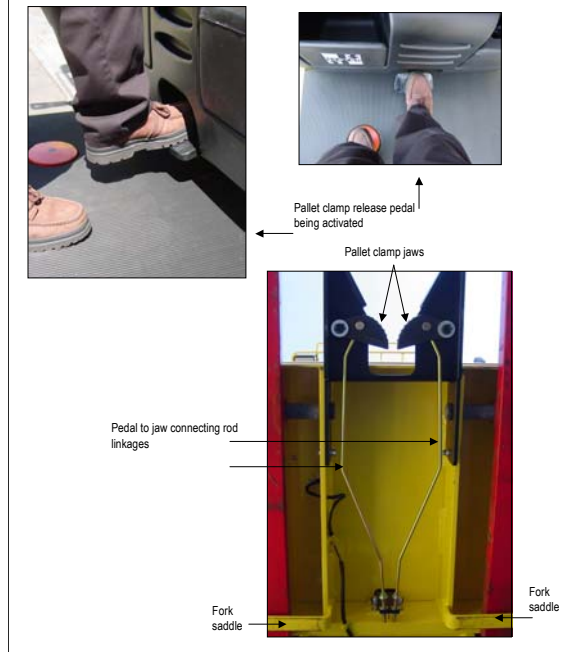


Hyster Pallet Clamp and Fork Adjustment

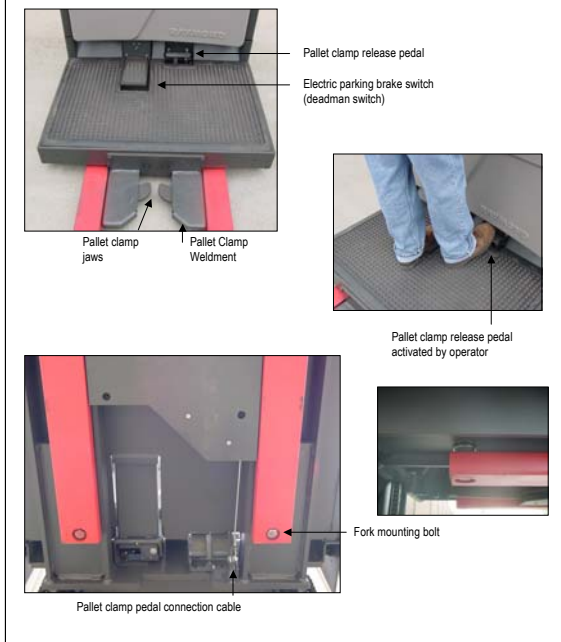


The Hyster pallet clamp is automatically activated and manually released. The pallet clamp jaws automatically grip the pallet runner when the pallet clamp is engaged to the pallet. To release the pallet clamp, simply step on the release pedal.

The pallet clamp jaws are connected to the release pedal with connecting linkage rods. These connecting rods are tucked up under the operator platform for protection. Connecting rods are used in lieu of the typical cable and pulley design for the pallet clamp because the connecting rods do not stretch like the cables will; minimizing adjustment requirements while maximizing reliability.

Fork adjustment on the Hyster R30XM₂ requires no tools. Simply push up on the fork tip. This will cause the fork to pivot on the mounting shaft-pin. The fork can be slid within the fork saddle easily to the left or to the right. When the desired fork position is obtained, lower the fork tip back down.

Raymond Pallet Clamp and Fork Adjustment

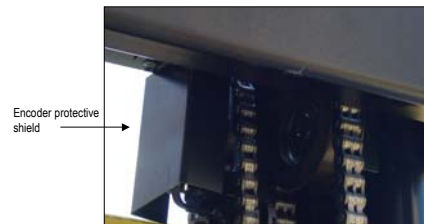
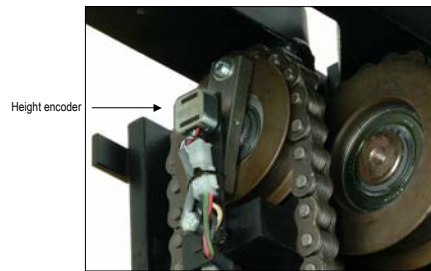


The Raymond pallet clamp design features a self clamping and manual release pedal. The pallet clamp has automatic clamping jaws, and clamp on to the pallet runner when engaging a pallet. The pallet clamp jaws are released by a release pedal located on the platform floorboard similar to the R30XM₂.

