Bendi

# ELECTRIC NARROW AISLE FORKLIFT

# SERVICE MANUAL

BENDI SERIES IV MODELS

**B25-4/42-180D**
**B30-4/42-180D**
**B35-4/48-180D**
**B40-4/48-180D**
**B45-4/48-180D**


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## Seat Safety Switch

If the operator leaves the driver's seat a limit switch is released. The drive and power steering motors are disabled to prevent further truck movement.

To continue, you must first lower and sit in the seat, set the direction control lever in NEUTRAL, then select the direction of travel.

**Note: A two to three second delay is programmed into the seat switch to avoid nuisance shutdown and interruption of normal operations. To stop the truck quickly, use the Emergency STOP button (See page S-5).**

## Emergency STOP Button

Press this button to shut down the drive and power steering motors and all mast movement. The truck drifts to a STOP. Immediately set the parking brake.

To continue, pull out on the button to reset the switch (See Figure S-1).

Use this button:

- in case of fire, smoke or overheating
- if a person comes between the truck and a fixed object.
- in case an accident occurs
- in case of a short circuit or other electrical malfunction; for example, if the pump motor is on continuously.

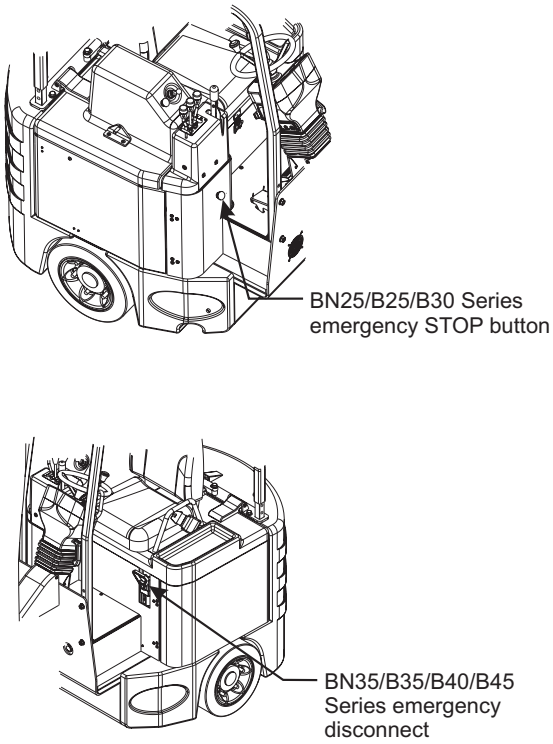



Figure S-1 Emergency STOP Button

## Parking Brake

The parking brake includes a safety interlock that shuts down the drive and power steering motors, disables the direction control lever and applies the brakes to prevent further truck movement. To continue, you must set the direction lever to NEUTRAL, re-lease the parking brake, then set the lever to the desired direction.

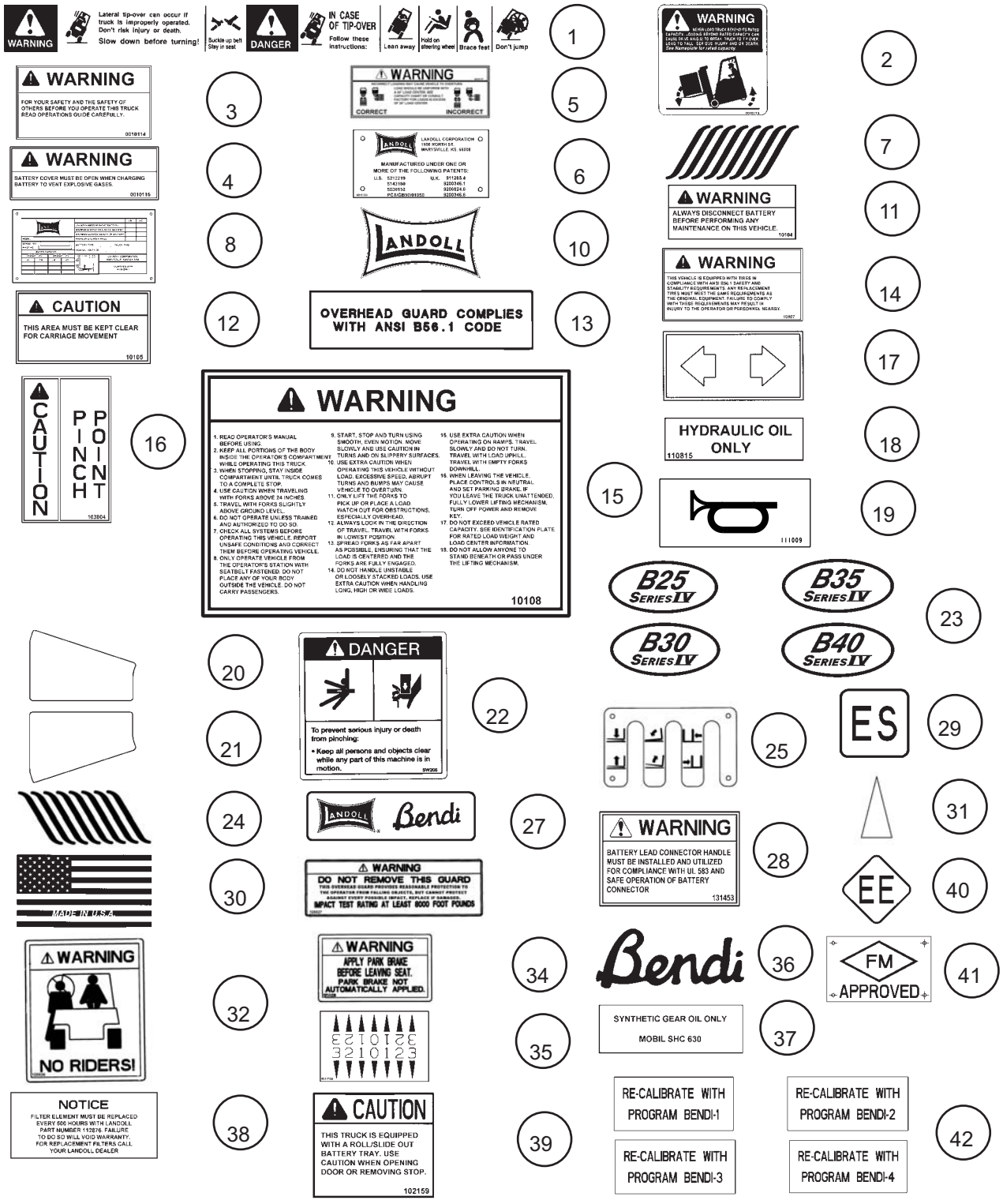



Figure S-5 Safety Decal Identification

# Overview

## Frame

The frame consists of 3/8” to 1” thick (9.525 mm to 25.4 mm) steel panels welded together to form the backbone of the truck (basic truck shape). A number of thick rectangular steel shapes (counterweights) are welded within the frame to counterbalance the truck against the weight of its load. The rear wall of the truck also includes a thick steel plate to add additional counterbalance.

