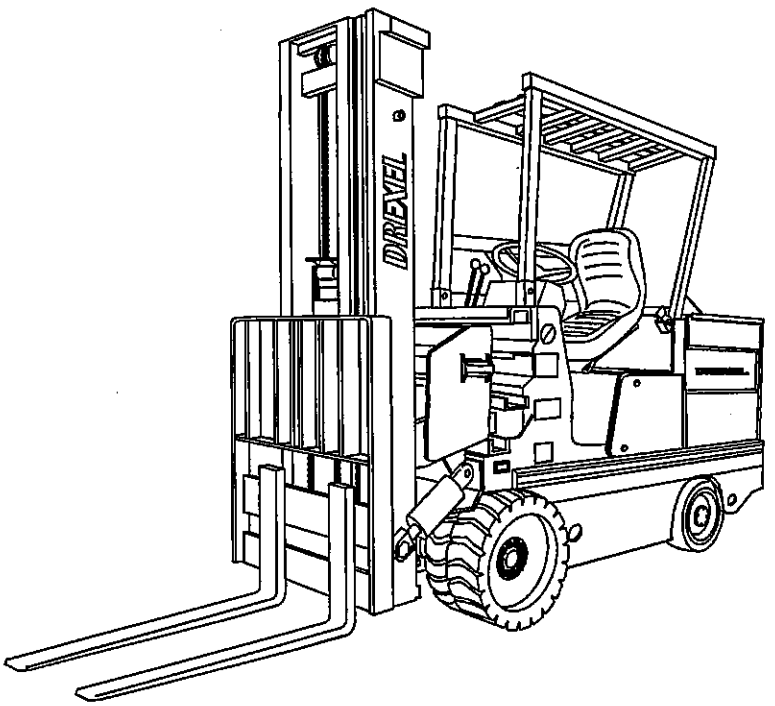
SL33 and SL44 Series

SwingMast® Lift Truck

Service and Parts Maintenance Manual



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safety

IMPORTANT !

The Drexel SL* (15020) Series trucks have been designed for optimum safety of their operators. Please follow the safety guidelines listed in this section and adhere to all Warning, Danger, Caution and Important notes found within this manual. When the truck is in operation, always keep loose clothing, jewelry, hair and fingers out of the restricted areas (especially pinch areas) as labeled on the truck.

This chapter on Safety must be carefully read, understood and adhered to strictly by all operators and service personnel using the Drexel SwingMast® SL Series lift trucks. Do not use this truck until you have thoroughly read this manual. Failure to comply could cause risk of death or serious injury to yourself and others.

Drexel SwingMast trucks meet or exceed ASME B56.1 - Part III, Safety for Powered Industrial Trucks.

S.1 Site supervision

Supervision is an essential element in the safe operation of powered industrial lift trucks.

The site supervisor must check that the driver's guide is in the seat compartment on the truck at all times. Operators must be trained on the use, maintenance and safety aspects of the **SL** series trucks under the supervision of a trained and experienced operator.

Only those individuals trained to operate and/or service this truck may do so. Familiarization and driving practice with a new truck must be arranged in a safe area, away from other trucks, obstacles and people. The training program must be applied to all new operators, regardless of previous experience.

* SL Series includes Drexel Models SL33, SL44/3, and SL44/4 lift trucks.

Shorting battery terminals can release enormous amounts of energy, causing sparks or flame, or heating nearby components to dangerous temperatures.

The battery is also very heavy, and if restraints are not replaced after maintenance, the battery could slide out of the truck causing electrical shorts or spilling acid - or it could cause the truck to tip over.

The battery is also used as a counterweight. A different size or weight battery could cause the truck to become unstable and tip. Use batteries that meet the weight and size specifications shown on the capacity plate in the operator's cab.

WARNING !

- ❑ **Always assume the battery is emitting hydrogen and employ proper safety precautions.**
- ❑ **Do not smoke, use an open flame, or create arcs or sparks near the battery.**
- ❑ **Consult the label on your battery for information on cell-type, ampere-hour capacity, charge rate and normal full-charge voltage. Do not charge the battery at a current greater than 1.5 amp per 100 amp-hours capacity at the end of charge.**
- ❑ **Packaged with every battery are specific instructions for battery safety, care and use, and a Material Safety Data Sheet (MSDS). Read these documents thoroughly before performing any service to the battery.**
- ❑ **Always disconnect the battery before performing any truck maintenance and be sure to wear protective clothing and safety glasses when working with battery acid or the battery in general.**
- ❑ **Neutralize acid spills immediately with Bicarbonate of Soda! If acid contacts the skin or eyes, wash with water immediately and seek medical help at once.**
- ❑ **Never place a tool or any metal object on top of the battery where it could possibly touch battery terminals causing a short or serious electrical shock.**

- ❑ **Use caution when changing battery connectors to ensure that the polarity is not reversed.**
- ❑ **Keep vent plugs in place and clean at all times.**
- ❑ **When replacing this battery, use the same type battery as specified on the truck rating nameplate. Failure to comply could result in an unbalanced condition, resulting in tipping the truck and possible personal injury or loss of life.**

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Truck overview

1.1 introduction

1.2 operating controls

1.3 technical specifications

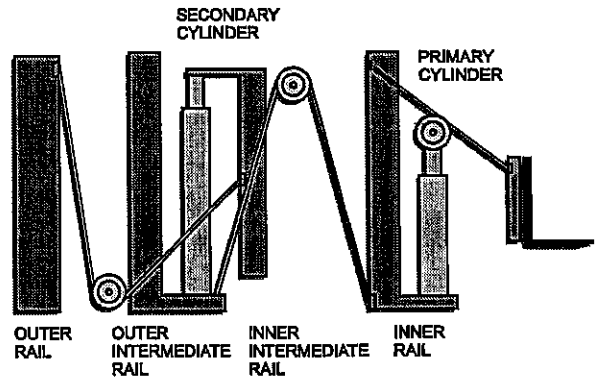
Downward movement of the mast is accomplished by releasing the hydraulic fluid from the cylinders back into the reservoir. The weight of the rails and carriage provides enough pressure to force the fluid from the cylinders.

When the secondary cylinder piston is fully contracted, the primary cylinder begins to collapse, forcing its fluid back to the reservoir.

The mast is supported by trunnions which allow it to tilt fore and aft. The amount of tilt is controlled by two short hydraulic cylinders mounted between the bottom of the mast and the pivot arm. A mast indicator gauge (pointer) is located on the left side of the mast (as viewed from the front of the truck) to indicate when the carriage/forks are perfectly level with the floor.

As an option, trucks may be equipped with quadplex masts which utilize four sets of rails, referred to as Outer, Outer Intermediate, middle, and Inner rails, respectively. (See Figure 1-4: 'Quadplex mast in collapsed position.')

