

SECTION 17

SUSPENSION

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NOTE:

- All suspension fasteners are an important attaching part in that it 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.
- Never attempt to heat, quench or straighten any suspension part. Replace it with a new part, or damage to the part may result.
- The leaf spring number or shape shown in this manual may differ from the car being actually serviced, depending on specification.

17-1. FRONT SUSPENSION

GENERAL DESCRIPTION

The front suspension consists of the double-acting shock absorbers, stabilizer bar, semi-elliptical leaf springs, axle housing, etc. as shown below.

The Barfield universal joints are used in the front axle to enable the axle shafts to drive the front wheels while allowing the wheels to be steered. This type of joint provides for a larger steering angle range and, what is more important, constant-velocity drive to the wheel.

If a single two-yoke (or Hooke's) universal joint is used to connect the live axle shaft to the wheel on each side of the front end, the wheels will run with the same speed, but not with the same constant velocity, as that of the axle shafts when the wheels are turned around their kingpins for steering action. The barfield joint transmits drive without varying the angular velocity of drive.

The Barfield joint is enclosed by the knuckle, which is shaped integral with the knuckle arm, and has a two-piece kingpin, namely, upper and lower kingpins.

The end of the dead axle sleeve is in the shape of dish. This dish is rotatably fitted into the knuckle structure to form a flexible connection, the sliding clearance between the two being sealed with a felt packing (against road dust and mud) and also with an oil seal (against the oil inside). The upper and lower kingpins, bolted to the knuckle extend into the knuckle and, inside, are held by the dish-like inner case through tapered roller bearings.

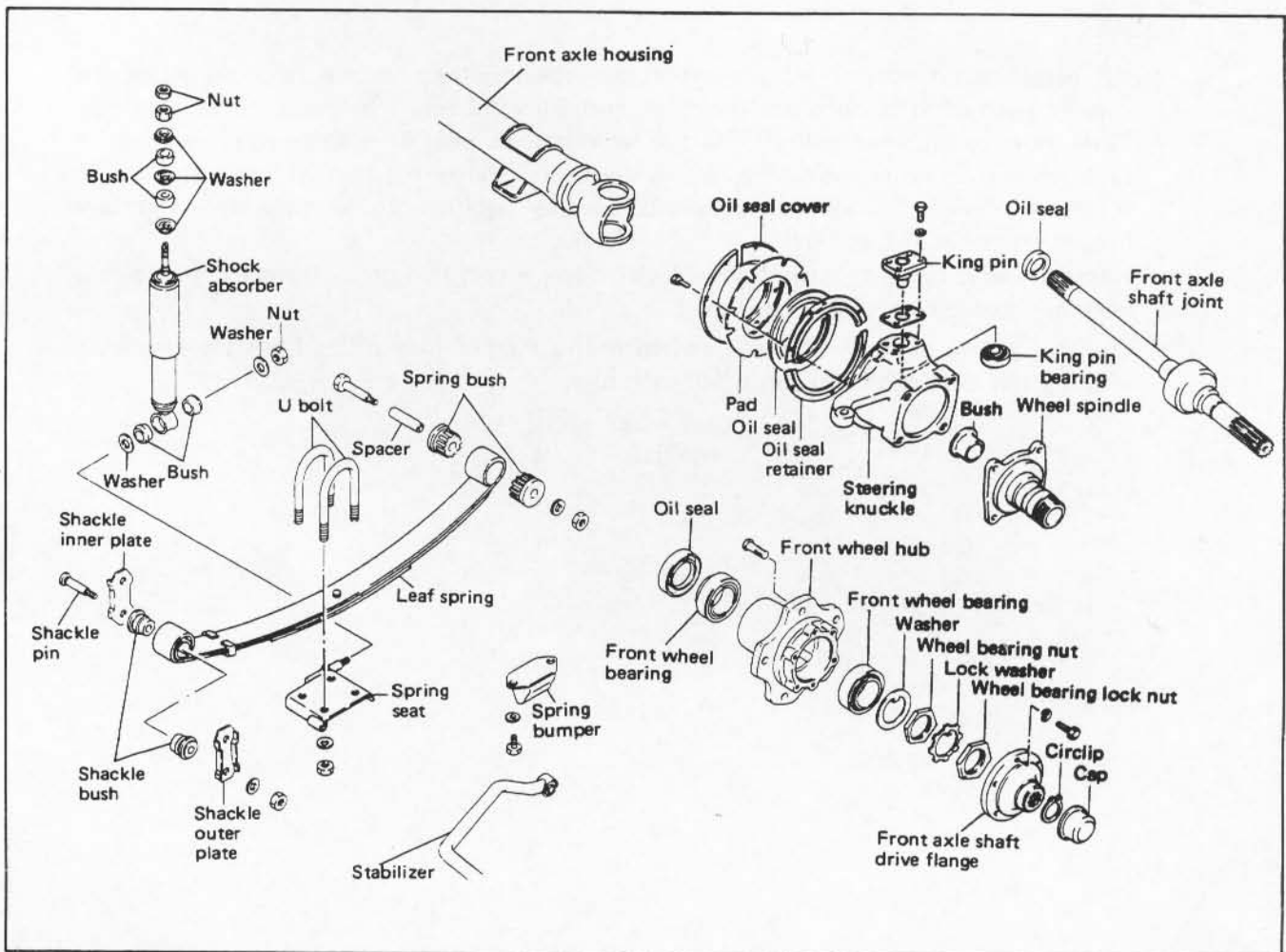
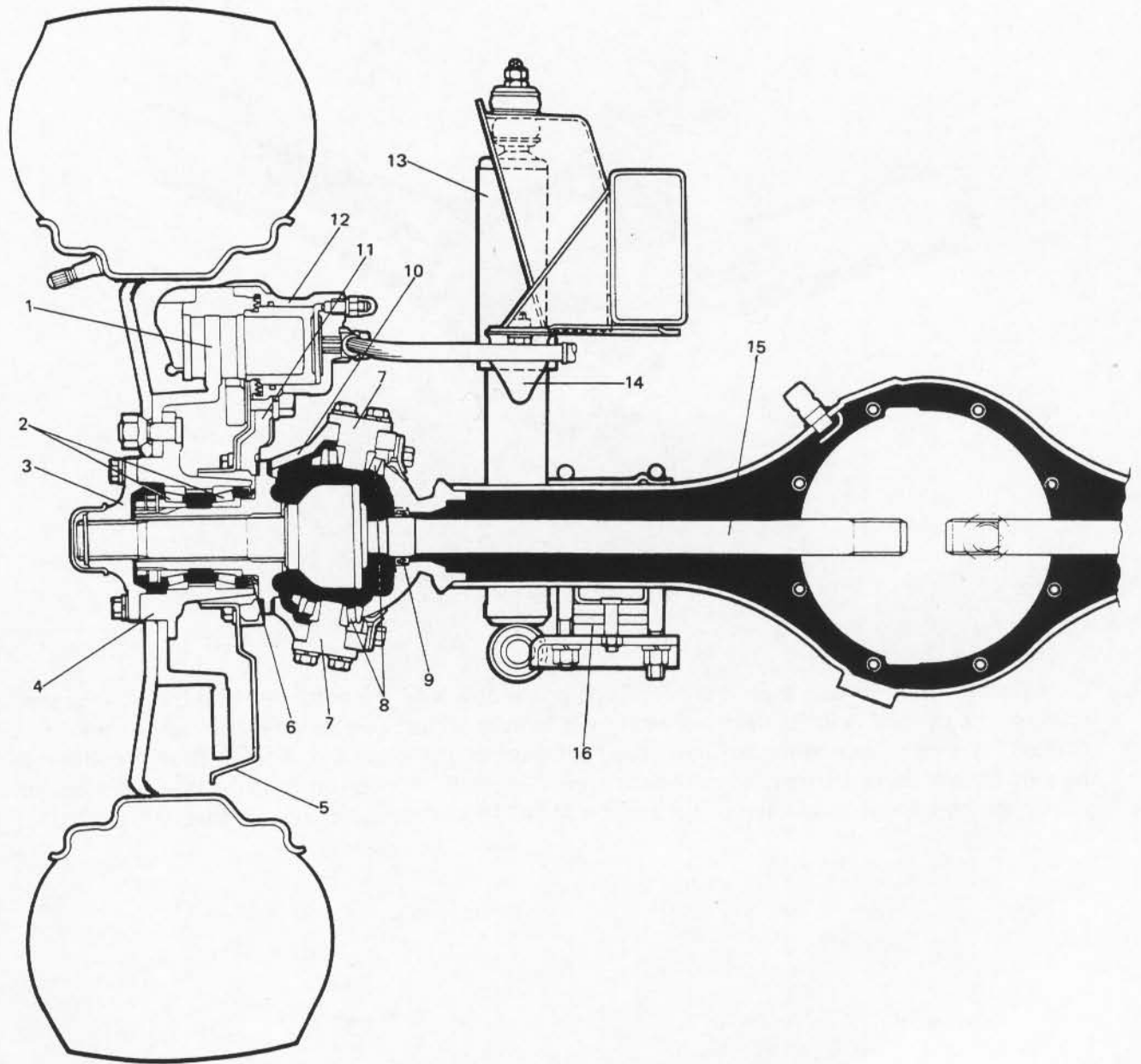


Fig. 17-1-1



- | | |
|----------------------------|------------------------|
| 1. Front brake disc | 9. Oil seal |
| 2. Wheel bearing | 10. Steering knuckle |
| 3. Axle shaft drive flange | 11. Disc brake holder |
| 4. Wheel hub | 12. Disc brake caliper |
| 5. Dust cover | 13. Shock absorber |
| 6. Oil seal | 14. Spring bumper |
| 7. King pin | 15. Axle shaft joint |
| 8. King pin bearing | 16. Leaf spring |

Fig. 17-1-2

BARFIELD JOINT CONSTRUCTION AND OPERATION

The major parts of the Barfield joint are the outer race (integral with wheel spindle, to which the wheel disc is splined), inner race (splined to the live axle shaft), six steel balls disposed between the two races, and cage (holding the steel balls in a single row lying in a plane).

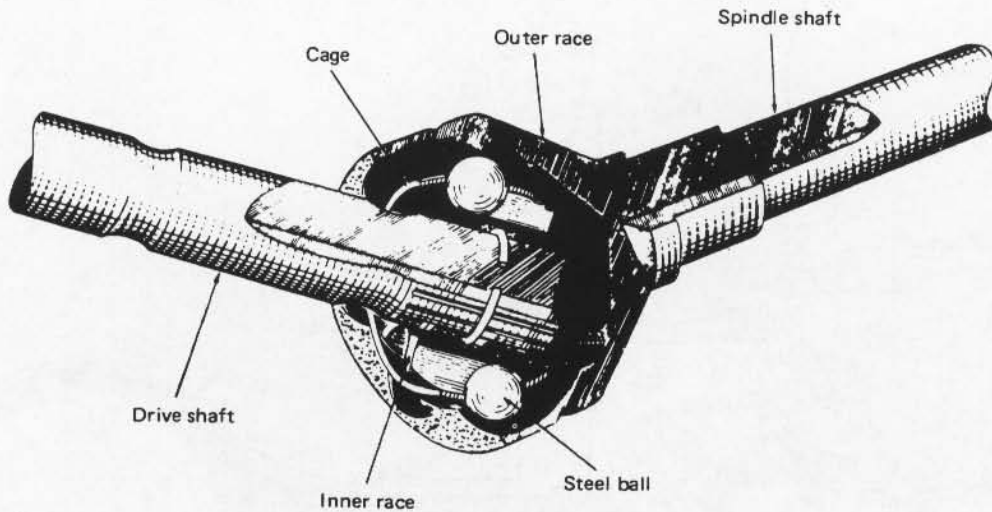


Fig. 17-1-3

The balls are fitted in two groups of raceways; one group is on the outer race and the other group on the inner race. Each ball is in its own raceways as if it were locked between the two races in the direction of rotation. The outer race with its wheel spindle is capable of angling and, when it so angles with respect to the axis of axle shaft, the row of steel balls angles just half as much, that is, the plane including this row tilts by an angle equal to one-half of the spindle angle. This relationship is illustrated in Fig. 17-1-4.

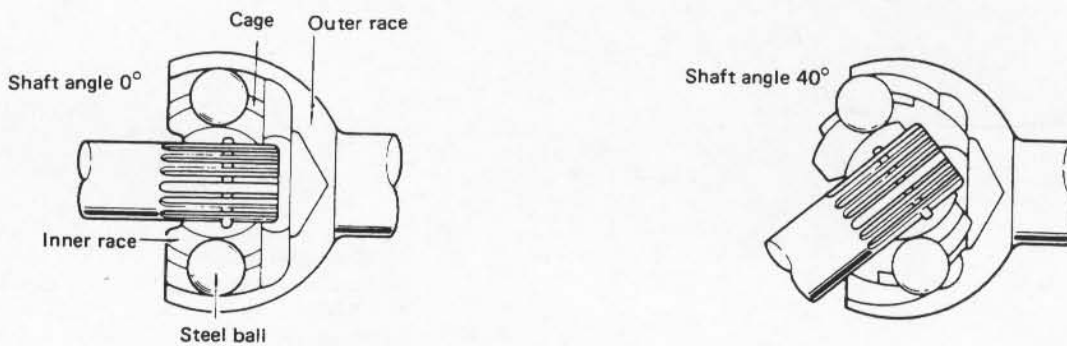


Fig. 17-1-4

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 fluid.

1. Hoist car.
2. Loosen lower and upper mounting nuts and remove shock absorber.

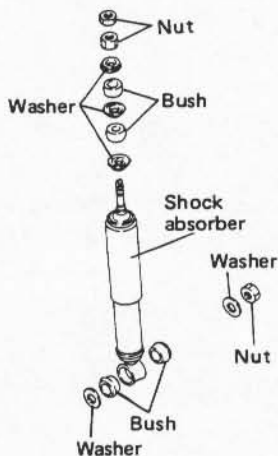


Fig. 17-1-5

Leaf Spring

1. Raise car. In this operation, garage jack or hoist must not be positioned against front suspension related parts. When garage jack is used, place safety stands under chassis to support raised body.
2. Remove front wheel.
3. Remove stabilizer bolt.
4. Remove U-bolt nuts.
5. Remove shackle nuts and leaf spring nut.

NOTE:

Removal of leaf spring causes axle housing to hang. Support it with safety stand to prevent it from damaging universal joint of propeller shaft and others.

