INTRODUCTION

GENERAL

This section has a description and the service procedures for the brake system. The parts of the brake system include the master cylinder, the brake shoes, wheel cylinders, pedals and linkage, and the parking brake system. Some electric lift trucks have an optional seat brake. The linkage and adjustments are shown at the end of this section.

DESCRIPTION AND OPERATION

The master cylinder has a housing and a piston assembly. The reservoir for the brake fluid is part of the housing for the master cylinder. When the brake pedal is pushed down, the push rod moves the piston assembly. The primary cup pushes the brake fluid through the check valve to the wheel cylinders. The secondary cup keeps the fluid that is above the primary cup in the master cylinder.

When the brake pedal is released, the return spring causes the piston assembly to return to the stop in the bore. The return springs for the brake shoes cause the pistons in the wheel cylinders to retract. The fluid in the wheel cylinders is pushed back through the lines to the check valve. The fluid pressure in the brake lines causes brake fluid to flow through the check valve to the master cylinder bore. The check valve keeps a low pressure in the brake lines so that the lips of the seals in the wheel cylinders are held in position against the bores.

When the brake pedal is released quickly, the return spring moves the piston faster than the brake fluid can flow through the check valve. Fluid from the inlet port flows from behind the piston through the holes drilled in the piston. The flow of fluid bends the lip of the primary cup and permits fluid to enter the pressure chamber. A port between the reservoir and the bore permits brake fluid to fill the volume in the reservoir and the bore. This compensator port has a very small diameter and is found near the primary cup on the pressure side of the piston. The compensator port permits brake fluid to move to and from the pressure side of the system when the temperature changes. The pedal linkage must be adjusted correctly. If the piston does not return to the stop, the primary cup will keep the compensator port closed.

A service brake assembly is installed at each end of the drive axle. The service brakes for the E/J1.25–1.75XL (E25–35XL) and E/J2.00–3.00XL (E/J40–60XL) are similar in operation, but are different in design. When the brake pedal is pushed, fluid pressure from the master cylinder causes the pistons in the wheel cylinder to move out of their bores. The pistons cause the brake shoes to expand against the drum.

The parking brake system uses the service brake shoes. A hand lever uses cables5 to apply the brakes. The clearance between the brake shoes and the brake drum is adjusted automatically. The adjuster linkage turns the adjuster wheel to adjust the clearance. The primary shoe and the adjuster links move a small amount with the brake drum when the brakes are applied when the lift truck is traveling in the REVERSE direction. The linkage causes the adjustor wheel actuator to rotate the adjuster wheel. The adjuster wheel can only turn when there is clearance between the lining and the brake drum. The adjuster wheel can also be turned manually. A slot in the back plate permits access for manual adjustment on the E/J1.25–1.75XL (E25–35XL) series. The drive wheel must be removed for access to the hole in the drum to manually adjust the adjuster wheel on the E/J2.00–3.00XL (E/J40–60XL) series.

REPAIRS

MASTER CYLINDER

This repair section describes the repair of the master cylinder that is used in the XL series of electric lift trucks. The repair of the brakes for the E/J1.25–1.75XL (E25–35XL) series and the E/J2.00–3.00XL (E/J40–60XL) series is described in separate parts of this repair section.

Removal And Disassembly

1. Remove the floor plate. Disconnect the clevis from the brake pedal and remove the push rod. Disconnect the hydraulic line from the master cylinder port. Install a plug in the master cylinder port to prevent leakage of the brake fluid.

2. Remove the mount plate for the master cylinder. Remove the bolts and the master cylinder from the frame. Drain the fluid from the reservoir.

3. Put the master cylinder in a vise with soft jaws as shown in FIGURE 2.

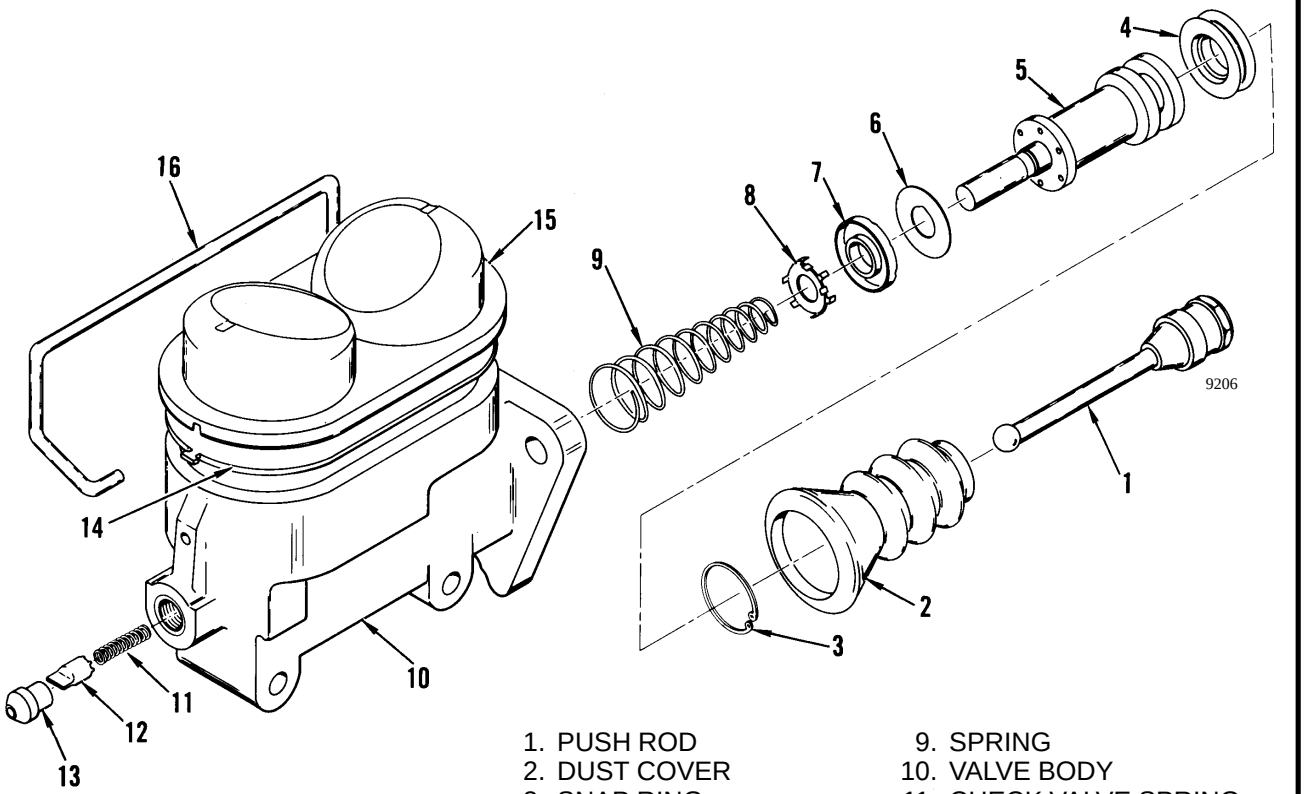
⚠ WARNING

There is a compressed spring behind the piston. Follow instructions in step 4. to avoid injury.

4. Hold the piston against the spring with a screwdriver. Remove the snap ring and carefully remove the piston assembly and spring.

5. Remove the check valve (12) and the spring (11). Use a thin rod as a driver to remove the check valve and tube fitting (13).

6. Clean all the parts with alcohol. DO NOT USE SOLVENT. Solvent will damage the rubber parts.



1. PUSH ROD
2. DUST COVER
3. SNAP RING
4. DOUBLE LIP CUP
5. PISTON
6. CUP PROTECTOR
7. PRIMARY CUP
8. CUP RETAINER
9. SPRING
10. VALVE BODY
11. CHECK VALVE SPRING
12. CHECK VALVE
13. TUBE FITTING
14. DIAPHRAGM GASKET
15. RESERVOIR COVER
16. RETAINER

FIGURE 1. MASTER CYLINDER

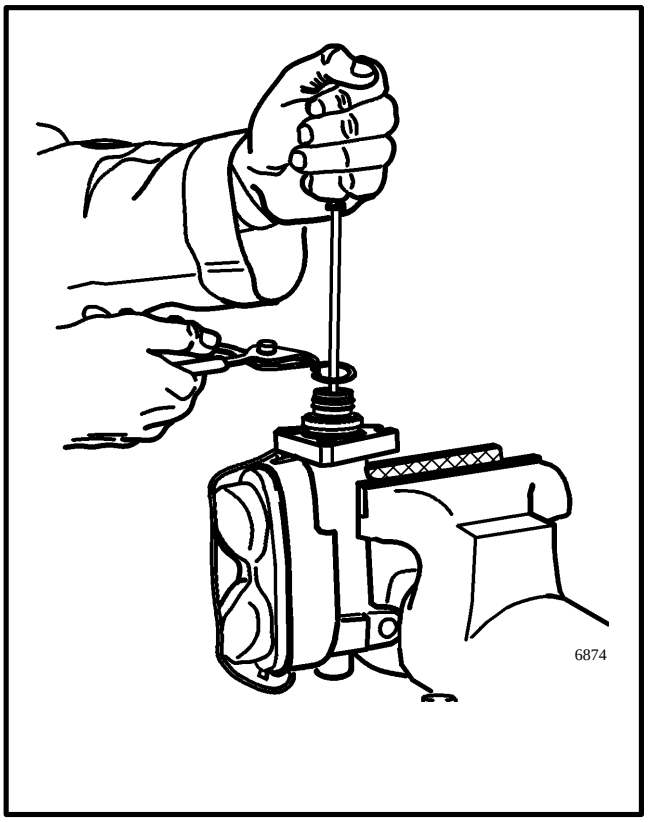


FIGURE 2. REMOVE THE PISTON

Inspection

Check the bore of the master cylinder for any damage. If any damage is found, replace the master cylinder.

Assembly

1. Use a repair kit. Install the parts in the order shown in FIGURE 1. Hold the piston in the cylinder with a screwdriver. Make sure the snap ring is in the correct position.

2. Install the check valve assembly. Install the diaphragm gasket and reservoir cover. Install the dust cover.

3. Fasten the master cylinder to the frame. Install the push rod and connect the clevis to the pedal. Install the mount plate for the brake switch and install the switch (if the lift truck is equipped with a brake switch).

4. Check the clearance between the push rod and the piston. Adjust the clearance so that the pedal can move approximately 1 to 4 mm (0.04 to 0.16 inch) before the piston begins to move. Loosen the jam nut and turn the push rod to adjust the clearance. If installed, adjust the brake switch so that the switch is closed when the brake pedal is in the up position.

5. Fill the reservoir with J1703 brake fluid. Operate the brake pedal to remove air from the master cylinder. Connect the hydraulic line to the master cylinder.

