

HYSTER

OPERATING MANUAL

CHALLENGER

H165-280XL [E007]

H300-360XL [D019]

H330-360XL-EC [D019]

DO NOT REMOVE THIS MANUAL FROM THIS UNIT

HYSTER COMPANY

PART NUMBER 897342

LIFT TRUCK MODEL _____	SERIAL NUMBER _____
ENGINE MODEL _____	SERIAL NUMBER _____
TRANSMISSION TYPE _____	SERIAL NUMBER _____
MAST LIFT HEIGHT _____	GROUP NUMBER _____
CARRIAGE TYPE _____	GROUP NUMBER _____
DRIVE TIRE SIZE _____	STEERING TIRE SIZE _____

SPECIAL EQUIPMENT OR ATTACHMENTS

REGISTERED TRADEMARKS

Hyster, , Challenger, SpaceSaver, Monotrol, RACKLOADER, SitDrive and StanDrive are trademarks of Hyster Company.

FOREWORD

TO OWNERS, USERS, AND OPERATORS:

The safe and efficient operation of a lift truck requires skill and alertness on the part of the operator. To develop the skill required the operator must:

- receive training pursuant to OSHA 1910.178(1) dated 12/98, in the proper operation of THIS lift truck.
- understand the capabilities and limitations of the lift truck.
- become familiar with the construction of the lift truck and see that it is maintained in good condition.
- read and understand the warnings and operating procedures in this manual.

In addition a qualified person, experienced in lift truck operation, must guide a new operator through several driving and load handling operations before the new operator attempts to operate the lift truck alone.

It is the responsibility of the employer to make sure that the operator can see, hear, and has the physical and mental ability to operate the equipment safely.

Various laws and regulations require the employer to train lift truck operators. These laws and regulations include:

Occupational Safety and Health Act (USA)

Canada Material Handling Regulations

NOTE: A comprehensive operator training program is available from HYSTER COMPANY. For further details, contact your dealer for HYSTER lift trucks.

This **OPERATING MANUAL** contains information necessary for the operation and maintenance of a basic fork lift truck. Optional equipment is sometimes installed that can change some operating characteristics described in this manual. Make sure the necessary instructions are available and understood before operating the lift truck.

Some of the components and systems described in this **OPERATING MANUAL** will NOT be installed on your unit. If you have a question about any item described, contact your dealer for HYSTER lift trucks.

Additional information that describes the safe operation and use of lift trucks is available from the following sources:

- employment safety and health standards or regulations (Examples: "Occupational Safety and Health Standards (USA)", "Canada Material Handling Regulations").
- safety codes and standards (Example: American National Standard, ANSI B56.1, *Safety Standard For Low Lift And High Lift Trucks*).
- publications from government safety agencies, government insurers, private insurers and private organizations (Example: *Accident Prevention Manual For Industrial Operations*, from the National Safety Council).

- "Guide for Users of Industrial Lift Trucks" describes lift truck safety, good maintenance practices, and training programs. Available from your dealer for HYSTER lift trucks. HYSTER Part No. 897342

NOTE: HYSTER lift trucks are not intended for use on public roads.

NOTE: The following symbols and words indicate safety information in this manual:

**WARNING**

Indicates a condition that can cause death or injury!

**CAUTION**

Indicates a condition that can cause injury or property damage!

CONTENTS

FOREWORD	1	Checks With The	
TO OWNERS, USERS,		Engine Running	37
AND OPERATORS:	1	OPERATING TECHNIQUES	39
CONTENTS	3	Basic Operating Procedures	39
WARNING	7	Driving And Direction Changes	42
WARNING	8	Inching	43
MODEL DESCRIPTION	10	Steering (Turning)	44
GENERAL	10	Load Handling, General	45
OPERATOR PROTECTION EQUIPMENT		Load Handling, Lifting,	
(See FIGURE 1.)	10	Lowering And Tilting	47
NAMEPLATE	11	Load Handling, How To Engage	
SAFETY LABELS	11	And Disengage A Load	49
INSTRUMENTS AND CONTROLS	15	Load Handling, How To Handle	
OPERATING PROCEDURES	31	Empty Containers	52
GENERAL	31	Load Handling, Traveling	55
Know Your Lift Truck	31	HIGHWAY TRUCKS, RAILROAD	
Stability And Center Of Gravity	33	CARS AND DOCKS	58
Capacity (Weight And Load Center)	34	ATTACHMENTS	59
INSPECTION BEFORE OPERATION	35	STOPPING	59
Checks With The		PARKING	60
Engine Stopped	35	MAINTENANCE	61
Starting Procedures (Diesel)	35	GENERAL	61
Starting Procedures, LPG Engine	36	Serial Number Data	62
Shutdown Procedures, Turbo Engines	37	HOW TO MOVE A DISABLED LIFT TRUCK	62
		How To Tow The Lift Truck	63

HOW TO PUT A LIFT TRUCK ON BLOCKS	64	Forks, Removal	82
How To Raise The Drive Tires (See FIGURE 8.)	64	Forks, Installation	83
How To Raise The Steering Tires (See FIGURE 8.)	65	Inspection Of Forks, Mast And Lift Chains (See FIGURE 17. and FIGURE 18.)	84
MAINTENANCE PROCEDURES	76	Tires And Wheels (See FIGURE 19.)	85
EVERY 8 HOURS OR DAILY	76	Operator Restraint System (See FIGURE 20.)	87
HOW TO MAKE THE CHECKS WITH THE ENGINE STOPPED	76	Safety Labels	88
Hydraulic System Oil (See FIGURE 14.)	76	Check For Fuel, Oil And Coolant Leaks	88
Engine Oil (See FIGURE 13. And FIGURE 11.)	77	HOW TO MAKE THE CHECKS WITH THE ENGINE RUNNING	88
Cooling System (See FIGURE 12.)	78	Gauges, Lights, Horn and Fuses	89
Fuel System	79	Control Levers And Pedals	89
Primary Fuel Filter, Diesel (See FIGURE 13.)	79	Transmission Oil (See FIGURE 22.)	89
Drive Belts	79	Lift System Operation	90
Battery (See FIGURE 14.)	80	Brakes	91
Pre-Cleaner For Engine Air Filter (See FIGURE 15.)	81	Steering System	91
Air Filters (See FIGURE 16.)	81	Steering Column Latch	92
Forks	82	HOW TO ADD FUEL TO THE LIFT TRUCK	92
Forks, Adjustment	82	Diesel Fuel	92
		Liquefied Petroleum Gas (LPG)	92
		TIRES AND WHEELS	96
		Remove The Wheels From The Lift Truck	97

Pneumatic Tires, Remove The Tire From The Wheel (See FIGURE 25.)	99	Install the Wheels (See FIGURE 30.)	106
Pneumatic Tires, Install The Tire On The Wheel (See FIGURE 26.)	99	HOW TO PUT INTERNAL COMBUSTION ENGINE (I.C.E.) TRUCKS IN STORAGE	107
Add Air To The Tires (See FIGURE 27.)	102	HOW TO PUT BATTERIES IN STORAGE	108
Solid Rubber Tires, Remove The Tire From The Wheel (See FIGURE 28.)	103	OPERATING PROCEDURES FOR A NEW OR REBUILT ENGINE	108
Solid Rubber Tires, Install The Tire On The Wheel (See FIGURE 29.)	103	CHANGES TO THE OVERHEAD GUARD	109

A **WARNING** label with this information must be on the lift truck.



**FAILURE to follow these instructions can cause SERIOUS INJURY or DEATH!
AUTHORIZED, TRAINED OPERATOR ONLY!**

KNOW THE EQUIPMENT:

- KNOW operating, inspection and maintenance instructions, and warnings in **MANUAL**.
- DO NOT operate or repair truck unless trained and authorized.
- INSPECT truck before use. Do not operate if truck needs repair. Tag truck and remove key. Repair truck before use.
- USE attachments for intended purpose only.
- MAKE SURE truck is equipped with overhead guard and load backrest adequate for the load.

LOOK WHERE YOU ARE GOING:

- IF YOU CAN'T SEE, DON'T GO!
- TRAVEL in reverse if load blocks forward vision.
- MAKE SURE tailswing area is clear before turning.
- SOUND horn at intersections or where vision is blocked.
- WATCH clearances, especially overhead.

KNOW YOUR LOADS:

- HANDLE only stable loads within specified weight and load center. See plate on this truck.
- DO NOT handle loose loads higher than load backrest.
- SPACE forks as far apart as load allows and center load between forks. Keep load against load backrest.

USE COMMON SENSE:

- NEVER transport people on any part of the truck.
- OBEY traffic rules. Yield right-of-way to pedestrians.
- BE in complete control at all times.
- ALLOW NO ONE under or near lift mechanism or load.
- OPERATE truck only from operator's seat.
- KEEP arms, legs, and head inside operator's compartment.
- DO NOT move truck if anyone is between truck and stationary object.
- DO NOT use truck to lift people unless no other practical option. Then use only securely attached special work platform. Follow instructions in manual.
- BEFORE DISMOUNTING, neutralize travel control, lower carriage, set brake.
- WHEN PARKING, also shut off power, close LPG fuel valve, block wheels on inclines.

KNOW THE AREA:

- NEVER enter a trailer or railroad car unless its wheels are blocked.
- CONFIRM floor strength.
- FILL fuel tank or charge battery only in designated area.
- TURN OFF engine when fueling.
- AVOID sparks or open flame. Provide ventilation.
- DO NOT start truck if fuel is leaking.
- KEEP vent caps clear when charging battery.
- DISCONNECT battery during servicing.
- CHECK dockboard width, capacity and security.

PROTECT YOURSELF, FASTEN YOUR SEATBELT!

- AVOID bumps, holes, loose materials, and slippery areas.
- AVOID sudden movements. Operate all controls smoothly.
- NEVER turn on or angle across an incline. Travel slowly.
- TRAVEL on inclines with load uphill or unloaded with mast downhill.
- TILT mast slowly and smoothly. LIFT or LOWER with mast vertical or tilted slightly back. Use minimum tilt when stacking elevated loads.
- TRAVEL with carriage as low as possible and tilted back.
- SLOW DOWN before turning—especially without load.

FAILURE to follow these instructions can cause the truck to tip over!
DO NOT JUMP off if the truck tips! HOLD steering wheel firmly.
BRACE your feet. LEAN FORWARD and AWAY from point of impact.



Sitdown Rider
Forklift Trucks
4/91

© American Airlines

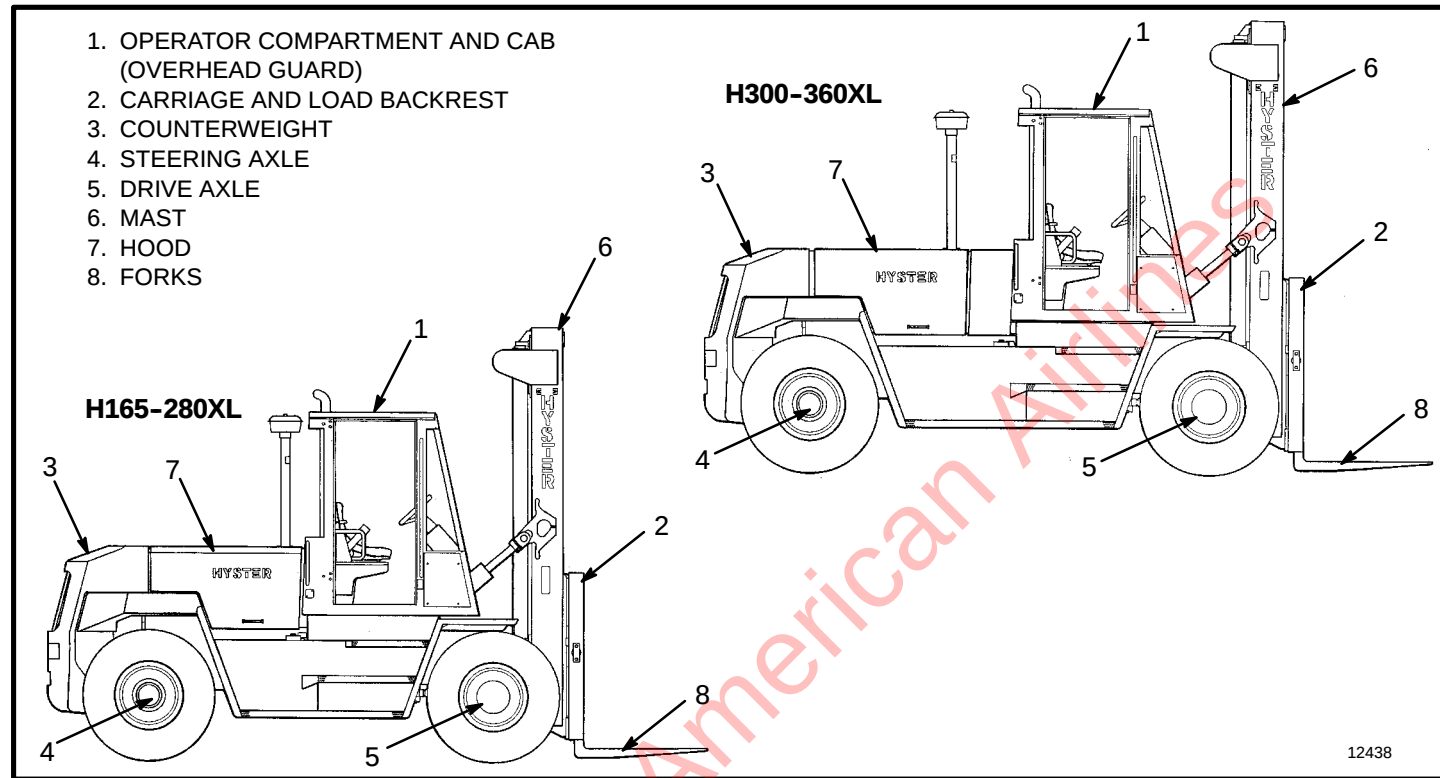


FIGURE 1. MODEL VIEW SHOWING MAJOR COMPONENTS

MODEL DESCRIPTION

GENERAL

This Operating Manual covers the following models of lift trucks:

H165XL, H190XL, H210XL, H230XL, H250XL, H280XL

H300XL, H330XL, H360XL

H330XL-EC, H360XL-EC

The models in these series of lift trucks have a capacity range from 16,500 to 36,000 pounds. These lift trucks are available with either a Perkins 1006.6 diesel engine or a GM V-8 engine that uses LPG fuel.

All units have a powershift transmission with three forward and three reverse speeds. Forward and reverse travel is controlled by either a Monotrol pedal or the transmission control lever. The control lever also controls the transmission speed ranges. The transmission in diesel powered units is controlled by the Autoshift system. In LPG powered units the transmission is manually controlled.

These lift trucks can be equipped with attachments such as fork positioners, a side-shift carriage or a container attachment.

OPERATOR PROTECTION EQUIPMENT (SEE FIGURE 1.)

The OVERHEAD GUARD or CAB is intended to offer reasonable protection to the operator from falling objects, but cannot protect against every possible impact. Therefore, it must not be considered a substitute for good judgement and care when handling loads.

The SEAT BELT and HIP RESTRAINT provide additional means to help the operator keep the head and torso substantially within the confines of the lift truck frame and overhead guard or cab if a tipover occurs. This restraint system is intended to reduce the risk of the head and torso being trapped between the lift truck and the ground, but it can not protect the operator against all possible injury in a tipover. The hip restraint bracket will help the operator resist side movement if the seat belt is not fastened. It is not a substitute for the seat belt. Always fasten the seat belt.

NAMEPLATE

The rated capacity for the lift truck, as it is equipped, must be shown on the nameplate. See FIGURE 2. If the lift truck nameplate already has a rating for special load handling equipment, it will be shown. If the lift truck nameplate does not show the rated capacity, or if the lift truck equipment does not match that shown on the nameplate, the lift truck must not be operated until its capacity is known.

WARNING

When a lift truck is shipped incomplete from the factory, the nameplate is covered by a label as shown in FIGURE 2. If your lift truck has this type of decal, do not operate the lift truck. Contact your HYSTER lift truck dealer to obtain a complete nameplate.

DO NOT add to or modify the lift truck. Any change to the lift truck, the tires or its equipment can change the lifting capacity. The lift truck must be rated as equipped and the nameplate must show the new capacity rating.

SAFETY 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 FIGURE 3.

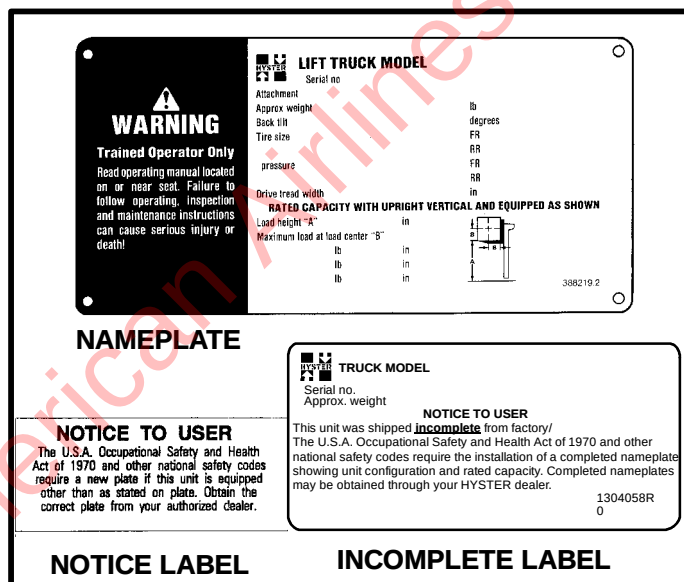


FIGURE 2. NAMEPLATE AND LABELS



FIGURE 3. WARNING AND SAFETY LABELS (1 of 2)

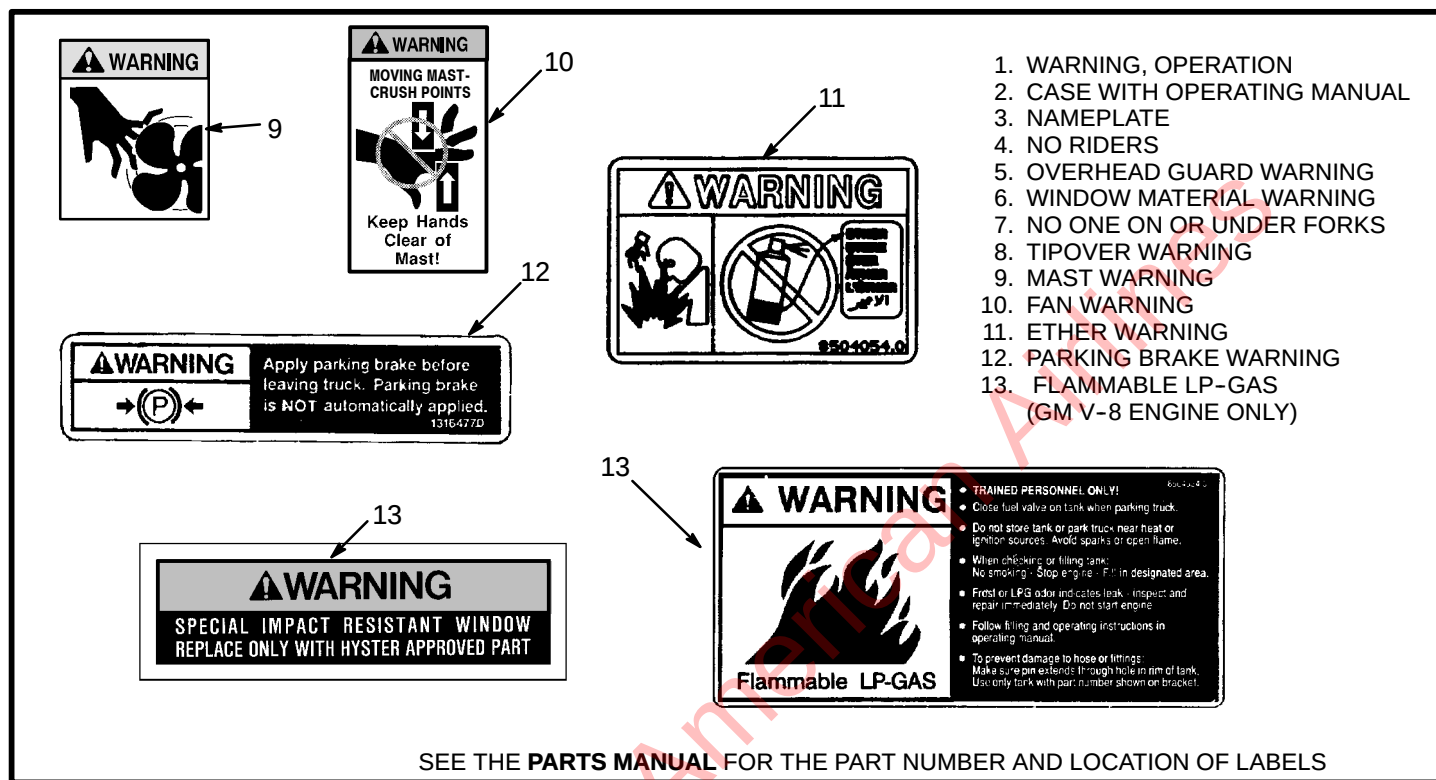


FIGURE 3. WARNING AND SAFETY LABELS (2 of 2)

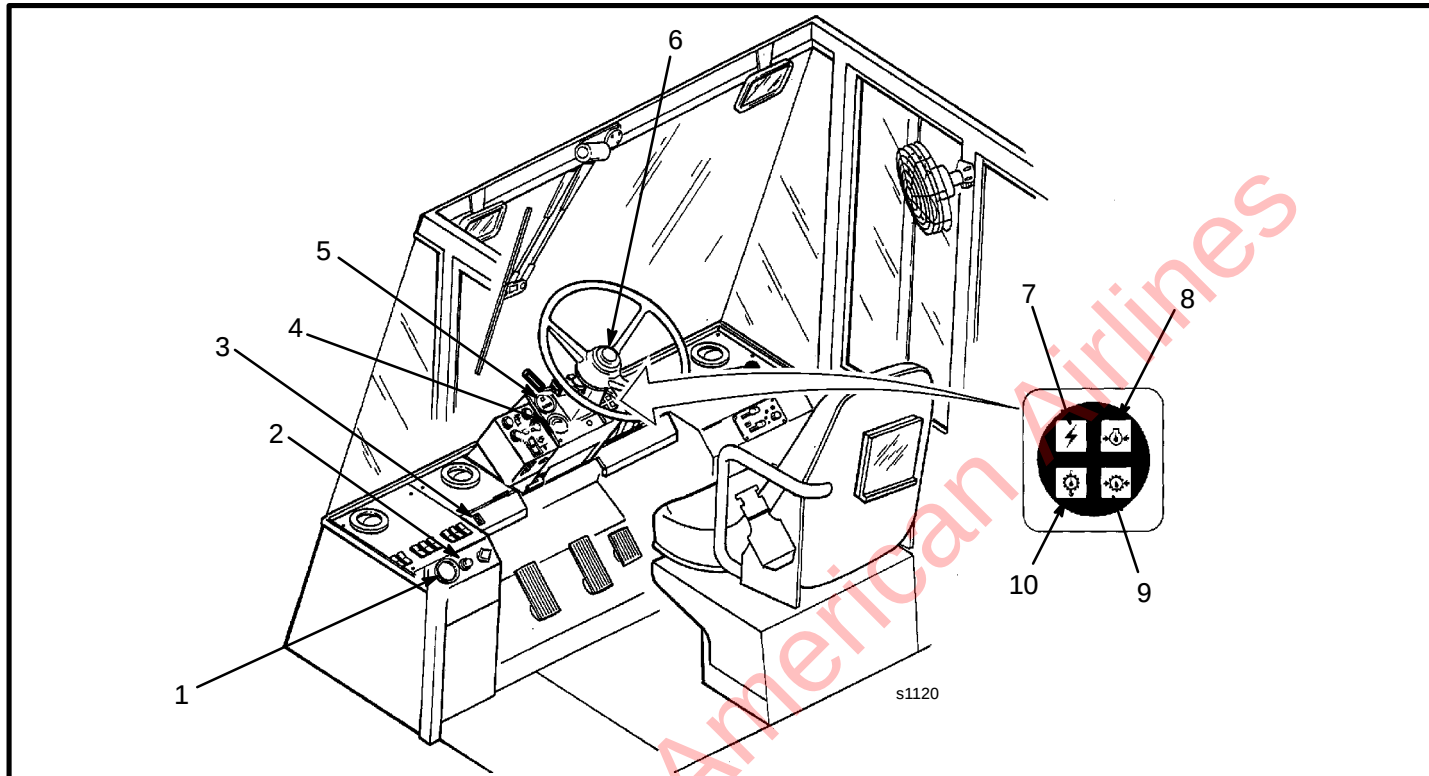


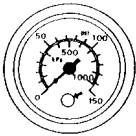
FIGURE 4. INSTRUMENTS

INSTRUMENTS AND CONTROLS

**WARNING**

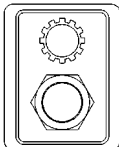
If any of the instruments, levers, or pedals do not operate as described in the following tables, report the problem immediately. DO NOT operate the lift truck until the problem is corrected.

