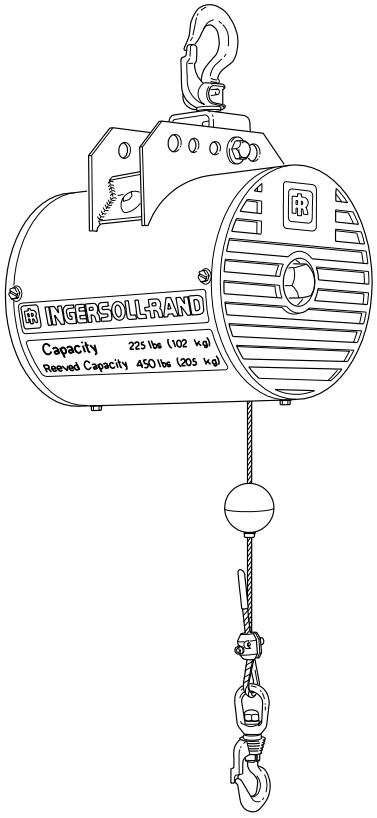
PARTS, OPERATION AND MAINTENANCE MANUAL

for

AIR LIFT BALANCER



READ THIS MANUAL BEFORE USING THESE PRODUCTS. This manual contains important safety, installation, operation and maintenance information. Make this manual available to all persons responsible for the operation, installation and maintenance of these products.

⚠WARNING

Do not use this balancer for lifting, supporting, or transporting people or lifting or supporting loads over people.

Always operate, inspect and maintain this balancer in accordance with applicable safety codes and regulations.

Refer all communications to the nearest Ingersoll-Rand Material Handling Office or Distributor.

Form MHD56088
Edition 2
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INGERSOLL-RAND®
MATERIAL HANDLING

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SAFETY INFORMATION

This manual provides important information for all personnel involved with the safe installation, operation and proper maintenance of this product. Even if you feel you are familiar with this or similar equipment, you should read this manual before operating the balancer.

Danger, Warning, Caution and Notice

Throughout this manual there are steps and procedures which, if not followed, may result in an injury. The following signal words are used to identify the level of potential hazard.

⚠ DANGER Danger is used to indicate the presence of a hazard which ***will*** cause ***severe*** injury, death, or substantial property damage if the warning is ignored.

⚠WARNING Warning is used to indicate the presence of a hazard which ***can*** cause ***severe*** injury, death, or substantial property damage if the warning is ignored.

⚠ CAUTION Caution is used to indicate the presence of a hazard which ***will*** or ***can*** cause injury or property damage if the warning is ignored.

NOTICE Notice is used to notify people of installation, operation, or maintenance information which is important but not hazard-related.

Safety Summary

⚠WARNING

• Do not use this balancer or attatched equipment for lifting, supporting, or transporting people or lifting or supporting loads over people.
• The supporting structures and load-attaching devices used in conjunction with these balancers must provide a safety factor of at least three times the rated capacity of the balancer. This is the customer's responsibility. If in doubt, consult a registered structural engineer.

NOTICE

• Lifting equipment is subject to different regulations in each country. These regulations may not be specified in this manual.

The National Safety Council, Accident Prevention Manual for Industrial Operations, Eighth Edition and other recognized safety sources make a common point: Employees who work near suspended loads or assist in hooking on or arranging a load should be instructed to keep out from under the load. From a safety standpoint, one factor is paramount: conduct all lifting operations in such a manner that if there were an equipment failure, no personnel would be injured. This means keep out from under a raised load and keep out of the line of force of any load.

The Occupational Safety and Health Act of 1970 generally places the burden of compliance with the owner/employer, not the manufacturer. Many OSHA requirements are not concerned or connected with the manufactured product but are, rather, associated with the final installation. It is the owner's responsibility and user's responsibility to determine the suitability of a product for any particular use. It is recommended that all applicable industry, trade association, federal, state and local regulations be checked. Read all operating instructions and warnings before operation.

Rigging: It is the responsibility of the operator to exercise caution, use common sense and be familiar with proper rigging techniques. See ASME B30.9 for rigging information, American National Standards Institute, 1430 Broadway, New York, NY 10018.

This manual has been produced by **Ingersoll-Rand** to provide dealers, mechanics, operators and company personnel with the information required to install, operate, maintain and repair the products described herein.
It is extremely important that mechanics and operators be familiar with the servicing procedures of these products, or like or similar products, and are physically capable of conducting the procedures. These personnel shall have a general working knowledge that includes:

1. Proper and safe use and application of mechanics common hand tools as well as special **Ingersoll-Rand** or recommended tools.
2. Safety procedures, precautions and work habits established by accepted industry standards.

Ingersoll-Rand can not know of, nor provide all the procedures by which product operations or repairs may be conducted and the hazards and/or results of each method. If operation or maintenance procedures not specifically recommended by the manufacturer are conducted, it must be ensured that product safety is not endangered by the actions taken. If unsure of an operation or maintenance procedure or step, personnel should place the product in a safe condition and contact supervisors and/or the factory for technical assistance.

SAFE OPERATING INSTRUCTIONS

The following warnings and operating instructions have been adapted in part from American National (Safety) Standards and are intended to avoid unsafe operating practices which might lead to injury or property damage.

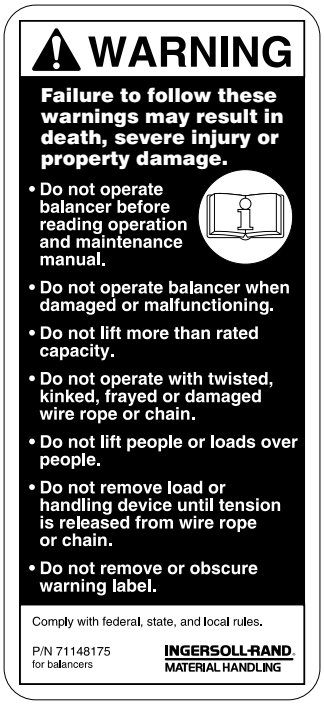
Ingersoll-Rand recognizes that most companies who use balancers have a safety program in force at their facility. In the event that some conflict exists between a rule set forth in this publication and a similar rule already set by an individual company, the more stringent of the two should take precedence.

Safe Operating Instructions are provided to make an operator aware of dangerous practices to avoid and are not necessarily limited to the following list. Refer to specific sections in the manual for additional safety information.

1. Only allow personnel trained in safety and operation of this balancer to operate this product.
2. Only operate a balancer if you are physically fit to do so.
3. When a "DO NOT OPERATE" sign is placed on the balancer, or controls, do not operate the balancer until the sign has been removed by designated personnel.
4. Do not use balancer if hook gate has been sprung or broken.
5. Check that the hook gates are closed before using.
6. Before each shift, check the balancer for wear and damage. Never use a balancer that inspection indicates is worn or damaged.
7. Never lift a load greater than the rated capacity of the balancer. See capacity labels attached to balancer.
8. Do not use more than one hook on a single load.
9. Never place your hand inside the throat area of a hook.
10. Never use the wire rope or chain as a sling.
11. Only operate a balancer when the wire rope or chain is centered over the hook. Do not "side pull" or "yard".
12. Never operate a balancer with twisted, kinked or damaged wire rope or chain.
13. Do not force hook into place by hammering.
14. Be certain the load is properly seated in the saddle of the hook.
15. Do not support the load on the tip of the hook.
16. Never run the wire rope or chain over a sharp edge.
17. Pay attention to the load at all times when operating the balancer.
18. Make sure everyone is clear of the load path. Do not lift a load over people.
19. Never use the balancer for lifting or lowering people, and never allow anyone to stand on a suspended load.
20. Do not swing a suspended load.
21. Do not leave load suspended when balancer is not in use.
22. Never leave a suspended load unattended.
23. Never weld or cut a load suspended by the balancer.
24. Ensure safety cable is installed.
25. Do not operate balancer if wire rope or chain jumping, excessive noise, jamming, overloading, or binding occurs.
26. Shut off air supply before performing any maintenance.
27. Avoid collision or bumping of balancer.

WARNING LABEL

Each balancer is shipped from the factory with the warning label shown. If the label is not attached to your balancer, order a new label and install it. See the parts list for the part number. Label is shown smaller than actual size.



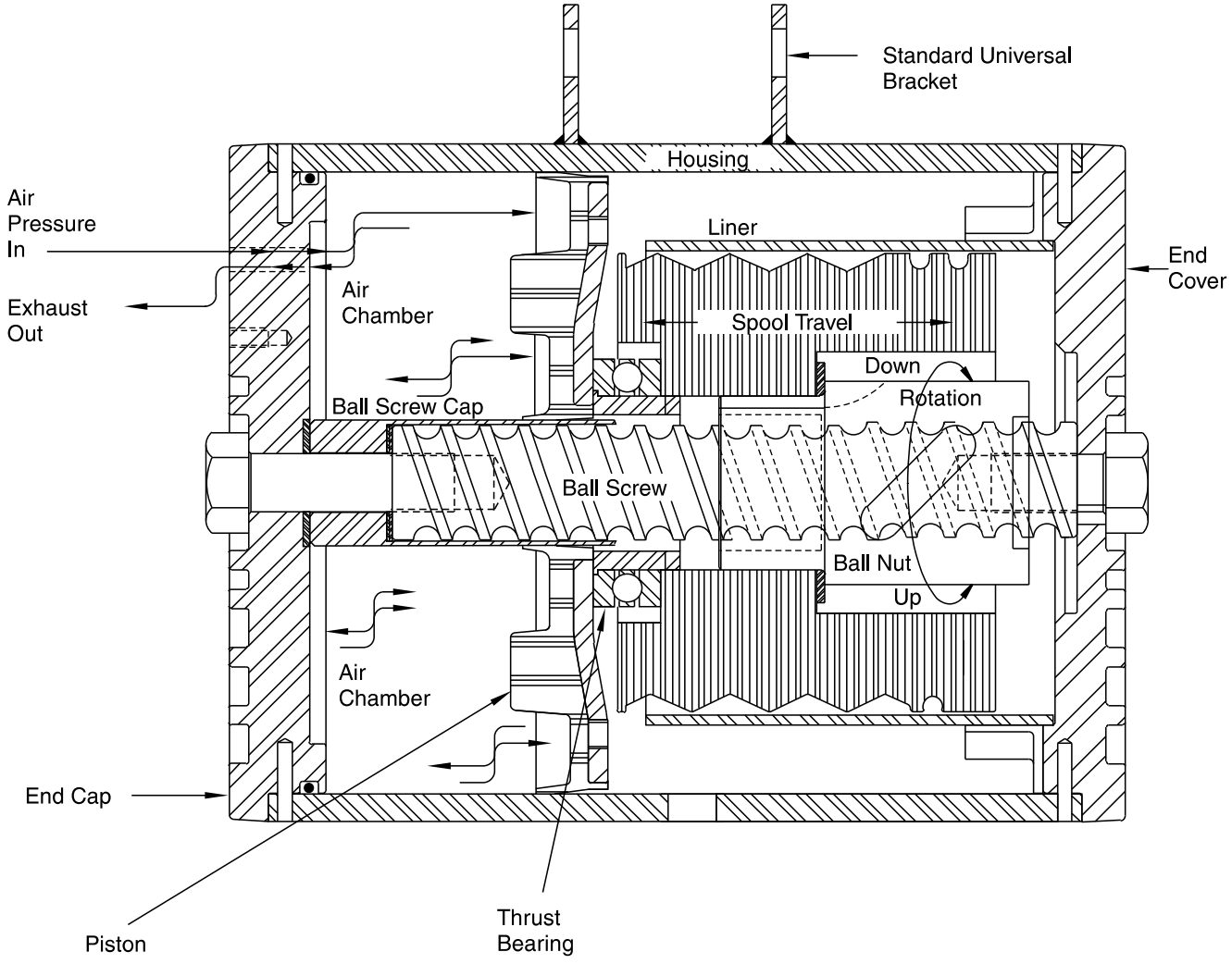
DESCRIPTION OF BALANCER OPERATION

Ingersoll-Rand Balancers have a “zero gravity” capability which allows the operator to effortlessly move and position a load. The operator grasps the load which is suspended from the balancer and by exerting a slight downward pressure causes the regulator to automatically bleed off control air, allowing the load to be lowered. The load is in a “zero gravity” condition and can be raised or lowered with minimal effort through the wire rope or chain length. All Balancers utilize a recoil control brake which prevents rapid upward cable or chain movement.

The spool and ball nut travel laterally on a stationary ball screw. This motion is caused by compressed air pushing against the piston which rides against a thrust bearing seated in the spool. The compressed air is regulated by an external control package.

The control package allows air to exhaust from the same port. When air enters, the wire rope or chain retracts and is wound around the spool. When air is exhausted the chamber loses pressure allowing the piston to retract, and wire rope or chain unwinds.

Air Lift Balancer Cross Section



(Dwg. MHTPA0703)

SPECIFICATIONS

Air Balancers "MAB" and MCB" Series

Model Number	Lifting Capacity		Vertical Travel		Body Diameter		Unit Weight	
Single Wire Rope Balancers								
	lb	**kg**	**in**	**mm**	**in**	**mm**	**lb**	**kg**
MAB100-56	100	45	56	1422	6	152	43	20
MAB120-76	120	54	76	1930	6	152	48	22
MAB150-52	150	68	52	1321	6	152	43	20
MAB225-55	225	102	55	1397	8	203	47	21
MAB225-73	225	102	73	1854	8	203	53	24
MAB225-117	225	102	117	2972	10	254	75	34
MAB350-55	350	159	55	1397	10	254	58	26
MAB350-73	350	159	73	1854	10	254	67	30
MAB300-101	300	136	101	2565	12	305	117	53
MAB500-46	500	227	46	1168	12	305	91	41
MAB500-64	500	227	64	1626	12	305	105	48
Chain Balancers								
MCB150-52	150	68	52	1321	6	152	43	20
MCB150-68	150	68	68	1727	6	152	48	22
MCB225-52	225	102	52	1321	8	203	47	21
MCB225-68	225	102	68	1727	8	203	53	24
MCB200-120	200	91	120	3048	10	254	75	34
MCB350-52	350	159	52	1321	10	254	58	26
MCB350-68	350	159	68	1727	10	254	67	30
MCB300-106	300	136	106	2692	12	305	117	53
MCB500-44	500	227	44	1118	12	305	91	41
MCB500-60	500	227	60	1524	12	305	105	48

Model Number	Lifting Capacity		Vertical Travel		Body Diameter		Unit Weight	
Wire Rope Reeved Balancers								
	lb	**kg**	**in**	**mm**	**in**	**mm**	**lb**	**kg**
MAB700-27	700	318	27	686	10	254	61	28
MAB700-36	700	318	36	914	10	254	70	32
MAB600-50	600	272	50	1270	12	305	120	54
MAB1000-32	1000	454	32	813	12	305	108	49
Wire Rope Tandem Balancers								
MAB450-117	450	204	117	2972	10	254	150	68
MAB700-55	700	318	55	1397	10	254	116	53
MAB700-73	700	318	73	1854	10	254	134	61
MAB600-101	600	272	101	2565	12	305	234	106
MAB1000-46	1000	454	46	1168	12	305	182	82
MAB1000-64	1000	454	64	1626	12	305	210	95
Wire Rope Tandem Reeved Balancers								
MAB1400-36	1400	635	36	914	10	254	144	65
MAB2000-32	2000	907	32	813	12	305	220	100

Air Balancers "MAB and MCB" Series Options

Part Number	Unit Weight		Description
	lb	kg	
Controls			
C017	9	4.1	Pendant Control module for 6 and 8 inch (152 and 203 mm) Models.
C091			Pendant Control module for 10 and 12 inch (254 and 305 mm) Models.
C018	5	2.3	Single weight balance control module for 150 lb (68 kg) capacity and under.
C090	6	2.7	High relieving single weight balance control module for over 150 lb (68 kg) capacity.
C089			Hydraulic Retract Assembly.
Suspension			
S013	15	6.8	Trolley for I-Beam fits: 2 to 4 inch (51 to 102 mm) rail flange. 1000 lb (454 kg) capacity.
S014	15	6.8	Trolley for patented track fits: 2 to 4 inch (51 to 102 mm) rail flange. 1000 lb (454 kg) capacity.
S016	4	1.8	Single hanger hook 1000 lb (454 kg) capacity.
S001A	4	1.8	Trolley for R000 Series 4 inch (102 mm) aluminum enclosed rail 500 lb (227 kg) capacity. (includes balancer mounting bolts)
S806A	9	4.1	Trolley for R800 Series 8 inch (203 mm) aluminum enclosed rail 1000 lb (454 kg) capacity. (includes balancer mounting bolts)

Model Code Explanation

Example: **MAB** **100** - **56** **S1** **C1**

Series
- **MAB = Wire Rope Balancer**
- MCB = Chain Balancer

Capacity = Weight in pounds (lbs.)

Travel = Length in inches (in.)

Suspension
- S0 = No Suspension
- **S1 = I-Beam Trolley**
- S2 = Patented Track Trolley
- S3 = Hook
- S4 = 4 in. (102 mm) Rail Trolley
- S5 = 8 in. (204 mm) Rail Trolley

Control
- C0 = No Controls
- **C1 = Pendant, 10 ft. (3 m) Reach**
- C2 = Single Balance

INSTALLATION

Prior to installing the balancer, carefully inspect it for possible shipping damage.
Balancers are supplied fully lubricated from the factory.

⚠ CAUTION

• Owners and users are advised to examine specific, local or other regulations, including American National Standards Institute and/or OSHA Regulations which may apply to a particular type of use of this product before installing or putting balancer to use.
• A falling load can cause injury or death. Before installing, read "SAFETY INFORMATION".

Balancer

Make certain your balancer is properly installed. A little extra time and effort in so doing can contribute a lot toward preventing accidents and helping you get the best service possible.

Always make certain the supporting member from which the balancer is suspended is strong enough to support the weight of the balancer plus the weight of a maximum rated load plus a generous factor of at least 300% of the combined weights.

If the balancer is suspended by a top hook, the supporting member should rest completely within the saddle of the hook and be centered directly above the hook shank. Do not use a supporting member that tilts the balancer to one side or the other.

Hook Mounted Balancer Installation

Place hook over mounting structure. Make sure hook gate is engaged.

Trolley Mounted Balancer Installation

When installing the balancer and trolley on the beam, make certain the side plates are parallel and vertical. After installation, operate the trolley over the entire length of the beam with a capacity load. Ensure rail stops are installed before operating balancer. Use Grade 5 or better bolts when attaching balancer to trolley assembly. Refer to Trolley Suspension Kit Assembly in this section.

⚠ CAUTION

• To avoid an unbalanced load which may damage the trolley, the balancer must be centered under the trolley.

Rail Mounted Balancer Installation

For proper and safe installation of the balancer on a rail system refer to Installation and Maintenance Manual MHD56091.

Air System

The supply air must be clean and free from water or moisture. A minimum of 100 psi (6.9 bar/690 kPa) at the balancer is required to provide rated capacity. Do not exceed 150 psi (1034 kPa).

⚠ WARNING

• Do not exceed 150 psi (1034 kPa) inlet pressure. Do not use a lubricator of any kind. Oil will damage internal components.

Air Lines

The inside diameter of the balancer air supply lines must not be smaller than 3/8 in. (10 mm) based on a maximum of 100 ft. (30 m) between the air supply and the balancer. Contact the factory for recommended air line sizes for distances greater than 100 ft. (30 m). Before making final connections, all air supply lines should be purged before connecting to unit inlet. Supply lines should be as short and straight as installation conditions will permit. Long transmission lines and excessive use of fittings, elbows, tees, globe valves, etc. cause a reduction in pressure due to restrictions and surface friction in the lines. If quick-disconnect fittings are used at the inlet of the balancer, they must have at least a 3/8 in. (10 mm) air passage. Use of smaller fittings will reduce performance.

Air Line Filter

It is recommended that an air line strainer/filter be installed as close as practical to the balancer air inlet port. The strainer/filter should provide 10 micron filtration and include a moisture trap. Clean the strainer/filter monthly to maintain its operating efficiency. Refer to "ACCESSORIES" in the parts section for the recommended Filter and Regulator.

To maintain dry air, the frequency for draining the filter should also be based on the condition of the air supply. We suggest the filter be drained weekly at first. Depending on air supply condition, a proper filter drain schedule should be established.

Moisture in Air Lines

Moisture that reaches the air motor through the supply lines is the chief factor in determining the length of time between service overhauls. Moisture traps can help to eliminate moisture. Other methods, such as an air receiver which collects moisture before it reaches the balancer controls or an aftercooler at the compressor that cools the air prior to distribution through the supply lines, are also helpful.

Control Assemblies

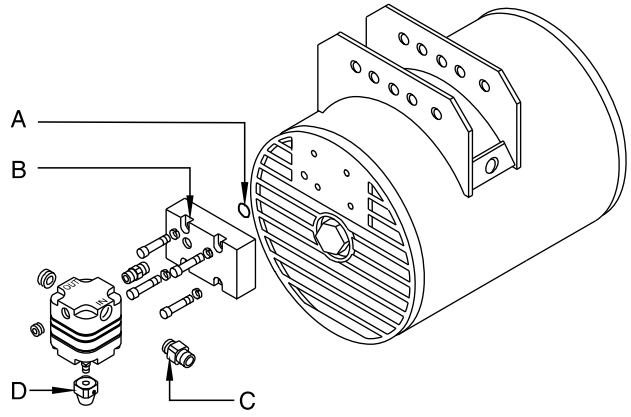
NOTICE

• Maximum lift capacity of balancer is calculated at 100 psi (690 kPa).

Single Balance Control Module C018 Capacity: Under 150 lbs (68 kg)

Control Module Installation (See Dwg. MHTPA0704)

1. Place balancer on a clean surface. Position the end cap which has orifice and tapped hole up.
2. Remove single balance control assembly parts from package. Insert and seat 'O' ring (A) properly into manifold (B). Attach manifold to end cap with four enclosed screws. Install single balance control assembly to manifold.



(Dwg. MHTPA0704)

NOTICE

• The air seal between the manifold and balancer end cap is vital for proper operation.

⚠WARNING

• Do not exceed 150 psi (1034 kPa) inlet pressure. Do not use a lubricator of any kind. Oil will damage internal components.

Connecting Air Supply

Before connecting air supply, close regulator by turning regulator knob counterclockwise until it stops.

1. Blow out air supply lines before connection. Ensure lines are free of all contaminants.
2. Connect clean, filtered, contaminant free air supply to check valve (C). (See Dwg. MHTPA0704)

Operational Adjustment

1. Attach load to be balanced before adjusting air.
2. Slowly turn regulator knob (D) clockwise until load begins to lift. Adjust knob until it reaches balance point (no drift).

