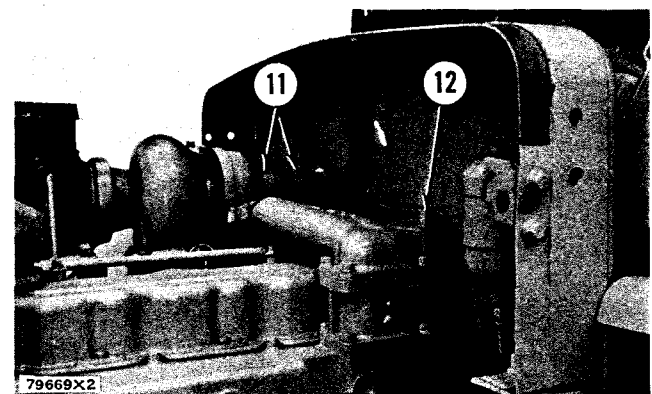
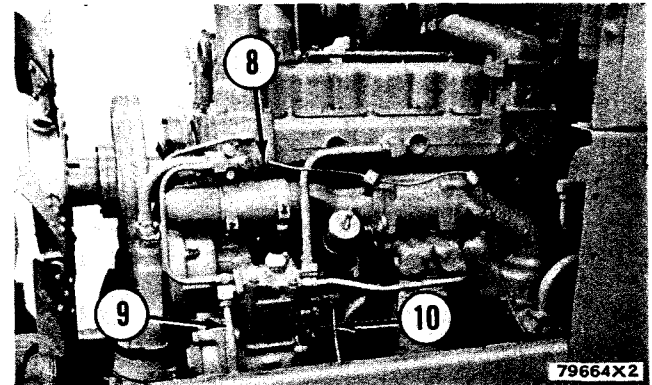
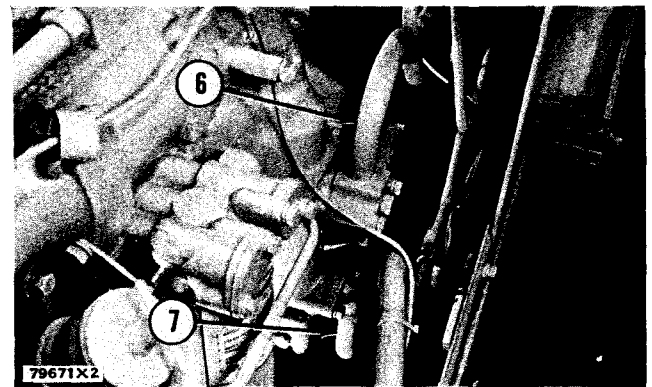
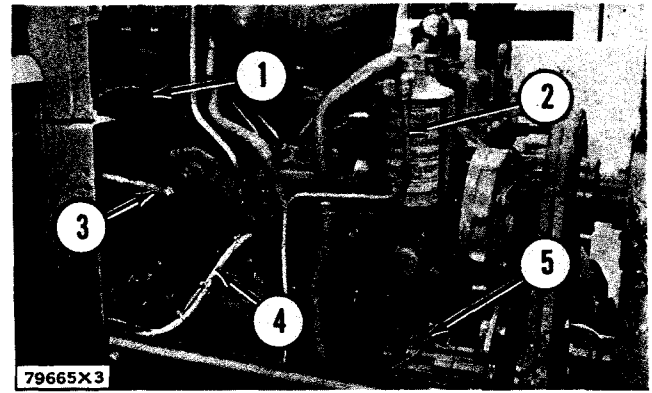


ENGINE, TORQUE CONVERTER AND TRANSMISSION

REMOVE ENGINE, TORQUE CONVERTER, AND TRANSMISSION 11-1004

start by:

- a) remove radiator and guard
 - b) remove transmission bottom guard
 - c) remove air tank
 - d) remove diverter valve for supplemental steering
1. Remove the oil from the transmission and hydraulic tank.
 2. Remove the governor control rod (3).
 3. Disconnect wires (4) from the starter and wires (5) from the alternator and put identification on each wire.
 4. Disconnect wire (1) from the glow plug lead and remove the two clips that hold the wire to the firewall. Let the wire hang down along the frame.
 5. Disconnect fuel line (2) from the fuel filter base and the fuel line from the accessory drive housing.
 6. Disconnect gauge line for fuel pressure from the fuel filter base.
 7. Disconnect gauge line for oil pressure from the rear of the engine.
 8. Remove inlet oil line (6) and outlet oil line (7) from the torque converter oil cooler.
 9. Disconnect gauge line (8) for water temperature at the cylinder head.
 10. Remove air line (10) and disconnect air line (9) from air compressor.
 11. Loosen the hose clamps (11) and slide hose toward the turbocharger.
 12. Remove the four bolts that hold the air cleaner bracket (12) to the air inlet pipe. Remove the air cleaner and bracket as a unit.

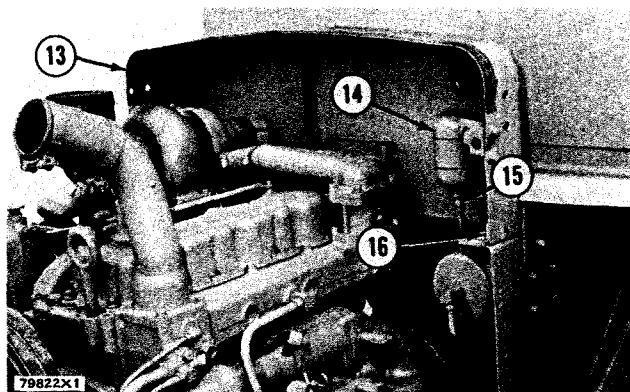


ENGINE, TORQUE CONVERTER AND TRANSMISSION

13. Disconnect tube (15) from the service brake control tank (14).

14. Remove the plate between the cab and the firewall.

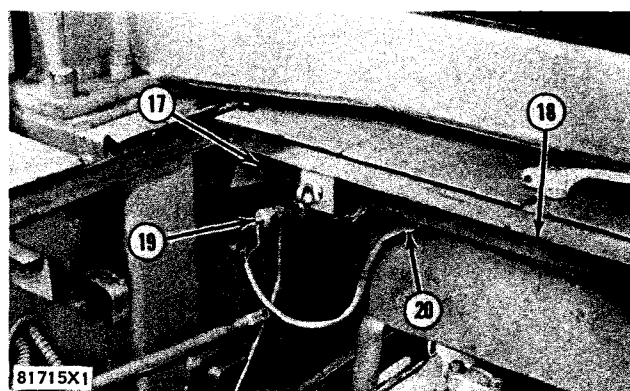
15. Remove bolts (16) and remove firewall (13).



16. Disconnect two wires (19) from the brake master cylinder.

17. Remove two clips (20) that hold the wire to the seat support.

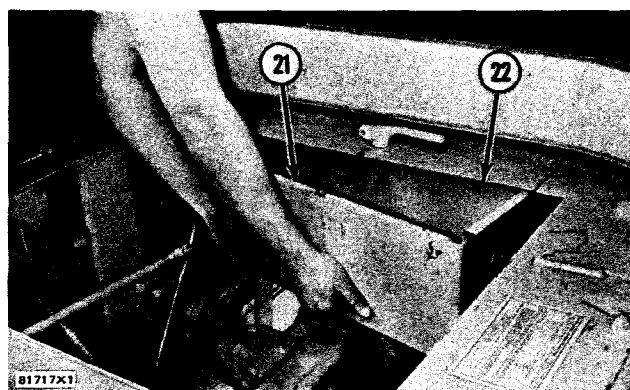
18. Remove two bolts (17) and remove seat support (18).



19. Remove tool box (21).

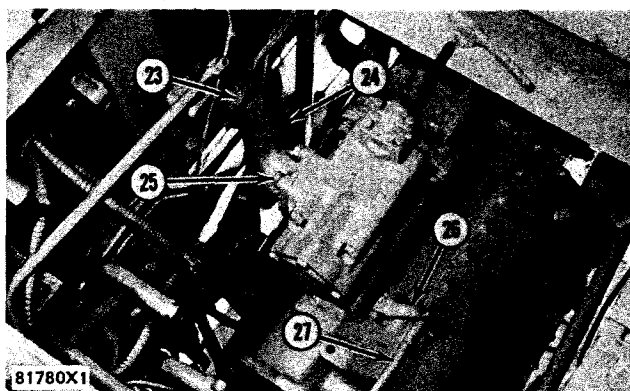
20. Remove plate (22) under the rear cab wall.

21. Remove transmission control rod (27) for forward and reverse from machine.



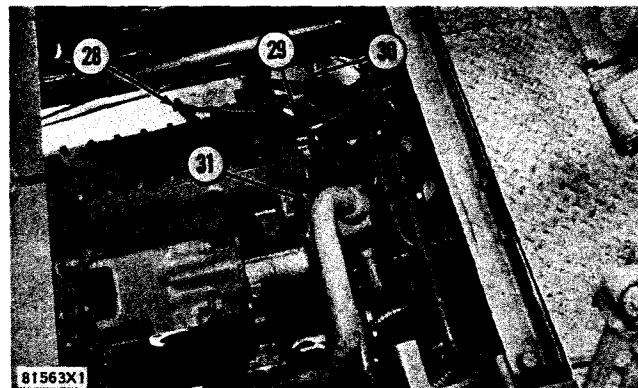
22. Remove the lever (26) from the transmission.

23. Loosen clamps (23) and slide hose toward hydraulic tank. Remove bolts (25) and suction elbow (24).



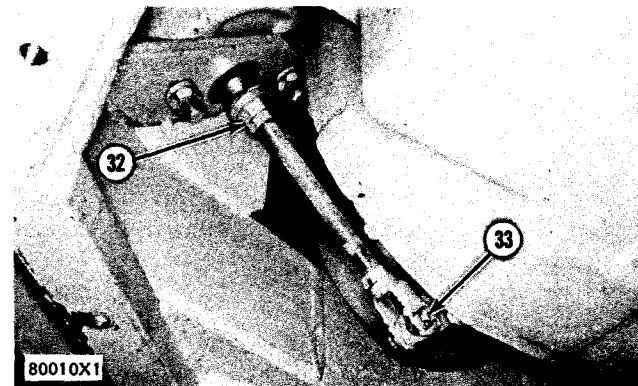
ENGINE, TORQUE CONVERTER AND TRANSMISSION

24. Disconnect pressure line (31) from the pump. Disconnect the clamp that holds the line to the frame. Pull the line forward and connect it to the platform with a wire.



25. Disconnect neutralizer line (30) from adapter.

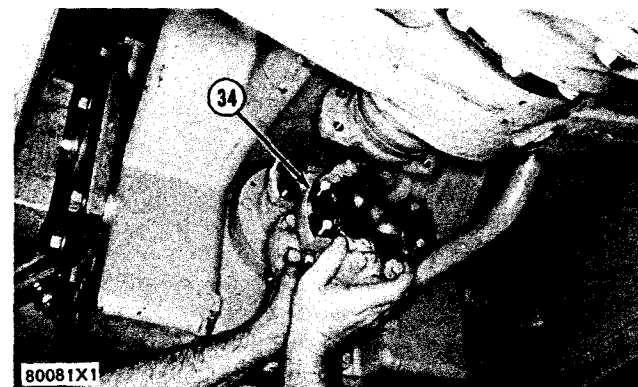
26. Remove the transmission filler tube (29).



27. Disconnect the transmission selector rod (28).

28. Remove the oil level gauge tube.

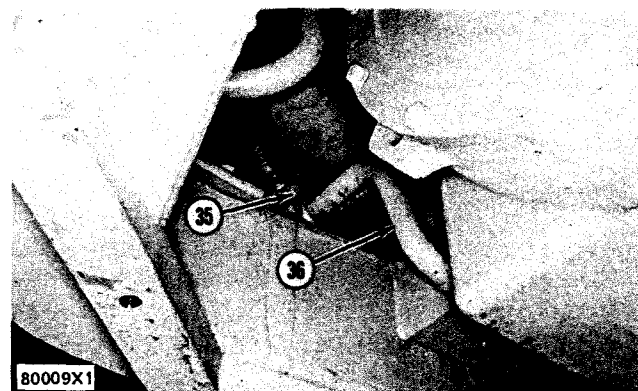
29. Release the parking brake by loosening the nuts (32) on the rod until the pin (33) is loose.



30. Remove pin (33) from rod.

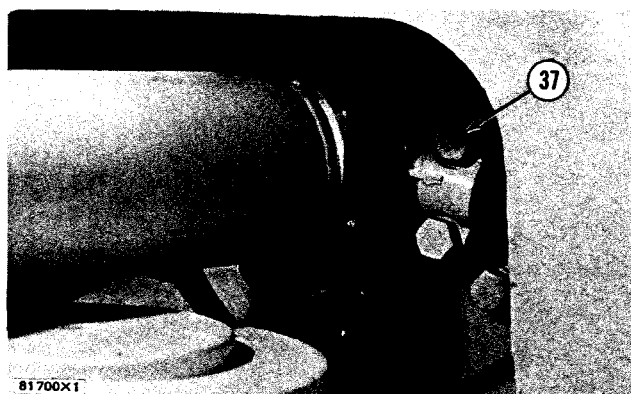
31. Remove rear universal joint (34).

32. Disconnect the clamp that holds the tube to the bracket along the rear of the frame. Remove bolts (35) and remove tube (36).



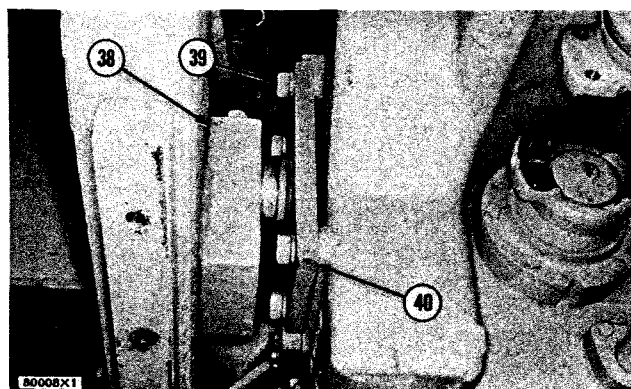
ENGINE, TORQUE CONVERTER AND TRANSMISSION

33. Remove bolts (37) from front universal joint and slide the drive shaft forward.



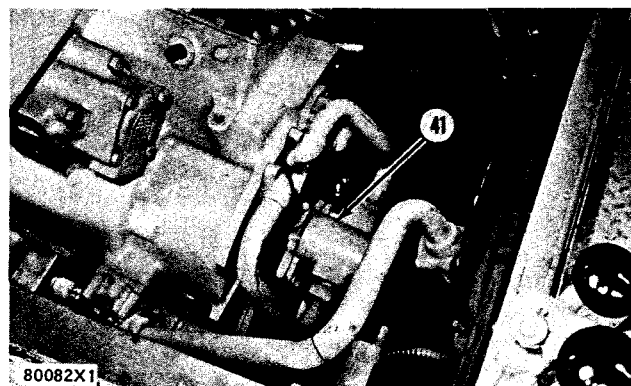
34. Install a 5/8"-11NC forged eyebolt in top of the torque converter housing. Connect a hoist to the engine and transmission.

35. Remove the two bolts from the front support for engine.



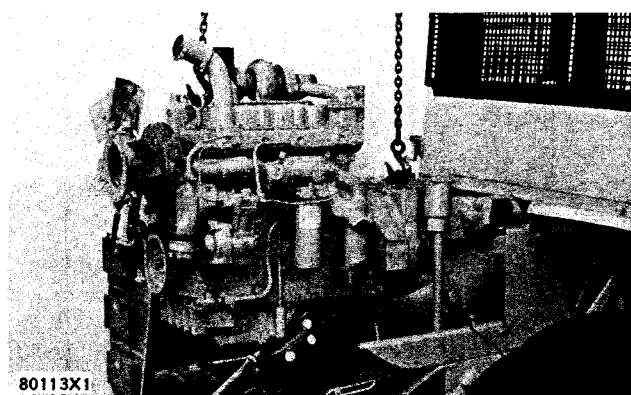
36. Remove the two caps (38) from transmission supports.

37. Remove the top two bolts (39) from both supports. Raise the engine and transmission to get clearance so the transmission supports can be removed.



38. Remove the two supports (40) from the transmission and move the transmission and engine toward rear of machine.

39. Remove the supplemental steering pump (41) and lines as a unit.

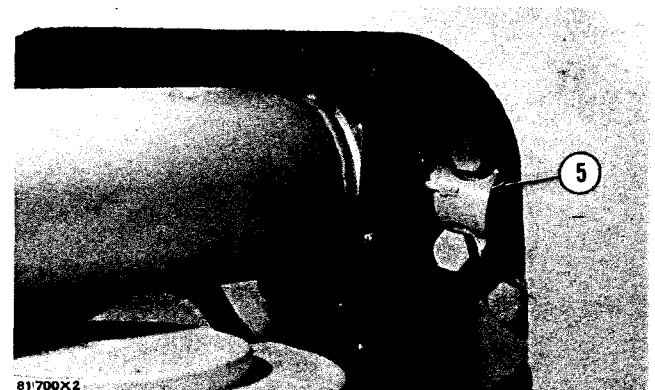
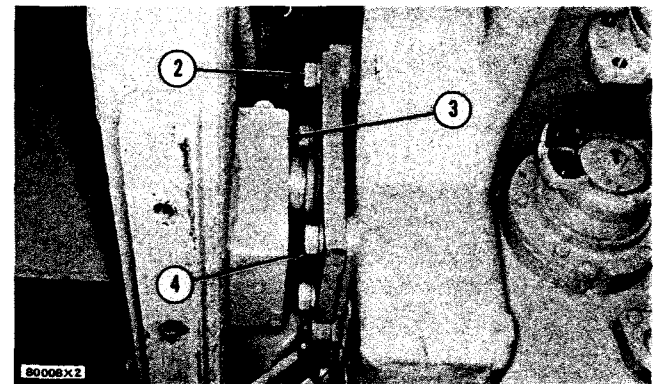
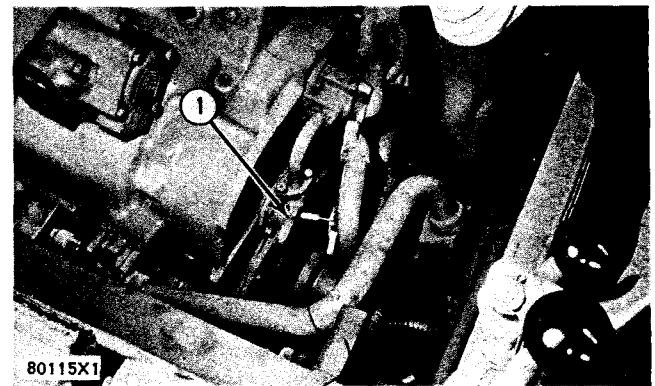
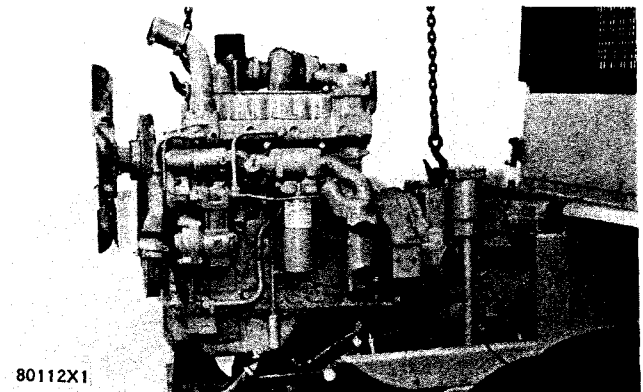


40. Move the engine and transmission toward the rear of machine until the transmission contacts the differential housing. Lift the unit and move it to the rear and out of machine. Weight of engine and transmission is 3400 lb. (1442 kg).

ENGINE, TORQUE CONVERTER AND TRANSMISSION

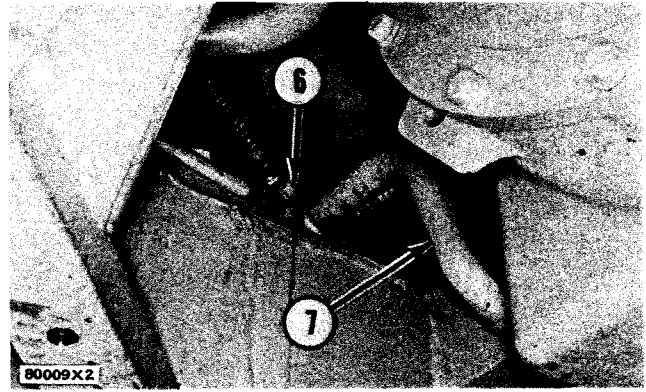
INSTALL ENGINE, TORQUE CONVERTER AND TRANSMISSION 12-1004

1. Put the engine and transmission in position in the frame. Move the unit forward over the differential housing and under the rear of cab.
2. Put the supplemental steering pump and lines in position on the manifold (1) and install nuts that hold pump.
3. Move the engine and transmission forward and down. Put the supports in position on the transmission and install the two lower bolts (4) loosely in each support.
4. Lower engine and transmission on to supports.
5. Install two bolts (2) in top of transmission supports. Tighten all support bolts.
6. Install bolts in the engine front support.
7. Install caps (3) and tighten bolts in caps.
8. Connect the front universal joint (5) to the brake drum flange and tighten bolts to a torque of 98 ± 10 lb.ft. (13.6 ± 1.4 mkg).