TABLE 1. INSTRUMENTS (See FIGURE 4.)

ITEM NO.	ITEM	FUNCTION
1	Air Pressure Gauge 	This gauge indicates the air pressure in the brake system.
2	Low Air Pressure Indicator 	This red indicator light illuminates when the air pressure in the brake system is less than 415 kPa (60 psi). WARNING Do not operate the lift truck when the light is illuminated or the alarm sounds.

MODEL DESCRIPTION

HYSTER

ITEM NO.	ITEM	FUNCTION
3	Autoshift Transmission Warning Light 	The red light flashes when the transmission oil pressure is low or the oil is too hot. The transmission shifts to Neutral (N) when the light comes on. This happens with the lever in any position. For emergency conditions, move the key to the OFF position and then to the ON position to allow lift truck movement in first gear for 16 to 31 seconds (normally 30 seconds). The transmission warning light also flashes when a transmission overspeed condition is detected. The engine goes into the de-throttle mode until the transmission output speed falls to acceptable pre-set limits.
4	Coolant Temperature Gauge 	This gauge indicates engine coolant temperature when the key switch is in the ON position. During normal operation the gauge needle will be in the green area. CAUTION Do not continue to operate the lift truck when the gauge indicates that the engine is too hot (needle in the red zone).
5	Hour Meter 	The hour meter operates when the key switch is in the ON position. Periodic Maintenance recommendations are based on these hours.

ITEM NO.	ITEM	FUNCTION
6	Fuel Gauge (Diesel Only) 	This gauge indicates the amount of fuel in the fuel tank.
7	Warning Light, Alternator 	The light will be ON when the key switch is ON and the engine is not running. The light must go OFF when the engine is running. ⚠ CAUTION Do not continue to operate the lift truck if the red light is ON at engine speeds above idle.
8	Warning Light, Engine Oil Pressure 	The red light is ON when the key switch is in the ON position and must go OFF when the engine is running. ⚠ CAUTION Stop the engine immediately if the red light is ON while the engine is running.
9	Warning light, Transmission Oil Pressure 	The red light is ON when the key switch is in the START position and must go OFF when the engine is running. ⚠ CAUTION Do not continue to operate the lift truck if the red light is ON.

MODEL DESCRIPTION

HYSTER

ITEM NO.	ITEM	FUNCTION
10	Warning light, Transmission Oil Temperature 	The red light is ON when the key switch is in the START position and must go OFF when the engine is running. ⚠ CAUTION Do not continue to operate the lift truck if the red light is ON .

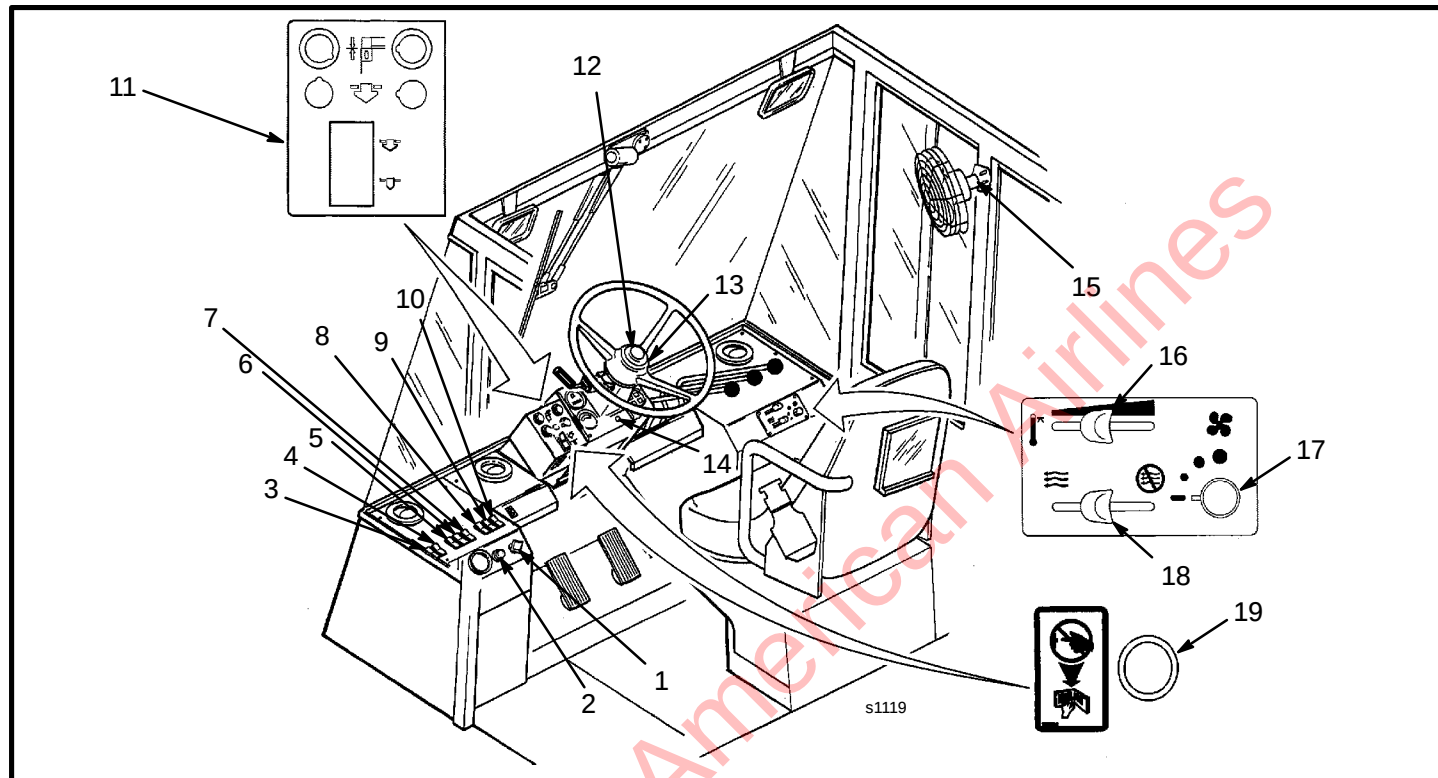
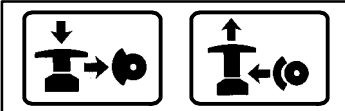
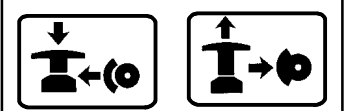


FIGURE 5. SWITCHES

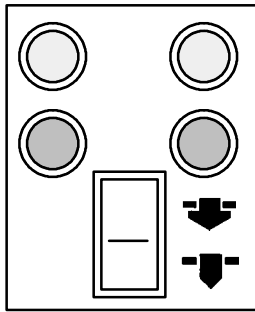
TABLE 2. SWITCHES (See FIGURE 5.)

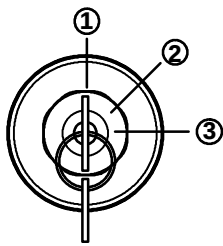
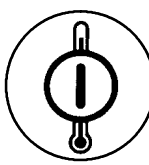
ITEM NO.	ITEM	FUNCTION
1	Parking Brake Knob (Some lift trucks have this type of knob.)  SQUARE, YELLOW KNOB	This knob controls the operation of the parking brake. The square, yellow knob works as follows: With the knob pushed in, the parking brake is applied and the transmission with Monotrol control is in NEUTRAL. When the knob is pulled out, the parking brake is released and the transmission with Monotrol control is engaged. NOTE: The parking brake must be applied before starting the engine. ⚠ WARNING Apply parking brake before leaving truck. Parking brake is NOT automatically applied.
1	Parking Brake Knob (Some lift trucks have this type of knob.)  ROUND, BLACK KNOB	This knob controls the operation of the parking brake. The round, black knob operates as follows: With the knob pushed in, the parking brake is released and the transmission with Monotrol control is engaged. When the knob is pulled out, the parking brake is applied and the transmission with Monotrol control is in NEUTRAL. NOTE: The parking brake must be applied before starting the engine. ⚠ WARNING Apply parking brake before leaving truck. Parking brake is NOT automatically applied.

ITEM NO.	ITEM	FUNCTION
2	Parking Brake Indicator Light 	This light is illuminated when the parking brake is applied or when there is not enough air pressure to release the parking brake.
3	Switch 	This switch controls the lights on the empty container attachment. Push on the front of the switch to turn the lights ON .
4	Switch 	This switch controls the floodlights. Push on the front of the switch to turn the lights ON .
5 6 7	Windshield Wiper and Washer Switches Rear Wiper/ Washer Top Wiper/ Washer Front Wiper/ Washer 	There is a switch for each windshield wiper/windshield washer. Push the front of the switch to the first position to turn ON the windshield wiper. Push the front of the switch past the ON position to activate the windshield washer.
8	Switch	This switch is for optional accessories.
9	Light Switch 	This switch controls the front drive lights, marker lights and tail lights. Push on the front of the switch to turn the lights ON .

MODEL DESCRIPTION

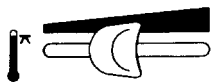
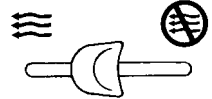
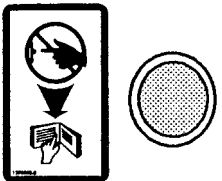
HYSTER

ITEM NO.	ITEM	FUNCTION
10	Light Switch 	This switch controls the front work lights or front drive lights, rear drive lights and tail lights. Push on the front of the switch to turn the lights ON .
11	Container Attachment Controls 	The controls for the container attachment operate as follows: Amber Lights (Top): The amber lights illuminate when the right and left ends of the attachment are set down on the container and the attachment is in position to be locked or unlocked. Both lights must be illuminated before the controls will operate. Green Lights (Bottom): The green lights illuminate when the lock pins are extended. Each lock pin operates a light. Lock Pin Switch: Push on the front of the rocker switch to engage the lock pins with the container. Push on the rear of the switch to disengage the lock pins from the container. NOTE: An audible alarm is activated whenever the attachment is seated and the rear of the lock pin switch is pushed to disengage the lock pins.
12	Horn 	The horn button controls the operation of the horn.

ITEM NO.	ITEM	FUNCTION
13	Key Switch 	The key switch has three positions: No. 1 Position: OFF position. Deenergizes all electric circuits except for the horn and headlights. No. 2 Position: ON position. Energizes all electric circuits except the starter circuit. The key switch will be in this position during normal operation. No. 3 Position: START position. Energizes the starter motor for starting the engine. A spring returns the key to position No. 2 (ON position) when the key is released. NOTE: There is a mechanical lockout that prevents the key switch from being returned to the START position without first being returned to the OFF position.
14	Cold Start Aid 	The cold start aid is used to help start the engine in cold weather. With the key in the ON position, push and hold the button to energize the cold start aid. See the STARTING PROCEDURES in this manual.
15	Fan Switch	This switch controls the operation of the fan. The location of the switch is on the fan.

MODEL DESCRIPTION

HYSTER

ITEM NO.	ITEM	FUNCTION
16	Heat Control Knob 	This knob controls the heater valve. When the knob is pushed to the left, the heater valve is closed (no heat). When the knob is pushed to the right, the heater valve is open and hot water enters the heater (heat to the cab).
17	Heater Fan Switch 	This switch controls the fan for the heater and defroster system. Turn the switch to the right to increase the speed of the fan.
18	Air Control Knob 	This knob controls the air vent for the heater. When the knob is pushed to the left, the heater vent is open. When the air vent is open the heater gets air from outside the cab. When the knob is pushed to the right the vent is closed and the heater gets air from inside the cab.
19	Override Button 	The Override Button operates as follows: The override button permits the operator to retract the lock pins when the attachment is not seated on a container. Push on the override button and the rear of the lock pin switch at the same time to retract the lock pins. NOTE: Each time the engine is shut off, the lock pins automatically extend. When the engine is started, the lock pins must be retracted by using the override button and the lock pin switch.

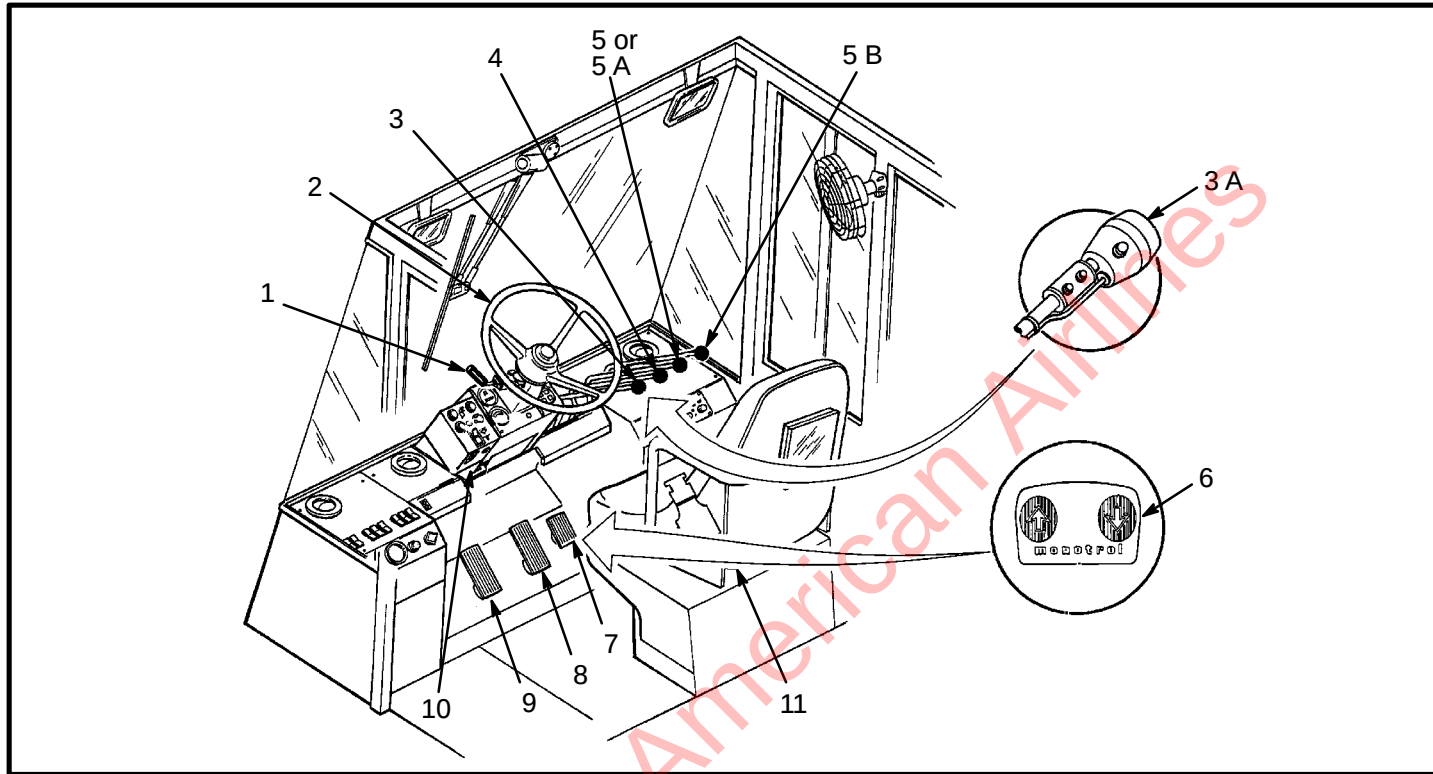
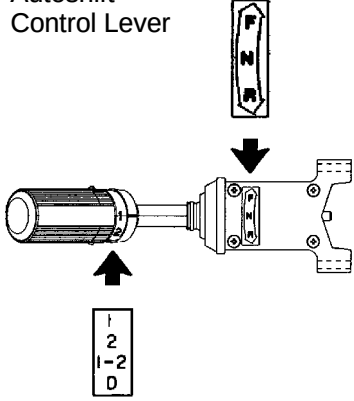
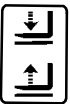
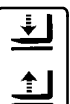
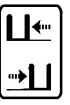


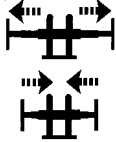
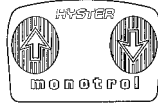
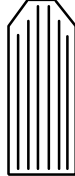
FIGURE 6. CONTROLS

TABLE 3. CONTROLS (See FIGURE 6.)

ITEM NO.	ITEM	FUNCTION
1	Autoshift Control Lever 	If the lift truck does not have a Monotrol pedal, travel direction is controlled by the Autoshift lever. Move the Autoshift lever to the Forward (F) position to travel in the forward direction. Move the Autoshift lever to the Reverse (R) position to travel in the reverse direction. The center position is Neutral (N). The Autoshift lever must be in the Neutral (N) position before the engine can be started. The lever does not move if there is a Monotrol pedal. The Autoshift lever has four range positions: 1 - First gear. The transmission stays in this gear until the operator selects another speed range. 2 - Second gear. The transmission stays in this gear until the operator selects another speed range. 1-2 - This third position allows the transmission to automatically shift between first and second gears. D - This position allows the transmission to automatically shift between all three gears. NOTE: The transmission automatically shifts to Neutral (N) if the transmission oil pressure is low or if the oil is too hot. This happens with the lever in any position. For emergency conditions, move the key to the OFF position and then to the ON position to allow lift truck movement in first gear for 16 to 31 seconds (normally 30 seconds).

ITEM NO.	ITEM	FUNCTION
2	Steering Wheel	The steering wheel controls the position of the steer tires.
3	Lift/Lower Control Lever 	The lift/lower lever is the first control lever to the right of the steering wheel. Pull back on the lever to raise the carriage and forks. Push the lever forward to lower the carriage and forks.
3A	Lift/Lower Control Lever with Two-Speed Lift Switch (Used with Empty Container Attachment) 	The button on the knob for the lift/lower lever lets the operator lift at a higher than normal speed when the pressure in the hydraulic system is less than 13.8 MPa (2000 psi). (A solenoid valve on the hydraulic pump senses hydraulic pressure.) Pull back on the lever and push the button to lift at the higher speed.
4	Tilt Control Lever 	The tilt control lever is on the right of the lift/lower control lever. Push the control lever forward to tilt the mast and forks forward. Pull backward on the control lever to tilt the mast and forks backward.
5	Auxiliary Control Lever	If the lift truck is equipped with an attachment, such as a side-shift carriage, an additional lever for the control of this attachment will be installed to the right of the tilt control lever. (See TABLE 4.)
5A	Side-Shift Control Lever (Used with Empty Container Attachment) 	Push the lever forward to move the attachment to the left. Pull back on the lever to move the attachment to the right.

MODEL DESCRIPTION**HYSTER**

ITEM NO.	ITEM	FUNCTION
5B	Extend/Retract Control Lever (Used with Empty Container Attachment) 	Push the lever forward to extend the attachment to the 40 foot position. Pull back on the lever to retract the attachment to the 20 foot position.
6	MONOTROL Pedal 	The MONOTROL pedal controls the speed and direction of the lift truck. Pushing on the right side of the pedal causes the lift truck to move in REVERSE . Pushing on the left side of the pedal causes the lift truck to move in FORWARD . The speed of the engine increases as the pedal is depressed.
7	Accelerator Pedal 	This pedal controls the speed of the engine and is operated by the operator's right foot. It is used on units that have a direction control lever.
8	Brake Pedal 	The brake pedal is located to the left of the accelerator pedal. This pedal controls the application of the service brakes.

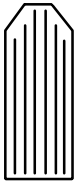
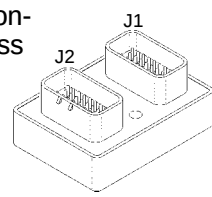
ITEM NO.	ITEM	FUNCTION
9	Inching/Brake Pedal 	By varying the position of the inching/brake pedal, the operator can move the lift truck slowly while a high engine speed is used for lifting loads. Completely depressing the pedal disengages the transmission and applies the service brakes. On units with a MONOTROL pedal, the engine can be started when the inching/brake pedal is fully depressed or when the parking brake is applied.
10	Steering Column Adjustment	The steering column tilts forward and backward for adjustment. Pull up on the lever and move the steering column to the desired position, then release the lever.
11	Autoshift Controller Bypass Unit 	The autoshift controller bypass unit is located under the operator's seat. It consists of a black connector (J1) and a white connector (J2). In the event of a autoshift controller failure, the bypass unit provides the truck with full shift capabilities through the column mounted gear selector. To use the controller bypass unit, disconnect the wiring harness connectors from the autoshift controller and plug it into the corresponding connectors on the controller bypass unit. The connectors are color coded for easy identification.