Resetting Recoil Control Brake

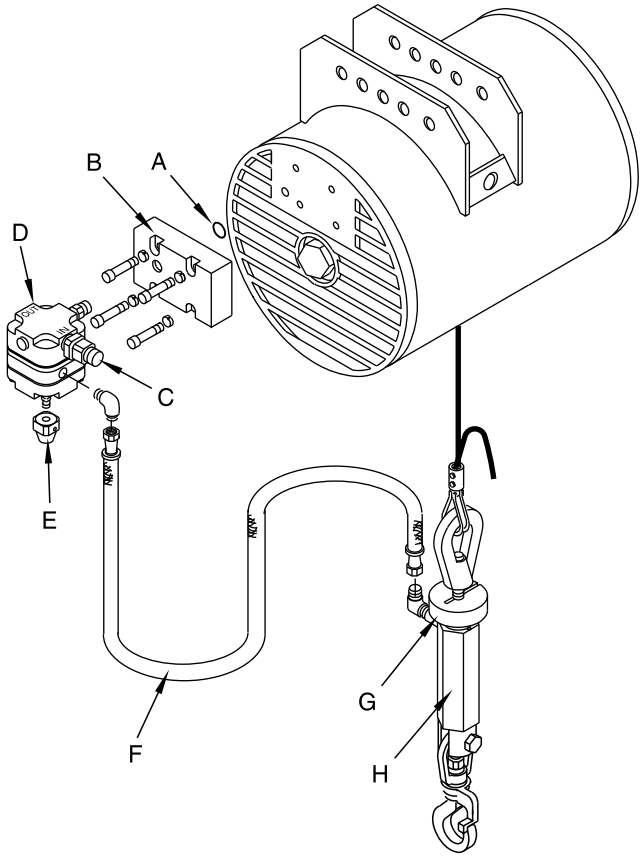
Reset unit after brake has been activated.

1. Turn regulator knob (D) counterclockwise slowly until hook lowers.
2. This will release the brake. Follow operational adjustment to reset balancer.

Single Balance Control Module C090 Capacity: 150 lbs. (68 kg) and over

Control Module Installation (See Dwg. MHTPA0705)

1. Place balancer on a clean surface, with end which has orifice and tapped hole up.
2. Remove single balance control assembly parts from package. Insert and seat 'O' ring (A) properly into manifold (B). Attach manifold to end cap with four enclosed screws.



(Dwg. MHTPA0705)

NOTICE

• The air seal between the manifold and balancer end cap is vital for proper operation.

3. Attach pilot regulator control (H) to wire rope or chain (see load hook installation in this section).
4. Open regulator (D) by turning knob (E) clockwise until it stops.
5. Open pilot regulator (H) by turning knob (G) counterclockwise.
6. Attach air line (F) to regulators (D) and (H).

Resetting Recol Control Brake

WARNING

• Do not exceed 150 psi (1034 kPa) inlet pressure. Do not use a lubricator of any kind. Oil will damage internal components.

Connecting Air Supply

Before connecting air supply follow steps 1 through 6 in Control Module Installation.

1. Blow out air supply lines before connection. Ensure lines are free of all contaminants.
2. Connect clean, filtered, contaminant free air supply to check valve (C).

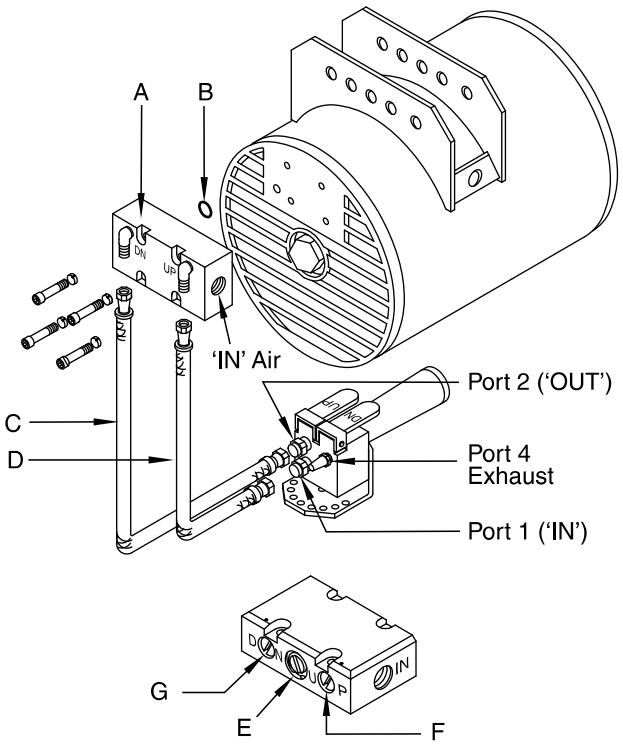
Operational Adjustment (See Dwg. MHTPA0705)

1. Attach load to hook.
2. Close pilot regulator (H) by slowly turning ring (G) clockwise. This will cause the load to lift. Adjust until load reaches a balance point (no drift up or down). Then go back to the regulator knob (E) and turn it counterclockwise. Readjust pilot regulator (H) until it reaches balance point (no drift).
3. Repeat procedure “2” above until load can be raised and lowered with minimal effort.

Resetting Unit

Reset unit after brake has been activated.

1. Turn regulator knob (E) counterclockwise slowly until hook lowers.
2. This will release the brake. Follow operational adjustment to reset balancer.



(Dwg. MHTPA0706)

Pendant Control Module C017 for 6 and 8 inch Models

Control Module Installation (See Dwg. MHTPA0706)

1. Place balancer on a clean surface, with end which has orifice and tapped holes up.
2. Remove control module assembly (A) from package. Insert and seat 'O' ring (B) properly into control module manifold (A). Attach control module manifold to end cap with four enclosed screws.

NOTICE

• The air seal between the control module manifold and balancer end cap is vital for proper operation.

3. Install pendant control assembly to control module manifold.

WARNING

• Do not exceed 150 psi (1034 kPa) inlet pressure. Do not use a lubricator of any kind. Oil will damage internal components.

Connecting Air Supply (See Dwg. MHTPA0706)

1. Blow out air supply lines before connection. Ensure lines are free of all contaminants.
2. Connect clean, filtered, contaminant free, air supply to port labeled “IN” on control module assembly (A).
3. Connect hoses (C) and (D) to proper fittings as shown.
4. Hose (C) must be attached to fitting labeled “DN” on control module (A) and port (2) 'OUT' on pendant handle. Hose (D) must be attached to fitting labeled “UP” on control module (A) and port (1) 'IN' on pendant handle.

Operational Adjustments

NOTICE

• The “UP” (F) and “DN” (G) speed control screws are closed when shipped to prevent accidental operation.

1. Attach an empty fixture to balancer if available. If an empty fixture is not available, the load hook must be in place as a minimum load.
2. Turn the “UP” (F) and “DN” (G) screws counterclockwise 1/2 turn each and operate both the up and down controls. Adjust each screw according to your needs. Turning the “UP” screw counterclockwise increases up speed. Turning it clockwise decreases up speed. The “DN” screw adjusts down speed similarly, and independently of up speed.
3. After adjusting up and down speeds, place the load hook (and fixture if attached) in the middle of vertical travel. Hook (and fixture if attached) should stay in a stationary position. If hook (and/or fixture) slowly drop, adjust the balance screw (E) to provide zero, or a slight upward drift. Turning the screw counterclockwise opens valve (G) and will eliminate downward drift.

Reset unit after brake has been activated.

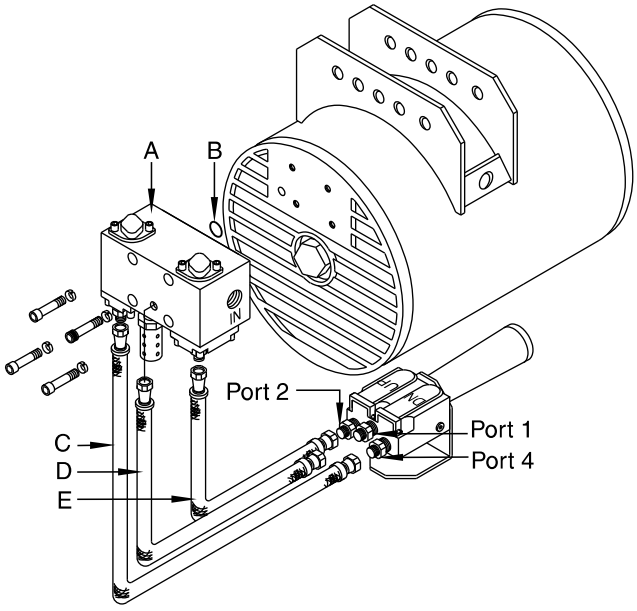
1. Turn regulator screw (E) counterclockwise slowly or depress the “DN” pendant lever until the hook lowers.
2. This will release the brake. Follow operational adjustment to reset balancer.

Pendant Control Module C091 for 10 and 12 inch Models

In certain applications where maximum lowering speed is not required the C017 pendant control may be used with 10 and 12 inch models.

Control Module Installation (See Dwg. MHTPA0707)

1. Place balancer on a clean surface, with end which has orifice and tapped holes up.
2. Remove control module assembly (A) from package. Insert and seat 'O' ring (B) properly into control module manifold (A). Attach control module assembly to end cap with four enclosed screws.



(Dwg. MHTPA0707)

NOTICE

• The air seal between the control module manifold and balancer end cap is vital for proper operation.

3. Install pendant control assembly to control module manifold.

⚠WARNING

• Do not exceed 150 psi (1034 kPa) inlet pressure. Do not use a lubricator of any kind. Oil will damage internal components.

Connecting Air Supply

1. Blow out air supply lines before connection. Ensure lines are free of all contaminants.
2. Connect clean, filtered, contaminant free, air supply to port labeled “IN” on control module assembly (A).
3. Connect hoses (C), (D) and (E) to proper fittings as shown.
4. Hose (C) must be attached to fitting labeled “DN” on control module (A) and port (4) on pendant handle. Hose (D) must be attached to center fitting on control module (A) and port (1) on pendant handle. Hose (E) must be attached to fitting labeled “UP” on control module (A) and port (2) on pendant handle.

Operational Adjustments

The “UP” and “DN” speed control screws are closed when shipped to prevent accidental operation. They must be adjusted before the balance screw on the control module assembly (A) is adjusted.

1. Attach an empty fixture to balancer if available. If an empty fixture is not available, the load hook must be in place as a minimum load.
2. Turn the “UP” and “DN” screws counterclockwise 1/2 turn each and operate both the up and down pendant controls. Adjust each screw according to your needs. Turning the “UP” screw counterclockwise increases up speed. Turning it clockwise decreases up speed. The “DN” screw adjusts down speed similarly, and independently of up speed.
3. After adjusting up and down speeds, place the load hook (and fixture if attached) in the middle of vertical travel. Hook (and fixture if attached) should stay in a stationary position. If hook (and/or fixture) slowly drop, adjust the balance screw on the control module assembly (A) to provide zero, or a slight upward drift. Turning the screw counterclockwise will eliminate downward drift.

Resetting Recoil Control Brake

Reset unit after brake has been activated.

1. Turn regulator screw counterclockwise slowly or depress the “DN” pendant lever until the hook lowers.
2. This will release the brake. Follow operational adjustment to reset balancer.

Overhead Assemblies

Single Hanger Hook Assembly C016

Hanger Hook Installation (See Dwg. MHTPA0708)

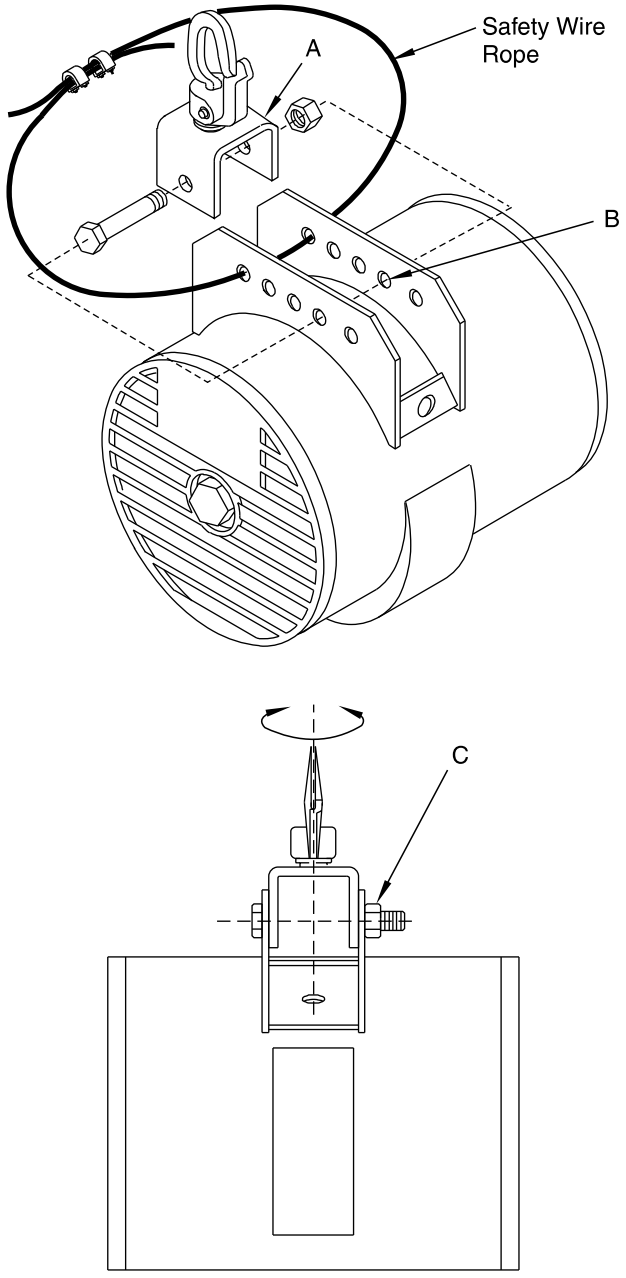
1. Place balancer on clean surface.
2. Bolt hanger hook assembly (A) to universal mounting bracket, one hole off center (B) toward wire rope guide.
3. Secure hanger bolt (C). Check hook assembly swivels freely.

⚠WARNING

• Severe injury and/or property damage may occur if overhead support unit capacity is less than three times the balancer capacity and/or safety wire rope is not installed.

Safety Wire rope Installation

1. Attach safety wire rope through universal mounting bracket and around overhead support.
2. Torque clamp nuts to 7.5 ft lbs (10 Nm).

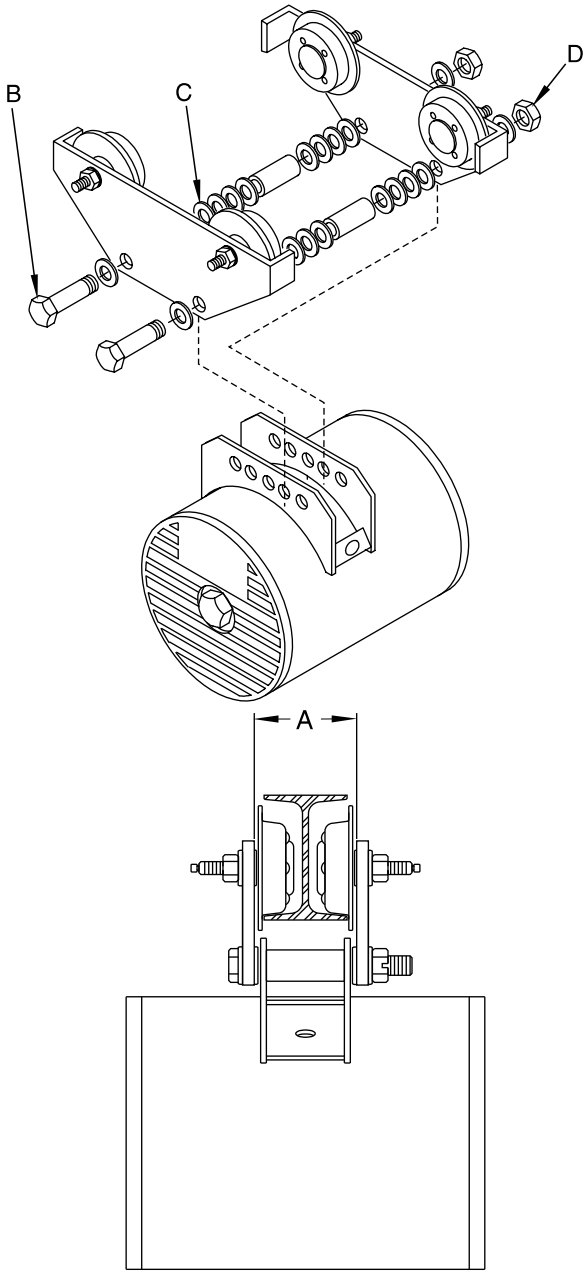


(Dwg. MHTPA0708)

Trolley Suspension Kit Assembly S013 (I-Beam) and S014 (Patented Track)

Trolley Installation (See Dwg. MHTPA0709)

1. Place balancer on clean surface.
2. Attach trolley to balancer as shown.
3. Dimension (A) should be 7/8 in. (22 mm) greater than rail flange width.
4. To adjust trolley center to center dimensions, remove bolts (B) and add or remove washers (C) equally at all four locations to suit.
5. After adjustments, secure flex nuts (D).



(Dwg. MHTPA0709)

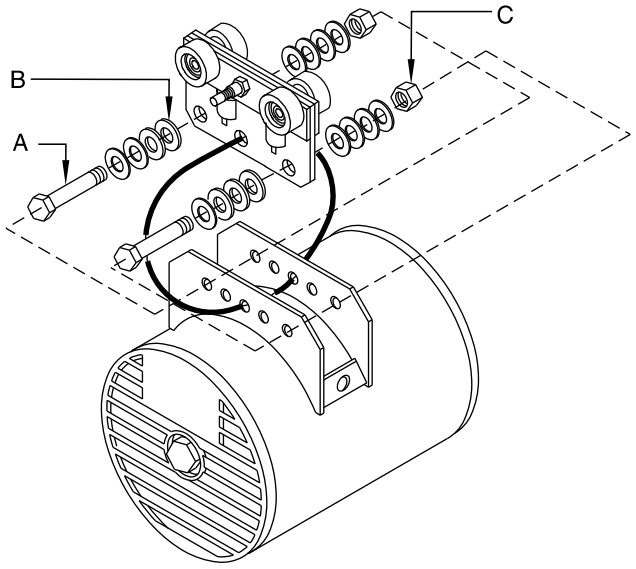
⚠WARNING

• Severe injury and/or property damage may occur if suspension kit is not installed correctly, or if installed on a rail flange other than specified. Rail stops must not contact balancer housing.

Enclosed Aluminum Rail Trolley Suspension Kit, 4 in. (102 mm) (S001) and 8 in. (203 mm) (S806)

Trolley Installation (See Dwg. MHTPA0710)

1. Place balancer on a clean surface.
2. Attach Trolley to balancer as shown.
3. Install safety wire rope as shown.
4. To adjust trolley center to center dimensions, remove bolts (A) and add or remove washers (B) equally at all four locations to suit.
5. After adjustments, secure flex nuts (C). Do not over tighten. Trolley should have 0.062 to 0.93 in. (1.6 to 2.4 mm) clearance between washers, for track alignment.



(Dwg. MHTPA0710)

⚠WARNING

• Severe injury and/or property damage may occur if suspension kit is not installed correctly, or if installed on a rail flange other than specified. Rail stops must not contact balancer housing.

Load Hook Assembly

Load Hook Installation KP2031 and KP2086 (See Dwg. MHTPA0711)

1. Install load hook as shown. (See Figure A.)
2. Remove bolts (A) from wire rope clamp. Lightly lubricate the bolt and wire rope clamp threads with oil. Loosely reassemble the bolts into the wire rope clamp. (See Figure B.)
3. Pass one end of the wire rope (B) through the wire rope clamp (E). (See Figure B.)

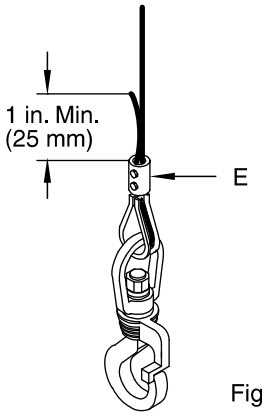


Figure A

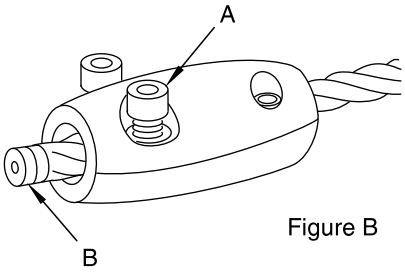


Figure B

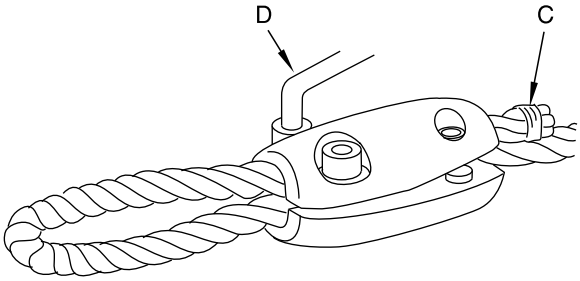


Figure C

(Dwg. MHTPA0711)

4. Return the end of the wire rope back through the wire rope clamp forming a loop (C), securing the thimble close to the face of the wire rope clamp. It is important that no part of the thimble enters the rope groove of the wire rope clamp.
5. Using a torque wrench (D), set to 4.3 ft lbs. (6 Nm), alternate and gradually tighten the bolts, turning the wire rope clamp as necessary, until the specified torque has been reached on each bolt. If correctly assembled, the top of both halves of the wire rope clamp should be matched.

⚠ WARNING

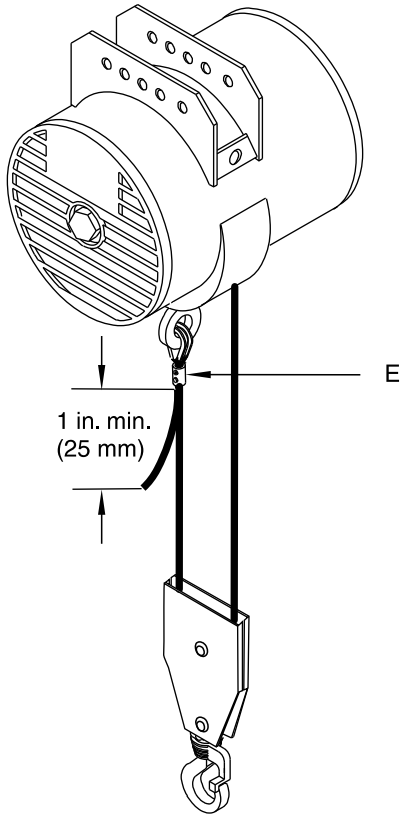
• Do not cut excess wire rope until a trial run has been performed.

6. If no adjustment is required, cut off excess wire rope. Leave at least 1 in. (25 mm) protruding past wire rope clamp (E).
7. After the wire rope clamp assembly has been subjected to its initial loading, it is important to retighten the wire rope clamp bolts to the specified torque values. Where practical, the heaviest loading anticipated should be applied before retightening the bolts. After this procedure further retightening should not be necessary.

Reeved and Tandem Reeved Installation

(See Dwg. MHTPA0712)

1. Install sheave.
2. Follow procedures 2 through 6 in Load Hook Installation.
3. Attach wire rope free end to eye bolt in can housing on single reeved balancers. Attach wire rope free end to the connecting bar on tandem reeved (double sheave) balancers.
4. Follow procedure 7 in "Load Hook Installation".



