

9-A REAR AXLE SHAFT

9-A-1. Removing Rear Axle Shaft
 Raise the rear end of the vehicle and support the rear axle housing with stands.

1. Remove the wheel.
2. Remove the brake drum.

Mount a dial indicator and check the bearing side using the axle shaft end play.

Standard side play: 0 - 0.7 mm
 (0 - 0.004 in)



Fig. 9-1

REAR AXLE

- 9-A. REAR AXLE SHAFT 9 : 1
 - 9-A-1. Removing Rear Axle Shaft 9 : 1
 - 9-A-2. Disassembling Rear Axle Shaft 9 : 2
 - 9-A-3. Inspecting Rear Axle Shaft and Bearing 9 : 3
 - 9-A-4. Assembling Rear Axle Shaft 9 : 3
 - 9-A-5. Installing Rear Axle Shaft 9 : 4
- 9-B. REAR AXLE REMOVAL 9 : 4
- 9-C. REAR AXLE DISASSEMBLY 9 : 4
 - 9-C-1. Removing Differential Assembly 9 : 4
 - 9-C-2. Disassembling Differential 9 : 5
 - 9-C-3. Removing Drive Pinion 9 : 5
- 9-D. REAR AXLE INSPECTION 9 : 6
 - 9-D-1. Checking Drive Pinion and Ring Gear 9 : 6
 - 9-D-2. Checking Differential Gears 9 : 6
 - 9-D-3. Checking Bearings 9 : 6
 - 9-D-4. Checking Collapsible Spacer 9 : 7
 - 9-D-5. Checking Oil Seal 9 : 7
 - 9-D-6. Checking Companion Flange 9 : 7
- 9-E. REAR AXLE ASSEMBLY 9 : 7
 - 9-E-1. Adjusting Drive Pinion 9 : 7
 - 9-E-2. Assembling Drive Pinion 9 : 9
 - 9-E-3. Assembling Differential 9 : 9
 - 9-E-4. Installing Differential 9 : 11
 - 9-E-5. Adjusting Backlash 9 : 11
- 9-F. REAR AXLE INSTALLATION 9 : 13

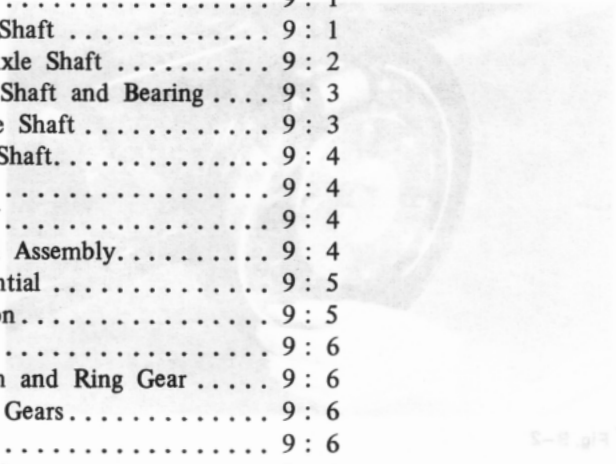


Fig. 9-2

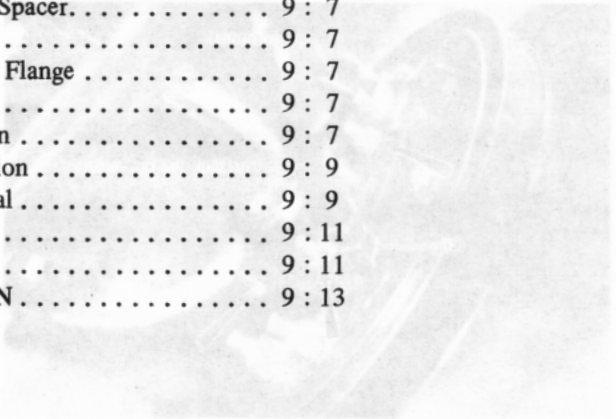


Fig. 9-3

9. Remove the axle shaft and backing plate assembly by using the puller (49 0133 030A) and attachment (49 8201 031) (49 8201 031)



Fig. 9-4

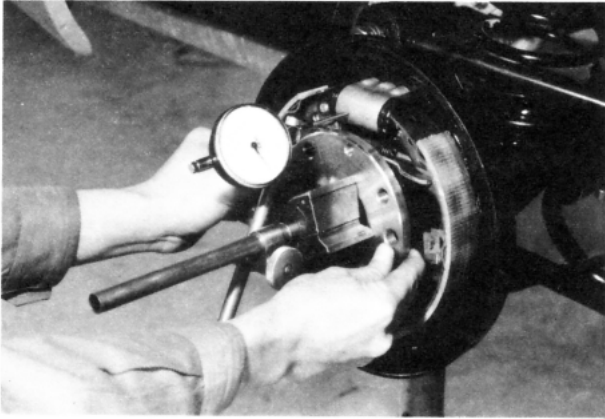


Fig. 9-1

9-A. REAR AXLE SHAFT

9-A-1. Removing Rear Axle Shaft

Raise the rear end of the vehicle and support the rear axle housing with stands.

1. Remove the wheel.
2. Remove the brake drum.

Mount a dial indicator and check the bearing side play by measuring the axle shaft end play.

Standard side play: 0 ~ 0.1 mm
(0 ~ 0.004 in)



Fig. 9-2

3. Remove the brake shoe return springs.
4. Remove the brake shoe assembly.

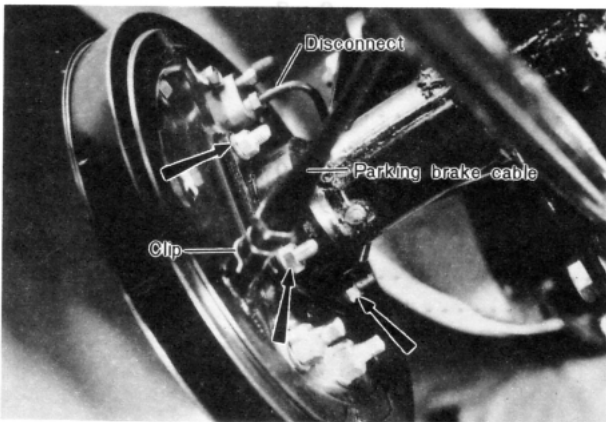


Fig. 9-3

5. Remove the backing plate attaching nuts.
6. Remove the parking brake cable clip.
7. Disconnect the parking brake cable.
8. Disconnect the brake pipe.