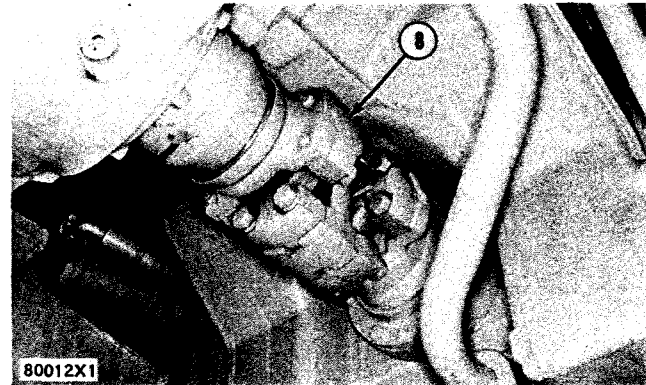


ENGINE, TORQUE CONVERTER AND TRANSMISSION

9. Put tube (7) in position on transmission and install bolts (6). Connect bracket at the rear of the frame to the tube.

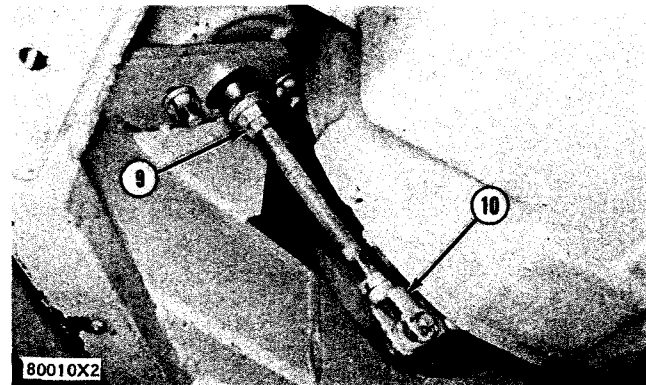


10. Install the rear universal joint (8) and tighten the bolts to a torque of 98 ± 10 lb.ft. (13.6 ± 1.4 mkg).



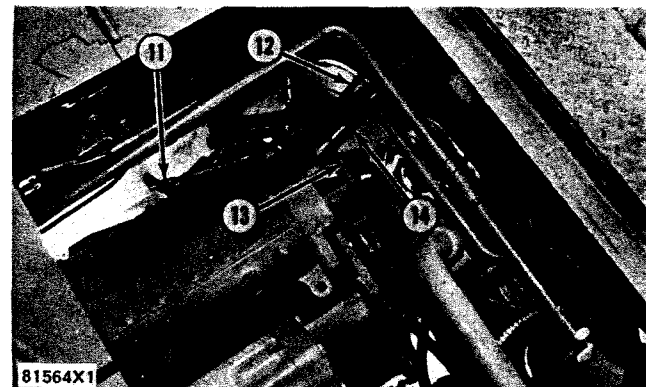
11. Connect rod (10) to lever for parking brake. Tighten nuts (9) on the rod.

12. Put gauge tube (12) for oil level in position on transmission and install bolts that hold it to the transmission.



13. Connect the shift rod (11) for transmission.

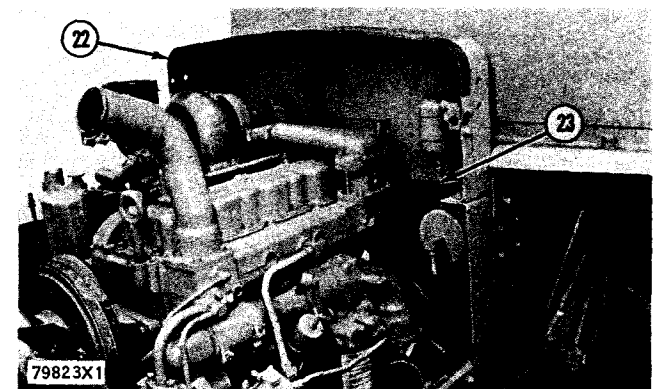
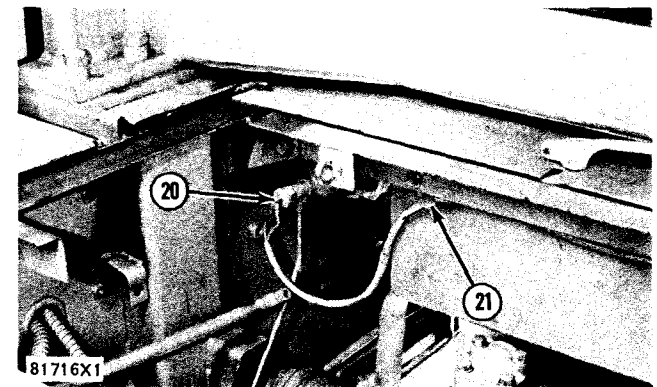
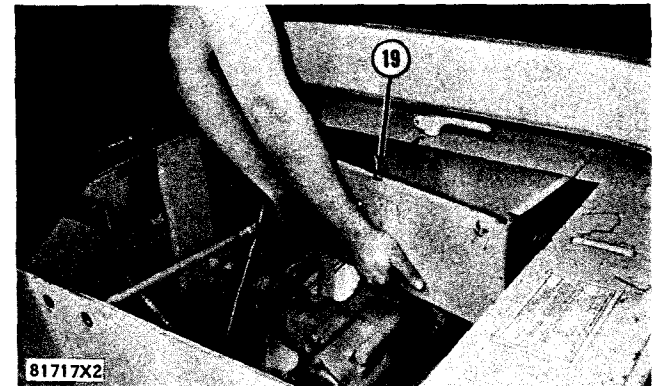
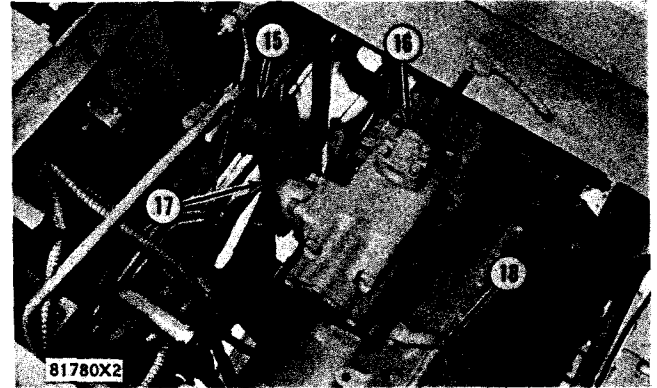
14. Install filler tube (14) for transmission. Install clamp between filler tube and gauge tube.



15. Connect the neutralizer line (13) to the adapter.

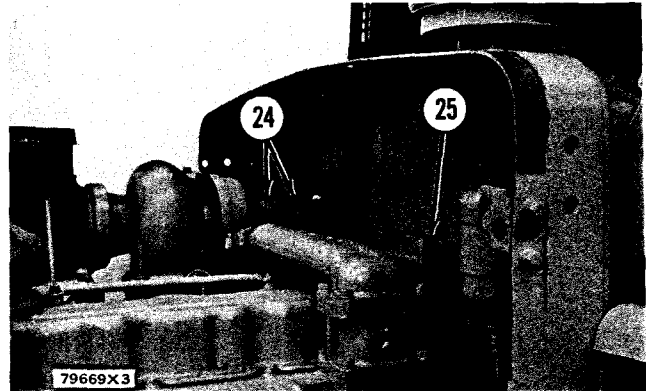
ENGINE, TORQUE CONVERTER AND TRANSMISSION

16. Remove the wire that holds the pressure line to the platform. Connect the pressure line to pump and install the clamp that holds the line to the frame.
17. Put the suction elbow (17) in position. Install the four bolts and tighten the clamps (15).
18. Install the lever (18) on the transmission.
19. Install the control rod for forward and reverse.
20. Install plate under rear of cab.
21. Install tool box (19).
22. Put the seat support in position and install the bolts.
23. Install the two clips (21) for brake wires on the seat support.
24. Connect the two wires (20) to the brake master cylinder.
25. Put the firewall (22) in position and install the four bolts.
26. Install the plate between the firewall and the cab.
27. Connect tube (23) to tank for service brake control.



ENGINE, TORQUE CONVERTER AND TRANSMISSION

28. Put the air cleaner and bracket in position and install the four bolts in the bracket (25). Tighten clamps (24) on hose between turbocharger and air cleaner.

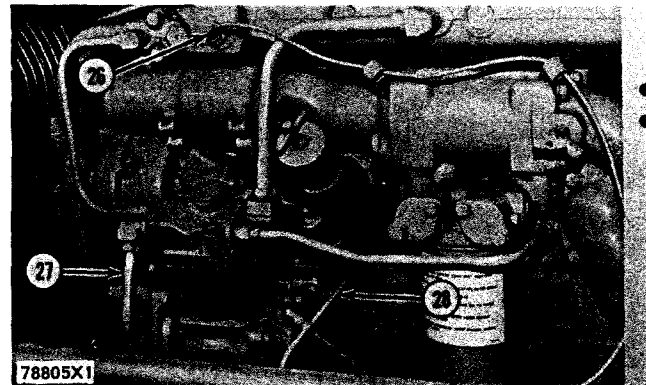


29. Connect air line (27) to air compressor.

30. Install air line (28) for compressor governor.

31. Connect gauge line (26) for water temperature.

32. Install outlet line (30) and inlet line (29) on oil cooler for torque converter.



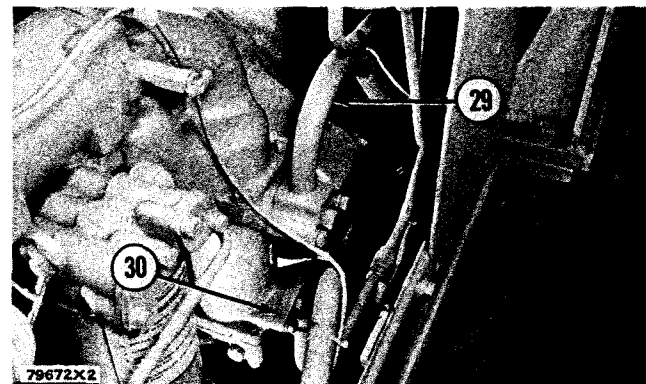
33. Connect gauge line for oil pressure.

34. Connect gauge line (32) for fuel pressure to the fuel filter base.

35. Connect fuel line (34) to the accessory drive housing and fuel line (33) to the filter base.

36. Connect wire for glow plugs and install clips that hold wire to firewall.

37. Connect wires to starter and alternator.

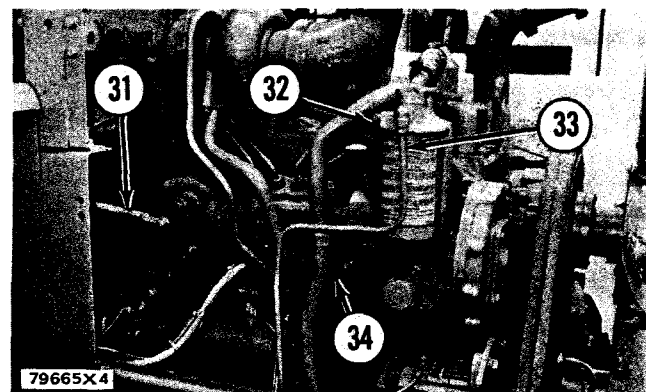


38. Install control rod (31) for governor.

39. Fill the transmission and hydraulic tank to correct level.

end by:

- a) install diverter valve for supplemental steering
- b) install air tank
- c) install transmission bottom guard
- d) install radiator and guard



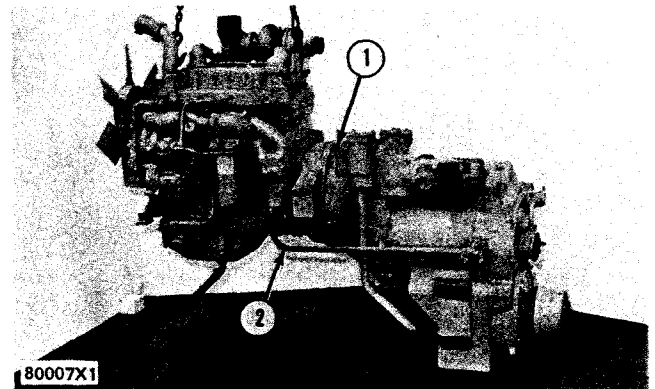
ENGINE, TORQUE CONVERTER AND TRANSMISSION

SEPARATION OF ENGINE FROM TORQUE CONVERTER AND TRANSMISSION

start by:

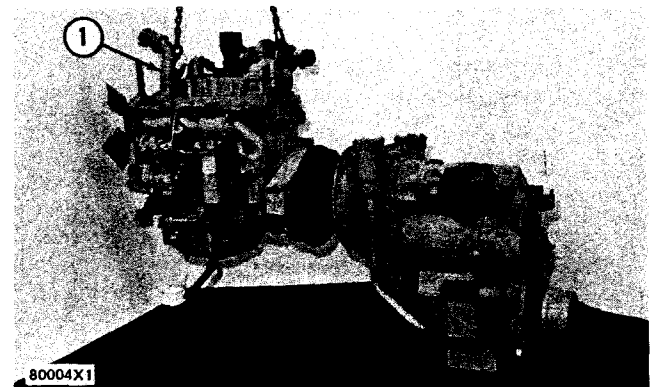
- a) remove engine, torque converter, and transmission

1. Connect a hoist to the engine.
2. Install blocks under bottom and front of transmission.
3. Remove cooler line (2) for torque converter.
4. Remove bolts (1) that hold engine to the torque converter and transmission. Remove engine. Weight is 1500 lb. (680 kg).



CONNECTION OF ENGINE TO TORQUE CONVERTER AND TRANSMISSION

1. Connect a hoist and put the engine (1) in position on torque converter and transmission. Turn engine crankshaft, if necessary, to put the flywheel gear in alignment with torque converter gear.
 2. Install bolts that hold engine to the torque converter and transmission.
 3. Install cooler line for torque converter.
 4. Install stands or blocks under front of engine.
- end by:
- a) install engine, torque converter and transmission

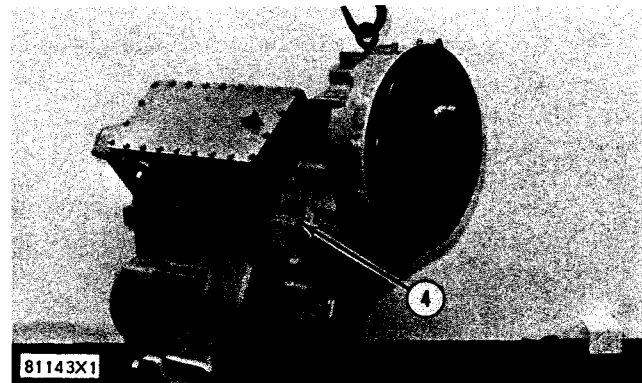
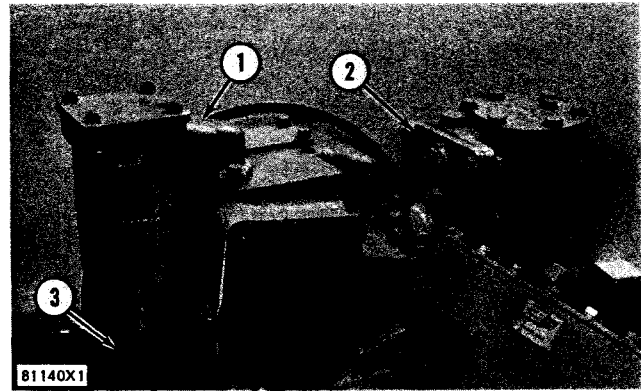


ENGINE, TORQUE CONVERTER AND TRANSMISSION

SEPARATION OF TORQUE CONVERTER FROM TRANSMISSION

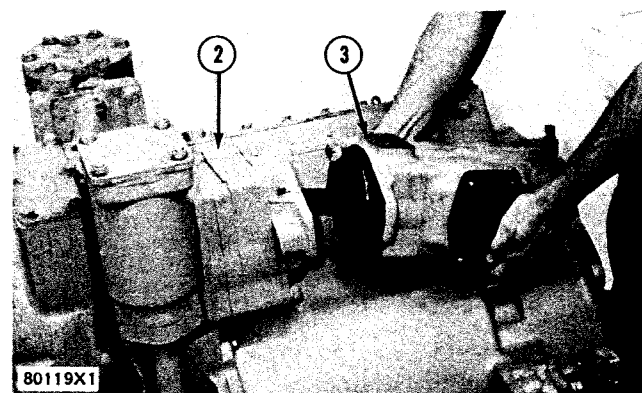
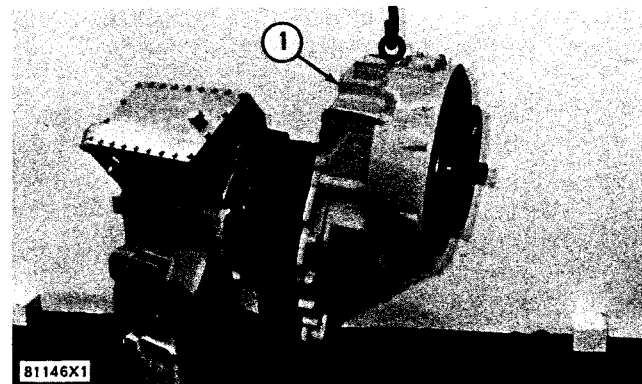
start by:

- a) separation of engine from torque converter and transmission
1. Remove hydraulic and transmission oil pumps.
2. Remove the bolts that hold support bracket (2) to torque converter housing. Remove the support bracket and oil filter as a unit.
3. Disconnect oil line (3) from bottom of transmission case.
4. Remove magnetic strainer (1) and oil tube as a unit.
5. Install a 5/8"—11NC forged eyebolt in top of housing for torque converter.
6. Connect a hoist and remove the bolts (4) that hold torque converter to transmission.
7. Remove the torque converter. Weight is 360 lb. (163 kg).



CONNECTION OF TORQUE CONVERTER TO TRANSMISSION

1. Install a 5/8"—11NC forged eyebolt in top of housing for torque converter. Connect a hoist to torque converter.
2. Put the torque converter and housing (1) into position on the transmission. Install the bolts that hold the torque converter housing to the transmission.
3. Install magnetic strainer and oil tube.
4. Put the oil filter and support bracket into position on housing. Install the bolts that hold bracket to housing.
5. Install transmission pump (2) and hydraulic pump (3).



end by:

- a) connection of engine to torque converter and transmission

TORQUE CONVERTER

DISASSEMBLE TORQUE CONVERTER

15-3100

Tools Needed		A	B
1P2321	Puller Assembly	1	
1P467	Drive Plate	1	
8B7548	Push Puller		1
8B7560	Step Plate		1
8H684	Ratchet Box Wrench		1
8B7550	Legs		2
8H663	Bearing Cup Pulling Attachment		1

start by:

a) separation of torque converter from transmission

1. Connect a hoist and put torque converter in position with output end up as shown.

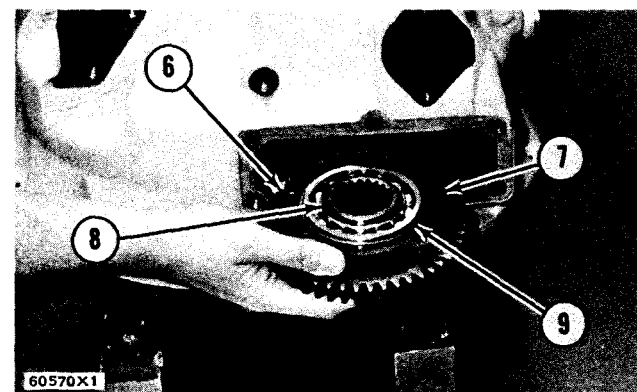
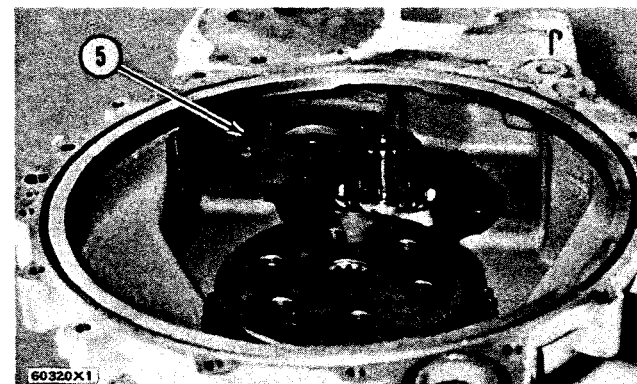
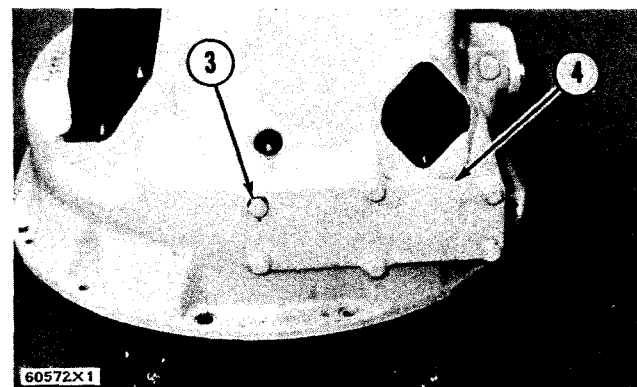
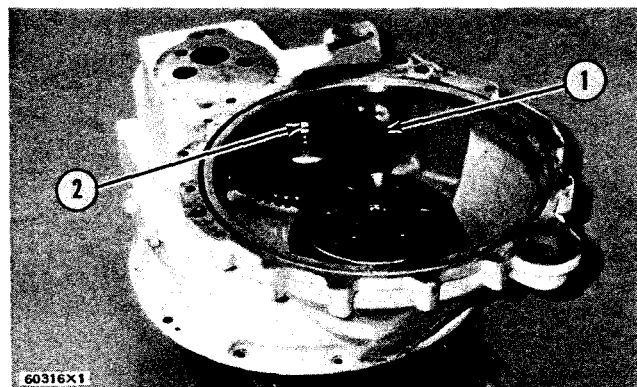
2. Remove bolt (2), retainer, and gear (1).

3. Remove the six bolts (3) and cover (4).

4. Remove the five bolts (5). Remove the drive gear (6) of the oil pump for transmission.

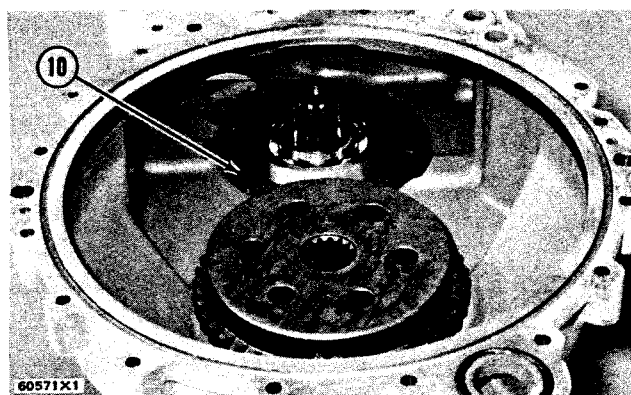
5. Remove ring (9) and retainer (7).

