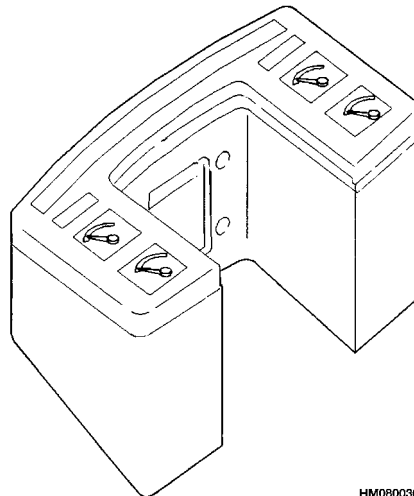


# **INSTRUMENT CLUSTER**

**J2.00-3.20XM (J40-60XM) [A216];  
N30-40XMR2, N25XMDR2 [B470];  
N50XMA2 [B471];  
S1.25-2.00XM (S25-40XM) [C010, D010];  
H1.25-2.00XM/XMS  
(H25-40XM/XMS) [D001, E001];  
E1.50-2.00XMS (E25-40XMS) [D114];  
S2.00-3.25XM (S45-65XM) [D187];  
E2.00-3.20XM (E45-65XM) [F108];  
N30XMDR2, N45XMR2 [F138];  
H2.00-3.20XM (H40-65XM) [H177]**



HM080030

# ***HYSTER***

# 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 **HYSTER 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:

J2.00-3.20XM (J40-60XM) [A216];  
 N30-40XMR2, N25XMDR2 [B470];  
 N50XMA2 [B471];  
 S1.25-2.00XM (S25-40XM) [C010, D010];  
 H1.25-2.00XM/XMS (H25-40XM/XMS) [D001, E001];  
 E1.50-2.00XMS (E25-40XMS) [D114];  
 S2.00-3.25XM (S45-65XM) [D187];  
 E2.00-3.20XM (E45-65XM) [F108];  
 N30XMDR2, N45XMR2 [F138];  
 H2.00-3.20XM (H40-65XM) [H177]

**"THE  
QUALITY  
KEEPERS"**

**HYSTER  
APPROVED  
PARTS**

## General

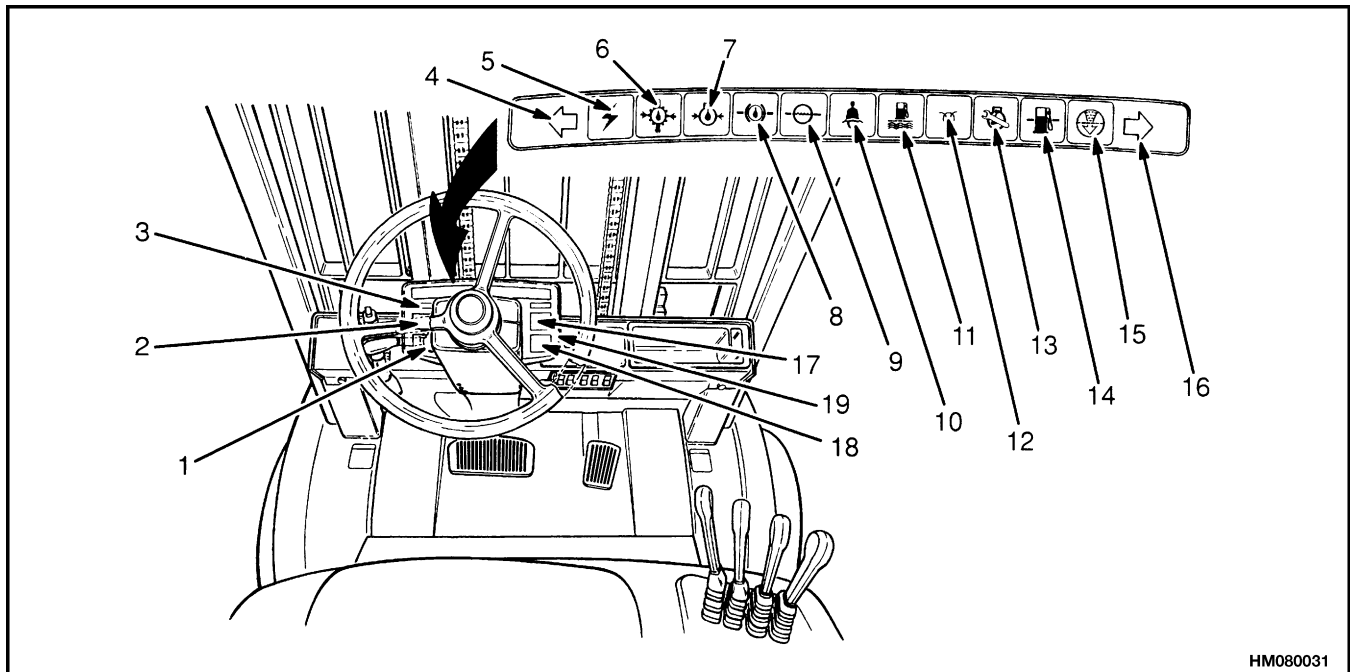
This section has the description and the repair procedures for the instrument clusters used on the XM model lift trucks. Senders that have signals for some of the meters and indicators are described in the section **Instrument Panel Indicators and Senders** 2200 SRM 143.

## Description

### DISPLAY PANELS ON STEERING COLUMN, INTERNAL COMBUSTION

The instrument cluster is installed around the steering column housing. See Figure 1 and Figure 5. The

instrument cluster has a series of gauges and indicator lights that help let the operator know about the condition of the lift truck and its systems. A list of the gauges and indicator lights and their operation is shown in Table 1.



*Figure 1. Instrument Cluster, Internal Combustion Trucks*

*Table 1. Instrument Cluster, Internal Combustion*


Item No.	Item	Function
1	Fuel Gauge 	This gauge indicates the amount of fuel in the gasoline or diesel fuel tank. The sending unit for the fuel gauge is in the fuel tank. If the fuel gauge does not work, check the wiring or replace the sending unit or gauge. To check the wiring, see the service manual section for <b>Diagrams</b> .

Table 1. Instrument Cluster, Internal Combustion (Continued)








Item No.	Item	Function
2	Coolant Temperature Gauge 	 <b>CAUTION</b> <b>Do not continue to operate the lift truck when the gauge indicates that the engine is too hot (needle in the red zone).</b> This gauge indicates engine coolant temperature when the key is in the <b>ON</b> position. During normal operation, the gauge needle will be in the green area. The sending unit for the coolant temperature gauge is in the cylinder head. If the temperature gauge does not work, check the wiring or replace the sending unit or gauge. To check the wiring, see the service manual section for <b>Diagrams</b> .
3	Hourmeter	The hourmeter operates when the key is in the <b>ON</b> position. Periodic Maintenance recommendations are based on these hours.
4	Left-Hand Turn Indicator (Optional) 	The light is on when the turn indicator lever is in the left turn position.
5	Warning Light, Alternator 	 <b>CAUTION</b> <b>Do not continue to operate the lift truck if the red light is ON at engine speeds above idle.</b> The light will be <b>ON</b> when the key is in the <b>ON</b> position and the engine is not running and must go <b>OFF</b> when the engine is running. If the light does not function correctly, check the alternator as described in the section for the <b>Electrical System</b> 2200 SRM 560. To check the wiring, see the service manual section for <b>Diagrams</b> .
6	Warning Light, Transmission Oil Temperature 	 <b>CAUTION</b> <b>Do not continue to operate the lift truck if the red light is ON.</b> The red light is <b>ON</b> when the key is in the <b>START</b> position and must go <b>OFF</b> when the engine is running. The sending unit for the temperature light is at the bottom of the transmission housing, on the front side. If the temperature light does not work, check the wiring or replace the sending unit or light. To check the wiring, see the service manual section for <b>Diagrams</b> .

