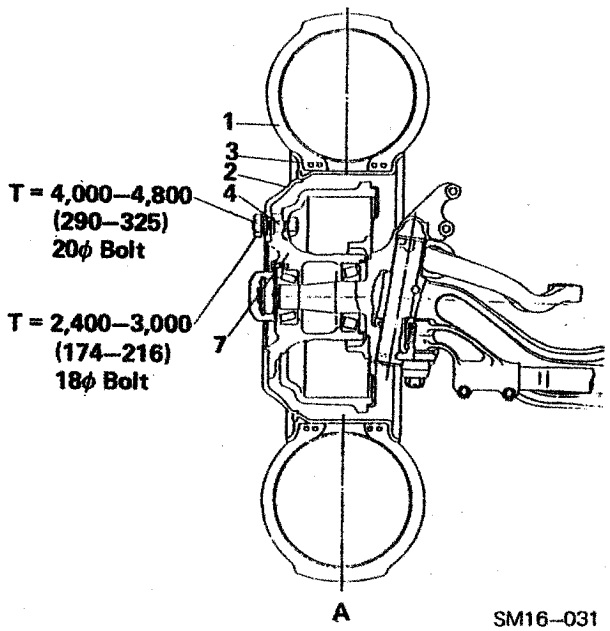
3. Radial tires (Tubeless)

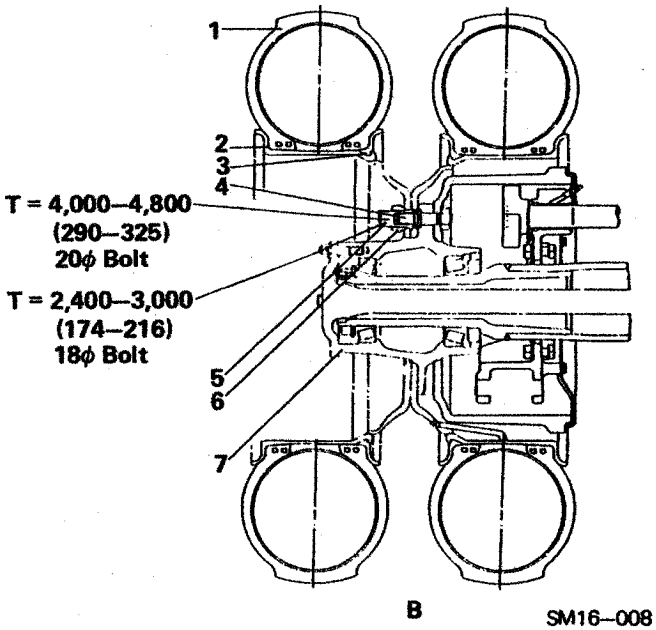
Tire size	Max. air press. kg/cm² (lb/in²)	Allowable max. load kg (lb)		*(1) Tire dynamic effective radius mm (in)	*(2) Applicable rim size
		Single	Dual		
225/80R 17.5-14PR	7.00 (100)	1,550 (3,417)	1,500 (3,307)	389 (15.31)	• 6.75 x 17.5 6.00 x 17.5
225/90R 17.5-14PR	7.00 (100)	1,750 (3,858)	1,650 (3,638)	410 (16.14)	• 6.75 x 17.5 6.00 x 17.5
9R22.5-14PR	7.25 (103)	2,030 (4,475)	1,930 (4,255)	470 (18.50)	• 6.75 x 22.5 6.00 x 22.5
(*3) 9.5R-17.5-14PR	6.85 (98.0)	1,700 (3,748)	1,600 (3,527)	–	• 6.00 x 17.5 6.75 x 17.5
10R22.5-14PR	7.25 (103)	2,415 (5,324)	2,300 (5,071)	492 (19.37)	• 7.50 x 22.5 6.75 x 22.5
11R22.5-14PR	7.00 (100)	2,725 (6,007)	2,500 (5,511)	508 (20.0)	• 8.25 x 22.5 7.50 x 22.5
11R22.5-16PR	8.00 (113)	3,000 (6,613)	2,725 (6,007)	508 (20.0)	• 8.25 x 22.5 7.50 x 22.5
12R22.5-14PR	7.25 (103)	3,000 (6,613)	2,725 (6,607)	523 (20.59)	• 9.00 x 22.5 8.25 x 22.5

4. Off the road tire (1-1R)

Tire size	Max. air press. kg/cm² (lb/in²)	Allowable max. load kg (lb)	Tire static effective radius mm (in)	*(2) Applicable rim size
		Single		
7.50-20-12PR	5.25 (75.0)	1,600 (3,527)	447 (17.6)	• 6.00S
8.25-20-12PR	5.25 (75.0)	1,890 (4,167)	465 (18.3)	6.00S • 6.50T
8.25-20-14PR	6.00 (85.0)	2,045 (4,508)		
9.00-20-12PR	4.75 (68.0)	2,120 (4,674)	485 (19.1)	6.50T • 7.00T
9.00-20-14PR	5.50 (78.0)	2,310 (5,093)		
10.00-20-14PR	5.00 (71.0)	2,470 (5,445)	500 (19.7)	7.00T • 7.50T 8.00V
11.00-20-14PR	4.75 (68.0)	2,605 (5,743)	513 (20.2)	7.50V 8.00V • 8.50V
12.00-20-14PR	4.25 (60.0)	2,795 (6,162)	532 (20.9)	800V • 8.50V 9.00V
12.00-20-16PR	5.00 (71.0)	3,075 (6,779)		
12.00-20-18PR	5.50 (78.0)	3,250 (7,165)		
12.00-24-16PR	5.00 (71.0)	3,460 (7,628)	582 (22.9)	8.00V • 8.50V 9.00V
13.00-24-18PR	5.00 (71.0)	4,000 (8,818)	606 (23.9)	8.50V • 9.00V
14.00-20-16PR	4.25 (60.0)	3,850 (8,488)	584 (23.0)	9.00V • 10.00WI
14.00-24-16PR	4.25 (60.0)	4,295 (9,469)	635 (25.0)	9.00V • 10.00WI
14.00-24-20PR	5.25 (75.0)	4,865 (10,725)		
14.00-24-24PR	6.50 (92.0)	5,510 (12,147)		

DESCRIPTION



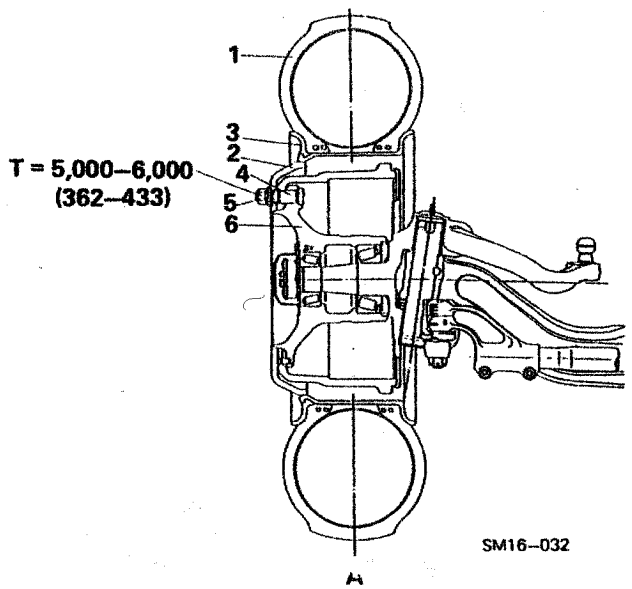


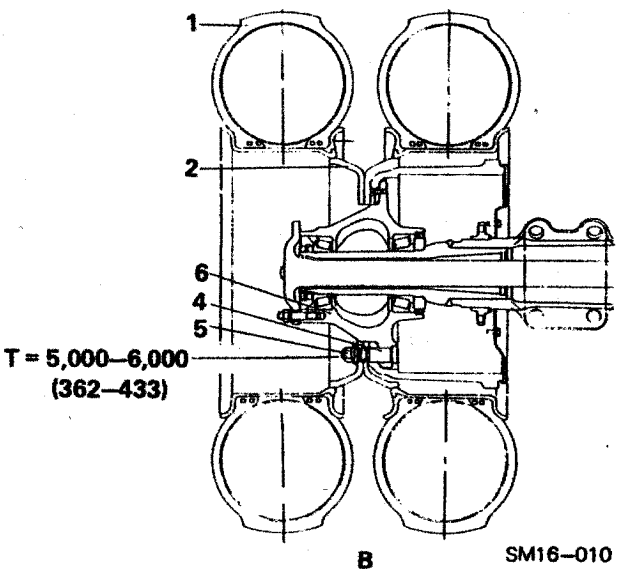
T = Tightening torque: kg·cm (lb.ft)

SAE TYPE

1. Tire
2. Disc wheel
3. Side ring
4. Hub bolt
5. Hub nut, inner
6. Hub nut, outer
7. Hub

A. Front
B. Rear



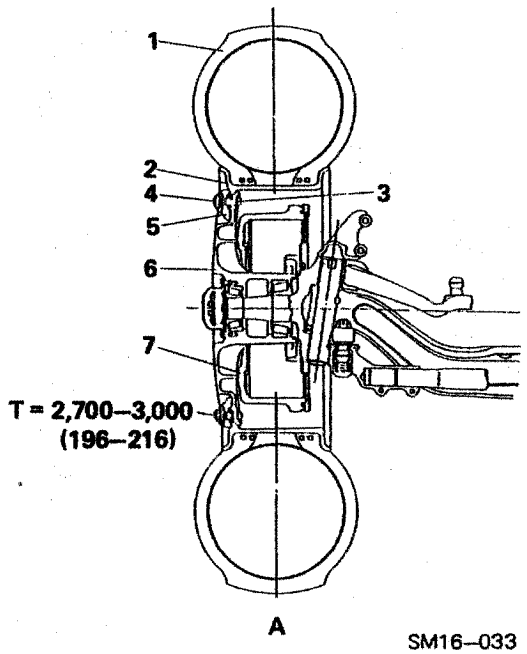


T = Tightening torque: kg·cm (lb.ft)

DIN TYPE

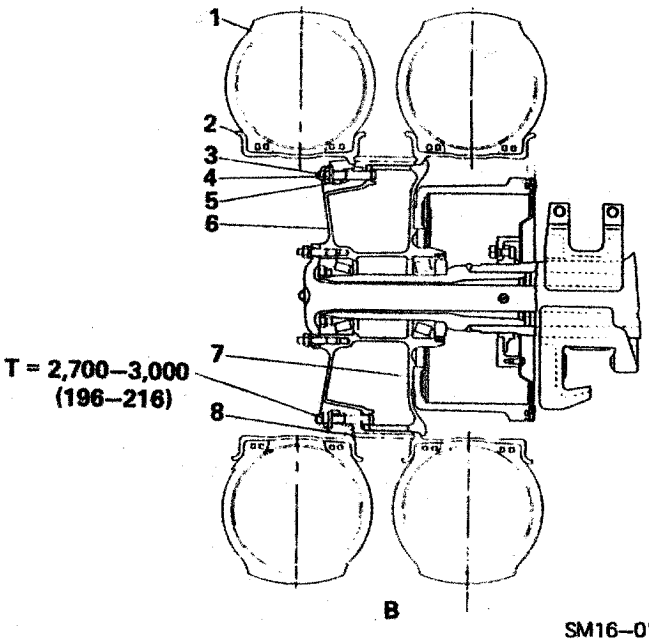
1. Tire
2. Disc wheel
3. Side ring
4. Hub bolt
5. Hub nut
6. Hub

A. Front
B. Rear



A

SM16–033



B

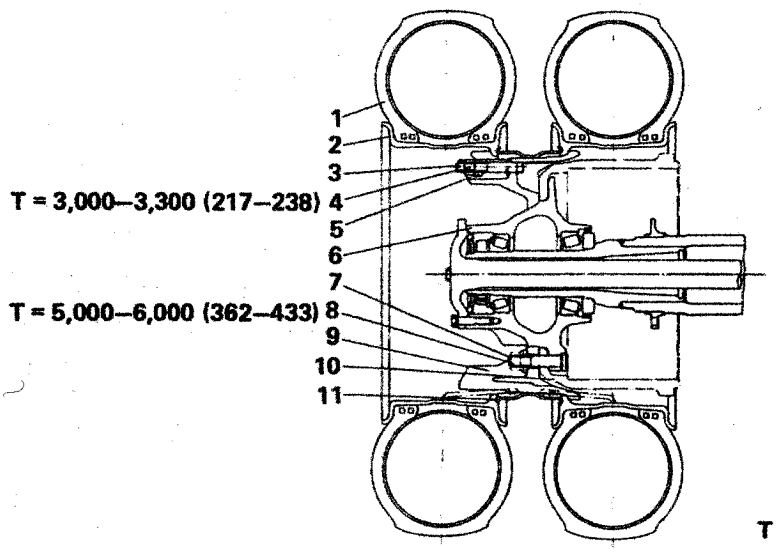
SM16–012

T = Tightening torque: kg·cm (lb.ft)

SPOKE WHEEL TYPE

1. Tire
2. Rim
3. Clamp bolt
4. Clamp nut
5. Clamp
6. Spoke wheel
7. Brake drum
8. Band spacer

A. Front
B. Rear

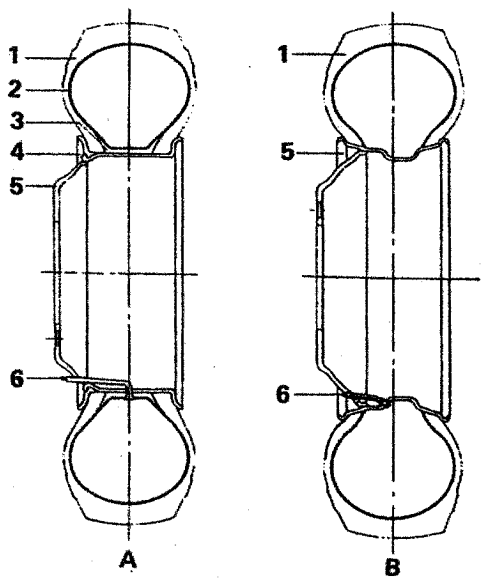


T = Tightening torque: kg·cm (lb.ft)

SM16–015

ADAPTER TYPE SPOKE WHEEL (Only for rear)

1. Tire
2. Rim
3. Clamp bolt
4. Clamp nut
5. Clamp
6. Hub
7. Hub bolt
8. Hub nut
9. Adapter
10. Brake drum
11. Band spacer



T = Tightening torque: kg-cm (lb.ft)

SM16–016

WHEEL AND TIRE

1. Tire
2. Tube
3. Flap
4. Side ring
5. Disc wheel
6. Valve

A. With tube
B. Tubeless

TROUBLESHOOTING

Symptom	Possible cause	Remedy/Prevention
Excessive wear on edges of tread	Underinflated tires	Properly inflate to recommended pressure.
	Vehicle overloading	Correct as required.
	High speed cornering	Correct as required.
	Incorrect wheel alignment	Set to correct specifications.
Tires show excessive wear in center of tread	Tires overinflated	Properly inflate to recommended pressure.
Excessive tire wear	Improper tire pressure	Properly inflate to recommended pressure.
	Incorrect tire wheel usage	Install correct tire wheel combination.
	Defective shock absorbers	Repair or replace.
	Front end out of alignment	Align front end.
	Loose, worn or damaged steering linkage, joints, suspension components, bushings or ball joints.	Inspect, repair or replace as required.
Wheel hop (vehicle vibration and rough steering)	**Disc wheels**	
	• Rocks or debris wedged between dual disc wheels.	Remove rocks and debris.
	• Out-of-balance tire and/or hub and drum	Determine the out-of-balance component and balance or replace.
	• Improper positioning of the side ring's split	Reassemble with ring split opposite (180 degrees) the valve opening to improve balance.
	Vehicle	
	• Loose or worn drive line or suspension	Identify location of vibration carefully as it may be transmitted through the frame making a rear end vibration appear to come from the front. Then repair or replace loose or worn parts. (Refer to PROPELLER SHAFT for vehicle vibration.)

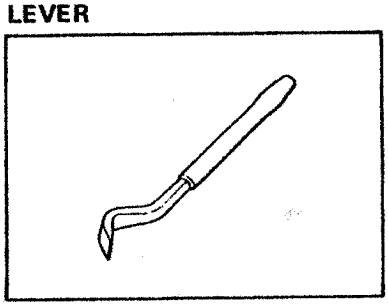
Symptom	Possible cause	Remedy/Prevention
Wobble (vehicle vibrations and rough steering)	**Disc wheels**	
	• Bent or distorted disc from over loading or improper handling.	Replace wheel.
	• Loose mountings, damaged studs, wheel nuts, enlarged stud holes, worn or broken hub face, or foreign material on mounting surfaces.	Replace worn or damaged parts. Clean mounting surfaces.
	Vehicle	
	• Improper alignment	Have vehicle aligned.
	• Loose worn or broken suspension parts	Repair or replace.
Cracked or broken wheel discs (cracks develop in the wheel disc from hand hole to hand hole, from hand hole to rim, or from hand hole to stud hole.)	Metal fatigue resulting from over-loading.	Replace wheel.
Damaged stud holes (stud holes become worn, elongated or deformed, metal builds up around stud hole edges, cracks develop from stud hole to stud hole.)	Loose wheel mounting	Replace wheel and check for. - Installation of correct studs and nuts. - Cracked or broken studs - replace. Worn hub face - replace. - Broken or cracked hub replace. - Clean mounting surfaces., (retorque wheel nuts periodically). - Rust streaks fanning out from stud holes: indicates that the wheel nuts are or have been loose.
Tire slippage on rim	**Disc wheels**	
	• Improper storage or operating conditions	Correct as required.
	• Poor maintenance	Follow proper maintenance procedures.
	• Rust, corrosion or bead seating	Correct as required.
	• Loss of pressure	Follow proper maintenance procedures.

Symptom	Possible cause	Remedy/Prevention
Tire mounting difficulties	**Wheel rims**	
	• Mismatched tire and rim sizes	Correct as required.
	• Defective or mismatched rings for rim use.	Correct as required.
	• Overinflation of tires	Follow recommended tire pressure.
	• Corrosion and dirt	Correct as required.
Loose inner wheel	Excessive stud standout from mounting face of hub allowing wheel nut to bottom out.	Replace with proper length hub bolt.
	Improper torque	Use recommended torque procedure.
	Wrong inner nut	Use correct nuts.
Broken wheel studs	Loose wheel nuts.	Replace stud and follow proper torque procedures.
	Overloading	Replace stud.
Stripped threads	Excessive clamp load	Replace studs - follow proper torque procedure.
Rust streaks from stud holes	Loose wheel nuts.	Check complete assembly, replace damaged parts and follow proper torque procedure.
Damaged inner or outer wheel nuts	Loose wheel assembly	Replace wheel nuts. Check for proper torque procedure.
Frozen inner or outer wheel nuts.	Corrosion or galling	Replace wheel nuts and hub bolts.

SPECIAL TOOLS

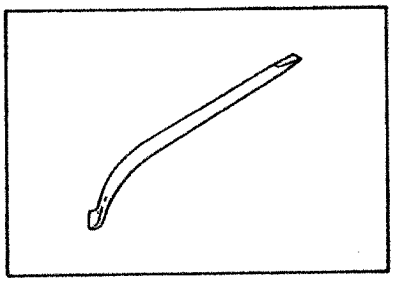
Prior to starting a wheel and tire overhaul, it is necessary to have these special tools.

LEVER



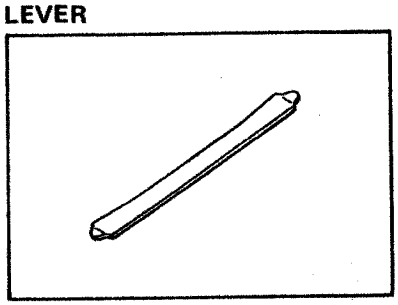
09672-1010

LEVER



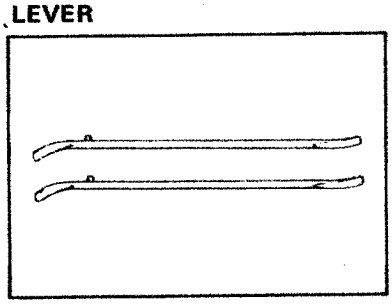
09672-1020

LEVER



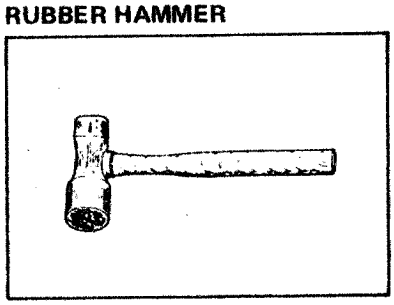
09672-1040

LEVER



09609-1210

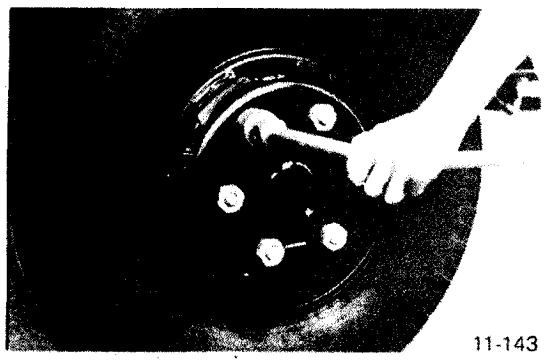
RUBBER HAMMER



09609-1220

WHEEL AND TIRE

(SAE AND DIN TYPE)



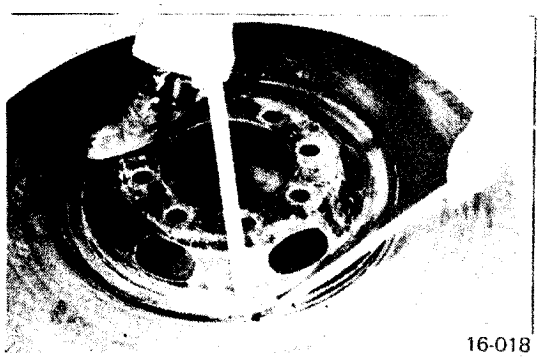
11-143

IMPORTANT POINT – DISMOUNTING

THE DISC WHEEL (SAE AND DIN TYPE)

SAE	General tools carried in vehicle	09849-4121, 09849-2501
DIN	General tools carried in vehicle	09849-3201, 09849-2501

NOTE: The hub bolts and nuts on the right side of the vehicle have right-hand threads, and its on the left side have left-hand threads.



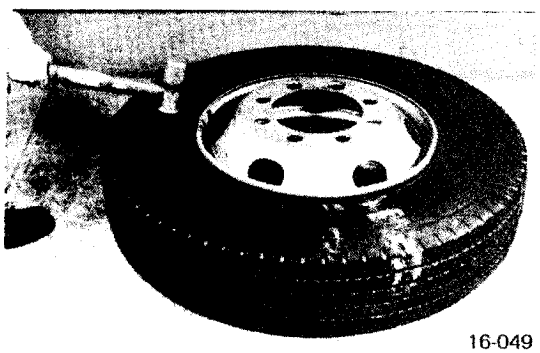
16-018

IMPORTANT POINT (S) – DISASSEMBLY

THE DISC WHEEL AND TIRE (WITH TUBE)

1. Release the air pressure in the tire.
   Remove the ring.

Special Tool: Lever (09672-1040)

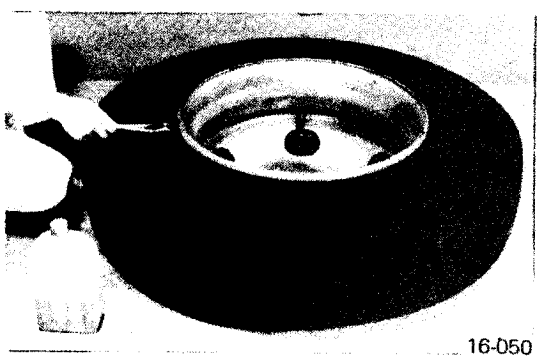


16-049

THE DISC WHEEL AND TIRE (TUBELESS)

1. Remove the valve and exhaust the air from the tire. Then hammer the tire to separate the tire bead from the rim.

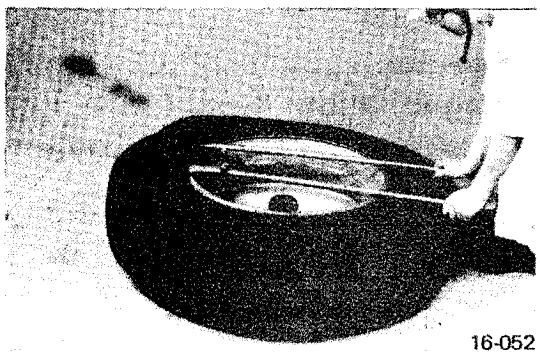
Special Tool: Rubber Hammer (09609-1220)



16-050

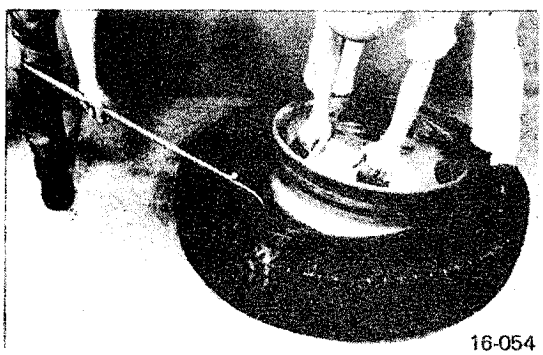
2. Apply the lubricant or soap water for the rim flange.

NOTE: The lubricant, recommended by tire manufacturer can only be used.


16-052

3. Insert the levers between the tire bead and the rim flange. Then lift the tire bead so that the bead gets over the rim flange.

Special Tool: Lever (09609-1210)

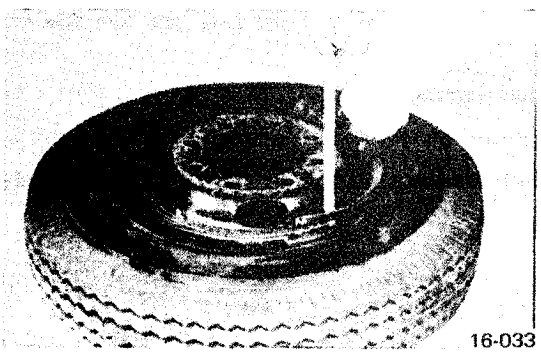

16-054

4. Turn the wheel over.
5. Insert the lever between the tire bead and the rim flange. Then lift the rim flange so that the flange gests over the tire bead.

Special Tool: Lever (09609-1210)

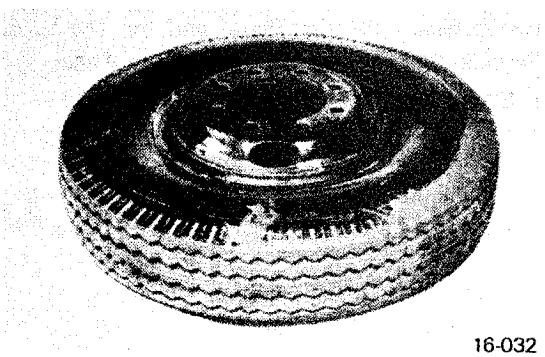
IMPORTANT POINT (S) – ASSEMBLY

WHEEL AND TIRE (WITH TUBE)

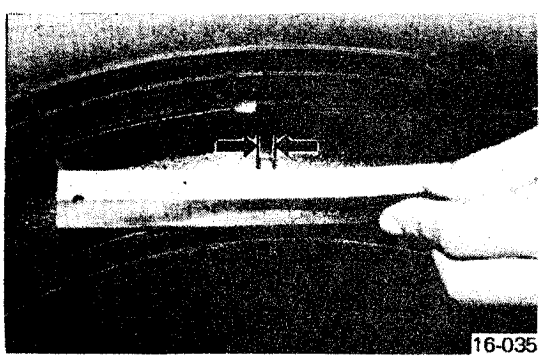

16-033

1. Put the side ring on the wheel and fit it in the flange on the clicking part of the rim.

Special Tool: Lever (09672-1040)

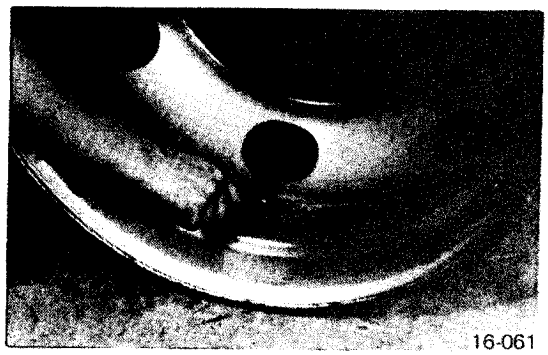

16-032

2. Check that the side ring is properly fitted into the rim groove.


16-035

3. Measure the side ring end clearance.

	Assembly standard
IR	2 – 7 mm (0.079 – 0.275 in)
SDC	2 – 6 mm (0.079 – 0.236 in)


16-061

WHEEL AND TIRE (TUBELESS)

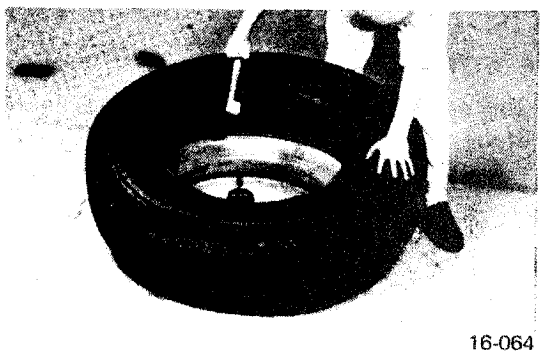
1. Install the valve to the rim.

