

# **AC MOTOR CONTROLLERS/DISPLAY PANEL**

**DESCRIPTION, CHECKS,  
ADJUSTMENTS, AND  
TROUBLESHOOTING**

**ERP1.6-1.8-2.0ATF (ERP030-040TH) [F807]**



# SAFETY PRECAUTIONS

## MAINTENANCE AND REPAIR

- When lifting parts or assemblies, make sure all slings, chains, or cables are correctly fastened, and that the load being lifted is balanced. Make sure 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 clean and the working area clean and orderly.
- Use the correct tools for the job.
- Keep the tools clean and in good condition.
- Always use **YALE APPROVED** parts when making repairs. Replacement parts must meet or exceed the specifications of the original equipment manufacturer.
- Make sure all nuts, bolts, snap rings, and other fastening devices are removed before using force to remove parts.
- Always fasten a DO NOT OPERATE tag to the controls of the unit when making repairs, or if the unit needs repairs.
- Be sure to follow the **WARNING** and **CAUTION** notes in the instructions.
- Gasoline, Liquid Petroleum Gas (LPG), Compressed Natural Gas (CNG), and Diesel fuel are flammable. Be sure to 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 is well ventilated.

**NOTE:** The following symbols and words indicate safety information in this manual:



### **WARNING**

Indicates a condition that can cause immediate death or injury!



### **CAUTION**

Indicates a condition that can cause property damage!

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This section is for the following models:  
 ERP1.6-1.8-2.0ATF (ERP030-040TH) [F807]

## Description

### GENERAL

This section describes the ZAPI™ AC motor controller. See Figure 1. Procedures are outlined for controller safety, adjustments, troubleshooting, and repair. This section does not contain information about other electrical components. See the section **Electrical System** 2200 YRM 1078 and the section **Electro-Hydraulic Control Valve** 2000 YRM 1086.

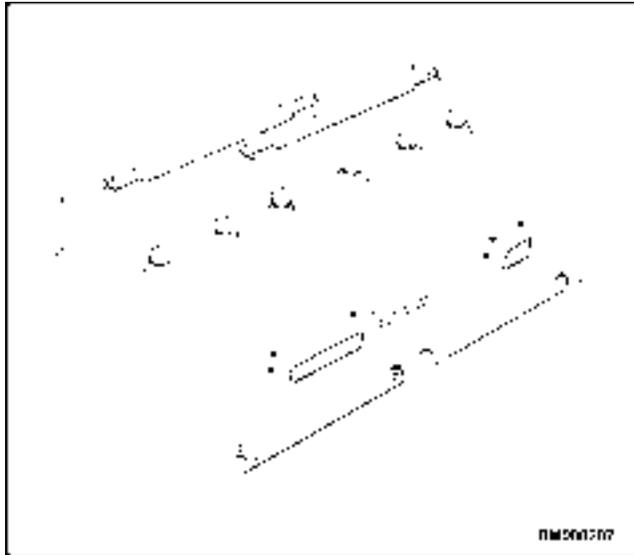
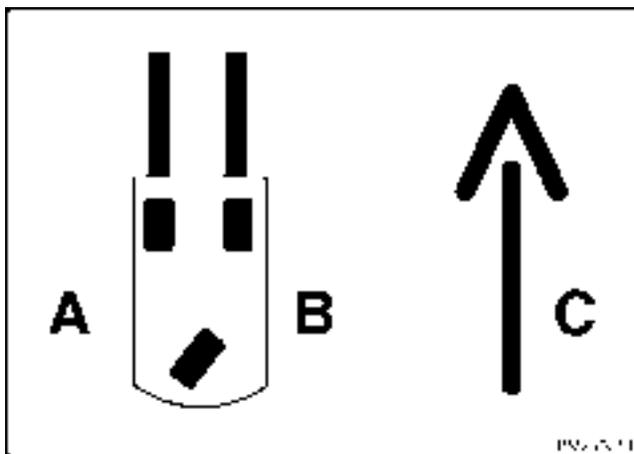


Figure 1. AC Controller



- A. LEFT SIDE
- B. RIGHT SIDE
- C. FORWARD TRAVEL

Figure 2. Truck Orientation

Throughout this section, forward will refer to travel in the direction of the forks and left and right are determined by an operator sitting in the seat facing forward. See Figure 2.

### DESCRIPTION

#### AC Motors

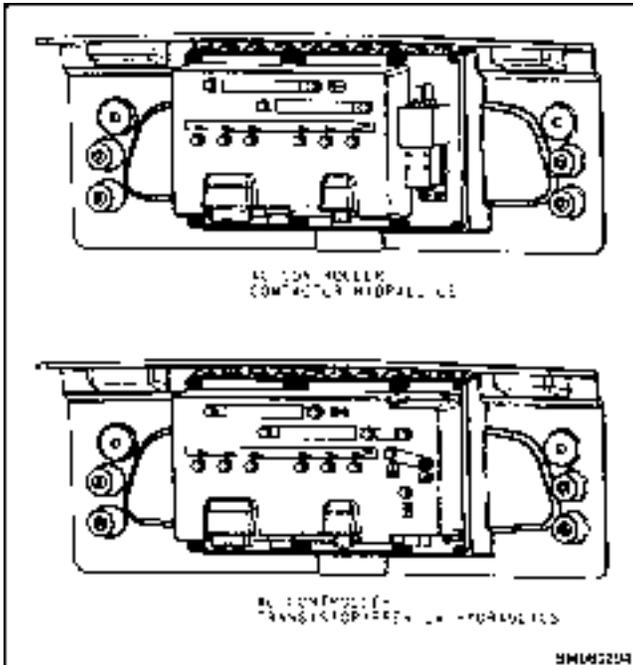
The AC motors are three-phase AC induction motors. They do not include motor brushes or commutators. An AC induction motor operates on three-phase AC power provided directly by the motor controller. The motor speed is controlled by the controller and can be changed by the frequency of the AC power presented to the motor. A speed sensor has been built into the rear motor bearing, which provides feedback to the motor controller, allowing software to continually monitor motor direction and revolutions per minute (RPMs). Using this software feedback, the AC motor control system can provide much better vehicle speed control than is available with DC SEM systems.

The AC motors also have thermal sensors, continuously monitored by the motor controllers, embedded in the motor windings.

#### ZAPI™ AC Motor Controller

The ZAPI™ controller comes in two versions. See Figure 3. The first version contains two inverters for controlling the dual traction motors and a contactor for the lift function. The second version contains two inverters for controlling both traction motors and a transistor controller to control a series DC pump motor.

The ZAPI™ controller is a solid state AC motor controller utilizing MOSFET technology with microprocessor control. The basic dual motor control is capable of controlling two asynchronous AC induction motors simultaneously. The controller has direct control of the traction system, main contactor, and the electromagnetic parking brakes.



**Figure 3. AC Controllers**

The controller software provides self diagnostics which are accessed by means of a personal computer (PC) with specialized ETACC software (see the section **Troubleshooting and Adjustments Using the AC Controls Program 2200 YRM 1058** or the on-board Dash Display). The controller software features a Test Menu for monitoring controller inputs and outputs, a Diagnostic Menu for viewing fault code information, and a Programming Menu for customizing the truck performance.

The self diagnostics monitor the traction motor, brake coil, main contactor coil, controller temperature, and internal logic functions. Troubleshoot fault codes generated by the controller self diagnostics by using the on-board dash display or a properly configured IBM™ compatible PC.

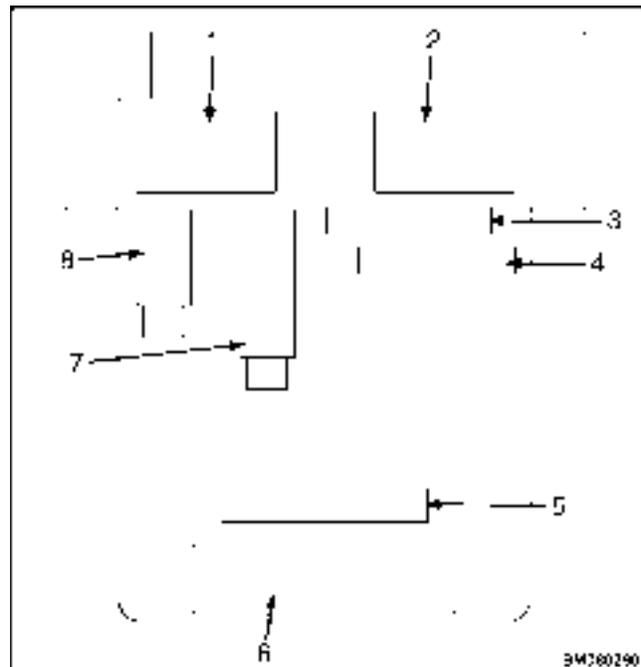
### Principles of Operation

The traction motor controllers convert DC power from the truck's battery to three-phase AC power at the frequencies and current necessary to independently power each traction motor. Each AC induction motor provides feedback to the controller for speed, rotation direction, and temperature.

The ZAPI™ AC motor controller uses two sophisticated microprocessors to control the logic and operation of

the controller. One microprocessor is designated the master and controls the right traction motor and the majority of the logic functions for the controller. The other microprocessor is designated the slave and controls the left traction motor and performs fewer functions than the master. The controller has many programmable features, including maximum speed, acceleration rate, neutral braking, and brake current limit. The controller includes a full range of features, as well as diagnostic and setup capability.

The controller contains two separate DC to AC inverters and the logic cards necessary to process input signals from various truck components. The controller uses these inputs to control the speed and direction of the dual traction motors. These components are all contained within a single housing located on the inside of the rear compartment cover. See Figure 4.



1. LH TRACTION MOTOR
2. RH TRACTION MOTOR
3. DASH DISPLAY
4. HYDRAULIC VALVE
5. CONTACTOR AND FUSE PANEL
6. TRACTION CONTROLLER
7. HYDRAULIC PUMP AND MOTOR
8. STEERING PUMP AND MOTOR

**Figure 4. Component Location**

The controller may also be equipped with an optional transistor pump motor controller. This transistor control is installed in a single housing along with the two inverters for powering the traction motors. The pump controller receives inputs from the hydraulic valve or the optional valve driver module. The pump motor will run at specific preset motor speeds when the manual control valve is installed. Motor speed is based on the hydraulic function selected.

### Controller Thermal Management

The motor controller is equipped with internal thermal sensors to protect the controller from a high temperature condition. At a temperature of 80°C (176°F), the controller will begin to reduce current to the traction circuit and slow the speed of the lift truck. If the controller temperature continues to rise, the traction current will be further reduced. If the temperature reaches 100°C (212°F), current to the traction circuit will be reduced to zero and the lift truck cannot travel. As the controller cools, traction will be restored. When the controller has cooled to 80°C (176°F), full traction speed will be available.

### Controller Area Network (CANbus)

The motor controller and the dash display are connected together with a CANbus communication system. When equipped with the optional electro-hydraulic valve, the valve, valve driver module, and the electro-hydraulic lever console also communicate with the ZAPI™ controller over the CANbus network. A PC with the appropriate service software can easily communicate with all system nodes by simply connecting to the CANbus. A special connector, located under the dash and next to the display, is configured specifically for this purpose.

### DISCHARGING THE CAPACITORS



#### WARNING

The capacitor in the transistor controller can hold an electrical charge after the battery is disconnected. To prevent an electrical shock and personal injury, discharge the capacitor before inspecting or repairing any component in the electrical compartment. Wear safety glasses. Make certain that the battery has been disconnected.



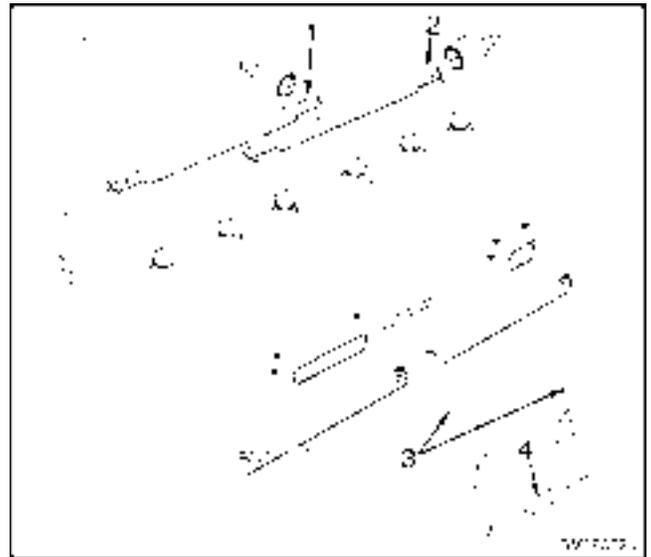
#### WARNING

**DO NOT short across the motor controller terminals with a screwdriver or jumper wire.**

**NOTE:** Some lift trucks are equipped with a premium controller, which controls the hydraulic motor as well as the traction motors.

1. Discharge the capacitor in the controller by connecting a 200-ohm, 2-watt resistor across the controller's BT+ and B- terminals for 10 seconds using insulated jumper wires. See Figure 5.
2. On the premium controller, also connect the 200-ohm, 2-watt resistor across the controller's P+ and B- terminals for 10 seconds using insulated jumper wires. See Figure 6.
3. Remove the 200-ohm, 2-watt resistor before reconnecting the battery.

**NOTE:** There are no user-serviceable parts in the ZAPI™ controller. No attempt should be made to open, repair, or otherwise modify the controller. Doing so may damage the controller and will void the warranty.



1. POSITIVE CONNECTION (BT+)
2. NEGATIVE CONNECTION (B-)
3. INSULATED JUMPER WIRES
4. 200-OHM, 2-WATT RESISTOR

*Figure 5. Discharging the Capacitors - Economy*



Figure 6. Discharging the Capacitors - Standard and Premium

### Legend for Figure 6

1. POSITIVE CONNECTION (BT+)
2. NEGATIVE CONNECTION (B-)
3. INSULATED JUMPER WIRES
4. 200-OHM, 2-WATT RESISTOR
5. POSITIVE CONNECTION (P+)

## AC Motor Controller Repair

### GENERAL

There are NO internal parts of the controller that can be repaired. The controller must be replaced if an internal malfunction occurs.

The motor controller, like other electronic devices, has temperature limits. These devices can be damaged if they get too hot. Normal maintenance will help prevent high-temperature conditions. Always make sure components are installed using silicon grease and that all heat sink surfaces are clean. Do not block cooling airflow.

### Special Precautions

#### WARNING

To avoid injury and prevent electrical shock, perform the following steps before troubleshooting, adjustments, or repairs:

Turn the key to the OFF position and disconnect the battery connector.

Discharge the capacitors in the controller.

#### WARNING

Some checks in this section must be done with the battery connected and power applied to the controller. When making these checks, make sure the drive wheels are raised from the floor.

Make sure you disconnect the battery and separate the connector before you remove any power cables from the power terminals of the motor controller. The capacitor stores electrical energy and can cause injury if a person discharges a capacitor through parts of the body. AFTER the battery is disconnected and the key is in the OFF position, make sure you discharge the capacitors.

#### CAUTION

To help prevent controller damage:

**ALWAYS** disconnect the battery when servicing the controller.

**ALWAYS** discharge the capacitors before performing any service.

**NEVER** connect power to the motor controller when any power cable is disconnected.

**NEVER** make a short circuit at any motor controller terminal to battery (+), battery (-), or the frame.

Check with the dealer for your lift truck before operating in an area with normal temperatures over 40°C (104°F). The lift truck motor controller may not operate at full power under these conditions.

**CAUTION**

**Never add any electrical component to the lift truck without approval from your Yale dealer. Added electrical components can prevent operation and/or damage the motor controller.**

**Never use steam to clean electronic components.** In dusty areas, blow low pressure air over the controller to remove dust. In oily or greasy areas, a mild solution of detergent or denatured alcohol can be used to wash off the controller. Then use low pressure air to completely dry the controller.

**CAUTION**

**Do NOT operate the traction system at high speeds or rapidly change the direction of operation with the wheels raised. Motor controller damage can occur.**

Do not subject the controller to any high voltage (hipot or megger) testing.

Use a lead acid battery with the voltage and ampere hour rating specified for the lift truck. Follow normal battery maintenance procedures, recharging before 80 percent discharged, with periodic equalizing charges.

**THERMAL SENSORS**

The thermal sensors for the motors are embedded in the motor end head and are continuously monitored by the motor controller. They are part of the motor and cannot be repaired.

**MOTOR CONTROLLER, REPLACE**

Make sure the battery is disconnected and the capacitors are discharged. Replace the motor controller as described in the following procedure.

1. Tag and disconnect all wire harness connections and power wires from the controller.
2. Remove the mounting screws holding the controller to the rear compartment cover. Carefully remove the controller from the truck.

**CAUTION**

**Do not remove the screws that secure the cover of the controller.**

3. Ensure there is no dirt between the base of the controller and the mounting surface on the rear compartment cover.
4. Put an even coat of thermal grease on the base plate of the controller. Ensure there are no air spaces between the plate and the mounting surface of the rear compartment cover. The base plate of the controller must make full contact with the mounting surface.
5. Install the screws that fasten the controller to the rear compartment cover.
6. Reconnect all power wires and wire harness connections to the controller.
7. Calibrate steering and throttle inputs. See Calibration Parameters in this section.

**Controller Checks and Adjustments**

All checks and adjustments to the controller can be done with a PC or through the dash display on the instrument panel. A PC can be connected to the CANbus via a connector on the main wiring harness near the bottom (backside) of the display panel.

The following checks and adjustments may be made using a PC or the dash display:

- Check the system status codes in history.
- Check the state of charge of the battery.
- Check the hourmeter readings on the traction circuit and hydraulic pump controllers.
- Monitor or adjust the register values for each function as shown in Function Parameters in this section.

## Function Parameters

### GENERAL

Memory elements within the controller are called **registers**. These registers can have electronic data stored in them to control an operation. The data stored in a register is called a **parameter**. A parameter is a measurement number that defines a lift truck function. A specific function parameter works with other function parameters to control the operation of the lift truck.

 **WARNING**

The parameter for each function has a value range so the motor controller can be used on different models of lift trucks. This variation is needed for lift trucks of different sizes and operating voltages. Adjustment of a function to the wrong number value for your lift truck model can cause the truck to operate differently than normal. This different operation of the truck can cause an injury.

**NOTE:** Table 1, Table 2, and Table 3 show the default parameter setting for each control function that is adjustable by the user. The factory-set default parameters are the recommended settings for new units. These settings will give satisfactory performance for most applications.

Some functions can be adjusted within the permitted range to change the lift truck operation for a specific application. Adjustment of a register to a number that is different than the factory settings is allowed, but follow the instructions carefully. Adjustments other than the factory settings will cause the lift truck to operate differently and can cause increased wear of parts.

**Table 1. Traction Parameters**

Control Settings		
Traction	Factory Defaults	
	36V	48V
Battery Voltage	36	48
Extended Shift	ON	ON
Acceleration	5	5
Top Speed Max FWD	128 Hz	140 Hz
Top Speed Max REV	128 Hz	140 Hz
Regen Braking	7	7
Auto Deceleration	6	6

**Table 1. Traction Parameters (Continued)**

Control Settings		
Traction	Factory Defaults	
	36V	48V
BDI Adjustment	35	35
Lift Interrupt	1	1
Service Reminder	0	0
Custom	0	0

**Table 2. Transistor Lift With Manual Valve Parameters**

Control Settings		
Transistor Lift With Manual Valve	Factory Defaults	
	36V	48V
Pump Acceleration	1	1
Max Lift Speed	100	100
Low Lift Speed	40	30
Tilt Speed	58	40
3rd Function Speed	33	25
4th Function Speed	85	85

**Table 3. Transistor Lift With Electro-Hydraulic Valve Parameters**

Control Settings		
Transistor Lift With Electro-Hydraulic Valve	Factory Defaults	
	36V	48V
Pump Acceleration	1	1
Max Lift Speed	100	100
Max Lowering Speed	75	75
Tilt Speed	33	25
3rd Function Max Speed	33	25
4th Function Max Speed	85	85
3rd Function	0	0
4th Function	3	3
Tilt/Auxiliary Pump Acceleration	4	4

## Function Parameter Descriptions

### PARAMETERS



#### WARNING

If any of the parameter values are changed, the operators must be told that the lift truck will operate differently.



#### WARNING

NEVER adjust any of the following parameters without using the procedures and settings given in this section.

The following section contains descriptions for the different parameters. Access these parameters through the **SETUP** menu in the dash display or with the PC software.

### Top Speed Forward

(Range 10-140 Hz)

This parameter setting determines the top speed of the truck in the forward direction.

To **increase** the top speed above the factory setting, the **extended shift** parameter will need to be **disabled**.

To **reduce** the top speed below the factory setting, the **extended shift** parameter may be **enabled** or **disabled**.

For speed limits slower than the normal truck speed, the top speed is the same regardless of the load on the forks. Acceleration rates are also unaffected by lowering the top speed.

### Top Speed Reverse

(Range 10-140 Hz)

This parameter setting determines the top speed of the truck in the reverse direction.

To **increase** the top speed above the factory setting, the **extended shift** parameter will need to be **disabled**.

To **reduce** the top speed below the factory setting, the **extended shift** parameter may be **enabled** or **disabled**.

For speed limits slower than the normal truck speed, the top speed is the same regardless of the load on the forks. Acceleration rates are also unaffected by lowering the top speed.

### Acceleration

(Range 0-9)

This parameter setting determines the truck acceleration rate. The truck will accelerate at this rate regardless of the load on the forks, provided that the motor and control can deliver the required power.

To **increase** the acceleration rate above the factory setting, the **extended shift** parameter will need to be **disabled**.

To **reduce** the acceleration rate below the factory setting, the **extended shift** parameter may be **enabled** or **disabled**.

Any **increase** in performance will decrease the battery shift life.

### Regen Braking

(Range 0-9)

This parameter setting determines the maximum deceleration rate when the accelerator pedal is fully depressed during regen braking.

**NOTE:** The deceleration rate is less when the pedal is not fully depressed.

### Auto Deceleration

(Range 0-9)

This parameter setting determines the maximum deceleration rate when the accelerator pedal is released. The strength of auto deceleration is a percentage of the regen braking strength.

A setting of **zero** will turn off auto deceleration completely and a setting of **nine** will give auto deceleration the same strength as regen braking.

### Extended Shift

(0 or 1)

(0 = Disable; 1 = Enable)

This parameter setting **enables** or **disables** a preset motor performance program in the traction motor controller.

When **enabled**, this function provides a balance between truck performance and battery shift life that will

meet the requirements of most applications. Truck acceleration and top speed will vary with the amount of load on the forks.

When **disabled**, truck acceleration and top speed are determined by values set in the acceleration and top speed parameters.

If the motor and controller can deliver the power, then the truck performance will not vary with the amount of load on the forks or the battery state of charge.

**Grade climbing speed will also improve because the motor controller will deliver maximum current. Any increase in performance will decrease the battery shift life.**

### Pump Acceleration

(Range 0-9)

This parameter setting determines the hydraulic pump motor acceleration rate. Increasing the setting will increase the speed of the motor.

### Tilt/Auxiliary Pump Acceleration

(Range 0-9)

This parameter setting determines the hydraulic pump motor acceleration rate when using the tilt or auxiliary functions with the electro-hydraulic valve option.

### Low Lift Speed

(Range 36V = 25-65%)

(Range 48V = 20-50%)

This parameter setting determines the hydraulic pump motor low speed. This is used with transistor lift and the manual control valve. Increasing the setting will increase the speed of the hydraulic pump motor.

### Maximum Lift Speed

(Range 0-100%)

This parameter setting determines the hydraulic pump motor high speed. High speed is used for maximum lift speed.

### Maximum Lowering Speed

(Range 0-100%)

This parameter setting determines the hydraulic pump motor speed during lowering. Increasing the setting will increase lowering speed.

### Tilt Speed

(Range 36V = 20-66%)

(Range 48V = 15-50%)

This parameter setting is used to set the hydraulic motor speed when the tilt function is selected. Increasing the setting will increase the speed of the hydraulic pump motor.

### 3rd Function

(Range 0, 1, or 2)

(0 = 3rd Function Without Interlock)

(1 = 3rd Function With Interlock)

(2 = 3rd Function With Push/Pull)

This parameter is used to select the operation of the 3rd function mini-lever or joystick roller switch. Use selection 0 when using the 3rd function to control a non-clamping type attachment. Use selection 1 when using the 3rd function to control a clamping type attachment. Use selection 2 when using the 3rd function to control a push/pull attachment.

### 3rd Function Speed

(Range 36V = 20-100%)

(Range 48V = 15-75%)

This parameter setting is used to set the hydraulic pump motor speed when the 3rd function hydraulic lever is actuated. Increasing the setting increases the speed of the hydraulic pump motor.

### 4th Function

(Range 0, 1, 2, or 3)

(0 = 4th Function Without Interlock)

(1 = 4th Function With Interlock)

(2 = 4th Function With Push/Pull)

(3 = Default - No 4th Function)

This parameter is used to select the operation of the 4th function mini-lever or joystick roller switch. Use selection 0 when using the 4th function to control a non-clamping type attachment. Use selection 1 when using the 4th function to control a clamping type attachment. Use selection 2 when using the 4th function to control a push/pull attachment.

### 4th Function Speed

(Range 36V = 0-100%)

(Range 48V = 0-100%)

This parameter setting is used to set the hydraulic pump motor speed when the 4th function hydraulic lever is actuated. Increasing the setting increases the speed of the hydraulic pump motor.

### Battery Voltage

(36V or 48V)

This parameter setting is used to inform the master controller what voltage battery is installed in the truck. The battery choices are 36V or 48V.

### Lift Interrupt

(0 or 1)

(0 = Disable; 1 = Enable)

This parameter setting **enables** or **disables** the lift interrupt feature. The lift interrupt feature stops lift operation when the battery discharge indicator (BDI) reads **empty** to protect the battery from excessive discharge and possible damage.

**NOTE:** Trucks are shipped from the factory with this feature **enabled**.

### BDI Adjustment (Early Models)

(Range - Single Digit 0-9)

This parameter setting allows for adjustment to improve the accuracy of the battery discharge indicator in the dash display. Increasing the setting will increase the battery voltage or specific gravity when the gage shows empty.

**A setting of 2 is the recommended starting point for flooded cell batteries. A setting of 7 is the recommended starting point for maintenance-free**

**batteries. Further adjustments may be used to fine tune the BDI accuracy.**

### BDI Adjustment (Later Models)

(Range - First Digit 1-5)

(Range - Second Digit 3-7)

This parameter setting allows for adjustment to improve the accuracy of the battery discharge indicator in the dash display.

This first digit adjusts the **charged** setting. Increasing the setting will increase the battery voltage or specific gravity required for the indicator to show full. If the indicator consistently reads low with fully charged batteries, decrease this setting.

The second digit adjusts the **discharged** setting. Increasing the setting will increase the battery voltage or specific gravity level required for the indicator to show empty. If the indicator consistently shows lift interrupt too soon, decrease this setting.

A setting of 35 is the recommended starting point for flooded batteries. A setting of 37 is the recommended starting point for maintenance-free batteries. Further adjustments may be used to fine-tune the BDI accuracy.

### BDI Decrement Time

This adjustment is used to compensate for duty cycles that involve nonstop operation where frequent pauses of more than 5 seconds do not occur (no drive, no hydraulic use). When the truck is finally stopped, turned **OFF**, and then restarted, some deviation in the BDI reading may occur. One of three things may happen to the BDI reading when the truck is restarted:

1. The BDI gage still reads within plus or minus one bar as it did when the truck was turned **OFF**. **No adjustment is needed.**
2. If the BDI gage changed downward more than one bar, this parameter should be **set to a lower number.**
3. If the BDI gage changed upward more than one bar, this parameter should be **set to a higher number.**

This adjustment has little or no effect on the BDI accuracy when the truck is used in intermittent duty cycles that have frequent pauses in truck activity for greater than 5 seconds each time.

## Service Reminder

### (Set Next Hourmeter)

This can be used by the service technician to show a **Status Code 99** when the truck is due for service.

To use this feature, set this function to the hourmeter reading at which the service is to occur. When that hourmeter is reached, the dash display will display Status Code 99 for 10 seconds each time the key is turned **ON**. After 20 hours of operation, the truck will slow to half speed and the code will display continuously until the service is performed. After servicing, adjust the service reminder parameter to the next desired service time.

## Custom

### (Range 0-100)

This parameter setting is not used except for special functions required for special applications. Normally it is set to zero.

## Restore Defaults

This function is used to restore all parameter settings to the factory default settings shown in Table 1, Table 2, and Table 3.

# Calibration Parameters

## THROTTLE CALIBRATION

Activating this parameter allows the controller to “learn” the voltage setting of the throttle assembly. The controller uses this information to control the lift truck speed. See the section **Electrical System** 2200 YRM 1078.

## STEERING CALIBRATION

Activating this parameter allows the controller to “learn” the voltage setting of the steering feedback system. The controller uses this information to control the traction motors during turning operations. See the section **Electrical System** 2200 YRM 1078.

