



Introducing Hyster Company's full line of orderpickers. Hyster offers a wide range of orderpicking solutions to cover a number of applications.

In 1996 the North American market size for order pickers was 5759 trucks. In 1999, the market size had grown to 8439 trucks. So, the market size for order pickers has grown by more than 40%. In that same period, Hyster Co.'s share of that market has remained steady, indicating a lot of untapped potential. The improvements that we have made to this truck make it more reliable and improve operator ergonomics for a more productive and competitive piece of equipment.

Product Line

R30XM₂, R30XMA₂, R30XMF₂, R30XMS₂

- R30XM₂, R30XMA₂, and R30XMF₂ comprise the premium line of orderpickers.
- The R30XM₂ is referred to as the counterbalanced truck.
- The R30XMA₂ straddles the load between the base arms. It is capable of achieving greater lift heights than the counterbalanced truck due to its extended base arms. It works very well in rail guided applications.
- The R30XMF₂ is equipped with longer base arms for much longer loads. It is commonly referred to as the “furniture truck.”
- The R30XMS₂ is the smaller of the four trucks.

The R30XMS2 features standard maximum fork height of 240” and is only available in 24 volt configuration.

The R30XM2 features a maximum fork height of 276” (300” as a SPED option) and can come with 24 volt standard or an optional 36 volt system.

The R30XMA2 features a maximum fork height of 300” (360” as a SPED option) and can come with 24 volt standard or an optional 36 volt system with greater lift capacity to height ratio.

The R30XMF2 features a maximum fork height of 360” and can come with 24 volt standard or an optional 36 volt system with greater lift capacity to height ratio. This truck is generally not suited to wire guidance, but rail guidance is strongly advised.



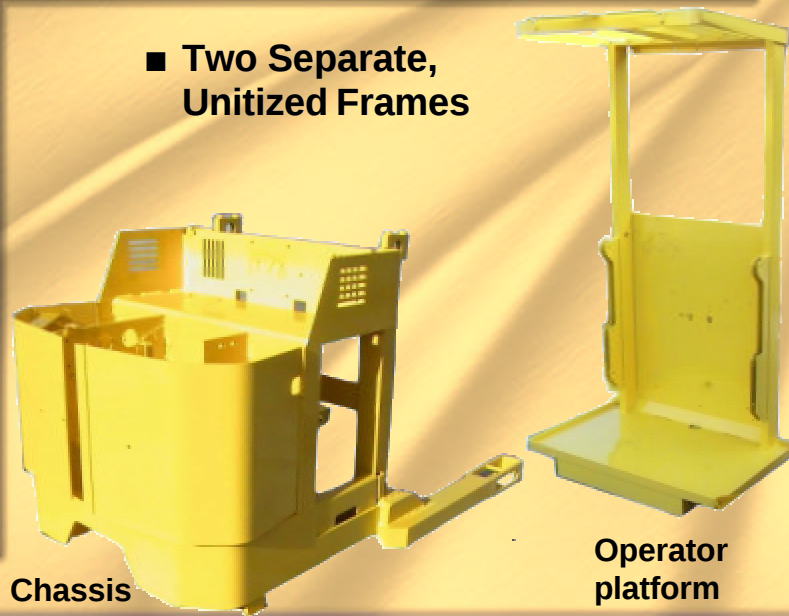
Some of the top SIC's for orderpickers are indicated in this slide.



This presentation will cover operator compartment ergonomics and operator controls, truck control systems, steering systems, continuous height sensing, hydraulic systems, masts, model differences, and some competitive information.

Frame

■ Two Separate, Unitized Frames



The frame consists of two main assemblies; the chassis and the operator platform. They are both unitized, all-welded heavy steel frames that provide strength, rigidity, and durability. The thick wrap around bumper plate is designed with a cutout that allows easy access for drive tire removal or replacement. Steel service compartment doors provide maximum protection for precision components and swing open easily for component access and servicing. Service compartment doors require no tools for opening.

Frame sizes vary per truck. Chassis heights as follows;

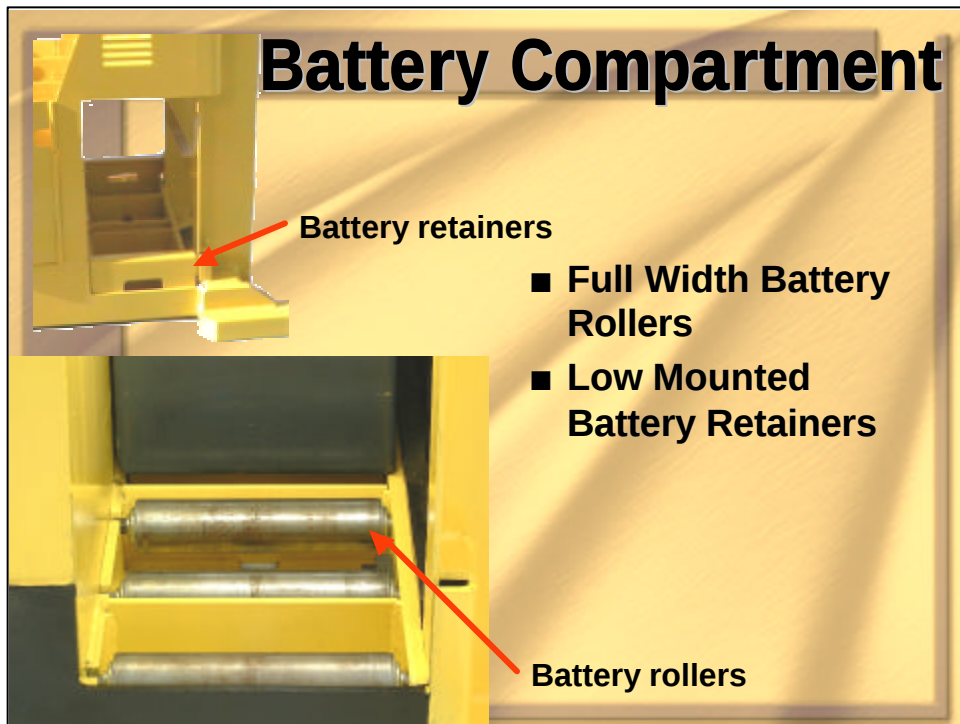
R30XMS2 43.2"

R30XM2 49.7"

R30XMA2 50.1"

R30XMF2 50.1"

The frame pictured is that of a R30XM2.



The battery compartment is equipped with 2-1/2" diameter rollers riding on ball bearings. They are Teflon sealed to resist corrosion from battery acid. The rollers are individually replaceable and lift out quickly and easily with no tools required.

Low-mounted battery retainers at the base of the compartment secure the battery in place. Retainers fit snugly in slots and are removed by lifting up and out.



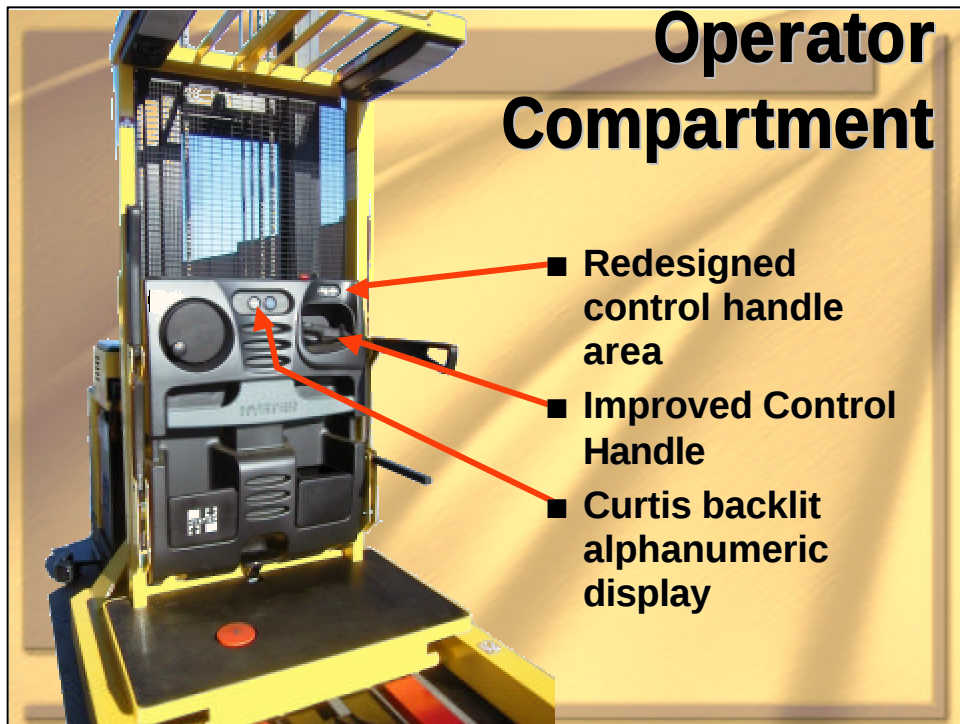
Base arms are welded directly to the chassis to provide a rugged, rolling chassis and to simplify mast installation and removal.

All-welded box section load wheel hangers with closed toe caps provide excellent durability and shield the load wheels from impact damage.

The R30XM2 and R30XMS2 feature tandem polyurethane load wheels that articulate to share the load evenly and diminish truck reaction to floor irregularities. The R30XMA2 and R30XMF2 have single load wheels. Load wheels are available in sizes of 4" x 3", 5" x 3", and 6"x 3" depending on the truck and the application. (See Price pages)

Double sealed bearings and single bolt installation simplify each load wheel replacement. No shimming or additional lubrication is required.

The R30XMA2 base arm pictured is shown with optional guide rollers for rail guided applications.

