IMPORTANT INFORMATION:

• A copy of our "Safe Operating Practices" Manuals are always available free of charge either by downloading it from our Technical Publications website @ www.airwinch.com or by contacting the Factory at (800) 866-5457 for North America and (206) 624-0466 for International. The Safe Operating Practices manual must be read prior to anyone operating a **Ingersoll-Rand** winch or hoist. The manual form numbers are as follows:

"Safe Operating Practices Non-Man Rider™ Winches" Manual, Form No. MHD56250
"Safe Operating Practices for Man Rider™ Winches" Manual, Form No. MHD56251
"Safe Operating Practices for Pneumatic, Hydraulic and Electric Hoists" Manual, Form No. MHD56295

• Available winch options may require additional supplements to the basic winch manual.

• For Man Rider™ winches ensure a copy of the Man Rider™ supplement is made available to the operator prior to winch operation.

Winch Man Rider™ Supplements:

Model:	Publication No.
FA2, FA2.5, FH2, FH2.5	MHD56046
FA5	MHD56042 and MHD56220
FA10	MHD56252
FA2.5A	MHD56236
FA2B and HU40A	MHD56207
FH10MR	MHD56212
Fulcrum Electric	MHD56277
LS500HLP/ LS1000HLP	SAM0004

Model:	Publication No.
LS500RLP	SAM0011
LS1000RLP	SAM0012
LS150RLP	SAM0082
LS150RLP/500/ 1000	SAM0115
LS150RLP and LS150PLP-PH	SAM0120
LS500RLP-E	SAM0122
LS150RLP-DP5M-F	SAM0184
LS150HLP	SAM0222

• We strongly recommend that ALL maintenance on **Ingersoll-Rand** equipment be carried out by personnel certified by **Ingersoll-Rand**, or by **Ingersoll-Rand** Authorized Service Centers.

• Contact the Factory if in doubt about installation, operation, inspection and maintenance instructions.

• Use only Genuine **Ingersoll-Rand** parts when maintaining or repairing a winch, hoist or any component of a winch or hoist.

• ANSI / ASME recommends that a winch or hoist (or any components of a winch or hoist) that has been repaired be tested prior to being placed into service:

* **Winches -** ANSI / ASME B30.7 (BASE MOUNTED DRUM HOISTS) Refer to section 7.2.2 - Testing.
* **Hoists -** ANSI / ASME B30.16 (OVERHEAD HOISTS - UNDERHUNG) Refer to section 16.2.2 - Testing.

Form MHD56298
Edition 2
November 2004
71441844

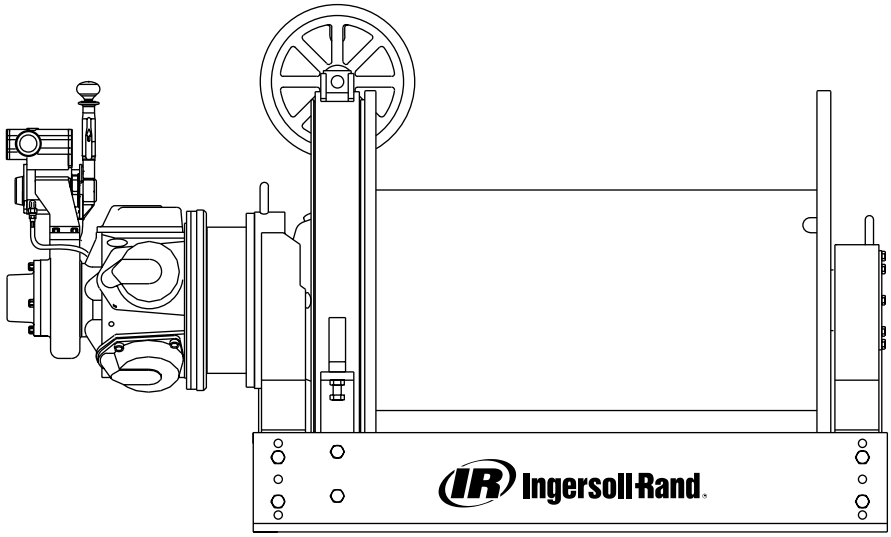
Ingersoll-Rand®

Form MHD56116

PARTS, OPERATION AND MAINTENANCE MANUAL

force5™ AIR WINCHES

MODEL FA10



(Dwg. MHP0916)

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 installation, operation and maintenance of these products.

⚠WARNING

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

Always operate, inspect and maintain this winch in accordance with American National Standards Institute Safety Code (ASME B30.7) and any other applicable safety codes and regulations.

Form MHD56116
Edition 2
August 2001
71301295

Ingersoll-Rand®

TABLE OF CONTENTS

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 winch.

