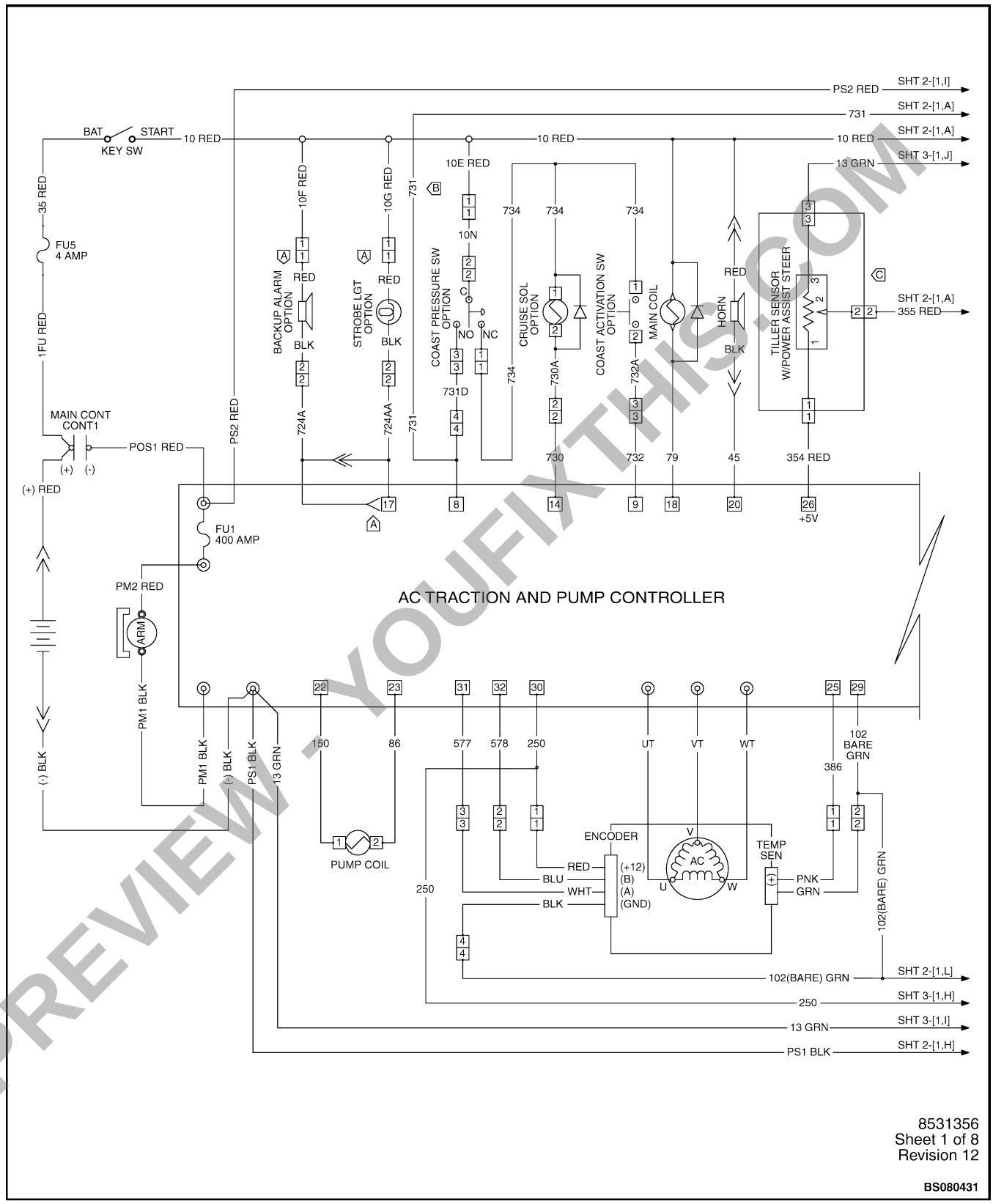


Figure 1. Schematic/Wiring Diagram (⇒ S/N B230N03907J, B233N02758J, A257N01500J, A262N01500J) (Sheet 1 of 8)

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General

This section covers the troubleshooting and repair procedures for the lift pump and motor assembly on B60-80Z^{HD} lift trucks.

It also includes information on the lowering valve, the lift cylinder, hydraulic system, and valve repair and adjustment. Additional information concerning the hydraulic system may be included in other sections when the information is more closely related to other systems. Sections that may contain related information include:

- **Periodic Maintenance** 8000 SRM 1453
- **Electrical System** 2200 SRM 1451

Description of Operation

The hydraulic system of the B60-80Z^{HD} lift trucks includes:

- Reservoir
- Pump
- Check Valve
- Relief Valve
- Lowering Valve
- Lift Cylinder
- Connecting Hoses and Tubes

WARNING

Always wear the proper protective equipment including eye protection and petroleum-resistant gloves when handling hydraulic oil. Thoroughly wash oil from exposed areas of skin as soon as possible.

Never check for leaks by putting hands on hydraulic lines or components under pressure. Hydraulic oil under pressure can be injected into the skin.

Completely lower forks to relieve hydraulic pressure before disassembling any part of the lift pump or disconnecting any hydraulic hoses.

The hydraulic oil is hot at normal operating temperatures. Be careful when draining the oil.

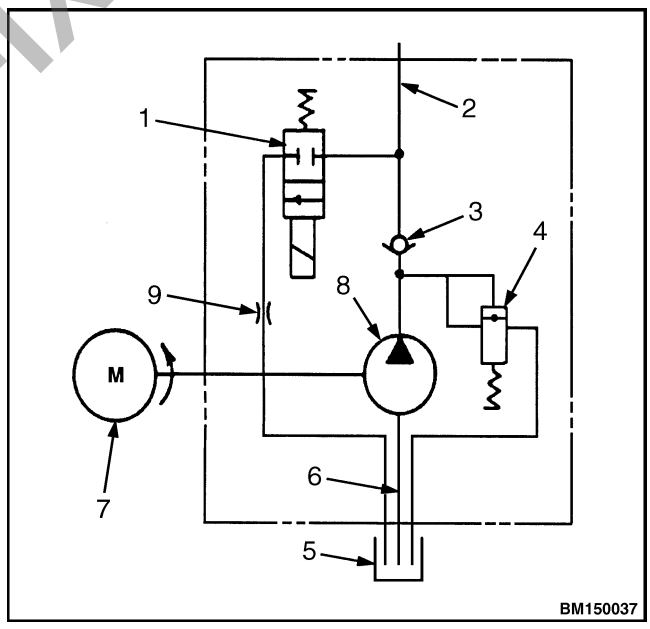
CAUTION

Protect the hydraulic system from dirt and contaminants when servicing the hydraulic system.

