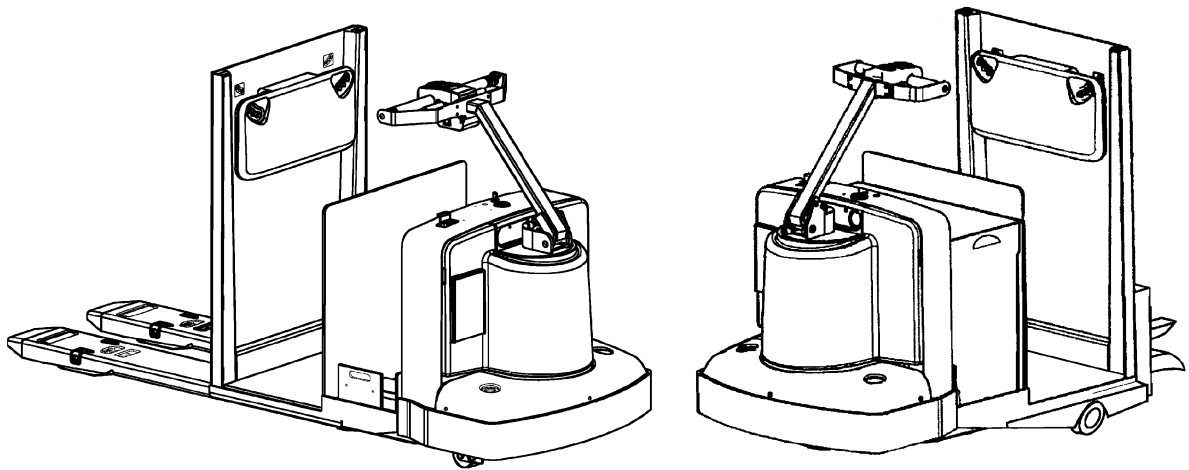


# PERIODIC MAINTENANCE

T5Z<sup>AC</sup> [B476]; T7Z<sup>AC</sup> [B477];  
C60Z<sup>AC</sup> [B478]; C80Z<sup>AC</sup> [B479]



# **HYSTER**

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This section is for the following models:

T5Z<sup>AC</sup> [B476];  
T7Z<sup>AC</sup> [B477];  
C60Z<sup>AC</sup> [B478];  
C80Z<sup>AC</sup> [B479]

## Introduction

### GENERAL

This section contains the instructions for periodic maintenance and inspection and a Maintenance Schedule.

The Maintenance Schedule has time intervals for inspection, lubrication, and periodic maintenance. The time intervals are based on normal operation. Normal operation is considered to be one 8-hour shift per day in a relatively clean environment on an improved surface. Multiple shifts, dirty operating conditions, etc., will require a reduction in the recommended time periods in the Maintenance Schedule.



### WARNING

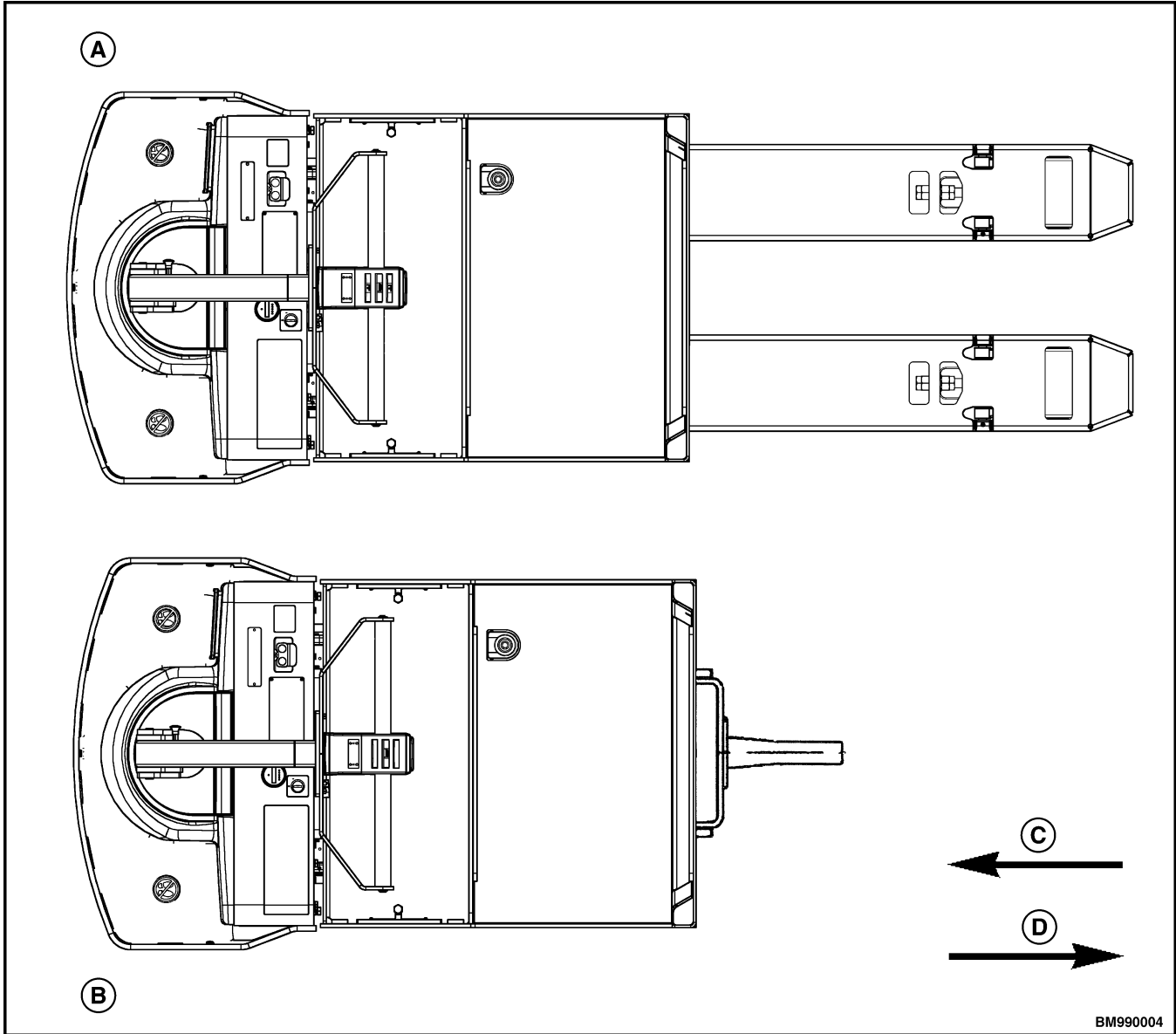
**DO NOT make repairs or adjustments unless you have been properly trained and authorized to do so. Improper repairs and adjustments can create dangerous operating conditions.**

**DO NOT operate a truck that needs repairs. If repair is necessary, attach a DO NOT OPERATE tag to the control handle. Report the need for repairs to your supervisor immediately.**

Some users have service personnel and facilities to perform the procedures listed in the Maintenance Schedule. Service Manuals are available from your Hyster™ lift truck dealer to help users who do their own repairs.

Your Hyster™ lift truck dealer has the trained personnel and equipment to conduct a complete program of inspection, lubrication, and maintenance. This program will help maximize your truck's performance and reliability.

**NOTE:** The front end of the truck is the control handle end. Forward travel refers to movement in the direction of the control handle with the load wheels trailing. Reverse is travel in the direction of the forks with the drive tire trailing. Left and right refer to the operator's left- and right-hand sides when standing on the truck, driving in the forward direction. See Figure 1.



BM990004

A. RH SIDE  
B. LH SIDE

C. FORWARD  
D. REVERSE

*Figure 1. Truck Orientation*

## DRIVE UNIT COMPARTMENT COVERS

Many procedures require access to the drive unit compartment. The drive unit compartment is located at the front of the truck in front of the battery and below the control handle assembly. Two covers must be removed to access the drive unit compartment. The covers must be correctly reinstalled to protect the electrical system and other components housed in the drive unit compartment. See Figure 2.

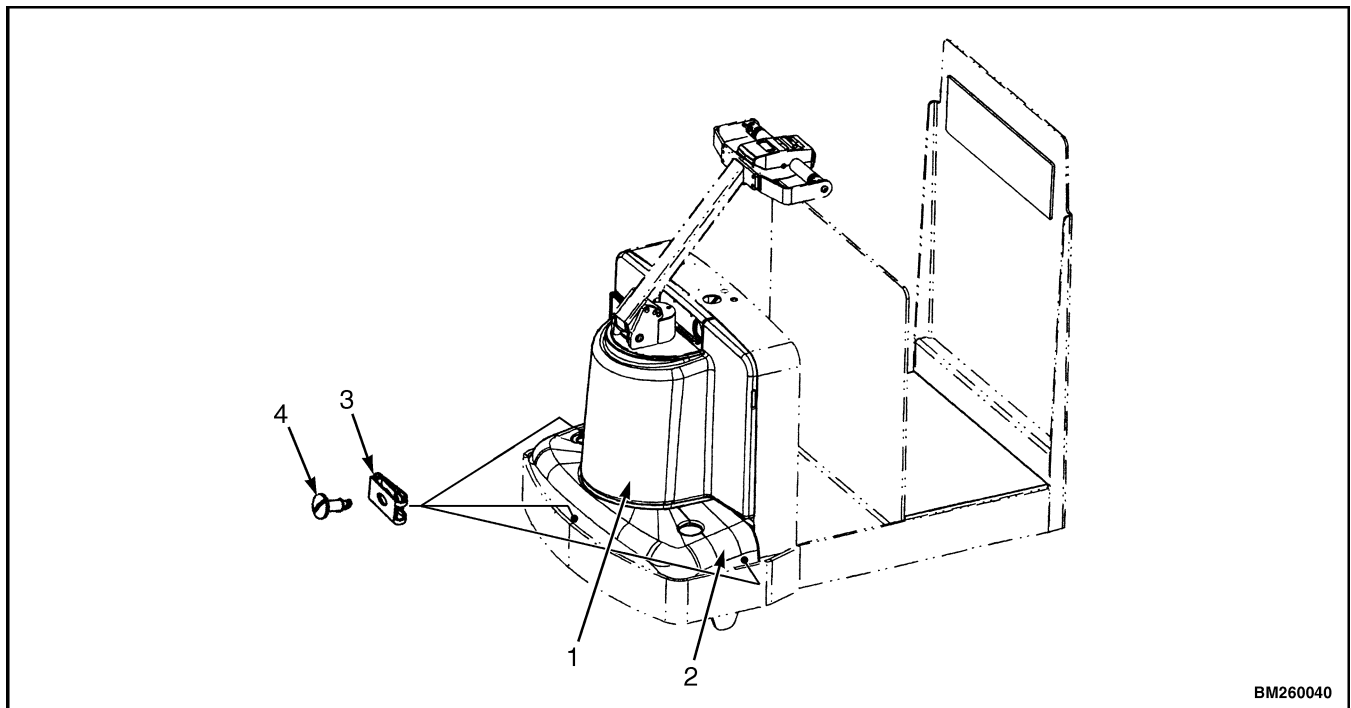
### Remove

1. Remove the three screws retaining the lower drive unit compartment cover.
2. Lift the lower cover from the drive unit compartment.

3. Pull the bottom edge on one side of the upper cover from the drive unit compartment. Continue pulling around the edge of the cover until completely removed from the truck.

### Install

1. Place the top corners of the upper cover into the retaining clips in the drive unit compartment.
2. Working around each side, bump the cover into place using the heel of the hand or a rubber hammer.
3. Place the lower cover into the bottom of the drive unit compartment.
4. Secure lower cover in place using three screws.



1. FRONT COVER
2. LOWER COVER

3. SPRING NUT CLIPS
4. SCREWS

**Figure 2. Drive Unit Compartment Covers**

## HOW TO MOVE A DISABLED TRUCK

Trucks are not normally towed. If the traction system will not operate, make repairs at the location, if possible. If the truck must be towed, tow the truck forward (in the direction of the control handle).

### CAUTION

Never attempt to tow by fastening any towing device to the control handle.

Carefully attach the tow chain completely around the motor compartment and battery compartment. Make sure the tow chain is installed on the truck so the chain will not cause damage. Make sure the parking brake is released on the truck. Steer the truck with the control handle while it is being towed. **DO NOT** get between the towing vehicle and the disabled truck.

