

Product: COMPACT WHEEL LOADER

Model: 910E COMPACT WHEEL LOADER 1SF

Configuration: 910F WHEEL LOADER 1SF01104-UP (MACHINE) POWERED BY 3114 ENGINE

Disassembly and Assembly 910F WHEEL LOADER POWER TRAIN

Media Number -SEN9538-01

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SEN95380009

Axle Housings (Final Drives, Brakes & Differential)

SMCS - 3260-015; 3268-016

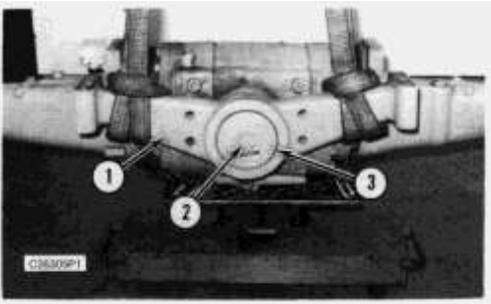
Disassemble Axle Housings (Final Drives, Brakes & Differential)

Tools Needed		A	B	C	D	E	F
1P520	Driver Group	1					
1P1863	Snap Ring Pliers		1				
4C6369	Spanner Wrench			1			
1P0074	Slide Hammer Puller				1		
8H663	Bearing Cup Puller				1		
6V3009	Crossbar				1		
5F7379	Bolt				2		
5P954	Spanner Wrench					1	
8H680	Bearing Cup Puller						1
FT884	Puller						1
5P4170	Step Plate						1

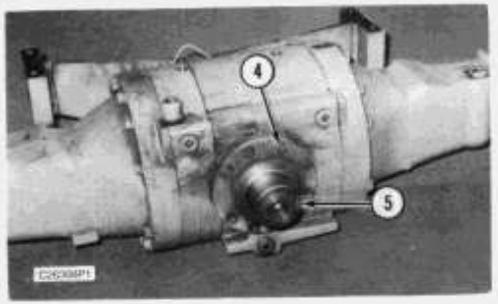
Tools Needed		H
OTC 1750 Engine Rotation Stand		1

Start By:

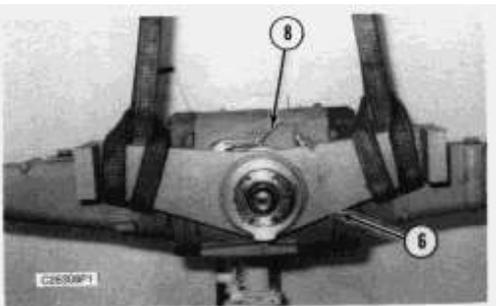
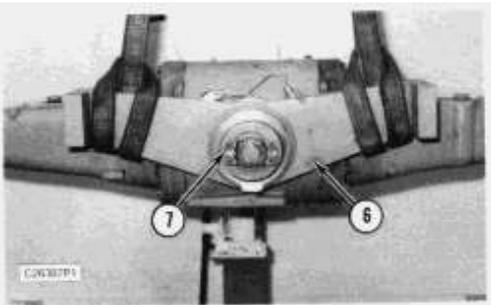
a. remove front or rear axle housings



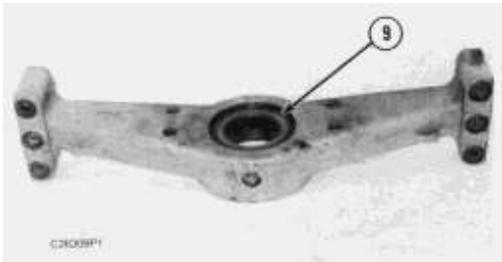
1. Fasten a hoist to rear support (1).
2. Remove bolt (2) and plate (3).
3. Remove rear support (1). The weight of the support is **32 Kg (71 lb)**.



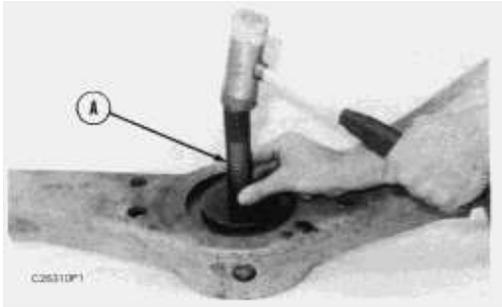
4. Remove bolts (4) and spindle (5). This will enable the axle housing to be mounted on tool (H).



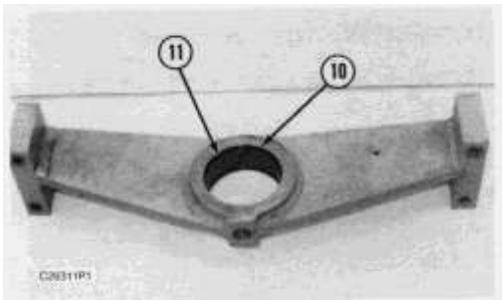
5. Put the axle shaft housing in position on tool (A). Fasten a hoist to front support (6).
6. Remove drive shaft yoke (7).
7. Remove brake line (8) from support (6).
8. Remove support (6). The weight of the support is **36 Kg (79 lb)**.



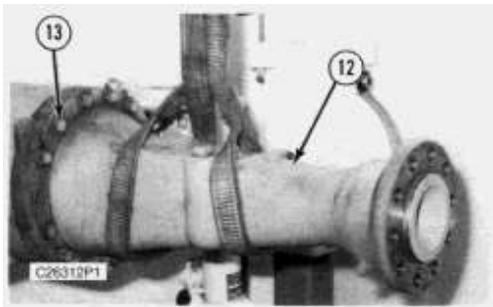
9. Remove fiberglass spacer (9) and O-ring seal from both sides of the rear support.



10. Remove the inner seal from the rear support with tool group (A).



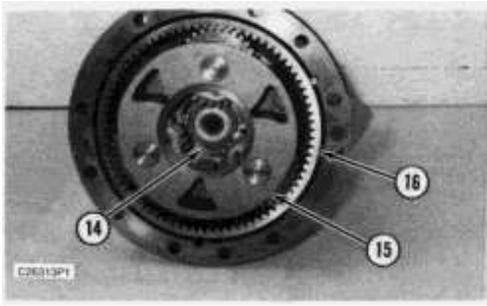
11. Remove two O-ring seals (10) and wear ring (11) from the front support.



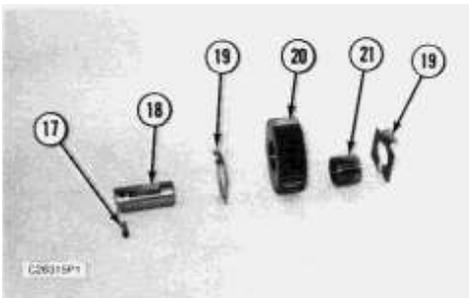
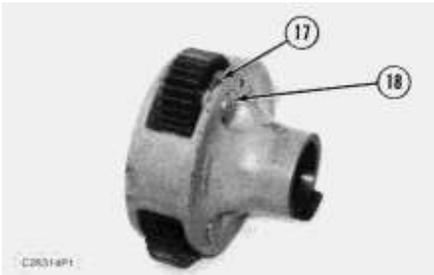
12. Fasten a hoist to axle shaft housing (12).

13. Remove twelve bolts (13) and remove axle shaft housing (12).

NOTE: Follow Steps 12 and 13 for removing the other axle shaft housing.

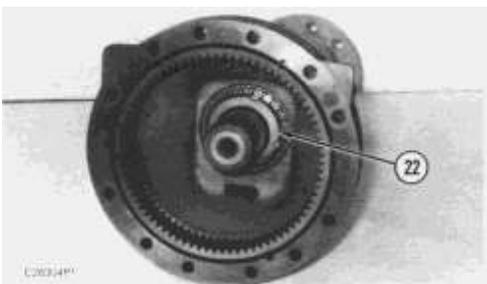


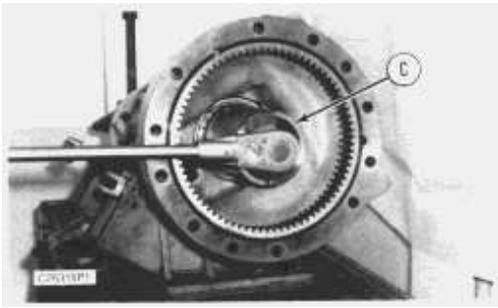
- 14. Remove snap ring (14) with tool (B).
- 15. Remove planetary assembly (15) from the axle shaft housing.
- 16. Ring gear (16) will have to be damaged if it is to be removed.