Table 1. Instrument Cluster, Internal Combustion (Continued)







Item No.	Item	Function
7	Warning Light, Engine Oil Pressure 	 <b>CAUTION</b> <b>Stop the engine immediately if the red light is ON while the engine is running.</b> The red light is <b>ON</b> when the key is in the <b>ON</b> position and the engine is not running and must go <b>OFF</b> when the engine is running. The sending unit for the warning light is in the engine block. If the warning light does not work, check the wiring or replace the sending unit or light. To check the wiring, see the service manual section for <b>Diagrams</b> .
8	Warning Light, Brake Fluid Level 	 <b>CAUTION</b> <b>Do not continue to operate the lift truck if the light is ON during operation.</b> The red light is <b>ON</b> when the key is in the <b>START</b> position and must go <b>OFF</b> when the engine is running. If the light is <b>ON</b> when the engine is running, the brake fluid level in the reservoir is low. There is a float in the master cylinder that actuates the warning light. If the light does not work, check the wiring or the master cylinder or replace the light. To check the master cylinder, see the service manual section for the <b>Brake System</b> . To check the wiring, see the service manual section for <b>Diagrams</b> .
9	Warning Light, Coolant Level in the Radiator 	 <b>CAUTION</b> <b>Do not continue to operate the lift truck if the light is ON during operation.</b> The red light is <b>ON</b> when the key is in the <b>START</b> position and must go <b>OFF</b> when the engine is running. If the light flashes when the engine is running, the level of the coolant in the radiator is too low. The sending unit for the warning light is in the top of the radiator. If the warning light does not work, check the wiring or replace the sending unit or light. To check the wiring, see the service manual section for <b>Diagrams</b> .

Table 1. Instrument Cluster, Internal Combustion (Continued)







Item No.	Item	Function
9	Coolant Level/Hot Warning Light Used ONLY On Later Model H/S2.00-3.20XM (H/S40-65XM) Trucks 	 <b>CAUTION</b> <b>Do not continue to operate the lift truck if the light is ON during operation.</b> The red light is <b>ON</b> when the key is in the <b>START</b> position and must go <b>OFF</b> when the engine is running. If the light flashes when the engine is running, the level of the coolant in the radiator is too low. The sending unit for the warning light is in the top of the radiator. If the warning light does not work, check the wiring or replace the sending unit or light. The light will also come on when the coolant temperature reaches 121°C (250°F). To check the wiring, see the service manual section for <b>Diagrams</b> .
10	Warning Light, Fasten Seat Belt 	 <b>WARNING</b> <b>Always fasten the seat belt when operating the lift truck.</b> The red light is <b>ON</b> for 10 seconds any time the key is put in the <b>ON</b> position. This warning light is activated by a switch in the seat. If the light does not work correctly, check the switch or wiring or replace the circuit board. To check the wiring, see the service manual section for <b>Diagrams</b> .
11	Warning Light, Water in Fuel Filter (Diesel Only) 	The red light is <b>ON</b> when the key is in the <b>START</b> position and must go <b>OFF</b> when the engine is running. If the light is <b>ON</b> when the engine is running, there is water in the fuel filter. The sending unit for the warning light is in the fuel filter. If the warning light does not work, check the wiring or replace the sending unit or light. To check the wiring, see the service manual section for <b>Diagrams</b> .
12	Indicator Light, Cold Start (Diesel Only) 	The red light is <b>ON</b> when the key is in the <b>ON</b> position and the glow plugs are activated. The length of time that the light is <b>ON</b> (glow plugs activated) is determined by the temperature of the engine. When the light goes out, the engine can be started. When the starter is cranking, the light will come <b>ON</b> again until the starter is off and the engine is running.



Table 1. Instrument Cluster, Internal Combustion (Continued)









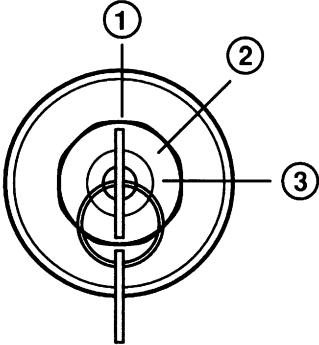
Item No.	Item	Function
13	Malfunction Indicator Lamp (Only on units with GM 3.0L engine or low emissions exhaust system) 	The light will be <b>ON</b> when the key is in the <b>ON</b> position and the engine is not running. This light will illuminate when the ECM computer senses a fault in the operation of the engine. If the engine will start, the operation of the engine will not be correct until the fault is corrected. If this light is <b>ON</b> when the engine is running, a trained service person must make repairs and adjustments. See the <b>Electronic Engine Control</b> section for your lift truck model.
14	Indicator Light, Low LPG Fuel Level 	The red light is <b>ON</b> when the key is in the <b>START</b> position and must go <b>OFF</b> when the engine is running. If the light is <b>ON</b> when the engine is running, the fuel level in the tank is low. The sending unit for the light is in the fuel line at the fuel filter. If the warning light does not work, check the wiring or replace the sending unit or light. To check the wiring, see the service manual section for <b>Diagrams</b> .
15	Indicator Light, Air Filter Restriction 	The red light is <b>ON</b> when the key is in the <b>START</b> position and must go <b>OFF</b> when the engine is running. If the light is <b>ON</b> when the engine is running, the air cleaner has a restriction and needs cleaning. The sending unit for the light is in the canister for the air filter. If the light does not work, check the wiring or replace the sending unit or light. To check the wiring, see the service manual section for <b>Diagrams</b> .
16	Right-Hand Turn Indicator (Optional) 	The light is on when the turn indicator lever is in the right turn position.
17	Engine Oil Pressure Gauge 	 <b>CAUTION</b> <b>Do not continue to operate the lift truck when the gauge indicates low oil pressure (needle in the red area).</b> This gauge indicates the pressure of the oil in the engine. During normal operation, the gauge needle will be in the green area. The sending unit for the gauge is in the engine block. If the gauge does not work, check the wiring or replace the sending unit or gauge. To check the wiring, see the service manual section for <b>Diagrams</b> .

Table 1. Instrument Cluster, Internal Combustion (Continued)

Item No.	Item	Function
18	Voltmeter 	 <b>CAUTION</b> <b>Do not continue to operate the lift truck when the gauge indicates in the yellow or red areas of the gauge.</b> This gauge indicates the output of the alternator. During normal operation the gauge needle will be in the green area. If the gauge does not work correctly, check the alternator as described in the <b>Electrical System</b> 2200 SRM 560. See the service manual section for <b>Diagrams</b> to check the wiring.
19	Key Switch 	The key switch has three positions: No. 1 Position: <b>OFF</b> position. De-energizes all electric circuits except for the horn. No. 2 Position: <b>ON</b> position. Energizes all electric circuits except the starter circuit. The key switch will be in this position during normal operation. No. 3 Position: <b>START</b> position. Energizes the starter motor for starting the engine. A spring returns the key to position No. 2 ( <b>ON</b> position) when the key is released.  <b>NOTE:</b> There is a mechanical lockout that prevents the key switch from being returned to the <b>START</b> position without first being returned to the <b>OFF</b> position.

## DISPLAY PANELS ON STEERING COLUMN, ELECTRIC LIFT TRUCKS

There are two display panels available on electric lift trucks:

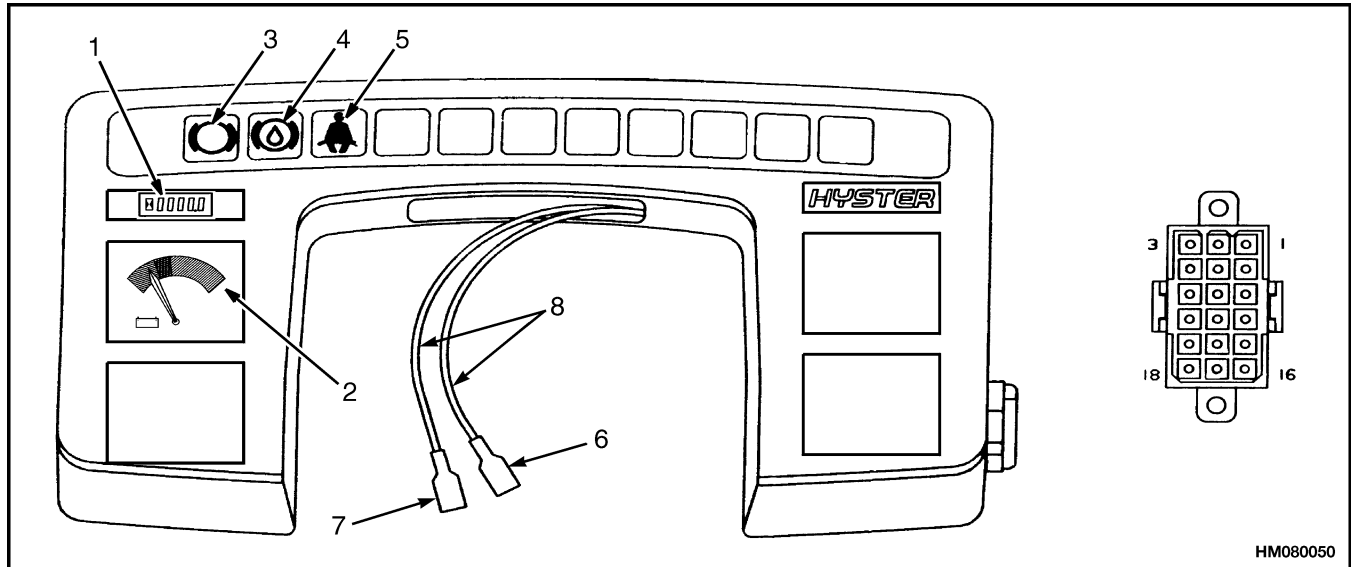
- A standard display panel gives the operator basic information about the operation of the lift truck.
- An enhanced display panel also includes diagnostic capabilities, more indicators, and performance settings.

