SERVICE REPAIR

MANUAL

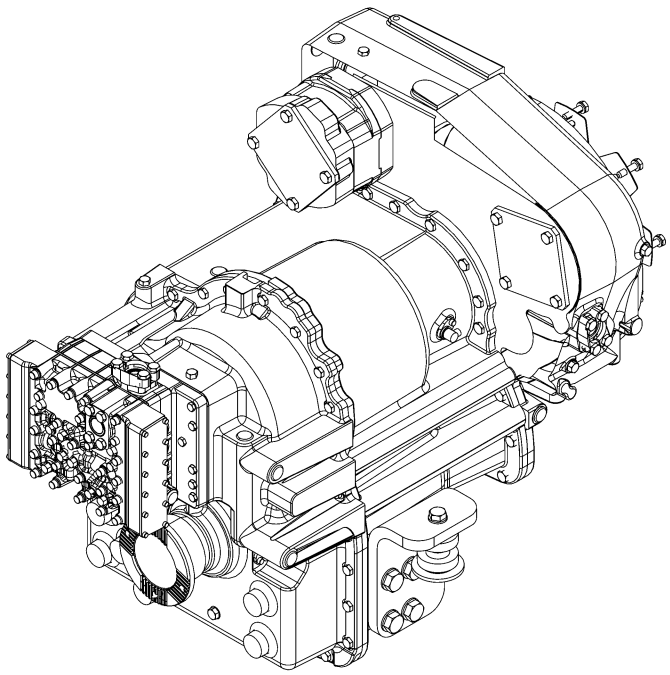
Hyster G008 (H550HD, H620HD, H650HD, H700HD, H550HDS, H650HDS, H700HDS) Internal Combustion Engine Trucks Service Repair Manual

HYSTER

TE-13 & TE-17 TRANSMISSION REPAIR

WITH FULL FLOW VALVE

H16XM-12, H18XM-12, H20XM-12, H22XM-12 (H400HD, H450HD, H500HD, H550HD) [B236]; H16XM-12EC, H18XM-12EC, H22XM-12EC (H400HD-EC, H450HD-EC, H500HD-EC) [C214]; H25-32XM-12, H25-30XMS-9 (H550-700HD, H550-700HDS) [G008]



PART NO. 4067268 **1300 SRM 1603**

SAFETY PRECAUTIONS
MAINTENANCE AND REPAIR

- The Service Manuals are updated on a regular basis, but may not reflect recent design changes to the product. Updated technical service information may be available from your local authorized Hyster® dealer. Service Manuals provide general guidelines for maintenance and service and are intended for use by trained and experienced technicians. Failure to properly maintain equipment or to follow instructions contained in the Service Manual could result in damage to the products, personal injury, property damage or death.
- When lifting parts or assemblies, make sure all slings, chains, or cables are correctly fastened, and that the load being lifted is balanced. Make sure the crane, cables, and chains have the capacity to support the weight of the load.
- Do not lift heavy parts by hand, use a lifting mechanism.
- Wear safety glasses.
- DISCONNECT THE BATTERY CONNECTOR before doing any maintenance or repair on electric lift trucks. Disconnect the battery ground cable on internal combustion lift trucks.
- Always use correct blocks to prevent the unit from rolling or falling. See HOW TO PUT THE LIFT TRUCK ON BLOCKS in the **Operating Manual** or the **Periodic Maintenance** section.
- Keep the unit clean and the working area clean and orderly.
- Use the correct tools for the job.
- Keep the tools clean and in good condition.
- Always use **HYSTER APPROVED** parts when making repairs. Replacement parts must meet or exceed the specifications of the original equipment manufacturer.
- Make sure all nuts, bolts, snap rings, and other fastening devices are removed before using force to remove parts.
- Always fasten a DO NOT OPERATE tag to the controls of the unit when making repairs, or if the unit needs repairs.
- Be sure to follow the **WARNING** and **CAUTION** notes in the instructions.
- Gasoline, Liquid Petroleum Gas (LPG), Compressed Natural Gas (CNG), and Diesel fuel are flammable. Be sure to follow the necessary safety precautions when handling these fuels and when working on these fuel systems.
- Batteries generate flammable gas when they are being charged. Keep fire and sparks away from the area. Make sure the area is well ventilated.

NOTE: The following symbols and words indicate safety information in this manual:

WARNING

Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury and property damage.

On the lift truck, the WARNING symbol and word are on orange background. The CAUTION symbol and word are on yellow background.

TABLE OF CONTENTS

This section is for the following models:

H16XM-12, H18XM-12, H20XM-12, H22XM-12 (H400HD, H450HD, H500HD, H550HD) [B236];
H16XM-12EC, H18XM-12EC, H22XM-12EC (H400HD-EC, H450HD-EC, H500HD-EC) [C214];
H25-32XM-12, H25-30XMS-9 (H550-700HD, H550-700HDS) [G008]

"THE QUALITY KEEPERS"

HYSTER APPROVED PARTS

General

This manual provides information on the disassembly and assembly of the TE-13 and TE-17 transmissions with full flow valve.

The difference between models TE-13 and TE-17 is in the torque converter and the number of discs in the clutches.

Model TE-13 is applied to B236 and C214 Tier 3 trucks with the 142 kW engine option.

Model TE-17 is applied to B236, C214 and G008 trucks with the 160 kW – 194 kW engine options.

Electrical system diagrams are shown in:

- For B236 see, **Diagrams** 8000SRM1487
- For C214 see, **Diagrams** 8000SRM1488
- For G008 see, **Diagrams** 8000SRM1490

Transmission Repair

GENERAL

The disassembly procedures cover each serviceable component for a complete transmission overhaul.

For the replacement of individual components follow the instructions until the relevant component has been removed.

For reassembly follow the reassembly instructions starting at the last component removed.

EXTERIOR COMPONENTS

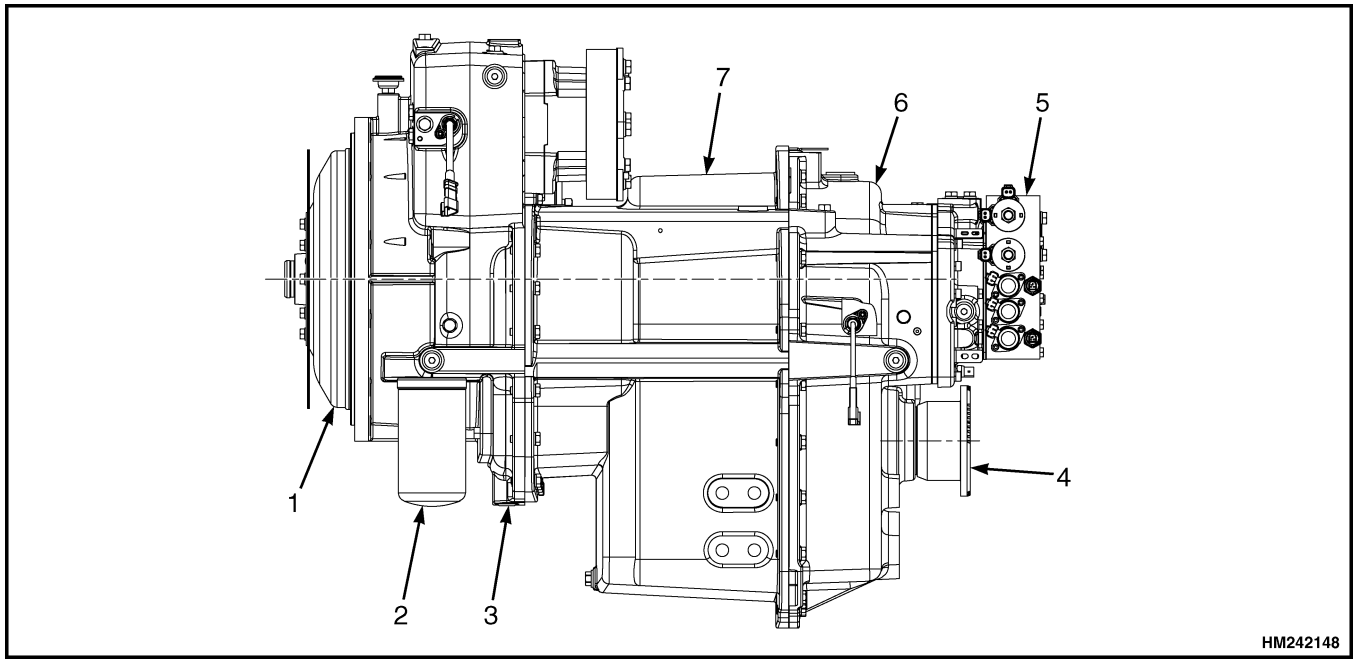
Table 1 lists the figures which show component replacement for which it is not necessary to remove the transmission from the truck. Consider that removal of these parts may avoid accidental damage during transmission removal, but also requires additional protection against ingress of dirt.

Before disconnecting hydraulic hoses, make sure to tag the hoses for proper identification for installation. Place caps and plugs on all hydraulic hoses, fittings, and any open ports after disconnecting.

Before disconnecting electrical connectors, make sure to tag the connectors for proper identification for installation.