TABLE 4. AUXILIARY CONTROL LEVERS

FUNCTION The control levers will be arranged in the following order from left to right.	DIRECTION OF MOVEMENT	
	LOAD OR EQUIPMENT	CONTROL LEVER
1 REACH	Retract/Extend	Backward/Forward
2 SIDE-SHIFT	Right/Left	Backward/Forward
3 PUSH-PULL	Backward/Forward	Backward/Forward
4 ROTATE	Clockwise/Counterclockwise	Backward/Forward
5 UPENDER	Up/Down	Backward/Forward
6 SCOOP	Up/Down	Backward/Forward
7 LOAD STABILIZER	Down (Clamp)/Up (Release)	Backward/Forward
8 SWING (FORKS)	Right/Left	Backward/Forward
9 SWING (CLAMP)	Right/Left	Backward/Forward
10 L.H. FORK POSITIONER	Together/Apart	Backward/Forward
11 R.H. FORK POSITIONER	Together/Apart	Backward/Forward
12 FORK SPREAD	Together/Apart	Backward/Forward
13 CLAMP	Clamp/Release	Backward/Forward
14 EXTEND/RETRACT	Extend/Retract	Backward/Forward

1	2	3	4	5	6	7	8	9	10	11	12	13	14

OPERATING PROCEDURES

GENERAL

Know Your Lift Truck

WARNING

EXHAUST GASES

Exhaust from internal combustion engines contains carbon monoxide and other harmful chemicals. Carbon monoxide is a colorless, odorless poison and can cause unconsciousness or death without warning. Long term exposure to exhaust or chemicals in the exhaust can cause cancer, birth defects and other reproductive harm. Avoid exposure to engine exhaust.

If engines are operated in confined spaces maintain adequate ventilation or vent exhaust to the outside. Do not exceed applicable air contaminant limits.

Follow the inspection and maintenance schedule and procedures in this manual. Do not alter exhaust, ignition or fuel systems.

WARNING

FIRE HAZARD

The hot engine surfaces and exhaust of internal combustion engine powered lift trucks can present fire hazards when operating in areas containing flammable gases, vapors, liquids, dusts or fibers. Engine and exhaust component surface temperatures can exceed the ignition temperatures of common solvents, fuels, oil, paper, and other organic materials (wood, wheat, cotton, etc.). Exhaust emitted sparks can ignite these materials as well. Engine and exhaust surface temperatures increase after engine shut-off, presenting increased fire hazard. Check the engine compartment immediately following truck operation in areas containing combustible dusts, fibers or paper, and remove any foreign material.

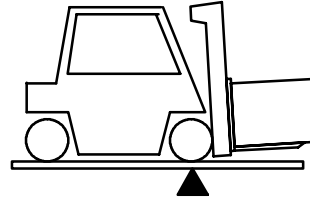
Operate the lift truck only in areas that have been approved for lift truck operation.

- OSHA regulations prohibit the use of lift trucks in areas containing hazardous concentrations of certain flammable gases or vapors.
- OSHA regulations require operating areas to be classified as hazardous or nonhazardous, and that the lift trucks used in designated locations be of the minimum type specified (see *Guide For Users Of Industrial Trucks*, Appendix C and Table N-1).

Only the designated types of approved lift trucks can be used in areas classified as hazardous by the authority having jurisdiction. Areas classified as hazardous must be identified by signs to show the type of approved lift truck required for operation in the area. Modifications or poor maintenance can result in the lift truck being unsuitable for operation in areas classified as hazardous.

The fork lift truck is designed to pick up and move materials. The basic lift truck has a lift mechanism and forks on the front to engage the load. The lift mechanism lifts the load so that it can be moved and stacked.

In order to understand how the fork lift truck can pick up a load, you must first know some basic things about the lift truck.

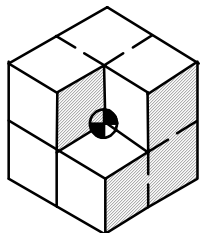


The lift truck is based on the principle of two weights balanced on opposite sides of a pivot (fulcrum). This is the same principle used for a see-saw. In order for this principle to work for a lift truck, the load on the forks must be balanced by the weight of the lift truck. The location of the center of gravity of both the truck and the load is also a factor.

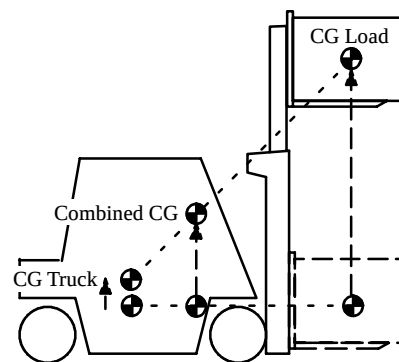
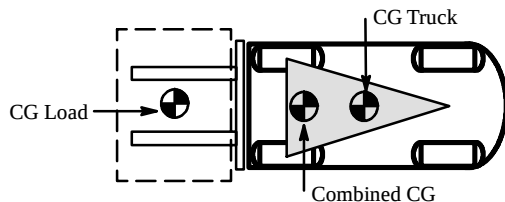
This basic principle is used for picking up a load. The ability of the lift truck to handle a load is discussed in terms of center of gravity and both forward and side stability.

Stability And Center Of Gravity

The center of gravity (CG) of any object is the single point about which the object is balanced in all directions. Every object has a CG. When the lift truck picks up a load, the truck and load have a new combined CG.



The stability of the lift truck is determined by the location of its CG, or if the truck is loaded, the combined CG.

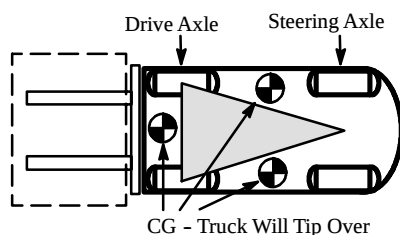


The lift truck has moving parts and therefore has a CG that moves. The CG moves forward and back as the mast is tilted forward and back. The CG moves up and down as the mast moves up and down.

The center of gravity, and therefore the stability, of the loaded lift truck is affected by a number of factors, such as size, weight, shape, and position of the load; the height to which the load is raised; the amount of forward and backward tilt; tire pressure; and the dynamic forces created when the truck is moving. These dynamic forces are caused by things like acceleration, braking, turning, and operating on uneven surfaces or on an incline. These factors must be considered when traveling with an unloaded truck, as well, because **an unloaded truck will tip over**

to the side easier than a loaded truck with its load in the lowered position.

In order for the lift truck to be stable (not tip over forward or to the side) the CG must stay within the area of the lift truck represented by a triangle drawn between the drive wheels and the pivot of the steering axle.

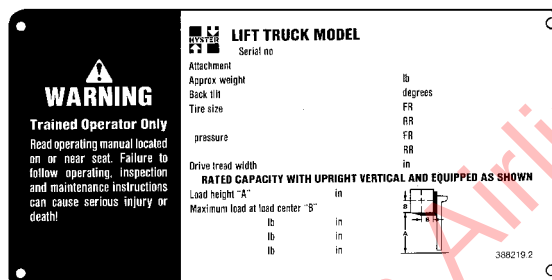


If the CG moves forward of the drive axle the lift truck will tip forward. If the CG moves outside of the line represented by the lines drawn between the drive wheels and the steering axle pivot, the lift truck will tip to that side.

Capacity (Weight And Load Center)

The capacity of the fork lift truck is shown on the Nameplate. The capacity is listed in terms of weight and load center. The weight is specified in kilograms or pounds.

The load center is specified in millimeters or inches. The capacity is the maximum load that the lift truck can handle. This load must weigh less than the maximum weight for a load center shown on the nameplate.



The load center of a load is determined by the location of its center of gravity. The load center is measured from the front face of the forks, or the load face of an attachment, to the center of gravity of the load. It is also assumed that the location of the center of gravity in the vertical direction is no greater than the specified horizontal dimension.

The operator must know whether or not a load is within the capacity of the lift truck before the load is handled.

INSPECTION BEFORE OPERATION



Checks With The Engine Stopped

Inspect the lift truck before use and every eight hours or daily as described in the MAINTENANCE section of this **OPERATING MANUAL**. Inspect more frequently if used in severe operating conditions.

Before using the lift truck, make the following checks:

- Fuel level and drain water from the primary fuel filter.
- Electrolyte level of the battery (unless maintenance free).
- Oil level in the engine and hydraulic tank.
- Coolant level in the cooling system and condition of the drive belts.
- Condition of the radiator. Clean if necessary.
- Pre-cleaner for the air filter.

- Condition of forks, carriage, chains, mast, attachments and operator compartment.
- Leaks from the engine, transmission, hydraulic system and fuel system.
- Condition of wheels and tires. Check air pressure in pneumatic tires.
- Seat belt latches properly.
- Mirrors are clean and adjusted.
- Windows are clean.



WARNING

Report damage or faulty operation immediately. Do not operate a damaged or defective lift truck. A lift truck will only do its job when it is in proper working order. If repairs are required, install a tag in the operator's area stating "DO NOT OPERATE" and remove the key from the key switch.

Starting Procedures (Diesel)

Do not start or operate the lift truck, including any of its functions or attachments, from any place other than the designated operator's position.

1. Make sure the parking brake is applied.

2. On units without a monotrol pedal, put the autoshift control lever in the **N** (Neutral) position.

NOTE: The engine can also be started while completely depressing the inching/brake pedal.

3. Turn the key to **START** to engage the starter. If the outside temperature is 7°C (45°F) or below, crank the engine two revolutions to prime the fuel system. Turn the key to the **OFF** position. Push the **HEAT** button and hold it for 20–25 seconds, then engage the starter again for 10 seconds.

CAUTION

Do not engage the starter for more than 30 seconds at a time. If the engine does not start, turn the key switch to OFF. Wait 60 seconds before engaging the starter again.

Use only approved starting aids. Use of non-approved starting aids can result in engine damage and void engine warranty.

4. If the engine does not start after four attempts, get help from authorized service personnel.

5. When the engine is running, check the gauges and indicator lights for the correct operation. See the Instruments And Controls section for a description of the correct operation.

Starting Procedures, LPG Engine

1. If the lift truck uses LPG fuel, open the fuel valve on the LPG tank.

WARNING

LPG is very flammable. An odor of LPG fuel can indicate a leak in the fuel system. DO NOT start the engine until the fuel leak is repaired.

2. Make sure the parking brake is applied or push on the inching/brake pedal.

3. If equipped, put the direction control lever for the transmission in the **NEUTRAL (N)** position.

4. Turn the key to the **START** position to engage the starter.

CAUTION

Do not engage the starter for more than 30 seconds at a time. If the engine does not start, turn the key switch to OFF. Wait 60 seconds before engaging the starter again.

5. If the engine does not start after four attempts, get help from authorized service personnel.

6. When the engine is running, check the gauges and indicator lights for the correct operation. See the INSTRUMENTS AND CONTROLS section in this **OPERATING MANUAL** for a description of the correct operation.

Shutdown Procedures, Turbo Engines

1. Put the control lever for the transmission in the Neutral (N) position.
2. With the engine at idle speed, wait 3 to 5 minutes before turning key switch to **OFF**.
3. Apply parking brake.



Checks With The Engine Running



WARNING

FASTEN SEAT BELT

If Lift Truck Tips Over

- Do Not Jump - Stay On Truck
- Hold Firmly To Steering Wheel - Brace Feet -

Lean Forward And Away From Impact

The seat belt is installed to help the operator stay on the truck if the lift truck tips over. IT CAN HELP ONLY IF IT IS FASTENED.

The operator must be aware that the lift truck can tip over. There is a great risk that the operator or someone else can be killed or injured if trapped or hit by the lift truck as it tips over. The risk of injury can be reduced if the operator stays on the lift truck. If the lift truck tips over do not jump off.

The SEAT BELT and HIP RESTRAINT provide a means to help the operator keep the head and torso substantially within the confines of the truck frame and overhead guard if a tipover occurs. This protection system is intended to reduce the risk of the head and torso being trapped between the lift truck and the ground, but it can not protect the operator against all possible injury in a tipover.

WARNING

Exhaust from internal combustion engines contains carbon monoxide and other harmful chemicals. Carbon monoxide is a colorless, odorless poison and can cause unconsciousness or death without warning. Long term exposure to exhaust or chemicals in the exhaust can cause cancer, birth defects and other reproductive harm. Avoid exposure to engine exhaust. Do not use diesel engines indoors where soot can accumulate.

If engines are operated in confined spaces maintain adequate ventilation or vent exhaust to the outside.

Do not exceed applicable air contaminant limits.

Follow the inspection and maintenance schedule and procedures in this manual. Do not alter exhaust, ignition or fuel systems.

Make sure that the area around the lift truck is clear before starting the engine or making any operational checks. Be careful when making the checks. If the lift truck is stationary during a check, apply the parking brake and put the transmission in **NEUTRAL**. Proceed carefully.

Check the operation of the following functions as described in the Periodic Checks and Maintenance section.

- Check the operation of the horn, gauges and indicator lights.
- Check the oil level in the transmission when the engine is running at idle speed.
- Operate the **LIFT**, **TILT** and auxiliary functions to check for the correct operations.
- Check the operation of the transmission, the control lever or Monotrol pedal.
- Check the operation of the service brakes and parking brake.
- Check the operation of the steering system.

OPERATING TECHNIQUES



WARNING
Before operating the lift truck
FASTEN YOUR SEAT BELT.



There are a number of operations, if not performed carefully, that can cause the lift truck to tip. If you have not read the **WARNING** page in the front of this **OPERATING MANUAL**, do so **NOW**. As you study the following information about how to properly operate a lift truck, remember the **WARNINGS**.

Basic Operating Procedures

Many people make the mistake of thinking that operating a lift truck is the same as driving an automobile. This is not true. It is true that some lift truck operating procedures are as simple and obvious as driving the family automobile. (e.g. Look where you are going, start and stop smoothly, etc.) But a lift truck is a special machine designed to do a much different job than an automobile. Because of the close areas in which a lift truck operates and its other operating characteristics (like rear wheel steering and tail swing), every operator must receive additional

training, even if they have a license to drive an automobile.



The following discussion lists basic procedures applicable to lift truck operation.

1. AUTHORIZED AND TRAINED OPERATOR ONLY.

This means the operator must be trained to drive the lift truck and it means that the operator must thoroughly understand the procedures for lift truck operation. It also means that a qualified person experienced in lift truck operation must guide the operator through several driving and load handling operations before the operator attempts to operate the lift truck alone. A basic education in proper

driving and load handling techniques is absolutely necessary to prepare the new operator for proper defensive driving and to expect the unexpected.



2. Operate the lift truck only in areas that have been approved for lift truck operation.

Certain areas contain hazardous flammable gases, liquid, dust, fibers or other materials. Lift trucks that are operated in these areas must have special approval.

These areas must be designated to show the type of lift truck approval required for operation in the area. Changes to special equipment or poor maintenance can make the lift truck lose its special approval.



3. NO RIDERS. A lift truck is built for only one person -- the operator. It is dangerous for anyone to ride on the forks or anywhere else on the lift truck.

WARNING

This lift truck is designed and intended for handling materials. A lift truck is not designed to lift people

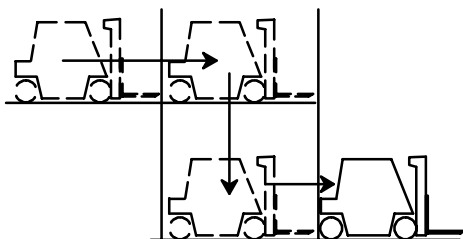
and may not meet the requirements of ANSI A92.6 for lifting people. Do not use a lift truck to lift people unless it has been determined that there is no other practical option (scaffolds, raised work platforms, aerial baskets, etc.) to perform the needed work.



If a lift truck is used to elevate a worker, a safety platform must be attached to the forks and carriage. The platform must be specially built to meet or exceed the requirements of ANSI B56.1. It must have a solid floor with a surface to prevent the feet of the worker from slipping, hand rail, toe board and a screen or shield at least 2 metres (7 feet) high between the people on the platform and the lift mechanism.

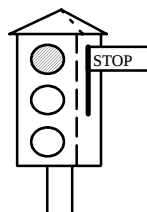
Before anyone is allowed in the platform, lift and lower the mast slowly with the platform in place to make sure the mast functions properly. Apply the parking brake. Do not travel with people in the platform. The operator must remain at the controls. Watch for overhead obstructions.

4. Do not drive a lift truck into an elevator unless authorized to do so. Approach the elevator slowly. After the elevator is properly leveled, the



lift truck must be centered so that the elevator is balanced. When the lift truck is in the proper position in the elevator, set the brakes, put the controls in **NEUTRAL**, and shut off the power. It is advisable that all other personnel leave the elevator before the lift truck enters or leaves.

5. Drive carefully, observe traffic rules and be in full control of the lift truck at all times. Be completely familiar with all the driving and load handling techniques contained in this Operating Manual.



Driving And Direction Changes

The transmission can have either an Autoshift Control Lever with direction change function or an Autoshift Control Lever without the direction change function. The Monotrol pedal is installed if the Autoshift Control Lever does not have the direction change function. The Autoshift Control Lever controls the three speeds of the transmission. If the lift truck has a Monotrol pedal, push on the left side of the pedal to go Forward or the right side of the pedal to go in Reverse. If not, move the Autoshift Control Lever toward the front of the lift truck to go Forward. Move the Autoshift Control Lever toward the rear of the lift truck to go in Reverse. To move the lift truck, push on the brake pedal and release the parking brake. Now, push down on the Monotrol pedal or the accelerator pedal while releasing the brake pedal.

A loaded or unloaded lift truck can usually start to move with the range lever in the **2** position. Start in the **1** position when the lift truck is on a grade. After the lift truck is moving, push forward on the range lever to increase speed or pull back to select a lower range as necessary.

The lift truck has the capability of making directional shifts at travel speeds up to a walking pace, but the mast must not be raised and the load must be stable. If the lift truck

is moving rapidly, slow to a walking speed before changing the direction of travel.

⚠ WARNING

Do not start to move the lift truck until the air pressure gauge indicates approximately 90 psi.

Do not operate the lift truck if the low air pressure indicator or warning alarm is on.

⚠ CAUTION

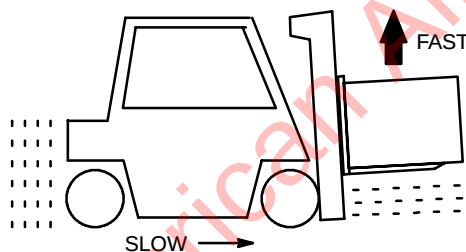
The drive train can be damaged if the lift truck is traveling too fast when the controls are changed to the opposite direction.

Inching

Inching is the movement of a lift truck that allows a slow travel speed while keeping the engine speed high for fast operation of the lift mechanism.

The lift truck has a brake pedal and an inching pedal. The brake pedal (right-hand pedal) applies only the brakes.

The inching/brake pedal (left-hand pedal) allows the direction clutch in the transmission to slip and also applies the service brakes. When the inching/brake pedal is partially applied, the clutch in the transmission is partially disengaged and the movement of the lift truck is slow. When the inching/brake pedal is fully applied, the transmission is completely disengaged and the service brakes are applied.



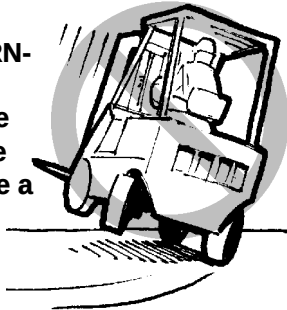
⚠ WARNING

Inching requires coordinated movement of the inching/brake pedal and the accelerator. New operators must practice this procedure before attempting to handle loads.

Steering (Turning)

⚠ WARNING

TRAVEL SLOWLY WHEN TURNING. Lift trucks can tip over even at very slow speeds. The combination of speed and the sharpness of a turn can cause a tipover.



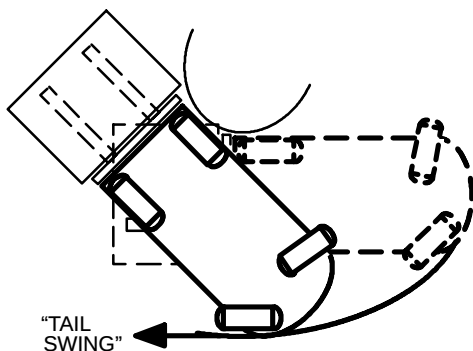
A lift truck is less stable when the forks are raised, with or without a load. Most operators can understand the need to be careful when handling loads. But some operators do not realize that a tipover can occur with an empty lift truck because similar dy-

namic forces are present. In fact, the lift truck will actually tip to the side easier when empty, than when loaded with the load lowered. Rearward tilt, off-center loads and uneven ground will aggravate these conditions.

IF THE LIFT TRUCK TIPS OVER, DO NOT JUMP OFF! HOLD FIRMLY TO STEERING WHEEL, BRACE YOUR FEET, AND LEAN FORWARD AND AWAY FROM THE POINT OF IMPACT.

Because lift trucks are designed to work in a relatively small space, they can turn sharper than some other vehicles.

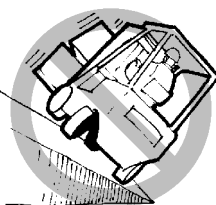
Most lift trucks are steered by the rear wheels and the rear of the lift truck can move to the side very fast during a turn. This movement is called "tail swing". An operator must be aware of tail swing and always check to make sure the tail swing area is clear before turning.



⚠ WARNING

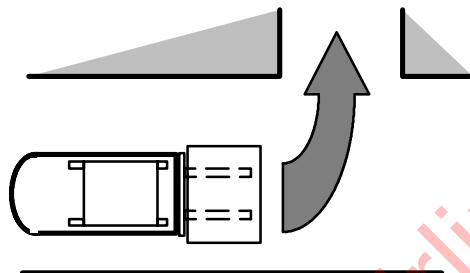
Failure to observe the tail swing area when making a turn can injure or kill someone.

Do not turn on an incline. To reduce the possibility of a tipover, a lift truck must not be driven across an incline.



When possible, keep both hands on the steering wheel. During most loading or unloading operations, the operator

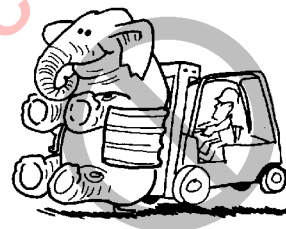
steers with the left hand. The right hand is used to operate the lift, tilt, and attachment controls.



