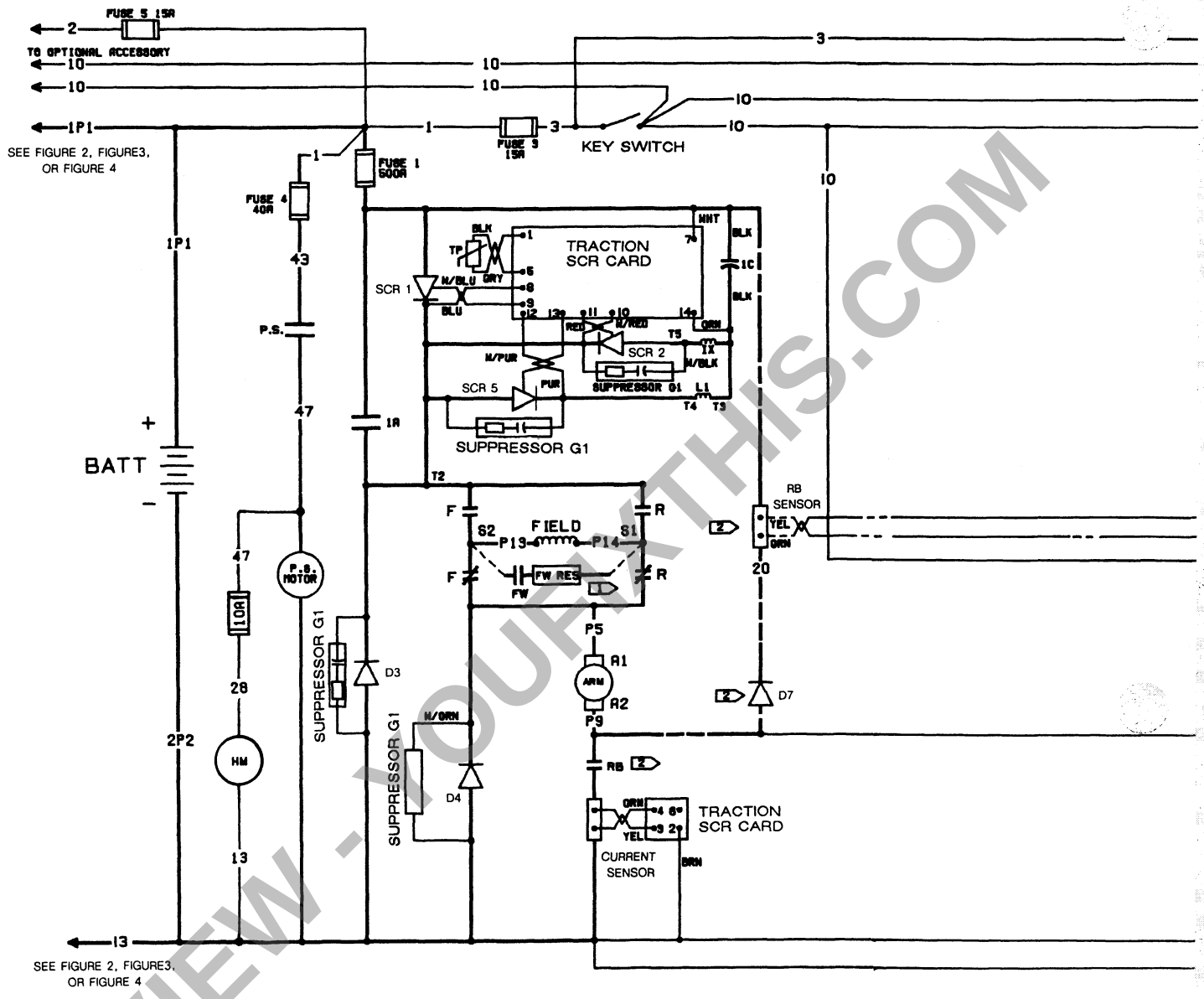


1 ITEMS ADDED WHEN FIELD WEAKENING IS USED. FIELD WEAKENING OPTION IS USED ONLY ON E2.00-3.00XL (E40-60XL) WITH 36-48 VOLT BATTERIES AND SCR CONTROL OF THE PUMP MOTOR.

2 ITEMS ADDED WHEN REGENERATIVE BRAKING IS USED

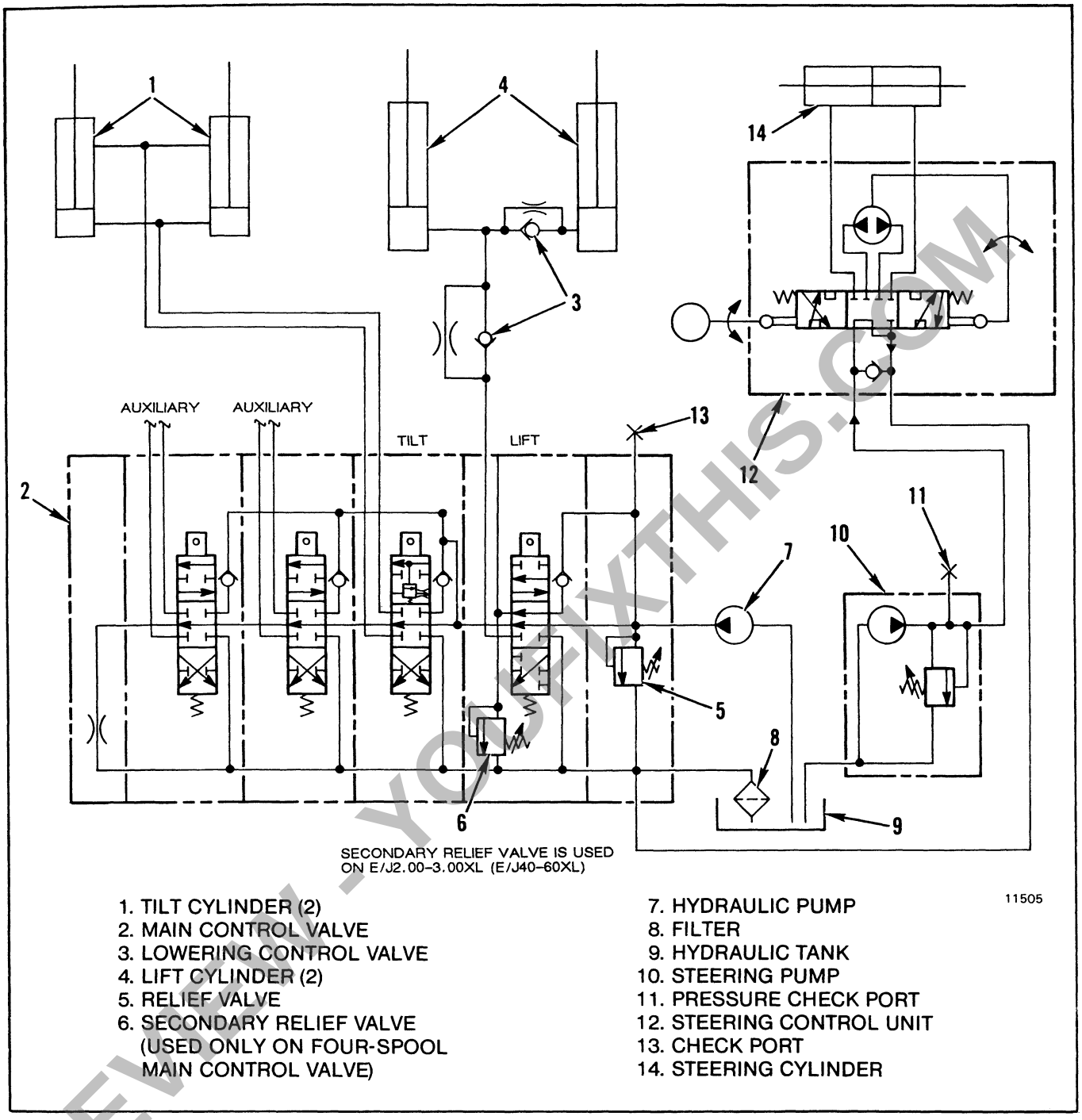
3. ALL SWITCHES ARE SHOWN IN THE STATIC LIFT TRUCK POSITION

4 REMOVE JUMPER WIRE FOR 48 VOLT LIFT TRUCKS ONLY

5 RESISTOR AND WIRE 10A ON 36-48 VOLT LIFT TRUCKS ONLY

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1. TILT CYLINDER (2)
2. MAIN CONTROL VALVE
3. LOWERING CONTROL VALVE
4. LIFT CYLINDER (2)
5. RELIEF VALVE
6. SECONDARY RELIEF VALVE (USED ONLY ON FOUR-SPOOL MAIN CONTROL VALVE)
7. HYDRAULIC PUMP
8. FILTER
9. HYDRAULIC TANK
10. STEERING PUMP
11. PRESSURE CHECK PORT
12. STEERING CONTROL UNIT
13. CHECK PORT
14. STEERING CYLINDER

FIGURE 18. HYDRAULIC SCHEMATIC (ALL MODELS)