Table 1. Exterior Components

Exterior Components	Removal	Assembly
Dipstick Assembly	See Figure 9.	See Figure 9.
Filter & Filter Housing	Go to Disassemble, Torque Converter and Housing, STEP 4.	Go to Assemble, Transmission Case, STEP 21.
Sensors	Go to Disassemble, Torque Converter and Housing, STEP 1.	Go to Assemble, Transmission Case, STEP 37.
Output Flange	Go to Disassemble, Rear Cover, STEP 1.	Go to Assemble, Transmission Case, STEP 7.
Charge Pump	Go to Disassemble, Torque Converter and Housing, STEP 19.	Go to Assemble, Transmission Case, STEP 16.
Control Valve Assembly	Go to Disassemble, Control Valve.	Go to Assemble, Control Valve, STEP 1.



1. TORQUE CONVERTER
2. OIL FILTER
3. TORQUE CONVERTER HOUSING
4. OUTPUT FLANGE
5. CONTROL VALVE
6. REAR COVER
7. TRANSMISSION CASE

Figure 1. Transmission Sub-Assemblies

REMOVAL FOR B236 AND C214 SERIES TRUCKS

NOTE: The transmission can be removed by lifting it out of the lift truck.

1. Place the lift truck on a solid, level surface.

2. Lower the mast completely.

3. Turn the key to **OFF** position to shut down the engine.

4. Apply the parking brake.

NOTE: When removing battery cables, always disconnect the ground cable first and then the positive cable.

5. Disconnect the cables at the battery.

6. Unlock the two front covers.

7. Remove the two front covers.

8. Disconnect the air intake tube from the air cleaner assembly.

9. Remove the nuts holding the two gas springs.

10. Remove the hood including the air cleaner assembly.

11. Disconnect the drive shaft at the differential. Remove the drive shaft between the transmission and the differential.

12. Disconnect the wiring harnesses from the transmission.

13. Disconnect the wires at the pressure and temperature sending unit on the transmission. Put identification tags on the wires so they can be correctly connected again.

14. Place a suitable container under the transmission sump and remove the transmission sump drain plug and drain the transmission oil.

15. Disconnect the oil lines to the oil cooler at the transmission. Drain the oil into a drain pan. Put plugs and caps on open lines/fittings.

16. Disconnect the oil hoses at the hydraulic pumps. Put plugs and caps on open lines/fittings.

NOTE: The hydraulic pump is connected to the transmission cover with four capscrews each. The drive shaft of the hydraulic pump is engaged in the splines of the drive gear. The drive shaft of the hydraulic pump will slide out of the drive gear when the hydraulic pump is removed.

17. Remove the hydraulic pump.

18. Disconnect and remove the dipstick assembly from the transmission.

19. Install blocks and a jack under the flywheel end of the engine as a support. If the support is under the engine oil sump, make sure that the support is across the width of the oil sump so the weight of the engine does not damage the oil sump.

WARNING

Make sure that the lifting device has a minimum capacity of 1000 kg (2205 lb).

20. Connect a lifting device to the transmission.

21. Remove the transmission mounts to the frame.

CAUTION

Do not drop the capscrews into the converter housing. They will be difficult to retrieve.

NOTE: You must turn the flywheel to gain access to each capscrew.

22. Remove the eight capscrews retaining the drive plate to the flywheel.

23. Raise the lifting device to hold the weight of the transmission only. Remove all fasteners between the torque converter housing to the flywheel housing.

24. Make sure that all connections have been removed.

WARNING

The transmission is heavy. Make sure that the lifting devices are properly positioned.

CAUTION

Keep the transmission level when the transmission is separated from the engine so the drive plate is not damaged.

25. To avoid damage to the drive plate, carefully lift the transmission assembly past the crossmember support.

26. Carefully lower the transmission on the ground.

REMOVAL FOR G008 SERIES TRUCKS

1. Place the lift truck on a solid, level surface.

2. Apply the parking brake.

3. Lower the carriage until the lift cylinders are approximately 25 cm (10 in.) before completely retracted position.

4. Tilt the mast completely forward.

5. Shut down the engine.

6. Place blocks on both sides (front and back) of the tires to prevent movement of the lift truck.

7. Turn the key switch to the **ON** position.

WARNING

Step 8, Step 9, and Step 10 must be performed to relieve the trapped or stored hydraulic pressure from the hydraulic system, or serious personal injury may occur

8. Apply brake pedal 10 to 20 times until accumulated hydraulic brake pressure is released.

9. Use the emergency lowering button and operate the tilt function fully backward to remove the hydraulic pressure from the tilt system.

10. Use the emergency lowering button and operate the lowering function to remove the hydraulic pressure from the lift system. Make sure the lift cylinders are completely retracted.

11. Turn the key switch to the **OFF** position.

12. Raise (side tilt) the cab to the fully open position to gain access to the transmission. Refer to the manual **Operator's Cab** 0100SRM1390.

CAUTION

Disconnect the negative (ground) cable first or lift truck damage may occur.

13. Disconnect the negative (ground) cable and positive (power) cable from the batteries.

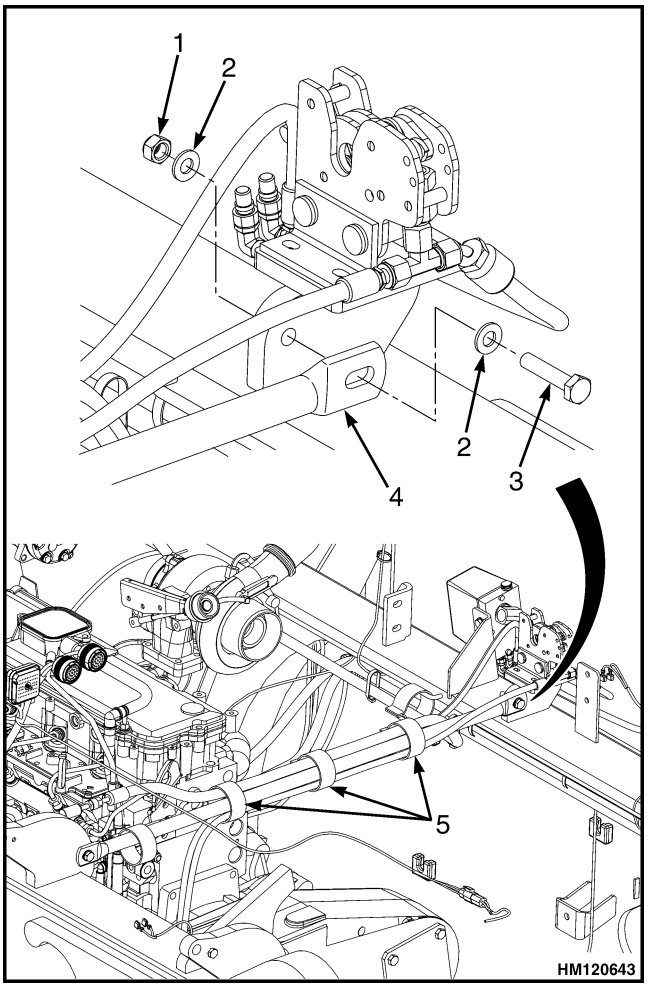
CAUTION

Disposal of lubricants and fluids must meet local environmental regulations.

14. Place a clean suitable container under the transmission and remove the drain plug to drain the transmission oil from the transmission [approximately 20 liter (5.28 gal) will drain from the transmission].

15. Install the drain plug at the bottom of the transmission.

16. Remove the three straps that retain the heater hoses and cab tilt system hoses to the bar. See Figure 2.



1. NUT
2. WASHER
3. CAPSCREW
4. BAR
5. STRAPS

Figure 2. Bar Location

17. Remove the two insulated clamps that retain the fuel hoses to the bar.

18. Remove the capscrews, washers, and nuts that retain the bar to the frame and remove the bar. See Figure 2.

19. Reroute the fuel hoses, heater hoses, and cab tilt system hoses over the engine away from the transmission.

NOTE: The approximate hydraulic tank capacity for the H25XMS-9, H25XM-12 (H550HDS, H550HD) lift trucks is 237 liter (62.6 gal).

The approximate hydraulic tank capacity for the H28-32XM-12, H28XM-16CH, H32XM-16CH, H28-32XMS-09 (H620-700HD, H620-700HDS) lift trucks is 273 liter (72.1 gal).

20. Place a clean suitable container under the hydraulic tank and remove the drain plug at the bottom of the hydraulic tank to drain the hydraulic oil from the hydraulic tank.

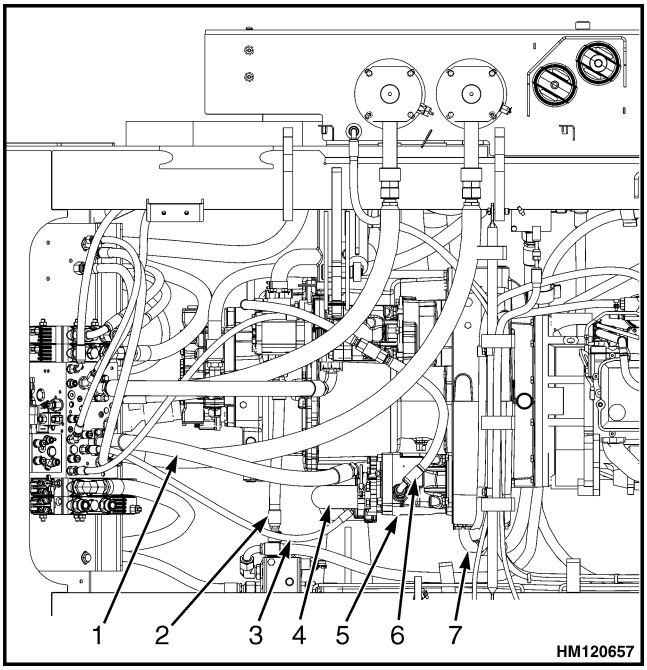
21. Install the drain plug at the bottom of the hydraulic tank.

