

SERVICE REPAIR

MANUAL

Hyster B470 (N25XMDR2, N30XMR2, N40XMR2) Forklift

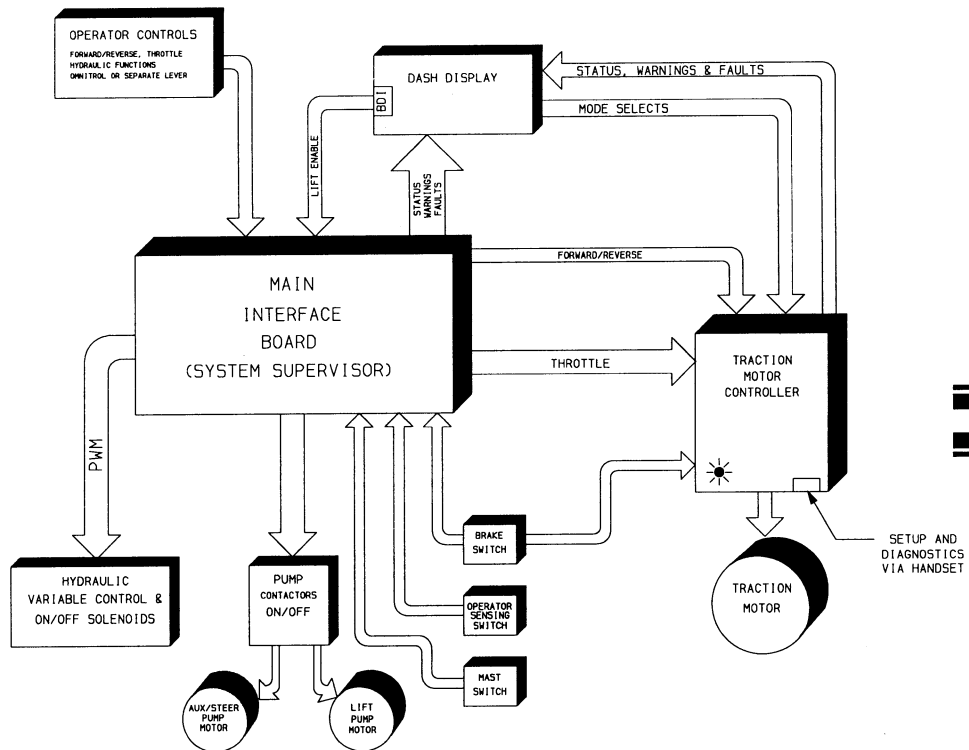
HYSTER

ELECTRICAL SYSTEM

N30-40-45 XMR

N25-30 XMDR

N50 XMA



HYSTER

SAFETY PRECAUTIONS

MAINTENANCE AND REPAIR

- When lifting parts or assemblies, make sure that all slings, chains or cables are correctly fastened and that the load being lifted is balanced. Make sure that the crane, cables and chains have the capacity to support the weight of the load.
- Do not lift heavy parts by hand. Use a lifting mechanism.
- Wear safety glasses.
- **DISCONNECT THE BATTERY CONNECTOR** before doing any maintenance or repair on electric lift trucks. Disconnect the battery ground cable on internal combustion lift trucks.
- Always use correct blocks to prevent the unit from rolling or falling. See “How To Put The Lift Truck On Blocks” in the **OPERATING MANUAL** or the **PERIODIC MAINTENANCE** section.
- Keep the unit and working area clean and in order.
- Use the correct tools for the job.
- Keep the tools clean and in good condition.
- Always use **HYSTER APPROVED** parts when making repairs. Replacement parts must meet or exceed the specifications of the original equipment manufacturer.
- Make sure that all nuts, bolts, snap rings and other fastening devices are removed before using force to remove parts.
- Always fasten a **DO NOT OPERATE** sign to the controls of the unit when making repairs or if the unit needs repairs.
- Make sure you follow the **DANGER, WARNING** and **CAUTION** notes in the instructions.
- Gasoline, Liquid Petroleum Gas (LPG), and Diesel are flammable fuels. Make sure that you follow the necessary safety precautions when handling these fuels and when working on these fuel systems.
- Batteries generate flammable gas when they are being charged. Keep fire and sparks away from the area. Make sure the area has ventilation.

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manual**

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| <p style="text-align: center;">This section is for the following models: N30-40-45 XMR, N25-30 XMDR, N50 XMA</p> |
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INTRODUCTION

GENERAL

This electrical system for the N30-40-45XMR, N25-30XMDR and N50XMA lift trucks is new to Hyster trucks. The electrical control system consists of the following major components:

- Main Interface Board (MIB)
- Proportional Electro-Hydraulic Valve
- Traction Motor Controller
- Dash Display Assembly
- Multi-function Control Handle Assembly (MFCH)
- Contactor Panel Assembly

- OMNITROL Lever or Separate Lever Hydraulic Control

Each of the major components will first be discussed in general. Later in this section complete instructions regarding removal, disassembly, repair, assembly, installation, adjustments and specifications are provided.

See the section, **DIAGRAMS, 8000 SRM 579** for additional wiring details.

NOTE: Throughout this manual the terms right, left, front and rear relate to the viewpoint of an operator standing in the truck facing the forks.