6. Remove the air from the system. Put the end of a small hose on the special fitting for removing the air from the wheel cylinder. Put the other end of the hose in a clean container. Loosen the special fitting one turn to permit brake fluid to flow from the wheel cylinder when the pedal is pushed. Slowly push the brake pedal and hold it at the end of its stroke. Close the special fitting. Repeat this procedure until air bubbles do not come from the hose. Make sure you do not completely drain the reservoir. Tighten the special fitting and remove the hose. Fill the reservoir. Repeat this procedure on the other wheel cylinder.

⚠ CAUTION

Do not permit brake fluid to flow from the special fitting on to any part of the axle. The brake fluid can cause damage to the oil and dust seals on the axle and cause a lubrication problem inside of the mast pivots. Brake fluid will also damage the paint on the lift truck.

BRAKES, E/J1.25–1.75XL(E25–35XL)

There are four configurations of tires available on the E/J1.25–1.75XL (E25–35XL) series of lift trucks:

E1.25–1.75XL (E25–35XL):

Standard Solid Tires
Wide Tread Solid Tires

J1.25–1.75XL (E25–35XL):

Pneumatic Tires (standard and wide tread)
Solid Tires that have a shape like pneumatic tires

The methods used to fasten the drive wheels to the hub are different for the standard and wide tread cushion tires and the rims used for the pneumatic tires. See FIGURE 3. When the drive tires are removed or installed, small changes in the procedure must be made for the differences in the axles. Do not mix types of tires or tread on the lift truck.

(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)

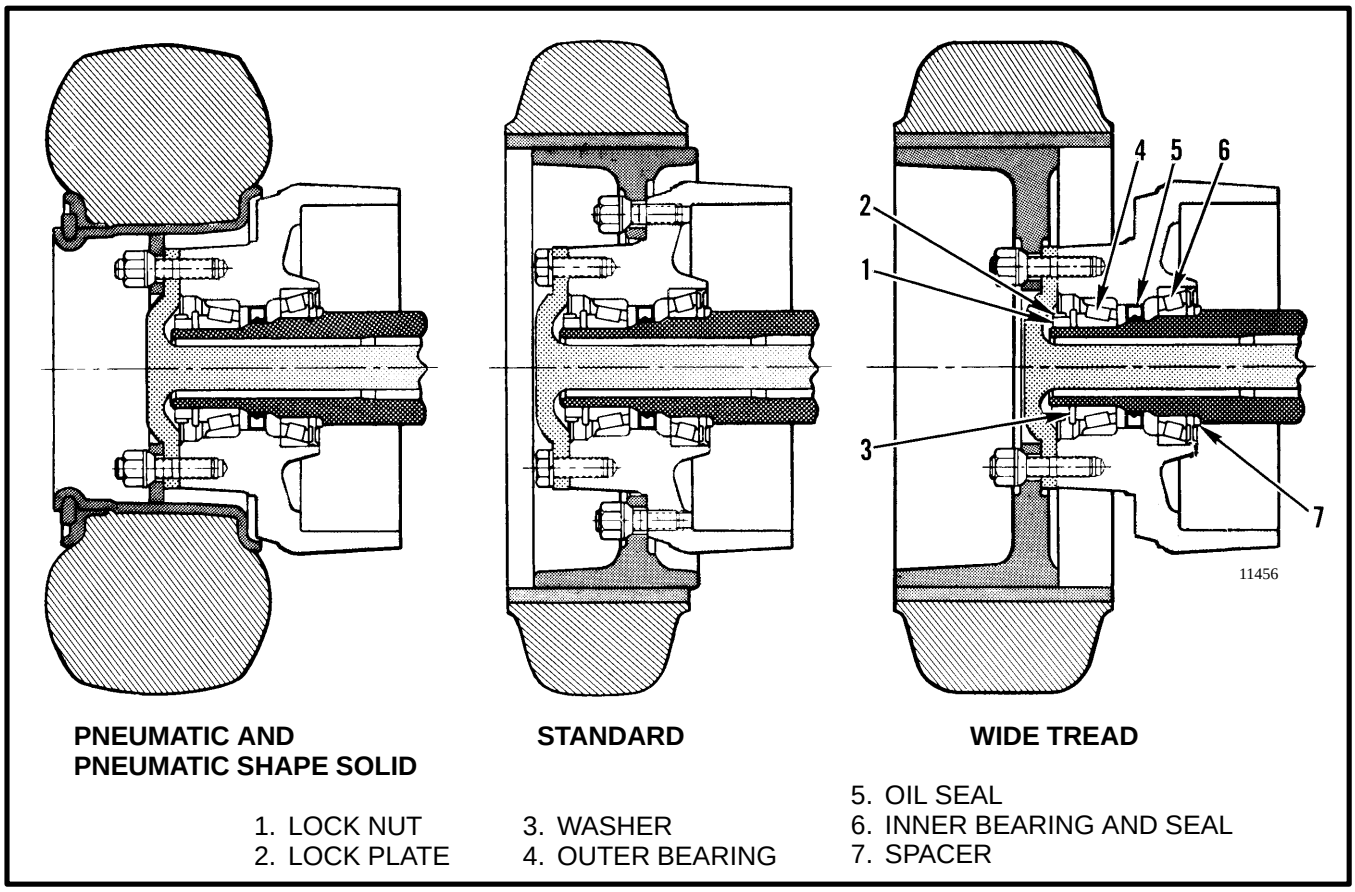


FIGURE 3. DRIVE WHEEL MOUNTS, E/J1.25–1.75XL (E25–35XL)

Removal And Disassembly

1. Tilt the mast fully backward and put blocks under the mast. Tilt the mast forward until the wheels are off of the floor. Put blocks under the frame.

2. Remove the drive wheels.

⚠ WARNING

If the lift truck has pneumatic tires, remove the air from the tires before the drive wheels are removed.

3. Remove the capscrews that hold the axle shaft to the hub. There are two holes with threads in the flange of the axle shaft. Put capscrews (M12 x 1.25) in these holes to loosen the axle shaft from the hub. The axle shaft can also be loosened from the hub by hitting the end of the axle shaft with a hammer. Remove the axle shaft.

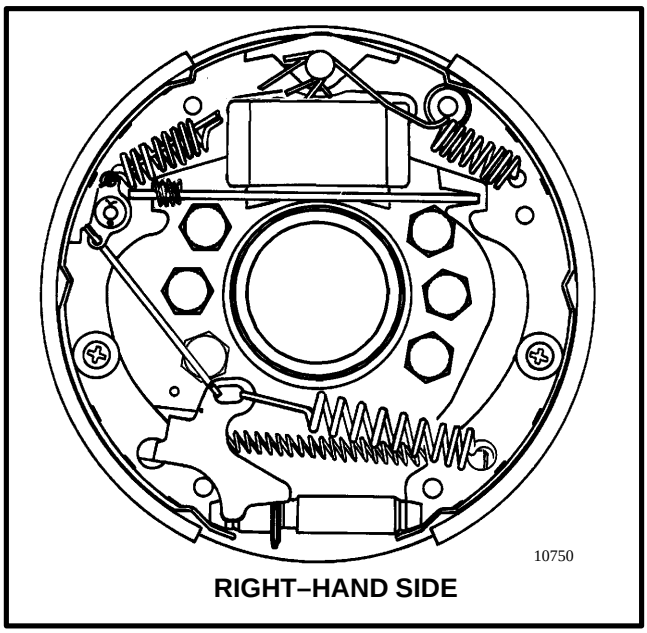


FIGURE 4. BRAKE ASSEMBLY

4. Raise the tabs on the lock plate, then remove the nut, lock plate and flat washer. Remove the brake drum and bearings. Be careful that you do not damage the oil seal. If the brake drum can not be easily

removed, turn the adjuster wheel to loosen the brake shoes. Use a second screwdriver to lift the adjuster wheel actuator away from the adjuster wheel so that the adjuster wheel can be turned.

5. Remove the spring and adjuster linkage from the brake shoes. Remove the spring assemblies that hold the brake shoes to the back plate. Remove the brake shoes. Disconnect the parking brake cable from the lever.

6. Disconnect the brake line at the wheel cylinder. Install a cap in the brake line. Remove the capscrews that hold the back plate to the axle mount. Remove the back plate.

7. Remove the wheel cylinder and the parking brake cable from the back plate.

8. If the parking brake cables need to be removed or replaced, remove the lever assembly from the lift truck. Remove the cables from the lever assembly.

Cleaning Procedures

⚠ WARNING

Brake linings can contain dangerous fibers. Inhaling the dust from these brake linings is a cancer or lung disease hazard. Do not make dust! Do not clean brake parts with compressed air or by brushing. Use vacuum equipment approved for brake dust or follow the cleaning procedure in this section. When the brake drums are removed, do not create dust.

Do not sand, grind, chisel, hammer, or change linings in any way that will make dust. Any changes to brake linings must be done in a restricted area with special ventilation. Protective clothing and a respirator must be used.

1. Do not release brake lining dust from the brake linings into the air when the brake drum is removed.

2. Use a solvent approved for cleaning of brake parts to wet the brake lining dust. Follow the instructions and cautions of the manufacturer for the use of the solvent. If a solvent spray is used, spray at a distance so that the dust is not released into the air.

⚠ CAUTION

Do not use an oil solvent to clean the wheel cylinder. Use a solvent approved for cleaning of brake parts. Do not permit oil or grease in the brake fluid or on the brake linings.

3. When the brake lining dust is wet, clean the parts. Put any rags or towels in a plastic bag or an airtight container while they are still wet. Put a "DANGEROUS FIBERS" warning label on the plastic bag or airtight container.

4. Any cleaning rags that will be washed must be cleaned so that fibres are not released into the air.

⚠ WARNING

Cleaning solvents can be flammable and toxic, and can cause skin irritation. When using cleaning solvents, always follow the safety instructions of the solvent manufacturer.

5. Clean the other parts of the brake system with with a brake cleaning fluid.

Inspection

1. Check the bore of the wheel cylinder for wear, damage and holes caused by corrosion. Install a new wheel cylinder if there is damage.

2. Check the return springs for damage. Inspect the back plate for wear where the brake shoes touch the back plate. Remove any grooves or install a new back plate.

3. Inspect the brake shoes for cracks or damage. If the linings or shoes are worn or damaged, new brake shoes must be installed. Maximum wear is to within 1 mm (0.025 in) of contact with the rivets, or the metal shoe on bonded linings. New brake shoes must be installed in complete sets.

