Disassembly and Assembly

D4B TRACTOR AND 935B TRACK-TYPE LOADER POWER TRAIN

Media Number -SENR3547-00 Pu

Publication Date -01/03/1987

Date Updated -15/02/2017

SENR35470018

Final Drive Pinions

SMCS - 4055-010

Remove And Install Final Drive Pinions

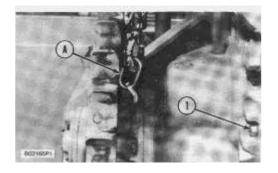
	Tools Needed	A	в
5P9736	Link Bracket	1	
1P520	Driver Group		1

Start By:>

a. separation of tracks

b. remove pinion flanges

1. Drain the oil from the final drive case.

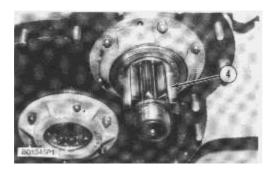


2. Install tool (A) and fasten a hoist as shown. Remove nuts (1) and bolts that hold the final drive cover to the steering clutch case.

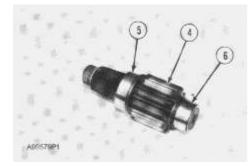


3. Install two 3/8 " -16 NC forcing screws (3) in the final drive cover. Tighten the forcing screws evenly and remove final drive (2) and sprocket as a unit. The weight is 158 kg (350 lb.).

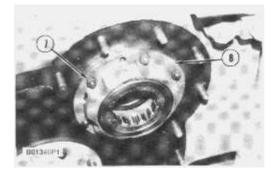
4. Remove the race and roller assembly for the pinion shaft from the final drive cover. See the topic, Remove Sprocket Shaft Gear And Cover.



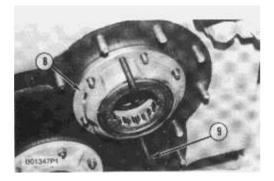
5. Remove pinion (4).



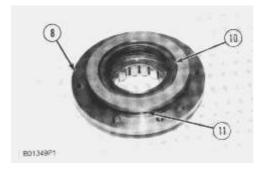
6. Remove bearing races (5) and (6) from pinion (4).



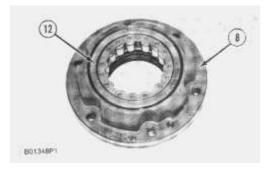
7. Remove nuts (7) that hold bearing cage (8) to the steering clutch case.



8. Install two 3/8 " -16 NC forcing screws (9). Tighten the forcing screws evenly and remove bearing cage (8).



9. Remove O-ring seal (11) and lip-type seal (10) from bearing cage (8).

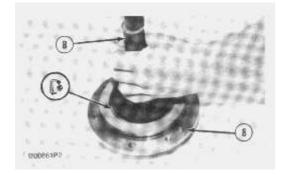


10. Remove race and roller assembly (12) from bearing cage (8).

NOTE: The following steps are for installation of the final drive pinions.

11. Inspect all parts for damage and make replacements if needed.

12. Lower the temperature of race and roller assembly (12). Install race and roller assembly (12) in bearing cage (8).



13. Use tooling (B) and install the lip-type seal in bearing cage (8) with the lip of the seal toward the final drive cover as shown. Put oil on the lip of the seal.

14. Install O-ring seal (11) on the bearing cage.

15. Put bearing cage (8) on the steering clutch case. Install the nuts that hold the bearing cage in place.

16. Heat bearing races (5) and (6) to a maximum temperature of 135°C (275°F). Install bearing races (5) and (6) on pinion (4).

17. Install pinion (4) in the bearing cage.

18. Install the race and roller assembly for the pinion shaft in the final drive cover. See the topic, Install Sprocket Shaft, Gear And Cover.

19. Put 7M7260 Liquid Gasket Material on the machined surfaces of the final drive cover and steering clutch case.

20. Install tool (A) and fasten a hoist to the final drive and sprocket. Put final drive and sprocket in position on the steering clutch case.

