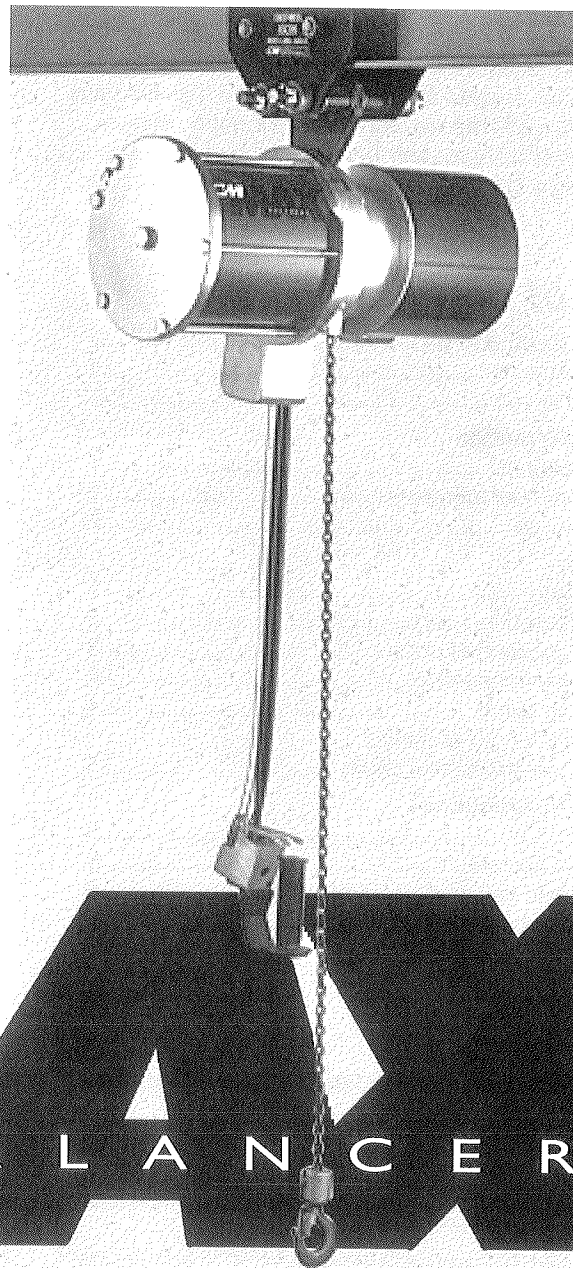


**OPERATING,
MAINTENANCE &
PARTS MANUAL**

**PNEUMATIC
BALANCER**



CM MAX BALANCER

**Capacities: 120 lb./55 kg., 200 lb./91 kg.,
300 lb./136 kg. and 500 lb./217 kg.**

Follow all instructions and warnings for inspecting, maintaining and operating this balancer.

The use of any balancer presents some risk of personal injury or property damage. That risk is greatly increased if proper instructions and warnings are not followed. Before using this balancer, each operator should become thoroughly familiar with all warnings, instructions and recommendations in this manual. Retain this manual for future reference and use.

Forward this manual to operator. Failure to operate equipment as directed in manual may cause injury.

Foreword

This manual contains important information to help you to properly install, operate and maintain the CM Max balancer for maximum performance, economy and safety. Please study its contents thoroughly before putting your unit into operation. By practicing correct operating procedures and

by carrying out the recommended maintenance suggestions, you will experience long, dependable and safe service. After you have completely familiarized yourself with the contents of this manual, it is recommended that it be carefully filed for future reference.

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Limitation of warranties, remedies and damages

THE WARRANTY STATED BELOW IS GIVEN IN PLACE OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, OR MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR OTHERWISE, NO PROMISE OR AFFIRMATION OF FACT MADE BY ANY AGENT OR REPRESENTATIVE OF SELLER SHALL CONSTITUTE A WARRANTY BY SELLER OR GIVE RISE TO ANY LIABILITY OR OBLIGATION.

Seller warrants that on the date of its delivery to carrier the goods are free from defects in workmanship and materials.

SELLER'S SOLE OBLIGATION IN THE EVENT OF BREACH OF WARRANTY OR CONTRACT OR FOR NEGLIGENCE OR OTHERWISE WITH RESPECT TO GOODS SOLD SHALL BE EXCLUSIVELY LIMITED TO REPAIR OR REPLACEMENT, F.O.B. SELLER'S POINT OF SHIPMENT, OF ANY PARTS WHICH SELLER DETERMINES TO HAVE BEEN DEFECTIVE or if Seller determines that such repair or replacement is not feasible, to a refund of the purchase price upon return of the goods to Seller.

Any action against Seller for breach of warranty, negligence or otherwise, must be commenced within one year after such cause of action accrues.

NO CLAIM AGAINST SELLER FOR ANY DEFECT IN THE GOODS SHALL BE VALID OR ENFORCEABLE UNLESS BUYER'S WRITTEN NOTICE THEREOF IS RECEIVED BY SELLER WITHIN ONE YEAR FROM THE DATE OF SHIPMENT.

Seller shall not be liable for any damage, injury or loss arising out of the use of the goods if, prior to such damage, injury or loss, such goods are

(1) damaged or misused following Seller's delivery to carrier; (2) not maintained, inspected, or used in compliance with applicable law and Seller's written instructions and recommendations; or (3) installed, repaired, altered or modified without compliance with such law, instructions or recommendations.

UNDER NO CIRCUMSTANCES SHALL SELLER BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES AS THOSE TERMS ARE DEFINED IN SECTION 2-715 OF THE UNIFORM COMMERCIAL CODE.

INDEMNIFICATION AND SAFE OPERATION

Buyer shall comply with and require its employees to comply with directions set forth in instructions and manuals furnished by Seller and shall use and require its employees to follow such instructions and manuals and to use reasonable care in the use and maintenance of the goods. Buyer shall not remove or permit anyone to remove any warning or instruction signs on the goods. In the event of personal injury or damage to property or business arising from the use of the goods, Buyer shall within 48 hours thereafter give Seller written notice of such injury or damage. Buyer shall cooperate with Seller in investigating any such injury or damage and in the defense of any claims arising therefrom.

If Buyer fails to comply with this section or if any injury or damage is caused, in whole or in part, by Buyer's failure to comply with applicable federal or state safety requirements, Buyer shall indemnify and hold Seller harmless against any claims, loss or expense for injury or damage arising from the use of the goods.

Repair and parts

For repair and parts service in the U.S.A. please call 1-800-831-6026 and ask for the Max Service Department.

In Canada, please call 1-712-841-4548 and ask for the Max Service Department.

The following are trademarks of Columbus McKinnon Corporation, registered in the U.S. Patent and Trademark Office: **CM**, **Hoistaloy**, **Latchlok**.

The following are trademarks of Columbus McKinnon Corporation: **LodeRail**.

Safety precautions

CM Max balancer is built in accordance with the specifications contained herein and at the time of manufacture complied with our interpretation of applicable sections of the Occupational Safety and Health Act - 1970. Please check each installation for compliance with requirements of OSHA as well as any state regulations and standards.

100% prevention of static electricity in the CM Max balancer is not possible. Metal-to-metal contact between the chain and pocket wheel is required for normal operation.

The safety laws for elevators, lifting of people, and for dumbwaiters, specify construction details that are not incorporated in CM Max balancers. For such applications, refer to the requirements of applicable state and local codes, and the American National Safety Code of elevators, dumbwaiters, escalators and moving walks (ASME A17 Series). Columbus McKinnon Corporation cannot be responsible for applications other than those for which CM Max balancer equipment is intended.

This symbol  points out important safety instructions which if not followed could endanger the personal safety and/or property of yourself and others. Read and follow all safety instructions in this manual and any provided with the equipment before attempting to operate your balancer.

Consult Columbus McKinnon Corporation for any usage of balancers that does not involve lifting or lowering a load on the lower hook, or usage of balancers in the inverted position. Using balancers in such application, without special precautions, may cause an accident that could result in injury and/or property damage.

Do's and Do Not's

The following are Do's and Do Not's for safe operation of the CM Max balancer. Taking precedence over any specific rule listed here, however, is the most important rule of all - **USE COMMON SENSE**. A few minutes spent reading these rules can make an operator aware of dangerous practices to avoid and precautions to take for his/her own safety and the safety of others. Frequent examinations and periodic inspections of the equipment as well as conscientious observance of safety rules will help prevent injuries as well as lost production time and money.



WARNING - To Avoid Injury: **THE DO'S**

1. **DO** read Operation Instructions in this manual.
2. **DO** become familiar with the operating controls, procedures and warnings.
3. **DO** make sure hook travel is in the same direction as shown on the controls.
4. **DO** maintain firm footing while operating the balancer.
5. **DO** make sure that load slings or other approved single attachments are properly sized and seated in the hook saddle.
6. **DO** make sure that hook latch, if used, is closed and not supporting any part of the load.

7. **DO** make sure the load is free to move and will clear all obstructions.
8. **DO** take up slack chain carefully, check load balance, raise a few inches and check load holding action before continuing.
9. **DO** avoid swinging of load or load hook.
10. **DO** make sure all persons stay clear of the suspended load.
11. **DO** warn personnel of an approaching load.
12. **DO** protect load chain from weld spatter or other damaging contaminants.
13. **DO** promptly report any malfunction, unusual performance, or damage to the balancer.
14. **DO** inspect the balancer regularly, replace damaged or worn parts, and keep appropriate records of maintenance.
15. **DO** use CM replacement parts when repairing the unit.
16. **DO** use hook latches whenever possible.



WARNING - To Avoid Injury: **THE DO NOT'S**

1. **DO NOT** raise more than rated load.
2. **DO NOT** use a damaged unit or a unit that is not working correctly.
3. **DO NOT** use a unit with twisted, kinked, damaged, or worn load chain.
4. **DO NOT** raise load unless load chain is properly seated in the pocket wheel.
5. **DO NOT** use load chain as a sling or wrap chain around load.
6. **DO NOT** raise a load if binding prevents equal loading on all supporting chain or sling legs.
7. **DO NOT** apply the load to the tip of the hook.
8. **DO NOT** raise load unless it is centered under the balancer.
9. **DO NOT** allow your attention to be diverted while operating the balancer.
10. **DO NOT** use the balancer to lift, support, or transfer people.
11. **DO NOT** lift loads over people.
12. **DO NOT** leave a suspended load unattended unless safety precautions have been taken.
13. **DO NOT** allow sharp contact between balancers or between a balancer and an obstruction.
14. **DO NOT** use the load chain as a ground for welding.
15. **DO NOT** touch the load chain with a live welding electrode.
16. **DO NOT** remove or obscure the warning labels on the balancer.
17. **DO NOT** adjust or repair the balancer unless qualified to perform such maintenance or repair.
18. **DO NOT** attempt to lengthen load chain or repair damaged load chain.
19. **DO NOT** use in explosive environments.

SAFETY IS UP TO YOU...



WARNING

DO NOT OPERATE WITH MORE THAN RATED CAPACITY LOAD.

1

CHOOSE THE RIGHT CM MAX BALANCER FOR THE JOB

Choose a CM Max balancer with the capacity for the job. Know the capacity of your balancer and the weight of your loads. Then match them.



The application, size and type of load, the attachments to be used and the period of use must also be taken into consideration in selecting the right CM Max balancer for the job.

Remember the CM Max balancer was designed to ease our burden and carelessness not only endangers the operator, but in many cases, a valuable load.



WARNING

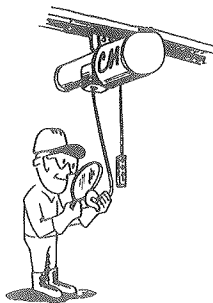
DO NOT OPERATE DAMAGED OR MALFUNCTIONING PNEUMATIC BALANCER.

2

INSPECT

All CM Max balancers should be visually inspected before use, in addition to regular, periodic inspections recommended in this manual.

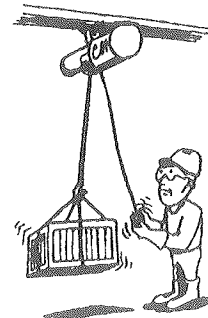
Report all deficiencies to your supervisor and be sure that defective units are tagged and taken out of service. Under no circumstances should you operate a damaged or malfunctioning pneumatic balancer.



Load chain should be properly lubricated.

Check chain for gouged, twisted, distorted links and foreign material. Do not operate with twisted, kinked or damaged links.

Check hook. Hooks that are bent, worn or whose openings are enlarged beyond normal throat opening should be replaced. If the latch does not engage throat opening of the hook, balancer should be taken out of service. Replace damaged or malfunctioning hook latch.

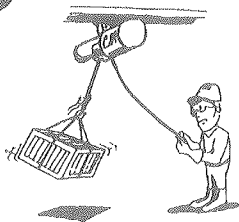


WARNING

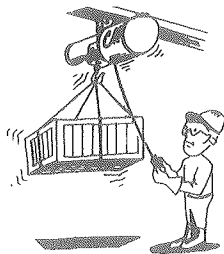
DO NOT PULL AT AN ANGLE. BE SURE LOAD IS CENTERED UNDER PNEUMATIC BALANCER. DO NOT ALLOW THE HOOK TO CONTACT PNEUMATIC BALANCER FRAME. DO NOT ATTEMPT TO LIFT LOAD THAT IS NOT FREE TO MOVE.

