

REAR AXLE & REAR SUSPENSION

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DESCRIPTION

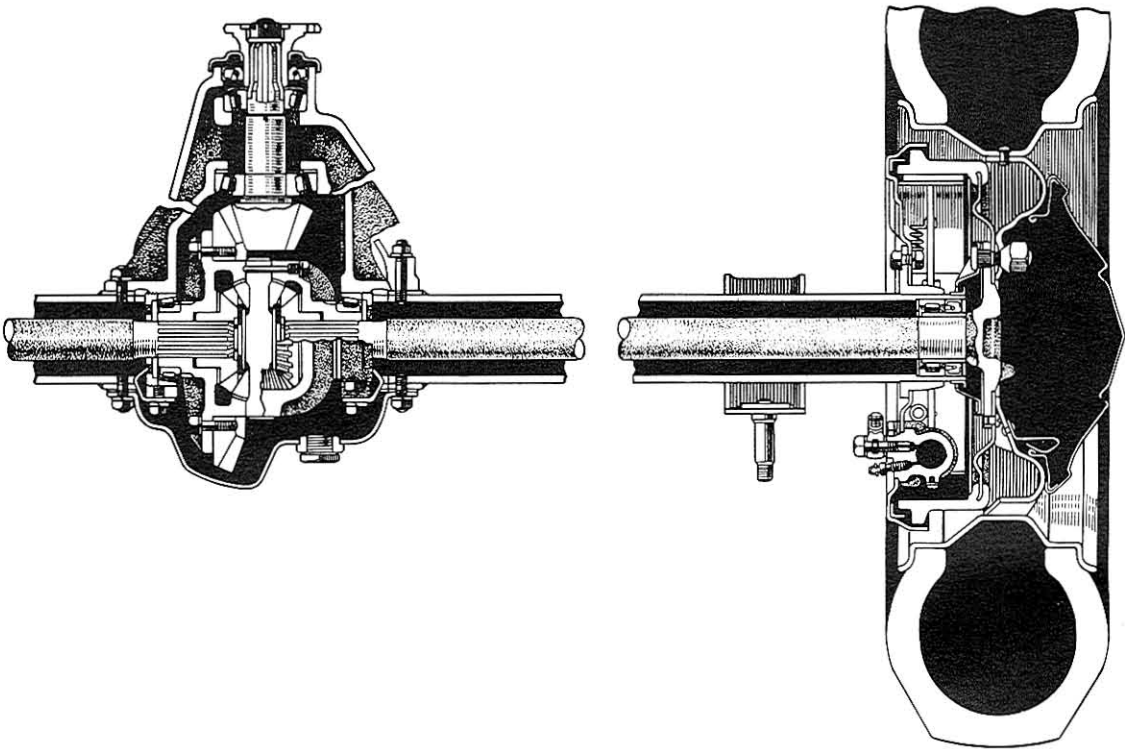


Fig.4-1 Cross Sectional View of Rear Axle

G2404

The rear axle shaft is a semi-floating, banjo-housing, hypoid gear, hotchkiss drive type.

The rear driving system is of the hotchkiss type, and the motion is transmitted to the frame through the leaf springs.

The rear suspension consists mainly of the leaf springs and the double acting telescopic type hydraulic shock absorbers. The leaf springs and shock absorbers are mounted through the rubber bushings.

The rear axle housing is of a steel plate construction, and the brake backing plates are installed at the ends of the axle housing. Leaf spring seats are welded onto the lower side of the axle housing.

The differential carrier is mounted onto the axle housing, and the differential gears are of hypoid type to obtain the most efficient torque and also the durability. As the differential gears are of hypoid type, it requires the use of hypoid gear lubricant. This differential carrier internal parts consist of the ring gear, drive pinion, side gears, differential pinions with respective bearings.

The outer end of the rear axle shaft is mounted in the axle housing with roller bearing, while the inner end is splined to mate with the differential side gear splines.

Specifications:

Axle housing type	Banjo	
Rear axle type	Semi-floating	
Differential:		
Gear type	Hypoid	
Reduction ratio	3.7	4.11
Number of gear teeth:		
Drive pinion	10	9
Ring gear	37	37
Differential pinion	10	10
Differential side gear	16	16
Lubricant capacity	Hypoid gear oil SAE 90 2.5 liters (2.6 US qts., 2.2 Imp qts)	

Rear Spring

	FJ40(L)	FJ43(L)	FJ45(L)	FJ55(L)
Number of leaf springs	6	6+3	6+3	7+1
Span of spring at no load	1100 mm (43.3")	1310 mm (51.2")	1314 mm (51.7")	1200 mm (47.2")
Width	70 mm (2.76")	←	←	←
Thickness	6 mm (0.24")	7 mm (0.28")	←	←
Thickness (Sub-leaf)	_____	11 mm (0.43")	←	13 mm (0.51")
Camber at no load	160 mm (7.87")	168 mm (6.61")	203 mm (7.99")	118 mm (4.64")
Spring constant	4.6 kg/mm (258 lb/in)	5.2 kg/mm (291 lb/in)	←	7.7 kg/mm (431 lb/in)
Spring constant (Total)	_____	11.2 kg/mm (627 lb/in)	11.1 kg/mm (622 lb/in)	10.7 kg/mm (600 lb/in)

Rear Shock Absorber

	FJ40(L)	FJ43(L)	FJ45(L)	FJ55(L)
Stroke	200 mm (7.87")	230 mm (9.06")	←	←
Maximum length	508 mm (20.00")	568 mm (22.36")	←	←
Minimum length	308 mm (12.13")	338 mm (13.40")	←	←
Damping force at 0.3 m/sec:				
In compression	29 kg (63.8 lb)	36 kg (29.2 lb)	←	←
In rebound	97 kg (213 lb)	110 kg (242 lb)	←	←

TROUBLE SHOOTING

An unusual noise is usually the first indication of improper functioning of the axle driving parts. Although some mechanical failures of the rear axle are relatively easy to locate, noises in the rear axle are a little more difficult to diagnose and repair. When noise is experienced in the rear axle assembly, it is advisable to make a thorough test and search for the location of the noise. Noises which seem to come from the rear axle may be caused by some other units such as engine, transmission, transfer case, tire, or other parts of the vehicle. These noises originating from other places cannot be corrected by adjustment and replacement of parts of the rear axle assembly.

Even an experienced mechanic sometimes fails to make a correct diagnosis, so that the following methods of locating troubles should be carefully observed when necessary repairs arise in the rear axle.

Caution: To make the rear axle noise diagnosis, the vehicle should be road tested on a smooth level road. Before road-testing the vehicle, make sure that the tire inflation and the rear axle lubricant level are normal.

Symptoms & Probable Causes

Remedies

1. Excessive rear axle noise.

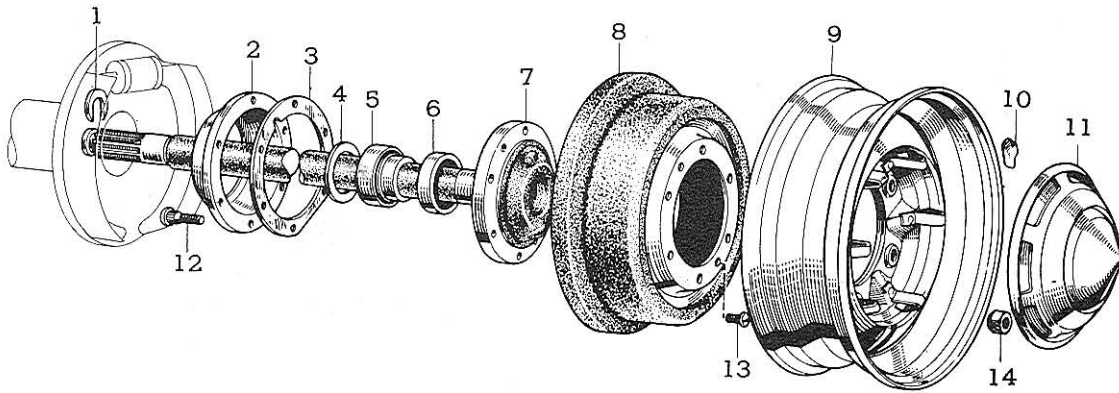
The rear axle noise can be classified into two types; the gear noise, and the bearing noise. It is the first step of rear axle trouble diagnosis to quickly differentiate these two types of noise.

Gear noise can be recognized since it produces a cycling pitch, and tends to peak in a narrow speed range, while the bearing noise will tend to remain constant in pitch, and produces a rough whine.

