

# INTRODUCTION

## GENERAL

This section has the description and the repair procedures for the brake assembly.

**NOTE:** Many of the procedures need the door open. To

open the door, remove the capscrew at the top of the left-hand post for the overhead guard to permit the post to move with the door. Then, remove the screw that fastens the door and open the door. Make sure to tighten the capscrew at the top of the post after closing the door.

## DESCRIPTION AND OPERATION

### BRAKE SYSTEM (See FIGURE 1.)

The brake assembly is a mechanical brake mechanism that is installed on the top of the traction motor. The brake assembly has a brake drum, two brake shoes, a cam and cam lever and the return spring for the brake shoes. The cam moves the brake shoes against the brake drum. A spring and linkage operates the cam lever to apply the brake. A hydraulic brake cylinder moves this same linkage to release the brake. The brake drum rotates with the armature of the traction motor. The brake shoe assembly and the linkage are fastened to the motor housing.

A master cylinder, reservoir and brake pedal assembly are fastened at the floor of the operator compartment. The brake pedal of the assembly goes through the floor plate for operation by the foot. There is a hydraulic line between the master cylinder and the brake cylinder. The master cylinder assembly operates the brake cylinder using hydraulic pressure from the master cylinder and pedal operation.

The brake is a normally On type of mechanism. The brake is fully applied when the brake pedal is fully released. Releasing the brake pedal permits a spring to move the cam lever and apply the brake shoes against the brake drum. The brake switch prevents the operation of the traction system when the brake pedal is released to apply the brake.

To release the brake, the operator must push on the brake pedal. The brake pedal moves the push rod of the master cylinder to apply hydraulic pressure to the brake cylinder. The push rod of the brake cylinder pushes the linkage against the spring to release the brake shoes. The shoe springs move the brake shoes away from the brake drum. The brake shoes will be gradually released as the brake pedal is pushed. The brake pedal must be pushed down as far as possible to completely release the brake. Brake line pressure operates the brake switch (On) when the brake pedal is pushed to release the brake. The brake switch must be On before the traction system can operate.

