

[For car not equipped with free wheeling hub]

5. Remove the front axle shaft cap.
6. Remove the circlip retaining the front axle shaft drive flange on front drive shaft, using the circlip remover **(A)**.

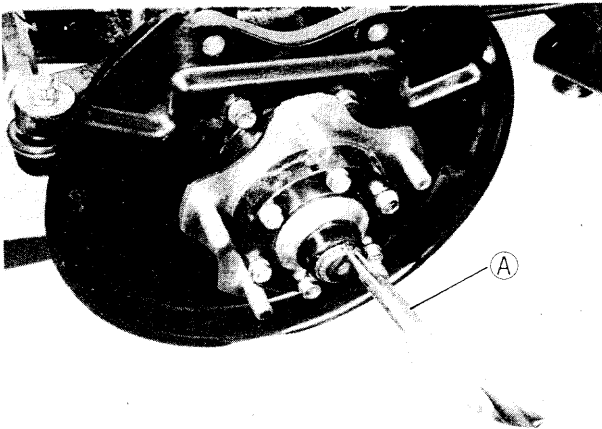


Fig. 17-1-12-3 (A) Circlip Remover

7. Loosen securing bolts of front axle shaft drive flange and take off drive flange.

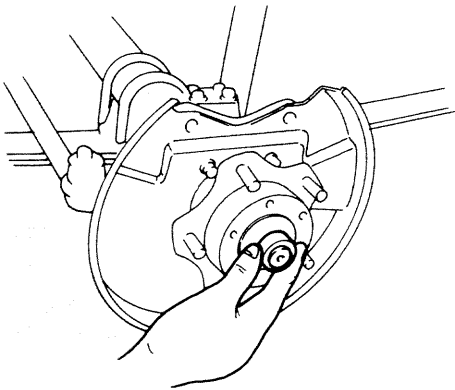


Fig. 17-1-13

8. Straighten bent part of lock washer and remove wheel bearing lock nut with special tool **(B)**.

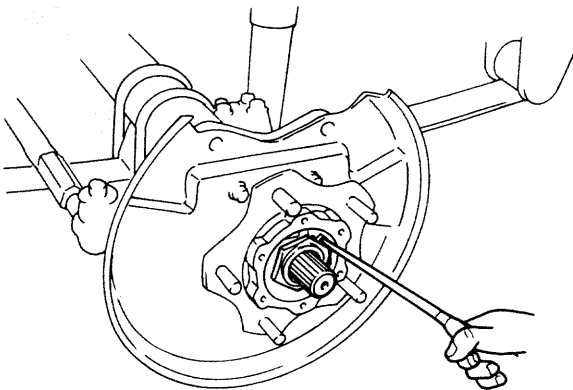
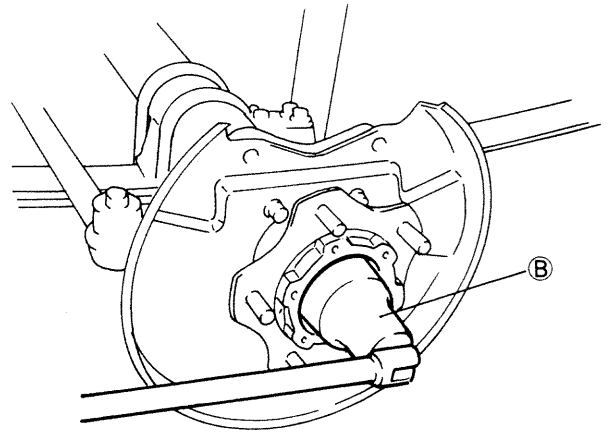


Fig. 17-1-14



*Fig. 17-1-15 Special tool (B)
(Front Wheel Bearing Nut Socket
Wrench 09941-58010)*

9. After loosening front wheel bearing nut with the same special tool **(B)** as mentioned in the foregoing step 8, take nut and washer off the front wheel spindle.

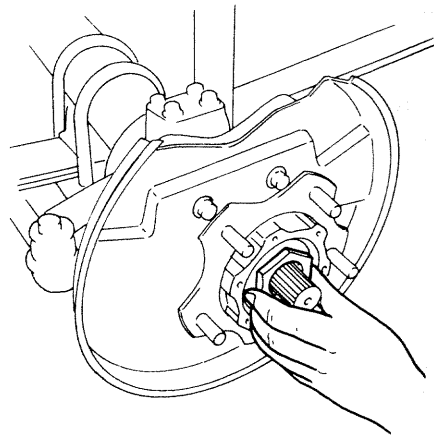


Fig. 17-1-16

10. Pull front wheel hub off the front wheel spindle.

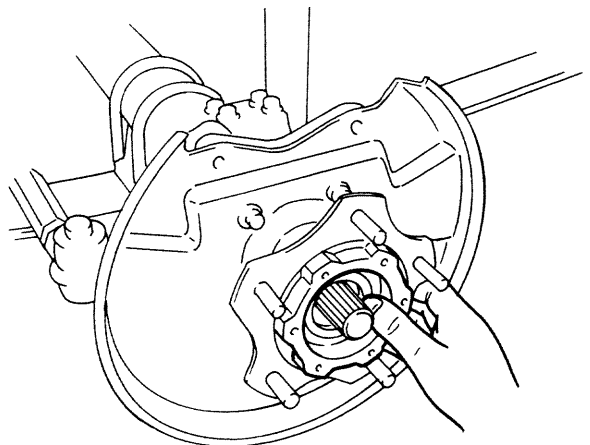


Fig. 17-1-17

11. Remove oil seal and outer race of inner bearing or outer bearing from wheel hub.

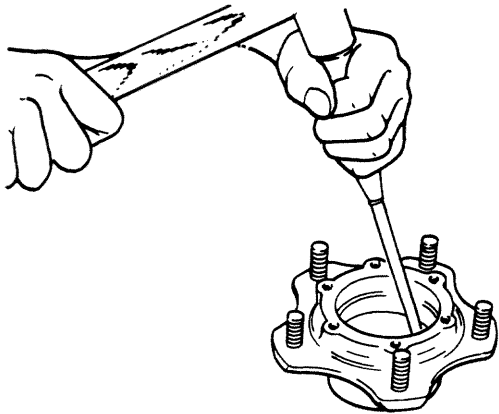


Fig. 17-1-18

Steering Knuckle

1. Remove front wheel hub, referring to steps 1 to 10 of foregoing front wheel hub and bearing removal.
2. Loosen bolts securing kingpins (upper & lower). At this point, king pins mustn't be removed.

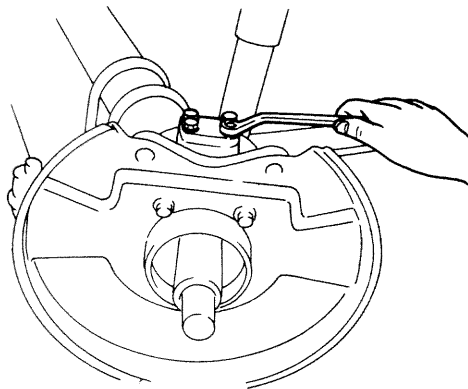


Fig. 17-1-19

3. Remove disc dust cover, caliper holder and wheel spindle.

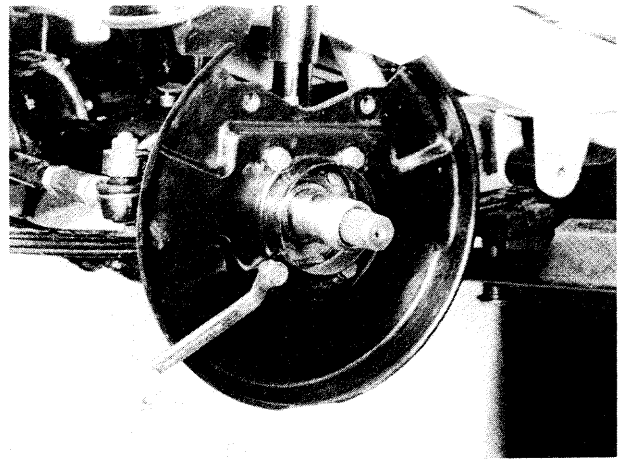


Fig. 17-1-20

4. Remove tie rod end castle nut and disconnect tie rod end from steering knuckle with special tool (A).

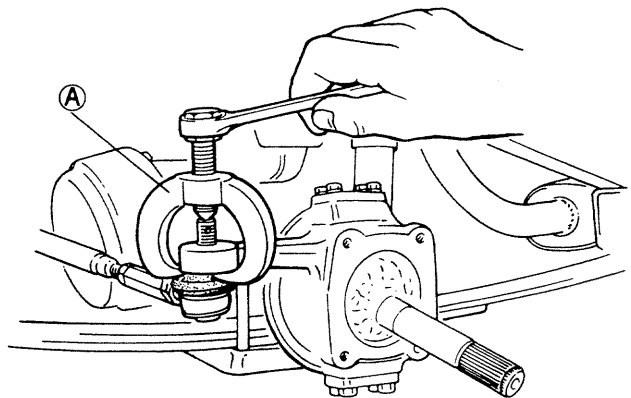


Fig. 17-1-21 Special tool (A) (Tie Rod End Remover 09913-65210)

5. Remove joint seal bolts. Then remove oil seal cover, pad, oil seal and retainer from knuckle.

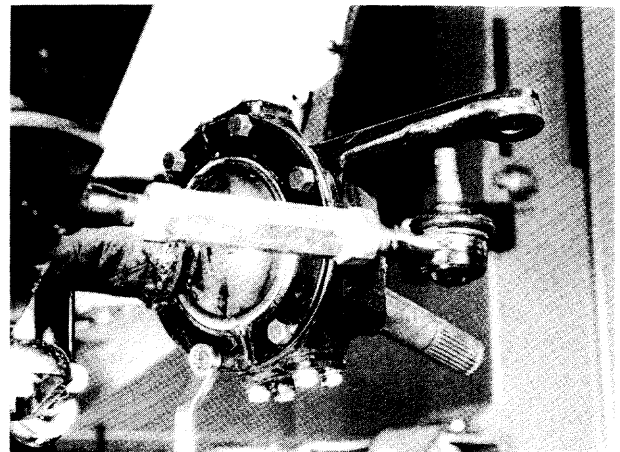


Fig. 17-1-22

6. Remove lower and upper kingpins.

NOTE:

- Upper and lower kingpins, when removed, must be marked off one from the other.
- Also make sure to check the number of kingpin shims that were fitted on each side.

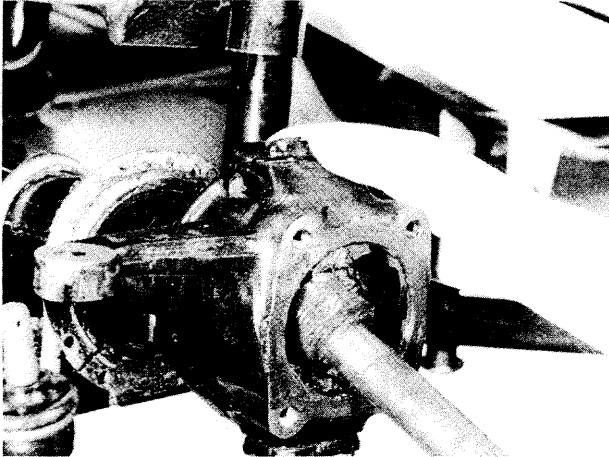


Fig. 17-1-23

7. Pull off steering knuckle.

NOTE:

- When steering knuckle is pulled, lower kingpin bearing sometimes falls off. So remove bearing while pulling off the knuckle gradually.
- Upper and lower kingpin bearings must be also marked off one from the other.

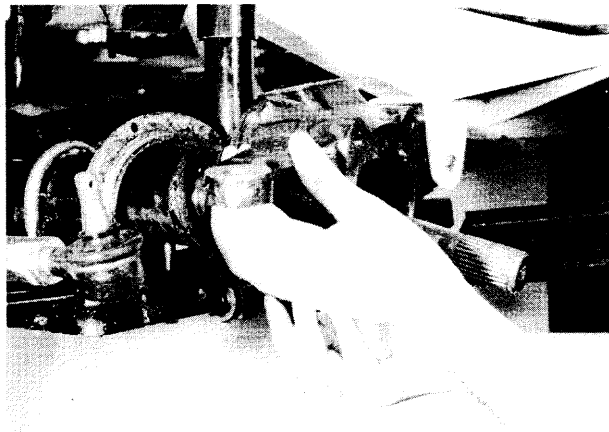


Fig. 17-1-24

Front Axle Shaft Joint

1. To remove axle shaft joint, carry out steps 1 through 7 of steering knuckle removal (p. 17-8 and 17-9) and then follow steps 2 and 3 given below.
2. Drain oil from differential housing by loosening drain plug.

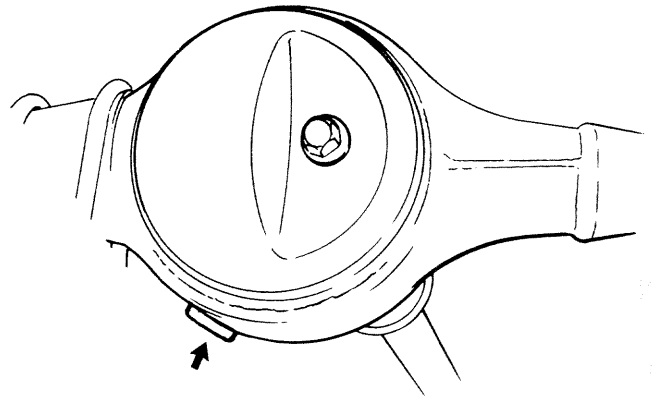


Fig. 17-1-25

3. Pull axle shaft joint off front axle housing.

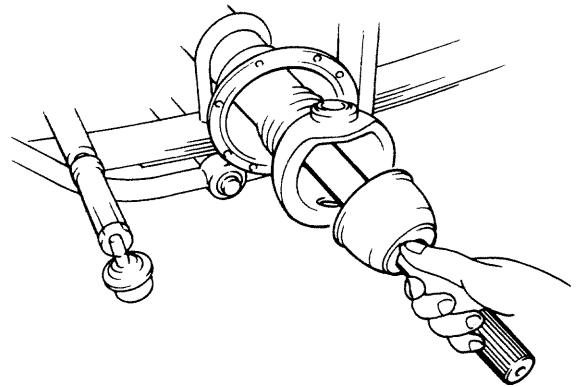


Fig. 17-1-26

INSPECTION OF COMPONENT

Stabilizer and its Bush

Inspect stabilizer for damage or deformation. If defective, replace.

Inspect bushes for damage, wear or deterioration. If defective, replace.

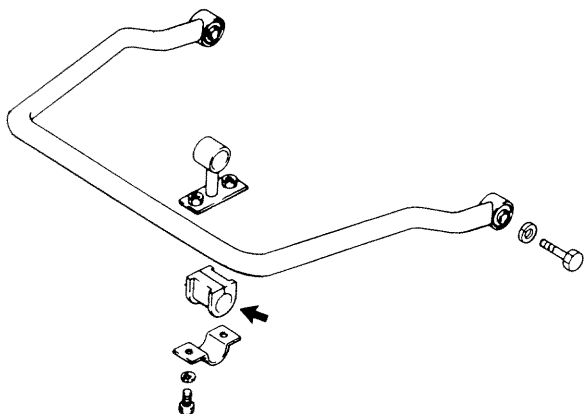


Fig. 17-1-27

Leaf Spring Bushes

Inspect for wear and breakage. If found defective, replace.

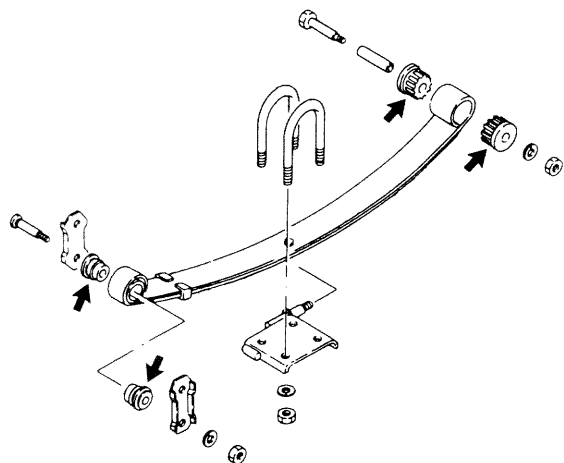


Fig. 17-1-28

Barfield Joint

To be checked on this joint is its axial play, which shows up when a push-and-pull motion is given to live axle shaft and wheel spindle held in both hands, as shown in figure. There should be no play at all but a play of up to 1.5 mm (0.06 in.) is permissible. If play exceeds service limit, replace it.

	Standard	Service Limit
Axial play in barfield joint	0 mm (no play)	1.5 mm (0.06 in.)

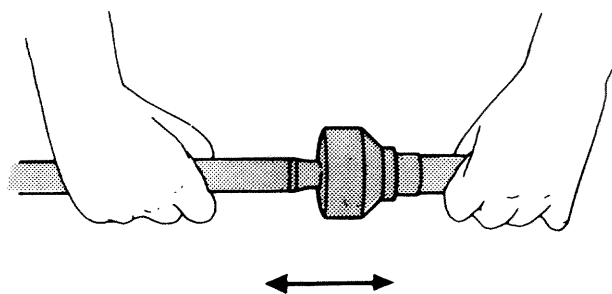


Fig. 17-1-29

Front Wheel Bearing

Check front wheel bearing rollers for damage. If anything is found wrong, replace bearing with a new one.



Fig. 17-1-30

Kingpins and Bearings

Inspect each kingpin closely for dents, signs of cracking, distortion or any other damage. Replace the kingpins found in defective condition.

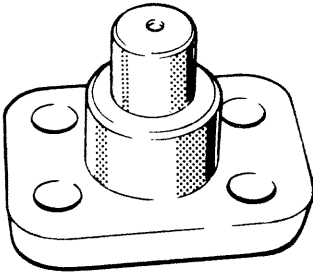


Fig. 17-1-31

Check the kingpin bearings for damage. If anything is found wrong, replace the bearing with new one.

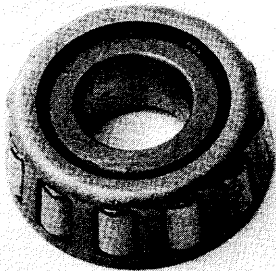


Fig. 17-1-32

Steering Knuckle Oil Seal

The oil seal used at the spherical sliding joint between the knuckle and the inner case accomplishes the additional purposes of keeping out road dust and of acting as the damper for the steering handwheel. As the wear of this seal advances, its damping effect decreases and thus make the front wheel develop a tendency to "shimmy" not only that road dust begins to creep into the sliding clearance to promote the wear of the spherical sliding surfaces.

Check the oil seal for wear or damage. If defective, replace with new one.

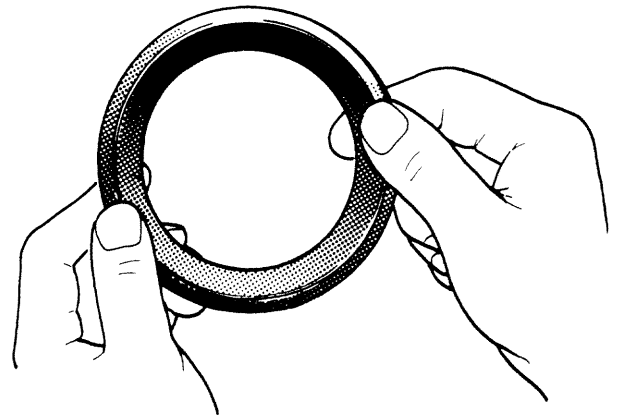


Fig. 17-1-33

INSTALLATION

Reverse removal procedure observing each precaution.

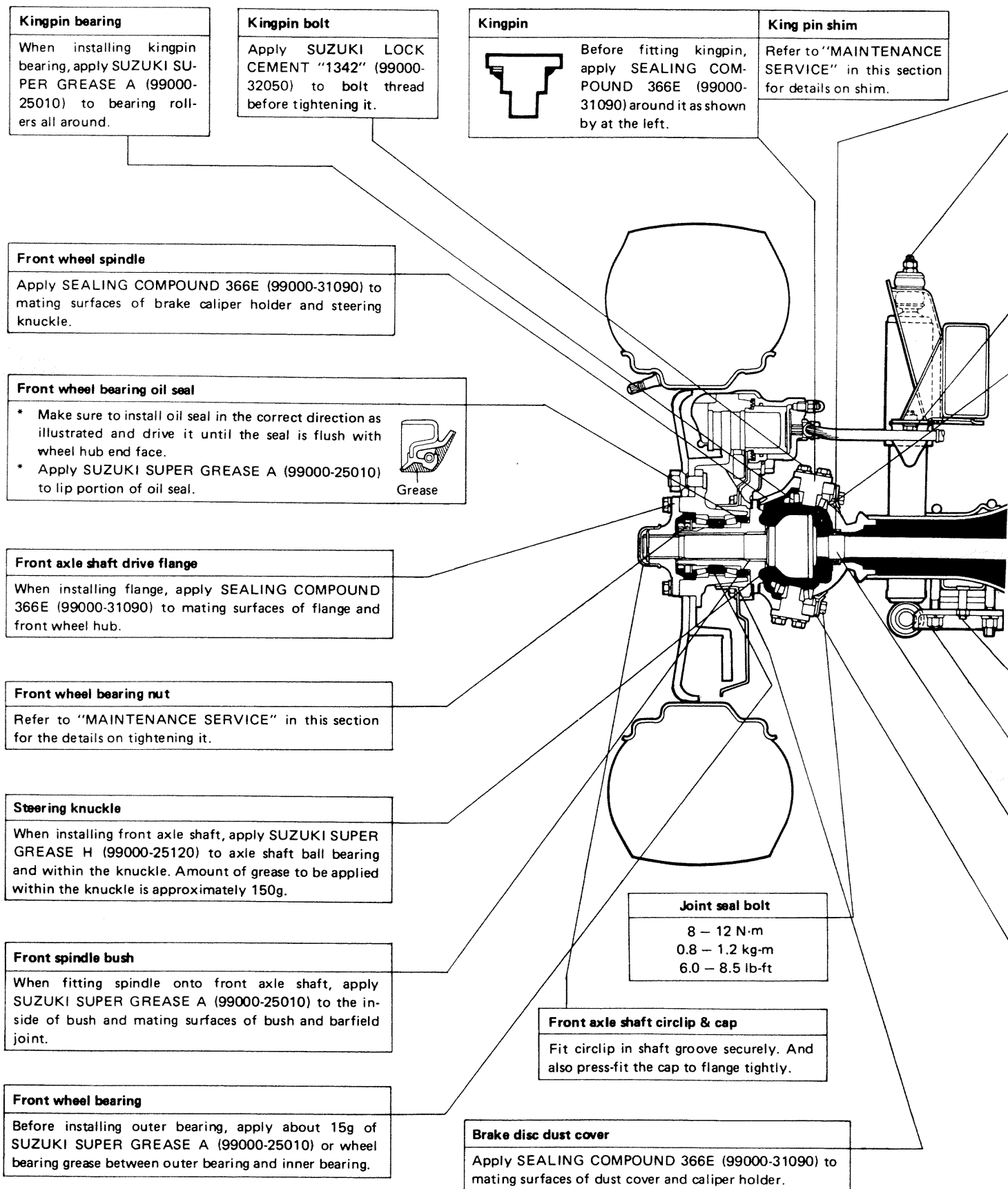


Fig. 17-1-34

Shock absorber lock nut

22 – 35 N·m
2.2 – 3.5 kg-m
(16.0 – 25.0 lb-ft)

Front axle shaft oil seal

Grease

- * Before installing oil seal, apply SUZUKI SUPER GREASE A (99000-25010) to its lip portion.
- * Use care for correct installing direction, referring to the illustration.

Spring bumper bolt

18 – 28 N·m
1.8 – 2.8 kg-m
(13.5 – 20.0 lb-ft)

Steering knuckle oil seal

Grease

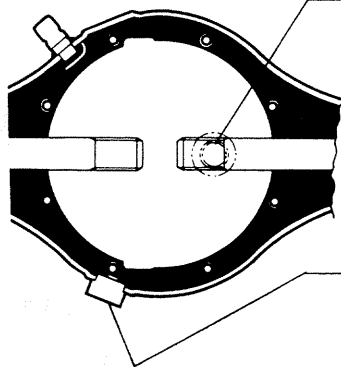
Before installing oil seal, apply SUZUKI SUPER GREASE A (99000-25010) to its lip portion.

Oil level & filler plug

35 – 50 N·m
3.5 – 5.0 kg-m
(25.5 – 36.0 lb-ft)

Oil drain plug

18 – 25 N·m
1.8 – 2.5 kg-m
(13.5 – 18.0 lb-ft)

**Leaf spring center bolt & nut**

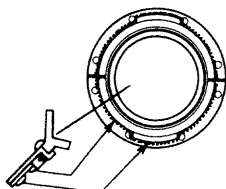
Insert bolt and nut securely into holes of axle housing seat and spring seat.

Front spring U bolt

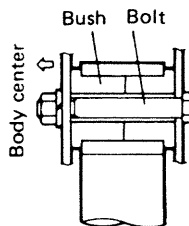
When securing U bolt, tighten its front and rear nuts evenly.

Front axle shaft joint Ass'y

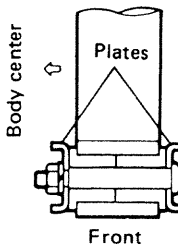
When inserting axle shaft into front axle housing, be careful not to cause any damage or distortion to axle shaft oil seal.

Oil seal retainer

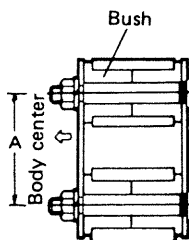
When installing retainer, apply SEALING COMPOUND 366E (99000-31090) all around it.

Front leaf spring bush & spring bolt

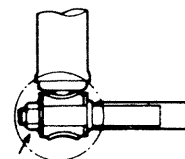
- * Either water or household type detergent may be used to press-fit the bush onto spring. But oil of any kind is strictly prohibited.
- * Insert both right and left bolts from the outside into the inside of body.

Front leaf spring shackle plate

Install plates with their backs directed to each other.

Front leaf spring shackle pins & bush

- * Insert both right and left pins from outside into inside of body.
- * Tighten nuts to specified torque in unloaded state.
- * When pins are inserted, make sure that the difference (A – B) is within –0.3 ~ +0.3 mm (–0.024 ~ +0.024 in).
- * Either water or household type detergent may be used to press-fit bush onto spring. But oil of any kind is strictly prohibited.

Shock absorber & nut

For correct installing direction of absorber washer, refer to the figure.

35 – 55 N·m
3.5 – 5.5 kg-m
(25.5 – 39.5 lb-ft)

NOTE:

Torque specifications of other bolts and nuts are given under "RECOMMENDED TORQUE SPECIFICATIONS" of this section.

Stabilizer

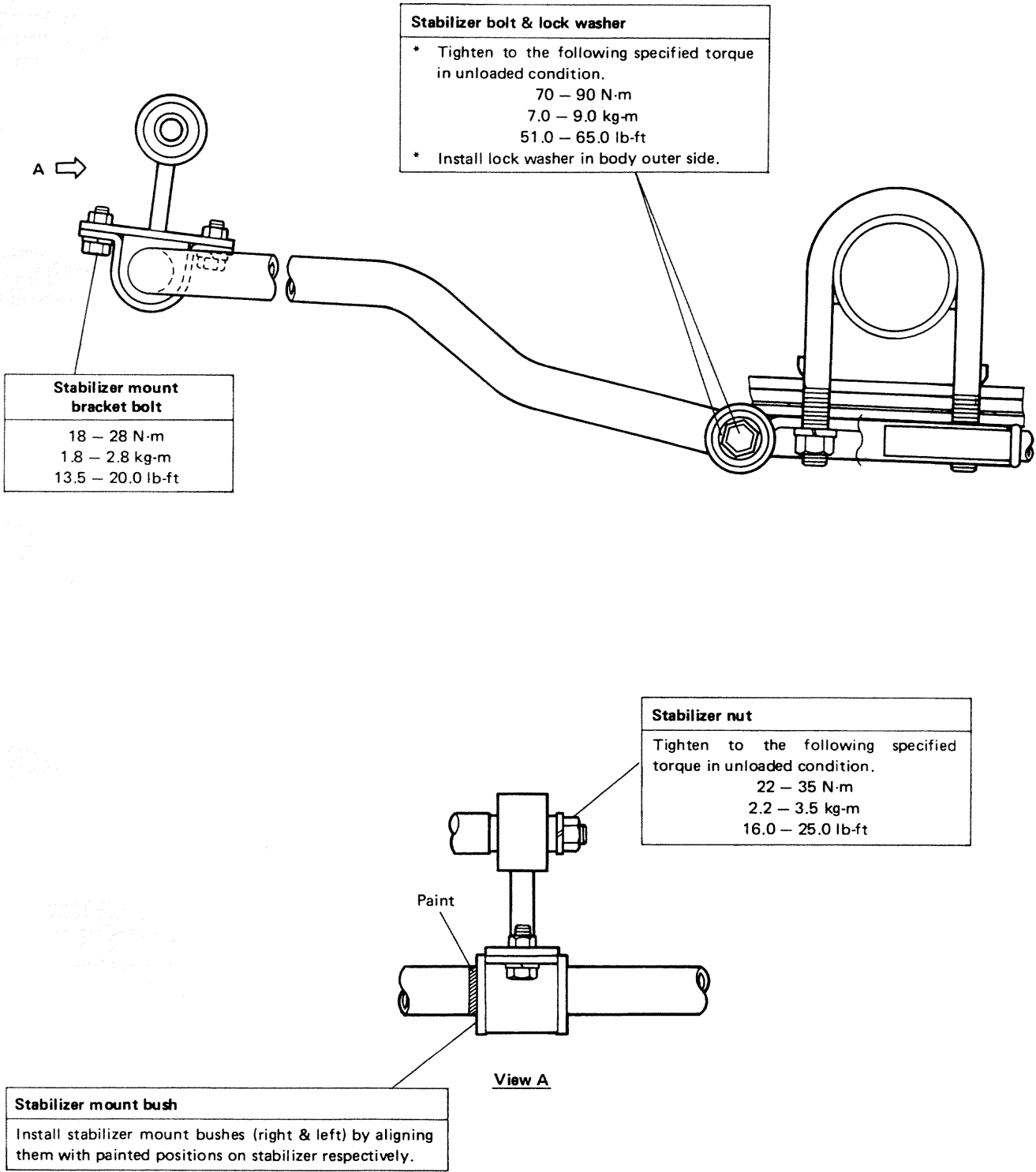


Fig. 17-1-35

17-2. REAR SUSPENSION

GENERAL DESCRIPTION

The rear suspension consists of leaf springs, axle housing, axle shafts and shock absorbers as shown below. The leaf springs are attached to the chassis frame through rubber bushes located at their both ends as shown. The axle housing is installed on the right and left leaf springs by means of spring seats and U bolts. The two shock absorbers (right & left) are installed with their lower ends attached to the spring seats and the upper ends to the chassis frame, all through rubber bushes.

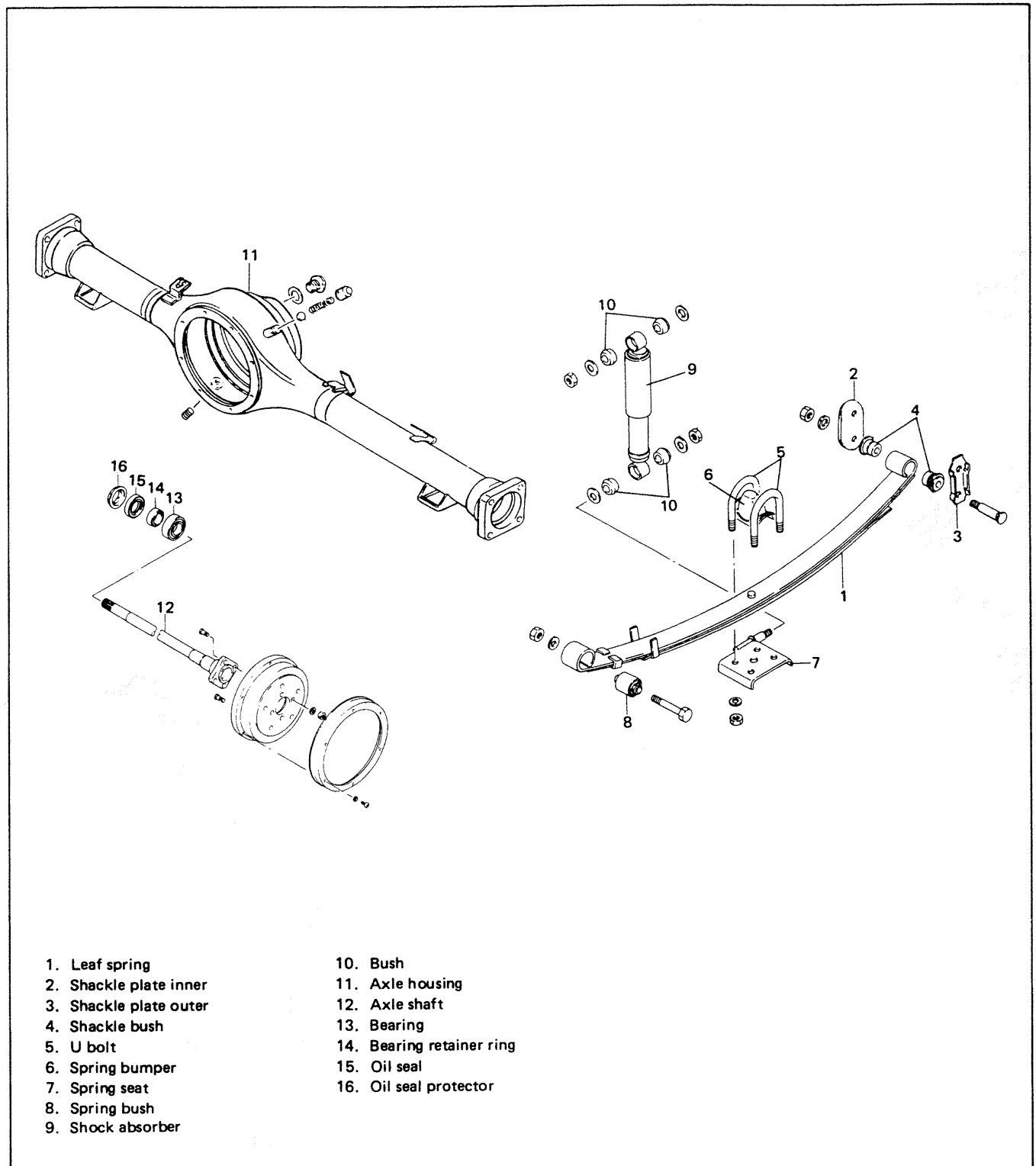


Fig. 17-2-1

REMOVAL

Shock Absorber

The shock absorber is non-adjustable, non-refillable, and cannot be disassembled. The only service the shock absorber requires is replacement when it has lost its resistance, is damaged, or leaking oil or gas.

- 1) Hoist car.
- 2) Loosen lower and upper nuts, and remove shock absorber.

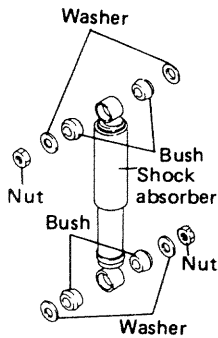


Fig. 17-2-2

Leaf Spring

- 1) Raise car. In this operation, garage jack or hoist must not be positioned against rear suspension related parts. When garage jack is used, place safety stands under chassis to support raised body.

NOTE:

Don't let rear axle housing hang on brake hose or pipe. If it occurs, hose or pipe may be damaged. To prevent it, always hold rear axle housing of raised car with safety stands.

- 2) Remove rear wheel.
- 3) Remove U-bolt nuts.
- 4) Remove shackle nuts and leaf spring nut.
- 5) Pull out leaf spring bolt and remove leaf spring from shackle pin.

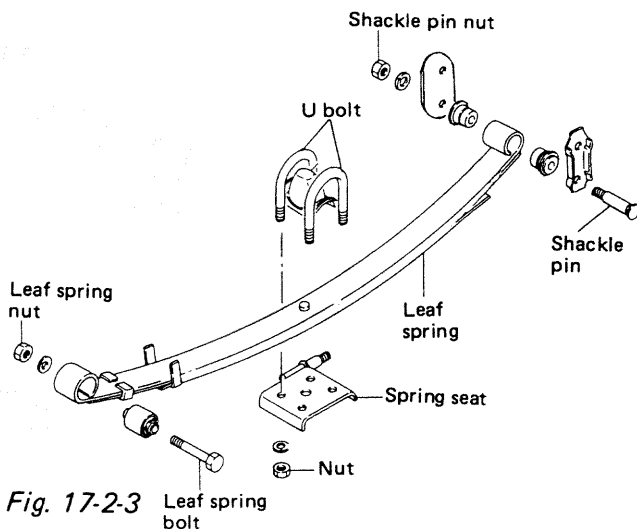


Fig. 17-2-3

Rear Axle Shaft

- 1) Remove rear brake drum. Refer to item 19-3 "REAR DRUM BRAKE".

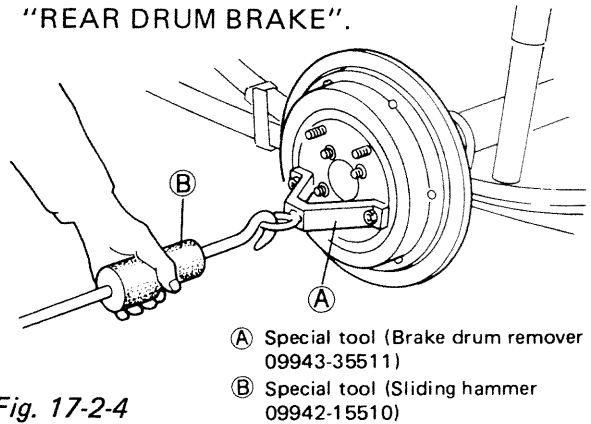


Fig. 17-2-4

- 2) Drain oil from axle housing loosening drain plug.

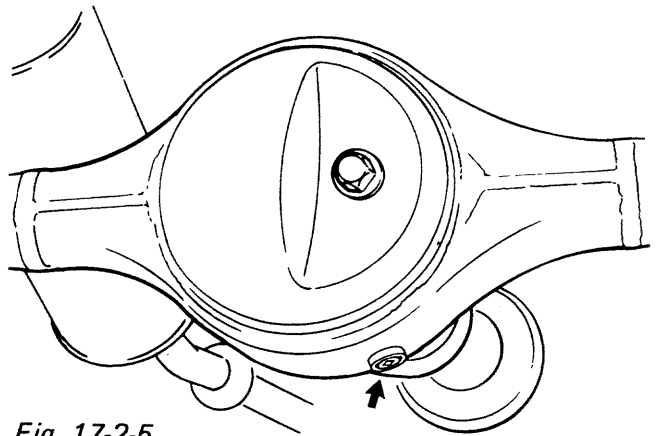


Fig. 17-2-5

- 3) Disconnect brake pipe from wheel cylinder. Have a small plug ready for use when disconnecting pipe. As pipe comes off the wheel cylinder, plug the pipe to prevent brake fluid from leaking out. And remove 4 brake backing plate securing bolts.

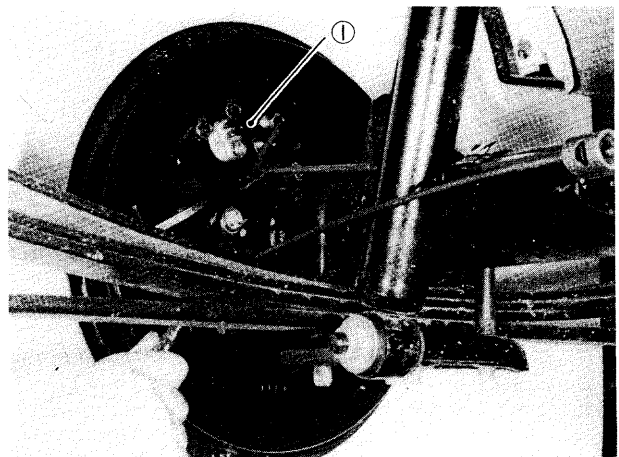


Fig. 17-2-6

1. Plug

- 4) Using special tools indicated below, draw out each axle shaft with brake backing plate.

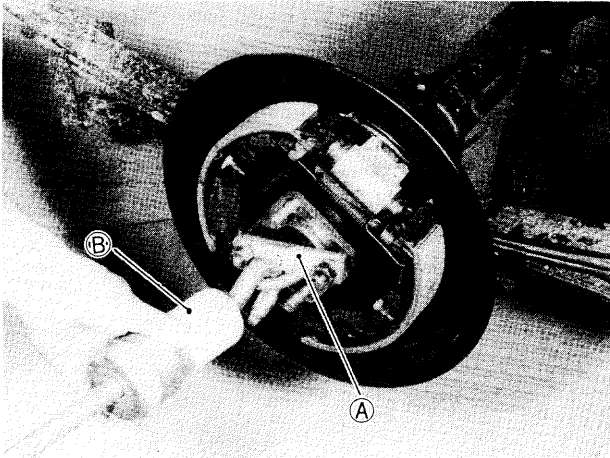


Fig. 17-2-7 ① *Special Tool (Rear Axle Remover 09922-66010)*
② *Special Tool (Sliding Hammer 09942-15510)*

Rear axle shaft that was drawn out.

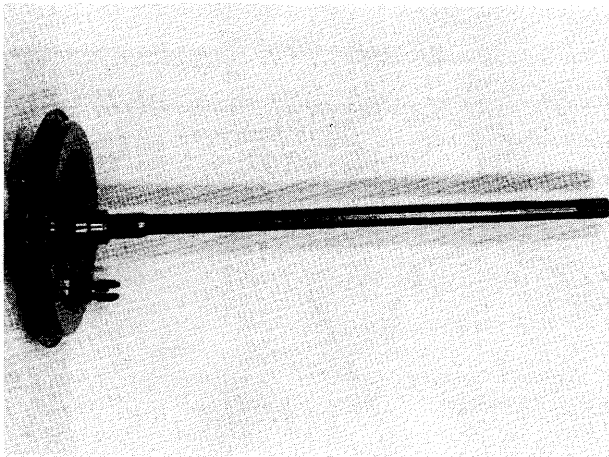


Fig. 17-2-8

- 5) In order to remove the retainer ring from the shaft, grind with a grinder two parts of the bearing retainer ring as illustrated till it becomes thin.

CAUTION:

Be careful not to go so far as to grind the shaft.

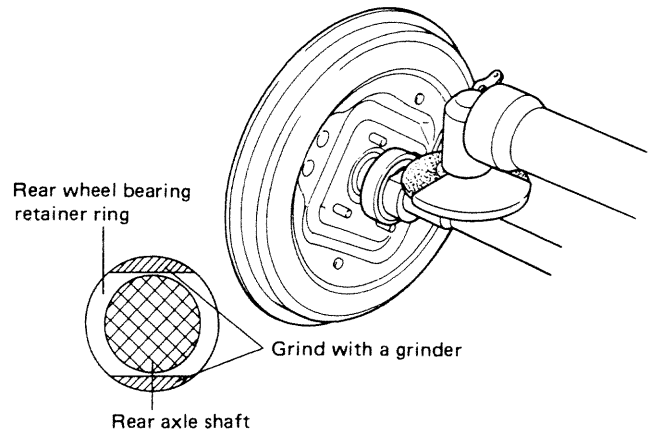


Fig. 17-2-9

Break with a chisel the thin ground retainer ring, and it can be removed.

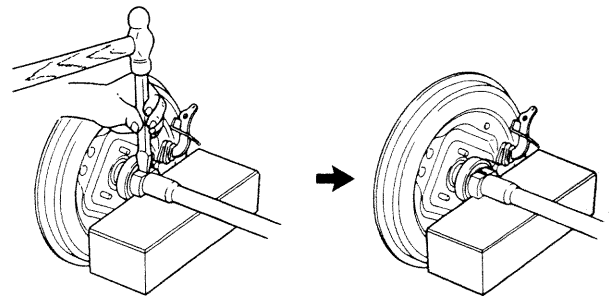


Fig. 17-2-10

- 6) Using special tools (C and D), remove bearing from shaft and then remove brake back plate.

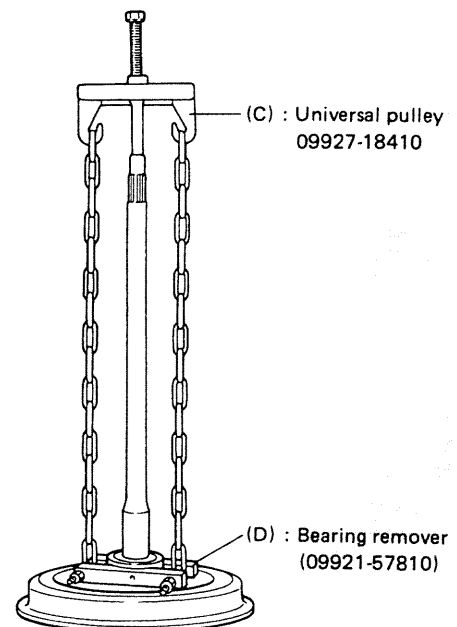


Fig. 17-2-11

INSTALLATION

Reverse removal procedure observing each precaution.

Rear shaft oil seal

- * Install oil seal so that the side with spring "A" faces differential side. Also, before its installation, be sure to apply SUZUKI SUPER GREASE A (99000-25010) to its lip as shown below.



- * Press-fit oil seal until it contacts oil seal protector.

Brake backing plate

When fitting brake backing plate onto the hub, apply SEALING COMPOUND 366E (99000-31090) to mating surfaces of both parts. This is to make brake drum watertight.

18 – 28 N·m
1.8 – 2.8 kg-m
13.5 – 20.0 lb-ft

Rear hub bolt & nut

When mounting hub bolts into rear axle shaft, make sure to fit the head securely in the stepped part of axle shaft.

50 – 80 N·m
5.0 – 8.0 kg-m
(36.5 – 57.5 lb-ft)

Wheel nut

50 – 80 N·m
5.0 – 8.0 kg-m
(36.5 – 57.5 lb-ft)

Rear brake drum

When installing drum, be careful not to let any foreign matter enter where drum and rear axle shaft contact.

Rear wheel bearing spacer

Install wheel bearing spacer with the tapered side of its inner diameter directed toward outside, or brake drum side.

Leaf spring U bolts & nuts

60 – 80 N·m
6.0 – 8.0 kg-m
(43.5 – 57.5 lb-ft)

Tighten 4 U bolt nuts uniformly so that measurement "B" is the same among the 4.

Fig. 17-2-12

Differential oil filler & level plug

35 – 50 N·m
3.5 – 5.0 kg·m
(25.5 – 36.0 lb·ft)

Oil drain plug

18 – 25 N·m
1.8 – 2.5 kg·m
13.5 – 18.0 lb·ft

Rear leaf spring center bolt & nut

Securely fit bolt head and nut in the hole of spring seats and then tighten U bolt nuts to specified torque.

Leaf spring shackle plate

Install plates with their backs directed to each other.

Shock absorber nut

35 – 55 N·m
3.5 – 5.5 kg·m
25.5 – 39.5 lb·ft

Leaf spring bolts & nuts

60 – 85 N·m
6.0 – 8.5 kg·m
(43.5 – 61.0 lb·ft)

- Mount leaf spring bolts (right & left) from the outside of the car toward the inside.
- Tighten leaf spring nut to specified torque in unladen state.

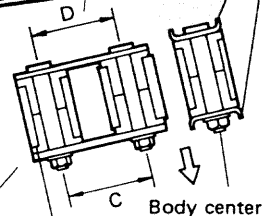
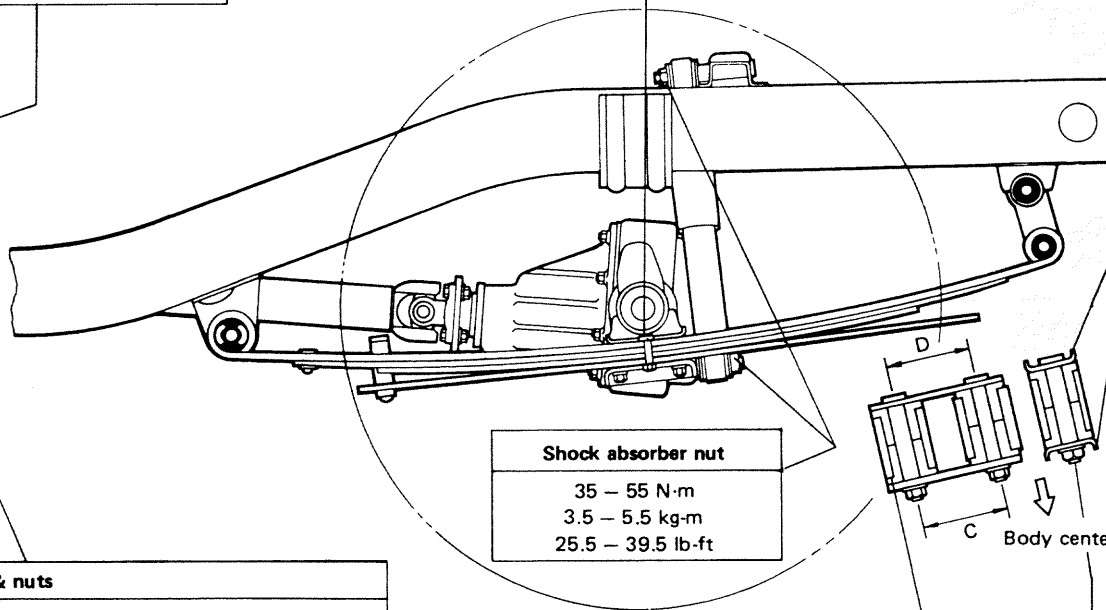
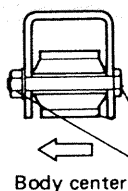
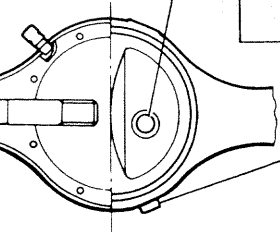
Shackle pin bushes

Press-fit shackle pin bushes. Some water or soapy water applied to bushes will make work easier.
NOTICE: Never apply any kind of oil to bushes.

Shackle pin & nuts

30 – 55 N·m
3.0 – 5.5 kg·m
(22.0 – 39.5 lb·ft)

- Install shackle pins, both right and left, from the outside of the car toward the center.
- Tighten shackle pin nuts to specified torque in unladen state.
- When shackle pins are inserted, make sure that the difference (C – D) is within $-0.3 \sim +0.3$ mm ($-0.024 \sim +0.024$ in.).



17-3. MAINTENANCE SERVICES

Shock Absorber

- 1) Inspect for deformation or damage.
- 2) Inspect bushings for wear or damage.
- 3) Inspect for evidence of oil leakage.

Replace any defective part.

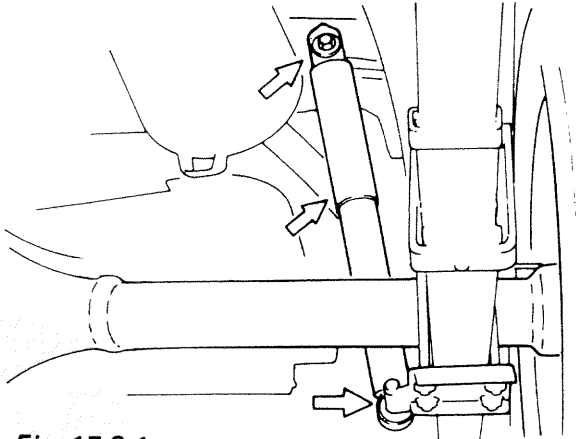


Fig. 17-3-1

WARNING:

When handling rear shock absorber in which high-pressure gas is sealed, make sure to observe the following precautions.

- 1) Don't disassemble it.
- 2) Don't put it into the fire.
- 3) Don't store it where it gets hot.
- 4) Before disposing it, be sure to drill a hole in it where shown by an arrow in the figure below and let gas and oil out. Lay it down sideways for this work.

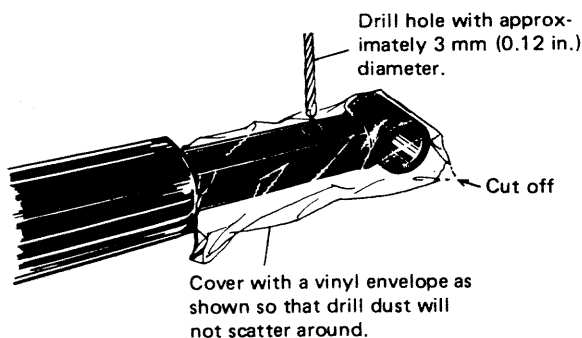


Fig. 17-3-2

Leaf Spring and Bumper

- 1) Inspect leaf spring for crack, wear and damage.

NOTE:

Special attention must be paid to that part as indicated by "A" in below figure (where each end of the shorter leaf contacts).

- 2) Inspect bumper for damage.
If found defective, replace.

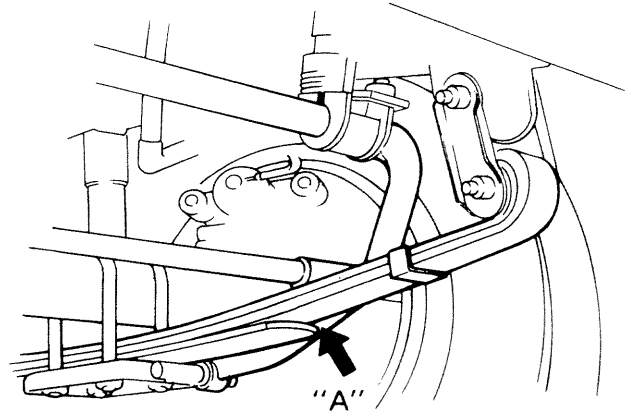


Fig. 17-3-3

Front Wheel Bearing

[Inspection]

- (1) To check wheel bearings, jack up front end. Spin wheel and check if it is spun smoothly and is free from abnormal noise. If it isn't, replace wheel bearing.

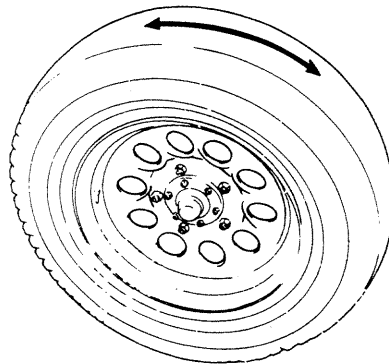


Fig. 17-3-4

- (2) Upon completion of the check in above(1), check each joint of steering system for tightness, each ball stud of the steering link as well as each kingpin for rattle. Then check bearing as described below.

- 1) Shake wheel in the direction indicated by an arrow in below figure to see if bearing rattles.

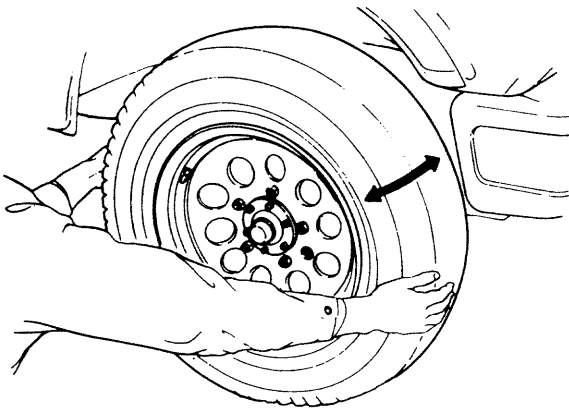


Fig. 17-3-5

- 2) Shake wheel in the direction indicated by an arrow in below figure to see if bearing rattles.

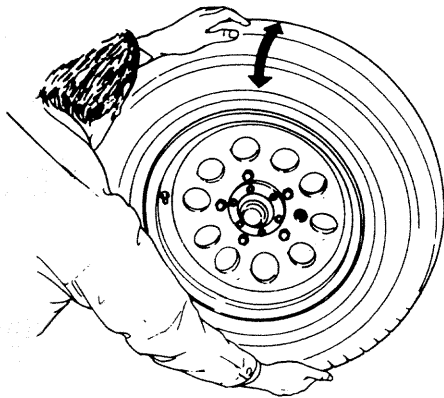


Fig. 17-3-6

- 3) If bearing rattles, check bearing preload with wheel, drive flange or free wheeling hub (if equipped) and brake caliper & holder removed as shown in below figure.

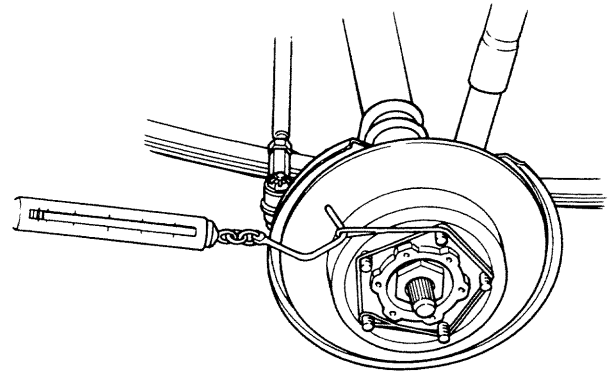


Fig. 17-3-7

Wheel bearing starting preload	1.0 – 3.0 kg (2.2 – 6.6 lb)
--------------------------------	--------------------------------

If preload is not within the above specification, adjust bearing preload according to following "adjustment".

[Adjustment]

- (1) After removing wheel bearing lock nut and lock washer, tighten bearing nut ① to the torque of 80 N·m (8.0 kg·m, 57.5 lb-ft) while spinning hub by hand. Next, loosen the nut until the torque becomes 0 N·m (0 kg·m, 0 lb-ft) and then tighten it again to tightening torque specified below.

In this way, an appropriate bearing preload is obtained.

Wheel bearing nut ① tightening torque	10.0 – 15.0 N·m 1.0 – 1.5 kg·m (7.5 – 10.5 lb-ft)
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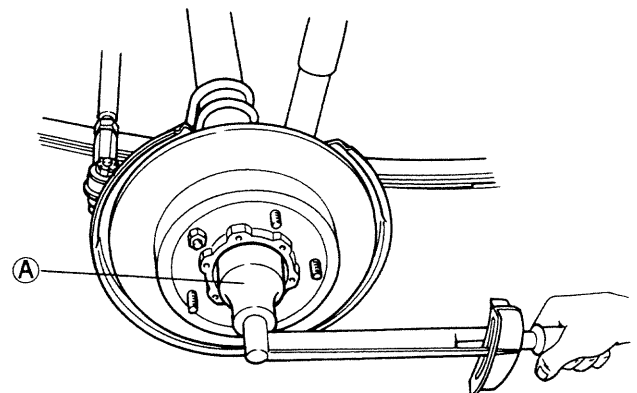


Fig. 17-3-8 ① Special tool (Front Wheel Bearing nut socket wrench 09941-58010)

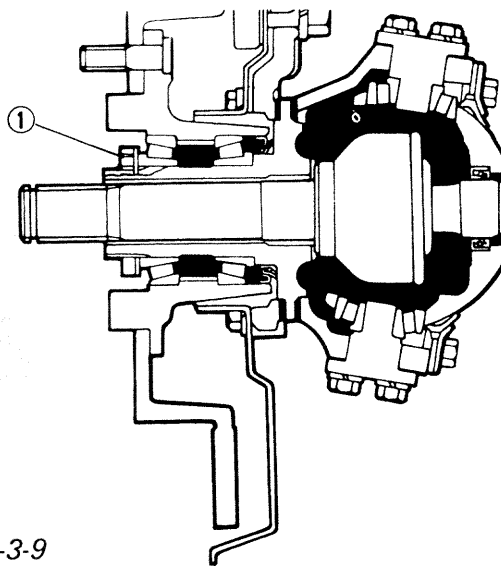


Fig. 17-3-9

- (2) Be sure to insert lock washer after adjustment and tighten lock nut ② to specified torque. Then bend a part of lock washer toward bearing nut (body side) and another part toward lock nut (outside) so that these 2 nuts are locked.

Wheel bearing lock nut	60 – 90 N·m
② tightening torque	6.0 – 9.0 kg-m (43.5 – 65.0 lb-ft)

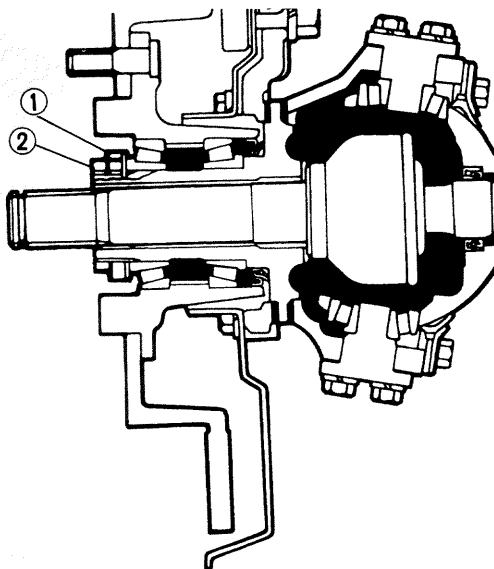


Fig. 17-3-10 ① Wheel Bearing Nut
② Wheel Bearing Lock Nut

- (3) Recheck that bearing starting preload is within specification.
(4) Upon completion of adjustment, be sure to install axle shaft drive flange or free wheeling hub (if equipped), circlip, disc brake caliper & holder and wheel.

Refer to "INSTALLATION" in this section.

King Pin

[Inspection and adjustment]

Where tapered roller bearings holding 2 kingpins at each front wheel are in good and properly preloaded (tightened) condition, there will be no appreciable rattle of wheel. To check kingpins and their tapered roller bearings, jack up the front end and shake wheel to feel any rattle, as shown in figure. If rattle is felt, eliminate it by properly decreasing the shim thickness. The shim is located between flanged part of kingpin and knuckle.

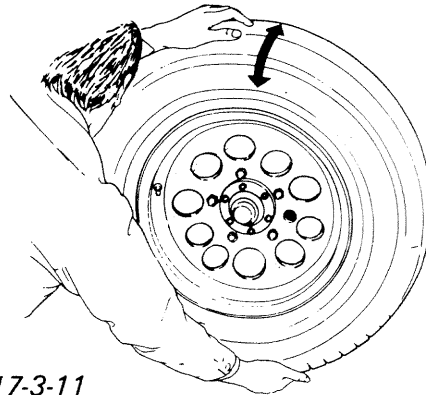


Fig. 17-3-11

The above-mentioned method of making a shim adjustment demands a high degree of skill on the part of the serviceman. The alternative method is to adjust shim thickness by referring to the torque resistance which knuckle arm offers when pulled in the condition shown in figure. For this method, the reference torque value is established as indicated below, and you are to increase or decrease shim thickness to produce this torque value.

NOTE:

After removing wheel and steering knuckle oil seal and disconnecting tie rod end, this checking and adjustment should be carried out.