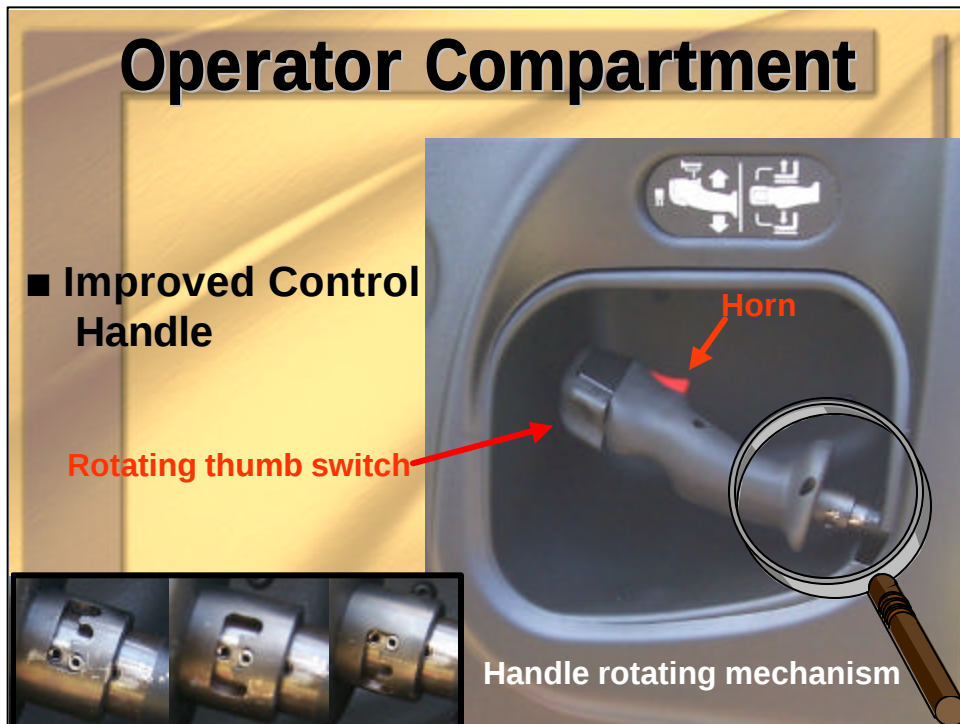


The operator compartment features a redesigned control handle and handle area, which we will discuss in more depth in some of the slides to follow.

The new Curtis backlit alphanumeric display is compatible with the new Controller Area Network (CAN) communications system. It allows the display of fault messages as well as battery discharge indicator and hour meter. It's also used during set up procedures to see menu and performance parameter values.

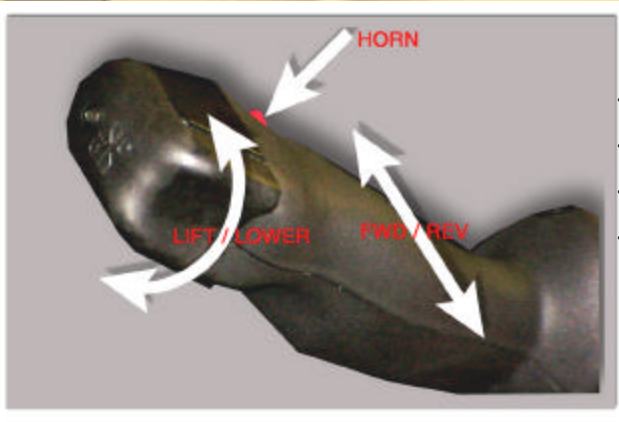
Note: Truck is pictured with optional multi turn steering. Hyster orderpickers come standard with return-to-center steering.

Truck is shown without standard equipment of tether line and belt.



The new multifunction control handle provides improved operator comfort. One of the features that improves operator comfort is the integral palm rest, which allows the operator to rest his hand more comfortably on the handle. A thumb-actuated rotating switch controls lift and lower functions. It is spring loaded to return to the neutral position when released. A trigger switch operates the horn. Forward and reverse motion are achieved by moving the handle in the direction of desired movement. The handle can be turned and locked in three possible orientations depending on operator preference to provide the operator with the most comfortable position possible. The handle is designed to accommodate travel in the forks first position or drive unit first. To maximize operator comfort for operating the truck in the forks first position, the truck should be equipped with the optional vertically adjustable operator console and standard return-to-center steering. The control handle is also spring loaded to return to neutral when released. The handle is also used to change performance parameters with readouts on the alphanumeric display.

Handle Functions



- ✓ Lift / Lower
- ✓ Traction Control
- ✓ Horn
- ✓ Setup & Diagnostic Control

During setup and diagnostics;

Moving the handle in the forward and reverse ranges will scroll through the menu options.

Moving the lift / lower thumb switch changes function values.

Pressing the horn switch at any time allows exit from the Setup / Diagnostics Function menu.

Control Handle Ergonomics



Traction Control



Lift / Lower

This slide contains video illustrating intuitive operation of the newly redesigned control handle. Push the handle forward for forward movement, pull it back for reverse movement. The thumb switch controls lift and lower. Rotating it upward actuates lift, while rotating it downward actuates lower.

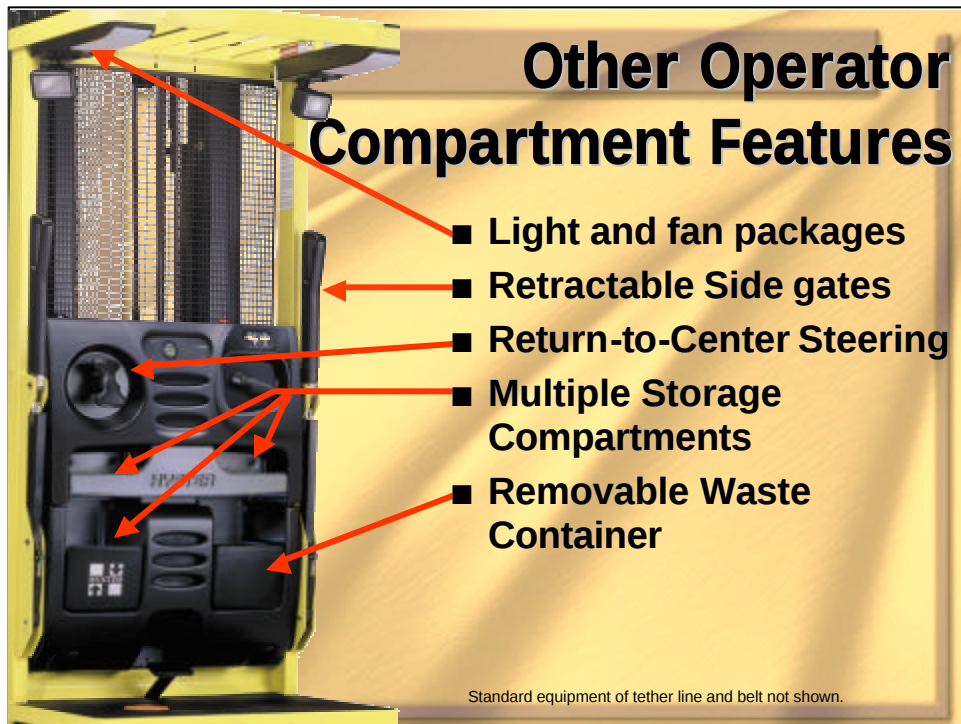
Two new features provide the operator the flexibility of comfortably operating the truck forks first or drive unit first. They are a new, re-contoured control handle area that has been scalloped out to provide more operator arm room for driving forks first, and a new redesigned control handle that will turn and lock in three separate orientations depending on operator preference.



When the system detects a truck fault, an audible alarm occurs, and a red light appears on the wrench icon. Beneath the wrench icon, a fault code or message appears in the alphanumeric LCD display. This provides real-time onboard diagnostics. The truck goes into a safe mode when a fault occurs. The safe mode selected by the truck will be determined by the nature of the fault. For example, if the truck detects a problem in the traction control system, it will stop the truck by applying the electric brake. If the truck detects a problem with the height encoder, slow travel speed will be permitted to allow the truck to be driven to a maintenance area. In general, the safe modes allow as much performance during abnormal or fault conditions as is possible.

The slack chain indicator is now incorporated into the backlit alphanumeric display. The red light appears on the wrench icon, and the message "SlackChn" appears in the LCD display.

In addition to control system diagnostics, the display is used in conjunction with the control handle for setup of the truck's operating parameters.



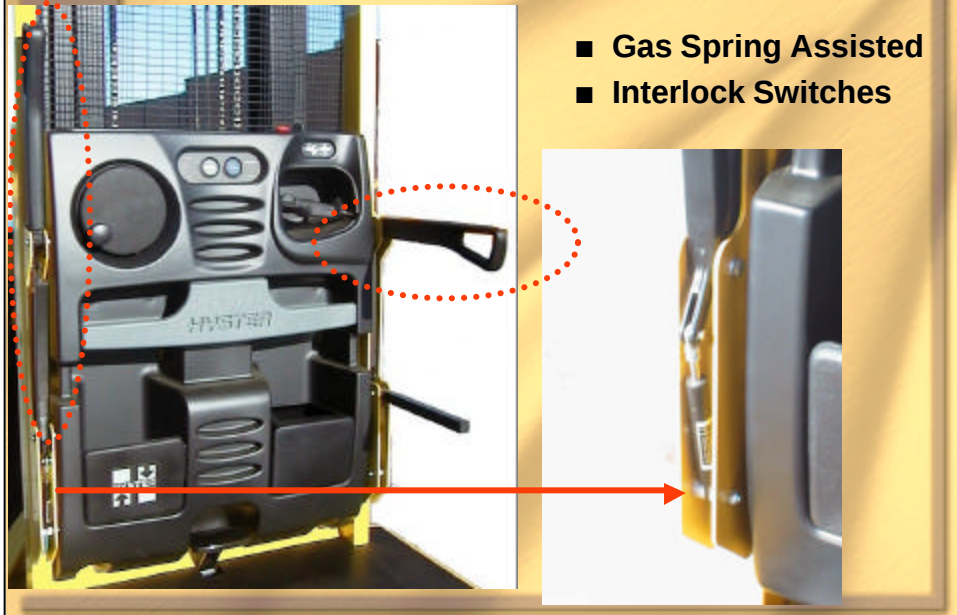
The overhead fans and lights package with optional bin lights provides illumination for the operator compartment, the fork area, and the bins. The fan has adjustable louvers to provide ventilation to the operator. The fan and light package is optional on the R30XMS2

The retractable side gates are gas spring assisted for easy one hand operation. They offer side protection while the ease of operation provides quick access to and from the operator's compartment. Side gate interlock switches are provided to disable lift/lower and traction control while side gates are raised. Retractable side gates are optional on the R30XMS2.