### How to Tow the Truck

### WARNING

Use extra care when moving a truck during the following conditions:

- Brake does not operate correctly
- Steering does not operate correctly
- Tire is damaged
- Traction conditions are bad

If there is no power, the drive wheel will not turn freely. Poor traction can cause the disabled truck or towing vehicle to slide. Grades will require additional distance to stop.

Never carry a disabled truck unless it **MUST** be moved and cannot be towed. The lift truck used to lift the disabled truck **MUST** have a rated capacity equal to or greater than the weight of the truck. See the nameplate on the truck for the approximate total weight. The fork spread must be equal to half the width of the disabled truck. The forks must extend the full width of the disabled truck. Put the weight of the disabled truck at the center of the forks and be careful not to damage the underside of it. Tilt the mast back and travel slowly.

Be sure to stay clear of the tow chain, towing vehicle, and truck during the towing operation to prevent injury.

### CAUTION

Never tow the lift truck faster than the speed of a person walking. Steering can be difficult and motor damage can occur at higher speeds. Always tow smoothly without sudden starts. Never tow the lift truck using the control handle. Make sure the brake has been released before towing. Refer to the section Brakes 1800 SRM 1285.

1. Remove the drive unit compartment covers. See Drive Unit Compartment Covers. Fasten the tow chain completely around the motor and battery compartments. Make sure the tow chain has the capacity to tow the weight. The chain must not cause damage to either truck.
2. Connect the battery. Turn the key switch to the **ON** position and the parking brake switch to the **OFF** position.

### WARNING

Make sure no one except the driver is near the truck during towing. Both the tow truck and the disabled truck can cause an injury during towing.

### CAUTION

Travel slowly and **DO NOT** tow on grades. **NEVER** tow the lift truck faster than a normal walking speed. Always tow smoothly without sudden starts or stops.

The control handle should be marked with a **DO NOT OPERATE** tag until the repairs have been completed.

3. Tow the lift truck slowly while a driver steers the truck while walking along side.

4. If towing with lift truck, add weight to the forks of the lift truck if the drive wheels are near the forks. The total weight of the lift truck and load must be equal to or greater than the weight of the disabled truck. Install a load of approximately half the maximum capacity on the forks of the towing lift truck. This load will increase the traction of the lift truck.

**DO NOT** add weight to the forks if the lift truck used for towing has a master drive unit (MDU) or drive unit on the opposite end as the forks. Additional weight on the forks may **DECREASE** the traction of the drive wheel. Make sure that the towing truck has a total weight equal to or greater than the weight of the disabled truck. Keep the load on the forks lowered as much as possible.

## HOW TO PUT THE TRUCK ON BLOCKS



### WARNING

**DO NOT** put the truck on blocks if the surface is not solid, even, and level. Make sure that any blocks used to support the truck are solid, one-piece units. Put a block in front and back of the tires touching the ground to prevent movement of the lift truck.

**DO NOT** raise the truck by attaching an overhead lifting device to areas that can be damaged. Some points of the truck are not designed to support the weight of the truck. The truck can be damaged or it can fall, causing serious injury. Attach the chain or sling to a support structure of the lift truck frame.

**DO NOT** make repairs or adjustments unless specifically authorized to do so. Repairs and adjustments must be performed by trained service technicians.

## How to Raise Drive/Steer Tire

1. Put blocks on both the front and back sides of the load wheels to prevent movement of the truck.

Use a special low-clearance hydraulic jack, crane, or a lift truck to raise the drive tire. Make sure that the jack, crane, or lift truck has the correct capacity rating. The capacity must equal at least 2/3 the weight of the truck, including the battery. See the nameplate for truck weight. On the C60-80Z<sup>AC</sup>, the lifting mechanism may be used to lift the truck and lower it onto blocks.

2. Raise the lift truck enough to suspend the drive tire. Install hardwood blocks under the frame on both sides of the truck.

## How to Raise the Load Wheels



### WARNING

**Never raise the truck any higher than necessary to change the load wheels. Always raise both sides at the same time. Raising either side too high can cause the truck to tip over and cause damage or serious injury.**

1. Put blocks on both the front and back sides of the drive tire to prevent movement of the truck.
2. Use an overhead lifting device and web sling under the truck at the rear to raise the load wheels. A lift truck can also be used to raise the rear of the truck. Make sure the overhead lifting device and web sling or lift truck has a capacity of at least 2/3 the total weight of the truck being lifted, including the battery. See the nameplate for the lift truck weight. On the C60-80Z<sup>AC</sup>, the lifting mechanism may be used to lift the truck and lower onto blocks.
3. Raise the truck enough to suspend the load wheels. Install blocks under the truck to the front of the load wheels to support the truck.



## Special Precautions

### WARNING

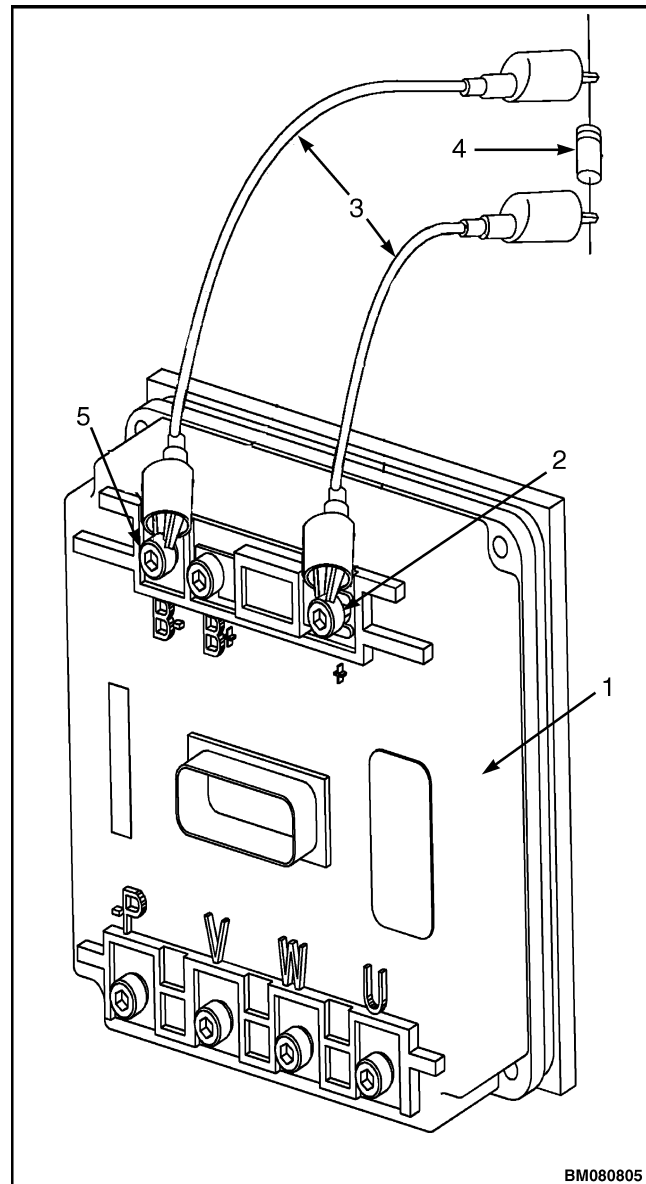
**DO NOT** make repairs or adjustments unless you have both authorization and training. Repairs and adjustments that are not correct can create dangerous operating conditions. **DO NOT** operate a lift truck that needs repairs. Report the need for repairs to your supervisor immediately. If repair is necessary, turn the key switch to the OFF position, disconnect the battery, and attach a **DO NOT OPERATE** tag to the control handle.

Verify that the battery had been disconnected before opening the drive unit compartment cover or inspecting or repairing the electrical system. If a tool causes a short circuit, the high current flow from the battery can cause personal injury or property damage.

Some checks and adjustments are done with the battery connected. **DO NOT** connect the battery until the procedure tells you to do so. Never wear jewelry or other metallic objects on your fingers, arms, or neck when servicing the lift truck. Metal items can accidentally make an electrical connection and cause injury.

Before performing any tests or adjustments, block the lift truck wheels to prevent unexpected movement.

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



1. CONTROLLER
2. POSITIVE CONNECTION
3. INSULATED JUMPER WIRES
4. 200-OHM, 2-WATT RESISTOR
5. NEGATIVE CONNECTION

*Figure 3. Discharging the Capacitors  
(C60-80Z<sup>AC</sup> and T5-7Z<sup>AC</sup>)*

 **CAUTION**

To avoid controller damage, always disconnect the battery and discharge the capacitor. Never put power to the controller while any power wires are disconnected. Never short any controller terminal or motor terminal to the battery. Make sure to use proper procedure when servicing the controller.

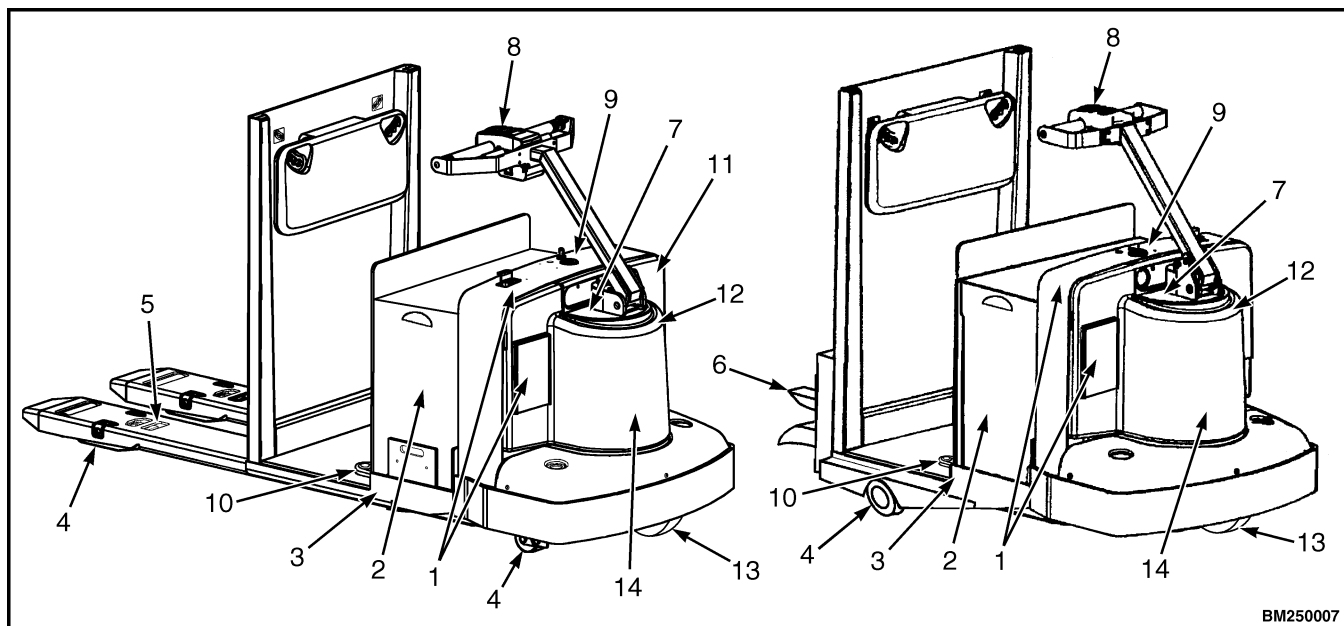
1. Block load wheels to prevent lift truck from moving.

2. Turn the key switch to the **OFF** position and disconnect the battery.
3. Discharge the capacitors in the controllers by connecting a 200-ohm, 2-watt resistor across the controller's B+ and B- terminals. **DO NOT** short across the motor controller terminals with a screwdriver or jumper wire.
4. Remove the 200-ohm, 2-watt resistor before reconnecting the battery. See Figure 3.

## Maintenance Schedule

The Maintenance Schedule is divided into four time intervals which call for particular maintenance procedures to be performed. The intervals are 1 Day or 8 Hours, 6 Weeks or 250 Hours, 3 Months or 500 Hours, and 1 Year or 2000 Hours for normal operation (whichever comes first). **Normal** operation is considered one 8-hour shift per day, in a relatively clean environment, on an improved surface. Operating a lift truck for more than eight hours per

day is considered **Heavy** operation and requires the 3-month/500-hour checks to be performed at 2 months/350 hours. Lift trucks operating in freezer environments or dirty conditions are considered **Severe** operation and require the 3-month/500-hour checks to be performed at 1 month/200 hours. The approximate locations of the items listed in the Maintenance Schedule are shown in Figure 4.