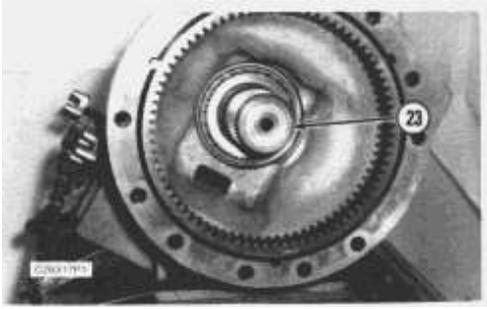
- 17. To disassemble the planetary, drive roll pin (17) into pin (18) so that pin (18) will slide freely.
- 18. Remove pin (18), plates (19) and gear (20) from the planetary.
- 19. Remove bearing (20) from gear (21).

NOTE: Perform Steps 17, 18 and 19 to disassemble the other two gears in the planetary.

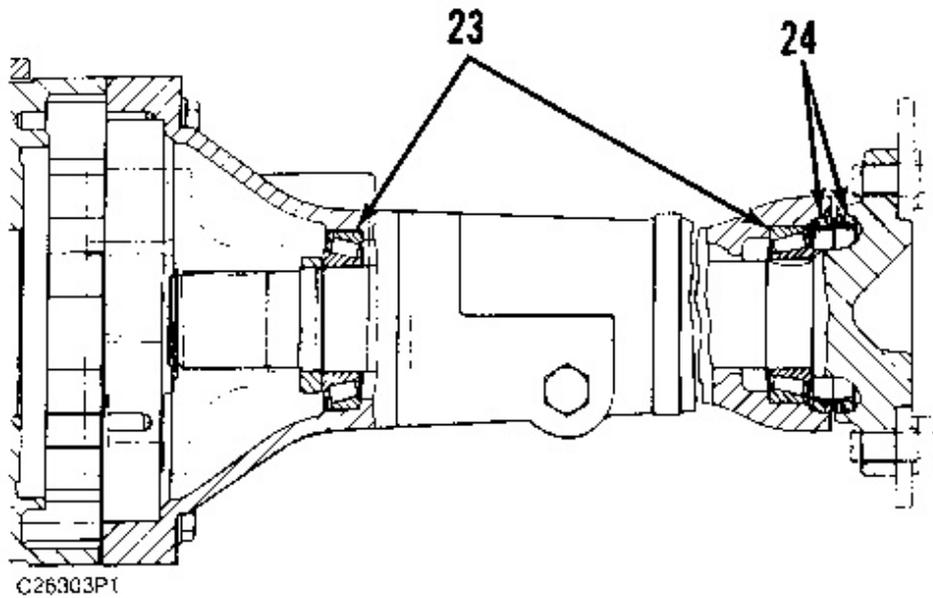




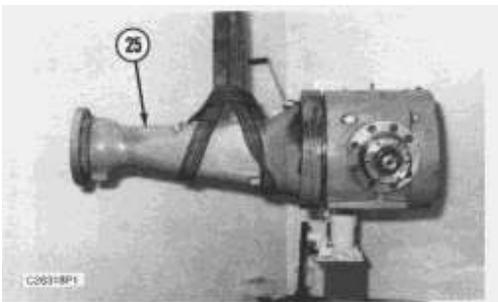
20. Remove the nut (22) from the axle shaft with tool (C).



21. Press axle shaft (23) out of the axle housing with a suitable press.

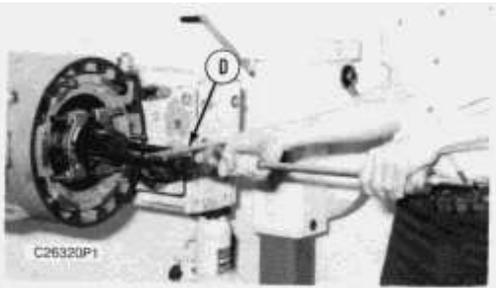
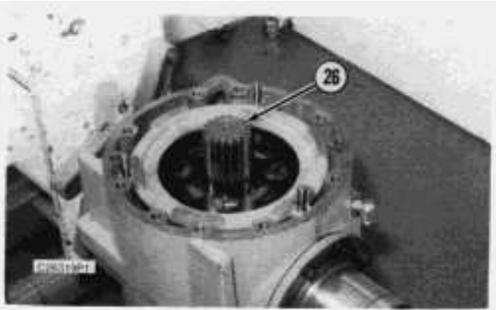


22. Check bearings (23) for damage and then remove them from the axle housing if necessary. Inspect and remove Duo-Cone seals (24) from the axle housing and the axle shaft if necessary.



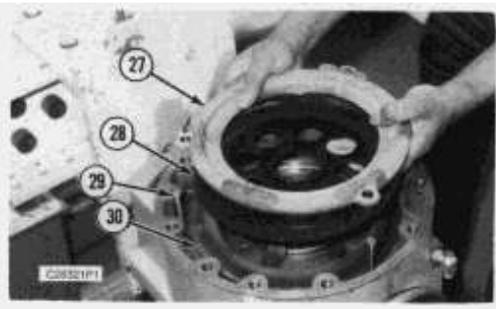
23. Remove the other axle shaft housing (25) and follow Steps 14 through 22 for the disassembly of the axle shaft housing.

NOTE: The following steps can be used to disassemble the brake components on both sides of the differential housing.



24. Remove splined shaft (26).

NOTE: If the splined shaft is too difficult to remove, tooling (D) may be used.

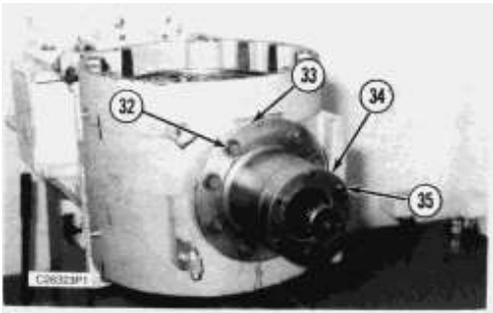


25. Remove plate (27), disc (28), piston (30) and dowel pins (29) from the differential housing.

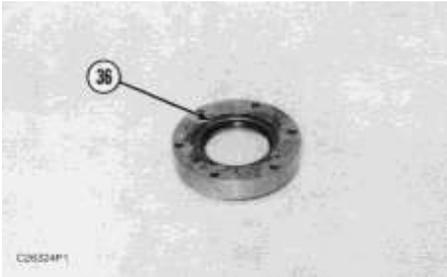


26. Remove O-ring seal (31) from the piston.

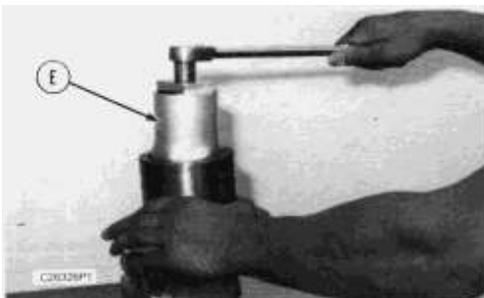
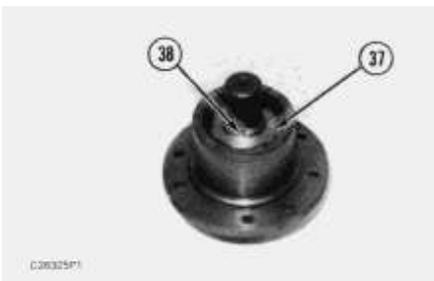
NOTE: Do Steps 25 and 26 for the opposite side brake components.