Other operator compartment features include ; Return to Center Steering(standard; Multi turn steering is optional), multiple storage compartments, and a removable waste container.

Return to center steering - what and why? The drive tire automatically returns to the center straight ahead position when the handle is released. This reduces wear to the drive tire. For rail-guided trucks, this reduces guide roller wear and rail maintenance. Even more important, return-to-center steering can reduce operator fatigue by facilitating ease of operation.

Retractable Side Gates



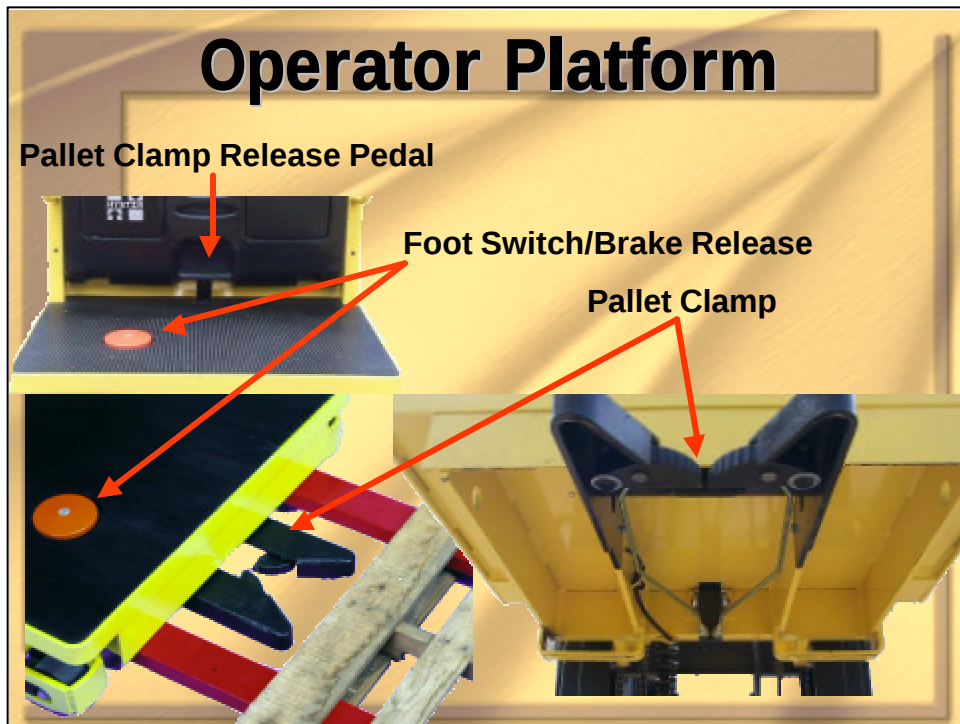
Retractable side gates are standard on the R30XM2, R30XMA2, and R30XMF2. The R30XMS2 features fixed-hoop side rails as standard equipment. The retractable side gates are gas spring assisted for easy one-hand operation. They offer side protection while the ease of operation provides quick access to and from the operator compartment. Side gate interlock switches are provided to disable lift / lower and traction control while side gates are raised.

Other Operator Compartment Features



- Emergency Disconnect Button
- Beverage Holder

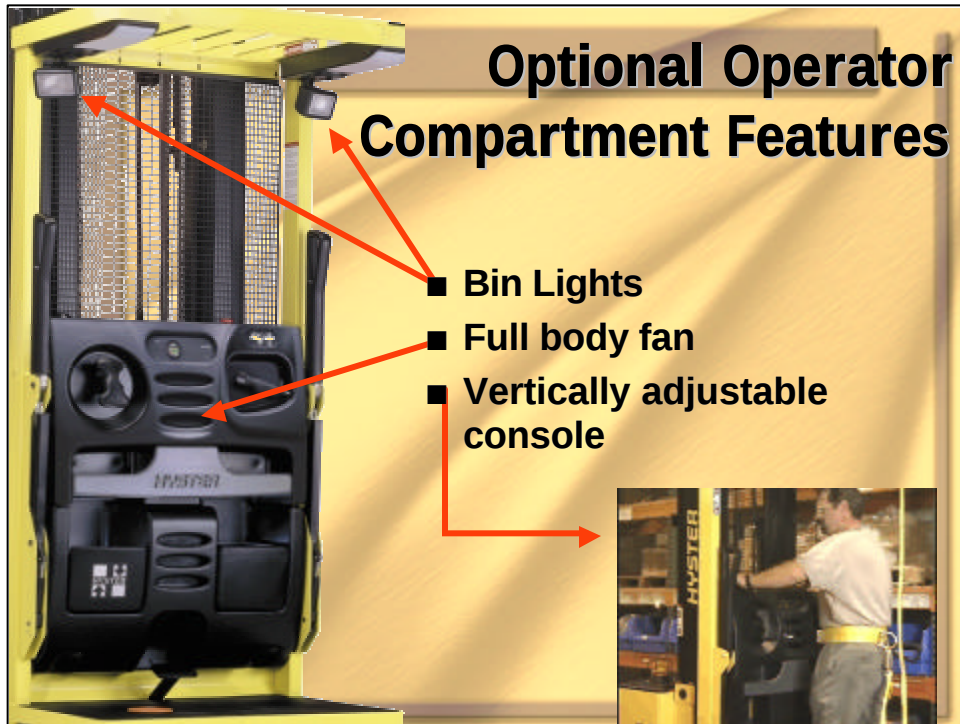
The emergency disconnect button is conveniently located on top of the operator console for quick, easy access. There is also a beverage container provided.



The foot switch/brake release is conveniently located in a position that allows the operator to stand naturally in the center of the operator's compartment in a comfortable stance.

The pallet clamp automatically centers and grips the pallet to allow fast, easy order picking. A foot operated pedal is easily actuated for quick pallet release. Crown's pallet clamp is foot applied/hand released.

The platform also features a full one inch thick rubber floormat for maximum operator comfort.



Optional Operator Compartment Features

- Bin Lights
- Full body fan
- Vertically adjustable console

Optional bin lights are adjustable to provide further illumination for racks and bins in low lighting situations.

The optional two speed full body fan provides maximum ventilation directed to the operator's mid-section. This is convenient for operators who prefer not to have the airflow directed to the head, or for maximum ventilation for operators who prefer both.

The optional adjustable console height provides a 6" vertical range of adjustability to accommodate most operators regardless of stature. It's important to remember that this feature is strongly recommended when specifying a truck in which the operator runs the truck primarily in the forks-first position.

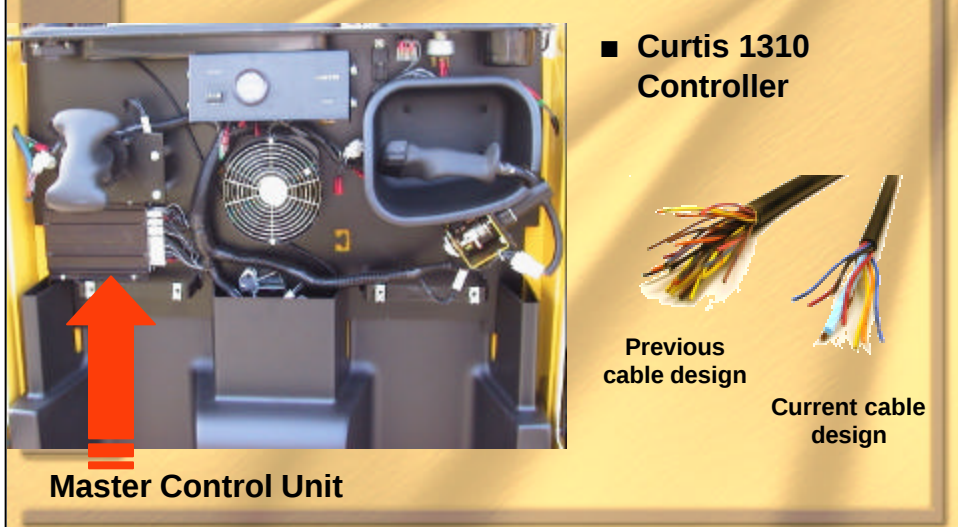
Corner posts are available as an option from Applications Engineering. These posts are constructed of square steel tubing that run from the overhead guard to the operator platform. They are designed to offer additional protection and are required in applications that involve using the truck in right angle stacking within racking.

Control Systems

- **Controller Area Network (CAN) Communications System**
- **Separately Excited Traction Motor**
- **MOSFET Traction Controller**
- **Inmotion Steering System**
- **HySense ä Continuous Height Sensing**
- **Variable Speed Lift and Lower** (large chassis only)
- **Braking Improvements**

These trucks feature a number of new control systems. We will see how the CAN system manages truck system communications. In addition there is a new SEM motor, which is controlled by a MOSFET traction controller. The new steer system is provided by Inmotion, formerly Atlas Copco. A new feature called HySense™ continuously senses the fork height and adjusts maximum travel speed. Variable speed lift and lower is now a feature of the large chassis trucks. (R30XMS2 is single speed lift / lower) There are also improvements to the braking system that we will discuss.

Controller Area Network (CAN) Communications



Controller Area Network or CAN communications allows the truck's multiple control systems to be connected using a pair of wires known as a CANbus. This type of system is ideally suited to orderpickers where the operator's compartment is raised and located remotely from the control devices in the chassis. CAN technology permits a significant reduction in the number of electrical conductors which must be reeved over the mast between the chassis and the operator's platform. The number of conductors has been reduced from 21 to 8. This reduction provides an extremely durable and reliable design. The CAN system is controlled by the Master Control Unit: a Curtis 1310 unit located on the operator's platform. The Master Control Unit (MCU) sends signals from the operator's input (i.e., lift/lower, forward/reverse, etc.) to the controls in the chassis below.