*Figure 4. Maintenance Points*

Table 1. Maintenance Schedule

Item No.	Item	1 day/ 8 hr	6 wk/ 250 hr	3 mo/ 500 hr	1 yr/ 2000 hr	Procedure or Quantity	Specification
1	Safety Labels and Operating Manual	X				Replace if Missing or Damaged	See <b>Parts Manual</b>
2	Battery	X				Check Charge Status (See NOTE 1)	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
3	Frame	X				Visually Inspect	Repair as Necessary
4	Trail Wheels (T5-7Z <sup>AC</sup> )	X				Check Condition	Repair or Replace as Necessary
	Bearings				C	Repack Bearings/ Replace As Necessary	Multipurpose Grease (See NOTE 2)
	Wheels	X				Inspect for Damage	Smooth Edges/ Remove Embedded Objects
	Axles				L	Lube	Antiseize Lubricant
4	Load Wheels (C60-80Z <sup>AC</sup> )	X				Check Condition	Replace as Necessary
	Wheels and Bearings			L		Lube Fitting	Multipurpose Grease (See NOTE 2)
	Axle Bolts (Food Processing)			L		Lube	Antiseize Lubricant
4	Casters and Load Wheels (C60-80Z <sup>AC</sup> )	X				Check Condition	Repair as Necessary
	Caster Adjustment			X		Check Adjustment Gap	Adjust With Shims as Necessary
	Caster Swivel – STD	L	L			Lube Fitting (See NOTE 7)	Multipurpose Grease (See NOTE 2)
	Caster Wheel – HD	L	L			Lube Fitting (See NOTE 7)	Multipurpose Grease (See NOTE 2)

X=Check C=Change L=Lubricate

Table 1. Maintenance Schedule (Continued)

Item No.	Item	1 day/ 8 hr	6 wk/ 250 hr	3 mo/ 500 hr	1 yr/ 2000 hr	Procedure or Quantity	Specification
5	Lift and Lower Linkage (C60-80Z <sup>AC</sup> )	X				Check Operation	Repair as Necessary
	Load Roller Linkage			L		Lube Fittings	Multipurpose Grease (See NOTE 2)
	Forks to Drive End Frame Linkage			L		Lube Fittings	Multipurpose Grease (See NOTE 2)
6	Coupler (T5-7Z <sup>AC</sup> )	X				Check Operation	
			L			Lubricate	SAE 20 or 30 Engine Oil
7	Steering	X				Check Operation	Repair as Necessary
	Tilt Pivot and Pin			L		Lubricate	SAE 20 or 30 Engine Oil
	Steer Bearings	X				Check Operation	Repair as Necessary
8	Control Handle and Horn	X				Check Operation	Repair as Necessary
9	BDI, Horn, Key Switch, and Electrical Circuits	X				Check Operation	Repair as Necessary
10	High Speed Switch	X				Check Operation	Repair as Necessary
X=Check C=Change L=Lubricate							

Table 1. Maintenance Schedule (Continued)

Item No.	Item	1 day/ 8 hr	6 wk/ 250 hr	3 mo/ 500 hr	1 yr/ 2000 hr	Procedure or Quantity	Specification
11	Hydraulic System (C60-80Z <sup>AC</sup> )	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 (See NOTE 3)
					C	Change (See NOTE 5)	
	Hydraulic Oil Strainer				X/C	Inspect / Replace as Necessary	See <b>Parts Manual</b>
12	Parking Brake	X				Check Operation	Repair as Necessary
					X	Hold on Grade Test (With Capacity Load)	5% Grade (T5-7Z <sup>AC</sup> ) 10% Grade (C60-80Z <sup>AC</sup> )
13	Drive Wheel and Tire	X				Check Condition	Repair as Necessary
	Tire	X				Inspect for Damage	Smooth Edges/ Remove Embedded Objects
	Axle Seal	X				Inspect for Oil Leaks	Remove Wrapped Debris
	Wheel Bolts Lug Nuts			X		Tighten as Required (See NOTE 4)	200 ±9 N•m (148 ±7 lbf ft)
14	Master Drive Unit	X				Check Operation	Repair as Necessary
	MDU Gearcase			X		Check Operation	Repair as Necessary
	Oil			X		Check Level	Gear Oil (See NOTE 5 and NOTE 6)
	(T5Z <sup>AC</sup> and C60Z <sup>AC</sup> )				C	1.7 liter (1.8 qt)	
	(T7Z <sup>AC</sup> and C80Z <sup>AC</sup> )					2.0 liter (2.1 qt)	
X=Check C=Change L=Lubricate							

Table 1. Maintenance Schedule (Continued)

Item No.	Item	1 day/ 8 hr	6 wk/ 250 hr	3 mo/ 500 hr	1 yr/ 2000 hr	Procedure or Quantity	Specification
<b>NOTE 1:</b> Equalization charge approximately each month, but not more than each week.							
<b>NOTE 2:</b> Use Mobilgrease® 28 synthetic extra-protection grease (clay) for standard, freezer, and cold storage configurations. Use Amsoil® GHD synthetic multipurpose grease (lithium complex) with 2 to 4% molybdenum disulfide for arctic and food processing configurations and for standard steer bearings on all configurations.							
<b>NOTE 3:</b> Use ISO VG 46 (conventional) antiwear (HCE-140) for standard, freezer, and cold storage configurations. Use Exxon Univis® HVI 26 (synthetic) for arctic and food processing configurations.							
<b>NOTE 4:</b> Apply antiseize at installation and check every 2 to 5 hours until nuts/bolts stay tight for an entire 8-hour shift. Check tightness every 3 months or 500 hours thereafter.							
<b>NOTE 5:</b> Replace after the first 500 hours of service and every 2000 hours or yearly thereafter.							
<b>NOTE 6:</b> Use conventional 80W-90 (GL-5) for standard, freezer, and cold storage configurations. Use synthetic 75W-90 (GL-5) for arctic and food processing configurations.							
<b>NOTE 7:</b> Lubricate every 8 hours if using in a food processing or corrosive environment.							
X=Check C=Change L=Lubricate							

## Maintenance Procedures Every 8 Hours or Daily

### CHECKS WITH THE KEY SWITCH OFF

**NOTE:** Be certain to read and understand the information covered in the Introduction section before performing any of the **Maintenance Procedures** that follow.

#### **WARNING**

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

Put the lift truck on a level surface. Lower the forks and turn the key switch to the **OFF** position. Disconnect the battery. Open the MDU compartment cover. Discharge the capacitor. Check for leaks and conditions that are not normal. Clean any oil or other

spills. Make sure that lint, dust, paper, and other materials are removed from the compartments.

### Safety Labels

#### **WARNING**

If labels that have warnings or instructions are damaged, they must be replaced immediately.

Check that all safety labels are installed in the correct locations on the lift truck. Make sure that all labels are not damaged and that they can be read. If necessary, see the **Parts Manual** for your lift truck for the correct location of the labels.

Safety labels are installed on the lift truck to give information about possible hazards. It is important that all safety labels are installed on the lift truck and can be read. See the **Parts Manual** for label placement for your lift truck.

## Battery

### WARNING

**DO NOT** lay tools on top of the battery.

**The acid in the electrolyte can cause injury. If the electrolyte is spilled, make the acid neutral with a solution of sodium bicarbonate (soda) and water, then flush the area with water. Acid in the eyes must be immediately flushed with water continuously for 15 minutes, then seek medical attention.**

**Batteries generate explosive fumes. Keep the vents in the caps clean. Keep sparks or open flames away from the battery area. DO NOT make a spark from the battery connections. Disconnect the battery when performing maintenance.**

**The battery must fit the battery compartment so the battery restraint panels will operate correctly. Use spacers to prevent the battery from moving more than 13.0 mm (0.5 in.) in any direction.**

**NOTE:** Battery water levels can be maintained without removing the battery from the truck.

Check for loose or broken electrical connections and damaged wires or cables. Examine the battery case for damage and leakage. See the battery dealer in the area to repair any damage to the battery or cables.

Check that the vent caps are clear. Check the level of the electrolyte daily on a minimum of one cell. Add only distilled water, as necessary, if the cell is low. If one cell is low, check the rest of the cells. The correct level is halfway between the top of the plates and the bottom of the fill hole. Use a hydrometer to check that the battery is not discharged below the minimum specific gravity given by the manufacturer and has enough charge to complete a work period. See How to Charge Battery in this section.

Remove the battery as described in the section **Industrial Battery** 2240 SRM 1. Check the battery case, connector, and cables for damage, cracks, or

breaks. See the battery dealer in your area to repair any damage. Keep the battery case and the battery compartment clean and painted. Leaks and corrosion from the battery can cause a malfunction in the electric controls of the lift truck. Use a water and soda solution to clean the battery and the battery compartment. Keep the top of the battery clean, dry, and free of corrosion.

Make sure the battery is the correct weight and voltage size. Prevent side-to-side movement of the battery by adjusting the brackets on either side of the battery. The correct battery is specified in How to Change Battery and in the **Operating Manual**. The **Operating Manual** is located in the container on the Drive Unit cover. This is a permanent reference and must be available for use at all times.

## Frame

### WARNING

**Forklift truck frames and components may have polyurethane paint. Welding, burning, or other heat sufficient to cause thermal decomposition of the paint may release isocyanates. These chemicals are allergic sensitizers to the skin and respiratory tract and overexposure may occur without odor warning. Always utilize good industrial hygiene practices, including removal of all paint (prime and finish coats) to the metal around the area to be welded. Use local ventilation and/or supplied-air respiratory protection when repairing the frame.**

### CAUTION

**All welding repairs must be pre-approved by Hyster™ company Contact Management.**

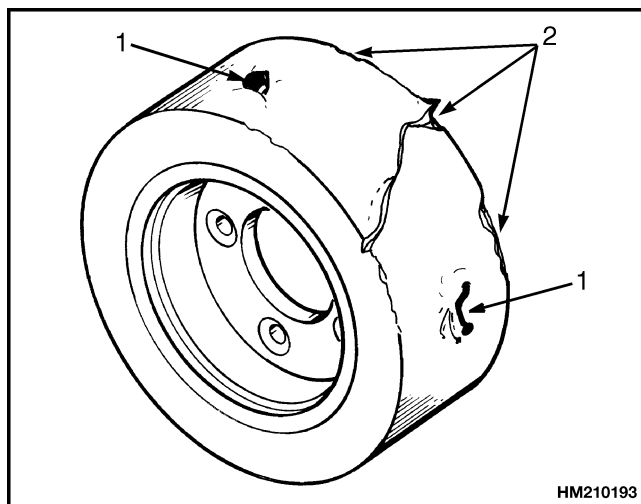
Check the frame for damage. Inspect for rust and cracks especially near welds. All surfaces of the frame should be covered with paint to prevent rust and corrosion. Heat can weaken metal, preventing some areas of the frame from being repaired. See Welding Repairs.

## Drive Tire, Casters (Optional), and Trail Wheels or Load Wheels

### CAUTION

If the drive tire has been removed and installed, check all wheel bolts after 2 to 5 hours of operation. Tighten the bolts in a cross pattern (see Drive Tire and Wheel) to the correct torque value shown in the Maintenance Schedule. When the bolts stay tight after eight hours, the interval for checking the torque can be extended to 500 hours.

Inspect the drive tire, casters (optional), and trail wheels or load wheels for damage. Inspect the tread and remove any objects that will cause damage. See Figure 5. Inspect the wheels and casters for loose or missing parts. Remove any wire, strapping, or other material wound around the axles or casters.



1. OBJECTS EMBEDDED IN TIRE.
2. GROOVES, CUTS, OR OTHER DAMAGE TO TIRE.

*Figure 5. Tire and Wheel Inspection*

### Lift Linkage (C60-80Z<sup>AC</sup>)

A series of levers and rods compose the lift linkage. These devices are connected together and to the frame and lift cylinder in series. The lift cylinder applies force in only one direction. The lift linkage transfers that force to the load wheel linkage and the drive end frame linkage, lifting the truck and load evenly and smoothly. Many pivot points indirectly shoulder the weight of the truck and load. These points must be lubricated every 500 hours/3

months to ensure minimal resistance from friction and damage from heat.

### Coupler (T5-7Z<sup>AC</sup>)

The coupler is mounted to the rear of the truck and can be released from the truck using a hand lever. The design of the coupler allows hand-free connections by backing the truck up to the connecting load until the coupler latches. Check that the hand lever moves easily with little resistance and returns to the latched position when released. A simple drop pin-type connector option is also available.

