

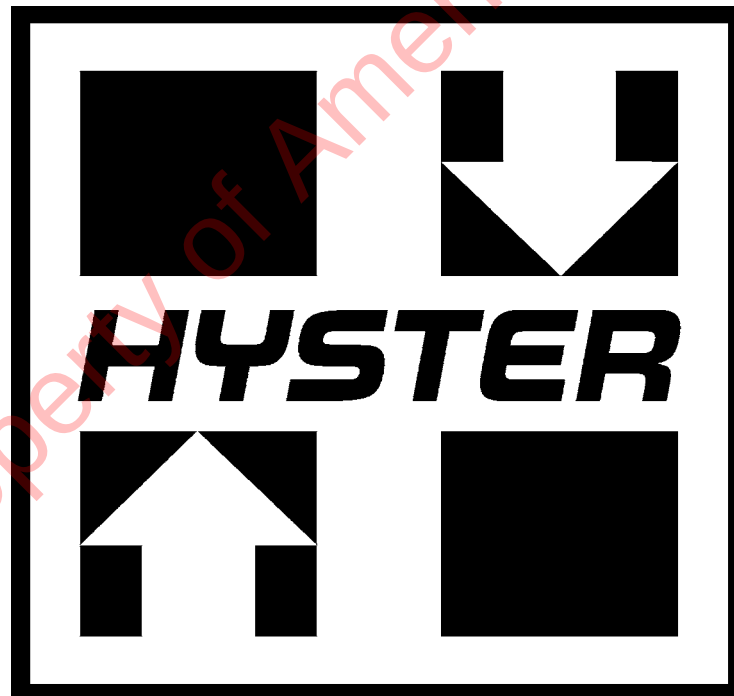
# OPERATING MANUAL

## CHALLENGER

H70XL, **H80XL**, H90XLS, H90XL, H100XL,  
H110XL (G005)

H135XL, H135XL<sub>2</sub>, H155XL, H155XL<sub>2</sub>, H155XLS  
(F006, G006)

**DO NOT REMOVE THIS MANUAL FROM THIS UNIT**



HYSTER COMPANY

PART NO. 897364

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

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# HYSTER

## FOREWORD

### 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 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.

**HYSTER**

## **FOREWORD**

**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: Industrial Truck Standards Development Foundation, ITSDF 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).

**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!**

# HYSTER

## CONTENTS

### CONTENTS

|                                         |           |                                                            |           |
|-----------------------------------------|-----------|------------------------------------------------------------|-----------|
| <b>FOREWORD</b> .....                   | <b>1</b>  | Driving And Direction Changes .....                        | 38        |
| <b>CONTENTS</b> .....                   | <b>3</b>  | Operator Presence System .....                             | 39        |
| <b>MODEL DESCRIPTION</b> .....          | <b>9</b>  | Inching .....                                              | 40        |
| GENERAL .....                           | 9         | Steering (Turning) .....                                   | 40        |
| OPERATOR PROTECTION EQUIPMENT .....     | 10        | Load Handling, General .....                               | 42        |
| NAMEPLATE .....                         | 10        | Load Handling, Lifting, Lowering, And Tilting ..           | 43        |
| SAFETY LABELS .....                     | 11        | Load Handling,<br>How To Engage And Disengage A Load ..... | 46        |
| INSTRUMENTS AND CONTROLS .....          | 19        | Load Handling, Traveling .....                             | 48        |
| <b>OPERATING PROCEDURES</b> .....       | <b>29</b> | <b>HIGHWAY TRUCKS, RAILROAD CARS AND</b>                   |           |
| GENERAL .....                           | 29        | <b>DOCKS</b> .....                                         | 51        |
| Know Your Lift Truck .....              | 29        | <b>ATTACHMENTS</b> .....                                   | 52        |
| Stability and Center Of Gravity .....   | 29        | <b>STOPPING</b> .....                                      | 53        |
| Capacity (Weight and Load Center) ..... | 30        | <b>PARKING</b> .....                                       | 53        |
| INSPECTION BEFORE OPERATION .....       | 31        | <b>MAINTENANCE</b> .....                                   | <b>55</b> |
| Checks With the Engine Stopped .....    | 31        | GENERAL .....                                              | 55        |
| Starting Procedures .....               | 32        | HOW TO MOVE A DISABLED LIFT TRUCK .....                    | 56        |
| Gasoline Or LPG Engine .....            | 32        | How To Tow The Lift Truck .....                            | 56        |
| Diesel Engine .....                     | 33        | HOW TO PUT A LIFT TRUCK ON BLOCKS .....                    | 57        |
| Checks With the Engine Running .....    | 34        | How To Raise The Drive Tires .....                         | 57        |
| OPERATING TECHNIQUES .....              | 35        | How To Raise The Steering Tires .....                      | 58        |
| Basic Operating Procedures .....        | 35        | HOW TO MAKE THE CHECKS WITH THE ENGINE                     |           |
|                                         |           | STOPPED .....                                              | 75        |

## CONTENTS

**HYSTER**

|                                                 |    |                                            |     |
|-------------------------------------------------|----|--------------------------------------------|-----|
| Hydraulic System Oil .....                      | 75 | Lift System Operation .....                | 98  |
| Engine Oil .....                                | 75 | Inching/Brake Pedal .....                  | 98  |
| Air Filter .....                                | 75 | Service Brakes .....                       | 99  |
| Drive Belts .....                               | 78 | Parking Brake .....                        | 99  |
| Cooling System .....                            | 78 | Steering System .....                      | 99  |
| Fuel System .....                               | 79 | HOW TO ADD FUEL TO THE LIFT TRUCK .....    | 100 |
| Primary Fuel Filter, Diesel Engine .....        | 79 | Liquified Petroleum Gas (LPG) .....        | 100 |
| Battery .....                                   | 80 | Gasoline or Diesel Fuel .....              | 103 |
| Tires and Wheels .....                          | 80 | WHEELS AND TIRES .....                     | 104 |
| Forks .....                                     | 82 | How To Repair A Pneumatic Tire .....       | 104 |
| Forks, Adjustment .....                         | 82 | Remove The Wheels From The Lift Truck .... | 104 |
| Forks, Removal And Installation .....           | 85 | Remove The Wheel From The Tire .....       | 105 |
| Inspection of Forks, Mast and Lift Chains ..... | 86 | Install The Wheel In The Tire .....        | 109 |
| Safety Labels .....                             | 89 | Add Air To The Tires .....                 | 111 |
| Operator Restraint System .....                 | 89 | Install The Wheels .....                   | 112 |
| Automatic Locking Retractor (ALR) .....         | 91 | INSTALLATION PROCEDURES, DUAL DRIVE        |     |
| Emergency Locking Retractor (ELR) .....         | 91 | WHEELS .....                               | 113 |
| HOW TO MAKE THE CHECKS WITH THE ENGINE          |    | PNEUMATIC TUBELESS TIRE, REPAIR .....      | 114 |
| RUNNING .....                                   | 92 | Remove Tire From Lift Truck .....          | 114 |
| Gauges, Lights, Horn and Fuses .....            | 93 | Remove Tire From Wheel .....               | 115 |
| Oil Level, Powershift Transmission .....        | 96 | Install Tire on Wheel .....                | 117 |
| Oil Level, Oil Clutch System, H70-110XL ....    | 96 | Add Air to Pneumatic Tubeless Tire .....   | 122 |
| Control Levers and Pedals .....                 | 97 | Install the Wheels .....                   | 123 |
|                                                 |    | SOLID RUBBER TIRES .....                   | 123 |

# **HYSTER**

## **CONTENTS**

|                                                           |     |
|-----------------------------------------------------------|-----|
| Remove The Tire From The Wheel .....                      | 123 |
| Install The Tire On The Wheel .....                       | 125 |
| OPERATING PROCEDURES FOR A NEW OR<br>REBUILT ENGINE ..... | 127 |

Property of American Airlines

## MODEL DESCRIPTION

# HYSTER

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

### **WARNING**

**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.

Standup Rider  
Forklift Trucks  
4/91

#### **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.

## **WARNING**

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## MODEL DESCRIPTION

# HYSTER

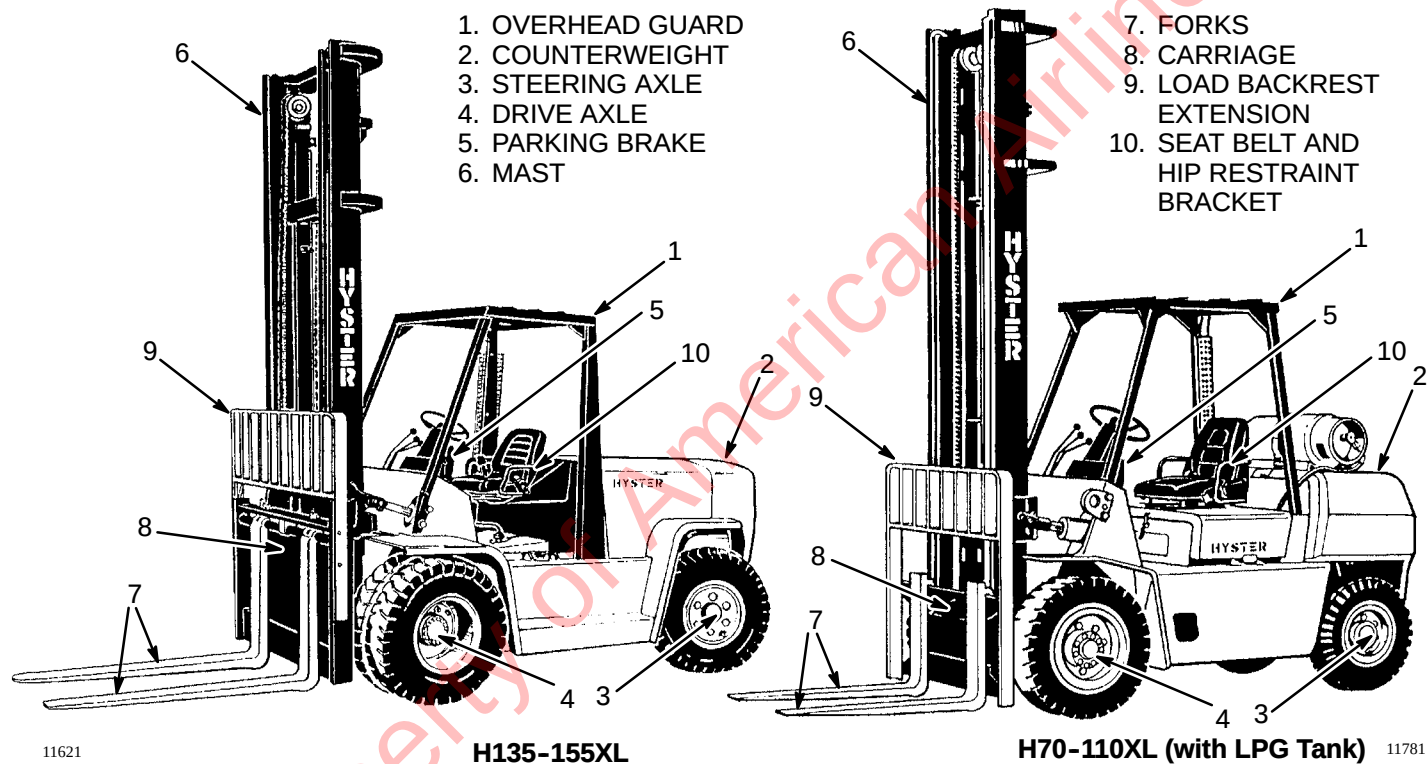


FIGURE 1. MODEL VIEW SHOWING MAJOR COMPONENTS

# HYSTER

## MODEL DESCRIPTION

### MODEL DESCRIPTION

#### GENERAL

This Operating Manual is for the following models of lift trucks:

- the **H70-110XL (G005) series** includes the H70XL, H80XL, H90XLS, H90XL, H100XL, and H110XL
- the **H135-155XL (F006, G006) series** includes the H135XL, H135XL<sub>2</sub>, H155XL, H155XL<sub>2</sub>, and H155XLS.

The H70-110XL and the H135-155XL series of lift trucks are available with an engine that uses gasoline or LPG fuel, or a diesel engine.

Some later production lift trucks quipped with gasoline engines have an electronic engine control (electronic spark timing and fuel injection). These lift trucks can also have a steering pod that allows the operator to select one of five different positions for the steering wheel.

The **H70-110XL** lift trucks can have either a three-speed manual transmission or a single-speed powershift trans-

mission. The single-speed powershift transmissions can be equipped with two kinds of controls:

- a MONOTROL® pedal that controls both the forward and reverse operation of the powershift transmission and the speed of the engine.
- a direction control lever near the left side of the steering wheel that controls the forward and reverse operation of the powershift transmission. A separate accelerator pedal controls the engine speed.

The **H135-155XL** lift trucks can have either a four-speed manual transmission with an oil clutch (F006 models only) or a two-speed powershift transmission. A range selector lever near the right side of the operator's seat controls the four speed ranges of the manual transmission. A range selector lever near the left side of the steering column controls the two speed ranges of the powershift transmission. The two-speed powershift transmissions can be equipped with two kinds of controls:

- a MONOTROL® pedal that controls both the forward and reverse operation of the powershift transmission and the speed of the engine.

**HYSTER**

## MODEL DESCRIPTION

- a direction control lever near the left side of the steering wheel that controls the forward and reverse operation of the powershift transmission. A separate accelerator pedal controls the engine speed.

## OPERATOR PROTECTION EQUIPMENT

The LOAD BACKREST EXTENSION is installed to keep loose parts of the load from falling back toward the operator. It must be high enough, with openings small enough to prevent the parts of the load from falling backwards. If a load backrest extension that is different from the one installed on your lift truck is required, contact your dealer for HYSTER lift trucks.

The OVERHEAD GUARD is intended to offer reasonable protection to the operator from falling objects, but can not protect against every possible impact. Therefore, it must not be considered a substitute for good judgment and care when handling loads. Do not remove the overhead guard.

The SEAT BELT AND HIP RESTRAINT BRACKET provide additional means to help the operator keep the head and torso substantially within the confines of the lift truck frame and overhead guard if a tipover occurs. This re-

straint 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

### WARNING

**Any change to the lift truck, the tires or its equipment can change the lifting capacity. If the Nameplate does not show the maximum capacity, or if the lift truck equipment, including the battery for electric trucks, does not match that shown on the Nameplate, the lift truck must not be operated.**

The capacity is specified in kilograms (kg) and pounds (lb). The capacity is the maximum load that the lift truck can handle for the load condition shown on the Nameplate.

The maximum capacity for the lift truck, at full load height, must be shown on the Nameplate. Special capacities with

# HYSTER

## MODEL DESCRIPTION

the load height reduced or with optional load centers, may also be shown on the Nameplate.

The lift truck serial number code is on the Nameplate. The serial number code is also stamped on the lift truck frame.

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 label, do not operate the lift truck. Contact your dealer for HYSTER lift trucks to obtain a complete nameplate.

## 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.

**WARNING**  
Trained Operators and Mechanics only  
Read Operating Manual located on or near seat.  
Failure to follow operating, inspection, and maintenance instructions can cause serious injury or death.  
CAPACITY WITH MAST VERTICAL AND EQUIPPED AS SHOWN

**Lift Truck Model**  
Serial Number  
Sales Order  
Attachment  
Truck Weight kg ( lb)  
Tire Front Rear  
Size  
Pressure  
Tread Width mm ( in)  
Load Height Dim. A mm ( in)  
Load Center Dim. B mm ( in) Dim. C mm ( in)  
MAXIMUM CAPACITY kg ( lb) ( mm ( in) ) ( mm ( in) ) ( mm ( in) )  
HO190005

NAMEPLATE

**HYSTER TRUCK MODEL**  
Serial no.  
Approx. weight  
**NOTICE TO USER**  
This unit was shipped incomplete from factory/  
The U.S.A. Occupational Safety and Health Act of 1970 and other national safety codes require the installation of a completed nameplate showing unit configuration and rated capacity. Completed nameplates may be obtained through your HYSTER dealer.

LABEL

FIGURE 2. NAMEPLATE AND LABEL

## MODEL DESCRIPTION

# HYSTER

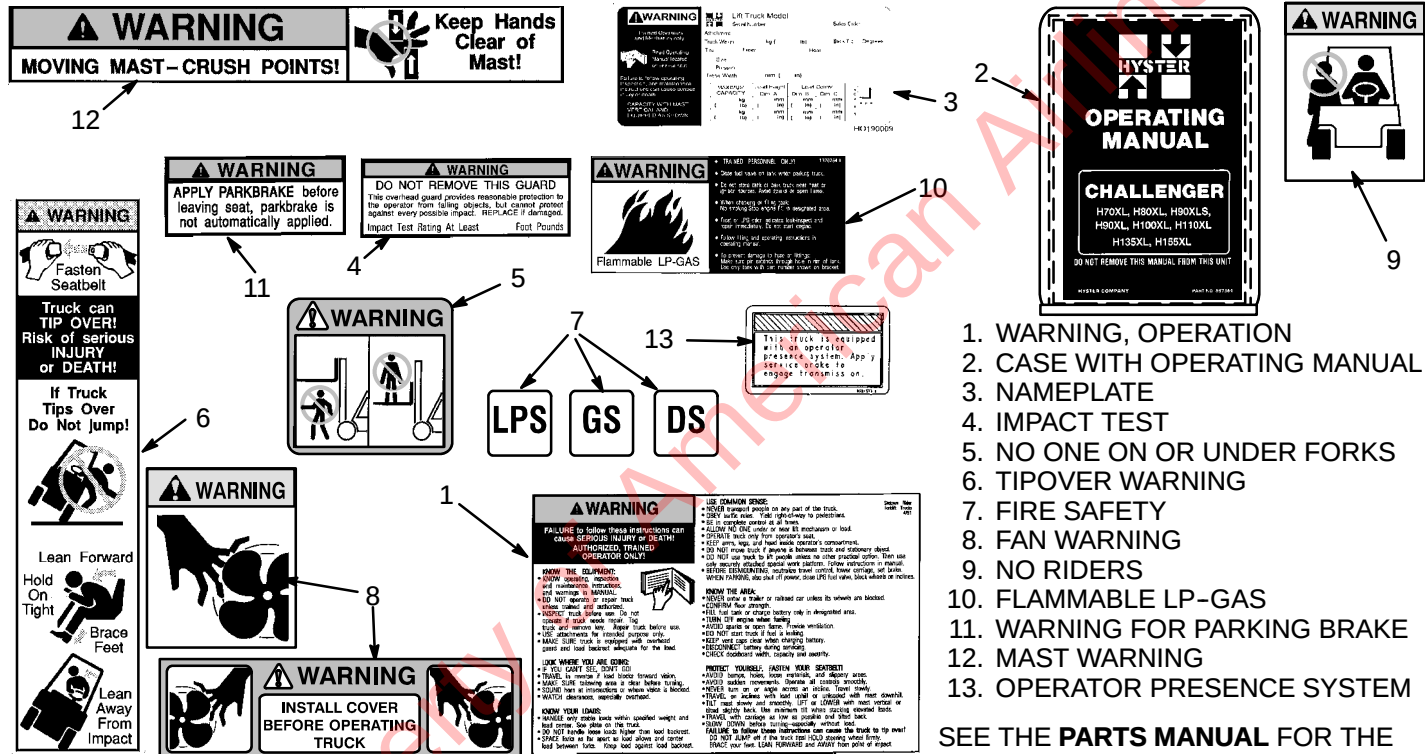


FIGURE 3. WARNING AND SAFETY LABELS

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## MODEL DESCRIPTION

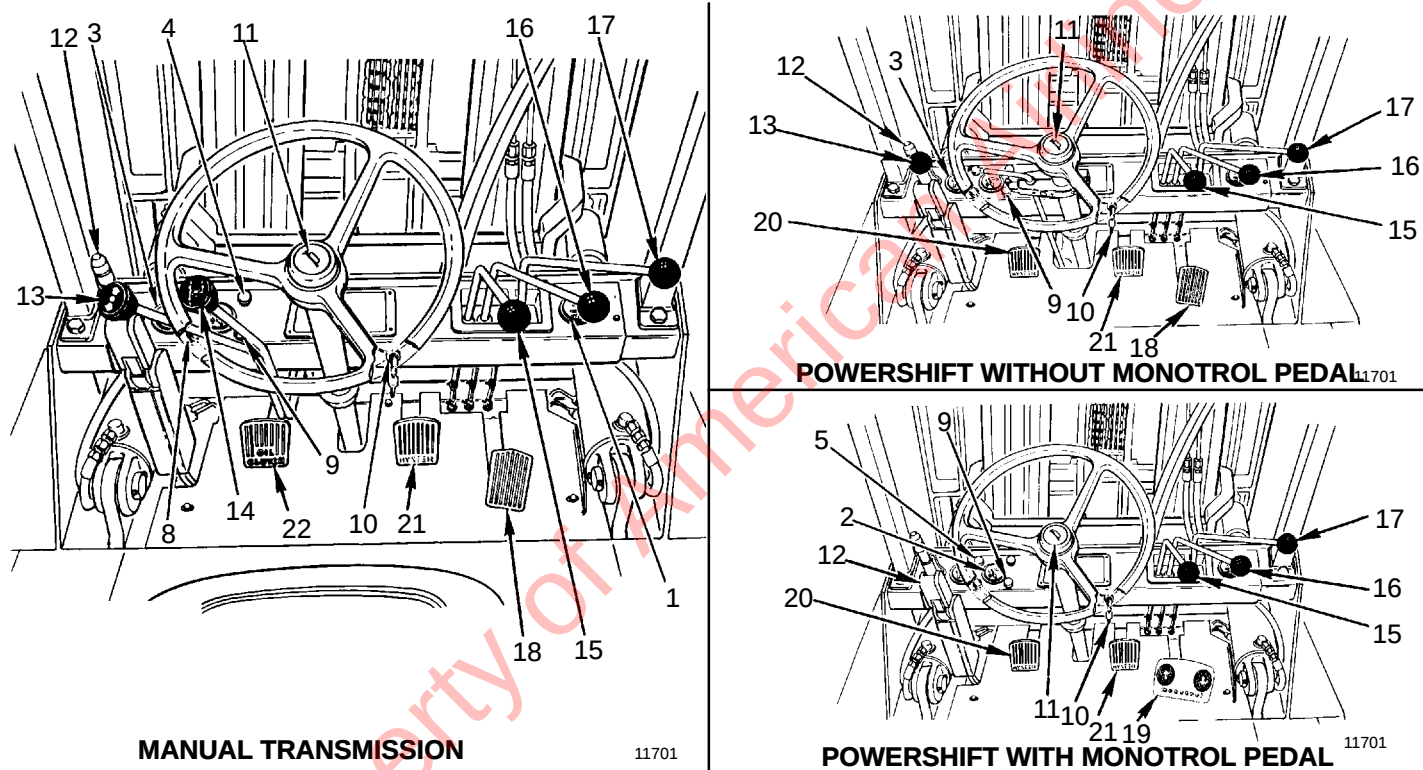


FIGURE 4. INSTRUMENTS AND CONTROLS (H70-110XL, EARLIER PRODUCTION)

## MODEL DESCRIPTION

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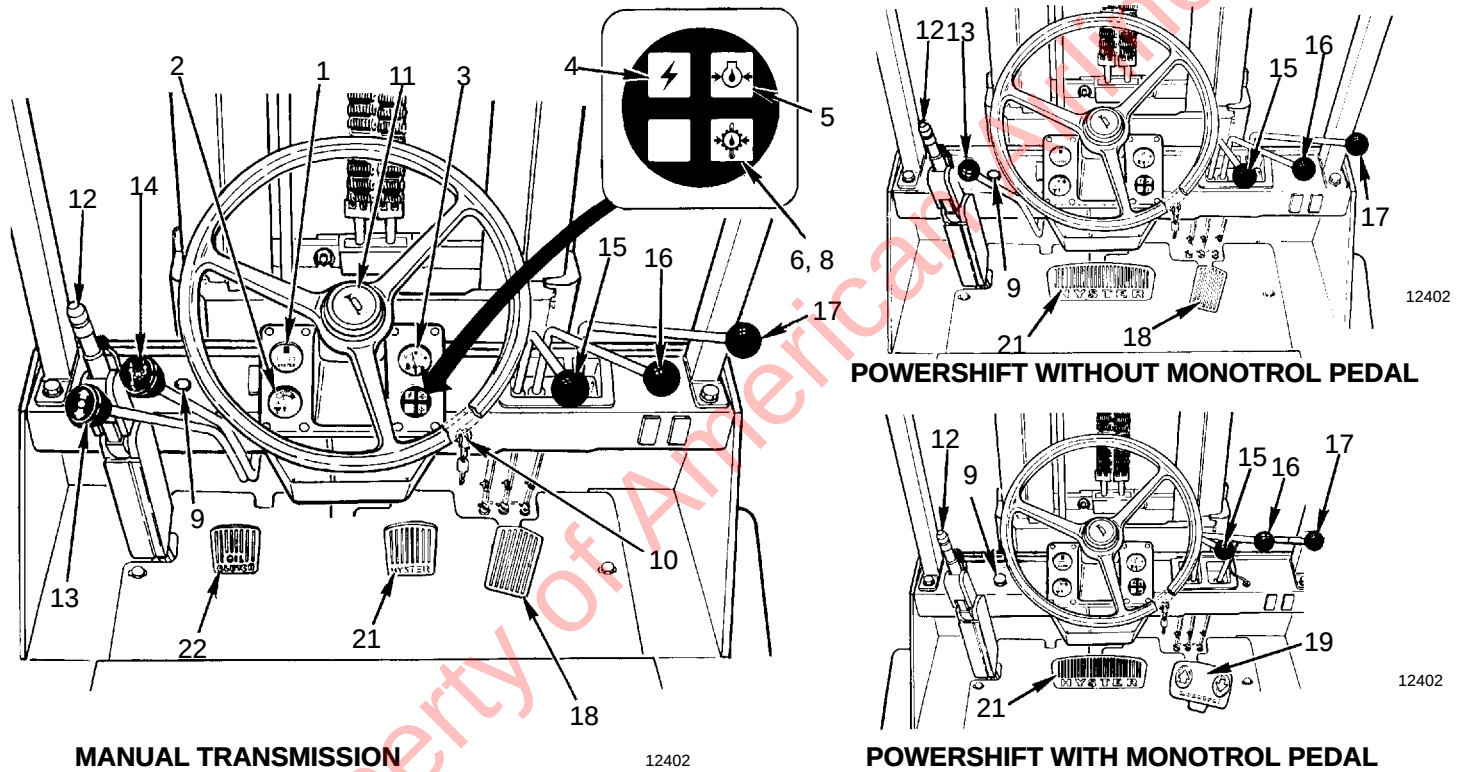