Danger, Warning, Caution and Notice

Throughout this manual there are steps and procedures which, if not followed, may result in a hazard. 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 winch for lifting, supporting, or transporting people or lifting or supporting loads over people.
• Supporting structures and load-attaching devices used in conjunction with this winch must provide an adequate safety factor to handle the rated load, plus the weight of the winch and attached equipment. This is the customer's responsibility. If in doubt, consult a registered structural engineer.

Ingersoll-Rand winches are manufactured in accordance with the latest ASME B30.7 standards.

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 or pulling 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 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 cannot know of, or 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) Standard ASME B30.7 and are intended to avoid unsafe operating practices which might lead to injury or property damage.

Ingersoll-Rand recognizes that most companies who use winches 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.

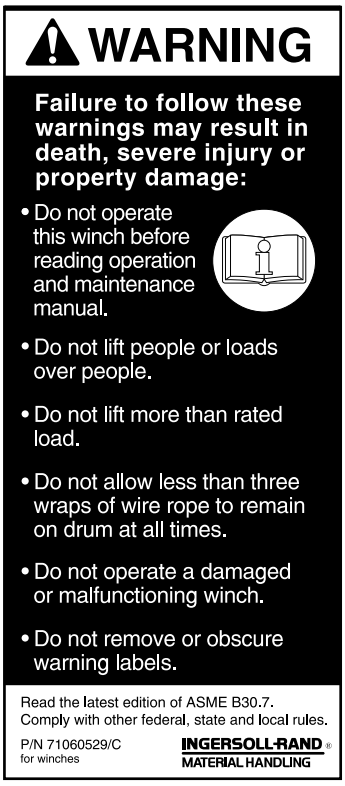
Safe Operating Instructions are provided to make an operator aware of dangerous practices to avoid and are not necessarily limited to the following list. Refer to specific sections in the manual for additional safety information.

1. Only allow personnel trained in safety and operation of this winch to operate and maintain this product.
2. Only operate a winch if you are physically fit to do so.
3. When a **"DO NOT OPERATE"** sign is placed on the winch, or controls, do not operate the winch until the sign has been removed by designated personnel.
4. Before each shift, check the winch for wear and damage. Never use a winch that inspection indicates is worn or damaged.
5. Never lift a load greater than the rated capacity of the winch. Refer to "SPECIFICATIONS" section.
6. Keep hands, clothing, etc., clear of moving parts.
7. Never place your hand in the throat area of a hook or near wire rope spooling onto or off of the winch drum.
8. Always rig loads properly and carefully.
9. Be certain the load is properly seated in the saddle of the hook. Do not tipload the hook as this leads to spreading and eventual failure of the hook.
10. Do not "side pull" or "yard".
11. Make sure everyone is clear of the load path. Do not lift a load over people.
12. Never use the winch for lifting or lowering people, and never allow anyone to stand on a suspended load.
13. Ease the slack out of the wire rope when starting a lift or pull. Do not jerk the load.
14. Do not swing a suspended load.
15. Never suspend a load for an extended period of time.
16. Do not leave a load suspended when the winch is unattended or not in use.
17. Pay attention to the load at all times when operating the winch.
18. After use, or when in a non-operational mode, the winch should be secured against unauthorized and unwarranted use.
19. Never use the winch wire rope as a sling.

WARNING LABELS

Each winch is shipped from the factory with the warning labels shown. If the labels are not attached to your winch, order new labels and install them. Refer to the parts list for the part numbers. Labels are shown smaller than actual size.

Label 71107130



Label 71060529

SPECIFICATIONS

Model Code Explanation
Example: FA10-36MK320P **FA10 - 36 M K 320 P**

Series (Capacity)
Drum Flange Height
Drum Length (Distance between drum flanges)
Band Brake
Disk Brake
Control
Options

Series (Capacity)			**Band Brakes**			
FA10	=	10 metric ton / 22,000 lbs	A	=	Automatic Band Brake	
Drum Flange Height			M	=	Manual Band Brake	
-	=	Standard flange: 38 inch (965 mm) diameter	X	=	None	
Drum Length (Distance between drum flanges)			**Disc Brake**			
16	=	16 inch (406 mm)	K	=	Automatic Disc Brake	
20	=	20 inch (508 mm)	X	=	None	
24	=	24 inch (610 mm) (Standard)	**Control**			
30	=	30 inch (760 mm)	1	=	Winch mounted lever throttle (Standard)	
36	=	36 inch (915 mm)	* 2XX	=	Remote full flow throttle (XX = Specify hose length (feet). Maximum 20 ft. (6 metres))	
40	=	40 inch (1016 mm)	* 3XX	=	Remote pilot pendant throttle (XX = Specify hose length (feet). Maximum 50 ft. (15 metres))	
50	=	50 inch (1270 mm)	* 4XX	=	Remote pilot lever throttle (XX = Specify hose length (feet). Maximum 50 ft. (15 metres))	

