CATERPILLAR®

Service Repair Manual

Models

993K Wheel Loader

Product: WHEEL LOADER
Model: 993K WHEEL LOADER Z9K
Configuration: 993K Wheel Loader Z9K00001-UP (MACHINE) POWERED BY C32 Engine

Disassembly and Assembly
993K Wheel Loader Power Train
Media Number -KENR5817-03 **Publication Date -01/03/2010** **Date Updated -28/08/2018**

i03005554

Input Transfer Gears - Assemble

SMCS - 3159-016-IV

Assembly Procedure

Table 1

Required Tools			
Tool	**Part Number**	**Part Description**	**Qty**
B	1P-7405	Eyebolt	1
C	1P-0520	Driver Group	1
D	8T-5096	Dial Indicator Group	1

Note: Cleanliness is an important factor. Before assembly, all parts should be thoroughly cleaned in cleaning fluid. Allow the parts to air dry. Wiping cloths or rags should not be used to dry parts. Lint may be deposited on the parts which may cause later trouble. Inspect all parts. If any parts are worn or damaged, use new parts for replacement.

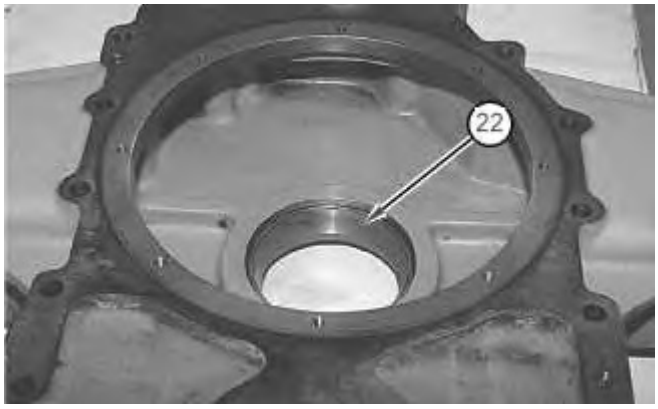

Illustration 1 g01528481

1. Lower the temperature of bearing cup (22). Install bearing (22) in the input transfer gear housing. Use a thickness gauge that has a thickness of 0.038 mm (0.0015 inch) or less to ensure that bearing cup (22) is seated.

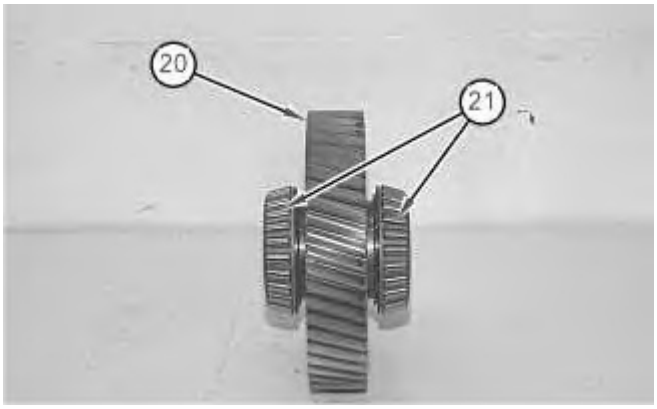

Illustration 2 g01562910

2. Raise temperature of bearing cones (21). Install bearing cones (21) on gear (20). Use a thickness gauge that has a thickness of 0.038 mm (0.0015 inch) or less to ensure that bearings (21) are seated.

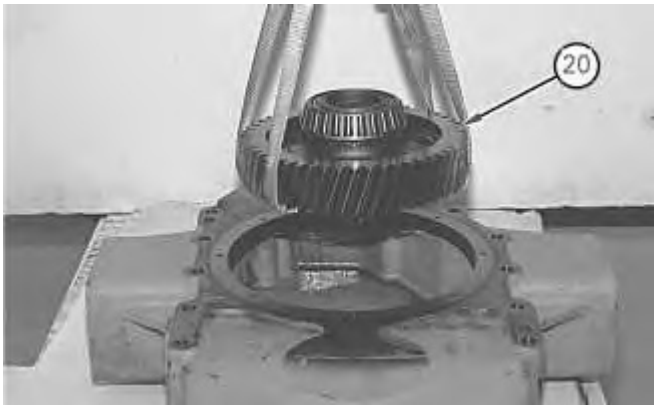

Illustration 3 g01562908

3. Use a suitable lifting device to install gear assembly (20) in the input transfer gear housing. The weight of gear assembly (20) is approximately 25 kg (55 lb).

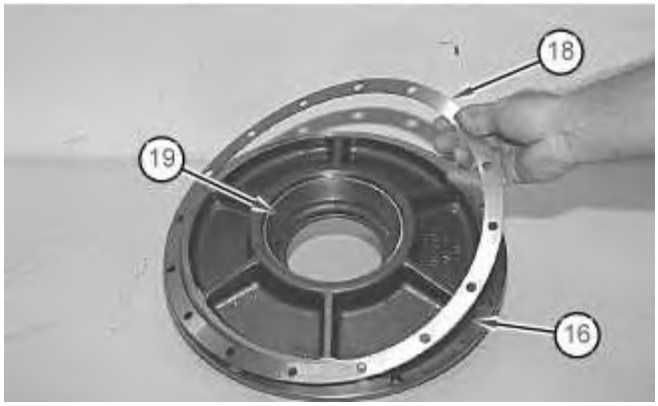

Illustration 4 g01562906

4. Lower the temperature of bearing cup (19). Install bearing cup (19) in cage assembly (16). Use a thickness gauge that has a thickness of 0.038 mm (0.0015 inch) or less to ensure that bearing cup (19) is seated.

5. Install the correct shims (18) on cage assembly (16).

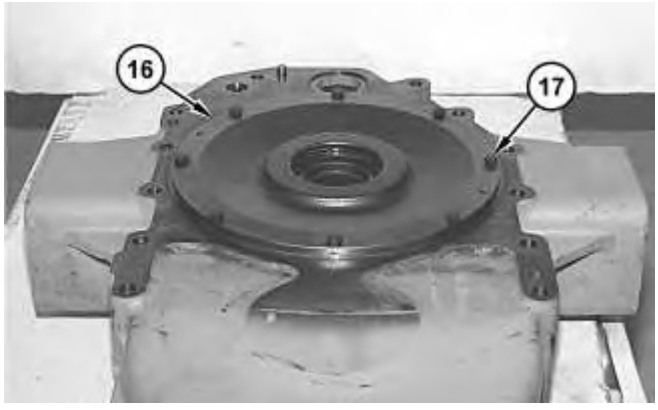

Illustration 5 g01562903

6. Install cage assembly (16) in the input transfer gear housing. Make sure that cage assembly (16) does not bind in the transfer case.

7. Install bolts (17). Tighten bolts (17) evenly. Tighten bolts (17) to a torque of 47 ± 9 N·m (35 ± 7 lb ft).

8. Rotate the gear assembly for a minimum of three revolutions or rotate the gear assembly until the rolling resistance of the gear assembly diminishes to a steady level.