FIGURE 5. INSTRUMENTS AND CONTROLS (H70-110XL, LATER PRODUCTION)

# HYSTER

## MODEL DESCRIPTION

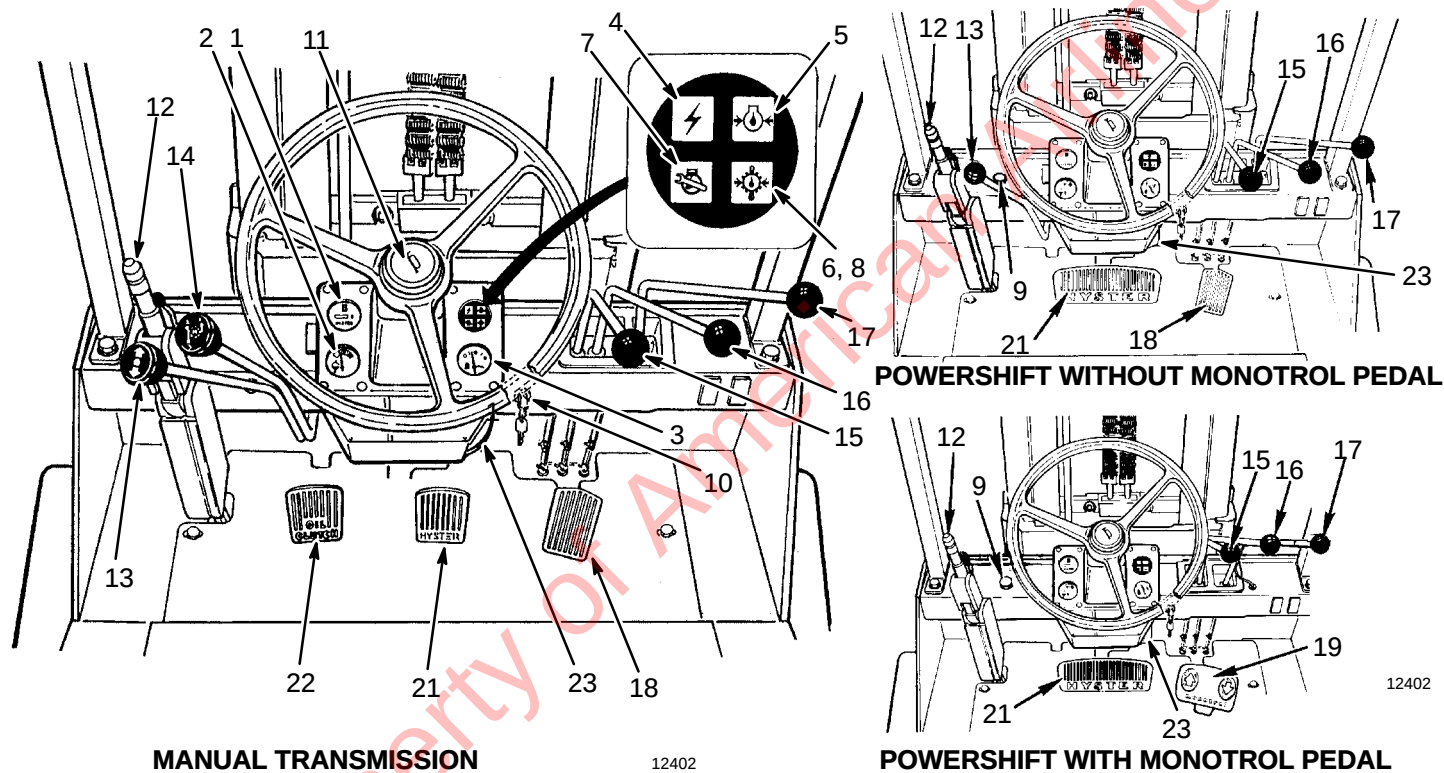
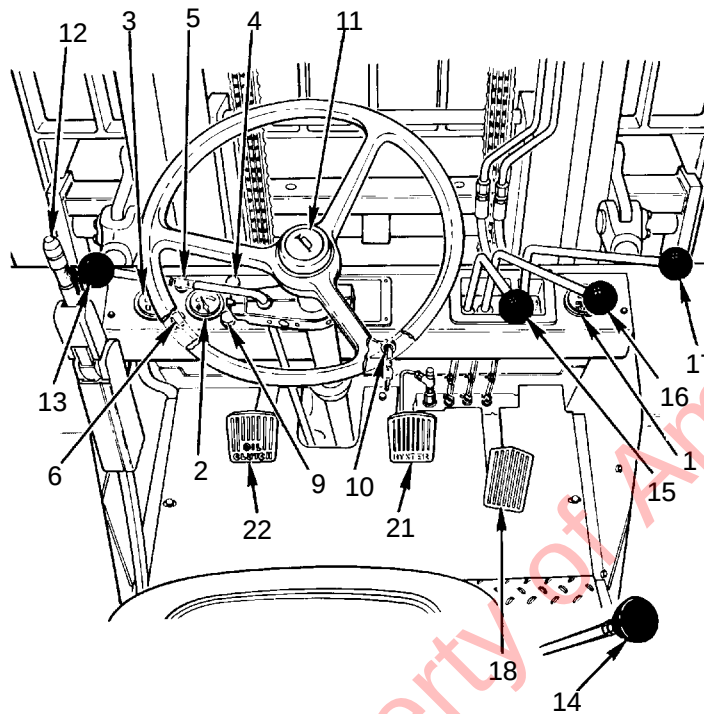


FIGURE 6. INSTRUMENTS AND CONTROLS (H70-110XL, WITH ELECTRONIC ENGINE CONTROL)

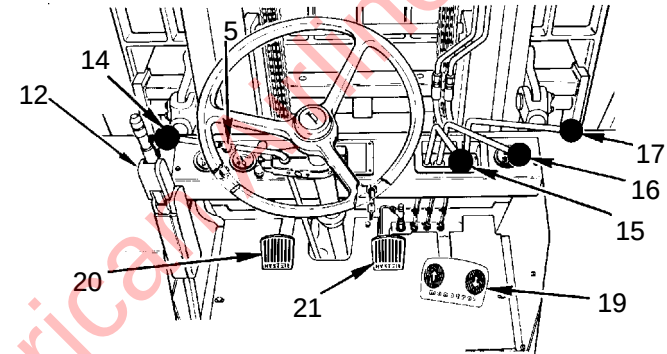
## MODEL DESCRIPTION

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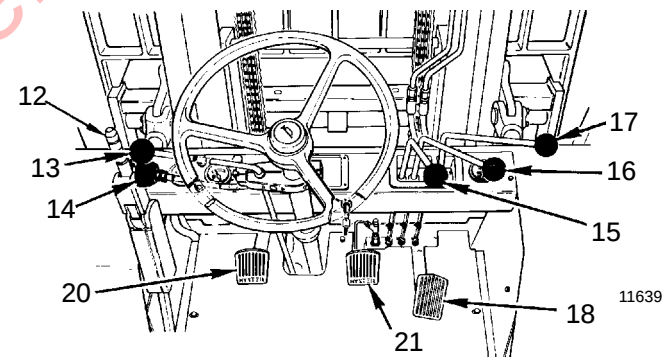
**MANUAL TRANSMISSION**

11639



**POWERSHIFT WITH MONOTROL PEDAL**

11639



**POWERSHIFT WITHOUT MONOTROL PEDAL**

11639

FIGURE 7. INSTRUMENTS AND CONTROLS (H135-155XL, [F006], EARLIER PRODUCTION)

# HYSTER

## MODEL DESCRIPTION

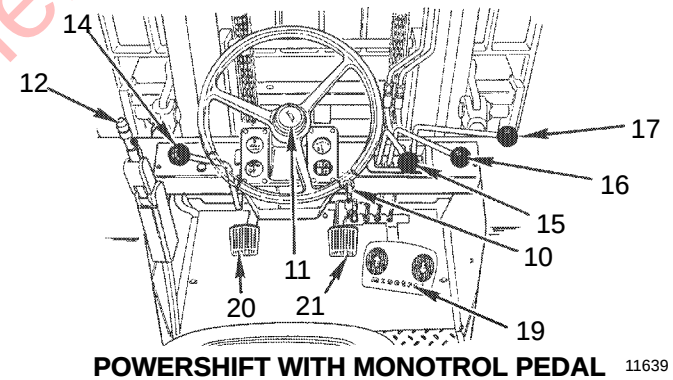
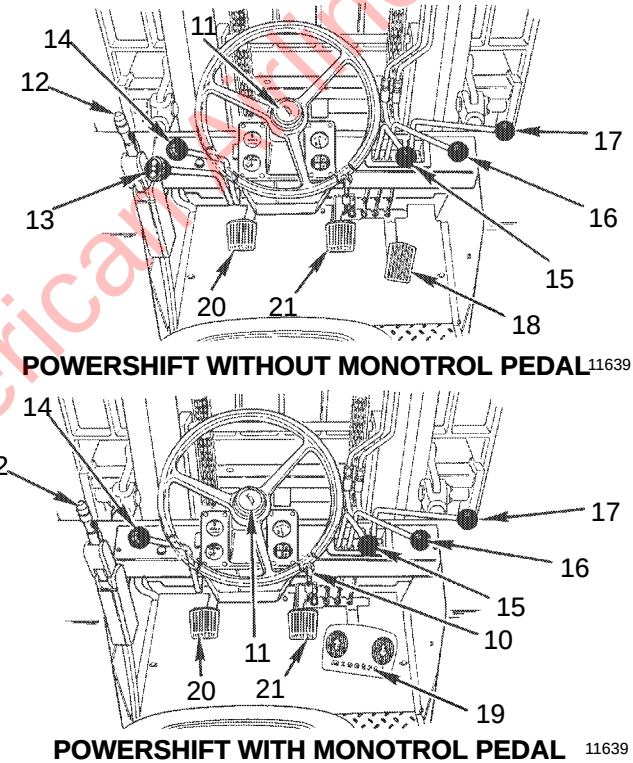
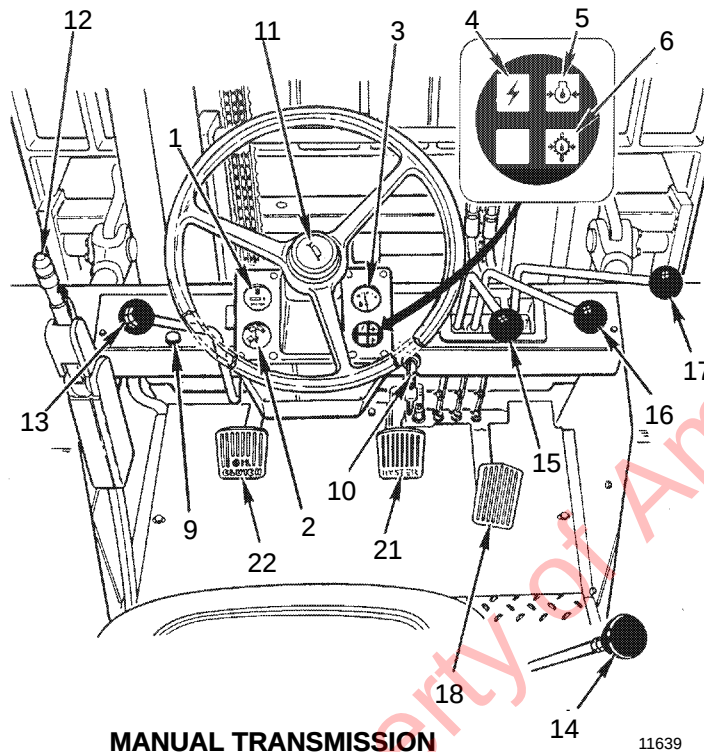


FIGURE 8. INSTRUMENTS AND CONTROLS (H135-155XL, [F006, G006], LATER PRODUCTION)

## MODEL DESCRIPTION

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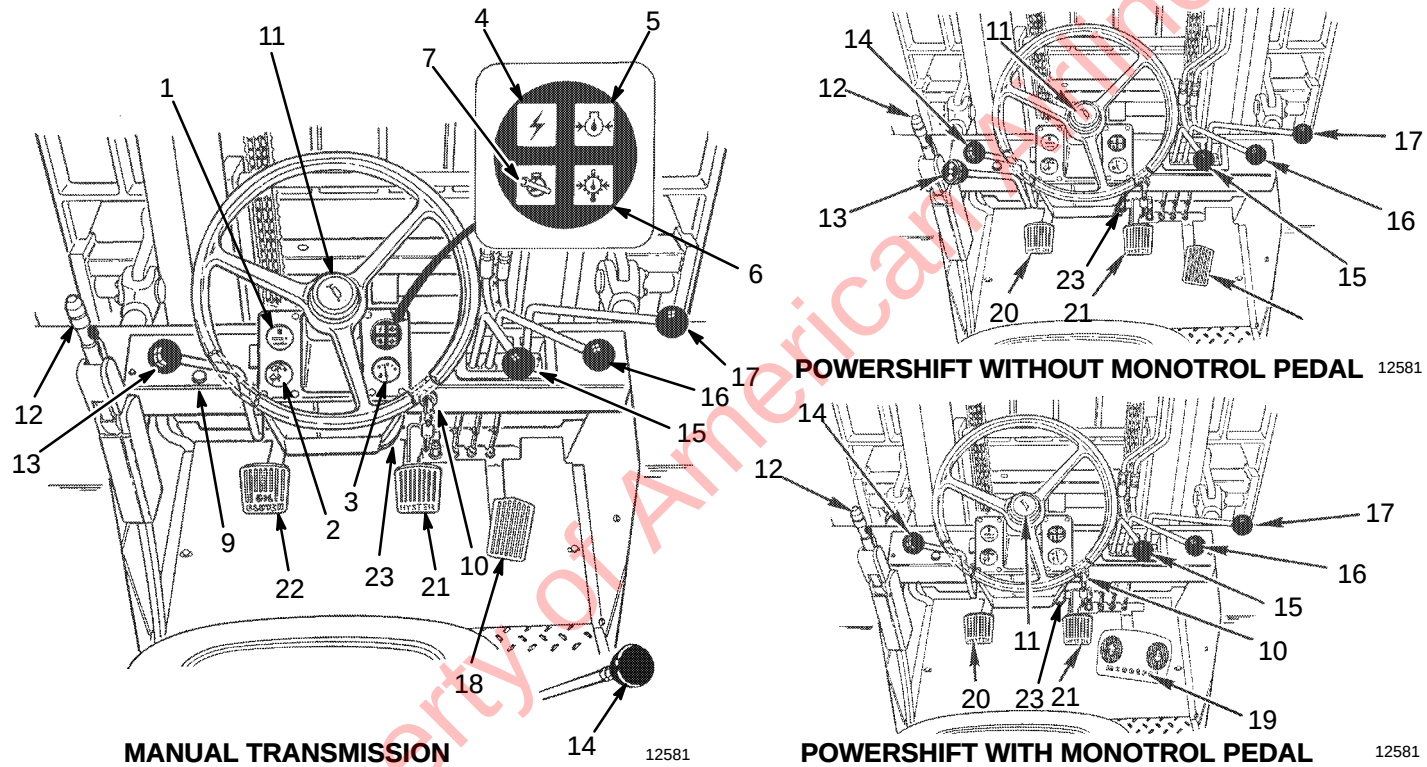


FIGURE 9. INSTRUMENTS AND CONTROLS (H135-155XL WITH ELECTRONIC ENGINE CONTROL)

# HYSTER

## MODEL DESCRIPTION

### INSTRUMENTS AND CONTROLS

(See TABLE 1., TABLE 2., TABLE 3., and FIGURE 4., FIGURE 5., FIGURE 6., FIGURE 7., FIGURE 8., FIGURE 9.)



### 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 |                                                                                                                 |                                                                                                                                                                                                                                                                                                                       |
|----------------------|-----------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ITEM NO.             | ITEM                                                                                                            | FUNCTION                                                                                                                                                                                                                                                                                                              |
| 1                    | Hour Meter<br>                 | The hour meter operates when the key switch is in the <b>ON</b> position. Periodic Maintenance recommendations are based on these hours.                                                                                                                                                                              |
| 2                    | Coolant Temperature Gauge<br> | Indicates engine coolant temperature when the key switch is in the <b>ON</b> position. During normal operation, the needle will indicate in the green zone of the gauge.<br><b>CAUTION</b><br>Do not continue to operate the lift truck when the gauge indicates that the engine is too hot (needle in the red zone). |

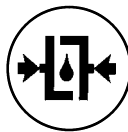
## MODEL DESCRIPTION

# HYSTER

| ITEM NO. | ITEM                                                                                                                                         | FUNCTION                                                                                                                                                                                                                  |
|----------|----------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 3        | Fuel Gauge<br>                                              | Indicates the amount of fuel in the gasoline or diesel fuel tank.                                                                                                                                                         |
| 4        | Warning Light, Alternator<br>                               | The light will be <b>ON</b> when the key switch is <b>ON</b> and the engine is not running.<br><br><b>CAUTION</b><br>Do not continue to operate the lift truck if the red light is <b>ON</b> at engine speeds above idle. |
| 5        | Warning Light, Engine Oil Pressure<br>                      | The red light is <b>ON</b> when the key switch is in the <b>START</b> position.<br><br><b>CAUTION</b><br>Stop the engine immediately if the light is <b>ON</b> when the engine is running.                                |
| 6        | Warning light, Powershift Transmission Oil Temperature<br> | The red light is <b>ON</b> when the key switch is in the <b>START</b> position.<br><br><b>CAUTION</b><br>Do not continue to operate the lift truck if the light is <b>ON</b> during operation.                            |

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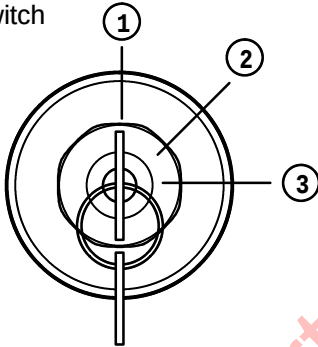
## MODEL DESCRIPTION

| ITEM NO. | ITEM                                                                                                                                                                                                            | FUNCTION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 7        | Warning Light, "Check Engine"<br>[Lift trucks with electronic engine control (electronic spark timing and fuel injection)]<br> | This light will be <b>ON</b> when the key switch is <b>ON</b> and the engine is not running. This light will illuminate when the ECM computer senses a fault in the operation of the engine. If the engine will start, the operation of the engine will not be correct until the fault is corrected. A trained service person must make repairs and adjustments if this light is <b>ON</b> when the engine is running.<br><b>NOTE:</b> XL <sub>2</sub> lift trucks with gasoline engines only. |
| 8        | Warning Light, Oil Pressure for Clutch (Manual Transmission, H70-110XL)<br>                                                    | The red light is <b>ON</b> when the oil pressure in the clutch system is too low for continued operation. The red light is <b>ON</b> when the key switch is <b>ON</b> and the engine is not running.<br><b>NOTE:</b> Used on earlier production lift trucks only.<br><b>CAUTION</b><br>Do not continue to operate the lift truck if the light is <b>ON</b> during operation.                                                                                                                   |

## MODEL DESCRIPTION

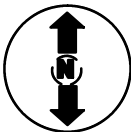
# HYSTER

**TABLE 2. CONTROLS**

| ITEM NO. | ITEM                                                                                             | FUNCTION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|----------|--------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 9        | Cold Start Aid  | The cold start aid is used on lift trucks with a diesel engine. The control button is on the instrument panel to the left of the steering column on H70-110XL units. The control button is on the top of instrument panel on H135-155XL units. The key switch must be in the <b>ON</b> position before the cold start aid can be energized.                                                                                                                                                                                                                                                                                                                                                          |
| 10       | Key Switch     | The key switch has three positions:<br>No. 1 Position: <b>OFF</b> position. Deenergizes all electric circuits except for the horn and headlights.<br>No. 2 Position: <b>ON</b> position. Energizes all electric circuits except the starter circuit. The key switch will be in this position during normal operation.<br>No. 3 Position: <b>START</b> position. Energizes the starter motor for starting the engine. A spring returns the key to position No. 2 ( <b>ON</b> position) when the key is released.<br><b>NOTE:</b> There is a mechanical lockout that prevents the key switch from being returned to the <b>START</b> position without first being returned to the <b>OFF</b> position. |
| 11       | Horn          | The horn button controls the operation of the horn.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

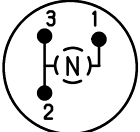
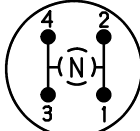
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## MODEL DESCRIPTION

| ITEM NO. | ITEM                                                                                                                                                                                                                           | FUNCTION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 12       | Parking Brake Lever<br>                                                                                                                       | <p>The lift truck is equipped with a hand lever to apply parking brake. Pull the lever to the upright position to apply the brake. <b>Lift trucks with a MONOTROL pedal:</b> when the parking brake is applied, a switch in the starting circuit is closed so that the engine can be started. The switch also puts the transmission in <b>NEUTRAL</b>. Use your finger to release the lock on the lever when the lever is moved to release the parking brake.</p> <p><b>WARNING</b><br/>           Correct adjustment is necessary to provide adequate braking and to keep the parking brake lever in the engaged position. See the <u>Maintenance</u> section for adjustment procedures.</p> <p><b>Always apply the parking brake when leaving the lift truck.</b></p> |
| 13       | Direction Control Lever<br><br>H70-110XL<br><br>H135-155XL | <p>The direction control for the transmission is to the left of the steering column. The direction control lever is used on units with a manual transmission and those units with a powershift transmission without a MONOTROL pedal. The lever has three positions: <b>FORWARD</b>, <b>NEUTRAL (N)</b> and <b>REVERSE</b>. Move the lever to one of the direction positions for travel.</p> <p><b>NOTE:</b> The direction control lever must be in the <b>NEUTRAL (N)</b> position before the engine can be started.</p>                                                                                                                                                                                                                                               |

## MODEL DESCRIPTION

**HYSTER**

| ITEM NO. | ITEM                                                                                                                                         | FUNCTION                                                                                                                                                                                                                |
|----------|----------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 14       | Range Lever (Manual Transmission) (H70-110XL )<br>          | The range lever is located to the left of the steering column. This lever controls the three speed ranges of the H70-110XL manual transmission.                                                                         |
| 14       | Range Lever (Manual Transmission) (H135-155XL Only)<br>     | The range lever is to the left of the steering column. The lever controls the four speed ranges of the manual transmission.                                                                                             |
| 14       | Range Lever (Powershift Transmission) (H135-155XL Only)<br> | The range lever is to the left of the steering column. The lever controls the two speed ranges of the powershift transmission.                                                                                          |
| 15       | Lift/Lower Control Lever<br>                              | The lift/lower control lever is the first lever to the right of the steering wheel. Pull backward on the control lever to raise the carriage and forks. Push the control lever forward to lower the carriage and forks. |

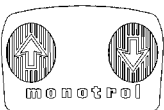
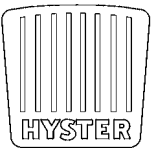
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## MODEL DESCRIPTION

| ITEM NO. | ITEM                                                                                                    | FUNCTION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|----------|---------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 16       | Tilt Control Lever<br> | The tilt control lever is on the right of the lift/lower control lever. Push the control lever forward to tilt the upright and forks forward. Pull backward on the control lever to tilt the upright and forks backward.                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 17       | Control Lever for Auxiliary Hydraulic Functions<br>See TABLE 3.                                         | <p>The control lever for auxiliary hydraulic functions is installed to the right of the tilt control lever. This control lever actuates a control spool in an auxiliary valve for a single function attachment and two control spools for a two-function attachment.</p> <p><b>Single Function Operation:</b><br/>The lever is spring-loaded to the left and must be pushed to the right before operating the auxiliary function.</p> <p><b>Two Function Operation:</b><br/>The lever is spring-loaded to the left and will operate one auxiliary function in this position. The lever must be pushed to the right before operating the other auxiliary function.</p> |
| 18       | Accelerator Pedal<br> | <p>This pedal controls the engine speed and is operated by the operator's right foot. It is used on units that have a direction control lever.</p> <p><b>NOTE:</b> Some units that have a manual transmission have a small round pedal pad on a bracket fastened to this accelerator pedal. This auxiliary pad permits simultaneous operation of brake and accelerator with the right foot. The left foot can operate the clutch. By varying the position of these pedals, the operator can move the lift truck slowly while a high engine speed is used for lifting loads.</p>                                                                                       |

## MODEL DESCRIPTION

# HYSTER

| ITEM NO. | ITEM                                                                                                                               | FUNCTION                                                                                                                                                                                                                                                                                                                    |
|----------|------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 19       | MONOTROL Pedal<br>(Powershift Transmission)       | 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 <b>REVERSE</b> . Pushing on the left side of the pedal causes the lift truck to move in <b>FORWARD</b> . The speed of the engine increases as the pedal is depressed.        |
| 20       | Inching/Brake Pedal<br>(Powershift Transmission)  | 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. The engine can be started when the inching/brake pedal is fully depressed. |
| 21       | 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. The engine can be started when the inching/brake pedal is fully depressed. |
| 21       | Brake Pedal                                     | This pedal, controlled by the operator's right foot, controls the application of the service brakes.                                                                                                                                                                                                                        |

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## MODEL DESCRIPTION

| ITEM NO. | ITEM                                                                                                                       | FUNCTION                                                                                                                                                                                                                                                                                                           |
|----------|----------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 22       | Clutch Pedal<br>(Manual Transmission)<br> | The clutch pedal is located to the left of the brake pedal. This pedal, controlled by the operator's left foot, controls clutch engagement for the transmission and inching operations.                                                                                                                            |
| 23       | Latch for Tilt Steering Column<br>(Only on lift trucks equipped with a tilt steering wheel.)                               | A latch located on the lower right side of the steering column allows the operator to select one of five different positions for the steering wheel. Raise the latch to release the steering column. Move the steering column to the selected position. Release the latch to lock the steering column in position. |

## MODEL DESCRIPTION

**HYSTER**

**TABLE 3. AUXILIARY CONTROL LEVERS**

| FUNCTION<br>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 TURN FORK                                                                               | Horizontal / Vertical        | Backward/Forward |
| 13 FORK SPREAD                                                                             | Together / Apart             | Backward/Forward |
| 14 CLAMP                                                                                   | Clamp / Release              | Backward/Forward |

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# HYSTER

## OPERATING PROCEDURES

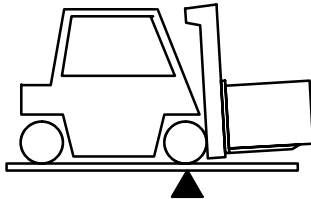
### OPERATING PROCEDURES

#### GENERAL

##### Know Your Lift Truck

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 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.