21. Install nuts (1) and bolts that hold the final drive in place.

22. Fill the final drive with oil to the correct level. See The Maintenance Guide.

End By:

a. install pinion flanges

b. connection of tracks

Main Product: TRACK LOADER Model: 935B TRACK LOADER 3DF Configuration: 935B TRACK LOADER / POWER SHIFT / 3DF00001-UP (MACHINE) POWERED BY 3204 ENGINE

Disassembly and Assembly

D4B TRACTOR AND 935B TRACK-TYPE LOADER POWER TRAIN

Media Number -SENR3547-00

Publication Date -01/03/1987

Date Updated -15/02/2017

SENR35470019

Bevel Gear And Pinion

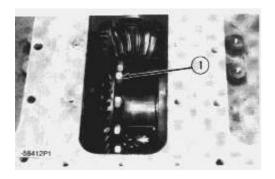
SMCS - 3254; 3256-011; 3256-012

Remove Bevel Gear And Pinion

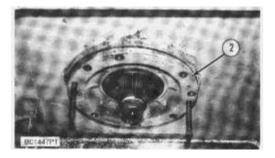
	Tools Needed	A
8B7548	Puller Assembly	1
8B7560	Step Plate	1
8H684	Ratchet Box Wrench	1
8H663	Bearing Puller Attachment	1

Start By:

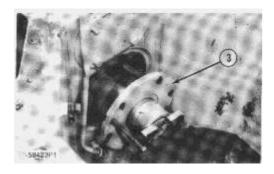
- a. remove steering clutch hub couplings
- **b.** remove pinion flanges
- **c.** remove drive shaft
- 1. Remove the cover for the bevel gear compartment.



2. Remove nuts (1) from the bolts that hold the bevel gear on the shaft.

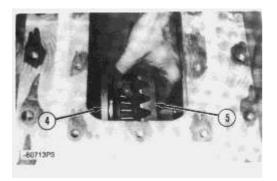


3. Remove the bolts that hold bearing cages (2) on the right and left sides of the bevel gear shaft. Install two3/8 - 16 NC forcing screws in the bearing cages. Tighten the forcing screws evenly and remove bearing cages (2) and shims. Keep the shims with their respective bearing cages for installation.

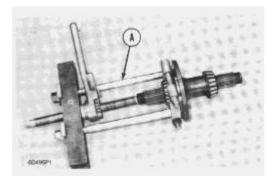


4. Remove the bolts that hold the pinion bearing cage assembly to the bevel gear case.

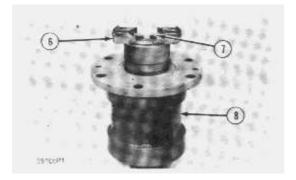
5. Install two 3/8 " - 16 NC forcing screws in the pinion bearing cage assembly. Tighten the forcing screws evenly and remove pinion bearing cage assembly (3) and shims. Keep the shims with the pinion bearing cage assembly for installation.



- 7. Move the bevel gear shaft away from the bevel gear.
- 8. Remove bevel gear (5) and bevel gear shaft (4).
- 9. Remove the bearing cups, O-ring seals and lip-type seals from the two bevel gear bearing cages.

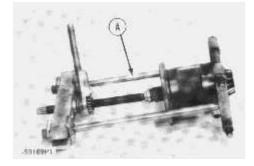


10. Remove the bearing cones from the bevel gear shaft with tooling (A).



11. Remove bolts (7) that hold the retainer on the pinion shaft flange (6).

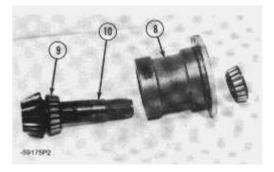
NOTE: Keep the shims with the retainer for correct installation.



Typical Example

12. Remove pinion bearing cage (8) from the pinion with tooling (A).

NOTE: Keep the puller attachment away from the inner bearing cone when tooling (A) is installed.

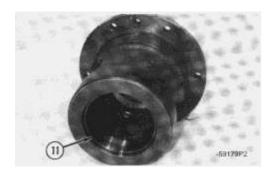


Typical Example

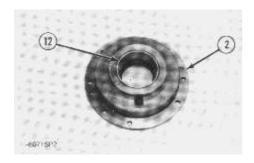
- **13.** Remove the O-ring seal and lip-type seal from pinion bearing cage (8).
- 14. Remove the bearing cups from pinion bearing cage (8).
- **15.** Remove inner bearing cone (9) from pinion shaft (10) with tooling (A).

