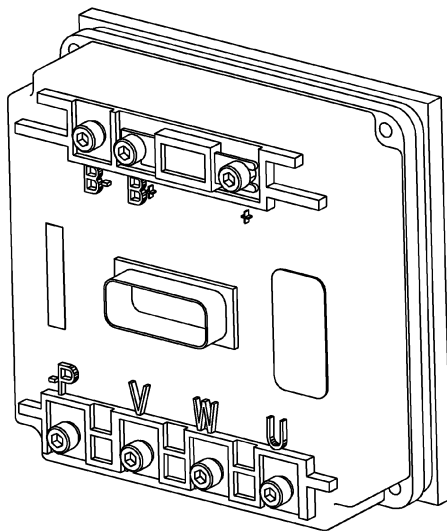


AC MOTOR CONTROLLER

T5Z^{AC} [B476]; T7Z^{AC} [B477];
C60Z^{AC} [B478]; C80Z^{AC} [B479]



HYSTER

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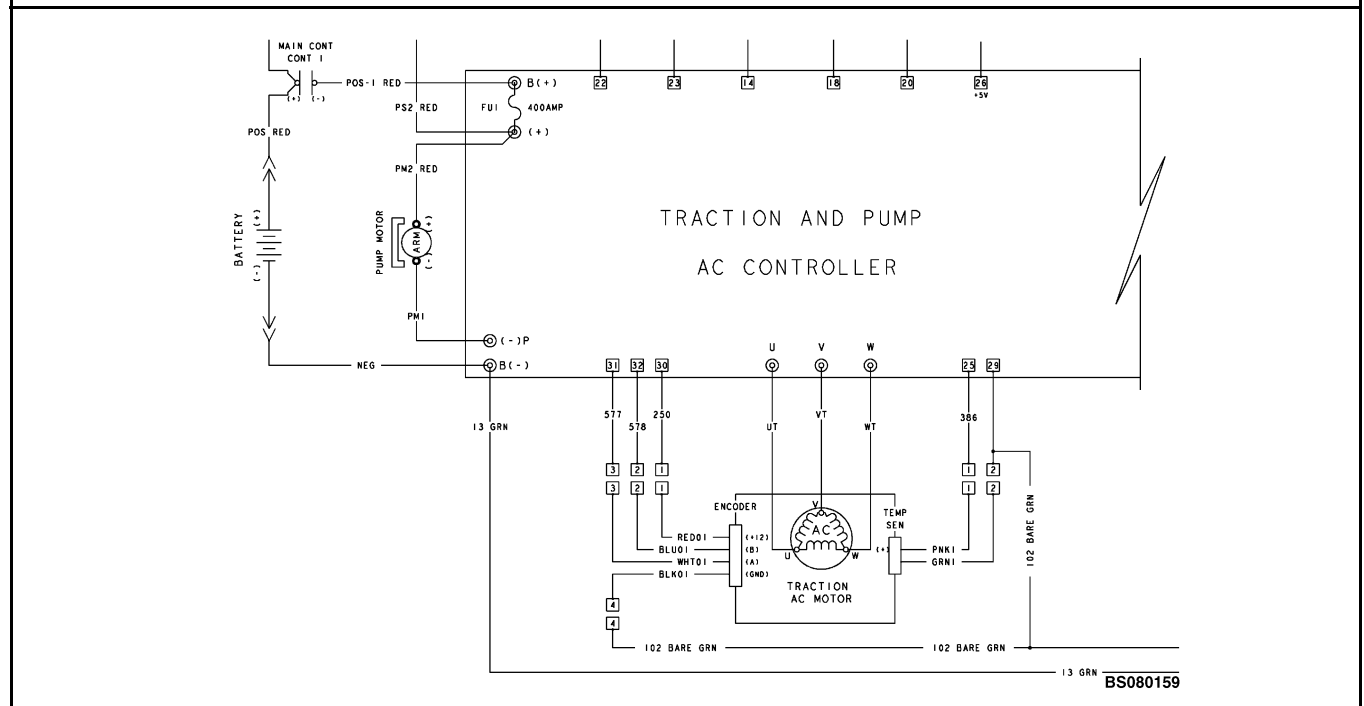
Table 2. Fault Codes (Continued)

Code	Description
21570	Main contactor circuit is open
21571	Main contactor circuit is shorted to B–
21588	Internal failure of the power steering unit
29445	Traction motor encoder failure
29448	Steer handle switch closed at startup
29456	Error in control module speed/direction sensor
29458	Steer handle sensor is out of limits
33056	Controller cannot establish communication with control module
33057	Controller cannot establish communication the power steering controller

STATUS CODE	DISPLAY MESSAGE	LED	CIRCUIT
16944	Performance Reduced	Flashing Red	Controller
DESCRIPTION		SYMPTOM	
Truck is in thermal cutback due to high controller temperature.		Traction system is operating at a reduced performance level.	

Probable Causes and Test Procedures

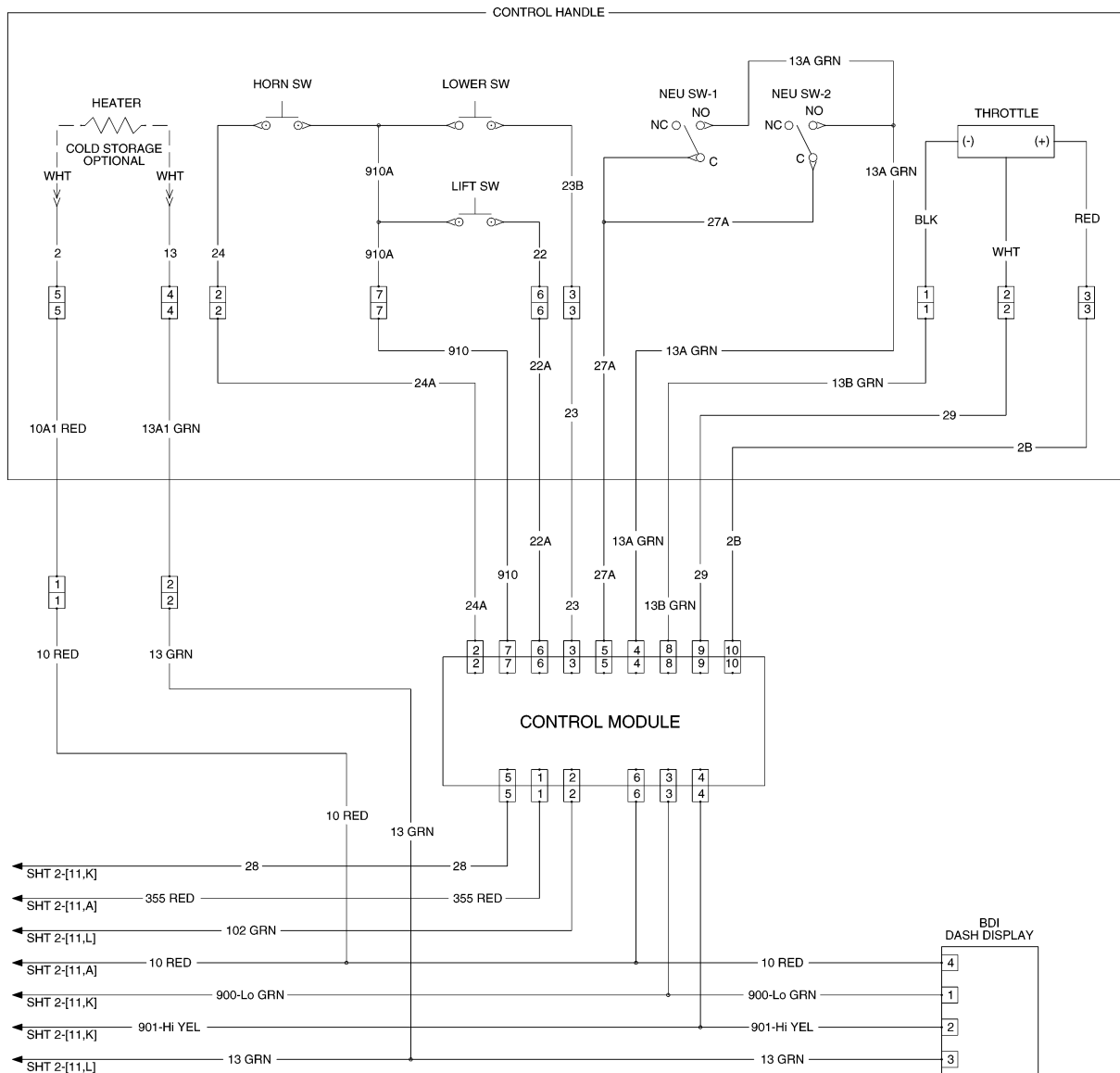
1. Internal temperature of controller has exceeded 165°C (329°F).
 - a. Reduce truck usage and allow the controller to cool.
2. Clear fault log in dash display. See **User Interface, Technician Functions On-Board Dash Display** 2200 SRM 1354.
3. With the controller at room temperature, turn the key switch to the **OFF** then back to the **ON** position and operate the lift truck briefly.
4. Verify fault does not repeat.
 - a. Contact NMHG Service Engineering Contact Management.



STATUS CODE	DISPLAY MESSAGE	LED	CIRCUIT
21378 (cont)	Service Required	Solid Red	Controls
DESCRIPTION		SYMPTOM	
Controller has lost communication with the control module (cont).		Traction and hydraulic systems will not operate.	

Probable Causes and Test Procedures

2. Measure resistance between pin #A and pin #B at the Service PC Connection.
 - a. Resistance should be approximately 40 ohms.
 - If resistance is greater than 90 ohms, check wiring for broken or shorted condition.



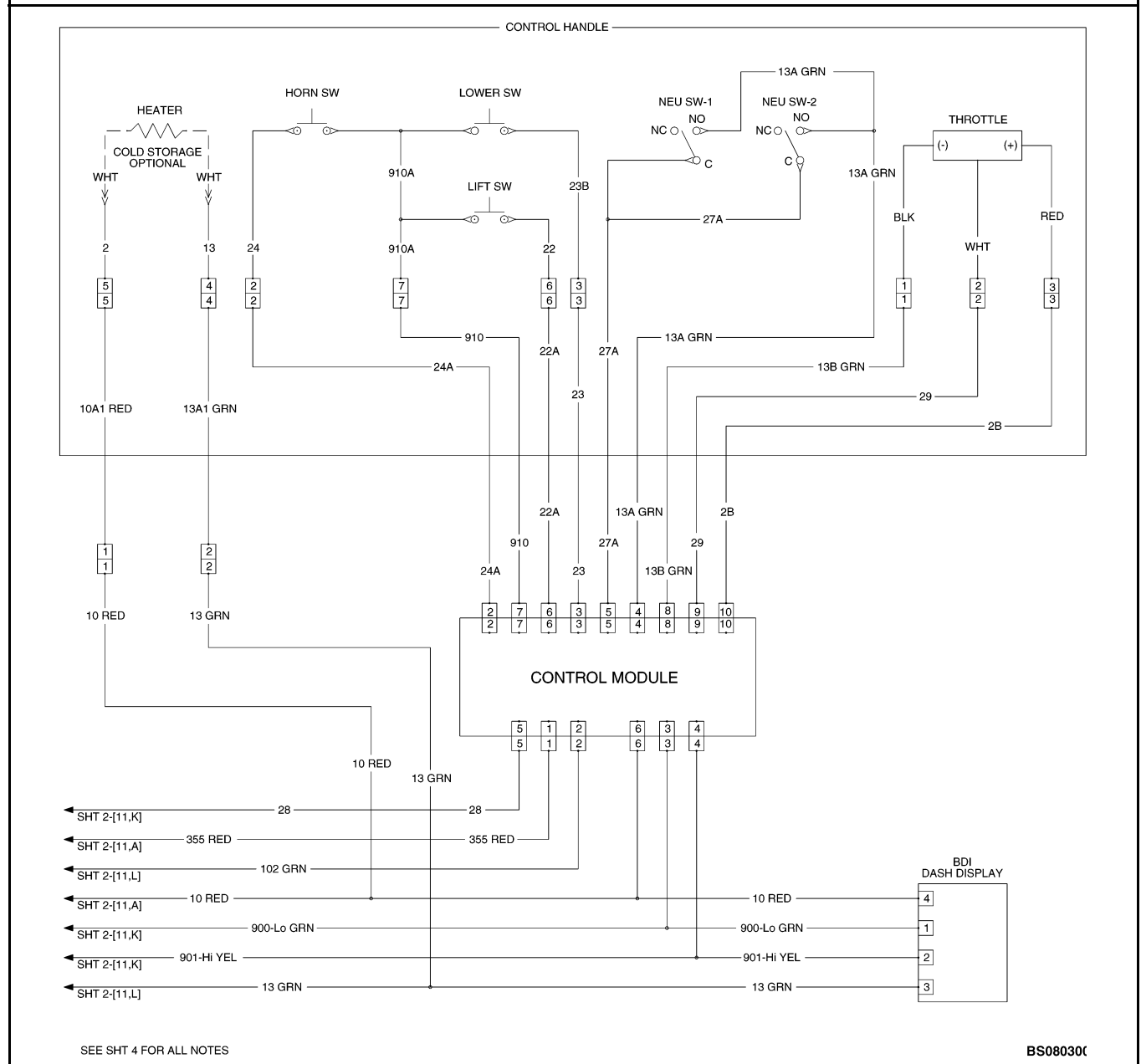
SEE SHT 4 FOR ALL NOTES

BS08030C

STATUS CODE	DISPLAY MESSAGE	LED	CIRCUIT
21552	Improper Start	Solid Red	Steer Handle
DESCRIPTION		SYMPTOM	
Controller has detected a fault in the signal from the control module.		Traction and hydraulic systems will not operate.	

Probable Causes and Test Procedures

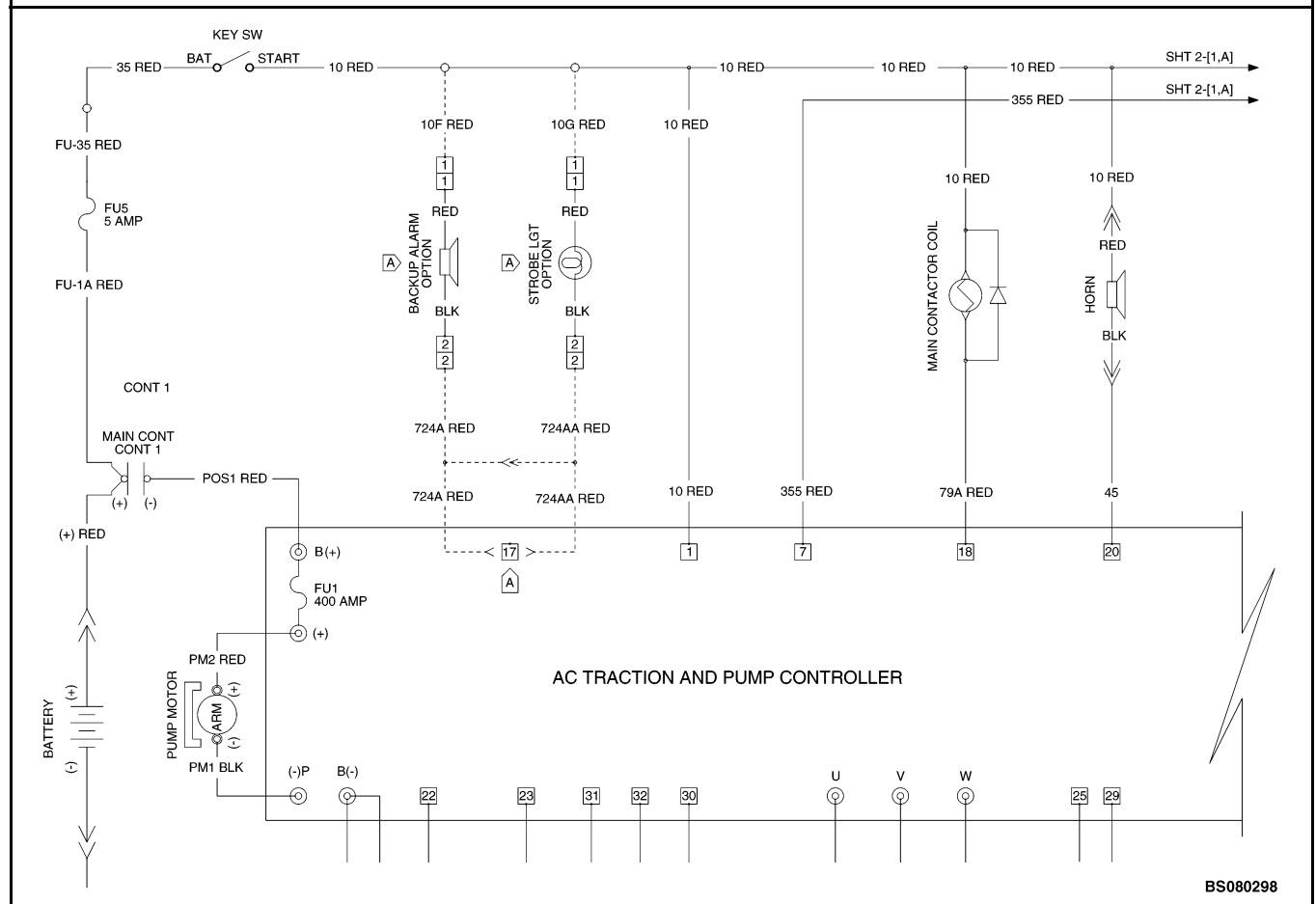
1. Verify all steer handle switches and controls are in the neutral position.
2. Check for battery voltage at pin #3 at the control module.
 - a. Check for continuity of wire #10 from the key switch to the control module.