⚠ WARNING

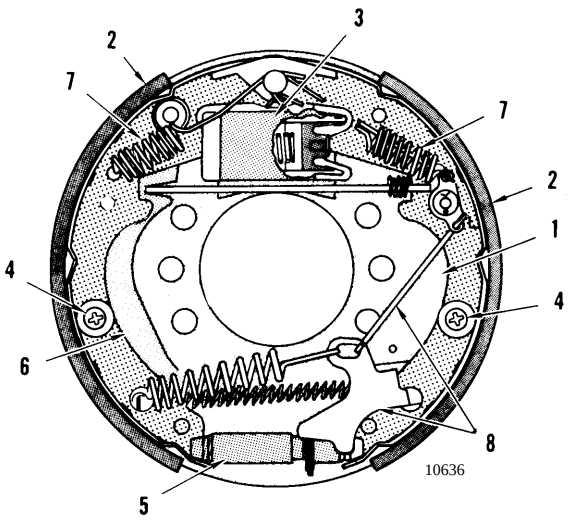
Install new brake shoes on both wheels if any shoe is damaged. The brake performance on both ends of an axle must be equal or the lift truck can be difficult to steer when the brakes are applied.

4. Inspect the brake drum for deep grooves or other damage. Use sandpaper on the surface for the brake shoes.

NOTE: If the brake drums require grinding, do not grind more than 1.5 mm (0.060 in) off the diameter. The maximum drum diameter, including the wear, is 231 mm (9.1 in). If the diameter is larger than this, install a new drum.

5. The teeth of the adjuster wheel must not be worn. The adjuster wheel must turn freely. Check the adjuster links for damage.

6. Make sure the parking brake levers move freely.



LEFT–HAND SIDE

1. BACK PLATE
2. BRAKE SHOE
3. WHEEL CYLINDER
4. BRAKE SHOE PIN
5. BRAKE ADJUSTER ASSEMBLY
6. LEVER, PARKING BRAKE
7. RETURN SPRING
8. LINKAGE, AUTOMATIC ADJUSTER
9. ADJUSTER WHEEL

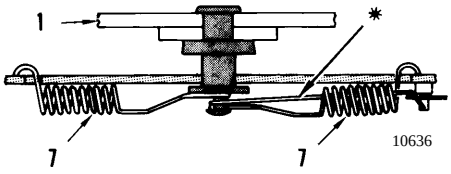


FIGURE 5.. BRAKE ASSEMBLY, E/J1.25–1.75XL (E25–35XL)

7. Check the surfaces of the seals for wear or damage.

Assembly And Installation

1. Assemble the wheel cylinder as shown in FIGURE 5. Use only HYSTER APPROVED parts.

2. Install the wheel cylinder on the back plate. Tighten the capscrews 10 to 14 N.m (90 to 120 lbf in).

3. Install the dust shield over the parking brake cable. Install the parking brake cable, cover plates and gasket in the back plate.

4. Install the brake shoe pin through the back plate. Use sealant Hyster Part No. 264159 between the back plate and the dust shield and between the dust shield and the axle mount. Install the dust shield and back plate to the axle mount. Tighten the capscrews for the back plate to 122 N.m (90 lbf ft).

5. Install the brake shoes and the pins, springs and retainers that hold the brake shoes to the back plate. Install the parking brake linkage, adjusting mechanism parts, spring plate and the return springs. Put an anti–seize compound on the threads of the adjuster wheel. Make sure the adjuster wheel is toward the rear of the lift truck.

⚠ WARNING

The brake adjuster assemblies used for the left and right brake assemblies have different threads. If the adjuster assemblies are installed in the wrong brake, the clearance of the brake shoes will increase with each application of the brake. The adjuster assembly for Right Brake has Left–Hand Threads. The adjuster assembly for Left Brake has Right–Hand Threads

6. Turn the adjuster wheel into the adjuster nut so that the adjuster assembly is in the shortest position.

7. Make sure the bottom edge of the adjuster wheel actuator for the adjuster wheel is just above the center of the teeth of the adjuster wheel.

8. Lubricate the inner bearing cone and install the spacer with the chamfer toward the differential. Lubricate the inner bearing and install the inner bearing, brake drum and outer bearing on the axle housing.

9. Install the washer, lock plate and nut. Tighten the nut to 200 N.m (150 lbf ft) while rotating the brake drum. Loosen the nut until the brake drum rotates freely. The torque must be less than 27 N.m (20 lbf ft). Tighten the nut to 34 N.m (25 lbf ft) or to the first alignment position after 34 N.m (25 lbf ft). Bend the tab on the lock plate to hold the nut.

10. Apply sealant (Hyster Part No. 264159) to the flange of the axle shaft. Install the axle shaft. Tighten the capscrews to the following torque:

M8 x 1.25 x 16 capscrews = 20 N.m (15 lbf ft),
M14 x 1.5 x 35 capscrews = 155 N.m (115 lbf ft)

11. Install the wheels. Tighten the wheel nuts to 155 N.m (115 lbf ft).

12. Adjust the clearance of the brake shoes with the adjuster wheel. Use a brake adjuster tool or screwdriver to adjust the brake shoes. Turn the adjuster wheel until the hub will not turn. Lift the adjuster wheel actuator with a second screwdriver. Use the brake adjuster tool to loosen the adjuster wheel approximately 20 teeth. As the lift truck travels in the Reverse direction and the brake are applied, the brakes will adjust to the correct clearance and stop the lift truck.

⚠ WARNING

If there is too much clearance, the pedal will go to the floor plate and the automatic adjusters will not operate because the brakes will not be applied. If the clearance is too tight, the automatic adjuster can wear the adjuster wheel so that the brakes will not adjust automatically.

13. Remove the air from the brake system as described in Remove Air From The Brake System in this section.

14. Remove the blocks from under the frame. Tilt the mast backward to remove the blocks from under the mast. Push on the brake pedal. The pedal must not touch the floor plate. Move the lift truck in the Reverse direction and push on the brake pedal to operate the adjusting mechanism. Do this procedure 10 times.

Adjust The Service Brakes

Put the lift truck on blocks so that the drive wheels can be rotated. A slot in the back plate permits access to the adjuster wheel. Use a brake adjuster tool to adjust the brake shoes so that the brake drum will not rotate. Push the adjuster wheel actuator away from the adjuster wheel with a small screwdriver. Use the brake adjuster tool to loosen the adjuster wheel approximately 20 teeth.

Install the drive wheels. Remove the lift truck from the blocks and check the operation of the brakes. Operate the lift truck in the Forward and Reverse directions. Stop the lift truck 10 times in each direction.

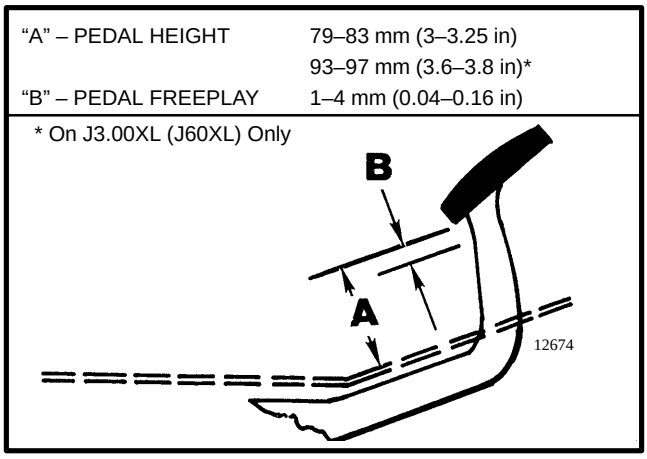


FIGURE 6. ADJUST THE BRAKE PEDAL

Adjust the brake pedal for the correct dimensions as noted in FIGURE 6. Loosen the lock nut from the push rod of the master cylinder and make the adjustment. Apply loctite to the threads and tighten the locknut again.

Adjust The Parking Brake

Make sure that the service brakes are adjusted and that the operation of the automatic adjuster mechanism is correct. Test the operation of the parking brake. When the parking brake is adjusted correctly, the parking brake will hold a lift truck with a capacity load on a 15% grade. Turn the knob on the end of the hand lever to adjust the parking brake. Do not tighten the adjustment so that the brakes are applied when the hand lever is released.

Remove The Air From The Brake System

Before the air is removed from the brake system, make sure the service brakes are adjusted. Fill the master cylinder reservoir with brake fluid. Put the end of a small hose on the special fitting for removing the air from the wheel cylinder. Put the other end of the hose into a clean container. Loosen the special fitting one turn. Slowly push the brake pedal and hold it at the end of its stroke. Close the special fitting. Repeat the procedure until there are no bubbles in the container.

Check the level of the brake fluid in the reservoir for the master cylinder during the procedure. Make sure to keep the brake fluid at the correct level. Repeat the procedure for the other wheel cylinder. If there is still air in the system, the air must be removed from the master cylinder. Slowly push on the brake pedal. Release the pedal slowly. Repeat this procedure until no air bubbles enter the reservoir.

⚠ CAUTION

Do not permit brake fluid to flow from the special fitting on to any part of the axle. The brake fluid can cause damage to the oil and dust seals used on the axle and cause a lubrication problem inside of the mast pivots. The brake fluid can also damage the paint.

BRAKES, E/J2.00–3.00XL (E/J40–60XL)

Removal And Disassembly

1. Tilt the mast fully backward. Put blocks under the mast. Tilt the mast forward until the wheels just touch the floor. Put blocks under the lift truck frame.

2. Remove the capscrews that hold the axle shaft to the hub. Remove the axle shaft.

3. Bend the lock plate and remove the nut that holds the axle bearing. Remove the washer and the bearing cone. Pull the wheel assembly from the axle spindle.

4. If the wheel assembly cannot be removed easily, remove the wheel from the hub. Align the hole in the brake drum with the adjuster wheel. Use a second screwdriver to lift the the actuator away from the adjuster wheel. Use a screwdriver to turn the adjuster wheel to loosen the brake shoes. Remove the hub and drum assembly. Do not damage the oil seal when the hub and brake drum are removed.

5. Remove the return springs with spring pliers.

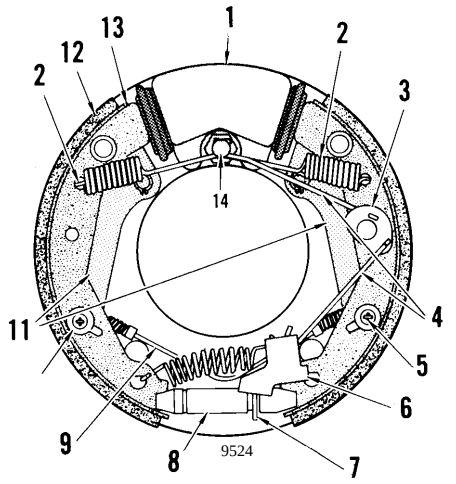
NOTE: The return springs are not the same. Make sure the springs are installed in the same positions from which they were removed. See FIGURE 13.