Options			
	7	=	Drum Grooving (Number = wire rope size in sixteenths, e.g. 7/16 inch) †
**	C	=	Low Temperature Components; specify -10° C (14° F) or -20° C (-4° F)
	D	=	Drum Divider Flange and additional wire rope anchor †
	E	=	Construction Cage
	G	=	Drum Guard
	L	=	Drum Locking Pin
**	M1	=	Material Traceability (typical material results) ††
**	M2	=	Material Traceability (actual material results ††
**	M3	=	Material Traceability (actual material results for these parts in finished, as-delivered condition) ††
	N	=	Type Approval - Specify: A = American Bureau of Shipping (ABS); N = Det Norske Veritas (DNV); R = Lloyd's Register of Shipping (LRS)
	P	=	Marine grade corrosion preventative finish
	Q	=	Special Paint
	S	=	Rotary Limit Switch (upper and lower)
	T	=	Tension Manifold
	U	=	Underwound wire rope operation †
**	W	=	Witness; please specify
	X	=	Testing; please specify
	Z	=	Sand Blast and Carbozinc primer only
	-E	=	Compliance with European Machinery Directive (includes Emergency Stop and Overload Protection)

* Remote throttles are provided with 6 feet (2 metres) of hose. Specify hose lengths greater than 6 feet. For lengths greater than 20 ft. (6 metres) with the Remote Full Flow Throttle, or 50 ft. (15 metres) with the Remote Pilot Lever and Remote Pilot Pendant Throttles contact your **Ingersoll-Rand** distributor or the factory for control acceptability. Metric lengths are provided for reference only, order lengths in feet.

** Documentation, witness testing and material traceability available; must be requested at time of order. Specify options or contact the factory or your nearest **Ingersoll-Rand** distributor for information.

† Not covered in this manual.

†† Refer to 'Traceability' on page 6 for a description of the differences between M1, M2 and M3.

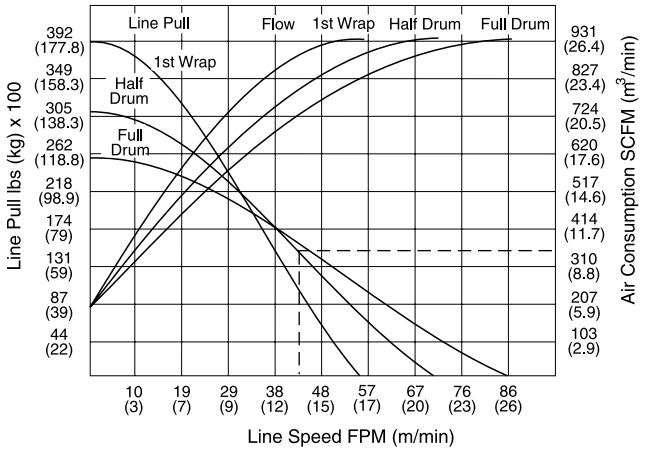
General Specifications		Model	
		FA10	
Air System	Rated Operating Pressure	90 psig	6.3 bar
	Air Consumption (at rated pressure and load)	800 scfm	22.7 m^3/min
Rated Performance (at rated pressure / volume)	Full Drum Line Pull	22,000 lb	10,000 kg
	Mid Drum Line Speed	16 fpm	5 m/m
	Max Stall Pull - 1st Layer	38,600 lbs	17,509 kg
Shipping Weight (24 in. long drum without wire rope)		3,550 lbs	1,610 kg
Air Motor Pipe Inlet Size		1-1/4 inches	
Minimum Air System Hose Size		1-1/2 inches	
Drum Barrel Diameter		20 inches	508 mm
Drum Flange Diameter		38 inches	965 mm
Horsepower		27 hp	20 kw

FA10 Drum Wire Rope Storage Capacities ft. (m)

Drum Length		Rope Diameter							
inches	**mm**	**3/4 inch**	**20 mm**	**7/8 inch**	**22 mm**	**1 inch**	**26 mm**	**1-1/8 inch**	**28 mm**
16	406	1632	497	1283	391	869	265	667	203
20	508	2060	628	1622	494	1100	335	847	258
24	610	2488	731	1962	592	1332	398	1026	377
30	762	3130	921	2470	746	1679	503	1295	476
36	914	3772	1110	2980	900	2026	606	1564	574
40	1016	4200	1236	3319	1002	2258	676	1744	640
50	1270	5271	1607	4168	1270	2837	865	2192	668

Wire rope storage capacity based on wire rope top layer located a minimum of 1/2 inch (13 mm) below drum flange and meets ASME B30.7. The wire rope storage capacities listed may vary from figures stated elsewhere.

Performance Graph



Example: 370 scfm = 43 fpm on half drum

Description of Operation

FA10 winches are air powered, planetary geared units designed for lifting and pulling applications. **FA10** winches are supplied with an internal automatic disc brake or a manual externally mounted drum band brake, or a combination of both.

