

ERP15-20VT (G807) SERVICE MANUAL CONTENTS

SECTION	PART NUMBER	YRM NUMBER	REV DATE
FRAME.....	524295629	0100 YRM 1329	09/14
OPERATOR'S CAB.....	550025937	0100 YRM 1446	09/14
AC MOTOR REPAIR.....	524327049	0620 YRM 1385	09/14
TRANSAXLE.....	524295630	1300 YRM 1330	09/12
STEERING SYSTEM.....	524295631	1600 YRM 1331	09/14
BRAKE SYSTEM.....	524295632	1800 YRM 1332	12/10
HYDRAULIC SYSTEM.....	524295633	1900 YRM 1333	09/14
HYDRAULIC CLEANLINESS PROCEDURES.....	550073240	1900 YRM 1620	12/14
MAIN CONTROL VALVES.....	524319495	2000 YRM 1334	09/14
CYLINDER REPAIR (MAST S/N A270-72, A551, A555, A559, A626, A627, A751-52, B551, B555, B586-91, B749-54, C661-63, C665, D507-09, D515, D562-64, E509, E564).....	524319496	2100 YRM 1382	03/14
WIRE HARNESS REPAIR.....	524223769	2200 YRM 1128	12/14
USER INTERFACE SUPERVISOR.....	524319497	2200 YRM 1335	09/14
USER INTERFACE SERVICE TECHNICIAN.....	524319498	2200 YRM 1336	09/14
ELECTRICAL SYSTEM.....	524320282	2200 YRM 1337	09/14
INDUSTRIAL BATTERY.....	524158040	2240 YRM 0001	09/14
MAST REPAIR (S/N A270, A271, A272).....	524327054	4000 YRM 1386	02/14
MAST REPAIR (S/N C661, C662, C663, C665).....	524333799	4000 YRM 1405	05/14
METRIC AND INCH (SAE) FASTENERS.....	524150797	8000 YRM 0231	10/13
PERIODIC MAINTENANCE.....	524320290	8000 YRM 1339	09/14
CAPACITIES AND SPECIFICATIONS.....	524306565	8000 YRM 1340	09/14
DIAGRAMS.....	524319503	8000 YRM 1341	09/14
DIAGNOSTIC TROUBLESHOOTING MANUAL.....	524319504	9000 YRM 1377	10/14

Service information for Cummins diesel engines can be ordered through the Hyster Literature Distribution Center.

PART NO. 524320408 (12/14)

SAFETY PRECAUTIONS

MAINTENANCE AND REPAIR

- 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 **YALE 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

- General..... 1
 - Discharging the Capacitors 2
 - Special Tools 2
- Transaxle Assembly..... 3
 - Remove Transaxle From Frame 3
 - Remove the Parking Brake and Traction Motor 4
 - Install Parking Brake and Traction Motor..... 4
 - Install Transaxle to Frame 5
- Maintenance and Repair 6
 - Speed Sensor Repair..... 6
 - Trunnion Cap Repair 6
 - Fluid Level Check..... 8
 - Fluid Change..... 8
 - Breather Repair..... 9
 - Stud Repair 10
 - Brake Cylinder Repair 11
 - Input Seal Repair 13
 - Cover to Housing Seal 13
 - During the Transaxle Warranty Period 13
 - After the Transaxle Warranty Period 14
 - Removing the Cover 14
 - Installing the Cover 15
- Wet Brakes..... 16

This section is for the following models:
 ERP15-20VT (ERP030-040VT) [G807];
 ERP16-20VF (ERP30-40VF) [A955]

General

CAUTION

DO NOT remove the cover from the transaxle housing during the warranty period. Removing the cover from the housing will void the transaxle warranty. The transaxle warranty period may vary from truck hours or other warranties. Contact Yale Company Contact Management if you have questions about warranty status.

CAUTION

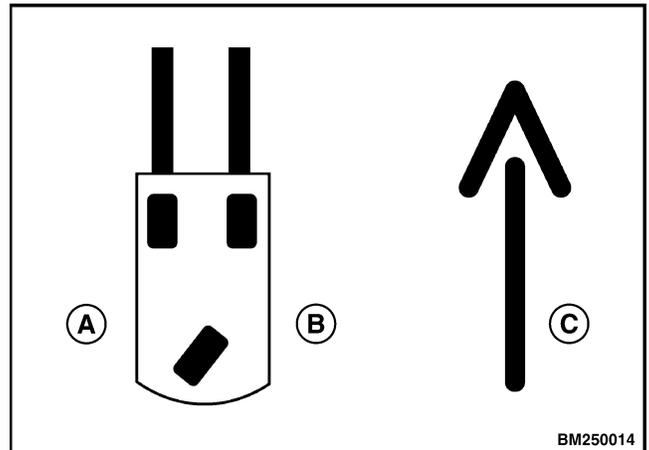
Use only transmission fluid from approved vendors. Using fluid from unapproved vendors will void the warranty. Contact Yale Company Contact Management if you have questions about warranty status.

This section contains the removal, repair, inspection, and installation instructions for the transaxle assemblies used on these models.

WARNING

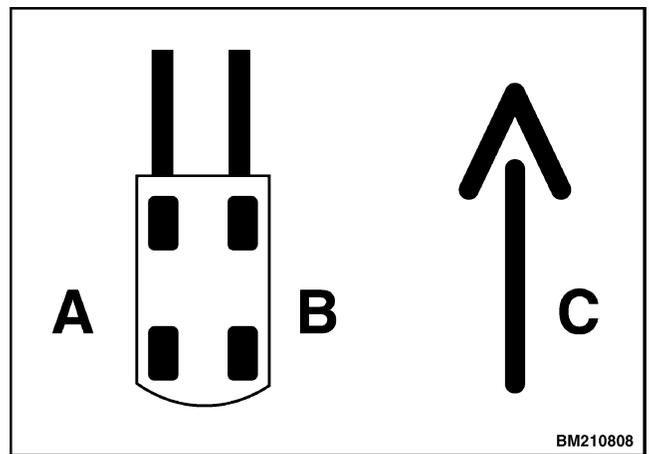
DO NOT make repairs or adjustments unless you have been properly trained and authorized to do so. Improper repairs and adjustments can create dangerous operating conditions. DO NOT operate a lift truck that needs repairs. Report the need for repairs to your supervisor immediately. If repair is necessary, attach a DO NOT OPERATE tag on the steering wheel and disconnect the battery.

Throughout this section, forward will refer to travel in the direction of the forks and left and right will be determined by sitting in the seat facing forward. See Figure 1 or Figure 2.



- A. LEFT SIDE
- B. RIGHT SIDE
- C. FORWARD TRAVEL

Figure 1. Truck Orientation (Three-Wheel Trucks)



- A. LEFT SIDE
- B. RIGHT SIDE
- C. FORWARD TRAVEL

Figure 2. Truck Orientation (Four-Wheel Trucks)

DISCHARGING THE CAPACITORS

WARNING

DO NOT make repairs or adjustments unless you have been properly trained and authorized to do so. Improper repairs and adjustments can create dangerous operating conditions. **DO NOT** operate a lift truck that needs repairs. Report the need for repairs to your supervisor immediately. If repair is necessary, attach a **DO NOT OPERATE** tag on the steering wheel and disconnect the battery.

Disconnect the battery and allow the capacitors to discharge before opening any compartment covers or inspecting or repairing the electrical system. **DO NOT** place tools on top of the battery. If a tool causes a short circuit, the high current flow from the battery can cause personal injury or property damage.

Some checks and adjustments are performed with the battery connected. **DO NOT** connect the battery until the procedure instructs you to do so. Never wear any metallic items on your fingers, arms, or neck. Metal items can accidentally make an electrical connection and cause injury.

Before performing any tests or adjustments, block the lift truck to prevent unexpected movement.

The capacitor in the transistor controller(s) can hold an electrical charge for about 10 seconds after the battery is disconnected. To prevent an electrical shock and personal injury, discharge the capacitor(s) before inspecting or repairing any component in the drive unit compartment. Make certain that the battery has been disconnected.

DO NOT short across the motor controller terminals with a screwdriver or jumper wire.

Make certain the Emergency Disconnect Switch has not been activated. This will isolate the controller and prevent the capacitors from discharging properly. The proper way to disconnect the battery is by separating the battery connectors.

1. Ensure capacitors are discharged by performing Step 2 through Step 6 below.
2. Turn key or keyless switch to **OFF** position.
3. Disconnect battery by separating connectors.

4. Block drive wheels to prevent lift truck from moving.
5. Make sure Emergency Disconnect Switch **HAS NOT** been activated. If Emergency Disconnect Switch is activated, rotate switch to the right until it pops up.
6. Press horn button. Wait 30 seconds to be sure capacitors are fully discharged.

SPECIAL TOOLS

Special tools are necessary to properly perform some repairs. These tools are available from your Yale dealer. Warranty will not cover damage resulting from work done using improper tools. Refer to Table 1.

Table 1. Yale Special Tools

	<p>Input Seal Driver Yale Part No. 582000161</p>
	<p>Breather Set Tool Yale Part No. 582000187</p>
	<p>Wheel Stud Tool Yale Part No. 582000162</p>

Transaxle Assembly

REMOVE TRANSAXLE FROM FRAME



WARNING

The lift truck must be put on blocks for some types of maintenance and transaxle repair. The removal of the battery, mast, transaxle, or the counterweight will cause large changes in the center of gravity. Position additional blocks under the frame when the lift truck is on blocks, so the lift truck cannot tip over.

1. Remove mast assembly.

See **Mast Repair, 2- and 3-Stage High Visibility Masts** 4000 YRM 1386 for European lift truck models

- ERP15-20VT (G807)
- ERP16-20VF (A955)

See **Mast Repair, 2-, 3-, And 4-Stage Heavy Duty Masts** 4000 YRM 1405 for European and American lift truck models

- ERP15-20VT (ERP030-040VT) (G807)
- ERP16-20VF (ERP30-40VF) (A955)

2. Turn key switch to **OFF** position and disconnect battery.
3. Position lift truck frame on blocks so drive tires are suspended off the floor.

See **Periodic Maintenance** 8000 YRM 1339 for lift truck models

- ERP15-20VT (ERP030-040VT) (G807)

See **Periodic Maintenance** 8000 YRM 1373 for lift truck models

- ERP16-20VF (ERP30-40VF) (A955)

4. Remove drive tire lug nuts and drive tire and wheel assembly.
5. Disconnect transaxle speed sensor connector from main wiring harness.
6. Disconnect parking brake connector from main wiring harness.
7. Disconnect manual override cable from parking brakes.

8. Tag and disconnect power cables from traction motor studs.
9. Disconnect traction motor temperature sensor at traction motor.
10. Disconnect service brake line from port on transaxle. Cap brake line and plug port on transaxle to reduce the possibility of contamination entering brake system.
11. Loosen, but do not remove, five mounting capscrews and nuts that hold transaxle assembly on lift truck.



WARNING

The transaxle and traction motor assemblies are heavy. Be sure that all lifting devices are suitable and of adequate capacity to lift the transaxle and traction motor.

12. Position a floor jack under transaxle assembly. Make sure assembly is properly balanced on floor jack so it will not fall once mounting capscrews have been removed.



CAUTION

Check that cables, hoses, and wires do not interfere with the removal of the transaxle assembly.

13. Remove five capscrews and washers holding transaxle on lift truck frame. Carefully lower transaxle assembly from lift truck frame using floor jack.



WARNING

The transaxle and traction motor assemblies are heavy. Be sure that all lifting devices are suitable and of adequate capacity to lift the transaxle and traction motor.

14. Transfer transaxle assembly from floor jack to a clean workbench using an appropriate sling and overhead lifting device.

REMOVE THE PARKING BRAKE AND TRACTION MOTOR

WARNING

Cleaning solvents can be flammable and toxic and can cause skin irritation. When using cleaning solvents, always follow the solvent manufacturer's recommended safety procedures.

WARNING

The traction motor is heavy. Be sure that all lifting devices are suitable and of adequate capacity to lift the traction motor.