22. Clean the area around the hydraulic pumps and the hose connections at the hydraulic pumps to avoid dirt entering the hoses and hydraulic pumps.

NOTE: Before disconnecting the hydraulic hoses, place a suitable container under the hydraulic hose connections to catch the hydraulic oil from the hydraulic hoses.

23. Tag and disconnect the following hoses located at the left side of the frame, see Figure 3. Place caps and plugs on all disconnected hoses and open fittings.

- Hydraulic pump supply hose at the hydraulic pump.
- Brake system supply hose at the hydraulic pump.
- LS hose at the hydraulic pump.
- Hydraulic pump suction hose at the hydraulic pump.
- Hydraulic pump drain hose at the hydraulic pump.
- Transmission cooling hose at the transmission.



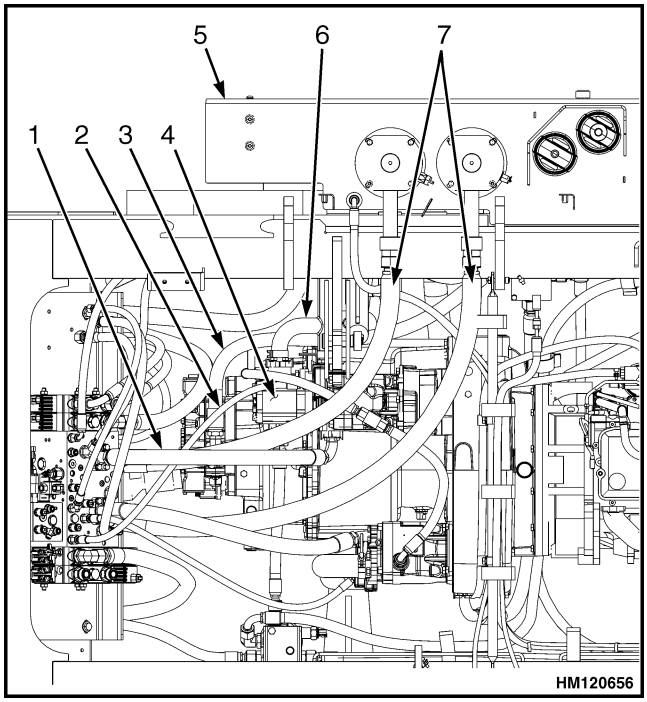
1. HYDRAULIC PUMP SUPPLY HOSE
2. BRAKE SYSTEM SUPPLY HOSE
3. LOAD SENSE (LS) HOSE
4. HYDRAULIC PUMP SUCTION HOSE
5. HYDRAULIC PUMP
6. HYDRAULIC PUMP DRAIN HOSE
7. TRANSMISSION COOLING HOSE

Figure 3. Hydraulic Hoses Located at Left Side of Frame

NOTE: Before disconnecting the hydraulic hoses, place a suitable container under the hydraulic hose connections to catch the hydraulic oil from the hydraulic hoses.

24. Tag and disconnect the following hoses located at the right side of the frame, see Figure 4. Place caps and plugs on all disconnected hoses and open fittings.

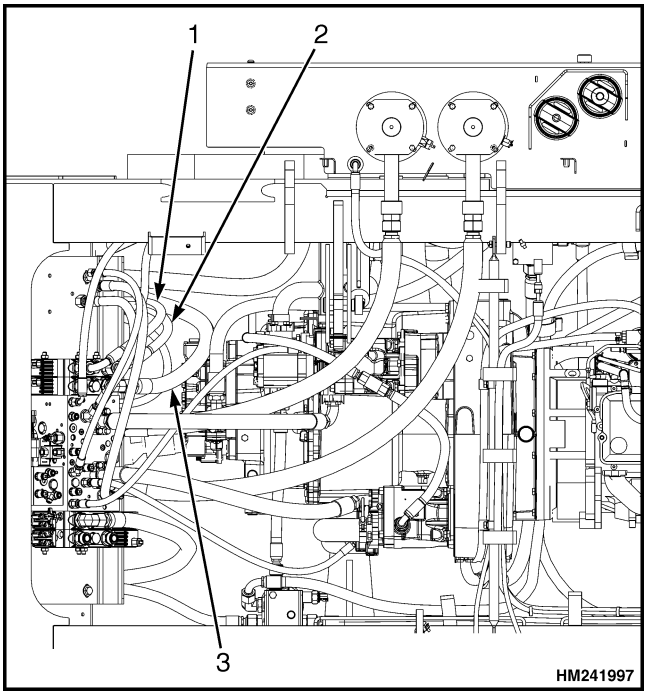
- Hydraulic pump supply hose at the hydraulic pump.
- LS hose at the hydraulic pump.
- Transmission cooling hose at the transmission.
- Hydraulic pump suction hose at the hydraulic pump.
- Two hydraulic tank return hoses at the hydraulic tank.



1. HYDRAULIC PUMP SUPPLY HOSE
2. LOAD SENSE (LS) HOSE
3. TRANSMISSION COOLING HOSE
4. HYDRAULIC PUMP
5. HYDRAULIC TANK
6. HYDRAULIC PUMP SUCTION HOSE
7. HYDRAULIC TANK RETURN HOSES

Figure 4. Hydraulic Hoses Located at Right Side of Frame

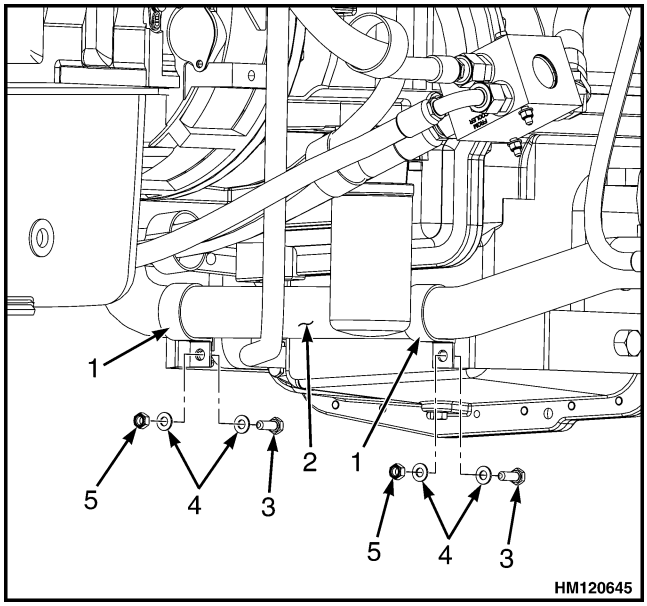
25. Tag and disconnect the lift hose and the two auxiliary hoses from the hydraulic control valve, see Figure 5. Place caps and plugs on all disconnected hoses and open fittings.



1. AUXILIARY HOSE B
2. AUXILIARY HOSE A
3. LIFT HOSE

Figure 5. Auxiliary and Lift Hoses

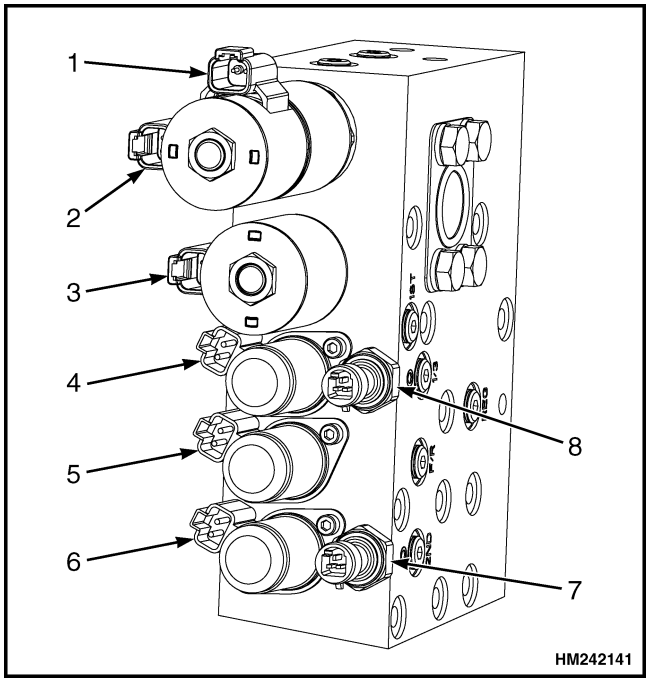
26. Remove the capscrews, washers, and nuts that retain the two insulated clamps and the supply hose underneath the transmission. See Figure 6.