- | | |
|--|---|
| a. Worn or damaged drive pinion bearing/s | Replace |
| b. Worn or damaged differential case bearing/s | Replace |
| c. Worn or damaged rear axle shaft bearing/s | Replace |
| d. No pre-load of drive pinion bearings | Adjust |
| e. Incorrect adjustment of drive pinion, and ring gear | Check tooth pattern and backlash or replace |
| f. Worn splines of side gear and rear axle shaft | Replace |
| g. Worn or damaged teeth of pinion and side gear | Replace |
| h. Excessive backlash from worn side gear and pinion gear thrust washers | Replace |
| i. Defective tires | Replace |
| j. Incorrect assembling of propeller shaft | Correct propeller shaft |

<u>Symptoms & Probable Causes</u>	<u>Remedies</u>
2. Differential heats	
a. Excessive pre-load of drive pinion bearings	Adjust or replace
b. Too little backlash of drive pinion, and ring gear	Adjust
c. Lack of lubricant or improper grade lubricant	Replenish or replace with proper grade lubricant
3. Lubricant leaks	
a. Damaged gasket or differential carrier or drain plug	Replace
b. Loose differential carrier attaching bolts	Tighten
c. Damaged "T" type oil seal of differential carrier or rear axle shaft	Replace
d. Damaged or worn drive pinion companion flange	Replace
e. Damaged breather plug	Repair or replace
4. Rear side inclination of car	
a. Weak leaf spring/s	Replace
b. Difference in camber of both leaf springs	Replace
c. Worn or damaged spring bushing	Replace
d. Loose U-bolt/s	Tighten
e. Broken leaf spring center bolt	Replace
5. Rear suspension noise	
a. Worn or damaged spring bushing/s	Replace
b. Damaged shock absorber	Replace
c. Loose U-bolt/s	Tighten

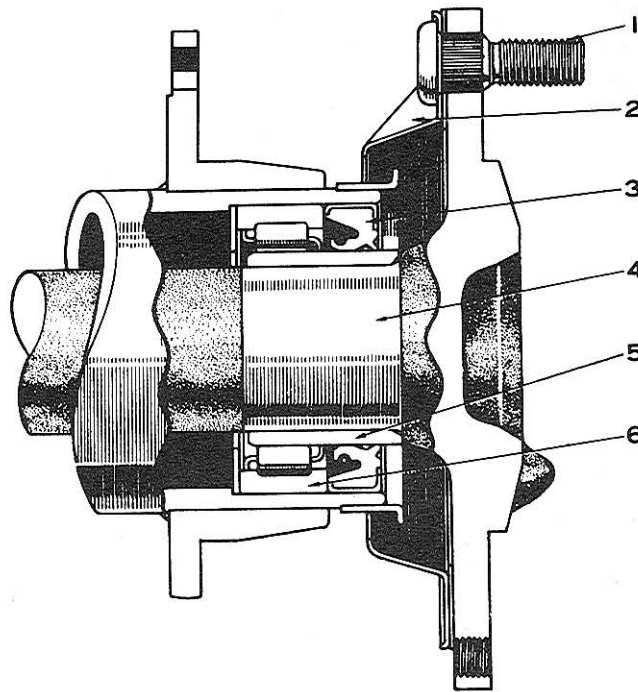
REAR AXLE SHAFT



- | | |
|-----------------------------|--------------------|
| 1. Rear axle shaft lock | 8. Brake drum |
| 2. Brake drum oil deflector | 9. Disc wheel |
| 3. Gasket | 10. Balance weight |
| 4. Washer | 11. Wheel cap |
| 5. Bearing | 12. Hub bolt |
| 6. Oil seal | 13. Drum set bolt |
| 7. Rear axle shaft | 14. Hub nut |

Fig.4-2 Rear Axle Shaft & Disc Wheel Components

G2405



1. Hub bolt
2. Oil deflector
3. Oil seal
4. Rear axle shaft
5. Bearing inner race
6. Bearing

Fig.4-3 Cross Sectional View of Axle Shaft, Bearing & Oil Seal

G2406

Removal & Disassembly

1. Pry off the wheel cap, and loosen the hub nuts.
2. Jack up the rear axle housing, and support the housing with suitable stands.
3. Remove the hub nuts, and remove the wheel.
4. Loosen and remove the brake drum set bolts, and remove the brake drum.
5. Drain the differential gear lubricant and next, remove the rear axle housing cover.
6. Loosen and remove the differential pinion shaft pin, and remove the differential pinion shaft and the shaft spacer from the differential case.

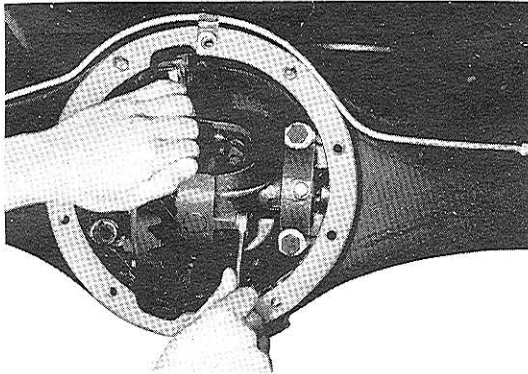


Fig.4-4 Removing Differential Pinion Shaft Pin V5091

7. Remove the rear axle shaft lock from the axle shaft.
Tap the rear axle shaft flange towards the differential with a mallet to facilitate the axle shaft lock removal.
8. Pull the rear axle shaft out of the axle housing.
9. Using the Rear Wheel Bearing Puller 09514-35010, remove the axle shaft bearing together with the oil seal.

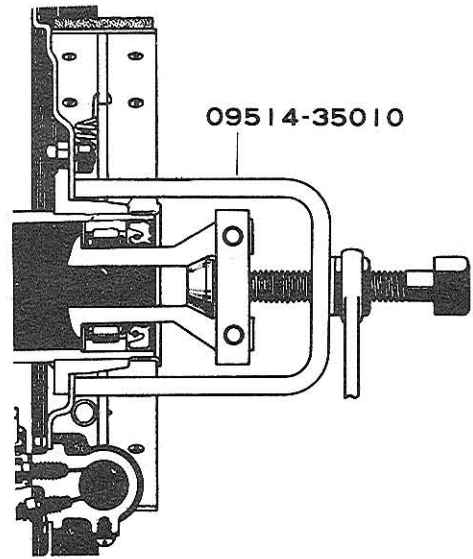


Fig.4-5 Bearing & Oil Seal Removal G2407

Inspection

Wash and clean the parts, and inspect the followings.

If any part found defective, replace as necessary.

1. Check the rear axle shaft for bend, crack or other damage.
2. Check the axle shaft splines for burrs, wear or damage.
Inspect the groove of the axle shaft for shaft lock installation for wear, or damage.
3. Inspect the machined surface of the axle shaft and the axle housing for rough spots or other irregularities which would affect the sealing of the oil seal.
4. Check the bearing for wear, abnormal noises or damage.
When replacing the bearing, also the bearing inner race on the axle shaft should be replaced.
To remove the bearing inner race, grind the bearing inner race with a grinder, and cut it with a chisel.

Installation

Follow the removal procedures in the reverse order.

1. To install the axle shaft bearing into the axle housing, use the Rear Wheel Bearing Replacer 09515-35010, and rivet in the position until it is in the original position, and next, install a new oil seal with the same tool (SST).

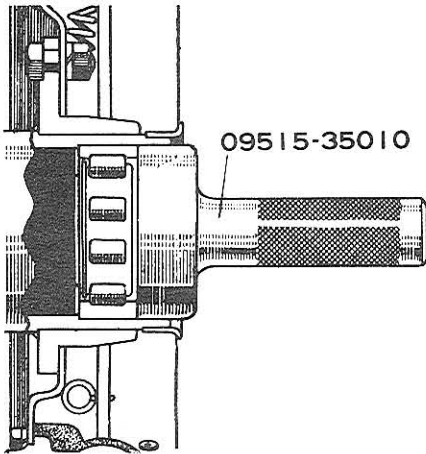


Fig.4-6 Bearing Installation G2408

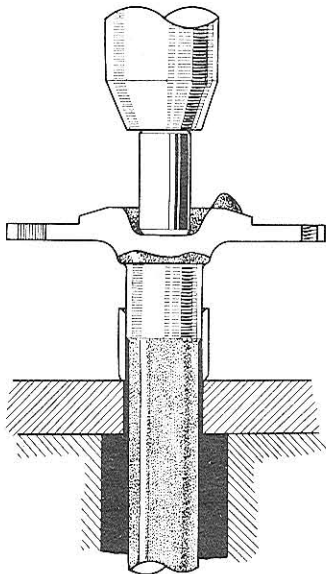


Fig.4-7 Bearing Inner Race Installation G2436

2. To install the bearing inner race onto the axle shaft, heat the bearing inner race to about 150° C or 302° F, and install it quickly onto the axle shaft with a suitable tool and a press.

3. After assembling the axle shaft, shaft lock, differential pinion shaft spacer and the pinion shaft, measure the clearance between the axle shaft end and the shaft spacer with a feeler gauge.

This clearance should be 0.06 to 0.46 mm (0.0024 ~ 0.0181").

If the clearance exceeds this specified clearance, replace the pinion shaft spacer to obtain the specified clearance.

The pinion shaft spacers are available as follows.