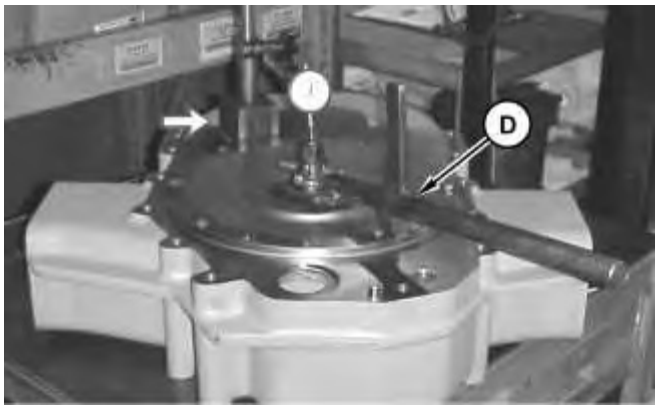

Illustration 6 g01565253

9. Install Tooling (D) on the input transfer gear housing, as shown. Measure the end play of the gear assembly by lifting on the gear assembly.

   Note: The desired end play for the gear is 0.152 mm (0.0060 inch). The maximum end play for the gear is 0.203 mm (0.0080 inch). The end play of the gear must be measured with a dial indicator in order to determine the correct gear end play.

10. If the end play is not within the correct range, perform Steps 5 through 9 again. Add shims or remove shims in order to achieve the correct end play, if necessary.

11. Rotate the shaft after the correct end play is achieved. Make sure that the shaft turns freely in order to verify that the bearings are not binding.

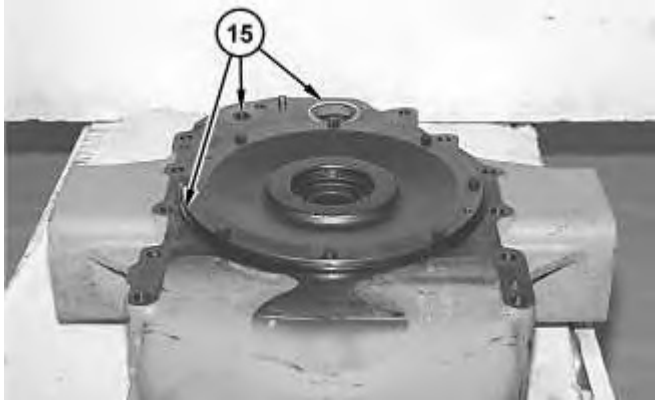

Illustration 7 g01562900

12. Install O-ring seals (15).

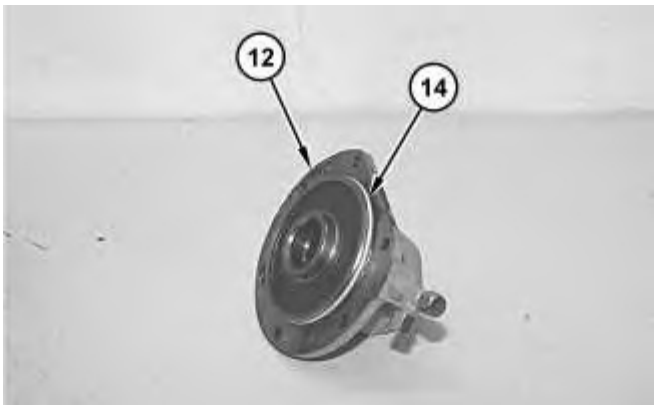

Illustration 8 g01562899

13. Install O-ring seal (14) on manifold assembly (12).

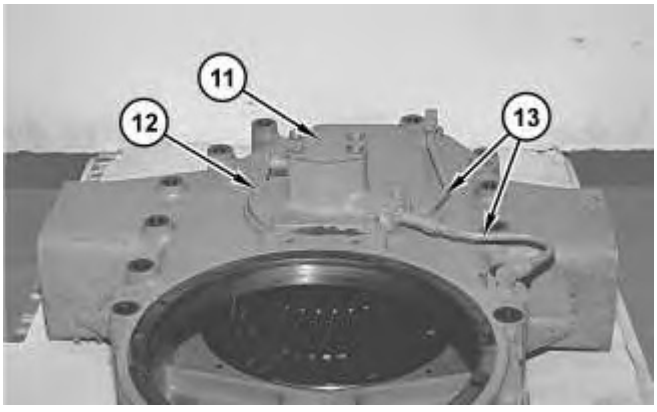

Illustration 9 g01563100

14. Rotate the input transfer gear housing to the opposite side, as shown. Install manifold assembly (11) and bolts (12) on the input transfer gear housing. Install tube assemblies (13).

Illustration 10 g01562895

15. Lower the temperature of bearing cup (10). Install bearing cup (10) in the input transfer gear housing. Use a feeler gauge that has a thickness of 0.038 mm (0.0015 inch) or less to ensure that bearing cup (10) is seated.

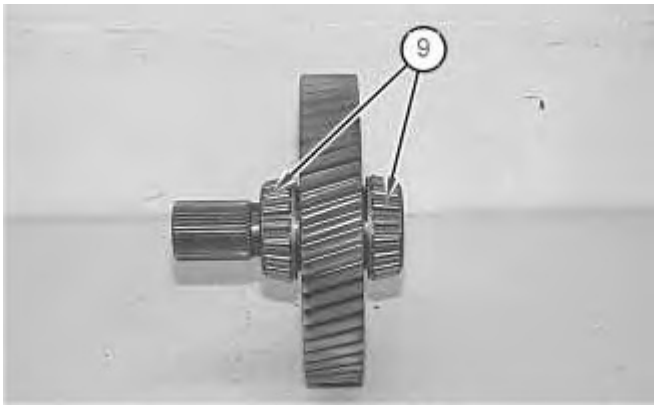

Illustration 11 g01562874

16. Raise the temperature of bearing cones (9) to a maximum temperature of 135°C (275°F). Install bearing cones (9) on the gear. Use a feeler gauge that has a thickness of 0.038 mm (0.0015 inch) or less to ensure that bearing cones (9) are seated.

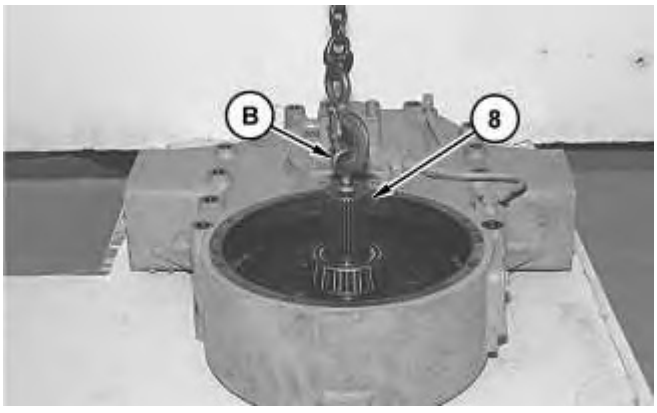

Illustration 12 g01562872

17. Install Tooling (B) and a suitable lifting device on gear assembly (8). The weight of gear assembly (8) is approximately 30 kg (66 lb). Install gear assembly (8) in the input transfer gear housing.

