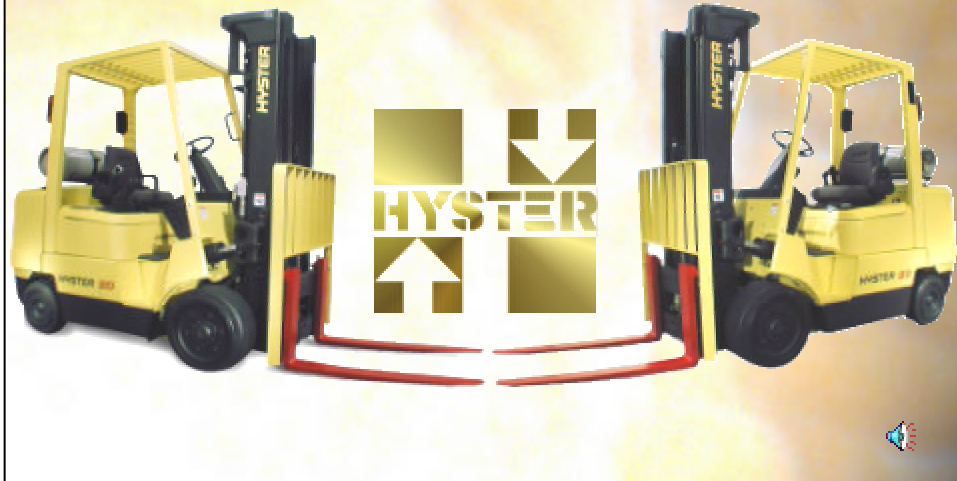


Hyster S70-120XM



Introducing the new S70-120XM.

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Presentation Highlights



- **Design Upgrades**
- **Testing**
- **Ergonomics**
- **Productivity**
- **Serviceability**



Hyster Company has upgraded the well-accepted XL2 series by improving ergonomics, performance, capacity, and styling. These areas were targeted for improvement through extensive market research and competitive evaluations. Basic components of the XL2 that are well accepted such as the engine, transmission and steer axle remain unchanged but have been augmented with the addition of new features and enhancements already in use on other XM products.

- New styling features include:
 - New rounded hood and counterweight
 - New Graphics style on mast, side of truck, and counterweight
 - Dual cooling outlets on the counterweight enhance appearance and match XM styling
- Seat side hydraulic control levers

Product Evaluation and Testing

Extensive testing has been performed to insure that quality is engineered into these trucks. The next few slides illustrate some of that testing, including field testing at customer locations as shown below.



Pilot field test sites

- Weyerhaeuser
- Georgia Pacific
- Sheets Unlimited (shown)

Overhead Guard Testing



- **Static**
- **Cube**
- **Vertical (shown in video)**
- **75 degree**
- **Paper roll penetration**



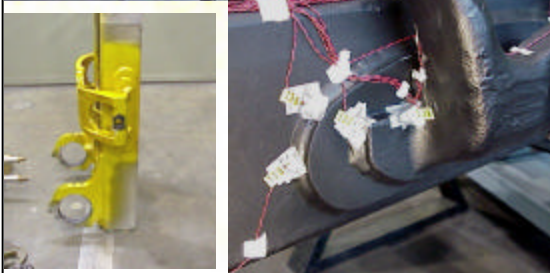
Video of prototype truck

Units are impact tested to ANSI B56.1 standards for permanent deflection of the overhead guard (OHG) and supporting structure. They are subjected to loads as high as 24,000 foot pounds, which is roughly equivalent to dropping 3,000 lbs. From eight feet above the top of the OHG. The drop test load weighs about 3750 lbs. and includes two integral carriages that remained fastened to the load at all times. These carriages operate within the guide channels to provide for vertical or 75 degree angle drop configurations. The electro-pneumatic remote release hook contains its own refillable compressed air supply and is released a safe distance from the test.

Stress Testing



- Extensive stress testing performed on frame and mast



Frames and structural components are sprayed with a coating of brittle lacquer. The brittle lacquer coating provides a means of pinpointing locations that are sensitive to fatigue damage. This enables accurate positioning of strain gauges, which allows measurable predictions in service hours of structural life expectancy.

Mast Cycle Testing

- 40,000 lift cycles
- 100,000 tilt cycles



Video

Masts are tested to insure compliance with ANSI B56 and OSHA regulations. 40,000 cycles are performed on the lift mechanism, and 100,000 cycles on the tilt mechanism with daily inspections . The cylinders are checked for visual signs of wear in the seals, bushings, and rods.

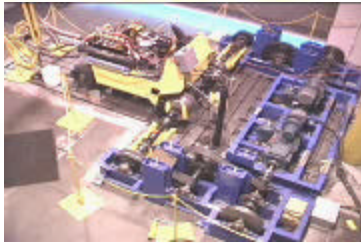
The chain sheaves, hoses, guides and latches are visually inspected for excessive wear. Chains and bearings are visually inspected for broken components and excessive looseness.

Rod ends, chain anchors, and welds are inspected with magnetic particle equipment for stress fractures.

Mustang Dynamometer



- Measures performance of the engine and drive train
- Proves durability of drive train in accelerated severe applications



Video

The Mustang dynamometer measures the in-vehicle performance of the engine and power train. The grade/weight/speed match calculates performance based on weight, grade, and speed.