6. Pull out leaf spring bolt and remove leaf spring from shackle pin.

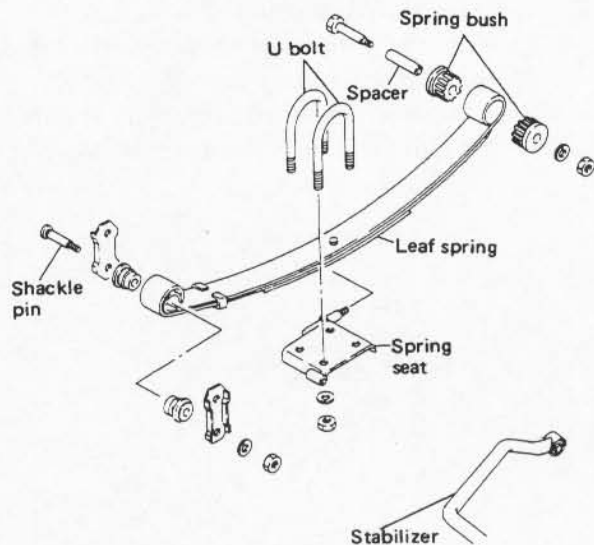
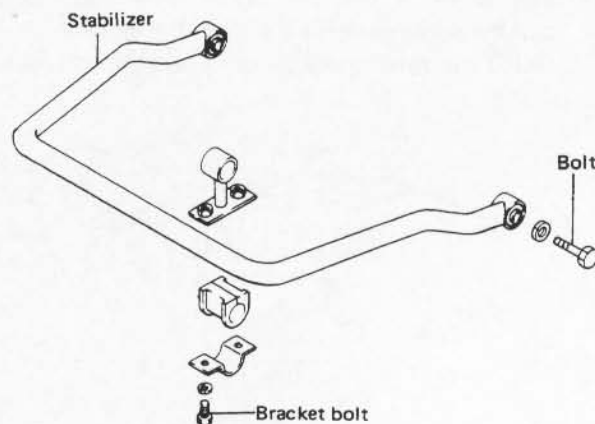


Fig. 17-1-6

Stabilizer

1. Hoist car.
2. Remove stabilizer bolts.
3. After removing stabilizer mount bush bracket bolts, remove stabilizer.



Front Wheel Hub & Bearing

1. Loosen the five nuts securing the wheel.
Raise the front end by jacking.
Rest the machine steady on safety stands.
2. Remove the five nuts and take off the wheel.

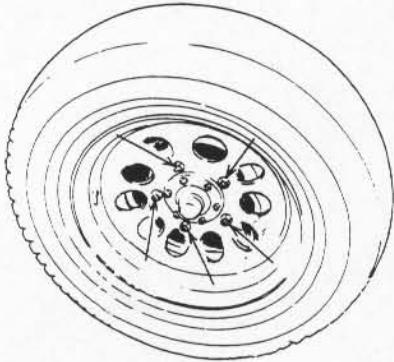


Fig. 17-1-8

3. Remove the caliper with mounting by loosening caliper mounting bolts.

NOTE:

Hang removed caliper with a wire hook or the like so as to prevent brake hose from bending and twisting excessively or being pulled.
Don't operate brake pedal with caliper removed.

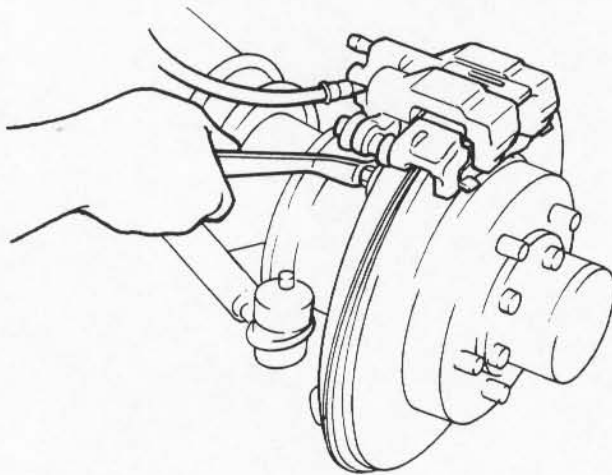


Fig. 17-1-9

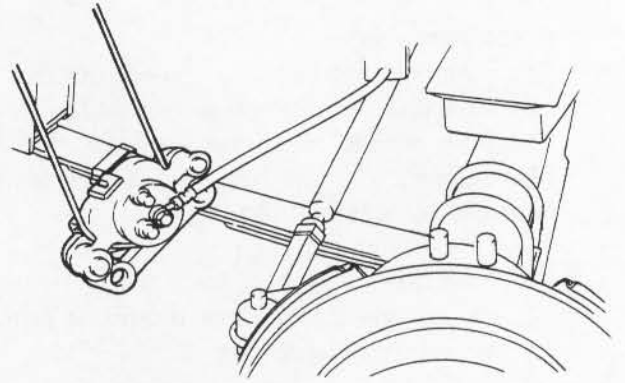


Fig. 17-1-10

4. Remove brake disc.

NOTE:

If brake disc can not be removed by hand, use 8 mm bolts as shown below.

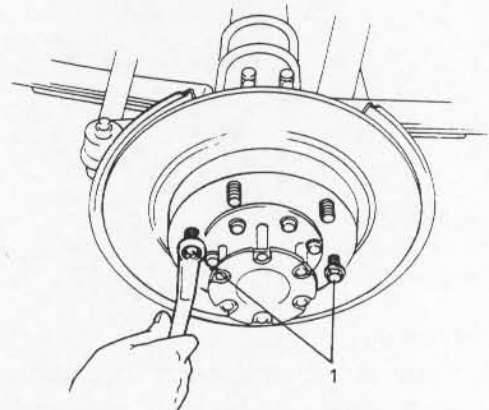


Fig. 17-1-11 1. 8 mm bolt

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).

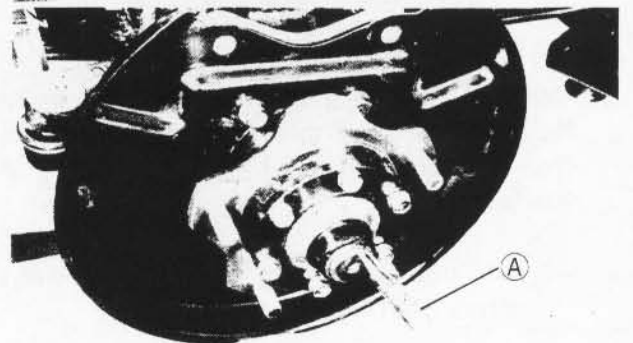


Fig. 17-1-12 (A) Circlip Remover (09900-06107)

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

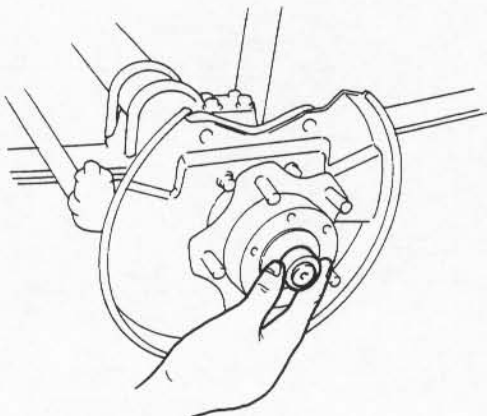


Fig. 17-1-13

8. Straighten bent part of lock washer and remove wheel bearing lock nut with special tool ②.

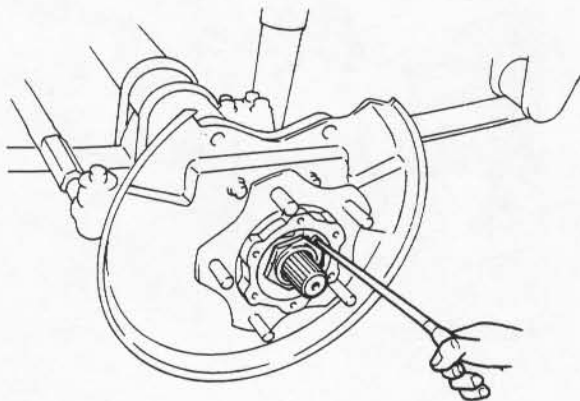


Fig. 17-1-14

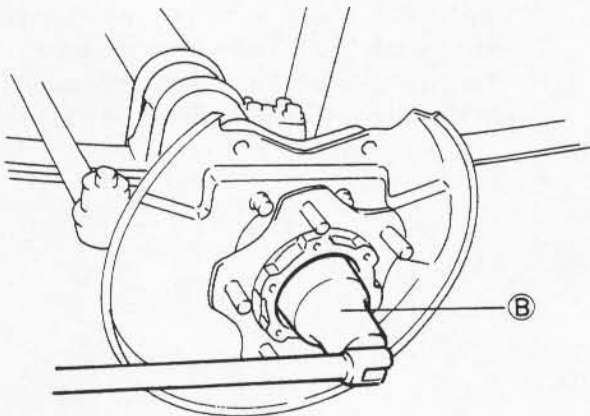


Fig. 17-1-15 Special tool ②
(Front Wheel Bearing Nut Socket
Wrench 09941-58010)

9. After loosening front wheel bearing nut with the same special tool ② as mentioned in the foregoing step 8, take nut and washer off the front wheel spindle.

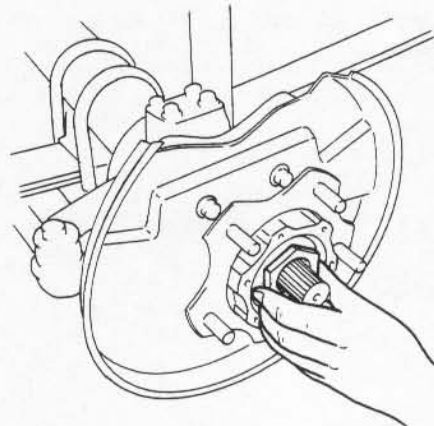


Fig. 17-1-16

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

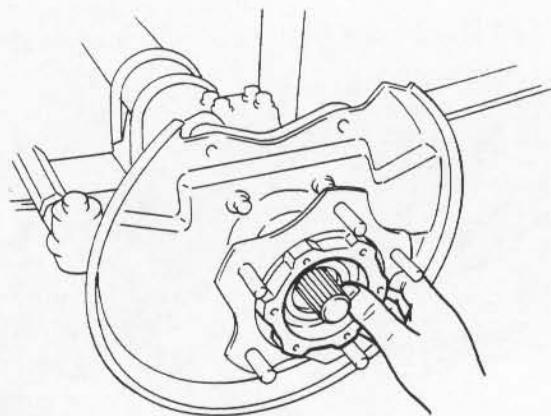


Fig. 17-1-17

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

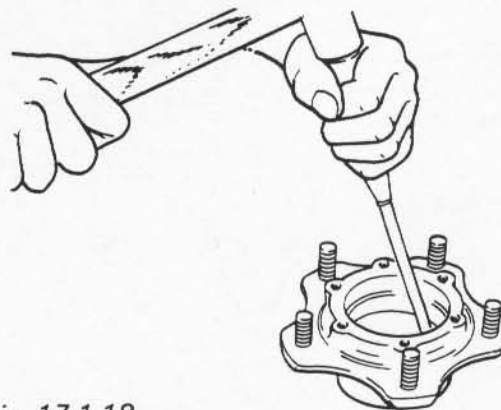


Fig. 17-1-18

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.

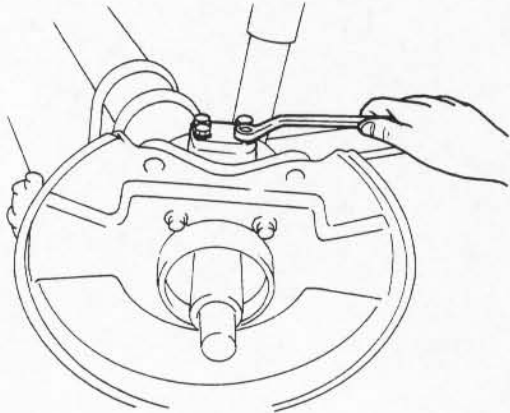


Fig. 17-1-19

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

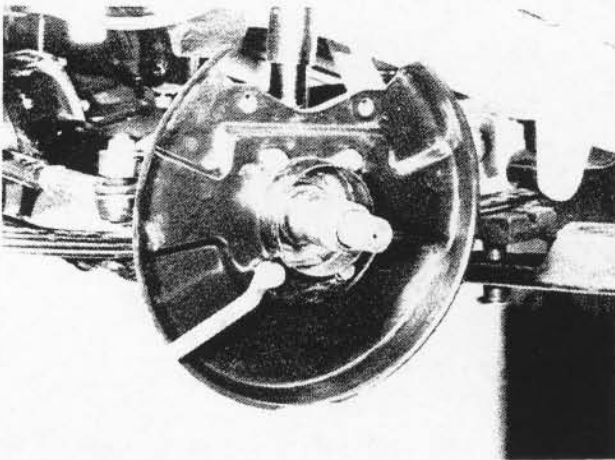


Fig. 17-1-20

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

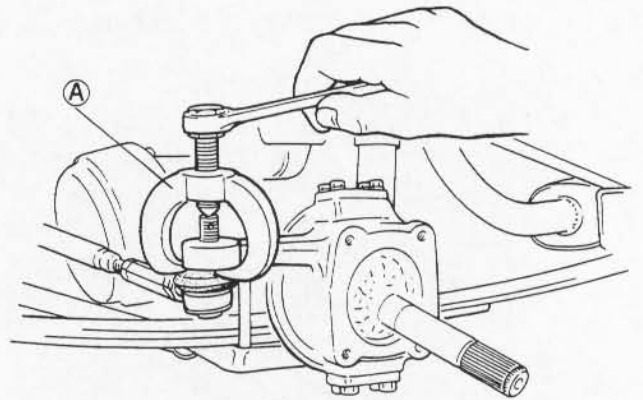


Fig. 17-1-21 Special tool (A) (Tie Rod End Remover 09913-65210)

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

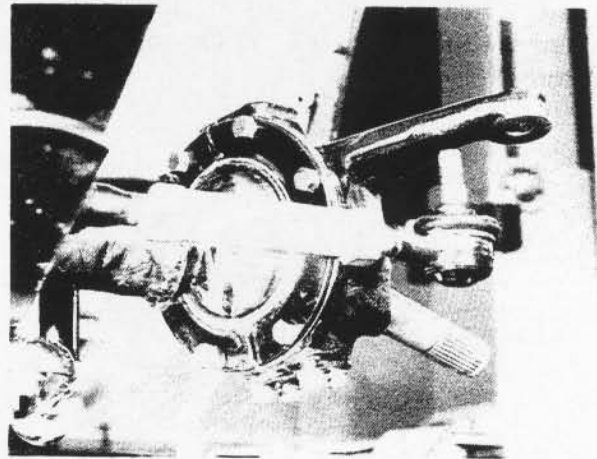


Fig. 17-1-22

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.

