SERVICE REPAIR

MANUAL

Hyster C210 (N30XMH) Forklift





SAFETY PRECAUTIONS MAINTENANCE AND REPAIR

- When lifting parts or assemblies, make sure all slings, chains, or cables are correctly fastened, and that the load being lifted is balanced. Make sure the crane, cables, and chains have the capacity to support the weight of the load.
- Do not lift heavy parts by hand, use a lifting mechanism.
- Wear safety glasses.
- DISCONNECT THE BATTERY CONNECTOR before doing any maintenance or repair on electric lift trucks.
- Disconnect the battery ground cable on internal combustion lift trucks.
- Always use correct blocks to prevent the unit from rolling or falling. See HOW TO PUT THE LIFT TRUCK ON BLOCKS in the **Operating Manual** or the **Periodic Maintenance** section.
- Keep the unit clean and the working area clean and orderly.
- Use the correct tools for the job.
- Keep the tools clean and in good condition.
- Always use **HYSTER APPROVED** parts when making repairs. Replacement parts must meet or exceed the specifications of the original equipment manufacturer.
- Make sure all nuts, bolts, snap rings, and other fastening devices are removed before using force to remove parts.
- Always fasten a DO NOT OPERATE tag to the controls of the unit when making repairs, or if the unit needs repairs.
- Be sure to follow the **WARNING** and **CAUTION** notes in the instructions.
- Gasoline, Liquid Petroleum Gas (LPG), Compressed Natural Gas (CNG), and Diesel fuel are flammable. Be sure to follow the necessary safety precautions when handling these fuels and when working on these fuel systems.
- Batteries generate flammable gas when they are being charged. Keep fire and sparks away from the area. Make sure the area is well ventilated.

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

Indicates a condition that can cause immediate death or injury!



Indicates a condition that can cause property damage!

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This section is for the following models:

 $\begin{array}{c} {\rm E2.00-3.20XM} \ ({\rm E45-65XM}, \ {\rm E45-65XM}_2) \ [{\rm F108}]; \\ {\rm N30XMH}, \ {\rm N30XMH}_2 \ [{\rm C210}]; \\ {\rm V30ZD} \ [{\rm D210}]; \\ {\rm E2.00-3.20XM} \ ({\rm E40-65Z}) \ [{\rm G108}] \end{array}$

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"THE QUALITY KEEPERS"

HYSTER APPROVED PARTS

General

This section has a description and the service procedures for the parts of the frame. These parts include the frame, counterweight assembly, overhead guard, hood and seat assembly, access panels, and label positions. The procedure for removing the traction motor is also described in this section.

Description

MAIN FRAME

The main frame is a single weldment. See Figure 1. The main frame has mounts for the following:

- Counterweight
- Overhead guard
- Battery restraint and hood
- Seat plate (with optional seat brake)
- Tilt cylinders
- Steering axle
- Drive axle assembly
- Cowl assembly
- Floor pedals and floor plates
- Side step and fender weldments
- Hydraulic tank
- Pump and motor assembly
- Control valves and levers

The hood is part of the operator and battery restraint system. The seat is also part of the operator restraint system. The floor plates can be removed for access to the hydraulic systems. A panel in the bottom of the battery compartment can be removed for access to the traction motor and the hydraulic pump motor. The electronic controller and contactors are in the counterweight. A panel in the counterweight can be removed for access to the controller and contactors.

Maximum clearance between the battery and battery compartment width is 13 mm (0.5 in.).

Maximum clearance between the battery and the spacer plate is also 13 mm (0.5 in.). The Battery Specifications chart shows the minimum size compartment allowed.

The lift trucks are equipped with an adjustable spacer plate in the battery compartment. See Figure 2. Adjust the spacer plate to control the movement of the battery in the forward and backward directions. Tighten the jam nuts on the adjustment capscrew to prevent the adjustment from changing.

The battery must fit the battery compartment so that the battery restraint will operate correctly. A loose battery can cause serious injury and property damage if the lift truck overturns. Adjust the spacer plate to prevent the battery from moving more than 13 mm (0.5 in.) forward or backward.