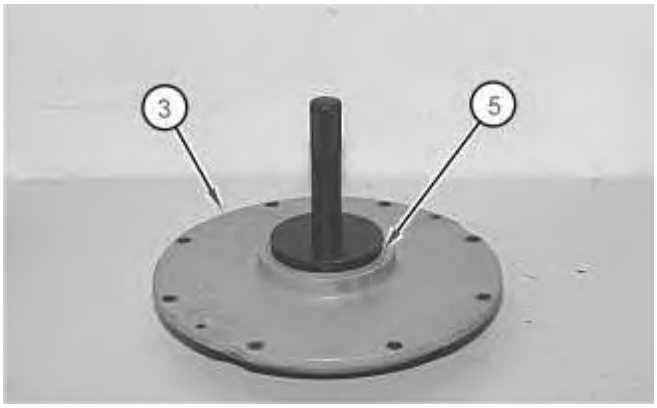

Illustration 13 g01565173

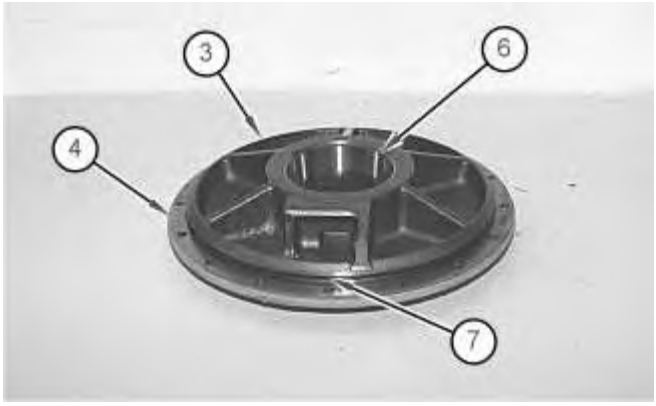

Illustration 14 g01562871

18. Lower the temperature of bearing cup (6). Install bearing cup (6) in cage assembly (3). Use a feeler gauge that has a thickness of 0.038 mm (0.0015 inch) or less to ensure that bearing (5) is seated. Use Tooling (C) to install lip seal (6) in cage assembly (3).

19. Install the correct shims (4) on bearing cage assembly (3). Install O-ring seal (7) on cage assembly (3).

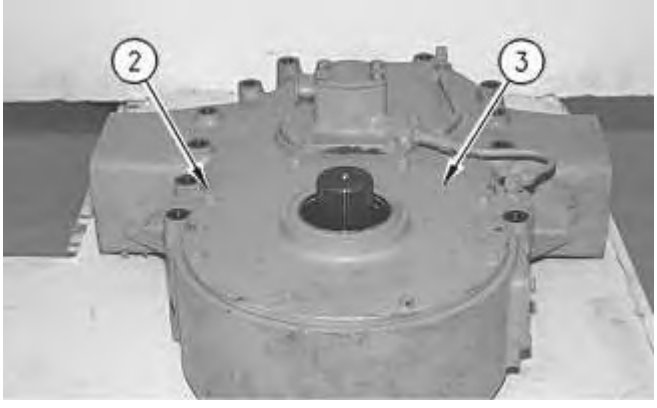

Illustration 15 g00375687

20. Install cage assembly (3) on the input transfer gear housing. Make sure that the cage assembly does not bind in the transfer case.

21. Install bolts (2). Tighten bolts (2) evenly. Tighten bolts (2) to a torque of 47 ± 9 N·m (35 ± 7 lb ft).

22. Rotate the gear assembly for a minimum of three revolutions or rotate the gear assembly until the rolling resistance of the gear assembly diminishes to a steady level. Use a mallet to tap the shaft lightly while you rotate the gear.

Illustration 16 g00661394

23. Install Tooling (B) on the input transfer gear housing, as shown. Measure the end play of the gear assembly by lifting on the gear assembly.

    Note: The desired end play for the gear is 0.152 mm (.0060 inch). The maximum end play for the gear is 0.203 mm (0.008 inch). The end play of the gear must be measured with a dial indicator in order to determine the correct gear end play.

24. If the end play is not within the correct range, perform Steps 19 through 23 again. Add shims or remove shims in order to achieve the correct end play, if necessary.

25. Rotate the shaft after the correct end play is achieved. Make sure that the shaft turns freely in order to verify that the bearings are not binding.

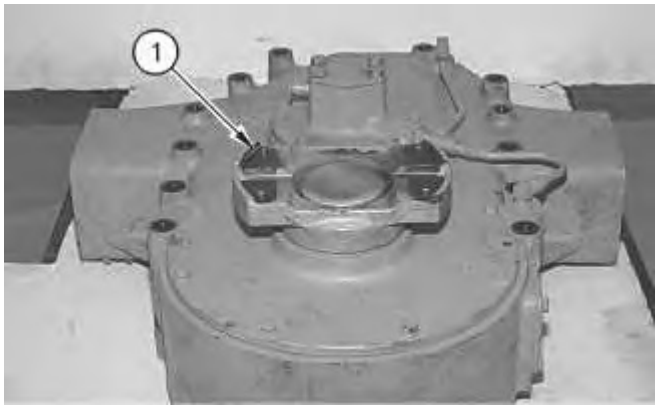

Illustration 17 g00375681

26. Install yoke (1).

End By:

a. Connect the transmission to the input transfer gears. Refer to Disassembly and Assembly, "Transmission to Input Transfer Gears and Output Transfer Gears - Connect".

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Disassembly and Assembly
993K Wheel Loader Power Train
Media Number -KENR5817-03 **Publication Date -01/03/2010** **Date Updated -28/08/2018**

i04864892

Transmission Planetary - Disassemble

SMCS - 3160-015

Disassembly Procedure

Table 1

Required Tools			
Tool	**Part Number**	**Part Description**	**Qty**
A	1P-2420	Transmission Repair Stand	1
B	1U-9200	Lever Puller Hoist Gp	1
C	138-7575	Link Bracket	2
D	3B-4617	Cotter	6
E	1P-0520	Driver Group	1
F	138-7573	Link Bracket	2
G	138-7574	Link Bracket	3
H	FT-0841	Clamp	2
J	1P-0520	Driver Group	1
K	1U-6396	O-Ring Assembly Compound	1
L	5D-1026	Hose Clamp	1
M	FT-0834	Clutch Testing Nozzle	6
N	4C-4032	Bearing Mount Compound	1

Start By:

a. Separate the transmission and the output transfer gears.

b. Remove the transmission hydraulic control valve.

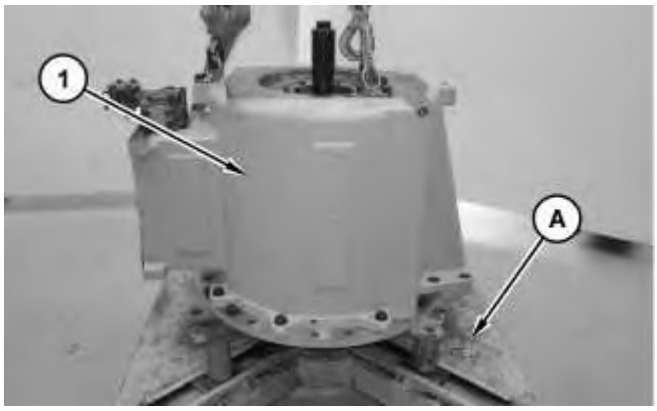

Illustration 1 g02992540

1. Position case assembly (1) on Tooling (A), as shown.

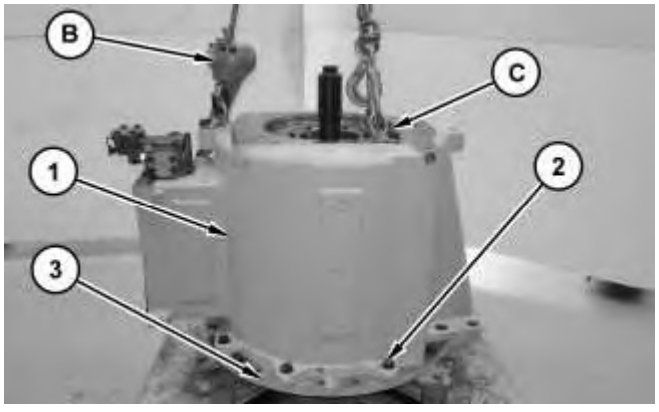

Illustration 2 g02992560

2. Attach Tooling (B) and Tooling (C) to case assembly (1) and remove bolts (2). Remove case assembly (1) from support housing assembly (3). The weight of case assembly (1) is approximately 204 kg (450 lb).