1. Position transaxle on blocks with studs down. Securely support in this position.
2. Remove parking brake assembly from traction motor:
 - a. Remove four capscrews, lockwashers, and washers holding brake assembly on traction motor. See Figure 3.
 - b. Pry evenly on opposite sides to remove brake assembly from brake hub. Remove brake assembly by hand.
 - c. Remove snap ring holding brake hub on traction motor shaft. Slide hub from shaft. Remove snap ring and woodruff key from beneath hub.
3. Remove traction motor from transaxle:
 - a. Install an eyebolt to traction motor shaft and attach an overhead lifting device of adequate capacity to eyebolt.
 - b. Remove four capscrews and washers mounting traction motor to transaxle.
 - c. Lift traction motor from transaxle using overhead lifting device.

INSTALL PARKING BRAKE AND TRACTION MOTOR

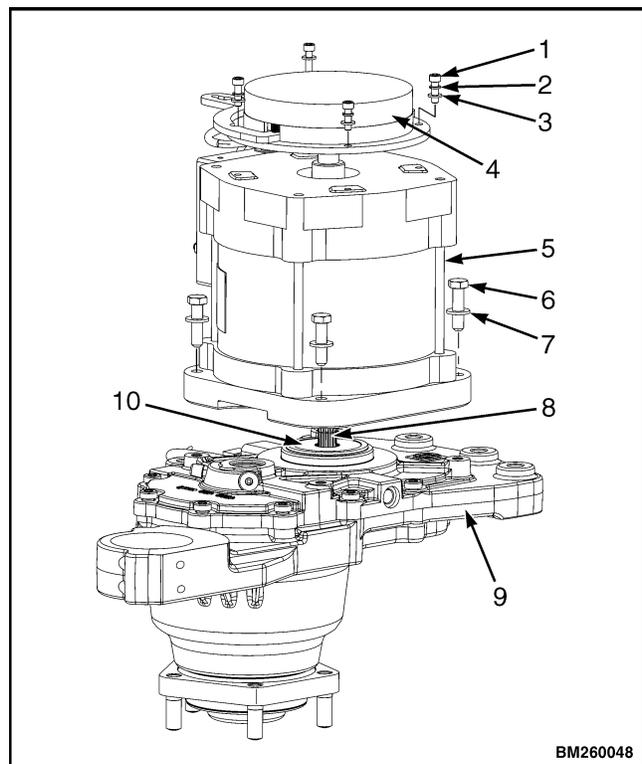
WARNING

Cleaning solvents can be flammable and toxic and can cause skin irritation. When using cleaning solvents, always follow the solvent manufacturer's recommended safety procedures.

WARNING

The traction motor is heavy. Be sure that all lifting devices are suitable and of adequate capacity to lift the traction motor.

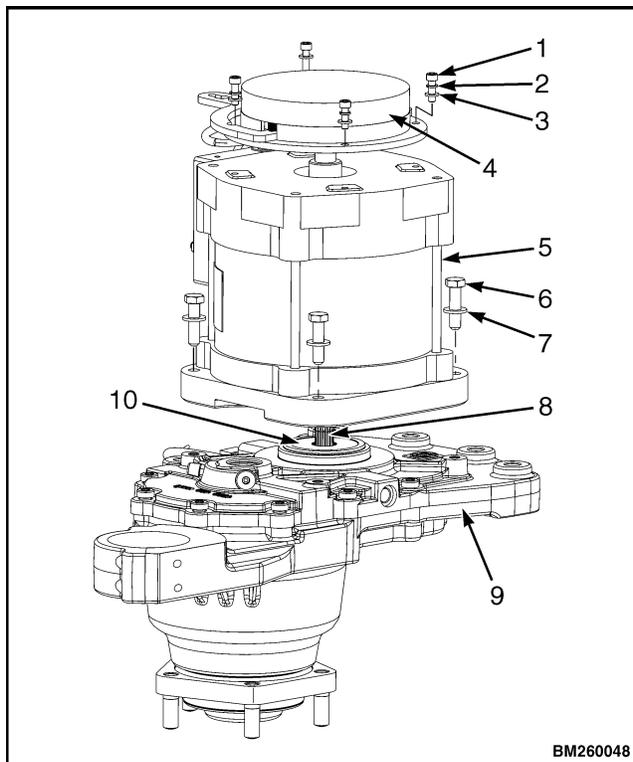
1. Position transaxle on blocks with studs down. Securely support in this position.
2. Install traction motor on transaxle:
 - a. Install an eyebolt to traction motor shaft and attach an overhead lifting device of adequate capacity to eyebolt.
 - b. Lightly lubricate inside lip of transaxle input shaft with multipurpose grease to ensure seal seats properly on traction motor shaft. It is not necessary to lubricate traction motor shaft as it is lubricated internally within the transaxle. See Figure 4.



- | | |
|---------------------------|----------------|
| 1. CAPSCREW | 6. CAPSCREW |
| 2. LOCKWASHER | 7. WASHER |
| 3. WASHER | 8. MOTOR SHAFT |
| 4. PARKING BRAKE ASSEMBLY | 9. TRANSAXLE |
| 5. TRACTION MOTOR | 10. INPUT SEAL |

Figure 3. Traction Motor and Parking Brake

- c. Lift traction motor and position it on transaxle using overhead lifting device. Guide traction motor shaft into transaxle through input seal. Align motor with transaxle.
 - d. Install four capscrews and washers mounting traction motor on transaxle. Tighten capscrews to 48 N•m (35 lbf in).
 - e. Remove eyebolt from traction motor shaft.
3. Install parking brake assembly to traction motor:
 - a. Install lower snap ring and woodruff key on traction motor shaft. Align groove in hub with woodruff key and slide hub onto shaft. Install upper snap ring holding brake hub onto traction motor shaft.
 - b. Position brake assembly onto brake hub. Align splines and seat brake on traction motor end head.



- | | |
|---------------------------|----------------|
| 1. CAPSCREW | 6. CAPSCREW |
| 2. LOCKWASHER | 7. WASHER |
| 3. WASHER | 8. MOTOR SHAFT |
| 4. PARKING BRAKE ASSEMBLY | 9. TRANSAXLE |
| 5. TRACTION MOTOR | 10. INPUT SEAL |

Figure 4. Traction Motor and Parking Brake

- c. Install four capscrews, lockwashers, and washers to secure brake assembly. Tighten capscrews to 8 N•m (71 lbf in).

INSTALL TRANSAXLE TO FRAME

1. Check that dowels are installed in transaxle housing and are in good condition. Replace as necessary.

WARNING

The transaxle and traction motor assembly are heavy. Be sure that all lifting devices are suitable and of adequate capacity to lift the transaxle and traction motor.

2. Move transaxle assembly onto a floor jack using an appropriate sling and lifting device. Make sure assembly is balanced and properly supported so it will not fall during installation.
3. Carefully position transaxle on frame using floor jack. Align transaxle mounting dowels with their mounting holes in frame.
4. Apply Loctite® 271 to five socket head capscrews and washers. Install capscrews with washers through transaxle and into mounting holes in frame. Tighten capscrews to 220 N•m (162 lbf ft).
5. Remove cap and plug from service brake line and service brake port. Install service brake line to service brake port. Tighten to 12 to 16 N•m (108 to 192 lbf in).
6. Connect power cables to traction motor studs as tagged during removal. Tighten to 8 N•m (71 lbf in).
7. Connect traction motor temperature sensor connectors to main wiring harness.
8. Connect parking brake connector to main wiring harness.
9. Connect manual override cable to parking brakes.
10. Connect transaxle speed sensor connector to main wiring harness.

**CAUTION**

Make sure the lift truck is blocked at the same height as with the drive tire installed to ensure the proper fluid level reading.

11. Bleed the service brakes. Refer **Brake System** 1800 YRM 1332 for procedures.
12. Check fluid level in transaxle. Fill as necessary. See Fluid Level Check.
13. Install drive tire and wheel assembly on wheel hub. Install lug nuts and tighten to 170 N•m (125 lbf ft).
14. Connect battery connector, turn key switch to **ON** position, and test lift truck for proper operation.
15. Lower lift truck from the blocks.

See **Periodic Maintenance** 8000 YRM 1339 for lift truck models

- ERP15-20VT (ERP030-040VT) (G807)

See **Periodic Maintenance** 8000 YRM 1373 for lift truck models

- ERP16-20VF (ERP30-40VF) (A955)

16. Install mast on lift truck.

See **Mast Repair, 2- and 3-Stage High Visibility Masts** 4000 YRM 1386 for European lift truck models

- ERP15-20VT (G807)
- ERP16-20VF (A955)

See **Mast Repair, 2-, 3-, And 4-Stage Heavy Duty Masts** 4000 YRM 1405 for European and American lift truck models

- ERP15-20VT (ERP030-040VT) (G807)
- ERP16-20VF (ERP30-40VF) (A955)

Maintenance and Repair

SPEED SENSOR REPAIR

The speed sensor monitors the speed of the transaxle and relays the information to the controller. The speed sensor can be replaced with the transaxle installed to the lift truck.

1. Park lift truck on a level surface. Turn key switch to **OFF** position and unplug battery connector.
2. Discharge capacitors. See section Discharging the Capacitors.
3. Remove floor mat and floor plates from operator compartment to access top of transaxle(s).
4. Disconnect sensor wiring harness from main wiring harness.

**CAUTION**

Use a brush to clean around the sensor before removing to avoid contaminating the transaxle.

5. Remove capscrew holding sensor to transaxle using a 5mm Allen wrench. See Figure 5.
6. Pull sensor out of transaxle.
7. Insert new sensor into transaxle.

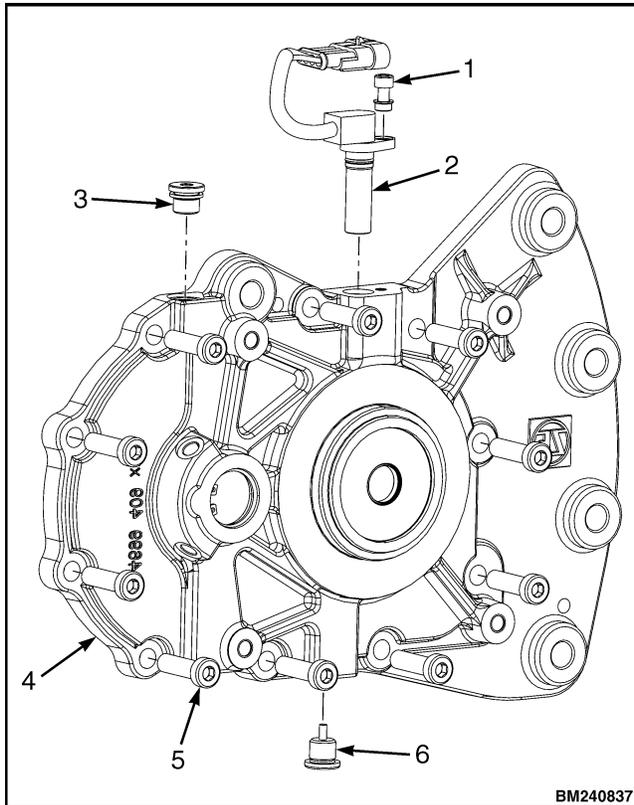
8. Align screw holes and install capscrew. Tighten capscrew to 9.5 N•m (84.0 lbf in).
9. Connect sensor wiring harness to main wiring harness.
10. Replace floor plates and floor mat in operator compartment.
11. Connect battery, turn key to **ON** position and test lift truck for proper operation.

TRUNNION CAP REPAIR

To repair the trunnion cap:

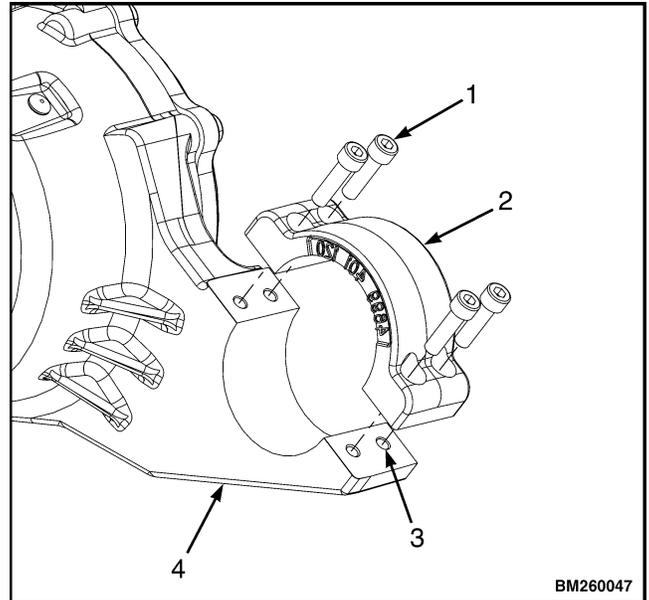
1. Remove load from forks and park lift truck on a level surface. Adjust mast to a vertical position, then turn key switch to **OFF** position and separate battery connectors.
2. Remove four capscrews holding trunnion cap on transaxle housing. Remove trunnion cap. See Figure 6.
3. Wipe away any dirt or grease near mounting holes. Clean holes with a proper sized tap and tap wrench as necessary.