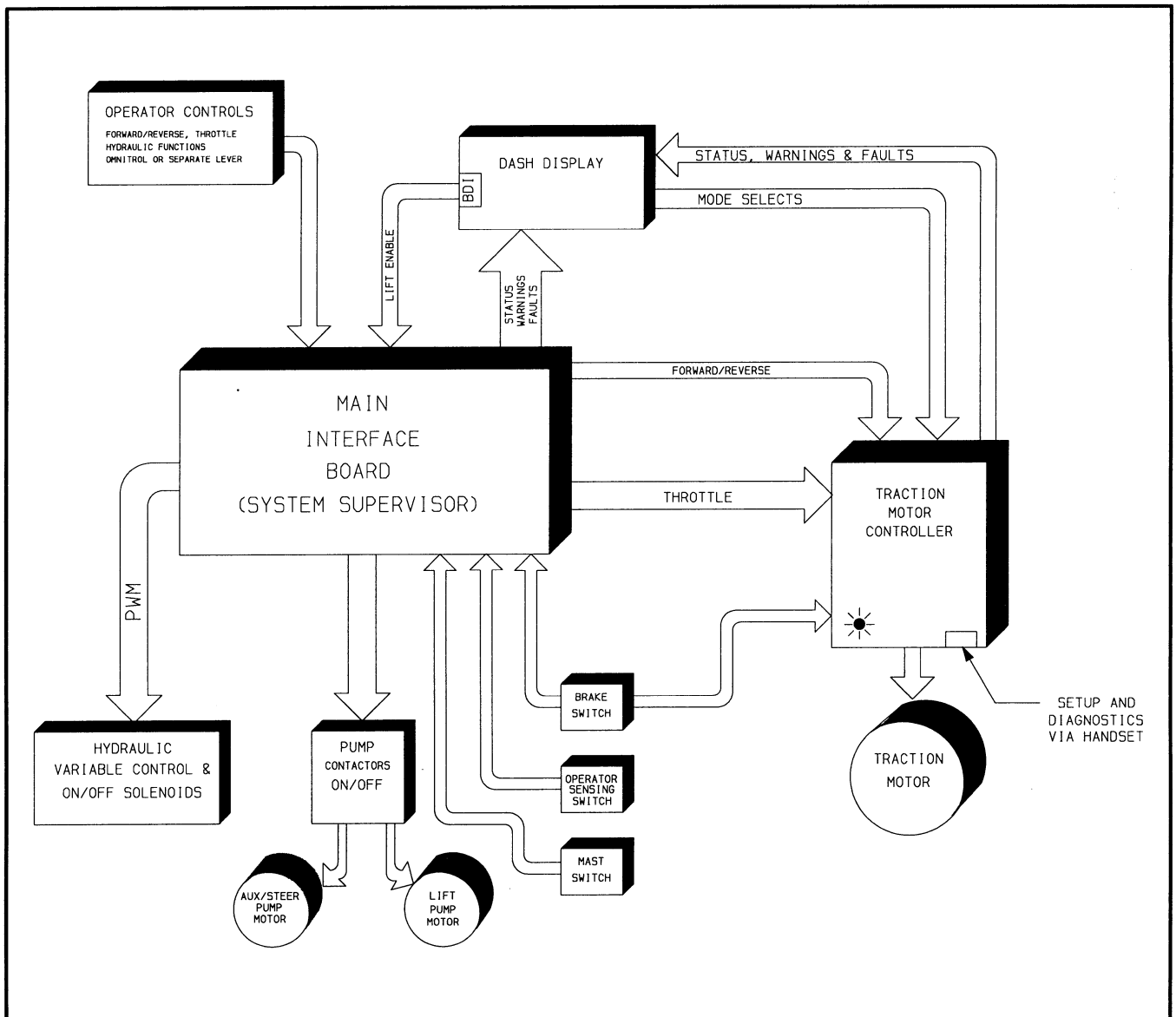


FIGURE 1 – LOGIC DIAGRAM

COMPONENT REPAIR AND TESTING

GENERAL

1. To check for wire connections to the frame, disconnect the battery so that the connector is completely free and use an ohmmeter to check the circuits. Check for 50,000 ohms or more between each terminal of the part of the battery connector on the lift truck and a clean connection on the frame. Make sure there are no electrical connections to the frame of the lift truck. Wires or terminals without insulation can cause these connections. Isolators for circuit boards that are missing, broken or not installed correctly can also cause these connections.

2. Check for voltage between each terminal of the connector on the battery and a clean metal connection on the frame of the lift truck. It is normal to measure some voltage between the battery and the frame even if the resistance checks are correct. If a voltage is measured, use an ammeter to determine if the level is acceptable. Current in excess of 100 milliamperes can cause a problem.

There can be a voltage on the frame if the battery is dirty or if the battery has a defect. Clean the battery and battery compartment as necessary. There can also be a voltage on the frame if there is carbon dust in the motors. Use dry compressed air to remove the carbon dust from all motors.

CONTACTOR PANEL ASSEMBLY

Description/Features

The contactor panel assembly is supplied as a subassembly complete with wiring. It contains the main, forward/reverse and steering pump contactors, all fuses, and the associated wiring and components. The lift pump contactor is mounted separately. All of the components used are common for all of this series of lift trucks, whether the lift truck is using a 24 volt or 36 volt battery. All of the components are located so that they are easy to see, test and maintain.

The contactor panel assembly is located behind the operator's compartment cover on the right hand side of the truck. Access to the contactor panel requires removing the cover. The fuses, "ER" (enable relay), main contactor, power steering contactor and the forward/reverse contactor are mounted on this panel assembly.

NOTE: The lift pump motor contactor, the "HMR" (hour meter relay) and the "HR" (horn relay) are located in the drive unit compartment.

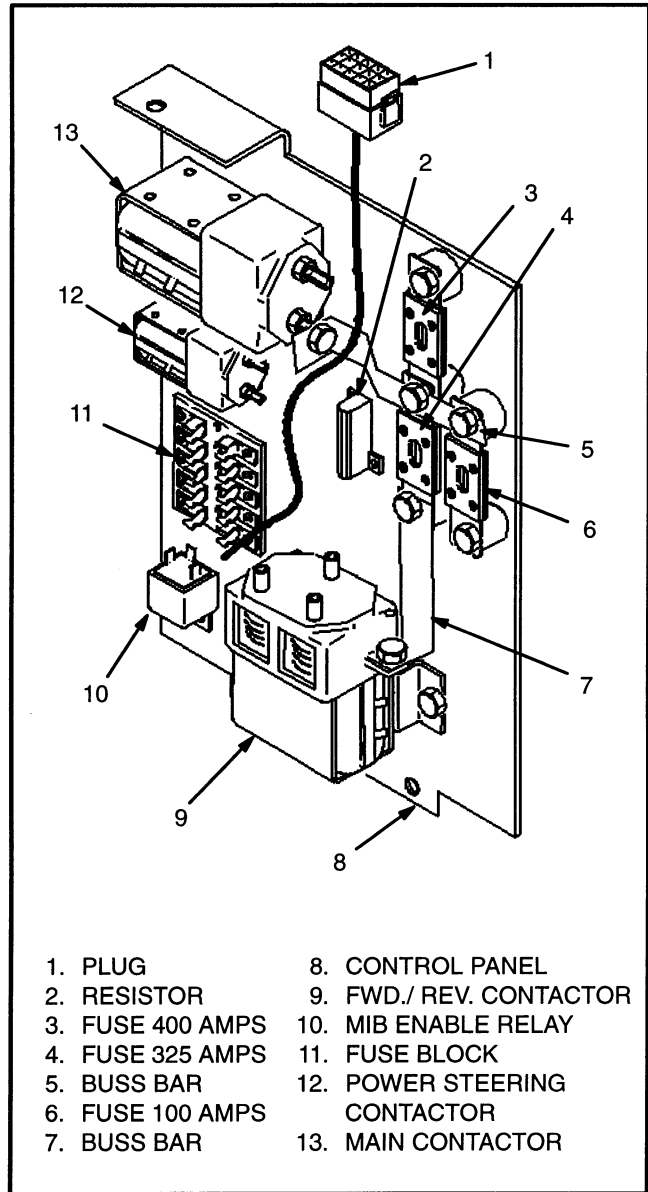


FIGURE 2 – CONTACTOR PANEL ASSEMBLY

Removal

1. Move the lift truck to a safe level area. Turn the key switch off and remove the key. Put a "DO NOT OPERATE" tag on the MFCH. Put blocks under the drive wheels to keep the lift truck from moving. See the section, **PERIODIC MAINTENANCE, 8000 SRM 578**. Refer to **HOW TO PUT A LIFT TRUCK ONTO BLOCKS**.

⚠ WARNING

Disconnect the battery and separate the connector before opening the compartment cover or inspecting or repairing the electrical system. If a tool causes a short-circuit, the high current flow from the battery can cause an injury or parts damage.

2. Disconnect the battery and separate the connectors.
3. Remove the socket head capscrews retaining the cover to the frame. Remove the operator's compartment cover for access to the contactor panel assembly.

⚠ WARNING

The capacitor in the traction motor controller can hold an electrical charge after the battery is disconnected. To prevent electrical shock and injury, discharge the capacitor before inspecting or repairing any component. Wear safety glasses. Make certain the battery has been disconnected. Discharge the capacitors in the controller by connecting a load (such as a contactor coil or a horn) across the controller's B+ and B- terminals (center 2 terminals). DO NOT use a screwdriver to discharge the traction motor controller.

4. Discharge the controller by connecting a load across terminals B+ and B-. Disconnect the plug to the main wiring harness.

NOTE: The contactor panel assembly does not normally have to be removed from the lift truck. The steps listed above must be done to service any item that is attached to the contactor panel assembly.

5. To remove the panel assembly, tag and disconnect the power wires to the contactors and the fuses.
6. Unplug the control wires from the main wire harness at the X-5 connector.
7. Remove the capscrew, flat washer, lockwasher and nut retaining the top of the panel assembly to the frame. Remove the two nuts, lockwashers, and flat washers retaining the bottom of the panel assembly to the frame. Remove the contactor panel assembly.