1. INSULATED CLAMP
2. SUPPLY HOSE
3. CAPSCREW
4. WASHER
5. NUT

Figure 6. Insulated Clamp Locations

27. Tag and disconnect the electrical connectors at the control valve and at the sensors on the transmission housing. See Figure 7 and Figure 13.



	Connector	Description
1.	CPS177	Reverse Selector Solenoid
2.	CPS176	Forward Selector Solenoid
3.	CPS167	1st/3rd Gear Selector Solenoid
4.	CPS168	1st/3rd Gear Proportional Solenoid
5.	CPS174	Forward/Reverse Proportional Solenoid
6.	CPS175	2nd Gear Proportional Solenoid
7.	CRP14	2nd Gear Pressure Sensor
8.	CRP13	1st/3rd Gear Pressure Sensor

Figure 7. Solenoid Description

WARNING

Each hydraulic pump weighs approximately 45 kg (100 lb) and can cause damage or injury if it falls.

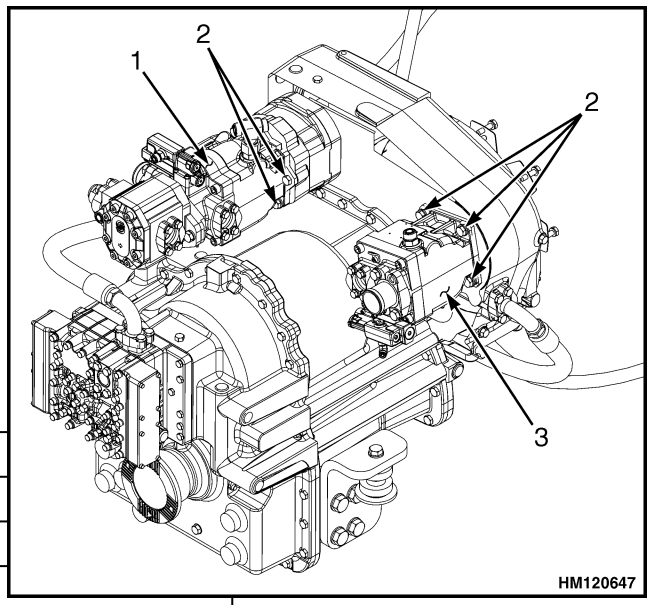
CAUTION

Make sure that the hydraulic pump maintains alignment with the drive gear during removal. The drive gear is NOT designed to absorb the induced torque when the hydraulic pump is NOT supported correctly and damage may occur.

NOTE: Each hydraulic pump is connected to the transmission with four capscrews and washers.

NOTE: The hydraulic pump drive shaft is engaged in the splines of the drive gear. The drive shaft will slide out of the drive gear when the hydraulic pump is removed.

28. Attach a lifting device to hold the hydraulic pump. Remove the four capscrews and washers that retain the hydraulic pump to the transmission. Remove the hydraulic pump. See Figure 8.

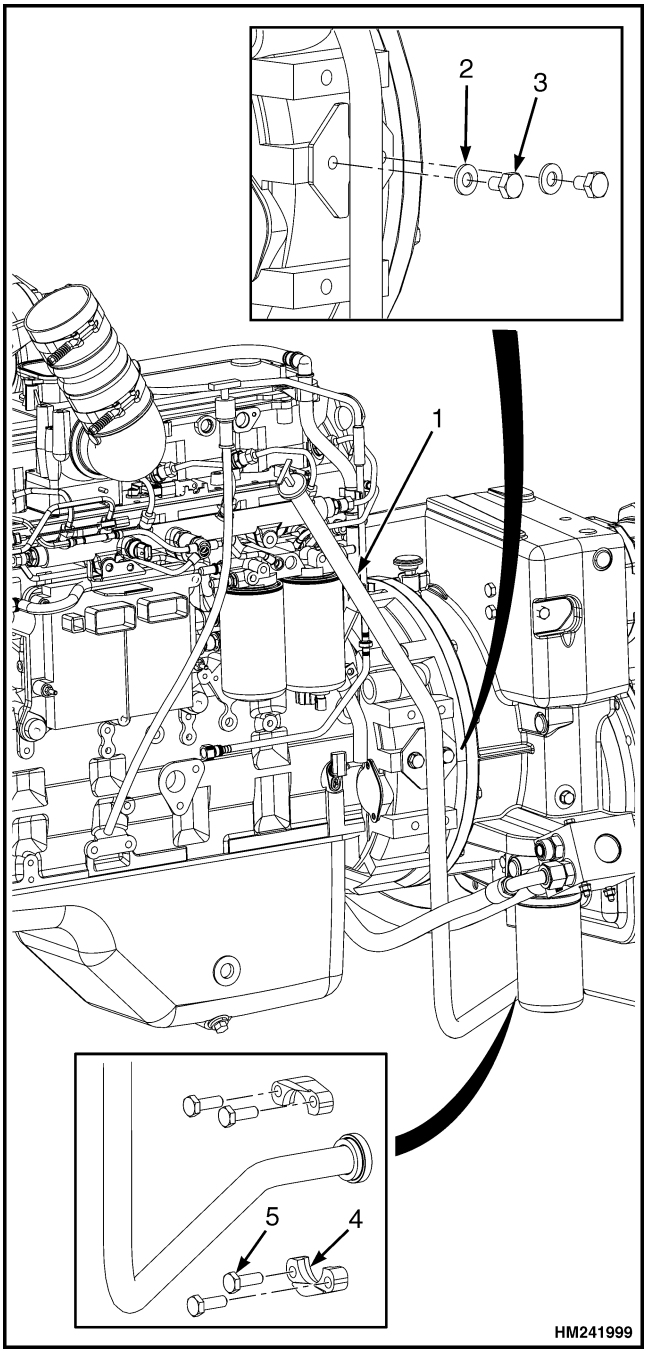


1. RIGHT HYDRAULIC PUMP
2. CAPSCREWS AND WASHERS
3. LEFT HYDRAULIC PUMP

Figure 8. Hydraulic Pumps

29. Repeat Step 28 to remove the remaining hydraulic pump.

30. Disconnect and remove the dipstick assembly from the engine and transmission. See Figure 9.



1. TRANSMISSION DIPSTICK ASSEMBLY
2. WASHER
3. CAPSCREW
4. FLANGE CLAMP
5. CAPSCREW

Figure 9. Transmission Dipstick Assembly

WARNING

The drive shaft weighs approximately 30 kg (66 lb) and can cause injury or damage if it falls.

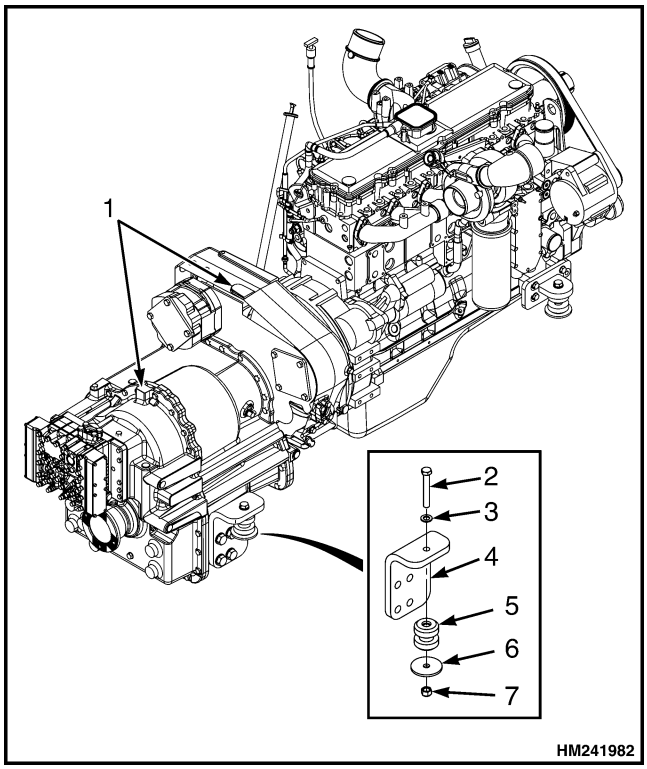
31. Remove the drive shaft. Refer to the manual **Drive Axle** 1400SRM1394.

32. Install blocks and a hydraulic floor jack under the flywheel end of the engine as a support. If the support is under the engine oil sump, make sure that the support is across the width of the oil sump so the weight of the engine does not damage the oil sump.

WARNING

Make sure that the lifting device has the rated capacity of 1200 kg (2646 lb) or personal injury may occur.

33. Install lifting eyes on the transmission at the locations indicated in Figure 10. The size of the thread in the transmission housing is M20 × 2.5 with a depth of 32 mm (1.26 in.).