**Note:** The size and weight of the battery is also used as a counterbalance.

## Traction Drive

Bendi Series IV trucks are dual-drive, four-wheeled trucks, having two steerable, articulating load support wheels in the front and two independently controlled drive wheels in the rear. The rear drive wheels consists of a gear box and a separate DC electric motor, controlled by the SRE transistorized controller. See “Electrical System,” page 1-6 for additional information.

### Brake System

The rear drive wheels are equipped with hydraulically-actuated dry disc brakes - typical automotive disc brake system. The brake pedal activates a master cylinder to apply hydraulic pressure to wheel calipers, forcing the disc pads to grip the rotor.

The system is a dedicated system using standard DOT #3 brake fluid and non-asbestos disc pads.

### Parking Brake

A parking brake system is fitted to the left-side drive unit disk brake caliper and is equipped with a cable-actuated dry disc brake (puck). The system is hand-lever actuated, and is electrically interlocked to create a NEUTRAL condition when the brake lever is actuated.

As the lever is raised to apply the brake, the drive and power steering motors shut down and the directional control electrically resets to NEUTRAL, preventing further movement of the truck.

To continue, the operator must first set the direction control lever to NEUTRAL, release the parking brake, then set the control lever to the desired direction of travel.

### Safety Interlock

Both a key lock switch (key switch) and an operator’s seat switch must be activated before the truck can move. The seat switch is activated when the operator is seated in the driver’s seat (Also see 'Seat Safety Switch,’ on page S-5 for additional information).

The differences in weights being supported by the cylinders, along with the differences in cylinder diameters, ensure that the primary cylinder will be fully extended before the secondary cylinder can begin to move. Consequently, when the mast is raised, it moves through two phases:

- Free lift, in which only the carriage assembly moves, up to the maximum height allowed by the inner rails (See Figure 1-13).
- Rail extension, in which both the middle and inner rails move, carrying the carriage upward (See Figure 1-14).

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 1-15).

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.

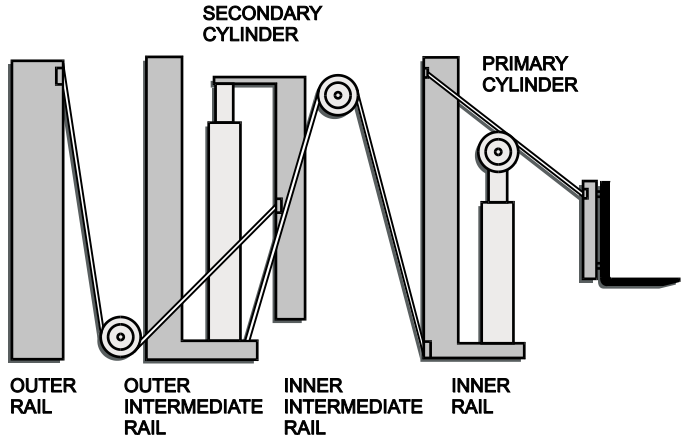



Figure 1-15 Quadplex Mast in Collapsed Position

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 2-1).

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

9. Connect battery cables and install battery in truck.

| Temp °F | Correction | Temp °F | Correction |
|---|---|---|---|
| 39-41 | -0.012 | 101-103 | +0.008 |
| 42-44 | -0.011 | 104-106 | +0.009 |
| 45-47 | -0.010 | 107-109 | +0.010 |
| 48-50 | -0.009 | 110-112 | +0.011 |
| 51-53 | -0.008 | 113-115 | +0.012 |
| 54-56 | -0.007 | 116-118 | +0.013 |
| 57-60 | -0.006 | 119-121 | +0.014 |
| 61-63 | -0.005 | 122-124 | +0.015 |
| 64-66 | -0.004 | 125-127 | +0.016 |
| 67-69 | -0.003 | 128-130 | +0.017 |
| 70-72 | -0.002 | 131-133 | +0.018 |
| 73-75 | -0.001 | 134-136 | +0.019 |
| 76-78 | 0 | 137-139 | +0.020 |
| 79-81 | +0.001 | 140-142 | +0.021 |
| 82-84 | +0.002 | 143-145 | +0.022 |
| 85-87 | +0.003 | 146-148 | +0.023 |
| 88-91 | +0.004 | 149-151 | +0.024 |
| 92-94 | +0.005 | 152-154 | +0.025 |
| 95-97 | +0.006 | 155-157 | +0.026 |
| 98-100 | +0.007 | 158-160 | +0.027 |

**Table 2-1 Specific Gravity Corrections for Electrolyte Temperature**

## Battery Storage

In general, batteries that are fully charged with the electrolyte at the proper level may be stored for up to one year. Batteries should be stored in a cool, dry, well-ventilated area, away from direct sunlight. Batteries without covers should be covered with a non-conductive material to protect them from dirt, moisture, etc.

**IMPORTANT !**

**Do not drape flexible plastic sheeting over batteries as it might trap explosive gases underneath. For batteries stored for more than one, consult the battery manufacturer.**

Consult the battery documentation or the manufacturer for storage method and routine inspection required during the temporary storage interval.

## Towing the Truck

### ⚠Warning

**Make sure the towing equipment is capable of handling the weight of the truck being towed (See Figure 1-1).**

**Never lift a truck using straps, chains or hoists of any type.**

**Never connect lifting equipment to the operator's cab overhead guards.**

**Never use the truck to tow materials.**

**Never tow a truck that is carrying a load.**

**Never connect towing equipment to the mast.**

**For better traction, partially load the truck doing the towing.**

## Load Center

### ⚠Warning

**Make sure the actual horizontal and vertical load centers do not exceed the maximum load centers stated on the capacity plate. Failure to do this can cause the forklift to tip over causing serious injury or death (See Figure 3-4).**

You need to consider two types of load centers. The horizontal load center (1) is equal to one-half the length of the load when the weight is evenly distributed (See Figure 3-4).