Installation

1. Align the contactor panel with the mounting holes in the frame. Install the two flat washers, lockwashers and nuts on the bottom of the panel assembly. Install the

capscrew, flat washer, lockwasher and nut to retain the top of the panel assembly.

2. Install the power wires and fuses. See the section, **DIAGRAMS, 8000 SRM 579** for additional information.
3. Reconnect the control wires.
4. Connect the battery and test the operation of the truck.
5. Remove the blocks from under the drive wheels, remove the "DO NOT OPERATE" tag and install the key.

CONTACTORS

Description/Features

Contactors are switches, controlled by electromagnets (coils), that close and open a power circuit. The MIB and traction motor controller have internal electronic drivers to control the current to the coils of the contactors. The electromagnetic field in the coil moves the armature against spring pressure to close the contact. When the coil is deenergized, the spring pressure moves the armature and opens the contacts. When a spring holds the contacts of a switch open, the switch is called normally open (NO). If a spring holds the contacts of a switch closed, the switch is called normally closed (NC).

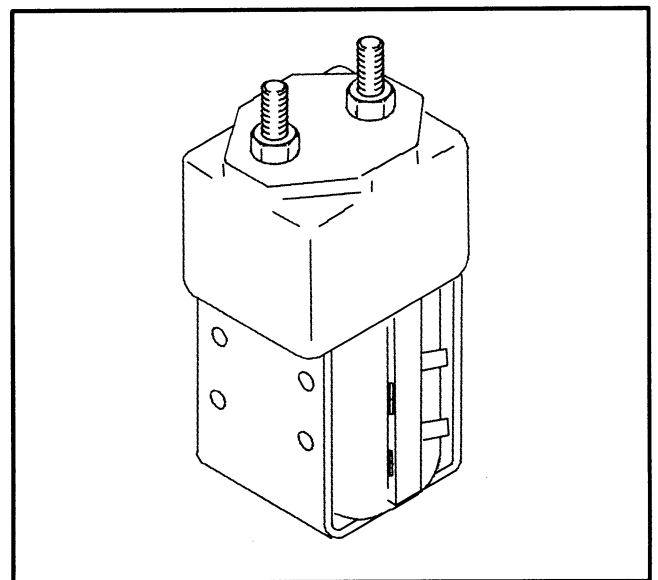


FIGURE 3 – TYPICAL SPNO CONTACTOR ASSEMBLY

The contactor contacts are made of special silver alloy. The contacts will normally look black and rough from normal operation. This condition does not cause prob-

lems with the operation of the lift truck. Cleaning is not necessary. **DO NOT USE A FILE ON THE CONTACTS. DO NOT LUBRICATE THE CONTACTS.** Replace the contacts when the silver alloy is worn away to the base support metal.

Lift trucks equipped with a power steering circuit have contactors with one set of single pole normally open contacts (SPNO). See FIGURE 3.

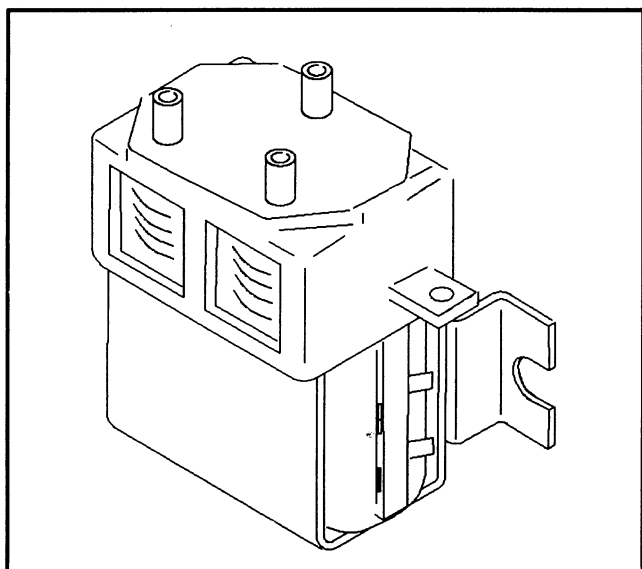


FIGURE 4 – DIRECTION CONTACTOR

A typical set of direction contactors is shown in FIGURE 4. The direction contactors (**FORWARD** and **REVERSE**) each have two sets of NC and NO contacts. When a coil for a direction contactor is energized, the NO contacts close and the NC contacts open. This design prevents the contacts from being closed in the wrong sequence.

Testing

⚠ WARNING

Parts of this procedure requires working on the lift truck with full electrical current present. Do not wear any rings, a watch or any other jewelry while working around the contactor panel assembly. When manually closing a contactor with the power connected, use a properly insulated tool.

1. Block the lift truck so that the drive wheels are off the floor. See the section, **PERIODIC MAINTENANCE, 8000 SRM 578**. Refer to **HOW TO PUT A LIFT TRUCK ONTO BLOCKS**. Make certain that the hydraulic controls are in the neutral position.

2. Remove the operator's compartment cover.

⚠ CAUTION

Never operate the traction motor at full speed for more than a few seconds without a load when the drive wheels are off the floor. A series wound DC motor will continue to accelerate indefinitely until it exceeds its designed maximum rpm, at which point it will self-destruct.

3. Check the condition of the battery. If it is not fully charged, charge or replace the battery with a fully charged battery before continuing.
4. Visually check to see if the contactor closes when the circuit is energized. If the contactor closes, skip to Step 10. If the contactor does not close, proceed to Step 5.
5. Connect a voltmeter across the coil terminals. Verify that the correct voltage is being applied to the coil with the circuit energized. See TABLE 1.

| CONTACTOR COIL | PULL IN Approximate | HOLDING Approximate |
|--|------------------------|------------------------|
| Forward/Reverse | 24 volts | 24 volts |
| Main-24 volt truck | 24 volts | 9 volts |
| Main-36 volt truck | 36 volts | 12 volts |
| Lift Pump | 24 volts | 12 volts |
| Power Steering/Aux. Pump | 24 volts | 12 volts |
| NOTE: Pull in voltage occurs for only approximately 1 second. Some voltmeters may not display this voltage. | | |

TABLE 1 – CONTACTOR COIL VOLTAGES

6. Check the contactor for loose, broken or corroded connections at the contactor.
7. Check the mechanical function of the contactor. Use an insulated tool, such as an electricians screwdriver to manually close the contactor tips. Check for looseness or binding of the moving parts of the contactor. The parts should move freely, but the parts must not be so loose that the movement is sloppy.
8. Visually check the tips for pitting, burning or wear.
9. If an external suppressor is attached to the coil, remove the suppressor. Check the ohm value of the contactor coil. Compare the reading against the ohm values for the type of contactor being tested. See TABLE 2,

Page 8 for coil resistance values. Readings not within the listed limits indicate the following:

High Resistance . Corrosion or an open coil

Low Resistance . . Shorted or a burnt coil

NOTE: No external suppressors are used on contactor coils which are controlled by the MIB or the traction motor controller. The MIB and traction motor controller have internal suppressors for these contactor coils.

10. If the contactor closes but the truck does not work properly, check the electrical function of the high current section of the contactor (the tips and buss bars). With the lift truck battery connected and all switches closed, connect a volt ohmmeter across the high current terminals of the contactor.

Set the voltage scale of the meter to the lowest range higher than battery voltage (50 volts for a 36 volt battery, etc.). On forward and reverse contactors, with the contactor open, a reading of zero volts should be obtained. As the contactor closes, the meter should jump then immediately drop to zero or close to zero. This is the voltage drop across the contactor. On pump contactors, read the voltage across the contactor with the tips open. Battery voltage should drop to zero or near zero as the tips close.