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TORQUE SPECIFICATIONS

ITEM	TORQUE
Wheel nuts	
E/J1.25–1.75XL (E/J25–35XL)	155 N.m (115 lb_f ft)
E/J2.00–3.00XL (E/J40–60XL)	237 to 305 N.m (175 to 225 lb_f ft)
E2.00–3.20XM (E45–65XM) and N30XMH	237 to 305 N.m (175 to 225 lb_f ft)
Axle shaft capscrews	
E/J1.25–1.75XL (E/J25–35XL)	
M8 x 1.25 x 16 capscrews (4)	20 N.m (15 lb_f ft)
M14 x 1.75 x 35 capscrews (10)	155 N.m (115 lb_f ft)
E2.00–3.00XL (E40–60XL)	90 N.m (66 lb_f ft)
J2.00–3.00XL (J40–60XL)	98 N.m (72 lb_f ft)
E2.00–3.20XM (E45–65XM) and N30XMH	90 N.m (66 lb_f ft)
Axle hangers to frame	
M20 x 2.5 x 80 bolts (early models)	
Torque wrench on head of bolt	540 N.m (400 lb_f ft)
Torque wrench on nut of bolt	473 N.m (350 lb_f ft)
$^{7}/_{8}$ x 14 UNF bolts (later models)	
Torque wrench on head of bolt	745 to 780 N.m (550 to 575 lb_f ft)
Torque wrench on nut of bolt	680 to 715 N.m (500 to 525 lb_f ft)
Back plate to axle mount capscrews	
E/J1.25–1.75XL (E/J25–35XL) (10)	122 N.m (90lb_f ft)
E/J2.00–3.00XL (E/J40–60XL)	
Top 3 (6)	110 N.m (81 lb_f ft)
Bottom 4 (8)	245 N.m (180 lb_f ft)
E2.00–3.20XM (E45–65XM) and N30XMH	255 N.m (188 lb_f ft)
Wheel cylinder capscrews	
E/J1.25–1.75XL (E/J25–35XL) (8)	10 to 14 N.m (7 to 10 lb_f ft)
E/J2.00–3.00XL (E/J40–60XL)	
Top 2 (4)	78 to 85 N.m (58 to 66 lb_f ft)
Bottom 2 (4)	80 to 102 N.m (67 to 75 lb_f ft)
E2.00–3.20XM (E45–65XM) and N30XMH	18 to 27 N.m (13 to 20 lb_f ft)
Ring gear to differential case	
$^{7}/_{16}$ UNF x 1 bolts (12)	111 N.m (82 lb_f ft)
Differential case halves	
$^{3}/_{8}$ UNF x 3 $^{1}/_{2}$ capscrews (8)	50 N.m (37 lb_f ft)
Bearing cap capscrews for differential bearings (4)	95 to 110 N.m (70 to 80 lb_f ft)
Retainer capscrews for adjusting nuts (2)	19 N.m (14 lb_f ft)
Axle housing to differential housing	
E/J1.25–1.75XL (E/J25–35XL)	
M12 x 1.75 x 35 capscrews (16)	66 N.m (48 lb_f ft)
E/J2.00–3.00XL (E/J40–60XL)	
M12 x 1.75 x 35 capscrews (16)	98 N.m (72 lb_f ft)
E2.00–3.20XM (E45–65XM) and N30XMH	90 N.m (66 lb_f ft)
Pinion Nut	340 N.m (250 lb_f ft)
Transmission housing to differential housing	
M10 x 1.5 x 30 bolts (6)	38 N.m (28 lb_f ft)
M10 x 1.5 x 40 bolts (2)	38 N.m (28 lb_f ft)
Traction motor to transmission	
M10 x 1.5 x 40 bolts (7)	38 N.m (28 lb_f ft)

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strips connect the control card to the lift truck circuits and the other circuits of the motor controller. The screw connections of the terminal strips are inputs from control components of the lift truck. The plugs for the control card are Plug A, Plug B, Plug Y and Plug Z. See FIGURE 3. Plugs A and B are six pin plugs. The purpose of the wires connected to these plugs can be different for different control cards. Plug Y is a 14 pin plug that connects the instrument panel display or hand set to the control card. Some pins of Plug Y are also used to connect the control card to the Truck Management Module or other auxiliary control cards. Plug Z is also a 14 pin plug that connects the oscillator part of the control card to other circuit components. The 14 pins on Plug Z have the same functions as the pins of other EV-100/200 control cards. The pin numbers are also the same, for the same function, for both the EV100/200 "**LX**" series and the other EV-100/200 control cards.

TABLE 1 - STATUS CODES LIST

STATUS CODE	DESCRIPTION
	CARD INPUTS
BLANK	No input voltage to card and/or display
-01	No seat switch input *
-02	FWD switch closed on initial start
-03	REV switch closed on initial start
-04	Start switch input low after start
-05	Start or brake switch did not close
-06	Accelerator depressed - no direction selected
-07	Accelerator input voltage too high
-08	Accelerator input voltage too low or power to control card after key sw. ON
-09	Both FWD and REV switches closed at same time
-10	Both right and left steer angle switches are closed at same time
-11	Start switch is closed when the key is moved to the **ON** position*
-15	Battery volts too low
-16	Battery volts too high
-17	Wrong card type selection
	CONTACTOR PANEL
-23	Forward or reverse contactor coil current low
-24	Voltage at T2 too high
-25	1A contactor does not open or opens too slowly
-26	Shorted coil driver for RB, SP or FW contactor
	SCR PANEL
-41	Open thermal protector or control over temperature
-42	Motor sensor input missing (green wire)
-43	Motor sensor input missing (yellow wire)
-44	SCR 1 did not turn off correctly
-45	SCR 1 did not turn on correctly
-46	"Look ahead" (T2 volts high)
-47	SCR 2 does not turn on correctly
-48	"Look ahead" (T2 volts low)
-49	SCR 5 does not turn on correctly
-50	C1 volts low
-51	C1 volts high with high motor current
-52	C1 volts high with low motor current
-53	SCR 1 does not turn off during plugging
-54	Shorted F, R or 1A driver
-57	Current sensor output voltage polarity check

*Not used on all models of lift trucks. Status codes in this group will flash on the display.
NOTE: Motor speed is decreased with a Motor Over Temperature code at the normal function setting.

STATUS CODE	DESCRIPTION
	REGENERATIVE BRAKING*
-70	Current sensor input missing (yellow wire)
-71	Current sensor input missing (green wire)
-72	Regenerative braking contactor does not energize
-73	Regenerative braking contactor does not deenergize or deenergizes slowly
-74	Regenerative braking contactor energizes too slowly
-75	SCR 1 does not turn off during regenerative braking
-76	C1 voltage too high during regenerative braking
	TRUCK MANAGEMENT*
-90	Traction Motor Over Temperature* ★ [Left]
-91	★ [Pump Motor Over Temperature*]
-92	★ [Traction Motor Over Temperature/Right*]
-93	Pump Motor Over Temperature* or
-93	★ [Traction Brush Wear/Right*]
-94	Traction Brush Wear* ★ [Left]
-95	Pump Motor Brush Wear*
	PUMP CONTROL*
-117	Wrong card type selection
-123	Pump contactor coil current low
-124	Voltage at T2 too high
-141	Open thermal protector or control over temperature
-142	Motor sensor input missing (green wire)
-143	Motor sensor input missing (yellow wire)
-144	SCR 1 did not turn off correctly
-145	SCR 1 did not turn on correctly
-146	"Look ahead" (T2 volts high)
-147	SCR 2 does not turn on correctly
-148	"Look ahead" (T2 volts low)
-149	SCR 5 does not turn on correctly
-150	C1 volts low
-151	C1 volts high with high motor current
-152	C1 volts high with low motor current
-154	Shorted #2 PUMP driver
-157	Current sensor output voltage polarity check

NOTE: ★ [ ] for TRUCK MODELS J1.60, J1.80 and 2.0XMT (J30XMT, J35XMT and J40XMT) only.

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battery compartment that hold the counterweight to the frame. Install the two lower capscrews in the tow pin area of the counterweight. Tighten the capscrews to the correct torque. The correct torque values for capscrews are shown in FIGURE 3.

2. Disconnect the sling or chain. Remove the eyebolts from the counterweight.

3. Install the overhead guard as described in the paragraphs for the OVERHEAD GUARD, Installation.

4. Install the battery. See **PERIODIC MAINTENANCE,** "How to Change the Battery".

NOTE: The access panel to the electronic controller can be removed from the counterweight to make checks and adjustments on the controller. Make sure the lugs are correctly engaged when the access panel is installed again or the panel will fall from the counterweight during operation.

TRACTION MOTOR

Removal

This procedure will show the removal of the traction motor through the battery compartment. Some lift trucks have a seat brake that actuates the brake on the armature shaft of the traction motor. (See FIGURE 8.) The seat brake linkage must be disconnected at the front of the traction motor before the motor is removed.

NOTE: The traction motor can also be removed from under the lift truck with the use of a floor jack, but is more difficult. The lift truck must be on blocks with clearance for the jack and traction motor, if the traction motor is removed from under the lift truck. The hydraulic lines from the hydraulic tank must also be disconnected if the traction motor is removed from under the lift truck.

1. Remove the battery. Remove the floor plates and the access panel in the bottom of the battery compartment.

2. Disconnect the seat brake linkage. Disconnect the hydraulic line to the main control valve so that the motor mount can be disconnected. Put caps on the open hydraulic fittings.