STATUS CODE	DISPLAY MESSAGE	LED	CIRCUIT
21571	Service Required	Solid Red	Main Contactor
DESCRIPTION		SYMPTOM	
Controller has detected the main contactor shorted to B-.		Traction and hydraulic systems will not operate.	

Probable Causes and Test Procedures

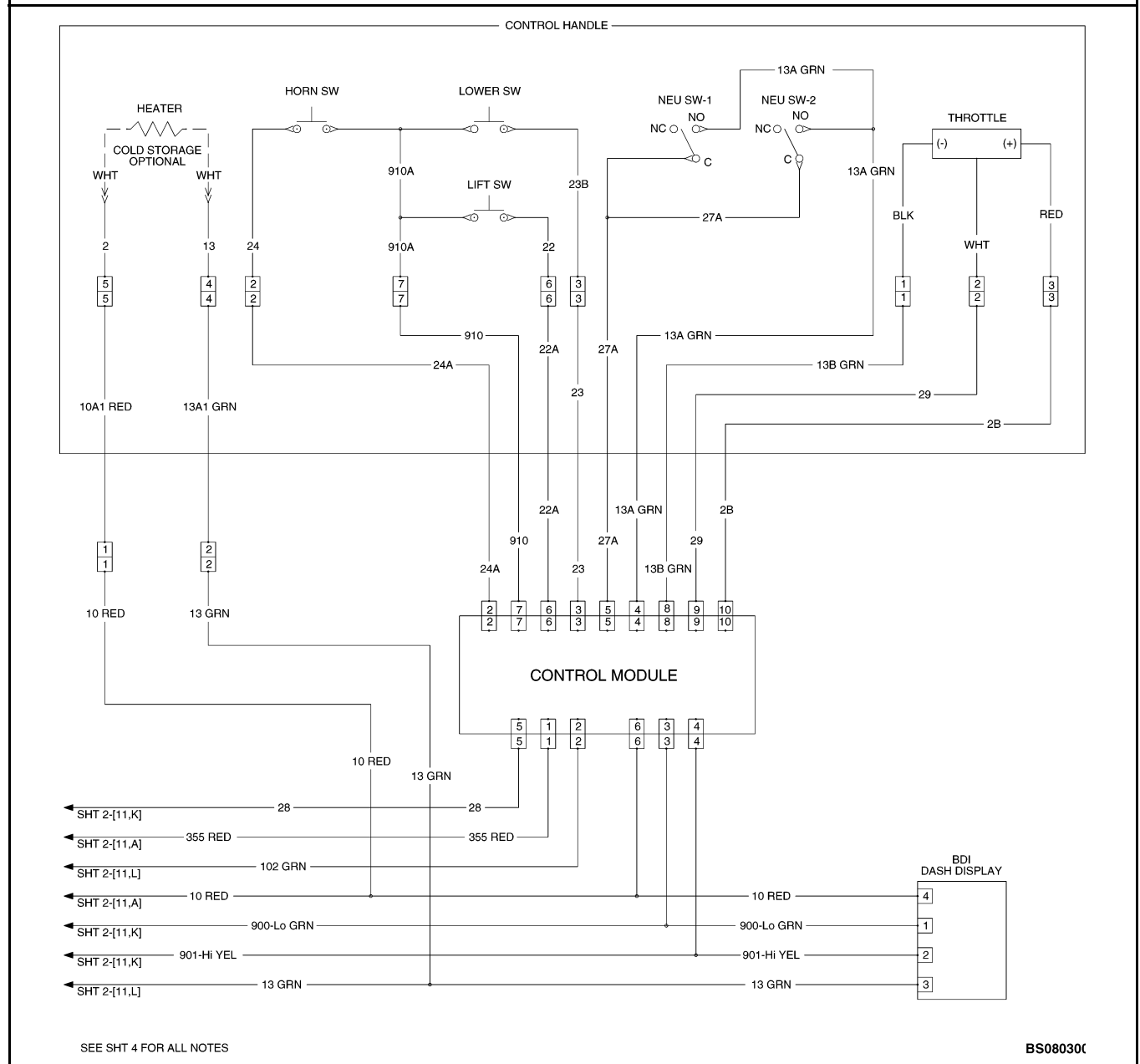
1. Ensure the B+ and B- cables from the battery are connected properly.
2. Separate the controller connector.
3. Check for a shorted condition between pin #18 at the controller and B-.
 - a. Contact NMHG Service Engineering Contact Management.
4. Check the connector for any pin-to-pin shorts to B-.
 - a. Repair any wiring faults.



STATUS CODE	DISPLAY MESSAGE	LED	CIRCUIT
33056 (cont)	Service Required	Solid Red	Controls
DESCRIPTION		SYMPTOM	
Controller cannot establish CAN communication with the control module (cont).		Traction and hydraulic systems will not operate.	

Probable Causes and Test Procedures

6. Internal failure in the control module.
 - a. Replace control module.
7. Internal failure of the traction controller.
 - a. Contact NMHG Service Engineering Contact Management.



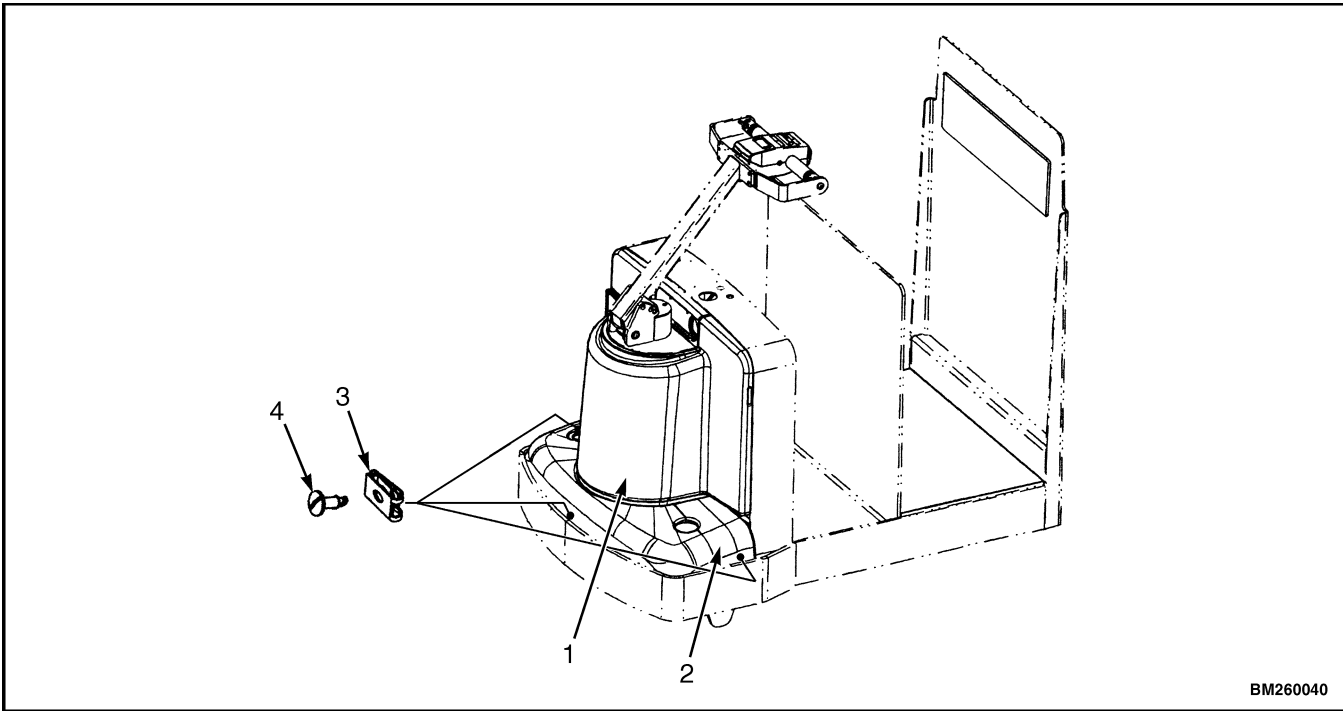
SEE SHT 4 FOR ALL NOTES

BS08030C

the front cover, near the bottom, and find the grip slot. With both hands, pull up and away from the truck until the bottom of the cover kicks out from the retaining clips. Repeat this for the other side of the cover. Work around the edge of the cover until free from the truck. See Figure 3.

To install the covers, place the bottom of the front cover onto the operator platform and position the lower edges partially into the lower retaining clips. Push the top of the cover partially into the upper

retaining clips. Do not push either edge of the cover in completely before starting all edges into the proper place. When the cover is aligned and started properly, press the cover completely into the retaining clips. Position the lower cover around the base of the front cover as removed. Make sure the spring nut clips and the lower cover mounting holes are aligned. Install the three screws to secure the lower cover in place.



BM260040

- 1. FRONT COVER
- 2. LOWER COVER

- 3. SPRING NUT CLIPS
- 4. SCREWS

Figure 3. Drive Unit Compartment Covers

General

WARNING

DO NOT operate a lift truck that needs repairs. If a repair is necessary, attach a **DO NOT OPERATE** tag to the control handle and disconnect the battery.

WARNING

Before performing repairs or adjustments on the brake system, blocks must be placed under each side of the frame to raise the drive tire off the ground. The blocks must prevent the lift truck from falling and causing personal injury or property damage. See *Periodic Maintenance 8000 SRM 1368* or *Periodic Maintenance 8000 SRM 1298 - How To Put A Lift Truck On Blocks*.

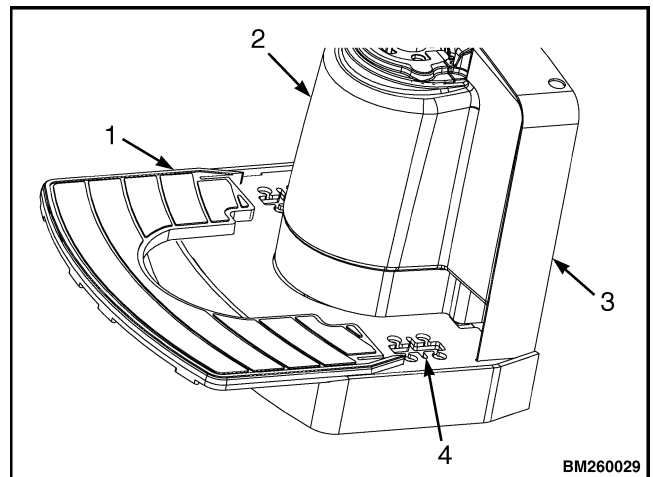
This section describes the electric brake and outlines the procedures for the maintenance, adjustment, and repair that may be required for servicing these lift trucks.

ACCESSING THE DRIVE UNIT COMPARTMENT

B60-80Z^{AC}

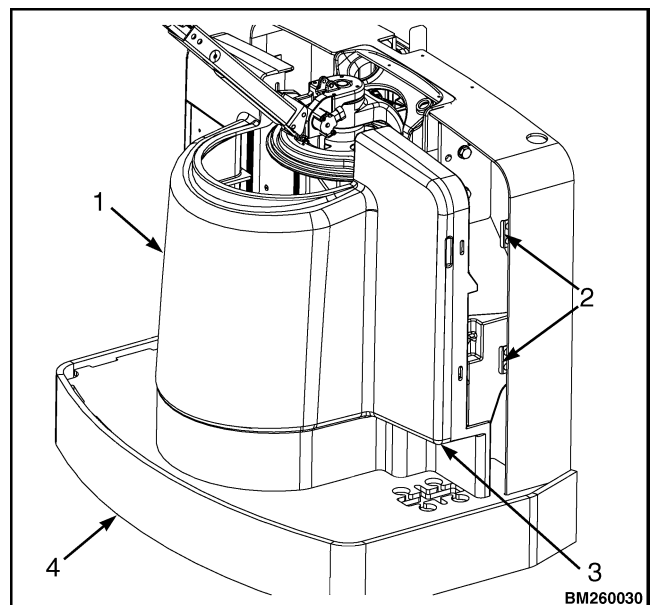
The drive unit compartment is concealed behind a molded cover which fits securely around the drive unit and steer support to the frame. The floormat fits snugly in the operator platform after the drive unit cover is installed.

To remove the drive unit cover, first lift the corners of the floormat and pull it out away from the drive unit. See Figure 1. Next, reach under the side of the drive unit cover, near the bottom, and find the grip slot. With both hands, pull up and away from the truck until the bottom of the cover kicks out from the retaining clips. See Figure 2. Repeat this for the other side of the cover. Work around the edge of the cover until free from the truck.



1. FLOORMAT
2. DRIVE UNIT COMPARTMENT COVER
3. FRAME
4. CASTER ADJUSTMENT ACCESS

Figure 1. Floormat



1. DRIVE UNIT COMPARTMENT COVER
2. RETAINING CLIPS
3. GRIP SLOT
4. FRAME

Figure 2. Drive Unit Compartment Cover

Install

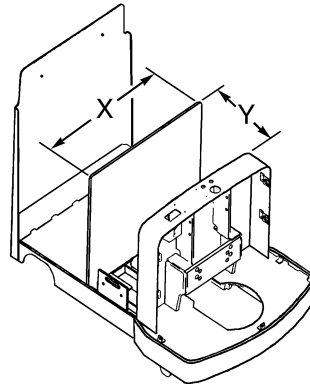


WARNING

Use caution when removing or installing snap rings. Snap rings can eject during removal or installation with enough force to cause personal injury. Always use the proper snap ring pliers and wear eye and face protection during removal and installation.

1. Install lower snap ring as removed.
2. Position the Woodruff key into the groove on the traction motor shaft as removed.
3. Align the Woodruff key with the groove inside the brake hub. Slide the brake hub down onto the traction motor shaft and Woodruff key.
4. Secure in place with upper snap ring as removed.
5. Position the brake assembly to align holes in brake with holes in traction motor head. Lower the brake assembly onto the brake hub. Slightly turn the brake assembly to align splines and lower until the brake assembly touches the top of the traction motor.
6. Make sure the brake assembly holes align with the holes in the traction motor head. Install three mounting screws. Tighten to touch, then torque to 22 N•m (16 lbf ft).
7. Connect the brake wiring connector to the main wiring harness.
8. On the B80Z^{AC}, the steering and dash assembly must be partially removed to access the brake mounting screws. Replace the steer support and dash after the brake has been installed. See **Steering Mechanism** 1600 SRM 1284 or **Steering Mechanism** 1600 SRM 1031.
9. Reinstall the drive unit compartment cover. See **Accessing the Drive Unit Compartment** in this section.
10. Reconnect the battery and turn the key switch to the **ON** position. Remove blocks from the wheels and test for proper operation.