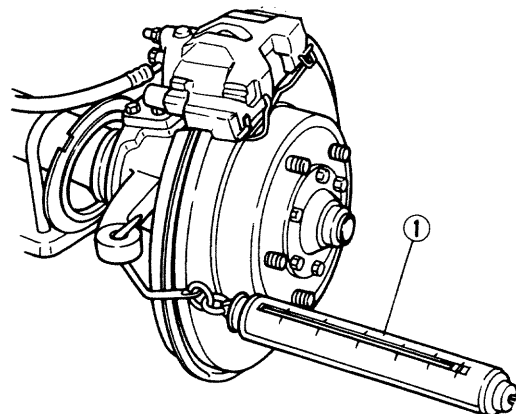


Fig. 17-3-12 ① Spring Balance

Before giving a test pull to knuckle arm with a spring balance in the alternative method, install a large amount of shims on each kingpin to lighten preload on tapered roller bearing. Keep on reading the torque, each time decreasing shim thickness a little, and continue this process until specified torque value is obtained. (This process protects kingpins because it ensure that no excessive pull will be applied to bearings at the onset.) If the process fails to produce specified torque, that is, if desired torque resistance does not occur even when shim thickness has been reduced to zero on each kingpin, it means that bearings or kingpins are excessively worn and need replacement.

NOTE:

- Read spring balance indication when knuckle arm begins to turn. In other words, you are to read "starting torque."
- When checking knuckle arm starting torque, be sure to have axle hub oil seal removed and tighten king pin bolts to specified torque.

Knuckle arm starting torque (force)	1.0 – 1.8 kg (2.20 – 3.96 lb) without oil seal
Available sizes of shim for kingpins	0.1, 0.5 mm (0.004, 0.02 in.)

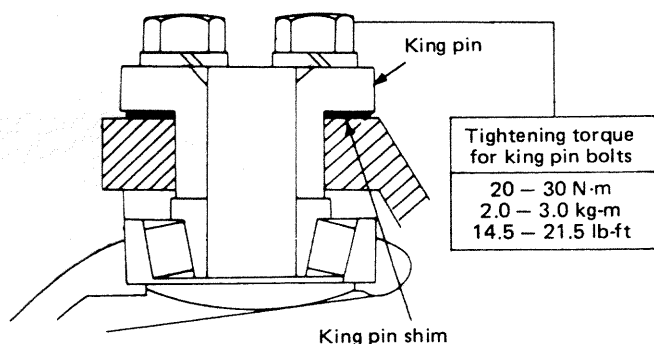


Fig. 17-3-13

Upon completion of this check and/or adjustment, be sure to connect tie rod end to steering knuckle and install oil seal retainer, oil seal, felt packing oil seal cover and wheel. Refer to "INSTALLATION" in this section.

Steering Knuckle Oil Seal

The oil seal used at the spherical sliding joint between knuckle and inner case accomplishes additional purposes of keeping out road dust and of acting as the damper for steering hand-wheel. As wear of this seal advances, its damping effect decreases and thus makes front wheel develop a tendency to "shimmy" not only that road dust begins to creep into sliding clearance to promote wear of spherical sliding surfaces.

The oil seal is an expendable item, and must be replaced at regular intervals.

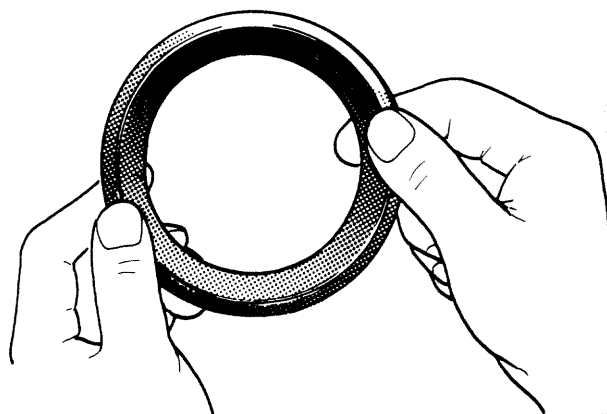


Fig. 17-3-14

[How to replace oil seal]

- 1) Remove 8 bolts securing joint seat, and displace oil seal cover and felt packing inward.

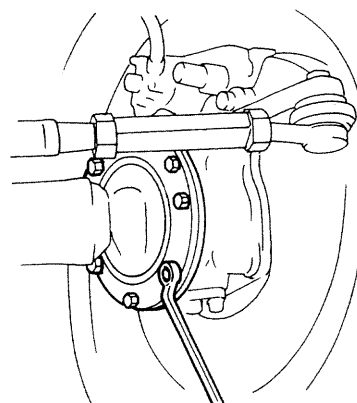


Fig. 17-3-15

- 2) Cut oil seal in place with scissors or a knife, and take it off.
- 3) Cut replacement oil seal at one place with scissors or a knife as shown in below figure.
- 4) Install the seal in oil seal retainer, bringing the cut portion to top side and locating it about 30 degrees off the matching face of oil seal retainer.

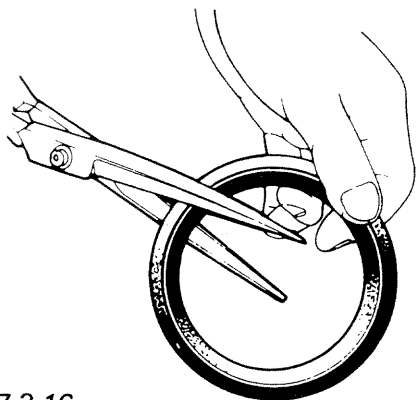


Fig. 17-3-16

- 5) Apply grease to inside of oil seal. Apply sealing compound to mating face all around: this is for preventing entry of water.

- SEALING COMPOUND "CEMEDINE" 366E (99000-31090)
- SUZUKI SUPER GREASE H (99000-25120).

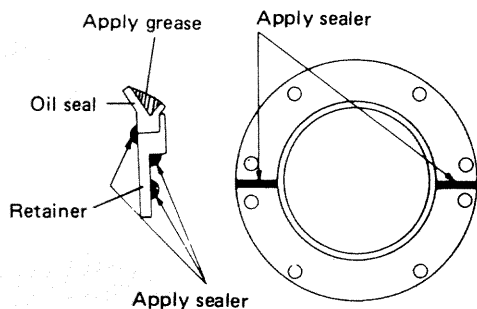


Fig. 17-3-17

- 6) Tighten joint seat securing bolts to specified torque.

Rear Wheel Bearing

- 1) Check wheel bearings for wear. When measuring thrust play, apply a dial gauge to drum center.

Thrust play Limit	Rear	0.8 mm (0.03 in.)
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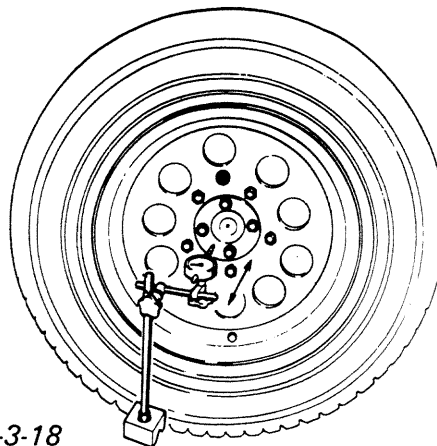


Fig. 17-3-18

When measurement exceeds limit, replace bearing.

- 2) By rotating wheel actually, check wheel bearing for noise and smooth rotation. If it is defective, replace bearing.

Bolts and Nuts

Check following bolts and nuts for tightness and retighten them to specified torque as necessary.

Fastening parts	Tightening torque
① Shackle pin nut	Refer to "RECOMMENDED TORQUE SPECIFICATIONS" in this section.
② Leaf spring nut	
③ Leaf spring U bolt nut	
④ Wheel nut	
⑤ Front axle shaft drive flange bolt	
⑥ Kingpin upper & lower bolt	
⑦ Rear hub nut	

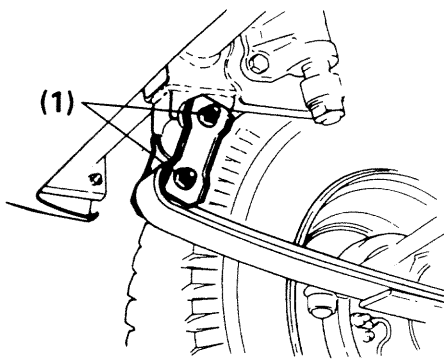


Fig. 17-3-19

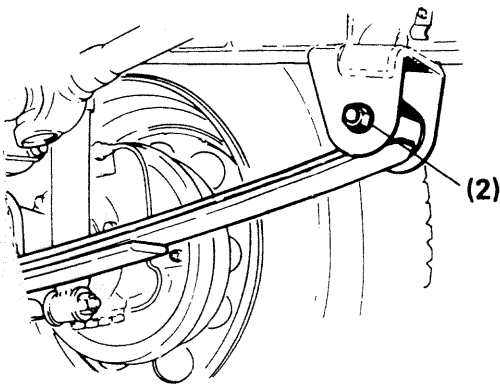


Fig. 17-3-20

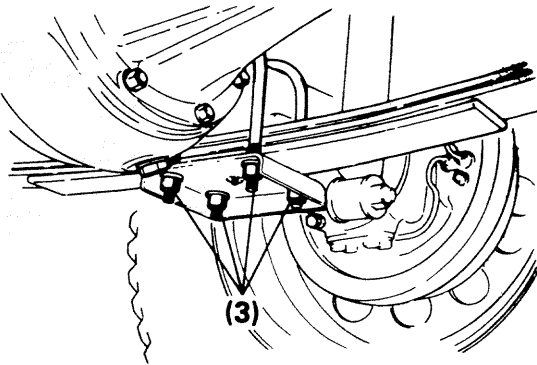


Fig. 17-3-21

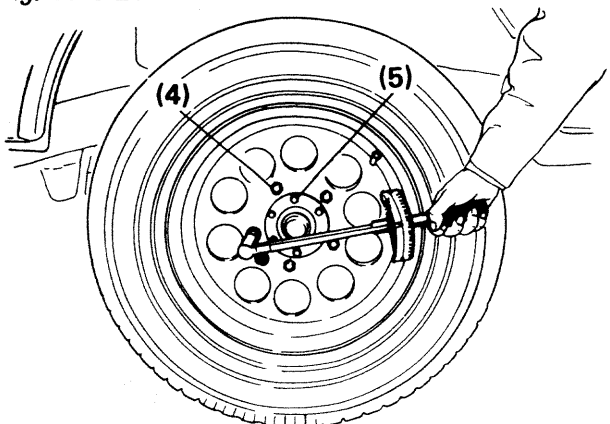


Fig. 17-3-22

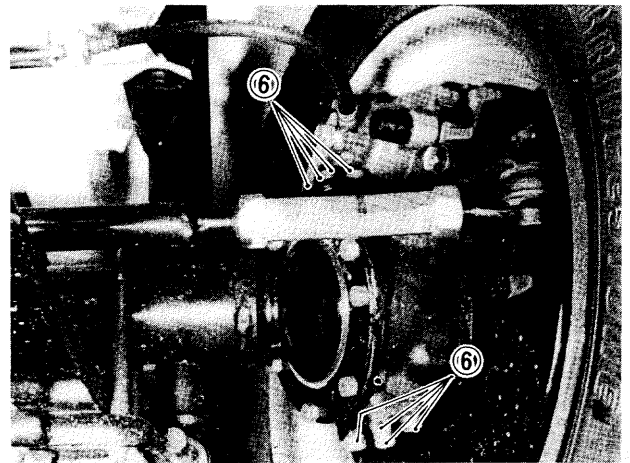


Fig. 17-3-23

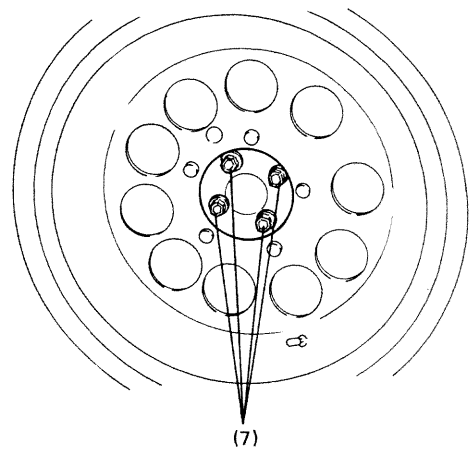


Fig. 17-3-24

17-4. RECOMMENDED TORQUE SPECIFICATIONS

Fastening parts	Tightening torque		
	N·m	kg-m	lb-ft
Schackle pin nut	30 – 55	3.0 – 5.5	22.0 – 39.5
Leaf spring nut	60 – 85	6.0 – 8.5	43.5 – 61.0
Leaf spring U bolt nut	60 – 80	6.0 – 8.0	43.5 – 57.5
Wheel nut	50 – 80	5.0 – 8.0	36.5 – 57.5
Front axle shaft drive flange bolt	20 – 30	2.0 – 3.0	14.5 – 21.5
Kingpin upper & lower bolts	20 – 30	2.0 – 3.0	14.5 – 21.5
Joint seal bolt	8 – 12	0.8 – 1.2	6.0 – 8.5
Front & rear shock absorber lower nut	35 – 55	3.5 – 5.5	22.5 – 39.5
Front shock absorber upper lock nut	22 – 35	2.2 – 3.5	16.0 – 25.0
Front leaf spring bumper bolt	18 – 28	1.8 – 2.8	13.5 – 20.0
Stabilizer bolt	70 – 90	7.0 – 9.0	51.0 – 65.0
Stabilizer nut	22 – 35	2.2 – 3.5	16.0 – 25.0
Stabilizer mount bracket bolt	18 – 28	1.8 – 2.8	13.5 – 20.0
Front wheel bearing nut	10 – 15	1.0 – 1.5	7.5 – 10.5
Front wheel bearing lock nut	60 – 90	6.0 – 9.0	43.5 – 65.0
Differential oil drain plug	18 – 25	1.8 – 2.5	13.5 – 18.0
Differential oil filler & level plug	35 – 50	3.5 – 5.0	25.5 – 36.0
Rear hub nut	50 – 80	5.0 – 8.0	36.5 – 57.5

17-5. FRONT FREE WHEELING HUB (OPTIONAL)

General Description

This section describes operation, installation and maintenance of free wheeling hub. Be sure to refer to this section carefully for proper service.

Operation

A free wheeling hub should be fitted onto each of the right and left front wheel hubs. The free wheeling hub has a knob and two embossed marks, "FREE" and "LOCK". When the knob is set to the "FREE" position, the axle shaft and wheel are disconnected and the revolution of the front wheels becomes free. When it is set to the "LOCK" position, the axle shaft and wheel are connected.

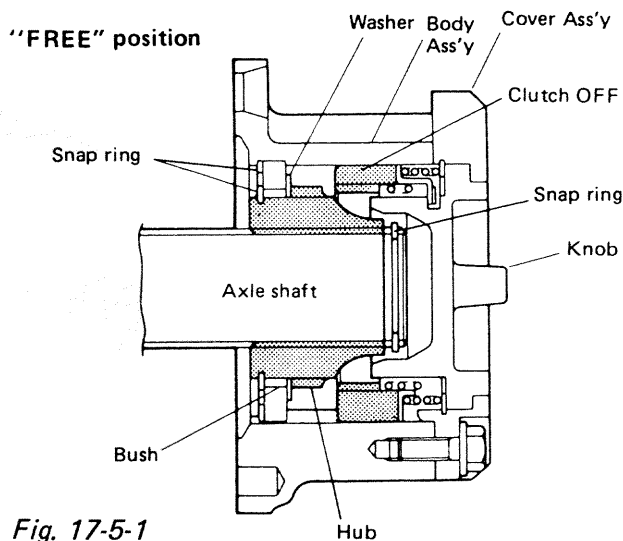


Fig. 17-5-1

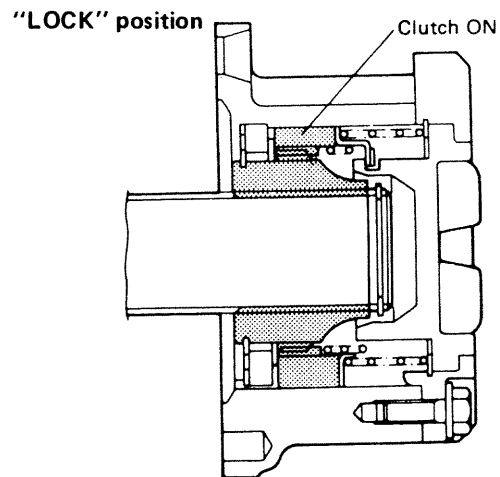


Fig. 17-5-2

For their usage, refer to Owner's Manual supplied with the car.

CAUTION:

Both of the right and left wheeling hub knobs must be set to the same position (either FREE or LOCK). Don't set one to 'FREE' and the other to "LOCK" positions.

Installation Instruction

After removing front axle shaft drive flange, install parts (shown in below figure) in accordance with the following procedure.

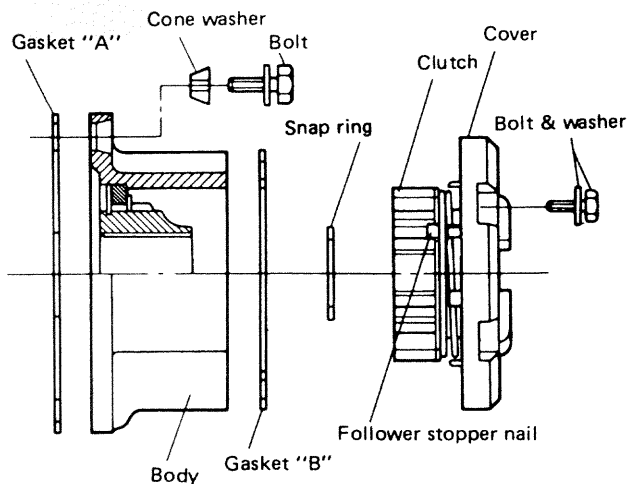


Fig. 17-5-3

- 1) After aligning "▽" mark on the knob of free wheeling hub cover with "FREE" position, separate free wheeling cover ass'y from body ass'y.
- 2) To facilitate installation, apply sealing compound 366E (99000-31090) thin.

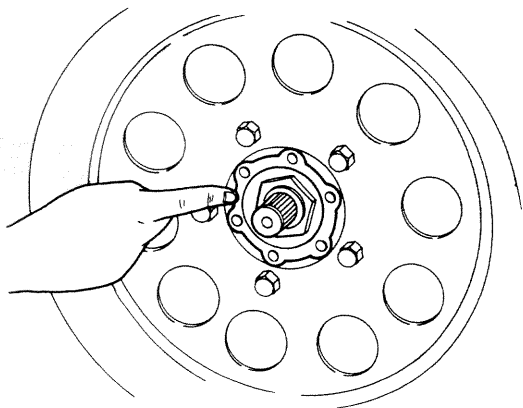


Fig. 17-5-4

- 3) Install gasket "A" and free wheeling hub body ass'y on front wheel hub.

Tightening torque	N·m	kg·m	lb·ft
	20 - 30	2.0 - 3.0	14.5 - 21.5

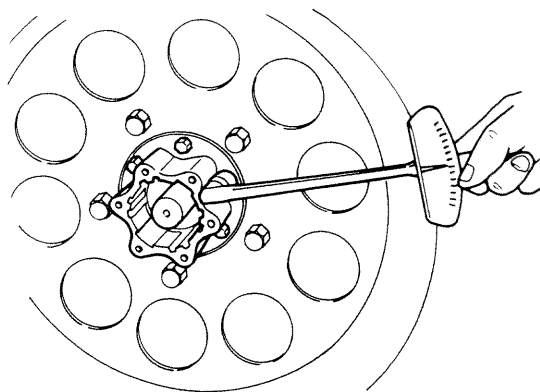


Fig. 17-5-5

- 4) Put bolt ① into front axle shaft and pull out the shaft and fit snap ring in the groove of axle shaft.
Remove bolt ① from axle shaft.

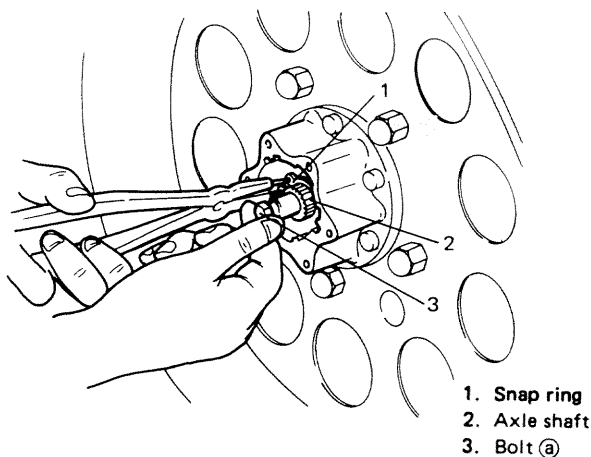


Fig. 17-5-6

- 5) Install cover ass'y to body ass'y so that follower stopper nail is fitted into groove of body ass'y.

NOTE:

Before installing cover ass'y, make sure of following points.

- "▽" mark on knob is at "FREE" position.
- Clutch is lifted to the cover side, if not (shown in below figure) it may cause malfunction.
- Gasket is set justly.

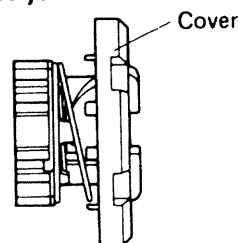


Fig. 17-5-7

There are two follower stopper nails and two grooves which can be fitted freely.

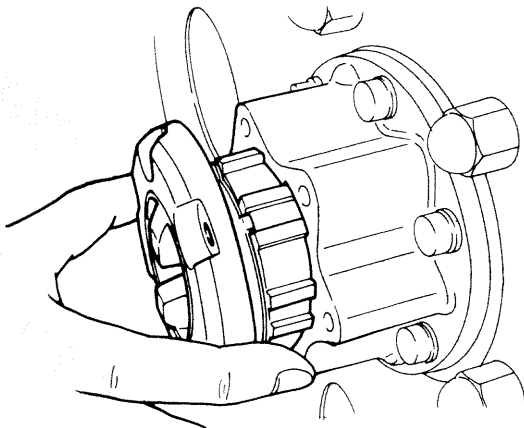


Fig. 17-5-8

6) Fix cover ass'y to body ass'y with cover bolts.

Tightening torque

Cover bolts	N·m	kg·m	lb·ft
	8-12	0.8-1.2	6.0-8.5

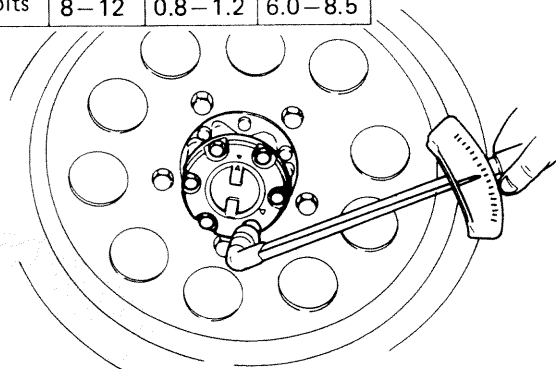


Fig. 17-5-9

7) To check free wheeling hub operation, jack up the front end, move the knob of free wheeling hub between "FREE" and "LOCK" positions and check for smoothness. Also check if wheel operates correctly with the knob at "FREE" and "LOCK" positions and by rotating wheel by hand.

Maintenance Service

The car equipped with free wheeling hubs are subject to the following periodical checks.

To check free wheeling hubs operation, jack up the front end, move the knob of free wheeling hub between "FREE" and "LOCK" positions

and check for smoothness. Also check if wheel operates correctly with the knob at "FREE" and "LOCK" positions and by rotating wheel by hand.

Should the check result be unsatisfactory, remove free wheeling hub cover and grease each sliding surface with SUZUKI SUPER GREASE A (99000-25010) or multipurpose grease after cleaning each sliding part.

If faulty operation is still noted even after greasing, correct defective part or replace it with a new one.

CAUTION:

Hubs should not be packed with grease.

For installation, refer to "Installation Instruction" in this section.

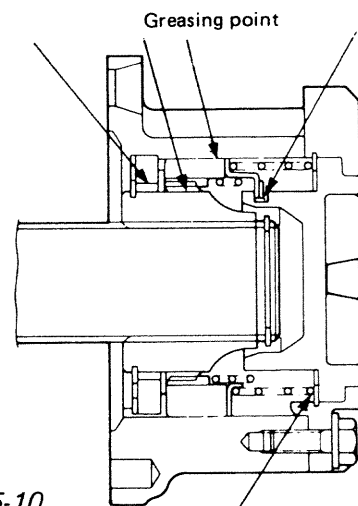


Fig. 17-5-10

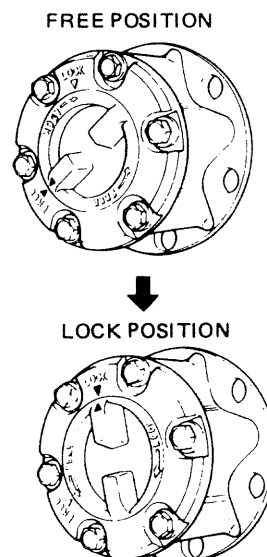


Fig. 17-5-11

SECTION 18

STEERING SYSTEM

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18-1. GENERAL DESCRIPTION	18-2
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18-3. STEERING GEAR BOX CONSTRUCTION AND OPERATION ...	18-5
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NOTE:

All steering system fasteners are important parts in that they could affect the performance of vital parts and systems, and/or could result in major repair expense. They must be replaced with one of the same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of this part.

18-1. GENERAL DESCRIPTION

The rotary motion of the steering handwheel is carried to the steering shaft upper, steering shaft lower, steering gear box and pitman arm. Then as the pitman arm moves, the drag rod is caused to move linearly, actuating the tie rod to turn the wheels, right and left, through their knuckle arms. The turning force exerted by the tie rod experiences a damping action due to the presence of the oil seal at the sphere-like joint between the knuckle case and the inner case (integral with the dead axle sleeve). Another damping action is available, which will be mentioned below.

The steering system formed by the components named above is designed for easy steering, high durability and excellent steering reaction as well as reliable self-restoring action. Articulated joints in the steering lever is equipped with a damping device for ensuring the greater steering stability.

Linkage are of wear-resistant ball-and-socket type. Pitman arm is equipped with a damping device for ensuring the greater steering stability.

[Right-hand steering vehicle]

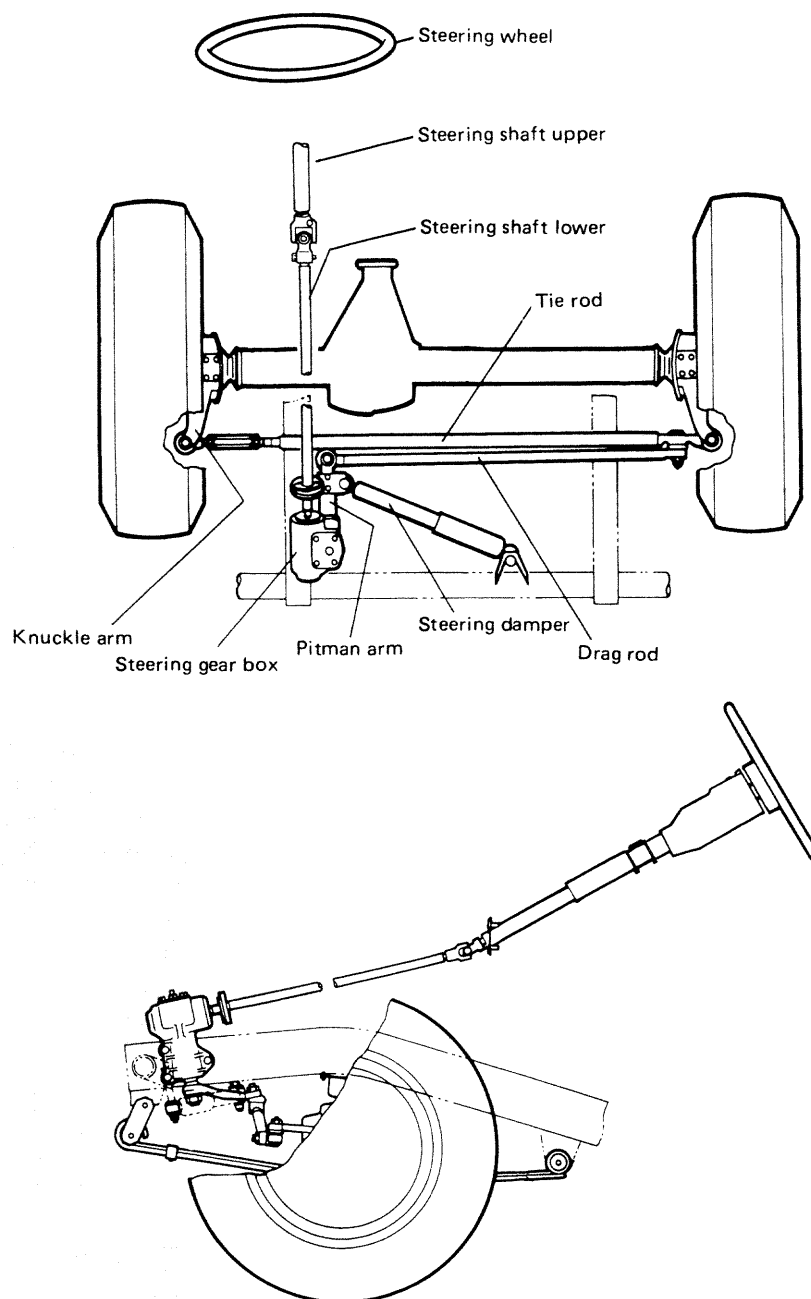


Fig. 18-1

[Left-hand steering vehicle]

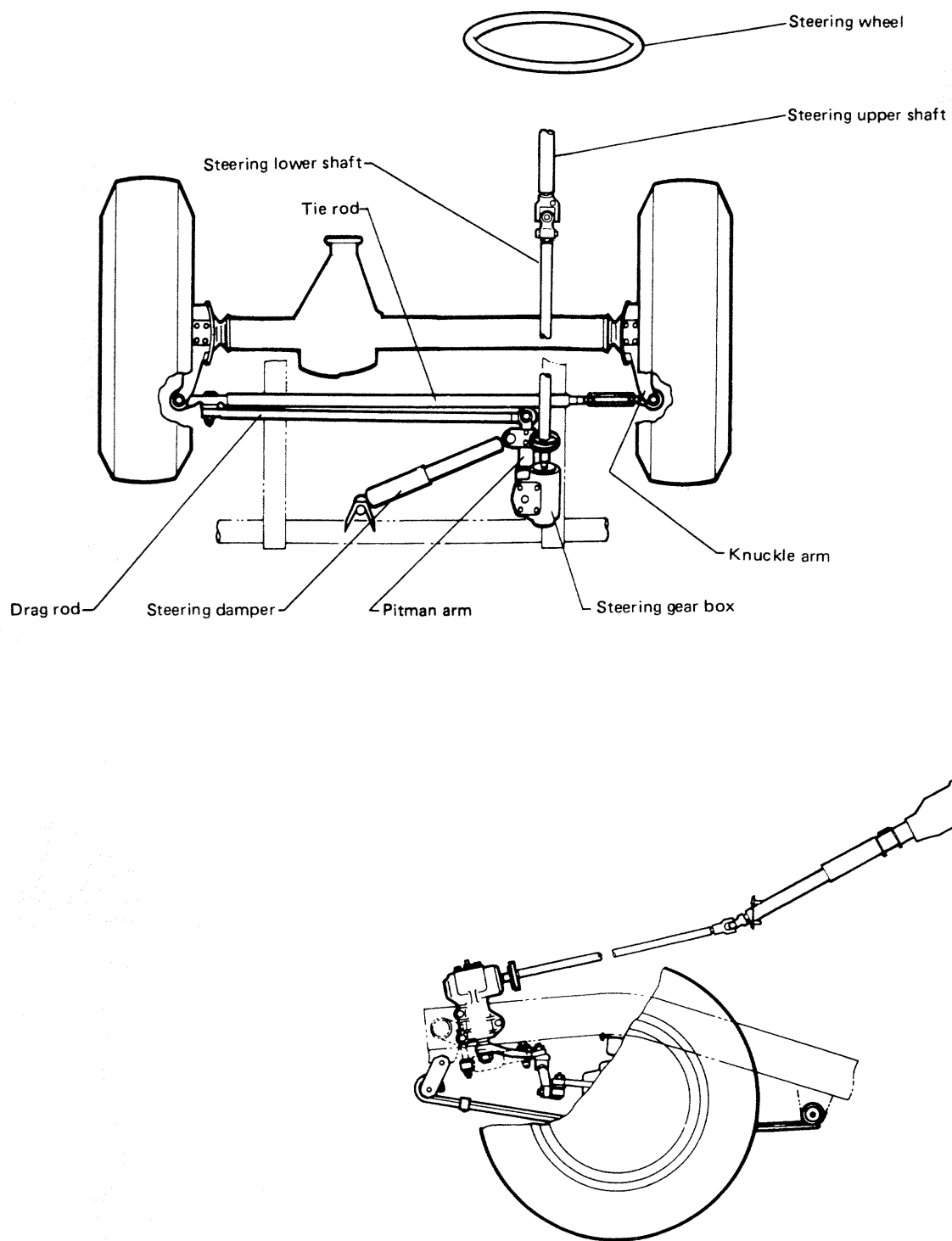


Fig. 18-1-1

18-2. SPECIFICATIONS AND DATA

Steering gear box		Recirculating ball-and-nut type
Gear ratio		15.6 – 18.1
Steering angle, inside		$29^{\circ} \pm 3^{\circ}$
Steering angle, outside		$26^{\circ} \pm 3^{\circ}$
Steering wheel diameter		400 mm (15.74 in.)
Minimum turning radius		5.1 m (16.73 ft.)
WHEEL ALIGNMENT	Toe-in	2 – 6 mm (0.079 – 0.236 in.)
	Camber	1 degree (1°) \pm 45'
	Kingpin inclination	9 degree (9°) \pm 2°
	Caster	3 degree 30 minutes ($3^{\circ} 30'$) \pm 1°
	Side slip	0 – in 3 m/km

18-3. STEERING GEAR BOX CONSTRUCTION AND OPERATION

The pitman arm is rigidly connected to the outer end of the shaft integral with the sector gear, which is inside the gear box and meshed with the teeth of the nut capable of sliding along the worm. Between the nut and the worm is a row of steel balls, which serves two purposes: to provide rolling contact between nut and worm and to keep the nut engaged with the worm as if the two were threadedly engaged. With the nut prevented from turning, the rotation of the worm causes the nut to move up or down the worm.

The worm is an extension of the steering shaft. As the handwheel is turned, the steel balls roll along in the groove and the nut moves up or down. The steel ball that has reached the end of the groove in the nut enters the return guide. The guide sends the ball back to the other end of the same groove. In this way, the row of balls recirculates.

By so moving, the nut turns the sector gear and hence the pitman arm. It should be noted here that it is through the steel balls that a rotary motion of the worm is converted into a linear motion of the nut, which is then converted into another rotary motion of the section gear.

The steering gear box is a precision-machined device, each part of it being machined to a closer tolerance for smooth conversion of motion, and is build sturdy for long service life. Special tools and instruments are needed in addition to specialized skill if the gear box is to be overhauled. For this reason, a gear box found to be in defective condition should be replaced with a new one; replacement is more economical and what is perhaps more important, safer.

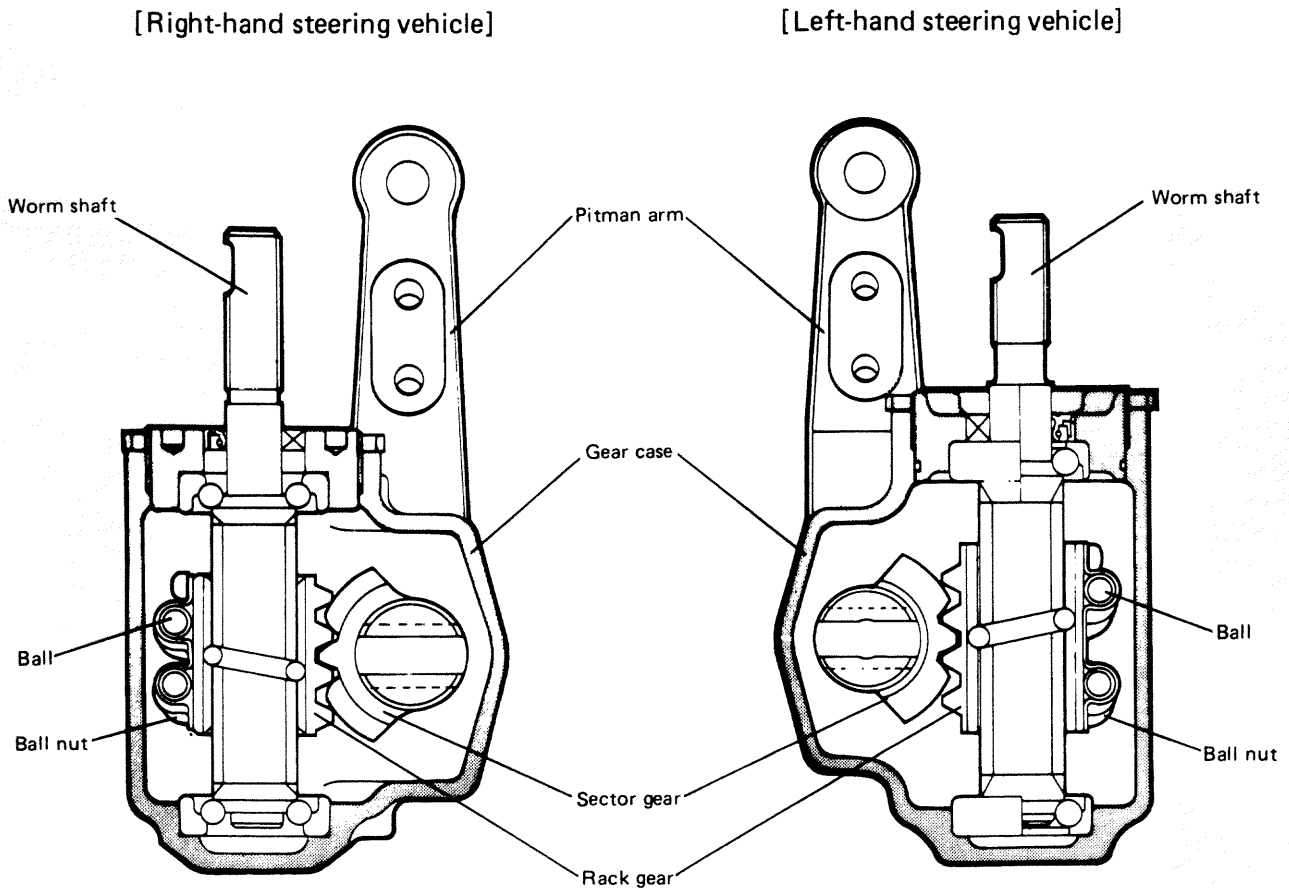


Fig. 18-2

18-4. REMOVAL

NOTE:

When removing the column assembly from the car, special care must be taken in handling it. Use of a steering wheel puller other than the steering wheel remover recommended in this manual or a sharp blow on the end of the steering shaft, leaning on the assembly, or dropping the assembly is prohibited. Any of such actions could shear the plastic shear pins which maintain column length especially.

Steering Hand Wheel

- 1) Disconnect negative battery cable.
- 2) Pull horn button to remove.

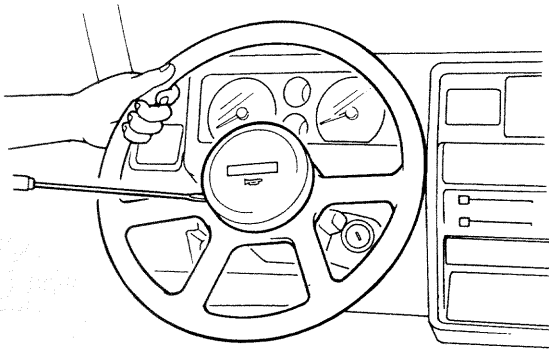


Fig. 18-3

- 3) After loosening steering shaft nut, remove steering wheel by using special tool.

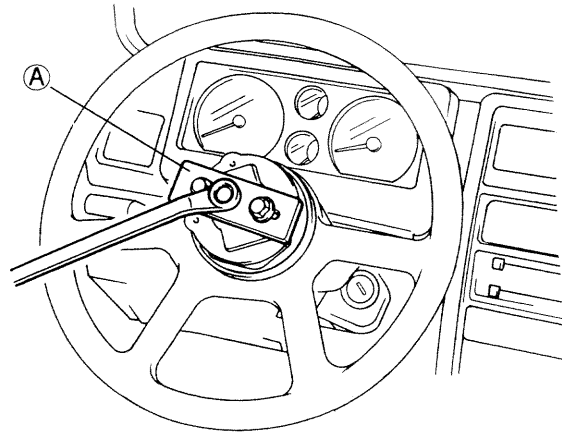


Fig. 18-4 Ⓐ Special tool (Steering wheel remover 09944-36010)

Steering Column

- 1) After removing steering handwheel according to the foregoing step, remove steering covers (lower & upper).

NOTE:

After removing instrument lower panel, loosen 2 screws and 4 nuts securing steering column to remove upper cover.

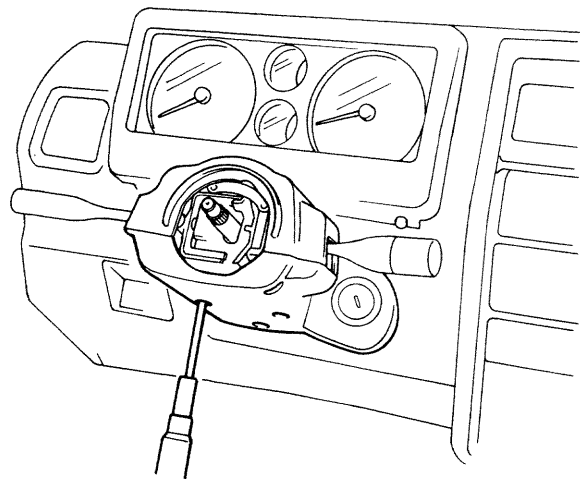


Fig. 18-5

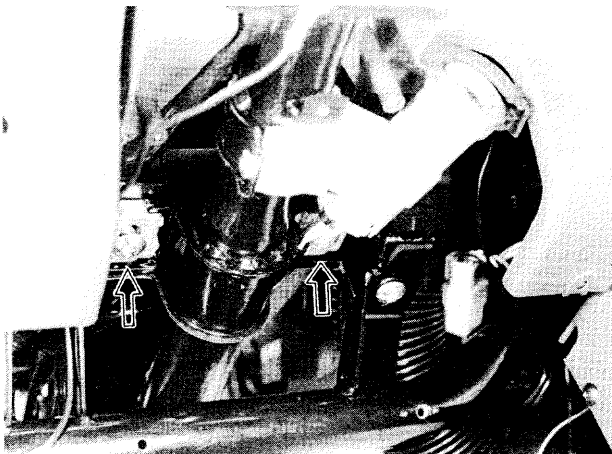


Fig. 18-6

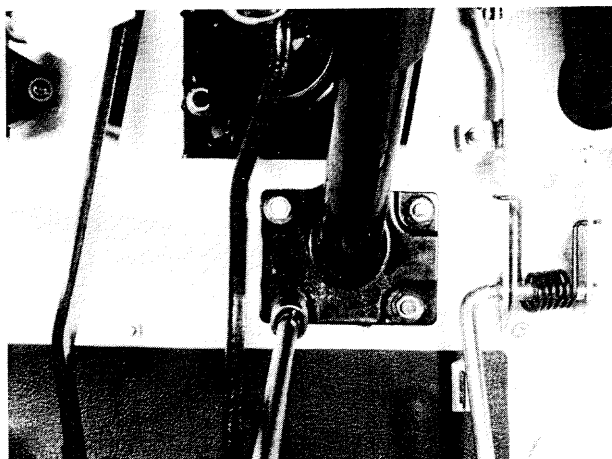


Fig. 18-7

- 2) Disconnect combination switch couplers and remove combination switch.

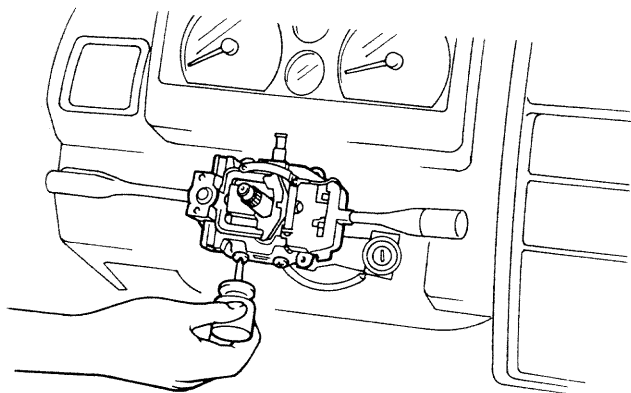


Fig. 18-8

- 3) Remove the bolt joining steering shafts in engine room.

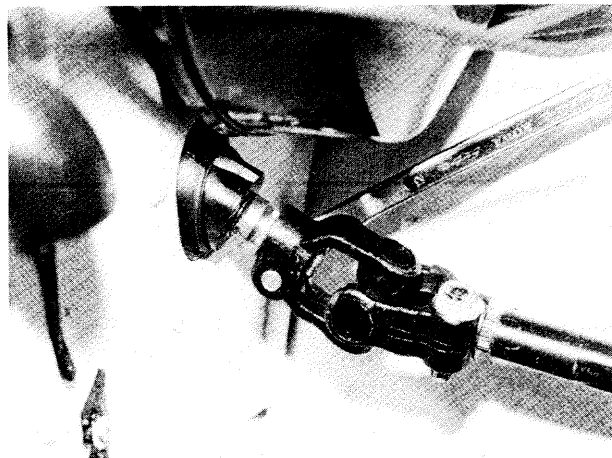


Fig. 18-9

- 4) Remove steering column ass'y.

NOTE:

- Don't separate steering column assembly into steering column and shaft. If column or shaft is defective, replace as an assembly.

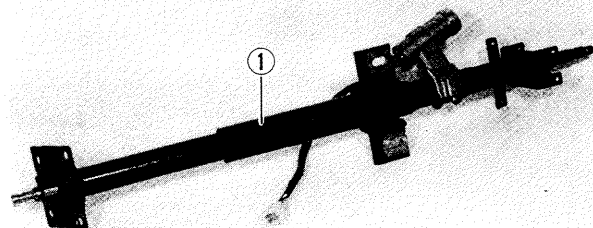


Fig. 18-10

1. Steering column ass'y

Steering Lock

- 1) After removing steering column, loosen and remove steering lock mounting bolts. Use care not to damage aluminum part of steering lock body with center punch.

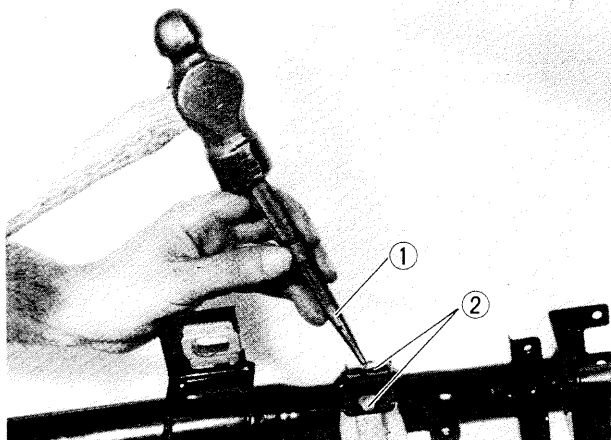


Fig. 18-11

1. Center punch (with sharp point)
2. Steering lock mounting bolts

- 2) Remove steering lock assembly from steering column.

Gear Box

- 1) Remove joint bolt.

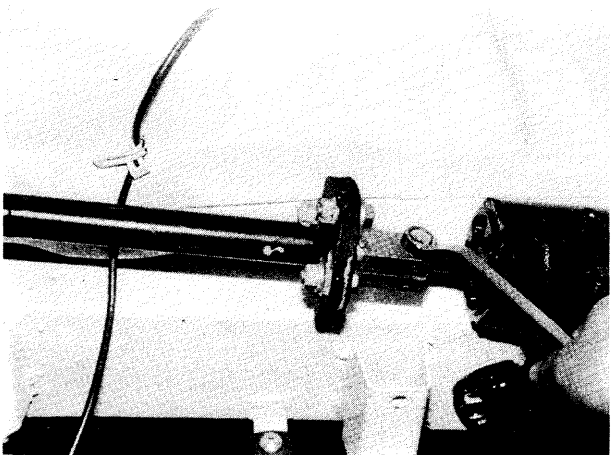


Fig. 18-12

- 2) Remove radiator under cover, and disconnect ball stud of drag rod using special tool and steering damper from pitman arm.

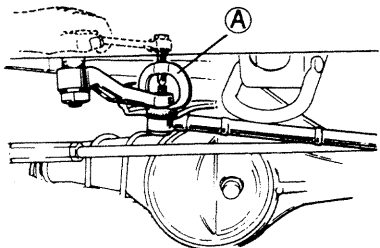


Fig. 18-13 Ⓐ Special tool (Tie-rod end remover 09913-65210)

- 3) Steering gear box is secured in place by mounting bolts. Remove these bolts and take down gear box.

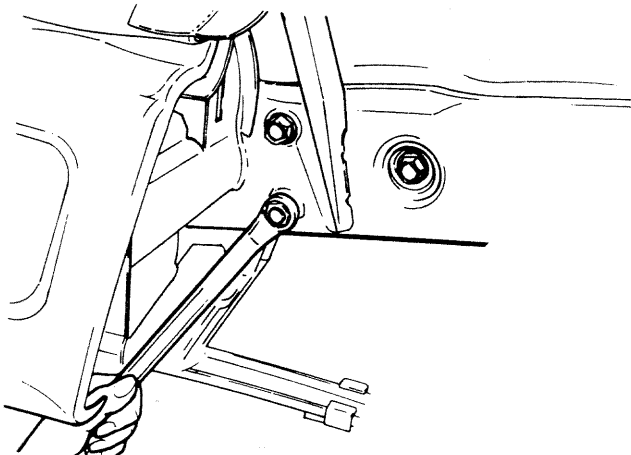


Fig. 18-14

Tie Rod and Tie Rod End

- 1) Hoist car and remove wheels.
- 2) Remove drag rod castle nut, and then remove tie rod and tie rod end using special tool.

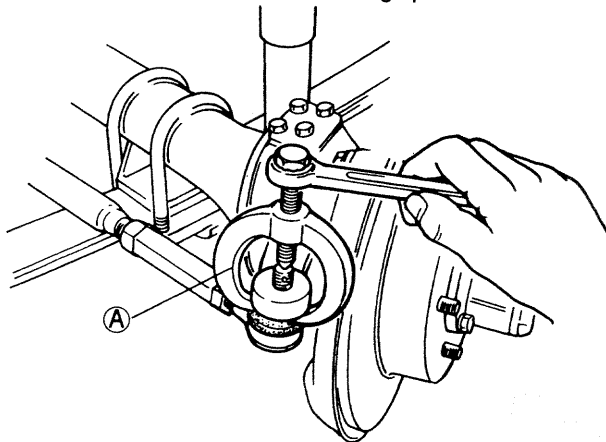
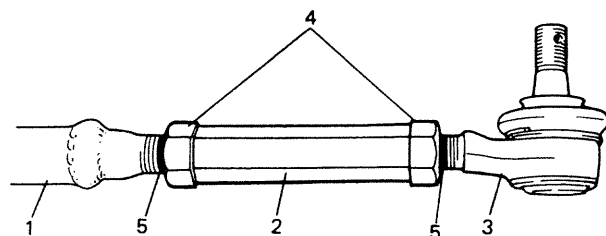


Fig. 18-15 Ⓐ Special tool (Tie-rod end remover 09913-65210)

- 3) For ease of adjustment after installation, mark tie rod and tie rod end to indicate lock nut positions. Then loosen each lock nut and separate tie rod and tie rod end.



1. Tie rod
2. Turnbuckle
3. Tie rod end
4. Lock nut
5. Marking to be made

Fig. 18-16

18-5. INSPECTION OF COMPONENTS

Steering Gear Box

[Oil level]

Oil surface should be up to the level as shown in below figures. If not, add prescribed gear oil, SAE 90.

Right hand steering vehicle

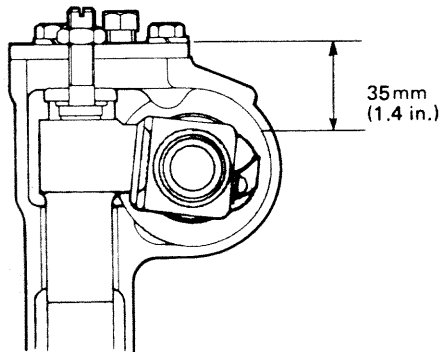


Fig. 18-17

Left hand steering vehicle

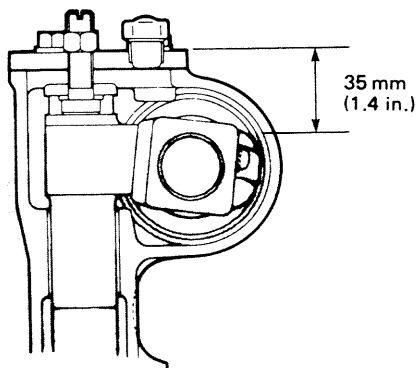


Fig. 18-18

[Adjustment of worm shaft starting torque]

The steering gear box is provided with adjusting bolt ① which gives preload to sector shaft.

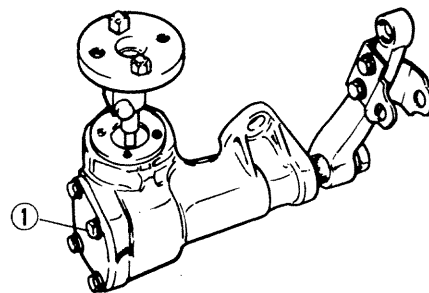


Fig. 18-19 ① Adjusting bolt

Make an adjustment according to the following procedure.

- 1) Check worm shaft to ensure that it is free from thrust play.
- 2) Position pitman arm in parallel with worm shaft as shown below.

(With pitman arm in this position, front wheel is in straightforward state.)

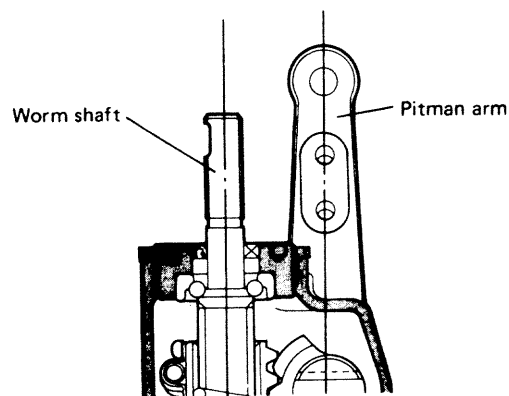
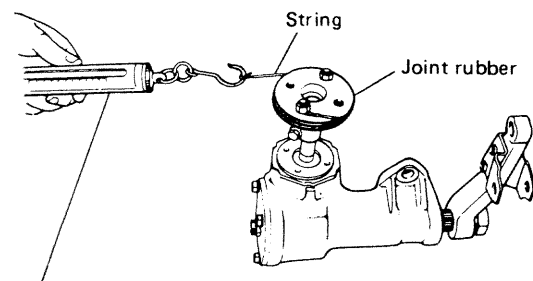


Fig. 18-20

- 3) Measure worm shaft starting torque from its position in the straightforward state in 2), using a spring balance and string as shown in below figure.



Spring balance (Use one with a maximum measurement of around 5 kg (11 lb.))

Fig. 18-21

Worm shaft (including sector shaft) starting torque (with torque wrench)	Right-hand steering vehicle 7.5 – 13.0 kg-cm (0.54 – 0.94 lb-ft)
	Left-hand steering vehicle 6.0 – 10.0 kg-cm (0.43 – 0.72 lb-ft)

Worm shaft (including sector shaft) starting torque (with spring balance)	Right-hand steering vehicle 1.97 – 3.42 kg (4.34 – 7.53 lb)
	Left-hand steering vehicle 1.58 – 2.63 kg (3.48 – 5.80 lb)

If measured torque is not within the specification, carry out adjustment with adjusting bolt ① to meet specification and check to confirm it again.

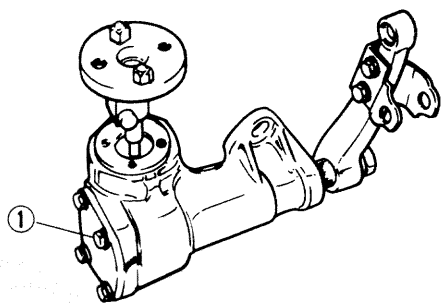


Fig. 18-22

- 4) If worm shaft starting torque is checked all right, another check should be carried out on worm shaft operating torque in its entire operating range (turning the worm shaft all the way to the right and left) as shown in Fig. 18-21.

Worm shaft (including sector shaft) operating torque (with torque wrench)	Right-hand steering vehicle Under 13.0 kg-cm (Under 0.94 lb-ft)
	Left-hand steering vehicle Under 12.0 kg-cm (Under 0.86 lb-ft)

Worm shaft (including sector shaft) operating torque (with spring balance)	Right-hand steering vehicle Under 3.42 kg (Under 7.53 lb)
	Left-hand steering vehicle Under 3.15 kg (Under 6.96 lb)

If measured torque does not conform to specification, readjust worm shaft starting torque in straightforward state by means of adjusting bolt ①, and then recheck worm shaft operating torque.

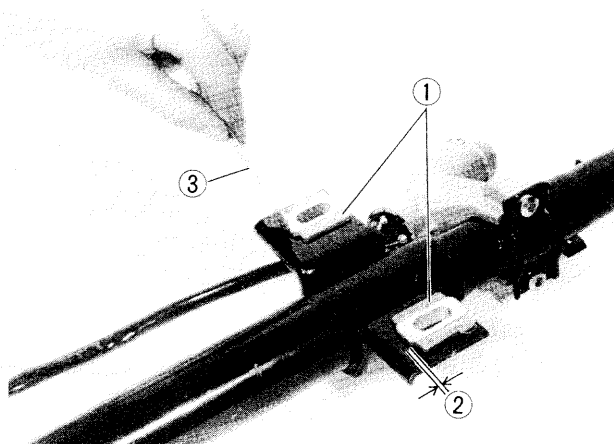
If the specified value is not attained even after readjustment, it is advisable to replace the gear box with a new gear box ass'y.

18-6. CHECKING STEERING COLUMN FOR ACCIDENT DAMAGE

Cars involved in accidents resulting in body damage or where the steering column has been impacted may also have a damaged or misaligned steering column.

Checking Procedure

1) Check capsules on steering column bracket; all should be within 1.0 mm (0.039 in) from the bottom of slots. If not, steering column assembly should be replaced. Use thickness gauge for convenience.



1. Capsules
Each capsule should be within 0 – 1.0 mm (0 – 0.039 in.) from the bottom of slot. If not, replace column assembly.
2. Within 0 – 1.0 mm (0 – 0.039 in)
3. Thickness gauge

Fig. 18-23

2) Take measurement "A" as shown. If it is shorter than specified length, replace column assembly with new one.

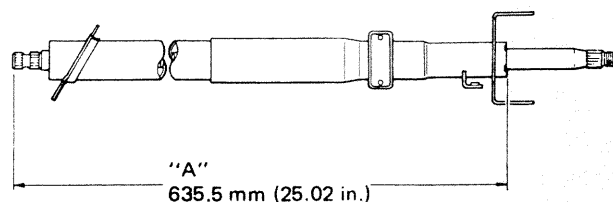


Fig. 18-24

3) Take measurement "B" of steering lower shaft as shown. If it is shorter than specified length, replace it with new one.

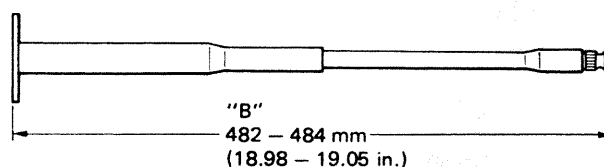


Fig. 18-25

4) Check steering shaft joints and shaft for any damages such as crack, breakage, malfunction or excessive play. If anything is found faulty, replace.

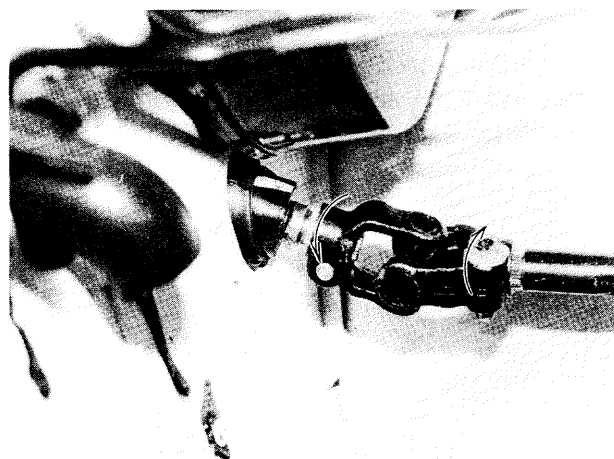


Fig. 18-26

5) Check steering shaft for smooth rotation. If found defective, replace as column assembly.

18-7. IMPORTANT STEPS IN REINSTALLATION

NOTE:

For installation, it is important that only the specified screws, bolts, and nuts be used as designated and that they are tightened to the specified torque.

Reverse removal procedure for installation, noting the following.

Steering Lock

- 1) Position groove of steering shaft in the center of hole in column.

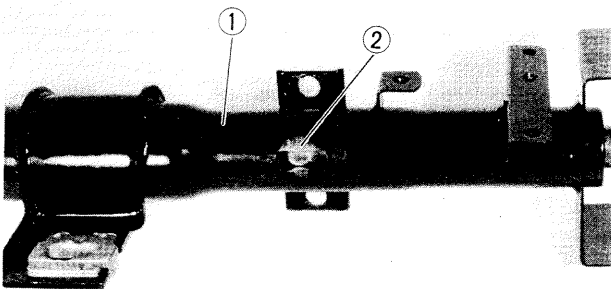


Fig. 18-27 1. Steering column
2. Steering shaft

- 2) Align hub on steering lock with groove of steering shaft and rotate shaft to assure that steering shaft is locked.

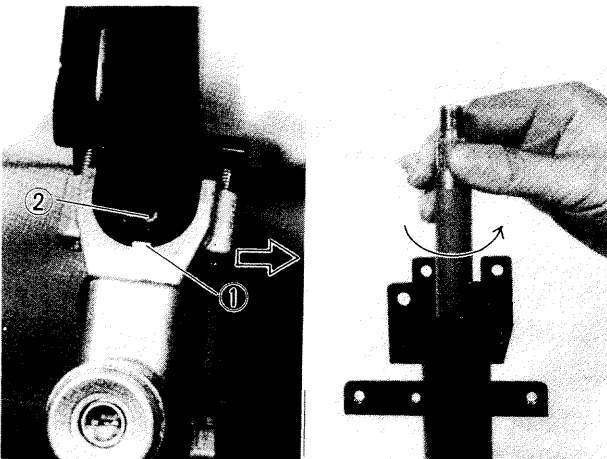


Fig. 18-28 1. Hub
2. Groove

- 3) Tighten 2 new bolts until head of each bolt is broken off.