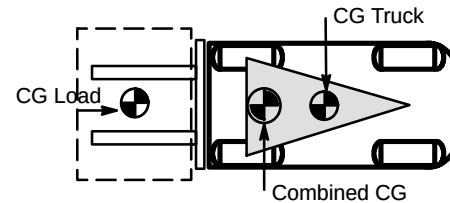
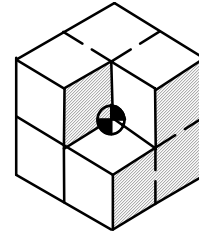
The lift truck is based on the principle of two weights balanced on opposite sides of a pivot (fulcrum). This is the same principle used for a see-saw. In order for this principle to work for a lift truck,

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.

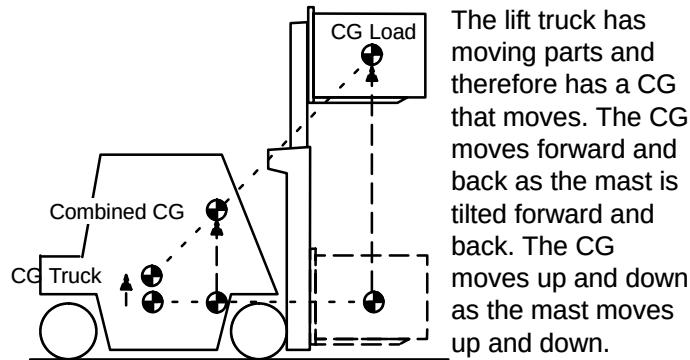
Every object has a CG. When the lift truck picks up a load, the truck and load have a new combined CG.



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

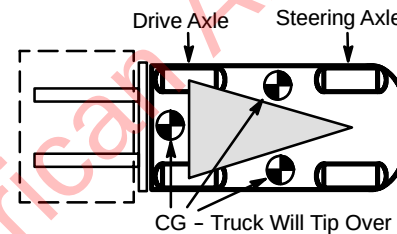
## OPERATING PROCEDURES

**HYSTER**



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 the 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 lift truck is shown on the Nameplate. The capacity is listed in terms of weight and load center. The weight is specified in kilograms and pounds. The load center is specified in millimeters and inches. The capacity is the maximum load that the lift truck can handle for the load condition shown on the Nameplate.

# HYSTER

## OPERATING PROCEDURES

**WARNING**

Trained Operators and Mechanics only

Read Operating Manual located on or near seat.

Failure to follow operating, inspection, and maintenance instructions can cause serious injury or death.

CAPACITY WITH MAST VERTICAL AND EQUIPPED AS SHOWN

|                  |              |               |           |             |  |
|------------------|--------------|---------------|-----------|-------------|--|
| Lift Truck Model |              | Serial Number |           | Sales Order |  |
| Attachment       | Truck Weight | kg ( lb)      | Back Tilt | Degrees     |  |
| Tire             | Size         | Front         | Rear      |             |  |
| Pressure         |              |               |           |             |  |
| Tread Width      | mm ( in)     |               |           |             |  |

| MAXIMUM CAPACITY | Load Height | Load Center |          |
|------------------|-------------|-------------|----------|
|                  |             | Dim. A      | Dim. B   |
| kg ( lb)         | mm ( in)    | mm ( in)    | mm ( in) |
| kg ( lb)         | mm ( in)    | mm ( in)    | mm ( in) |

HO190009

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. Both the vertical and horizontal load centers are specified on the Nameplate.

For carriages or attachments that can be sideshifted, the Nameplate specifies capacities in the "Centered" and "Sideshifted" conditions. Capacities listed under "Centered" on the Nameplate apply when transporting loads that are centered on the centerline of the lift truck. Capacities listed under "Sideshifted" on the Nameplate apply if loads are transported that are not centered on the centerline of the lift truck. Loads should be transported while centered on the centerline of the lift truck.

The operator must know whether or not a load is within the maximum 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**.

Before using the lift truck, make the following checks:

- Fuel level (if the lift truck has a diesel engine, drain water from the primary 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.
- Condition of forks, carriage, chains, mast, attachment and overhead guard.
- Leaks from the engine, transmission, hydraulic system and fuel system.

## OPERATING PROCEDURES

# HYSTER

- Condition of wheels and tires.
- Seat belt latches properly.
- Seat is correctly fastened to its mounts. Hood is securely latched.

### **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

Do not start nor operate the lift truck, including any of its functions or attachments, from any place other than the designated operator's position.



### Gasoline Or 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.

# **HYSTER**

## **OPERATING PROCEDURES**

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.

### **Diesel Engine**

1. Make sure the parking brake is applied or push on the inching/brake pedal.
2. If equipped, put the direction control lever for the transmission in the **NEUTRAL (N)** position.
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. Push the button for the Cold Start Aid and hold it until the wire in the Cold Start Indicator is red. When the Cold Start Indicator is red,

the glow plugs in the engine are hot. Engage the starter again. Push the button for the Cold Start Aid while the starter is engaged.



### **CAUTION**

**Use only approved starting aids. The 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.

## OPERATING PROCEDURES

# HYSTER



### Checks With the Engine Running



**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.**

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 truck as it tips over. The risk of injury can be reduced if the operator stays on the truck. If the truck tips over do not jump off.

The SEAT BELT AND HIP RESTRAINT BRACKET 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 truck and the ground, but it can not protect the operator against all possible injury in a tipover.

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 MAINTENANCE section.

- Check the operation of the horn, gauges and indicator lights.
- Check the oil level in the powershift transmission when the direction control lever is in **NEUTRAL** and 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, MONOTROL pedal or the direction control lever and accelerator pedal.
- Check the operation of the service brakes and parking brake.
- Check the operation of the steering system.

# HYSTER

## OPERATING PROCEDURES

### 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.**

**NOTE:** Lift trucks manufactured before November 1, 2005 are equipped with the Automatic Locking Retractor (ALR) type seat belts. The seat belt must fasten securely. Make sure the seat belt extends and retracts smoothly and is not frayed or torn. If the seat belt is damaged or does not operate properly, it must be replaced.

**NOTE:** Lift trucks manufactured after November 1, 2005 are equipped with the Emergency Locking Retractor (ELR) style seat belt. When the ELR seat belt is properly buckled across the operator, the belt will permit slight operator repositioning without activating the locking mechanism. If the truck tips, travels off a dock, or comes to a sudden stop,

the locking mechanism will be activated and hold the operator's lower torso in the seat.

### 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

## OPERATING PROCEDURES

**HYSTER**

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.



### HAZARDOUS AREA

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

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



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, elevated work platforms, aerial baskets, etc.) to perform the needed work.

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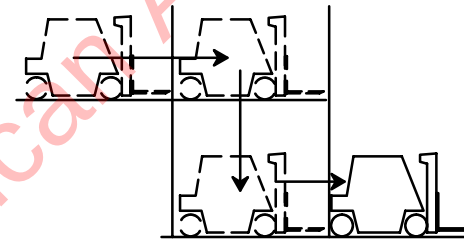
## OPERATING PROCEDURES



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.

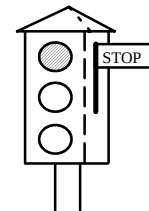
Before anyone is allowed in the platform, lift and lower the mast slowly with the platform in place to make sure the mast functions properly. Apply the parking brake. Do not travel with people in the platform. The operator must remain at the controls. Watch for overhead obstructions.

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**.



## OPERATING PROCEDURES

**HYSTER**

### Driving And Direction Changes

The H70-110XL lift trucks can have a three-speed manual transmission or a single-speed powershift transmission. The H135-155XL lift trucks can have either a four-speed manual transmission or a two-speed powershift transmission. The following paragraphs are a short description on how to operate the transmissions.

**MANUAL TRANSMISSION.** If the lift truck has a manual transmission, it will also have a clutch pedal and two control levers. One control lever is for direction control and the other control lever is for the speed range.

To move the lift truck, release the parking brake. Depress the clutch and select the first or second gear (first gear if the load is heavy or the lift truck is on a grade). Select the **FORWARD** or **REVERSE** direction as required. Slowly release the clutch the clutch pedal while the engine speed is increased with the accelerator pedal. When the lift truck is moving easily, depress the clutch pedal and select the next higher gear. Again, release the clutch pedal while increasing the engine speed. Make changes in speed range selection smoothly so that the load on the forks is always under control.

If the lift truck begins to move more slowly because of the load or a grade, select a lower speed range. (Do not select first gear when the lift truck is moving.) Depress the clutch and select the lower speed range (lower gear). When the second gear is selected from third gear, increase the engine speed before releasing the clutch. Also change to a lower gear before traveling down a steep grade.

To change directions, apply the brakes and depress the clutch pedal to stop the lift truck. Move the direction control lever to the select the opposite direction. Select the first or second gear as necessary. Select a higher gear as necessary when traveling.



### CAUTION

**Prevent damage to the transmission. Stop the lift truck to change direction of travel.**

**Stop the lift truck before selecting first gear. The transmission can be damaged if first gear is selected while the lift truck is moving.**

**POWERSHIFT TRANSMISSION.** A MONOTROL pedal or a direction control lever can be installed to control the powershift 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 the

# HYSTER

## OPERATING PROCEDURES

truck has a direction control lever, move the lever toward the front of the lift truck to travel **FORWARD**. Move the lever toward the rear of the lift truck to travel in **REVERSE**. The H135-155XL lift trucks also have a range selection lever to control the two speed ranges of the transmission. Select the correct speed range required for the load and operating conditions.

To move the lift truck, push on the inching/brake pedal and release the parking brake. Then push down on the MONOTROL pedal or the accelerator pedal as the inching/brake pedal is slowly released.

The operator of a lift truck with a powershift transmission can select the opposite direction of travel at slow travel speeds (less than a walking speed), but the mast must not be in a raised position. If the lift truck is moving rapidly, slow to a walking speed before changing the direction of travel.

### CAUTION

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

### Operator Presence System

#### WARNING

**Always make sure the parking brake is fully applied before leaving the lift truck. If the operator leaves the lift truck while in operation mode, a operator presence module will shift the transmission to neutral, and sound an alarm for 10 seconds. If the lift truck is left on a grade, without the parking brake fully applied, it can free-wheel down the grade, possibly causing injury or property damage.**

Lift trucks produced after November 1, 2005 are equipped with an Operator Presence System (OPS). The OPS feature has an electrical switch in the seat which senses the presence of the operator and a operator presence module which disengages the transmission. This allows the transmission in internal combustion engine trucks to be engaged only when the operator is in the seat. The OPS is designed with slight delay in the seat switch to allow the operator to reposition himself without disengaging the transmission. When the operator presence module disengages the transmission (neutral position), the operator must depress the service brake to re-engage the traction (travel mode).

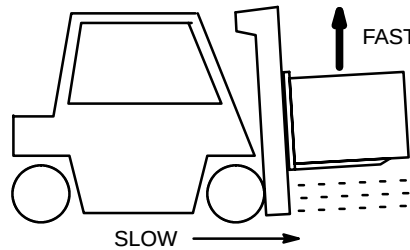
## OPERATING PROCEDURES

# HYSTER

The operator's presence module will automatically shift the transmission to neutral within 1-2 seconds when the operator leaves the seat of the lift truck.

### 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 inching/brake pedal is used to control the inching operation on a lift truck with a powershift transmission. When the inching/brake pedal is applied, the clutch in the transmission is partially disengaged and the movement of the truck is slow. When the inching/brake pedal is fully applied, the transmission is completely disengaged and the brakes are applied. Use the accelerator pedal or MONOTROL pedal to keep the engine speed high while inching.

### ⚠ WARNING

Inching requires coordinated movement of the inching/brake pedal and the accelerator or the MONOTROL pedal. 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 sharpness of a turn can cause a tipover. A lift truck is less stable when the forks are elevated, 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 dynamic forces are present. In fact, the lift truck will actually tip over easier when empty, than when loaded.

# HYSTER

## OPERATING PROCEDURES

with the load lowered. Rearward tilt, off-center loads and uneven ground will aggravate these conditions.

### **⚠ WARNING**

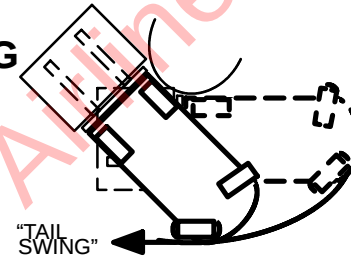
**IF THE LIFT TRUCK TIPS OVER, DO NOT JUMP OFF! HOLD FIRMLY TO STEERING WHEEL, BRACE YOUR FEET, AND LEAN FORWARD AND AWAY FROM THE POINT OF IMPACT.**

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

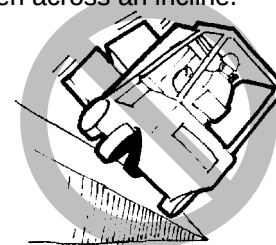
Most lift trucks are steered by the rear wheels and the rear of the lift truck can move to the side very fast during a turn. This movement is called "tail swing". An operator must be aware of tail swing and always check to make sure the tail swing area is clear before turning.

### **⚠ WARNING**

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



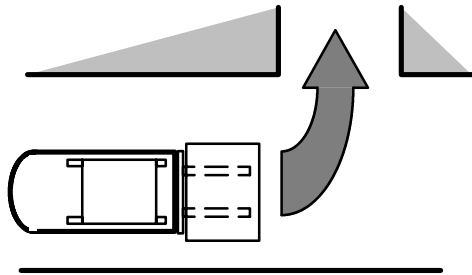
Do not turn on an incline. To reduce the possibility of a tipover, a lift truck must not be driven across an incline. When possible, keep both hands on the steering wheel. During most loading or unloading operations, the operator steers with the left hand. The right hand is used to operate the lift, 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 permits the lift truck to enter the narrow aisle going straight ahead.

## OPERATING PROCEDURES

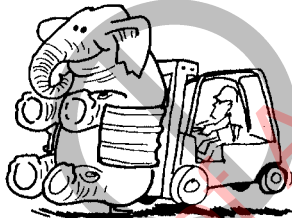
# HYSTER



### Load Handling, General

1. The capacity is the maximum load that the lift truck can handle for the load condition shown on the Nameplate. The operator must know whether or not a load is within the maximum capacity of the lift truck before the load is handled.

However, such factors as weak floors, uneven terrain, special load handling attachments 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



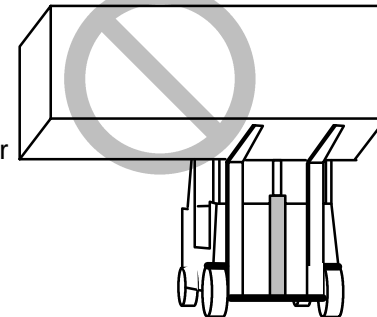
operator must reduce the load so that the lift truck will remain stable.

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 load backrest or any part of the load is likely to fall.

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



# **HYSTER**

## **OPERATING PROCEDURES**

If the weight of the load is not centered between the forks, the load can fall from 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.

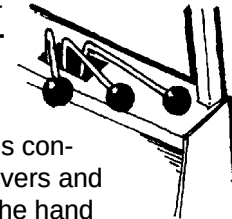
Make sure the pins that keep the forks in position are engaged so that the forks cannot move.

4. For carriages or attachments that can be sideshifted, the load should be centered on the centerline of the lift truck before the load is transported. Capacities listed under "Centered" on the Nameplate apply when transporting loads that are centered on the centerline of the lift truck. Capacities listed under "Sideshifted" on the Nameplate apply if loads are transported that are not centered on the centerline of the lift truck.

5. 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. See the **Instruments and Controls** section for the correct operation.

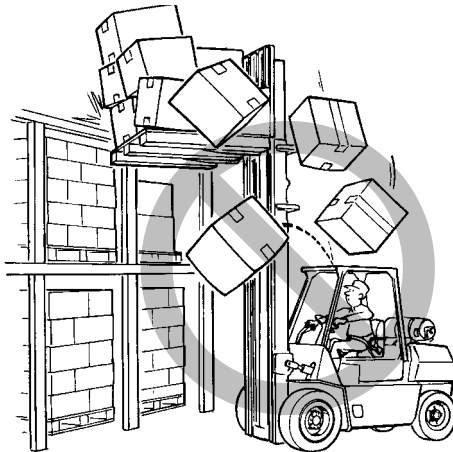


The speed of the hydraulic functions is controlled by the position of the control levers and the speed of the engine. The farther the hand lever is moved from the **NEUTRAL** position, the faster the speed of the hydraulic function.

Do not lift or hit anything that can fall on the operator or a bystander. Remember, a lift truck equipped with a HYS-TER overhead guard and load backrest extension provides reasonable protection to the operator from falling objects, but can not protect against every possible impact.

## OPERATING PROCEDURES

# HYSTER



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 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.

### **WARNING**

**MOVING MAST—CRUSH POINTS!**



**Keep Hands  
Clear of  
Mast!**

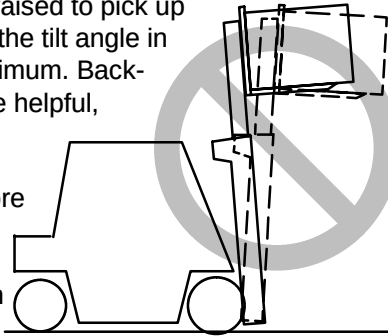
This warning applies not only to the operator but also a helper. A helper must not be near the load or lift mechanism while the operator is attempting to handle a load. The lift mechanism has moving parts with close clearances that can cause serious injury.

# HYSTER

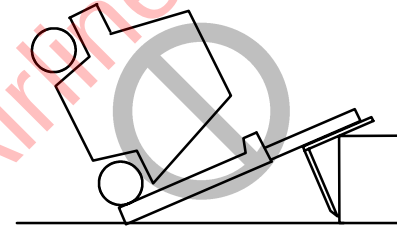
## OPERATING PROCEDURES

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 more than necessary when handling a load that is raised. 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.



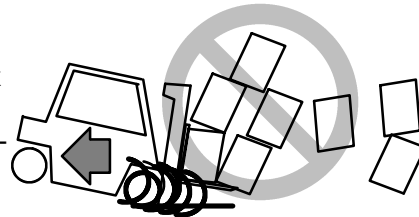
**IF THE LIFT TRUCK TIPS OVER, DO NOT JUMP OFF! HOLD FIRMLY TO STEERING WHEEL, BRACE YOUR FEET, AND LEAN AWAY FROM POINT OF IMPACT.**

## OPERATING PROCEDURES

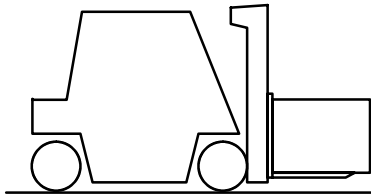
**HYSTER**

### 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.



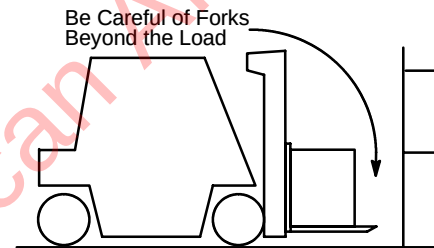
Approach the load carefully. Make sure that the truck is perpendicular to the load. Raise the forks to the proper height for engaging the load.



2. Move forward slowly until the forks are in position under the load. The forks must support at least two-thirds ( $\frac{2}{3}$ ) 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. Lift the load a small distance from the floor to make sure the lift truck has the capacity to lift the load.

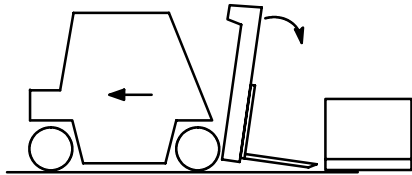


If the forks are longer than the load, move the forks under the load so that the tips of the forks do not extend beyond the load. Lift the load from the surface. Move backward a few inches, then lower the load onto the surface and inch forward to engage the load against the carriage. Tilt the mast backward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

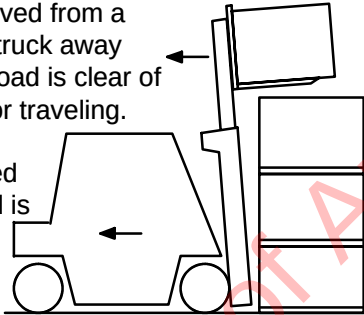
3. When a load is put on the floor, tilt the mast forward to a vertical position and lower the load. Tilt the mast forward to permit smooth removal of the forks. Carefully move the lift truck backward to remove the forks from under the load.

# HYSTER

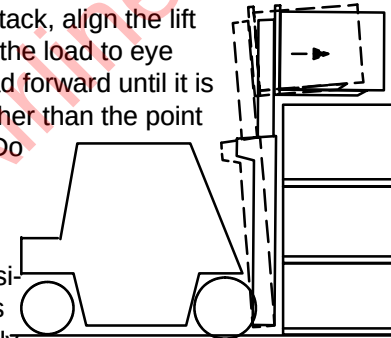
## OPERATING PROCEDURES



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.



5. To put the load on a stack, align the lift truck with the stack. Lift the load to eye level and then tilt the load forward until it is level. 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, particularly with an electric lift truck. Be careful not to damage or move adjacent loads.



### **⚠ WARNING**

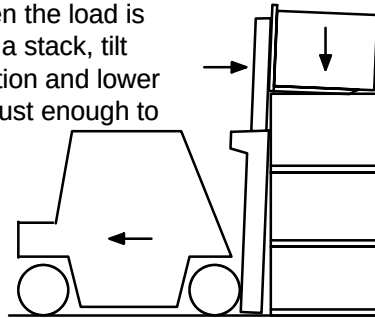
**Move carefully and smoothly when the load is raised over a stack. When the load is elevated the center of gravity of the lift truck and the load is much higher. The lift truck can tip over when the load is raised.**

**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.**

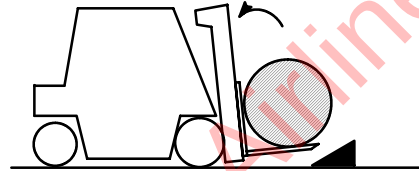
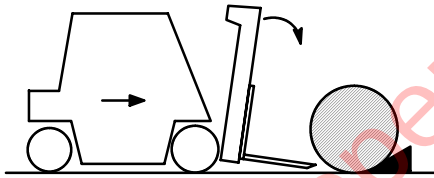
## OPERATING PROCEDURES

**HYSTER**

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.

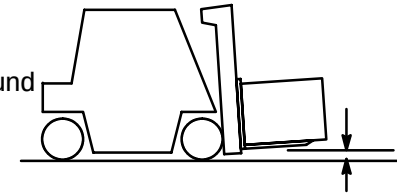


**NOTE:** Not every load can be lifted using only the forks of a lift truck. Some loads will require a special attachment.