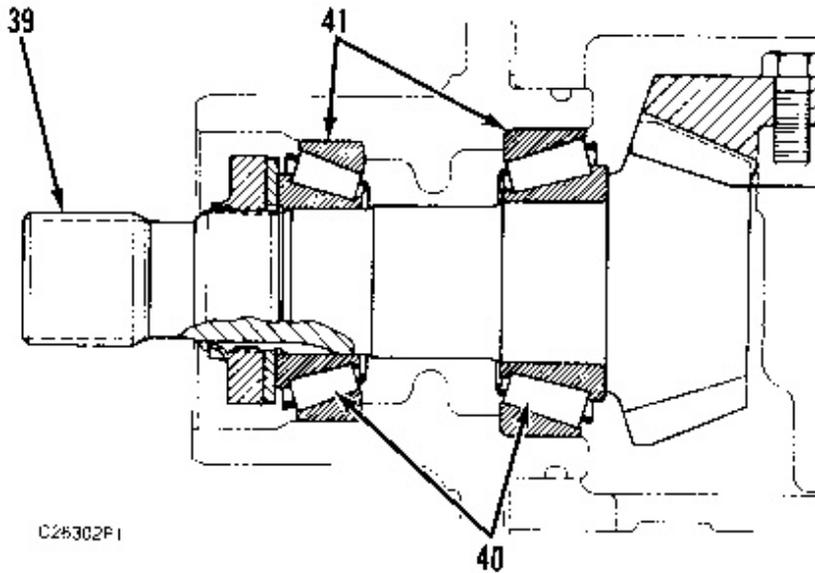
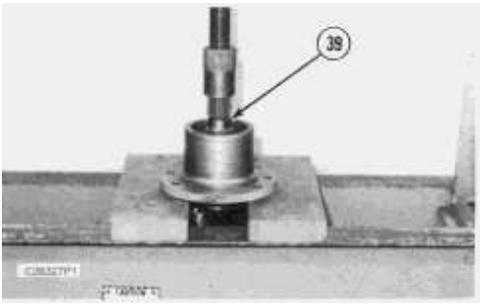
27. Remove six bolts (35) holding down seal retainer (34). Remove seal retainer (34).
28. Remove bolts (32) holding pinion housing and remove pinion housing (33).



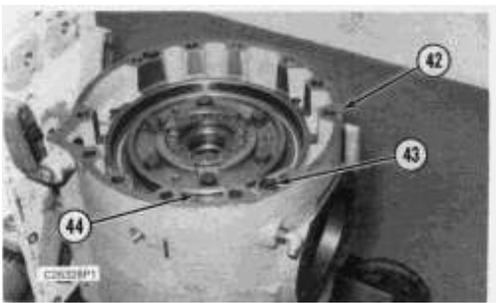
29. Inspect seal (36) in the seal retainer (34). Remove seal (36) in the seal retainer if necessary.



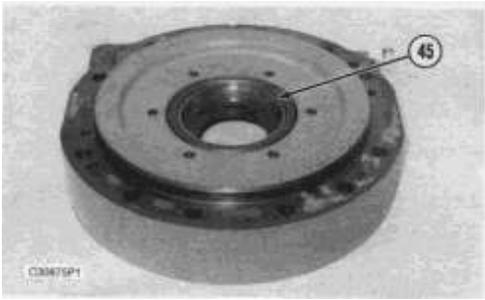
30. Bend crimp (38) away from the pinion shaft.
31. Remove nut (37) from the shaft with tool (E).



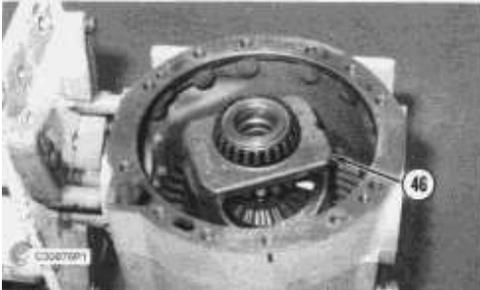
32. Press pinion shaft (39) from the pinion housing
33. Remove bearing (40) and bearing races (41) from the pinion housing.



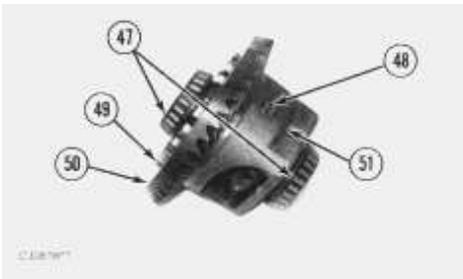
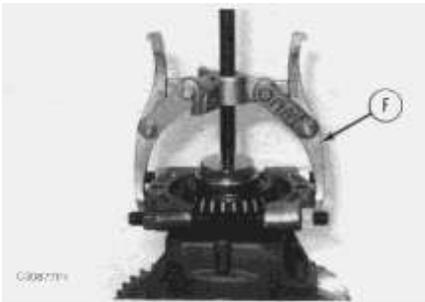
34. Remove two bolts (43) that holds brake housing (42).
35. Remove O-ring seal (44) from the flange on the brake housing.
36. Remove brake housing (42) from the differential housing.

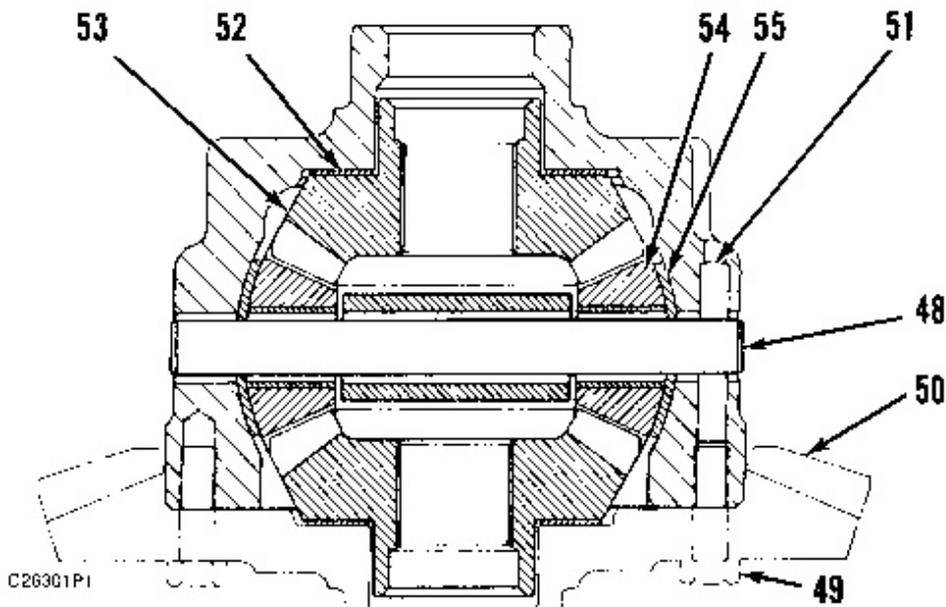


37. Remove bearing race (45) from the brake housing.



38. Remove differential assembly (46) from the differential housing.





39. Use tooling (F) and remove both bearing cones (47) from the differential assembly.

40. Remove bolts (49) from the bevel gear (50).

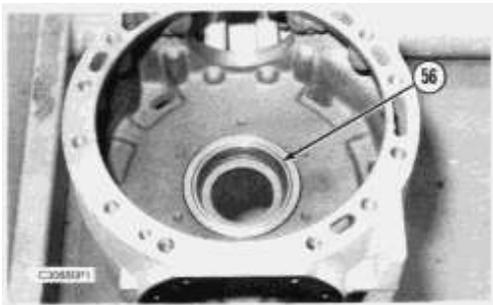
41. If necessary, use a suitable press to press differential assembly from bevel gear (50).

42. Use a hammer and a punch and then drive pin (51) from shaft (48).

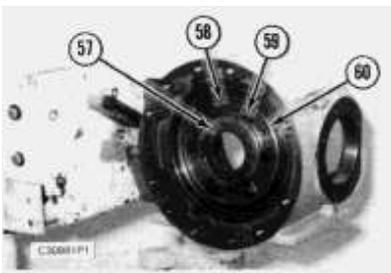
43. Remove shaft (48).