Part No.	41344-35010
Thickness:	29.8 mm (1.173")
Part No.	41345-35010
Thickness:	30.2 mm (1.189")
Part No.	41346-35010
Thickness:	30.6 mm (1.204")

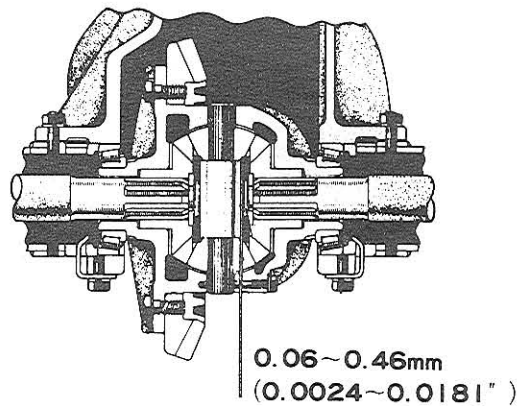
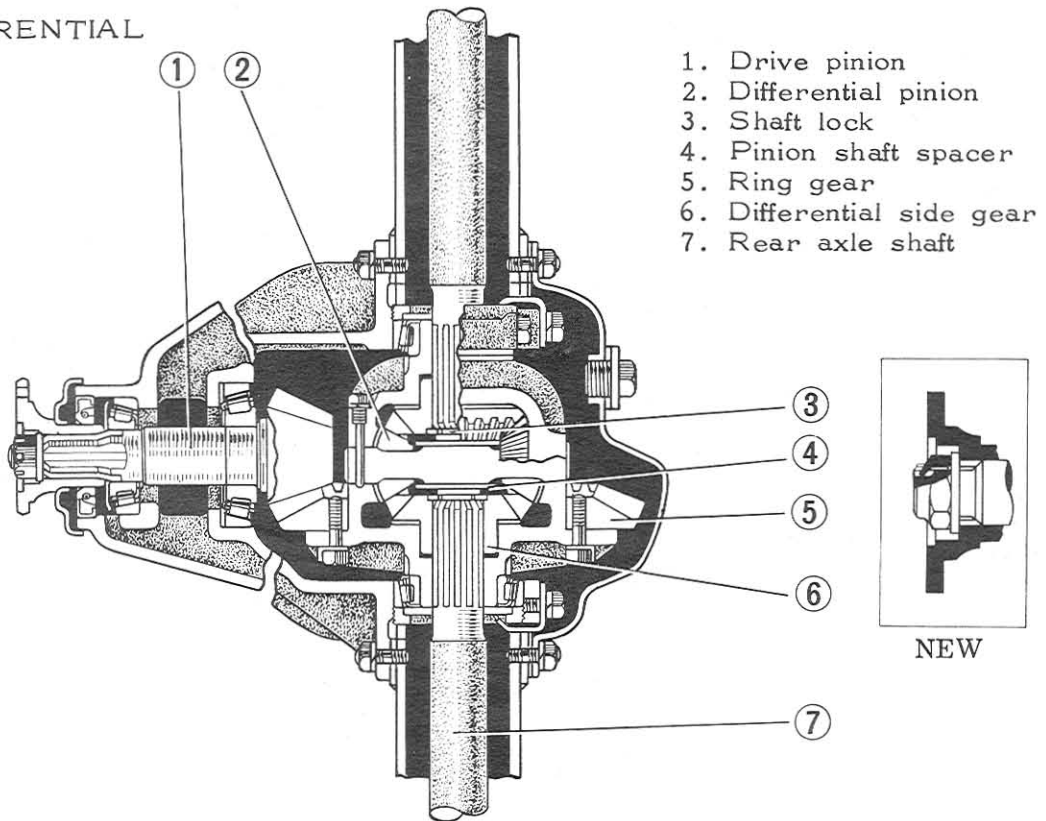


Fig.4-8 Shaft and Spacer Clearance G2409

4. Refill the axle housing with proper grade hypoid oil up-to the filler hole. Grade SAE 90, capacity is 2.5 l (2.6 US qts., 2.2 Imp qts.).

DIFFERENTIAL



- 1. Drive pinion
- 2. Differential pinion
- 3. Shaft lock
- 4. Pinion shaft spacer
- 5. Ring gear
- 6. Differential side gear
- 7. Rear axle shaft

Fig.4-9 Cross Section of Rear Differential

G1328

Removal

1. Pry off the wheel caps, and loosen the hub nuts.
2. Jack up the rear axle housing, and support the housing with suitable stands.
3. Remove the hub nuts, and remove the wheels.
4. Loosen and remove the brake drum set bolts, and remove the brake drums.
5. Drain the differential gear lubricant and next, remove the rear axle housing cover.
6. Loosen and remove the differential pinion shaft pin, and then pull the differential pinion shaft out of the differential case, and remove the shaft spacer.

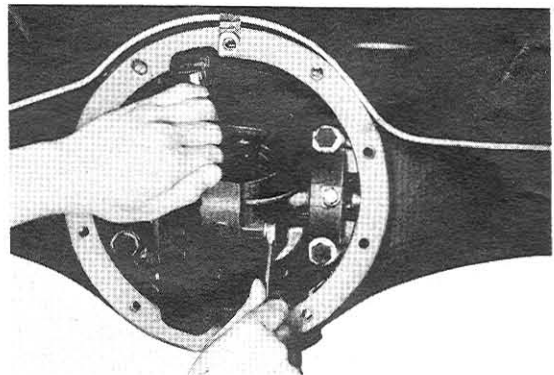


Fig.4-10 Removing Pinion V5091 Shaft Pin

7. With the rear axle shafts slightly pushed toward the differential, remove the axle shaft locks from the rear axle shaft ends.
8. Pull the rear axle shafts out of the axle housing without damaging the axle shaft oil seals.
9. Remove the bolts, and disconnect

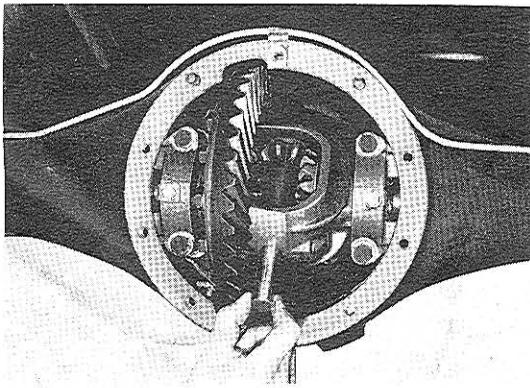
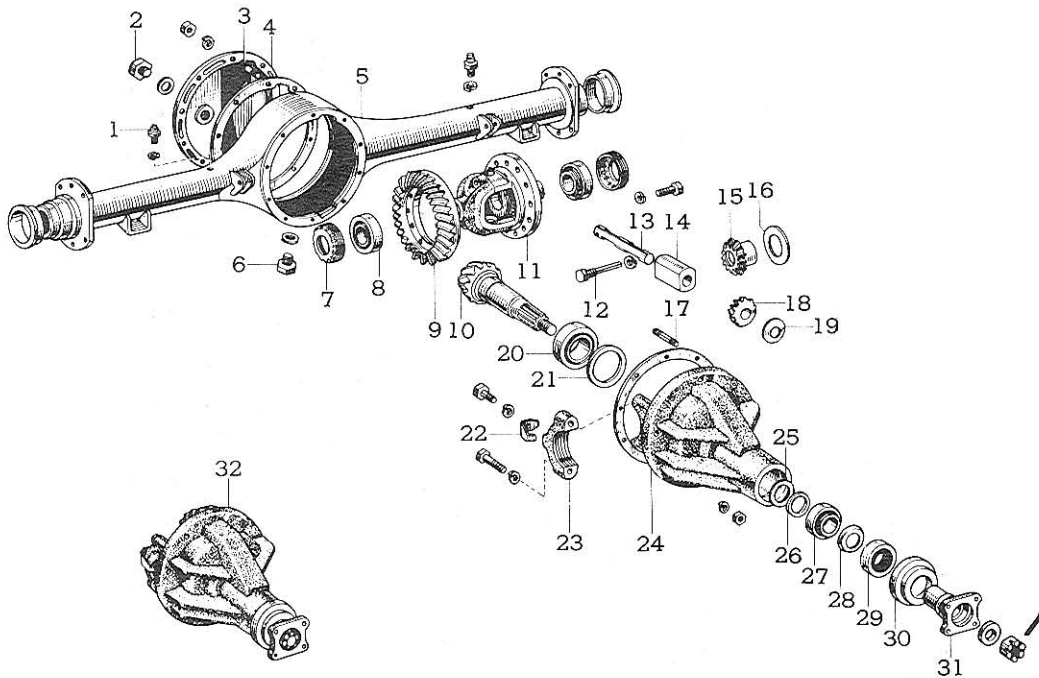


Fig.4-11 Removing Pinion Shaft V5092

the rear propeller shaft from the differential.

10. Remove the differential carrier retaining nuts, and remove the differential carrier assembly from the axle housing.

Disassembly



- | | |
|---|---|
| <ol style="list-style-type: none"> 1. Breather plug 2. Filler plug 3. Stud bolt 4. Rear axle housing cover 5. Rear axle housing 6. Drain plug 7. Side bearing adjusting nut 8. Side bearing 9. Ring gear 10. Drive pinion 11. Differential case 12. Pinion shaft pin 13. Pinion shaft 14. Pinion shaft spacer 15. Side gear 16. Side gear thrust washer | <ol style="list-style-type: none"> 17. Stud bolt 18. Differential pinion 19. Pinion thrust washer 20. Bearing 21. Adjusting shim 22. Adjusting nut lock 23. Bearing cap 24. Differential carrier 25. Adjusting spacer 26. Shim 27. Bearing 28. Oil slinger 29. Oil seal 30. Dust deflector 31. Universal joint flange 32. Differential carrier assembly |
|---|---|

Fig.4-12 Differential & Rear Axle Housing Components

1. Place the differential carrier assembly onto a work stand with a carrier adapter.
2. Punch the mating marks onto the bearing caps and the carrier.

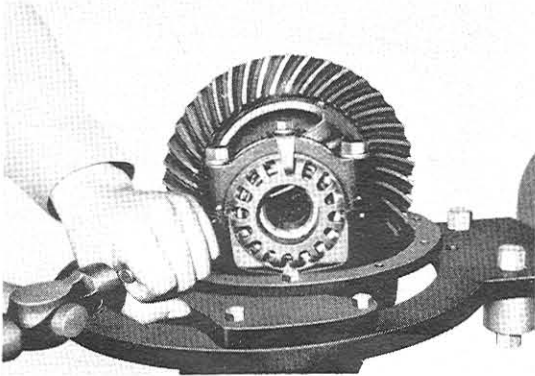


Fig.4-13 Punching Mating Marks V5140

3. Remove the bearing adjusting nut locks on the bearing caps. Next, loosen and remove the bolts retaining the bearing cap onto the differential carrier. Remove the bearing caps and the bearing adjusting nuts. Do not mix the mated parts with the others.