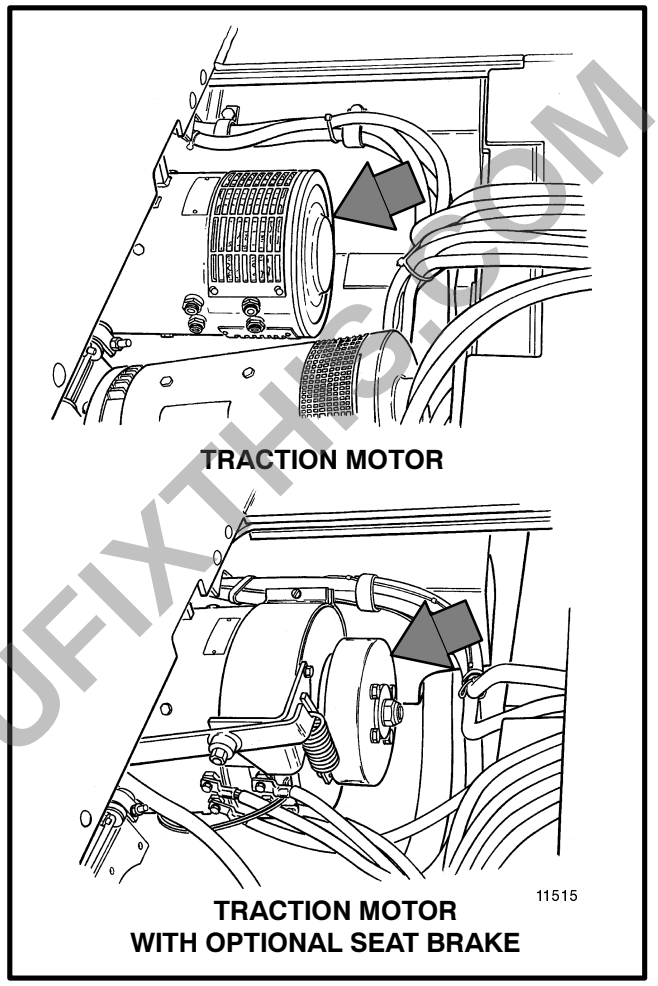


FIGURE 8. TRACTION MOTOR

3. Disconnect the power cables from the traction motor. Make an identification of which cable is connected to each terminal.

4. Put the lift truck on blocks for easier access to the bottom bolts between the traction motor and the speed reducer. Remove the bolts between the speed reducer and the motor.

5. Install a sling to hold the traction motor. (See FIGURE 9.) Use a wood block and a board under the sling as shown in the illustration to control the traction motor during removal and installation. Use the crane to hold the weight of the traction motor.

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TEST FOR SHORT CIRCUIT BETWEEN FIELD AND MOTOR CASE

Make sure that carbon dust has been cleaned from the motor before making this test. An ohmmeter (R × 10,000 scale) can be used to test for a short circuit between the field and the motor case. Put one probe on the motor case and the other probe on a field terminal. Check the resistance between the field terminal and the motor case. A resistance of less than 1 megohm indicates a problem between the field terminal and the motor case.

BRUSH HOLDER TEST

Make sure the carbon dust has been removed from the brush holders. Use an ohmmeter (R × 10,000 scale) to measure the resistance between the brush holder and the motor case. The correct resistance is an indication of infinity (∞).

Troubleshooting

PROBLEM	POSSIBLE CAUSE	PROCEDURE OR ACTION
Heavy streaks and fine grooves (see Table 2).	Operation in a dirty or abrasive environment.	Clean commutator more frequently.
	Continuous operation of motor with a light load.	Increase load on motor from time to time.
	Brush pressure is too low.	Increase brush pressure.
	Worn brushes.	Replace brushes.
Grooves and lines following heavy streaks. The armature must be replaced or the brushes will wear rapidly (see Table 2).	Operation in a dirty or abrasive environment.	Clean commutator more frequently.
	Continuous operation of motor with a light load.	Increase load on motor from time to time.
	Brush pressure is too low.	Increase brush pressure.
	Worn brushes.	Replace brushes.
Grooves the width of the brushes (see Table 2).	Operation in a dirty or abrasive environment.	Clean commutator more frequently.
	Wrong type of brushes for this motor and operation.	Replace brushes with correct type.
	Brush pressure is too high.	Adjust brush pressure.

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is specified for this lift truck, see your Hyster® lift truck dealer for the correct spacers.

NOTE: Maximum tolerances are +0 and –13 mm (+0 and –0.5 in) for the size of the battery compartment. The battery specification chart shows the maximum size tolerances that will permit a battery to still fit into a battery compartment.

⚠ WARNING

The battery must fit the battery compartment so that the battery restraint system will operate correctly. Use spacers to prevent the battery from moving more than 13 mm (0.5 in) in any horizontal direction.

The weight of the battery is a large part of the counterweight system on an electric lift truck. Make sure that the battery is within the weight limits indicated on the nameplate. Each model of lift truck has a cast-iron counterweight that provides the additional weight necessary for the indicated capacity. A slot in the overhead guard permits removal of the battery without removing the overhead guard.

TABLE 1. BATTERY SPECIFICATIONS (Battery Without Cover)

MODEL	MINIMUM COMPARTMENT SIZE LENGTH X WIDTH	BATTERY SIZE MINIMUM/MAXIMUM		WEIGHT	
		LENGTH	WIDTH	MIN.	MAX.
E1.25XL (E25XL)	694 x 909 mm (27.3 x 35.8 in)	654 / 692 mm (25.8 / 27.2 in)	784 / 885 mm (30.9 / 34.8 in)	794 kg (1749 lb)	1132 kg (2493 lb)
E1.50XL (E30XL)	694 x 909 mm (27.3 x 35.8 in)	654 / 692 mm (25.8 / 27.2 in)	784 / 885 mm (30.9 / 34.8 in)	839 kg (1848 lb)	1132 kg (2493 lb)
E1.75 XL (E35XL)	694 x 909 mm (27.3 x 35.8 in)	654 / 692 mm (25.8 / 27.2 in)	784 / 885 mm (30.9 / 34.8 in)	917 kg (2020 lb)	1132 kg (2493 lb)
E2.00-2.50XL (E40-50XL)	694 x 987 mm (27.3 x 38.9 in)	681 / 692 mm (26.8 / 27.2 in)	978 / 983 mm (38.5 / 38.7 in)	1045 kg (2302 lb)	1450 kg (3195 lb)
E2.00-3.00XL (E40-60XL)	841 x 987 mm (33.1 x 38.9 in)	800 / 838 mm (31.5 / 32.9 in)	978 / 983 mm (38.5 / 38.7 in)	1315 kg (2896 lb)	1750 kg (3855 lb)
E3.50-4.00XL (E70-80XL)	993 x 1146 mm (39.3 x 45.1 in)	950 / 1117 mm (37.4 / 43.9 in)	950 / 990 mm (37.4 / 38.9 in)	1542 kg (3396 lb)	2400 kg (5286 lb)
E5.00XL (E100XLS)	993 x 1146 mm (39.3 x 45.1 in)	950 / 1117 mm (37.4 / 43.9 in)	950 / 990 mm (37.4 / 38.9 in)	1633 kg (3597 lb)	2400 kg (5286 lb)
E5.00XL (E100XL)	1153 x 1146 mm (45.9 x 45.1 in0	950 / 1117 mm (37.4 / 43.9 in)	1115 / 1150 mm (43.9 / 45.3 in)	1814 kg (3996 lb)	2700 kg (5947 lb)
E5.50 XL (E120XL)	1153 x 1146 mm (45.9 x 45.1 in)	950 / 1117 mm (37.4 / 43.9 in)	1115 / 1150 mm (43.9 / 45.3 in)	1919 kg (4227 lb)	2700 kg (5947 lb)
J2.00-2.50XL (J40-50XL)	842 x 987 mm (33.1 x 38.9 in)	800 x 838 mm (31.5 / 32.9 in)	978 / 983 mm (38.5 / 38.7 in)	1315 kg (2896 lb)	1750 kg (3855 lb)
J2.00-3.00XL (J40-60XL)	1010 x 987 mm (39.8 x 38.9 in)	968 / 991 mm (38.1 / 39.0 in)	978 / 983 mm (38.5 / 38.7 in)	1550 kg (3417 lb)	2060 kg (4537 lb)

585 mm (23.0 in) = maximum height for batteries without a cover used in lift trucks with a hood.

NOTE: Maximum tolerances are +0 and –13 mm (+0 and –0.5 in) for the size of the battery compartment. The battery specification chart shows the maximum size tolerances that will permit the battery to still fit into a battery compartment.

⚠ WARNING

The battery must fit the battery compartment so that the battery restraint system will operate correctly. Use the spacers designed by Hyster Company to prevent the battery from moving more than 13 mm (0.5 in) in any horizontal direction.