3

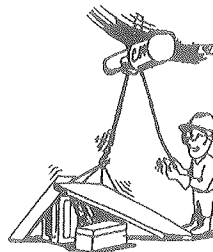
USE CM MAX BALANCER PROPERLY



Be sure that the balancer and load are in a straight line. Do not pull at an angle.



Be sure that the hook is at least 1" below the balancer when the hook is in its uppermost position. Do not use chain as a sling.



Be sure the load is free to move and that it will clear all obstructions as it is raised and moved.

Be sure the handling device will hold the load securely. Raise load a few inches, check load balance and load holding action of the device before continuing. Make sure the load is securely hooked and do not tip load the hook or load the hook latch.

Exhaust air to remove chain tension before removing the load or the load handling device.



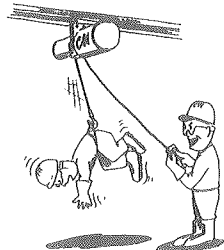
WARNING

DO NOT LIFT PEOPLE OR LOADS OVER PEOPLE.

4

PRACTICE CAUTION ALWAYS.

Do not lift people with a pneumatic balancer. Make sure everyone is clear of the load as you maneuver it. Do not remove or obscure warning label or tag. Use common sense at all times when operating the balancer.

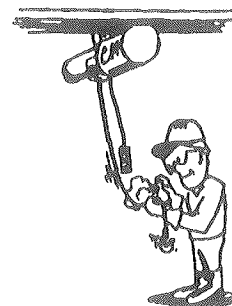


5

OPERATOR SERVICE

Cleaning. CM Max balancers should be kept clean and free of dust, dirt, moisture, etc. that will in any way affect the operation or safety of the equipment.

After repairs, carefully operate the balancer before returning it to full service.



VIOLATION OF ANY OF THE WARNINGS LISTED MAY RESULT IN SERIOUS PERSONAL INJURY TO THE OPERATOR OR NEARBY PERSONNEL BY RELEASED LOAD OR BROKEN COMPONENTS.

General information

Specifications

CM Max balancers are highly versatile material handling devices that are intended for applications involving precise positioning, high duty cycle and/or repetitive transfers of loads up to 500 pounds (217 kg.). In these units, air pressure is applied against a piston to create a lateral force which is then translated into rotary motion. This then rotates a pocket wheel and provides the lifting and lowering of the hook. Increasing or decreasing the air pressure on the piston, via the pendant control, suspends the load at the selected elevation. The load can then be manually raised or lowered, "floated," about 8 inches (203 mm) in either direction for precise positioning. Three types of controls are available for the CM Max balancer: pendant control, single load balancing control, and multi-load balancing control. These are fully described in later sections of this manual.

Allowable temperature range: -40°C to +80°C.
The balance circuitry may be duplicated for additional preset loads.

The standard features of the CM Max balancer include:

- Available in four frame sizes and capacities: 120 (55 kg.), 200 (91 kg.), 300 (136 kg.) and 500 (217 kg.) pounds.
- Lightweight aluminum frame, covers and cylinder.
- CM's load chain for long and dependable service.
- CM latch type hook.
- Pressure compensated speed control that prevents excessive vertical speed of an empty hook.
- Lost load protector system that immediately stops the upward movement of the chain should the load be inadvertently released.
- Lockout-tagout bolt that can be used to prevent unauthorized use of the balancer.
- Lifetime lubrication which eliminates the periodic lubricating of the air load balancer, except for the load chain.
- Ball bearings at rotating points.
- An auxiliary port that can be used to supply air operated devices furnished by the user.
- Suspension screws that have the heads drilled for a safety wire.
- Adjustable lowering speed.
- Machine weights:

Model/Capacity	Net Weights	
	(lbs.)	(kg.)
Model 120	60	27
Model 200	68	31
Model 300	86	39
Model 500	98	45

CM repair/replacement policy

All Columbus McKinnon CM Max balancers are thoroughly inspected and performance tested prior to shipment. If any properly maintained CM Max balancer develops a performance problem due to a material or workmanship defect, as verified by CM, repair or replacement of the unit will be made to the original purchaser without charge. This repair/replacement policy applies only to CM Max balancers installed, maintained and operated as outlined in this manual, and specifically excludes parts subject to normal wear, abuse, improper installation, improper or inadequate maintenance, hostile environmental effects, and unauthorized repairs/modifications.

We reserve the right to change materials or design if, in our opinion, such changes will improve our product, without any obligation to change previously manufactured units. Abuse, repair by an unauthorized person, or use of non-CM replacement parts voids the guarantee and could lead to dangerous operation. For full Terms of Sale, see Sales Order Acknowledgment. Also, refer to the inside of the front cover for Limitations of Warranties, Remedies and Damages, and Indemnification and Safe Operation.

Accessories

Lug suspension

Lug suspensions are standard on CM Max balancers. These are intended for mounting the units in a fixed position and they are also used to suspend the units from the CM Max low headroom trolley (figure 2) and box track trolleys (figure 3). Two high strength suspension screws that are drilled for safety wiring and lockwashers are included with the lug suspension.

Single and dual hook suspensions are available.

Note: The Max unit will not hang level and may affect performance.

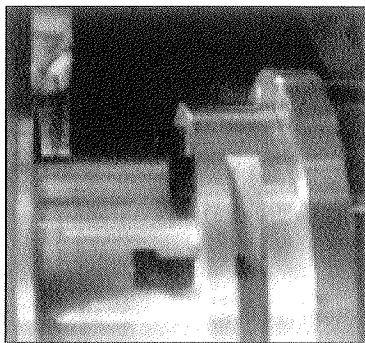


Figure 1. Lug suspension

CM Max low headroom trolley

This is a manual push type trolley that is designed for use with the CM Max balancers. The lug suspension of the unit is connected to the suspension plate by the two suspension screws with lockwashers supplied with the balancer. The trolley is adjustable for operation on American Standard "S" beams with flange widths from 2 5/8" to 5 5/8" (66,7 to 143 mm) and it will also operate on flat flanged beams. The suspension plate includes an extra hole for the installation of a safety cable. Complete installation instructions are provided with the trolley.

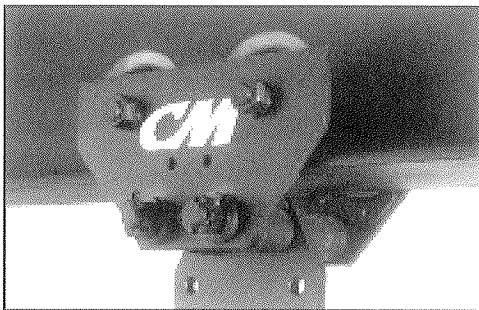


Figure 2. CM Max low headroom trolley

LodeRail trolley

This is a manual push type trolley that is designed to allow the balancer to be suspended from the CM LodeRail system. The suspension plate of the trolley is connected to the lugs of the balancer by the two suspension screws and lockwashers supplied with the balancer. Complete installation instructions are provided with the trolley. The suspension plate has an extra hole for the installation of a safety cable. Note that CM can on a special, per order basis, supply suspension plates that can be used to suspend the CM Max balancers for other types of box track trolleys. Contact CM for additional information on these suspension plates.

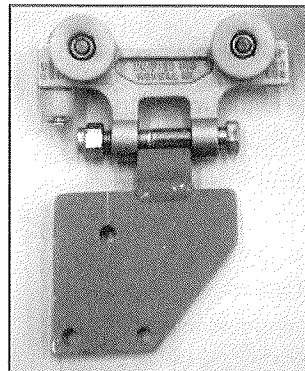


Figure 3. LodeRail trolley

CM Latchlok hook

CM's Latchlok hook is available to replace the standard latch type hook used on the CM Max balancers. The unique design of the Latchlok hook assures that it will stay locked until the operator releases it by depressing the push button. It will not open accidentally - even if the load chain goes slack. Once opened, it can be shut with one hand or with the weight of the load when it is lifted.

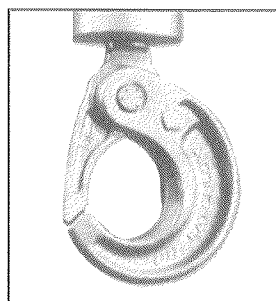


Figure 4. Latchlok hook

Installation

Unpacking

After opening the carton, carefully inspect the CM Max balancer for damage that may have occurred during shipment. Check the frame for dents or cracks, the load chain for damaged links and the fittings for damage or cracks. For units with pendant control, check the hoses for damage or cuts and the pendant control station for damage. If damage has occurred, refer to the packing list envelope on the carton for the claim procedure.

WARNING

Operating a unit with obvious external damage may cause load to drop and that may result in personal injury and/or property damage.

TO AVOID INJURY:

Carefully check unit for external damage prior to installation.

Note that the load side and loose sides of the chain are tied together for shipping purposes.

Plate suspended units

CM Max balancers that are to be installed in a fixed position can be suspended from the supporting structure using the lugs on the unit and the supplied suspension screws and lockwashers (refer to figure 1). Figure 5 shows the recommended dimensions for the suspension plate. This plate should be machined from 1/2" (12,7 mm) thick M1020 cold rolled steel and it must be drilled for the suspension screws as indicated.

After the suspension plate has been secured to the supporting structure, lift the balancer into position so that the suspension plate is between the lugs. Install the suspension screws and lockwashers supplied with the CM Max balancer and firmly tighten these to a seating torque of 5 to 10 pound feet (7 to 13 Nm). If necessary, safety wire the heads of the suspension screws together.

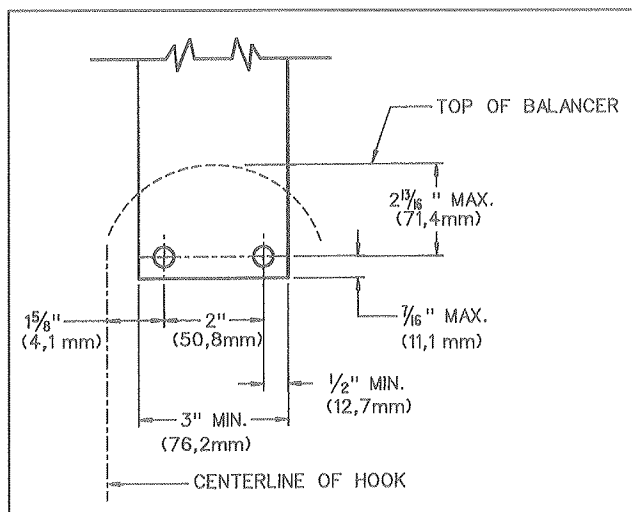


Figure 5. Suspension Plate

WARNING

Using other than CM supplied high strength suspension screws to attach the suspension plate to the balancer may cause the screws to break and allow the balancer and load to fall.

TO AVOID INJURY:

Use only the CM supplied suspension screws and lockwashers to attach the suspension plate to the balancer and tighten these screws to the recommended seating torque as specified above.

Trolley suspended units

CM Max balancers that are to be suspended from trolleys should be installed in accordance with the instructions packed with the trolley.

Air supply line

CM Max balancer must be connected to a proper air supply to insure correct and reliable operation. As a minimum, the air line supplying compressed air to the balancer must be as follows (figure 6):

1. Have a minimum inside diameter of 3/8" (9,5 mm). This includes the line itself and the devices listed below.
2. Must include an automatic drain with a 10 Micron filter.
3. Have a regulator with gauge capable of supplying air at 90 PSI (6 Bar) and the rated SCFM per model (see chart below) To this must be added what is needed to run any air operated equipment being supplied air through the balancer's auxiliary port.
4. Have a manual shut-off valve.
5. Arranged so that the hose between the regulator and the balancer will not kink or bend during normal operation.
6. A 3/8" NPT straight male fitting on the end of the hose to connect to the balancer inlet.

NOTE: All of the above items are to be supplied by the installer.

MAX Air Usage Based on 90 PSI (6.2 Bar)

Model	Bore in (mm)	CFM (LM)	SCFM (NLM)
120	6 (152.4)	1.14 (32.2)	10 (283.1)
200	8 (203.2)	2.02 (57.1)	15 (424.7)
300	10 (254)	3.15 (89.1)	25 (707.9)
500	10 (254)	6.08 (172.0)	45 (1274.2)

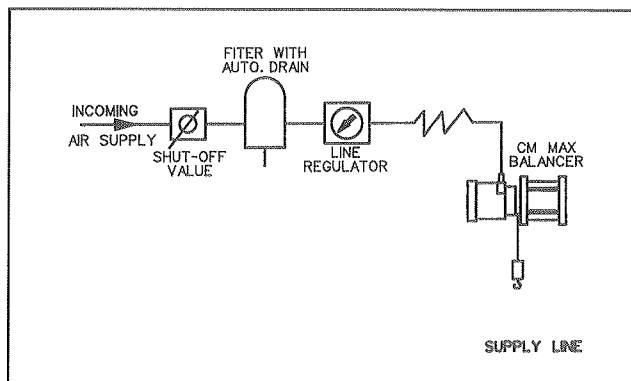


Figure 6. Supply line

Important: Before connecting the air supply line to the CM Max balancer, blow all debris and moisture out of the lines and turn the shut-off valve to the “off” position.