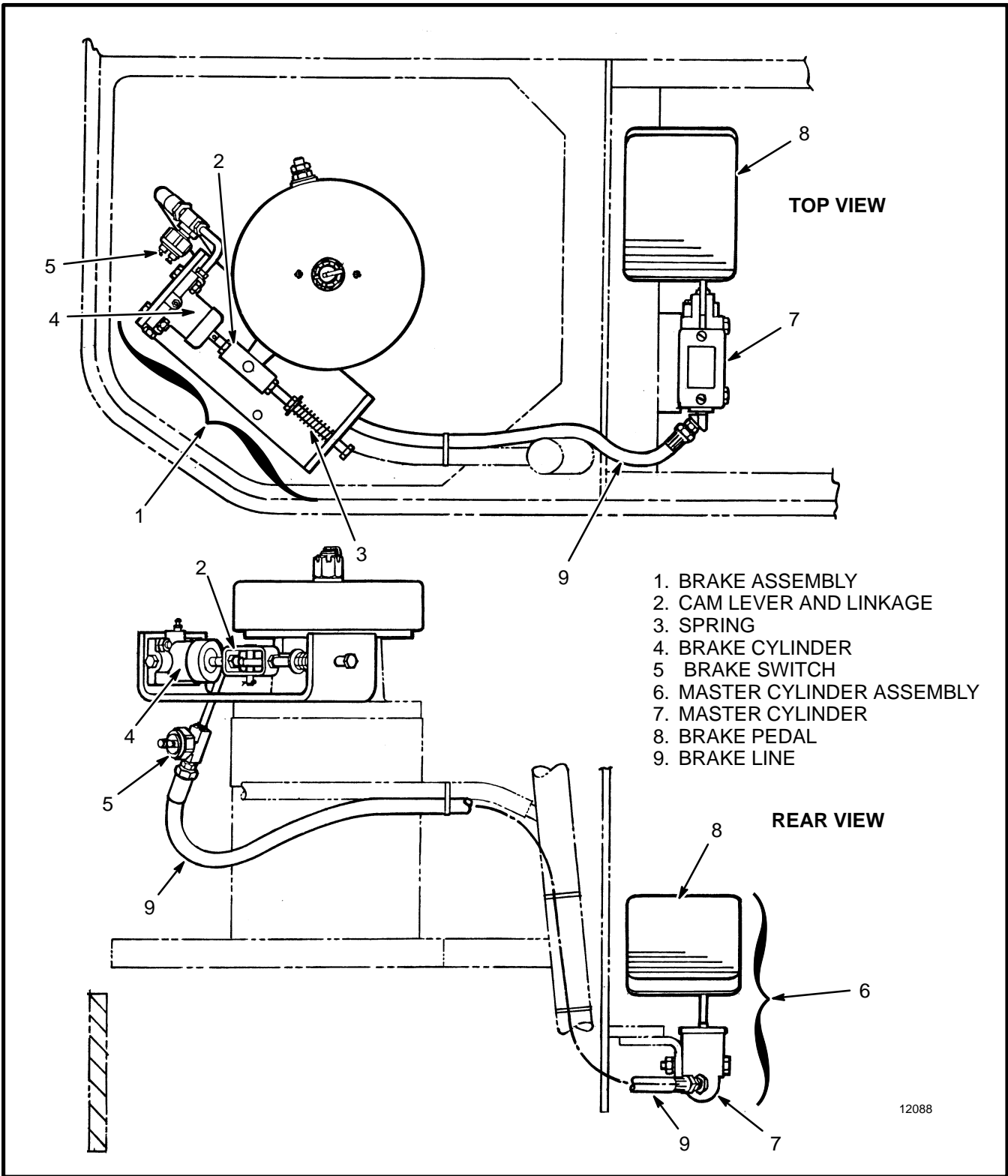


FIGURE 1. BRAKE SYSTEM

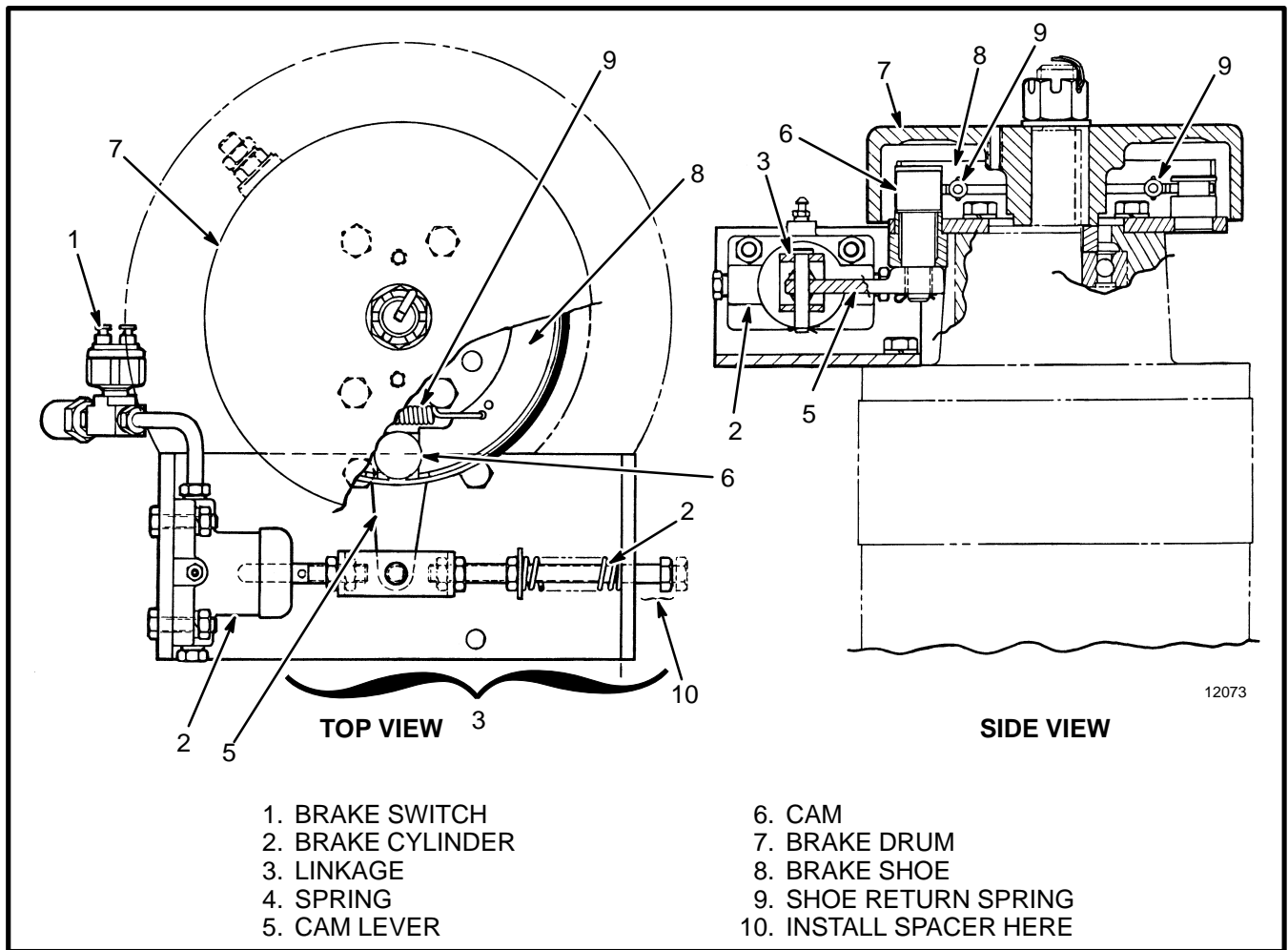


FIGURE 2. BRAKE ASSEMBLY

### BRAKE SWITCH (See FIGURE 1. and FIGURE 2.)

The brake switch is a hydraulic switch in the brake line between the master and brake cylinders. The switch is in the On position (closed) when there is pressure in the brake line. The brake switch must be closed before the traction system can be energized. There is pressure to

operate the brake switch when the brake pedal is pushed to release the brake.

**NOTE:** Early units have a switch with "clip-on" terminals. Later units have a switch with spade terminals.

**NOTE:** If it is necessary to move the lift truck without battery power, there must be an operator. The operator must push the brake pedal to release the brake.

## REPAIRS

**NOTE:** These procedures need the door open. To open the door, remove the capscrew at the top of the left-hand post for the overhead guard to permit the post to move with the door. Then, remove the screw that fastens the door and open the door. Make sure to tighten the capscrew at the top of the post after closing the door.

### BRAKE ASSEMBLY

#### Removal And Disassembly (See FIGURE 2. and FIGURE 3.)

**NOTE:** The complete brake assembly normally does not need to be removed to make repairs. Remove only the parts necessary to make the repair.

1. Disconnect the battery. Open the motor compartment door for access to the brake assembly. Put blocks on each side of the drive wheel to prevent movement of the lift truck.