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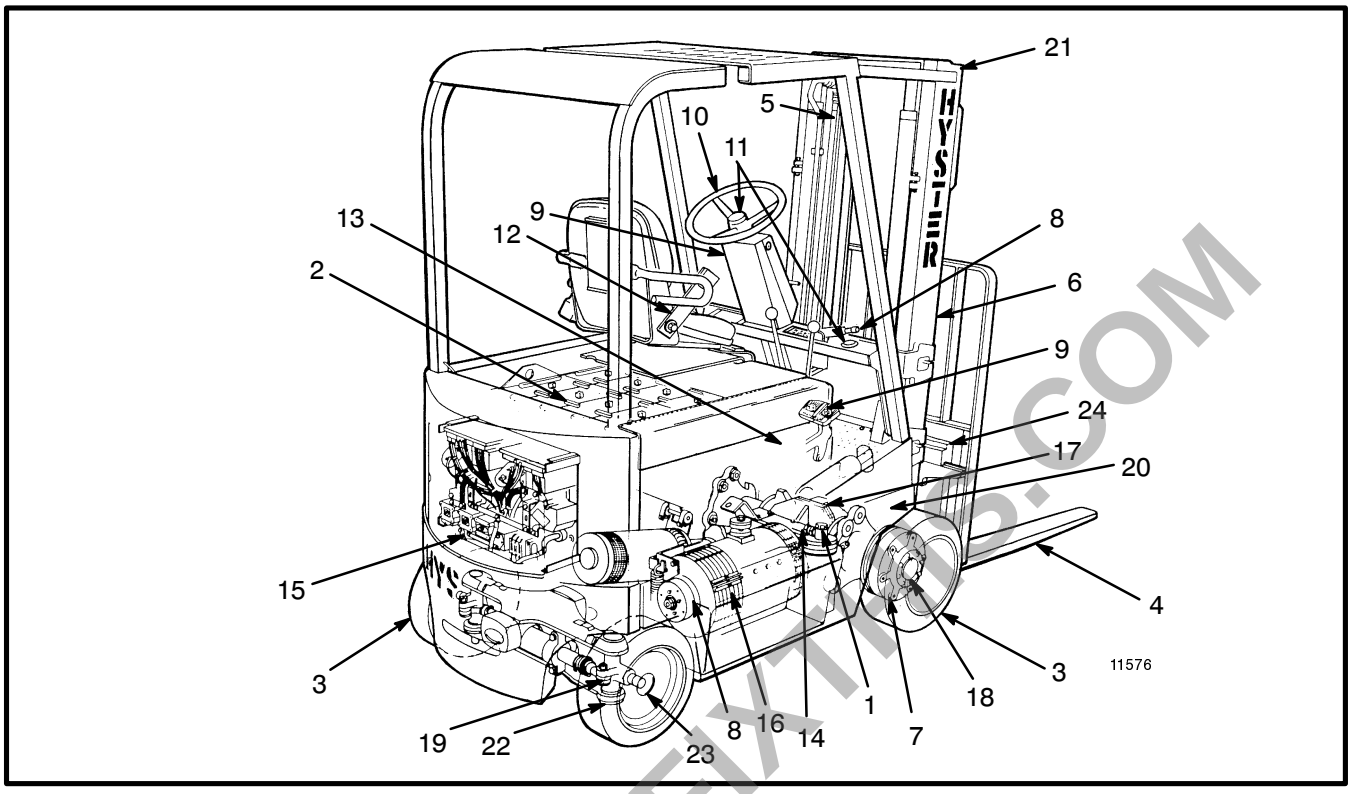


FIGURE 2. MAINTENANCE POINTS

MAINTENANCE SCHEDULE

ITEM NO.	ITEM	8 hr/ Daily	350 hr/ 2 mo	2000 hr/ 1 yr	PROCEDURE OR QUANTITY	SPECIFICATION
1	HYDRAULIC OIL (Total) E/J1.25-1.75XL (E25-35XL) E2.00-3.00XL (E40-60XL) E3.50-5.50XL (E70-120XL) j2.00-3.00XL (J40-60XL)	X		C	 17 litre (18 qt) 19 litre (20 qt) 19 litre (20 qt) 37 litre (39 qt)	API SC/CC -18°C to 38°C (0°F to 100°F) SAE 10W
	CHECK FOR OIL LEAKS	X			Check for Leaks	
2	BATTERY BATTERY RESTRAINT	X[1]			Check Condition	
3	TIRES AIR PRESSURE (Pneumatic Tires)	X X			Check Condition Check Air Pressure	See Nameplate
4	FORKS	X			Check Condition	
5	LIFT CHAINS	X	L* X		Check Condition and Lubrication Check Adjustment and Length	Engine Oil
6	MAST AND CARRIAGE	X			Check Operation	
7	SERVICE BRAKES	X		X	Check Operation Check Condition	

X=Check C=Change L=Lubricate
* Lubricate every 250 hours of operation.

NOTE: Never use steam to clean electrical parts. See the Service Manual for cleaning information.
[1] Equalization Charge is required approximately each month

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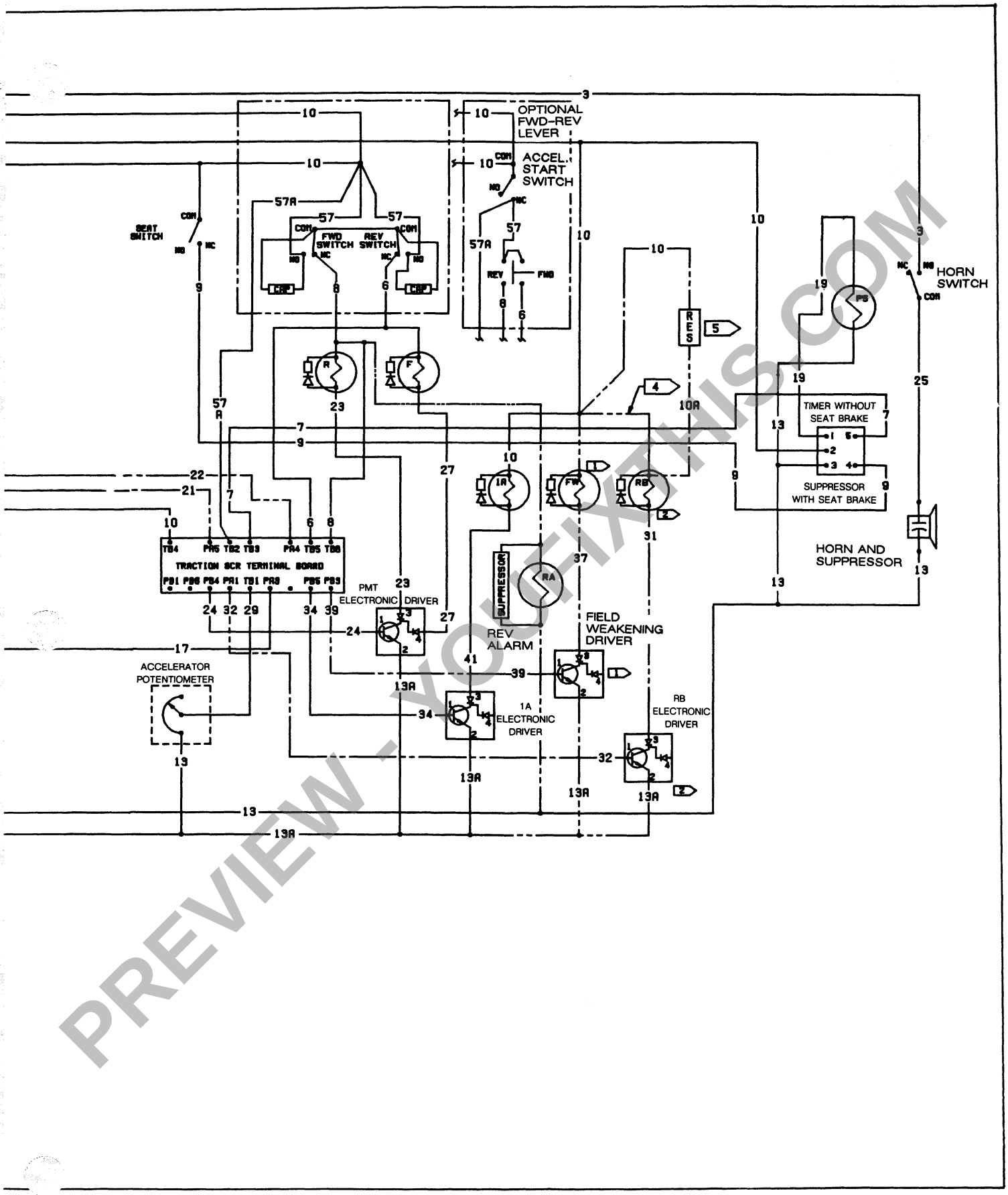


FIGURE 1. SCHEMATIC DIAGRAM, EV-100 MOTOR CONTROLLER (1 of 6)
(AFTER NOVEMBER 1987)

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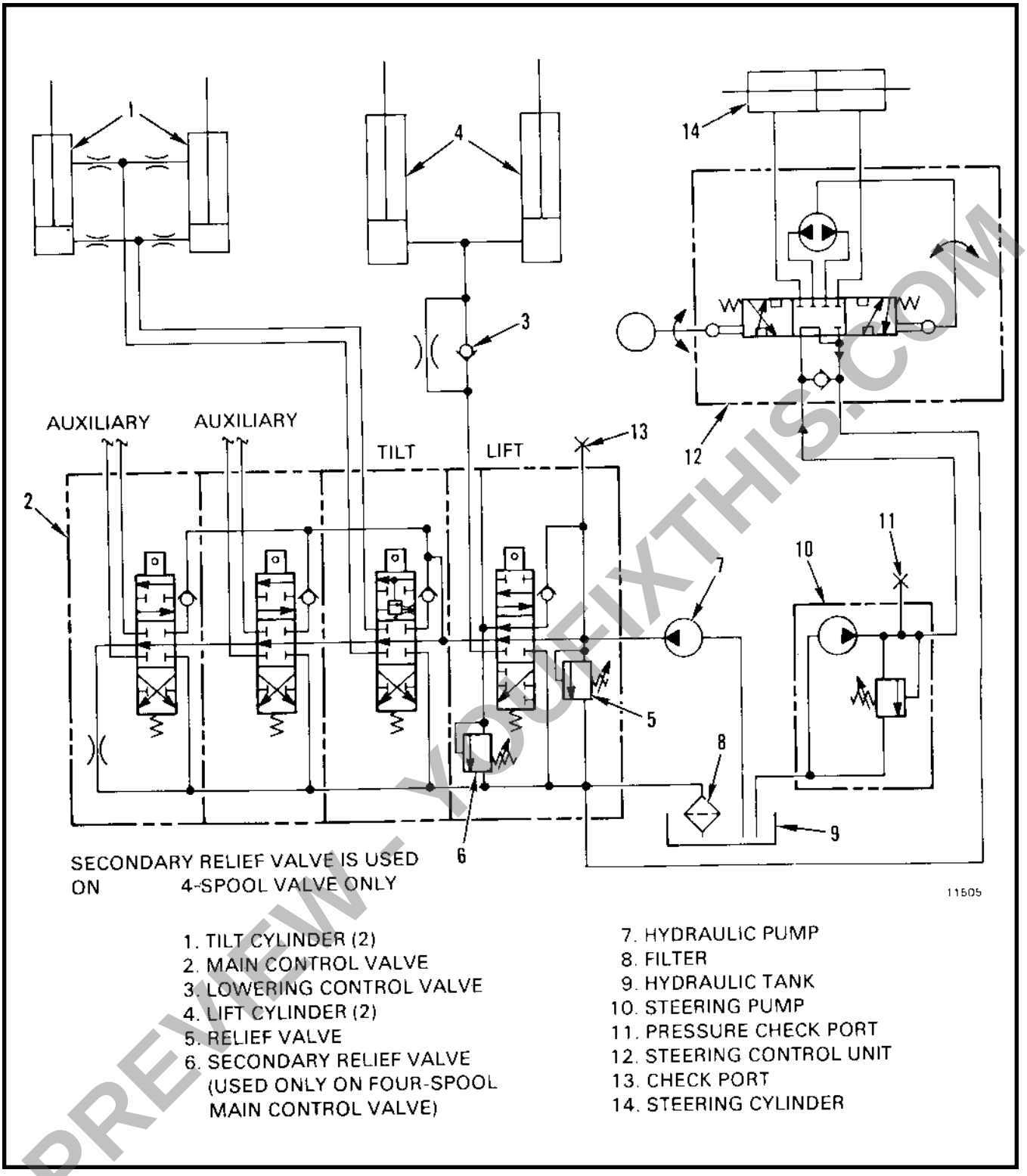