Extensive testing has been performed on the MCU to ensure reliability.

CAN technology allows single point diagnostics through the new dash display.

CAN Communications

- Operator input sends signals to truck systems
- Continual monitoring of truck systems

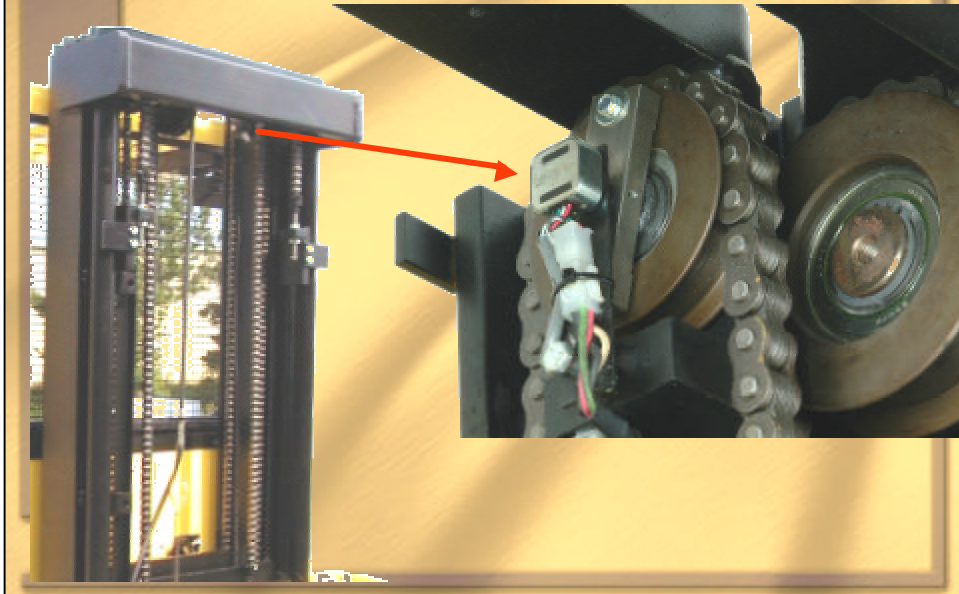


Electronic boxes connected by the CANbus link are the Curtis 1310 Master Control Unit(MCU), the Curtis 1243 Traction controller, The Inmotion Advanced Power Steering(APS), and Wire Guidance unit(optional). The Canbus link carries the following data: Traction throttle, Traction direction, horn, lift/lower, steering position, steering rate, wire guidance(optional), status information, parameter change downloads, and diagnostic information.

The MCU (Curtis 1310) receives input from the following devices.

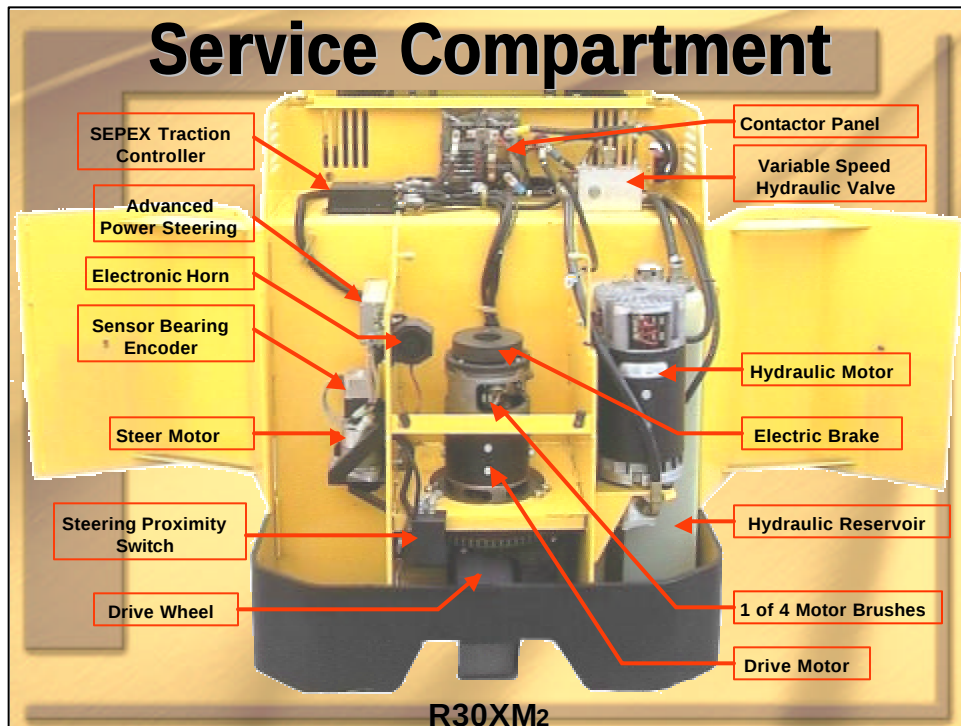
- Throttle -Controlled by a Hall-effect sensor.(a non-contact solid state sensor which **eliminates** the throttle potentiometer for a more reliable design.)
- Lift and lower switches
- Horn switch
- Foot switch (Brake release)
- Slack Chain switch
- Steering position encoder (a sensor bearing encoder which is integral to the upper part of the steer motor. It provides a drive unit position signal which eliminates the steer feedback potentiometer.(MDU pot)(Very reliable design)
- Height encoder - an optical encoder detects mast chain pulley rotation which is directly proportional to operator platform motion. There is a mast proximity switch at 24" that calibrates the position. The encoder reads each turn of the pulley to continually sense fork height.
- Return-to-center steering proximity switch

Optical Height Encoder



CANbus Advantages

- **Increased reliability**
- **Substantial reduction in connections and wiring complexity**
- **Extensive function monitoring**
- **Fast data rate allows real time control**
- **Access to all controller parameters through a single CANbus port**



Hyster Co. has designed the service compartment to be uncluttered with quick, easy access to all major components.



The **Master Drive Unit** (MDU) features a vertically-mounted, stationary design. The non-rotating motor mounting eliminates power lead flexing or twisting. That means less service downtime.

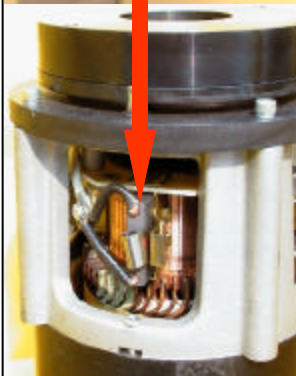
The **Separately Excited traction Motor** (SEM) is fan cooled for extended motor life and utilizes class H insulation for durability. The MDU is mounted to the frame with a large diameter ball bearing for ease of operation and long service life. 180 degree steering angle offers excellent maneuverability.

The R30XMS2 and R30XM2 feature an HFK300 drive unit, while the R30XMA2 and R30XMF2 utilize the HFK400. Both units are provided by ZF Industries and feature field proven design. The size of the drive unit is basically determined by the amount of weight it needs to support and the gear ratio required to allow the traction motor to operate at the proper speed. Both the 300 and 400 offer essentially the same range of standard ratios, so the main consideration is weight. The weight on the drive units for both the straddle and furniture order pickers exceeds the capacity of the HFK 300 drive unit, so the 400 has to be used. The 300 is good up to about 4,400 lbs.

To summarize, the 400 is larger and can carry more weight than the 300.

Separately Excited Traction Motor

Motor brushes
easy to change



- **Hyster-built SEM Traction Motor**
- **Regenerative Braking**
- **Reduced Wiring**

The 6.6" traction motor replaces a 7.3" traction motor on the R30XMS2. The reduction in size is achieved with better performance due to the SEM system and regenerative braking. Regen braking is when the kinetic energy of the moving truck is converted to electrical energy by the motor and routed to the battery where it converts to heat and dissipates during plugging. In the previous system, the traction motor converted the kinetic energy into heat which had to be dissipated by the motor itself, thus requiring a larger motor. This also results in improved motor brush life, which improves reliability and reduces maintenance costs.

Three other motors are used on the large chassis trucks; the 73BB, 73MC, and 75EG. The numbers refer to motor diameter size; 7.3" and 7.5". The 73BB is used on the 24v Counterbalanced truck. The 73MC is used on all 36v trucks, and the 75EG is used on the 24v straddle and furniture truck. These trucks required a larger diameter motor due to higher currents. All these motors feature SEM technology.

Separately Excited Traction Motor



- Hall Effect Sensors
- Improved Reliability
- Improved Speed Control & Acceleration

Hall effect accelerator input improves speed control and acceleration. This new design increases reliability by eliminating the accelerator potentiometer.

Hall effect devices are used in applications to replace potentiometers. A potentiometer relies on an electrical connection of a moving wiper in contact with an element. This contact surface is prone to wear and contamination from vibration and moisture.

Hall effect devices use sensors which measure magnetic fields. They use a magnet mounted on a mechanism which moves the magnet closer to or farther away from the sensor. Since there is no contact between the magnet and the sensor, there are no moving parts to wear out. Only the shaft and bushing are subject to wear, and will typically last many millions of cycles. The shaft is sealed to prevent moisture contamination.

In a further simplified explanation, the difference between a potentiometer and a Hall effect device is like the difference between a CD player and a record player. The record player has a needle that makes direct contact with the record causing wear on both. The CD player has a non-contact device that reads data from the CD without actually touching the CD.