Valve Nut Tightening Torque: 130 kg·cm (9.4 lb.ft)


16-062

2. Apply the lubricant or soap water for the bead of the tire.

NOTE: **The lubricant recommended by tire manufacturer can only be used.**

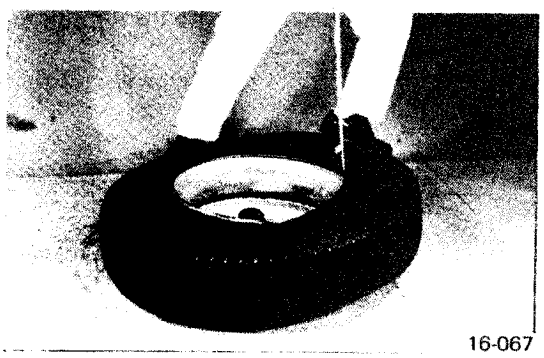

16-064

3. Hammer the lower bead so that the bead get over the rim flange.

Special Tool: Rubber Hammer (09609-1220)

4. Apply the lubricant or soap water for upper bead of the tire.

NOTE: **The lubricant recommended by tire manufacturer can only be used.**


16-067

5. Insert the lever between the rim flange and the tire bead. Then lift the lever so that the bead get over the rim flange.

Special Tool: Lever (09609-1210)


16-068

6. Hammer the tread of the tire so that the bead and seating portion of the rim will be seated.

Special Tool: Rubber Hammer (09609-1220)

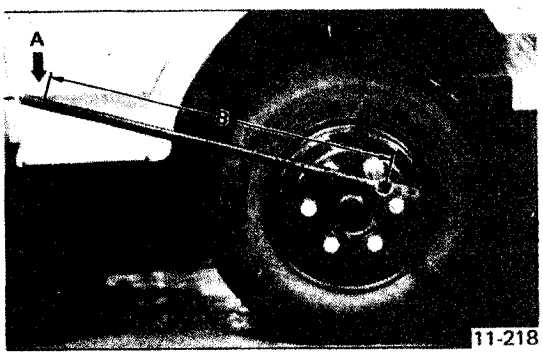

10-697


10-698

IMPORTANT POINT – MOUNTING

THE DISC WHEEL (SAE AND DIN TYPE)

1. Apply lubricant (Engine oil or grease) for the threads part of the hub bolts and the nuts.



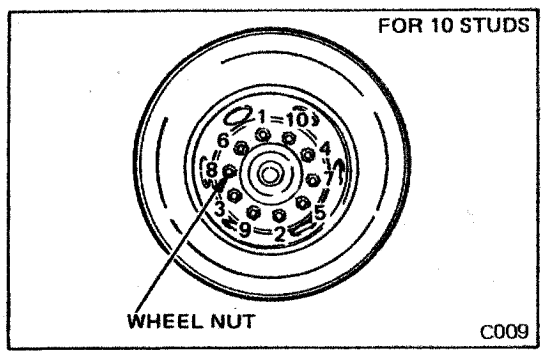
11-218

2. Clean the mounting surface of the wheel hub or the brake drum and the disc wheel.

SAE type	General tools carried in vehicle	20ϕ	09840-4121, 09849-2501
		18ϕ	09840-3517, 09849-2203
DIN type			09849-3201, 09849-2501

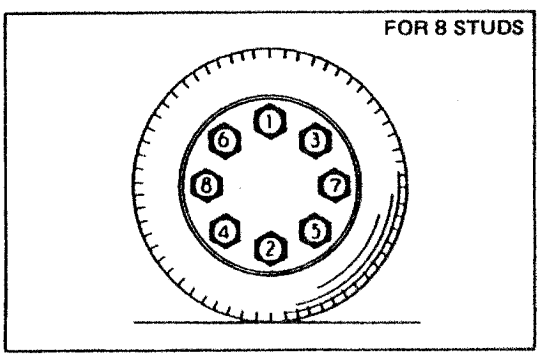
Tightening torque

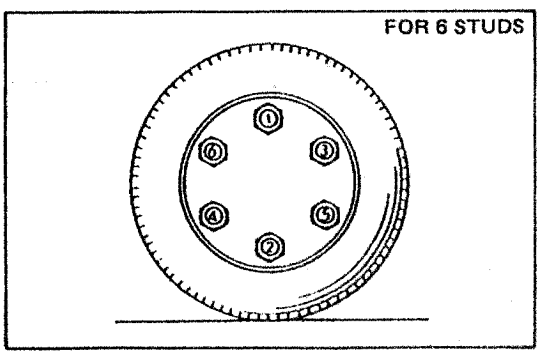
SAE type	20ϕ	4,000–4,800 kg-cm (289–347 lb.ft)	A=60 kg (132.3 lb)	B= 80 cm (31.5 in)
	18ϕ	2,400–3,000 kg-cm (174–216 lb.ft)	A=60 kg (132.3 lb)	B= 50 cm (19.7 in)
DIN type		5,000–6,000 kg-cm (362-434 lb.ft)	A=60 kg (132.3 lb)	B=100 cm (39.4 in)



3. Tighten the hub nuts with using criss-cross method as shown figure and through several repetitions of the tightening order so as to reach torque gradually and evenly.

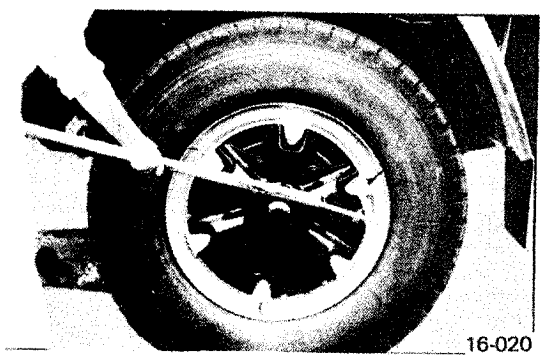
NOTE: **The hub bolts and nuts on the right side of the vehicle have right-hand threads, and its on the left side have left-hand threads.**





WHEEL AND TIRE

(SPOKE WHEEL TYPE)

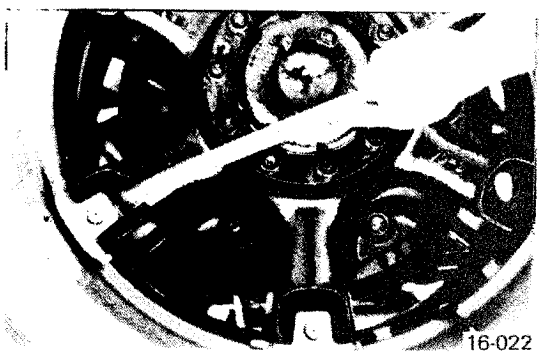

16-020

IMPORTANT POINT (S) – DISMOUNTING

THE SPOKE WHEEL.

1. Removings single wheel
   Release the nuts, and lift the wheel from the hub.

General tools carried in vehicle (09839-2701, 09672-1030)


16-022

2. Remove twin wheels.
   Unscrew the nuts.
3. Remove the clamps.

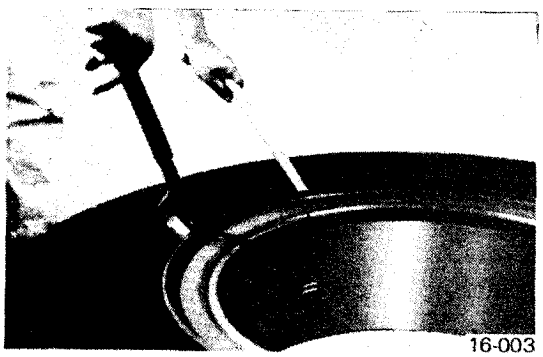
Special Tool: Lever (09672-1010)

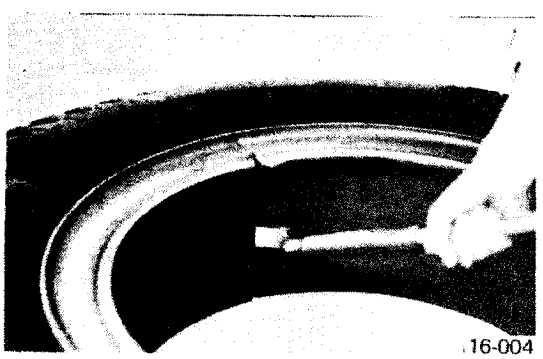
IMPORTANT POINT (S) – DISASSEMBLY

THE RIM AND TIRE FOR SPOKE WHEEL.

1. Remove the rim.
   Press down the side of tire.

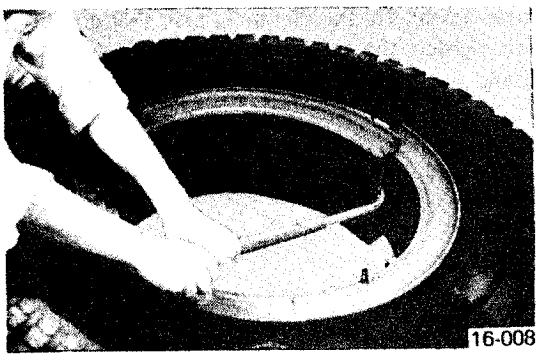
Special Tool: Lever (09672-1010, 09672-1020)


16-003


16-004

2. Place the lever in the joint of the rim and separate the rim.

Special Tool: Lever (09672-1010)

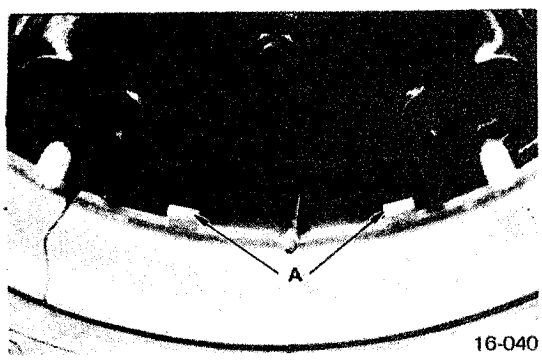

16-008

IMPORTANT POINT – ASSEMBLY

THE SPOKE WHEEL.

1. Place the fitting lever in the slot on the valve rim. By evenly on the lever, the third segment is fitted into position and locked securely.

NOTE: Do not pull upward.

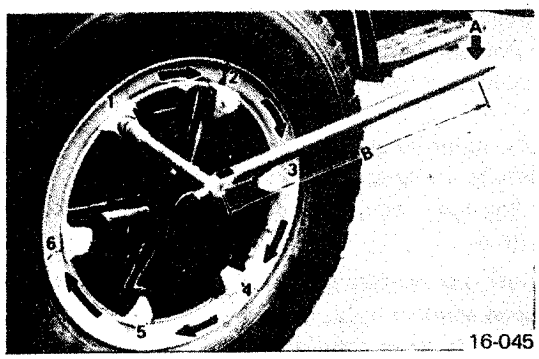


16-040

IMPORTANT POINT (S) – MOUNTING

THE SINGLE WHEEL.

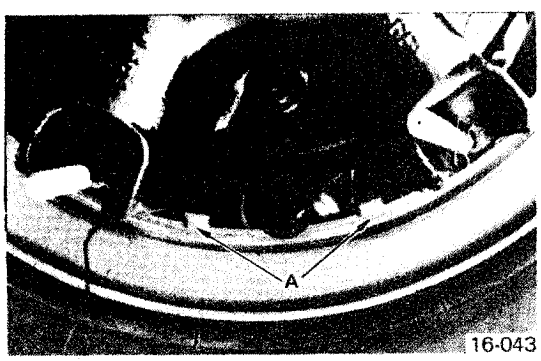
1. Install the wheel over the spoke ends so that the valve and stopper "A" of the rim come between two spokes.



16-045

2. First, fit the clamps (upper side and lower side) and tighten the clamp nuts lightly. Then tighten the clamp nuts in sequence round the rim edge.

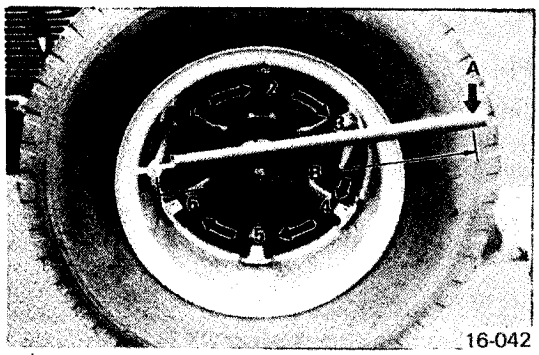
General tools carried in vehicle	09839-2701, 09672-1030		
Tightening torque	2,700 – 3,000 kg·cm (195 – 217 lb.ft)	A = 60 kg (132.3 lb)	B = 50 cm (19.7 in)



16-043

THE TWIN WHEELS.

1. Install the inner wheel so that the valve and stopper "A" of the rim are between two spokes.

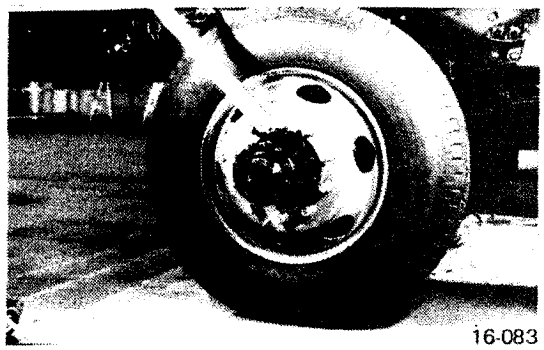


16-042

2. Install the outer wheel, fit the clamp (upper side and lower side) and then tighten the clamp nut lightly. Then fit the other clamps and nuts, then tighten it in sequence round the rim ring.

General tools carried in vehicle		09389-2701, 09672-1030		
Tightening torque	Sproke wheel	2,700 – 3,000 kg-cm (195 – 217 lb.ft)	A=60 kg (132.3 lb)	B=50 cm (19.6 in)
	Adapter type	3,000 – 3,300 kg-cm (217 – 238 lb.ft)	A=60 kg (132.3 lb)	B=55 cm (21.6 in)

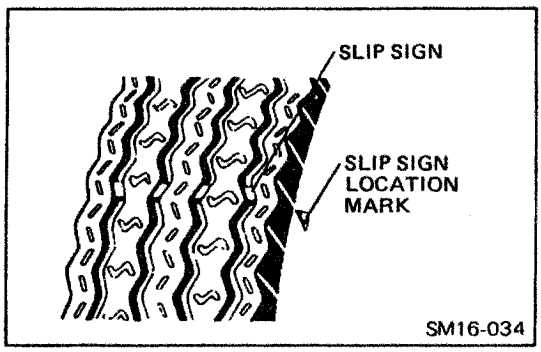
THE FOLLOWING ORDER AND INSTRUCTIONS ARE NECESSARY FOR INSTALLING DOUBLE TIRES.


16-083

1. Installation procedures for the inner wheel nuts are the same as in 1. through 4. above.
2. Installation procedures for the outer wheel nuts are the same as above.
3. When only the outer wheel is replaced, first tighten all the inner wheel nuts to the specified torque.
   Then mount the outer wheel and tighten all the outer wheel nuts to the torque.

NOTE: **○ Install dual rear wheels with their valve stems positioned 180 degrees apart to facilitate inflation.**
○ Tighten all the inner nuts and outer nuts according to the above-mentioned procedures.

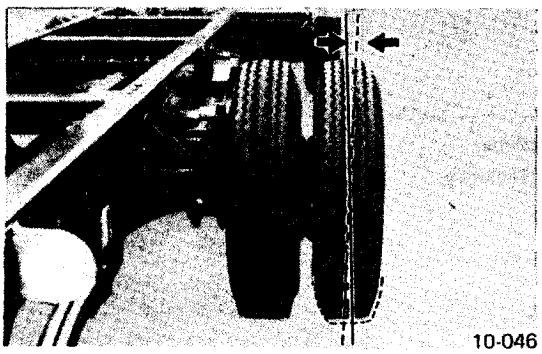
GENERAL INSPECTION



1. Check the tire thread wear (groove depth) and tire damage. If the slip sign on the tire tread comes out, replace the tire.

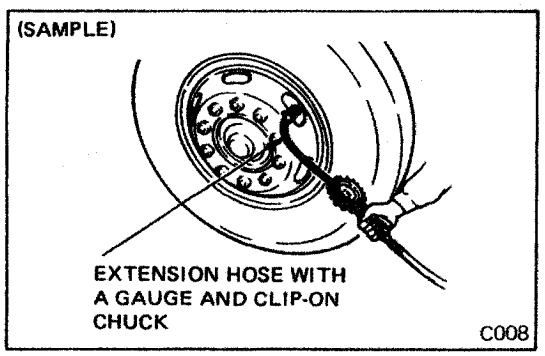
Groove depth (Remaining groove)

General running: 1.6 mm (0.063 in)
High-speed running: 3.2 mm (0.126 in)



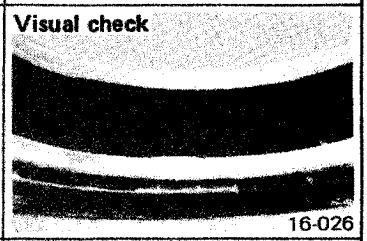
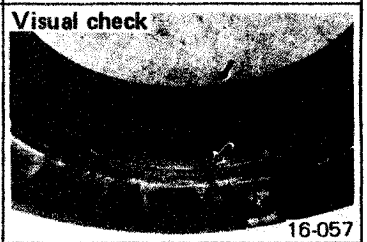
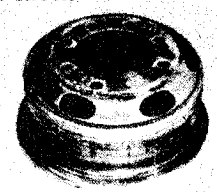
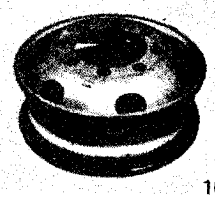
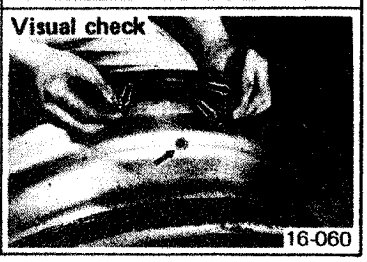
2. Inspect for wheel wobble.

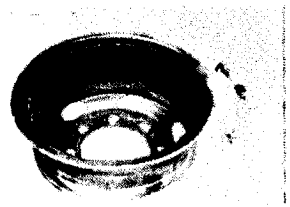
Repair Limit: 5 mm (0.196 in)



3. Check for air pressure.

INSPECTION AND REPAIR

Inspection Item	Standard	Limit	Remedy	Inspection Procedure
Tire Damage, Foreign matter, etc.			Replace, if necessary.	Visual check  16-026
Tubeless tire. Damage.			Replace, if necessary.	Visual check  16-057
Tube. Air leakage.			Replace, if necessary.	Visual check  16-027
Wheel for the tire with tube. Cracks, Deformation.			Replace, if necessary.	Visual check  16-028
Wheel for the tubeless tire. Cracks, Deformation.			Replace, if necessary.	Visual check  16-058
Rim. Damage.			Replace, if necessary.	Visual check  16-059
Pipe, nut and O-ring of the valve. Damage.			Replace, if necessary.	Visual check  16-060

Inspection Item	Standard	Limit	Remedy	Inspection Procedure
Disc wheel side wobble.	0–2 mm (0–0.079 in) Off set: Less than 115 0–1.8 mm (0–0.071 in)	4 mm (0.157 in)	Replace	 16-029

SU-90E-01

CHAPTER SU

SUSPENSION

Models AB and RB

DATA AND SPECIFICATIONS

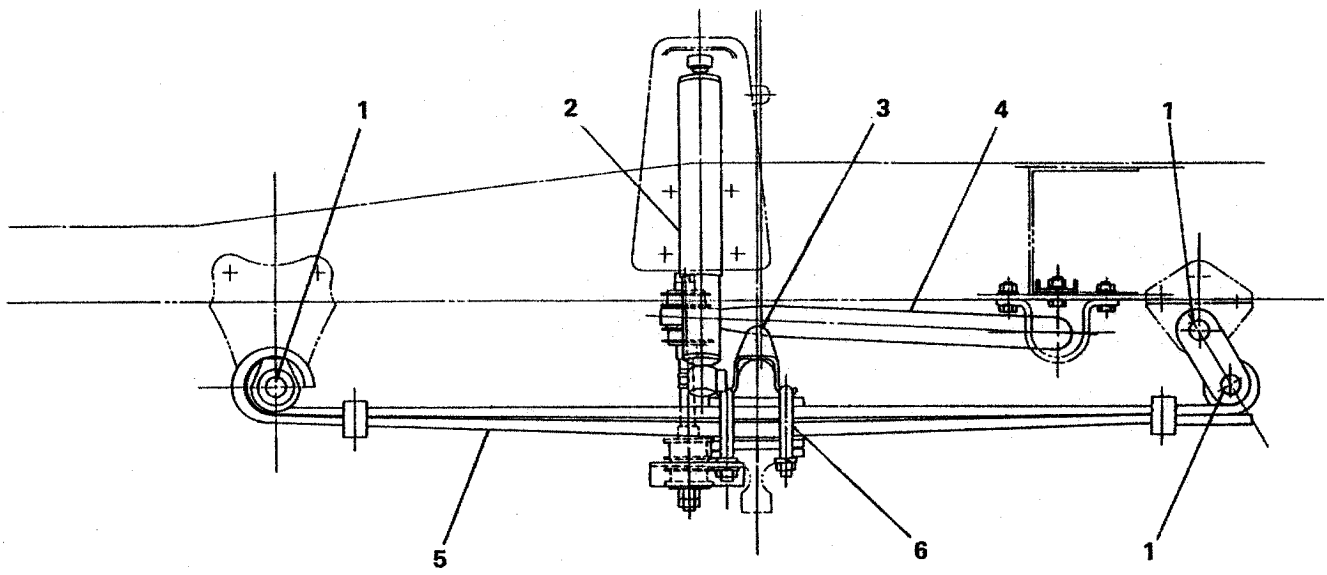
FRONT

Model	AB	RB
Type	Semi-elliptic leaf springs with shock absorbers	Semi-elliptic leaf springs with shock absorbers and stabiliaer
Dimensions of leaf springs:		
Span	1,200 mm (47.24 in)	←
Width	70 mm (2.76 in)	←
Thickness x number	16 mm (0.63 in) x 2	←
Shock absorbers:		
Type	Double acting	←
Stroke	240 mm (9.45 in)	←
Min. length	335 mm (13.19 in)	←
Max. length	575 mm (22.64 in)	←
Stabilizer:		
Type	Non	Torsion bar

REAR

Model	AB	RB
Type	Semi-elliptic main and auxiliary leaf springs with shock absorbers	Semi-elliptic main and auxiliary leaf springs with shock absorbers and stabilizer
Dimensions of leaf springs:		
Span	1,300 mm (51.18 in)	←
Width	70 mm (2.76 in)	←
Thickness x number	14 mm (0.55 in) x 4	14 mm (0.55 in) x 3
Shock absorbers:		
Type	Double acting	←
Stroke	225 mm (8.86 in)	←
Min. length	333 mm (13.11 in)	←
Max. length	558 mm (21.97 in)	←
Stabilizer:		
Type	Non	Torsion bar

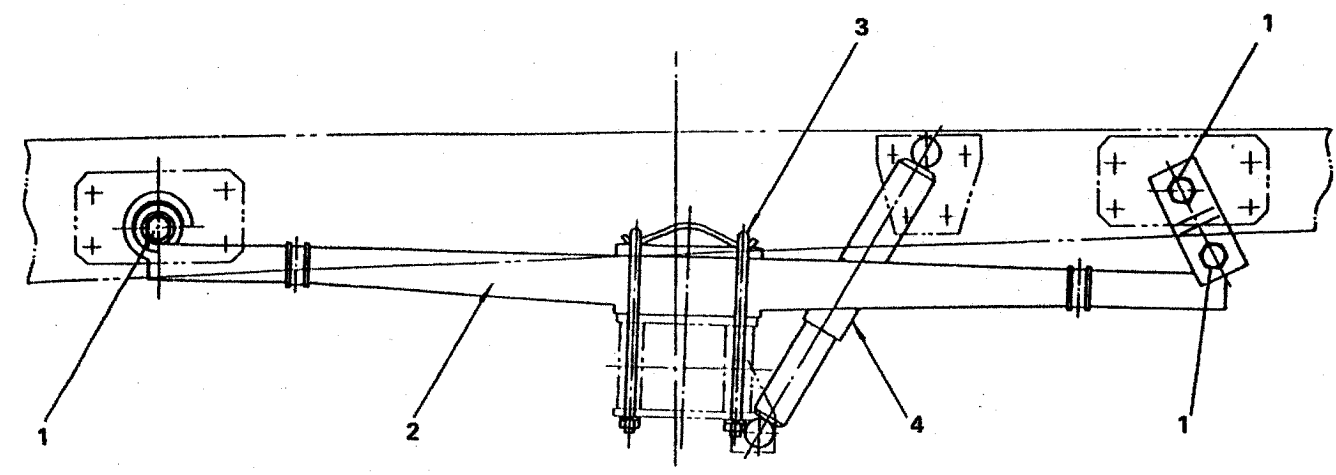
DESCRIPTION



SM17-436

FRONT LEAF SPRING

1. Spring pin
2. Shock absorber
3. Bumper rubber
4. Stabilizer (For model RB)
5. Leaf spring assembly
6. U-bolt

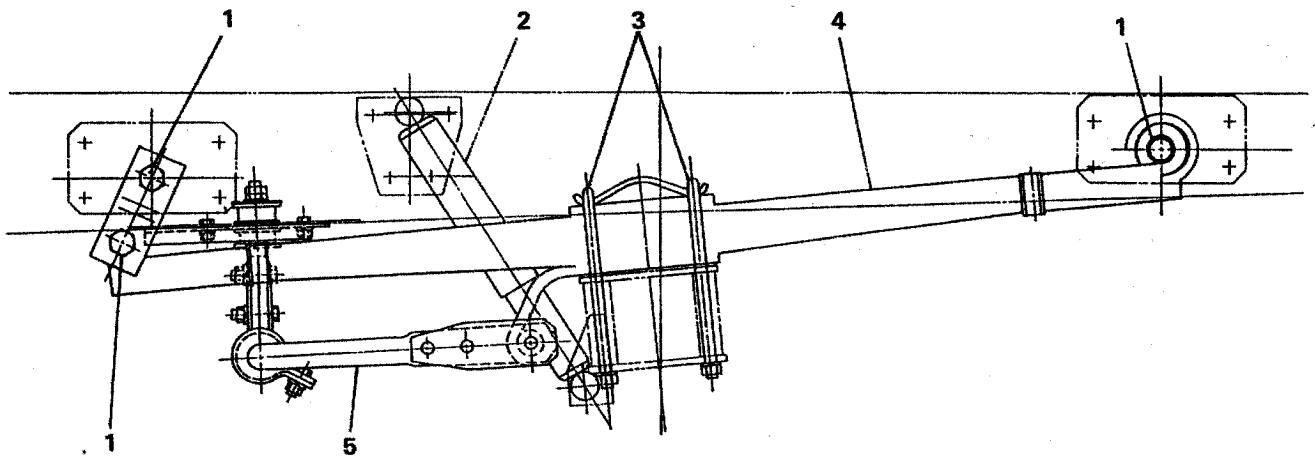


SM17-437

REAR LEAF SPRING (FOR MODEL AB)

1. Spring pin
2. Leaf spring assembly
3. U-bolt
4. Shock absorber

TROUBLESHOOTING



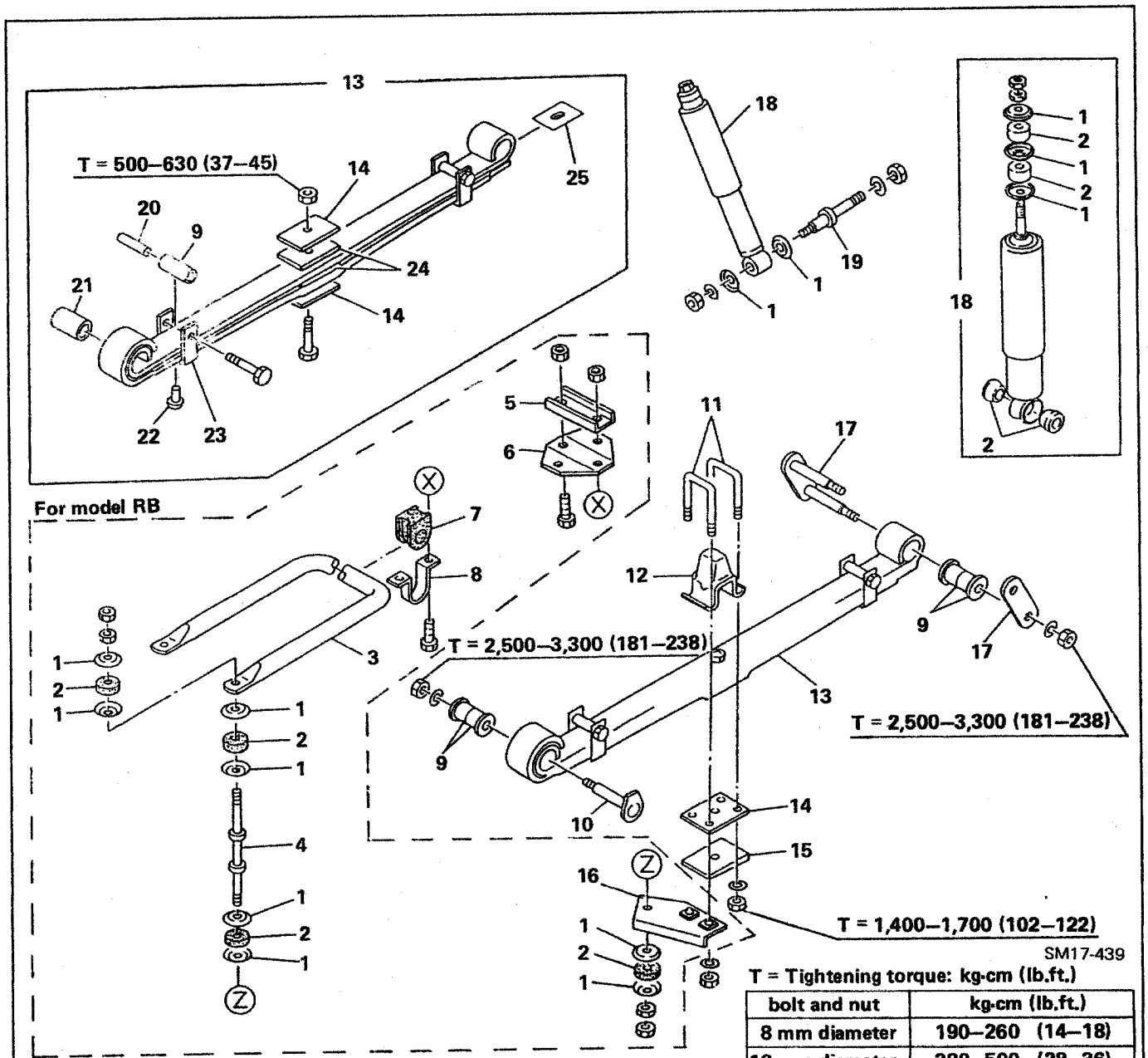
SM17-438

REAR LEAF SPRING (FOR MODEL RB)

1. Spring pin
2. Shock absorber
3. U-bolt
4. Leaf spring assembly
5. Stabilizer

Symptom	Possible cause	Remedy/Prevention
Rough ride	Broken leaves	Replace the leaves.
		Check the load capacity rating.
	Cracked or damaged.	Replace the leaves.
		Check the load capacity rating.
	Overloading	Decrease the load.
Heavy sway	Inoperative shockabsorber.	Replace the shockabsorber.
Leaves broken at the center bolt hole	Loose U-bolts	Tighten to specified torque.
Squeaking of the leaves	Friction between the leaves	Apply chassis grease between leaves.