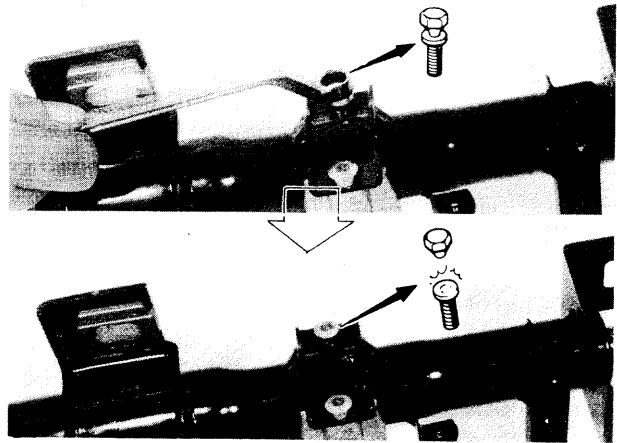


Fig. 18-29

- 4) Turn ignition key to "ACC" or "ON" position and check to be sure that steering shaft rotates smoothly. Also check for lock operation.
- 5) Install steering column. Refer to p. 18-14.

Steering Gear Box

Put steering gear box bolts through from inside of car and tighten nuts to specified torque.

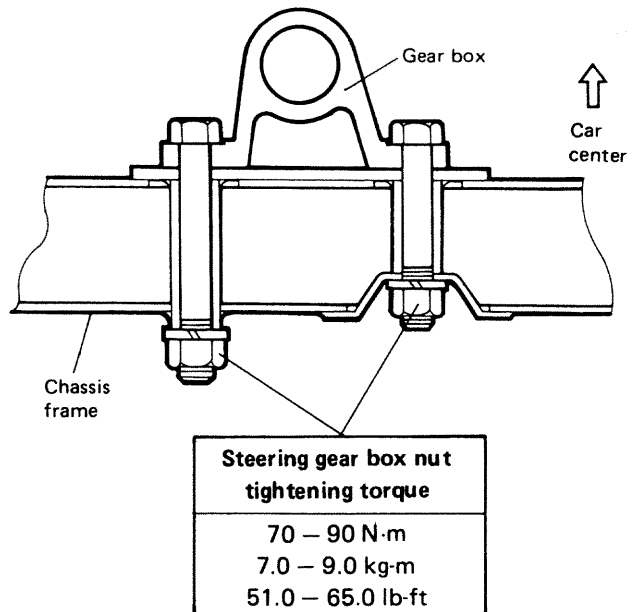


Fig. 18-29-1

Steering Damper

- Install steering damper with larger diameter hole end directed toward pitman arm and hole in outer shell downward.
- Install steering damper stay, directing its circular boss side upward.
- Mount steering damper and steering damper stay bolts from the top.
- Torque steering damper pin nut and damper nut to specification while directing steering to straightforward state (with pitman arm in parallel with center line of car).

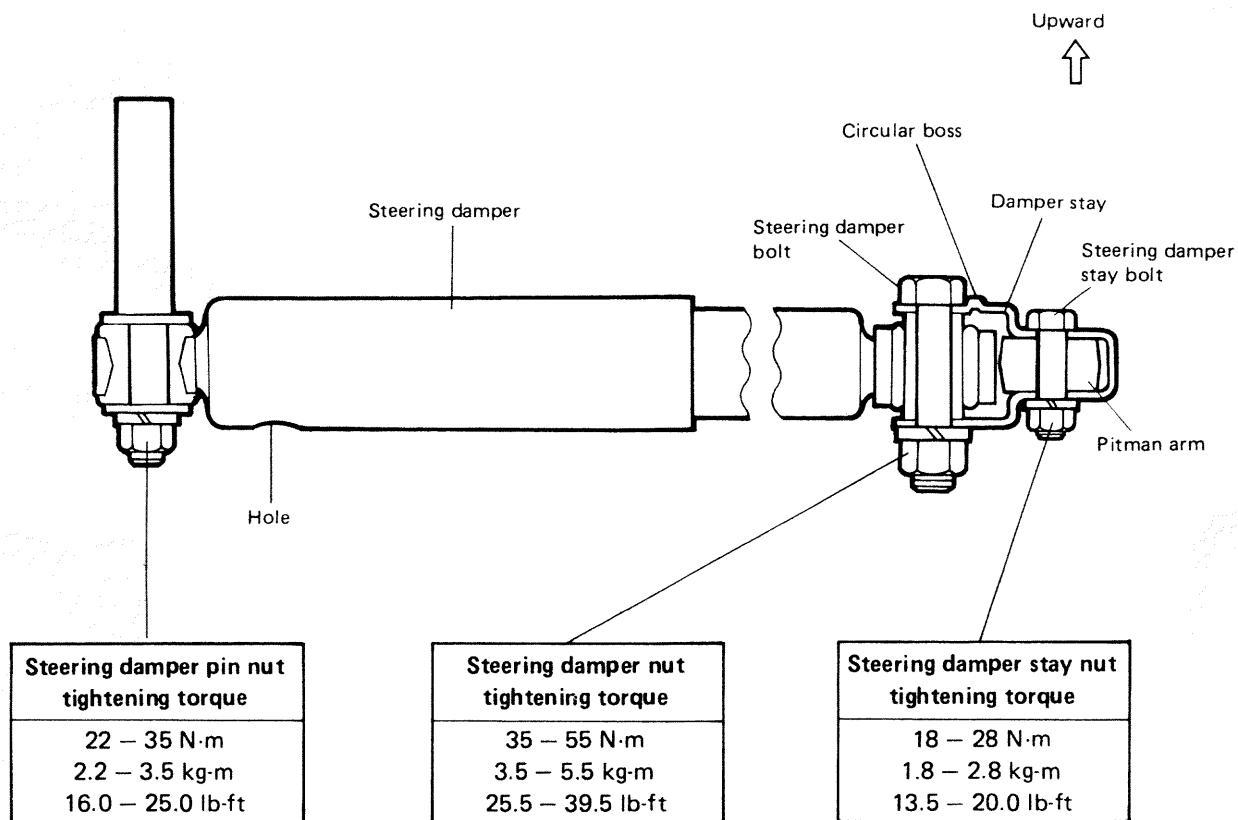


Fig. 18-29-2

Steering Column

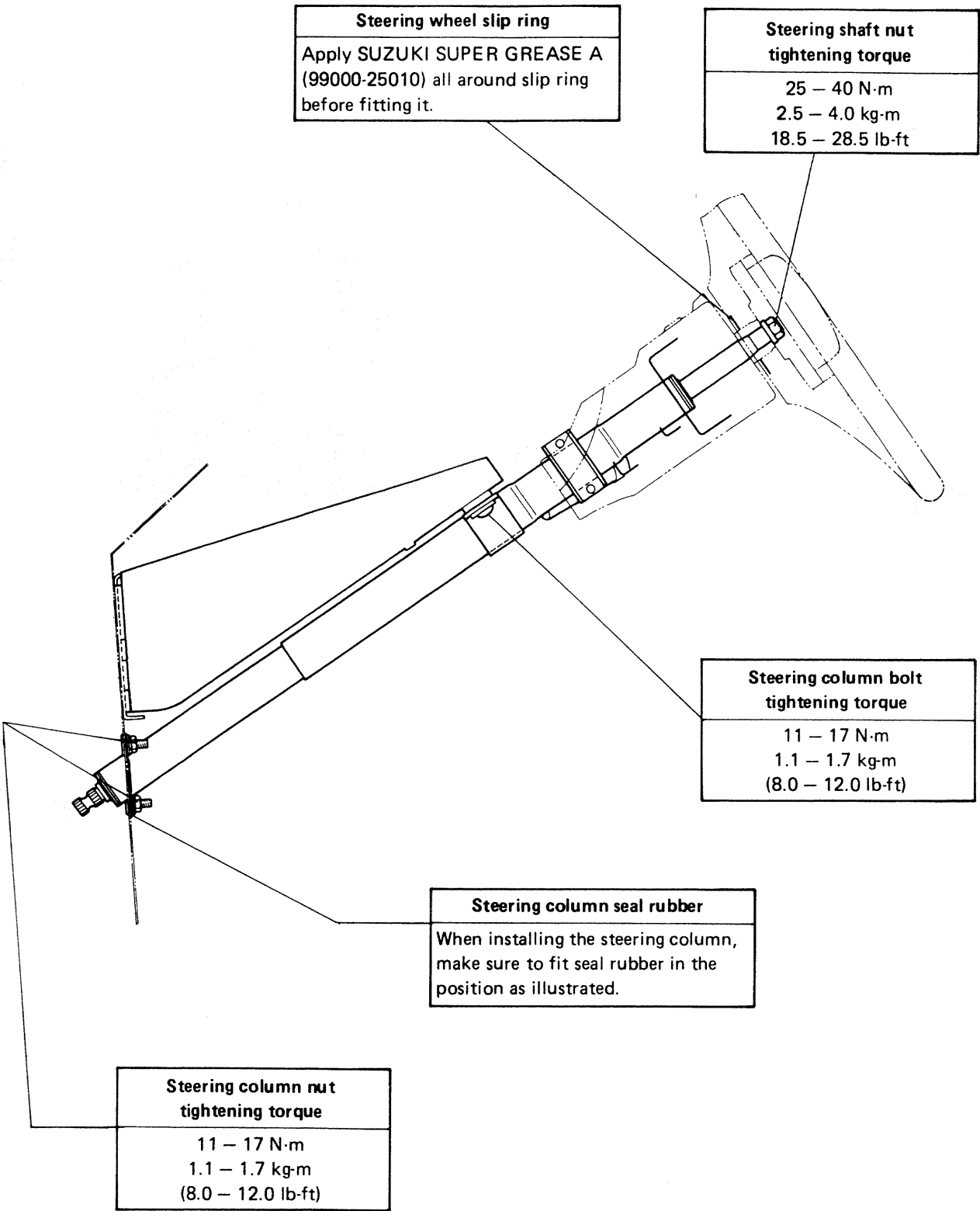


Fig. 18-30

Steering Lower Shaft and Joint

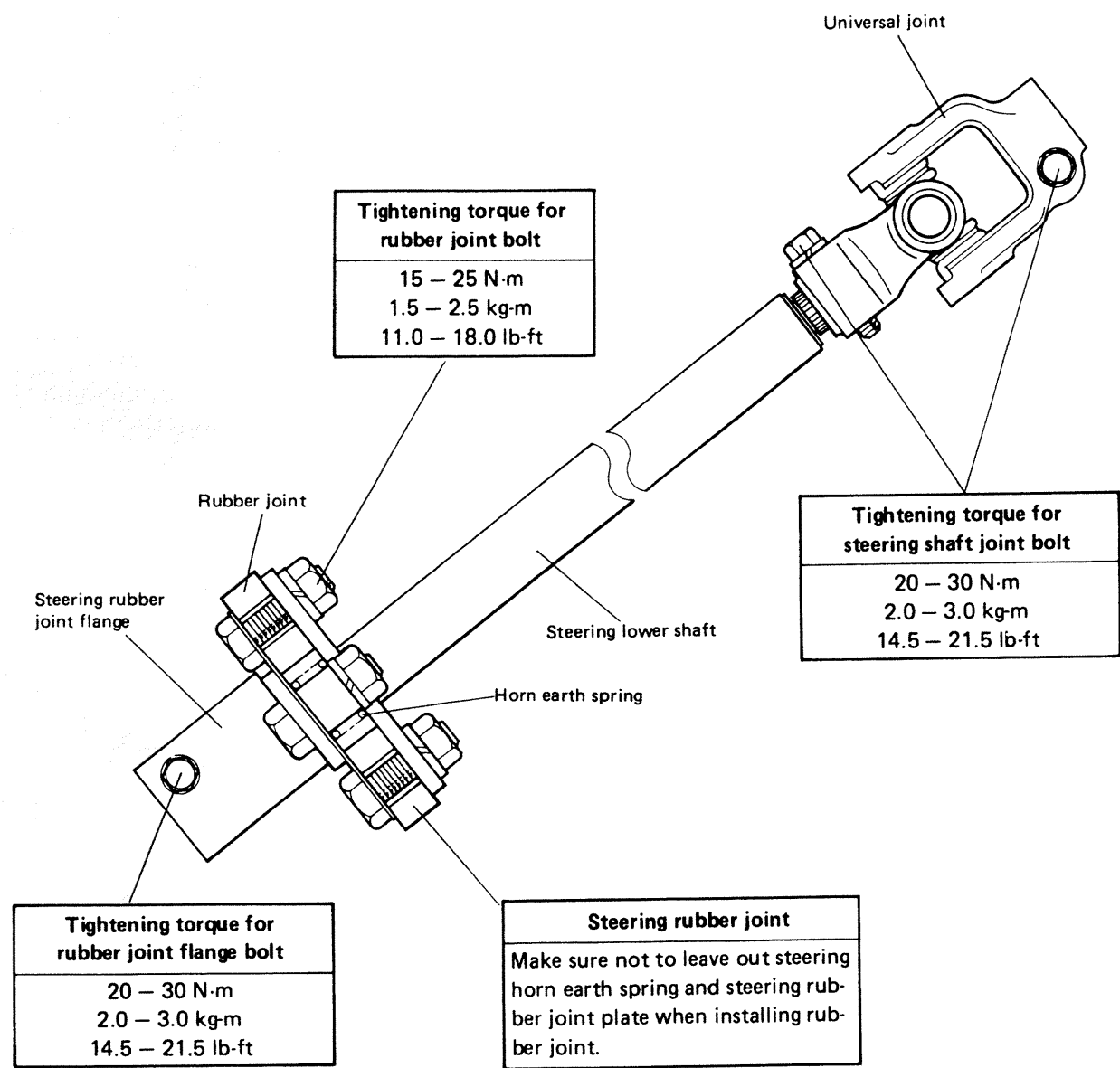


Fig. 18-31

Steering Handwheel

Two requirements must be met, among others, in installing and setting steering wheel: 1) check to be sure that handwheel play meets specification, and 2) set it in such a way that, with front wheels in straightforward state, its two outer spokes are horizontal.

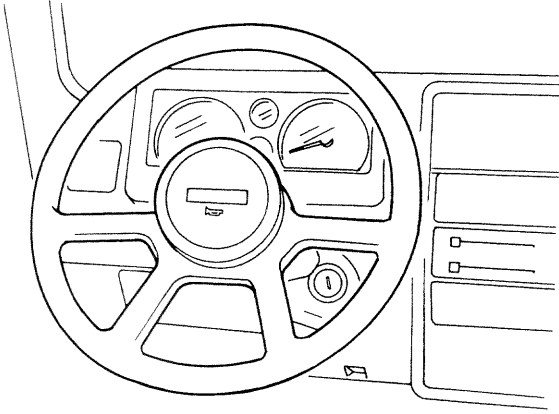
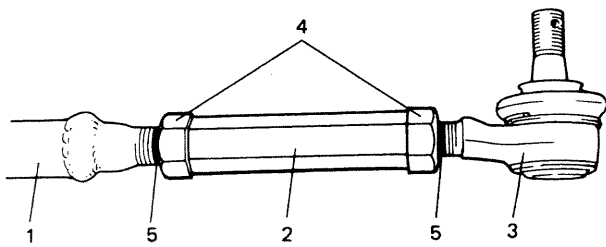


Fig. 18-32

Tie Rod and Tie Rod End

1) Install tie rod end to tie rod, aligning each lock nut to respective marks scribed before disassembly.



1. Tie rod
2. Turnbuckle
3. Tie rod end
4. Lock nut
5. Marking to be made

Fig. 18-33

- 2) Connect tie rod end to knuckle and tie rod to drag rod. Tighten castle nut until holes for split pin are aligned, but only within specified torque.
- 3) Bend split pin.
- 4) Inspect for proper toe (Refer to 18-8 WHEEL ALIGNMENT).
- 5) After confirming proper toe, tighten tie rod end lock nuts to specified torque.

18-8. WHEEL ALIGNMENT

Front alignment refers to the angular relationship between the front wheels, the front suspension attaching parts and the ground. Generally, the only adjustment required for front alignment is toe setting. Camber and caster can't be adjusted. Therefore, should camber or caster be out of specification due to the damage caused by hazardous road conditions or collision, whether the damage is in chassis frame (body) or in suspension should be determined and damaged body should be repaired or damaged suspension should be replaced.

Toe Setting

Toe is the turning in or out of the front wheels. The purpose of a toe specification is to ensure parallel rolling of the front wheels (Excessive toe-in or toe-out may increase tire wear). Amount of toe can be obtained by subtracting "A" from "B" as shown in figure and therefore is given in mm (in.).

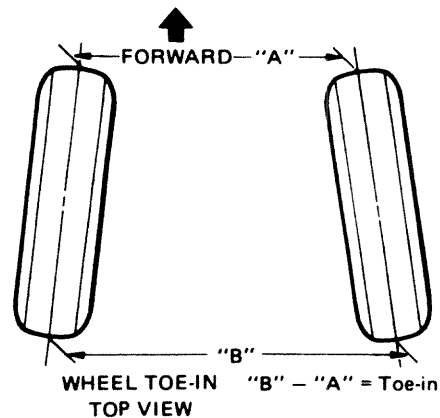


Fig. 18-34

Camber

Camber is the tilting of the front wheels from the vertical, as viewed from the front of the car. When the wheels tilt outward at the top, the camber is positive. When the wheels tilt inward at the top, the camber is negative. The amount of tilt is measured in degrees.

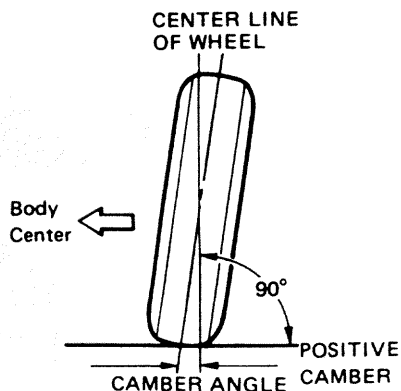


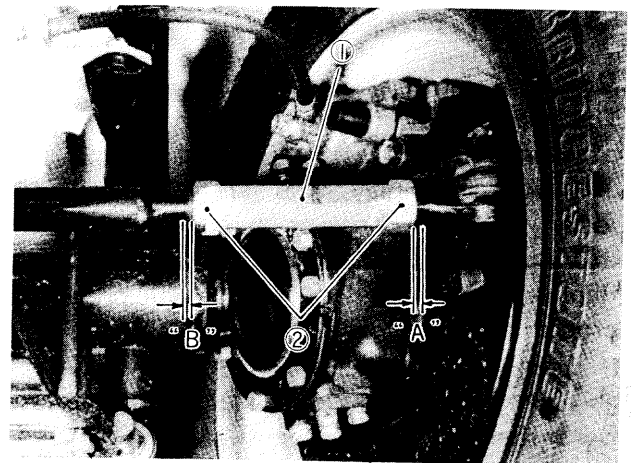
Fig. 18-35

Toe Adjustment

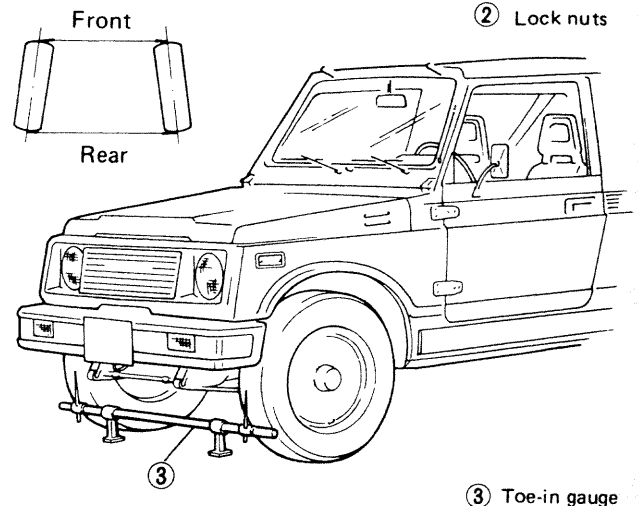
1. Before making any adjustment affecting toe setting, the following checks and inspections should be made to insure correctness of alignment readings and alignment adjustments:

- 1) Check all tires for proper inflation pressures and approximately the same tread wear.
- 2) Check steering and suspension system for looseness. If excessive looseness is noted, it must be corrected before adjusting.
- 3) Check for run-out of wheels and tires.
- 4) Consideration must be given to excess loads, such as tool boxes. If this excess load is normally carried in the car, it should remain in the car during alignment checks.
- 5) Consider condition of the equipment being used to check alignment and follow manufacturer's instructions.
- 6) Regardless of equipment used to check alignment, the car must be on a level surface both fore and aft and transversely.
- 7) Check to be sure that front wheels are set in straightforward driving position.

2. Toe is adjusted by changing tie rod length. Loosen tie rod end lock nuts first and then rotate turnbuckle ① to align toe-in to specification. At this time, thread length "A" and "B" should be equal. After adjustment, tighten lock nuts to specified torque.



- ① Turnbuckle
- ② Lock nuts



- ③ Toe-in gauge

Fig. 18-36

Camber and Caster Adjustment

Should camber or caster be found out of specifications upon inspection, locate its cause first. If it is in damaged, loose, bent, dented or worn suspension parts, they should be replaced. If it is in chassis frame (car body), repair it so as to attain specifications.

To prevent possible incorrect reading of camber or caster, car front end must be moved up and down a few times before inspection.

Reference Information:

SIDE SLIP:

For inspecting front wheel side slip with side slip tester:

Side slip limit: Less than 3 mm/m
(Less than 0.118 in/3 ft)

If side slip exceeds this limit, toe-in or front wheel alignment may not be correct.

18-9. MAINTENANCE SERVICES

Steering Handwheel Play

The wheel play is proper if it is anywhere between 10 and 30 mm (0.4 and 1.2 in.). An unusually large play means that the ball-and-socket joints are loose or that the wear in the steering gear box is excessively large.

Replacement of the worn joint will provide a proper handwheel play.

If steering handwheel play is excessive though no each joint of steering system rattles, adjust worm shaft starting torque of steering gear box by referring to item of "Adjustment of worm shaft starting torque."

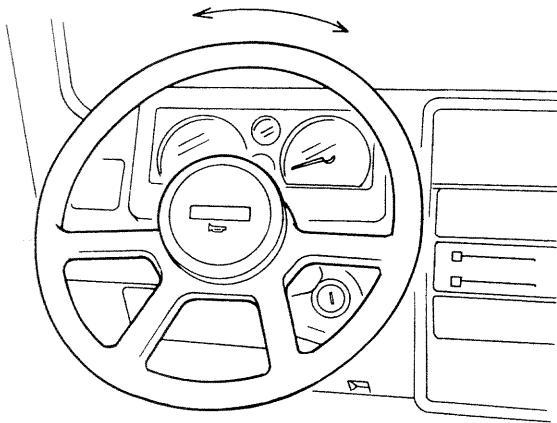


Fig. 18-37

Steering Shaft Joint

Check universal joint of the steering shaft for rattle and damage. If rattle and damage is found, replace defective part with a new one.

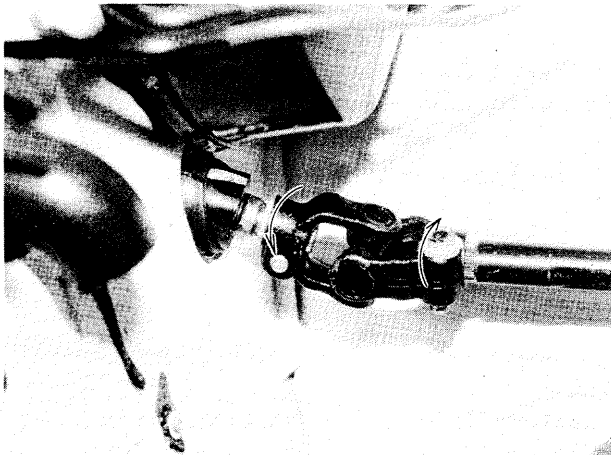


Fig. 18-38

Steering Rubber joint

Inspect rubber joint for evidence of crack or breakage, and make sure that its bolts are tight.

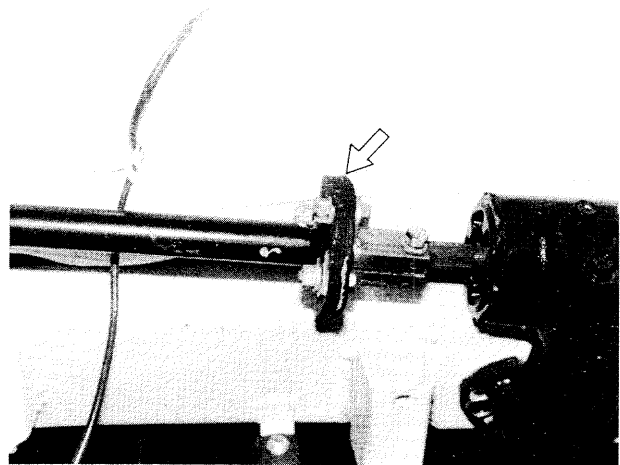


Fig. 18-39

Steering Link & Tie Rod

Inspect steering link and tie rod for bend and rattle where they are joined. Inspect ball joint boots in steering system for leaks, detachment, tear or other damage. If one of such malconditions is found, replace defective part with a new one.

Check the following bolts and nuts (① — ⑦) for tightness and retighten them as necessary.

Refer to "RECOMMENDED TORQUE SPECIFICATIONS" in this section for tightening torque.

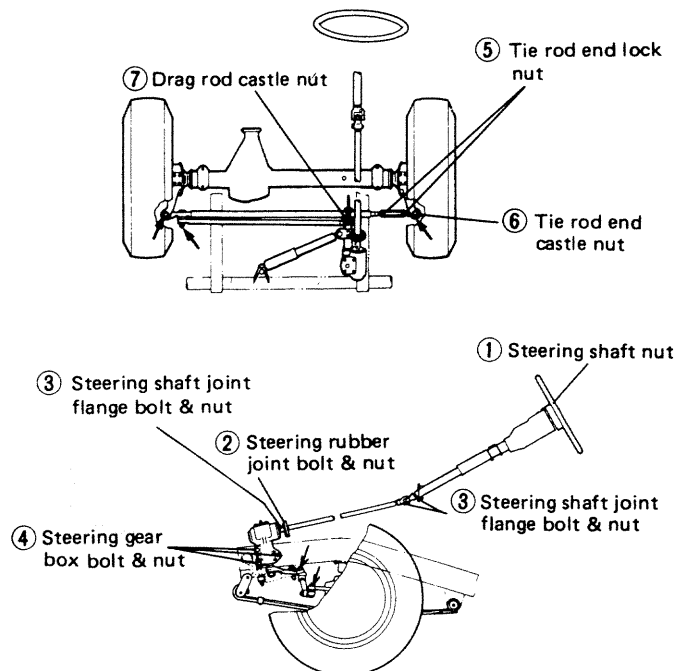


Fig. 18-40

Steering Gear Box

Check steering gear box for evidence of oil leakage. If leakage is found, repair or replace and then refill specified oil to specified level.

Refer to "18-5 INSPECTION OF COMPONENT" in this section for steering gear box oil.

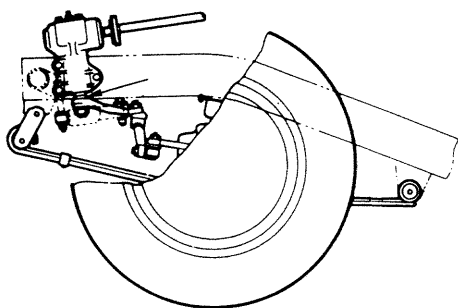


Fig. 18-41

Tires

When replacement is necessary, the original equipment type tire should be used. Refer to Tire Placard.

Replacement tires should be of the same size, load range and construction as those originally on the car. Use of any other size or type tire may affect ride, handling, speedometer/odometer calibration, vehicle ground clearance and tire or snow chain clearance to body and chassis.

NOTE:

Do not mix different types of tires on the same car such as radial, bias and bias-belted tires except in emergencies, because car handling may be seriously affected and may result in loss of control.

It is recommended that new tires be installed in pairs on the same axle. If necessary to replace only one tire, it should be paired with the tire having the most tread, to equalize braking traction.

[Inspection]

- Check tires for uneven or excessive wear, or damage. If defective, replace.
- Check inflating pressure of each tire and, as necessary, adjust pressure to specification.
- Check wheels for dent, crack or other damage.
- Check wheel nuts for tightness.

Tightening torque for wheel nuts	50 – 80 N·m 5.0 – 8.0 kg-m (36.5 – 57.5 lb-ft)
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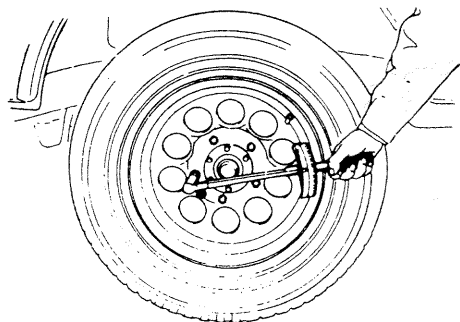


Fig. 18-42

[Tire wear indicator]

Check wear indicator, and replace tire when its wear is the same level as the indicator.

Tire service limit	Less than 1.6 mm (0.063 in.) depth of tread at two places.
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NOTE:

The mud & snow tire has a platform to indicate wear in addition to tire tread wear indicator. It shows up when 50% of tire tread is worn out. When driving on muddy or snowy roads, check if its wear is the same level as the platform and if it does, replace the tire.

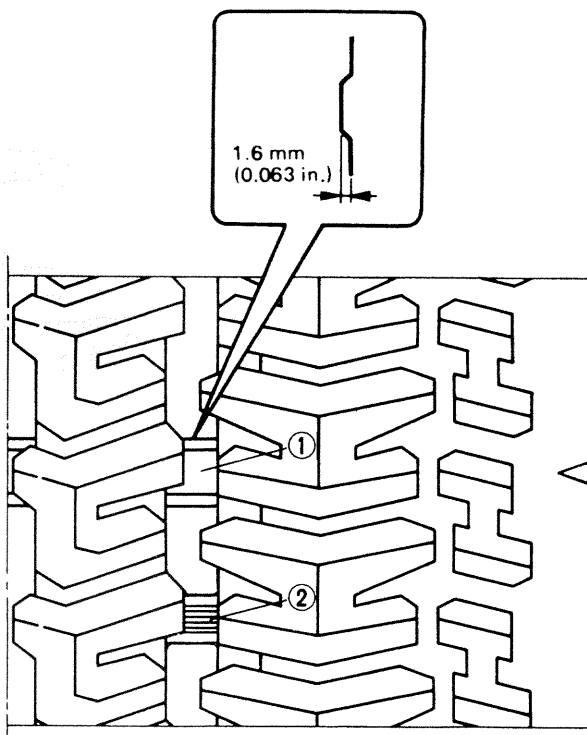


Fig. 18-43 ① Tire tread wear indicator
② Wear indicating platform

[Inflation of tires]

- Tire inflation pressures are listed on the Tire Placard at driver's side of instrument panel.
- Tire inflation pressures should be checked (including spare tire) at least monthly and when significantly changing the load in the car.
- Always check tire inflation pressures when tires are "cold".
- Always use tire pressure gauge when checking inflation pressure.
- Be sure to reinstall tire inflation valve caps to prevent dirt and moisture from getting into valve core, as they may cause air leakage.
- If air loss occurs while driving, do not drive on the deflated tire more than is needed to stop safely. Driving even a short distance on a deflated tire can damage a tire and wheel beyond repair.

[Tire rotation]

"Rotate" tires at the regular intervals in order to equalize tire wear and thereby make full use of each tire. Refer to below figure for the scheme of rotation. Adherence to this scheme prolongs tire life.

NOTE:

Before installing wheels, remove any build-up of corrosion on the wheel mounting surface and brake drum or disc mounting surface by scraping and wire brushing. Installing wheels without good metal-to-metal contact at the mounting surfaces can cause wheel nuts to loosen, which can later allow a wheel to come off while the car is moving.

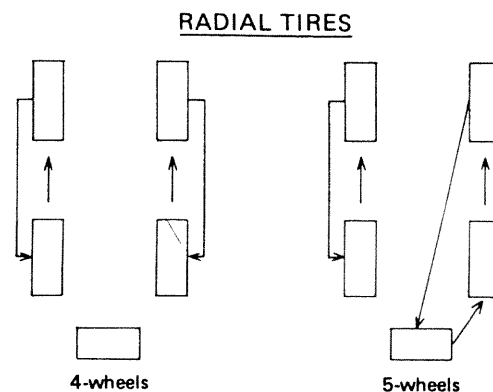
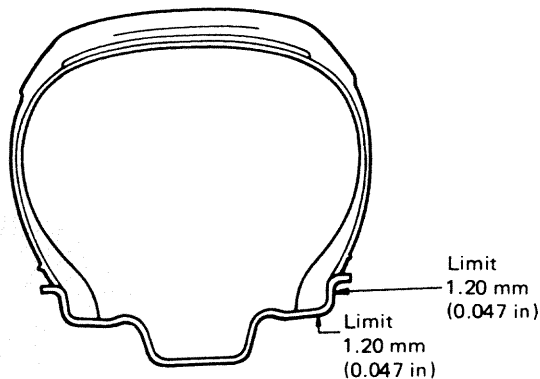


Fig. 18-44

[Wheels]

Wheels must be replaced if they are bent, dented, have excessive lateral or radial runout, leak air through welds, have elongated bolt holes, if lug nuts won't stay tight, or if they are heavily rusted. Wheels with greater runout than shown in below figure may cause objectional vibrations. Replacement wheels must be equivalent to the original equipment wheels in load capacity, diameter, rim width, offset and mounting configuration. A wheel of improper size or type may affect wheel and bearing life, brake cooling, speedometer/odometer calibration, car ground clearance and tire clearance to the body and chassis.



*TOTAL INDICATOR READING
IGNORE INDICATOR "JUMPS"
DUE TO WELD SEAMS, PAINT
RUNS, SCRATCHES, ETC.

Fig. 18-45

Wheel repairs that use welding, heating, or peening are not approved. All damaged wheels should be replaced.

[Tire demounting and mounting]

Use a tire changing machine to mount or demount tires. Follow the equipment manufacturer's instructions. Do not use hand tools or tire irons alone to change tires as they may damage the tire beads or wheel rim.

Rim bead seats should be cleaned with a wire brush or coarse steel wool to remove lubricants, old rubber and light rust. Before mounting or demounting a tire, the bead area should be well lubricated with an approved tire lubricant.

After mounting, inflate to 220 kPa (32 psi) so that beads are completely seated.

WARNING:

Do not stand over tire when inflating. Bead may break when bead snaps over rim's safety hump and cause serious personal injury.

Do not exceed 240 kPa (35 psi) pressure when inflating. If 220 kPa (32 psi) pressure will not seat beads, deflate, re-lubricate and reinflate. Over inflation may cause the bead to break and cause serious personal injury.

Inflate to specified pressure.

[Tire repair]

There are many different materials and techniques on the market to repair tires. As not all of these work on all types of tires, tire manufacturers have published detailed instructions on how and when to repair tires. These instructions can be obtained from the tire manufacturer.

18-10. RECOMMENDED TORQUE SPECIFICATIONS

Fastening parts	Tightening torque		
	N·m	kg-m	lb-ft
Steering shaft nut	25 – 40	2.5 – 4.0	18.5 – 28.5
Steering shaft rubber joint bolt	15 – 25	1.5 – 2.5	11.0 – 18.0
Steering shaft joint flange bolt	20 – 30	2.0 – 3.0	14.5 – 21.5
Steering gear box nut	70 – 90	7.0 – 9.0	51.0 – 65.0
Drag rod castle nut	30 – 70	3.0 – 7.0	22.0 – 50.5
Tie rod end castle nut	30 – 55	3.0 – 5.5	22.0 – 39.5
Tie rod end lock nut	70 – 100	7.0 – 10.0	51.0 – 72.0
Steering damper stay nut	18 – 28	1.8 – 2.8	13.5 – 20.0
Steering damper nut	35 – 55	3.5 – 5.5	25.5 – 39.5
Steering damper pin nut	22 – 35	2.2 – 3.5	16.0 – 25.0
Steering column bolt & nut	11 – 17	1.1 – 1.7	8.0 – 12.0

SECTION 19

BRAKES

CONTENTS

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NOTE:

All brake fasteners are important attaching parts in that they could affect the performance of vital parts and systems, and/or could result in major repair expense. They must be replaced with one of same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of all parts. There is to be no welding as it may result in extensive damage and weakening of the metal.

WARNING:

When servicing wheel brake parts, do not create dust by grinding, sanding brake linings, or by cleaning wheel brake parts with a dry brush or with compressed air. Many wheel brake parts contain asbestos fibers which can become airborne if dust is created during servicing. Breathing dust containing asbestos fibers may cause serious bodily harm. A water dampened cloth or water based solution should be used to remove any dust on brake parts. Equipment is commercially available to perform this washing function. These wet methods will prevent asbestos fibers from becoming airborne.

19-1. GENERAL DESCRIPTION

When the foot brake pedal is depressed, hydraulic pressure is developed in the master cylinder to actuate pistons (two in front and four in rear).

The master cylinder is a tandem master cylinder. Two brake pipes are connected to the master cylinder and they make two independent circuits. One connects the front brakes (right & left) and the other connects the rear brakes (right & left).

The proportioning and bypass valve (P & B valve) is included within the brake circuit which connects the master cylinder and the rear wheel brake.

In this brake system, the disc brake type is used for the front wheel brake and a drum brake type (leading/trailing shoes) for the rear wheel brake.

The parking brake system is mechanical. It applies brake force to only rear wheels by means of the cable and mechanical linkage system. The same brake shoes are used for both parking and foot brakes.

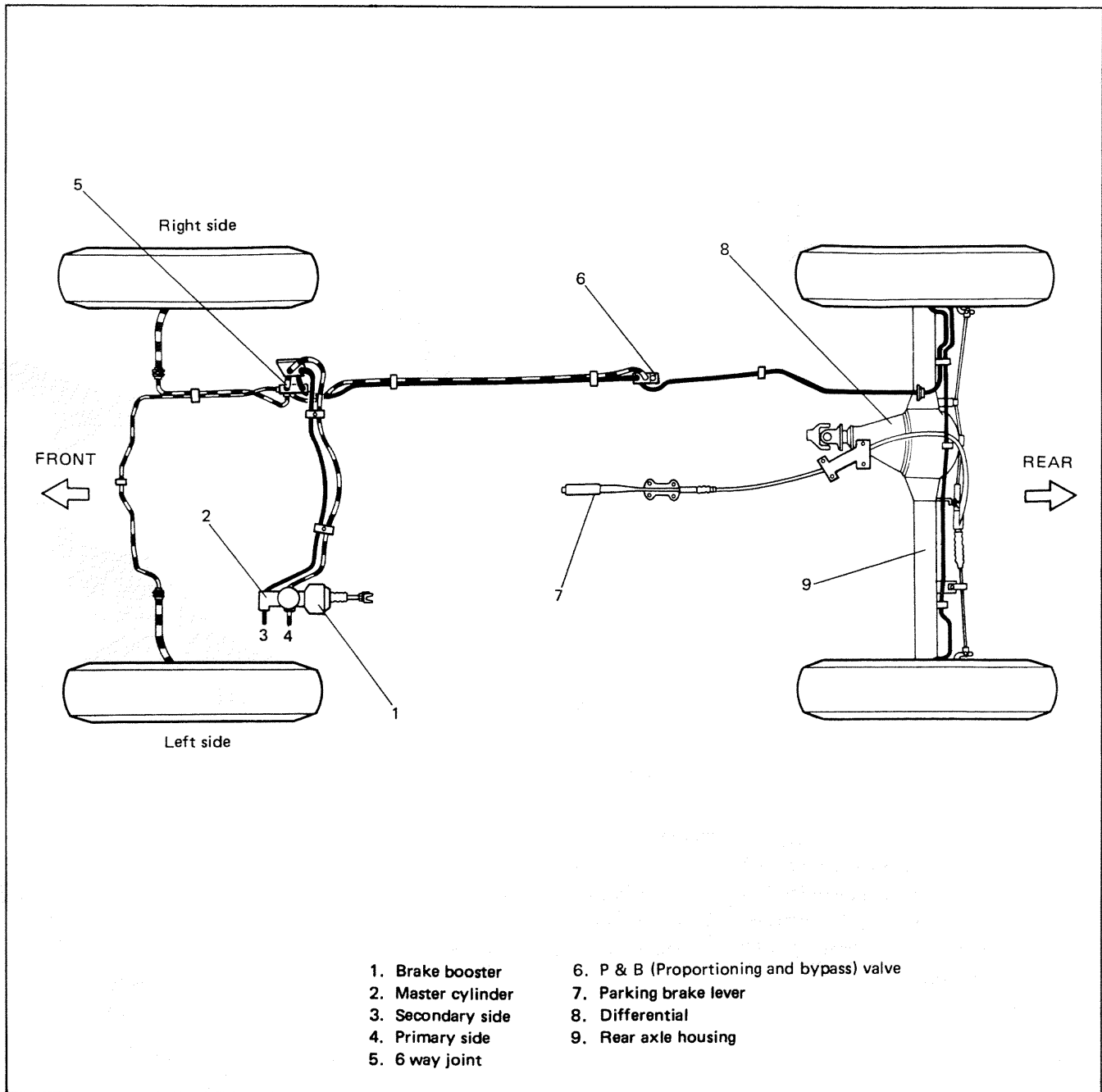
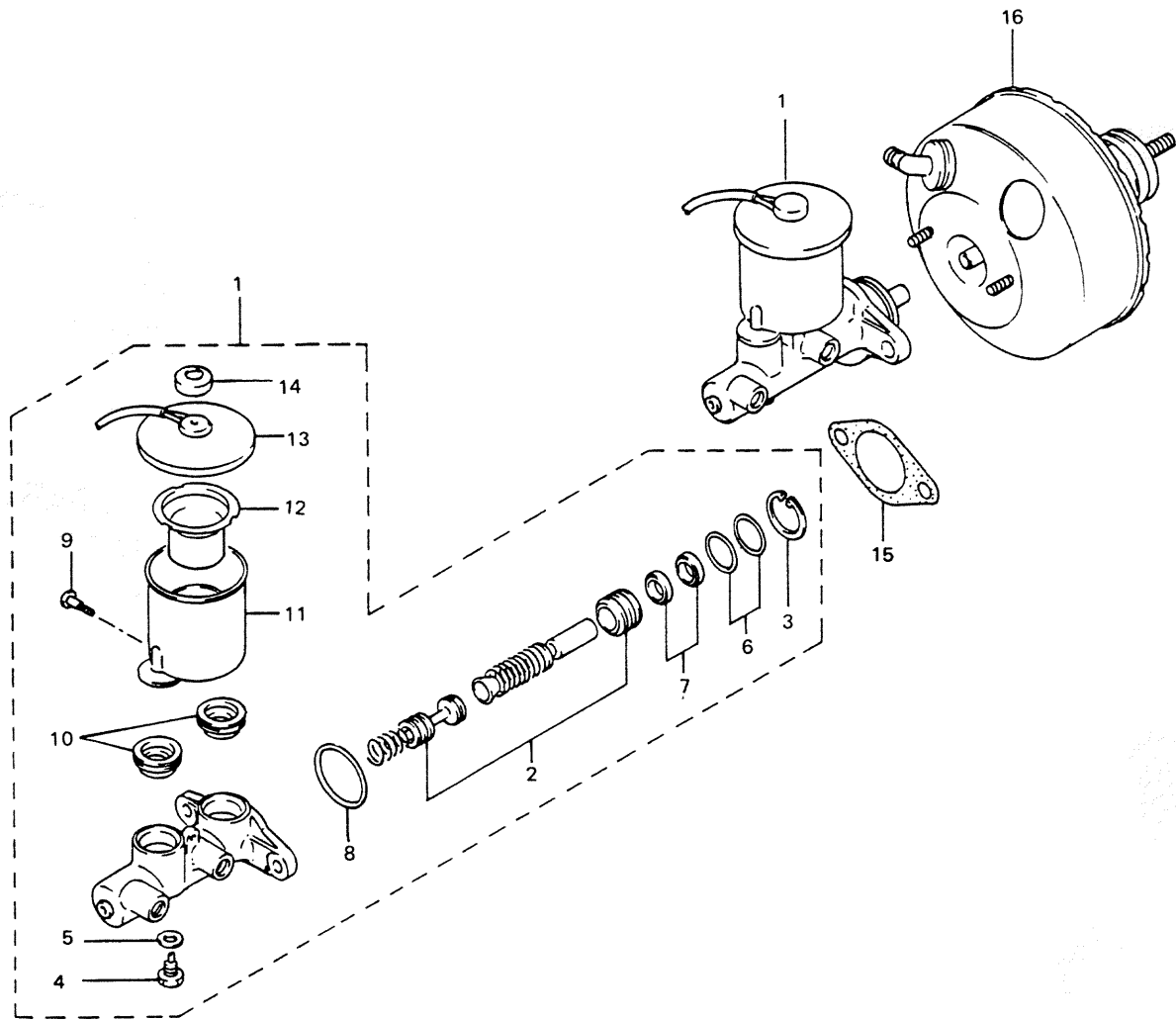


Fig. 19-1

MASTER CYLINDER



1. Brake master cylinder assembly
2. Brake master cylinder piston set
3. Piston stopper circlip
4. Secondary piston stopper bolt
5. Seal ring
6. Piston stopper seal ring
7. Cylinder cup
8. Master cylinder seal ring
9. Connector screw
10. Reservoir connector grommet
11. Master cylinder reservoir
12. Cylinder reservoir strainer
13. Cylinder reservoir cap
14. Breather cap
15. Master cylinder gasket
16. Brake booster assembly

Fig. 19-2

MASTER CYLINDER ASSEMBLY

[GENERAL DESCRIPTION]

The master cylinder has two pistons and three piston cups. Its hydraulic pressure is produced in the primary ("a" in the below figure) and secondary ("b") chambers. The hydraulic pressure produced in the primary chamber ("a") acts on the front wheel brakes (right & left).

Also, the hydraulic pressure produced in the secondary chamber ("b") acts on the rear wheel brakes (right & left).

NOTE:

Replace all components included in repair kits to service this master cylinder. Lubricate rubber parts with clean, fresh brake fluid to ease assembly. Do not use lubricated shop air on brake parts as damage to rubber components may result. If any hydraulic component is removed or brake line disconnected, bleed the brake system. The torque values specified are for dry, unlubricated fasteners.

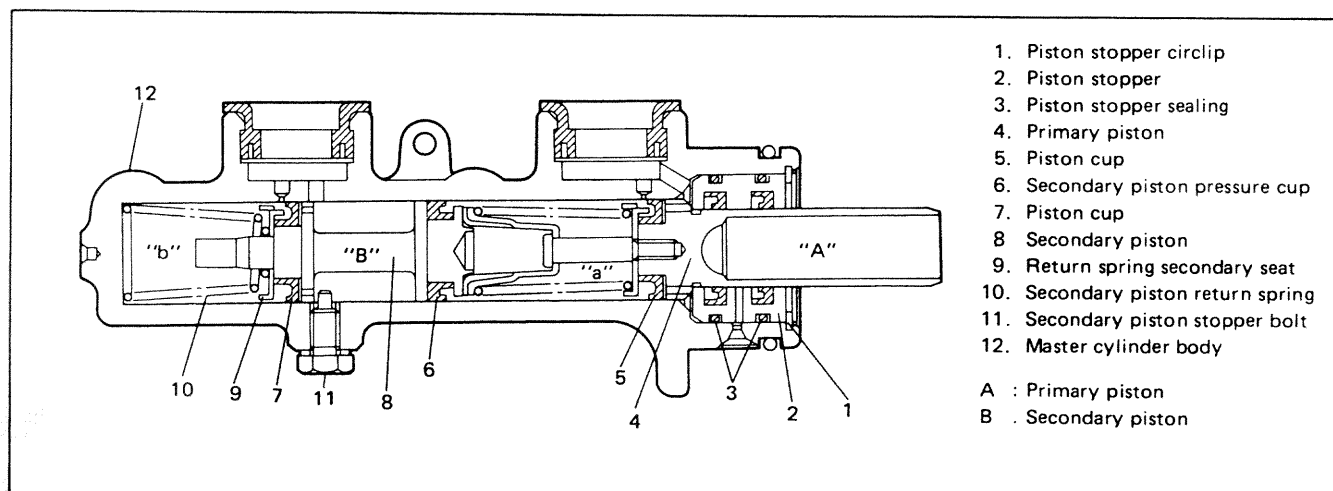


Fig. 19-3

[Master cylinder OPERATION]

Normal operation

Depressing the brake pedal forces the primary piston "A" to move to the left in the below figure and consequently the hydraulic pressure is produced in the chamber "a".

By means of this pressure and the return spring force, the secondary piston "B" is also pushed to the left and thus the hydraulic pressure is produced in the chamber "b".

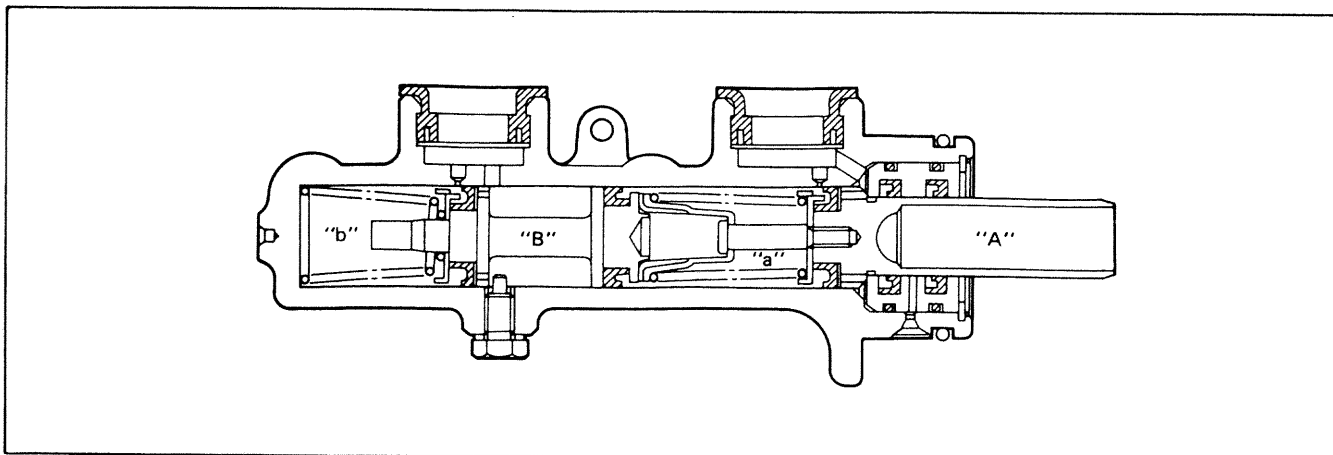


Fig. 19-3-1

One-circuit operation (Primary chamber "a" circuit failure)

Depressing the brake pedal forces the primary piston "A" to move as described previously, but since the brake circuit connected to the chamber "a" cannot hold the pressure, no pressure is produced in the fluid immediately ahead of the piston "A". The piston "A" keeps moving while compressing the spring and when it reaches the retainer, the piston "B" is pushed and begins to move. This causes the pressure to rise in the chamber "b" and the pressure acts on rear wheel brakes (right & left).

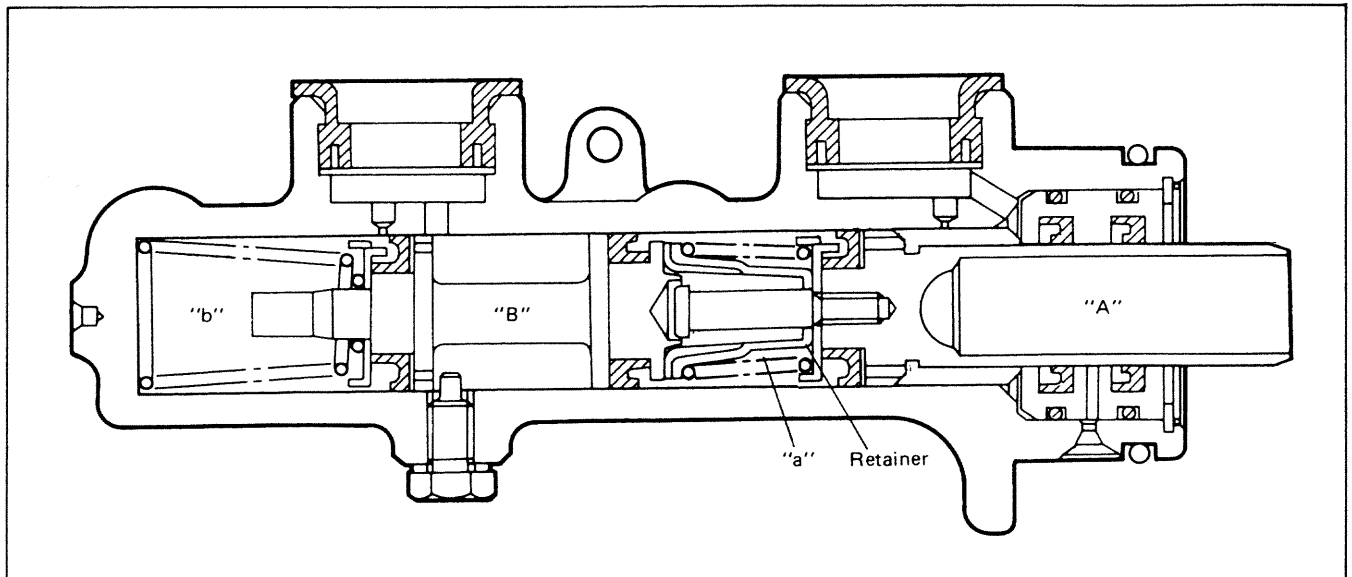


Fig. 19-4

One-circuit operation (Secondary chamber "b" circuit failure)

In this case, the leftward movement of the piston "A" has but little effect in causing the fluid pressure to rise in the chamber "a" in the beginning, because the initial rise of the fluid pressure causes the piston "B" to promptly yield and move to the left. However, when the forward end of the piston "B" comes to the head of the cylinder and stops there, the leftward movement of the piston "A" becomes effective. Thus the fluid pressure is produced in the chamber "a" and it acts on front wheel brakes (right & left).

The below figure shows secondary piston "B" at halt.

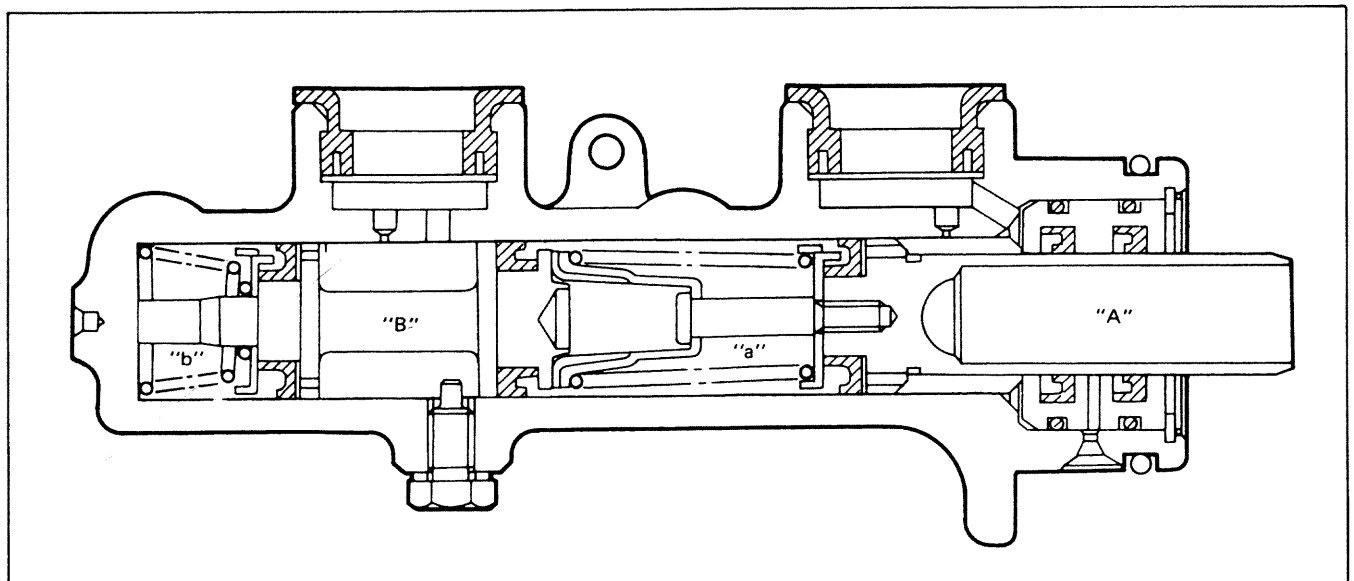


Fig. 19-4-1

DISC BRAKE CALIPER ASSEMBLY

[GENERAL DESCRIPTION]

This caliper has a single 51.1 mm (2.012 in.) bore and is mounted to the brake caliper holder with two mounting bolts. Hydraulic force, created by applying force to the brake pedal, is converted by the caliper to friction. The hydraulic force acts equally against the piston and the bottom of the caliper bore to move the piston outward and to move (slide) the caliper inward, resulting in a clamping action on the disc. This clamping action forces the pads (linings) against the disc, creating friction to stop the car.

For details, refer to OPERATION in the next page.

NOTE:

Lubricate parts as specified. Do not use lubricated shop air on brake parts as damage to rubber components may result. If any component is removed or line disconnected, bleed the brake system. Replace pads in axle sets only. The torque values specified are for dry, unlubricated fasteners.

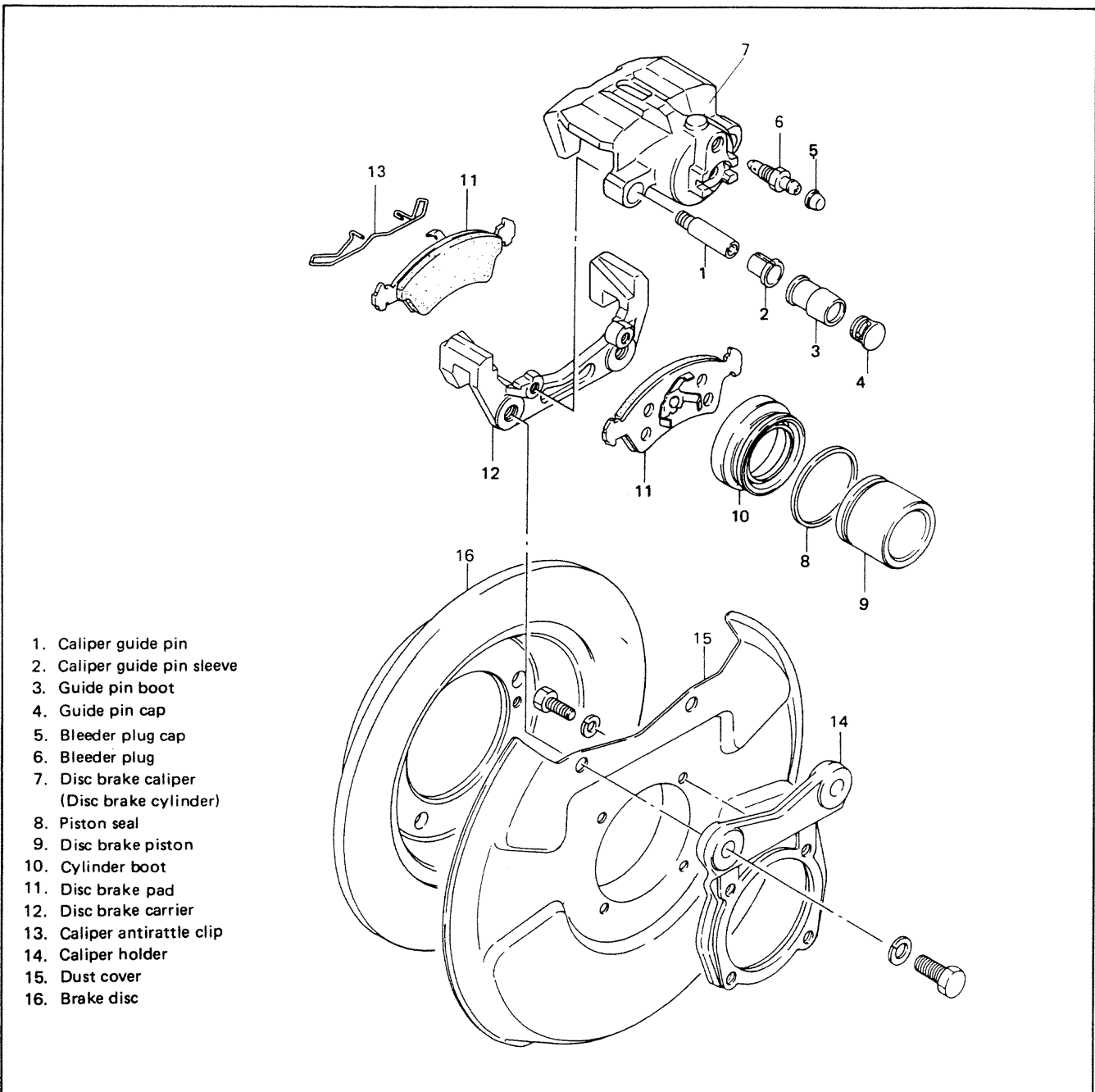


Fig. 19-5

[Caliper OPERATION]

Single piston floating caliper type

The single piston floating caliper type brake is employed in this model. One cylinder and one piston are used for this type. (The cylinder is constructed as a monoblock with the caliper.) Fluid pressure generated in the cylinder causes the pad (1) on the piston side to press against the disc. At the same time, the floating type caliper body is moved to the right by the cylinder pressure, which pulls pad (2) against the disc and so brakes the wheel.

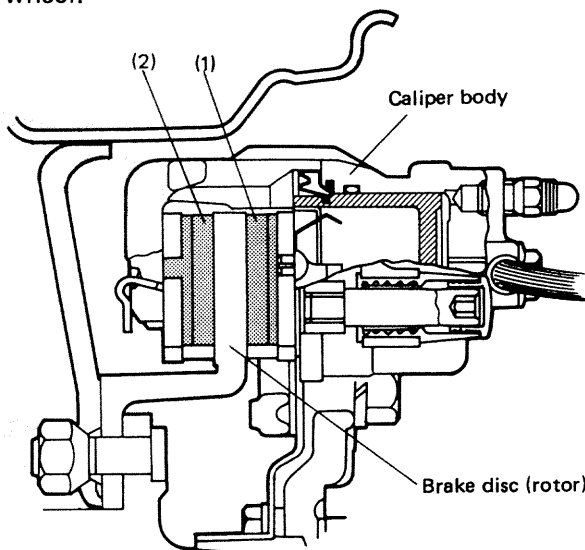


Fig. 19-6

The disc brake has no servo assistance as in drum braking, and it is necessary to increase the working pressure of the piston and pad. For this purpose, the wheel cylinder has a large bore. Even only a little change in clearance between the disc and pad has therefore a large influence on the brake pedal stroke. It is necessary to have the clearance adjusted to the minimum at all times, by means of the piston (rubber) seal.