The CM Max balancer operates at rated capacity with an incoming air pressure of 90 PSI (6 Bar). The internal controls compensate for slight variations in line pressure; however, the supply line regulator must be adjusted so that the air pressure does not exceed 120 PSI (8.3 Bar). In addition, should the supply line pressure be below 80 PSI (5.5 Bar), the lifting capacity and speed of the balancer will decrease.

WARNING

An air supply pressure in excess of 120 PSI (8.3 Bar) may damage the internal components of the air balancer which may cause premature failure and load loss.

TO AVOID INJURY:

Adjust the air supply pressure regulator to 120 PSI (8.3 Bar) maximum.

Air supply connection

Before connecting the air supply line to the balancer, set the line regulator to 0 PSI and when the air stops flowing through the line regulator, turn the shut-off valve to the “off” position. Then connect the air supply line to the 3/8” NPT female inlet mounted on the balancer. Check for air leaks in the supply line as follows:

1. Slowly turn the shut-off valve to the full “on” position.
2. Slowly adjust the line regulator to 20 PSI (1.4 Bar).
3. With no load on the hook, depress the “up” lever, on units equipped with pendant control, or turn the balancer regulator screw to the full clockwise position, on units with balancing control, to raise the hook to its uppermost position.
4. Adjust the line regulator to 90 PSI (6 Bar) and check for and repair air leaks in the supply line. Note that on units with pendant control, the internal regulator allows a small amount of air to escape during normal operation. Do not consider this an air leak.

5. Depress the “down” lever, on units equipped with pendant control, or turn the balancer regulator screw to the full counterclockwise position to allow the hook to descend to the lowest position.

IMPORTANT: Do not jerk the load chain in an attempt to make it descend faster as this may cause it to jam.

6. Check the line regulator and reset it to 90 PSI (6 Bar) if required. The CM Max balancer is now ready for operation.

Adjusting reach

As supplied from the factory, the CM Max balancer has a reach of approximately 12 feet (3,7 m), measured from the bottom of the frame to the saddle of the hook, and a working range of 80 inches (2,03 m)*. For certain applications, it will be necessary to reduce the reach so that the hook contacts the floor or the hook is at the desired elevation. To do this:

1. Depress the down lever (on units with pendant control) or turn the balancer regulator to its full counterclockwise position (on units with balancing control) to exhaust the air from the cylinder.
2. Slowly pull down on the chain until it is fully extended (chain will stop moving).
3. Measure along the chain and mark it at 84 inches (2,13 m)* from the bottom of the chain guide. Cut the chain (refer to instructions on page 14) at this mark or beyond.

WARNING

A reach of less than 84 inches (2,13 m) will allow the hook block to contact the balancer frame. This may damage the frame and it may cause the load to drop due to breaking the hook block screw and/or the chain.

TO AVOID INJURY:

Make sure there is at least 84 inches (2,13 m) of chain extending from the balancer when the hook is at its lowest position.

4. *Remove the hook block from the end of the cut-off piece of chain and reassemble it to the end of the chain remaining on the balancer.

***NOTE:** Extended lift units have a working range of 130” (3.30 m) and require 134 inches (3.40 m) from the bottom of the chain guide.

On initial units, hold the hook block screw stationary and turn the nut. This will prevent damaging the screw and/or chain.

Adjusting length of control hoses and strain relief cable

Balancers with pendant control are shipped from the factory with control hoses that are 8 feet long and a corresponding length of strain relief cable. If these are too long, the drop of the pendant control should be adjusted as follows:

1. Turn the supply line shut-off valve to the "off" position and depress the down lever to exhaust all air from the balancer and remove any load from the hook.
2. Slide the warning tag up the hoses. Remove the brass compression sleeve from the hose fitting and retain.
3. Cut off the hoses by the amount the drop is to be shortened and separate the hoses for approximately 6 inches (152 mm).
4. For each hose, insert the end of the hose through the rounded end of the brass sleeve. Push the hose onto the barbed fitting until it is seated against the threaded base. Slide the brass sleeve down over the barbed connection and thread it onto the fitting. Tighten the sleeve with a wrench until it securely meets the fitting body.
5. Cut the black tube through which the cable passes at the point where the hoses are separated, making sure not to cut the cable. Feed the cable around the support pin in the pendant control. Pull on the free end of the cable until the pendant control is supported by the cable. Cut off the free end of the cable about 1 1/2 inches (38 mm) above the support pin. Slide the metal sleeves onto the cable. Feed the cable around the support pin and form a loop by inserting the free end of the cable into the open side of the metal sleeve. Using heavy pliers, securely crimp the metal sleeve onto the cable. Reposition the warning tag so that it is as close to the pendant control as possible.
6. Turn the shut-off valve to the "on" position and adjust the line regulator to 90 PSI (6 Bar). Operate the unit and check for air leaks at the new connections to the pendant control.

CAUTION

Tying knots in or looping the control hoses to shorten the drop of the pendant control will make the strain relief ineffective and can cause erratic and unsafe operation of the balancer.

TO AVOID PROBLEMS:

Shorten the control hoses and strain relief cable according to the the above instructions.

Operating instruction

General

Operating the CM Max balancer is very simple, and depends upon the type of control with which the unit was supplied. The following are the operating instructions for units equipped with either pendant control or single load balancing control. A small amount of practice is usually sufficient to become accustomed to how the balancer operates. However, the following safety precautions must be observed when operating the CM Max balancer:

1. **Do not** operate at an air pressure greater than 100 PSI (7 Bar).
2. **Do not** operate with a handling device and load whose combined weight exceeds the rated capacity of the unit.

WARNING

Ignoring the additional weight of a handling device that is always suspended from the CM Max balancer may overload the balancer and cause the load to fall.

TO AVOID INJURY:

The weight of the handling device plus the weight of the load must not exceed the rated capacity of the CM Max balancer.

3. **Do not** operate with twisted, kinked, damaged or worn load chain.
4. **Do not** operate a damaged or malfunctioning CM Max balancer.
5. **Do not** lift people or maneuver loads over people.
6. **Do not** operate when load is not centered under the CM Max balancer.
7. **Do not** permit the hook block to contact the CM Max balancer frame.
8. **Do not** leave a suspended load unattended.
9. **Do not** attempt to lift a load that is not free to move.
10. **Do not** use a handling device that does not hold the load securely.
11. **Do not** attempt to remove the handling device until the load chain tension is released.
12. **Do not** allow the load to bear against the hook latch.
13. **Do not** remove or obscure the warning tag and label.
14. **Do** replace damaged or malfunctioning hook latch.

WARNING

Allowing the load to bear against the hook latch and/or hook tip can result in loss of load.

TO AVOID INJURY:

- Do not allow the load to bear against the hook latch and/or hook tip.
- Apply load to hook bowl or saddle only.

Pendant control

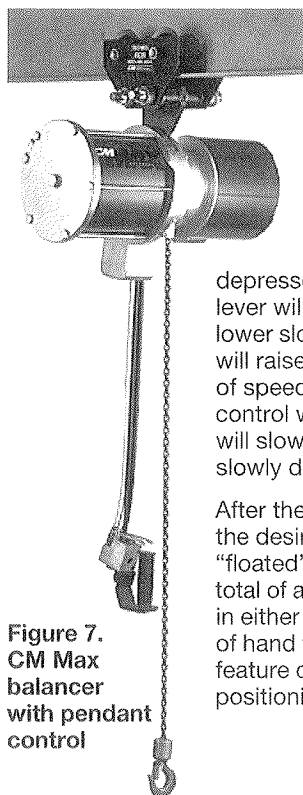


Figure 7.
CM Max
balancer
with pendant
control

Units equipped with the pendant control (see figure 7) are operated by depressing the up (^) and down (v) levers on the pendant control to, respectively, raise or lower the load. The speed at which the load is raised or lowered depends upon the distance the lever is

depressed. A slight depression of the lever will cause the load to raise or lower slowly, whereas full depression will raise or lower the load at a fast rate of speed. Also, this is a variable speed control whereby the speed of the load will slowly increase as the lever is slowly depressed.

After the load is raised or lowered to the desired elevation, the load can be "floated" or raised and lowered for a total of approximately 8 inches (203 mm) in either direction using a small amount of hand force on the load. This float feature can be used for precise positioning.

Single load balancing control

Units equipped with balancing control (see figure 8) are normally operated using hand force to raise and lower a fixed load. To set the air pressure to balance the load, remove the plug from the control end cap and rotate the balancer regulator screw clockwise to raise the load to a convenient elevation. Then rotate the regulator screw clockwise or counterclockwise so that the hand force required to raise or lower the load is approximately equal. The load can then be "floated" or raised and lowered through the entire working range using hand force on the load. The load will remain at the selected elevation until it is moved using hand force. After the load is balanced, reinstall the plug in the control end cap.

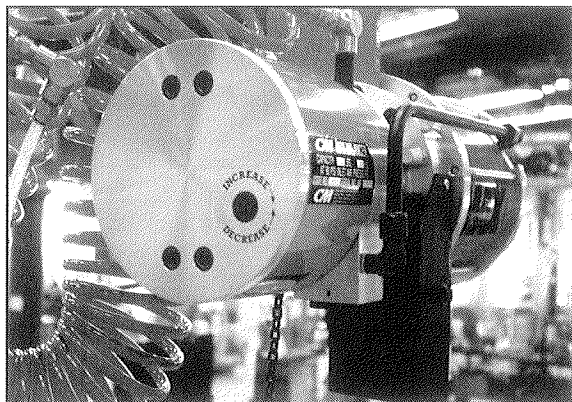


Figure 8. CM Max balancer with single load balancing control

NOTE: The single load balancing control system includes a check valve (609-541) to prevent the load from lowering if the air supply is shut off or disengaged. As a result the load will remain suspended and it cannot be moved until the air supply is restored. If it is necessary to lower the load, slowly loosen the lockout-tagout bolt (see page 9) two or three turns to exhaust the air from the cylinder. After the load is lowered, retighten the lockout-tagout bolt and rotate the balancer regulator screw to its full counterclockwise position. After the air supply is restored, adjust the balancing control per the above instructions.

Multi-load balancing control

Multi-load balancing control systems are available. In the U.S.A., please contact 1-800-831-6026 and ask for the Max Service Department. In Canada, please call 712-845-4548 and ask for the Max Service Department.

Lost load protector

The CM Max balancer is equipped with a lost load protector that stops the rapid upward movement of the hook in the event of an accidental and sudden release of an unsupported load. If a load is accidentally and suddenly released, the hook will move less than 6 inches (1520 mm) and stop. This locks the internal drive mechanism and the hook will not rise when the "up" lever is depressed on units with pendant control. On units with balance control, the chain will not retract when the tool, handling device or hook are manually moved upward.

WARNING

Lost load protector will protect properly only when the following conditions are complied with. The lost load protector should in no instances be used as a travel limiting stop or up stop.

TO AVOID INJURY:

- The weight of the load must be equal to the weight of the handling device, if used, plus 20% of the balancer's rated capacity.
- The handling device, if used, must weigh less than the load.

If the total weight is less than 20% of the balancer's rated capacity and the load is accidentally and suddenly released, the hook (and handling device if used) may move upward at less than the normal lifting speed about 2 feet (0,6 m) and stop.

To restore the balancer to normal operation:

1. Secure the dropped load so that it is not a safety hazard.
2. Release the pressure from the balancer by depressing the down lever (on units with pendant control) or turning the balancer regulator screw to its full counterclockwise position (on units with balancing control) and slowly pull the hook down at least 12 inches (305 mm).
3. The lost load protector is now reset and the balancer is ready to resume normal operation. On units with balancing control, readjust the balancer regulator as necessary.

NOTE: If the hook is in its lowest position when the lost load protector engages (due to the accidental release of the load), the following procedure should be used to restore normal operation:

1. Release the pressure from the balancer by depressing the down lever (on units with pendant control) or turning the balancer regulator screw to its full counterclockwise position (on units with balancing control).
2. Slowly pull on the chain in the downward direction. To do this will require pulling on the chain with a force of about 25 pounds (11.3 kg.).
3. Slowly release the chain and the lost load protector should now be reset and the balancer is ready to resume normal operation. On units with balancing control readjust the balance regulator as necessary.

In most cases, the above will reset the lost load protector. However, under certain conditions, it will not. As a result, the lockout-tagout bolt will have to be used to return the balancer to normal operation. To use the lockout-tagout bolt for this purpose:

1. Turn the air line shut-off valve to the "off" position.
2. Release the pressure from the balancer by depressing the down lever (on units with pendant control) or turning the balancer regulator screw to its full counterclockwise position (on units with balancing control).
3. Loosen the lockout-tagout bolt in the center of the cylinder end cap two to three turns.
4. Slowly pull down on the chain until it stops.
5. Tighten the lockout-tagout bolt to a seating torque of 20 pound feet (27 Nm).
6. Turn the air line shut-off valve to the "on" position and make sure the line regulator is set at 90 PSI (6 Bar).
7. The lost load protector is now reset and the balancer is ready to resume normal operation. On units with balancing control, readjust the balance regulator as necessary.