FRONT LEAF SPRING



SM17-439

T = Tightening torque: kg-cm (lb.ft.)

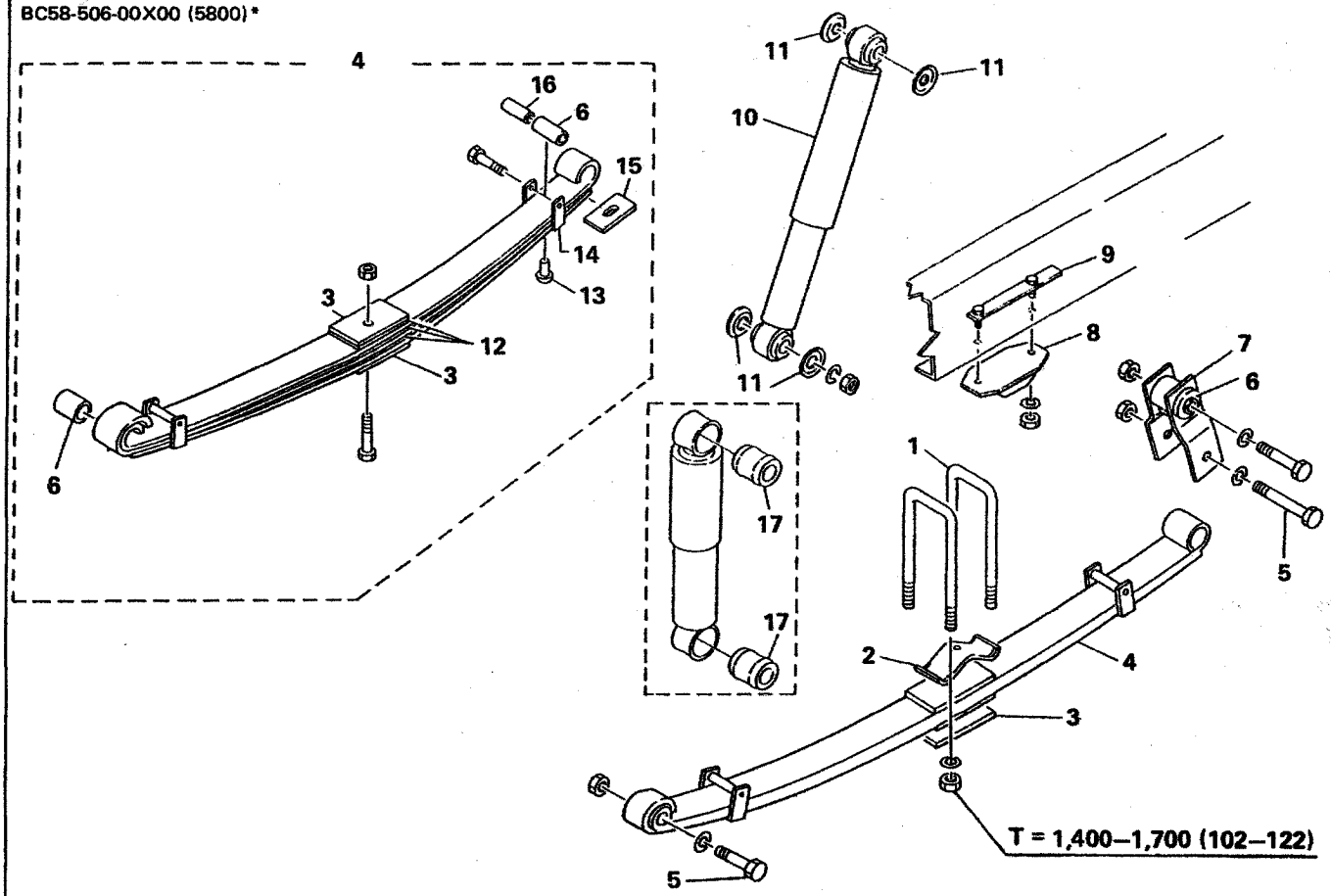
bolt and nut	kg-cm (lb.ft.)
8 mm diameter	190–260 (14–18)
10 mm diameter	380–500 (28–36)
12 mm diameter	650–870 (47–62)
14 mm diameter	1,100–1,500 (80–108)
16 mm diameter	1,700–2,300 (123–166)
18 mm diameter	2,500–3,300 (181–238)

1. Cushion washer
2. Cushion
3. Stabilizer bar
4. Stabilizer rod
5. Stiffener
6. Stabilizer bracket
7. Stabilizer bar sleeve
8. Stabilizer holder
9. Rubber bushing
10. Spring pin
11. U-bolt
12. Spring bumper
13. Leaf spring assembly
14. Spacer
15. Caster shim
16. Stabilizer bar lever
17. Shackle
18. Shock absorber
19. Shock absorber pin
20. Case
21. Collar
22. Rivet
23. Clip
24. Inter leaf
25. Silincer

REAR LEAF SPRING

For model AB

BC58-506-00X00 (5800) *



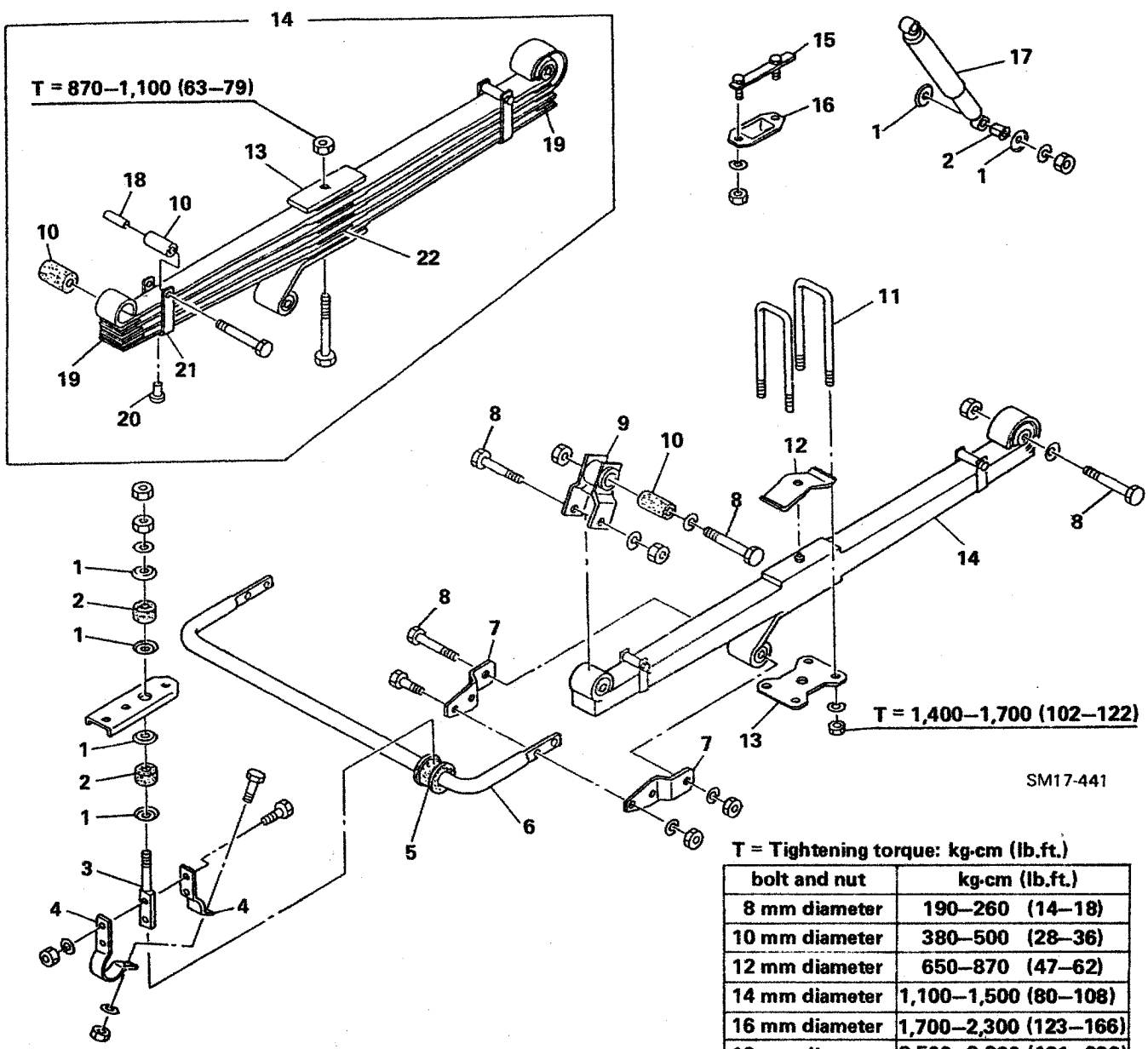
SM17-440

T = Tightening torque: kg-cm (lb.ft.)

bolt and nut	kg-cm (lb.ft.)
8 mm diameter	190–260 (14–18)
10 mm diameter	380–500 (28–36)
12 mm diameter	650–870 (47–62)
14 mm diameter	1,100–1,500 (80–108)
16 mm diameter	1,700–2,300 (123–166)
18 mm diameter	2,500–3,300 (181–238)

1. U-bolt
2. Spring pad
3. Spacer
4. Leaf spring assembly
5. Spring pin
6. Rubber bushing
7. Shackle
8. Spring bumper
9. Setting plate
10. Shock absorber
11. Cushion washer
12. Inter leaf
13. Revet
14. Clip
15. Silencer
16. Case
17. Cushion

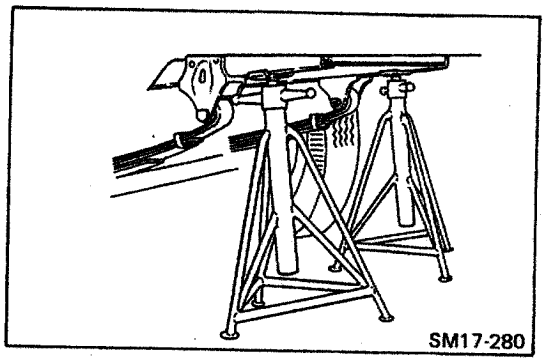
For model RB



T = Tightening torque: kg-cm (lb.ft.)

bolt and nut	kg-cm (lb.ft.)
8 mm diameter	190–260 (14–18)
10 mm diameter	380–500 (28–36)
12 mm diameter	650–870 (47–62)
14 mm diameter	1,100–1,500 (80–108)
16 mm diameter	1,700–2,300 (123–166)
18 mm diameter	2,500–3,300 (181–238)

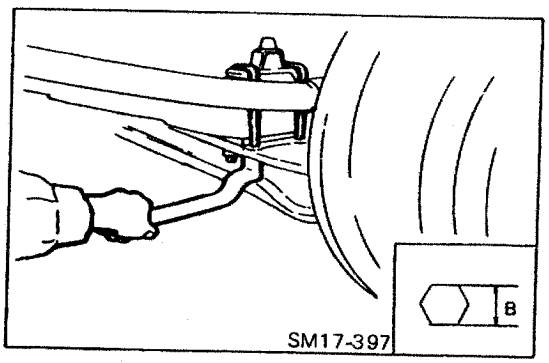
1. Cushion washer
2. Cushion
3. Stabilizer link rod
4. Stabilizer holder
5. Stabilizer bar sleeve
6. Stabilizer bar
7. Stabilizer bar lever
8. Spring pin
9. Shackle
10. Rubber bushing
11. U-bolt
12. Spring pad
13. Spacer
14. Leaf spring assembly
15. Setting plate
16. Spring bumper
17. Shock absorber
18. Case
19. Inter leaf
20. Revet
21. Clip
22. Silencer


SM17-280

IMPORTANT POINT(S) – DISASSEMBLY

SUPPORT THE FRAME WITH STANDS.

1. Park the vehicle on level ground.
2. Jack up the axle, and support the frame with stands.
3. Remove the tires.



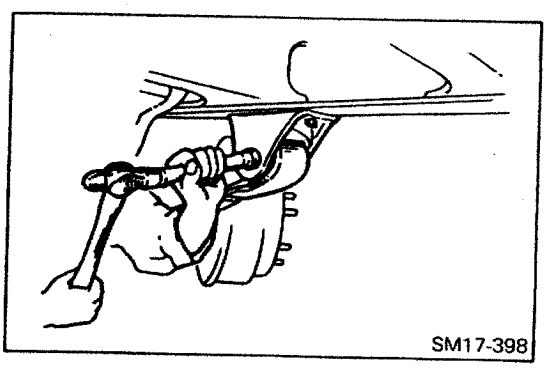
SM17-397

REMOVAL OF THE U-BOLT.

1. Remove the stabilizer (if so installed).
2. Remove the shockabsorber (if so installed).
3. Support the axle with jack.
4. Using socket wrench, remove the U-bolt mounting nuts.

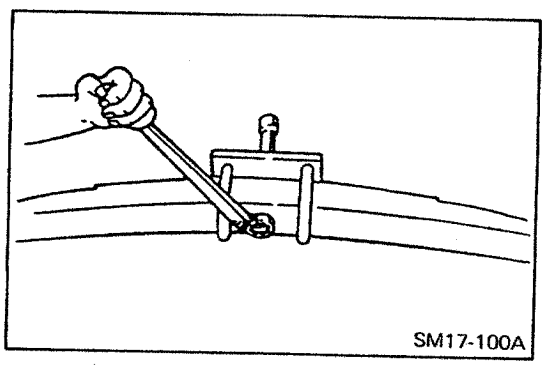
Socket Wrench B: 22 mm (0.87 in)

NOTE: When cutting off the U-bolts (due to rusted threads) with a torch, never direct the flame toward the leaves or allow sparks to come in contact with the leaves.


SM17-398

REMOVAL OF THE SPRING PIN.

1. Remove the nut.
2. Using a brass rod, remove the spring pin.

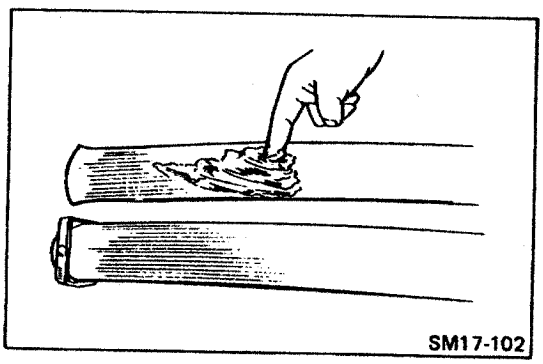

SM17-100A

DISASSEMBLY OF THE LEAF SPRING.

Using a vise or an arber press for holding the leaf spring in place while disassembling.

WARNING

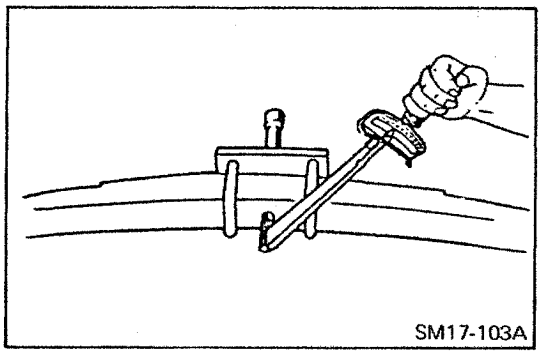
When disassembling the leaf spring, care should be taken to avoid possible personal injury.


SM17-102

IMPORTANT POINT (S) – ASSEMBLY

APPLY CHASSIS GREASE ON SURFACE OF LEAF

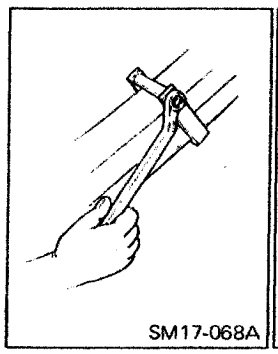
1. Apply coating on the leaf after removing rust, and the apply chassis grease on both surface at leaves.

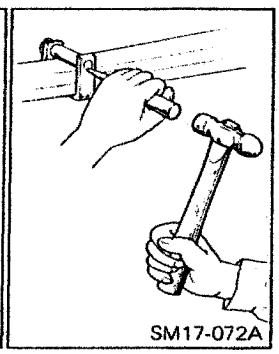

SM17-103A

2. Using a vise or an arber press for holding the leaf spring in place while assembling.

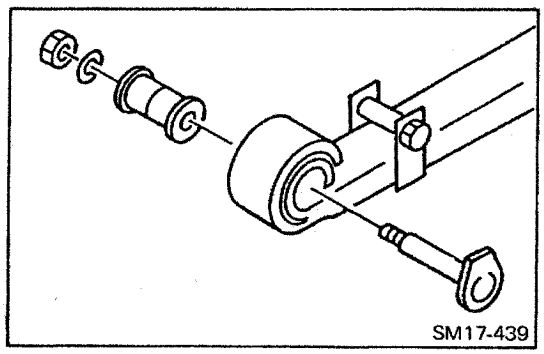
WARNING

When assembling the leaf spring, care should be taken to avoid possible personal injury.


SM17-068A

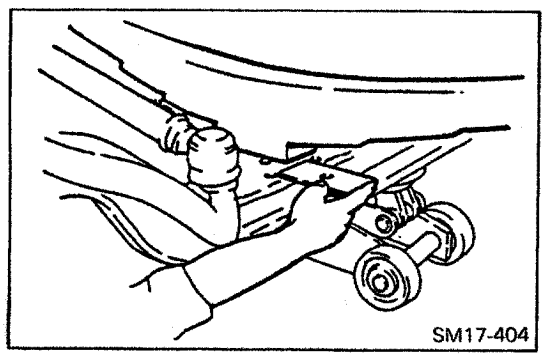

SM17-072A

3. Tighten the clip bolts with collars.
4. Using a punch, peen the thread of clip bolts.


SM17-439

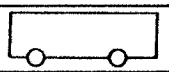
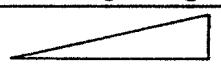
INSTALLATION OF THE SPRING PIN.

NOTE: ○ **When installing the spring pin, apply soapy water for spring pin and rubber bushing.**
○ **Do not apply the grease on the rubber bushings.**


SM17-404

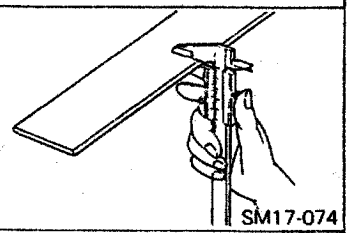
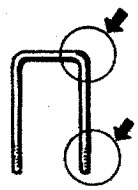
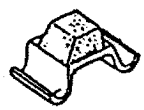
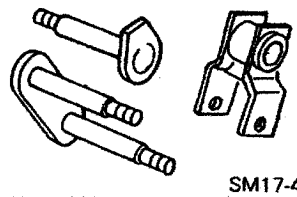
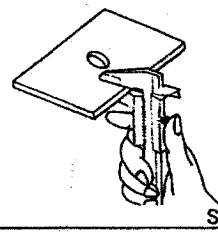
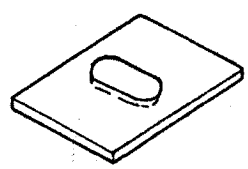
INSTALLATION OF THE CASTER SHIM.

NOTE: When installing the caster shim, the thick end should face rear.

	← To front 
With power steering	
Without power steering	**Non caster shim**

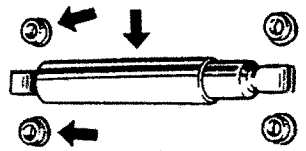
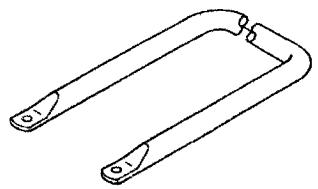
INSPECTION AND REPAIR

Unit: mm (in)

Inspection Item	Standard	Limit	Remedy	Inspection Procedure
Leaf. Damage and Wear.	—	More than 15%	Replace	 SM17-074
U-bolt. Damage.	—	—	Replace, if necessary.	Visual check  SM17-098B
Spring Bumper. Wear.	—	—	Replace, if necessary.	Visual check  SM17-260
Spring Pin and Shackle. Damage.	—	—	Replace, if necessary.	Visual check  SM17-442
Spring Pin Rubber Bushing. Wear.	—	—	Replace, if necessary.	Visual check  SM17-439
Inter Leaf. Wear.	1.2 (0.047)	0.6 (0.024)	Replace.	 SM17-295
Silencer. Wear.	—	—	Replace, if necessary.	Visual check  SM17-132A

INSPECTION AND REPAIR

Unit: mm (in)

Inspection Item	Standard	Limit	Remedy	Inspection Procedure
Shock Absorber and Bushing Operation, Oil Leak and Damage.	—	—	**Replace, if necessary.**	Visual check  SM17-097
Stabilizer Bar. Damage.	—	—	**Replace, if necessary.**	Visual check  SM17-439
Stabilizer Sleeve and Bushing. Wear.	—	—	**Replace, if necessary.**	Visual check  SM17-439

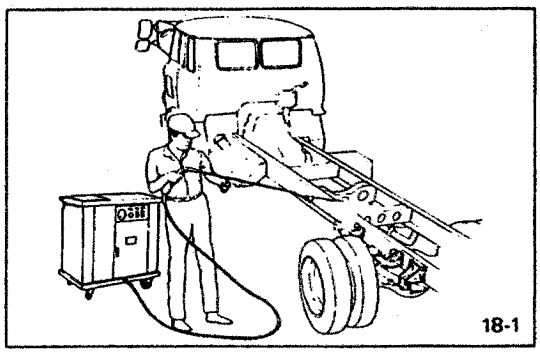
CF-22E-01

CHAPTER CF

CHASSIS FRAME

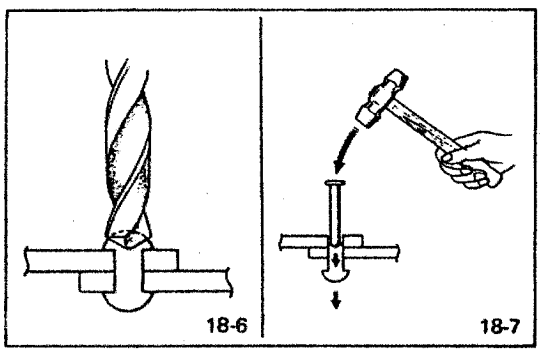
TROUBLESHOOTING

Symptom	Possible cause	Remedy/Prevention
Frame distortion (Vehicle inclination)	Flattening or breakage of springs on one side	Inspection & Replacement of springs
	Incorrect mounting (Attachment of heavy unit on one side of the vehicle)	Improvement of mounting
Bent frame	Overloading or concentrated load on frame rear end	Improvement of the usage Correction by frame correction device
Cracking of frame and breaking of rivets	Unappropriate method of body mounting	Improvement of mounting Improvement of the usage
	Overloading	Reinforcement by stiffener


18-1

CLEAN THE FRAME.

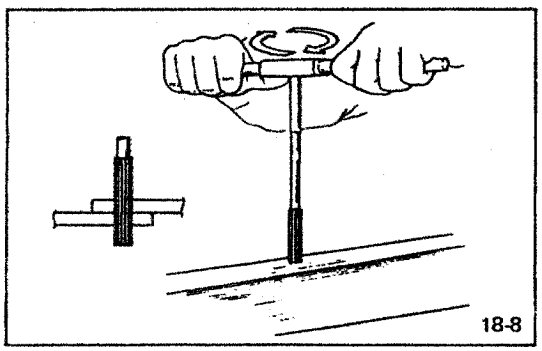
NOTE: While inspecting or repairing, stop the vehicle engine and block the wheels. When cleaning sections with a steam cleaner, use safety goggles.


18-6 18-7

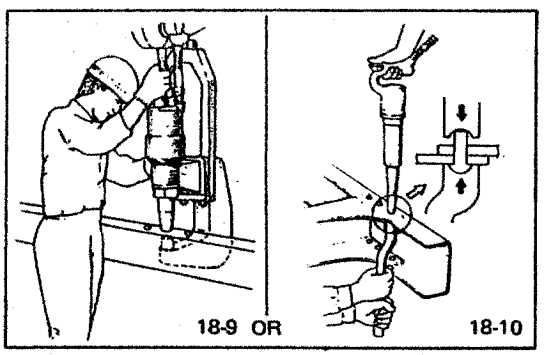
REPLACEMENT OF LOOSENED RIVETS.

1. Drill out the head of the loosened rivet with a drill.

NOTE: When drilling, do not use gloves. They can get caught up in the drill.

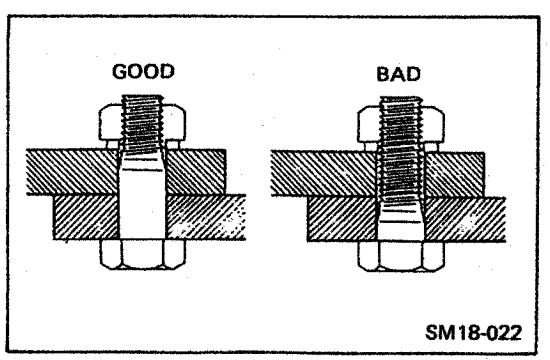

18-8

2. Ream out the hole with a reamer.


18-9 OR 18-10

3. Strike rivets with proper force using a pneumatic riveter.

Rivet		Rivet hole
ϕ 10 mm	Standard:	ϕ 11 mm (ϕ 0.43 in)
(0.39 in)	Repair limit:	ϕ 11.5 mm (ϕ 0.45 in)
ϕ 11 mm	Standard:	ϕ 12 mm (ϕ 0.47 in)
(0.43 in)	Repair limit:	ϕ 12.5 mm (ϕ 0.49 in)
ϕ 13 mm	Standard:	ϕ 14 mm (ϕ 0.55 in)
(ϕ 0.51 in)	Repair limit:	ϕ 14.5 mm (ϕ 0.57 in)
ϕ 16 mm	Standard:	ϕ 17 mm (ϕ 0.67 in)
(ϕ 0.63 in)	Repair limit:	ϕ 17.5 mm (ϕ 0.69 in)

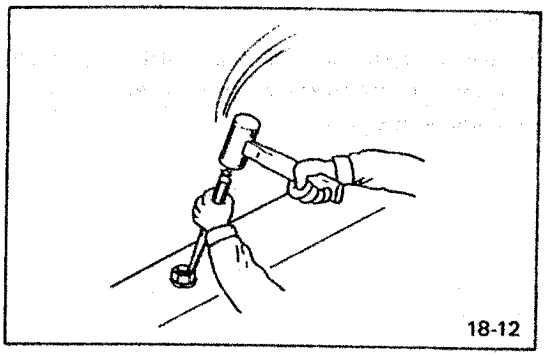


SM18-022

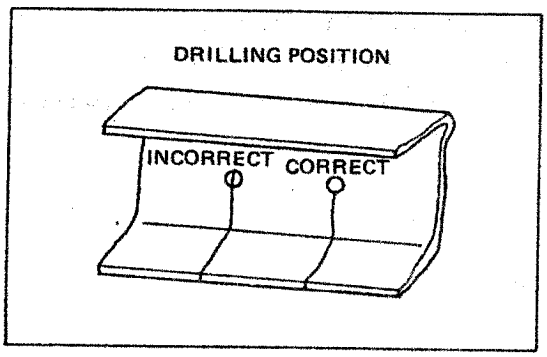
4. If it is impossible to tighten with rivets. Finish the rivet hole with a reamer and tighten with reamer bolts.