Never operate the pump without the proper amount of oil in the hydraulic system. The operation of the hydraulic pump with low oil levels will damage the pump.

The reservoir contains the hydraulic fluid necessary for the operation of the system. It acts as a heat sink to provide cooling. As the hydraulic oil leaves the reservoir, it passes through a strainer in the reservoir. See Figure 1.

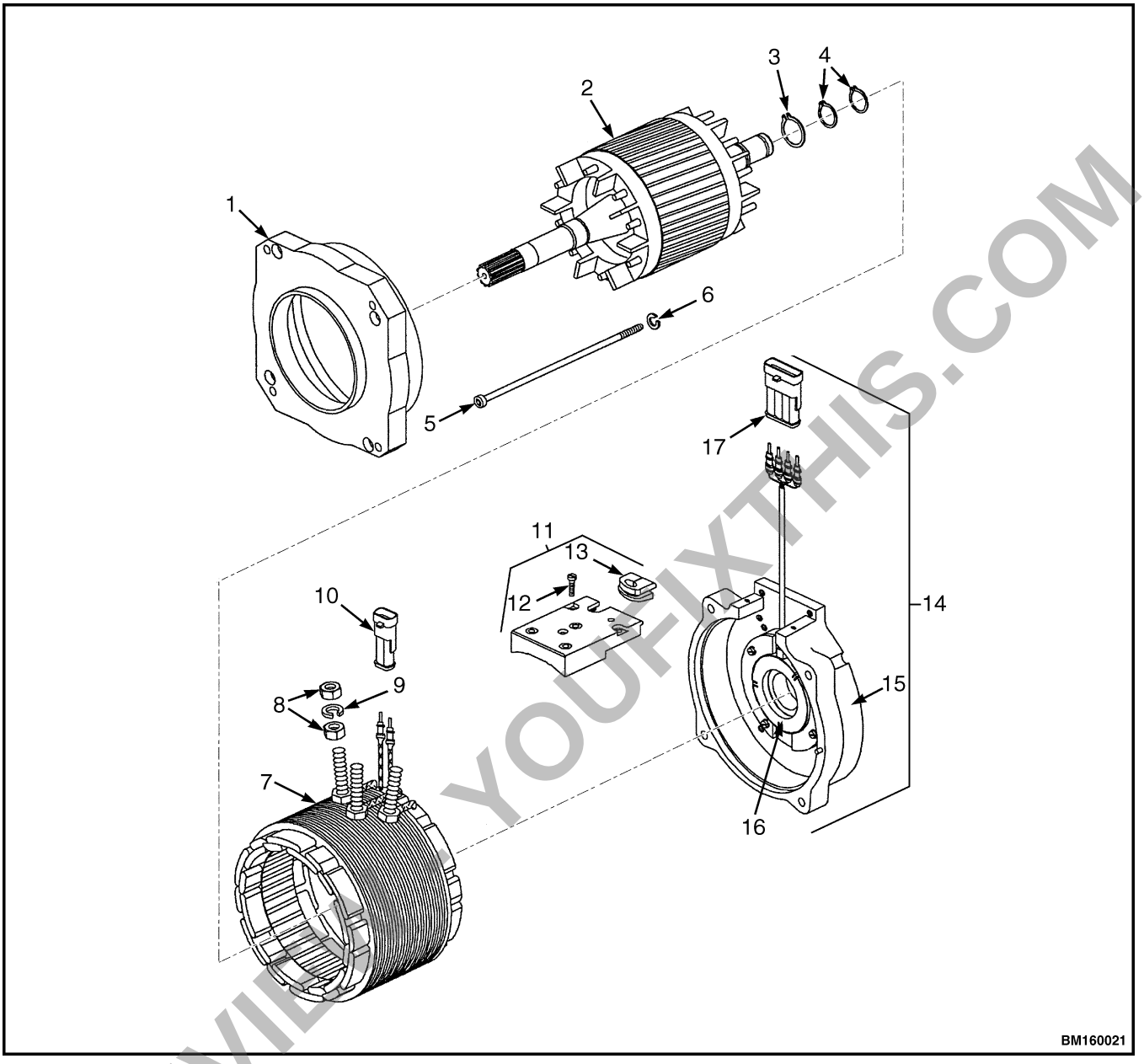
The hydraulic pump provides the flow of the hydraulic oil which activates the cylinder.



1. LOWERING SOLENOID VALVE
2. TO LIFT CYLINDER
3. CHECK VALVE
4. RELIEF VALVE
5. RESERVOIR
6. INLET LINE
7. PUMP MOTOR
8. LIFT PUMP
9. ORIFICE

Figure 1. Lift Pump and Motor Assembly Schematic

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1. FLANGE (DRIVE END)
2. ARMATURE
3. SNAP RING
4. SNAP RINGS (BRAKE ASSEMBLY)
5. ASSEMBLY SCREW
6. LOCKWASHER
7. STATOR
8. NUTS
9. LOCKWASHER
10. TEMP SENSOR CONNECTOR (FEMALE 2 PRONG)
11. MOUNTING PLATE ASSEMBLY
12. SCREW
13. GROMMET
14. FLANGE (BRAKE END)
15. FLANGE HOUSING
16. BEARING AND WIRING
17. ENCODER CONNECTOR (FEMALE 4 PRONG)

Figure 8. Traction Motor Repair

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Torque Specifications

CASTER ASSEMBLY

Mounting Capscrews (8 each)
57 ±3 N•m (42 ±2 lbf ft)

DRIVE WHEEL ASSEMBLY

Drive Wheel Capscrews (5 each)
200 ±9 N•m (148 ±7 lbf ft)

MASTER DRIVE UNIT

Motor Mount Bolts (4 each)
17 ±1 N•m (13 ±9 lbf in)

Transmission to Frame Mounting Bolts (4 each)
B60ZHD 200 ±9 N•m (148 ±7 lbf ft)
B80ZHD 300 N•m (221 lbf ft)

Drain Plug
41 N•m (30 lbf ft)

Fill-Level Plug
27 N•m (20 lbf ft)

STANDARD STEERING

Dash to Frame Mounting Bolts (4 each)
119 N•m (88 lbf ft)

Steer Swivel to Dash Lock Nut (1 each)
27 N•m (20 lbf ft)

Steer Handle to Tiller Bracket (2 each)
27 N•m (20 lbf ft)

Butterfly Throttle Control to Handle (2 each)
1 N•m (9 lbf in)

Gas Spring Mounting Stud
30 N•m (22 lbf ft)

Gas Spring Ball Stud
27 N•m (20 lbf ft)

Steer Bearing Nut
26 ±2 N•m (19 ±1 lbf ft)

POWER ASSIST STEERING

Dash to Frame Mounting Capscrews (4 each)
45 ±3 N•m (33 ±2 lbf ft)