Raymond chooses to use a cable and pulley design to activate the pallet clamp jaws. Unlike the Hyster R30XM₂ which uses steel connecting rods to connect the pallet clamp jaws to the release pedal. The cable designed pallet clamps require more maintenance than do the connecting rod design due to the fact the cables will stretch and require adjustment where as the metal connecting rods will not stretch. In short, the connecting rod type pallet clamp is more durable / reliable than cable designs and also require less adjustments than the typical cable and pulley design.

The Raymond fork design requires tools to adjust the fork spread. The locking bolt must be removed from the rear of the fork assembly and the fork slid over until aligned with the additional bolt hole pattern. This procedure is very difficult for one person to perform. Care must be taken when sliding the forks over the additional mounting holes so that the threads are not crossed when reinstalling the locking bolt. Fork adjustment on the Hyster R30XM₂ requires no tools and no hardware to remove and install.

Hyster Height Sensing



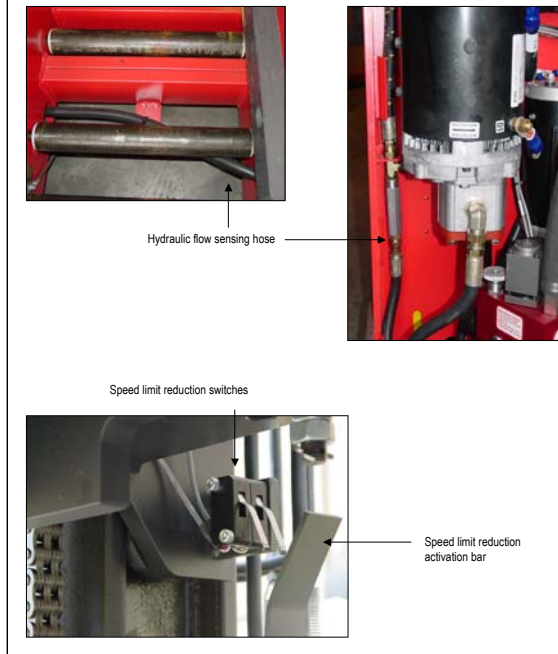
The R30XM₂ features a continuous height sensing system, referred to as HySense™. An optical encoder is used in conjunction with the software logic contained in the Curtis 1310 master control unit (MCU) to regulate travel speeds.

The encoder shaft is attached directly to the left hand side mast chain pulley. The encoder counts the number of pulley rotations, which is directly proportional to the platform motion (up and down).

The encoder has a sealed shaft and ball bearings to assure durability and requires no adjustments.

The continuous height sensing system eliminates stepped travel speeds and provides linear travel speeds in relation to platform height. Specifically, as the platform is raised above sixty inches the traction speeds are gradually reduced at various platform heights instead of certain designated (pre-determined) heights. This allows maximum speeds at various platform heights.