### Standard Display Panel

When the key is first moved to the **ON** position, a start program will cause each LED indicator (Light-Emitting Diode) to illuminate to show that the LED is functioning. See Figure 2.

This display panel has the following components:

1. **Hourmeter.** The hourmeter display shows the operating time of 0000 to 9999 hours. The time for the traction circuit is shown for four seconds after the lift truck has been operating and the key is moved to the **OFF** position.
2. **Battery Indicator.** This battery indicator has a green, yellow, and red band to indicate the voltage of the battery. The battery must have a current draw (load) to check the battery charge. Hold the tilt or rotate lever in the **BACKWARD** position and look at the indicator. If the needle is in the red band, charge the battery. Operating the lift truck when the battery needs charging can decrease battery life. Continued operation with a discharged battery can damage the battery, motors, or the contactors. See the section **Battery Indicators** 2260 SRM 138 for a more complete description of the operation and the adjustment and repair procedures.



HM080050

Standard Display 18-Pin Connector			
Pin	Function	Pin	Function
1-11	No Connection	15	Hyd. Contactor Coil
12	Battery Negative (-)	16	Seat Switch
13	Parking Brake Switch	17	Key Switch (IGN)
14	Brake Fluid Switch	18	Battery Positive (+) from Fuse 6

- |   |   |
|---|---|
| <ol style="list-style-type: none"> <li>1. HOURMETER</li> <li>2. BATTERY INDICATOR</li> <li>3. WARNING LED, PARKING BRAKE INDICATOR</li> <li>4. WARNING LED, BRAKE FLUID RESERVOIR IS LOW</li> </ol> | <ol style="list-style-type: none"> <li>5. WARNING LED, FASTEN SEAT BELT</li> <li>6. RED/BRN "IGN" TERMINAL</li> <li>7. BRN "BAT" TERMINAL</li> <li>8. KEY SWITCH LEADS</li> </ol> |
|---|---|

*Figure 2. Standard Display Panel and Plug Connector, Electric Trucks*

3. **Warning LED, parking brake indicator.** The red LED is **ON** when the parking brake is applied and the seat switch is closed, and goes **OFF** when the parking brake is released.

A buzzer is **ON** for 8 to 10 seconds if the parking brake is **NOT** applied and the seat switch opens or the key is moved to the **OFF** position.

4. **Warning LED, brake fluid reservoir is low.** The red LED is **ON** for 1 second when the key switch is moved to the **START** position and must go **OFF** during operation. If the warning LED is **ON** during operation, the brake fluid level in the reservoir is too low.
5. **Warning LED, fasten seat belt.** The red LED is **ON** for 8 to 10 seconds after the key switch is moved to the **ON** position.

### Enhanced Display Panel

When the key is moved to the **ON** position, a start program will cause each warning and LED indicator to illuminate to show that the indicator is functioning. See Figure 3.

This display panel has the following functions:

1. **Battery Charge Indicator with Lift Interrupt.** This battery charge indicator shows the battery charge with an LED bar graph. There are four green bars, four orange bars, and two red bars. When the battery is discharged during operation, the LED bar that is illuminated decreases sequentially from the top green bar through the orange bars to the red bars. When the battery is discharged to approximately 70 to 75%, the red LED bars are illuminated and the lift interrupt function will not permit operation of the hydraulic motor. The battery must be

charged or a charged battery must be installed before lift truck operation can continue. The top green bar will be illuminated when the battery is more than 90% charged.

The controller also checks the battery voltage each time a battery is connected. The traction control will prevent lift truck operation if the battery voltage is not correct as set by traction function 15. A status code of -16 (voltage too high) or -15 (voltage too low) will indicate on the digital display. The battery can have a voltage that is too high or too low. A battery with the correct voltage can also be deeply discharged from use or other reasons and have a voltage that is less than the minimum of the voltage range.

Batteries that have different ampere-hour ratings or are of different ages can sometimes be used in the same lift truck. It can be necessary to adjust traction function 14 of the EV-100ZX motor controller so that the weakest battery is not damaged. Follow the procedure for adjusting traction function 14 in one of the following service manual sections: **EV-100ZX™ SCR Motor Controller** 2200 SRM 557 or **EV-T100™ Transistor Motor Controller** 2200 SRM 581.

2. **Digital Display.** This four-digit LED display is blank when the lift truck is operating correctly. The status codes and the hourmeter values are shown on this display. When the status code indicator is illuminated, the status code is shown. When the hourmeter and either the hydraulic motor or traction motor indicators are illuminated, the operating hours are shown. When a problem occurs, the status code will be shown with a dash (-) in the left digit position together with three numbers. The warning LED for the service interval will also be illuminated when a problem occurs.

When it is time for periodic maintenance, the warning LED for the service interval will be illuminated and a status code -99 will be indicated. The traction motor or hydraulic motor indicator will also be illuminated to show which system needs maintenance. The register in the controller card must be reset by the service person before the service interval LED will go **OFF**.

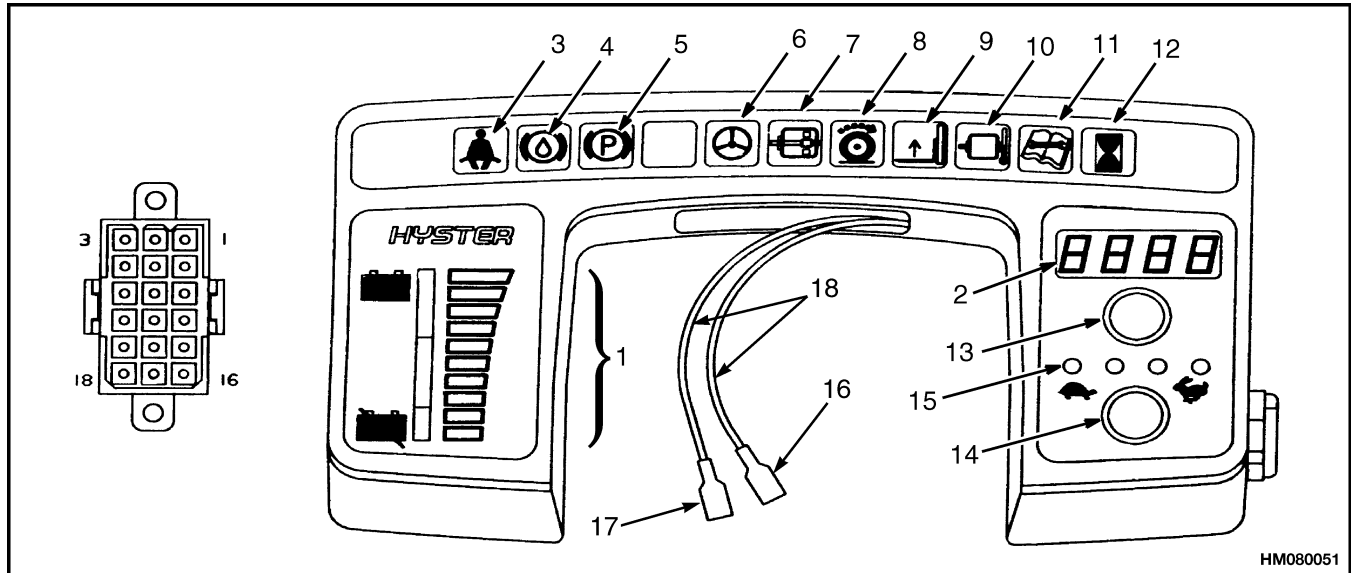
The digital display for the hourmeter shows the operating time of 0000 to 9999 hours. The time for the traction circuit is shown for 4 seconds after the lift truck has been operating and the key

is moved to the **OFF** position. The LED indicators for the traction motor and for the hourmeter will also be illuminated during this time. If there is an SCR control card for the hydraulic pump motor, the operating time of the pump motor will then be shown on the digital display for another 4 seconds. The LED indicators for the hydraulic motor and for the hourmeter will also be illuminated during this last 4 seconds.