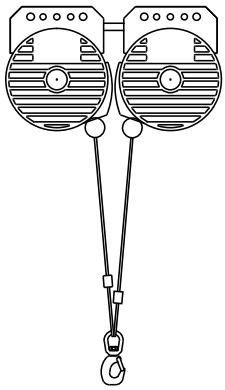
(Dwg. MHTPA0712)

Tandem and Tandem Reeved Balancer Installation

A connecting “tow” bar must be installed between the two balancers to ensure correct spacing is maintained at all times. Balancers must be mounted with wire rope guides toward each other.

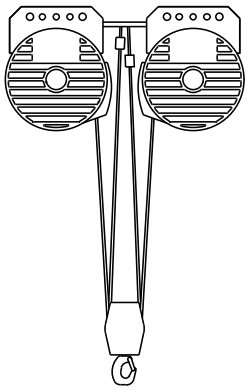
Hook and trolley suspension systems for tandem and tandem reeved balancers are the same as for single balancers.

Tandem Balancer



(Dwg. MHTPA0781)

Tandem Reeved Balancer



(Dwg. MHTPA0782)

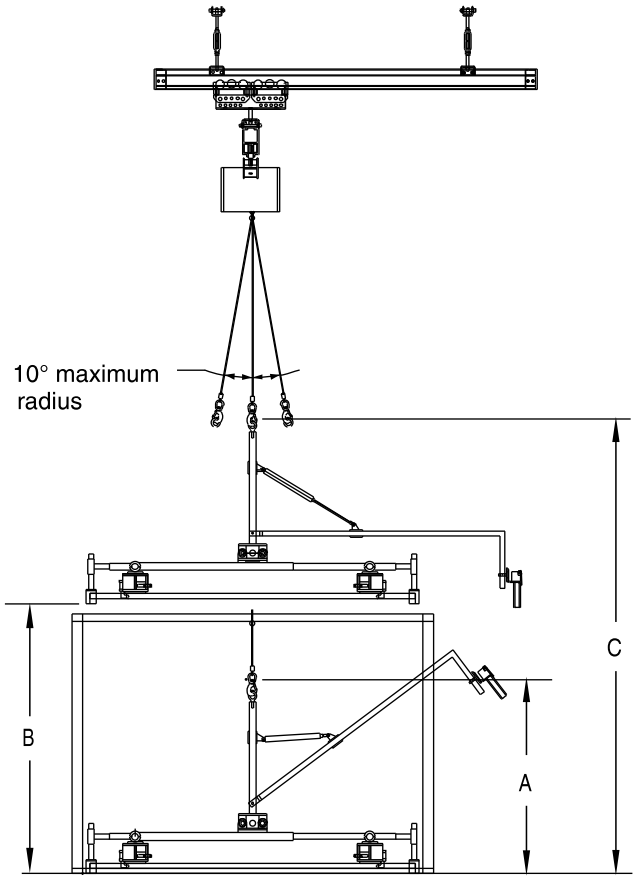
On tandem reeved balancers the free end of the wire rope from each balancer is attached to the connecting (tow) bar.

Safety Wire rope Installation
Height Measurement (See Dwg. MHTPA0713)

1. Measure the lowest drop or load position (A).
2. Measure the highest point of clearance (B).
3. Hook C = A + B + (3 to 5 in. (76 to 127 mm)) (clearance).

Load Hook Positioning (See Dwg. MHTPA0713)

1. The ideal overhead position of the balancer with respect to the load hook is vertical. Position balancer directly above load.
2. The maximum radius of deflection is 10 degrees. A larger radius will cause the wire rope or chain to wear.



(Dwg. MHTPA0713)

NOTICE

• Follow Installation Procedures described in the preceding pages to match your particular workstation.

Recoil Control Brake Assembly

All balancers are provided with a recoil control brake. If the recoil control brake has been activated the balancer will not operate until the brake arm is reset. Refer to the "OPERATION" section for instructions on resetting the recoil control brake.

Storing the Balancer

1. Always store the balancer in a no load condition.
2. Wipe off all dirt and water.
3. Oil the wire rope/load chain, hook pins and hook gate.
4. Place in a dry location.
5. Plug balancer air inlet port.
6. Before returning balancer to service follow instructions for Balancers not in Regular Service in the "INSPECTION" section.

OPERATION

The four most important aspects of balancer operation are:
1. Follow all safety instructions when operating balancer.
2. Allow only people trained in safety and operation on this product to operate balancer.
3. Subject each balancer to a regular inspection and maintenance procedure.
4. Be aware of the balancer capacity and weight of load at all times.

⚠ WARNING

• Only allow personnel trained in safety and operation of this product to operate the balancer and trolley.
• The balancer is not designed or suitable for lifting, lowering or moving persons. Never lift loads over people.

Operators must be physically competent. Operators must have no health condition which might affect their ability to act, and they must have good hearing, vision and depth perception. The balancer operator must be carefully instructed in his duties and must understand the operation of the balancer, including a study of the manufacturer's literature. The operator must thoroughly understand proper methods of hitching loads and should have a good attitude regarding safety. It is the operator's responsibility to refuse to operate the balancer under unsafe conditions.

Initial Operating Checks

Balancers are tested for proper operation prior to leaving the factory. Prior to placing the balancer into service the following initial operating checks should be performed.
1. After installation of trolley or rail mounted balancers, check to ensure the balancer is centered and securely connected to the rail hanger, trolley or supporting member.
2. Check for air leaks in the supply hose and fittings.
3. Operate along the entire length of the beam or rail.
4. Check balancer performance when raising, moving and lowering test load(s). Balancer and trolley must operate smoothly prior to being placed in service.
5. Check to see that the load is securely inserted in the hook, and that the hook gate is closed.

Recoil Control Brake

The recoil control brake is a standard feature of all "M" series air balancers. The recoil control brake prevents rapid upward wire rope or chain movement. When the recoil control brake senses overspeeding of the chain or wire rope, the brake arm (147), is thrown outward until engaged with the inner diameter of the balancer body. The brake arm is designed to immediately stop wire rope or chain movement, preventing an unsafe condition.

Re-Setting of Recoil Control Brake

If the recoil control brake is activated the balancer will not operate until the brake arm (147) is re-set.

To re-set:
On pendant controlled units, first release air pressure by depressing the down pendant valve. After the air pressure is released the brake arm (147) should re-set. If it does not, depress the down pendant lever while pulling down on the load hook. This will allow the brake arm (147) to re-set. The balancer is now ready to be used. If the brake was activated due to a loss of load resulting from hook, wire rope or chain damage, see pertinent information in "MAINTENANCE" section.

Single Balance Control Module C018

The C018 Single Balance Control Module's basic function is to support a constant non varying weight at zero gravity.

The 'O' ring (KP2078), regulator (KP2062), check valve (KP2063), and manifold (KP2059) are the major components of this control package. The 'O' ring is the seal between the manifold and the balancer housing. The regulator adjusts the air flow to support the constant, non varying, weight at zero gravity within the balancer's capacity range. The check valve prevents the load from dropping if the main air supply to the balancer is lost, and the manifold links these components together.

Adjustments to this control package are done with the self relieving regulator. A clockwise turn of knob (KP2074) increases the pressure through the regulator. A counter-clockwise turn of knob (KP2074) reduces the pressure to regulator. This compensation of air pressure allows the balancer to support any weight up to the rated capacity.

The only other factor which effects the balancer's lifting capacity is the amount of air pressure that is supplied.

Example: The MBA100-061 will lift 100 lb (45 kg) at 100 psi (690 kPa). If pressure is only 50 psi (345 kPa), it will reduce the balancer lifting capacity by 50%.

High Relieving Single Balance Control Module C090

Like the C018 Single Balance Control Module, the C090 High Relieving Single Balance Control Module's basic function is to support a constant, non varying, weight at zero gravity. One of the differences between the two control modules is the pilot valve which increases or decreases the pilot pressure to the self relieving regulator.

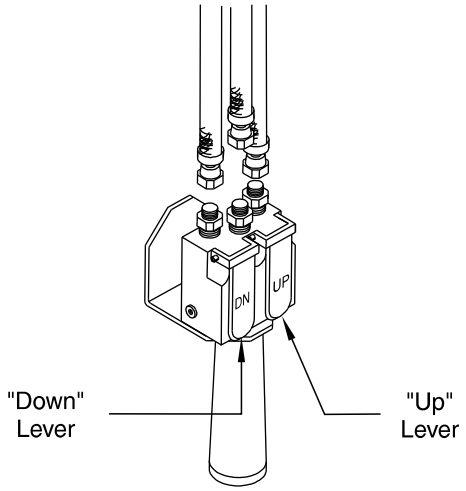
This control option is recommended for loads above 150 lb (68 kg).

Pendant Control Module C017

The C017 Pendant Control Module's function, unlike the C018 single balance control, is used for varying weight applications.

Balancers with a pendant control will function similar to a chain or wire rope hoist. Unlike other hoists, the balancer's wire rope or chain travels on a ball screw giving it the freedom to achieve any position desired (see “Description of Balancer Operation” Section for a complete explanation of the internal working procedure). The balancer also has a free float action. This allows the operator to physically move the part up and down within a 10 to 12 in. (250 to 300 mm) range without the use of the pendant.

The balancer can achieve up to 400 ft/min. (122 m/min.) The balancer's speed is dependent on the total weight being lifted. If the weight being lifted is greater than 75% of the balancer rated load, it will not achieve maximum speed.



(Dwg. MHTPA0702)

The pendant control module uses a closed valve (KP9009) which is located in the control handle. A constant flow of air from the main supply is blocked by the “UP” lever. Live air enters through the up flow control and through its corresponding hose to the “UP” lever. When the lever is depressed, the air passes to the “DN” lever valve and up through the down hose back to the manifold. This fills the balancer with air and allows the wire rope or chain to retract and lift the load. When the “DN” lever is depressed, it allows the air from the balancer to flow through the exhaust port and lowers the load.

The control module also allows for varying speeds. The flow controls for up and down speed can be adjusted to a maximum rate. If a slower rate is required up or down, the control handle can compensate for a slower speed. This compensation is done by slightly depressing the levers either up or down allowing less pressure to flow through the control valve.

Pendant Control Module C091

Pilot Air Operation

The pendant control module uses a closed valve KP9001 which is located in the control handle. Pilot air from the main supply is blocked at the pendant until the “UP” or “DN” lever is actuated. When the “UP” lever is depressed pilot air passes through the pendant to the valve on the balancer which in turn fills the balancer with air allowing the wire rope or chain to retract and lift the load. When the lever is released air is exhausted and the load ceases movement. When the “DN” lever is depressed pilot air from the pendant is sensed by the valve which allows air from the balancer to exhaust and lowers the load.

Pendant Control for Tandem and Tandem Reeved Balancers

One balancer body is mounted with the control manifold, the second balancer body is mounted with a passive (slave) manifold. A connecting hose is installed between the two manifolds. All adjustments are done at the main control manifold.

⚠WARNING

• Never use a balancer that inspection indicates is damaged.

Frequent and periodic inspections should be performed on equipment in regular service. Frequent inspections are visual examinations performed by operators or personnel trained in safety an operation of this equipment and include observations made during routine equipment operation. Periodic inspections are thorough inspections conducted by personnel trained in the safety, operation and maintenance of this equipment.

Inspection intervals depend upon the nature of the critical components of the equipment and the severity of usage. Careful inspection on a regular basis will reveal potentially dangerous conditions while still in the early stages, allowing corrective action to be taken before the condition becomes dangerous.

Deficiencies revealed through inspection, or noted during operation, must be reported to designated personnel instructed in safety, operation and maintenance of this equipment. A determination as to whether a condition constitutes a safety hazard must be decided, and the correction of noted safety hazards accomplished and documented by written report before placing the equipment in service.

Records and Reports

Some form of inspection record should be maintained for each balancer, listing all points requiring periodic inspection. A written report should be made periodically, based on the severity of usage and the condition of the critical parts of each balancer. These reports should be dated, signed by the person who performed the inspection, and kept on file where they are readily available to authorized personnel for review.

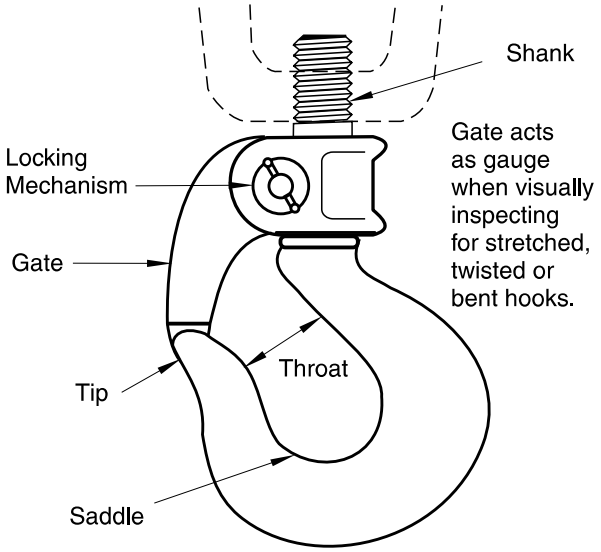
Wire Rope Reports

Records should be maintained as part of a long-range wire rope inspection program. Records should include the condition of wire rope removed from service. Accurate records will establish a relationship between visual observations noted during frequent inspections and the actual condition of wire rope as determined by periodic inspections.

Frequent Inspection

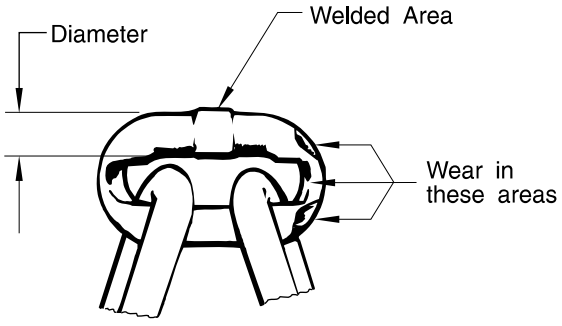
On balancers in continuous service, frequent inspection should be made by the operator at the beginning of each shift. In addition, visual inspections should be conducted during regular operation for indications of damage or evidence of malfunction.

1. OPERATION. Check for visual signs or abnormal noises (grinding etc.) which could indicate a potential problem. Check wire rope or chain feed through the balancer. If wire rope or chain binds or jumps clean and lubricate. If problem persists, replace the wire rope or chain. Do not operate the balancer until all problems have been corrected.
2. HOOKS. Check for wear or damage, increased throat width, bent shank or twisting of hook. Replace hook if gate no longer contacts hook tip (See Dwg. MHTPA0662). Refer to the latest edition of ASME B30.10 “HOOKS” for additional information. Check hook support bearings for lubrication or damage. Ensure they swivel easily and smoothly.



(Dwg. MHTPA0662)

3. CHAIN. (MCB Models only) Examine each of the links for bending, cracks in weld areas or shoulders, traverse nicks and gouges, weld splatter, corrosion pits, striation (minute parallel lines) and chain wear, including bearing surfaces between chain links (see Dwg. MHTPA0102). Replace a chain that fails any of the inspections. Check chain lubrication and lubricate if necessary. Refer to “Load Chain” in “ LUBRICATION” section.



(Dwg. MHTPA0102)

NOTICE

• Excessive wear or stretching may not be apparent from visual observation. Inspect chain by measuring five links in accordance with instructions under "Periodic Inspection". A worn load chain may cause the spool to wear rapidly. Inspect the spool and replace if damaged or worn.

4. AIR SYSTEM. Visually inspect all connections, fittings, hoses and components for indication of air leaks. Repair any leaks found. Check and clean the filter in the system.
5. PENDANT CONTROL. (Optional Feature) During operation of balancer, verify response to pendant is quick and smooth. See that the pendant control levers return to neutral when released. If balancer responds slowly or movement is unsatisfactory, do not operate balancer until all problems have been corrected.
6. HOOK GATE. Make sure the hook gate is present and operating. Replace if necessary.

⚠ CAUTION

• Do not use balancer if hook gate is missing or damaged.

7. WIRE ROPE. (MAB Models only) Visually inspect all wire rope which can be expected to be in use during the day's operations. Inspect for damage indicated by distortion of wire rope such as kinking, "birdcaging", core protrusion, main strand displacement, corrosion, broken or cut strands. If damage is evident, do not operate balancer until the discrepancies have been reviewed and inspected further by personnel instructed in the operation, safety and maintenance of this balancer.

NOTICE

• The full extent of wire rope wear cannot be determined by visual inspection. At any indication of wear inspect wire rope in accordance with instructions in "Periodic Inspection".

8. WIRE ROPE REEVING. Make sure wire rope spools evenly and correctly into grooves in the spool. Check wire rope is not twisted or kinked. Check wire rope clamps are tight. Visually inspect connecting eye bolt and sheave if used.
9. SAFETY WIRE. Ensure safety wire clamp is secure and wire is not damaged.
10. LOAD HOOK CLAMPS. Ensure bolts are correctly torqued. Refer to "INSTALLATION" section. Check a minimum of 1 in. (25 mm) of wire rope is visable.

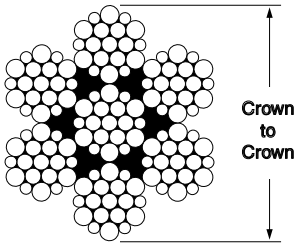
Periodic Inspection

Frequency of periodic inspection depends on the severity of usage:

NORMAL	HEAVY	SEVERE
yearly	semi-annually	quarterly

Disassembly may be required for HEAVY or SEVERE usage. Keep accumulative written records of periodic inspections to provide a basis for continuing evaluation. Inspect all the items in "Frequent Inspection". Also inspect the following:

1. FASTENERS. Check all rivets, split pins, capscrews and nuts. Replace if missing or tighten if loose.
2. ALL COMPONENTS. Inspect for wear, damage, distortion, deformation and cleanliness. If external evidence indicates the need, disassemble. Check shafts, bearings, spool, piston housing, covers and wire rope or chain guide. Replace worn or damaged parts. Clean, lubricate and reassemble.
3. HOOKS. Inspect hooks carefully for cracks using magnetic particle or other suitable non-destructive method. Inspect hook retaining parts. Tighten or repair, if necessary.
4. SUPPORTING STRUCTURE. Check for distortion, wear and continued ability to support the balancer and load.
5. TROLLEY. (if equipped) Check that the trolley wheels track the beam properly and clearance between trolley wheels and beam is correct. Refer to "INSTALLATION" section. Check that wheels and rail are not excessively worn and inspect side plates for spreading due to bending. Do not operate the balancer until all problems have been corrected.
6. LABELS AND TAGS. Check for presence and legibility. Replace if necessary.
7. WIRE ROPE END ANCHORS. (MAB Models only) Ensure both ends of wire rope are securely attached. Secure if loose, repair if damaged, replace if missing.
8. WIRE ROPE. (MAB Models only) Nominal size of wire rope is 3/16 in. (5 mm) diameter for all models. In addition to frequent inspection requirements, inspect for the following:
   a. Build-up of dirt and corrosion. Clean if necessary.
   b. Loose or damaged end connection. Replace if loose or damaged.
   c. Check wire rope anchor is secure.
   d. Changes in the size of the wire rope diameter. Periodically measure the diameter of the wire rope from crown-to-crown throughout the life of the wire rope. The actual diameter should be recorded when the wire is under equivalent loading and in the same operating section. If the actual diameter of the wire rope has decreased more than 1/64 in. (0.04 mm) a thorough examination of the wire rope should be conducted by an experienced inspector to determine the suitability of the wire rope to remain in service. (See Dwg. MHTPA0056)

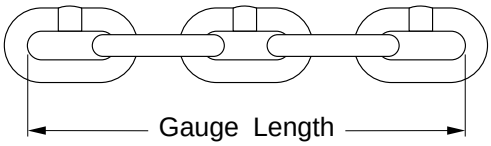


(Dwg. MHTPA0056)

9. LOAD CHAIN. (MCB Models only) Measure the chain for stretching by measuring across five link sections all along the chain paying particular attention to the most frequently reeved links. When any five links in the working length reaches or exceeds the discard length, replace the entire chain (see Dwg. MHTPA0041 and Table 3). Always use genuine **Ingersoll-Rand** Material Handling replacement load chain.

Table 3

Chain Size	Length When New		Discard Length	
	in	mm	in	mm
3/16 in. (5 mm) Diameter	3.147	79	3.24	82



(Dwg. MHTPA0041)

Balancers Not in Regular Use

1. A balancer which has been idle for a period of one month or more, but less than one year, should be given an inspection conforming with the requirements of "Frequent Inspection" prior to being placed into service.
2. A balancer which has been idle for a period of more than one year should be given an inspection conforming with the requirements of "Periodic Inspection" prior to being placed into service.
3. Standby balancers should be inspected at least semi-annually in accordance with the requirements of "Frequent Inspection". In abnormal operating conditions balancers should be inspected at shorter intervals.

INSPECTION AND MAINTENANCE REPORT
Ingersoll-Rand Air Lift Balancers

Model Number:	**Date:**
Serial Number:	**Inspected by:**

Reason for Inspection: (Check Applicable Box)

	1. Scheduled Periodic Inspection (___ Monthly ___ Yearly)	Operating Environment:
	2. Discrepancy(s) noted during Frequent Inspection	
	3. Discrepancy(s) noted during maintenance	Normal ___ Heavy ___ Severe ___
	4. Other: _____	

Refer to the Parts, Operation and Maintenance Manual "INSPECTION" section for general inspection criteria. Also, refer to appropriate National Standards and Codes of practice. If in doubt about an existing condition contact the nearest Ingersoll-Rand Distributor or the factory for technical assistance.

COMPONENT	CONDITION		CORRECTIVE ACTION		NOTES
	Pass	**Fail**	**Repair**	**Replace**	
Fasteners					
Shafts					
Bearings			- - -		
Spool					
Wire Rope or Chain Guide(s)			- - -		
Covers					
Controls					
Hooks:			- - -		
Top — Gate acts as gauge when visually inspecting for stretched, twisted or bent hooks.					
Top — Damage			- - -		
Top — Hook Crack Test Method Used:_____Dye Penetrant _____Magnetic Particle _____Other: _____					
Bottom — Gate acts as gauge when visually inspecting for stretched, twisted or bent hooks.					
Bottom — Damage			- - -		
Bottom — Hook Crack Test Method Used:_____Dye Penetrant _____Magnetic Particle _____Other: _____					
Hook Gate			- - -		
Load Chain			- - -		
Working length(s) maximum stretch: _____ inches / _____ mm					
Chain Anchors					
Wire Rope					
Working length(s) maximum stretch: _____ inches / _____ mm					
Supporting Structure					
Rail System					Refer to Rail System Manual MHD56091
Labels and Tags			- - -		
Other Components (list in NOTES section)					

LUBRICATION

To ensure continued satisfactory operation of the balancer, all points requiring lubrication must be serviced with the correct lubricant at the proper time interval as indicated for each assembly. Correct lubrication is one of the most important factors in maintaining efficient operation.