44. Remove two pinions (54) and two pinion thrust washers (55).

45. Remove two gears (53) and two side thrust washers (52) from the housing.



46. Remove bearing race (56) from inside the differential housing.



47. Remove O-ring seal (60) from the brake piston cavity.

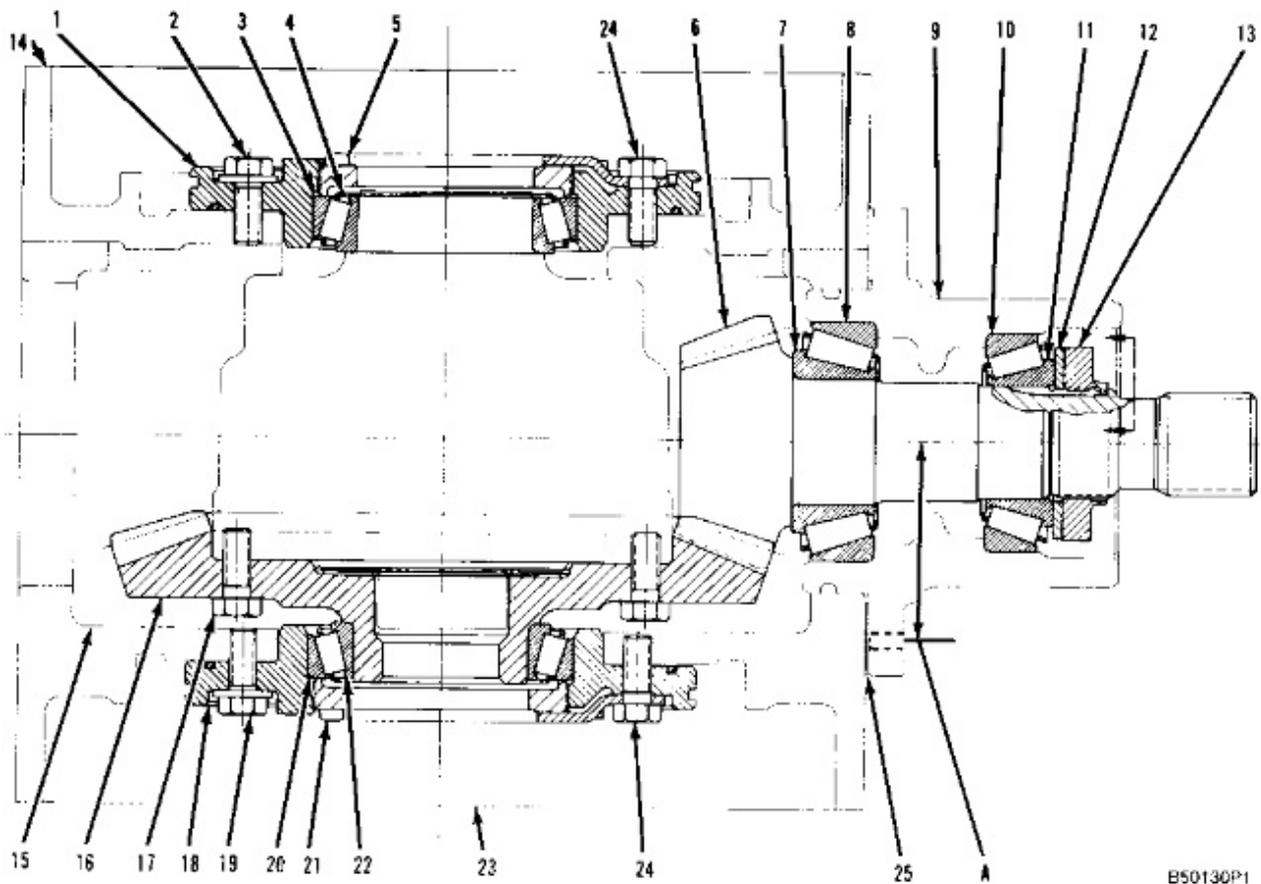
48. Plate (58) can be removed to replace adjusting nut (57) by removing six bolts (59).

Assemble Axle Housing (Final Drives, Brakes & Differential)

Tools Needed		A	B	C	D	E
	OTC 1750 Engine Rotation Stand	1				
5P954	Spanner Socket		1			
4C6369	Spanner Wrench			1		
FT2338	Spanner Wrench				1	
8S2328	Dial Indicator Test Group					1

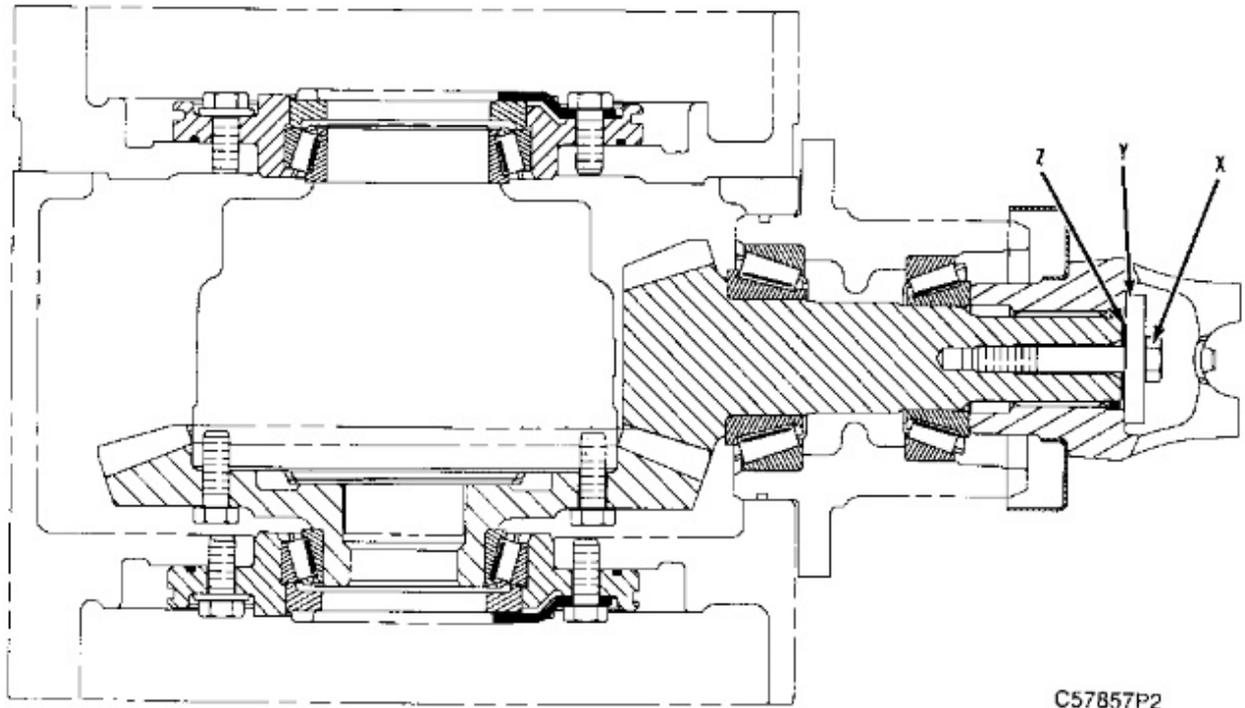
NOTE: Before the assembly of any differential assembly, there are adjustments to be made. First will be the pinion preload adjustment.

NOTE: The same adjustments are used for both the front and rear pinion assemblies.



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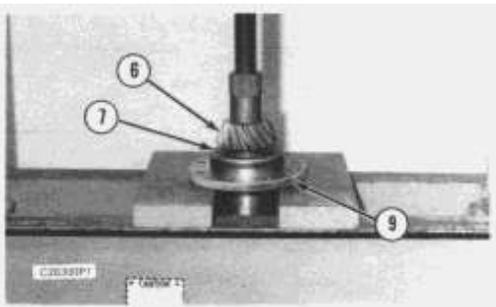
Oscillating Axle



Fixed Axle

NOTE: Nut (13) and washer (12) on the oscillating axle has been changed to a bolt (X), washer (Y) and shims (Z) for the fixed axle. All others call outs are the same.