Figure 1-4: Quadplex mast in collapsed position



The primary cylinder and carriage operate the same as a triplex (three-rail) mast. When the secondary cylinders extend, they lift the middle rails.

Through an intricate system of chains and sheaves, the rising middle rails pull up the outer intermediate rails at half the middle rail speed, and push up the inner rails at twice the middle rail speed.

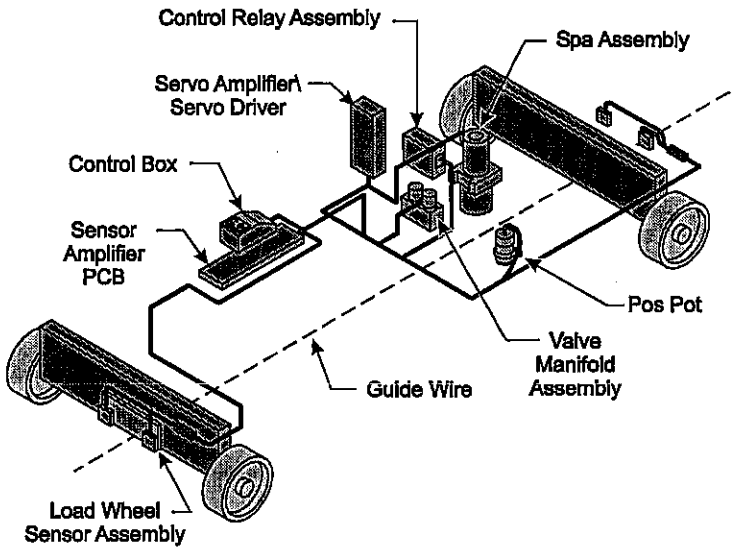


Figure 1-9: Automatic guidance system overview

- ❑ **Toggle switch** -switches between complete operator control of the truck (manual mode) and automatic guidance.
- ❑ **LED's -** when both the RED and YELLOW LED's are off, the truck is in complete operator control (or the manual mode).

  When the RED and YELLOW LED's are lit, the automatic guidance system is in the acquisition mode (attempting to receive and process a radio-frequency signal from the guide wire embedded in the floor).

  When the truck is ready to move, the RED LED goes out and YELLOW remains lit - the truck follows the guide wire.

  If RED remains lit, an error has occurred (see your automatic guidance system manual for troubleshooting).

Note: If your truck includes an automatic guidance system, a separate manual can be found in the Appendix section of this manual. The manual includes all necessary information for set up, operation, maintenance and troubleshooting of the Automatic Guidance System.

4. Charge the battery using a constant current charger set to 5% of the six-hour battery capacity. For example, 55 amps for an 1,100 AH (ampere-hour) battery.

IMPORTANT !

Do not charge the battery at a finish current which exceeds the rating on the battery's nameplate. Consult the label on your battery for information on cell-type, ampere-hour capacity, charge rate and normal full-charge voltage. Do not charge the battery at a current greater than 1.5 amp per 100 amp-hours capacity at the end of charge.

5. Replace the vent caps. They must be secured in place during charging. Ordinarily, the charge should take about 3 to 5 hours to complete.

6. During the initial charge the volume of electrolyte decreases through electrolysis and evaporation. Water approved for use in lead-acid storage batteries should be added if the electrolyte level falls below the level indicator.

   If the cell temperature rises higher than +110° F (+61.2° C) either reduce the charging current to half the original value or stop charging until the temperature falls below +110° F (+61.2° C). If you reduce the charging current, extend the charging time accordingly.

7. Continue charging until the cells gas freely and the specific gravity remains constant over a three-hour period. At the end of the charge period the cell voltages rise to about 2.55 volts and the specific gravity rises to about 1.280, corrected to 77° F. (See Table 1: 'Specific gravity corrections for electrolyte temperature,' on page 2-10.)

8. When charging is complete, REPLACE the vented cell caps on the battery.

9. Connect battery cables and install battery in truck.

2.4 replacing the battery

Replacing the battery requires lift and support apparatus capable of supporting the weight and size of the battery. Check the capacity plate for battery information. (Also see Safety 'Figure 2: Capacity plate location,' on page 12 for addittional information.)

An external battery roller tray stand is also helpful, and available through your Landoll distributor, to allow the battery to be pushed into the compartment.

2.4.1 To replace a battery

Before you begin, review section, S.8 "Battery," beginning on page 14 in the Safety chapter of this manual.

1. Return the truck to your service charging station area.
2. **Set the key switch to OFF and place the key in your pocket.**
3. Disconnect the battery cable and lay it across the battery top. (See Figure 2-5: 'Removing the battery,' on page 2-19.)
4. Place blocks in front of and behind all wheels.
5. Raise the driver's seat. *Optional* - release and raise the top battery compartment door (lid) safety retainer bar.

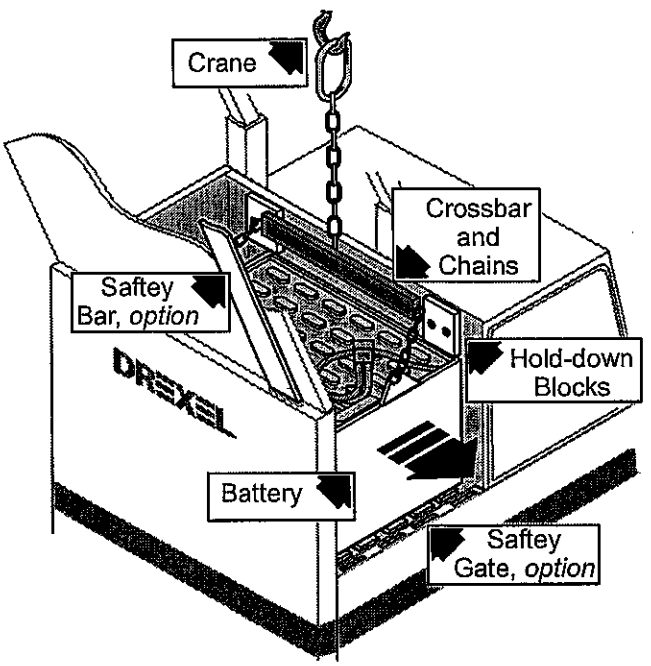


Figure 2-5: Removing the battery

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3.8 fork positioner option

3.9 proximity sensor option

WARNING ! - continued

You should tilt the mast only at the floor level or at the load level in the rack when depositing or picking up a load. At any other time, forward tilting could cause the truck to tip forward or cause the load to slide off the forks causing serious injury to yourself or anyone in the area.

6. Tilting a loaded mast forward should be done slowly by feathering the tilt lever. Rapid tilting might jostle a load off the forks prematurely. Also make sure the area to the right of the truck is clear.

7. Push the PIVOT lever away from you to pivot (or swing) the forks 90° to the right (clockwise).

Figure 3-10: Pivot lever icon

The mast pivoting 90° to the right has the effect of extending the forks outward to the right to extend your reach.