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



Figure 1. Lift Truck Frame

Legend for Figure 1

NOTE: OPTIONAL SIDE PANELS FOR BATTERY COMPARTMENT NOT SHOWN.

- A. BATTERY COMPARTMENT
- B. BATTERY SPACER PLATE USED ON OLDER LIFT TRUCK MODELS
- C. BATTERY SPACER PLATE USED ON NEWER LIFT TRUCK MODELS
- 1. SPACER PLATE
- 2. ACCESS COVERS
- 3. COWL



	COMPARTMENT	5.
2.	BATTERY	
3.	BULKHEAD	6.



Figure 2. Battery Spacer Plate

- 4. FLOOR PLATE
- 5. FRAME
- 6. SIDE STEP AND FENDER WELDMENT

OTHER FRAME WELDMENTS

These frame parts are the right-hand and left-hand side step and fender weldments and the cowl weldment. Each part is a weldment fastened to the main frame to make the frame assembly. The cowl weldment is a mount for the front of the overhead guard, the steering column assembly, the release linkage of the parking brake and the instrument panel with light switches. On newer models of lift trucks, with SEM (Separately Excited Motor) and AC (Alternating Current) electronic controllers and contactors, the display panel is part of the instrument panel. See Figure 3 and Figure 4. On early model lift trucks, with SCR (Silicon Controlled Rectifier) electronic controllers and contactors, the display panel is not part of the instrument panel. The steering column housing is the mount for the display panel assembly. See Figure 7.



A. STANDARD SEM DISPLAY PANEL

B. PREMIUM SEM DISPLAY PANEL

Figure 3. SEM Display Panel



NOTE: FOR LIFT TRUCK MODELS WITH AC ELECTRONIC CONTROLLERS AND CONTACTORS, BOTH THE STANDARD AND PREMIUM DISPLAY PANELS LOOK IDENTICAL. THE ONLY DIFFERENCE IS IN THE DISPLAY SOFTWARE AND THE RESULTING FUNCTIONALITY.

Figure 4. AC Display Panel

BATTERY RESTRAINT/HOOD FRAME AND PLATE FOR OPTIONAL SEAT BRAKE

The hood and battery restraint with its latch mechanism must operate correctly before a lift truck is operated.

The battery restraint and hood frame is a heavy steel weldment that has a hinge at the front of the battery compartment. See Figure 5. An adjustable spacer plate is used inside the battery compartment to prevent forward and backward movement of the battery. The batteries for these lift trucks must fit the battery compartment width with a maximum of 13 mm (0.5 in.) clearance.



- A. SIDE PANEL
- B. LATCH PIN AND LEVER
- 1. HOOD
- 2. LIFT HANDLE
- 3. LATCH HANDLE
- 4. HOOD FRAME AND BATTERY RESTRAINT
- 5. LINKAGE AND GAS SPRING

Figure 5. Hood and Battery Restraint

The hood must be locked in the down position during operation. The battery must have the spacer plate correctly adjusted to prevent forward or backward movement of 13 mm (0.5 in.) maximum. On lift trucks E2.00-3.20XM (E45-65XM, E45-65XM₂) (F108), N30XMH, and N30XMH₂ (C210), and V30ZD (D210), if the unit has a seat brake, raise the seat and seat plate assembly. Use the latch handle at the rear of the hood (see Figure 6) to release the hood frame and battery restraint. Raise the latch handle and slide the handle toward the right side of the truck. A spring moves the handle back to the left.

Use the lift handle by the seat to raise the hood. A gas spring and stop rod will hold the assembly in the up position. Make sure that the battery cannot move more than a total of 13 mm (0.5 in.) in any one horizontal direction. If necessary, adjust the battery spacer plate as shown in Figure 2.



- 1. HOOD AND BATTERY RESTRAINT
- 2. LATCH HANDLE
- 3. LIFT HANDLE
- 4. STOP ROD LABEL (UNDER HOOD)
- 5. COUNTERWEIGHT
- 6. LATCH WARNING LABEL

Figure 6. Latch for Battery Restraint and Hood

Release the stop rod by moving it to the right before lowering hood. See the label in Figure 6. Make sure the latch handle is fully to the right when closing the hood so that the latch can engage the latch piece. Make sure the hood is locked securely. Try to raise the hood using <u>only</u> the lift handle to make sure the hood is latched and will not move.