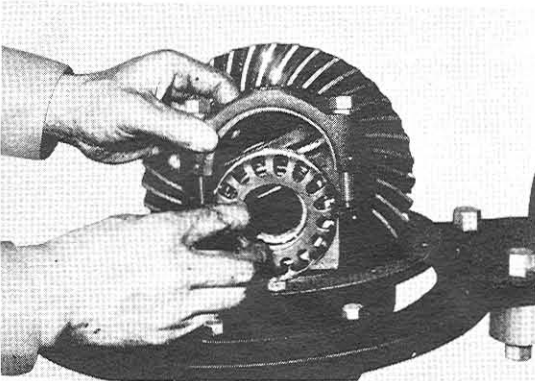


Fig.4-14 Removing Bearing V5141 Cap

4. Remove the differential case assembly from the carrier together with the bearings.
5. Remove the cotter pin from the universal joint flange retaining nut. Using the Universal Joint Flange

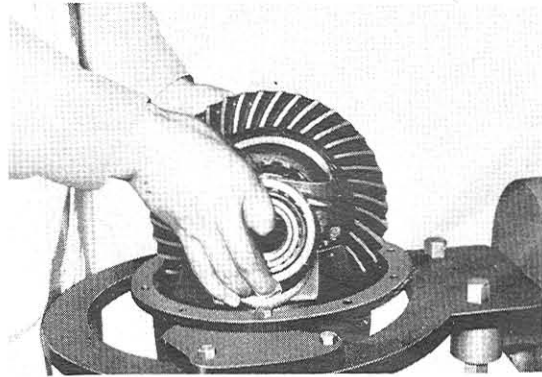


Fig.4-15 Removing Differ- V5142 ential Case & Bearing

Holding Tool 09330-30010, retain the universal joint flange, and remove the nut with a socket wrench. When removing the nut, be careful not to allow the drive pinion to drop.

09330-00010

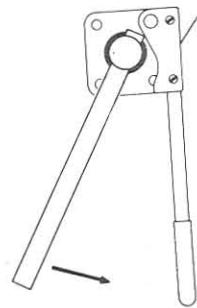


Fig.4-16 Removing Flange V5143 Nut

6. Remove the universal joint flange, and then remove the drive pinion from the inside of the differential carrier with the drive pinion rear bearing and the adjusting shims.
7. Using the Oil Seal Puller 09950-10010, remove the drive pinion oil seal from the differential carrier.
8. Remove the drive pinion front bearing from the differential carrier.
9. Remove the drive pinion front and

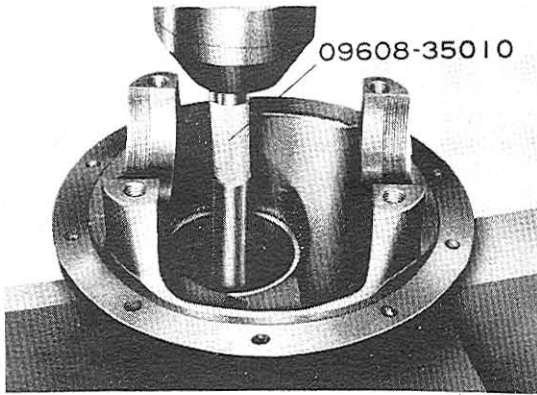


Fig. 4-17 Removing Front V3440 Bearing Cup

rear bearing cups using the Front Hub & Drive Pinion Bearing Tool Set 09608-35010 and a press.

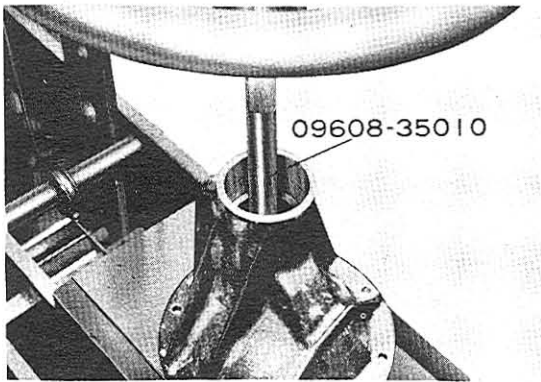


Fig. 4-18 Removing Rear V3397 Bearing Cup

10. Remove the drive pinion rear bearing using the Universal Puller 09950-20010.

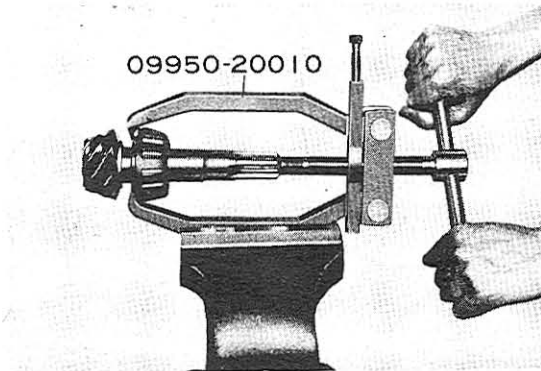


Fig. 4-19 Removing Rear V3442 Bearing

11. Remove the differential side gears with the thrust washers, and the differential pinions with the thrust washers from the differential case.

Inspection

Wash all disassembled parts thoroughly in cleaning solvent. Lubricate the bearings immediately after washing to prevent rusting.

Inspect the parts for wear, damage, and other defects.

The parts found defective should be repaired or replaced.

1. Check the bearings for scores or erratic wear pattern.

When operating the bearing in the bearing cup, the bearing must turn freely without any roughness. Examine the roller ends for wear.

- a. If necessary, replace the differential side bearings.

Using the Universal Puller 09950-20010, remove the bearings from the differential case.

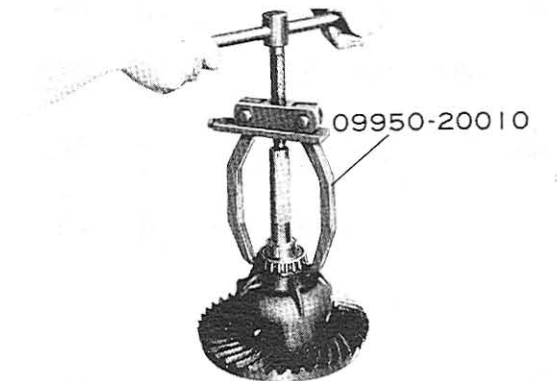


Fig. 4-20 Removing Side V5093 Bearing

- b. To install, use the Differential Side Bearing Replacer 09505-20010, and fit the bearing onto the differential case.

2. Inspect the drive pinion and ring gear for scores or signs of excessive wear, and if necessary, replace the ring gear and drive pinion as a set.

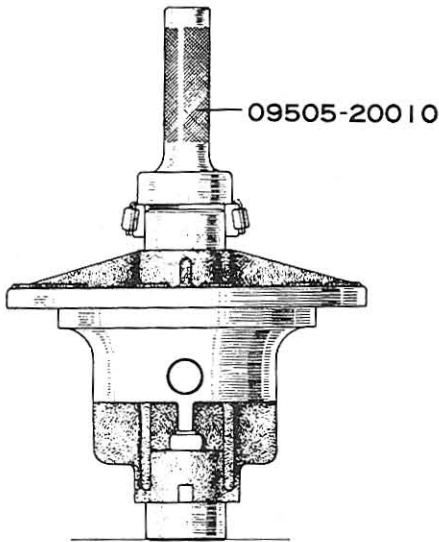


Fig. 4-21 Side Bearing G2411
Installation

The pattern taken during disassembly should be helpful in judging if the gears are suitable for reuse.

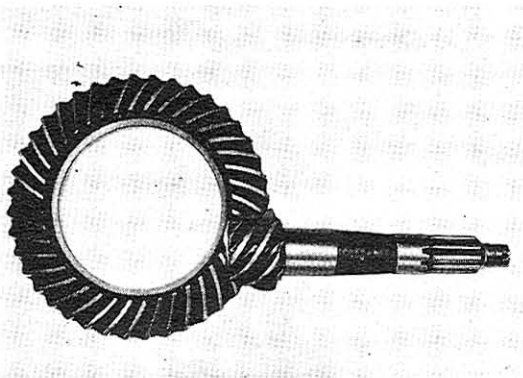


Fig. 4-22 Gear Inspection V5144

To remove the ring gear from the differential case, punch the mating marks onto the differential case and the ring gear for assembly in the original position.

Next, loosen and remove the ring gear retaining bolts alternately.

3. Check the ring gear retaining bolts for stretch, and threads for damage.
4. Inspect the side gears, pinion gears,

thrust washers, pinion shaft and the shaft spacer for wear, scores and other defects.

Inspect the gear teeth and thrust surface, and wear of splines, thrust surfaces or thrust washers can contribute to excessive drive line backlash.

5. Inspect the differential case for cracks and other defects.

Make sure the hub where the side bearings mount are smooth. Check the fit of the differential gears in the counter-bores.

Carefully examine the thrust surfaces.

Be sure that the mating surfaces of the case and the face of ring gear attaching flange are smooth and free from nicks or burrs.