# Display Panel

## GENERAL

There are two dash display options, Standard and Premium. Both displays look identical. See Figure 7.

### Premium Display Panel

- Allows preassigned user passwords to control driver access to the vehicle.
- Provides four driving modes that are accessed through the key pad.
- Allows preassigned service passwords to control access to the service functions available through the display.
- Provides a comprehensive set of service functions, which are accessed through the mode buttons and liquid crystal display (LCD).

- Allows access to the User Check List function.

### Standard Display Panel

- Allows preassigned service passwords to control access to the service functions available through the display.
- Provides the same comprehensive set of service functions using the mode buttons and LCD as the Premium Display.

Standard and Premium display panels are interchangeable on the vehicle. Therefore, the display system can be easily upgraded or downgraded by changing the display panel.

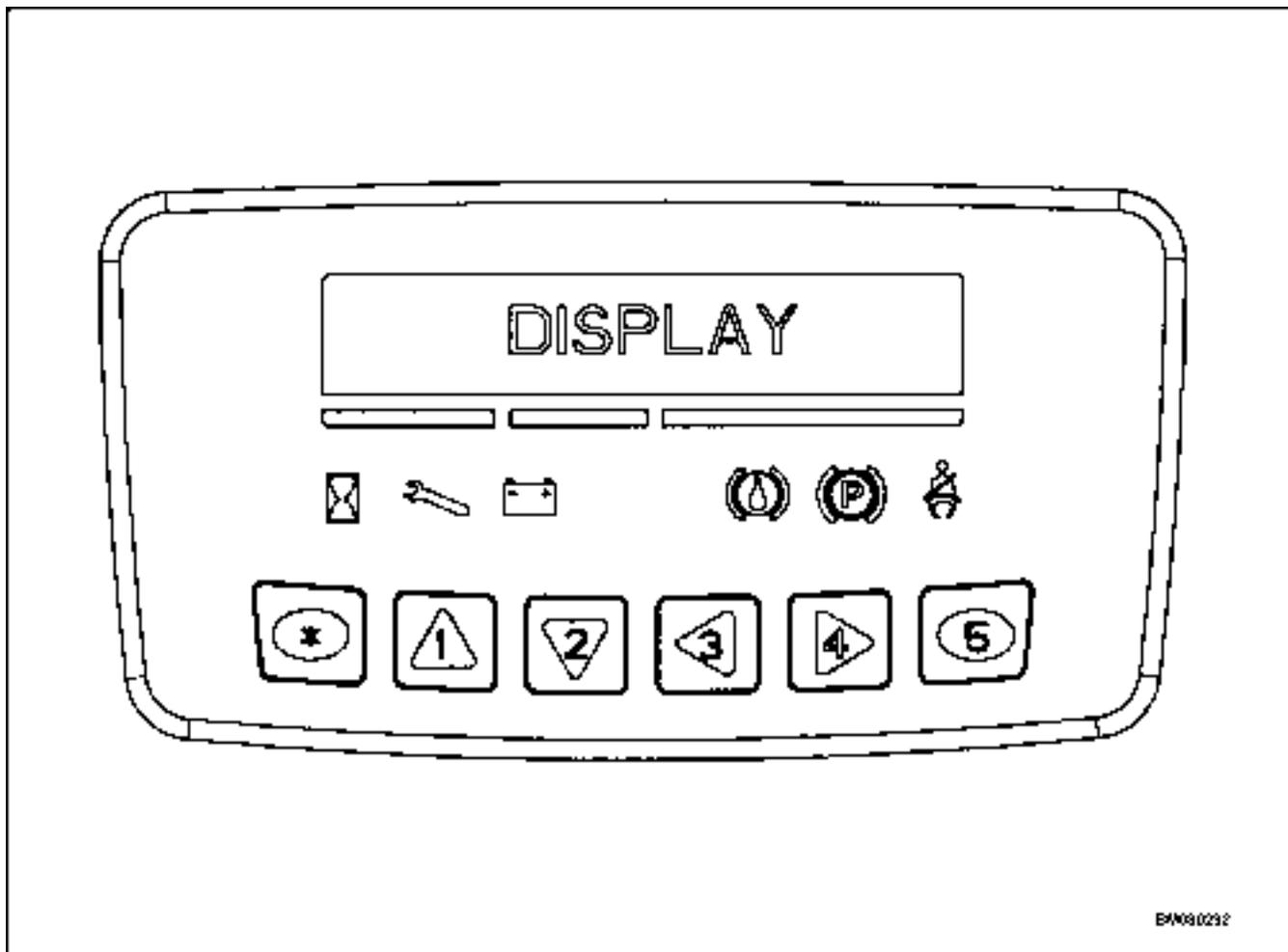


Figure 7. Standard and Premium Display Panel

## Display Functions and Features

### KEY-ON INITIALIZATION

Upon turning the key to the **ON** position, the display sequentially lights the indicators, from left to right, located along the top of the display. See Figure 8.

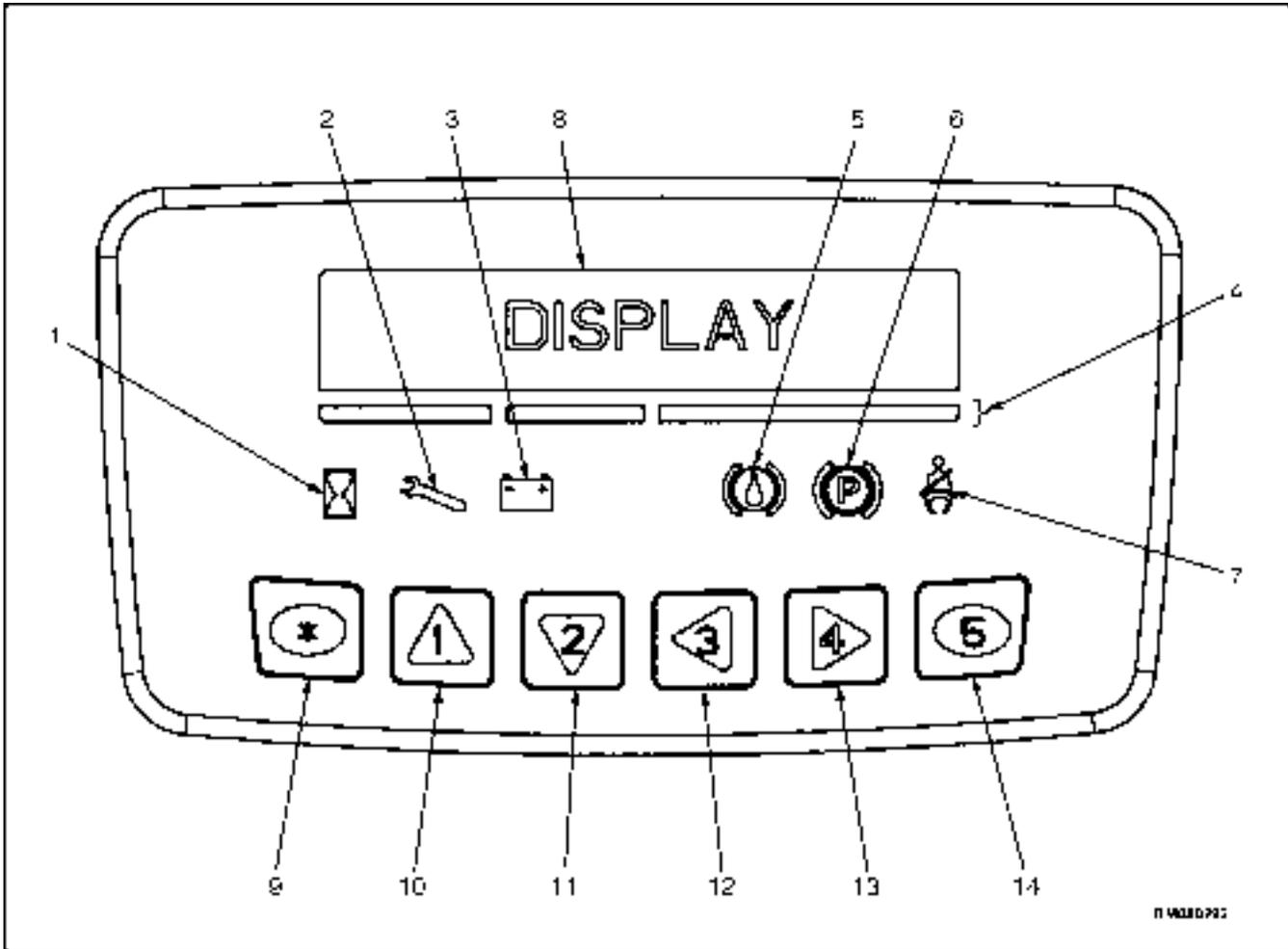
**NOTE:** The seat belt light will stay on whether the seat belt is fastened or not fastened.

The indicator lights turn off sequentially, except for the seat belt light, which will remain lighted for approximately 10 seconds.

### STANDARD DISPLAY

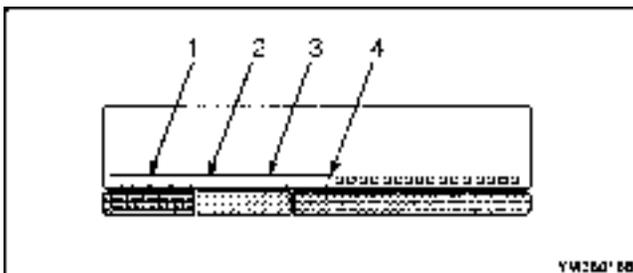
Following the sequence given above, and as the seat belt light becomes illuminated, the LCD displays the BDI as a bar. See Figure 9. As the battery is discharged, the bar becomes shorter.

When the key is turned to the **OFF** position, the Hour-glass indicator becomes illuminated, and the following hourmeter information is flashed on the LCD screen: Traction Hours for 3-4 seconds, followed by Pump Hours for 3-4 seconds, after which the display turns off and appears black. See Figure 10.



- |                                      |                     |
|--------------------------------------|---------------------|
| 1. HOURMETER INDICATOR               | 8. LCD SCREEN       |
| 2. WRENCH INDICATOR                  | 9. STAR PUSH BUTTON |
| 3. BATTERY INDICATOR                 | 10. PUSH BUTTON #1  |
| 4. BATTERY DISCHARGE INDICATOR (BDI) | 11. PUSH BUTTON #2  |
| 5. BRAKE FLUID LEVEL                 | 12. PUSH BUTTON #3  |
| 6. PARKING BRAKE                     | 13. PUSH BUTTON #4  |
| 7. FASTEN SEAT BELT                  | 14. PUSH BUTTON #5  |

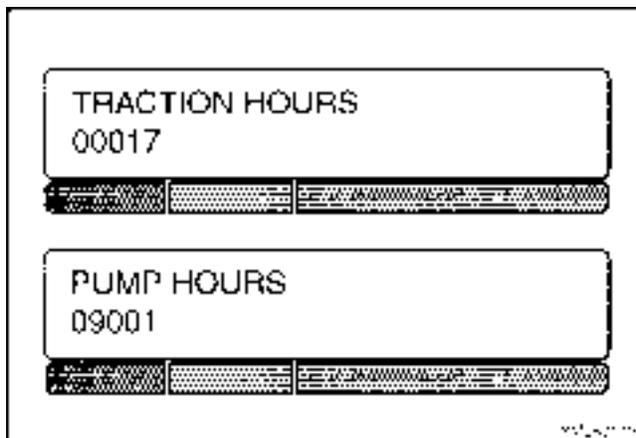
**Figure 8. Dash Display**



**Legend for Figure 9**

1. 4 SEGMENTS ADJACENT TO RED
2. 4 SEGMENTS ADJACENT TO ORANGE
3. 12 SEGMENTS ADJACENT TO GREEN
4. BDI SHOWS APPROXIMATELY 65-70% CHARGE

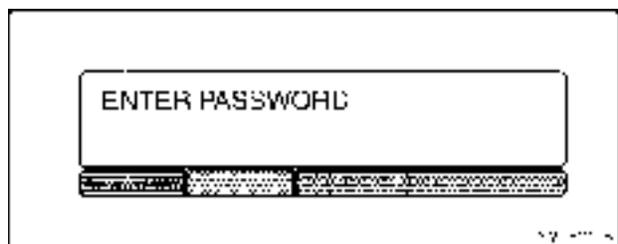
**Figure 9. Battery Discharge Indicator**



**Figure 10. Traction/Pump Hours**

### PREMIUM DISPLAY

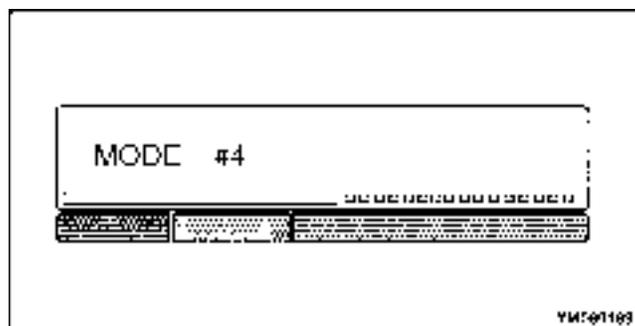
Following the sequence given above, and as the seat belt light becomes illuminated, the LCD displays the prompt for the operator to enter a password if this function has been enabled. See Figure 11. If the password function is disabled, the display will bypass the password prompt. To enable the password function, see **Troubleshooting and Adjustments Using the AC Controls Program** 2200 YRM 1058, Enable/Disable Password and Lift Truck Inspection Functions.



**Figure 11. Password Prompt Screen**

Until a password is entered that agrees with a password stored in the dash display, the lift and traction systems are inoperative. Passwords may be entered directly into the dash display or by using the PC software program.

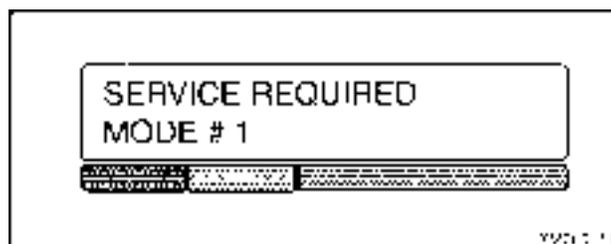
A few seconds after the correct password has been entered, the BDI and performance mode are displayed and the vehicle can be operated. See Figure 12.



**Figure 12. Display Screen (Premium Display)**

### LIFT TRUCK INSPECTION FUNCTION

If this function is turned on, the operator is prompted to answer a checklist of questions. The operator indicates a 1 for pass or a 4 for fail. If the operator indicates the vehicle passes the inspection, the display will show the previous information and the operator can drive the vehicle. If the operator indicates that the vehicle fails the inspection, Service Required will appear on the display screen, and the vehicle will only operate in Mode 1 until the required action is taken. See Figure 13.



**Figure 13. Inspection Failure Screen**

The inspection feature can be enabled with or without the password function enabled, depending upon the user's preference. The inspection checklist feature, as with the password feature, may be set up using either the dash display or using a PC. The checklist must be enabled or disabled by a service technician.

The following is the list of checks:

- Check for leaks.
- Check service brake.
- Check park brake.
- Check horn, lights, and reverse alarm.
- Check gauges and warning lights.
- Check tire condition and pressure.
- Check hydraulic oil level.

## ACCESS TO SERVICE FUNCTIONS

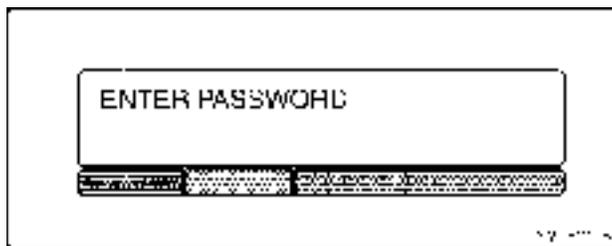
All service functions are accessible from either Standard or Premium displays. The following functions are the same with either display version, except as noted in the following sections.

Once the vehicle is turned **ON** with the key switch and the initialization process has been completed, a service technician can gain access to the service functions by pressing the star button (\*) twice within 3 seconds.

**NOTE:** It is suggested that the factory set password, 55555, be changed prior to the lift truck being placed into service.

The display will prompt the service technician for a five-digit password. See Figure 14. The default setting for the password is 55555. When a correct password is entered, the Service Features menu is displayed as follows:

- Hourmeters
- Software Versions
- Password
- Diagnostics
- Setup



**Figure 14. Password Request**

If no password is entered, the screen will automatically return to the start up screen after 20 seconds. The screen will also revert to the start up screen if an incorrect password is entered.

The technician can scroll through the menu using the up [1] or down [2] arrows and select the desired function by pressing the [4] button. Each menu selection has a list of submenu functions. The submenus are viewed and items selected by scrolling through the menu in the same manner as described above.

To exit a selected function and return to the previous function, press the [3] button. Pressing the [3] button multiple times will return the technician to the operator's driving mode.

## SERVICE FUNCTIONS

The following submenu functions are accessible from the main menu of service functions, described above. This includes the following vehicle setup values and control function settings. The control function settings are discussed further in Function Parameter Descriptions.

- View Hourmeter
  - Secure Hourmeter
  - Set Pump Hours
  - Set Traction Hours
- Software Version
  - Master
  - Slave
  - Display
  - Valve Driver (Electro-Hydraulic only)
- Password
  - Add Password
  - Delete Password
  - Edit Password
  - Operator Password
  - Truck Inspection

**NOTE:** All indications in the diagnostic menu are shown as **ON**, **OFF**, (or a value i.e. volts, amps). **ON** is indicated by a one. **OFF** is indicated by a zero.

- Diagnostic
  - Error Log
  - Run Diagnostics
    - Left Trac Mtr Speed
    - Left Trac Mtr Crnt
    - Left Trac Mtr Temp
    - Right Trac Mtr Speed
    - Right Trac Mtr Crnt
    - Right Trac Mtr Temp
    - Steer Position
  - Lift Transistor Control
    - Pump Motor Voltage
    - Pump Motor Current
  - No Run Diagnostics
    - Hood Switch
    - Seat Belt Switch
    - Seat Switch
    - Forward Switch
    - Reverse Switch
    - Accelerator Start
    - Brake Switch
    - Brake Fluid Level
    - Hydraulic Oil Level
    - Pump Motor Brushes
    - Pump Motor Temp
    - Throttle Pot Volt

- Steering Enable
- Manual with Transistor Control
  - Lo Lift Switch
  - Lift Switch
  - Tilt Switch
  - 3rd Function Switch
  - 4th Function Switch
- Electro-Hydraulic
  - Arm Rest Switch
  - Lift Speed
  - Lower Speed
  - Tilt Forward Speed
  - Tilt Back Speed
  - 3rd Func In Speed
  - 3rd Func Out Speed
  - 4th Func In Speed
  - 4th Func Out Speed
- Manual
  - Hydraulic Switch
- Setup
  - Traction Settings
    - Throttle Calibration
    - Max Steer Right
    - Max Steer Left
    - Max Steer 0
    - Top Speed Forward
    - Top Speed Reverse
    - Acceleration
    - Regen Braking
    - Auto Deceleration
    - Extended Shift
  - Hydraulic Settings
    - Manual with Transistor Controller
      - Lift Pump Accel
      - Tilt/Aux Pump Accel
      - Lo Lift Speed
      - Max Lift Speed
      - Tilt Speed
      - 3rd Function Speed
      - 4th Function Speed
    - Electro-Hydraulic
      - 4th Function Installed
      - Lift Pump Accel
      - Tilt/Aux Pump Accel
      - Max Lift Speed
      - Lowering Max Speed
      - Tilt Max Speed
      - 3rd Function Max Speed
      - 4th Function Max Speed
      - 3rd Function
      - 4th Function
  - Manual
    - No Parameters Will Display

- Truck Settings
  - Serial Number
  - Battery Voltage
  - Lift Interrupt
  - Restore Defaults
  - BDI Adjustment
  - BDI Decrement Time
  - Service Reminder
  - Custom
  - Language

## PERFORMANCE MODES

**NOTE:** Performance modes are not available on the Standard Dash display, and the factory configuration is equivalent to Mode 4.

When equipped with the Premium Dash display, the following four operator-selectable performance modes are available. These modes are preconfigured from the factory as described below. Mode 4 provides the highest performance and Modes 1-3 are percentages of Mode 4. A service technician, using the dash display or connecting with the PC software, can revise the control settings and configure the top speed and acceleration of the vehicle. The relationship between Modes 1-4 remains constant and cannot be altered.

With the premium display, the operator can change modes by pressing the numbered keys on the dash display. Any number can be selected at any time to change the performance mode. If the mode change is requested while the traction system is in operation, the requested change will not take effect until the accelerator pedal has been released to the neutral position. During this operation, the display will indicate **Mode X Requested** until the accelerator is released. If the password is enabled, the operator will be limited by the performance level set in the password function.

Mode 4 is the highest level of performance available to the operator, regardless of the performance setup in the control. For instance, if the control is configured to limit top speed less than maximum, then Mode 4 top speed is equal to the top speed set in the control. Three lower performance modes are available to the operator by using the buttons on the display. These lower performance settings are percentages of the highest performance available in Mode 4 as described below:

- Mode 4 - This is the highest performance mode. Other modes are a lower percentage of Mode 4.
- Mode 3 - Top speed is the same as Mode 4. Acceleration is 80 percent of Mode 4.

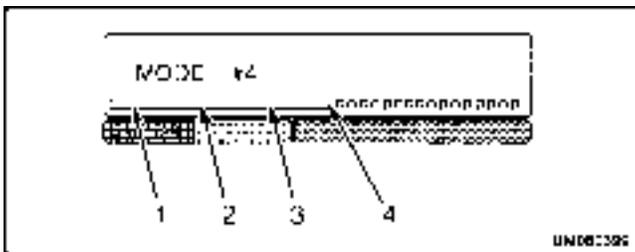
- Mode 2 - Top speed is 80 percent of Mode 4. Acceleration is 70 percent of Mode 4.
- Mode 1 - Top speed is 60 percent of Mode 4. Acceleration is 60 percent of Mode 4.

### BATTERY DISCHARGE INDICATION (BDI)

The AC control system includes a Battery Discharge Indicator (BDI) that provides indication of the battery state of charge. See Figure 15. The BDI feature is displayed to the operator on the dash display with a 20-segment bar that looks and functions the same as the current BDI. Lift truck operators will not need to learn a new BDI system.

The BDI provides full functionality when used with a full range of batteries including:

- Flooded cell, standard amp-hour batteries
- Flooded cell, high amp-hour capacity batteries
- Valve regulated (absorbed glass mat) maintenance-free batteries (VRLA)



1. 4 SEGMENTS ADJACENT TO RED
2. 4 SEGMENTS ADJACENT TO ORANGE
3. 12 SEGMENTS ADJACENT TO GREEN
4. BDI SHOWS APPROXIMATELY 65-70% CHARGE

**Figure 15. Battery Discharge Indication in Dash Display LCD Window**

The lift interrupt feature is controlled by the vehicle master controller and prevents the lift function when the battery is 80 percent discharged. Although lift interrupt prevents lifting, low speed functions, such as tilt, remain operational to allow the operator to more easily remove the forks from the load and return to the battery charging area.

When lift interrupt is initiated, it will remain in effect until the battery is disconnected and a recharged battery is reconnected to the lift truck. In order to reset the BDI function and allow lift truck operation, the recharged battery must have a state of charge that is 20 percent above the open cell voltage BDI setting.

Two BDI adjustment features are provided via the control setup function, which is accessible via the dash display (service password required) or with the PC service software.

### HOURLMETER

There are three different hourmeter functions.

1. Pump hours - accumulates time only when the pump motor is operating.
2. Traction hours - accumulates time when the seat switch is closed and the key switch is in the **ON** position.
3. Secure hours - based on traction hours. The secure hours cannot be manually reset. However, secure hours will be automatically reset to zero if both the controller and the dash display are replaced at the same time.

The hourmeter data is stored in the master controller during every 6 minutes of operation. If there is a loss of power, data is not lost.

### STATUS CODE LIST

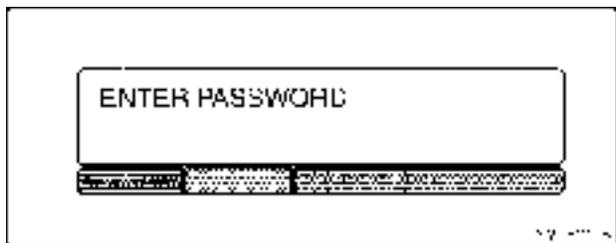
The status code list is a stored history of selected status codes for malfunctions or incorrect truck use that have occurred since the list was last cleared of entries by a technician. These selected status codes are **NOT** a list of malfunctions or symptoms that are currently present, but a list of those that have occurred in the past. The list can only be read with the key in the **OFF** position.

To access the status code list, wait until after the traction and pump hours have been displayed, then push the **STAR** button. All of the status codes in the list will then be shown in sequence. After the last status code, **END FAULT CODE HISTORY** will be shown.

## Dash Display Service Menu Navigation

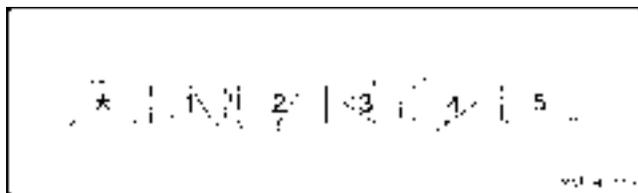
### GENERAL

To enter the service mode, turn the key to the **ON** position and press the (\*) button twice. Enter Password prompt will appear on the display. See Figure 16. All lift trucks will have 55555 as the default service password at the time of delivery. This password can be changed by a service technician. Go to Editing and Adding Information.



**Figure 16. Password Prompt**

Buttons [1], [2], [3], [4], and [\*] are used for menu navigation and for adding or editing information. Button [5] is only used if it is part of the password required to enter the service mode. The display has arrows on the buttons to aid in the navigation process. See Figure 17.



**Figure 17. Dash Display Buttons**

The following list is the numbers on the dash display and their function:

1. Is up, for scrolling up
2. Is down, for scrolling down
3. Is left, for scrolling left or out of the current menu
4. Is right, for scrolling right or deeper into the next menu level

### MOVING THROUGH MENU SELECTIONS

1. When the service technician's password is correctly entered, the first menu item, which is the hourmeter, is displayed on the dash display LCD screen. To view the next menu item, press the [2] key on the dash display numeric key pad. Repeat this until the

desired menu item has been reached. To return to a previous menu item, press the [1] key. When the last menu item is reached and the [2] key is pressed again, the first menu item will return to the display.

2. To move into a submenu of a main menu item, press the [4] key on the dash display numeric key pad. To move into a sub submenu, as with the Diagnostics Menu, press the [4] key again.
3. To move up or down within the submenu or the sub submenu, press the [1] or [2] keys.
4. To move out of the sub submenu and return to the submenu, press the [3] key.
5. To move out of the submenu and return to the main menu, press the [3] key.
6. To exit the service mode, press the [3] key.

### EDITING AND ADDING INFORMATION

**NOTE:** The setup and password menus can be used to edit or add information to the truck software. When an item in these menus is selected, the current value will be displayed. The characters available to be selected from the display are 0-9, A-Z, blank, and dash. Each line in the display can have no more than 20 characters including blanks.

1. If a change is to be made, press the [4] key and the cursor will blink on one of the characters. Keys [3] and [4] are used to move from character to character in the item being changed.
2. When a character that is to be changed is blinking, use keys [1] and [2] to scroll up or down until the desired character is found. Use keys [3] or [4] to move to the next character to be changed. This is repeated until all changes in the item have been made.
3. When all changes have been made, press the [\*] key to store the value. Press the [1] or [2] key to access the next item to be changed. Repeat this procedure for each item that is to be changed.
4. When all changes have been made, press the [3] key to exit the menu.

## ETACC Test

If you have access to the ETACC software, the following tests may be conducted.

### MANUAL HYDRAULICS:

Connect dongle between the truck and your pc. Turn on the truck, select the proper truck configuration, and click the connect button. Ensure the "connected" icon is showing.

- If the red LED on the IFAK dongle is flashing, disconnect the dash display connector.
  - If the LED stops flashing, the dash display may be defective.
  - If the LED continues to flash, go to the next step.
- Reconnect the dash display connector and disconnect connector A from the traction controller.
  - If the LED stops flashing, the traction controller may be defective.
  - If the LED continues to flash, the wiring harness may be defective.

### ELECTRO-HYDRAULICS:

Connect dongle between the truck and your pc. Turn on the truck, select the proper truck configuration, and click the connect button. Ensure the "connected" icon is showing.

- If the red LED on the IFAK dongle is flashing, disconnect the 6 pin connector and the joystick.
  - If LED stops flashing, the ILM controller may be defective.
  - If LED continues to flash, go to next step.
- Disconnect the dash display connector and connector B at the traction controller.
  - If LED stops flashing, the traction controller may be defective.
  - If LED continues to flash, go to next step.
- Reconnect the dash display and connector B.
  - If LED stops flashing, the controller may be defective.
  - If LED continues to flash, the wiring harness may be defective.

## Troubleshooting

### GENERAL

The AC motor and master controllers are sealed units with no serviceable components. Troubleshooting is usually limited to accessing status codes and following the diagnostic procedures listed in the Status Code Charts.