Lowering speed adjustment

On units with pendant control, the lowering speed is adjustable. If after installation it is found that the lowering speed is too fast or slow for the application, it can be changed by turning the screw that projects from the exhaust muffler on the pendant control valve block. Turn the screw clockwise to decrease and counterclockwise to increase the lowering speed. After adjusting the lowering speed, tighten the nut to lock the adjustment.

CM Max balancers suspended from trolleys

Balancers suspended from the CM Max low headroom trolley or LodeRail trolley should be moved laterally by pushing or pulling on the load or the lower hook block. Do not move the unit by pulling on the pendant control.

Maintenance

Inspection

To maintain continuous and satisfactory operation, a regular inspection program must be initiated to replace worn or damaged parts before they become unsafe. Inspection intervals must be determined by the individual application and are based on the type of service to which the CM Max balancer will be subjected and the degree of exposure to wear or deterioration of the critical components.

The type of service to which the CM Max balancer is subjected can be classified as "normal" and "heavy."

Normal service: Involves operation with randomly distributed loads up to the rated load limit, or uniform loads less than 65 percent of rated load capacity for no more than 25 percent of the time.

Heavy service: Involves operating the CM Max balancer within the rated load limit in excess of 25 percent of the time.

Two classes of inspection, frequent and periodic, must be performed.

Frequent inspections: These inspections are visual examinations by the operator or other designated personnel. Records of such inspections are not required. The frequent inspections are to be performed monthly for normal service and weekly for heavy service and they should include those items listed in table 1.

Periodic inspections: These inspections are visual inspections of external conditions by an appointed person. Records of periodic inspections are to be kept for continuing evaluation of the condition of the CM Max balancer. Periodic inspections are to be performed yearly for normal service and semi-annually for heavy service and they are to include those items listed in table 2.

CAUTION: Any deficiencies must be corrected before the CM Max balancer is returned to service. Also, the external conditions may show the need for disassembly to permit a more detailed inspection, which, in turn, may require the use of nondestructive type testing.

Table 1. Minimum frequent inspections

Type of service		Items to check
Normal	Heavy	
↑ Monthly ↓	↑ Weekly ↓	a. Inability to hold load in suspension. b. Control functions for proper operation. c. Hook for damage, cracks, twist, excessive throat opening, latch engagement and latch operation - see page 9. d. Load chain for adequate lubrication, signs of wear, damaged links and foreign matter - see page 9.

Table 2. Minimum periodic inspections

Type of service		Items to check
Normal	Heavy	
↑ Yearly ↓	↑ Every Six Months ↓	a. Items in table 1 for frequent inspections. b. External evidence of loose screws, bolts or nuts. c. External evidence of worn, corroded, cracked or distorted suspension screws. d. Inspect hoses for cracks or cuts. e. Inspect trolley wheels for external wear on tread and flange and for internal wear on the bearing surfaces as evidenced by looseness on the stud. f. Inspect for signs of air leaks at the cylinder end cap, hose connections, fittings, manifold block, regulator, pendant control, etc., and tighten fittings and connections to stop leaks. If leaks persist, disassemble and replace seals, hose clamps or fittings or reseal fittings using thread sealant or Teflon tape. g. Check the torque of the screws used to suspend the balancer from the trolley or permanent support. The torque should be 5 to 10 pound feet (7 to 13 Nm).

Hook inspection

Hooks damaged from chemicals, deformations or cracks, or that have more than a 10° twist from the hook's unbent plane or excessive opening or seat wear must be replaced. Also, hooks that are opened and allow the latch not to engage the tip must be replaced. Any hook that is twisted or has excessive throat opening indicates abuse or overloading of the unit. Inspect other load sustaining parts for damage.

On latch type hook, check to make sure that the latch is not damaged or bent and that it operates properly with sufficient spring pressure to keep the latch tightly against the tip of the hook and allow the latch to spring back to the tip when released. If the latch does not operate properly, it should be replaced. See figure 9 to determine when the hook must be replaced.

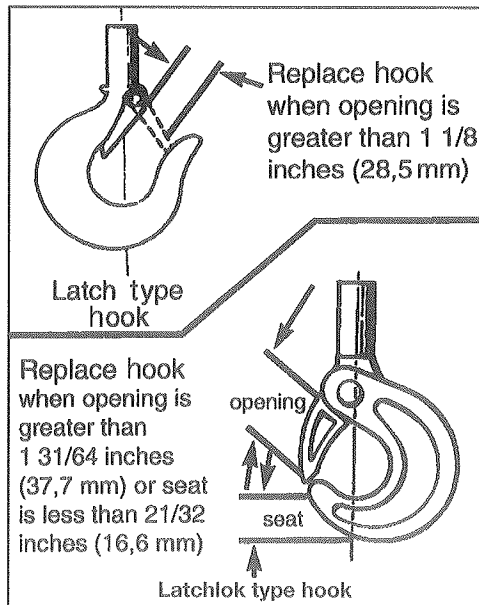


Figure 9. Hook inspection

Load chain

First clean the load chain with a non-acid or non-caustic type solvent, then slack the chain and make a link by link inspection for nicks, gouges, twisted links, stretching and excessive wear. In particular, observe the bearing surface between links, and if any of these conditions exist, the load chain must be replaced. Chain should be gauged throughout its entire length and replaced if beyond serviceable limits.

To determine if load chain should be continued in service, check gauge length as indicated in figure 10. Chain should be clean, free of twists and pulled taut before measuring. In cases where the wear is localized and not beyond serviceable limits, it is sometimes possible to reverse the load chain, end for end, and allow a new section to take the wear. Removal and installation of the load chain are covered in subsequent paragraphs.

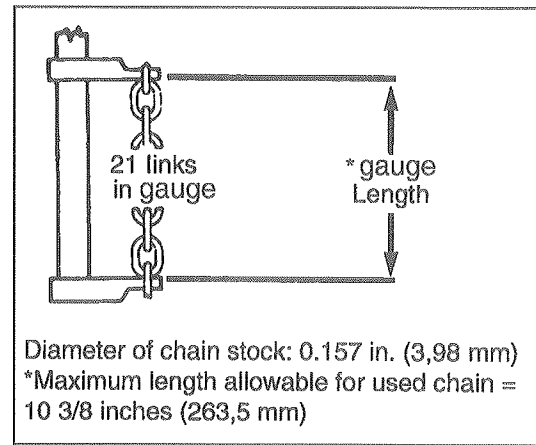


Figure 10. Gauging load chain wear.

CAUTION: Before installing new load chain, the unit must be disassembled to allow inspection for damage or wear and replacement, if required, of mating parts (pocket wheel, chain guides, and center section).

When installing new load chain or mating parts, refer to Lubrication on page 10.

Important: Do not use replaced chain for other purposes such as lifting or pulling. Load chain may break suddenly without visual deformation. For this reason, cut worn chain into short lengths to prevent re-use after disposal.

WARNING

Using other than CM supplied load chain may cause the chain to jam in the balancer and/or allow the chain to break and the load to drop.

TO AVOID INJURY:

Due to size requirements and physical properties, use only CM load chain in the CM Max balancer.

Lockout-tagout bolt

To prevent unauthorized use of a malfunctioning or damaged unit, the CM Max balancer is equipped with a lockout-tagout bolt. This is the large bolt in the center of the cylinder end cap. Once backed out or removed, it prevents the compression of the air in the cylinder and makes it impossible to operate the balancer. To remove the lockout-tagout bolt:

1. Turn the air line shut-off valve to the "off" position.
2. Release the pressure from the balancer by depressing the down (v) lever (on units with pendant control) or turning the balancer regulator screw to its full counter clockwise position (on units with balancing control). Allow the hook to lower to its lowest position and remove any load from the hook.
3. Loosen the lockout-tagout bolt and back it out until the hole in the shank of the bolt is visible. The bolt can remain in this position or it can be removed completely.
4. Tie an appropriate tag to the load chain to indicate that the unit is not to be used. If removed, store the lockout-tagout bolt and seal until the balancer is repaired and is ready to return to service.

WARNING

Removing the lockout-tagout bolt while air pressure is applied to the balancer will cause the bolt to fly out and could result in an injury.

TO AVOID INJURY:

Always turn the air line shut-off valve to the "off" position and release the pressure from the balancer as indicated above before removing the lockout-tagout bolt.

To replace the lockout-tagout bolt after the balancer has been repaired. Note: If the lockout-tagout bolt was not completely removed, just turn it back into the cylinder end cap and tighten it to a seating torque of 20 pound feet (27 Nm).

1. Inspect the sealing surface around the hole in the cylinder end plate. If necessary smooth any roughness or scratches with fine emery paper.
2. Inspect the seal and replace it if it is damaged.
3. Apply a light coat of lithium based grease (see lubrication instructions below) to both sides of the seal and slide the seal onto the bolt. Insert the lockout-tagout bolt and tighten it to a seating torque of 20 pound feet (27 Nm).
4. Turn the air line shut-off valve to the "on" position and make sure that the line regulator is set at 90 PSI (6 Bar).
5. Test the balancer for proper operation (see page 14).
6. Remove the tag from the load chain.

Lubrication

WARNING

The lubricants used in and recommended for the CM Max balancer may contain hazardous materials that mandate specific handling and disposal procedures.

TO AVOID CONTACT AND CONTAMINATION:

Handle and dispose of lubricants only as directed in applicable material safety data sheets and in accordance with applicable local, state and federal regulations.

A. CM Max balancers

Except for the load chain and the pendant control, the balancers do not require periodic lubrication. However, if the unit is disassembled for inspection or repair, the following parts should be lubricated with NLGI grade 2 lithium based grease such as Northland Motor Oils and Lubricants "Norplex."

1. Ball screw. Apply a heavy coat of grease to the threads. Be careful when removing the pocket wheel assembly from the ball screw; refer to disassembly instructions on page 12.
2. Cylinder. Apply a light coat of grease to the inside of the cylinder.
3. Bearings. Pack the pocket wheel bearings with grease. Note that the sealed anti-rotation rollers are packed with lifetime lubricant.
4. Seals. Apply a light coat of grease to lockout-tagout bolt seal, cylinder end cap seal, piston seal and piston bolt seal as well as the grooves for these seals.
5. Hook thrust bearing. Pack the needle thrust bearing with grease.
6. Load chain. A small amount of lubricant will greatly increase the life of load chain. Do not allow the chain to run dry. Keep it clean and lubricate it at regular intervals with Lubriplate Bar and Chain Oil 10-R (Fiske Bros. Refining Co.) or equal lubricant. Normally, weekly lubrication and cleaning is satisfactory, but under hot and dirty conditions it may be necessary to clean the chain at least once a day and lubricate it several times between cleanings. When lubricating the chain, apply sufficient lubricant to obtain natural runoff and full coverage.

WARNING

Used motor oils contain unknown carcinogenic material.

TO AVOID HEALTH PROBLEMS:

Never use used motor oils as a chain lubricant. Use only Lubriplate Bar and Chain Oil 10-R as a lubricant for the load chain.

7. Pendant control. Once a month apply a few drops of light machine oil to the up and down valve stems and operate these to work in the oil.

B. CM Max low headroom and LodeRail trolleys

The bearings in the wheels of these trolleys are pre-lubricated with lifetime lubricant and require no periodic lubrication.

Trouble shooting

If the balancer does not operate properly or if it does not hold a load in suspension, it is probably caused by air leaks and/or plugged air lines or passages. Therefore, if there is a problem, first check the line supplying air to the unit. Make sure the line is clear, the filter is not plugged, 90 PSI (6 Bar) and the required airflow (see page 3) is being delivered to the unit and the shut-off valve is fully open and not plugged. If the supply line is OK and it has no leaks and the unit still does not operate properly, there could be a problem with the balancer. The following trouble shooting chart provides information that may help you locate and overcome the problem with the balancer.

Trouble	Possible Cause	Check and Remedy
1. Load drifts slowly downward	a. Air escaping from balancer.	a. Check external and internal fittings for air leaks. Tighten fittings to stop leaks. Check various seals (refer to parts list and drawings) for leaks. Tighten screws. If leak persists, replace seals.
	b. Air escaping from pendant control.	b. Check hoses for cuts or cracks. Replace hoses if necessary. Check fittings for air leaks. Tighten fittings to stop leaks. Check control valves for leaks. Replace parts if necessary to stop leaks.
2. Load will not move upward	a. Lost load protector engaged.	a. Release lost load protector as described on page 6.
	b. Air passages plugged.	b. Check and clean out air hoses, pendant control valves, regulator, filters, manifold and air line.
	c. Excessive load.	c. Reduce load to rated capacity of balancer.
	d. Low line pressure.	d. Check and adjust line regulator to 90 PSI (6 Bar) and the required flow rate of (see page 3)
	e. Supply line too small.	e. Check supply line. The line and all fittings must have a 3/8" (9,5 mm) minimum inside diameter.
	f. Chain jammed between pocket wheel and center section.	f. Operate in down direction and slowly pull on chain. Disassemble unit, if this does not free the chain (see page 12).
3. Load will not move downward	a. Chain jammed against loose end chain guide.	a. Operate unit in up direction. If this does not free the chain, exhaust the air from the unit. Remove the chain container. If the chain is jammed against the chain guide, use a small screw driver or needle nose pliers to free the chain. Slowly pull down on the hook. If this frees the chain, replace the chain container. If the chain is still jammed, disassemble the unit (see page 12) to free the chain.
	b. Air passages plugged.	b. See item 2b.
	c. Hook at lowest position and lost load protector engaged.	c. Release lost load protector as described on page 6.
4. Unit operates sluggishly	a. Air escaping from balancer.	a. See item 1a.
	b. Air escaping from pendant control.	b. See item 1b.
	c. Air passages partially plugged.	c. See item 2b.
	d. Excessive load.	d. See item 2c.
	e. Low line pressure.	e. See item 2d.
	f. Supply line too small.	f. See item 2e.