6. Remove the spring assemblies that hold the brake shoes to the back plate. Remove the brake shoes and adjuster assembly.

7. Remove the brake line from the wheel cylinder. Install a cap on the brake line. Remove the capscrews that hold the back plate to the axle housing.

8. Remove the boots, pistons, cups and springs from the wheel cylinder.

9. Remove the snap rings from the parking brake levers. Remove the parking brake levers from the back plate.



1. WHEEL CYLINDER
2. RETURN SPRING
3. PIVOT PLATE
4. LINK
5. PIN, HOLD–DOWN
6. ADJUSTER WHEEL ACTUATOR
7. ADJUSTER WHEEL
8. ADJUSTER NUT
9. CABLE, PARKING BRAKE
10. RETAINER
11. LEVERS FOR PARKING BRAKE
12. LINING FOR BRAKE SHOE
13. BRAKE SHOE
14. ANCHOR

FIGURE 7. BRAKE ASSEMBLY

Cleaning Procedures

⚠ WARNING

Brake linings can contain dangerous fibers. Inhaling the dust from these brake linings is a cancer or lung disease hazard. Do not make dust! Do not clean brake parts with compressed air or by brushing. Use vacuum equipment approved for brake dust or follow the cleaning procedure in this section. When the brake drums are removed, do not create dust.

Do not sand, grind, chisel, hammer, or change linings in any way that will make dust. Any changes to brake linings must be done in a restricted area with special ventilation. Protective clothing and a respirator must be used.

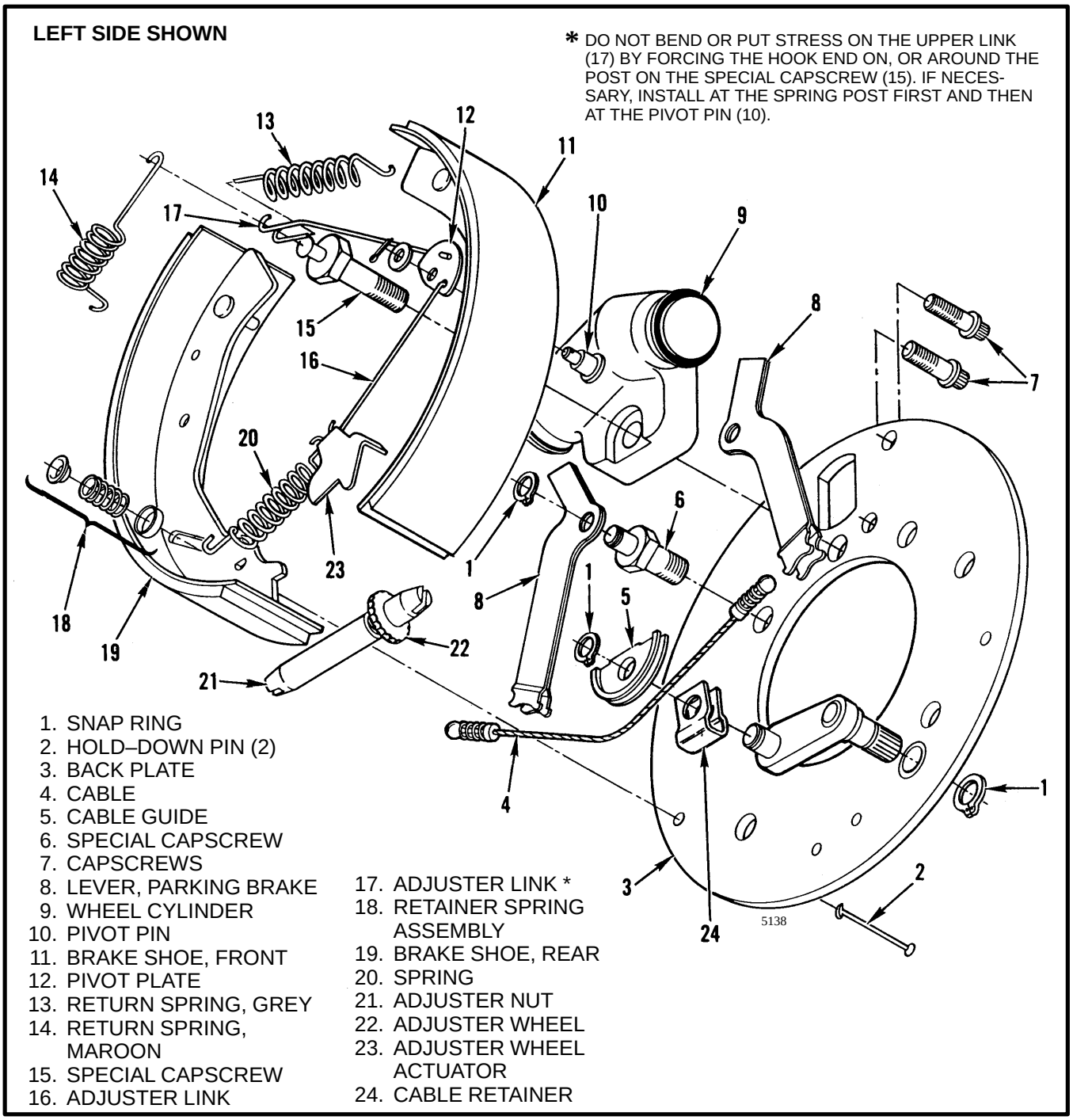


FIGURE 8. BRAKE ASSEMBLY, E/J2.00–3.00XL (E/J40–60XL)

1. Do not release asbestos dust into the air when the brake drum is removed.

2. Use a solvent to wet the asbestos dust on the parts of the brake. If a solvent spray is used, do not create asbestos dust with the spray.

3. When the asbestos dust is wet, clean the parts. Put any cloth or towels in a plastic bag or an airtight container while they are still wet. Put a "DANGEROUS FIBERS" warning label on the plastic bag or airtight container.

4. Any cleaning cloths that will be washed must be cleaned so that asbestos fibers are not released into the air.

DO NOT use solvent to clean the master cylinder, wheel cylinder, or the brake linings. Do not get oil or grease in the brake fluid or on the linings.

Use alcohol to clean the master cylinder, wheel cylinders and the brake linings. Use solvent to clean all of the other parts of the brake system.

Inspection

1. Check the bore of the wheel cylinder for holes or scratches. Replace a damaged wheel cylinder.

2. Check the return springs for damage. Inspect the back plate for wear where the brake shoes touch the back plate. Grind the back plate if it is not smooth.

3. Replace the brake shoes if they are cracked, damaged, or have more than 50% wear. If one brake shoe is replaced, both brake shoes on that wheel must be replaced.

4. Inspect the brake drum for deep grooves or other damage. Use sandpaper on the surface for the brake shoes.

5. The teeth of the adjuster wheel must not be worn. The adjuster wheel must turn freely. Check the adjuster links for damage.

NOTE: If the brake drums require grinding do not grind more than 1.5 mm (0.060 in) off the diameter. The maximum drum diameter, including the wear, is 262 mm (10.22 in). If the diameter is larger than this, replace the drum.

6. Make sure the parking brake levers move freely.

7. Check the surfaces of the seals for wear or damage.

Assembly

1. Assemble the wheel cylinder as shown in FIGURE 9. Use only HYSTER APPROVED parts.

2. Install the wheel cylinder on the back plate. Make sure the special fitting for removing the air is at the top. Put Loctite® 271 on the threads of the capscrews. Tighten the two capscrews that are near the top of the wheel cylinder to 78 to 85 N.m (58 to 66 lbf ft). Tighten the two larger capscrews to 80 to 102 N.m (67 to 75 lbf ft).