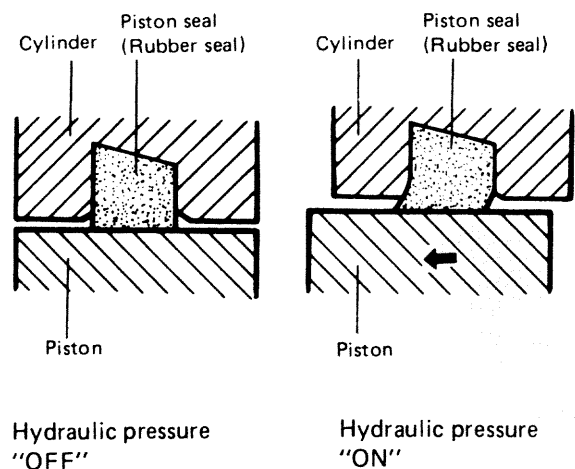


Fig. 19-7

Clearance correction

When oil pressure is applied to the piston, the piston moves forward. The rubber seal, which exerts considerable pressure against the piston, moves with the cylinder. However, as a part of the rubber seal has been fixed into a groove in the cylinder, the shape of the rubber seal is distorted toward internal end of the cylinder, as shown in above figure. When pressure is taken off from the foot brake pedal and fluid pressure is released from the piston, a restoring force is generated at the seal and pushes the piston back. As the pads wear away and the clearance between the disc and pads becomes larger, the piston moves a larger distance. The seal then could change in shape further but, since the end of the seal is fixed into the groove in the cylinder, the distortion is limited to the same amount as previously described. The piston moves further to cover the distance of clearance. The piston returns by the same distance and the rubber seal recovers its shape as described above and thus the clearance between the disc and pads are maintained in adjustment.

DRUM BRAKE ASSEMBLY (Rear Wheel Brake)

[GENERAL DESCRIPTION]

The drum brake assembly has a self shoe clearance adjusting system so that drum-to-shoe clearance is maintained appropriate at all times. For details, refer to OPERATION in the next page.

NOTE:

Replace all components included in repair kits used to service this drum brake. Lubricate parts as specified.

WARNING:

When servicing wheel brake parts, do not create dust by grinding or sanding brake linings or by cleaning wheel brake parts with a dry brush or with compressed air. (A water dampened cloth should be used.) Many wheel brake parts contain asbestos fibers which can become airborne if dust is created during servicing. Breathing dust containing asbestos fibers may cause serious bodily harm. If any hydraulic component is removed or brake line disconnected, bleed the brake system. The torque values specified are for dry, unlubricated fasteners.

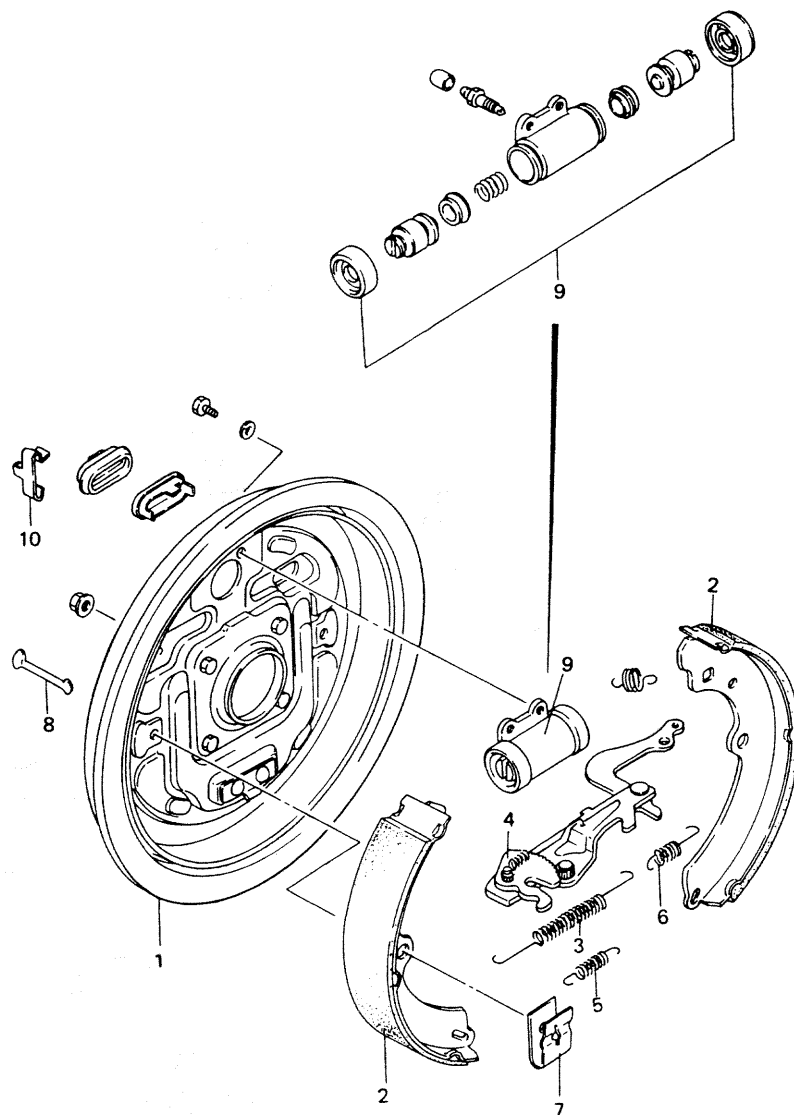


Fig. 19-8

[Rear brake OPERATION]

With the general drum brake type, when the brake pedal is depressed, two pistons in the wheel cylinder force the brake shoes outward, restraining the turn of the drum.

The more the brake shoes get worn, the longer distance the pistons must move. As a result, the brake pedal travel (pedal-to-wall clearance) increases. Then the shoe clearance must be adjusted by the shoe adjusting screws. Thus periodical adjustment is required for the drum brake type in general.

This rear brake is provided with a self-adjusting system which automatically adjusts the shoe-to-drum clearance (pedal-to-wall clearance) caused by such brake shoe wear.

Clearance correction

In each rear wheel cylinder, pistons, piston cups, and a piston spring (1) are installed. When the brake pedal is depressed, fluid pressure is applied to the inside of the chamber on the piston (2), (3).

Being actuated by this pressure, the piston (2) moves to the left (piston (3) moves to the right) in the following figure and presses the brake shoe against the brake drum, thus producing brake force.

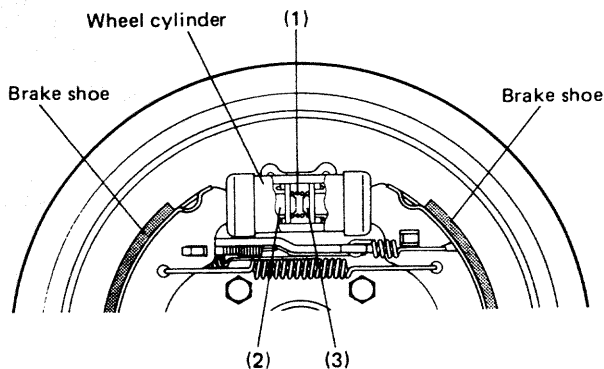


Fig. 19-9

At this time, the distance the brake shoe moves is "B", that is, the distance that "A" (the end of the long hole made in the brake shoes web) moves till it contacts the lever (1) which is fitted in the long hole.

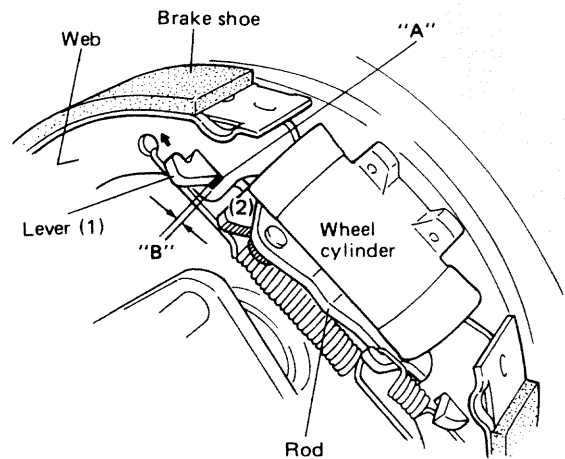


Fig. 19-10

When the brake pedal is depressed, the piston and brake shoe move toward the brake drum side by the aforementioned distance "B" and "A" of the brake shoe web contacts the lever (1). As the brake shoe gets worn and the brake shoe clearance becomes larger, the force applied to the lever (1) at the time of such a contact becomes larger. When it exceeds 10 — 12 kg (22 — 26 lbs), the "A" of the brake shoe web moves the lever (1) as much as the amount of the brake shoe lining wear toward the direction as shown with an arrow in the figure. Thus the shoe is forced against the drum and the brake force is produced.

The distance the lever (1) moves corresponds to the amount of wear. In accordance with the lever (1) movement, the fan-shaped ratchet (2) also moves, for they are assembled as a unit. The lever (1) and ratchet (2) remain in the positions as they moved until the shoe-to-drum clearance becomes even larger.

When the brake pedal is released, the brake shoe is allowed to move back by the amount of clearance "B" by means of the return spring. In this way, the brake shoe-to-drum clearance is automatically adjusted constant every time the brake pedal is depressed.

The brake shoe-to-drum clearance "B" corresponds to 0.6 – 0.8 mm (0.0236 – 0.0315 in.) in terms of the brake drum diameter $A \leftrightarrow A'$. And the amount adjusted by one notch of the ratchet corresponds to 0.20 mm (0.008 in.) in terms of the brake drum diameter $A \leftrightarrow A'$.

The spring provided in the wheel cylinder prevents the piston from moving back more than the specified brake shoe-to-drum clearance.

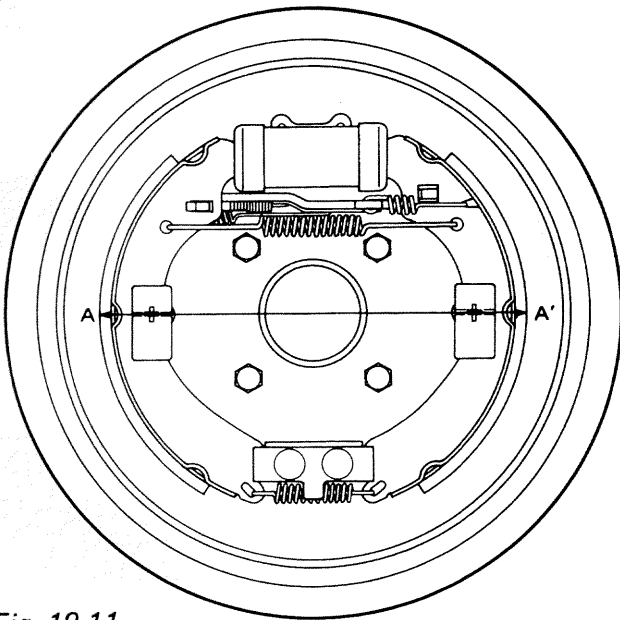


Fig. 19-11

BOOSTER ASSEMBLY

[GENERAL DESCRIPTION]

The booster is located between the master cylinder and the brake pedal. It is so designed that the force created when the brake pedal is depressed is mechanically increased combined with the engine vacuum. The booster has a diaphragm of ϕ 180 mm effective diameter. Its operation is described in the following pages.

NOTE:

- Use all components included in repair kits to service this booster. Lubricate rubber parts, where indicated, with silicone grease provided in kits. The torque values specified are for dry, unlubricated fasteners. If any hydraulic component is removed or brake line disconnected, bleed the brake system.
- Never lubricate any hydraulic component with silicone grease.

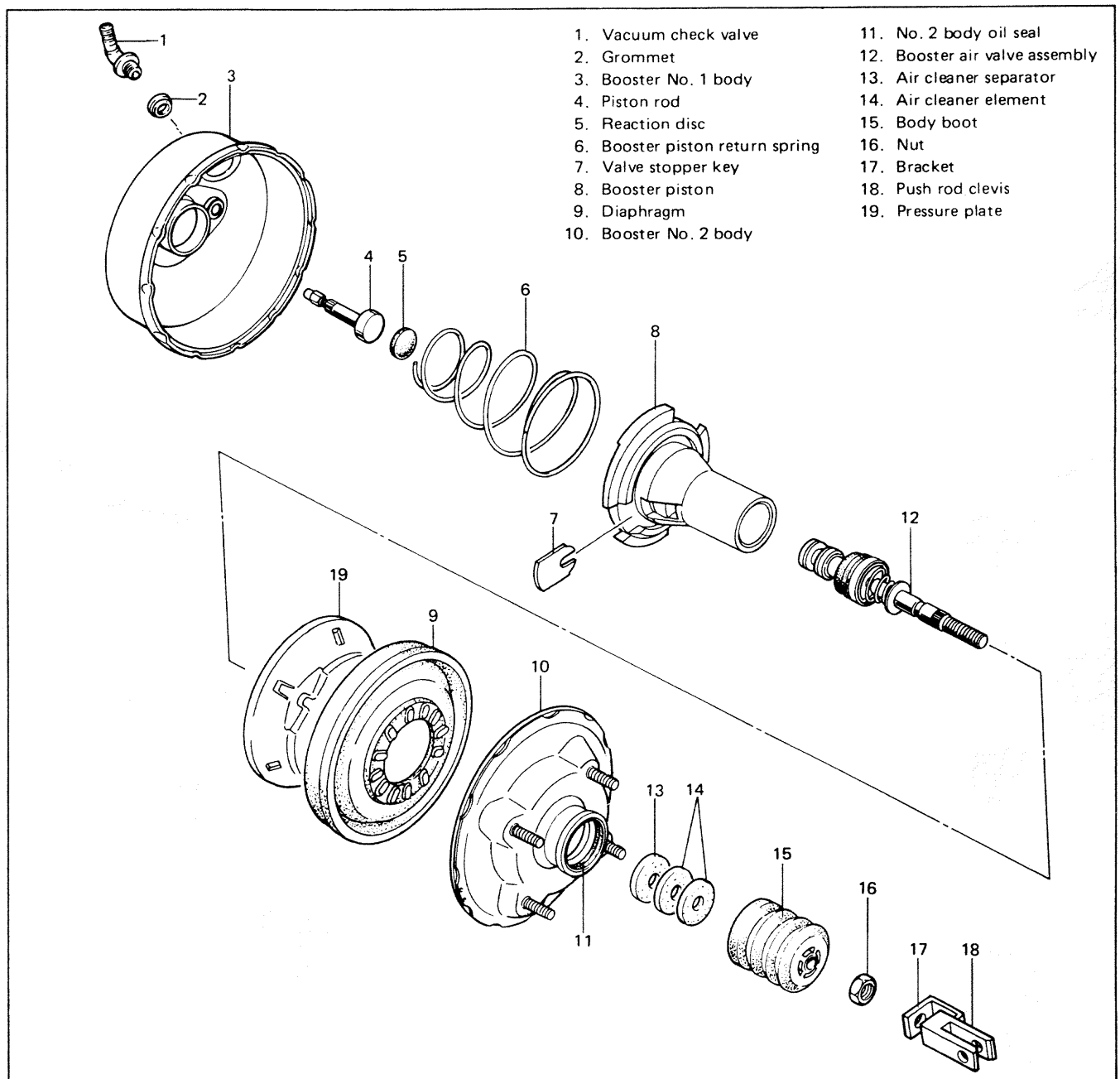


Fig. 19-12

[Booster OPERATION]

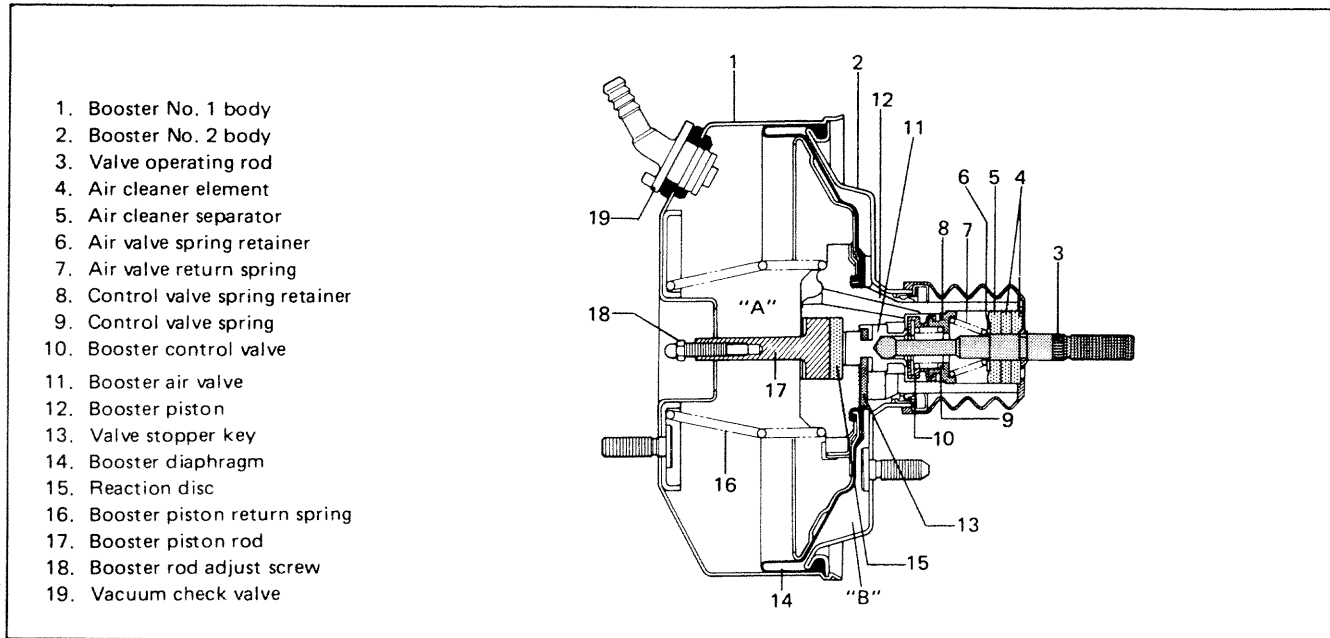


Fig. 19-13-1 Vacuum Booster Assembly

When the brake pedal is depressed, the force is transmitted to the piston of the master cylinder through the valve operating rod, booster air valve, reaction disc and piston rod. At the same time, the force of the booster piston developed due to the pressure difference between the two chambers "A" and "B" in the above figure is added to it.

The end of the booster control valve has a double function of a vacuum valve and air valve. That is, as shown in the figure, the booster control valve closes between the "A" and "B" chambers as its outer end "C" contacts the booster piston seat and opens as "C" leaves the booster piston seat (vacuum valve function). Also it closes between the "B" chamber and outside air as its inner end "D" contacts the air valve seat and opens as "D" leaves the air valve seat (air valve function).

When foot brake pedal is not depressed

The valve operating rod is pushed to the right by the spring force as shown. The air valve is also enough to the right to contact the valve stopper key as shown. In this state, the vacuum valve (control valve "C") is open and the air valve (control valve "D") is closed. Thus the chambers "A" and "B" conduct and share the same negative pressure (because of no pressure difference) which allows the return spring to push the booster piston to the right.

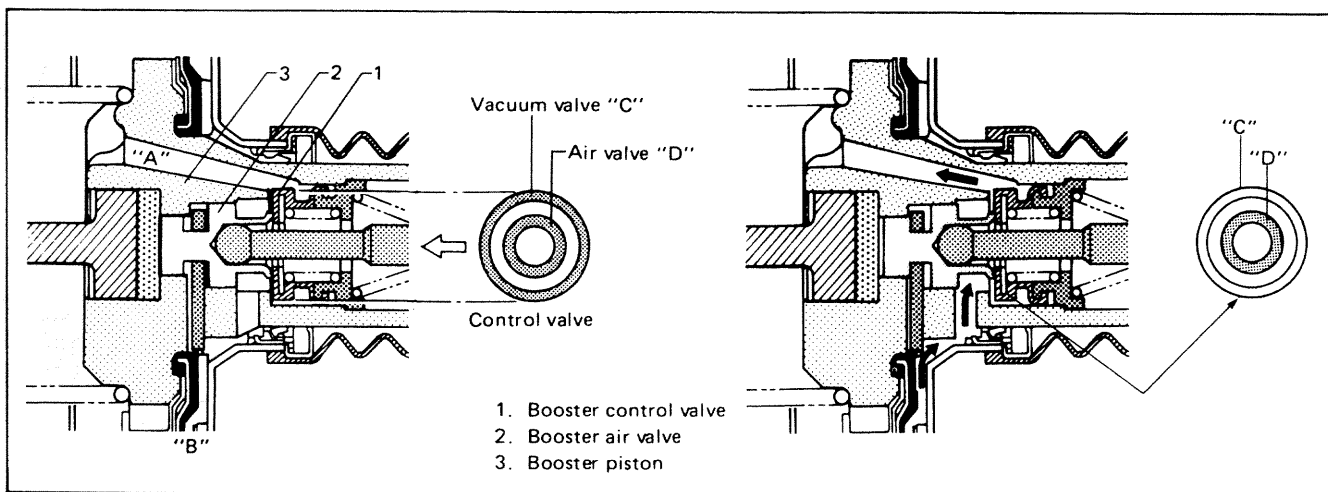


Fig. 19-13-2 Vacuum Booster Assembly

When foot brake pedal is depressed

Being pushed by the operating rod, the booster air valve moves to the left as shown. Then the control valve is pushed against the booster piston seat closely by the valve spring force. Thus the vacuum valve (control valve "C") is closed to cut off between the chambers "A" and "B". At this time the air valve (control valve "D") is still closed.

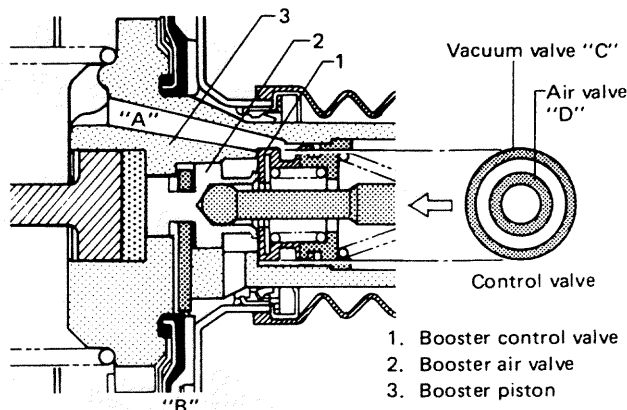


Fig. 19-14-1

As the booster air valve moves further to the left, it leaves the control valve and the air valve (control valve "D") opens to allow the air to flow into the chamber "B". The entry of air causes a difference in pressures between the chambers "A" and "B". When this pressure difference grows greater than the piston return spring force, the booster piston moves to the left and the booster control valve also moves to the left. The resulting air valve (control valve "D") closure stops the air flow into the chamber "B" and its pressure remains as it is. In this way, a small brake pedal depressing force is made into a strong push to the master cylinder push rod to produce high hydraulic pressure.

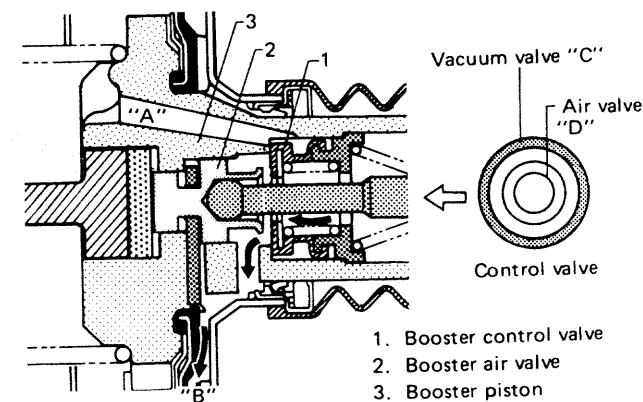


Fig. 19-14-2

When foot brake pedal is released

When the brake pedal is released, the booster air valve returns to the right by the master cylinder piston return force and the air valve return spring force as shown. Then the vacuum valve (control valve "C") opens and causes negative pressure in the chamber "B". The result is that the master cylinder piston and booster piston return to their original positions. This is the same state as described under "When foot brake pedal is not depressed".

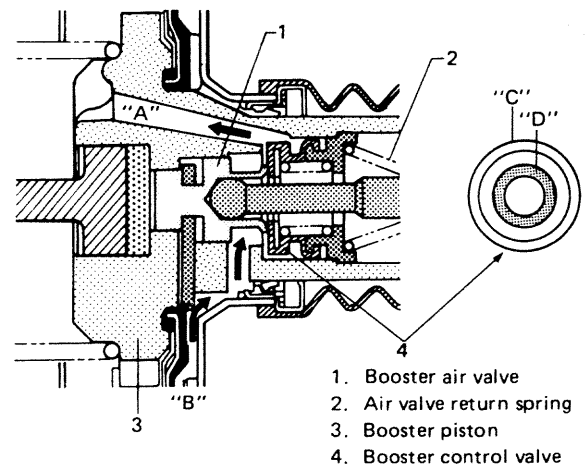


Fig. 19-14-3

Reference

Should any of the vacuum related parts in the booster be faulty, the brake force is not increased. Even then, however, the brake depressing force is transmitted to the valve operating rod, booster air valve, valve stopper key and booster piston in that order, to push the master cylinder push rod. Thus, the braking operation itself will not fail.

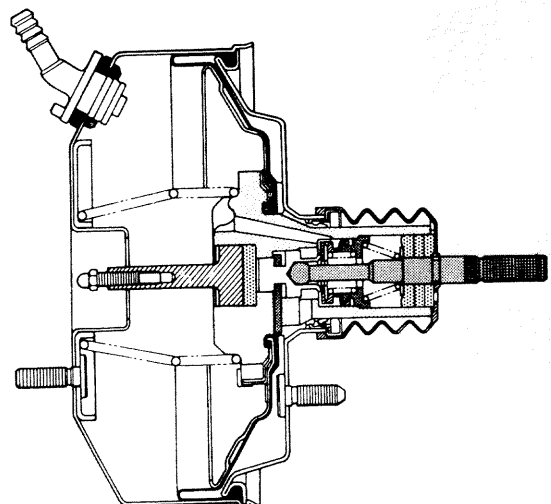


Fig. 19-14-4

19-2. FRONT DISC BRAKE

REMOVAL

- 1) Loosen, but do not remove, front wheel nuts.
- 2) Hoist car.
- 3) Remove wheel nuts and take off front wheels.

Brake Pad

After taking down the wheel, remove brake pads according to the following procedure.

- 1) Remove caliper antirattle clip.

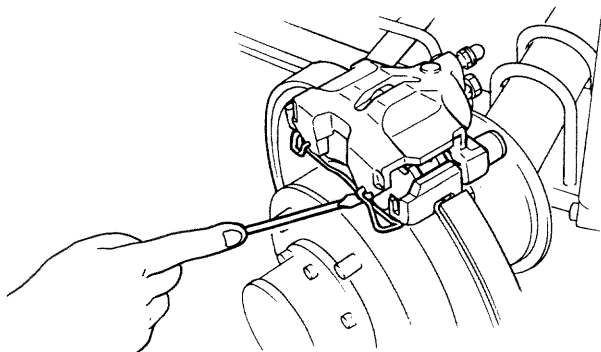


Fig. 19-17

- 2) Remove caliper guide pin caps (2 pcs).
- 3) Remove caliper guide pins (2 pcs) by using 6 mm hexagon wrench.

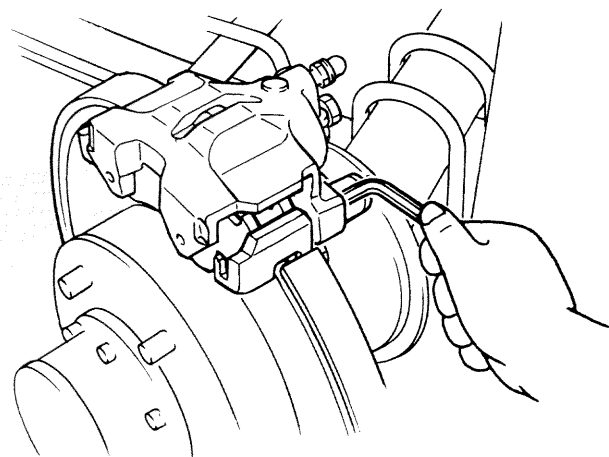


Fig. 19-18

- 4) Remove caliper (cylinder).

NOTE:

During removal, be careful not to damage brake flexible hose.

Also, don't depress brake pedal.

- 5) Remove pads.

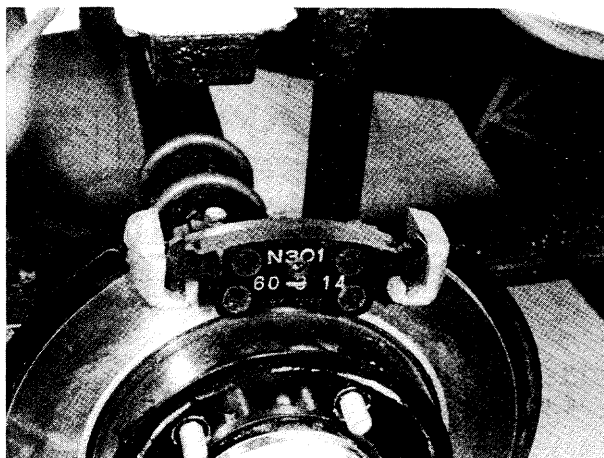


Fig. 19-20

Caliper

After taking down the wheel, remove piston and piston seal according to the following procedure.

- 1) Clean outside of reservoir.
- 2) Take out fluid with a syringe or such.
- 3) Wipe caliper clean.
- 4) Disconnect brake flexible hose from caliper body (cylinder).

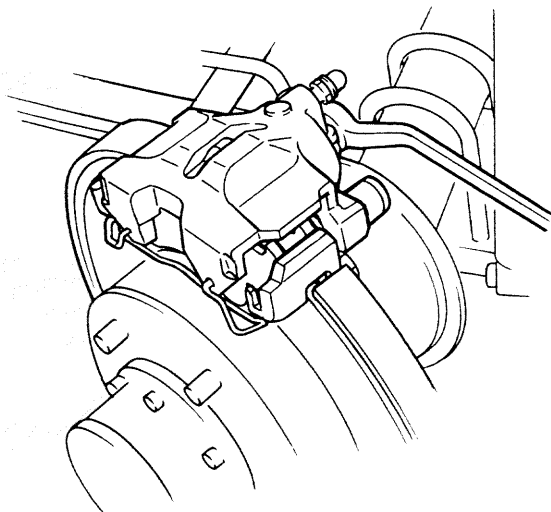


Fig. 19-21

- 5) Remove caliper (cylinder) and bolt. For removal of caliper and pads, refer to steps 1) through 5) of brake pad removal in this section (p. 19-14).

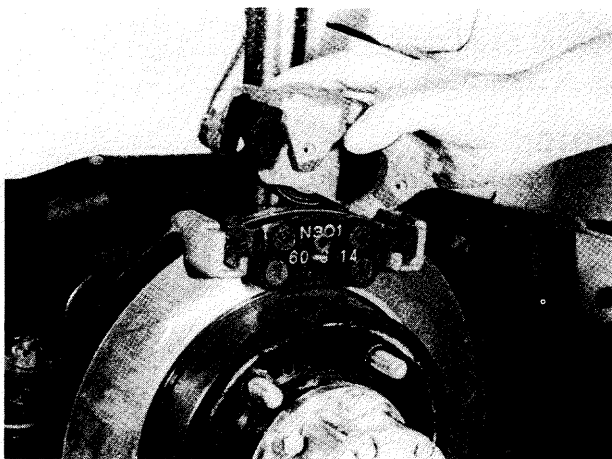


Fig. 19-22

- 6) Blow compressed air into cylinder through bolt hole where flexible hose was fitted. With this air pressure, the piston can be pushed out of cylinder.

WARNING:

Do not apply too highly compressed air which will cause piston to jump out of cylinder. It should be taken out gradually with moderately compressed air. Do not place your fingers in front of the piston when using compressed air to push it out.

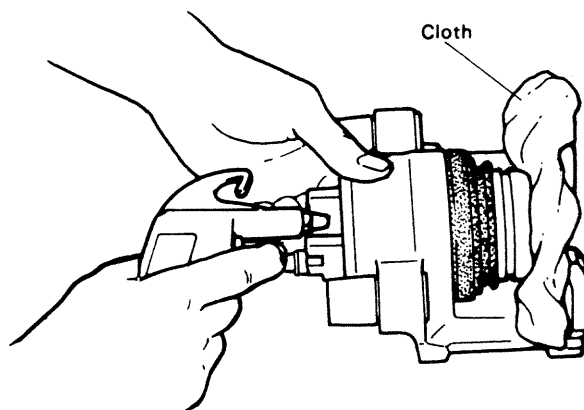


Fig. 19-23

- 7) Remove piston seal using a thin blade like a thickness gauge, etc.

CAUTION:

Be careful not to damage inside (bore side) of cylinder.

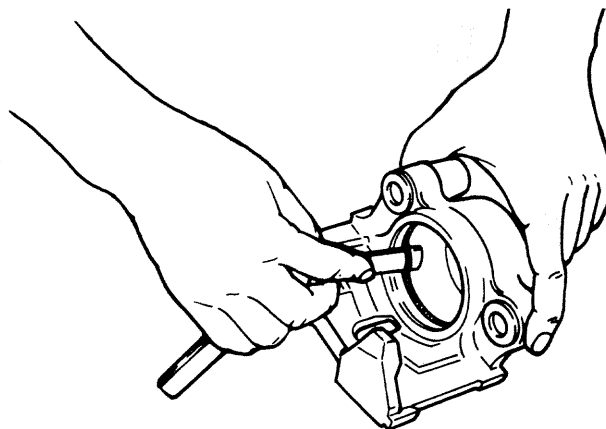


Fig. 19-24

Disc

- 1) After taking down the wheel, remove caliper assembly by loosening carrier bolts (2 pcs).

CAUTION:

During removal, be careful not to damage brake flexible hose and not to depress brake pedal.

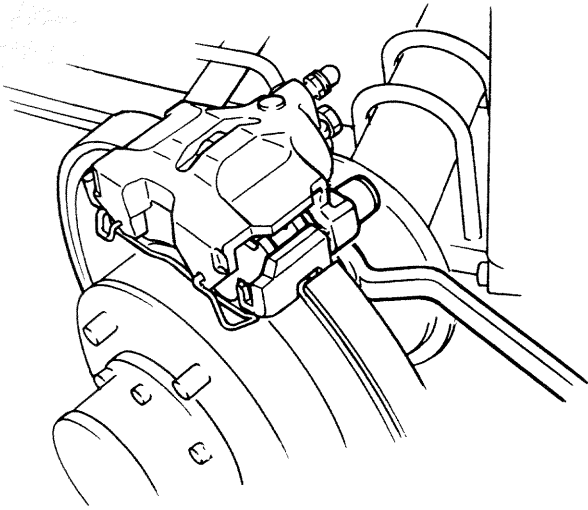


Fig. 19-25

- 2) Remove disc by using 8 mm bolts ⑧ (2 pcs).

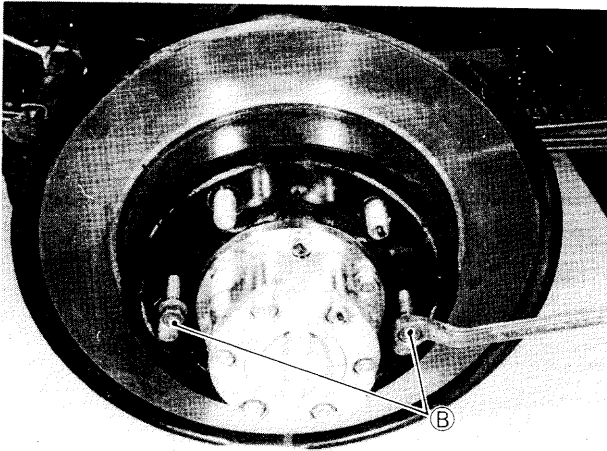


Fig. 19-26

INSPECTION OF COMPONENTS

Brake Pad

Check pad lining for wear. When wear exceeds its limit, replace with a new one.

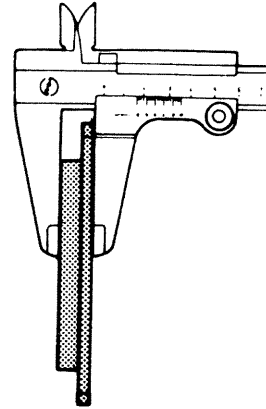


Fig. 19-27

CAUTION:

Never polish pad lining with sandpaper. If lining is polished with sandpaper, hard particles of sandpaper will be deposited in lining and may damage disc. When pad lining requires correction, replace it with a new one.

Pad thickness (lining + pad rim)	Standard	Limit
	15.0 mm (0.590 in.)	6.0 mm (0.236 in.)

NOTE:

When pads are removed, visually inspect caliper for brake fluid leak. Correct leaky point, if any.

Cylinder Slide Bush

Check bush for smooth movement as shown. If it is found faulty, replace guide pin or guide pin sleeve.

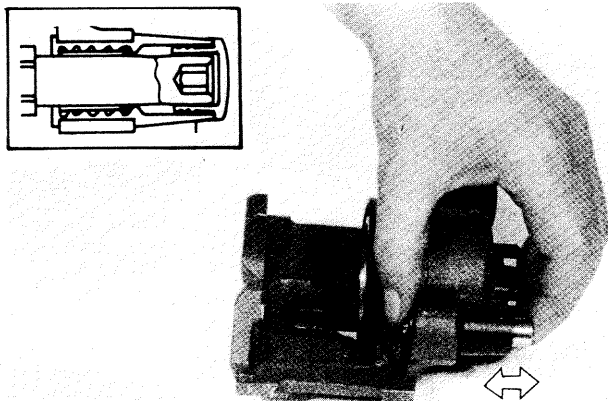


Fig. 19-28

Bush Dust Boot and Cylinder Boot

Check boots for breakage, crack and damage. If defective, replace.

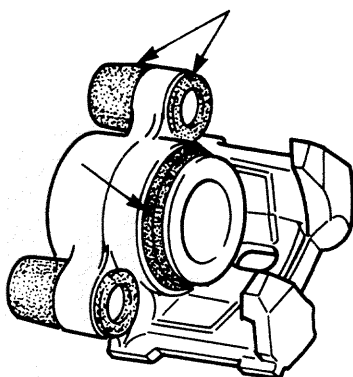


Fig. 19-29

Piston Seal

Excessive or uneven wear of pad lining may indicate unsmooth return of the piston. In such a case, replace rubber seal.

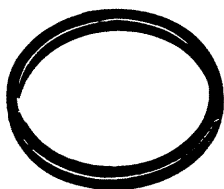


Fig. 19-30

Brake Disc

Check disc surface for scratches in wearing parts. Scratches on disc surface noticed at the time of specified inspection or replacement are normal and the disc is not defective if these are not serious. But when there are deep scratches or scratches all over the surface, replace disc. When only one side is scratched, polish and correct that side.

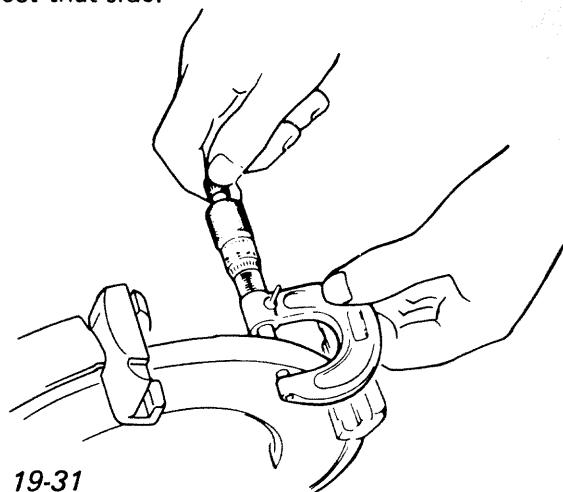


Fig. 19-31

Disc thickness	Standard	Limit
	10 mm (0.394 in.)	8.5 mm (0.334 in.)

To check disc deflection, measure at 2 points on its periphery and center with a dial gauge, while rotating the disc.

Limit on disc deflection	0.15 mm (0.006 in.)
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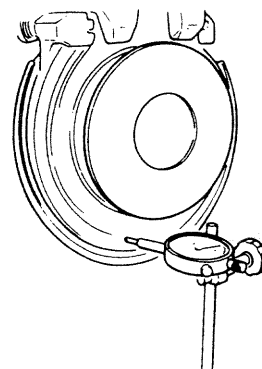


Fig. 19-32

NOTE:

Check front wheel bearing for looseness before measurement.

PRECAUTIONS ON INSTALLATION

Reassemble front brake in the reverse order of disassembly, using care for the following points.

CAUTION:

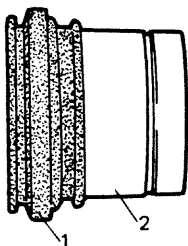
- Wash each part cleanly before installation in the same fluid as the one used in master cylinder reservoir.
- Never use other fluid or thinner.
- Before installing piston and piston seal to cylinder, apply fluid to them.
- After reassembling brake line, bleed air from lines.

Piston Seal

Piston seal is used to seal piston and cylinder and to adjust clearance between pad and disc. Replace with a new one at every overhaul. Fit piston seal into groove in cylinder taking care not to twist it.

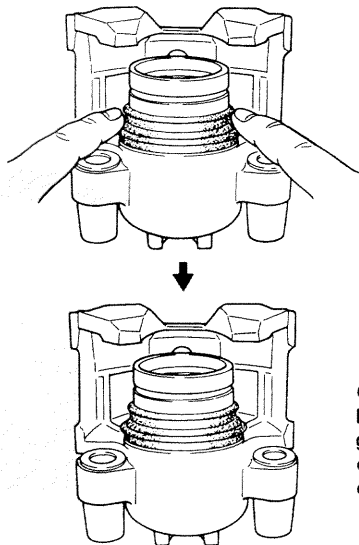
Piston and Boot

- 1) Before inserting piston into cylinder, install boot onto piston as shown below.



1. Boot
2. Piston

- 2) Fit boot as it is in the above figure into boot groove in cylinder with fingers.



Check to make sure that boot is fitted into boot groove in cylinder completely in its circumference.

Fig. 19-33

- 3) Insert piston into cylinder by hand and fit boot in boot groove in piston.

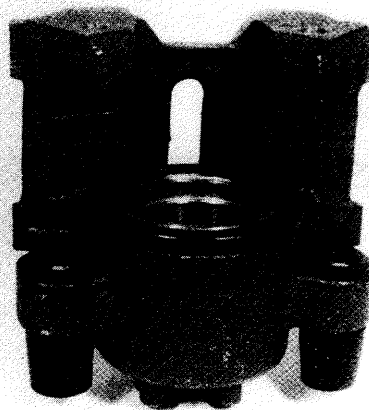


Fig. 19-34

- 4) To confirm that boot is fitted in its groove in cylinder properly, pull piston out of cylinder a little but do not take it all out.

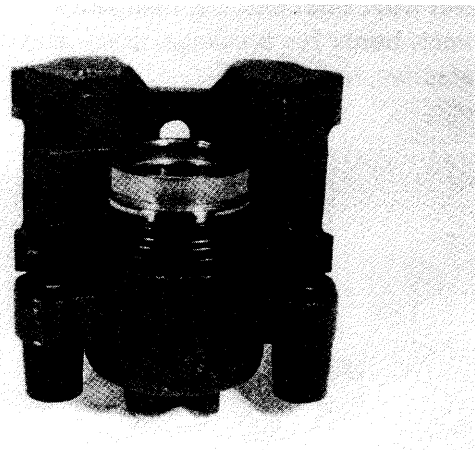


Fig. 19-35

- 5) Insert piston into cylinder by hand.

Caliper

Before installing caliper (cylinder body) to carrier, check to ensure that guide pin inserted in each caliper hole can be moved smoothly in thrust direction.

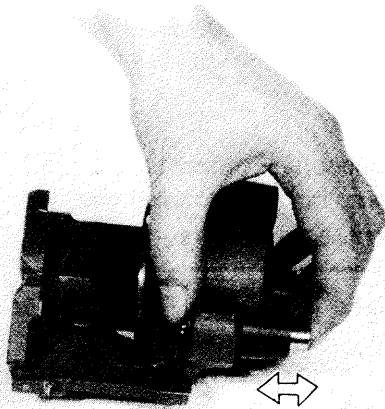


Fig. 19-36

Front Brake Disc and Pad

- Use care not to scratch or put oil or grease on sliding surface of disc and pad during installation work.
- After installing brake disc to wheel hub properly, tighten wheel nuts to specified torque.

Front Wheel Spindle

Apply SEALING COMPOUND 366E (99000-31090) to mating surfaces of brake caliper holder and steering knuckle.

Dust Cover

When fitting dust cover onto brake caliper holder, apply SEALING COMPOUND 366E (99000-31090) to mating surfaces of both parts.

Front Brake Flexible Hose

- Connect flexible hose to caliper as shown below and tighten hose bolt to specified torque.
- Connect the other end of hose to chassis body bracket, being careful not to kink it with front wheels directed straightforward.

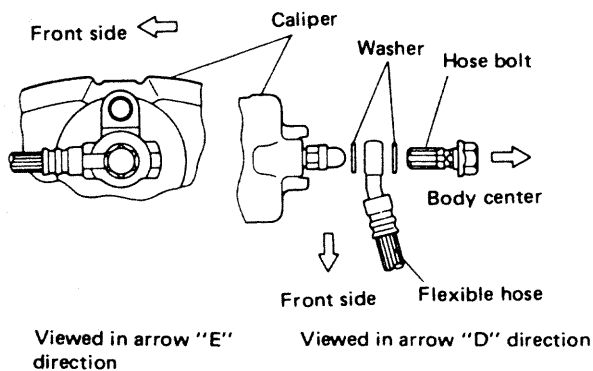


Fig. 19-38

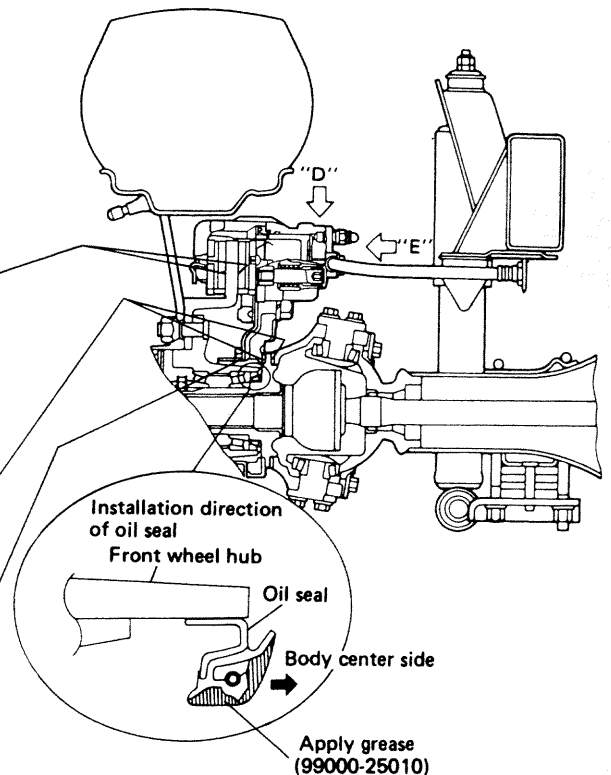


Fig. 19-37

Tightening torque

Fastening parts	N·m	kg-m (lb-ft)
Flexible hose bolt	20 - 25	2.0 - 2.5 (14.5 - 18.0)
Carrier bolt	70 - 100	7.0 - 10.0 (51.0 - 72.0)
Caliper holder bolt	40 - 60	4.0 - 6.0 (29.0 - 43.0)
Caliper guide pin	25 - 30	2.5 - 3.0 (18.5 - 21.5)
Wheel nut	50 - 80	5.0 - 8.0 (36.5 - 57.5)

NOTE:

After completing installation, fill reservoir with brake fluid and bleed brake system. Perform brake test and check each installed part for oil leakage.

Inspection for Front Brake After Installing

Mount tires and make certain that they rotate smoothly, with a force of less than 3.0 kg (6.6 lb).

NOTE:

For the above check, the following must be observed.

- 1) Jack up front wheels, both right and left, off the ground.
- 2) Set free wheeling hubs of both right and left wheels to "LOCK", if equipped.
- 3) Shift transfer shift lever to 2H (rear wheel) position.
- 4) The below figure shows outer periphery of tire.
- 5) Be careful not to depress brake pedal when checking tire for rotation.

If tire rotation is heavy, check the following:

- Wheel bearings for breakage.
- Wheel bearing starting preload for proper adjustment.
- Disc for flatness (Improper flatness brings disc into contact with lining during rotation and makes rotation heavy).

To check this, measure disc deflection.

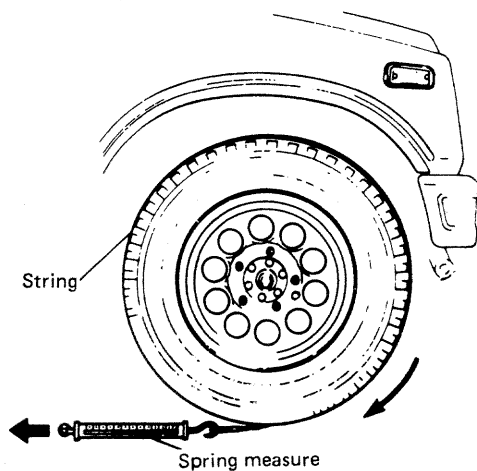


Fig. 19-39

19-3. REAR DRUM BRAKE

REMOVAL

Brake Drums

- 1) Remove wheel center cap.
- 2) Loosen, but do not remove, rear wheel nuts and brake drum nuts.
- 3) Hoist car.
- 4) Remove rear wheel nuts and take off rear wheel.
- 5) Check to ensure that parking brake lever is not pulled up.
- 6) To increase clearance between brake shoe and brake drum, remove parking brake shoe lever return spring ① and disconnect parking brake cable joint ③ from parking brake shoe lever ②.

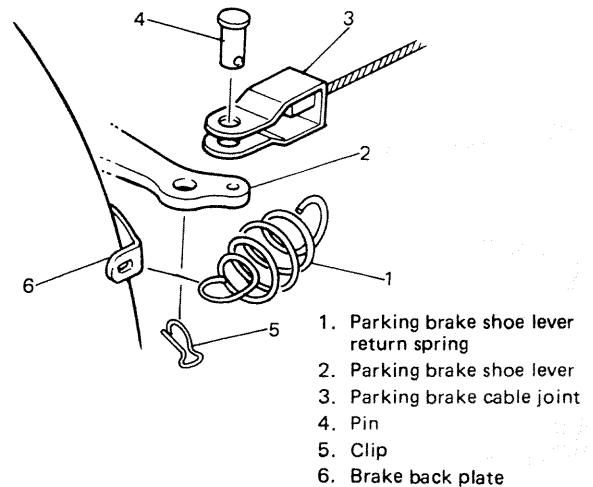


Fig. 19-40

- 7) Remove parking brake shoe lever stopper plate.

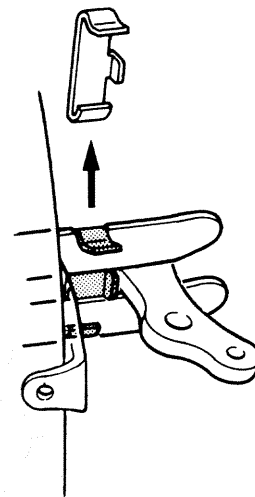


Fig. 19-41

8) Remove brake drum by using special tools.

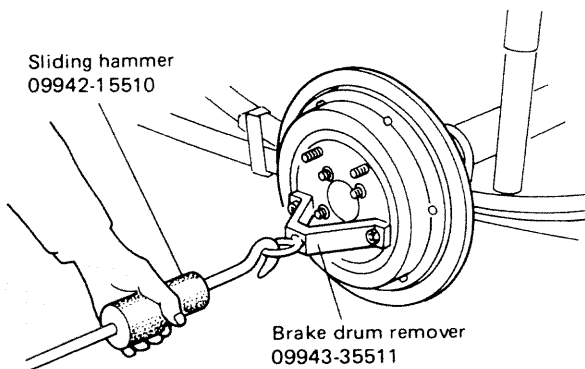


Fig. 19-42

Brake Shoes and Strut

- 1) Remove brake drum referring to REMOVAL on previous page.
- 2) Remove shoe hold down springs ① by turning shoe hold down pins ② as shown.

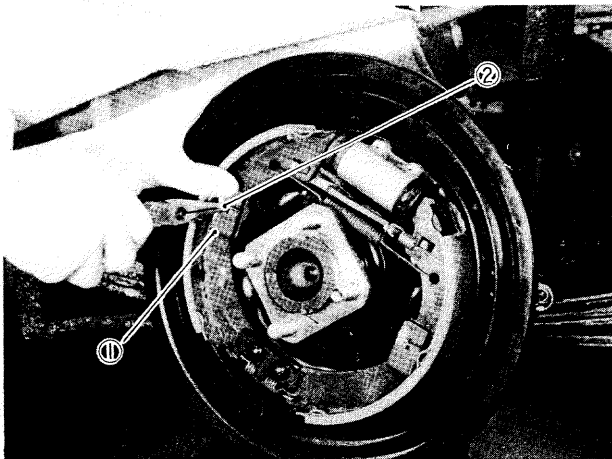


Fig. 19-43

- 3) Remove brake shoes.
- 4) Remove brake shoe strut.

INSPECTION OF COMPONENTS

Brake Drum

Inspect drum for cleanliness. Check its braking surface for wear by measuring its inside diameter.

Item	Standard	Service limit
Brake drum ID	220 mm (8.66 in.)	222 mm (8.74 in.)

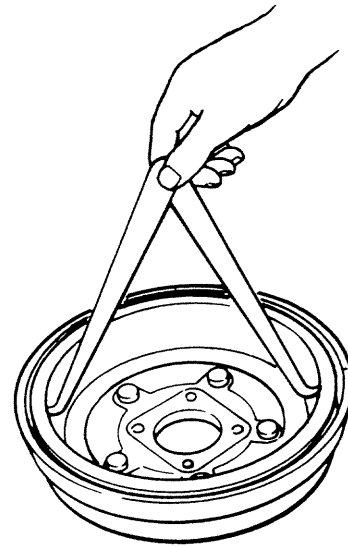


Fig. 19-44

Whenever brake drums are removed, they should be thoroughly cleaned and inspected for cracks, scores, deep grooves.

Cracked, Scored, or Grooved Drum

A cracked drum is unsafe for further service and must be replaced. Do not attempt to weld a cracked drum. Smooth up any slight scores. Heavy or extensive scoring will cause excessive brake lining wear and it will probably be necessary to resurface drum braking surface.

If brake linings are slightly worn and drum is grooved, drum should be polished with fine emery cloth but should not be cut.

NOTE:

When drum is removed, visually inspect wheel cylinder for brake fluid leak. Correct leaky point, if any.

Brake Shoe and Rim

If lining is worn out beyond service limit, replace shoe.

Brake lining	Standard	Service limit
Thickness (lining + shoe rim)	7.0 mm (0.28 in.)	3.0 mm (0.12 in.)

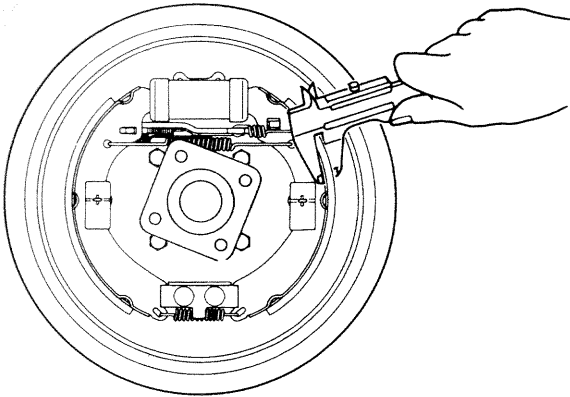


Fig. 19-45

If one of brake linings is worn to or beyond service limit, all linings must be replaced at the same time.

NOTE:

Never polish lining with sandpaper. If lining is polished with sandpaper, hard particles of sandpaper will be deposited in lining and may damage drum. When it is required to correct lining, replace it with a new one.

Wheel Cylinder

When removing brake drum, check wheel cylinder for oil leakage. If any leakage is found, replace wheel cylinder inner parts.

Inspect wheel cylinder disassembled parts for wear, cracks, corrosion or damage.

NOTE:

Clean wheel cylinder components with brake fluid.

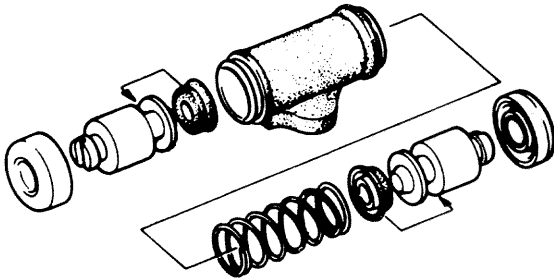


Fig. 19-46

Brake Strut

Inspect ratchet of strut for wear or damage.

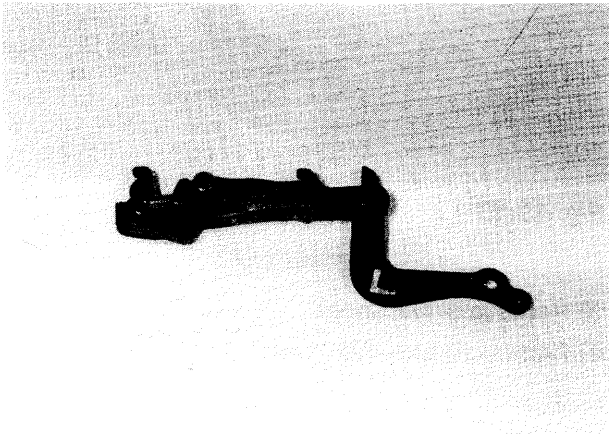


Fig. 19-47

Springs

Inspect for damage or weakening.

Inspect each part for rust. If found defective, replace.

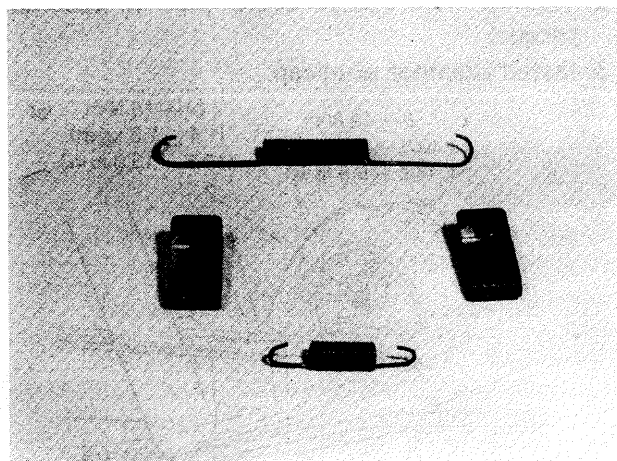


Fig. 19-48

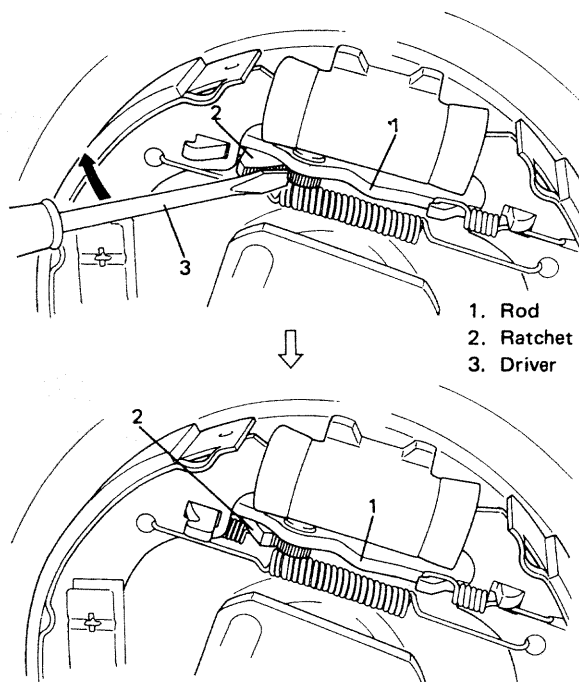
Self Shoe Clearance Adjusting System

To check self shoe clearance adjusting system of rear brake for operation, follow steps described below.

- 1) Remove brake drum.

Carry out steps 1) through 8) of brake drum removal (p. 19-20).

- 2) To maximize brake shoe-to-drum clearance, put screw driver between rod and ratchet and push down ratchet as shown in figure.



Above figure shows ratchet position where brake shoe-to-drum clearance is maximum.

Fig. 19-49

- 3) Install parking brake shoe lever stopper plate.

NOTE:

Make sure to install this plate.

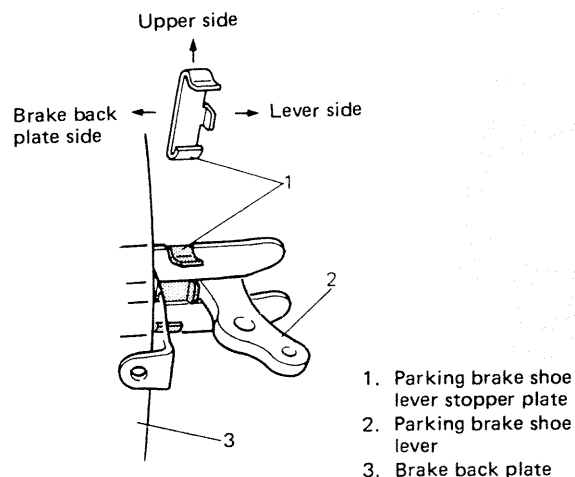


Fig. 19-49-1

- 4) Install brake drum and depress brake pedal with about 30 kg (66 lbs) load 4 or 5 times.

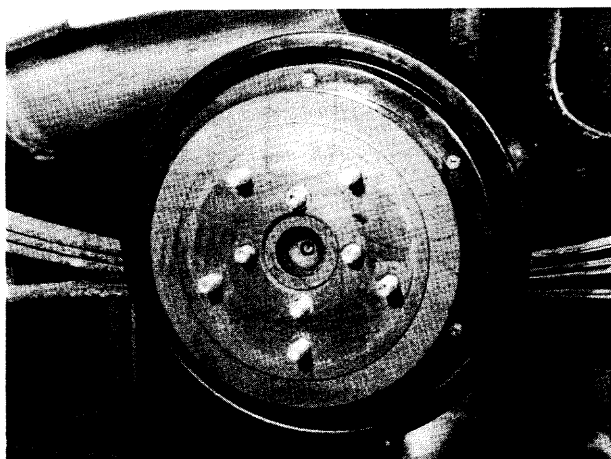


Fig. 19-49-2

- 5) Remove parking brake shoe lever stopper plate.