6. Remove the bearing retaining ring (8) and bearing from drive gear.



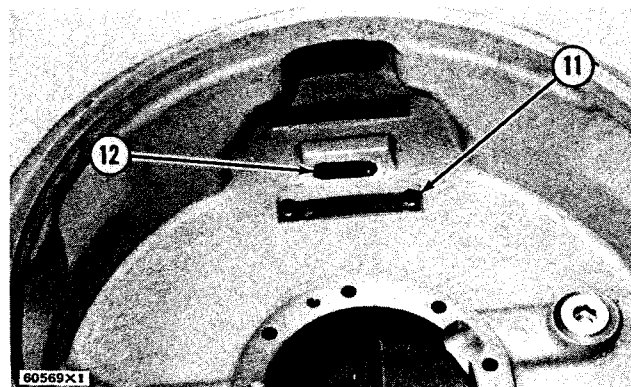
TORQUE CONVERTER

7. Remove the bolts (10) from housing.



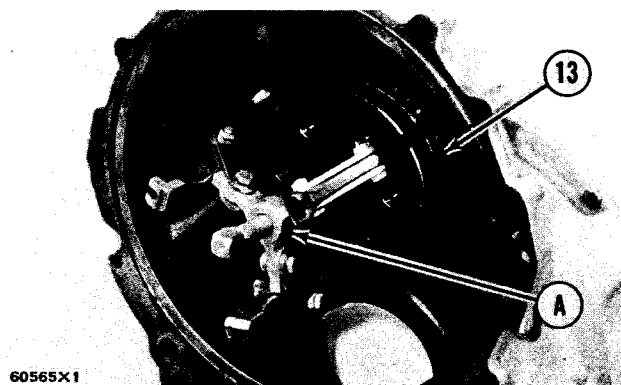
8. Install two 3/8"-16NC forged eyebolts in the torque converter housing.

9. Connect a hoist and remove the torque converter housing. Weight of housing is 195 lb. (88 kg). Weight of torque converter is 85 lb. (39 kg).

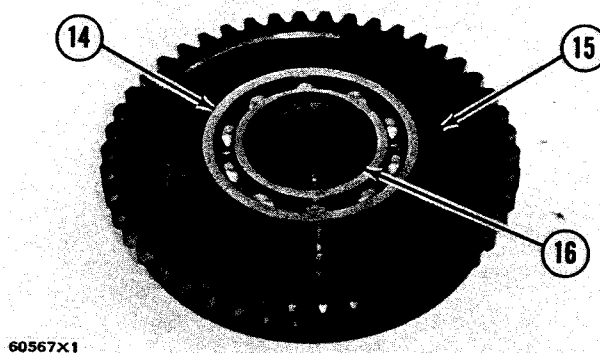


10. Remove the four bolts (11) and two locks that hold output gear assembly to housing.

11. Remove output gear with tooling (A) as follows. Install puller assembly on the gear and the drive plate in hole (12) in housing. Remove output gear (13).



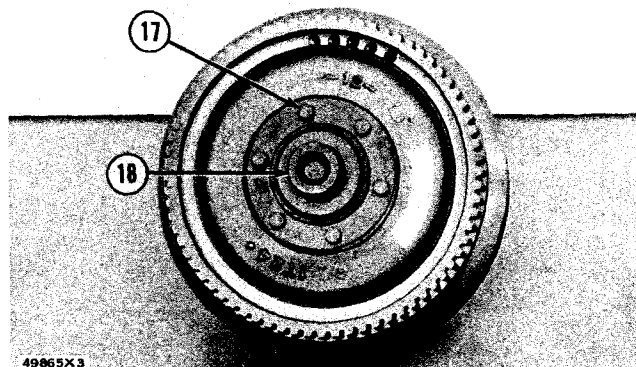
12. Remove ring (16) from gear.



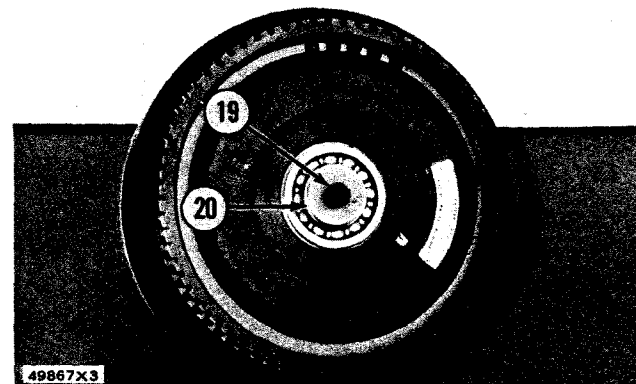
13. Remove bearing (14) and retainer (15) from output gear (13).

TORQUE CONVERTER

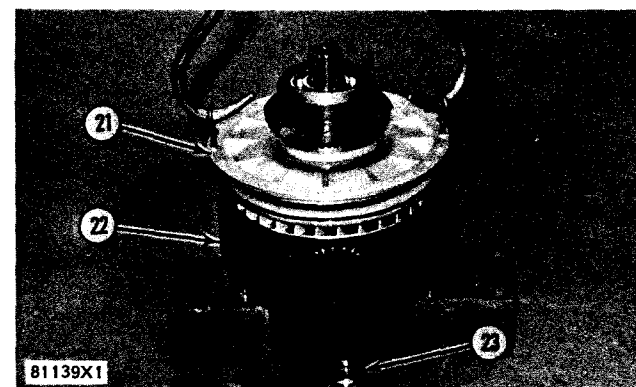
14. Remove bolts (17). Remove pilot (18).



15. Remove bolt (19) and retainer (20).

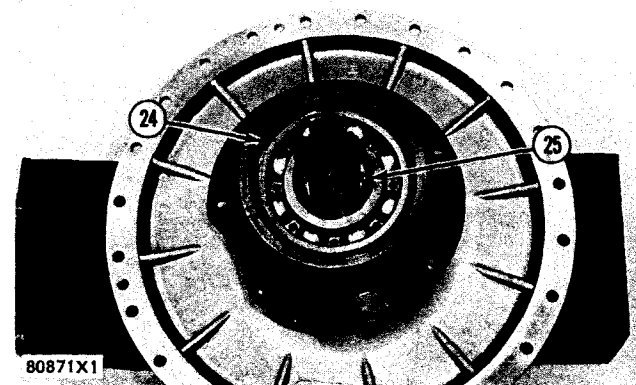


17. Install four 5/16"-18NC forcing screws and remove impeller (21) from rotating housing (22).



18. Remove the four forcing screws. Install two 5/16"-18NC forged eyebolts in impeller.

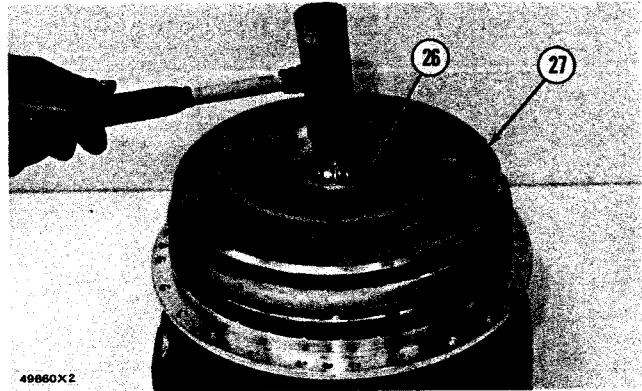
19. Connect a hoist and lift the impeller off the housing. Bearing race (23) will fall out of housing.



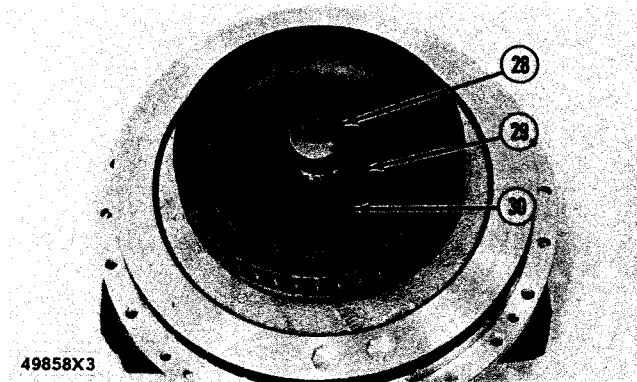
20. Remove rings (24) and (25). Turn impeller (21) on opposite side.

TORQUE CONVERTER

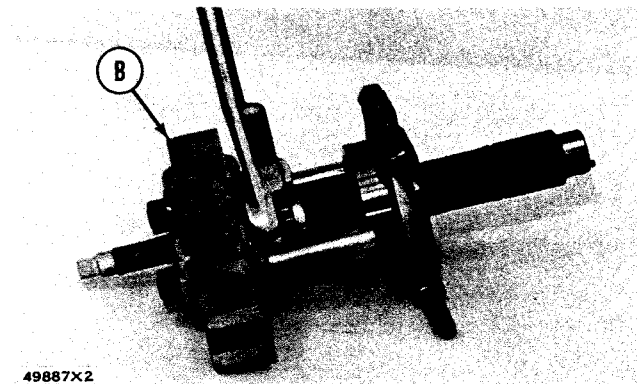
21. Hit shaft down with a soft hammer far enough to remove bearing race (26). Remove turbine (27).



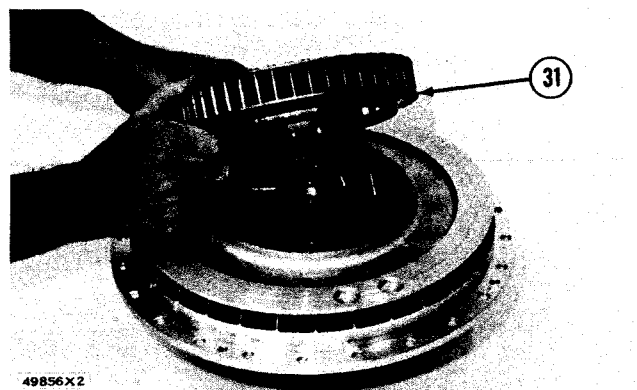
22. Remove screws (29) and ring (30). Remove shaft (28).



23. Remove seal ring from shaft (28). Remove bearing from shaft (28) with tooling (B).

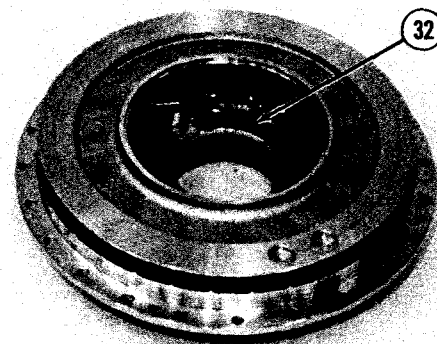


24. Remove stator (31) from impeller. Remove impeller from carrier.



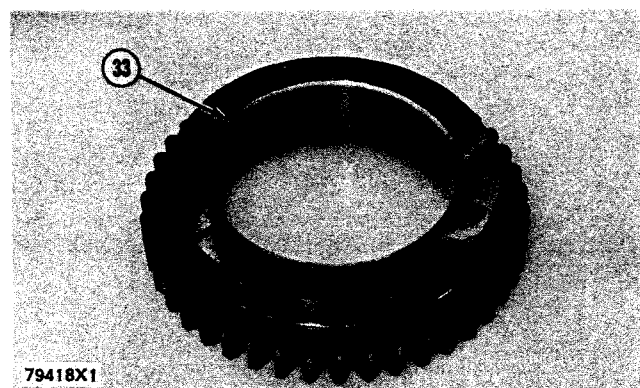
TORQUE CONVERTER

25. Remove plates and bolts (32) that hold the gear to the impeller. Remove gear from opposite side of impeller.



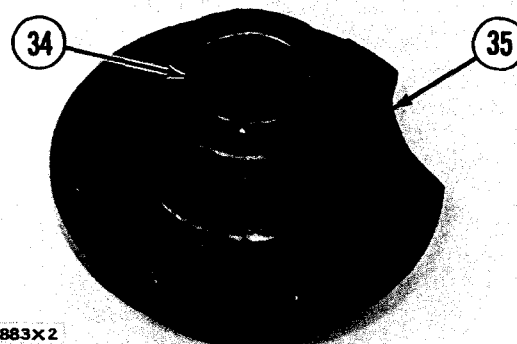
49857X2

26. Remove bearing (33) from gear.



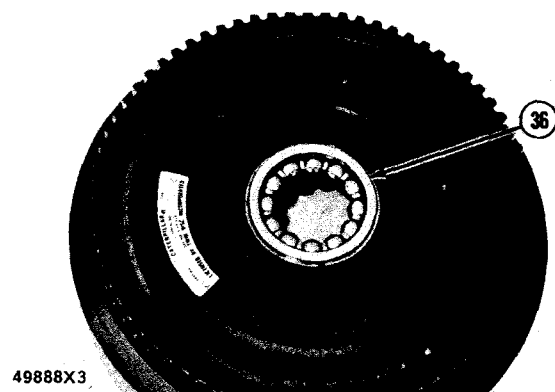
79418X1

27. Remove sleeve (34) from carrier (35).



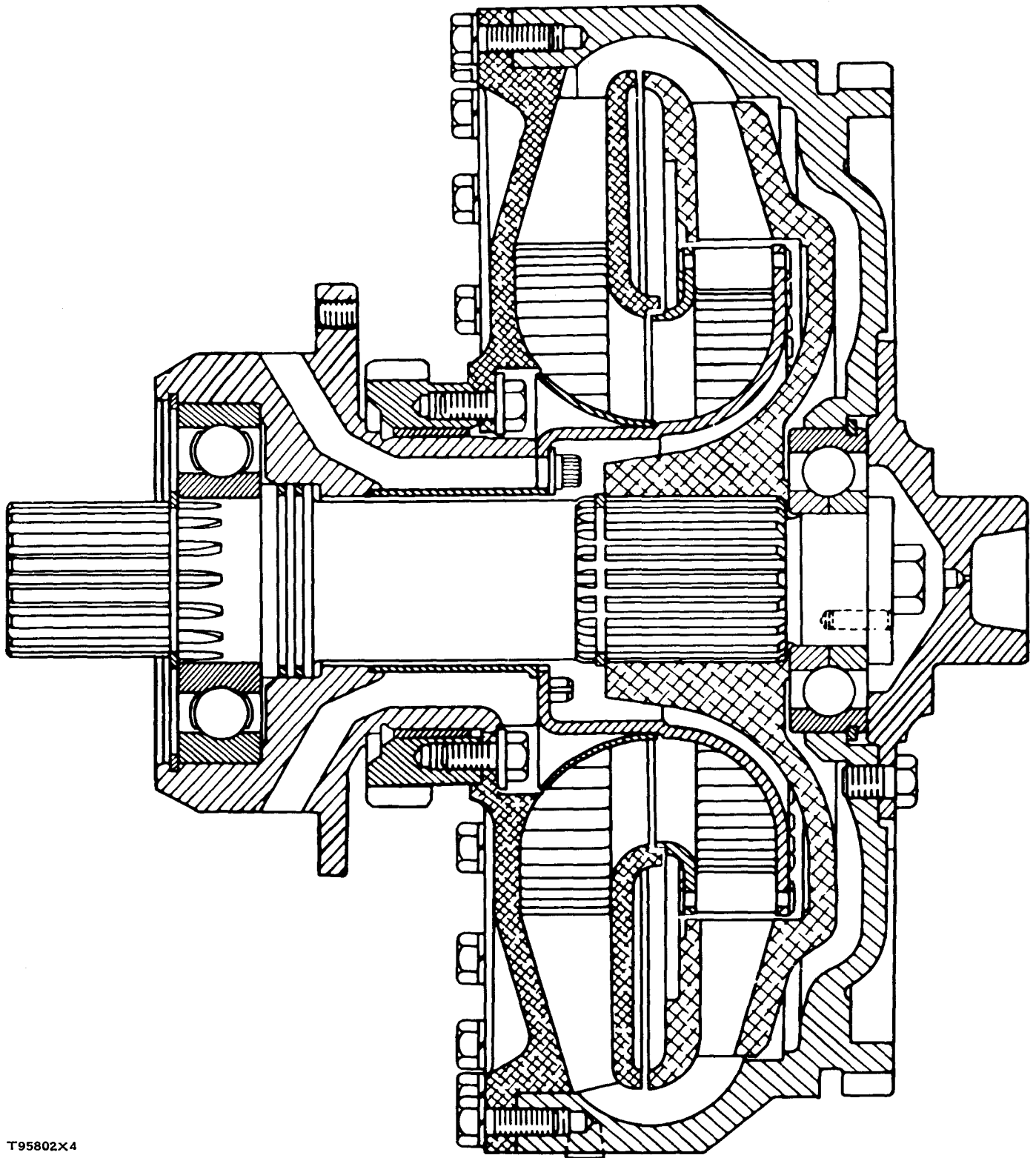
49883X2

28. Remove bearing (36) from housing.



49888X3

TORQUE CONVERTER



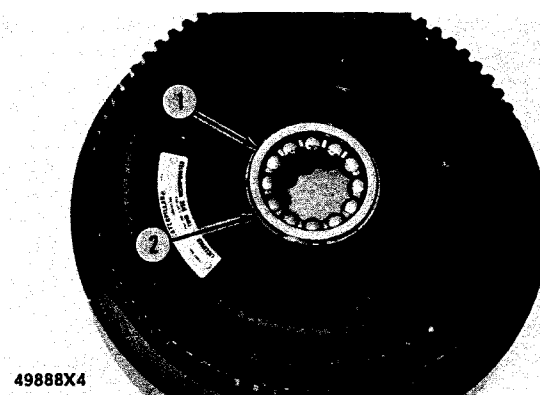
T95802x4

TORQUE CONVERTER

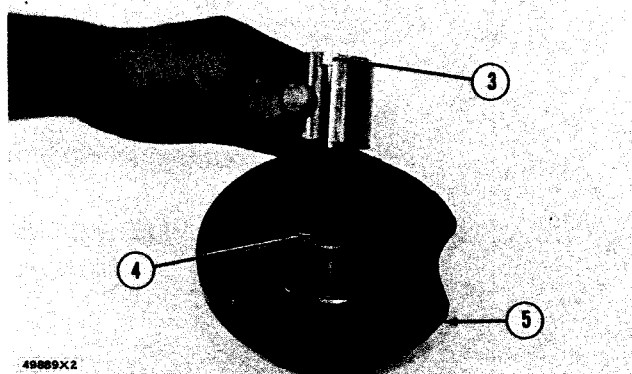
ASSEMBLE TORQUE CONVERTER 16-3100

Tools Needed		A
1P532	Handle	1
1P515	Drive Plate	1

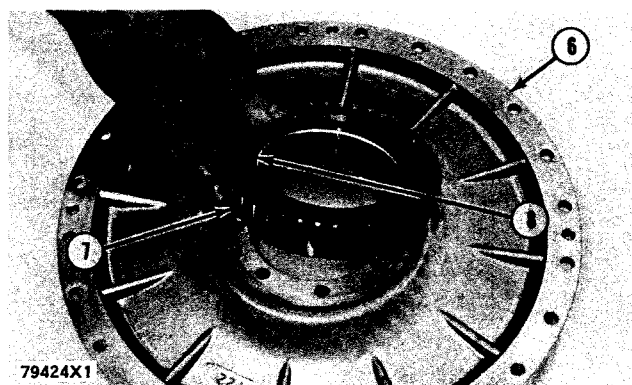
1. Install bearing (1) in housing with tooling (A). Install bearing (1) so ring (2) makes contact with bottom of bore.



2. Install sleeve in carrier (5) with extension (3) on sleeve in position in groove (4) in carrier bore.

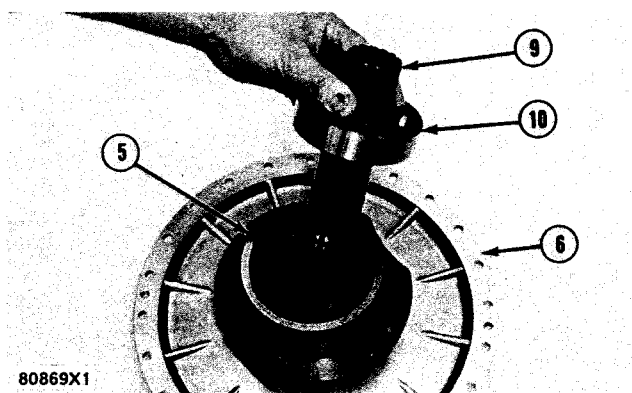


3. Install bearing (8) in gear (7). Put gear (7) in position on impeller (6). Install the bolts and plates on opposite side that hold the gear (7) to the impeller (6). Tighten the bolts to a torque of 20 ± 1 lb.ft. (2.8 ± 0.14 mkg).



4. Install carrier (5) on impeller (6).

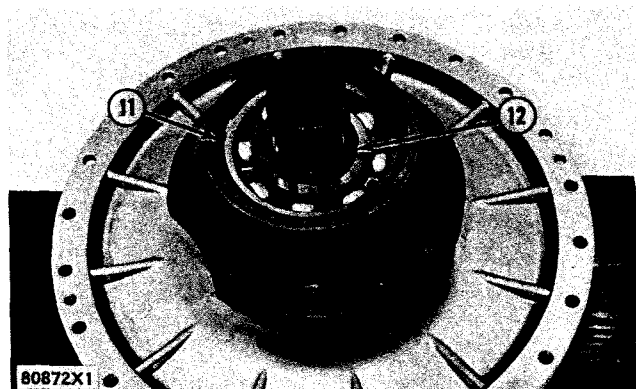
5. Put bearing (10) in oil at a temperature of 275°F (135°C). Install bearing (10) on shaft (9). Install seal ring on shaft (9).



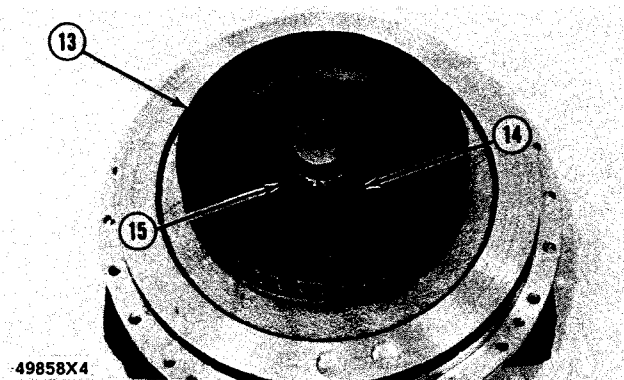
6. Install shaft in carrier.

TORQUE CONVERTER

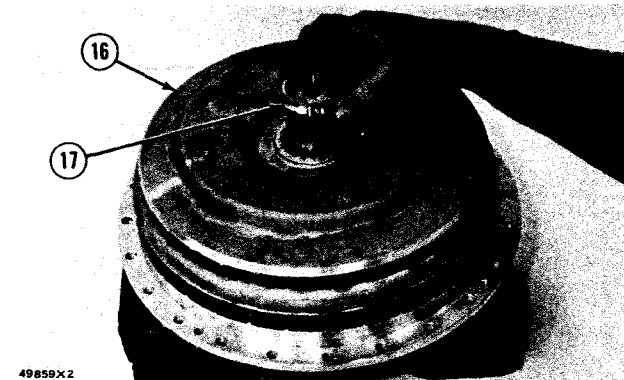
7. Install ring (12) in groove in shaft and ring (11) in groove in carrier.