Install Bevel Gear And Pinion

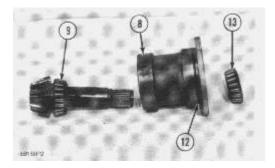
		Tools Needed	В
8S232	28	Dial Test Indicator Group	1



1. Lower the temperature of bearing cups (11). Install bearing cups (11) in the pinion bearing cage.

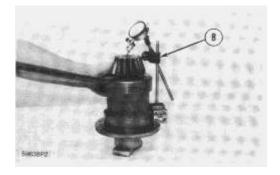


2. Lower the temperature of bearing cups (12). Install bearing cups (12) in bevel gear bearing cages (2).

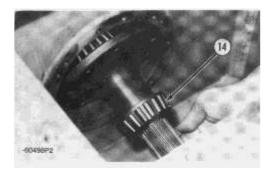


3. Heat bearing cone (9) to a maximum temperature of 135° C (275° F). Install bearing cone (9) on the pinion shaft. Install the pinion shaft in pinion bearing cage (8). Install bearing cone (13) on the pinion shaft. Install O-ring seal (12). Install the lip-type seal in the pinion bearing cage with the lip of the seal toward the oil that is to be sealed.

4. Install the flange, retainer and bolts. Tighten the bolts which will pull the bearing cone on to the pinion shaft. Turn the pinion shaft while the bolts are tightened until a small preload is felt.



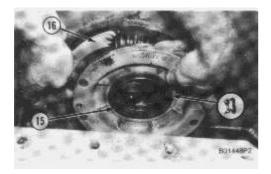
5. Install tooling (B) as shown and check the end play in the pinion shaft. Add enough shims behind the retainer to get 0 to 0.05 mm (0 to .002 in.) end play in the pinion shaft. Install the Oring, retainer, lock and bolts.



6. Heat bearing cones (14) to a maximum temperature of 135° C (275° F). Install bearing cones (14) on the bevel gear shaft.

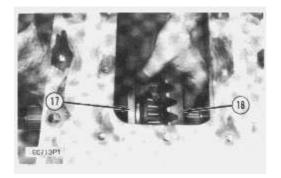
7. Put the bevel gear into position in the bevel gear case.

8. Install the bevel gear shaft through the bevel gear.

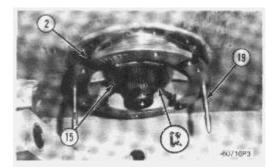


9. Install the O-ring seal and lip-type seal (15) in the left bearing cage. The spring loaded lip of the lip-type seal must be toward the bevel gear.

10. Install the left bearing cage with original amount of shims (16) behind the bearing cage.

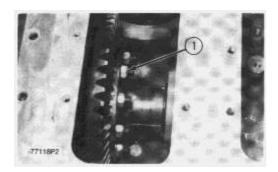


11. Put bevel gear shaft (17) into position in bevel gear (18). Install the bolts and nuts that hold the bevel gear to the bevel gear shaft.



12. Install the O-ring seal and lip-type seal (15) in the right bearing cage. The spring loaded lip of the lip-type seal must be toward the bevel gear.

13. Install two 1/2 " - 13 NC guide bolts (19). Install right bearing cage (2) on the shaft without shims. Install the bolts and tighten the bolts evenly, while the bevel gear shaft is turned, until a small amount of bearing preload is felt.



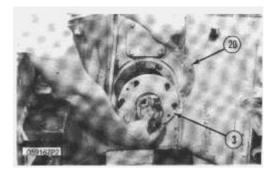
14. Tighten nuts (1) on the bevel gear to a torque of 142 ± 14 N·m (106 ± 10 lb.ft.).

15. Install tooling (B) on the end of the bevel gear shaft. Loosen the bolts around the right bearing cage evenly until there is no end play or preload on the bevel gear shaft.

16. Make a measurement of the clearance between the right bearing cage and the bevel gear case with a feeler gauge. The clearance must be the same at all bolt locations.

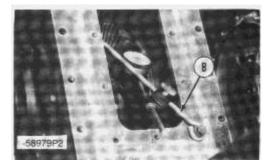
17. Remove tooling (B) and the right bearing cage. Install shims equal to the thickness measured minus 0.18 mm (.007 in.). Install the right bearing cage.