When turning the lift truck from a wide aisle into a narrow aisle, start the turn as close to the opposite stock pile as tail swing will permit. This action allows the lift truck to enter the narrow aisle going straight ahead.

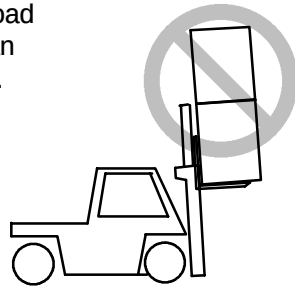
Load Handling, General

1. Handle only loads within the rated capacity as shown on the nameplate. This rating represents the maximum load that can be lifted.



However, such factors as weak floors, uneven terrain, or loads having a high center of gravity can mean that the safe working load is less than the rated capacity. When such conditions exist, the operator must reduce the load so that the lift truck will remain stable.

2. Handle only stable loads. A load can have unstable items that can easily shift and fall on someone.

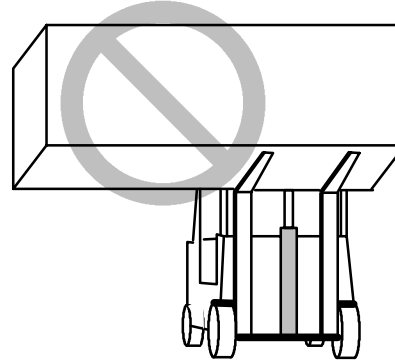


⚠ WARNING

Do not handle a load if any loose part of it is above the top of the carriage or any part of the load is likely to fall. Loads such as bundles of lumber or empty containers can fall backwards onto the truck if they extend past the top of the carriage and mast.

3. Position each fork the same distance from the center of the carriage. This action will help center the load on the carriage. Set the forks as far apart as possible for maxi-

mum support of the load. Center the weight of the load between the forks.



If the weight of the load is not centered between the forks, the load can fall off the forks when you turn a corner or hit a bump. An off center load will increase the possibility of the truck tipping over to the side.

Make sure the pins that keep the forks in position are engaged so that the forks cannot move.

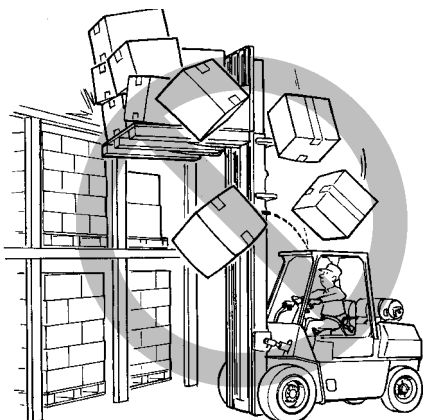
4. Check the condition of the driving surface. Make sure the floor will support the weight of the lift truck and the load.

Load Handling, Lifting, Lowering And Tilting

The **LIFT** and **TILT** functions are controlled by separate levers. Refer to the **Instruments and Controls** section for proper operation.

The speed of the hydraulic functions is controlled by the position of the control levers and the speed of the engine. The farther the hand lever is moved from the **NEUTRAL** position, the faster the speed of the hydraulic function.

Do not lift or hit anything that can fall on the operator or a bystander.



Remember, a lift truck equipped with a HYSTER overhead guard provides reasonable protection to the operator from falling objects, but cannot protect against every possible impact.

A lift truck without an overhead guard provides no such protection and other personnel have no overhead protection. Avoid hitting objects such as stacked material that could become dislodged and fall.

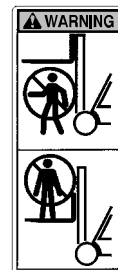
The operator must exercise extreme care while working near such objects. Whether the lift truck is loaded or empty, do not travel with the load or carriage in a raised position.



WARNING

Keep yourself and all others clear of the lift mechanism. Never allow anyone under or on the forks.

NEVER put hands, arms, head or legs through the mast or near the carriage or lift chains.



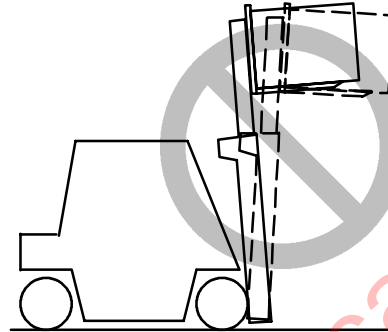
This warning applies not only to the operator but also a helper. A helper must not be near the load or lift mechanism while the operator is attempting to handle a load. The lift mechanism has moving parts with close clearances that can cause serious injury.

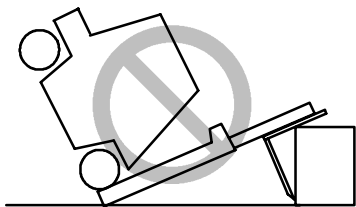


Lift and lower with the mast vertical or tilted slightly backward from vertical. Tilt elevated loads forward only when directly over the unloading place. If the lift mechanism is raised to pick up or deposit a load, keep the tilt angle in either direction to a minimum. Backward and forward tilt are helpful, but they affect side and forward stability. Do not tilt in either direction any more than necessary when handling elevated loads. The lift truck can tip forward if the mast is tilted forward with a load in the raised position.

WARNING

The lift truck can tip over forward when the load is raised. Forward tipping is even more likely when tilting forward, braking when traveling forward or accelerating in reverse.

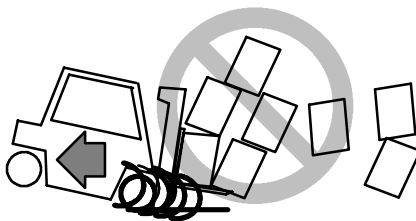




IF THE LIFT TRUCK TIPS OVER, DO NOT JUMP OFF! HOLD FIRMLY TO STEERING WHEEL, BRACE YOUR FEET, AND LEAN AWAY FROM POINT OF IMPACT.

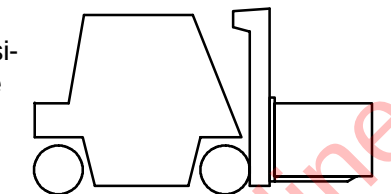
Load Handling, How To Engage And Disengage A Load

1. Avoid fast starts. Sudden movement can cause the lift truck to tip. People can be hurt or killed and material can be damaged.



Approach the load carefully. Make sure that the truck is perpendicular to the load. Raise the forks to the proper height for engaging the load.

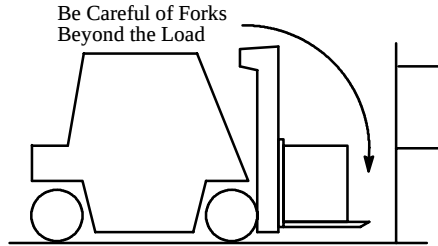
2. Move forward slowly until the forks are in position under the load. The forks must support at least two-thirds (2/3) of the length of the load.



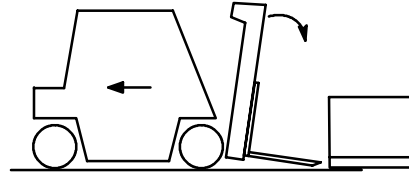
Make sure that the load is centered between the forks. Make sure that the forks do not extend past the load so that loads or equipment that are behind the load being lifted are not damaged.

If the forks are longer than the load, move the forks under the load so that the tips of the forks do not extend beyond the load. Lift the load from the surface. Move backward a few inches, then lower the load onto the surface and inch forward to engage the load against the carriage. Tilt the

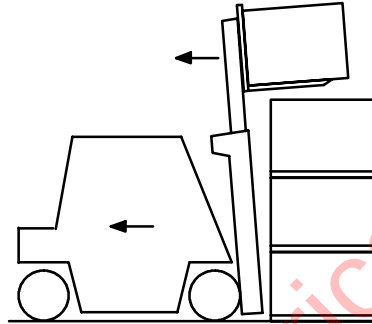
mast backward just far enough to lift the load from the surface.



3. When a load is put on the floor, tilt the mast forward to a vertical position and lower the load. Tilt the mast forward to permit smooth removal of the forks. Carefully move the lift truck backward to remove the forks from under the load.



4. If the load is being removed from a stack, slowly move the lift truck away from the stack. When the load is clear of the stack, lower the load for traveling.



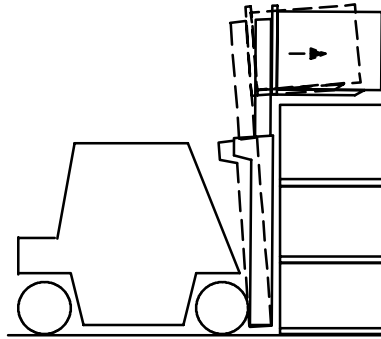
Always travel with the load as low as possible and tilted backward. Lowering speed is controlled by the position of

the control lever. Lower slowly and smoothly. Slowly return the control lever to the neutral position so that the load is not dropped or that the lift truck is not tipped over due to the rapid stop of the load.

⚠ WARNING

Move carefully and smoothly when the load is raised over a stack. When the load is raised the center of gravity of the lift truck and the load is much higher. The lift truck can tip over when the load is raised.

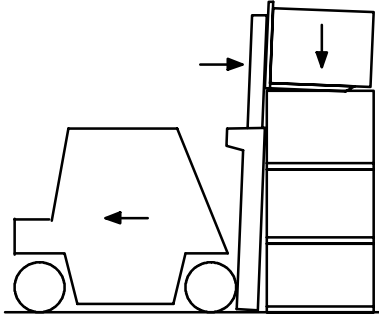
IF THE LIFT TRUCK TIPS OVER EITHER TO THE SIDE OR FORWARD, DO NOT JUMP OFF! HOLD FIRMLY TO STEERING WHEEL, BRACE YOUR FEET, AND LEAN FORWARD AND AWAY FROM THE POINT OF IMPACT.



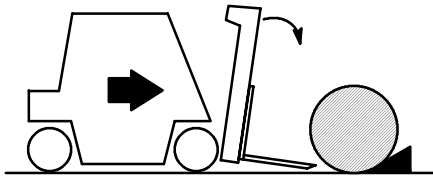
5. To put the load on a stack, align the lift truck with the stack. Raise the load higher than the point where it will be placed. Do not raise the load to a point below where the load is to be placed and "jog" the load up into position. This operation uses added energy. Be careful not to damage or move adjacent loads.

Move forward slowly. When the load is in position for lowering on a stack, tilt the mast to a vertical position and lower the load. Lower the forks just enough to remove them from under the load. Do not lower the forks so that they will drag on the surface under the load. Tilt the mast

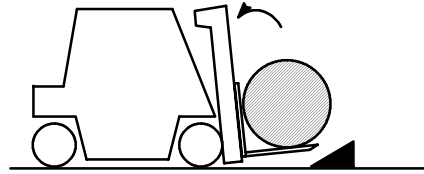
forward just enough to permit smooth removal of the forks from under the load. Carefully move the lift truck backward to remove the forks from under the load. Lower the forks when traveling.



6. When lifting round objects, use a block behind the object. Tilt the mast forward so that the forks can slide along the floor under the object to be lifted.



Tilt the mast fully backward to help keep the load on the forks.



NOTE: Not every load can be lifted using only the forks of a lift truck. Some loads will require a special attachment.

Load Handling, How To Handle Empty Containers

The following discussion describes the use of the 20 to 40 foot extendable attachment used for handling empty containers.

⚠ WARNING

Failure to follow these instructions can cause serious injury or death.

1. Follow these instructions and the operating, inspection and maintenance instructions in the **SERVICE MANUAL**.

2. Before using the container attachment, inspect the attachment for damage and make sure all of the controls operate as specified in Table 3.
3. Always put the attachment in the center of the lift truck when not carrying a container. Use the side-shift function to put the attachment in the center position.
4. Use the side-shift function to keep the container as level as possible when carrying a container.
5. Watch the clearance around the whole length of the container.
6. Never lift a container that is heavier than the capacity listed on the nameplate of the lift truck.
7. Always be careful of winds while handling containers. Strong wind force on raised containers can tip the lift truck. Do not stack containers in winds above 45 km/hr (27 mph).
8. Do not use the override button while a container is being carried by the attachment.

HOW TO PICK UP A CONTAINER

1. When the engine is shut-off the lock pins extend. The green lights on the control panel for the attachment will be illuminated when the lock pins are extended. The lock pins must be retracted before the attachment can be put in position so that the container can be picked up.
 2. The lock pins can not be locked or unlocked unless the attachment is seated on a container.
- NOTE:** There is an override button that permits the lock pins to be retracted without the attachment being seated on a container. See Item 19, TABLE 2.
3. Put the lift truck in a position so that the attachment is approximately centered with the container. Raise the attachment to the height of the container. If necessary, extend or retract the attachment to match the length of the container.
 4. Use the side-shift function to align the attachment with the container. Move forward until the guides on the vertical end beams contact the container.
 5. When the attachment is aligned with the container, lower the attachment so that both vertical guide pins enter the top openings in the corner pockets of the container.

The amber lights on the control panel will come on when both ends of the attachment are in contact with the container.

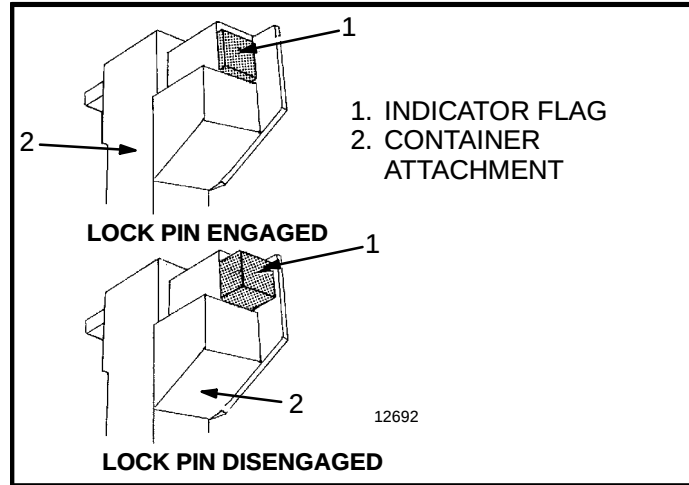


FIGURE 7. INDICATOR FLAG

6. Push on the front of the lock pin switch to extend the lock pins. The green lights on the control panel will come on when the lock pins are in the engaged position. Make

sure the indicator flags for the lock pins are in the engaged position. See FIGURE 7.

NOTE: If both lock pins are not engaged, an audible alarm will sound. Change the position of the container to allow the pins to engage.

⚠ WARNING

DO NOT lift the container unless both lock pins are fully engaged.

7. Tilt the mast rearward a small amount. Lift the container. The amber lights must go OFF. Use the side-shift function to move the center of gravity of the load to the center-line of the lift truck.

8. Do not travel with the container higher than necessary for adequate ground clearance.

9. Move the container.

HOW TO DEPOSIT A CONTAINER

1. Keep the mast vertical when picking up or depositing the container.

2. Put the container on a stable, even surface or container.

3. Lower the container and attachment until the amber lights come on.
4. Tilt the mast slightly forward.
5. Push on the rear of the lock pin switch to retract the lock pins. Make sure the green lights are off. Also check that the indicator flags are in the disengaged position. See FIGURE 7.

NOTE: The audible alarm will beep when the lock pin switch is pushed to retract the lock pins. If for any reason the lock pins do not move to the disengaged position, the alarm will continue to make a sound.

6. Lift the attachment from the container. The amber lights will go off. Move the lift truck and lower the attachment for travel.

CAUTION

Do not hit the attachment on other containers or objects. The attachment can be damaged by hitting other objects. This is especially important when extending or retracting the outer booms of the attachment.

Load Handling, Traveling

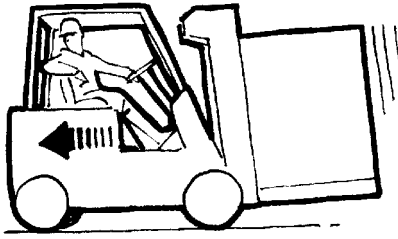
1. When traveling with the load lowered, keep the load against the carriage and the mast tilted fully backward. This will help keep the load on the forks and give good forward and side stability.
2. Travel with the lift mechanism raised only enough to clear the ground or obstacles.



When the mast, carriage or load is in a raised position the stability of the lift truck is reduced. This is also critical when the lift truck is not carrying a load. The ability of the lift truck to resist side tipping can be less on a lift truck without a load than it is on a lift truck with a load in the lowered (travel) position. Therefore, a lift truck without a load is more likely to tip sideways, especially in a turn, than a lift truck with a load carried in the lowered position.

3. For better visibility with large loads, travel with the load trailing, but always keep a proper lookout in the direction

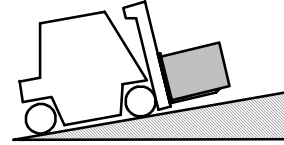
of travel. Normally, direction of travel is determined by the best visibility available to the operator. If the lift truck must travel in a direction where visibility is obstructed, a lookout helper may be required.



WARNING

Some lift trucks have mirrors for viewing along the side to observe the tail swing area. These mirrors are an aid to the driver, but are **NOT** driving mirrors and **must NOT** be used as such when operating in reverse. Always look in the direction of travel to avoid damage to something or injury to someone.

4. When traveling up or down a grade with a **heavily loaded** lift truck, the load should be kept upgrade to maintain control.



When operating an **unloaded** lift truck on a steep grade, keep the counterweight upgrade.

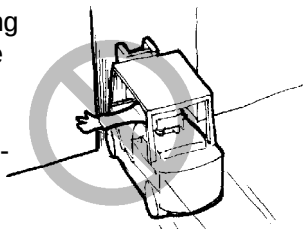


5. Watch out for pedestrians at all times. Do not drive up to anyone standing in front of an object.

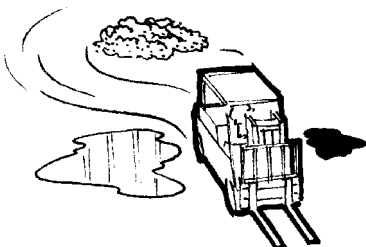
Use extra care at cross-aisles, doorways and other locations where pedestrians can step into the path of travel of the lift truck. Slow down when approaching blind intersections or turns and sound the horn. This is done to warn

pedestrians that there is a vehicle in the area and to be alert to possible danger.

6. Anytime the lift truck is moving keep arms, legs, etc., inside the operator's compartment. Arms and legs outside the machine can be injured when passing obstructions.



7. Avoid bumps, holes, slick spots and loose materials that may cause the lift truck to swerve or tip. If unavoidable, slow down.



Different models of lift trucks are designed to operate under different conditions. Lift trucks with solid rubber tires

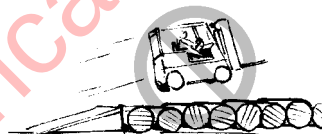
are designed to operate on relatively smooth surfaces. Lift trucks with pneumatic tires can adapt to more uneven ground. Always make sure you pick the smoothest route for your lift truck.

8. Watch clearances, especially forks, masts, overhead guard and tail swing. A lift truck is designed to perform a wide variety of functions within limited space. Make sure that the forks do not extend past the load so that loads being lifted are not damaged.

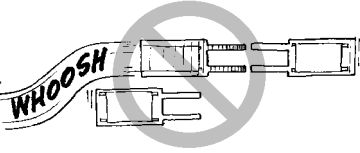


Serious accidents can be caused by masts and overhead guards hitting pipes and beams near the ceiling.

9. Do not indulge in stunt driving or horseplay.



10. Do not pass another lift truck traveling in the same direction at intersections, blind spots or at other dangerous locations.



11. Stay away from the edge of the road. Keep the wheels of the lift truck, particularly the steer wheels, on the roadway. If the wheels are allowed to run off the edge of the travel surface onto soft ground, the lift truck can tip over.

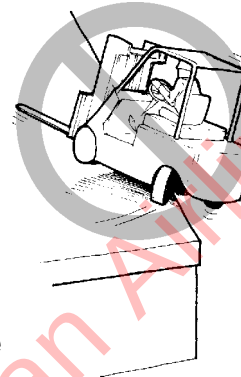
12. Under all travel conditions, operate the lift truck at a speed that will permit it to be brought to a stop in a safe manner.



HIGHWAY TRUCKS, RAILROAD CARS AND DOCKS

⚠ WARNING

Maintain a safe distance from the edge of docks, ramps, platforms and other similar working surfaces. Watch the "tail swing". Remember when traveling in the forward direction and the steering wheel is turned to move the lift truck away from the edge of the dock the rear will swing toward the edge. This can cause the lift truck to fall off the dock.



⚠ WARNING

IF THE LIFT TRUCK FALLS OFF THE DOCK, DO NOT JUMP OFF! HOLD FIRMLY TO STEERING WHEEL, BRACE YOUR FEET, AND LEAN FORWARD AND AWAY FROM THE POINT OF IMPACT.

Before operating in a highway truck or railroad car, observe the following:

- DO NOT use a lift truck to move a railroad car.
- DO NOT use a lift truck to open or close the door on a railroad car unless the lift truck has an attachment that is specifically designed for opening and closing railroad car doors and the operator is trained in its use.
- Check to make sure that the brakes on the highway truck are set and that wheel blocks have been placed on both sides of the rear wheels (unless a dock locking mechanism is engaged). Fixed jacks may be necessary to support the front and rear of a semi-trailer to prevent it from moving during loading or unloading.
- Make sure that the railroad car brakes are set and the wheels are blocked while loading or unloading. Do this so that the railroad car will not move due to the movement of the lift truck in and out of the railroad car.
- Check the condition of the driving surface. Make sure the floor will support the weight of the lift truck and the load.

Make sure the dockboard is secured, in good condition and of the proper capacity.

ATTACHMENTS



If an attachment is installed on the lift truck, make sure the operating instructions are available and understood before operating the attachment. See TABLE 4. for the operation of attachment control levers.

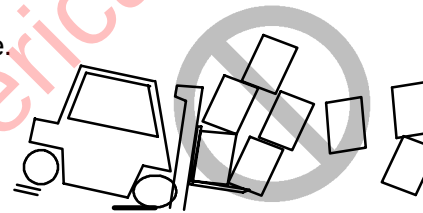


WARNING

Make sure the nameplate is correct if an attachment has been installed.

STOPPING

Stop the lift truck as gradually as possible. Hard braking and wheel sliding can cause the load to fall off of the forks and damage the load or hurt someone.



PARKING

The operator must never leave a lift truck in a condition so that it can cause damage and injury. When parking the lift truck, do the following operations:

1. Stop the lift truck and apply the parking brake.
2. Fully lower the forks, carriage or attachment. Tilt mast forward until the tips of the forks touch the ground.
3. On units with a direction control lever, put the control lever for the transmission in **NEUTRAL**.
4. Turn the key switch to **OFF** to stop the engine.