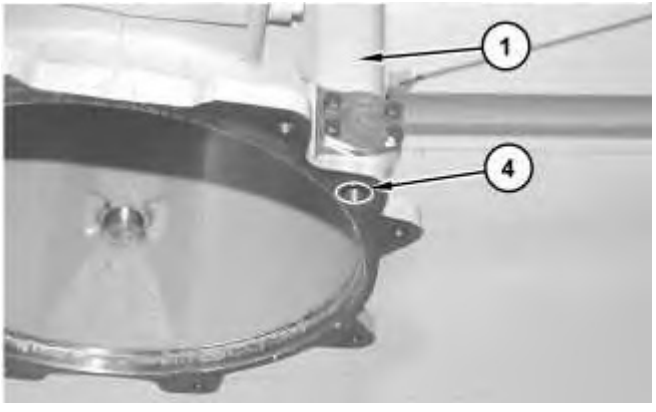

Illustration 3 g02992785

3. Remove O-ring seal (4) from case assembly (1).

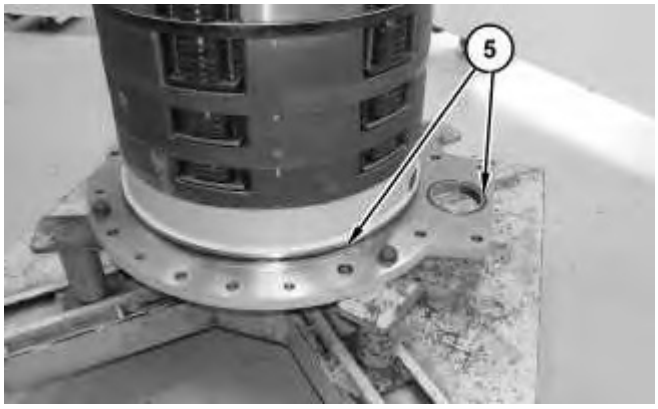

Illustration 4 g02992798

4. Remove O-ring seals (5).

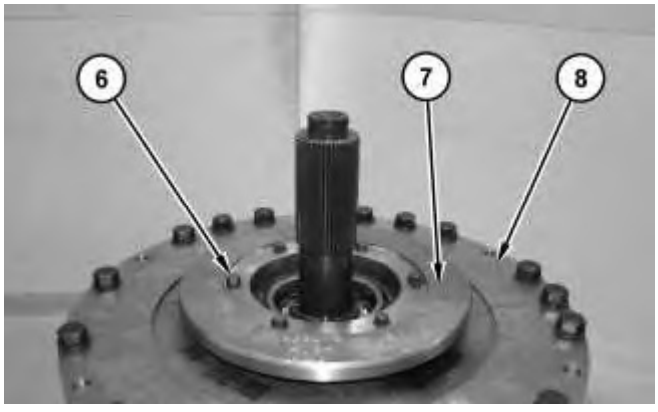

Illustration 5 g02992836

5. Remove bolts (6) that secure bearing retainer (7) to clutch housing (8). Remove bearing retainer (7).

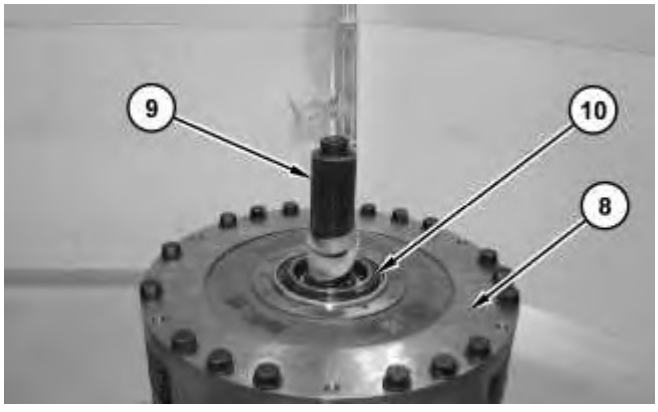

Illustration 6 g02992877

6. Attach a suitable lifting device to shaft (9). Lift on shaft (9) in order to remove retainer (10) from clutch housing (8).

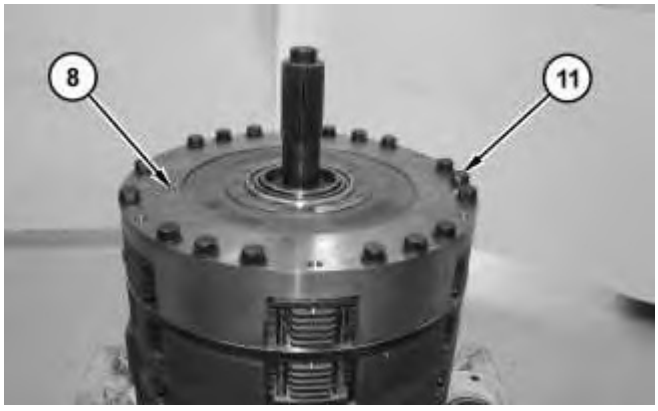

Illustration 7 g02992905

7. Remove bolts (11) from clutch housing (8).

Illustration 8 g02992956

8. Attach Tooling (C) and a suitable lifting device to clutch housing (8). The weight of clutch housing (8) is approximately 84 kg (185 lb). Remove clutch housing (8).