Battery Specifications and Adjustments

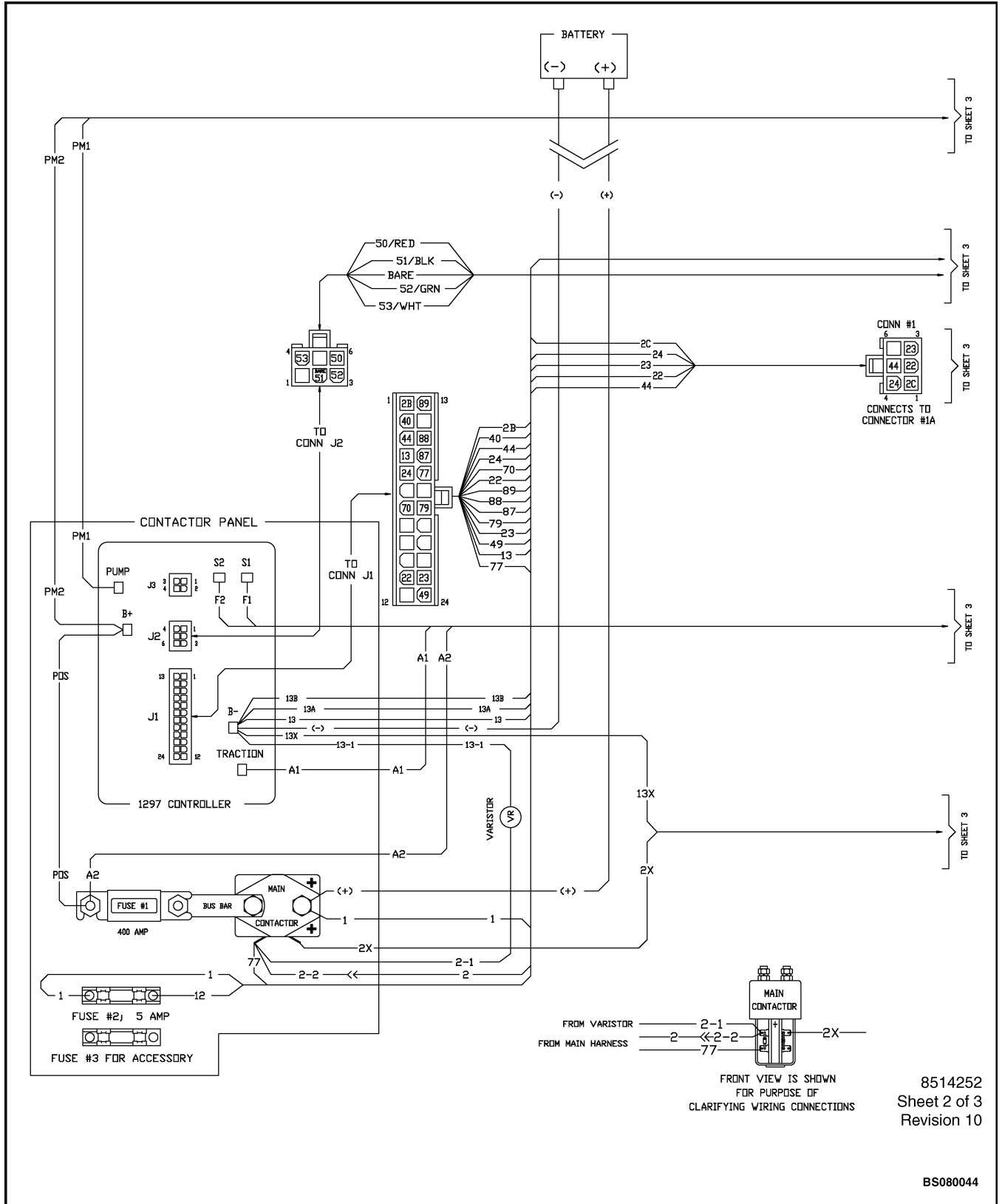


BO030000

Figure 1. Battery Compartment

Battery and Battery Compartment Dimensions									
Model	Battery Compartment			Battery					
	Dimensions			Length (X)		Width (Y)		Capacity ²	Weight
	Length (X) mm (in.)	Width (Y) mm (in.)	Height	Min ¹ mm (in.)	Max mm (in.)	Min ¹ mm (in.)	Max mm (in.)	Max kwh (amp hr)	Max kg (lb)
T5Z and T5Z ^{AC}	794 (31.25)	340 (13.4)	Open	648 (25.5)	785 (30.9)	218 (8.6)	330 (13)	11.9 (510)	469 (1035)
T7Z and T7Z ^{AC}	794 (31.25)	340 (13.4)	Open	648 (25.5)	785 (30.9)	218 (8.6)	330 (13)	17.6 (750)	658 (1450)
C60Z and C60Z ^{AC}	794 (31.25)	340 (13.4)	Open	663 (26.1)	785 (30.9)	325 (12.8)	330 (13)	11.9 (510)	469 (1035)
C80Z and C80Z ^{AC}	794 (31.25)	340 (13.4)	Open	663 (26.1)	785 (30.9)	325 (12.8)	330 (13)	17.6 (750)	658 (1450)

¹ Minimum battery dimensions allowed with standard battery spacer group.
² 6 hour rate.
NOTE: 24 Volt DC battery only.
 Covered batteries required.
 Battery connector type is 175 Amp, Red (Gray is optional).
 Cable lead position B.
 20-Inch cable length.
 Maximum cable gauge of 1/0.



FRONT VIEW IS SHOWN FOR PURPOSE OF CLARIFYING WIRING CONNECTIONS

8514252
Sheet 2 of 3
Revision 10

BS080044

Figure 4. Schematic Diagram - 24V "E" SEM Control

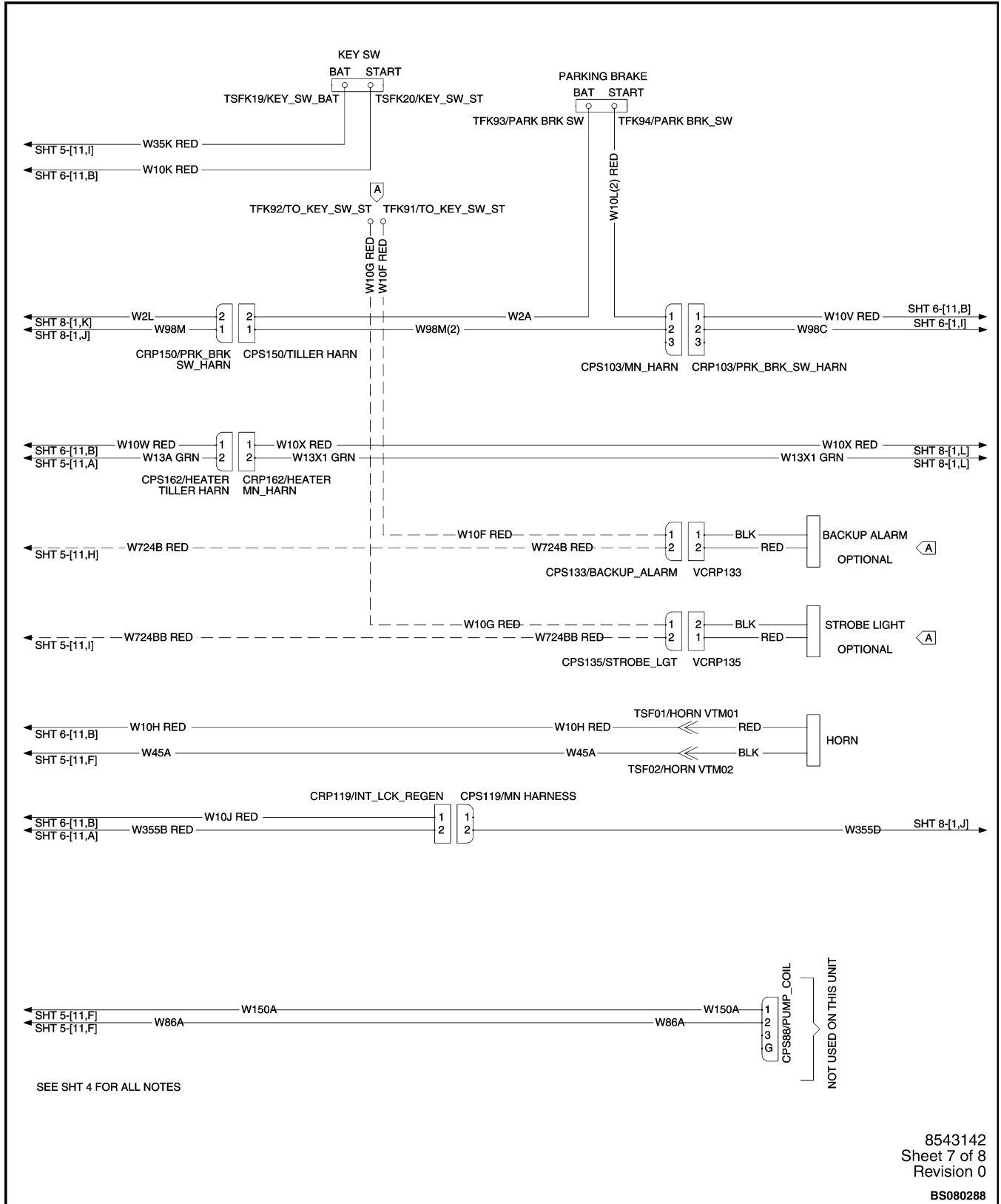


Figure 8. Schematic / Wiring Diagrams (Sheet 7 of 8)

Electrical System Checks



WARNING

Disconnect the battery 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 personal injury or property damage.

The capacitor in the controller can hold an electrical charge after the battery is disconnected. To prevent electrical shock, disconnect the battery and discharge the capacitor before inspecting or repairing any component in the drive unit compartment. Always wear safety glasses.



CAUTION

The correct meter polarity is necessary for the checks. The voltage checks are made between the point indicated and battery negative. Connect the meter negative to battery negative.

Always disconnect the battery and discharge the capacitor before disconnecting cables from the controller. Never put power to the controller with any cables or wires disconnected. Never short any controller or motor terminal to the battery. Always follow proper procedure when working in the electrical system.

1. Turn the key switch to the **OFF** position.
2. Disconnect and separate the battery connectors.

NOTE: The battery does not have to be removed to check the specific gravity.

3. Check the specific gravity of the battery. If the specific gravity is less than 1.260, the battery is not fully charged or is damaged. A fully charged battery has a specific gravity of 1.270 to 1.290. A discharged battery has a specific gravity of approximately 1.165 or less. Refer to **Industrial Battery** 2240 SRM 1.

4. Remove the drive unit compartment covers. See **Periodic Maintenance** 8000 SRM 1368.
5. Discharge the capacitor. See Special Precautions in this section.
6. The electric lift truck has a two-wire system. The frame must not be a common electrical path. Using an ohmmeter, check for 50,000 ohms or more between each terminal of the battery connector (truck end) and a clean connection on the frame. Remove any electrical paths between the controller and the frame of the lift truck, such as a dirty battery case. Carbon dust in a motor or other parts can cause an electrical path. Check for additional equipment that may provide an electrical path to the frame.
7. Check for voltage between each terminal of the battery connector (battery end) and a clean connection on the frame. Normally there is small voltage (less than 30% of the battery voltage) between the battery and the frame, even though the resistance is very high. A higher voltage can indicate a dirty or damaged battery. Clean battery and battery compartment as necessary.
8. Visually check for parts or wires that are loose or damaged.



WARNING

Some checks require the battery to be reconnected. Do not connect the battery until the point of the procedure when you are directed to do so. Raise the drive wheel of the truck and position on solid hardwood blocks to prevent unexpected movement when working with the battery connected.

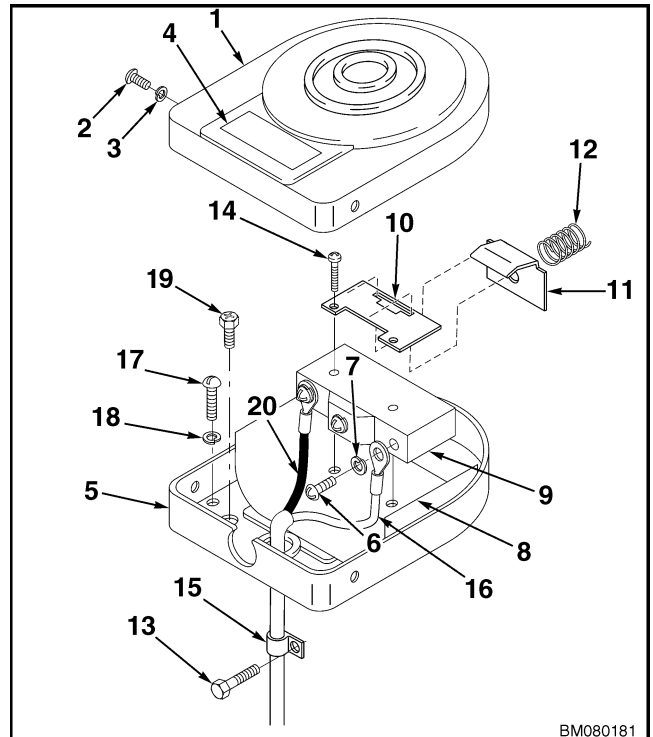
9. Always follow proper procedure when working in the electrical system..See Table 1.

NOTE: Make an identification of any wires before you disconnect them. The wires must be connected correctly after checks or repairs.

**WARNING**

Move the truck to an area with plenty of room where top speeds can be checked safely.

11. Test the high speed switch for proper operation.
12. Install the floormat.



- | | |
|--------------------|------------------|
| 1. COVER | 11. ACTUATOR |
| 2. SCREW | 12. SPRING |
| 3. LOCKWASHER | 13. SCREW |
| 4. NAMEPLATE | 14. SCREW |
| 5. BASE | 15. CABLE CLAMP |
| 6. SCREW | 16. WHITE WIRE |
| 7. LOCKWASHER | 17. SCREW |
| 8. INSULATION | 18. LOCKWASHER |
| 9. SWITCH | 19. GROUND SCREW |
| 10. ACTUATOR PLATE | 20. BLACK WIRE |

Figure 14. Foot Switch

Control Handle

DISASSEMBLE

**WARNING**

DO NOT make repairs or adjustments unless you have both authorization and training. Repairs and adjustments that are not correct can create a dangerous operating condition. **DO NOT** operate a lift truck that needs repairs. Report the need for repairs to your supervisor immediately. If repair is necessary, put a **DO NOT OPERATE** tag on the control handle. Remove the key from the key switch.

It is not always necessary to remove and disassemble all the components of the control handle to replace a damaged part. Perform only the steps necessary to replace the damaged parts. See Figure 15.

1. Move truck to a safe, level area.
2. Block wheels to prevent truck from moving.
3. Remove the key from the key switch. Disconnect battery.

Frame Separation and Assembly

C60Z, C60Z^{AC}, C80Z, AND C80Z^{AC}

Frame Separation

 **WARNING**

Forklift truck frames and components may have polyurethane paint. Welding, burning, or other heat sufficient to cause thermal decomposition of the paint, may release isocyanates. These chemicals are allergic sensitizers to the skin and respiratory tract and overexposure may occur without odor warning. Should work be performed, utilize good industrial hygiene practices, including removal of all paint (prime and finish coats) to the metal around the area to be welded, local ventilation, and/or supplied air respiratory protection.