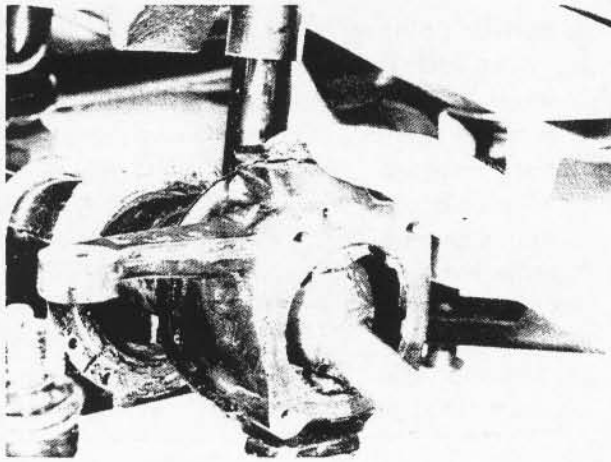


Fig. 17-1-23

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.

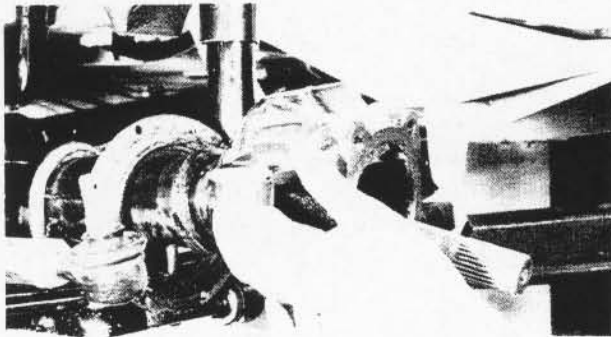


Fig. 17-1-24

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.

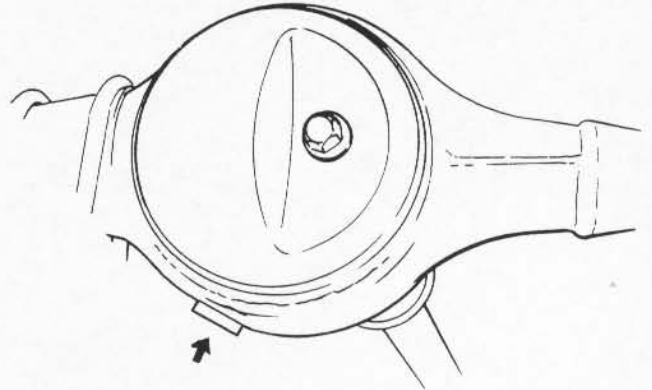


Fig. 17-1-25

3. Pull axle shaft joint off front axle housing.

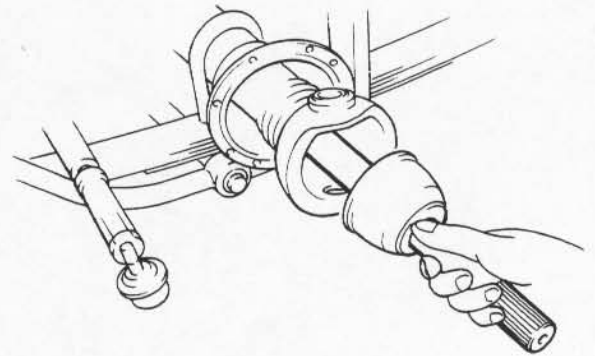


Fig. 17-1-26

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.

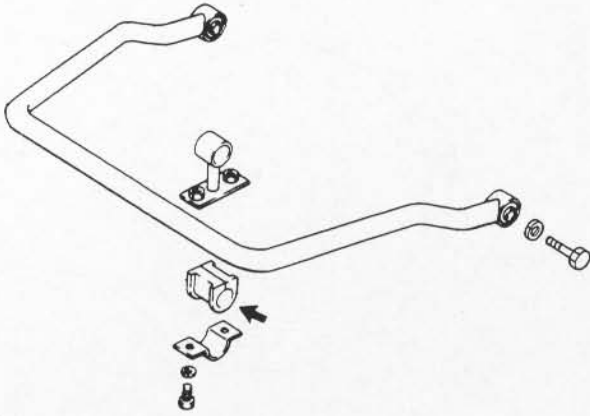


Fig. 17-1-27

Leaf Spring Bushes

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

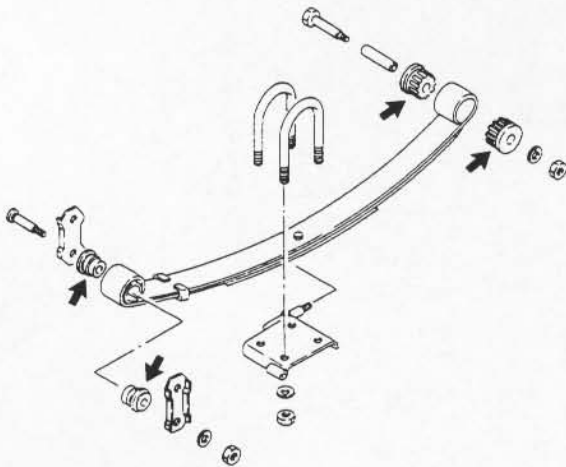


Fig. 17-1-28

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.)

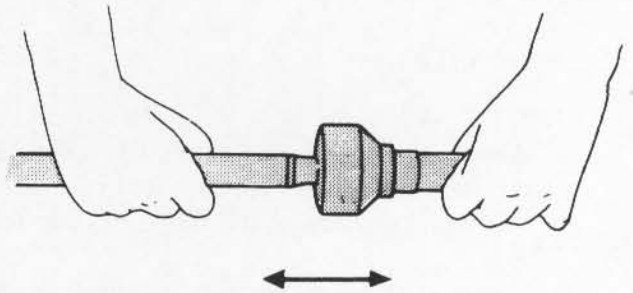


Fig. 17-1-29

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.

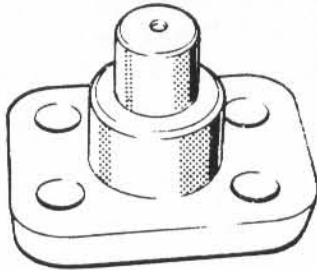


Fig. 17-1-31

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

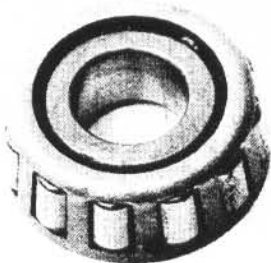


Fig. 17-1-32

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.

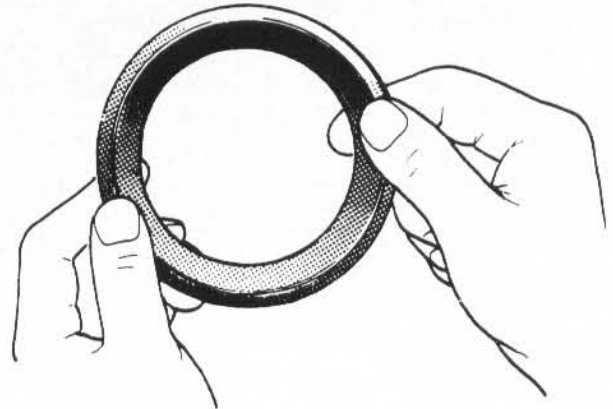


Fig. 17-1-33

INSTALLATION

Reverse removal procedure observing each precaution.

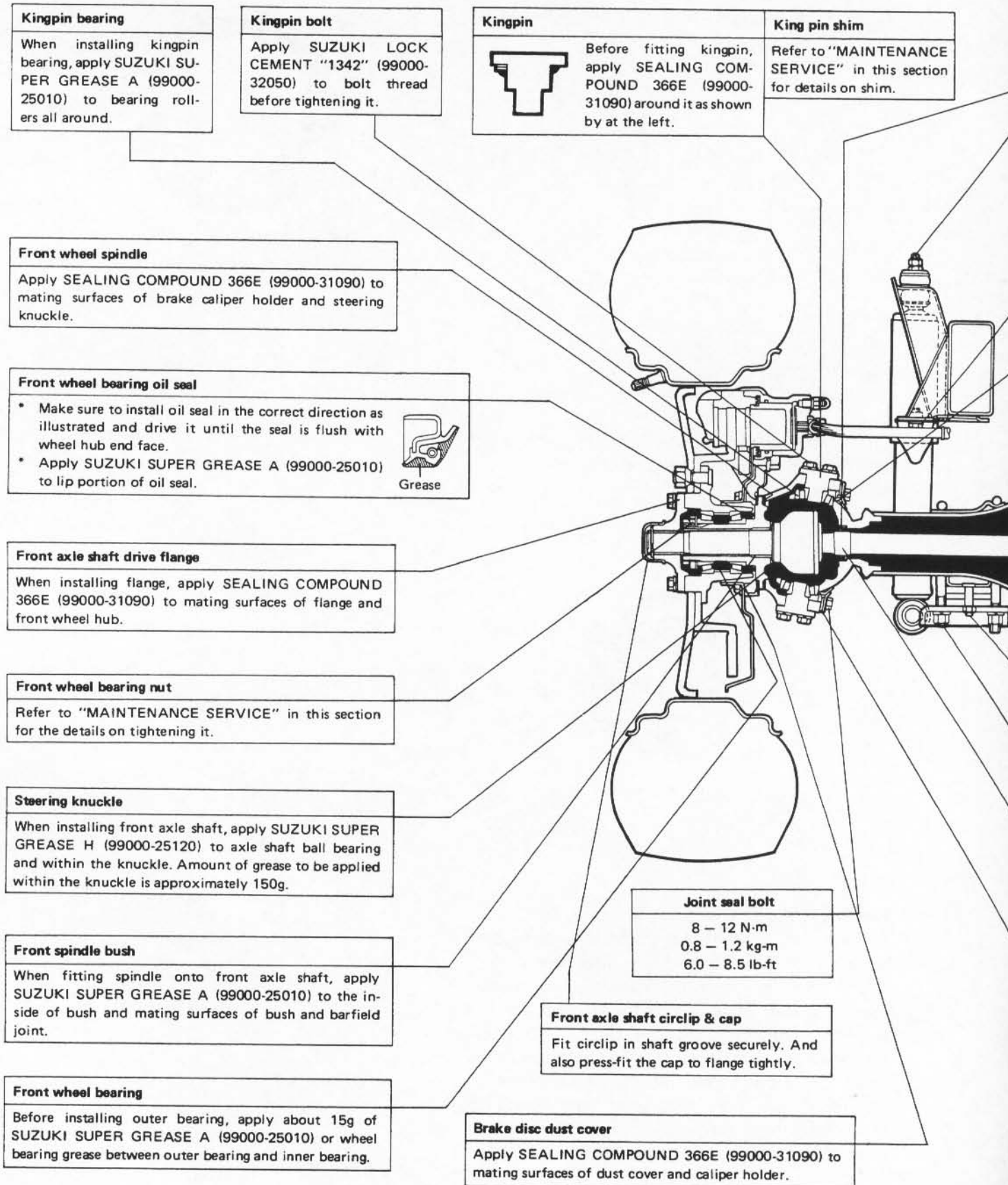


Fig. 17-1-34

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.

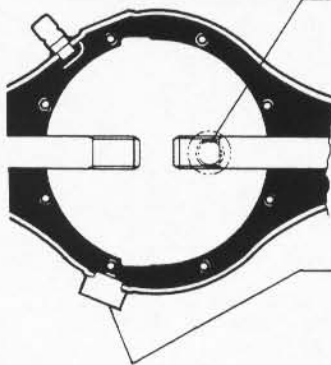
Spring bumper bolt

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

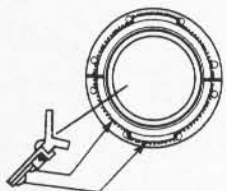
Insert bolt and nut securely into holes of axle housing seat and spring seat.

Front spring U bolt

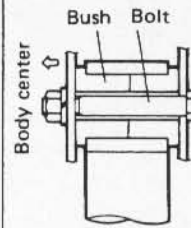
When securing U bolt, tighten its front and rear nuts evenly.

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.

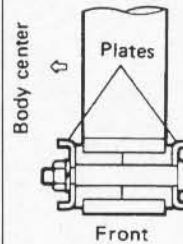
Oil seal retainer

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

Front leaf spring bush & spring bolt

Body center

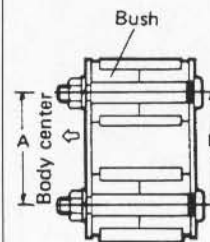
- Either water or household type detergent may be used to press-fit the bush onto spring. But oil of any kind is strictly prohibited.
- Insert both right and left bolts from the outside into the inside of body.

Front leaf spring shackle plate

Body center

Front

Install plates with their backs directed to each other.