It also calculates drawbar pull and stall speeds.

Stability Testing



- **Multi-axis stability platform**
- **Measure and record truck stability**

Trucks are placed on a multi-axis stability platform to measure and record stability in accordance with ANSI and OSHA standards and to establish data necessary in determining load ratings.

Trucks are secured to the platform, which is tilted to various angles, and held in those positions at set intervals to measure truck stability.

Hood Testing



- Hood and Cowl Impact Testing

Video

The video in this slide represents durability testing of the hood for the Delta product; the same hood used on the S70-120XM.

A ten pound steel ball was dropped from a height of eight feet onto the hood, which absorbed the load shock without penetration or major damage.

In the second test the cowl and hood were struck with a five pound sledge hammer. Again, no penetration or major damage resulted from the impact.

**S70-80XM, S80-100XM-BCS,
S100-120XM, S120XMS,
S120XMS-PRS**



Top SIC's

- **Corrugated and Solid Fiber Box Manufacturing**
- **General Manufacturing**
- **Paper Roll Handling**
- **Building Materials**
- **Paper Mills**
- **Recycling Centers**

S120XM, S120XMS, S120XMS-PRS



S120XMS-PRS



S120XM

S120XMS not shown

With the updates to this truck we now have three 12,000 lb. cushion models; S120XM, S120XMS, and S120XMS-PRS. The main difference in the trucks is the counterweight. The S120XM is equipped with a cast counterweight. The S120XMS is equipped with a taller, shorter, lead-filled counterweight for use in confined spaces to maximize turning radius. The S120XMS-PRS has a similar counterweight to the S120XMS with the addition of a steel slab on top. This slab, which weighs approximately 1200 lbs., provides the additional counterweight needed to add a paper roll clamp to the truck and increases the net capacity of the truck.

The optional differences(hydraulic control valves, hose groups, optional pressure regulator and gauge, etc.) will be application specific. There may be some capacity de-rating at elevated heights, depending upon masts and attachments. Consult your High Lift Sheets or Applications Engineering.

ERGONOMICS



- Ease of Entry
- Hood Mounted Hydraulic Controls
- Dash Display, Cowl, Covers
- Storage Trays
- Floor mats
- Optional Swing-out Drop-down LPG Tank Bracket
- Improved Seat Comfort
- Improved Head Clearance
- Updated Styling



To assist the operator in mounting and dismounting the vehicle, a contoured, rubber-coated handgrip is provided on the left hand front overhead guard leg, and a full step with an aggressive open tread pattern is located in the frame; this step is provided on both sides of the truck. Ergonomic studies have shown that 15.8" (400mm) is ideal as a step height. That is what we have made the step height for the S70-120XM. The hip restraint completes the third point of the three point entry. A handgrip is available as a SPED option for the right side of the truck to facilitate ease of entry from either side.

Operator Compartment



- **Open floor provides ample foot room for convenient maneuverability**
- **Heavy rubber floormat**
- **Tilt cylinders located beneath floor plates**

The large, open floor area allows ample foot room for maneuverability within the compartment. It is covered with a thick rubber floormat to help reduce noise and vibration to the operator and provide a softer feel to the operator's feet. The floormat and floor plates lift out with no tools required. The tilt cylinders are located beneath the floor plates for more foot space.

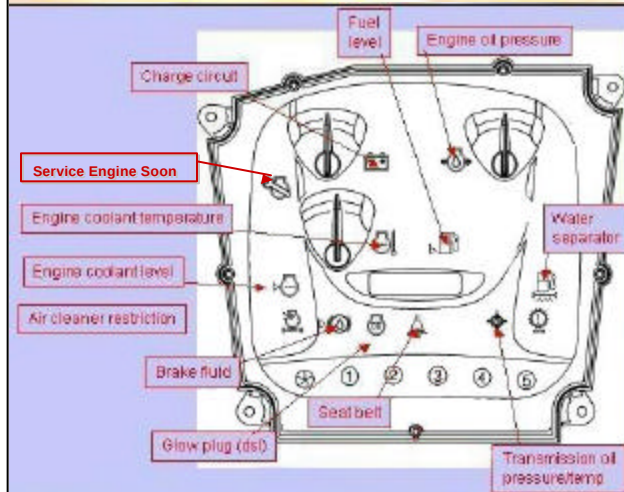
Operator Compartment



- Easy-to-read display
- Steering column mounting provides greater leg room for the operator
- Cup holder
- Storage receptacle
- 4 position tilt steering column, with adjustment at base of column

The tilt angle of the steering wheel is adjustable by releasing the latch on the steering column assembly. Four different positions are available to accommodate a wide range of operator preference. A compact 13.8 in. diameter steering wheel is provided. A convenient storage box is located to the right hand side of the steering column for stowing of clipboards, markers, pens, pencils, and other miscellaneous items. A cup holder is provided on the left-hand side of the steering column.

Operator Display



Standard display



Premium display

The instruments are enclosed in a molded housing, mounted into the right side of the dash for convenient operator viewing. The gauges are backlit for brighter imaging in low light conditions. The instrument cluster contains a microprocessor that controls the gauges, hour meter, an engine shutdown system and an operator lockout keypad with the premium display option.