3. **Warning LED, Fasten Seat Belt.** The red LED is **ON** for 8 to 10 seconds after the key switch is moved to the **ON** position.
4. **Warning LED, Brake Fluid Reservoir Is Low.** The red LED is **ON** for 1 second when the key switch is moved to the **START** position and must go **OFF** during operation. If the warning LED is **ON** during operation, the brake fluid level in the reservoir is too low.
5. **Warning LED, Parking Brake Indicator.** The red LED is **ON** when the parking brake is applied and goes **OFF** when the parking brake is released.

A buzzer is **ON** for 8 to 10 seconds if the parking brake is NOT applied and the seat switch opens or the key is moved to the **OFF** position.

6. **LED Indicator, Steering Pump Motor.** This LED will illuminate with another warning LED if the brushes in the steering pump motor are too worn. If the brush wear sensor is activated in the motor, the warning LED for brush wear will go **ON** and the LED indicator for the steering pump motor will show that this motor has the problem.
7. **Warning LED, Motor Brushes are Worn.** When the sensor for brush wear closes, this warning LED and the LED indicator for the motor that has the problem will both illuminate. The indicator will stay **ON** until the key is moved to the **OFF** position.
8. **LED Indicator, Traction Motor.** This LED will illuminate with another warning LED if the traction motor is too hot or the brushes are too worn. For example, if the brush wear sensor is activated in the motor, the warning LED for brush wear will go **ON** and the LED indicator for the traction motor will show that this motor has the problem.



Enhanced Display 18-Pin Connector

Pin	Function	Pin	Function
1	Traction Card PY 5	11	Brush Wear Indicator & Temperature Jumper*
2	Pump Card PY 5	12	*
3	No Connection	13	Parking Brake Switch
4	Traction Card PY 14	14	Brake Fluid Switch
5	Traction Card PY 13	15	No Connection
6	Pump Card PY 14	16	No Connection
7	Pump Card PY 13	17	Key Switch (IGN)
8	No Connection	18	No Connection
9	Traction Card PY 4		
10	Pump Card PY 4		

\*Pin 11 to 12 jumper (in wire harness). Brush Wear Indicator (BWI) and temperature LEDs disabled if cut.

- |  |   |
|--|---|
| <ol style="list-style-type: none"> <li>1. BATTERY CHARGE INDICATOR WITH LIFT INTERRUPT</li> <li>2. DIGITAL DISPLAY</li> <li>3. WARNING LED, FASTEN SEAT BELT</li> <li>4. WARNING LED, BRAKE FLUID RESERVOIR IS LOW</li> <li>5. WARNING LED, PARKING BRAKE INDICATOR</li> <li>6. LED INDICATOR, STEERING PUMP MOTOR</li> <li>7. WARNING LED, MOTOR BRUSHES ARE WORN (TRACTION, HYDRAULIC, OR STEERING)</li> <li>8. LED INDICATOR, TRACTION MOTOR</li> </ol> | <ol style="list-style-type: none"> <li>9. LED INDICATOR, HYDRAULIC MOTOR</li> <li>10. WARNING LED, MOTOR TEMPERATURE OVER LIMIT (TRACTION OR HYDRAULIC)</li> <li>11. WARNING LED, SERVICE INTERVAL</li> <li>12. LED INDICATOR, HOURMETER</li> <li>13. PUSH BUTTON, DISPLAY STATUS CODES</li> <li>14. PUSH BUTTON, SET PERFORMANCE LEVEL</li> <li>15. PERFORMANCE LEVEL INDICATORS (4 LEDS)</li> <li>16. RED/BRN "IGN" TERMINAL</li> <li>17. BRN "BAT" TERMINAL</li> <li>18. KEY SWITCH LEADS</li> </ol> |
|--|---|

Figure 3. Enhanced Display Panel and Plug Connector, Electric Trucks

**9. LED Indicator, Hydraulic Motor.** This LED will illuminate with another warning LED if the hydraulic pump motor is too hot or the brushes are too worn. For example, if the temperature

over limit switch closes in the motor, the warning LED for the motor temperature over limit will go **ON** and the LED indicator for the hydraulic motor will show that this motor has the problem.

- 10. Warning LED, Motor Temperature Over Limit.** The traction motor and the hydraulic pump motor have thermal switches inside the motors. When the temperature increases to the limit, the thermal switch closes and the warning LED on the display panel illuminates. The LED indicator for the traction motor indicator or for the hydraulic motor will show which motor has the problem. The maximum travel speed will also be decreased to speed limit 1.
- 11. Warning LED, Service Interval.** When it is time for periodic maintenance, the warning LED, service interval indicator will be illuminated and a status code -99 will be indicated. The register in the controller card must be reset by the service person before this warning LED will go **OFF**. The warning LED will also be illuminated when a problem occurs.
- 12. LED Indicator, Hourmeter.** This LED will illuminate with another indicator when hours of operation are shown on the digital display. Refer to the previous **Digital Display** for the complete description of operation.
- 13. Push Button, Status Codes.** With the key in the **OFF** position, this push button will cause the status codes for the problems to be shown on the digital display. When the button is held down for 1 or 2 seconds, the LED indicator for the traction motor will illuminate. The status codes in memory for the detected problems will be displayed, starting with the most recent problem. The system will go through 16 traction codes, then automatically go through 16 pump motor codes. If the button is pushed again, the display will start from the beginning again. The hourmeter time and the battery charge at the time of the problem will not be shown. A handset or a personal computer (PC) must be used to show this additional information. A handset or a PC must be used to clear the status code from the register. For the correct procedures for using the handset or PC, see **EV-100ZX™ SCR Motor Controller** 2200 SRM 557 or **EV-T100™ Transistor Motor Controller** 2200 SRM 581.

If the button is pushed briefly, released, then held down for 1 or 2 seconds, the LED indicator for the hydraulic motor will illuminate. The status codes in memory for the detected problems will be displayed, starting with the most recent problem. If the button is pushed twice to start the sequence again, the display will start from

the beginning. The hourmeter time at the time of the problem will not be shown. A handset or a PC must be used to show this additional information. A handset or a PC must be used to clear the status code from the register. For the correct procedures for using the handset or PC, see **EV-100ZX™ SCR Motor Controller** 2200 SRM 557 or **EV-T100™ Transistor Motor Controller** 2200 SRM 581.

- 14. Push Button, Set Lift Truck Performance.** The lift truck can be set to any one of four performance levels by the operator. If the customer does not want this function available to the operator, a service person can set all four levels to the same setting. Each time the operator pushes the yellow button, the performance level will increase by one step. After the maximum (rabbit) level, the performance levels will begin at the lowest (turtle) level again. The four performance levels set by the manufacturer are:
- Lowest performance for handling fragile loads and lowest rate of consumption of battery energy.
  - Medium travel and lift speed and some increase in consumption of battery energy.
  - Higher performance with higher consumption of battery energy.
  - Highest level of lift truck performance with maximum consumption of battery energy.

A service person can adjust the performance settings with either a PC or the handset (functions 48 through 62). For the correct procedures for using the handset or PC, see **EV-100ZX™ SCR Motor Controller** 2200 SRM 557 or **EV-T100™ Transistor Motor Controller** 2200 SRM 581.