For example, a load that is 48” (122 cm) long has a horizontal load center of 24” (61 cm). The further the load center is from the fulcrum (2), the less stable the forklift (See Figure 3-4).

Always make sure your load is flush against the rear of the forks (3), and that unevenly distributed loads are loaded with the heaviest end of the load closest to the front wheels (See Figure 3-4).

The vertical load center (4) is equal to one-half the height of the load when the weight is evenly distributed. For example, a load that is 48” (122 cm) high has a vertical load center of 24” (61 cm). Make sure that you **do not** pick up a load that is higher than twice the vertical load center.

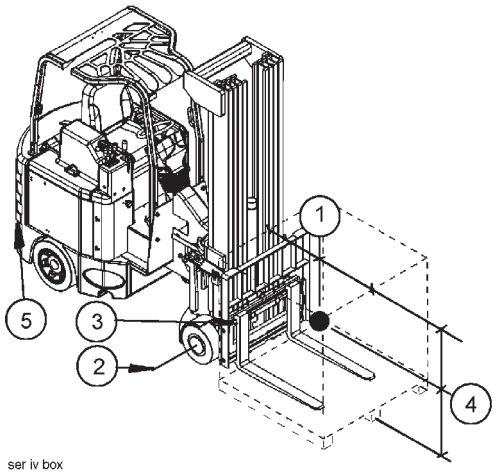



Figure 3-4 Load Center Rating

The maximum horizontal and vertical load centers your Bendi forklift can handle is listed on the capacity plate (See Figure 3-2).

## Counterweight

### ⚠Warning

**Never let a coworker stand on the back of the forklift to add counterweight. Your coworker can fall off the forklift, or the truck can tip backwards, causing serious injury or death.**

Your Bendi forklift has a counterweight (5) that allows it to travel with heavy loads. When the forklift lifts a heavy load, the counterweight on the other end of the forklift keeps the center of gravity inside the stability triangle and prevents it from tipping over (See Figure 3-4).

3. Pull the TILT lever towards you to tilt the mast back. Rear tilt is 3° maximum (See Figure 3-13).
4. Push the TILT lever away from you to move the mast forward, or to return the forks to their horizontal position as indicated by the tilt level gauge mounted on the right and left sides of the mast (See Figure 3-13).
5. Practice tilting the mast slowly by feathering in the desired direction. Feathering is the process of moving the lever ever so slowly in the required direction to very slowly move the load into position.

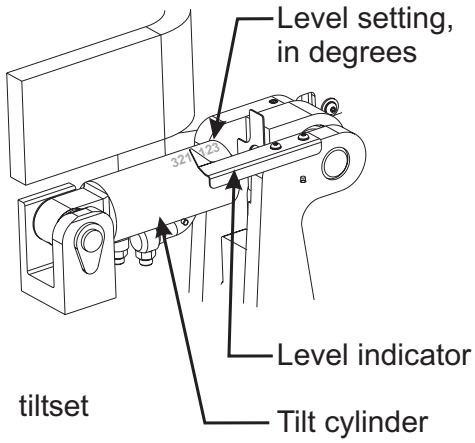



Figure 3-13 Tilt Level Gauge

## ⚠Warning

**Avoid jerky movements of the mast, especially when the load is raised. Jerky movements with the mast raised could tip the truck or allow the load to slip from the forks, causing serious injury and/or damage.**

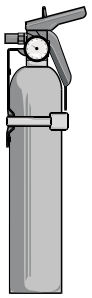
**You should tilt the mast only at the floor level or at the load level in the rack when depositing or picking up a load. At any other time, forward tilting could cause the truck to tip forward or cause the load to slide off the forks causing serious injury to yourself or anyone in the area.**

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.
7. Make sure the area to the right of the truck is clear.
8. Push the SHIFT lever forward to shift the mast to the right (See Figure 3-12).
9. Pull the SHIFT lever back to shift the mast to the left.
10. When you are thoroughly familiar with all of the control movements of the mast levers, practice depositing and retrieving a load under the supervision of an experienced instructor or operator.

# Fire Extinguisher Option

If your truck includes a fire extinguisher it should be inspected monthly or more frequently if circumstances dictate. The extinguisher should be checked to see that:

- it is not damaged
- the discharge outlet is not blocked
- it is fully charged
- the seal is not broken
- the instruction pamphlet is clearly visible



**IMPORTANT !**

**Dry-powder extinguishers are shipped fully charged. Do not experiment with your extinguisher since even a small amount of discharge could cause it to slowly lose the rest of its pressure, rendering the extinguisher useless.**

## In Case of a Fire !

### ⚠Warning

**Fumes and smoke from any fire may be dangerous and can be deadly.**

**All fires should be handled by professionals. Call the fire department, no matter what the size of the fire. Emergency telephone numbers should be posted at each telephone.**

The following directions are for general use only, intended to familiarize you with the key functions and procedure of the fire extinguisher. Always check the extinguisher label for specific techniques and starting distances.

1. Have everyone vacate the area immediately.
2. Hold the extinguisher upright and pull the pin.
3. Stand back from the fire the minimum distance indicated on the extinguisher label.
4. Continue to keep the extinguisher upright, compress the handles together to discharge while sweeping the extinguisher from side to side over the fire.
5. Move closer to the areas as the fire is extinguished, BUT NOT CLOSE SO AS TO DISPERSE BURNING MATERIAL.
6. When the fire is extinguished, beware of re-ignition.
7. Vacate and ventilate the area immediately.
8. Be equipped to leave the area in the event the fire cannot be controlled immediately.