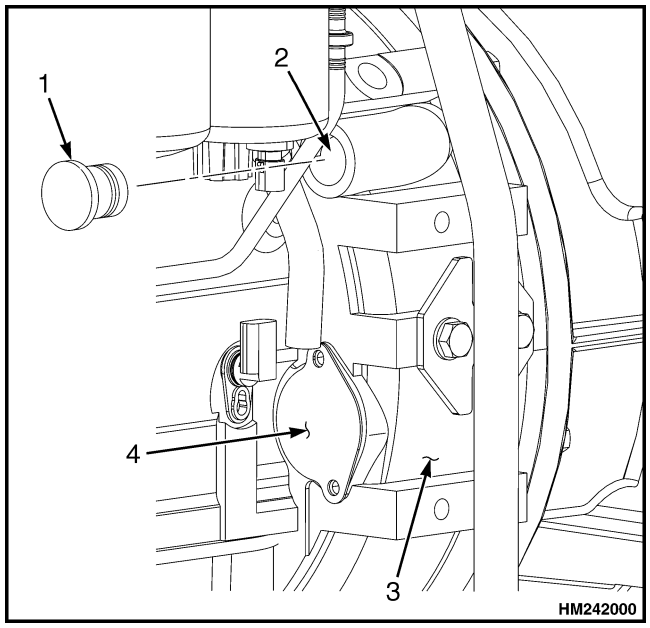


1. TRANSMISSION LIFTING EYE LOCATIONS
2. CAPSCREW
3. WASHER (SMALL)
4. TRANSMISSION MOUNT BRACKET
5. ISOLATOR
6. WASHER (LARGE)
7. NUT

Figure 10. Transmission Mounts and Lifting Eye Locations

34. Connect a lifting device to the two lifting eyes at the transmission. See Figure 10.

35. Remove the access plug to gain access to the flywheel ring gear. See Figure 11.



1. ACCESS PLUG
2. ACCESS HOLE TO ROTATE FLYWHEEL
3. TORQUE CONVERTER HOUSING
4. ACCESS PLATE TO FLYWHEEL CAPSCREWS

Figure 11. Access Plug for Flywheel to Drive Plate Capscrews

36. Remove the access plate to gain access to the capscrews that connect the flywheel to the drive plates. See Figure 11.

37. Insert a flywheel rotation tool into the access plug hole and rotate the flywheel until one of the capscrews is visible through the access plate hole. See Figure 11.

38. Remove the capscrew and washer. Rotate the flywheel and remove the remaining capscrews and washers until all eight of the capscrews and washers have been removed.

39. Raise the lifting device to hold the weight of the transmission only. Remove the twelve capscrews and washers that hold the torque converter housing to the flywheel housing.

40. Remove the two transmission mount capscrews, small washers, large washers, and nuts that retain the transmission mount brackets to the frame mounts. See Figure 10.

CAUTION

Make sure that the transmission maintains alignment with the engine when the transmission is separated from the engine so the drive plates will not be damage.

41. Make sure that all connections to the transmission have been removed/disconnected. Slowly lift the transmission assembly from the frame and engine.

42. Carefully lower the transmission onto the ground.

43. If necessary, remove the two transmission isolators from the frame mounts.

DISASSEMBLE

Figure 12 shows the front view of the TE17 transmission.

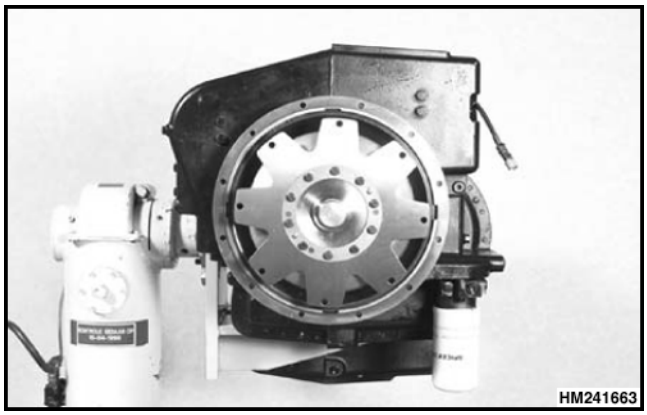
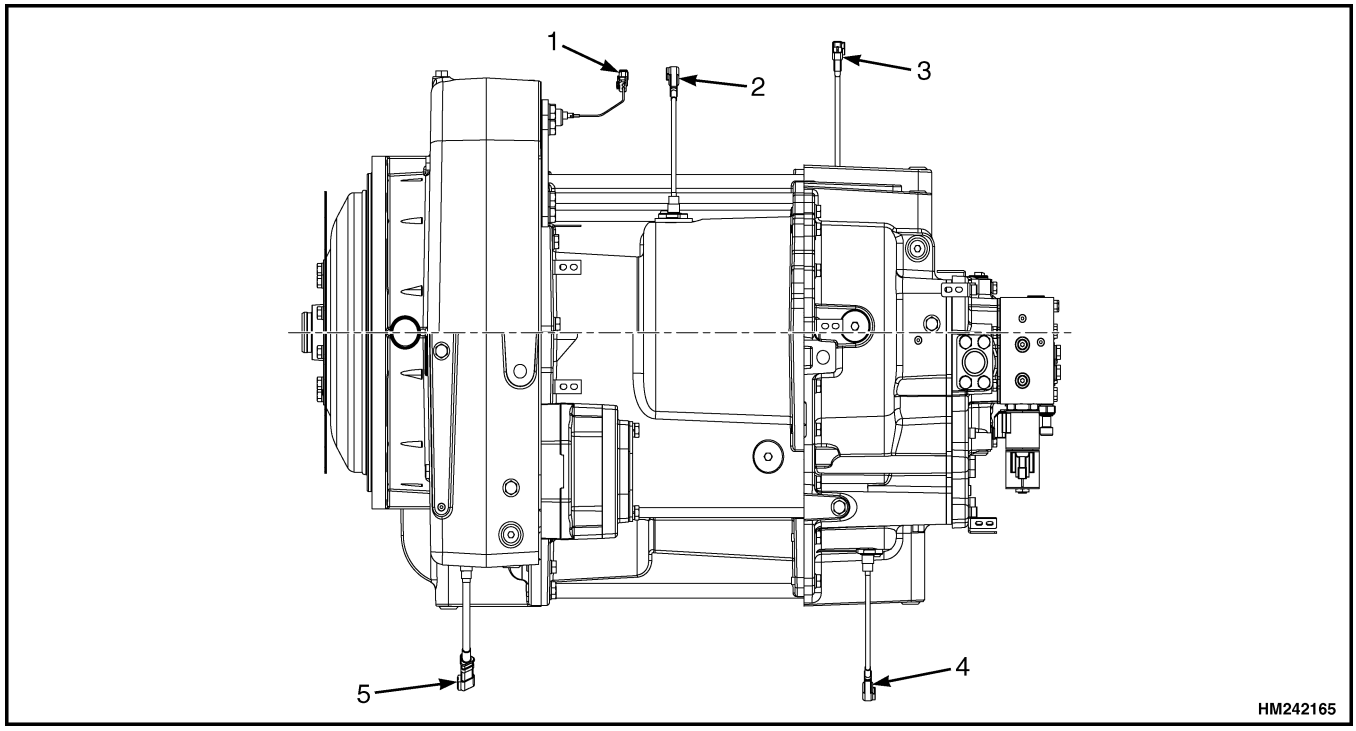


Figure 12. TE17 Transmission



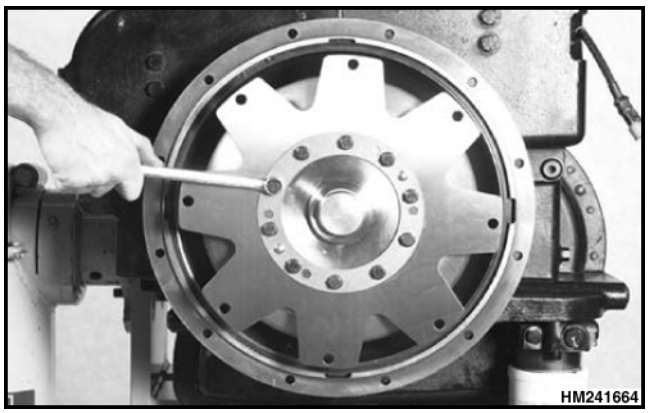
1. TEMPERATURE SWITCH
2. TURBINE SPEED SENSOR
3. OUTPUT SPEED SENSOR
4. DRUM SPEED SENSOR
5. ENGINE SPEED SENSOR

Figure 13. Sensor Locations

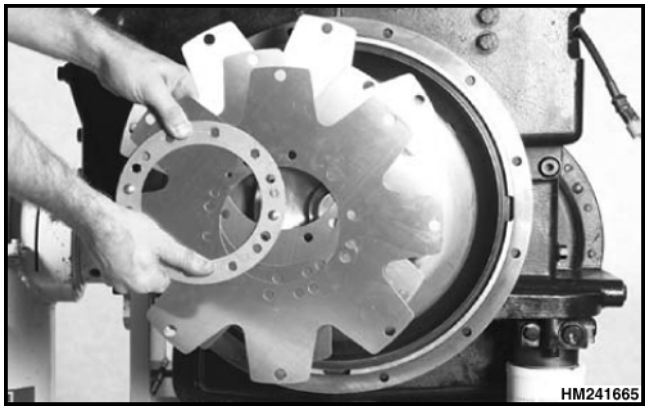
Torque Converter and Housing

STEP 1.
Remove the speed and temperature sensors from the transmission case. See Figure 13.