Front leaf spring shackle pins & bush

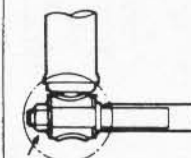
Body center

Bush

A

B

- 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 $-0.3 \sim +0.3$ mm ($-0.024 \sim +0.024$ 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

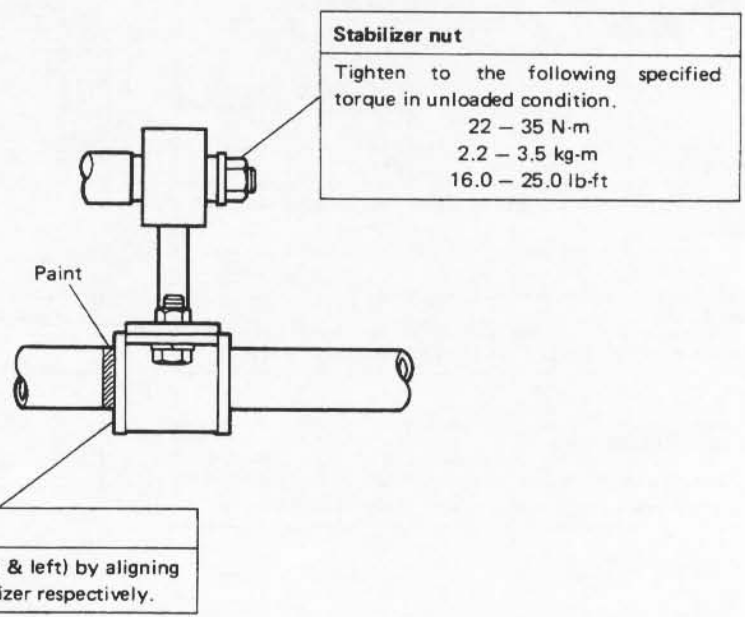
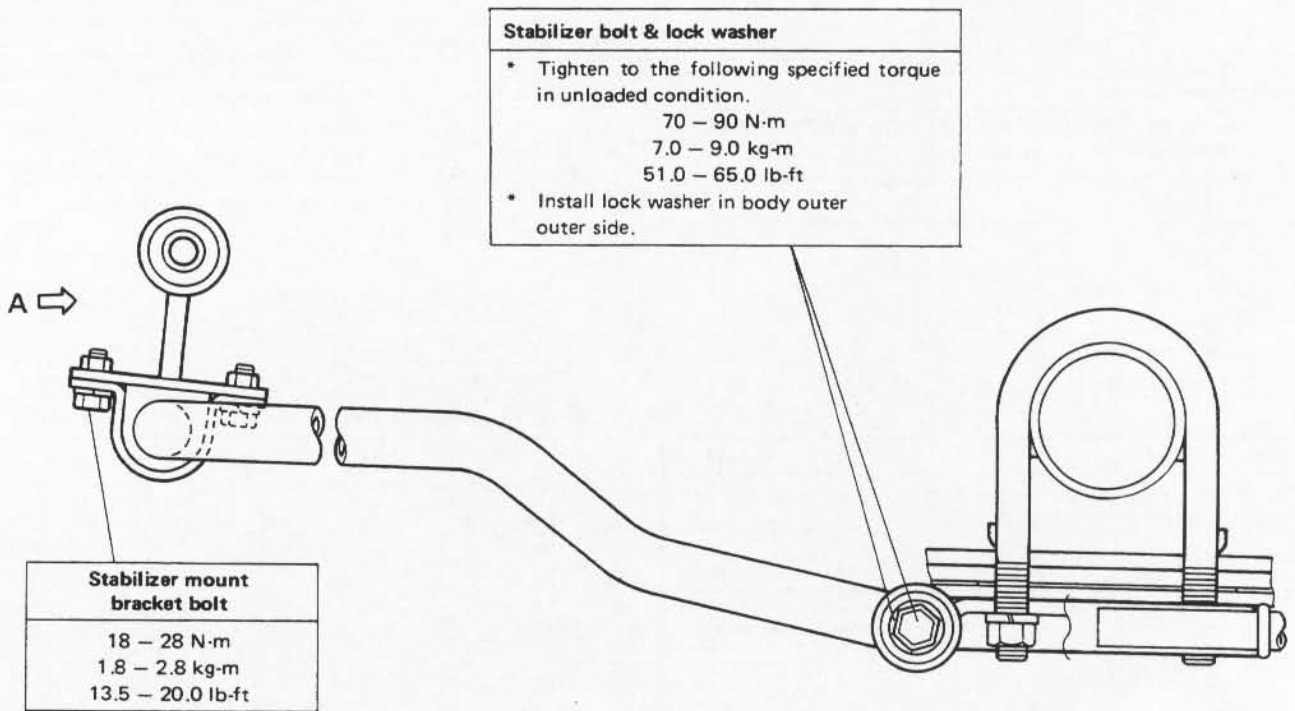
For correct installing direction of absorber washer, refer to the figure.

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



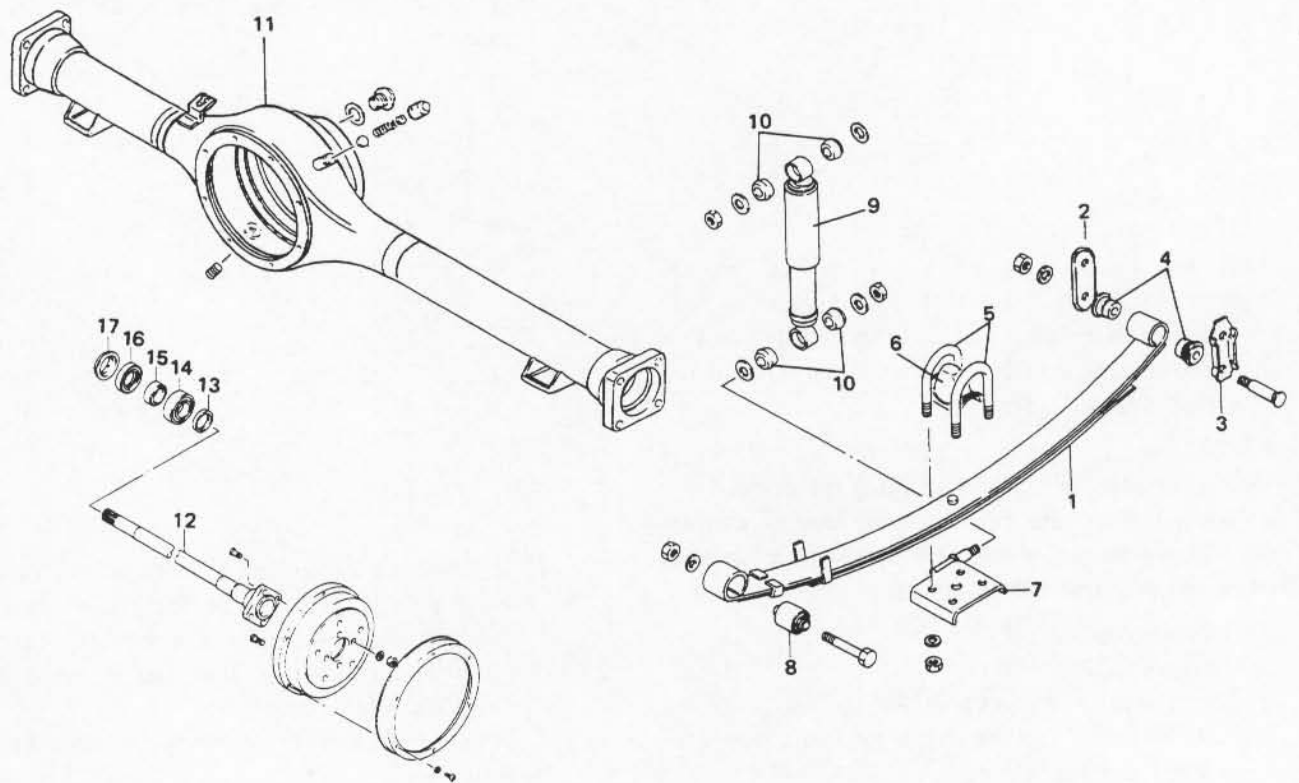
View A

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.



- | | |
|------------------------|---------------------------|
| 1. Leaf spring | 10. Bush |
| 2. Shackle plate inner | 11. Axle housing |
| 3. Shackle plate outer | 12. Axle shaft |
| 4. Shackle bush | 13. Spacer |
| 5. U bolt | 14. Bearing |
| 6. Spring bumper | 15. Bearing retainer ring |
| 7. Spring seat | 16. Oil seal |
| 8. Spring bush | 17. Oil seal protector |
| 9. Shock absorber | |

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.

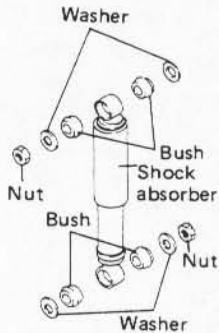


Fig. 17-2-2

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.

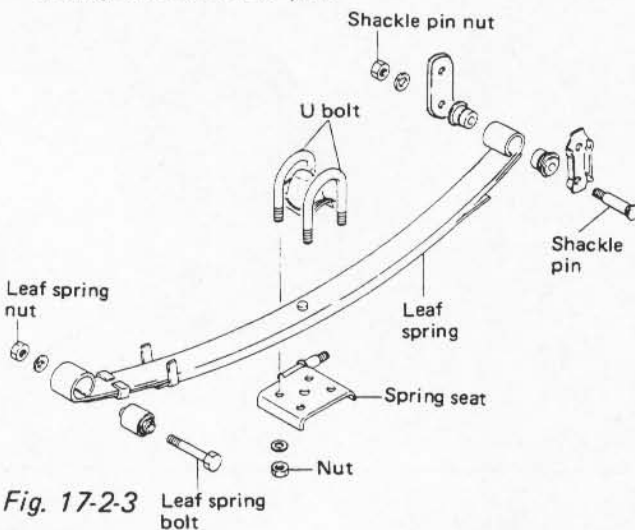
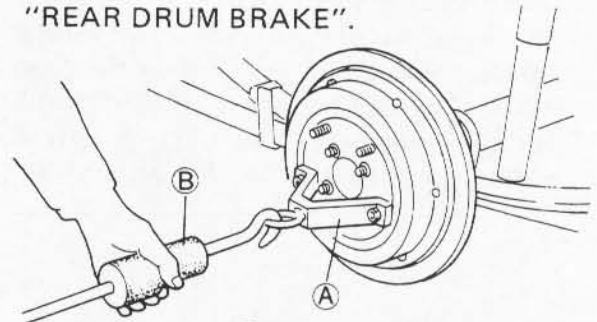


Fig. 17-2-3 Leaf spring bolt

Rear Axle Shaft

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



- A Special tool (Brake drum remover 09943-35511)
- B Special tool (Sliding hammer 09942-15510)

Fig. 17-2-4

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

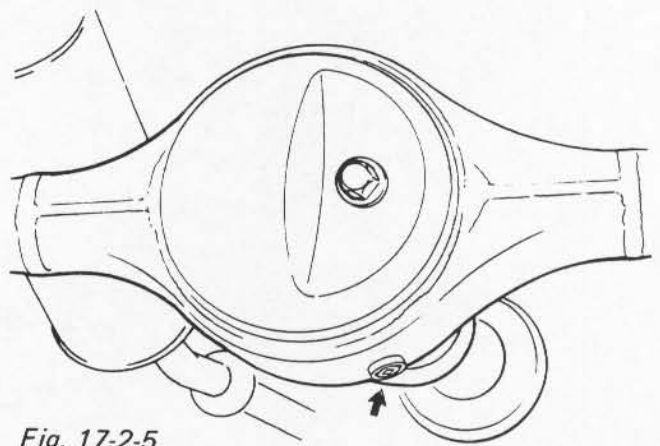


Fig. 17-2-5

- 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.

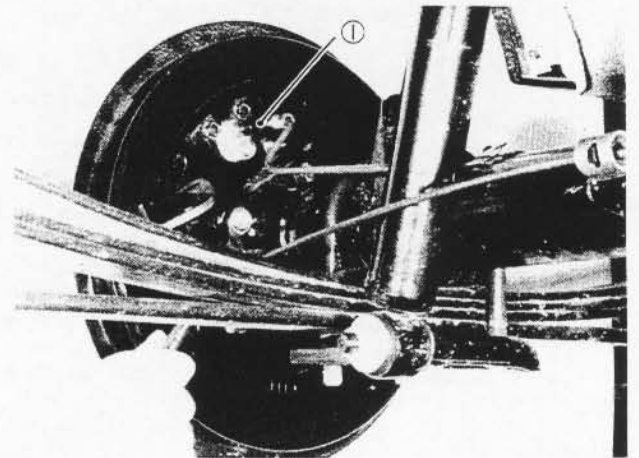


Fig. 17-2-6 1. Plug

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

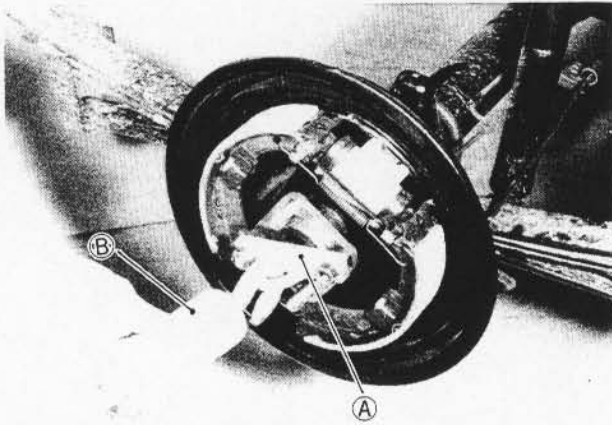


Fig. 17-2-7 (A) Special Tool (Rear Axle Remover 09922-66010)
(B) Special Tool (Sliding Hammer 09942-15510)

Rear axle shaft that was drawn out.

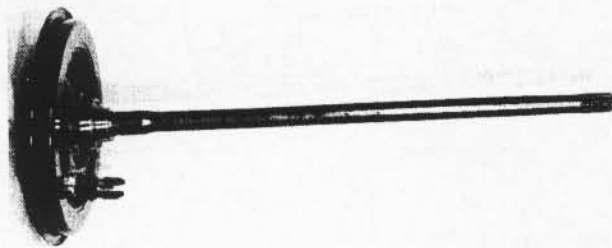


Fig. 17-2-8

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.

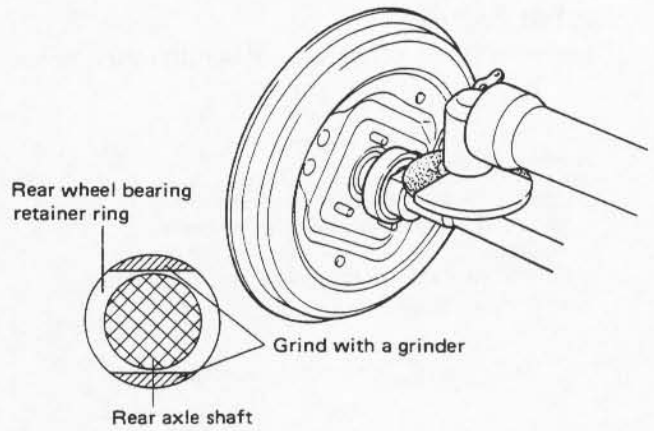


Fig. 17-2-9

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

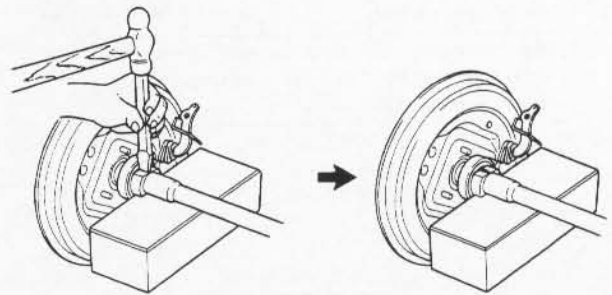


Fig. 17-2-10

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

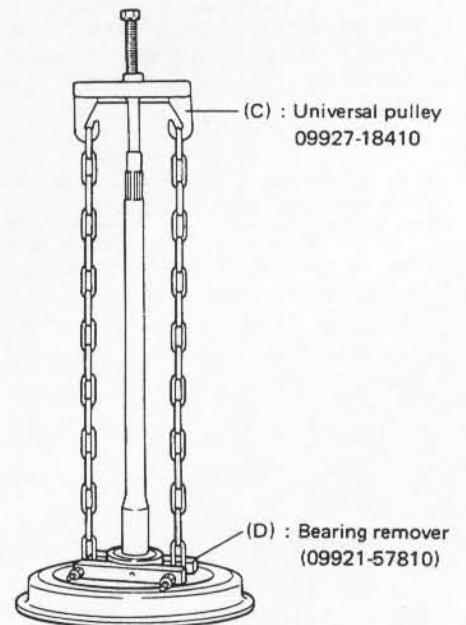



Fig. 17-2-11

INSTALLATION

Reverse removal procedure observing each precaution.