| Dash Display Service Codes | | |
|---|---|---|
| **Displayed Code** | **What It Means** | **What to Do** |
| 27 | Battery Voltage Too High on Drive | 48 Volt battery recently charged. Surface charge has not dissipated<br><br>This fault can be self-correcting. On a truck with power steering, the controller, if set to do so, will pull in the steering pump briefly to dissipate the surface charge.<br><br>Ensure that the high voltage response is properly set with the ProBit.<br><br>Clear the fault(s) with the ProBit. |
| 30 | Check for a Sticky Forward Contactor | The switching time of the contactor exceeds the maximum allowable value.<br><br>Check the plungers for free movement, the coils for shorts and anything that could physically restrict the speed of the contactor. |
| 31 | Check for a Sticky Reverse Contactor | The switching time of the contactor exceeds the maximum allowable value.<br><br>Check the plungers for free movement, the coils for shorts and anything that could physically restrict the speed of the contactor. |
| 33 | Direction Contactor Failed to Drop Out | The controller has detected that the contactor tips were still closed after the contactor coil was dropped. Most likely the contactor tips are welded, or mechanically held closed. Correct. |
| 70 | Open Circuit - Check Wiring to Lift Motor | This error occurs mostly during startup. The controller is reading an open circuit across the motor. Check for loose or broken motor cables. |
| 74 | Recommend Lift Controller be Replaced | There has been an unrecoverable error in the memory of the controller. All calibration values have been lost. Please contact the Landoll Corporation for more information. |
| 77 | Battery Voltage too High for Lift | Battery voltage is over 55 volts. Usually caused by surface charge of a hot battery fresh off the charger. |
| 85 | Battery Current Limit for Lift Exceeded | There may be a short circuit in the main motor cables. Repair.<br><br>The motor may be drawing too much current from a shorted field or armature. Check the motor and repair as necessary. |

## Floor Access Panel - Removal

This panel provides access to the linear accelerator module assembly which is mounted to the underside of the floor plate. The master cylinder and service brake pedal and linkage are mounted within the frame well.

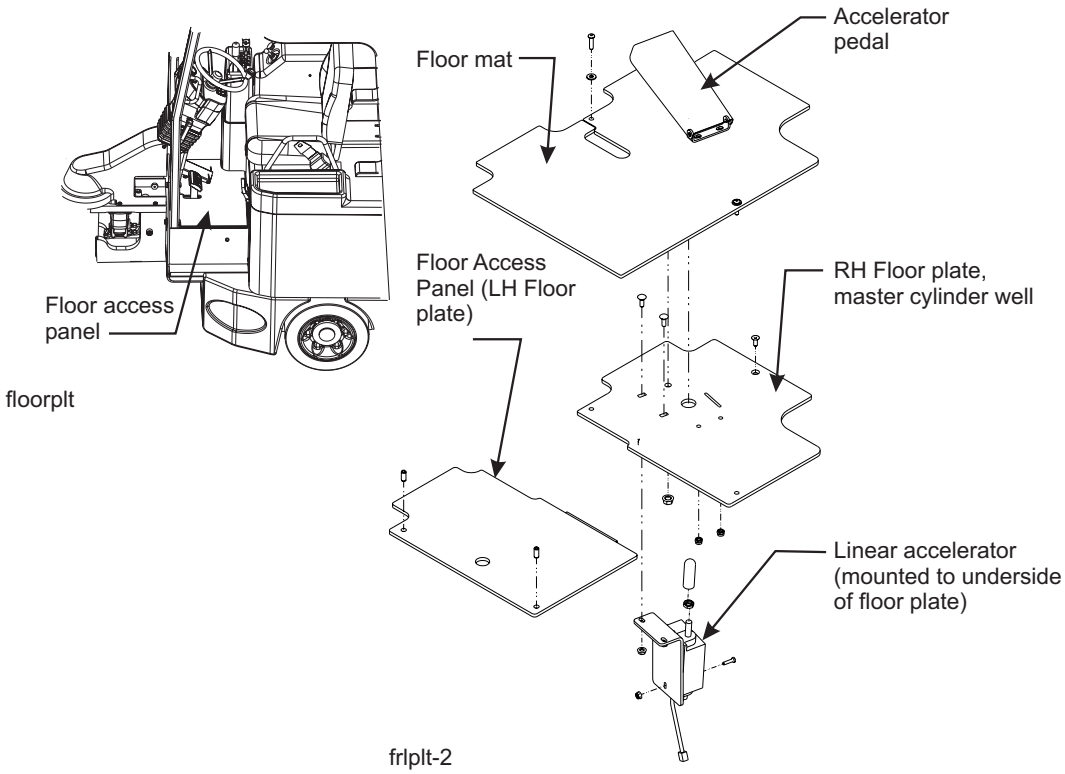



Figure 4-1 Floor Access Panel, Driver's Cab

1. Thoroughly clean the floor area using brush and dustpan or vacuum.
2. If provided, remove hardware and pull up the rubber floor mat. Be careful around the accelerator pedal to avoid tearing the mat (See Figure 4-1).
3. Remove hardware and the access panel (LH floor plate) from the truck frame (See Figure 4-1).
4. Remove the hardware holding the accelerator pedal to the RH floor plate. Carefully lift the RH floor plate.

**Note: The linear accelerator module electrical harness will restrict how far the plate can be lifted. To fully remove the plate you must disconnect the electrical harness.**

5. Install all screws when the panel is reinstalled and make certain the accelerator harness is secured to the linear accelerator. *Install the rubber floor mat, if included.*

7. Add hydraulic oil as needed. See Table 4-2 on page 4-3 for recommended lubricants.

   **Do not overfill.** Having the level above the FULL line does not allow enough area for expansion when the oil heats during normal operation.

8. If the fluid appears very dirty or dark in color, check the truck's maintenance log for the last fluid and filter change and change accordingly.

9. Install the fill/dipstick cap, making sure it is tight. Close the access panel and hook the rubber latch.

## Check Master Cylinder Fluid Level

The master cylinder is located below the driver's cab floor access panel.

1. Remove the floor panel (See page 4-9).

2. First clean the reservoir cap to avoid fluid contamination, then remove the fill cap and rubber gasket (See Figure 4-11).

3. Additional fluid is needed when the fluid level is below the FULL line stamped in the cylinder housing body.

4. Add fluid as needed. **DO NOT OVER FILL.** See Table 4-2 on page 4-3 for recommended lubricants.

5. Reinstall the reservoir fill cap and rubber gasket. Tighten only enough to provide a leak-proof seal. Do not overtighten and crimp or split the seal.