18. Check the amount of torque needed to turn the bevel gear shaft constantly for two or three turns. The torque must be 3.9 to 5.6 N·m (35 to 50 lb.in.). Add or remove shims as necessary if the torque is not correct.



19. Slide pinion bearing cage assembly (3), with the large oil hole in the bearing cage up, into the bevel gear case.

20. Install original shims (20) behind the pinion bearing cage. If the original shims are not available, install enough shims behind the pinion bearing cage to get the heel of the bevel gear in alignment with the pinion gear.



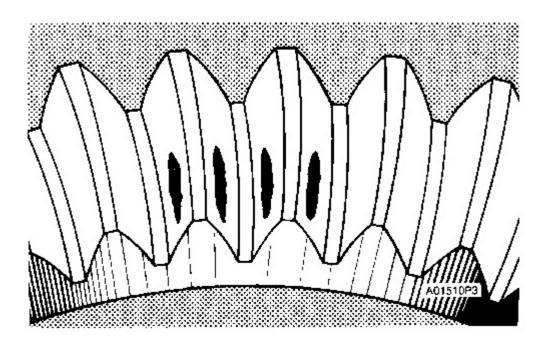
21. Install tooling (B) to check the gear clearance (backlash) between the bevel gear and pinion. Turn the gears and check the gear clearance (backlash) at several places to find out the place where there is the least amount of gear clearance (backlash). The correct gear clearance (backlash) is 935B: 0.20 + 0.10 or -.08 mm (.008 + .004 or -.003 in.); D4B: 0.25 + 0.10 or -0.8 mm (.010 + .004 or -.003 in.).

22. The gear clearance (backlash) can be increased, or decreased by removal of shims from one bearing cage and installation behind the other.

23. Preload on the bearings of the bevel gear shaft will not be changed if shims are moved from one side to the other and the thickness of the shims is kept the same.

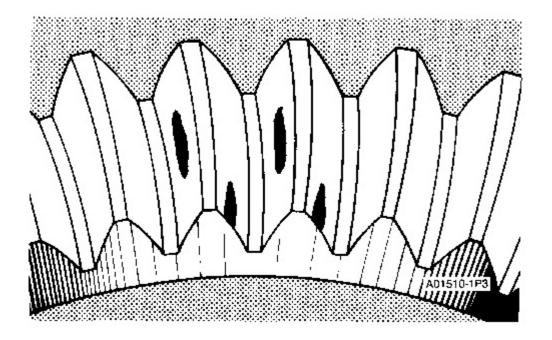
24. After the gear clearance (backlash) and bearing preload adjustments have been made, check the tooth contact between the bevel gear and pinion as follows:

a. Put Prussian blue, red lead or paint with a brush on the bevel gear teeth. Turn the pinion and check the contact area of the teeth on the drive side of the bevel gear. When the tooth contact on the drive side is correct, reverse side must also be correct.

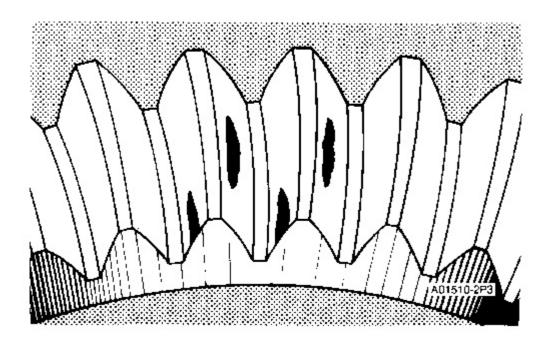


Correct Tooth Contact Setting

b. With no load, the correct tooth setting will be as shown. The area of contact starts near the toe of the gear and goes about 30% up the length of the tooth with this setting. When a load is put on the gear, it will be over the correct area of the teeth.



c. If the bevel pinion shaft is too far away from the bevel gear, short toe contact will be the result as shown. The teeth of the pinion will be in contact with toe end of convex faces (part that makes a curve toward the outside) and top edge of heel end of concave faces (part that makes a curve toward inside). To correct this, move the pinion shaft closer to the bevel gear. To do this, remove shims between pinion bearing cage and bevel gear case. Check gear clearance (backlash) and tooth contact again.