WARNING

Disassembling unit or controls with pressure applied will cause parts to fly apart.

TO AVOID INJURY:

Prior to disassembly, shut off the air supply to the unit, remove the load from the hook and exhaust the air from the unit by depressing the down (v) lever or turning the balancer regulator screw to its full counterclockwise position, then loosen or remove the lockout-tagout bolt.

Disassembly

Refer to pages 16 through 21 for parts lists and drawings.

Note: Metric tools are required for disassembly and reassembly. The following are general guidelines for disassembling the CM Max balancer. Prior to attempting to disassemble the balancer, it should be:

1. Disconnected from the air supply line.
2. Removed from its support.
3. The pressure released from the balancer by depressing the down (v) lever on units with pendant control or turning the balancer regulator screw to its full counterclockwise position on units with balancing control.

WARNING

Disassembling unit or controls with pressure applied will cause parts to fly apart.

TO AVOID INJURY:

Prior to disassembly, shut off the air supply to the unit, remove the load from the hook and exhaust the air from the unit by depressing the down (v) lever or turning the balancer regulator screw to its full counterclockwise position, then loosen or remove the lockout-tagout bolt.

These guidelines cover the disassembly of major components; not covered is the removal of obvious items such as hardware and seals. While disassembling the unit, care should be taken not to damage the seals. The seals should be inspected for nicks or damage that could cause air leaks. Any damaged seals should be replaced prior to reassembly.

To disassemble the balancer:

1. Set the unit upright on the cylinder bottom (609-400).
2. Remove the anti-rotation guide screws (609-431) and the control cover endplate (609-430).
3. Remove the air line (609-486). Remove the manifold attaching screw (609-485) and the manifold block (609-474 or 609-520) with relay and controls.
4. Remove the chain container (609-435) and the loose load chain guide assembly (609-455).
5. Tie a soft wire, approximately 20 in. (500mm) long, to the loose end of the load chain making sure to keep the chain straight. Rotate the anti-rotation bar (609-427) counter clockwise until the chain comes out of the unit.
6. Remove the anti-rotation bar assembly (609-427) and the five cylinder attaching screws (609-426).
7. Remove the center section (609-425).
8. Remove the pocket wheel assembly (609-414 through 417) with the brake assembly (609-418 through 423) intact. A 6 in (152mm) long x 1-1/8 in (28.6mm) diameter wood dowel is required to keep the bearing balls in the ball nut. Firmly press the dowel against the ball screw while rotating the pocket wheel assembly counter clockwise until it dis-engages from the ball screw (609-411). Note that the dowel should remain in the ball nut until the balancer is reassembled.
9. Remove the six cylinder tie bolts (609-401). They are torqued at 30 pounds of pressure. You will now be able to remove the head plate (609-413), cylinder tube (609-412), cylinder piston (609-408),

piston stop (609-405) and ball screw (609-411) from the piston if necessary. Also the cylinder bottom (609-400). This will allow you to check the u-cup (609-409) and o-ring (609-407).

NOTE: Ball screw and Nut spare parts only available as an assembly.

Reassembly

The reassembly of the unit is, basically, the reverse of the above disassembly sequence. However, prior to reassembly, wipe the old grease from the parts and relubricate them as indicated on page 10. When putting the chain back in refer to page 13 Load Chain Replacement as a guide. In addition, the threads of the various screws and bolts should be cleaned using a wire brush and locking compound, such as Loctite #242 (#262 for the piston bolt), which should be applied to the threads.

During reassembly certain screws and bolts must be tightened to the seating torques as indicated below:

Part	Key No.	Torque	
		# ft.	(Nm)
Anti-rotation bar attaching bolt	609-450	45-55	(61-75)
Lockout-tagout bolt	609-404	10-20	(13-27)
Cylinder tie bolts	609-401	25-30	(34-41)
Anti-rotation guide screw	609-431	25-30	(34-41)
Cylinder attaching screw	609-426	25-30	(34-41)
Piston bolt	609-406	45-55	(61-75)

Additional items relating to the reassembly of the balancer:

1. When installing the control end pocket wheel bearing (609-424) in the center section, make sure that the largest outside edge on the inner bearing case is facing you when looking into the large bore of the center section (609-425).
2. To install the chain refer to Load Chain Replacement.
3. When assembling the piston (609-408) to the ball screw, make sure that the smaller diameter hub of the piston is against the ball screw (609-411) - refer to parts list drawing.
4. When installing the piston seal (609-409), make sure that the open (lip) side is on the piston stop (609-405) side of the piston (609-408).
5. After reassembly, test the balancer - see page 14.

NOTE: If the relay is replaced it needs to be reset. On balance units reset the the load regulators.

Load chain replacement

If the unit is not completely disassembled, use the following procedure to replace the load chain: (Refer to pages 16 through 21 for parts lists and drawings.)

1. Turn the air line shut-off valve to the "off" position.
2. Release the pressure from the balancer by depressing the down (v) lever (on units with pendant control) or turning the balancer regulator screw to its full counterclockwise position (on units with balancing control). Allow the hook to lower to its lowest position and remove any load from the hook.
3. Remove the anti-rotation guide screws (609-431), the control cover end plate (609-430) and the control cover (609-429).

4. Remove the air line (609-486) and the manifold block (609-474 or 609-530) with relay and controls.
5. Remove the chain container (609-435).
6. Tie a soft wire, approximately 20 inches (500 mm) long to the loose end of the chain.
7. Rotate the anti-rotation bar (609-427) until the chain comes out of the unit. Untie the wire from the chain and leave the wire over the pocket wheel.
8. Tie the end of the new chain to the wire on the load side of the unit.
9. Orient the new chain so that the first link to engage the pocket wheel is a flat link and the upstanding links have their welds away from the pocket wheel.
10. Push the anti-rotation bar against the center section at a 10:00 and 5:00 position. One end of the anti-rotation bar will be inline with the loose load chain guide assembly (609-455).
11. Pull on the wire until there is 7 to 9 inches (177 to 229 mm) of chain extending beyond the bottom of the loose end chain guide.
12. Hold the chain in this position and push the anti-rotation bar clockwise until it bottoms against the center section. Adjust the anti-rotation bar counter clockwise so that the guide rollers are between the threaded holes in the center section. Pull the chain down until stopped. A minimum of 4-6" of chain should remain.
13. Untie the wire from the loose end of the chain. Replace the loose load chain guide assembly. Feed the loose end of the chain through the eyebolt in the chain container. Make sure all of the chain is in the container and that there are no chain links caught between the eyebolt and the chain guide. Reassemble the chain container to the center section.
14. Reassemble the manifold assembly to the center section and reinstall the air line (609-486).
15. Assemble the control cover and end cap to the center section.
- 16.*Remove the hook block assembly from the "old" chain and attach it to the new chain.
17. Turn the air line shut-off valve to the "on" position and adjust the line regulator to 90 PSI (6 Bar).
18. Test the unit for proper operation - see page 14.

***NOTE:** On initial units, hold the hook block screw stationary and turn the nut. This will prevent damaging the screw and/or chain.

Testing

After reassembly, test the unit with a light load of approximately 50 pounds (23 kg.) to make sure the CM Max balancer operates properly. Then test with a rated capacity load to reset the relay or load regulators.

Cutting chain

CM Hoistaloy load chain is hardened and it is difficult to cut. The following methods are recommended when cutting a length of new chain from stock or cutting off worn chain.

1. Use a grinder and nick the link on both sides (figure 11), then secure the link in a vise and break off with a hammer.
2. Use a 7" minimum diameter by 1/8" thick abrasive wheel (or type recommended by wheel supplier) that will clear adjacent links.

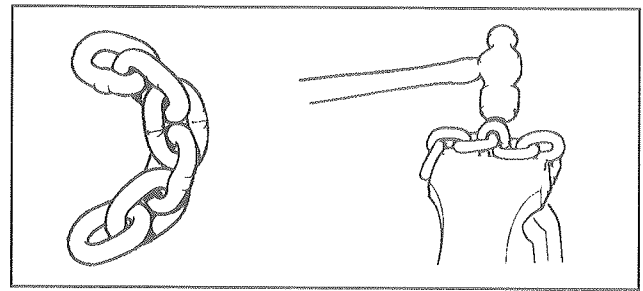


Figure 11. Cutting chain by nicking

3. Use a bolt cutter (figure 12) similar to the H.K. Porter No. 0590MTC with special cutter jaws for cutting hardened chain (1" long cutting edge).

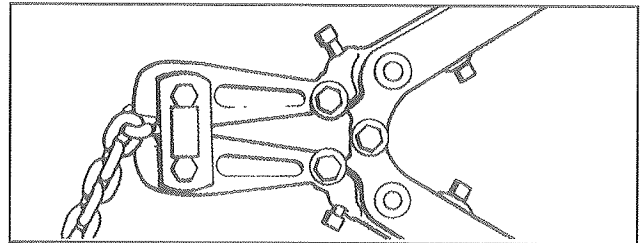


Figure 12. Cutting chain with a bolt cutter

⚠ WARNING

Cutting chain can produce flying particles.

TO AVOID INJURY:

- Wear eye protection.
- Provide a shield over chain to prevent flying particles.

Repair parts

Ordering instructions

The following information must accompany all correspondence or orders for replacement parts:

1. Capacity of the unit.
2. Serial number from identification plate.
3. Key number and part number of part from parts list.
4. Number of parts required.
5. Part name from parts list.

If trolley replacement parts are ordered, also include the type and capacity of the trolley.

When ordering replacement parts, it is recommended that consideration be given to the need to order such additional items as O-rings, seals, fasteners, etc. Such items may be damaged or lost during disassembly or may be unfit for future service.

⚠ WARNING

Using commercial or other manufacturer's parts to repair the CM Max balancers may cause load loss.

TO AVOID INJURY:

Order all replacement parts from CM. Parts may look alike but often CM parts are made of specific materials or processed to achieve specific properties.

CM MAX BALANCER

MECHANICAL COMPONENTS

PARTS LIST

Key No.	No. Req'd.	Part Name	Part Number		
			CM Max 120 (0950)	CM Max 200 (0951)	CM Max 300 (0952)
609-400	1	Cylinder Bottom	09402	09416	09420**
609-401	6	Cylinder Tie Bolt 4 for Max 120/6 all others	09804		
609-402	1	Cylinder O-Ring	09801	09809	09821**
609-403	1	Lockout-tagout Bolt Seal	09802**		
609-404	1	Lockout-tagout Bolt	09429**		
609-405	1	Piston Stop	09406	09444**	
	1 *	Bolt & O-Ring Assembly Key # 609-406 & 609-407	9408809**		
609-406	1	Piston Bolt	09407		
609-407	1	Piston Bolt O' ring	09803		
609-408	1	Piston	09403	09419	09421**
609-409	1	Piston U - Cup	09822	09823	09824**
609-411	1	Ball Screw #	09807		
609-412	1	Cylinder Tube	09404P	09417P	09422P
609-413	1	Cylinder Head Plate	09405	09418	09423**
	1 *	Pocket Wheel Assembly Key # 609-414 - 609-417	9530603		
609-414	1	Pocket Wheel Bearing - Cylinder End	09808		
609-415	1	Pocket Wheel	09408		
609-416	1	Ball Nut w / balls# w / 0 screw	09705		
609-417	1	Ball Nut Set Screw	09810		
	2 *	Brake Sub-Assembly Key # 609-418 - 609-423	9408807**		
609-418	1	Lost Load Protector	09503		
609-419	1	Lost Load Protector Clevis Pin	09410**		
609-420	2	Lost Load Protector Bushings	09811		
609-421	1	Lost Load Protector Cotter Pin	09840**		
609-422	1	Lost Load Protector Spring	09812		
609-423	3	Lost Load Protector Spring Pin (2unit/ 1 assembly) are part of the Max Assembly	09813**		

Key No.	No. Req'd.	Part Name	Part Number		
			CM Max 120 (0950)	CM Max 200 (0951)	CM Max 300 (0952)
609-424	1	Pocket Wheel Bearing - Control End	09814**		
609-425	1	Center Section	09411		
609-426	5	Cylinder Attaching Screw	09815**		
609-427	1 *	Anti-Rotation Bar Assembly w/rubber pads Contains Key # 609-428	09412		
609-428	2	Anti-Rotation Bearing	09816		
	2	Anti-Rotation Pad	9426308		
	1	Anti-Rotation Bar	9330520		
609-429	1	Control Cover Anti - Rotation Tube	09413P		
609-430	1	Control Cover End Plate	09414		
	1	Single Balance End Plate	09445		
	1	Dual Balance End Plate	9420911		
	1	Tri Balance End Plate	9531202		
609-431	4	Anti-Rotation Guide Screw	09817		
609-432	1	Chain Guide - Load Side	09415**		
609-433	2	Chain Guide Attaching Screw	09818**		
609-434	2	Chain Container Attaching Screw	09819**		
609-435	1 *	Chain Container Assembly	09820**		
609-436	168"	Load Chain (Specify Additional Length if Req'd.)	85990**		
609-446	1A *	Lower Hook Block Assembly Contains 8 parts Key # 609-437 - 609-444	09500**		
	1B *	Latchlok Hook Assembly Contains 9 parts Key # 609-438 - 609-445	1086		
609-437	1A	Hook with Latch	09346		
609-438	1	Hook Block - Drilled	06341		
609-439	1	Hook Block - Tapped	06340		
609-440	1	Hook Nut	986429		
609-441	1	Hook Nut Pin	983793		
609-442	1	Hook Thrust Bearing	87081		
609-443	2	Hook Thrust Washer	87080		
609-444	1	Hook Block Screw	06727		
609-445	1B	Latchlok Hook #	09501		
609-447	1	Latch Kit	132 - P001771		

Not Sold Separately.