4. Position new cap over mast pin and onto transaxle.
5. Apply Loctite® 242 to threads and install four cap-screws and tighten alternately in small increments. Tighten capscrews to 24 N•m (216 lbf in).
6. Grease fitting in mast stub shaft to lubricate trunnion cap.
7. Connect battery, turn key to **ON** position and test lift truck for proper operation.



1. CAPSCREW
2. SPEED SENSOR
3. FILL PLUG
4. TRANSAXLE COVER
5. COVER CAPSCREWS
6. DRAIN PLUG

Figure 5. Speed Sensor



1. CAPSCREWS
2. TRUNNION CAP
3. THREADED MOUNTING HOLES
4. TRANSAXLE HOUSING

Figure 6. Trunnion Cap

FLUID LEVEL CHECK



CAUTION

Use only transmission fluid from approved vendors. Using fluid from unapproved vendors will void the warranty. Contact Yale Company Contact Management if you have questions about warranty status.

Each transaxle has a separate fluid supply which must be checked every 2000 hours or 1 year or when other maintenance procedures require the fluid level to be checked. Make sure the transaxle is installed to the lift truck and the lift truck is positioned on a level surface when checking fluid levels for an accurate reading.



CAUTION

Clean around the fill and check plugs with solvent before removal to prevent contamination of the system.



CAUTION

Blocking the lift truck higher or lower or at a different angle than it normally sits with the drive tire installed will result in an incorrect fluid level check.

1. Remove drive tire and block lift truck frame to position transaxle at the same height and position as with drive tire installed.

See **Periodic Maintenance** 8000 YRM 1339 for lift truck models

- ERP15-20VT (ERP030-040VT) (G807)

See **Periodic Maintenance** 8000 YRM 1373 for lift truck models

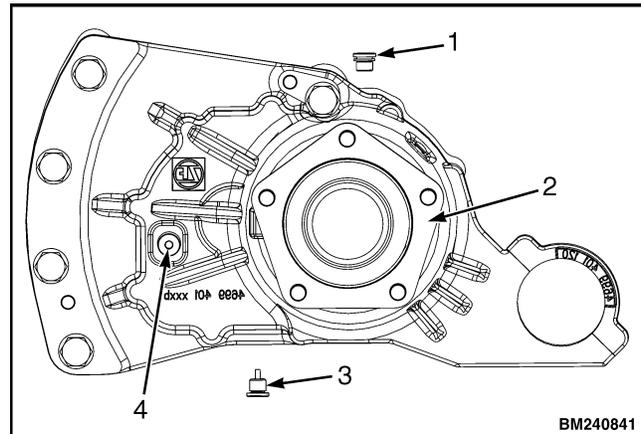
- ERP16-20VF (ERP30-40VF) (A955)

2. Remove check plug. Fluid should be level with bottom of check hole.
3. If necessary, remove fill plug and add fluid through fill hole until level with bottom of check hole. Each transaxle holds approximately 0.60 liter (0.63 qt) of transmission fluid.

NOTE: New sealing rings must be installed with the drain, fill, and check plugs.

4. Replace check plug (and fill plug if removed) and tighten to 22 N•m (192 lbf in). See Figure 7.
5. Reinstall drive tire and tighten lugs to 170 N•m (125 lbf ft). Remove truck from blocks.

6. Repeat for other transaxle. Check fluid level in each transaxle every 2000 hours or one year.



- | | |
|--------------|---------------|
| 1. FILL PLUG | 3. DRAIN PLUG |
| 2. WHEEL HUB | 4. CHECK PLUG |

Figure 7. Transaxle Plug Locations

FLUID CHANGE



CAUTION

Use only transmission fluid from approved vendors. Using fluid from unapproved vendors will void the warranty. Contact Yale Company Contact Management if you have questions about warranty status.

The fluid is not normally changed unless contamination is suspected or other maintenance procedures require draining the transaxle. If changing the fluid is necessary, refer to the following procedures.



WARNING

The fluid is hot at normal operating temperatures. Be careful when draining the transaxles.



CAUTION

Blocking the lift truck higher or lower or at a different angle than it normally sits with the drive tire installed will result in an incorrect fluid level check.



CAUTION

Clean around the fill and check plugs with solvent before removal to prevent contamination of the system.

NOTE: Install new sealing rings on the plugs anytime the drain, check, or fill plugs are removed.

NOTE: Operate the lift truck for 5 minutes or until the transaxle is warm to the touch. Transaxle fluid will drain easier and more thoroughly when it is warm. Each transaxle uses separate, self-contained fluid supplies.

1. Remove drive tire and block lift truck frame to position transaxle at the same height and position as with drive tire installed.

See **Periodic Maintenance** 8000 YRM 1339 for lift truck models

- ERP15-20VT (ERP030-040VT) (G807)

See **Periodic Maintenance** 8000 YRM 1373 for lift truck models

- ERP16-20VF (ERP30-40VF) (A955)

2. Turn key switch to **OFF** position and disconnect battery. Block the wheels to prevent unexpected movement.
3. Place a drip pan with at least a 3.0 liter (3.3 qt) capacity under transaxle.



CAUTION

Clean around plugs with solvent before removal to prevent contamination of the transaxles.

4. Remove fill plug on transaxle. Inspect breather for proper operation. Clean or replace as necessary. See section Breather Repair.
5. Remove check plug.
6. Remove drain plug. Clean drain plug thoroughly, removing any metallic debris that has collected on drain plug magnet.



CAUTION

Disposal of lubricants and fluids must meet local environmental regulations.



CAUTION

The drain plug must not be interchanged with the fill or check plugs. Use only an approved magnetic type drain plug to prevent damage to the transaxle.

NOTE: It may take as long as 10 minutes for the transaxle to drain completely depending on temperature and contaminants. Allow the transaxle to drain completely before continuing.

7. After transaxle has drained completely, install drain plug into transaxle as removed. Tighten to 22 N•m

(192 lbf in). Remove drip pan and dispose of waste fluid properly.

NOTE: Use a funnel or a funnel with a tube attached to add fluid to the transaxle. Pour slowly.

8. Fill transaxle with fluid until level with bottom of check hole. Each transaxle should be filled with approximately 0.60 liter (0.63 qt) of fluid.
9. When fluid reaches bottom of check hole, install check plug and fill plug and tighten each to 22 N•m (192 lbf in).

BREATHER REPAIR

The breather can be repaired with the transaxle installed to the lift truck and the drive tire removed. The breather equalizes air pressure inside the transaxle with the air pressure outside. If the breather is visibly damaged then the breather should be replaced.

1. Remove drive tire and block lift truck frame to position transaxle at the same height and position as with drive tire installed.

See **Periodic Maintenance** 8000 YRM 1339 for lift truck models

- ERP15-20VT (ERP030-040VT) (G807)

See **Periodic Maintenance** 8000 YRM 1373 for lift truck models

- ERP16-20VF (ERP30-40VF) (A955)

2. Remove breather cap by shearing off with a flat screwdriver. See Figure 8.

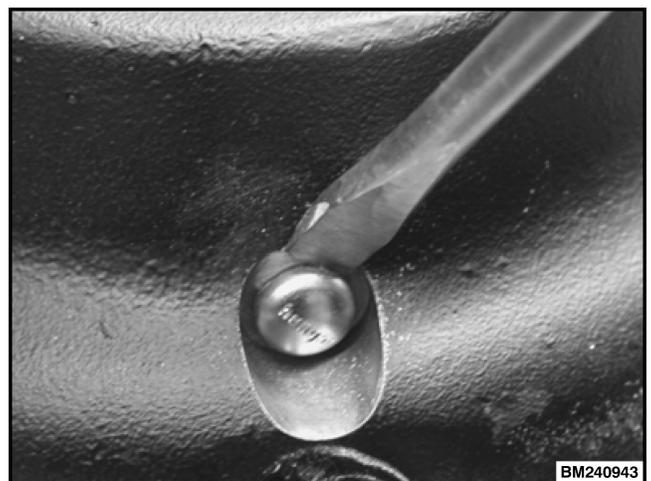


Figure 8. Remove Breather Cap

3. Remove spring by hand. A small breather ball is located under spring. Blow into breather at a slight angle with compressed air to force breather ball out.
4. Install a 6mm thread tap into breather using a tap wrench, and pull breather out of housing. See Figure 9.



Figure 9. Extracting the Breather

5. Position new breather into housing by hand.



CAUTION

A special tool is require to set the proper gap between housing and breather head. **DO NOT** drive the breather flush against the housing.

6. Drive breather into housing using Breather Set Tool (refer to section General, Special Tools) and a nylon faced hammer. See Figure 10.



Figure 10. Installing the Breather

7. Reinstall drive tire and tighten lugs to 170 N•m (125 lbf ft). Remove truck from blocks.

STUD REPAIR

Stud repair can be performed with the transaxle installed to the lift truck or removed.

1. Remove drive tire and block lift truck frame to position transaxle at the same height and position as with drive tire installed.

See **Periodic Maintenance** 8000 YRM 1339 for lift truck models

- ERP15-20VT (ERP030-040VT) (G807)

See **Periodic Maintenance** 8000 YRM 1373 for lift truck models

- ERP16-20VF (ERP30-40VF) (A955)

2. Remove damaged stud using adjustable grip pliers.
3. If stud is sheared off:

- a. Mark center of stud with a center punch and nylon faced hammer.

- b. Drill into center of stud with a 3mm drill bit. See Figure 11.

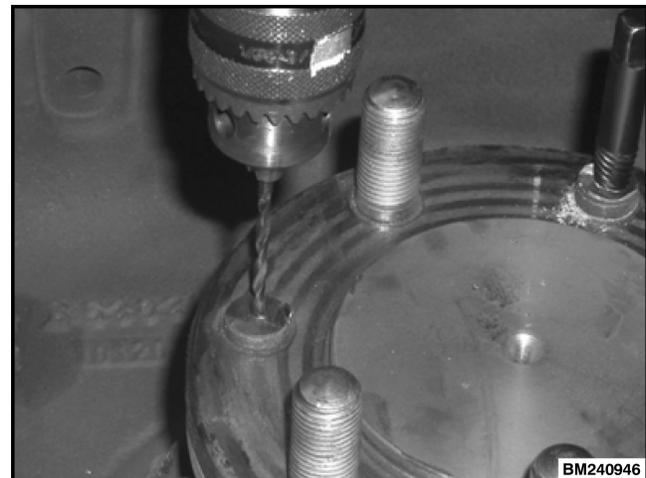


Figure 11. Drilling the Stud

- c. Drill hole larger with a 7mm drill bit.
- d. Lightly tap an easy-out into hole in stud. Install tap wrench and unscrew stud from hub. See Figure 12.

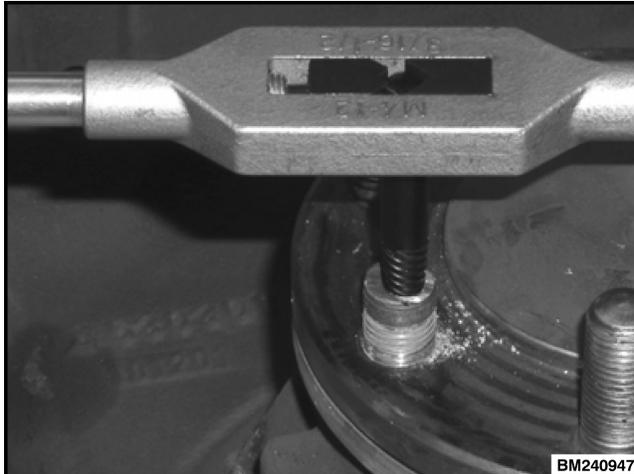


Figure 12. Removing the Stud

4. Run a thread tap (size M14 x 1.5) into stud hole to clean and repair any damaged threads.
5. Test threads with a thread plug gauge (size M14 x 1.5 - 6H).
6. If threads are within specification, install new stud using Stud Installation Tool (refer to section General, Special Tools).
7. Tighten studs to 80 N•m (59 lbf ft). See Figure 13.