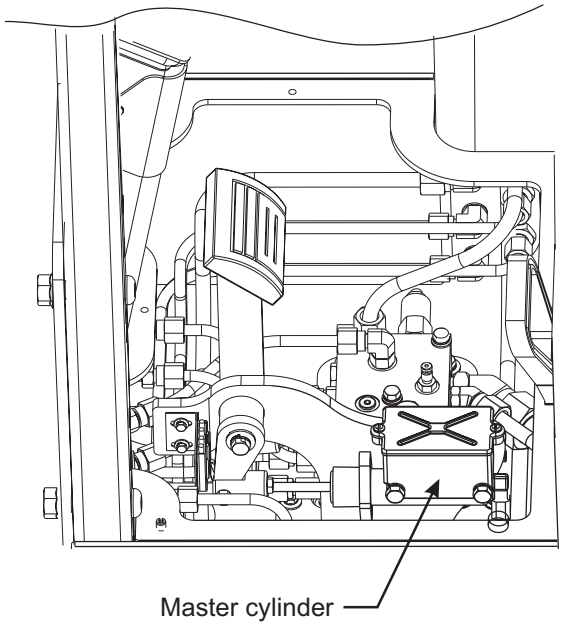



Figure 4-11 Master Cylinder

17. Clean any contaminants from the magnetic trap and O-ring seal on the plugs. reinstall both plugs and torque each to 15 ft. Lbs. (20 Nm).
18. Wipe off any oil spillage on the outside of the unit.
19. Turn the gear unit a few times to eliminate any air pockets and recheck fluid level. The oil level should be checked again after a short driving period. If necessary, top off the oil level.

## Check Lift Operation

1. Check the lift cylinders to ensure proper sequencing. If adjustment is needed, see “The Mast,” on page 6-76.
2. Check to see that an unloaded mast will completely lift (the relief valve opens). If it will not, check the hydraulic oil level in the reservoir; add oil if necessary.
3. Load the mast and raise it approximately 5’ (1.524 m). Quickly lower the mast until it is about 6” (152.4 mm) above the floor and stop the mast abruptly.
4. Make sure the elevating channel rollers maintain proper contact with the mast channel (See Figure 4-22).
5. Look for signs of galling where the rollers contact the rail (See Figure 4-23).

   Galling is indicated by track marks in the rails that are 1/4” to 1/2” (6.35 mm to 12.7 mm) wide running up the rail. Normal track marks are no more than 1/4” (6.35 mm) wide.
6. If galling is detected, adjust the rollers for the proper clearance over the full length of the mast rails (See ‘General,’ page 4-34). Also see “Inspection Check List,” page 4-36.

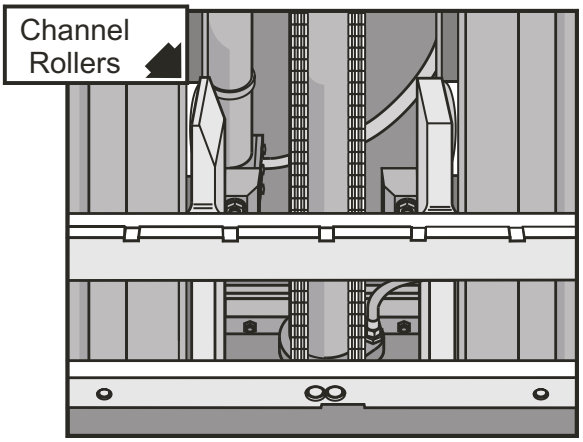



Figure 4-22 Channel Roller Contact


Figure 4-23 Channel Galling

## Replacing Motor Brushes

To check the running hours of the various motors, turn the key switch off and on and record the hours shown on the display for the specific motor in question. Also see “Dash Display Panel,” page 1-12.

**⚠Warning**

**Disconnect the battery cables before working on electrical components. An electrical short may result in arcing which could cause serious burns.**

**Always wear a dust mask and eye protection when seating brushes, cleaning commutators, and/or blowing dirt out of motors using forced air.**

### Exposing the Motors

To repair and/or replace the brushes in the main pump motor or the power steering pump motor, the following must be either disconnected or removed:

1. Set the parking brake and all wheels not being serviced.
2. Position the mast to the front position.
3. **Set the key switch to OFF and place the key in your pocket.**
4. Disconnect the battery.

- Never steam clean the control.

  In dusty areas, use low-pressure forced air to blow off the control. In oily or greasy areas, a mild solution of detergent or denatured alcohol may be used to wash off the control. Then, using low-pressure forced air, blow the unit completely dry. The control may also be cleaned using an electrical contact-type degreaser.
- The use of a heat-transfer grease, such as Dow Corning #340, is recommended when re-installing the SRE panel. The grease helps dissipate heat.
- Thermal boards and other exposed SRE control parts should be kept free of dirt and paint that might change the effective resistance between points.
- Use a lead-acid battery with a voltage and ampere hour rating specific for the vehicle. Follow normal battery maintenance procedures recharging the battery before 80% discharge and with equalizing charges capability.

# Options

## Fork Positioner Lubrication, Non-Side Shifting

1. Set the key switch to ON and position the mast straight ahead.
2. **Set the key switch to OFF and place the key in your pocket.**

**⚠WARNING**

**Do not service the fork positioner while the key switch is ON. If the pivot or tilt joystick is accidentally moved, serious injury could occur.**

3. Before lubricating the positioner rails, wipe off excess lubricant and dirt buildup from within the rail channels and dirt from the top and bottom of the rail grooves.
4. Using a brush, lubricate the shaded areas on the fork rails, including a thin film on the front face of both rails (See Figure 4-38).
5. Wipe off excess grease.