The lubrication intervals recommended in this manual are based on intermittent operation of the balancer eight hours each day, five days per week. If the balancer is operated almost continuously or more than the eight hours each day, more frequent lubrication will be required. The lubricant types are based on operation in an environment relatively free of dust, moisture, and corrosive fumes. Use only those lubricants recommended. Other lubricants may affect the performance of the balancer. Approval for the use of other lubricants must be obtained from your **Ingersoll-Rand** Technical Support Department or distributor. Failure to observe this precaution may result in damage to the balancer and/or its associated components.

Air Lift Balancer

Whenever a Air Lift Balancer is disassembled, lubricate as follows:

1. Coat all valve and pendant parts with a light film of **Ingersoll-Rand** LUBRI-LINK-GREEN or a SAE 50 to 90 EP oil before assembling.
2. The top and bottom hooks are supported by thrust bearings. These bearings must be lubricated with **Ingersoll-Rand** No. 68 grease or a standard No. 2 multi-purpose grease at regular intervals. Neglect of proper lubrication may lead to premature bearing failure.
3. Apply a thin film of lubricant, Amber Petrolatum or equivalent, to washer and place on ball screw cap (lubricant side down).
4. Before placing 'O' ring into the groove in end cap, apply a thin film of lubricant, Amber Petrolatum or equivalent.

Wire Rope (MAB Models only)

Follow the wire rope manufactures's instructions. At a minimum, observe the following guidelines.

1. Clean with a brush or steam if there is dirt, rock dust or other foreign material on the surface of the wire rope.

⚠ CAUTION

• Do not use an acid-based solvent. Only use cleaning fluids specified by the wire rope manufacture.

2. Apply a wire rope lubricant, **Ingersoll-Rand** LUBRI-LINK-GREEN or SAE 30W oil.
3. Brush, dip or spray lubricant weekly, or more frequently, depending on severity of service.

Hook and Suspension Assemblies

1. Lubricate the hook and hook gate pivot points. Hook and gate should swivel/pivot freely.
2. Use **Ingersoll-Rand** LUBRI-LINK-GREEN or a SAE 50 to 90 EP oil.

Trolley (optional feature)

I-Beams

Periodically, grease the wheel bearings with **Ingersoll-Rand** No. 68 grease or a standard No. 2 multi-purpose grease. Grease fittings are provided in the end of each trolley wheel axle.

Precision Rail

Rail system trolleys are manufactured with sealed bearings which require no lubrication.

Load Chain (MCB Models only)

⚠ WARNING

• Failure to maintain clean and well lubricated load chain will result in rapid load chain wear that can lead to chain failure which can cause severe injury, death or substantial property damage.

1. Lubricate each link of the load chain weekly. Apply new lubricant over existing layer.
2. In severe applications or corrosive environments, lubricate more frequently than normal.
3. Lubricate hook gate pivot point with the same lubricant used on the load chain.
4. To remove rust or abrasive dust build-up, clean chain with an acid free solvent. After cleaning, lubricate the load chain.
5. Use **Ingersoll-Rand** LUBRI-LINK-GREEN or a SAE 50 to 90 EP oil.

TROUBLESHOOTING

This section provides the information necessary for troubleshooting this balancer. The troubleshooting guide provides a general outline of problems which could be experienced with normal use of this balancer. It lists the symptom, the possible cause, and the possible remedy for the trouble being experienced. If any of the noted remedies do not solve the symptom refer to the "MAINTENANCE" section for additional information.

AIR LIFT BALANCER		
Symptom	**Cause**	**Remedy**
Balancer will not lift load.	Air leaking around end cap bolt.	Replace seal on ball screw cover.
	Air leaking around end cap.	Replace 'O' ring on outside diameter of end cap.
	Air leaking through end cover or inside can housing.	Replace piston, clean and lubricate inside can housing.
	Ball screw and/or thrust bearing binding.	Clean or replace ball screw and/or thrust bearing. Check for rust, dirt or lack of lubrication.
	Spring (KP1022) worn or damaged.	Replace spring. Refer to instructions in "Maintenance" section.
Erratic Operation.	Ball screw or thrust bearing binding.	Disassemble and clean thoroughly and lubricate ball screw and nut assembly or replace.

HIGH RELIEVING SINGLE BALANCE CONTROL MODULE C090		
Symptom	**Cause**	**Remedy**
Balancer will not lift load.	Not enough air pressure.	Increase air pressure to 100 psi. (690 kPa).
	Load exceeds balancer's rated lift capacity.	Contact Ingersoll-Rand for proper balancer.
	Regulators not adjusted properly.	Slowly turn regulator knob (KP2074) clockwise and (KP9032) counterclockwise until load lifts.
	Check valve not correctly installed.	Reinstall check valve (KP2063) so that arrow direction is toward the regulator. Ball inside check valve will be visible on the main air supply end.
	Air line from main regulator to remote regulator leaking.	Replace air line and fittings. (KP9030).
	Brake spring worn or damaged.	Replace spring (KP1021).
Greater effort required to lower load than to lift load.	Regulator setting is too high.	Slowly turn regulator knob (KP2074) counterclockwise until effort becomes equal in both directions.
	Remote regulator not relieving correctly.	Adjust regulator knob (KP9032) until effort becomes equal in both directions.
	Regulator exhaust slots clogged.	If possible, clean slots. If not, replace regulator.
	Air line from main regulator to remote regulator clogged.	Unclog air lines and fittings (KP9030) if possible or replace lines and fittings (KP9030).
Continuous air flow from regulator exhaust slots.	Diaphragm inside regulator is ruptured.	Replace regulator (KP2029).

RETRACT CONTROL ASSEMBLY		
Symptom	**Cause**	**Remedy**
Balancer will not lift load.	Brake spring worn or damaged.	Replace brake spring (KP1022).

PENDANT CONTROL MODULE C091		
Symptom	**Cause**	**Remedy**
Balancer lifts without lever actuated.	Air leakage in "UP" valve (KP9014).	Replace valve assembly (KP9014).
Balancer lifts but does not hold load.	Air leakage in "DOWN" valve (KP9014).	Replace valve assembly (KP9014).
	Worn or blocked control lines.	Clean and/or replace air line.
	Air leakage around fittings.	Check and tighten air fittings. Pipe sealant may be used.
Balancer will lift but load drops.	Air leakage in "UP", "DOWN" valve screws (KP9018).	Replace 'O' rings (KP9019).
	Air leakage between mainfold and end cap.	Make sure 'O' ring is seated properly or replace if worn.
	Air leakage in trim valve (KP9027).	Replace 'O' ring (KP9019).
Balancer will not lift load.	Brake spring worn or damaged.	Replace brake spring (KP1021).

PENDANT CONTROL MODULE C017		
Symptom	**Cause**	**Remedy**
Balancer lifts without lever actuated.	Air leakage in "UP" valve (KP9014).	Replace valve assembly (KP9014).
Balancer lifts but does not hold load.	Air leakage in "DOWN" valve (KP9014).	Replace valve assembly (KP9014).
	Worn or blocked control lines.	Clean and/or replace air line.
	Air leakage around fittings.	Check and tighten air fittings. Pipe sealant may be used.
Balancer will lift but load drops.	Air leakage in "UP", "DOWN" valve screws (KP9018).	Replace 'O' rings (KP9019).
	Air leakage between mainfold and end cap.	Make sure 'O' ring is seated properly or replace if worn.
	Air leakage in trim valve (KP9027).	Replace 'O' ring (KP9019).
Balancer will not lift load.	Brake spring worn or damaged.	Replace brake spring (KP1021).
Lifts but no power.	Hoses switched.	Reverse hoses.
Balancer lifts but does not lower.	"UP" / "DOWN" control incorrectly adjusted.	Close values all the way and open 1/2 turn at a time until correct adjustment is obtained.

SINGLE BALANCE CONTROL MODULE C018		
Symptom	**Cause**	**Remedy**
Balancer will not lift load.	Not enough air pressure.	Increase air pressure to 100 psi (690 kPa).
	Load exceeds balancer's rated lift capacity.	Reduce load or contact Ingersoll-Rand for proper size balancer.
	Regulator not adjusted properly.	Slowly turn regulator knob (KP2074) clockwise until load lifts.
	Check valve not correctly installed.	Reinstall check valve (KP2063) so that arrow direction is toward the regulator. Ball inside check valve will be visible on the main air supply end.
	Brake spring worn or damaged.	Replace brake spring (KP1022).
Greater effort required to lower load than to lift load.	Regulator setting is too high.	Slowly turn regulator knob (KP2074) counterclockwise until effort becomes equal in both directions.
	Regulator exhaust slots clogged.	If possible, clean slots. If not, replace regulator.
Continuous air flow from regulator exhaust slots.	Diaphragm inside regulator is ruptured.	Replace regulator (KP2029).

⚠WARNING

• Never perform maintenance on the balancer while it is supporting a load.
• Before performing maintenance, tag controls:
DANGER - DO NOT OPERATE -
EQUIPMENT BEING REPAIRED.
• Only allow personnel trained in the operation and service of this balancer to perform maintenance.
• After performing any maintenance on the balancer, test balancer before returning balancer to service.
• Shut off air system and depressurize air lines before performing any maintenance.

Wire Rope

During storage or shipment the wire rope tends to uncoil. Ensure hook is fully retracted. If not corrected, loops will form which may in time cross over one another and cause serious damage to the wire rope.

General Maintenance Instructions

It is recommended that all maintenance work on the balancer be performed on a bench in a clean dust free work area. In the process of disassembling the balancer, observe the following:

1. Turn off air system and depressurize air lines before performing any maintenance. Disconnect hoses from balancer. Plug or cap openings to keep out dirt and contaminants.
2. Never disassemble the balancer any further than is necessary to accomplish the needed repair. A good part can be damaged during the course of disassembly.
3. Never use excessive force when removing parts. Tapping gently around the perimeter of a cover or housing with a soft hammer, for example, is sufficient to break the seal.
4. Do not heat a part with a flame to free it for removal, unless the part being heated is already worn or damaged beyond repair and no additional damage will occur to other parts.

In general, the balancer is designed to permit easy disassembly and assembly. The use of heat or excessive force should not be required.

5. Keep the work area clean to prevent dirt and other foreign matter from getting into bearings and other moving parts.
6. All seals and 'O' rings should be discarded once they have been removed. New seals and 'O' rings should be used when assembling the balancer.
7. When grasping a part in a vise, always use leather or copper covered vice jaws to protect the surface of the part and help prevent distortion. This is particularly true of threaded members, machined surfaces and housings.
8. Do not remove any part which is press fit in or on a subassembly unless the removal of the part is necessary for repairs or replacement.
9. To avoid damaging bearings during balancer assembly or disassembly always tap or press on the bearing inner race for shaft fit bearings or the outer race for bore fit bearings.

Control Assemblies

As with any air pilot valve system, clean dry air is the best preventive maintenance. Refer to “INSTALLATION” section for air line filter information.

Visually inspect all air lines for ruptures or signs of wear.

Overhead Assemblies

A visual inspection of connecting bolts and safety wire should be done periodically depending on frequency of use. The unit itself should hang so that the wire rope does not rub against the wire guide.

Load Hook Assemblies

After the wirelock assembly has been subjected to its initial loading, it is important to retighten the wirelock bolts to the specified torque values. Where practical, the heaviest loading anticipated should be applied before retightening the bolts. After this procedure further retightening should not be necessary.

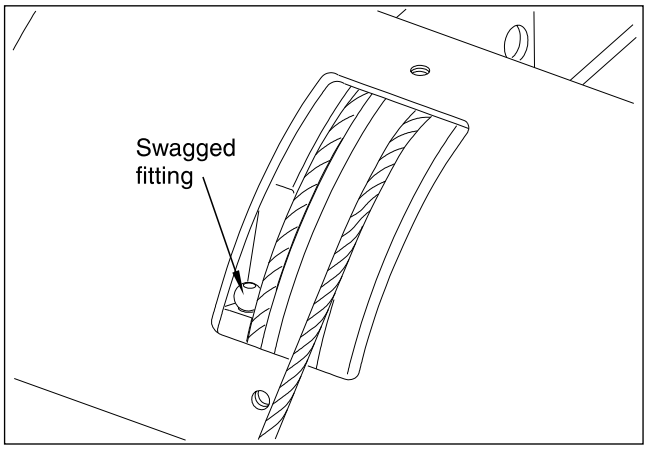
If, while in use, the wire rope is inadvertently subjected to severe snatch or other shock loading, it is advisable to check the wirelock assembly and retorque to the specified values.

Wire Rope Removal (MAB Models only)

⚠WARNING

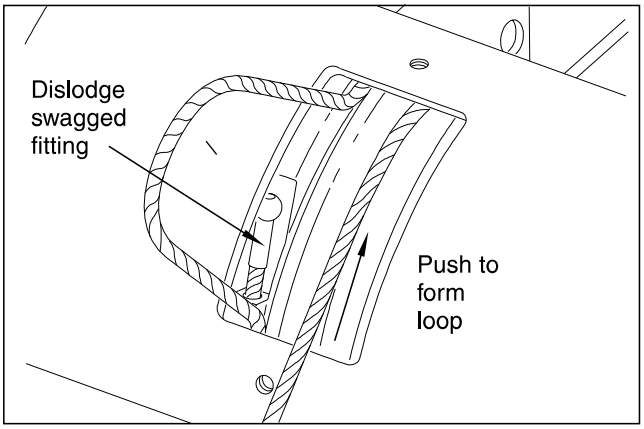
• Before removing any components from unit, lower and remove suspended load. Disconnect air supply and remove unit from overhead suspension.

1. Place unit on a clean surface horizontally with wire rope guide facing upward.
2. Pull wire rope out of balancer until wire rope and spool stop.
3. Using wire rope cutters, cut wire rope two (2) feet (0.6 m) from outside of wire rope guide. Remove plate(s) (28) and capscrew(s) (27) holding wire rope guide and remove guide. Some units use a screw and plate at the top and bottom of the wire rope guide. On other units the wire rope guide is notched and automatically locates in the can housing at one end.
4. Swagged fitting should be visible.



(Dwg. MHTPA0722)

5. Holding the cut end of wire rope closest to balancer, push wire rope into can housing. This will create a loop in wire rope closest to swagged fitting.



(Dwg. MHTPA0723)

6. Holding lower end of loop, pull out excess wire rope.
7. Push upper end of excess wire rope so that the swagged fitting dislodges itself from spool.
8. Remove wire rope completely by pulling swagged fitting end.

Chain Removal (MCB Models only)

⚠WARNING

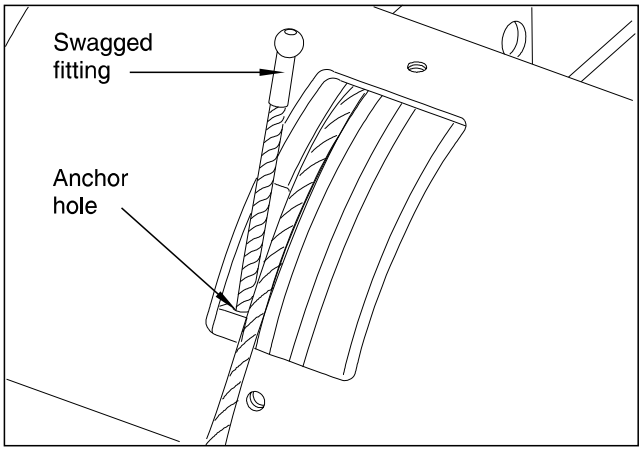
• Before removing any components from unit, lower and remove suspended load. Disconnect air supply and remove unit from overhead suspension.

Chain Removal

1. Remove hook assembly (17) from chain (34).
2. Remove plate(s) (28) and capscrew(s) (27) holding chain guide (29) and remove guide. Some units use a screw and plate at the top and bottom of the chain guide. On other units the chain guide is notched and automatically locates in the can housing at one end.
3. Pull chain from spool (6) to furthest extent of travel. Grip chain in the groove of the next to last wrap and carefully pull through the opening in the can housing. Repeat process for last wrap.
4. When chain is completely unreeved remove nut (33) and pry chain end from threaded post on thread plate (32).

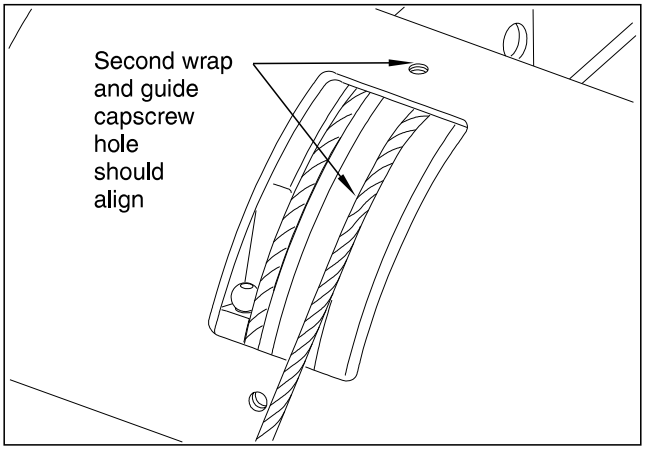
Wire Rope Replacement (MAB Models only)

1. Insert new wire rope into swagged fitting anchor hole. Push wire rope through until swagged fitting seats itself into anchor hole.



(Dwg. MHTPA0724)

2. Insert cut end into first groove, next to anchor hole. Push it through until end appears at top of spool. Pull cut end out until wire rope is snug against spool.



(Dwg. MHTPA0725)

3. Repeat process for second groove. The second groove and wire rope must be aligned with the wire rope guide anchor hole above, and be central to, the wire rope guide opening.
4. Thread wire rope through wire rope guide (29) and replace wire rope guide with plate(s) (28) and screw(s) (27). Some units use a screw and plate at the top and bottom of the wire rope guide. On other units the wire rope guide is notched and automatically locates in the can housing at one end.
5. To completely retract spool, apply about 5 psi (34 kPa) to balancer. Slowly increase to about 15 psi (103 kPa) until spool retracts.

6. On single wire rope balancers only. Slide rubber ball (13), washer and wire rope crimp (15) onto wire rope until it hits wire rope guide.
7. Using a crimping tool, crimp the stop.

Chain Replacement (MCB Models only)

1. Install last chain link on threaded post of the threaded plate (32). Using a punch carefully tap chain link into position until fully seated. Install nut (33) and tighten. Use Loctite “Removable Threadlocker” on threads. Nut should be flush with the top of the threaded post if correctly installed. If nut cannot be sufficiently tightened due to limited access it will be necessary to remove screws (19) from can housing and loosen capscrew (22). This will allow the spool to be moved further into the can housing opening and nut can be tightened.
2. Reinstall capscrew (22) and screws (19) following steps 38 to 41 in balancer assembly instructions.

Installing Chain in Balancer

Use a 4 foot (1 metre) length of flexible wire with a small hook attachment at one end. The hook should be small enough to feed around the spool, between the spool and the can housing and be shaped to hook to one of the chain links. Feed wire around the first groove of the spool and attach hook to the last link on the chain free end. Carefully pull chain all the way through. Do not allow the chain to become twisted or jamming will occur. Repeat this process for the second wrap around the spool. Two full grooves on the spool must be filled before proceeding further. The second groove and chain must be aligned with the chain guide anchor hole above, and be central to, the chain guide opening. Turn spool by hand to wind remaining chain onto the spool.

Feed chain through chain guide and install chain guide (29) on can housing. Secure chain guide to can housing with screw (27) and plate (28). Some units use a screw and plate at the top and bottom of the chain guide. On other units the chain guide is notched and automatically locates in the can housing at one end.

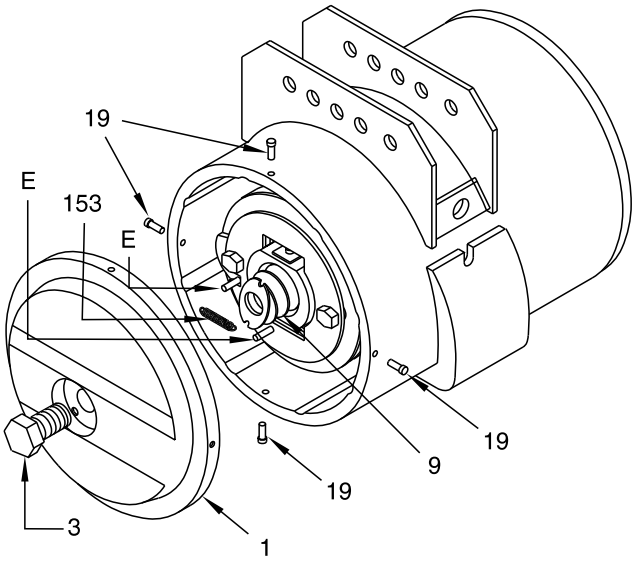
Retract Control Spring Replacement

1. Stand balancer on end with can end cover (1) facing up.
2. Remove end cover bolt (3) and washer (151).
3. Remove housing screws (19).
4. Remove end cover (1). Do not turn ball screw (9) as this will misalign components.

NOTICE

• 225 lb. (102 kg) capacity units and above will have a liner attached to end cover.

5. Retract control (KP2089) will be visible.
6. Locate spring (153) and remove.
7. Replace spring (153) into grooves located on pins (E). On some units plate (149) may use a bent tab in place of pin (E).
8. Rotate arm (147) and verify spring action.
9. Replace end cover (1) and housing screws (19). Ensure screws (2) in cover locate in notches in ball screw assembly (9).
10. Replace and tighten end cover bolt (3) to 120 ft/lbs (162 Nm).



(Dwg. MHTPA0777)

NOTICE

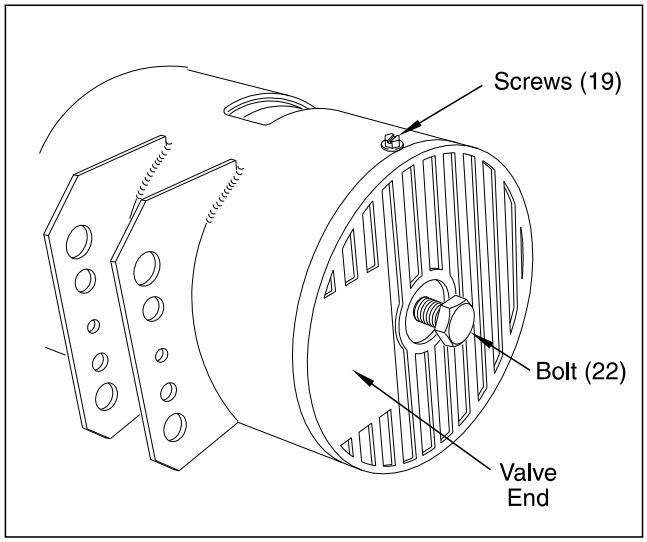
• 225 lb. (102 kg) capacity units and above will have a liner assembly that will be attached to the end cover. This liner will be scalloped not the housing.