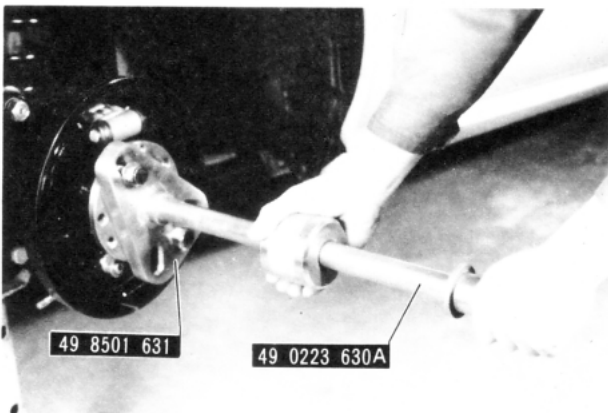


Fig. 9-4

9. Remove the axle shaft and backing plate assembly by using the puller (49 0223 630A) and attachment (49 8501 631).

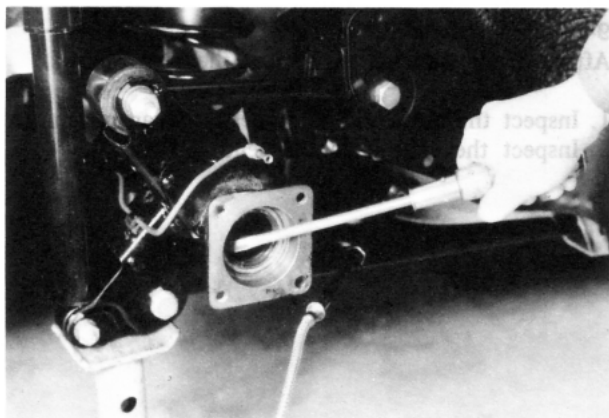


Fig. 9-5

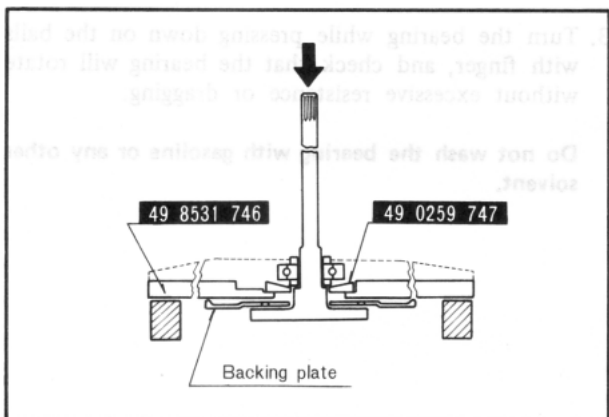


Fig. 9-6

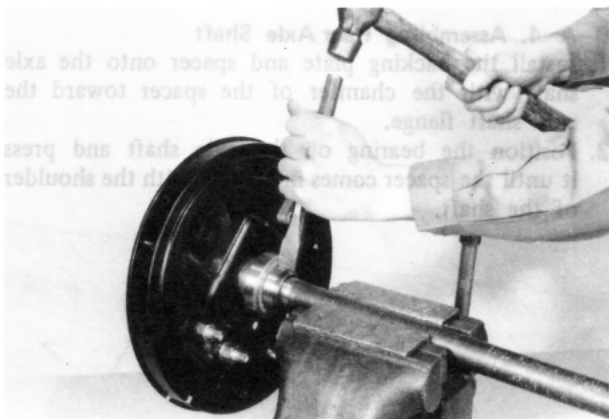


Fig. 9-7

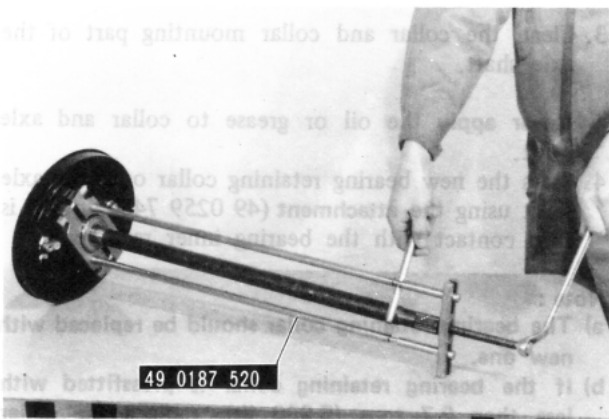


Fig. 9-8

10. Remove the oil seal.
Do not remove unless the oil seal is necessary to replace.

9-A-2. Disassembling Rear Axle Shaft
Using the bearing separator (49 8531 746) and attachment (49 0259 747), support the spacer and press the axle shaft out of the collar and bearing.

- Note :**
- a) If the bearing separator and attachment are not available, grind off the part of bearing retaining collar and cut it with a chisel, taking care not to damage the axle shaft.
 - b) Remove the bearing with the bearing puller (49 0187 520).

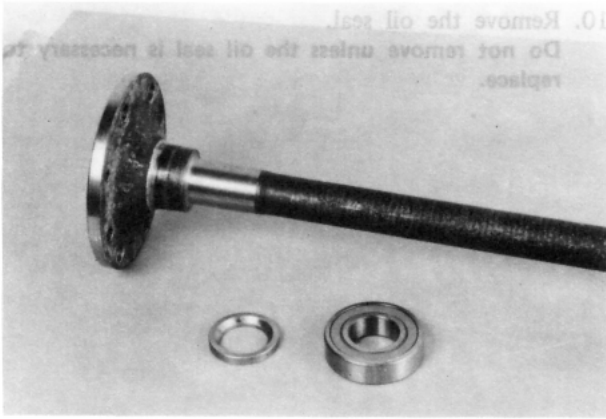


Fig. 9-9



Fig. 9-10

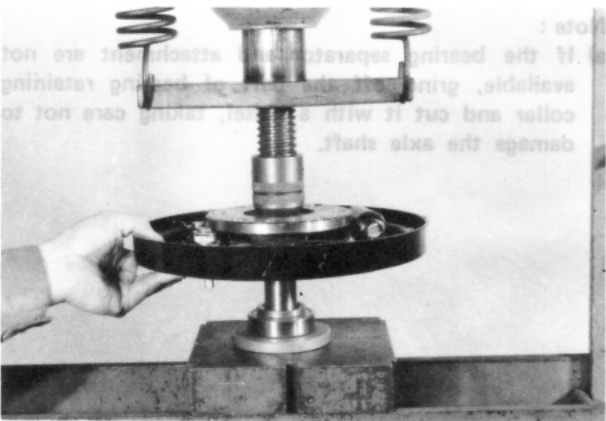


Fig. 9-11

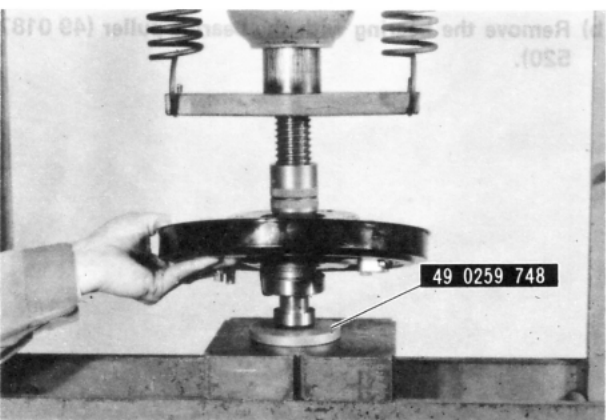


Fig. 9-12

9-A-3. Inspecting Rear Axle Shaft and Bearing
After cleaning the parts, inspect them as follows.