A voltage drop of 2 volts or more across the tips indicates a poor contact or high resistance. Check for burned or worn tips, incorrect size or mismatched tips and for an incorrect gap setting on contactors with adjustable point gaps.

Removal

WARNING

The capacitor in the traction motor controller can hold an electrical charge after the battery is disconnected. To prevent electrical shock and injury, discharge the capacitor before inspecting or repairing any component. Wear safety glasses. Make certain the battery has been disconnected. Discharge the capacitors in the controller by connecting a load (such as a contactor coil or a horn) across the controller's B+ and B- terminals (center 2 terminals). **DO NOT** use a screwdriver to discharge the traction motor controller.

1. Disconnect the battery and separate the connectors.

2. Refer to CONTACTOR PANEL ASSEMBLY, REMOVAL for access to the main, power steering and forward/reverse contactors mounted on the contactor panel. The pump contactor is located on a bracket located in the drive unit compartment. To access the pump contactor, open the drive unit compartment door.

3. Discharge the controller by connecting a load across terminals B+ and B-.

4. Tag and disconnect the wires and/or buss bars to the contactor.

5. Remove the capscrews, flat washers and lockwashers retaining the contactor to the contactor panel assembly. For the pump contactor, remove the capscrews, lockwashers, flat washers and nuts.

Installation

1. For the contactors on the contactor panel assembly, align the contactor to the contactor panel assembly. Install the contactor using the capscrews, flat washers and lockwashers. For the pump contactor, align the contactor with the bracket in the drive unit compartment. Install the capscrews, flat washers, lockwashers and nuts.

2. Connect the wires and/or buss bars to the contactor. See the section, **DIAGRAMS, 8000 SRM 579** for wiring connections.

3. Close the drive unit compartment door for the pump contactor. Install the operator's compartment cover for the contactors mounted on the contactor panel assembly.

4. Connect the battery and test the operation of the truck.

"EE" CONTACTORS

When "EE" contactors are used, additional steps are required to service the contactors as the contactors are covered by an enclosure shroud.

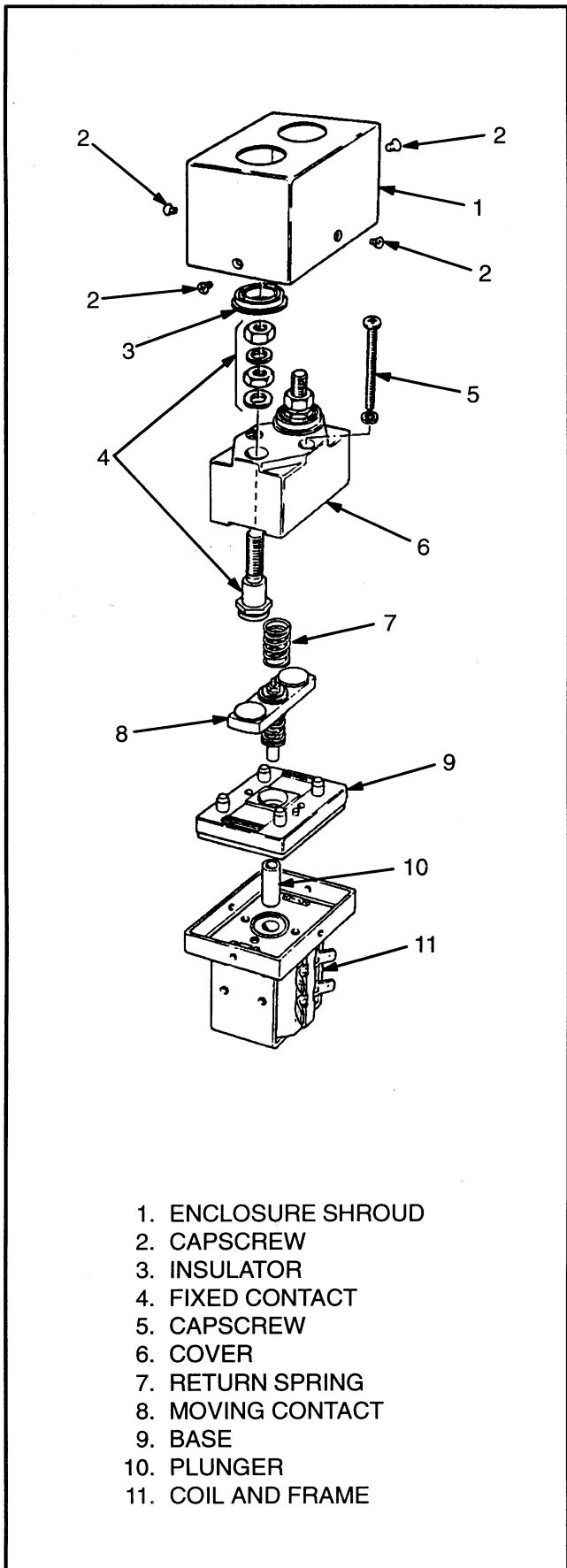
1. Remove the capscrews retaining the enclosure shroud to the contactor. Remove the shroud.

2. Remove the insulator.

3. Service the contactor.

4. Install the insulator.

5. Position the enclosure shroud over the contactor and fasten the shroud to the coil and frame assembly.



1. ENCLOSURE SHROUD
2. CAPSCREW
3. INSULATOR
4. FIXED CONTACT
5. CAPSCREW
6. COVER
7. RETURN SPRING
8. MOVING CONTACT
9. BASE
10. PLUNGER
11. COIL AND FRAME

FIGURE 5 – TYPICAL “EE” CONTACTOR

FUSES

The fuses for these lift trucks are located on the contactor panel assembly. See CONTACTOR PANEL ASSEMBLY, REMOVAL to access the contactor panel assembly.

⚠ WARNING

Disconnect the battery and separate the connector before opening the compartment cover or inspecting or repairing the electrical system. If a tool causes a short-circuit, the high current flow from the battery can cause an injury or parts damage.

When the lift truck has the provision for “EE” the fuses FU1 through FU3 are enclosed in a fuse box on the contactor panel assembly. For access to the fuses, see FIGURE 6. Remove the capscrews and lockwashers retaining the floor insulator, wall insulator and the fuse box enclosure to the base plate to test or remove the fuses.

The fuses may be checked for continuity if it cannot be determined visually that a fuse has failed. Make certain to replace any failed fuse with one of the same amperage when replacing a fuse.

| | | |
|-----|---|----------|
| FU1 | TRACTION MOTOR | 325 AMPS |
| FU2 | LIFT PUMP MOTOR | 400 AMPS |
| FU3 | POWER STEERING MOTOR | 100 AMPS |
| FU4 | DASH DISPLAY/BDI | 10 AMPS |
| FU5 | KEY SWITCH | 10 AMPS |
| FU6 | CONTROL CIRCUITS | 10 AMPS |
| FU7 | HORN AND OPTIONAL FANS | 10 AMPS |
| FU8 | OPERATOR COMPARTMENT LAMP (OPTIONAL) | 10 AMPS |

RELAYS

Description/Features

There are three relays used on the standard N30-40-45XMR, N25-30XMDR and N50XMA model lift trucks. The “ER” (enable relay) is mounted on the contactor control panel. The “HMR” (hourmeter relay) and “HR” (horn relay) are mounted below the lift contactor in the drive unit compartment.

The “HMR” (hour meter relay) is used to send a signal to the dash display whenever the lift pump is activated.

When the signal is present, pump hours accumulate on the dash display hourmeter.