<p>Rear shaft oil seal</p> <p>* 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.</p> <p>Wheel side  Differential side</p> <p>* Press-fit oil seal until it contacts oil seal protector.</p>
--

<p>Brake backing plate</p> <p>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.</p> <p>18 – 28 N·m 1.8 – 2.8 kg·m 13.5 – 20.0 lb·ft</p>
--

<p>Rear hub bolt & nut</p> <p>When mounting hub bolts into rear axle shaft, make sure to fit the head securely in the stepped part of axle shaft.</p> <p>50 – 80 N·m 5.0 – 8.0 kg·m (36.5 – 57.5 lb·ft)</p>
--

<p>Wheel nut</p> <p>50 – 80 N·m 5.0 – 8.0 kg·m (36.5 – 57.5 lb·ft)</p>

<p>Rear brake drum</p> <p>When installing drum, be careful not to let any foreign matter enter where drum and rear axle shaft contact.</p>

<p>Rear wheel bearing spacer</p> <p>Install wheel bearing spacer with the tapered side of its inner diameter directed toward outside, or brake drum side.</p>
--

<p>Leaf spring U bolts & nuts</p> <p>60 – 80 N·m 6.0 – 8.0 kg·m (43.5 – 57.5 lb·ft)</p> <p>Tighten 4 U bolt nuts uniformly so that measurement "B" is the same among the 4.</p>
--

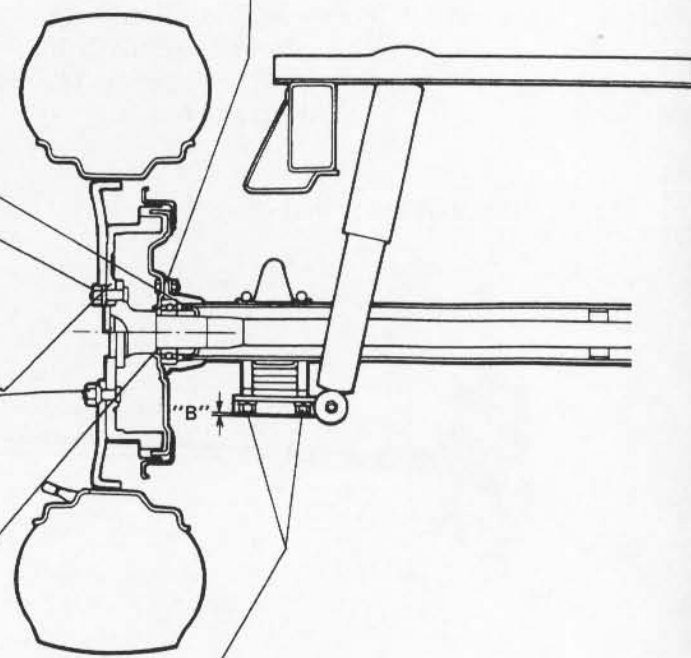
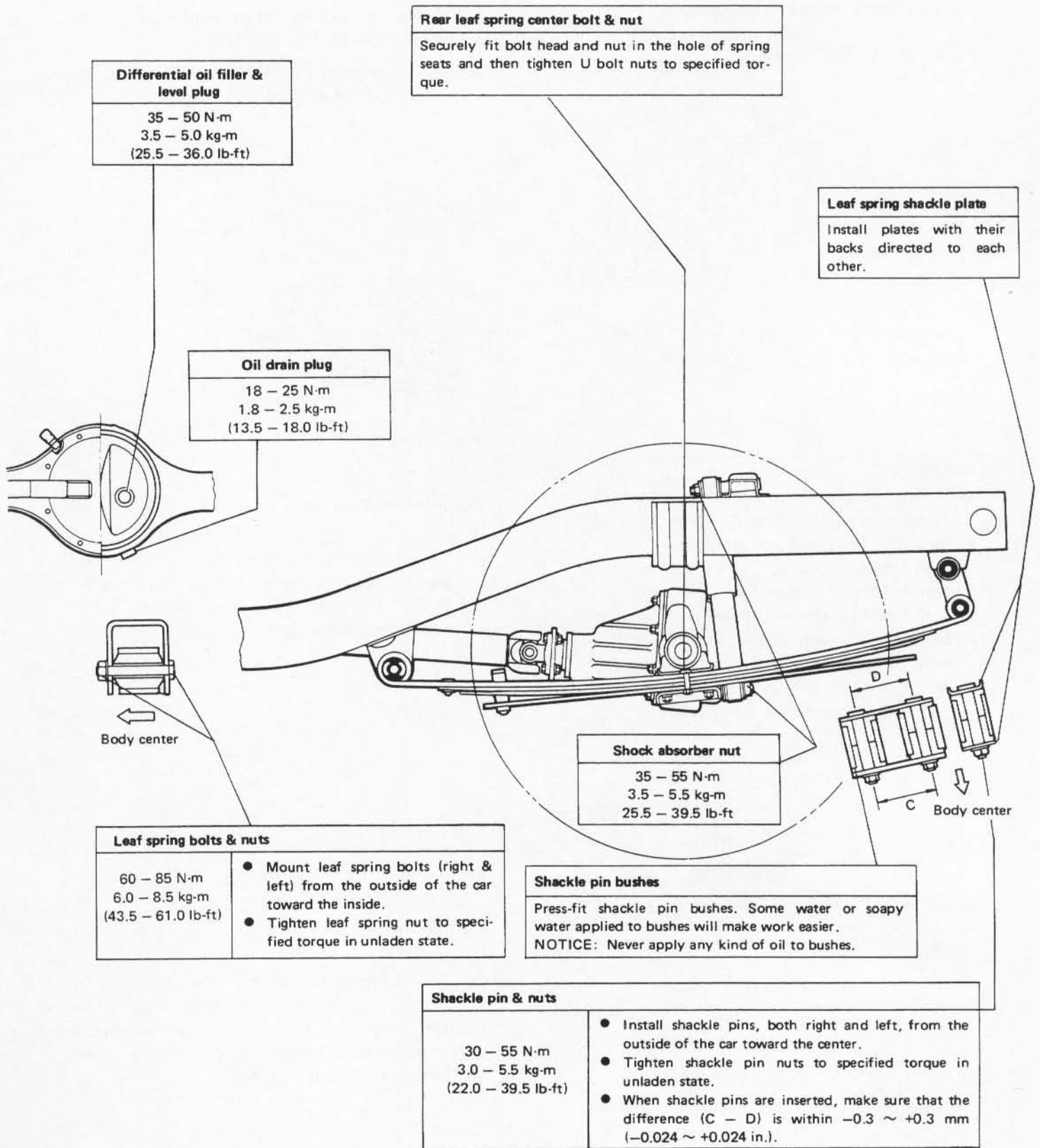


Fig. 17-2-12



Differential oil filler & level plug

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

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.

Oil drain plug

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

Shock absorber nut

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

Body center

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.

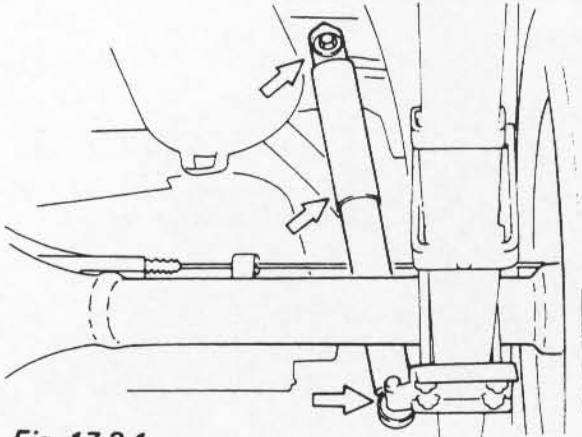


Fig. 17-3-1

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.

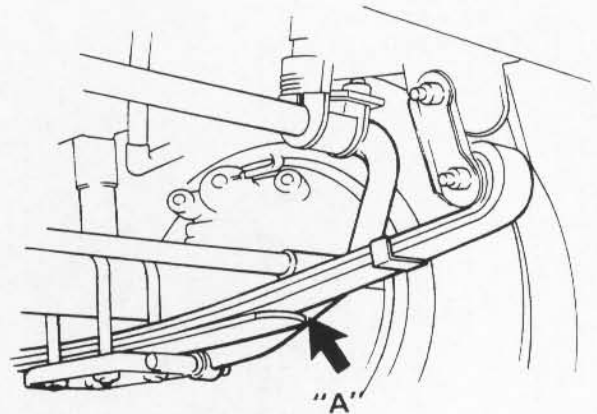


Fig. 17-3-3

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.

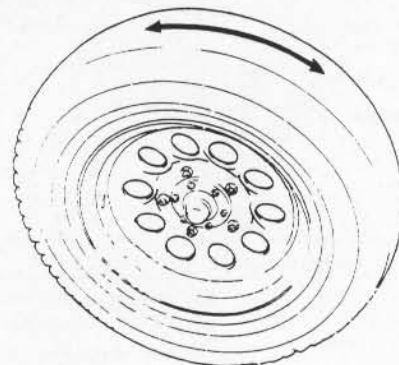


Fig. 17-3-4

- (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.

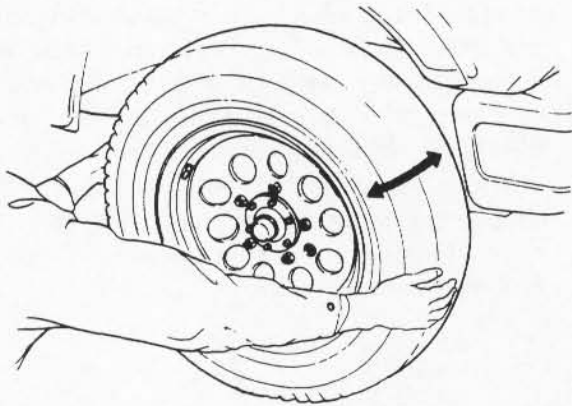


Fig. 17-3-5

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

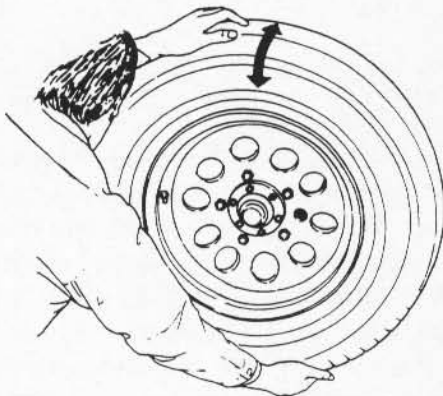


Fig. 17-3-6

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.

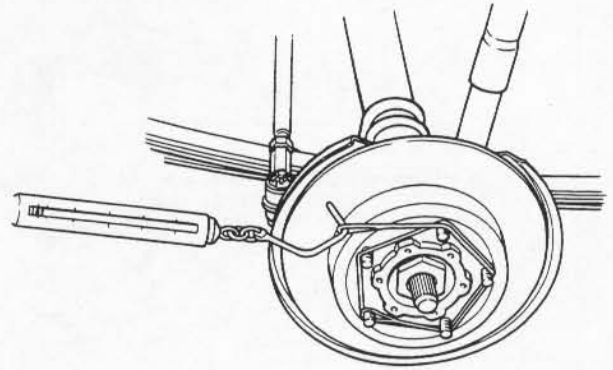


Fig. 17-3-7

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)
---------------------------------------	---

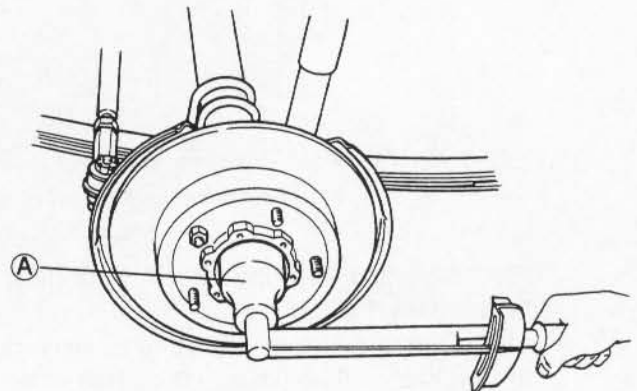


Fig. 17-3-8 (A) Special tool (Front Wheel Bearing nut socket wrench 09941-58010)

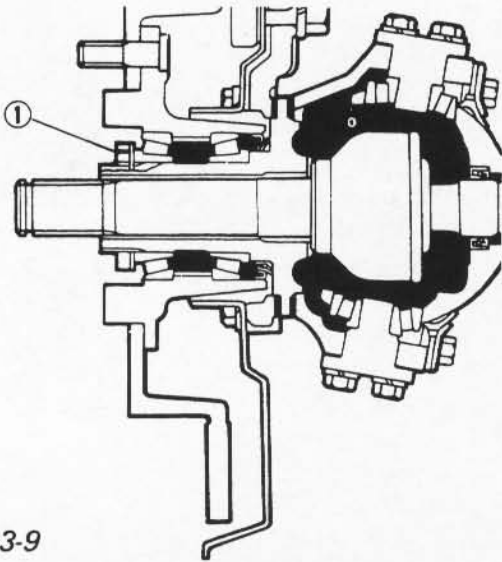


Fig. 17-3-9

- (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)

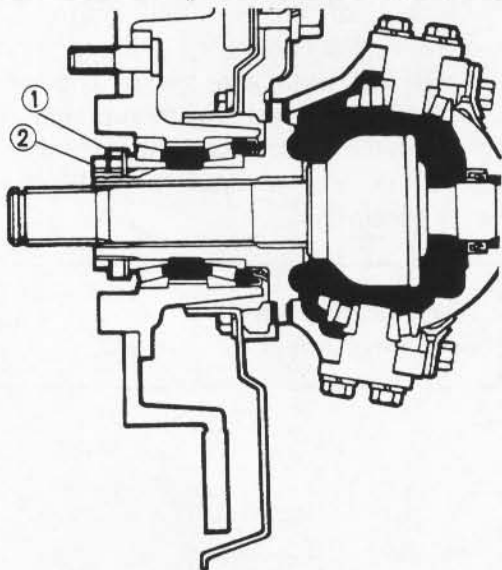


Fig. 17-3-10 ① Wheel Bearing Nut
② Wheel Bearing Lock Nut

- (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.