DO NOT make repairs or adjustments unless you have been properly trained and authorized to do so. Improper repairs and adjustments can create dangerous operating conditions.

DO NOT operate a lift truck that needs repairs. Report the need for repairs to your supervisor immediately. If repair is necessary, turn the key switch to the **OFF** position, disconnect the battery connector, and attach a **DO NOT OPERATE** tag to the control handle.

In some cases a main frame weldment or a fork frame weldment may be damaged, while the rest of the truck is still usable. The two frames may be separated from each other.

The main frame weldment is connected to the fork frame weldment by the lift cylinder, upper links, and rocker arms. Disconnect/connect these components to separate/assemble the frames.

See the section **Lifting Mechanism** 4000 SRM 965. Refer to Upper Link - Remove/Install, and Rocker Arm - Remove/Install.

See the section **Walkie Hydraulic Systems** 1900 SRM 964. Refer to Lift Cylinder - Remove/Install.

Painting Instructions

 **WARNING**

Always use solvents and paints in an area with ventilation. **DO NOT** use solvents or paints near heat or fire.

Cleaning solvents can be flammable and toxic and can cause skin irritation. Wear protection for eyes and skin. When using cleaning solvents, always follow the recommendations of the manufacturer.

1. Remove all dirt from the surface to be painted. Clean the area to be painted using a solvent for painted surfaces. Remove all oil and grease.

2. Remove the top surface of paint and all rust from the metal using sandpaper. Paint all metal surfaces where the paint is completely removed using primer. Apply the primer before applying the color paint.
3. Protect all surfaces that will not be painted. **DO NOT** paint cylinder rods, cables, labels, plates, or controls.
4. Paint all the surfaces the original color, using Hyster[®] paint. Follow the directions on the container.

General

This section describes how to select and do the maintenance for large batteries used in electric lift trucks. This information is for service personnel that must do the maintenance on large lead-acid batteries. Battery repair requires special training and equipment. Do not try to repair a battery unless you have the correct tools, equipment, and experience. Most battery repairs are done by a special repair service. Some

batteries have a nameplate attached to the face of the battery cover. This nameplate communicates specific information about the battery including the name of the battery manufacturer, battery type, serial number, nominal voltage, capacity in amperes at the five-hour rate, and service mass (with ballast if used to compensate for lack of battery mass).

Lead-Acid Batteries

A lead-acid battery converts chemical energy into electrical energy. See Figure 1. Chemical changes within the battery give the electrical energy. When the chemical reaction has occurred so the battery will not give its rated voltage and current, the battery is discharged. A reverse chemical action must occur so the battery can be used again. The batteries described in this section can be charged again by an electric voltage and current from an outside source so there is a reverse chemical action. The lead-acid chemicals store the electric energy until the electric energy is needed to operate an electric device.

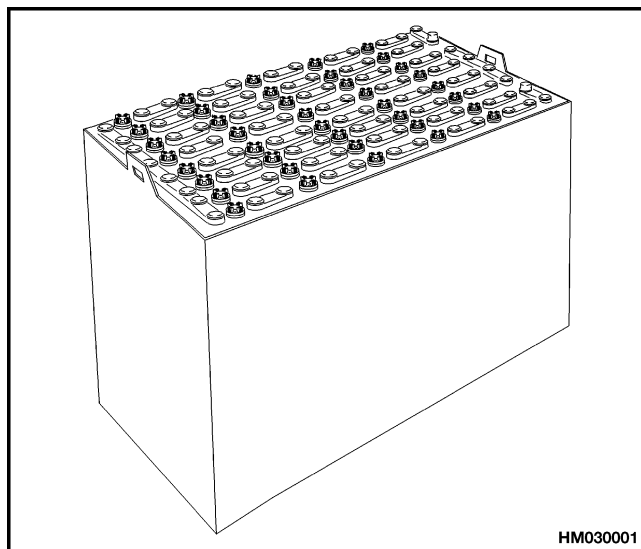
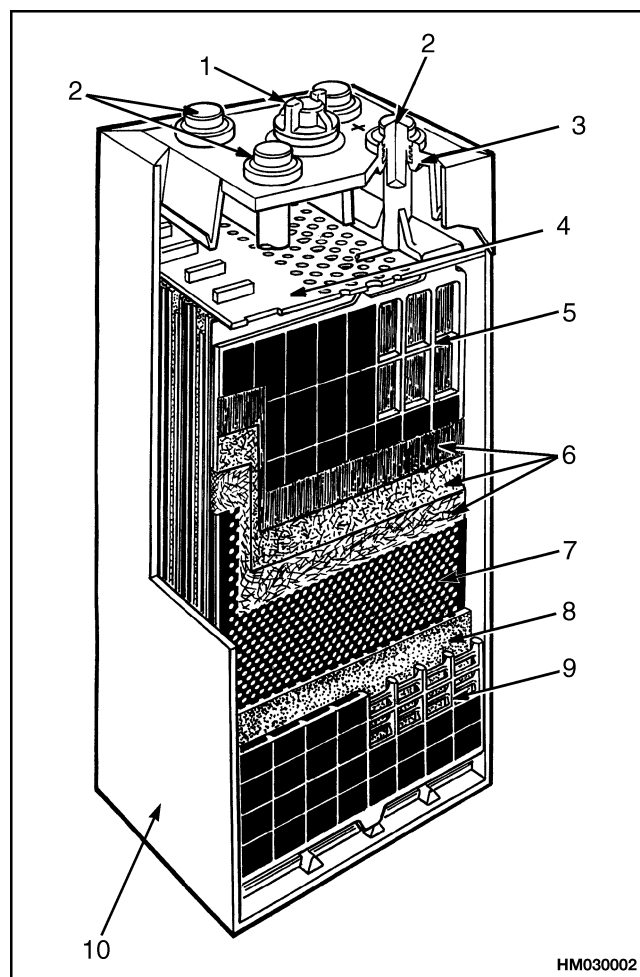


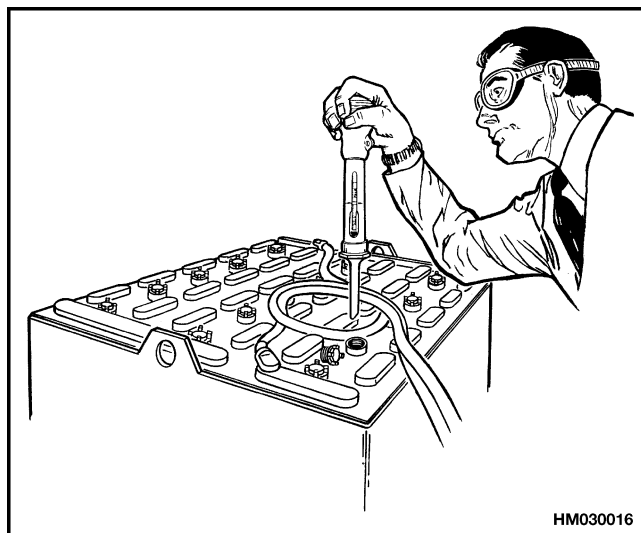
Figure 1. Lead-Acid Industrial Battery

A lead-acid battery is made from several lead-acid batteries called cells. Each cell has positive and negative plates with dielectric spacers between each plate. All of the plates are within a solution of electrolyte. See Figure 2.



- | | |
|-----------------------------|-------------------|
| 1. VENT AND FILL CAP | 5. POSITIVE PLATE |
| 2. POST | 6. EXPANSION MATS |
| 3. POST SEAL | 7. RETAINER |
| 4. PLATE PROTECTOR (SHIELD) | 8. SEPARATOR |
| | 9. NEGATIVE PLATE |
| | 10. BATTERY JAR |

Figure 2. Battery Cell



Specific Gravity Reading	Electrolyte Temp.	Correction Points	Correct Value
1.210	31°C (88°F)	+0.003	1.213
1.210	27°C (81°F)	+0.001	1.211
1.210	25°C (77°F)	0.000	1.210
1.210	18°C (64°F)	-0.004	1.206

+0.001 or -0.001 for each 2 degrees C from the 25-degree base value.

Figure 15. Specific Gravity Check

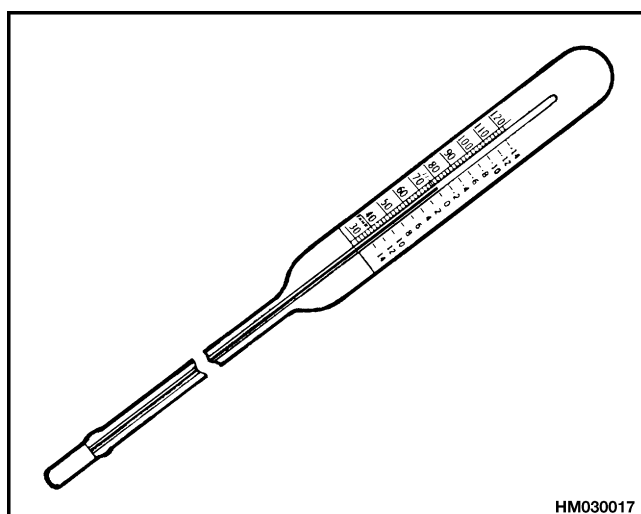


Figure 16. Battery Thermometer

CHARGING BATTERY

NOTE: There can be one of two types of batteries. One type has removable cell caps. The other type

has sealed cells. The sealed batteries require a different charger. The electrolyte level or specific gravity cannot be checked, and water cannot be added to the electrolyte of these sealed batteries.

WARNING

The acid in the electrolyte can cause injury. If electrolyte is spilled, use water to flush the area. Make the acid neutral with a solution of sodium bicarbonate.

Batteries generate explosive fumes when they are being charged. Keep fire, sparks, and burning material away from the battery charger area. Prevent sparks from the battery connectors.

Charge batteries only in the special area for charging batteries. When charging the batteries, keep the vent caps clean. The battery charger area must have ventilation so that explosive fumes are removed. Open the hood over the battery or remove the cover if the battery has a cover.

Disconnect the battery when doing cleaning and maintenance.

If the lift truck has been operated with a low battery, check the contactors for welded contacts before a charged battery is connected. The circuit will not reset and lift truck operation cannot be controlled if the contacts are welded. To check the contacts, see the Contactor inspection procedure for your lift truck.

CAUTION

Use only battery chargers approved by the battery manufacturer or dealer.

CAUTION

NEVER connect the battery charger plug to the plug of the lift truck. You can damage the traction control circuit. Make sure the charger voltage is the correct voltage for the battery.

Correct use of the hydrometer (see Figure 14) and proper operation of the battery charger is important. Also see Figure 15. Follow the instructions of the charger manufacturer. NEVER let the battery discharge below the minimum value given by the battery manufacturer. A fully charged battery will have a specific gravity of 1.265 to 1.310 at 25°C

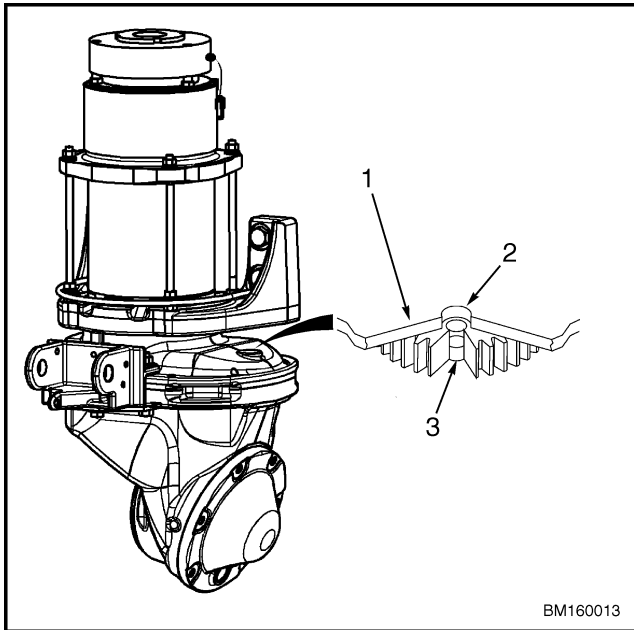
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1. MASTER DRIVE UNIT FRAME
2. OIL FILL HOLE
3. OIL LEVEL SHOULD BE AT THE BOTTOM EDGE OF GEAR OR HALFWAY UP.

Figure 1. Check Oil Level

4. If the lubricant level is low, add additional lubricant. See **Capacities and Specifications 8000 SRM 1033**, **Capacities and Specifications 8000 SRM 918**, **Capacities and Specifications 8000 SRM 1299**, or **Capacities and Specifications 8000 SRM 1028**.

CHANGE GEAR OIL (T5-7Z^{AC}, B60-80Z^{AC}, AND C60-80Z^{AC})

NOTE: The oil used in the master drive unit should be drained and replaced after the initial 500 hours break-in period. After the initial oil change, the MDU gear oil should be changed every 2000 hours.

Operate the lift truck MDU for several minutes to warm the gear oil. Elevate truck to access drive unit. Keep truck level. Remove drive unit cover. Remove both drain and oil fill plugs and drain gear oil into a suitable container. Replace drain plug. Add gear oil through oil fill plug until oil is level with top of gear without covering gear. Replace oil fill plug. **DO NOT OVERFILL.**

Safety Precautions

⚠ WARNING

Put blocks under each side of the truck under the drive unit frame. Position blocks on both sides of the load wheels. The blocks must prevent the motorized hand truck from falling and causing injury or damage.

⚠ WARNING

The capacitor in the transistor controller can hold an electrical charge after the battery is disconnected. To prevent electrical shock and personal injury, discharge the capacitor before inspecting or repairing any component in the MDU compartment. Wear safety glasses. Make certain the battery has been disconnected. **DO NOT** use a screwdriver to make a short circuit across the B+ and B- terminals of the transistor controller.

⚠ WARNING

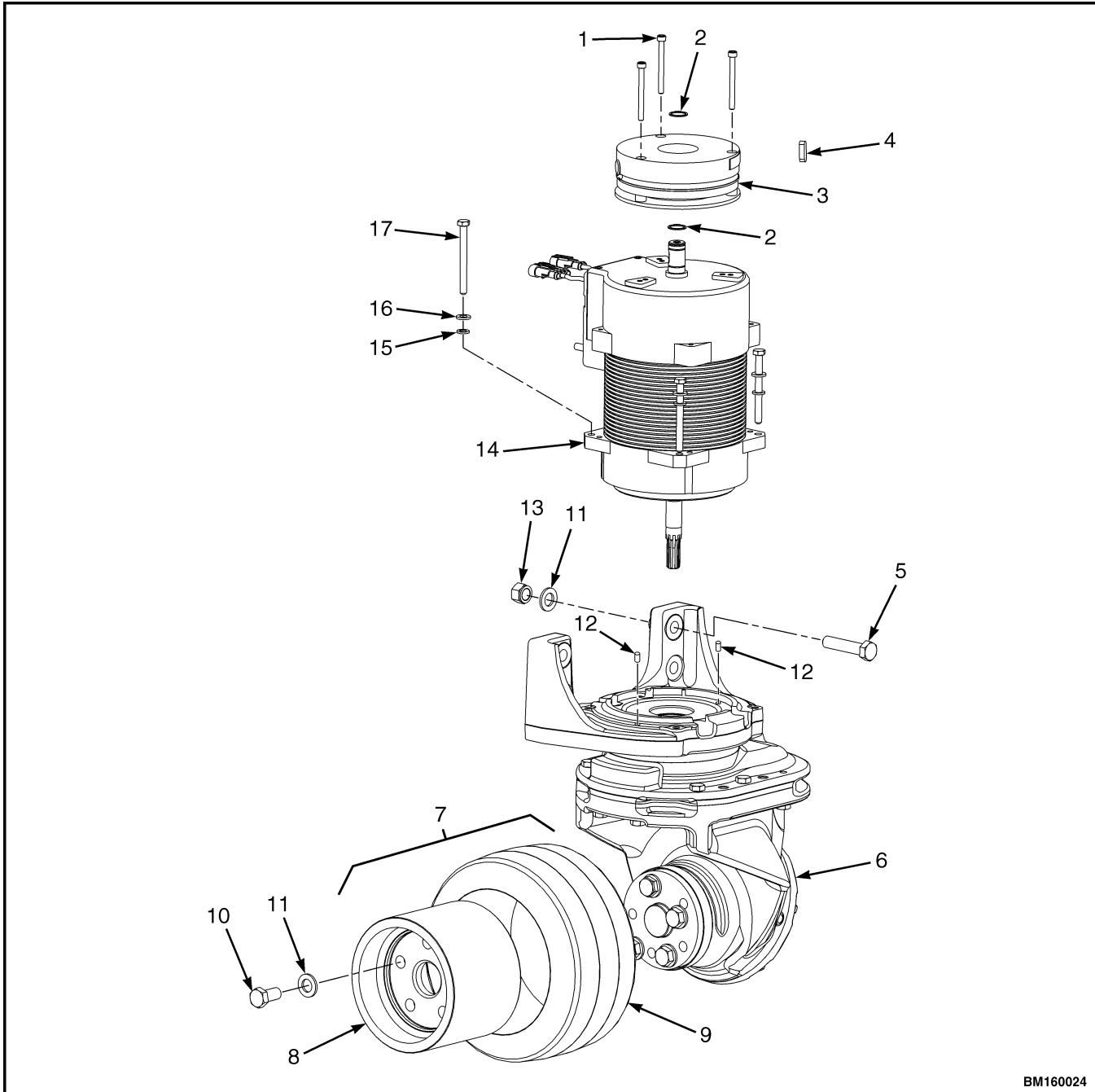
To avoid personal injury and prevent electrical shock, perform the following steps before

performing any troubleshooting or adjustments, and before connecting or disconnecting a handset or Personal Computer.