On E2.00-3.20XM (E45-65XM, E45-65XM₂) (F108), N30XMH, and N30XMH₂, and V30ZD (D210) units with a seat brake, there is a separate plate with a hinge fastened to the front of the battery compartment. The seat is fastened to this plate instead of the hood on these units. The linkage for the seat plate has a spring that holds the plate up and applies the brake on the rear of the traction motor. The weight of the operator compresses the spring and applies the brake. On these units, push the seat and seat plate into position over the hood.

The seat belt, hip restraint brackets, seat and mounting, battery restraint (hood plate), and latch are all part of the operator restraint system. Each item must be checked to make sure it is attached securely, functions correctly and is in good condition. The seat belt must latch securely. Make sure the seat belt extends and retracts smoothly and is not damaged or torn. If the seat belt cannot be pulled from the retractor assembly, the seat belt must be replaced.

Make sure that the seat is not loose on the rails. Make sure the seat rails are not loose. The seat rails must lock securely in position, but move freely when unlocked. The seat rails must be securely attached to the mounting surface.

OVERHEAD GUARD

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

The overhead guard is a weldment that fastens to the main frame and cowl to help protect the operator from falling objects. See Figure 7, Figure 8, or Figure 9.

Overhead Guard Repair

REMOVE

Do not weld, drill, grind, or cut the overhead guard for mounts, lights, or accessories. The strength of the overhead guard can be reduced.

- 1. See How to Change Battery in your vehicle's **Periodic Maintenance** or **Operating Manual**. Remove the battery from the truck.
- 2. Access to the capscrews that hold the rear legs of the overhead guard to the frame is from the battery compartment. Remove the two capscrews that fasten each leg. See Figure 7, Figure 8, and Figure 9.
- **3.** Remove the three M12 capscrews and washers that hold each front leg of the overhead guard to the cowl. Disconnect any electric wires from under the cowl that go through the front legs of

the overhead guard. When the overhead guard is lifted from the frame, make sure these electric wires move through the holes in the frame at the front and rear so that they are not damaged.

4. Use a lifting device or another person to help lift the overhead guard from the lift truck.

INSTALL

If necessary, align the attachment plate on each front leg and install the setscrews. See Figure 7, Figure 8, and Figure 9. Put the overhead guard on the lift truck. Install any electric wires from the overhead guard legs through the holes in the frame. Install the three M12 capscrews and washers that hold each front leg to the frame. Tighten the capscrews. Install the capscrews, washers, and nuts that hold the rear legs to the frame. Tighten the capscrews. Install the battery.



NOTE: DISPLAY PANELS SHOWN ARE FOR LIFT TRUCKS WITH SCR ELECTRONIC CONTROLLERS AND CONTACTORS

- OVERHEAD GUARD 1.
- 2. STEERING WHEEL 3. **ON-DEMAND STEERING** COMPONENTS (NOT ALL UNITS)
- 4. HORN SWITCH CONNECTOR
- COLUMN COVER COLUMN FRAME 5.
- 6. 7.
- STEERING CONTROL UNIT
- LATCH MECHANISM 8.
- HOUSING 9.
- **10. INDICATOR LIGHT ASSEMBLY**
- **11. PREMIUM DISPLAY PANEL**
- 12. ECONOMY DISPLAY PANEL
- 13. GAUGES
- 14. KEY SWITCH

Figure 7. Overhead Guard, Steering Column, and Display Panel, Truck Models E2.00-3.20XM (E45-65XM) (F108), N30XMH (C210), and V30ZD (D210)



NOTE: DISPLAY PANELS SHOWN ARE FOR LIFT TRUCKS WITH SEM ELECTRONIC CONTROLLERS AND CONTACTORS

- 1.
- STEERING WHEEL SHIFT LEVER MECHANISM 2.
- 3.
- COLUMN COVER STEERING CONTROL UNIT 4.
- 5. COLUMN FRAME

- 6. **ON-DEMAND STEERING COMPONENTS**
- DISPLAY PANEL (PREMIUM DISPLAY PANEL 7. SHOWN)
- **OVERHÉAD GUARD** 8.