* Subassemblies are recommended spare parts

** Parts that are common with the Max 500 are noted with a double asterisk.

CM MAX BALANCER

MECHANICAL COMPONENTS

PARTS LIST

Key No.	No. Reqd.	Part Name	Part Number		
			CM Max 120 (0950)	CM Max 200 (0951)	CM Max 300 (0952)
609-448	2	Suspension Screw	09825**		
609-449	2	Suspension Screw Lock Washer	09859**		
609-450	1	Anti - Rotation Bar Attaching Screw	09805**		
	1	Attaching Washer	104 - P000260**		
609-451	1	Warning Label (Not Shown)	09844**		
609-452	1	Capacity Label (Not Shown)	09843	09845	09846
609-453	2	CM Max Label (Not Shown)	09847**		
609-454	1	Identification Label (Not Shown) Serial Tag	09842**		
609-455	1 *	Chain Guide Assembly Loose Side	09430**		
	1	CM Max loose side Chain Guide	9401201		
	1	Roll Pin	P002084		
609-456	2	Shim	09850**		
	1 *	Double Reeving Assembly	0968		
	1	Load Chain Assembly	200113702		
		Contains Key #609-436 & #609-446			

Not Sold Separately.

* Subassemblies are recommended spare parts

** Parts that are common with the Max 500 are noted with a double asterisk.

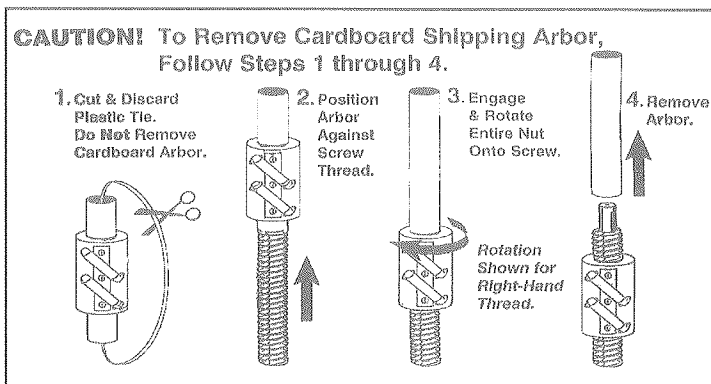
CM MAX BALANCER

MAX 500 COMPONENTS (0943)

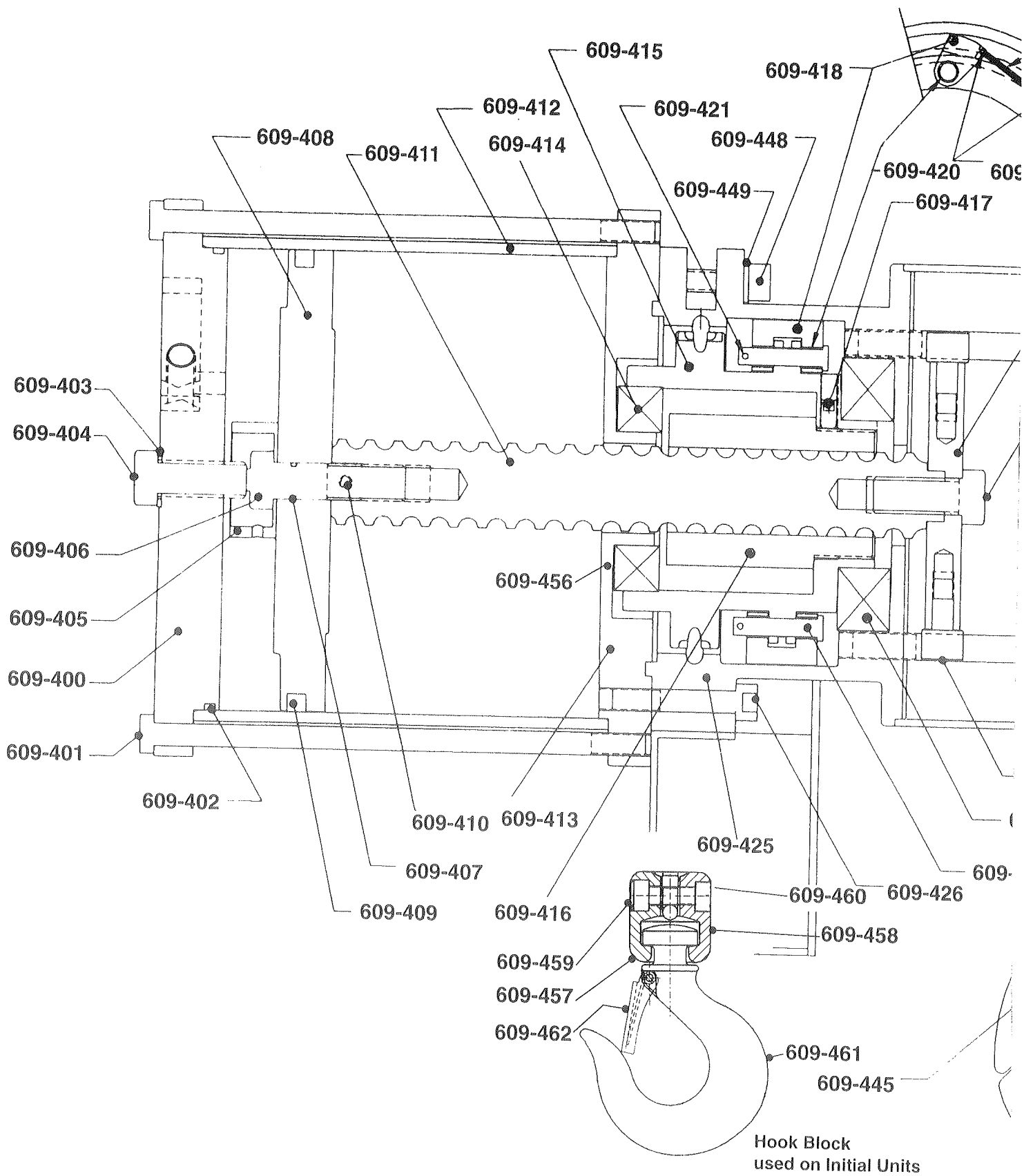
PARTS LIST

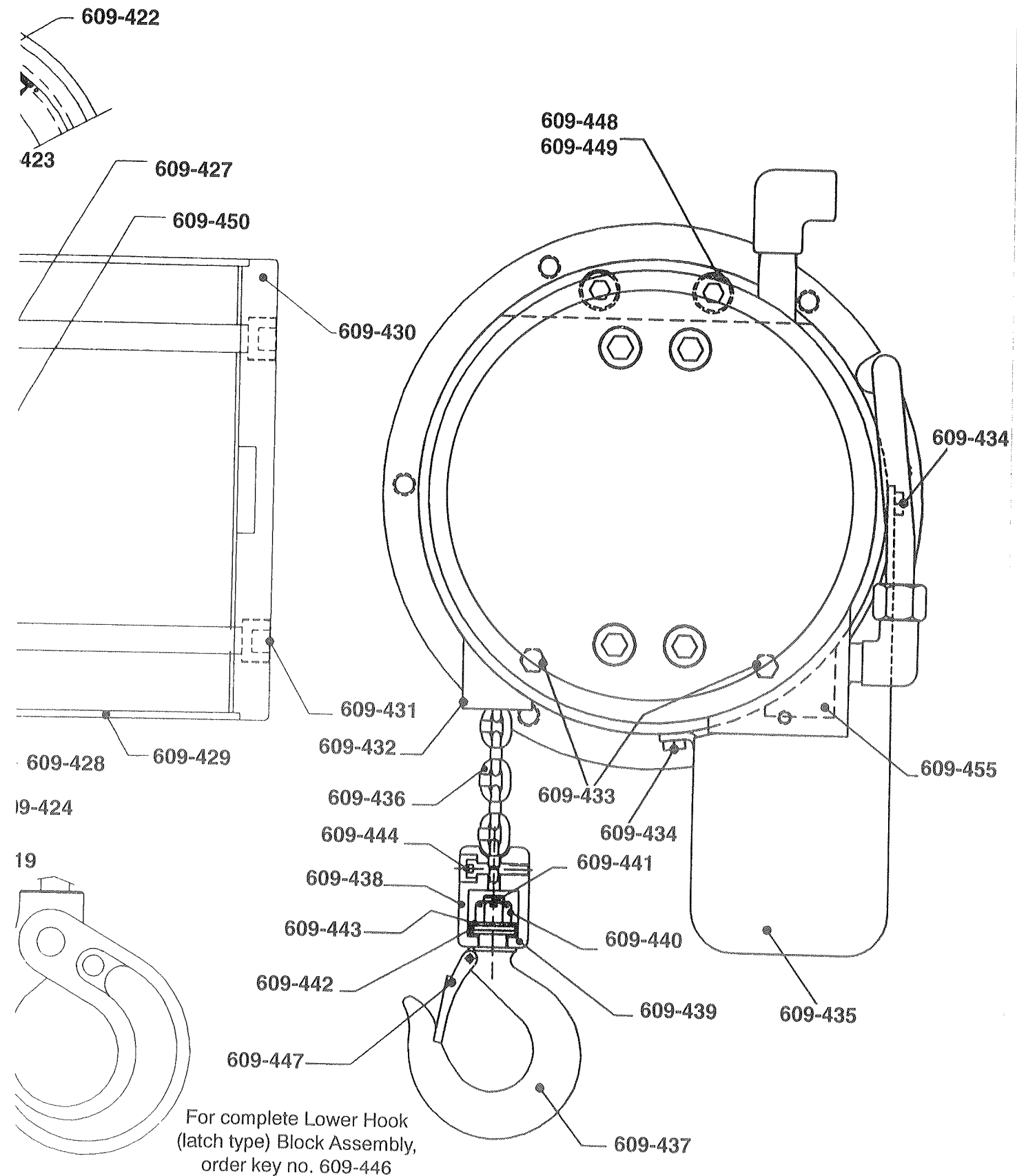
Key No.	No. Reqd.	Part Name	Part Number
			CM Max 500 (0943)
609-478	1	Air Relay for Max 500	P008353
609-412	1	Cylinder Tube	9524007P
609-401	6	M10 1.5 X 325 mm Hex Head Cap Screw	P007192
	1 *	Pocket wheel Assembly *(sold only with ball nut)	200113701
609-415		Pocket Wheel	9524004
609-411		Ball Screw #	9524006
609-414		Ball Bearing	09808
609-417		M08 1.25 X 12 mm Cup Point	09810
609-425	1	Center section	9709212
609-416	1	Ball Nut (sold only with pocket wheel assembly) #	P008307
609-427	1 *	Anti-Rotation Bar Assembly	9524010
609-429	1	Anti-Rotation Tube	9524008P
609-430	1	End Plate	9524009
609-431	1	M16 2.0 X 285 mm Socket Head Cap Bolts	P007170
609-452	1	500# Capacity Tag	P007172
	1 *	Metering Control Assembly For Max 500	9528515
609-486	1	Tube Air Line Max 500	9611402

