

INTRODUCTION

GENERAL

This section has a description and the repair and adjustment procedures for the different battery indicators used on electric lift trucks.

CAUTION

Do not operate an electric lift truck with a

discharged battery. Continued operation can damage contactors, motors and the battery.

WARNING

If the lift truck has been operated using a low battery, check all contactors for welded contacts **BEFORE** connecting a charged battery. Lift truck operation cannot be controlled if the contacts are welded.

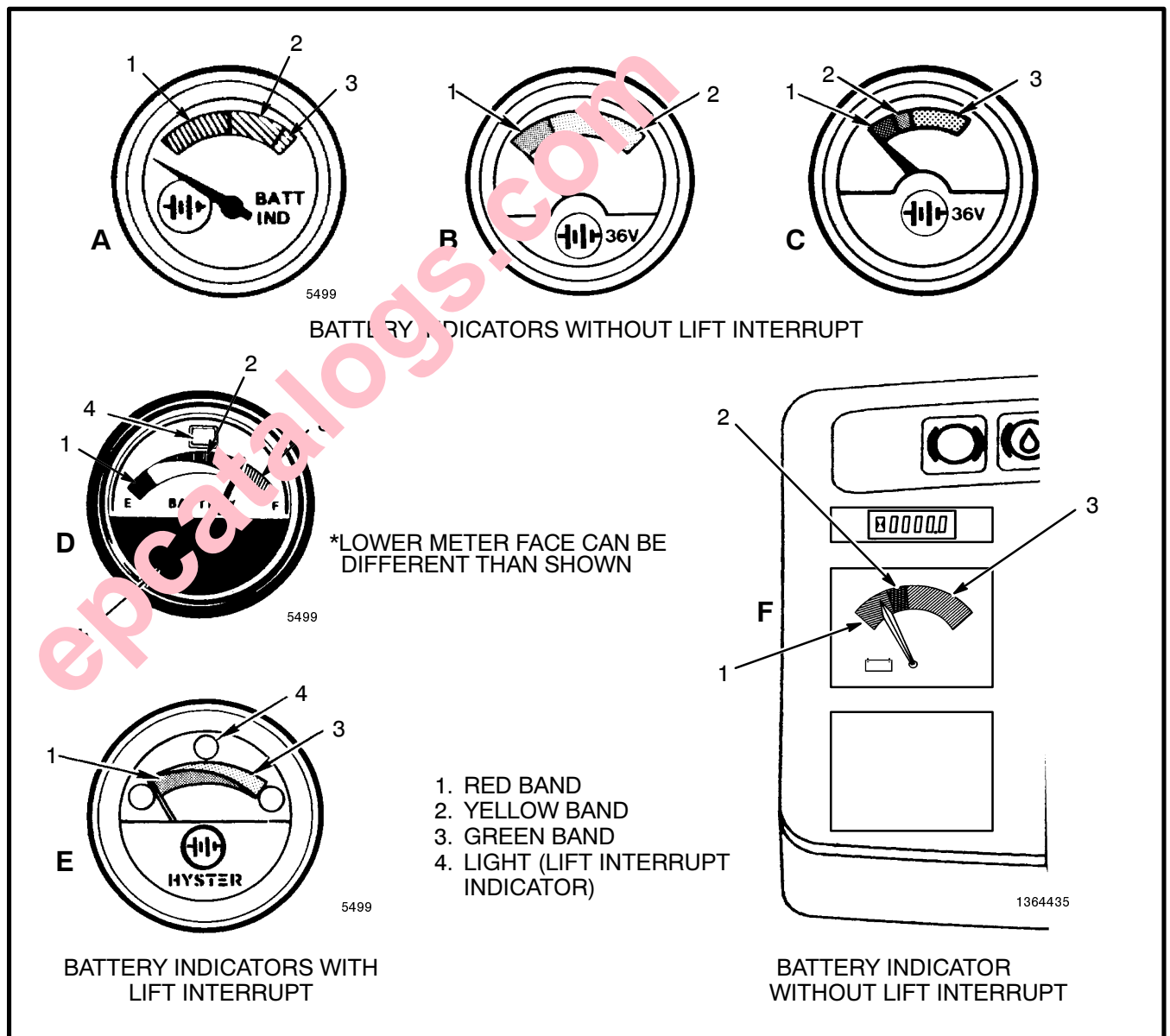


FIGURE 1. BATTERY INDICATORS WITH METER MOVEMENTS

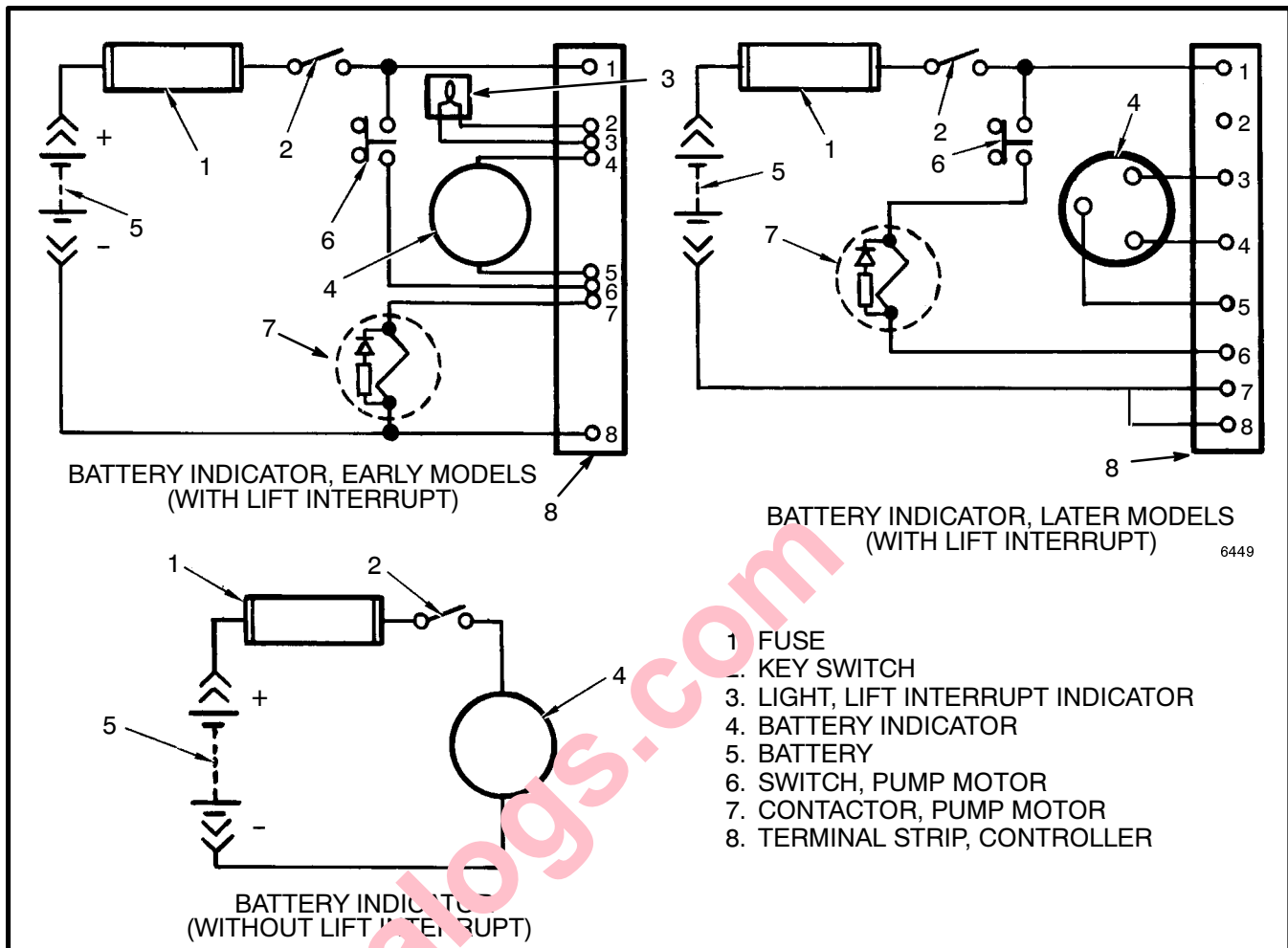


FIGURE 2. ELECTRICAL CIRCUITS FOR BATTERY INDICATORS WITH METER MOVEMENTS

INDICATORS WITH METER MOVEMENTS (See FIGURE 1. and FIGURE 2.)