Potentiometer Mounting Capscrews (2 each)
2 N•m (1 lbf ft)

Gas Spring Ball Stud and Nut
27 N•m (20 lbf ft)

Steer Bearing Jam Nut
24 ±3 N•m (18 ±2 lbf ft)

Support Base to Center Support Capscrews (2 each)
34 ±7 N•m (25 ±5 lbf ft)

Articulated Shaft Bolts (2 each)
18 ±3 N•m (13 ±2 lbf ft)

BRAKE

Mounting Capscrews
B60ZHD 8 ±1 N•m (6 ±9 lbf in)
B80ZHD 22 ±2 N•m (16 ±1 lbf ft)

ELECTRICAL

Traction Motor Power Wire Nuts (4 each)
8 N•m (6 lbf ft)

Steady-Rest to frame (4 each)
88 N•m (65 lbf ft)

Auxiliary Control Box (4 each)
9 N•m (7 lbf ft)

Static Strap Mounting Capscrew
195 ±9 N•m (144 ±7 lbf ft)

Assisted Steer Contactor Terminal Nuts
8 ±2 N•m (6 ±1 lbf ft)

Assisted Steer Fuse Terminal Nuts
7 ±1 N•m (62 ±9 lbf in)

LIFT MECHANISM

Pull Rod Jam Nuts (4 each Rod)
176 ±3 N•m (130 ±2 lbf ft)

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Table 2. Fault Codes

Code	Description
	To troubleshoot symptoms that do not generate a fault code, refer to Non-Status Code Errors, in this section.
Check Battery	High or low DC link voltage.
High Temp	Thermal cut-back due to high motor temperature or high power bridge temperature.
Overheat	Overheated motor or power bridge.
Overload	Pump in relief.
Release Coast	Coast system engage switch tied down at key **ON**.
Release Horn	Horn switch tied down at key **ON**.
Release Lift/Lower	Lift or lower switch tied down at key **ON**.
Release Rabbit	High speed switch tied down at key **ON** or activated before throttle.
Reset Handle	Tiller was pulled down at key on or throttle was requested before the steer arm was moved into active region, or open load at regen switch or tiller enable switch.
Stalled	Loss of signal from encoder or encoder is disconnected.
Stalled	Open load at encoder or brake coil.
9024	Controller failure of the traction motor power circuit.
9088	Pump motor shorted.
9089	Pump motor open.
9090	Pump at relief.
9091	Controller failure of the pump motor power circuit.
12808	Error in steer handle card speed/direction sensor.
12813	Steer handle sensor is out of limits.
12814	Steer handle card signaled that a belly switch error has occurred.
12816	Controller internal voltage over 36 volts.
12819	Incorrect voltage battery connected.
12832	Controller internal voltage less than 16 volts.
12835	Incorrect voltage battery connected.
13316	Pump proportional valve (coil) open load or over current.
13317	Horn open load.
13384	Main contactor bridge (coil) open.
16912	Controller power section is over temperature.
16944	Controller is in thermal cutback - high controller temperature.
16945	Controller internal temperature sensor failure.
17168	Traction motor is over temperature.
17169	Controller is in thermal cutback - high traction motor temperature.

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Frame Separation and Assembly

DISASSEMBLE

In some cases a fork frame or a drive frame may be damaged, while the rest of the truck is still usable. The two frames may be separated from each other by using the following steps:

1. Remove the drive unit compartment covers.
2. Remove the nut and washer from the hydraulic cylinder rod end.
3. Raise the motorized lift truck to its maximum height using the control handle Lift button. Move the key to the **OFF** position. Disconnect the battery.
4. Remove the battery from the lift truck, but keep it nearby so it can be reconnected when necessary.
5. Securely support the drive frame so it will remain upright when disconnected from the fork frame by positioning blocks under all four corners. Shim the blocks so they are snug to the frame.
6. Position blocks under each side of the fork frame near the battery compartment. Position blocks under each fork near the load roller. Refer to the section **Periodic Maintenance** 8000 SRM 1453, How to Put Lift Truck on Blocks.
7. Reconnect the battery connector, and move the key switch to the **ON** position. Using the control handle Lower button, lower the fork frame onto the blocks and continue lowering to relieve pressure from the lift cylinder and lifting mechanism.
8. Move the key to the **OFF** position and disconnect the battery. Discharge the capacitors. Refer to the section **Periodic Maintenance** 8000 SRM 1453, Discharging the Capacitors.
9. Remove the capscrew securing the pin in the lift cylinder (lower end) to the lifting mechanism. Drive the pin out using a brass drift. Remove the lift cylinder from lifting mechanism and secure within the drive unit compartment.
10. Remove the pivot pins retaining the upper links to the drive unit frame. Refer to the section **Lifting Mechanism** 4000 SRM 1452.
11. Remove both drive frame pivot pins retaining the rocker arm to the drive unit frame. Refer to the section **Lifting Mechanism** 4000 SRM 1452.
12. Carefully move one of the frames away from the other.

ASSEMBLE

1. Position the fork frame and the drive frame together and align so the lift linkage can be reconnected. Securely support the frames on blocks. Refer to the section **Periodic Maintenance** 8000 SRM 1453, How to Put Lift Truck on Blocks.
2. Install both drive unit frame pivot pins to attach the rocker arms to the drive unit frame. Refer to the section **Lifting Mechanism** 4000 SRM 1452.
3. Install both pivot pins to attach the upper link to the drive unit frame. Refer to the section **Lifting Mechanism** 4000 SRM 1452.
4. Install the hydraulic cylinder rod into the trunnion mounting on the fork frame.
5. Install the pivot pin to attach the bottom of the hydraulic cylinder to the fork frame. Install the capscrew to retain the cylinder pivot pin.

NOTE: Position the battery near the lift truck so it can be connected to power the lift truck.

6. Connect the battery connector and turn the key switch to the **ON** position. Raise the lift truck using the control handle Lift button.
7. Remove the blocks from under the frames and test the operation of the truck by lifting and lowering the truck several times. Lower the truck to the floor using the control handle lower button.
8. Check the pull rod adjustment. Refer to the section **Lifting Mechanism** 4000 SRM 1452, Pull Rod Adjustment.
9. Turn the key switch to the **OFF** position and disconnect the battery connector.

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5. Route and connect all wiring and connectors as removed.

6. Install the steering support and dash assembly to the lift truck. Refer to

7. Connect the battery connector, turn the key switch to the **ON** position, and test the lift truck for proper operation. Remove the lift truck from blocks and return to service.