NOTE: The tensile strength of the material of the bolts must be above 70 kg/mm^2 (99,540 spi).

Tightening Torque:
10 mm Bolt 380 – 500 kg.cm (28 – 36 lb.ft)
12 mm Bolt 650 – 870 kg.cm (47 – 62 lb.ft)
14 mm Bolt 1,100 – 1,500 kg. cm (80 – 108 lb.ft)
16 mm Bolt 1,700 – 2,300 kg.cm (123 – 166 lb.ft)
18 mm Bolt 2,500 – 3,300 kg.cm (181 – 238 lb.ft)
20 mm Bolt 3,500 – 4,700 kg.cm (254 – 339 lb.ft)
22 mm Bolt 4,800 – 6,400 kg.cm (348 – 462 lb.ft)



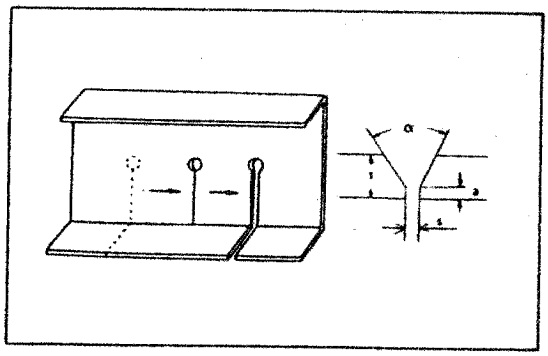
5. Caulk nuts and bolts to prevent loosening.



REPAIRING OF FRAME CRACKS.

1. Perform the procedure for preventing enlargement of cracks.

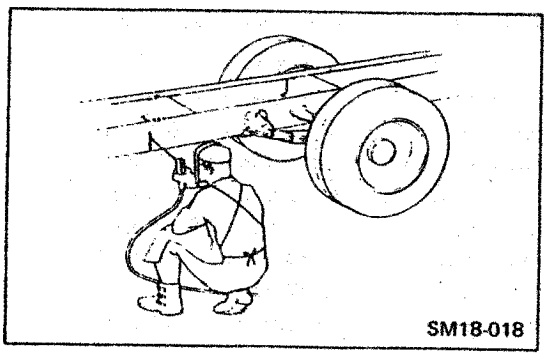
NOTE: Do not make drill holes on frame flanges except in the case of repairing cracks.



2. Grind the frame to make the V-shaped groove along the crack according to table.

Unit: mm (in)

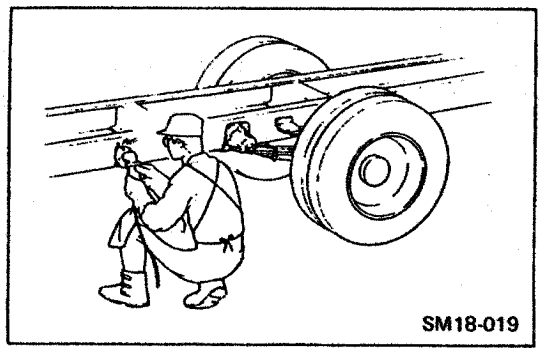
t	α°	S	a
4.5 (0.18)	90	1.0 (0.039)	0
6 (0.24)	70	1.0 (0.039)	0
7 (0.28)	70	1.5 (0.059)	1 (0.039)
8 (0.31)	70	1.5 (0.059)	1 (0.039)
9 (0.35)	70	1.5 (0.059)	1 (0.039)
10 (0.39)	60	1.5 (0.059)	1 (0.039)
12 (0.47)	60	1.5 (0.059)	1 (0.039)
16 (0.63)	60	2.0 (0.079)	1 (0.039)



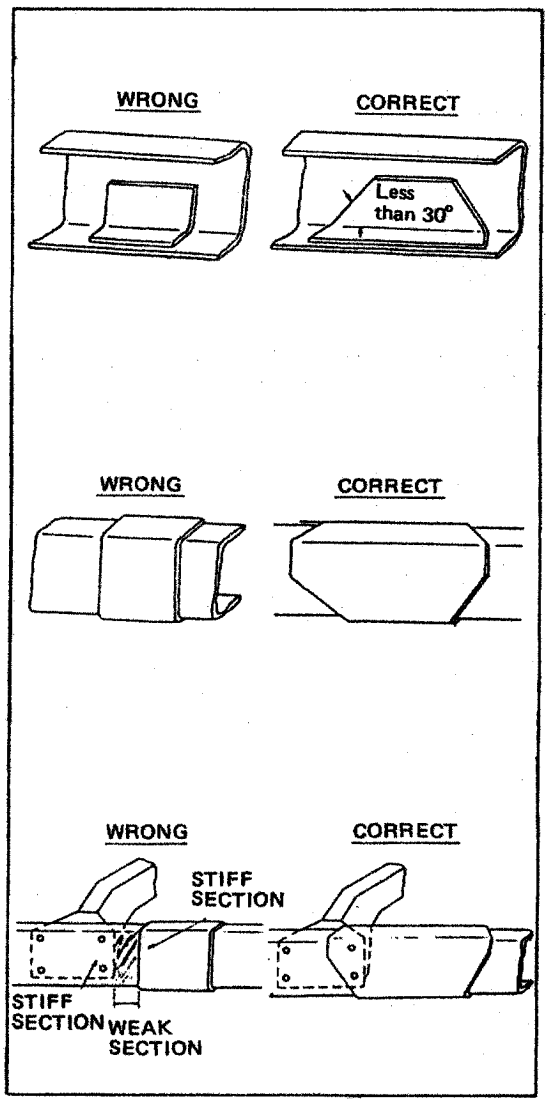
3. Apply electric welding.
Refer to page CF-6 for welding current

WARNING

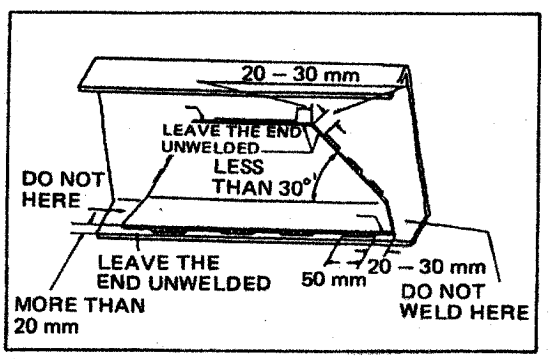
- **Disconnect the negative battery ground cable before using electric welding equipment.**
- **While welding, make sure that there are no flammable materials such as oil, rags, etc. around. As welded parts becomes extremely hot and sparks are present, make sure that there are no items like harnesses, tubes, pipes, etc. which may be damaged.**
- **While are welding, ventilate or wear antitoxic mask for noxious gas.**
- **To prevent burns, electric shock and gas positioning during are welding, wear helmet, antitoxic mask, safety goggles, arm cocering, apron, leg covering, safety boots and gloves.**


SM18-019

4. Smooth both surface of the welded section and the face of the flange then reinforce the repaired section with a patch-plate of same thickness as frame.

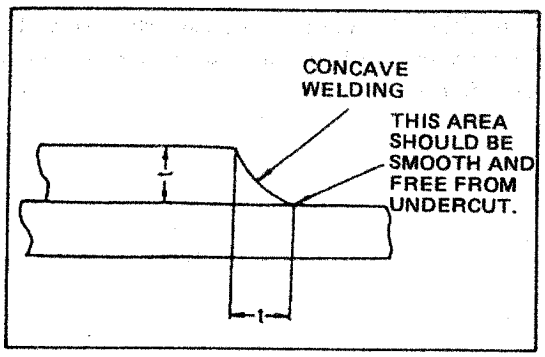


5. Reinforcement patching method.
Sudden sectional change at the end of the reinforcing material may became a cause of damage.



6. Welding method.

a. Weld the reinforcement patching according to left figure.



b. Shape of welding bead.

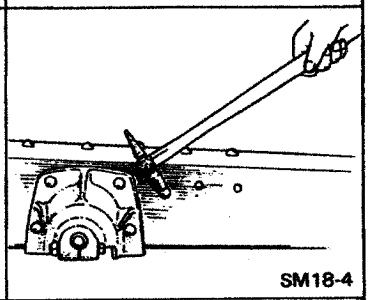
NOTE: An experienced professional should always perform the welding since a bad welding job on the frame may cause damage.

WELDING CURRENT

Mechanical property of weld metal & rod / Rod dia φ / Welding position	Welding current (A)					
	3.2 mm (0.126 in)		4 mm (0.157 in)		5 mm (0.197 in)	
	Flat	Vertical overhead	Flat	Vertical overhead	Flat	Vertical overhead
Weld Metal (Hot roll plate) Tensile strength; 45 kg/mm² (63,990 psi) Welding Rod (Tensile strength; 43 kg/mm²) Illuminated type Coated electrode	80 – 130	60 – 110	120 – 180	100 – 150	170 – 250	130 – 200
Weld Metal (Hot roll plate) Tensile strength; 55 kg/mm² (78,210 psi) Welding Rod (Tensile strength; 50 kg/mm²) Illuminated type Coated electrode	90 – 140	80 – 130	141 – 190	110 – 160	180 – 250	–

NOTE: • Diameter of welding rod φ 3.2 mm or φ 4mm – plate thinner than 5 mm (0.197 in)
• Diameter of welding rod φ 4 mm or φ 5 mm – plate thicker than 6 mm (0.24 in)

INSPECTION AND REPAIR

Inspection Item	Standard	Limit	Remedy	Inspection Procedure
Looseness of the Rivet	—	—	Replace the rivet, if necessary. (Refer to page CF-3 for replace the rivet.)	 SM18-4
Cracking of the Frame	—	—	Repair the frame (Refer to page CF-4 for repair the cracks.)	—

EE-106E-01

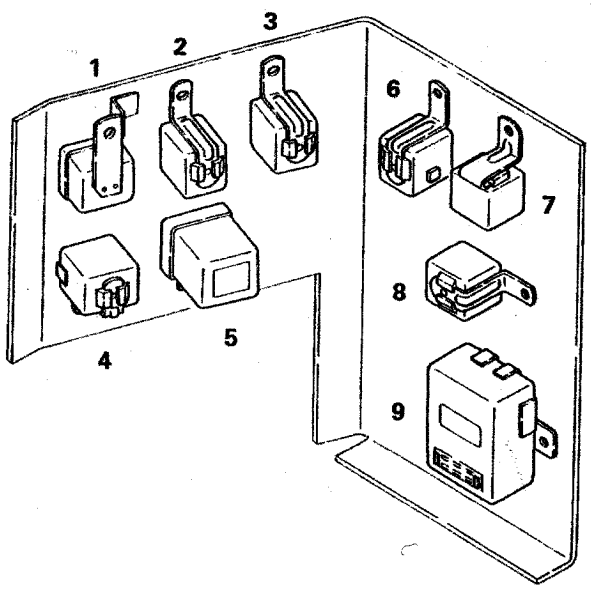
CHAPTER EE

ELECTRICAL EQUIPMENT

DATA AND SPECIFICATIONS

Electrical system	
Voltage	DC24V
Ground	Negative ground
Head lamp (Inner)	55W x 2
(Outer)	50/65W x 2
Front combination lamp	
Direction signal	25W x 2
	5W x 2
Clearance and parking	5W x 2
Rear combination lamp	
Tail and stop	25/10W x 2
Direction signal	25W x 2
Licence plate lamp	12W x 2
Back-up lamp	25W x 2
Fog lamp	35W x 2
Dome lamp	10W

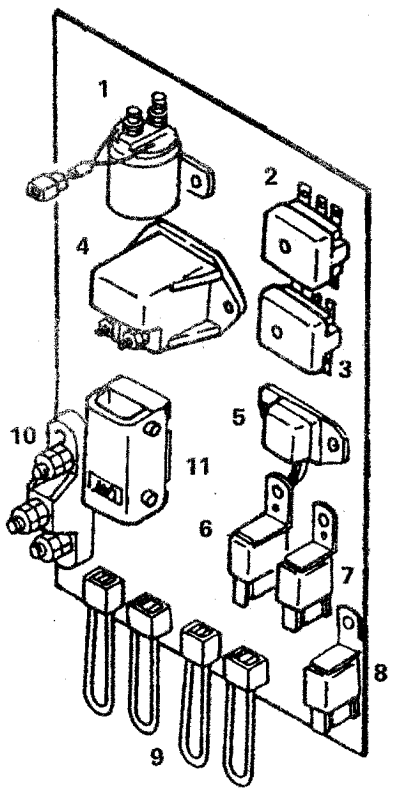
DESCRIPTION



SMEE-911

LOCATION OF THE RELAYS

1. Stop lamp relay
2. Tail lamp relay
3. Head lamp relay
4. Flusher unit
5. Intermittent relay
6. Power relay
7. Head/fog switch relay
8. Over heat lamp relay
9. Warm up control relay



ENGINE ROOM ELECTRIC BOX

1. Pre-heat power relay
2. Fuse
3. Fuse
4. Stater safety relay
5. Charge lamp relay
6. Radiator fan relay
7. Radiator fan relay
8. Main relay
9. Fusible link
10. Janction block
11. Fuse

SMEE-911

TROUBLESHOOTING

Symptom	Possible cause	Remedy/Prevention
STARTING SYSTEM		
Engine does not crank.	**Key switch**	
	• Poor contact condition	Polish or replace contacts
	Battery	
	• Discharged battery	Apply charger
	• Short circuited between electrodes	Replace battery
	• Poor contact condition of battery terminal	Polish or retighten
	Engine oil	
	• Improper viscosity oil	Change oil
	Starter relay	
	• Defective or poor contact of starter relay	Repair or replace
	Starter	
	• Starter does not operate	Repair or replace Refer to **CHAPTER "STARTER".**
Starter does not stop running.	**Key switch**	
	• Contacts keep closing	Replace
	• Key switch sticks	Replace
	Starter	
	• Overrunning clutch sticks to armature	Repair or replace overrunning clutch or armature
	Starter relay	
	• Contacts keep closing	Repair or replace

Symptom	Possible cause	Remedy/Prevention
SPEEDOMETER		
The numberals of the trip counter are not aligned.	Resetting is not done properly	Carefully press the trip counter knob in all the way

NOTE: If the trip counter is not reset properly, an error in totaling may occur after driving for a while, make sure resetting is done properly.

The needle of the speedometer oscillates irregularly. Oscillation is wide at low speeds and becomes narrow as speed increases.	Meter cable bending radius is under 150 mm (5.906 in)	Widen the meter cable bending radius to over 150 mm (5.906 in)
	Meter cable is not connected to the speedometer firmly	Connected firmly

NOTE: Irregular noises and needle oscillation are usually caused by poor wiring of the meter cable. Therefore, inspect the wiring of the meter cable.

Speed indicator indicates (+).	Irregular wear or specifications of the installed tires and their air pressure are not met	Replace or inflate to correct air pressure
A clicking sound is heard as the speed of the vehicle increases.	Rubber bushing is not in the meter cable at the meter	Install rubber bushing

TACHOMETER

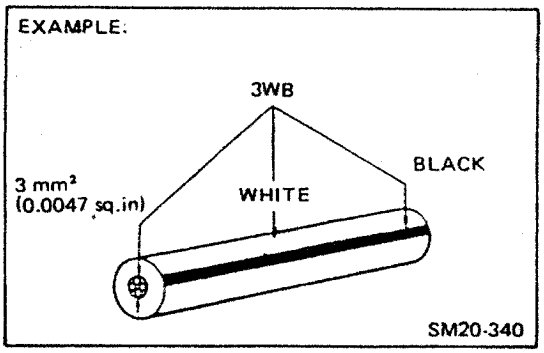
Does not move, needle vibrates, display is incorrect.	Fuse or fusible link burnt out (When no movement)	Determine cause and replace fuse or fusible link
	Connector for the tachometer is loose or rusted	Polish or retighten
	Connector for the sensor is loose or rusted	Polish or retighten
	No continuity between the terminals of the sensor.	Replace sensor

GENERAL INSTRUC

WARNING

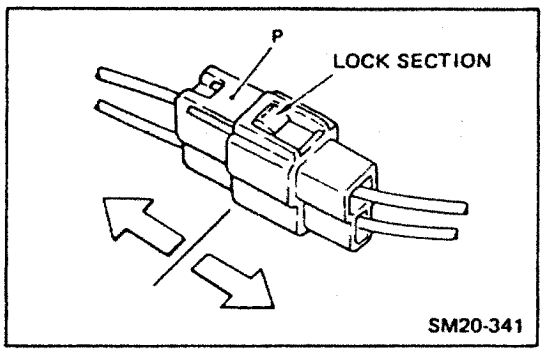
Be sure to disconnect the cable from the negative (–) terminal of the battery before servicing the electrical circuits except for on-vehicle testing.

NOTE: If you use a high-pressure washer, do not direct the washer hose to the electrical parts.



Wiring color

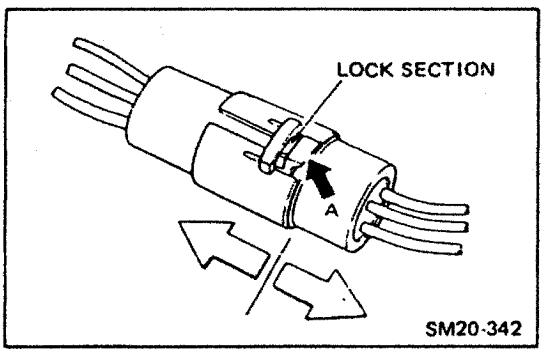
1) Symbol of color
   B – Black G – Green L – Blue
   W – White Y – Yellow R – Red
   Br – Brown
   Lg – Light green
2) Symbols consisting of two letters
   The first letter – Ground color
   The second letter – Marking color
3) Example
   WB . . . Indicate a Black marking on a White ground.



DISCONNECTING CONNECTORS

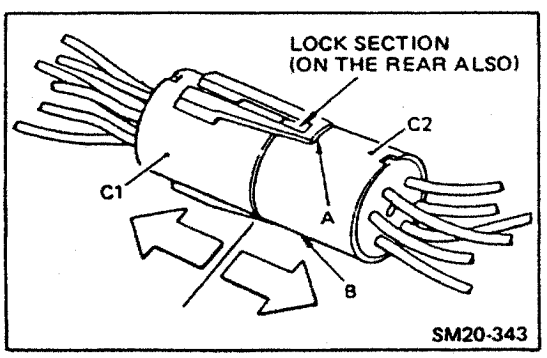
1. Hold the connectors, one in each hand, press section P with your thumb, and pull them apart.

NOTE: Do not pull on the harness.



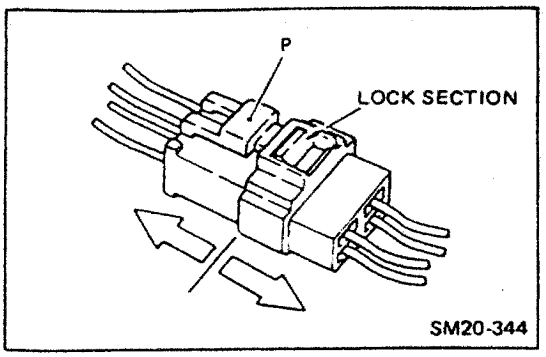
2. Hold the connectors, one in each hand, raise notch A with your thmb, and pull them apart.

NOTE: Do not pull on the harness.



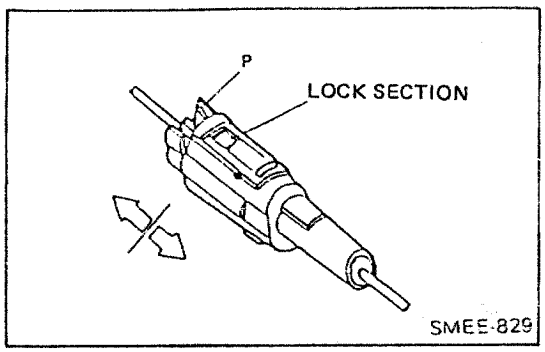
3. Hold connector C1 in one hand and C2 in the other. Raise notches A and B with the thumb and finger of one hand, then pull the connectors apart.

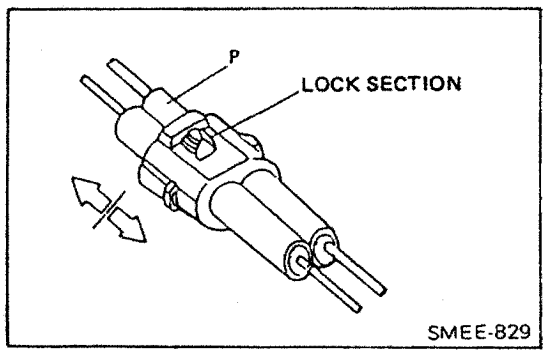
NOTE: Do not pull on the harness.

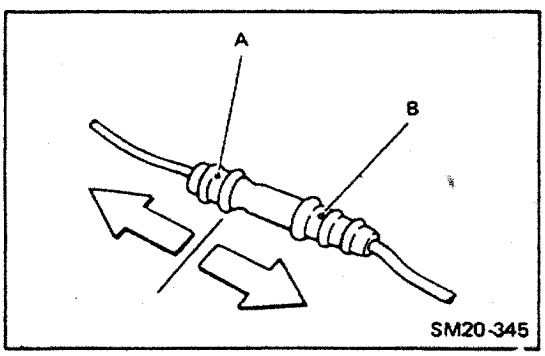


4. Hold the connector, one in each hand, press section P with your thumb, and pull the connectors apart.

NOTE: Do not pull on the harness.

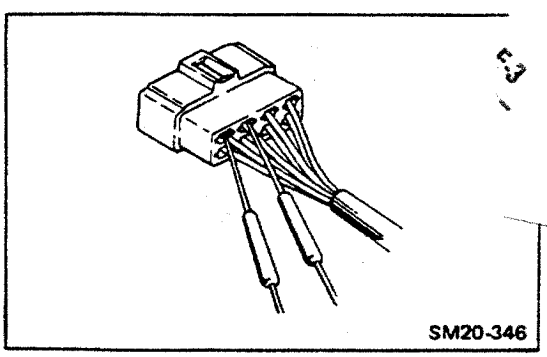




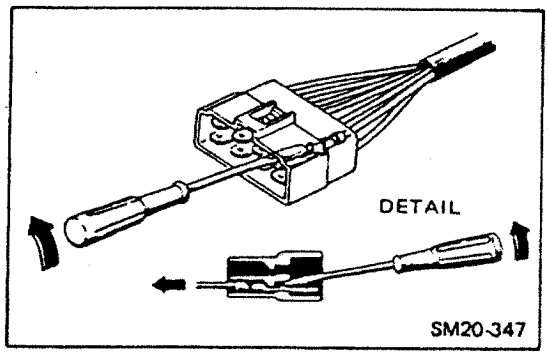


5. Hold A and B, one in each hand, and pull them apart.

NOTE: Do not pull on the harness.



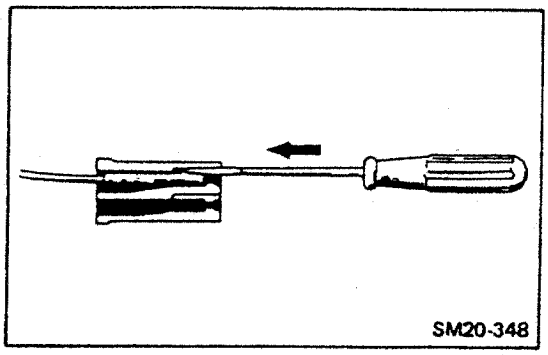
When testing the continuity or voltage with a circuit tester, insertion of the test lead into the receptacle connector may open the fitting to the connector and result in poor contact. Therefore, ensure that the test lead is inserted only from the female harness side as shown.



REPLACING THE TERMINALS

1. Remove the terminal.

a. Type A
Insert a miniature screwdriver from the open end and flatten the locking lugs then pull the terminal out from the rear.



b. Type B
Insert a miniature screwdriver from open end and flatten the locking lugs then pull the terminal out from the rear.

2. Install the terminal.
Push the terminal into the connector.

NOTE: Make sure that the locking lugs engages with the connector body securely.

ELECTRIC GROUNDING

1. General notifications
   - ○ All contact area of ground connections should be free of any contaminant such as rust, oil or dirt.
   - ○ Be sure to remove contaminants, if any, before connecting the ground wire.

NOTE: In connecting a grounding cable, be sure not to fail to include the specified toothed washer (see floowings), which enables a secure electrical connection.

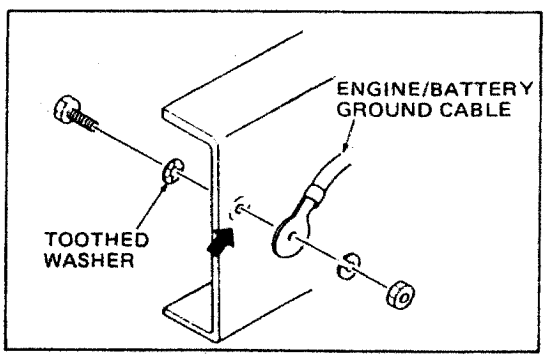
- ○ Be sure to tighten each bolt/nut to the specified torque.

Unit: kg·cm (lb.ft)

Bolt diameter	Tightening torque
12 mm (0.472 in)	650 – 870 (48 – 62)
10 mm (0.394 in)	380 – 500 (28 – 36)
8 mm (0.315 in)	190 – 260 (14 – 18)

- ○ Be sure to repaint to finish the ground connection.

NOTE: In addition to the above, the following instructions for the specified groundings should be observed.



2. Engine/Battery grounding

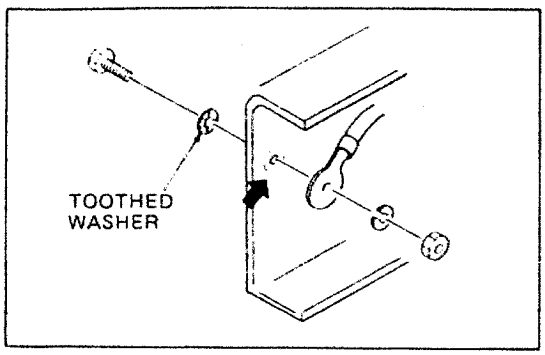
When connecting a single engine/battery ground:

1) Remove the paint in the area (A) where the engine/battery ground cable contacts the frame member.

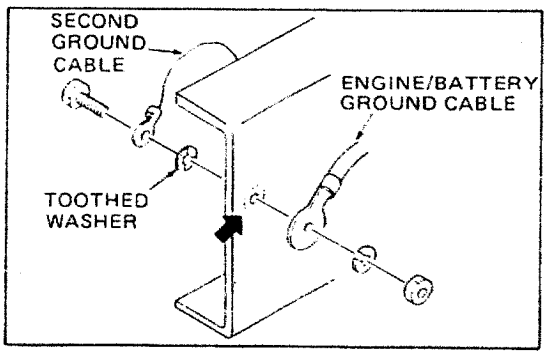
A: Equal to or more than 20 mm (0.787 in) in diameter.

2) Pasition the parts in the order shown.

1 with ground cable outside chassis frame.



2 with ground cable inside chassis frame.

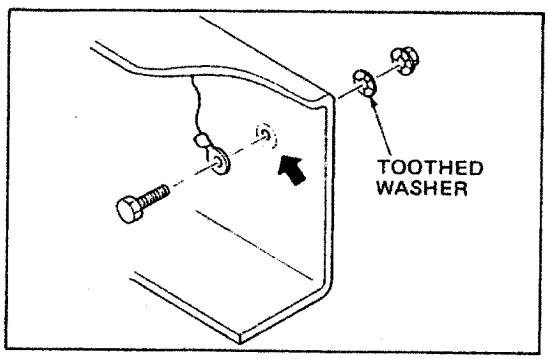


When another ground line is connected along with engine/battery ground.

1) Remove the paint in the manner described above

A: Equal to or more than 20 mm (0.787 in) in diameter.

2) Position the parts as shown.



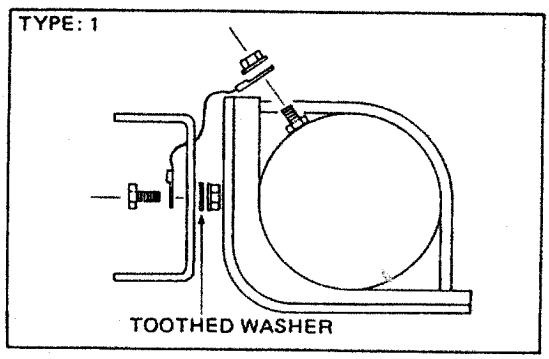
3. Cab ground

1) Remove the paint in the area (B) where the cab ground cable contacts the frame member.

B: Equal to or more than 15 mm (0.590 in) in diameter.