The lift truck can have one of two types of battery indicators. One type of indicator does NOT have Lift Interrupt and is not adjustable. The other type of battery indicator HAS Lift Interrupt and is adjustable for different batteries or operating conditions. The indicator that does not have Lift Interrupt is a voltmeter. The face of the meter has a green and red band. Some meters also have a yellow band between the red and green bands. During operation, the indicator needle moves from the green to the red band to indicate a discharged battery. When the battery is fully charged, the needle is in the green band.

The early (D of FIGURE 1.) battery indicator with Lift Interrupt automatically measures the charge of the battery. A separate controller for the meter has an electronic circuit. This circuit controls the meter movement, a warning light (early units only) and an electronic switch

for the main hydraulic pump. The circuit can remember the charge on the battery when the battery is disconnected and connected. The meter face has a band that is red at the left end and green at the right. Some indicators have a split area with green on top and yellow on the bottom. Some other meters have a yellow band between the red and green bands. The needle location indicates the battery charge level. When the needle is at the edge of the red area of the band, the warning light illuminates if the indicator has one. At this point, the battery has approximately 5% (reserve) capacity remaining. If the reserve is used, the needle enters the red band and power to the hydraulic pump motor is interrupted until the battery is charged or replaced. Normally there is enough battery power to move the lift truck to a battery charger or to a place where a charged battery can be installed. When the needle of the indicator is in the red band, the battery must be charged or changed. Continued operation will damage the battery, contactors or motors.

Another of the battery indicators WITH Lift Interrupt is also a gauge type instrument (E of FIGURE 1.). A separate controller for this indicator has an electronic circuit that controls the indicator needle, a red warning light and an electronic switch for the main hydraulic pump. The circuit can remember the charge on the battery when the battery is disconnected and connected. This gauge indicator has a band that is a split area with green on the top and red on the bottom. The needle location indicates the battery charge level. When the battery has been discharged so that the warning light illuminates, there is still some capacity in the battery. If operation is continued, power to the main hydraulic pump circuit is interrupted (specific gravity is approximately 1.140). This action prevents the operation of the main hydraulic pump. Normally there is enough battery power to move the lift truck to a battery charger or to a place where a charged battery can be installed. When the warning light illuminates, the battery must be charged or changed. Continued operation will damage the battery, contactors or motors.

BATTERY INDICATORS WITH LCD OR LED DISPLAYS

NOTE: The Lift Interrupt function on lift trucks that have the EV-100ZX or the EV-510 motor controllers, is part of the control card. These lift trucks also have one of three display panels. The early Basic Display Panel has a mechanical meter for a battery indicator (voltmeter). See FIGURE 1. Later basic display panels have a set of vertical LEDs beside colored bars. The Performance Display Panel has a bar scale of Light Emitting Diodes (LED's) for the battery indicator. See FIGURE 4. The battery indicators discussed here do not use mechanical meters to show the battery charge.

There are battery indicators that are parts of display panels or meter faces that include other indicators. See the section **INSTRUMENT PANEL INDICATORS AND SENDERS, 2200 SRM 143** for these other indicators.

Some of these battery indicators also have the Lift Interrupt function to help prevent damage to motors, contactors and batteries. Lift Interrupt prevents motor operation of the main (lift) hydraulic pump when the battery discharges to a value too low for continued operation.

Some of the battery indicators have a Liquid Crystal Display (LCD) to show the state of charge of the battery. Others have red, yellow and green Light Emitting Diodes (LED's) to show the state of charge.