Troubleshooting

PROBLEM	POSSIBLE CAUSE	PROCEDURE OR ACTION
Unusual noise from traction motor.	Parking brake not releasing/damaged.	Troubleshoot the parking brakes.
	Drive unit internal damage.	Check that the drive unit rotates smoothly.
	Traction motor bearing damaged.	Replace end head(s) and check stator and rotor for damage. Replace damaged components or traction motor if necessary.
Truck moves slow or in a jerky motion.	Encoder broken.	Replace encoder bearing.
	Encoder wire broken.	Check and repair encoder wire or replace encoder bearing.
Temperature sensor failure.	Temperature sensor wire damaged.	Measure resistance with ohmmeter. Resistance should be 530 ohms at 25 °C (77 °F). Inspect and repair temperature sensor wire. The temperature sensor wire can be repaired, but the temperature sensor must be replaced if faulty.
	Main wiring harness damaged.	Test temperature sensor circuit through main wiring harness from connection at controller.
	Temperature sensor malfunction.	Measure resistance with ohmmeter. If wiring is ok, resistance should be 530 ohms at 25 °C (77 °F). Replace the temperature sensor.
Stator shorting.	Loss of insulation in wire.	Disconnect the battery and check resistance between winding and case. Resistance should be at 50,000 ohms or above.
Stator open circuit.	Broken coil windings.	Raise drive wheel off the floor and verify voltage at motor terminals. Dis-

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Two different MDU designs are used:

Top Mount Handle

Bottom Mount Handle

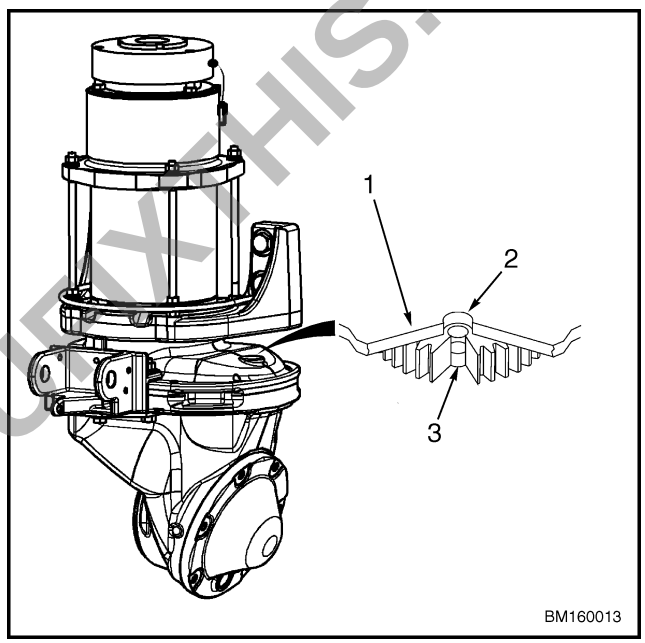
The MDUs for these trucks are the Carraro™ MDU115 and MDU150. These assemblies are available with three different gear ratios. Refer to Table 1. The highest ratio is 16:1 which will produce higher output speed with lower torque. The lowest ratio (25:1) produces lower output speed with higher torque.

Table 1. Drive Unit Specifications

Model	Gear Ratio	MDU
W60/65/80Z, W30/40ZA, W20/30ZR, W25/30/40ZC	25:1	Carraro™ MDU115
B80Z, T7Z, C80Z, $T7Z^{AC}$, $C80Z^{AC}$, $B80Z^{AC}$, $B80Z^{HD}$	17.8:1	Carraro™ MDU150
B60Z, T5Z, C60Z, $T5Z^{AC}$, $C60Z^{AC}$, $B60Z^{AC}$, $B60Z^{HD}$	16:1	Carraro™ MDU115

CHECK OIL LEVEL

1. Rotate the steering control handle until the oil fill plug is exposed.
2. Remove the oil fill plug.
3. Move the directional control knobs, turning the drive wheel slightly forward or backward until one of the gear holes lines up with the fill hole. Check the level of lubricant. There is enough lubricant in the MDU when the lubricant level is up to the bottom of the gear or halfway to the top of the gear. See Figure 4.
4. If the lubricant level is low, add additional lubricant. See the following section for your truck:
   - **Capacities and Specifications** 8000SRM1033 for unit codes A476, A477, A478, A479, B476, B477, B478, and B479
   - **Capacities and Specifications** 8000SRM0918 for unit codes A229, A230, A231, A233, and A234
   - **Capacities and Specifications** 8000SRM1299 for unit codes B230 and B233
   - **Capacities and Specifications** 8000SRM1028 for unit codes B453, B454, and B455
   - **Capacities and Specifications** 8000SRM1454 for unit codes A257 and A262
   - **Capacities and Specifications** 8000SRM1633 for unbit codes B257, C230, C476 and C477



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

Figure 4. Check Oil Level

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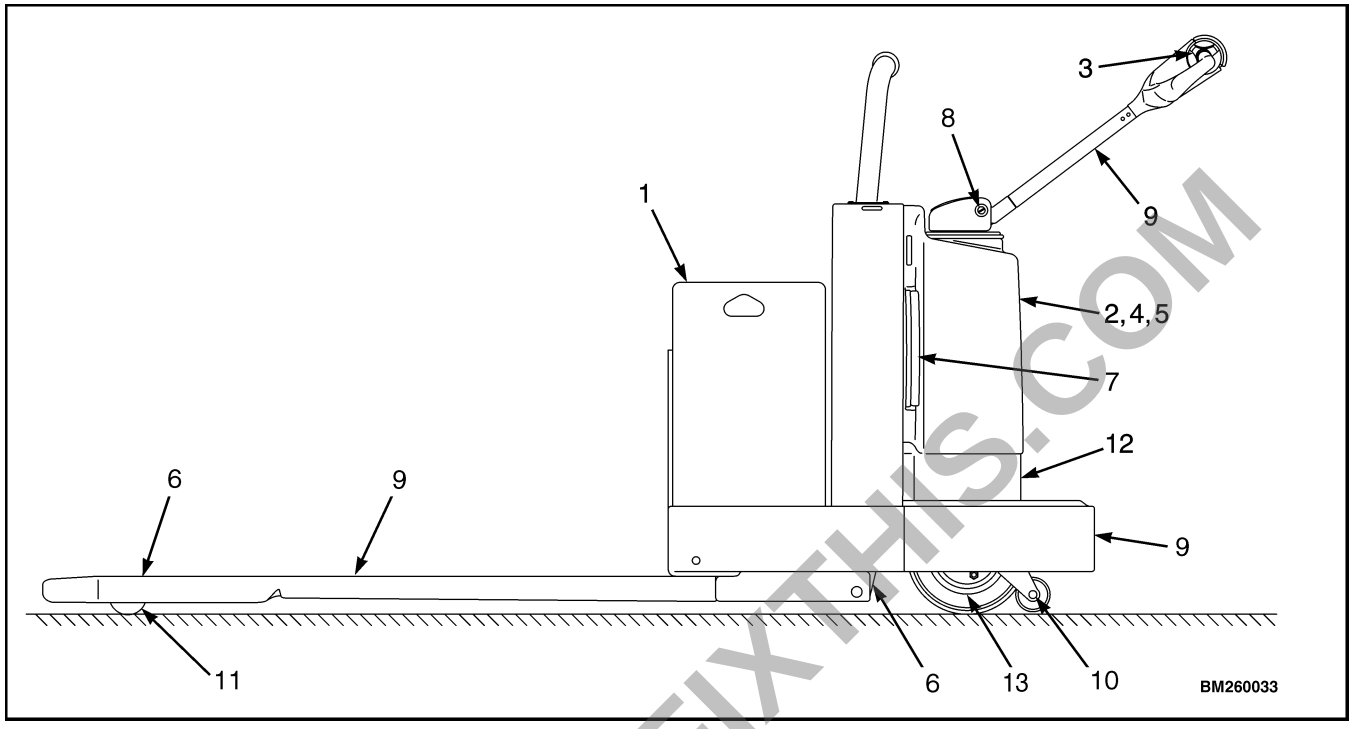