Balancer Disassembly

⚠WARNING

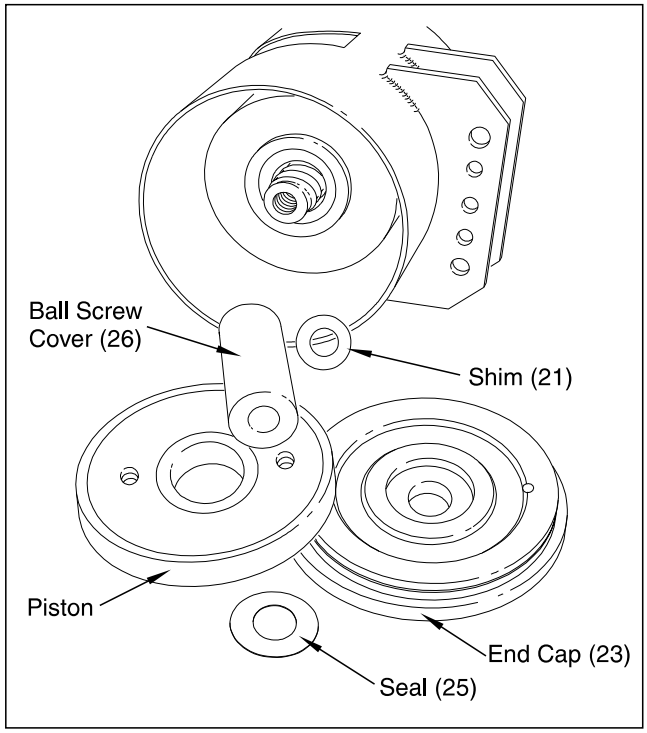
• Before removing any components from the balancer, lower and remove suspended load. Disconnect air supply and remove unit from overhead suspension.

1. Place balancer on a clean surface horizontally with wire rope or chain guide facing upward.
2. On MAB Models use wire rope cutters and cut wire rope two feet (0.6 m) from outside of wire rope guide. On MCB Models remove hook assembly from chain end. Remove screw(s) and plates on wire rope or chain guide and remove guide.
3. Remove control module assembly from end cap (23) by removing the four bolts.
4. After control module assembly is removed, make sure 'O' ring remains seated in the manifold and set assembly to one side.
5. Remove center bolt (22) on the end cap (23) valve side with a wrench. Remove the four screws (19) around the outside diameter.



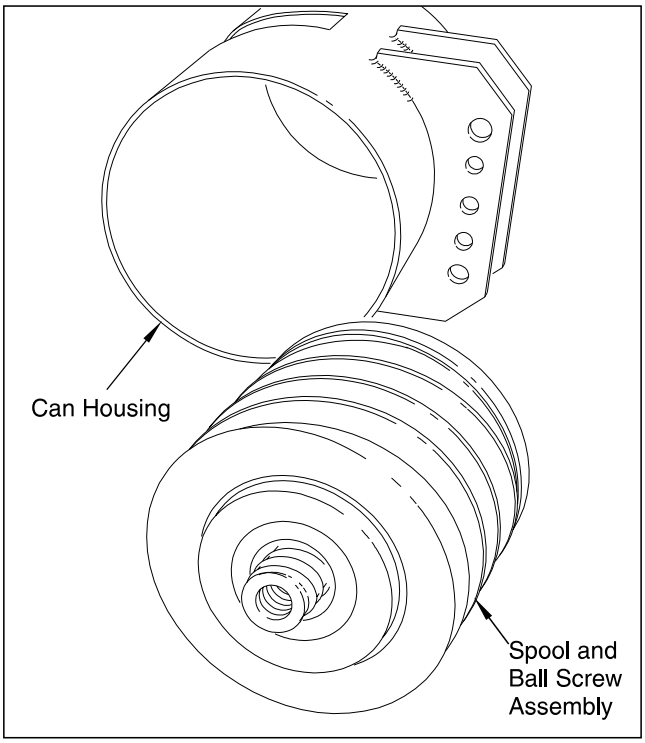
(Dwg. MHTPA0726)

6. To loosen end cap from unit. Pull wire rope or chain until end cap breaks away from can housing.
7. Completely remove end cap (23). The seal and white plastic washer will be visible; remove both.
8. Pull ball screw cover (26) away from unit. Inside the cover, there will be a series of shims (21). DO NOT misplace the shims.



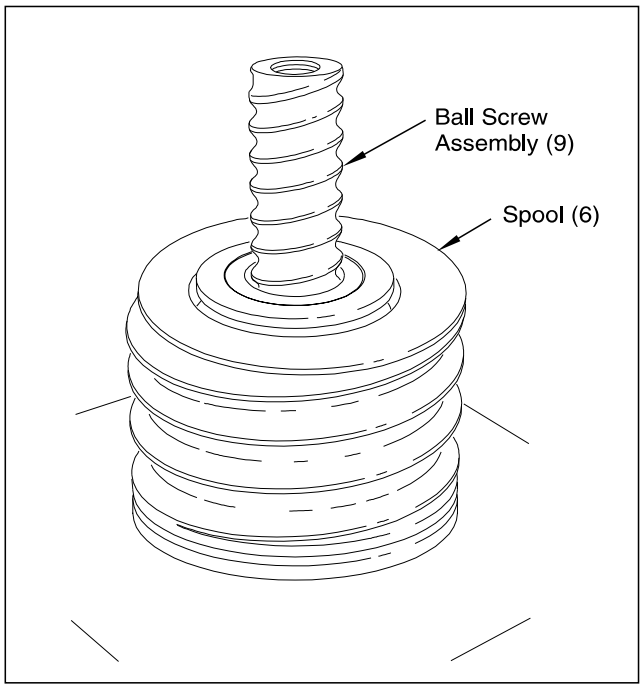
(Dwg. MHTPA0727)

9. On MAB Models, without allowing spool to rotate completely off ball screw, rotate spool so that swagged fitting is visible through wire rope guide opening.
10. Holding the cut end of the wire rope closest to the can, push wire rope into the can. This will create a loop in wire rope closest to swagged fitting.
11. Holding the lower end of loop, pull out excess wire rope.
12. Push upper end of excess wire rope so the swagged fitting dislodges itself from spool.
13. Remove wire rope completely by pulling swagged fitting end.
14. On MCB Models, pull chain from spool (6) to furthest extent of travel. Grip chain in the groove of the next to last wrap and carefully pull through the opening in the can housing. Repeat process for last wrap.
15. When chain is completely unreeved remove nut (33) and pry chain end from threaded post on thread plate (32).
16. Remove center bolt (3) from end cover (1).
17. Remove ball screw and spool assembly from can housing, without allowing spool to travel off of ball screw.



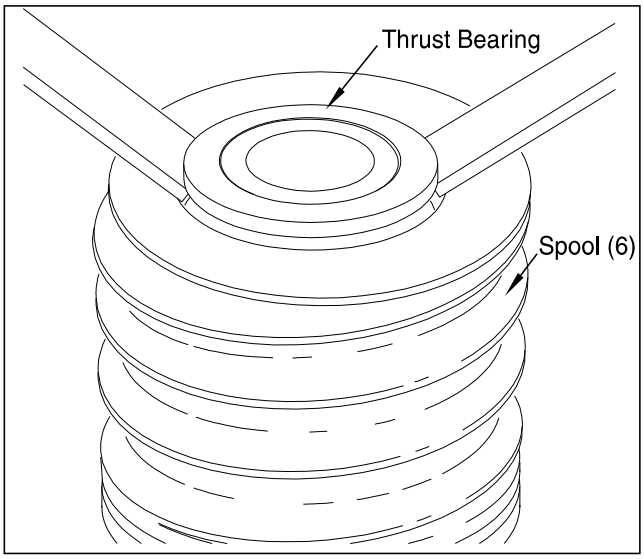
(Dwg. MHTPA0728)

18. To remove bearing, turn spool over and place on a clean cloth. Slowly rotate ball screw completely out. Bearings may be trapped inside spool and nut. Before going any further make sure all bearings are removed.
19. Remove spring (153) from pins or tab in arm (147) and plate (149).
20. Remove capscrews (150) and lift off plate (149), bushings (148), arm (147) and spool plate (146).



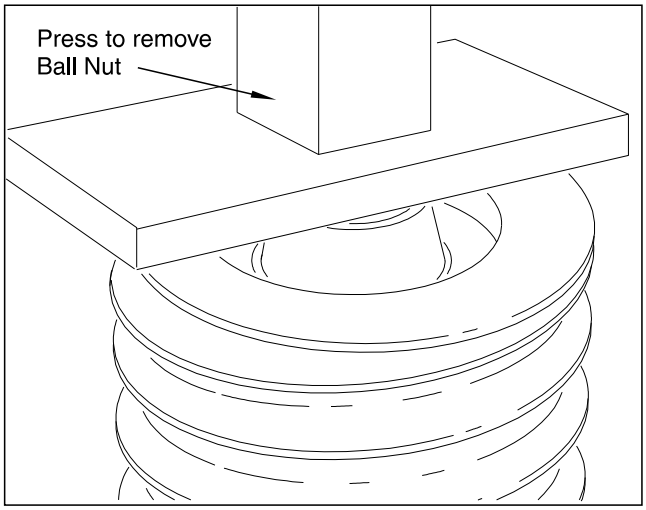
(Dwg. MHTPA0729)

21. To remove thrust bearing, use a bearing puller, or carefully pry bearing off.



(Dwg. MHTPA0731)

22. To remove remaining ball nut, a press must be used. A thrust washer and pin are also inside the spool.



(Dwg. MHTPA0730)

⚠WARNING

• Do not remove the hanger bracket from the can housing unless absolutely necessary. Damage to the can housing may result.

Control Pendant Handle C091

Disassembly

1. Shut off air supply and disconnect hoses to control pendant handle.
2. Remove capscrews (72) securing control body to handle (71).
3. Remove pin (63) and "UP" and "DOWN" levers (61 and 62).
4. Remove retainer rings holding poppet valve assemblies (64).
5. Remove two retainer washers (65) by pulling straight out.
6. Remove poppet valve assemblies (64). Clean valve body. Check valve springs for breakage or loss of tension and replace if necessary. Examine rubber seat on end of valve stem and 'O' rings for signs of wear or deterioration.
7. Replace all worn parts.

Control Pendant Handle C017

Disassembly

1. Shut off air supply and disconnect hoses to control pendant handle.
2. Remove capscrews (72) securing control body to handle (71).
3. Remove pin (63) and "UP" and "DOWN" levers (61 and 62).
4. Remove retainer rings (64) holding retainers.
5. Remove retainers, springs, seals and plunger. Examine ‘O’ rings and seals for damage, replace as required. Inspect spring for damage. Clean valve body.

Single Balancer Control C018

Disassembly

1. Remove hose (46) between regulator (40) and valve body (51).
2. Remove capscrew (52), nut (55) and hook (17) from valve body (51).
3. Gradually loosen threaded thimble (47) until spring compression is relaxed.
4. Remove threaded thimble (47), ring (48), washers (49) and (50), spring (53) and bolt (54) from valve body (51).

Trolley Assembly S001A

Disassembly

1. To replace trolley wheels (125) remove retainer rings (120) on trolley axles (132). Pull wheels from axles.
2. If further disassembly is required or guide rollers (128) require replacement remove nuts (121) and lockwashers (122) from wheel axles.
3. Remove axles from trolley plates (126) and body (130).
4. Remove plates, guide rollers, pins (129) and washers (127).

Trolley Assembly S806A

Disassembly

1. Do not attempt to disassemble guide roller pins from trolley. Guide roller pins are permanently secured with rivets. If guide rollers require replacement order complete trolley plate (130).
2. To remove wheels (125) and axles remove retainer rings (120) from axles (132) and pull off wheels. Remove nuts (121) and washers (122) from wheel axles and remove axles from plate (130).
3. Bearings are moulded into the wheels and cannot be separated.

Cleaning, Inspection and Repair

Use the following procedures to clean, inspect, and repair the components of the balancer.

Cleaning

⚠ CAUTION

• Do not use trichloroethylene to clean parts.

Clean all balancer component parts in solvent. The use of a stiff bristle brush will facilitate the removal of accumulated dirt and sediments on the shafts and housings. Dry each part using low pressure, filtered compressed air.

Inspection

All disassembled parts should be inspected to determine their fitness for continued use. Pay particular attention to the following:

1. Inspect spool (6) for wear or damage.
2. Inspect all spacers and wire rope or chain guide for wear, scoring, or galling.
3. Inspect shafts for ridges caused by wear. If ridges caused by wear are apparent on shafts, replace the shaft.
4. Inspect all threaded items and replace those having damaged threads.
5. Check bearings for freeness of rotation and wear. Replace bearings if rotation is rough or bearings are excessively worn.
6. Inspect retract control spring (153) for stretching or damage.

Repair

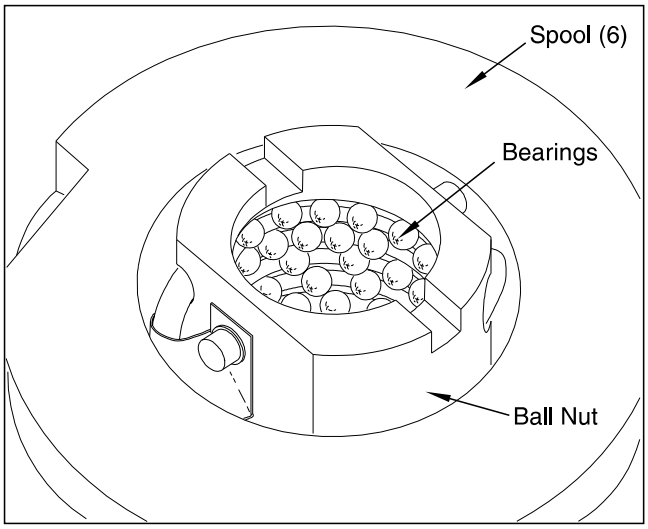
Actual repairs are limited to the removal of small burrs and other minor surface imperfections. Use a fine stone or emery cloth for this work.

1. Worn or damaged parts must be replaced. Refer to the applicable parts listing for specific replacement parts information.
2. Inspect all remaining parts for evidence of damage. Replace or repair any part which is in questionable condition. The cost of the part is often minor in comparison with the cost of redoing the job.
3. Smooth out all nicks, burrs, or galled spots on shafts, bores, pins, or spacers.
4. Polish the edges of all shaft shoulders to remove small nicks which may have been caused during handling.
5. Remove all nicks and burrs caused by lockwashers.
6. Replace all seals and 'O' rings.

Balancer Reassembly

Assembly Procedure

1. Install hanger bracket (154) to can housing (18) if it has been removed. On 6 in. can housings the hanger bracket is welded to the can housing and cannot be replaced. On 8 in. can housings the heads of the button head bolts must be located on the inside of the can housing and flat washers are required under the bolt head. On 10 and 12 in. can housings the heads of the button head bolts are located on the outside of the can housing. No washers are required.
2. Align the ball nut. Press washer and ball nut into the spool (6). After ball nut is seated, insert pin from opposite end.
3. When installing thrust bearing, make sure flange on inner race is inside spool. Using a press, seat bearing into spool. Inside race should protrude 0.008 to 0.012 in. (0.2 to 0.3 mm) above outer bearing. Outer bearing should also rotate freely.
4. Temporarily plug ball screw and insert it into ball nut from thrust bearing side.
5. Rotate ball screw so that is recedes 1-1/2 in. (38 mm) from upper lip of ball nut.
6. Drop approximately half the 64 to 66 bearings into ball screw.



(Dwg. MHTPA0732)

7. Rotate ball screw (9) up and down until bearings locate themselves into ball nut.
8. Add all of the remaining bearings except 6 and rotate ball screw up and down to locate bearings into ball nut.
9. Rotate ball screw so that it recedes 3/4 in. (19 mm) from ball nut lip. Add remaining 6 bearings.
10. Remove temporary plug from ball screw
11. Lubricate ball screw and thrust bearing assembly with Amber Petrolatum or equivalent. Use elastic bands or suitable ties to prevent ball screw rotating in ball nut.
12. The slot in the can housing (18) is positioned closer to one end than the other. For assembly purposes this will be called the short end.
13 Verify that the two setscrews (2) are installed on the inside face of the end cover (1). Setscrew position is set during factory assembly. Do not attempt to remove or adjust the setscrews.
14. Install the liner (4) on the end cap (1). Balancers with 6 in. diameter housing cans do not require a liner. Align the screw holes in the liner with the holes in the end cap prior to tapping into position. The liner should be snug on the end cap. Position cutout in liner with pilot dimple on end cover inside face. Install self tapping screws (5) do not overtorque.
15. Stand can housing (18) on end with the short end up (refer to instruction 12) and install the end cover and liner assembly. Ensure cutout in liner is in line with the slot in the can housing. Align the four capscrew holes in the end cover and can housing.
16. Install self tapping screws (19) do not tighten at this time. Balancers with 6 in. diameter can housings require only two screws (19). All other size balancers use four screws (19).
17. Turn can housing over, long end up (refer to instruction 12). Before proceeding ensure ball screw assembly is preassembled and ready for installation.
18. Install washer (7) on ball screw assembly (9). Position bent tab on washer approximately 180 degrees from pin groove in ball screw assembly. On earlier design wire rope balancers, washer (7) is flat and can be rotated to any position.
19. On MCB chain units install threaded plate (32) in spool (6). Tap into position until plate is flush against spool bore. Ensure plate does not protrude beyond end of spool (6).

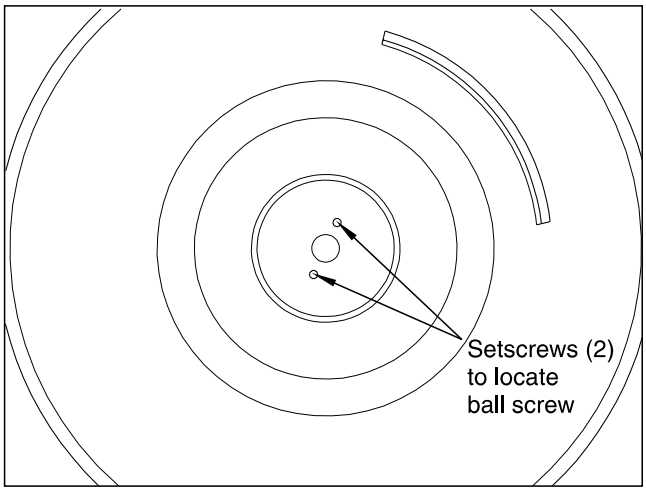
All Models

20. Install pin (8) in ball screw assembly (9). Install spool over ball screw assembly. Pin (8) must engage and locate both parts. The bent flat on washer (7) must align with the thread plate (32) on MCB chain units. Press or tap spool until fully seated on ball screw assembly. Fine shavings from the spool bore may be present after this procedure and should be cleaned away.
21. Lubricate thrust bearings (11) with grease. Press retainer (12) into thrust bearing (11). Install through bearing race from large chamfer side. Press bearing assembly into spool. Flanged end of retainer must be positioned to the outside (grooved end of retainer to enter spool first.)
22. Remove ball screw assembly ties.

⚠WARNING

• Bearing retainer (12) must be slightly below surface of thrust bearing race after assembly and thrust bearing race must rotate freely.

23. Stand spool assembly on table with retract control assembly end up. Install spool plate (146) on spool. Position bore cutouts in plate to clear capscrews in ball screw assembly. Position bushings (148) over capscrew holes. Lay arm (147) on spool plate and bushing. Install plate (149) over arm. Notch/cutout in plate outer diameter must fit over the pin in the arm. A small groove is located in pin on plate (149) which must face upward. Install capscrews (150) and tighten. Verify arm is free to move. Install spring (153) between the pin in arm (147) and pin or tab in plate (149). Ensure loops at either end of the spring are fully seated in pin grooves.
24. Grease exposed grooves of ball screw.
25. Install ball screw assembly in can housing. Ensure 1 in. (25 mm) of ball screw extends beyond end of spool. This will allow the notches in the end of the ball screw to locate over the setscrews (2) in the end cover (1).
26. Hold ball screw from rotating and install capscrew (3) and washer (151). Tighten capscrew. Use extreme care that ball screw does not become disengaged from locating setscrews. Do not allow spool to bottom on its travel while tightening capscrew (3).

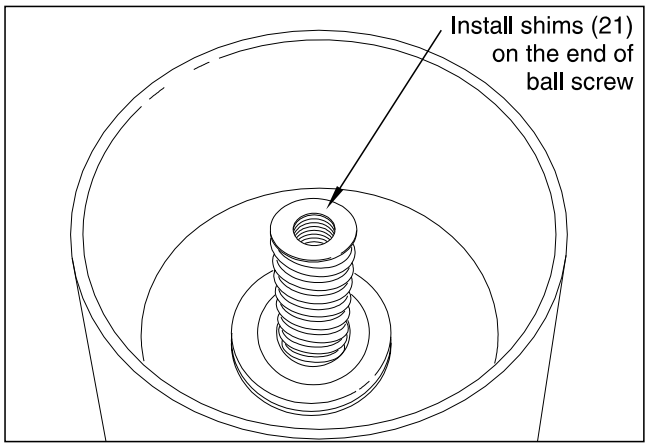


(Dwg. MHTPA0733)

27. When viewed through the wire rope or chain guide opening, the first groove in spool to the left must be aligned with hole above and be central to the wire rope or chain guide opening. If first groove is not aligned, remove spool and rotate 180 degrees and reinstall. Secure end cover bolt.
28. Place balancer in a vertical position (open end up).
29. Place shims (21) on top of ball screw.

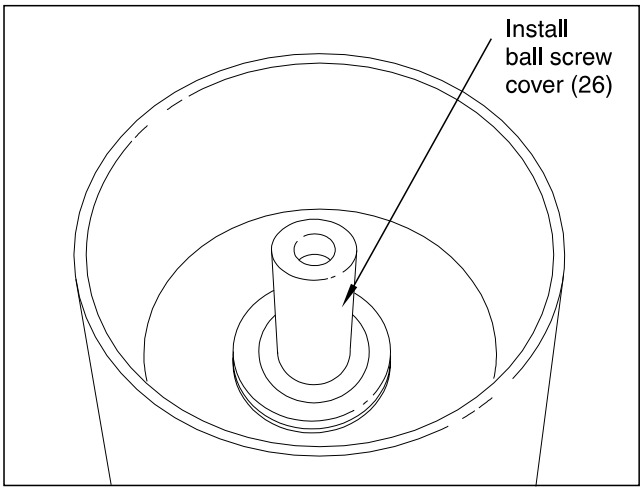
Check Shim Height

30. Install shims (21) on the end of ball screw with ball screw cover (26). Install seal (25) and end cap (23) without 'O' ring (24). Adjust number of shims (21) to ensure a slight rocking motion of the end cap on the can housing. End cap should not fully seat. Maintain a 0.005 to 0.010 in. (0.13 to 0.25 mm) gap between the end cap and can housing all the way around. When correct shim height has been established grease and install 'O' ring on end cap. Apply a light coating of grease on the can housing bore and inner and outer diameters of the piston (20).