The "HR" (horn relay) supplies battery volts to the horn when the horn button is depressed.

The relay mounted near the bottom of the contactor panel is designated as the "ER" (enable relay). The enable

relay is controlled by the MIB. The enable relay supplies battery volts to the the lift pump contactor coil, the power steering contactor coil, the hydraulic control valve coils, the selector valve coils and to certain MIB input switches. The relay will deenergize these circuits if certain fault conditions occur. See MIB fault codes 70, 71, 72 and 73.

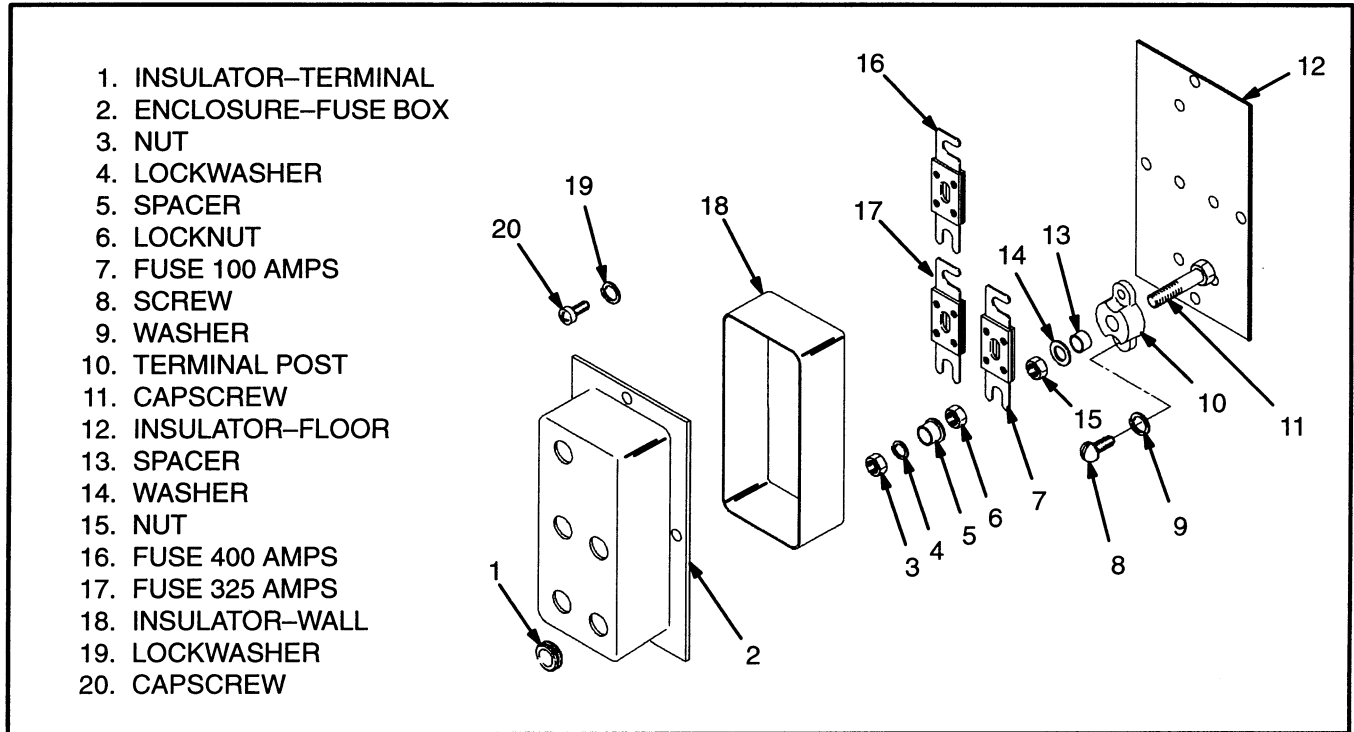


FIGURE 6 – ENCLOSED FUSE BOX "EE" APPLICATION

Coil testing

The "ER", "HMR" and "HR" relay coils can be tested for resistance across terminals 85 and 86. See FIGURE 7 for test point locations. Replace any relay which has a coil resistance value outside of specifications. See TABLE 2 for coil resistance values.

NOTE: The "ER" (enable relay) "HMR" (hourmeter relay) and "HR" (horn relay) are both single pole, double throw (SPDT) type relays. They are manufactured by either The Bosch Company or Potter & Brumfield. When testing these relays, it is important to identify the manufacturer due to different coil resistance values. The name of the manufacturer is stamped on the relay.

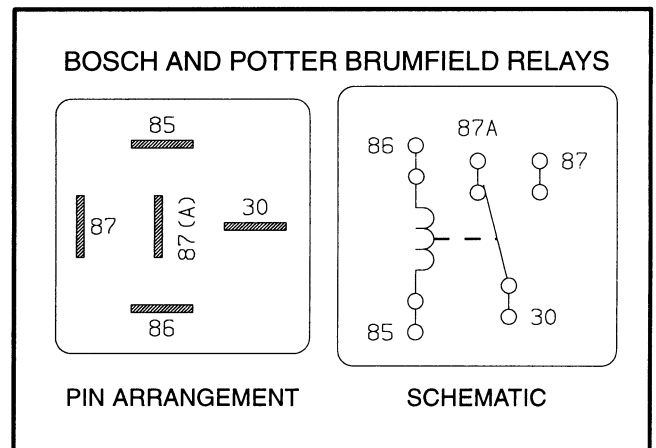


FIGURE 7 – "ER", "HMR" AND "HR" RELAYS

Contact testing

The normally open contacts of the “ER”, “HMR” and “HR” relays are checked at terminals 30 and 87. Check for a voltage drop across the N.O. contacts with the relay energized. Replace any relay which has a voltage drop exceeding 2 volts. See FIGURE 7 for test point locations.

Removal and Installation

To remove the relays, tag and disconnect the wires. Remove the capscrews and lockwashers retaining the relay to the contactor panel assembly or the mounting bracket.

Replace the relays by aligning the relay with the mounting holes in the contactor panel assembly or mounting bracket and installing the capscrews and lockwashers.

| COIL | LOCATION | MANUFACTURER | COIL RESISTANCE @ 21°C (70°F) | TEST POINTS |
|---|-------------------------|------------------------|-------------------------------|---------------------|
| “LIFT” and “LOWER” coils | Hydraulic Control Valve | Vickers | 6.5 ± .5 ohms | Coil leads |
| “AUX UP” (auxiliary up) and “AUX DOWN” (auxiliary down) coils | | | 1.8 ± .2 ohms | Coil leads |
| “ER” (enable relay) coil | Contactor Panel | Robert Bosch Corp. | 305 ± 15 ohms | Terminals 85 and 86 |
| | | Potter & Brumfield Co. | 360 ± 35 ohms | |
| “HMR” (hourmeter relay) coil | Drive Unit Compartment | Robert Bosch Corp. | 305 ± 15 ohms | Terminals 85 and 86 |
| | | Potter & Brumfield Co. | 360 ± 35 ohms | |
| “HR” (horn relay) coil | Drive Unit Compartment | Robert Bosch Corp. | 305 ± 15 ohms | Terminals 85 and 86 |
| | | Potter & Brumfield Co. | 360 ± 35 ohms | |
| “SS” (sideshift) coils | Extend Assembly | HydraForce Inc. | 39 ± 4 ohms | Coil leads |
| “REACH” coils | Mast | HydraForce Inc. | 39 ± 4 ohms | Coil leads |
| “LIFT PUMP” coil | Drive Unit Compartment | Albright | 15 ± 1 ohms | Coil leads |
| “PS” (power steer) | Contactor Panel | Albright | 52 ± 4 ohms | Coil leads |
| “MAIN” coil | Contactor Panel | Albright | 20 ± 1 ohms | Coil leads |
| “FWD” and “REV” (forward) and (reverse) coils | Contactor Panel | Albright | 17 ± 1 ohms | Coil leads |

TABLE 2 – COIL RESISTANCE VALUES

HEIGHT LIMIT SWITCH

Removal

1. Move the lift truck to a safe level area. Raise the mast high enough to obtain access to the height limit switch. SAFETY CHAIN THE MAST. See the section, **PERIODIC MAINTENANCE, 8000 SRM 578**. Refer to SAFETY PROCEDURES WHEN WORKING NEAR THE MAST. Turn the key switch off and remove the key. Put a “DO NOT OPERATE” tag on the MFCH. Put blocks under the drive wheels to keep the lift truck from moving. See the section, **PERIODIC MAINTENANCE, 8000 SRM 578**. Refer to HOW TO PUT A LIFT TRUCK ONTO BLOCKS.