Use standard testing procedures to verify inputs and outputs when necessary.



### CAUTION

**Never attempt to probe through the back of the connector plugs of the motor controller. These plugs are special sealed plugs. Probing through the back of the plugs will destroy the seal and can cause a short circuit. If a circuit must be tested for voltage, check for voltage at an amp-type plug, a switch, or a component. If a circuit is suspect, check the circuit for continuity by disconnecting the P plug and testing continuity from the front (pin end) of the plug.**

**Standard probes are too large to be inserted into the center of the female pins (sockets) of the special sealed plugs and can expand the pins. Expanded pins will not provide good connections once the plug is reconnected. The connectors are shaped to**

**allow the insertion of a small flat blade screwdriver into the connector. After inserting the screwdriver into the connector attach probes with alligator clips to the shank of the screwdriver to obtain readings. An additional method would be to use a breakout kit Yale P/N 580002086.**

See **Diagrams** 8000 YRM 1081 for additional wiring details.

If the lift truck does not operate correctly, a status code is displayed on the display panel.

Once the status code number is obtained, follow the procedures outlined in the Status Code Charts of this manual to determine the problem.

**NOTE:** Due to the interaction of the master controller with all lift truck functions, almost any status code or controller fault could be caused by an internal failure of the master controller. After all other status code procedures have been followed and no problem is found, the master controller should be replaced as the last option to correct the problem.

Tools and test equipment required are: clip leads, volt ohmmeter (20,000 ohms per volt), and basic hand tools.

Check resistance on RX1000 scale from frame to power and controller terminals. Resistance of less than 20,000 ohms can cause misleading symptoms. Resistance of less than 1000 ohms should be corrected first.

Before proceeding, visually check for loose wiring, misaligned linkage to the accelerator switch, signs of overheating of components, etc.

## STATUS CODES

**NOTE:** Make sure the parameter values are correct for your lift truck to ensure the trouble is not just an incorrect setting. See Function Parameters to set the correct parameter values. If there is no status code display and the lift truck does not operate correctly, there can be a fault in the master controller.

The status codes are code numbers for malfunctions or lift truck operations that are not correct and that the motor controller can sense. The master controller will

indicate this code number on the LCD screen of the display panel.

The master and motor controllers sense the following types of malfunctions:

- Input voltages that are too high or too low
- Input voltages in the wrong sequence or
- Correct input voltages that occur at the wrong time

**NOTE:** A status code indication does not always mean that there is a malfunction. A temporary operating condition can cause a status code display.

These code numbers are only codes to help identify a possible malfunction. A short description of the different status codes is shown in Table 4.

The Status Code Charts in this section have a more complete description of the status code, the circuit that has generated the input for the status code, the symptom, and the possible causes.

**Table 4. List of Status Codes**

Status Code	Description
01	Request traction or hydraulic function while seat switch open.
02	Forward switches closed at key on.
03	Reverse switches closed at key on.
05	Start switch not closed when seat switch is closed and either the forward or reverse directional switch is closed and accelerator voltage shows demand for traction.
06	Request traction function while forward and reverse switches are opened.
07	Accelerator input voltage too high on power up.
08	Accelerator input voltage too low on power up.
09	Forward and reverse direction requested together.
11	Start switch closed before key or seat switch.
12	Steer sensor feedback voltage too low.
13	Steer sensor feedback voltage too high.
14	After steer calibration, controller senses "max right" parameter to be less than "max left" parameter.
15	Battery voltage lower than the setting in controller.
16	Battery voltage higher than the setting in controller.
41	High temperature in master or slave or both power sections, performance is progressively reduced as temperature rises.
42	Pump control temperature too high.
43L	Left traction motor temperature out of range.

**Table 4. List of Status Codes (Continued)**

Status Code	Description
43R	Right traction motor temperature out of range.
51	Capacitor voltage too low.
52L	Failure in encoder, in encoder to controller connection, or in controller input circuit, left motor.
52R	Failure in encoder, in encoder to controller connection, or in controller input circuit, right motor.
62	Backup alarm driver shorted. Overcurrent protection activated.
65	Main line contactor coil driver shorted.
66L	Left traction motor shorted.
66R	Right traction motor shorted.
90L	Left traction motor high temperature.
90R	Right traction motor high temperature.
91	Pump motor high temperature.
95	Pump motor brushes worn.
99	Maintenance required.
142	Controller senses no pump current.
143	Controller senses low pump current.
145	Power transistor did not turn on properly.
201	Request hydraulic or traction function while arm rest switch not closed.
202	Hydraulic oil low.
203	Brake fluid low.
204	Request traction or hydraulic function while hood switch/switches not closed.
207	Lift cutout.
208	Pump incorrect start.
209L	Brake coil open, disabling traction.
209R	Brake coil open, disabling traction.
210	Internal "watchdog" hardware circuit triggered.
212L	Problem with UVW voltage feedback in slave controller.
212R	Problem with UVW voltage feedback in master controller.
213	The controller has detected an overvoltage or an undervoltage condition within the controller.
214L	Wrong voltage on one phase --> failure in power section (high leg), driver circuit, or motor in slave controller.
214R	Wrong voltage on one phase --> failure in power section (high leg), driver circuit, or motor in master controller.
215L	Wrong voltage on one phase --> failure in power section (low leg), driver circuit, or motor in slave controller.

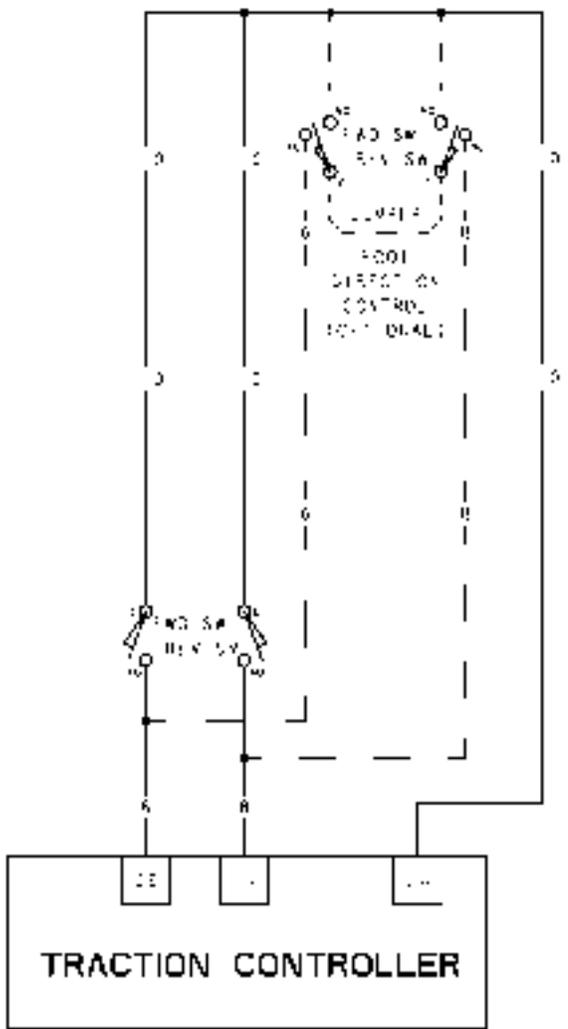
**Table 4. List of Status Codes (Continued)**

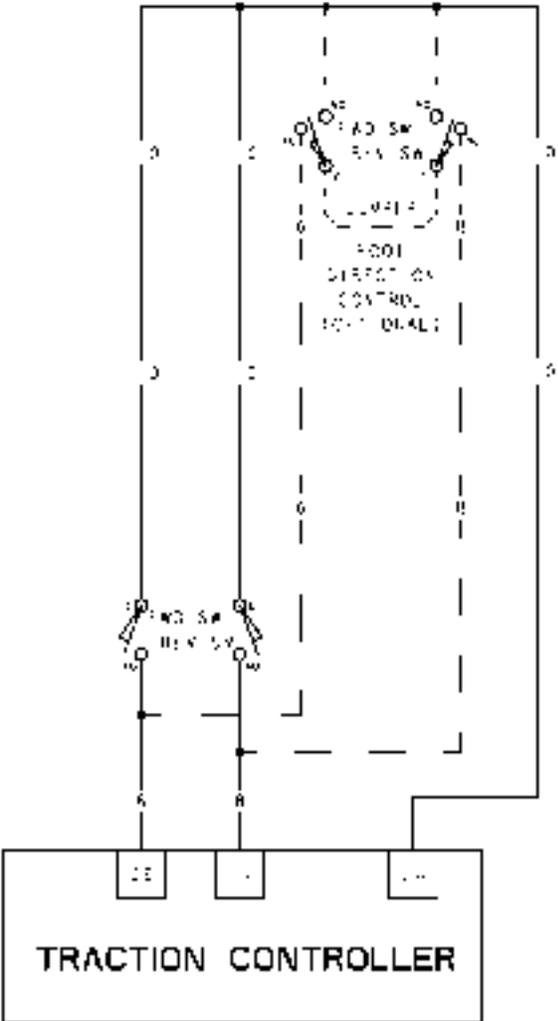
<b>Status Code</b>	<b>Description</b>
<b>215R</b>	Wrong voltage on one phase --> failure in power section (low leg), driver circuit, or motor in master controller.
<b>222</b>	Controller checks to ensure main contactor coil or brake coil is not shorted at start up.
<b>223</b>	Controller checks main contactor tips and ensures they are open before powering controller.
<b>224</b>	Main contactor not closed.
<b>226</b>	Electric brake driver damaged (shorted or open).
<b>227</b>	Traction controller receives a signal for traction from accelerator potentiometer without start switch being closed.
<b>238</b>	Internal failure of traction controller hardware.
<b>239</b>	Master controller detected problem in slave controller functionality.
<b>240</b>	Slave controller detected problem in the master controller functionality.
<b>241</b>	Master does not see CAN messages from slave.
<b>242</b>	Master does not see CAN messages from electro-hydraulic lever console.
<b>243</b>	Slave does not see CAN messages from valve driver module.
<b>244</b>	Failure of dash display memory.
<b>245</b>	Master does not see CAN messages from display.
<b>246</b>	Slave does not see CAN messages from display.
<b>247</b>	Valve driver does not see CAN messages from display.
<b>248</b>	Slave does not see CAN messages from master.
<b>249</b>	No communication from slave to EV.
<b>250L</b>	Left rotor locked.
<b>250R</b>	Right rotor locked.
<b>260</b>	Incorrect voltage on pump motor --> failure in power section, driver section, or motor itself.
<b>270</b>	Error in lift/lower lever.
<b>271</b>	Error in tilt lever.
<b>272</b>	Error in 3rd function lever.
<b>273</b>	Error in 4th function lever.
<b>275</b>	Internal failure of valve driver module.
<b>276</b>	One of the EV drivers of group 1 (lift/lower) is shorted.
<b>277</b>	One of the EV drivers of group 2 (auxiliary in/out) is shorted.
<b>279</b>	One of the EV drivers of group 3 (tilt up/down) is shorted.
<b>280</b>	One of the EV drivers of group 4 (sideshift R/L) is shorted.
<b>281</b>	Driver of single EV (9th) is shorted.

Table 4. List of Status Codes (Continued)

Status Code	Description
282	One of the on/off EV drivers is shorted.
283	One of the on/off EV coils is shorted; short-circuit protection is triggered.
289	Voltage supply to the valve driver control module is low.
292	IBattery selection is wrong in valve controller.
294	Interlocked hydraulic function requested without activation of interlock switch.
295	Hi-Lift switch is closed and the Lo-Lift switch is open.
299	CAN wires configuration problem.

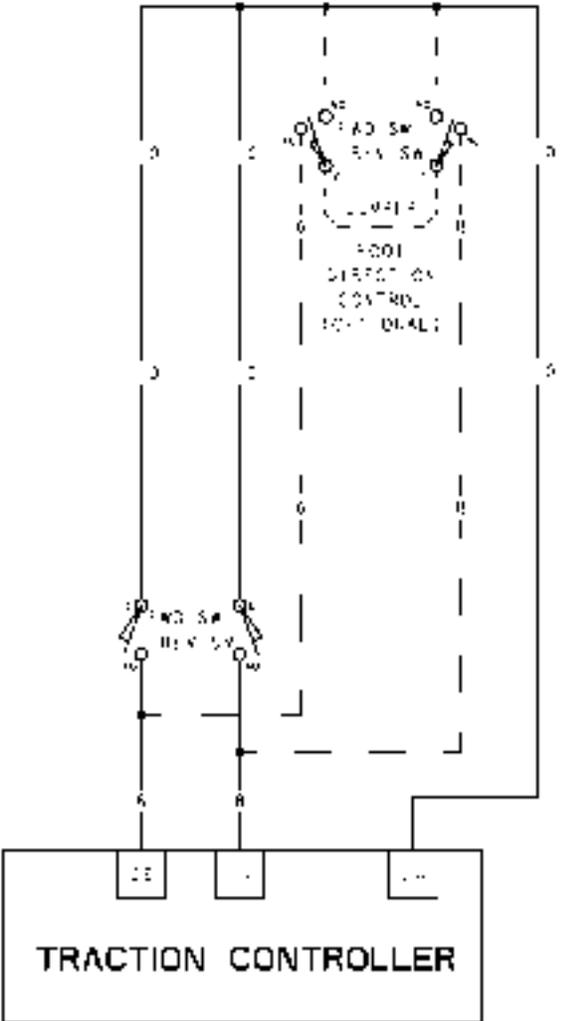
Status Code	Premium Display Message	Memory Recall	Circuit
01	NO SEAT SWITCH INPUT	No	Traction
<b>Description</b>			
Controller is not receiving an input signal from the seat switch while receiving a traction or hydraulic function command.			
<b>Symptom</b>			
Lift truck does not move.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Seat switch malfunction.                             <ul style="list-style-type: none"> <li>Check to see if the seat switch operates properly.</li> <li>Use the dash display diagnostics menu to check the seat switch operation.</li> <li>Replace failed switch.</li> </ul> </li> <li>• Check continuity of wiring to and from the seat switch to the traction controller.                             <ul style="list-style-type: none"> <li>Pin C33 at motor controller to seat switch.</li> <li>Seat switch to Pin C18 at motor controller.</li> </ul> </li> </ul>			

Status Code	Premium Display Message	Memory Recall	Circuit
02	FORWARD SWITCH CLOSED	No	Traction
<b>Description</b>			
Forward directional switch is closed before the key switch closes.			
<b>Symptom</b>			
Lift truck does not move.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• A directional switch is engaged before startup. Return directional switch to neutral.</li> <li>• A directional switch is failed, closed, or out of adjustment. Use dash display diagnostics menu to check operation of the directional switches. Replace failed switch. Adjust switch for correct operation. See the section <b>Electrical System</b> 2200 YRM 1078.</li> <li>• Check for a shorted condition between wire #6 and B+. Wire #6 will be at battery voltage when the switch is closed. Wire #6 will be at 0 volts when the switch is open.</li> </ul>			
			

Status Code	Premium Display Message	Memory Recall	Circuit
03	REVERSE SWITCH CLOSED	No	Traction
<b>Description</b>			
Reverse directional switch is closed before the key switch closes.			
<b>Symptom</b>			
Lift truck does not move.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• A directional switch is engaged before startup. Return directional switch to neutral.</li> <li>• A directional switch is failed, closed, or out of adjustment. Use dash display diagnostics menu to check operation of the directional switches. Replace failed switch. Adjust switch for correct operation. See the section <b>Electrical System</b> 2200 YRM 1078.</li> <li>• Check for a shorted condition between wire #8 and B+. Wire #8 will be at battery voltage when the switch is closed Wire #8 will be at 0 volts when the switch is open.</li> </ul>			
 <p style="text-align: right; font-size: small;">34:80:12</p>			

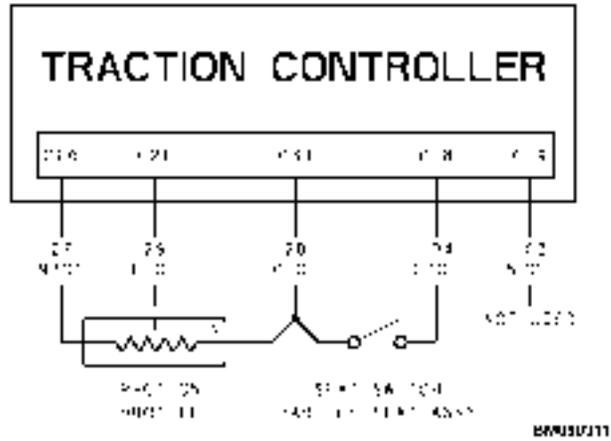
Status Code	Premium Display Message	Memory Recall	Circuit
05	START SWITCH NOT CLOSED	No	Traction
<b>Description</b>			
<p>Start switch is open when the seat switch is closed and either the forward or reverse directional switch is closed and the accelerator output voltage shows there is a demand for traction.</p>			
<b>Symptom</b>			
Lift truck does not move.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Malfunction of the start switch.                             <ul style="list-style-type: none"> <li>Use dash display diagnostics to check operation of the start switch.</li> <li>Check for proper switch adjustment.</li> <li>Replace start switch.</li> </ul> </li> <li>• Malfunction of the start switch.                             <ul style="list-style-type: none"> <li>Check for open circuit or loose connections in wiring from the key switch to the start switch and from the controller to the start switch.</li> <li>Wire #15 will be at battery voltage when the switch is closed.</li> <li>Wire #15 will be at 0 volts when the switch is open.</li> </ul> </li> </ul>			
9M601313			

Status Code	Premium Display Message	Memory Recall	Circuit
06	NO DIRECTION SELECTED	No	Traction
<b>Description</b>			
The forward and the reverse switches are both open and there is a request for traction.			
<b>Symptom</b>			
Lift truck does not move.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Accelerator pedal is depressed before closing a directional switch.                      Status code will disappear when the pedal is released.</li> <li>• Open circuit between the directional switch and the controller.                      Use dash diagnostics to check the operation of the switch.                      Check wiring from C4 to FWD and REV switches.                      Use ohm meter to ensure proper operation of direction switches.                      Check for continuity between C4 and C6 or C4 and C7 when each switch closes.                      Check wiring from switches to C6 and C7.                      Check operation of switch for continuity through the switch when the switch is closed.</li> <li>• Malfunction of the directional switch.                      Check switch adjustment.                      FWD or REV switch is closed when direction is selected.</li> <li>• Wire #6 will be at battery voltage when the FWD switch is closed.</li> <li>• Wire #8 will be at battery voltage when the REV switch is closed.</li> <li>• Wires # 6 &amp; #8 will be at 0 volts when the switches are open.</li> </ul>			

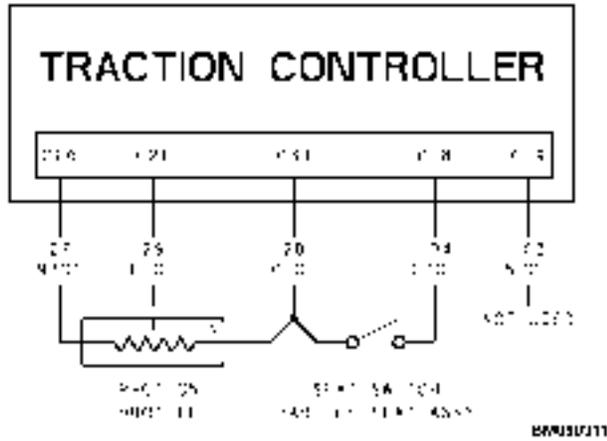


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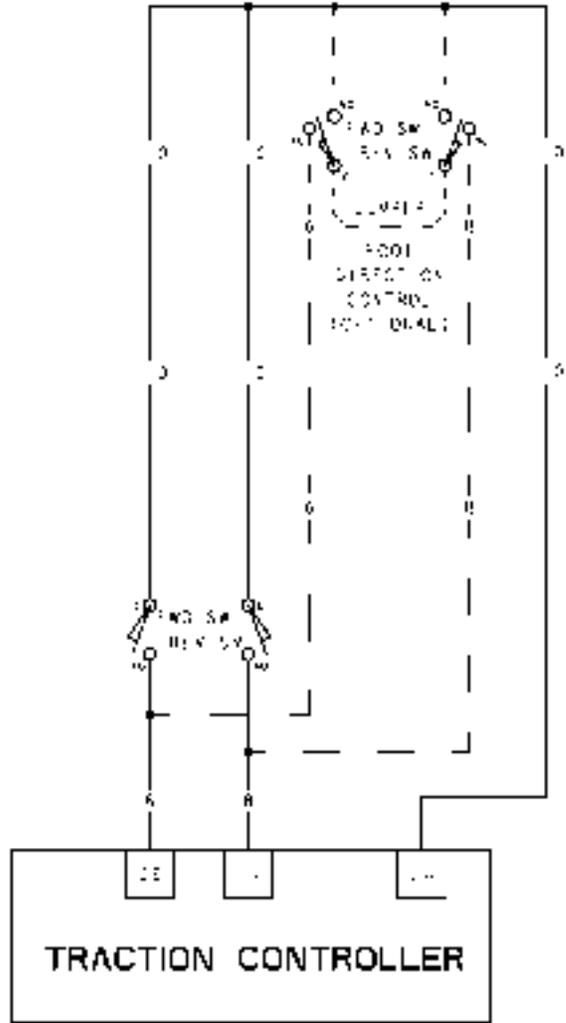
Status Code	Premium Display Message	Memory Recall	Circuit
07	THROTTLE POT ERROR	Yes	Traction
<b>Description</b>			
Accelerator input voltage is too high when the key is first moved to the <b>ON</b> position.			
<b>Symptom</b>			
Lift truck does not move.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Accelerator unit has a malfunction or is out of adjustment.                      Maximum accelerator wiper voltage should be 4.6 volts with the pedal fully up at C33.                      Check for open circuit between accelerator and controller.                      Recalibrate throttle. See the section <b>Electrical System</b> 2200 YRM 1078.</li> <li>• Check for 5 volts between wire # 27 and wire # 28 at the throttle potentiometer.</li> </ul>			



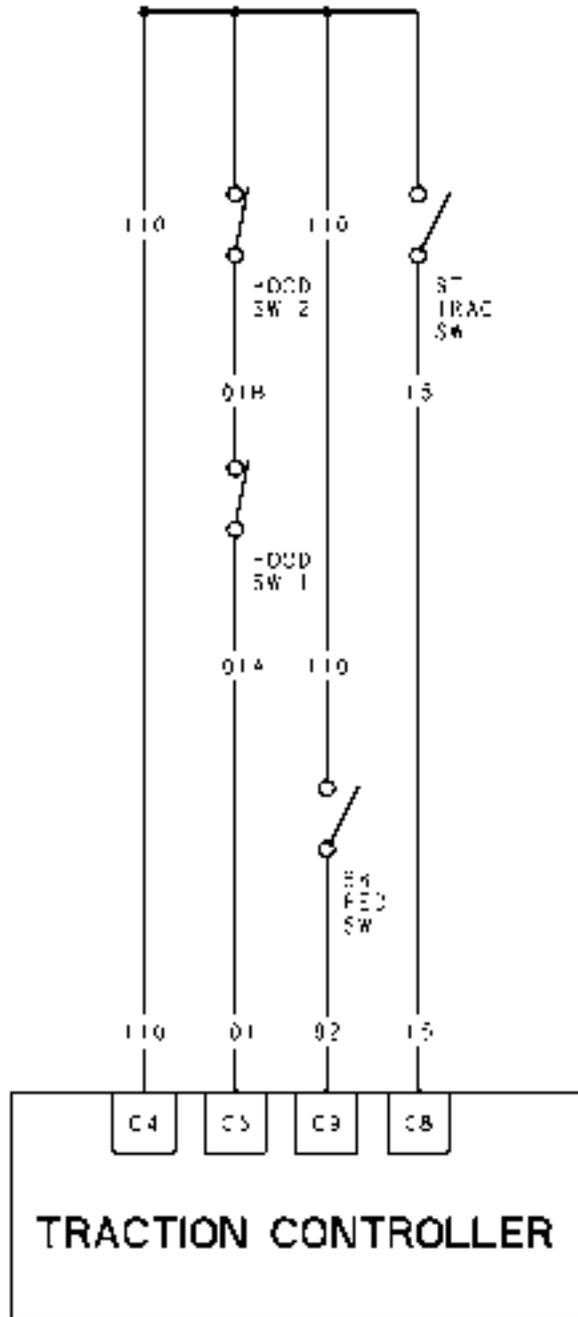
Status Code	Premium Display Message	Memory Recall	Circuit
08	THROTTLE VOLTAGE LOW	No	Traction
<b>Description</b>			
Accelerator input voltage is lower than threshold voltage set at throttle calibration.			
<b>Symptom</b>			
Lift truck does not move.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Accelerator unit has a malfunction or is out of adjustment.                         <ul style="list-style-type: none"> <li>Check for open circuit between accelerator and controller.</li> <li>Minimum accelerator wiper voltage should be 0.5 volt with the pedal fully down at C21.</li> <li>Recalibrate throttle. See the section <b>Electrical System</b> 2200 YRM 1078.</li> </ul> </li> <li>• Check for 5 volts between wire # 27 and wire # 28 at the throttle potentiometer.</li> </ul>			



Status Code	Premium Display Message	Memory Recall	Circuit
09	FWD and REV SWITCHES CLOSED AT SAME TIME	No	Traction
<b>Description</b>			
Both the forward and reverse directional switches are closed at the same time.			
<b>Symptom</b>			
Lift truck does not move.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Either the forward or reverse switch is failed closed.                         <ul style="list-style-type: none"> <li>Use dash display diagnostic to check operation of directional switches.</li> <li>Replace failed or malfunctioning switch.</li> </ul> </li> <li>• Directional switch is out of adjustment.                         <ul style="list-style-type: none"> <li>Switches should be open with directional switch in neutral.</li> </ul> </li> <li>• Wire #6 will be at battery voltage when the FWD switch is closed.</li> <li>• Wire #8 will be at battery voltage when the REV switch is closed.</li> <li>• Wires # 6 &amp; #8 will be at 0 volts when the switches are open.</li> </ul>			

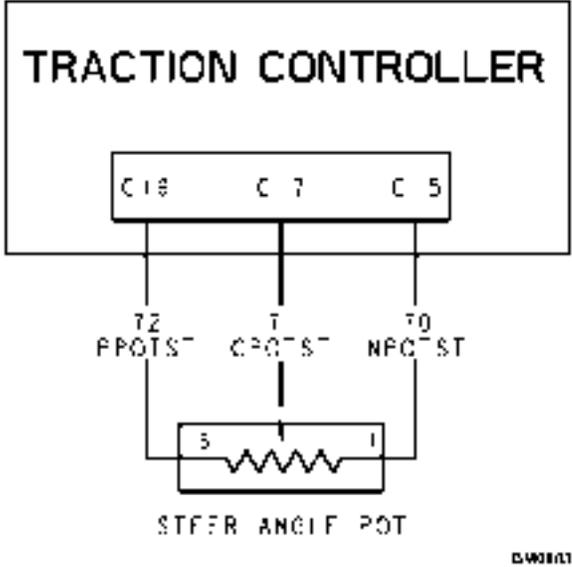


Status Code	Premium Display Message	Memory Recall	Circuit
11	START SWITCH CLOSED BEFORE KEY	No	Traction
<b>Description</b>			
Accelerator start switch is closed before the key and/or the seat switch.			
<b>Symptom</b>			
Lift truck does not move.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Accelerator pedal depressed when key is turned to <b>ON</b> position. Release pedal and restart.</li> <li>• Accelerator start switch is out of adjustment. Switch should be open with accelerator pedal fully up.</li> <li>• Accelerator start switch is shorted closed. Use dash display diagnostic menu to check operation of switch. Replace failed switch.</li> <li>• Wire # 15 will be at battery voltage when the start switch is closed.</li> <li>• Wire # 15 will be at 0 volts when the start switch is open.</li> </ul>			



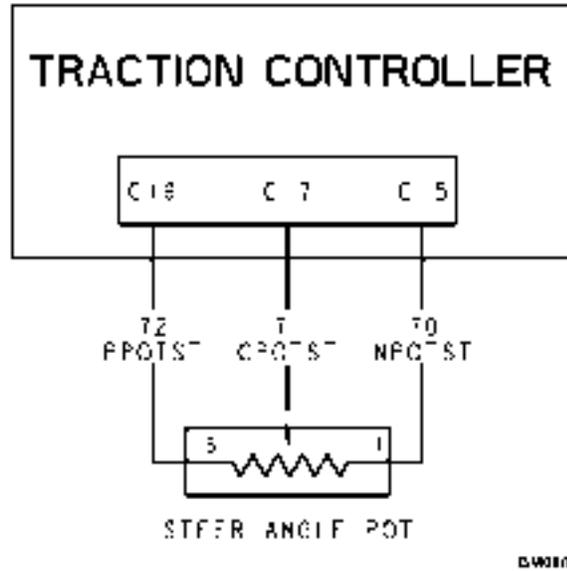
94602313

Status Code	Premium Display Message	Memory Recall	Circuit
12	STEER SENSOR VOLTAGE LOW	Yes	Traction
<b>Description</b>			
Steer sensor feedback voltage is too low.			
<b>Symptom</b>			
Lift truck does not move.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Use dash diagnostics to check operation of the steer sensor.</li> <li>• Check potentiometer and adjustment. Potentiometer wiper should be set at 5K ohms with wheels straight ahead.</li> <li>• Check wiring continuity between steering potentiometer and traction controller.</li> <li>• Check voltage between C15 and C16. Voltage should be 5.0 volts.</li> <li>• Check for 5.0 volts between wire # 70 and Wire # 72 at the steer potentiometer.</li> <li>• Recalibrate steering. See the section <b>Electrical System</b> 2200 YRM 1078. Check voltage at C17 at the traction controller. Voltage is typically 2.2 volts with the steer wheel in the straight ahead position.</li> <li>• Operate the lift truck and recheck the steering potentiometer voltage to ensure the system will mechanically remain in calibration.</li> </ul>			