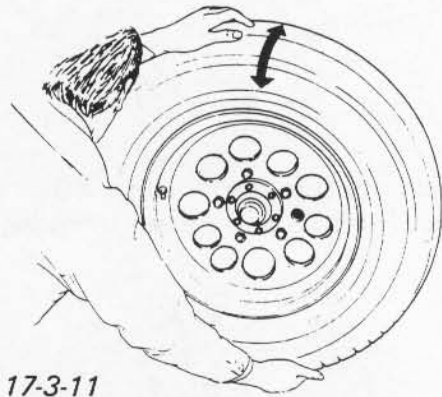


Fig. 17-3-11

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.

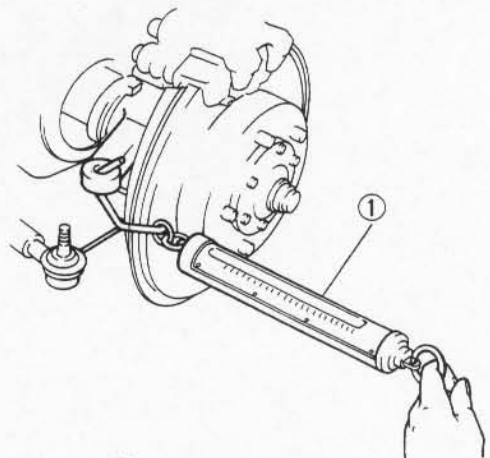


Fig. 17-3-12 ① Spring Balance

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.)

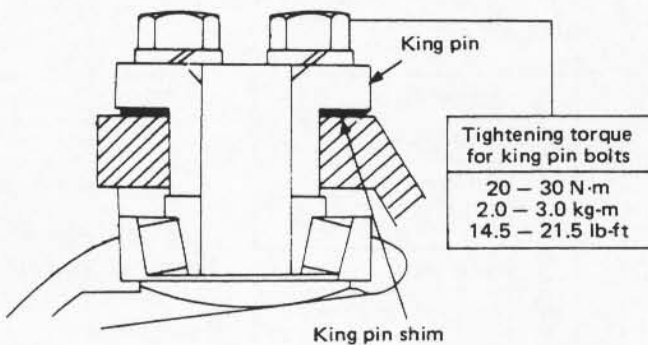


Fig. 17-3-13

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.

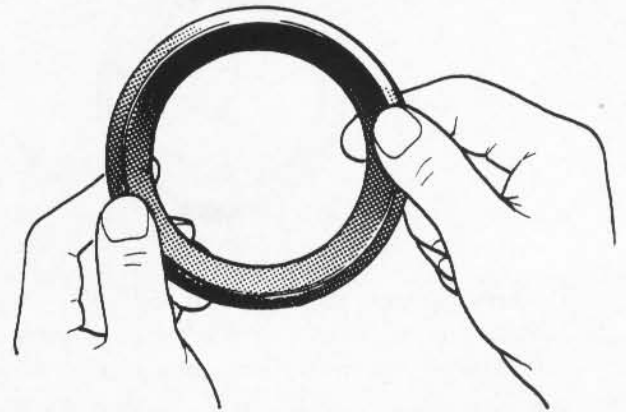


Fig. 17-3-14

[How to replace oil seal]

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

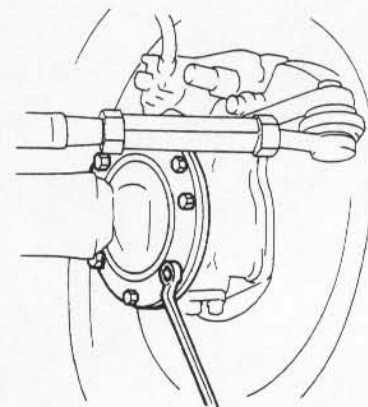


Fig. 17-3-15

- 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.

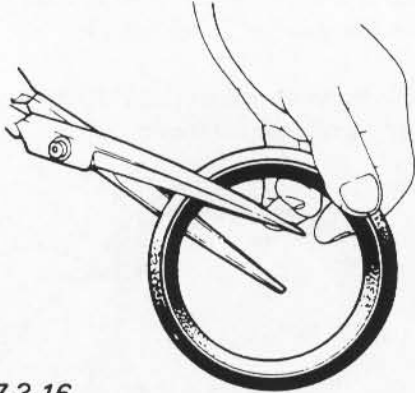


Fig. 17-3-16

- 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).

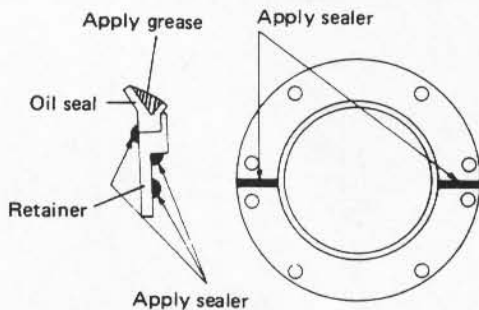


Fig. 17-3-17

- 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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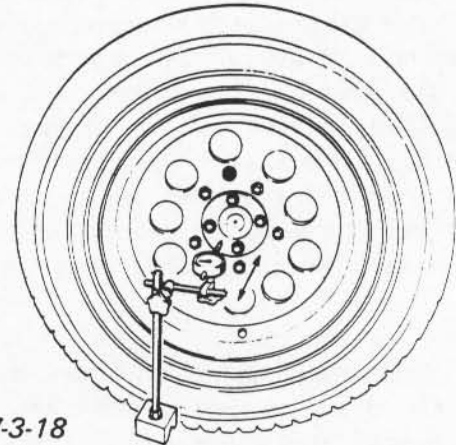


Fig. 17-3-18

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	

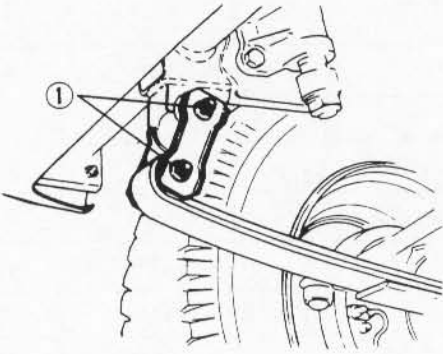


Fig. 17-3-19

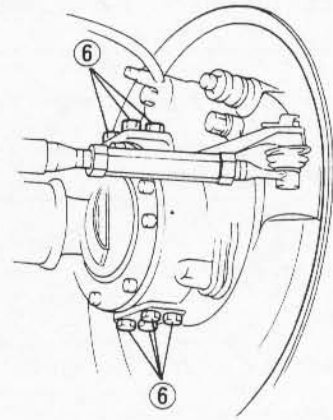


Fig. 17-3-23

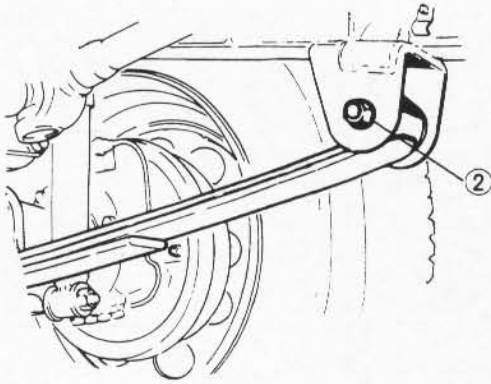


Fig. 17-3-20

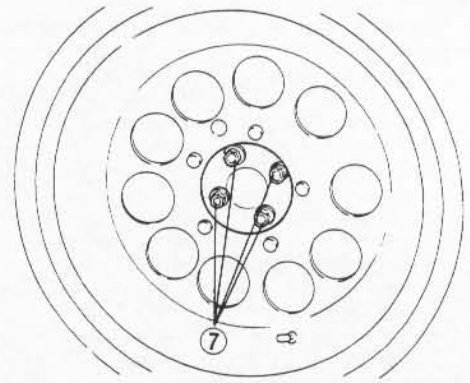


Fig. 17-3-24

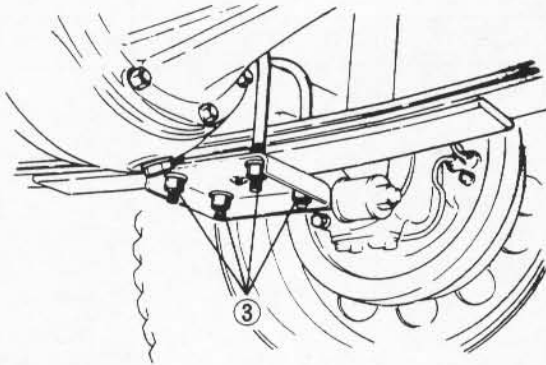


Fig. 17-3-21

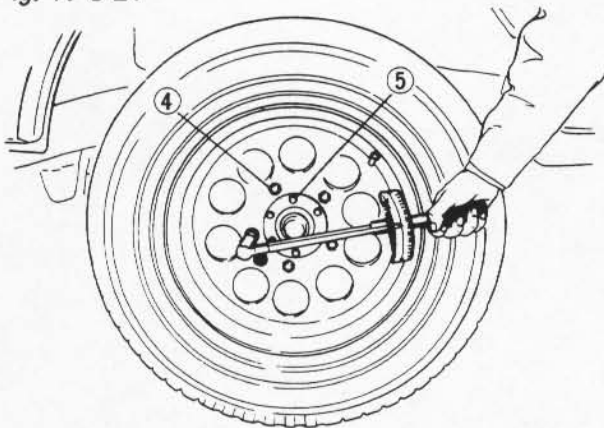


Fig. 17-3-22

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

There are two types of the front free wheeling hub, one is manual type and the other is automatic type. This section describes operation, installation and maintenance of each type. Be sure to refer to this section carefully for proper service of the front free wheeling hub.

[Manual free wheeling hub]

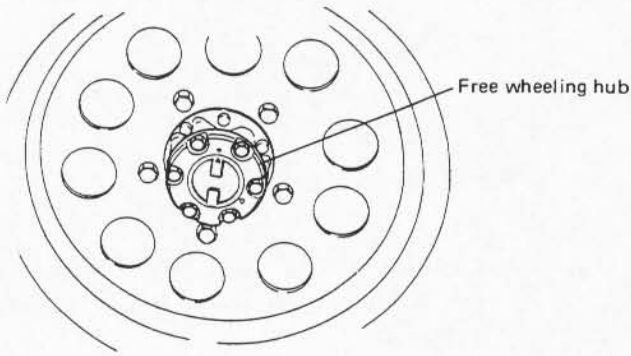


Fig. 17-5-1

[Automatic Free Wheeling Hub]

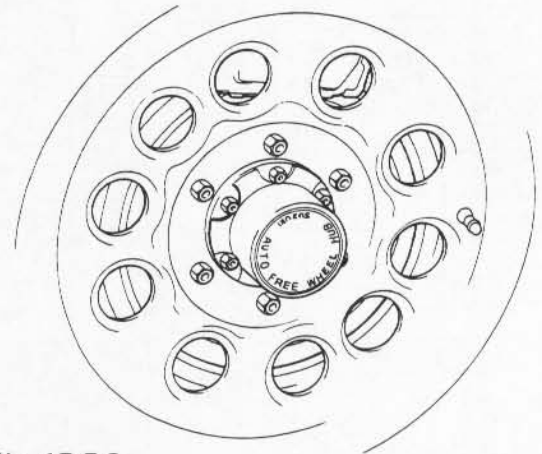


Fig. 17-5-2

MANUAL FREE WHEELING HUB

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.

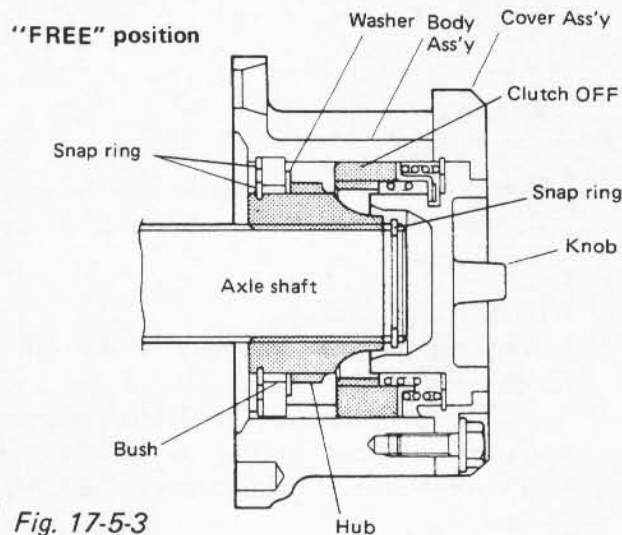


Fig. 17-5-3

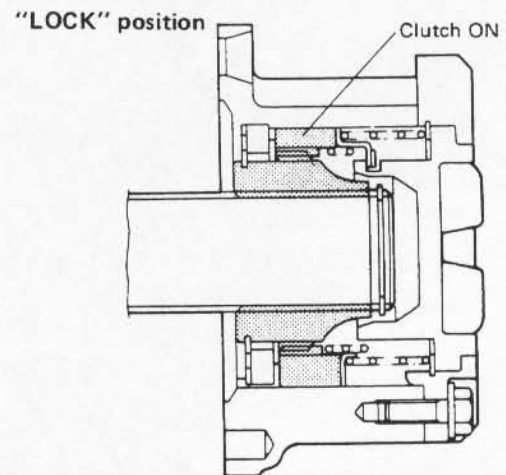


Fig. 17-5-4

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.