FIGURE 7. SCHEMATIC, HYDRAULIC

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4. Hold the end caps and install the cylinder on the axle frame using the capscrews or nuts and capscrews. On the H/J2.00–3.20XM (H/J40–65XM), tighten the capscrews to 225 N.m (165 lb_f ft). On the E/J1.25–1.75XL (E25–35XL) and the J2.00–3.00XL (J40–60XL), tighten the capscrews and nuts to 165 N.m (122 lb_f ft).

NOTE: On J2.00–3.00XL (J40–60XL) units the nuts are against the end caps.

5. Install the tie rods between the cylinder and the spindles. Make sure the belleville washers are on each side of the bushings in the tie rods. Install the pins and snap rings.

6. Remove the caps and connect the hydraulic lines to the steering cylinder. Operate the steering system to remove the air from the cylinder and the hydraulic system. Turn the steering wheel several times from one stop to the other.

TORQUE SPECIFICATIONS

Steer Axle Mount Bracket Hardware	88 N.m (65 lb_f ft)
Wheel/Hub Nut	
Initial Torque	200 N.m (150 lb_f ft)
Final Torque	34 N.m (25 lb_f ft)
King Pin Nut	
Initial Torque	90 N.m (66 lb_f ft)
Final Torque	34 N.m (25 lb_f ft)
Wheel Nuts	
H/J2.00–3.20XM (H/J40–65XM)	237 to 305 N.m (175 to 225 lb_f ft)
J1.25–1.75XL (J25–35XL)	155 N.m (115 lb_f ft)
J2.00–3.00XL (J40–60XL)	155 N.m (115 lb_f ft)
Steer Cylinder Mount Hardware	
H/J2.00–3.20XM (H/J40–65XM)	225 N.m (165 lb_f ft)
E/J1.25–1.75XL (E/J25–35XL)	165 N.m (122 lb_f ft)
J2.00–3.00XL (J40–60XL)	165 N.m (122 lb_f ft)

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STATUS CODE BLANK DISPLAY	DESCRIPTION	MEMORY RECALL	No
	Display of instrument panel or hand set is blank.	CIRCUIT	Traction and Pump

INDICATION OF FAULT

No status code shown on instrument panel or hand set display.

POSSIBLE CAUSE

Positive or negative control volts missing.

- Make sure that the key switch **ON** and there is voltage between PZ7 and PZ3 (NEG). Check for voltage between TB4 and PZ3 (NEG).

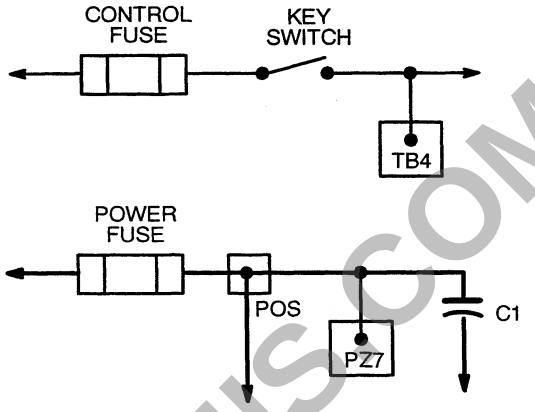
Open-circuit between logic card Plug "Y" and instrument panel display or hand set.

- Check for an open-circuit or loose connections between each wire going between logic card Plug "Y" and the instrument panel display or hand set.

Malfunction of instrument panel display or hand set.

- replace instrument panel display or hand set.

Also see **TROUBLESHOOTING, NOTES 1, 2 and 3** on the previous page.

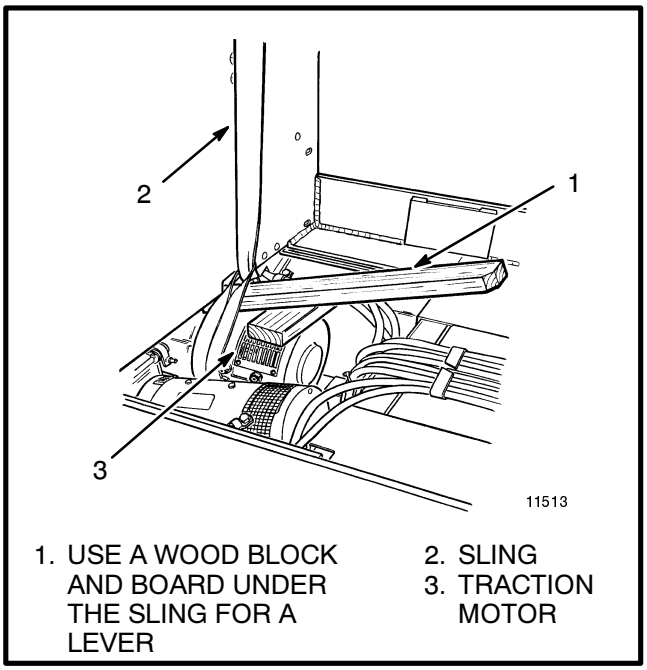


REASON FOR STATUS CODE DISPLAY

No input voltage to the control card or the display unit.

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1. USE A WOOD BLOCK AND BOARD UNDER THE SLING FOR A LEVER
2. SLING
3. TRACTION MOTOR

FIGURE 9. INSTALL A SLING TO LIFT THE TRACTION MOTOR

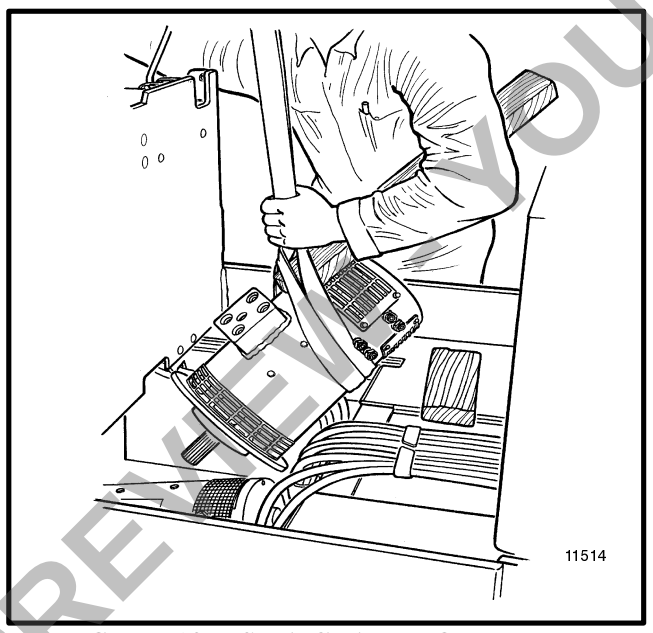


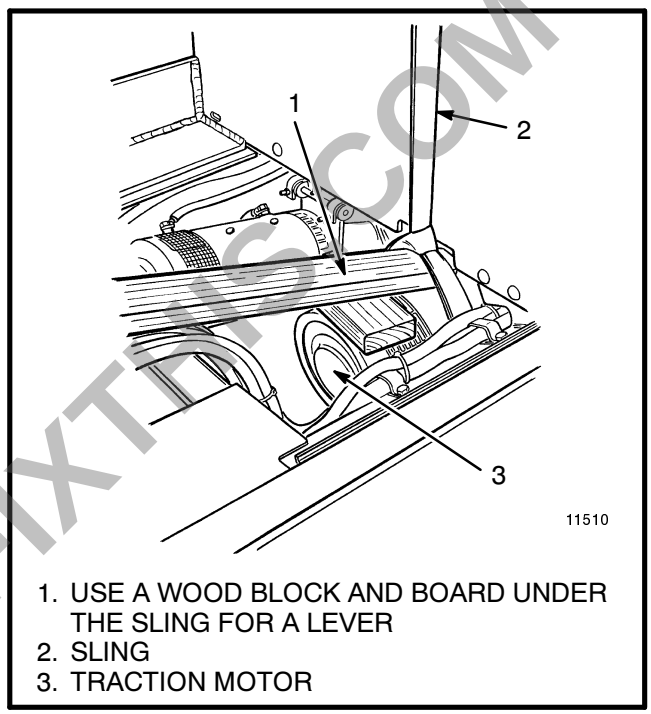
FIGURE 10. USE A CRANE TO LIFT THE TRACTION MOTOR

⚠ CAUTION

The traction motors are in different configurations for different applications of the lift trucks. Traction motors weigh approximately 90 to 140 kg (200 to 310 lb). Make sure that the sling can not slide and permit the traction motor to fall.