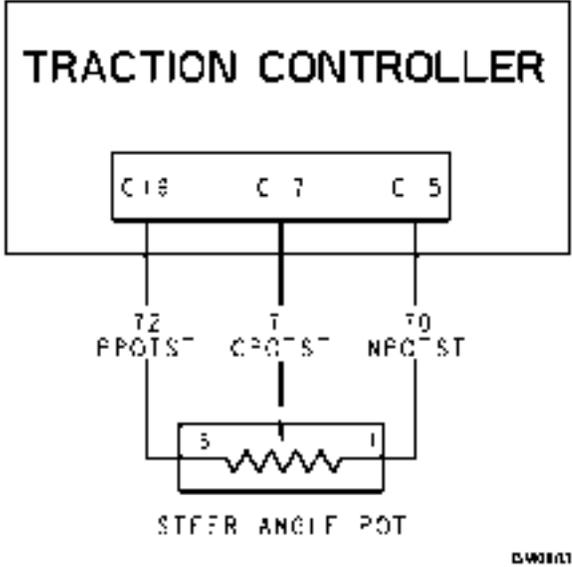
DW000114

Status Code	Premium Display Message	Memory Recall	Circuit
13	STEER SENSOR VOLTAGE HIGH	Yes	Traction
<b>Description</b>			
Steer sensor feedback voltage is too high.			
<b>Symptom</b>			
Lift truck does not move.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Use dash diagnostics to check operation of the steer sensor.</li> <li>• Check potentiometer and adjustment. Potentiometer wiper should be set at 5K ohms with wheels straight ahead.</li> <li>• Check wiring continuity between steering potentiometer and traction controller.</li> <li>• Check voltage between C15 and C16. Voltage should be 5.0 volts.</li> <li>• With steer wheel straight ahead, check for 2.2 volts at C17 on the traction controller.</li> <li>• Recalibrate steering. See the section <b>Electrical System</b> 2200 YRM 1078.</li> </ul>			



DW000114

Status Code	Premium Display Message	Memory Recall	Circuit
14	WRONG STEER CALIBRATION	Yes	Traction
<b>Description</b>			
After steer calibration, the controller is sensing the "max right" parameter to be less than the "max left" parameter.			
<b>Symptom</b>			
No lift truck operation.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Recalibrate the steering sensor.</li> <li>• Check sensor values using the dash diagnostics.</li> <li>• Check adjustment of the steering potentiometer.</li> <li>• Check for 5.0 volts between wire # 70 and Wire # 72 at the steer potentiometer.</li> <li>• Check voltage at C17 at the traction controller. Voltage is typically 2.2 volts with the steer wheel in the straight ahead position.</li> <li>• Operate the lift truck and recheck the steering potentiometer voltage to ensure the system will mechanically remain in calibration.</li> </ul>			



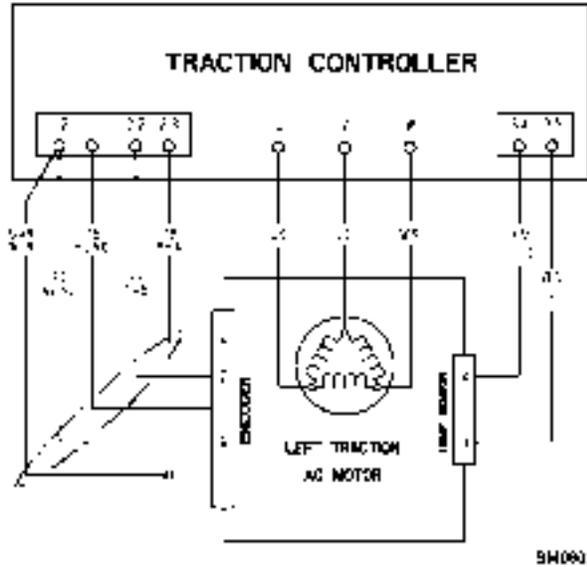
Status Code	Premium Display Message	Memory Recall	Circuit						
15	BATTERY VOLTAGE LOW	Yes	Traction						
<b>Description</b>		<table border="1"> <thead> <tr> <th>NOMINAL BATTERY VOLTAGE</th> <th>MINIMUM LIMIT VOLTS AT 1.85 VDC PER CELL</th> </tr> </thead> <tbody> <tr> <td>36</td> <td>33.3</td> </tr> <tr> <td>48</td> <td>44.4</td> </tr> </tbody> </table>		NOMINAL BATTERY VOLTAGE	MINIMUM LIMIT VOLTS AT 1.85 VDC PER CELL	36	33.3	48	44.4
NOMINAL BATTERY VOLTAGE	MINIMUM LIMIT VOLTS AT 1.85 VDC PER CELL								
36	33.3								
48	44.4								
The battery voltage is lower than the setting in the controller.									
<b>Symptom</b>									
Lift truck does not move.									
<b>Probable Causes and Test Procedures</b>									
<ul style="list-style-type: none"> <li>• Incorrect battery installed in truck.</li> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Discharged battery. Check battery for correct open circuit voltage. Charge battery.</li> <li>• Battery is damaged. Check each cell for correct voltage (greater than 1.85 volts per cell). Repair or replace battery.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Incorrect controller adjustment. Use dash display to check battery voltage.</li> <li>• Check condition of main contactor tips.</li> </ul>									

Status Code	Premium Display Message	Memory Recall	Circuit						
16	BATTERY VOLTAGE HIGH	Yes	Traction						
<b>Description</b>									
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>The battery voltage is higher than the setting in the controller.</p> </div> <table border="1" data-bbox="954 365 1442 604" style="width: 45%; text-align: center;"> <thead> <tr> <th data-bbox="954 365 1203 506">NOMINAL BATTERY VOLTAGE</th> <th data-bbox="1203 365 1442 506">MAXIMUM LIMIT VOLTS AT 2.40 VDC PER CELL</th> </tr> </thead> <tbody> <tr> <td data-bbox="954 506 1203 554">36</td> <td data-bbox="1203 506 1442 554">43.2</td> </tr> <tr> <td data-bbox="954 554 1203 604">48</td> <td data-bbox="1203 554 1442 604">57.6</td> </tr> </tbody> </table> </div>				NOMINAL BATTERY VOLTAGE	MAXIMUM LIMIT VOLTS AT 2.40 VDC PER CELL	36	43.2	48	57.6
NOMINAL BATTERY VOLTAGE	MAXIMUM LIMIT VOLTS AT 2.40 VDC PER CELL								
36	43.2								
48	57.6								
<b>Symptom</b>									
Lift truck does not move.									
<b>Probable Causes and Test Procedures</b>									
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Incorrect battery installed in truck.</li> <li>• Overcharged battery.     Check battery for correct open circuit voltage.</li> <li>• Incorrect controller adjustment.     Use dash display to check battery voltage.</li> <li>• Check condition of main contactor tips.</li> </ul>									

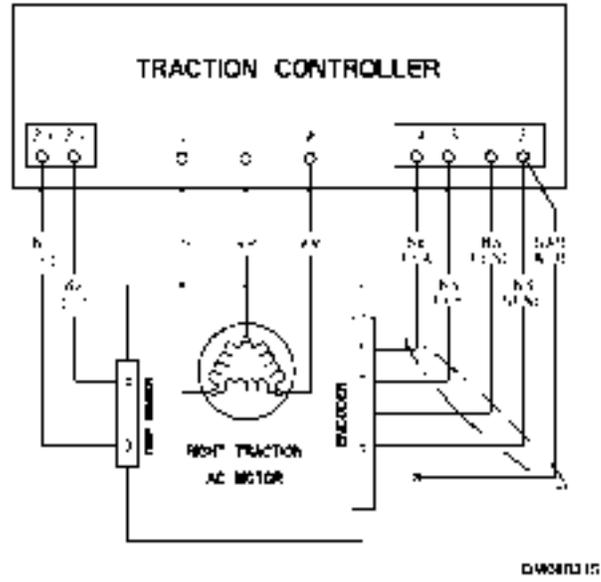
Status Code	Premium Display Message	Memory Recall	Circuit
41	TRACTION CONTROL TEMPERATURE HIGH	Yes	Traction
<b>Description</b>			
High temperature in the traction controller power section. Truck performance is progressively reduced as temperature rises.			
<b>Symptom</b>			
Traction performance is reduced.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Reduce duty cycle until temperature is reduced.</li> <li>• If fault is indicated when controller is cold, replace controller.</li> <li>• Check for dragging parking brakes or service brakes.</li> <li>• Use dash diagnostics to check for correct current level of the left and right traction motors and the pump motor.</li> <li>• Check for mechanical offset of steering potentiometer. Recalibrate as necessary.</li> </ul>			

Status Code	Premium Display Message	Memory Recall	Circuit
42	PUMP CONTROL TEMPERATURE HIGH	Yes	Hydraulic
<b>Description</b>			
<p>Pump controller temperature is too high. Traction performance is progressively reduced as temperature increases.</p>			
<b>Symptom</b>			
<p>Traction performance is reduced.</p>			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Reduce duty cycle until temperature is reduced.</li> <li>• If fault is indicated when controller is cold, replace controller.</li> <li>• Check for dragging parking brakes or service brakes.</li> <li>• Use dash diagnostics to check for correct current level of the left and right traction motors and the pump motor.</li> <li>• Check for mechanical offset of steering potentiometer. Recalibrate as necessary.</li> </ul>			

Status Code	Premium Display Message	Memory Recall	Circuit
43L	LEFT MOTOR TEMP OUT OF RANGE	Yes	Traction
<b>Description</b>			
Left traction motor temperature is out of range.			
<b>Symptom</b>			
Lift truck does not move.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Failed thermal sensor in traction motor. Using dash display diagnostic, check motor temperature.</li> <li>• Check the motor temperature sensor resistance at the traction controller between C34 and C35. Resistance should read 500 ohms at 24°C (75°F).</li> <li>• Check for a shorted condition between C34 and the truck frame and C35 and the truck frame. Should see a minimum 1 megohm resistance.</li> </ul>			



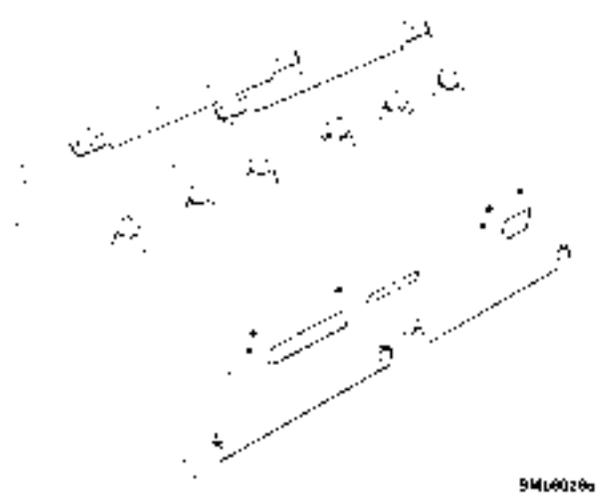
Status Code	Premium Display Message	Memory Recall	Circuit
43R	RIGHT MOTOR TEMP OUT OF RANGE	Yes	Traction
<b>Description</b>			
Right traction motor temperature is out of range.			
<b>Symptom</b>			
Lift truck does not move.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Failed thermal sensor in traction motor. Using dash display diagnostic, check motor temperature.</li> <li>• Check the motor temperature sensor resistance at the traction controller between C24 and C25. Resistance should read 500 ohms at 24°C (75°F).</li> <li>• Check for a shorted condition between C24 and the truck frame and C25 and the truck frame. Should see a minimum 1 megaohm resistance.</li> </ul>			



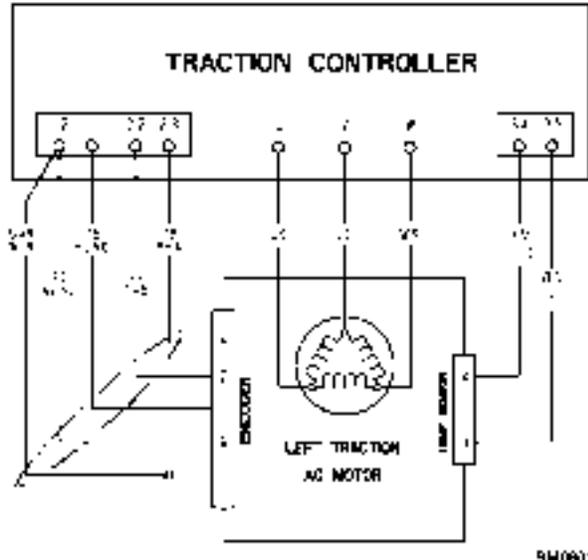
Status Code	Premium Display Message	Memory Recall	Circuit
51	PRECHARGE	Yes	Traction
<b>Description</b>			
Controller capacitor voltage does not increase at startup.			
<b>Symptom</b>			
Lift truck does not move.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Ensure the towing connector near the dash display is not in place.</li> <li>• Remove fuse FU3 and turn the key to the <b>ON</b> position. If the problem remains, perform Test A. If the problem does not reappear, perform Tests B.</li> </ul> <p><b>Test A:</b>                      Disconnect the battery and discharge the capacitors. See Discharging Capacitors in the front of this section.                      Disconnect the B+ cable from the traction controller.                      Connect and ohm meter between the B+ and the B- terminals of the traction controller.                      Look for an increasing resistance from 0 to 150 ohms over 10 seconds.                      Disconnect the ohm meter and discharge the capacitors. See Discharging Capacitors in the front of this section.                      Connect the ohm meter negative lead to B- and ohm meter positive lead to UM. The ohm meter should read approximately 5K ohms.                      Connect the ohm meter negative lead to B- and the ohm meter positive lead to US. The ohm meter should read approximately 5K ohms.                      Connect the ohm meter negative lead to UM and the ohm meter positive lead to B+. The ohm meter should read approximately 5K ohms. (Continued on next page)</p>			



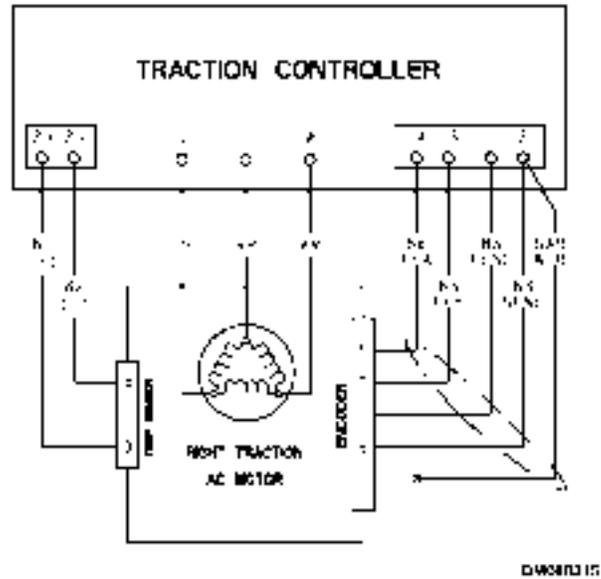
Status Code	Premium Display Message	Memory Recall	Circuit
51 (Cont)	PRECHARGE	Yes	Traction
<b>Description</b>			
Controller capacitor voltage does not increase at startup.			
<b>Symptom</b>			
Lift truck does not move.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Remove fuse FU3 and turn the key to the <b>ON</b> position. If the problem remains, perform Test A. If the problem does not reappear, perform Tests B. (Continued)</li> </ul> <p style="margin-left: 20px;"><b>Test A: (Continued)</b> Connect the ohm meter negative lead to US and the ohm meter positive lead to B+. The ohm meter should read approximately 5K ohms. If any of these tests is failed, replace the controller.</p> <p style="margin-left: 20px;"><b>Tests B:</b> Check resistance between B+ and B- at the steering motor. The reading should be several thousand ohms. Check for a failed R1 resistor in the steering circuit. Install fuse (FU3), disconnect the dash connector, and turn the key to the <b>ON</b> position. Measure the voltage across B+ and B- on the traction controller. If the value is battery voltage, the dash display may be defective. Check for brake driver continuous on. With the key switch in the ON position and the seat switch in the open condition, check that voltage between C28 and C29 in less than 2 volts. Check for welded pump contactor tips.</p> <ul style="list-style-type: none"> <li>• Wire #47 should be greater than 5 volts after the seat switch opens for more than 10 seconds.</li> <li>• Check the connections of wires #10-6 and #47.</li> </ul>			



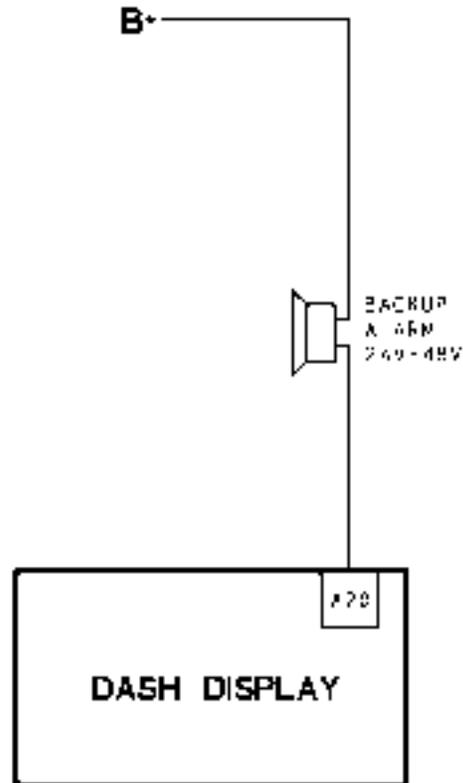
Status Code	Premium Display Message	Memory Recall	Circuit
52L	LEFT ENCODER ERROR	Yes	Traction
<b>Description</b>			
Incorrect feedback from traction motor speed sensor.			
<b>Symptom</b>			
Lift truck does not move.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Use dash diagnostics to check encoder operation.</li> <li>• Check for 12-volt supply to encoder.</li> <li>• Ensure wiring to the encoder is correct. See the section <b>Diagrams</b> 8000 YRM 1081.</li> <li>• Ensure all wiring connections between the encoder and the traction motor are tight.</li> <li>• Check continuity of the wiring from the controller to the encoder.</li> <li>• Check for any shorted condition between C1, C2, C13, or C14 to the truck frame.</li> <li>• Disconnect the 6 pin connector from the traction motor and check for pin to pin resistance in the connector on the motor side. There should be a minimum 1 megohm resistance from pin to pin.</li> </ul>			



Status Code	Premium Display Message	Memory Recall	Circuit
52R	RIGHT ENCODER ERROR	Yes	Traction
<b>Description</b>			
Incorrect feedback from traction motor speed sensor.			
<b>Symptom</b>			
Lift truck does not move.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Use dash diagnostics to check encoder operation.</li> <li>• Check for 12-volt supply to encoder.</li> <li>• Ensure wiring to the encoder is correct. See the section <b>Diagrams</b> 8000 YRM 1081.</li> <li>• Ensure all wiring connections between the encoder and the traction motor are tight.</li> <li>• Check continuity of the wiring from the controller to the encoder.</li> <li>• Check for any shorted condition between C1, C2, C13, or C14 to the truck frame.</li> <li>• Disconnect the 6 pin connector from the traction motor and check for pin to pin resistance in the connector of the motor side. There should be a minimum 1 megohm resistance from pin to pin.</li> </ul>			

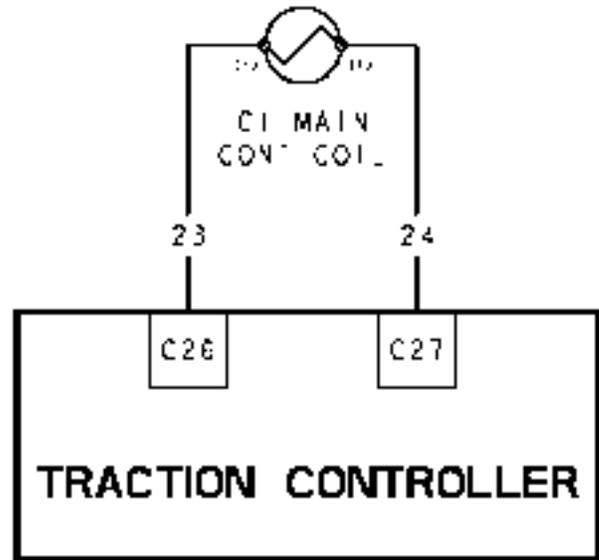


Status Code	Premium Display Message	Memory Recall	Circuit
62	REVERSE SIGNAL OUTPUT SHORTED	Yes	Auxiliary
<b>Description</b>			
Backup alarm driver is shorted. Overcurrent protection has been activated.			
<b>Symptom</b>			
Backup alarm does not operate.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Disconnect the dash display A connector and check for shorted wiring between pin A20 and B- or B+.</li> <li>• Check wiring for shorts.</li> <li>• Check for a shorted alarm.</li> <li>• Check the resistance of R3, R4, D1 and LRC1 for proper values if equipped with a DC/DC converter.</li> <li>• Replace dash display.</li> </ul>			



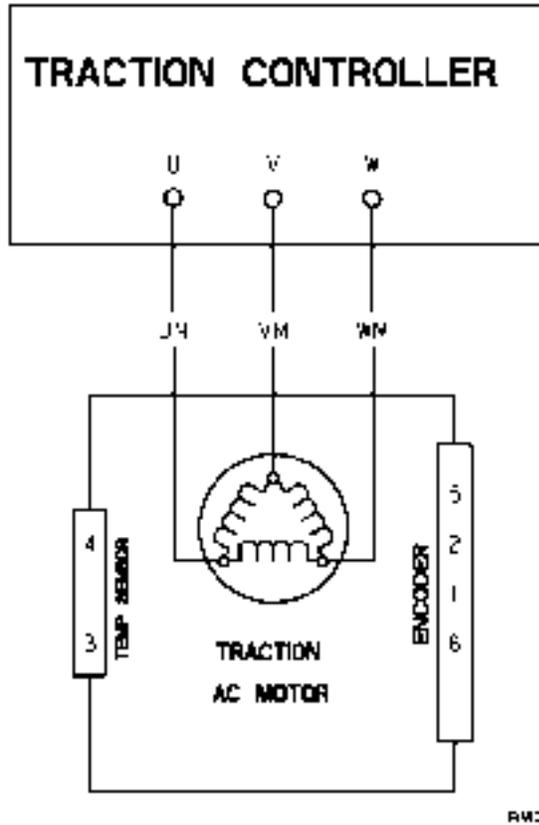
3M200126

Status Code	Premium Display Message	Memory Recall	Circuit
65	MAIN CONTACTOR SHORTED	Yes	Traction
<b>Description</b>			
The main contactor coil driver is shortened.			
<b>Symptom</b>			
Lift truck does not move.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Disconnect C connector from the traction controller and check the controller for a shorted condition between C26 and B-.</li> <li>• Check the harness for a shorted condition between pin C26 and B+ or B-.</li> <li>• Check for shorted driver at the controller. Check for short between terminal C26 and B-.</li> <li>• Check for shorted main contactor coil. Coil should measure approximately 32 ohms.</li> </ul>			



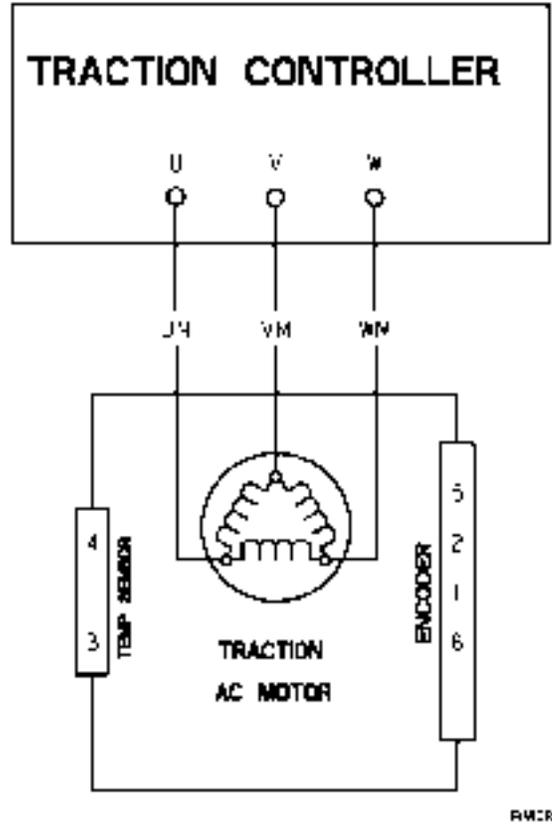
RM010317

Status Code	Premium Display Message	Memory Recall	Circuit
66L	LEFT TRACTION MOTOR SHORTED	Yes	Traction
<b>Description</b>			
Left traction motor is shorted.			
<b>Symptom</b>			
Lift truck does not move.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Ensure all motor connections are tight.</li> <li>• Ensure motor connections are not shorted to the truck frame.</li> <li>• Disconnect all motor leads from the traction motor. Check line-to-line stator resistance. Resistance should be <math>10.00 \pm 0.10</math> milliohms for 48-volt truck and <math>6.10 \pm 0.10</math> milliohms for 36-volt truck.</li> </ul>			

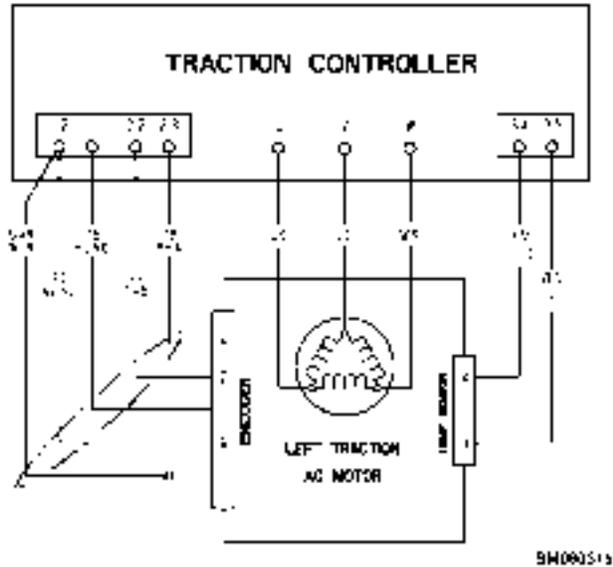


RWC6011R

Status Code	Premium Display Message	Memory Recall	Circuit
66R	RIGHT TRACTION MOTOR SHORTED	Yes	Traction
<b>Description</b>			
Right traction motor is shorted.			
<b>Symptom</b>			
Lift truck does not move.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Ensure all motor connections are tight.</li> <li>• Ensure motor connections are not shorted to the truck frame.</li> <li>• Disconnect all motor leads from the traction motor. Check line-to-line stator resistance. Resistance should be 10.00 ±0.10 milliohms for 48-volt truck and 6.10 ±0.10 milliohms for 36-volt truck.</li> </ul>			