Figure 13. Stud Installation

8. Reinstall drive tire and tighten lugs to 170 N•m (125 lbf ft). Remove truck from blocks.

BRAKE CYLINDER REPAIR

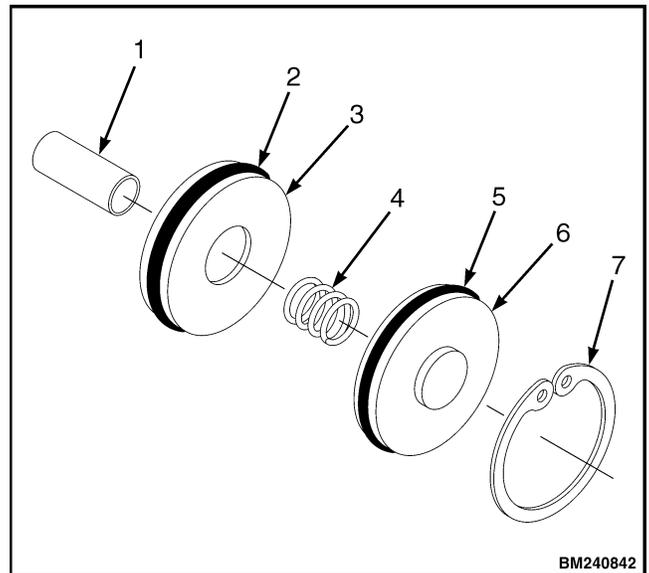


WARNING

Always wear eye protection and use the proper tools when installing/removing snap rings.

The service brake pedal in the operator compartment actuates the master cylinder sending pressurized fluid to the brake pistons in the transaxles through the service brake lines.

1. Remove transaxle from lift truck. Remove parking brake and traction motor from transaxle. See section Remove Transaxle From Frame.
2. Drain oil from transaxle.
3. Remove snap ring in brake cylinder. See Figure 14.



- | | |
|--------------------|--------------|
| 1. CYLINDRICAL PIN | 5. O-RING |
| 2. PISTON SEAL | 6. CAP |
| 3. PISTON | 7. SNAP RING |
| 4. SPRING | |

Figure 14. Brake Piston Assembly



CAUTION

Cover the cap with a cloth to control it in case it is ejected from the piston.

NOTE: Make note of the piston and cap orientation as well as the orientation of the seal on the piston before removal.

4. Direct pressurized air into service brake line port in cover to force cap out of cylinder. Recover spring from beneath cap. Remove seal from the cap and cut it in two to prevent accidental reuse. See Figure 15.



Figure 15. Removing the Cap

5. Using a grind stone, slightly bevel the end of a 7/16 x 2 inch roll pin. Allow pin to cool.

6. Carefully position roll pin to piston. Drive roll-pin into cavity of piston with a nylon faced hammer.

NOTE: It may be helpful to apply compressed air to the service brake line port (as with removing the cap) **AFTER** the piston has been pulled to the top end of the brake cylinder.

NOTE: Make note of the piston and seal orientation during removal.

7. Pull roll-pin (and piston) from cylinder using pliers.

NOTE: Make note of the cylindrical pin orientation during removal.

8. Remove cylindrical pin from beneath piston.

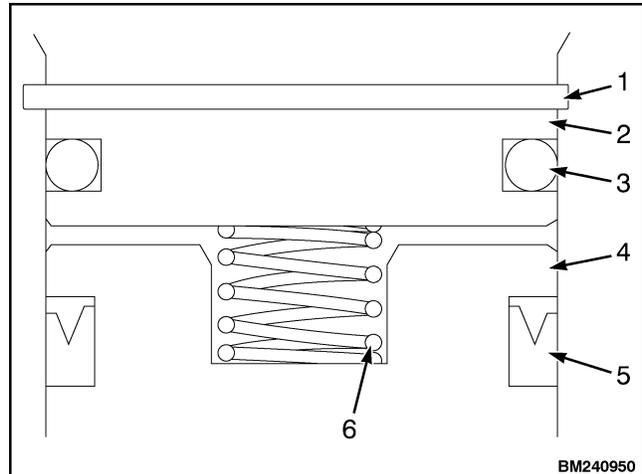
9. Inspect cylinder walls for pits, cracks, and other damage.

NOTE: Install the cylindrical pin in the orientation noted during removal.

10. Lightly lubricate cylindrical pin with multipurpose grease and install into brake cylinder as noted during removal.

NOTE: A new brake piston and new seal should be used when repairing the brake cylinder assembly. Make sure the new piston and new seal are oriented as noted when removed.

11. Lightly lubricate new piston seal with multipurpose grease and install in new brake piston as noted during removal. See Figure 16.



- | | |
|--------------|-----------|
| 1. SNAP RING | 4. PISTON |
| 2. CAP | 5. SEAL |
| 3. O-RING | 6. SPRING |

Figure 16. Piston Seal Orientation

12. Install new brake piston (and seal) into brake cylinder.

13. Place spring into cavity in piston by hand.

14. Lightly lubricate new O-ring with multipurpose grease and install on cap as noted during removal.

NOTE: Make sure the cap is oriented as noted when removed.

15. Install cap into brake cylinder.

16. Press cap into cylinder, to expose snap ring groove, and install snap ring on brake piston.

NOTE: It is recommended to verify the torque on the transaxle cover capscrews before reinstalling the traction motor. See section Cover to Housing Seal.

17. Install brake and traction motor on transaxle and install transaxle on lift truck. See section Install Transaxle to Frame.



CAUTION

Make sure the lift truck is blocked at the same height as with the drive tire installed to ensure the proper fluid level reading.

18. Check transaxle fluid level. See section Fluid Level Check.

19. Install drive tire and tighten lugs to 170 N•m (125 lbf ft). Test lift truck for proper operation.

INPUT SEAL REPAIR

The input seal is located between the traction motor and the transaxle. The seal covers the transaxle input bearing and input pinion. The traction motor shaft slides through the center of the seal into the input pinion. To replace the input seal:



WARNING

Cleaning solvents can be flammable and toxic and can cause skin irritation. When using cleaning solvents, always follow the solvent manufacturer's recommended safety procedures.



WARNING

The traction motor is heavy. Be sure that all lifting devices are suitable and of adequate capacity to lift the traction motor.

1. Remove transaxle from lift truck. Remove parking brake and traction motor from transaxle. See section Remove Transaxle From Frame.



CAUTION

The transaxle is heavy and can be difficult to stabilize when positioned with the studs down. Securely support the transaxle in a stable position during these procedures.

2. Carefully position transaxle with drive tire mounting studs down. Support transaxle with wooden blocks to stabilize.
3. Use solvent to clean outside of transaxle before removing seal.

NOTE: Removal is destructive to the seal.

4. Puncture seal with a flat screwdriver (carefully near center of seal to avoid damaging bearing) and pry around the edge under the seal to remove from cover.
5. Clean around flange to remove any dirt or debris.
6. Install input seal using Yale input seal installation tool (refer to section General, Special Tools).

NOTE: It is recommended to verify the torque on the transaxle cover capscrews before reinstalling the traction motor. See section Cover to Housing Seal.

7. Lightly lubricate center of input seal with multipurpose grease to allow seal to seat properly on motor

shaft. It is not necessary to lubricate traction motor shaft. Install traction motor on transaxle.

8. Install brake on traction motor. Install transaxle on lift truck. See section Install Transaxle to Frame.

COVER TO HOUSING SEAL



CAUTION

DO NOT remove the cover from the transaxle housing during the warranty period. Removing the cover from the housing will void the transaxle warranty. The transaxle warranty period may vary from truck hours or other warranties. Contact Yale Company Contact Management if you have questions about warranty status.

The transaxle cover is mated to the housing using an anaerobic sealant and secured in place with ten socket-head capscrews. **DO NOT** remove the cover from the housing during the transaxle warranty period. **THIS WILL VOID THE WARRANTY.** Internal parts of the transaxle are press fit and cannot be repaired or properly preloaded without specialized equipment. If a leak develops from between the cover and the housing, different procedures are required depending on whether your transaxle is within the warranty period or beyond the warranty period. Refer to section During the Transaxle Warranty Period or After the Transaxle Warranty Period.

During the Transaxle Warranty Period



CAUTION

DO NOT remove the cover from the transaxle housing during the warranty period. Removing the cover from the housing will void the transaxle warranty. The transaxle warranty period may vary from truck hours or other warranties. Contact Yale Company Contact Management if you have questions about warranty status.

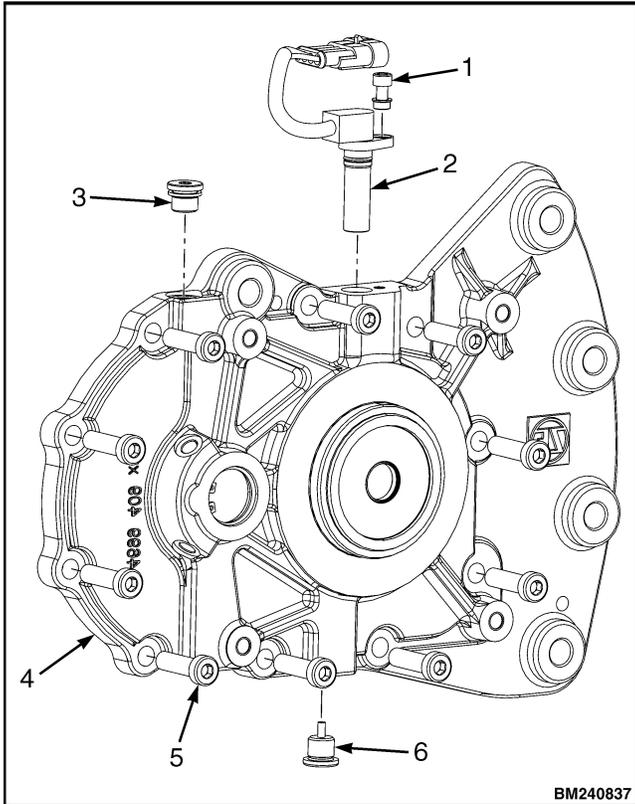


CAUTION

The transaxle is heavy and can be difficult to stabilize when positioned with the studs down. Securely support the transaxle in a stable position during these procedures.

1. Remove transaxle from lift truck. Remove parking brake and traction motor from transaxle. See section Remove Transaxle From Frame.

2. Tighten capscrews to 110 N•m (81 lbf ft). See Figure 17.



1. SOCKET-HEAD SCREW
2. SPEED SENSOR
3. FILL PLUG
4. COVER
5. SOCKET-HEAD CAPSCREW
6. DRAIN PLUG

Figure 17. Cover Assembly

3. Install brake and traction motor on transaxle. Install transaxle on lift truck. See section Install Transaxle to Frame.
4. If the leak persists, the unit must be reported to Yale Company Contact Management.

After the Transaxle Warranty Period

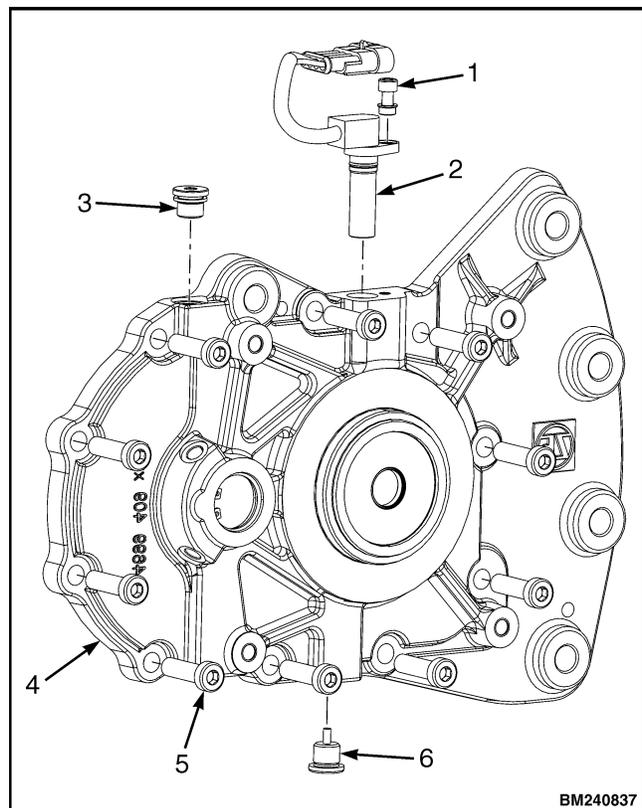
Removing the Cover



CAUTION

The transaxle is heavy and can be difficult to stabilize when positioned with the studs down. Securely support the transaxle in a stable position during these procedures.