Figure 8. Overhead Guard, Steering Column, and Display Panel, Truck Models E2.00-3.20XM $(E45-65XM_2)$ (F108), N30XMH₂ (C210), and V30ZD (D210)



Figure 9. Overhead Guard, Steering Column, and Display Panel, Truck Models E2.00-3.20XM (E40-65Z) (G108)

Legend for Figure 9

NOTE: DISPLAY PANELS SHOWN ARE FOR LIFT TRUCKS WITH AC ELECTRONIC CONTROLLERS AND CON-TACTORS

- 1. ON-DEMAND STEERING COMPONENTS
- 2. SHIFT LEVER MECHANISM
- 3. STEERING WHEEL
- 4. DISPLAY PANEL
- 5. COLUMN COVER
- 6. COLUMN FRAME

- 7. STEERING CONTROL UNIT
- 8. COWL WELDMENT
- 9. DASH
- 10. COLUMN MOUNT 11. OVERHEAD GUARD
- Battery Restraint and Seat Assembly Repair

On units with a shorter frame, the gas spring for the hood can raise the hood at a rapid rate and cause an injury. Do NOT bend over hood when raising hood.

A battery restraint system is installed as a safety device. See Figure 5. The function of the battery restraint system, when correctly locked in the down position, is to hold the battery in the battery compartment if an accident causes the lift truck to tip over. The battery restraint is a steel weldment that is connected to the frame with a hinge. A sliding latch mechanism (see Figure 6) locks the battery restraint in the down position for operation. The latch, at the top center of the counterweight, unlocks the battery restraint from the frame, so that the battery restraint can be raised to the up position for access to the battery. The battery restraint is also the support for the hood. A gas spring helps lift the hood assembly. A rod is used to hold the hood in the up position on units with a longer frame. The operator must hold the hood assembly with one hand. Use the other hand to move the rod to the storage position. Lower the hood and battery restraint assembly to the operating position. Make sure that the battery restraint is correctly locked to the frame for operation of the lift truck.

Correct operation of the battery restraint system requires that the battery does not move more than 13 mm (0.5 in.) horizontally. Make sure that the battery spacer plate is correctly adjusted.

To operate correctly, the battery restraint must be locked in the down position. The battery must have the spacer plate correctly adjusted to prevent movement in any one horizontal direction of 13 mm (0.5 in.) maximum. See Figure 2. Raise the seat. Use the knob for the latch to release the battery restraint. See Figure 6. Use the handle on the hood to raise the battery restraint and hood. Make sure that the battery cannot move more than a total of 13 mm (0.5 in.) in any one horizontal direction. Make sure the spacer plate is correctly adjusted to prevent movement. Push the hood and the battery restraint down until the latch locks. Make sure the battery restraint is locked securely. Lift on the handle to make sure it is latched and will not move.

The battery restraint and its latch mechanisms must operate correctly before a lift truck is operated.

The operator restraint system contains the seat, hip restraints, and the seat belt. The system helps the operator stay within the lift truck in case of a tipover. See Figure 10.



Figure 10. Seat Assembly

Counterweight Repair

If the lift truck must be put on blocks for maintenance or repair, see How to Put Lift Truck on Blocks in the Operating Manual or Periodic Maintenance of your vehicle.

The counterweight is very heavy. Make sure that the crane and lifting devices have enough lifting capacity to safely lift the counterweight. The weights of the counterweights are shown in Table 1.

Legend for Figure 10

1. SEAT

2.

- HIP RESTRAINT
- SEAT BELT AND 3. MOUNT

(E40-65Z) (G108) TRUCKS.