SEM Traction System

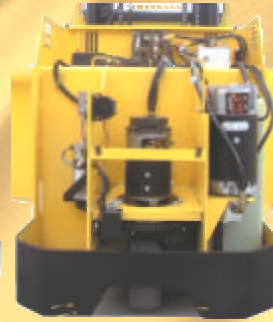
- Permits Reduced Chassis Wiring
- Eliminates Forward/Reverse Contactors



Crown System



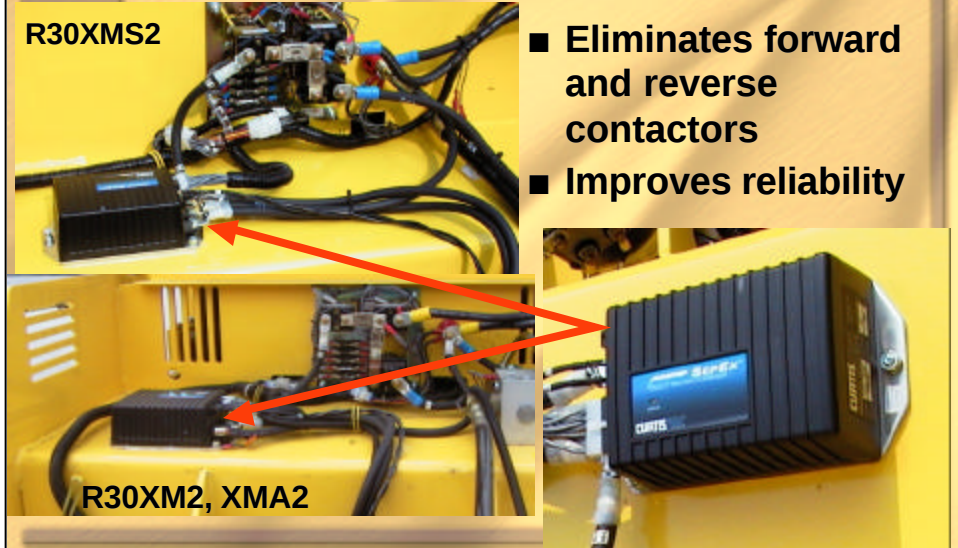
Caterpillar System



Hyster System

The new SEM traction system, in conjunction with the CAN system, provides a simpler, cleaner design with no forward/reverse contactors and less wiring. Compare the service compartment to that of a Caterpillar or Crown order picker.

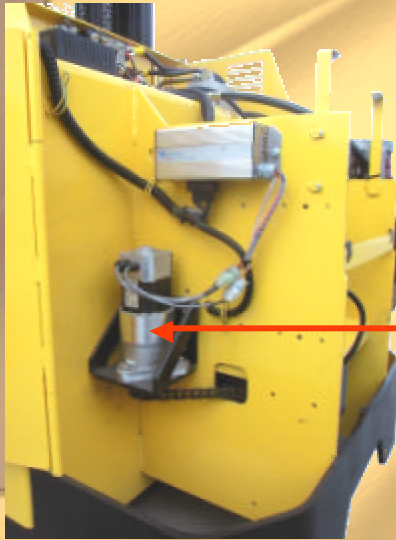
MOSFET Traction Controller



The **M**etal **O**xide **S**emiconductor **F**ield **E**ffect **T**ransistor (MOSFET) traction controller is a Curtis 1243 unit. It can control and change direction of the current to the traction motor in response to directional changes from the operator. This eliminates the forward and reverse contactors. The Curtis 1243 also controls lift and lower functions.

The 1243 controller reduces plugging aggressiveness at elevated heights to provide smooth traction control.

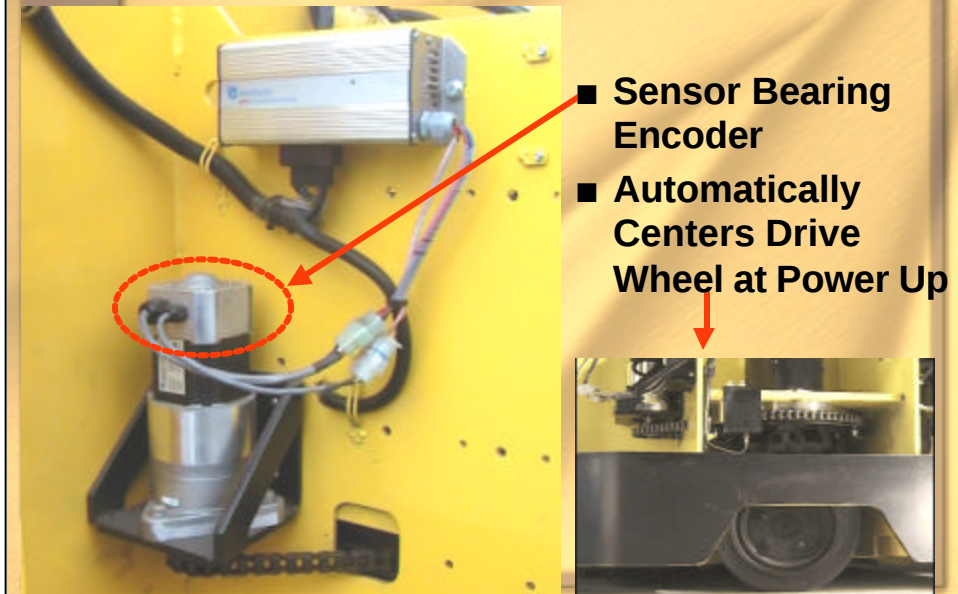
Steering System



- Three-phase brushless DC steer motor requires no maintenance

Electronic on-demand power steering is provided by an Inmotion (formerly Atlas Copco) gear motor and controller. The system uses a three-phase brushless DC motor with integral gear box assembly and a controller with CAN communications. No brushes....no maintenance.

Steering System



The steer system is equipped with a sensor bearing encoder and a steering proximity switch that **automatically centers the drive wheel at power up**. Integral Hall effect sensors eliminate dip switches, potentiometers and tachometer to reduce steering adjustments and maintenance. The only adjustment needed is calibrating the steering proximity switch at the drive unit straight ahead position. The control system receives steering command signals from a second encoder mounted behind the steering wheel/handle through the CAN system. The steering controller monitors performance and sends signals to the truck controller (Curtis 1310) if faults occur.

Optional Wire Guidance

- **CANbus Communications**
- **Standard Steer Motor and Controller**
- **No Change to Truck Wire Harnesses**
- **Add-on Guidance Module & Two Sensors**
- **Lighted Guidance Switch Added to Console**

Note: Optional Wire Guidance Tentatively Scheduled for Release April / May 2001. Additional Details Will Be Made Available By Product Announcement.

By utilizing the existing CANbus communication system, the wire guidance system is considerably simplified. The system uses the standard steering motor and controller and communicates with the steering and master controllers via the CANbus. There is no need to change existing wire harnesses. The previous system required changing the steer motor and controller when adding wire guidance.

The wire guidance system is comprised of the wire, wire guidance unit (WGU), and two sensors. A switch and indicator light must also be added to the operator console. The WGU is a separate add-on box. The control unit will bolt on to the chassis near the steer controller. Like the previous system there are two sensors, one at each end of the truck. These sensors use a different type of coil arrangement that make them less sensitive to signal strength and depth than the previous system.

Optional Wire Guidance

- **Auto Select Sensors: 6.2 kHz @ 78 ma or 5.2 kHz @ 35 ma**
- **No Additional Over-the-Mast Wiring Required**
- **System is Digital / Analog Hybrid**
- **No Potentiometers to Adjust**

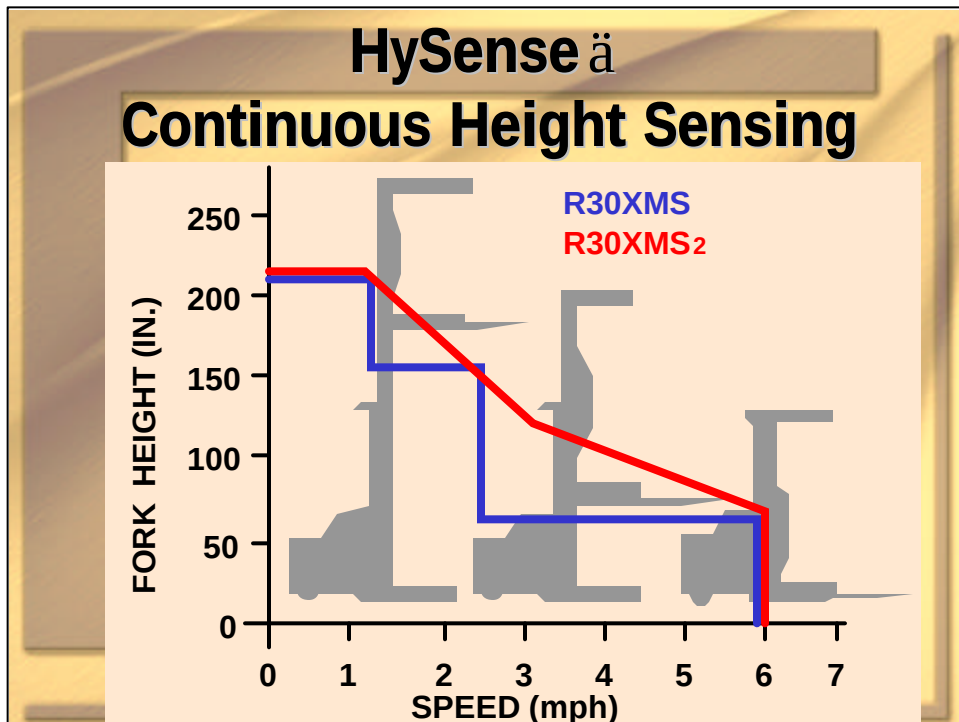
Note: Optional Wire Guidance Tentatively Scheduled for Release April / May 2001. Additional Details Will Be Made Available By Product Announcement.

The system will function at 6.2 kHz at 78 milliamps or 5.2 kHz at 35 milliamps. The guidance controller and antennae are the same for 24v or 36v, 5.2 kHz or 6.25kHz. There is no need for additional over-the-mast cable as in the previous system. All of the communication between the chassis and operator platform is accomplished through the CAN system.

It is a mostly digital system, which means no potentiometers to adjust, and it is less susceptible to electronic interference. No potentiometers simplifies setup and increases reliability. It acquires the wire smoothly and tracks solidly in both directions.

All setup and calibration will be performed using onboard software (no laptop or handset required).