Caution is for Ball nut service & replacement:
Part #'s 09705 & 9524006

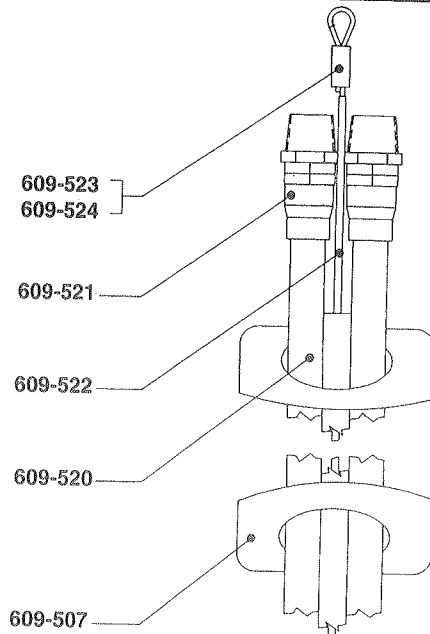
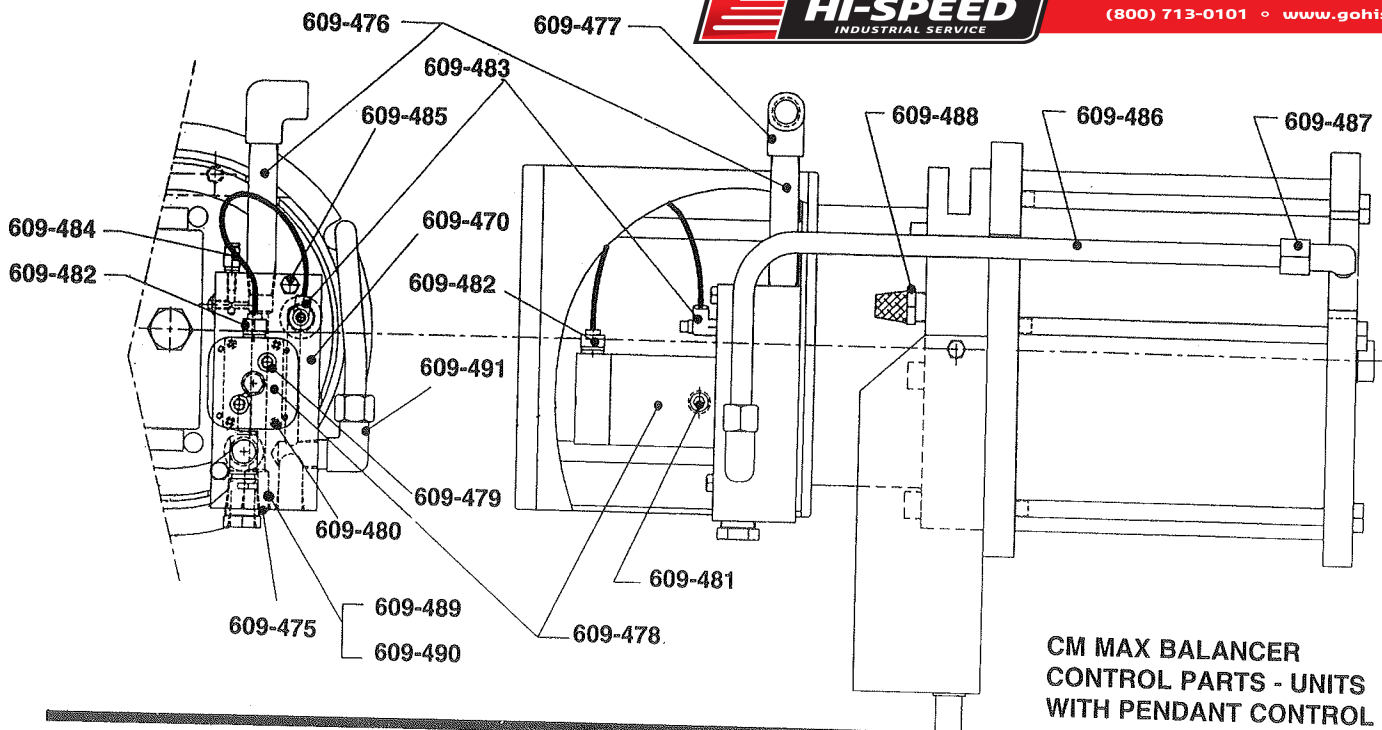


NOTES

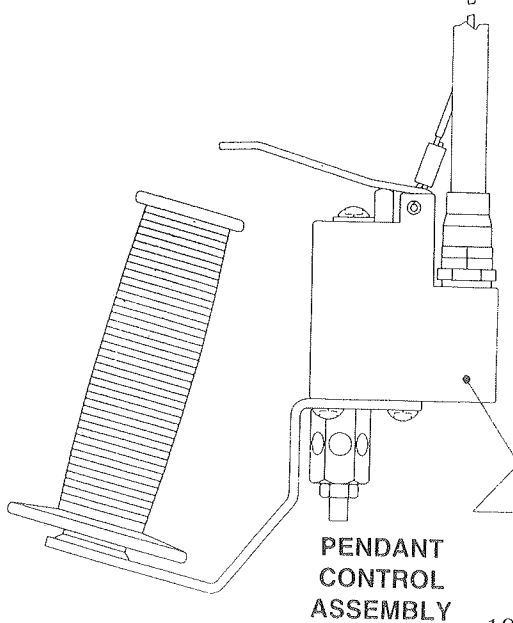




CM MAX BALANCER MECHANICAL COMPONENTS

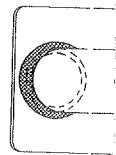


FOR COMPLETE PENDANT CONTROL ASSEMBLY INCLUDING 8 FOOT LONG HOSES AND STRAIN RELIEF CABLE ORDER KEY NO. 609-500,



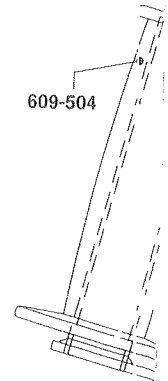
PENDANT CONTROL ASSEMBLY

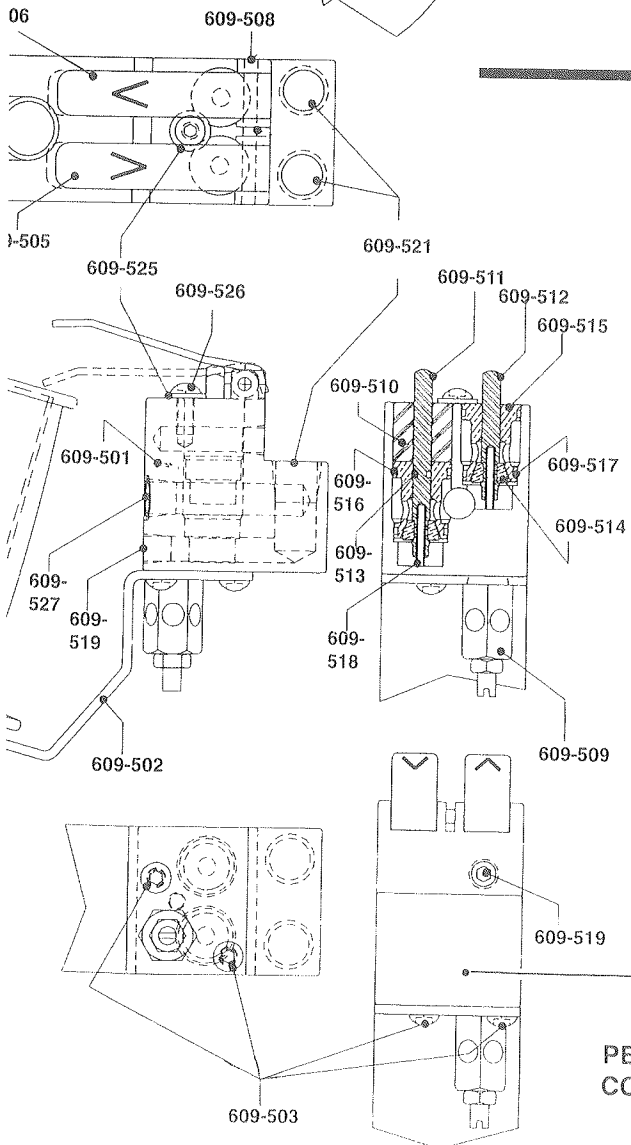
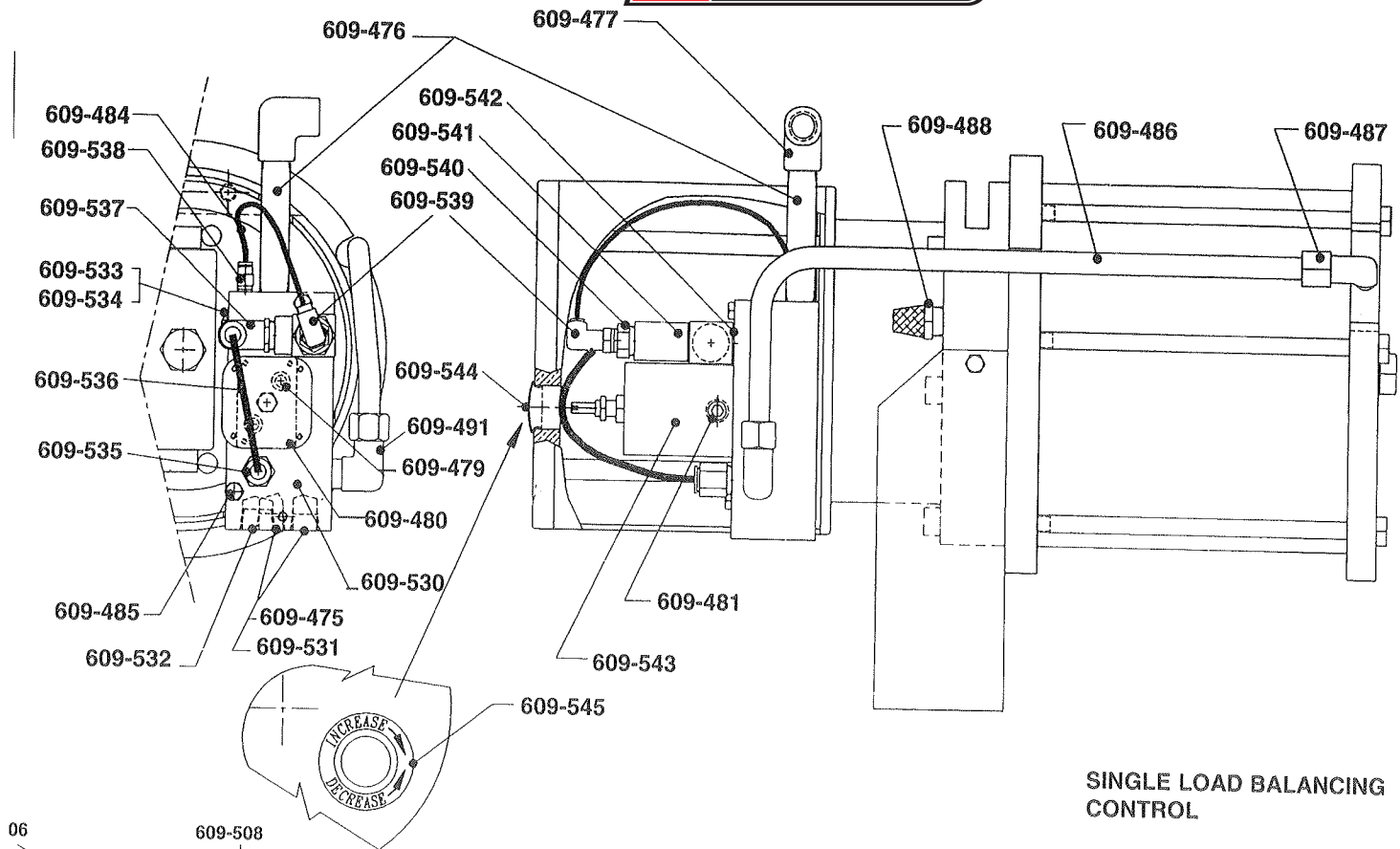
609-



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609-504





CM MAX BALANCER

CONTROL COMPONENTS PARTS LIST

Key No.	No. Req'd.	Part Name	Part Number		
			CM Max 120 (0950)	CM Max 200 (0951)	CM Max 300 (0952)
	1 *	Manifold Assembly for Balance	9416103		
	1 *	Manifold Assembly for Dual Balance	9421700		
	1 *	Manifold Assembly for Tri Balance	9531304		
	1 *	Metering Control Assembly Contains Key # 609-474 - 609-491	9408901		
609-474	1	Manifold	09424		
609-475	1	Auxiliary Port/	989050		
	1	Shipping Plug			
609-476	1	Inlet Pipe	09839		
609-477	1	Inlet Elbow	09833		
609-478	1	Control Air Relay	09827		
609-479	2	Relay Seal	09829		
609-480	4	Relay Attaching Screw	09828		
609-481		Relay Plug-included	989053		
609-482	1	Relay Fitting	09830		
609-483	1	Flow Control Valve	09832		
609-484	1	Pilot Line (Specify Length) 7" Balance/ 25" Pendant	09831		
609-485	2	Manifold Attaching Screw	09826		
609-488	1	Muffler	09837		
609-489	1	Strain Cable Attaching Screw	09848		
609-490	1	Strain Cable Attaching Screw Washer	09849		
609-491	1	Air Line Fitting - Manifold	09834		
609-486	1	Air Line	9601600	9601601	9530604
609-487	1	Air Line Fitting	09835	09835	09834**
609-500	1 *	Pendant Control Assembly Complete With 9 ft. Long Hoses 6 Items Key # 609-507, 609-520 - 609-523, & Assembly P006959	00956** ?		
609-507	1	Warning Tag	09841		
609-520	- 108"	Air Line - Specify Length Req'd. - Also Order Key # 609-522	09857		
609-521	4	Air Line Fitting	09858		
609-522	- 126"	Strain Relief Cable - Specify Length Req'd.	09879		