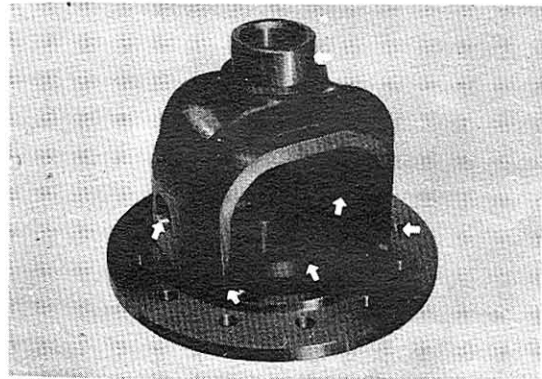


Fig. 4-23 Differential Case V5094
Inspection

6. Check the universal joint flange for score or defect. The end of the flange contacting the oil seal or pinion front bearing must be smooth.
7. Check the threads of the differential side bearing adjusting nuts and bearing cap retaining bolts for damages.

Assembly & Adjustment

Clean all parts before assembly. To provide initial lubrication, apply a thin coating of differential lubricant on all parts before installation.

1. Assemble the ring gear onto the differential case, aligning the mating marks punched upon disassembly, and tighten the ring gear retaining bolts evenly, then tighten them alternately across the ring gear to specified torque.

Retaining bolts tightening torque:
10 ~ 12 m-kg (72 ~ 87 ft-lb)

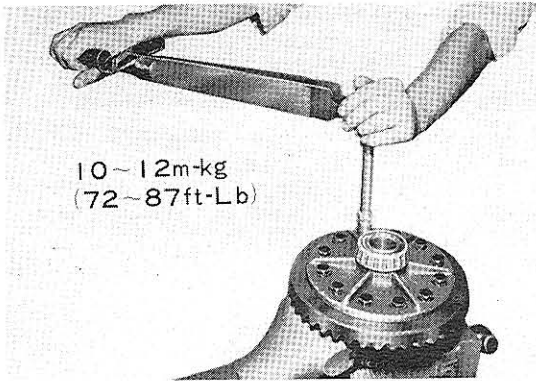


Fig.4-24 Assembling Ring V5095 Gear

2. Place the differential side gears and the thrust washers with the oil grooves facing towards the side gears, and differential pinions and the thrust washers in the differential case.

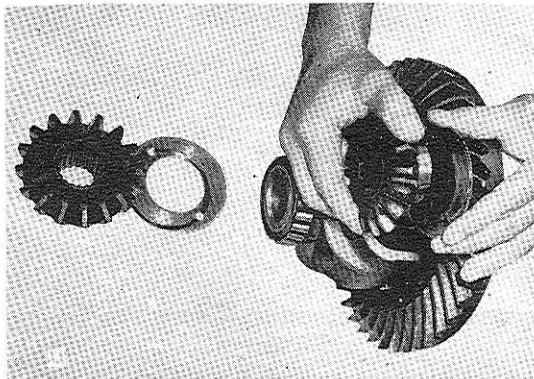


Fig.4-25 Assembling Side V5096 Gear & Thrust Washer

3. Inspection of differential side gear thrust clearance.

a. Insert the pinion shaft into the differential case through the pinion gears and the thrust washers.

- b. Check the clearance between the differential side gear and the differential case.

The specified clearance is 0.15 to 0.35 mm (0.006 ~ 0.014"), and if the clearance is incorrect, replace the side gear thrust washers and the pinion thrust washers.

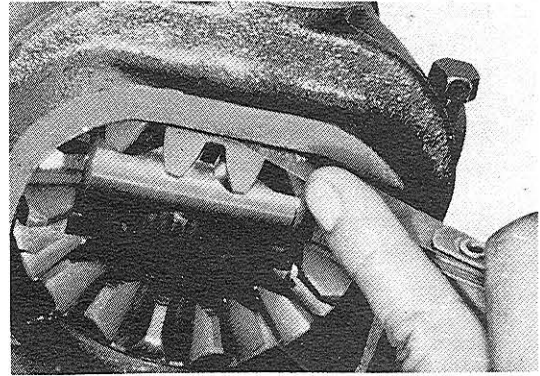


Fig.4-26 Measuring Side V5097 Gear Thrust Clearance

- c. After adjusting the thrust clearance, remove the pinion shaft and the differential pinion with the thrust washers from the differential case.

4. Press the drive pinion front and rear bearing cups into the differential carrier using the Front Hub & Drive Pinion Bearing Tool Set 09608-35010.

5. Drive pinion depth and bearing pre-load adjustment.
For proper adjustment, the Differential Drive Pinion Adjusting

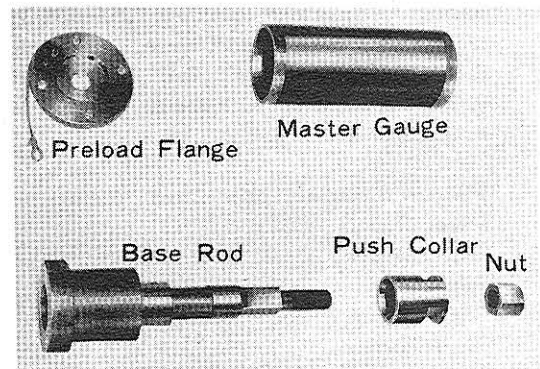


Fig.4-27 Differential Drive V5098 Pinion Adjusting Gauge

Gauge 09530-35010 should be used.

a. Install the drive pinion rear bearing onto the adjusting gauge base rod, and then assemble the base rod with bearing into the differential carrier.

Next, install the drive pinion front bearing and adjusting gauge push collar onto the base rod.

Tighten the adjusting gauge nut to 2 ~ 3 m-kg (14 ~ 22 ft-lb) torque.

b. Assemble the master gauge onto the differential carrier and secure it with the side bearing caps.

Tighten the bearing cap retaining bolts to 9.0 ~ 11 m-kg (65 ~ 79 ft-lb) torque.

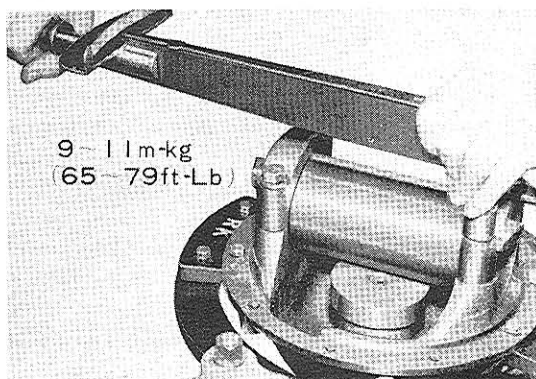


Fig.4-28 Assembling Master V5099 Gauge

c. Select proper thickness shim/s from the following four pinion locating adjusting shims so as to minimize the clearance between the master gauge and the shim when inserted between the base rod and the master gauge.

Pinion locating adjusting shim:

- Part No. 90564-70101
- Thickness: 0.25 mm (0.0098")
- Part No. 90564-70102
- Thickness: 0.30 mm (0.0118")
- Part No. 90564-70103
- Thickness: 0.35 mm (0.0138")
- Part No. 90564-70104
- Thickness: 0.45 mm (0.0177")

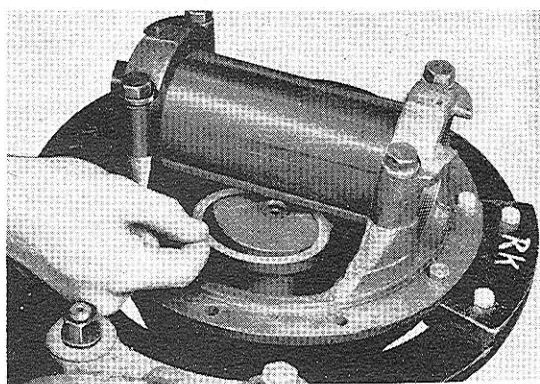


Fig.4-29 Selecting Adjusting V5100 Shim

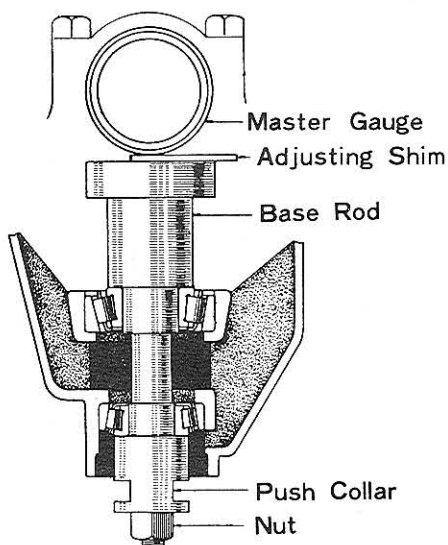


Fig.4-30 Adjusting Shim G2412 Selection

d. After selecting the shim, remove the Differential Drive Pinion Adjusting Gauge.

e. Remove the drive pinion rear bearing cup from the differential carrier with the Front Hub and Drive Pinion Bearing Tool Set 09608-35010.

Next, install the selected pinion

locating adjusting shim into the differential carrier, and then re-install the bearing cup.

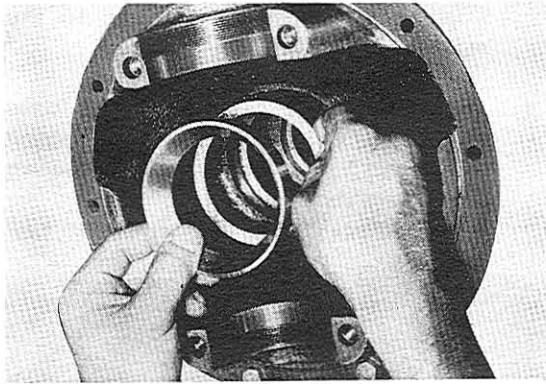


Fig.4-31 Assembling Shim V5101 & Bearing Cup

f. Press the drive pinion rear bearing onto the drive pinion with the Differential Drive Pinion Rear Bearing Cone Replacer 09506-35010.