Short Heel Contact Setting

d. If the pinion shaft is too near to the center of the bevel gear, short heel contact will be the result as shown. The teeth of the pinion shaft will be in contact with the toe ends of concave faces (part that makes a curve toward the inside) and the heel end of convex faces (part that makes a curve toward the outside). To correct this, move the pinion shaft away from the bevel gear. To do this, add shims between pinion bearing cage and bevel gear case. Check gear clearance (backlash) and tooth contact again.

NOTE: Several adjustments must be made for the correct tooth contact setting. If the gear clearance (backlash) is changed, the tooth contact setting will change.

e. Remove all of the Prussian blue, red lead or paint from the bevel gear and pinion.

End By:

- a. install drive shaft
- b. install pinion flanges
- c. install steering clutch hub couplings

Disassembly and Assembly D4B TRACTOR AND 935B TRACK-TYPE LOADER POWER TRAIN Media Number -SENR3547-00 Publication Date -01/03/1987 Date Updated -15/02/2017

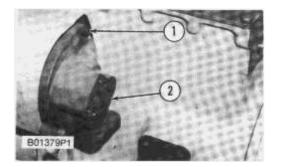
SENR35470020

Transmission Oil Pump And Pump Drive Gear

SMCS - 3153-010; 3153-017

Remove And Install Transmission Oil Pump And Pump Drive Gear

NOTE: This can be done in the machine. Transmission is removed for photo illustration.



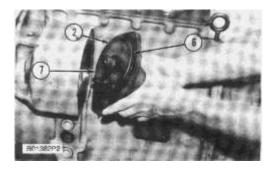
- 1. Disconnect the two oil lines connected to the oil pump.
- 2. Remove two bolts (1) and remove transmission oil pump (2).



3. Remove bolt (3) and retainer (4) that hold pump drive gear (5) in place. Remove pump drive gear (5).

NOTE: The following steps are for installation of the transmission oil pump and drive gear.

4. Put pump drive gear (5) in place in the transmission and install retainer (4) and bolt (3).



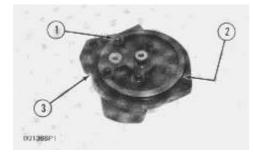
5. Make sure O-ring seal (6) is in position and install transmission oil pump (2). Install bolts (1) that hold the pump to the transmission case (7).

Disassemble And Assemble Transmission Oil Pump and Pump Drive Gear

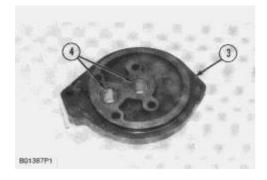
	Tools Needed	A
1P510	Driver Group	1

Start By:

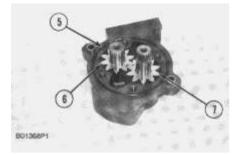
a. remove transmission oil pump and pump drive gear



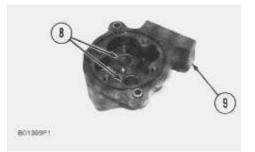
1. Remove O-ring seal (2) from cover (3), bolts (1) and cover (3) from the pump body.



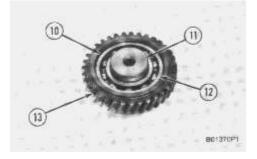
2. Remove bearings (4) from cover (3).



3. Remove drive gear (7), driven gear (6) and O-ring seal (5) from the pump body.



4. Remove bearings (8) from pump body (9).



5. Remove spiral lockring (10), shaft (11) and bearing (12) from gear (13).

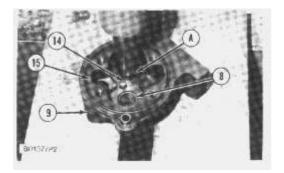
NOTE: The following are assembly steps of the transmission oil pump and drive gear.

6. Make sure all of the parts of the transmission oil pump and pump drive gear are clean. Put clean oil on all the parts of the pump and gear. Inspect all parts for damage and make replacements if needed.

7. Install bearing (12) and shaft (11) in gear (13) with spiral lockring (10) to hold the bearing in place.

NOTICE

Make sure the joint in both bearings (8) are in the correct location. The location of the joint is an angle of $30^{\circ} \pm 15^{\circ}$ from the center line of the two bearing bores in the direction of groove (14) on surface (15).