**⚠ WARNING**

**Put a "DO NOT OPERATE" tag in the operator's compartment and remove the key as a warning to prevent operation. To help prevent injury or damage, do not operate the lift truck without a brake.**

2. Remove the cotter pin at the nut that fastens the brake drum. Remove the nut and washer. Have another person push and hold the brake pedal to release the brake shoes. Temporarily install a spacer under the head of the capscrew of the brake linkage. See FIGURE 2. Make sure the spacer will prevent the spring from moving the cam lever. Fasten the spacer to the linkage capscrew to prevent releasing the capscrew. Release the brake pedal and remove the brake drum.

3. Check for damaged or broken parts. Replace any damaged or broken parts. Replace both brake shoes if the minimum thickness of either brake lining is 2.4 mm (0.087 in) or less. Disconnect the shoe return springs and remove the brake shoes. See FIGURE 3.

**⚠ WARNING**

**If the brake cylinder and bracket will be removed, fasten the spacer at the head of the linkage capscrew. The spring has tension and can release with enough force to cause an injury.**

4. If it is necessary to remove the support plate, first remove the cam lever from the linkage. Remove the cotter pin and pin from the cam lever and linkage bracket. Move the cam lever out of the linkage bracket. Remove the four capscrews and lockwashers that fasten the support plate to the motor housing. Remove the support plate.