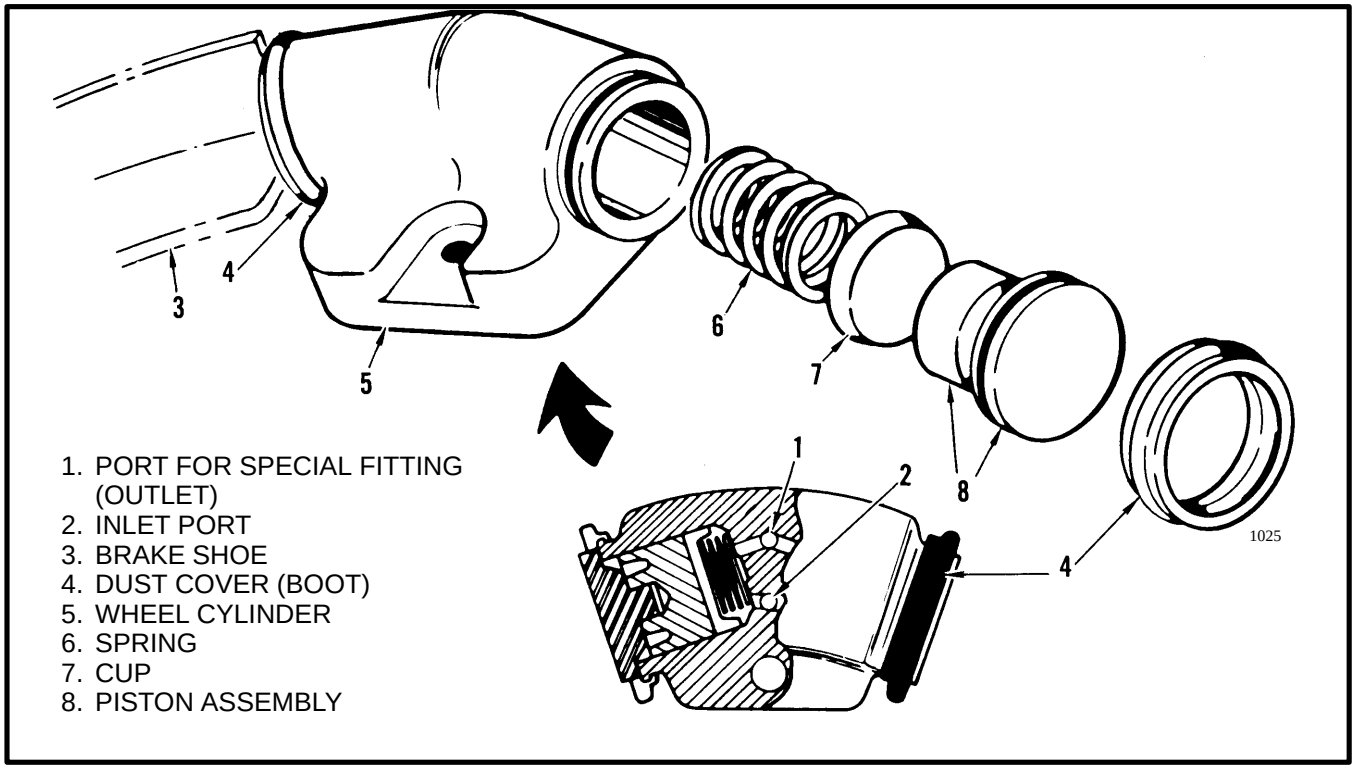


FIGURE 9. WHEEL CYLINDER

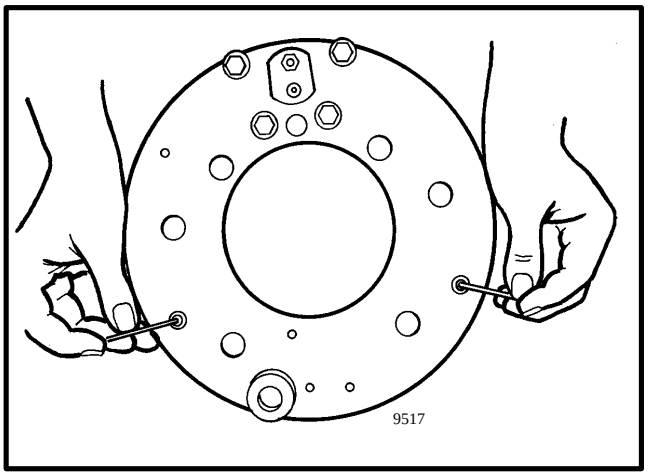


FIGURE 10. INSTALL THE PINS

3. Put the pins that hold the brake shoes through the back plate. See FIGURE 10. Install the back plate on the axle housing. Tighten the two special capscrews for the parking brake levers to 245 N.m (180 lbf ft). Tighten the three capscrews that hold the back plate to the axle housing to 245 N.m (180 lbf ft). The special capscrew that is the anchor for the return springs must be tightened to 125 N.m (84 lbf ft). See FIGURE 11.

4. Install the parking brake levers and cable. Install the snap rings. Install the cable, guide, cable retainer and snap ring on the crank for the parking brake.

NOTE: The upper link for the left brake assembly is not the same as the upper link for the right brake assembly. Install the pivot plate so that the letter “L” is visible on the left brake assembly. Install the pivot plate on the right brake assembly so that the letter “R” is visible.

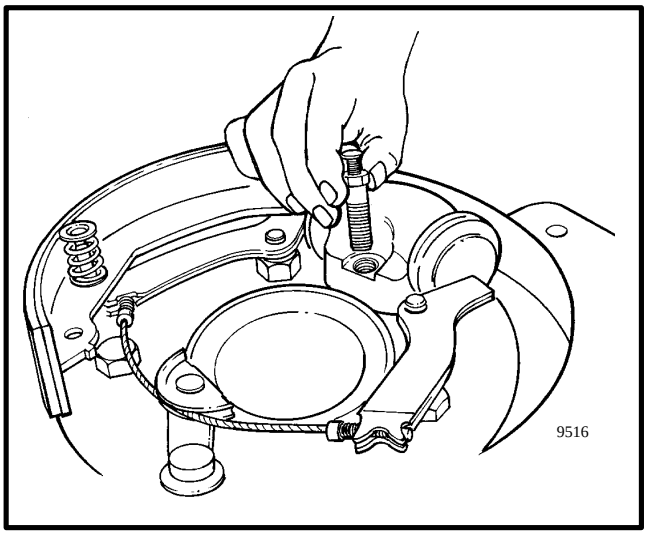


FIGURE 11. INSTALL THE ANCHOR PINS

5. Install the pivot pin through the brake shoe that is toward the rear of the lift truck. Install the links in the pivot plate. Install the pivot plate, links and cotter pin.

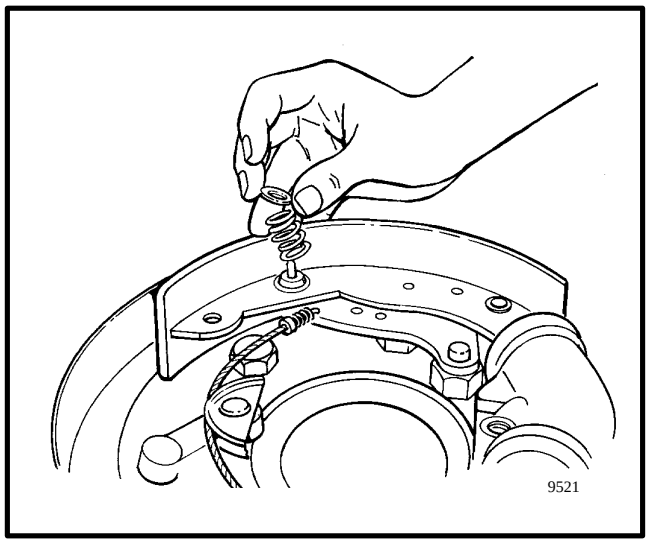


FIGURE 12. INSTALL THE RETAINER SPRING ASSEMBLY

6. Use a small amount of white grease to lubricate the back plate where the shoes touch. Install the brake shoes. Put a spring seat, spring and retainer on the pin. Push on the retainer and rotate the retainer 90 degrees. Make sure the retainer is in the correct position. Install the other spring assembly.

7. Put an anti–seize compound on the threads of the adjuster wheel. Install the adjuster wheel assembly between the two brake shoes. Make sure the adjuster wheel is toward the rear of the lift truck. Turn the adjuster wheel into the adjuster nut so that the adjuster assembly is in its shortest position. (Make sure that the adjuster wheel is free to turn so that the adjuster wheel actuator can turn the adjuster wheel.) This action permits the brake drum to be more easily installed over the brake shoes.

⚠ WARNING

The brake adjuster assemblies used for the left and right brake assemblies have different threads. If the adjuster assemblies are installed in the wrong brake, the clearance of the brake shoes will increase with each application of the brake. The adjuster assembly for Right Brake has Left–Hand Threads. The adjuster assembly for Left Brake has Right–Hand Threads

8. Install the link in the adjuster wheel actuator. See FIGURE 13. Put the adjuster wheel actuator (7) in the

hole in the brake shoe. Install the spring (6) to the adjuster wheel actuator and the brake shoe. The spring must be installed in the position shown. Install the return springs (1) and (5) for the brake shoes. Make sure the return springs are installed in the correct positions. See FIGURE 13.

NOTE: A gray spring (2) is installed on the front shoe of the right and left side brake of the lift truck. A maroon spring (1) is installed on the rear shoe of the right and left side brake.

9. Make sure the bottom edge of the adjuster wheel actuator is just above the center of the teeth of the adjuster wheel.

NOTE: The hub and drum assembly can be temporarily fastened to the wheel to prevent damage to the inner oil seal when the hub is installed on the axle. Align the height of the axle housing with hub bearings. Put grease under the wheel and slide the wheel toward the axle housing. Install the outer bearing and nut. Remove the wheel from the hub so that the clearance of the brake shoes can be adjusted.

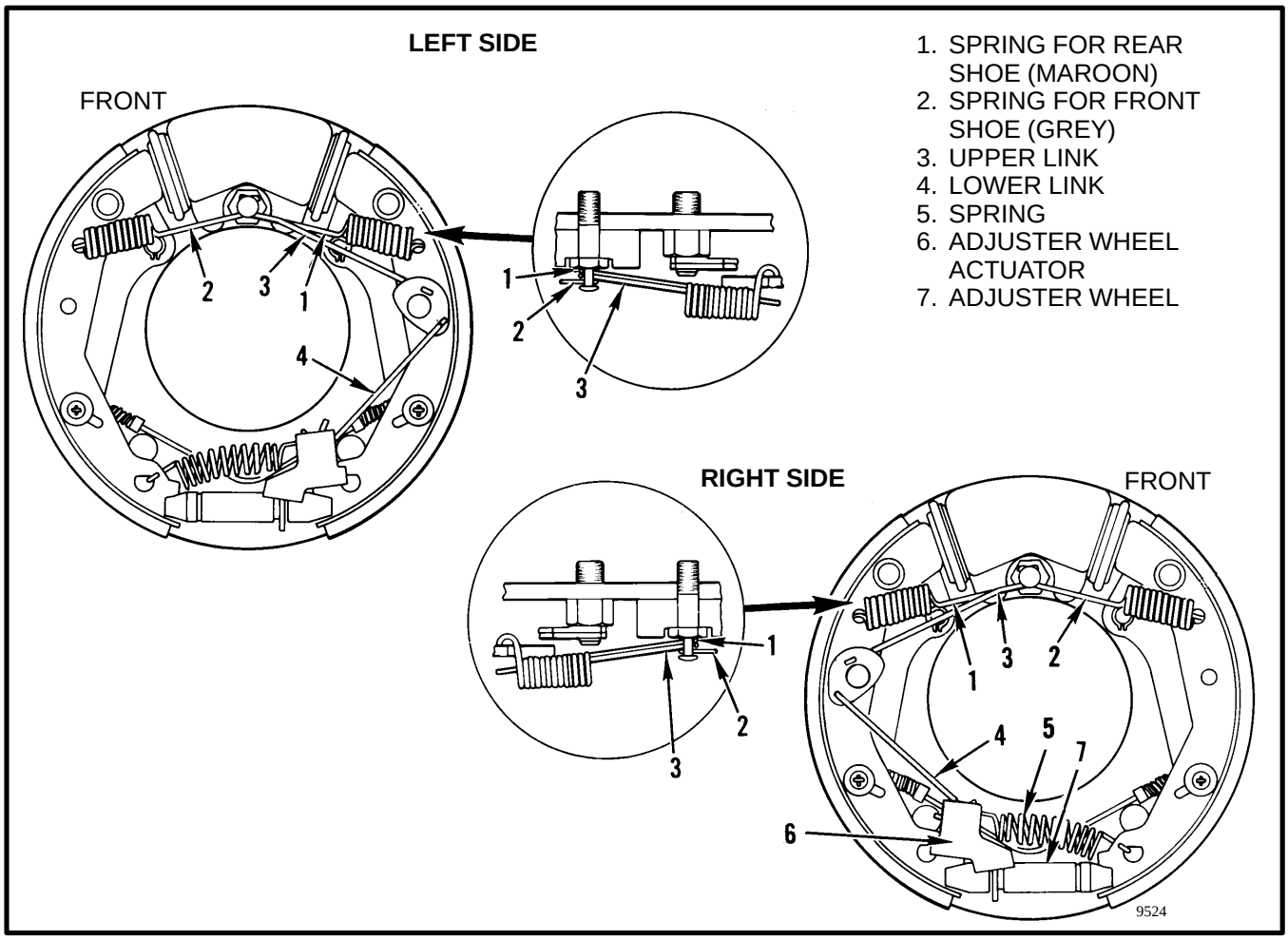


FIGURE 13. INSTALLATION OF THE SPRINGS, E/J2.00–3.00XL (E/J40–60XL)