1. Remove the transaxle from the lift truck and remove the parking brake and traction motor. See section Remove Transaxle From Frame.
 2. Drain fluid from transaxle.
 3. Remove ten socket-head capscrews holding cover on housing. See Figure 18.
- NOTE:** The cover is aligned to the housing with internal components of the transaxle. Carefully pry the cover from the housing by levering equally on each side.
4. Separate cover from housing by tapping around seam of cover and housing using a thin flat chisel. Gently pry around cover in small equal increments to remove from housing.



1. SOCKET-HEAD SCREW
2. SPEED SENSOR
3. FILL PLUG
4. COVER
5. SOCKET-HEAD CAPSCREW
6. DRAIN PLUG

Figure 18. Cover Assembly

Installing the Cover**WARNING**

Cleaning solvents can be flammable and toxic and can cause skin irritation. When using cleaning solvents, always follow the solvent manufacturer's recommended safety procedures.

**CAUTION**

Make sure the cover has been thoroughly drained of any fluid so the new sealant is not contaminated when the cover is turned over to be assembled.

1. Clean housing flange and cover flange thoroughly before reassembly. The flanges must be clean of oil, dirt, and old sealant to ensure a proper seal. Make sure cover has been thoroughly drained of any oil so new sealant is not contaminated when cover is turned over to be assembled.
2. Apply a continuous coating of Loctite® 5188 completely around housing flange using a clean, lint free paint roller to ensure a proper seal. See Figure 19.

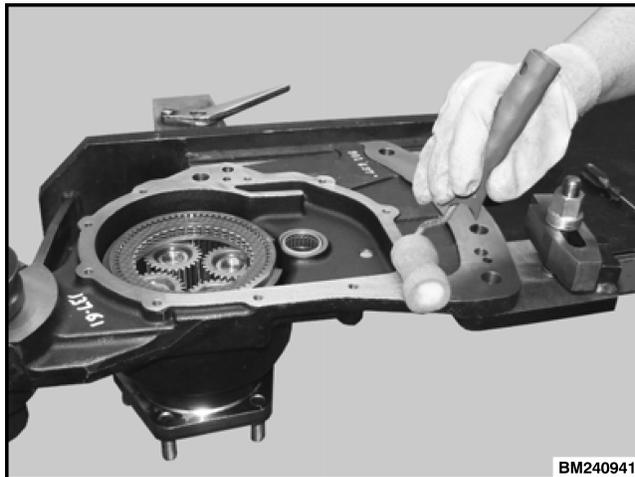


Figure 19. Applying Sealant to the Flange

NOTE: The cover is aligned to the housing with internal components of the transaxle. Carefully align the cover to the housing and lower equally on every side until it is mated. Dowel pins inside the housing must be aligned with the cover during installation.

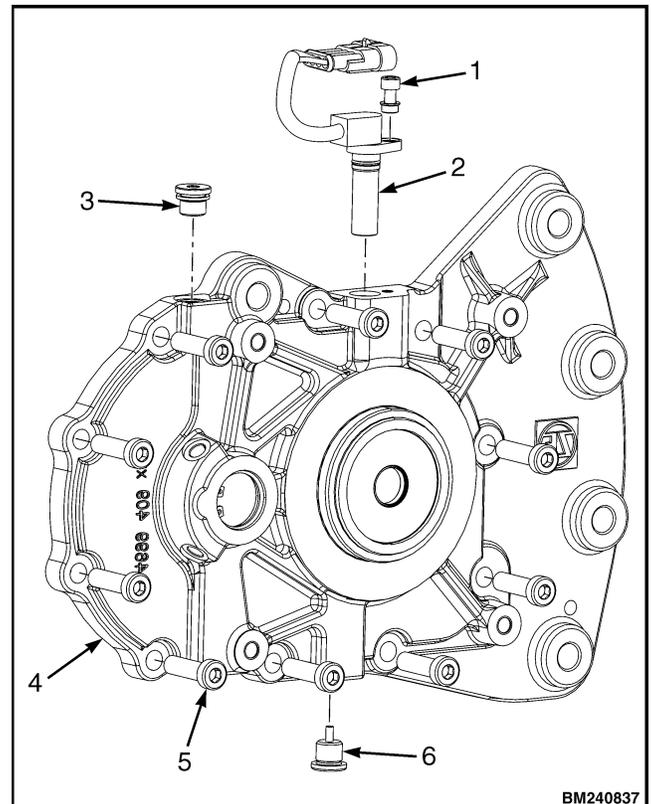
3. Position cover on transaxle and slowly lower into position. Turn assembly while beginning to lower to

ensure that internal components seat properly and do not bind. Make sure assembly holes and dowels are aligned as the cover and housing meet. Lightly tap evenly around cover with a rubber mallet to seat cover onto housing.

**CAUTION**

DO NOT install the capscrews until the cover is completely seated. Tightening capscrews can damage internal components if the cover is not properly seated.

4. When cover is completely seated onto housing, install ten socket head screws holding cover on housing. Incrementally tighten screws in a non-concentric pattern to 110 N•m (81 lbf ft). See Figure 20.



1. SOCKET-HEAD SCREW
2. ENCODER SENSOR
3. FILL PLUG
4. COVER
5. SOCKET-HEAD CAPSCREW
6. DRAIN PLUG

Figure 20. Cover Assembly

5. Install brake and traction motor on transaxle. Install transaxle on lift truck. See section Install Transaxle to Frame.

**CAUTION**

Make certain to use the proper magnetic plug for the drain plug. The drain plug is not interchangeable with the fill and check plugs.

6. Fill transaxle with fluid to the proper level:
 - a. Install drain plug with new sealing ring and tighten to 22 N•m (192 lbf in).

NOTE: Each transaxle requires approximately 0.60 liter (0.63 qt) of transmission fluid.

- b. Fill transaxle until fluid begins to emerge from check hole.
- c. Install check and fill plugs with new sealing rings and tighten to 22 N•m (192 lbf in).

WET BRAKES

The wet brake discs can be replaced after the warranty period. To replace the brake discs:

**CAUTION**

DO NOT remove the cover from the transaxle housing during the warranty period. Removing the cover from the housing will void the transaxle warranty. The transaxle warranty period may vary from truck hours or other warranties. Contact Yale Company Contact Management if you have questions about warranty status.

**CAUTION**

The transaxle is heavy and can be difficult to stabilize when positioned with the studs down. Securely support the transaxle in a stable position during these procedures.

1. Remove transaxle from lift truck. Remove parking brake and traction motor from transaxle. See section Remove Transaxle From Frame.
2. Drain fluid from transaxle.
3. Remove cover from transaxle. Refer to section Removing the Cover.

**CAUTION**

Always replace the full set of inner and outer splined brake discs.

NOTE: Make note of the orientation of the brake discs during removal.

4. Remove 4 brake discs (outer spline) and 3 brake discs (inner spline) from transaxle by hand. Remove pressure plate from transaxle by hand. See Figure 21.

NOTE: New pressure plate thicknesses are 4.8 mm (0.19 in.), 5.3 mm (0.20 in.), and 5.8 mm (0.23 in.).

5. Measure thickness of old pressure plate. Select new pressure plate with next highest thickness.
6. Install the pressure plate into transaxle housing by hand.
7. Soak new brake discs in clean transaxle fluid before installing.
8. Install a brake disc (external spline) against pressure plate in transaxle.

**CAUTION**

Brake discs with internal splines should be installed in the transaxle housing so that the rounded off side of teeth point upward.

9. Install a brake disc (internal spline) against brake disc (external spline) with rounded off side of teeth pointing upward.
10. Install remainder of brake discs alternating between internal and external splined discs. The disc pack should have a total of 1 pressure plate, 4 brake discs (external spline) and 3 brake discs (internal spline).
11. Align splines of internal discs using a screwdriver.
12. Install cover to transaxle. Refer to section Installing the Cover.
13. Install traction motor and brake on transaxle. Install transaxle on lift truck. See section Install Transaxle to Frame.

CAUTION

Make certain to use the proper magnetic plug for the drain plug. The drain plug is not interchangeable with the fill and check plugs.

14. Fill transaxle with fluid to proper level:

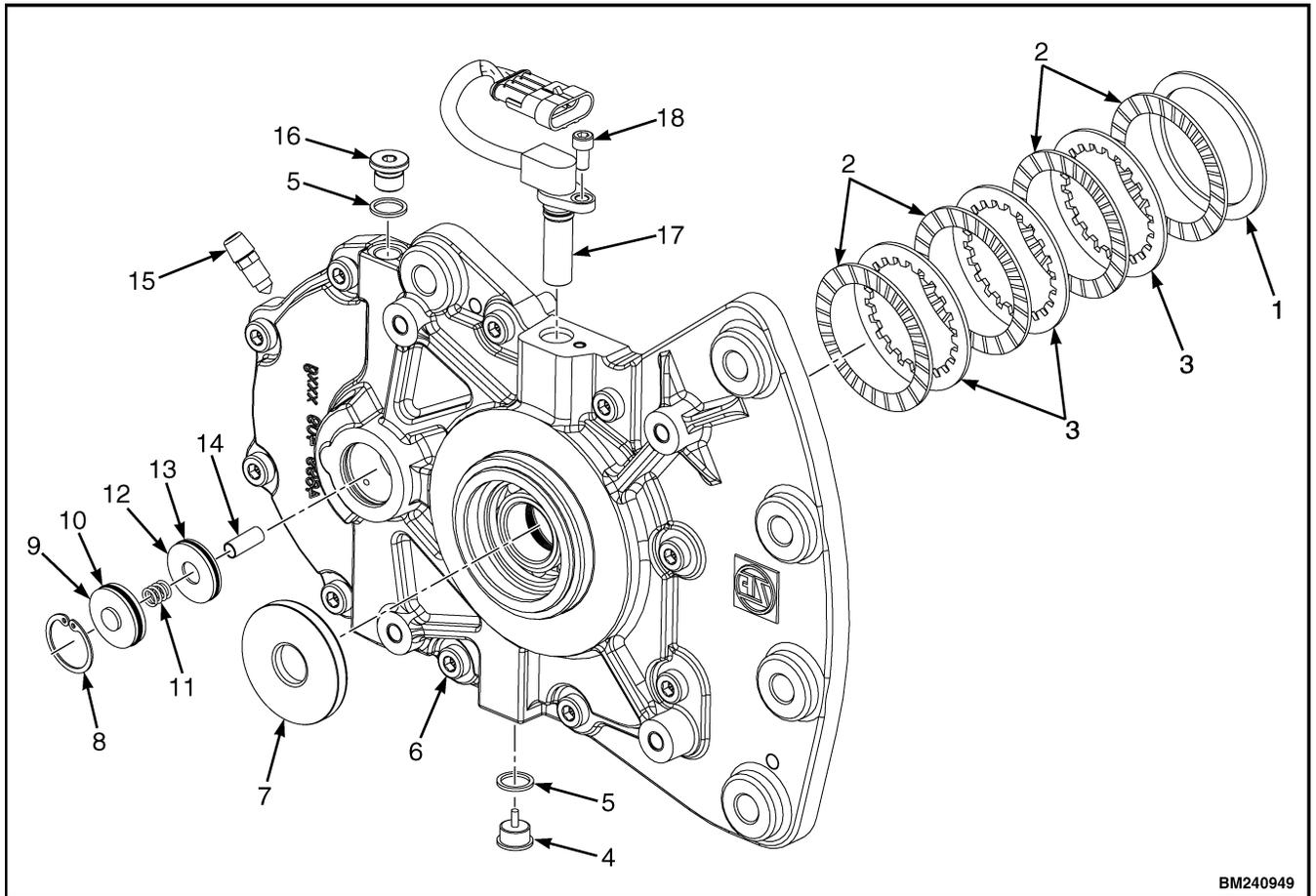
- a. Install drain plug with new sealing ring and tighten to 22 N•m (192 lbf in).