6. Remove the motor mount that holds the traction motor to the frame. Pull the traction motor from the speed reducer.

7. Use the crane to move the traction motor to a space to make repairs.



1. USE A WOOD BLOCK AND BOARD UNDER THE SLING FOR A LEVER
2. SLING
3. TRACTION MOTOR

FIGURE 11. ALIGN THE TRACTION MOTOR WITH THE SPEED REDUCER

Installation

1. Install a sling to lift the traction motor. Use a wood block and a board under the sling as shown in FIGURE 9. to control the traction motor during installation.

2. Lower the traction motor into position in the lift truck. Align the traction motor with the speed reducer.

3. Use a board or prybar as necessary to push the traction motor into the speed reducer.

4. Align the bolt holes in the speed reducer and the motor housing. Install the bolts that hold the traction motor to the speed reducer. Tighten the bolts to 38 Nm (28 lbf ft).

5. Remove the sling and install the traction motor mount.

6. Connect the inlet hydraulic line to the main control valve. Install the power cables.

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PROBLEM	POSSIBLE CAUSE	PROCEDURE OR ACTION
Copper drag occurs when copper from the commutator is pulled into the slot between the commutator bars. This problem will cause a short circuit between the commutator bars (see Table 2).	Operation in a dirty or abrasive environment.	Clean commutator more frequently.
	Brush holder is not correctly adjusted electrically for the motor.	Adjust brush holder.
	Wrong type of brushes for this motor and operation.	Replace brushes with correct type.
	Brush pressure is incorrect (too high or too low).	Adjust brush pressure.
Electrical burns on commutator bars on opposite sides of the commutator (see Table 2).	Open armature winding.	Replace armature.
	Motor has been stalled.	Use correct operating techniques.
Copper wears rapidly at the edge of the commutator bars (see Table 2).	Operation in a dirty or abrasive environment.	Clean commutator more frequently.
	Wrong type of brushes for this motor and operation.	Replace brushes with correct type.

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TABLE 2. BATTERY SPECIFICATIONS (Battery With Flat Cover)

MODEL	MINIMUM COMPARTMENT SIZE LENGTH X WIDTH	BATTERY SIZE MINIMUM/MAXIMUM		WEIGHT	
		LENGTH	WIDTH	MIN.	MAX.
E1.25XL (E25XL)	694 x 909 mm (27.3 x 35.8 in)	654 / 692 mm (25.8 / 27.2 in)	784 / 907 mm (30.9 / 35.7 in)	794 kg (1749 lb)	1285 kg (2830 lb)
E1.50XL (E30XL)	694 x 909 mm (27.3 x 35.8 in)	654 / 692 mm (25.8 / 27.2 in)	784 / 907 mm (30.9 / 35.7 in)	839 kg (1848 lb)	1285 kg (2830 lb)
E1.75XL (E35XL)	694 x 909 mm (27.3 x 35.8 in)	654 / 692 mm (25.8 / 27.2 in)	784 / 907 mm (30.9 / 35.7 in)	917 kg (2020 lb)	1285 kg (2830 lb)
E2.00-2.50XL (E40-50XL) 36/48V	694 x 987 mm (27.3 x 38.9 in)	681 / 691 mm (26.8 / 27.2 in)	978 / 983 mm (38.5 / 38.7 in)	1045 kg (2300 lb)	1450 kg (3197 lb)
E2.00-3.00XL (E40-60XL) 36/48V	841 x 987 mm (33.1 x 38.9 in)	800 / 838 mm (31.5 / 32.9 in)	978 / 983 mm (38.5 / 38.7 in)	1315 kg (2900 lb)	1750 kg (3855 lb)
E2.00-2.50XL (E40-50XL) 72/80V	694 x 1037 mm (27.3 x 40.8 in)	681 / 691 mm (27.0 / 27.2 in)	1029/1034 mm (40.5 / 40.7 in)	935 kg (2059 lb)	1270 kg (2797 lb)
E2.00-3.00XL (E40-60XL) 72/80V	841 x 1037 mm (33.1 x 40.8 in)	833 / 838 mm (32.8 / 32.9 in)	1029/1034 mm (40.5 / 40.7 in)	1420 kg (3128 lb)	1690 kg (3722 lb)
E3.50-4.00XL (E70-80XL)	993 x 1146 mm (39.3 x 45.1 in)	950 / 990 mm (37.4 / 39.0 in)	950 / 1143 mm (37.4 / 45.0 in)	1542 kg (3396 lb)	2400 kg (5286 lb)
E5.00XLS (E100XLS)	993 x 1146 mm (39.3 x 45.1 in)	950 / 990 mm (37.4 / 39.0 in)	950 / 1143 mm (37.4 / 45.0 in)	1633 kg (3597 lb)	2400 kg (5286 lb)
E5.00XL (E100XL)	1153 x 1146 mm (45.9 x 45.1 in)	1115 / 1150 mm (43.9 / 45.3 in)	950 / 1143 mm (37.4 / 45.0 in)	1814 kg (3996 lb)	2700 kg (5947 lb)
E5.50 XL (E120XL)	1153 x 1146 mm (45.9 x 45.1 in)	1115 / 1150 mm (43.9 / 45.3 in)	950 / 1143 mm (37.4 / 45.0 in)	1919 kg (4227 lb)	2700 kg (5947 lb)
J2.00-2.50XL (J40-50XL) 36/48V	841 x 987 mm (33.1 x 38.9 in)	800 x 838 mm (31.5 / 32.9 in)	978 / 983 mm (38.5 / 38.7 in)	1315 kg (2900 lb)	1750 kg (3855 lb)
J2.00-3.00XL (J40-60XL) 36/48V	1009 x 987 mm (39.7 x 38.9 in)	968 / 991 mm (38.1 / 39.0 in)	978 / 983 mm (38.5 / 38.7 in)	1550 kg (3414 lb)	2060 kg (4537 lb)
J2.00-2.50XL (J40-50XL) 72/80V	841 x 1037 mm (33.1 x 40.8 in)	833 / 838 mm (32.8 / 32.9 in)	1029 /1034 mm (40.5 / 40.7 in)	1420 kg (3128 lb)	1690 kg (3722 lb)
J2.00-3.00XL (J40-60XL) 72/80V	1009 x 1037 mm (39.7 x 40.8 in)	1001 / 1006 mm (39.4 / 39.6 in)	1029 /1034 mm (40.5 / 40.7 in)	1600 kg (3524 lb)	1850 kg (4075 lb)

617 mm (24.3 in) = maximum height for batteries with a flat cover used in lift trucks without a hood.

NOTE: Maximum tolerances are +0 and −13 mm (+0 and -0.5 in) for the size of the battery compartment. The battery specification chart shows the maximum size tolerances that will permit the battery to still fit into a battery compartment.

⚠ WARNING

The battery must fit the battery compartment so that the battery restraint system will operate correctly. Use the spacers designed by Hyster Company to prevent the battery from moving more than 13 mm (0.5 in) in any horizontal direction.

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MAINTENANCE SCHEDULE

ITEM NO.	ITEM	8 hr/ Daily	350 hr/ 2 mo	2000 hr/ 1 yr	PROCEDURE OR QUANTITY	SPECIFICATION
	SAFETY LABELS	X			Replace as Necessary	See Parts Manual
8	PARKING BRAKE	X			Check Operation	
9	DIRECTION/SPEED CONTROLS	X			Check Operation	
10	STEERING CONTROLS STEERING COLUMN LATCH	X X			Check Operation Check Operation	
11	HORN, GAUGES, LIGHTS, ALARMS	X			Check Operation	
12	SEAT BELT, HIP RESTRAINTS AND SEAT RAILS	X			Check Condition	
13	BRAKE FLUID		X		0.25 litre (0.5 pint)	SAE J-1703
14	HYDRAULIC TANK BREATHER		X		Clean or Replace	
	SEAT (PARKING) BRAKE ADJUSTMENT		X		Service Person to make Adjustments	
15	CONTACTORS		X	C[2]	Check Condition	
16	MOTOR BRUSHES		X[3]		Check Condition	
17	DIFFERENTIAL AND SPEED REDUCER		X	C	3.3 litre (3.5 qt) 5.2 litre (5.5 qt) (E70-120XL)	Ultra Gear Lube Gear Oil SAE 80W (Chevron Oil Co.) or SAE 90W EP
18	WHEEL NUT TORQUE E25-35XL (Drive Wheel) E40-60XL (Drive Wheel) E70-120XL (Drive Wheel) J40-60XL (Drive Wheel) J40-60XL (Steer Wheel)		X		Check Torque	 155 Nm (115 lbf ft) 237-305 Nm (175-225 lbf ft) 600 Nm (443 lbf ft) 237-305 Nm (175-225 lbf ft) 155 Nm (115 lbf ft)
19	TIE RODS, STEERING (E25-35XL) (J40-60XL)		L*		4 Fittings	Multi-Purpose Grease with 2-4% Molybdenum Disulphide
20 21	MAST PIVOTS MAST SLIDING SURFACES		L L		2 Fittings As Required	Multi-Purpose Grease with 2-4% Molybdenum Disulphide
22	SPINDLE BEARINGS (J40-60XL)		L*		As Required	Multi-Purpose Grease with 2-4% Molybdenum Disulphide
1	HYDRAULIC FILTER			C	1	See Parts Manual
23	WHEEL BEARINGS			L	As Necessary	Multi-Purpose Grease with 2-4% Molybdenum Disulphide
24	FORK GUIDES AND LOCKS	X	L		As Necessary	Engine Oil

X=Check C=Change L=Lubricate

NOTE: Never use steam to clean electrical parts. See the Service Manual for cleaning information.