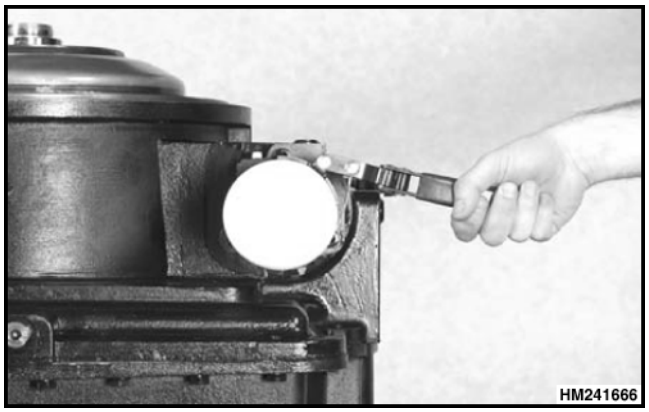
STEP 2.
Remove the drive plate mounting bolts and washers.



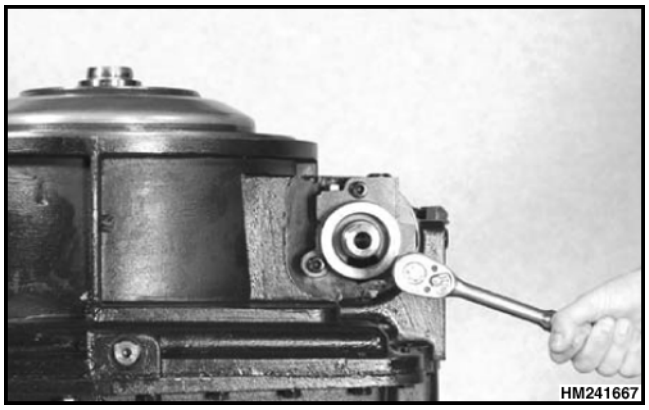
STEP 3.
Remove the drive plates and backing ring.



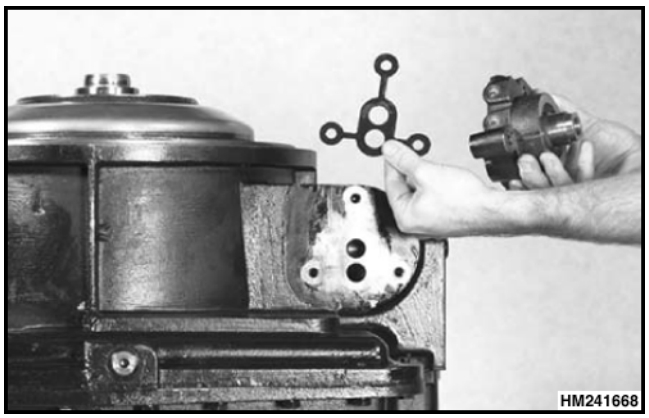
STEP 4.
Remove the filter element.



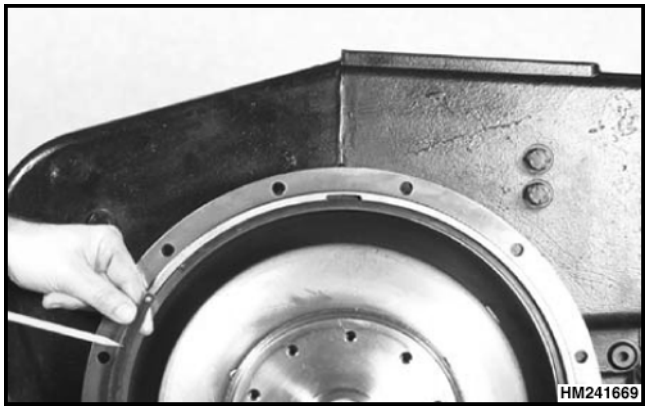
STEP 5.
Remove the filter adapter bolts and lockwashers.



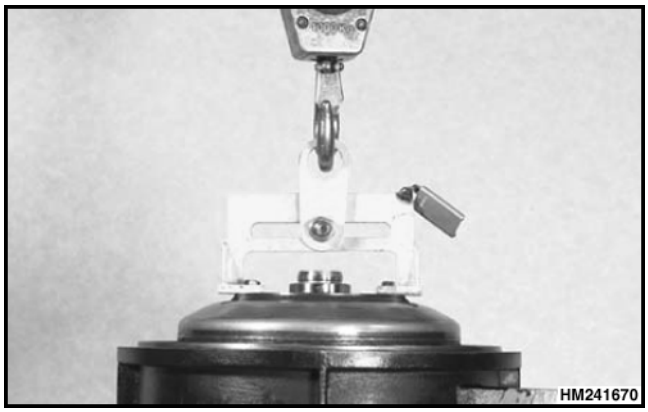
STEP 6.
Remove the filter adapter and gasket.



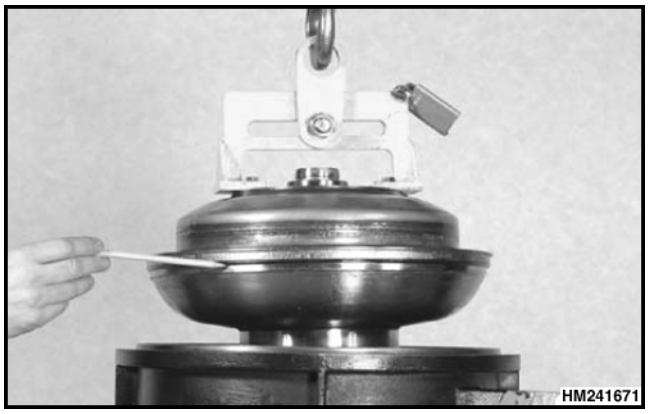
STEP 7.
Remove the oil baffle retaining ring.



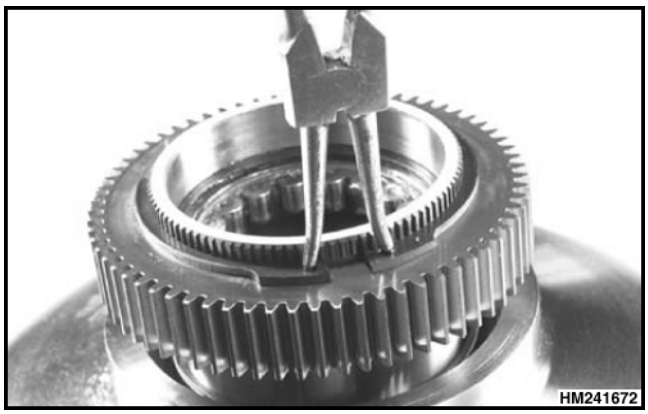
STEP 8.
Attach a special tool or two lifting eyes to the mounting surface of the drive plates to lift the converter and oil baffle from the converter housing as an assembly.



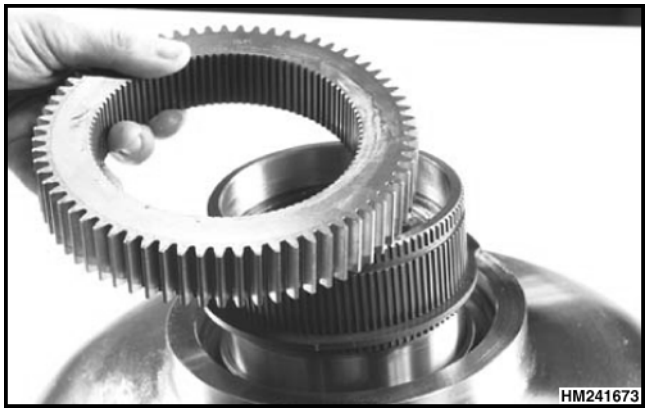
STEP 9.
Remove the converter housing, oil baffle, and sealing ring.



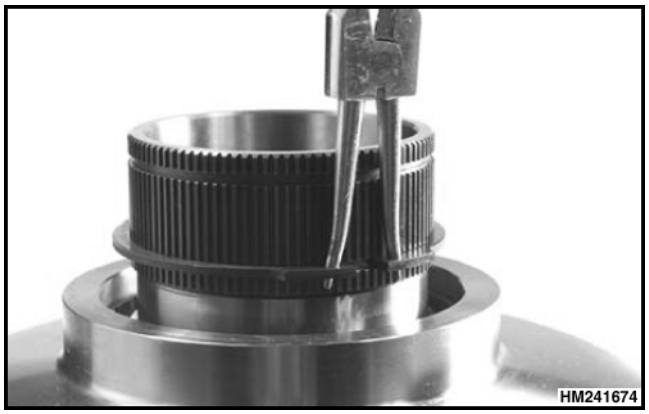
STEP 10.
Remove the torque converter gear snap ring.



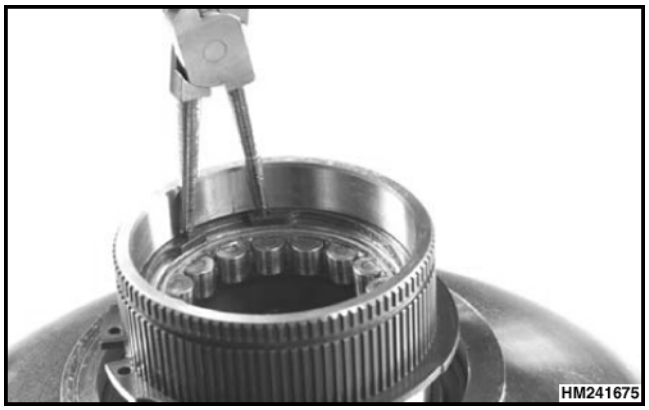
STEP 11.
Remove the torque converter gear.