- b. Fill transaxle until fluid begins to emerge from check hole.

- c. Install check and fill plugs with new sealing rings and tighten to 22 N•m (192 lbf in).

15. Connect battery connectors, turn key switch to **ON** position, and test lift truck for proper operation.

NOTE: Each transaxle requires approximately 0.60 liter (0.63 qt) of transmission fluid.



BM240949

- | | | |
|-------------------------------|---------------|-------------------|
| 1. PRESSURE PLATE | 6. SCREW | 13. RING |
| 2. BRAKE DISC (OUTER SPLINED) | 7. INPUT SEAL | 14. PIN |
| 3. BRAKE DISC (INNER SPLINED) | 8. SNAP RING | 15. BLEEDER VALVE |
| 4. PLUG | 9. COVER | 16. PLUG |
| 5. SEALING RING | 10. O-RING | 17. SPEED SENSOR |
| | 11. SPRING | 18. SCREW |
| | 12. PISTON | |

Figure 21. Brake Discs

DISCHARGING THE CAPACITORS



WARNING

DO NOT make repairs or adjustments unless you have been properly trained and authorized to do so. Improper repairs and adjustments can create dangerous operating conditions. **DO NOT** operate a lift truck that needs repairs. Report the need for repairs to your supervisor immediately. If repair is necessary, attach a **DO NOT OPERATE** tag on the steering wheel and disconnect the battery.

Disconnect the battery and discharge the capacitors before opening any compartment covers or inspecting or repairing the electrical system. **DO NOT** place tools on top of the battery. If a tool causes a short circuit, the high current flow from the battery can cause personal injury or property damage.

Some checks and adjustments are performed with the battery connected. **DO NOT** connect the battery until the procedure instructs you to do so. Never wear any metallic items on your fingers, arms, or neck. Metal items can accidentally make an electrical connection and cause injury.

Before performing any tests or adjustments, block the lift truck to prevent unexpected movement.

The capacitors in the transistor controllers can hold an electrical charge after the battery is disconnected. To prevent an electrical shock and

personal injury, discharge the capacitors before inspecting or repairing any component in the drive unit compartment. Make certain that the battery has been disconnected.

DO NOT short across the motor controller terminals with a screwdriver or jumper wire.

Make certain the Emergency Disconnect Switch has not been activated. This will isolate the controller and prevent the capacitors from discharging properly. The proper way to disconnect the battery is by separating the battery connectors.

1. Ensure the capacitors are discharged by performing Step 2 through Step 5 below.
2. Turn the key or keyless switch to the **OFF** position and disconnect the battery by separating the connectors.
3. Block load wheels to prevent lift truck from moving.
4. Make sure the Emergency Disconnect Switch **HAS NOT** been activated. If the Emergency Disconnect Switch is activated, rotate the switch to the right until it pops up.
5. Wait at least 10 seconds to be sure the capacitors are completely discharged.

Brake Pedal Assembly Repair

REMOVE

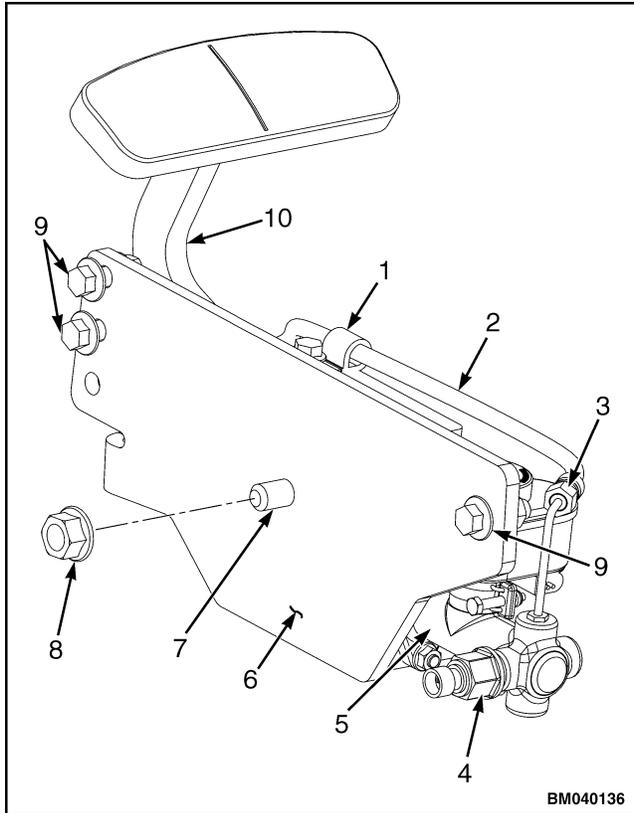
It is not always necessary to remove the brake pedal assembly to disassemble certain components. Parts of the brake pedal assembly may be removed without removing the assembly from the lift truck. The entire removal procedure is outlined below. Evaluate the required service to determine if the entire brake assembly should be removed. Perform only the steps necessary to safely complete the required service.

1. Turn the key switch to the **OFF** position and disconnect the battery.

2. Remove floor mat and floor covers.
3. Tag and disconnect transducer and fluid sensor wiring.

NOTE: Position a catch can or a cloth to contain the brake fluid spilled when the line is disconnected.

4. Remove the clamp and disconnect the main pressure line from the elbow fitting on top of the master cylinder. Cap or plug the lines and fittings to minimize spills and prevent contamination to the brake system. See Figure 3.



- | | |
|-----------------------|--------------------------------|
| 1. CLAMP | 6. BRACKET |
| 2. MAIN PRESSURE LINE | 7. BOLT |
| 3. ELBOW FITTING | 8. NUT |
| 4. TRANSDUCER | 9. MOUNTING CAPSCREWS AND NUTS |
| 5. MASTER CYLINDER | 10. PEDAL |

Figure 3. Pedal Retaining Nut

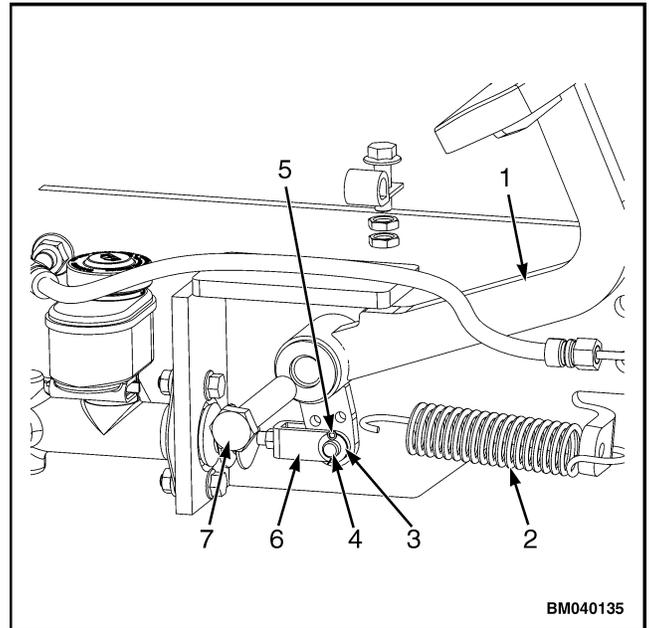
5. Remove three mounting cap screws and nuts securing bracket to frame.
6. Lift brake pedal assembly from the lift truck.

DISASSEMBLE

For the following procedures, see Figure 3, Figure 4, and Figure 5.

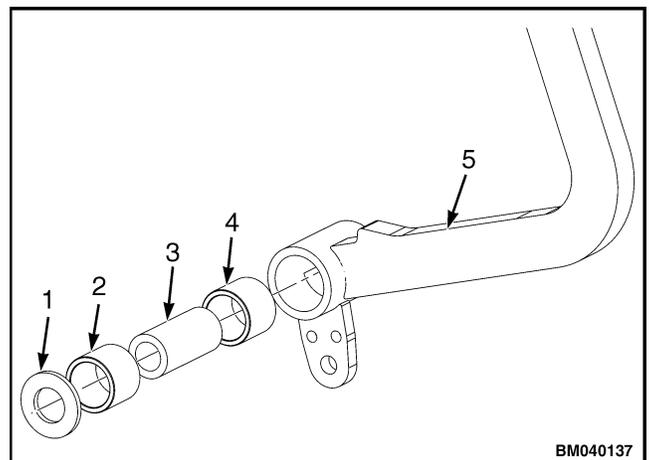
1. Remove master cylinder if necessary. See Master Cylinder Repair, in this section.
2. Remove brake pedal:
 - a. Remove the return spring. See Figure 4.
 - b. Pull the cotter pin and remove clevis pin and washer from the clevis if the master cylinder has not been removed. Discard the cotter pin.

- c. Remove nut, then slide bolt from assembly. See Figure 3 and Figure 4.
- d. Lift pedal from assembly. Recover washer and sleeve from pedal. See Figure 5.
- e. Remove bushings from pedal if necessary.



- | | |
|------------------|---------------|
| 1. PEDAL | 5. COTTER PIN |
| 2. RETURN SPRING | 6. CLEVIS |
| 3. WASHER | 7. BOLT |
| 4. CLEVIS PIN | |

Figure 4. Pedal Assembly and Linkage



- | | |
|------------|------------|
| 1. WASHER | 4. BUSHING |
| 2. BUSHING | 5. PEDAL |
| 3. SLEEVE | |

Figure 5. Pedal Bushings

ASSEMBLE

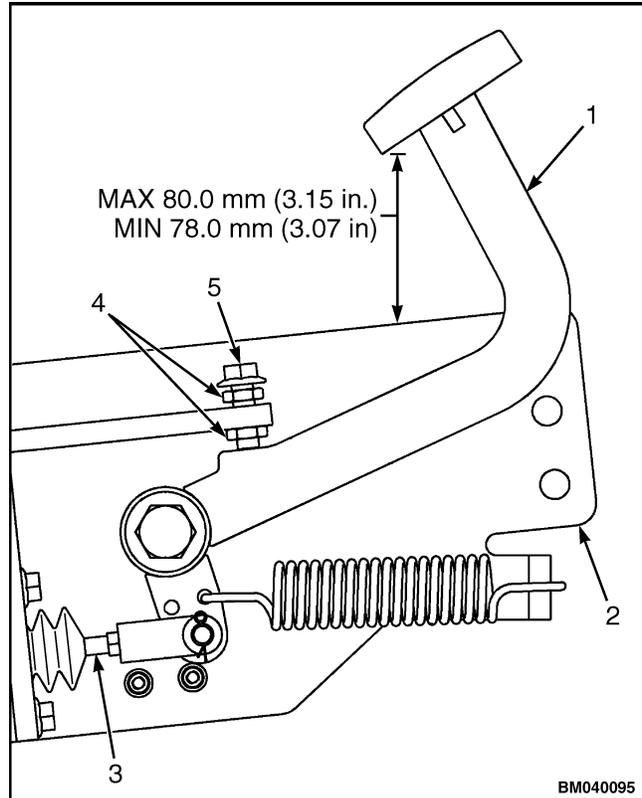
For the following procedures, see Figure 4, and Figure 5.

1. Install brake pedal:
 - a. Install new bushings into pedal if removed. Install sleeve into bushings. See Figure 5.
 - b. Position pedal and washer into bracket and align holes. Make sure clevis is positioned properly if the master cylinder was not removed.
 - c. Install bolt through washer, pedal, and bracket and secure with nut. Tighten to 165 to 206 N•m (122 to 152 lbf ft). See Figure 4.
2. Install pedal return spring.
3. Install master cylinder if removed. See Master Cylinder Repair in this section.
4. Install clevis to pedal using clevis pin and washer. Install new cotter pin to secure. See Figure 4.

INSTALL

1. Place brake pedal assembly in position and align the bracket with the mounting holes in the frame.
2. Install three capscrews and nuts securing bracket to frame.
3. Connect transducer and fluid sensor wiring as removed.
4. Connect the main pressure line to the elbow fitting on top of the master cylinder.
5. Bleed air from the brake system. See Master Cylinder Repair - Bleed the Brake System in this section.
6. Adjust the brake pedal to the proper height:
 - a. Measure distance from the top of the bracket to the foot pedal as shown in Figure 6.