Operator Compartment

- **Standard vinyl seat**
- **Optional full-suspension**
- **6" of adjustment**



Standard Seat



Premium Seat

The Sears "Super Suburban" seat is provided as the non-suspension seat offering. It features a durable vinyl covered cushion, contoured for operator comfort.

The new Sears FLS 1500 "Full Suspension" seat is available as an option. This seat provides improved ride and operator comfort, and has seat belt mounting above the suspension to reduce cinching.

A swiveling version of the Sears FLS 1500 is offered as an SPED price list option. This seat swivels to the right 12° or to the left 8° and locks for reverse operation. This option requires the 87" OAH overhead guard.

All seats are fitted with an electrical seat switch wired to the instrument module warning circuits. If the operator leaves the seat without setting the parking brake, an audible alarm will sound, regardless of whether the key switch is in the on or off position.

Operator Compartment



- **Easily accessible parking brake lever with release button on top**

The parking brake system consists of a brake lever assembly, brake cables, and the primary service brake.

The brake lever assembly is located on the left-hand side of the steering column, and is ergonomically positioned for a direct pull with the operator's left hand. High brake forces with low hand actuation efforts are achieved through the use of a compound lever action within the hand lever assembly.

Adjustment of the parking brake is accomplished by adjusting the handgrip of the lever assembly. Turning the handgrip assembly clockwise increases the brake cable tension, counter-clockwise decreases the tension. An equalizing bar within the brake lever assembly provides equal forces to the right and left hand service brakes.

The system uses a low friction coated and sealed park brake cable, routed directly into the brake assembly. This simple system avoids the use of external linkage pieces as found on many other systems.

Compared to the XL park brake, the lever was redesigned to provide a more comfortable grip and easier actuation of the lever release button for added convenience of the operator.

Operator Compartment



- **Seat-side hydraulic control levers within easy reach of the operator**

Hoist and tilt functions are controlled by individual levers positioned beside the seat on the right hand side for convenient, easy-to-reach, operation. The control levers are contour molded with "soft touch" polyurethane material for operator comfort, and they feature low operating force.

The levers are connected to the hydraulic control valve by mechanical linkage.

Optional Auxiliary Hydraulic Function Hand levers:

Standard lever arrangement is three lever three function direct acting for use with non clamping attachment.

No charge option is three lever, three function push away for use with clamping attachment.

Other optional lever arrangements include:

Four lever, four function.

Four lever, five function with H pattern for fifth option.

Overhead Guard



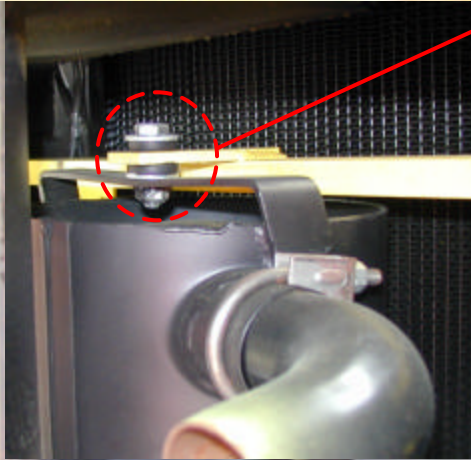
- **Bar-on-edge design**
- **Cross bars moved rearward to enhance visibility**
- **Bolts to frame and cowl**
- **Standard OHG 87 inches**
- **Optional reduced height OHG 84 inches**

The top of the overhead guard is composed of flat bars placed on edge for good visibility and low reflected noise.

A standard height and a reduced height overhead guard are available. The standard guard was made available for use with full suspension seats, and for those applications that require optimum head clearance.

The reduced height guard is available for specific customer requirements and is only compatible with the non-suspension seat.

Exhaust



- **Low noise muffler mounted on rubber isolators to reduce vibration**
- **Fan reduces exhaust temperatures**

The exhaust pipe is routed to the opening in the counterweight behind the radiator. This diffuses exhaust fumes into the cooling airflow and produces a low exhaust outlet temperature. Location is optimized for fumes, carbon deposit and condensation considerations.

The muffler is mounted in the frame between the radiator and counterweight on rubber mounts. It is designed and constructed to reduce both noise and heat radiation, resulting in quiet operation and a cooler engine compartment.

The exhaust pipe from the engine to the muffler is constructed of two pieces clamped together to ensure good alignment and fit of all the components.

UL Type "S" exhaust system directs the exhaust gas through numerous small holes in a metal housing (an integral part of the muffler) to diffuse the gases into the engine cooling airflow.

LPG Bracket



A fixed LPG tank bracket is standard. The new EZXchange™ LPG tank bracket is available as a standard price book option. The bracket swings out and drops down to facilitate ease of removal/replacement.

PRODUCTIVITY

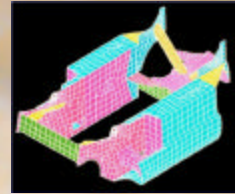


The new S70-120XM series features improved performance. Some of the areas of improvement include:

- Cooling System/Radiator screen
- Braking System
- Traction Performance
- Improved Hydraulic performance
- Integral Side Shift
- Improved Serviceability and Service Access

Frame

- **Large, open step**
- **Integral fuel and hydraulic tanks**
- **Long term durability**



Finite Element
Modeling



A new frame design features simple construction for the ease of manufacture, and efficient material usage.