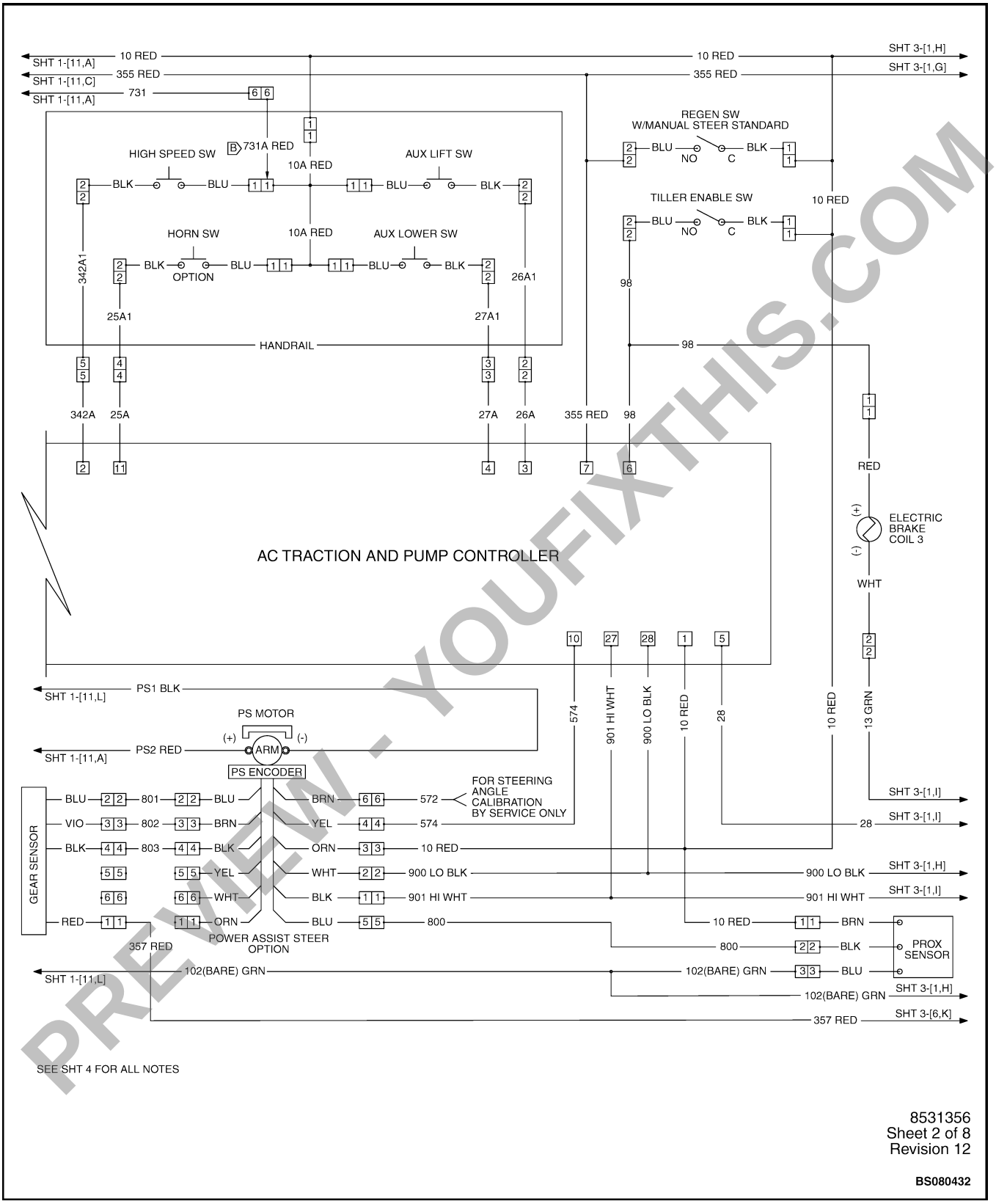
Figure 5. Maintenance Points

Table 1. Maintenance Schedule

Item No.	Item	1 day/ 8 hr[8]	6 wk/ 250 hr[8]	3 mo/ 500 hr[8]	1 yr/ 2000 hr[8]	Procedure or Quantity	Specification
1	Battery	X[1]				Check Charge Status	Charge or Change Out
	Electrolyte	X				Check Level	Distilled Water
	Restraint Panels	X				Check Condition	Repair as Necessary
	Power Disconnect	X				Check Operation	Repair as Necessary
2	Parking Brake	X				Check Operation	Repair as Necessary
					X	Hold on Grade Test	Capacity Load on 10% Grade
3	Control Handle and Horn	X				Check Operation	Repair as Necessary
4	BDI, Horn, Key Switch, and Electrical Circuits	X				Check Operation	Repair as Necessary
X=Check C=Change L=Lubricate							

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Figure 1. Schematic/Wiring Diagram (⇒ S/N B230N03907J, B233N02758J, A257N01500J, A262N01500J) (Sheet 2 of 8)