- b. Loosen locknuts and adjust capscrew so pedal is within the proper distance from the bracket.
 - c. Retighten locknuts to secure capscrew in place.
7. Adjust the master cylinder linkage. See Adjust Linkage in this section.
 8. Connect the battery and test for proper operation.
 9. Install the floor covers and the floor mat.



1. PEDAL
2. BRACKET
3. MASTER CYLINDER LINKAGE
4. LOCKNUTS
5. CAPSCREW

Figure 6. Pedal Adjustment

Master Cylinder Repair

REMOVE



WARNING

Always wear the proper protective equipment including eye protection and petroleum-resistant gloves when handling Dexron III. Thoroughly wash exposed areas of skin as soon as possible.



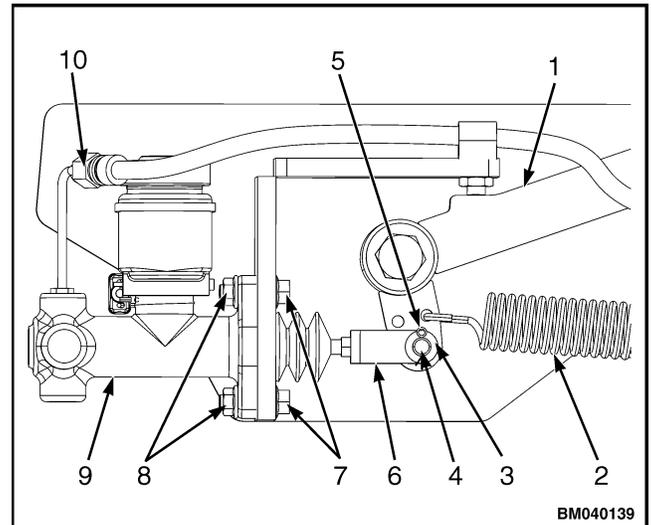
CAUTION

Protect the brake system from dirt and contaminants during servicing procedures.

1. Turn the key switch to the **OFF** position and disconnect the battery.
2. Remove the floor mat and floor plates.
3. Disconnect the brake pressure line from the elbow fitting on top of the master cylinder. Cap hose and fitting to minimize spills and prevent contamination.
4. Disconnect the transducer and the fluid sensor wiring.
5. Pull the cotter pin from the clevis pin and remove the clevis pin and washer connecting the clevis to the pedal. Discard the cotter pin.
6. Remove capscrews and nuts securing master cylinder to bracket.
7. Remove master cylinder from bracket. See Figure 7.

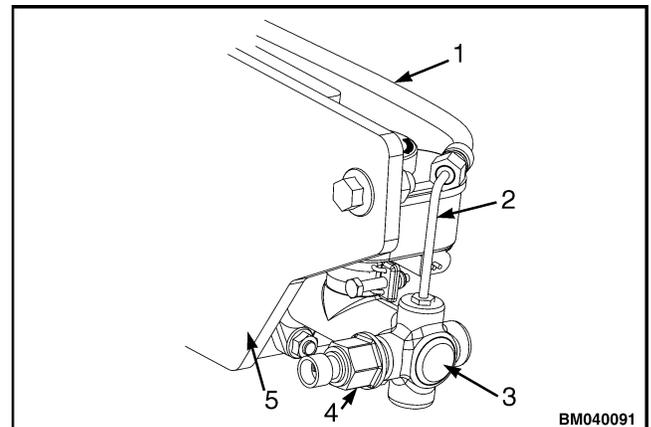
DISASSEMBLE

1. Remove master cylinder assembly from the truck. See Remove.
2. Remove the brake switch by unscrewing it from the cylinder housing. See Figure 8.
3. Remove the elbow fitting from the cylinder housing.
4. Loosen the clamp and remove the reservoir from the cylinder housing. See Figure 9.
5. Pull the push rod out of the boot. Remove the boot from the cylinder housing. See Figure 9.



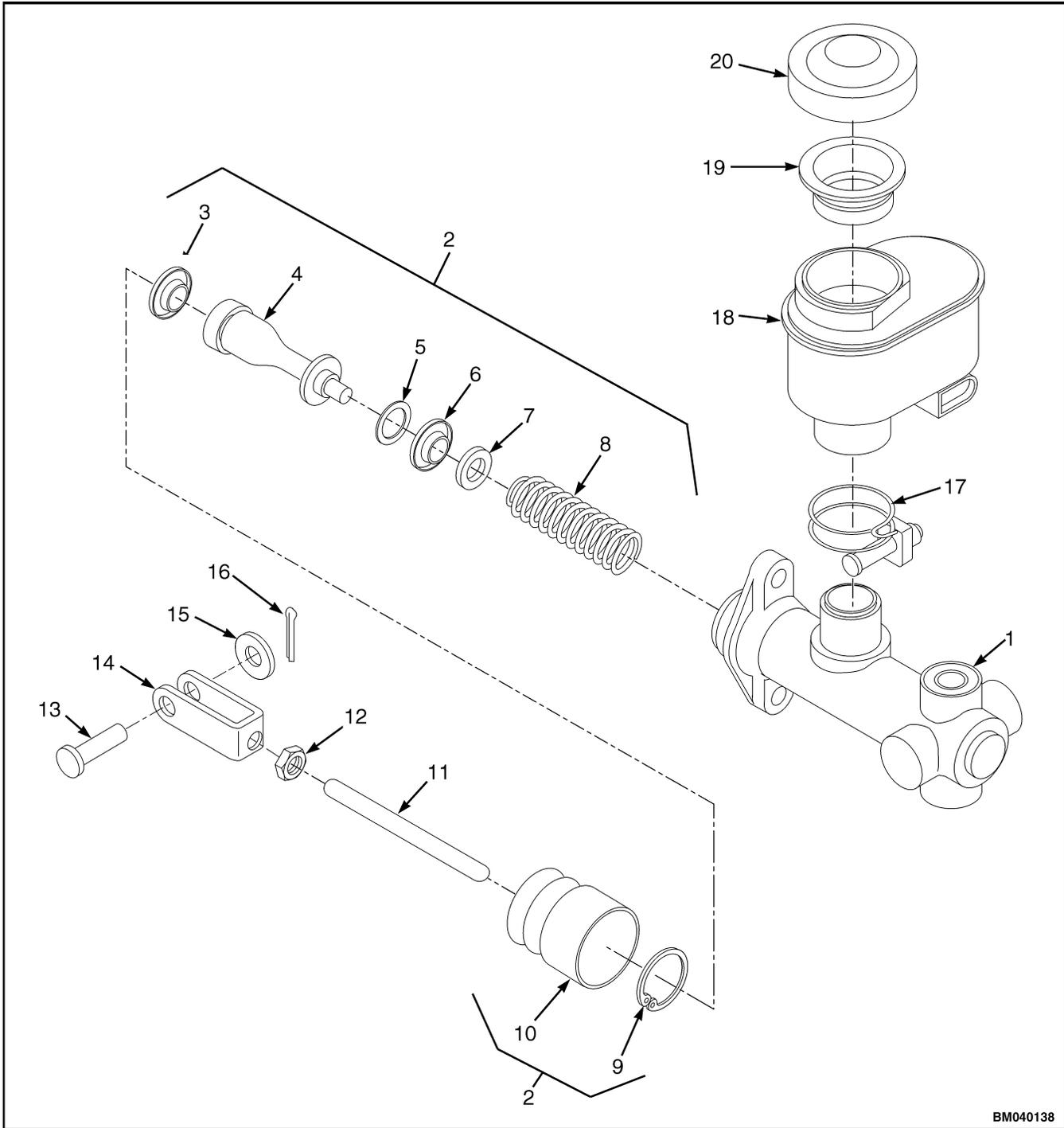
- | | |
|------------------|-------------------------|
| 1. PEDAL | 7. CAPSCREWS |
| 2. RETURN SPRING | 8. NUTS |
| 3. WASHER | 9. CYLINDER HOUSING |
| 4. CLEVIS PIN | 10. BRAKE PRESSURE LINE |
| 5. COTTER PIN | |
| 6. CLEVIS | |

Figure 7. Master Cylinder Mounting



1. MAIN BRAKE LINE
2. ELBOW FITTING
3. MASTER CYLINDER HOUSING
4. TRANSDUCER (BRAKE PRESSURE)
5. BRACKET

Figure 8. Brake Switch



BM040138

- 1. CYLINDER HOUSING
- 2. PISTON ASSEMBLY
- 3. CUP
- 4. PISTON
- 5. SPACER
- 6. CUP
- 7. RETAINER

- 8. SPRING
- 9. RETAINING RING
- 10. BOOT
- 11. PUSH ROD
- 12. NUT
- 13. CLEVIS PIN
- 14. CLEVIS

- 15. WASHER
- 16. COTTER PIN
- 17. CLAMP
- 18. RESERVOIR
- 19. GASKET
- 20. CAP

Figure 9. Master Cylinder

6. Loosen the nut and remove the clevis and nut from the push rod if necessary.
7. Remove the retaining ring and extract the piston assembly from the cylinder housing.

CLEAN AND INSPECT

Clean the inside of the master cylinder housing with a clean cloth and solvent. Inspect the inside of the housing for grooves, wear, or scarring. If the housing shows any visible damage, replace the master cylinder.

ASSEMBLE



CAUTION

The brake system uses Dexron III (same as used in the transaxle). Use of other fluids can damage the brake system.

NOTE: Lightly lubricate the piston assembly components with Dexron III prior to installation.

1. Install the piston assembly into the cylinder housing:
 - a. Carefully install the piston assembly into the cylinder housing (spring first) and hold in position.
 - b. Install the retaining ring into the cylinder housing against the cup. Ensure that the retaining ring is securely seated in the groove of the cylinder housing.
2. Install the transducer by screwing it into the cylinder housing. Tighten to 23 to 28 N•m (17 to 21 lbf ft).
3. Install the elbow fitting into the cylinder housing. Orient as removed.
4. Install the reservoir onto the cylinder housing. Tighten the clamp to secure in position.
5. Install the boot to the housing.
6. Install nut onto rod and then install clevis onto rod as removed. Wait to tighten nut until linkage has been adjusted.

NOTE: Lightly lubricate the push rod with Dexron III to ease in installation.

7. Install the push rod through the hole in the boot into the cylinder housing.

8. Install master cylinder assembly to the truck. See Install.

INSTALL



CAUTION

The brake system uses Dexron III (same as used in the transaxle). Use of other fluids can damage the brake system.

1. Position master cylinder to bracket and align mounting holes.
2. Install capscrews and nuts securing master cylinder to bracket. Tighten to 19 to 23 N•m (14 to 17 lbf ft).
3. Install the main pressure line to the elbow fitting on top of the master cylinder.
4. Connect transducer and fluid sensor wiring as removed.
5. Attach the clevis to the pedal using the clevis pin and washer. Secure in place with a new cotter pin. Adjust linkage as necessary. See Adjustments, Adjust Linkage.
6. Bleed air from the brake system. See Adjustments, Bleed the Brake System.

ADJUSTMENTS

Bleed the Brake System



CAUTION

The brake system uses Dexron III (same as used in the transaxle). Use of other fluids can damage the brake system.

When the brake system is operating properly, the brake pedal will have back pressure that will stop the pedal before it can be pressed to the end of its mechanical travel limit. A brake system that has air present may have some back pressure but not enough to stop the pedal before reaching its mechanical travel limit. The pedal may feel soft and inconsistent (spongy) and must be bled before operating the lift truck.

NOTE: Bleeding air from the brake system requires two technicians. One technician must sit in the seat and operate the brake pedal while the other opens and closes the brake bleed valve located on the transaxle housing.

To bleed air from the brake system:

1. Remove the floor plates and check that the master cylinder reservoir is full of oil.
2. One technician must sit in the seat and repeatedly press and release (pump) the brake pedal to increase the back pressure. The brake pedal may become harder to press as this occurs.
3. When back pressure seems to be at the maximum, the technician must press and hold the pedal as far as it will go.
4. The second technician must slowly loosen the bleed valve on one of the transaxle housings between the wheel and the frame. Air and oil should bubble from the valve until the pedal is pressed to its mechanical travel limit.
5. The pedal should be held in this position while the valve is retightened.
6. Repeat Step 2 through Step 5 until oil with no air (bubbles) flows from the valve. Check the oil level in the master cylinder every cycle and fill reservoir as necessary.
7. Perform Step 2 through Step 5 on the other transaxle until all air has been bled from the system.