- 4. HOOD 5. SEAT RAILS
 - SEAT PLATE (WITH
- 6. SEAT BRAKE)*

*THE SEAT PLATE IS NOT USED ON E2.00-3.20XM

The counterweight normally is not removed for most repairs. Replacement of the SCR Electronic Controllers is easier with the counterweight removed. Replacement of the SEM, and AC Controllers is accomplished by removing the cover from the counterweight. See Figure 11. The counterweight is fastened to the frame with four capscrews. The weights for the counterweights are shown in Table 1.



- COUNTERWEIGHT AND SEAL 1.
- UPPER CAPSCREW AND WASHERS 2.
- З.
- COVER AND SEAL COVER CAPSCREW AND WASHERS 4.
- 5. LOWER CAPSCREW AND WASHER

Figure 11. Counterweight Assembly

Table	1.	Counterweights
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Model	(mm*)	Weight	+ 50 kg (110 lb) - 0 kg (0 lb)	
E2.00XM (F108) and E2.25XM (F108) E2.00XM (G108)	700			
$\begin{array}{c} {\rm E2.50XM}\ ({\rm F108})\\ {\rm and}\ {\rm E50XM},\\ {\rm XM}_2\ ({\rm F108})\\ {\rm 2.50XM}\ ({\rm G108})\\ {\rm and}\ {\rm E50Z}\ ({\rm G108}) \end{array}$	847	544 kg (1200 lb)		
E3.00XM (F108) and E3.00XM (G108)	1015			
*Approximate battery compartment lengths.				

Table 1. Counterweights (Continued)

Model	(mm*)	Weight	+ 50 kg (110 lb) - 0 kg (0 lb)	
E45XM, XM ₂ (F108) and E40-45Z (G108)	700			
E55XM, XM_2 (F108) and E2.50XM (F108) and E55Z (G108) and E2.50XM (G108)	847	770 kg	g (1700 lb)	
E65XM, XM ₂ (F108) and E3.00-3.20XM (F108) and E65Z (G108) and E3.00-3.20XM (G108)	1015			
E50XM, XM ₂ (F108) and E2.50XM (F108) and E50Z (G108) and E2.50XM (G108)	700			
E60XM, XM ₂ F108) and E3.00XM (F108) and E60Z (G108) and E3.00XM (G108)	847	976 kg	g (2150 lb)	
N30XMH, and N30XMH ₂ (C210) and V30ZD (D210)	1015			
*Approximate battery compartment lengths				

REMOVE

- 1. See How to Change Battery in your vehicle's Periodic Maintenance or Operating Manual. Remove the battery from the truck.
- Install the counterweight lifting tool to the coun-2. terweight with a $1 \text{ UNC} \times 2 \text{ in.} (50 \text{ mm})$ bolt. See Figure 11, Figure 12, and Figure 13. Connect a

clevis to the counterweight lifting tool. The clevis must have a pin diameter of 16.0 to 19.0 mm (0.625 to 0.750 in.). Fasten a chain or sling to the clevis. Make sure the chain or sling and crane has the capacity to lift the counterweight. See Table 1. Use the crane to hold the weight of the counterweight.

3. From inside the battery compartment near the bottom, remove the two top capscrews that hold the counterweight to the frame. Remove the capscrews, nuts, and washers from the tow pin area of the counterweight. Use the crane to lift the counterweight away from the frame. Make sure that you do not damage the electronic controller.



2. LIFTING TOOL3. CLEVIS4. COUNTERWEIGHT

Figure 12. Lift the Counterweight



NOTE: THE MATERIAL IS ASTM A36 STEEL, 12.7 mm (0.50 in.) THICK.

Figure 13. Counterweight Lifting Tool

INSTALL

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

 Use a crane and the lifting tool, during removal, to lift the counterweight into position. See Figure 11. Make sure that you do not damage the electronic controller during installation. Install the two upper capscrews near the bottom of the battery compartment that hold the counterweight to the frame. Install the lower capscrews, washers, and nuts in the tow pin area of the counterweight. Tighten the upper capscrews to 380 N•m (280 lbf ft). Tighten the lower (tow pin) capscrews and nuts to 66 N•m (49 lbf ft). If removed, tighten the cover capscrews to 52 N•m (38 lbf ft).