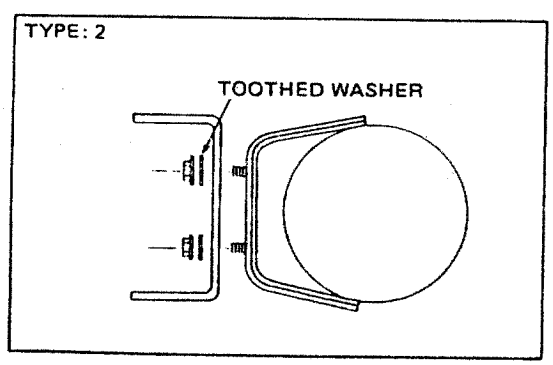
2) Position the parts in the order shown.

NOTE: **If the ground cable comes outside the chassis frame, position the parts in reverse order.**

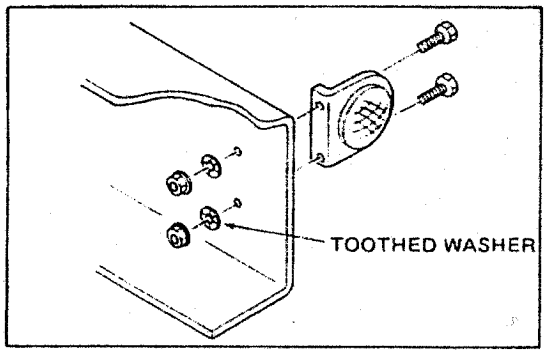


4. Air/Vacuum tank

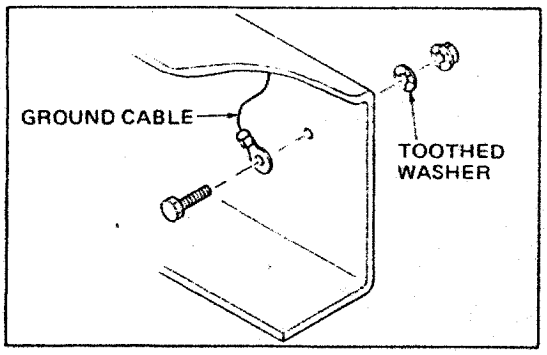
TYPE 1.
Grounding by means of ground cable.
Connect ground cable inside the chassis frame using toothed washers.



TYPE 2.
Grounding without ground cable.
Mount the tank, with tank bracket welded on it, using a toothed washer.

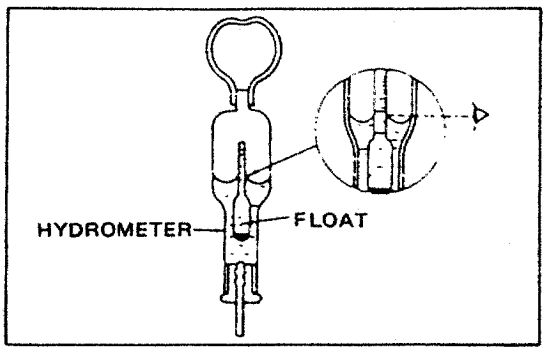


5. Cable-less grounding such as back-up lamp
Mount the electrical equipment (lamp, etc.) using toothed washer(s).



6. Other groundings with ground cable
Connect ground cable to the chassis frame using toothed washer.

BATTERY



Measure the specific-gravity of electrolyte.

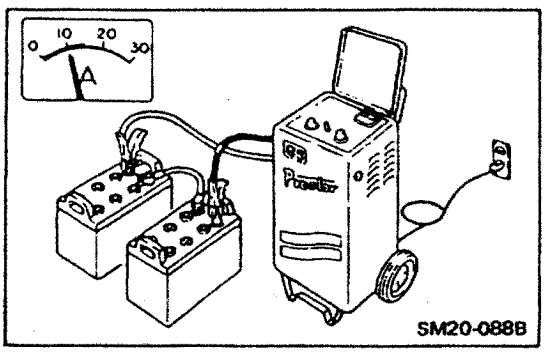
NOTE: **Specific-gravity of electrolyte varies by temperature. It can be converted into the value that at the reference temperature (20° C) using the following formula:**

$S_{20} = St + 0.0007\ (t - 20)$

Where, S_{20}: Equivalent specific-gravity at reference temperature (20° C)

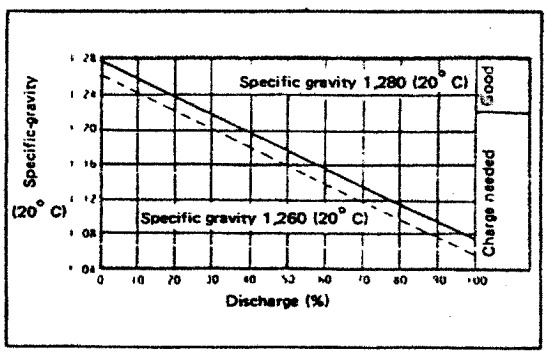
St: Measured specific-gravity

t : Temperature of electrolyte when measured



Setting of charging current

The charging current must be the regular charging current specified by the battery manufacturer or approximately 1/10 of the battery capacity.



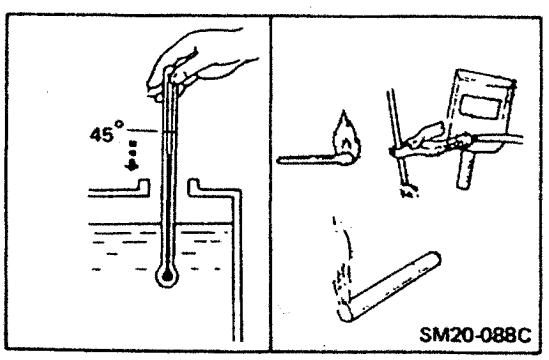
Setting of charging time

$$T = \frac{B \times C}{A} \times (1.2 \text{ to } 1.5)$$

T : Charging time (h)
A : Charging current (A)
B : Battery capacity (Ah)
C : Discharge condition (%)

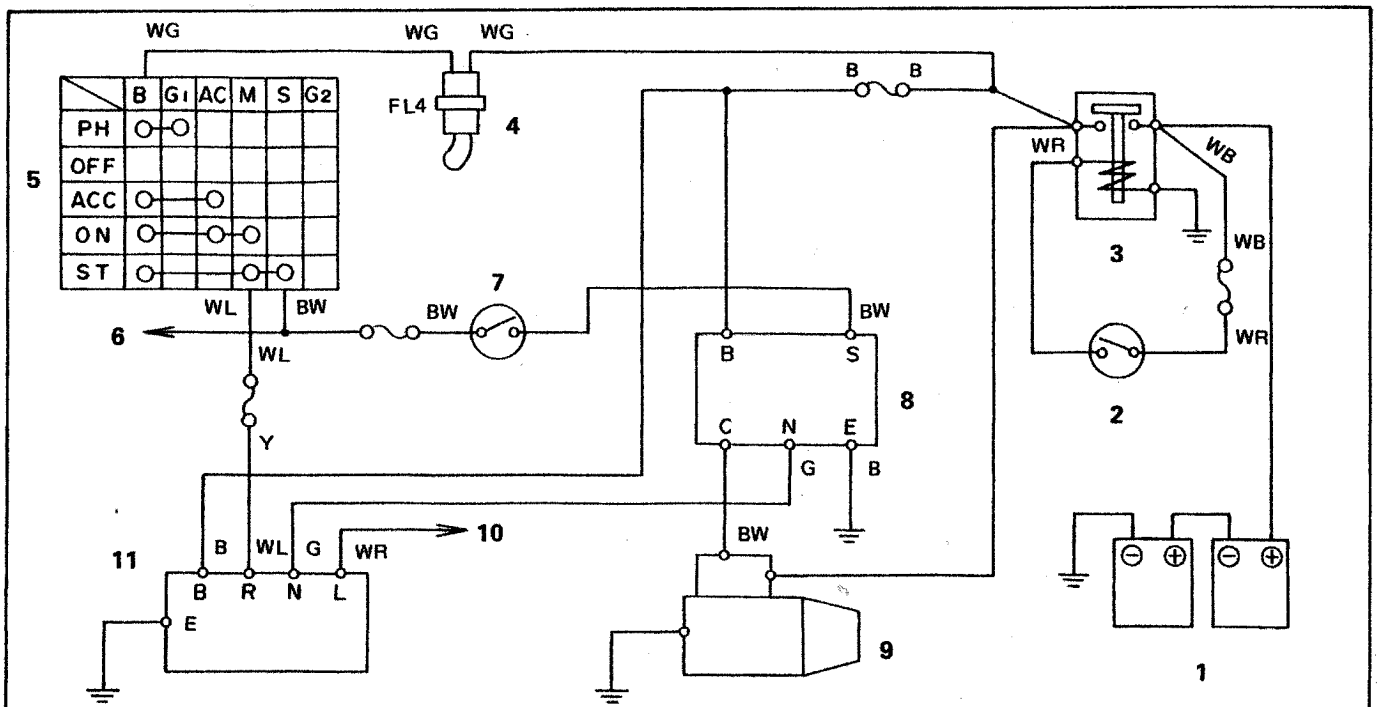
When specific gravity of electrolyte is not measureable with hydrometer.

T = 12 to 15 T : Charging time (h)



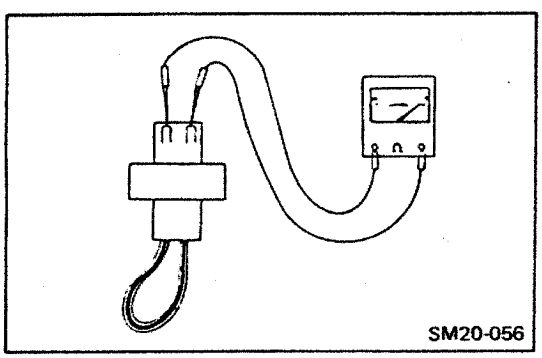
NOTE: **Stop the charging when the electrolyte temperature becoming higher than 45°C.**
Naked fire kept out when charging the battery.

STARTING CIRCUIT



SMEE-912

1. Battery
2. Battery switch
3. Battery relay
4. Fusible link
5. Starter switch
6. To pre-heat timer
7. Safety switch
8. Safety relay
9. Starter motor
10. To charge lamp and charge lamp relay
11. Alternator



SM20-056

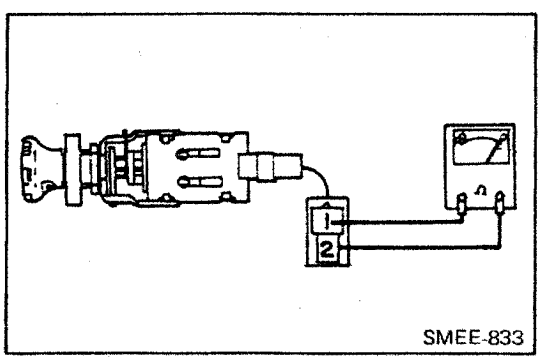
INSPECTION

CHECK THE FUSIBLE LINK

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

If not continuity, replace the fusible link.

NOTE: When fusible link is blown out, the relay also may become malfunctioning due to this current. Check the operation of the relay also.

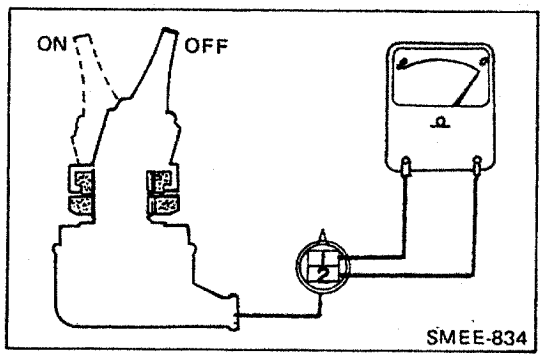


SMEE-833

CHECK THE OPERATION OF THE BATTERY SWITCH.

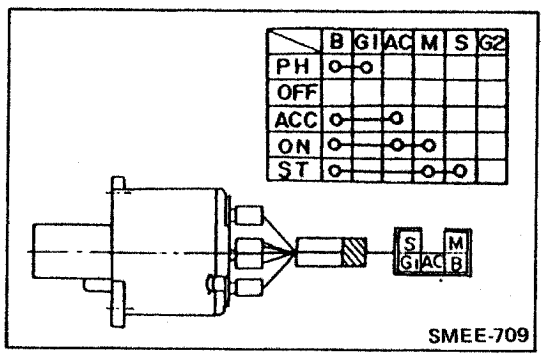
Using an ohmmeter, check the continuity of the terminals 1 and 2 with on position.

If there is no continuity, replace it.



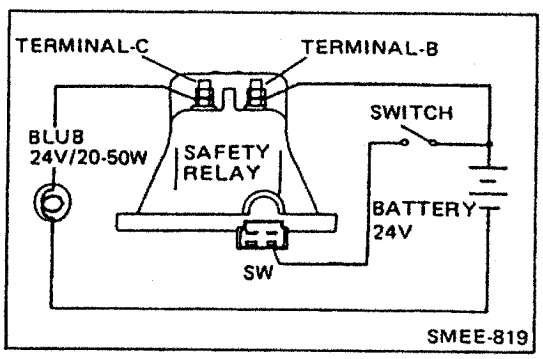
CHECK THE OPERATION OF THE STARTER SAFETY SWITCH.

Using an ohmmeter, check the continuity of the terminals 1 and 2 with on position.
If there is no continuity, replace it.



CHECK THE OPERATION OF THE STARTER SWITCH.

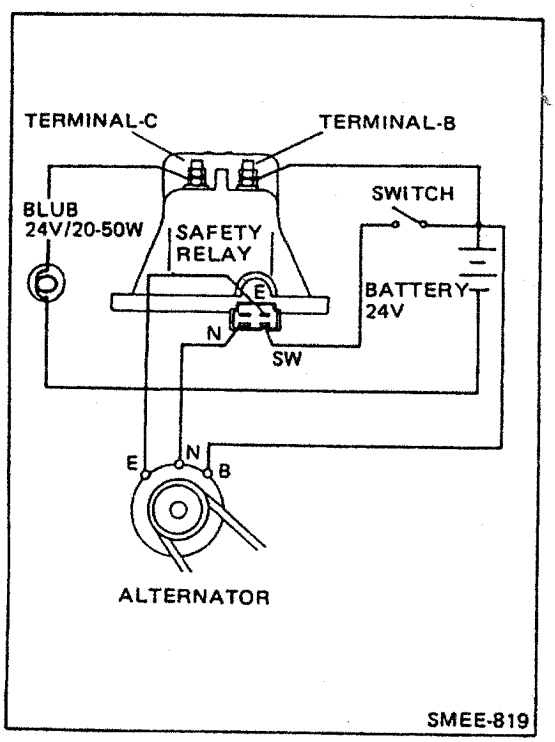
Using an ohmmeter check the continuity of the terminals with each switch position.
If there is no continuity between the switch terminals, replace the switch.



CHECK THE OPERATION OF THE SAFETY RELAY.

1. Starter relay
   Switch OFF Lamp not lights
   Switch ON Lamp lights

NOTE: As semiconductors are installed, (+) and (−) must be connected correctry.
Complete operation confirmation within 2 minutes.
Use 24V/20-50W

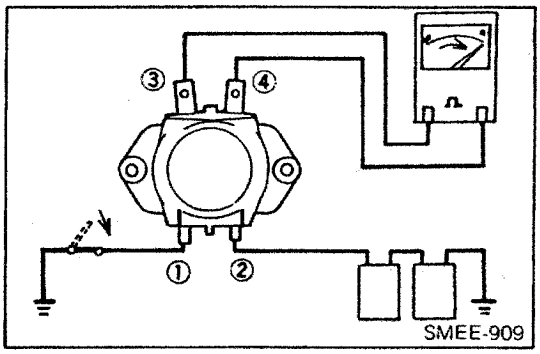


2. Starter safety device (separation revolution)
   1) Switch ON. (Lamp lights)
   2) Gradually increase the alternator revolution.
   3) Confirm the lamp goes out revolution.

Lamp goes out alternator revolution	1,000 – 1,200 rpm

3. Starter safety device (holding revolution)
   1) Switch ON (Lamp lights)
   2) Increase the alternator revolution to about 1,500 rpm (Lamp goes out)
   3) Gradually decrease the alternator revolution.
   4) Comfirm the lamp lights revolution.

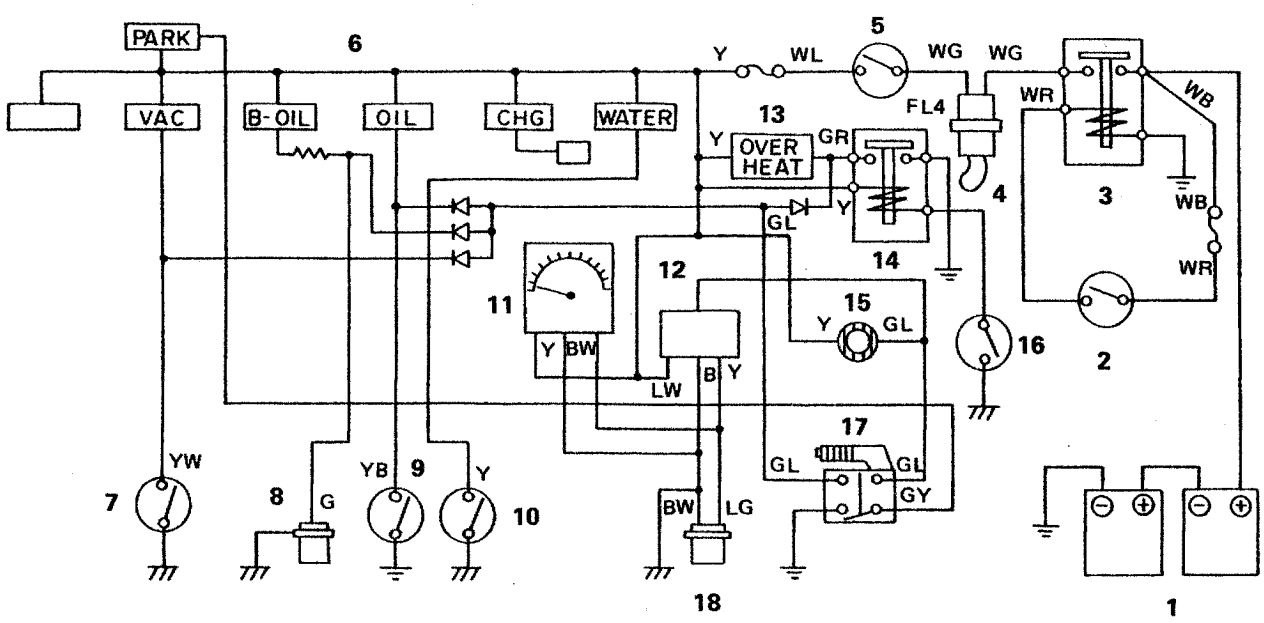
Lamp lights revolution	Less than 200 rpm



CHECK THE OPERATION OF THE BATTERY RELAY.

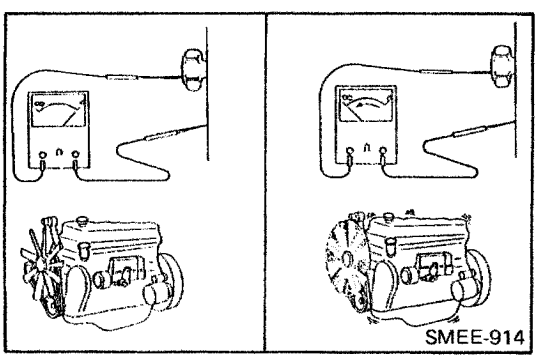
1. Remove the relay.
2. Using an ohmmeter, check that there is no continuity between terminals ③ and ④.
3. Apply 24V D.C. across terminals ① and ②.
   Using an ohmmeter, check that there is continuity between terminals ③ and ④.
   If the relay does not operate, replace it.

WARNING CIRCUIT



SMEE-913

1. Battery
2. Battery switch
3. Battery relay
4. Fusible link
5. Starter switch
6. Warning lamps
7. Vacuum warning switch
8. Brake fluid level warning switch
9. Engine oil pressure warning switch
10. Coolant level warning switch
11. Tachometer
12. Over run relay
13. Over heat warning lamp
14. Over heat warning lamp relay
15. Over run warning buzzer
16. Over heat warning switch
17. Parking lever switch
18. Tachometer sensor



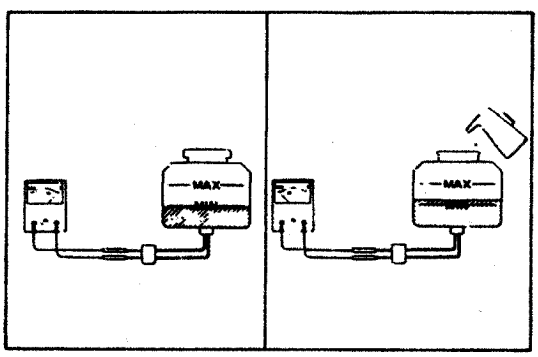
SMEE-914

INSPECTION

ENGINE OIL PRESSURE WARNING

Check the operation of the oil pressure warning switch.

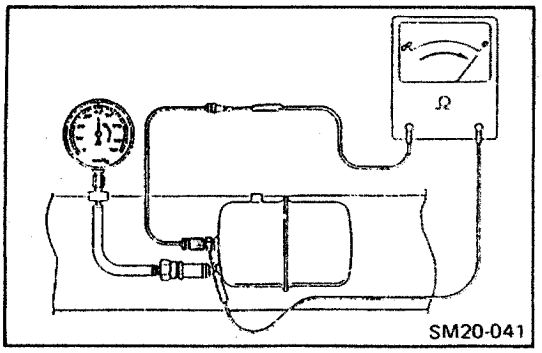
1. Disconnect the connector.
2. Using an ohmmeter, check the continuity between the terminal and ground with the engine stopped (0 ohm) and with the engine running (infinity).
   If not correct, replace the oil pressure warning switch.



BRAKE FLUID LEVEL WARNING

Check the operation of the brake fluid level warning switch.

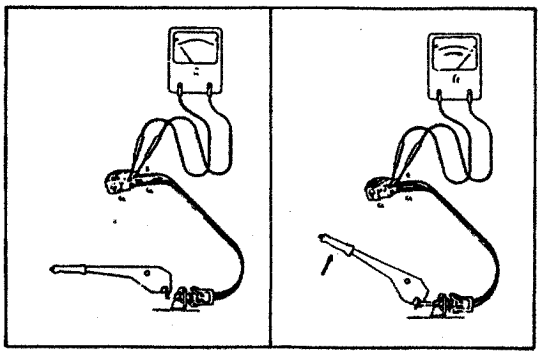
1. Disconnect the connector.
2. Using an ohmmeter, check the continuity between the terminals, with the float up (infinity) and with the float down, (0 ohm).
   If not correct, replace the reservoir assy.



VACUUM WARNING SWITCH

Check the operation of the vacuum warning switch.

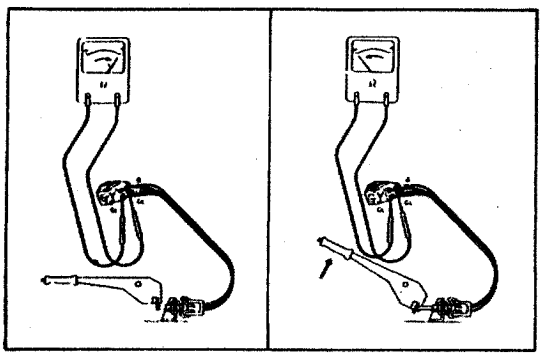
1. Disconnect the connector.
2. Using an ohmmeter, test the continuity between the terminal and ground with vacuum pressure over 400 mm Hg (infinity) and with vacuum pressure under 400 mm Hg (0 ohm).
   If not correct, replace the switch.



PARKING BRAKE WARNING

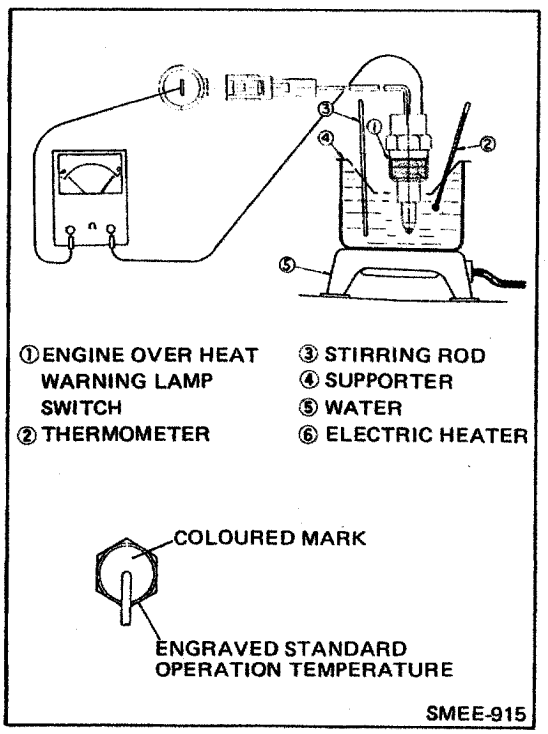
Check the operation of the parking brake switch.

1. Disconnect the connector.
2. Using an ohmmeter, check that there is no continuity between terminals color (B) and (GY).
3. Apply the parking lever and using an ohmmeter, check that there is continuity between terminals color (B) and (GY).
   Not correct, replace the switch.



Check the operation of the buzzer switch.

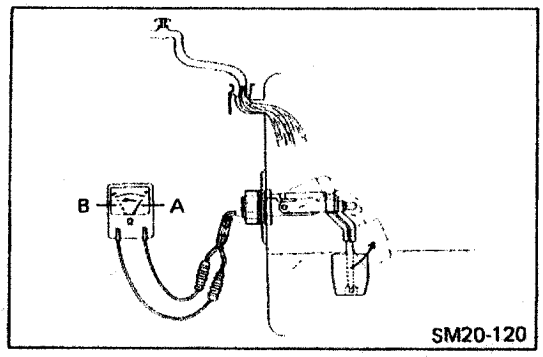
1. Disconnect the connector.
2. Using an ohmmeter, check that there is continuity between terminals color (GL) and (GL).
3. Apply the parking brake and using an ohmmeter, check that there is no continuity between terminals color (GL) and (GL).
   If readings are not correct, replace the switch.

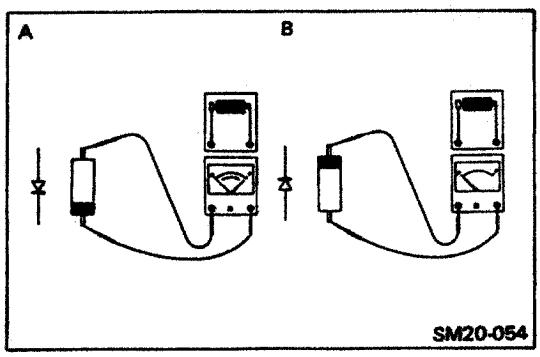


CHECK THE OPERATION OF THE OVER HEAT WARNING SWITCH.

Using an ohmmeter, check the continuity between terminals at the indicated water temperatures.
If resistance is not within specifications, replace the switch.

Coloured mark	Switch ON	Switch OFF
Green	105 – 111°C or higher	101°C or lower





COOLANT LEVEL WARNING

Check the operation of the coolant level warning switch.

1. Remove the coolant level warning switch.
2. Using an ohmmeter, measure the resistance of the switch when the switch is in the "ON (Empty)" and when the switch is in the "OFF (Full the water)".
   If resistance is not correct, replace the switch.

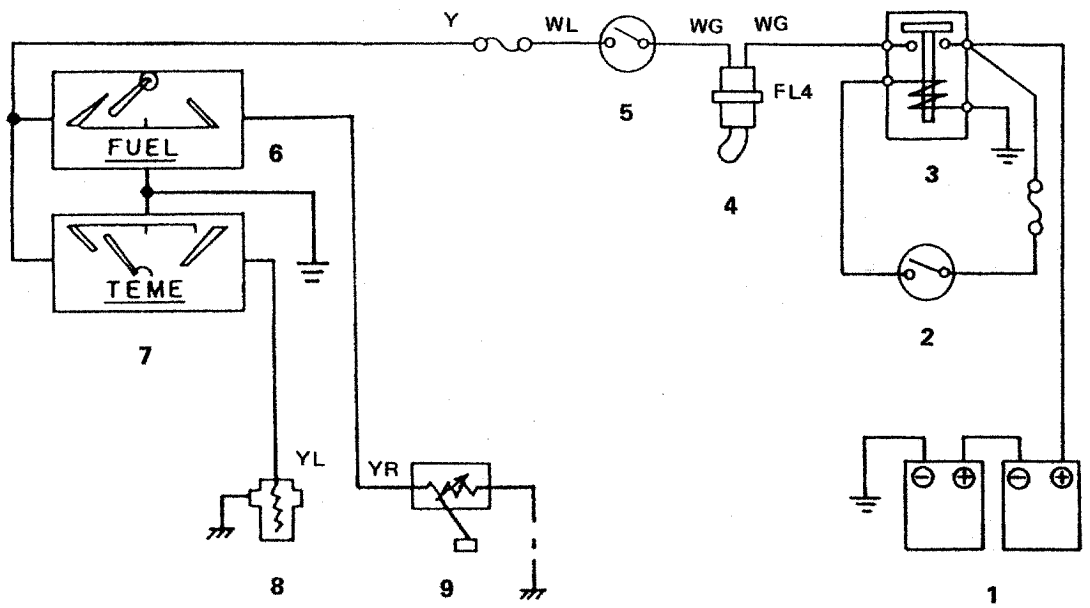
Water tank condition		Switch	Tester
A	Empty	ON	0
B	Full the water	OFF	∞

DIODE

Check the operation of the diode with an ohmmeter.