⚠ WARNING

To avoid controller damage, always disconnect the battery. Discharge the capacitor and never put power to the controller with any power wire disconnected. Never short any controller terminal or motor terminal to battery. Make sure to use proper procedure when servicing the controller.

1. Block the lift truck so that the drive wheel is off the floor. See the section for your truck, **Periodic Maintenance 8000 SRM 919**, **Periodic Maintenance 8000 SRM 1027**, **Periodic Maintenance 8000 SRM 1368**, or **Periodic Maintenance 8000 SRM 1032 - How to Put a Lift Truck on Blocks**.
2. Turn the key switch to the **OFF** position and disconnect the battery.

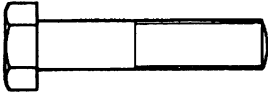
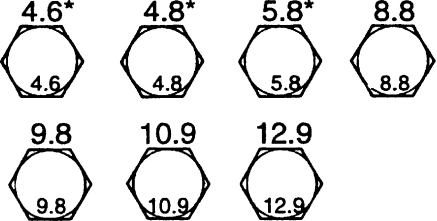

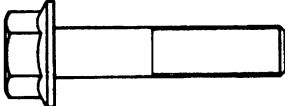

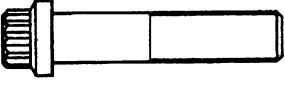

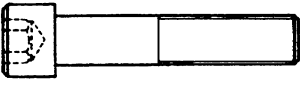


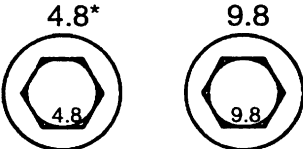



BM160024

- | | |
|-------------------------|--------------------|
| 1. CAPSCREW | 10. CAPSCREW |
| 2. SNAP RING | 11. WASHER |
| 3. BRAKE | 12. DOWEL |
| 4. WOODRUFF KEY | 13. NUT |
| 5. CAPSCREW | 14. TRACTION MOTOR |
| 6. DRIVE UNIT | 15. WASHER |
| 7. DRIVE TIRE AND WHEEL | 16. WASHER |
| 8. WHEEL | 17. CAPSCREW |
| 9. TIRE | |

Figure 8. Drive Unit Assembly C60Z^{AC} and T5Z^{AC}

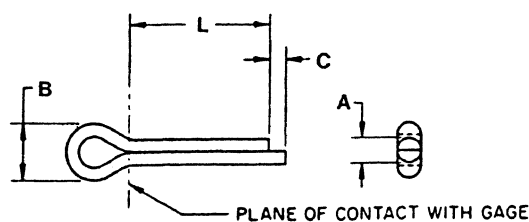
Table 1. Bolts and Screws

TYPE OF FASTENER	METRIC FASTENERS STRENGTH LEVELS: PROPERTY CLASS * MARKINGS NOT REQUIRED	INCH FASTENERS STRENGTH LEVELS: SAE GRADES * MARKINGS NOT REQUIRED
 <p>HEX HEAD BOLTS AND CAPSCREWS</p>	 <p>MARKINGS FOR SIZE M5 AND LARGER</p>	
 <p>HEX HEAD FLANGE SCREWS</p>	<p>SAME AS ABOVE</p>	
 <p>12-POINT FLANGE SCREWS</p>		
 <p>HEX SOCKET HEAD CAPSCREWS</p>		<p>MARKINGS NOT REQUIRED</p>
 <p>SEMS</p>		

HM210066

Table 10. Cotter Pin Dimensional Data (Continued)

Nominal Length L	Length Range		Nominal Size - Part Numbers				
	max	min	4.00 mm (0.156 in.)	5.00 mm (0.188 in.)	6.30 mm (0.250 in.)	8.00 mm (0.312 in.)	9.52 mm (0.375 in.)
31.75 mm (1.250 in.)	33.3 mm (1.310 in.)	29.2 mm (1.150 in.)	0015234	0015243	0015252	0015262	0221884
38.1 mm (1.500 in.)	40.9 mm (1.610 in.)	36.6 mm (1.440 in.)	0015235	0015244	0015253	0015263	0221885
44.45 mm (1.750 in.)	46.0 mm (1.810 in.)	42.9 mm (1.690 in.)	0015236	0015245	0015254	0015264	0221886
50.8 mm (2.000 in.)	52.3 mm (2.060 in.)	49.3 mm (1.940 in.)	0015237	0015246	0015255	0015265	0015271
57.15 mm (2.250 in.)	58.7 mm (2.310 in.)	55.1 mm (2.170 in.)	0015238	0015247	0015256	0221880	0221887
63.5 mm (2.500 in.)	65.0 mm (2.560 in.)	62.0 mm (2.440 in.)	0015240	0015248	0015257	0221881	0015273
69.85 mm (2.750 in.)	72.1 mm (2.840 in.)	68.3 mm (2.690 in.)	0015280	0015249	0015258	0221882	0015286
76.2 mm (3.000 in.)	81.3 mm (3.200 in.)	74.7 mm (2.940 in.)	0015283	0015250	0015259	0015267	0015272
88.9 mm (3.500 in.)	91.4 mm (3.600 in.)	87.4 mm (3.440 in.)		0015239	0015284	0015266	0015274
101.6 mm (4.000 in.)	113.3 mm (4.460 in.)	98.8 mm (3.890 in.)		0015301	0015260	0128754	0015275
127.0 mm (5.000 in.)	128.5 mm (5.060 in.)	123.7 mm (4.870 in.)				0221883	0015277
152.4 mm (6.000 in.)	153.9 mm (3.060 in.)	5.460 mm (138.7 in.)					0221888



EXTENDED PRONG

HM211587

DRIVE UNIT COMPARTMENT COVERS

Many procedures require access to the drive unit compartment. The drive unit compartment is located at the front of the truck in front of the battery and below the control handle assembly. Two covers must be removed to access the drive unit compartment. The covers must be correctly reinstalled to protect the electrical system and other components housed in the drive unit compartment. See Figure 2.

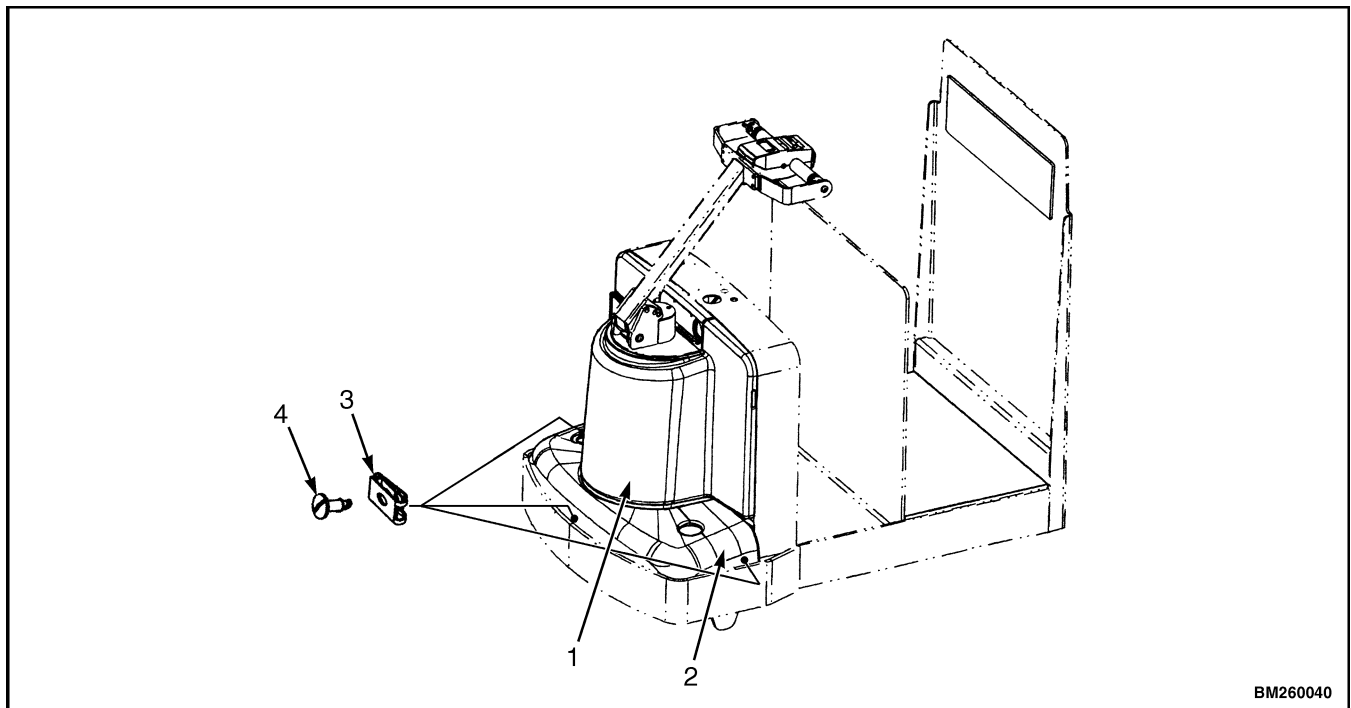
Remove

1. Remove the three screws retaining the lower drive unit compartment cover.
2. Lift the lower cover from the drive unit compartment.

3. Pull the bottom edge on one side of the upper cover from the drive unit compartment. Continue pulling around the edge of the cover until completely removed from the truck.

Install

1. Place the top corners of the upper cover into the retaining clips in the drive unit compartment.
2. Working around each side, bump the cover into place using the heel of the hand or a rubber hammer.
3. Place the lower cover into the bottom of the drive unit compartment.
4. Secure lower cover in place using three screws.



1. FRONT COVER
2. LOWER COVER

3. SPRING NUT CLIPS
4. SCREWS

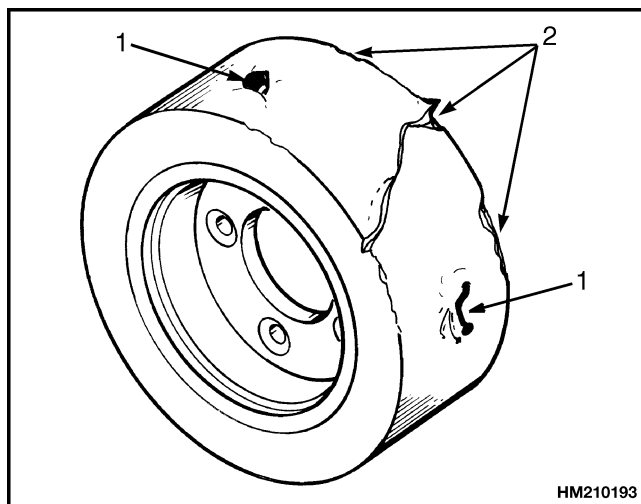
Figure 2. Drive Unit Compartment Covers

Drive Tire, Casters (Optional), and Trail Wheels or Load Wheels

CAUTION

If the drive tire has been removed and installed, check all wheel bolts after 2 to 5 hours of operation. Tighten the bolts in a cross pattern (see Drive Tire and Wheel) to the correct torque value shown in the Maintenance Schedule. When the bolts stay tight after eight hours, the interval for checking the torque can be extended to 500 hours.

Inspect the drive tire, casters (optional), and trail wheels or load wheels for damage. Inspect the tread and remove any objects that will cause damage. See Figure 5. Inspect the wheels and casters for loose or missing parts. Remove any wire, strapping, or other material wound around the axles or casters.



1. OBJECTS EMBEDDED IN TIRE.
2. GROOVES, CUTS, OR OTHER DAMAGE TO TIRE.

Figure 5. Tire and Wheel Inspection

Lift Linkage (C60-80Z^{AC})

A series of levers and rods compose the lift linkage. These devices are connected together and to the frame and lift cylinder in series. The lift cylinder applies force in only one direction. The lift linkage transfers that force to the load wheel linkage and the drive end frame linkage, lifting the truck and load evenly and smoothly. Many pivot points indirectly shoulder the weight of the truck and load. These points must be lubricated every 500 hours/3

months to ensure minimal resistance from friction and damage from heat.

Coupler (T5-7Z^{AC})

The coupler is mounted to the rear of the truck and can be released from the truck using a hand lever. The design of the coupler allows hand-free connections by backing the truck up to the connecting load until the coupler latches. Check that the hand lever moves easily with little resistance and returns to the latched position when released. A simple drop pin-type connector option is also available.

Steering Operation

Check that the steering operates smoothly and gives good steering control. Move the handle to the left or right to steer the lift truck in the desired direction of travel. Reposition the steering control handle up and down to ensure easy adjustment during use.