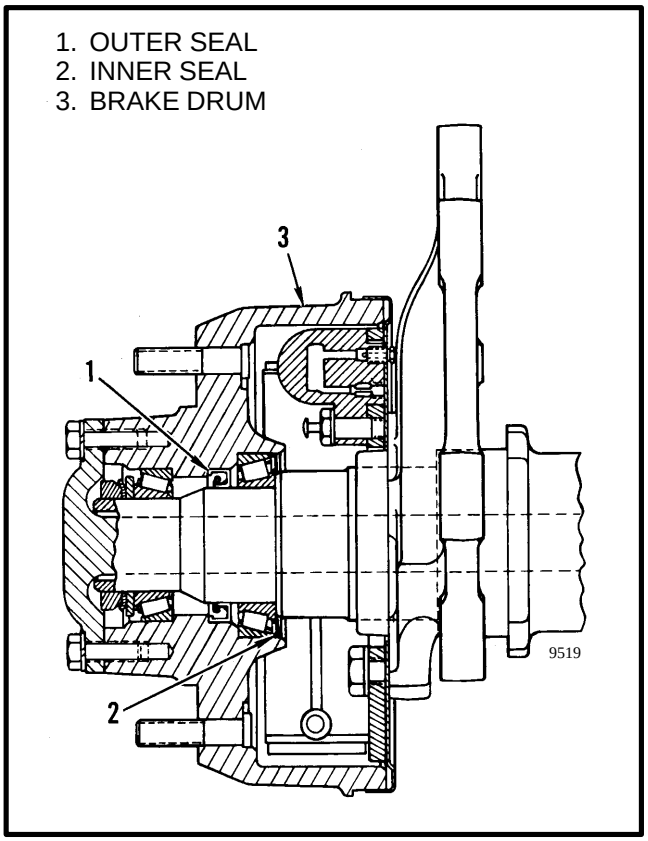


FIGURE 14. GREASE SEALS

10. Clean the hub bearings. Lubricate the hub bearings with the correct amount of wheel bearing grease. Install the hub bearings and seals in the hub. Install the assembly on the axle housing. See FIGURE 14.

11. Tighten the nut to 200 N.m (150 lbf ft) while rotating the hub to adjust the hub bearings. Loosen the nut until the hub turns freely. The torque must be less than 27 N.m (20 lbf ft). Tighten the nut to 34 N.m (25 lbf ft) or until the first alignment position after 34 N.m (25 lbf ft). Bend the lock plate over the nut.

12. Adjust the clearance of the brake shoes. Use a brake adjustment tool or a screwdriver to adjust the brakes through the hole in the drum. Turn the adjuster wheel until the hub will not turn. Lift the actuator from the adjuster wheel with a second screwdriver. Turn the adjuster wheel approximately 20 to 25 teeth in the opposite direction. The brakes will adjust to the correct clearance when they are applied when the lift truck is traveling in the Reverse direction.

⚠ WARNING

If there is too much clearance, the pedal will go to the floor plate and the automatic adjusters will not operate because the brakes will not be applied. If the clearance is too tight, the adjuster wheel actuator can wear a space on the adjuster wheel so that the brakes will not adjust automatically.

13. Put sealant on the flange of the axle shaft. Install the axle shaft and capscrews. Tighten the capscrews to 98 N.m (72 lbf ft).

14. Install the parking brake lever to the crank. The position of the lever must be between horizontal and 21° below horizontal towards the rear of the lift truck. Connect the cable to the lever. See FIGURE 15.

NOTE: When the clamp lever is at the "full applied" position the cable will be approximately 90° to the lever for maximum mechanical advantage. The knob on the hand lever control can help adjust the position of the clevis, but it will not adjust the cable so that the lever has more stroke.

15. Remove the air from the brake hydraulic system. See "Removing The Air From The Brake System" for the procedure.

16. Install the wheel on the hub. Tighten the wheel nuts to 237 to 305 N.m (175 to 225 lbf ft).

17. Tilt the mast backward to remove the blocks. Push on the brake pedal. The pedal must not touch the floor plate. Move the lift truck in Reverse and push on the brake pedal to permit adjusting mechanism to operate.

Adjust The Service Brakes

Put the lift truck on blocks so that the drive wheels can be removed. Remove the drive wheels. Use a brake adjuster tool to adjust the brake shoes so that the brake drum will not rotate. Push the adjuster wheel actuator away from the adjuster wheel with a small screwdriver. Use the brake adjuster tool to loosen the adjuster wheel approximately 25 teeth.

Install the drive wheels. Remove the lift truck from the blocks. Operate the lift truck in the Forward and Reverse direction. Stop the lift truck 10 times in each direction.

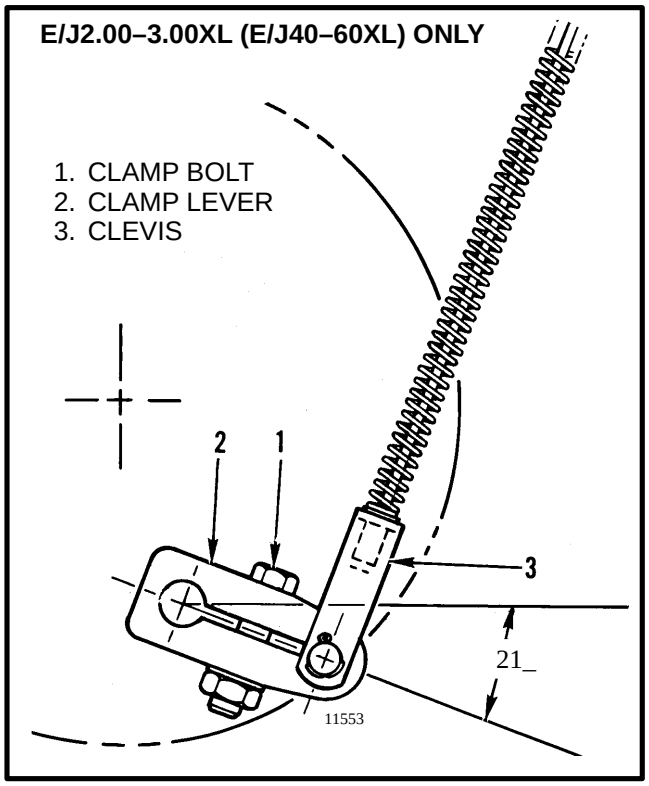


FIGURE 15. ADJUST THE PARKING BRAKE LEVERS

Adjust The Parking Brake

Make sure that the service brakes are adjusted and that the operation of the automatic adjuster mechanism is correct. Test the operation of the parking brake. The lift truck with a capacity load must not move when the parking brake is applied on a 15% grade. The position of the levers for the parking brake can be adjusted.

⚠ CAUTION

The parking brake lever must be correctly adjusted so that the automatic adjusting function of the service brake will operate correctly.

The E/J2.00–3.00XL (E/J40–60XL) brakes have an additional adjustment where cables are fastened to the cranks at the brakes. This adjustment can be made when the knob on the end of the hand lever does not have enough adjustment. Make sure the hand lever is in the released position. Loosen the knob on the end of the hand lever. Loosen the bolt and nut for the clamp lever on the crank for the parking brake. Rotate the clamp lever down until the cable is tight. Make sure the crank does not rotate. Tighten the clamp bolt. The clamp lever must be between horizontal and 20° below horizontal toward the rear of the lift truck when the parking brake is released. See FIGURE 15. Small adjustments can be made by turning the knob on the end of the hand lever.

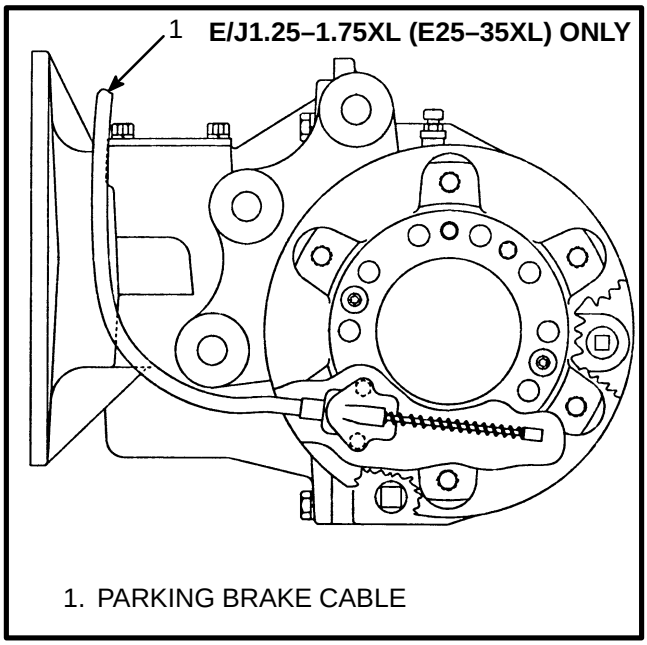


FIGURE 16. PARKING BRAKE CABLE ROUTING

Remove The Air From The Brake System

Adjust the service brakes before the air is removed from the brake system. Fill the master cylinder reservoir with brake fluid. Put the end of a small hose on the special fitting for removing the air from the wheel cylinder. Put the other end of the hose into a clear container of brake fluid. Loosen the special fitting one turn. Slowly push the brake pedal and hold it at the end of its stroke. Close the special fitting. Repeat the procedure until there are no bubbles in the container. Check the level of the brake fluid in the reservoir for the master cylinder during the procedure. Make sure to keep the brake fluid at the correct level. Repeat the procedure for the other wheel cylinder. If there is still air in the system, the air must be removed from the master cylinder. Slowly push on the brake pedal. Release the pedal slowly. Repeat this procedure until there are no air bubbles entering the reservoir.

⚠ CAUTION

Do not permit brake fluid to flow from the special fitting on to any part of the axle. The brake fluid can cause damage to the oil and dust seals used on the axle and cause a lubrication problem inside of the mast pivots. Brake fluid will also damage the paint on the lift truck.