8. Pull the PIVOT lever toward you to pivot (or swing) the forks 90° to the left (counterclockwise).

9. Pull the SHIFT lever toward you to shift the mast back to the right side of the truck, as viewed from the driver's cab.

Figure 3-11: Shift lever icon

10. Push the SHIFT lever away from you to shift the mast back to the center of the truck.

11. Practice some combination moves by moving the pivot and shift levers at the same time.

    The mast simultaneously pivots out to the right 90° (clockwise) and shifts left or right. These two actions do not occur at the same speed and one action is typically completed before the other.

    With practice, you should be able to adjust the amount of control deflection of the lever to achieve any desired combination of the two actions.

    This maneuver is commonly required when attempting to swing the forks into position to pick up a load from the right.

6. * When the forks are aligned to the pallet, shift the mast to the right, inserting the forks all the way into the pallet. (See Figure 3-25: 'Shifting the forks into the pallet.')

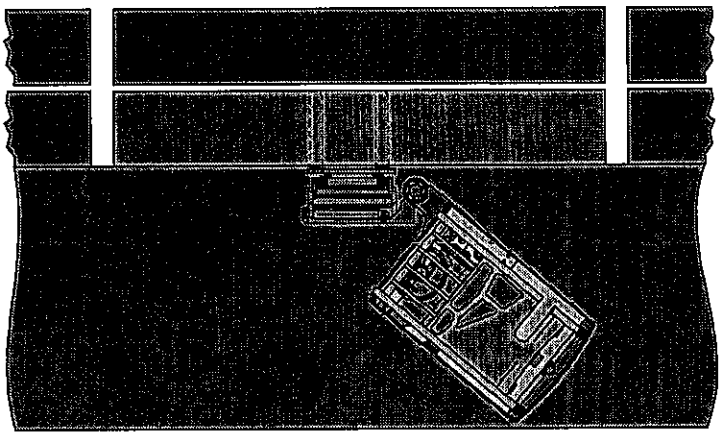


Figure 3-25: Shifting the forks into the pallet

7. Raise the load above the rack about 2" (51mm) to clear the rack horizontal members. Be careful of any cross members above the load.

8. Make sure the load is centered and appears balanced before you move the load any distance.

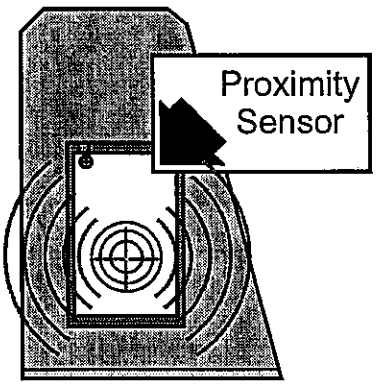
9. Tilt the mast back to secure the load on the forks. You may have to wait until the load has been withdrawn somewhat before you can tilt it completely without striking any cross members above it. (See Figure 3-15: 'Tilting the load,' on page 3-19.)

   The following steps marked *, although listed as separate steps, are combined together to produce one smooth motion for inserting the forks. This may require some practice to be performed smoothly and effectively.

10. *Shift the load to the left and out of the rack being careful that it does not strike the truck's overhead guard or that the load ends

11. *Slowly move (creep) the truck in reverse. At the same time, pivot the load to the right to position it parallel to the truck. (See Figure 3-26: 'Removing the load,' on page 3-26.)

Figure 3-35: Proximity sensor



The proximity sensor shuts-down the lower and pivot return solenoids just before the load reaches the deck surface. To continue, the operator must shift and/or raise the load until the sensor is cleared.

IMPORTANT !

The proximity sensor must be kept clean and dry at all times. For cleaning, see Chapter 2, Receiving and Inspection, heading, "Routine checks" on page 2-14.)

Chapter 4 describes the routine inspections, adjustments and lubrication necessary to keep your **SL series** fork lift truck operating safely and efficiently with minimum *downtime*. A maintenance schedule is provided in Table 4-1, recommended lubricants in Table 4-2, and torque values in Tables 4-3 and 4-4.

4.1 tables

4.1.1 Preventive maintenance schedule

Table 1: Preventive maintenance schedule

WEEKS			6	12	26	52	See Section No. /
OPERATING HOURS	8	50	250	500	1,000	2,000	Page Number
Check batteries	■						See 4.3.1, page 4-17
Check power steering	■						See 4.3.1, page 4-17
Check control lever reaction	■						See 4.3.3, page 4-20
Check "return-to-neutral"	■						See 4.3.4, page 4-20
Check primary lift chain	■						See 4.3.5, page 4-21
Inspect tires	■						See 4.3.6, page 4-22
Check driver's seat limit switch	■						See 4.3.7, page 4-25
Check hydraulic level		■					See 4.4.1, page 4-26
Checking/adding drive axle fluid		■					See 4.4.4, page 4-28
Check master cylinder fluid level		■					See 4.4.2, page 4-27
Check brake shoes			■				See 4.4.3, page 4-28
Check pivot and shift settings			■				See 4.5.1, page 4-29
Normal (front) carry position setting			■				See page 4-30
Pivot cylinder clevis adjust			■				See page 4-31
90° pivot and reach setting			■				See page 4-32
Pivot arm deflection			■				See page 4-33
Table continued on next page							

It is a good practice to select a different cell each time a measurement is taken and to test more than one cell.

6. If the electrolyte temperature is above 77° F (25° C). Add a factor of 0.003 to the specific gravity reading for every 10° F (-12.2° C) above 77° F (25° C).

7. If the specific gravity of the battery is less than the manufacturer's specification at 80% discharge, you must charge the battery. (See separate chapter 'Corrective maintenance' for charging information.)

8. When returning the electrolyte to the battery, return it to the same cell it was taken from and **be very careful** not to splash the electrolyte as it is squeezed from the hydrometer.

9. Check the level in all battery cells. If a level is below the top of the battery plates, add distilled water to bring the level above the plates.

10. Replace all the vent caps and make sure they are tight.

4.3.2 Check power steering

1. Sit in the driver's seat and set the key switch to ON. While applying the service brake, release the parking brake and set the direction control to FORWARD or REVERSE.

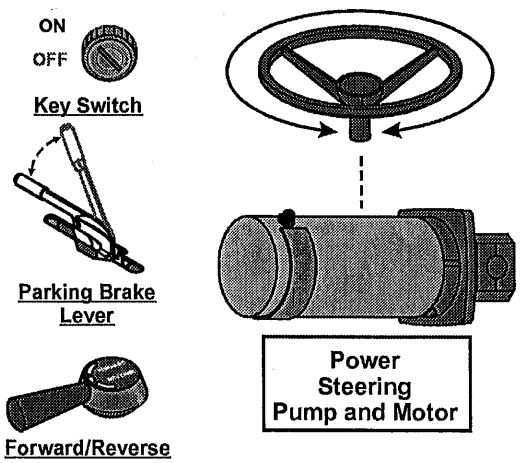


Figure 4-2: Check power steering

The power steering pump motor should start running. (See Figure 4-2: 'Check power steering.')