CHECKS WITH THE KEY SWITCH ON

Control Handle

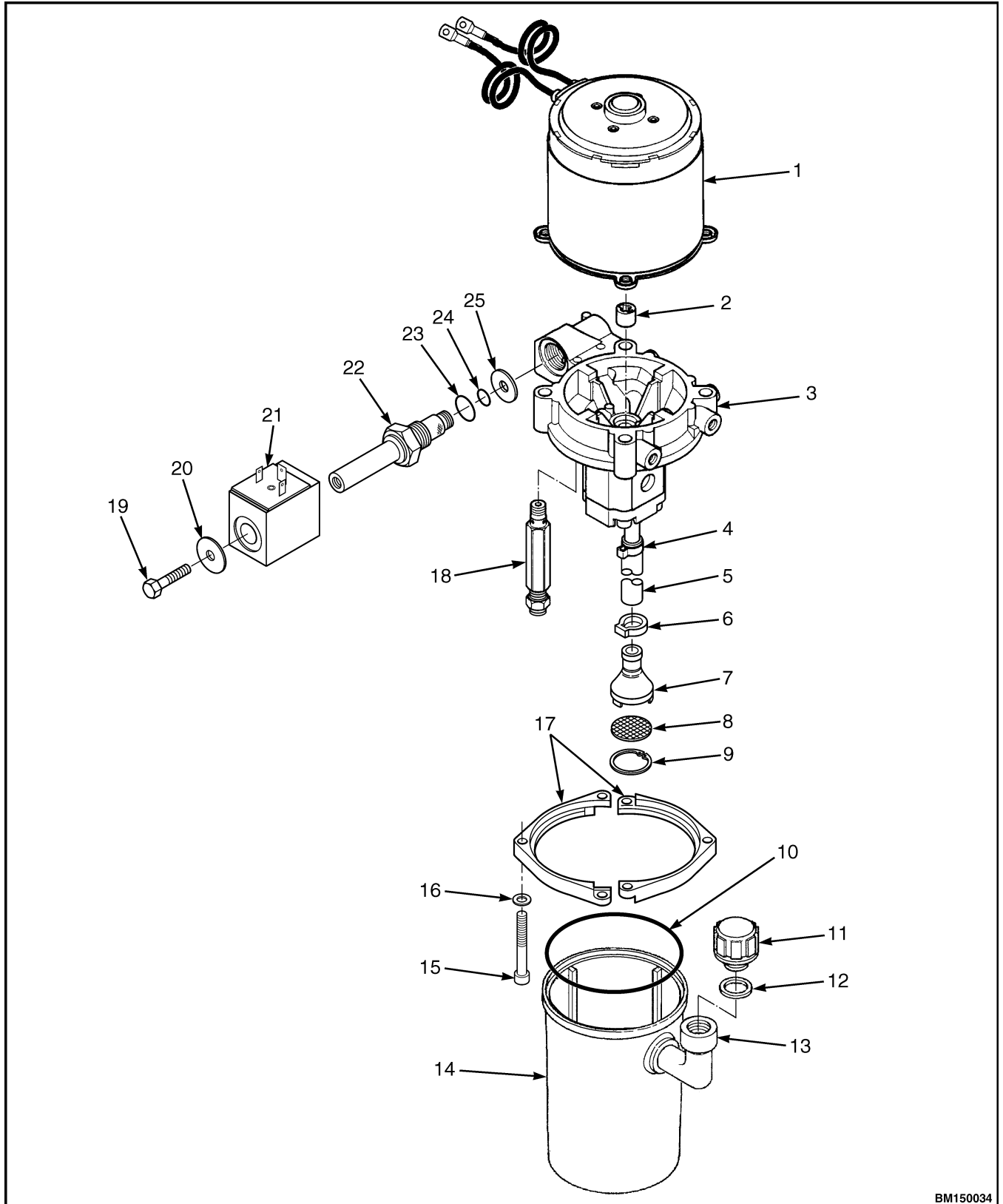
WARNING

Make sure the area around the lift truck is clear before moving the lift truck or checking for correct operation. Be careful when making the checks.

Check that the speed/direction control and the foot switch for high speed operates as described in the **Operating Manual**. Also check that the horn switch is operational.

The speed/direction control is for selecting forward or reverse movement and the travel speed of the lift truck. The control is spring loaded and should return to the neutral position when the control is released. The control can be operated by either hand. The operator controls the speed and direction of travel by rotating the control in the desired direction. Maximum rotation of the control causes maximum travel speed. To stop or change direction, the operator rotates the control in the opposite direction. The lift truck will come to a stop. If the speed/direction control is not released when the lift truck stops, it will accelerate in the opposite direction. Changing the direction with the speed/direction control is called plugging. Arrows on the control indicate the direction of travel.

Check the operation of the horn. The key switch must be in the **ON** position for the horn to operate.

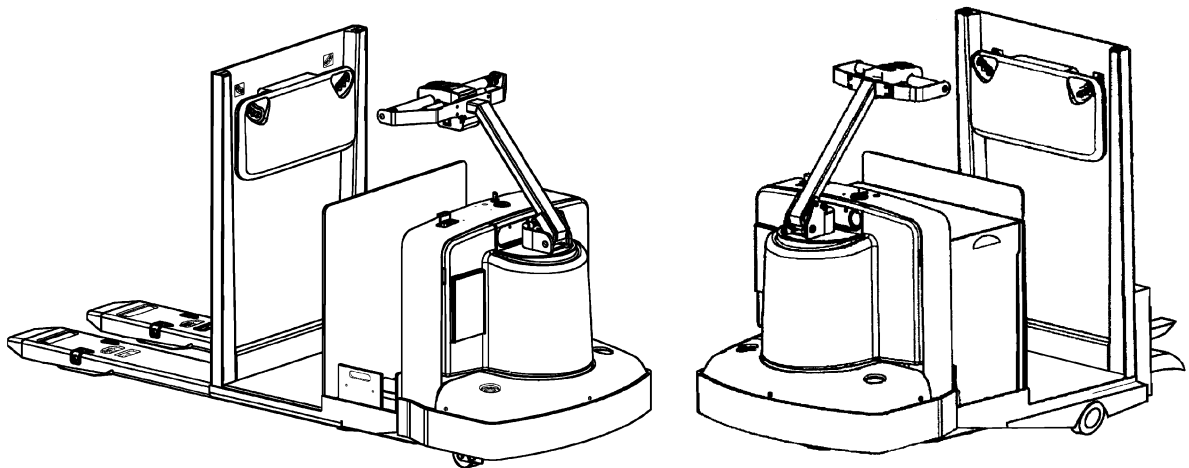


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Figure 12. Lift Pump and Motor Assembly (C60Z^{AC})

STEERING MECHANISM

T5Z [A476]; T7Z [A477]; C60Z [A478];
C80Z [A479]; T5Z^{AC} [B476]; T7Z^{AC} [B477];
C60Z^{AC} [B478]; C80Z^{AC} [B479]



HYSTER

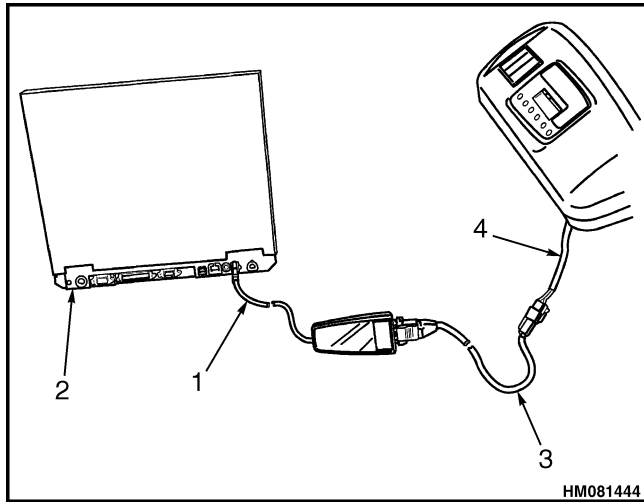
Troubleshooting

PROBLEM	POSSIBLE CAUSE	PROCEDURE OR ACTION
Steering is rough or difficult.	Damaged, worn, or defective steering handle swivel bearing(s).	Replace bearings.
	Steering handle swivel bearing(s) need lubrication.	Lubricate or repack bearings.
	Bearing retaining nut torque incorrect.	Loosen retaining nut and torque to 27 N•m (20 lbf ft).
	Drive unit housing bearing (steer) damaged.	Replace drive unit housing bearing (steer).
	Incorrect caster adjustment. (C60-80Z and C60-80Z ^{AC} Only)	Adjust caster height.
	Caster damaged. (C60-80Z and C60-80Z ^{AC} Only)	Replace caster.

CONNECT PC TO LIFT TRUCK

To connect the Interface Cable Kit Hyster part number 1534010 to the lift truck wire harness, follow these steps:

1. Connect the USB connector of the Interface Cable to the USB port on the PC. See Figure 4.

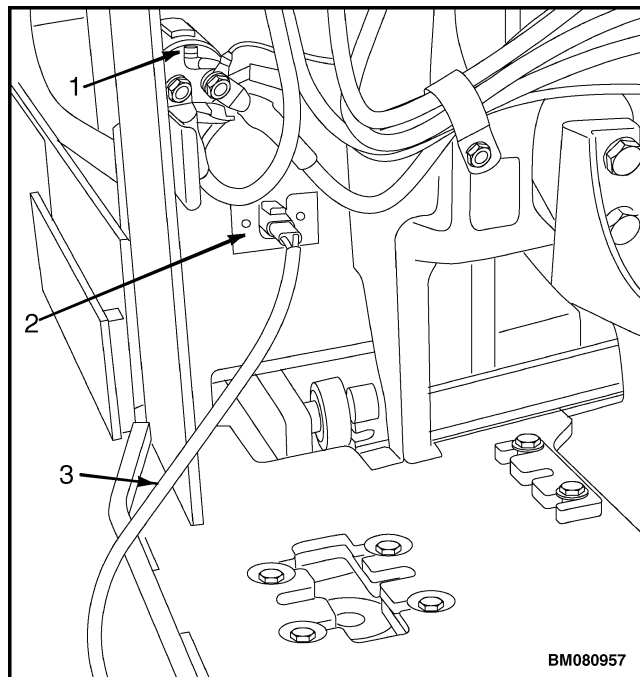


1. INTERFACE CABLE
2. LAPTOP COMPUTER
3. INTERFACE CABLE EXTENSION
4. LIFT TRUCK WIRING HARNESS

Figure 4. Interface Cable Kit Connected to USB Connector

2. If provided, connect the nine-pin connector of the Interface Cable extension to the Interface Cable. See Figure 4.
3. Disconnect the battery connector or depress the battery disconnect switch if the lift truck is so equipped. See Figure 7.
4. Connect the three-pin connector of the Interface Cable to the lift truck ETACC connector. On models B60Z^{AC} (B230), B80Z^{AC} (B233), C60Z^{AC} (B478), C80Z^{AC} (B479), T5Z^{AC} (B476), and T7Z^{AC} (B477), the ETACC connector is located inside the drive unit compartment below

the main contactor. See Figure 5. On models N30ZDRS, N35-40ZRS (A265), N35ZDR, N45ZR (C264), N30ZDR, N35-40ZR (D470), remove the cap covering the connector on the front frame panel. See Figure 6. On models J2.00-3.20XM (J40-65Z) (A416/B416), V30ZMD (D210/E210), E1.50-2.00XM (E25-40Z) (E114/F114), E2.00-3.20XM (E45-65Z) (G108), and E3.50-5.50XL (E70-120Z) (D098/E098), connect to the wiring harness three-pin connector which is located behind the dashboard cowl liner cutout under the dash display. See Figure 4. The connection between the PC and lift truck is now complete.



1. MAIN CONTACTOR
2. ETACC CONNECTION
3. INTERFACE CABLE

Figure 5. ETACC Connection - B60Z^{AC}, B80Z^{AC}, C60Z^{AC}, C80Z^{AC}, T5Z^{AC}, and T7Z^{AC} [B230, B233, B478, B479, B476, and B477]

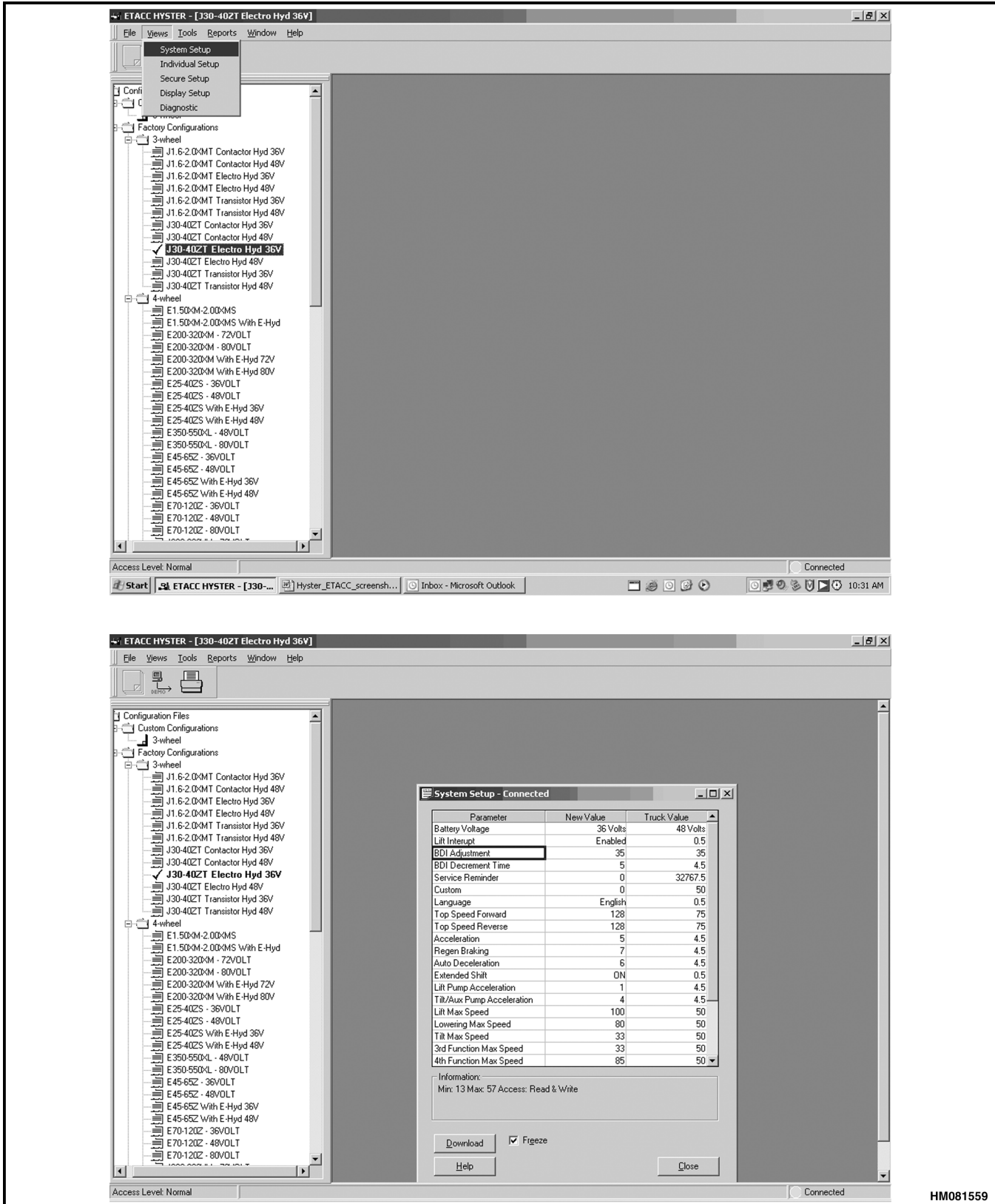


Figure 15. Views Menu System Setup, J1.60-2.00XMT (J30-40ZT) (J160)