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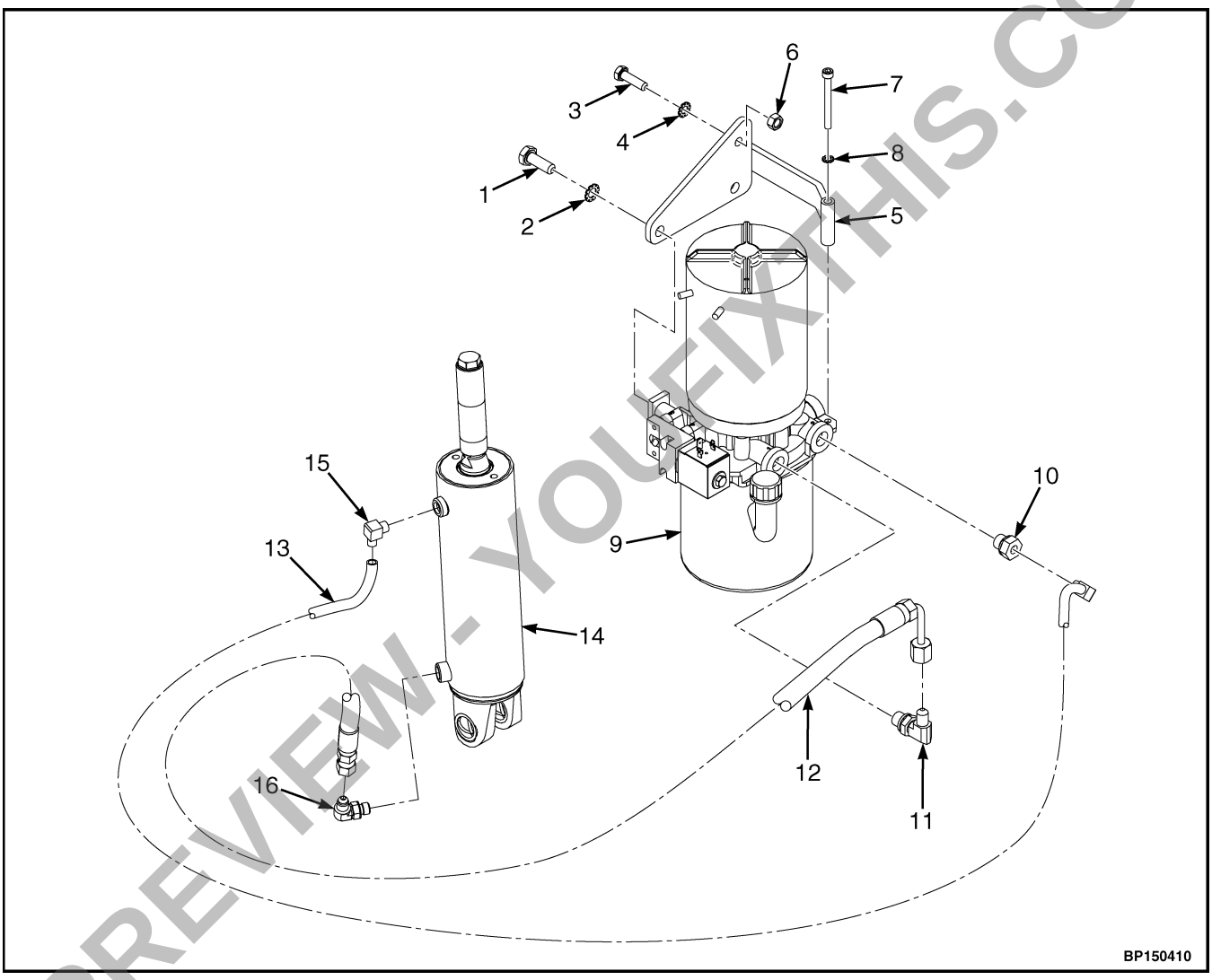
A check valve allows flow of the hydraulic oil in one direction only. In this hydraulic system, it prevents the oil from flowing backwards through the pump.

A relief valve limits maximum system pressure to protect the hydraulic system components.

The lowering valve is a normally closed valve. When it opens, hydraulic oil from the lift cylinder is allowed to return to the reservoir, and the forks lower.

The lift cylinder rod extends to operate the lift linkages to raise the forks.

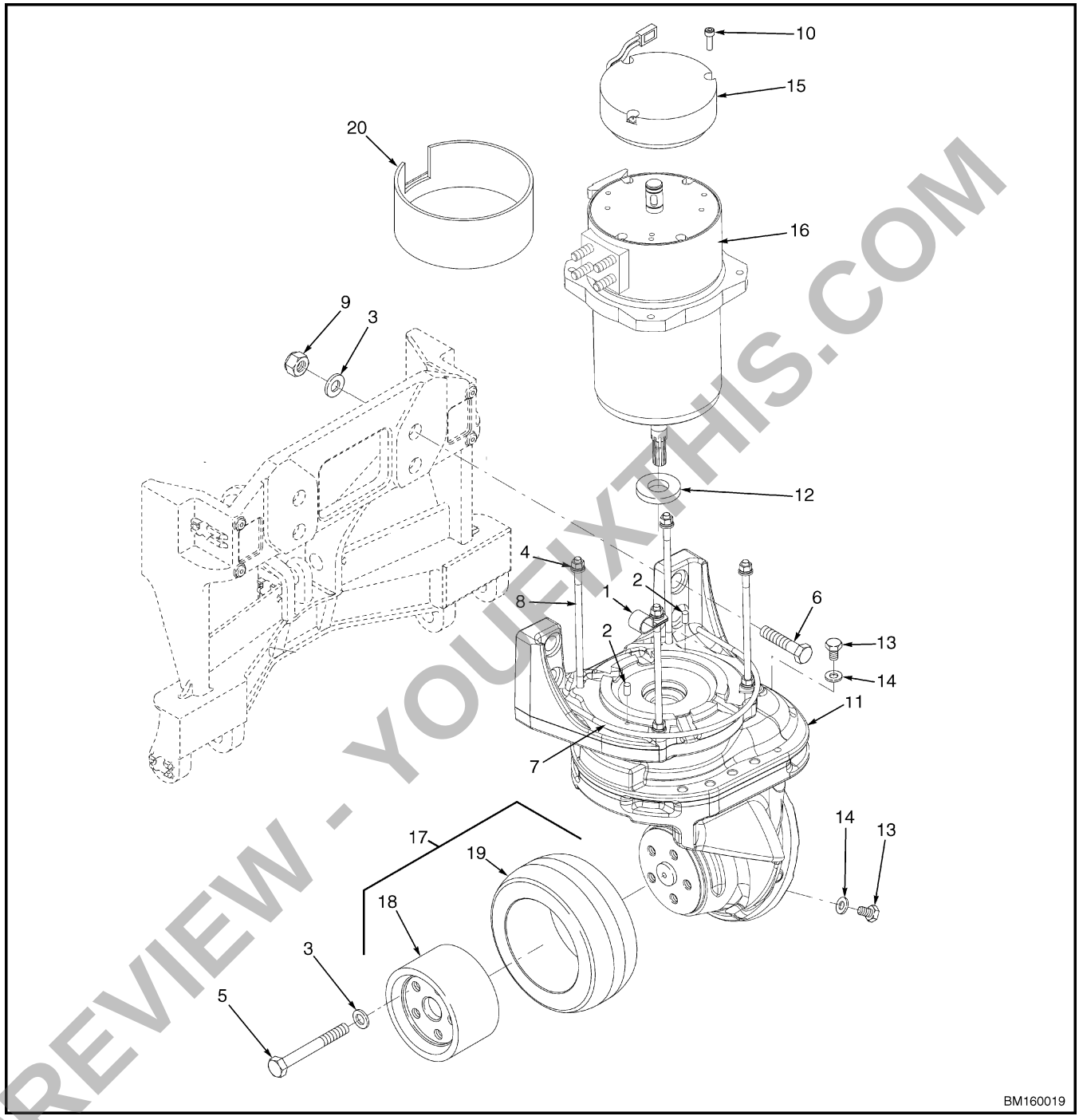
The connecting hoses and tubing connect the various hydraulic components in the lift truck to complete the hydraulic circuit. See Figure 2.