- **2.** Disconnect the sling or chain. Remove the lifting tool from the counterweight.
- 3. See How to Change Battery in your vehicle's **Periodic Maintenance** or **Operating Manual**. Install the battery into the truck.

Traction Motor Repair

REMOVE

This procedure will show the removal of the traction motor through the battery compartment. Some lift trucks have a seat brake that actuates a brake on the armature shaft of the traction motor. See Figure 14 and Figure 15. On lift trucks E2.00-3.20XM (E45-65XM, E45-65XM₂) (F108), N30XMH, and N30XMH₂ (C210), and V30ZD (D210) the seat brake linkage under the floor plate must be disconnected at the front of the traction motor before the motor is removed.



TRACTION MOTOR
LEVER OF SEAT BRAKE LINKAGE

Figure 14. Traction Motor With Seat Brake, Lift Trucks E2.00-3.20XM (E45-65XM, E45-65XM₂) (F108), N30XMH, and N30XMH₂ (C210), and V30ZD (D210)

NOTE: The traction motor can be removed separately or as a unit with the drive train. These removal methods require removal from under the lift truck with the use of a floor jack. These methods are more difficult. The lift truck must be on blocks with clearance for the jack and traction motor to be removed as a unit. The hydraulic lines from the hydraulic tank must also be disconnected if this method is used. 1. See How to Change Battery in your vehicle's **Periodic Maintenance** or **Operating Manual**. Remove the battery from the truck. Then remove the floor plates and the access panel in the bottom of the battery compartment.

NOTE: Replace the hydraulic tank breather with a plug to help prevent oil flow when disconnecting the tank-to-pump hydraulic line.

2. On lift trucks E2.00-3.20XM (E45-65XM, E45-65XM₂) (F108), N30XMH, and N30XMH₂ (C210) and V30ZD (D210), disconnect the ball of the ball joint from the lever of the seat brake linkage under the floor plate.



1. SEAT BRAKE 3. TRUCK FRAME 2. TRACTION MOTOR

Figure 15. Traction Motor With Seat Brake, Lift Trucks E2.00-3.20XM (E40-65Z) (G108)

- **3.** Disconnect the power cables from the traction motor. If installed, disconnect the wires for the brush wear indicators and the temperature sensor at the motor. Make an identification of which cable and wire is connected to each terminal.
- **4.** Put the lift truck on blocks for easier access to the bottom bolts between the traction motor and the speed reducer. Remove the bolts that fasten the speed reducer and the motor.
- **5.** Install a sling to hold the traction motor. See Figure 16. Use a wood block and a board under the sling as shown in the illustration to control the traction motor during removal and installation. Use the crane to hold the weight of the traction motor. See Figure 17.



NOTE: USE A WOOD BLOCK AND BOARD UNDER SLING FOR A LEVER. TRACTION MOTOR FOR MODELS E2.00-3.20XM (E45-65XM, E45-65XM₂) (F108), N30XMH AND N30XMH₂ (C210), AND V30ZD (D210) SHOWN. TRACTION MOTOR FOR E2.00-3.20XM (E40-65Z) (G108) IS SIMILAR.

- 1. SLING
- 2. BOARD AND BLOCK
- 3. TRACTION MOTOR

Figure 16. Install Sling to Lift Traction Motor



NOTE: TRACTION MOTOR FOR MODELS E2.00-3.20XM (E45-65XM, E45-65XM₂) (F108), N30XMH AND N30XMH₂ (C210), AND V30ZD (D210) SHOWN. TRACTION MOTOR FOR E2.00-3.20XM (E40-65Z) (G108) IS SIMILAR.

Figure 17. Use Crane to Lift Traction Motor

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

- **6.** Remove the motor mount that holds the traction motor to the frame. Pull the traction motor from the speed reducer. See Figure 17.
- 7. Use the crane to move the traction motor to a space to make repairs. If installed on lift truck models E2.00-3.20XM (E45-65XM, E45-65XM₂) (F108), N30XMH and N30XMH₂ (C210), and V30ZD (D210), remove the bracket, lever, and spring for the seat brake. Remove the brake assembly from the traction motor as described in the section **Brake System** 1800 SRM 574