The output from an externally mounted piston air motor is transmitted through a coupling and shaft to the planetary reduction gear assembly.

The output from the planetary reduction gear assembly is connected to the wire rope drum through the output shaft.

FA10 winches can be provided with an optional disc brake assembly consisting of friction plates splined to a hub which in turn is connected to the drive shaft from the air motor. The brake friction plates are clamped to the drum shaft through a spring applied piston. The brake remains applied until winch control valve is operated and winch payout or haul-in occurs. Air is introduced into brake piston chamber which is formed between brake piston and brake housing and causes brake piston to retract, compressing brake springs and releasing friction plates allowing motor shaft to rotate. A power failure or sudden loss of air will immediately cause spring applied brake to engage.

The drum band brake operates by applying a friction force between band brake and winch drum. The manual brake requires an operator to engage and disengage brake using a lever located on top of brake band. The automatic drum band brake operation is similar to disc brake operation; they are both fully disengaged in the haul-in and payout direction.

Traceability

Load bearing parts are documented to provide traceability. Documentation includes chemical and physical properties of raw material, heat treating, and hardening, tensile and charpy tests as required for the part.

Units with M1, M2 or M3 in the model code have traceable load-bearing components.

M1–Material Traceability certificates according to EN 10204 (Ex DIN 50049) 2.2 on load bearing parts. Conformity documents affirm (by the manufacturer) that parts are in compliance with the requirements of the order based on non-specific inspection and testing (i.e. results are typical material properties for these parts).

M2–Material Traceability certificates according to EN 10204 (Ex DIN 50049) 3.1b on load bearing parts. Conformity documents affirm (by a department independent of the manufacturing department) that the actual parts are in compliance with the requirements of the order based on specific inspection and testing (i.e. results are actual material properties for these parts).

M3–Material Traceability certificates according to EN 10204 (Ex DIN 50049) 3.1b on load bearing parts. Conformity documents affirm (by a department independent of the manufacturing department) that the actual parts used in the product are in compliance with the order based on specific inspection and testing (i.e. results are actual material properties for these parts in a finished, as delivered condition).

Components with part numbers ending in CH are charpy parts for use under extreme cold conditions. Traceability requirements must be stated when reordering these parts for continued certification.

INSTALLATION

Prior to installing the winch, carefully inspect it for possible shipping damage.
Winches are supplied fully lubricated from the factory. Before operation check oil levels and adjust as necessary. Use the proper type of oil as recommended in the "LUBRICATION" section.

⚠ 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 winch to use.

Mounting

Refer to Dwg. MHP0920, Table 1 and Table 2 on page 7.
Care must be taken when moving, positioning or mounting winch. In most cases, lifting lugs have been provided to assist in handling the winch. If lug locations are improper for your specific installation, great care should be taken to ensure that winch, when lifted, will be properly balanced. Determine the weight of your winch by referring to the "SPECIFICATIONS" section. Lift winch 3 to 4 inches (75 to 100 mm) off the ground. Verify winch is balanced and secure before continuing lift.

Mount winch so axis of drum is horizontal and motor vent cap is not more than 15° off top vertical center. If winch is to be mounted in an inverted position, motor case must be rotated to position vent cap at top.

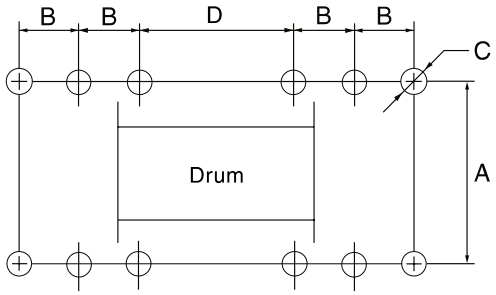
1. The winch mounting surface must be flat and of sufficient strength to handle rated load plus weight of winch and attached equipment. An inadequate foundation may cause distortion or twisting of winch uprights and side rails resulting in winch damage.
2. Make sure mounting surface is flat to within 0.005 inch (0.127 mm) per inch of drum length. Shim if necessary.

Table 1 — Mounting Surface Tolerance

Drum Length		Mounting Surface Minimum flatness	
inch	**mm**	**inch**	**mm**
16	406	0.080	2.03
20	508	0.100	2.54
24	610	1.120	3.05
30	762	1.150	3.81
36	914	0.180	4.57
40	1016	0.200	5.08
50	1270	0.250	6.35