1. CAPSCREW
2. WASHER
3. CAPSCREW
4. WASHER
5. MOUNTING BRACKET
6. NUT
7. SCREW
8. WASHER
9. PUMP AND MOTOR ASSEMBLY
10. ADAPTER
11. FITTING
12. HOSE
13. TUBE
14. CYLINDER ASSEMBLY
15. FITTING
16. FITTING

Figure 2. Hydraulic System

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1. WIRE CLAMP
2. PIN
3. WASHER
4. WASHER
5. CAPSCREW
6. CAPSCREW
7. WIRE GUIDE
8. STUD
9. NUT
10. CAPSCREW
11. DRIVE UNIT
12. MOTOR SHAFT SEAL
13. OIL PLUG
14. OIL GASKET
15. ELECTRIC BRAKE
16. TRACTION MOTOR
17. TIRE AND WHEEL ASSEMBLY
18. DRIVE WHEEL
19. TIRE
20. COVER

Figure 5. Drive Unit Assembly B60-80Z, C60-80Z, W60-65-80Z, and T5-7Z

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FASTENER TORQUE TABLES

Table 5. Torque Values for Metric Fasteners*

Size and Pitch	Property Class 5.8[1]		Grade 8.8[2]		Grade 10.9[3]	
	N•m	lbf ft	N•m	lbf ft	N•m	lbf ft
M3 × 0.5 M3.5 × 0.6 M4 × 0.7 M5 × 0.8 M6 × 1	0.62 0.97 1.44 2.91 4.94	0.5 0.7 1.1 2.1 3.6	0.99 1.55 2.30 4.65 7.90	0.7 1.1 2.1 3.6 6	1.34 2.11 3.13 6.33 10.8	1.0 1.6 2.3 4.7 8
M8 × 1.25 M8 × 1 M10 × 1.5 M10 × 1.25	12.0 12.8 23.8 25.1	9 9 18 19	19.2 20.5 38.0 40.1	14 15 28 30	26.1 27.9 52 55	19 21 38 41
M12 × 1.75 M12 × 1.25 M14 × 2 M14 × 1.5	41.4 45.3 66 72	31 33 49 53	66 72 105 115	49 53 77 85	90 98 145 155	66 72 105 115
M16 × 2 M16 × 1.5 M20 × 2.5 M20 × 1.5	105 110 200 225	77 81 150 165	165 175 320 355	122 130 235 260	225 240 435 485	165 175 320 360
M24 × 3 M24 × 2 M27 × 3 M27 × 2	345 375 505 550	255 275 370 405	555 605 810 875	410 445 600 645	755 820 1,100 1,190	560 605 810 880
M30 × 3.5 M30 × 3 M30 × 2 M33 × 3.5 M33 × 2	690 715 765 940 1,030	510 530 565 695 760	1,100 1,140 1,220 1,500 1,640	810 840 900 1,100 1,210	1,500 1,550 1,660 2,040 2,240	1,100 1,140 1,230 1,510 1,660
M36 × 4 M36 × 3 M39 × 4 M39 × 3	1,200 1,280 1,560 1,640	885 945 1,150 1,210	1,930 2,040 2,490 2,630	1,430 1,510 1,840 1,940	2,620 2,780 3,390 3,570	1,940 2,050 2,500 2,640
M42 × 4.5 M42 × 3 M45 × 4.5 M45 × 3 M48 × 5 M48 × 3	1,930 2,070 2,410 2,580 2,900 3,160	1,430 1,530 1,780 1,910 2,140 2,330	3,080 3,320 3,850 4,120 4,630 5,040	2,280 2,450 2,840 3,040 3,420 3,720	4,200 4,510 5,240 5,610 6,300 6,860	3,100 3,330 3,870 4,140 4,650 5,060

* Unless otherwise specified [1] Approximately equal to Grade 2 [2] Approximately equal to Grade 5 [3] Approximately equal to Grade 8

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Table 2. Fault Codes (Continued)

Code	Description
17170	Traction motor temperature sensor failure.
20756	Key switch open.
21024	Steer handle card failure.
21376	Traction Reversing switch closed at startup.
21378	Controller cannot establish contact with steer handle card.
21379	Controller failed to receive Power Steer PDO message within 3 seconds.
21533	Horn circuit is shorted to B+.
21534	Horn circuit is open.
21535	Horn circuit is shorted to B−.
21539	Digital output driver failure.
21552	Steer handle inputs incorrect at startup.
21553	Hi Speed switch is closed at startup.
21554	Horn switch is closed at startup.
21555	Lift or lower switch is closed at startup.
21556	Coast engage switch closed at startup.
21568	Main contactor circuit is open.
21569	Main contactor circuit is shorted to B+.
21570	Main contactor circuit is open.
21571	Main contactor circuit is shorted to B−.
21588	Internal failure of the power steering unit.
21808	Controller Internal Fault or controller has wrong parameters.
21809	Controller Internal Fault or controller has wrong parameters.
25361	Truck type parameter has not been selected.
28961	Steer assist motor has reached a stop condition.
29445	Traction motor encoder failure.
29448	Steer handle switch closed at startup.
29456	Error in steer handle card speed/direction sensor.
29458	Steer handle sensor is out of limits.
29459	Steer handle card signaled that a belly switch error has occurred.
29472	Failed or maladjusted sensor.
32816	Pump open circuit.
33033	Controller cannot communicate with steer card, dash display, or power steering motor.
33034	Controller cannot establish communication with steer control card.