SEAT BRAKE

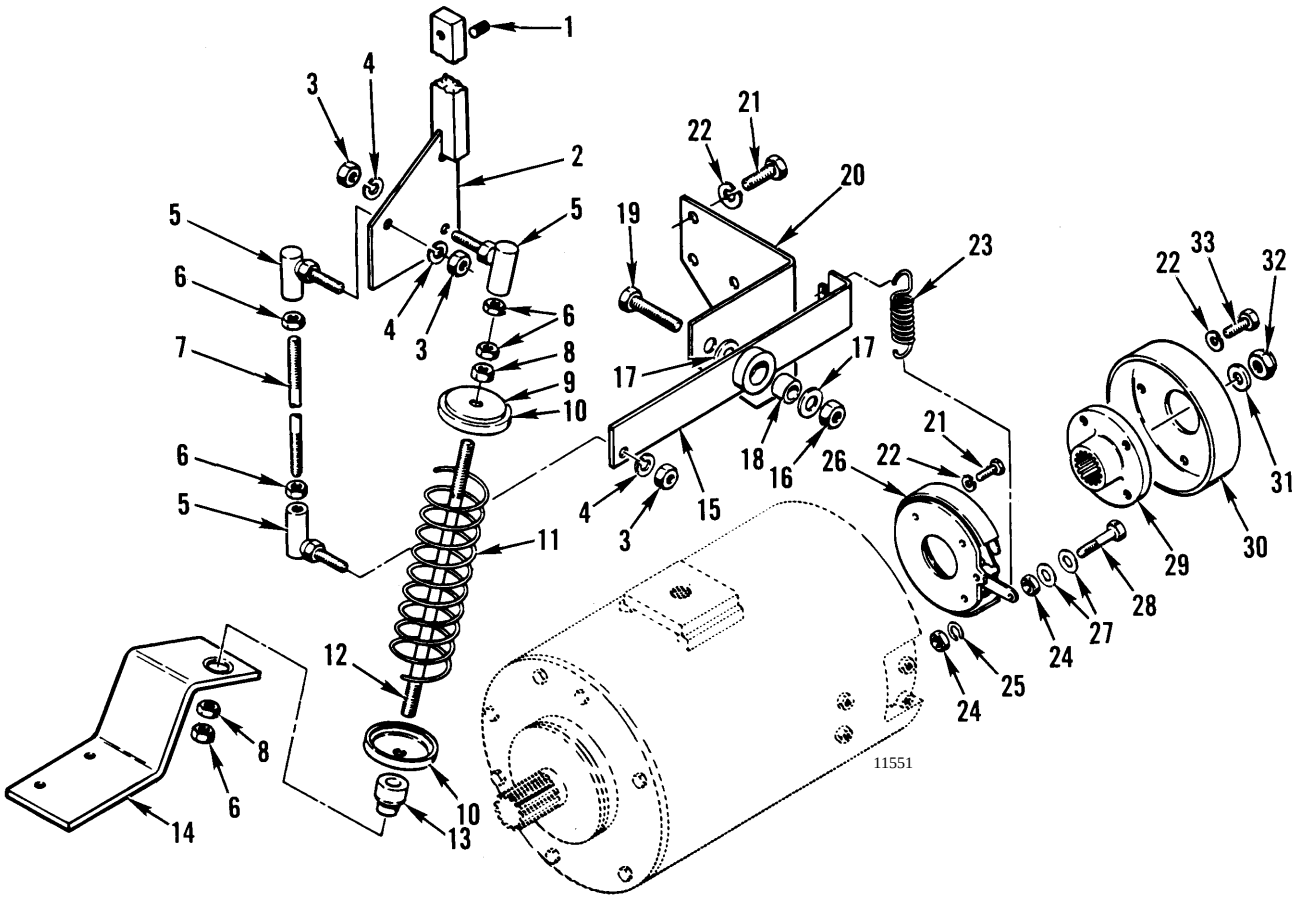
Some electric lift trucks are equipped with a seat brake. The linkage for the seat brake is shown in this section. The adjustment procedure is also described.

Lift trucks that are not equipped with a seat brake will still have a switch located in the seat to activate the power steering circuit. These units will continue to use a power steering timer.

REPAIRS (See FIGURE 17., FIGURE 18., and FIGURE 19.)

Inspection

If the parking brake linkage is correctly adjusted, the wear on the parts of the parking brake assembly is slow. Replace the brake shoes when the brake linings are worn to less than 1.0 mm (0.04 in). A hub with



1. SET SCREW
2. LEVER
3. NUT
4. LOCKWASHER
5. BALL JOINT
6. JAM NUT
7. ROD
8. NUT
9. WASHER
10. CUP
11. SPRING
12. ROD
13. THRUST BEARING
14. PLATE
15. LEVER
16. NUT
17. WASHER
18. BUSHING
19. CAPSCREW
20. BRACKET
21. CAPSCREW
22. LOCKWASHER
23. SPRING
24. NUT
25. LOCKWASHER
26. BRAKE ASSEMBLY
27. WASHER
28. CAPSCREW
29. HUB
30. DRUM
31. WASHER
32. NUT
33. CAPSCREW

FIGURE 17. SEAT BRAKE LINKAGE

splines connects the brake drum to the traction motor shaft. The nut that holds the hub on the traction motor shaft is tightened to 120 N.m (89 lbf ft) on the E/J1.25–1.75XL (E25–35XL) and 214 N.m (158 lbf ft) on the E/J2.00–3.00XL (E/J40–60XL). To inspect the brakes for wear, put the lift truck on blocks so that you can have access to the seat brake. Remove the brake drum and inspect the brake shoes.