5. If it is necessary to remove the brake cylinder and bracket assembly from the motor housing, first remove the cam lever from the linkage. Remove the cam lever as described in step D. Remove the brake line from the brake cylinder. Install caps on the brake line and cylinder port. Remove the two capscrews and lockwashers that fasten the bracket assembly to the motor housing. Remove the brake cylinder from the bracket assembly.

**⚠ CAUTION**

**Brake fluid damages paint. Immediately remove any brake fluid that is on a painted surface.**

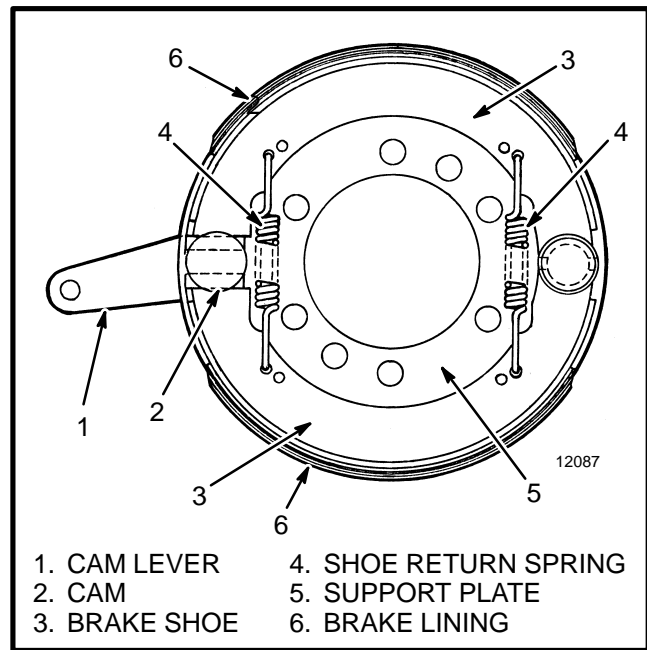


FIGURE 3. BRAKE SHOE ASSEMBLY

**Assembly And Installation**

**(See FIGURE 2. and FIGURE 3.)**

1. If removed, install the brake cylinder on the bracket assembly. Make sure the push rod is installed in the piston of the brake cylinder.
2. If removed, install the bracket assembly on the motor housing using the two capscrews and lockwashers. Tighten the capscrews.
3. If removed, connect the brake line to the brake cylinder.

**⚠ CAUTION**

**The air must be removed from the system before the brake will release correctly.**

4. If removed, install the brake shoe assembly on the motor housing using the four capscrews and lockwashers. Make sure the cam lever is in alignment with the linkage bracket. Tighten the capscrews.
  5. If removed, install the brake shoes on the support plate. Make sure the flat end of each shoe is installed against the cam. Install the shoe return springs in the correct holes. See FIGURE 3.
  6. Install the brake drum, washer and nut. Tighten the nut and install a new cotter pin at the nearest position of alignment.
- NOTE:** Do NOT install the pin to fasten the cam lever in the linkage bracket. The air must be removed from the system and the brake must be adjusted before the pin is installed.

**CAUTION**

Put a "DO NOT OPERATE" tag in the operator's compartment and remove the key as a warning to prevent operation. The brake will not release.

7. If the brake line was removed, remove the air from the brake system as described in CHECKS AND ADJUSTMENTS.

8. Adjust the brakes as described in CHECKS AND ADJUSTMENTS.

### MASTER CYLINDER AND PEDAL ASSEMBLY

#### Removal And Disassembly (See FIGURE 1. and FIGURE 4.)

1. Remove the floor plate of the operator compartment.

2. Remove the brake line from the master cylinder. Install caps on the brake line and master cylinder port or fitting.

**CAUTION**

**Brake fluid damages paint. Immediately remove any brake fluid that is on a painted surface.**

3. Hold the master cylinder assembly. Remove the two capscrews, washers and nuts that fasten the master cylinder to the lift truck frame.

**NOTE:** It is not necessary to remove the pedal from the master cylinder to replace the pedal pad.

4. If the master cylinder or pedal must be replaced, remove the pedal from the master cylinder. Use a punch to remove the pin that fastens the pedal to the master cylinder.