### Steering Operation

Check that the steering operates smoothly and gives good steering control. Move the handle to the left or right to steer the lift truck in the desired direction of travel. Reposition the steering control handle up and down to ensure easy adjustment during use.

### CHECKS WITH THE KEY SWITCH ON

#### Control Handle

### WARNING

**Make sure the area around the lift truck is clear before moving the lift truck or checking for correct operation. Be careful when making the checks.**

Check that the speed/direction control and the foot switch for high speed operates as described in the **Operating Manual**. Also check that the horn switch is operational.

The speed/direction control is for selecting forward or reverse movement and the travel speed of the lift truck. The control is spring loaded and should return to the neutral position when the control is released. The control can be operated by either hand. The operator controls the speed and direction of travel by rotating the control in the desired direction. Maximum rotation of the control causes maximum travel speed. To stop or change direction, the operator rotates the control in the opposite direction. The lift truck will come to a stop. If the speed/direction control is not released when the lift truck stops, it will accelerate in the opposite direction. Changing the direction with the speed/direction control is called plugging. Arrows on the control indicate the direction of travel.

Check the operation of the horn. The key switch must be in the **ON** position for the horn to operate.



## Gauges

**NOTE:** The electrical controls will not operate until the key switch is turned to the **ON** position.

Check that all the instruments and controls operate as described in the **Operating Manual**. The **Operating Manual** is located in the container on the MDU cover. This is a permanent reference and must be available for use at all times.

Check the operation of the gauges. The key switch must be in the **ON** position for the gauges to operate. The battery discharge indicator/hourmeter displays the total operation hours. Periodic maintenance recommendations are based on these operating hours.

## Fuses

### WARNING

The capacitor in the transistor controller can hold an electrical charge after the battery is disconnected. To prevent electrical shock and injury, discharge the capacitor before inspecting or repairing any component in the drive unit compartment. Refer to Special Precautions. Wear the proper protective eyewear. Make certain the battery has been disconnected.

A control fuse is located in-line on the harness and a power fuse is located on the controller. Remove the MDU compartment cover to check the fuses. Check that the fuses are the correct ampere size and are not burned. Some types of fuses must be checked with an ohmmeter. Replace a bad fuse with a fuse with the correct rating. **NEVER** use a fuse with a higher rating. The power and the control fuses have the following ratings:

Control Fuse	Traction Power Fuse
5 Amps	400 Amps

## High Speed Switch

The high speed switch is a foot switch located in the floor of the driver's compartment. The high speed function activates when:

- The key switch is in the **ON** position.
- The parking brake switch is in the **OFF** position.
- The directional controls of the control handle are rotated.
- The battery discharge indicator/hourmeter (BDI) reads 20% or greater.

- The high speed switch is depressed.

Test for proper operation of the high speed switch daily to ensure the truck is performing at optimal efficiency.

## Hydraulic (C60-80Z<sup>AC</sup>)

### 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.

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.

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

### 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.

Inspect the hydraulic system for leaks and damaged or loose components.

Inspect all hydraulic hoses and fittings for leaks. Check for broken or defective clamping devices. Repair or replace any damaged components as necessary.

The hydraulic oil level must be checked daily. Operating a truck without enough hydraulic oil can cause substandard performance and can damage the hydraulic system. Fill the reservoir to the **MIN** mark with hydraulic oil.

## Hand Brake



### WARNING

**DO NOT operate a truck with an improperly functioning brake.**

A two-stage hand brake is mounted just below the control handle and connects to the control handle wiring harness. The hand brake assembly consists of two independent handles, various linkages, and three switches to perform two different braking functions. Check for proper operation of the brake. When either hand brake handle is placed in the first position, the controller places the traction motor into

re-gen mode. This slows the truck by using opposing magnetic fields inside the traction motor. A spring-applied/electrically released brake is mounted to the top of the traction motor. When the key switch is in the **ON** position and the parking brake is in the **OFF** position, the coil pulls the pressure plate away from the friction disc disengaging the brake. The brake is applied when the brake handle is placed in the second position, the parking brake switch is in the **ON** position, or when the key switch is in the **OFF** position.

## Maintenance Procedures Every 250 Hours or Every 6 Weeks

### CASTER LUBRICATION



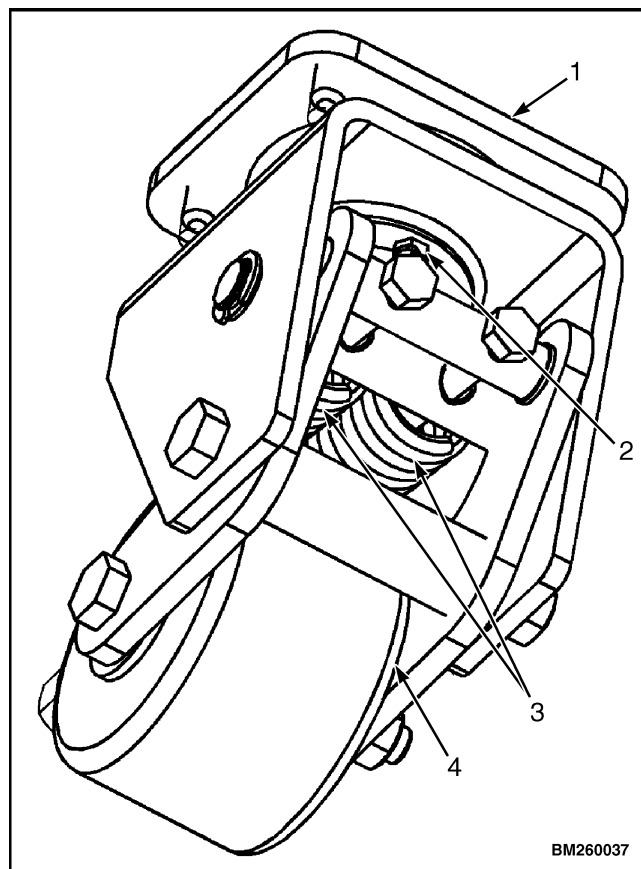
### CAUTION

**Use only the recommended lubricants for your application. Refer to Capacities and Specifications 8000 SRM 1033 for lubrication specifications for your lift truck.**

**Wipe grease fittings clean before greasing.**

**NOTE:** Some optional packages may utilize sealed bearings or different grease fitting configurations. Contact your Hyster™ dealer for information on optional packages.

The casters should be lubricated every 250 hours or 6 weeks during normal operation. The standard caster has one grease fitting above the springs which provides lubrication to the swivel bearing. See Figure 6.



1. SWIVEL MOUNT
2. GREASE FITTING
3. SPRINGS
4. CASTER WHEEL

*Figure 6. Standard Caster*

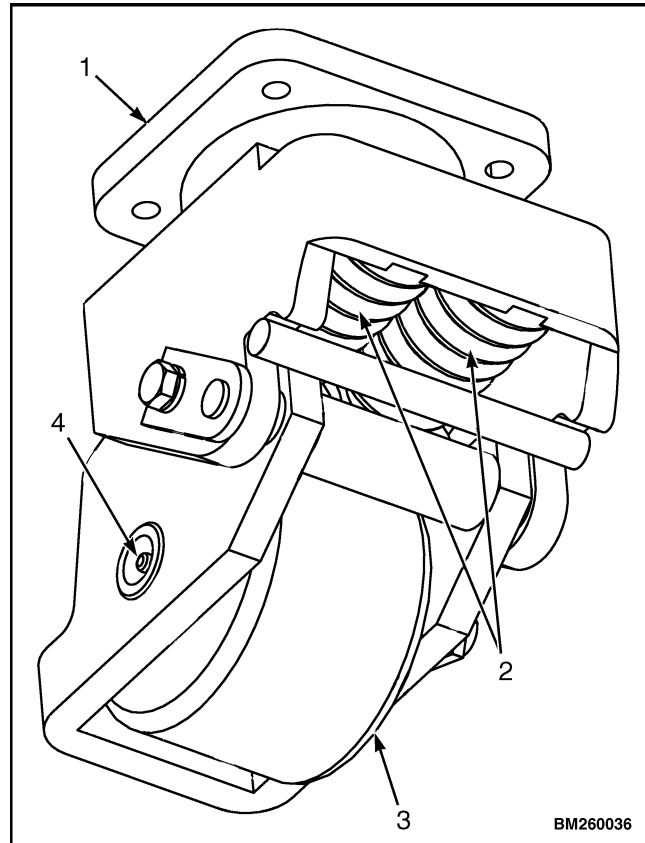
(More Content includes: Brake system, Capacities, and specifications, Frame, Hydraulic, System, Industrial battery, Main control, Valve, Mast repair, Fasteners, Schematics diagrams, Steering axle, Steering system, Wire harness repair And more)

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much.**

The heavy-duty caster has one grease fitting in the end of the caster wheel axle which lubricates the caster wheel bearings. See Figure 7.



1. SWIVEL MOUNT
2. SPRINGS
3. CASTER WHEEL
4. GREASE FITTING

*Figure 7. Heavy-Duty Caster*

## Maintenance Procedures Every 500 Hours or Every 3 Months

### HYDRAULIC SYSTEM

#### **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.

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.

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

#### **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

Perform the following checks.

## Hydraulic Oil

**NOTE:** The hydraulic oil should be changed after the initial 500 hour break-in period and then every 2000 hours thereafter. Refer to Maintenance Procedures Every 2000 Hours or Yearly for oil change procedures for the initial 500 hour change.

Check the hydraulic oil level when the oil is at normal operating temperature and forks are in the lowered position.

Remove drive unit cover. Remove breather cap from hydraulic pump and reservoir. Add hydraulic oil, if necessary, through the breather filler pipe until oil is at Full mark on reservoir. Install breather cap and tighten. **DO NOT OVERFILL.**

## Hydraulic Reservoir Breather

Check the condition of the breather cap. The breather cap is located on the side of the hydraulic reservoir of the oil pump and motor assembly, inside the drive unit compartment. Unscrew the cap from the oil fill elbow. Clean the breather cap with a suitable cleaning solution, blow dry with compressed air, and reinstall. If the breather cap cannot be cleaned so air will flow through it easily, or it is damaged, it must be replaced.

## STEERING SYSTEM

### Steer Column and Tilt Mechanism

The steer handle is connected to the hub by a pivot pin. Bushings in the hub cushion the pin and help reduce wear. The handle only moves on the pivot when adjusting the control handle height. An adjusting pin locks the handle in place. Lubricate the pivot pin and the adjusting pin using SAE 20 motor oil.

## LIFT LINKAGE AND LOAD WHEELS (C60-80Z<sup>AC</sup>)

The lift linkage must be lubricated regularly to ensure smooth operation and to prevent component wear. The linkage is equipped with grease fittings near the load wheels accessible from the top of the forks. The linkage is also equipped with grease fittings accessible from beneath the frame near the battery compartment. Wipe all grease fittings clean

and check for damage to lift linkage components before greasing.

Some load wheel axles are also fitted with a grease fitting. These load wheels should be greased every 500 hours or 3 months unless the lift truck is being operated in a food processing/corrosive environment which requires daily lubrication. Load wheel axles without grease fittings are used on units with sealed load wheel bearings. These bearings may be wiped clean with a cloth, but cannot be lubricated and must be replaced if not operating smoothly. Apply a thin coat of antiseize lubricant to the sealed bearing axles during installation.

## CASTERS

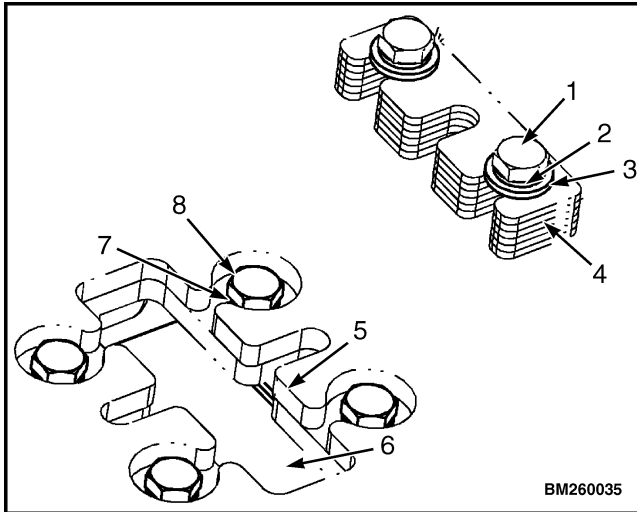
### Caster Shim Check

Periodically, the casters must be adjusted to compensate for drive tire wear/replacement. Excess rocking is often a sign of under shimmed casters. This may occur when a new drive tire is installed. Loss of traction may be caused by over shimmed casters. This may occur when the drive tire diameter has decreased because of regular wear. The casters ideally should be level with the bottom of the drive tire (just touching the floor). A gap of not more than 1.50 mm (0.06 in.) between the caster wheels and the floor is acceptable, as is the casters being compressed to the floor not more than 1.50 mm (0.06 in.). Refer to the following instructions for the proper caster checking and adjustment procedures.