5. If the lift truck must be left on an incline, put blocks on the down hill side of the wheels so that the lift truck can not move.

6. Check engine compartment if operating in areas containing combustible material. (See page 29, FIRE HAZ-ARD)

If the lift truck is equipped with an LPG fuel system and is parked more than momentarily, close the fuel valve at the tank. If the lift truck is going to be left over night or longer, the truck must be parked outside or the LPG tank must be removed and stored outside.

Do not park the lift truck so that it limits access to fire aisles, stairways, and fire equipment.

MAINTENANCE

GENERAL

This section contains a MAINTENANCE SCHEDULE and the instructions for maintenance and inspection.

The MAINTENANCE SCHEDULE has time intervals for inspection, lubrication and maintenance for your lift truck. The recommendation for the time intervals are for eight hours of operation per day. The time intervals must be decreased from the recommendations in the MAINTENANCE SCHEDULE for the following conditions:

- a. If the lift truck is used more than eight hours per day.
- b. If the lift truck must work in dirty operating conditions.

Your dealer for Hyster lift trucks has the equipment and trained service personnel to do a complete program of inspection, lubrication and maintenance. Regular inspection, lubrication, and maintenance will help your lift truck give more efficient performance and operate for a longer period of time.

Some users have service personnel and equipment to do the inspection, lubrication, and maintenance shown in the MAINTENANCE SCHEDULE. Service Manuals are available from your dealer for Hyster lift trucks to help users who do their own maintenance.

WARNING

Do not make repairs or adjustments unless you have both authorization and training. Repairs and adjustments that are not correct can make a dangerous operating condition.

Do not operate a lift truck that needs repairs. Report the need for repairs immediately. If repair is necessary, put a "DO NOT OPERATE" tag in the operator's area. Remove the key from the key switch.

CAUTION

Disposal of lubricants and fluids must meet local environmental regulations.

Serial Number Data

The serial number for the lift truck is on the nameplate and is stamped on the frame.

HOW TO MOVE A DISABLED LIFT TRUCK

NOTE: If there is no air pressure in the brake system, the parking brake must be manually released. To manually release the parking brake, use the release bolt at each air chamber to compress the spring that applies the brake. Tighten the release bolt or nut until the brake is released.

On the H165–280XL models, the release bolt, washer and nut are in a receptacle on the side of the air chamber.

Make sure the release bolt is engaged in the piston before the nut is tightened. On the H300–360XL models, the release bolt is permanently installed in the piston.

WARNING

Use extra caution when towing a lift truck if any of the following conditions exist:

- a. Brakes do not operate correctly.
- b. Steering does not operate correctly.
- c. Tires are damaged.
- d. Traction conditions are bad.

Property of American Airlines

- e. The lift truck must be towed on a slope.

If the engine cannot run, there is no power available for the hydraulic steering system and the service brakes. This condition can make the lift truck difficult to steer and stop. If the lift truck uses power from the engine to help apply the brakes, the application of the brakes will be more difficult. Poor traction can cause the disabled lift truck or towing vehicle to slide. A slope will also make the lift truck more difficult to stop.

Never lift and move a disabled lift truck unless the disabled lift truck **MUST** be moved and cannot be towed. A lift truck used to move a disabled lift truck **MUST** have a capacity rating equal to or greater than the weight of the disabled lift truck. The capacity of the lift truck used to move a disabled lift truck must have a load center equal to half the width of the disabled lift truck. See the nameplate of the disabled lift truck for the approximate total weight. The forks must extend the full width of the disabled lift truck. Put the weight center of the disabled lift truck on load center of the forks. Be careful to not damage the under side of the lift truck.

How To Tow The Lift Truck

NOTE: Disconnect the drive line before towing the lift truck if the engine or transmission are disabled.

1. The towed lift truck must have an operator.
2. Tow the lift truck slowly.
3. Raise the carriage and forks approximately 30 cm (12 inches) from the surface. Install a chain to prevent the carriage and mast channels from moving.
4. If another lift truck is used to tow the disabled lift truck, that lift truck must have an equal or larger capacity than the disabled lift truck. Install approximately $\frac{1}{2}$ of a capacity load on the forks of the lift truck that is being used to tow the disabled lift truck. This $\frac{1}{2}$ capacity load will increase the traction of the lift truck. Keep the load as low as possible.
5. Use a towing link made of steel that attaches to the tow pins in the counterweights of both lift trucks.

HOW TO PUT A LIFT TRUCK ON BLOCKS

WARNING

The lift truck must be put on blocks for some types of maintenance and repair. The removal of the following assemblies will cause large changes in the center of gravity: mast, drive axle, engine and transmission, and the counterweight. When the lift truck is put on blocks, put additional blocks in the following positions to maintain stability:

- a. Before removing the mast and drive axle, put blocks under the counterweight so that the lift truck can not fall backward.
- b. Before removing the counterweight, put blocks under the mast assembly so that the lift truck can not fall forward.

The surface must be solid, even, and level when the lift truck is put on blocks. Make sure that any blocks used to support the lift truck are solid, one piece units. Put a steel plate on top of the block.

NOTE: Some lift trucks have lifting eyes. These lift points can be used to raise the lift truck so that blocks can be installed.

How To Raise The Drive Tires (See FIGURE 8.)

1. Put blocks on each side (front and back) of the steering tires to prevent movement of the lift truck.
2. Put the mast in a vertical position. Put a block under each outer mast channel.
3. Tilt the mast fully forward until the drive tires are raised from the surface.
4. Put additional blocks under the frame behind the drive tires. Make sure the blocks are under the frame and not the hydraulic or fuel tanks.
5. If the hydraulic system will not operate, use a hydraulic jack under the side of the frame near the front. Make sure that the jack has a capacity equal to at least half the weight of the lift truck. See the nameplate.

How To Raise The Steering Tires (See FIGURE 8.)

1. Apply the parking brake. Put blocks on both sides (front and back) of the drive tires to prevent movement of the lift truck.
2. Use a hydraulic jack to raise the steering tires. Put the

jack under the steering axle or frame to raise the lift truck. Make sure that the jack has a capacity of at least 2/3 of the total weight of the lift truck as shown on the name-plate.

3. Put blocks under the frame to support the lift truck. Make sure the blocks are under the frame and not the hydraulic or fuel tanks.

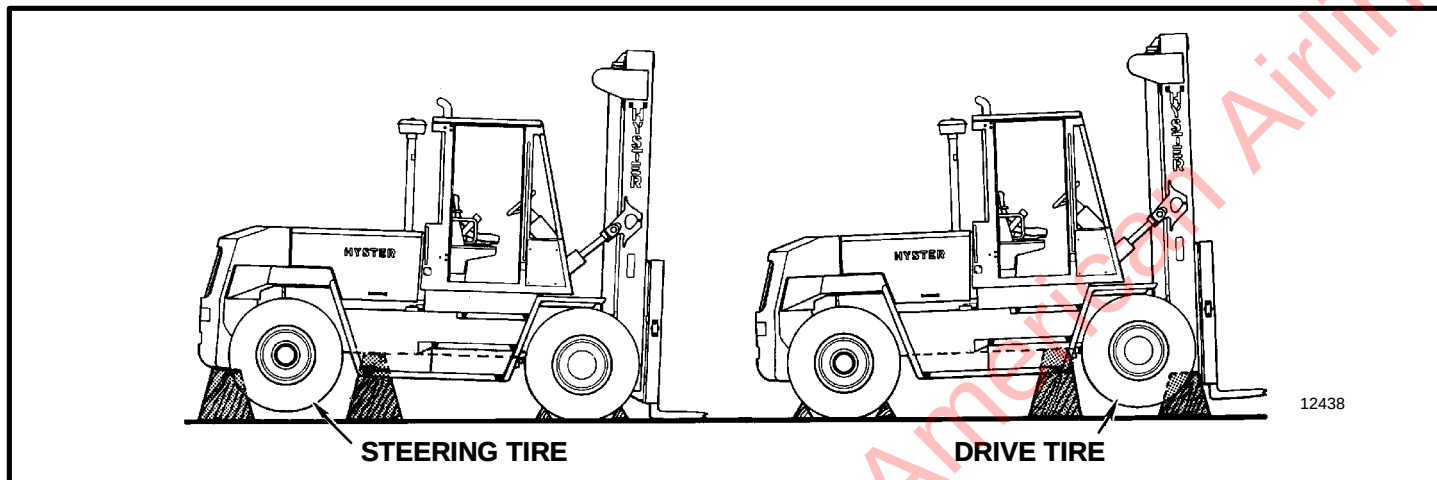


FIGURE 8. PUT A LIFT TRUCK ON BLOCKS

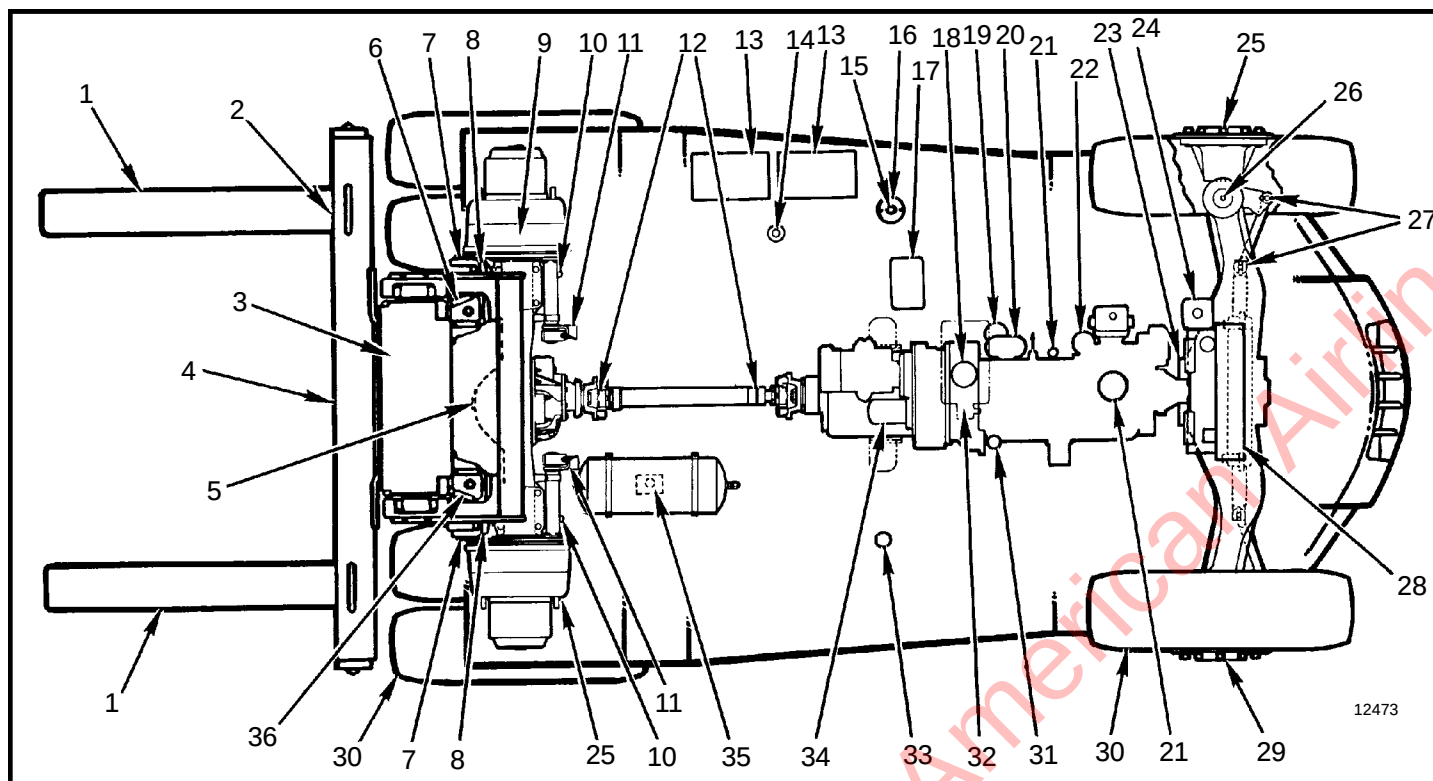


FIGURE 9. MAINTENANCE POINTS (DIESEL ENGINE SHOWN)

TABLE 5. MAINTENANCE SCHEDULE

ITEM NO.	ITEM	8 Hr./ Daily	150 Hr./ 2 mo.	350 Hr./ 2 mo.	1000 Hr./ 6 mo.	2000 Hr./ 1 yr.	PROCEDURE OR QUANTITY	SPECIFICATION
30	TIRES TIRE PRESSURE	X X					Check Condition See Nameplate	See Parts Manual
1	FORKS	X		X			Check Condition	
3	MAST, CARRIAGE, ATTACHMENT	X					Check Condition and Operation	
6	LIFT CHAINS	X	X, L X				Check Condition and Lubrication Check Adjustment Check Length	Engine Oil
	SAFETY LABELS	X					Replace If Necessary	See Parts Manual
	SAFETY BELT AND SEAT RAILS	X					Check Condition	
	CHECK FOR LEAKS— FUEL, OIL, COOLANT	X					Check for leaks	
33	FUEL TANK (Diesel) LPG (Option)	X					120 liter (31.7 gallons) (2) 43.5 lb tanks	Diesel No. 2 LPG — HD-5
X= Check C=Change L=Lubricate								

ITEM NO.	ITEM	8 Hr./ Daily	150 Hr./ 2 mo.	350 Hr./ 2 mo.	1000 Hr./ 6 mo.	2000 Hr./ 1 yr.	PROCEDURE OR QUANTITY	SPECIFICATION
24	COOLING SYSTEM	X				C	26.0 liter (27.5 qt)	50% water with 50% Ethylene Glycol
28	RADIATOR HOSES	X					Check Condition	See Parts Manual
23	DRIVE BELTS	X		X			Check Condition Check Tension	See Parts Manual
19	PRIMARY FUEL FILTER	X			C		Drain Water	See Parts Manual
13	BATTERY ELECTROLYTE LEVEL	X X					Clean Check Level	See Parts Manual 2 Batteries
15	HYDRAULIC SYSTEM H8.00-12.00XL (H165-280XL) H13.00-16.00XL (H300-360XL)	X				C	113 liter (31.7 gallons) 142 liter (37.5 gallons)	-18°C (0°F) and Above SAE 10W API CC or CC/SE/SF/SG
18	PRE-CLEANER FOR ENGINE AIR FILTER	X					Clean	See Parts Manual
32	AIR FILTER, ENGINE AND AIR COMPRESSOR		X				Clean or Replace (See NOTE 3)	See Parts Manual
X= Check C=Change L=Lubricate NOTE 3: Very dirty conditions will require a daily clean and check.								

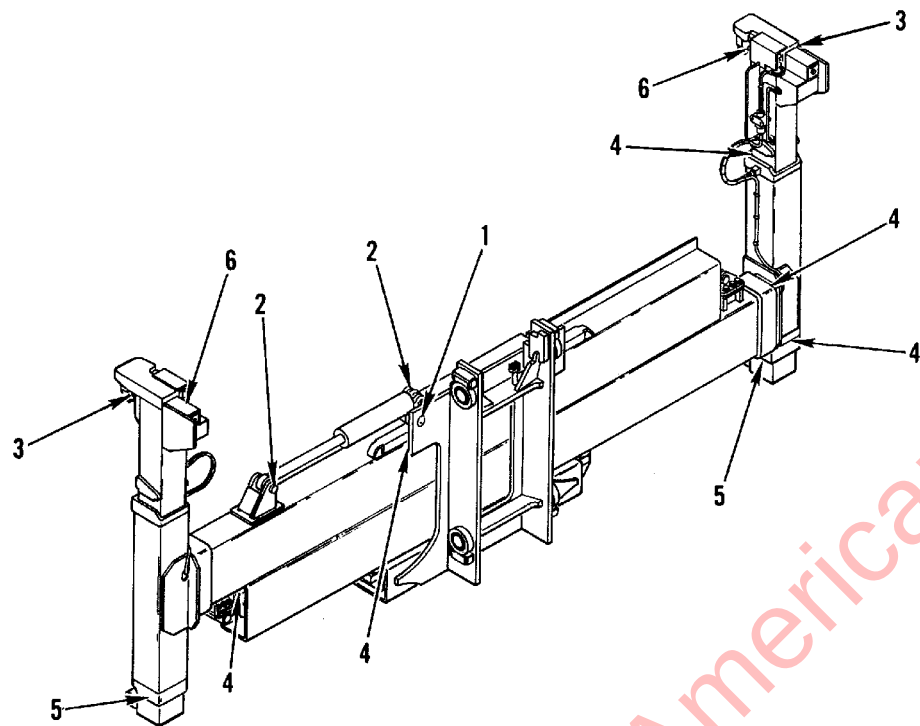
ITEM NO.	ITEM	8 Hr./ Daily	150 Hr./ 2 mo.	350 Hr./ 2 mo.	1000 Hr./ 6 mo.	2000 Hr./ 1 yr.	PROCEDURE OR QUANTITY	SPECIFICATION
17	WINDSHIELD WASHER FLUID	X					Check Level	
21 22	ENGINE OIL AND FILTER Perkins Diesel	X		C			15.1 liter (16.0 qt) 1 Filter See NOTES 1 & 2	greater than -18°C (0°F) SAE 10W-30 API SE/SG See Parts Manual
21 22	ENGINE OIL AND FILTER GM V-8	X		C			10 liter (9.5 qt) 1 Filter See NOTES 1 & 2	API SE/SF greater than -18°C (0°F) SAE 10W-30 See Parts Manual
	HORN, GAUGES, LIGHTS, ALARMS, AND MIRRORS	X					Check Operation	
31	TRANSMISSION OIL HYSTER T-50	X			C		28 liter (29 qt)	Hyster Part No. 336830 Hyster Part No. 336831 Hyster Part No. 336832
	STEERING	X					Check Operation	
9	BRAKES, SERVICE AND PARKING	X				X	Check Operation Check Condition	
X= Check C=Change L=Lubricate		NOTE 1: Change filters after first 100 hours of operation on a new lift truck. NOTE 2: Change engine oil and filters every 400 hours.						

ITEM NO.	ITEM	8 Hr./ Daily	150 Hr./ 2 mo.	350 Hr./ 2 mo.	1000 Hr./ 6 mo.	2000 Hr./ 1 yr.	PROCEDURE OR QUANTITY	SPECIFICATION
35	AIR TANK		X				Drain Moisture	
12	DRIVE SHAFT		L				3 Fittings	Multi-Purpose Grease See NOTE 4
27	STEERING AXLE TIE RODS		L				4 Fittings	See NOTE 4 Multi-Purpose Grease
26	LOWER SPINDLE BEARINGS		L				2 Fittings	Multi-Purpose Grease
10	SHAFT FOR BRAKE ACTUATORS		L				2 Fittings	Multi-Purpose Grease See NOTE 4
5	DRIVE AXLE AND DIFFERENTIAL H8.00-12.00XL (H165-280 XL) H13.00-16.00XL (H300-360XL)		X			C	23.7 liter (25.0 qt) 24.6 liter (26 qt)	SAE 85W-140
14	HYDRAULIC TANK BREATHER		X				1 Clean as Necessary	See Parts Manual
X= Check C=Change L=Lubricate NOTE 4: Multi-purpose grease with 2-4% molybdenum disulfide.								

ITEM NO.	ITEM	8 Hr./ Daily	150 Hr./ 2 mo.	350 Hr./ 2 mo.	1000 Hr./ 6 mo.	2000 Hr./ 1 yr.	PROCEDURE OR QUANTITY	SPECIFICATION
	AIR FILTER, HEATER		X				1 Clean (See NOTE 3)	See Parts Manual
25	WHEEL NUTS DRIVE WHEELS STEER WHEELS		X X				Check Torque Check Torque	640 to 680 Nm (470 to 500 lb _f ft)
11	BRAKE ACTUATOR ARMS			X			2 Check Adjustment	
8 36 4 2 7	MAST PIVOTS SLIDING SURFACES SIDE SHIFT CARRIAGE FORK GUIDES TILT CYLINDER PIVOT PINS CHAIN ANCHORS (Top of Mast)			L L L L L L			2 Fittings As Necessary 4 Fittings As necessary 4 Fittings 2	See NOTE 4 Multi-Purpose Grease Multi-Purpose Grease Multi-Purpose Grease Engine Oil Multi-Purpose Grease Multi-Purpose Grease
X= Check C=Change L=Lubricate NOTE 3: Very dirty conditions will require a daily clean and check. NOTE 4: Multi-purpose grease with 2-4% molybdenum disulfide.								

ITEM NO.	ITEM	8 Hr./ Daily	150 Hr./ 2 mo.	350 Hr./ 2 mo.	1000 Hr./ 6 mo.	2000 Hr./ 1 yr.	PROCEDURE OR QUANTITY	SPECIFICATION
	PEDALS, LEVERS, LINKAGES, CABLES, HINGES, SEAT RAILS			L			As Necessary	Engine Oil
	ENGINE SPEED (DIESEL) IDLE SPEED GOVERNED SPEED ENGINE SPEED (GM V-8) IDLE SPEED GOVERNED SPEED			X X X X			Adjust as Necessary Adjust as Necessary	725 to 775 rpm 2660 to 2760 rpm 725 to 750 rpm 2700 to 2800 rpm
	TIMING, INJECTION PUMP				X		Adjust as Required	23° BTDC Static
	TIMING, GM V-8				X		Adjust as Required	6° to 8° BTDC
	VALVE ADJUSTMENT (DIESEL) INLET (Cold) EXHAUST (Cold) GM V-8 NO VALVE ADJUSTMENT				X		Adjust as Required	0.20 mm (0.008 in) 0.45 mm (0.018 in)
	SPARK PLUGS (GM V-8)				C		8	0.89 mm (0.35 in) See Parts Manual
X= Check C=Change L=Lubricate		NOTE 4: Multi-purpose grease with 2-4% molybdenum disulfide.						

ITEM NO.	ITEM	8 Hr./ Daily	150 Hr./ 2 mo.	350 Hr./ 2 mo.	1000 Hr./ 6 mo.	2000 Hr./ 1 yr.	PROCEDURE OR QUANTITY	SPECIFICATION
20	FINAL FUEL FILTERS (DIESEL)				C		2	See Parts Manual
	FUEL FILTER (LPG)				C			See Parts Manual
34	TRANSMISSION OIL FILTER				C		1 (See NOTE 1)	See Parts Manual
16	HYDRAULIC SYSTEM OIL FILTER					C	1 (See NOTE 1)	See Parts Manual
29	HUB BEARINGS, STEER WHEELS					C	As Necessary	Multi-Purpose Grease See NOTE 4
	ENGINE COMPARTMENT	X					Remove Combustible Materials	
X= Check C=Change L=Lubricate		NOTE 1: Change filters after first 100 hours of operation on a new lift truck. NOTE 4: Multi-purpose grease with 2-4% molybdenum disulfide.						