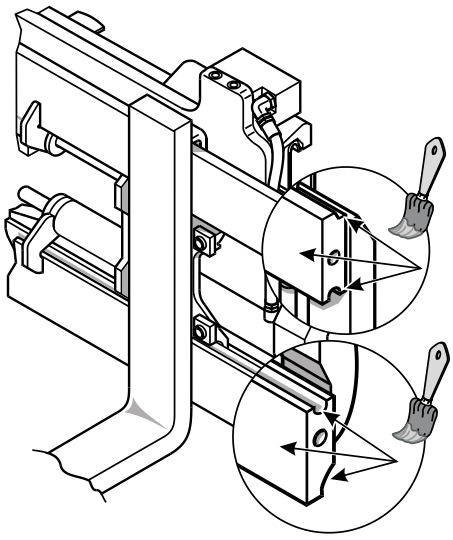


Figure 4-38 Fork Positioner, Non-Side Shifting

## Handling and Storage

- Batteries and battery components should be handled only in accordance with the safety procedure outlined in "Waste Generation and Disposal," page 5-9.
- All batteries, as well as other hazardous substances, should be stored under cover and on an impervious surface with adequate containment to prevent dispersion of contaminants to the environment.
- Batteries and acids should be stored away from sewer and storm drains and from sources of heat.
- Leaking and cracked batteries and cells must be provided with adequate containment during storage and transportation.
- Generally, there are no storage time restrictions for batteries or for spent lead-acid batteries which are destined for recycling. However, state regulations and local fire and health ordinances should be consulted for special restrictions on the storage of hazardous substances, including batteries and acid.
- Sulfuric acid is listed as an extremely hazardous substance under the Federal Emergency Planning and Community Right-to-Know Act (EPCPA). Notification and/or reporting to state and local agencies may be required if specific quantity limitations are exceeded. The threshold planning quantity (TPQ) and reportable quantity (RQ) for sulfuric acid is 1,000 pounds.

## Waste Generation and Disposal

- Spent lead-acid batteries which are destined for recycling are not regulated under federal hazardous waste regulations or by most state regulations. Contact your state environmental agency for additional information.
- Under federal land ban restrictions and individual state battery recycling laws, spent lead-acid batteries can be disposed of only by recycling/reclamation at permitted secondary lead smelters or other authorized recycling facilities. Spent batteries should be sent only to facilities which have obtained EPA or state hazardous waste permits for the storage of spent batteries prior to recycling. Also see Table 5-1.
- Acid which is removed from spent batteries is a regulated hazardous waste. Facilities which generate spent acid may be subject to state or federal regulations for large or small quantity generators applicable to labeling, manifesting, transportation, and reporting.

| Chart - Performance Problems | | | |
|---|---|---|---|
| **#** | **Problem** | **Cause** | **Suggested Repair** |
| | | Loose steering pump and motor assembly mounting. | • Check and tighten mounting brackets and mounting between motor and pump.<br>• See “Steer Pump and Motor,” page 6-52. |
| | | Worn or loose wheel bearings. | • Check wheel bearings - replace as needed.<br>• See “Wheel Bearings, Seals, and Races,” page 6-39.<br>• See “Drive Wheels,” page 6-41. |
| | | Air in the hydraulic system. | • Check the inlet connections to determine where air is being drawn into the system.<br>• Tighten loose connections.<br>• Check the minimum drive speed which may be too slow to prime the pump.<br>• Bleed hydraulic system. |
| 8. | **Hard steering effort in one or both directions.** | Improperly sized tires. | • See Figure 4-7 on page 4-14. |
| | | Vehicle overloaded. | • NEVER exceed capacity of the truck. Check capacity nameplate for tire specs.<br>• See “Capacity,” page 3-4.<br>• Also see “Understanding Stability,” page 3-2. |
| | | Low hydraulic fluid. | • See “Check Hydraulic Oil Level,” on page 4-18. |
| | | Low flow rate or fluid pressure. | • Restriction in fluid return line or line is too small. Remove line, clean and/or replace line.<br>• Check pump. See “Steer Pump and Motor,” page 6-52.<br>• Check hydraulic pressure - 2,600psi. |

## SRE Troubleshooting

The following SRE/Probit Manual information is located in the Appendix, index tab A - H "Electrical System":

- Probit Manual Version 1.2
- SRE ProBit PB-200, Faults and Settings Explained
- Menu Layout for Probit
- PSM Module Troubleshooting Manual

## Adjust the Parking Brake Handle

1. First, review “Before You Begin,” page 6-2.
2. **Set the key switch to OFF, then place the key in your pocket and disconnect the battery.**
3. Block all wheels.
4. Raise the left side of the truck until the rear drive tire clears the floor by no more than 1” (25.4 mm) - see “Before You Begin,” page 6-2.
5. Pull up on the parking brake handle as far as possible using moderate force (See Figure 6-4).

   The amount of vertical travel should allow the handle to snap into the full vertical position. The left rear wheel should not turn when attempting to turn by hand.

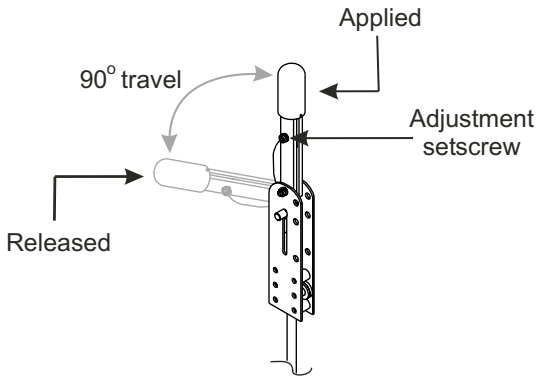



Figure 6-4 Parking Brake Vertical Travel

**⚠Warning**

**BEFORE REACHING IN TO TURN THE WHEEL, MAKE SURE THE TRUCK HAS SAT IDLE LONG ENOUGH TO COOL. VARIOUS PARTS CAN GET EXTREMELY HOT DURING OPERATION. ALSO MAKE SURE YOU ARE WEARING WORK GLOVES.**

6. Release the parking brake by pushing downward as far as the lever will travel.
7. To adjust, tighten or loosen the Allen head adjustment setscrew accordingly. Turning clockwise tightens the setting; counterclockwise loosens the setting.

**Note: Do not overtighten. You will separate the cable from the clevis ends.**

8. Apply and release the parking brake five or six times to stretch (seat) the cable, then double check your adjustment.
9. If this fails to properly adjust the brake, see “Adjust Parking Brake Caliper,” page 6-10.

## Brake System - Repair

**⚠WARNING**

**Safety must always be paramount when working on brake system components.**

**Do not use parts that do not appear to be in perfect working condition. It is recommended to use only Landoll genuine replacement parts.**

**Whenever servicing a brake component, it is recommended to service both sides of the truck to prevent premature wear and uneven braking action.**

**If you are unsure about a procedure, seek professional help. Contact your Landoll service representative.**

**Wear eye protection. If brake fluid comes in contact with your eyes, immediately rinse them with water and seek medical attention.**

**Use only DOT #3 brake fluid.**

**Brake fluid will damage paint. Cover all body parts and be careful not to spill fluid during this procedure.**

**Note: Whenever the master cylinder is removed and/or replaced, the hydraulic brake system must be bled. The time required to bleed the system can be reduced and made easier if the master cylinder is filled with brake fluid and bench-bled before installing the cylinder into the truck (See 'Bench Bleed the Master Cylinder,' on page 6-29).**

**IMPORTANT !**

**Brake fluid will damage paint. Cover all body parts and be careful not to spill fluid during this procedure. Wipe up any spilled fluid immediately, then flush the area with clean water.**

## Bench Bleed the Master Cylinder

Since high pressure is not involved in the bench bleed procedure, your finger can be used to plug the cylinder hole and prevent air intake.