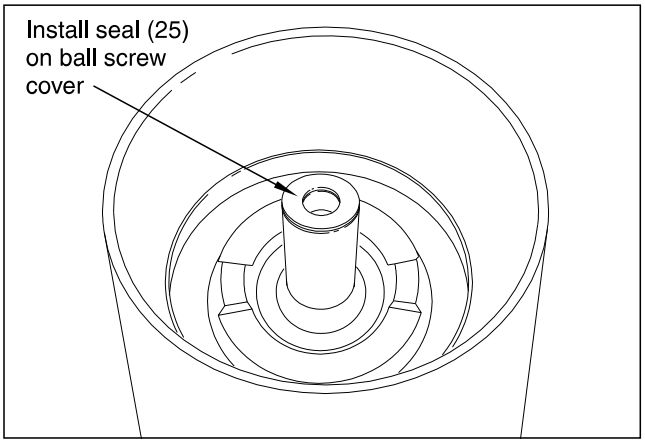
(Dwg. MHTPA0734)

31. Evenly apply a thin film of lubricant, Amber Petrolatum or equivalent, to inside housing and outside diameter of ball screw cover (26).
32. Place ball screw cover (26) over ball screw. Apply a thin film of lubricant, Amber Petrolatum or equivalent, to seal (25) and place on ball screw cover (lubricant side down).



(Dwg. MHTPA0735)

33. Install piston (20) with seal lip facing the open end of the can housing. Press into position until it meets thrust bearing (11). Carefully install end cap (23) to avoid damaging 'O' ring (24). Align end cap (23) so that the four mounting holes on outside diameter of end cap and housing match, and that control mounting holes are closest to trolley bracket. On balancers with 6 in. diameter can housings align the setscrew in the end cap with the notch in the end face of the can housing. Ensure end cap remains square with can housing during installation. Install capscrew (22) and washer (151). Pull end cap into position. Gently tap end cap with a plastic mallet to assist installation.



(Dwg. MHTPA0736)

34. Insert center bolt (22) and hand tighten. Install the four self tapping screws (19) around outside diameter of can housing. Do not tighten at this time. Balancers with 6 in. diameter can housings do not require screws. All other sizes use 4 screws.
35. Torque capscrew (22) to 120 ft lbs (162 Nm). Tighten screws (19). Do not overtorque.

36. Replace control module but DO NOT APPLY AIR at this point.
37. Position can housing assembly on its side and reaching through the can housing opening rotate the spool to the end of its travel.
38. Install wire rope or chain following the procedures outlined in the "MAINTENANCE" section.

Control Pendant Handle C091

Assembly

1. Lubricate and install 'O' rings and seals on plungers.
2. Carefully install springs then plunger assemblies in valve body.
3. Install retainer washer (65) in valve body.
4. Depress retainer washer in valve body and install retainer ring (64).
5. Install "UP" and "DOWN" levers (61 and 62) on valve body with pin (63).
6. Install valve body assembly on pendant handle (71) with capscrews (72).

Control Pendant Handle C017

Assembly

1. Lubricate and install 'O' rings and seals on plungers.
2. Carefully install plunger assemblies in valve body.
3. Install spring and retainer in valve body. Ensure spring is centered on retainer.
4. Depress retainer in valve body and install retainer ring (64).
5. Install "UP" and "DOWN" levers (61 and 62) on valve body with pin (63).
6. Install valve body assembly on pendant handle (71) with capscrews (72).

Single Balancer Control C018

Assembly

1. Install spring (53) and bolt (54) in valve body (51). Compress spring and install washers (49) and (50), ring (48) and threaded thimble (47) on bolt (54).
2. Tighten threaded thimble until end of bolt is just below the surface of the thimble threaded hole.
3. Install screw (57).
4. Install hook (17) on valve body with capscrew (52) and nut (55).
5. Connect hose (46) between regulator (40) and valve body.

Trolley Assembly S001A

Assembly

1. Install guide rollers (128) and washers (127) on pins (129).
2. Position guide roller assemblies in plate (130).
3. Place one outer plate (126) on each side of plate (130) and install axles (132). Secure in position with nuts (121) and lockwashers (122).
4. Install trolley wheels (125) on axles and secure with retainer rings (120).

Trolley Assembly S806A

Assembly

1. Install axles (132) in plate (130) with washers (132) and secure in position with nuts (121).
2. Install wheels (125) on axles and secure with retainer rings (120).

Balancers using Hydraulic Retract Cylinders C089

A large thrust bearing is used in place of the mechanical retract control parts. To assemble press retainer sleeve into thrust bearing until seated. Place bearing assembly on the end of the spool using the same technique as was used for the smaller thrust bearing at the opposite end. Hydraulic shocks (178) are initially set by the factory at 4. Adjustment should not be required. It is important that both shocks are at the same setting.

Testing

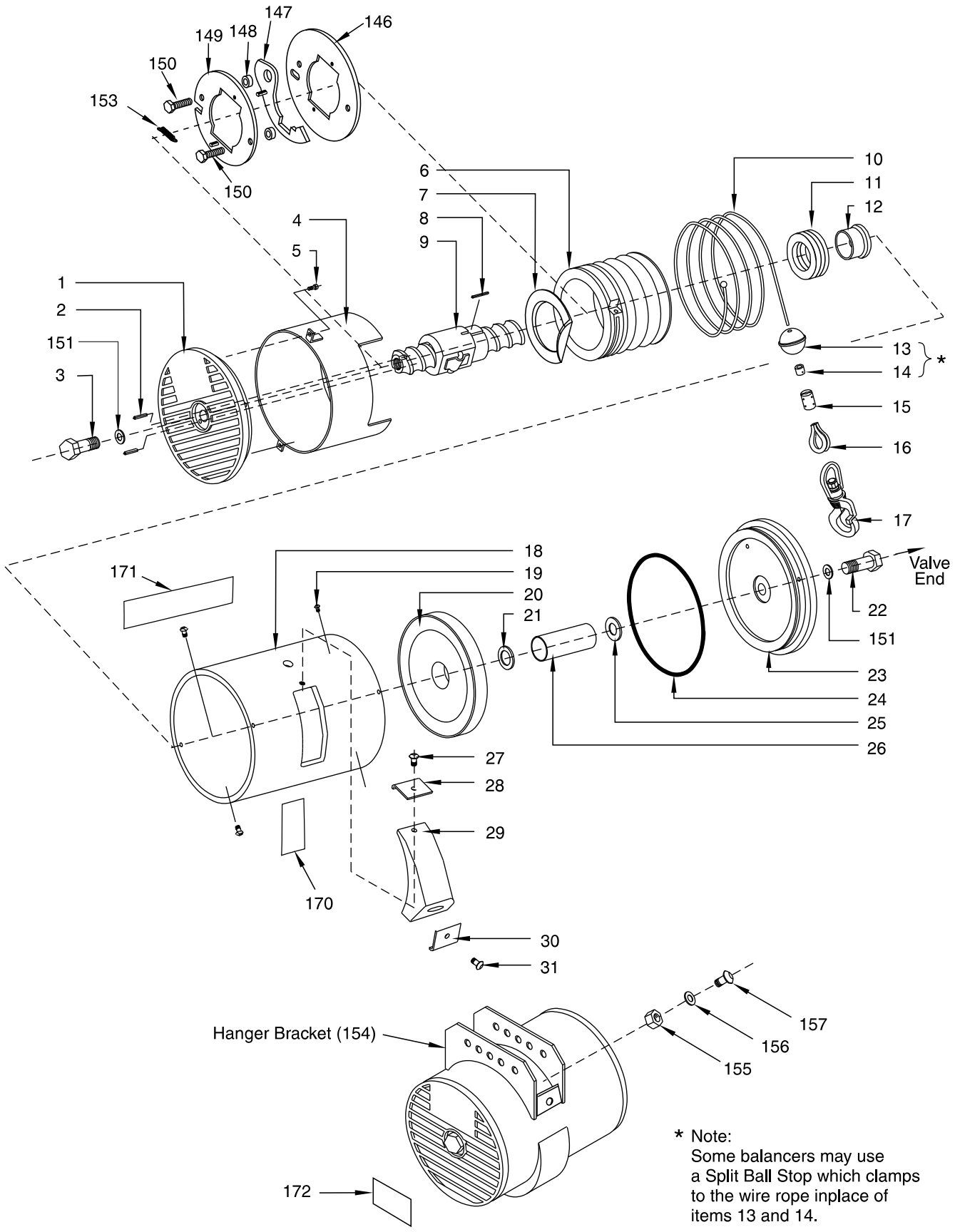
Prior to initial use, all new, extensively repaired, or altered balancers shall be tested by or under the direction of a person trained in safety, operation and maintenance of balancers, and a written report furnished confirming the test. Test balancer to 100% of the rated balancer capacity.

The unit should lift, balance and lower the load smoothly and quietly, with only the sound of exhausting air at the regulator when lowering the load. A slight air bleed at regulator orifice and control pendant handle is normal.

By grasping the suspended load by hand and with minimum effort the load should be able to be moved up or down the full vertical travel of the balancer.

If the balancer does not operate properly refer to the "TROUBLESHOOTING" section. All problems must be corrected before placing balancer into service.

SINGLE WIRE ROPE BALANCER (MAB) PARTS DRAWING



(Dwg. MHTPA0714)

SINGLE WIRE ROPE BALANCER (MAB) PARTS LISTS

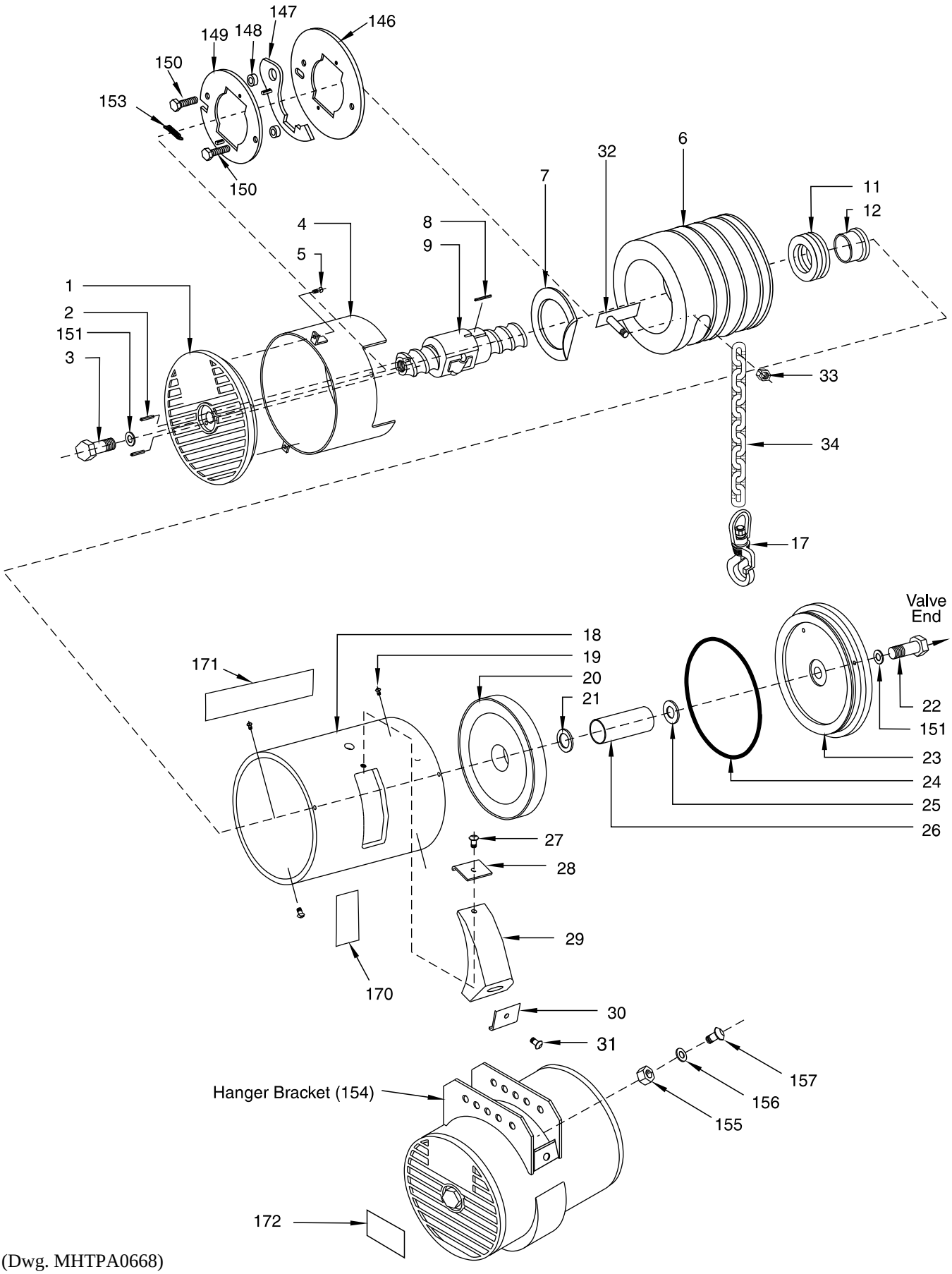
Item No.	Description of Part	Qty. Total	Part Number					
			MAB100 -56	MAB150 -52	MAB120 -76	MAB225 -55	MAB225 -73	MAB225 -117
1	Can End Cover	1	KP2093			KP2094		KP2095
2	Setscrew	2	KP2067					
3	Bolt	1	KP2066					
4	Can Liner	1	- - -			KP2007	KP2072	KP2110
5	Screw	2	- - -			KP2113		
6	Spool	1	KP2002	KP2038	KP2069	KP2002	KP2069	KP2111
7	Washer	1	KP2068					
8	Pin	1	KP2084					
9	Ball Screw Assembly	1	KP2001		KP2070	KP2001	KP2070	
- - -	Wire Rope Assembly 15 feet (4.5 m) incls. items 10, 13 thru 16	1	KP1019					
10	Wire Rope 15 feet (4.5 m)	1	KP2027					
11	Thrust Bearing	1	KP2025					
12	Retainer	1	KP2026					
*13	Wire Rope Ball Stop	1	KP2009					
*14	Stop	1	KP2028					
15	Clamp	1	KP2029					
16	Thimble	1	KP2030					
17	Load Hook Assembly	1	KP2031				KP1009	
18	Can Housing	1	KP1000		KP1001	KP2000	KP2085	KP2101
19	Screw	8	KP1004			KP2032		
20	Piston	1	KP1003			KP2203		KP2102
21	Shim 0.010 in. (0.25 mm)	As Req'd	KP2033					
	Shim 0.025 in. (0.64 mm)							
22	Bolt	1	KP2037					
23	End Cap	1	KP1005			KP2005		KP2103
24	'O' Ring	1	KP1011			KP2011		KP2109
25	Seal	1	KP2034					
26	Ball Screw Cover	1	KP2004		KP2071	KP2004	KP2071	
27	Screw	1	KP2035					
28	Plate	1	KP2036					
29	Wire Rope Guide	1	KP1008			KP2008		KP2107
30	Plate	1	KP2036			- - -		KP2036
31	Screw	1	KP2035			- - -		KP2035
146	Spool Plate	1	KP1026					
147	Arm	1	KP1025					
148	Bushing	2	KP1024					
149	Plate	1	KP1023					
150	Bolt	2	KP1022					
151	Washer	2						
153	Spring	1	KP1021					
154	Hanger Bracket	1	welded to item #18			KP2010		KP2106
155	Capscrew	2	- - -					
156	Washer	2	- - -					- - -
157	Nut	2	- - -					
170	Warning Label	1	71148175					
171	Capacity Label	1	71148076	71148092	71148084	71148100		
172	Model/Serial No. Label	1	71157135					

SINGLE WIRE ROPE BALANCER (MAB) PARTS LISTS CONTINUED

Item No.	Description of Part	Qty. Total	Part Number				
			MAB350 -55	MAB350 -73	MAB300 -101	MAB500 -46	MAB500 -64
1	Can End Cover	1	KP2095		KP2206		KP2006
2	Setscrew	2	KP2067				
3	Bolt	1	KP2066		KP2204		
4	Can Liner	1	KP2007	KP2072	KP2110	KP2007	KP2072
5	Screw	2	KP2113				
6	Spool	1	KP2002	KP2069	KP2111	KP2002	KP2069
7	Washer	1	KP2068				
8	Pin	1	KP2084				
9	Ball Screw Assembly	1	KP2001	KP2070		KP2001	KP2070
- - -	Wire Rope Assembly 15 feet (4.5 m) incls. items 10, 13 thru 16	1	KP1019				
10	Wire Rope 15 feet (4.5 m)	1	KP2027				
11	Thrust Bearing	1	KP2025				
12	Retainer	1	KP2026				
*13	Wire Rope Ball Stop	1	KP2009				
*14	Stop	1	KP2028				
15	Clamp	1	KP2029				
16	Thimble	1	KP2030				
17	Load Hook Assembly	1	KP1009			KP2086	
18	Can Housing	1	KP2100	KP2101	KP2211	KP2200	KP2211
19	Screw	8	KP2032				
20	Piston	1	KP2102		KP2203		
21	Shim 0.010 in. (0.25 mm)	As Req'd	KP2033				
	Shim 0.025 in. (0.64 mm)						
22	Bolt	1	KP2037		KP2207		
23	End Cap	1	KP2103		KP2205		
24	'O' Ring	1	KP2109		KP2202		
25	Seal	1	KP2034			KP2209	
26	Ball Screw Cover	1	KP2004	KP2071		KP2004	KP2071
27	Screw	1	KP2035				
28	Plate	1	KP2036				
29	Wire Rope Guide	1	KP2105		KP2208		
30	Plate	1	KP2036		- - -		
31	Screw	1	KP2035		- - -		
146	Spool Plate	1	KP1026		KP1029	KP1026	
147	Arm	1	KP1025		KP1028	KP1025	
148	Bushing	2	KP1024				
149	Plate	1	KP1023		KP1027	KP1023	
150	Bolt	2	KP1022				
151	Washer	2					
153	Spring	1	KP1021				
154	Hanger Bracket	1	KP2106		KP2201		
155	Capscrew	2					
157	Nut	2					
170	Warning Label	1	71148175				
171	Capacity Label	1	71148142		71148134	71148159	
172	Model/Serial No. Label	1	71157135				

NOTES

CHAIN BALANCER (MCB) PARTS DRAWING



(Dwg. MHTPA0668)

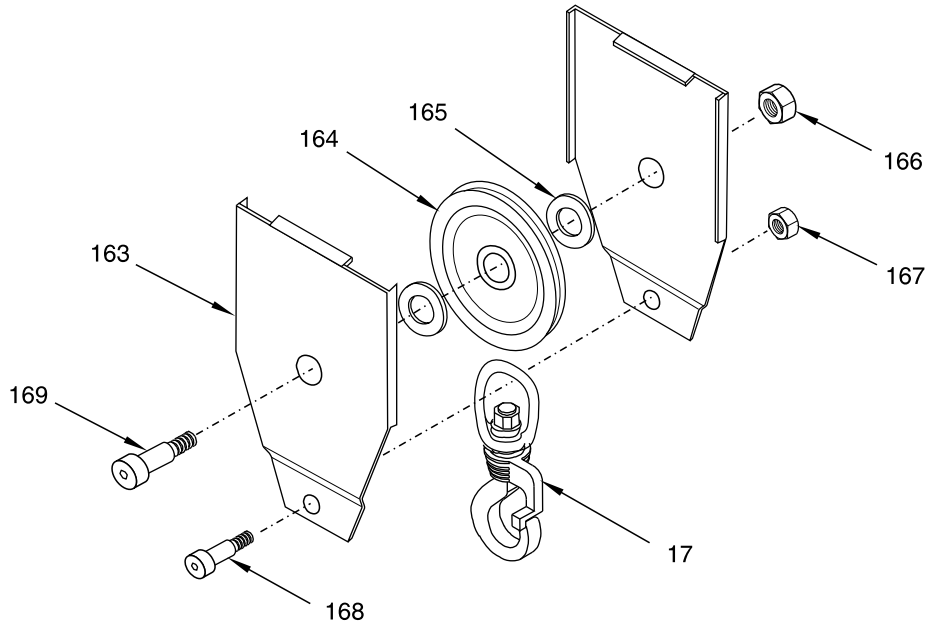
CHAIN BALANCER (MCB) PARTS LISTS

Item No.	Description of Part	Qty. Total	Part Number				
			MCB150 -52	MCB150 -68	MCB225 -52	MCB225 -68	MCB200 -120
1	Can End Cover	1	KP2093		KP2094		KP2095
2	Setscrew	2	KP2067				
3	Bolt	1	KP2066				
4	Can Liner	1	- - -		KP2007	KP2072	KP2110
5	Screw	2	- - -		KP2113		
6	Spool	1	KP1012	KP1013	KP1012	KP1013	KP1014
7	Washer	1	KP2068				
8	Pin	1	KP2084				
9	Ball Screw Assembly	1	KP2001	KP2070	KP2001	KP2070	
11	Thrust Bearing	1	KP2025				
12	Retainer	1	KP2026				
17	Load Hook Assembly	1	KP2031				
18	Can Housing	1	KP1000	KP1001	KP2000	KP2085	KP2101
19	Screw	2	KP1004		- - -		
		8	- - -		KP2032		
20	Piston	1	KP1003		KP2003		
21	Shim 0.010 in. (0.25 mm)	As Req'd	KP2033				
	Shim 0.025 in. (0.64 mm)						
22	Bolt	1	KP2037				
23	End Cap	1	KP1005		KP2005		
24	'O' Ring	1	KP1011		KP2011		
25	Seal	1	KP2034				
26	Ball Screw Cover	1	KP2004	KP2071	KP2004	KP2071	
27	Screw	1	KP2035A				
28	Plate	1	KP2036				
29	Chain Guide	1	KP1008		KP2008		KP2107
30	Plate	1	KP2036		- - -		KP2036
31	Screw	1	KP2035		- - -		KP2035
32	Thread Plate	1	KP1037				
33	Nut	1	KP1038				
34	Chain 10 feet (3 m)	1	KP1040				
146	Spool Plate	1	KP1026				KP1029
147	Arm	1	KP1025				KP1028
148	Bushing	2	KP1024				
149	Plate	1	KP1023				
150	Bolt	2	KP1022				
151	Washer	2					
153	Spring	1	KP1021				
154	Hanger Bracket	1	welded to item #18		KP2010		KP2106
155	Capscrew	2	- - -				
156	Washer	2	- - -				- - -
157	Nut	2	- - -				
170	Warning Label	1	71148175				
171	Capacity Label	1	71148092		71148100		
172	Model/Serial No. Label	1	71157135				