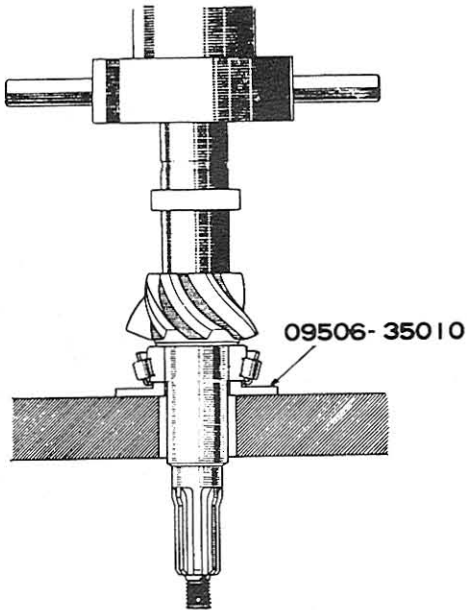


Fig.4-32 Rear Bearing Installation G2413

g. Install the bearing pre-load adjusting spacer and the shim which were removed during disassembly onto the drive pinion, and assemble into the differential carrier.

Install the drive pinion front bearing and the universal joint flange. Retain the universal joint flange with the Universal Joint Flange Holding Tool 09330-30010, and tighten the flange retaining nut to 20 ~ 24 m-kg (144 ~ 173 ft-lb) torque.

Do not assemble the oil seal at this time.

h. Attach the adjusting gauge pre-load flange to the universal joint flange, and check the pre-load of the drive pinion bearings.

The pull-scale reading should be 3.8 ~ 5.2 kg (8.4 ~ 11.4 lb) with a steady pull.

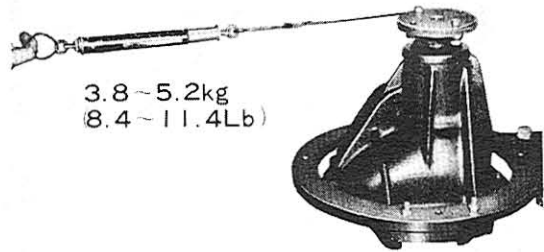


Fig.4-33 Checking Bearing V5102 Pre-load

In case the specific reading cannot be obtained, select the proper bearing pre-load adjusting spacer. If the pre-load is tight, select a thicker spacer, and if loose, use a thinner one.

Bearing pre-load adjusting spacer thickness:

- Part No. 90560-30184
Thickness: 2.75 mm (0.108")
- Part No. 90560-30185
Thickness: 2.78 mm (0.109")
- Part No. 90560-30186
Thickness: 2.81 mm (0.111")

- Part No. 90560-30187
Thickness: 2.84 mm (0.112")
- Part No. 90560-30188
Thickness: 2.87 mm (0.113")
- Part No. 90560-30190
Thickness: 2.90 mm (0.114")
- Part No. 90560-30191
Thickness: 2.93 mm (0.115")
- Part No. 90560-30192
Thickness: 2.96 mm (0.116")
- Part No. 90560-30199
Thickness: 2.99 mm (0.118")

Repeat the above procedures until the specified pre-load is obtained by selecting the adjusting spacer.

i. After adjustment, remove the nut, universal joint flange and the drive pinion from the differential carrier.

6. Place the drive pinion oil slinger onto the drive pinion front bearing in the differential carrier. Next, drive in the drive pinion oil seal into the differential carrier. Lubricate the oil seal with differential gear lubricant.
7. Reinstall the selected adjusting spacer and shim onto the drive pinion, and then install the drive pinion into the differential case. Install the universal joint flange and tighten the retaining nut to 20 to 24 m-k_g (144 ~ 173 ft-lb) torque. Turn the drive pinion, and check the rotating condition. Calk the companion flange attaching nut

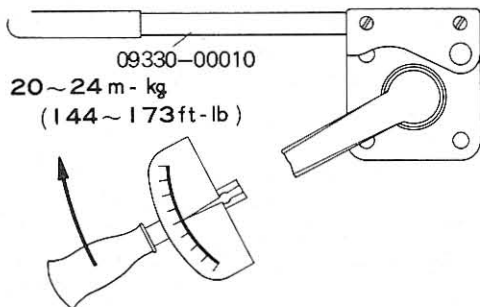


Fig. 4-34 Installing Companion Flange

8. Place the differential case assembly onto the differential carrier. Position the side bearing adjusting nuts onto the carrier and to the side bearings.
9. Install the side bearing caps onto the differential carrier, aligning the mating marks punched during disassembly. Next, install the bearing cap re-

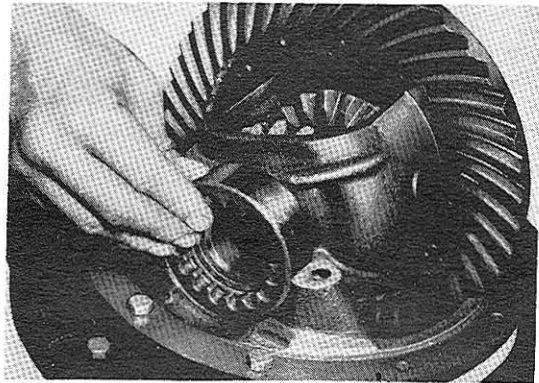


Fig.4-35 Assembling Bearing V5103 Adjusting Nut

taining bolts, and screw in with the fingers.

Carefully set the bearing caps in place so that the threads of the side bearing adjusting nuts and the caps fit snugly, and tighten the bolts to 9 ~ 11 m-k_g (65 ~ 79 ft-lb) torque.

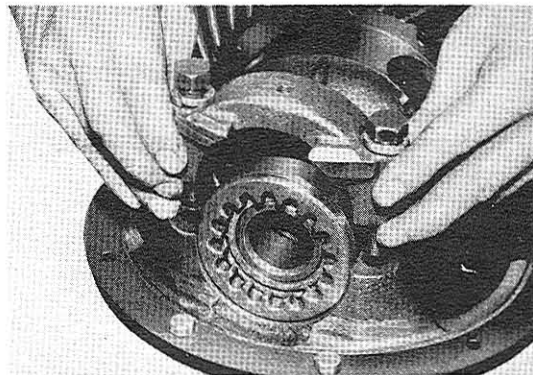


Fig.4-36 Installing Bearing V5104 Cap

10. Side bearing pre-load and gears backlash adjustment. Differential side bearing pre-load,

and drive pinion and ring gear backlash are adjusted after the drive pinion assembly is installed into the differential carrier.

a. Loosen the side bearing cap retaining bolts about 45° for adjustment of side bearing pre-load.

b. Using the Differential Adjusting Nut Wrench 09504-30010, loosen

the side bearing adjusting nut on the drive pinion side sufficiently, and then screw in the side bearing adjusting nut on the ring gear side until a slight backlash can be felt between the ring gear and the drive pinion.

During this operation, rotate the ring gear several turns in each direction to seat the bearings in the bearing cups.

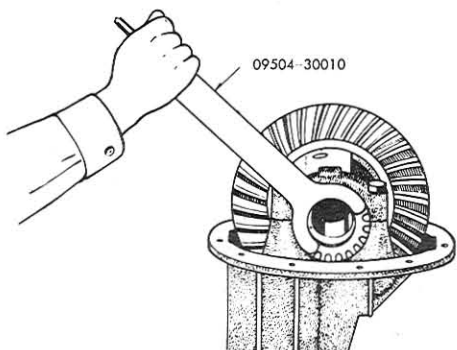


Fig.4-37 Adjusting Bearing V5145 Pre-load

c. Install a dial gauge onto the differential carrier with the plunger against the rear face of the ring gear. Next, screw in the bearing adjusting nut on the drive pinion side reading the ring gear side side play on the dial gauge until the side play is removed. Then from this zero side play position, tighten the side bearing adjusting nut one or two notches to pre-load the bearings.

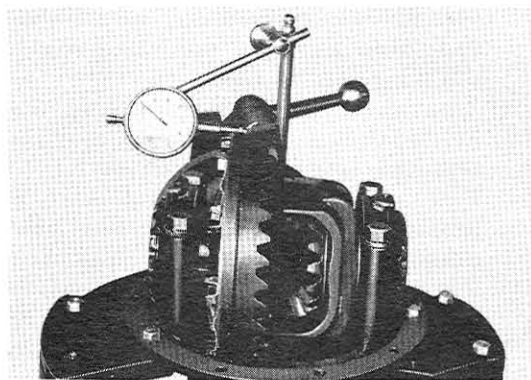


Fig.4-38 Adjusting Bearing V5146 Pre-load

d. After adjusting the side bearing pre-load, rotate the ring gear one revolution, and also check the ring gear run-out with the dial gauge.

The specified limit is 0.1 mm or 0.004", if the total gauge reading exceeds the limit, recheck the ring gear and differential case mounting surfaces, and the side bearing installing condition.