1. Inspect the shaft end for excessive wear or damage.
2. Inspect the axle shaft for bend.



3. Turn the bearing while pressing down on the balls with finger, and check that the bearing will rotate without excessive resistance or dragging.

Do not wash the bearing with gasoline or any other solvent.



9-A-4. Assembling Rear Axle Shaft

1. Install the backing plate and spacer onto the axle shaft with the chamfer of the spacer toward the axle shaft flange.
2. Position the bearing on the axle shaft and press it until the spacer comes in contact with the shoulder of the shaft.



3. Clean the collar and collar mounting part of the axle shaft.

Never apply the oil or grease to collar and axle shaft.

4. Press the new bearing retaining collar onto the axle shaft using the **attachment** (49 0259 748) until it is firm contact with the bearing inner race.

Note :

- a) The bearing retaining collar should be replaced with new one.
- b) If the bearing retaining collar is pressfitted with less than 2.7 tons (5.900 lb), replace the collar with a another one.

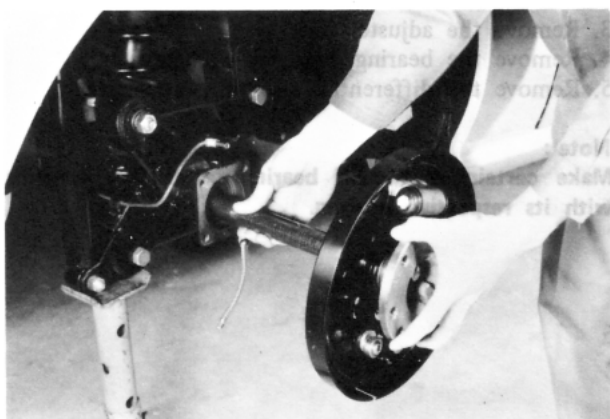


Fig. 9-13

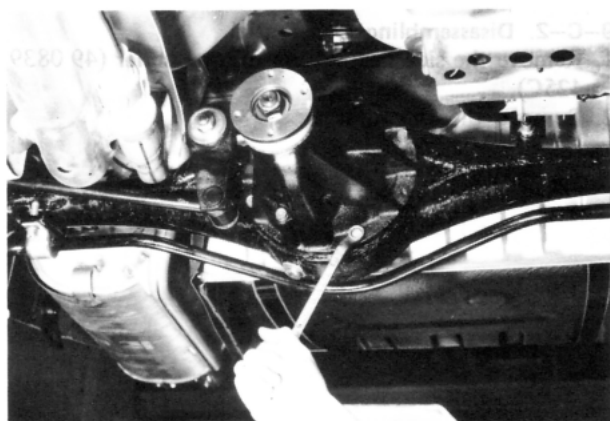


Fig. 9-14

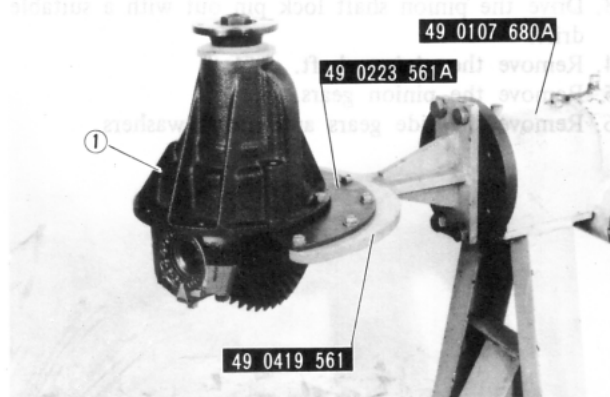


Fig. 9-15

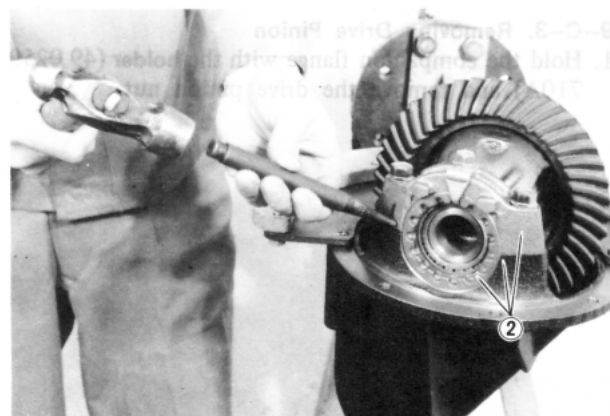


Fig. 9-16

9-A-5. Installing Rear Axle Shaft

1. Install the oil seal into the axle housing with installer (49 0180 321A).
2. Apply the grease to oil seal lip.
3. Install the rear axle shaft assembly in the reverse order of removing, being careful not to damage the oil seal lip.

9-B. REAR AXLE REMOVAL

Jack up the vehicle until the rear wheels are clear the ground and support it with stands.

After draining the oil with the wrench (49 0259 730), remove the following parts.

1. Rear axle shaft (refer to Par. 9-A-1)
2. Propeller shaft (refer to Par. 8-A)
3. Rear axle

9-C. REAR AXLE DISASSEMBLY

9-C-1. Removing Differential Assembly

1. Mount the rear axle assembly on the engine stand (49 0107 680A) and the attachments (49 0419 561 and 49 0223 561A).
2. Apply identification punch marks on the carrier, differential bearing caps and adjusters for reassembly purpose.