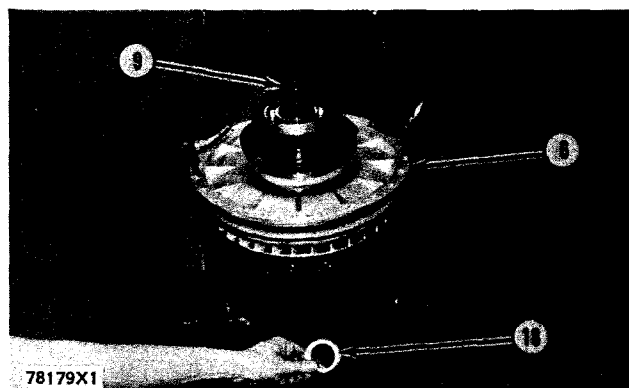
8. Turn impeller on opposite side. Put stator (13) in position on shaft. Install ring (14) in groove in shaft. Install bolts (15) and tighten to a torque of 20 ± 1 lb.ft. (2.8 ± 0.14 mkg).



9. Install turbine (16) on shaft. Install the half of bearing race (17) on shaft with the side of the race that is not cut away against the turbine (16).



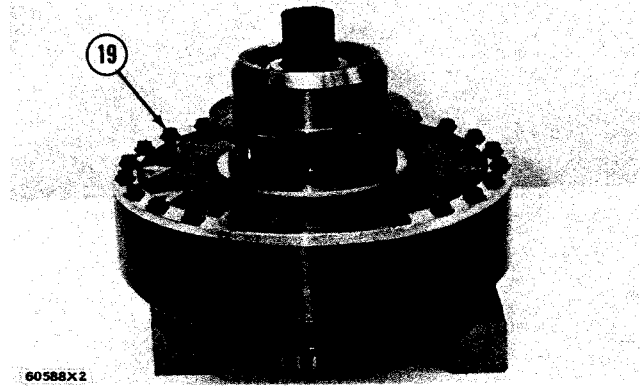
10. Install two 5/16"-18NC forged eyebolts in the impeller. Put the impeller (6) in the housing with a hoist. Install half of bearing race (18) on shaft.



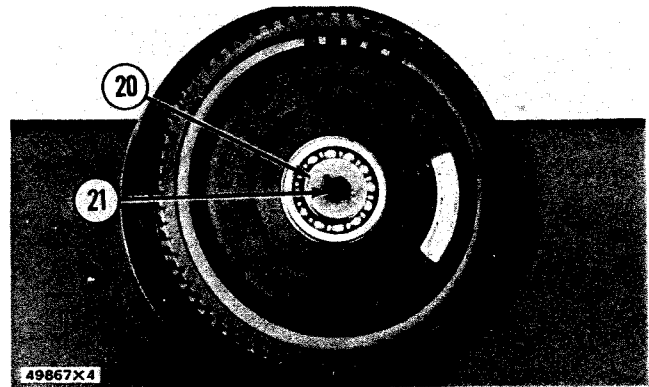
CAUTION: Turn shaft (9) to get bearing in correct position on inner half of bearing race. The shaft must turn free before and after tightening bolts around impeller wheel.

TORQUE CONVERTER

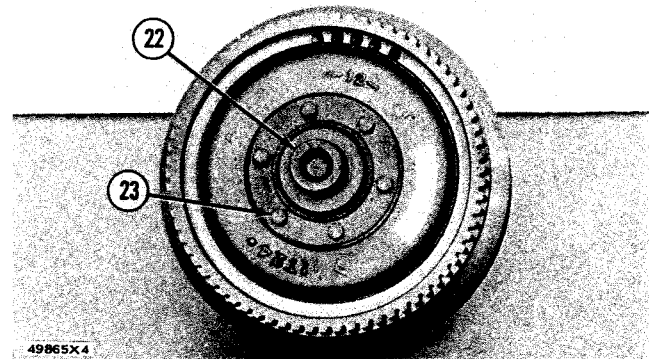
11. Install bolts (19) in impeller wheel and tighten to a torque of 20 ± 1 lb.ft. (2.8 ± 0.14 mkg).



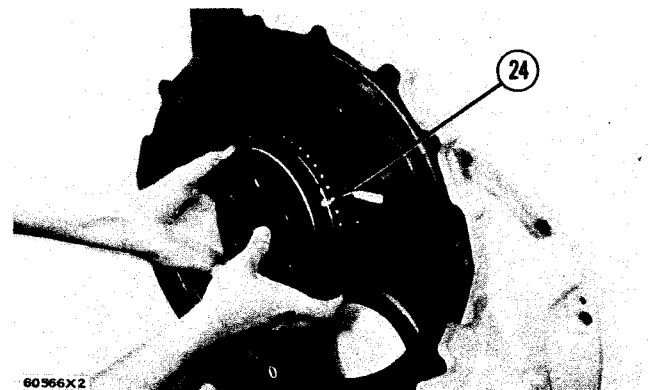
12. Install retainer (20) and bolt (21) in shaft. Tighten bolt (21) to a torque of 81 ± 4 lb.ft. (11.2 ± 0.55 mkg).



13. Put pilot (22) in position on housing and install bolts (23). Tighten bolts (23) to a torque of 36 ± 2 lb.ft. (5.0 ± 0.28 mkg).



14. Install the bearing and retainer in output gear (24). Install the retaining ring.



15. Put the output gear (24) in position in the housing for the torque converter. Install the four bolts and two locks that hold gear in position.

TORQUE CONVERTER

16. Install two 3/8"-16NC forged eyebolts in the housing of the torque converter.

17. Connect a hoist and put the housing (25) into position on torque converter.

18. Install the seven bolts that hold the housing to the torque converter. Tighten the bolts to a torque of 40 ± 5 lb.ft. (5.5 ± 9.7 mkg).

19. Install the bearing (29) and retaining ring (28) on drive gear (30) of oil pump for the transmission and torque converter.

20. Install the bearing retainer (27) and retaining ring (26) on the gear.

21. Put the gear (30) in position in housing for torque converter. Install the five bolts (31) that hold gear to housing. Tighten the bolts to a torque of 36 ± 2 lb.ft. (4.98 ± 0.28 mkg).

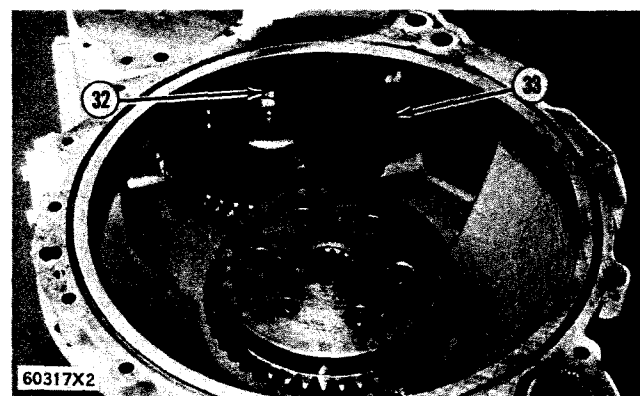
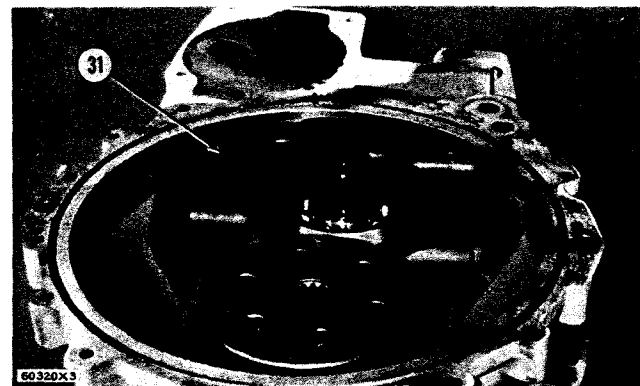
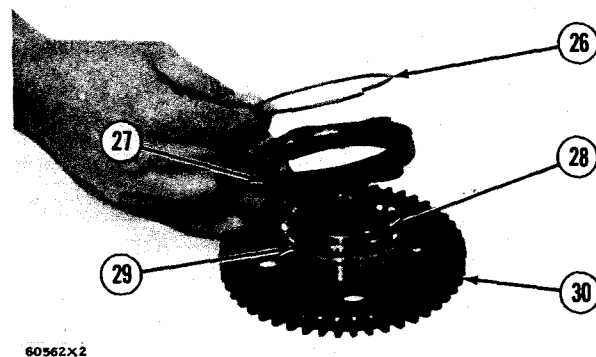
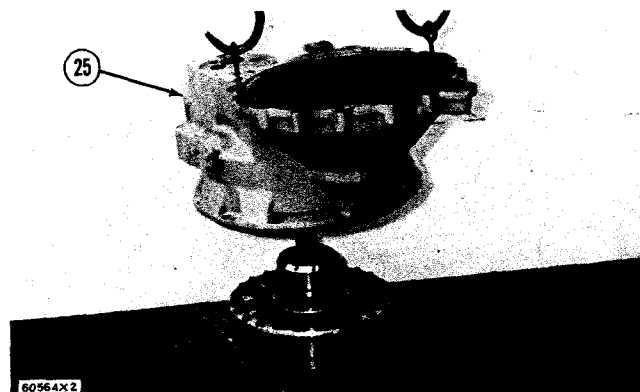
22. Install the cover for gear on the housing.

23. Put the gear (33) in position on shaft.

24. Install the retainer and bolt (32). Tighten the bolt to a torque of 81 ± 4 lb.ft. (11.2 ± 0.55 mkg).

end by:

a) connection of torque converter to transmission



TRANSMISSION LUBRICATION RELIEF VALVE

REMOVE TRANSMISSION LUBRICATION RELIEF VALVE 11-3182

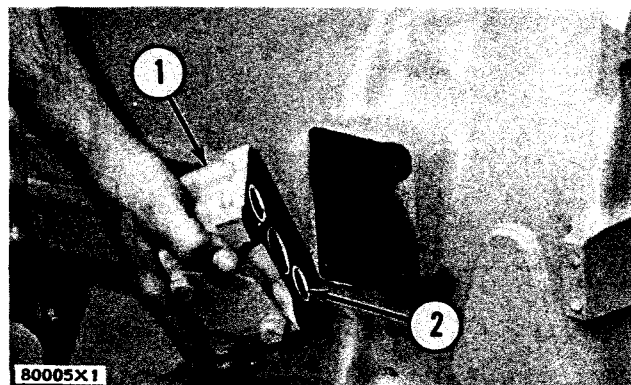
NOTE: Photos shown are of the valve out of chassis for better illustration.

1. Remove bolts (1) that hold valve to the transmission case.
2. Remove valve and O-ring seals.



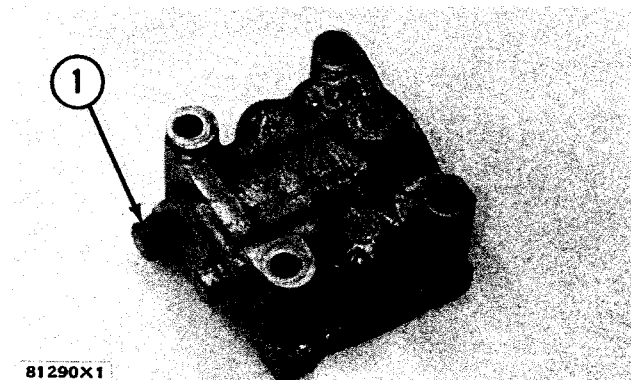
INSTALL TRANSMISSION LUBRICATION RELIEF VALVE 12-3182

1. Install O-rings (2) in valve.
2. Put valve (1) into position on transmission case and install bolts.



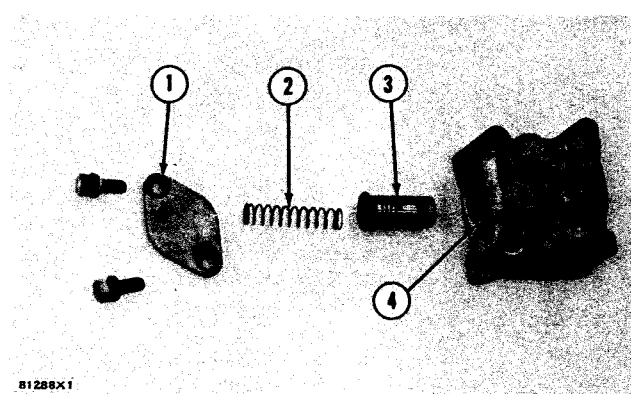
DISASSEMBLE TRANSMISSION LUBRICATION RELIEF VALVE 15-3182

1. Remove bolts (1) from cover.
2. Remove cover, O-ring, spring, and valve spool.



ASSEMBLE TRANSMISSION LUBRICATION RELIEF VALVE 16-3182

1. Install valve spool (3) and spring (2).
2. Install O-ring (4) and cover (1).



TRANSMISSION

DISASSEMBLE TRANSMISSION

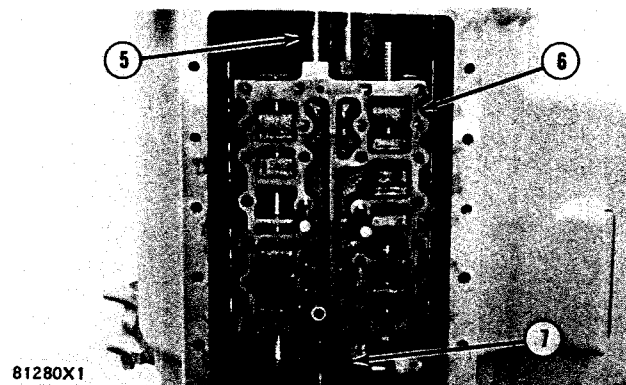
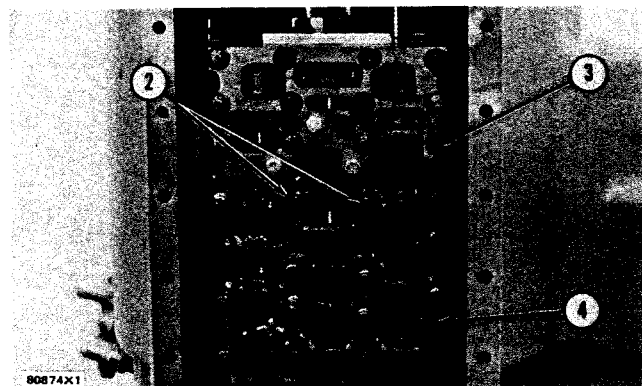
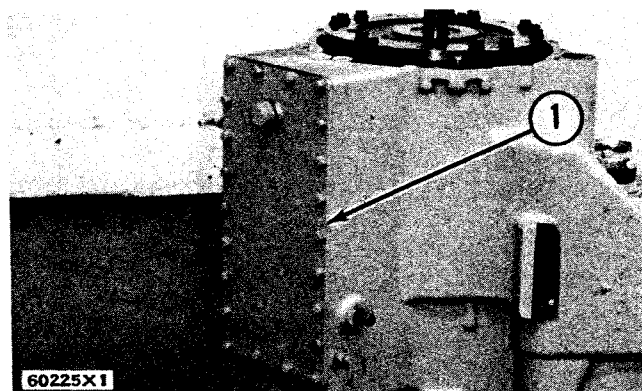
15-3150

Tools Needed		A
1P2420	Transmission Repair Stand	1

start by:

a) separation of torque converter from transmission

1. Connect a hoist and put the transmission on stand (A) in position shown. Weight of transmission is 1300 lb. (590 kg).
2. Remove cover (1).
3. Remove the two bolts (2) and install two 3/8"-16NC guide bolts.
4. Remove the two other large bolts and the twenty-four bolts (3).
5. Remove pressure control valve group (4).
6. Remove the manifold.
7. Push tubes (7) down out of selector valve group (6).
8. Remove the two O-ring seals and two sleeves (5).
9. Put rubber bands or O-ring seals around the valve spools to keep them in position during removal of valve group.
10. Remove selector valve group (6).
11. Remove the manifold (8).
12. Remove the two guide bolts.

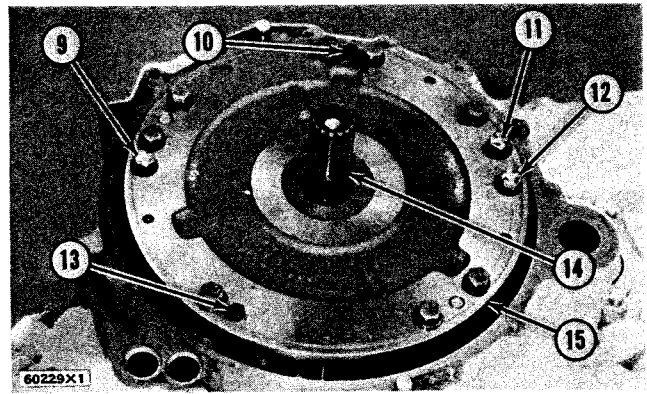


TRANSMISSION

13. Remove the input shaft (14).

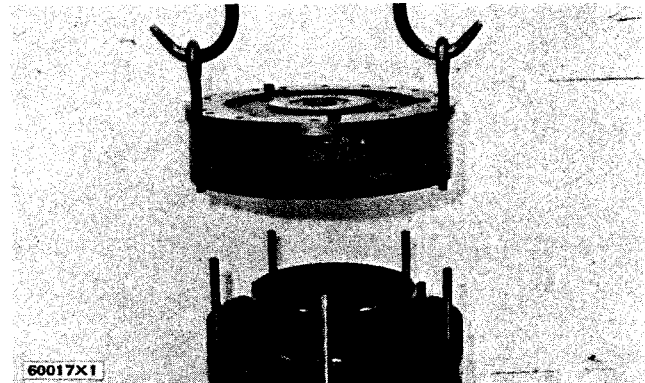
14. Remove all of the large bolts except bolts (9), (11), and (12) which have identification letter "S" marks on plate assembly (15).

CAUTION: Do not remove the two small bolts (10) and (13) or the three large bolts with identification letter "S".

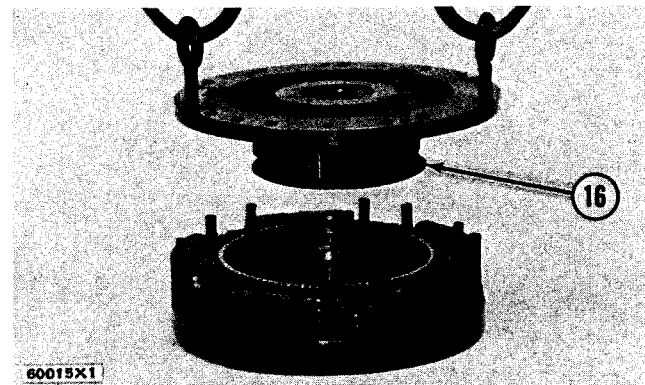


15. Install two 5/8"-11NC forged eyebolts and connect a hoist to the planetary group.

16. Remove the planetary group from transmission case. Weight of group is 650 lb. (295 kg).



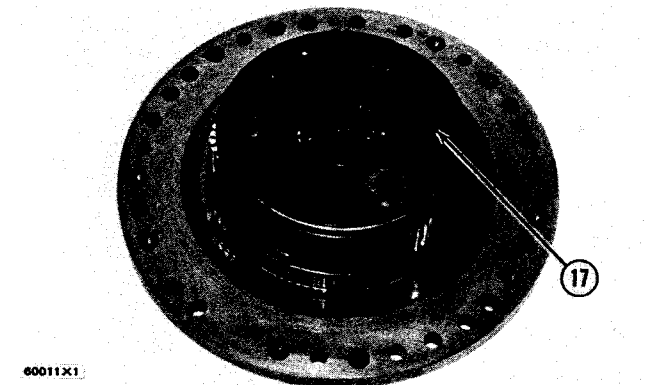
17. Put the planetary group in position on blocks. Remove the three large bolts (9), (11), and (12).



18. Connect a hoist and remove the No. 1 clutch and No. 1 carrier assembly as a unit. Weight of assembly is 115 lb. (52 kg).

19. Remove the two small bolts (10) and (13) that fasten plate to No. 1 clutch housing.

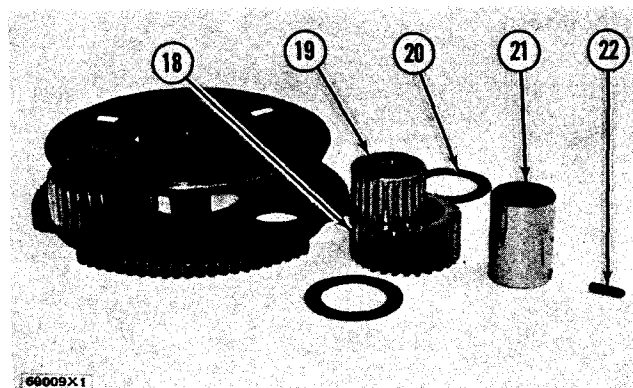
20. Remove the plate (15) and No. 1 carrier (16) from the clutch housing.



21. Remove the three bolts (17) that fasten the No. 1 carrier to the plate. Remove the carrier from the plate.

TRANSMISSION

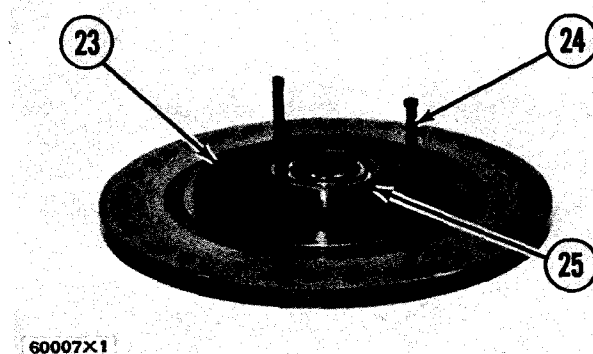
22. Disassemble the No. 1 carrier as follows:
- Push the pins (22) into the shafts (21).
 - Remove the shafts (21), planet gears (18), bearings (19), and washers (20).
 - Remove pins (22) from shafts.



23. Remove the retaining ring for bearing. Install three 3/8"-16NC forcing screws (24), and remove bearing cage (23) from plate.

24. Remove bearing (25) from cage (23).

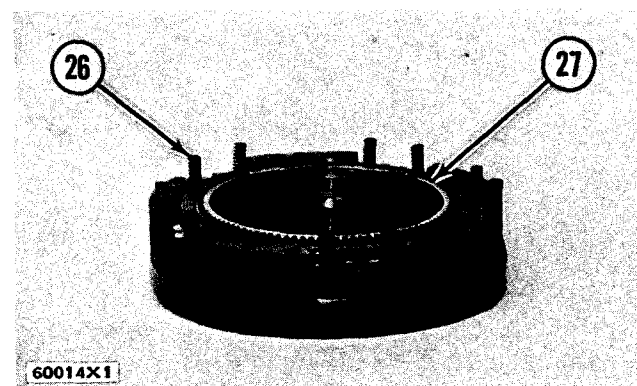
25. Remove the seal rings from cage (23) and from plate (15).