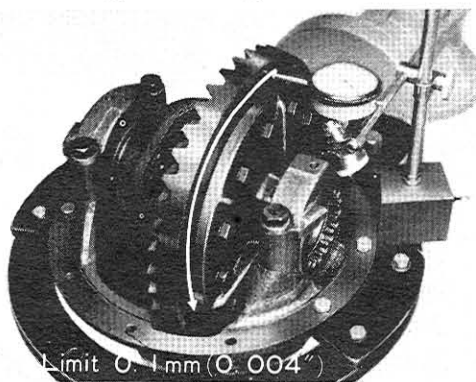


Fig.4-39 Measuring Ring V5105 Gear Run-out

e. Mount the dial gauge, and contact the plunger against the ring gear tooth at right angle. Hold the drive pinion and rock the ring gear to-and-fro, and read the dial gauge.

The specified backlash is 0.15 to 0.20 mm (0.006 ~ 0.008").

Adjust the backlash if incorrect to the above specification.

To decrease the backlash, loosen the side bearing adjusting nut on

the drive pinion side, and tighten the side bearing adjusting nut on the ring gear side.

The same number of notches must be loosened or tightened to maintain the correct pre-load.

For example; if one nut is to be loosened one notch, loosen it two notches, then tighten it one notch. This method will assure that the adjusting nut is properly contacting the bearing cup, and that the bearing cup will not shift after being put into service.

Tighten the side bearing cap retaining bolts to 9 ~ 11 m-kg or 65 ~ 79 ft-lb torque, and recheck the gear backlash.

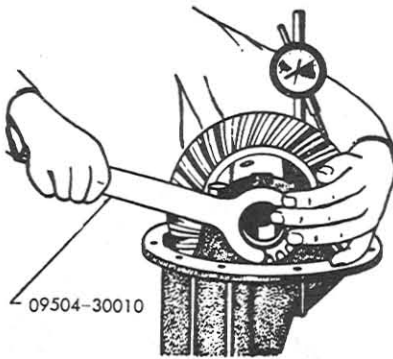


Fig.4-40 Measuring Gear Backlash V5147

11. Ring gear and drive pinion tooth contact pattern adjustment.

After the differential is completely assembled and adjusted, a tooth contact pattern should be checked. The correct tooth contact is considered as a final check on the drive pinion depth and backlash adjustment.

As some minor differences will exist on individual gear sets, the following patterns should be considered as typical only, and should be used as a guide rather than a rigid standard.

Apply a thin coat of red-lead evenly on the ring gear teeth.

Rotate the ring gear back and forth until a clean tooth contact pattern is obtained, holding the drive pinion flange with the hand to act as

a brake.

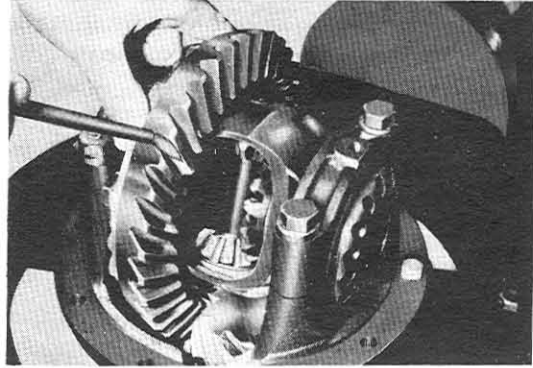


Fig.4-41 Applying Red-lead V5106

To adjust the drive pinion depth, select the pinion locating adjusting shim to be inserted between the drive pinion rear bearing and the differential carrier.

Refer to Drive Pinion Depth Adjustment on page 4-14.

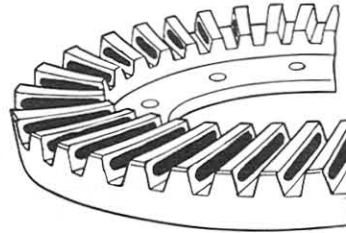


Fig.4-42 Correct Tooth Contact Y5525

a. Heel contact

To obtain the correct tooth pattern, move the pinion towards the ring gear by increasing the thickness of the pinion locating adjusting shim. Adjust the backlash by moving the ring gear away from the drive pinion.

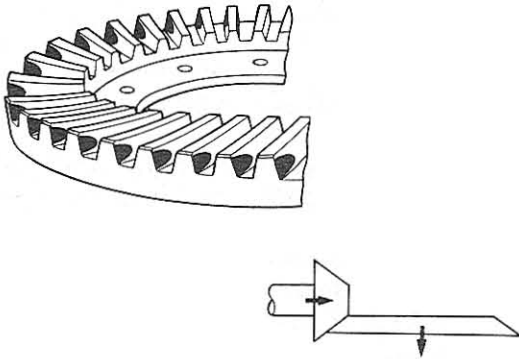


Fig.4-43 Heel Contact Y5527
Tooth Pattern

b. Toe contact

Move the drive pinion away from the ring gear by reducing the thickness of the pinion locating adjusting shim.

Adjust the backlash by moving the ring gear towards the drive pinion.

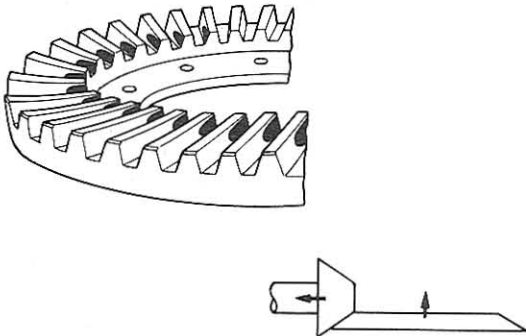


Fig.4-44 Toe Contact Y5528
Tooth Pattern

c. Flank contact

To correct this contact, perform the same procedure as the Toe contact.

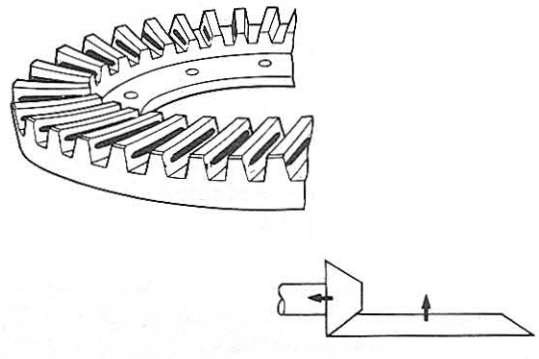


Fig.4-45 Flank Contact Y5526
Tooth Pattern

d. Face contact

Adjust in the same manner as the Heel contact.

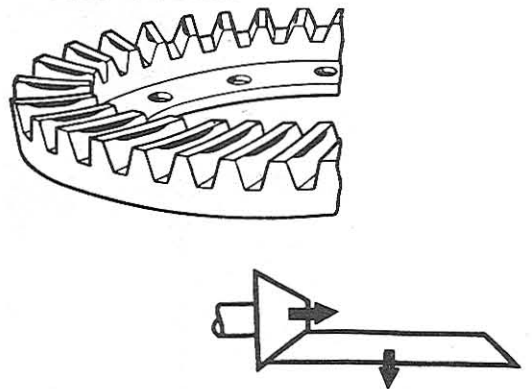


Fig.4-46 Face Contact Y5529
Tooth Pattern

The tooth contacts shown above do not occur individually in the actual operation, but in most cases Heel & Face contacts or Toe and Flank contacts appear overlapping with each other.

Repeat the above adjustments until the correct pattern is obtained, and check the backlash to be in the same specifications.

Next, clean the gear teeth and install the bearing adjusting nut locks onto the bearing caps securely.

Installation

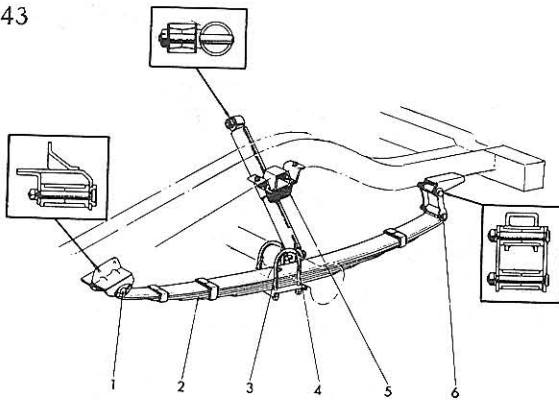
Follow the removal procedures in the reverse order.

1. When installing, all gaskets should be replaced.

2. To prevent oil leak, use liquid sealer for differential carrier gasket and the rear axle housing cover gasket.
3. The tightening torque of the differential carrier retaining nuts is 4 to 5.5 m-kg (29 ~ 40 ft-lb).
4. After installing the rear axle shafts, install the differential pinions with thrust washers.
Next, install the differential pinion shaft and shaft spacer, then aligning the pinion shaft pin hole, install the pinion shaft pin.
Tighten the pinion shaft pin to 1.5 to 2.2 m-kg (11 ~ 16 ft-lb) torque. To install the rear axle shaft refer to Rear Axle Shaft section
5. After installing the differential carrier assembly and the rear axle shaft, check and adjust the rear axle shaft thrust play.
To adjust, refer to paragraph 3 in Rear Axle Shaft section on page 4-7.
6. Refill the axle housing with hypoid gear lubricant up-to the filler hole with SAE 90. The capacity is 2.5 liters (2.6 US qts. , 2.2 Imp qts).