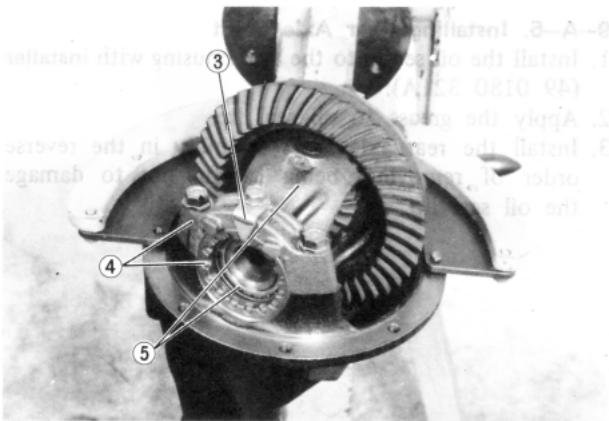


Fig. 9-17

3. Remove the adjuster lock plates.
4. Remove the bearing caps and adjusters.
5. Remove the differential assembly and bearings.

Note :

Make certain that each bearing outer race remains with its respective bearing.

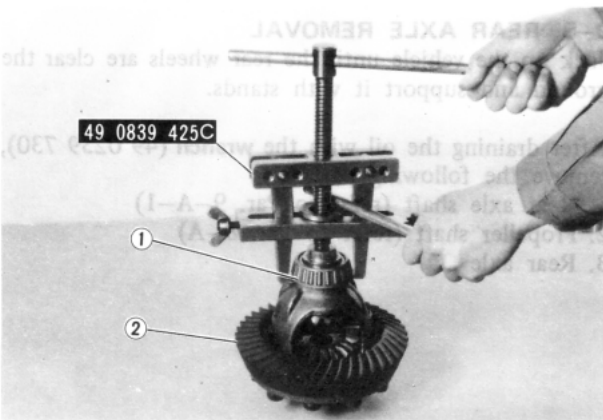


Fig. 9-18

9-C-2. Disassembling Differential

1. Remove the side bearings by using a puller (49 0839 425C).
2. Remove the ring gear.



Fig. 9-19

3. Drive the pinion shaft lock pin out with a suitable drift.
4. Remove the pinion shaft.
5. Remove the pinion gears.
6. Remove the side gears and thrust washers.



Fig. 9-20

9-C-3. Removing Drive Pinion

1. Hold the companion flange with the holder (49 0259 710A) and remove the drive pinion nut.



Fig. 9-21

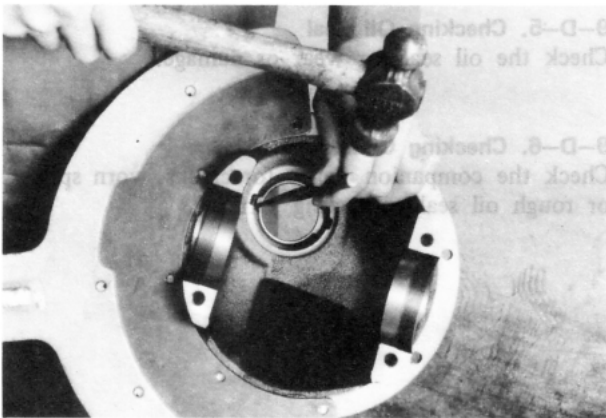


Fig. 9-22



Fig. 9-23



Fig. 9-24

2. Remove the companion flange.
3. Remove the drive pinion, spacer, rear bearing and collapsible spacer assembly from the carrier.
4. Remove the oil seal and front bearing.

5. If necessary, remove the bearing outer races by using a drift in slots provided for this purpose.

9-D. REAR AXLE INSPECTION

Wash the disassembled parts and inspect them on the following points. Replace any part found defective.

9-D-1. Checking Drive Pinion and Ring Gear

Check the drive pinion for damaged or excessively worn teeth, damaged bearing journals and splines. Inspect the ring gear for worn or chipped teeth. If any of above conditions is found, replace both drive pinion and ring gear as they are available only in set.

9-D-2. Checking Differential Gears

Check the differential side gears and pinion gears for cracks, chipped teeth or any damage.

9-D-3. Checking Bearings

Check the differential bearings and pinion bearings for wear, flaking or any damage.

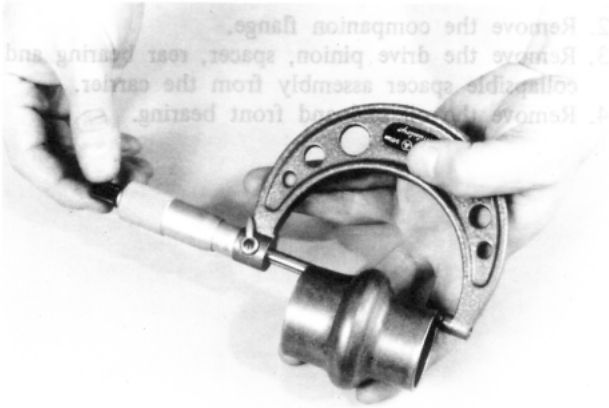


Fig. 9-25

9-D-4. Checking Collapsible Spacer

Measure the length of the collapsible spacer with a micrometer.

Standard length: 57 ± 0.15 mm (2.244 ± 0.006 in)



Fig. 9-26

9-D-5. Checking Oil Seal

Check the oil seal for wear or damage.

9-D-6. Checking Companion Flange

Check the companion flange for cracks, worn splines, or rough oil seal contacting surface.

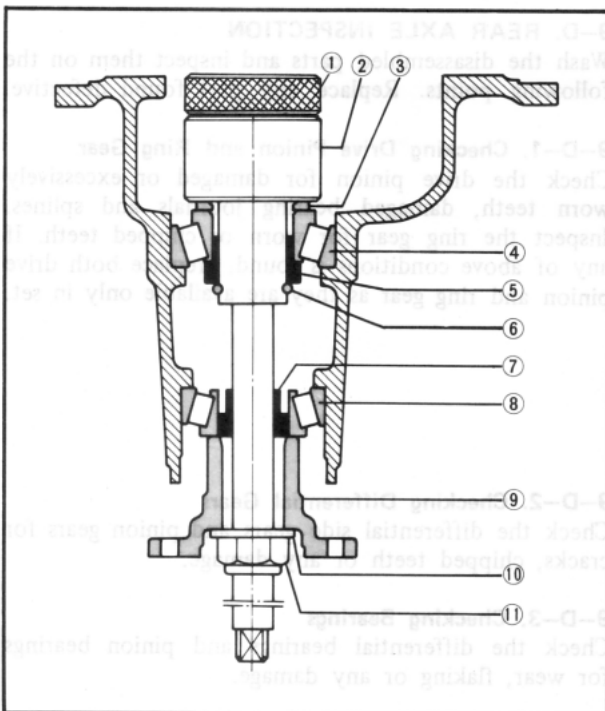


Fig. 9-27

- | | |
|-------------------------------------|---------------------------|
| 1. Gauge block (49 0305 555) | 6. "O" ring |
| 2. Drive pinion model (49 8531 565) | 7. Coller A (49 8531 567) |
| 3. Spacer | 8. Front bearing |
| 4. Rear bearing | 9. Companion flange |
| 5. Coller B (49 8531 568) | 10. Washer |
| | 11. Nut |

9-E. REAR AXLE ASSEMBLY

9-E-1. Adjusting Drive Pinion

1. Make certain that the differential bearing support bore are free of dirt and burrs.
2. Install the front and rear bearing outer races, which are to be used actually, into the differential carrier.
3. Install a spacer (3), rear bearing (4) and **coller B** (49 8531 568) on the **drive pinion model** (49 8531 565) and secure them with "O" ring (6).
4. Install them in the carrier.