3. Mounting bolts must be 7/8 inch (22 mm) Grade 8 or better. Use self-locking nuts or nuts with lockwashers.

Winch Bolt Hole Mounting Dimensions



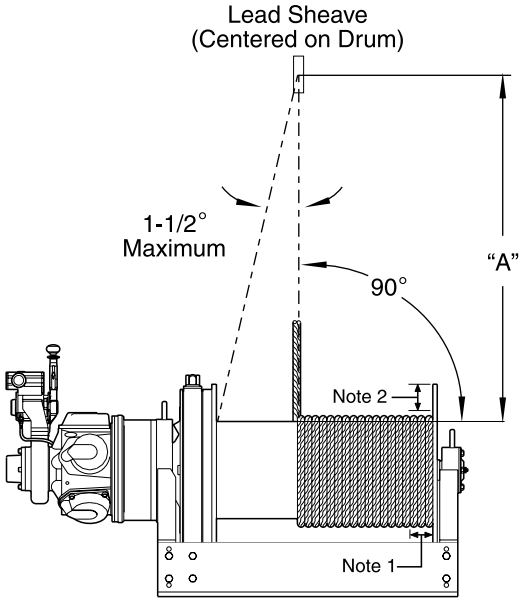
(Dwg. MHP0920)

Table 2 — Winch Bolt Hole Mounting Dimensions

Dimension		Drum Length (inches)						
		16	**20**	**24**	**30**	**36**	**40**	**50**
A	in	25						
	mm	1073						
B	in	6			8			
	mm	152			203			
C	in	15/16						
	mm	24						
D (with band brake)	in	6	10	14	12	18	22	N/A
	mm	152	254	356	305	457	559	
D (without band brake)	in	N/A	6	10	8	14	18	28
	mm		152	254	203	356	457	711

N/A - Not Available

4. Tighten 7/8 inch (22 mm) mounting bolts evenly and torque to 600 ft. lbs. (813 Nm) for dry thread fasteners. If fasteners are plated, lubricated or a thread locking compound is used, torque to 460 ft. lbs. (624 Nm).
5. Maintain a fleet angle between sheave and winch of no more than 1-1/2°. Lead sheave must be on a center line with drum and, for every inch (25 mm) of drum length, be at least 1.6 feet (0.5 metre) from the drum. Diameter of lead sheave must be at least 18 times the diameter of wire rope. Refer to Dwg. MHP2123 on page 8.
6. Do not weld to any part of the winch.



(Dwg. MHP2123)

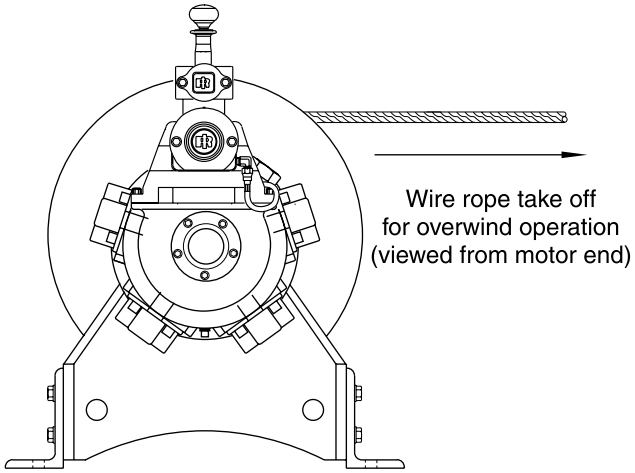
"A"=1.6 feet (.05 metre) per inch of drum length:
"A"=26.0 feet (7.9 metres) for 16 inch long drum.
"A"=32.0 feet (9.8 metres) for 20 inch long drum.
"A"=38.4 feet (11.7 metres) for 24 inch long drum.
"A"=48.0 feet (14.6 metres) for 30 inch long drum.
"A"=57.6 feet (17.5 metres) for 36 inch long drum.
"A"=64.0 feet (19.5 metres) for 40 inch long drum.
"A"=79.2 feet (24.0 metres) for 50 inch long drum.

Notes:
1. Maintain a minimum of 3 tight wraps of wire rope on drum at all times.
2. Ensure wire rope does not exceed top layer requirement. Refer to "SPECIFICATIONS" section on page 6.

Wire Rope

CAUTION

• Maintain at least 3 tight wraps of wire rope on drum at all times.
• Install wire rope to come off drum for overwind operation (normal application). Refer to Dwg. MHP2124 on page 8.



(Dwg. MHP2124)

NOTICE

• Some applications may require underwind operation. Consult the factory prior to use.

Wire Rope Selection

Consult a reputable wire rope manufacturer or distributor for assistance in selecting appropriate type and size of wire rope and, where necessary, a protective coating. Use a wire rope which provides an adequate safety factor to handle actual working load and that meets all applicable industry, trade association, federal, state and local regulations.

When considering wire rope requirements the actual working load must include not only static or dead load but also loads resulting from acceleration, retardation and shock load. Consideration must also be given to the size of the winch wire rope drum, sheaves and method of reeving. Wire rope construction should be 6 X 19 or 6 X 37 IWRC EIPS regular right lay. Refer to Table 3 for minimum and maximum recommended wire rope diameters.