WARNING

Do not raise the frame of the truck with the forks raised. Raising the forks will reduce the stability of the truck and could cause it to tip over. Tipping of the truck can cause personal injury or property damage.

WARNING

Disconnect the battery and separate the connector before opening the compartment cover or inspecting or repairing the electrical system. If a tool causes a short-circuit, the high current flow from the battery can cause an injury or parts damage.

2. Disconnect the battery and separate the connectors.
3. Disconnect the plug X-11.

4. Remove the two capscrews retaining the cover to the switch body. Remove the cover from the switch body.
5. Test the switch for continuity.
6. If the switch must be replaced, tag and disconnect the wires.
7. Remove the switch by removing the mounting capscrews, lockwashers and nuts.

Installation

1. Position the new switch on the bracket. Install the mounting capscrews, lockwashers and nuts.
2. Connect the wires to the switch.
3. Install the cover using the two capscrews.
4. Connect plug X-11.
5. Remove the safety chains from the mast. Connect the battery, install the key and check the mast for proper operation.
6. Remove the blocks from under the drive wheels. Remove the "DO NOT OPERATE" tag from the MFCH.
7. Check the truck for proper operation. Maximum travel speed must be limited with the mast elevated above free lift.

KEY SWITCH

Removal

1. Move the lift truck to a safe level area. Turn the key switch off and remove the key. Put a "DO NOT OPERATE" tag on the MFCH. Put blocks under the drive wheels to keep the lift truck from moving. See the section, **PERIODIC MAINTENANCE, 8000 SRM 578**. Refer to HOW TO PUT A LIFT TRUCK ONTO BLOCKS.

WARNING

Disconnect the battery and separate the connector before opening the compartment cover or inspecting or repairing the electrical system. If a tool causes a short-circuit, the high current flow from the battery can cause an injury or parts damage.

2. Disconnect the battery and separate the connectors.

3. Remove the hydraulic tank dipstick.
4. Remove the socket head capscrews retaining the battery compartment cover to the frame. Remove the battery compartment cover for access to the wiring to the key switch.
5. Tag and disconnect the electrical wires to the key switch.
6. Remove the nut retaining the key switch to the mounting bracket and remove the key switch.

Installation

1. Position the new switch in the mounting bracket. Install the nut to retain the key switch.
2. Install the electrical wires to the key switch. See the section, **DIAGRAMS, 8000 SRM 579**.
3. Install the battery compartment cover.
4. Install the hydraulic tank dipstick.
5. Connect the battery.
6. Remove the blocks from under the drive wheels, remove the "DO NOT OPERATE" tag and install the key.

BATTERY DISCONNECT SWITCH

Removal

1. Move the lift truck to a safe level area. Turn the key switch off and remove the key. Put a "DO NOT OPERATE" tag on the MFCH. Put blocks under the drive wheels to keep the lift truck from moving. See the section, **PERIODIC MAINTENANCE, 8000 SRM 578**. Refer to HOW TO PUT A LIFT TRUCK ONTO BLOCKS.

WARNING

Disconnect the battery and separate the connector before opening the compartment cover or inspecting or repairing the electrical system. If a tool causes a short-circuit, the high current flow from the battery can cause an injury or parts damage.

2. Disconnect the battery and separate the connectors.
3. Remove the hydraulic tank dipstick.
4. Remove the socket head capscrews retaining the battery compartment cover to the frame. Remove the battery compartment cover for access to the wiring to the battery disconnect switch.

5. Tag and disconnect the electrical wires to the battery disconnect switch.
6. Remove the nut retaining the battery disconnect switch to the mounting bracket and remove the battery disconnect switch.

Installation

1. Position the new battery disconnect switch in the mounting bracket. Install the nut to retain the battery disconnect switch.
2. Install the electrical wires to the battery disconnect switch. See the section, **DIAGRAMS, 8000 SRM 579**.
3. Install the battery compartment cover.
4. Install the hydraulic tank dipstick.
5. Connect the battery.
6. Remove the blocks from under the drive wheels, remove the "DO NOT OPERATE" tag and install the key.

PROPORTIONAL ELECTRO-HYDRAULIC VALVE

Description/Features

There are four electrically operated proportional valves located on the main hydraulic control valve. These proportional valves are controlled by solenoids. Valve openings are controlled by varying the electrical current in the solenoid coils.

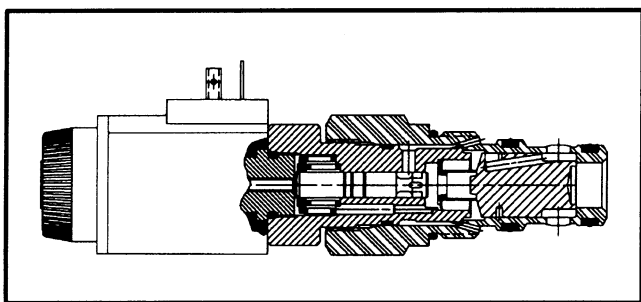


FIGURE 8 – PROPORTIONAL ELECTRO-HYDRAULIC VALVE

Testing/Removal/Installation

Solenoid coils can be checked by removing the leads to the solenoid coil and testing the coil resistance using a volt ohmmeter. See TABLE 2 for coil resistance values. If a reading other than those listed is obtained, replace the solenoid coil.

See the section, **HYDRAULIC SYSTEM, 2000 SRM 607** for instructions on removal and installation of the proportional valves.

Manual Lowering

⚠ WARNING

Allow no one under or near the lift mechanism or load during the manual lowering procedure.

⚠ WARNING

Always verify that there are no obstructions beneath the lift mechanism or load before attempting to lower manually.

A provision is provided on the lowering valve to allow manual lowering of the forks if necessary. Manual lowering is accomplished by inserting an 1/8 inch allen wrench into the manual lowering screw (located in the center of the lowering valvistor) and slowly turning it clockwise until the forks begin to lower. See FIGURE 9. Be sure to return the screw to the original position once the manual lowering process is complete by slowly turning the screw counterclockwise until it stops.