Note :

- a) **Never use the collapsible spacer.**
 - b) **The head portion of the drive pinion model is screw in type, so you make sure that the head has no looseness.**
5. Install the front bearing (8), **coller A** (49 8531 567), companion flange (9) and washer (10).
 6. Tighten the nut so that the drive pinion model turns smoothly.

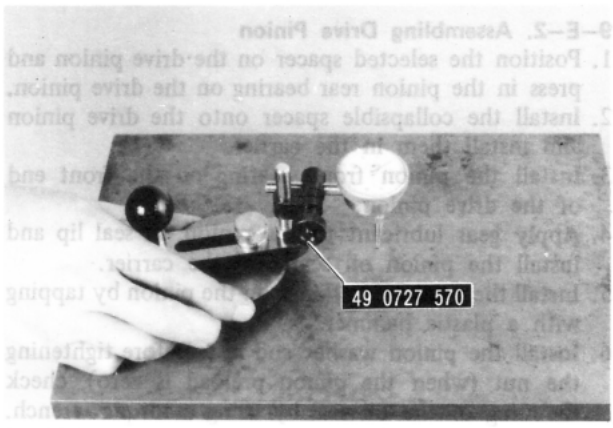


Fig. 9-28



Fig. 9-29

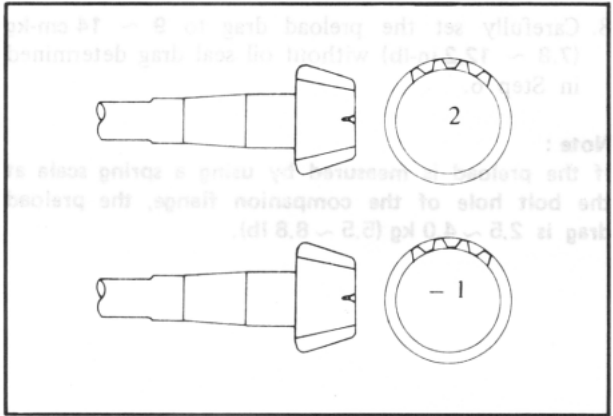


Fig. 9-30

Identification mark	Thickness
08	3.08 mm (0.1213 in)
11	3.11 mm (0.1224 in)
14	3.14 mm (0.1236 in)
17	3.17 mm (0.1248 in)
20	3.20 mm (0.1260 in)
23	3.23 mm (0.1271 in)
26	3.26 mm (0.1283 in)
29	3.29 mm (0.1295 in)
32	3.32 mm (0.1307 in)
35	3.35 mm (0.1319 in)
38	3.38 mm (0.1331 in)
41	3.41 mm (0.1343 in)
44	3.44 mm (0.1354 in)
47	3.47 mm (0.1366 in)

7. Install a dial indicator to the **gauge body** (49 0727 570). Place the gauge body on the surface plate and set up the dial indicator to "Zero".

8. Place the **gauge block** (49 0305 555) on the drive pinion model and carefully place the gauge body adjusted in Step 7 on the gauge block so that the feeler of the indicator comes in contact with the lowest portion of the differential bearing support bore.

The measurement should be taken on each bearing support bore.

9. Record an average of readings.

- 1) If the average is on plus (+) side, use a spacer which is thicker by the plus value than the spacer used in Step 3.
- 2) If the average is on minus (-) side, use a spacer which is thinner by the minus value than the spacer used in Step 3.

10. Remove the gauge body and dial indicator, and check zero setting on the surface plate to make sure this setting was not disturbed by handling.

11. In order to compensate for all of the machining variables, the pinion has number recorded in hundredth millimeters on the pinion face of tapered end.

Example :

$$2 = + 0.02 \text{ mm } (+ 0.0008 \text{ in})$$

$$-1 = - 0.01 \text{ mm } (- 0.0004 \text{ in})$$

1) If the pinion is marked a number, subtract the specified amount on the pinion face of tapered end from the amount determined in Step 9.

2) If the pinion is marked "-" (minus) number, add the specified amount on the pinion face of tapered end to the amount determined in Step 9.

12. Finally select the pinion spacer within the tolerance of $\pm 0.03 \text{ mm } (\pm 0.0012 \text{ in})$ from the left table.

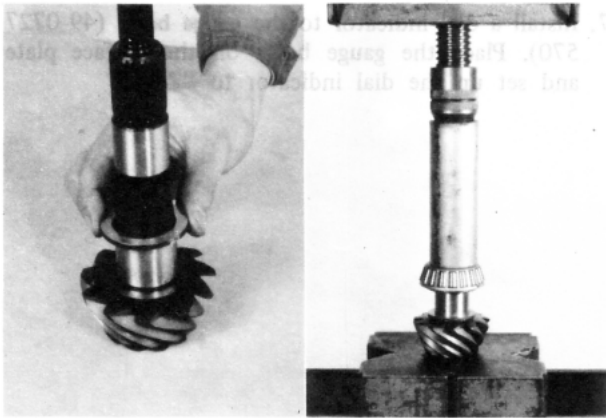


Fig. 9-31

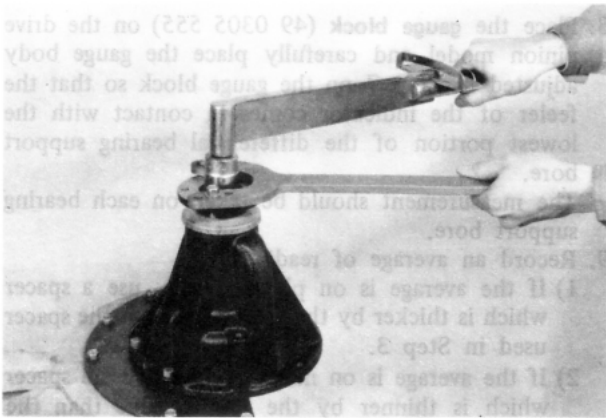


Fig. 9-32



Fig. 9-33



Fig. 9-34

9-E-2. Assembling Drive Pinion

1. Position the selected spacer on the drive pinion and press in the pinion rear bearing on the drive pinion.
2. Install the collapsible spacer onto the drive pinion and install them in the carrier.
3. Install the pinion front bearing on the front end of the drive pinion.
4. Apply gear lubricant to the pinion oil seal lip and install the pinion oil seal into the carrier.
5. Install the companion flange on the pinion by tapping with a plastic hammer.
6. Install the pinion washer and nut. Before tightening the nut (when the pinion preload is zero), check the drag of the oil seal by using a torque wrench.
7. Tighten the pinion nut to **13 m-kg (94 ft-lb)** and check the preload.