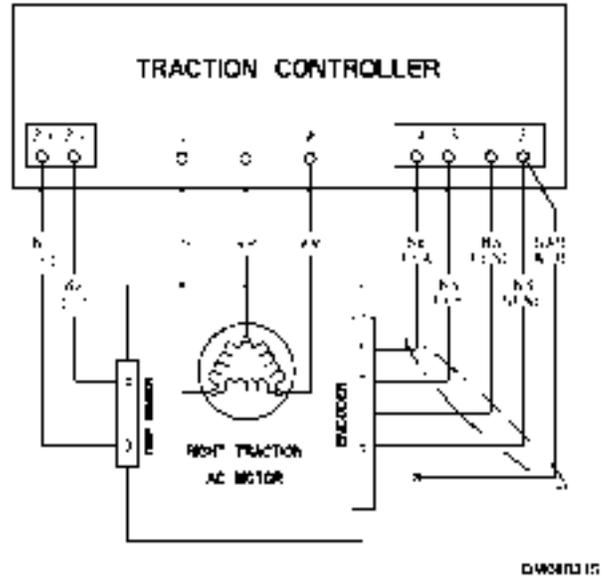


Status Code	Premium Display Message	Memory Recall	Circuit
90L	LEFT TRACTION MOTOR TEMP HIGH	Yes	Traction
<b>Description</b>			
Left traction motor high temperature. Temperature sensor in traction motor has indicated high temperature.			
<b>Symptom</b>			
Traction performance is reduced.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Use dash display diagnostics to verify motor temperature sensor is operating properly.</li> <li>• Reduce truck operation until motor cools.</li> <li>• If a fault is signaled with cold motor, disconnect the C connector from the traction controller and check the motor temperature sensor resistance between pin C34 and C35 in the connector. The resistance should be 555 ohms to 607 ohms at 20°C (68°F). If the resistance is out of range, disconnect the 6 pin connector at the left traction motor and measure the resistance again between pins 3 and 4 at the motor side of the connector. If the resistance is within range, check the wiring harness.</li> <li>• Check for broken or loose wires.</li> <li>• Disconnect all motor leads from the traction motor and check line to line stator resistance. The resistance should read 10.00 +/-0.10 milliohms for a 48 volt truck and 6/10 +/-0.10 milliohms for a 36 volt truck.</li> </ul> <p style="margin-left: 20px;">If the above readings are within in the specified ranges, compare motor current between the two traction motors using dash display diagnostics. Drive the truck straight ahead and observe the current level of each traction motor. If the left traction motor is drawing significantly more current than the right traction motor check for a dragging service or parking brake.</p> <ul style="list-style-type: none"> <li>• Check for mechanical offset of steering potentiometer. Recalibrate as necessary.</li> </ul>			

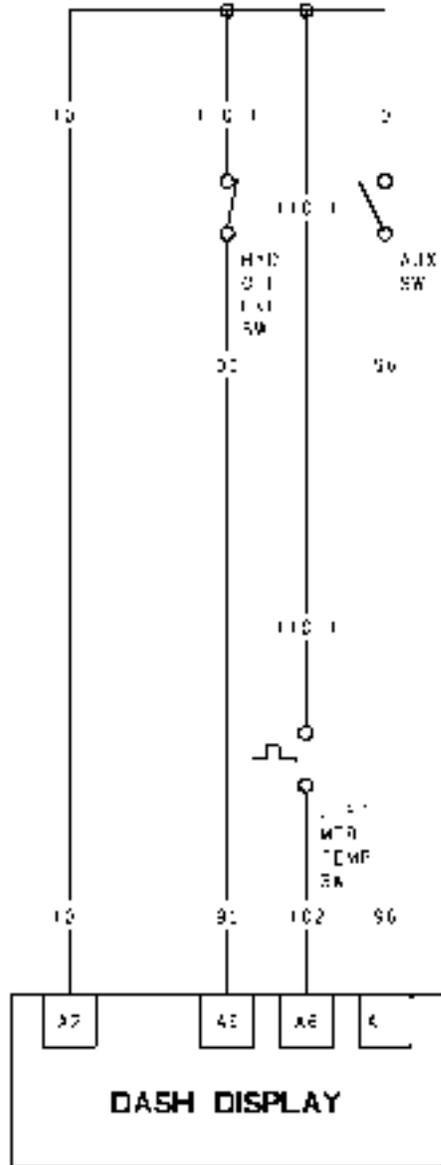


9M000513

Status Code	Premium Display Message	Memory Recall	Circuit
90R	RIGHT TRACTION MOTOR TEMP HIGH	Yes	Traction
<b>Description</b>			
Right traction motor high temperature. Temperature sensor in traction motor has indicated high motor temperature.			
<b>Symptom</b>			
Traction performance is reduced.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Use dash display diagnostics to verify motor temperature sensor is operating properly.</li> <li>• Reduce truck operation until motor cools.</li> <li>• If a fault is signaled with cold motor, disconnect the C connector from the traction controller and check the motor temperature sensor resistance between pin C34 and C35 in the connector. The resistance should be 555 ohms to 607 ohms at 20°C (68°F). If the resistance is out of range, disconnect the 6 pin connector at the left traction motor and measure the resistance again between pins 3 and 4 at the motor side of the connector. If the resistance is within range, check the wiring harness.</li> <li>• Check for broken or loose wires.</li> <li>• Disconnect all motor leads from the traction motor and check line to line stator resistance. The resistance should read 10.00 +/-0.10 milliohms for a 48 volt truck and 6/10 +/-0.10 milliohms for a 36 volt truck.                      If the above readings are within in the specified ranges, compare motor current between the two traction motors using dash display diagnostics. Drive the truck straight ahead and observe the current level of each traction motor. If the right traction motor is drawing significantly more current than the right traction motor, check for a dragging service or parking brake.</li> <li>• Check for mechanical offset of steering potentiometer. Recalibrate as necessary.</li> </ul>			



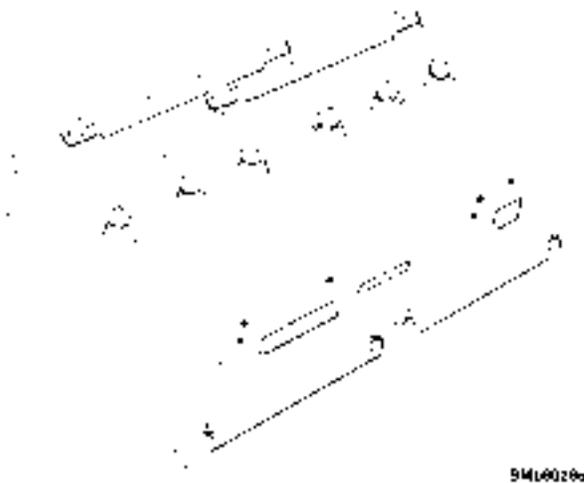
Status Code	Premium Display Message	Memory Recall	Circuit
91	PUMP MOTOR TEMPERATURE HIGH	No	Lift
<b>Description</b>			
Pump motor temperature too high. Thermal switch in pump motor has been activated.			
<b>Symptom</b>			
Display message.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Use dash display diagnostics to verify motor over-temperature switch is activated.</li> <li>• Reduce truck operation until motor cools.</li> <li>• If fault is signaled with a cold motor, disconnect the dash display connector and measure the resistance between A2 and A6 at the harness side of the connector. The resistance should be less than 10 ohms.                      If the resistance is greater than 10 ohms, disconnect the 4 pin connector at the pump motor and measure the resistance between wires 110 and 102 on the motor side of the connector. If the resistance is less than 10 ohms, check the wiring harness and connectors.</li> <li>• Remove all motor leads from the pump motor and check line to line stator resistance.</li> <li>• Use the dash display to check for high current draw during hydraulic operations if equipped.</li> </ul>			

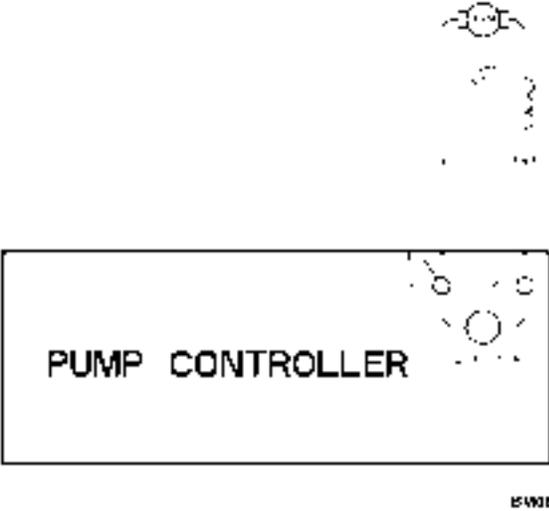


Status Code	Premium Display Message	Memory Recall	Circuit
95	PUMP MOTOR BRUSHES	No	Lift
<b>Description</b>			
Pump motor brushes worn. Brush wear indicator switch in pump motor has been activated.			
<b>Symptom</b>			
Dash display message.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Replace pump motor brushes.</li> <li>• Check wiring and connections.</li> </ul>			

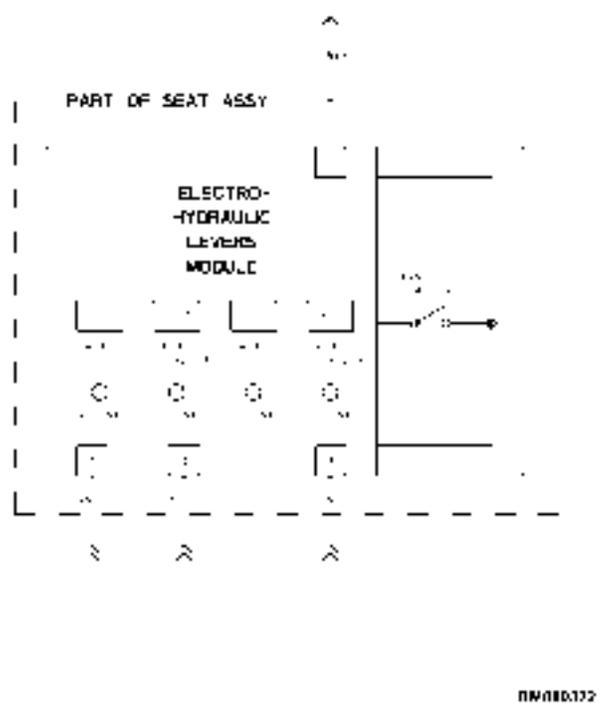
Status Code	Premium Display Message	Memory Recall	Circuit
99	MAINTENANCE REQUIRED	No	None
<b>Description</b>			
Truck maintenance required.			
<b>Symptom</b>			
Dash display message. Flashing "wrench" icon.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Truck requires scheduled maintenance.</li> <li>• Perform required maintenance activity.</li> </ul>			

Status Code	Premium Display Message	Memory Recall	Circuit
142	PUMP CURRENT SENSOR MISSING	Yes	Hydraulic
<b>Description</b>			
Controller senses no pump current.			
<b>Symptom</b>			
No hydraulic function.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Check that traction motor windings are not shorted to the truck frame.</li> <li>• Check the P+ and P– connections at both the controller and the pump motor.</li> <li>• Check for shorts from P+ and P– to the truck frame.</li> <li>• Check to see if the pump motor reverses direction when a hydraulic function is returned to neutral. If reverse rotation is observed, check the hydraulic valves for proper operation.</li> </ul>			

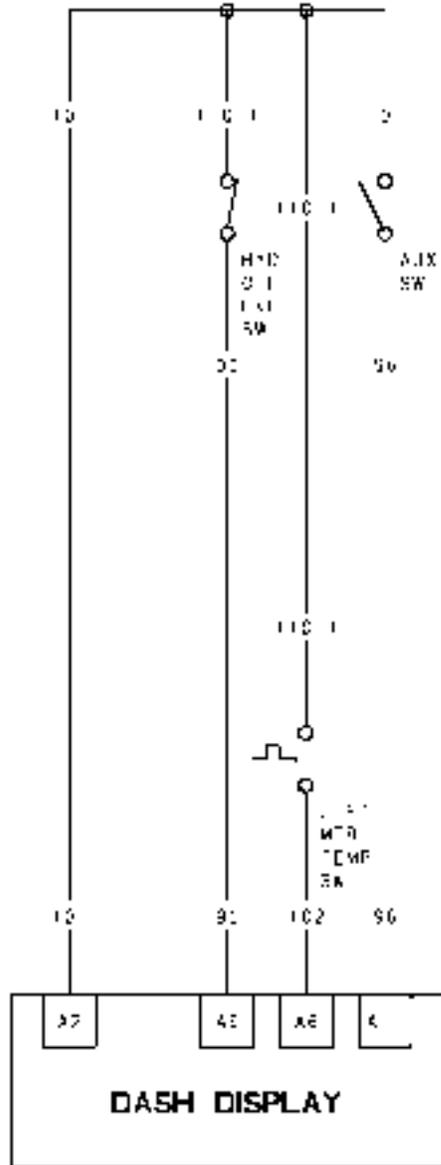
Status Code	Premium Display Message	Memory Recall	Circuit
143	PUMP CURRENT SENSOR LOW	Yes	Hydraulic
<b>Description</b>			
Controller senses low pump current.			
<b>Symptom</b>			
No hydraulic function.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Check that traction motor windings are not shorted to the truck frame.</li> <li>• Check the P+ and P- connections at both the controller and the pump motor.</li> <li>• Check for shorts from P+ and P- to the truck frame.</li> <li>• Check to see if the pump motor reverses direction when a hydraulic function is returned to neutral. If reverse rotation is observed, check the hydraulic valves for proper operation.</li> </ul>			

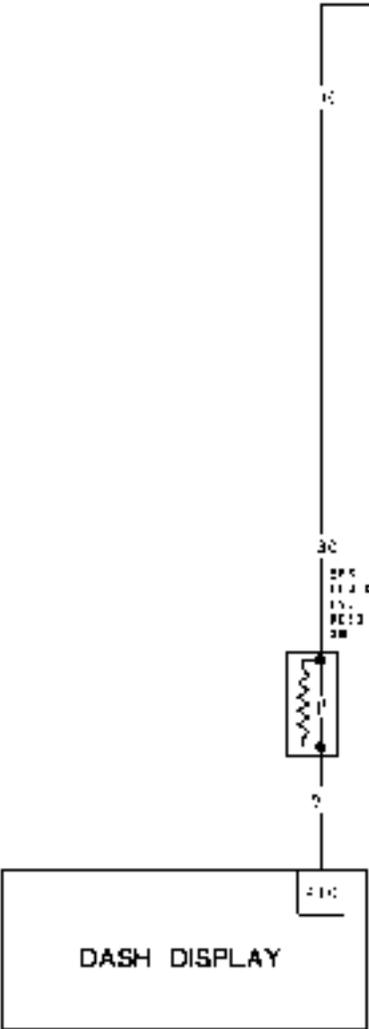
Status Code	Premium Display Message	Memory Recall	Circuit
145	PUMP M- FAULT	Yes	Hydraulic
<b>Description</b>		 <p data-bbox="1312 846 1393 863">E4W0015U</p>	
Power transistor did not turn on properly.			
<b>Symptom</b>			
No lift operation.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Check wiring connections between the controller and the pump motor.</li> <li>• Check for open motor windings.</li> <li>• Check for worn pump motor brushes.</li> <li>• Check for any shorted condition between P+ or P- at the pump controller and the truck frame.</li> </ul>			

Status Code	Premium Display Message	Memory Recall	Circuit
201	NO ARM REST SWITCH INPUT	No	Lift
<b>Description</b>			
Arm rest switch not closed when requesting traction or hoist functions.			
<b>Symptom</b>			
Lift does not operate.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Ensure arm rest is in full down position.     Arm rest should be in the locked position.</li> <li>• Use dash diagnostics to check operation of switch.     Check all wiring connections to switch.     Check switch adjustment. See the section <b>Electrical System</b> 2200 YRM 1078 for adjustment procedure.</li> </ul>			

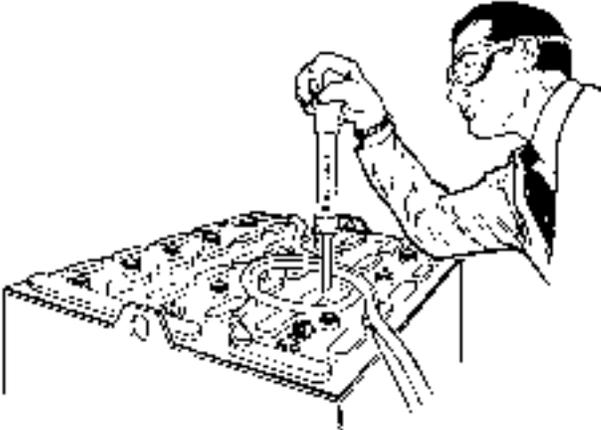


Status Code	Premium Display Message	Memory Recall	Circuit
202	HYDRAULIC OIL LOW	No	Lift
<b>Description</b>			
Hydraulic fluid is low.			
<b>Symptom</b>			
Dash display message. Flashing icon on display.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Ensure forks are fully lowered, turn key to the <b>ON</b> position.</li> <li>• Check hydraulic fluid level. Add fluid. See the section <b>Periodic Maintenance</b> 8000 YRM 1079 for correct fluid.</li> <li>• Check sensor for open condition. Ensure all wiring connections are secure.</li> <li>• Check for battery voltage at A9 on the dash display when the hydraulic oil level is full.</li> <li>• Disconnect the dash display connector and measure the resistance between A2 and A9 at the harness side of the connector. The resistance should be less than 10 ohms when the hydraulic oil level is full. If the resistance is greater than 10 ohms, disconnect the 2 pin connector at the hydraulic oil level sensor and measure the resistance at the sensor. If this resistance is less than 10 ohms, check the condition of the wiring harness.</li> </ul>			

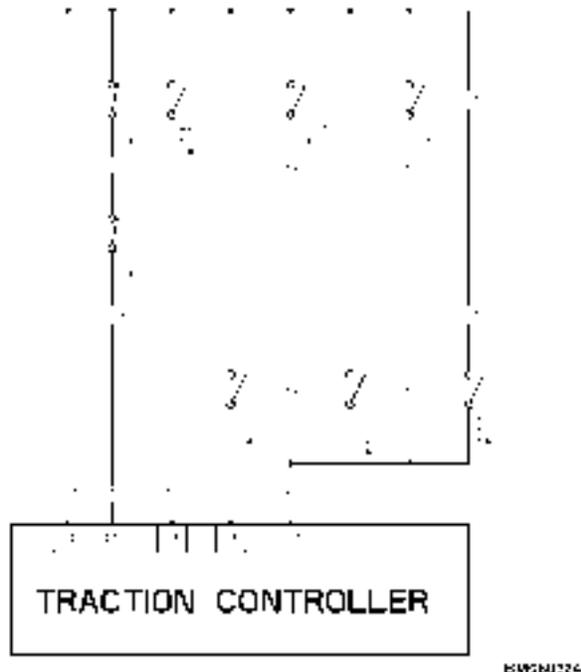


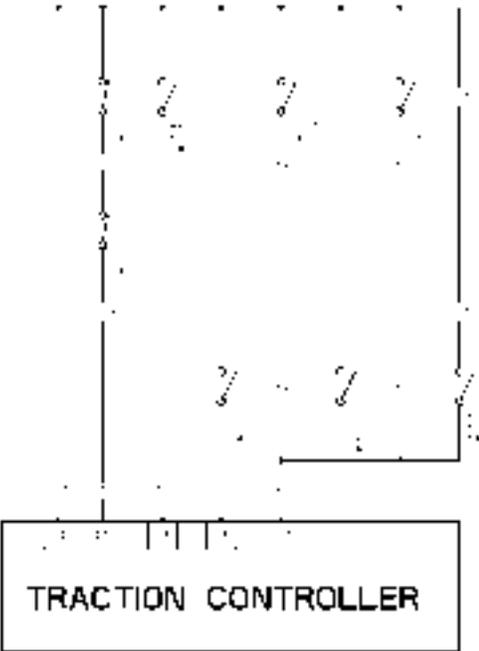
Status Code	Premium Display Message	Memory Recall	Circuit
203	BRAKE FLUID LOW	No	Brake
<b>Description</b>			
Brake fluid is low.			
<b>Symptom</b>			
Dash display message. Flashing icon on display.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Check brake master cylinder fluid level. Fill as needed.</li> <li>• Check for loose or broken wires.</li> </ul>			
<div style="display: flex; align-items: flex-start;"> <div style="flex: 1;"> <p><b>CAUTION</b></p> <p><b>Do not use DOT brake fluid! This truck uses hydraulic oil in the brake system. See the section Capacities and Specifications 8000 YRM 1080.</b></p> <ul style="list-style-type: none"> <li>• Check sensor.                             <ul style="list-style-type: none"> <li>Disconnect wiring connector.</li> <li>Remove fill cap and sensor from reservoir.</li> <li>Check resistance across the sensor pins.                                     <ul style="list-style-type: none"> <li>Resistance is approximately 470 ohms when float is fully raised.</li> <li>Resistance is less than 10 ohms when the float is fully lowered and the switch is closed.</li> </ul> </li> </ul> </li> </ul> </div> <div style="flex: 2; text-align: center;">  </div> </div>			

Status Code	Premium Display Message	Memory Recall	Circuit
204	NO HOOD SWITCHES INPUT	No	Traction/Lift
<b>Description</b>			
Hood switch or switches are open when requesting traction or hydraulic functions.			
<b>Symptom</b>			
No traction or lift operation.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Check wiring continuity between switches. There are two switches wired in series. Check for battery voltage at C5 with both switches closed. Check each switch for open condition while operating the switch.</li> <li>• Replace failed switch.</li> </ul>			
9M602313			

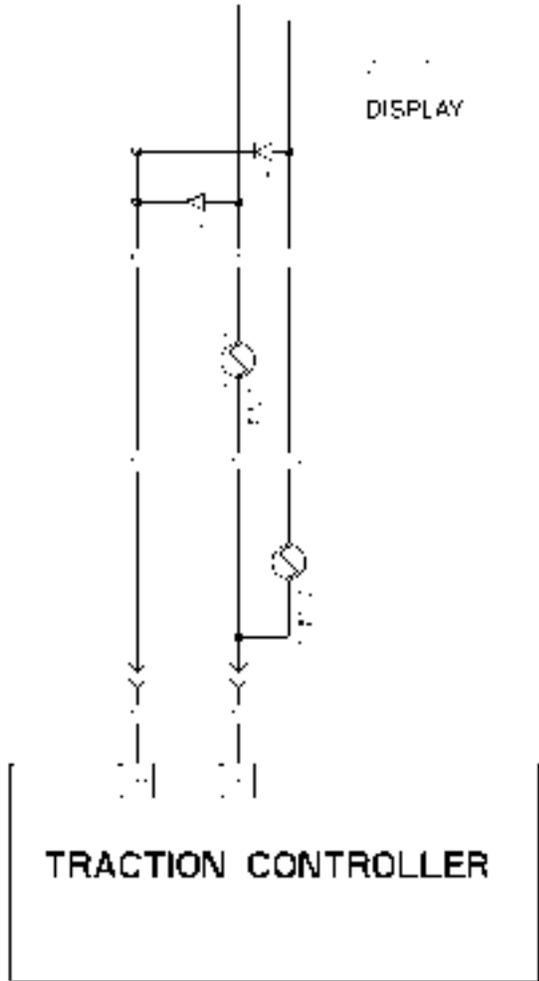
Status Code	Premium Display Message	Memory Recall	Circuit
207	LIFT INTERRUPT	No	Lift
<b>Description</b>		 <p data-bbox="1403 806 1479 825">E/W/E0018</p>	
Fault is set when battery is discharged below 20 percent of full charge.			
<b>Symptom</b>			
Lift does not operate.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Occurs when battery is 80 percent discharged.</li> <li>• Discharged battery. Charge or change battery.</li> </ul>			

Status Code	Premium Display Message	Memory Recall	Circuit
208	PUMP REQUEST BEFORE KEY	No	Lift
<b>Description</b>			
Incorrect pump motor starting sequence.			
<b>Symptom</b>			
Lift does not operate.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> </ul>			
<b>Manual Valve</b>			
<ul style="list-style-type: none"> <li>• Recycle key.</li> <li>• Check for a closed hydraulic function switch at the manual hydraulic control valve. Check switch adjustment. Switches should be open with the hydraulic function levers in the neutral position.</li> <li>• Replace failed switch.</li> </ul>			
<p><b>NOTE:</b> Lift trucks with transistor hydraulics share circuitry between the hydraulic and traction circuits inside the motor controller. This fault code may sometimes be caused by a problem registered from the traction motor encoders.</p>			
<p>If the lift truck is equipped with transistor hydraulics, perform the following tests:</p>			
<ul style="list-style-type: none"> <li>• Disconnect connector "D" from the traction controller.</li> <li>• Check the status of each function's switches using the dash display.</li> <li>• If the status reading flashes "1" and "0" alternately or if the pump motor runs: Turn the key switch to the <b>OFF</b> position. Disconnect the six pin connectors securing both the left and right traction motor encoders to the main wiring harness. Turn the key switch to the <b>ON</b> position. (Continued on next page)</li> </ul>			

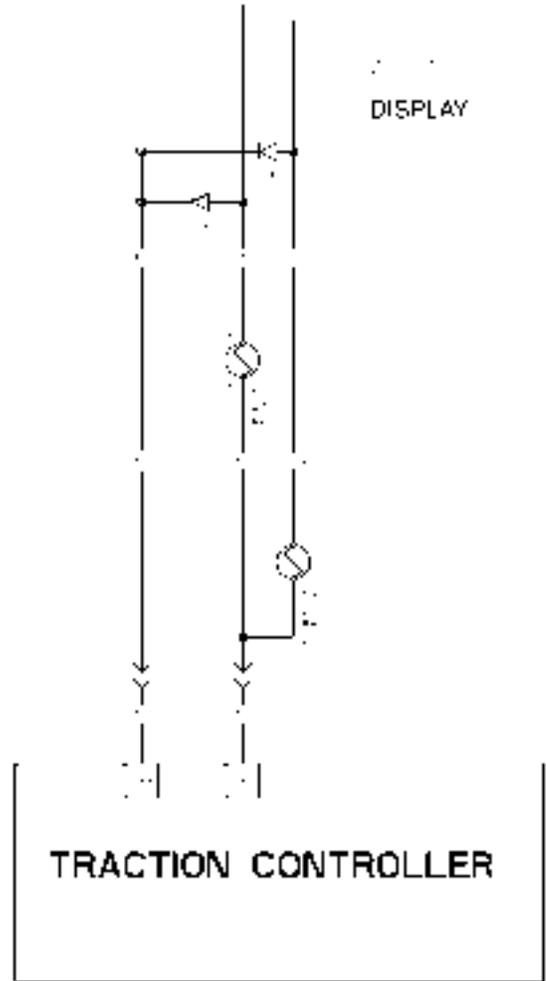


Status Code	Premium Display Message	Memory Recall	Circuit
208 (Cont)	PUMP REQUEST BEFORE KEY	No	Lift
<b>Description</b>		 <p style="text-align: right; font-size: small;">E442M124</p>	
Incorrect pump motor starting sequence.			
<b>Symptom</b>			
Lift does not operate.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• If the status reading has stopped flashing "1" and "0" alternately and if the pump motor has stopped: One or both of the encoders is faulty. Check both encoders by measuring the resistance between any combination of connector pins 1, 2, 5, and 6 on the motor side. The resistance should be at least 1 megohm. Parking brakes that are dragging can damage the encoders. Inspect the parking brakes for proper operation when encoders have to be replaced. See <b>Brake System</b> 1800 YRM 1076.</li> </ul>			
<p><b>Electro-Hydraulic Valve</b></p> <ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Cycle key switch from <b>OFF</b> to <b>ON</b>.</li> <li>• Check for function lever not in neutral. See the section <b>Electro-Hydraulic Control Valve</b> 2000 YRM 1086.</li> <li>• Use the dash display diagnostic to view all hydraulic functions while all levers are in neutral. All functions should show 0%.</li> </ul>			

Status Code	Premium Display Message	Memory Recall	Circuit
209L	BRAKE COIL OPEN	No	Brake
<b>Description</b>			
Brake coil is open, disabling traction.			
<b>Symptom</b>			
No truck movement, or truck may pull to one side when starting to accelerate.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Check the resistance of the brake coil. The coil resistance should read approximately 32 ohms at 24°C (75°F).</li> <li>• Recycle key switch.</li> <li>• Check for voltage at the brake coil. Should read approximately 36 volts. If no voltage, check wiring for loose connections at the dash display connector pins A12 &amp; A13. Also check pins C28 &amp; C29 at the traction controller. Check for open circuits in the wiring harness.</li> <li>• Check brake circuit diodes.</li> <li>• Check brake circuit diodes D2 and D3 for an open or shorted condition.</li> </ul>			

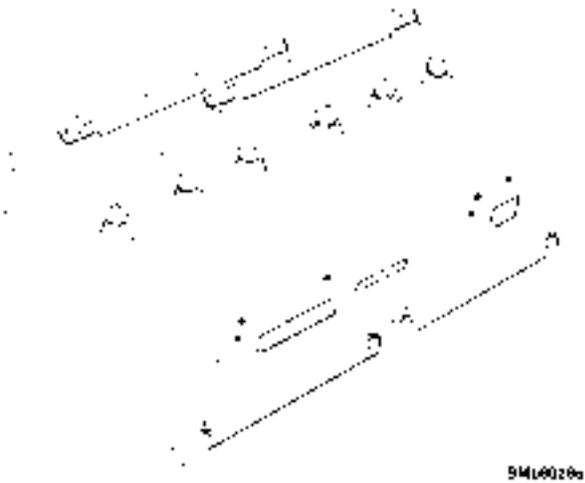


Status Code	Premium Display Message	Memory Recall	Circuit
209R	BRAKE COIL OPEN	No	Brake
<b>Description</b>			
Brake coil is open, disabling traction.			
<b>Symptom</b>			
No truck movement, or truck may pull to one side when starting to accelerate.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Check the resistance of the brake coil. The coil resistance should read approximately 32 ohms at 24°C (75°F).</li> <li>• Recycle key switch.</li> <li>• Check for voltage at the brake coil. Should read approximately 36 volts. If no voltage, check wiring for loose connections at the dash display connector pins A12 &amp; A13. Also check pins C28 &amp; C29 at the traction controller. Check for open circuits in the wiring harness.</li> <li>• Check brake circuit diodes.</li> <li>• Check brake circuit diodes D2 and D3 for an open or shorted condition.</li> </ul>			