Raymond Height Sensing and Speed Reduction

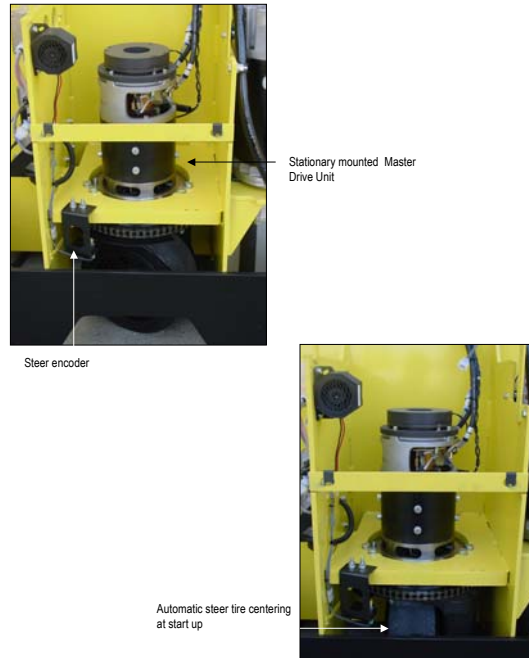


The Raymond height sensing is done either electrically or hydraulically. When performed hydraulically, it is referred to as advanced intellispeed. A flow sensor is placed in the hydraulic system that senses the amount of fluid flowing to the lift cylinders. A positive flow indicates the platform is being raised and a negative flow indicates the platform is being lowered. The electronics in the flow sensor relay information to the truck control system electronically to indicate truck height. Based on platform height, direction the truck is traveling in, and steer angle, the speed is either gradually increased or decreased for a smooth step-less activation. However, there are several short comings with this design:

1. The advanced Intellispeed option is a \$1,295 price book option.
2. This design does not work with the cold storage option or the cold storage with wire guidance option. Since the height sensing is done hydraulically, and cold storage hydraulic oil is thinner than standard hydraulic oil, the flow sensor will not calculate the oil flow accurately.
3. The hydraulic flow sensor is very sensitive to contamination and static
4. The flow sensor does not work properly at low lift / lower speeds.
5. The electronics in the flow sensor are very sensitive. The flow sensor cannot be repaired or modified. When there is a problem with the flow sensor the part must be replaced and it is expensive.

Standard height sensing consists of micro-switches that relay platform height information electrically (as can be seen from the bottom photo). As the platform is raised the activation bar trips the micro-switch to reduce the speed. This design reduces the speed in steps every so many inches (steps), unlike the intellispeed option, which gradually reduces truck speeds in a linear fashion as the platform is raised allowing faster travel speeds at various platform heights.

Hyster Drive Unit Assembly



The R30XM₂ features Separately Excited Motor (SEM) technology, which improves reliability and performance. SEM traction control systems provide control of the traction motor field current independent from the armature current, providing superb traction control.

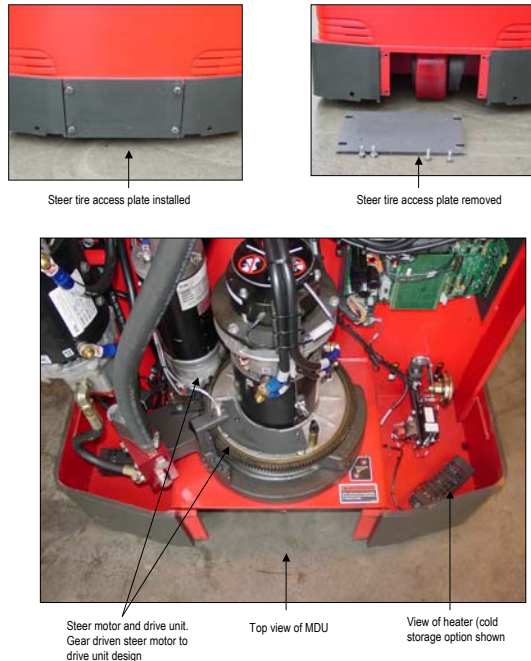
Regenerative plugging (braking) is also a part of the SEM traction system. Regen braking occurs when directional input changes from one direction to the other while the truck is in motion. The energy (heat) generated through the motor is transferred to the battery, which acts like a large heat-sink, minimizing motor heating.

Furthermore, SEM requires less current through the motor brushes, thus increasing motor brush life.

The SEM drive motors, in conjunction with the MOSFET traction controller, eliminates the forward and reverse contactors which increase reliability, durability and simplify servicing. SEM technology provides better battery shift life, smooth acceleration, adjustable plugging and regenerative braking as compared to non-SEM traction systems.

The R30XM₂ drive motor is fixed-mounted. The drive motor is stationary, resulting in fewer loose connections and less cable and wire harness fatigue and failure as compared to rotating drive motor designs.

Raymond Drive Unit Assembly



The Raymond drive unit assembly features SEM (separately excited motor) technology as does the Hyster R30XM₂. There are many benefits to the SEM system.