26. Remove the No. 1 clutch springs (26).

27. Remove No. 1 clutch discs and plates.

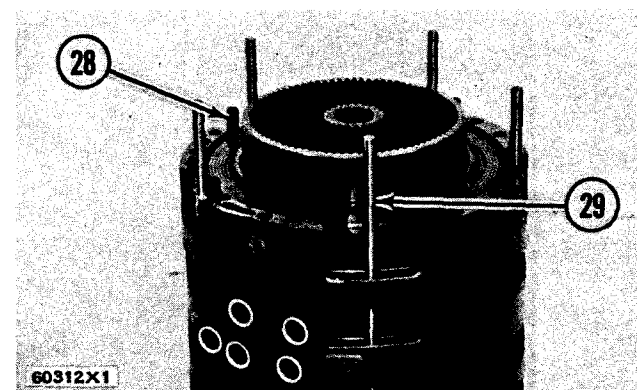
28. Remove the No. 1 clutch ring gear (27).



29. Remove the piston from clutch housing.

30. Remove the seal rings from piston and housing.

31. Remove the No. 2 clutch springs (28), and the No. 1 and No. 2 clutch pins (29).

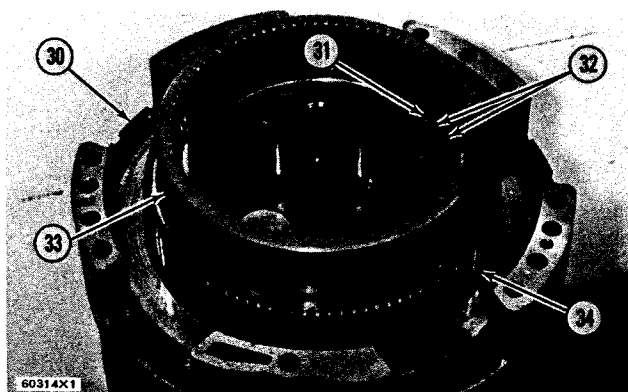


32. Remove the No. 2 clutch discs and plates.

TRANSMISSION

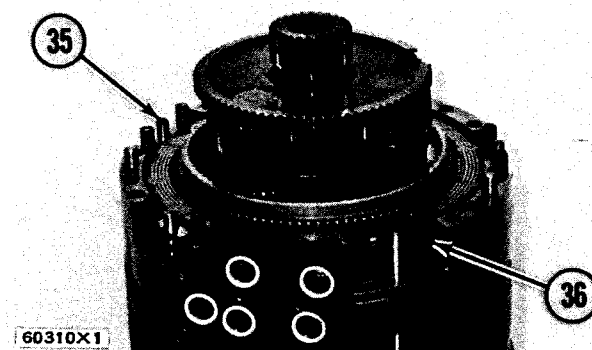
33. Push the retaining pins (32) into the carrier.

34. Pull the retaining ring (31) together and remove the ring gear (33) for No. 1 and No. 2 carrier. Remove ring gear (34) for No. 2 clutch.



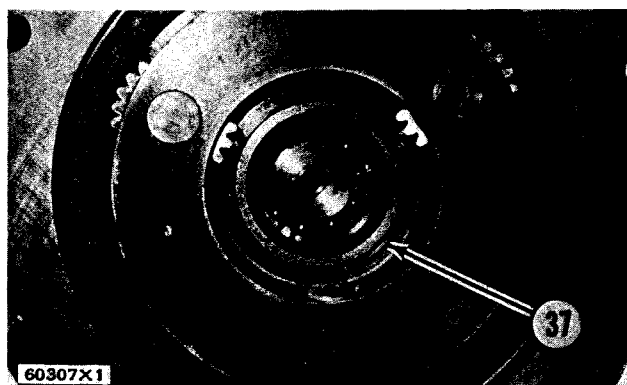
35. Remove the piston (3) from No. 2 clutch housing. Remove the seal rings from piston and from housing.

36. Remove the No. 3 clutch springs (36). Remove the No. 3, 4, and 5 clutch pins (35).



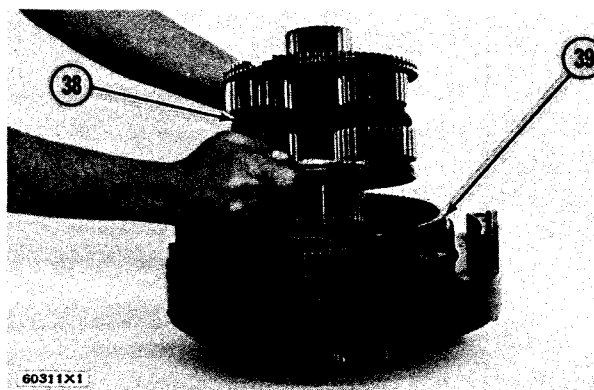
37. Remove the No. 3 clutch discs and plates.

38. Install two 3/8"-16NC forged eyebolts, connect a hoist and remove the No. 2 and No. 3 carrier, the No. 4 carrier, and the No. 3 clutch as a unit.



39. Remove the retaining ring (37).

40. Remove the No. 2 and No. 3 carrier (38) from the No. 3 clutch housing.

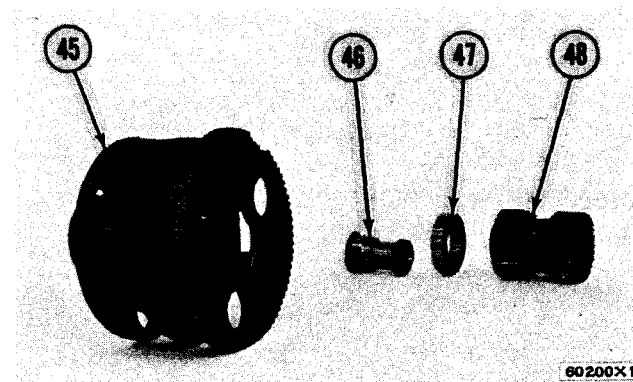
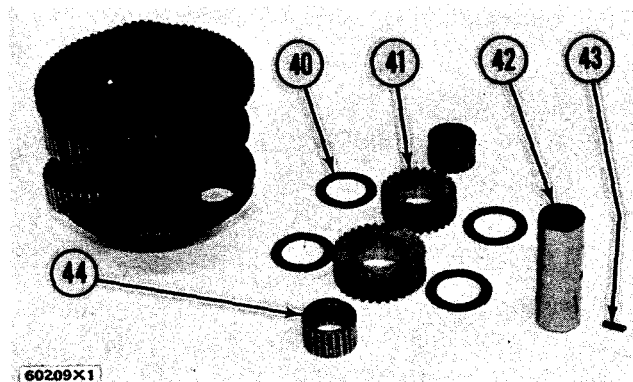


41. Remove the No. 3 clutch ring gear (39).

TRANSMISSION

42. Disassemble the No. 2 and No. 3 carrier as follows:

- a) Push retaining pins (43) into shafts (42).
- b) Remove the six planet gears (41), six bearings (44), three shafts (42), and twelve washers (40).
- c) Remove the three pins (43) from shafts.
- d) Remove the fastening bolt from No. 1 and No. 2 sun gears (48).
- e) Remove the No. 1 and No. 2 sun gears.
- f) Remove the ring from retainer (46). Remove the retainer and bearing (47). Remove the bearing from retainer.
- g) Remove the seal ring (45) from carrier.
- h) Remove the two pins for retaining ring for No. 1 and No. 2 carrier from carrier.

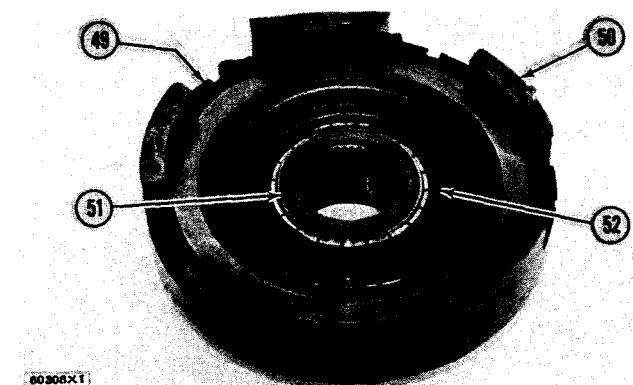


43. Remove No. 3 clutch piston (49).

44. Remove the seal rings from piston (49) and from clutch housing.

45. Remove retaining ring (51).

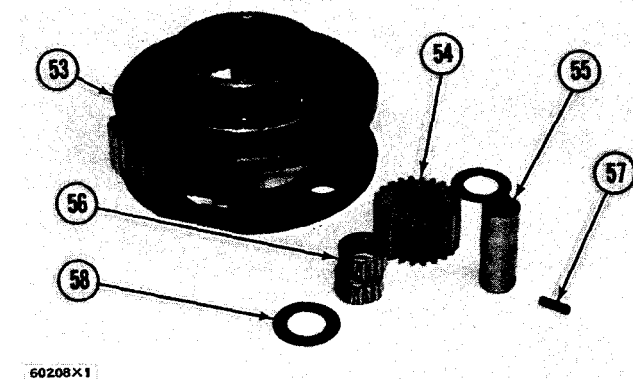
46. Remove the No. 3 clutch housing (50) from the No. 4 carrier.



47. Remove retaining ring (52). Remove the bearing from No. 3 clutch housing.

48. Disassemble No. 4 carrier as follows:

- a) Push the retaining pins (57) into the shafts (55).
- b) Remove the three planet gears (54), six washers (58), six bearings (56), and three shafts (55).
- c) Remove the three pins (57) from shafts.
- d) Remove seal ring (53) from carrier.



TRANSMISSION

49. Remove the No. 4 clutch springs (59).

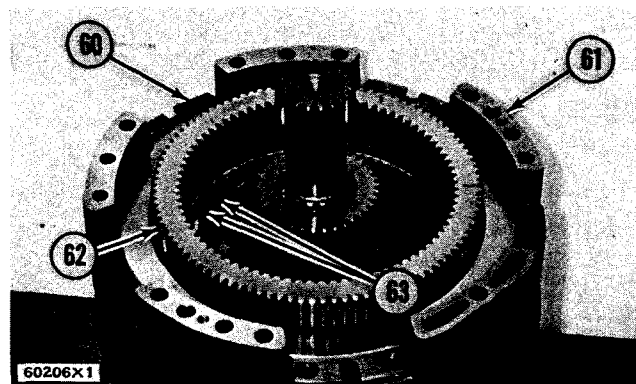
50. Remove No. 4 clutch discs and plates.

51. Push the pins (63) into the carrier. Pull the retaining ring together and remove the No. 4 clutch ring gear (62).



52. Remove the No. 4 clutch housing (61).

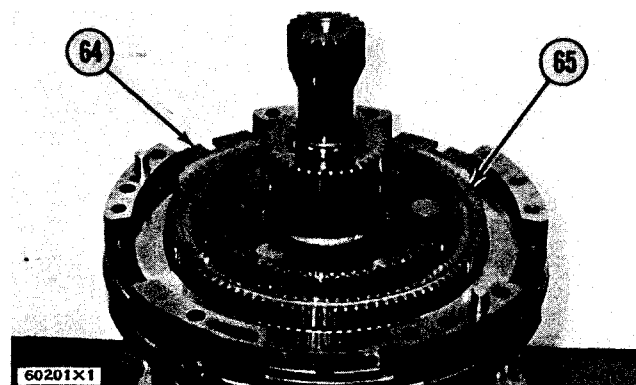
53. Remove No. 4 clutch piston (60) from housing. Remove the seal rings from piston and housing.



54. Remove No. 5 clutch springs, discs, and plate.

55. Remove the No. 5 clutch ring gear (65).

56. Remove piston (64) from housing. Remove the seal ring from No. 5 clutch piston.

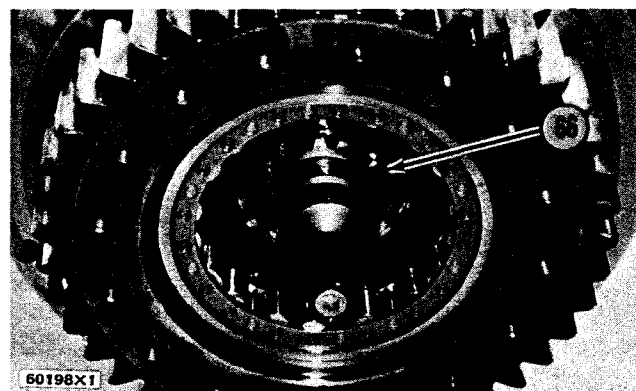


57. Install two 3/8"-16NC forged eyebolts in No. 5 clutch housing.

58. Connect a hoist and lift the remainder of the planetary group.

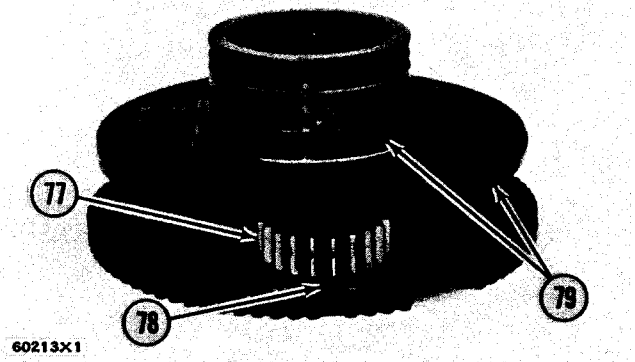
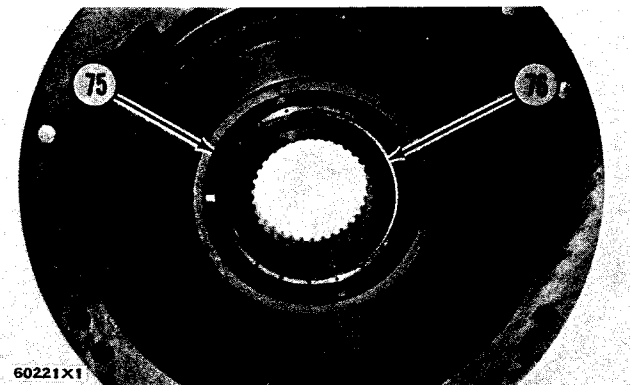
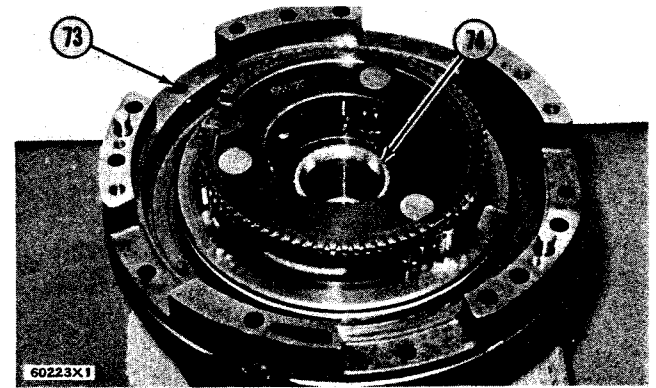
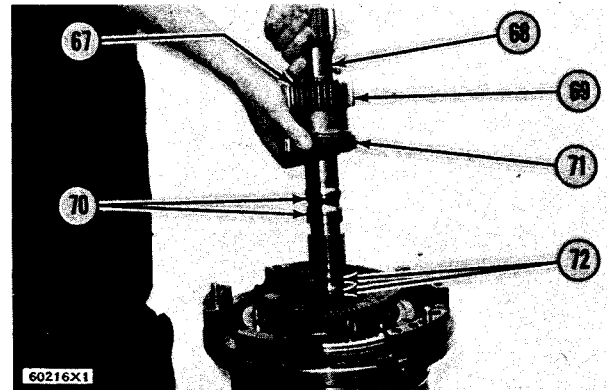
59. Remove the retaining ring (66) from bottom of shaft.

60. Lower the planetary group on to the blocks.



TRANSMISSION

61. Remove the output shaft (68).
62. Remove the seal rings (70) and (72) from output shaft.
63. Remove retaining ring (67) from shaft.
64. Remove the No. 5 sun gear (71) and the No. 4 sun gear (69) from shaft.
65. Remove retaining ring (74).
66. Install two 3/8"-16NC forged eyebolts in the No. 5 clutch housing (73).
67. Connect a hoist and remove the No. 5 clutch housing and No. 5 carrier as a unit.
68. Remove retaining ring (76).
69. Remove No. 5 carrier from No. 5 clutch housing.
70. Remove retaining ring (75). Remove the bearing from No. 5 clutch housing. Remove the seal ring from housing.
71. Disassemble the No. 5 carrier as follows:
 - a) Remove seal rings (79) from carrier.
 - b) Push the retaining pins (78) into the shafts.
 - c) Remove the three gears (77), three shafts, three bearings, and six washers.
 - d) Remove the pins (78) from shafts.
 - e) Remove the two pins for the retaining ring from the carrier.



TRANSMISSION

72. Remove the bolts and locks that hold retainer (81) to piston (83).

73. Remove retainer (81).

74. Remove springs (80) from housing.

75. Remove bolts (82) from housing.

76. Remove piston (83) and housing (84). Remove the piston from housing. Remove the seal rings from housing and from piston.

77. Remove the No. 6 clutch hub (85). Remove the two O-ring seals from hub.

78. Remove the No. 6 clutch discs and plates.

79. Remove retaining ring (86) from output gear.

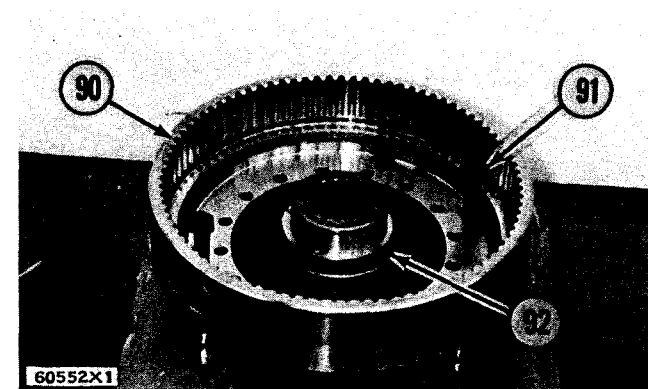
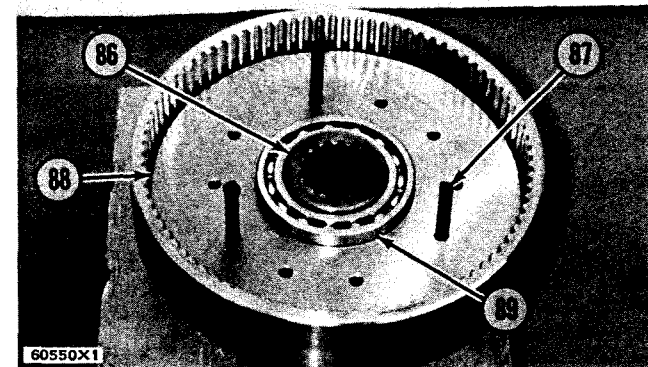
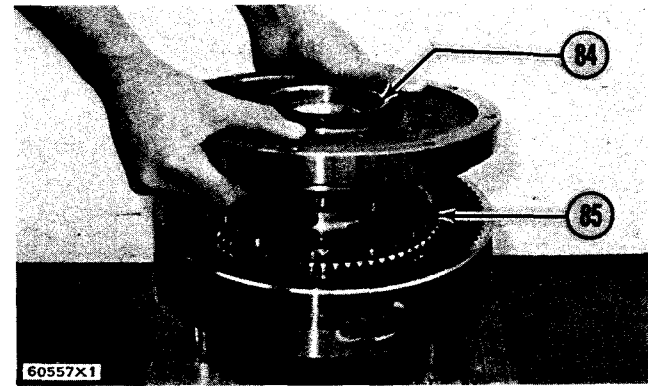
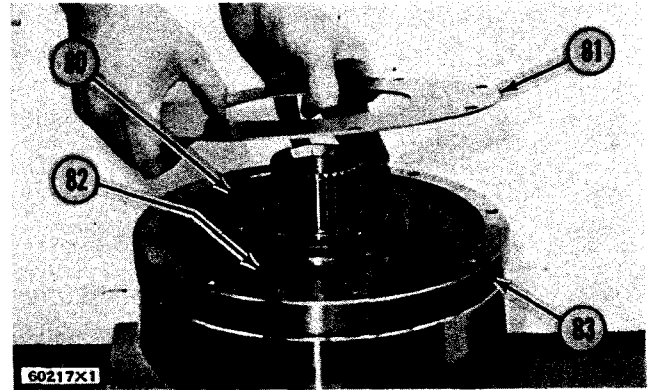
80. Install three 3/8"-16NC forcing screws (87), and remove plate (88).

81. Remove bearing (89) from plate.

82. Remove the bolts that hold coupling (90) to the output gear.

83. Use two of the bolts (91) to remove the coupling (90) from output gear (92).

84. Remove the bearing retaining ring from output gear (92). Remove bearing from gear.

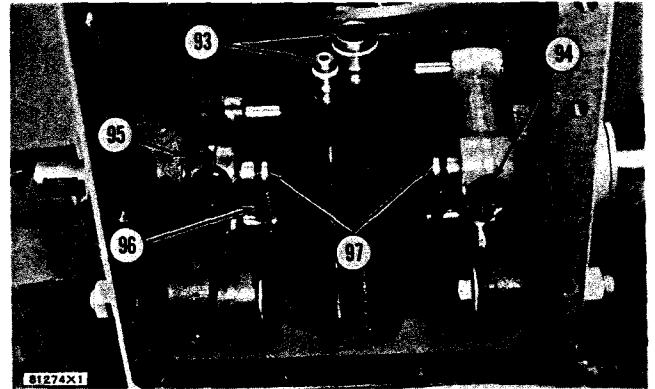


TRANSMISSION

85. Remove the oil tubes (93).

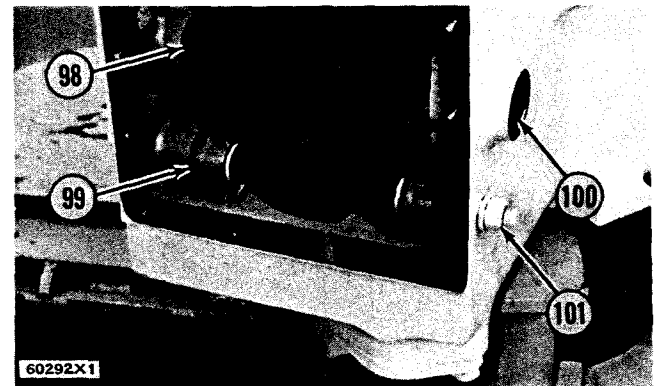
86. Remove the two springs (96).