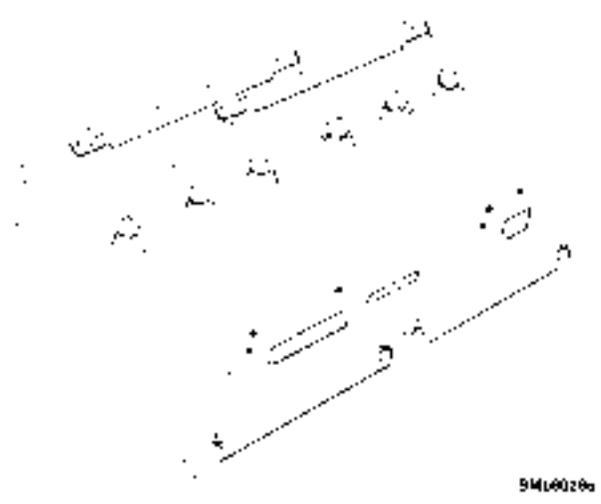


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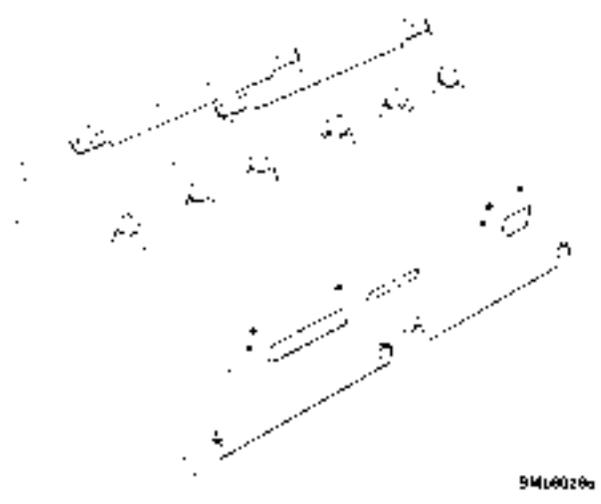
Status Code	Premium Display Message	Memory Recall	Circuit
210	WATCHDOG IN TRACTION CONTROLLER	Yes	Traction
<b>Description</b>			
The internal "watchdog" hardware circuit has been triggered.			
<b>Symptom</b>			
Lift truck does not move.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Cycle key switch from <b>OFF</b> to <b>ON</b>.</li> <li>• Check resistance between CANL and CANH wires at the controller. Resistance should be approximately 60 ohms.</li> <li>• Ensure CANL, CANH, B+, or B- is not shorted to the frame of the truck.</li> <li>• Ensure CANL or CANH is not shorted to B-.</li> <li>• Ensure CANL and CANH is not shorted to B+.</li> <li>• If the truck is equipped with electro-hydraulics option, check for continuity between the hydraulic levers mounting plate and the truck frame.</li> <li>• ETACC tests may be conducted on the system if you have access to the ETACC software. Refer to ETACC Test.</li> </ul>			



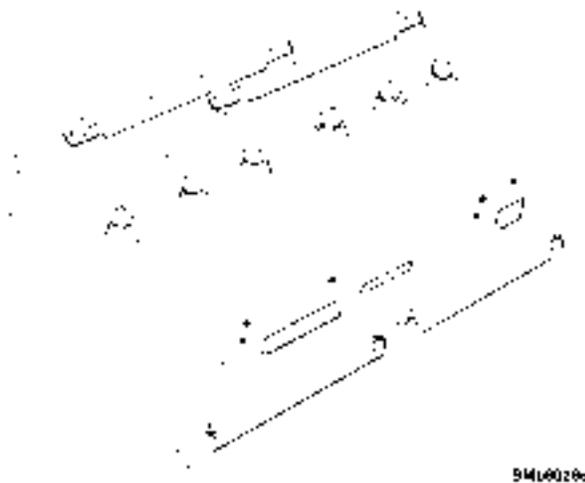
Status Code	Premium Display Message	Memory Recall	Circuit
212L	LEFT U.V.W. VOLTAGE FEEDBACK	Yes	Traction
<b>Description</b>			
Problem with UVW voltage feedback in slave controller.			
<b>Symptom</b>			
No traction.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Check that traction motor windings are not shorted to the truck frame.</li> </ul>			



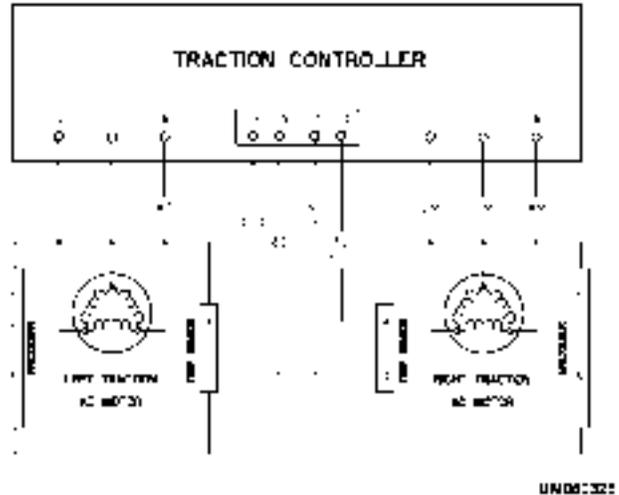
Status Code	Premium Display Message	Memory Recall	Circuit
212R	RIGHT U.V.W. VOLTAGE FEEDBACK	Yes	Traction
<b>Description</b>			
Problem with UVW voltage feedback in master controller.			
<b>Symptom</b>			
No traction.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Check that traction motor windings are not shorted to the truck frame.</li> </ul>			



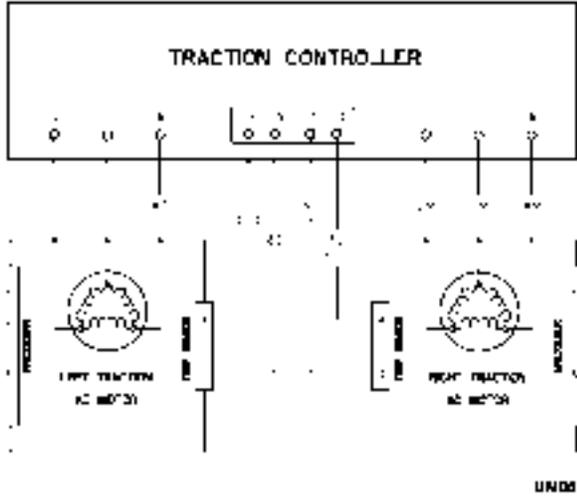
Status Code	Premium Display Message	Memory Recall	Circuit
213	UNDER/OVER VOLTAGE	Yes	Internal Controller
<b>Description</b>			
The controller has detected an overvoltage or an undervoltage condition within the controller.			
<b>Symptom</b>			
Lift truck does not move.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Cycle key switch from <b>OFF</b> to <b>ON</b>.</li> <li>• Check that the battery is the proper voltage and is fully charged. Check the specific gravity of each cell.</li> <li>• If a fault occurs at key ON, disconnect the dc-dc converter if installed on the truck.</li> <li>• If the fault occurs when a hydraulic or traction function is activated, check the battery disconnect switch condition and the main contactor tip condition.</li> </ul>			



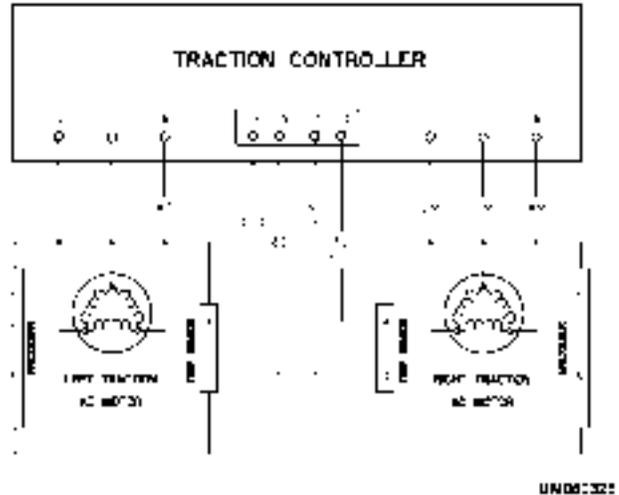
Status Code	Premium Display Message	Memory Recall	Circuit
214L	LEFT MOTOR VOLTAGE LOW	Yes	Traction
<b>Description</b>			
Incorrect voltage on one phase of the power circuit.			
<b>Symptom</b>			
Lift truck does not move.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Check all wiring connections to motors and controller. All connections should be tight.</li> <li>• Ensure power wires are connected to correct terminals. See the section <b>Diagrams</b> 8000 YRM 1081.</li> <li>• Check the resistance of each motor winding. Each winding should measure approximately 10.00 ±0.10 milliohms (48V) and 6.10 ±0.10 milliohms (36V).</li> <li>• Ensure each of the motor windings is not shorted to the truck frame.</li> </ul>			



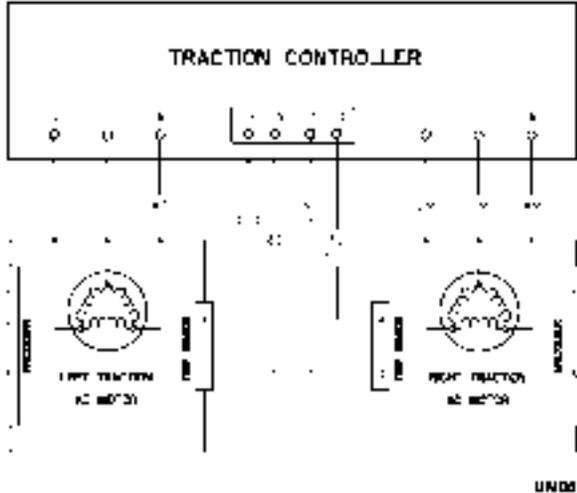
Status Code	Premium Display Message	Memory Recall	Circuit
214R	RIGHT MOTOR VOLTAGE LOW	Yes	Traction
<b>Description</b>			
Incorrect voltage on one phase of the power circuit.			
<b>Symptom</b>			
Lift truck does not move.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Check all wiring connections to motors and controller. All connections should be tight.</li> <li>• Ensure power wires are connected to correct terminals. See the section <b>Diagrams</b> 8000 YRM 1081.</li> <li>• Check the resistance of each motor winding. Each winding should measure approximately 10.00 ±0.10 milliohms (48V) and 6.10 ±0.10 milliohms (36V).</li> <li>• Ensure each of the motor windings is not shorted to the truck frame.</li> </ul>			

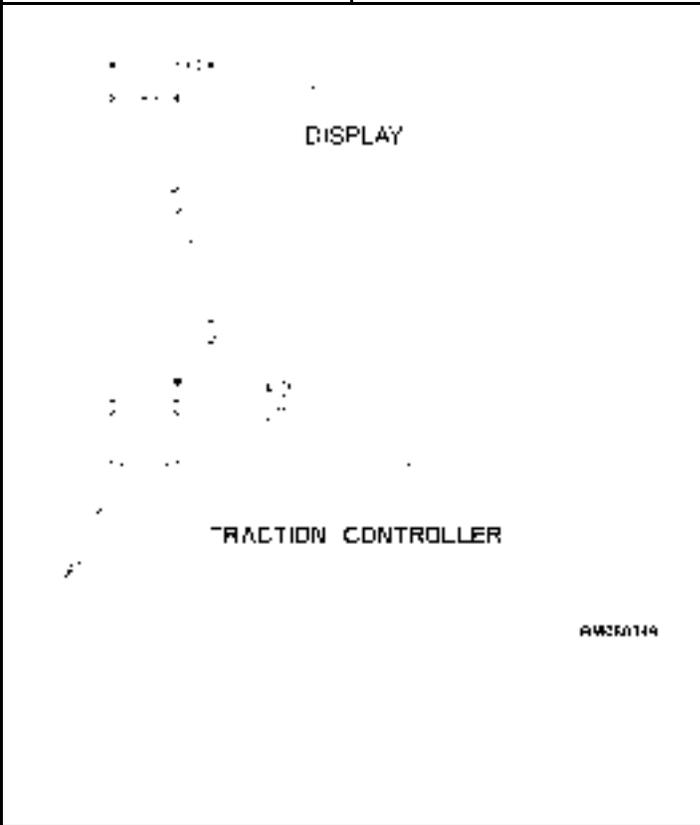


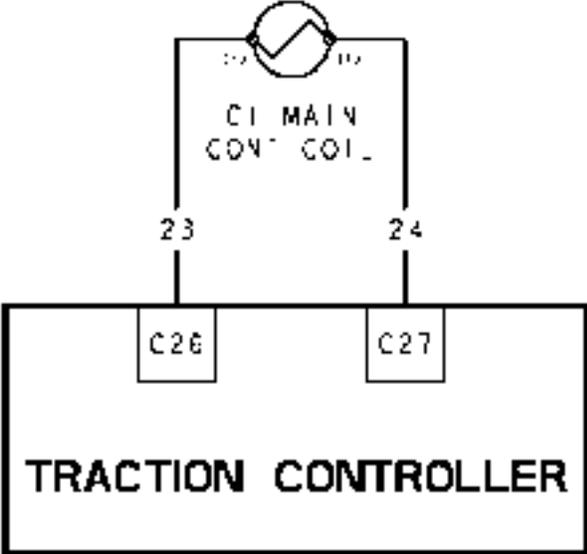
Status Code	Premium Display Message	Memory Recall	Circuit
215L	LEFT MOTOR VOLTAGE HIGH	Yes	Traction
<b>Description</b>			
Incorrect voltage on one phase of the power circuit.			
<b>Symptom</b>			
Lift truck does not move.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Check all wiring connections to motors and controller. All connections should be tight and clean.</li> <li>• Ensure power wires are connected to correct terminals. See the section <b>Diagrams</b> 8000 YRM 1081.</li> <li>• Check the resistance of each motor winding. Each winding should measure approximately 10.00 ±0.10 milliohms (48V) and 6.10 ±0.10 milliohms (36V).</li> <li>• Ensure each of the motor windings is not shorted to the truck frame.</li> </ul>			



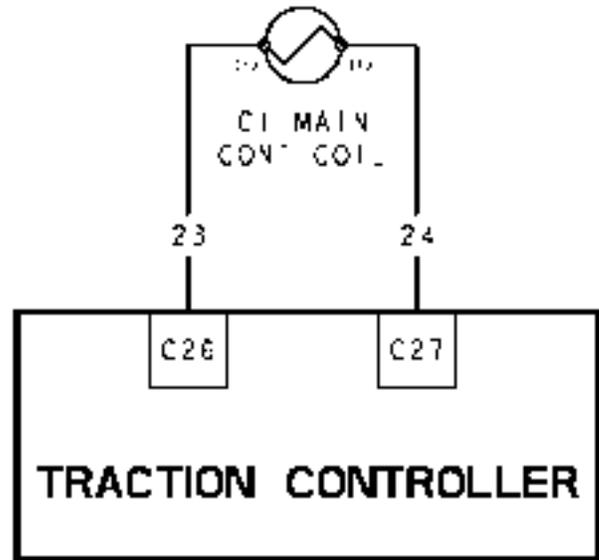
Status Code	Premium Display Message	Memory Recall	Circuit
215R	RIGHT MOTOR VOLTAGE HIGH	Yes	Traction
<b>Description</b>			
Incorrect voltage on one phase of the power circuit.			
<b>Symptom</b>			
Lift truck does not move.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Check all wiring connections to motors and controller. All connections should be tight and clean.</li> <li>• Ensure power wires are connected to correct terminals. See the section <b>Diagrams</b> 8000 YRM 1081.</li> <li>• Check the resistance of each motor winding. Each winding should measure approximately 10.00 ±0.10 milliohms (48V) and 6.10 ±0.10 milliohms (36V).</li> <li>• Ensure each of the motor windings is not shorted to the truck frame.</li> </ul>			



Status Code	Premium Display Message	Memory Recall	Circuit
222	MAIN OR BRAKE COIL OVERCURRENT	Yes	Traction
<b>Description</b>			
The controller checks to ensure the main contactor or brake coils are not shorted at start up.			
<b>Symptom</b>			
Lift truck does not move.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Check for shorted main contactor coil. Coil should measure approximately 32 ohms resistance across the coil terminals.</li> <li>• Check for shorted wiring.</li> <li>• Check for shorted brake coils. Coil should measure 32.5 ohms resistance across the coil leads.</li> <li>• Check for shorted condition between pins C26 &amp; C27 and between pins C28 &amp; C29 at the traction controller.</li> </ul>			

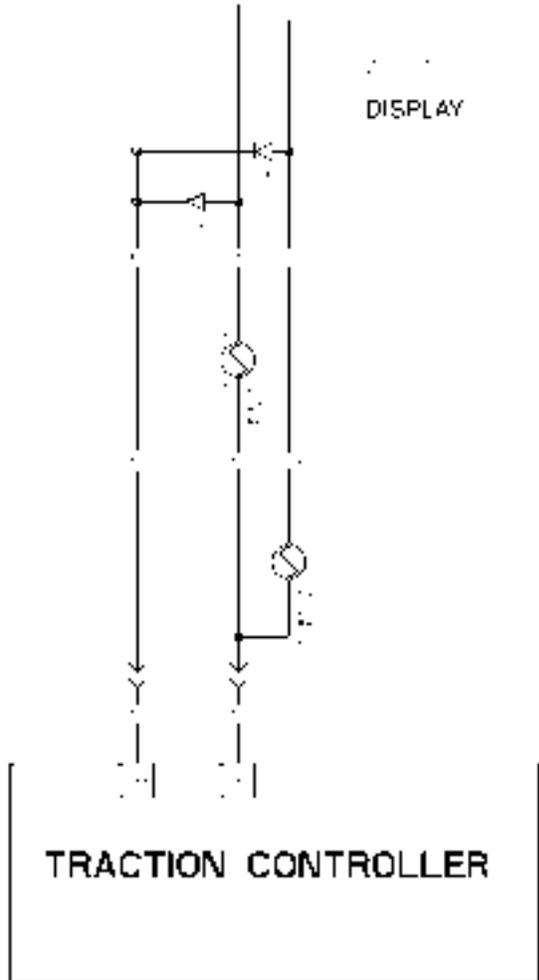
Status Code	Premium Display Message	Memory Recall	Circuit
223	MAIN CONTACTOR WELDED	Yes	Traction
<b>Description</b>		 <p style="text-align: right; font-size: small;">NW010317</p>	
The controller checks the main contactor tips and ensures they are open before powering the controller.			
<b>Symptom</b>			
Lift truck does not move.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Check that the main contactor tips are not welded.</li> <li>• Open contactor tips and replace if needed.</li> </ul>			

Status Code	Premium Display Message	Memory Recall	Circuit
224	MAIN CONTACTOR NOT CLOSED	Yes	Traction
<b>Description</b>			
The controller checks to ensure the main contactor closes after power has been supplied to the contactor coil.			
<b>Symptom</b>			
Lift truck does not move.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Ensure contactor is not stuck in open position.</li> <li>• Check the contactor coil. Coil should measure approximately 32 ohms resistance.</li> <li>• Check wiring from the controller to the contactor coil. Check for continuity from C26 to coil. Check for continuity from C27 to coil.</li> <li>• Check for shorted condition between C26 and the truck frame.</li> <li>• Check for shorted condition between C27 and the truck frame.</li> </ul>			

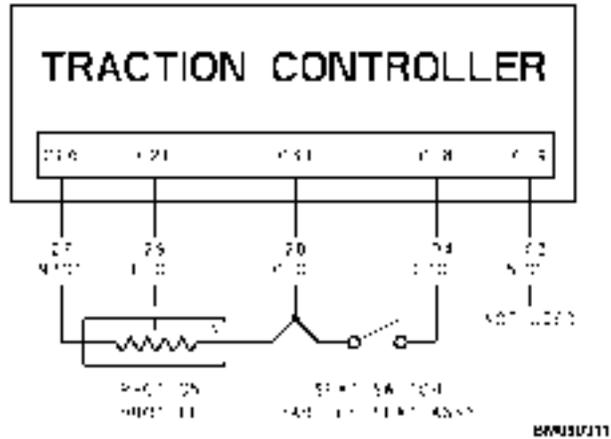


RM010317

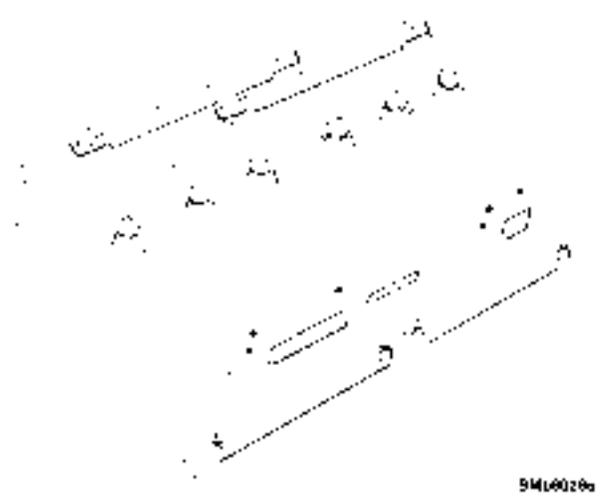
Status Code	Premium Display Message	Memory Recall	Circuit
226	BRAKE DRIVER OPEN OR SHORTED	Yes	Traction
<b>Description</b>			
Internal check of the parking brake driver in the controller.			
<b>Symptom</b>			
Lift truck does not move.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Check for a shorted condition between C28 at harness side of the connector and B-. If there is an indication of low resistance while making this check, check the wire harness for shorts.</li> <li>• Check for a shorted condition between C28 and B- at the controller side. If there is an indication of low resistance while making this check, the controller may be defective.</li> <li>• Check the brake coil resistance, the brake coil should measure approximately 31 ohms.</li> <li>• Check for a shorted condition between pin C28 at the traction controller and the truck frame. Check for a shorted condition from pin C29 to the truck frame at the traction controller.</li> </ul>			



Status Code	Premium Display Message	Memory Recall	Circuit
227	THROTTLE VOLTAGE HIGH	No	Traction
<b>Description</b>			
The traction controller is receiving a signal for traction from the accelerator potentiometer without the start switch being closed.			
<b>Symptom</b>			
Lift truck does not move.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Accelerator potentiometer is out of adjustment. Recalibrate throttle. See the section <b>Electrical System</b> 2200 YRM 1078.</li> <li>• Malfunction of the start switch. Use dash display diagnostics to check operation of the start switch. Check for proper switch adjustment.</li> <li>• Use the dash display diagnostics to check operation of the throttle sensor. Replace throttle sensor if necessary.</li> <li>• Check for a shorted condition between pins C20, C21 and C33 at the traction controller and the truck frame.</li> </ul>			



Status Code	Premium Display Message	Memory Recall	Circuit
238	TRACTION CONTROLLER FAULT	Yes/No	Traction
<b>Description</b>			
Internal failure of the traction controller hardware.			
<b>Symptom</b>			
Lift truck will not operate.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Check the condition of the main contactor and pump contactor (if equipped) tips.</li> <li>• Recycle key from <b>OFF</b> to <b>ON</b>.</li> <li>• If the truck is equipped with a pump controller, check all pump motor power connections and cables.                         <ul style="list-style-type: none"> <li>Check for a shorted condition between P+ and the truck frame and between P- and the truck frame.</li> <li>Check for reverse rotation of the pump motor when returning a hydraulic function to neutral. If reverse rotation is observed, check hydraulic valves for proper operation.</li> </ul> </li> </ul>			

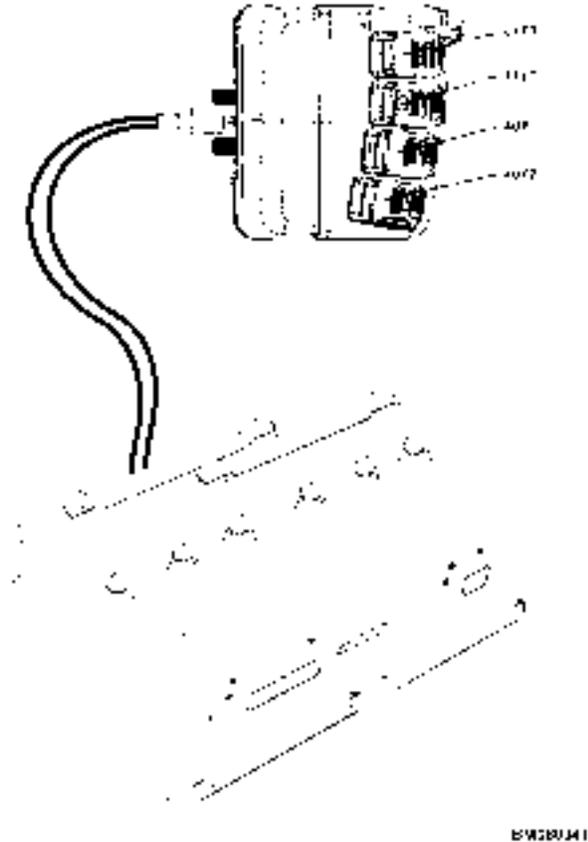
Status Code	Premium Display Message	Memory Recall	Circuit
239	ALARM IN SLAVE	Yes	Internal Controller
<b>Description</b>			
Master controller has detected a problem with the slave controller.			
<b>Symptom</b>			
Lift truck does not operate.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Check the condition of the main contactor and pump contactor (if equipped) tips.</li> <li>• Recycle key from <b>OFF</b> to <b>ON</b>.</li> <li>• Check resistance between CANH and CANL wires at the traction controller. Resistance should be approximately 60 ohms.</li> <li>• Check CANL, CANH, B+, and B- are not shorted to the frame of the truck.</li> <li>• Check CANL and CANH are not shorted to B- or B+.</li> <li>• Check all CANbus wiring for loose connections or damaged wiring.</li> <li>• If the truck is equipped with electro-hydraulics option, check for continuity between the hydraulic levers mounting plate and the truck frame.</li> <li>• ETACC tests may be conducted on the system if you have access to the ETACC software. Refer to ETACC Test.</li> </ul>			
			

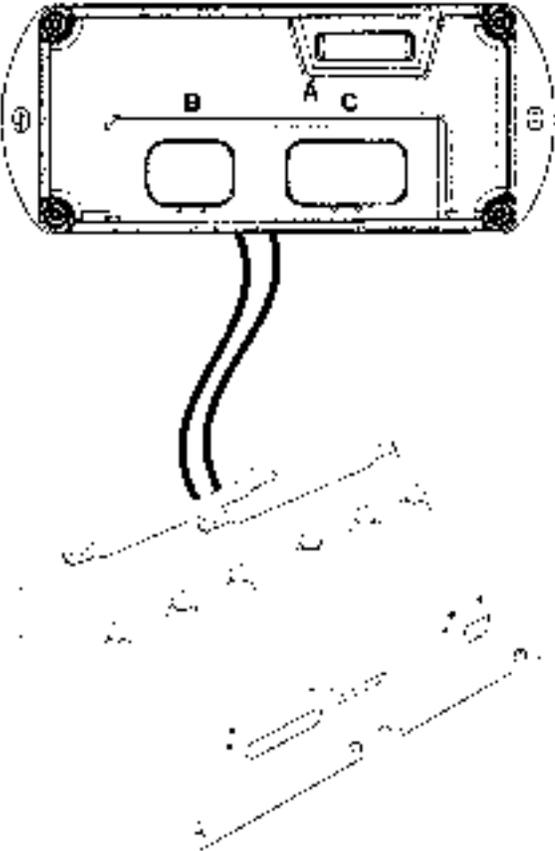
Status Code	Premium Display Message	Memory Recall	Circuit
240	ALARM IN MASTER	Yes	Internal Controller
<b>Description</b>			
Slave controller has detected a problem with the master controller.			
<b>Symptom</b>			
Lift truck does not operate.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Check the condition of the main contactor and pump contactor (if equipped) tips.</li> <li>• Recycle key from <b>OFF</b> to <b>ON</b>.</li> <li>• Check resistance between CANH and CANL wires at the traction controller. Resistance should be approximately 60 ohms.</li> <li>• Check CANL, CANH, B+, and B- are not shorted to the frame of the truck.</li> <li>• Check CANL and CANH are not shorted to B- or B+.</li> <li>• Check all CANbus wiring for loose connections or damaged wiring.</li> <li>• If the truck is equipped with electro-hydraulics option, check for continuity between the hydraulic levers mounting plate and the truck frame.</li> <li>• ETACC tests may be conducted on the system if you have access to the ETACC software. Refer to ETACC Test.</li> </ul>			