During operation, WG mode is displayed on the multi-function display, in addition to the alarm and light indicators used on the previous system.



In the previous system, travel speeds are stepped down at set intervals of fork height. In the new system, unloaded travel speeds are reduced approximately 1 MPH for every 22.5" in increased fork height between the heights of 60" and 150". Therefore the reduction in speed is smooth, gradual and is less noticeable to the operator.

Travel above maximum fork height with restricted steer angle is optional. (Capacity reduction required. Contact Applications Engineering for capacity ratings.)

Model	Optional travel above	Steer angle
R30XMS2	150"	10 degrees
R30XM2	212"	10 degrees
R30XMA2	272"	7 degrees
R30XMF2	272"	7 degrees

This travel option eliminates the "pogo" effect, in which the operator must stop the truck, elevate to the necessary height, pick, and lower to the necessary height to re-engage travel before proceeding to the next location, where he may have to stop the truck before reaching the necessary height again.

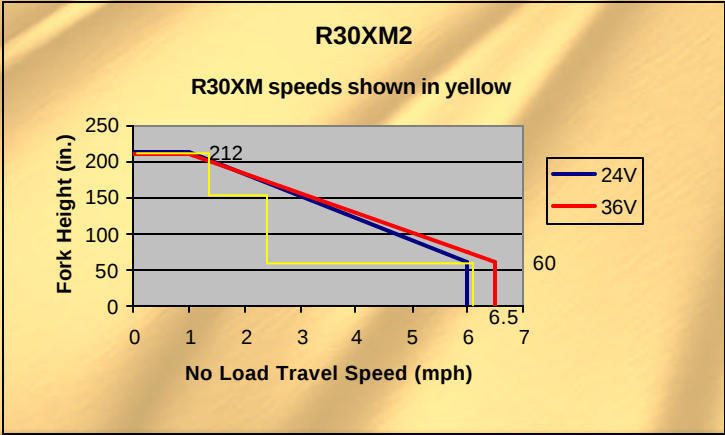
The drive unit is also monitored by the MCU to further reduce travel speeds when steer angle is greater than 10° with fork height greater than 24".

Mast height is monitored by a solid-state optical encoder. The encoder is a sealed unit which requires no maintenance or cleaning.

HySense ä

Continuous Height Sensing

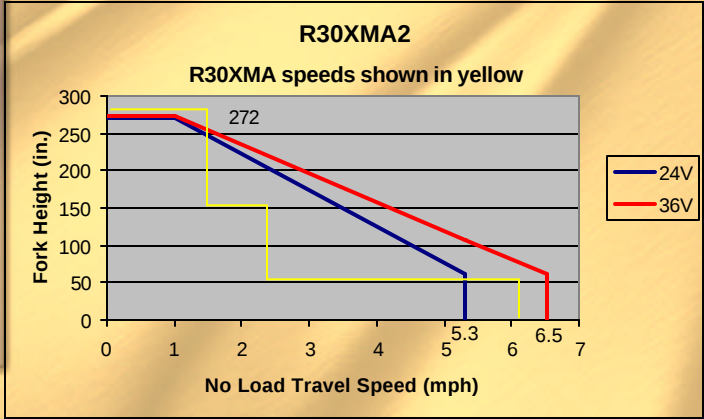
	0	1	6	6	6.5	6.5
24V	212	212	60	0		
36V	210	210	73.8182	73.8182	60	0



HySense ä

Continuous Height Sensing

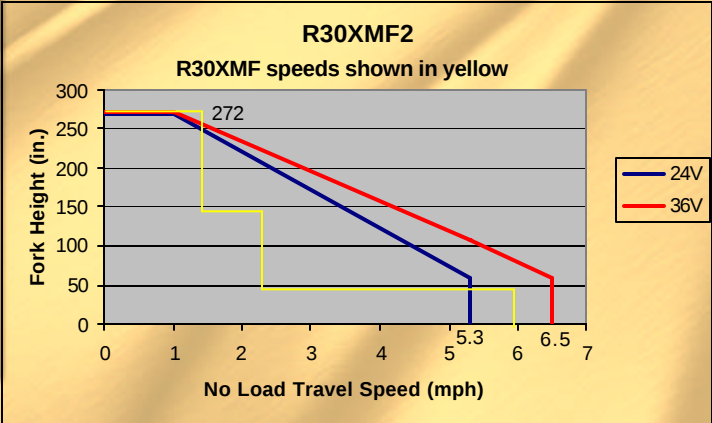
	0	1	5.3	5.3	6.5	6.5
24V	270	270	60	0		
36V	272	272	106.2545	106.2545	60	0



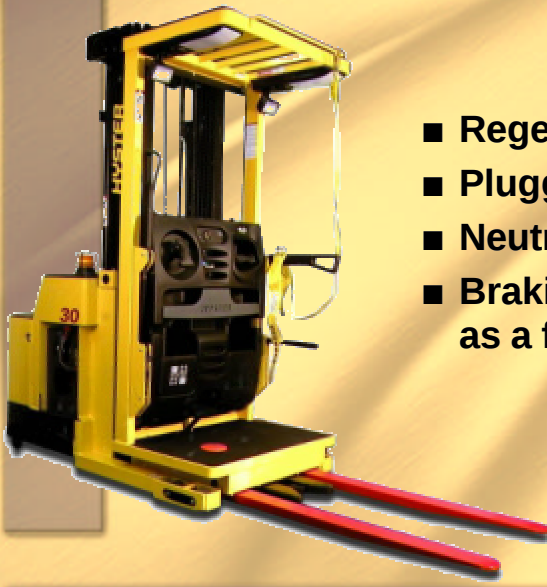
HySense ä

Continuous Height Sensing

	0	1	5.3	5.3	6.5	6.5
24V	270	270	60	0		
36V	272	272	106.2545	106.2545	60	0



Braking Systems



- Regenerative Braking
- Plugging
- Neutral Braking
- Braking rate reduced as a function of height

Regenerative or regen braking (actuated by plugging) slows to a stop then applies the park brake. Plugging is variable in relation to the actuation of the handle. Neutral braking (the automatic light braking of the truck) is adjustable and occurs when the multi-function control handle is released and returns to the neutral position. Braking aggressiveness is reduced as a function of height to provide smooth operation.

Five methods of stopping provided:

- Plugging - This is the recommended method of reducing truck speed and changing travel direction. To plug, move the control handle through the neutral position to the opposite direction of travel. The controller provides proportional regenerative braking. The rate of deceleration is proportional to the position of the handle.
- Foot switch- Aggressive regen braking is provided when the operator releases the footswitch. As the truck comes to a complete stop, the parking brake will apply.
- Non-traction fault - If a stop is triggered by conditions other than a traction control system fault the system will plug (regen) to a stop and apply the electric brake. (i.e., wire guidance loses the wire; steering system sends a shut down command to controller)
- Traction system fault - will disable travel and fully apply park brake
- Emergency button or key off- will apply the park brake immediately

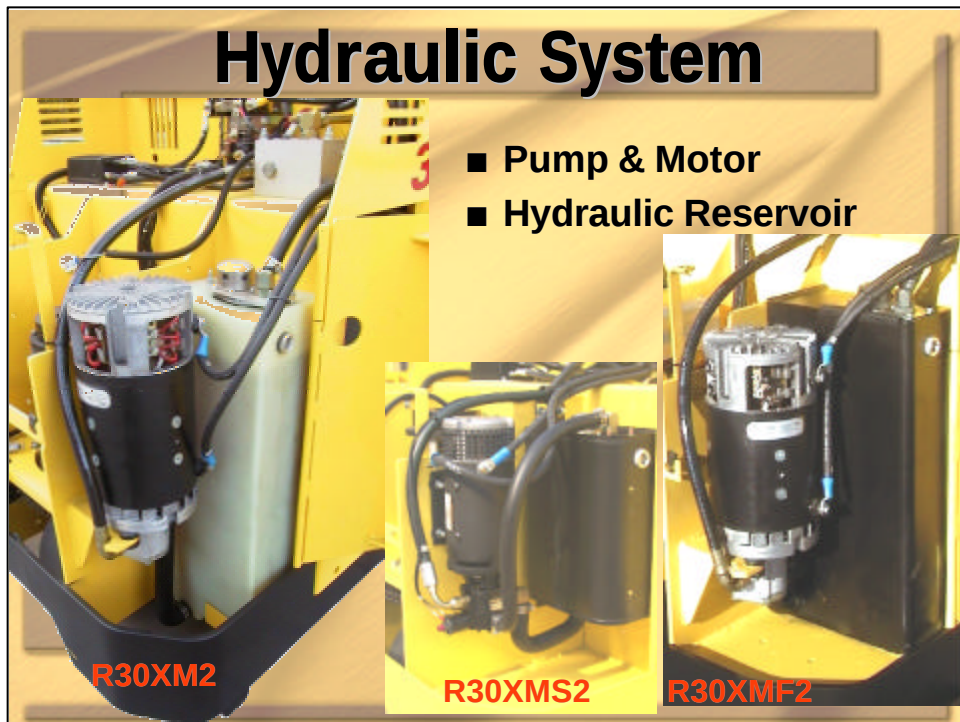
Braking Systems



Advantages

- Abrupt stops diminished
- Tire lock up reduced
- Reduced park brake wear

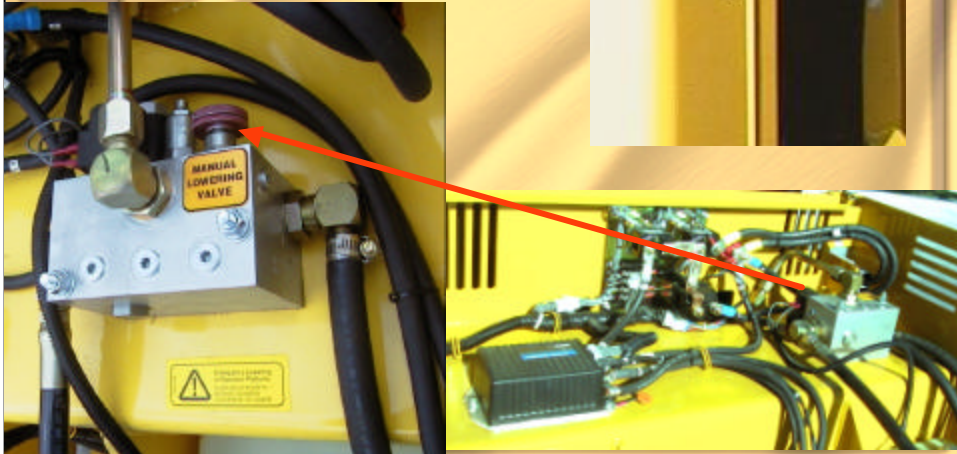
The braking logic limits the application of the parking brake while traveling. Abrupt stops are diminished. This reduces tire lock up and decreases drive tire wear. Since the truck plugs to a stop, it also reduces wear on the park brake.