Note :

The pinion nut should be tightened only a little at a time and preload should be checked after each slight amount of tightening. The maximum tightening torque of the nut is **18 m-kg (130 ft-lb)**.

If the specified preload is not obtained after tightening the nut to the maximum torque of **18 m-kg (130 ft-lb)**, replace the collapsible spacer with a new one.

8. Carefully set the preload drag to **9 ~ 14 cm-kg (7.8 ~ 12.2 in-lb)** without oil seal drag determined in Step 6.

Note :

If the preload is measured by using a spring scale at the bolt hole of the companion flange, the preload drag is **2.5 ~ 4.0 kg (5.5 ~ 8.8 lb)**.

9-E-3. Assembling Differential

1. Install the thrust washers on each differential side gear and install these in the gear case.

16	1.6 mm (0.125 in)
17	1.7 mm (0.134 in)
18	1.8 mm (0.142 in)
19	1.9 mm (0.149 in)
20	2.0 mm (0.157 in)
21	2.1 mm (0.165 in)
22	2.2 mm (0.173 in)
23	2.3 mm (0.181 in)
24	2.4 mm (0.189 in)
25	2.5 mm (0.197 in)
26	2.6 mm (0.205 in)
27	2.7 mm (0.213 in)
28	2.8 mm (0.221 in)
29	2.9 mm (0.229 in)
30	3.0 mm (0.237 in)
31	3.1 mm (0.245 in)
32	3.2 mm (0.253 in)
33	3.3 mm (0.261 in)
34	3.4 mm (0.269 in)
35	3.5 mm (0.277 in)
36	3.6 mm (0.285 in)
37	3.7 mm (0.293 in)
38	3.8 mm (0.301 in)
39	3.9 mm (0.309 in)
40	4.0 mm (0.317 in)
41	4.1 mm (0.325 in)
42	4.2 mm (0.333 in)
43	4.3 mm (0.341 in)
44	4.4 mm (0.349 in)
45	4.5 mm (0.357 in)



Fig. 9-35

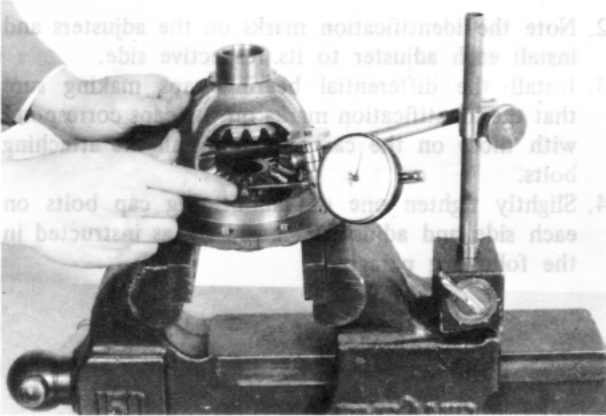


Fig. 9-36

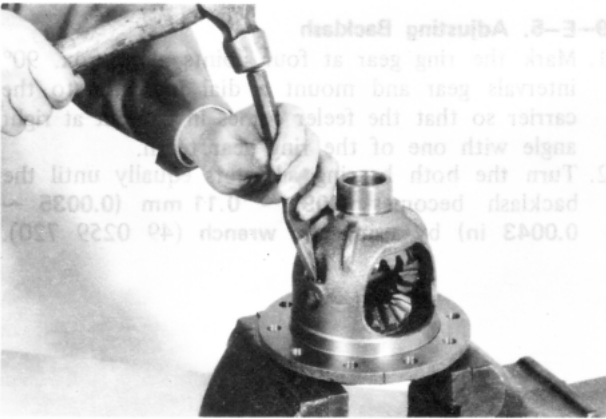


Fig. 9-37

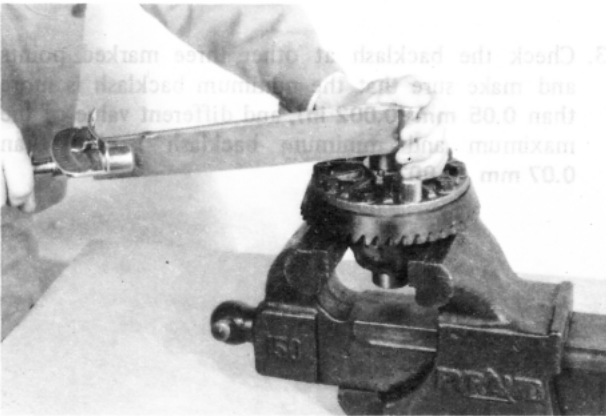


Fig. 9-38

2. Through the openings of the gear case, insert each of two pinion gears exactly **180 degrees** opposite each other.
3. Rotate the gears **90 degrees** so that the pinion shaft holes of the case come into alignment with the holes in the pinion gears.
4. Insert the pinion shaft through the case and pinion gears.



5. Check and adjust the backlash of the side gear and pinion gear by inserting a proper thickness of thrust washer.

Standard backlash: 0 ~ 0.1 mm (0 ~ 0.004 in)

Thrust washer thicknesses:

Identification mark	Thickness
0	2.0 mm (0.0787 in)
05	2.05 mm (0.0807 in)
1	2.1 mm (0.0827 in)
15	2.15 mm (0.0846 in)
2	2.2 mm (0.0866 in)

6. Install the lock pin to secure the pinion shaft. Stake the lock pin into position with a punch to prevent it from working out.



7. Install the ring gear to the case and torque the bolts to **7.0 ~ 8.5 m·kg (51 ~ 61 ft·lb)**.
8. Press in each differential bearing to the gear case.
9. Install the differential bearing outer races to their respective bearings.