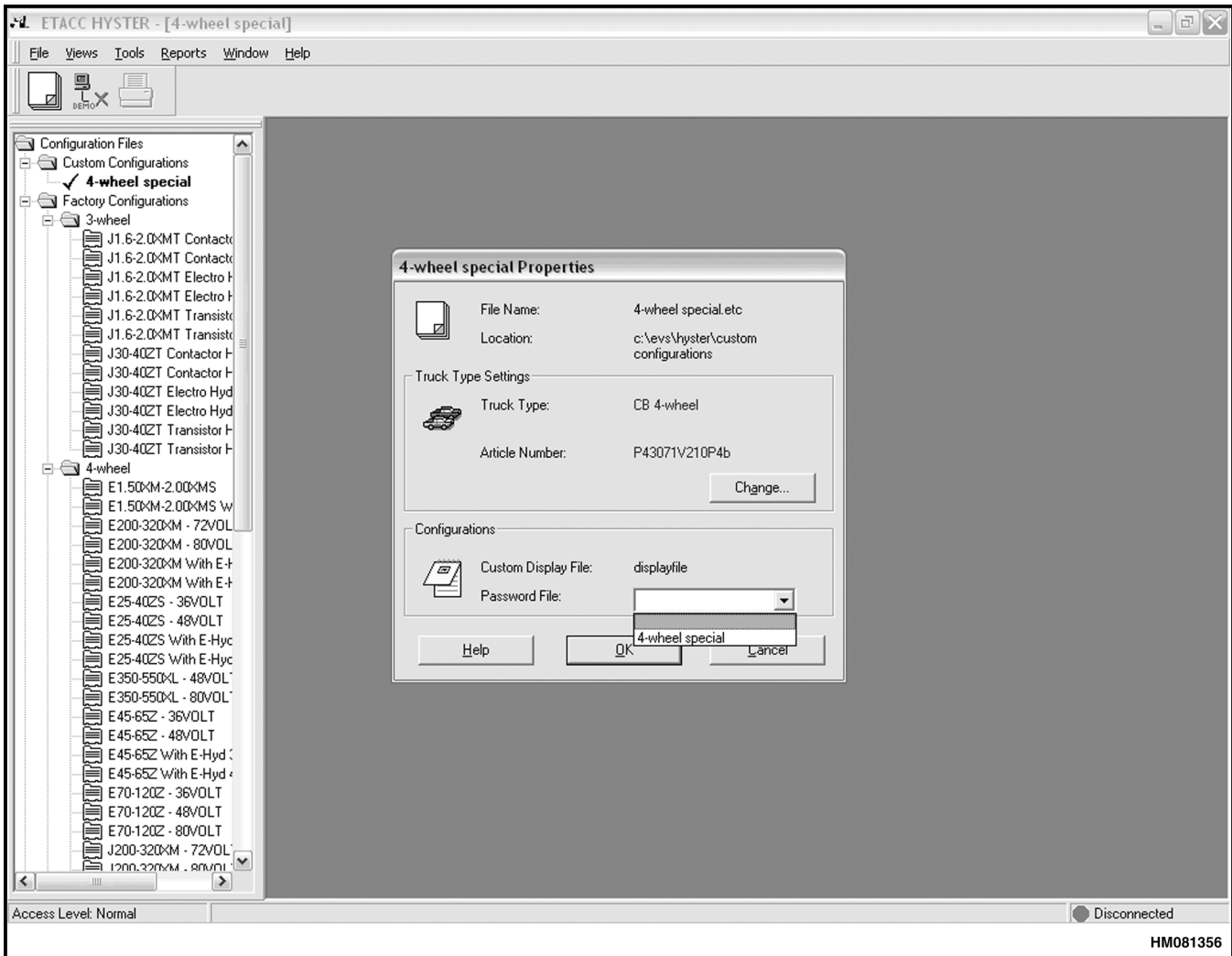


Figure 24. Passwords File

IMPORT NEW LIFT TRUCK CONFIGURATION FROM DISK

NOTE: The import feature is used to update the Electric Truck AC Control Program Hyster with new information through an update CD.

1. Place the update CD in the CD-ROM drive.
2. Select **Import** from the **File** menu. An **Import Configuration Files** dialog box pops up. See Figure 25.
3. Select the disk drive where the CD is located from the **Look in** line in the **Import Configuration Files** dialog box. See Figure 25.
4. Select the file to be imported. Click **Open**. The new file is imported and updates the Electric Truck AC Control Program Hyster.

Password Functions

This section contains the following processes:

- **Enable/Disable Password and Lift Truck Inspection functions**
- **Password Properties**
- **Create New Password File**
- **Download and Upload Passwords**

ENABLE/DISABLE PASSWORD AND LIFT TRUCK INSPECTION FUNCTIONS

Click **Display Setup** from the **Views** menu. See Figure 32.

The **Display Setup Connected** dialog box will pop up and allow the user to enable or disable the lift truck inspection checklist and password functions.

Truck Inspection Checklist

If this option is enabled, the **Truck Inspection List** must be completed each time before operating the lift truck. The items in the **Truck Inspection List** are answered by pressing the **1** key for **YES** or the **4** key for **NO**.

NOTE: If an item in the **Truck Inspection List** is answered with a **NO** response and the action is not corrected or repaired, the lift truck traction speed will be reduced by one-half speed until the problem is corrected or repaired.

Password

NOTE: If the **Truck Inspection Checklist** is enabled, the checklist **CANNOT** be performed until a correct password has been entered in the display panel.

If this option is enabled, the user is required to enter a five-digit password before the lift truck can be operated.

PASSWORD PROPERTIES

With this feature, the user can display, edit, and save passwords (service technician or lift truck operator),

and add or remove user names. The user can also display, edit, and save mode levels and operator/service settings.

1. Select the **Password File**. See Figure 33.
2. The Password File **Properties** pop-up box appears. It contains the following information. See Figure 34.

NOTE: To edit the table, use the left arrow (←) and right arrow (→) keys to move between columns, use the up (↑) and down (↓) arrows to move between the rows or use a mouse to select the desired column or row and left click the mouse. The table can be sorted by columns by clicking on any of the column headers.

Password: Identifies the numeric password assigned to a specific user.

User Name: Identifies the Operator or Service Personnel assigned to the password.

Mode: Identifies the maximum performance setting for the user.

Type: Identifies the user as an **Operator** or **Service Personnel**.

3. To select **Mode**, click on the drop-down list, select **1** through **4**. See Figure 35.
4. To select **Type**, click on the drop-down list, select **Operator** or **Service Personnel**.
5. To add a new password, click the **Add Password** button. To remove a password, select the password to be removed and click the **Remove Password** button.
6. When finished editing the Password File **Properties** dialog box, click **Save** or **OK** to save the Password File.

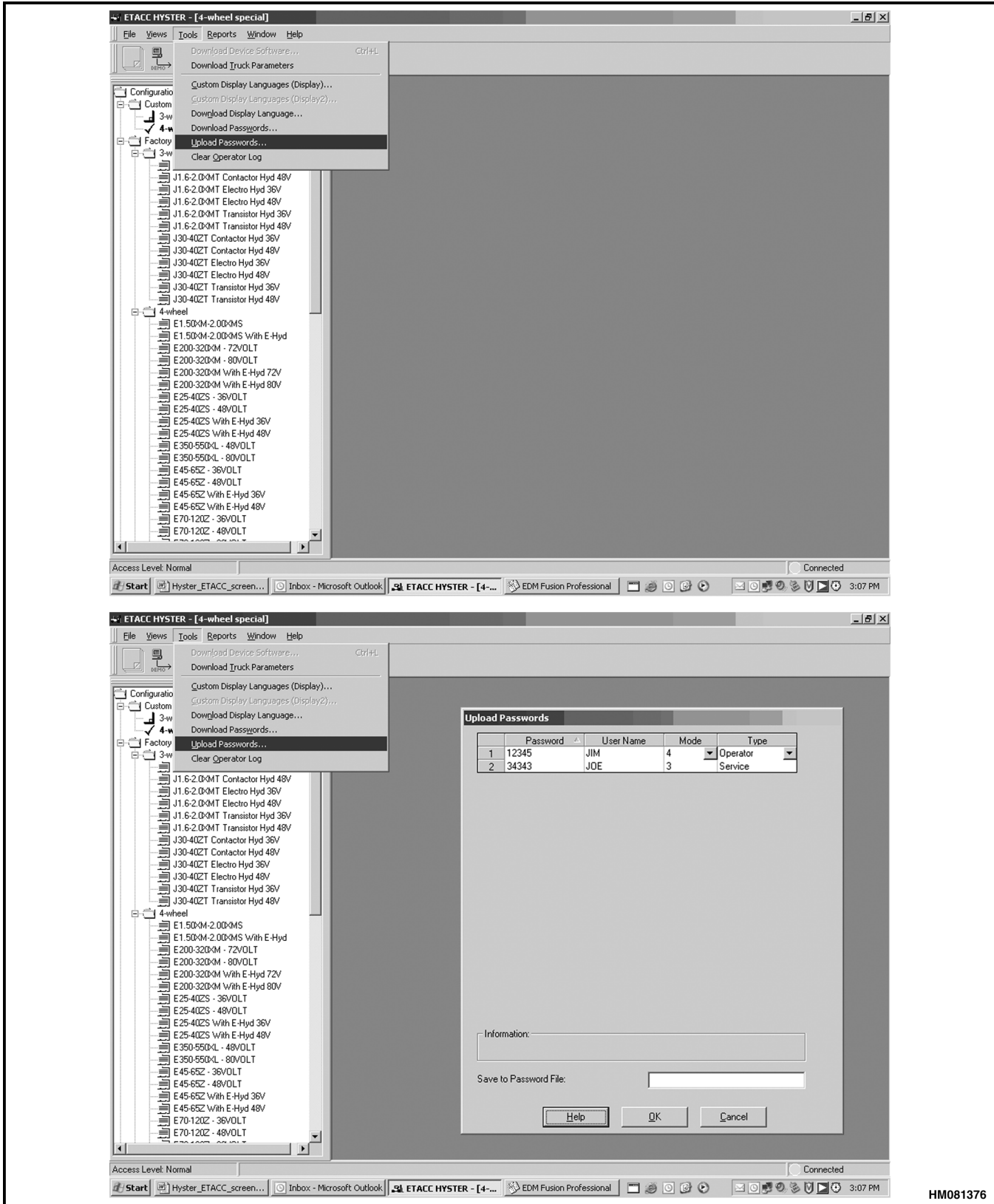
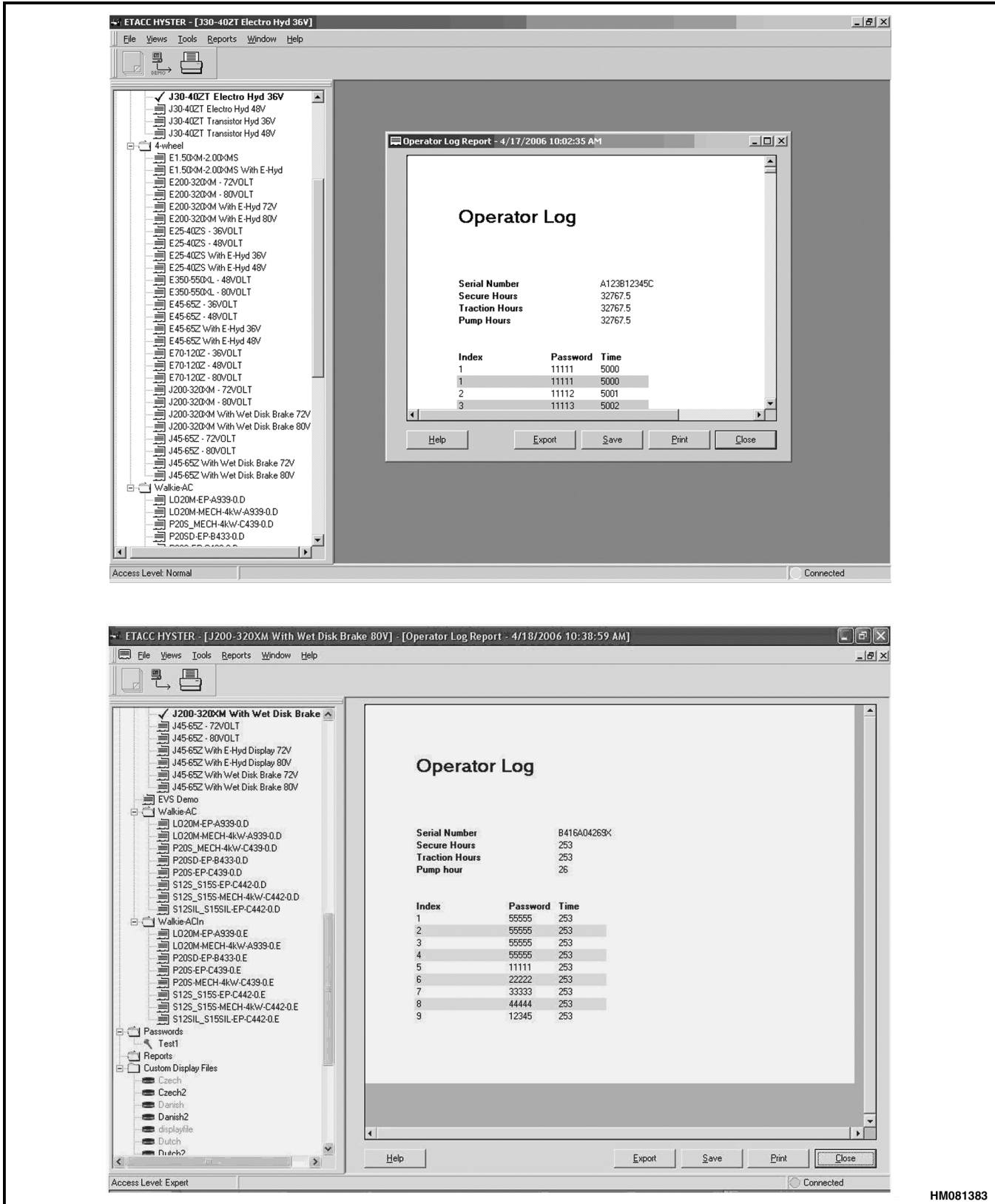


Figure 40. Tools Menu, Upload Passwords



HM081383

Figure 49. Operator Log Report

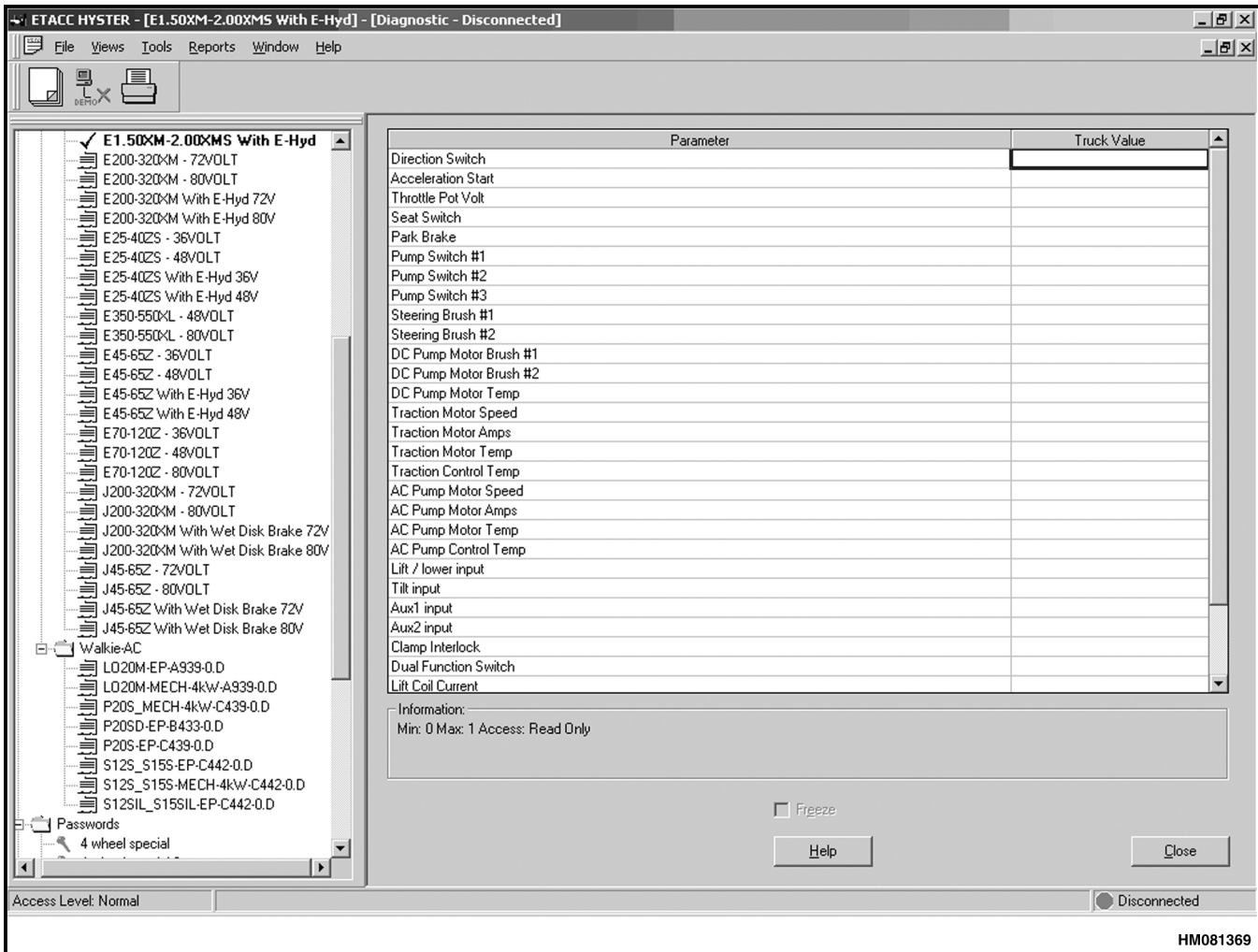


Figure 59. Diagnostic Screen With No Lift Truck Communication

NOTE: Temperatures shown in the **Truck Value** column are in Celsius **ONLY**.