### Load Handling, 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.



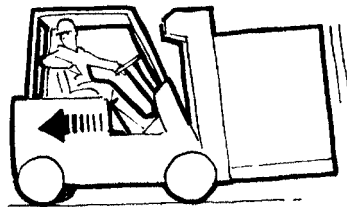
When the mast, carriage or load is in an elevated position the stability of the lift truck is reduced. This is also critical when the lift truck is not carrying a load. The ability of the lift truck to resist side tipping can be less on a lift truck without a load than it is on a lift truck with a load in the low-

# HYSTER

## OPERATING PROCEDURES

ered (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.

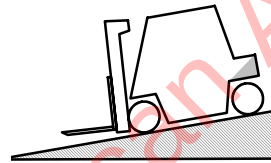
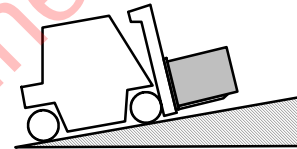
3. For better visibility with large loads, travel with the load trailing, but always keep a proper lookout in the direction of travel. Normally, direction of travel is determined by the best visibility available to the operator. If the lift truck must travel in a direction where visibility is obstructed, 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, keep the load upgrade to maintain control.



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

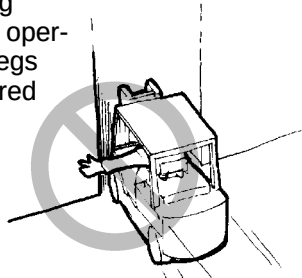
5. Watch out for pedestrians at all times. Do not drive up to anyone standing in front of an object. Use extra care at cross - aisles, doorways and other locations where pedestrians can step into the path of travel of the lift truck. Slow down when approaching blind intersections or turns and sound the horn. This alarm is to warn pedestrians that there is a vehicle in the area and to be alert to possible danger.



## OPERATING PROCEDURES

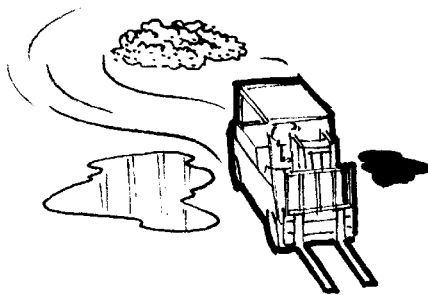
# HYSTER

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. Arms and legs outside the machine can be injured when passing obstructions.

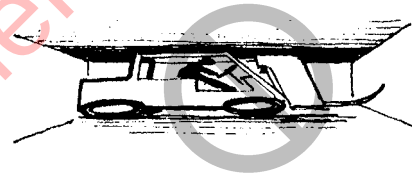


faces. Lift trucks with pneumatic tires can adapt to more uneven ground. Always make sure you choose the smoothest route for your lift truck.

8. Watch clearances, especially forks, mast, 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 or equipment that are behind the load being lifted are not damaged.

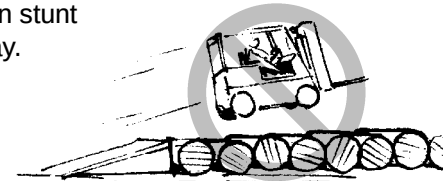


7. Avoid bumps, holes, slick spots and loose materials that may cause the lift truck to swerve or tip. If unavoidable, slow down.



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

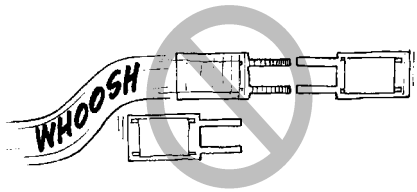
9. Do not indulge in stunt driving or horseplay.



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, firm sur-

# HYSTER

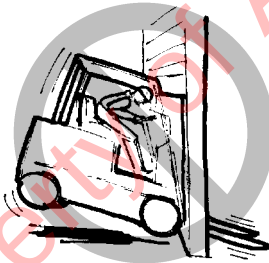
## OPERATING PROCEDURES



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.

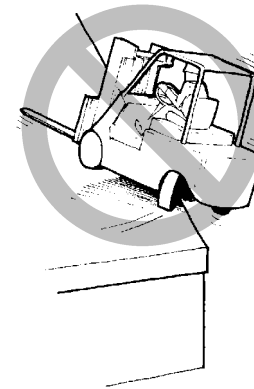


### HIGHWAY TRUCKS, RAILROAD CARS AND DOCKS

#### **WARNING**

Maintain a safe distance from the edge of docks, ramps, platforms and other similar working surfaces. Watch the "tail swing".

**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.**



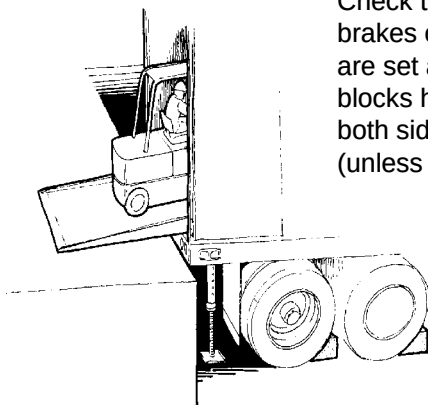
Before operating in a highway truck or railroad car, observe the following:

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 railcar doors and the operator is trained in its use.

## OPERATING PROCEDURES

**HYSTER**



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 or tipping during loading or unloading.

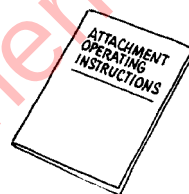
Make sure that the railroad car brakes are set and the wheels are blocked while loading or unloading. Do this so that the railroad car will not move due to the movement of the lift truck in and out of the railroad car.

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.

When entering a railroad car the operator can enter at an angle (if the dock plate or bridge is wide enough). This will reduce the turning required after entering.

### 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 3. for the operation of attachment control levers.



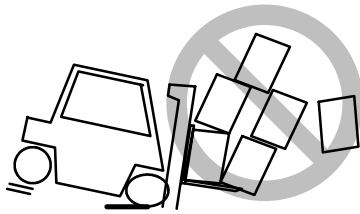
### WARNING

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

# HYSTER

## OPERATING PROCEDURES

### 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 or carriage. Tilt the mast forward until the tips of the forks touch the ground.

3. Put the direction control lever for the powershift transmission in **NEUTRAL**. If the lift truck has a manual transmission, leave the gears of the transmission engaged. DO NOT leave a manual 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.

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.

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## MAINTENANCE

### MAINTENANCE

#### GENERAL



#### 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.**



#### 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.**

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.

## MAINTENANCE

**HYSTER**

### HOW TO MOVE A DISABLED LIFT TRUCK

#### **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.
- 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**

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 1/2 of a capacity load on the forks of the lift truck that is being used to tow the disabled lift truck. This 1/2 capacity load will increase the traction of the lift truck. Keep the load as low as possible.

# HYSTER

## MAINTENANCE

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.**

**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 10.)

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.
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.

## MAINTENANCE

**HYSTER**

### How To Raise The Steering Tires (See FIGURE 10.)

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. Make sure that the jack has a capacity of at least  $\frac{2}{3}$  of the total weight of the lift truck as shown on the nameplate.

3. Put the jack under the steering axle or frame to raise the lift truck. Put blocks under the frame to support the lift truck.

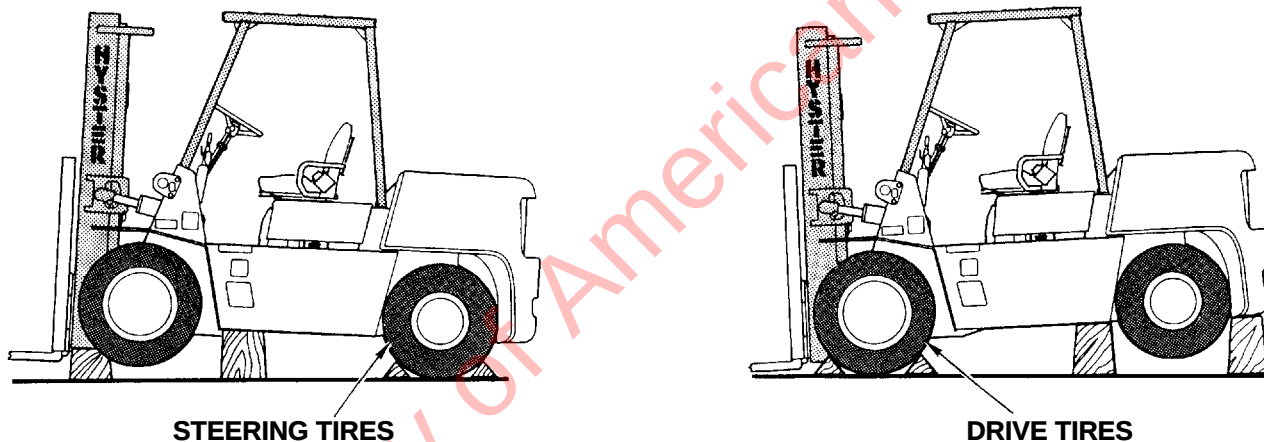


FIGURE 10. PUT THE LIFT TRUCK ON BLOCKS

11704

**HYSTER**

**MAINTENANCE**

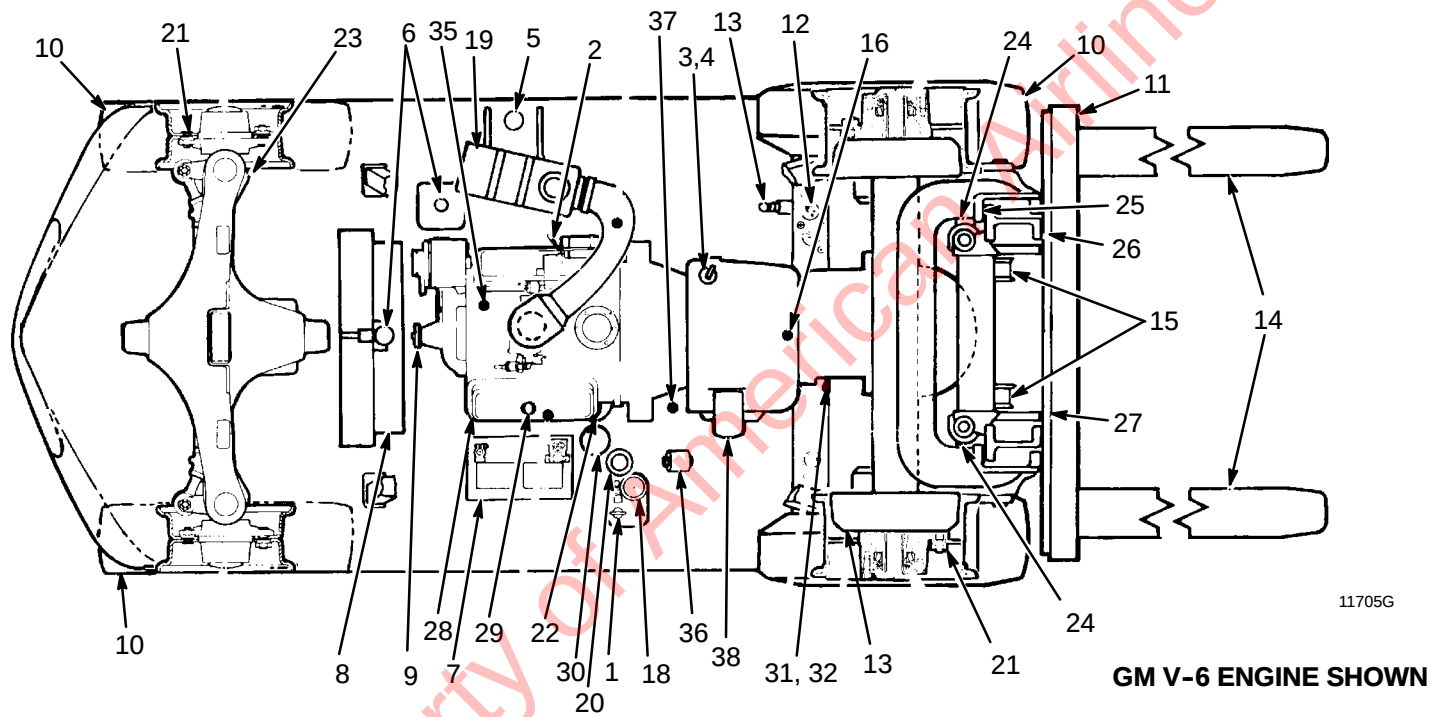


FIGURE 11. MAINTENANCE POINTS FOR H70-110XL

## MAINTENANCE

**HYSTER**

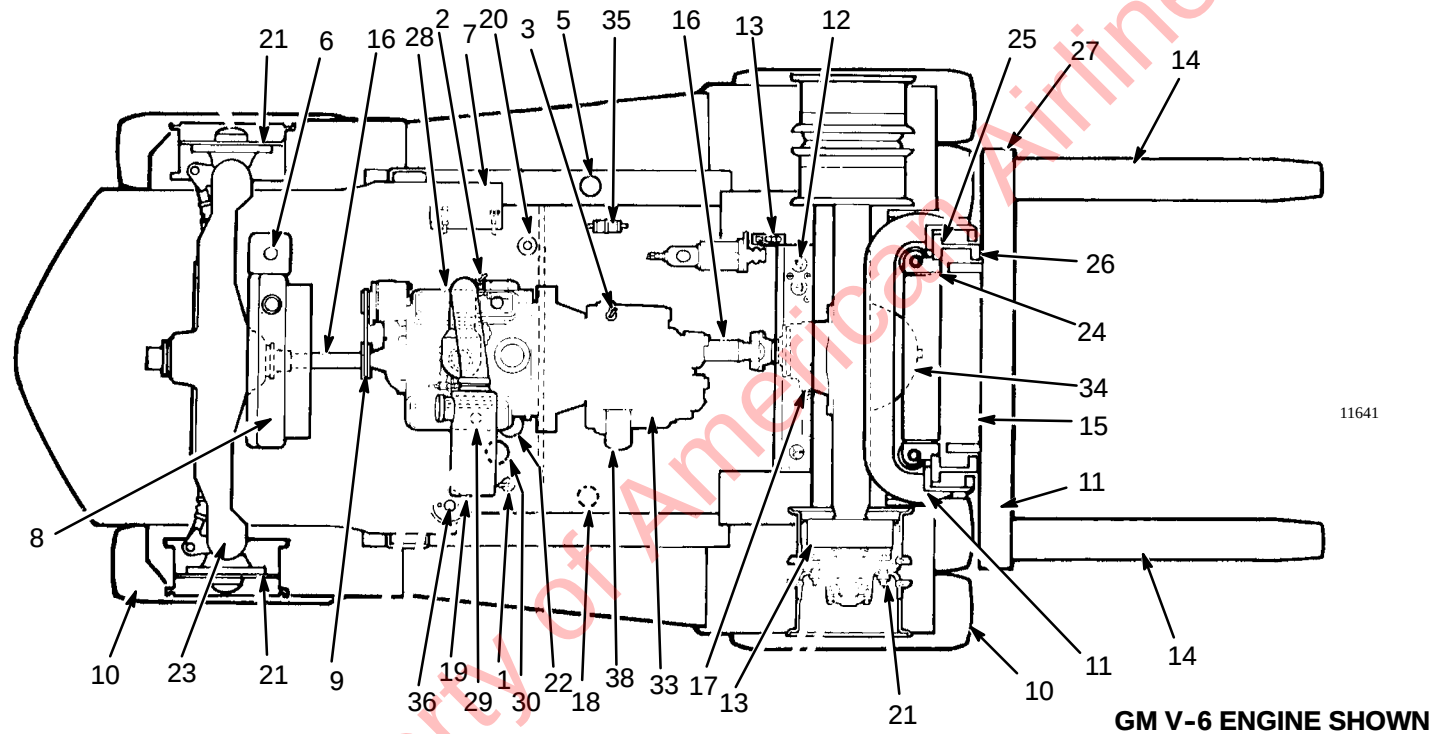


FIGURE 12. MAINTENANCE POINTS FOR H135-155XL, H135-155XL<sub>2</sub>, H155XLS

# HYSTER

## MAINTENANCE

| ITEM NO.                           | ITEM                                                                              | 8 Hr./<br>Daily | 250<br>Hr./<br>6 wks. | 350<br>Hr./<br>2 mo. | 500<br>Hr./<br>3 mo. | 1000<br>Hr./<br>6 mo. | 2000<br>Hr./<br>1 yr. | PROCEDURE<br>OR QUANTITY | SPECIFICATION                                                                                                                   |
|------------------------------------|-----------------------------------------------------------------------------------|-----------------|-----------------------|----------------------|----------------------|-----------------------|-----------------------|--------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| 1                                  | HYDRAULIC OIL<br>H70-110XL                                                        | X               |                       |                      |                      |                       | C                     | 36 liter (38 qt)         | -18°C (0°F) and Above<br>SAE 10W<br>API CC or CC/SE/SF/SG                                                                       |
| 1                                  | HYDRAULIC OIL<br>H135-155XL, (F006)<br>Manual Transmission                        | X               |                       |                      |                      |                       | C                     | 51.1 liter (54 qt)       | -18°C (0°F) and Above<br>SAE 10W<br>API CC or CC/SE/SF/SG                                                                       |
| 1                                  | HYDRAULIC OIL<br>H135-155XL, XL <sub>2</sub> , H155XLS<br>Powershift Transmission | X               |                       |                      |                      |                       | C                     | 49.7 liter (52 qt)       | -18°C (0°F) and Above<br>SAE 10W<br>API CC or CC/SE/SF/SG                                                                       |
| 2                                  | ENGINE OIL<br>GM V-6                                                              | X               | C                     |                      |                      |                       |                       | 4.7 liter (5.0 qt)       | -18° to 40°C (0° to 104° F)<br>SAE 10W-30<br>API SL<br>ILSAC GF-3<br>SAE 2362                                                   |
|                                    | ENGINE OIL, DIESEL<br>Perkins 4.2482                                              | X               | C                     |                      |                      |                       |                       | 8.5 liter (9.0 qt)       | -15 to 40°C (5 to 104°F)<br>SAE 10W-30<br>-10 to 50°C (14 to 122°F)<br>SAE 15W-40<br>API CG4/CH4<br>ACEA E3/E5<br>MIL-PRF-2104G |
| X=Check    C=Change    L=Lubricate |                                                                                   |                 |                       |                      |                      |                       |                       |                          |                                                                                                                                 |

## MAINTENANCE

**HYSTER**

| ITEM NO.                           | ITEM                                                                    | 8 Hr./ Daily | 250 Hr./ 6 wks | 350 Hr./ 2 mo. | 500 Hr./ 3 mo | 1000 Hr./ 6 mo. | 2000 Hr./ 1 yr. | PROCEDURE OR QUANTITY | SPECIFICATION                                                                                                                   |
|------------------------------------|-------------------------------------------------------------------------|--------------|----------------|----------------|---------------|-----------------|-----------------|-----------------------|---------------------------------------------------------------------------------------------------------------------------------|
|                                    | ENGINE OIL, DIESEL<br>Perkins 1004-42                                   | X            |                |                | C             |                 |                 | 8.0 liter (8.5 qt)    | -15 to 40°C (5 to 104°F)<br>SAE 10W-30<br>-10 to 50°C (14 to 122°F)<br>SAE 15W-40<br>API CG4/CH4<br>ACEA E3/E5<br>MIL-PRF-2104G |
|                                    | ENGINE OIL, DIESEL<br>Perkins 1104C-44 (RE)                             | X            |                |                | C             |                 |                 | 8.0 liter (8.5 qt)    | -15 to 40°C (5 to 104°F)<br>SAE 10W-30<br>-10 to 50°C (14 to 122°F)<br>SAE 15W-40<br>API CG4/CH4<br>ACEA E3/E5<br>MIL-PRF-2104G |
| 3                                  | POWERSHIFT<br>TRANSMISSION OIL<br>H70-110XL                             | X            |                |                |               |                 | C               | 17 liter (18 qt)      | Hyster Part No. 336831                                                                                                          |
| 3                                  | POWERSHIFT<br>TRANSMISSION OIL<br>H135-155XL, XL <sub>2</sub> , H155XLS | X            |                |                |               |                 | C               | 15.1 liter (16 qt)    | Hyster Part No. 336831                                                                                                          |
| X=Check    C=Change    L=Lubricate |                                                                         |              |                |                |               |                 |                 |                       |                                                                                                                                 |

# HYSTER

## MAINTENANCE

| ITEM NO.                           | ITEM                                                                    | 8 Hr./ Daily | 250 Hr./ 6 wks | 350 Hr./ 2 mo. | 500 Hr./ 3 mo | 1000 Hr./ 6 mo. | 2000 Hr./ 1 yr. | PROCEDURE OR QUANTITY | SPECIFICATION                                                  |
|------------------------------------|-------------------------------------------------------------------------|--------------|----------------|----------------|---------------|-----------------|-----------------|-----------------------|----------------------------------------------------------------|
| 4                                  | OIL CLUTCH SYSTEM, OIL LEVEL<br>H70-110XL                               | X            |                |                |               |                 | C               | 9.5 liter (10.0 qt)   | Hyster Part No. 336831                                         |
| 5                                  | FUEL TANK<br>H70-110XL                                                  | X            |                |                |               |                 |                 | 87 liter (23 gallon)  | 86 Octane — Gasoline<br>Diesel No. 2<br>LPG — HD-5             |
| 5                                  | FUEL TANK<br>H135-155XL, XL <sub>2</sub> , H155XLS                      | X            |                |                |               |                 |                 | 87 liter (23 gallon)  | 86 Octane — Gasoline<br>Diesel No. 2<br>LPG — HD-5             |
| 6                                  | COOLING SYSTEM<br>H70-110XL<br>Gasoline/LPG                             | X            |                |                |               |                 | C               | 19.9 liter (21.0 qt)  | 50% Water and<br>50% Ethylene Glycol<br>Boron Free Anti-Freeze |
|                                    | COOLING SYSTEM<br>H70-110XL<br>Diesel, Perkins 4.2482                   | X            |                |                |               |                 | C               | 17.0 liter (18.0 qt)  | 50% Water and<br>50% Ethylene Glycol<br>Boron Free Anti-Freeze |
|                                    | COOLING SYSTEM<br>H70-110XL<br>Diesel, Perkins 1004-42                  | X            |                |                |               |                 | C               | 15.1 liter (16.0 qt)  | 50% Water and<br>50% Ethylene Glycol<br>Boron Free Anti-Freeze |
| 6                                  | COOLING SYSTEM<br>H135-155XL, XL <sub>2</sub> , H155XLS<br>Gasoline/LPG | X            |                |                |               |                 | C               | 19.9 liter (21.0 qt)  | 50% Water and<br>50% Ethylene Glycol<br>Boron Free Anti-Freeze |
| X=Check    C=Change    L=Lubricate |                                                                         |              |                |                |               |                 |                 |                       |                                                                |

## MAINTENANCE

**HYSTER**

| ITEM NO.                           | ITEM                                                                                                    | 8 Hr./ Daily | 250 Hr./ 6 wks | 350 Hr./ 2 mo. | 500 Hr./ 3 mo | 1000 Hr./ 6 mo. | 2000 Hr./ 1 yr. | PROCEDURE OR QUANTITY            | SPECIFICATION                                                  |
|------------------------------------|---------------------------------------------------------------------------------------------------------|--------------|----------------|----------------|---------------|-----------------|-----------------|----------------------------------|----------------------------------------------------------------|
| 6                                  | COOLING SYSTEM (Gas/LPG)<br>H135-155XL, XL <sub>2</sub> , H155XLS<br>GM V-6 EPA Compliant Engine        | X            |                |                |               | C               |                 | 19.9 liter (21.0 qt)             | 50% Water and<br>50% Ethylene Glycol<br>Boron Free Anti-Freeze |
|                                    | COOLING SYSTEM<br>H135-155XL, XL <sub>2</sub> , H155XLS<br>Diesel, Perkins 1004-42<br>and 1104C-44 (RE) | X            |                |                |               |                 | C               | 15.1 liter (16.0 qt)             | 50% Water and<br>50% Ethylene Glycol<br>Boron Free Anti-Freeze |
|                                    | COOLING SYSTEM<br>H135-155XL, XL <sub>2</sub> , H155XLS<br>Diesel, Perkins 4.2482                       | X            |                |                |               |                 | C               | 19.9 liter (21.0 qt)             | 50% Water and<br>50% Ethylene Glycol<br>Boron Free Anti-Freeze |
| 6                                  | CLEAN DEBRIS FROM<br>RADIATOR CORE                                                                      |              |                | X              |               |                 |                 | Clean as needed                  |                                                                |
| 7                                  | BATTERY ELECTROLYTE                                                                                     | X            |                |                |               |                 |                 | Check Level                      | See Parts Manual                                               |
| 8                                  | COOLANT HOSES                                                                                           | X            |                |                |               |                 |                 | Check Condition                  | See Parts Manual                                               |
|                                    | SEAT BELT, SEAT RAILS AND<br>HIP RESTRAINTS                                                             | X            |                |                |               |                 |                 | Check Condition                  |                                                                |
| 9                                  | DRIVE BELTS                                                                                             | X            |                |                |               |                 |                 | Check Condition<br>Check Tension | See Parts Manual                                               |
| 10                                 | TIRES, TIRE PRESSURE                                                                                    | X            |                |                |               |                 |                 | Check Condition                  | See Nameplate                                                  |
| X=Check    C=Change    L=Lubricate |                                                                                                         |              |                |                |               |                 |                 |                                  |                                                                |