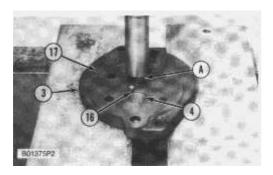


8. Install two bearings (8) into pump body (9) with tooling (A) and a press. The distance from the top of the bearing to surface (15) after assembly is 1.50 ± 0.25 mm (.059 ± .010 in.).

9. Install O-ring seal (5), driven gear (6) and drive gear (7) in pump body (9).

NOTICE

Make sure the joint in both bearings (4) are in the correct location. The location of the joint is an angle $30^\circ \pm 15^\circ$ from the centerline of the two bearing bores in the direction of groove (16) on surface (17).



10. Install two bearings (4) in cover (3) with tooling (A). The distance from the top of the bearing to surface (17) after assembly is 1.50 ± 0.25 mm (.059 ± .010 in.).

11. Install O-ring seal (2) on cover (3). Install cover on pump body (9) with bolts (1).

NOTE: Pump must turn freely by hand after assembly.

End By:

a. install transmission oil pump and pump drive gear

«Product: TRACK LOADER
Model: 935B TRACK LOADER 3DF
Configuration: 935B TRACK LOADER / POWER SHIFT / 3DF00001-UP (MACHINE) POWERED BY 3204 ENGINE

Disassembly and Assembly

D4B TRACTOR AND 935B TRACK-TYPE LOADER POWER TRAIN Media Number -SENR3547-00 Publication Date -01/03/1987

Date Updated -15/02/2017

SENR35470021

Engine And Transmission

SMCS - 1004-010; 1004-029

Remove And Install Engine And Transmission

	Tools Needed	A	В
5P9736	Link Bracket	1	ľ
8S9906	Ratchet Puller		1

Start By:

a. remove radiator and guard^{*}

b. remove air cleaner group^{*}

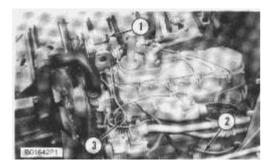
c. remove muffler^{*}

d. remove drive shaft

^{*}These operation locations are in The Engine, Disassembly And Assembly Manual

NOTE: This operation is done on a D3B with a 3F/3R transmission and a cab. The procedures shown will also apply to the D4B and 935B.

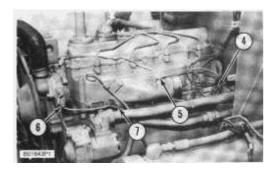
NOTE: Drain the oil from the hydraulic tank. Turn the valve on the bottom of the fuel tank to the "OFF" position.



1. Disconnect wire (1) from the alternator and wires from the air conditioner compressor, if so equipped.

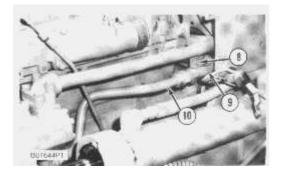
2. Disconnect battery cable (2) and wires from the starting motor.

3. Remove clip (3) from the cylinder head and the clip on the left side of the cylinder block. Pull the wire harnesses clear from the engine.

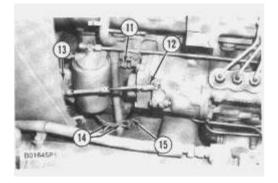


4. Disconnect oil pressure gauge oil line (4) from the fitting in the cylinder block. Disconnect air cleaner indicator line (5) from the fitting in the air inlet manifold.

5. Disconnect water temperature sensing unit (6) and remove clips (7) that hold the water temperature sensing line in place.

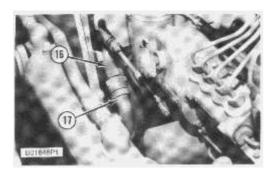


6. Remove bolt (8) that holds the clamps in place. Disconnect oil line (9) from oil line (10).

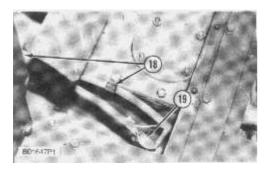


- 7. Disconnect fuel supply line (11). Put plugs in the openings.
- 8. Disconnect wires (14) from switch (15).