Truck Value: The Truck Value will have an **actual value** for **Throttle Pot Volts, Traction/Pump Motor Amps, Traction/Pump Motor and Controller Temp, and RPM**. On lift trucks equipped with Electro-Hydraulics (E-Hydraulics), Lift/Lower input, Tilt input, Aux 1 input, and Aux 2 input

display 128 at the NEUTRAL position, and values should range proportionally from less than 5 at full back position to greater than 250 at the full forward position. All other items will be indicated by either a **0** value or a **1** value in each row. The **1** value is the **ON** condition. The **0** value is the **OFF** condition for the lift truck.

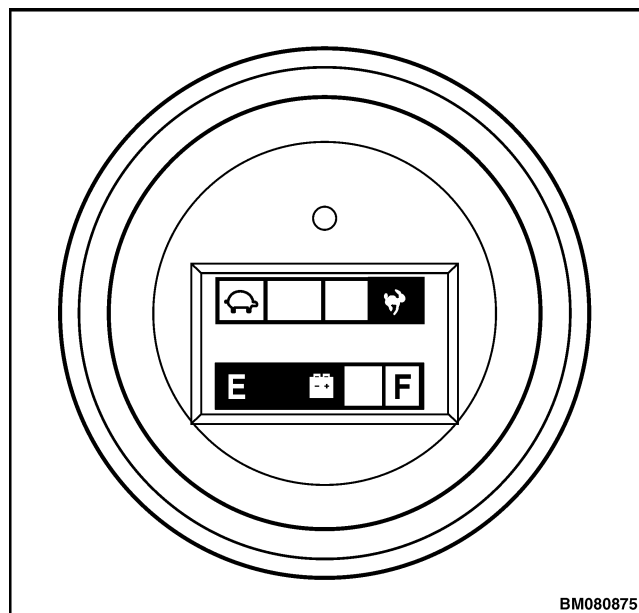
General

DESCRIPTION

NOTE: Menu functions can be accessed through the dash display by using a technician-level password. These functions include truck speed settings, acceleration rates, audible/visual alarm, and performance settings.

NOTE: The initial setup of the supervisor password must be performed by a service technician accessing the menu system with a technician-level password. The supervisor password must be entered before a supervisor can gain access to the menu functions.

The dash display is a multifunction device. It contains a truck status LED and an LCD which displays the performance mode indicator and a battery charge indicator. The dash display menu system can be accessed by starting the truck in service mode and entering the proper password. See Figure 1.



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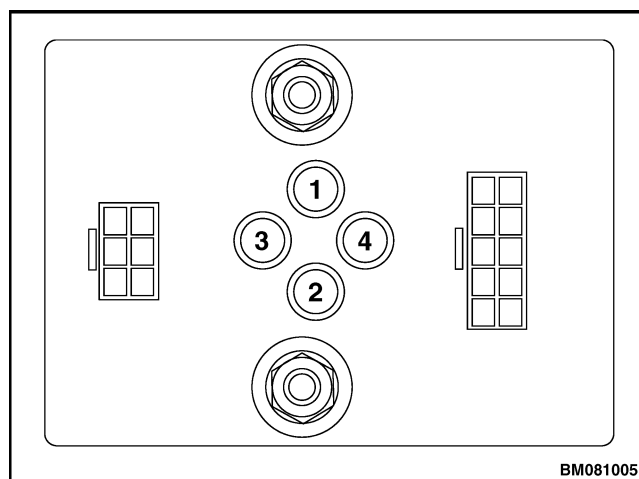
Figure 1. Dash Display

DASH DISPLAY MENU ACCESS

Start up the lift truck in service mode to access the dash display menu system:

1. Remove the drive unit compartment covers. Refer to **Periodic Maintenance** 8000 SRM 1368.
2. Depress and **HOLD** the #3 switch (located on the control module inside the electrical compartment). See Figure 2.
3. Turn the key switch to the **ON** position.
4. Continue holding the #3 switch and press the HORN switch (located on top of the control handle) within 1 second of turning the key switch.
5. Release the #3 and horn switches.

The Enter Password screen will now appear on the LCD. See Figure 3. At the Enter Password screen, enter your five-digit Technician password. The default Service Technician password is 55555.



BM081005

- | | |
|--------------|--------------|
| 1. #1 BUTTON | 3. #3 BUTTON |
| 2. #2 BUTTON | 4. #4 BUTTON |

Figure 2. Control Module

Traction Motor

The Traction Motor menu provides the following information:

- Traction Motor Voltage
- Traction Motor Current (amps)
- Traction Motor Speed (Encoder RPMs)

To exit the Traction Motor menu, press both the #4 and #1 switches and hold until the next diagnostic menu is present, or cycle the key switch to return the lift truck to **RUN** mode. See Figure 14.

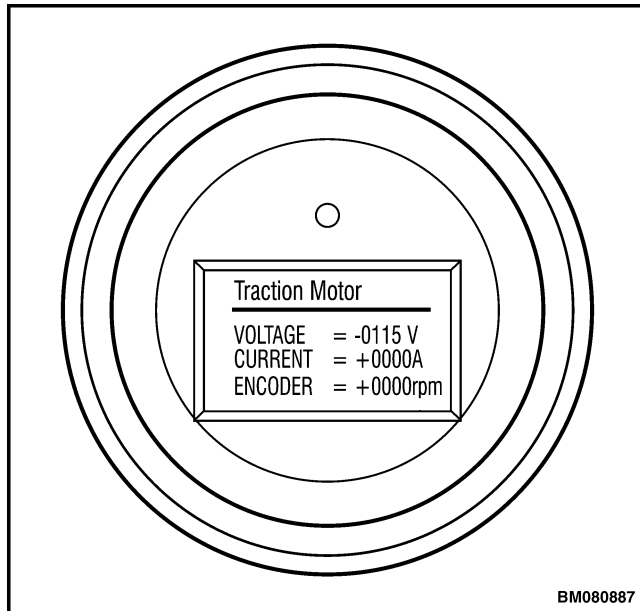


Figure 14. Traction Motor Screen

Pump Motor and Valve

The Pump Motor and Valve menu provides the following information about the lift system:

- Pump Motor Voltage
- Pump Motor Current (in amps)
- Valve Current (in milliamps)

To exit the Pump Motor and Valve menu, press both the #4 and #1 switches and hold until the next diagnostic menu is present, or cycle the key switch to return the lift truck to **RUN** mode. See Figure 15.

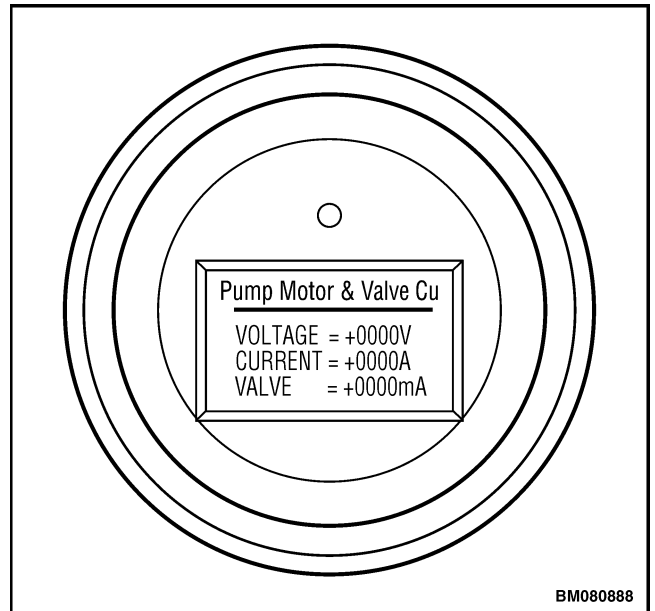


Figure 15. Hydraulic Motor/Valve Screen

A/V Alarm (Audible/Visual)

This menu will allow you to program the operation of the motion alarm. The menu also has an Off setting which will allow you to turn off the Motion Alarm feature. See Figure 35. There are three modes of operation:

Forward Operation – the alarm will activate only when the lift truck is traveling in the forward direction.

Reverse Operation – the alarm will activate only when the lift truck is traveling in the reverse direction.

Continuous With Key **ON** – the alarm will activate any time the lift truck key is in the **ON** position.

Select A/V Alarm parameter using the #4 switch and scroll through the choices using the #1 or #2 switches. Select the desired mode of operation and press the #3 switch to return to the Set General Items menu. Scroll to the Exit Options and select the correct option. Press the #4 switch to return to the Technician Menu.

CLEAR FAULT LOG

This menu allows the technician to clear all logged faults from the fault log. To use this menu, select "Confirm" or "Abort," and press the #4 switch to return to the Technician Menu. See Figure 36.

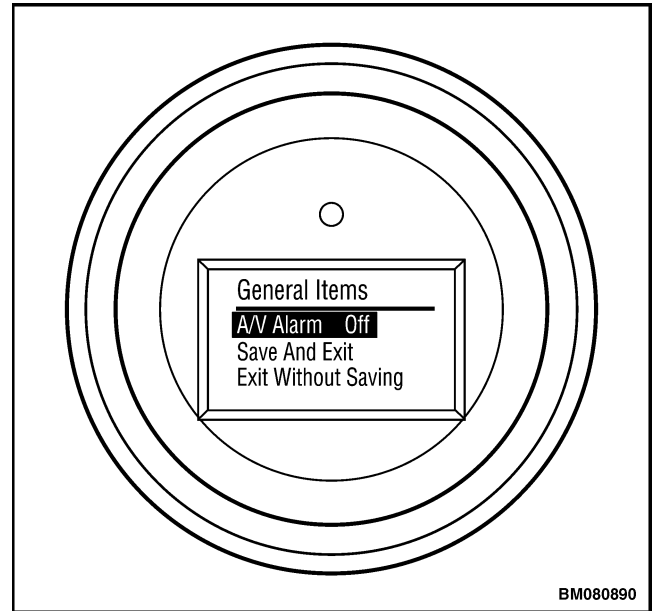


Figure 35. Motion Alarm Screen

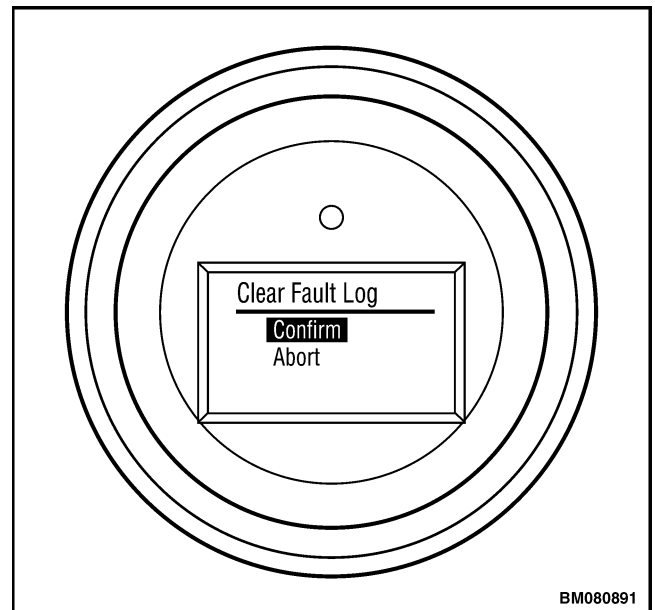


Figure 36. Clear Fault Log Screen

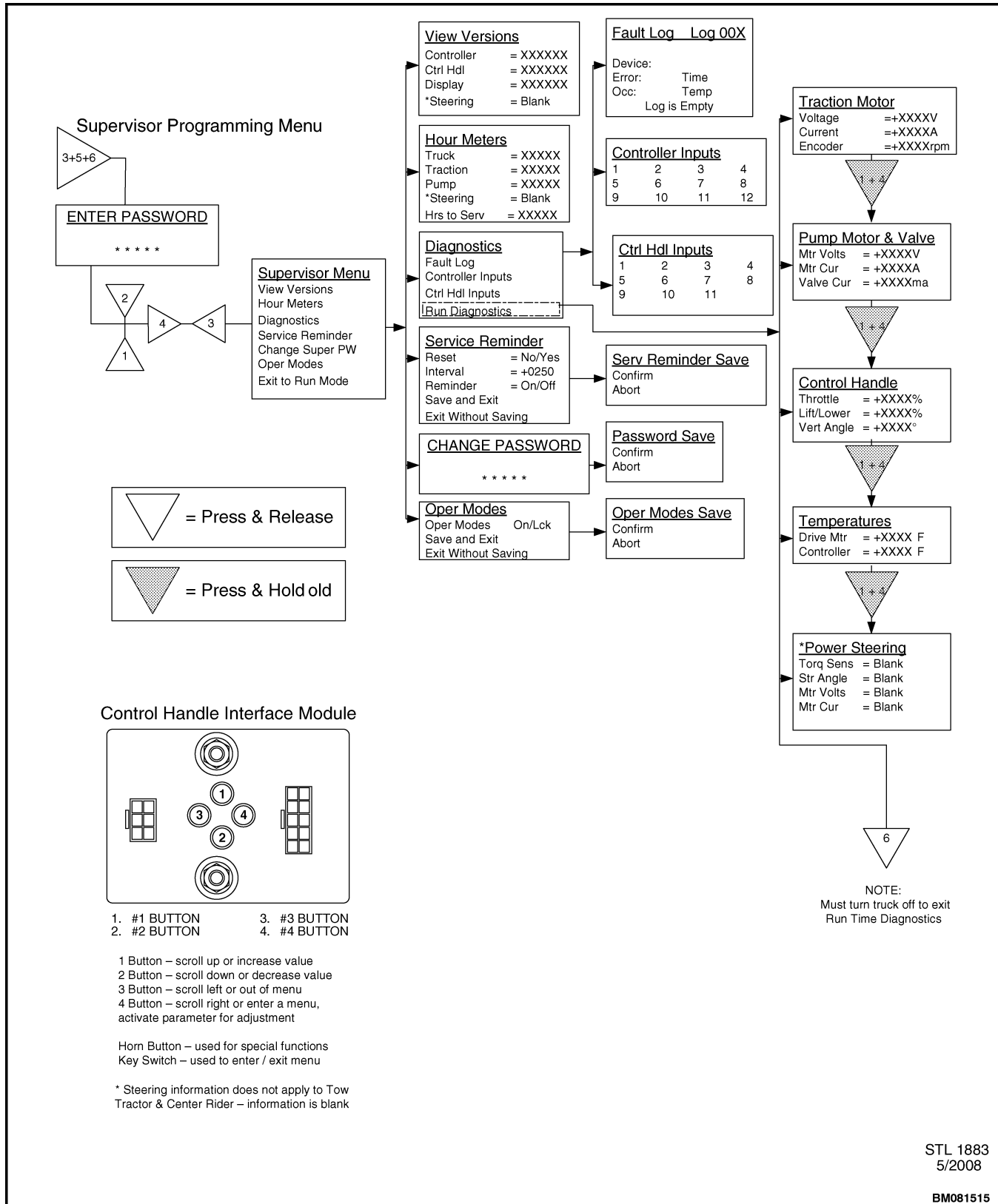


Figure 5. Programming Menu

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