NOTE: For the fixed axle a torque of 0.6 N·m (5.34 lb in) is needed for the seal drag.



NOTE: Bearing cup freezing or bearing cone heating may be used if cups or cones are reset with a driver (tool group [A]) or press after parts have reached a uniform temperature. Limit cone heating to 135°C (275°F) maximum for a for a maximum of 4 hours. Lubricate bearings after they have cooled to prevent rusting.

1. Press bearing cups (8) and (10) in housing (9). The bearing cups must be seated against the shoulders in housing (9).
2. Press bearing cone (7) onto pinion (6). Bearing cone (7) must be seated against the shoulder on pinion (6). Put clean lubrication on bearing cone (7).
3. Install pinion (6) in housing (9). Press bearing cone (11) into place leaving a small amount of end play. Put clean lubrication on bearing cone (11). Put clean lubrication on washer (12) and nut (13).
4. Install washer (12) and (13) atop bearing cone (11).

5. Position the housing and pinion assembly in a soft jawed vise. Tighten the vise against the teeth on pinion (6). Install and tighten an appropriate bolt and nut through an outer bolt hole in pinion housing (9).

6. Place a **203 mm (8.0 in)** torque wrench on this bolt so that it is in line with the center of pinion (6).

7. While turning housing (9) with the torque wrench, tighten nut (13) until the torque wrench reading is: For new bearings with actual torque at the pinion, the torque should be **0.7-1.1 N·m (6-10 lb in)**. For new bearings, the torque wrench reading should be **0.5-0.8 N·m (5-8 lb in)**. For used bearings with actual torque at the pinion, the torque should be **0.35-0.55 N·m (3-5 lb in)**. For used bearings, the torque wrench reading should be **0.25-0.40 N·m (2.5-4.0 lb in)**.

8. Check to be sure that there is zero end play of pinion shaft (6).

9. If pinion rolling torque exceeds the specifications, back off nut (13) 1/8 turn and reseal bearing cone (11) and washer (12) against nut (13). Perform Steps 6 and 7 again. If any other length torque wrench is used, find the torque wrench reading by using the following formula.

$$C = B \times T/B \times A$$

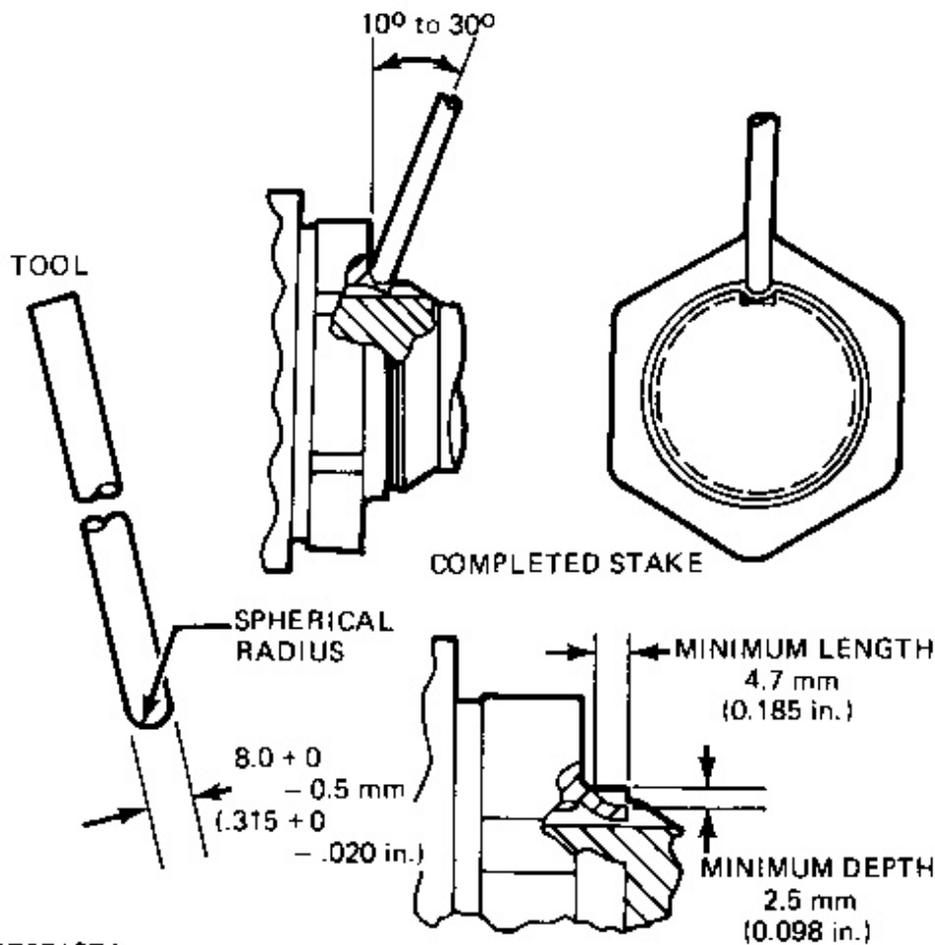
Where:

"C" is the torque reading on the torque wrench (in N·m).

"B" is the length of the torque (in meters).

"A" is the bolt circle radius of pinion housing (9) in meters and is equal to **.0875 m (3.44 in)**.

"T" is the rolling torque specification for pinion bearing preload which is **0.7 to 1.1 N·m (6 to 10 lb in)**.

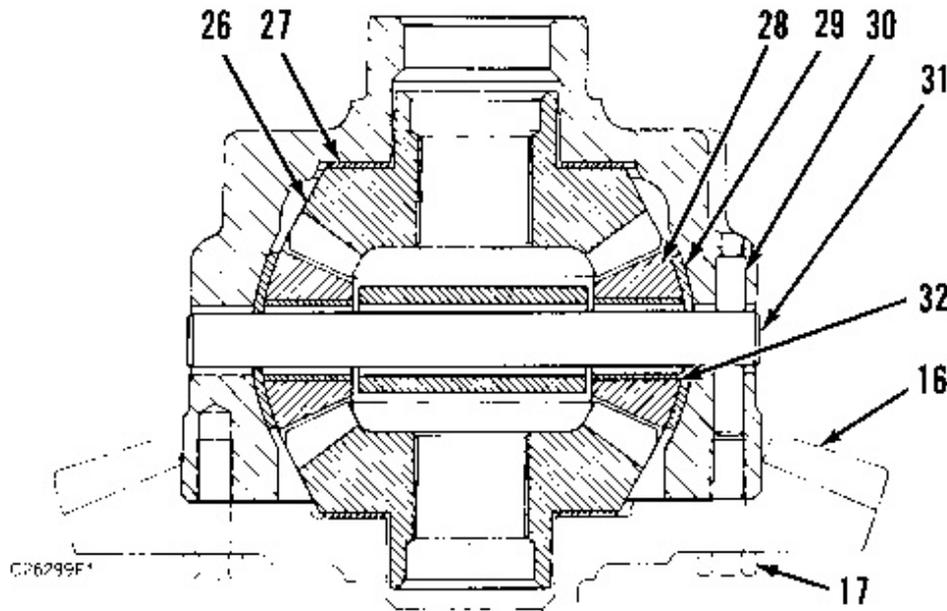


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10. When the torque needed to turn the pinion is correct, stake nut (13) by peening the collar on the nut into the key slot in pinion shaft (6), see Illustration A for the correct tooling and dimensions.

NOTE: The nut may be reused if the collar is not cracked during removal or restaking.

NOTE: The following procedure is for the differential backlash and bearing adjustment which controls the bearing preload and gives the same results for new and used bearings.



11. Prior to assembly, clean and lubricate all thrust washer surfaces in the differential case with a general purpose lubricant.