The four performance levels can be set to any level up to the maximum limits. Two or more adjacent performance levels can be set to the same limits. The performance levels must be set at the same or in ascending order (from turtle to rabbit). The register interlocks will not permit a higher performance level setting toward the turtle than the adjacent registers toward the rabbit. The lower performance level is always to the left (turtle).

- 15. LED Indicators, Performance Level.** These four LEDs show which performance level has been selected. The LEDs illuminate in sequence from low performance (turtle) to maximum performance (rabbit).

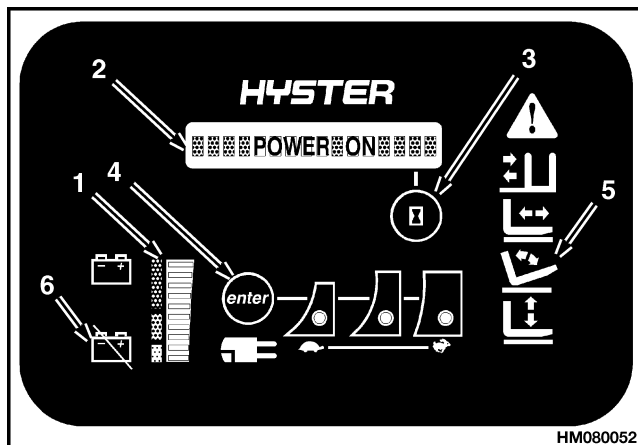
**Status Code Memory.** The control cards for the traction motor controller and hydraulic pump motor each have memory registers in which the last 16 status codes can be stored. Each status code is stored with the hourmeter time at the time of the problem. Traction cards with Battery Discharge Indicator (BDI) can also show the battery charge at the time of the problem. The status code for the last problem will be indicated on the digital display. If the key is moved to the **OFF** position, the status code will be removed from the digital display. The push button for the status codes can be used to show these status codes on the digital display.

## CURTIS 1215 DISPLAY PANEL

### Description and Features

**NOTE:** See the section **Battery Indicators** 2260 SRM 138 for a more complete description of the operation and the adjustment and repair procedures.

This display panel is a rectangular display unit that operates with the main interface board and the traction motor controller. See Figure 4. The panel is located in the front cover over the battery compartment of the N30-45XMR, N25-30XMDR, and N50XMA lift trucks. It is used exclusively with the Curtis 1215 traction motor controller. For additional information, see the section **Traction Motor Controller and Handset** 2200 SRM 608.



1. BATTERY CHARGE INDICATOR
2. MESSAGE DISPLAY
3. SELECTABLE FUNCTION HOURMETERS
4. SELECTABLE FUNCTION DRIVE MODES
5. HYDRAULIC FUNCTION INDICATORS
6. LOW-BATTERY LIFT INTERRUPT INDICATOR

**Figure 4. Curtis 1215 Display Panel**

Two different versions of the display panel are available, depending on ambient temperature.

Standard models	-25 to 70°C (-13 to 158°F)
Freezer models	-40 to 70°C (-40 to 158°F)

### Operation

1. The battery indicator has a 10-bar multicolor diode (LED) to indicate battery charge status. The bars are green, yellow, and red. As power is used, the LEDs will turn off, starting with green, then yellow, then red. The red LED second from the bottom will flash, indicating a nearly discharged battery. The bottom red LED will alternately flash with the LO-Battery LED indicator (a crossed battery symbol), indicating a discharged battery. The lift function will be disallowed at this point. Continued operation with a discharged battery can damage the battery, motor, or the contactors. See Figure 4.
2. The message center is a 16-character, dot matrix, liquid crystal display (LCD) with green backlighting. The 16-character, alphanumeric display shows the hourmeter readings, lift truck performance status, and warning or fault conditions. When a warning message is received, the warning/fault indicator will blink as a yellow light. When a fault message is received, the warning/fault indicator will blink as a red light.
3. The instrument display hourmeter switch is controlled by the operator and is used for on-demand display of hourmeter information. The hourmeter data can be displayed at any time by pressing the hourmeter switch. The switch is marked with an hourglass symbol. Press once to display truck hours to 1/10 of an hour. Press twice to display drive motor hours. Press three times to display the lift motor hours. Press four times to return to the normal display mode. After 30 seconds, the display will return to the normal display mode, which indicates the current operational status of the truck.
4. The drive mode display allows the operator to select the level of traction motor controller performance most suited to the application. Operation of the drive mode switch will cause the green

indicators and corresponding drive modes to increase from Turtle to Mid to Rabbit. The following describes these modes as programmed from the factory:

- Turtle mode provides slower acceleration, reduced top speed, and maximized energy efficiency. It is also a valuable setting when training new operators.
- Mid mode reduces acceleration with full travel speed.
- Rabbit mode provides maximum acceleration and travel speed. When the key switch is turned to **OFF**, the selected drive mode is retained. When the battery is disconnected, the drive mode returns to the Rabbit mode.

The rates of acceleration and travel speeds are programmable and can be adjusted by a qualified

service technician. See the section **Traction Motor Controller and Handset** 2200 SRM 608 for additional information. Refer to Programming Traction Motor Controller.

5. The LED function selection lights display the selected hydraulic function. Status messages will be displayed for lift, tilt, reach, and sideshift. The function selection lights will display the current hydraulic function, independent of the present LCD display.

The instrument display is powered when the key switch is **ON**. The instrument panel contains an internal backup battery that is capable of memory retention of the battery indicator and hourmeter readings when the battery is disconnected.

## Cluster-Type Display Panel (Internal Combustion) Replacement

### REMOVE AND DISASSEMBLE

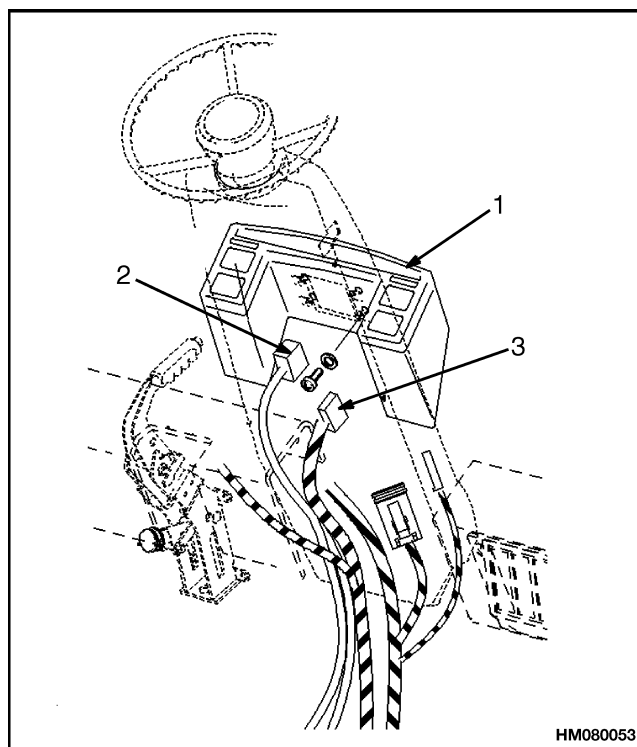
#### CAUTION

To prevent damage to electrical components, disconnect negative battery cable before removing covers.

1. Remove steering control unit as described in the following sections:
  - **Steering Housing and Control Unit** 1600 SRM 512 for S/H2.00-3.20XM (S/H40-65XM)
  - **Steering Housing and Control Unit** 1600 SRM 720 for S/H1.25-1.75XM, S/H2.00XMS (S/H25-35XM, S/H40XMS)

**NOTE:** Newer instrument cluster panels have turn signals that are red. The turn signals on older model cluster panels are green.

2. For older model instrument cluster panels, disconnect the two wiring harnesses at the instrument cluster. See Figure 5, Figure 7, and Figure 8. For newer model instrument cluster panels, disconnect the 24-pin and 6-pin pig tail connections and the ground wire at the steering column. See Figure 6 and Figure 8.
3. Remove screws that hold instrument cluster to steering housing.