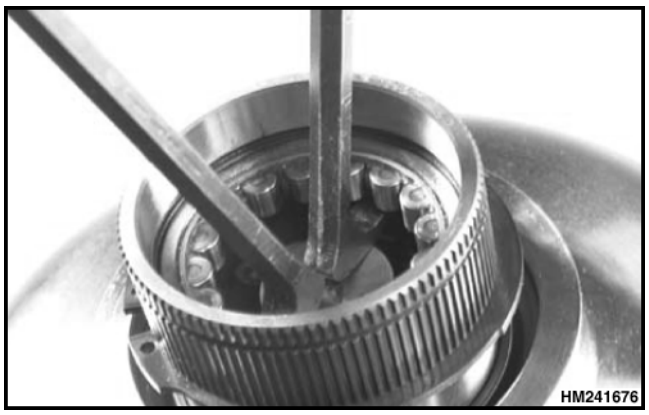
STEP 12.
Remove the torque converter gear lower snap ring.



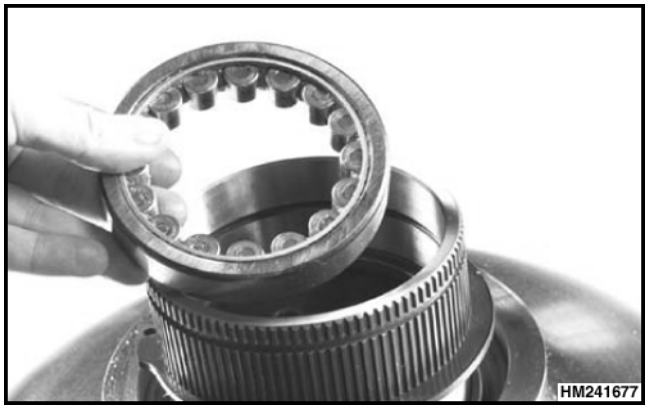
STEP 13.
Remove the stator support bearing retaining snap ring.



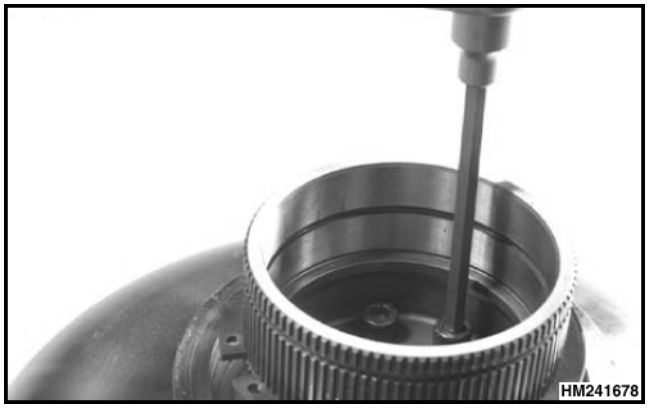
STEP 14.
Pry the stator support bearing from the converter assembly as shown.



STEP 15.
Remove the stator support bearing.



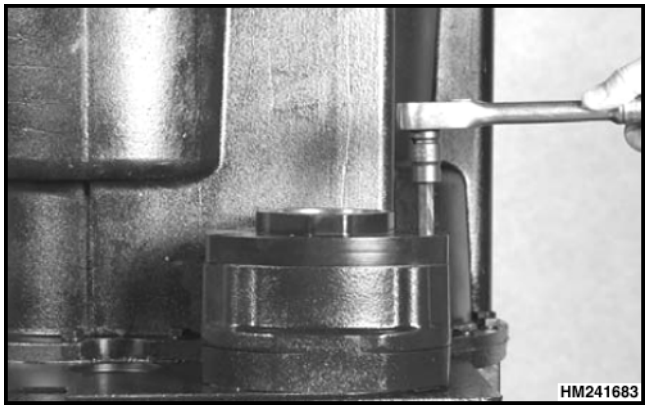
STEP 16.
Remove the stator support capscrews and lockwashers.



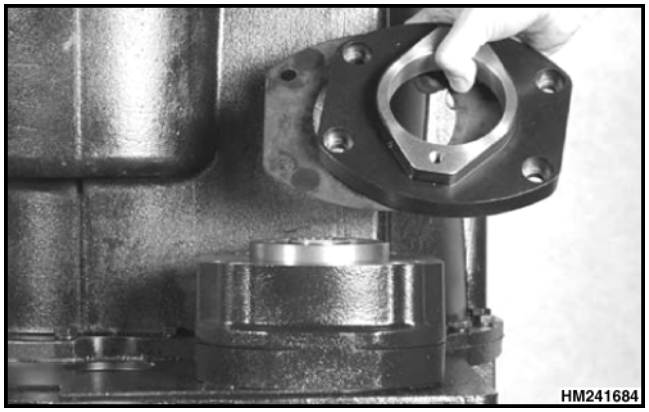
STEP 17.
Remove the torque converter sleeve and gasket.

STEP 18.
Remove the oil baffle and sealing ring.

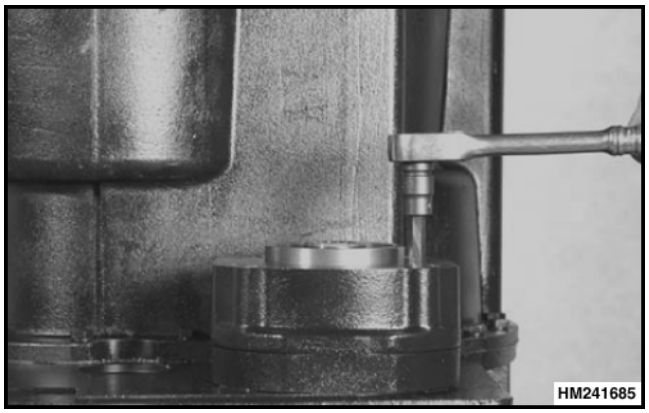
STEP 19.
Remove the charging pump adapter plate capscrews and lockwashers.



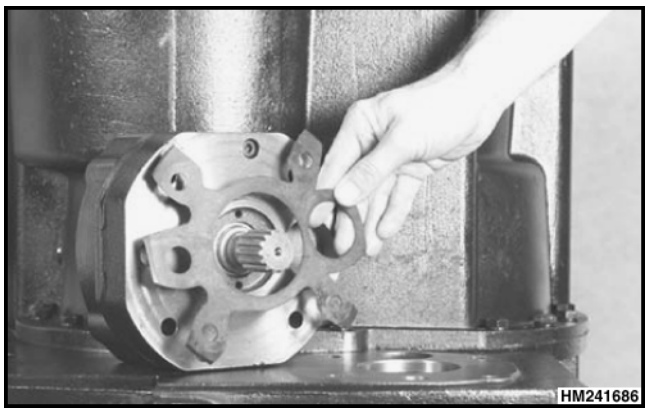
STEP 20.
Remove the charging pump adapter plate and gasket.



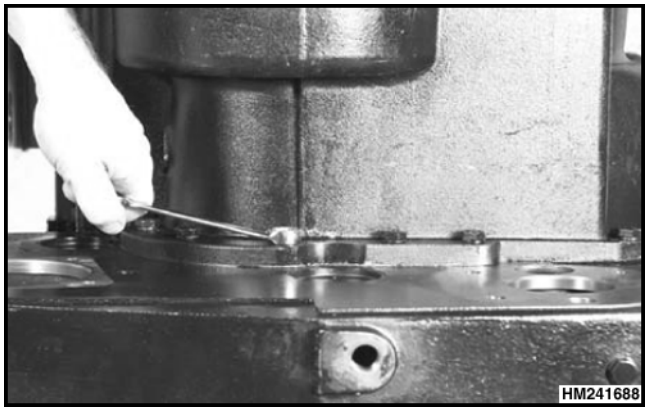
STEP 21.
Remove the charging pump capscrews and lockwashers.



STEP 22.
Remove the charging pump assembly and gasket.

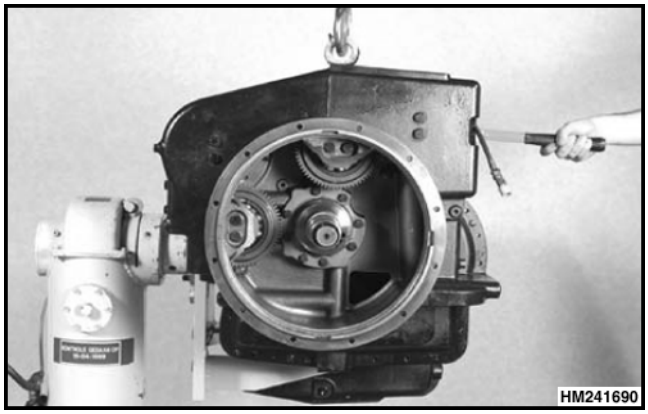


STEP 23.
Remove the torque converter housing to transmission case bolts and lockwashers.