9. Disconnect governor linkage (12) from the governor lever. Remove governor linkage (12) from bracket (13).

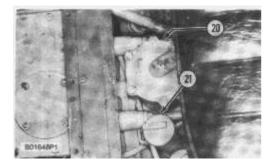


10. Disconnect oil line (17) from oil line (16).

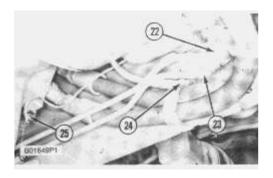


11. Remove the floor plates from the cab if so equipped or the operator's platform.

12. Remove clamps (18) that hold the battery cable to the transmission and disconnect wire harness (19).

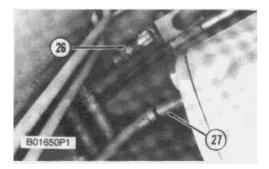


13. Disconnect transmission control cables (20) and (21) from the transmission.

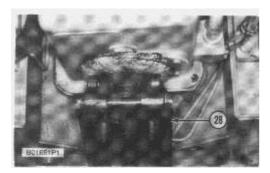


14. Disconnect oil lines (22) and (23). Remove bolt (24) that holds the clamp for the torque converter oil cooler lines and ground strap to the frame.

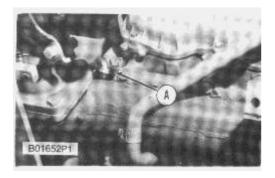
15. Disconnect torque converter oil temperature sensing unit (25) from the transmission.



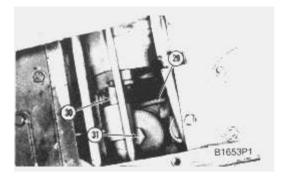
16. Disconnect oil line (26) from the transmission oil filter line and disconnect oil line (27) from the transmission.



17. Put a hydraulic floor jack (28) under the transmission as shown.

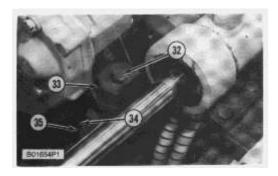


18. Remove the head bolt and install tool (A) on the right rear of the cylinder head. Fasten a hoist to the rear lifting bracket and tool (A). Fasten tool (B) to the front lifting bracket.

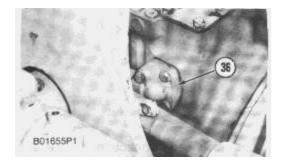


19. Disconnect oil line (30) from the transmission oil pump and transmission oil filter housing and remove it from the machine.

20. Remove a bolt (31), sleeve and mount assembly from each side of the transmission rear support group. Lift the transmission with hydraulic floor jack (28). Remove rear support assembly (29) from each side of the transmission.

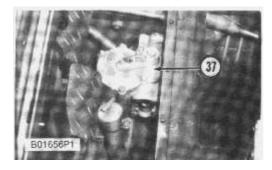


21. Remove a bolt (32), sleeve and mount assembly (33) from each side of the engine front support group. Remove bolt (34) that holds clamp (35) and torque converter oil cooler line in place. Do this for the other side also.

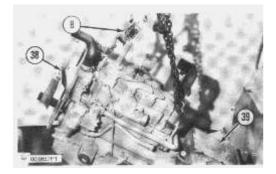


NOTE: Make a final check to be sure all removals and disconnections have been made from the engine and transmission.

22. Lift the engine and transmission and move the unit forward until oil line (36) on the right side of the transmission can be disconnected.



23. Remove the four bolts that hold transmission oil filter housing (37) on the transmission. Remove transmission oil filter housing (37).



NOTE: The engine and transmission must be at the approximate angle shown to have clearance for the transmission so the engine and transmission can be removed.

24. Use tool (B) to put the engine and transmission in the approximate angle shown. Remove engine (38) and transmission (39) as a unit. The weight is 923 kg (2050 lb.).

NOTE: The following steps are for installation of the engine and transmission.

25. Install tool (A) on the right rear of the cylinder head. Fasten a hoist to the rear lifting bracket and tool (A). Install tool (B) on the front lifting bracket and fasten it to the hoist. Put engine (38) and transmission (39) at the approximate angle shown. Slide engine (38) and transmission (39) in position and use tool (B) and a hydraulic floor jack under the transmission to lower the front of the engine after the transmission is clear of the firewall.

NOTE: Do not slide the engine and transmission into the machine all the way at this time.