# HYSTER

## MAINTENANCE

| ITEM NO.                                                                                                          | ITEM                                       | 8 Hr./ Daily | 250 Hr./ 6 wks | 350 Hr./ 2 mo. | 500 Hr./ 3 mo | 1000 Hr./ 6 mo. | 2000 Hr./ 1 yr. | PROCEDURE OR QUANTITY                 | SPECIFICATION    |
|-------------------------------------------------------------------------------------------------------------------|--------------------------------------------|--------------|----------------|----------------|---------------|-----------------|-----------------|---------------------------------------|------------------|
| 11                                                                                                                | MAST, CARRIAGE, AND LIFT CHAINS            | X            |                | X              |               |                 |                 | Check Condition and Operation         |                  |
|                                                                                                                   | CHECK FOR LEAKS FUEL, OIL, WATER           | X            |                |                |               |                 |                 | Check for Leaks See NOTE 1            |                  |
|                                                                                                                   | HOOD AND SEAT LATCHES                      | X            |                |                |               |                 |                 | Check Condition                       |                  |
| 12                                                                                                                | HORN, GAUGES, LIGHTS, ALARMS               | X            |                |                |               |                 |                 | Check Operation                       |                  |
|                                                                                                                   | STEERING AND STEERING WHEEL POSITION LATCH | X            |                |                |               |                 |                 | Check Operation                       |                  |
| 13                                                                                                                | SERVICE BRAKES                             | X            |                |                |               |                 | X               | Check Operation Clean and Inspect     |                  |
| 13                                                                                                                | PARKING BRAKES                             | X            |                |                |               | L               |                 | Check Operation Check Condition       | Engine Oil       |
| 14                                                                                                                | FORKS                                      | X            |                | X              |               |                 |                 | Check Condition                       |                  |
| 15                                                                                                                | LIFT CHAINS                                | X            | L              | X              |               |                 |                 | Check for Lubrication Check Condition | Engine Oil       |
|                                                                                                                   | SAFETY LABELS                              | X            |                |                |               |                 |                 | Replace as Necessary                  | See Parts Manual |
| X=Check C=Change L=Lubricate<br>NOTE 1: Check fuel system for leaks prior to any service or maintenance activity. |                                            |              |                |                |               |                 |                 |                                       |                  |

## MAINTENANCE

**HYSTER**

| ITEM NO.                                                                                                                                                                                                                               | ITEM                                                                    | 8 Hr./ Daily | 250 Hr./ 6 wks | 350 Hr./ 2 mo. | 500 Hr./ 3 mo | 1000 Hr./ 6 mo. | 2000 Hr./ 1 yr. | PROCEDURE OR QUANTITY          | SPECIFICATION                     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|--------------|----------------|----------------|---------------|-----------------|-----------------|--------------------------------|-----------------------------------|
| 16                                                                                                                                                                                                                                     | DRIVE SHAFT, TRANSMISSION<br>H70-110XL                                  |              | L              |                |               |                 |                 | 2 Fittings                     | MultiPurpose Grease<br>See NOTE 2 |
| 16                                                                                                                                                                                                                                     | DRIVE SHAFT, TRANSMISSION<br>H135-155XL, XL <sub>2</sub> , H155XLS      |              | L              |                |               |                 |                 | 2 Fittings                     | MultiPurpose Grease<br>See NOTE 2 |
| 16                                                                                                                                                                                                                                     | DRIVE SHAFT, HYDRAULIC<br>PUMP<br>H135-155XL, XL <sub>2</sub> , H155XLS |              | L              |                |               |                 |                 | 3 Fittings                     | MultiPurpose Grease<br>See NOTE 2 |
| 18                                                                                                                                                                                                                                     | HYDRAULIC TANK BREATHER<br>H70-110XL                                    |              |                | X              |               |                 |                 | 1<br>Clean or Replace          | See Parts Manual                  |
| 19                                                                                                                                                                                                                                     | AIR FILTER                                                              |              |                | X              |               |                 |                 | Clean or Replace<br>See NOTE 3 | See Parts Manual                  |
| 19                                                                                                                                                                                                                                     | AIR FILTER<br>GM V-6 EPA Compliant<br>Engine                            |              | X              |                |               |                 |                 | Clean or Replace<br>See NOTE 3 | See Parts Manual                  |
| 19                                                                                                                                                                                                                                     | AIR FILTER ELEMENT<br>GM V-6 EPA Compliant<br>Engine                    |              |                |                |               |                 | C               | See NOTE 4                     | See Parts Manual                  |
| X=Check    C=Change    L=Lubricate<br>NOTE 2: Multipurpose grease with 2 to 4% Molybdenum Disulfide.<br>NOTE 3: Very dirty conditions require daily clean and check.<br>NOTE 4: In dirty or dusty environments, replace at 1000 hours. |                                                                         |              |                |                |               |                 |                 |                                |                                   |

# HYSTER

## MAINTENANCE

| ITEM NO.                           | ITEM                                         | 8 Hr./<br>Daily | 250<br>Hr./<br>6 wks | 350<br>Hr./<br>2 mo. | 500<br>Hr./<br>3 mo | 1000<br>Hr./<br>6 mo. | 2000<br>Hr./<br>1 yr. | PROCEDURE<br>OR QUANTITY | SPECIFICATION                                           |
|------------------------------------|----------------------------------------------|-----------------|----------------------|----------------------|---------------------|-----------------------|-----------------------|--------------------------|---------------------------------------------------------|
| 20                                 | BRAKE FLUID                                  | X               |                      | X                    |                     |                       |                       | 0.5 liter (1.1 pt)       | SAE J-1703                                              |
|                                    | CLUTCH, BRAKE, AND<br>INCHING/BRAKE PEDALS   |                 |                      | X                    |                     | L                     |                       | Adjust as Required       | Hyster Part No. 328388                                  |
|                                    | ENGINE IDLE SPEED<br>GM V-6                  |                 |                      | X                    |                     |                       |                       | Adjust as Required       | 625 to 675 rpm                                          |
|                                    | ENGINE IDLE SPEED<br>Diesel, All Engines     |                 |                      | X                    |                     |                       |                       | Adjust as Required       | 725 to 775 rpm                                          |
|                                    | ENGINE GOVERNED SPEED<br>GM V-6              |                 |                      | X                    |                     |                       |                       | Adjust as Required       | 2400 to 2500 rpm                                        |
|                                    | ENGINE GOVERNED SPEED<br>Diesel, All Engines |                 |                      | X                    |                     |                       |                       | Adjust as Required       | 2400 to 2500 rpm                                        |
| 7                                  | BATTERY, BATTERY CASE<br>AND CABLES          |                 |                      | X                    |                     |                       |                       | Clean                    |                                                         |
| 21                                 | WHEEL NUTS<br>DRIVE WHEELS                   |                 |                      | X                    |                     |                       |                       | Check Torque             | All Wheel Nuts<br>610 to 680 N.m<br>(450 to 500 lbf ft) |
| X=Check    C=Change    L=Lubricate |                                              |                 |                      |                      |                     |                       |                       |                          |                                                         |

## MAINTENANCE

**HYSTER**

| ITEM NO.                                                                                                                                                                              | ITEM                                                 | 8 Hr./ Daily | 250 Hr./ 6 wks | 350 Hr./ 2 mo. | 500 Hr./ 3 mo | 1000 Hr./ 6 mo. | 2000 Hr./ 1 yr. | PROCEDURE OR QUANTITY | SPECIFICATION                                           |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|--------------|----------------|----------------|---------------|-----------------|-----------------|-----------------------|---------------------------------------------------------|
| 21                                                                                                                                                                                    | WHEEL NUTS<br>STEER WHEELS                           |              |                | X              |               |                 |                 | Check Torque          | All Wheel Nuts<br>610 to 680 N.m<br>(450 to 500 lbf ft) |
| 22                                                                                                                                                                                    | ENGINE OIL FILTER<br>GM V-6                          |              | C              |                |               |                 |                 | 1<br>See NOTE 5       | See Parts Manual                                        |
|                                                                                                                                                                                       | ENGINE OIL FILTER<br>Perkins Diesel 4.2482           |              |                | C              |               |                 |                 | 1<br>See NOTE 5       | See Parts Manual                                        |
|                                                                                                                                                                                       | ENGINE OIL FILTER<br>Perkins Diesel 1004-42          |              |                |                | C             |                 |                 | 1<br>See NOTE 5       | See Parts Manual                                        |
|                                                                                                                                                                                       | ENGINE OIL FILTER<br>Perkins Diesel<br>1104C-44 (RE) |              |                |                | C             |                 |                 | 1<br>See NOTE 5       | See Parts Manual                                        |
| 23                                                                                                                                                                                    | STEERING AXLE SPINDLES                               |              |                | L              |               |                 |                 | 2 Fittings            | Multipurpose Grease<br>See NOTE 2                       |
| 24<br>25                                                                                                                                                                              | MAST<br>Pivots                                       |              | L              |                |               |                 |                 | 2 Fittings            | Multipurpose Grease<br>See NOTE 2                       |
| X=Check    C=Change    L=Lubricate<br>NOTE 2: Multipurpose grease with 2 to 4% Molybdenum Disulfide.<br>NOTE 5: Change filters on NEW trucks at the first 100 hours on the hourmeter. |                                                      |              |                |                |               |                 |                 |                       |                                                         |

# HYSTER

## MAINTENANCE

| ITEM NO.                                                       | ITEM                                                       | 8 Hr./ Daily | 250 Hr./ 6 wks | 350 Hr./ 2 mo. | 500 Hr./ 3 mo | 1000 Hr./ 6 mo. | 2000 Hr./ 1 yr. | PROCEDURE OR QUANTITY | SPECIFICATION                              |
|----------------------------------------------------------------|------------------------------------------------------------|--------------|----------------|----------------|---------------|-----------------|-----------------|-----------------------|--------------------------------------------|
| 24<br>26                                                       | MAST<br>Sliding Surfaces and Load<br>Roller Surfaces       |              | L              |                |               |                 |                 | As Required           | Multipurpose Grease<br>See NOTE 2          |
| 24<br>27                                                       | MAST<br>Sideshift Carriage                                 |              | L              |                |               |                 |                 | 4 Fittings            | Multipurpose Grease<br>See NOTE 2          |
| 24                                                             | MAST<br>Fork Guides                                        |              | L              |                |               |                 |                 | As Required           | Engine Oil                                 |
|                                                                | PEDALS, LEVERS, LINKAGES,<br>CABLES, HINGES, SEAT<br>RAILS |              |                |                |               | L               |                 | As Required           | Engine Oil                                 |
|                                                                | FINAL FUEL FILTER, DIESEL                                  |              |                |                |               | C               |                 | 1                     | See Parts Manual                           |
| 28                                                             | SPARK PLUGS                                                |              |                |                |               | C               |                 | 6<br>Check Plug Wires | See Parts Manual<br>Gap, 1.6 mm (0.062 in) |
| X=Check    C=Change    L=Lubricate                             |                                                            |              |                |                |               |                 |                 |                       |                                            |
| NOTE 2: Multipurpose grease with 2 to 4% Molybdenum Disulfide. |                                                            |              |                |                |               |                 |                 |                       |                                            |

## MAINTENANCE

**HYSTER**

| ITEM NO.                                                                                                                                                                                                                                                                        | ITEM                                                       | 8 Hr./ Daily | 250 Hr./ 6 wks | 350 Hr./ 2 mo. | 500 Hr./ 3 mo | 1000 Hr./ 6 mo. | 2000 Hr./ 1 yr. | PROCEDURE OR QUANTITY | SPECIFICATION      |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|--------------|----------------|----------------|---------------|-----------------|-----------------|-----------------------|--------------------|
| 29                                                                                                                                                                                                                                                                              | PCV VALVE (GM V-6)                                         |              |                |                |               | X               | C               | 1                     | See Parts Manual   |
| 30                                                                                                                                                                                                                                                                              | CRANKCASE BREATHER<br>GM V-6                               |              | X              |                |               | C               |                 | 1<br>See NOTE 6       | See Parts Manual   |
|                                                                                                                                                                                                                                                                                 | CRANKCASE BREATHER<br>Perkins 4.2482                       |              |                | X              |               | C               |                 | 1<br>See NOTE 6       | See Parts Manual   |
|                                                                                                                                                                                                                                                                                 | CRANKCASE BREATHER<br>Perkins 1004-42 and<br>1104C-44 (RE) |              |                |                | X             | C               |                 | 1<br>See NOTE 6       | See Parts Manual   |
|                                                                                                                                                                                                                                                                                 | TIMING<br>GM V-6                                           |              |                |                |               | X               |                 | Adjust as Required    | 0° BTDC @650 rpm   |
|                                                                                                                                                                                                                                                                                 | TIMING<br>Diesel, All Units                                |              |                |                |               | X               |                 | Adjust as Required    | 16° BTDC Static    |
|                                                                                                                                                                                                                                                                                 | VALVE ADJUSTMENT<br>GM V-6                                 |              |                |                |               | X               |                 |                       | Not Adjustable     |
|                                                                                                                                                                                                                                                                                 | VALVE ADJUSTMENT<br>Diesel, All Engines<br>Inlet (Cold)    |              |                |                |               | X               |                 | Adjust as Required    | 0.20 mm (0.008 in) |
| X=Check    C=Change    L=Lubricate<br>NOTE 6: Both H135-155XL, H135-155XL <sub>2</sub> , H155XL, and H70-110XL units require a check of the crankcase breather after every engine oil change. For H70-110XL units, change the crankcase breather after 1000 hours of operation. |                                                            |              |                |                |               |                 |                 |                       |                    |

# HYSTER

## MAINTENANCE

| ITEM NO.                                                                                                                                                                                               | ITEM                                                                                           | 8 Hr./ Daily | 250 Hr./ 6 wks | 350 Hr./ 2 mo. | 500 Hr./ 3 mo | 1000 Hr./ 6 mo. | 2000 Hr./ 1 yr. | PROCEDURE OR QUANTITY              | SPECIFICATION       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|--------------|----------------|----------------|---------------|-----------------|-----------------|------------------------------------|---------------------|
|                                                                                                                                                                                                        | VALVE ADJUSTMENT<br>Diesel, All Engines<br>Exhaust (Cold)                                      |              |                |                |               | X               |                 | Adjust as Required                 | 0.45 mm (0.018 in)  |
| 31                                                                                                                                                                                                     | MANUAL TRANSMISSION,<br>SPEED REDUCER AND<br>DIFFERENTIAL OIL<br>H70-110XL                     |              |                |                |               | X               | C               | 14.7 liter (15.5 qt)<br>See NOTE 7 | SAE 80W-90, 85W-140 |
| 32                                                                                                                                                                                                     | SPEED REDUCER AND<br>DIFFERENTIAL OIL, SINGLE<br>SPEED POWERSHIFT<br>TRANSMISSION<br>H70-110XL |              |                |                |               | X               | C               | 7.6 liter (8.0 qt)<br>See NOTE 7   | SAE 80W-90, 85W-140 |
| 33                                                                                                                                                                                                     | MANUAL TRANSMISSION OIL<br>H135-155XL (F006)                                                   |              |                |                |               | X               | C               | 3.3 liter (3.5 qt)                 | SAE 80W-90, 85W-140 |
| 34<br>17                                                                                                                                                                                               | SPEED REDUCER AND<br>DIFFERENTIAL OIL, MANUAL<br>TRANSMISSION<br>H135-155XL (F006)             |              |                |                |               | X               | C               | 14.3 liter (15.0 qt)<br>See NOTE 7 | SAE 80W-90, 85W-140 |
| X=Check    C=Change    L=Lubricate<br>NOTE 7: Check the thrust screw adjustment on the differential after the first 150 hours of operation. Adjustments after first 150 hours are normally not needed. |                                                                                                |              |                |                |               |                 |                 |                                    |                     |

## MAINTENANCE

**HYSTER**

| ITEM NO.                                                                                                                                                                                                                                                                                | ITEM                                                                                                                    | 8 Hr./<br>Daily | 250<br>Hr./<br>6 wks | 350<br>Hr./<br>2 mo. | 500<br>Hr./<br>3 mo | 1000<br>Hr./<br>6 mo. | 2000<br>Hr./<br>1 yr. | PROCEDURE<br>OR QUANTITY           | SPECIFICATION       |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|-----------------|----------------------|----------------------|---------------------|-----------------------|-----------------------|------------------------------------|---------------------|
| 34<br>17                                                                                                                                                                                                                                                                                | SPEED REDUCER AND<br>DIFFERENTIAL OIL,<br>TWO-SPEED POWERSHIFT<br>TRANSMISSION<br>H135-155XL, XL <sub>2</sub> , H155XLS |                 |                      |                      |                     | X                     | C                     | 12.1 liter (12.8 qt)<br>See NOTE 7 | SAE 80W-90, 85W-140 |
| 35                                                                                                                                                                                                                                                                                      | FUEL FILTER<br>GASOLINE                                                                                                 |                 |                      |                      |                     |                       | C                     | 1                                  | See Parts Manual    |
| 35                                                                                                                                                                                                                                                                                      | FUEL FILTER<br>LPG                                                                                                      |                 |                      |                      |                     |                       | C                     | 1                                  | See Parts Manual    |
| 35                                                                                                                                                                                                                                                                                      | FUEL FILTER, LPG<br>GM V-6 EPA Compliant<br>Engine                                                                      |                 |                      |                      |                     | C                     |                       | 1                                  | See Parts Manual    |
| 36                                                                                                                                                                                                                                                                                      | OIL FILTER, HYDRAULIC<br>SYSTEM                                                                                         |                 |                      |                      |                     |                       | C                     | 1<br>See NOTE 5                    | See Parts Manual    |
| 37                                                                                                                                                                                                                                                                                      | OIL FILTER, OIL CLUTCH<br>SYSTEM<br>H70-110XL                                                                           |                 |                      |                      |                     |                       | C                     | 1<br>See NOTE 5                    | See Parts Manual    |
| X=Check    C=Change    L=Lubricate<br>NOTE 5: Change filters on NEW trucks at the first 100 hours on the hourmeter.<br>NOTE 7: Check the thrust screw adjustment on the differential after the first 150 hours of operation. Adjustments after first 150 hours are normally not needed. |                                                                                                                         |                 |                      |                      |                     |                       |                       |                                    |                     |

# HYSTER

## MAINTENANCE

| ITEM NO.                                                                                                            | ITEM                                                                      | 8 Hr./<br>Daily | 250<br>Hr./<br>6 wks | 350<br>Hr./<br>2 mo. | 500<br>Hr./<br>3 mo | 1000<br>Hr./<br>6 mo. | 2000<br>Hr./<br>1 yr. | PROCEDURE<br>OR QUANTITY | SPECIFICATION    |
|---------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|-----------------|----------------------|----------------------|---------------------|-----------------------|-----------------------|--------------------------|------------------|
| 38                                                                                                                  | OIL FILTER, POWERSHIFT<br>TRANSMISSION                                    |                 |                      |                      |                     |                       | C                     | 1<br>See NOTE 5          | See Parts Manual |
|                                                                                                                     | PRIMARY FUEL FILTER,<br>DIESEL                                            | X               |                      |                      |                     | C                     |                       | 1<br>Drain Water         | See Parts Manual |
|                                                                                                                     | INSPECT ENGINE<br>ELECTRICAL SYSTEM,<br>CONNECTORS AND<br>FCVS CONNECTION |                 |                      |                      |                     | X                     |                       |                          |                  |
|                                                                                                                     | INSPECT ENGINE<br>VACUUM AND FUEL<br>LINES AND FITTINGS                   |                 |                      |                      |                     |                       | X                     |                          |                  |
|                                                                                                                     | INSPECT LOCK OFF<br>FOR LEAKS AND<br>ENSURE LOCK OFF<br>CLOSING           |                 |                      |                      |                     |                       | X                     |                          |                  |
|                                                                                                                     | TEST LPG/GAS<br>REGULATOR<br>PRESSURE                                     |                 |                      |                      |                     |                       | X                     |                          |                  |
| X=Check    C=Change    L=Lubricate<br>NOTE 5: Change filters on NEW trucks at the first 100 hours on the hourmeter. |                                                                           |                 |                      |                      |                     |                       |                       |                          |                  |

## MAINTENANCE

**HYSTER**

| ITEM NO.                           | ITEM                                                           | 8 Hr./<br>Daily | 250<br>Hr./<br>6 wks | 350<br>Hr./<br>2 mo. | 500<br>Hr./<br>3 mo | 1000<br>Hr./<br>6 mo. | 2000<br>Hr./<br>1 yr. | PROCEDURE<br>OR QUANTITY  | SPECIFICATION |
|------------------------------------|----------------------------------------------------------------|-----------------|----------------------|----------------------|---------------------|-----------------------|-----------------------|---------------------------|---------------|
|                                    | OXYGEN SENSOR<br>GM V6 EPA Compliant<br>Engine                 |                 |                      |                      |                     |                       | X                     | Check Indicator<br>Light  |               |
|                                    | INSPECT LOW PRESSURE<br>REGULATOR FOR OIL<br>BUILDUP AND LEAKS |                 |                      |                      |                     |                       | X                     | Drain Oil If<br>Necessary |               |
|                                    | CHECK AIR INDUCTION<br>SYSTEM FOR LEAKS                        |                 |                      |                      |                     |                       | X                     |                           |               |
|                                    | CHECK MANIFOLD FOR<br>VACUUM LEAKS                             |                 |                      |                      |                     |                       | X                     |                           |               |
|                                    | CHECK THROTTLE<br>SHAFT FOR STICKING                           |                 |                      |                      |                     |                       | X                     |                           |               |
|                                    | CHECK INJECTORS AND<br>RAILS FOR LEAKS                         |                 |                      |                      |                     |                       | X                     |                           |               |
|                                    | INSPECT EXHAUST<br>MANIFOLD AND PIPING<br>FOR LEAKS            |                 |                      |                      |                     |                       | X                     |                           |               |
|                                    | INSPECT CATALYST<br>INLET AND OUTLET                           |                 |                      |                      |                     |                       | X                     |                           |               |
| X=Check    C=Change    L=Lubricate |                                                                |                 |                      |                      |                     |                       |                       |                           |               |

# HYSTER

## MAINTENANCE

### HOW TO MAKE THE CHECKS WITH THE ENGINE STOPPED

#### Hydraulic System Oil (See FIGURE 13.)

#### **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 pump without oil in the hydraulic system. The operation of the hydraulic pump without oil will damage the pump.

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 14.)

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

#### Air Filter (See FIGURE 14.)

#### **WARNING**

Compressed air can move particles so that they cause **injury to the user or to other personnel. Make sure that the path of the compressed air is away from all personnel. Wear protective goggles or a face shield to prevent injury to the eyes.**

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.

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.