1. Park on a smooth and level surface with the control handle centered and with no load on the forks. Lower the forks completely.
2. Turn the key switch to the **OFF** position and disconnect the battery (**DO NOT** remove the battery). Remove the floormat from the operator platform.
3. Position a small level across the operator platform to verify the lift truck is level.
4. Slide a sheet of paper under one of the caster wheels to determine if it is touching the floor. If the caster wheel is touching the floor, skip to Step 6.

5. If the caster wheel is not touching the floor, check the caster for under shimming:

- a. Loosen the two capscrews securing the extra shims to the frame of the operator platform. See Figure 8.



1. CAPSCREW
2. LOCKWASHER
3. WASHER
4. EXTRA SHIMS STACK
5. SHIM SLOT IN FRAME
6. TOP OF CASTER
7. LOCKWASHER
8. CAPSCREW

**Figure 8. Caster Shims**

- b. Remove one shim by sliding it off the top of the stack.
- c. Place a shim flat on the floor beside the caster wheel and try to push the shim under the wheel.
- d. Repeat for the other caster.
- e. If the shim slides under the caster wheel, a shim should be added between each side of the caster and the frame. If two shims stacked can be slid under the wheel, two shims should be added between each side of the caster and the frame. See Caster Shim Adjust.
- f. If the caster wheel is not touching the floor but a shim cannot be slid under the caster

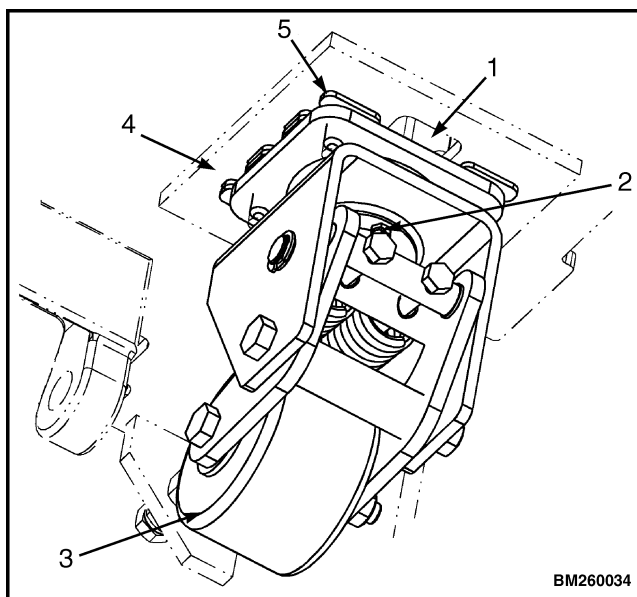
wheel, the caster is properly adjusted. Repeat checks for other caster.

6. If the caster wheel is touching the floor, check caster for over shimming:
  - a. Position a floor jack centered under the drive end of the lift truck. Raise the casters off the floor and verify jack position using the level.
  - b. Position a sheet of paper under one of the caster wheels and lower the lift truck.
  - c. Slowly raise the lift truck again while trying to pull the paper from under the caster wheel. Stop raising the truck as soon as the paper can be removed from under the caster wheel.
  - d. Loosen the two capscrews securing the extra shims to the frame of the operator platform. See Caster Shim Adjust.
  - e. Remove one shim by sliding it off the top of the stack. Place a shim flat on the floor beside the drive wheel and try to push the shim under the drive tire.
  - f. If the shim slides under the drive tire, a shim should be removed from between each side of the caster and the frame. If two shims stacked can be slid under the drive tire, two shims should be removed from between each side of the caster and the frame.
  - g. If a shim cannot be slid under the drive tire, the caster wheel is properly adjusted. Repeat checks for other caster.

### Caster Shim Adjust

1. Park on a smooth and level surface with the control handle centered and with no load on the forks. Lower the forks completely.
2. Turn the key switch to the **OFF** position and disconnect the battery (**DO NOT** remove the battery). Remove the floormat and the drive unit compartment cover.
3. Check to determine if the casters need shims added or removed for each caster. Refer to Caster Shim Check.

4. Position a floor jack centered under the drive end of the lift truck. Raise the casters off the floor.
5. Loosen the four capscrews and lockwashers securing one caster to the frame. See Figure 8.
6. Loosen the two capscrews securing the extra shims to the frame of the operator platform.
7. Add or remove the proper amount of shims between each side of the caster and the frame. Insert or remove shims through the shim slot in the frame. Use shims from the extra shim stack to augment or store extra shims in the stack for later use. See Figure 9.



- |                 |                |
|-----------------|----------------|
| 1. SHIM SLOT    | 4. TRUCK FRAME |
| 2. SWIVEL       | 5. SHIMS       |
| 3. CASTER WHEEL |                |

**Figure 9. Caster Mounting**

8. Tighten the four capscrews and lockwashers securing the caster to the frame.
9. Repeat for other caster.
10. Tighten the two capscrews securing the extra shims to the frame of the operator platform.

11. Lower the lift truck and check for proper adjustment.

12. Reinstall the floormat, connect the battery, and turn the key switch to the **ON** position. Test for proper operation.

## MASTER DRIVE UNIT

### Change Gear Oil

**NOTE:** The oil used in the master drive unit should be drained and replaced after the initial 500 hours break-in period in accordance with the Maintenance Schedule. After the initial oil change, the MDU gear oil should be changed every 2000 hours. Refer to Maintenance Procedures Every 2000 Hours or Yearly.

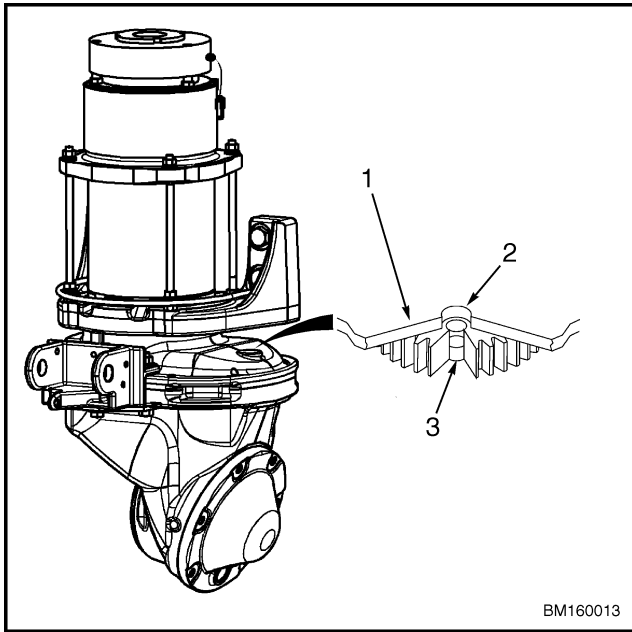
It may be necessary to turn the control handle arm to allow access the oil fill plug in the MDU housing.

Operate the lift truck MDU for several minutes to warm the gear oil. Elevate truck to access drive unit. Keep truck level. Remove drive unit cover. Remove both drain and oil fill plugs and drain gear oil into a suitable container. Replace drain plug. Add gear oil to the proper level (see Check Oil Level). Replace oil fill plug. **DO NOT OVERFILL.**

Refer to the section for MDU repair procedures.

### Check Oil Level

Check gear oil level. Position the truck on a level surface, turn the key switch to the **OFF** position, and disconnect the battery. Remove the drive unit compartment cover. Turn the control handle arm to access the oil fill plug in the MDU housing. Remove oil fill plug. It may be necessary to roll the drive wheel either forward or backward to line holes in the gear up with the fill hole to visually check the oil level. See Figure 10. Add gear oil through oil fill plug, if necessary, until oil is level with bottom or halfway to the top of the gear. Install fill plug. **DO NOT OVERFILL.**



- |                  |              |
|------------------|--------------|
| 1. MDU HOUSING   | 3. OIL LEVEL |
| 2. OIL FILL HOLE |              |

*Figure 10. Oil Level*

## Maintenance Procedures Every 2000 Hours or Yearly

**NOTE:** Perform these procedures in addition to the 8-hour and the 500-hour checks.

### TRAIL WHEEL BEARINGS (T5-7Z<sup>AC</sup>)

#### **WARNING**

Move the lift truck to a level location where it can be serviced. Disconnect the battery and remove the key.

The lift truck must be put on blocks to perform maintenance on the load wheel bearings.

#### Remove

Follow the steps below to remove the load wheel bearings. See Figure 11.

1. Put the lift truck on blocks and disconnect the battery.
2. Remove hub cap (6) and attaching screws (7).
3. Remove cotter pin (10) from end of the axle shaft (14).
4. Remove nut (9) and washer (5).

### DRIVE TIRE CHECK

#### **WARNING**

When the drive tire has been installed, check all wheel bolts after 2 to 5 hours of operation. When the wheel bolts stay tight after an 8-hour check, the interval for checking the torque can be extended to 500 hours.

Check to ensure the wheel bolts or lug nuts are properly tightened to  $200 \pm 9 \text{ N}\cdot\text{m}$  ( $148 \pm 7 \text{ lbf ft}$ ). Inspect the tire for embedded rocks, glass, wire, pieces of metal, holes, cuts, and other damage. Remove any object that will cause damage. Check for loose or missing lug nuts or wheel bolts. Remove any wire strapping or other material that is wrapped around the axle to prevent damage to the axle seal. Make sure the wheel bolts are tight.

When installing the tire and wheel, snug the wheel bolts, then tighten to half the torque value, then tighten to the full torque value. Tighten the nuts in a cross pattern to properly seat the wheel to the hub.

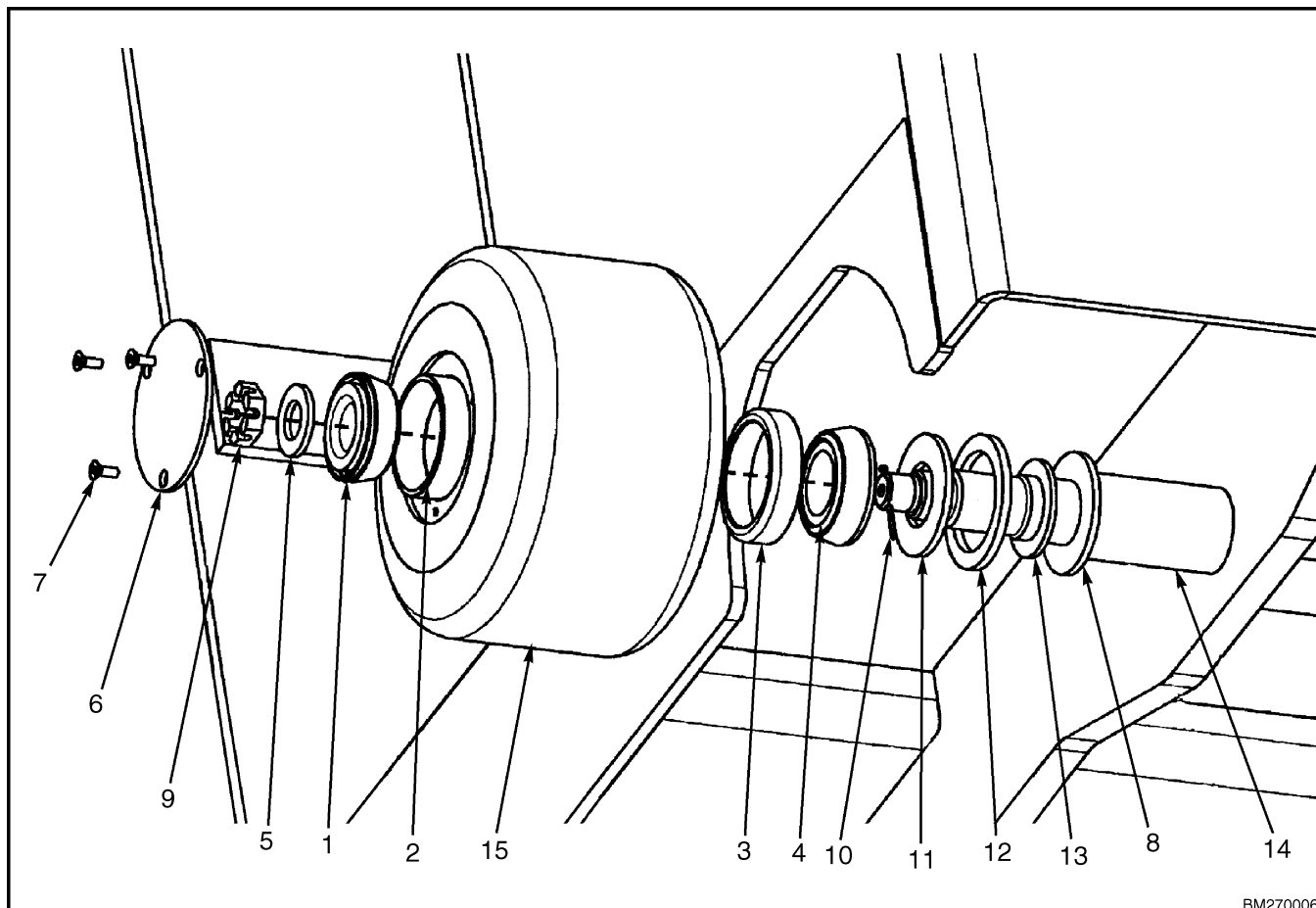
5. Remove load wheel (15) and bearing assemblies by pulling the load wheel off the axle shaft.
6. Remove bearing cones (1, 4) and remaining washers (11, 12, 13, 8) from the axle shaft.
7. Remove the bearing cups (3, 2) **ONLY** if they are damaged and must be replaced.