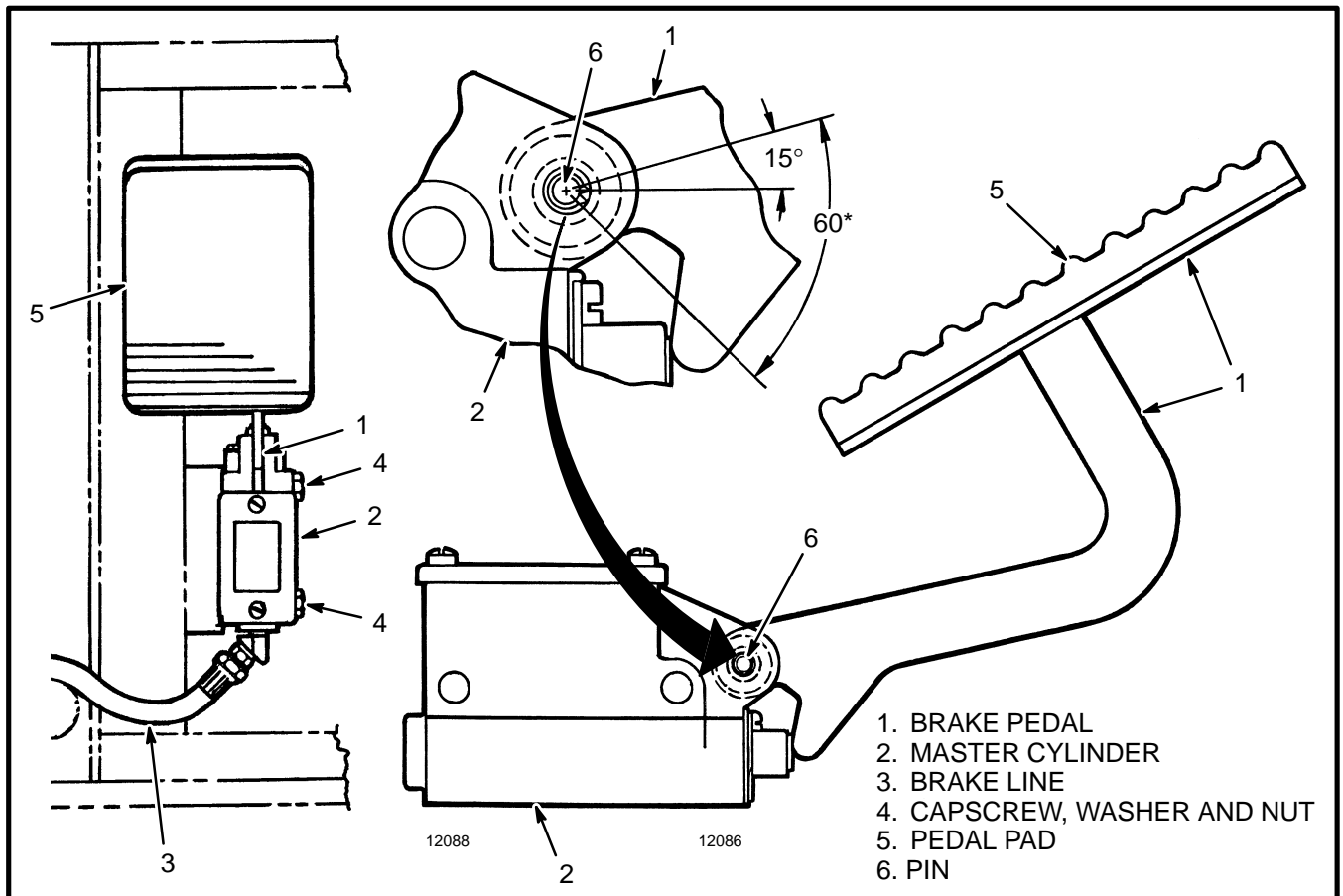


FIGURE 4. MASTER CYLINDER ASSEMBLY

#### Cleaning And Repair, Master Cylinder (See FIGURE 5.)

1. If the master cylinder is not being replaced, remove the cover and diaphragm gasket. Drain all the brake fluid.

**CAUTION**

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(More Content includes: Brake system, Capacities, and specifications, Frame, Hydraulic, System, Industrial battery, Main control, Valve, Mast repair, Fasteners, Schematics diagrams, Steering axle, Steering system, Wire harness repair And more)

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2. Remove the screw that fastens the retainer and piston assembly in the master cylinder housing.