## MAINTENANCE

# HYSTER

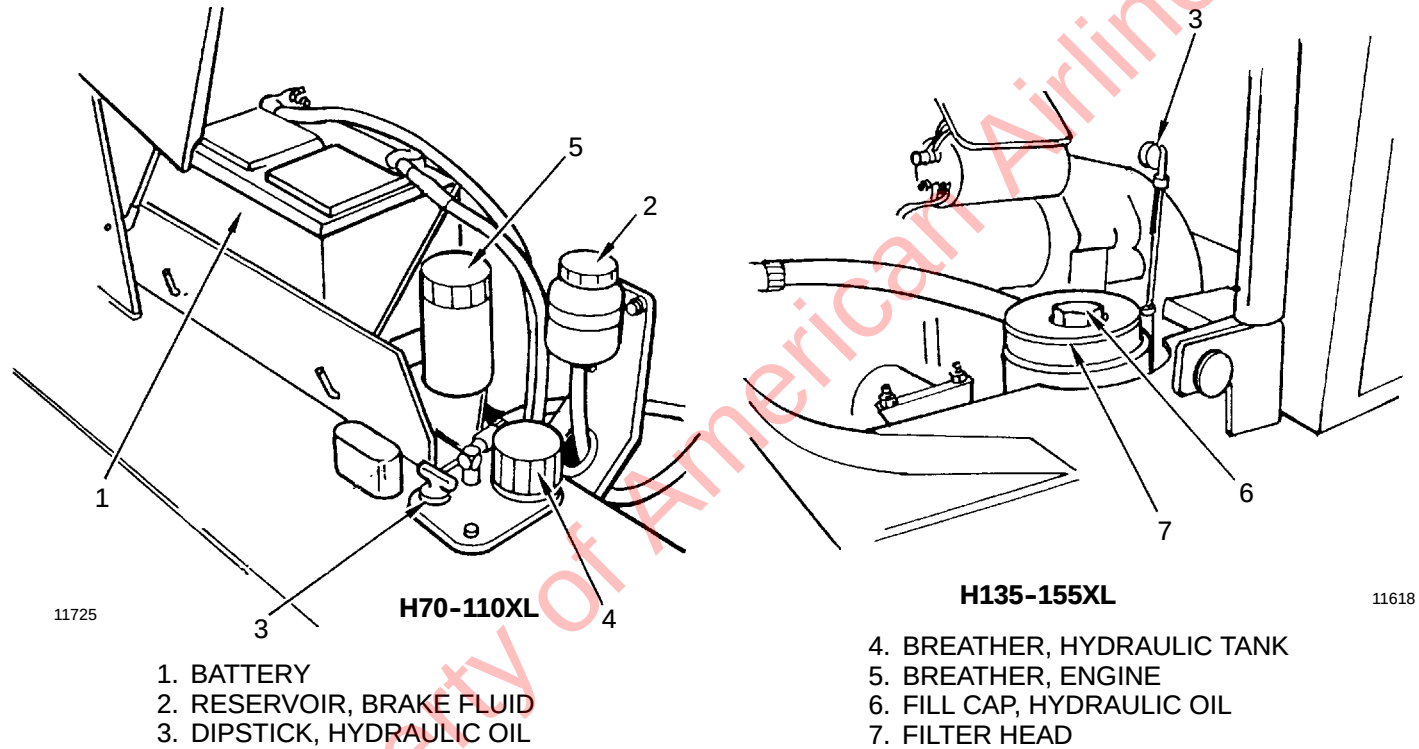
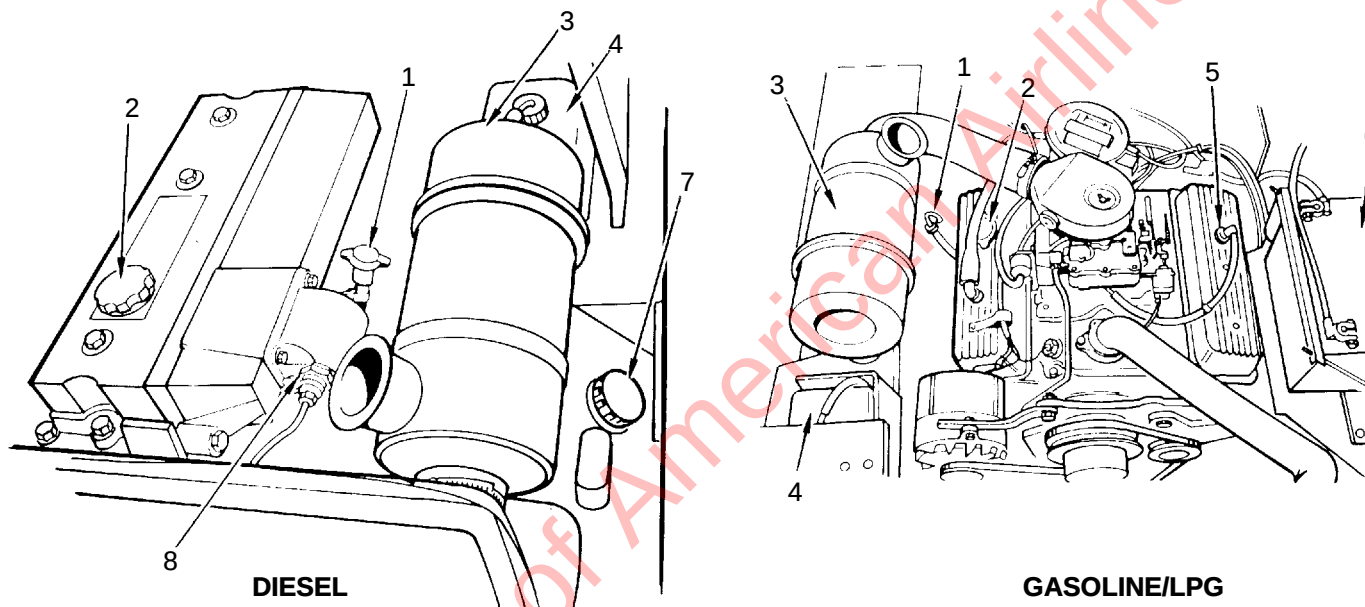


FIGURE 13. MAINTENANCE POINTS

# HYSTER

## MAINTENANCE



- 12185
- 1. DIPSTICK FOR ENGINE OIL
  - 2. ENGINE OIL FILL CAP
  - 3. AIR FILTER
  - 4. AUXILIARY COOLANT RESERVOIR

- 5. PCV VALVE (GM V-6)
  - 6. BATTERY
  - 7. FILL CAP, FUEL
  - 8. COLD START AID, DIESEL
- 12186

FIGURE 14. ENGINE MAINTENANCE POINTS

## MAINTENANCE

**HYSTER**

### Drive Belts

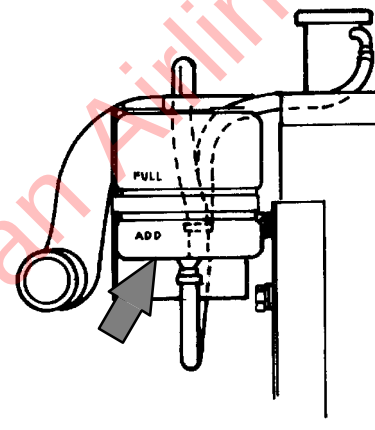
Check the drive belts for wear or damage.

### Cooling System (See FIGURE 15.)



#### WARNING

**DO NOT** remove the radiator cap from the radiator when the engine is hot. When the radiator cap is removed, the pressure is released from the system.



11619

FIGURE 15. AUXILIARY COOLANT RESERVOIR

**If the system is hot, the steam and boiling coolant can cause burns. DO NOT remove the cover for the radiator when the engine is running.**

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

# HYSTER

## MAINTENANCE

correct mixture of water and ethylene glycol. See the MAINTENANCE SCHEDULE.

### WARNING

Compressed air can move particles so that they cause injury to the user or to other personnel. Make sure that the path of the compressed air is away from all personnel. Wear protective goggles or a face shield to prevent injury to the eyes.

Check the radiator fins. Clean the radiator with compressed air or water as needed.

### 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 fuel is added to the lift truck, see the section, **How To Add Fuel To The Lift Truck** procedures in this **OPERATING MANUAL**.

### Primary Fuel Filter, Diesel Engine (See FIGURE 16.)

Drain the water from the primary fuel filter.

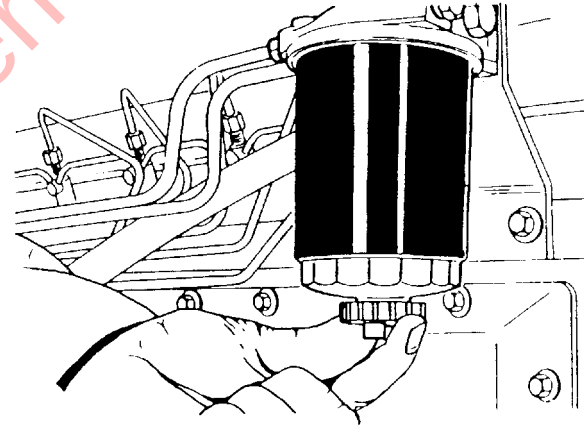


FIGURE 16. PRIMARY FUEL FILTER

## MAINTENANCE

**HYSTER**

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.
2. Close the valve.

### Battery (See FIGURE 13.)

#### **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.**

**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 battery 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.

If the battery becomes discharged and requires a boost battery to start the engine, follow these procedures carefully when connecting the jumper cables:

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

### Tires and Wheels (See FIGURE 17.)

#### **WARNING**

**Air pressure in the 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 air pressure, the tire must be removed before air is added. Put the tire in a safety cage when adding air**

# HYSTER

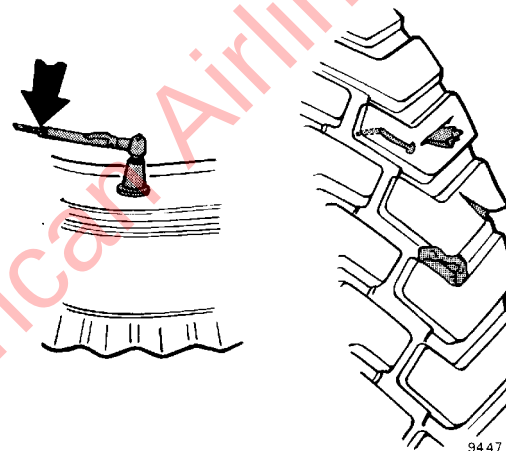
## MAINTENANCE

pressure to the tire. Follow the procedures under **ADD AIR TO THE TIRES**.

**When adding air 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 the warm tires must always be equal to or greater than the air pressures specified for cold tires.

Check the tires for damage. See FIGURE 17. 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.



1. CHECK THE TIRE PRESSURE
2. CHECK FOR DAMAGE

9447

FIGURE 17. CHECK THE TIRES

Make sure the drive wheel nuts are tight. Tighten the wheel nuts in a cross pattern to the correct torque value shown in the **MAINTENANCE SCHEDULE** table.

## MAINTENANCE

**HYSTER**

### CAUTION

**Check all wheel nuts after 2 to 5 hours of operation: when new lift trucks begin operation and on all lift trucks when the drive wheels have been removed and installed. Tighten the nuts in a cross pattern to the correct torque value shown in the MAINTENANCE SCHEDULE. When the nuts stay tight for eight hours, the interval for checking the torque can be extended to 350 hours.**

### Forks

The identification of a fork is how the fork is connected to the carriage. The **H70-110XL** series of lift trucks normally have a hook fork. A pin fork is available for this series of

lift trucks as an option. The **H135-155XL** series of lift trucks normally have a pin fork.

### Forks, Adjustment

**Hook forks** are connected to the carriage by hooks and lock pins. The lock pins can be one of two types. See FIGURE 18. These lock pins are installed through the top fork hooks and fit into slots in the top carriage bar. Adjust the forks as far apart as possible for maximum support of the load. Hook forks will slide along the carriage bars to adjust for the load to be carried. Raise the lock pin in each fork to slide the fork on the carriage bar. Make sure the lock pin is engaged in the carriage bar to lock the fork in position after the width adjustment is made.

# HYSTER

## MAINTENANCE

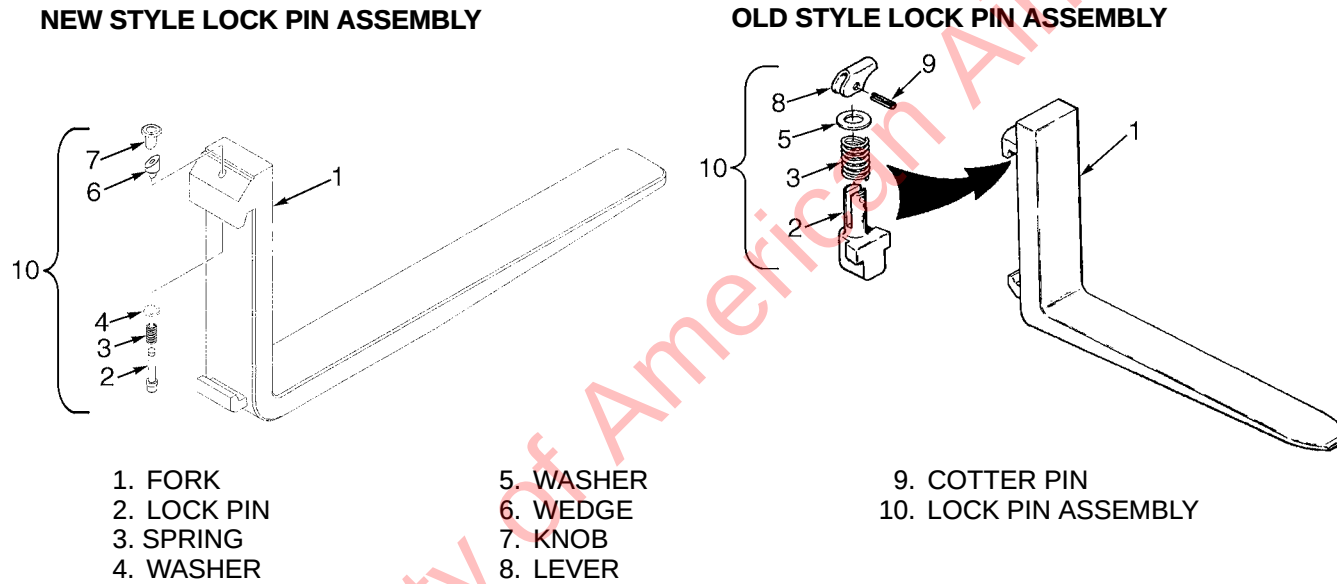


FIGURE 18. HOOK FORK LOCK PIN ASSEMBLY

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## MAINTENANCE

# HYSTER

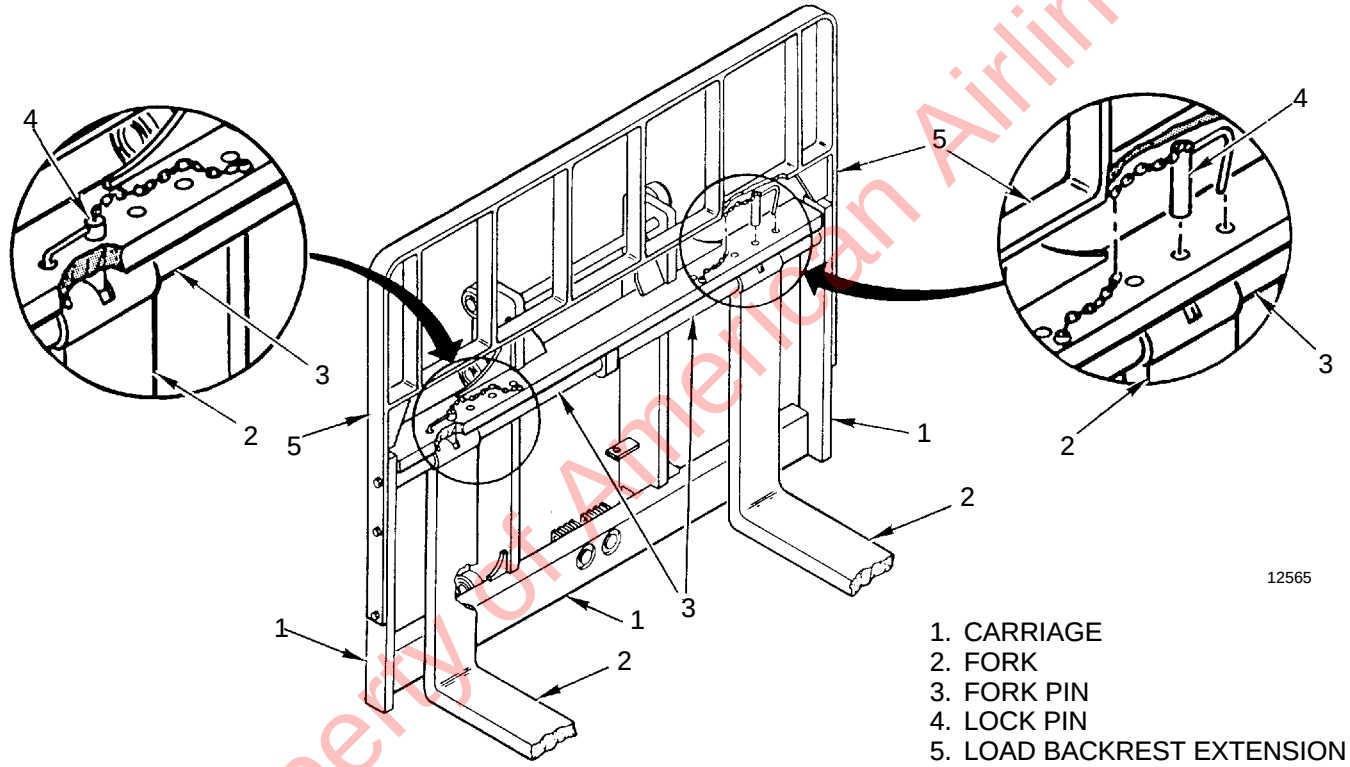


FIGURE 19. PIN FORKS

# HYSTER

## MAINTENANCE

**Pin forks** are fastened to the carriage with large fork pins. 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. See FIGURE 19. 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 And Installation

A fork can be removed from the carriage for replacement of the fork or other maintenance. See FIGURE 19. and FIGURE 20.

#### **WARNING**

**Do not try to move a fork without a lifting device. Each fork for these lift trucks can weigh 66 kg to 183 kg (145 to 402 lb) for a hook fork and 128 to 226 kg (281 to 498 lb) for a pin fork.**

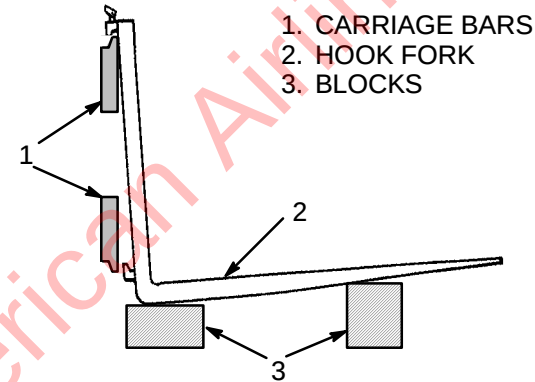


FIGURE 20. REMOVE A HOOK FORK

**Hook Fork (Removal).** Slide a hook fork to the fork removal notch on the carriage. See FIGURE 21. Lower the fork onto blocks so that the bottom hook of the fork moves through the fork removal notch. See FIGURE 21. Lower the carriage further so that the top hook of the fork is disengaged from the top carriage bar. Move the carriage away from the fork, or use a lifting device to move the fork away from the carriage.

**Hook Fork (Installation).** Move the fork and carriage so that the top hook on the fork can engage the upper car-

## MAINTENANCE

**HYSTER**

riage bar. Raise the carriage to move the lower hook through the fork removal notch. Slide the fork on the carriage so that both upper and lower hooks engage the carriage. Engage the lock pin with a notch in the upper carriage bar.

**Pin Fork (Removal).** Lower the carriage and put blocks under a pin fork. When the weight of the forks have been removed from the fork pin, remove the load backrest extension. The load backrest extension holds the fork pin in the carriage. Slide the fork pin from its mount in the carriage and through the eye of the fork. See FIGURE 19. Use a lifting device to lift the fork away from the carriage.

**Pin Fork (Installation).** Install the fork pin in the carriage. Align the eyes of the forks so that the forks will be installed on the fork pin. When the fork pin is installed in the carriage so that it holds the forks, install the load backrest extension. Engage the fork with the lock pin.

### Inspection of Forks, Mast and Lift Chains (See FIGURE 21. and FIGURE 22.)



#### **WARNING**

**Never work under a raised carriage or forks. 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.**

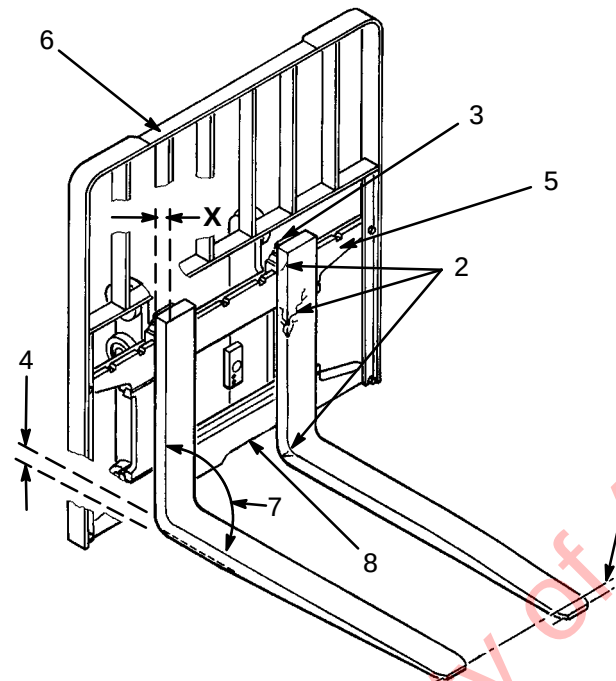
**Do not try to correct the alignment of the fork tips by bending the forks or adding shims. Replace damaged forks.**

**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 capscrews and nuts are tight.
2. Inspect the channels for wear in the areas where the rollers travel. Inspect the rollers for wear or damage.

# HYSTER

## MAINTENANCE



1. TIP ALIGNMENT (MUST BE WITHIN 3% OF FORK LENGTH)
2. CRACKS
3. LATCH DAMAGE
4. HEEL OF FORK (MUST BE 90% OF DIMENSION "X")
5. CARRIAGE
6. LOAD BACKREST EXTENSION
7. MAXIMUM ANGLE 93°
8. FORK REMOVAL NOTCH

| FORK TIP ALIGNMENT |                 |
|--------------------|-----------------|
| LENGTH OF FORKS    | 3% DIMENSION    |
| 915 mm (36 in)     | 27 mm (1.10 in) |
| 1220 mm (48 in)    | 37 mm (1.45 in) |
| 1830 mm (72 in)    | 55 mm (2.15 in) |

10221

FIGURE 21. CHECK THE FORKS

## MAINTENANCE

**HYSTER**

3. Inspect the load backrest extension for cracks and damage.

4. Inspect the forks for cracks and wear. Check that the fork tips are aligned within 13 mm (0.5 in) of each other. (See FIGURE 21.) Check that the bottom of the fork is not worn (Item 4).

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

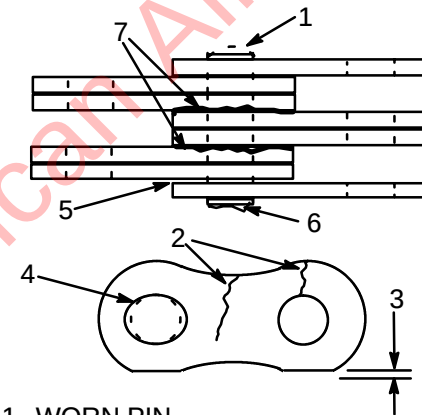
6. If the lift truck is equipped with a side-shift carriage or attachment, inspect the parts for cracks and wear. Make sure the parts that fasten the side-shift carriage or attachment to the carriage are in good condition.

7. Check that the lift chains are correctly lubricated. Use SAE 30 engine oil to lubricate the lift chains.

8. Inspect the lift chains for cracks or broken links and pins. (See FIGURE 22.)

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

10. 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.**



- |              |                 |
|--------------|-----------------|
| 1. WORN PIN  | 5. LOOSE LEAVES |
| 2. CRACKS    | 6. DAMAGED PIN  |
| 3. EDGE WEAR | 7. CORROSION    |
| 4. HOLE WEAR |                 |

FIGURE 22. CHECK THE LIFT CHAINS

# **HYSTER**

## **MAINTENANCE**

### **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

### **Operator Restraint System (See FIGURE 23.)**

The seat belt, hip restraint brackets, seat and mounting, hood, latches and floor plates 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.

## MAINTENANCE

# HYSTER

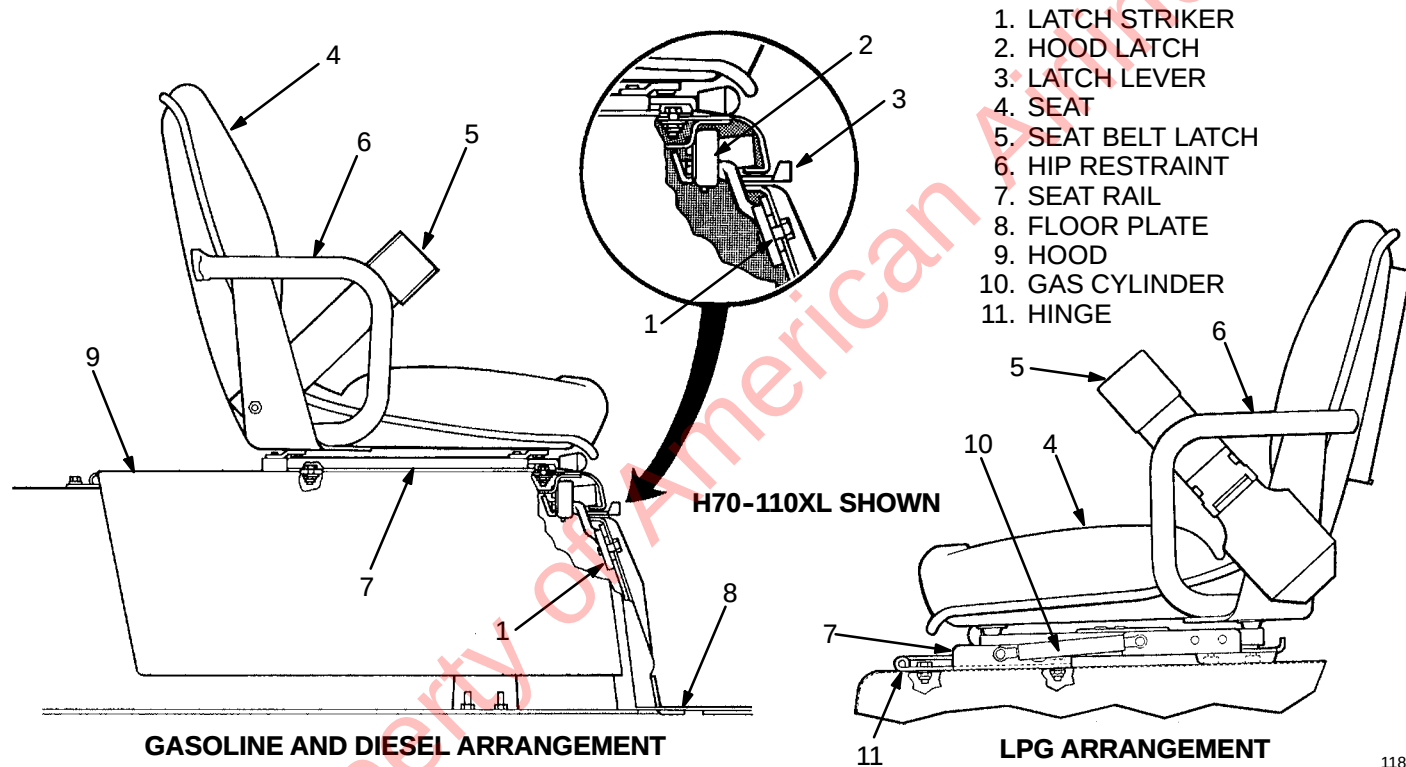


FIGURE 23. CHECK THE HOOD AND SEAT LATCHES

# HYSTER

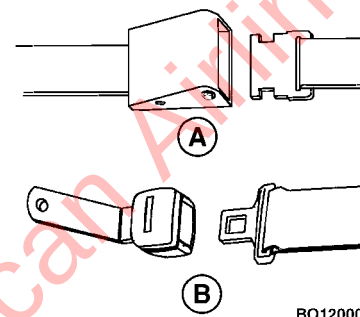
## MAINTENANCE

Make sure the seat rails and latch striker are not loose. The seat rails must lock tightly in position, but move freely when unlocked. The seat rails must be correctly fastened to the mount surface. If the mounting surface is the hood, the hood must be fastened to the floor plate with the latch. The floor plate must be fastened to the lift truck frame. Try to lift the hood to make sure it is latched and will not move. See FIGURE 23.