2. If the motor does not start, first check that the parking brake is released.

CAUTION !

If truck has been in operation for a period of time the oil could be very hot. Use special gloves or allow the truck to cool before changing the oil. Never drain oil into sewer lines.

2. Clean the area around the inspection plug to avoid dropping contaminants inside the unit.

3. Place a container under the inspection plug to trap any overfill.

4. Remove the inspection plug and verify that oil is up to bottom of inspection hole. (See Figure 4-9: 'Checking drive axle fluid,' on page 4-28.)

5. If necessary, add oil through the inspection hole until oil just begins to drip from the hole, then replace inspection plug. (See Table 2: 'Recommended lubricants,' on page 4-12.)

6. Apply a light coat of NeverSieze and install the inspection plug and torque to 15 ft. lbs. (20 Nm).

7. Wipe off any oil spills on the outside of the unit.

4.5 every six weeks

4.5.1 Check pivot and shift settings

WARNING !

When checking any of the mast functions, such as, pivot, tilt and shift, etc., keep everyone away from the truck. Movement of the mast or other components may injure unaware bystanders. Also review the Safety chapter at the beginning of this manual.

The following adjustment procedures are critical and must be maintained for optimum truck performance.

Check these adjustments once or twice during the first 50 hours of operation, then once every 250 hours thereafter.

3. In the following illustrations, the location of grease fittings or surfaces to be greased are marked by either a grease-gun or brush icon.

Figure 4-19: Grease-gun and brush icons

4. Make sure all grease fittings are wiped clean before lubricating. If any of the fittings are corroded or blocked, replace them.

   Before brush-applying grease to bearing pad surfaces, wipe out the channel to remove any foreign matter that may have accumulated since your last lubrication.

5. After high-pressure washing, lubricate all unprotected grease fittings and metal-to-metal surfaces, located outside the truck.

6. Interval frequency can be recorded from the running hours read on the BDI display in the driver's cab.

7. Before lubricating, also see Table 2: "Recommended lubricants," on page 4-12.

Pivot cylinder clevis

1. Set the key switch to ON and pivot the mast 90° to the right.

2. **Set the key switch to OFF and place the key in your pocket.**

WARNING !

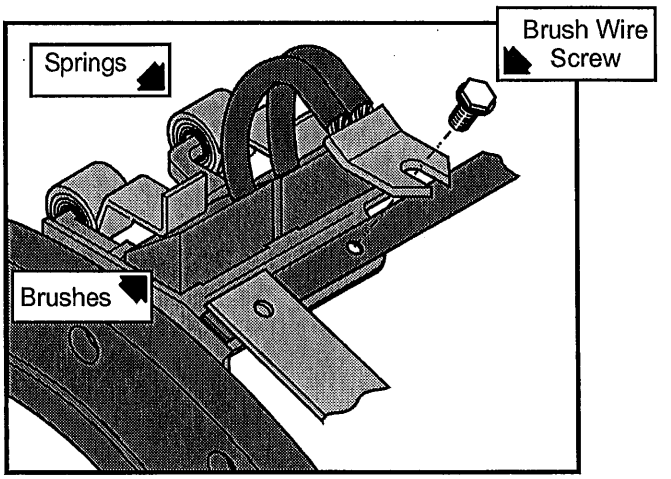
Do not service the pivot cylinder while the key switch is ON. If the pivot joystick is accidentally moved serious injury could occur.

3. Remove the plastic cap and grease the fitting in the clevis until you can see some grease being extruded within the clevis. Replace the cap. (See Figure 4-20: 'Pivot cylinder clevis lubrication,' on page 4-40.)

4. Wipe off excess grease.

7. The four left hand brush holder clips are removed with the fingers. (See Figure 4-29: 'Brush holder clips.')

Figure 4-29: Brush holder clips



8. Remove brush wires and inspect brushes. If they are worn to within 3/8" (9.5 mm) of the lead inset counter-bore they should be replaced.

9. Inspect the commutator for excessive wear, cracks or burn spots. If burn spots are found, the commutator must be cleaned (polished). Cracks or excessive wear may require turning-down the commutator on a lathe or possibly replacing the assembly.

10. Next, inspect the mica bar-to-bar insulation. When excessive commutator wear results in flush or protruding mica insulation between the commutator bars, the mica must be undercut to approximately 0.025" (0.635 mm).

11. Open the right hand door of the truck.

12. *On EE models*, open the brush access door located on the electrical panel. (See Figure 4-30: 'EE Model access door.')

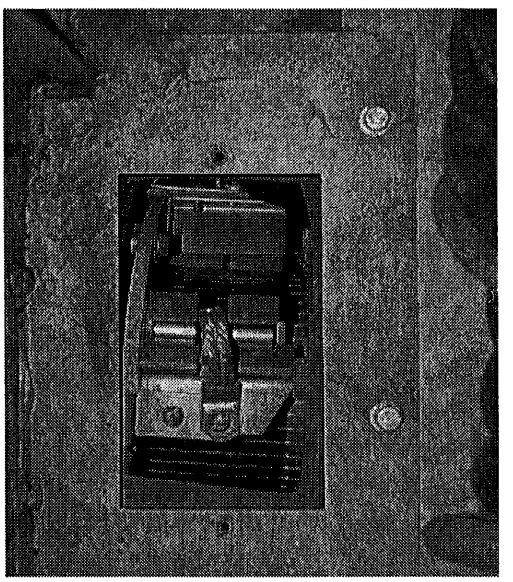


Figure 4-30: EE Model access door

13. The right hand brush holder clips are easily hand removed.

14. Remove brush wires and inspect brushes for cracks and wear.

Secondary lift chain

1. When the secondary chains are adjusted correctly, the rails are even with each other across the bottom and the lower carriage rollers protrude slightly below the inner rail. (See Figure 4-39: 'Secondary chain, roller and anchor adjustment.')