87. Remove the two bolts (94).



88. Remove cams (95) and shafts (97).

89. Remove the nuts (101).

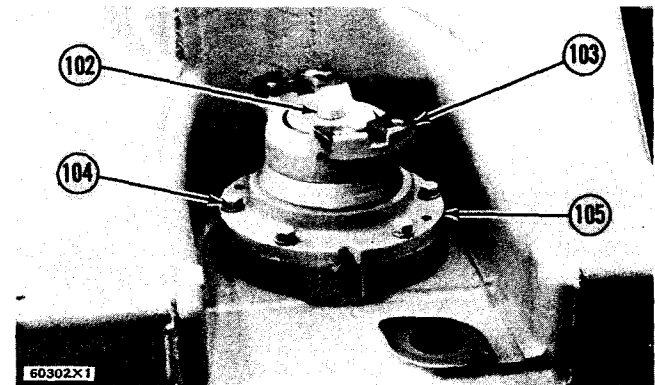


90. Remove detents (99), spacers, washers, and bolts.

91. Remove the two lip-type seals (100) from transmission case.

92. Remove the two bearings (98) from case.

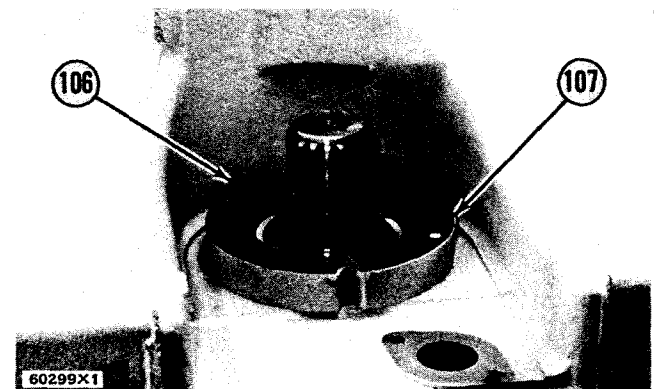
93. Remove bolt (102) and retainer.



94. Remove the yoke (103) and O-ring seal.

95. Remove bolts (104). Remove seal retainer (105). Remove seal from retainer.

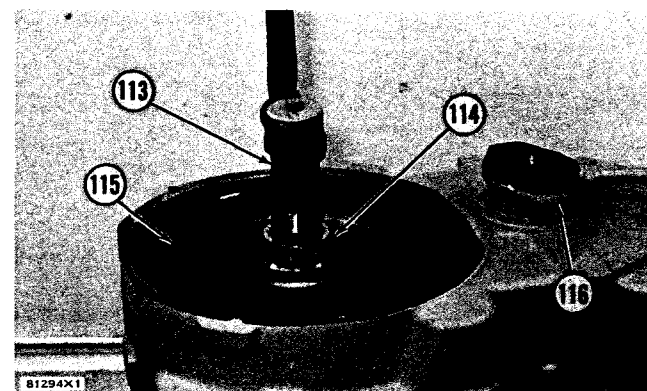
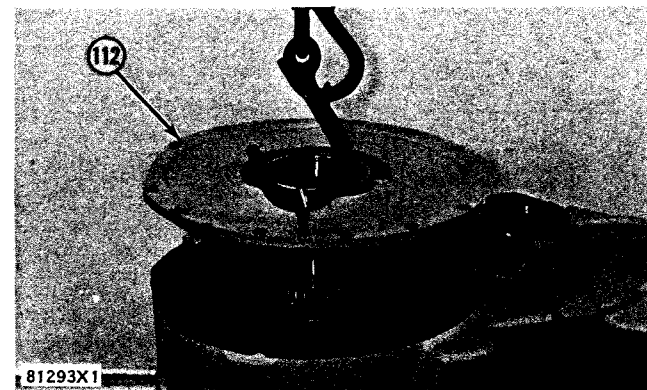
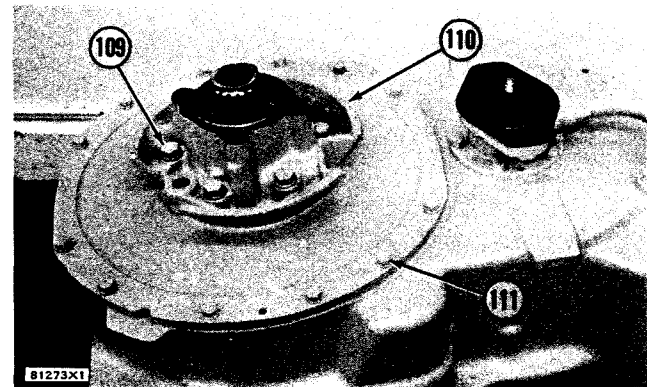
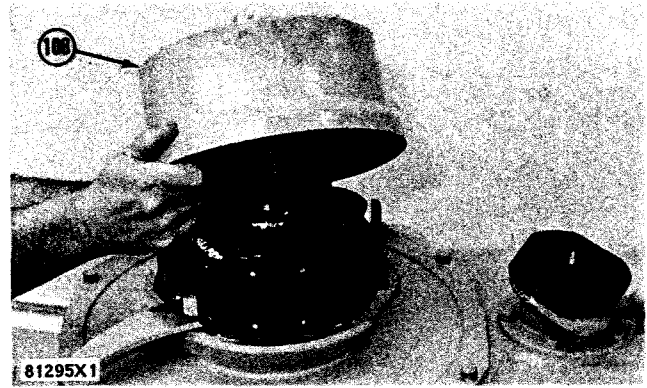
96. Install two 3/8"-16NC forcing screws (106) and remove bearing cage (107), bearing cones, and bearing cups.



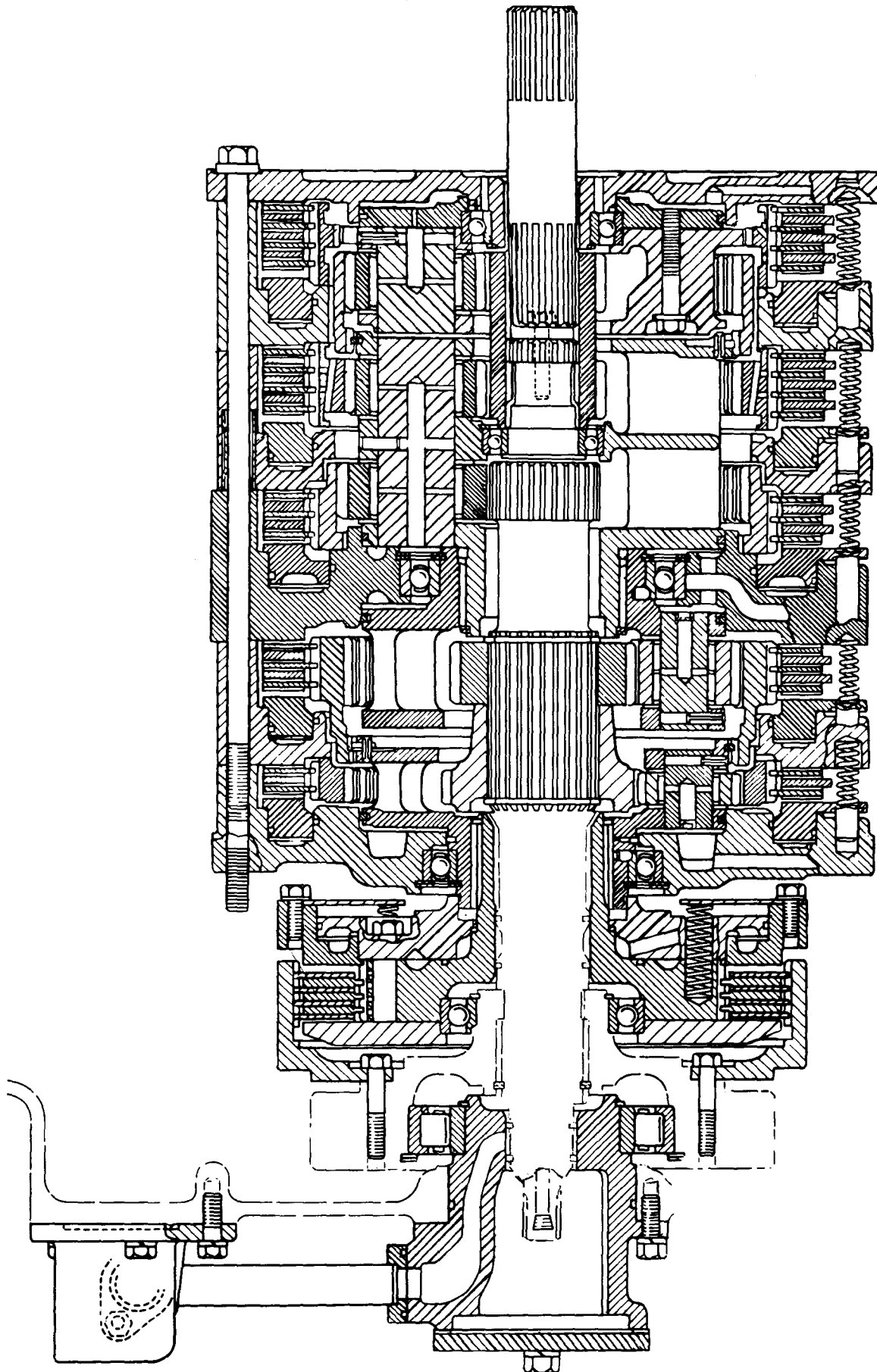
97. Remove the two bearing cones and two cups from the bearing cage.

TRANSMISSION

98. Connect a hoist and turn the transmission case over on stand (A).
99. Remove bolt, retainer and O-ring seal from output flange.
100. Remove flange and drum (108). Remove brake linings and plate as a unit.
101. Remove bolts (109), seal retainer (110) and spacer. Remove seal from retainer.
102. Remove bolts (111). Install two 3/8"-16NC forged eyebolts as forcing screws to make the bearing cage (112) separate from case.
103. Remove bearing cage (112).
104. Remove bearing race from cage (112).
105. Install the bolts for the output flange in the end of output shaft (113).
106. Connect a hoist and strap to the bolt. Remove output shaft (113) and gear from case. Weight of gear and shaft is 70 lb. (32 kg).
107. Remove bearing (114) and output gear (115) from output shaft.
108. Remove manifold assembly (116).
109. Remove the retaining ring and bearing race from manifold assembly.



TRANSMISSION



T99789-2X2

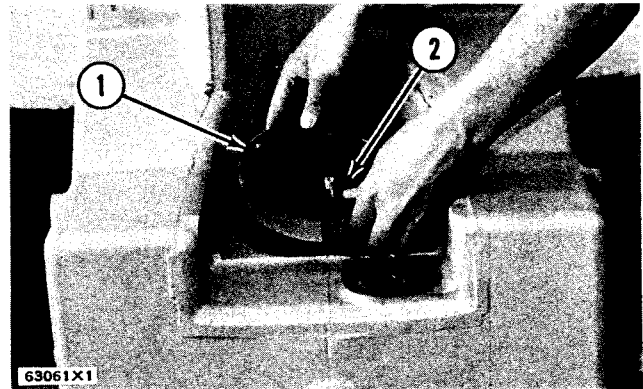
TRANSMISSION

ASSEMBLE TRANSMISSION

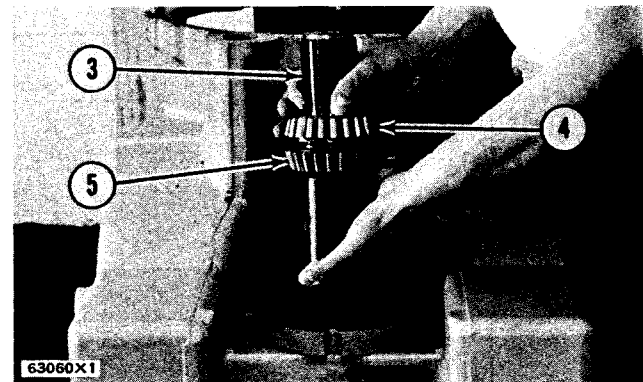
16-3150

Tools Needed		A	B
1P2420	Transmission Repair Stand	1	
FT834	Clutch Testing Nozzle		1

1. Heat the bearing cones (4) and (5) in oil at a maximum temperature of 275°F (135°C). Install the two bearing cones on output shaft (3).

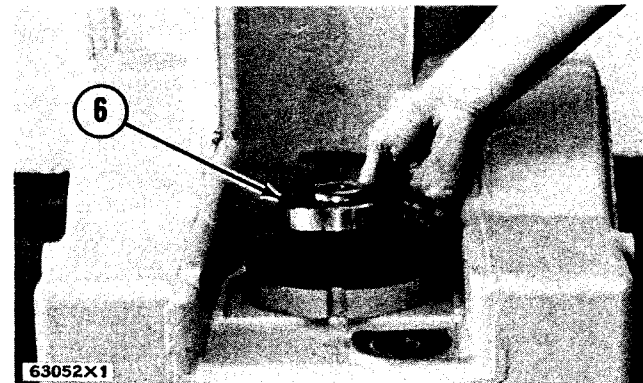


2. Install the bearing cup (2) for bearing cone (5) in cage (1).



3. Put the cage (1) into position in transmission case.

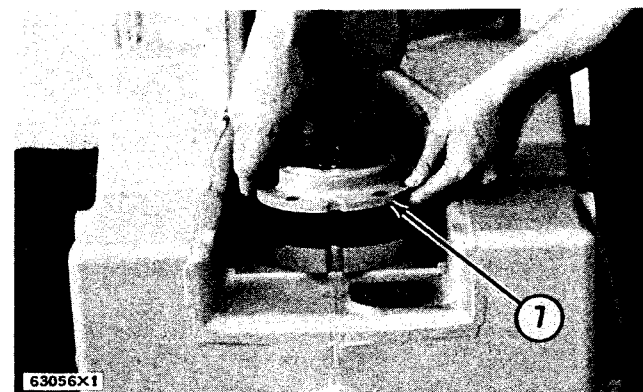
4. Install the output shaft. Install the bearing cup (6) for bearing cone (4) in cage (1).



5. Put 7M7260 Liquid Gasket Material on the seal surface of bore of retainer (7). Let the gasket material become dry. Install the seal in the retainer with lip of seal toward the transmission case.

CAUTION: Do not get any liquid gasket material on the lip of seal.

6. Put clean oil on lip of seal. Install the retainer (7) on transmission case. Install the bolts that hold it.



7. Install the output yoke, retainer, and bolt.

TRANSMISSION

8. Connect a hoist and turn transmission case over on stand (A).

9. Install the gear (8) on output shaft.

10. Heat the bearing (12) in oil to a maximum temperature of 275°F (135°C), and install it on output shaft.

11. Install the spacer (11) on shaft.

12. Install the bearing race (10) in cage (9).

13. Install the cage (9) on case. Install the bolts.

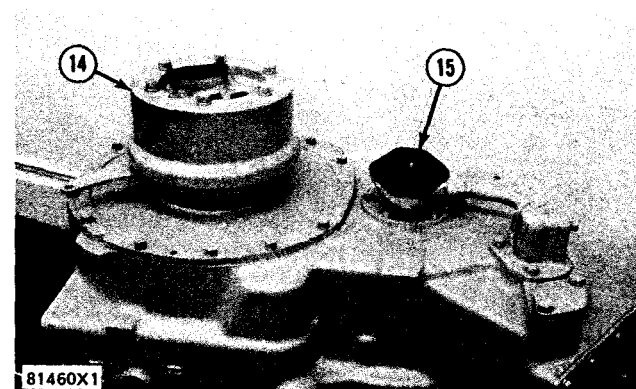
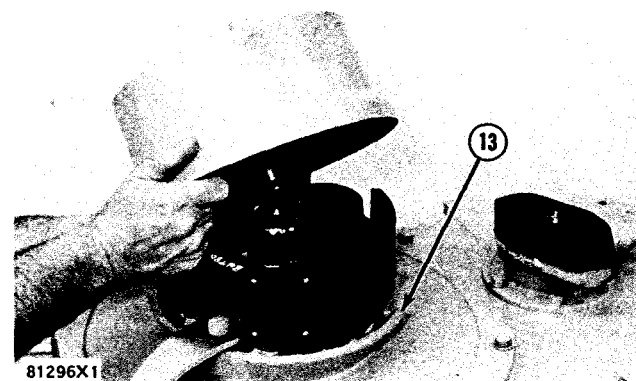
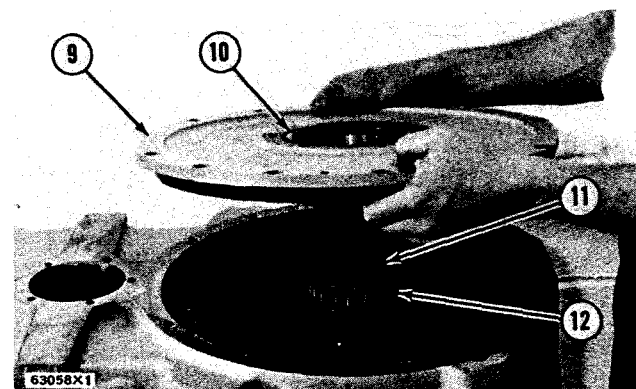
14. Put 7M7260 Liquid Gasket Material on the seal surface of bore of retainer (13). Let the gasket material become dry. Install the seal in the retainer with lip of seal toward transmission case.

CAUTION: Do not get any liquid gasket material on the lip of seal.

15. Install the retainer (13) and bolts. Install brake linings and plate as a unit. Install the drum, output flange (14), retainer and bolt.

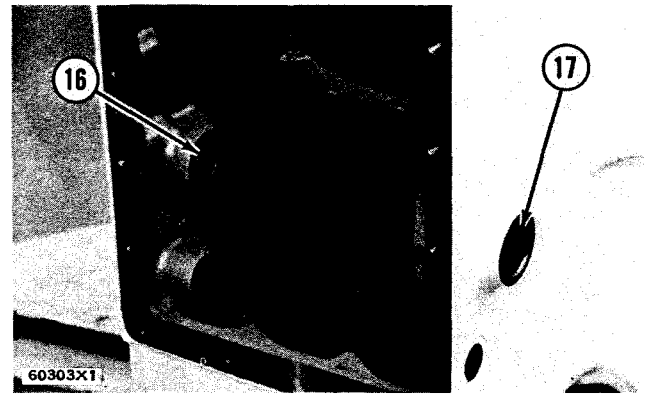
16. Heat the bearing race for the transmission output gear in oil at a maximum temperature of 275°F (135°C). Install the bearing race and retaining ring on manifold assembly (15).

17. Install the manifold assembly (15) and tube on transmission case. Install bolts.

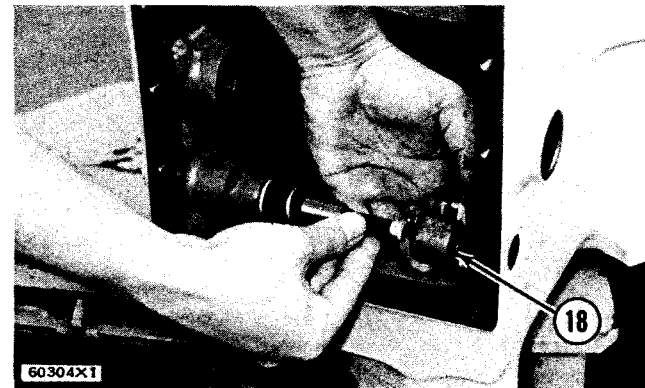


TRANSMISSION

18. Install the two bearings (16) in transmission case with end of bearings even with inside face of case.



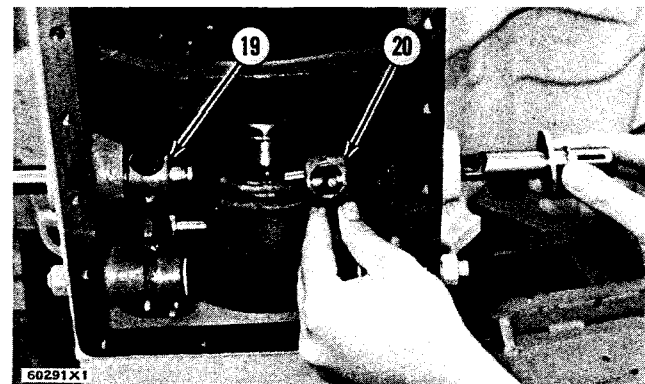
19. Put 7M7260 Liquid Gasket Material on the seal surface of bores of case. Let the gasket material become dry. Install the seals (17) in case with lip of seals toward the bearings.



20. Install detents (18), spacers, washers, bolts, and nuts in the case.

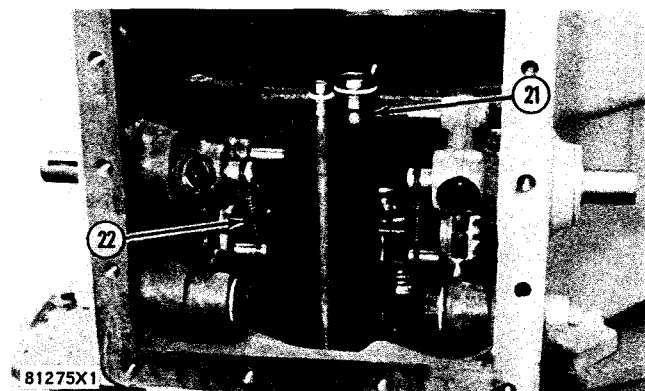
21. Install directional cam (19), shaft, and bolt.

NOTE: Directional cam (19) has three notches and speed cam (20) has four notches.