26. Put oil filter housing (37) in position on the transmission and install the four bolts that hold it in place.

27. Connect oil line (36) that goes from the right side of the oil filter housing to the right side of the transmission.

28. Slide the engine and transmission in its original position in the machine.

29. Install mount assembly, sleeve (33) and bolt (32) on each side for the front engine support group. Tighten bolt (32) to a torque of 360 ± 47 N·m (265 ± 35 lb.ft.).

30. Put clamp (35) for the torque converter oil cooler line in position and install bolt (34) that holds the clamp to the frame. Do this for the other side also.

31. Put a hydraulic floor jack in place under the transmission and lift the transmission. Put rear support assembly (29) on each side of the transmission. Install bolts that hold the support assemblies to the transmission. Tighten the bolts to a torque of 120 ± 14 N·m (90 ± 10 lb.ft.)

32. Install mount assembly, sleeve and bolt (31) on each side for the transmission rear support group. Tighten bolts (31) to a torque of 360 ± 47 N·m (265 ± 35 lb.ft.).

33. Connect oil line (30) to the transmission oil pump and to the transmission oil filter housing. Remove the hydraulic floor jack and hoist. Remove tools (A) and (B). Put 5P3931 Anti-Seize Compount on the threads of the head bolt. Tighten the head bolt to a torque of $150 \pm 7 \text{ N} \cdot \text{m}$ (110 $\pm 5 \text{ lb.ft.}$).

34. Connect oil line (26) to the transmission oil filter line and connect oil line (27) to the transmission case.

35. Connect torque converter oil temperature sensing unit (25) to the transmission case.

36. Install bolt (24) that holds the ground strap and the clamp for the torque converter oil cooler lines to the frame. Connect oil lines (22) and (23).

37. Connect transmission control cables (20) and (21) to the transmission.

38. Install clamps (18) that hold the battery cable to the transmission. Connect wire harness (19).

39. Connect oil line (17) to oil line (16).

40. Connect wires (14) to switch (15). Install governor linkage (12) in bracket (13). Connect governor linkage (12) to the lever of the governor. Remove the plugs, and connect fuel supply line (11).

41. Connect oil line (9) to oil line (10) for the hydraulic pump. Install bolt (8) that holds the clamps and oil lines in place.

42. Connect air cleaner indicator line (5) to the fitting in the air inlet manifold. Connect oil pressure gauge oil line (4) to the fitting in the cylinder block.

43. Install clips (7) that hold the water temperature sensing line in place. Install water temperature sensing unit (6).

44. Connect wires and battery cable (2) to the starting motor.

45. Put the wire harnesses in place and install clip (3) and the clip on the left side of the cylinder block that holds the wire harnesses in place.

46. Connect wire (1) to the alternator. Connect the wires to the air conditioner compressor if so equipped.

47. Fill the hydraulic tank with oil to the correct level. See the Maintenance Guide. Turn the valve on the bottom of the fuel tank to the "ON" position.

48. Install the floor plates.

End By:

a. install drive shaft

b. install muffler^{*}

c. install air cleaner group^{*}

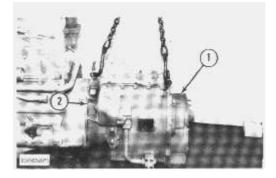
d. install radiator and guard^{*}

^{*}These operation locations are in the Engine, Disassembly And Assembly Manual.

Separation And Connection Of Engine And Transmission

Start By:

a. remove engine and transmission



1. Remove the torque converter oil cooler lines and ground strap.

2. Install two 1/2 "-13 NC forged eyebolts in the transmission and fasten a hoist.

3. Remove bolts (2) that hold the transmission to the flywheel housing. Remove transmission (1). The weight is 945 lb. (430 kg).

4. Remove the O-ring seal from the front of the transmission case.

5. Inspect O-ring seal for damage and make a replacement if needed. Install O-ring seal.

6. Install two 1.2"-13 NC forged eyebolts and fasten a hoist to the transmission.

7. Make sure the internal teeth of the flywheel are in correct engagement with the external teeth on the torque converter and install transmission (1) against the flywheel housing.

8. Install bolts (2) that hold the transmission to the flywheel housing.

9. Install the ground strap and torque converter oil cooler lines.

End By:

a. install engine and transmission

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