The frame is designed to distribute loads and stress uniformly throughout the structure. The application of this design concept through Finite Element Modeling (FEM) and extensive stress testing produces a balanced design with long term durability. FEM is a computer design process that allows the frame design to be analyzed for possible stress fatigue points.

Two frames are used to provide 61.8 in. and 71in. wheelbases. Both frames are identical except for rear frame details, which position the steer axle.

Both fuel and hydraulic tanks are integral with the frame side channels. Drain ports are provided in both tanks.

A new large, full open step is included on both sides of the truck for easy on/off access by the operator.

Engine Choices

Standard GM 4.3L V-6

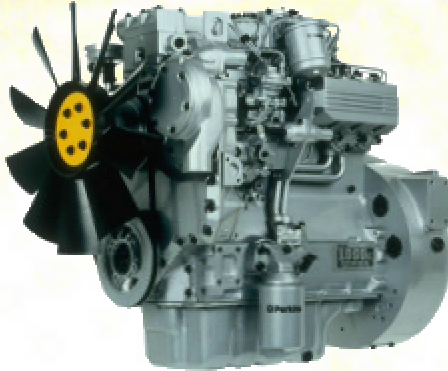
- Gasoline & LP
- 69.9 kw/93.8 hp @ 2500 RPM



The Gas/LPG engine is a GM 4.3L (260 cu. in.) V-6 displacement, 6-cylinder overhead valve design. It has a high-energy direct fire ignition system, electronic governor, and the gasoline version is fueled with Throttle Body Injection (TBI) electronic fuel injection. The LPG version is carbureted. High Energy Ignition (HEI) increases spark plug life and provides easier starting. The block and heads are cast iron. It has hydraulic lifters to eliminate adjustment. The engine has five main bearings. Exhaust and intake valve seats are hardened for use with unleaded fuel and LPG. Special emphasis was placed on making this a leak-free engine. Gasket and seals were thoroughly evaluated and tested. For example, the valve covers are retained by six shoulder bolt type flange screws (3 per side) to provide more even loading on the formed valve cover seal. It uses a Hyster developed electronic governor to increase available power in the upper speed range and increase governor accuracy and reliability. No load governed speed is 2500 rpm. The LPG engine uses a single barrel IMPCO CA125 carburetor. A uniquely mounted pusher fan system provides excellent cooling. A single flat type multi-vee belt (in a serpentine routing) is used to drive the fan, alternator and water pump. Belt tension is maintained by a spring-loaded tensioner, thus eliminating periodic tightening. The tensioner has a built in wear indicator. On gasoline units, an Electronic Control Module (ECM) is used to control the spark and fueling functions. This unique ECM is designed to function in an under hood environment. Fueling is compensated for altitude and coolant temperatures. On LPG units, a microprocessor controls spark timing(MSTS), governor and optional closed loop fuel system.

The ECMs (gas and LPG) contain diagnostic circuits that will indicate trouble by turning on the "service indicator" light on the instrument module. The trouble codes are stored and can be read and displayed on a Scan Tool analyzer or PC (for LPG). On gasoline and LPG engines the engine coolant is routed through the intake manifold to improve durability and reduce exhaust emissions. The fan end of the engine is supported by compression-type rubber mounts with a snubber cap/variable spring rate to reduce engine vibration and noise. The other end of the engine transaxle is mounted to the frame through the drive axle mounting brackets. The full pressure lubrication system has a spin-on full flow oil filter that has a relief valve to ensure engine lubrication even if the filter becomes clogged.

Perkins Diesel



Optional Perkins - 1004.42 Diesel

- **4.2 L (255.5 cu. in)
displacement 4
cylinder
overhead valve**
- **61.4 kw/82.3 hp @
2500 RPM**

Diesel engines feature a cold start aid button on the left side of the dash panel. During a cold start, depress the button until the glow indicator light turns off, and then proceed with engine cranking.

To start the engine on units equipped with Monotrol, the park brake hand lever must be applied or the inch-brake pedal must be depressed. To start the engine on units equipped with direction control lever, the lever must be in the neutral detent position.

Gas/LPG and diesel engine units are shut-off by turning off the ignition key.

The Diesel engine is a Perkins 1004.42, 4.23L (255.5 cu. in.) displacement 4-cylinder overhead valve. Naturally aspirated and direct injected for fuel economy and low emissions. The block and head are cast iron. The block extends below the crankshaft for added strength.

The engine designated "Darwin" by Perkins is designed to meet the strict emission regulations of both the EPA and EC. 500-hour service intervals for oil and filter change. The fan end of the engine is supported by compression type rubber mounts with a snubber cap/variable spring rate. The other end of the engine transaxle is mounted to the frame through the drive axle mounting brackets.

The full pressure lubrication system has a spin-on full flow oil filter that has a relief valve to ensure engine lubrication even if the filter becomes clogged.

The fuel system incorporates the standard fuel filter plus an additional fuel filter/separator.

Transmission



- **Field proven single speed powershift transmission**
- **New torque converter improves gradeability for gas & LPG engines**
- **Smooth inching control**

The S70-120XM is equipped with a single speed, forward and reverse powershift transmission. This transmission has been field proven in the previous XL series.