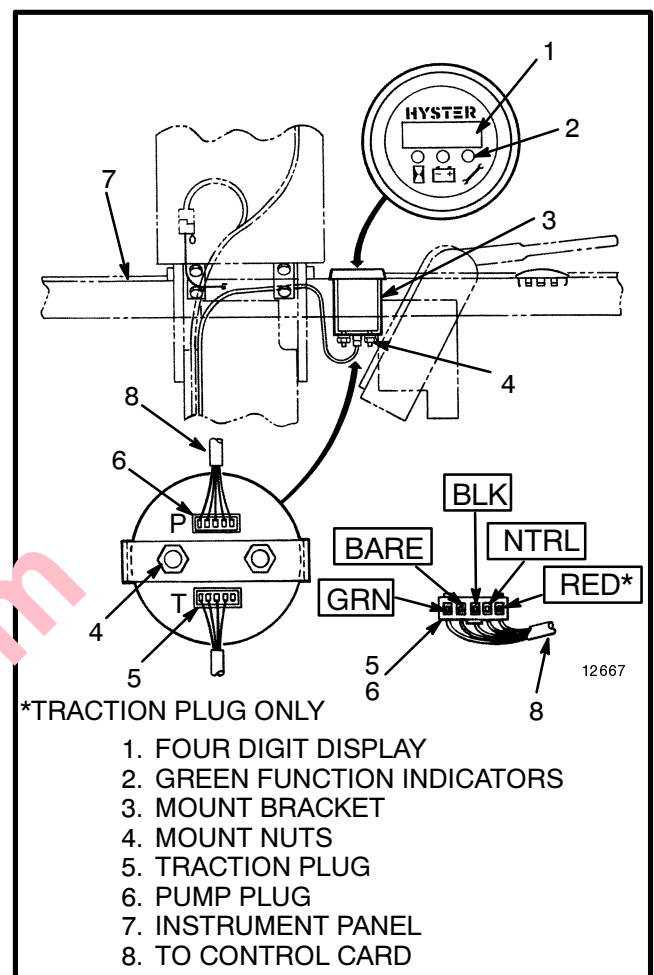


FIGURE 3. "LX" SERIES INSTRUMENT PANEL DISPLAY BATTERY INDICATOR

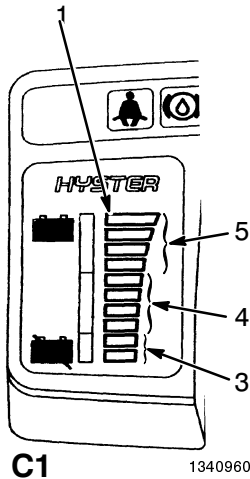
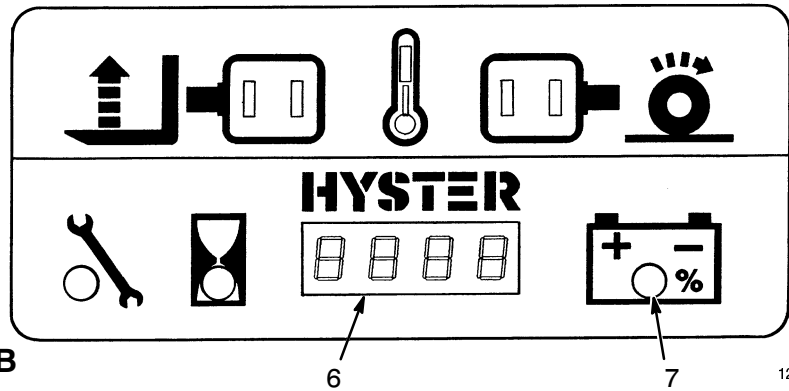
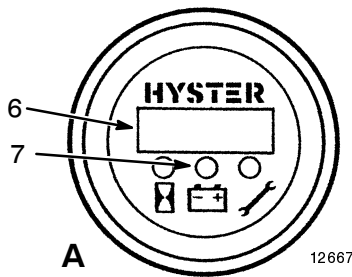
Liquid Crystal Displays

DESCRIPTION, DISPLAY PANELS ("ZX" Or Earlier Motor Controllers)