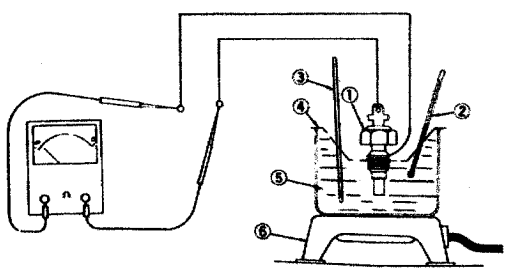
1. Set the resistance range to 1 k ohm.
2. Touch the red and black tester leads and adjust to 0 ohm.
3. When the black lead is placed on the anode and the red lead on the cathode of the diode to be tested, if the tester pointer stops before reaching 0, the diode is satisfactory.
4. On the contrary, when the red lead is placed on the anode and the black lead on the cathode, if the tester pointer does not move, the diode is satisfactory.

GAUGE CIRCUIT



SMEE-916

1. Battery
2. Battery switch
3. Battery relay
4. Fusible link
5. Starter switch
6. Fuel gauge
7. Coolant temperature gauge
8. Coolant temperature sender gauge
9. Fuel sender gauge



① COOLANT TEMPERATURE GAUGE
② THERMOMETER
③ STIRRING ROD
④ SUPPORTER
⑤ WATER
⑥ ELECTRIC HEATER

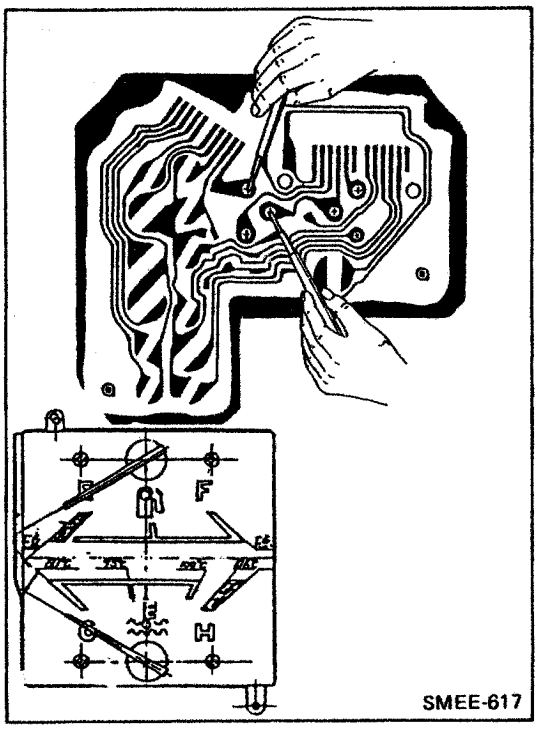
SM20-042

INSPECTION

CHECK THE OPERATION OF THE COOLANT TEMPERATURE GAUGE UNIT.

Using an ohmmeter, measure the resistance between the terminal and ground at the indicated coolant temperatures.
If resistance is not within specifications, replace the gauge unit.

Temperature	Resistance
75 ± 2.5°C (167 ± 4.5°F)	87.2 Ω
100 ± 3°C (212 ± 5.4°F)	38.0 Ω

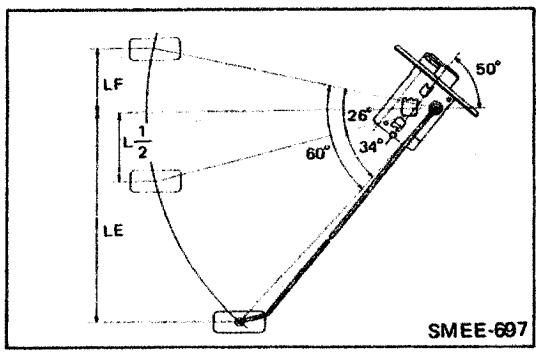


FUEL AND TEMPERATURE GAUGE

Using an ohmmeter, measure the resistance between each terminal of the gauge.
If resistance is not within specifications, replace the gauge.

Terminal		⊕IGN⊖G·E	FU ⊖ G·E	⊕ IGN F·U
Resistance	Fuel	400 ± 42Ω	128 ± 13Ω	273 ± 29Ω

Terminal		⊕IGN⊖G·E	TU⊖ G·E	⊕IGN T·U
Resistance	Temperautre	300 ± 32Ω	90 ± 9Ω	218 ± 23Ω



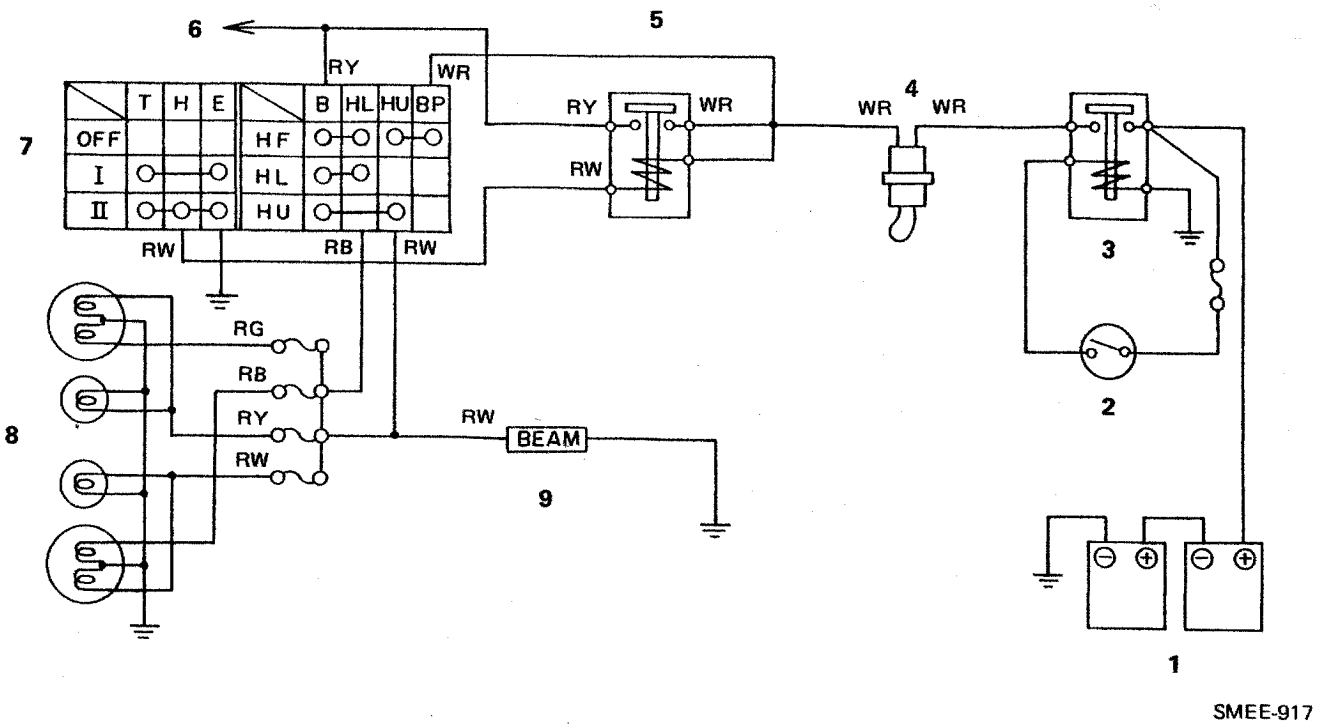
CHECK THE OPERATION OF THE FUEL GAUGE UNIT.

Using an ohmmeter, measure the resistance between the terminal and gauge unit body at the indicated positions.
The terminal and gauge unit body at the indicated float positions.

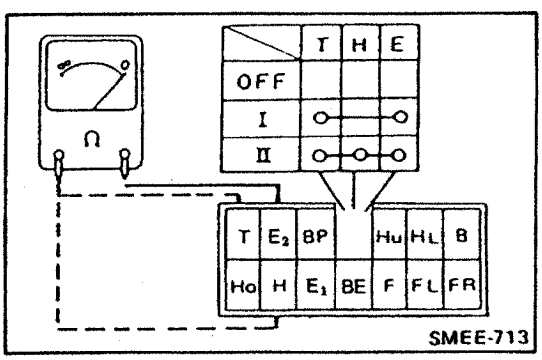
Unit: mm (in)

Float position	E	1/2	F
Resistance (Ω)	150 ± 15	31 ± 3.1	$0\ ^{+2}_{-0}$
Length	LE: 269.6 (10.60)	L 1/2 : 222.5 (8.76)	LF: 47.1 (1.85)

HEAD LAMPS CIRCUIT



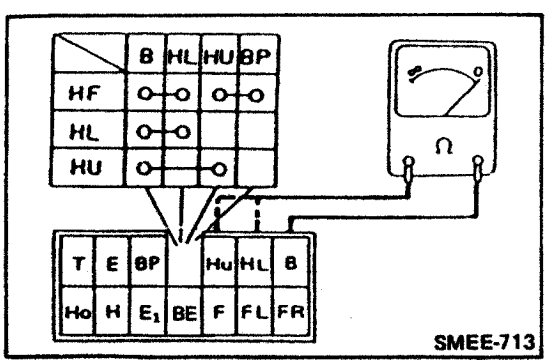
1. Battery
2. Battery switch
3. Battery relay
4. Fusible link
5. Head lamp relay
6. To head fog switch relay
7. Combination switch
8. Head lamp
9. High beam indicator



INSPECTION

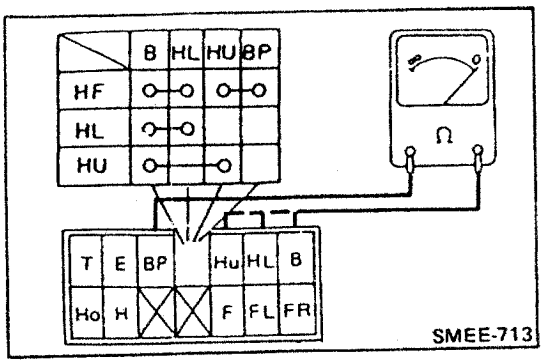
CHECK THE OPERATION OF THE LIGHTING SWITCH.

Using an ohmmeter, check the continuity between the terminals with the switch to lighting position.
If not correct, replace the lighting switch.

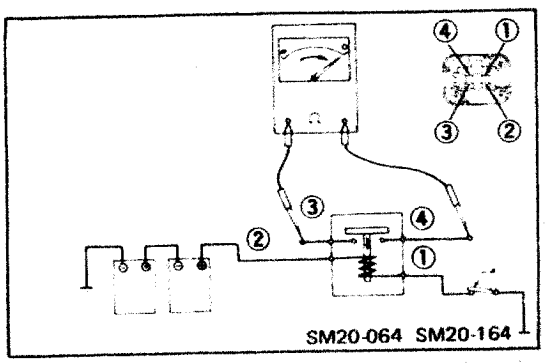


CHECK THE OPERATION OF THE DIMMER SWITCH.

1. Low beam (HL)
   Using an ohmmeter check the continuity between terminal with the switch to low beam position.
   At this time, ohmmeter is indicated 0 ohm.
   If not correct, replace the dimmer switch.
2. High beam (HU)
   Using an ohmmeter check the continuity between terminal with the switch to high beam position.
   At this time, ohmmeter is indicated 0 ohm.
   If not correct, replace the dimmer switch.

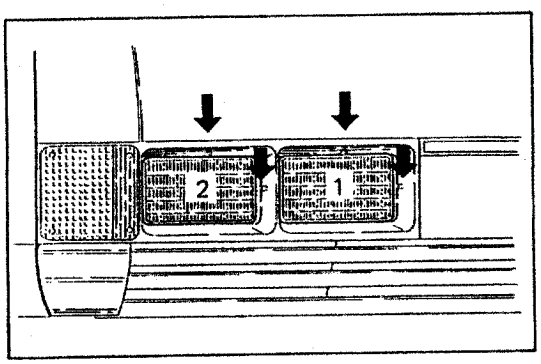


3. Passing
Using an ohmmeter, check that there is continuity between terminals HU and BP, B and HL with the switch to passing position.
At this time, ohmmeter should be indicated 0 ohm.
If not correct, replace the switch.



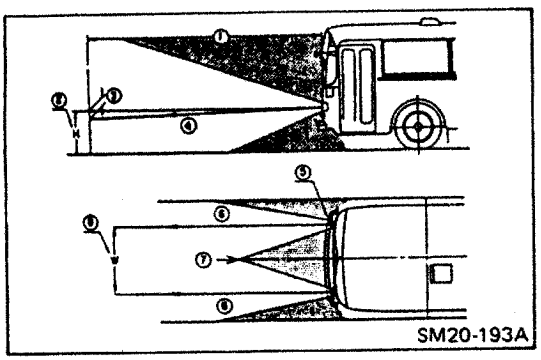
CHECK THE OPERATION OF THE HEADLAMP RELAY.
(Main and dimmer)

1. Remove the relay.
2. Using an ohmmeter, check that there is no continuity between terminals ③ and ④ .
3. Apply 24V D.C. across terminals ① and ② .
Using an ohmmeter, check that there is continuity between terminals ③ and ④ .
If the relay does not operate, replace it.



ADJUSTMENT OF THE HEADLAMPS.

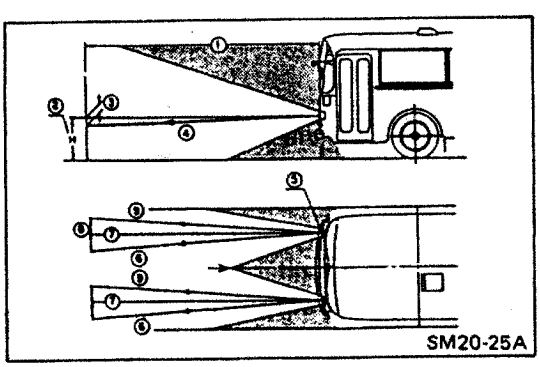
1. Inner headlamps.
2. Outer headlamps.



INNER HEADLAMPS

1 Mask the outer headlamps.
2 Switch the headlamps to high beam.
3 Turn the adjusting screw and adjust the direction of the beam.

① 10 m (393.7 in)
② Lamp mounting height: H
③ $\frac{H}{10}$ cm
④ Main beam
⑤ Inner headlamp
⑥ Main beam
⑦ Center line of vehicle
⑧ Center distance of inner headlamp

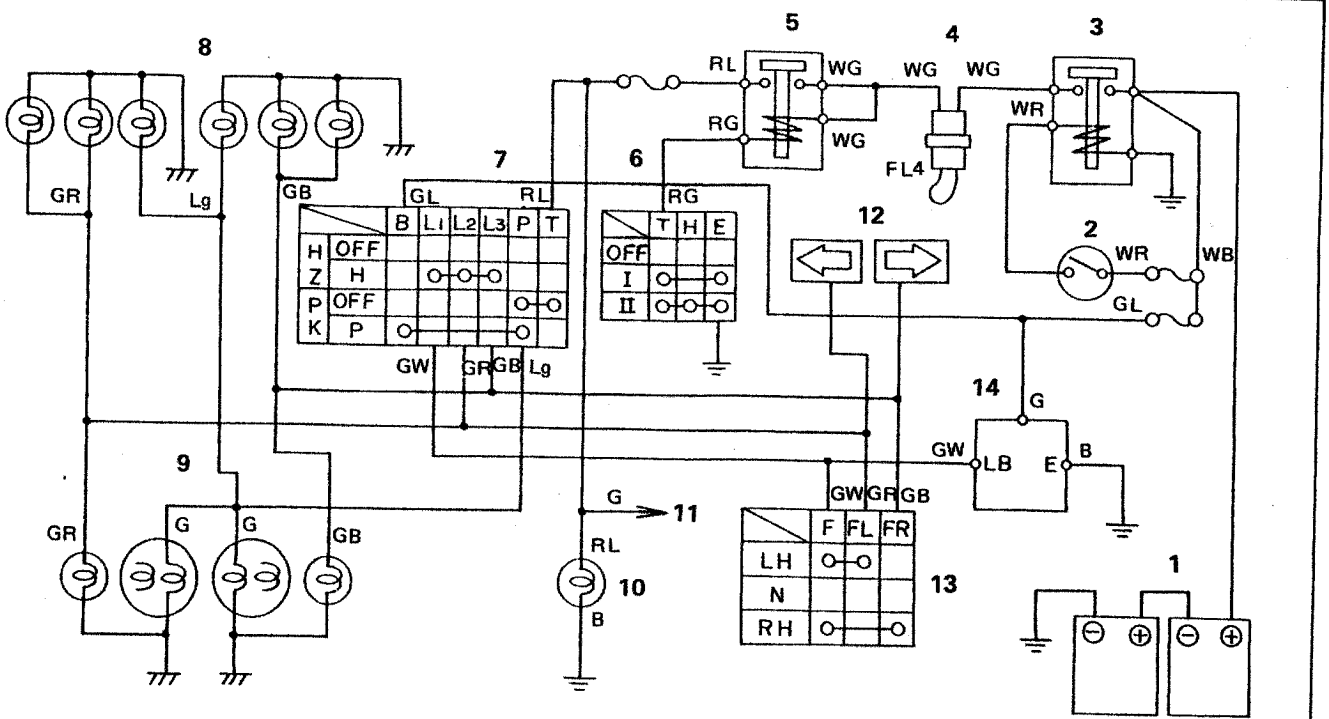


OUTER HEADLAMPS.

1 Switch the headlamps to low beam.
2 Turn the adjusting screw and adjust the direction of the beam.

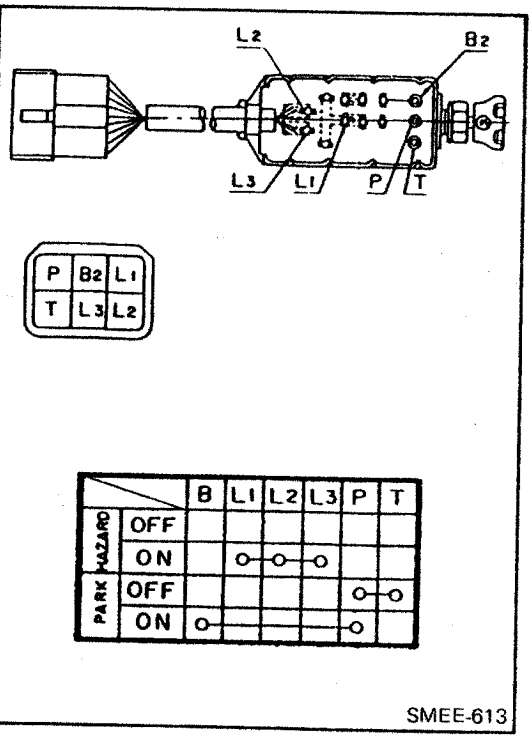
① 10 mm (393.7 in)
② Lamp mounting height: H
③ $\frac{H}{4}$ cm
④ Main beam
⑤ Outer headlamp
⑥ Center line of outer headlamp
⑦ Main beam
⑧ 30 – 35 cm (11.81 – 17.78 in)

HAZARD, PARK, TAIL AND DIRECTION SIGNAL LAMP CIRCUIT



SMEE-918

1. Battery
2. Battery switch
3. Battery relay
4. Fusible link
5. Tail lamp relay
6. Lighting switch
7. Hazard parking switch
8. Front combination lamp
9. Rear combination lamp
10. Licence lamp
11. To back buzzer
12. Direction signal indicator
13. Direction signal switch
14. Flasher unit

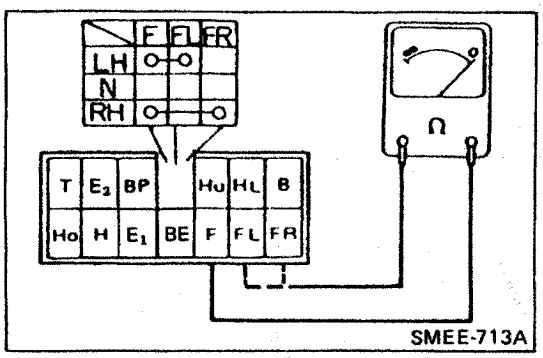


SMEE-613

INSPECTION

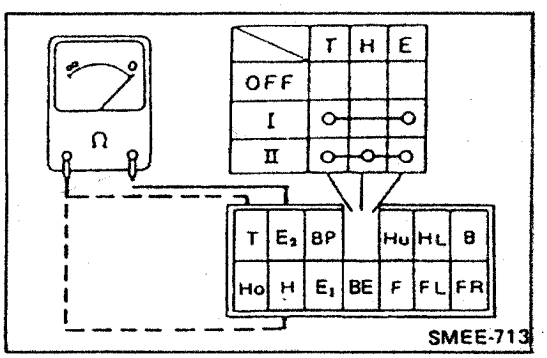
CHECK THE OPERATION OF THE HAZARD AND PARK SWITCH.

1. OFF POSITION
   Using an ohmmeter, check the continuity between terminals with P–T.
2. HAZARD POSITION
   Using an ohmmeter, check the continuity between terminals with L_1–L_2 and L_2–L_3.
3. PARK POSITION
   Using an ohmmeter, check the continuity between terminals with B–P.
   If not correct, replace the switch.



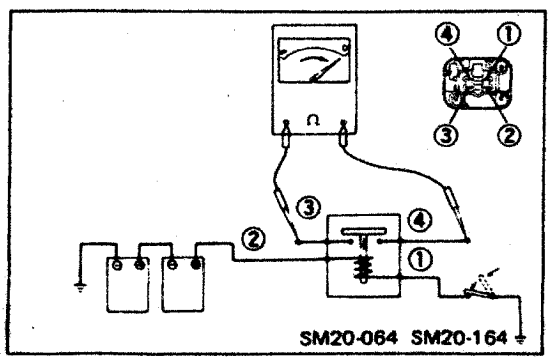
CHECK THE OPERATION OF THE DIRECTION SIGNAL SWITCH.

Using an ohmmeter, check the continuity between terminals F and FL (Direction signal switch to LEFT), F and FR (Direction signal switch to RIGHT).



CHECK THE OPERATION OF THE LIGHTING SWITCH.

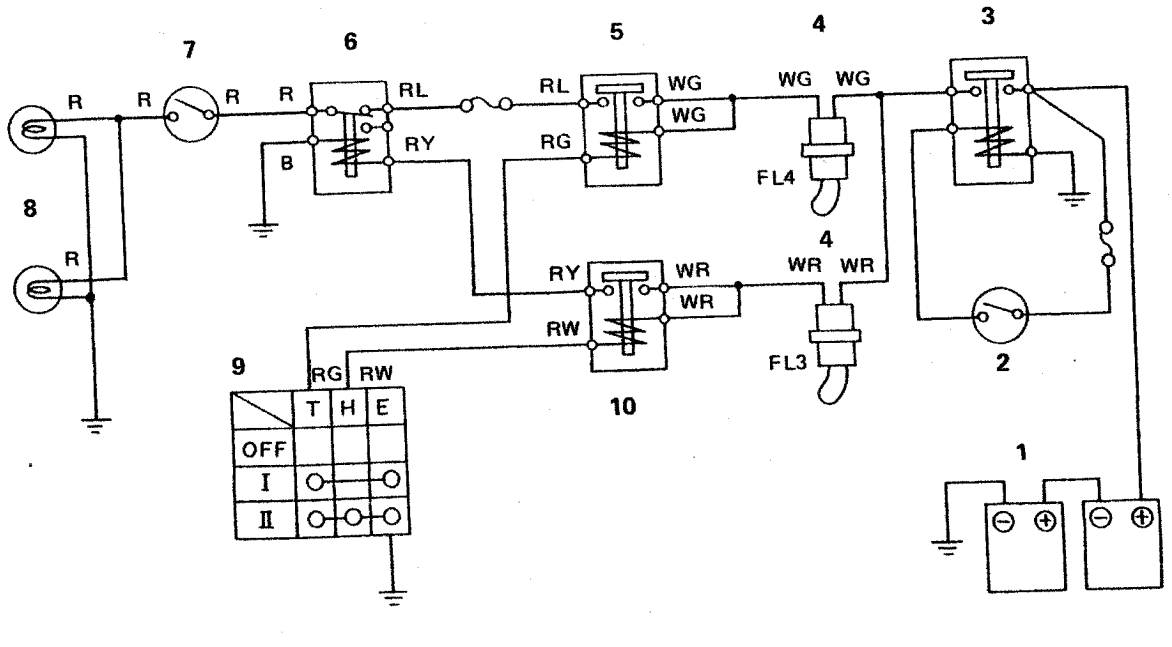
Using an ohmmeter, check the continuity between terminals with the switch to each position.
At this time, ohmmeter is indicated 0 ohm.
If not correct, replace the lighting switch.



CHECK THE OPERATION OF THE TAIL LAMP RELAY.

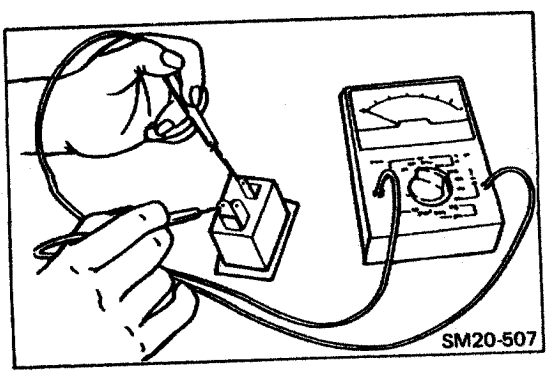
1. Remove the relay.
2. Using an ohmmeter, check that there is no continuity between terminals ③ and ④ .
3. Apply 24V D.C. across terminals ① and ② .
   Using an ohmmeter, check that there is continuity between terminals ③ and ④ .
   If the relay does not operate, replace it.

FOG LAMP CIRCUIT



SMEE-919

1. Battery
2. Battery switch
3. Battery relay
4. Fusible link
5. Tail lamp relay
6. Head fog switch relay
7. Fog lamp switch
8. Fog lamp
9. Lighting switch
10. Head lamp relay

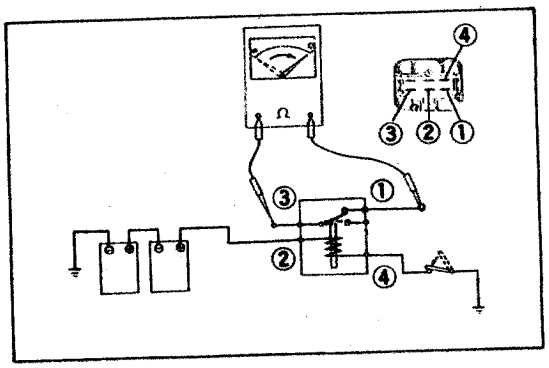


SM20-507

INSPECTION

CHECK THE OPERATION OF THE FOG LAMP SWITCH.

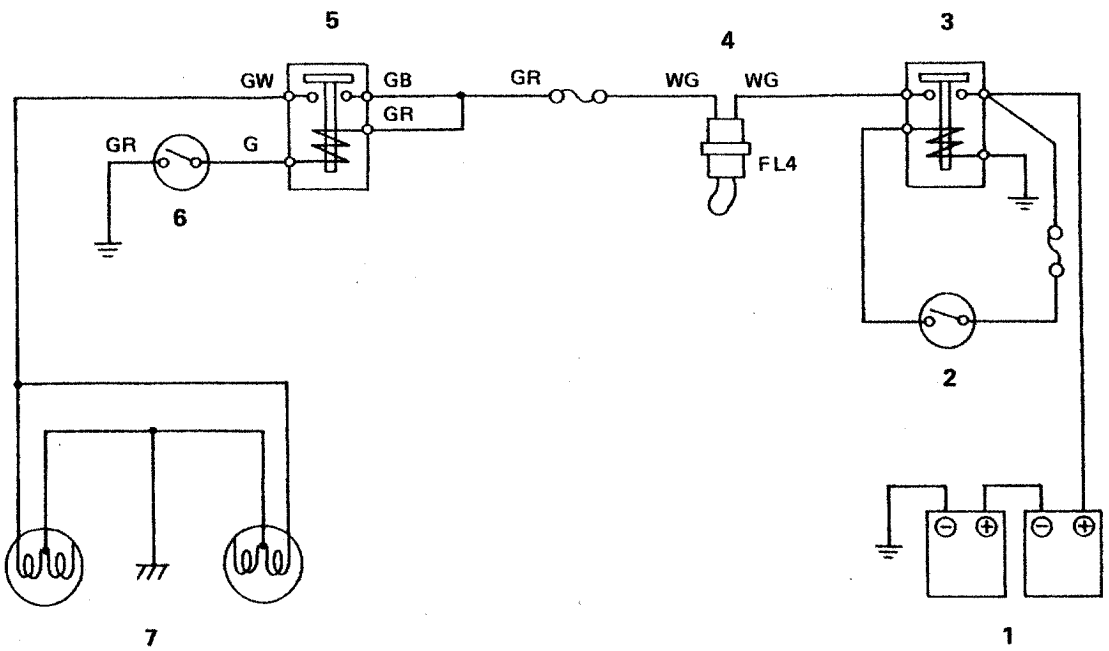
Using an ohmmeter, check the continuity between terminals with the switch to fog lamp position.
At this time, ohmmeter is indicated 0 ohm.
If not correct, replace the switch.