A transmission oil cooler, which is located in the radiator, helps ensure efficient performance and low maintenance.

The new torque converter results in improved gradeability on both the LPG and gas engine. Shifting is actuated by electric solenoids. The transmission has a built-in variable pressure regulator that automatically cushions directional shifts to reduce shock loads and provide smooth clutch engagement. This smooth forward/reverse shifting reduces component stress and improves operator control. Smooth inching control provides precise load placement.

Helical gears are used for reduced noise.

The differential and hypoid final drive gear set is an integral part of the powershift transmission assembly.

Steer Axle



- **Cast ductile iron**
- **Elastomeric mount reduces vibration to the operator compartment**
- **Durable, long-lasting design**
- **Tapered roller bearings**

The hydrostatic steering axle consists of a cast axle frame, a hydraulic cylinder, two non-adjustable tie rods, two spindles, bearings, and two wheel hubs.

The one-piece axle frame carries the axle loads, and provides the mounting for the spindles and cylinder. The cast metal frame is designed to tolerate heavy loads and provide long component life.

The axle is mounted in rubber mounts to dampen shock loads on the steering axle, truck, and driver.

Tapered roller bearings are used for spindle support. They carry both radial and thrust loads, eliminating external thrust bearings and external rotating shims. Hyster's tapered roller bearing arrangement permits pre-loading of the bearings, whereas conventional spindle arrangements do not. Pre-loading the spindle bearings decreases the possibility of impact damage, a problem common to some manufacturers. The Hyster spindle stays tight and lubricated under the hardest, dirtiest applications several times longer than conventional designs. Cast wheel hubs rotate around the spindle on tapered roller bearings, sealed to prevent the loss of grease.

By mounting the cylinder on the axle, all linkage is contained within the axle. The cylinder does not exert an external force on the axle frame. This design provides sharp wheel angles and greater maneuverability with less tire wear due to scrubbing. The cylinder is repairable in the truck.

The equal area, double-ended steering cylinder produces a balanced steering system with an equal number of turns in both directions. The cylinder is a 4-piece design. The two cast iron end housings mount the cylinder to the axle frame and also serve as port connections. A separate outer shell fits between and is sealed to the end housings. The rod is sealed to and strokes through the end housings and shell. This design uses the axle frame to structurally tie the cylinder together, permitting a simpler design.

Non-adjustable tie rods help ensure proper tire alignment, optimizing tire life. Non-adjustable tie rods and sealed large tapered roller bearings throughout are maintenance reducing features. The only regular maintenance points are lube fittings on the spindle.

This axle design, with its large sealed bearings, precision-machined parts, and non-

Drive Axle



- Cast Metal
- Withstands heavy loads
- Absorbs shock loads

- Tapered roller bearings
- Full Floating axle assembly
- Weight of truck carried by housing not shafts

- Brake assemblies mounted to axle hanger brackets
- Brake torsional loads absorbed by the frame not power train

The central drive axle housing is made of cast metal to withstand heavy loads and absorb shock loads. Steel axle spindles are bolted to both sides of the central housing to complete the basic axle assembly.

The drive axle assembly mounts to the frame through cast metal drive axle hanger brackets. This arrangement permits the transaxle type drive train to pivot on the drive axle centerline.

The drive axle hanger brackets also support the mast through a trunnion mounting system. A grease fitting in the hanger bracket is provided to lubricate the mast mounting bushing.

Brake assemblies are mounted to the drive axle hanger brackets, so the brake torsional loads are absorbed by the frame rather than the power train.

The wheel hubs rotate on large tapered roller bearings with the outer bearing lubricated by axle oil and the inner bearing lubricated by grease. Lip-type seals on both sides of the inner bearing separate the two lubes, contain the inner bearing grease and seal against outside contaminants.

Drive axle shafts are splined on one end for engaging the differential, and flanged on the other end for bolting to the wheel hub. The axle assembly is a "full floating" design, which means that the weight of the truck is carried by the axle housing, not the axle shafts. The right and left axle shaft are the same.

Brakes



- **Redesigned System**
- **Akebono 12.48 x 2.48 in.**
- **? Self energizing for improved performance**
- **Vacuum booster improves smoothness of application and low pedal effort**
- **Two pedal inch/brake option**

The hydraulic service brake system consists of a vacuum booster unit, sealed master cylinder with integral reservoir, reservoir fluid level monitor, inch-brake pedal and associated linkage, brake fluid lines, and self-adjusting brake assemblies.

The booster/master cylinder assembly is mounted to the cowl under the floor plates and is activated by linkage from the pedal assembly to reduce vibration to the operator's foot.

The master cylinder reservoir features a fluid level sensor. When the brake fluid drops to a given level, an internal float magnetically actuates an electrical reed switch and turns on a warning light located in the instrument module. The reed switch is mounted externally to the reservoir to avoid fluid contact with the electrical parts.

The Akebono 12.48 x 2.48 in. brakes are mounted to the drive axle hanger brackets without disassembly of the brake shoes.

The brakes are self-energizing. This means that as the brake is applied, the primary shoe starts to rotate with the brake drum. This action pushes the secondary shoe tighter against the drum and increases the force applied to the brake drums.