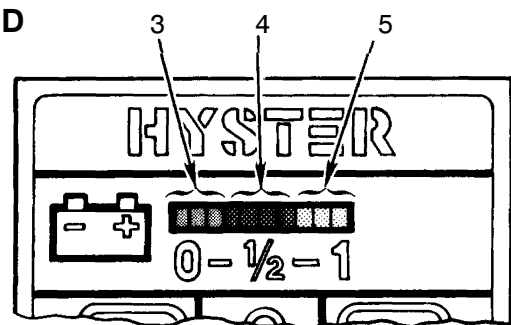
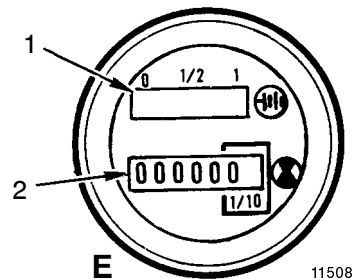
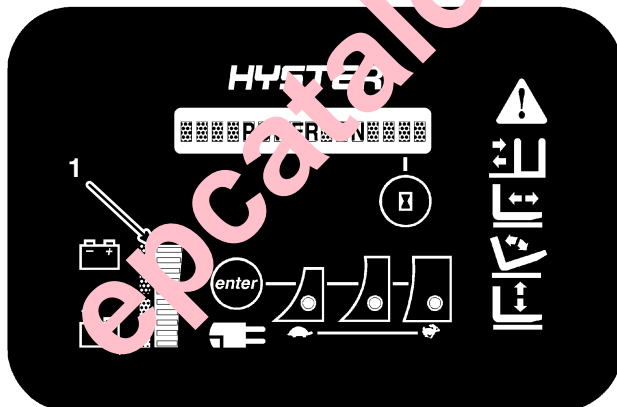
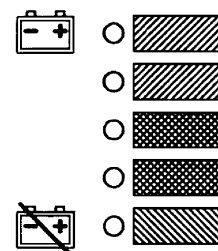
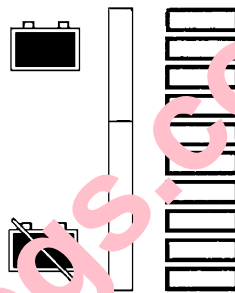
These battery indicators use Liquid Crystal Displays (LCDs) using numerical digits to show the battery condition. This same LCD also shows other functions. See the section **INSTRUMENT PANEL INDICATORS AND SENDERS, 2200 SRM 143** for the other functions. The function that is being displayed is indicated by a light at the symbol for that function. The symbol for the battery indicator function is a battery.

The EV-100/200 "LX" Series motor controller can have a display panel that includes the Battery Indicator Function. There can also be a round (meter style) indicator that includes the Battery Indicator Function. The battery indicator reading is shown on the four digit LCD display when the function LED indicator at the battery symbol is illuminated. See FIGURE 4. Also see FIGURE 3.

BATTERY INDICATORS WITH LIQUID CRYSTAL DISPLAYS (LCD)



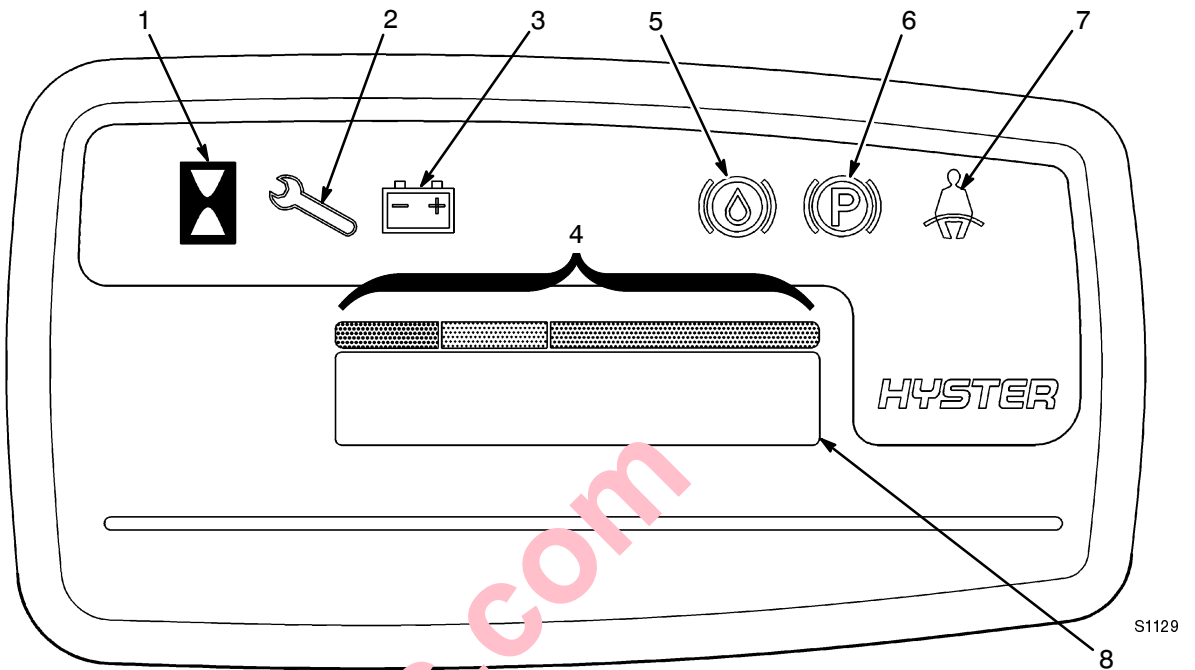
BATTERY INDICATORS WITH LIGHT EMITTING DIODES (LED's)