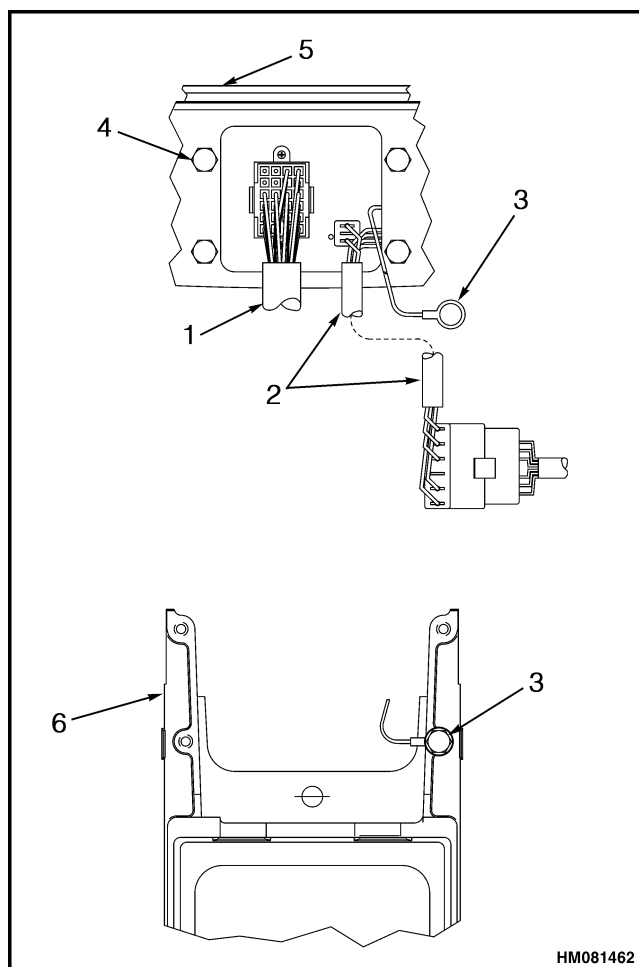
1. INSTRUMENT CLUSTER
2. WIRING HARNESS (24-PIN CONNECTOR)
3. WIRING HARNESS (6-PIN CONNECTOR)

*Figure 5. Instrument Cluster Mounting (Older Model Cluster Panels)*



**NOTE:** Newer instrument clusters are non-repairable and must be replaced with a new unit. If the ignition switch fails, it is replaceable and can be installed without replacing the instrument cluster.

4. Remove screws that hold cover to housing. For older instrument clusters, replace parts in cluster as necessary. Parts in cluster cannot be repaired.

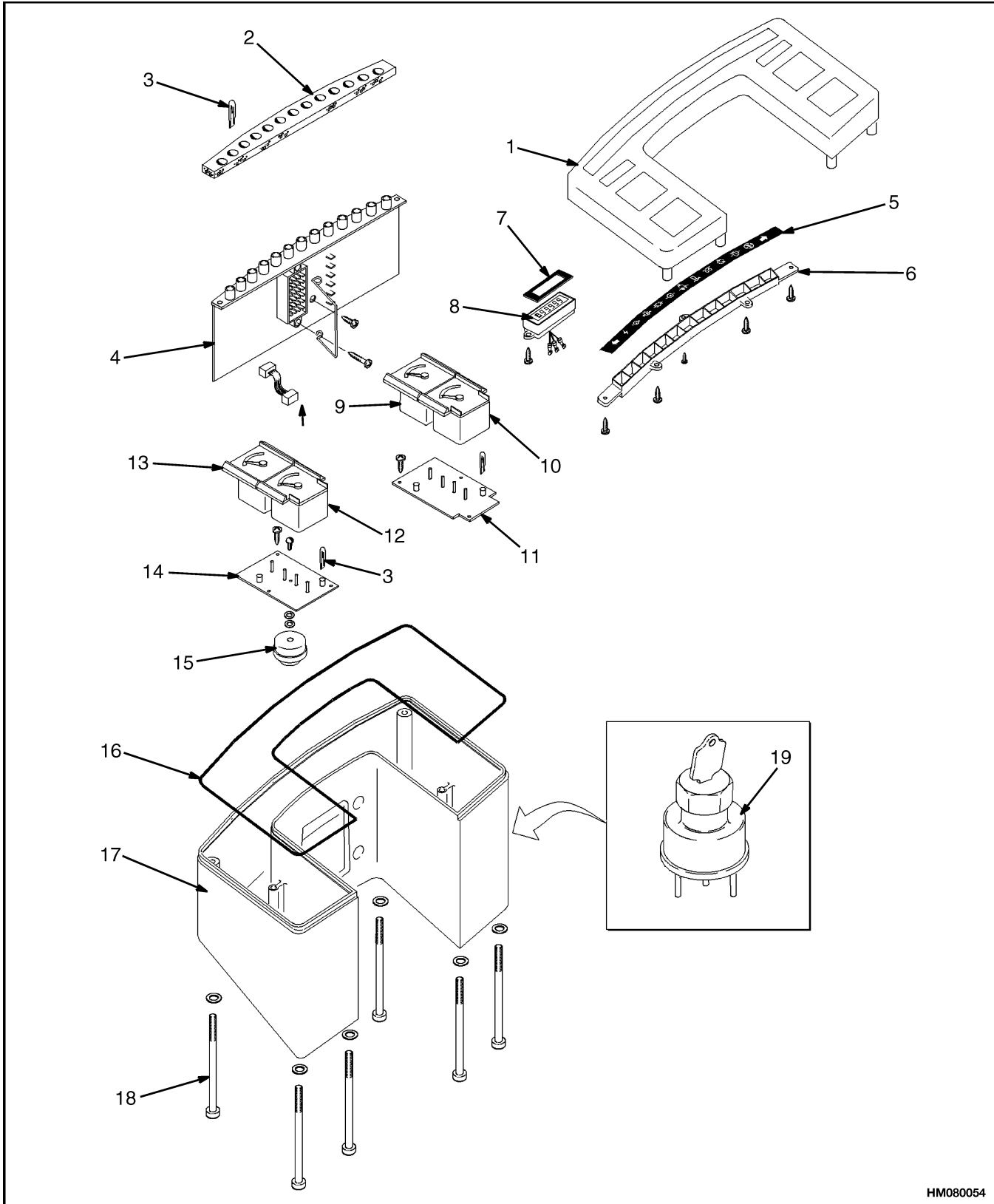


1. WIRING HARNESS (24-PIN CONNECTOR)
2. WIRING HARNESS (6-PIN CONNECTOR)
3. GROUND WIRE RING TERMINAL
4. MOUNTING SCREWS
5. INSTRUMENT CLUSTER
6. STEERING COLUMN

**Figure 6. Instrument Cluster Mounting (Newer Model Cluster Panels)**

**Legend for Figure 6 (Continued)**

24-PIN CONNECTOR FUNCTIONS	
1	Malfunction Indicator (GM Gas Only)
2	Cluster Ground
3	Diesel Fuel Filter
4	Low Brake Fluid Level
5	Low Fuel Level (LPG)
6	Glow Plug
7	Engine Oil Pressure
8	Transmission Oil Temperature
9	Air Filter Restriction
10	Low Coolant Level
11	Charging Circuit
12	Left Turn Signal
13	Engine Oil Pressure Gauge
14	Right Turn Signal
15	Fuel Gauge
16	Coolant Temperature
17	Not Used
18	Not Used
19	Reversed
20	Forward
21	Not Used
22	Not Used
23	Parking Brake
24	Seat Switch
6-PIN CONNECTOR FUNCTIONS	
1	Ignition
2	Accessory
3	Not Used
4	Starter
5	Battery
6	Battery



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Figure 7. Instrument Cluster, Internal Combustion Engine Trucks (Older Model Cluster Panels)