CHECK THE OPERATION OF THE HEAD, FOG, SWITCH RELAY.

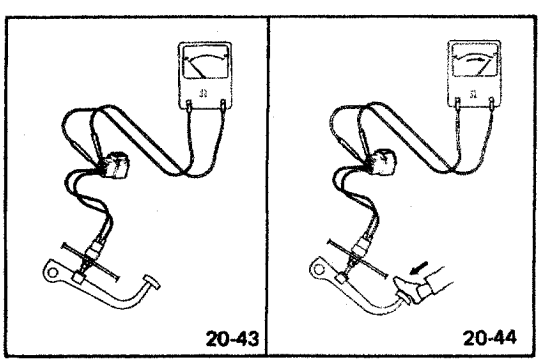
1. Remove the relay.
2. Using an ohmmeter, check that there is continuity between terminals ① and ③.
3. Apply 24V D.C. across terminals ② and ④.
   Using an ohmmeter, check that there is no continuity between terminals ① and ③.
   If the relay does not operate, replace it.

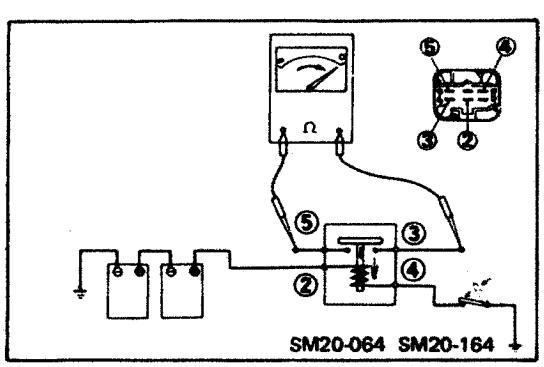
STOP LAMP CIRCUIT



SMEE-024

1. Battery
2. Battery switch
3. Battery relay
4. Fusible link
5. Stop lamp relay
6. Stop lamp switch
7. Rear combination lamp





INSPECTION

CHECK THE OPERATION OF THE STOP LAMP SWITCH.

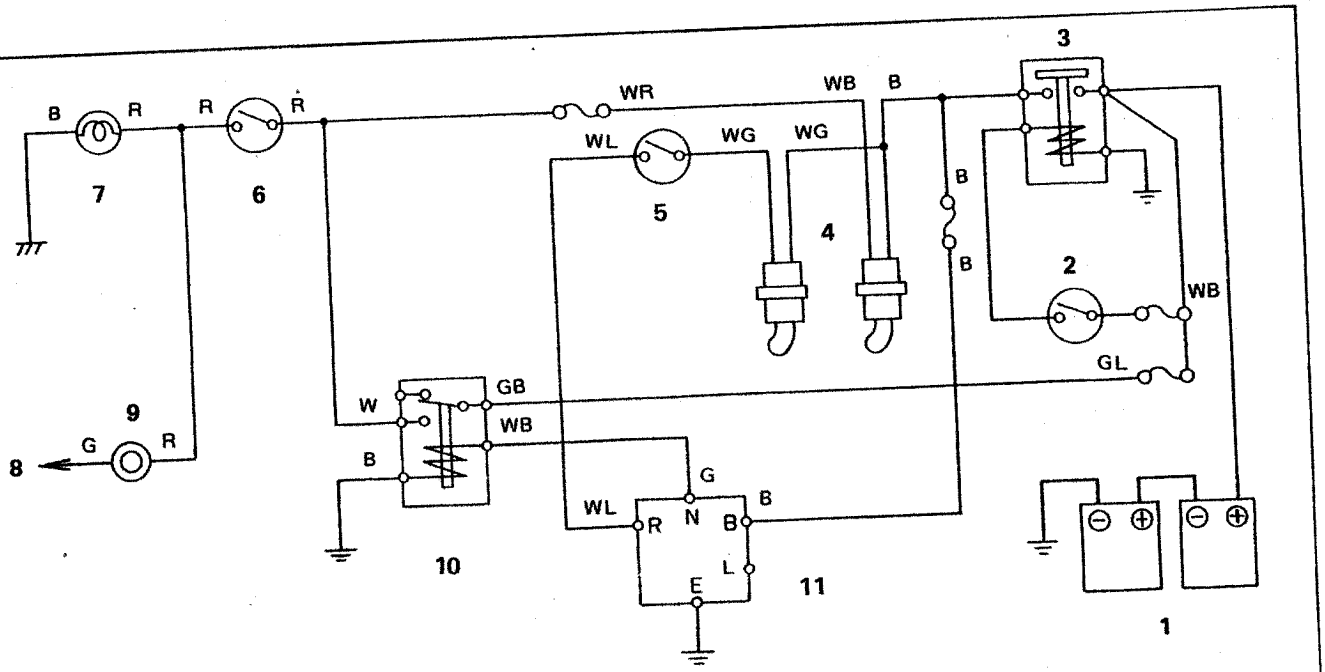
Using an ohmmeter, test the continuity between the terminals with brake pedal free (infinity) and with the brake pedal depressed (0 ohm).
If not correct, replace the switch.

NOTE: The stop lamp switch should be installed so that is automatically comes on when the brake pedal reaches 3 – 4 mm (0.118 – 0.157 in) depression.

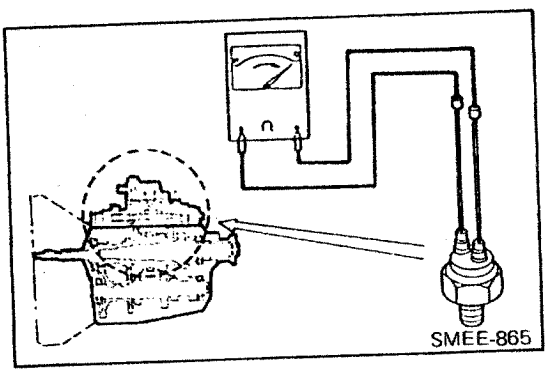
CHECK THE OPERATION OF THE STOP LAMP RELAY.

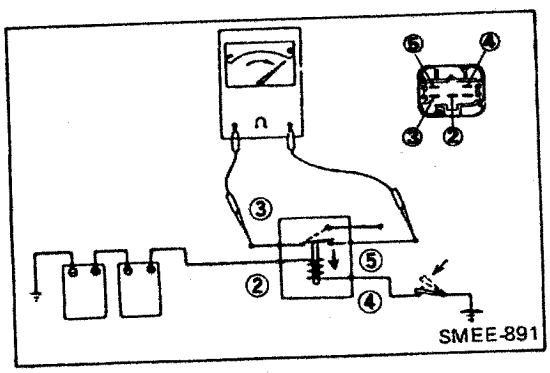
1. Remove the relay.
2. Using an ohmmeter, check that there is no continuity between terminals ③ and ⑤ .
3. Apply 24V D.C. across terminals ② and ④ .
   Using an ohmmeter, check that there is continuity between terminals ③ and ⑤ .
   If the relay does not operate, replace it.

BACK-UP LAMP CIRCUIT



1. Battery
2. Battery switch
3. Battery relay
4. Fusible link
5. Starter switch
6. Back lamp switch
7. Back lamp
8. To tail lamp
9. Back buzzer
10. Main relay
11. Alternator





INSPECTION

CHECK THE OPERATION OF THE BACK-UP LAMP SWITCH.

Using an ohmmeter, check the continuity between the terminals with the transmission control lever in "NEUTRAL" (infinity) and with the transmission control lever in "REVERSE" (0 ohm).

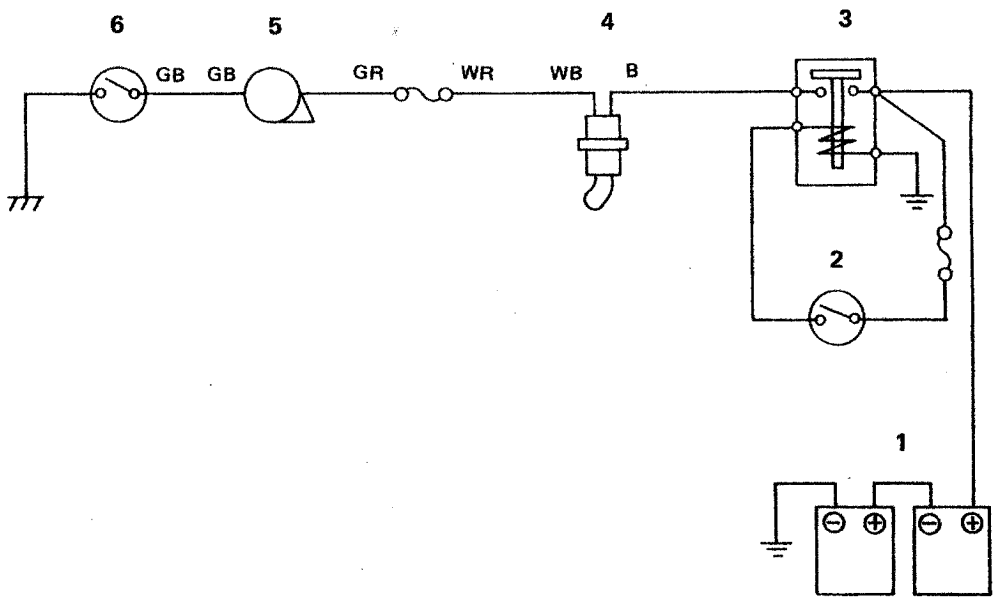
If not correct, replace the switch.

CHECK THE OPERATION OF THE MAIN RELAY.

1. Remove the relay.
2. Using an ohmmeter, check that there is no continuity between terminals ③ and ⑤ .
3. Apply 24V D.C. across terminals ② and ④ .
   Using an ohmmeter, check that there is continuity between terminals ③ and ⑤ .

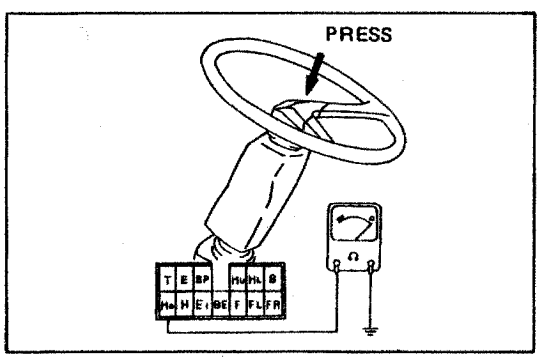
If the relay does not operate, replace it.

HORN CIRCUIT



SMEE-921

1. Battery
2. Battery switch
3. Battery relay
4. Fusible link
5. Horn
6. Horn switch

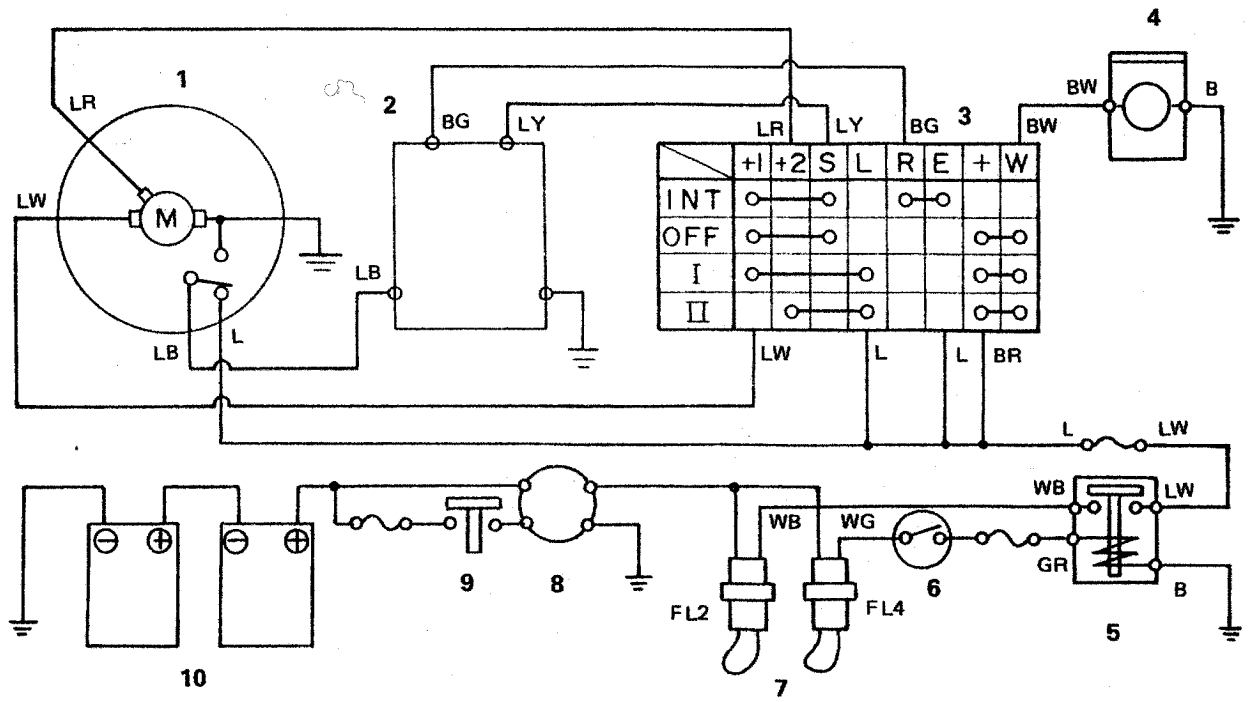


INSPECTION

CHECK THE OPERATION OF THE HORN SWITCH.

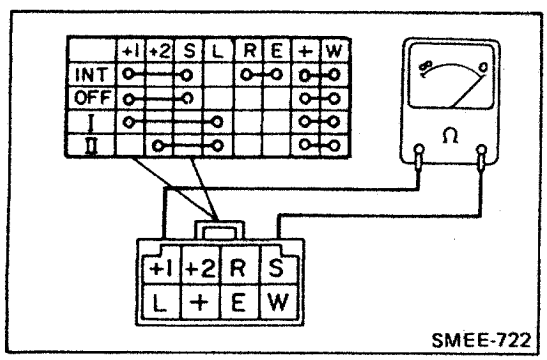
Using an ohmmeter, checkthe contnuity between terminal and body earth with the switch button press position.
At this time, ohmmeter is indicated 0 ohm.
If not correct, repair the horn switch.

WIPER CIRCUIT



SMEE-922

1. Wiper motor
2. Intermittent relay
3. Wiper switch
4. Washer
5. Power relay
6. Starter switch
7. Fusible link
8. Battery relay
9. Battery switch
10. Battery

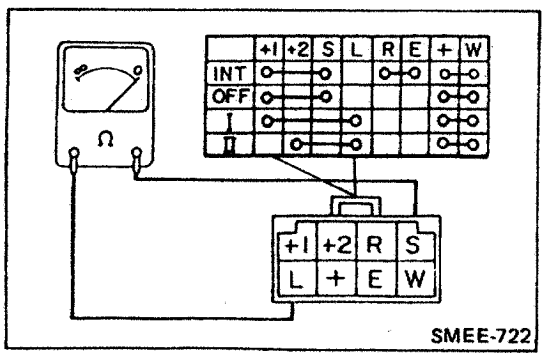


SMEE-722

INSPECTION

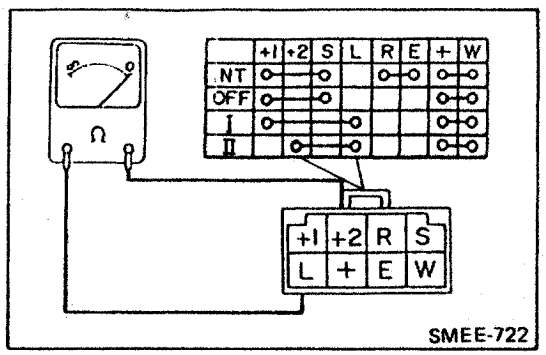
CHECK THE OPERATION OF THE WIPER SWITCH.

1. OFF position
   Using an ohmmeter, check the continuity between terminals with +1—S.
   If not correct, replace the switch.

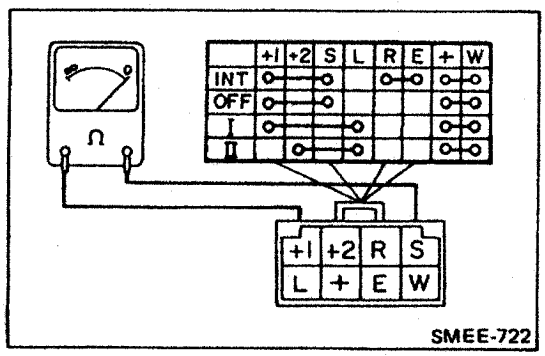


SMEE-722

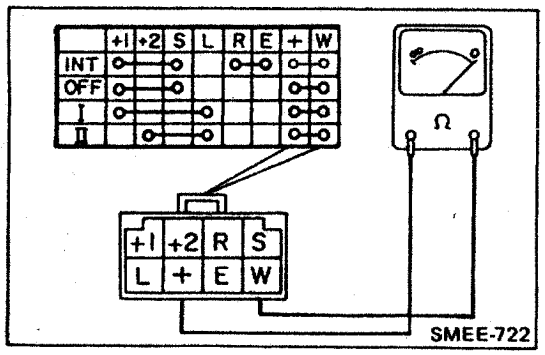
2. LO position (I)
   Using an ohmmeter, check the continuity between terminals with +1—L.
   If not correct, replace the switch.



3. HI position (II)
Using an ohmmeter, check the continuity between terminals with +2—L.
If not correct, replace the switch.



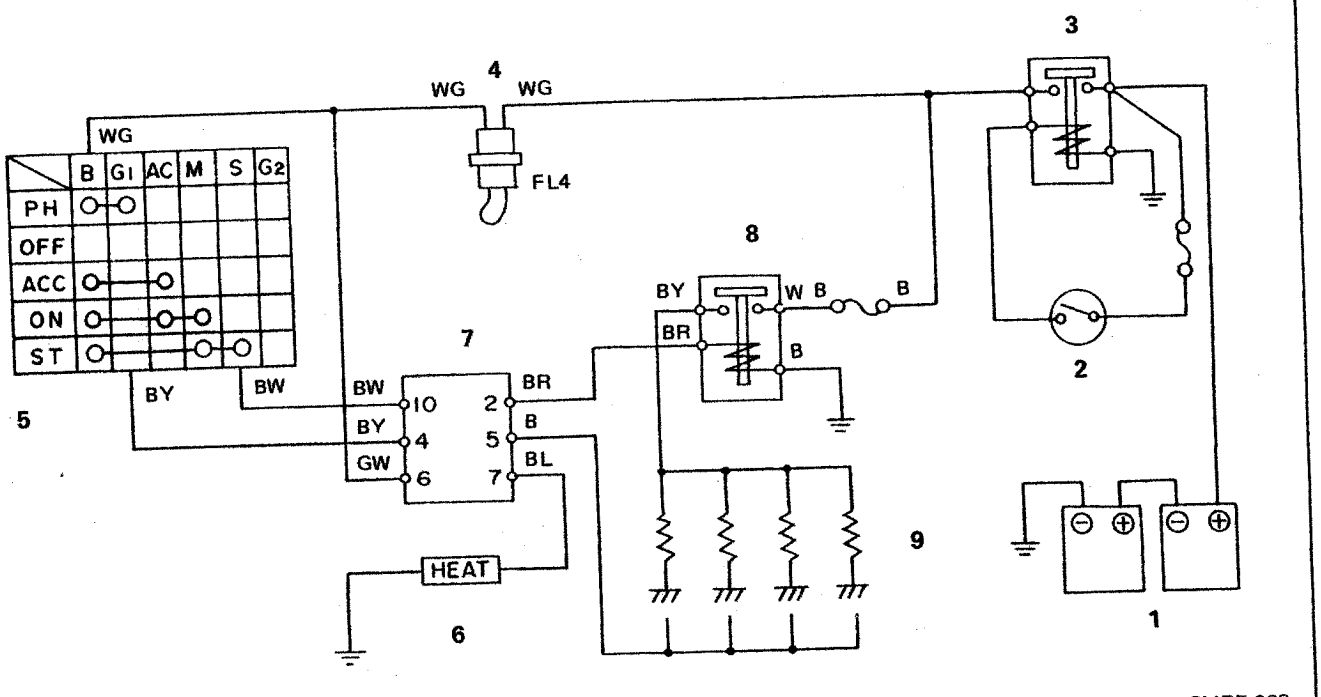
4. INT position
Using an ohmmeter, check the continuity between terminals with +1—S and R—E.
If not correct, replace the switch.



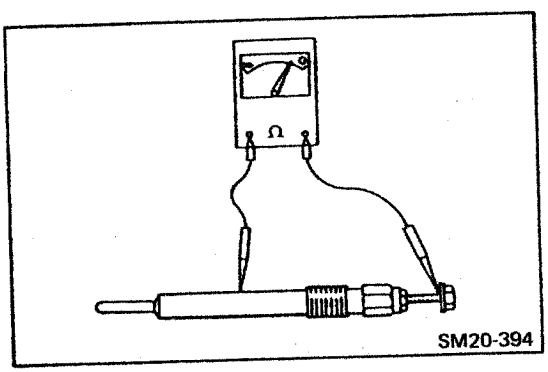
CHECK THE OPERATION OF THE WASHER SWITCH.

Using an ohmmeter, check the continuity between terminals with +—W in each switch position.
If not correct, replace the switch.

PRE-HEATER CIRCUIT



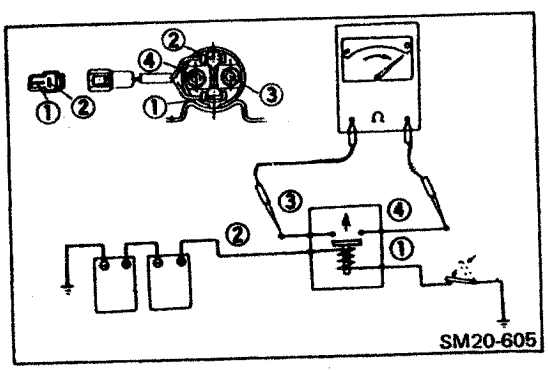
1. Battery
2. Battery switch
3. Battery relay
4. Fusible link
5. Starter switch
6. Pre-heater indicator
7. Pre-heat timer
8. Pre-heat power relay
9. Heater plug



CHECK THE RESISTANCE OF THE HEATER PLUG.

Measure the resistance between the terminal and heater plug body.
If not correct, replace the heater plug.

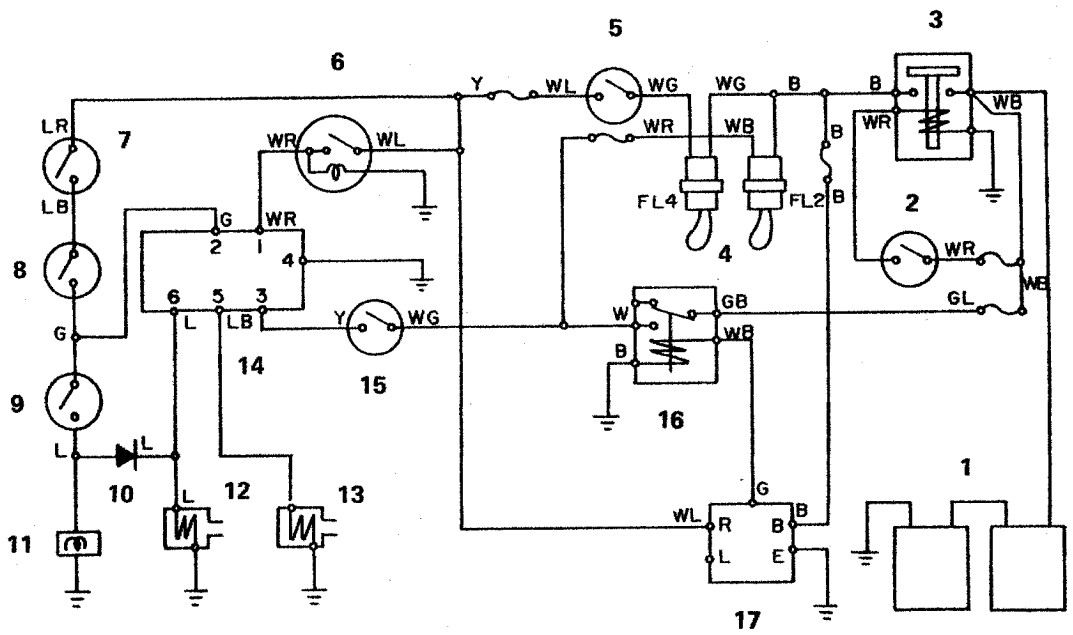
Resistance: About 4.9 Ω at 20°C (68.0°F)



CHECK THE OPERATION OF THE PRE-HEAT POWER RELAY.

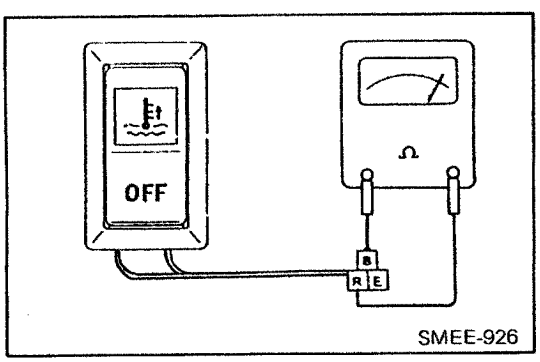
1. Remove the relay.
2. Using an ohmmeter, check that there is no continuity between terminals ③ and ④ .
3. Apply 24V D.C. source across terminals ① and ②
   Using an ohmmeter, check that there is continuity between terminal ③ and ④ .
   If the relay does not operate, replace it.

ENGINE WARM-UP CIRCUIT



SMEE-928

1. Battery
2. Battery switch
3. Battery relay
4. Fusible link
5. Starter switch
6. Warm-up switch
7. Accel switch
8. Clutch switch
9. Exhaust brake switch
10. Diode
11. Exhaust brake indicator
12. Exhaust brake vacuum switching valve
13. Idle up vacuum switching valve
14. Warm-up control unit
15. Neutral switch
16. Main relay
17. Alternator

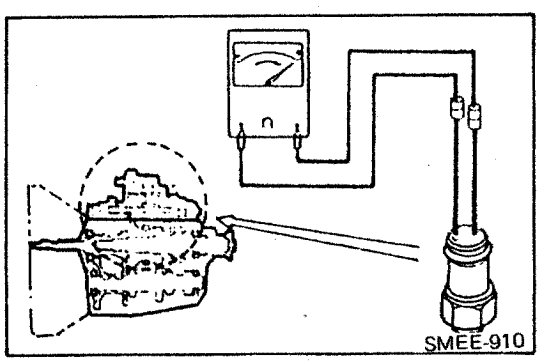


SMEE-926

INSPECTION

CHECK THE OPERATION OF THE ENGINE WARM-UP SWITCH.

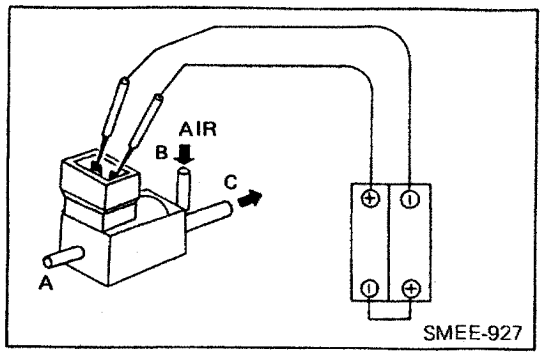
Using an ohmmeter, check the continuity between terminals with the switch to on position.
At this time, ohmmeter is indicated 0 ohm.
If not correct, replace the switch.



SMEE-910

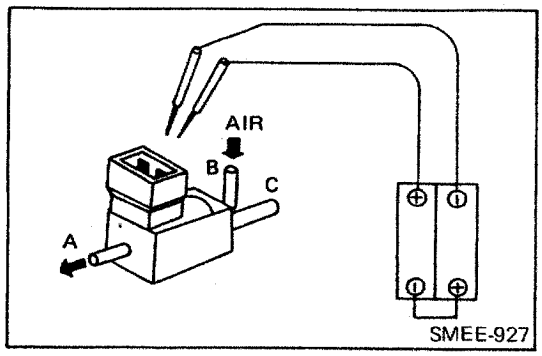
CHECK THE OPERATION OF THE NEUTRAL SWITCH.

Using an ohmmeter, check the continuity between the terminals with the transmission control lever in "NEUTRAL" (0 ohm) and other each position are infinity.
If not correct, replace the switch.