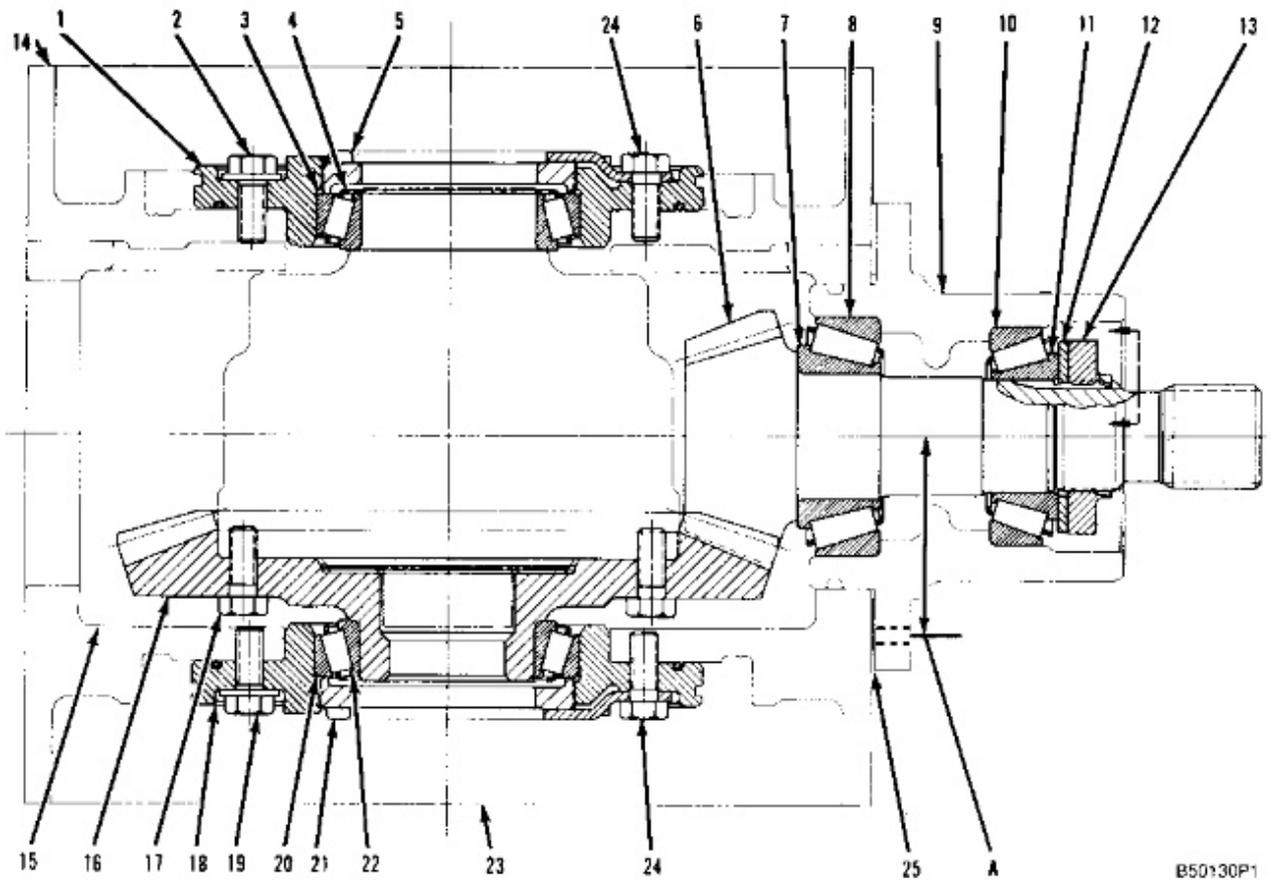
12. Install side gear thrust washers (27). Check to be sure that the washers lie flat and move freely within their restricted space. Lubricate and install differential side gears (26) and make sure they turn freely.

13. Lubricate and install spider shaft (31), pinion bearing sleeves (32) [if they were removed], differential pinion gears (28) and differential thrust washers (29). Install pin (30) in spider shaft (31). Check to insure that all gears turn freely.

14. Heat bevel gear (16) to **135°C (275°F)** for a maximum of four hours. Install the bevel gear on the differential case. Tighten bolts (17) to a torque of **125 ± 15 N·m (90 ± 11 lb ft)**. Check to make sure that the bevel gear is seated on the differential case shoulder.

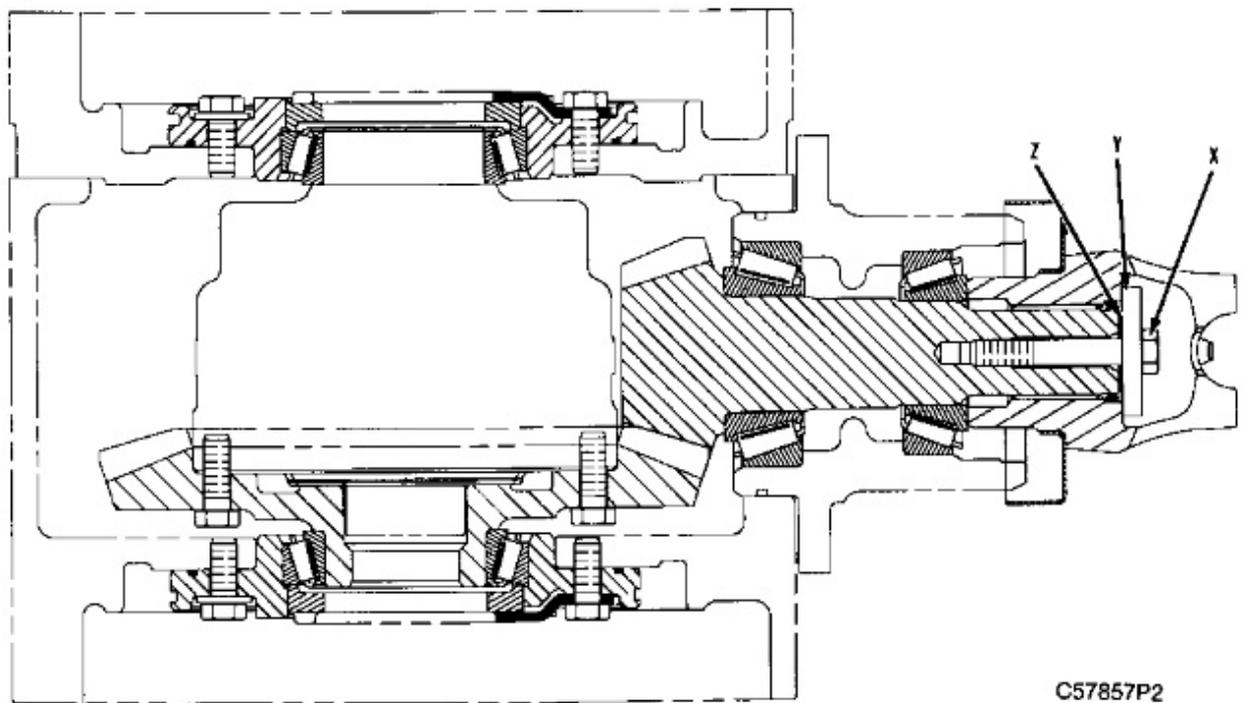
15. Press bearing cone (22) on bevel gear (16) and bearing cone (4) on differential case (15). Check for full seating of the bearing cones.

NOTE: Cup freezing or cone heating may be used if cups or cones are reset with a driver or press after parts have reached a uniform temperature. Limit cone heating to **135°C (275°F)** maximum for a maximum of 4 hours. Lubricate bearings after they have cooled to prevent rusting.



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Oscillating Axle

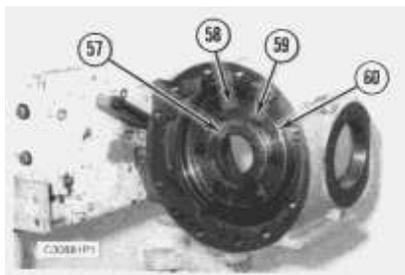


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Fixed Axle

NOTE: Nut (13) and washer (12) on the oscillating axle has been changed to a bolt (X), washer (Y) and shims (Z) for the fixed axle. All others call outs are the same.