1. BATTERY INDICATOR LED DISPLAY
2. HOURMETER DISPLAY
3. RED LED's
4. YELLOW LED's
5. GREEN LED's
6. LIQUID CRYSTAL DISPLAY
7. LIGHT TO INDICATE DISPLAY IS FOR BATTERY

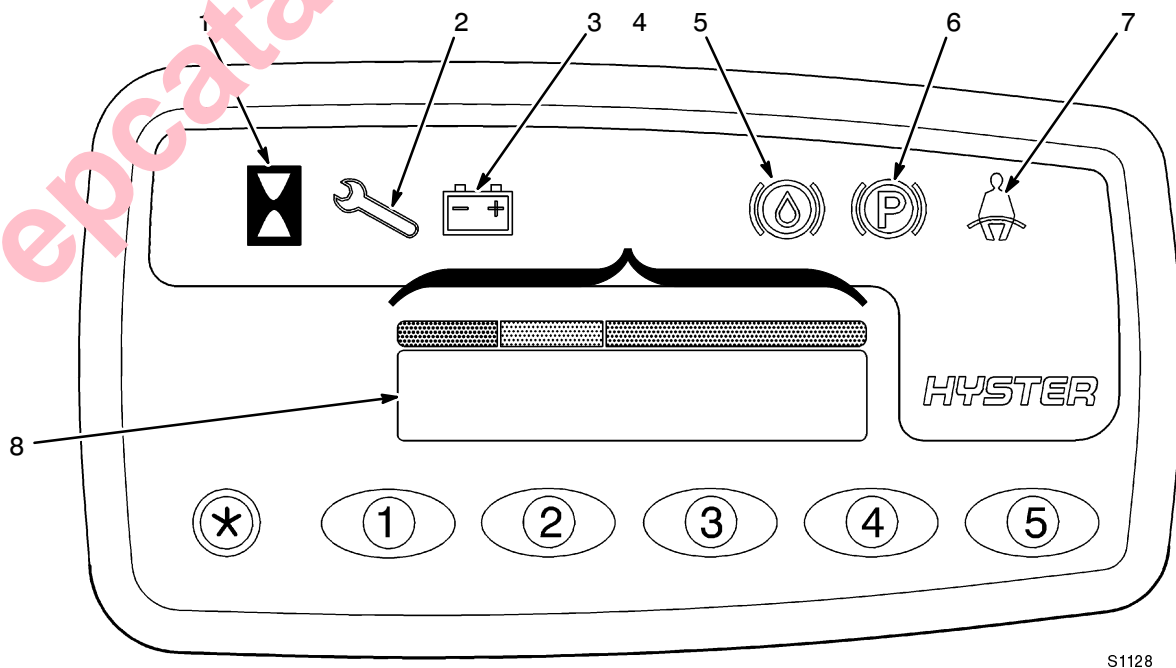
FIGURE 4. BATTERY INDICATORS WITH LCD OR LED DISPLAYS ("ZX" Or Earlier Motor Controllers)

STANDARD DISPLAY PANEL



1. LED HOURMETER SYMBOL
2. LED WRENCH INDICATOR SYMBOL
3. LED BATTERY SYMBOL
4. BATTERY STATE OF CHARGE (BDI)

5. LED BRAKE FLUID TOO LOW SYMBOL
6. LED PARKING BRAKE SYMBOL
7. LED SEAT BELT SYMBOL
8. LCD "SCREEN"



PREMIUM DISPLAY PANEL

FIGURE 5. BATTERY INDICATOR WITH SEM DISPLAY PANEL

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