12698

FIGURE 10. MAINTENANCE POINTS, EMPTY CONTAINER ATTACHMENT

TABLE 6. MAINTENANCE SCHEDULE, EMPTY CONTAINER ATTACHMENT
(Item Numbers Reference FIGURE 10.)

ITEM NO.	ITEM	150 Hr./ 2 mo.	350 Hr./ 2 mo.	2000 Hr./ 1 yr.	PROCEDURE OR QUANTITY	SPECIFICATION
1	SIDE-SHIFT ROLLERS		L		8 Fittings	Multi-Purpose Grease ⁴
2	SIDE-SHIFT CYLINDER PINS		L		2 Fittings	Multi-Purpose Grease ⁴
3	LOCK PINS		L		2 Fittings	Multi-Purpose Grease ⁴
4	BEARING BLOCKS		X, L		As Necessary	Multi-Purpose Grease ⁴
5	ACCUMULATORS		X		Drain Moisture	
6	LOCK PIN CYLINDERS			L	Lubricate Internally	See Service Manual
X= Check C=Change L=Lubricate NOTE 4: Multi-purpose grease with 2-4% molybdenum disulfide.						

MAINTENANCE PROCEDURES**EVERY 8 HOURS OR DAILY**** WARNING**

Do not operate a lift truck that needs repairs. Report the need for repairs immediately. If repair is necessary, put a “DO NOT OPERATE” tag in the operator’s area. Remove the key from the key switch.

HOW TO MAKE THE CHECKS WITH THE ENGINE STOPPED

Put the lift truck on a level surface. Lower the carriage and forks, stop the engine and apply the parking brake. Open the hood and check for leaks and conditions that are not normal. Clean any oil or fuel spills. Ensure all sur-

faces are free of oils, lubricants, fuel and organic dust or fibers (paper, wood, cotton, agricultural grass/grain, etc.).

Hydraulic System Oil (See FIGURE 14.)** WARNING**

At operating temperature the hydraulic oil is HOT. Do not permit the oil to contact the skin and cause a burn.

** CAUTION**

Do not permit dirt to enter the hydraulic system when the oil level is checked or the filter is changed.

Never operate the hydraulic pump without oil in the hydraulic system. The operation of the hydraulic pump without oil will damage the pump.

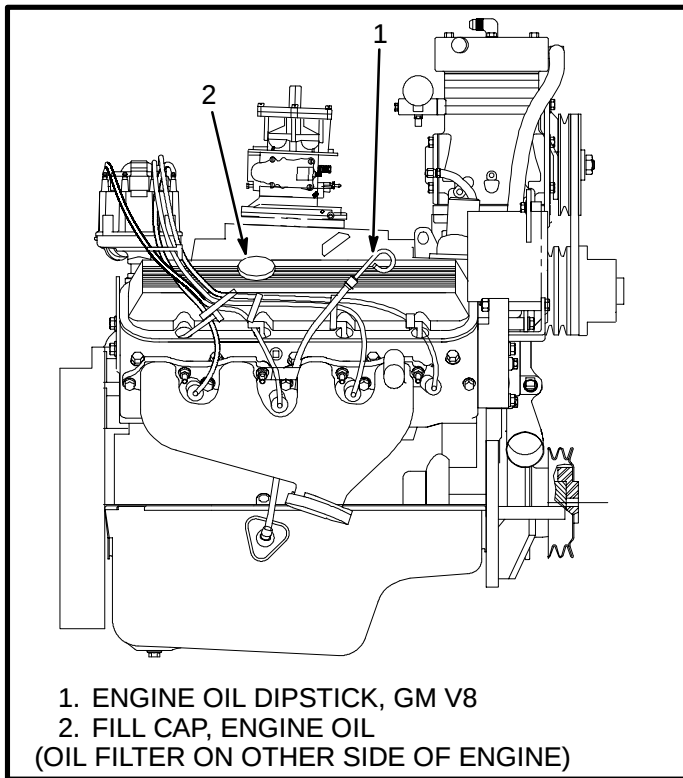


FIGURE 11. ENGINE MAINTENANCE, GM V8

Check the hydraulic oil level when the oil is at operating temperature, the carriage is lowered and the engine is stopped. Add hydraulic oil only as needed. If more hydraulic oil is added than the "FULL" level, the hydraulic oil will leak from the breather during operation.

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

Engine Oil (See FIGURE 13. And FIGURE 11.)

After the engine has stopped, wait one minute before checking the oil level. Keep the oil at the correct level as indicated on the dipstick. Use the correct oil as shown in the MAINTENANCE SCHEDULE.

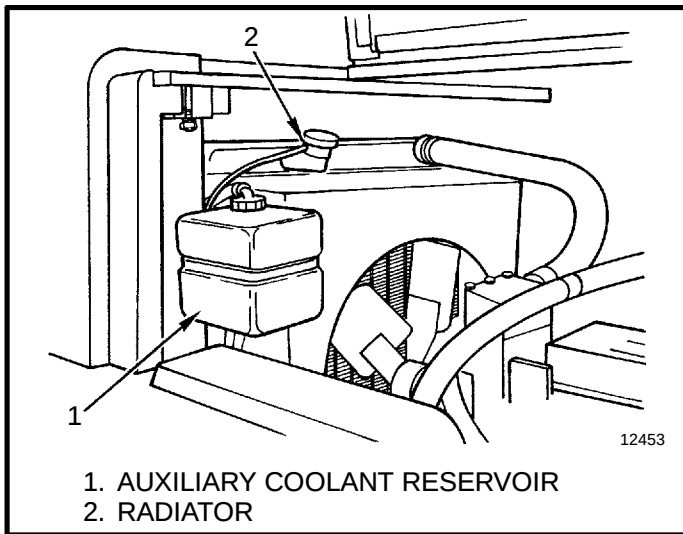


FIGURE 12. AUXILIARY COOLANT RESERVOIR

Cooling System (See FIGURE 12.)

⚠ WARNING

DO NOT remove the pressure cap from the radiator when the engine is hot. When the pressure cap is removed from the radiator, the pressure is released from the system. If the system is hot, the steam and boiling coolant can cause burns.

Check the coolant level at the auxiliary coolant reservoir. Make sure the coolant level is between the "FULL" and the "ADD" mark on the auxiliary coolant reservoir. The coolant will expand as it is heated and the level in the auxiliary coolant reservoir will increase.

If coolant is added, use the correct mixture of water and ethylene glycol. See the MAINTENANCE SCHEDULE.

Check the radiator fins. Clean the radiator with compressed air or water as needed. Be careful not to bend the radiator fins.

Check the condition of the radiator hoses and heater hoses.

Fuel System

WARNING

All fuels are very flammable and can burn or cause an explosion. Do not use an open flame to check the fuel level or to check for leaks in the fuel system. If there is a leak in the fuel system, extra care must be used during the repair. Do not operate the lift truck until a leak is repaired.

Check the fuel system for leaks and the condition of parts. When adding fuel to the lift truck, refer to the **How To Add Fuel To The Lift Truck** procedures in this **OPERATING MANUAL**.

Primary Fuel Filter, Diesel (See FIGURE 13.)

Drain the water from the primary fuel filter as follows:

1. Open the valve on the bottom of the filter canister. Drain some fuel (and any water) into a cup until clean fuel flows from the filter.

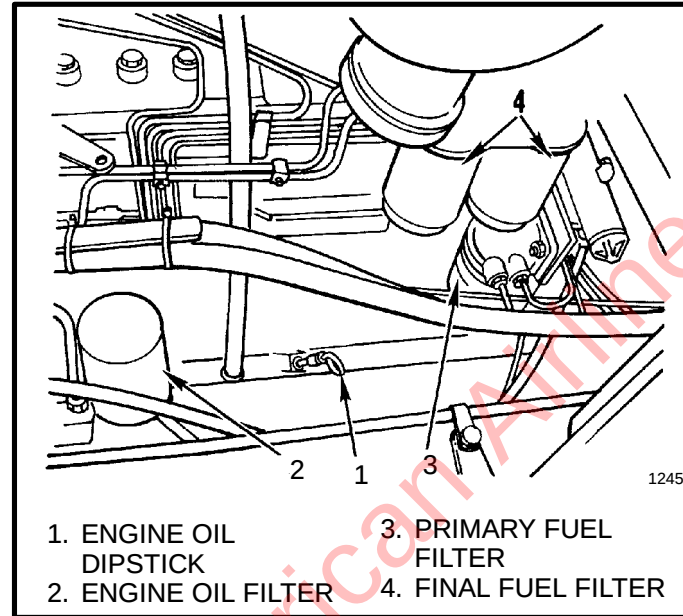


FIGURE 13. DIESEL ENGINE MAINTENANCE

2. Close the valve.

Drive Belts

Check the drive belts for wear or damage.

Battery (See FIGURE 14.)

⚠ WARNING

The acid in the electrolyte can cause injury. If the electrolyte is spilled, use water to flush the area. Use a solution of sodium bicarbonate (soda) to make the acid neutral. Acid in the eyes must be flushed with water immediately.

Wear eye protection. Batteries generate explosive fumes. Keep the vents in the caps clean. Keep sparks or open flame away from the battery area. Do not make sparks from the battery connections. Disconnect the battery ground cable when doing maintenance.

Keep the batteries and cable terminals clean. Check the electrolyte level (unless maintenance-free). Keep the electrolyte level above the separators and plates. Use distilled water. Do not fill the battery past the bottom of the internal filler neck.

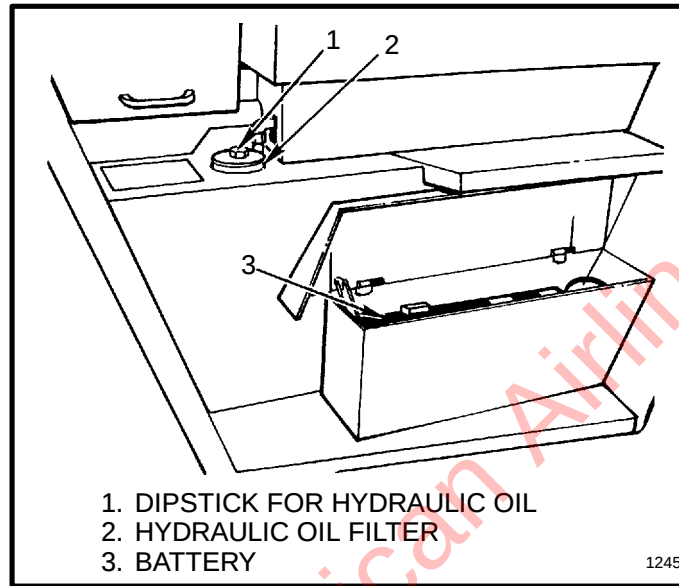


FIGURE 14. MAINTENANCE POINTS

If the batteries become discharged and require a boost from another charged battery, follow these procedures carefully:

- Always connect the positive jumper cable to the positive terminal of the discharged battery and the negative jumper cable to the negative terminal.
- Always connect the jumper cable that is the ground cable last.
- Always connect the jumper cables to the discharged battery before connecting them to the booster battery.

Pre-Cleaner For Engine Air Filter (See FIGURE 15.)

Clean the pre-cleaner for the air filter as necessary. Remove the cover for the pre-cleaner, then remove the dirt from the bowl. Install the bowl and cover.

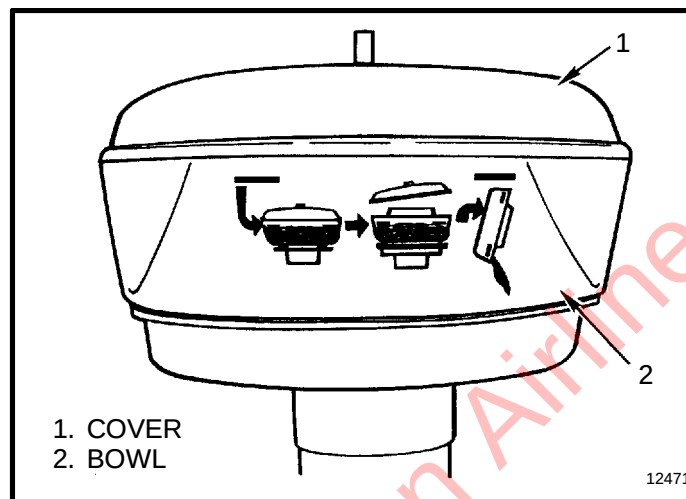


FIGURE 15. PRE-CLEANER FOR THE ENGINE AIR FILTER

Air Filters (See FIGURE 16.)

There are air filters for the engine and the air compressor. Clean or replace the air filter as necessary. Use compressed air to clean the filter element. Air pressure must

be less than 210 kPa (30 psi). Apply the air from the inside to the outside of the element.

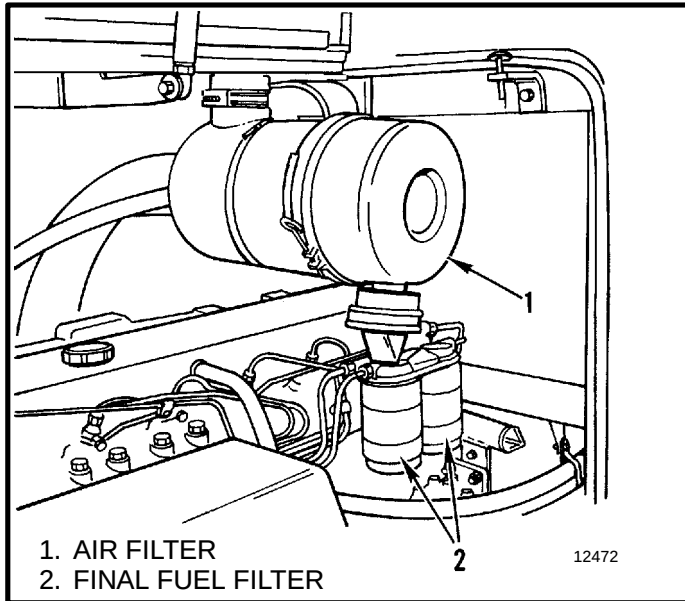


FIGURE 16. AIR FILTER AND FINAL FUEL FILTERS, DIESEL

To inspect the element, put a bright light inside and look for holes or other damage. If the element is damaged, replace it with a new element. Clean the inside of the canister when changing filters.

Forks

The identification of a fork is determined by how it is connected to the carriage. These lift trucks have pin forks. Pin forks are fastened to the carriage with large fork pins.

Forks, Adjustment

A lock pin for each fork fits into the top carriage bar and a slot in the fork. These lock pins hold the fork in position. Adjust the forks as far apart as possible for maximum support of the load. Make sure the lock pin is engaged in the carriage bar and the fork. The fork must be locked into position after the adjustment is made.

Forks, Removal

WARNING

Do not try to remove a fork without a lifting device. The forks can weigh up to 370 kg (800 lb) each.

Put the lift truck on a level surface and lower the forks. Tilt the mast so that the forks have stability. Remove the re-

tainers for the fork pins and push the pins from the carriage. Move the lift truck away from the forks.

Forks, Installation

1. Put the forks approximately 1 m (3 ft) in front of the

carriage.

2. Slowly move the lift truck toward the forks until the fork pins can be installed. Install the fork pins, fork guides and the retainers.

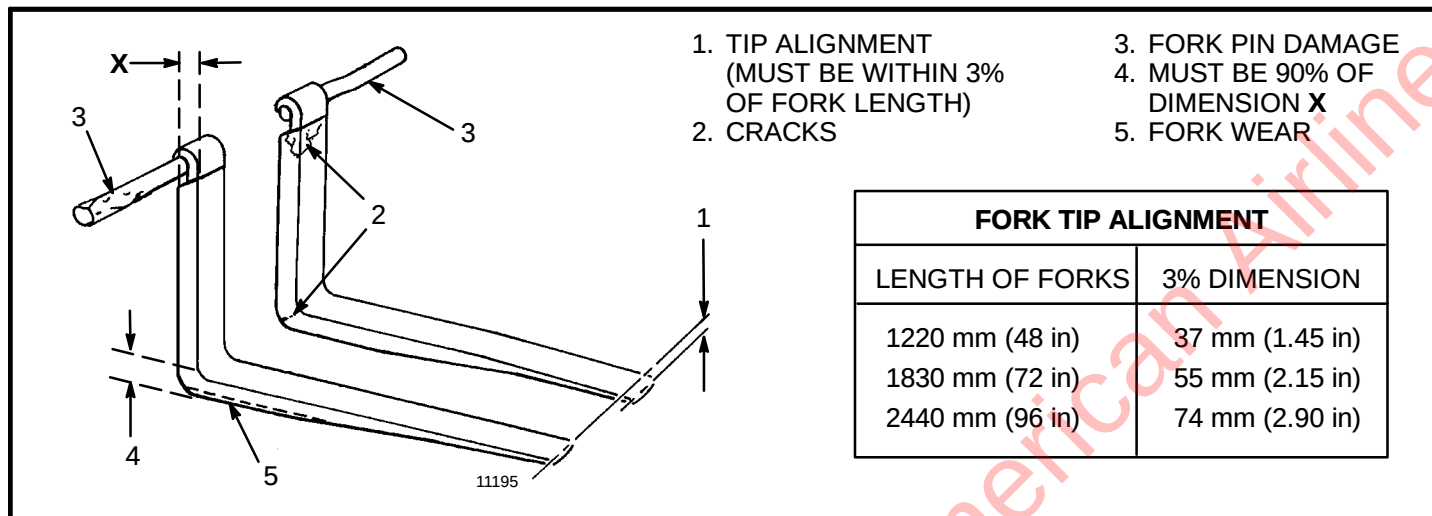


FIGURE 17. CHECK THE FORKS

Inspection Of Forks, Mast And Lift Chains (See FIGURE 17. and FIGURE 18.)

WARNING

Never work under a raised carriage, forks or mast channel. Lower the carriage or use blocks and chains on the mast weldments and carriage so that they can not move. Make sure the moving parts are attached to a part that does not move.

Do not try to correct fork tip alignment by bending the forks or adding shims. Replace damaged forks.

Never repair damaged forks by heating or welding. Forks are made of special steel using special procedures. Replace damaged forks.

1. Inspect the welds on the mast and carriage for cracks. Make sure that the nuts and bolts are tight.

2. Inspect the channels for wear in the areas where the rollers travel. Inspect the rollers for wear or damage.

3. Inspect the forks for cracks and wear. Check that the fork tips are aligned within 13 mm (0.5 in) of each other (item 1, FIGURE 17.). Check that the bottom of the fork is not worn (item 4, FIGURE 17.).

4. Replace any damaged or broken parts that are used to keep the forks locked in position.

5. Check that the lift chains are correctly lubricated. Use engine oil to lubricate the lift chains.

6. If the lift truck is equipped with a side-shift carriage or attachment, inspect the parts for cracks and wear. Make sure the parts that fasten the side-shift carriage or attachment to the carriage are in good condition.

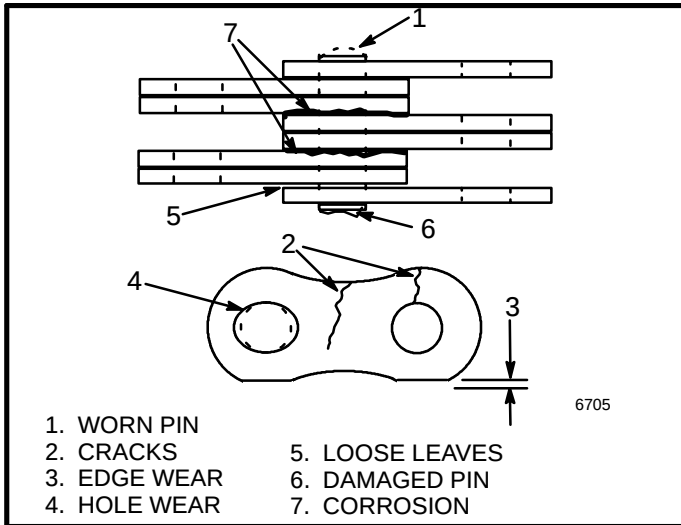


FIGURE 18. CHECK THE LIFT CHAINS

7. Inspect the lift chains for cracks or broken links and pins. See FIGURE 18.

8. Inspect the chain anchors and pins for cracks and damage.

9. Make sure the lift chains are adjusted so that they have equal tension. **Adjustment or repair of the lift chains must be done by authorized personnel.**

Tires And Wheels (See FIGURE 19.)

WARNING

Air pressure in tires can cause tire and wheel parts to explode. The explosion of wheel parts can cause serious injury or death.

Remove all of the air from the tires before the tires are removed from the lift truck.

If the air pressure is less than 80% of the correct pressure the tire must be removed before air is added. Put the tire in a safety cage when adding air pressure to the tire. Follow the procedures under **ADD AIR TO THE TIRES.**

When air is added to the tires, a remote air chuck must be used so that the person adding air can stand to the side and not in front of the tire.

Keep the tires at the correct air pressure. (See the Nameplate.) Check the air pressure with a gauge when the tires are cold. If it is necessary to add air to a tire that is warm, check one of the other tires on the same axle and add air

to the tire that has low pressure so that the air pressures are equal. The air pressure of warm tires must always be equal to or greater than air pressures specified for cold tires.

Check the tires for damage. Check the tread and remove any objects that will cause damage. Check for bent or damaged rims. Check for loose or missing hardware. Remove any wire, strapping or other material that is wrapped around the axle.

Make sure the wheel nuts are tight. Tighten the wheel nuts in a cross pattern (to the correct torque value shown in the MAINTENANCE SCHEDULE table. See FIGURE 30.

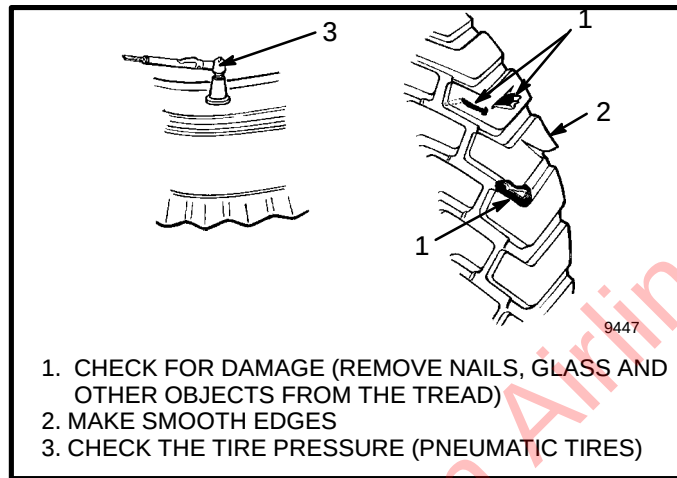


FIGURE 19. CHECK THE TIRES

⚠ CAUTION

Check all wheel nuts after 2 to 5 hours of operation when new trucks are put into operation or when wheels have been removed and installed. Tighten the nuts in a cross pattern to the correct torque value shown in the MAINTENANCE SCHEDULE table. When the nuts stay tight for eight hours, the interval for checking the torque can be extended to 150 hours.