Removal

1. Put the lift truck on blocks. Remove the brake drum.

2. Remove the nuts or springs that hold the brake shoes to the back plate and remove the brake shoe assembly.

Installation

1. Install the two springs that connect the brake shoe assembly.

2. Install the brake shoe assembly on the back plate.

3. Install the brake drum.

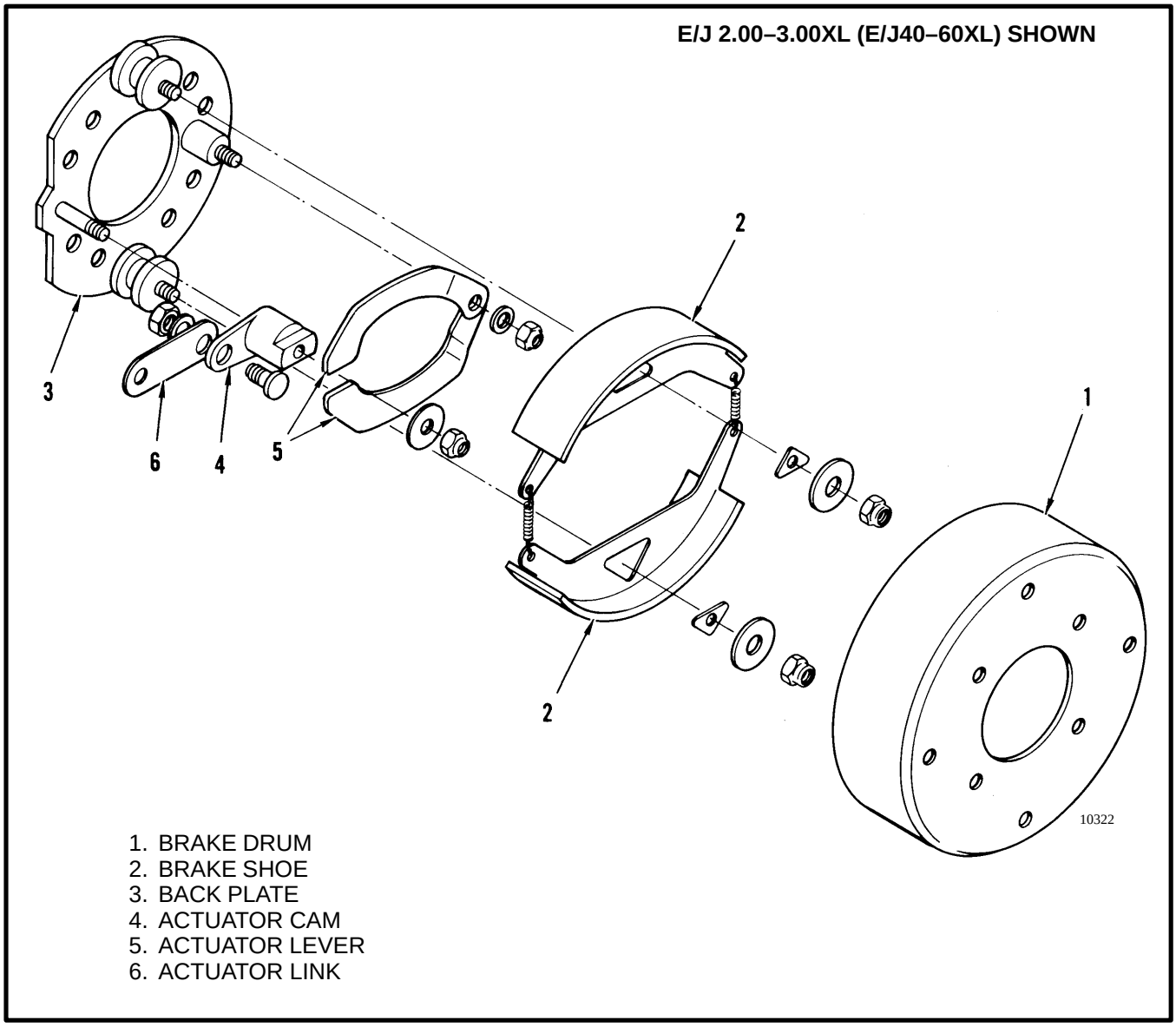


FIGURE 18. SEAT BRAKE ASSEMBLY

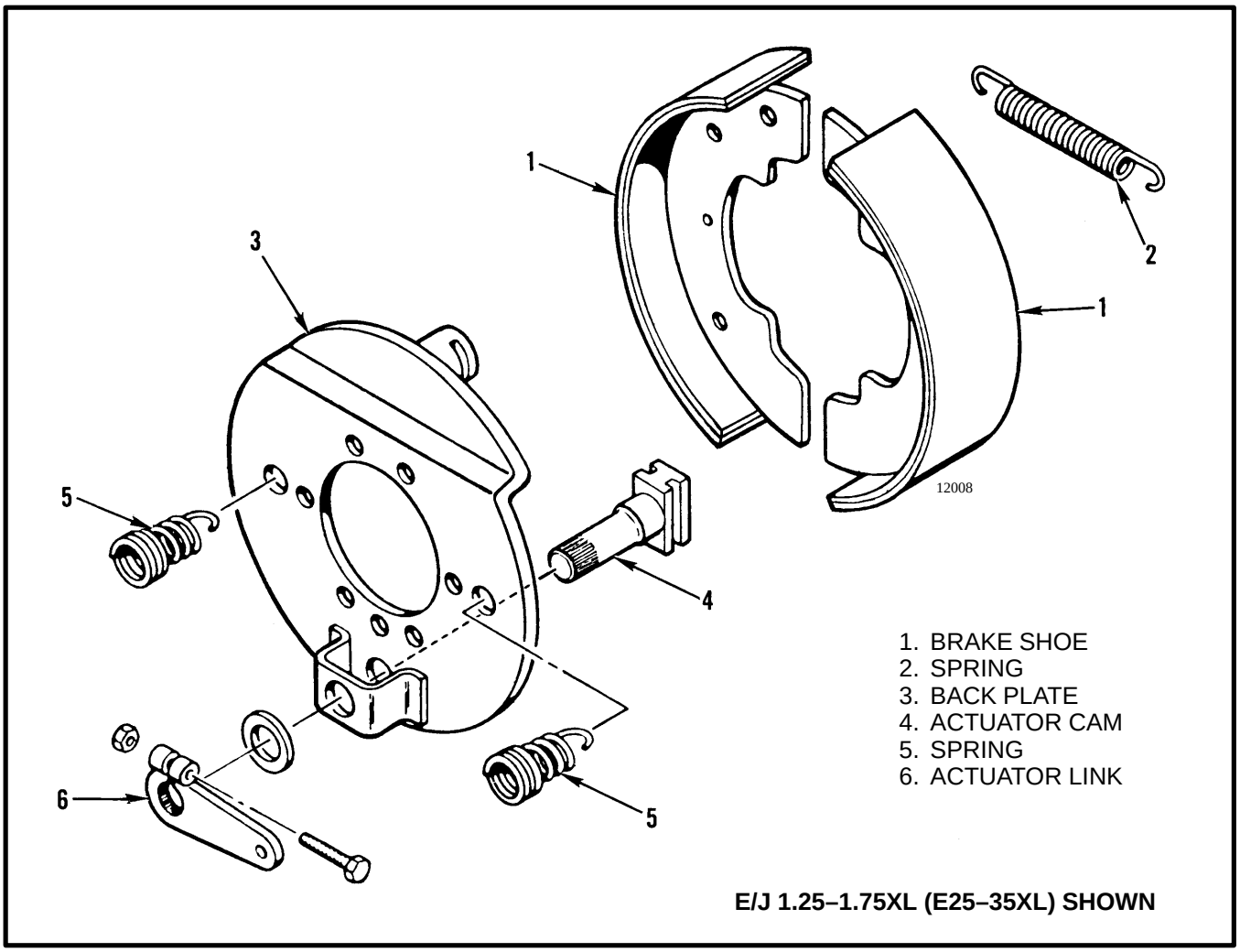


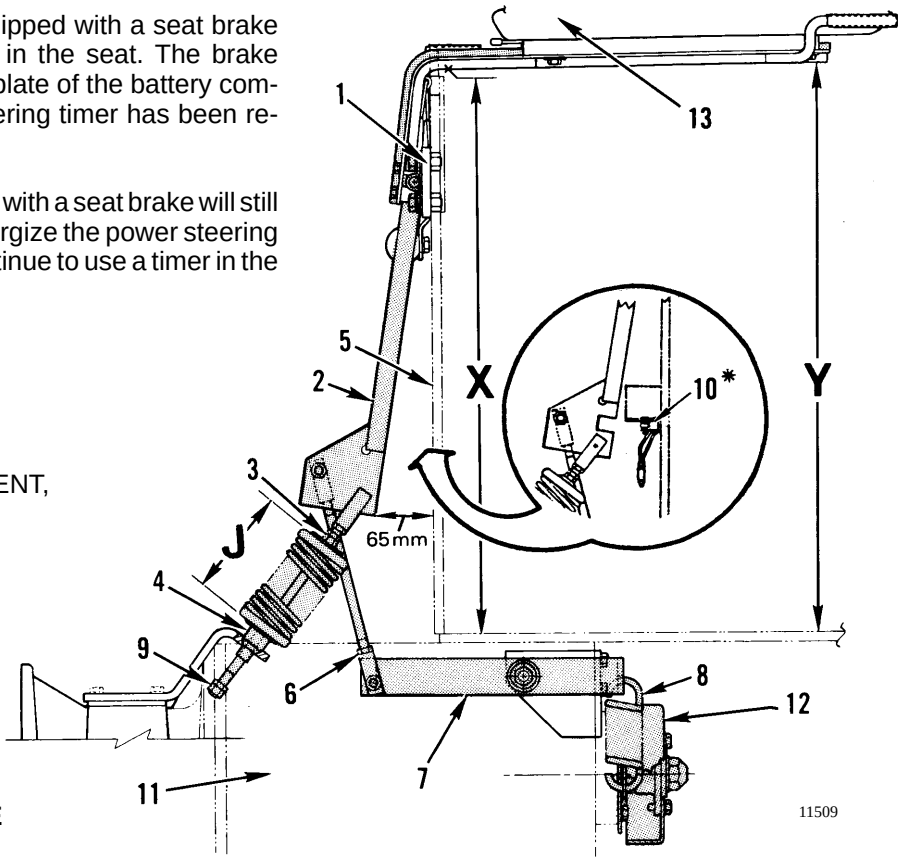
FIGURE 19. SEAT BRAKE ASSEMBLY

Seat Brake Adjustments

* Later production lift trucks equipped with a seat brake do not have a switch located in the seat. The brake switch is fastened to the front plate of the battery compartment. Also, the power steering timer has been replaced with a filter.

Lift trucks that are not equipped with a seat brake will still have a switch in the seat to energize the power steering circuit. These lift trucks will continue to use a timer in the power steering circuit.

1. CLAMP
2. LEVER
3. SPRING ADJUSTMENT
4. BEARING
5. BATTERY COMPARTMENT, FRONT PLATE
6. ROD ADJUSTMENT
7. LEVER
8. SPRING
9. JAM NUTS
10. BRAKE SWITCH
11. MOTOR
12. BRAKE ASSEMBLY
13. SEAT



ADJUSTMENT PROCEDURE

1. Put a weight in the seat to release the seat brake. Measure dimensions “X” and “Y”. Add or remove shims under the clamp (1) so that dimension “Y” is 6 to 9 mm (0.23 to 0.35 in) greater than dimension “X”.

2. Adjust the setscrew at the top of the lever (2) so that the bottom of the lever is 65 mm (2.5 in) from the front plate of the battery compartment.

3. Turn the spring adjustment (3) so that the length is dimension “J”.

Dimension “J”:	E/J1.25–1.75XL (E25–35XL)	standard seat	63 mm (2.46 in)
		suspension seat	74 mm (2.91 in)
	E/J2.00–3.00XL (E/J40–60XL)	standard seat	107 mm (4.13 in)
		suspension seat	118 mm (4.65 in)

4. Adjust the length of rod (6) to remove the clearance in the lever (7) and the spring (8). Make sure that the adjustment does not apply the brake.

5. Raise the seat to the “up” position and make sure the jam nuts (9) do not hit the bearing (4). Test the operation of the seat brake to make sure the seat brake is actuated correctly. Make sure the measurements for the linkage adjustments are correctly done. If the seat brake does not correctly actuate the brake after the adjustments have been made, make additional adjustments to the length of the rod (6).

The seat can be removed from the battery restraint plate by removing four bolts. The battery restraint plate is removed from the frame by removing the hinge pin that holds the assembly to the frame.

FIGURE 20. SEAT BRAKE ADJUSTMENT

SPECIFICATIONS

FASTENER	TORQUE
Back Plate to Axle Mount Capscrews	
E/J1.25–1.75XL (E25–35XL)	122 N.m (90 lbf ft)
E/J2.00–3.00XL (E/J40–60XL)	
Top 3	110 N.m (81 lbf ft)
Bottom 4	245 N.m (180 lbf ft)
Wheel Cylinder Capscrews	
E/J1.25–1.75XL (E25–35XL)	10 to 14 N.m (90 to 120 lbf in)
E/J2.00–3.00XL (E/J40–60XL)	
Top 2	78 to 85 N.m (58 to 66 lbf ft)
Bottom 2	80 to 102 N.m (67 to 75 lbf ft)
Wheel Nuts	
E/J1.25–1.75XL (E25–35XL)	155 N.m (115 lbf ft)
E/J2.00–3.00XL (E/J40–60XL)	237 to 305 N.m (175 to 225 lbf ft)
Axle Shaft Capscrews	
E/J1.25–1.75XL (E25–35XL)	
M8 x 1.25 x 16 capscrews	20 N.m (15 lbf ft)
M14 x 1.50 x 35 capscrews	155 N.m (115 lbf ft)
E/J2.00–3.00XL (E/J40–60XL)	98 N.m (72 lbf ft)

TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE
The brakes do not operate equally.	Oil, water or brake fluid is on the linings.
	The linings are worn or hard.
	The wheel cylinders are damaged.
	The brake lines have a restriction.
	The brake shoes or back plate is damaged.
	A brake drum is damaged or is not round.

TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE
One brake assembly does not release.	The shoes are adjusted too tight.
	A brake shoe is damaged.
	A return spring for the brake shoe is damged.
	The brake lines have a restriction.
	The wheel bearings are adjusted too tight or are damaged.
Both brakes do not release.	A wheel cylinder is damaged.
	A back plate is damaged.
	A cable for the parking brake is damaged.
	The brake pedal is not adjusted correctly.
	The master cylinder is damaged.
	The shoes are adjusted too tight.
The pedal is hard to push.	The parking brake cables are damaged.
	The parking brake is not released.
	The seal are damaged.
	The pedal linkage is damaged.
	The linings are worn.
	Water or oil is on the linings.
	The master cylinder is damaged.
	The wheel cylinders are damged.
	The pedal return spring is damaged.
	The clearance for the push rod is not correct.
The pedal does not have enough resistance.	Air is in the brake system.
	The master cylinder mount is loose.
	The shoes are damaged.
	A brake drum is damaged.
	A back plate is damaged.
	A wheel cylinder is damaged.
	The linings do not fit the drums.
	The pedal return spring is broken.
The pedal moves to the floor.	Air is in the brake system.
	The shoes are not adjusted correctly.
	The clearance at the push rod is too much.
	The linings are worn.
	The pedal linkage is not adjusted correctly.
	The master cylinder is damaged.
	The brake system has a leak.

TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE
The brakes make noise.	Oil, water or brake fluid is on the linings.
	The linings are worn.
	A brake drum is damaged.
	A shoe is damaged.
	Dirt is on the linings.
The brakes do not stop the lift truck.	Oil, water or brake fluid is on the linings.
	The linings are worn.
	The wheel cylinders are damaged.
	The shoes are not adjusted correctly.
	The master cylinder is damaged.
The parking brake will not hold.	Oil, water or brake fluid is on the linings.
	The parking brake lever is not adjusted correctly.
	The parking brake cables are not adjusted correctly.
	The parking brake lever is damaged.
	The brake linings are worn.
The parking brake will not release.	The parking brake is adjusted too tight.
	The parking brake cables are damaged.