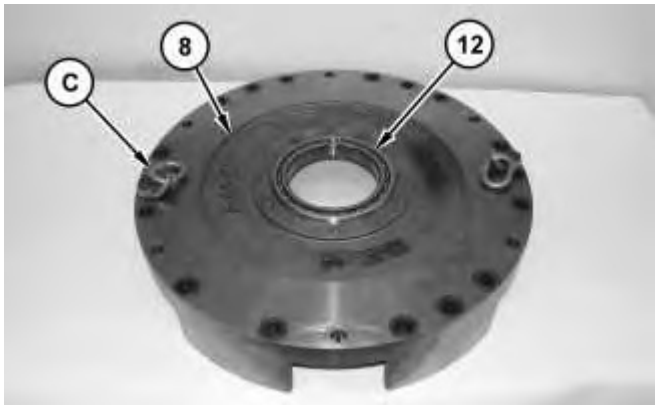

Illustration 9 g02997222

9. Remove Tooling (C) and bearing (12) from clutch housing (8).

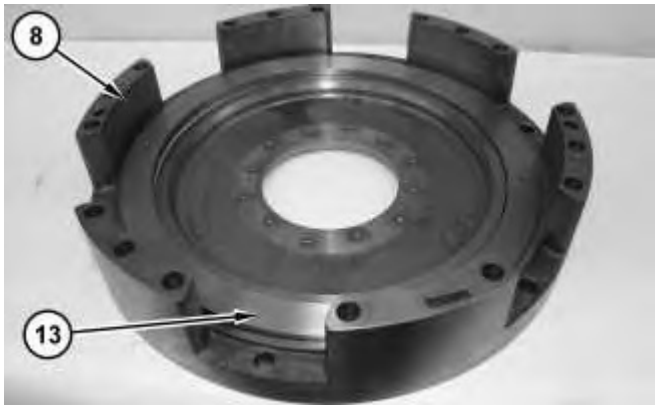

Illustration 10 g02997616

10. Use compressed air to remove piston (13) from clutch housing (8).

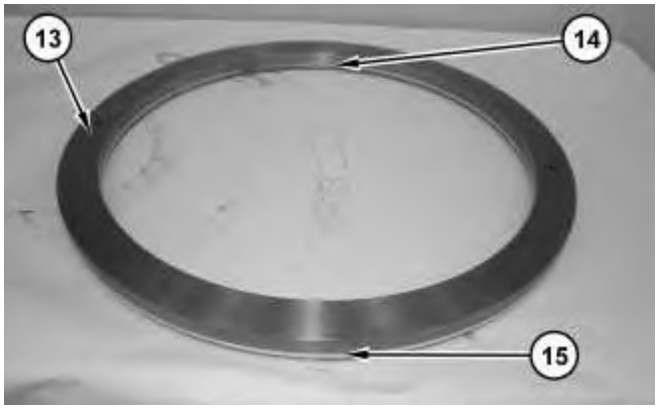

Illustration 11 g02997577

11. Remove seals (14) and (15) from piston (13).

Illustration 12 g02997681

12. Remove clutch plate (16).

Illustration 13 g02997738

13. Remove springs (17).

Illustration 14 g02997743

14. Remove six friction discs (18) and five clutch plates (19).

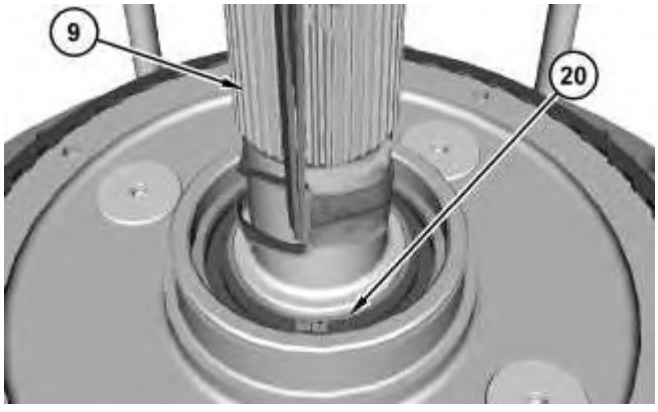

Illustration 15 g02999257

15. Attach a suitable lifting device to shaft (9). Slightly raise shaft (9) and remove retaining ring (20).

Illustration 16 g02997829

16. Attach Tooling (C) and a suitable lifting device to carrier assembly (21). The weight of carrier assembly (21) is approximately 57 kg (125 lb). Remove carrier assembly (21).

Illustration 17 g02999496

17. Remove Tooling (C) from carrier assembly (21) and remove retaining ring (22).

Illustration 18 g02999537

18. Remove bearing (23) from carrier assembly (21).

Illustration 19 g02999567

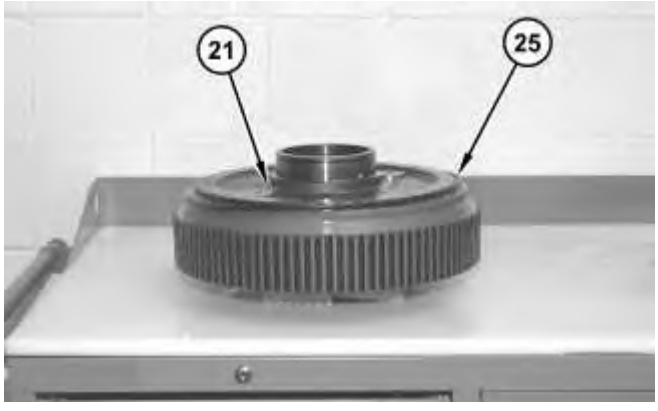

Illustration 20 g02999578

19. Place the carrier assembly on suitable cribbing, as shown. Use Tooling (D) in order to compress lock ring (25) that secures coupling (24) to carrier assembly (21). Coupling (24) will drop down exposing lock ring (25). Remove lock ring (25).