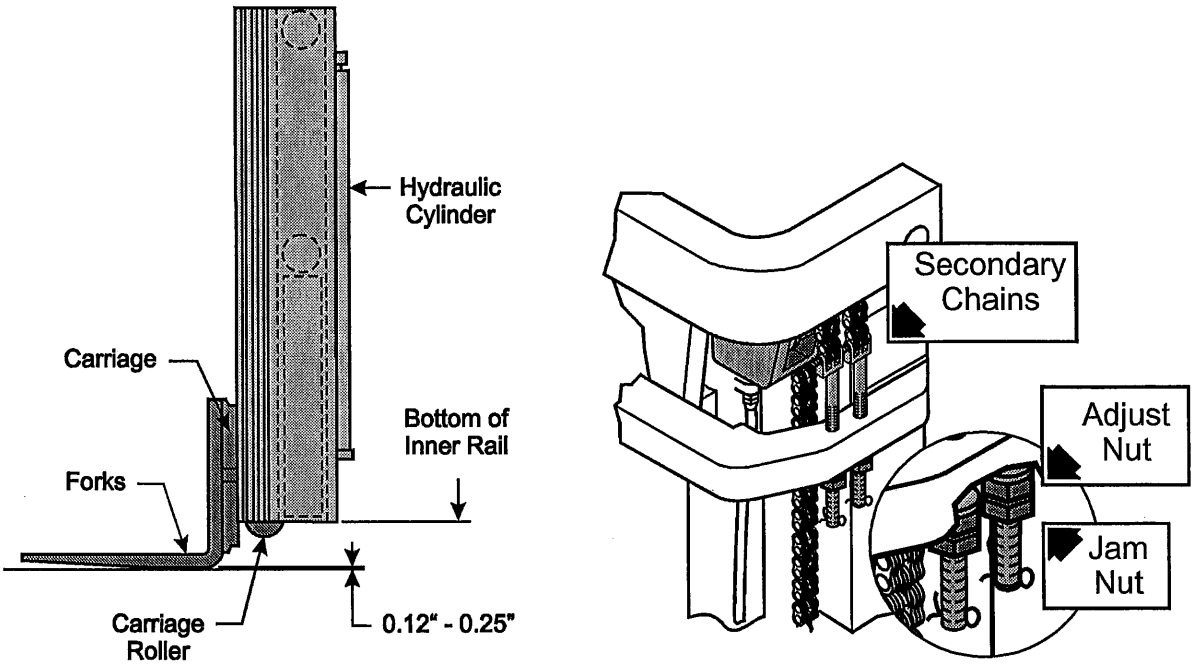


Figure 4-39: Secondary chain, roller and anchor adjustment

IMPORTANT !

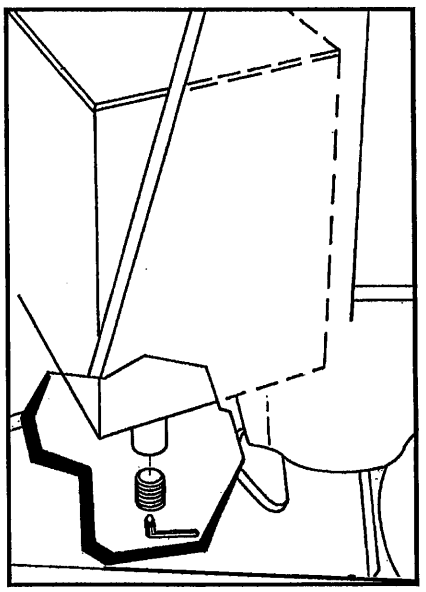
This adjustment is critical and must be maintained for optimum mast performance.

2. Loosen the jam nut, then turn the adjust nut to obtain the correct chain adjustment. (See Figure 4-39: 'Secondary chain, roller and anchor adjustment.')

3. Make sure the rails are even across the bottom and that any excess slack is removed from the chains.

4. Tighten the jam nut against the adjust nut.

Figure 4-49: Hydraulic oil drain



4. Slide a flat collection pan, having a capacity of 13 gallons (50 liters) minimum under the drain plug, then remove the plug.

5. Clean the magnetic trap on the drain plug of any contaminants. When the tank is empty, reinstall the drain plug.

6. Add hydraulic oil. (See Table 2: 'Recommended lubricants,' on page 4-12.) Also see section 4.4.1 "Check hydraulic oil level," on page 4-26.

Note: Do not overfill. Having the level above the FULL marker on the dipstick does not allow enough area for expansion when the oil heats during normal operation.

7. Replace the fill cap and make sure it is tightened securely.

8. Make sure the drain plug is tight enough to prevent oil leaks, but do not over tighten.

4.9 SCR controller

The SCR control unit, like all electrical apparatus, exhibits some thermal losses. The semi-conductor junctions have finite temperature limits above which these devices may be damaged. For these reasons, normal maintenance should guard against any action that could expose the components to excessive heat, such as steam cleaning; or that could reduce heat dissipating ability of the control, such as restricting air flow.

Note: For additional information on the SCR Controller, see the Appendix Q-Z of this manual, heading, SCR Controller, EV100 LX/LXT.

Figure 4-57: Roller clearance

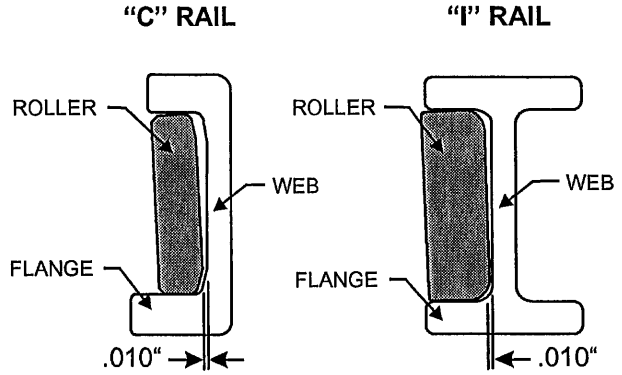


Figure A Figure B

8. Determine the clearance of each roller-to-rail at various location points along the full stroke of the mast (every 24" to 36" [610 mm to 914.4 mm]).

9. Be careful as this will require starting and stopping the truck a number of times to lower the mast.

10. Record these measurements along the full stroke of the mast as the mast must be disassembled to make the corrections.

IMPORTANT !

If shimming is required, do not attempt this repair yourself. Contact your authorized Landoll service representative. The shimming procedure requires removing the mast from the truck, using an approximate 3 ton overhead crane, and placing it in a horizontal position.

11. Remove all obstacles from the area, such as tools, safety platform or step ladder, rail block supports, etc. and start the truck. Fully lower the mast.

Carriage thrust rollers, quad mast only

WARNING !

NEVER walk or stand under raised forks.

NEVER stand on top of or on any part of the mast rails.

NEVER reach through upright open areas.

5.1.2 Pump fuse 2FU open

1. Examine connections on the power fuse block. (See step 1 of paragraph 5.1.1.)

3. Examine terminals on the electric door assembly, traction motor and pump motor. (See step 4 of paragraph 5.1.1.)

4. Continual and frequent full extension of the mast assembly will cause hydraulic pressure to climb to the relief valve level of 1,500 psi (10.34 mp). This can also occur with other hydraulic functions; that is, tilt, pivot, and shift.

5. Excessive heat in the electrical compartment may cause power fuse 2FU to open. (See item 5 of paragraph 5.1.1.)

6. The traction or pump motor may be defective causing repeated opening of the power fuses. (See item 8 of paragraph 5.1.1.)