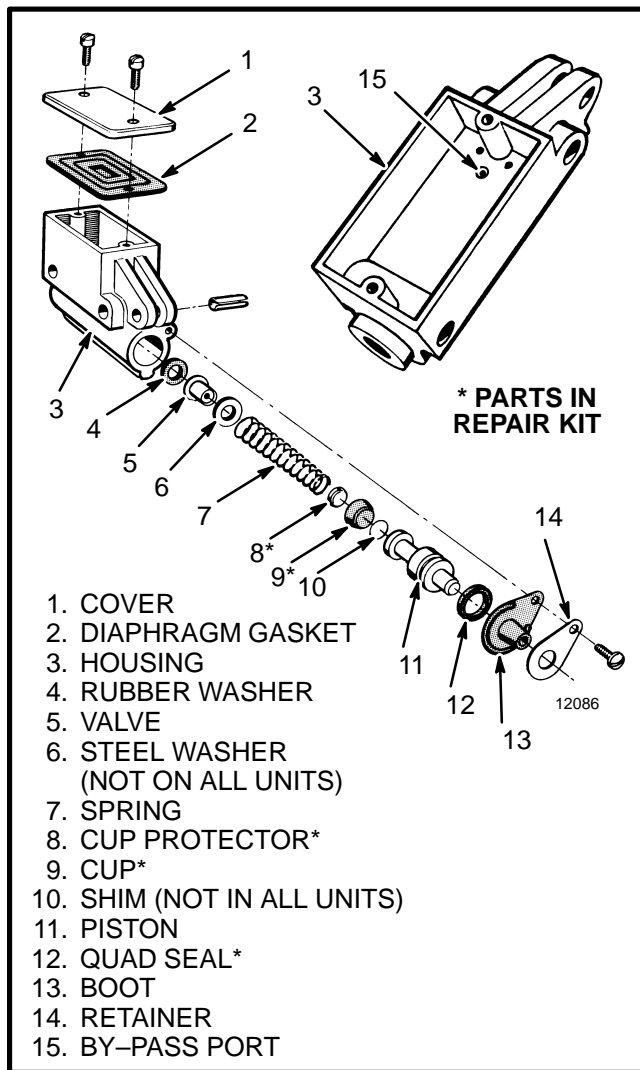


FIGURE 5. MASTER CYLINDER

**CAUTION**

Do NOT use mineral oil solvent to clean the master cylinder. Mineral oil will damage rubber seals. Clean the master cylinder using isopropyl alcohol, or a solvent approved for cleaning brake parts.

3. Remove the parts shown in FIGURE 5. Make sure the rubber washer is also removed from the bore. Clean the reservoir and all metal parts. Use a 0.38 mm (0.015 in) diameter wire to make sure the by-pass port has an open orifice. See FIGURE 5. Check the bore for wear and damage (scratches or holes). If the bore is worn or has damage, replace the master cylinder. If any parts are damaged and are not in the kit, replace the master cylinder.

4. Keep all parts clean. If the bore and parts are in good condition, lubricate the bore and all parts with clean brake fluid. Install the parts as shown in FIGURE 5. If there is a shim (FIGURE 5.) make sure to install this shim. Install new parts (\*) from the repair kit. Install the diaphragm gasket and cover to keep the reservoir clean. Make sure to install a cap at the brake line port.

**Assembly And Installation  
(See FIGURE 1. and FIGURE 4.)**

**NOTE:** Use an adhesive for rubber and metal to replace the pedal pad.

1. If removed, install the pedal on the master cylinder. Install the pin so that the slot is aligned as shown in FIGURE 4.

2. Install the brake line on the master cylinder. Make sure the fittings are tightened so that the brake line hose is correctly aligned after installation of the master cylinder.