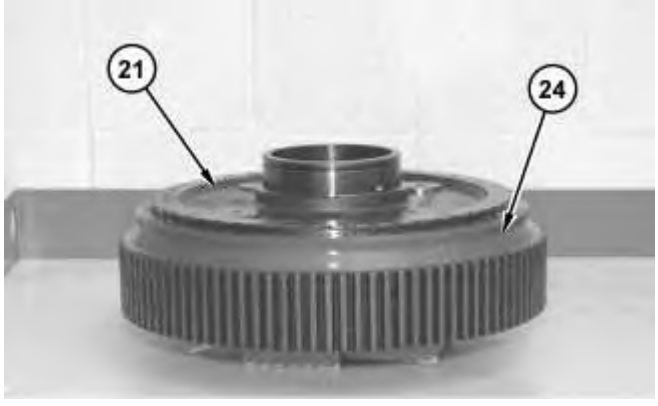

Illustration 21 g02999673

20. Remove coupling (24) from carrier assembly (21).

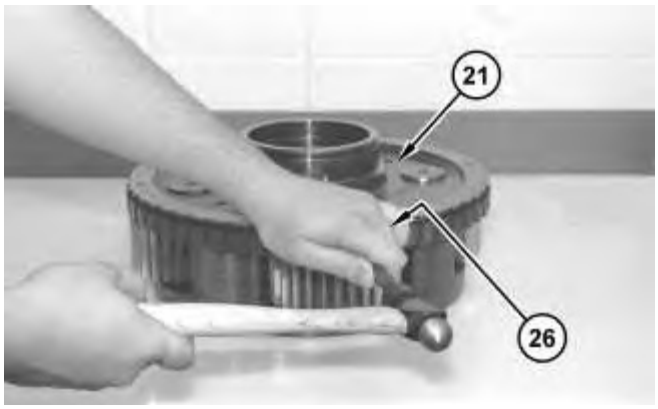

Illustration 22 g02999700

21. Use a suitable drift in order to drive spring pin (26) (not shown) toward the center of carrier assembly (21).

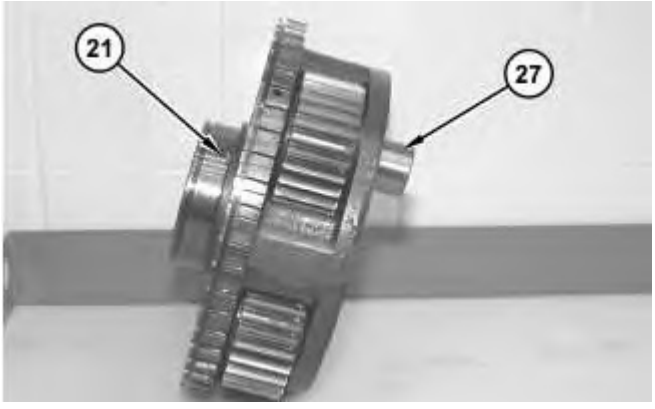

Illustration 23 g02999704

22. Remove planetary shaft assembly (27) from carrier assembly (21).

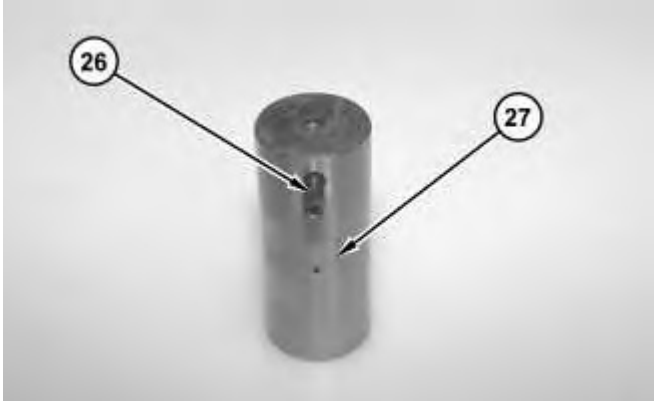

Illustration 24 g02999757

23. Use a suitable drift in order to remove spring pin (26) from planetary shaft assembly (27).

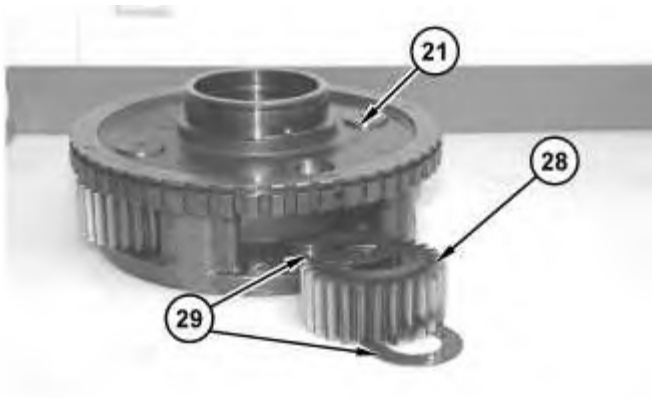

Illustration 25 g02999821

24. Remove planetary gear (28) and thrust discs (29) from carrier assembly (21).

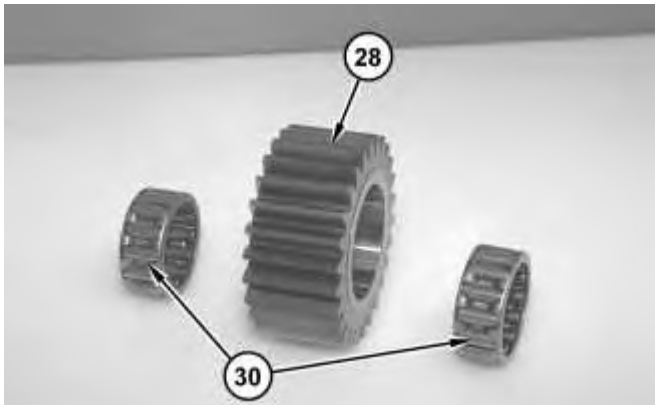

Illustration 26 g02999979

25. Remove roller assemblies (30) from planetary gear (28).
26. Repeat Steps 21 through 25 for remaining planetary shaft assemblies (33).

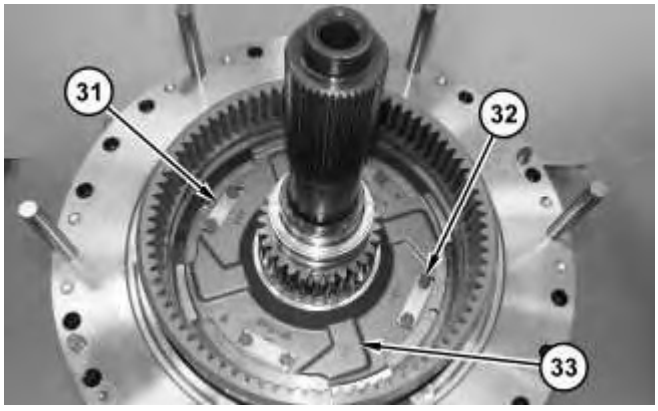

Illustration 27 g03000003

27. Bend nut locks (31) away from bolts (32). Remove bolts (32) that secure bearing cage (33) to the planetary carrier.

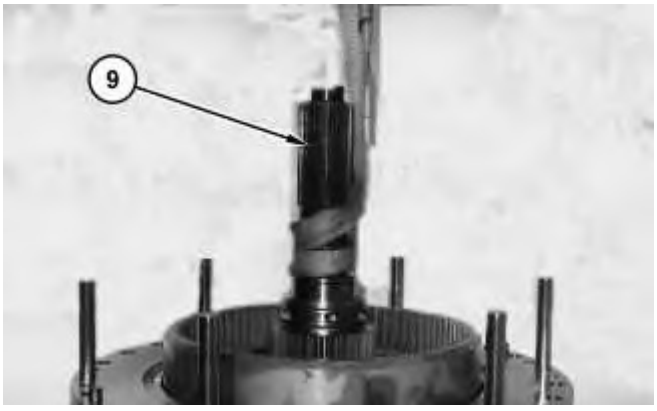

Illustration 28 g03000019

28. Attach a suitable lifting device to shaft assembly (9). The weight of shaft assembly (9) is approximately 45 kg (100 lb). Remove shaft assembly (9).

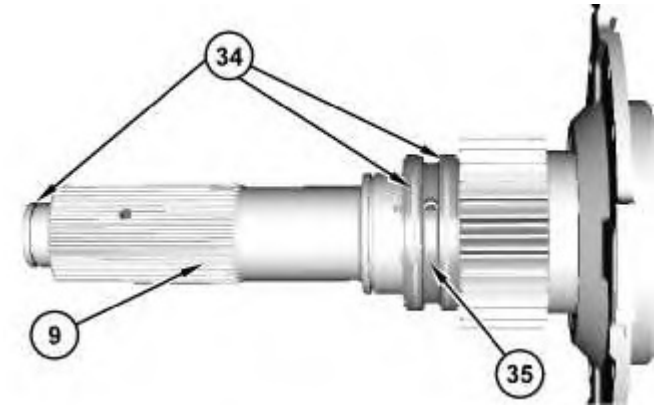

Illustration 29 g03000120

29. Remove metal seal rings (34) from shaft (9) and ring carrier (35).

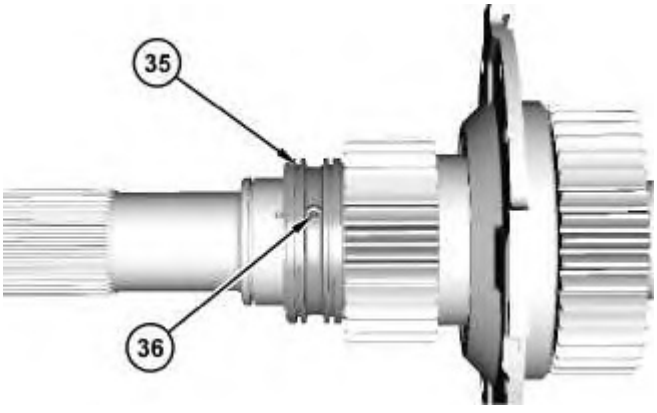

Illustration 30 g03000162

30. Use a suitable drift in order to remove spring pin (36). Ring carrier (35) will be destroyed in order to be removed. Use a hammer and a chisel in order to break ring carrier (35). Remove ring carrier (35).