Table 3 — Minimum and Maximum Wire Rope Size

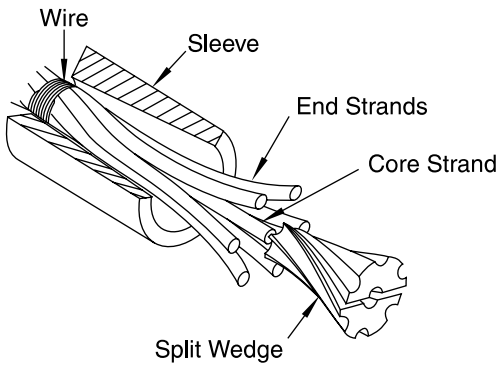
Model	Minimum		Maximum	
	inch	mm	inch	mm
FA10	3/4	20	1-1/8	28

Installing Wire Rope

CAUTION

• To avoid disc brake damage when installing wire rope on winches, pressurize brake with a minimum of 60 psig (4.1 bar) air from an auxiliary source.

Refer to Dwg. MHP0166 on page 8.
1. Cut wire rope to length in accordance with wire rope manufacturer's instructions.
2. Feed end of wire rope into wire rope anchor hole in drum and pull through approximately one foot (305 mm) of wire rope.
3. Wrap wire rope with wire a distance from the end equal to wedge length plus one inch (25 mm).
4. Slide sleeve over end of wire rope so larger diameter of taper bore is nearest end of wire rope.
5. Spread end strands of wire rope and insert split wedge until it is below end of wire rope.



(Dwg. MHP0166)
6. Pull sleeve over wire rope end until tight. Check that wire rope strands stay in slots located on split wedge.
7. Pull wire rope anchor into position in drum anchor pocket.

⚠ CAUTION

• Make sure first wrap of wire rope is tight and lays flush against drum flange.

Safe Wire Rope Handling Procedures

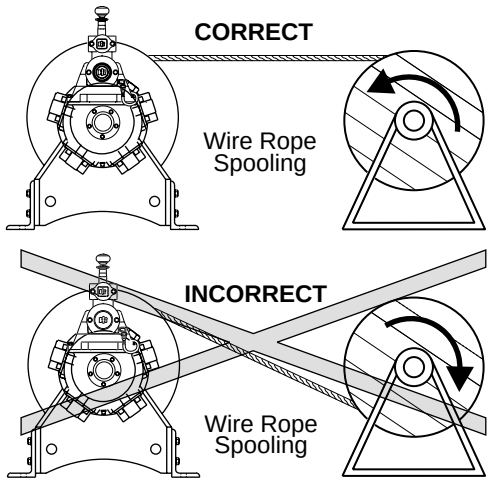
1. Always use gloves when handling wire rope.
2. Never use wire rope which is frayed or kinked.
3. Never use wire rope as a sling.
4. Always ensure wire rope is correctly spooled and first layer is tight against drum.
5. Always follow wire rope manufacturer's recommendation on use and maintenance of wire rope.

Wire Rope Spooling

To compensate for uneven spooling and decrease in line pull capacity as drum fills up, use as short a wire rope as practical. When rewinding apply tension to wire rope to eliminate slack. This helps achieve level winding and tight spooling.

Support wire rope spool and have wire rope come off top of spool and over top of winch drum. This will prevent damage to wire rope.

Spooling Wire Rope onto Winch Drum



(Dwg. MHP2125)

Rigging

Make sure all wire rope blocks, tackle and fasteners have a sufficient safety margin to handle required load under all conditions. Do not allow wire rope to contact sharp edges or make sharp bends which will cause damage to wire rope, **use a sheave.** Refer to wire rope manufacturer's handbook for proper sizing, use and care of wire rope.

Safe Installation Procedures

1. Do not use wire rope as a ground (earth) for welding.
2. Do not attach a welding electrode to winch or wire rope.
3. Never run wire rope over a sharp edge. Use a correctly sized sheave.
4. Always maintain at least three full, tight wraps of wire rope on the drum.
5. When a lead sheave is used, it must be aligned with center of drum. The diameter of lead sheave must be at least 18 times diameter of wire rope. Refer to Dwg MHP2123 on page 8.

Air Supply

The air supply must be clean, free from moisture and lubricated to ensure optimum motor performance. Foreign particles, moisture and lack of lubrication are the primary causes of premature motor wear and breakdown. Using an air filter, lubricator and moisture separator will improve overall winch performance and reduce unscheduled down time.

Air consumption for the **FA10** air motor is 800 scfm (22.7 cu. m/min) at rated operating pressure of 90 psig (6.3 bar/ 630 kPa) at winch motor inlet. If air supply varies from recommended, then winch performance will change

Air Lines

Inside diameter of winch air supply lines must not be less than sizes shown in Table 4. Before making final connections, all air supply lines should be purged with clean, moisture free air or nitrogen before connecting to winch 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.