NOTE: Whenever a wheel is removed, it will be necessary to lubricate the wheel nuts and studs. (See FIGURE 30.) Put two drops of engine oil (or other lubricant) between the flange and body of the wheel nut. Also put two drops of oil on the threads of the studs.

Operator Restraint System (See FIGURE 20.)

The seat belt, hip restraint brackets, seat and mounting are all part of the operator restraint system. Each item must be checked to make sure it is attached securely, functions correctly and is in good condition.

The seat belt must latch securely. Make sure the seat belt extends and retracts smoothly and is not damaged or torn.

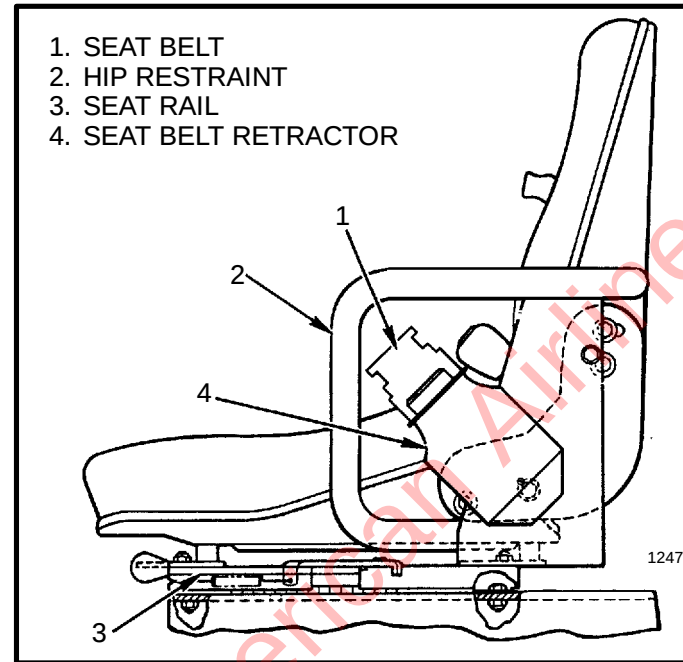


FIGURE 20. CHECK THE SEAT

Make sure the seat rails are not loose. The seat rails must lock securely in position, but move freely when unlocked.

The seat rails must be securely attached to the mounting surface.

Safety Labels

WARNING

Safety labels are installed on the lift truck to give information about operation and possible hazards. It is important that all safety labels are installed on the lift truck and can be read.

Check that all safety labels are installed in the correct locations on the lift truck. See the **PARTS MANUAL** for the correct location of the safety labels. The instructions to install the labels are also in the **PERIODIC MAINTENANCE** section

Check For Fuel, Oil And Coolant Leaks

WARNING

All fuels are very flammable and can burn or cause an explosion. Do not use an open flame to check the fuel level or to check for leaks in the fuel system. If there is a leak in the fuel system, extra care must be used during the repair. Do not operate the lift truck until a leak is repaired.

Make a visual check for leaks on and under the lift truck. If possible, find and repair the leak at the source. Leaks often indicate a need for repair of damaged or worn components. Leaks in the LPG fuel system are usually not visible unless ice is visible. There is however, usually a strong odor. Fuel leaks **MUST** be repaired **NOW**.

Check the fuel system for leaks and the condition of parts. When fuel is added to the lift truck, see the section, **How To Add Fuel To The Lift Truck**.

Also check the condition of the radiator or heater hoses that are not leaking. Soft or cracked hoses need to be replaced before a major leak occurs.

HOW TO MAKE THE CHECKS WITH THE ENGINE RUNNING

WARNING

FASTEN YOUR SEAT BELT! The seat belt is installed to help the operator stay on the truck if the lift truck tips over. IT CAN ONLY HELP IF IT IS FASTENED.

Make sure that the area around the lift truck is clear before starting the engine or making any operational checks. Be careful when making the checks. If the lift truck is stationary during a check, apply the parking brake and put the transmission in Neutral (**N**). Proceed carefully.

Gauges, Lights, Horn and Fuses

Start the engine. Check the gauges and lights for correct operation as described in TABLE 1. Check the operation of the horn.

The fuses are under the instrument panel on the left side. (See FIGURE 21.)

Control Levers And Pedals

Check that the control levers for the transmission, mast and attachment operate as described in Tables 2 and 3.

Check that the pedals operate as described in Table 2.

Transmission Oil (See FIGURE 22.)

Apply the parking brake. Check the oil level in the power-shift transmission when the engine is running at idle speed and, if equipped, the direction control lever is in the **N** (NEUTRAL) position. Use the correct oil as shown in the Maintenance Schedule. Keep the oil level at the "FULL" mark on the dipstick.

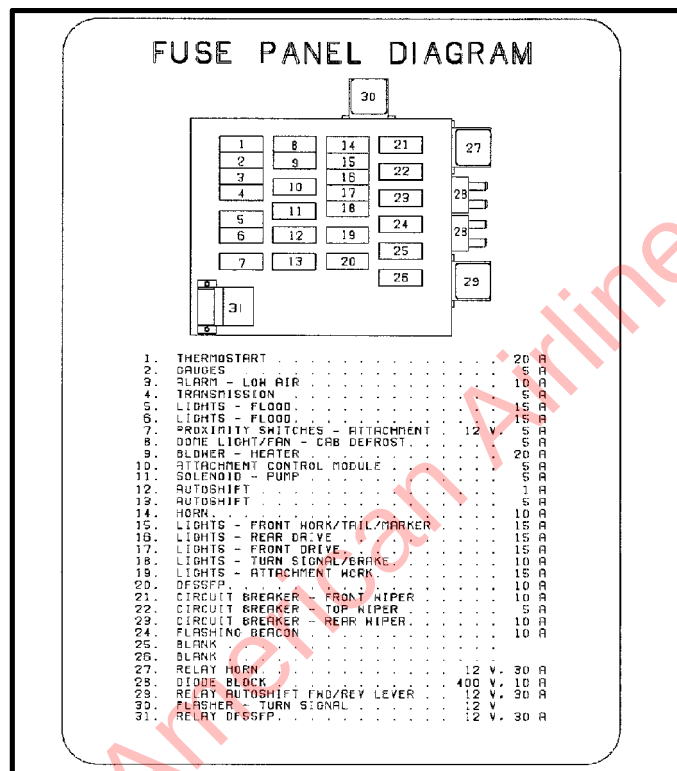


FIGURE 21. FUSES

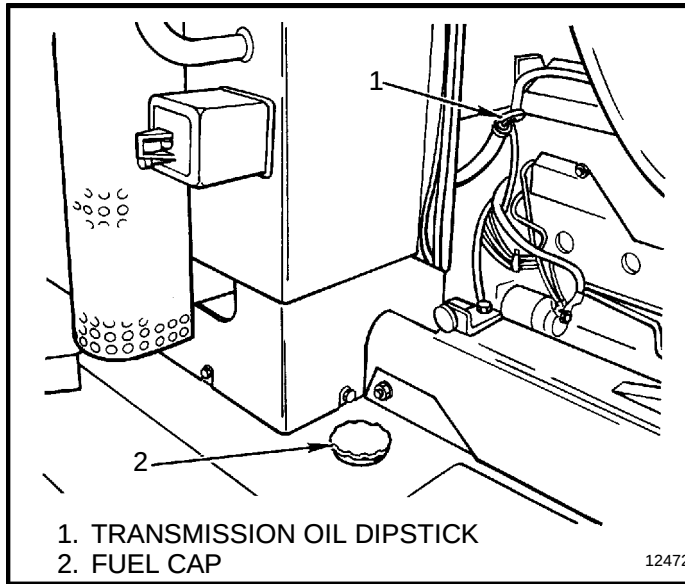


FIGURE 22. TRANSMISSION OIL

Lift System Operation

⚠ WARNING

Lower the lift mechanism completely. Never allow anyone under a raised carriage. Do not put any part of your body in or through the lift mechanism unless all parts of the mast are completely lowered and the engine is STOPPED.

If the mast cannot be lowered, use chains on the mast weldments and carriage so that they can not move. Make sure the moving parts are attached to a part that does not move. See the PERIODIC MAINTENANCE section that was included with your lift truck for additional information.

Do not try to locate hydraulic leaks by putting hands on pressurized hydraulic components. Hydraulic oil can be injected into the body by pressure.

Do the following checks and inspections:

- a. Check for leaks in the hydraulic system. Check the condition of the hydraulic hoses and tubes.
- b. Slowly raise and lower the mast several times without a load. Raise the mast to its full extension height at least once. The mast components must raise and lower smoothly in the correct sequence.

NOTE: Some parts of the mast move at different speeds during raising and lowering.

- c. The inner weldment and the carriage must lower completely.
- d. Raise the mast one metre (three feet) with a capacity load. The inner weldment and the carriage must raise smoothly. Lower the mast. All moving components must lower smoothly.
- e. Lower the load to approximately 0.3 metre (one foot) from the floor. Tilt the mast forward and backward. The mast must tilt smoothly and both tilt cylinders must stop evenly.

- f. Check that the controls operate the functions of the attachment correctly. (See the symbols next to each of the controls.) Make sure all of the hydraulic lines are connected correctly and do not leak.

Brakes

Check that the service and parking brakes operate correctly. The service brakes must apply when the brake pedal is depressed. The parking brake must apply or release with the knob movement described on page 14. On lift trucks with a Monotrol pedal, applying the parking brake puts the transmission in NEUTRAL.

NOTE: Full application of the inching/brake pedal applies the service brakes and disengages the transmission.

Steering System



WARNING

The lift truck has hydraulic power steering. The steering can be difficult if the engine is not running.

Make sure the steering system operates smoothly and gives good steering control.

Steering Column Latch

Make sure the latch for the steering column operates correctly. The latch must NOT allow the column to move unless the latch is released.

HOW TO ADD FUEL TO THE LIFT TRUCK

WARNING

Stop the engine. Turn the key switch to OFF. The operator must be off of the lift truck while fuel is added.

No smoking.

All fuels for internal combustion engines are very flammable.

Fill the fuel tank only in a designated area with good ventilation. Have a fire extinguisher available.

Never fill the fuel tank near an open flame or near equipment that can create sparks. Never check fuel level or check for leaks with an open flame.

Breathing fuel vapor may cause nausea, unconsciousness or death. Long term exposure to gasoline vapors may cause liver or kidney damage and cancer. Avoid breathing vapor.

Diesel Fuel

1. Remove the fuel cap. Make sure the fuel tank is filled with the correct fuel for the type of engine in the lift truck. Clean the fuel cap.

2. Replace the fuel cap.

WARNING

When adding fuel, keep the funnel or fuel nozzle in contact with the metal of the fuel tank to reduce the possibility of static electric sparks. Clean any spilled fuel.

Liquefied Petroleum Gas (LPG)

WARNING

Close the fuel valve on the tank when parking the lift truck more than momentarily. Do not park the lift truck near heat or ignition sources.

Do not store LPG tanks near heat or an open flame. For complete instructions on the storage of LPG fuels, refer to ANSI/NFPA 58 & 505.

LPG is extremely flammable. When checking or filling an LPG tank: No smoking. Stop engine.

Frost on the surface of the tank, the valves or fittings and the odor of LPG fuel indicates a leak. Inspect the LPG system and repair a leak immediately. An LPG fuel leak creates an explosion and fire hazard. Do not attempt to start the engine if there is a leak in the LPG fuel system.

Only trained and authorized personnel are permitted to operate filling equipment.

Use only the LPG tank indicated on the label on the tank bracket. Do not use an LPG tank that is damaged. A damaged LPG tank must be removed from service.

WARNING

LPG tanks are heavy. The weight of an LPG tank can exceed the maximum recommended weight for safe lifting by an individual. Get assistance when lifting or lowering an LPG tank. Use correct lifting procedures. Fill LPG tanks outdoors. Stay at least 15 meters (50 feet) from buildings, motor vehicles, electrical equipment or other ignition sources. Stay at least 5 meters (15 feet) from LPG storage tanks.

Use the following procedure to remove the LPG tank:

- a. Removable LPG tanks can be replaced indoors only if the lift truck is a minimum of 8 meters (25 feet) from any open flame or ignition source.
- b. Move the lift truck to the area where LPG tanks are changed.
- c. See FIGURE 23. Turn the fuel valve clockwise until the fuel valve is completely closed.
- d. Run the engine until it stops, then turn the key switch to the **OFF** position.
- e. Disconnect the tank at the quick disconnect fitting.

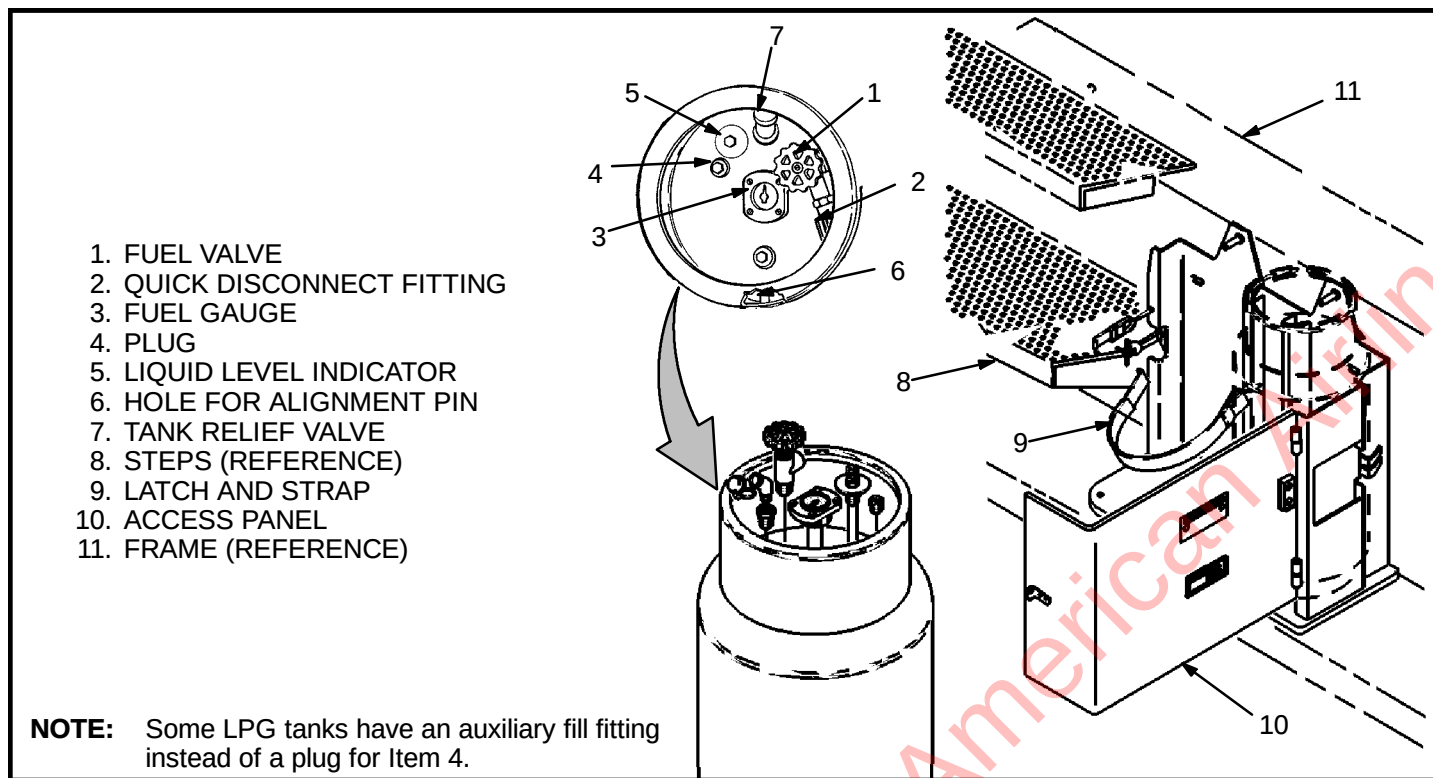


FIGURE 23. LPG TANK

- f. Release the latch that holds the LPG tank in its bracket. Remove the LPG tank from the bracket.

Use the following procedure to install the LPG tank:

- a. Before the LPG tank is installed on the lift truck, check the operation of the fuel gauge. Look at the fuel gauge and move the tank. If the gauge needle does not move, a new tank must be installed.

WARNING

Make sure the alignment pin extends through the correct hole in the rim of the LPG tank. See FIGURE 23. The hose or the fittings can be damaged if the LPG tank is not installed in the correct position. A damaged hose or fitting can release LPG fuel and cause an explosion and fire hazard.

- b. Install the LPG tank in its bracket so that the alignment pin is in the correct hole as shown in FIGURE 23. Close the latch on the tank bracket.
- c. Connect the quick disconnect fitting to the fuel valve on the LPG tank. Use your hand to tighten the fitting.

- d. Turn the fuel valve counterclockwise to open the fuel valve.

- e. Inspect the fuel system for leaks when the fuel valve is open. Frost on the surface of the tank, valves or fittings or a strong odor of LPG fuel indicates a leak.

Use the following procedure to fill the LPG tank:

WARNING

Read and follow all the refuelling precautions and instructions under Liquefied Petroleum Gas (LPG).

NOTE: The following instructions are general procedures. There is a variation in equipment for filling LPG tanks. The local authorities that have jurisdiction have specific rules and regulations for filling LPG tanks. Make sure these rules and regulations are available and understood.

- a. Check the LPG tank to make sure it needs filling. During the fill operation, the LPG tank must be in a position so that the liquid level indicator will always be in the vapor space above the liquid level. See FIGURE 23.

- b. Open the liquid outlet valve and by-pass return valve on the storage tank.
- c. Start the pump.
- d. Connect the supply hose to the quick disconnect fitting on the LPG tank. If the LPG tank has an auxiliary fill fitting, connect the supply hose to this fitting. Make sure the correct adapter is used to connect the supply hose to the auxiliary fill fitting.
- e. Open the vent valve on the liquid level indicator.
- f. Open the fuel valve on the LPG tank.
- g. Open the valve on the end of the supply hose.
- h. Watch for a discharge from the vent valve on the liquid level indicator. When a cloud of visible vapor appears, the LPG tank is full. Do not fill the LPG tank more than the maximum level indicated by the liquid level indicator. Immediately close the valve at the end of the supply hose.
- i. Close the vent valve on the LPG tank.

- j. Close the fuel valve on the LPG tank.
- k. Disconnect the supply hose.
- l. Stop the pump.
- m. Close the liquid outlet valve and the by-pass return valve on the storage tank.

TIRES AND WHEELS



WARNING

The type of tire and tire pressure (pneumatic tires) are shown on the nameplate. Make sure the nameplate is correct for the type of tires on the lift truck.

Some models of lift trucks can be equipped with pneumatic tires or solid rubber tires that look like pneumatic tires. These variations in the tires also cause a variation in the types of wheels and the disassembly and assembly procedures. See FIGURE 24. The procedures for solid rubber tires that look like pneumatic tires are described later in this section.

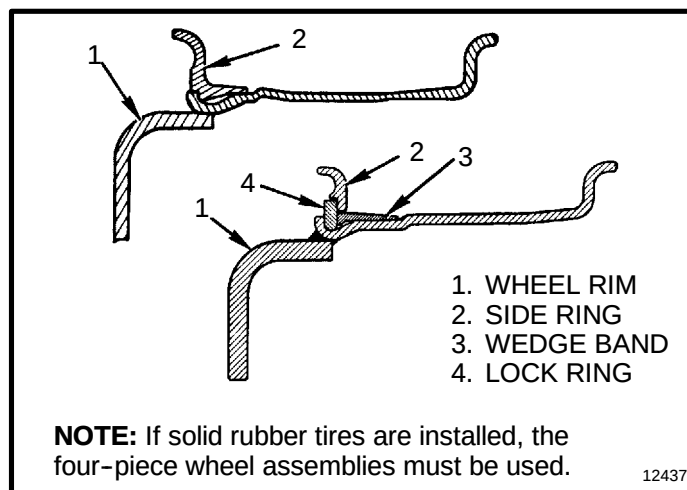


FIGURE 24. TYPES OF WHEELS

Remove The Wheels From The Lift Truck

⚠ WARNING

Wheels must be changed and tires repaired by trained personnel only.

Always wear safety glasses.

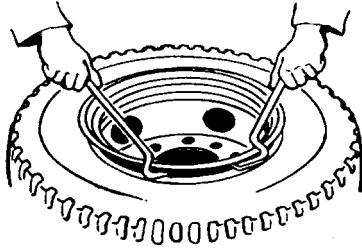
Completely remove the air pressure from the tire before it is removed from the lift truck. If dual wheels are installed, remove the air pressure from both tires. Air pressure in the tires can cause the tire and rim to explode causing serious injury or death.

1. Raise the lift truck as described in **How To Put a Lift Truck On Blocks** in this manual.

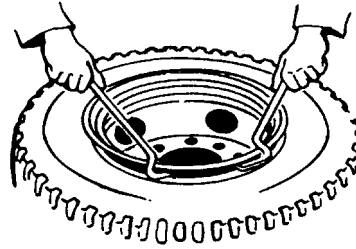
2. Remove the air from the tire. Remove the valve core to make sure that all of the air is out of the inner tube. Push a wire through the valve stem to make sure that the valve stem does not have a restriction. If dual tires are installed, remove the air pressure from both tires.



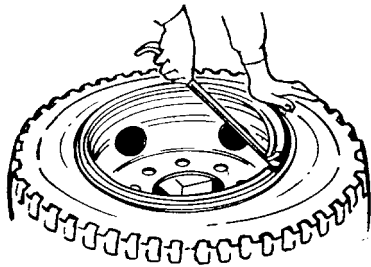
SEE WARNINGS



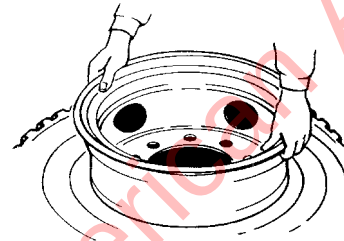
STEP 1. Loosen the tire bead from the side ring and/or lock ring.



STEP 3. Turn the tire over. Separate the tire from the wheel rim.