3. Hold the master cylinder assembly to align the holes and install the capscrews, washers and nuts.

4. Remove the cover and diaphragm gasket. Fill the reservoir using clean brake fluid shown in the Maintenance Schedule of the section **PERIODIC MAINTENANCE, 8000 SRM 373.**

**CAUTION**

**Brake fluid damages paint. Immediately remove any brake fluid that is on a painted surface.**

5. Remove the air from the system as described in Checks And Adjustments.

**REPLACING BRAKE SWITCH  
(See FIGURE 1. and FIGURE 2.)**

1. Pull the Power Disconnect lever to disconnect the battery. Open the door for access to the brake assembly.

2. Disconnect the brake switch wires from the brake switch. Use a wrench to remove the brake switch from the tee fitting.

3. Install the replacement brake switch in the tee fitting.

4. Remove the air from the brake system as described in Checks And Adjustments.

## CHECKS AND ADJUSTMENTS

### HOW TO ADJUST THE BRAKE (See FIGURE 6.)

#### **CAUTION**

If the brake shoes need replacing, replace them before adjusting the brake. Check and replace the brake shoes as described in REPAIRS.

1. Pull the Power Disconnect lever to disconnect the bat-

tery. Open the door for access to the brake assembly.

2. Loosen the spring adjustment nut to remove the tension on the spring. Make sure the capscrew nuts are tight on each side of the linkage bracket.

#### **WARNING**

The springs for the brake shoes have tension and can move the cam lever to cause an injury. Use caution to prevent injury when you move the cam lever.