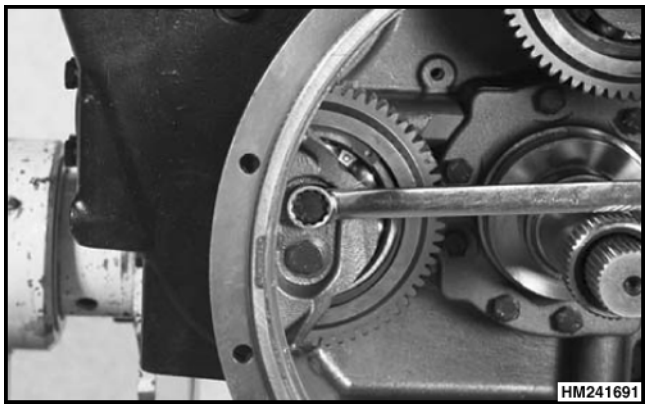


STEP 24.
Support the torque converter housing with a chain hoist and using a soft hammer, tap the torque converter housing away from the transmission case.

NOTE: Skip STEP 25 thru STEP 34 if clutch removal is the purpose for disassembly

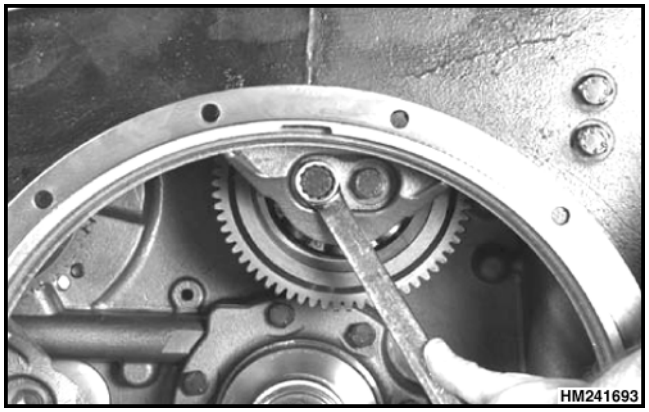


STEP 25.
Remove the first pump drive idler gear bolts and lockwashers.

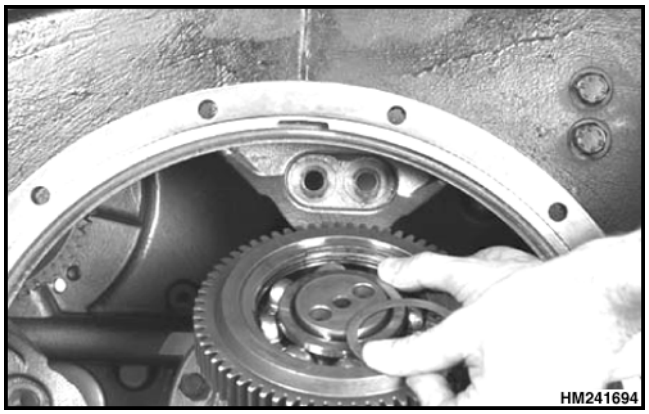


STEP 26.
Remove the first pump drive idler gear, washer, and bearing as an assembly.

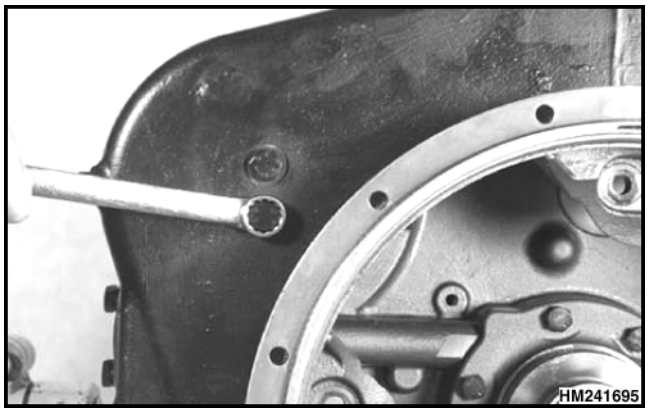
STEP 27.
Remove the second pump drive idler gear bolts and lockwashers.



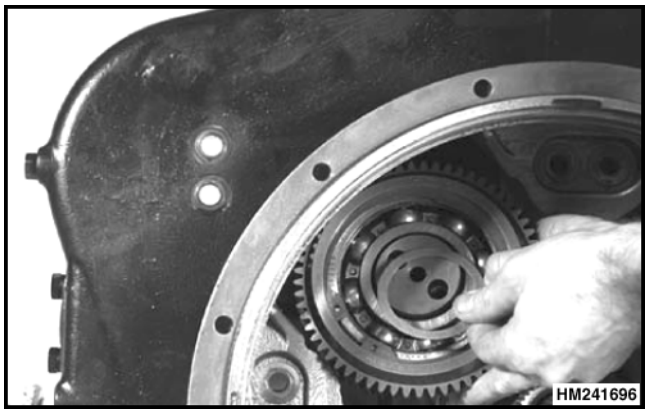
STEP 28.
Remove the second pump drive idler gear, washer, and bearing as an assembly.



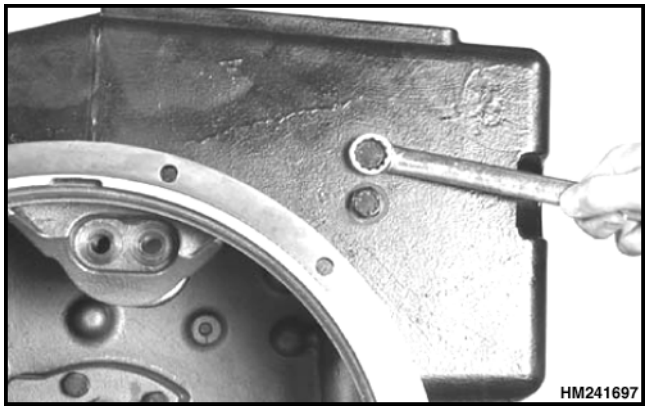
STEP 29.
Remove the first pump drive gear bolts and lockwashers.



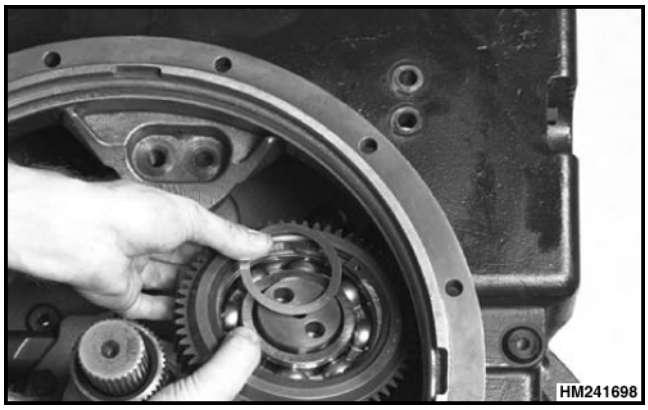
STEP 30.
Remove the first pump drive gear, washer, and bearing as an assembly.



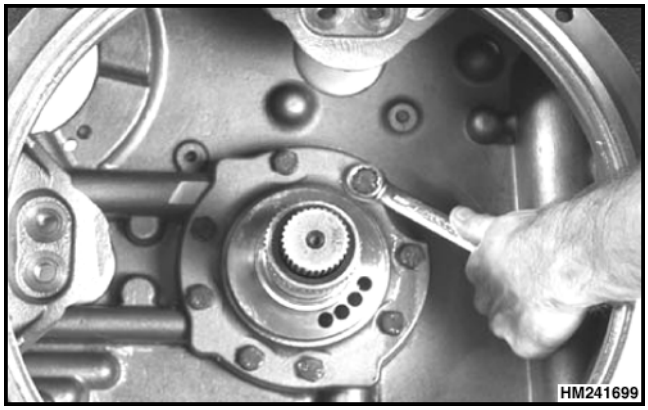
STEP 31.
Remove the second pump drive gear bolts and lockwashers.



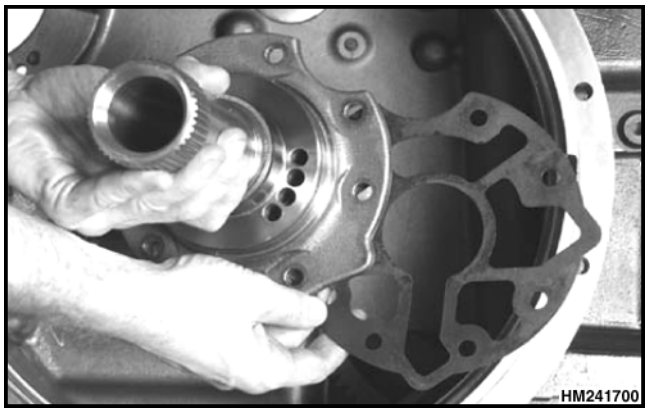
STEP 32.
Remove the second pump drive gear, washer, and bearing as an assembly.



STEP 33.
Remove the stator support bolts and lockwashers.



STEP 34.
Remove the stator support and gasket.



STEP 35.
Remove the lock nut from the FWD/3rd shaft assembly.

STEP 36.
Install a special tool with the dimensions shown onto the FWD/3rd shaft assembly. Use two bolts to attach the special tool to the transmission housing to prevent the gear from dropping when the transmission is turned. Turn the transmission.