NOTE: For the fixed axle a torque of 0.6 N·m (5.34 lb in) is needed for the seal drag.

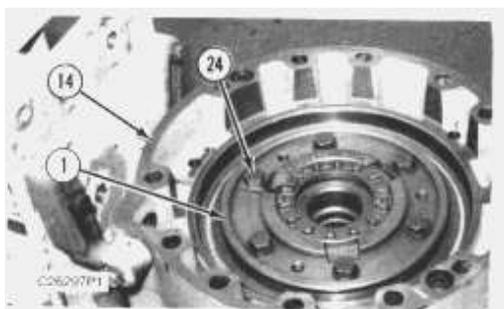


16. Press bearing cups (3) and (20) into bearing cages (1) and (18). Lubricate the threads of adjusting nuts (5) and (21) and install them in bearing cages (1) and (18).

17. Install bearing cage (18) [with bearing cup and adjusting nut into center housing (23). Torque the five bolts that hold bearing cage (18) to a torque of **125 ± 15 N·m (90 ± 11 lb ft)**.

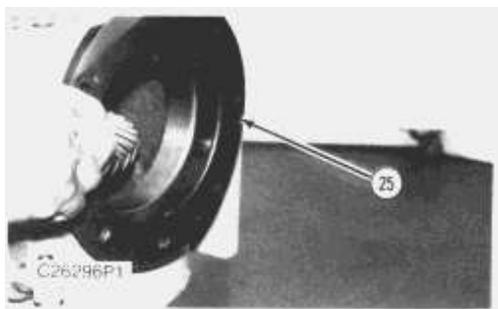


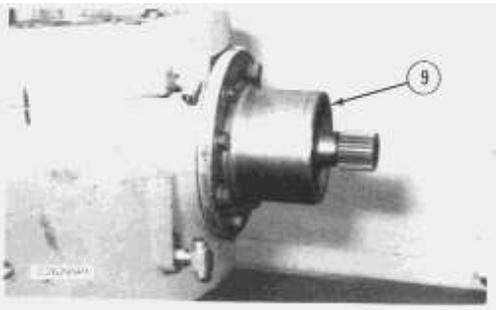
18. Put center housing (23) in an appropriate support fixture with the open side facing upward. Lower differential group (15) and bevel gear into position in the center housing.



19. Install intermediate housing on center housing (23). Torque two bolts to a torque of **95 ± 15 N·m (70 ± 11 lb ft)**.

20. Install bearing cage (1) [with bearing cup and adjusting nut] into intermediate housing (14). Tighten five bolts that hold bearing cage (1) to a torque of **125 ± 15 N·m (90 ± 11 lb ft)**.

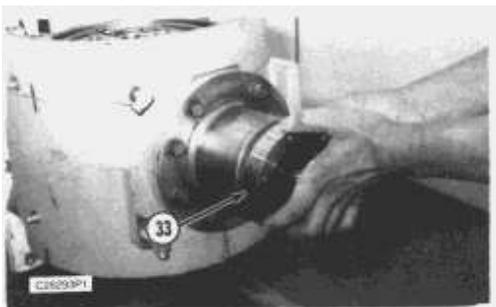
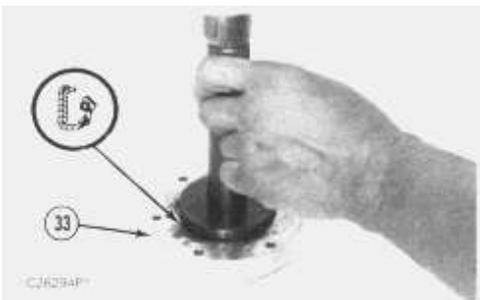




21. Lubricate and install O-ring seal on pinion housing (9). Install pinion housing (9) on center housing (23). Tighten eight bolts to a torque of $125 \pm 15 \text{ N}\cdot\text{m}$ ($90 \pm 11 \text{ lb ft}$).

Use the original thickness of shims (25) or a new shim pack measured to the same thickness as the original pack. If the original shim pack is not available, use 70% of a new shim pack.

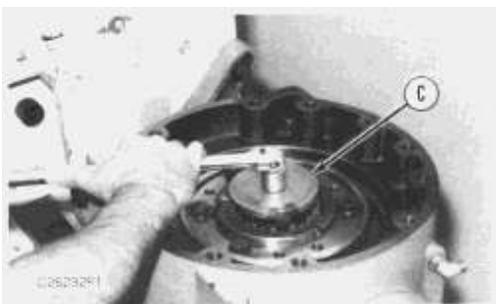
NOTE: Shim pack thickness may have to be changed when adjusting the tooth contact pattern.



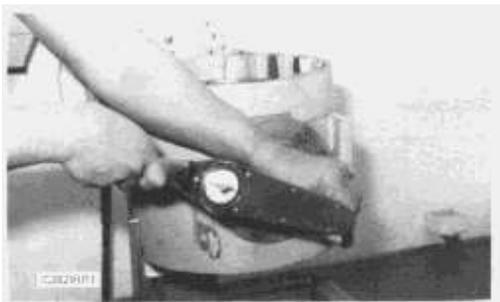
22. Install lip seal in seal retainer (33) with a suitable driver group. Install the lip of the seal toward the pinion gear.

23. Install seal retainer (33) on the pinion housing.

24. Position center housing (23) in the support fixture so the center housing (23) and pinion housing (9) are horizontal (the same position as they are in the vehicle).



25. Tighten adjusting nuts (5) and (21) with tool (D) to a position that maintains gear backlash (but not tight gear mesh) and a slight bearing end play.



26. Install tool (B) on pinion shaft nut (13) for this measurement. Measure the torque required to rotate pinion shaft (6). Record the measured torque.

27. While rotating pinion shaft (6) back and forth, tighten adjusting nut (21) with tool (D) to zero backlash position. Then back off adjusting nut (21) one lug plus the increment to the nearest lock position.

28. Tighten adjusting nut (5) with tool (D) while rotating pinion shaft (6). Tighten nut (5) with tool (D) until a torque increase of **0.2 to 0.6 N·m (2.0 to 5.0 lb in)** over the torque recorded in Step 26 is measured. This is the seated position.

29. Tighten adjusting nut (5) with tool (D) one lug plus the increment to the nearest lock position.

NOTE: As a check for correct assembly and adjustment, the rolling torque of the bevel gear group measured at the pinion shaft should be **1.8 to 3.0 N·m (16 to 27 lb in)** for new bearings and **.9 to 1.5 N·m (8 to 13 lb in)** for used bearings.

30. Measure the backlash between bevel gear (20) and pinion shaft (9). The backlash must be **0.20 ± 0.10 - 0.08 mm (.008 ± .004 - .003 in)**. Do this through the inspection hole with tool (E) on the heel of a bevel gear tooth.

31. If the backlash does not meet specifications, loosen one nut the same amount as the opposite nut is tightened. This will maintain the bearing preload.