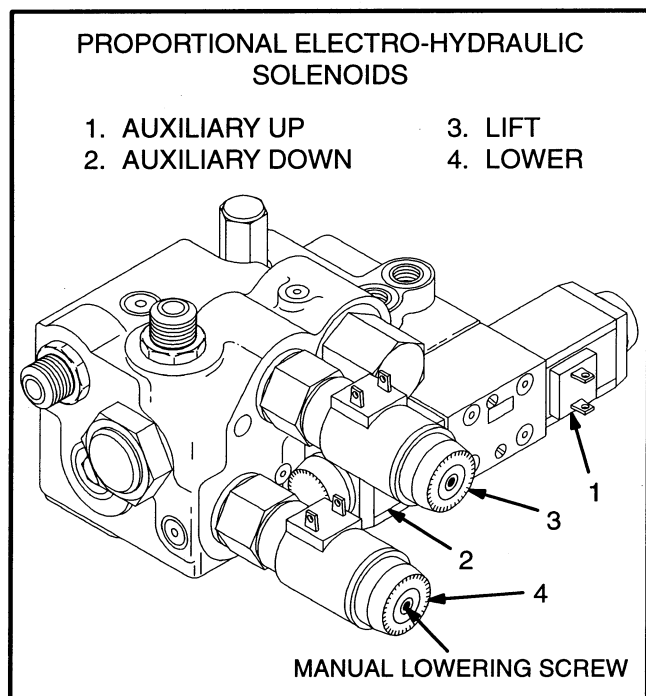


FIGURE 9 – HYDRAULIC CONTROL VALVE

⚠ WARNING

Failure to return the manual lowering screw to the full counterclockwise position will cause the forks to lower unexpectedly.

SELECTOR VALVES

Description/Features

(Used on N30-40-45XMR and N25-30XMDR model trucks only.)

If the lift truck has provisions for tilt, sideshift and reach there are solenoids used to operate these functions located on selector valves. One selector valve assembly, containing two selector valves and two solenoids is located on the mast assembly and used to select between reach or tilt. See FIGURE 11. A second selector valve assembly, also containing two selector valves and two solenoids is located on the reach assembly and used to select between tilt and sideshift. See FIGURE 10. The second selector valve assembly is only fitted on reach model trucks equipped with an optional sideshifter.

When tilt is selected by the operator, neither of the two selector valve assemblies is energized. When reach is selected, the coils are energized on the reach selector valve. When sideshift is selected the coils on the optional sideshift selector valve are energized.

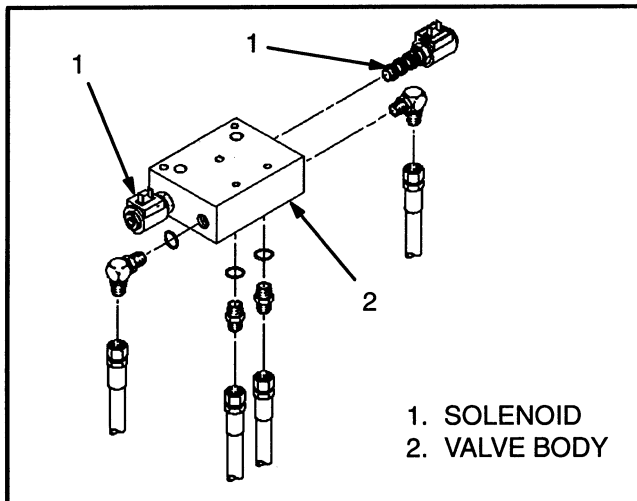


FIGURE 10 – SIDESHIFTER SELECTOR VALVE

Testing/Removal/Installation

Solenoid coils can be checked by removing the leads to the solenoid coil and testing the coil resistance using a volt ohmmeter. See TABLE 2 for coil resistance values.

If a reading other than those listed is obtained, replace the solenoid coil.

See the section **HYDRAULIC SYSTEM, 2000 SRM 607**, for information on removing and installing the sideshift and reach solenoids.

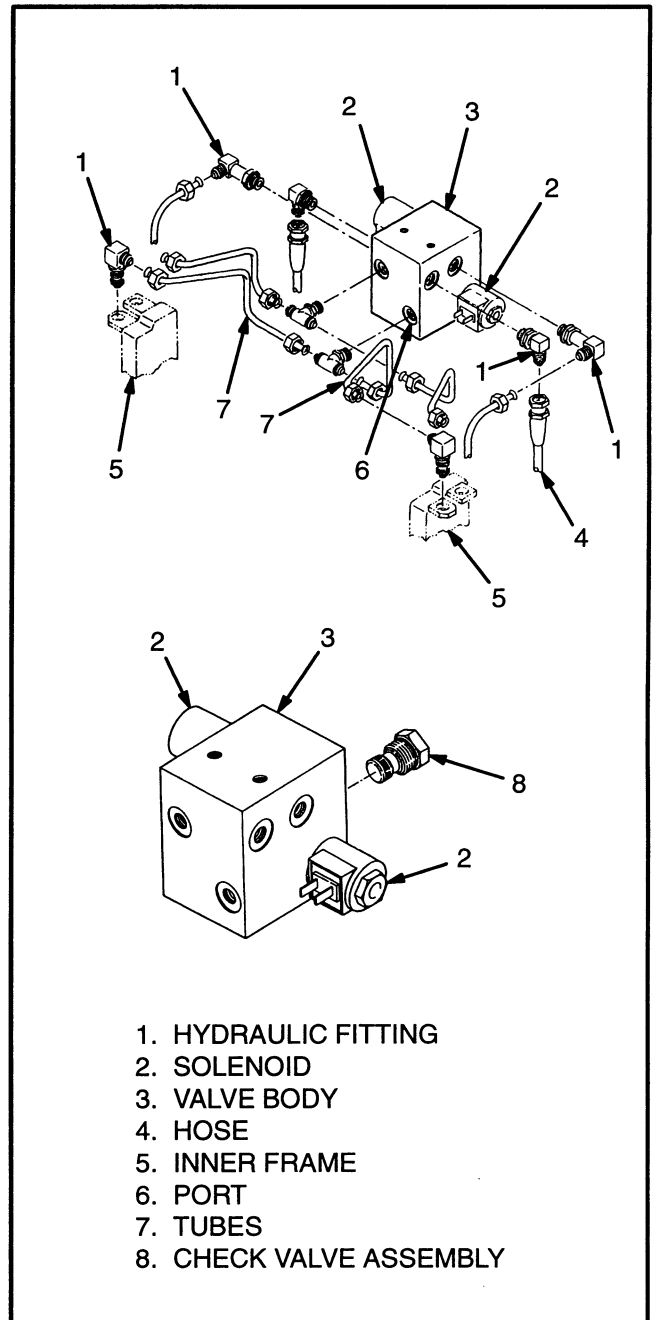


FIGURE 11 – REACH SELECTOR VALVE

MULTI-FUNCTION CONTROL HANDLE

Description/Features

The MFCH (multi-function control handle) is located in the operator's compartment with the handle positioned to afford the operator a comfortable position from which to operate the lift truck. Traction control, horn operation and certain hydraulic functions (depending on hydraulic control option) are controlled by using this single handle.

Rotating the MFCH forward activates travel in the forward direction. Rotating the MFCH backward activates travel in the reverse direction. Travel speed is also controlled by the MFCH. Faster travel speeds are provided as the MFCH is moved further from the neutral position. The MFCH is spring loaded to allow handle to return to the center (neutral position) when there is no pressure applied.

The MFCH is designed so that the forward and reverse switches are activated and the traction potentiometer is turned when the MFCH is rotated.