Status Code	Premium Display Message	Memory Recall	Circuit
241	NO COMMUNICATION SLAVE TO MASTER	Yes	Internal Controller
<b>Description</b>			
Master controller is not receiving CAN messages from the slave controller.			
<b>Symptom</b>			
Lift truck does not move.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Check the condition of the main contactor and pump contactor (if equipped) tips.</li> <li>• Recycle key from <b>OFF</b> to <b>ON</b>.</li> <li>• Check resistance between CANH and CANL wires at the traction controller. Resistance should be approximately 60 ohms.</li> <li>• Check CANL, CANH, B+, and B- are not shorted to the frame of the truck.</li> <li>• Check CANL and CANH are not shorted to B- or B+.</li> <li>• Check all CANbus wiring for loose connections or damaged wiring.</li> <li>• If the truck is equipped with electro-hydraulics option, check for continuity between the hydraulic levers mounting plate and the truck frame.</li> <li>• ETACC tests may be conducted on the system if you have access to the ETACC software. Refer to ETACC Test.</li> </ul>			

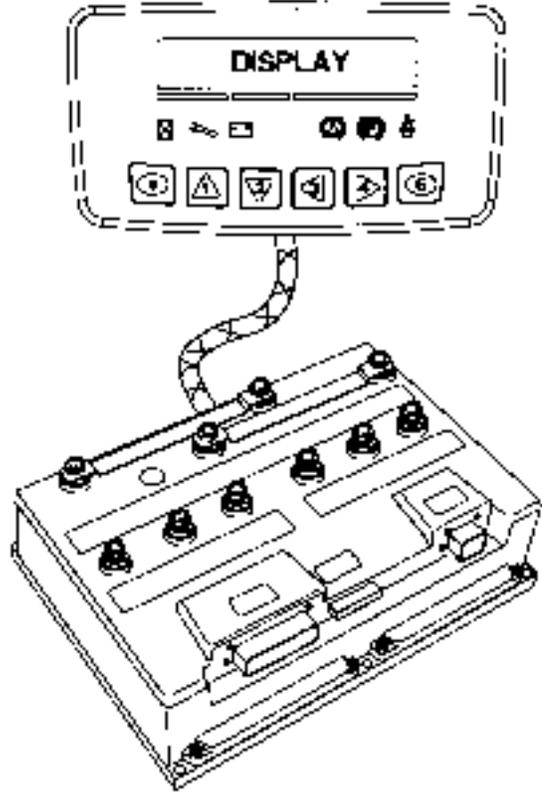
Status Code	Premium Display Message	Memory Recall	Circuit
242	NO COMMUNICATION LEVER TO MASTER TO MASTER	Yes	Lift
<b>Description</b>			
Master controller is not receiving CAN messages from the electro-hydraulic lever console.			
<b>Symptom</b>			
Lift does not operate.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Check the condition of the main contactor and pump contactor (if equipped) tips.</li> <li>• Recycle key from <b>OFF</b> to <b>ON</b>.</li> <li>• Check resistance between CANH and CANL wires at the traction controller. Resistance should be approximately 60 ohms.</li> <li>• Check CANL, CANH, B+, and B- are not shorted to the frame of the truck.</li> <li>• Check CANL and CANH are not shorted to B- or B+.</li> <li>• Check all CANbus wiring for loose connections or damaged wiring.</li> <li>• If the truck is equipped with electro-hydraulics option, check for continuity between the hydraulic levers mounting plate and the truck frame.</li> <li>• ETACC tests may be conducted on the system if you have access to the ETACC software. Refer to ETACC Test.</li> </ul>			



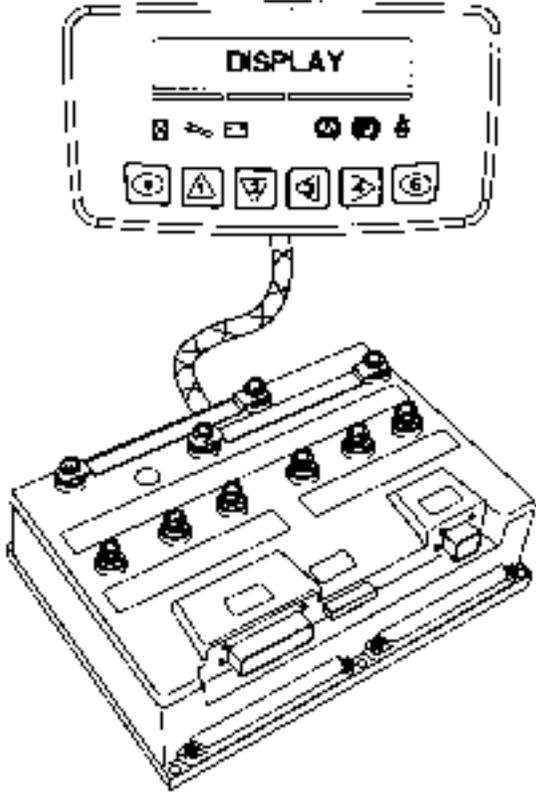
Status Code	Premium Display Message	Memory Recall	Circuit
243	NO COMMUNICATION EV TO SLAVE	Yes	Lift
<b>Description</b>		 <p style="text-align: right; font-size: small;">81053145</p>	
Slave controller is not receiving CAN messages from the electro-hydraulic valve driver module.			
<b>Symptom</b>			
Lift does not operate.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Check the condition of the main contactor and pump contactor (if equipped) tips.</li> <li>• Recycle key from <b>OFF</b> to <b>ON</b>.</li> <li>• Check resistance between CANH and CANL wires at the traction controller. Resistance should be approximately 60 ohms.</li> <li>• Check CANL, CANH, B+, and B- are not shorted to the frame of the truck.</li> <li>• Check CANL and CANH are not shorted to B- or B+.</li> <li>• Check all CANbus wiring for loose connections or damaged wiring.</li> <li>• If the truck is equipped with electro-hydraulics option, check for continuity between the hydraulic levers mounting plate and the truck frame.</li> <li>• ETACC tests may be conducted on the system if you have access to the ETACC software. Refer to ETACC Test.</li> </ul> <p>EV = Electro-hydraulic valve driver module.</p>			

Status Code	Premium Display Message	Memory Recall	Circuit
244	DASH DISPLAY FAULT	No	Display
<b>Description</b>		 <p style="text-align: right; font-size: small;">RM001543</p>	
Failure of the dash display memory.			
<b>Symptom</b>			
Dash display does not operate.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Recycle key from OFF to ON.</li> <li>• Check all wiring and pins in the dash display connector are tight and secure.</li> </ul>			

Status Code	Premium Display Message	Memory Recall	Circuit
245	NO COMMUNICATION MASTER TO DASH	Yes	Traction
<b>Description</b>			
Master controller is not receiving CAN messages from the dash display.			
<b>Symptom</b>			
Lift truck does not move or moves very slowly.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Check the condition of the main contactor and pump contactor (if equipped) tips.</li> <li>• Recycle key from <b>OFF</b> to <b>ON</b>.</li> <li>• Check termination resistor. Should measure approximately 60 ohms between A7 and A22 at the dash display.</li> <li>• Check resistance between CANH and CANL wires at the traction controller. Resistance should be approximately 60 ohms.</li> <li>• Check CANL, CANH, B+, and B- are not shorted to the frame of the truck.</li> <li>• Check CANL and CANH are not shorted to B- or B+.</li> <li>• Check all CANbus wiring for loose connections or damaged wiring.</li> <li>• If the truck is equipped with electro-hydraulics option, check for continuity between the hydraulic levers mounting plate and the truck frame.</li> <li>• ETACC tests may be conducted on the system if you have access to the ETACC software. Refer to ETACC Test.</li> </ul>			

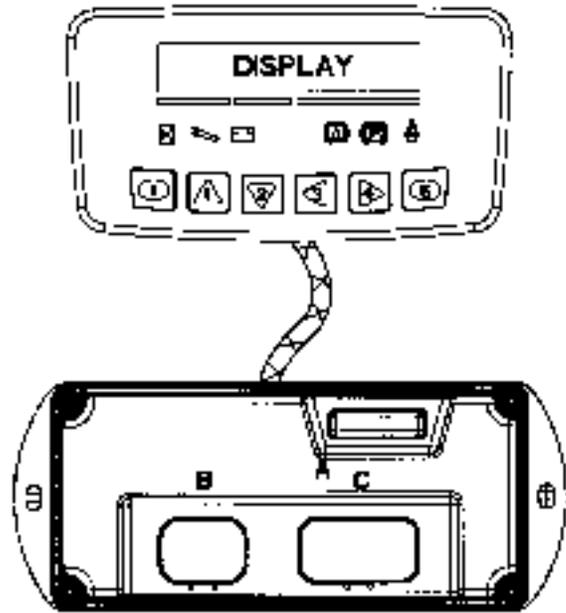


Status Code	Premium Display Message	Memory Recall	Circuit
246	NO COMMUNICATION SLAVE TO DASH	Yes	Traction
<b>Description</b>			
Slave controller is not receiving CAN messages from dash display.			
<b>Symptom</b>			
Lift truck does not move.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Check the condition of the main contactor and pump contactor (if equipped) tips.</li> <li>• Recycle key from <b>OFF</b> to <b>ON</b>.</li> <li>• Check termination resistor. Should measure approximately 60 ohms between A7 and A22 at the dash display.</li> <li>• Check resistance between CANH and CANL wires at the traction controller. Resistance should be approximately 60 ohms.</li> <li>• Check CANL, CANH, B+, and B- are not shorted to the frame of the truck.</li> <li>• Check CANL and CANH are not shorted to B- or B+.</li> <li>• Check all CANbus wiring for loose connections or damaged wiring.</li> <li>• If the truck is equipped with electro-hydraulics option, check for continuity between the hydraulic levers mounting plate and the truck frame.</li> <li>• ETACC tests may be conducted on the system if you have access to the ETACC software. Refer to ETACC Test.</li> </ul>			



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Status Code	Premium Display Message	Memory Recall	Circuit
247	NO COMMUNICATION EV TO DASH	Yes	Lift
<b>Description</b>			
Electro-hydraulic valve driver module is not receiving CAN messages from the dash display.			
<b>Symptom</b>			
Lift does not operate.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Check the condition of the main contactor and pump contactor (if equipped) tips.</li> <li>• Recycle key from OFF to ON.</li> <li>• Check continuity of the CANbus wires between the dash display and the valve driver module.</li> <li>• Check resistance between CANH and CANL wires at the traction controller. Resistance should be approximately 60 ohms.</li> <li>• Check CANL, CANH, B+, and B- are not shorted to the frame of the truck.</li> <li>• Check CANL and CANH are not shorted to B- or B+.</li> <li>• Check all CANbus wiring for loose connections or damaged wiring.</li> <li>• If the truck is equipped with electro-hydraulics option, check for continuity between the hydraulic levers mounting plate and the truck frame.</li> <li>• ETACC tests may be conducted on the system if you have access to the ETACC software. Refer to ETACC Test.</li> </ul>			
EV = Electro-hydraulic valve driver module.			

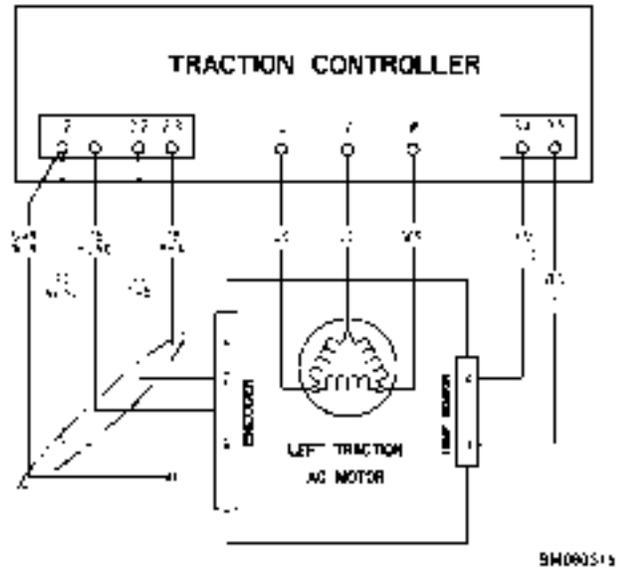


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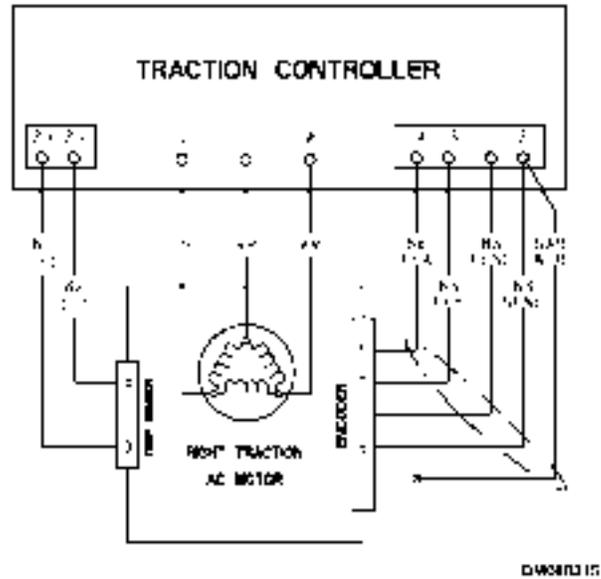
Status Code	Premium Display Message	Memory Recall	Circuit
248	NO COMMUNICATION MASTER TO SLAVE	Yes	Internal Controller
<b>Description</b>			
Slave controller is not receiving CAN messages from the master controller.			
<b>Symptom</b>			
Lift truck does not move.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Check the condition of the main contactor and pump contactor (if equipped) tips.</li> <li>• Recycle key from OFF to ON.</li> <li>• Check continuity of the CANbus wires between the dash display and the valve driver module.</li> <li>• Check resistance between CANH and CANL wires at the traction controller. Resistance should be approximately 60 ohms.</li> <li>• Check CANL, CANH, B+, and B- are not shorted to the frame of the truck.</li> <li>• Check CANL and CANH are not shorted to B- or B+.</li> <li>• If the truck is equipped with electro-hydraulics option, check for continuity between the hydraulic levers mounting plate and the truck frame.</li> <li>• ETACC tests may be conducted on the system if you have access to the ETACC software. Refer to ETACC Test.</li> </ul>			

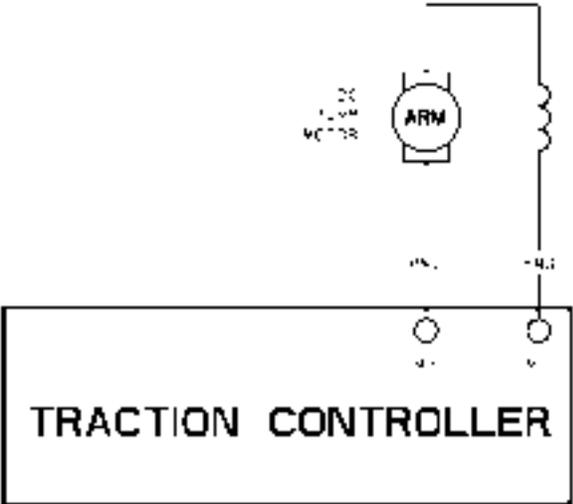
Status Code	Premium Display Message	Memory Recall	Circuit
249	NO COMMUNICATION SLAVE TO EV	Yes	Internal Controller
<b>Description</b>			
EV controller is not receiving CAN messages from the slave controller.			
<b>Symptom</b>			
Truck will not operate.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Check the condition of the main contactor and pump contactor (if equipped) tips.</li> <li>• Recycle key from OFF to ON.</li> <li>• Check resistance between CANH and CANL wires at the traction controller. Resistance should be approximately 60 ohms.</li> <li>• Check CANL, CANH, B+, and B- are not shorted to the frame of the truck.</li> <li>• Check CANL and CANH are not shorted to B- or B+.</li> <li>• Check all CANbus wiring for loose connections or damaged wiring.</li> <li>• If the truck is equipped with electro-hydraulics option, check for continuity between the hydraulic levers mounting plate and the truck frame.</li> <li>• ETACC tests may be conducted on the system if you have access to the ETACC software. Refer to ETACC Test.</li> </ul> <p>EV = Electro-hydraulic valve driver module.</p>			

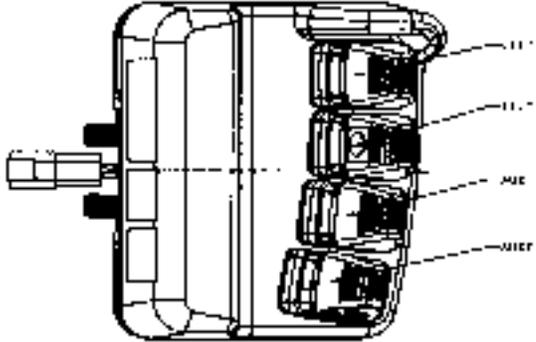
Status Code	Premium Display Message	Memory Recall	Circuit
250L	LEFT ROTOR LOCKED	Yes	Traction
<b>Description</b>			
The controller is supplying current to the traction motors while sensing one or both of the traction motors is not turning.			
<b>Symptom</b>			
No truck movement while depressing the accelerator pedal.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Wheel is in a hole and the truck cannot move.</li> <li>• Brake coil has not released the brake disk.</li> <li>• Mechanical failure of one or both of the traction motors.</li> <li>• Use the dash display diagnostics to check operation of traction motor encoder.</li> <li>• Check for 12 volts at encoder between wires 75 and 76.</li> <li>• Ensure all wiring connections between the encoder harness and the traction motor are tight.</li> <li>• Check for continuity of all wiring between the encoder and the traction controller.</li> <li>• Check for any shorted condition from pins C11, C12, C22, or C23 at the traction controller to the truck frame.</li> <li>•</li> <li>• Ensure the wiring to the encoder is correct. See the section <b>Diagrams</b> 8000 YRM 1081.</li> <li>• Disconnect the 6 pin connector at the traction motor and measure the resistance between any combination of pins 1, 2, 5, and 6. The resistance should be at least 1 megohm.</li> </ul>			

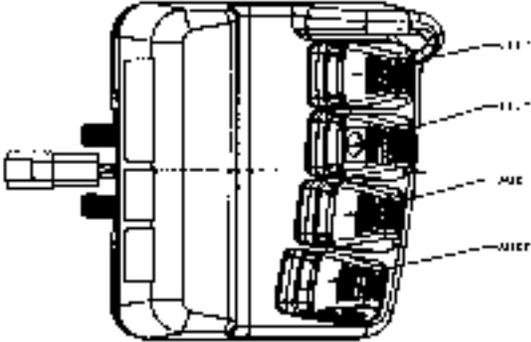


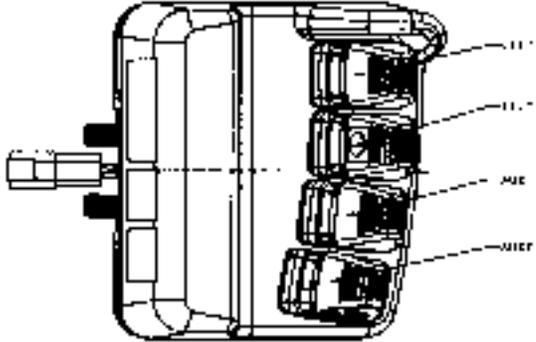
Status Code	Premium Display Message	Memory Recall	Circuit
250R	RIGHT ROTOR LOCKED	Yes	Traction
<b>Description</b>			
The controller is supplying current to the traction motors while sensing one or both of the traction motors is not turning.			
<b>Symptom</b>			
No truck movement while depressing the accelerator pedal.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Wheel is in a hole and the truck cannot move.</li> <li>• Brake coil has not released the brake disk.</li> <li>• Mechanical failure of one or both of the traction motors.</li> <li>• Use the dash display diagnostics to check operation of traction motor encoder.</li> <li>• Check for 12 volts at encoder between wires 83 and 84.</li> <li>• Ensure all wiring connections between the encoder harness and the traction motor are tight.</li> <li>• Check for continuity of all wiring between the encoder and the traction controller.</li> <li>• Check for any shorted condition from pins C1, C2, C13, or C14 at the traction controller to the truck frame.</li> <li>•</li> <li>• Ensure the wiring to the encoder is correct. See the section <b>Diagrams</b> 8000 YRM 1081.</li> <li>• Disconnect the 6 pin connector at the traction motor and measure the resistance between any combination of pins 1, 2, 5, and 6. The resistance should be at least 1 megohm.</li> </ul>			

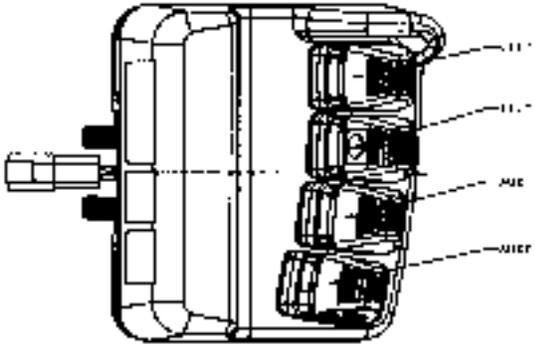


Status Code	Premium Display Message	Memory Recall	Circuit
260	PUMP MOTOR VOLTAGE LOW	Yes	Transistor Lift
<b>Description</b>			
Incorrect voltage on pump motor.			
<b>Symptom</b>			
No lift operation.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Wrong voltage battery installed in truck.     Ensure battery voltage matches voltage shown on truck nameplate.</li> <li>• Wrong voltage parameter selection.     Ensure parameter setting matches voltage shown on truck nameplate.     Check parameter setting using the dash display.</li> <li>• Check for any shorted condition from P+ or P- to the truck frame.</li> <li>• Check for any shorted condition between P- and B-.</li> <li>• Check P+ and P- connections are tight at the controller and the pump motor.</li> </ul>			

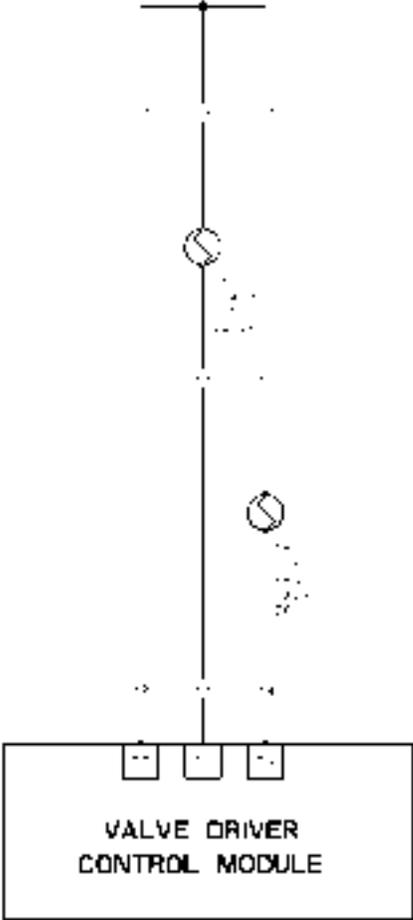
Status Code	Premium Display Message	Memory Recall	Circuit
270	LIFT/LOWER LEVER ERROR	Yes	Electro-hydraulic
<b>Description</b>			
Error in signal from the lift/lower lever assembly.			
<b>Symptom</b>			
No lift/lower operation.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Check all wiring connections between the hydraulic lever console and the hydraulic controller are tight and secure.</li> <li>• Check for 12 volts at pin 1 on the hydraulic lever console.                  Check for 12 volts at pin B10 on the valve driver module.</li> <li>• Replace the lift/lower lever PC board.</li> </ul>			

Status Code	Premium Display Message	Memory Recall	Circuit
271	TILT LEVER ERROR	Yes	Electro-hydraulic
<b>Description</b>			
Error in the signal from the tilt lever.			
<b>Symptom</b>			
No mast tilt operation.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Check all wiring connections between the hydraulic lever console and the hydraulic controller are tight and secure.</li> <li>• Check for 12 volts at pin 1 on the hydraulic lever console.                  Check for 12 volts at pin B10 on the valve driver module.</li> <li>• Replace the tilt lever PC board.</li> </ul>			

Status Code	Premium Display Message	Memory Recall	Circuit
272	3RD FUNCTION LEVER ERROR	Yes	Electro-hydraulic
<b>Description</b>			
Error in the signal from the sideshift lever.			
<b>Symptom</b>			
No carriage sideshift operation.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Check all wiring connections between the hydraulic lever console and the hydraulic controller are tight and secure.</li> <li>• Check for 12 volts at pin 1 on the hydraulic lever console.                  Check for 12 volts at pin B10 on the valve driver module.</li> <li>• If the truck is not equipped with 3rd. function, make sure 3rd function parameter is set at 3.</li> <li>• Replace the sideshift lever PC board.</li> </ul>			

Status Code	Premium Display Message	Memory Recall	Circuit
273	4TH FUNCTION LEVER ERROR	Yes	Electro-hydraulic
<b>Description</b>		 <p style="text-align: right; margin-right: 50px;">B906020</p>	
Error in the signal from the auxiliary lever.			
<b>Symptom</b>			
No operation of the auxiliary hydraulic function.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Check all wiring connections between the hydraulic lever console and the hydraulic controller are tight and secure.</li> <li>• If the truck is not equipped with 4th function, make sure 4th function parameter is set at 3.</li> <li>• Check for 12 volts at pin 1 on the hydraulic lever console.                  Check for 12 volts at pin B10 on the valve driver module.</li> <li>• Replace the auxiliary lever PC board.</li> </ul>			

Status Code	Premium Display Message	Memory Recall	Circuit
275	VALVE CONTROLLER FAULT	Yes	Electro-hydraulic
<b>Description</b>			
Internal failure of the valve driver module.			
<b>Symptom</b>			
No operation of the electro-hydraulic functions.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Recycle key switch from <b>OFF</b> to <b>ON</b>.</li> <li>• Check all pins at the valve controller connector are tight and secure.</li> <li>• Replace the valve driver module.</li> </ul>			

Status Code	Premium Display Message	Memory Recall	Circuit
276	LIFT/LOWER EV DRIVER SHORTED	Yes	Electro-hydraulic
<b>Description</b>			
Lift/lower driver in the valve driver module is shorted.			
<b>Symptom</b>			
No lift/lower operation.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Recycle key switch.</li> <li>• Disconnect connector "C" from EV. Check all wires for shorts to B-, the truck frame, or between wires.</li> <li>• Check resistance of coils: Resistance should read approximately 19 ohms at 25°C (77°F).</li> </ul>			
<p>EV = Electro-hydraulic valve driver module.</p> <div style="text-align: right; margin-top: 20px;">  </div>			

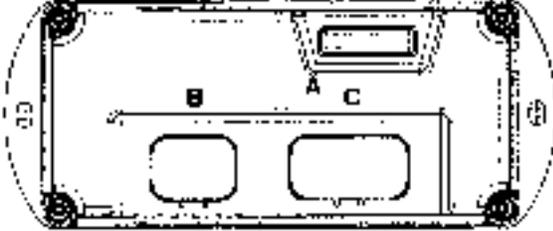
Status Code	Premium Display Message	Memory Recall	Circuit
277	4TH FUNCTION EV DRIVER SHORTED	Yes	Electro-hydraulic
<b>Description</b>		 <p>The diagram shows a rectangular box labeled 'VALVE DRIVER CONTROL MODULE' with several electrical terminals on top. Wires connect these terminals to various components, including two solenoid coils (represented by circles with an 'S' inside) and other smaller components. The connections are shown with lines and dots representing terminals.</p>	
Auxiliary driver in the valve driver module is shorted.			
<b>Symptom</b>			
No operation of the auxiliary hydraulic function.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Recycle key switch to clear fault.</li> <li>• Disconnect connector "C" from EV. Check all wires for shorts to B-, the truck frame, or between wires.</li> <li>• Check resistance of coils: Resistance should read approximately 19 ohms at 25°C (77°F).</li> </ul> <p>EV = Electro-hydraulic valve driver module.</p>			

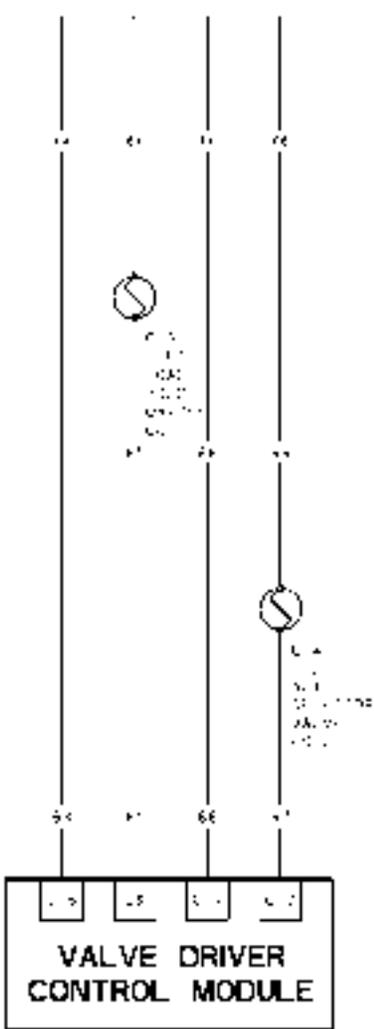
Status Code	Premium Display Message	Memory Recall	Circuit
279	TILT EV DRIVER SHORTED	Yes	Electro-hydraulic
<b>Description</b>			
Tilt driver in the valve driver module is shorted.			
<b>Symptom</b>			
No tilt function operation.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Recycle key switch to clear fault.</li> <li>• Disconnect connector "C" from EV. Check all wires for shorts to B-, the truck frame, or between wires.</li> <li>• Check resistance of coils: Resistance should read approximately 19 ohms at 25°C (77°F).</li> </ul> <p>EV = Electro-hydraulic valve driver module.</p>			