* Lubricate every 250 hours of operation.

[2] Replace the contacts for the hydraulic pump contactor every 1000 hous of operation. Replace other contacts when thickness is reduced to 30% of new contacts.

[3] Check after 500 hours. If brush wear is slow, extend the interval to check to 1000 hours of opewration.

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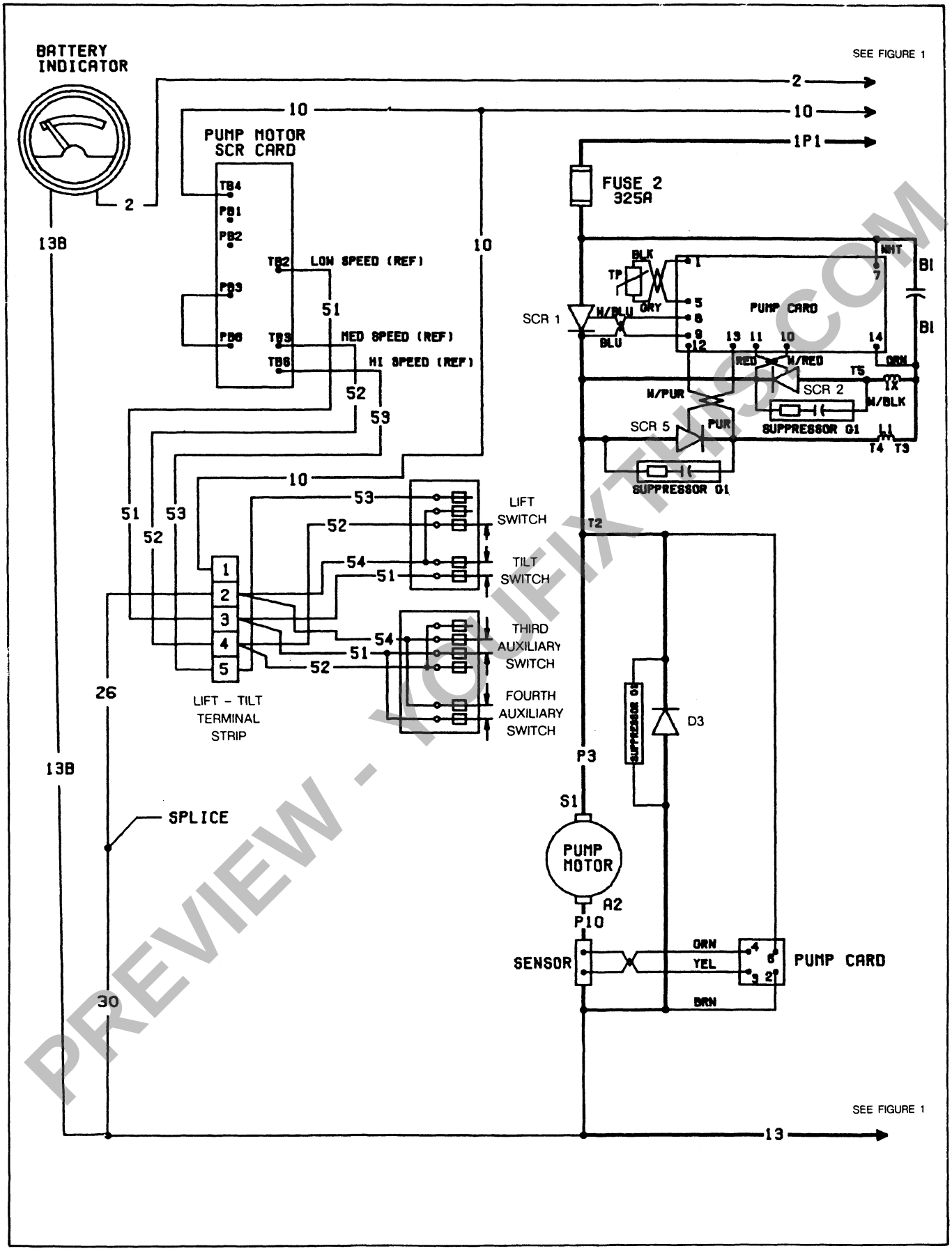


FIGURE 2. SCHEMATIC DIAGRAM, BATTERY INDICATOR WITHOUT LIFT INTERRUPT AND SCR CONTROL FOR HYDRAULIC PUMP MOTOR (2 of 6) (AFTER NOVEMBER 1987)

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TORQUE SPECIFICATIONS

ITEM	SPECIFICATION
FRAME	
Overhead Guard	
Front supports to cowl (2)	86 N.m (63 lbf ft)
Rear supports to counterweight (2)	435 N.m (320 lbf ft)
Counterweight Capscrews	
M20 x 2.5 x 80 capscrews (2)	405 to 440 N.m (300 to 325 lbf ft)
M12 x 1.75 x 90 capscrews (2)	66 N.m (49 lbf ft)
DRIVE AXLE, SPEED REDUCER AND DIFFERENTIAL	
Wheel Nuts	
E/J1.25–1.75XL (E25–35XL)	155 N.m (115 lbf ft)
E2.00–3.00XL (E40–60XL)	237 to 305 N.m (175 to 225 lbf ft)
J2.00–3.00XL (J40–60XL)	237 to 305 N.m (175 to 225 lbf ft)
Axle Shaft Capscrews	
E/J1.25–1.75XL (E25–35XL)	
M8 X 1.25 X 16 capscrews (4)	20 N.m (15 lbf ft)
E1.25–1.75XL (E25–35XL)	
M14 X 1.75 X 35 capscrews (20)	155 N.m (115 lbf ft)
E2.00–3.00XL (E40–60XL)	90 N.m (66 lbf ft)
J2.00–3.00XL (J40–60XL)	98 N.m (72 lbf ft)
Axle Hangers to Frame	
Torque wrench on Head of Bolt	745 to 780 N.m (550 to 575 lbf ft)
Torque wrench on Nut of Bolt	680 to 715 N.m (500 to 527 lbf ft)
Back Plate to Axle Mount Capscrews	
E/J1.25–1.75XL (E25–35XL) (10)	745 to 780 N.m (550 to 575 lbf ft)
E2.00–3.00XL (E40–60XL)	
J2.00–3.00XL (J40–60XL)	
Top Three (6)	680 to 715 N.m (500 to 527 lbf ft)
Bottom Four (8)	680 to 715 N.m (500 to 527 lbf ft)
Wheel Cylinder Capscrews	
E/J1.25–1.75XL (E25–35XL) (8)	10 to 14 N.m (90 to 120 lbf in)
E2.00–3.00XL (E40–60XL)	
J2.00–3.00XL (J40–60XL)	
Top Two (4)	78 to 85 N.m (58 to 66 lbf ft)
Bottom Two (4)	80 to 102 N.m (67 to 75 lbf ft)
Ring Gear to Differential Case	
7/16 UNF X 1 bolts (12)	111 N.m (82 lbf ft)
Differential Case Halves	
3/8 UNF x 3–1/2 capscrews (8)	50 N.m (37 lbf ft)
Bearing Cap Capscrews for Differential Bearings (4)	95 to 110 N.m (70 to 80 lbf ft)
Retainer Capscrews for the Adjusting Nuts (2)	19 N.m (14 lbf ft)
Pinion Nut	
Transmission Housing to Differential Housing	
M10 x 1.5 x 30 bolts (6)	38 N.m (28 lbf ft)
M10 x 1.5 x 40 bolts (2)	38 N.m (28 lbf ft)
Traction Motor to Transmission	
M10 x 1.5 x 40 bolts (7)	38 N.m (28 lbf ft)
Traction Motor to Motor Mount	165 N.m (122 lbf ft)

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STATUS CODE -01	DESCRIPTION	MEMORY RECALL	No
	No voltage signal from seat switch.	CIRCUIT	Traction

INDICATION OF FAULT

Forward and reverse contactor will not energize.

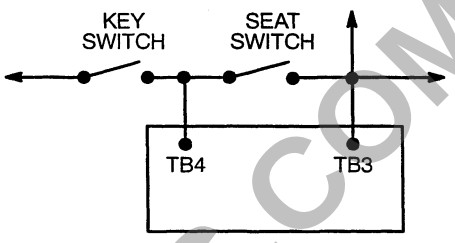
POSSIBLE CAUSE

Seat switch is damaged or needs adjusting.

- Check that seat switch operates correctly.

Open-circuit between battery positive and TB3 of control card.

- Check for loose connections or broken wires between the seat switch and TB3.
- Check for loose connections or broken wires between the key switch and the battery positive side of the seat switch.
- Check for loose connections or broken wires between the key switch or seat switch and TB4.
- On units without a seat switch, check for loose connections or broken wires between the terminals TB4 and TB3 of the control card.



REASON FOR STATUS CODE DISPLAY

This status code is displayed when the voltage at TB3 is less than 50% of battery voltage.

STATUS CODE -02	DESCRIPTION	MEMORY RECALL	No
	Forward switch is closed when the key is moved to the **ON** position.	CIRCUIT	Traction

INDICATION OF FAULT

Forward contactor will not energize. Static Return to Off (SRO) circuit is activated.

POSSIBLE CAUSE

Forward switch is closed when the key is moved to the **ON** position and, if installed, the start switch is closed.

- Move the Monotrol, direction lever or direction and speed control to the NEUTRAL position. Now select a direction.

Forward switch is damaged so that it has a short-circuit in the open position. Forward switch needs to be adjusted.