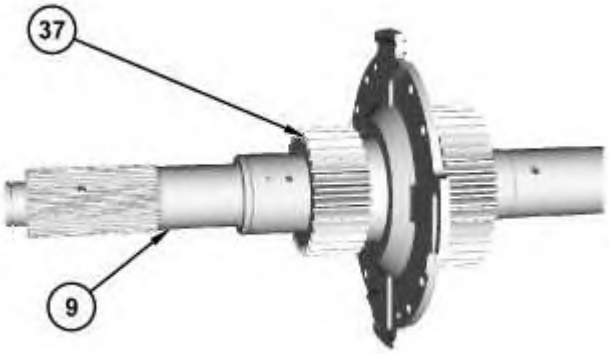

Illustration 31 g03000636

31. Remove sun gear (37) from shaft assembly (9).

Illustration 32 g03000816

32. Remove seal ring (38) from sun gear (37).

Illustration 33 g03000821

33. Remove bearing cage (33) from shaft assembly (9).

Illustration 34 g03000856

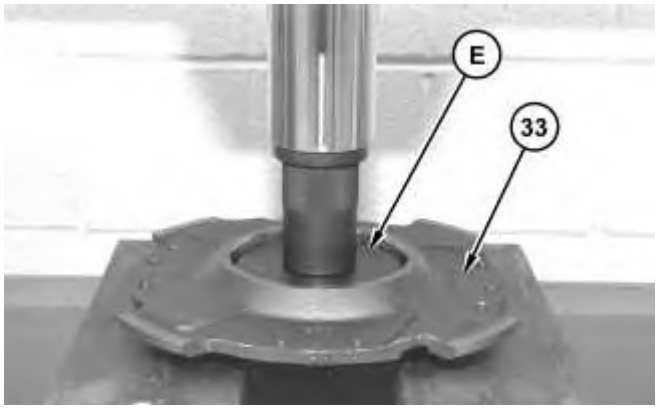

Illustration 35 g03000862

34. Remove retaining ring (39) that secures bearing (40) in ball bearing cage (33).

35. Use a suitable press and Tooling (E) in order to remove bearing (40) from bearing cage (33).

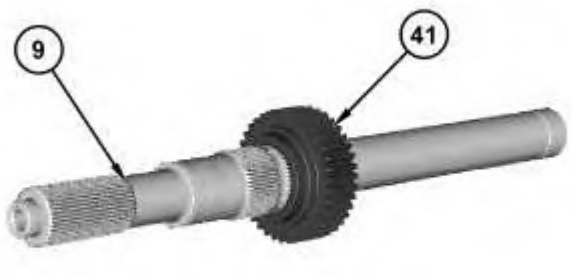

Illustration 36 g03000864

36. Remove sun gear assembly (41) from shaft assembly (9).

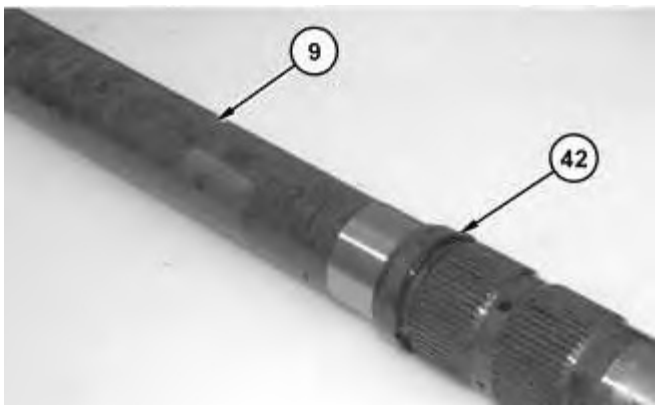

Illustration 37 g03000896

37. Remove ring (42) from shaft assembly (9).

Illustration 38 g03001439

38. Remove coupling gear (43). Remove retaining ring (44) from coupling gear (43).

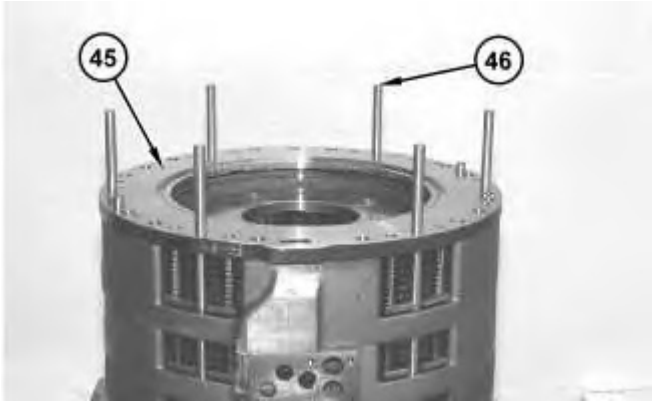

Illustration 39 g03001477

39. Remove dowels (46) from center plate assembly (45).

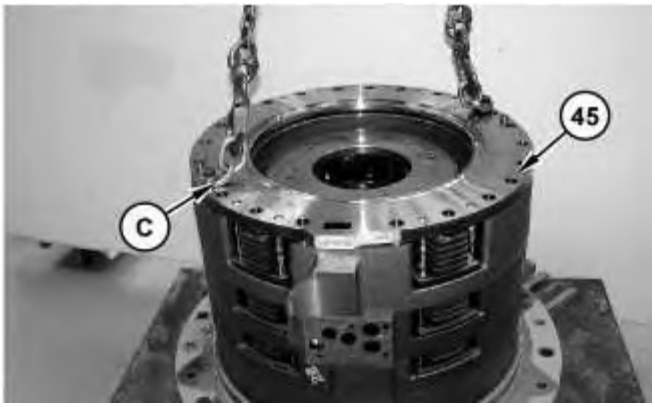

Illustration 40 g03001538

40. Attach Tooling (C) and a suitable lifting device to center plate assembly (45). Remove center plate assembly (45). The weight of center plate assembly (45) is approximately 25 kg (55 lb). Remove Tooling (C) and the suitable lifting device.