Automatic adjusting linkage adjusts the shoe-to-drum clearance as required when the brakes are applied while traveling in reverse.

Low operator pedal efforts are achieved by utilizing a vacuum boost system and by using brake linings with a high coefficient of friction on this large diameter brake.

The wheel hubs are sealed to prevent the leakage of differential oil or wheel bearing grease onto the brake shoes.



A radiator cover panel is attached to OHG legs and seals the joint between the counterweight and hood. The radiator cover is easily removed with no tools by lifting on the handles. This provides access to the radiator cap and debris screen.

The radiator features increased face area, provides cooling capacity to cope with heavy-duty applications. A unique core design provides excellent cooling efficiency with less likelihood of plugging in dusty or fibrous applications.

The 15 psi cooling system uses a pusher fan and fan cowl to achieve high cooling efficiency. The cowl is mounted to the front of the radiator inside the engine compartment. The fan is engine-mounted.

The unique square wave design core provides the best attributes of serpentine core cooling and tube and fin anti-plugging. For applications with severe airborne contamination and associated core plugging problems, a removable screen is available as an option. Radiator core cleaning is less frequent.

A radiator “low coolant” level sensor is located in the upper left-hand side of the radiator. It is connected to an indicator light on the instrument panel.



Each model in the series is fitted with a specific counterweight to achieve the required truck capacity rating. A seal mounted to the front face of the counterweight provides a noise seal between the counterweight and the rear of the overhead guard.

The counterweight is secured to the truck frame via two "hang-on" mounting ramps located on the rear upper section of the frame, and a cap screw in the lower section. This method provides for easy installation/removal.

Shims are used at the upper hang-on points to align the counterweight with the frame. Shims located on the forward sloped ramp surface raise and lower the counterweight and adjust fore and aft.

The height and depth of the counterweights provide for good maneuverability and visibility.

The counterweights have been designed to internally mount catalytic converters and diesel soot filters.

The vertical muffler within the counterweight efficiently guides the cooling system airflow into the dual air discharge tunnels in the counterweight.

Air Cleaner



- **Large 7 in. diameter air cleaner**
- **Easily removable paper element**

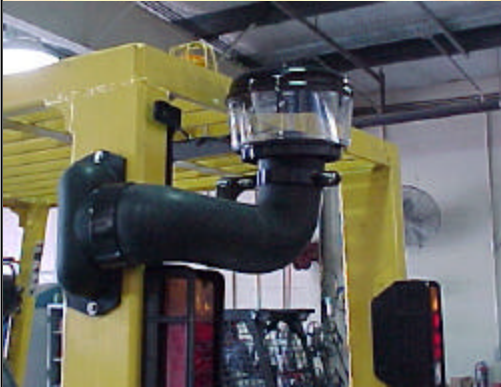
A large 7.0-inch diameter air cleaner is used for all models to reduce the frequency of cleaning requirements and to ensure longer element life.

The air intake is located near the top of the rear overhead guard leg on the left hand side of the truck to provide a clean source of air. This lengthens the life of the air cleaner. After the air enters the grille near the top of the overhead guard, the air flows down the guard leg, through a hose to the air cleaner and through a hose to the inlet on the engine.

The replaceable, dry-paper element filters out smaller particles before the air reaches the carburetor or engine. This helps protect the engine from contaminants.

Heavy Duty Air Cleaner (Opt.)

- High air intake
- Optional intake pre-cleaner
- Better engine performance in dirty environments



An optional pre-cleaner is available which connects to the standard air intake. This extends filter life and change intervals in severe environments.

As air enters the pre-cleaner section of the air cleaner, it swirls in a circular motion to throw out heavier particles and allows them to collect in a canister at the end of the cleaner. The air cleaner also has an unloader valve that discharges some of the heavy particles.

Hydraulic System



- **Lift Speeds**
 - Increased 8%
 - Optional 5 function control valve
- **In tank hydraulic filter**
 - Improved filtration
 - Enhanced serviceability
- **Priority (steering) flow built into the control valve instead of the pump.**
 - Reduced cost
 - Ease of service

The hydraulic system consists of a main hydraulic pump, main hydraulic control valve, hydraulic tank, hydraulic filter, steering flow control, steering control unit, and tilt cylinders.

A 3200 psi lift hydraulic system allows the use of small hydraulic lines and components that increase operating efficiency and improves fuel economy. Tilt and auxiliary systems will have 2250 psi relief in all valve variations.

Slim diameter lift cylinders provide good visibility.

Small hydraulic lines and components mean better maintenance accessibility. This also improves operating efficiency and fuel economy.

Thirty-seven degree hydraulic fittings with o-ring ports are used throughout to reduce the potential for leaks.

A combination of flexible wire-braid hoses and steel tubing is used to simplify the hydraulic plumbing. These hydraulic lines are carefully routed and held in place to reduce possible damage. This feature extends service life and simplifies service access.

Lift cylinders for the 2 STG LFL, 2 STG FFL and 3 STG FFL masts have been sized separately for the 3.5-4.0 ton and 4.0-5.5 ton masts. This produces optimum performance without varying or adding additional hydraulic components.

Vista Mast



A full line of 2-stage, limited free-lift (2 STG LFL), 2-stage full free-lift (2 STG FFL), and 3-stage full free-lift (3 STG FFL) masts further enhance operator comfort, visibility and productivity. These masts feature smooth operation, and good forward visibility.