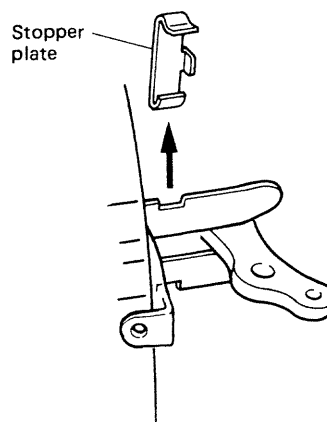
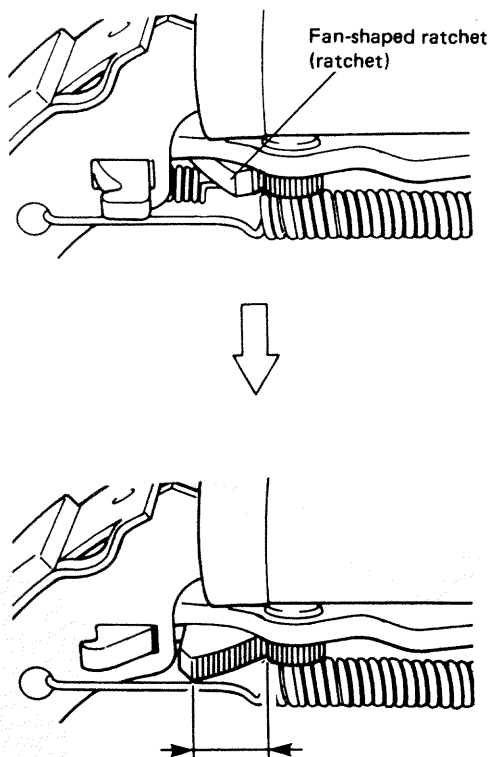


Fig. 19-49-3

- 6) Remove brake drum and check fan-shaped ratchet position.

If it has shifted off its previous position in step 2) when it was pushed down, it proves proper operation of shoe adjusting system.



If not, replace strut assembly.

Fig. 19-49-4

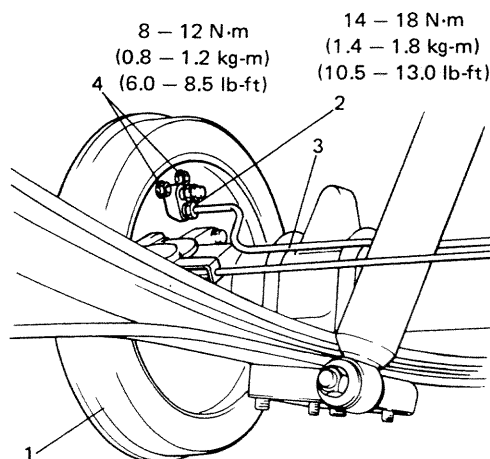
NOTE:

For brake drum installation, refer to steps 1) through 8) of brake drum installation in this section (p. 19-25).

PRECAUTIONS ON INSTALLATION

Wheel Cylinder

- 1) Tighten wheel cylinder to brake back plate to specified torque.
- 2) Tighten flare nut of brake pipe to specified torque.
- 3) Install breather plug cap.



- | | |
|---|--|
| 8 – 12 N·m
(0.8 – 1.2 kg-m)
4 (6.0 – 8.5 lb-ft) | 14 – 18 N·m
(1.4 – 1.8 kg-m)
(10.5 – 13.0 lb-ft) |
| 1. Brake back plate | 3. Brake pipe |
| 2. Brake pipe flare nut | 4. Wheel cylinder bolts |

Fig. 19-50

Brake Shoes

- 1) Assemble parts as shown in the reverse order of removal.

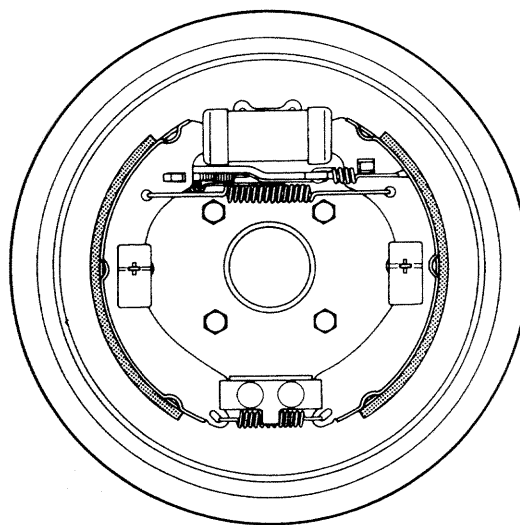


Fig. 19-50-1

NOTE:

When installing shoes, use care not to cause damage to wheel cylinder boots.

- 2) Install shoe hold down springs by pushing them down in place and turning hold down pins.

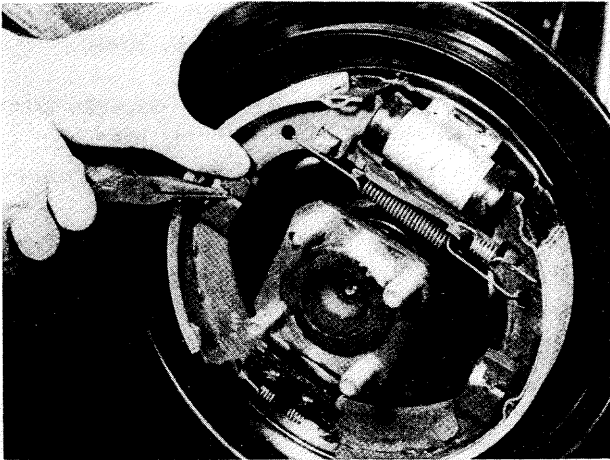


Fig. 19-51

Brake Drum

- 1) Install parking brake shoe lever stopper plate, referring to the following figure for its installation direction.

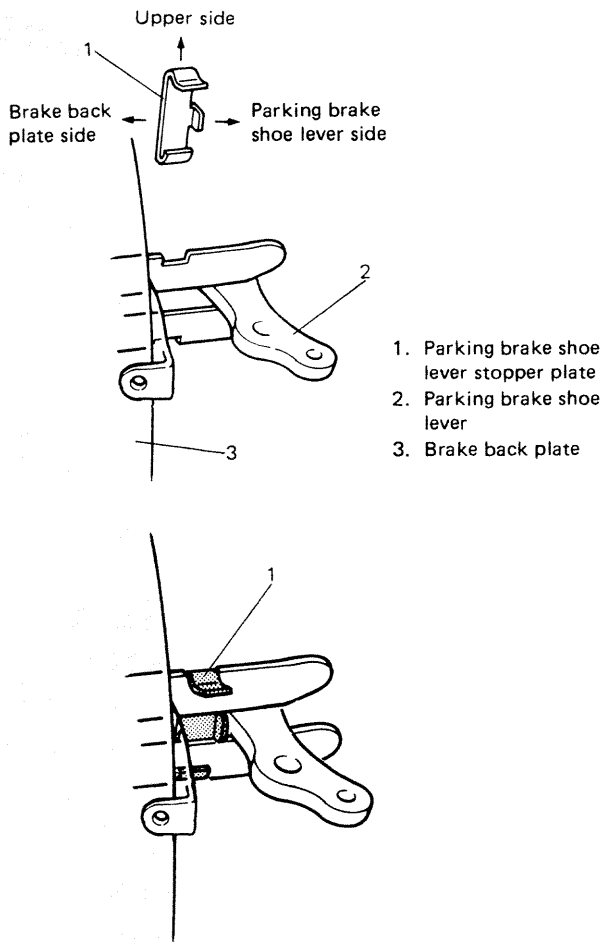


Fig. 19-52

1. Parking brake shoe lever stopper plate

- 2) Connect brake cable joint to parking brake shoe lever by using joint pin.
Insert joint pin down from the top and install clip into joint pin hole securely.

NOTE:

Check to ensure that clip is in good condition before installing it. If deformed or broken, replace.

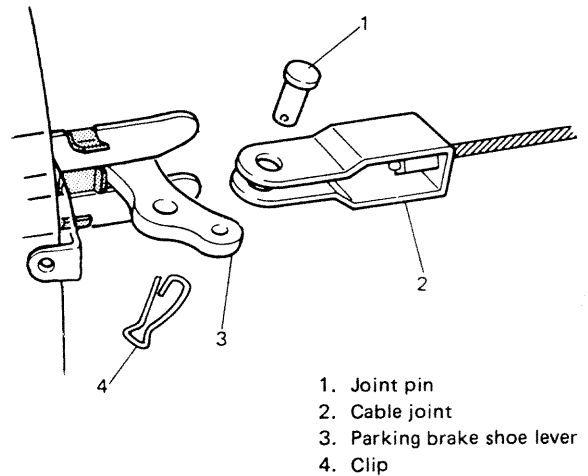


Fig. 19-52-1

- 3) Install parking brake shoe lever return spring.

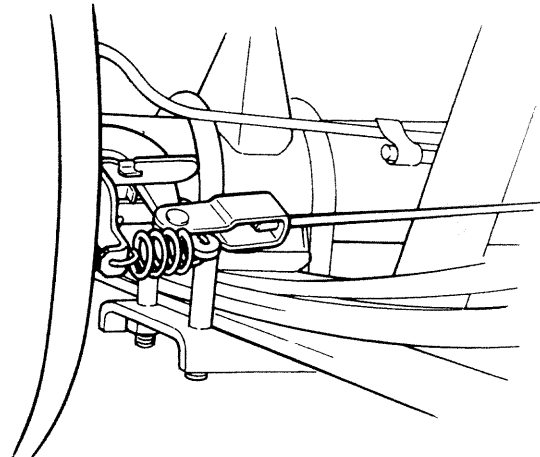
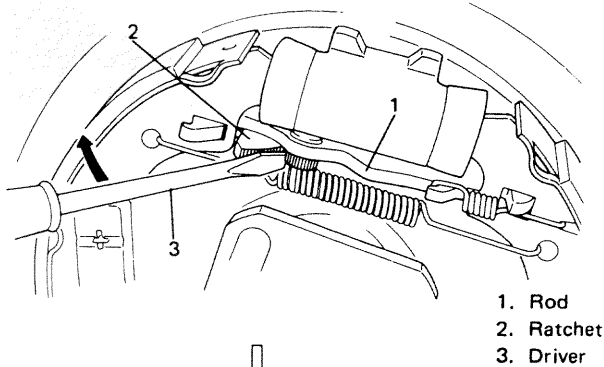


Fig. 19-53

- 4) Before installing brake drum, to maximize brake shoe-to-drum clearance, put screw driver between rod and ratchet and push down ratchet as shown in figure.



Below figure shows ratchet position where brake shoe-to-drum clearance is maximum.

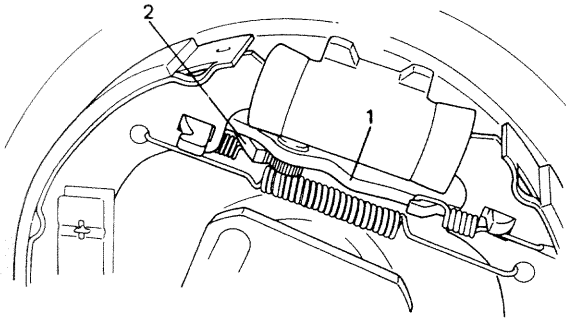


Fig. 19-54

- 5) Install brake drum after making sure that inside of brake drum and brake shoes are free from dirt and oil.
- 6) Torque wheel nuts and brake drum nuts to specification.

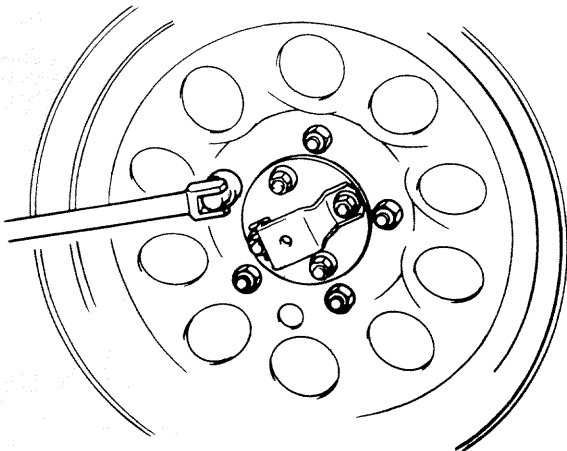


Fig. 19-55

NOTE:

If brake backing plate was removed from wheel cylinder or brake pipe was disconnected from wheel cylinder. Bleed air from brake system. (For bleeding operation, refer to p. 19-46.)

- 7) Upon completion of all jobs, depress brake pedal with about 30 kg (66 lbs) load four or five times so as to obtain proper drum-to-shoe clearance.
- 8) Check to ensure that brake drum is free from dragging and proper braking is obtained. Then remove car from hoist and perform brake test (foot brake and parking brake).

19-4. MASTER CYLINDER

REMOVAL

- 1) Clean outside of reservoir.
- 2) Take out fluid with a syringe or such.
- 3) Remove reservoir connector screw.
- 4) Remove reservoir.

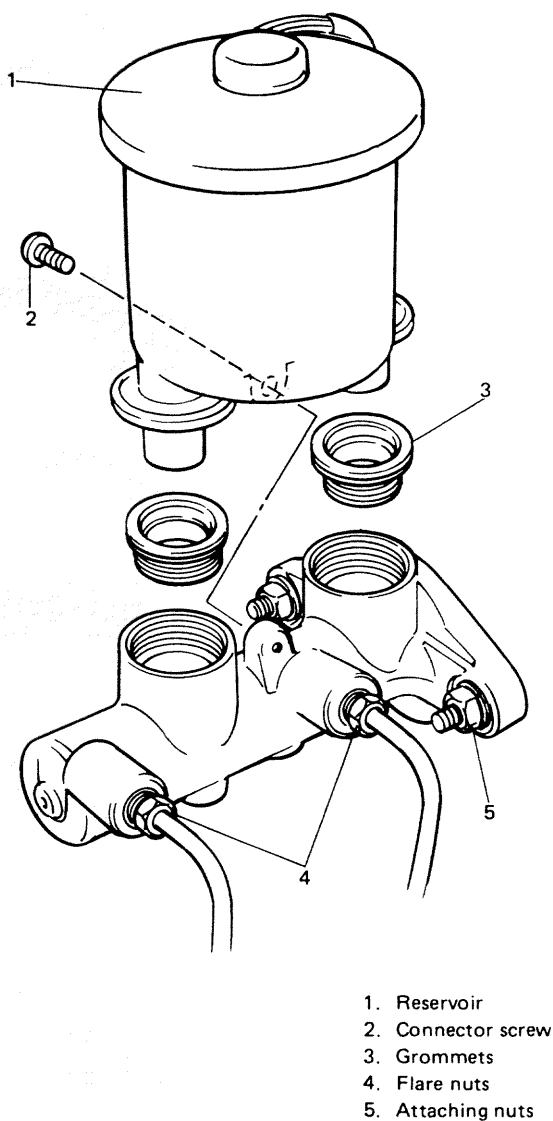


Fig. 19-56

- 5) Disconnect 2 brake pipes from master cylinder.

NOTE:

Do not allow brake fluid to get on painted surfaces.

- 6) Remove 2 attaching nuts and washers.
- 7) Remove master cylinder.

DISASSEMBLY

- 1) Remove circlip.
- 2) Remove primary piston by using compressed air as shown. Be cautious during removal as primary piston will jump out.

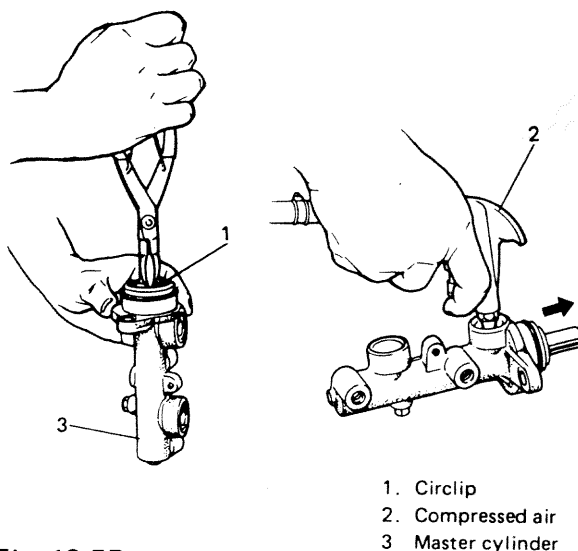


Fig. 19-57

- 3) Remove piston stopper bolt. Then remove secondary piston by blowing compressed air into hole from which piston stopper bolt was removed.

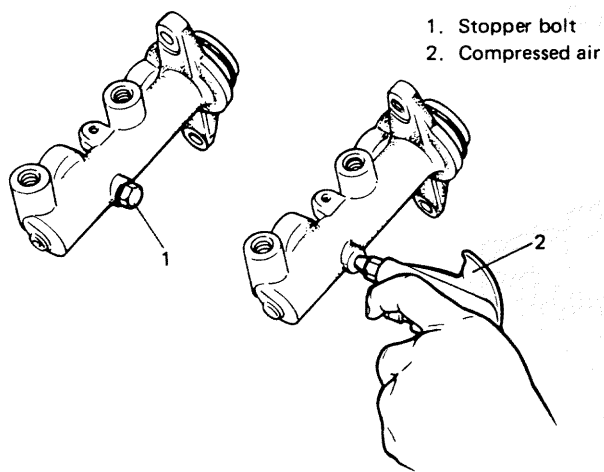


Fig. 19-58

INSPECTION OF COMPONENTS

Master Cylinder Inner Parts

Inspect all disassembled parts for wear or damage, and replace parts if necessary.

NOTE:

- Wash disassembled parts with brake fluid.
- Do not reuse piston cups.

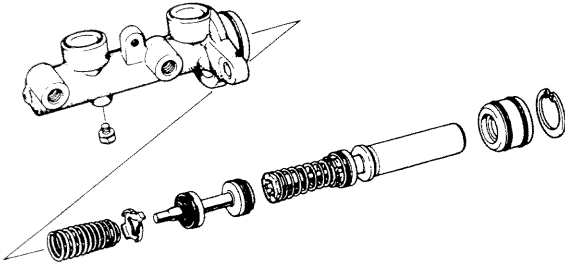


Fig. 19-59

Inspect master cylinder bore for scoring or corrosion. It is best to replace a corroded cylinder. Corrosion can be identified as pits or excessive roughness.

NOTE:

Polishing bore of master cylinder with cast aluminum body with anything abrasive is prohibited, as damage to cylinder bore may occur.

Rinse cylinder in clean brake fluid. Shake excess rinsing fluid from cylinder. Do not use a cloth to dry cylinder, as lint from cloth will remain on cylinder bore surface.

Reservoir

NOTE:

Do not use shock absorber fluid or any other fluid which contains mineral oil. Do not use a container which has been used for mineral oil or a container which is wet from water. Mineral oil will cause swelling and distortion of rubber parts in the hydraulic brake system and water will mix with brake fluid, lowering the fluid boiling point. Keep all fluid containers capped to prevent contamination.

Fluid to fill reservoir with is indicated on reservoir cap of the car with embossed letters or in owner's manual supplied with the car. Add fluid up to MAX line.

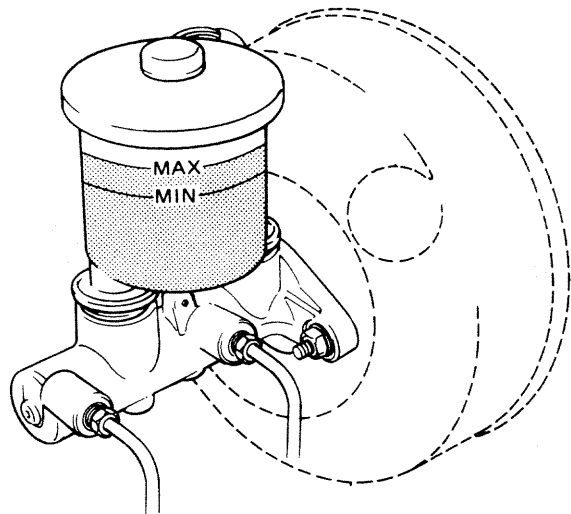


Fig. 19-60

ASSEMBLY

NOTE:

Before assembling, wash each part in fluid recommended to use for the car.

1) Assemble secondary piston as shown below.

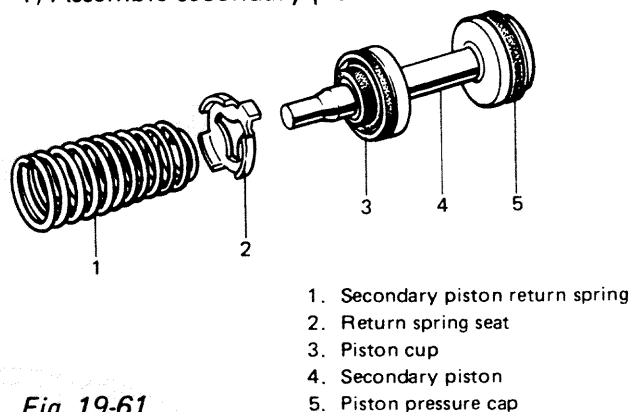


Fig. 19-61

2) Install secondary piston assembly into cylinder.

3) Install primary piston in cylinder.

4) Depress, and install circlip.

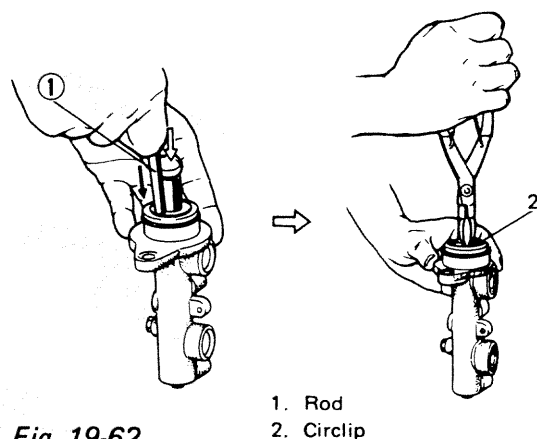


Fig. 19-62

5) Install piston stopper bolt with pistons pushed in all the way and tighten it to specified torque.

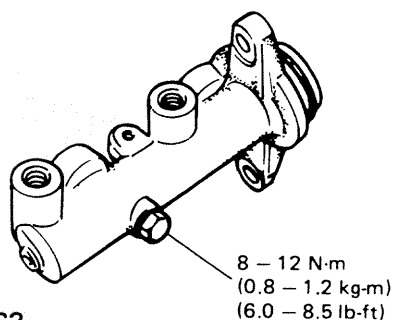


Fig. 19-63

6) For installation on car, refer to INSTALLATION.

PRECAUTION OF INSTALLATION

NOTE:

- See NOTE at the beginning of this section.
- Adjust clearance between booster piston rod and primary piston with special tool (See page 19-33).

- 1) Install master cylinder as shown and torque attaching nuts to specification.
- 2) Connect 2 hydraulic lines and torque flare nuts to specification.
- 3) When using new grommets, lubricate them with the same fluid as the one to fill reservoir with. Then press-fit grommets to master cylinder. Grommets must be seated in place.
- 4) Install reservoir and tighten screw to specified torque.
- 5) Fill reservoir with specified fluid.

After installing, check brake pedal height, bleed air from system (See p. 19-43 and p. 19-46) and also check for fluid leakage.

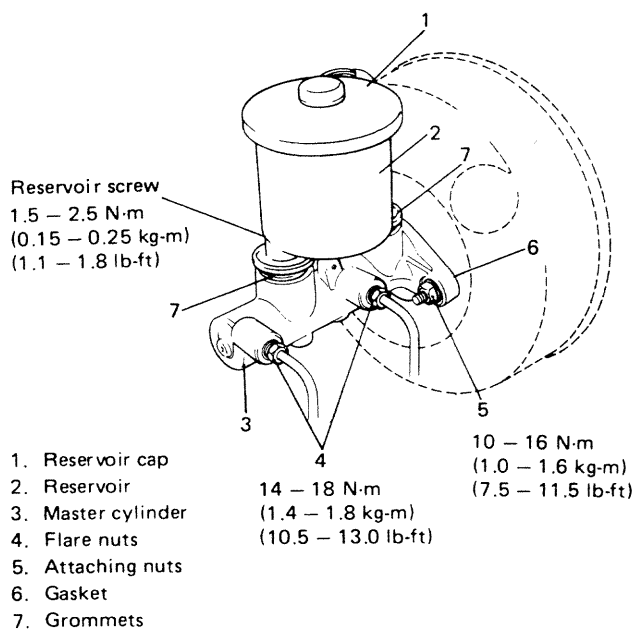


Fig. 19-64

19-5. BRAKE BOOSTER

REMOVAL

- 1) Take out fluid from master cylinder with a syringe or such.
- 2) Disconnect 2 brake pipes from master cylinder and remove master cylinder from booster.
- 3) Disconnect vacuum hose from booster.
- 4) Disconnect push rod clevis from brake pedal arm.
- 5) Remove attaching nuts and then booster as shown.

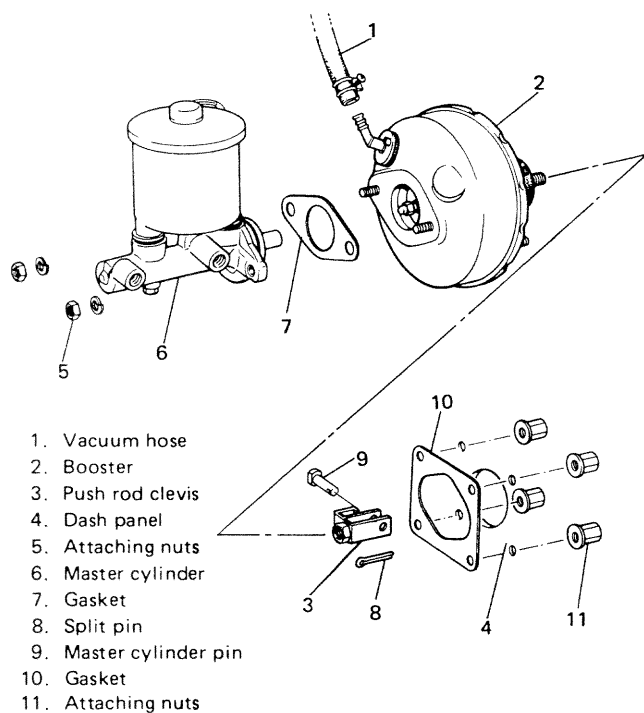
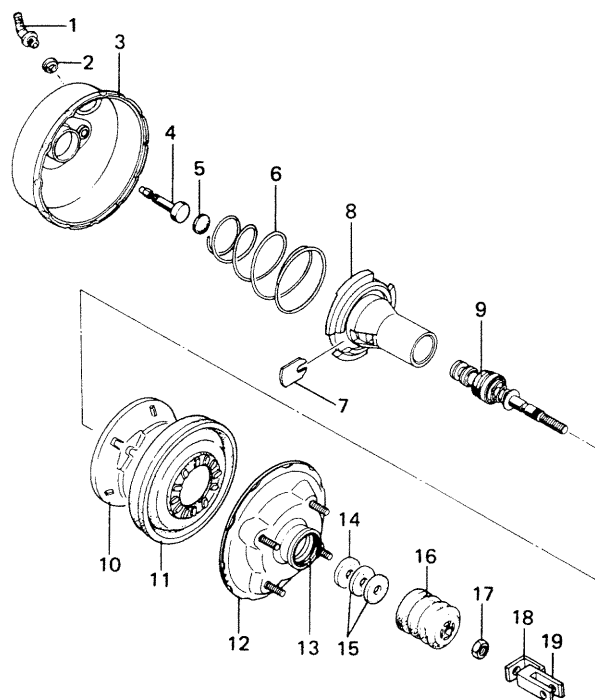


Fig. 19-65

DISASSEMBLY



- | | |
|---------------------------------|---------------------------|
| 1. Vacuum check valve | 11. Diaphragm |
| 2. Grommet | 12. Booster No. 2 body |
| 3. Booster No. 1 body | 13. No. 2 body oil seal |
| 4. Piston rod | 14. Air cleaner separator |
| 5. Reaction disc | 15. Air cleaner element |
| 6. Booster piston return spring | 16. Body boot |
| 7. Valve stopper key | 17. Nut |
| 8. Booster piston | 18. Bracket |
| 9. Booster air valve assembly | 19. Push rod clevis |
| 10. Pressure plate | |

Fig. 19-66

- 1) Remove piston rod from booster.
- 2) Remove push rod clevis and nut.

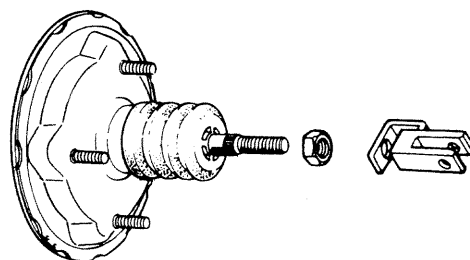


Fig. 19-67

3) Set booster to special tool (A) as shown.

NOTE:

When setting, check to be sure that booster vacuum check valve is not in faulty contact with base of special tool.

Tighten 2 nuts on upper part of special tool evenly to specified torque.

Special tool nuts tightening torque	N·m	kg·m	lb·ft
	3 – 5	0.3 – 0.5	2.2 – 3.6

NOTE:

Be careful not to over-tighten nuts, or booster body will be deformed.

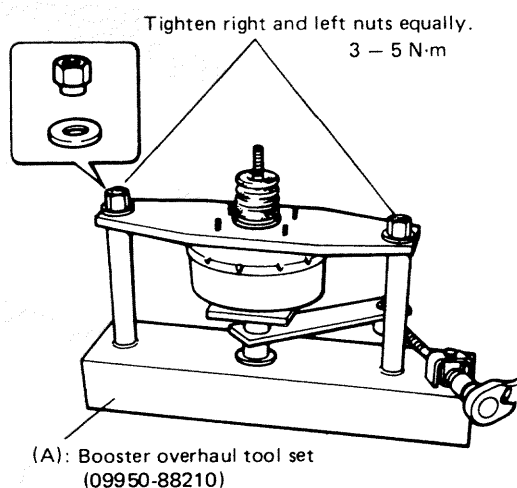


Fig. 19-68

4) Turn special tool bolt clockwise until No. 1 body projecting part and No. 2 body depressed part fit each other.

Once they are matched, make match marking on No. 1 and No. 2 bodies to facilitate their installation.

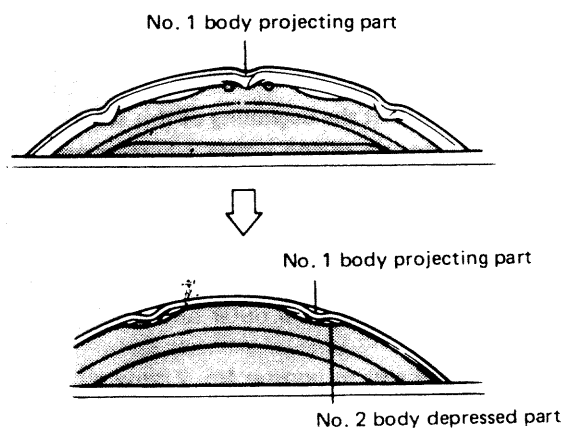


Fig. 19-69

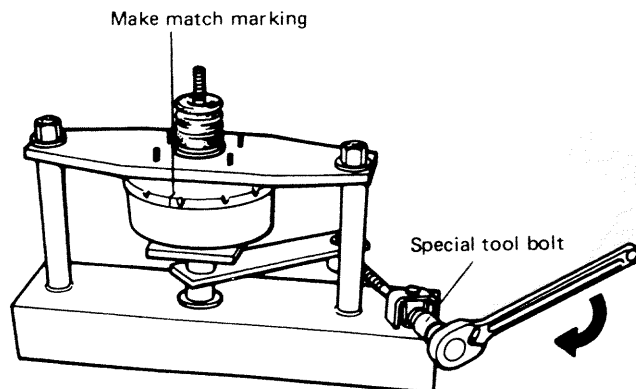


Fig. 19-70

5) Remove booster from special tool and separate No. 1 body and No. 2 body. Remove piston return spring.

NOTE:

When separating two bodies, hold both bodies carefully to prevent either body from jumping off by spring force.

6) From booster No. 2 body, remove boot, air cleaner elements and air cleaner separator in this order.

7) Using camshaft pulley holder (special tool 09917-68210), turn booster piston counter-clockwise and remove piston.

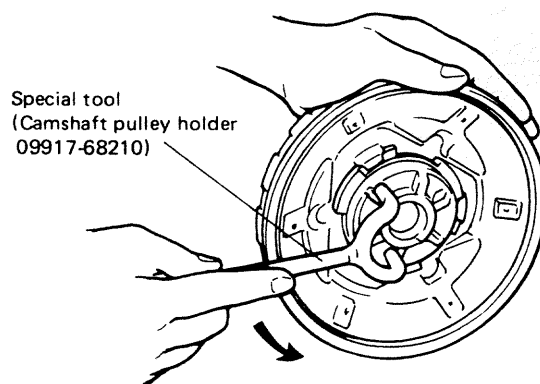
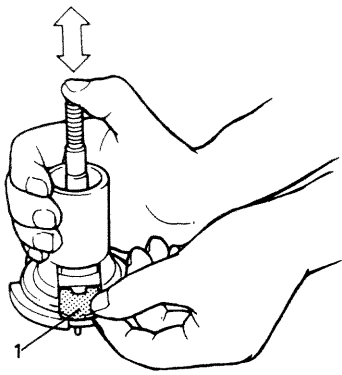


Fig. 19-71

8) While compressing air valve spring (by moving rod up and down as shown), remove valve stopper key. Then remove booster air valve assembly from booster piston.

NOTE:

Booster air valve assembly can't be disassembled.



1. Valve stopper key

Booster air valve assembly

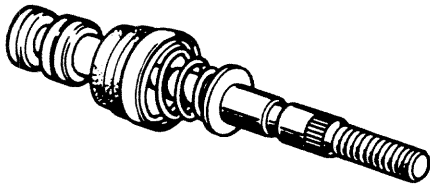


Fig. 19-72

9) Remove diaphragm from pressure plate.

NOTE:

Don't use screwdriver or any other tool for removal. Pull it off by hand carefully handling pressure plate groove area where diaphragm is fitted.

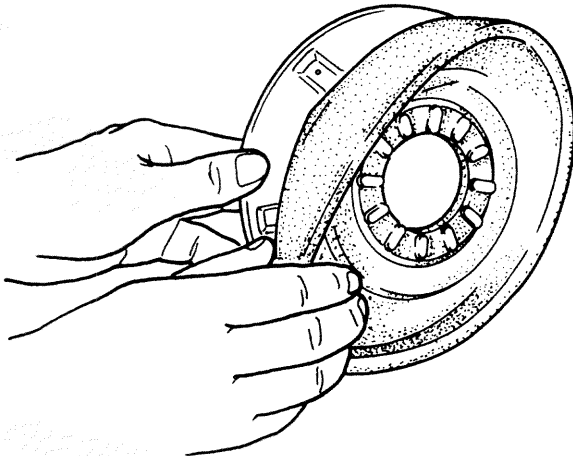


Fig. 19-73

10) Remove reaction disc from booster piston with fingers.

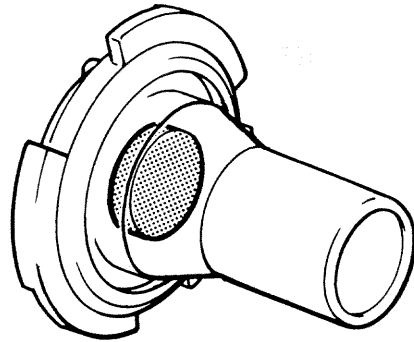
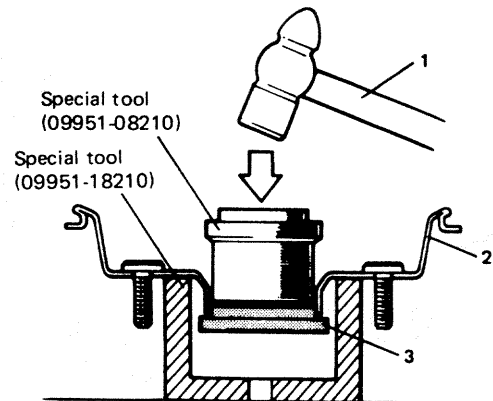


Fig. 19-74

11) Remove oil seal from booster No. 2 body with special tools as shown.

NOTE:

Removed oil seal must not be reused.



1. Hammer lightly
2. No. 2 body
3. Oil seal

Fig. 19-75

INSPECTION

Inner Parts

NOTE:

After disassembly, soak all metal parts in ethyl alcohol. Wipe rubber diaphragm and plastic parts with a clean cloth. Use ethyl alcohol damped cloth to wipe out heavy dirt. Application of much ethyl alcohol especially to rubber parts is prohibited.

[Rubber parts]

Wipe fluid from rubber parts and carefully inspect each rubber part for cuts, nicks or other damage. These parts are the key to the control of air flow. If there is any question as to the serviceability of rubber parts, REPLACE them.

[Metal parts]

BADLY DAMAGED ITEMS, OR THOSE WHICH WOULD TAKE EXTENSIVE WORK OR TIME TO REPAIR, SHOULD BE REPLACED. IN CASE OF DOUBT, INSTALL NEW PARTS.

Inspection/Adjustment of Clearance Between Booster Piston Rod and Master Cylinder Piston

The length of booster piston rod is adjusted to provide specified clearance between piston rod end and master cylinder piston.

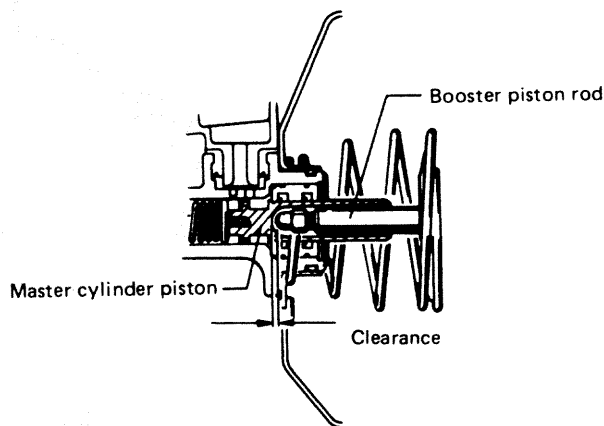


Fig. 19-76

- Before measuring clearance, push piston rod several times so as to make sure reaction disc is in place.
- Take measurement with gasket installed to master cylinder.
- Keep inside of booster at atmospheric pressure for measurement.

1) Set special tool (D) on master cylinder and push pin until it contacts piston.

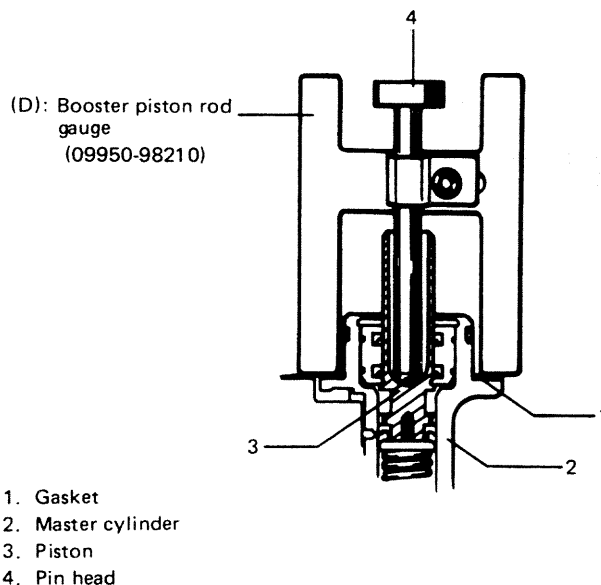


Fig. 19-77

- 2) Turn special tool upside down and place it on booster. Adjust booster piston rod length until rod end contacts pin head.
- 3) Adjust clearance by turning adjusting bolt of piston rod.

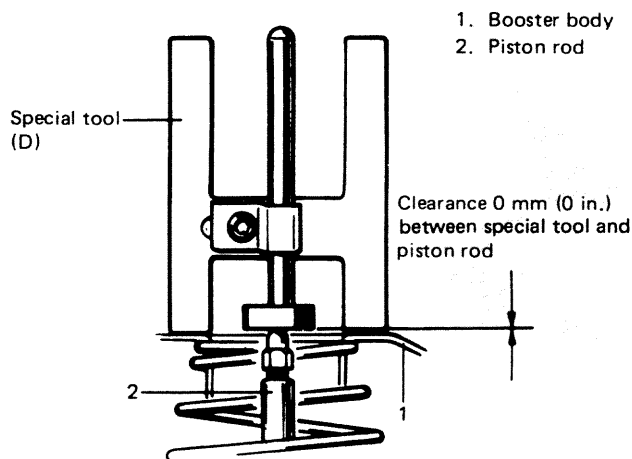


Fig. 19-78

Reference

When adjusted as above, if negative pressure is applied to booster with engine at idle, piston to piston rod clearance should become 0.1 – 0.5 mm (0.004 – 0.020 in.).

BOOSTER INSPECTION TABLE

Part	Inspect For	Corrective Action
1. Booster piston	Cracks, distortion or damage.	Replace.
2. Air valve ass'y (Control valve spring)	Damaged or worn seal surfaces.	Replace.
3. Reaction disc	Damage or wear.	Replace.
4. Diaphragm and boot	Damage.	Replace.
5. Piston rod	Damage or bend.	Replace.
6. Booster No. 1 & No. 2 body.	<ol style="list-style-type: none"> Scratches, scores, pits, dents, or other damage affecting rolling or sealing of diaphragm or other seals. Cracks, damage at ears, damaged threads on studs. Bent or nicked locking lugs. Loose studs. 	Replace, unless easily repaired. Replace, unless easily repaired. Replace, unless easily repaired. Replace.
7. Air filters and separator	Dirt.	Replace.

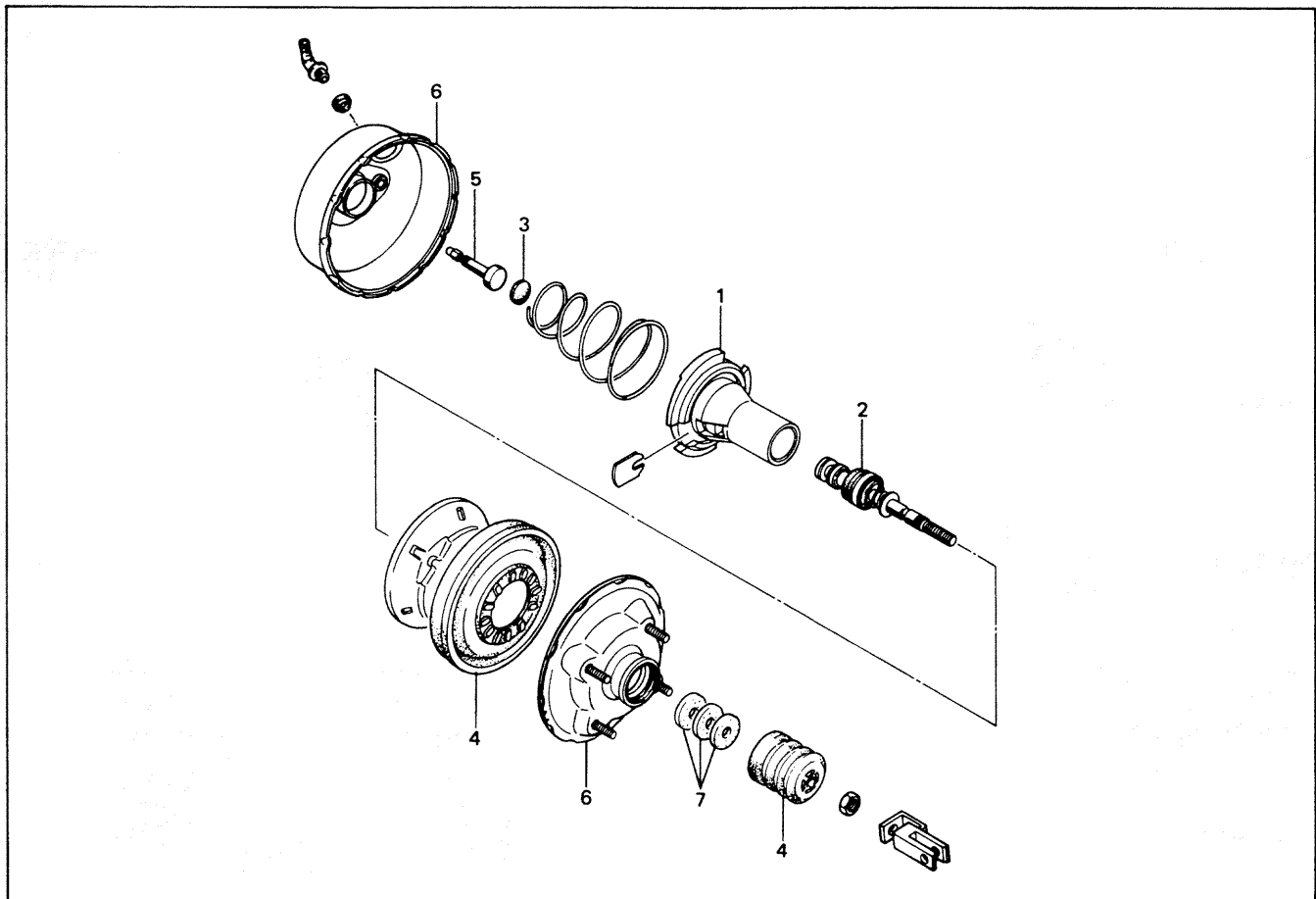


Fig. 19-79

ASSEMBLY

NOTE:

- See NOTE at the beginning of this section.
- Be sure to use silicon grease wherever application of grease is instructed during assembly. Use of oil and grease for installation of check valve and its grommet is strictly prohibited.

- 1) Apply grease to oil seal outer surface and oil seal lip as shown. Press-fit oil seal to booster No. 2 body by using special tool (B) and (C).

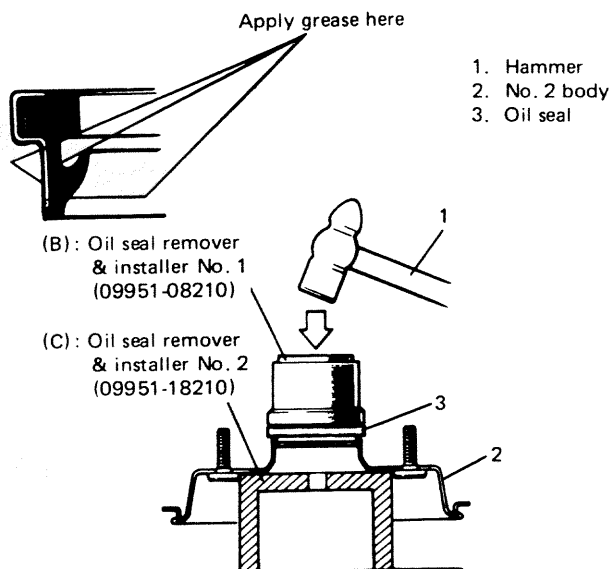


Fig. 19-80

- 2) Install booster air valve assembly to booster piston. Before installation, apply grease as shown.

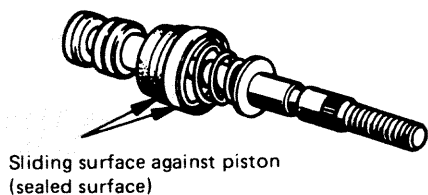


Fig. 19-81

- 3) Compress air valve assembly and insert valve stopper key.

NOTE:

Be sure that valve assembly is in piston "A" as indicated in figure. (Don't force installation.)

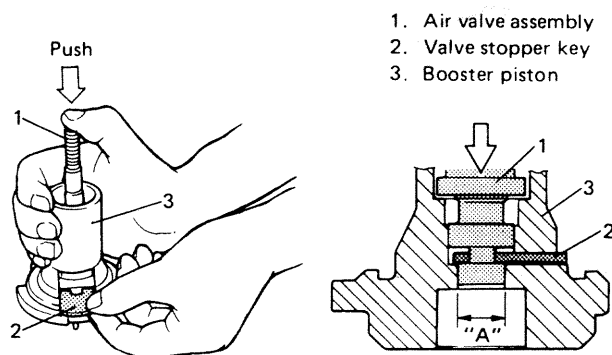


Fig. 19-82

- 4) Install diaphragm to pressure plate by hand.

NOTE:

Check to be sure that diaphragm is seated securely in pressure plate groove for diaphragm by turning diaphragm.

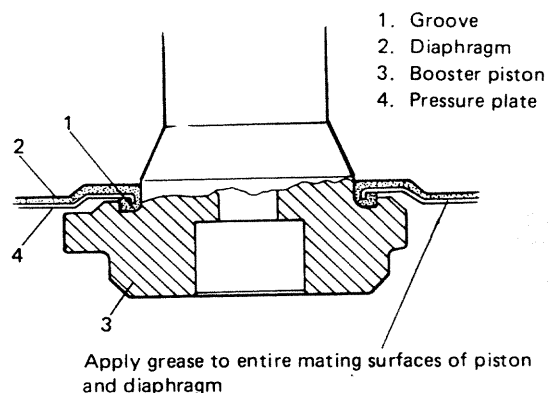


Fig. 19-83

- 5) Install reaction disc to booster piston after greasing its entire face.
- 6) Install booster piston to booster No. 2 body.

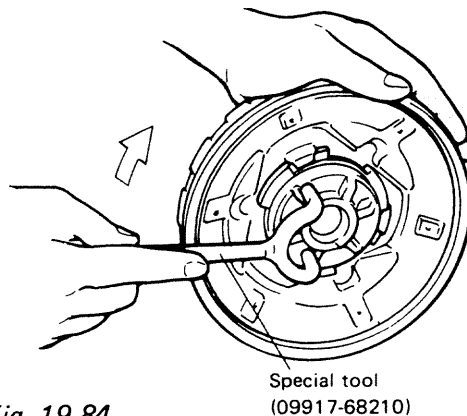
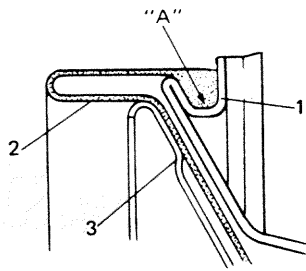


Fig. 19-84

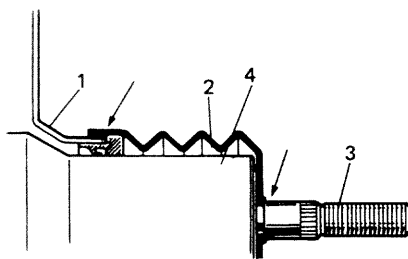


1. Booster No. 2 body
2. Diaphragm
3. Pressure plate

Check all around booster No. 2 body to make sure that diaphragm is seated securely in its outer groove as shown in "A".

Fig. 19-85

- 7) Install air cleaner separator and then 2 elements to rod of air valve assembly.
- 8) Install body boot to booster No. 2 body. Both ends of boot must be fitted securely as shown.



1. No. 2 body
2. Boot
3. Rod
4. Booster piston

Fig. 19-86

- 9) Place No. 1 body on special tool (A). Then install piston return spring, being careful for its installing direction.

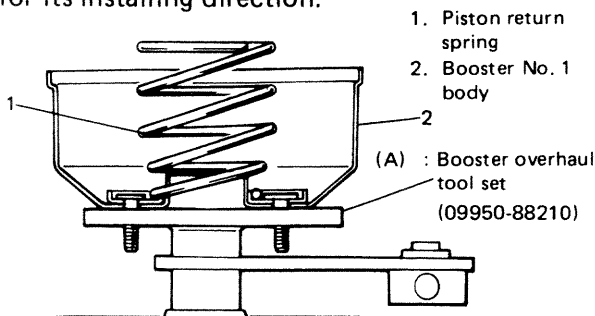


Fig. 19-87

- 10) Place booster No. 2 body on piston return spring. Then check to be sure that spring is in piston spring guide.

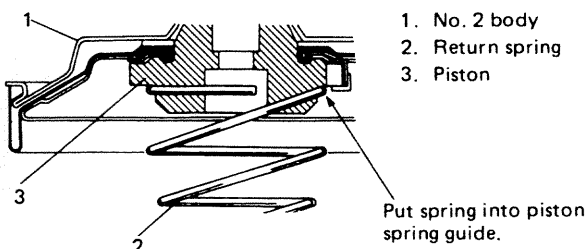


Fig. 19-88

- 11) Put No. 1 and No. 2 bodies together by aligning markings made before disassembly. Holding No. 2 body with upper plate (special tool) as shown, torque 2 nuts equally to specification.

Special tool nuts tightening torque	N·m	kg·m	lb·ft
	3 - 5	0.3 - 0.5	2.2 - 3.6

NOTE:

When holding No. 2 body, use care so that diaphragm is not caught by projections at 16 locations around No. 1 body.

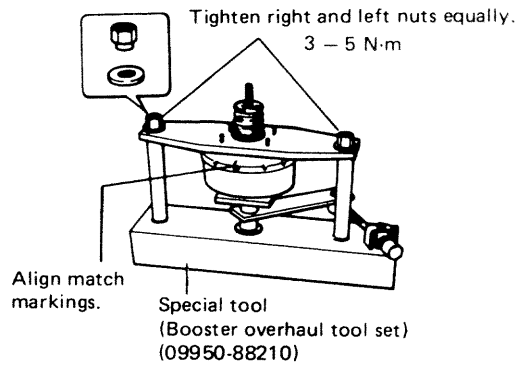


Fig. 19-89

- 12) Turn special tool bolt counterclockwise until No. 1 body projecting part comes to mid-position of No. 2 body depressed parts as shown.

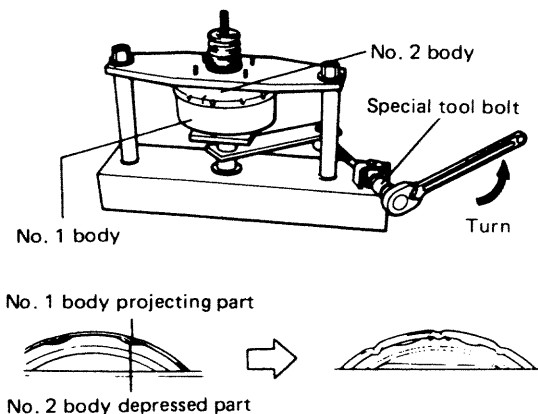


Fig. 19-90

- 13) Remove booster from special tool and install push rod clevis so that below measurement "A" is obtained and torque nut to specification.

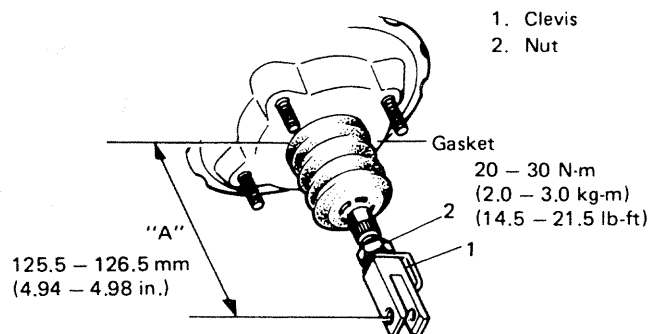


Fig. 19-91

- 14) Insert piston rod into booster piston.

NOTE:

Whenever booster was disassembled, make sure to check clearance between piston rod and master cylinder piston after reassembly. (For details, refer to p. 19-33.)

INSTALLATION

NOTE:

- See NOTE at the beginning of this section.
- Adjust clearance between booster piston rod and master cylinder piston with special tool. (See page 19-33.)
- Check length of push rod clevis. (Refer to Fig. 19-91).

- 1) Install booster to dash panel as shown. Then connect booster push rod clevis to pedal arm with pin and split pin.
- 2) Torque booster attaching nuts to specification.
- 3) Install master cylinder to booster and torque attaching nuts to specification.
- 4) Connect 2 brake pipes and torque flare nuts to specification. (See p. 19-29).
- 5) Fill reservoir with specified fluid.
- 6) Bleed air from brake system. (See BLEEDING BRAKES on p. 19-46).
- 7) After installing, check pedal height and play. (See p. 19-43).

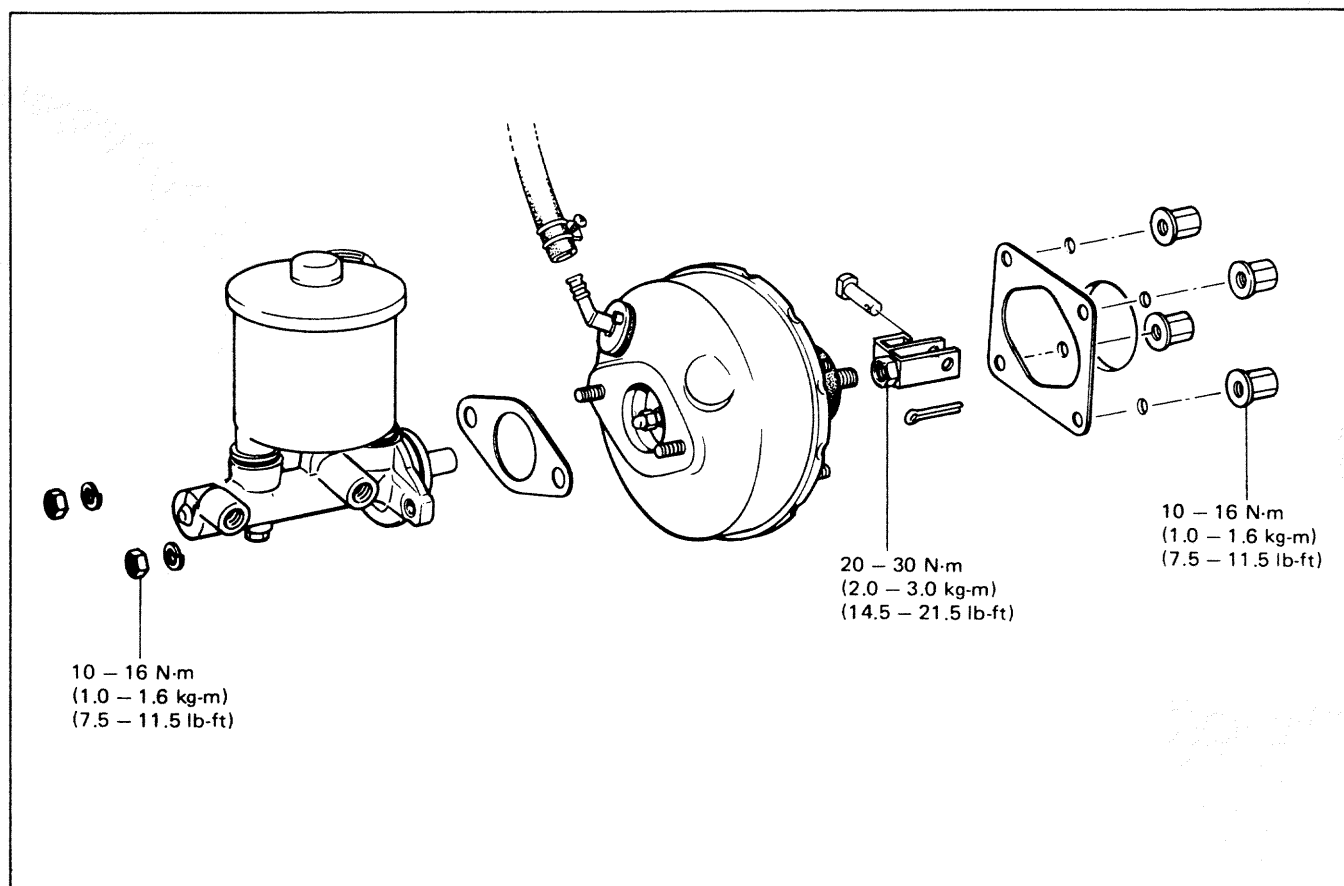


Fig. 19-92

19-6. PARKING BRAKE

NOTE:

For parking brake inspection and adjustment, refer to p. 19-44 under 19-8 MAINTENANCE SERVICE in this section.

INSTALLATION

- If parking brake cable was removed and reinstalled, make sure to clamp it properly according to illustrated instruction for each clamp in the figure below.
- After installing cable, check the following;
 - * Parking brake lever stroke is within specification
 - * Parking brake operates properly
 - * Brake is free from dragging

For stroke data and cable adjustment, refer to p. 19-44 and 19-45 under 19-8 MAINTENANCE SERVICE in this section.

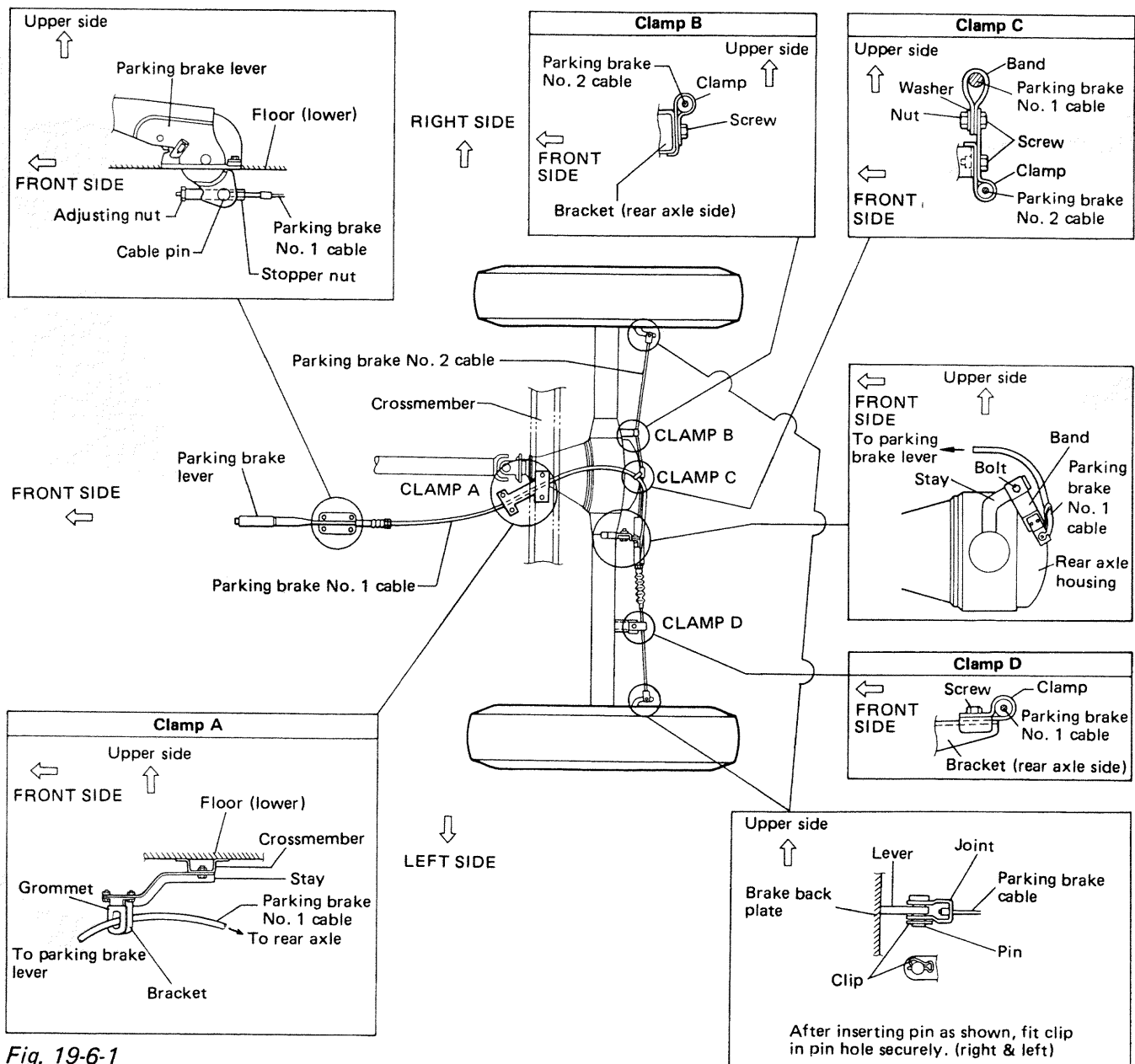


Fig. 19-6-1

19-7. BRAKE PIPES AND HOSES

REMOVAL AND INSTALLATION

- 1) Take out fluid with a syringe or such.
- 2) Clean dirt and foreign material from both hose end or pipe end fittings. Remove brake hose or pipe.
- 3) Reverse removal procedure for brake hose or pipe installation. When installing hose, make sure that it has no twists or kinks. Inspect to see that hose doesn't make contact with any part of suspension. Check in extreme right and extreme left turn conditions. If hose makes any contact, remove and correct. Fill and maintain brake fluid level in reservoir. Bleed brake system.