22. Install speed cam (20) shaft, and bolt.

23. Install the springs (22) on directional cam and speed cam.



24. Install the oil tubes (21).

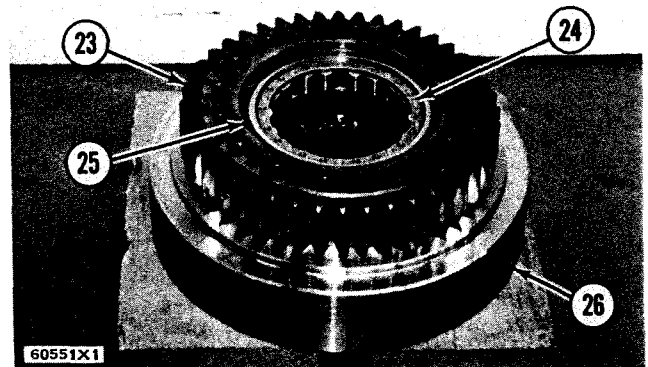
TRANSMISSION

25. Install the bearing (24) in output gear (23).

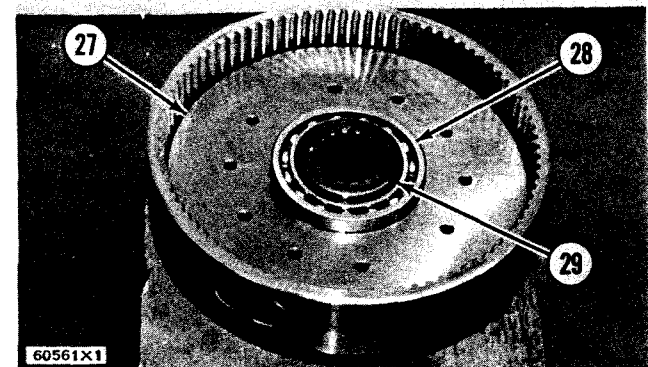
26. Install the retaining ring (25) for bearing.

27. Put output gear (23) in position on coupling (26). Install the bolts that hold gear to the coupling.

28. Install the plate (27).



29. Heat bearing (28) in oil at a maximum temperature of 275°F (135°C). Install the bearing with notch in bearing in alignment with dowel in output gear. Install retaining ring (29).



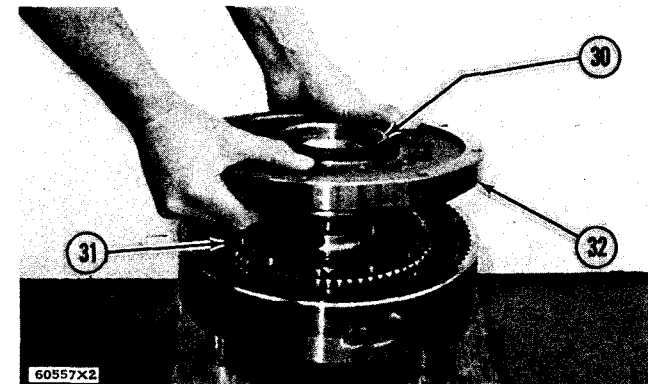
30. Install the two O-ring seals on the No. 6 clutch hub (31).

31. Put the No. 6 clutch hub in position in coupling.

32. Install the four disc assemblies and three plates starting with a disc assembly.

33. Install the seal ring in housing (30) and seal ring in piston (32). Put oil on the seal rings.

34. Put the seal rings in the center of their grooves. Put the housing (30) on piston, and softly push housing into position.



CAUTION: When installing piston into clutch housing, use care to prevent causing damage to the seal rings. Never use a hammer to install pistons. Broken seal rings can be the result.

35. Install the piston and housing. Install the bolts that hold housing to clutch hub.

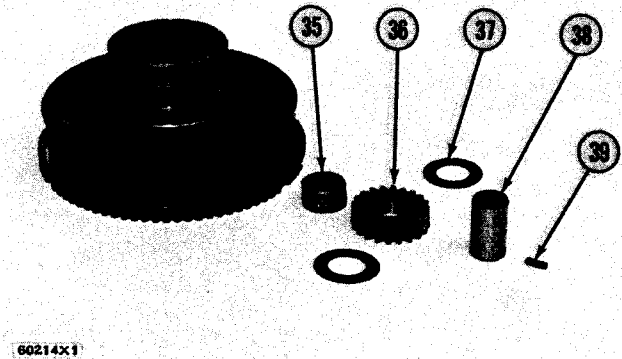
36. Put springs (33) in housing. Install the retainer (34), bolts, and locks.



TRANSMISSION

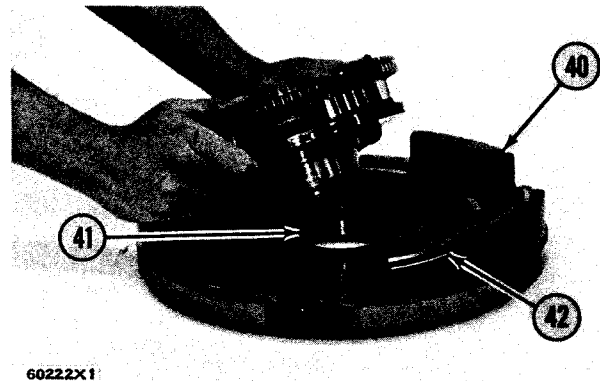
37. Assemble the No. 5 carrier as follows:

- a) Put the bearings (35) in the gears (36), and install the three planet gears with a washer (37) on each side of each gear.
- b) Install the three shafts (38) with hole in shafts in alignment with holes in carrier.
- c) Install the three pins (39).
- d) Install the seal rings on carrier. Put oil on the seal rings. Put the joints in seal rings 180° apart.



CAUTION: Do not twist, bend, or open the seal rings more than necessary during installation. When installed, seal rings must be free to move in their grooves.

38. Install the bearing (41) in No. 5 clutch housing (40). Install retaining ring for bearing.



39. Install the seal ring (42) in clutch housing. Put oil on the seal ring.

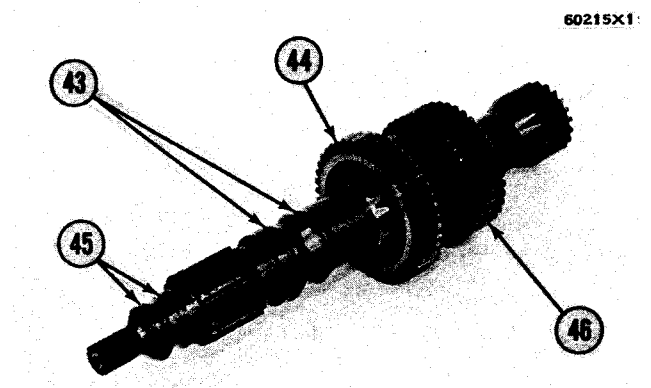
40. Put No. 5 carrier into position in No. 5 clutch housing with dowel in carrier in alignment with notch in bearing (41). Install retaining ring.



41. Install two 3/8"-16NC forged eyebolts in the No. 5 clutch housing. Connect a hoist and install the No. 5 clutch housing and carrier.

42. Install the ring that holds the housing and carrier in position.

43. Install the No. 4 sun gear (46) and No. 5 sun gear (44) on output shaft. Install the ring that holds gears in position.



44. Install seal rings (43) and (45) on output shaft. Put oil on the seal rings. Put the joints in seal rings 180° apart.

TRANSMISSION

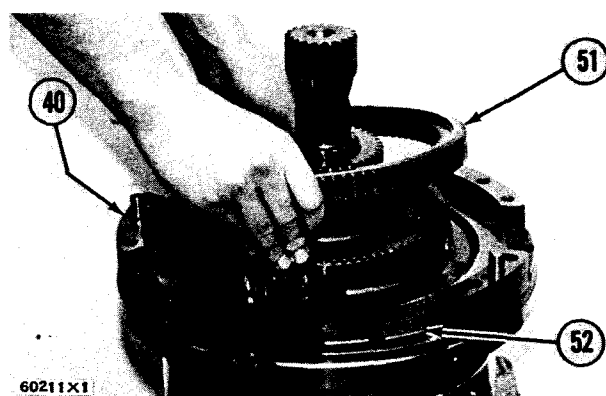
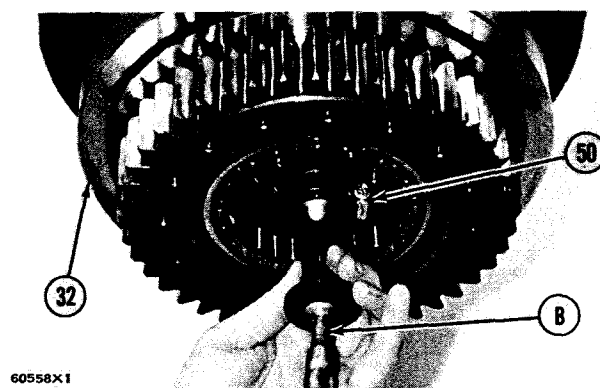
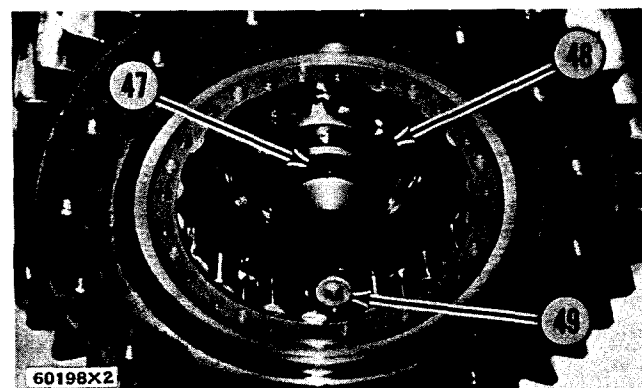
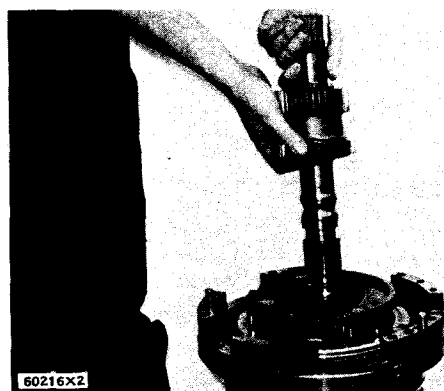
45. Install the output shaft.
46. Install two 3/8"—16NC forged eyebolts in the No. 5 clutch housing. Connect a hoist and lift the planetary group.
47. Install the retaining ring (48) that holds the output shaft in position.
48. Check the operation of No. 6 clutch as follows:
 - a) Put some oil in openings (47) in shaft.
 - b) Cut a piece of rubber 1 in. by 5 in. by 1/8 in. (25 mm by 127 mm by 3 mm) in size.
 - c) Put the piece of rubber around shaft so that it is over the four holes in shaft. Install and tighten a hose clamp (50) of 2 in. (50 mm) diameter to hold rubber in position.
 - d) Remove plug (49) from end of shaft.
 - e) Use clutch testing nozzle (B) and compressed air to check the operation of No. 6 clutch piston (32).

NOTE: If No. 6 clutch piston is free, there should be about 1/8—1/4 in. (3 mm—6 mm) of travel in the piston. If the piston does not move, the No. 6 clutch has not been assembled correctly and must be disassembled to find the cause.

- f) Remove the hose clamp and piece of rubber. Put 8M8059 Loctite Sealant on threads of plug (49). Install the plug in end of shaft.
49. Lower the planetary group down on to the blocks. Remove the two eyebolts from clutch housing.
50. Install the seal ring on No. 5 clutch piston (52). Put oil on seal ring.
51. Put the seal ring in piston (52) and in housing (40) in the center of their grooves. Put the piston on housing, and softly push piston into position in housing.

CAUTION: When installing piston into housing, use care to prevent causing damage to the seal rings. Never use a hammer to install piston. Broken seal rings can be the result.

52. Install the ring gear (51) for No. 5 clutch.



TRANSMISSION

53. Install the two disc assemblies and plate for No. 5 clutch starting with a disc assembly.

54. Install the springs (54) for No. 5 clutch.

55. Install retaining ring (56) for ring gear of No. 4 clutch on the No. 5 carrier.

56. Install the seal ring in No. 4 clutch piston (55) and in No. 4 clutch housing (53). Put oil on seal rings.

57. Put the seal rings in the center of their respective grooves. Put the piston on housing, and softly push piston into position in housing.

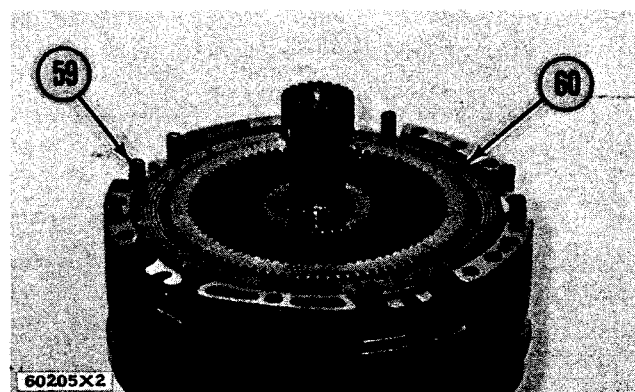
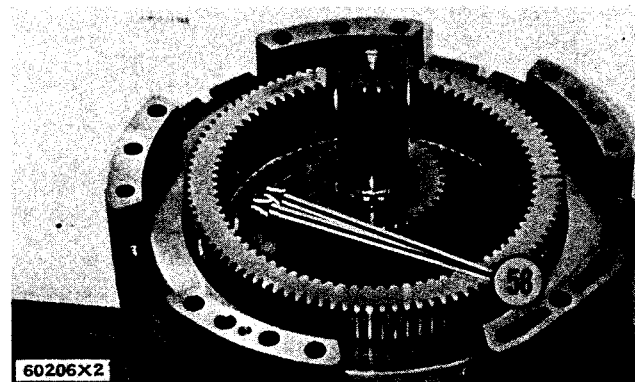
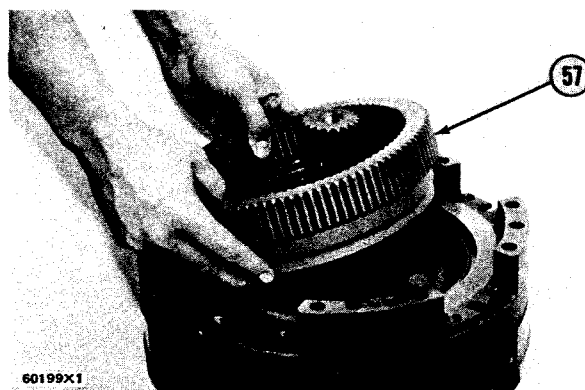
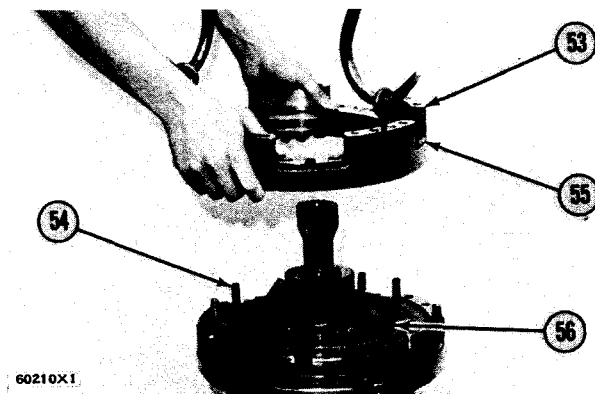
CAUTION: When installing piston into housing, use care to prevent causing damage to the seal rings. Never use a hammer to install piston. Broken seal rings can be the result.

58. Install the No. 4 clutch housing (53).

59. Install ring gear (57) for No. 4 clutch. Install the two pins (58) for retaining ring (56) in the carrier.

60. Install the three disc assemblies (60) and two plates for the No. 4 clutch starting with a disc assembly.

61. Install the springs (59) for No. 4 clutch.

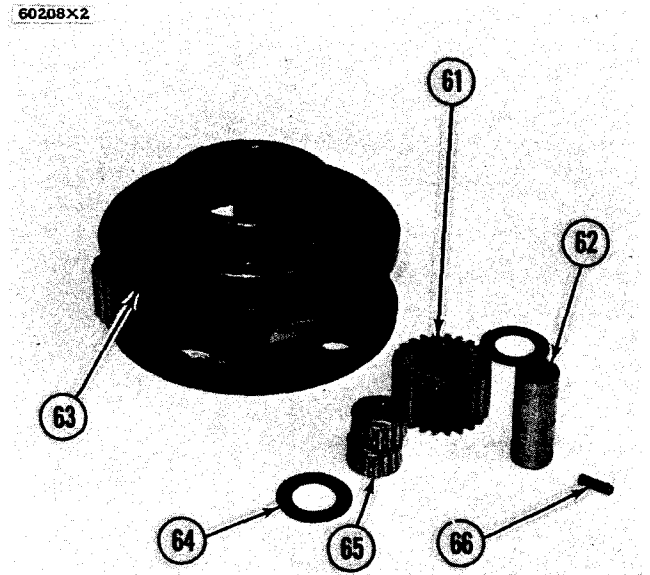


TRANSMISSION

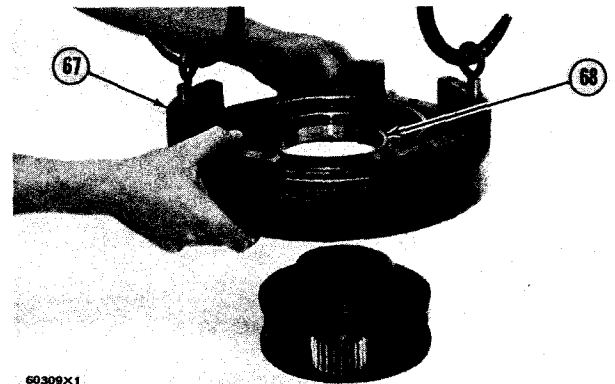
62. Assemble the No. 4 carrier as follows:

- a) Put the bearings (65) in planet gears (61), and install the gears in carrier with a washer (64) on each side of each gear.
- b) Install the three shafts (62) with hole in shafts in alignment with holes in carrier.
- c) Install the three pins (66).
- d) Install the seal ring (63) on carrier. Put oil on seal ring.

CAUTION: Do not twist, bend, or open the seal ring more than necessary during installation. When installed, seal ring must be free to move in groove.



63. Install bearing (68) in No. 3 clutch housing (67). Install the ring that holds bearing in position.



64. Install the seal ring in No. 3 clutch housing. Put oil on the seal ring. Put the seal ring in the center of its groove.

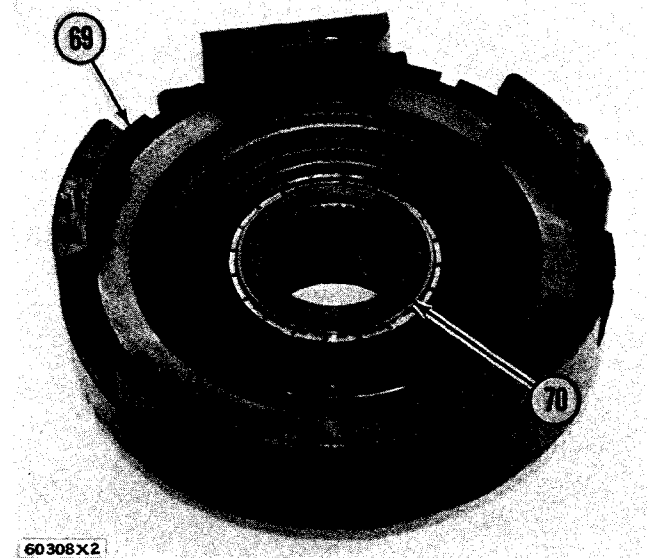
65. Put the No. 3 clutch housing in position on No. 4 carrier with dowel in carrier in alignment with notch in bearing (68). Install the ring (70) that holds carrier to housing.

CAUTION: Use care when lowering housing into place to prevent causing damage to the seal ring (63) in carrier.

66. Install the seal ring in piston for No. 3 clutch. Put oil on the seal ring.

67. Put the seal rings in piston (69) and in housing (67) in the center of their grooves. Put the piston on housing, and softly push piston into the No. 3 clutch housing.

CAUTION: When installing piston into housing, use care to prevent damage to the seal rings. Never use a hammer to install piston. Broken seal rings can be the result.



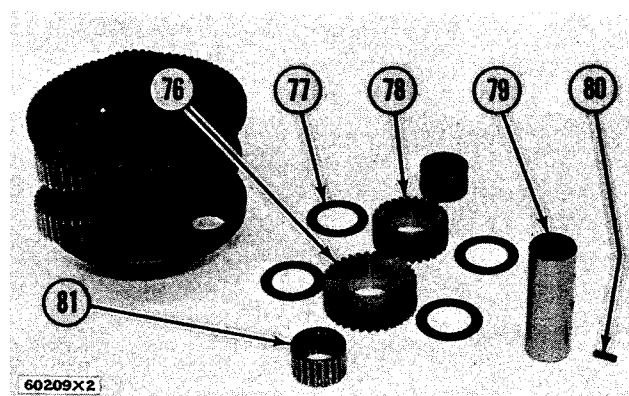
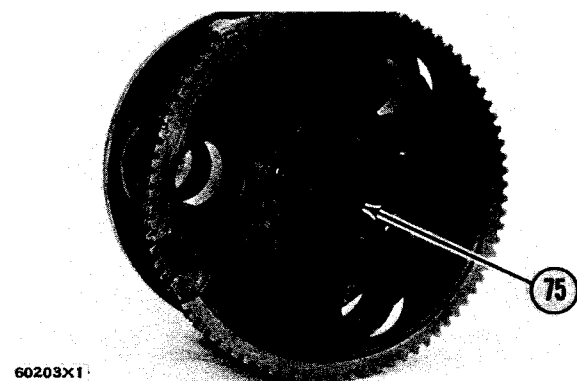
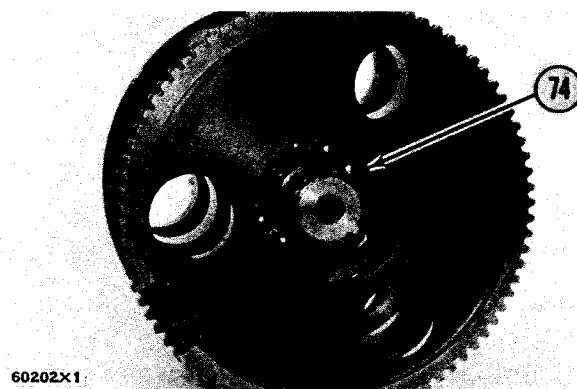
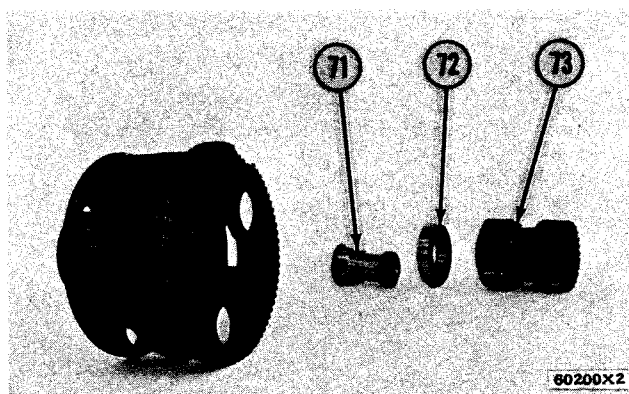
TRANSMISSION

68. Assemble No. 2 and No. 3 carrier as follows:

- a) Install the bearing (72) on retainer (71).
- b) Install the retaining ring (74) that holds bearing and retainer in position.
- c) Check to be sure the ring is in correct position inside the No. 1 and No. 2 sun gears (73).
- d) Put No. 1 and No. 2 sun gears in the carrier, and install retainer and bolt (75).
- e) Put a bearing (81) inside No. 2 planet gears (78). Put the gears in position in carrier with a washer (77) on each side of each gear.
- f) Put a bearing (81) inside the No. 3 planet gears (76). Put the gears in position in carrier with a washer (77) on each side of each gear.
- g) Install the three shafts (79) in carrier with hole in shafts in alignment with holes in carrier.
- h) Install the three pins (80) in carrier.
- i) Install the seal ring on carrier. Put oil on seal ring.