The R30XMS2 features a five inch Ohio Electric pump motor. The rest of the product line features 7.5" Hyster-built motors. The trucks are equipped with a variety of Hydraulic fluid reservoirs. The XMS2 has a 3.75 gallon welded metal tank. The XM2 and XMA2 feature 7.25 gallon plastic tanks, and the XMF2 features a 7 gallon welded metal tank. Tank size and construction varies due to capacity and application. All are equipped with a 25 micron return line filter inside the tank to reduce foaming of returning hydraulic fluid. The filter is easily replaced without having to drain the tank.

Hydraulic System

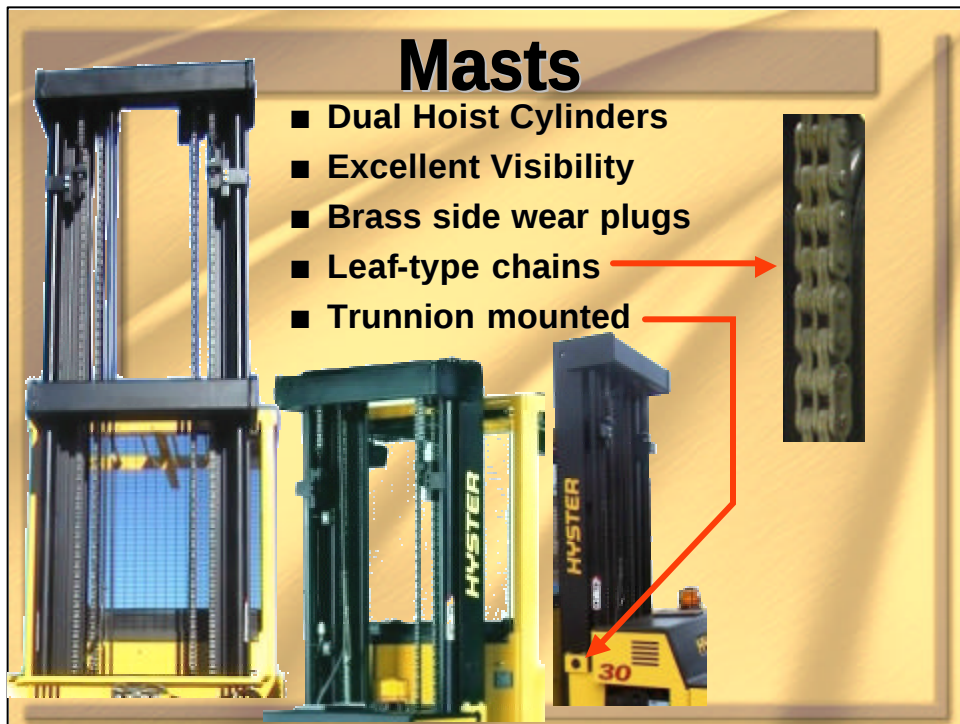
- Sight Glass
- Manual Lowering Valve



The trucks are equipped with a manual lowering valve in the unlikely event that the truck should lose power with the operator platform elevated.

All Hyster orderpickers are equipped with a sight glass to provide quick and easy fluid level checks without opening the service compartment.

The hydraulic system provides variable speed lift and lower in the R30XM2, XMA2, and XMF2. Lift speed is proportional to the actuation of the thumb switch on the control handle.



Vista 3-stage masts are available on all four models. A 2-stage Vista mast is available on the R30XMS2 only. The masts feature a nested channel design and full-face straight load rollers.

Dual hoist cylinders are designed to provide smooth lift and lower action. A built-in flow control valve regulates the maximum rate of descent under any system condition.

Brass side wear plugs allow easy mast adjustment during periodic maintenance without the removal or disassembly of the mast.

Leaf-type chains are used for strength and compact size.

Masts are trunnion-mounted for easy removal and installation. Trunnion mounting also serves to distribute load forces evenly to the frame.

The zero free lift provides excellent visibility. In addition, it provides smooth staging transitions in lift and lower, creating a more stable environment for operator and load.

Mast Visibility



Model Differences



R30XM2



R30XMF2

Base Arms

- Application Driven
- Affect Turn Radius
- Affect Maximum Fork Heights

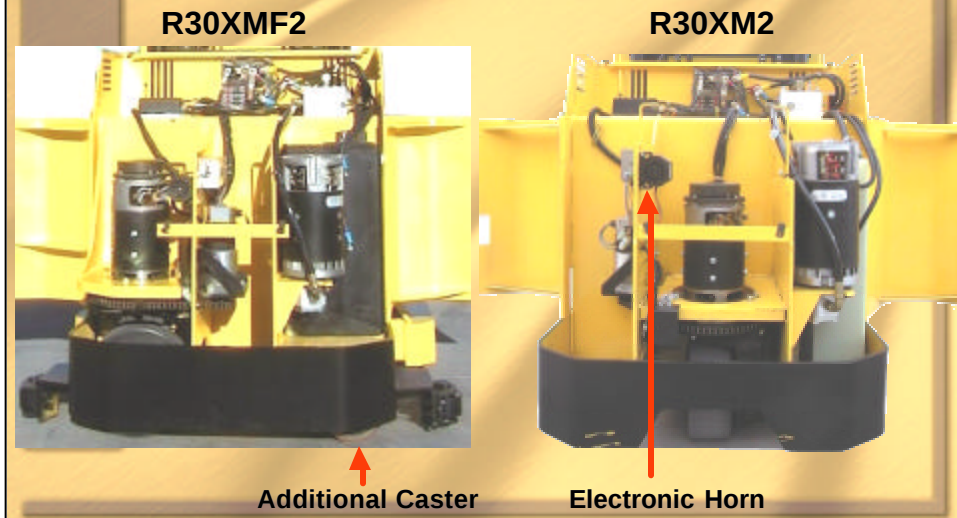


R30XMA2

Base arms are welded directly to the chassis to create a rugged rolling chassis. They are generally application driven. The need for maintained capacity at higher elevated heights create the need for longer base arms. Generally, longer base arms help make higher maximum fork heights achievable. The longer the base arms, however, the greater the turn radius.

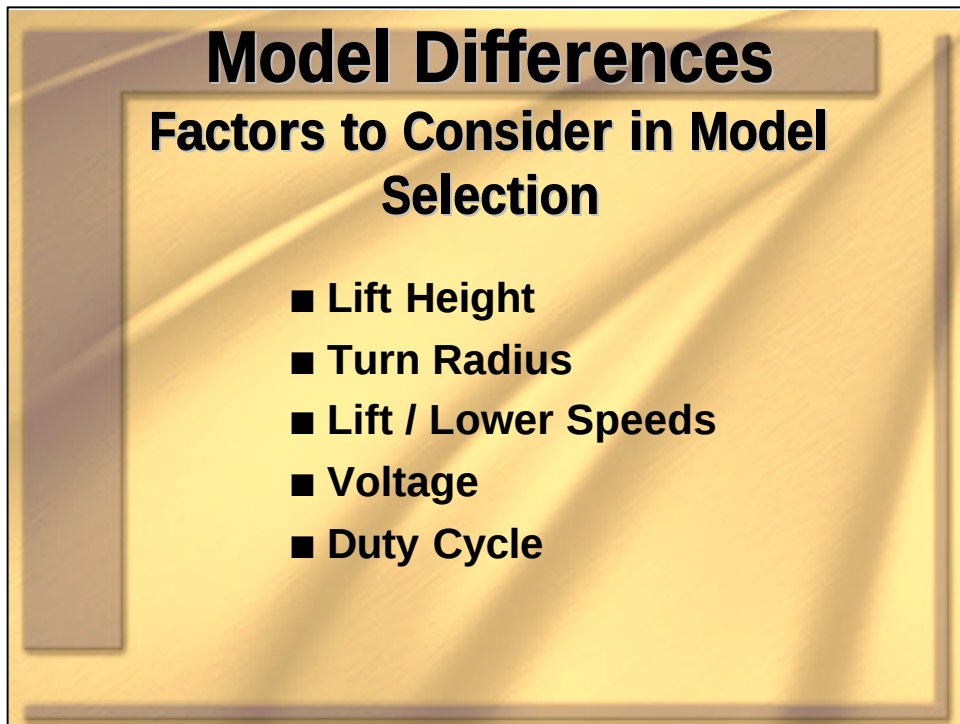
Model Differences

Service Compartment



The service compartment configuration is slightly different on the furniture truck (R30XMF2). As you can see in the images above, the MDU is moved over to the left hand side, instead of the center, where it is positioned on the other models. The R30XMF2 is designed with a 4 point suspension system to help maintain stability while achieving greater elevated fork heights. The XM2, XMA2, and XMS2 are 3 point suspension. The three points are the drive tire and load wheels. The fourth point on the XMF2 is achieved by the addition of a caster wheel. The MDU is moved over to the left side to complete the four point suspension.

The horn is replaced with a more reliable electronic horn. It also provides a quick test to see if the CANbus system is working. If the horn works, the CANbus system is receiving communications from input devices. The same horn is used on all four models.