CAUTION:

- Refer to Fig. 19-38 when connecting brake flexible hose to brake caliper and tighten to specified torque.
- Be sure to install brake pipe in proper position referring to Fig. 19-7-2 and clamp it securely and correctly.

NOTE:

- Be sure to install brake flexible hose E-ring into hose groove.

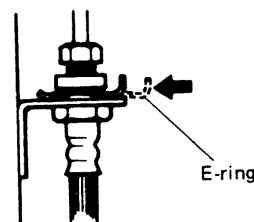


Fig. 19-7-1

- Upon completion of installation, check each joint for fluid leakage with brake pedal depressed.

Tightening torque

	N·m	kg-m	lb-ft
Brake pipe flare nuts	14 – 18	1.4 – 1.8	10.5 – 13.0
Brake flexible hose bolt	20 – 25	2.0 – 2.5	14.5 – 18.0
6-way joint bolt	6 – 10	0.6 – 1.0	4.5 – 7.0
Proportioning valve bolt	6 – 10	0.6 – 1.0	4.5 – 7.0
Proportioning valve plate bolt	6 – 10	0.6 – 1.0	4.5 – 7.0

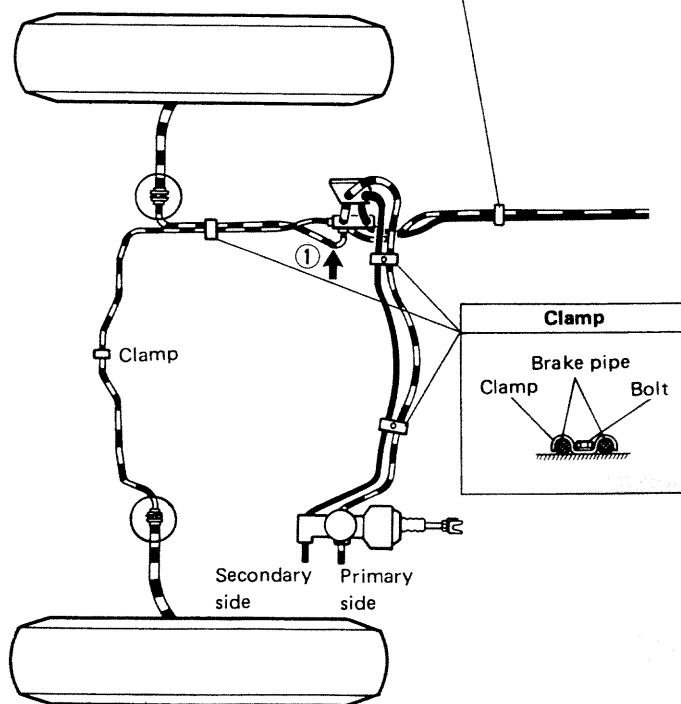
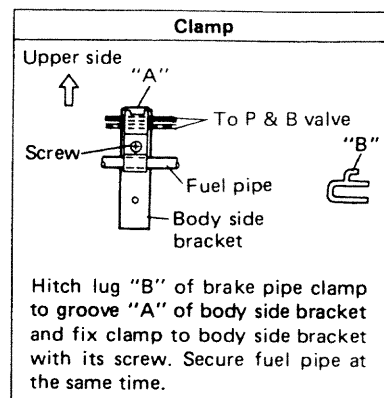
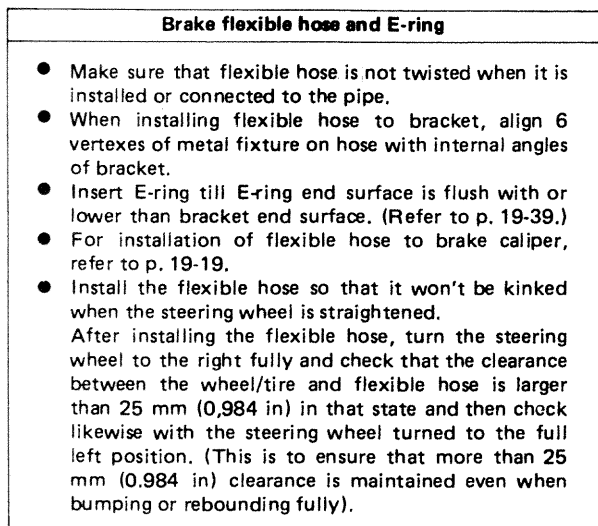
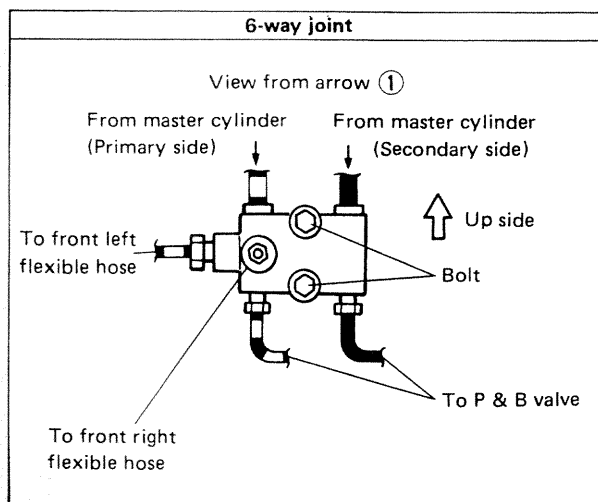
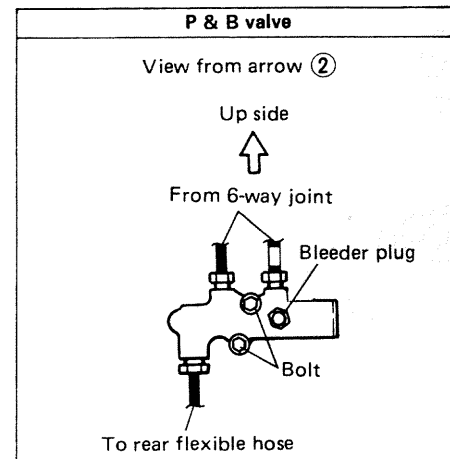
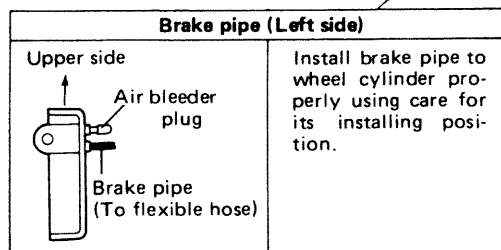
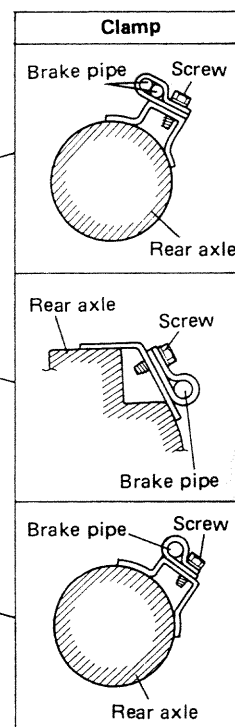
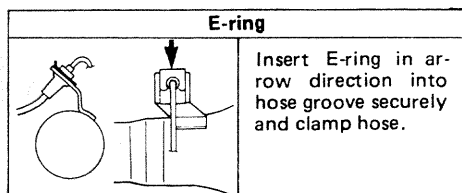
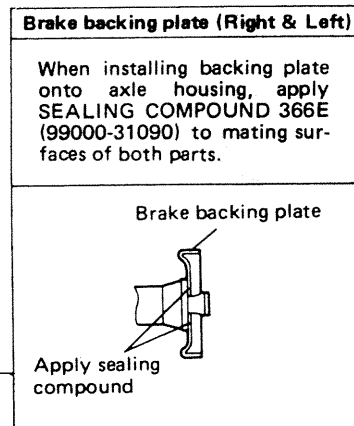
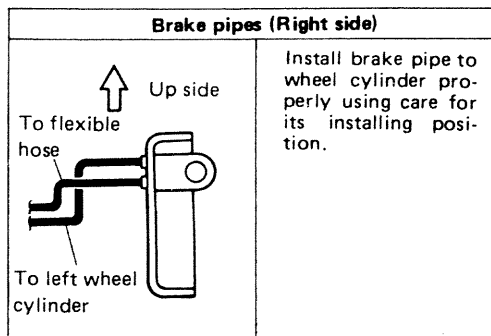
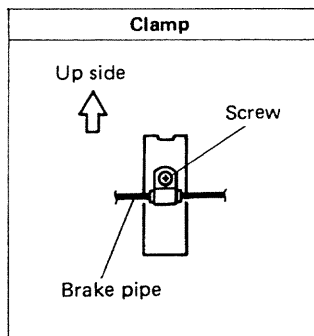


Fig. 19-7-2



19-8. MAINTENANCE SERVICE

ROAD TESTING BRAKES

Brakes should be tested on dry, clean, smooth and reasonably level roadway which is not crowned. Road test brakes by making brake applications with both light and heavy pedal forces at various speeds to determine if the car stops evenly and effectively.

Also drive car to see if it leads to one side or the other without brake application. If it does, check tire pressure, front end alignment and front suspension attachments for looseness. See diagnosis chart for other causes.

BRAKE FLUID LEAKS

Check master cylinder fluid levels. While a slight drop in reservoir level does result from normal lining wear, an abnormally low level indicates a leak in the system. In such a case, check the entire brake system for leakage. If even a slight evidence of leakage is noted, the cause should be corrected or defective parts should be replaced.

BRAKE FLUID LEVEL INSPECTION

Be sure to use particular brake fluid either as marked on reservoir cap of that car or recommended in owner's manual which comes along with that car.

Use of any other fluid is strictly prohibited.

Fluid level should be between MIN and MAX lines marked on reservoir.

When warning light lights sometimes during driving, replenish fluid to MAX line.

When fluid decreases quickly, inspect brake system for leakage. Correct leaky points and then refill to specified level.

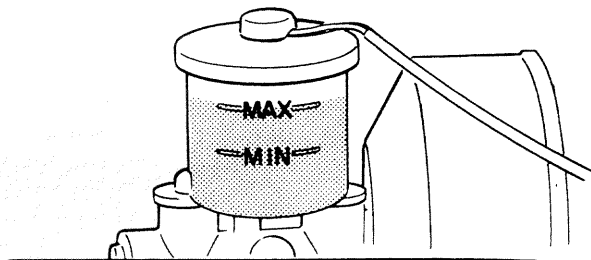


Fig. 19-8-1

FILL RESERVOIR

CAUTION:

Do not use shock absorber fluid or any other fluid which contains mineral oil. Do not use a container which has been used for mineral oil or a container which is wet from water. Mineral oil will cause swelling and distortion of rubber parts in the hydraulic brake system and water will mix with brake fluid, lowering the fluid boiling point. Keep all fluid containers capped to prevent contamination.

Fluid to fill reservoir which is indicated on reservoir cap of the car with embossed letters or in owner's manual supplied with the car.

Add fluid up to MAX line.

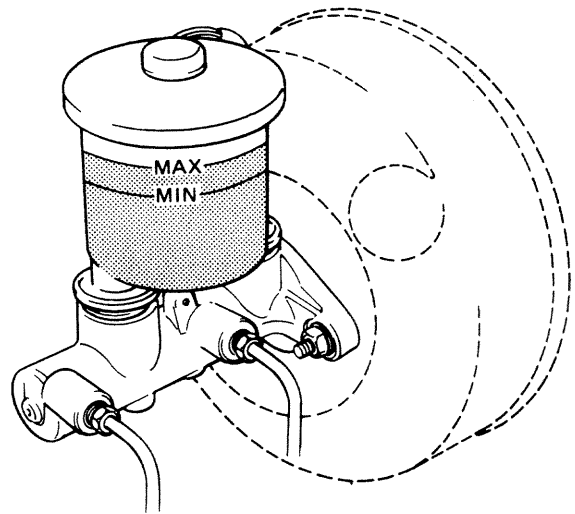


Fig. 19-8-2

BRAKE PEDAL FREE HEIGHT ADJUSTMENT

Brake pedal height is normal if brake pedal is as high as clutch pedal.

- 1) When booster push rod clevis has been reinstalled, it is important that measurement between booster mounting surface (with a gasket attached) and the center of clevis pin hole is adjusted within 125.5 mm – 126.5 mm (4.94 – 4.98 in.). (See page 19-37.)
- 2) When stop light switch has been removed, refer to the following STOP LIGHT SWITCH ADJUSTMENT for proper installation. The services in above steps 1) and 2) may affect brake pedal height.

STOP LIGHT SWITCH ADJUSTMENT

Adjustment should be made as follows when installing the switch.

Pull up brake pedal toward you and while holding it there, adjust switch position so that clearance between the end of thread and brake pedal contact plate (shown as "A" in figure) is within 0.5 – 1.0 mm (0.02 – 0.04 in.). Then tighten lock nut to specified torque.

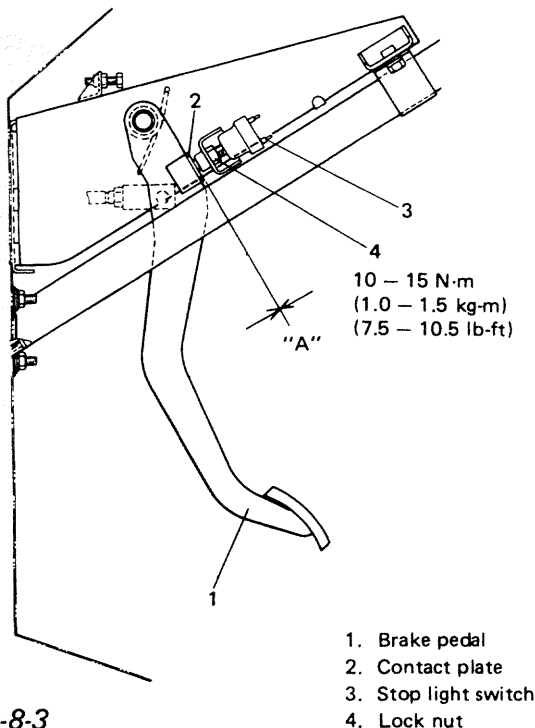


Fig. 19-8-3

EXCESSIVE PEDAL TRAVEL CHECK

- 1) Start the engine.
- 2) Depress brake pedal a few times.
- 3) With brake pedal depressed with approximately 30 kg (66 lbs) load, measure pedal arm to wall clearance "B". It mustn't be less than 75 mm (2.95 in.).

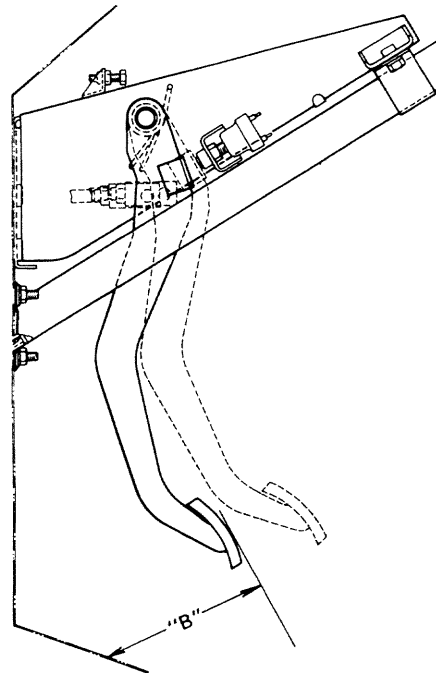


Fig. 19-8-4

- 4) If clearance "B" is less than 75 mm (2.95 in.), the most possible cause is either rear brake shoes are worn out beyond limit or air is in lines. Should clearance "B" remain less than 75 mm (2.95 in.) even after replacement of brake shoes and bleeding of system, other possible but infrequent cause is malfunction of rear brake shoe adjusters or booster push rod length out of adjustment for the car with brake booster.
- See p. 19-22 for brake shoe inspection.
 - See p. 19-46 for bleeding brake system.
 - Remove brake drums for adjuster inspection. (See p. 19-23.) If defective, correct or replace.

BRAKE HOSE AND PIPE INSPECTION

Hose

The brake hose assembly should be checked for road hazard damage, for cracks and chafing of outer cover, for leaks and blisters. A light and mirror may be needed for an adequate inspection. If any of the above conditions are observed on brake hose, it will be necessary to replace it.

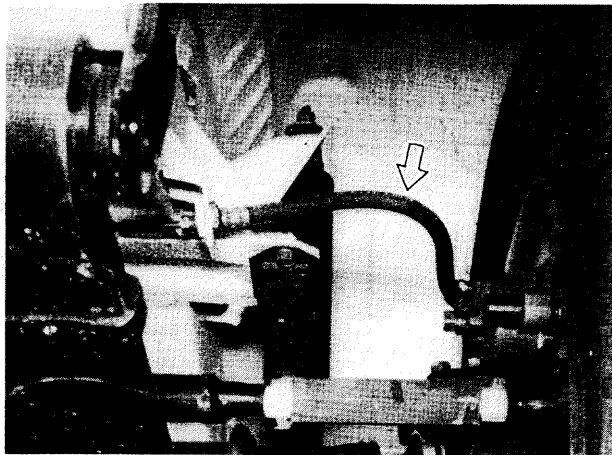


Fig. 19-8-5

Pipe

Inspect the tube for damage, cracks, dents and corrosion. If any defect is found, replace it.

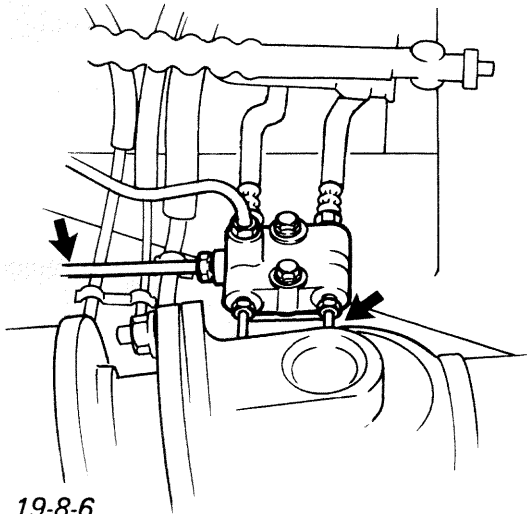


Fig. 19-8-6

PAD LINING INSPECTION

Inspect pad linings periodically according to maintenance schedule and whenever wheels are removed (for tire rotation or other reason). For wear check of pad linings, refer to p. 19-16.

DISC INSPECTION

Inspect disc periodically according to maintenance schedule.

For more information, refer to p. 19-17.

REAR BRAKE SHOE & LINING INSPECTION

Inspect brake shoe & lining according to maintenance schedule.

For shoe and lining inspection, refer to p. 19-22.

REAR BRAKE DRUM INSPECTION

Inspect brake drum according to maintenance schedule.

For more information, refer to p. 19-21.

PARKING BRAKE INSPECTION AND ADJUSTMENT

1) Parking brake lever stroke inspection.

Hold the center of parking brake lever grip and pull it up with 20 to 25 kg (44 to 55 lb) force.

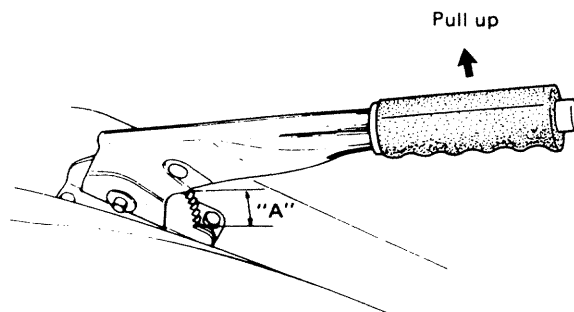
With parking brake lever pulled up as above, count ratchet notches in "A" as shown in figure. There should be 3 to 8 notches.

Also, check if both right and left rear wheels are locked firmly.

If number of notches is out of specification, adjust cable by referring to adjustment procedure described on the next page so as to obtain specified parking brake stroke.

NOTE:

Check tooth tip of each notch for damage or wear. If any damage or wear is found, replace parking brake lever.



Parking brake stroke "A": When lever is pulled up at 20 kg (44 lb).	Within 3 - 8 notches
--	----------------------------

Fig. 19-8-7

- 2) Parking brake lever stroke adjustment
- a) If parking brake lever stroke was found out of specification when checked as described on the previous page, adjust parking brake cable.

NOTE:

Make sure for following conditions before cable adjustment.

- No air is trapped in brake system.
- Brake pedal travel is proper.
- Brake pedal has been depressed a few times with about 30 kg (66 lbs) load.
- Parking brake lever has been pulled up a few times with about 20 kg force.
- Rear brake shoes are not worn beyond limit, and self adjusting mechanism operates properly.

- b) After confirming that above 5 conditions are all satisfied, adjust parking brake lever stroke by loosening or tightening adjusting nut indicated in figure and tighten stopper nut to the pin.

NOTE:

- For cable adjustment, loosen stopper nut and turn adjusting nut while holding hold nut with spanner so as to prevent inner cable from getting twisted.
- Check brake drum for dragging after adjustment.

Parking brake stroke; when lever is pulled up at 20 kg (44 lb)	Within 3 – 8 notches
--	----------------------

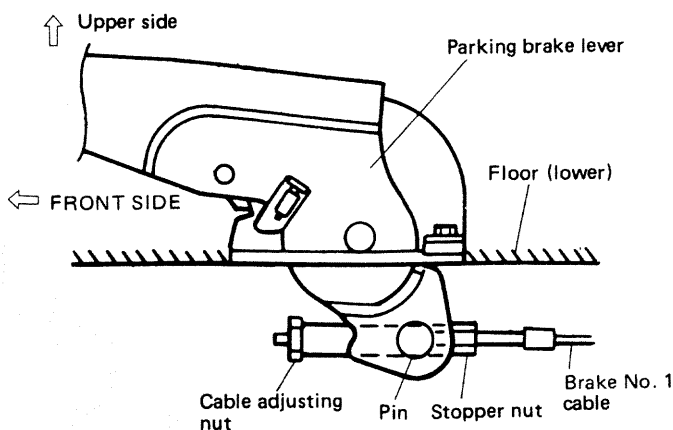


Fig. 19-8-8

3) Parking brake cable inspection

Check brake cable for damage and also for smooth movement. Replace if deteriorated.

BRAKE PEDAL PLAY INSPECTION

Pedal play should be within below specification. If out of specification, check stop light switch for proper installation position and adjust if necessary.

Also check pedal shaft bolt and master cylinder pin installation for looseness and replace if defective.

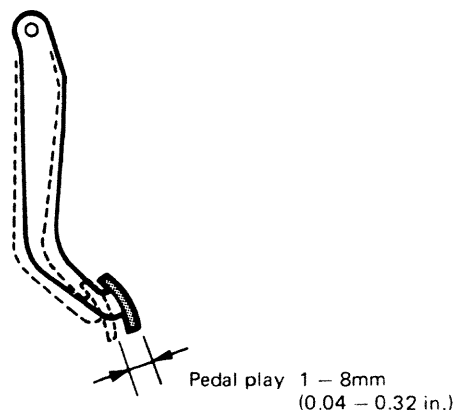


Fig. 19-8-9

REAR DRUM BRAKE SHOE ADJUSTMENT

Rear brake has self-adjusting mechanism but it does require adjustment for proper drum to shoe clearance when brake shoe has been replaced or brake drum has been removed for some other service.

Adjustment is automatically accomplished by depressing brake pedal 3 to 5 times with approximately 30 kg (66 lbs) load after all parts are installed.

Then check brake drum for dragging and brake system for proper performance. After lowering car from lift, brake test should be performed.

FLUSHING BRAKE HYDRAULIC SYSTEM

It is recommended that entire hydraulic system be thoroughly flushed with clean brake fluid whenever new parts are installed in hydraulic system.

Periodical change of brake fluid is also recommended.

BLEEDING BRAKES

NOTE:

Brake fluid is extremely damaging to paint. If fluid should accidentally touch painted surface, immediately wipe fluid from paint and clean painted surface.

With this vehicle, air bleeding is required at four places: right and left front wheels, P & B valve and rear wheel cylinder on left side as marked with dot (•) in Fig. 19-8-10. And at each of these places, there is air bleeder plug.

Whenever brake pipe or hose has been disconnected at any place, carry out air bleeding so as to make sure that no air remains in brake circuit.

CAUTION:

Upon completion of air bleeding at four places, be sure to tighten each air bleeder plug to specified torque and check entire brake circuit to make sure that no fluid leakage exists.

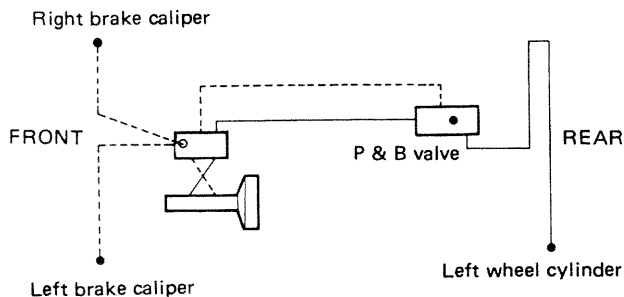


Fig. 19-8-10

- 1) Fill master cylinder reservoir with brake fluid and keep at least half filled during bleeding operation.
- 2) Remove bleeder plug cap.
Attach vinyl tube to bleeder plug of wheel cylinder, and insert the other end into container.

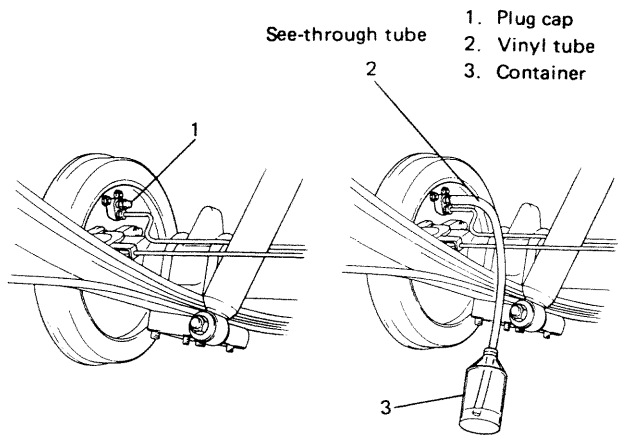
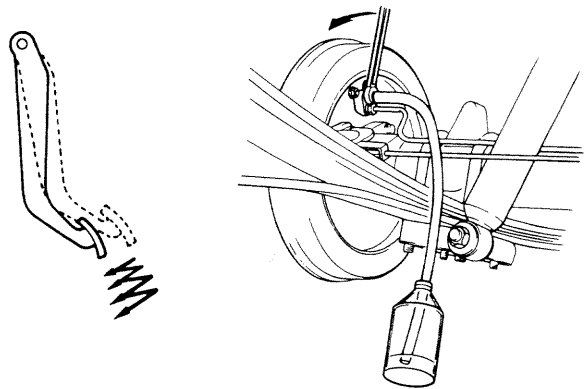


Fig. 19-8-11

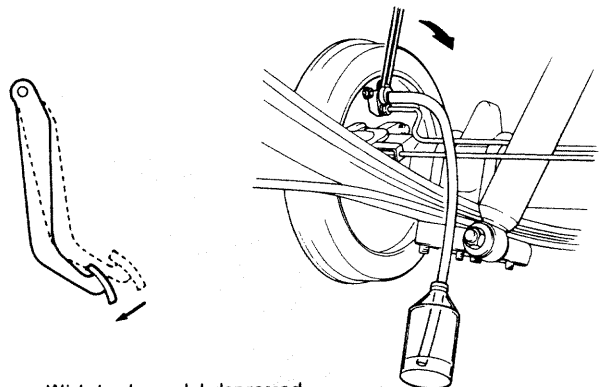
- 3) Depress brake pedal several times, and then while holding it depressed, loosen bleeder plug about one-third to one-half turn.



Depress brake pedal several times and with pedal depressed, loosen bleeder plug a little.

Fig. 19-8-12

- 4) When fluid pressure in the cylinder is almost depleted, retighten bleeder plug.



With brake pedal depressed, retighten bleeder plug.

Fig. 19-8-13

- 5) Repeat this operation until there are no more air bubbles in hydraulic line.
- 6) When bubbles stop, depress and hold brake pedal and tighten bleeder plug.
- 7) Then attach bleeder plug cap.

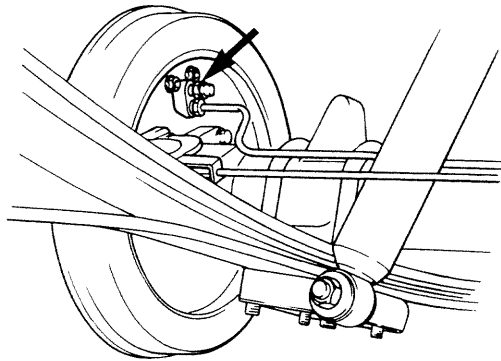


Fig. 19-8-14

- 8) After completing bleeding operation, apply fluid pressure to pipe line and check for leakage.
- 9) Replenish fluid into reservoir up to specified level.

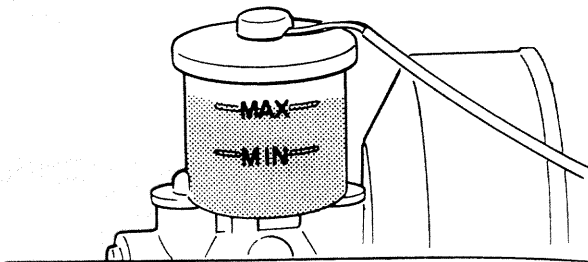


Fig. 19-8-15

- 10) Check brake pedal for "sponginess". If found spongy, repeat entire procedure of bleeding.

INSPECT BOOSTER OPERATION

There are two ways to perform this inspection, with and without a tester. Ordinarily, it is possible to roughly determine its condition without using a tester.

NOTE:

For this check, make sure that no air is in hydraulic line.

INSPECTION WITHOUT TESTER

Check Air Tightness

- 1) Start engine.
- 2) Stop engine after running for 1 or 2 minutes.
- 3) Depress brake pedal several times with the same load as in ordinary braking and observe pedal travel. If pedal goes down deep the first time but its travel decreases as it is depressed the second and more times, air tightness is obtained.

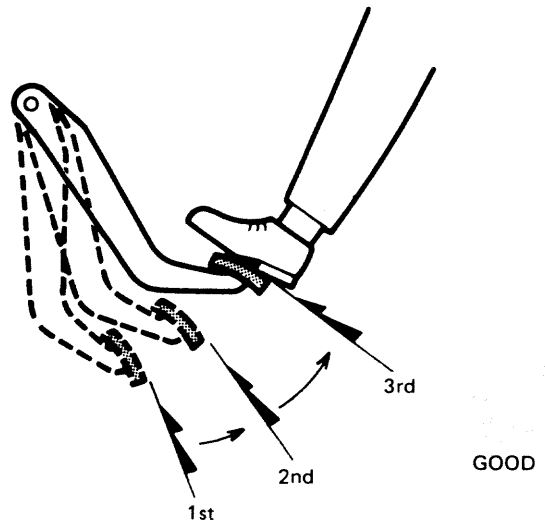
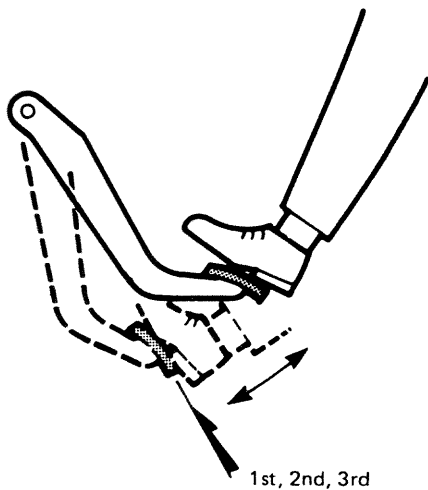


Fig. 19-8-16

- 4) If pedal travel doesn't change, air tightness isn't obtained.



NO GOOD

Fig. 19-8-17

NOTE:

If defective, inspect vacuum lines and sealing parts, and replace any faulty part.
When this has been done, repeat the entire test!

Check Operation

- 1) With engine stopped, depress brake pedal several times with the same load and make sure that pedal travel doesn't change.

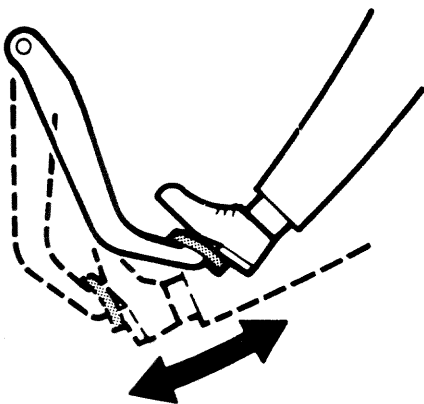


Fig. 19-8-18

- 2) Start engine while depressing brake pedal. If pedal travel increases a little, operation is satisfactory. But no change in pedal travel indicates malfunction.

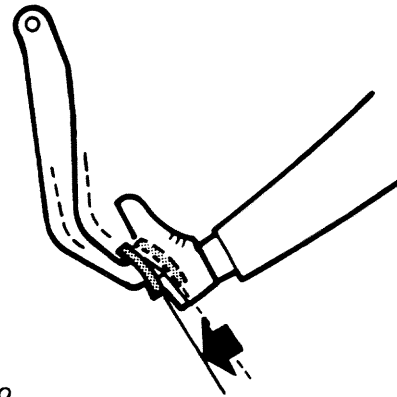


Fig. 19-8-19

Check Air Tightness Under Load

- 1) With engine running, depress brake pedal. Then stop engine while holding brake pedal depressed.

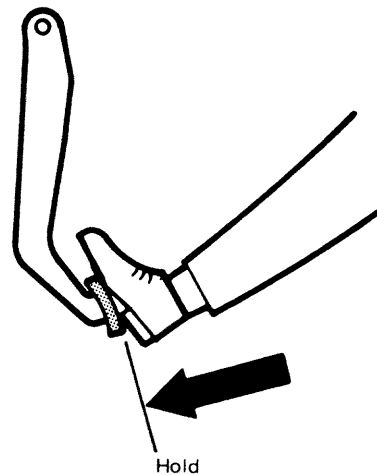


Fig. 19-8-20

- 2) Hold brake pedal depressed for 30 seconds. If pedal height does not change, condition is good. But it isn't if pedal rises.

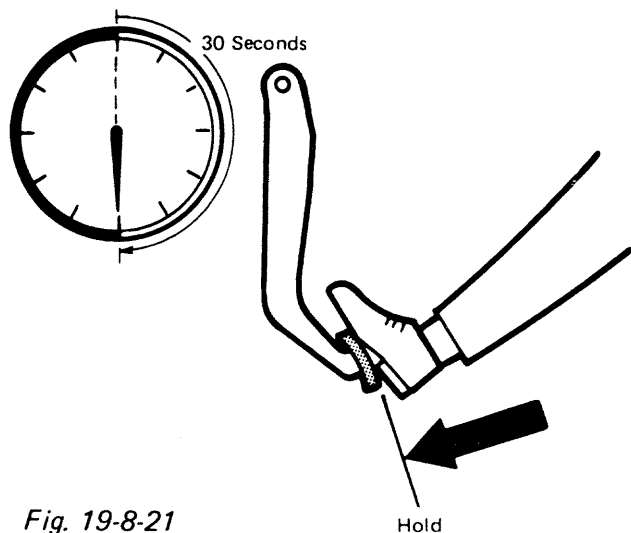


Fig. 19-8-21

19-9. TORQUE SPECIFICATION

Fastening parts	Tightening torque		
	N·m	kg-m	lb-ft
1. Brake caliper holder bolt	40 – 60	4.0 – 6.0	29.0 – 43.0
2. Brake carrier bolt	70 – 100	7.0 – 10.0	51.0 – 72.0
3. Brake caliper guide pin	25 – 30	2.5 – 3.0	18.5 – 21.5
4. Brake nut (Brake back plate nut)	18 – 28	1.8 – 2.8	13.5 – 20.0
5. Master cylinder nut	10 – 16	1.0 – 1.6	7.5 – 11.5
6. Booster nut	10 – 16	1.0 – 1.6	7.5 – 11.5
7. Brake pipe 6-way joint bolt	6 – 10	0.6 – 1.0	4.5 – 7.0
8. Brake flare nut	14 – 18	1.4 – 1.8	10.5 – 13.0
9. Brake pedal shaft nut	18 – 28	1.8 – 2.8	13.5 – 20.0
10. Universal joint flange nut	23 – 30	2.3 – 3.0	17.0 – 21.5
11. Brake flexible hose bolt	20 – 25	2.0 – 2.5	14.5 – 18.0
12. Proportioning and bypass valve bolt	6 – 10	0.6 – 1.0	4.5 – 7.0
13. Proportioning and bypass valve plate bolt	6 – 10	0.6 – 1.0	4.5 – 7.0
14. Brake flexible hose nut	20 – 40	2.0 – 4.0	14.5 – 28.5
15. Front brake caliper air bleeder plug	7 – 12	0.7 – 1.2	5.5 – 8.5

SECTION 20

BODY SERVICE

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20-1. FRONT DOOR

DESCRIPTION

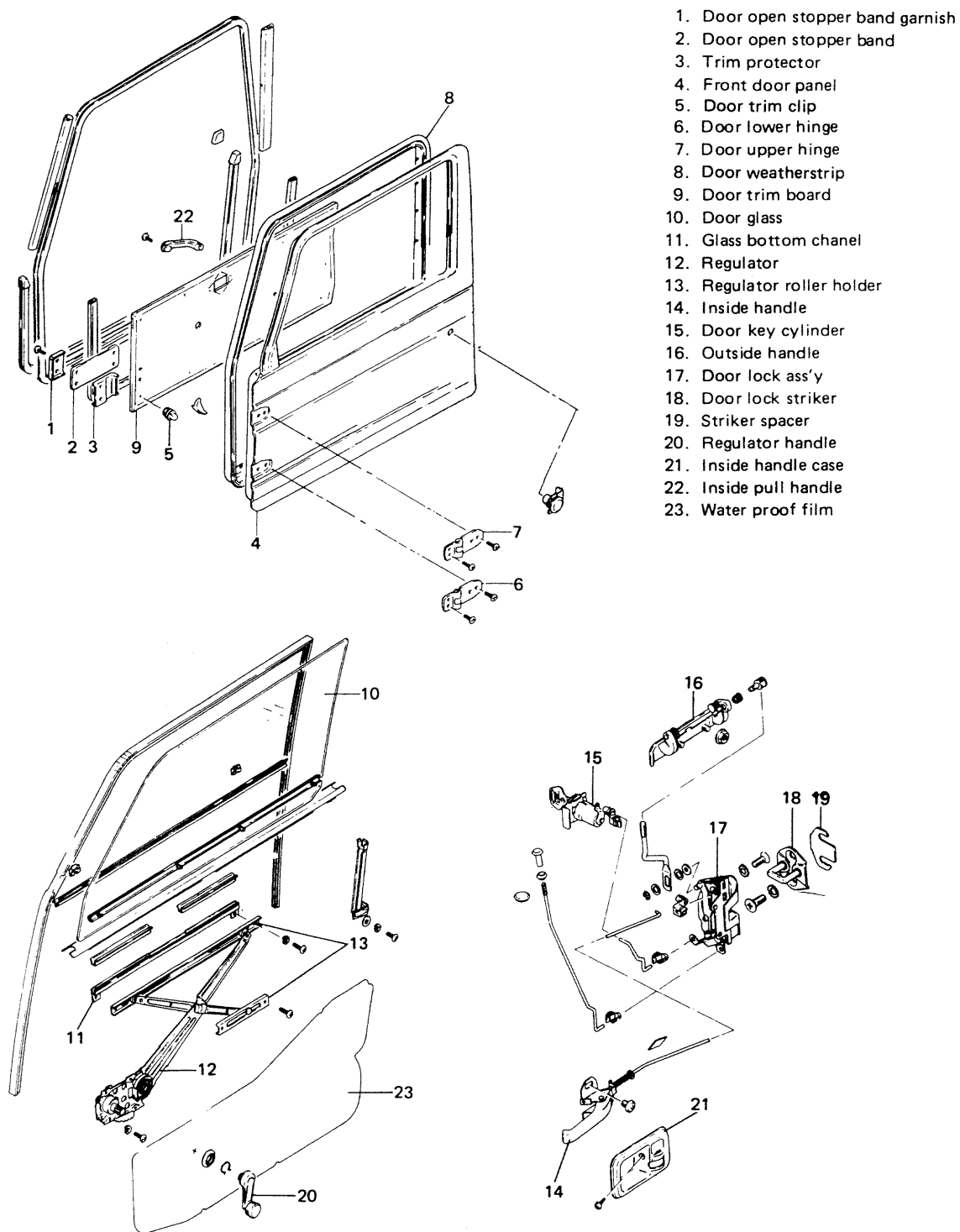


Fig. 20-1-1

REMOVAL

Door Window Glass

1) Remove door window regulator handle.

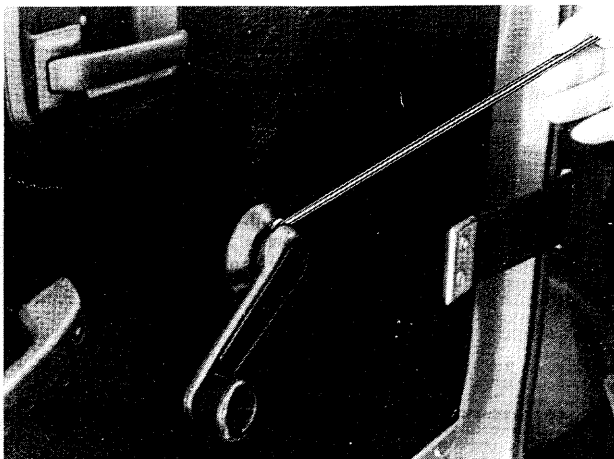


Fig. 20-1-2

2) Remove inside handle case.

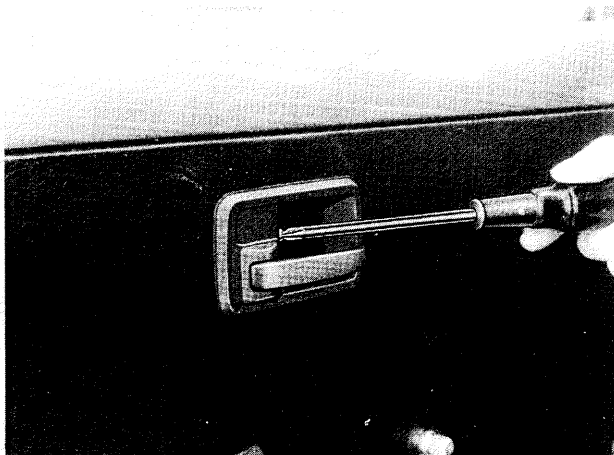


Fig. 20-1-3

3) Remove inside pull handle.

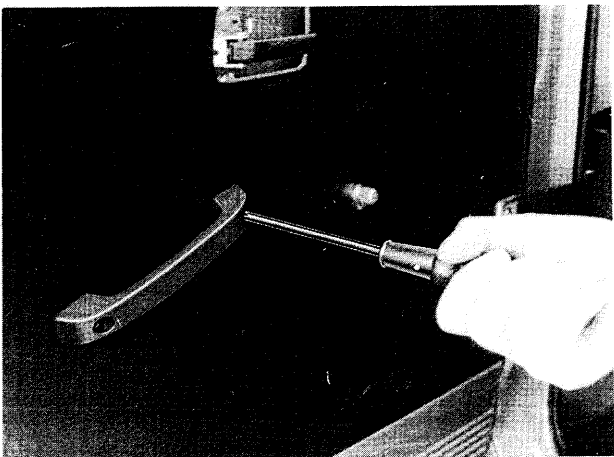


Fig. 20-1-4

4) Loosen two screws securing the stopper band, and take off the band.

5) Remove door trim board.



Fig. 20-1-5

6) Remove the door water proof film.

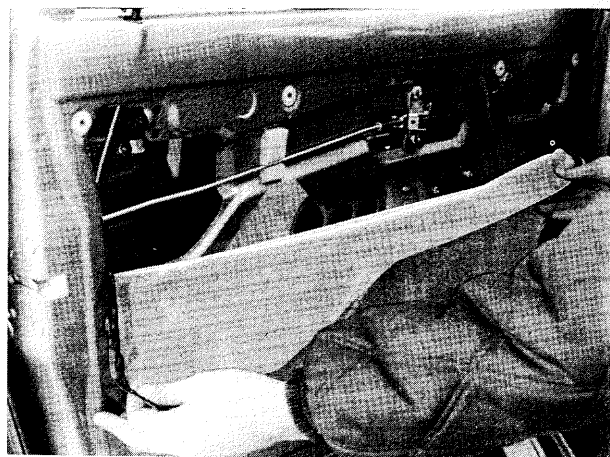


Fig. 20-1-6

7) Remove the glass inside and outside scrape.

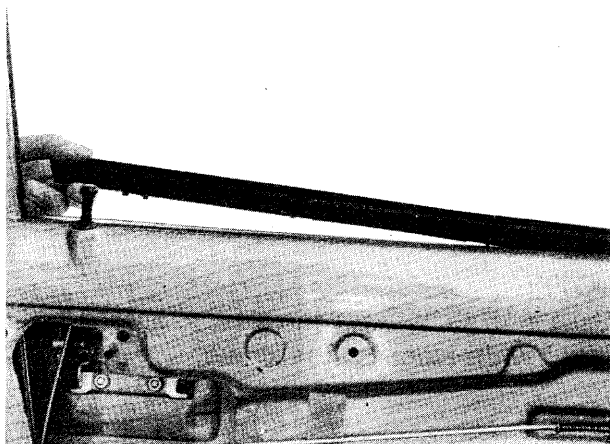


Fig. 20-1-7

- 8) Remove 2 screws securing the door window regulator roller holder (lower side).

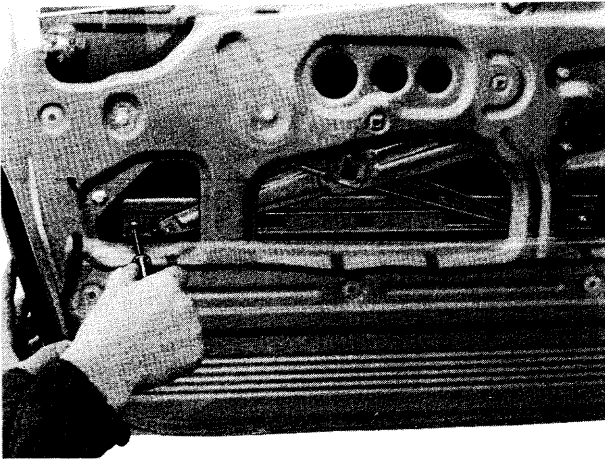


Fig. 20-1-8

- 9) Take out the glass.

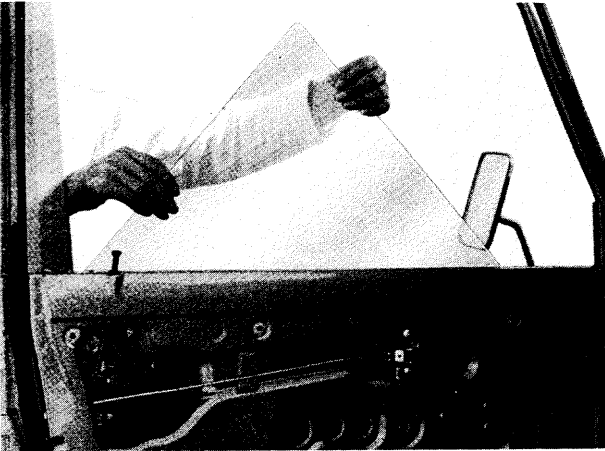


Fig. 20-1-9

- 10) Detach glass from bottom channel.

Door Window Regulator

After carrying out door glass removal steps 1) through 6) and 8), move on to the following steps to take off the door window regulator.

- 1) Remove 2 screws securing the door window regulator roller holder (upper side).

NOTE:

Make sure to support the glass to keep it from falling while removing the screws.

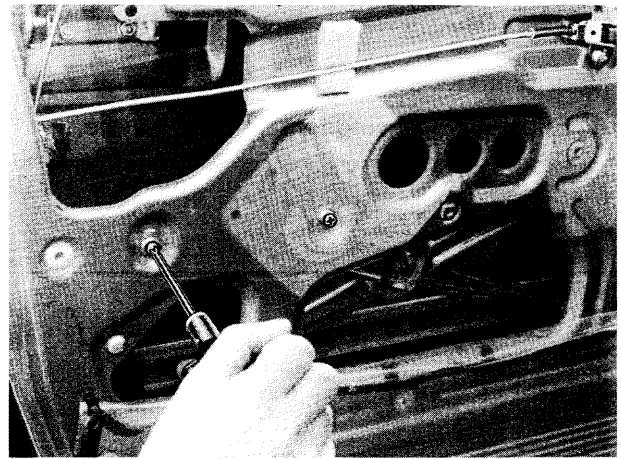


Fig. 20-1-10

- 2) Remove 4 screws securing the window regulator.

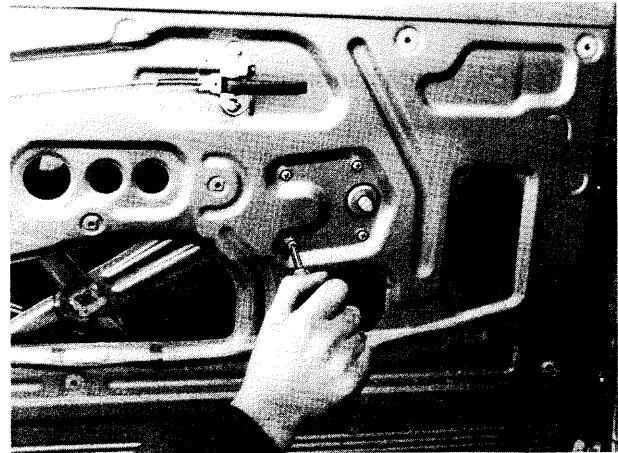


Fig. 20-1-11

- 3) Remove the window regulator.

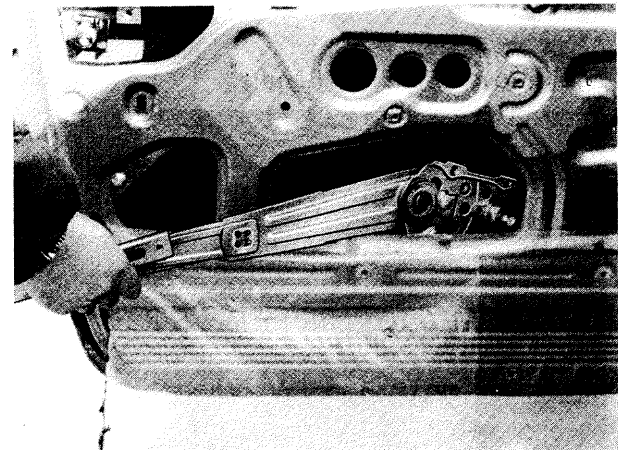


Fig. 20-1-12

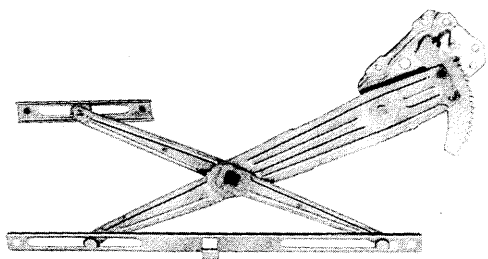
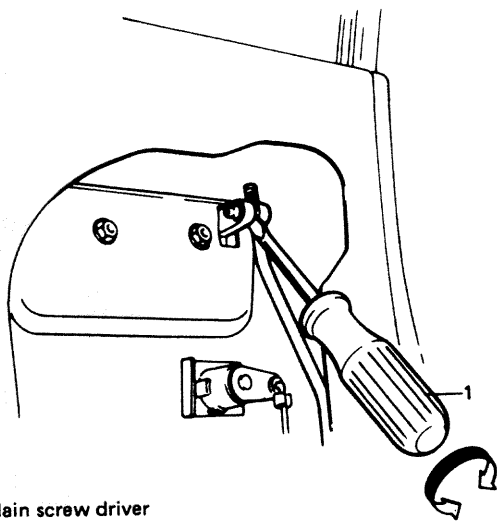


Fig. 20-1-13

Front Door Lock

After carrying out steps 1) through 6) of door glass removal, move on to the following step to take off the door lock.

After disconnecting each joint of control link, remove the door inside handle and door lock ass'y.



1. Plain screw driver

Fig. 20-1-14

INSTALLATION

Door Window Glass or Regulator

Reverse the removal sequence to install the door window glass or regulator. However, be careful of the following points.

[Door window regulator]

When installing door window regulator to door panel, apply multi-purpose grease to the sliding parts.

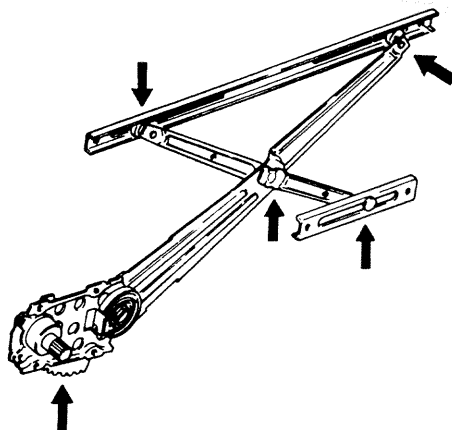


Fig. 20-1-15

[Door glass]

When fitting the glass bottom channel on the door glass, adjust the distance between the glass end ① and channel end ② to that indicated below.

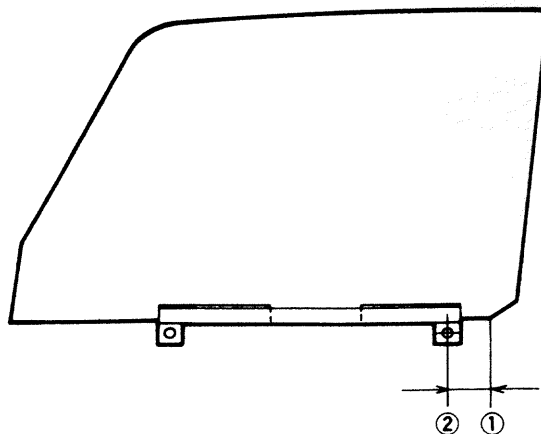


Fig. 20-1-16

42 mm (1.65 in.)

When it is hard to raise and lower the door glass, the glass may be slanting towards the door sash. If this is the case, loosen the screws fastening the door regulator roller holder, move the holder up and down so that the glass and sash are brought in parallel.

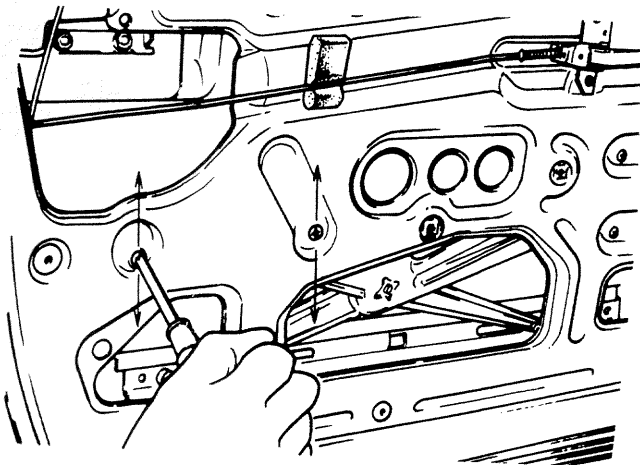


Fig. 20-1-17

[Water proof film]

A proof film that is broken a little may be mended with vinyl tape but should be replaced with polyethylene film as a rule. Apply bonding agent all around the circumference and stick on from the underside.

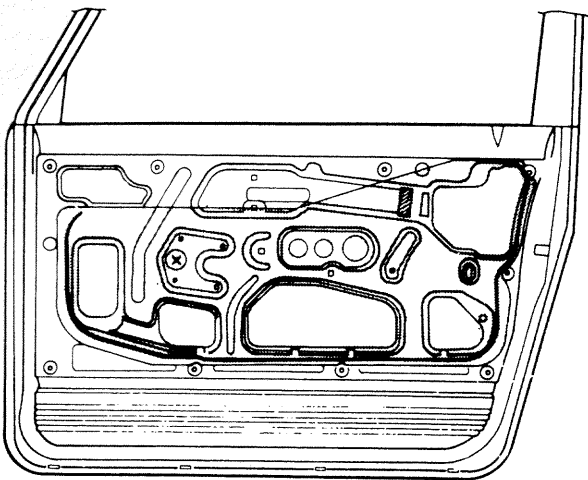


Fig. 20-1-18

[Regulator handle]

Install the handle at the angle as specified in below figure with the door window glass closed (raised all the way up).

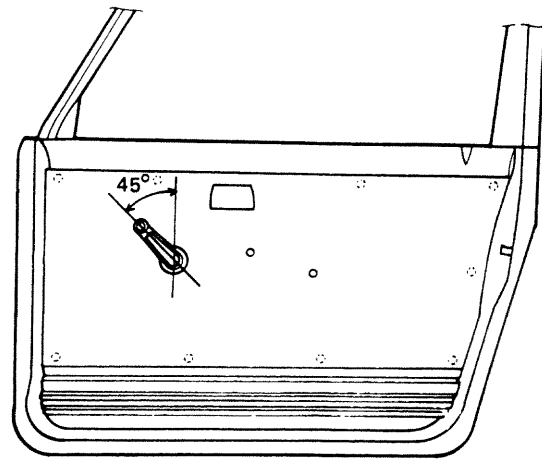


Fig. 20-1-19

Front Door Lock

Reverse the removal sequence to install the door lock. However, be careful of the following points.

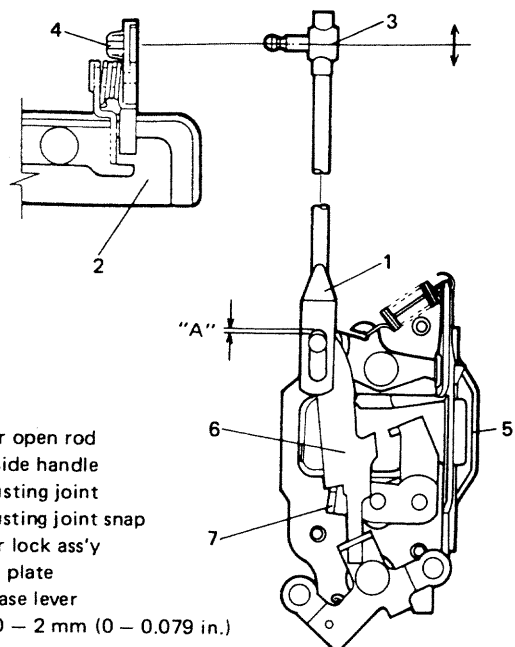
[Door outside open rod]

When installing open rod ① on outside handle ②, adjust clearance "A" to 0 – 2 mm (0 – 0.079 in) by turning adjusting joint ③.

NOTE:

Don't push down push plate ⑥ when installing the open rod.

After installing the open rod, give the outside handle a trial and check if its play felt then is appropriate.



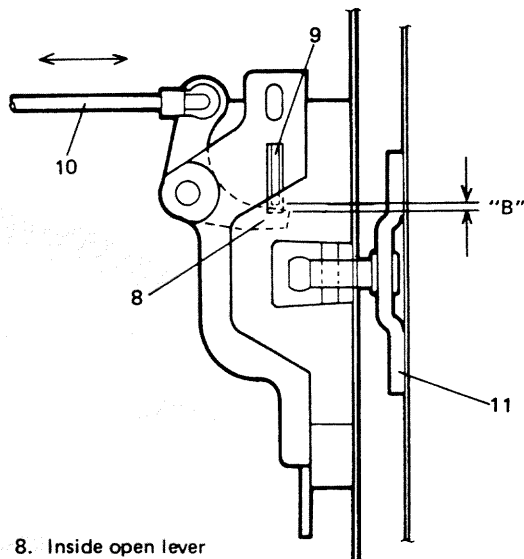
1. Door open rod
 2. Outside handle
 3. Adjusting joint
 4. Adjusting joint snap
 5. Door lock ass'y
 6. Push plate
 7. Release lever
- "A" : 0 – 2 mm (0 – 0.079 in.)

Fig. 20-1-20

[Door lock inside handle]

Fit the inside handle, adjusting the clearance between inside open lever ⑧ and outside open lever ⑨ of the door lock to 0 – 2 mm (0 – 0,079 in) by moving the inside handle remote control rod ⑩ in the arrow direction given in below figure.

After installation, give it a trial and check if its play felt then is appropriate.



- 8. Inside open lever
- 9. Outside open lever
- 10. Control rod
- 11. Door lock striker
- "B" : 0 – 2 mm (0 – 0.079 in.)

Fig. 20-1-21

[Door lock rod pin]

Fix the lock rod with rod pin securely as illustrated below.

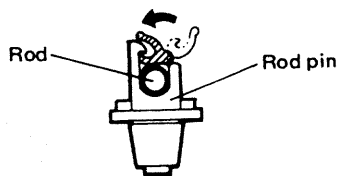


Fig. 20-1-22

[Door lock striker]

Increase or decrease striker spacers fitted in "A" position behind the striker to adjust dimensions to below values as shown in below figure.

After adjustment, check the difference in level between the door and body and adjust when there is difference by moving the door lock striker to right or left.