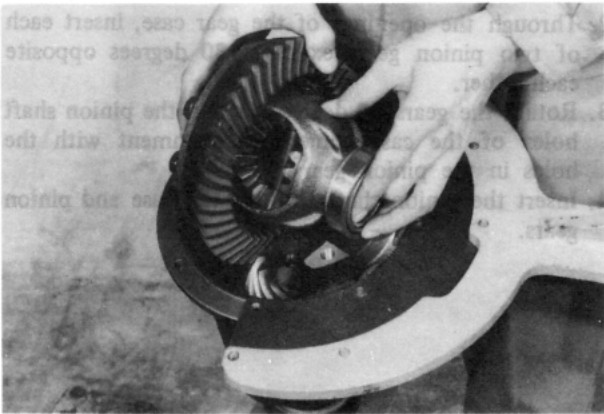


Fig. 9-39

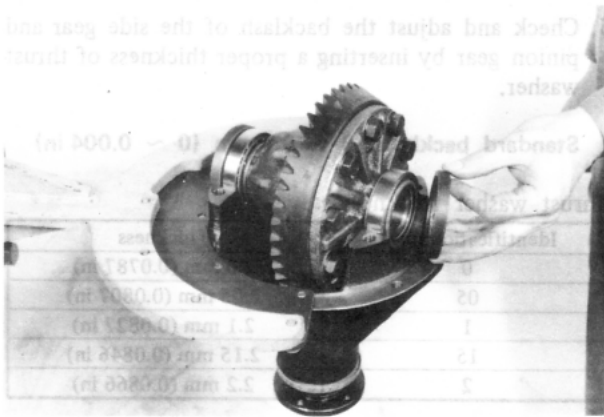


Fig. 9-40

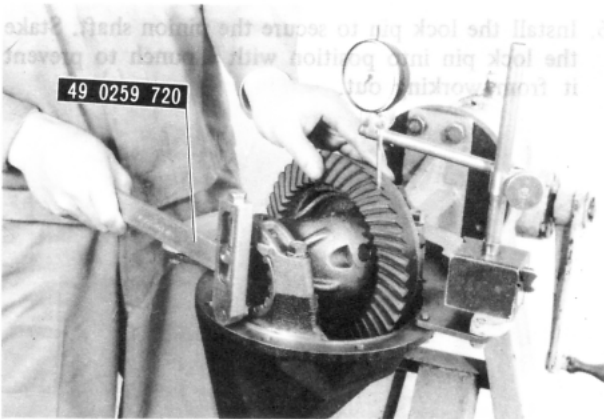


Fig. 9-41

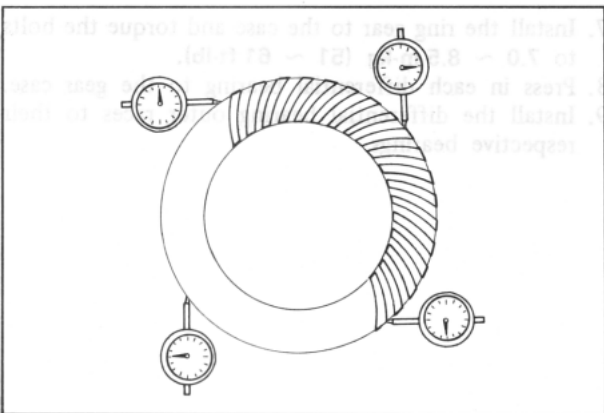


Fig. 9-42

9-E-4. Installing Differential

1. Install the differential gear assembly in the carrier.

2. Note the identification marks on the adjusters and install each adjuster to its respective side.
3. Install the differential bearing caps making sure that the identification marks on the caps correspond with those on the carrier and install the attaching bolts.
4. Slightly tighten one of the bearing cap bolts on each side and adjust the backlash, as instructed in the following paragraph.

9-E-5. Adjusting Backlash

1. Mark the ring gear at four points at approx. 90° intervals gear and mount a dial indicator to the carrier so that the feeler comes in contact at right angle with one of the ring gear teeth.
2. Turn the both bearing adjusters equally until the backlash becomes **0.09 ~ 0.11 mm (0.0035 ~ 0.0043 in)** by using the **wrench (49 0259 720)**.

3. Check the backlash at other three marked points and make sure that the minimum backlash is more than **0.05 mm (0.002 in)**, and different value of the maximum and minimum backlash is less than **0.07 mm (0.0028 in)**.