#### Inspect

The bearing cups, cones, washers, and load wheels should be cleaned and inspected when removed. Any damaged parts should be replaced. To inspect the load wheel and bearings:

1. Wipe grease and dirt from bearing cups and cones, load wheel, washers, and axle shaft.
2. Wash the bearing cones in solvent to remove all dirt and grease.
3. Inspect the cups and washers for pits and grooves or other damage.
4. Inspect the cones for looseness, wear, and other damage.





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- |                       |                |                 |
|-----------------------|----------------|-----------------|
| 1. OUTER BEARING CONE | 6. HUB CAP     | 11. WASHER      |
| 2. OUTER BEARING CUP  | 7. SCREW       | 12. FELT WASHER |
| 3. INNER BEARING CUP  | 8. WASHER      | 13. WASHER      |
| 4. INNER BEARING CONE | 9. NUT         | 14. AXLE SHAFT  |
| 5. WASHER             | 10. COTTER PIN | 15. LOAD WHEEL  |

**Figure 11. Trail Wheel Assembly (T5-7Z<sup>AC</sup>)**

- Place bearing cone inside cup and slowly turn the cone while pressing down with the palm of the hand. The bearings should roll smoothly without interruption.

**NOTE:** If any damage is found on a bearing cup or cone, then **BOTH** the matching bearing cup and cone must be replaced.

### Install

Install the load wheel assembly by reversing the order of removal until installing the nut (9) and then by following these instructions:

- Install bearing cups to load wheel if removed.
- Pack the wheel bearing cones with Amsoil® GHD synthetic multipurpose (lithium complex) with 2 to 4% molybdenum disulfide. The wheel hub cavity between the bearing cups should be packed with the same lubricant to a level even with the center of the bearing cups. Apply a light coat of grease to the spindle and the finished surface on which the oil seal rides.
- Install washers (8, 13, 12, and 11) to axle shaft.
- Install bearing cones to load wheel and install load wheel and bearing assemblies on to axle shaft.
- Install washer (5) and nut (9) to axle shaft.

6. Tighten the wheel adjusting nut (9) while slowly rotating the wheel until wheel will not rotate. See Figure 11.
7. Back off adjusting nut (turn counterclockwise) 1/16 to 1/4 turn until slot in lock nut lines up with hole in axle shaft.

**NOTE:** Hub should turn freely with 0.0254 to 0.2540 mm (0.0010 to 0.0100 in.) end play.

8. Install cotter pin (10).
9. Place hub cap (6) over hub and align screw holes. Attach the hub cap with screws (7).

## HYDRAULIC SYSTEM (C60-80Z<sup>AC</sup>)

### Changing the Hydraulic Oil

#### **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.

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.

1. Move the lift truck to a safe and level area. Lower the forks completely to relieve pressure from the hydraulic system. Block load wheels to prevent lift truck from moving.
2. Turn the key switch to the **OFF** position and disconnect battery.
3. Remove the drive unit compartment covers.

4. Discharge the capacitor.
5. Tag and disconnect all power wires, control wires, and hoses to the lift pump and motor assembly.
6. If necessary, remove the battery.
7. Loosen and remove the three capscrews retaining the lift pump and motor assembly to the frame. Support the lift pump and motor assembly as the capscrews are being removed. Remove lift pump and motor assembly.
8. Place lift pump and motor assembly on a clean workbench securely supported in an upright position. The reservoir is unstable in an upright position and must be securely supported at all times.

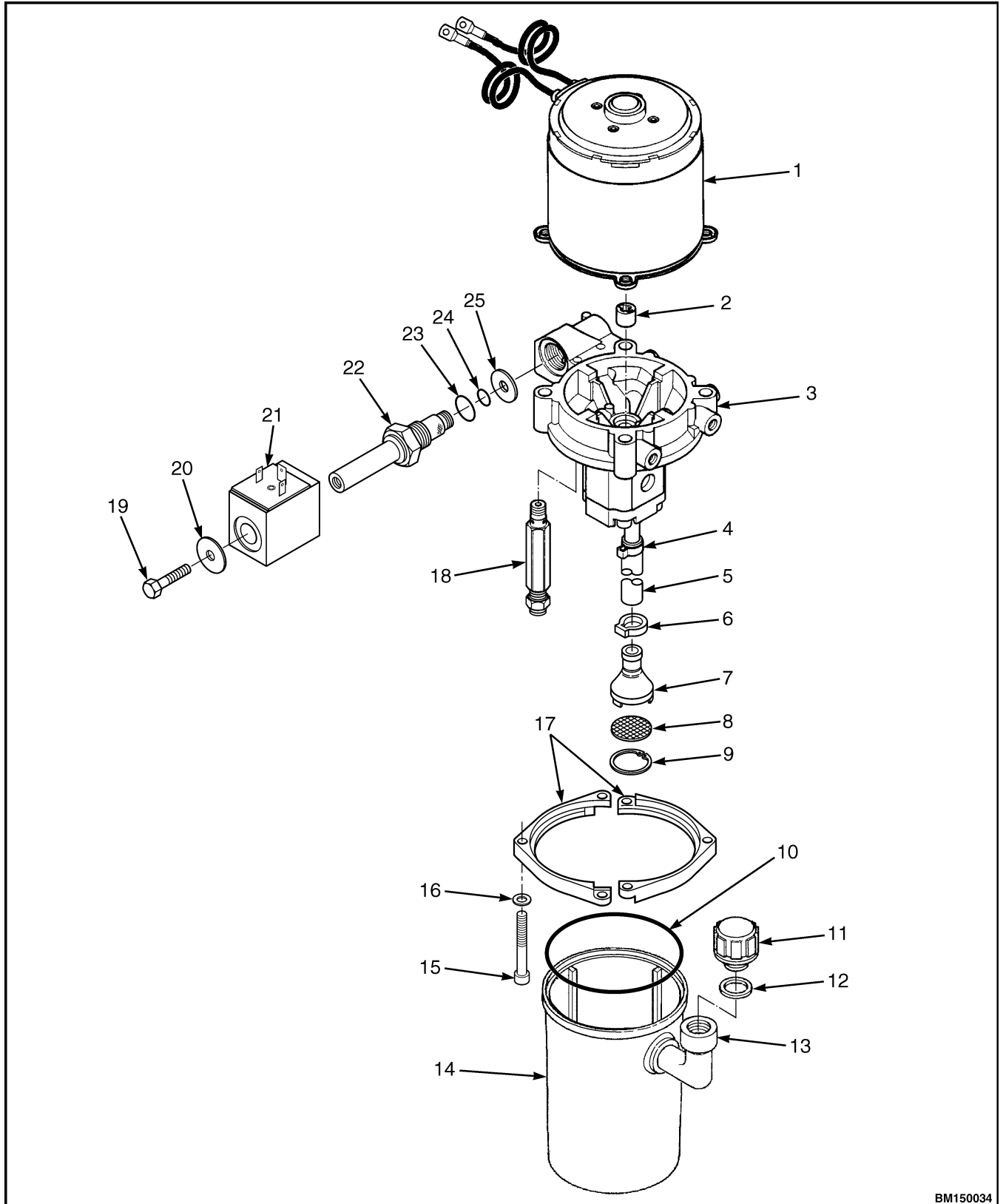
**NOTE:** On the C60Z<sup>AC</sup> trucks, the capscrews that hold the reservoir to the pump assembly also hold the motor to the pump assembly. When the capscrews are removed, the motor will be resting on the pump assembly.

9. Use the following procedure that applies to your lift truck:
  - a. Remove the four Torx-head screws retaining the reservoir to the lift pump. See Figure 12.
  - b. Remove the four socket head screws retaining the reservoir to the lift pump. See Figure 13.
10. Carefully remove the reservoir from the lift pump and motor.
11. Place the pump and motor assembly on a clean drip pan.

#### **CAUTION**

Disposal of lubricants and fluids must meet local and environmental regulations.

12. Pour oil from reservoir in a container suitable for disposal.
13. Remove and inspect the O-ring seal located between the lift pump assembly and the hydraulic reservoir. Verify that the O-ring seal is not damaged. Replace as needed.
14. Inspect the strainers. If necessary, remove the retaining clip to access the screen. Replace parts that are damaged or cannot be cleaned.



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Figure 12. Lift Pump and Motor Assembly (C60Z<sup>AC</sup>)

*Legend for Figure 12*

- |                         |                              |
|-------------------------|------------------------------|
| 1. LIFT PUMP MOTOR      | 14. RESERVOIR                |
| 2. COUPLING             | 15. TORX-HEAD SCREW          |
| 3. LIFT PUMP            | 16. WASHER                   |
| 4. CLAMP                | 17. TWO-PIECE CLAMP          |
| 5. TUBE                 | 18. RELIEF VALVE             |
| 6. CLAMP                | 19. CAPSCREW                 |
| 7. STRAINER             | 20. WASHER                   |
| 8. SCREEN               | 21. LOWERING VALVE COIL      |
| 9. RETAINER             | 22. LOWERING VALVE CARTRIDGE |
| 10. O-RING              | 23. O-RING                   |
| 11. BREATHER/FILLER CAP | 24. O-RING                   |
| 12. FLAT SEAL           | 25. LOWERING ORIFICE         |
| 13. FILLER ELBOW        |                              |