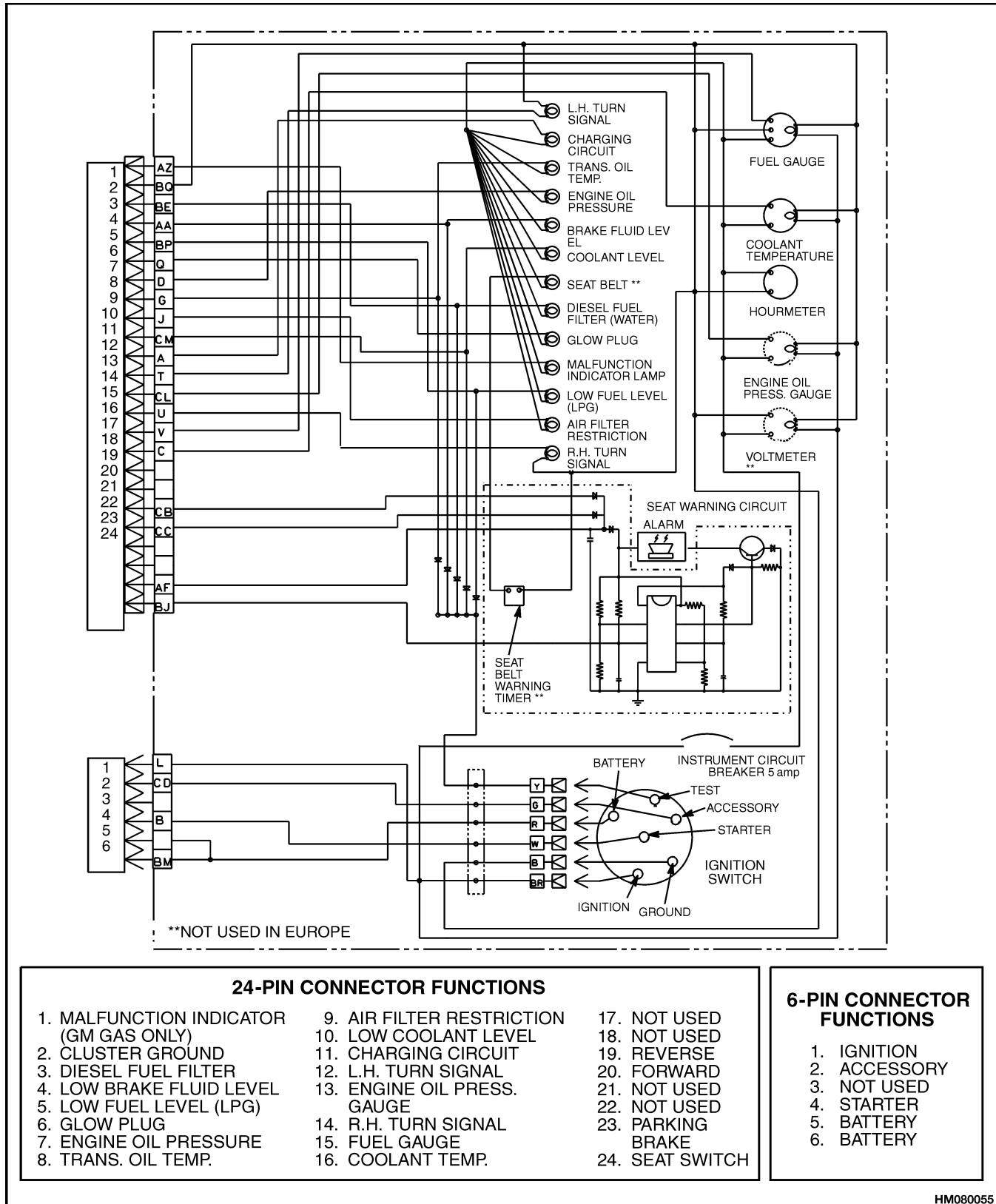
*Legend for Figure 7*

- |                              |                                |
|------------------------------|--------------------------------|
| 1. COVER                     | 11. CIRCUIT BOARD (RIGHT-HAND) |
| 2. FOAM GASKET               | 12. FUEL GAUGE                 |
| 3. BULB                      | 13. WATER TEMPERATURE GAUGE    |
| 4. CIRCUIT BOARD             | 14. CIRCUIT BOARD (LEFT-HAND)  |
| 5. INDICATOR STRIP           | 15. ALARM                      |
| 6. BULB HOUSING              | 16. SEAL                       |
| 7. GASKET                    | 17. HOUSING                    |
| 8. HOURMETER                 | 18. SCREW                      |
| 9. ENGINE OIL PRESSURE GAUGE | 19. KEY SWITCH                 |
| 10. VOLTMETER                |                                |

**ASSEMBLE AND INSTALL**

**NOTE:** Newer instrument clusters are non-repairable and must be replaced with a new unit. If the ignition switch fails, it is replaceable and can be installed without replacing the instrument cluster.

1. Install parts in instrument cluster that were removed or replaced as shown in Figure 7. Make sure seal is installed between housing and cover.
2. Install instrument cluster on steering housing. Install and tighten four capscrews. On older model cluster panels, connect the two wiring harnesses at the instrument cluster. See Figure 5 and Figure 8. For newer model cluster panels, connect the 24-pin and 6-pin pig tail connections and the ground wire to the steering column. See Figure 6 and Figure 8.
3. Install steering control unit and cover as described in the following sections:
  - **Steering Housing and Control Unit 1600 SRM 512** for S/H2.00-3.20XM (S/H40-65XM)
  - **Steering Housing and Control Unit 1600 SRM 720** for S/H1.25-1.75XM, S/H2.00XMS (S/H25-35XM, S/H40XMS)
4. Connect battery. Check that gauges and indicators operate as described.



HM080055

Figure 8. Instrument Cluster Schematic, Internal Combustion Engine Trucks

## Cluster Display Panel (Electric Lift Truck) Replacement

Each of the two display panel assemblies, standard and enhanced, can be replaced as a unit.

**NOTE:** Most parts of the standard display panel can be replaced. However, the LED indicators cannot be replaced separately. The LEDs are part of the circuit board assembly. The major replaceable parts of this display panel are:

- Key switch
- Housing, top cover, and O-ring seal
- Housing and light filter for LED warning lights
- Battery indicator
- Hourmeter and gasket
- Buzzer and circuit board
- Jumper harness and the wires to the key switch

**NOTE:** The only replaceable parts of the enhanced display panel are the O-ring seal, key switch, wires to the key switch, and the housing that fastens to the steering column. All other parts of the panel must be replaced as a single unit. See Display Panel Assembly, Replace.

### DISPLAY PANEL ASSEMBLY, REPLACE

Follow this procedure to replace the standard or enhanced display panel as an assembly.

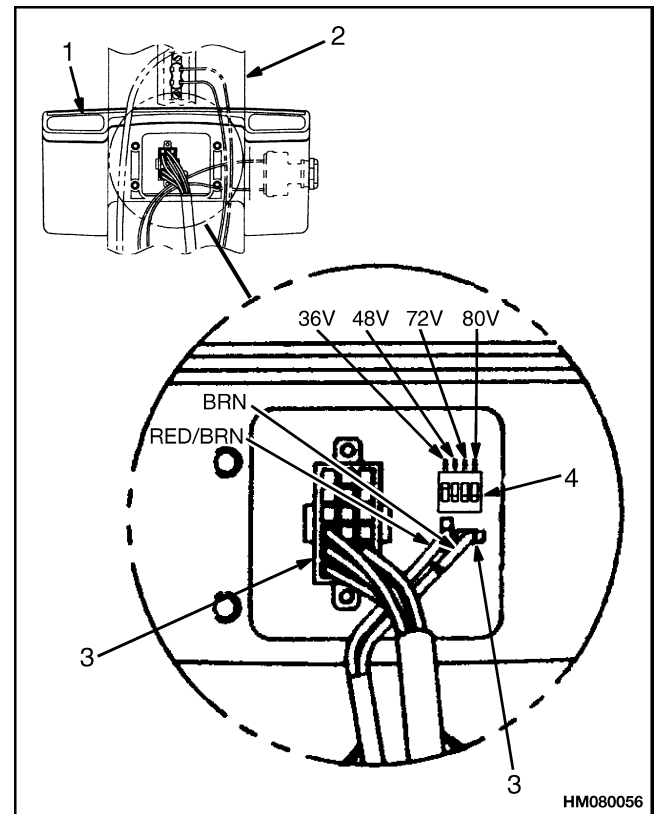
1. Disconnect battery and remove key.
2. Remove front steering column cover with display panel assembly attached. Carefully disconnect 18-pin connector, key switch wires, and two-pin connector (on standard panel only) from inside column cover.
3. Remove four screws that fasten display panel to column cover.
4. Install replacement display panel assembly to cover of steering column and tighten screws. Install connectors and key switch wires. On standard panel, set DIP switches near connector for panel to voltage of lift truck. See Figure 9. Move DIP switch for correct voltage to up position and all others to down position. Install column cover on steering column.