Capacity increase to 12,000 lbs. @ 24 inches.

Third and fourth function internal header hoses with 1/2 in. I.D. hose for all 2 STG LFL and 3 STG FFL masts. Third function internal header hoses with 1/2 in. I.D. hose and fourth function external header hose for 2 STG FFL.

Optional sideshift is integral instead of hang-on for enhanced capacity and visibility.

Tilt Cylinders



- **Wide spacing for mast support**
- **Designed for long life**

Two double acting, single-stage cylinders are mounted beneath the drive tire fenders. The tilt cylinder mounting is widely spaced for mast support.

The cylinders rotate on lubricated hardened steel pins fixed to the frame anchors. The cylinders are fastened to the mast with lubricated hardened steel pins and spherical bushings for extended tilt seal life.

Chromed rods and single-lip urethane seals are self-lubricating to offer outstanding cylinder life and low maintenance. Wiper rings are used to help prevent contaminants from entering the cylinders.

Carriage



- **Class III & IV hook type carriages standard in 42 or optional 48 in. width**
- **Integral sideshift carriages available in 42 and 48 in. width for class III and 48 in. for class IV.**
- **Optional Class III attachment carriage available for S100XM and S100XMBCS**

The S70-80XM uses Class III carriages and the S100-120XM uses Class IV carriages. Two carriage widths are provided (42, 48). There is an optional Class III attachment carriage for the S100XM and S120XM-BCS.

All carriages are equipped with six load rollers.

Each carriage features pre-lubed and sealed, full-radius, angled load rollers that resist the forward, backward and lateral forces. This gives good load support during lifting and lowering and simplifies the design by eliminating the need for additional side thrust rollers. The load roller full-radius corner contact with the inner mast channel eliminates channel web milling and reduces the frequency of load roller adjustment. To further reduce load roller to channel clearance for those applications that may require minimal fore/aft carriage movement, oversized load rollers are available as service items.

At least four load rollers are in constant contact with the inner mast channel at all lift heights.

All carriages can be removed or installed from the bottom of the inner mast for easier serviceability.

All carriages are designed to meet ANSI & ISO dimensional specifications.



The angle of the fender at the base of the frame is designed so that, if the operator is backing into a low-lying object, it will direct the truck and object away from each other, thereby reducing the risk of drive wheel damage.

Lead Filled Counterweight

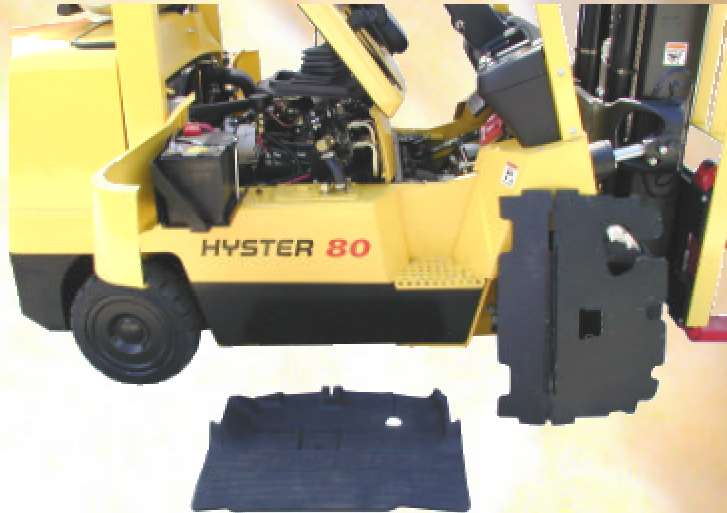


- **S80XM-BCS, S100XM-BCS, S120XMS, S120XMS-PRS**
 - **Shorter length counterweight aids in maneuvering**

The S80XM-BCS, S100XM-BCS, and S120XMS are equipped with a lead-filled boxcar special counterweight.

The S120XMS-PRS is available with additional slabbing needed to add a paper roll clamp to the truck. The boxcar special counterweight for this model is essentially the same as the paper roll special model except for the additional slab on top which weighs approximately 1200 lbs. The additional slab results in increased net capacity on the PRS.

SERVICEABILITY



Simplified service requirements. There are only two lubrication points at the mast pivot, two lubrication points at the tilt/mast connection, and two lubrication points at the steer axle.

All service points are readily accessible. The top section of the hood pivots forward to expose the routine service points. The lower section of the hood is made of three parts, with two side panels, which swing open toward the rear and lift out.

Service Access



- **One piece, gas-spring assisted hood**
- **Swing-out side panels are removable without tools**
- **Swing-out battery tray**

The upper hood panel is a single composite material piece. The two side panels and front panel are metal to maintain the current product durability.

The upper hood panel opens by tilting forward, and provides easy service access. To further increase service access, both side panels swing open and can be lifted out. The battery tray located on the right side of the engine compartment also swings open for further service access improvement.

A circular section seal is fitted around the outer edge of the upper hood section to provide a noise seal between the top and side panels.

The top hood panel is aligned and supported vertically via adjustable bumpers.

Two gas spring assemblies provide assistance when opening/closing the hood, as well as holding the hood open. For easy removal of the hood, the gas springs have a quick disconnect.