The seat belt must fasten correctly. Make sure the seat belt can be pulled from the retractor and retracts smoothly. The seat belt must not be damaged or worn.

### Automatic Locking Retractor (ALR)

**NOTE:** Lift trucks produced before November 1, 2005 are equipped with the ALR type seat belts. See FIGURE 24.



- A. AUTOMATIC LOCKING RETRACTOR (ALR)
- B. EMERGENCY LOCKING RETRACTOR (ELR)

FIGURE 24. SEAT BELTS

The seat belt must fasten securely. Make sure the seat belt extends and retracts smoothly and is not frayed or torn. If the seat belt is damaged or does not operate properly, it must be replaced.

### Emergency Locking Retractor (ELR)

**NOTE:** Lift trucks produced after November 1, 2005 are equipped with the Emergency Locking Retractor (ELR) style seat belt. See FIGURE 24.

## MAINTENANCE

**HYSTER**

When the ELR style seat belt is properly buckled across the operator, the belt will permit slight operator repositioning without activating the locking mechanism. If the truck tips over, travels off a dock, or comes to a sudden stop, the locking mechanism will be activated and hold the operator's lower torso in the seat.

A seat belt that is damaged, worn, or does not operate properly will not provide protection when it is needed. The end of the belt must fasten correctly in the latch. The seat belt must be in good condition. Replace the seat belt if it is damaged or worn.

The following seat belt operation checks must be performed:

- With the hood closed and in the locked position, pull the seat belt slowly from the retractor assembly. Make sure the seat belt pulls out and retracts smoothly. If the seat belt cannot be pulled from the retractor assembly or the belt will not retract, replace the seat belt assembly.
- With the hood closed and in the locked position, pull the seat belt with a sudden jerk. Make sure the seat belt will not pull from the retractor assembly. If the seat belt can be pulled from the retractor when it is

pulled with a sudden jerk, replace the seat belt assembly.

- With the hood in the open position, make sure the seat belt will not pull from the retractor assembly. If the seat belt can be pulled from the retractor, with the hood in the open position, replace the seat belt assembly.

## HOW TO MAKE THE CHECKS WITH THE ENGINE RUNNING



### 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

# HYSTER

## MAINTENANCE

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**

**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**. Make the checks 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. If any of the lights or gauges do not operate correctly, check the fuses. The fuses are under the instrument panel on the left side of the cowl. See FIGURE 25.

On H135-155XL (G006) lift trucks only, there are additional fuses and relays located in the engine compartment. See FIGURE 26. and FIGURE 27.

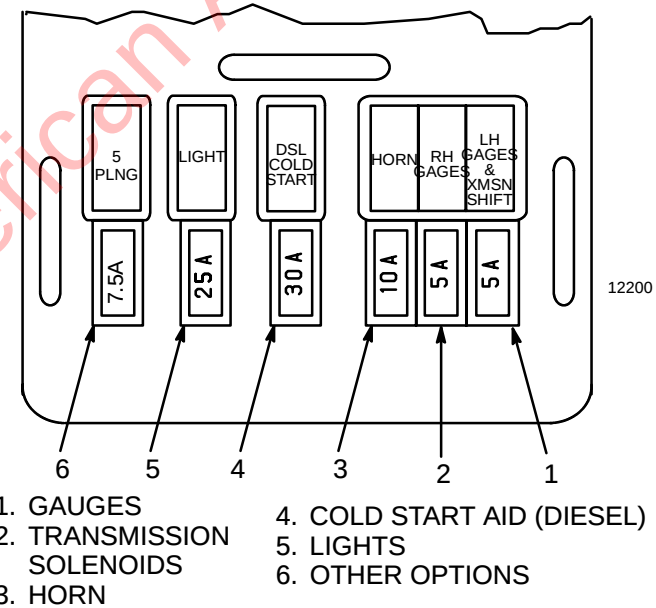
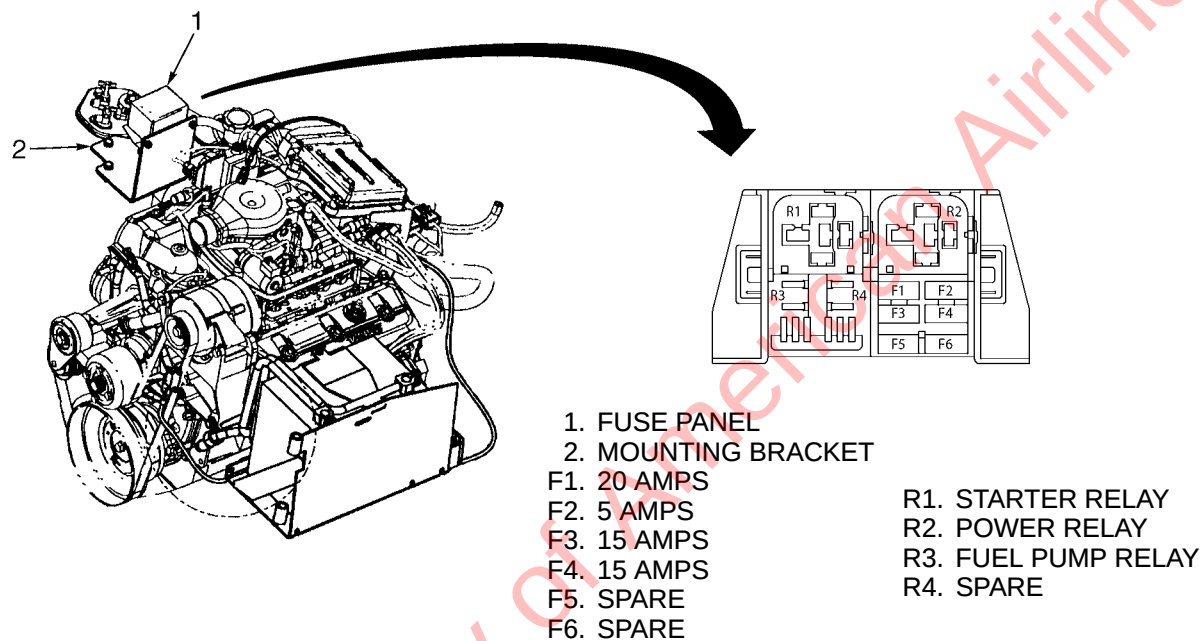


FIGURE 25. FUSES

## MAINTENANCE

# HYSTER

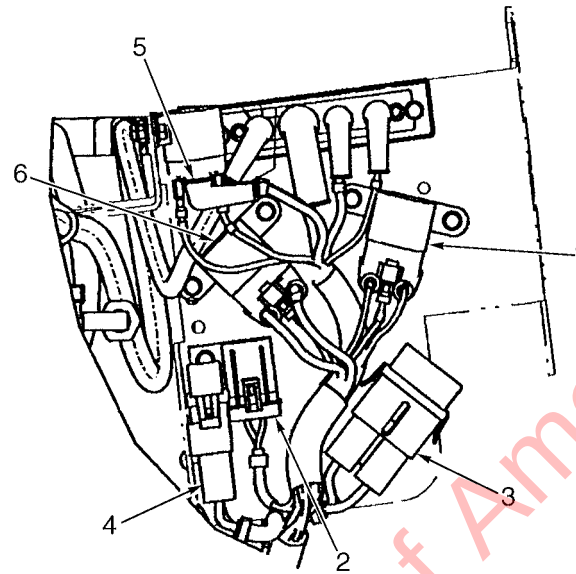


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FIGURE 26. ENGINE COMPARTMENT FUSES AND RELAYS, GM 4.3L EPA COMPLIANT ENGINE (H135-155XL, H135-155XL<sub>2</sub> AND H155XLS [G006] TRUCKS ONLY)

# **HYSTER**

## **MAINTENANCE**



1. LIFT PUMP RELAY
2. LIFT PUMP FUSE (10A)
3. ALTERNATOR FUSE (60A)
4. GLOW PLUG FUSE (60A)
5. STARTER RELAY
6. GLOW PLUG RELAY

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FIGURE 27. ENGINE COMPARTMENT FUSES AND RELAYS , PERKINS 1104C-44 (RE) DIESEL ENGINE  
(H135-155XL, H135-155XL<sub>2</sub> AND H155XLS [G006] TRUCKS ONLY)

## MAINTENANCE

# HYSTER

### Oil Level, Powershift Transmission (See FIGURE 28.)

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

### Oil Level, Oil Clutch System, H70-110XL (See FIGURE 28.)

**NOTE:** The oil clutch system for the H135-155XL (F006) lift trucks do not have a dipstick because the oil clutch uses oil from the hydraulic system.

Put the direction control lever in the **NEUTRAL** (N) position. Apply the parking brake. Check oil level in the clutch housing when the engine is running at idle speed. Make sure the oil is at operating temperature. Use the correct oil as shown in the MAINTENANCE SCHEDULE. Keep the oil at the "FULL" mark on the dipstick.

# HYSTER

## MAINTENANCE

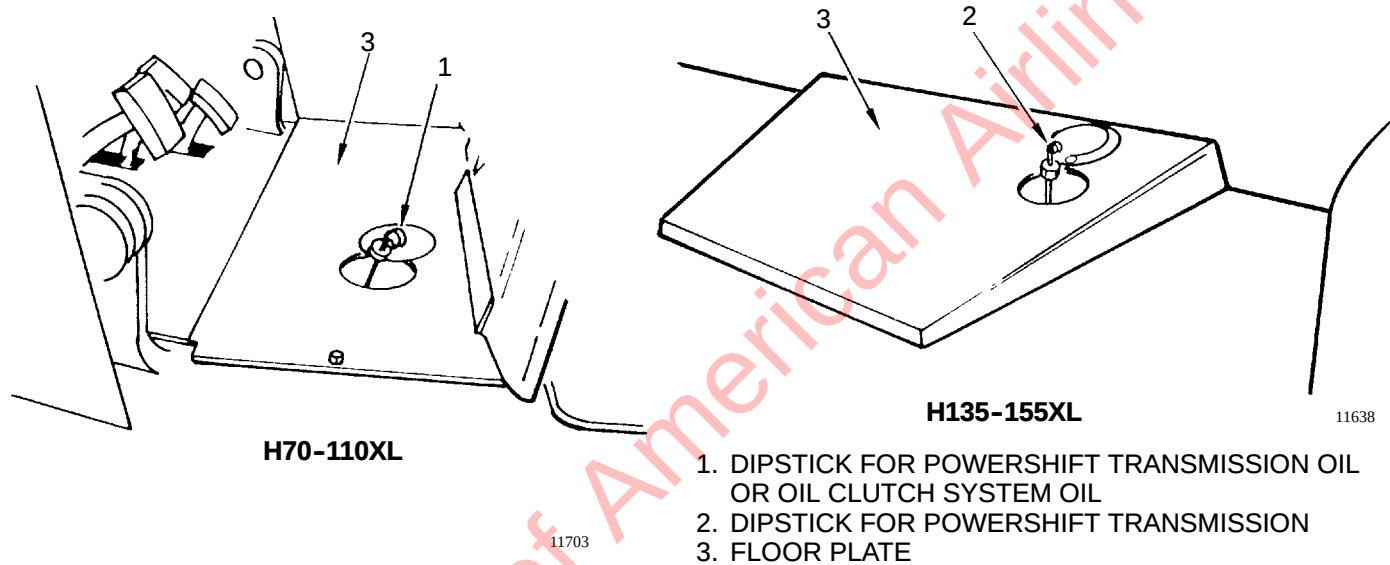


FIGURE 28. POWERSHIFT TRANSMISSION OR OIL CLUTCH SYSTEM OIL

### Control Levers and Pedals

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

TABLE 3. Check that the pedals operate as described in TABLE 2.

## MAINTENANCE

**HYSTER**

### 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.**

**Before making any repairs, 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 find hydraulic leaks by putting hands on pressurized hydraulic components. Hydraulic oil can be injected into the body by the 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 weldments and the carriage must lower completely.
- d. Raise the mast one metre (three feet) with a capacity load. The inner weldments 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). Tilt the mast forward and backward. The mast must tilt smoothly and both tilt cylinders must stop evenly.
- f. Check that the controls for the attachment operate the functions of the attachment. (See symbols by each of the controls.) Make sure all of the hydraulic lines are connected correctly and do not leak.

### Inching/Brake Pedal

Push on the inching/brake pedal. The service brakes must be applied before the inching/brake pedal reaches the floor plate. Full application of the inching/brake pedal applies the service brakes and puts the transmission in **NEUTRAL**. When the inching/brake pedal is fully applied, a

# HYSTER

## MAINTENANCE

switch in the starting circuit is closed so that the engine can be started.

### Service Brakes

Check the operation of the service brakes. Push on the inching/brake pedal (or the brake pedal for units with a manual transmission). The brakes must be applied before the pedal reaches the floor plate. The brake pedal must stop firmly and must not move slowly down after the brakes are applied. The brakes must apply equally to both drive wheels with no noticeable pull to either side. The service brakes are automatically adjusted as the brakes are applied when the lift truck changes direction.

#### **WARNING**

**Loss of fluid from the brake fluid reservoir indicates a leak. Repair the brake system before using the lift truck. Replace the brake fluid in the system if there is dirt, water or oil in the system.**

**The lift truck has a brake booster that receives power from the hydraulic system. The brake pedal can be hard to push when the engine is not running so that the hydraulic system is not operating.**

### Parking Brake

Check the operation of the parking brake. The parking brake, when in good condition and correctly adjusted, will hold a lift truck with a capacity load on a 15% grade [1.5 metre rise in 10 metres (1.5 ft rise in 10 ft)]. Turn the knob on the end of the hand lever to adjust the parking brake. Do not tighten the adjustment so that the brake is applied when the hand lever is released. The lever for the parking brake has a lock. Use your finger to release the lock on the lever when the lever is moved to release the parking brake.

**Lift trucks with a MONOTROL pedal:** when the parking brake is applied, a switch in the starting circuit is closed so that the engine can be started. The switch also puts the transmission in **NEUTRAL**.

### 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.

## MAINTENANCE

**HYSTER**

### 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.

### Liquified 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.

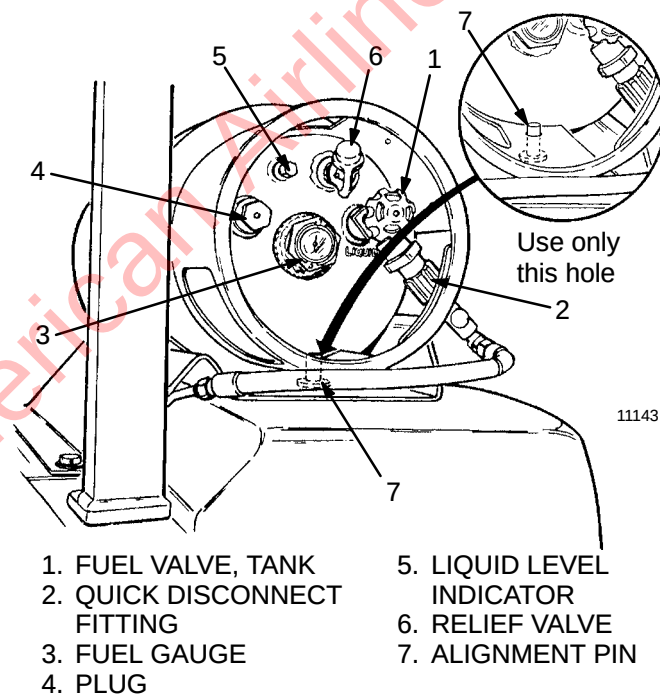
Fill LPG tanks outdoors. Stay at least 15 metres (50 feet) from buildings, motor vehicles, electrical equipment or other ignition sources. Stay at least 5 metres (15 feet) from LPG storage tanks.

# HYSTER

## MAINTENANCE

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 metres (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 29. 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. Release the latch that holds the LPG tank in its bracket.
- f. Raise the LPG tank from its bracket so that the quick disconnect fitting can be disconnected. Remove the LPG tank from the bracket.



**NOTE:** Some LPG tanks have an auxiliary fill fitting instead of a plug for Item 4.

FIGURE 29. LPG TANK

## MAINTENANCE

**HYSTER**

### **WARNING**

**Use only the LPG tank listed 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.**

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.
- b. Put the LPG tank on the tank bracket. Connect the quick disconnect fitting to the fuel valve on the LPG tank. Use your hand to tighten the fitting.
- c. Install the LPG tank in its bracket so that the alignment pin is in the correct hole as shown in FIGURE 29.

### **WARNING**

**Make sure the alignment pin extends through the correct hole in the rim of the LPG tank. See FIGURE 29. The hose or the fittings can be damaged if the LPG tank is not installed in the correct position. A dam-**

**aged hose or fitting can release LPG fuel and cause an explosion and fire hazard.**

- d. Close the latch on the tank bracket. 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 refueling 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 29.

# HYSTER

## MAINTENANCE

- 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.

### Gasoline or 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 fuel is added, 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.**

## MAINTENANCE

**HYSTER**

### WHEELS AND TIRES

#### How To Repair A Pneumatic Tire

##### **WARNING**

A solid rubber tire that is the same shape as a pneumatic tire can be installed on a three-piece or four-piece wheel for a pneumatic tire. **DO NOT** make changes in the parts of the rim if this type of solid rubber tire is installed instead of a pneumatic tire. Changes to the parts of the rim can cause a failure of the wheel and cause an accident.

##### **WARNING**

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

#### Remove The Wheels From The Lift Truck

##### **WARNING**

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

Deflate tire completely before removing the wheel from the lift truck. If dual wheels are used, deflate both tires. Air pressure in the tires can cause the tire and rim parts to explode causing serious injury or death.

**Always wear safety glasses.**

**Never loosen the nuts that hold the inner and outer wheel halves together when there is air pressure in the tire.**

1. Put the lift truck on blocks as described in **How To Put A Lift Truck On Blocks** at the beginning of this section.
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.
3. Remove the wheel nuts and remove the wheel from the lift truck. Lift truck wheels are heavy.

# HYSTER

## MAINTENANCE

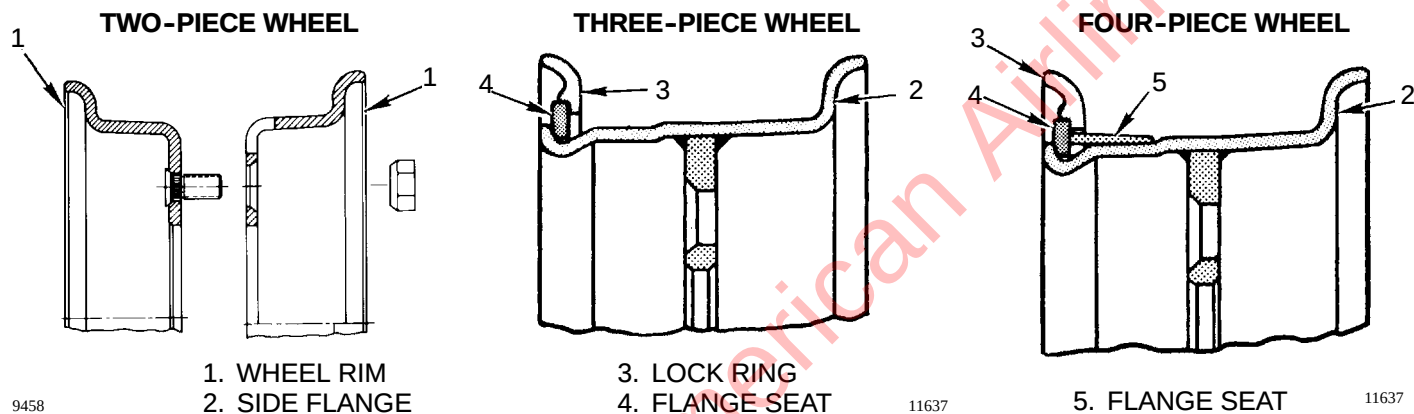


FIGURE 30. TYPES OF WHEELS

**Remove The Wheel From The Tire**  
(See FIGURE 31. and FIGURE 32.)

### **⚠ WARNING**

A solid rubber tire that is the same shape as a pneumatic tire can be installed on a three-piece or four-piece wheel for a pneumatic tire. **DO NOT** make changes in the parts of the rim if this type of solid rubber

tire is installed instead of a pneumatic tire. Changes to the parts of the rim can cause a failure of the wheel and cause an accident.

### **⚠ WARNING**

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

## MAINTENANCE

**HYSTER**

### **WARNING**

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

Deflate tire completely before removing the wheel from the lift truck. If dual wheels are used, deflate both tires. Air pressure in the tires can cause the tire and rim parts to explode causing serious injury or death.

Always wear safety glasses.

Never loosen the nuts that hold the inner and outer wheel halves together when there is air pressure in the tire.

### **WARNING**

Make sure all of the air pressure is removed from the tire before a wheel is disassembled. Air pressure in the tires can cause the tire and rim parts to explode causing serious injury or death.

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

**NOTE:** When the wheels are disassembled, see FIGURE 30. There are several types of wheels used on these series of lift trucks.

# HYSTER

## MAINTENANCE

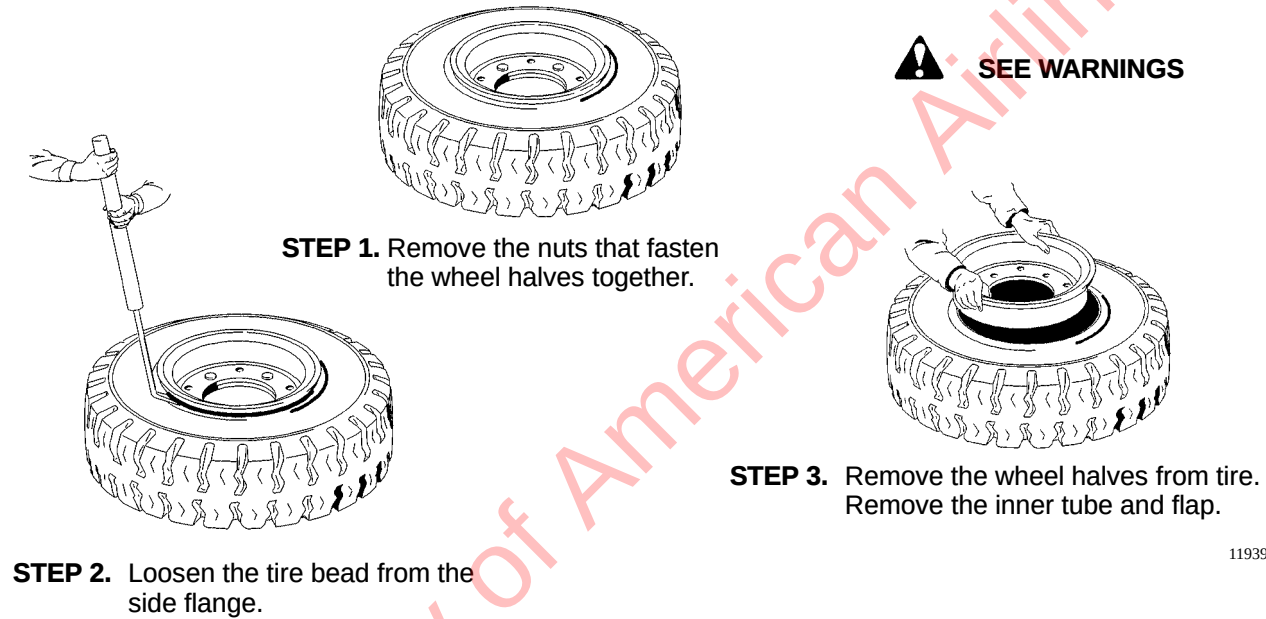
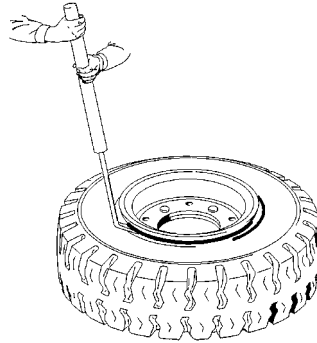


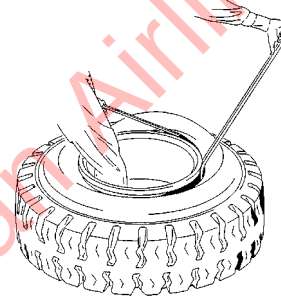
FIGURE 31. TIRE REMOVAL, TWO PIECE WHEEL

## MAINTENANCE

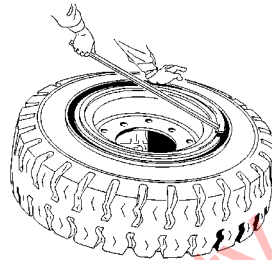
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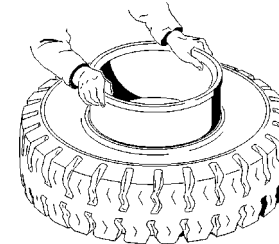
**STEP 1.** Loosen the tire bead from the side flange.