7. The pump motor power fuse, 2FU, may open if the hydraulic system relief valves are set for a pressure higher than 1,500 psi (10.34 mp). A higher pressure setting can only occur if the valve has been disassembled for service and washers were left out at reassembly.

   a. Remove the pump inlet hose from the inlet elbow. Loosen the elbow and rotate it away from the O-ring plug directly beneath it.

   b. Remove the plug and spring. Long needle nose pliers may be needed to grasp and retract the cartridge from the valve body. (See Figure 5-1: 'Relief valve.')

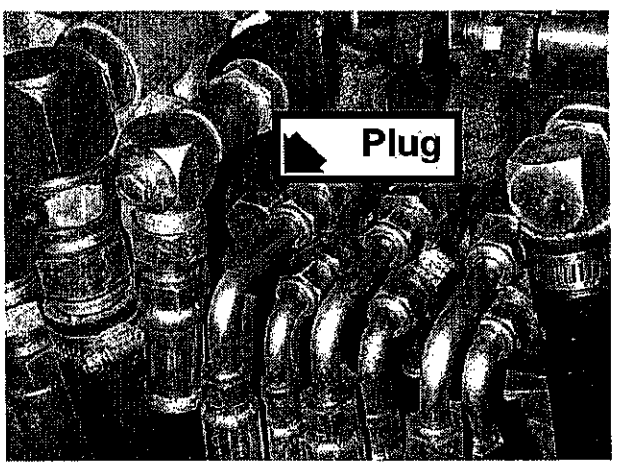


Figure 5-1: Relief valve

b. Manually press and release the switch plunger. An audible *click* should be heard, indicating normal mechanical operation. If it can not be heard for one or both functions, a damaged switch is indicated. Replace seat switch.

c. Place a volt-ohm-meter across terminals 24 and 25. The two terminals are located on terminal strip (TS-2) mounted in the electrical compartment intermediate panel. Select the R x 100 volt-ohm-meter resistance scale.

d. With the seat switch released, the meter should read 10,000 ohms. With the seat switch depressed, the meter should read zero ohms. If there is no change in the volt-ohm-meter when the seat switch plunger is depressed, replace the seat switch. (See Figure 5-9: 'Seat switch,' on page 5-18.)

6. The pump contactor may be inoperative causing loss of power to the pump motor. Check the following conditions:

- ❑ With the battery disconnected, push the contactor armature and contacts inward to check for restriction of free movement.
- ❑ Check for loose power or control wiring at the contactor tips and coil.
- ❑ Check for an open coil with a volt-ohm-meter placed across the two coil terminals.

7. The pump time delay control operates in two ways to prolong pump contactor service life, **(1)** to assure that the pump contactor remains closed long enough for the pump motor to accelerate and thus reduce the load current that the contactor must interrupt, and **(2)** to permit a drop in hydraulic system pressure, reducing the power required by the pump motor, after a hydraulic control function has been used, thus reducing the load current that the contactor must interrupt.

Note: It is important to note that the pump contactor is not directly energized by the lift, tilt, pivot and shift control valve switches. These switches energize the time delay module, which in turn energizes the contactor coil driver module, which then connects the contactor coil to battery negative.

8. A faulty time delay module may be the cause of the pump motor not operating.

a. Attach a volt-ohm-meter to terminal 13 (negative) and terminal 28. Adjust the volt-ohm-meter for the 50 volt D.C. range.

Loads in excess of the load weights and load centers displayed on the vehicle rating plate can create an unsafe vehicle stability condition and must be avoided. Also see section "Figure 2: Capacity plate location," on page 12 for addittional information.

5.2.6 Loss of lift speed

1. Overload of the hydraulic hoist. (See item 7 of paragraph 5.2.5.)

2. Damage to one or both of the hydraulic pump sections. (See item 5 of paragraph 5.2.5.)

3. Mechanical damage of mast assembly. (See item 4 of paragraph 5.2.5.)

4. A discharged battery. (See item 6 of paragraph 5.1.1.)

5. Damaged or worn cylinder seals will cause internal leakage and could impair the speed or static holding ability of the cylinder.

   a. Check for cylinder drift as follows, the lift assembly must be capable of holding the rated load at maximum height for 2 minutes with not more than 1-3/4" (44.5 mm) vertical drift and not more than 1° of rotational drift from the vertical.

Note: Specified drift rates are measured when hydraulic oil temperature is not less than 120° F.

   b. Replace the cylinder seals if drift exceeds these specifications

   c. Improper mast cylinder sequencing. (See item 6 of paragraph 5.2.5.)

5.2.7 Drift of raised load

1. Overload of the hydraulic hoist. (See item 7 of paragraph 5.2.5.)

2. The lift control valve may be leaking or damaged allowing drift of the raised load.

5.6.4 Plugging

Slow down is accomplished when reversing by providing a small amount of retarding torque for deceleration. If the vehicle is moving and the directional lever is moved from one direction to the other, the motor field is reversed. The plug signal is initiated by the fact that the directional switch has moved from one direction to the other. The motor armature, drive by the inertia of the vehicle, acts as generator. This generated current passes through 4REC and the sensor. The oscillator circuit regulates at a plug current limit level as set by the plug trimpot on the control card.

This controls the pulse rate 1REC to regulate the generated motor current and bring the truck to a smooth stop and reversal. The accelerator potentiometer input will modulate plugging current. With the accelerator potentiometer at minimum resistance, the plugging trimpot will enable adjustment of plugging current from maximum to minimum current level.

With the accelerator potentiometer at maximum resistance, the plugging current will be reduced.

5.6.5 Ramp start

This feature provides full SCR torque to restart a vehicle on an incline. The memory for this function is the directional switch. When stopping on an incline, the directional switch must be left in its original or off position to allow the control to assure full power when restarted. The accelerator potentiometer input will modulate ramp start current.

5.6.6 Full power transition

This built-in feature provides smooth transition from SCR to 1A bypass. This is accomplished by the SCR continuing to pulse until the 1A contactor power tips close.

1A control

The contactor has two modes of control:

- ❑ Timed Pickup - this feature works with the potentiometer in the accelerator.