STEP 2. Put the tire tool into the slot between the side ring and/or lock ring and the wheel rim. Remove the side ring and/or lock ring.



STEP 4. Remove the wheel rim from the tire. Remove the inner tube and flap.

12455

FIGURE 25. REMOVE THE TIRE FROM THE WHEEL

3. Remove the wheel nuts and remove the wheel from the lift truck. Be careful not to damage the studs when removing the wheels. Lift truck wheels are heavy.

Pneumatic Tires, Remove The Tire From The Wheel (See FIGURE 25.)

NOTE: When disassembling the wheels, see FIGURE 24. There are two types of wheels used on this series of lift trucks.

WARNING

Completely remove the air pressure from the tire before it is removed from the lift truck. If dual wheels are installed, remove the air from both tires. Air pressure in the tires can cause the tire and rim to explode causing serious injury or death.

Keep tire tools in firm contact with the wheel. If the tool slips, it can move with enough force to cause serious injury.

Pneumatic Tires, Install The Tire On The Wheel (See FIGURE 26.)

NOTE: When assembling the wheels, see FIGURE 24. There are two types of wheels used on this series of lift trucks.

WARNING

Failure to follow the procedures can cause the wheel assembly to explode and cause injury or death.

Clean and inspect all parts of the wheel before installing the tire. DO NOT use any damaged or repaired wheel parts. Wheels that have been repaired can explode when air pressure is added to the tire or during operation. Make sure that all parts of the wheel are the correct parts for the wheel assembly. Do not mix parts between different types or manufacturers of wheels. Do not mix type of tires, type of tire tread or wheel assemblies of different manufacturers on any one lift truck.

Do not use a steel hammer on the wheel. Use a rubber, lead, plastic or brass hammer to put parts together. Make sure that the side ring is in the correct position. The ends of the side ring must not touch. The clearance at the ends of the side ring must be 2.5 to 6.5 mm (0.1 to 0.25 in) after air pressure is added to the tire. If the clearance is wrong, the wrong part has been used.

1. Clean and inspect all parts of the wheel. If the wheel has rust or corrosion, remove loose rust and corrosion and paint the parts.

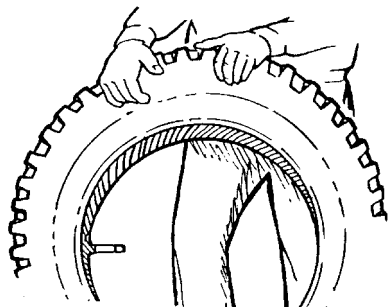
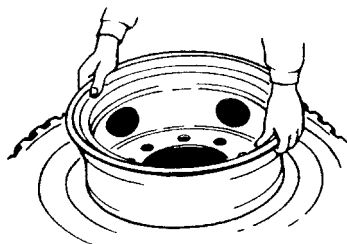
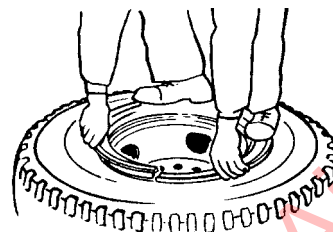
2. Install a new inner tube and flap in the tire. Inner tubes and flaps that have been used in earlier service can cause tire failure. (Some inner tubes also require a backup washer on the valve stem.)

WARNING

Do not lubricate the tire bead with anti-freeze or petroleum based liquid. Vapors from these liquids can cause an explosion when air pressure is added or when the tire is in use.

3. Apply a rubber lubricant or a soap solution to the tire bead and tube.

4. Make sure that the rim is the correct size for the tire. Lubricate the parts of the rim that engage the bead and flap.

**SEE WARNINGS****STEP 1.** Install the inner tube and the flap in the tire.**STEP 2.** Install the wheel rim in the tire. Make sure the stem of the inner tube is aligned with the slot in the rim.**STEP 3.** Turn over the rim and tire. Put a block under the rim so that the rim is 8 to 10 cm (3 to 4 inches) above the floor. If used, install the wedge band. Install the side ring and/or the lock ring.

12455

FIGURE 26. INSTALL THE TIRE ON THE WHEEL

Add Air To The Tires (See FIGURE 27.)

⚠ WARNING

Add air pressure to the tires only in a safety cage. Inspect the safety cage for damage before use. When air pressure is added to the tire, use a chuck that fastens onto the valve stem of the inner tube. Make sure there is enough air hose to permit the operator to stand away from the safety cage when air pressure is added to the tire.

Do not sit or stand by the safety cage. Do not use a hammer to try and correct the position of the side ring and/or lock ring when the tire has air pressure greater than 20 kPa (3 psi).

1. Put the tire in a safety cage.
2. Add 20 kPa (3 psi) of air pressure to the tire.
3. Check that all wheel parts are correctly installed. Hit the side ring and/or lock ring lightly to make sure that it is in the seat.
4. If installation is correct, add air pressure to the tire. The correct pressure is shown on the nameplate.

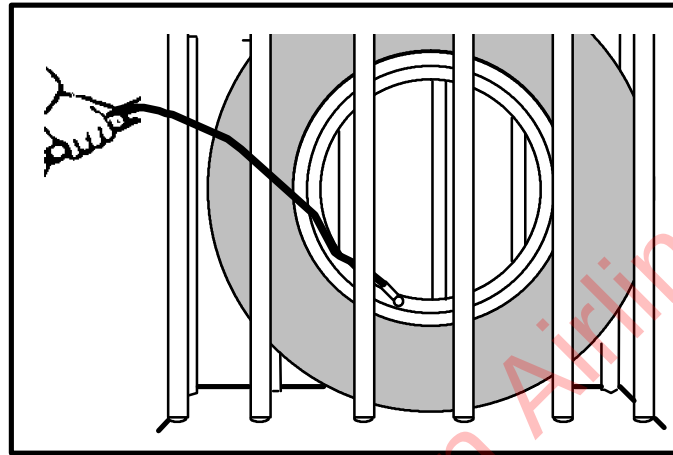


FIGURE 27. ADD AIR TO THE TIRES

5. Check that all wheel parts are correctly installed. If installation is not correct, remove all of the air pressure from the tire. Remove the valve core to make sure all of the air pressure has been removed and make adjustments. The clearance at the ends of the side ring and/or lock ring will be 13 to 25 mm (0.5 to 1.0 in) when the tire has the correct air pressure.

Solid Rubber Tires, Remove The Tire From The Wheel (See FIGURE 28.)

NOTE: When disassembling the wheels, see FIGURE 24. There are two types of wheels used on this series of lift trucks.

⚠ WARNING

Keep tire tools in firm contact with the wheel. If the tool slips, it can move with enough force to cause serious injury.

Solid Rubber Tires, Install The Tire On The Wheel (See FIGURE 29.)

NOTE: See Figure 24 when assembling the wheels. There are two types of wheels used on this series of lift trucks. The four-piece wheel must be used with solid rubber tires. Some solid rubber tires will not allow the wedge band to be installed. If necessary, install the side ring and the lock ring only.

⚠ WARNING

Failure to follow these procedures will cause damage to the tire and wheel assembly and can cause injury or death.

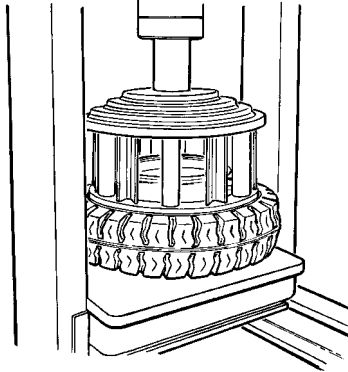
Clean and inspect all parts of the wheel before installing the tire. **DO NOT** use any damaged or repaired wheel parts. Make sure that all parts of the wheel are the correct parts for the wheel assembly. Do not mix parts between different types or manufacturers of wheels. Do not mix type of tires, type of tire tread or wheel assemblies of different manufacturers on any one lift truck.

Do not use a steel hammer on the wheel. Use a rubber, lead, plastic or brass hammer to put parts together. Make sure that the side ring is in the correct position. The ends of the side ring must not touch. The clearance at the ends of the side ring and/or lock ring will be 13 to 25 mm (0.5 to 1.0 in) when the tire parts have been installed correctly. If the clearance is wrong, the wrong part has been used.

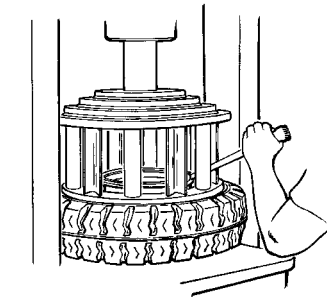
Keep tire tools in firm contact with the wheel. If the tool slips, it can move with enough force to cause serious injury.


SEE WARNINGS

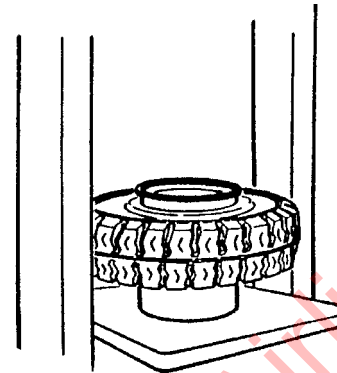
STEP 1. Put the wheel rim on the bed of the press. Put the cage in position on the tire. Use the press to push the tire away from the side flange.



STEP 2. Put the tire tool into the slot between the lock ring and the wheel rim. Remove the lock ring and side flange.



STEP 3. Turn the tire over. Put a support under the wheel rim. Make sure the wheel rim is at least 150 to 200 mm (6 to 8 inches) from the bed of the press.



STEP 4. Put the cage in position on the tire. Use the press to push the tire from the wheel rim.

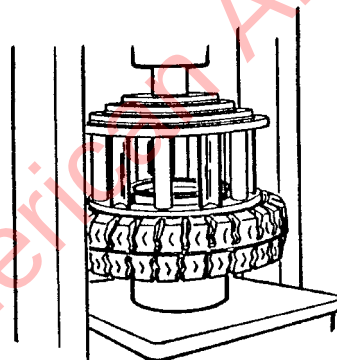


FIGURE 28. REMOVE THE TIRE FROM THE WHEEL

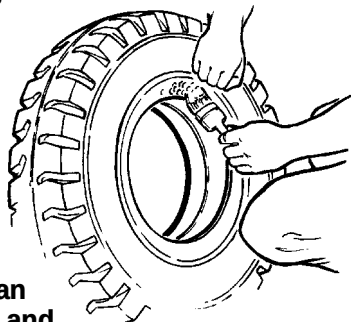
SEE WARNINGS

STEP 1. Lubricate the wheel rim and the inner surface of the tire with tire lubricant or soap.

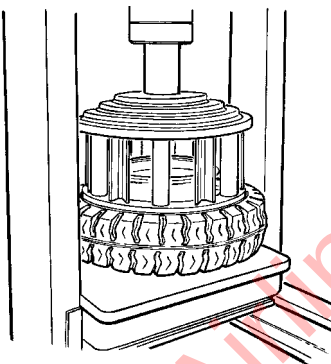
CAUTION

Too much lubricant can cause the tire to slide and move around the wheel rim.

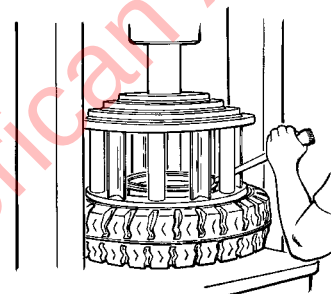
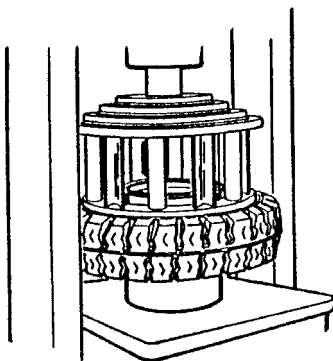
STEP 2. Put the wheel rim on the bed of the press. Put the tire over the wheel rim. Put the cage in position on the tire. Use the press to install the tire on the wheel rim.



STEP 3. Remove the cage and put the flange seat (if used), the side flange and the lock ring in position on the wheel rim. Install the cage on the tire. Use the press to push the tire onto the wheel rim so that the side flange and lock ring can be installed.



STEP 4. While the cage is holding the tire on the wheel rim, install the lock ring. Use a tire tool to make sure the lock ring is in the correct position.



12602

FIGURE 29. INSTALL THE TIRE ON THE WHEEL

Install the Wheels (See FIGURE 30.)

1. Install the wheel on the hub. When dual wheels are used, install the inner wheel so that it is tight against the brake drum. Install the outer wheel. Be careful not to damage the threads on the studs.

2. Lubricate the studs and nuts as shown in FIGURE 30. Do not get any oil on the outer surfaces of the wheel or the flange of the nut.

3. Start with the wheel nut at the top and tighten the nuts to 68 to 136 Nm (50 to 100 lbf ft) in the sequence shown. Check to make sure that the wheel(s) is tight against the hub, then tighten the nuts to 640 to 680 Nm (470 to 500 lbf ft).

WARNING

Check all wheel nuts after 2 to 5 hours of operation when new trucks are put into operation or when wheels have been removed and installed. Tighten the nuts in a cross pattern to the correct torque value shown in the MAINTENANCE SCHEDULE table. When the nuts stay tight for eight hours, the interval for checking the torque can be extended to 150 hours.

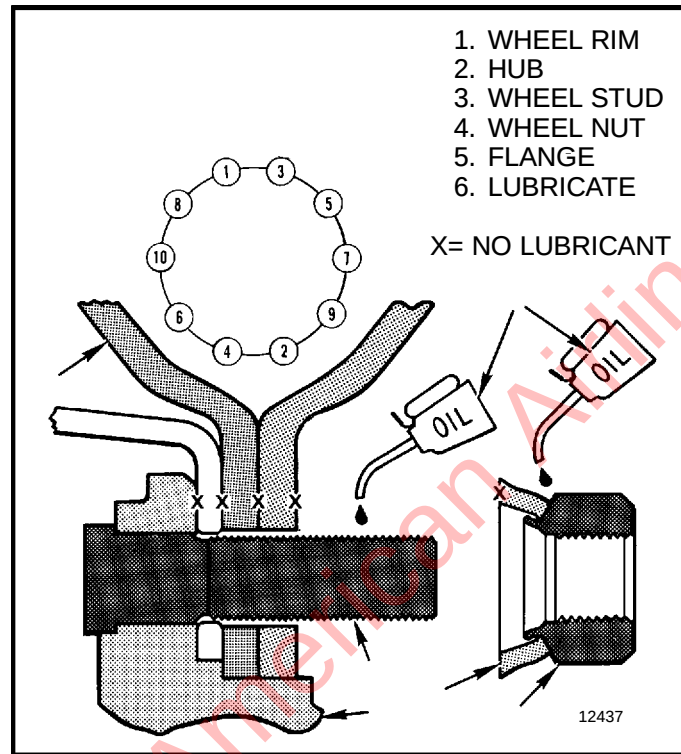


FIGURE 30. INSTALL THE WHEELS

HOW TO PUT INTERNAL COMBUSTION ENGINE (I.C.E.) TRUCKS IN STORAGE

Experience has taught that complications can arise as a result of improper handling of trucks during periods of storage.

The main areas of concern are engines, hydraulic components and truck batteries.

I.C.E. powered trucks can best be protected by being operated for a short period of time each month.

Before placing any truck in storage, you must choose an area which is clean, dry and free from airborne contaminants.

Trucks powered by I.C.E. must be started and run at 700 RPM until normal operating temperature is reached. This will coat the internal engine components with a film of oil and rid the engine of built-up condensation.

CAUTION

Do not shut down an engine before it reaches operating temperature. Engine damage can occur.

For safety and increased usable floor area, remove the forks and tag them with the truck serial number.

Prior to operating a truck each month, make a visual inspection for leaks or signs of deterioration. Take corrective action immediately. Also, check the fluid level in the radiator, hydraulic tank and brake master cylinder.

All hydraulic cylinders must be cycled several times each month to keep the seals active and to coat the interior walls with oil. Actuate each cylinder, in both directions, until it reaches the stops.

To protect the tilt cylinder rods, park your trucks with the mast tilted fully backward (cylinders retracted).

When parked with the power off, actuate each control handle to relieve hydraulic pressure.

CAUTION

Mast are to be stored fully lowered to protect cylinder rods.

Coat any exposed portion of all cylinder rods with fresh, high grade SAE 30 or 40 weight engine oil.

Install blocks, front and rear, at the drive wheels when parked - DO NOT USE THE HAND BRAKE.

HOW TO PUT BATTERIES IN STORAGE

Batteries are to be placed on a wooden pallet and stored in a dry, moderately cool area.

Lead acid batteries will slowly “self-discharge” over a period of time due to their chemical make-up. If the self-discharge is left uncontrolled, excessive sulfation can occur which is difficult to reduce and can damage the plates. A discharged battery with a specific gravity of 1.100 will freeze at -7.8°C ($+18^{\circ}\text{F}$). A fully charged battery with a specific gravity of 1.280 will freeze at -66°C (-87°F).

This “self-discharge” is due to a chemical reaction; therefore, that chemical reaction can be accelerated by heat resulting in more rapid “self-discharge”. The rate of discharge can amount to an average of about 0.001 point drop in specific gravity per day.

The following procedure can be followed when placing a battery in storage or when not in operation for more than 30 days:

- a. Give an equalizing charge prior to placing new batteries in storage. Used batteries are to be fully charged then allowed to balance for approximately three more hours.

- b. Neutralize and clean the battery. Clean with a solution of 16 ounces of baking soda to one (1) gallon of water.
- c. Store in a cool dry location.
- d. Check each cell in the battery at least once every 30 days and boost charge when specific gravity falls below 1.240.
- e. Protect batteries from ambient contamination.

If a greasy film forms on the top of a battery, this is acid and must be neutralized with the solution described above.

When a truck is to be placed in service after storage, it must be given the 150 hour inspection shown in the Recommended Schedule of Maintenance.

OPERATING PROCEDURES FOR A NEW OR REBUILT ENGINE

A new or rebuilt engine must be operated under special conditions during the first 50 hours. These special conditions prevent damage to the engine until the new parts can wear and adjust to fit each other.

1. Make sure the fluid levels of oil and coolant are correct.
2. Start and run the engine at approximately one-half throttle for 30 minutes for the first operation. Check the gauges and indicators for the correct operation during this first operating period. Check for leaks.
3. If the work conditions are slow and the loads are less than 50% of the truck capacity, a simulated work condition must be used during the first four hours of operation. Operate the lift truck with a minimum load of 75% capacity. Operate the engine through cycles from idle to full throttle and back to idle. Avoid long periods of high engine speeds with a light load during the first 50 hours of opera-

tion. High engine speeds with a light load can cause damage to the cylinders in the engine.

CHANGES TO THE OVERHEAD GUARD

WARNING

Do not operate the lift truck without the overhead guard correctly fastened to the lift truck.

Do not make changes to the overhead guard by welding. Changes that are made by welding, or by drilling holes that are too big in the wrong location, can reduce the strength of the overhead guard. See the instructions for "Changes To The Overhead Guard" in the PERIODIC MAINTENANCE section.

**"THE
QUALITY
KEEPERS"**

**HYSTER
APPROVED
PARTS**

NO MATTER HOW YOU SAY IT . . .

La Prudence Paye
La Seguridad Paga
Betriebssicherheit Macht Sich Bezahlt
Passaa Oll Huolellinen
Veiligheid Voor Alles
Säkerhet Först
Essere Sicuro Paga
Seguranca Paga
Sikkerhet Først
Pinter Be Awas

सावधान और रिन्दा रहो ।

في التأني السومة

安全第一

**SAFETY
PAYS!**

WARNING

California Proposition 65 - This product contains and/or emits chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.

10/02 (10/99) (3/99) (11/98) (5/97) (9/93) (2/91) (10/89) Printed in U.S.A.

History

5/97 - ARW

Updated Operating Manual to include GM V8-366 engine and LPG fuel system. Reformatted Maintenance section to more closely follow the revised formats of newer manuals.

11//98 - Lloyd

Revised to add Autoshift.

3/3/99 - Kevin Johnston

Added missing Fire Hazard Materials Updates and I. C. E. Storage Updates. Also updated copywrite information. Added "Changes to the Overhead Guard", "Serial Number Data" and "Support Information" sections. Changed Maintenance Section Layout to match UK version. Added "Maintenance Procedures" and "Every 8 Hours or Daily" section headers. Standardization of formatting also conducted throughout.

10/99 - Jack

Corrected autoshift details on pages 15, and 24. Added bypass unit on page 28. Added OSHA statement on page 1. Deleted reference to Operator Seat alarm buzzer on page 23 per Alan Reece review comments. Corrected formatting errors throughout. Changed illustration on page 85 to show autoshift fuses.

REVISED: 14

REISSUED: 96

11/03/99 TOTAL: 110

6/5/00 - Greg Vogel

Added change to the Operating Procedure (page 50, #7) regarding the use of the side-shift function when picking up containers. Change was done per Richard Shaber's instructions.

10/02 - Rich Bundy

Updated to include shutdown procedure for turbocharged engines.

D019/E007 Operating Manual - U.S.

H8.00-12.00XL (H165-280XL) [E007]

H13.00-16.00XL (H300-360XL) (H330-360XL-EC) [D019]

PART NO. 897342

10/02 (9/99) (5/99) (11/98) (5/97)(9/93)(2/91)(10/89)

**DO NOT PUBLISH THIS PAGE
REFERENCE ONLY**

Property of American Airlines

Writer's Notes

2/20/97 - ARW

Updated Operating Manual to include GM V8-366 engine and LPG fuel system. Reformatted Maintenance section to more closely follow the revised formats of newer manuals.

10/28/98 - Lloyd

Created this Writer's Notes page since none existed. Revising to add Autoshift. Reformatted to current format. Changed all Warnings and Cautions symbols to current format. Changed all "N.m (lbf ft)" and "N.m (lbf in)" torques to "Nm (lb_f-ft) torque" and "Nm (lb_f-in) torque" as applicable according to current practice. Added Model Code designations.

11/9/98 - Lloyd

Finished. To Chris for routing/printing.

11/11/98 - Lloyd

Made Chris and Theo's changes. Back to Chris for routing/printing.

10/11/99 - Jack

Corrected autoshift details on pages 15, and 24. Added bypass unit on page 28. Added OSHA statement on page 1. Deleted reference to Operator Seat alarm buzzer on page 23 per Alan Reece review comments. Corrected formatting errors throughout. Changed illustration on page 85 to show autoshift fuses.

D019/E007 Operating Manual - U.S .

H8.00-12.00XL (H165-280XL)

H13.00-16.00XL (H300-360XL)

PART NO. 897342

9/99 (5/99) (11/98) (5/97)(9/93)(2/91)(10/89)

**DO NOT PUBLISH THIS PAGE
REFERENCE ONLY**