### LED INDICATORS

The LED indicators of the standard display panel are part of the circuit board and must be replaced as an

assembly. See Standard Display Panel Parts, Replace.

The LED indicators of the enhanced display panel cannot be replaced. If these LED indicators are faulty, replace display panel. See Display Panel Assembly, Replace.



ON = UP as shown  
 36V SW#1 ON, Others OFF  
 48V SW#2 ON, Others OFF  
 72V SW#3 ON, Others OFF  
 80V SW#4 ON, Others OFF

**NOTE:** SET DIP SWITCHES TO TRUCK VOLTAGE. IF TRUCK VOLTAGE IS NOT KNOWN, SET 36/48V (US) TRUCKS TO 48V AND 72/80V (EUR) TRUCKS TO 80V.

- |                  |                 |
|------------------|-----------------|
| 1. DISPLAY PANEL | 3. ELECTRICAL   |
| 2. STEERING      | CONNECTOR       |
| COLUMN           | 4. DIP SWITCHES |

*Figure 9. Dip Switches*

## BATTERY INDICATORS

There are two types of battery indicators for these trucks. One type is a meter movement with colored bands showing the battery charge (standard display panel). The other type is a Light-Emitting Diode (LED) display with LEDs of different colors showing battery charge (enhanced display panel).

The battery indicator is replaced as one of the components of the display panel. See procedure under Standard Display Panel Parts, Replace. The battery indicator of the enhanced display panel cannot be replaced as a separate component. The indicator must be replaced as part of the enhanced display panel. See Display Panel Assembly, Replace.

To adjust these battery indicators, see the section **Battery Indicators** 2260 SRM 138.

## DIGITAL DISPLAY (ENHANCED DISPLAY PANEL ONLY)

The digital display of the enhanced display panel cannot be replaced as a separate component. The display must be replaced as part of the enhanced display panel. See Display Panel Assembly, Replace.

## STATUS CODE OR PERFORMANCE LEVEL SWITCHES AND LED INDICATORS (ENHANCED DISPLAY PANEL ONLY)

These switches of the enhanced display panel cannot be replaced as separate components. The switches must be replaced as part of the enhanced display panel. See Display Panel Assembly, Replace.

## STANDARD DISPLAY PANEL PARTS, REPLACE

The parts of the standard display panel can be replaced with the display panel on the steering column. If the assembly housing will be replaced, remove the complete assembly from the steering column as described in Display Panel Assembly, Replace.

**NOTE:** The following is a complete disassembly procedure. Do ONLY those steps necessary to replace the part you want replaced.

1. Disconnect battery and remove key.
2. Remove eight screws that fasten top cover to panel housing. Screws are at bottom of housing. See Figure 2. The hourmeter is fastened to the top cover with the electrical connector on the

circuit board inside the housing. Carefully lift top cover up off housing and LED indicators without damaging O-ring gasket. The gasket for the LED indicators can stick to the LED housing as the top cover is removed. Do not lose or damage gasket. Disconnect three-wire connector for hourmeter.

3. If the housing or filter for the indicators will be replaced, remove screws that fasten LED housing to cover. If the hourmeter or hourmeter gasket will be replaced, remove screws that fasten it to top cover. Install replacement parts to top cover. Make sure that hourmeter is installed so that it can be read after cover is installed.
4. Remove nut that fastens key switch in housing. See Figure 2. Remove key switch. Make a note of which wires are on which terminals and disconnect wires. Install wires on the same terminals of replacement switch.
5. Align notch in shaft housing of key switch with tab in housing of display panel. Install replacement switch. Tighten nut and connect wires.

**NOTE:** It is not necessary to do Step 6 if only the meter movement of the battery indicator will be replaced on the existing circuit board. Carefully lift meter movement up off pins of circuit board without bending pins. See Figure 2. Carefully install replacement meter movement on pins. Make sure pins are correctly aligned on back of meter before pushing meter on pins.

6. If the battery indicator circuit board for the hourmeter or the buzzer will be replaced, remove screws that fasten circuit board to housing. Disconnect connector from circuit board. Remove buzzer from bottom of circuit board. Make sure to install fiber washer when installing replacement buzzer on replacement circuit board. If necessary, carefully lift meter movement up off pins of circuit board without bending pins. See Figure 2. Carefully install replacement meter movement on pins of replacement circuit board. Make sure pins are correctly aligned on back of meter before pushing meter on pins. Connect electrical connector to circuit board and install circuit board assembly in housing.
7. If the LED indicator assembly will be replaced, first remove 18-pin connector. It is necessary to remove the front steering column cover with the display panel assembly attached for access

to the connector. After removing screws that fasten front cover, carefully disconnect connector. It can be necessary to disconnect key switch wires (Step 4) and two-wire connector for enough clearance to disconnect 18-pin connector. Remove two screws that fasten LED assembly to housing. Install replacement LED assembly. Carefully connect all connectors and wires. Install front steering column cover with display panel assembly attached. Install LED gasket over LED indicators.

8. If necessary, install new O-ring gasket. Carefully install O-ring gasket in groove of top cover. Carefully install top cover assembly over LED indicators and assembly housing without damaging either LED gasket or O-ring gasket. Make

sure O-ring gasket is still correctly aligned with cover and housing before installing screws. Install eight screws that fasten top cover to panel housing and tighten them in a cross pattern.

## ENHANCED DISPLAY PANEL PARTS, REPLACE

The only replaceable parts of the enhanced display panel are the O-ring seal, key switch, wires to the key switch, and the housing that fastens to the steering column. All other parts of the panel must be replaced as a single unit. See Display Panel Assembly, Replace and Figure 3.

## Curtis 1215 Display Panel Replacement

### REMOVE

The Curtis 1215 Display Panel is located in the front cover over the battery compartment. The display panel cannot be repaired and must be replaced if it is faulty.

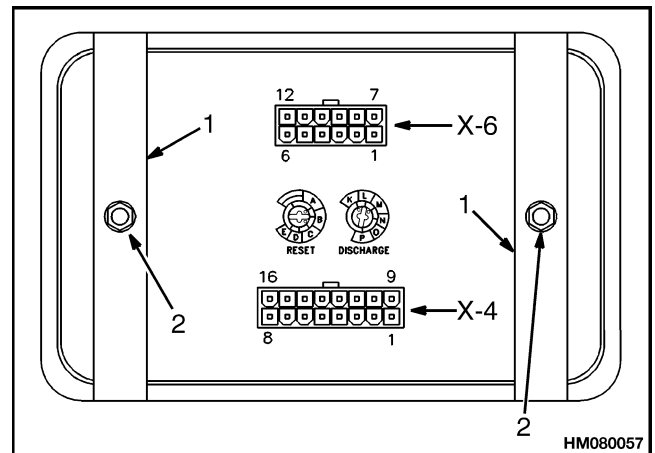
1. Move lift truck to a safe, level area. Turn key switch to **OFF** and remove key. Put a **DO NOT OPERATE** tag on the multifunction control handle. Put blocks under drive wheels to keep lift truck from moving. Refer to How to Put Lift Truck on Blocks in the section **Periodic Maintenance**.



### WARNING

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

2. Disconnect and separate battery connector.
3. Remove hydraulic tank dipstick.
4. Remove socket head capscrews retaining battery compartment cover. Remove battery compartment cover.
5. Disconnect two plugs X-4 and X-6 from rear of display assembly.
6. Remove two nuts and brackets that fasten display assembly to instrument panel. See Figure 10. Remove display assembly.



1. MOUNT BRACKET
2. MOUNT NUT

*Figure 10. Curtis 1215 Mount*

### INSTALL

1. Adjust pots on rear of dash display assembly.
2. Connect two plugs X-4 and X-6 to rear of dash display.
3. Position display assembly in instrument panel. Install nuts and brackets to rear of display to fasten display assembly to instrument panel.
4. Install battery cover.
5. Reinstall hydraulic tank dipstick.
6. Remove blocks from under drive wheels. Remove **DO NOT OPERATE** tag. Connect battery and install key.







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