Illustration 41 g03001519

41. Remove springs (47).

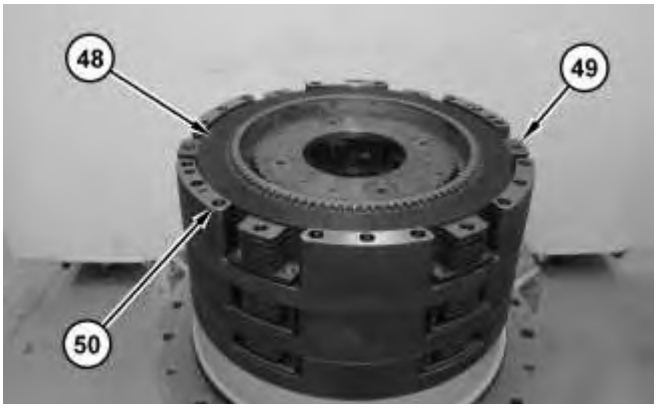

Illustration 42 g03001599

42. Remove six friction disks (48) and five clutch plates (49) from clutch housing (50).

Illustration 43 g03001738

43. Remove bottom clutch plate (51) from clutch housing (50).

Illustration 44 g03001764

44. Remove ring gear (52) from clutch housing (50).

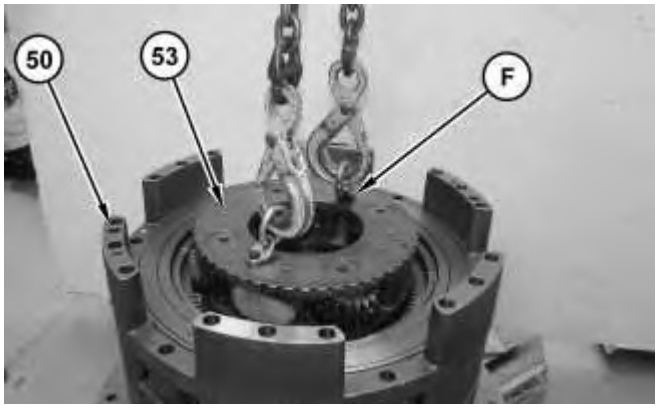

Illustration 45 g03002040

45. Attach Tooling (F) and a suitable lifting device to planetary carrier (53). Remove planetary carrier (53) from clutch housing (50). The weight of planetary carrier (53) is approximately 59 kg (130 lb). Remove Tooling (F) and the suitable lifting device.

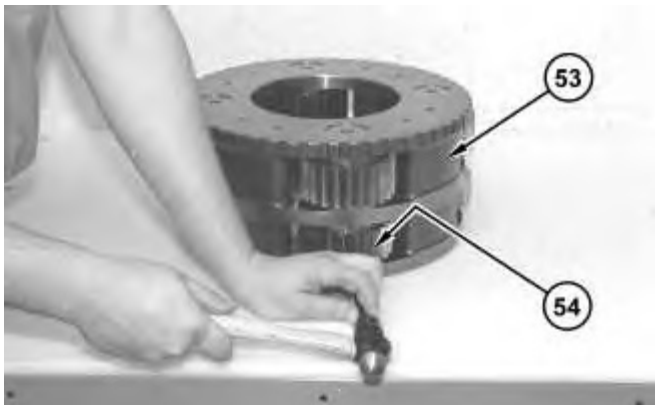

Illustration 46 g03002196

46. Use a suitable drift in order to drive the spring pin (54) (not shown) toward the center of planetary carrier (53).

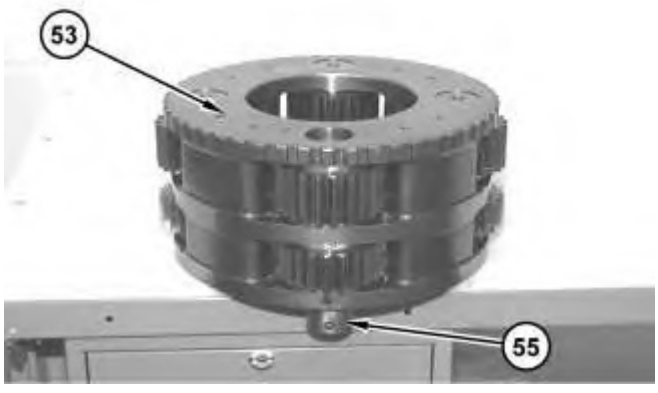

Illustration 47 g03002236

47. Remove planetary shaft (55) from planetary carrier (53).

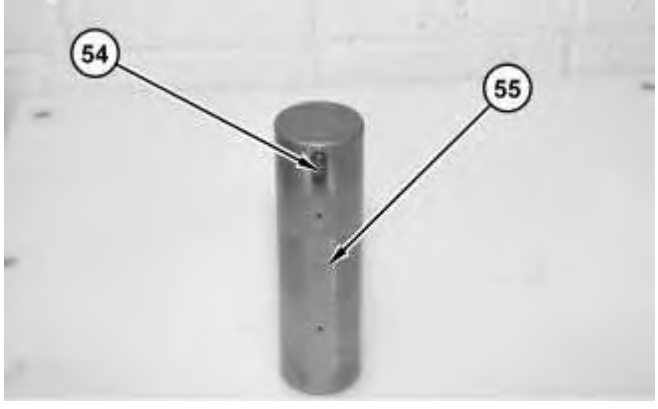

Illustration 48 g03002304

48. Use a suitable drift in order to remove spring pin (54) from planetary shaft (55).

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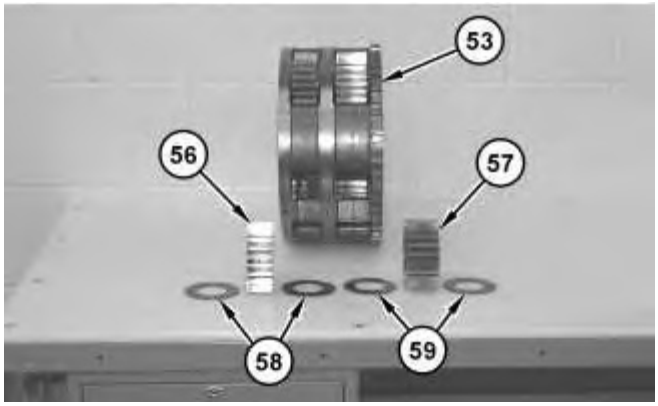

Illustration 49 g03002318

49. Remove planetary gears (56) and (57) from planetary carrier (53). Remove thrust discs (58) and (59) from planetary carrier (53).

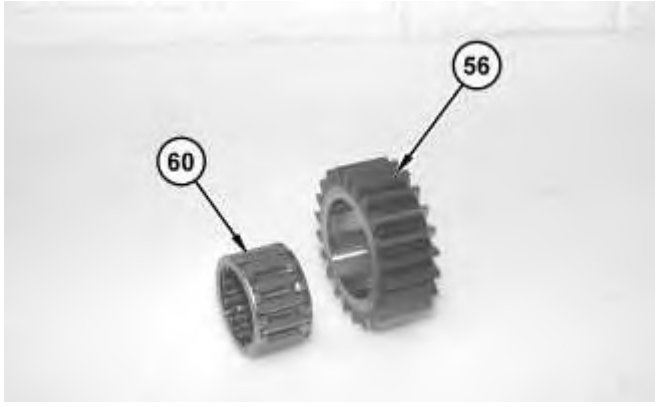

Illustration 50 g03002536

50. Remove bearing (60) from planetary gear (56).

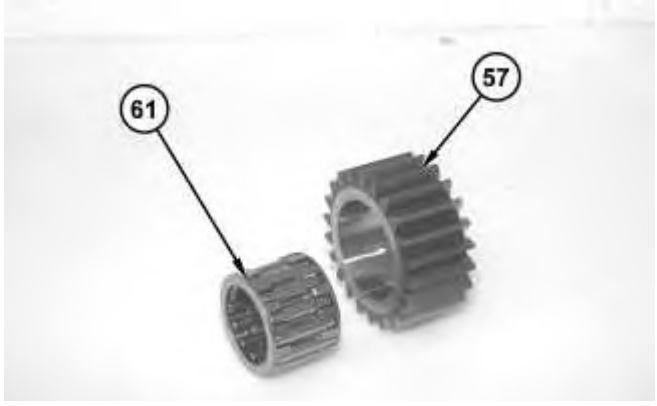

Illustration 51 g03002577

51. Remove bearing (61) from planetary gear (57).

52. Repeat Steps 46 through 51 for the remaining three planetary shafts (55).