CHAIN BALANCER (MCB) PARTS LISTS CONTINUED

Item No.	Description of Part	Qty. Total	Part Number				
			MCB350 -52	MCB350 -68	MCB300 -106	MCB500 -44	MCB500 -60
1	Can End Cover	1	KP2095		KP2206		KP2006
2	Set Screw	2	KP2067				
3	Bolt	1	KP2066		KP2204		
4	Can Liner	1	KP2007	KP2072	KP2110	KP2007	KP2072
5	Screw	2	KP2113				
6	Spool	1	KP1012	KP1013	KP1014	KP1012	KP1013
7	Washer	1	KP2068				
8	Pin	1	KP2084				
9	Ball Screw Assembly	1	KP2001	KP2070		KP2001	KP2070
11	Thrust Bearing	1	KP2025				
12	Retainer	1	KP2026				
17	Load Hook Assembly	1	KP1009				
18	Can Housing	1	KP2100	KP2101	KP2211	KP2200	KP2211
19	Screw	8	KP2032				
20	Piston	1	KP2102		KP2203		
21	Shim 0.010 in. (0.25 mm)	As Req'd	KP2033				
	Shim 0.025 in. (0.64 mm)						
22	Bolt	1	KP2207				
23	End Cap	1	KP2103		KP2205		
24	'O' Ring	1	KP2109		KP2202		
25	Seal	1	KP2034			KP2209	
26	Ball Screw Cover	1	KP2004	KP2071		KP2004	KP2071
27	Screw	1	KP2035				
28	Plate	1	KP2036				
29	Chain Guide	1	KP2105		KP2208		
30	Plate	1	KP2036		---		
31	Screw	1	KP2035		---		
32	Thread Plate	1	KP1037				
33	Nut	1	KP1038				
34	Chain 10 feet (3 m)	1	KP1040				
146	Spool Plate	1	KP1026		KP1029	KP1026	
147	Arm	1	KP1025		KP1028	KP1025	
148	Bushing	2	KP1024				
149	Plate	1	KP1023		KP1027	KP1023	
150	Bolt	2	KP1022				
151	Washer	2					
153	Spring	1	KP1021				
154	Hanger Bracket	1			KP2201		
155	Capscrew	2					
156	Washer	2	---				
157	Nut	2					
170	Warning Label	1	71148175				
171	Capacity Label	1	71148142		71148134	71148159	
172	Model/Serial No. Label	1	71157135				

REEVED AND TANDEM REEVED LOAD HOOK DRAWING AND PARTS LIST

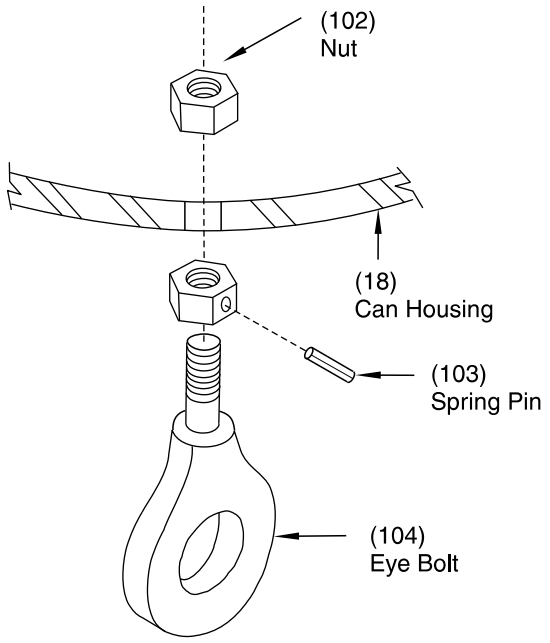


(Dwg. MHTPA0778)

Item No.	Description of Part	Qty. Total	Part Number	
			Wire Rope Reeved	Wire Rope Tandem Reeved
17	Load Hook Assembly (incls. items 163 thru 169)	1		
163	Cover Plate	2		
164	Sheave	See ( )	(1)	(2)
165	Washer	See ( )	(2)	(3)
166	Nut	1		
167	Nut	1		
168	Shoulder Bolt	1		
169	Shoulder Bolt	1		

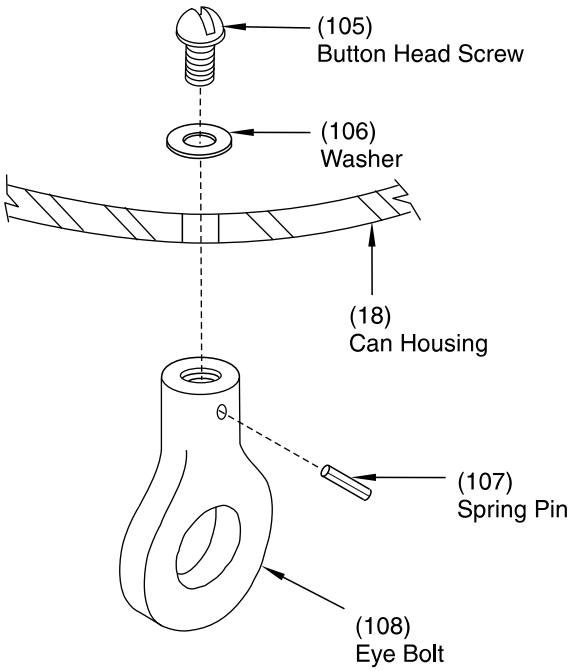
Contact factory for part number information.

WIRE ROPE REEVED BALANCER PARTS LIST



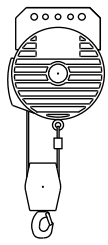
Use with Model MAB600-50

(Dwg. MHTPA0783)



Use with Models MAB700-27, MAB700-36 and MAB1000-32

(Dwg. MHTPA0751)

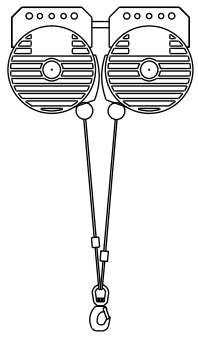


(Dwg. MHTPA0780)

Model	Description	Eye Bolt Assembly
MAB700-27	**Use parts list for MAB350-55 plus hook assembly (17), eye bolt, (108) screw (105), washer (106) and pin (107).**	
MAB700-36	**Use parts list for MAB350-73 plus hook assembly (17), eye bolt, (108) screw (105), washer (106) and pin (107).**	
MAB1000-32	**Use parts list for MAB500-64 plus hook assembly (17), eye bolt, (108) screw (105), washer (106) and pin (107).**	
MAB600-50	**Use parts list for MAB300-101 plus hook assembly (17), eye bolt (104), nuts (102), and pin (103).**	

It is not recommended that Single Wire Rope Balancers be converted to Reeved Balancers.
It may be necessary to rework the Can Housing to accomodate the wire rope attaching device.
See Dwgs. MHTPA0751 and MHTPA0783.
Reeved balancers do not use the wire rope stop ball (13) and clamp (15).
Consult the factory for additional information.

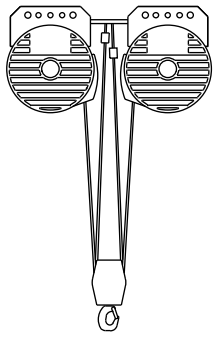
WIRE ROPE TANDEM BALANCER PARTS LISTS



Model	Description	Connecting Bar
MAB450-117	Use parts list for MAB225-117 plus connecting bar	KP2115
MAB700-55	Use parts list for MAB350-55 plus connecting bar	
MAB700-73	Use parts list for MAB350-73 plus connecting bar	
MAB600-101	Use parts list for MAB300-101 plus connecting bar	KP2212
MAB1000-46	Use parts list for MAB500-46 plus connecting bar	
MAB1000-64	Use parts list for MAB500-64 plus connecting bar	

(Dwg. MHTPA0781)

WIRE ROPE TANDEM REEVED BALANCER PARTS LIST

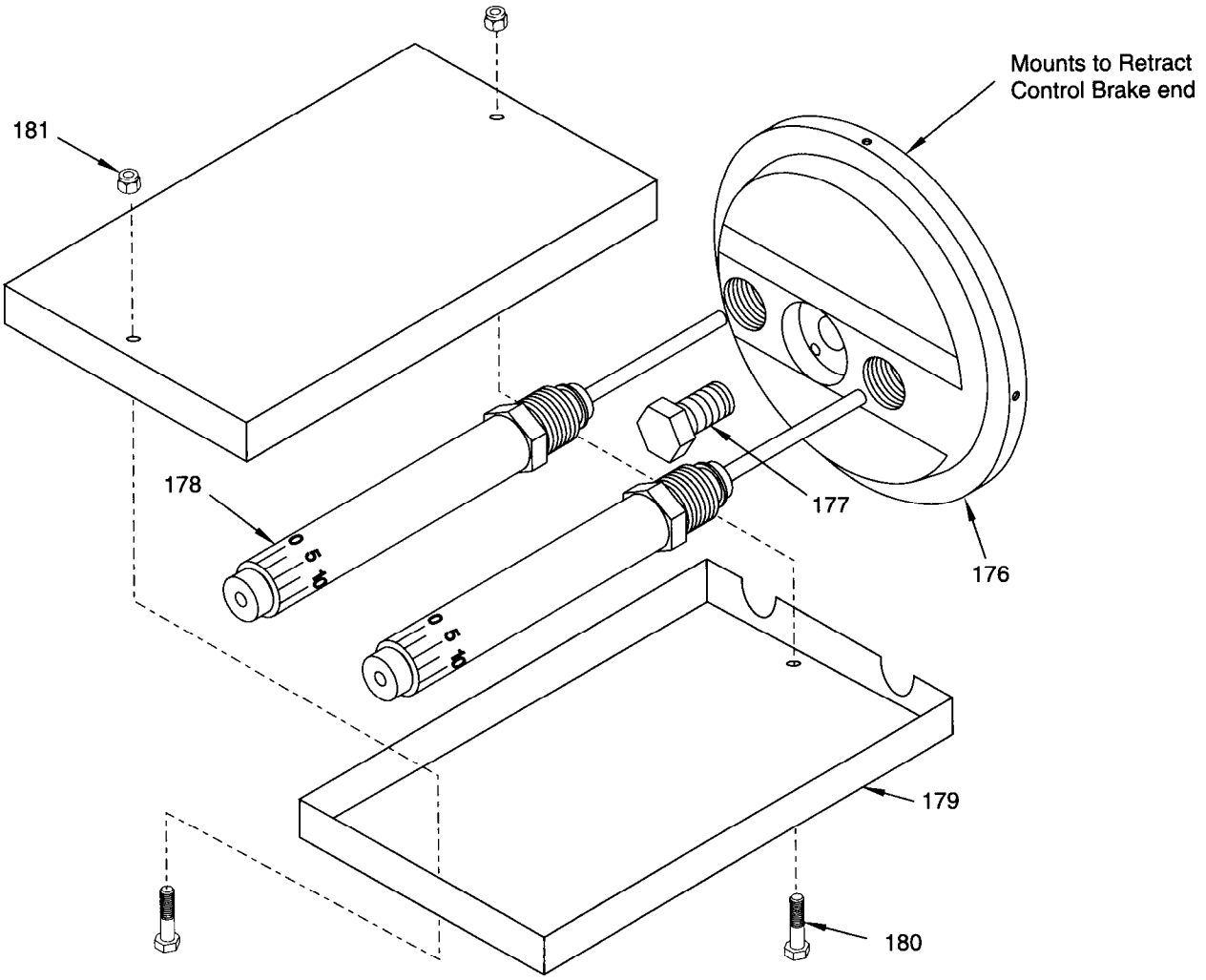


Model	Description	Connecting Bar
MAB1400-36	Use parts list for MAB700-73 plus connecting bar	KP2115
MAB2000-32	Use parts list for MAB1000-64 plus connecting bar	KP2212

Tandem Reeved Balancers do not use the wire rope stop ball (13) and clamp (15).

(Dwg. MHTPA0782)

HYDRAULIC RETRACT CONTROL ASSEMBLY C089 DRAWING AND PARTS LIST



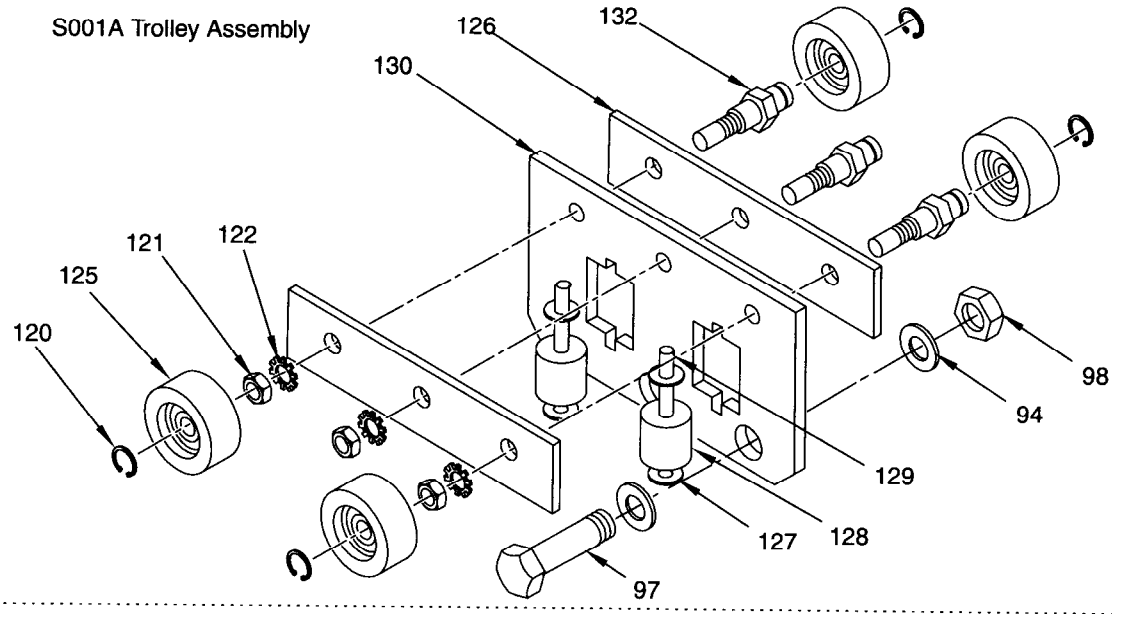
(Dwg. MHTPA0715)

Item No.	Description of Part	Qty. Total	Part Number			
			6 inch Body Diameter	8 inch Body Diameter	10 inch Body Diameter	12 inch Body Diameter
176	Can End Cover	1	KP2093	KP2094	KP2095	KP2210
177	Capscrew	1	KP2075			
178	Shock	2	KP2096			
179	Cover Guard *	1	KP2114			
180	Capscrew	2				
181	Nut	2				

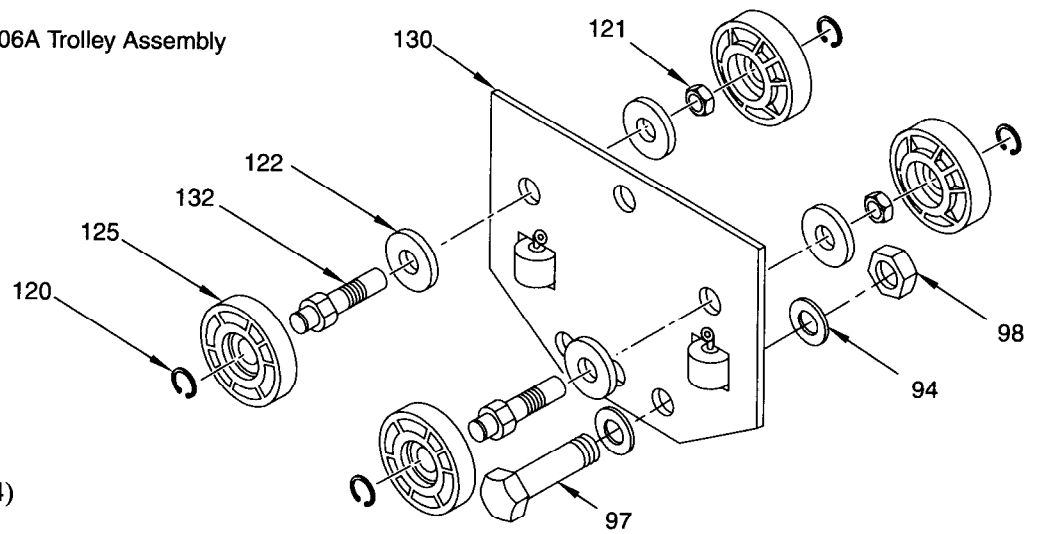
* Includes items 180 and 181.

ENCLOSED ALUMINUM RAIL TROLLEY S001A AND S806A DRAWING AND PARTS LIST

S001A Trolley Assembly



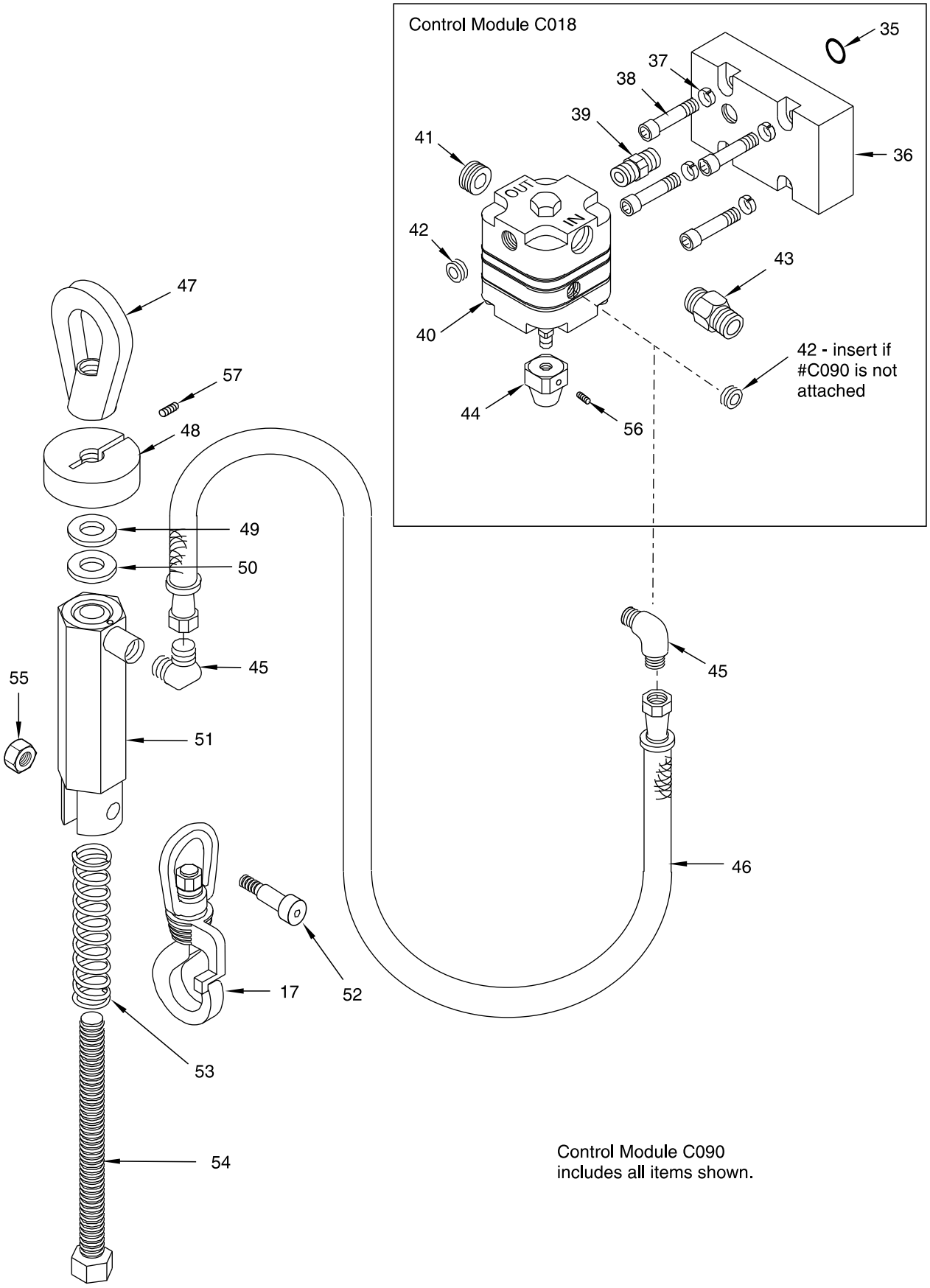
S806A Trolley Assembly



(Dwg. MHTPA0784)

Item No.	Description of Part	Qty. Total	Part Number	
			R000 Rail	R800 Rail
- - -	Trolley Assembly	1	S001A	S806A
94	Washer	4	KP2041	
97	Capscrew	2	KP2040	
98	Flex Lock Nut	2	KP2043	
120	Axle Retainer Ring	4	KP4135	KP4850
121	Reverse Lock Nut	See ( )	KP4108 (3)	KP4854 (2)
122	Washer	3	KP4136	- - -
		4	- - -	
125	Wheel	4	KP4157	KP4862
126	Trolley Outer Plate	2	KP4159	- - -
127	Guide Roller Washer	4	KP4158	Order Trolley Plate Inner item 130
128	Guide Roller	2	KP4134	
129	Pin Guide Roller	2	KP4133	
130	Trolley Plate Inner	1	KP4160	KP4840 (incls. Guide Rollers)
132	Axle	See ( )	KP4144 (3)	KP4838 (2)

SINGLE BALANCER CONTROL MODULE C018 AND C090 PARTS DRAWING

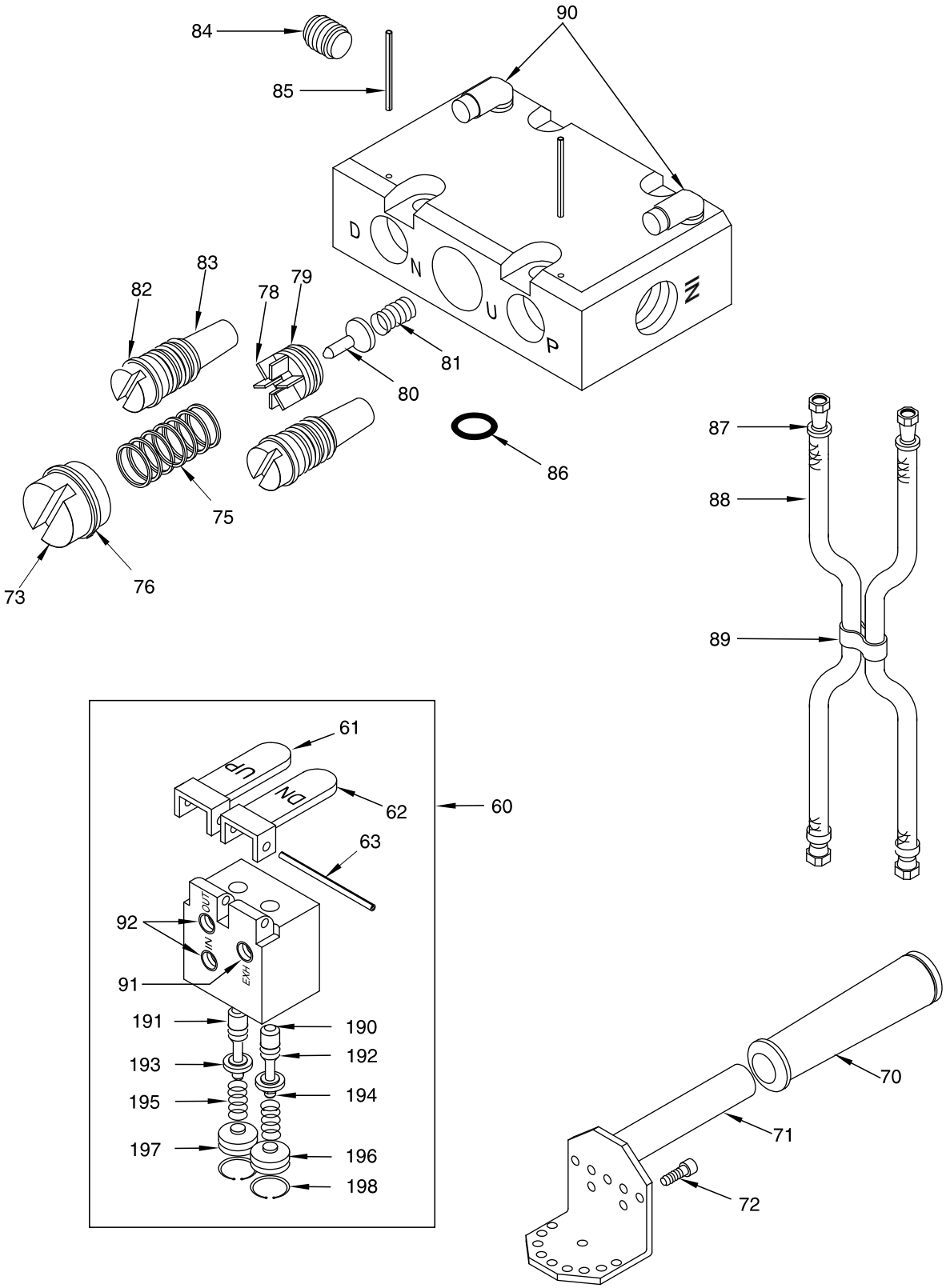


(Dwg. MHTPA0716)