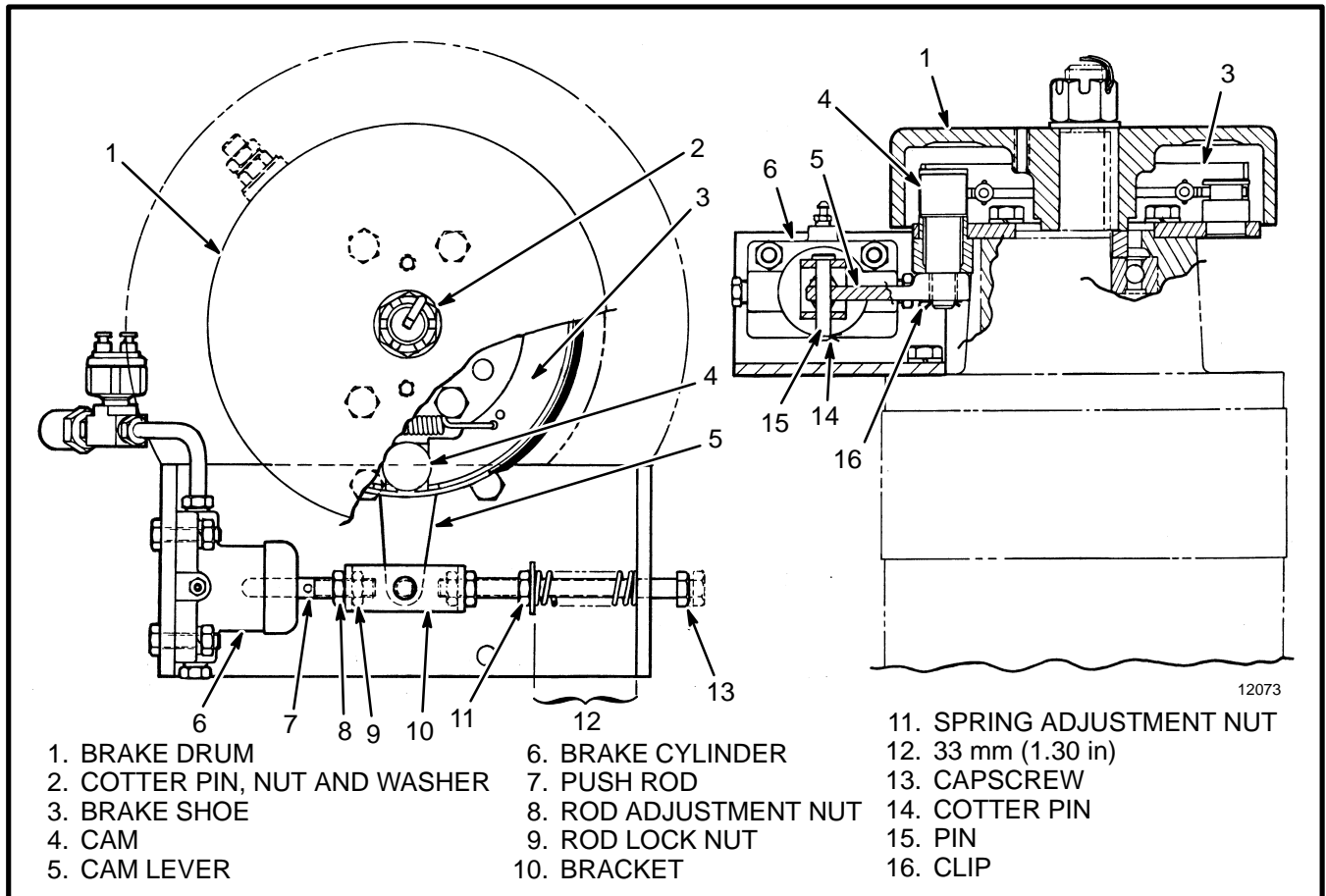


FIGURE 6. ADJUSTING BRAKE

3. If necessary, remove the cotter pin that fastens the pin through the cam lever and bracket. Remove the pin. Remove the clip that fastens the cam lever to the shaft of the cam. Temporarily remove the cam lever from the shaft of the cam. Temporarily install the cam lever at a new position and move the cam lever completely to the left. The cam lever must push the brake shoes tight against the brake drum at the end of lever movement. Keep installing the cam lever at a new position on the cam until the cam lever is in the last position shown in

FIGURE 6. The last position must be at the end of lever movement. The last position must also be as close as possible to 90 degrees as shown in FIGURE 6. Install a new clip to fasten the cam lever on the cam.

4. Install the pin through the bracket and cam lever to hold the cam lever in the bracket. Install a new cotter pin in the end of the bracket pin.

5. Loosen the rod adjustment and lock nuts on the push rod of the brake cylinder. It is necessary to temporarily



install a pin or tool in the hole of the push rod. Use the pin or tool to prevent rotation of the push rod. The hole is approximately 3.5 mm (0.125 in) in diameter.

6. Make sure the brake pedal is released to the Up position. Make sure that there is no spacer at the head of the capscrew (item 13). Rotate the spring adjustment nut for the spring length shown in FIGURE 6.

7. Temporarily remove the boot from the brake cylinder and move it toward the bracket (item 10) on the push rod. Push the piston of the brake cylinder to make sure it is in the fully retracted position. Hold the push rod against the piston. Make sure the lock nut (item 9) does not prevent moving the push rod against the piston. Rotate the adjustment nut (item 8) for a clearance of 3.2 mm (0.125 in) between the adjustment nut and the bracket. Move the push rod so that the adjustment nut is against the bracket and tighten the lock nut as tight as possible using your fingers. Do not let the push rod or adjustment nut rotate. Use a pin in the hole of the push rod to prevent rotation and tighten the adjustment nut against the bracket using a wrench. This adjustment will make a clearance of 3.2 mm (0.125 in) between the end of the push rod and the brake cylinder.

8. Install the boot on the brake cylinder.

## REMOVE THE AIR FROM THE BRAKE SYSTEM

1. Before the air is removed from the brake system, make sure the brake is correctly adjusted. Make sure the master cylinder reservoir is filled with brake fluid. Make sure you do not drain the reservoir and put additional air into the system during this procedure.

2. Put one end of a rubber hose on the special fitting at the top of the brake cylinder. Put the other end of the hose into a clear container of brake fluid. Make sure the spacer is removed from the brake linkage.

3. Loosen the special fitting one turn. Slowly push the brake pedal and hold it at the end of its stroke. Close the special fitting and release the brake pedal. Repeat the procedure until there are no air bubbles from the rubber hose. Check the level of the brake fluid in the reservoir for the master cylinder during the procedure. Make sure you do not drain the reservoir and put air into the brake system.

## TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE
The brake will not release.	The brake system is not adjusted correctly.
	There is air in the brake system.
	The master or brake cylinder is damaged.
The brake will not stop the lift truck.	The brake system is not adjusted correctly.
	The brake shoes are worn or damaged.
	There is oil or grease on the lining material.