However, the Raymond design permits the drive unit to turn in response to operator steering input. There are disadvantages to this type of design:

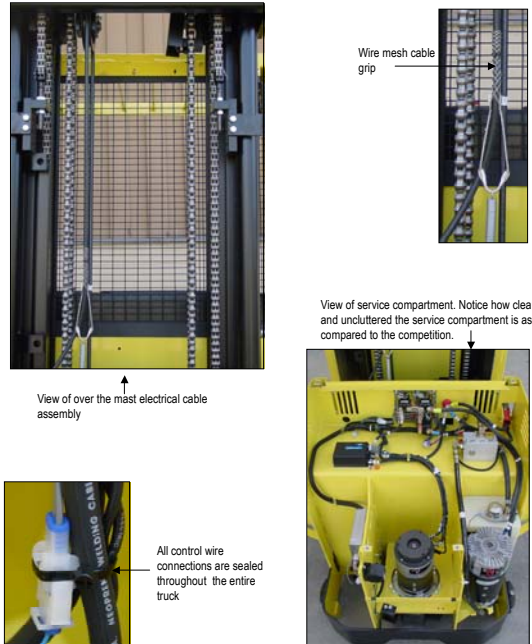
1. The power cables tend to become loose much quicker on this design as compared to a fix mounted drive unit. Loose connections cause performance degradation, motor and / or cable overheating.

2. The power cables have a much greater chance of getting chaffed or cut leading to a short or grounded situation. A shorted power cable can lead to an electrical fire, intermittent electrical malfunctions, or cause critical electrical components to fail. A grounded power cable can lead to many intermittent electrical problems as well as excessive battery amperage drainage.

Both of these situations lead to expensive repairs and truck downtime.

Another design related issue on the MDU is the drive tire access plate. This plate is secured with four mounting bolts and must be removed each time the drive tire needs inspection or servicing.

Hyster Wire Harness and Cables



With the innovative electrical system, the over the mast cable assembly has been reduced to a single 8 conductor (8'strands') cable, no matter what combination of options are configured on the truck. The smaller conductor cables do not pigtail (twist) like the larger cables typically do. This alone reduces truck downtime and maintenance cost.

The over the mast cable is properly tensioned by a wire mesh cable grip. Having the proper tension on the cable assures the cable will track properly on the cable sheave preventing pig tailing (twisting) which will eventually cause the wires to pull apart resulting in truck down time, and diagnostic and repair time.

Wires are color coded and numbered for ease of identification and reduced trouble shooting time in the event of a fault.

All wire connectors are sealed for a positive connection and for moisture protection.

Raymond Wire Harnesses and Cables



Two 6 conductor over the mast wire cables

Metal tension spring clips used on electrical cables



The OPC30TT order picker utilizes Raymond's own designed CANbus style electrical system. This is evident by only requiring two six conductor electrical cables to interface the trucks electrical system between the chassis and the platform. The Hyster CANbus system only requires a single eight conductor electrical cable interface between the platform and chassis.

The Raymond electrical cables are properly tensioned by springs and metal retaining clips. The metal retaining clips tend to cut into the electrical cable insulation over time. This can contribute to intermittent electrical problems such as false fault codes and component failure; both of which are expensive to troubleshoot.

The cable sheaves are the circular groove style which have a tendency to cause the electrical cables to track out of the sheaves and / or cause pig-tailing (twisting) of the cables, which lead to the wire strands within the cable to break over time.

The Hyster R30XM₂ utilizes a flat bottom groove cable sheave. The flat bottom grooved style cable sheaves reduce cable pig-tailing and keeps the electrical cables tracking straight.

Hyster Load Wheels and Base Arms



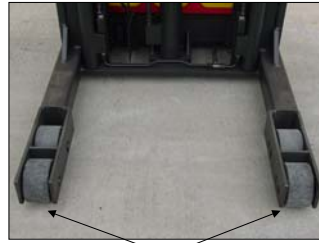
The Hyster Load wheel and base arm assembly provide several distinct advantages over the competition:

- The Hyster load wheels are designed to articulate. The articulation provides a smoother ride for the operator, especially on uneven floor surfaces.
- Articulated load wheels tend to wear more evenly than non-articulated load wheels.
- Typically with non-articulated load wheel designs, when a single load wheel needs replacing, both are replaced due to uneven floor surface contact. Uneven floor surface contact can result in truck wobble and cause uneven weight / load distribution on the load wheels. Additionally, uneven floor contact can result in tracking problems, especially in rail guided and wire guidance applications. Because the Hyster load wheel design provides articulation, the load wheels will find their position independently, minimizing load wheel replacement.