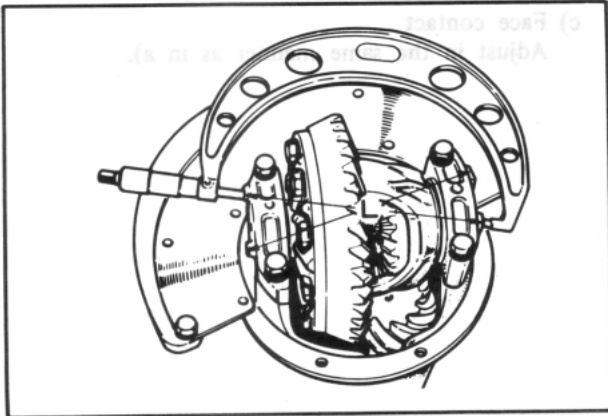


Fig. 9-43

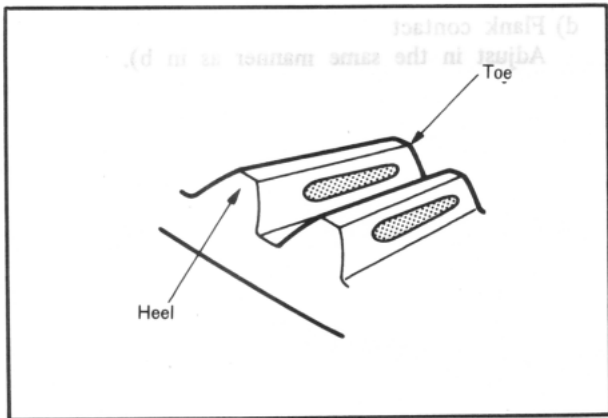


Fig. 9-44

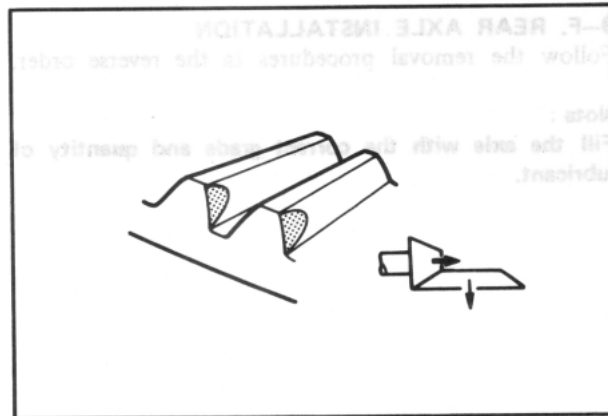


Fig. 9-45

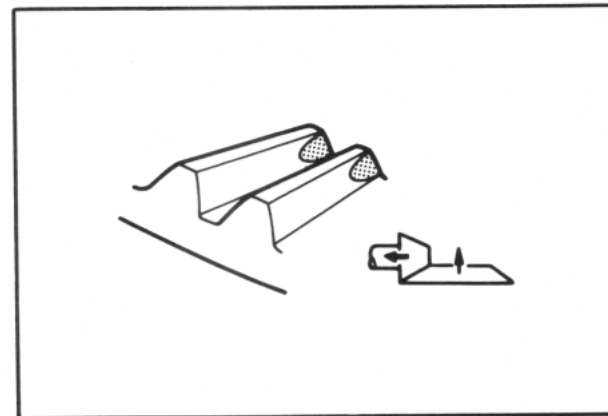


Fig. 9-46

4. After adjusting the backlash, tighten the adjusters equally until the distance between both pilot sections on bearing caps becomes **185.428 ~ 185.5 mm (7.3004 ~ 7.3033 in)**.

Note :

When adjusting the differential bearing preload, care must be taken not to affect the backlash of the drive pinion and ring gear.

5. Tighten the bearing cap bolts to a torque of **3.8 ~ 5.3 m-kg (27 ~ 38 ft-lb)**.
6. Install the adjuster lock plates on the bearing caps to prevent the adjusters from loosening.

7. Check the tooth contact of the ring gear and pinion by applying a thin coat of red lead on both sides of about six or eight of ring gear teeth and rotating the ring gear few times forward and backward. If the pinion position and backlash have been correctly set, the contact pattern should be obtained as shown in figure.

If faulty tooth contact pattern is obtained, it can be adjusted in the following manners.

a) Heel contact

Select pinion spacer that will bring the drive pinion closer to ring gear.

b) Toe contact

Select pinion spacer that will shift the drive pinion away from ring gear.

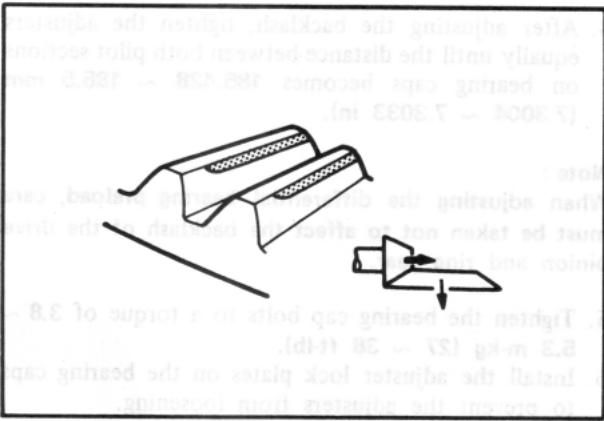


Fig. 9-47

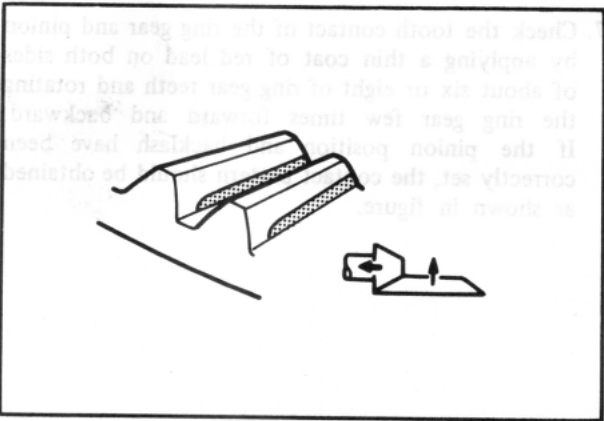


Fig. 9-48

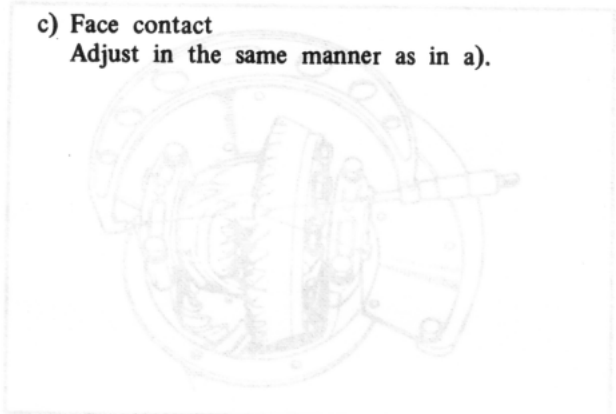


Fig. 9-43

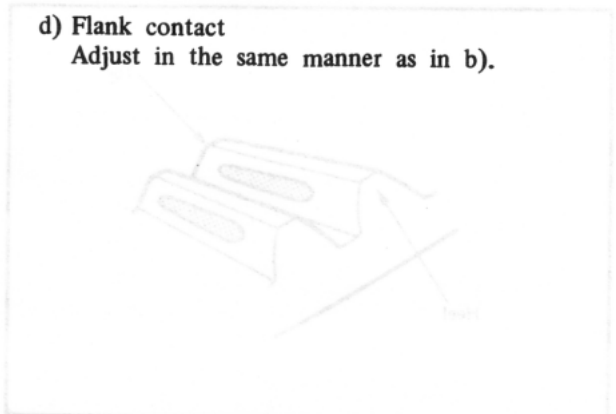


Fig. 9-44

9-F. REAR AXLE INSTALLATION

Follow the removal procedures in the reverse order.

Note :

Fill the axle with the correct grade and quantity of lubricant.

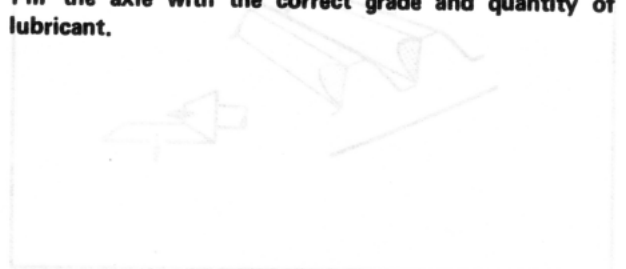


Fig. 9-45



Fig. 9-46