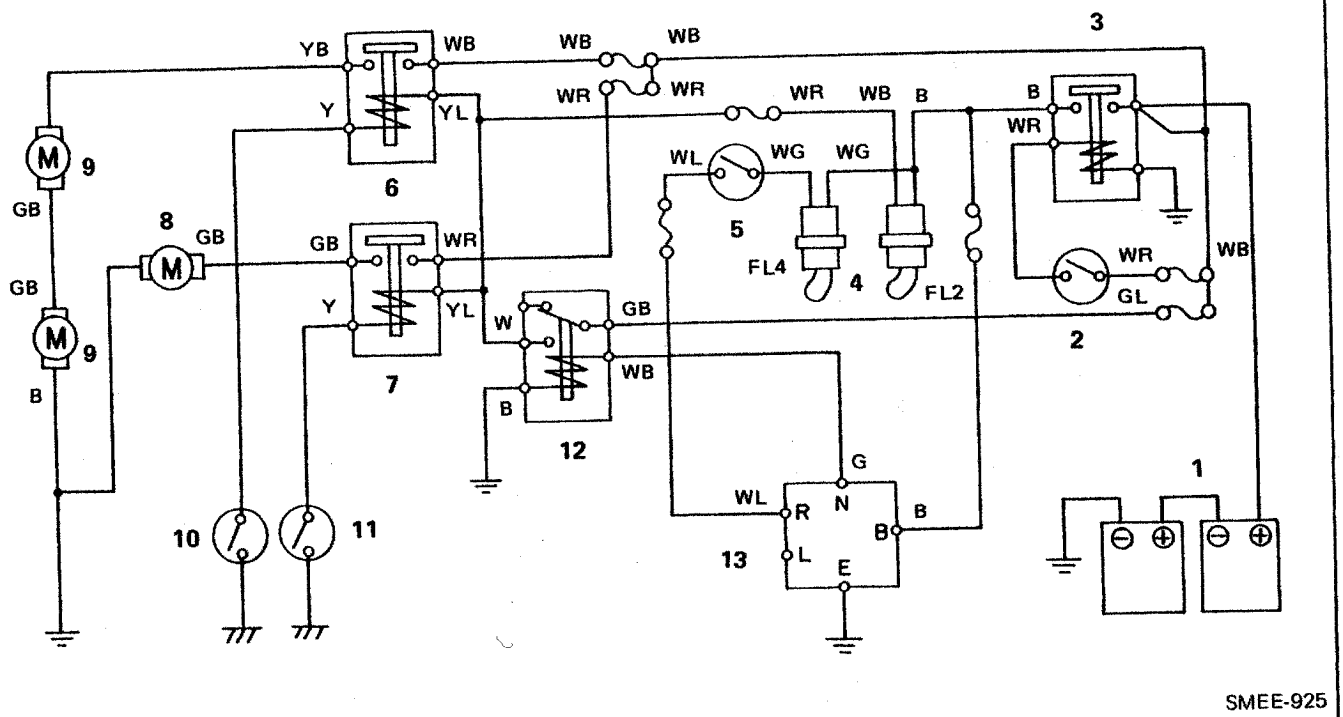
CHECK THE OPERATION OF THE VACUUM SWITCHING VALVE (EXHAUST BRAKE & IDLE-UP).

a. Connect the switching valve terminals to the battery terminals as shown.
b. Blow air into port B and check that air comes out of port C.



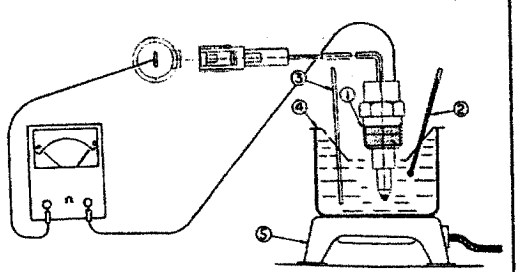
c. Disconnect the battery connections.
d. Blow air port B and check that air comes out of port A.

RADIATOR FAN CIRCUIT

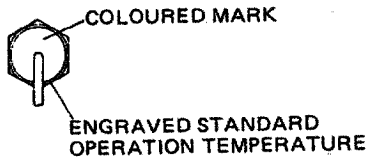


SMEE-925

1. Battery
2. Battery switch
3. Battery relay
4. Fusible link
5. Starter switch
6. Fan motor relay (main)
7. Fan motor relay (sub)
8. Sub radiator fan motor
9. Main radiator fan motor
10. Coolant temperature switch (main)
11. Coolant temperature switch (sub)
12. Main relay
13. Alternator



①COOLANT TEMPERATURE SWITCH
②THERMOMETER
③ STIRRING ROD
④ SUPPORTER
⑤ WATER
⑥ ELECTRIC HEATER



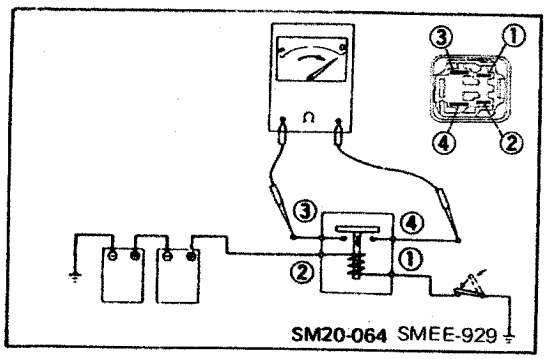
SMEE-915

INSPECTION

CHECK THE OPERATION OF THE COOLANT TEMPERATURE SWITCH (MAIN & SUB).

Using an ohmmeter, check the continuity between terminals at the indicated water temperatures.
If not correct, replace the switch.

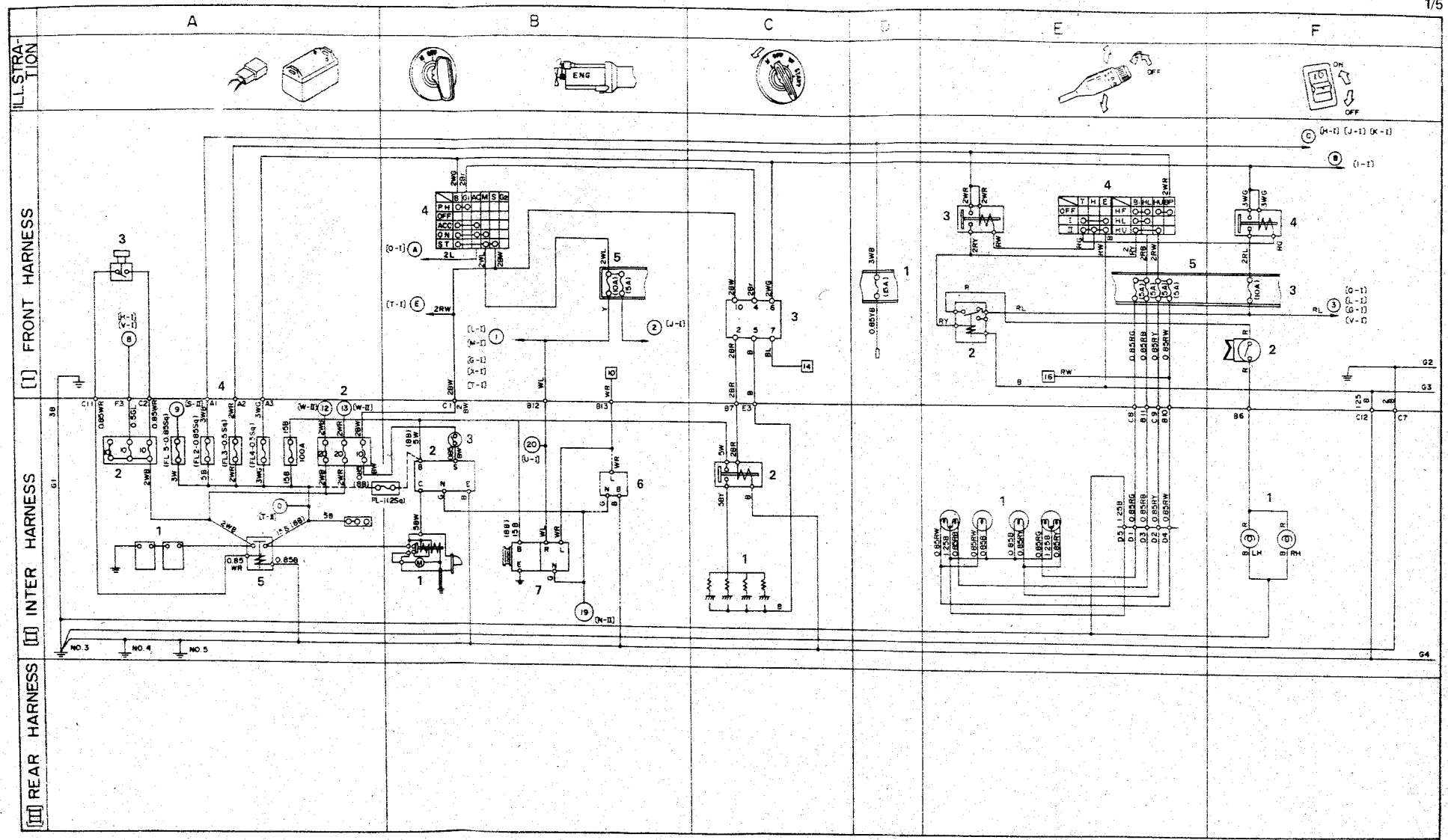
Coloured mark	Switch ON	Switch OFF
Type: A (brown)	84 – 90°C or higher	82°C or lower
Type: B (blue)	87 – 93°C or higher	83°C or lower



INSPECTION

CHECK THE OPERATION OF THE FAN MOTOR RELAY. (MAIN & SUB)

1. Remove the relay.
2. Using an ohmmeter, check that there is no continuity between terminals ③ and ④ .
3. Apply 24V D.C. across terminals ① and ② .
   Using an ohmmeter, check that there is continuity between terminals ③ and ④ .
   If the relay does not operate, replace it.



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A. POWER SUPPLY CIRCUIT

1. Battery
2. Fuse
3. Battery switch
4. Fusible link
5. Battery relay

B. STARTING CIRCUIT

1. Starter motor
2. Starter safety relay
3. Starter safety switch
4. Starter switch
5. Fuse
6. Charge lamp relay
7. Alternator

C. PRE-HEATER CIRCUIT

1. Heater plug
2. Pre-heater power relay
3. Pre-heat timer

D. SPARE POWER SUPPLY

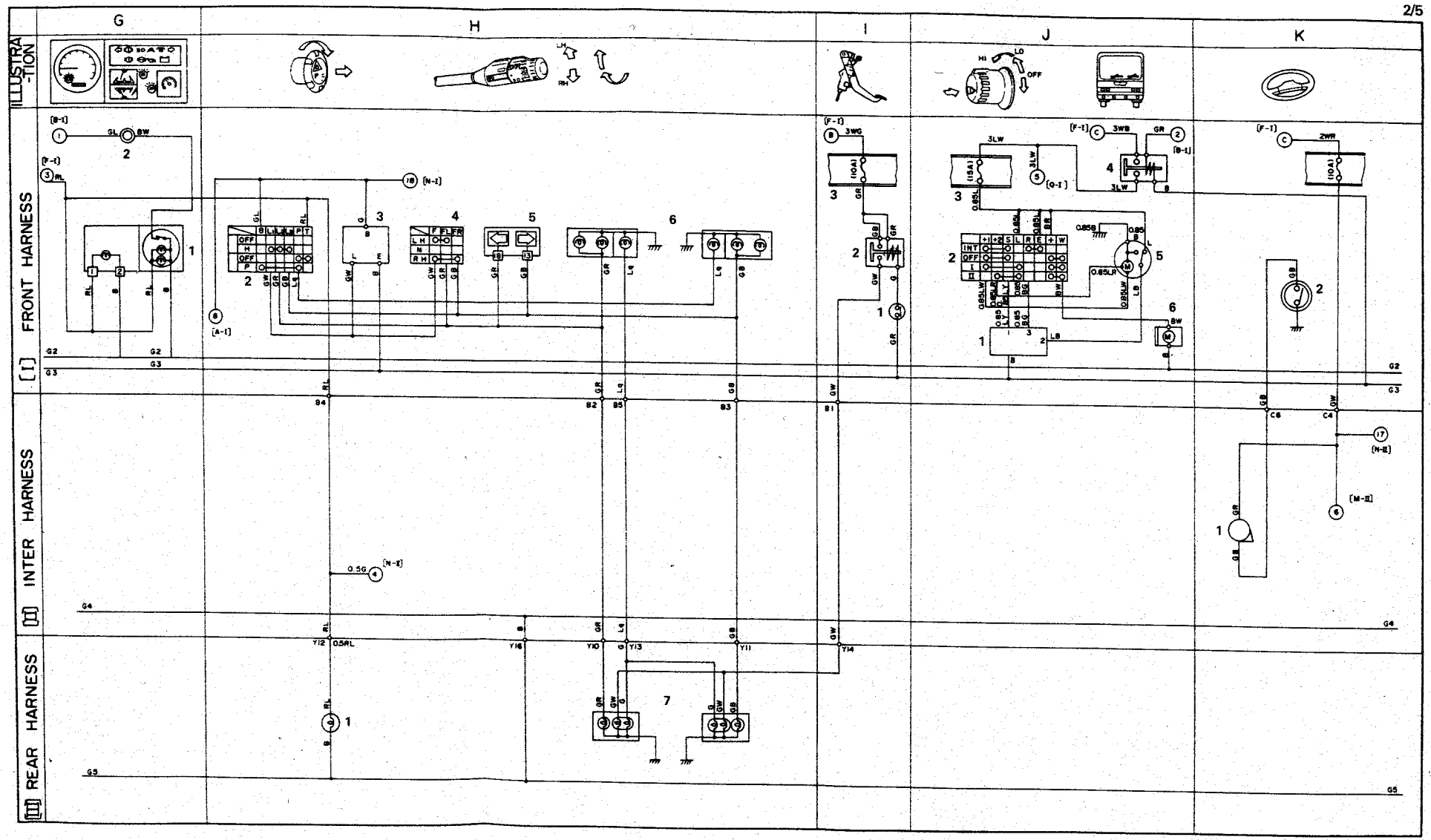
1. Fuse

E. HEAD LAMP CIRCUIT

1. Head lamp
2. Head, fog switch relay
3. Head lamp relay
4. Lighting switch
5. Fuse

F. FOG LAMP CIRCUIT

1. Fog lamp
2. Fog lamp switch
3. Fuse
4. Tail lamp relay



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G. MAX. SPEED WARNING CIRCUIT

1. Speedometer
2. Warning buzzer

H. HAZARD, PARK, TAIL, DIRECTION SIGNAL LAMP CIRCUIT

1. Licence lamp
2. Hazard & park switch
3. Flasher unit
4. Direction signal switch
5. Direction signal indicator lamp
6. Front combination lamp
7. Rear combination lamp

I. STOP LAMP CIRCUIT

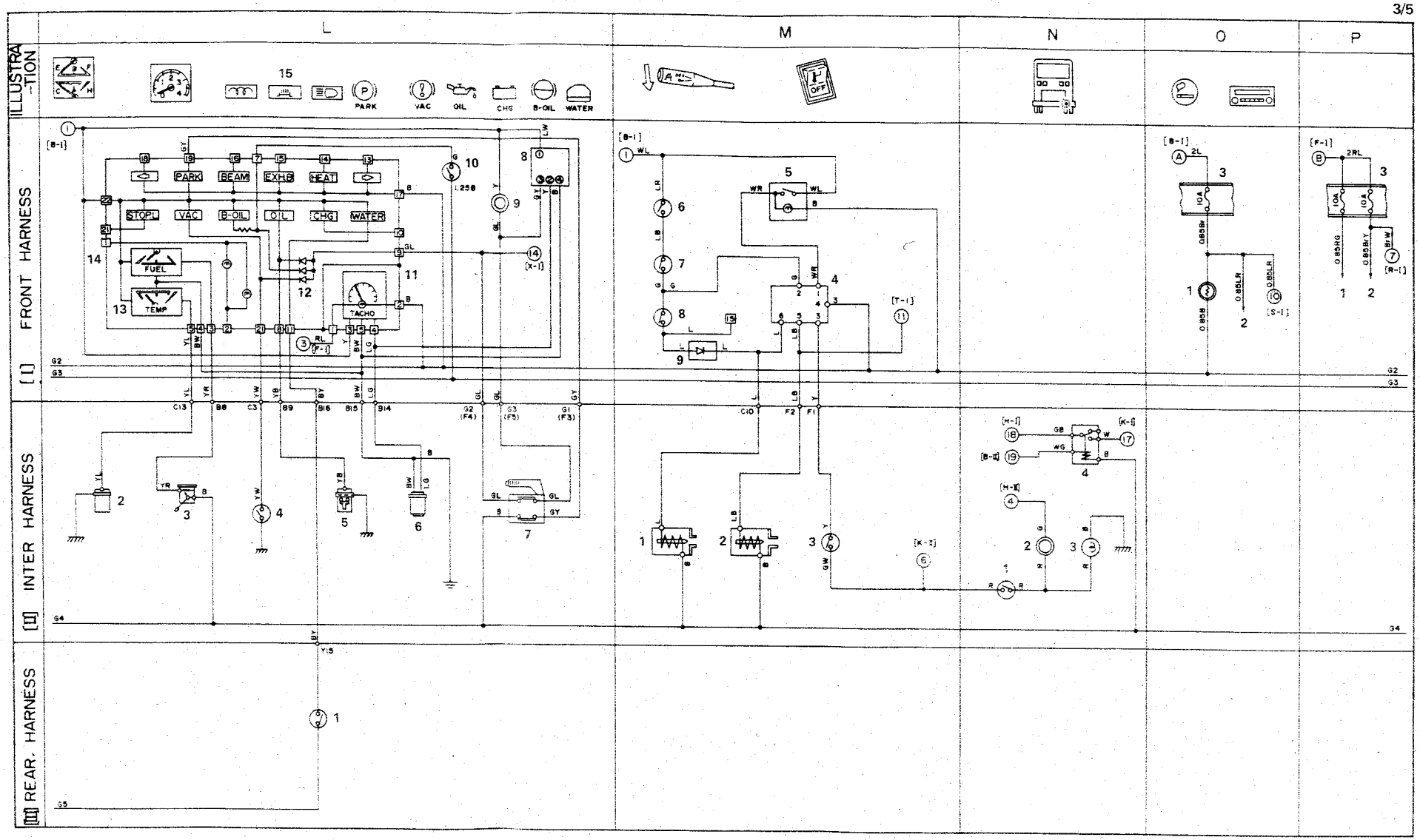
1. Stop lamp switch
2. Stop lamp relay
3. Fuse

J. WIPER CIRCUIT

1. Intermittent relay
2. Wiper switch
3. Fuse
4. Power relay
5. Wiper motor
6. Washer

K. HORN CIRCUIT

1. Horn
2. Horn switch
3. Fuse



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L. GAUGE, METER, WARNING CIRCUIT

1. Coolant level switch
2. Temperature gauge sender unit
3. Fuel gauge sender unit
4. Vacuum switch
5. Engine oil pressure switch
6. Tachometer pick-up
7. Parking brake switch
8. Overrun relay
9. Warning buzzer
10. Brake fluid level switch
11. Tachometer
12. Diode
13. Temperature gauge
14. Fuel gauge
15. Indicator lamps
16. Warning lamps

M. EXHAUST BRAKE & ENGINE WARM-UP CIRCUIT

1. Exhaust brake vacuum switching valve
2. Idle-up vacuum switching valve
3. Neutral switch
4. Warm-up control unit
5. Warm-up switch
6. Accel switch
7. Clutch switch
8. Exhaust brake switch
9. Diode

N. BACK-UP LAMP CIRCUIT

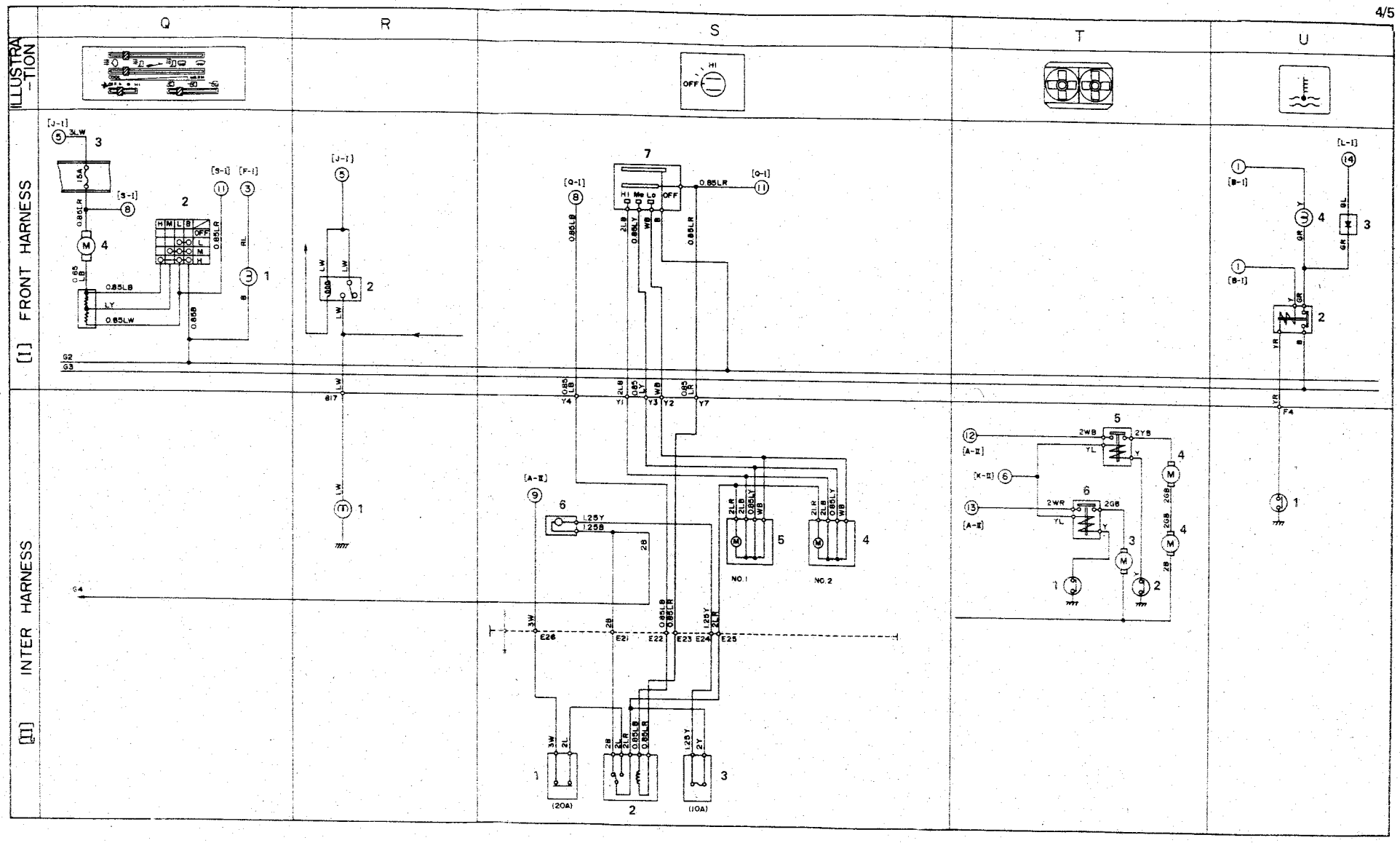
1. Back-up lamp switch
2. Back buzzer
3. Back lamp
4. Main relay

O. CIGARETTE LIGHTER RADIO

1. Cigarette lighter
2. Power source of radio
3. Fuse

P. POWER SOURCE

1. Power source of room lamp
2. Power source of body
3. Fuse



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Q. FRONT HEATER CIRCUIT

1. Heater panel illumination
2. Heater switch
3. Fuse
4. Blower motor

R. STEP LAMP CIRCUIT

1. Step lamp
2. Door relay

S. REAR HEATER CIRCUIT

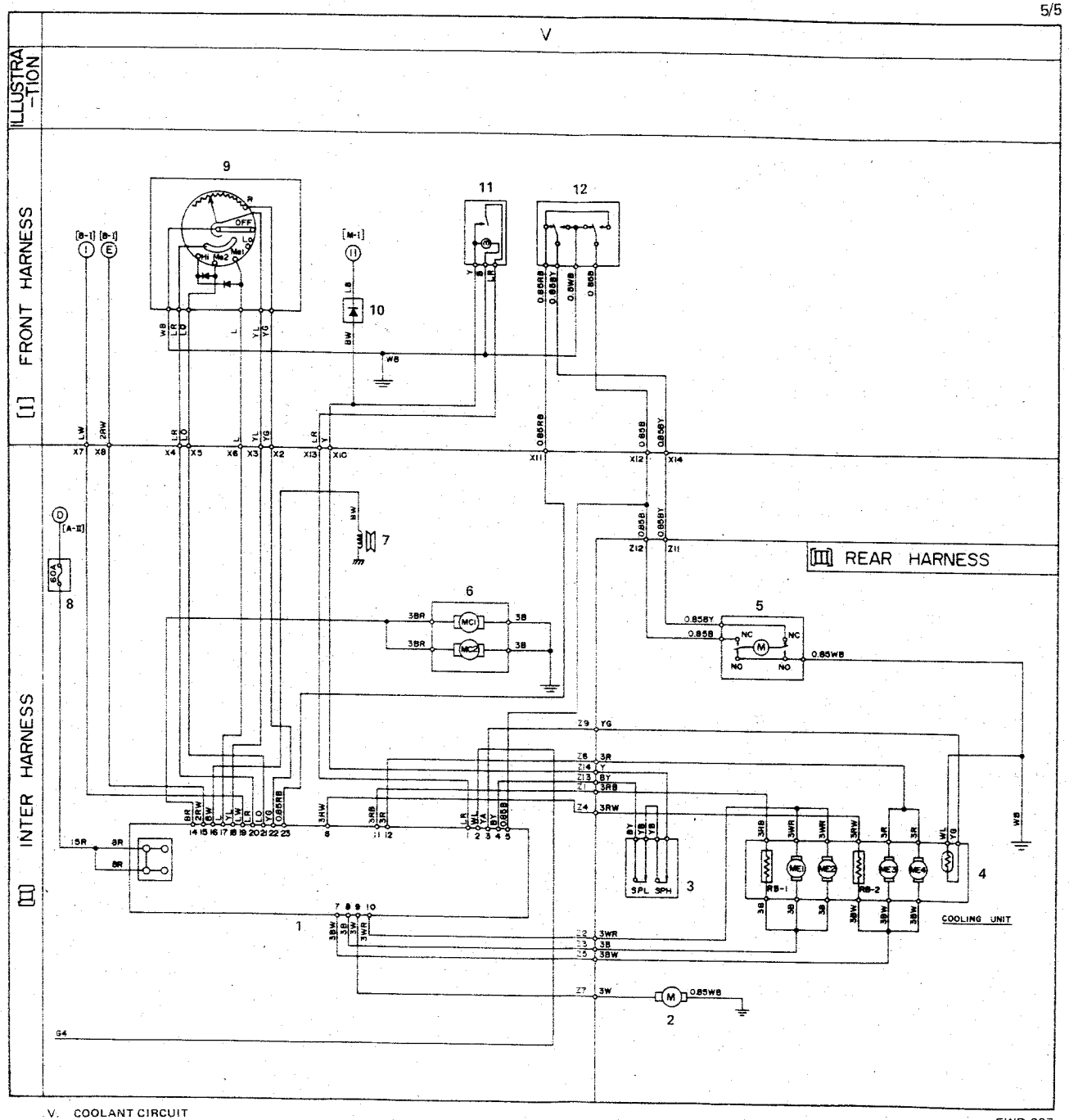
1. Breaker
2. Heater relay
3. Fuse
4. No. 2 heater
5. No. 1 heater
6. Water pump
7. Rear heater switch

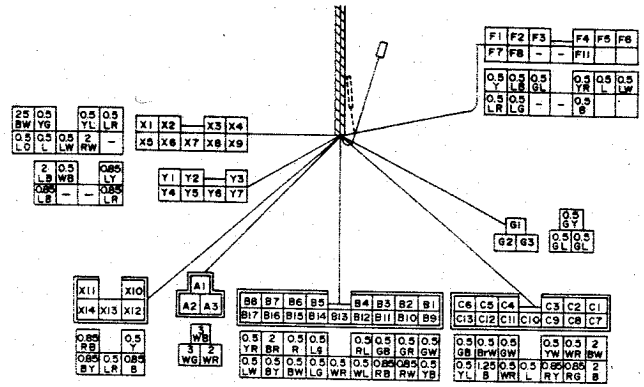
T. RADIATOR FAN CIRCUIT

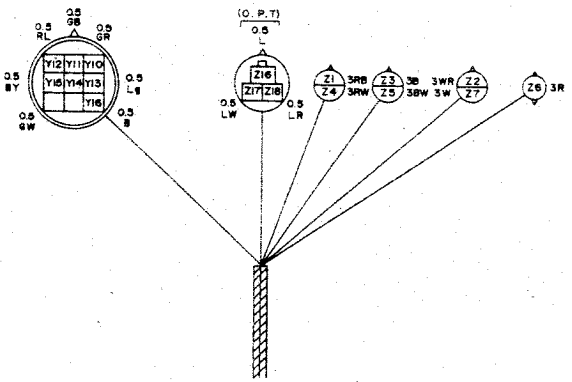
1. Coolant temperature switch (for sub)
2. Coolant temperature switch (for main)
3. Sub-radiator fan motor
4. Main radiator fan motor
5. Fan relay (for main)
6. Fan relay (for sub)

U. OVER HEAT WARNING CIRCUIT

1. Over heat warning lamp switch
2. Over heat warning lamp relay
3. Diode
4. Over heat warning lamp







V. COOLANT CIRCUIT

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1. Cooler control box
2. Ventilator blower motor
3. Pressure detecting switch
4. Cooling unit
5. CIRC/FRESH control servo motor
6. Condensing unit
7. Compressor magnet clutch
8. Fuse
9. Cooler control panel
10. Diode
11. Cooler switch
12. CIRC/FRESH control switch