1. Support the cylinder (in a vise) to prevent fluid spillage while allowing you to push the internal piston (See Figure 6-17).
2. Remove the filler cap and fill the cylinder with DOT #3 brake fluid.
3. Slowly push in on the rubber boot and cylinder plunger (push rod) assembly to force air from the cylinder, then hold the piston in (See Figure 6-17).

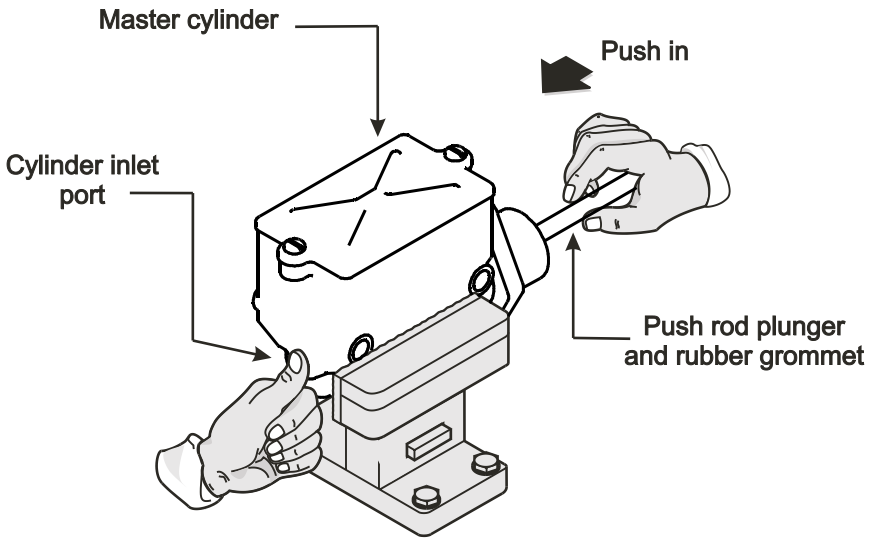



Figure 6-17 Support and Bench Bleed the Cylinder

# Steer (Load) Wheels

## To Check

1. **First, review "Lifting the Truck," beginning on page 6-3.**
2. With the truck raised and supported, spin each wheel and check for noise, rolling resistance and free play.
3. Rock the wheel in and out on the spindle. If there is any noticeable movement, the bearings should be checked and then repacked with grease and/or replaced.

## Wheel Bearings, Seals and Race

1. First, review "Before You Begin," page 6-2.
2. **Set the key switch to OFF and place the key in your pocket.**
3. Apply the hand brake and disconnect the battery. Make sure all the other wheels are securely blocked so that the truck cannot move.
4. Lift and support the truck so that the wheel being serviced is clear of the floor by no more than 1" (25.4 mm). Review "Lifting the Truck," on page 6-3.
5. Remove (pry off using flat blade screwdriver) the wheel rim cover (hub cap). Clean excess grease from around the spindle (See Figure 6-26).
6. Remove the cotter pin. Unscrew the hex slot nut (use open-end wrench) and remove the nut and spindle washer (See Figure 6-26).

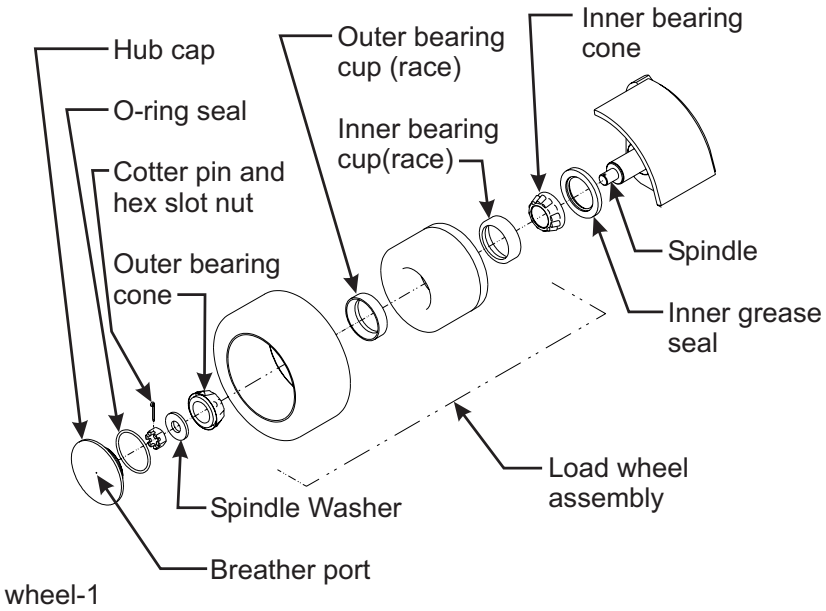



Figure 6-26 Removing the Hub Cap and Wheel

7. With help, lift the steering column upwards to disengage the shaft form the orbital unit, then remove the steer column from the truck.
8. When installing the new steer column, you must turn the steering shaft until it aligns with the orbital unit and drops into place.
9. Continue by reversing the preceding steps making sure to tighten and torque all mounting screws (See Table 4-3 on page 4-4).

## Orbital Steer Unit

1. Repeat Steps 1 through 5 of preceding section “Steering Column (Console)”, beginning on page 6-47.
2. Tag the port locations of each hydraulic line and fitting, then disconnect the four lines from the unit (See Figure 6-34).

   Review previous section “Hydraulic Fittings and Hoses,” on page 6-4. Have shop rags handy to soak up any fluid spills.
3. If the unit is being replaced, or the fittings are defective, notice the placement (angle) of the hose fittings then remove them. Thread them into the new orbital unit (or replace).
4. Immediately cap the ports in the control unit to prevent oil spills.
5. Install the new orbital control unit to the steering column by following the preceding steps in reverse order (See Figure 6-34).