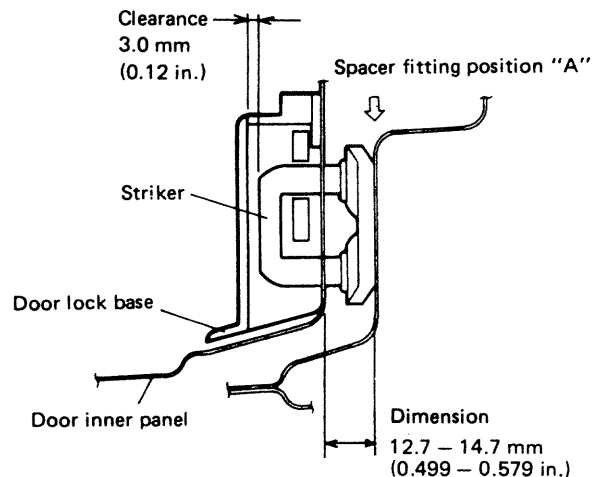


Fig. 20-1-23

Move the striker base up and down so that striker shaft aligns with the center of the groove of the door lock (the clearance between the shaft of door lock striker and lock base is 1.0 mm (0.04 in.)) in the vertical direction.

CAUTION:

- The striker should be placed vertically.
- Do not adjust the door lock.

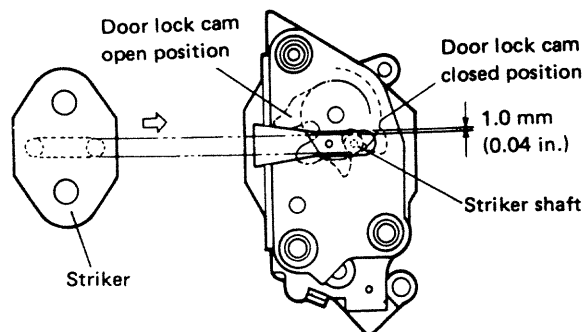


Fig. 20-1-24

20-2. WINDSHIELD

The windshield glass is bonded to the window panel (body) with weatherstrip in position. When replacing the glass, it is necessary to perform correct operation and adhesive selection so that adequate bonding strength can be obtained.

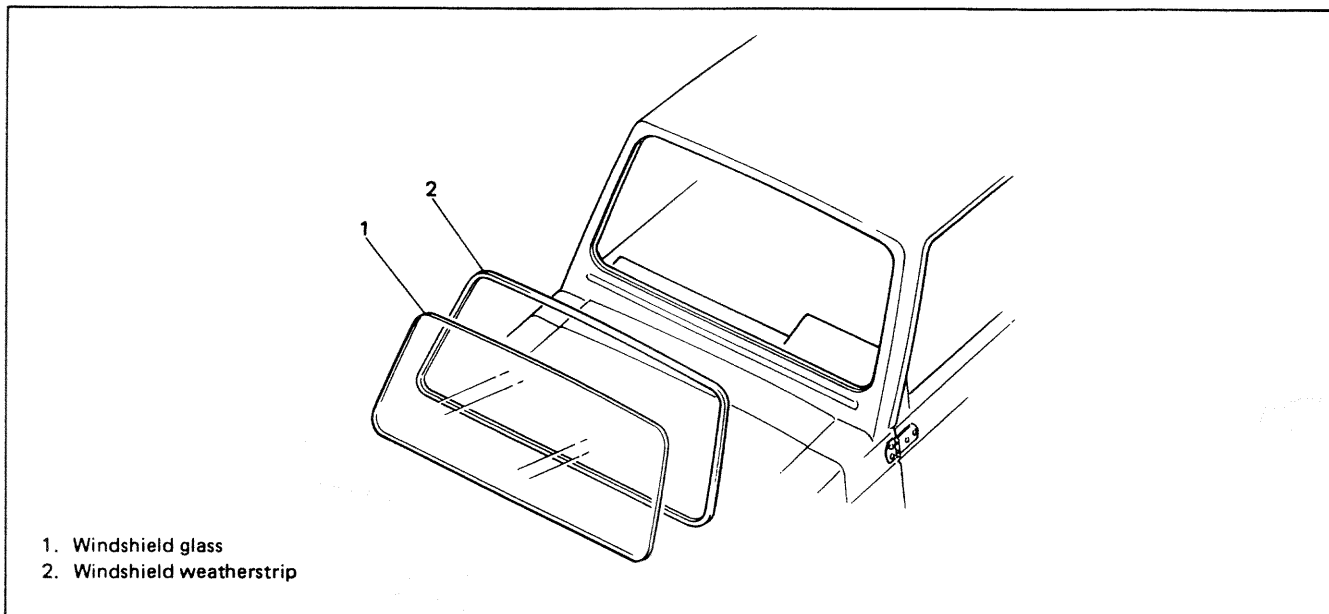


Fig. 20-2-1

CLEANING

- 1) After removing the glass, remove the urethane gum sticking to the glass and window panel (body).

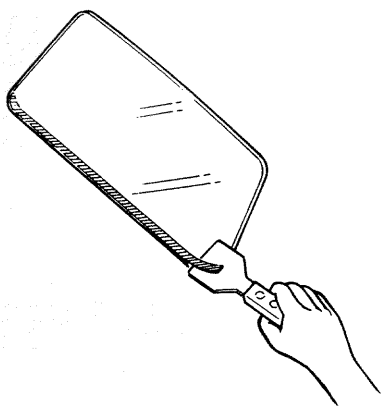
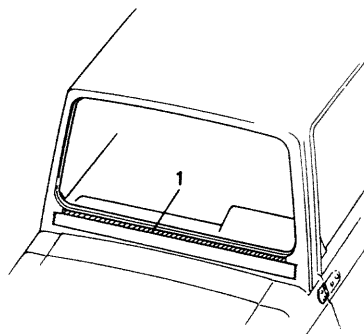


Fig. 20-2-2

NOTE:

When removing the urethane gum from the window panel (body), apply a masking tape along the edge of the gummed surface to protect the painted surface from damage.



1. Urethane gum

Fig. 20-2-3

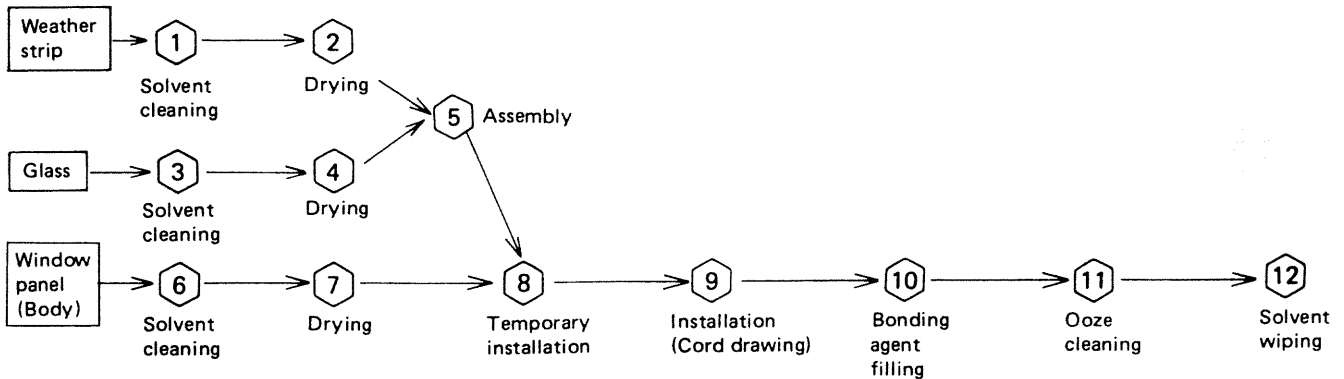
2. Use cleaning solvent to clean the glass and window panel (body).

NOTE:

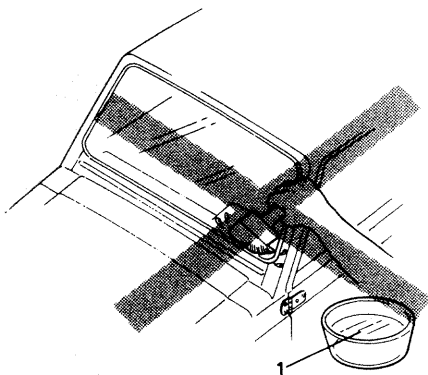
The use of alcohol or thinner when cleaning may adversely affect some kinds of adhesives in terms of bonding strength, resulting in that it is impossible to obtain adequate strength for glass installation. So, be careful sufficiently about the selection of the cleaning solvent.

INSTALLATION

The installation sequence is shown in the Block Diagram below.



- 1) As for the cleaning, use cleaning solvent. The use of alcohol or thinner adversely affects some kinds of adhesives in terms of bonding strength. Hence, use sufficient care to select proper cleaning solvent.
- 2) When cleaning the weatherstrip, apply a 3 kg or more pressure on a clean cloth to wipe and clean it.
- 3) After cleaned with solvent, each item should not be touched by hand fouled with grease, etc.
- 4) Make a glass-and-weatherstrip assembly. Thereafter, carefully keep the assembly free from dust to assemble it to the window panel (body) as soon as possible.
- 5) Glass installation
When assembling the glass into the weatherstrip's glass channel, and when assembling the glass-and-weatherstrip assembly to the window panel (body) soapy water must not be used as lubricant. If the installation is felt hard, use cleaning solvent as lubricant.



1. Soapy water

Fig. 20-2-4

- When installing the glass-and-weatherstrip assembly to the window panel (body), previously fit a cord into the weatherstrip's body flange channel.
- Start the installation from the central bottom portion of the glass.
- Position the glass-and-weatherstrip assembly in the window panel (body) opening with a helper applying pressure by palm from the outside. Then, pull the weatherstrip over the flange with the cord to install the assembly into position.

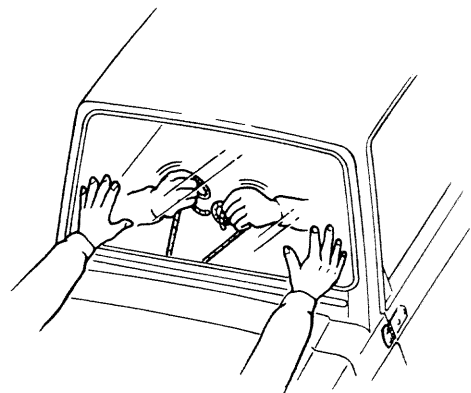


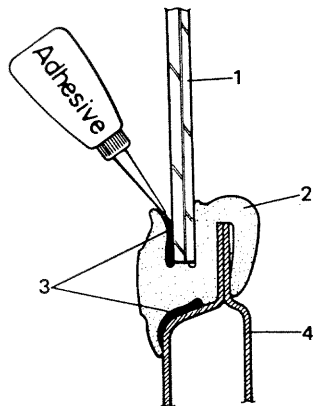
Fig. 20-2-5

- To settle the glass in place, tap it by palm from the outside.
- 6) As for the bonding agent, use urethan-based bonding agent having the strength as shown below:

Separating Strength	At least 6 kg/1/2 in wide
Shearing Strength	At least 10 kg/cm ²

7) Fill bonding agent completely between the glass and the weatherstrip and also between the window panel (body) and the weatherstrip.

To confirm this condition, bonding agent should be oozed out of position.



- 1. Windshield glass
- 2. Windshield weatherstrip
- 3. Adhesive
- 4. Window panel (body)

Fig. 20-2-6

CAUTION:

- Bonding agent should be of the type which conforms to the material of the weatherstrip, having the above-mentioned strength. Also it must not affect the painted surface, weatherstrip or glass.
- Until when the bonding agent is so completely dried that its strength can be obtained sufficiently, the relevant vehicle should not be driven. As for the drying time, follow the direction suggested by the manufacturer of the relevant bonding agent.

8) Oozed bonding agent should be wiped and cleaned with solvent completely.

20-3. BACK DOOR (APPLICABLE TO HARD TOP VEHICLE)

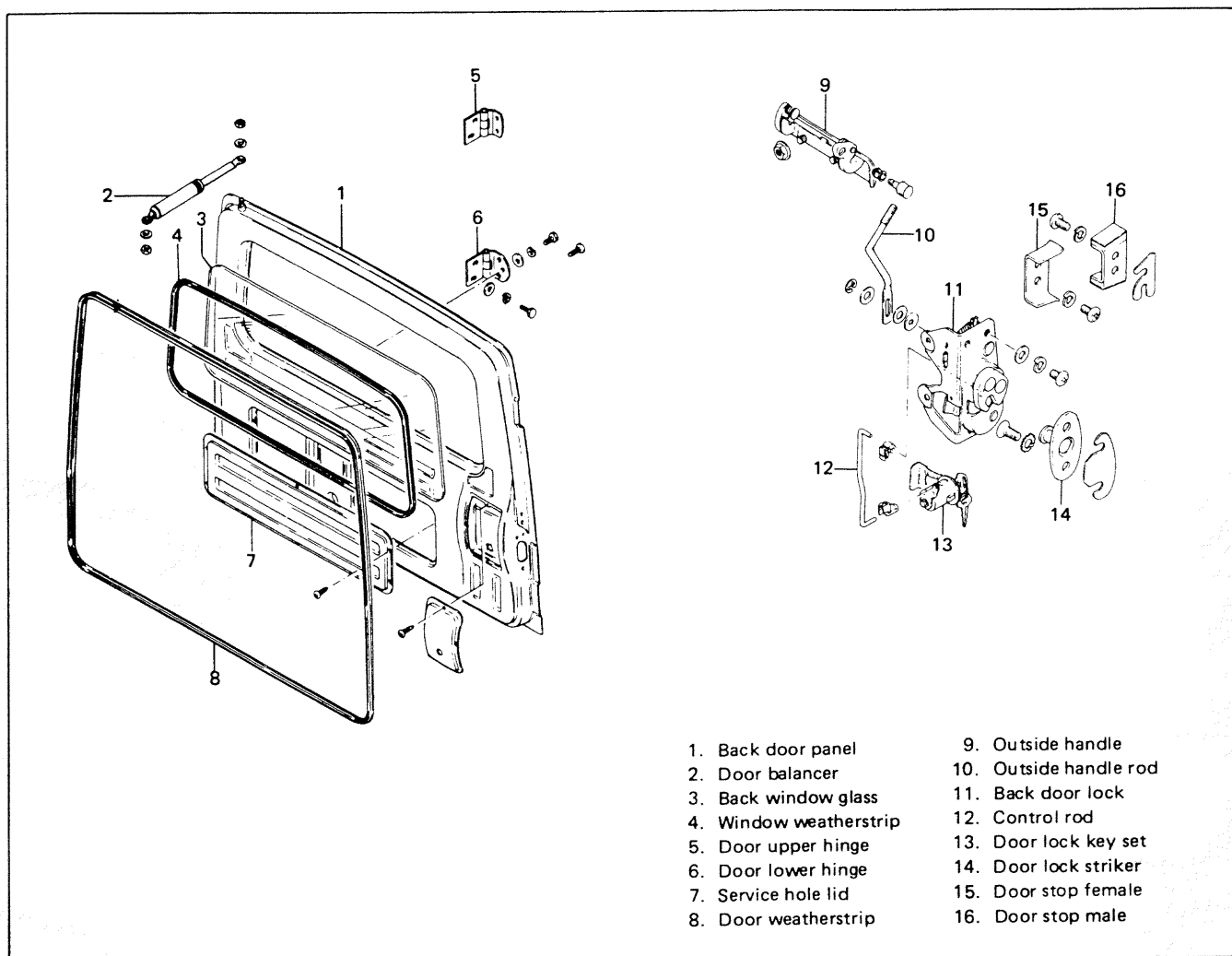


Fig. 20-3-1

DOOR LOCK AND STRICKER ADJUSTMENT Door Outside Open Rod

When installing open rod ② onto outside open handle ①, adjust clearances "A" to 0 – 2 mm (0 – 0.079 in) and "B" to 2 mm (0.079 in) as shown in Fig. 20-3-2 by turning adjusting joint ③

NOTE:

Don't push down push plate ④ when installing the rod.

After installing the open rod, give the outside handle a trial and check if its play felt then is appropriate.

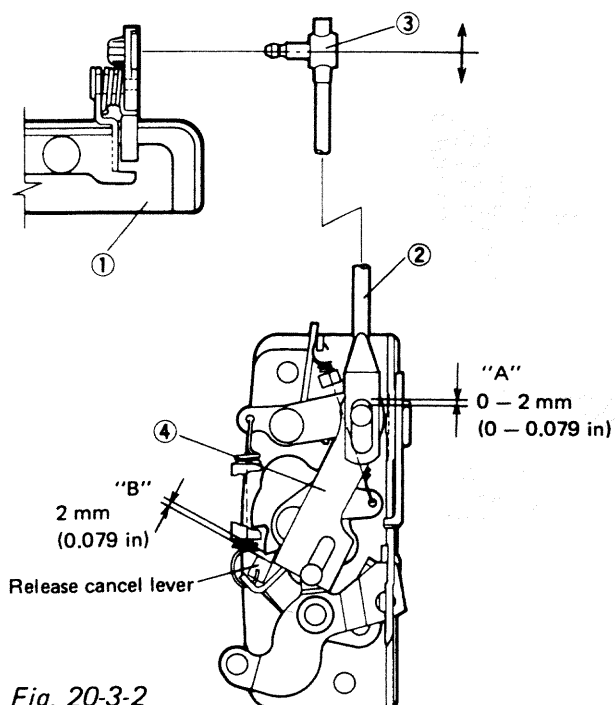


Fig. 20-3-2

Door Lock Stricker

After reinstalling the door lock striker or door lock which was once removed, adjust dimension "C" in Fig. 20-3-3 to 1.0 mm (0.04 in) by moving the striker up and down.

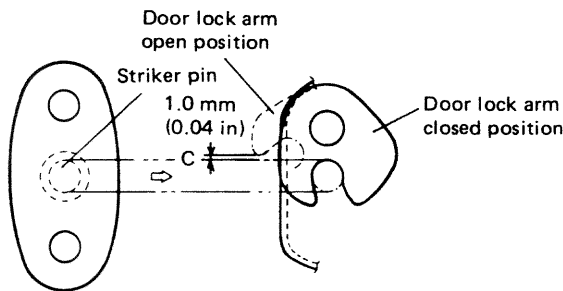


Fig. 20-3-3

To position the door lock striker correctly in the front and rear direction, adjust dimension "D" to 5.5 mm (0.22 in) as shown in Fig. 20-3-4 by increasing or decreasing spacers fitted in "E" position behind the striker.

After adjustment, check the difference in level between the door and body and adjust when there is a difference by moving the door lock striker to right or left.

CAUTION:

Do not adjust the door lock.

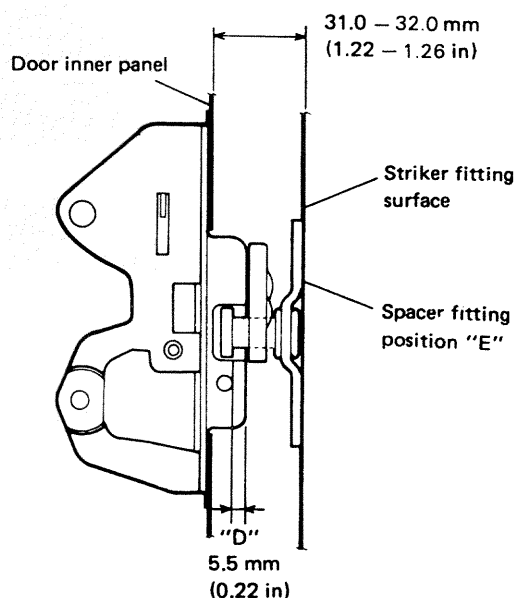


Fig. 20-3-4

Handling of Back Door Balancer

WARNING:

- Handle the balancer carefully. Do not scar or scratch the exposed surface of its piston rod, and never allow any paint or oil to stick to the surface.
- Do not disassemble the balancer because its cylinder is filled with high pressure gas.
- Do not put it into the fire.
- Do not store it where it gets hot.
- When discarding the removed back door balancer, envelop it, as illustrated, with a vinyl bag. Then, use a 2 to 3 mm (0.08 to 0.12 in) drill to make a hole, as shown, from above through the bag into the balancer and let gas out.

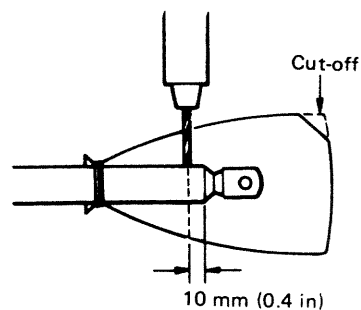
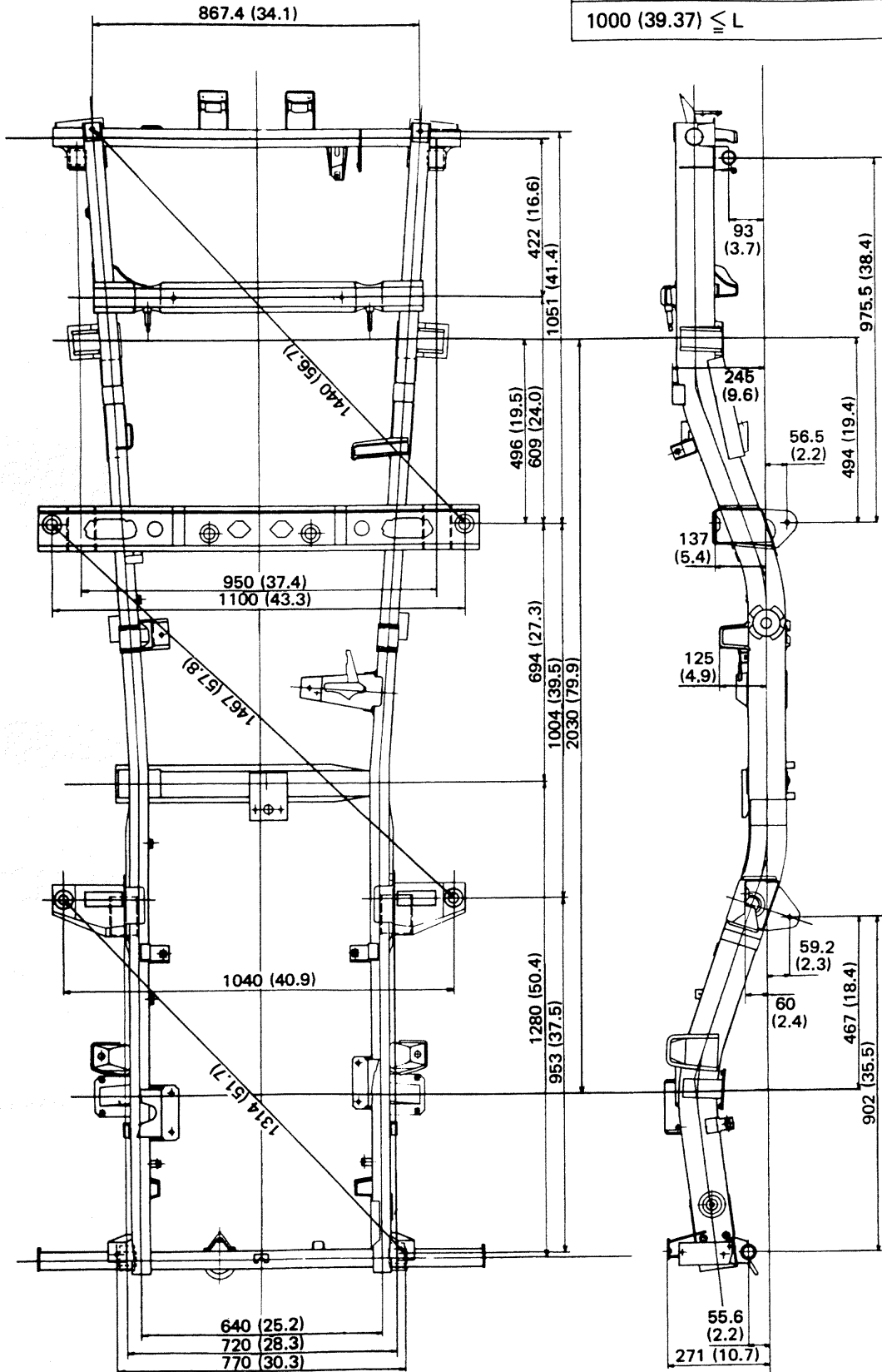


Fig. 20-3-5

20-4. CHASSIS DIMENSIONS

Unit: mm (in)

Dimension	Tolerance
$L < 100 \text{ (3.94)}$	$\pm 2 \text{ (0.079)}$
$100 \text{ (3.94)} \leq L < 1000 \text{ (39.37)}$	$\pm 3 \text{ (0.118)}$
$1000 \text{ (39.37)} \leq L$	$\pm 4 \text{ (0.157)}$



SECTION 21

BODY ELECTRICAL EQUIPMENT

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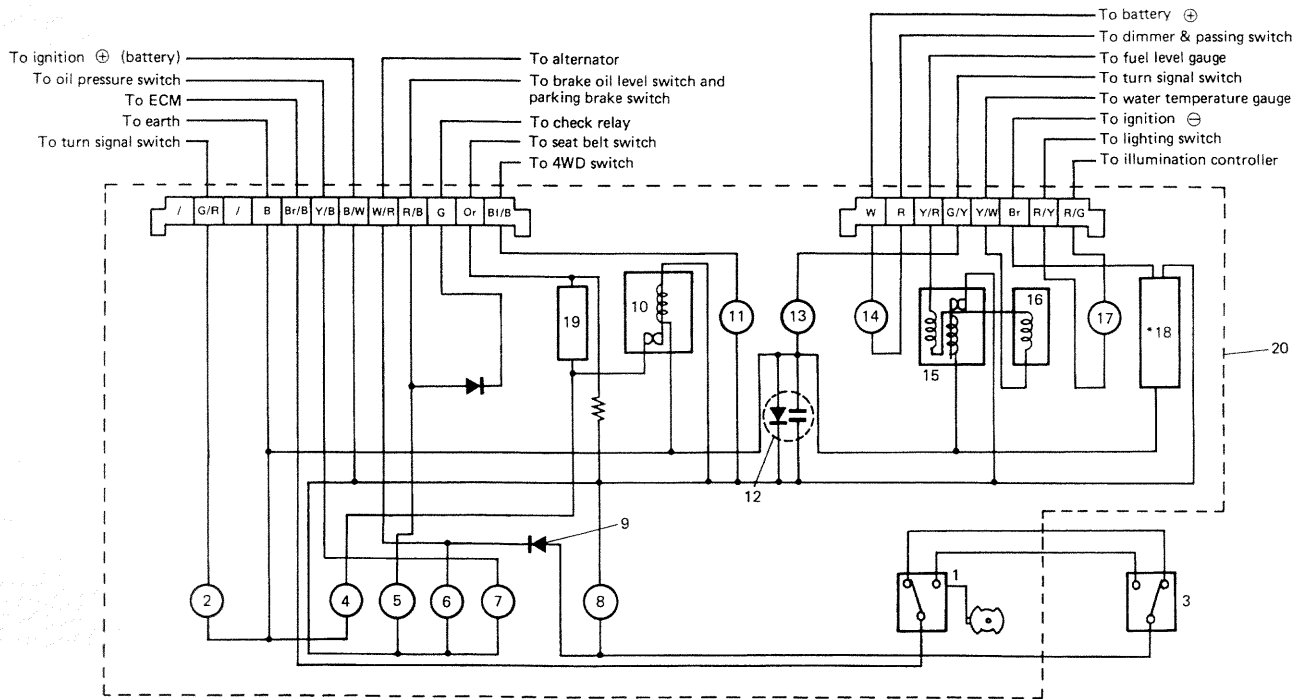
21-1. COMBINATION METER

COMBINATION METER CIRCUIT AND COMPONENTS

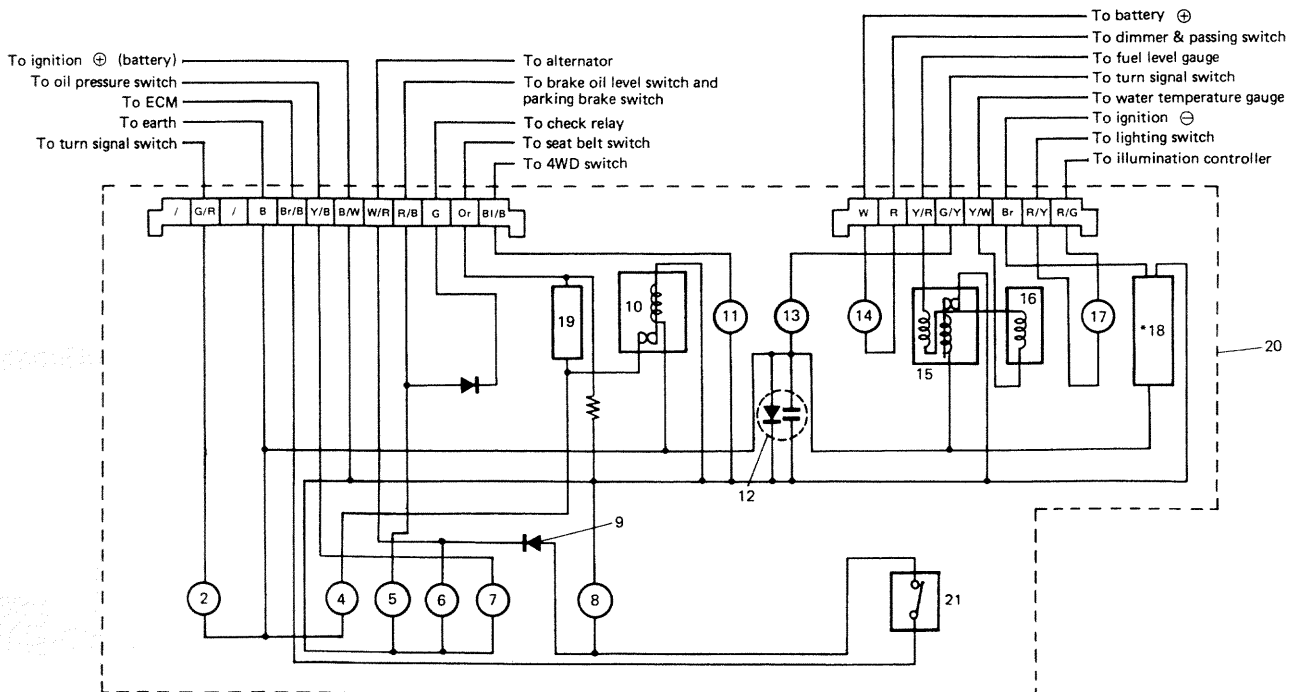
NOTE:

Whether equipped with * marked parts or not depends on vehicle specifications.

[U.S.A. specification vehicle]



[Canadian specification vehicle]



Wire color

G/R	Green/Red	Or	Orange
B	Black	Bl/B	Blue/Black
Br/B	Brown/Black	W	White
Y/B	Yellow/Black	Y/R	Yellow/Red
B/W	Black/White	G/Y	Green/Yellow
W/R	White/Red	Y/W	Yellow/White
R/B	Red/Black	R/Y	Red/Yellow
G	Green	R/G	Red/Green

1. 50,000 mile, 80,000 mile and 100,000 mile sensor switch
2. Turn signal pilot light (L)
3. Cancel switch
4. Seat belt warning light
5. Brake oil level warning light and parking brake light
6. Charge light
7. Engine oil pressure light
8. "CHECK ENGINE" light
9. Diode
10. Seat belt relay
11. 4WD light
12. Noise suppressor
13. Turn signal pilot light (R)
14. Beam pilot light
15. Fuel level meter
16. Temp. meter
17. Illumination light
18. Tachometer
19. Seat belt warning buzzer
20. Combination meter
21. Check switch

[Combination meter without tachometer]

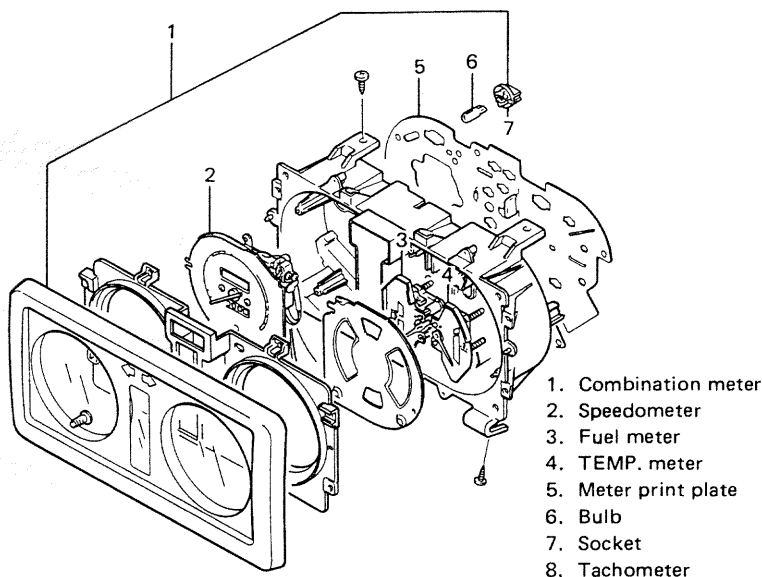
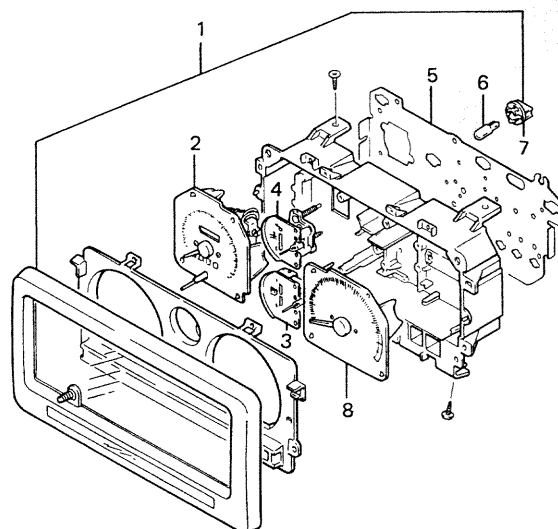


Fig. 21-1

REMOVAL AND INSTALLATION

1. Disconnect battery negative cable.
2. Remove instrument lower panel.
3. Lower steering column.
4. Remove combination meter cover.
5. Disconnect speedometer cable and wire harness coupler.
6. Remove combination meter.

[Combination meter with tachometer]



7. To install combination meter, reverse above removal procedure.

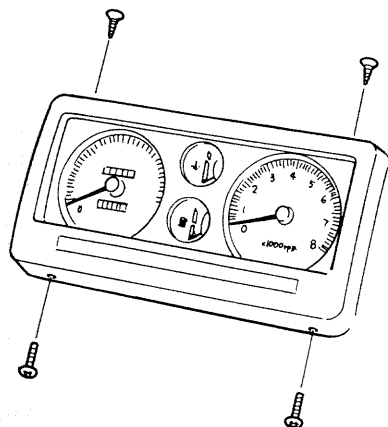


Fig. 21-2

21-2. HEAD LIGHT WIRING CIRCUIT

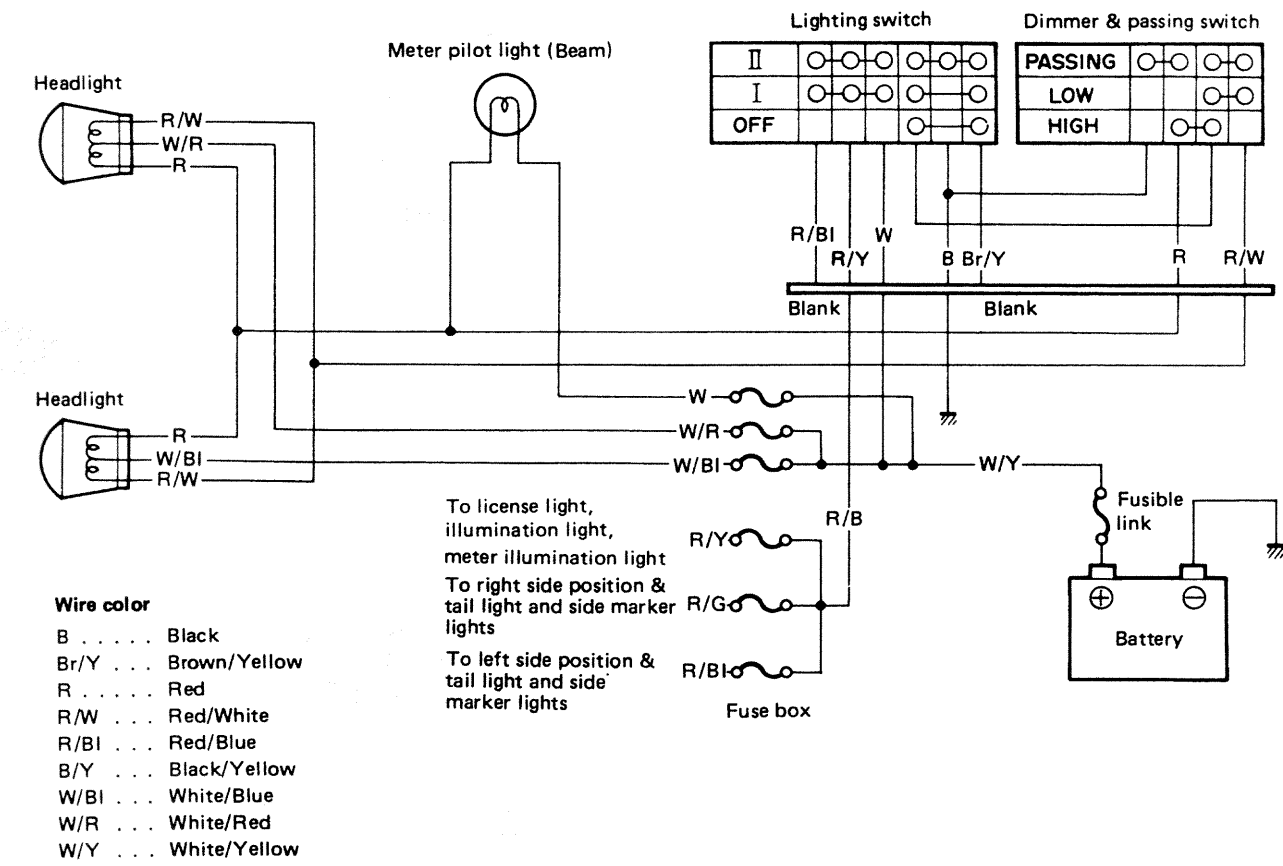


Fig. 21-3

HEADLIGHT INSPECTION

1. Lighting (Low beam, High beam, Passing)
2. Mounting
3. Dirt and cracks on lenses
4. Main beam axis direction and brightness

HEADLIGHT BEAM SETTING (STANDARD PROCEDURE)

Before setting the headlight beams, adjust air pressures of four tires to a specified value respectively. Move the vehicle up and down by hand to settle its attitude. Then move it over a flat surface. There are available a variety of headlight beams setting methods (e.g., the screen method using a focusing tester, etc.). However, the method described here does not use such tester.

Beam alignment

Unless otherwise obligated by the local regulations, align the headlight beams according to the following procedure. Place a blank wall 7.6 m (25 ft) ahead of the headlight. Check to see if the hot spot (high intensity zone) of each main (low) beam axis falls as illustrated below. The beam alignment should be carried out with one driver (68 kg, 150 lb) aboard.

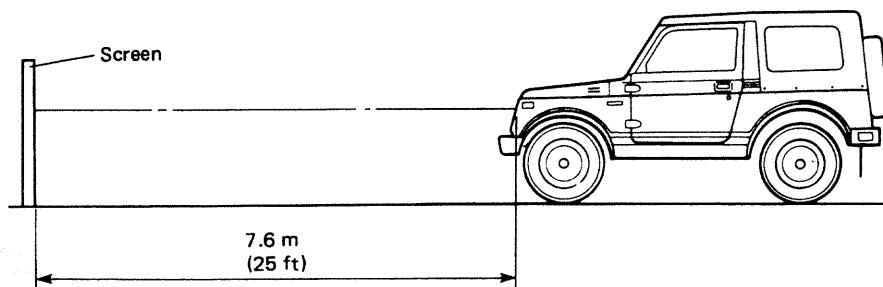
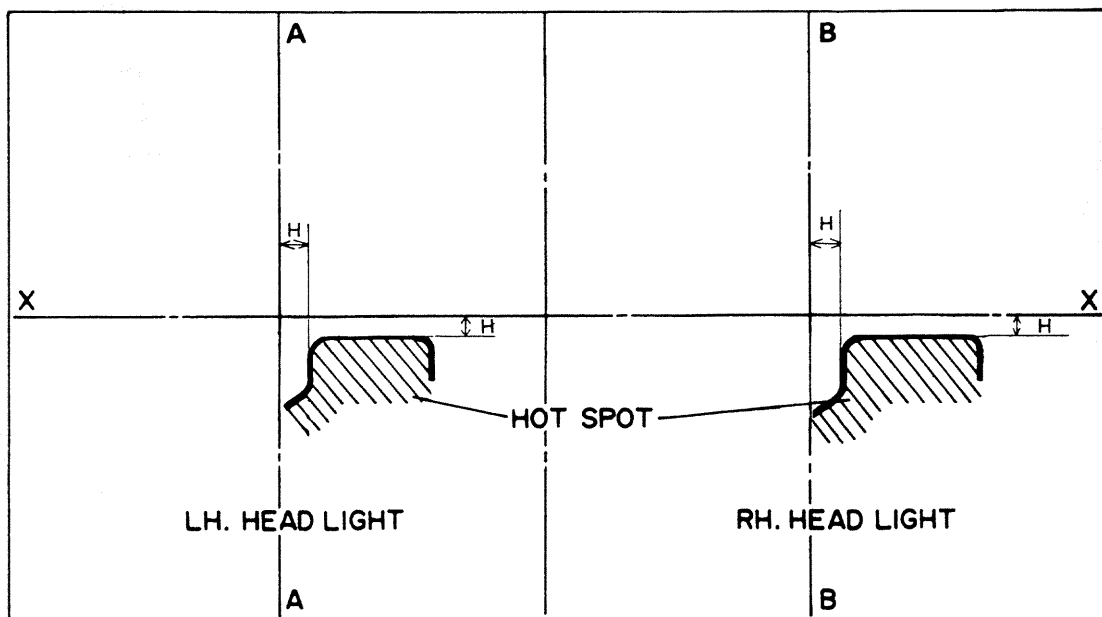


Fig. 21-4



X - X : Horizontal center line of headlights
A - A : Vertical center line of left headlight
B - B : Vertical center line of right headlight

H : 25 mm (0.98 in.)

Fig. 21-5

MAINTENANCE

(1) Headlight adjustment

There are two screws ① and ② which can be used for adjustment. Use these screws to adjust the headlight position for the vertical and horizontal alignment of each beam.

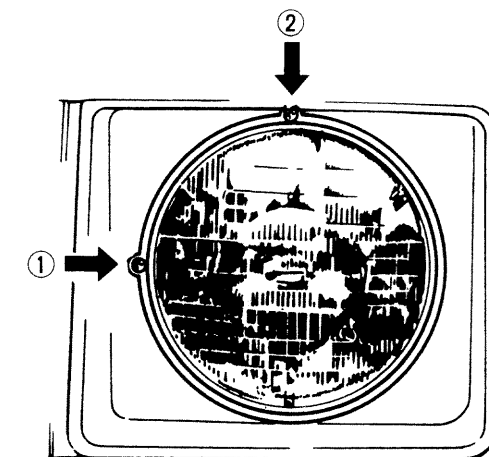
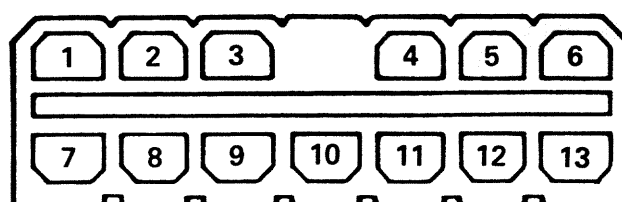


Fig. 21-6

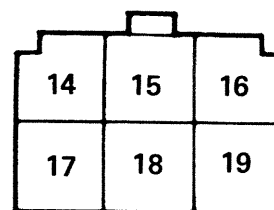
(2) Head light dimmer switch

Using circuit tester, check each circuit for continuity by putting tester probe pins to the terminals shown in Fig. 21-7. With switch kept in LOW BEAM position, tester should indicate continuity between terminals ⑦ and ⑮. Similarly, there should be continuity between terminals ⑧ and ⑮ when in HIGH BEAM position.

Switch connector



- | | |
|----------------------------|------------------|
| 1. Green/Red (Green/Black) | 8. Red |
| 2. Green/Yellow | 9. Blue/Green |
| 3. Green | 10. Brown/Yellow |
| 4. Yellow | 11. Red/Blue |
| 5. White/Blue | 12. Red/Yellow |
| 6. Yellow/Blue | 13. White |
| 7. Red/White | |



- | | |
|------------------|----------------|
| 14. Yellow/White | 17. Blue/Black |
| 15. Blue | 18. Black |
| 16. Blue/Red | 19. Blue/White |

Fig. 21-7

Combination switch (Lighting switch circuit)

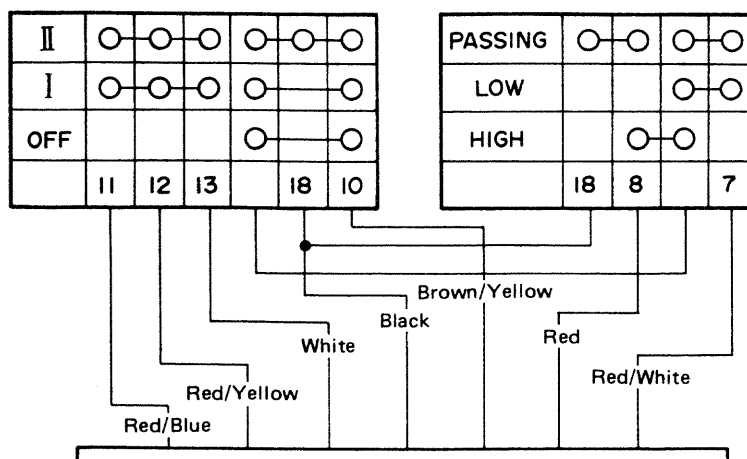
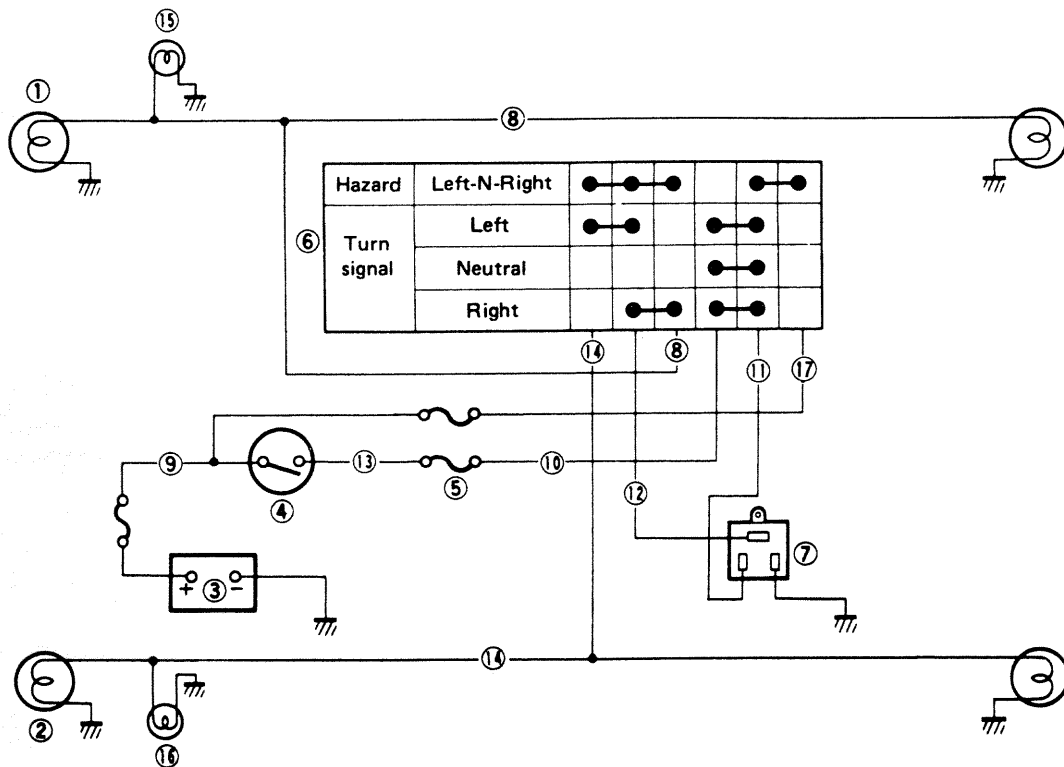


Fig. 21-8

21-3. TURN SIGNAL LIGHT AND HAZARD WARNING LIGHT

CIRCUIT DESCRIPTION



- | | | |
|--|-----------------|-------------------------------|
| 1. Right turn signal | 8. Green/Yellow | 15. Meter pilot light (Right) |
| 2. Left turn signal | 9. White/Yellow | 16. Meter pilot light (Left) |
| 3. Battery | 10. Yellow | 17. White/Green |
| 4. Main switch | 11. Yellow/Blue | |
| 5. Fuse | 12. Green | |
| 6. Turn signal and hazard warning switch | 13. Black/Blue | |
| 7. Turn signal and hazard warning relay | 14. Green/Red | |

Fig. 21-9

When hazard warning switch is "OFF", Yellow lead ⑩ is connected to Yellow/Blue lead ⑪.

When the hazard warning switch is "ON", White/Green lead ⑰ is connected to Yellow/Blue lead ⑪, and Green lead ⑫ to both Green/Yellow lead ⑧ and Green/Red lead ⑭.

When Turn-signal switch is "ON" for right turn, Green lead ⑫ is connected to Green/Yellow lead ⑧.

When Turn-signal switch is "ON" for left turn, Green lead ⑫ is connected to Green/Red lead ⑭.

INSPECTION

1) Trouble diagnosis

Symptom	Possible cause
1. Lights will not come on in either left or right group of light.	Fusible link is blown off.
2. Hazard light comes on but turn signal lights will not.	Open circuit (due to poor point contact) in turn signal dimmer switch.
3. No light comes on; or lights light up but do not flicker.	Defective relay unit.
4. Turn signal lights are satisfactory, but hazard light will not come on.	Open circuit in hazard warning switch.
5. Flickering freueqncy is erratic, or lights remain lit.	Light bulbs are defective or improperly grounded.
6. Turning on hazard warning switch lights up only one group of lights.	Defective contact in dimmer switch.

2) Turn signal switch

Using circuit tester, check for continuity between each pair of terminals by referring to the chart given below and figure at the right for each position of turn signal switch lever. Discontinuity means that contact points are burnt or otherwise defective in the switch. For example, switch is in sound condition if continuity is noted between terminals 2 and 3, with lever in right-turn position, and between terminals 1 and 3, with lever in left-turn position.

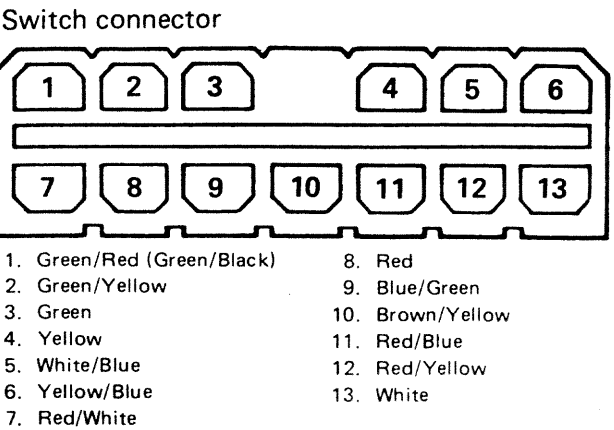


Fig. 21-10

3) Hazard warning switch

Disconnect lead wire of the hazard warning switch at its coupler. Set switch to ON position and check for continuity with circuit tester between each of the following pairs of terminals; 2 and 3, 1 and 3, 5 and 6 among those shown in Fig. 21-10. The switch is in sound condition if continuity is noted between each pair.

Turn signal & hazard warning switch

		1 (Green/Red or Green/Black)	3 (Green)	2 (Green/Yellow)	4 (Yellow)	6 (Yellow/Blue)	5 (White/Blue)
Hazard warning	Left-N-Right	●————●	●————●	●		●————●	
Turn signal	Left	●————●	●		●————●	●	
	Neutral				●————●	●	
	Right		●————●	●	●————●	●	

21-4. WINDSHIELD WIPER MOTOR

CIRCUIT DESCRIPTION

The circuit is designed so that, when the Wiper Switch is turned "OFF", the blade will automatically return to the horizontal position. In Fig. 21-11, when the Wiper Switch is turned "ON" while the Main Switch is "ON", current is supplied to the Wiper Motor from the Battery, the motor rotates and the blade moves. The gear mechanism which converts rotational movement of the motor into swinging movement of the blade has a cam on the final gear shaft. The cam switches the contacts of P0 and P2 every revolution. (At the blade stop position, the contact is switched from P2 to P1.)

Repeated contact making and breaking is independent of the wiper motor rotation. When the Wiper Switch is turned "OFF" while the blade is in a position other than the rest position, motor current path is changed (i.e. BI/W → BI → MOTOR). Therefore, the motor keeps rotating even though the wiper switch is turned "OFF", and the blade will return to the rest position.

When the blade returns to the rest position, the cam contact is changed from P2 to P1 and motor current is shunted. When supply to the motor is cut off, a counter electromotive force is generated in the armature. As a result of this counter electromotive force, current flows through the motor and shunt circuit and the motor stops and the wiper blade stays in the specified position.

[INTERVAL WIPER RELAY CIRCUIT (OPTIONAL)]

When the wiper switch is set to the interval position with the ignition switch ON (the condenser is charged at this time), current from the battery flows through the yellow/blue wire, generates magnetic force in the coil in the relay and causes the switch in the relay to turn ON. Then current is transmitted in the sequence of yellow/blue, relay, wiper switch and blue and causes the wiper motor to rotate (meanwhile, the condenser discharges). By the time the wiper motor makes one rotation and the cam in the motor comes to the automatic stop position P1, the condenser in the relay has finished discharging (no magnetic force in the coil in the relay). Then the switch in the relay turns OFF and the wiper stops. They remain that way until the condenser is fully charged. As soon as the condenser begins discharging after being fully charged, magnetic force generated in the coil in the relay causes the switch to turn ON. As described above, interval operation of the wiper motor is controlled by charging and discharging of the condenser.

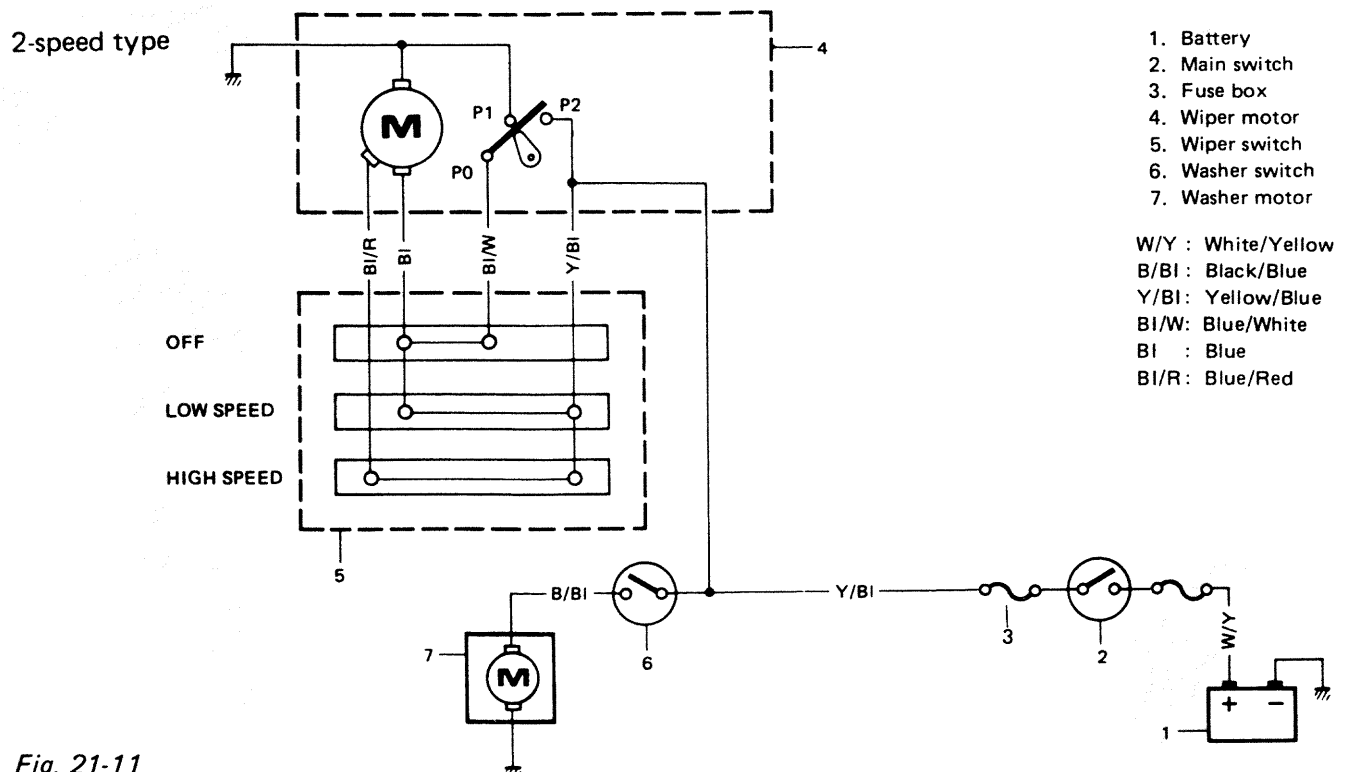


Fig. 21-11

3-speed type

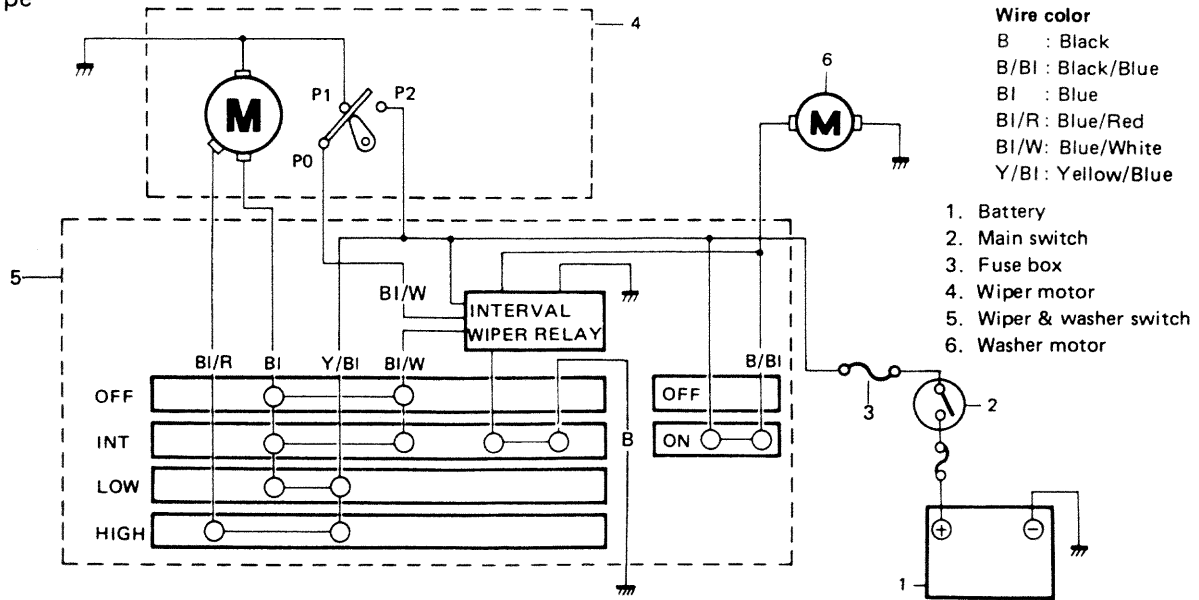


Fig. 21-12

MAINTENANCE

1) Wiper trouble diagnosis

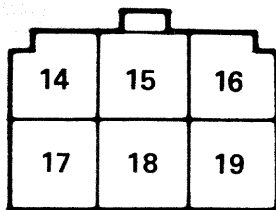
When wiper motor does not start even if Wiper Switch is turned "ON", check lead connections and coupler connections. Then, check the following.

a) Fuse blown or mounted incorrectly.

b) Wiper switch:

To check wiper switch, remove couplers and check continuity between following terminals by using circuit tester.

Switch connector



- 14. Yellow/White
- 15. Blue
- 16. Blue/Red
- 17. Blue/Black
- 18. Black
- 19. Blue/White

2-speed type

	Yellow/white	Blue	Blue/red	Blue/white
High speed	●	●	●	
Low speed	●	●		
OFF		●	●	●

Wiper switch

3-speed type

	Yellow/white	Blue/white	Blue	Blue/red	To replay	Black
OFF		●	●			
Interval		●	●		●	●
Low speed	●		●			
High speed	●		●	●		

Wiper switch

c) Break in wiper motor armature or poor commutator brush contact:

To check these, check continuity between Blue lead and ground, and Blue/Red wire and ground respectively.

2) No-load run test

As shown in Fig. 21-13, using a 12V battery, connect positive battery terminal to Blue terminal and the negative terminal to motor. If motor rotates at 45 – 57 r/min, this is acceptable (for Low-speed check). For High-speed check, connect the positive terminal to Blue/Red terminal and negative terminal to motor. If motor rotates at 67 – 81 r/min, this is acceptable.

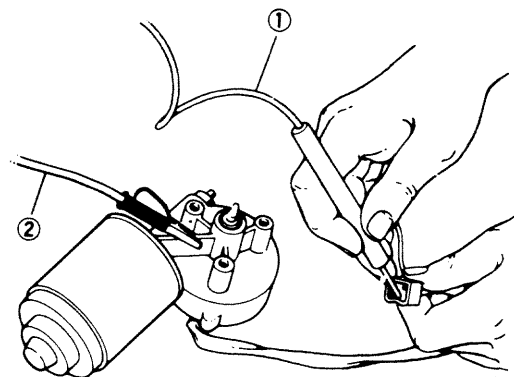


Fig. 21-13 Testing motor

1. Positive terminal

2. Negative terminal

3) Automatic stop action test

Connect yellow terminal of motor to positive \oplus battery terminal, and put a jumper between Blue/White (Blue/Black) and Blue terminals to see if motor output shaft comes to a halt at a certain, not just any, angular position. That position corresponds to starting position of the blade. Using jumper, stop motor a number of times to make sure that motor stops at the same position each time.

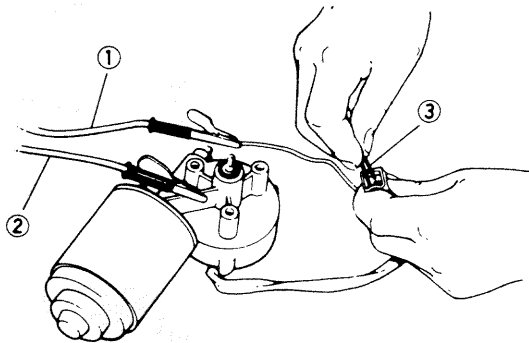


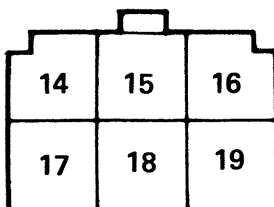
Fig. 21-14 Testing motor

1. Positive terminal
2. Negative terminal
3. Put a jumper between Blue/White (Blue/Black) and Blue

4) Internal wiper relay test

1. Disconnect wiper & washer switch coupler.
 2. Turn wiper switch to "INT" position.
 3. Connect positive battery terminal to Yellow/White coupler terminal and negative battery terminal to Black terminal.
- If an operating sound is heard, the relay is at work properly.