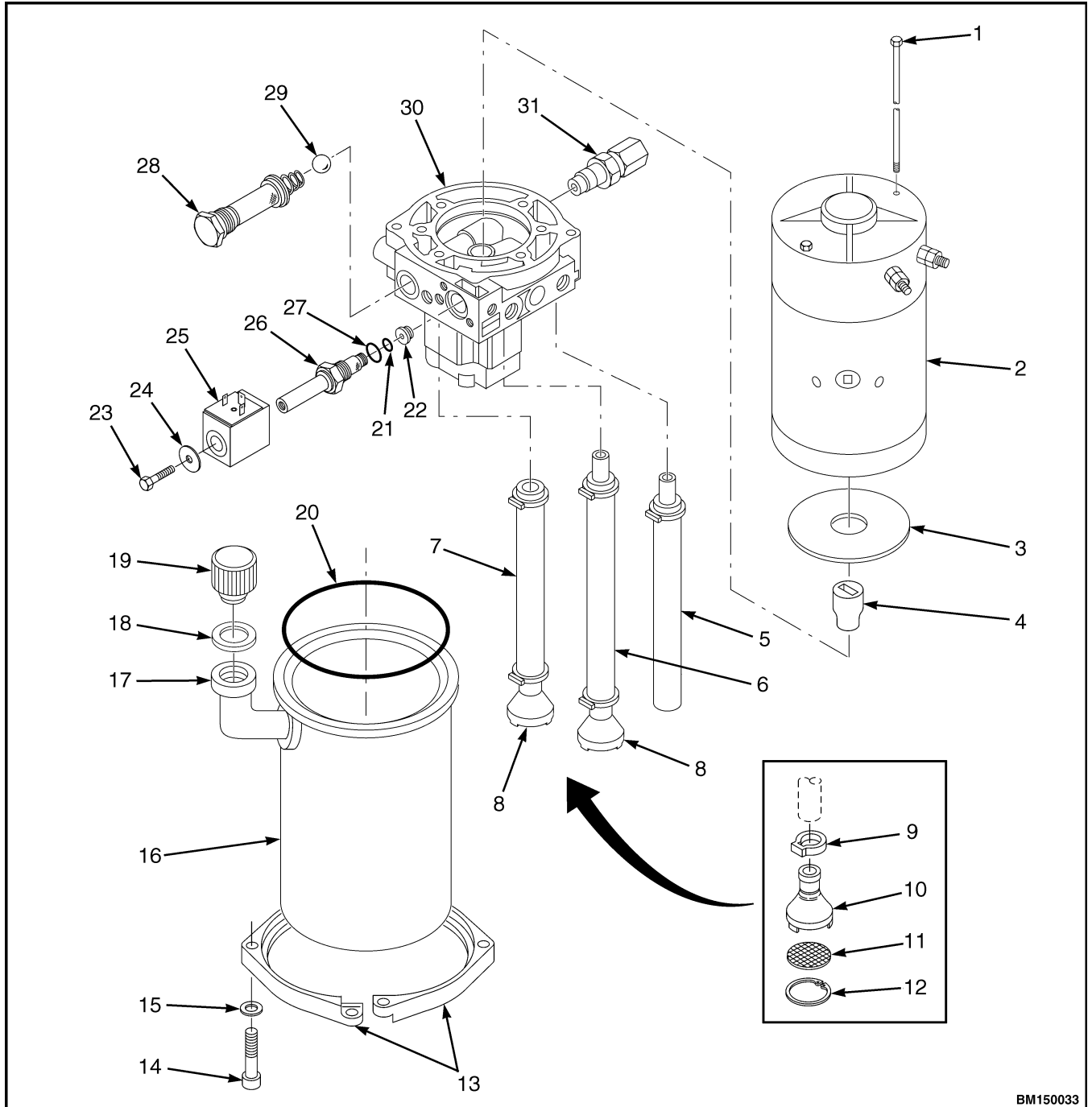
**CAUTION**

**If oil is contaminated or excessively dirty, the entire hydraulic system should be thoroughly cleaned.**

15. Examine the hydraulic reservoir for damage. Inspect for dirt, foreign materials, or contamination. Clean or replace the reservoir as necessary.
  16. Remove the breather/filler cap. Separate the top and bottom of the breather/filler cap. Clean and inspect the breather element and the flat seal. Replace parts that are damaged or cannot be cleaned and reassembled.
  17. Place reservoir on a clean workbench securely supported in an upright position.
- NOTE:** The reservoir may be filled at this point or it may be filled after the lift pump and motor assembly have been installed.
18. Fill the hydraulic reservoir to proper level and install breather/filler cap to reservoir.
  19. Install O-ring seal on pump assembly. If necessary, use a small amount of grease to hold the O-ring seal in place.
  20. Position lift pump and motor assembly onto the reservoir and install two-piece clamp to reservoir and pump assembly.
  21. Install four screws and torque to 8 N•m (71 lbf in).

**NOTE:** Verify that the lift motor is positioned properly (as removed) and the coupling (where equipped) is seated properly.

22. Align the lift pump and motor assembly with the mounting holes in the frame. Install three cap-screws and torque to 26 N•m (19 lbf ft).
23. Connect hydraulic hoses, power wires, and control wires to lift pump and motor assembly.
24. Remove breather/filler cap. Fill the hydraulic reservoir to proper level and reinstall the breather/filler cap.
25. If removed, install the battery.
26. Remove blocks from wheels, connect the battery, and turn the key switch to the **ON** position.
27. Depress the lift button to pump oil through the pump body and valve. Operate the forks up and down several times to remove air from the system.
28. Test lift truck by lifting and lowering a load several times. Check for leaks.
29. Check hydraulic oil level in reservoir and fill to proper level. Install drive unit compartment covers.



BM150033

**Figure 13. Lift Pump and Motor Assembly (C80Z<sup>AC</sup>)**

*Legend for Figure 13*

- |                       |                              |
|-----------------------|------------------------------|
| 1. CAPSCREW           | 17. FILLER ELBOW             |
| 2. LIFT PUMP MOTOR    | 18. FLAT SEAL                |
| 3. ADAPTER PLATE      | 19. BREATHER/FILLER CAP      |
| 4. COUPLING           | 20. O-RING                   |
| 5. TUBE               | 21. O-RING                   |
| 6. INLET TUBE         | 22. LOWERING ORIFICE         |
| 7. RETURN TUBE        | 23. CAPSCREW                 |
| 8. STRAINER           | 24. WASHER                   |
| 9. CLAMP              | 25. LOWERING VALVE COIL      |
| 10. STRAINER HOUSING  | 26. LOWERING VALVE CARTRIDGE |
| 11. SCREEN            | 27. O-RING                   |
| 12. RETAINER          | 28. CHECK VALVE              |
| 13. TWO-PIECE CLAMP   | 29. CHECK VALVE BALL         |
| 14. SOCKET HEAD SCREW | 30. LIFT PUMP                |
| 15. WASHER            | 31. RELIEF VALVE             |
| 16. RESERVOIR         |                              |

**MASTER DRIVE UNIT**

**Drive Unit Gear Oil**



**CAUTION**

**Disposal of lubricants and fluids must meet local environmental regulations.**

**NOTE:** Refer to Maintenance Schedule for gear oil type and drive unit capacities.

Refer to Figure 14 for the following procedures.

1. Turn the key switch to the **OFF** position and disconnect the battery.
2. Remove the drive unit compartment covers.
3. Remove both the drain and oil fill plugs to drain oil.
4. Replace drain plug. Torque to 60 N•m (44 lbf ft).
5. Align hole in gear with fill hole and add gear oil until oil is touching the bottom of gear or is halfway to top of gear.
6. Install the fill plug. Torque to 45 N•m (33 lbf ft).

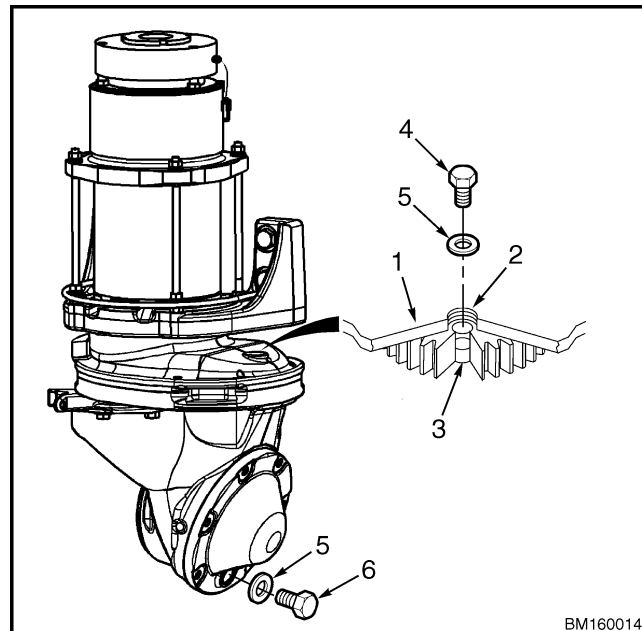
**Brakes**

In addition to the 8-hour check for operation, test the brakes to ensure it will hold on grade to specification.

1. Load the truck to specification.  
2268 kg (5000 lb) (trailer plus load weight) - T5-7Z<sup>AC</sup>  
Capacity Load - C60-80Z<sup>AC</sup>

2. Slowly drive the truck up grade.  
5% Grade - T5-7Z<sup>AC</sup>  
10% Grade - C60-80Z<sup>AC</sup>
3. Hold the hand brake in the second position to stop the truck.

If the brake cannot hold the loaded truck on the specified grade, the brake must be repaired or replaced. Refer to the section **Brakes** 1800 SRM 963.



- |                  |               |
|------------------|---------------|
| 1. HOUSING       | 4. FILL PLUG  |
| 2. OIL FILL HOLE | 5. WASHER     |
| 3. OIL LEVEL     | 6. DRAIN PLUG |

**Figure 14. Master Drive Unit**

## Welding Repairs

### WARNING

Disconnect the battery connector and remove the battery before welding. Welding can cause a fire and/or an explosion. Make sure there is no fuel, oil, or grease near the weld area. Make sure the area is well ventilated.

Forklift truck frames and components may have polyurethane paint. Welding, burning, or other heat sufficient to cause thermal decomposition of the paint may release isocyanates. These chemicals are allergic sensitizers to skin and respiratory tract and overexposure may occur without odor warning. When performing work, utilize good industrial hygiene practices, including removal of all paint (prime

and finish coats) to the metal around the area to be welded. Use local ventilation, and/or supplied-air respiratory protection.

### CAUTION

All welding repairs must pre-approved by Hyster™ company Contact Management.

Always disconnect the battery connector to prevent damage to circuit components when welding. Connect the welding ground clamp as close to the weld area as possible to prevent welding current from damaging components.

Observe the previous **WARNING** and **CAUTION** before performing any welding repairs.

## Battery Maintenance

### HOW TO CHARGE BATTERY

#### WARNING

**DO NOT** lay tools on top of the battery.

The acid in the electrolyte can cause injury. If the electrolyte is spilled, use water to flush the area. Make the acid neutral with a solution of sodium bicarbonate (soda) and water. Acid in the eyes must be immediately flushed with water continuously for 15 minutes, then seek medical attention.

Batteries generate explosive fumes. Keep the vents in the caps clean. Keep sparks or open flames away from the battery area. **DO NOT** make a spark from the battery connections. Disconnect the battery when performing maintenance.

The battery must fit the battery compartment so the battery restraint panels will operate correctly. Use spacers to prevent the battery from moving more than 13.0 mm (0.5 in.) in any direction.

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

#### CAUTION

Never connect the battery charger plug to the plug of the lift truck. You can damage the traction control circuit. Always make sure the charger voltage is the correct voltage for the battery.

**INDUSTRIAL TRUCK BATTERIES** - Correct use of the hydrometer and proper operation of the battery charger is important. Operate the battery charger according to the instructions of the charger manufacturer. Never let the battery discharge below the minimum value given by the battery manufacturer. A fully charged battery will have a specific gravity of 1.265 to 1.310 at 25°C (77°F). See Figure 15. Never charge a battery at a rate that will raise the electrolyte temperature above 49°C (120°F). Never permit a battery to stay discharged for long periods.

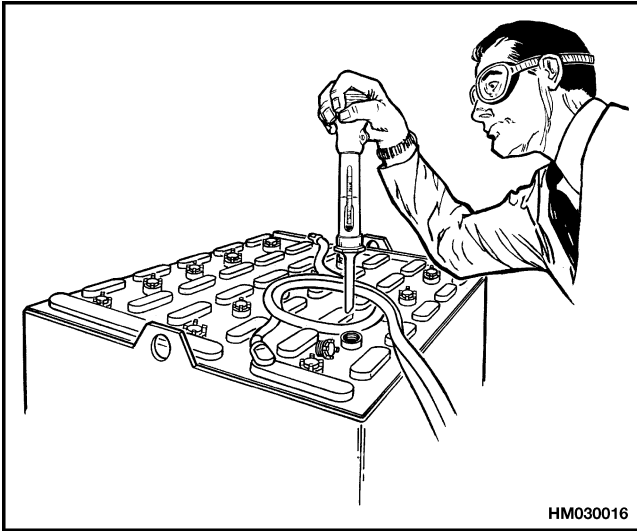


Figure 15. Checking Specific Gravity

Table 2. Specific Gravity Corrections

Specific Gravity Reading	Electrolyte Temperature	Cor-rection Points	Cor-rect Value
1.210	31°C (87°F)	+0.003	1.213
1.210	27°C (80°F)	+0.001	1.211
1.210	25°C (77°F)	+0.000	1.210
1.210	18°C (64°F)	-0.004	1.206
+0.001 or -0.001 for each 1.8°C from the 25°C (77°F) base value. (Degrees C × 1.8) + 32 = Degrees F.			

**NORMAL CHARGE:** This charge is normally given to a battery that is discharged from normal operation. Many customers charge the battery at regular intervals that depend on use. The procedure will keep the battery correctly charged if the battery is not discharged below the limit. Always use a hydrometer to check the battery if the battery is charged at regular intervals. Frequent charging of a battery that has 2/3 or more charge can decrease the life of the battery.