Not Sold Separately

* Subassemblies are recommended spare parts

** Parts that are common with the Max 500 are noted with a double asterisk.

Key No.	No. Req'd.	Part Name	Part Number		
			CM Max 120 (0950)	CM Max 200 (0951)	CM Max 300 (0952)
609-523	3	Strain Relief Sleeve	P008036		
609-499		Hand Control Key #609-501 - 609-512 (609-513-519 in 609-511 & 609-512)	09460		
609-501		Valve Block	09428		
609-502	1	Control Handle	09502		
609-503 609-526	2 1	Valve Block Attaching Screw	09848		
609-525	1	#12 zinc plated washer	09849		
609-504	1	Grip	09747		
609-505	1	Up Lever	09431		
609-506	1	Down Lever	09434		
609-508	1	Lever Pivot Pin	09436		
609-509	1	Speed Control Muffler	09855		
609-510	1	Cartridge Spacer	09437		
609-519	2	Valve Block Plug, 1/8"	989076		
609-527	1	Valve Block Plug, 1/4"	989053		
609-511	1 *	Up Stem Kit Key # 609-513-519	09438		
609-512	1 *	Down Stem Kit Key #609-514-519	09439		
609-513	1	Stem Seal	09851		
609-514	2	Rubber Seal	09440		
609-515	2	Cartridge Body	09441		
609-516	2	Cartridge Seal - Large	09852		
609-517	2	Cartridge Seal - Small	09853		
609-518	2	Stem Spring	09854		
609-530	1	Manifold Block (SLB)	09448		
609-531	2	Control Port Plug, 3/8"	989050		
609-532	1	Label, Balancing	09877		
609-533	1	Hole Seal	09836		
609-534	1	Hole Seal Screw	09856		
609-535	1	High Flow Fitting - Straight	09867		
609-536	-	High Flow Tube - Specify Length Req'd.	09868		
609-537	1	High Flow Fitting - 90°	09869		
609-538	1	Pilot Line Fitting - Straight	09870		
609-539	1	Pilot Line Fitting - 90°	09871		
609-540	1	Reducer	09872		
609-541	1	Check Valve, Pilot Operated	09873		
609-542	1	Check Valve Seal	09874		
609-543	1	Balancing Regulator	09875		
609-544	1	Control End Plate Plug	09876		



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CM MAX BALANCER

MECHANICAL COMPONENTS

PARTS LIST

Key No.	No. Reqd.	Part Name	Part Number		
			CM Max 120 (0950)	CM Max 200	CM Max 300
609-400	1	Cylinder Bottom	09402	09416	09420**
609-401	6	Cylinder Tie Bolt 4 for Max 120/6 all others		09804	
609-402	1	Cylinder O-Ring	09801	09809	09821**
609-403	1	Lockout-tagout Bolt Seal		09802**	
609-404	1	Lockout-tagout Bolt		09429**	
609-405	1	Piston Stop		09406	09444**
	1 *	Piston Assembly Key # 609-406 & 609-407		9408809**	
609-406	1	Piston Bolt		09407	
609-407	1	Piston Bolt O' ring		09803	
609-408	1	Piston	09403	09419	09421**
609-409	1	Piston U - Cup	09822	09823	09824**
609-411	1	Ball Screw		09807	
609-412	1	Cylinder	09404	09417	09422
609-413	1	Cylinder Head Plate	09405	09418	09423**
	1 *	Pocket Wheel Ass'y Key # 609-414 - 609-417		9530603	
609-414	1	Pocket Wheel Bearing - Cylinder End		09808	
609-415	1	Pocket Wheel		09408	
609-416	1	Ball Nut w / balls w / 0 screw		09705	
609-417	1	Ball Nut Set Screw		09810	
	2 *	Brake Sub-Assembly Key # 609-418 - 609-423		9408807**	
609-418	1	Lost Load Protector		09503	
609-419	1	Lost Load Protector Clevis Pin		09410**	
609-420	2	Lost Load Protector Bushings		09811	
609-421	1	Lost Load Protector Cotter Pin		09840**	
609-422	1	Lost Load Protector Spring		09812	
609-423	2	Lost Load Protector Spring Pin 2 more are part of the Max Ass'y		09813**	

Key No.	No. Reqd.	Part Name	Part Number		
			CM Max 120 (0950)	CM Max 200 (0951)	CM Max 300 (0952)
609-424	1	Pocket Wheel Bearing - Control End		09814**	
609-425	1	Center Section		09411	
609-426	5	Cylinder Attaching Screw		09815**	
609-427	1 *	Anti-Rotation Bar. Ass'y w/ rubber pads Contains Key # 609-428		09412	
609-428	2	Anti-Rotation Roller		09816	
	2	Anti-Rotation Pad		9426308	
	2	Anti-Rotation Bar		9330520	
609-429	1	Control Cover Anti - Rotation Tube		09413	
609-430	1	Control Cover End Plate		09414	
	1	Single Balance End Plate		09445	
	1	Dual Balance End Plate		9420911	
	1	Tri Balance End Plate		9531202	
609-431	4	Anti-Rotation Guide Screw		09817	
609-432	1	Chain Guide - Load Side		09415**	
609-433	2	Chain Guide Attaching Screw		09818**	
609-434	2	Chain Container Attaching Screw		09819**	
609-435	1 *	Chain Container Assembly		09820**	
609-436	1 14'	Load Chain (Specify Length Req'd.)		85988**	
609-446	1 *	Lower Hook Block Ass'y Contains 8 parts Key # 609-437 - 609-444		09500**	
	1 *	Latchlok Hook Ass'y Contains 9 parts Key # 609-437 - 609-445		1086	
609-437	1	Hook with Latch		09346	
609-438	1	Hook Block - Drilled		06341	
609-439	1	Hook Block - Tapped		06340	
609-440	1	Hook Nut		986429	
609-441	1	Hook Nut Pin		983793	
609-442	1	Hook Thrust Bearing		87081	
609-443	2	Hook Thrust Washer		87080	
609-444	1	Hook Block Screw		06727	
609-445	1	Latchlok Hook		09501	
609-447	1	Latch Kit		132 - P001771	

* Look in "BMSI" on computer for list of components in sub assemblies. Subassemblies are recommended spare parts

** Parts that are common with the Max 500 are noted with a double asterisk.

CM MAX BALANCER

MECHANICAL COMPONENTS PARTS LIST

Key No.	No. Reqd.	Part Name	CM Max 120 (0950)	CM Max 200 (0951)	CM Max 300 (0952)
609-448	2	Suspension Screw	09825**		
609-449	2	Suspension Screw Lock Washer	09859**		
609-450	1	Anti - Rotation Bar Attaching Screw	09805**		
	1	Attaching Washer	104 - P000260**		
609-451	1	Warning Label (Not Shown)	09844**		
609-452	1	Capacity Label (Not Shown)	09843	09845	09846
609-453	2	CM Max Label (Not Shown)		09847**	
609-454	1	Identification Label (Not Shown) Serial Tag	09842**		
609-455	1 *	Chain Guide Ass'y Loose Side	09430**		
	1	CM Max loose side Chain Guide	9401201		
	1	Roll Pin	P002084		
	1 *	Chain Container Assembly	109820		
	1	Eye Bolt	P000290		
	1	Thin Height Nylon Locknut	P000293		
	1	Chain Container	9435702		
609-456	-	Shim - Specify No. Req'd. Usually 2 required	09850**		
	1 *	Double Reaving Ass'y Assembly	0968		

* Look in "BMSI" on computer for list of components in sub assemblies. Subassemblies are recommended spare parts

** Parts that are common with the Max 500 are noted with double asterisk.

CM MAX BALANCER

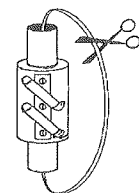
MAX 500 COMPONENTS (0943) PARTS LIST

Key No.	No. Reqd.	Part Name	Part Number	
				CM Max 500 (0943)
	1	Air Relay for Max 500	P008353	
	1	Cylinder Tube	9524007	
	6	M10 1.5 X 325 mm Hex Head Cap Screw	P007192	
	1	Pocket Wheel	9524004	
	1	Ball Screw	9524006	
	1	Ball Nut	P008307	
	1	Ball Bearing	09808	
	1	M08 1.25 X 12 mm Cup Point	09810	
	1	Center Section	9709212	
	1 *	Anti-Rotation Bar Assembly	9524010	
	1	Anti-Rotation Tube	9524008	
	1	End Plate	9524009	
	1	M16 2.0 X 285 mm Socket Head Cap Bolts	P007170	
	1	500# Capacity Tag	P007172	
	1 *	Metering Control Ass'y For Max 500	9528515	
	1	Tube Air Line Max 500	9611402	

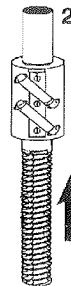
Caution is for Ball nut service & replacement:
Part #'s 09705 & 9524006

CAUTION! To Remove Cardboard Shipping Arbor, Follow Steps 1 through 4.

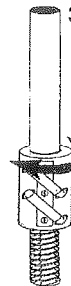
1. Cut & Discard Plastic Tie. Do Not Remove Cardboard Arbor.



2. Position Arbor Against Screw Thread.



3. Engage & Rotate Entire Nut Onto Screw.



4. Remove Arbor.



Rotation Shown for Right-Hand Thread.

CM MAX BALANCER

CONTROL COMPONENTS

PARTS LIST

Key No.	No. Req'd.	Part Name	Part Number		
			CM Max 120 (0950)	CM Max 200 (0951)	CM Max 300 (0952)
	1 *	Manifold Assembly for Balance	9416103		
	1 *	Manifold Assembly for Dual Balance	9421700		
	1 *	Manifold Assembly for Tri Balance	9531304		
	1 *	Metering Control Ass'y Contains Key # 609-474 - 609-491	9408901		
609-474	1	Manifold	09424		
609-475	1	Auxiliary Port/	989050		
	1	Shipping Plug			
609-476	1	Inlet Pipe	09839		
609-477	1	Inlet Elbow	09833		
609-478	1	Control Air Relay	09827		
609-479	2	Relay Seal	09829		
609-480	4	Relay Attaching Screw	09828		
609-481		Relay Plug-included	989053		
609-482	1	Relay Fitting	09830		
609-483	1	Flow Control Valve	09832		
609-484	1	Pilot Line (Specify Length) 7" Balance/ 25" Pendant	09831		
609-485	2	Manifold Attaching Screw	09826		
609-488	1	Muffler	09837		
609-489	1	Strain Cable Attaching Screw	09848		
609-490	1	Strain Cable Attaching Screw Washer	09849		
609-491	1	Air Line Fitting - Manifold	09834		
609-486	1	Air Line	9601600	9601601	9530604
609-487	1	Air Line Fitting	09835	09835	09834**

Key No.	No. Req'd.	Part Name	Part Number		
			CM Max 120 (0950)	CM Max 200 (0951)	CM Max 300 (0952)
609-500	1 *	Pendant Control Assembly Complete With 9 ft. Long Hoses 6 Items Key # 609-507, 609-520 - 609-523, & Assembly P006959	00956**		
609-507	1	Warning Tag	09841		
609-520	- 108"	Air Line - Specify Length Req'd. - Also Order Key # 609-522	09857		
609-521	4	Air Line Fitting	09858		
609-522	- 126"	Strain Relief Cable - Specify Length Req'd.	09879		
609-523	3	Strain Relief Sleeve	P008036		
609-499 & 609-512)		Hand Control Key #609-501 - 609-512 (609-513-519 in	1	09460	609-511
609-501		Valve Block	09428		
609-502	1	Control Handle	09502		
609-503	2	Valve Block Attaching Screw	09848		
609-526	1	#12 zinc plated washer	09849		
609-525	1	Grip	09747		
609-504	1	Up Lever	09431		
609-505	1	Down Lever	09434		
609-508	1	Lever Pivot Pin	09436		
609-509	1	Speed Control Muffler	09855		
609-510	1	Cartridge Spacer	09437		
609-511	1 *	Up Stem Kit Key # 609-513-519	09438		
609-512	1 *	Down Stem Kit Key #609-514-519	09439		
609-513	1	Stem Seal	09851		
609-514	2	Rubber Seal	09440		
609-515	2	Cartridge Body	09441		
609-516	2	Cartridge Seal - Large	09852		
609-517	2	Cartridge Seal - Small	09853		
609-518	2	Stem Spring	09854		
609-519	2	Valve Block Plug, 1/8"	989076		
609-527	1	Valve Block Plug, 1/4"	989053		

Not Sold Separately

* Subassemblies are recommended spare parts

** Parts that are common with the Max 500 are noted with a double asterisk.