SINGLE BALANCER CONTROL MODULE C018 AND C090 PARTS LIST

Item No.	Description of Part	Qty. Total	Part Number	
			Control Module C018	High Relieving Control Module C090
17	Load Hook Assembly	1	- - -	KP2086
35	'O' Ring	1	KP2078	
36	Balancer Manifold	1	KP2059	
37	High Collar Lockwasher	4	KP2056	
38	Capscrew	4	KP2060	
39	Male Connector	1	KP2061	
40	Regulator	1	KP2062	KP9029
41	Pipe Plug	1	KP2079	
42	Pipe Plug	2	KP2080	- - -
		1	- - -	KP2080
43	Check Valve	1	KP2063	
44	Knob	1	KP2074	
45	Fitting, 90° elbow	2	- - -	KP9030
46	Air Hose	1	- - -	
47	Threaded Thimble	1	- - -	KP9031
48	Ring	1	- - -	KP9032
49	Flat Washer	1	- - -	KP9033
50	Rubber Washer	1	- - -	KP9034
51	Valve Body	1	- - -	KP9035
52	Shoulder Bolt	1	- - -	KP9038
53	Spring	1	- - -	KP9036
54	Capscrew	1	- - -	KP9037
55	Nut	1	- - -	
56	Setscrew	1		
57	Setscrew	1	- - -	

PENDANT CONTROL MODULE ASSEMBLY C017 PARTS DRAWING



(Dwg. MHTPA0717)

PENDANT CONTROL MODULE ASSEMBLY C017 PARTS LIST

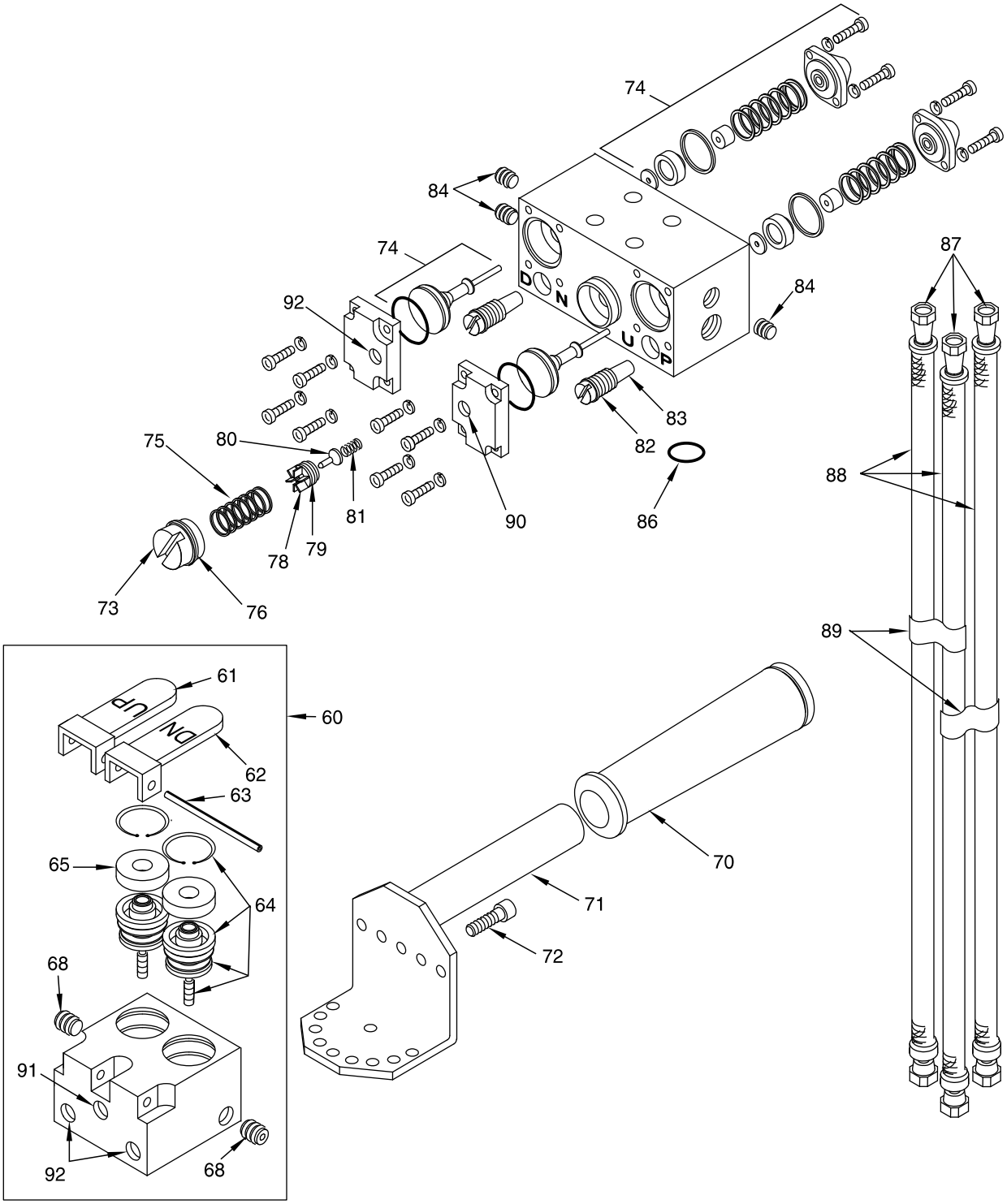
Item No.	Description of Part	Qty. Total	Part Number
- - -	Valve Assembly	1	KP9005
60	Control Module Assembly	1	KP9009
61	Up Lever Pendant Control	1	KP9002
62	Down Lever Pendant Control	1	KP9003
63	Lever Retainer Roll Pin	1	KP9004
70	Grip	1	KP9001G
71	Handle (incls. item 72)	1	KP9001H
72	Capscrew	2	KP9046
73	Adjustment Screw	1	KP9048
75	Spring	1	KP9025
76	'O' Ring	1	KP9047
78	Plug	1	KP9022
79	'O' Ring	1	KP9021
80	Valve	1	KP9020
81	Spring	1	KP9017
82	'O' Ring	2	KP9019
83	Up/Down Flow Control Screw	2	KP9018
84	Pipe Plug	1	KP9015
85	Retainer Pin	2	KP9016
86	'O' Ring	1	KP2053
91	Muffler *	1	KP9013
190	'O' Ring	2	KP9007
191	Plunger	2	KP9061
192	'O' Ring	2	KP9062
193	Seal	2	KP9063
194	'O' Ring	2	KP9064
195	Spring	2	KP9008
196	Retainer	2	KP9010
197	'O' Ring	2	KP9011
198	Retainer Ring	2	KP9039

* Not shown on drawing.

Item No.	Description of Part	Qty. Total	6 in Diameter Units		8, 10, and 12 in Diameter Units	
			Rubber Hose Assembly KP2039	Coiled Hose Assembly KP1033	Rubber Hose Assembly KP2021	Coiled Hose Assembly KP2023
			Part Number			
87	Fitting	4	KP2055	- - -	KP9055	- - -
88	Hose	2	KP2058	KP9052	KP9056	KP9060
89	Hose Clamp	1	KP2073	- - -	KP9057	- - -
90	Fitting, Elbow	2	KP9049	KP9051	KP9054	KP9059
92	Fitting, Straight Nipple *	2	KP2054	KP9050	KP9053	KP9058

* Not shown on drawing.

PENDANT CONTROL MODULE ASSEMBLY C091 PARTS DRAWING



(Dwg. MHTPA0718)

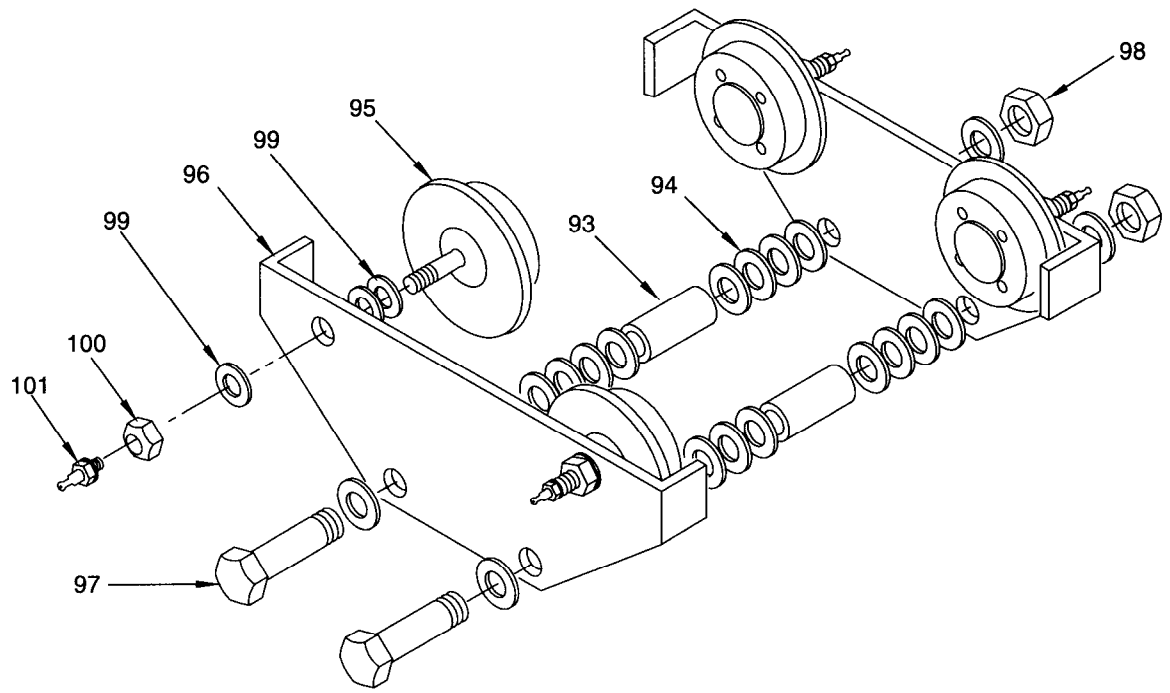
PENDANT CONTROL MODULE ASSEMBLY C091 PARTS LIST

Item No.	Description of Part	Qty. Total	Part Number
- - -	Valve Assembly	1	
60	Control Module Assembly	1	KP9001
61	Up Lever Pendant Control	1	KP9002
62	Down Lever Pendant Control	1	KP9003
63	Lever Retainer Roll Pin	1	KP9004
64	Poppet Valve Assembly	1	
	Retainer Ring	2	
	Poppet Body	2	
	'O' Ring	2	
	Spring	2	
65	Retainer Washer	2	KP9006
68	Pipe Plug	2	KP9012
70	Grip	1	KP9001G
71	Handle (incls. item 72)	1	KP9001H
72	Capscrew	2	KP9046
73	Adjustment Screw	1	KP9048
74	Valve Assembly	2	
75	Spring	1	KP9025
76	'O' Ring	1	KP9047
78	Plug	1	KP9022
79	'O' Ring	1	KP9021
80	Valve	1	KP9020
81	Spring	1	KP9017
82	'O' Ring	1	KP9019
83	Up/Dn Flow Control Screw	2	KP9018
84	Pipe Plug	3	KP9015
86	'O' Ring	1	KP2053
91	Muffler *	1	KP9013

* Not shown on drawing.

Item No.	Description of Part	Qty. Total	6, 8, 10 and 12 in Diameter Units	
			Rubber Hose Assembly KP2022	Coiled Hose Assembly KP2024
			Part Number	
87	Fitting	6	KP2055	- - -
88	Hose	3	KP2058	KP9067
89	Hose Clamp	2	KP2073	- - -
92	Fitting, Straight Nipple	4	KP2054	KP9050

TROLLEY SUSPENSION KIT ASSEMBLY S013 AND S014 DRAWING AND PARTS LIST

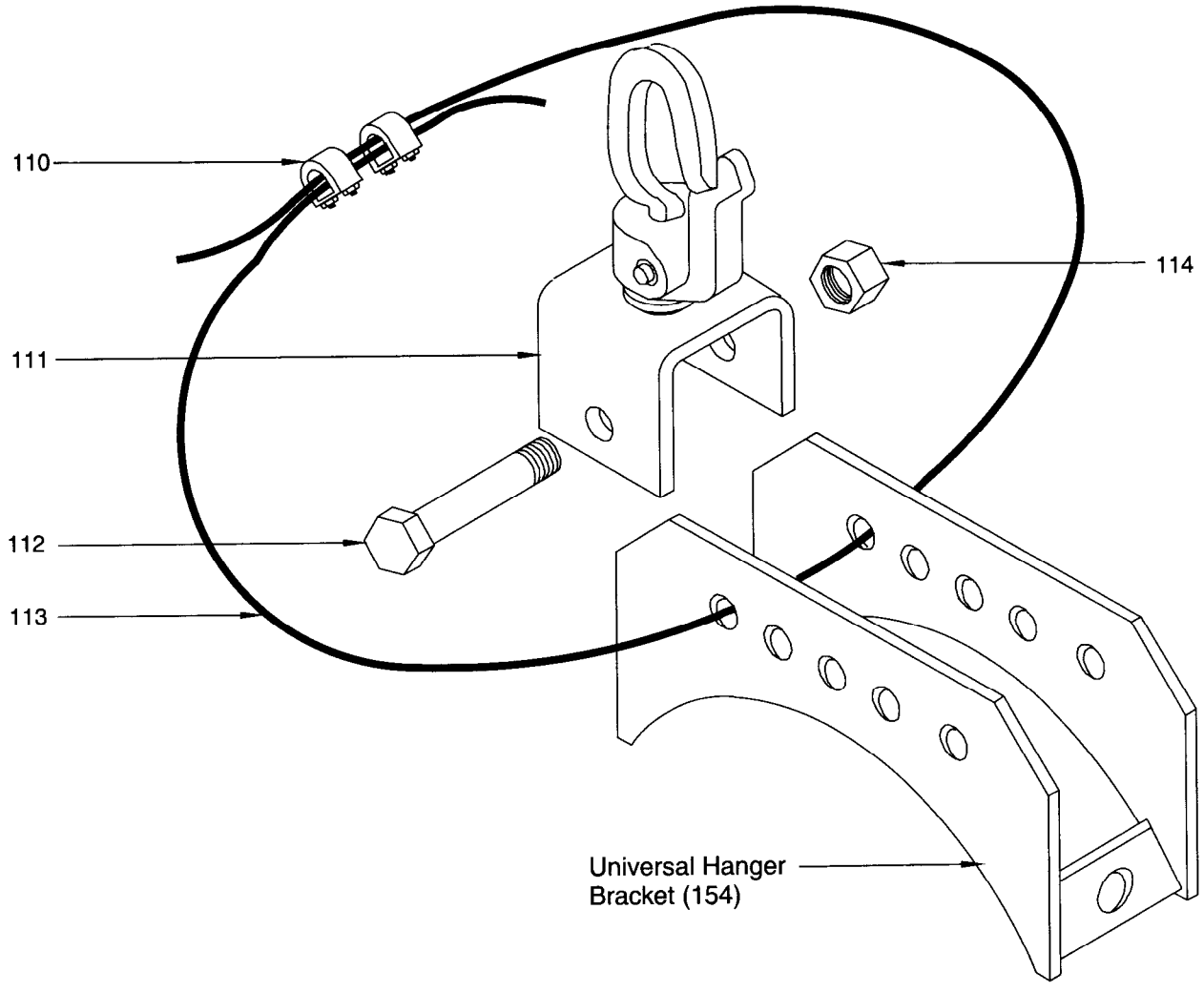


(Dwg. MHTPA0719)

Item No.	Description of Part	Qty. Total	Part Number	
			I-Beam Suspension	Patented Track Suspension
- - -	Trolley Suspension Kit (incls items 93 to 101)	1	S013	S014
93	Spacer	2	KP2042	
94	Washer	20	KP2041	
95	Trolley Wheel Assembly *	4	KP2045	KP2046
96	Trolley Plate	2	KP2044	
97	Capscrew	2	KP2040	
98	Flex Lock Nut	2	KP2043	
99	Washer	4		
100	Nut	4		
101	Grease Fitting	4		

* Includes washer (99), nut (100) and grease fitting (101).

SINGLE HANGER HOOK ASSEMBLY S016 DRAWING AND PARTS LIST



(Dwg. MHTPA0720)

Item No.	Description of Part	Qty. Total	Part Number			
			6 in.	8 in.	10 in.	12 in.
- - -	Hook Assembly (incls. items 111, 112 and 114)	1	S016			
110	Wire Rope Clamp	2	KP2051			
111	Hanger Hook	1	KP2050			
112	Capscrew	1	KP2047			
113	Wire Rope Assembly (incls. item 110)	1	KP2049			
114	Flex Lock Nut	1	KP2048			
154	Universal Hanger Bracket	1	welded to can housing	KP2010	KP2106	KP2201

KITS AND ACCESSORIES

Description of Part	Part Number
Lubricant	LUBRI-LINK-GREEN
Filter/Regulator	KP4018
Rail System Manual	MHD56091

PARTS ORDERING INFORMATION

Balancers are designed and constructed to provide long, trouble-free service. In time it may become necessary to order and install new parts to replace those that have been subjected to wear.

The use of other than **Ingersoll-Rand** Material Handling replacement parts may result in decreased Balancer performance, and may invalidate the warranty. For prompt service and genuine **Ingersoll-Rand** Material Handling parts, provide your nearest Distributor with the following:

1. Complete balancer model number and serial number as it appears on the nameplate.
2. Part number and part description as shown in this manual.
3. Quantity required.

The model and serial number label is located on the balancer housing.

For your convenience and future reference it is recommended that the following information be recorded.

Balancer Model Number _____

Balancer Serial Number _____

Date Purchased _____

Return Goods Policy

If it becomes necessary to return the complete Balancer or certain parts to the factory, contact the Distributor from whom you purchased the Balancer, or the nearest **Ingersoll-Rand** Distributor in your locality. **Ingersoll-Rand** will not accept any returned goods for warranty or service work unless prior arrangements have been made and written authorization has been provided from the location where the goods were purchased.

NOTICE

• Continuing improvement and advancement of design may cause changes to this balancer which are not included in this manual. Manuals are periodically revised to incorporate changes. Always check the manual edition number on the front cover for the latest issue.

Disposal

When the life of the balancer has expired, it is recommended that the balancer be disassembled, degreased and parts separated as to materials so that they may be recycled.

For additional information contact:
Ingersoll-Rand Material Handling
2724 Sixth Avenue South
Seattle, Wa. 98124 USA
Phone: (206) 624-0466
Fax: (206) 624-6265
or
Ingersoll-Rand International Sales
111, avenue Roger Salengro
59450 Sin Le Noble, France
Phone: (33) 27-93-08-08
Fax: (33) 27-93-08-00

LIMITED WARRANTY

Ingersoll-Rand Company (**I-R**) warrants to the original user its Hoists and Winches (Products) to be free of defects in material and workmanship for a period of one year from the date of purchase. **I-R** will repair, without cost, any Product found to be defective, including parts and labor charges, or at its option, will replace such Products or refund the purchase price less a reasonable allowance for depreciation, in exchange for the Product. Repairs or replacements are warranted for the remainder of the original warranty period.

If any Product proves defective within its original one year warranty period, it should be returned to any Authorized Hoist and Winch Service Distributor, transportation prepaid with proof of purchase or warranty card.

This warranty does not apply to Products which **I-R** has determined to have been misused or abused, improperly maintained by the user, or where the malfunction or defect can be attributed to the use of non-genuine **I-R** parts.

I-R makes no other warranty, and all implied warranties including any warranty of merchantability or fitness for a particular purpose are limited to the duration of the expressed warranty period as set forth above. I-R's maximum liability is limited to the purchase price of the Product and in no event shall I-R be liable for any consequential, indirect, incidental, or special damages of any nature rising from the sale or use of the Product, whether based on contract, tort, or otherwise.

Note: Some states do not allow limitations on incidental or consequential damages or how long an implied warranty lasts so that the above limitations may not apply to you.

This warranty gives you specific legal rights and you may also have other rights which may vary from state to state.

IMPORTANT NOTICE

It is our policy to promote safe delivery of all orders.

This shipment has been thoroughly checked, packed and inspected before leaving our plant and receipt for it in good condition has been received from the carrier. Any loss or damage which occurs to this shipment while enroute is not due to any action or conduct of the manufacturer.

VISIBLE LOSS OR DAMAGE

If any of the goods called for on the bill of lading or express receipt are damaged or the quantity is short, do not accept them until the freight or express agent makes an appropriate notation on your freight bill or express receipt.

CONCEALED LOSS OR DAMAGE

When a shipment has been delivered to you in apparent good condition, but upon opening the crate or container, loss or damage has taken place while in transit, notify the carrier's agent immediately.

DAMAGE CLAIMS

You must file claims for damage with the carrier. It is the transportation company's responsibility to reimburse you for repair or replacement of goods damaged in shipment. Claims for loss or damage in shipment must not be deducted from the **Ingersoll-Rand** invoice, nor should payment of **Ingersoll-Rand** invoice be withheld awaiting adjustment of such claims as the carrier guarantees safe delivery.

You may return products damaged in shipment to us for repair, which services will be for your account and form your basis for claim against the carrier.

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International Office Locations

Offices and distributors in principal cities throughout the world. Contact the nearest **Ingersoll-Rand** office for the name and address of the distributor in your country or write/ fax to:

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Fax: (206) 624-6265

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