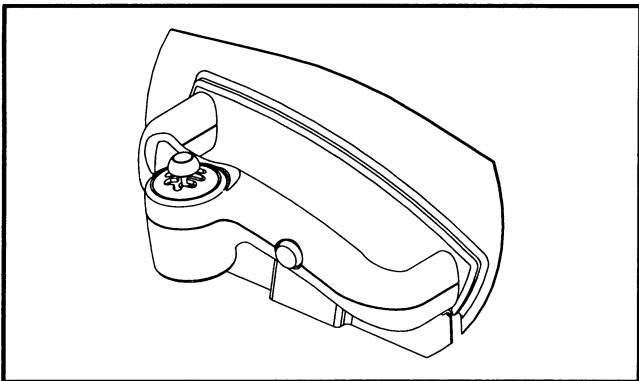


FIGURE 12 – MFCH WITH OMNITROL LEVER

The MFCH also provides a means to control hydraulic functions. On OMNITROL lever equipped lift trucks, all hydraulic functions are controlled by the OMNITROL lever located on the MFCH. See FIGURE 12. On separate lever equipped lift trucks, there are thumb actuated push button switches for single speed lift or single speed lower located on the MFCH. See FIGURE 13.

The travel, lift/lower, tilt and reach functions will operate when the MFCH and/or OMNITROL lever is moved in accordance with the directions specified in ANSI B56.1.

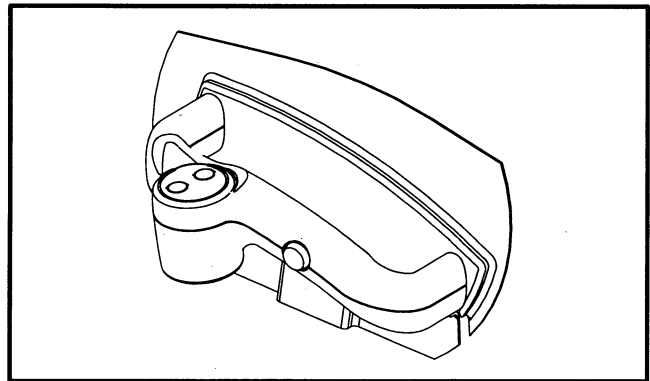


FIGURE 13 – MFCH WITH SINGLE SPEED LIFT/LOWER

MFCH TRACTION CONTROL

Disassembly

⚠ CAUTION

The gear segment is held to the T-plate with a special epoxy. Never disturb the gear segment mounting, unless adjustment or replacement is necessary. Always install the gear segment using the proper procedure and epoxy.

The numbers in the (), in the following procedures refer to item numbers in FIGURE 14.

⚠ WARNING

Disconnect the battery and separate the connector before opening the compartment cover or inspecting or repairing the electrical system. If a tool causes a short-circuit, the high current flow from the battery can cause an injury or parts damage.

1. Disconnect the battery and separate the connectors.
2. Remove the socket head capscrews retaining the operator's compartment cover to the frame. Remove the cover.
3. Remove the potentiometer mounting plate (16) from the mounting weldment (6) by removing the two capscrews (20) and lockwashers (21).

⚠ CAUTION

Pulling the potentiometer gear from the potentiometer assembly can cause damage to the potentiometer.

4. Loosen the setscrew holding the gear (22) to the potentiometer shaft and remove the potentiometer gear by using a screwdriver positioned in the slot of the potentiometer shaft (14). Push the potentiometer shaft through the gear while holding the gear stationary.

5. Remove the nut and lockwasher retaining the potentiometer (14) to the mounting plate (16).
6. If gear segment adjustment or replacement is neces-

sary remove the two countersunk screws (27) retaining the gear segment (11) to the T-plate (26). Break the epoxy seal between the gear segment and the T-plate.

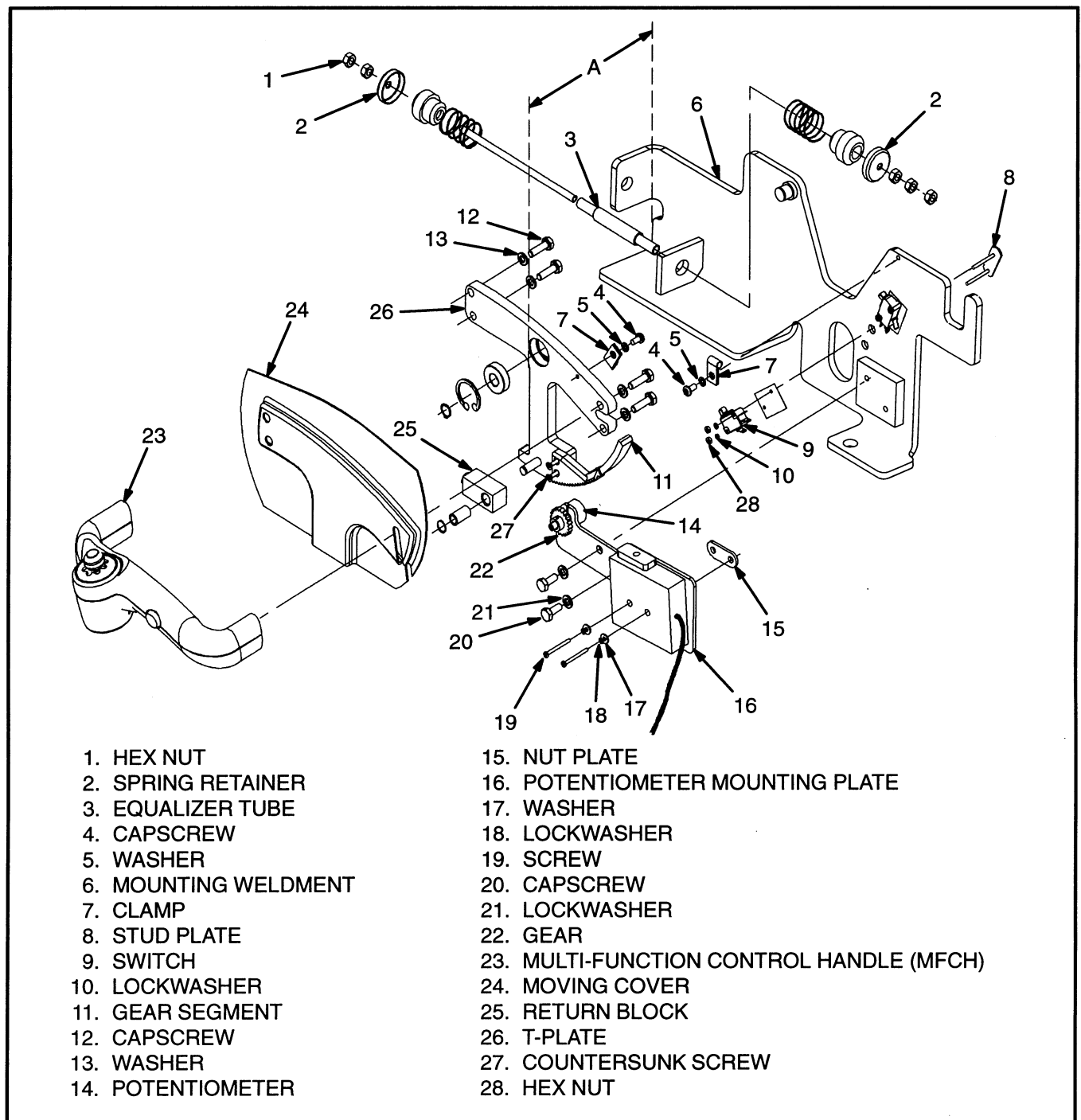


FIGURE 14 – MULTI-FUNCTION CONTROL HANDLE ASSEMBLY WITH OMNITROL LEVER

Assembly

The numbers in the (), in the following procedures refer to item numbers in FIGURE 14.

1. Before assembling the spring retainer assembly, apply anti-seize to the thicker center part of the equalizer

tube (3). The spring retainer (2) should be held firmly against the equalizer tube by inside nuts (1) on either end. Adjust the location of the return block (25) by turning the spring assembly clockwise or counterclockwise until the leg of the T-plate assembly (26) is approximately parallel (A) to the left side of the mount weldment (6).