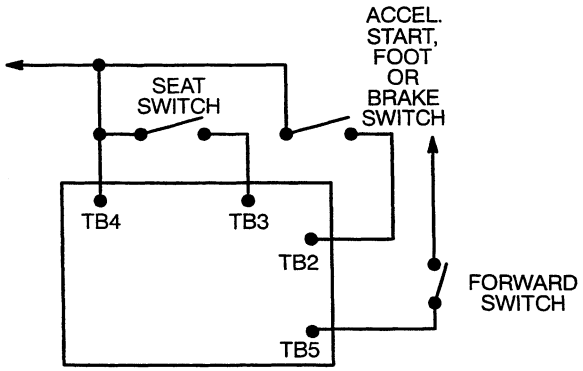
- Replace or adjust the forward switch so that it opens when the Monotrol, direction lever or direction and speed control is in the NEUTRAL position.

Short-circuit between TB2 and TB5

- Disconnect the wire from TB5 and check for a short-circuit between TB2 and the wire.

Malfunction of the control card

- Disconnect the wire from TB5 and check for less than 60% of battery voltage at TB5.



REASON FOR STATUS CODE DISPLAY

This status code is displayed when the voltage at TB5 is more than 60% of battery voltage when the key is moved to the **ON** position.

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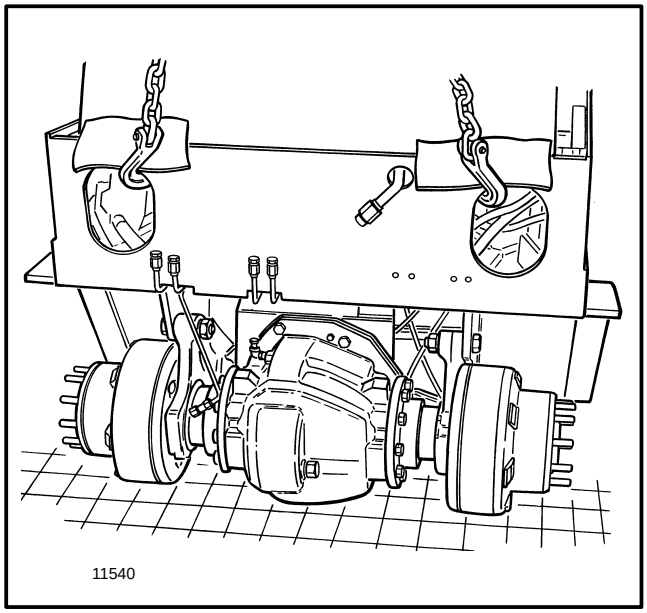


FIGURE 4. LOWER THE DRIVE AXLE TO THE SURFACE

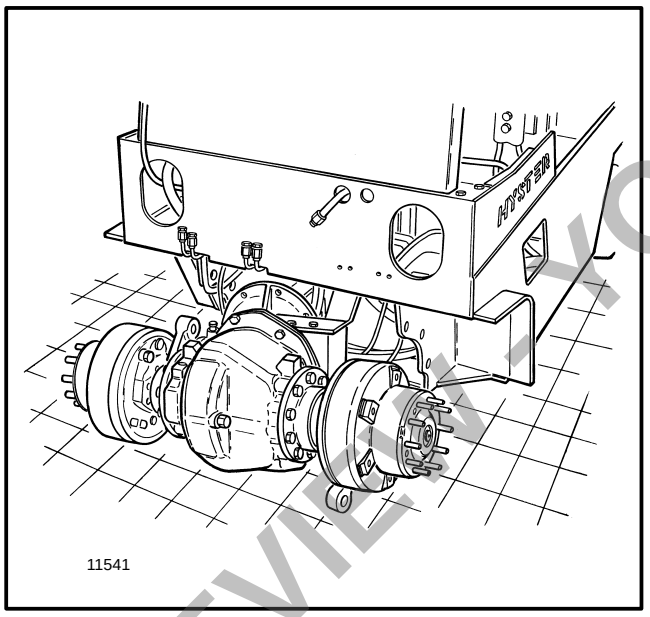


FIGURE 5. REMOVE THE DRIVE AXLE FROM THE LIFT TRUCK

5. Remove the drive wheels and lower the lift truck so that the drive axle and the front of the frame is on the floor. (The steering wheels are on the floor and hold the end of the frame with the counterweight.)

6. Remove the $^{7}/_{8}$ x 14 UNF bolts that hold the axle mounts to the frame. Turn the axle mounts forward so that there is additional clearance for removal of the drive axle.

NOTE: Some early models of the electric XL series of lift trucks have M20 x 2.5 x 80 bolts instead of $^{7}/_{8}$ x 14 UNF bolts.

7. Remove the mounting bolts for the hydraulic filter. With the hoses still attached to the filter, move the filter to improve access to the mounting bolt for the transmission. Remove the mounting bolt that is located on the top of the transmission/differential assembly (see item 12, FIGURE 2.)

8. Slide the drive axle assembly from the lift truck. Use a crane and slings to move the drive axle to a work space.

Disassembly of the Drive Axle

1. Remove the capscrews that hold the axle shaft to the hub. There are two holes with threads in the flange of the axle shaft. Put capscrews (M12 x 1.75) in these holes to loosen the axle shaft from the hub.

2. Bend the lock plate so that the nut can be removed from the axle spindle. Remove the nut, lock plate, washer, and bearing cone. Carefully slide the hub and brake drum assembly from the spindle. Keep the spindle in the center of the hub and brake drum assembly during removal so that the oil seal in the hub is not damaged. Do not permit oil or grease to get on the brake shoes.

3. Remove the inner bearing cone from the spindle. [E/J1.25–1.75XL (E25–35XL) models also have a spacer between the grease seal and the shoulder of the wheel spindle.]

4. If the brakes must be repaired, disassemble the brake assembly as described in the section for THE BRAKES. If disassembly of the brakes is not required, slide the brake assembly and the axle mount bracket from the axle spindle.

5. The axle spindles are not normally removed from the differential housing. If repairs are necessary, remove the 16 M12 x 1.75 x 35 capscrews that hold the axle spindles to the differential housing. Remove the axle spindles.

6. Remove the six M10 x 1.5 x 30 capscrews and washers and the two M10 x 1.5 x 40 capscrews and washers from the bottom of the differential housing. Remove the transmission and differential assembly from the differential housing.

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PROBLEM	POSSIBLE CAUSE	PROCEDURE OR ACTION
Burning/Overheating **1.** Flashover causes burning of the commutator bar. **2.** Open circuit in winding causes deep burning of adjacent commutator bars. **3.** Overheating causes damage to varnish insulation (see Table 2).	Motor has been too hot. Wrong lift truck for the application. Motor has been stalled. Open armature winding. Open field coil.	Use correct lift truck for the application. Use correct operating techniques. Replace armature or resurface commutator in a lathe. Replace field coil.
Commutator bars are either too high or too loose, both of which can cause damage to brushes (see Table 2).	Motor has been stalled.	Use correct operating techniques.
	Motor has been too hot.	Use correct lift truck for the operation.

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TABLE 3. BATTERY SPECIFICATIONS (Battery With Dome Cover)

MODEL	MINIMUM COMPARTMENT SIZE LENGTH X WIDTH	BATTERY SIZE MINIMUM/MAXIMUM		WEIGHT	
		LENGTH	WIDTH	MIN.	MAX.
E1.25XL (E25XL)	694 x 909 mm (27.3 x 35.8 in)	686 / 691 mm (27.0 / 27.2 in)	890 / 895 mm (35.0 /35.2 in)	794 kg (1750 lb)	1285 kg (2830 lb)
E1.50XL (E30XL)	694 x 909 mm (27.3 x 35.8 in)	686 / 691 mm (27.0 / 27.2 in)	890 / 895 mm (35.0 /35.2 in)	839 kg (1850 lb)	1285 kg (2830 lb)
E1.75XL (E35XL)	694 x 909 mm (27.3 x 35.8 in)	686 / 691 mm (27.0 / 27.2 in)	890 / 895 mm (35.0 /35.2 in)	917 kg (2020 lb)	1285 kg (2830 lb)
E2.00-2.50XL (E40-50XL)	694 x 1037 mm (27.3 x 40.8 in)	686 / 691 mm (27.0 / 27.2 in)	1029 / 1034 mm (40.5 / 40.7 in)	935 kg (2059 lb)	1270 kg (2797 lb)
E2.50-3.00XL (E50-60XL)	841 x 1037 mm (33.1 x 40.8 in)	833 / 838 mm (32.8 / 33.0 in)	1029 / 1034 mm (40.5 / 40.7 in)	1420 kg (3128 lb)	1690 kg (3722 lb)
J2.00-2.50XL (J40-50XL)	841 x 1037 mm (33.1 x 40.8 in)	833 / 838 mm (32.8 / 32.9 in)	1029 /1034 mm (40.5 / 40.7 in)	1420 kg (3128 lb)	1690 kg (3722 lb)
J2.00-3.00XL (J40-60XL)	1009 x 1037 mm (39.7 x 40.8 in)	1001 / 1006 mm (39.4 / 39.6 in)	1029 /1034 mm (40.5 / 40.7 in)	1600 kg (3524 lb)	1850 kg (4075 lb)

612 mm (24.1 in) = maximum height for batteries with a dome cover used in lift trucks without a hood.

NOTE: Maximum tolerances are +0 and –13 mm (+0 and –0.5 in) for the size of the battery compartment. The battery specification chart shows the maximum size tolerances that will permit the battery to still fit into a battery compartment.

⚠ WARNING

The battery must fit the battery compartment so that the battery restraint system will operate correctly. Use the spacers designed by Hyster Company to prevent the battery from moving more than 13 mm (0.5 in) in any horizontal direction.

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All Electric Lift Trucks

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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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