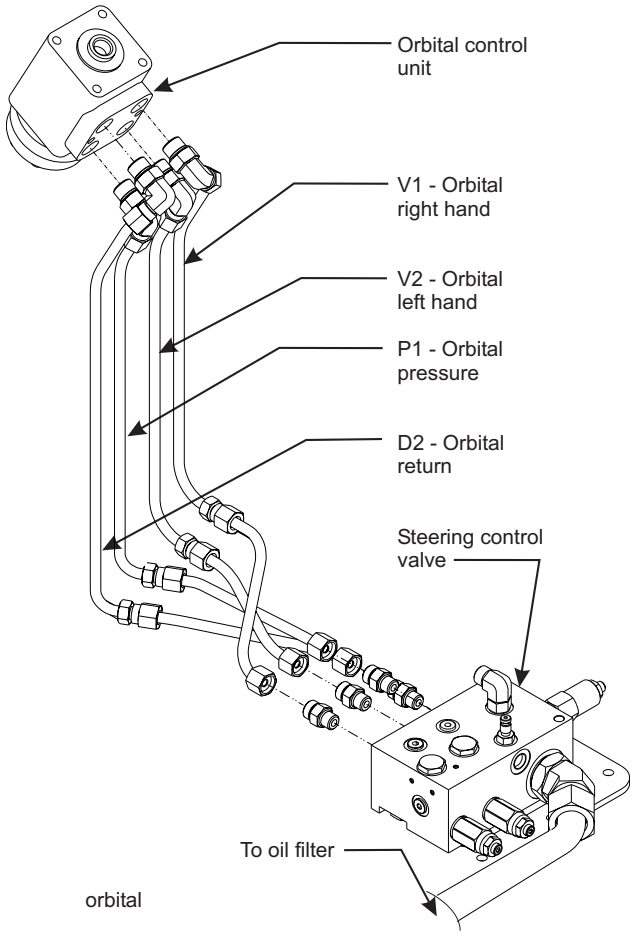



Figure 6-34 Orbital Control Unit

6. Check oil level in the hydraulic tank and fill as needed (See ‘Check Hydraulic Oil Level,’ on page 4-18).

## To Service the Orbital Control Unit

To service the orbital control unit, see the Appendix, index tab Q - Z 'Steer System'.

10. **Lift pump service only**

- Disconnect the pump high pressure line (tube) from the lift pump fitting (See Figure 6-38).
- Disconnect the suction low pressure line (hose) from the pump fitting.

**Note: Immediately plug and cap all hose/tube ends and pump ports and tag each for identification. Have shop rags handy to soak up any oil spills.**

**Use # 16 male O-ring face seal for suction line; #08 for high pressure line.**

- Remove the pump/motor mounting screws and hardware (3/8”-24). Slide the pump shaft from the motor and remove the pump assembly to a workbench.

  Be careful of electrical wire harness and other tubing/hose lines in the area to avoid unnecessary damage and repair.
- Wipe clean any oil spills in the bottom of the frame well compartment.
- Notice the placement (angle) of the pump fittings, then remove the fittings and install them in the new pump - if the pump is being replaced.
- Apply graphite grease to the pump shaft before inserting into the electric motor.
- Install the new pump to the electric motor, making sure the hydraulic fittings are properly aligned, and install the assembly to the truck by following the preceding steps in reverse order.
- Tighten and torque all screws (See Table 4-3 on page 4-4).
- Check fluid in the hydraulic tank (See ‘Check Hydraulic Oil Level,’ page 4-18).

## To Service the Lift Pump

To service (rebuild) the lift pump, see the Appendix, index tab I - P 'Lift circuit'.

## Pedal Spring

1. Repeat Steps 1, 2 and 3 of preceding section “Module and Cable Assembly” , beginning on page 6-67.
2. Remove one of the pin shaft retaining rings (See Figure 6-43).
3. While applying slight pressure to the  pedal, slide the pin from the assembly.
4. Ease up on the accelerator pedal and slide the pin out to replace the return spring.
5. Replace return spring and put back together by reversing preceding steps.

## Seat Switch

The driver’s seat micro switch and cable assembly are mounted to the bottom of the seat cushion.

## ⚠CAUTION

**Wedge a block of wood between the mast and the front mounting plate to insure that the mast cannot be accidentally move backwards while you are disconnecting the pivot pin assemblies.**

9. Remove the trunnion pin bolts (5/8”-11) and hardware (See Figure 6-47).
10. Remove the wedged block of wood between the mast and front mounting plate and slowly slide the mast backwards.

    Raise the mast enough to release the trunnion pins from their supports.

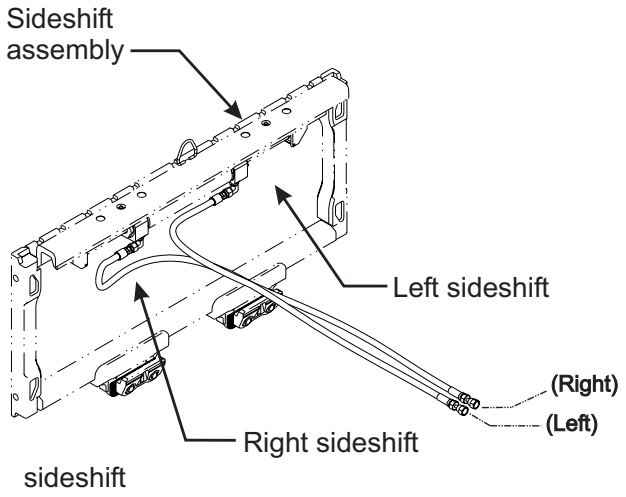



Figure 6-50 Sideshift Assembly

## ⚠WARNING

**The mast may swing from the lift truck, *be alert and cautious!***

11. Lay the mast horizontally, carriage side facing up, across three or four 6” x 6” x 48” (53 mm x 153 mm x 1,220 mm) planks of wood.
12. Dismantle, clean and inspect the mast assemblies and subassemblies as instructed in the Service Manual.
13. Reassemble the mast in reverse order, using your notes as necessary and the enclosed Mast Service Manuals.
14. Before returning the mast to service, perform all adjustment procedures listed in enclosed Mast Service Manuals. Refer to the Appendix, index tab I-P 'Mast'.