Operator weight and seat belt loads are carried by a steel structure under the upper hood panel, and not by the panel itself. This structure consists of a formed seat pan with pivoting features at the front and the hood latch at the rear. The hood is released by a push button integrated into the handle. The forward hood pivot is connected to the frame crossmember, along with the anchor end of the gas spring. The hood latch secures to a forged striker bolted to the overhead guard.

A single 475 cold cranking amp battery serves the electrical system for the gasoline and LPG trucks.

A single 900 cold cranking amp battery serves the electrical system for the diesel engine.

Floor Plates

- Thick rubber floormat lifts out with no tools
- One-piece hinged floor plate lifts out with no tools
- Flip-up cover for transmission oil check



Trucks are fitted with a flat rear floor plate and a flat forward floor plate, which are hinged together for convenient removal. Floor plates can be removed for service access without the use of tools. A 5/8" thick floormat is standard to provide reduced vibration, lower noise and a softer feel to the feet of the operator. There is a flip-up panel in the floormat that allows a quick and easy transmission fluid check.

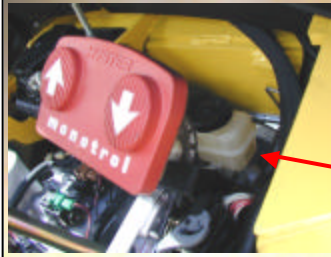
Service Access



• Engine oil breather

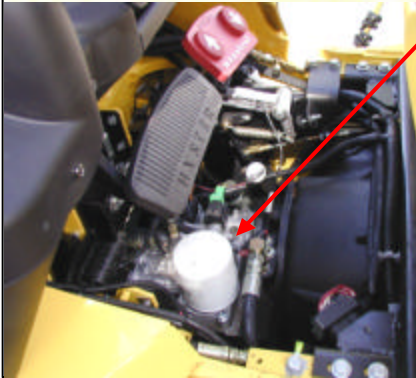
• Improved access to spark plugs

Serviceability



- **Brake fluid reservoir**

- **Transmission oil filter**



Both the brake fluid reservoir and transmission oil filter are easily accessed by removing the floormat and floor plate. Did we mention this requires no tools?

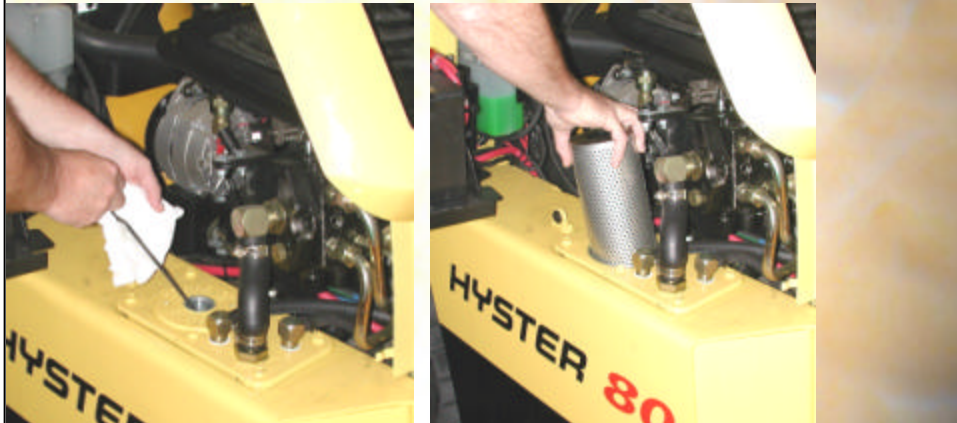
Service Access



- **Hydraulic tubing turned to front for improved service access**

Service Access

- Easy access to hydraulic dipstick and hydraulic oil filter



Hydraulic Tank:

The hydraulic tank is integrated into the right-hand side of the truck frame, and is easily reached by raising the hood.

Oil level is checked with a dipstick located in the fill cap on top of the hydraulic tank. All oil poured in the fill port goes through the hydraulic filter before entering the tank.

Hydraulic Filter:

An in-tank, return full flow filtration system is provided for protection of the hydraulic circuit. The system features an easy to remove cartridge-type filter that can be replaced without disconnecting any hydraulic plumbing.

The filter contains a 10 micron element that protects the hydraulic system from contaminants, promotes reliable performance, and helps to provide long life for all the system components.

Service Access



Power Distribution Module (PDM) located under dash

Consolidation of fuses and relays

- **Simplifies assembly**
- **Improves appearance**
- **Troubleshooting**
- **Auxiliary fuse slots**

The truck has a power distribution module located on the right hand side beneath the dash panel, with a snap on cover for easy access. The power distribution module contains 17 push-in type fuses and eight relays. This consolidates the fuses and relays in a convenient and accessible location.

Advantages of using a Power Distribution Module (PDM) located under dash

Consolidation of electrical fuses and relays

Simplifies assembly

Improves appearance and centralizes location

Aids troubleshooting of electrical problems

Auxiliary fuse slots simplify addition of electrical accessories in the field.

Truck Specifications



- Click on the truck image at left while in slide show view to bring up truck specifications for the S70-120XM series.
- You must have Adobe Acrobat Reader to view the files