#	Problem	Suggested Repair
1.	**Hub stud shearing.** **Drive tire scuffing.** **Broken shafts and/or undue stress -** ***continued***	Bent axle shafts or axle shafts on different center lines. • This condition may bind the drive clutch spline to the side gear spline, preventing the driven clutch from overrunning freely, subjecting the NoSPIN and axle parts to excess stress and possible failure. • Minimal binding is generally indicated by occasional, unusual noises and an increase in the normal torsional stress on the axle shafts. • A severe binding condition can prevent the clutch from disengaging until the torsional stress is excessive, stressing other drive line parts. • Extreme conditions may delay or prevent clutch/spider re-engagement, allowing one side to overrun continually, transmitting all the power to the opposite side. These conditions can be corrected by replacing the bent shaft or shafts or by repairing misalignment conditions caused by hub faces that are not square with axle shaft flanges.
2.	**Vehicle pulls to one side - the left or right on straight forward driving;** **Vehicle goes straight forward when making turns.**	• Unequal rolling radii on each of the drive tires. • If the tire rolling radii are not equal, one side of the NoSPIN will be overrunning constantly when power is being applied, while the other will do all the driving, tending to pull the vehicle to one side. • Replace tires so that rolling radii are equal.
		• Broken axle shaft, foreign material in the axle housing. If an axle shaft should break, the remaining axle shaft will carry the full driving torque and will tend to pull the vehicle to one side. • The broken shaft should be replaced, and the other shaft checked at the same time for possible damage from broken ends, chips or firm stress conditions. • Chips, pieces of metal and other foreign material in the axle can result in erratic NoSPIN action, loss of drive to one side of the axle or damage to other internal parts. • Foreign material may lodge between the NoSPIN's driven clutch and spider (central driver), or between the clutch and side gear splines, causing the NoSPIN to remain disengaged so that no drive is transmitted to that side of the NoSPIN.
		• Brake dragging on one wheel. • This condition will tend to pull the vehicle in one direction. • Correct by readjusting the brakes. • Be sure to elevate both wheels off the ground when doing so. • If one wheel is still on the ground, the vehicle will start moving.
		• Worn, damaged or loose steering linkage. • Repair as needed.

Chart continued on next page.

Contents - continued

Page

6.4 steer axle

6.5 service brake

6.3 drive assembly

6.3.1 Removal

1. First review heading: 6.2 "before you begin," beginning on page 6-7.
2. **Set the key switch to OFF; place the key in your pocket.**
3. Disconnect the battery.
4. Block the front and rear of both steer tires.
5. Unbolt and remove the right floor plate and accelerator module.
6. Disconnect the accelerator module wiring and place the assembly safely aside.

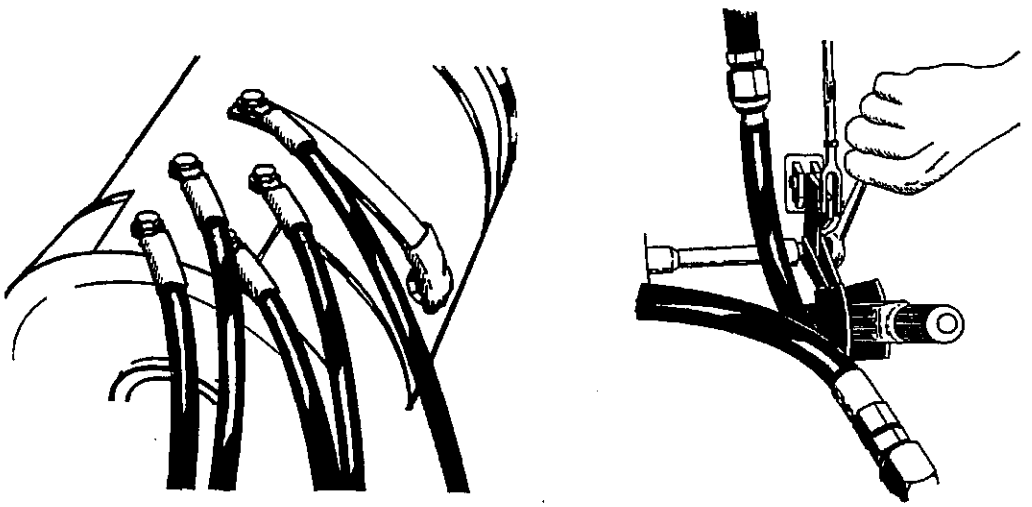


Figure 6-3: Drive motor power cables & hand brake lever

7. Tag for identification, then remove the five power cables from the top rear of the drive motor. (See Figure 6-3: 'Drive motor power cables & hand brake lever.')
8. Place the cables in a protected area.

10. Bleed the brakes. (See Section 6.3.8 'Bleeding brakes,' on page 6-23.)

Note: It is advisable when replacing a brake assembly, a wheel cylinder or a master cylinder, to purge the entire brake system of old, possibly contaminated build.

6.3.7 Brake backing plate and cover

1. Remove the brake shoes and wheel cylinder as previously outlined.
2. Remove the backing plate retaining screws using a socket and breaker bar as each screw was assembled with Loctite.
3. Pull the backing plate and final drive gear cover forward, away from the final drive gear housing. (See Figure 6-12: 'Wheel cylinder service,' on page 6-22.)

6.3.8 Bleeding brakes

WARNING !

- **Wear eye protection. If brake fluid comes in contact with your eyes, immediately rinse them with water and seek medical attention.**
- **Check the fluid level often during the bleeding operation and add fluid as needed to prevent the level from falling low enough to allow air bubbles into the master cylinder.**
- **Use only fresh (new) DOT #3 brake fluid. NEVER use old or used brake fluid. It contains moisture which will deteriorate the brake system components.**

Bleeding the hydraulic brake system is necessary to remove any air that is trapped in the system when replacing brake lines, wheel cylinders or the master cylinder. To avoid extensive damage to the system, use only DOT #3 brake fluid.

It is necessary to bleed both wheels if air has entered the system due to low fluid level or if a brake line has been disconnected at the master cylinder or at the T fitting.

If an individual wheel brake line or cylinder are serviced at the wheel location, only that wheel will require bleeding.

8. File the face of differential flange to remove any burrs or nicks. With three or four bolts used as guides, fasten new bevel gear to differential case.

9. Attach and torque bolts, washers and castellated nuts - see Table 3: "English torque specifications," on page 6-13.

10. Turn the nut to expose hole at the end of the bolt. Install and secure cotter pin.

6.3.13 Replacing pinion gear bearings

1. Remove six 3/8-16 cap-screws and lock washers. Lift the oil seal assembly and retainer away from the case.

2. Lift off the two bevel pinion bearing cover spacers and three gaskets.

3. Place bevel pinion cage with pinion and bearings assembled in an arbor press with tooth end of pinion up.

4. Press pinion and bearings out of cage.

5. The bevel pinion bearing consists of two Timken bearing cones, one double row Timken bearing cup and one bearing cone spacer.

   This spacer is ground to the correct dimension to be used with the particular bearing cones and cup and is shipped this way from the Timken Roller Bearing factory. (Do not use original spacer with other bearings).

6. When wear appears on the bearing cup or cones, always replace complete assembly, that is, the bearing cones, bearing cup and mating spacer.

7. Remove the oil seal from the oil seal retainer. (See Figure 6-26: 'Pinion gear assembly,' on page 6-34.)

10. Install one brake shoe only. Hook the springs into place on the shoe and into the other shoe which should be approximately in

11. When both shoes are properly in place, fit the inner cup, spring and outer cup on each retaining pin.

12. Make a preliminary adjustment of the brakes by checking that the outer surface of each lining is even with the edge of the gear cover.