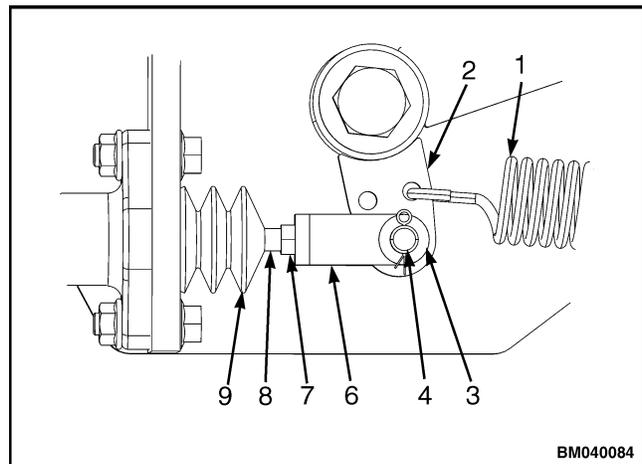
Adjust Linkage

To adjust the master cylinder linkage:

1. Check that the pedal is adjusted properly before adjusting the master cylinder linkage. Refer to Brake Pedal Assembly Repair section for procedures.
2. Loosen the lock nut on the push rod. See Figure 10.

NOTE: Do not allow the boot to be twisted while adjusting the push rod length.

3. Turn the push rod to counterclockwise (as viewed from rear of truck) to remove all slack between the master cylinder and the brake pedal.
4. Turn the push rod 1/8 clockwise (as viewed from rear of truck) to allow the master cylinder to fully return when the brake pedal is released.
5. Hold the push rod in position, and tighten the locknut on the push rod against the clevis to secure in place.



- | | |
|----------------|-------------|
| 1. SPRING | 6. CLEVIS |
| 2. BRAKE PEDAL | 7. LOCKNUT |
| 3. WASHER | 8. PUSH ROD |
| 4. CLEVIS PIN | 9. BOOT |
| 5. COTTER PIN | |

Figure 10. Linkage Adjustment

Brake Lines



WARNING

Always wear the proper protective equipment including eye protection and petroleum-resistant gloves when handling oil. Thoroughly wash oil from exposed areas of skin as soon as possible.

Never check for leaks by putting hands on pressurized lines or components under pressure. Pressurized oil can be injected into the skin.

Pressure is transferred from the master cylinder to the transaxles through brake lines. These are metal tubes filled with oil connected by hydraulic fittings. Brake lines run below the floor plates, from the master cylinder to a tee fitting located near the front of the frame. They continue from there as separate left-hand (LH) and right-hand (RH) lines through the frame to a fitting on each transaxle. The drive wheel may be removed to access this connection. See Figure 11.

BRAKE LINE REPLACEMENT

1. Clean around the component(s) to be replaced to reduce the risk of contaminating the brake system.



CAUTION

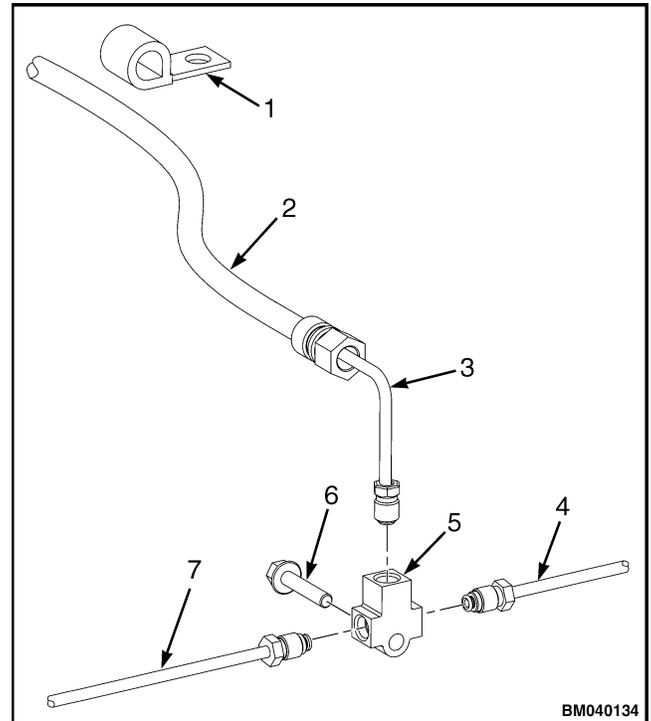
Disposal of fluids must meet local environmental regulations.

2. Disconnect the brake line component(s) which need replacement at both ends. Drain oil from brake lines into a suitable container.

NOTE: Clean up any spilled oil.

3. Remove the component(s) and install the new component(s) as necessary.

4. Bleed the brake lines. Refer to Bleed the Brake System in this section.



BM040134

- | | |
|-----------------------|----------------|
| 1. CLAMP | 5. TEE FITTING |
| 2. MAIN PRESSURE LINE | 6. CAPSCREW |
| 3. FITTING | 7. RH LINE |
| 4. LH LINE | |

Figure 11. Brake Lines

Parking Brake

The parking brake consists of two identical spring-applied, electrically-released brakes mounted directly to the drive motors. The controller breaks the power supply to the brake coils, engaging the parking brake when the truck is stopped. Pressing the emergency disconnect will apply the parking brake immediately in any mode of operation. The parking brakes may be released for towing by removing the floor plate from the operator compartment and pulling the manual release lever. This lever and cable assembly manually releases the parking brakes for towing. The following procedures detail the repair procedures for the lever and cable assembly and removal and installation procedures for the parking brakes.

MANUAL RELEASE LEVER

Adjust Cable

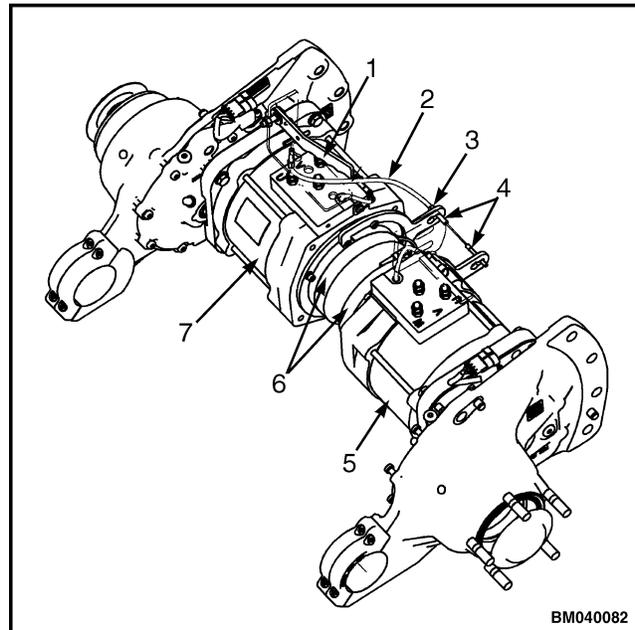
The manual release mechanism should be adjusted so that the brake is fully engaged when the lever is down, but is fully released when the lever has been pulled up.



CAUTION

If the cable is adjusted too tight, damage to the cable may occur when the manual release lever is used. Make sure the cable is adjusted so there is 2 to 4 mm (0.08 to 0.16 in.) extra travel available between the parking brake actuators when the manual release lever is UP.

1. Check the adjustment of the manual release lever by placing the lever in the UP position and checking the tension on the parking brake actuators. See Figure 12.
2. If the parking brake actuators have more than 2 to 4 mm (0.08 to 0.16 in.) of free travel available, adjust the nuts to tighten the cable and check free travel again.
3. If the parking brake actuators have less than 2 to 4 mm (0.08 to 0.16 in.) of free travel, adjust the nuts to loosen cable and check free travel again.
4. When the adjustment is within specification, tighten the nuts, lower the manual release lever and test for proper operation.



1. MANUAL RELEASE LEVER
2. CABLE
3. NUTS
4. PARKING BRAKE ACTUATORS
5. TRACTION MOTOR (LEFT)
6. PARKING BRAKE ASSEMBLIES
7. TRACTION MOTOR (RIGHT)

Figure 12. Manual Release Components

Replace Cable

1. Remove the floor mat and floor plates. The manual release lever must be in the down position.
2. Loosen the hardware securing the cable in place.
3. Press the parking brake actuators together so the cable can be removed from the parking brake actuators.
4. Disconnect the cable from the manual release lever.
5. Install the new cable to the manual release lever.
6. Secure the cable in position with hardware as removed.
7. Press the parking brake actuators together and install the cable to the parking brake actuators.

- Adjust the cable. See Adjust Cable.

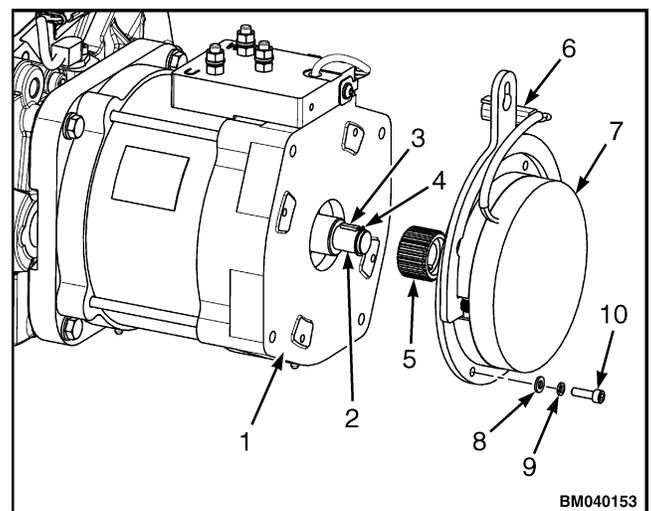
REMOVE

- Raise and safety chain the mast to prevent unexpected movement while working under the mast. See the section **Periodic Maintenance** 8000 YRM 1373 for lift truck models ERP16-20VF (ERP30-40VF) (A955) or **Periodic Maintenance** 8000 YRM 1339 for lift truck models ERP15-20VT (ERP030-040VT) (G807) for instructions on properly safety chaining the mast.
- Turn the key switch to the **OFF** position and disconnect the battery.
- Block the wheels of the truck to prevent unexpected movement.
- Disconnect the parking brake wiring harness near the parking brake assembly.
- Disconnect the manual release cable from the parking brakes. Refer to Replace Cable.
- Remove the four capscrews, lockwashers, and washers securing the brake assembly to the drive motor. See Figure 13.
- Slide brake assembly from the hub.
- Remove the retaining ring securing the hub to the motor shaft. Slide the hub off the motor shaft. Re-cover the Woodruff key.

INSTALL

- Install the Woodruff key to the motor shaft. See Figure 13.
- Install the hub onto the motor shaft with key groove aligned with the Woodruff key in the motor shaft.
- Install the snap ring into the groove in the motor shaft to secure hub in place.
- Position the brake assembly onto the hub and secure to the motor housing using four capscrews, lockwashers, and washers.

- Install brake wiring harness.
- Install the manual release cable to the parking brakes. Refer to Replace Cable.
- Remove safety chains from the mast. See the section **Periodic Maintenance** 8000 YRM 1373 for lift truck models ERP16-20VF (ERP30-40VF) (A955) or **Periodic Maintenance** 8000 YRM 1339 for lift truck models ERP15-20VT (ERP030-040VT) (G807) for instructions on properly removing safety chains from the mast.
- Remove blocks from the wheels.
- Connect the battery, sit in the seat and turn the key switch to the **ON** position. Listen for the parking brakes to release. Check for proper operation.



- | | |
|-------------------|-------------------|
| 1. TRACTION MOTOR | 6. BRAKE WIRING |
| 2. SHAFT | 7. BRAKE ASSEMBLY |
| 3. WOODRUFF KEY | 8. WASHER |
| 4. SNAP RING | 9. LOCKWASHER |
| 5. HUB | 10. CAPSCREW |

Figure 13. Parking Brake

**Thank you very much
for your reading.**

Please Click Here

**Then Get More
Information.**