Table 4 — Minimum Allowable Air Supply Line Sizes

Model	inch	mm
FA10	1-1/2	38

Air Line Lubricator

Refer to Dwg. MHP0191 on page 10.
Always use an air line lubricator with these motors. The lubricator must have an inlet and outlet at least as large as inlet on motor. Install air line lubricator as close to air inlet on motor as possible.

⚠ CAUTION

• Lubricator must be located no more than 10 ft. (3 m) from motor inlet.
• Shut off air supply before filling air line lubricator.

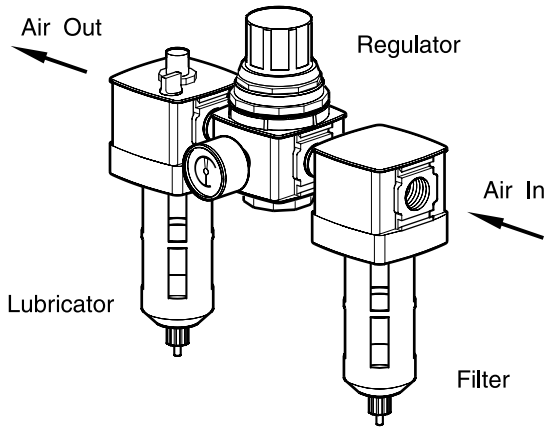
Air line lubricator should be replenished daily and set to provide 6 to 9 drops per minute of ISO VG32 (SAE 10W) oil. A fine mist will be exhausted from throttle control valve when air line lubricator is functioning properly.

Air Line Filter

Refer to Dwg. MHP0191 on page 10.
It is recommended that an air line strainer/filter be installed as close as practical to motor air inlet port, but before lubricator, to prevent dirt from entering valve and motor. The strainer/filter should provide 20 micron filtration and include a moisture trap. Clean strainer/filter periodically to maintain its operating efficiency.

Air Pressure Regulator

Refer to Dwg. MHP0191 on page 10.
If an air pressure regulator is used, install between lubricator and filter.



(Dwg. MHP0191)

Moisture in Air Lines

Moisture that reaches the air motor through air supply lines is a primary 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 motor, an aftercooler at compressor that cools air to condense and collect moisture prior to distribution through supply lines are also helpful.

Mufflers

Make sure mufflers are installed in winch exhaust manifold and control valve exhaust ports. An additional muffler is used on winches equipped with an emergency stop and overload device. Check mufflers periodically to ensure they are functioning correctly.

Motor

For optimum performance and maximum durability of parts, provide an air supply of 90 psig at 800 scfm (6.3 bar/630 kPa at 22.7 cu. m/min) as measured at motor inlet. The air motor should be installed as near as possible to compressor or air receiver. Recommended pressures and volumes are measured at point of entry to air motor.

Emergency Stop and Overload System (old style)

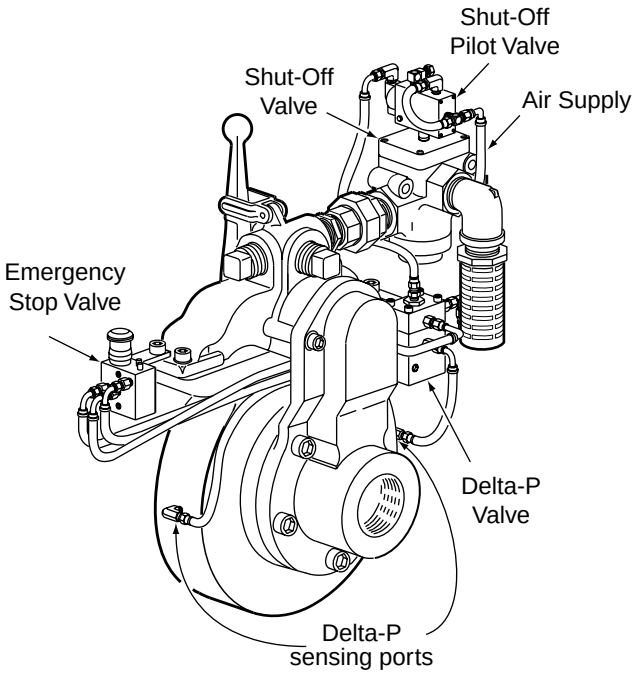
Refer to Dwg. MHP1492 on page 10.
The air supply line is connected to shutoff valve which is connected to the air control valve. When Emergency Stop valve is activated, a pilot signal is sent to the shut off pilot valve which directs shutoff valve to cut off air to winch, immediately stopping all winch movement.

⚠ CAUTION

• If winch continues to move (payout load) after shutoff valve activates, brake(s) are not holding load and need to be adjusted or repaired.