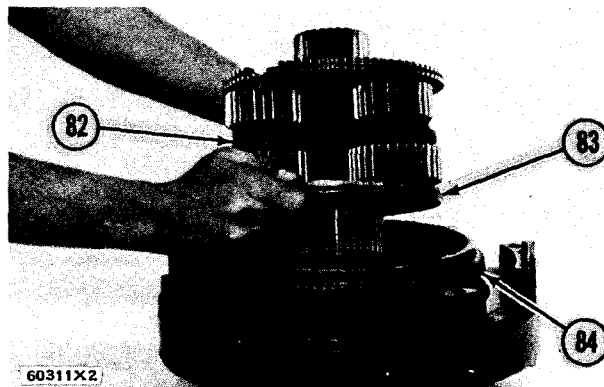
CAUTION: Do not twist, bend, or open the seal ring more than necessary during installation. When installed, seal ring must be free to move in groove.

- j) Install the O-ring seal on carrier.



TRANSMISSION

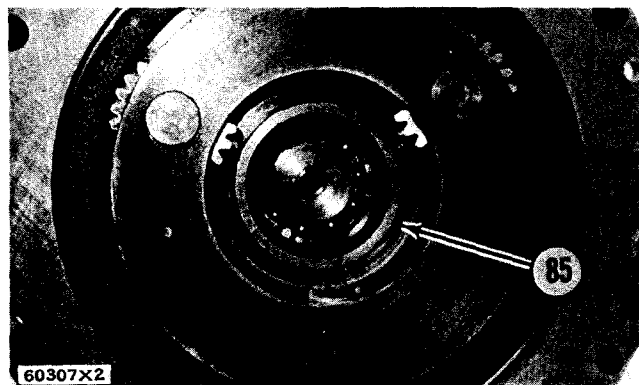
69. Install the ring gear (84) for No. 3 clutch.



70. Put seal ring (83) in center of its groove.

71. Install the No. 2 and No. 3 carrier (82) in the clutch housing.

CAUTION: Use care when lowering No. 2 and No. 3 carrier into place to prevent causing damage to the seal ring (83) in carrier.



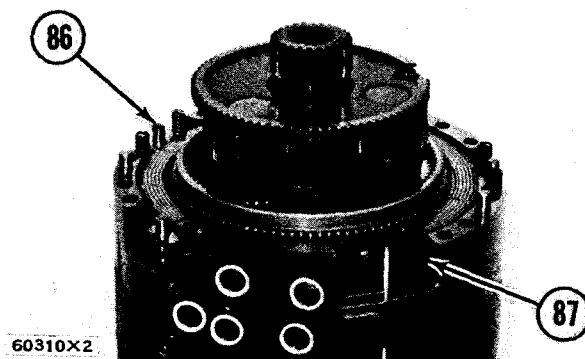
72. Install the ring (85) that holds No. 2 and No. 3 carrier in position.

73. Install two 3/8"—16NC forged eyebolts in No. 3 clutch housing. Connect a hoist and install the No. 2 and No. 3 carrier, No. 4 carrier, and No. 3 clutch housing as a unit.



74. Install the three disc assemblies and two plates for the No. 3 clutch starting with a disc assembly.

75. Install the No. 3, No. 4, and No. 5 clutch pins (86).

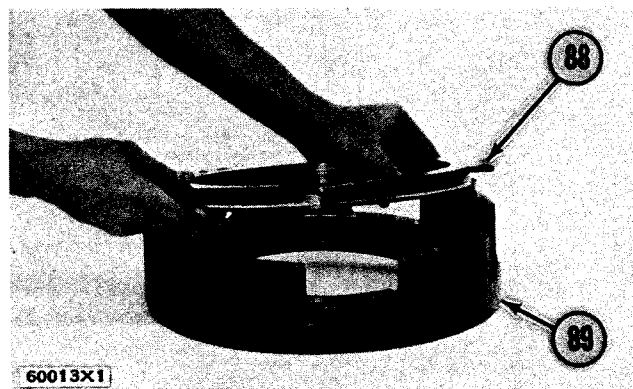


76. Install the No. 3 clutch springs (87).

TRANSMISSION

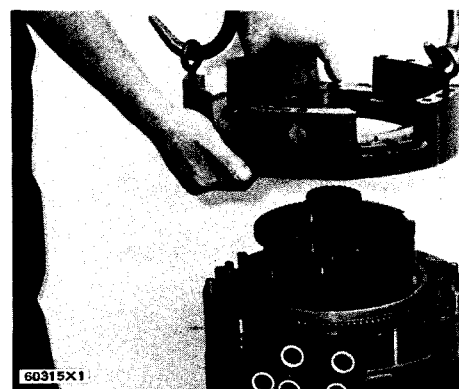
77. Install seal ring in piston (88) and in No. 2 clutch housing (89). Put oil on seal rings.

78. Put the seal rings in the center of their grooves. Put piston (88) on housing (89), and softly push the piston into No. 2 clutch housing.



CAUTION: When installing piston into housing, use care to prevent causing damage to the seal rings. Never use a hammer to install piston. Broken seal rings can be the result.

79. Install No. 2 clutch housing on planetary group.



80. Install retaining ring (92) on carrier.

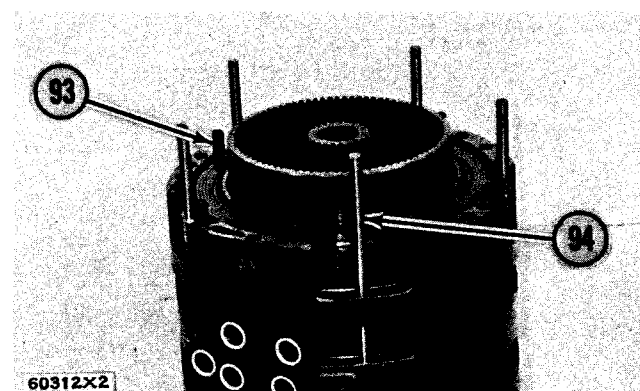
81. Install the ring gear (91) for No. 2 clutch.



82. Install ring gear (90) for No. 1 and No. 2 carrier. Install the two pins that hold the retaining ring (92) in position.

83. Install the four disc assemblies and three plates of the No. 2 clutch starting with a disc assembly.

84. Install the pins (94) for the No. 1 and No. 2 clutch.

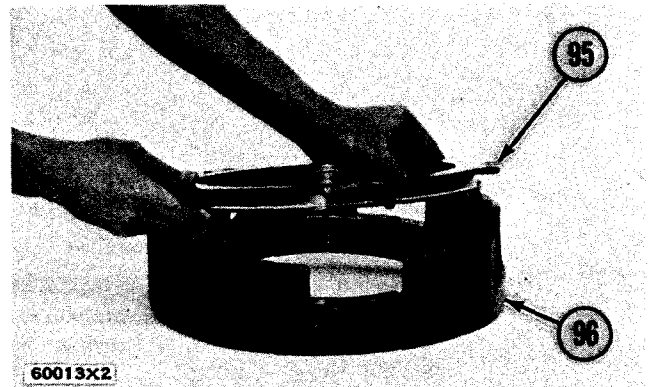


85. Install springs (93) for No. 2 clutch.

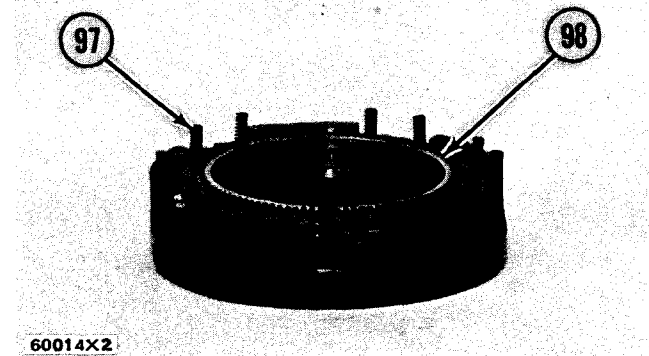
TRANSMISSION

86. Install seal ring in piston (95) and in No. 1 clutch housing (96). Put oil on seal rings.
87. Put the seal rings in the center of their grooves. Put piston (95) on housing (96), and softly push the piston into No. 1 clutch housing.

CAUTION: When installing piston into housing, use care to prevent causing damage to the seal rings. Never use a hammer to install piston. Broken seal rings can be the result.



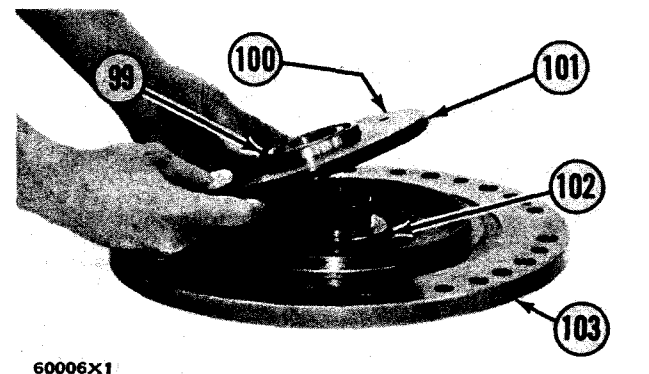
88. Install the ring gear (98) for No. 1 clutch.
89. Install the four disc assemblies and three plates for the No. 1 clutch starting with a disc assembly.



90. Install the springs (97) for No. 1 clutch.

91. Install bearing (99) in cage (100).

92. Install seal ring (101) on cage (100) and seal ring (102) on plate (103). Put oil on the seal rings. Install cage (100) in plate (103).

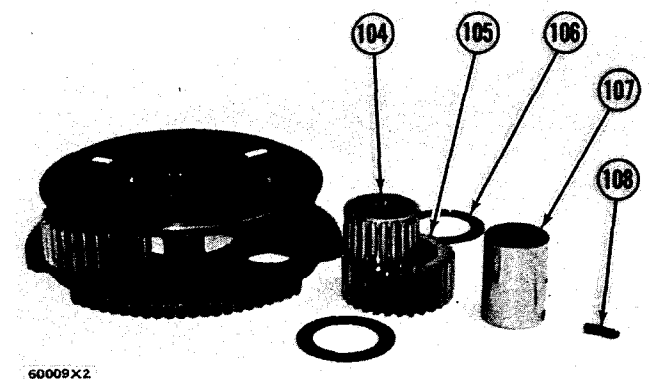


CAUTION: Do not twist, bend, or open the seal rings more than necessary during installation. When installed, seal ring must be free to move in grooves.

93. Install the ring that holds bearing and cage (100) in position.

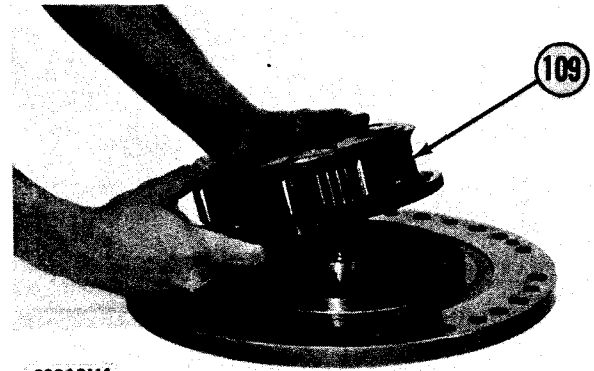
94. Assemble the No. 1 carrier as follows:

- a) Put a bearing (104) inside each of the three No. 1 planet gears (105).
- b) Put the gears (105) in position in carrier with a washer (106) on each side of each gear.
- c) Install the three shafts (107) with holes in shafts in alignment with holes in carrier.
- d) Install the pins (108) in carrier.

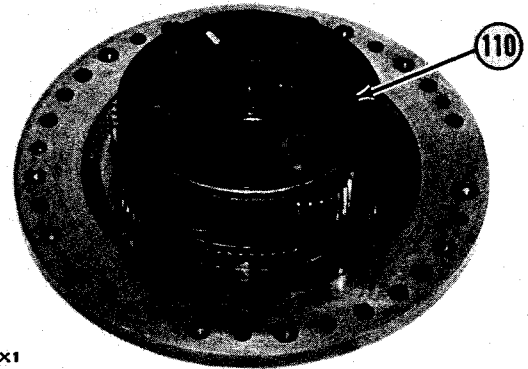


TRANSMISSION

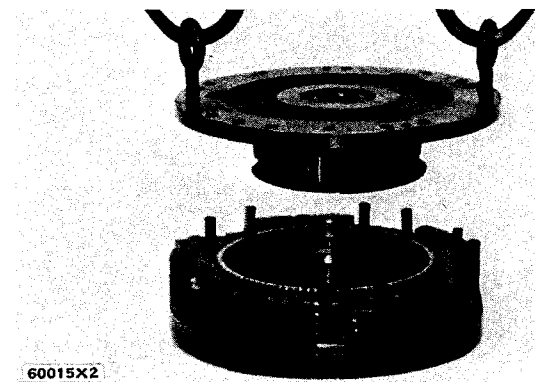
95. Put the No. 1 carrier (109) in position on plate. Install the three bolts (11) that hold carrier to cage.



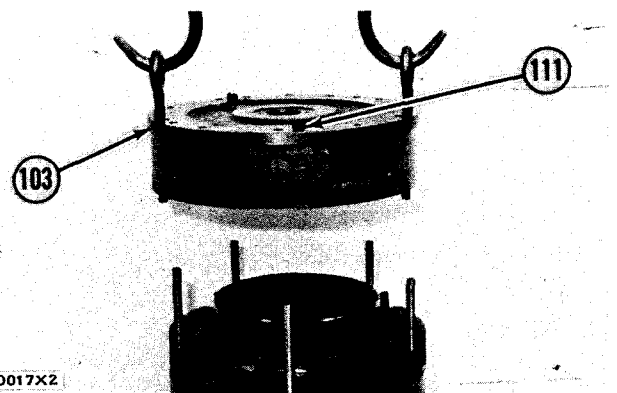
96. Install two 5/8"-11NC forged eyebolts in the plate.



97. Connect a hoist and put the plate and No. 1 carrier in position on No. 1 clutch housing.



98. Install the two bolts (111) that hold the plate to the No. 1 clutch housing.

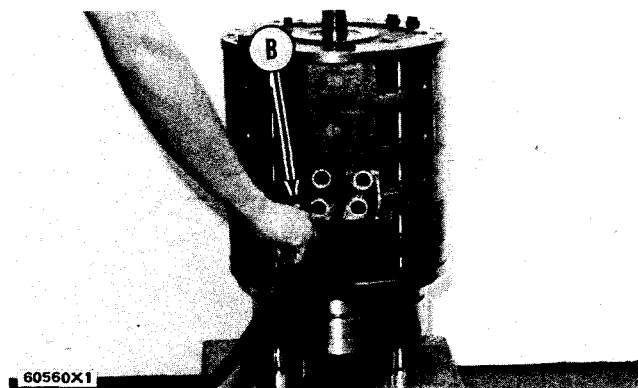
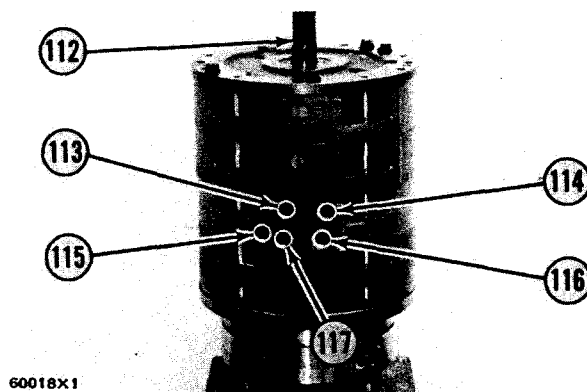


100. Install the three bolts at locations with identification marks "S" on plate (103). Tighten the bolts to 85 ± 5 lb.ft. (11.8 ± 0.7 mkg).

TRANSMISSION

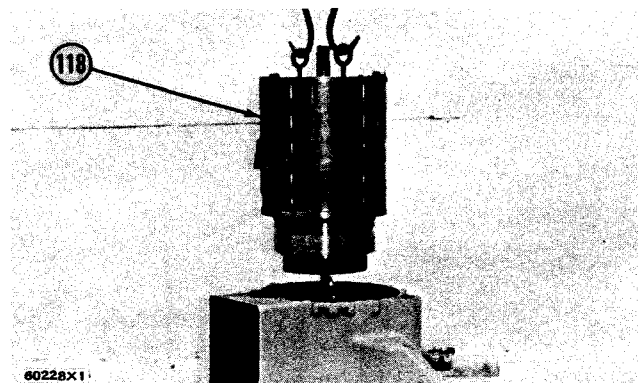
101. Install the input shaft (112).
102. Check the operation of the clutches (except No. 6 clutch) using clutch testing nozzle (B) and compressed air. Put oil in the clutch ports before checking travel of the clutch pistons. The clutch ports shown are: (113) No. 1 clutch, (114) No. 2 clutch, (115) No. 3 clutch, (117) No. 4 clutch, and (116) No. 5 clutch.

NOTE: If the clutch pistons are free to move, there should be about 1/8–1/4 in. (3 mm–6 mm) of travel in each of the pistons. If the piston does not move, the clutch has not been assembled correctly and must be disassembled to find the cause.



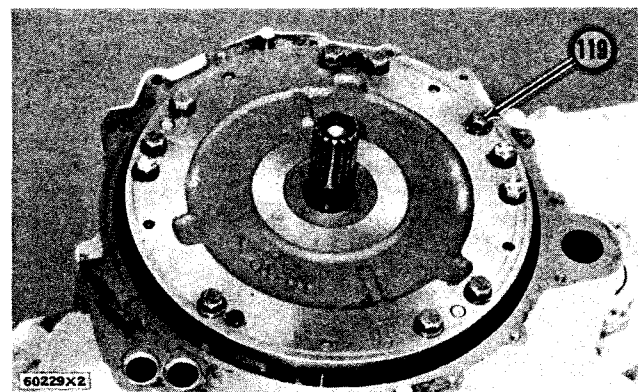
103. Install two 5/8–11NC forged eyebolts in the plate assembly.

104. Put the seal rings on end of output shaft in the center of their grooves.



105. Connect a hoist and put the planetary group (118) in position in the transmission case.

106. Install the eight bolts (119) that hold the planetary group to the transmission case. Tighten the bolts to 85 ± 5 lb.ft. (11.8 ± 0.7 mkg).



TRANSMISSION

107. Check to be sure the five O-ring seals are in position in No. 3 clutch housing.

108. Install the two 3/8"-16NC guide bolts in the No. 3 clutch housing.

109. Install manifold (120).

110. Put rubber bands or O-ring seals around the valve spool (121) for directional selector and around valve spool (122) for speed selector to keep valve spools in position during the installation of valve group.

111. Install the selector valve group (123). Remove the rubber bands or O-ring seals.

112. Pull tubes (126) up into position in the selector valve group.

113. Install the O-ring seals on sleeves (124). Install the two sleeves.

114. Install the manifold (125).

115. Install valve group (127) for pressure control.

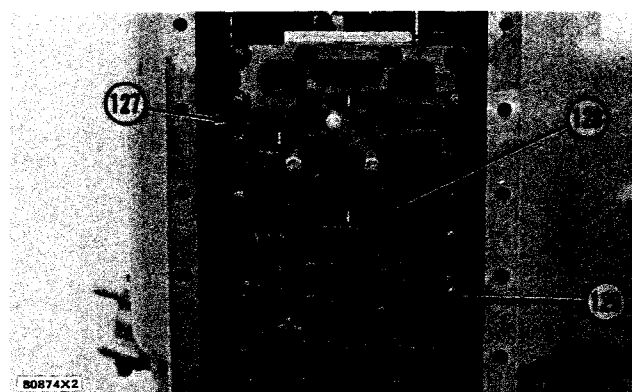
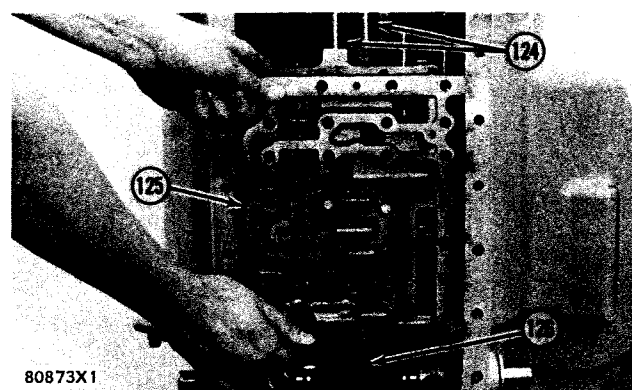
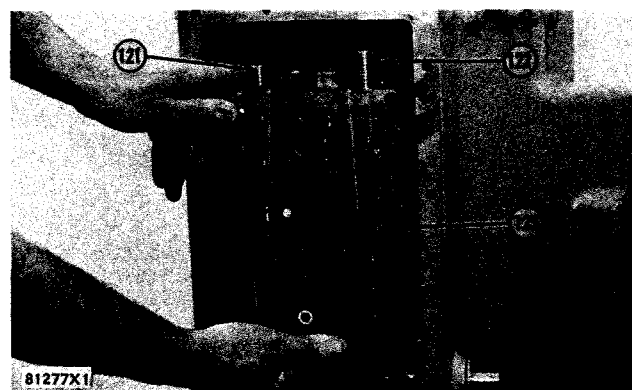
116. Install two of the large bolts and remove the two guide bolts. Install the other two large bolts. Install the twenty-four small bolts. Tighten the four large bolts (128) to a torque of 35 ± 3 lb.ft. (4.8 ± 0.4 mkg). Tighten the twenty-four small bolts (129) evenly to a torque of 22 ± 3 lb.ft. (3.0 ± 0.4 mkg).

117. If necessary, make an adjustment to valve spool (121) and (122) as shown in TESTING AND ADJUSTING.

118. Install cover on transmission case.

end by:

- a) connection torque converter to transmission



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