**EQUALIZING CHARGE:** This charge is at a low rate and balances the charge in all of the cells. The equalizing charge is normally given approximately once a month. It is a charge at a slow rate for three to six hours in addition to the regular charging cycle. **DO NOT** give an equalizing charge more than once a week. The most accurate specific gravity measurement of specific gravity for a charged battery will be

after an equalizing charge. If the difference in specific gravity is more than 0.020 between cells of a battery after an equalizing charge, there may be a cell that has a malfunction. Consult your battery dealer.

**NOTE:** Many customers have battery chargers that can follow a program to automatically charge a battery according to recommendations of the battery manufacturer. Use the recommendations of the battery manufacturer for charging the battery. Use only battery chargers approved by the battery manufacturer or dealer.

### HOW TO CHANGE BATTERY

#### **WARNING**

Batteries are heavy and can cause an injury. Use care to avoid injury. **DO NOT** put hands, arms, feet, or legs between the battery and a solid object.

**INDUSTRIAL TRUCK BATTERIES** - Make sure the capacity of the crane and spreader bar is greater than the weight of the battery. The weight of the battery is normally shown on the battery case. The maximum battery weight is shown on the lift truck nameplate. The spreader bar must **NOT** be made of metal, or it must have insulated straps. See Figure 16.

#### Adjusting the Battery Spacers

The standard battery spacers are designed to hold the battery in place during normal operation. Each spacer is adjusted by loosening the nut and sliding the spacer in the slot in the frame until it is pressed firmly against the battery.

#### Changing Battery With Rollers

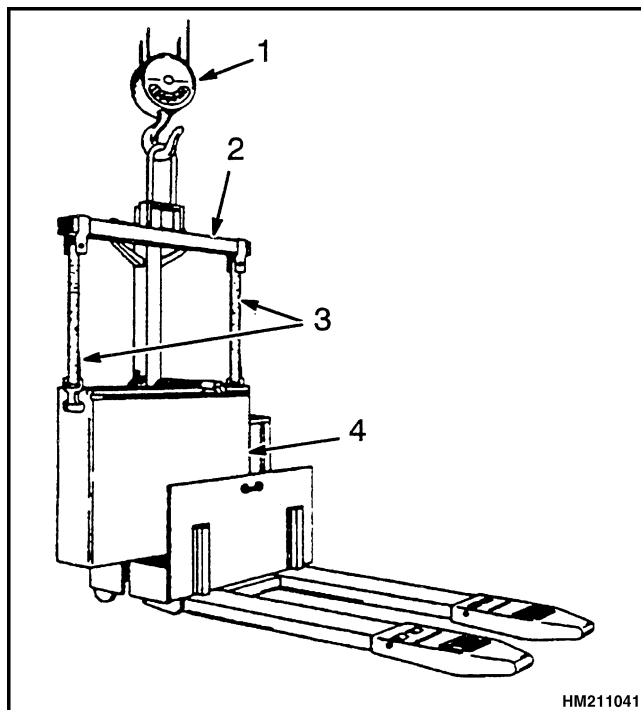
#### **WARNING**

Batteries are heavy and can cause an injury. Use care to avoid injury. **DO NOT** put hands, arms, feet, or legs between the battery and a solid object.

**Always wear protective clothing, gloves, and goggles when handling batteries and electrolyte.**

**NOTE:** The battery spacers used for the battery roller option are bolted onto the side gates and are not adjustable. Different spacers can be obtained for different width batteries.





1. CRANE
2. SPREADER BAR
3. INSULATOR STRAPS
4. BATTERY

**Figure 16. Changing Battery**

Changing the battery with rollers should only be done on a level surface and with a properly functioning battery puller.

#### Remove

#### WARNING

To prevent injury, equipment damage, and unexpected battery movement, the battery must be level when it is moving. Make sure the battery stand is level, correctly aligned with the battery, and adjusted as described in the following procedure.

1. Move the lift truck to a safe, level area.
2. Turn the key switch to the **OFF** position and disconnect the battery connector.
3. Align the battery stand and puller with the battery compartment and battery.
4. Adjust the legs of the battery stand so top of rollers are the same height as the bottom of the battery. Make sure the battery stand is level.

#### WARNING

To prevent personal injury and equipment damage, **DO NOT** permit hook to touch battery cell terminals.

5. Attach the hook of the battery puller to the lifting hole of the battery. **DO NOT** touch battery cell terminals with the hook.
6. Remove the side gate.
7. Stand on base of the battery puller, release the ratchet lever, and operate the crank to pull the battery onto the battery stand.

#### Install

1. Remove the side gate and install the battery puller on lift truck at center of the battery compartment opening on the opposite side of lift truck from the battery stand.

#### WARNING

To prevent personal injury and equipment damage, **DO NOT** permit hook to touch battery cell terminals.

2. Attach hook of the battery puller to the lifting hole of battery. **DO NOT** touch battery cell terminals with the hook.
3. Stand on the base of the battery puller, release the ratchet lever, and operate the crank to pull the battery onto the battery stand.
4. Install the side gates and remove the battery puller from frame.
5. Connect the battery.

#### Remove Battery Using Overhead Crane

1. Turn the key switch to the **OFF** position. Disconnect the battery so the connector is completely free. Use a spreader bar and crane to move the battery.
2. **DO NOT** let the battery move from side to side. Make sure the battery cables have clearance.

### Install Battery Using Overhead Crane

 **WARNING**

The replacement battery must fit the battery compartment correctly. Adjust the brackets on each side of the battery and tighten the capscrews, lockwashers, and nuts to retain the batteries.

Make sure that the battery voltage and weight of the replacement battery is correct as shown on the nameplate.

Before connecting the battery, make sure the key switch is in the OFF position.

 **CAUTION**

Disposal of batteries must meet local environmental regulations.

The replacement battery must fit the battery compartment. Make sure the battery cables have clearance to move during lifting and lowering of the forks.

Make sure the battery is the correct size and weight for the lift truck. The correct battery is specified in Battery Specifications of this manual and the **Operating Manual**. Make sure the battery has clearance for installation. Check that the battery connector can be connected to the lift truck connector without pulling during lifting and lowering operations. Make certain that the battery compartment has the correct spacers for the battery you are installing. The spacers must not let the battery move more than 13.0 mm (0.5 in.) in any direction. The spacers must keep the battery as far from the forks as possible. Have authorized personnel replace or adjust the battery spacers for that battery. See your Hyster lift truck dealer for the correct spacers. **DO NOT** damage the battery cables during installation.

### BATTERY SPECIFICATIONS

Table 3. Battery Specifications (C60Z<sup>AC</sup>)

Truck Specifications			Battery Specifications					
Volts	Battery Compartment		Ampere Hours (Max)	Kilo-watt Hours (Max)	Length (Max) mm (in.) "X"	Width (Max) mm (in.) "Y"	Height (Max) mm (in.)	Weight (Max) kg (lbs)
	Width mm (in.)	Length mm (in.)						
24	340 (13.4)	794 (31.25)	375	8.7	673 (26.5)	330 (13.0)	592 (23.3)	374 (825)
24	340 (13.4)	794 (31.25)	425	9.9	663 (26.1)	325 (12.8)	592 (23.3)	392 (865)
24	340 (13.4)	794 (31.25)	450	10.5	785 (30.9)	330 (13.0)	592 (23.3)	448 (987)
24	340 (13.4)	794 (31.25)	510	11.9	785 (30.9)	330 (13.0)	592 (23.3)	469 (1035)
24	340 (13.4)	794 (31.25)	600	14.0	785 (30.9)	330 (13.0)	665 (26.2)	517 (1140)
24	340 (13.4)	794 (31.25)	750	17.6	785 (30.9)	330 (13.0)	787 (31.0)	658 (1450)

The battery retainers must be adjusted except on batteries longer than 693.4 mm (27.3 in.). These models require the retainers to be removed. Accessory bolts are used instead to fasten the battery to the chassis.

Table 4. Battery Specifications (C80Z<sup>AC</sup>)

Truck Specifications			Battery Specifications					
Volts	Battery Compartment		Ampere Hours (Max)	Kilo-watt Hours (Max)	Length (Max) mm (in.) "X"	Width (Max) mm (in.) "Y"	Height (Max) mm (in.)	Weight (Max) kg (lbs)
	Width mm (in.)	Length mm (in.)						
24	340 (13.4)	794 (31.25)	375	8.7	673 (26.5)	330 (13.0)	592 (23.3)	374 (825)
24	340 (13.4)	794 (31.25)	425	9.9	663 (26.1)	325 (12.8)	592 (23.3)	392 (865)
24	340 (13.4)	794 (31.25)	450	10.5	785 (30.9)	330 (13.0)	592 (23.3)	448 (987)
24	340 (13.4)	794 (31.25)	510	11.9	785 (30.9)	330 (13.0)	592 (23.3)	469 (1035)
24	340 (13.4)	794 (31.25)	600	14.0	785 (30.9)	330 (13.0)	665 (26.2)	517 (1140)
24	340 (13.4)	794 (31.25)	750	17.6	785 (30.9)	330 (13.0)	787 (31.0)	658 (1450)

The battery retainers must be adjusted except on batteries longer than 693.4 mm (27.3 in.). These models require the retainers to be removed. Accessory bolts are used instead to fasten the battery to the chassis.

Table 5. Battery Specifications (T5Z<sup>AC</sup>)

Truck Specifications			Battery Specifications					
Volts	Battery Compartment		Ampere Hours (Max)	Kilo-watt Hours (Max)	Length (Max) mm (in.) "X"	Width (Max) mm (in.) "Y"	Height (Max) mm (in.)	Weight (Max) kg (lbs)
	Width mm (in.)	Length mm (in.)						
24	340 (13.4)	794 (31.25)	225	5.2	650 (25.6)	224 (8.8)	592 (23.3)	243 (536)
24	340 (13.4)	794 (31.25)	225	6.0	648 (25.5)	218 (8.6)	592 (23.3)	268 (590)
24	340 (13.4)	794 (31.25)	375	8.7	673 (26.5)	330 (13.0)	592 (23.3)	374 (825)
24	340 (13.4)	794 (31.25)	425	9.9	663 (26.1)	325 (12.8)	592 (23.3)	392 (865)
24	340 (13.4)	794 (31.25)	450	10.5	785 (30.9)	330 (13.0)	592 (23.3)	448 (987)
24	340 (13.4)	794 (31.25)	510	11.9	785 (30.9)	330 (13.0)	592 (23.3)	469 (1035)

The battery retainers must be adjusted except on batteries longer than 693.4 mm (27.3 in.). These models require the retainers to be removed. Accessory bolts are used instead to fasten the battery to the chassis.

*Table 6. Battery Specifications (T7Z<sup>AC</sup>)*

Truck Specifications			Battery Specifications					
Volts	Battery Compartment		Am- pere Hours (Max)	Kilo- watt Hours (Max)	Length (Max) mm (in.) "X"	Width (Max) mm (in.) "Y"	Height (Max) mm (in.)	Weight (Max) kg (lbs)
	Width mm (in.)	Length mm (in.)						
24	340 (13.4)	794 (31.25)	225	5.2	650 (25.6)	224 (8.8)	592 (23.3)	243 (536)
24	340 (13.4)	794 (31.25)	255	6.0	648 (25.5)	218 (8.6)	592 (23.3)	268 (590)
24	340 (13.4)	794 (31.25)	375	8.7	673 (26.5)	330 (13.0)	592 (23.3)	374 (825)
24	340 (13.4)	794 (31.25)	425	9.9	663 (26.1)	325 (12.8)	592 (23.3)	392 (865)
24	340 (13.4)	794 (31.25)	450	10.5	785 (30.9)	330 (13.0)	592 (23.3)	448 (987)
24	340 (13.4)	794 (31.25)	510	11.9	785 (30.9)	330 (13.0)	592 (23.3)	469 (1035)
24	340 (13.4)	794 (31.25)	600	14.0	785 (30.9)	330 (13.0)	665 (26.2)	517 (1140)
24	340 (13.4)	794 (31.25)	750	17.6	785 (30.9)	330 (13.0)	787 (31.0)	658 (1450)

The battery retainers must be adjusted except on batteries longer than 693.4 mm (27.3 in.). These models require the retainers to be removed. Accessory bolts are used instead to fasten the battery to the chassis.

**NOTE:** If battery compartment length is less than 327.6 mm (12.9 in.), a supplemental retainer is required.