**STEP 3.** Loosen the bead from the other side of the wheel rim. Remove the valve stem from the wheel.



**STEP 2.** Put the tire tool into the slot between the lock ring and wheel rim. Remove the lock ring and side flange. If there is a flange seat, remove it.



**STEP 4.** Remove the wheel from the tire.

FIGURE 32. TIRE REMOVAL, THREE AND FOUR PIECE WHEELS

# HYSTER

## MAINTENANCE

**Install The Wheel In The Tire**  
(See FIGURE 33. and FIGURE 34.)

### **WARNING**

**Wheels can explode and cause injury or death if the following procedures are not followed:**

- **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 that wheel assembly.**
- **DO NOT mix parts between different types or manufacturers of wheels.**
- **DO NOT mix types 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 clear-**

**ance at the ends of the lock ring must be 13 to 25 mm (0.5 to 1.0 in) after it is installed. If the clearance is wrong, the wrong part has been used.**

1. Clean and inspect all parts of the wheel. Paint any parts that have rust or corrosion.
2. Install a new inner tube in the tire. Used tubes and flaps can cause tire failure.

### **WARNING**

**Do not lubricate the tire bead with anti-freeze or petroleum based liquid. Vapors from these liquids can cause an explosion during inflation or use.**

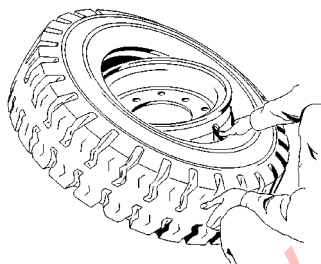
3. Apply a rubber lubricant or a soap solution to the tire bead and tube.
4. Install a new tire flap.
5. Make sure the rim is the correct size for the tire. Lubricate the parts of the rim that contacts the bead and flap.
6. Install the two-piece wheel as shown in FIGURE 34. Install the three-piece or four-piece wheel in the tire as shown in FIGURE 33.

## MAINTENANCE

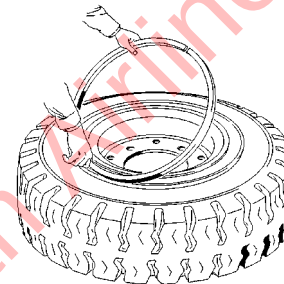
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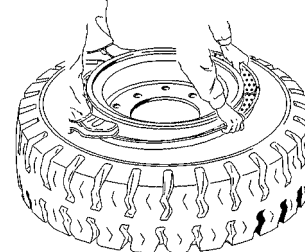
**STEP 1.** Install the inner tube and the rubber flap in the tire..



**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 blocks under the rim so that the rim is 8 to 10 cm (3 to 4 in) above the floor. Install the flange seat (if used) and the side flange. Hold them in the correct position.

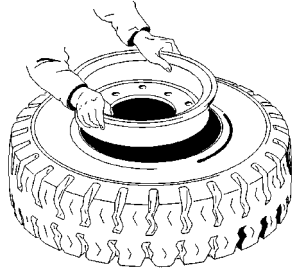


**STEP 4.** Put the lock ring in the correct position on the rim. Add air pressure to the tire as described in "Add Air To The Tires".

FIGURE 33. INSTALL THE WHEEL IN THE TIRE, THREE OR FOUR PIECE WHEEL

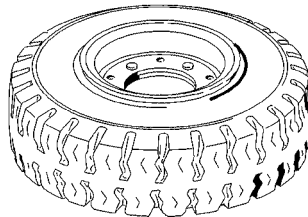
# HYSTER

## MAINTENANCE



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**STEP1.** Install the inner tube and the rubber flap in the tire. Install both halves of the wheel rim in the tire. Make sure the stem of the inner tube is aligned with the slot in the rim.



**STEP 2.** Tighten the nuts that hold the rim halves together to 195 to 210 N.m (145 to 155 lbf ft). Add air pressure to the tire (see the Name-plate).

FIGURE 34. INSTALL WHEEL IN THE TIRE, TWO PIECE WHEEL

Add Air To The Tires (See **FIGURE 35.**)

### **⚠ 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, use a chuck that fastens onto the valve stem of the inner tube. Make sure there is enough 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 flange 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 lock ring lightly to make sure that it is in the seat.
4. If installation is correct, add air pressure to the tire to the specified pressure.
5. Check that all wheel parts are correctly installed. If installation is not correct, remove all of the air pressure from

## MAINTENANCE

**HYSTER**

the tire. Remove the valve core to make sure all of the air pressure has been removed and then make adjustments. The clearance at the ends of the lock ring will be 25 to 32 mm (1.0 to 1.25 in) when the tire has the correct air pressure.

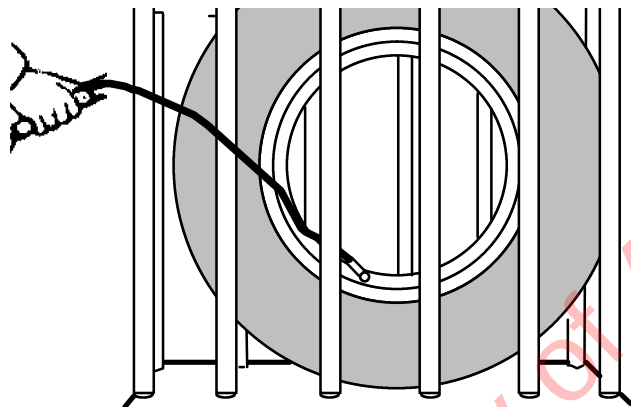


FIGURE 35. ADD AIR TO THE TIRES

### Install The Wheels



#### WARNING

Check all wheel nuts after 2 to 5 hours of operation - when new lift trucks begin operation and on all lifts trucks when the drive wheels have been removed and installed. Tighten the nuts in a cross pattern to the correct torque value shown in the MAINTENANCE SCHEDULE. When the nuts stay tight for eight hours, the interval for checking the torque can be extended to 350 hours.

Install the wheel on the hub. Tighten the nuts as to the correct torque as shown in the MAINTENANCE SCHEDULE. If the wheels are the two-piece rims, make sure the nuts that fasten the rim halves together are toward the hub when they are installed.

# **HYSTER**

## **MAINTENANCE**

### **INSTALLATION PROCEDURES, DUAL DRIVE WHEELS**

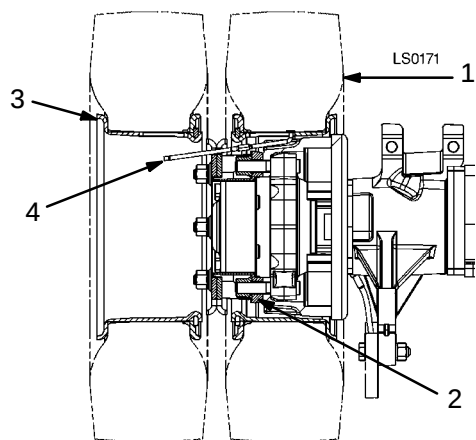
**NOTE:** Some lift trucks can have dual drive wheels. The following procedures describe the steps to install the dual sets of wheels.

1. See FIGURE 36. Install the inner wheel on the hub. Tighten the nuts as shown in the MAINTENANCE SCHEDULE. If two-piece wheels are installed, make sure the nuts that fasten the rim halves together are toward the brake drum when they are installed.
2. Install the spacer to the axle shaft. Tighten the nuts 98 Nm (80 lbf ft).
3. Install the outer wheel on the spacer. Tighten the nuts as shown in the MAINTENANCE SCHEDULE. If the wheels are the two-piece rims, make sure the nuts that

fasten the rim halves together are toward the brake drum when they are installed.

## MAINTENANCE

# HYSTER



- |                     |                         |
|---------------------|-------------------------|
| 1. INNER WHEEL      | 3. OUTER WHEEL          |
| 2. ADAPTER ASSEMBLY | 4. EXTENSION, AIR VALVE |

FIGURE 36. INSTALLATION, DUAL DRIVE WHEELS

### PNEUMATIC TUBELESS TIRE, REPAIR

#### Remove Tire From Lift Truck

#### **⚠ WARNING**

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

Deflate tire completely before removing the wheel from the lift truck. If dual wheels are used, deflate both tires. Air pressure in the tires can cause the tire and rim parts to explode causing serious injury or death.

Always wear safety glasses.

Never loosen the nuts that hold the inner and outer wheel halves together when there is air pressure in the tire.

The Tubeless Bead Seal (TBS) enables tubeless tires to be used on wheel rims that were designed to be used with a tube.

The main component of the TBS is a special rubber ring that fits inside the tire between the tire beads to ensure the airtightness of the existing wheel and the tubeless tire assembly. See FIGURE 30.

# HYSTER

## MAINTENANCE

1. Put the lift truck on blocks as described in HOW TO PUT THE LIFT TRUCK ON BLOCKS at the beginning of this section.
2. Remove the valve cap and core to remove all air from the tire.
3. Remove the wheel nuts and remove the wheel and tire from the lift truck. Lift truck tires and wheels are heavy.

### Remove Tire From Wheel



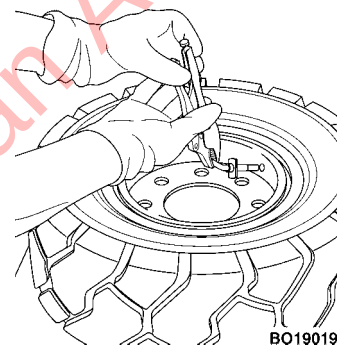
#### WARNING

Make sure all of the air pressure is removed from the tire before a wheel is disassembled. Air pressure in the tires can cause the tire and rim parts to explode causing serious injury or death.

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

**NOTE:** There are several types of wheels used on these lift trucks. When disassembling wheels, see FIGURE 30.

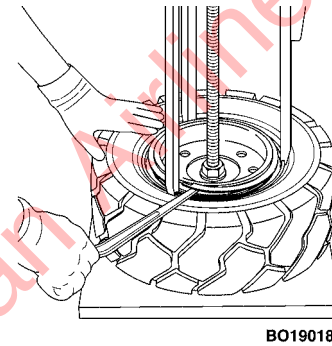
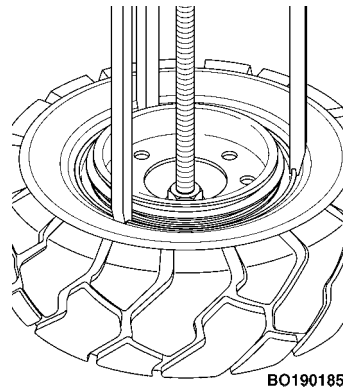
1. If wheel rim is a three or four-piece rim, turn the valve 1/4 turn and remove valve from wheel.



2. Put wheel and tire assembly on the press. Position the feet of the press on the loose flange. Push press down on loose flange to expose the locking ring.

## MAINTENANCE

**HYSTER**

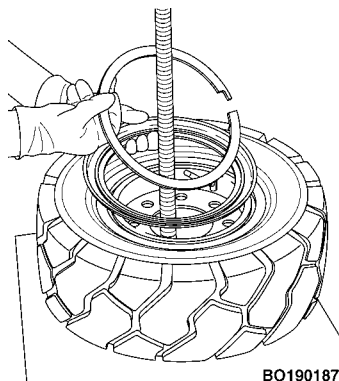


3. Remove the loose flange locking ring and the advance band (four-piece wheel only) using a tire tool.

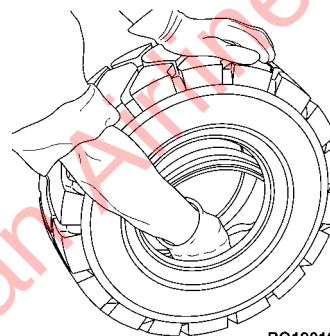
4. Remove the press and remove the loose flange locking ring and the advance band (four-piece wheel only) from the tire and wheel assembly.

# **HYSTER**

## **MAINTENANCE**



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### **Install Tire on Wheel**

#### **⚠ WARNING**

Damage to the tire and wheel assembly and injury or death can occur if you do not do the following procedures:

- Clean and inspect all parts of the wheel before installing the tire.

5. Push the TBS towards the inside of the tire to remove it.

## MAINTENANCE

**HYSTER**

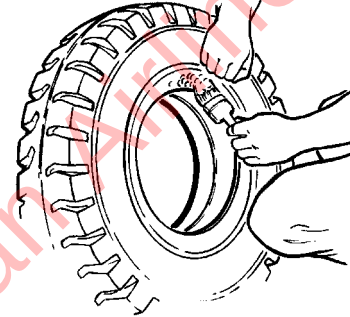
- **DO NOT** use any damaged or repaired wheel parts.
- **Make sure that all parts of the wheel are the correct parts for that wheel assembly.**
- **DO NOT** mix parts between different types or manufacturers of wheels.
- **DO NOT** mix types of tires, type of tire tread, or wheel assemblies of different 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.**

### **WARNING**

**Do not lubricate the tire bead with anti-freeze or petroleum based liquid. Vapors from these liquids can cause an explosion during inflation or use.**

1. Clean interior and exterior bead area of the tire. Lubricate tire beads and the inside of the tire, up to the tire shoulders. Apply lubricant to entire underside of the TBS.



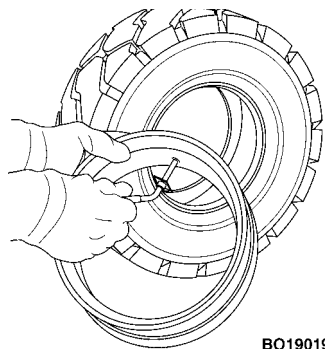
**NOTE:** If the wheel rim width is less than six inches, the TBS will contain one valve hole to accommodate the needle valve. If the wheel rim width is greater than six inches, the TBS will have two holes for the needle valve. One hole is centrally located and the other is offset, to ensure the correct positioning of the valve in the valve slot. The valve hole that is not used should be sealed with a small plastic plug.

2. Apply lubricant to the needle valve and the valve hole that will be used (see NOTE), by inserting and removing the lubricated valve several times. If a three or four-piece wheel is being used, remove the valve. If a two-piece wheel is being used, leave valve in valve hole.

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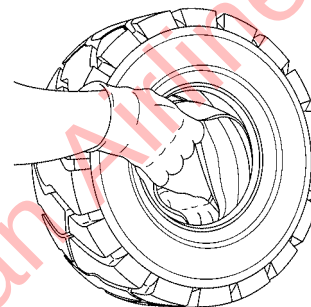
## **MAINTENANCE**

If the TBS has two valve holes, lubricate the plastic plug and insert into valve hole that will not be used. **BO190190**



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3. Place the TBS inside the tire, making sure that the wings of the TBS are not folded over. Make a mark on the tire to note the position of the valve hole in the TBS.



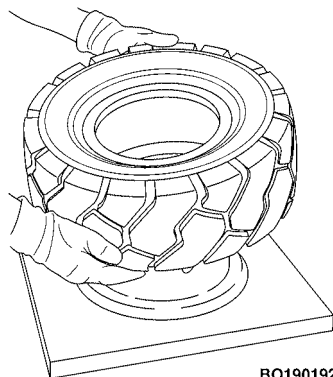
**BO190191**

4. Apply lubricant to the rim. If a four-piece wheel is being used, lubricate the advance band. Slide the tire and TBS onto the wheel.

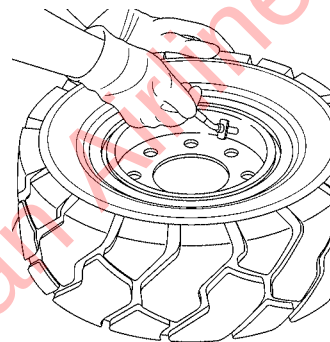
Line up the valve hole in the TBS with the valve slot in the wheel. Lubricate and insert the valve into the valve hole. Make sure it is fully inserted.

## MAINTENANCE

**HYSTER**



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BO190193

5. Place the wheel and tire assembly on a flat surface. Turn the valve a 1/4 turn to lock the collar under the edges of the rim valve slot.

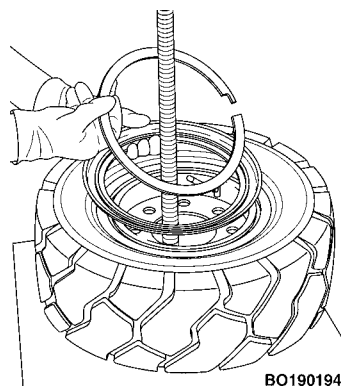
6. Raise the tire and position the base and threaded stem of the press through the hole in the center of the wheel.

Insert in wheel assembly, the following parts:

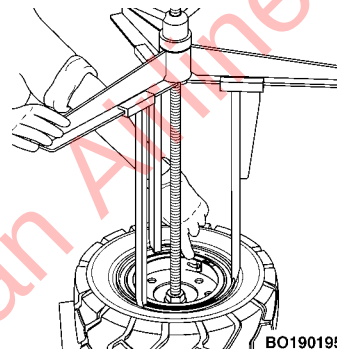
- Advance band (four-piece wheel only)
- Loose flange
- Locking ring

# HYSTER

## MAINTENANCE



BO190194



BO190195

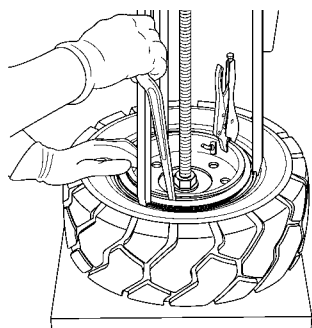
7. Position the advance band. Ensure that it does not go in too far and damage the valve. Position the arms of the press onto the loose flange.

Push down on press to depress the tire beads until the locking ring groove is fully exposed.

8. Insert tire tool into the locking ring groove, and a vise grip on other end. Remove vise grip. Release the press and check that all component parts are correctly positioned. Replace the valve core.

## MAINTENANCE

**HYSTER**



BO190196

### Add Air to Pneumatic Tubeless Tire

#### **⚠ WARNING**

Add air pressure to the tires only in a safety cage. See **FIGURE 37**. Inspect the safety cage for damage before use. When air pressure is added, use a chuck that fastens onto the valve stem. Make sure there is enough 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.

9. Inflate tire to 103 kPa (15 psi) Tap wheel with a mallet to ensure all components are correctly seated. Remove the press from wheel and tire assembly.

Add air to tire to the recommended pressure that is shown on the Nameplate. Install valve cap to ensure air stays in the tire.

# HYSTER

## MAINTENANCE

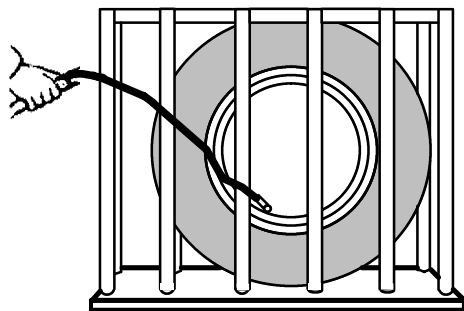


FIGURE 37. ADD AIR TO TUBELESS TIRES

### Install the Wheels

Install the wheel on the hub. Tighten the nuts in a cross pattern to torque shown in the MAINTENANCE SCHEDULE. If the wheels are the two-piece rims, make sure the nuts that fasten the rim halves together are toward the hub when they are installed.

### SOLID RUBBER TIRES



#### WARNING

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

Always wear safety glasses.

1. Put the lift truck on blocks as described in **How to Put the Lift Truck on Blocks**, at the beginning of this section.
2. Remove the wheel nuts and remove the wheel and tire from the lift truck. Lift truck tires and wheels are heavy.

### Remove The Tire From The Wheel (See FIGURE 38.)



#### WARNING

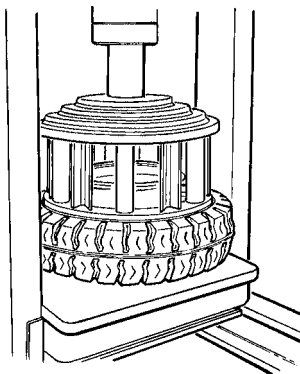
Keep tire tools in firm contact with the wheel. If the tool slips, it can move with enough force to cause serious injury.

**NOTE:** When the wheels are disassembled, see FIGURE 30. There are several types of wheels used on these series of lift trucks.

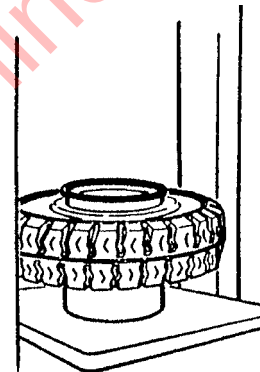
## MAINTENANCE

# HYSTER

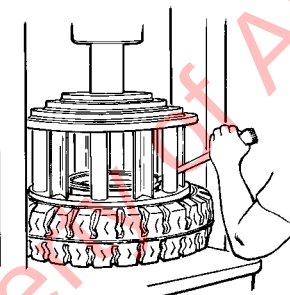
**STEP 1.** Put the wheel rim on the bed of the press. Put the cage in position on the tire. Use the press to push the tire away from the side ring.



**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 2.** Put the tire tool into the slot between the side ring and/or lock ring and the wheel rim. Remove the side ring, lock ring and wedge band.



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

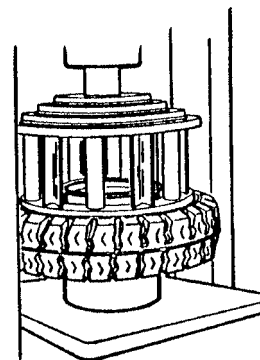


FIGURE 38. REMOVE THE TIRE FROM THE WHEEL

# **HYSTER**

## **MAINTENANCE**

**Install The Tire On The Wheel**  
(See FIGURE 39.)

### **WARNING**

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

- 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 lock ring must be 13 to 25 mm (0.5 to 1.0 in) after it is installed. If the clearance is wrong, the wrong part has been used.

**NOTE:** When the wheels are disassembled, see FIGURE 30. There are several types of wheels used on these series of lift trucks.

## MAINTENANCE

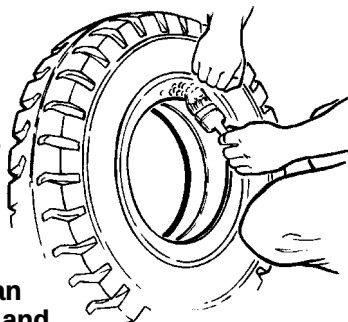
# HYSTER

### ⚠ SEE WARNINGS

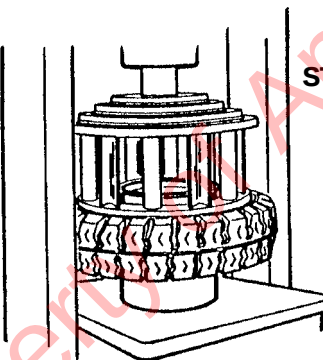
**STEP 1.** Lubricate the wheel rim and the inner surface of the tire with tire lubricant or soap.

### ⚠ CAUTION

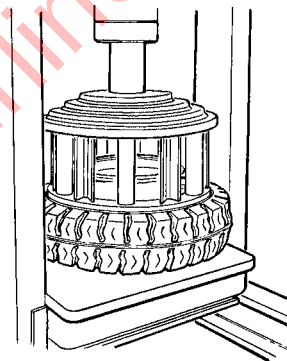
Too much lubricant can cause the tire to slide and move around the wheel rim.



**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 wedge band (if used), the side ring and the lock ring in position on the wheel assembly. Install the cage on the tire. Use the press to push the tire onto the wheel rim so that the wedge band and side ring can be installed.



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**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.

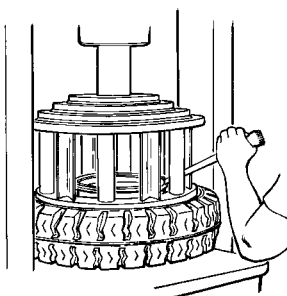


FIGURE 39. INSTALL THE TIRE ON THE WHEEL

# **HYSTER**

## **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 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 operation. High engine speeds with a light load can cause damage to the cylinders in the engine.

# HYSTER

## This image shows a blank sheet of white paper with horizontal blue ruling lines. A prominent, semi-transparent red watermark is oriented diagonally from the bottom-left towards the top-right, containing the text "Property of American Airlines". The watermark is repeated multiple times along its diagonal path. The paper itself is otherwise empty of any other markings or text.

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La Seguridad Paga  
Betriebssicherheit Macht Sich Bezahl  
Passaa Oll Huolellinen  
Veiligheid Voor Alles  
Säkerhet Först  
Essere Sicuro Paga  
Seguranca Paga  
Sikkerhet Først  
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في التاني السومة

安全第一

**SAFETY  
PAYS!**

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