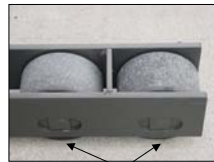
The Hyster basearm assembly has two distinct advantages over the competition.

- The Hyster designed basearm assemblies consist of a basearm with wheel hanger weldments welded to the end of the basearms. This design allows the replacement of the wheel hanger and not the entire base arm in the event the truck is run into a rack or damaged. With the R30XM₂ design, the wheel hanger can be cut off the base arm and a new wheel hanger assembly welded back to the basearm.
- The wheel hanger weldment assembly features end caps to protect the load wheels from becoming damaged.

Raymond Load Wheels and Base Arms



Unprotected load wheel design



Fixed load wheels. Flag pin type axle shafts



Grease fitting and retaining (snap) ring

The Raymond load wheels are exposed and unprotected, wheel damage is inevitable.

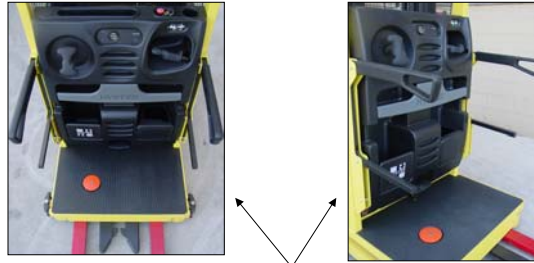
The Load wheels are fixed-mounted to the base arms and do not articulate like the R30XM₂. Several issues can be discussed:

- Load wheels tend to wear unevenly
- A rougher ride is experienced
- Typically, when a load wheel needs replacing, both are replaced due to uneven floor surface contact.

The Raymond order picker mast and base arm assembly is one part. The base arm assemblies are a part of the welded mast structure, and mounted independently to the tractor part of the truck. There is no rolling chassis as on the Hyster R30XM₂. With the mast removed, there is no way to move the tractor part of the truck without picking it up with another lift truck or lifting device. The R30XM₂ base arm design is part of the chassis/or tractor part of the truck.

With the base arms being a part of the mast assembly, if rack height changes and / or application changes are required, the customer must purchase another mast and base arm assembly; very expensive. The Hyster R30XM₂ can have the mast easily removed independently and another installed.

Hyster Retractable Side Gates



View of retractable side gates and operator compartment. Double arm design.



Soft touch-sure grip retractable side gates



View of side gates in fully retracted position

The retractable side gates are standard on the R30XM₂. Fixed side gates are also available on the R30XM₂.

The R30XM₂ retractable side gate design features a soft touch sure grip rubber coating, with a gas cylinder assist. Order picking requires the side gates to be raised and lowered many times throughout the work shift. The rubber coating provides increased operator comfort and reduced hand fatigue, while the gas assist cylinder reduces shoulder and arm fatigue.

When the side gates are raised, interlock switches are activated causing the traction circuit and lift/lower circuit are interrupted. Only with the side gates fully lowered will traction, hoisting and lowering functions be enabled.

Raymond Retractable Side Gates



Recessed hand grip



Single arm design

The Raymond side gate assembly design is similar to the Hyster side gate design in that there are gas assist cylinders to keep the side gates up when they are in the fully raised position. In addition, the gas cylinders help bring the side gates to a controlled lowered position when the side gates are released for travel.

The side gates however are a one piece design and offer only upper body protection; no lower body protection. The Hyster side gate is a two piece design with an upper and lower gate. The two piece design provides upper and lower body protection.

The two piece design can also make the operator feel more secure in the operator compartment, especially while in upper rack picking applications.

Interlock switches are not a part of the Raymond standard truck construction. Interlock switches and traction cutout when side gates are raised are price book options. The Hyster order picker includes interlock switches and traction cutout as a part of the standard truck construction.