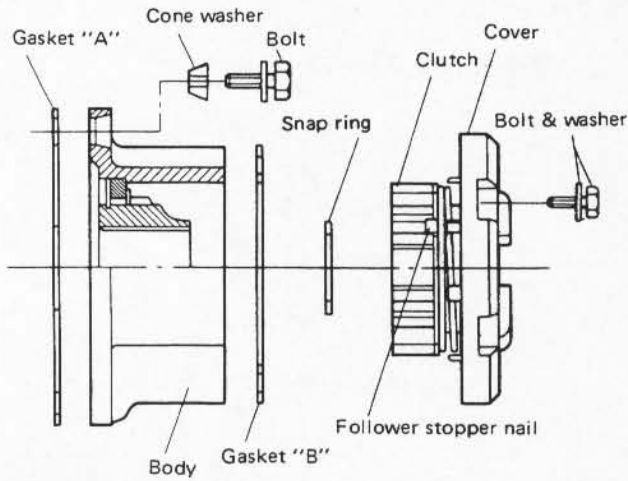


Fig. 17-5-5

- 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.

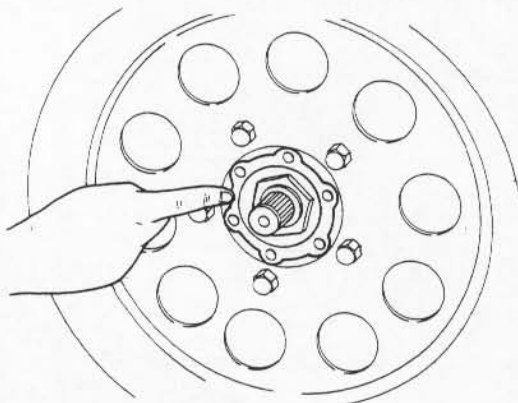


Fig. 17-5-6

- 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

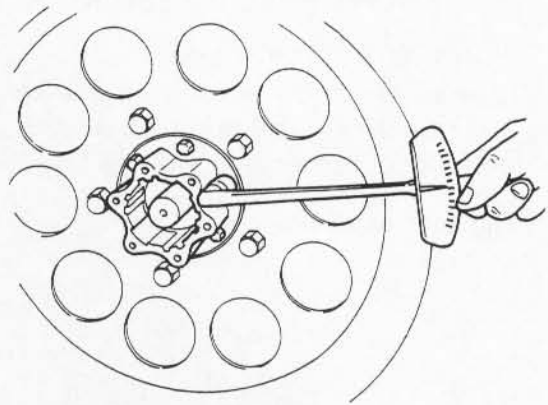


Fig. 17-5-7

- 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.

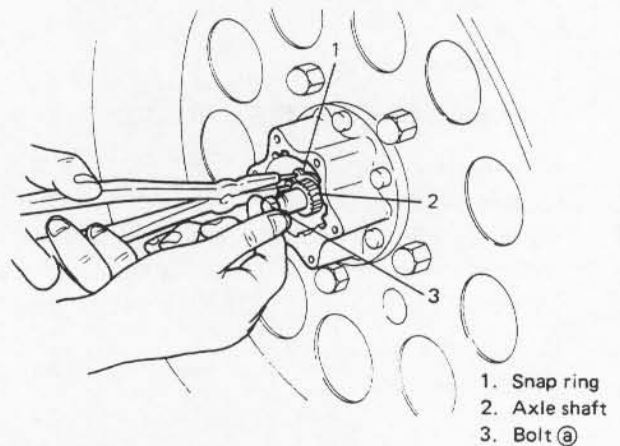


Fig. 17-5-8

- 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.

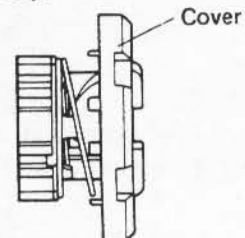


Fig. 17-5-9

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

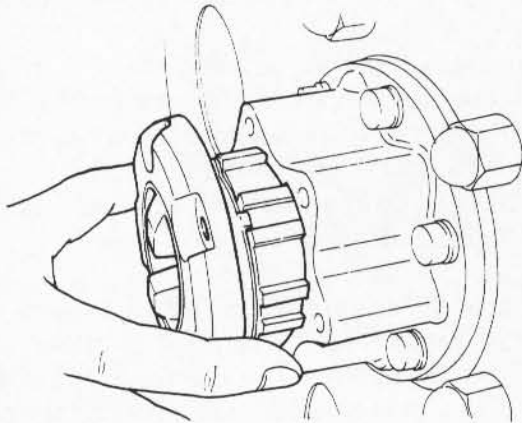


Fig. 17-5-10

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

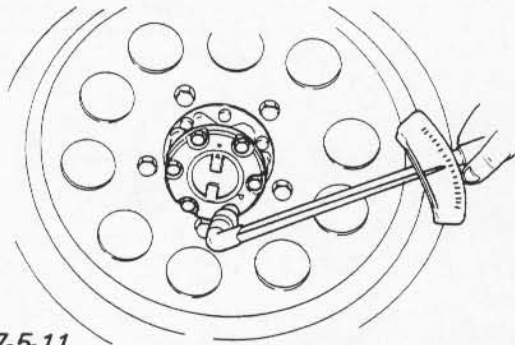


Fig. 17-5-11

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 manual 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.

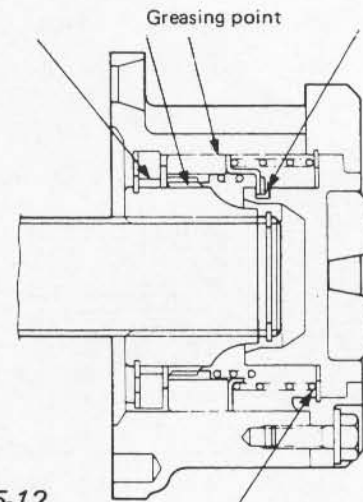


Fig. 17-5-12

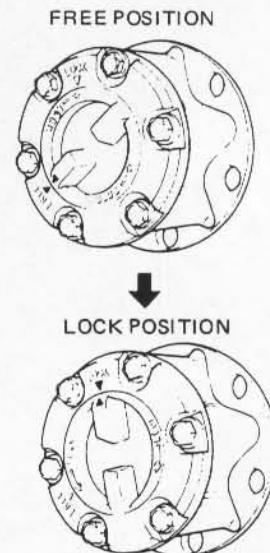


Fig. 17-5-13

AUTOMATIC FREE WHEELING HUB

Operation

An automatic free wheeling hub is equipped in the right and left front wheel hubs in similar manner to that of the manual type.

When the car equipped with these automatic free wheeling hubs is started out with the gear shift lever shifted from 2H to 4H or 4L, the drive power as shown in the diagram below is transmitted to the hub, slide gear and cam. The cam lobe then disengages from the retainer slot and rides on the retainer lobe. As a result, the cam shifts the slide gear to the right as shown in the figure. This shift causes the slide gear to mesh with gear at inner side of free wheeling hub body installed on the drive axle housing resulting in automatically creating 4WD with axle shaft drive power being transmitted to wheel hub (wheel).

When the transfer gear shift lever is shifted from 4H or 4L to 2H and slowly started to advance in the opposite direction (that is, reverse if advancing forward or advance ahead if reversing), at the same time, the car movement causes the front wheel and front free wheeling hub body to revolve in the direction reverse to previous revolution. As a result, the gear at inner side of free wheeling hub body and its meshed slide gear together with the cam fixed to the slide gear all start to rotate in reverse direction. When the cam lobe is rotated to the retainer slot position, the return spring causes the cam lobe to return to slot position from its former lobe position on the retainer. The slide gear fixed on the cam shifts to the left as shown in the figure. The gear maintained at inner side of free wheeling hub body then becomes disengaged so that the front wheeling hub becomes free. This operation (4WD → 2WD) is completed within 2 meters of vehicle advance distance.

"FREE" condition

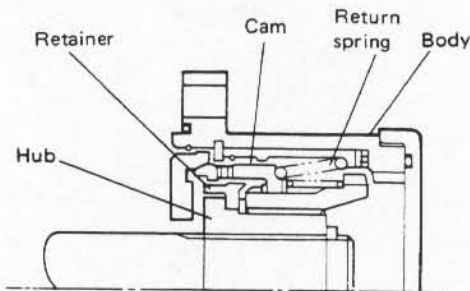


Fig. 17-5-14

"LOCK" condition

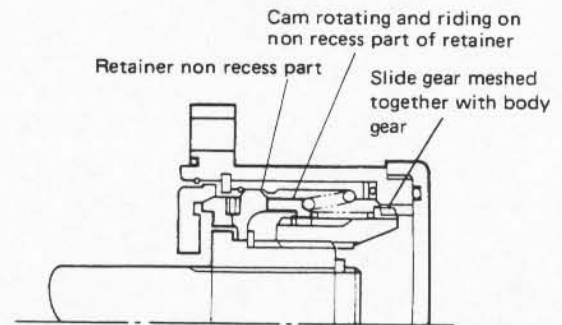


Fig. 17-5-15

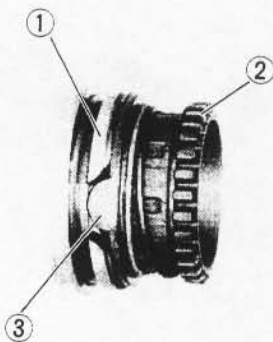


Fig. 17-5-16

1. Retainer
2. Slide gear
3. Cam in retainer recess

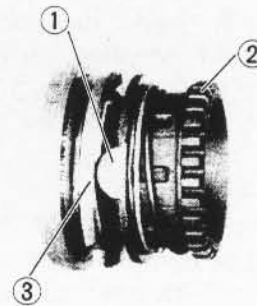


Fig. 17-5-17

1. Cam rotating and riding on non recess part of retainer
2. Pushed out slide gear
3. Retainer non recess part

Installation Instruction

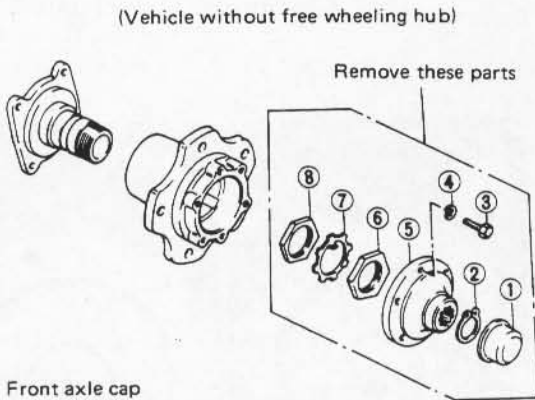
[Checking and Removal before installation]

1. Check the following before installation.

- Make sure parts in Fig. 17-5-22 are all ready.
- Check that parts in Fig. 17-5-22 are all cleaned (not fouled).

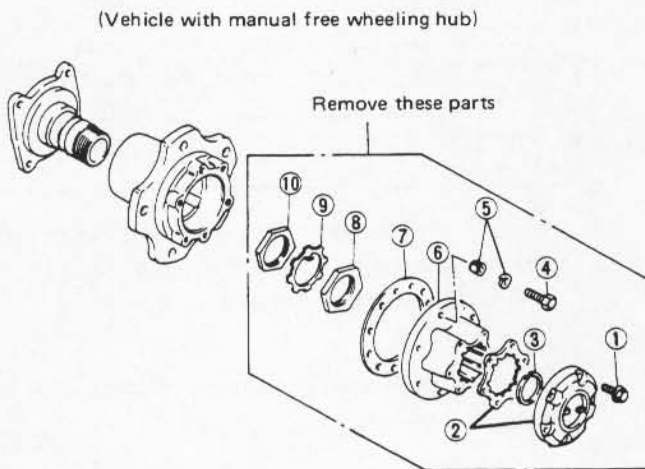
2. Carry out following preparatory steps before installation.

- 1) Raise front end of the car, and be sure to support front end so that it is not dropped from its raised position.
- 2) Remove each front tire-and-wheel.
- 3) Remove parts shown below following their numerical sequence.



1. Front axle cap
2. Axle shaft circlip
3. Bolt (1-wheel 6 pcs)
4. Lock washer
5. Drive flange
6. Wheel bearing lock nut
7. Lock washer
8. Wheel bearing nut

Fig. 17-5-18



1. Hub cover bolt
2. Locking hub cover and packing
3. Axle shaft circlip
4. Bolt
5. Lock washer and cone washer
6. Hub body
7. Packing
8. Wheel bearing lock nut
9. Lock washer
10. Wheel bearing nut

Fig. 17-5-19

4) Remove a pin bolt of disc brake caliper. Thus, separate caliper from disc.

NOTE:

- Do not disconnect brake hose as much as practicable.
- As long as caliper is separated from disc, use care never to depress brake pedal.

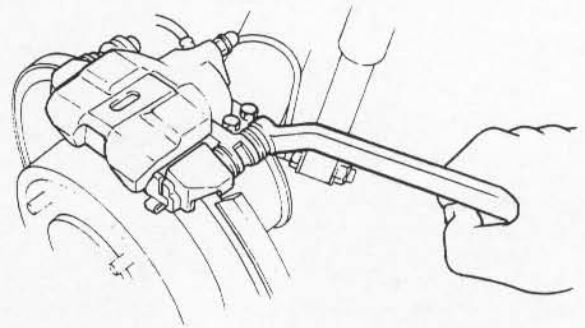


Fig. 17-5-20

5) Tighten 2 hub nuts by hand lightly so that disc will not come off.

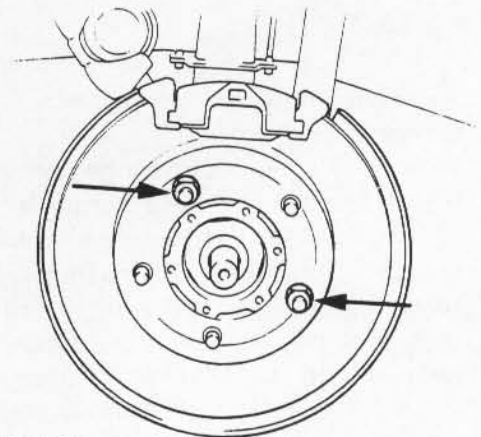
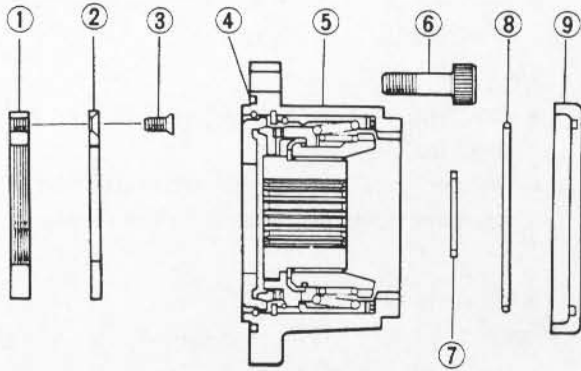


Fig. 17-5-21

[Installation]

Install automatic free wheeling hub according to the sequence of the number shown in figure below. Be sure to observe the instructions 1) through 3) of item 1 mentioned below especially for proper assembly.