Switch connector



14. Yellow/White
15. Blue
16. Blue/Red
17. Blue/Black
18. Black
19. Blue/White

Fig. 21-15

21-5. WATER TEMPERATURE METER AND GAUGE

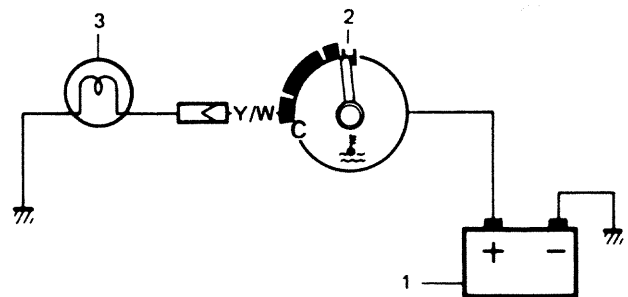
The water temperature meter is located in the combination meter and its gauge unit on the inlet manifold.

The gauge unit shows different resistance values depending on the coolant temperature. This causes a current flowing through the temperature meter coil to change, controlling the meter pointer. That is, when the coolant temperature is raised, the gauge unit resistance is decreased with more current flowing through the meter coil, raising the meter pointer upward from the "C" position.

INSPECTION

[Water temperature meter]

1. Disconnect Y/W (Yellow/White) lead wire going to gauge unit installed to intake manifold.
 2. Use a bulb (12V 3.4W) in position to ground above wires as illustrated.
 3. Turn main switch ON, Confirm that the bulb is lighted and meter pointer fluctuates several seconds thereafter.
- If meter is faulty, replace it.



1. Battery
 2. Water temperature meter
 3. Test lamp (12V, 3.4W)
- Y/W: Yellow/White

Fig. 21-16

[Gauge unit]

Warm up gauge unit. Thus make sure its resistance is decreased with increase of temperature. Temperature and resistance relationship can be plotted in a graph as shown below.

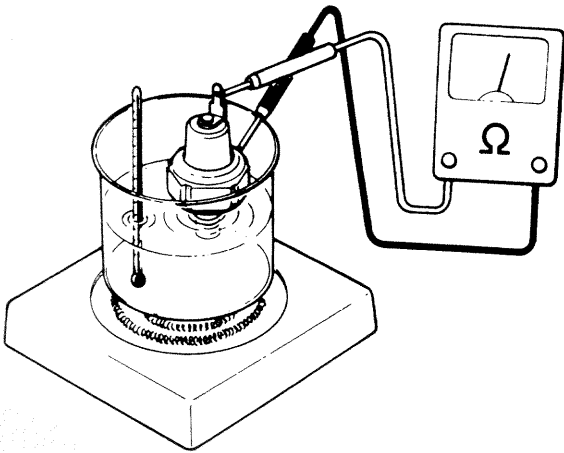


Fig. 21-17

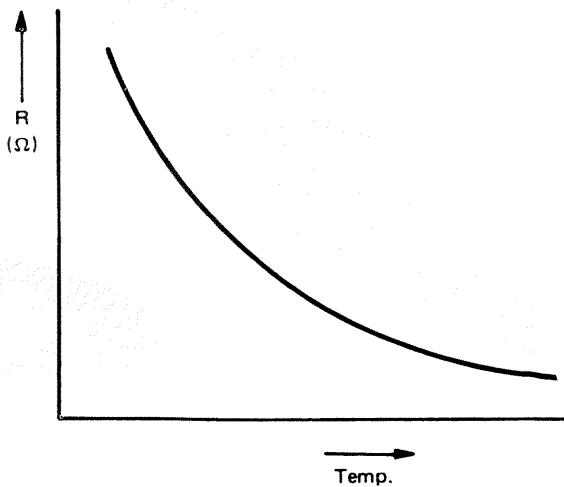


Fig. 21-18 Resistance-Temp. Relationship

Temperature	Resistance
50°C (122°F)	133.9 – 178.9 Ω
80°C (176°F)	47.5 – 56.8 Ω
100°C (212°F)	26.2 – 29.3 Ω

NOTE:

Wind sealing tape on screw threads of gauge before installing gauge to intake manifold.

21-6. FUEL LEVEL METER AND GAUGE

The fuel level meter circuit consists of the fuel level meter installed inside the combination meter and the fuel level gauge installed to the fuel tank.

Current flowing through the meter coil is changed to control the meter pointer. That is, when fuel is full, the fuel level gauge unit resistance is decreased with more current flowing into the meter coil, causing the meter pointer to point at the "F" position.

INSPECTION

[Fuel level meter]

1. Disconnect Y/R (Yellow/Red) lead wire going to gauge unit.
2. Use a bulb (12V 3.4W) in position to ground above lead wire as illustrated.
3. Turn ignition switch ON.

Make sure the bulb is lighted and meter pointer fluctuates several seconds thereafter. If meter is faulty, replace it.

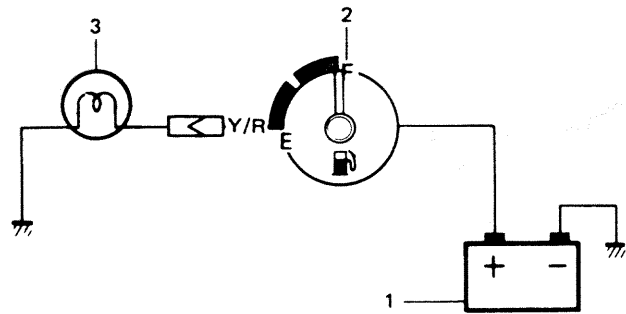


Fig. 21-19

1. Battery
 2. Fuel level meter
 3. Test lamp (12V, 3.4W)
- YR : Yellow/Red

[Gauge unit]

Use ohmmeter to confirm that level gauge unit changes in resistance with change of the float position. Float position-to-resistance relationship can be plotted in a graph as shown below.

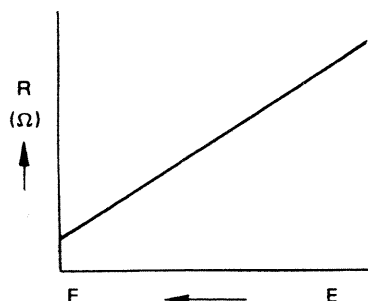


Fig. 21-20 Resistance-Fuel Level Relationship

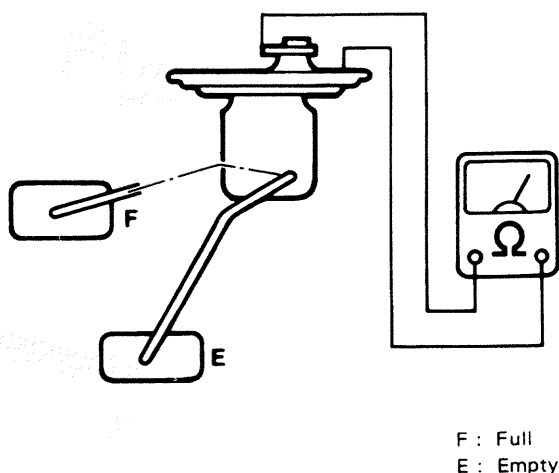


Fig. 21-21

Position	Resistance
E	$110 \pm 7 \Omega$
F	$3 \pm 2 \Omega$
1/2	$32.5 \pm 4 \Omega$

21-7. BRAKE WARNING LAMP

The brake warning lamp system consists of the brake fluid level switch installed to the master cylinder reservoir and the lamp inside the combination meter.

This circuit includes a parking brake switch which gives a warning for unreleased parking brake.

OPERATION

When the engine is stopped, the warning lamp is lighted regardless of the brake fluid level position and parking brake operation, if the main switch is turned ON. This is because the point of the regulator incorporated in the alternator is closed so that the W/R lead wire is grounded.

After the engine is started (meaning the charging is started), release the parking brake. If the lamp goes OFF, the brake fluid level is proper.

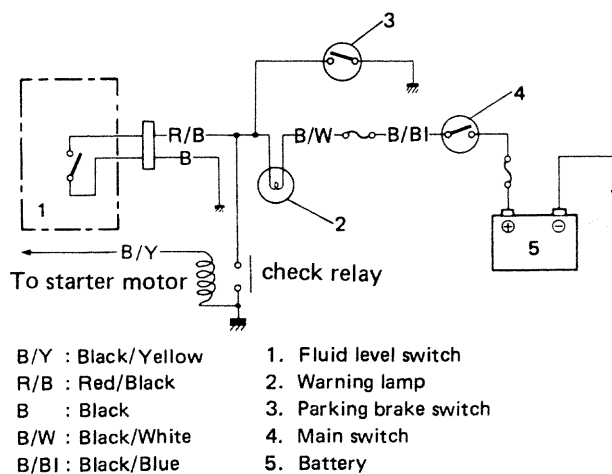


Fig. 21-22

INSPECTION

[Brake fluid level switch]

Use ohmmeter to check switch for resistance and continuity.

If found defective, replace switch.

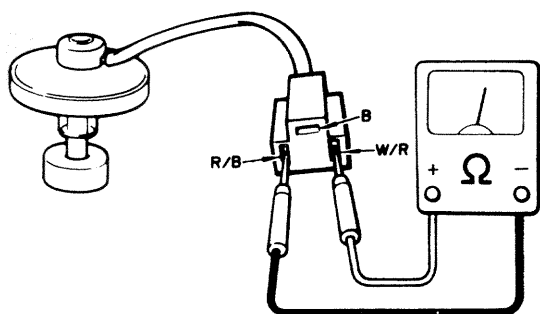


Fig. 21-23

W/R : White/Red
B : Black
R/B : Red/Black

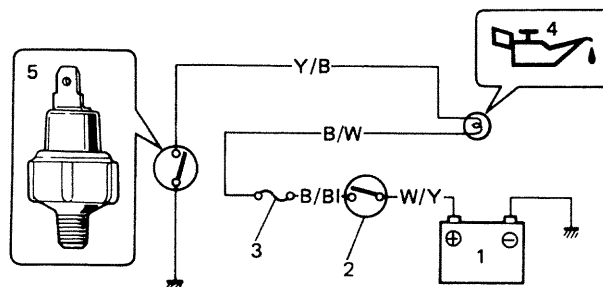
R/B – B Resistance	
OFF position (float up)	∞
ON position (float down)	Several Ω

R/B – W/R Continuity	
R/B to W/R	Continuity obtained
W/R to R/B	No continuity obtained

21-8. OIL PRESSURE LAMP

The oil pressure lamp circuit consists of the oil pressure switch installed to the cylinder block and the lamp (warning lamp) inside the combination meter.

The oil pressure switch so operates that it is switched OFF when oil pressure is produced by the started engine and then fed to switch.



1. Battery
2. Main switch
3. Fuse
4. Oil pressure lamp
5. Oil pressure switch

B/BI : Black/Blue
B/W : Black/White
Y/B : Yellow/Black
W/Y : White/Yellow

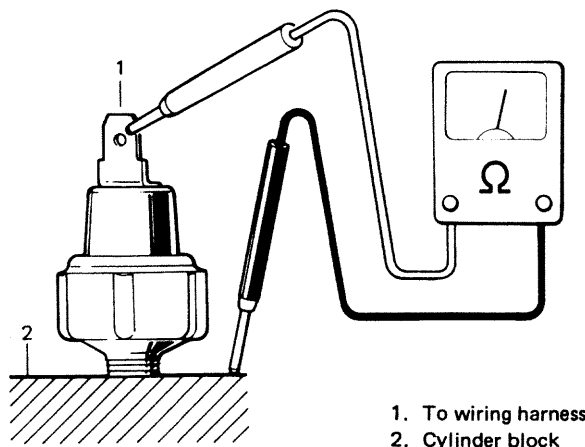
Fig. 21-24

INSPECTION

[Oil pressure switch]

Use a ohmmeter to check the switch continuity.

During engine Running	No continuity obtained ($\infty \Omega$)
At Engine Stop	Continuity obtained (0Ω)



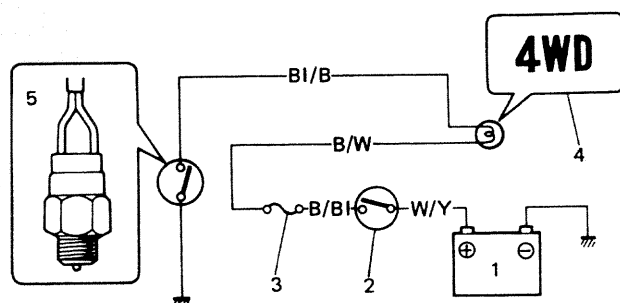
1. To wiring harness
2. Cylinder block

Fig. 21-25

21-9. 4 WHEEL DRIVE LAMP

The 4 wheel drive lamp circuit consists of the 4 wheel drive indicator lamp switch installed to the transfer and the lamp inside the combination meter.

The 4WD switch so operates that it is switched ON when transfer gear shift control lever is shifted to "4H" or "4L" position.



1. Battery
2. Main switch
3. Fuse
4. 4WD lamp
5. 4WD switch

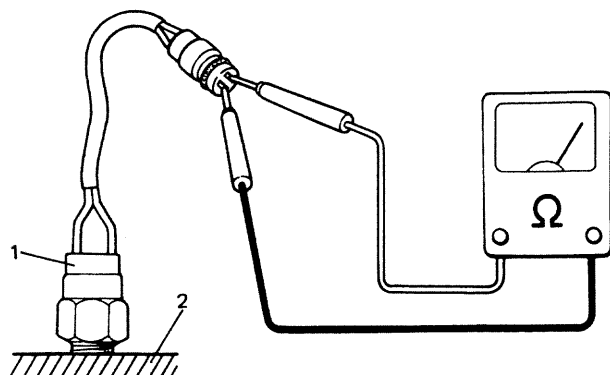
B/B : Black/Blue
B/W : Black/White
B/B : Blue/Black
W/Y : White/Yellow

Fig. 21-26

INSPECTION [4WD switch]

Use a ohmmeter to check the switch continuity.

"4H" or "4L" position	Continuity obtained (0 Ω)
"2H" or "N" position	No continuity obtained (∞ Ω)

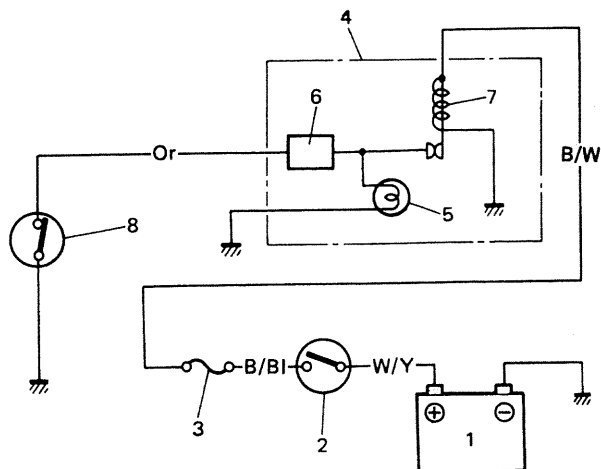


1. 4WD switch
2. Transfer

Fig. 21-27

21-10. SEAT BELT WARNING LAMP/BUZZER

The seat belt warning lamp/buzzer circuit is a system to light and sound the lamp and buzzer respectively for several seconds, urging the driver to wear his seat belt. After several seconds passed, the lamp goes OFF and the buzzer stops sounding whether the seat belt is worn or not.



1. Battery
2. Main switch
3. Fuse
4. Combination meter
5. Warning lamp
6. Warning buzzer
7. Bi-metal
8. Warning switch

W/Y : White/Yellow
B/B : Black/Blue
B/W : Black/White
Or : Orange

Fig. 21-28

INSPECTION

When the warning lamp/buzzer do not make lighting/sounding, use the above Circuit Diagram as reference to check the bulb, buzzer, wiring, etc.

21-11. MAIN SWITCH KEY WARNING BUZZER

The main switch key warning buzzer circuit is a system to sound the buzzer if the driver leaves the car with the main switch key inserted in place, urging him to take it out of place.

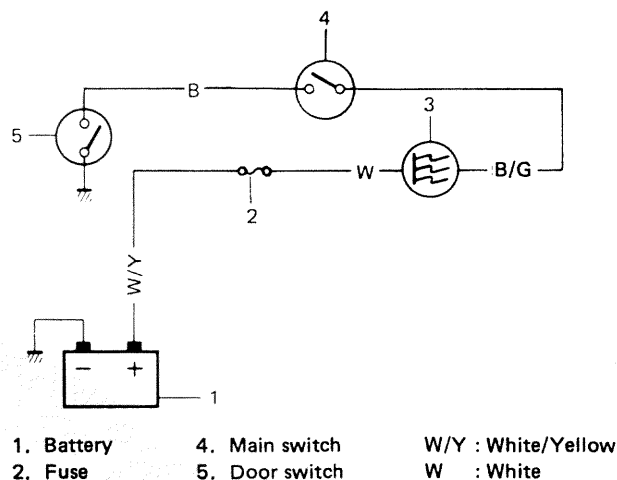


Fig. 21-29

INSPECTION

If the main switch key warning buzzer does not sound, use the above Wiring Diagram as reference to check the buzzer.

21-12. ILLUMINATION CONTROLLER

INSPECTION

Use a test lamp to wire as illustrated below.

Make sure that the illumination controller knob is turned rightwise to brighten the test lamp, leftwise to darken it.

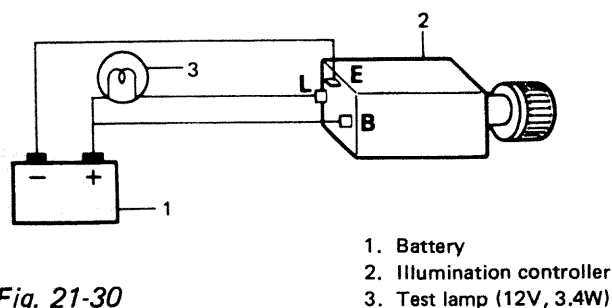


Fig. 21-30

21-13. REAR DEFOGGER (OPTIONAL FOR HARD TOP MODEL)

The Defogger circuit for the rear window glass heating wires is as follows:

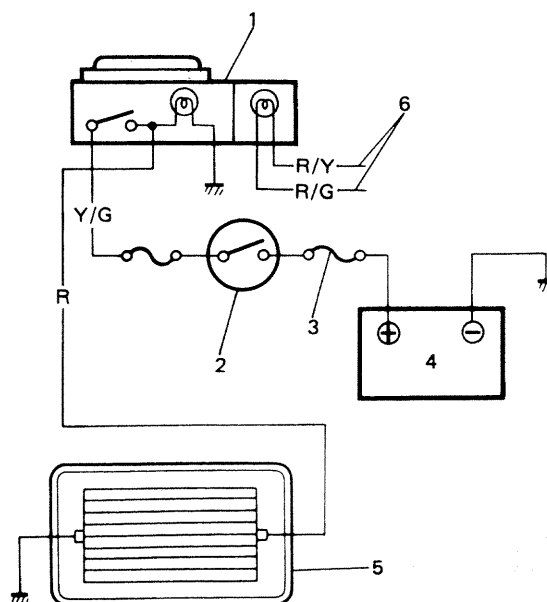


Fig. 21-31

To check function of Defogger Switch, check continuity between Yellow/Green wire and Red wire when Defogger Switch is "ON"

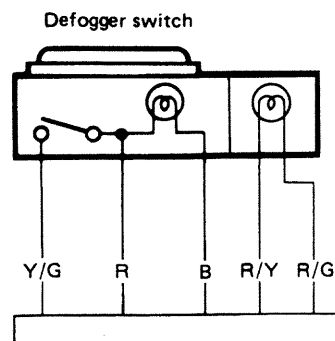


Fig. 21-32

Y/G : Yellow/Green
R : Red
B : Black
R/Y : Red/Yellow
R/G : Red/Green

DEFOGGER WIRE

NOTE:

- When cleaning the rear window glass, use a dry cloth to wipe it along the wire direction.
- When cleaning the glass, do not use detergent or abrasive-containing glass cleaner.
- When measuring wire voltage, use a tester with the negative probe wrapped with a tin foil which should be held down on the wire by finger pressure.

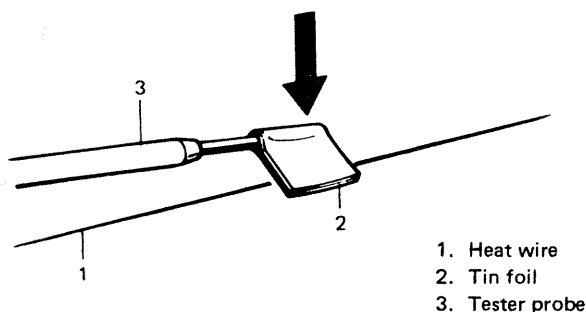


Fig. 21-33

1) Checking wire damage

- Turn the main switch ON.
- Turn the defogger switch ON.
- Use a voltmeter to check the voltage at the center of each heat wire, as illustrated.

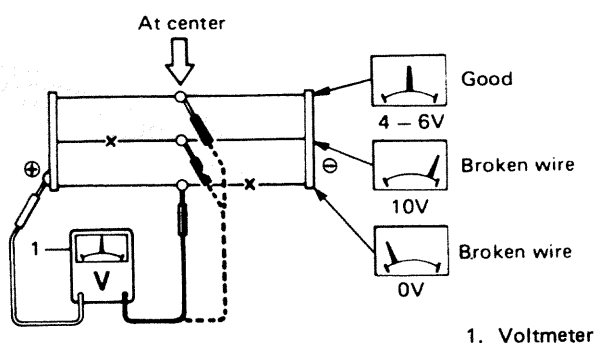


Fig. 21-34

Voltage	Criteria
Approx. 5V	Good (No break in wire)
Approx. 10V or 0V	Broken wire

If the obtained voltage is 10V, the wire must be damaged between its center and positive end. If the voltage is zero, the wire must be damaged between its center and earth.

2) Checking wire for damaged place

- Set the voltmeter positive (+) lead to the heat wire positive terminal end.

- Set the voltmeter negative (−) lead with a foil strip to the heat wire positive terminal end to then move it along the wire to the negative terminal end.
- The place which causes the voltmeter to fluctuate from zero to several volts is a damaged place.

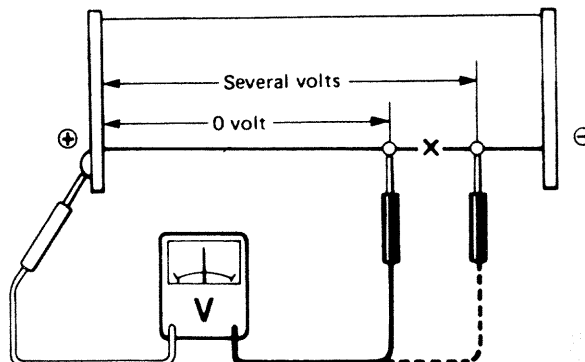


Fig. 21-35

NOTE:

If the heat wire is free from damage, the voltmeter should point 12V at the heat wire positive terminal end with its indication gradually decreased toward zero to thus equal 0V at the other terminal (earth) end.

REPAIR

[Defogger circuit]

- Use white gasoline for cleaning.
- Apply a masking tape at both the upper and lower sides of a heat wire to be repaired.

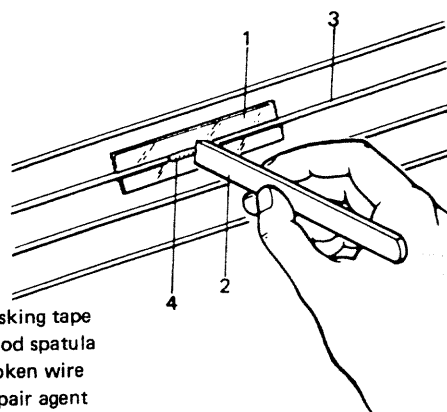
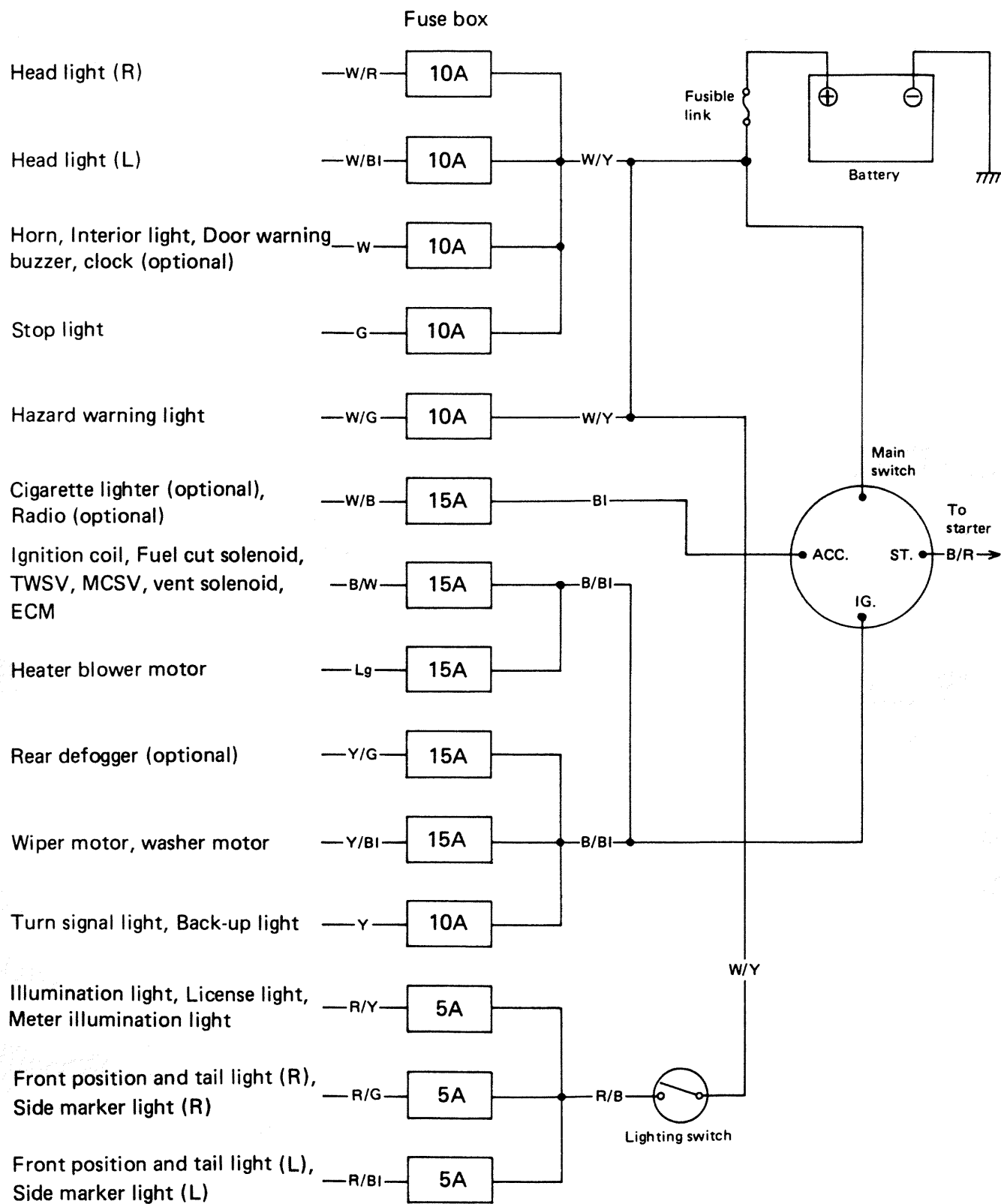


Fig. 21-36

- Apply commercially-available repair agent with a fine-tip brush.
- Two to three minutes later, remove the masking tapes previously applied.
- Leave the repaired heat wire as it is for at least 24 hours before operating the defogger again.

21-14. FUSE BOX

The fuses in the fuse box is wired as follows.

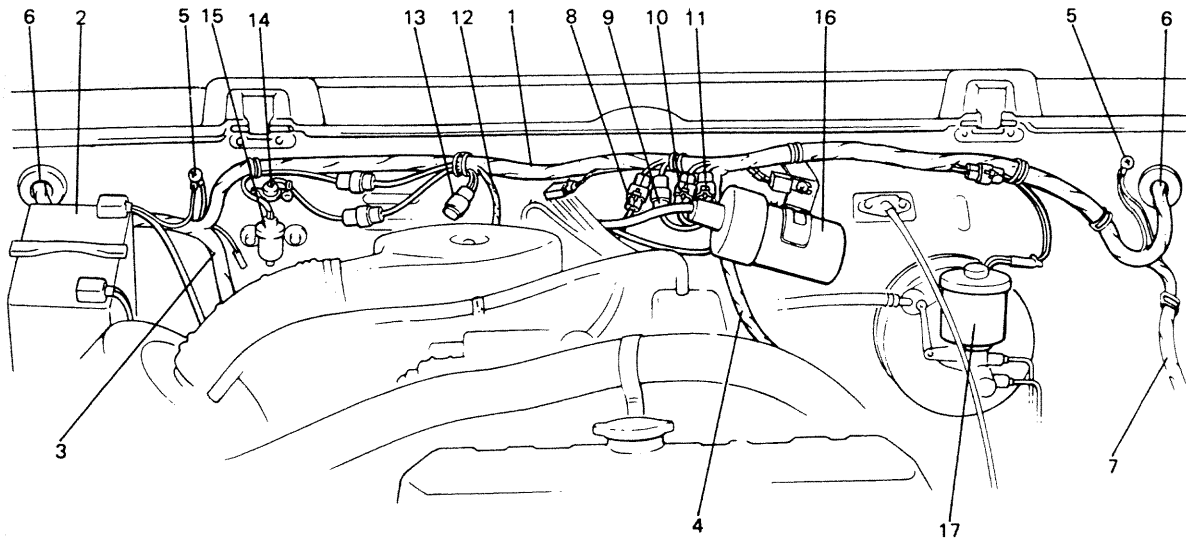


21-15. WIRING HARNESS ROUTING

When reinstalling wire harness, be careful for the following.

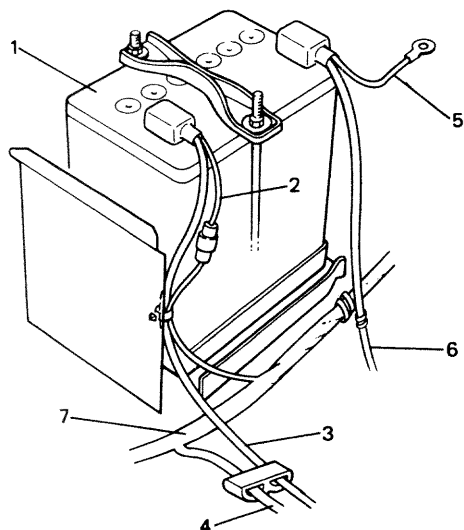
- When doing wiring harness related work, make always sure to disconnect battery negative cable from battery.
- Clamp wire harness securely at prescribed positions.
- Try to route wire harness so as to avoid contact with other parts as much as possible. Use special care not to let it contact sharp edges of body or other parts.
- Connect connectors securely.

Engine Room Wiring

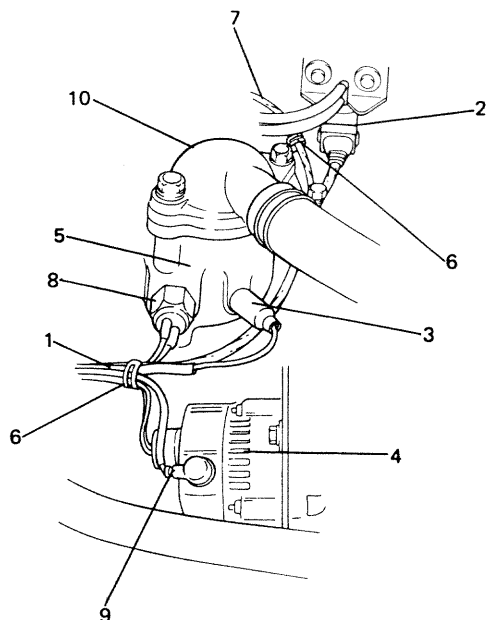


- | | |
|---|--------------------------------|
| 1. Wire harness No. 2 | 12. To TWSV |
| 2. Battery | 13. Duty check coupler |
| 3. To starter, alternator, head light, small light, horn and etc. | 14. Thermal engine room switch |
| 4. To license light, stop/tail light, 4WD switch | 15. HAC |
| 5. Earth | 16. Ignition coil |
| 6. To wiring harness No. 1 | 17. Brake fluid reservoir |
| 7. To head light, small light, etc. | |
| 8. To distributor | |
| 9. To ignition coil | |
| 10. To back up light switch | |
| 11. To fifth switch | |

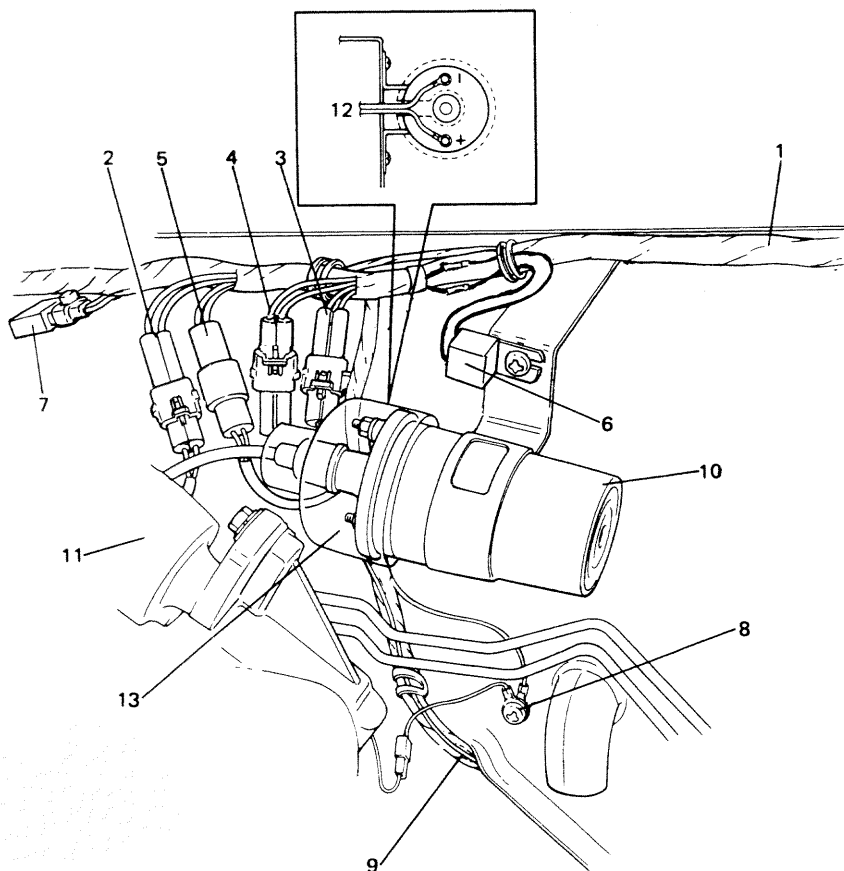
Fig. 21-37



1. Battery
2. Fusible link
3. To starter
4. To starter, alternator, etc
5. Earth
6. Earth (To starter mounting bolt)
7. Wiring harness No. 2

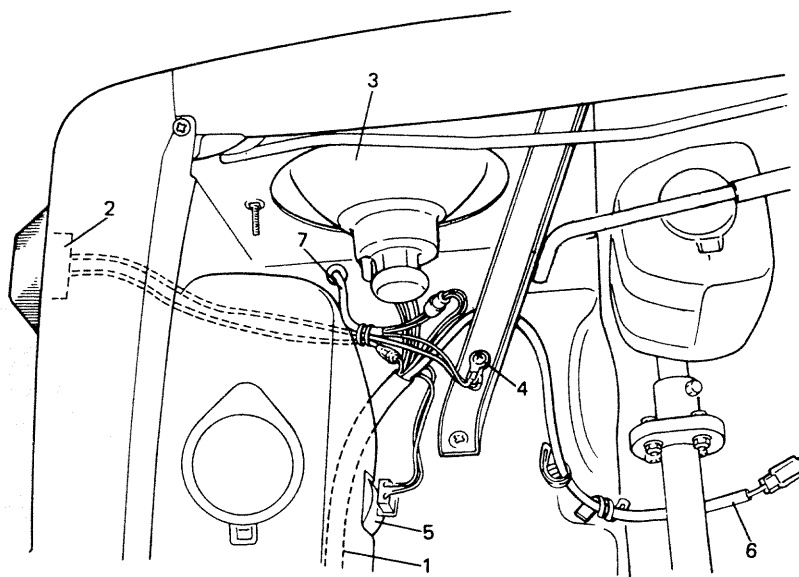


1. From wire harness No. 2
2. TWSV (Three way solenoid valve)
3. Water temperature gauge
4. Alternator
5. Intake manifold
6. Clamp
7. To VSV
8. Thermal switch
9. Mount this terminal horizontally as shown
10. Thermostat cap



1. Wire harness No. 2
2. To distributor
3. To fifth switch
4. To back up light switch
5. To ignition coil
6. Condensor
7. Noise suppressor filter (Clamp it toward engine room so as to prevent it from contacting dash panel edge.)
8. Earth
9. To license light, stop/tail light, 4WD switch
10. Ignition coil
11. Distributor
12. To wire harness No. 2
13. Ignition coil cap

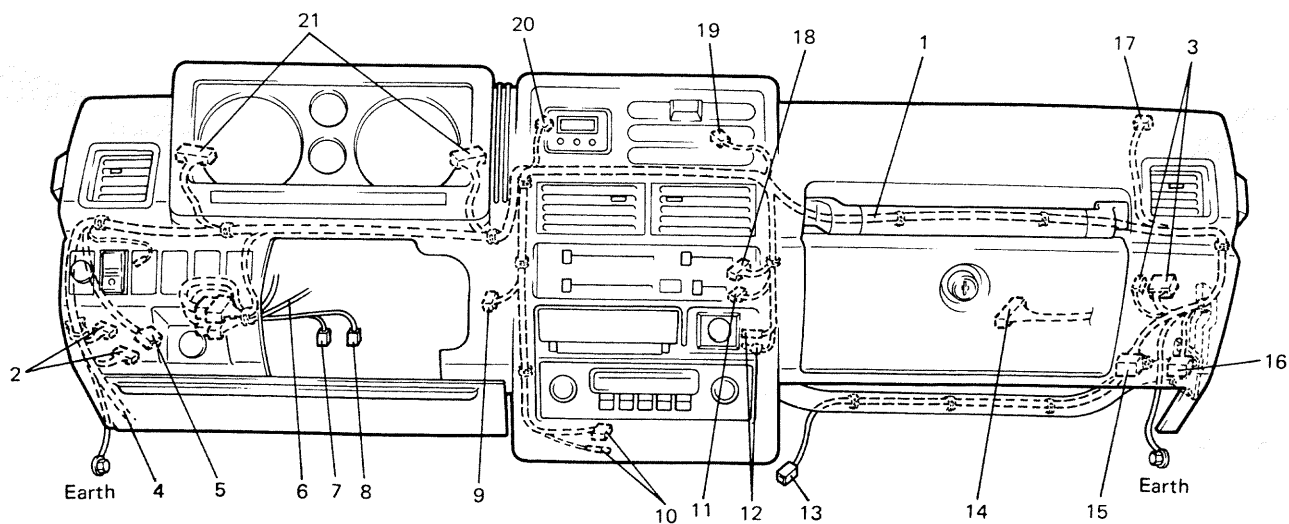
Fig. 21-38



1. Wire harness No. 2
2. Side marker light
3. Head light
4. Earth
5. Washer motor
6. To oil pressure gauge
7. To combination light

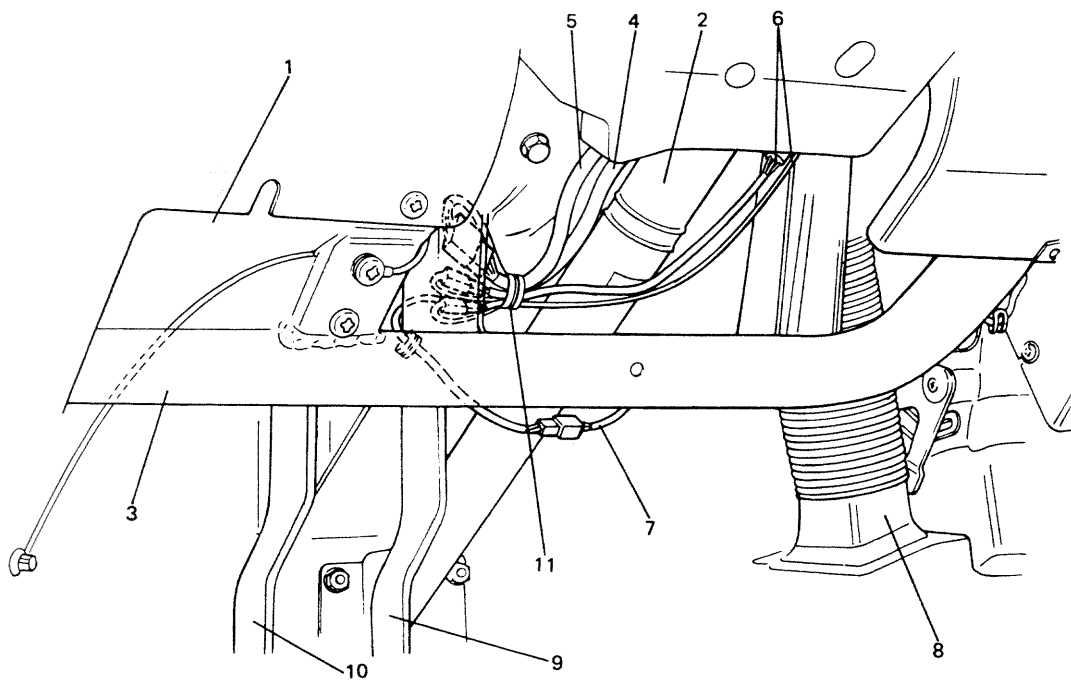
Fig. 21-39

Instrument Panel Wiring



- | | | |
|--------------------------|---------------------------|--------------------------|
| 1. Wire harness No. 1 | 8. To stop lamp switch | 15. Door warning buzzer |
| 2. To wire harness No. 2 | 9. To heater blower motor | 16. Check relay |
| 3. To wire harness No. 2 | 10. To radio | 17. To wiper motor |
| 4. To fuse box | 11. To heater fan switch | 18. To illumination lamp |
| 5. Horn relay | 12. To cigar light | 19. To optional meter |
| 6. To combination switch | 13. To radio | 20. To clock |
| 7. To clutch switch | 14. To ECM | 21. To meter |

Fig. 21-40



- | | |
|---------------------------|--|
| 1. Instrument panel | 8. Defroster hose |
| 2. Steering column | 9. Brake pedal |
| 3. Steering column holder | 10. Clutch pedal |
| 4. Wiring harness No. 1 | 11. Clamp lead wires of ignition switch and combination switch, |
| 5. To combination switch | using care not to allow lead wires to contact the edge of steer- |
| 6. To ignition switch | ing column bracket. |
| 7. To clutch switch | |

Fig. 21-41

21-16. WIRING DIAGRAM

Wiring diagrams are attached at the end of this manual.

SECTION 22

SERVICE DATA

CONTENTS

22-1. SPECIFICATIONS	22-1
22-2. SERVICE DATA	22-4

22-1. SPECIFICATIONS

Item	Models	Convertible/Hard Top
ENGINE		
Type	Four-stroke cycle, water cooled, OHC	
Number of cylinders	4	
Lubrication system	Wet sump	
Bore	74.0 mm (2.91 in.)	
Stroke	77.0 mm (3.03 in.)	
Piston displacement	1,324 cm ³ (1,324 cc, 80.8 cu. in.)	
Compression ratio	8.9 : 1	
Carburetor	HITACHI two-barrel down draft	
Air cleaner	Polyester fiber element (Dry type)	
ELECTRICAL		
Ignition timing	10° B.T.D.C. at 800 r/min (rpm)	
Standard spark plug	NGK BPR-5ES or NIPPON DENSO W16EXR-U	
Starter	Magnetic shift type	
Generator	Alternator	
Battery	12V, 137 kC (38 Ah)/5HR * 12V, 130 kC (36 Ah)/5HR	
Headlight	12V, 60/50W	
Turn signal light	12V, 32 cp	
Clearance light	12V, 4 cp	

* : For Canadian specification vehicle

Item		Models	Convertible/Hard Top
Tail/Brake light			12V, 3/32 cp
Side marker light			12V, 3.8W
License plate light			12V, 4 cp
Back-up light			12V 32 cp
Interior light			12V, 5W
Meter pilot light			12V, 1.4W
Main fuse			0.5 mm ² (fusible link)
Fuse box			10/10/10/10/10/15/15/15/15/15/10/5/5/5A
POWER TRANSMISSION			
Clutch type			Dry, single disc
Transmission type			5-forward all synchromesh, 1 reverse
Final reduction ratio			3.727
Gear ratios	low		3.652
	2nd		1.947
	3rd		1.423
	4th		1.000
	5th		0.864
	reverse		3.466
Transfer gear ratios	low range		2.268
	high range		1.409
Overall reduction ratios:			
Low range	low		30.869
	2nd		16.457
	3rd		12.028
	4th		8.452
	5th		7.303
	reverse		29.297
High range	low		19.177
	2nd		10.224
	3rd		7.472
	4th		5.251
	5th		4.537
	reverse		18.201

Item		Models	Convertible/Hard Top
WHEEL AND SUSPENSION			
Tire size: front and rear		P205/70 R15	
Tire pressure	front	140 kPa (1.40 kg/cm ² , 20 psi)	
	rear	140 kPa (1.40 kg/cm ² , 20 psi)-unladen	
		180 kPa (1.80 kg/cm ² , 26 psi)-laden	
Suspension type	front	Leaf spring	
	rear	Leaf spring	
STEERING			
Turning radius		5.1 m (16.7 ft)	
Steering gear box		Ball nut type	
Toe-in		2 — 6 mm (0.08 — 0.24 in.)	
Camber angle		1° 00'	
Caster angle		3° 30'	
King pin angle		9° 00'	
BRAKE SYSTEM			
Type		4-wheel, hydraulic	
Wheel brake	front	Disc brake (floating caliper type)	
	rear	Drum brake (leading and trailing)	
Parking brake		Mechanical actuated on rear wheels	
CAPACITIES			
Cooling solution		4.8 ℓ (10.1/8.4 US/Imp pt)	
Fuel tank		40ℓ (10.6/8.8 US/Imp gal)	
Engine oil		3.5 ℓ (7.4/6.2 US/Imp pt)	
Transmission oil		1.3 ℓ (2.7/2.3 US/Imp pt)	
Differential gear box oil	front	2.0 ℓ (4.2/3.5 US/Imp pt)	
	rear	1.5 ℓ (3.2/2.6 US/Imp pt)	
Transfer gear box oil		0.8 ℓ (1.7/1.4 US/Imp pt)	

22-2. SERVICE DATA

ENGINE

Item			Standard		Service Limit	
Compression pressure			14.0 kg/cm ² (199.0 psi)/400 r/min (rpm)		12.0 kg/cm ² (170.0 psi)/400 r/min (rpm)	
	Difference between cylinders		_____		1.0 kg/cm ² (14.2 psi)/400 r/min (rpm)	
Valve lash (clearance)	Cold (When coolant temperature is 15 ~ 25°C or 59 ~ 77°F)	Inlet	0.13 ~ 0.17 mm (0.0051 ~ 0.0067 in.)		_____	
		Exhaust	0.16 ~ 0.20 mm (0.0063 ~ 0.0079 in.)		_____	
	Hot (When coolant temperature is 60 ~ 68°C or 140 ~ 154°F)	Inlet	0.23 ~ 0.27 mm (0.009 ~ 0.011 in.)		_____	
		Exhaust	0.26 ~ 0.30 mm (0.0102 ~ 0.0118 in.)		_____	
Cylinder head	Flatness of gasketed surface		_____		0.05 mm (0.002 in.)	
	Flatness of manifold seat	Inlet	_____		0.1 mm (0.004 in.)	
		Exhaust	_____		0.1 mm (0.004 in.)	
	Valve seat	Seating width	Inlet	1.3 ~ 1.5 mm (0.0512 ~ 0.0590 in.)	_____	
			Exhaust	1.3 ~ 1.5 mm (0.0512 ~ 0.0590 in.)	_____	
	Seating angle		45°		_____	
Valve guide hole diameter (In & Ex) (over size)			12.030 ~ 12.048 mm (0.4736 ~ 0.4743 in.)		_____	
Valve, valve spring & cam shaft	Camshaft/Journal clearance		0.050 ~ 0.091 mm (0.0020 ~ 0.0036 in.)		0.15 mm (0.0059 in.)	
	Camshaft thrust clearance		_____		0.75 mm (0.0295 in.)	
	Cam height (Base circle + lift)	Inlet	37.500 mm (1.4763 in.)		37.400 mm (1.4724 in.)	
		Exhaust	37.500 mm (1.4763 in.)		37.400 mm (1.4724 in.)	
		Fuel pump cam	40.000 mm (1.5748 in.)		39.600 mm (1.5590 in.)	
	Camshaft runout		_____		0.10 mm (0.0039 in.)	
	Valve stem diameter	Inlet	6.965 ~ 6.980 mm (0.2742 ~ 0.2748 in.)		_____	
		Exhaust	6.950 ~ 6.965 mm (0.2737 ~ 0.2742 in.)		_____	
	Valve guide I.D.	Inlet	7.000 ~ 7.015 mm (0.2756 ~ 0.2761 in.)		_____	
		Exhaust	7.000 ~ 7.015 mm (0.2756 ~ 0.2761 in.)		_____	
	Valve guide-to-valve stem clearance	Inlet	0.020 ~ 0.050 mm (0.0008 ~ 0.0019 in.)		0.07 mm (0.0027 in.)	
		Exhaust	0.035 ~ 0.065 mm (0.0014 ~ 0.0025 in.)		0.09 mm (0.0035 in.)	
	Thickness of valve head periphery	Inlet	1.0 mm (0.039 in.)		0.6 mm (0.0236 in.)	
		Exhaust	1.0 mm (0.039 in.)		0.7 mm (0.0275 in.)	
	Contact width of valve and valve seat	Inlet	1.3 ~ 1.5 mm (0.0512 ~ 0.0590 in.)		_____	
		Exhaust	1.3 ~ 1.5 mm (0.0512 ~ 0.0590 in.)		_____	
	Valve spring free length	Inlet	49.3 mm (1.9409 in.)		48.1 mm (1.8937 in.)	
Exhaust		49.3 mm (1.9409 in.)		48.1 mm (1.8937 in.)		
Valve spring preload	Inlet	24.8 ~ 29.2 kg (54.7 ~ 64.3 lb) for fitting length 41.5 mm (1.63 in.)		22.8 kg (50.2 lb) for fitting length 41.5 mm (1.63 in.)		
	Exhaust	24.8 ~ 29.2 kg (54.7 ~ 64.3 lb) for fitting length 41.5 mm (1.63 in.)		22.8 kg (50.2 lb) for fitting length 41.5 mm (1.63 in.)		

Item			Standard	Service Limit	
Valve, valve spring & cam shaft	Valve stem end deflection	Inlet	_____	0.14 mm	(0.005 in.)
		Exhaust	_____	0.18 mm	(0.007 in.)
	Stock allowance of valve stem end face		_____	0.5 mm	(0.019 in.)
	Valve head radial runout		_____	0.08 mm	(0.003 in.)
	Valve spring squareness		_____	2.0 mm	(0.079 in.)
	Valve guide protrusion (In. & Ex.)		14 mm (0.55 in.)	_____	
Rocker arm shaft and rocker arm	Rocker shaft O.D.		15.973 ~ 15.988 mm (0.628 ~ 0.629 in.)	_____	
	Rocker arm I.D.		16.000 ~ 16.018 mm (0.629 ~ 0.630 in.)	_____	
	Shaft-to-arm clearance	Inlet	0.012 ~ 0.045 mm (0.0005 ~ 0.0017 in.)	0.09 mm	(0.0035 in.)
		Exhaust	0.012 ~ 0.045 mm (0.0005 ~ 0.0017 in.)	0.09 mm	(0.0035 in.)
Cylinder	Rocker shaft runout		_____	0.12 mm	(0.004 in.)
	Flatness of gasketed surface		0.03 mm (0.0012 in.)	0.06 mm	(0.0024 in.)
	Cylinder bore (S.T.D.)		74.00 ~ 74.02 mm (2.9134 ~ 2.9142 in.)	74.15 mm	(2.9193 in.)
	Cylinder bore out-of-round and taper		_____	0.10 mm	(0.0039 in.)
Piston	Cylinder-to-piston clearance		0.02 ~ 0.04 mm (0.0008 ~ 0.0015 in.)	_____	
	Piston diameter	Standard	73.970 ~ 73.990 mm (2.9122 ~ 2.9129 in.)	_____	
		Oversize: 0.25 mm (0.0098 in.)	74.220 ~ 74.230 mm (2.9220 ~ 2.9224 in.)	_____	
		Over size: 0.50 mm (0.0196 in.)	74.470 ~ 74.480 mm (2.9319 ~ 2.9322 in.)	_____	
	Piston ring groove width	Top ring	1.22 ~ 1.24 mm (0.0480 ~ 0.0488 in.)	_____	
		2nd ring	1.51 ~ 1.53 mm (0.0594 ~ 0.0602 in.)	_____	
		Oil ring	2.81 ~ 2.83 mm (0.1106 ~ 0.1114 in.)	_____	
Piston ring	Piston pin diameter		16.995 ~ 17.000 mm (0.6691 ~ 0.6693 in.)	_____	
	Piston ring thickness	Top ring	1.17 ~ 1.19 mm (0.0461 ~ 0.0468 in.)	_____	
		2nd ring	1.47 ~ 1.49 mm (0.0578 ~ 0.0586 in.)	_____	
		Oil ring	0.45 mm (0.0177 in.)	_____	
	Ring clearance in groove	Top ring	0.03 ~ 0.07 mm (0.0012 ~ 0.0027 in.)	0.12 mm	(0.0047 in.)
		2nd ring	0.02 ~ 0.06 mm (0.0008 ~ 0.0023 in.)	0.10 mm	(0.0039 in.)
	Piston ring end gap	Top ring	0.20 ~ 0.33 mm (0.0079 ~ 0.0129 in.)	0.7 mm	(0.0275 in.)
		2nd ring	0.20 ~ 0.35 mm (0.0079 ~ 0.0137 in.)	0.7 mm	(0.0275 in.)
		Oil ring	0.20 ~ 0.70 mm (0.0079 ~ 0.0275 in.)	1.8 mm	(0.0708 in.)
Crank shaft	Crankshaft runout (middle)		_____	0.06 mm	(0.0023 in.)
	Crank pin diameter		41.982 ~ 42.000 mm (1.6529 ~ 1.6535 in.)	_____	
	Crank pin clearance in con. rod		0.030 ~ 0.050 mm (0.0012 ~ 0.0019 in.)	0.08 mm	(0.0031 in.)
	Connecting rod small end bore		16.968 ~ 16.979 mm (0.6680 ~ 0.6684 in.)	_____	
	Crank journal diameter		44.982 ~ 45.000 mm (1.7710 ~ 1.7716 in.)	_____	
	Bearing-to-journal clearance		0.020 ~ 0.040 mm (0.0008 ~ 0.0016 in.)	0.06 mm	(0.0023 in.)
	Crank pin out-of-round and taper		_____	0.01 mm	(0.0004 in.)

Item			Standard		Service Limit	
Crankshaft	Crank journal out-of-round and taper		_____		0.01 mm	(0.0004 in.)
	Flywheel runout		_____		0.2 mm	(0.0078 in.)
	Crankshaft thrust play		0.11 — 0.31 mm	(0.0044 ~ 0.0122 in.)	0.38 mm	(0.0149 in.)
	Connecting rod big end side clearance		0.10 ~ 0.20 mm	(0.0039 ~ 0.0078 in.)	0.35 mm	(0.0137 in.)
	Connecting rod	Twist	_____		0.10 mm	(0.0039 in.)
		Bow	_____		0.05 mm	(0.0020 in.)

CLUTCH & TRANSMISSION

Item			Standard		Service Limit	
Clutch	Pedal free travel		20 ~ 30 mm	(0.8 ~ 1.1 in.)	_____	
	Facing wear (Rivet head depth)		1.2 mm	(0.05 in.)	0.5 mm	(0.02 in.)
	Facing-input shaft serration backlash		_____		0.8 mm	(0.03 in.)
	Clutch release arm play		2 ~ 4 mm	(0.08 ~ 0.16 in.)	_____	
Transmission	Clearance between gears and rings	Low & high	1.0 ~ 1.4 mm	(0.039 ~ 0.055 in.)	0.5 mm	(0.019 in.)
		5th speed	1.2 ~ 1.6 mm	(0.047 ~ 0.063 in.)	0.5 mm	(0.019 in.)
	Key slot width of synchronizer ring		10.1 mm	(0.397 in.)	10.4 mm	(0.409 in.)
	Gear shift fork shaft spring free length		25.5 mm	(1.004 in.)	21.0 mm	(0.826 in.)
	Gear backlash		0.06 ~ 0.15 mm	(0.0024 ~ 0.0059 in.)	0.3 mm	(0.0118 in.)

LUBRICATION

Item			Standard		Service Limit	
Lubrication	Radial clearance between outer rotor and case		_____		0.310 mm	(0.0122 in.)
	Oil pump side clearance (flatness)		_____		0.15 mm	(0.0059 in.)
	Oil relief valve spring	Free length	45 mm	(1.77 in.)	_____	
	Set pressure of oil pressure switch		0.2 ~ 0.4 kg/cm ²	(2.84 ~ 5.68 psi)	_____	
	Engine oil pressure		3.0 ~ 4.2 kg/cm ² (42.7 ~ 59.7 psi) at 3,000 r/min (rpm)		_____	

COOLING SYSTEM

Item		Standard	Service Limit
Cooling system	Fan belt tension as deflection under 10 kg (22 lb) push applied to middle point between pulleys	6 ~ 9 mm (0.23 ~ 0.35 in.)	_____
	Thermostat start-to-open temperature	*82°C (179°F) or 88°C (190°F)	_____
	Thermostat full-open temperature	*95°C (203°F) or 100°C (212°F)	_____
	Valve lift	8 mm (0.31 in.)	_____

* There are two types of thermostat depending on specifications.

DIFFERENTIAL

Item		Standard	Service Limit
Differential	Bevel gear backlash	0.10 ~ 0.15 mm (0.004 ~ 0.006 in.)	_____
	Side gear thrust play	0.12 ~ 0.37 mm (0.005 ~ 0.014 in.)	_____
	Pinion bearing preload	1.8 ~ 3.4 kg (4.0 ~ 7.5 lbs.)	_____

SUSPENSION

Item		Standard	Service Limit
Suspension	Front wheel bearing starting preload	1.0 ~ 3.0 kg (2.2 ~ 6.6 lbs.)	_____
	Rear wheel bearing thrust play	_____	0.8 mm (0.03 in.)
	Axial play in barfield joint	0 mm (No play)	1.5 mm (0.06 in.)
	Knackle arm starting torque (without oil seal)	1.0 ~ 1.8 kg (2.20 ~ 3.96 lbs.)	_____

CARBURETOR

Item		Standard	Limit
Engine idle speed		800 ± 50 r/min (rpm)	_____
Engine idle speed when turning head light "ON"		950 ± 50 r/min (rpm)	_____
Float level	Float height	8 mm (0.31 in.)	_____
Accelerator cable play	When engine is cold	10 ~ 15 mm (0.4 ~ 0.6 in.)	_____
	When engine is hot	3 ~ 5 mm (0.12 ~ 0.20 in.)	_____

STEERING SYSTEM

Item	Standard	Service Limit
Gear ratio	15.6 ~ 18.1	_____
Steering angle, inside	29°	_____
Steering angle, outside	26°	_____
Steering wheel play	10 ~ 30 mm (0.4 ~ 1.2 in.)	_____

BRAKE

Item	Standard	Service Limit
Front brake disc thickness	10 mm (0.394 in.)	8.5 mm (0.334 in.)
Front brake disc deflection	_____	0.15 mm (0.006 in.)
Front brake pad thickness (lining + pad rim)	15.0 mm (0.590 in.)	6.0 mm (0.236 in.)
Rear brake lining thickness (lining + shoe rim)	7.0 mm (0.28 in.)	3.0 mm (0.12 in.)
Rear brake drum inside diameter	220 mm (8.66 in.)	222 mm (8.74 in.)
Pedal-to-wall clearance: When pedal is depressed at 30 kg (66 lb)	75 mm (2.95 in.) minimum	_____

ELECTRICAL

	Item	Standard	Service Limit
Ignition system	Ignition order	1 – 3 – 4 – 2	_____
	Signal rotor air gap	0.2 ~ 0.4 mm (0.008 ~ 0.016 in.)	_____
	Generator resistance	130 ~ 190 ohms	_____
	High tension cord resistance	16 kΩ/3.3 ft (1 m)	20 kΩ/pc
	Ignition coil; Primary coil resistance (20°C)	1.35 ~ 1.65 ohms	_____
	Ignition coil; Secondary coil resistance (20°C)	11.0 ~ 14.5 kilohms	_____
	Spark plug gap	0.7 ~ 0.8 mm (0.027 ~ 0.031 in.)	_____

Item		Standard	Service Limit
Starter motor	Voltage	12 Volts	_____
	Output	0.9 kw	_____
	Rating	30 seconds	_____
	Brush length	17 mm (0.67 in.)	11.5 mm (0.45 in.)
	Number of pinion teeth	8	_____
	Commutator diameter	32 mm (1.26 in.)	31 mm (1.22 in.)
	Mica depth	0.4 ~ 0.6 mm (0.015 ~ 0.023 in.)	0.2 mm (0.008 in.)
	Commutator out of round	0.05 mm (0.0019 in.) or less	0.4 mm (0.015 in.)
	Brush spring tension	1.6 kg (3.53 lb)	1.0 kg (2.20 lb)
Charging system	Nominal operating voltage	12 Volts	_____
	Maximum alternator output	45A	_____
	Maximum permissible alternator speed	15,000 r/min (rpm)	_____
	Working temperature range	-30 ~ 90°C (-22 ~ 194°F)	_____
	Rotor; Ring-to-ring circuit resistance	2.8 ~ 3.0 ohms	_____
	Brush length	11.0 mm (0.43 in.)	5.0 mm (0.20 in.)
	Standard output voltage and current	14.2 ~ 14.8 Volts, 10A maximum	_____
	Regulated voltage	14.2 ~ 14.8 Volts	_____