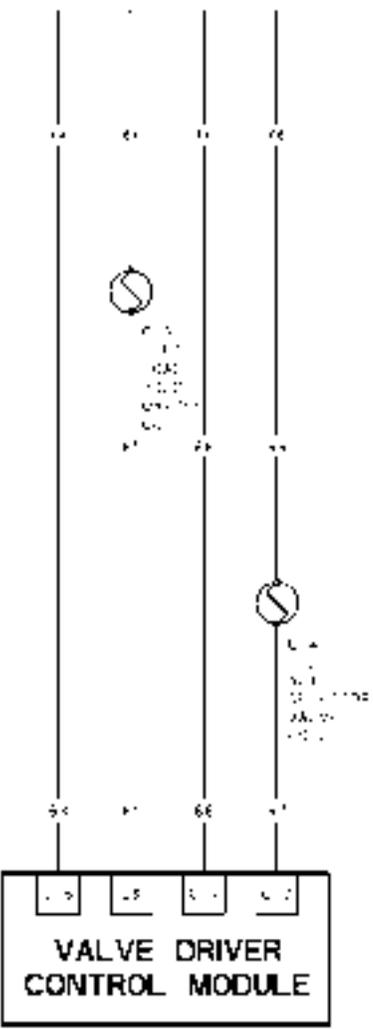
BM003302

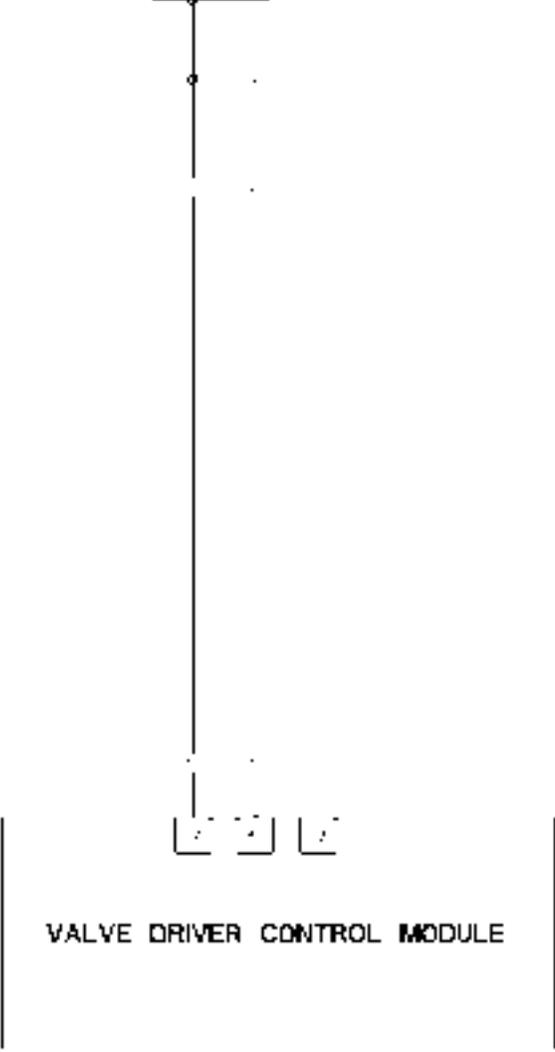
Status Code	Premium Display Message	Memory Recall	Circuit
280	3RD FUNCTION EV DRIVER SHORTED	Yes	Electro-hydraulic
<b>Description</b>			
The sideshift function driver in the valve driver module is shorted.			
<b>Symptom</b>			
No sideshift function operation.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Recycle key switch to clear fault.</li> <li>• Disconnect connector "C" from EV. Check all wires for shorts to B-, the truck frame, or between wires.</li> <li>• Check resistance of coils: Resistance should read approximately 19 ohms at 25°C (77°F).</li> </ul> <p>EV = Electro-hydraulic valve driver module.</p>			

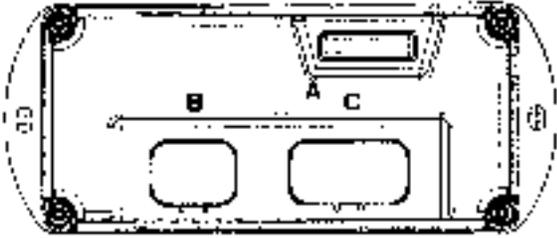
RM090333

Status Code	Premium Display Message	Memory Recall	Circuit
281	EV 9 DRIVER SHORTED	Yes	Electro-hydraulic
<b>Description</b>		 <p data-bbox="1307 625 1388 640">EWA10315</p>	
Single EVP driver is shorted.			
<b>Symptom</b>			
<b>Probable Causes and Test Procedures</b>			
<p>This spare output is not used.</p> <ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Recycle key switch to clear fault.</li> <li>• Disconnect connector "C" from EV. Check all wires for shorts to B-, the truck frame, or between wires.</li> </ul> <p>EV = Electro-hydraulic valve driver module.                      EVP = Electro-hydraulic proportional valve driver.</p>			

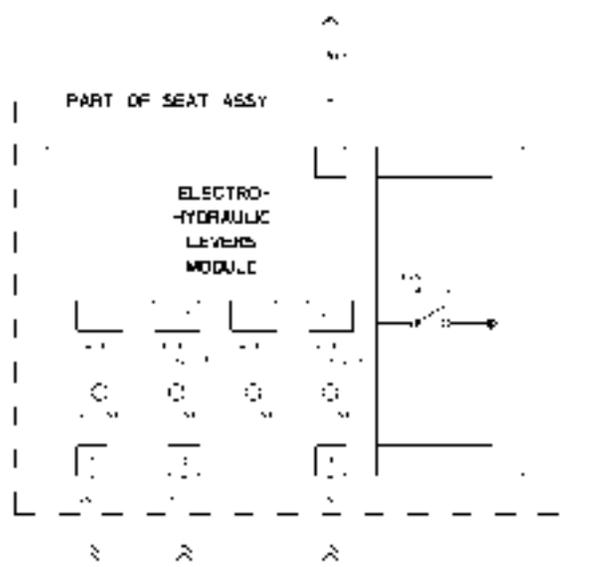
Status Code	Premium Display Message	Memory Recall	Circuit
282	SELECTOR EV DRIVER SHORTED	Yes	Electro-hydraulic
<b>Description</b>			
On/off EV driver is shorted.			
<b>Symptom</b>			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Recycle key switch to clear fault.</li> <li>• Disconnect connector "C" from EV. Check all wires for shorts to B-, the truck frame, or between wires.</li> <li>• Check resistance of coils: Resistance should read approximately 19 ohms at 25°C (77°F).</li> </ul>			
EV = Electro-hydraulic valve driver module.			
			

Status Code	Premium Display Message	Memory Recall	Circuit
283	SELECTOR EV COIL SHORTED	Yes	Electro-hydraulic
<b>Description</b>			
One of the electro-hydraulic valve coils is shorted.			
<b>Symptom</b>			
One of the hydraulic functions will not operate.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Recycle key switch to clear fault.</li> <li>• Disconnect connector "C" from EV. Check all wires for shorts to B-, the truck frame, or between wires.</li> <li>• Check resistance of coils: Resistance should read approximately 19 ohms at 25°C (77°F).</li> </ul>			
EV = Electro-hydraulic valve driver module.			
			

Status Code	Premium Display Message	Memory Recall	Circuit
289	EV CONTROLLER LOW VOLTAGE	Yes	Electro-hydraulic
<b>Description</b>			
Voltage supply to the valve driver control module is low.			
<b>Symptom</b>			
No operation of the electro-hydraulic functions.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Check for battery voltage at pins B1 and B2 with key switch closed.</li> <li>• Check that all connections are secure.</li> </ul> <p>EV = Electro-hydraulic valve driver module.</p>			

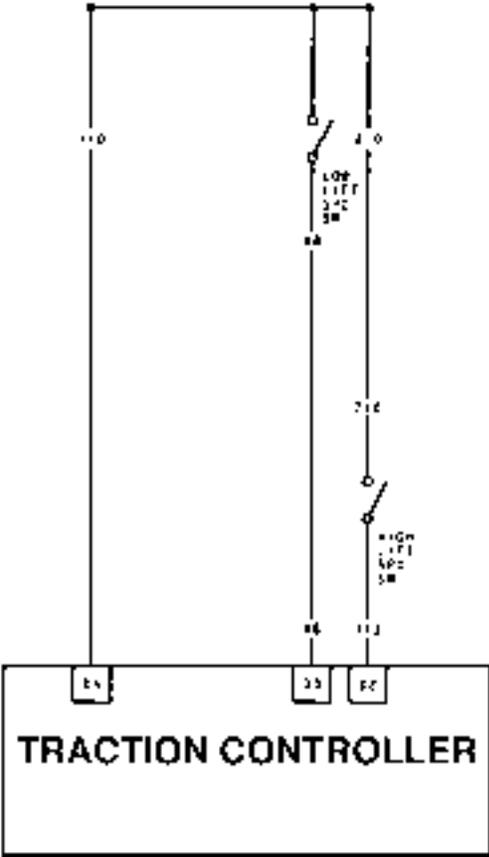
Status Code	Premium Display Message	Memory Recall	Circuit
292	WRONG BATTERY SET IN EV CONTROLLER	Yes	Electro-hydraulic
<b>Description</b>		 <p style="text-align: right; margin-right: 50px;">ENR10315</p>	
Incorrect battery selection parameter in the valve driver module.			
<b>Symptom</b>			
No operation of hydraulic system.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Ensure battery voltage matches voltage shown on the lift truck nameplate.     Install correct voltage battery in the lift truck.</li> <li>• Ensure battery parameter setting matches voltage shown on the lift truck nameplate.     Use dash display to change battery parameter.</li> </ul> <p>EV = Electro-hydraulic valve driver module.</p>			

Status Code	Premium Display Message	Memory Recall	Circuit
294	INTERLOCK SWITCH	No	Hydraulic
<b>Description</b>			
Message is displayed when an interlocked hydraulic function is requested without activating the interlock switch.			
<b>Symptom</b>			
No operation of the requested interlocked hydraulic function.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Check interlock switch on the ILM; replace as necessary.</li> </ul>			



PN0100172

Status Code	Premium Display Message	Memory Recall	Circuit
295	NO LO LIFT SWITCH INPUT	Yes	Hydraulics
<b>Description</b>			
Message is displayed when the hi-lift switch is closed and the lo-lift switch is open.			
<b>Symptom</b>			
Lift will only operate at low speed.			
<b>Probable Causes and Test Procedures</b>			
<ul style="list-style-type: none"> <li>• Ensure all fuses are properly seated and tight in the fuse holders.</li> <li>• Ensure all wiring connections are tight and secure at the fuse panel, key switch, and the battery disconnect switch.</li> <li>• Check that the battery disconnect switch, the key switch, and the main contactor contacts are in the correct position and properly making contact.</li> <li>• Use dash display diagnostics to check for correct operation of the lo-lift switch.</li> <li>• Check switch for correct operation.</li> <li>• Check for correct switch adjustment. See the section <b>Electrical System</b> 2200 YRM 1078 for adjustment procedure.</li> <li>• Check wiring to switch for loose connections or broken wires.</li> </ul>			



GW38110



**CONTROLLER CONNECTOR PIN OUTS**

*Table 5. Connector A*

Pin	Wire Number	Function
A1	CANH	High Level CANbus
A2		
A3		
A4	CANL-OUT	Low Level CANbus
A5		
A6	CANL	Low Level CANbus
A7	CANH-OUT	High Level CANbus
A8		

*Table 6. Connector C*

Pin	Wire Number	Function
C1	83	Right Motor Encoder Positive (+5V/+12V)
C2	84	Right Motor Encoder B-
C3	10	B+ from Key Switch
C4	110	B+ to Switches
C5	101	Seat Switch Input
C6	6	Forward Switch Input
C7	8	Reverse Switch Input
C8	15	Start Switch Input
C9	92	Brake Pedal Switch Input
C10	94	Hydraulic Function Input (Contactor Hydraulic Only)
C11	75	Left Motor Encoder Positive (+5V/+12V)
C12	76	Left Motor Encoder B-
C13	85	Right Motor Encoder Phase B
C14	86	Right Motor Encoder Phase A

*Table 6. Connector C (Continued)*

Pin	Wire Number	Function
C15	70	Steering Potentiometer B-
C16	72	Steering Potentiometer Positive (+5V/+12V)
C17	71	Steering Potentiometer Wiper Input
C18	104	Brake Potentiometer Wipe Input
C19	103	B-
C20	27	Accelerator Potentiometer B-
C21	29	Traction Potentiometer Wiper Input
C22	77	Left Motor Encoder Phase B
C23	78	Left Motor Encoder Phase A
C24	82	Right Motor Temp Sensor B-
C25	81	Right Motor Temp Sensor Input Signal
C26	23	Main Contactor B-
C27	24	Main Contactor B+
C28	50	Parking Brake Coil B-
C29	51	Parking Brake Coil B+
C30	88	Auxiliary B+
C31	87	Auxiliary B-
C32		B-
C33	28	Traction Potentiometer Positive (+5V/+12V)
C34	79	Left Traction Motor Temp Sensor B-
C35	80	Left Traction Motor Temp Sensor Input Signal

**Table 7. Connector D - Standard Model**

Pin	Wire Number	Function
D1		
D2	113	High Speed Lift Switch Input
D3	98	Low Speed Lift Switch Input
D4	114	Tilt Speed Prox Switch Input
D5	210	B+ for Hydraulic Switches
D6	97	4th Function Speed Switch Input
D7	93	Sideshift Switch Input
D8	95	Tilt Switch Input
D9		
D10		
D11		
D12		
D13		
D14		

**Table 8. Connector D - Premium Model**

Pin	Wire Number	Function
D1		
D2		
D3		
D4	114	Tilt Speed Prox Switch Input
D5	210	B+ for Hydraulic Switches
D6		

**Table 8. Connector D - Premium Model (Continued)**

Pin	Wire Number	Function
D7		
D8		
D9		
D10		
D11		
D12		
D13		
D14		

### VALVE DRIVER MODULE (ELECTRO-HYDRAULIC VALVE OPTION)

**Table 9. Connector B**

Pin	Wire Number	Function
B1	10-1	Key Switch Input B+
B2	10-1	Key Switch Input B+
B3	130	Battery Negative
B4	CANL-2	CAN Low Input Signal
B5	OPEN	
B6	OPEN	
B7	OPEN	
B8	OPEN	
B9	OPEN	
B10	74	12V Supply to Lever Module
B11	OPEN	
B12	OPEN	
B13	CANH-2	CAN High Input Signal
B14	OPEN	

**Table 10. Connector C**

Pin	Wire Number	Function
C1	53	Negative for Lowering Proportional Valve
C2	52	Positive for Lift and Lower Proportional Valves
C3	54	Negative for Lift Proportional Valve
C4	56	Negative for Auxiliary IN Proportional Valve
C5	55	Positive for Auxiliary Proportional Values
C6	57	Negative for Auxiliary OUT Proportional Valve
C7	59	Negative for Tilt UP Proportional Valve
C8	58	Positive Voltage Supply for Tilt Proportional Valves
C9	65	Negative for Load Hold Valve
C10	67	Negative for Tilt Auxiliary Selector Valve
C11	OPEN	
C12	62	Negative for Sideshift Right Proportional Valve
C13	61	Positive for Sideshift Right and Left Proportional Valves
C14	63	Negative for Sideshift Left Proportional Valve
C15	60	Negative for Tilt Down Proportional Valve
C16	64	Positive for Lift Hold Valve
C17	66	Positive for Tilt Auxiliary Selector Valve
C18	OPEN	
C19	OPEN	
C20	OPEN	
C21	OPEN	

**Table 10. Connector C (Continued)**

Pin	Wire Number	Function
C22	OPEN	
C23	130	Battery Negative

**HYDRAULIC LEVER CONSOLE  
(ELECTRO-HYDRAULIC OPTION ONLY)**

Pin	Wire Number	Function
1	74	12V Supply from Valve Driver Module
2	CANH_OUT1	CANbus High
3	130	Battery Negative
4	CANL_OUT1	CANbus Low

**DASH DISPLAY**

Pin	Wire Number	Function
A1	10-1B	Key Switch Input B+
A2	110-1	Positive Supply to Indicators
A3	130F	Battery Negative B-
A4	130G	Battery Negative B-
A5	107	Lift Motor Brush Wear Indicator Input
A6	102	Negative for Pump Motor Temp Sensor
A7	CANL-1	CANbus Low
A8	OPEN	
A9	90	Negative for Hydraulic Oil Lever Sensor
A10	91	Positive for Brake Fluid Level Switch
A11	96	Negative for Auxiliary Switch
A12	50G	Parking Brake Coil Input
A13	50F	Parking Brake Coil Input
A14	OPEN	
A15	OPEN	
A16	47B	Steering Encoder Input

Pin	Wire Number	Function
A17	12A	Battery Positive B+
A18	130P	Battery negative B-
A19	OPEN	
A20	26	Positive for Reverse Alarm
A21	OPEN	

Pin	Wire Number	Function
A22	CANH-1	CANbus High
A23	OPEN	

### SYSTEM LOGIC DIAGRAMS

The system logic diagrams for the economy, standard, and premium truck models may be able to assist in troubleshooting. See Figure 18, Figure 19, and Figure 20.

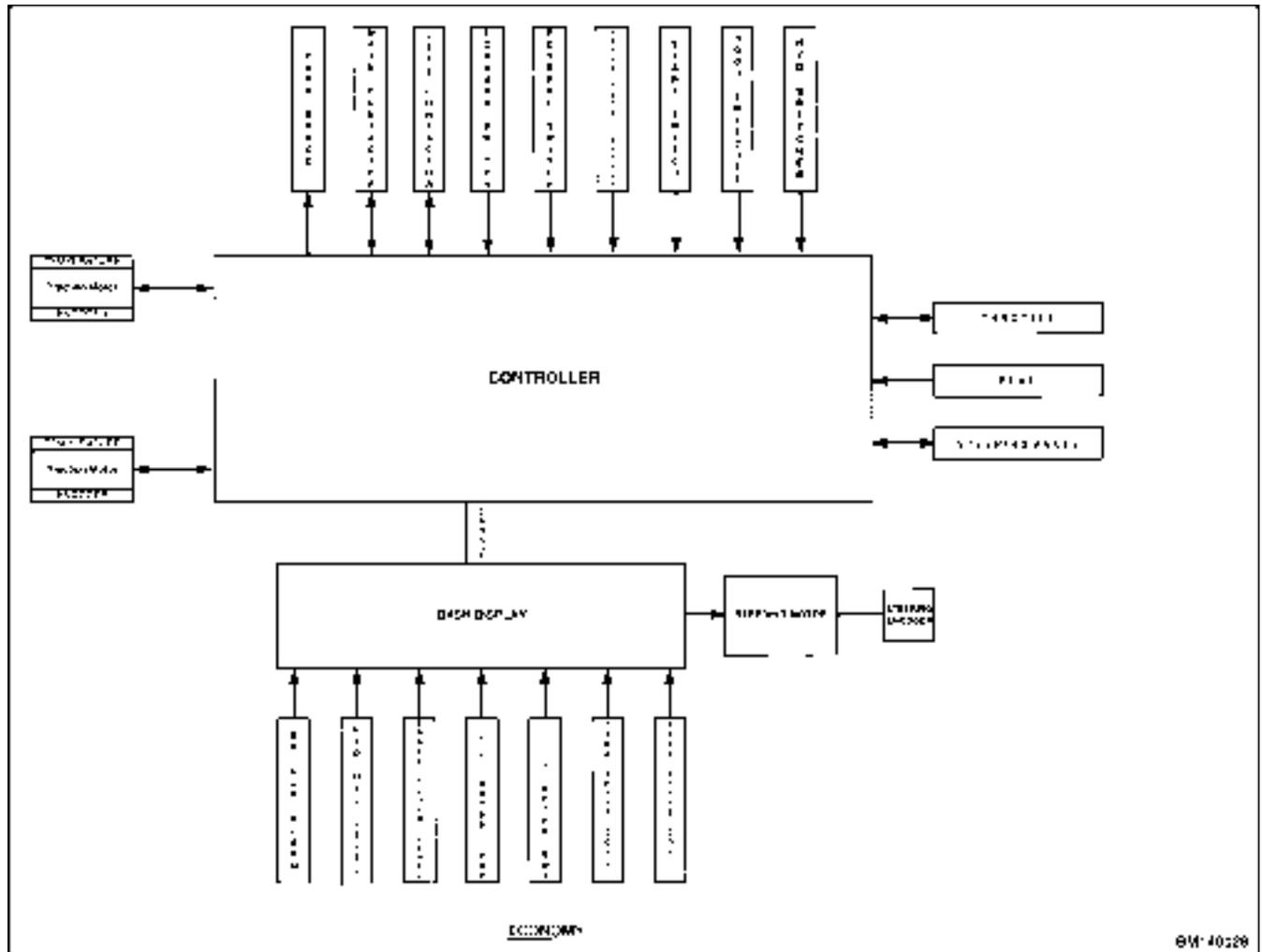


Figure 18. Logic Diagram - Economy

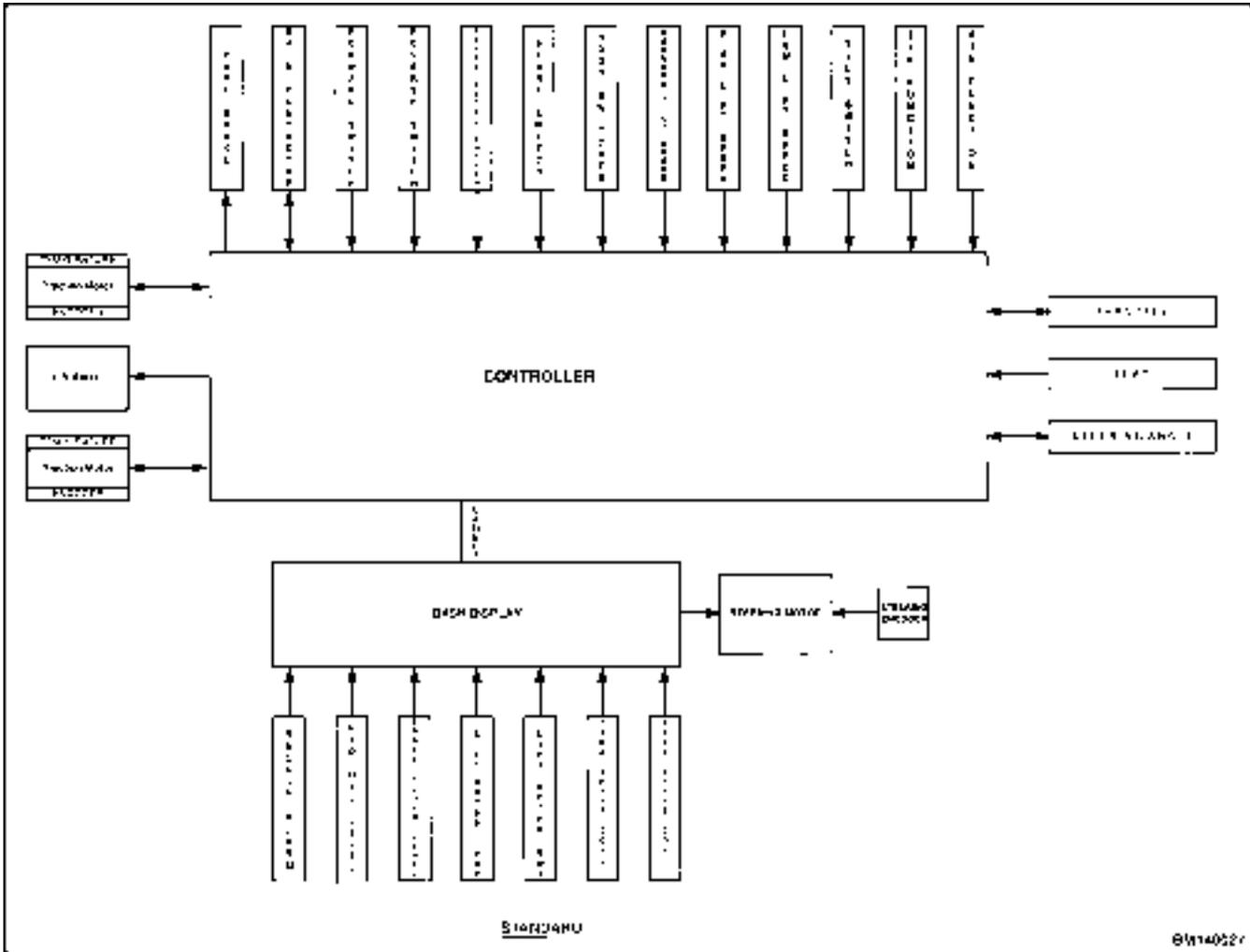


Figure 19. Logic Diagram - Standard

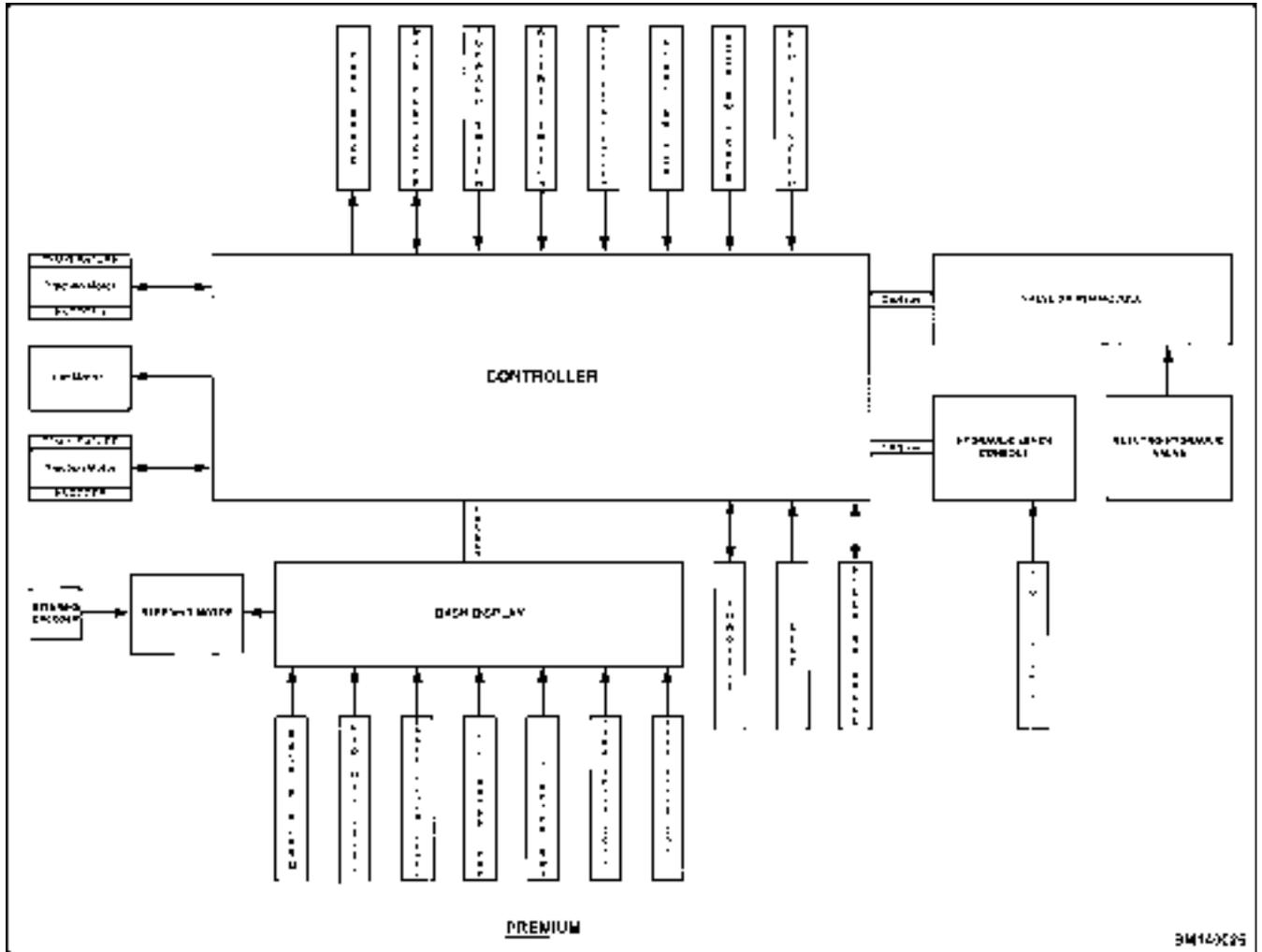


Figure 20. Logic Diagram - Premium







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