The parts ① through ⑧ shown below are the ones corresponding with one wheel.

1. Wheel bearing nut
2. Lock washer
3. Screw (4 pcs)
4. O-ring (for body use)
5. Free wheeling hub body ass'y
6. Bolt (6 pcs)
7. Axle shaft circlip
8. O-ring (for cover use)
9. Hub cover

CAUTION:

Hub body ass'y should not be disassembled.

Fig. 17-5-22

1. Assembly of wheel bearing nut ① and lock washer ②
 - 1) With wheel hub turned by hand, tighten wheel bearing nut by a torque of 80 N·m (8.0 kg·m, 57.5 lb·ft) using special tools A and B. Next, loosen the nut until the above torque is reduced to 0 N·m (0 kg·m). Then, retighten the nut by the torque within a range of 10 to 15 N·m (1.0 to 1.5 kg·m 7.5 to 10.5 lb·ft) until 4 screw holes opened on the nut correspond with the 4 screw holes opened on the lock washer assembled next to the nut respectively. (See Figs. 17-5-23 and 17-5-24.)
 - 2) Tighten lock washer securely with 4 pieces of the screws ③ to lock wheel bearing nut.

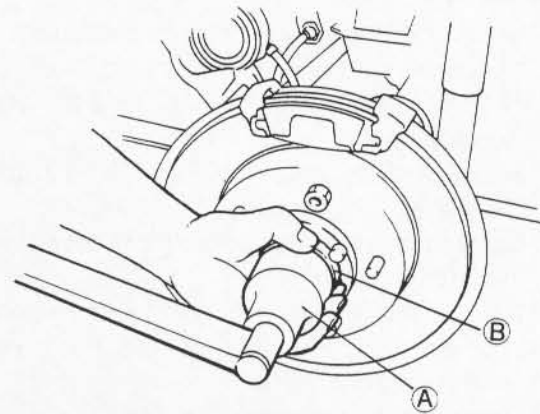


Fig. 17-5-23 Special Tool A (Front Wheel Bearing Nut Socket Wrench 09941-58010)
Special Tool B (Automatic Free Wheeling Hub Socket 09944-98010)

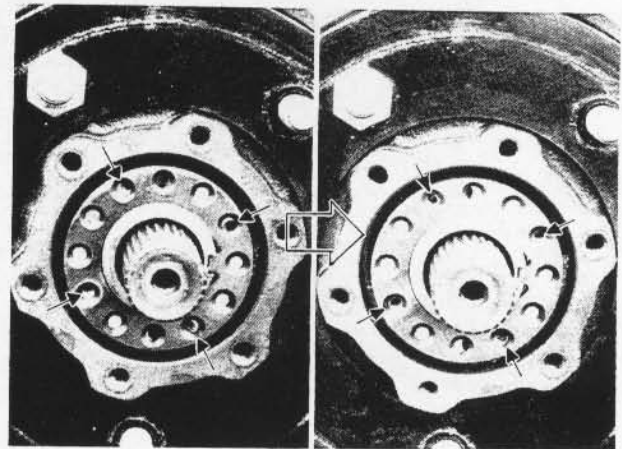


Fig. 17-5-24

Parts	Tightening torque		
	N·m	kg·m	lb·ft
Wheel bearing nut ①	10 – 15	1.0 – 1.5	7.5 – 10.5
Lock washer screw ③	1 – 1.4	0.1 – 0.14	0.72 – 1.01

- 3) Check wheel bearing starting preload using string and spring balance as shown in Fig. 17-5-25, and record the results.

NOTE:

Make sure that pads are not in contact with disc during this check.

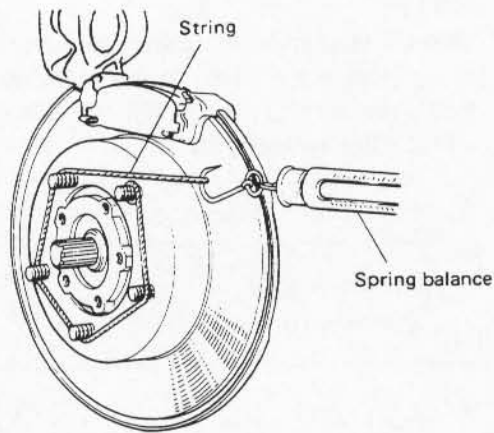


Fig. 17-5-25

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

If preload does not satisfy specification, repeat the operations described in steps 1), and 2) until the specified preload is obtained.

4) Check to ensure that measurement "d" between hub (A) surface and washer (B) surface (as shown in below figure) is within 2.68 to 4.02 mm (0.11 to 0.16 in.).

If measurement does not satisfy specification, such conditions as poor assembly, trapped foreign matter, etc. can be regarded as possible causes.

Taking the above into consideration, repeat steps 1) to 3) to obtain specified measurement.

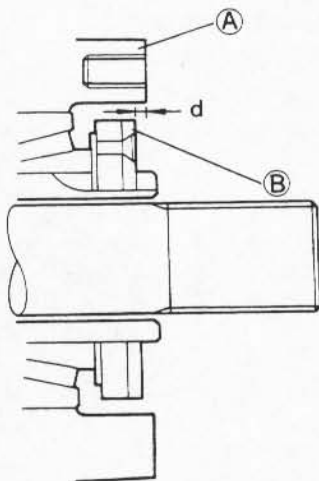


Fig. 17-5-26

2. Assembly of hub body ass'y ⑤

1) Make sure O-ring ④ is securely inserted into the hub body groove, and fit hub body ass'y key ④ to steering knuckle spindle key groove ③. Thus, assemble hub body ass'y onto front axle shaft. Then, ensure that fitting surfaces ① and ② of hub body ass'y and wheel hub are closely fitted to each other when body ass'y is pushed lightly to wheel hub. In case the close fitting is not obtained, rotate wheel hub to obtain close fitting.

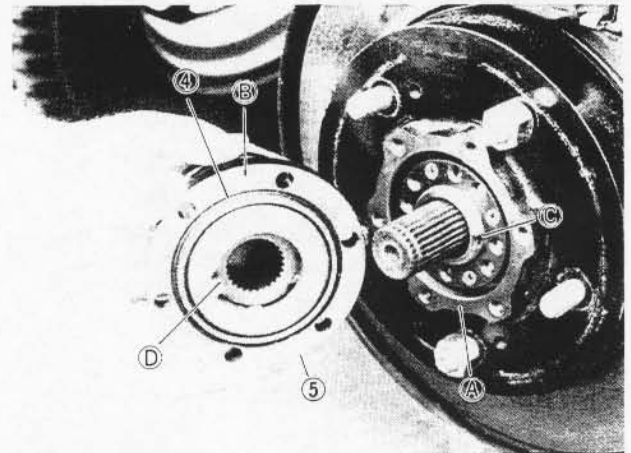


Fig. 17-5-27

2) Using special tools, ③ and ④, tighten bolts ⑥ to specified torque.

Tightening torque for bolt ⑥	N·m	kg·m	lb·ft
	30 – 35	3.0 – 3.5	22.0 – 25.0

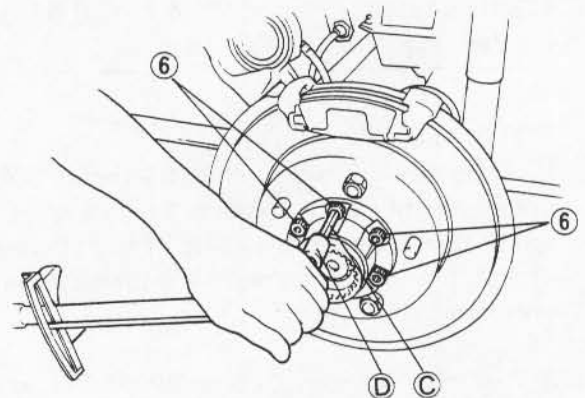


Fig. 17-5-28 Special Tool ③ (Hexagon Bit 6mm 09900-00414)
Special Tool ④ (Hexagon Socket 09900-00411)

3. Assembly of Circlip ⑦, O-ring ⑧ and Cover ⑨

1) With new circlip ⑦, fix hub body ass'y to axle shaft.

CAUTION:
The circlip should be assembled securely in the groove provided on axle shaft.

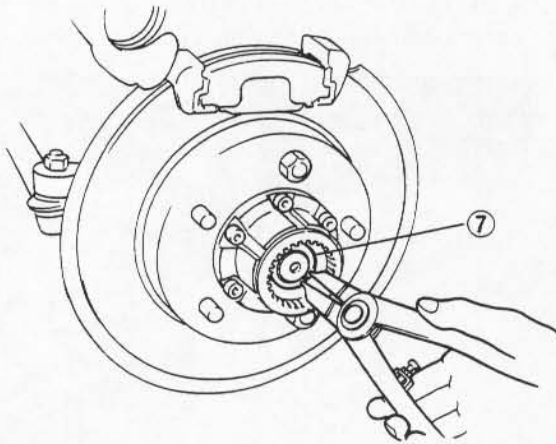


Fig. 17-5-29

2) Measure wheel hub starting preload again in the same manner as with the assembly operation described previously in step 3) of item 1. Compare the present measurement with the previous measurement obtained in step 3) of item 1.

The difference of measurement should be 1.4 kg or less.

Difference of measurement	1.4 kg (3.1 lbs) or less
---------------------------	--------------------------

NOTE:

If difference of measurement exceeds 1.4 kg, poor assembly of automatic free wheeling hub can be considered as the cause of such excess. Therefore, conduct assembly and measurement once more.

3) Assemble O-ring ⑧ correctly in the groove provided inside the cover ⑨.

Tighten cover ⑨ to hub body ass'y by hand.

NOTE:

Upon completion of operation check mentioned in the next item "post-assembly confirmation", be sure to firmly tighten this cover using an oil filter wrench, etc.

4. Install disc brake caliper.

Caliper pin bolt tightening torque	18 – 26 N·m (1.8 – 2.6 kg·m) (13.0 – 18.5 lb·ft)
------------------------------------	--

5. Install front wheels and tighten wheel nuts by specified torque.

Tightening torque for wheel (hub) nuts	N·m	kg·m	lb·ft
	58 – 80	5.0 – 8.0	36.5 – 57.5

6. Dismount the vehicle from the lift, and be sure to carry out the operation check of free wheeling hub mentioned in the next item "post-assembly confirmation".

[Post-assembly confirmation]

Confirm automatic free wheeling hub for proper operation in the sequence described below.

1. Set transfer gear shift lever to 4H or 4L position, and move the car 2 m (6.5 ft) or more forward slowly.
2. Remove each free wheeling hub cover at right and left, and confirm that hub body spline is properly engaged with the slide gear spline positioned just inside the hub body (i.e., that automatic free wheeling hub is in locked condition).

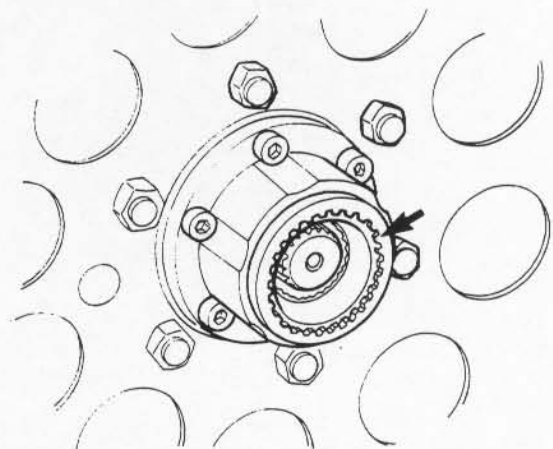


Fig. 17-5-30

3. Set transfer gear shift lever to 2H position, and move the car 2 m (6.5 ft) or more backward slowly.
4. Confirm that slide gear of each automatic free wheeling hub at right and left is slid toward hub body-inside so that slide gear spline is completely disengaged from hub body spline (i.e., each automatic free wheeling hub is in the free condition). (Fig. 17-5-31)

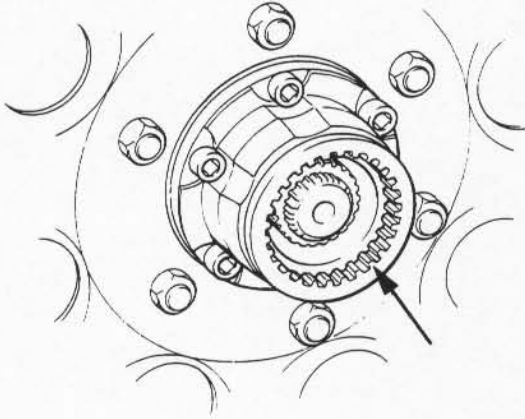


Fig. 17-5-31

5. Check to ensure that free wheeling hub locks and unlocks properly by reversing car moving directions described in steps 1 to 4. (It should lock when moving backward and unlock when moving forward.)

If any malfunction is found as to the confirmation in the above steps 1 through 5, the method of assembly is responsible for the malfunction. Therefore, conduct assembly again.

6. Make sure the automatic free wheeling hub cap has an O-ring correctly installed, and assemble this cap firmly to the free wheeling hub body using an oil filter wrench, etc. (The cap should not be able to be loosened by hand.)

NOTE:

While the automatic free wheeling hub cap is removed, strict care should be taken that foreign matters, such as dust, mud, etc., do not get into the free wheeling hub interior.

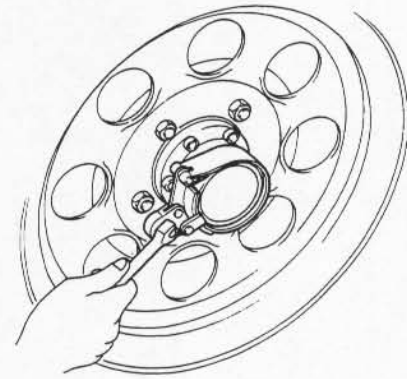


Fig. 17-5-32

Maintenance Services

Confirm automatic free wheeling hub for proper operation periodically according to the procedure described previously in "post-assembly confirmation". If automatic free wheeling hub shows any malfunction, replace it with new one.