The R30XMS2 is 24 volt only, has single speed lift and lower, and is limited to 240" Max fork height, but has the smallest turn radius of the four trucks (65.8").

The R30XM2, XMA2, and XMF2 are available in either 24 or 34 volt configurations. They also have variable speed lift and lower.

The R30XM2 goes to 276" MFH with a turn radius of 67.7".
The R30XMA2 goes to 300" MFH with a turn radius of 95.8".
The R30XMF2 goes to 360" MFH with a turn radius of 149.9".

Turn radius and intersecting aisle are important considerations when choosing these trucks. To achieve greater lift heights you may have to go from an XMS2 to an XM2 or an XMA2. As you move up in model size, wheelbase increases. This is one of the factors that make greater lift heights achievable. Wheelbase directly impacts turn radius. A good rule of thumb to remember is, as wheelbase increases, so does turn radius.

Capacity de-rating at elevated heights may also be a concern. Be sure to consult Hyster High Lift Sheets when choosing a truck.

Make	Hyster	Hyster	Hyster	Hyster
Model	R30XMS2	R30XM2	R30XMA2	R30XMF2
Battery Voltage Std./Opt.	24/(n/a)	24/36	24/36	24/36
Head Length 2-Stg/3-Stg	72.0/73.0	(n/a)/75.3	(n/a)/75.3	(n/a)/75.3
Overall Width Minimum/Maximum	41.3/48.0	41.0/55.0	51.5/57.5	53.0/59.0
Height to Top of OHG	88.8	88.7	88.7	92.2
Standard Mast: MFH/OAH	213/95	240/105	240/105	360/155
High Visibility Mast	STD	STD	STD	STD
Wheelbase	55.1	57.0	85.5	139.6
Travel Loaded STD V/OPT V	5.5/ N/A	5.5/6.0	4.8/5.8	4.8/5.8
Travel Empty STD V/OPT V	6.0/ N/A	6.0/6.5	5.0/6.5	5.0/6.5
Lift Loaded STD V/OPT V	26/NA	42/48	42/48	42/48
Lift Empty STD V/OPT V	42/NA	65/75	65/75	65/75
Lower Loaded / Empty	42/42	67/67	67/67	67/67
Turn radius Min outside	65.9	67.7	95.8	149.9
Stacking aisle *	121.4 / 122.4	n/a - 122.9	n/a - 108	n/a - 164
Intersecting aisle **	73.2	74.7	88.2	83.6
Battery Compartment-Size WxLxH	13.5x36.0x24.7	14.6x39.0x31.6	14.6x39.0x31.6	14.6x39.0x31.6
Weight Less Battery	4700	4600	5400	8250
Step Height	8.4	8.5	8.5	12.0
Operator Platform Width	40.3	40.3	40.3	40.3
Drive Control	Curtis SepEx	Curtis SepEx	Curtis SepEx	Curtis SepEx
Drive Tires	12.0 x 5.5 x 8.0	12.0 x 5.5 x 8.0	13.5 x 5.5 x 8.0	13.5 x 5.5 x 8.0
Load Wheel	4.0 x 3.0	5.0 x 3.0	6.0 x 3.0	6.0 x 3.0
Max Fork Height	240	300	360	360

* zero clearance w/ 48" std load2-stg/3-stg

** equal aisle w/ 48" x 48" pallet

*** - R30XMF2 figures based on 48" x 96" load, 3 stage mast

Competition Ergonomics



Only Hyster comes standard with return to center steering. Return-to-center reduces operator fatigue, facilitates ease of operation in the fork-first position, and is readily adaptable to rail guided applications.

Operator Platform



The foot switch / brake release on Hyster orderpickers is flush mounted to the operator platform. It is located in a natural position for the operator to enjoy a more comfortable stance. Cat and Raymond brake release pedals stick up requiring the operator to step up and over them.

Also, note the high position of the pallet clamp pedal on the Crown truck. The Crown pallet clamp is foot applied, hand released.

Multi-Function Control Handle



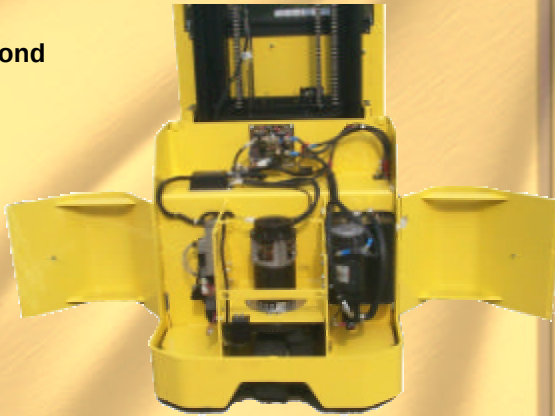
Multi-function control handles. Cat and Raymond have them. Crown does not. What sets one apart from the other? First off, Crown features a motorcycle style twist grip with buttons for lift, lower and horn that are not located on the handle itself. Hyster, Cat and Raymond all have a thumb actuated lift / lower control. Four things about the Hyster handle set it apart. Note the Hyster handle has been set in a position to allow the hand to rest on it naturally and comfortably. The Hyster handle is also designed with a palm rest to give it additional support, especially when traveling drive unit first. The Hyster handle can be turned and locked in three separate positions, depending on operator preference to provide an even further degree of operator comfort. Finally, the Hyster handle is positioned in such a way that, in conjunction with the re-contoured console area and the optional adjustable console, it is beneficial when operating the truck in a forks-first position.

Serviceability



Raymond

Hyster
R30XMS2



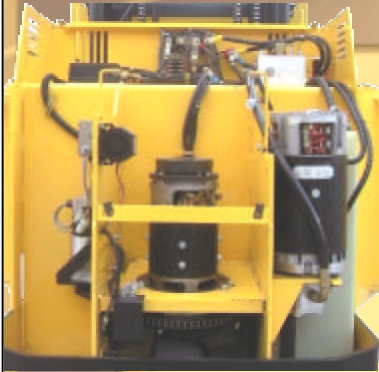
Cat

The Hyster service compartment is clean and uncluttered. Bi-parting steel doors open quickly and easily with no tools required. The lightweight, ABS plastic top service compartment cover is held in place by two spring load bolts that grant access in seconds. Cat, Crown, and Raymond service compartments are crowded and cluttered.

The Cat and Raymond Trucks have both a battery cover and a battery retainer which must be removed to change the battery.

Images of Crown service compartment are shown on next slide.

Hyster R30XM2,
R30XMA2



Serviceability

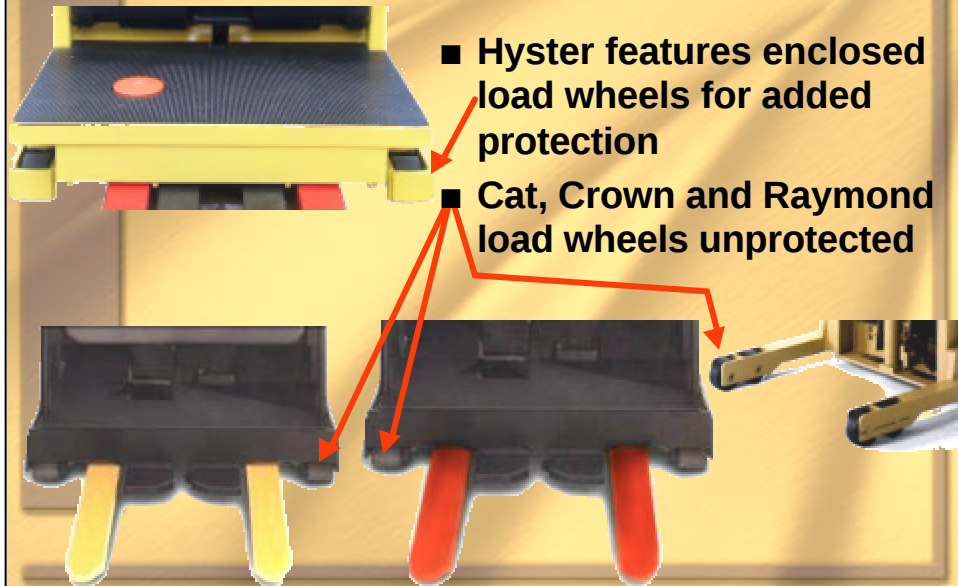
SP3000



Crown
30SP36



Serviceability



Hyster orderpickers feature load wheels that have closed toe caps for additional load wheel protection. Cat, Crown and Raymond all have open toe caps leaving the load wheels unprotected.

Competitive Specifications

Make	HYSTER	Crown	Raymond	CATERPILLAR
Model	R30XMS2	30SP36TT	OPC30TT	NOR30
Head Length	72.03	74.6	72.5	72
Overall Width	41.25	42	40	40
Height to Top of OHG	80.4	79	85.0	80.5
Standard Mast: MFH/OAH	213/95	210/95	204/95	137/95
High Visibility Mast	STD	STD	STD	STD
Wheelbase	55.1	51	60	60
Travel Loaded STD Voltage	5.5	5.3	6	5
Travel Empty STD Voltage	6	6	6	5.3
Lift Speed NL/RL	42/26	40/26	45/33	45/35
Lower Speed NL/RL	42/42	40/38	40/40	40/40
Battery Voltage STD	24	24	24	24
Battery Compartment-Size WxLxH	13.5 x 36 x 24.7	14x36.88x30.88	14x36.88x30.88	14x36.88x30.88
Step Height	8.44	8	8	8.0
Operator Platform Width	40	42	39	39
Drive Control	Curtis SEPEX Transistor	Transistor	Transistor	Transistor
Drive Tire	12 x 5.5	13 x 5.5	12 x 5	12x5
Load Wheel	4 x 3	6 x 2.8	6 x 3.63	6x3.6
Max Extended Height of Truck	299.4	298	289	325
Power Steer	ON DEMAND	ON DEMAND	Power	Power
Turning Radius (inches)	65.9	68	72	72
Free Lift	0	8	10"	n/a
Fork Spread	21"-28"	24"-30"	24"-28"	24"-28"

**Good Luck and Good
Selling!**