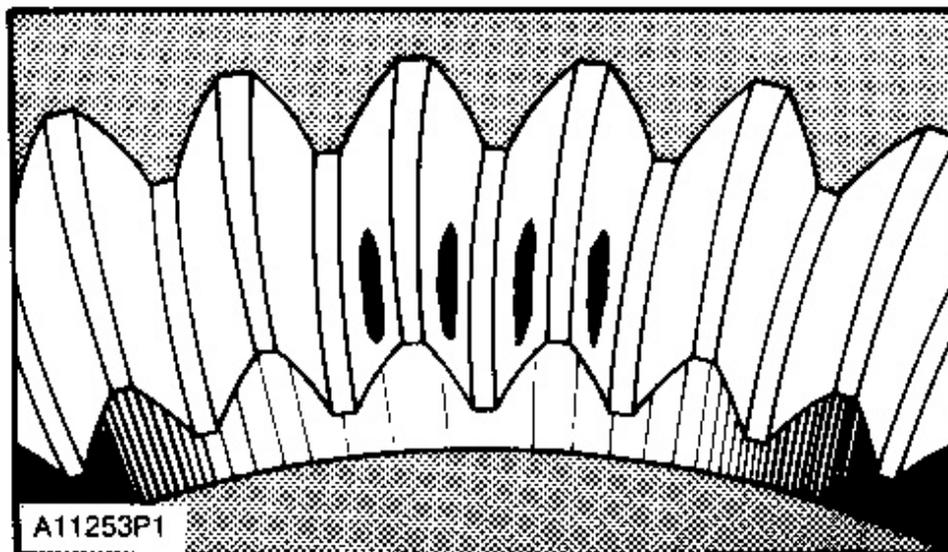


Illustration A

32. After the backlash and the preload adjustments have been made, the tooth contact between pinion shaft (6) and bevel gear (16) must then be checked. Do the procedure that follows:

- a.** Put a small amount of Prussian blue, red lead or paint on three or four adjacent teeth of bevel gear (16) through the access hole in center housing (15).
- b.** Rotate pinion shaft several revolutions in one direction and then several revolutions in the opposite direction. Then turn pinion shaft in one direction until the marked teeth can be seen through the access hole in the center housing.
- c.** The correct area of tooth contact starts near the inside end of the teeth of bevel gear (16) and goes a maximum of 50 percent of the length of the teeth. See Illustration A for an example of the correct area of tooth contact.

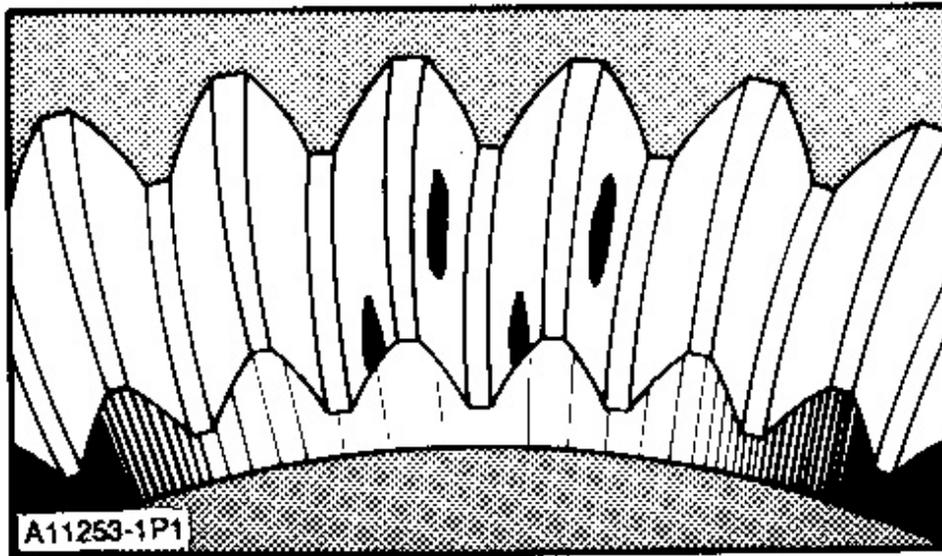


Illustration B

33. If the tooth contact looks like the marks in Illustration B, do the procedure that follows:

- a.** Remove some of shims (25).
- b.** Do Steps 30 and 31 for the backlash adjustment procedure again.
- c.** Do Step 32 of checking the tooth contact between pinion shaft (6) and bevel gear (16) again.

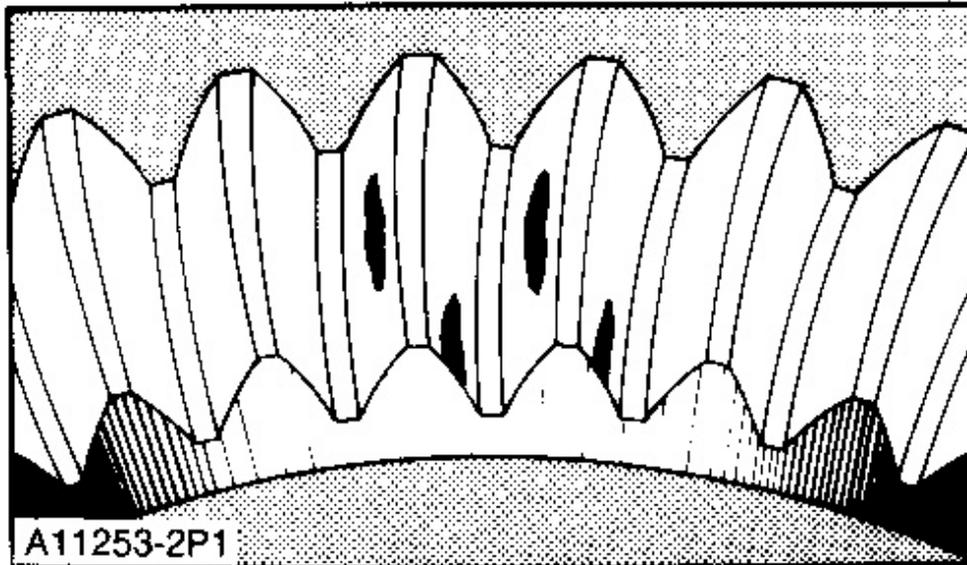


Illustration C

34. If the tooth contact looks like the marks in Illustration C, do the procedure that follows:

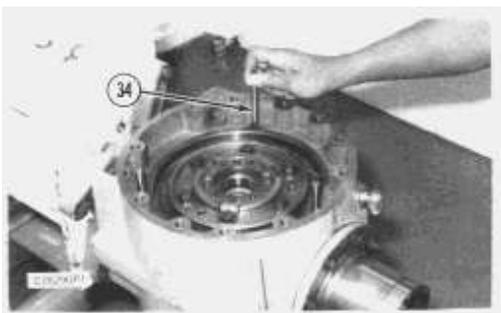
- a. Add some of shims (5).
- b. Do Steps 30 and 31 for the backlash adjustment procedure again.
- c. Do Step 32 of checking the tooth contact between pinion shaft and bevel gear (16) again.

NOTE: Always make sure the backlash adjustment is correct before an adjustment is made to the area of tooth contact. Several adjustments to the backlash and tooth contact may be necessary to get the correct adjustments. Always remember that a change to gear clearance (backlash) will also change the gear contact. A change in gear contact will also change gear clearance (backlash).

35. After adjustments are made, remove Prussian blue, red lead or paint from the gears.

NOTE: See Illustration C26297P1 for Step 36.

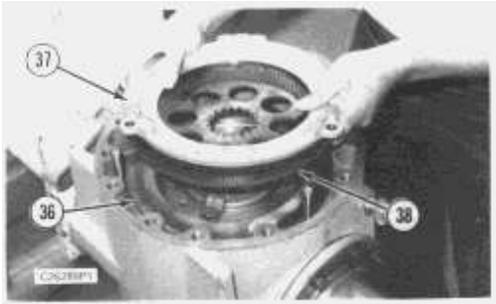
36. Install one remaining bolt (24) with lock on each bearing cage (1) and (18) and torque bolt (24) to a torque of $125 \pm 15 \text{ N}\cdot\text{m}$ ($90 \pm 11 \text{ lb ft}$).



37. Install brake reaction dowels (34) into the center housing.

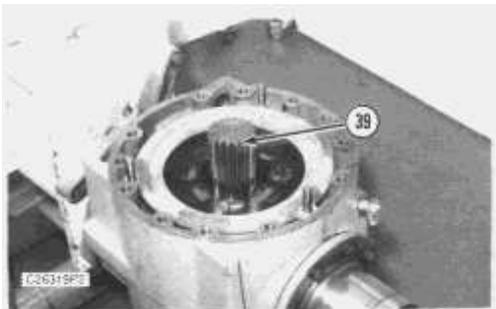


38. Put clean oil on seals (35) and install them on piston (36).



39. Clean and lubricate the piston and center housing sealing surfaces. Install piston (36) in the center housing.

40. Install friction disc (38) and reaction plate (37) in the center housing.



41. Install sun gear shaft (39) into the brake assembly.

NOTE: Follow Steps 37 through 40 for the other brake housing assembly.

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