13. Put wheel back in place and replace the lock-washers and nuts. Check the brake operation before placing vehicle back in service by applying the brake pedal hard several times.

14. Reassembly of the drive coupling, parking brake assembly, motor support tube and drive motor is accomplished by revers

15. Fill the axle with the correct lubricating oil. (See Figure 6-36: 'Replacing axle fluid.')

    Fill level hole is forward and lower and is not shown.

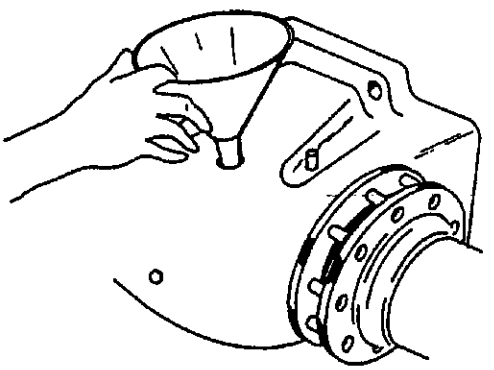


Figure 6-36: Replacing axle fluid

16. With both drive wheels jacked up, operate the drive wheels for several minutes. Listen for any unusual noises. Inspect for any oil leaks. Correct as necessary.

6.4 steer axle

6.4.1 Removal

WARNING !

Before removing the steer axle, turn the steering wheel back and forth between the stops several times to relieve any residual pressure in the steer cylinder hoses.

6.5.2 Brake shoe inspection

(See Section 6.5 'service brake,' on page 6-51.)

6.5.3 Bleeding brakes

(See Section 6.3.8 'Bleeding brakes,' on page 6-23.)

6.5.4 Steer axle brake removal

(See Section 6.3.5 'Changing brake shoes,' on page 6-17.)

6.5.5 Parking brake adjustment

Hand brake

1. The adjustment of the hand operated parking brake is performed in the released position. (See Figure 6-51: 'Hand brake.')

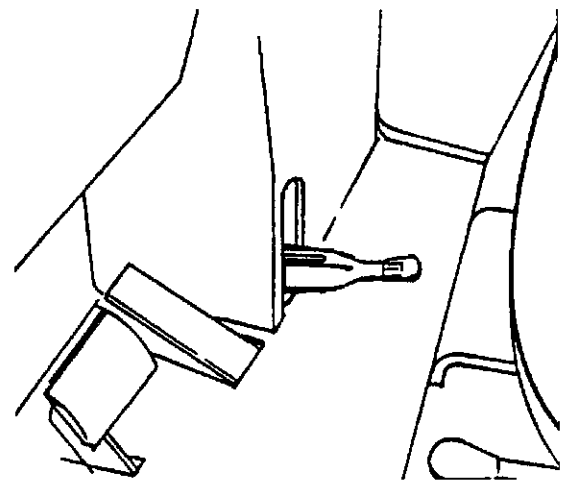


Figure 6-51: Hand brake

2. To increase parking brake effort turn brake lever knob end clockwise.
3. To decrease effort turn knob end counterclockwise.

6.5.6 Seat brake

When the seat parking brake cable length is properly adjusted, the brake system with the operator's seat vacated will hold the truck on a grade of 15% with the rated load in a carry position. (See Figure 6-52: 'Seat brake assembly,' on page 6-54.)

6.8 pivot & shift interlocks

6.8.1 Description

The pivot/shift interlocks prevent the truck operator from positioning his load into an unsafe condition.

The mechanical components are the pivot interlock switch actuating cam and the shift interlock switch actuating cam.

The electrical components are the pivot interlock switch and the shift interlock switch. (See Figure 6-62: 'Pivot/shift diagram.')

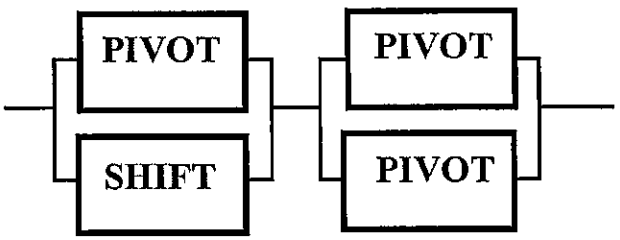


Figure 6-62: Pivot/shift diagram

The hydraulic components are the pivot circuit shut-off hydraulic solenoid valve (Solenoid C) and the shift circuit-shut-off hydraulic solenoid valve (Solenoid B). (See Figure 6-62: 'Pivot/shift diagram.')

The switch section provides positional data, such as pivot arm rotation and lateral position of the mast/side shift assembly.

The solenoid section, when signaled by the switch section, limits the travel of the pivot and shift functions.

6.8.2 Circuit components

The pivot switch is mechanically cammed open when the mast assembly is in the front loading position. The switch will remain cammed open up to 15° of clockwise mast rotation.

The pivot switch actuating cam is located at the rod end clevis of the pivot cylinder which rotates along with the pivot arm. (See Figure 6-63: 'Pivot/shift actuating cam,' on page 6-64.)

6. Add the two top stationary contacts and top retainers. Insert the buss connectors before proceeding.

7. Tighten the four long bolts in a uniform manner using a diagonal tightening sequence. Tighten and torque the bolts to 14-18 in. lbs. (1.6-2.03 Nm).

6.9.6 Accelerator module

WARNING !

Before attempting work on the accelerator module, disconnect the battery connector.

Removal

5. Loosen and remove the accelerator floor plate retaining screws. (See Figure 6-67: 'Accelerator floor plate.')

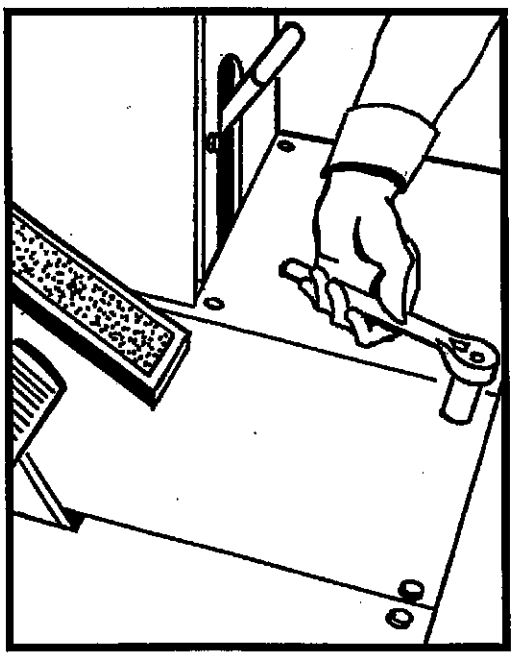


Figure 6-67: Accelerator floor plate

6. Grasp the accelerator pedal and pull the accelerator module upward.

   Angle the floor plate to clear the brake pedal and lay the accelerator module on the adjacent floor plate.