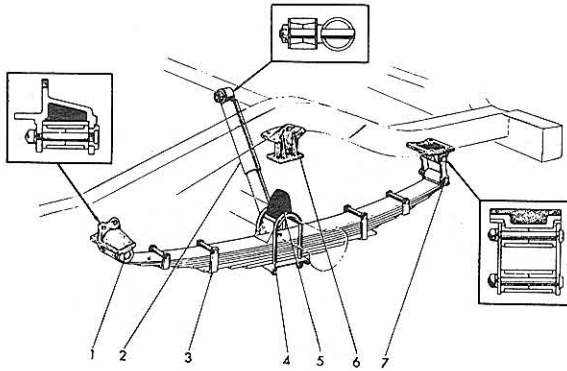
REAR SUSPENSION

FJ40, 43



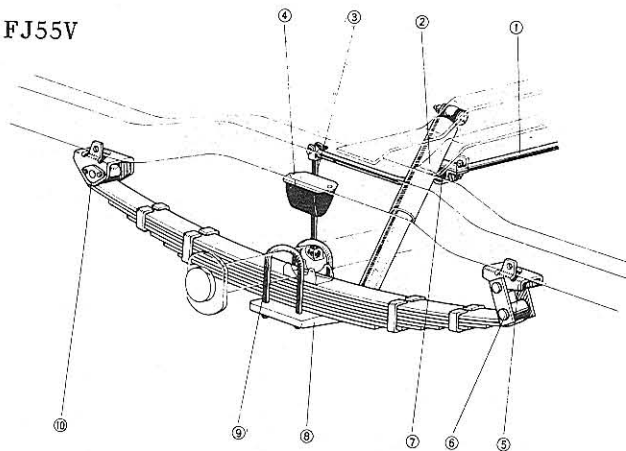
1. Hanger & shackle pin
2. Rear spring
3. U bolt
4. Rear shock absorber
5. Rubber cushion
6. Hanger & shackle pin

FJ45



1. Hanger & Shackle pin
2. Rear shock absorber
3. Rear spring
4. U bolt
5. Rubber cushion
6. Cushion stopper
7. Hanger & shackle pin

FJ55V



1. Rear stabilizer bar
2. Shock absorber
3. Stabilizer link
4. Spring bumper
5. Spring bracket

6. Spring shackle
7. Stabilizer bushing
8. Spring U-bolt seat
9. "U" bolt
10. Spring bracket pin

Fig.4-46 Rear Suspension Components

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Removal

1. Pry off the wheel cap, and loosen the hub nuts.
2. Raise the rear end of the vehicle, and place stands under the frame and under the rear axle housing.
3. Remove the hub nuts, and remove the wheel.
4. Remove the cotter pin and nut, and disconnect the lower end of the shock absorber from the pivot pin on the axle housing.
5. Remove the cotter pins and the nuts at lower end of the stabilizer links, and disconnect the stabilizer links from the axle housing. (55V) Remove the stabilizer bracket covers, and then withdraw the stabilizer bar with stabilizer links. (55V)
6. Loosen and remove the U-bolt nuts, and remove the U-bolts and the spring U-bolt seat.
7. Adjust the axle housing height with a jack until the weight is off the spring shackle. Remove the nuts, and take out the spring shackle inner plate. Next, pry the spring shackle with a suitable bar, and remove the spring shackle and the rubber bushings.
8. Remove the two bolts retaining the spring bracket pin onto the spring bracket, and then drive out the spring bracket pin. Remove the rear spring assembly.
9. Remove the cotter pin and the nut at the shock absorber upper end, and remove the shock absorber with the rubber bushings.
2. Check the rubber bushings for cracks and wear or weakness.
3. Check the stabilizer bar for deformation and cracks. Also check the stabilizer links for wear or bent conditions.
4. Inspect the spring shackle and the spring bracket pin for wear or other defects.
5. Check the U-bolts for cracks and stripped threads.
6. Check the spring U-bolt seat for deformation, cracks or other defects.
7. Check the springs for breakage, cracks or weak leaves.

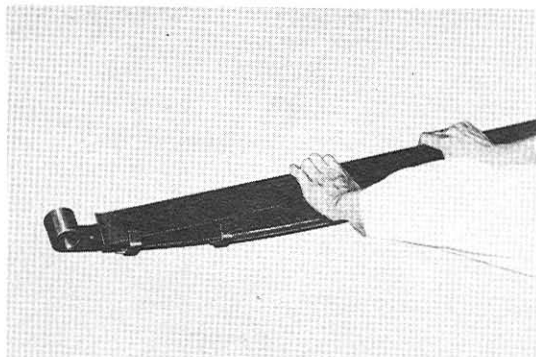


Fig.4-48 Prying Spring V0825
Clip

If necessary, disassemble the rear springs and inspect, then reassemble as follows.

- a. Pry the spring clips with a suitable tool, and then loosen and remove the spring center bolt from the springs.
- b. Inspect the spring leaves, center bolt, and the spring clips for wear, cracks or other defects.
- c. To remove the spring clip from the spring leaf, drill the rivetted head of the round head rivet with a drill, and then drive out the round head rivet with a long drift

Inspection & Repair

1. Check the shock absorber operation, and oil leak.

punch. Remove the spring clip from the spring leaf.

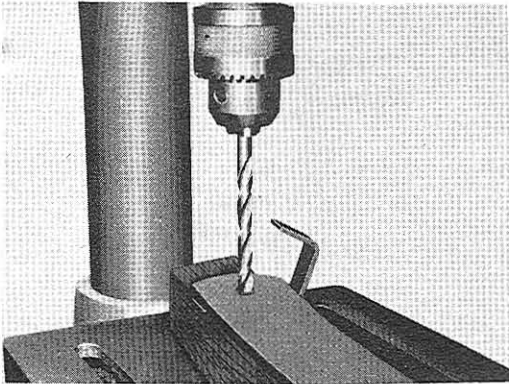


Fig.4-49 Removing Round V0827 Head Rivet

d. Install a new rivet into the spring leaf and the spring clip, and then rivet with a press.

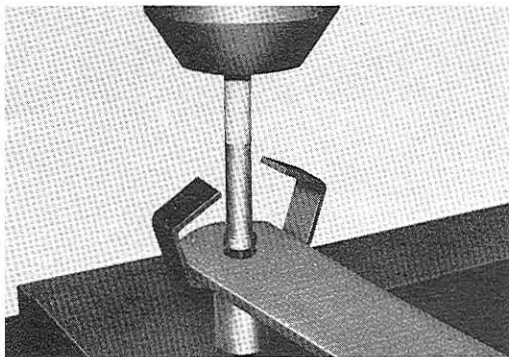


Fig.4-50 Installing Spring V0828 Clip

e. Assemble the spring leaves, and tighten the spring center bolt securely. Bend the spring clips to keep the spring leaves in place.

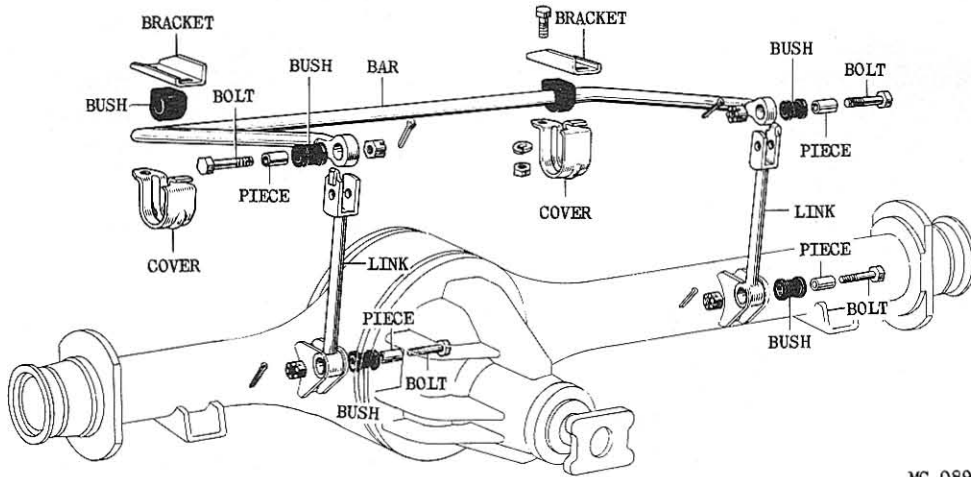
Installation

1. Install the rubber bushings into the front eye of the spring. Connect the front eye of the spring with the spring bracket by installing the spring bracket pin. Tighten the spring bracket pin retaining bolts. Do not tighten the spring bracket pin nut at this time.

2. Install the rubber bushings into the rear eye of the spring and the rear spring bracket. Mount the rear end of the spring by inserting the spring shackle pins through the rear spring bracket and the rear eye of the spring. Install the spring shackle inner plate, and install the shackle pin nuts. Do not tighten the nuts at this time.
3. Position the U-bolts over the axle housing, and install the spring U-bolt seat.

Tighten the U-bolt nuts to 6.9 to 9.7 m-k_g (50 ~ 70 ft-lb) torque. Make sure that the spring center bolt head is properly positioned into the hole provided in the spring seat on the axle housing.

4. Install the shock absorber with the rubber bushings and the cushion washers. Tighten the shock absorber retaining nuts to 3.5 ~ 5.5 m-k_g or 25 ~ 40 ft-lb) torque. Secure the nuts with the cotter pins.
5. Raise the axle housing with a jack until the vehicle is free from the stands. Next, tighten the spring bracket pin and the spring shackle nuts to 5 ~ 8 m-k_g (36 ~ 58 ft-lb) torque. If these nuts are tightened without any load on the spring, it may cause improper seating of the bushings with resultant of excessive wear of the bushings.
6. Install the wheel and the wheel cap. Remove the stands and lower the vehicle.



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Fig.4-51 Stabilizer Component Parts (FJ55V series)