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Description

The traction motor is a three-phase AC induction motor. DC battery current is converted into AC current in the controller and then supplied to the traction motor. The controller controls motor speed and direction. Each traction motor contains an encoder bearing in the flange (brake end) that provides continuous motor speed and direction information to the controller. A temperature sensor built into the stator continually monitors motor temperature. Brass terminals receive the power cables from the controller and a small connector links the encoder bearing wiring harness to the main wiring harness. A shaft extends out the top and bottom of the traction motor. The splined end of the shaft engages the input gear in the drive unit. A short, round section of the shaft protrudes from the top of the motor and is secured in place with a snap ring which secures it to the flange. This end also supports the parking brake hub using a woodruff key and two additional small snap rings.

AC Motor Repair

REMOVE

WARNING

The AC traction motor is heavy. To prevent injury, use a lifting device of adequate capacity for lifting the assembly.

It is not necessary to remove the traction motor from the lift truck to make some repairs. Perform only the steps necessary to safely complete the required service.

1. Turn the key switch to the **OFF** position and disconnect the battery connector. Discharge the capacitors. See Special Precautions.
2. Remove the steer support and dash from the lift truck. Refer to
   - **Steering Mechanism** 1600SRM1284 for unit codes B230 and B233.
   - **Steering Mechanism** 1600SRM1031 for unit codes B476, B477, B478 and B479.
   - **Steering Mechanism** 1600SRM1449 for unit codes A257 and A262.
   - **Steering Mechanism** 1600SRM1627 for unit codes C476 and C477.
   - **Steering Mechanism** 1600SRM1637 for unit codes B257, B262, and C230.

CAUTION

Remove the brake only as directed. Changes to adjustment screws may render the brake unusable. The brake is factory set and cannot be adjusted if altered.

NOTE: The brake may be removed at this point. However, it is not necessary to remove the brake if the motor will not be disassembled.

3. Remove the brake from the top of the traction motor if necessary. Refer to
   - **Brakes** 1800SRM1285 for unit codes A257, A262, B230, B233, B476, B477, B478 and B479.
   - **Brakes** 1800SRM1628 for unit codes A282, A373, C476 and C477.
   - **Brakes** 1800SRM1638 for unit codes C230, B862 and B257.
4. Identify, tag, and disconnect the power cables and wiring connecting the traction motor the truck electrical system.
5. Remove the four capscrews and lockwashers securing the traction motor to the drive unit.
6. Attach a sling and a lifting device to the traction motor. Lift the motor from the drive unit and position it securely at a suitable work station. Remove the sling from the motor.

DISASSEMBLE

Some disassembly may be performed with the traction motor installed in the lift truck. Perform only the steps necessary to safely complete the required service.

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PROBLEM	POSSIBLE CAUSE	PROCEDURE OR ACTION
		connect the battery and check resistance of windings.
Traction motor does not operate.	Battery lacks sufficient charge.	Charge/change battery.
	Throttle position sensor or neutral switch broken or out of adjustment.	Troubleshoot the throttle position sensor or neutral switch.
	Stator coil shorted to case.	Check resistance between winding and case. Resistance should be at 50,000 ohms or above. Replace stator or traction motor assembly if necessary.
	Stator wires broken-open circuit.	Check resistance between motor terminals. Resistance should read less than 1 ohm between each terminal. Replace stator or traction motor assembly if necessary.
	Electric brake assembly not releasing/ damaged.	Troubleshoot the electric brake assembly.
	Drive unit internal damage.	Raise the drive tire and check that the drive unit rotates smoothly.

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Hydraulic System

Unit	Battery Compartment	Operating Pressure[1]		Ampere Draw[2]		Relief Setting		Lift Time (sec)		Lower Time (sec)	
		No Load	Rated Load	No Load	Rated Load	Pressure[3]	Amp Draw	No Load	Rated Load	No Load	Rated Load
B60Z^{HD}	340 mm (13.4 in.)	2.94 MPa (426 psi)	11.03 MPa (1600 psi)	34	81	18.62 MPa (2700 psi)	124	3.7	4.7	3.0	1.8
B80Z^{HD}	340 mm (13.4 in.)	2.76 MPa (401 psi)	14.98 MPa (2173 psi)	45	108	24.13 MPa (3500 psi)	147	3.7	5.4	5.9	3.2

Standard Specifications
Hydraulic Tank Capacity - 1.0 liter (1.06 qt)
Pump Displacement (24 Volts) - 2.0 cm^3/rev (0.122 $in.^3$/rev)
Creep Rate - 6.4 mm (0.25 in.) Maximum In 10 Minutes @ 32°C (90°F) Oil Temperature

Footnotes
[1] ±0.35 MPa (±51 psi) @ 21°C (70°F) Oil Temperature
[2] ±10 Amps @ 1.270 Battery Specific Gravity
[3] +0.6 to 0.0 MPa (+87 to 0 psi) @ 32°C (90°F) Oil Temperature Full Flow

Hydraulic Oils

Operating Condition	Standard	CS/Freezer
For All Hydraulically-Actuated Equipment		
Specification	ISO VG 46 Antiwear (HCE-140)	Exxon Univis® HVI 26
Type	Conventional	Synthetic
Temperature Range	32 to −120°C (89.6 to −184.0°F)	0 to −120°C (32.0 to −184.0°F)
Pour Point Maximum	−15°C (5.0°F)	−60°C (−76.0°F)

Field Personnel Note: The product listed above is the approved source that meets or exceeds **Hyster** specifications. The use of products other than that listed above is unauthorized.

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Table 1. Maintenance Schedule (Continued)

Item No.	Item	1 day/ 8 hr[8]	6 wk/ 250 hr[8]	3 mo/ 500 hr[8]	1 yr/ 2000 hr[8]	Procedure or Quantity	Specification
5	Hydraulic System	X				Check for Leaks	Repair as Necessary
	Hydraulic Hoses and Fittings	X				Visually Inspect for Leaks	Repair as Necessary
				X		Check for Hose Damage and Loose Fittings	Repair or Replace as Necessary
	Hydraulic Oil			X		Check Level (Full Mark on Tank)	Hydraulic Oil[3]
					C[5]	Change	
	Hydraulic Oil Strainer				X/C	Inspect / Replace as Necessary	See **Parts Manual**
6	Lift and Lower Linkage	X				Check Operation	Repair as Necessary
	Load Roller Linkage			L		Lube Fittings	Multipurpose Grease[2]
	Forks to Drive End Frame Linkage			L		Lube Fittings	Multipurpose Grease[2]
7	Safety Labels and Operating Manual	X				Replace if Missing or Damaged	See **Parts Manual**
8	Standard Steer	X				Check Operation	Repair as Necessary
	Steer Bearings				L	Repack Bearings	Multipurpose Grease[2]
8	Power Assist Steer	X				Check Operation	Repair as Necessary
	Steering Gears			L		Spray Lubricant	CRC® 3-36 Anti-Corrosive Spray or Equivalent
9	Frame	X				Visually Inspect	Repair as Necessary
X=Check C=Change L=Lubricate							

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