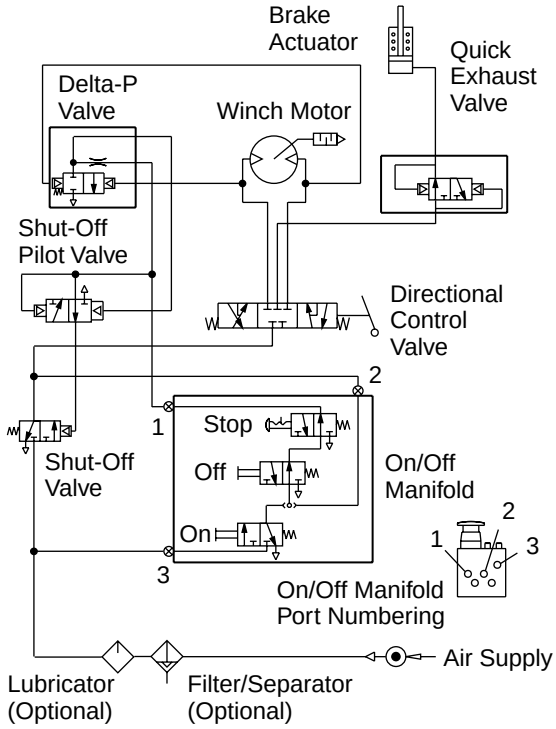
The overload system also activates the shutoff valve. When Delta-P valve senses a preset pressure difference between the two ports, located on rotary housing, it directs a pilot signal to shutoff pilot valve activating the shutoff valve. Refer to Dwg. MHP1491 on page 10.

Emergency Stop and Overload System Components (old style)



(Dwg. MHP1492)

Air Schematic-Emergency Stop and Overload System (old style)

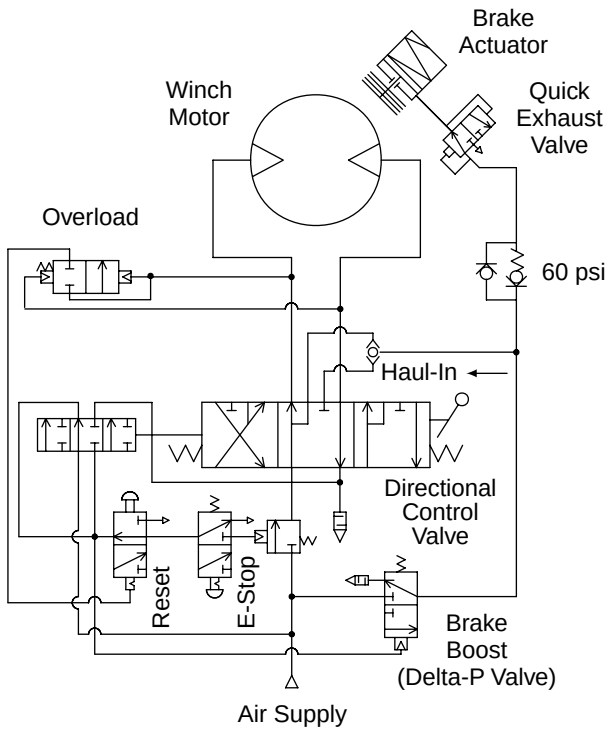


(Dwg. MHP1491)

Emergency Stop and Overload System (new style)

The air supply line is connected to the inlet part on the air throttle control valve. When Emergency Stop valve is activated, a pilot signal is sent to the shut off pilot valve which directs shutoff valve to cut off air to winch, immediately stopping all winch movement.

Air Schematic - Emergency Stop and Overload System (new style)



(Dwg. MHP2174)

Initial Operating Checks

Winches are tested for proper operation prior to leaving the factory. Before winch is placed into service the following initial operating checks should be performed.

1. When first running motor inject some light oil into the inlet connection to provide initial lubrication.
2. When first operating winch it is recommended that the motor be driven slowly in both directions for a few minutes.

For winches that have been in storage the following start-up procedures are required.

1. Give winch an inspection conforming to the requirements of "Winches Not in Regular Use" in "INSPECTION" section.
2. Pour a small amount of ISO VG32 (SAE 10W) oil in motor inlet port.
3. Operate motor for 10 seconds in both directions to flush out any impurities.
4. The winch is now ready for normal use.

OPERATION

The four most important aspects of winch operation are:

1. Follow all safety instructions when operating winch.
2. Allow only people trained in safety and operation of this winch to operate this equipment.
3. Subject each winch to a regular inspection and maintenance procedure.
4. Be aware of winch capacity and weight of load at all times.

⚠ CAUTION

• To avoid damage to rigging, structure supporting rigging and winch, do not "two-block"* the end of wire rope.

* Two blocking occurs when the winch wire rope is multi reeved using two separate sheave blocks which are allowed to come in contact with each other during winch operation. When this occurs extreme forces are exerted on wire rope and sheave blocks which may result in equipment and or rigging failure.

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 winch operator must be carefully instructed in his duties and must understand the operation of winch, 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 winch under unsafe conditions.

Controls

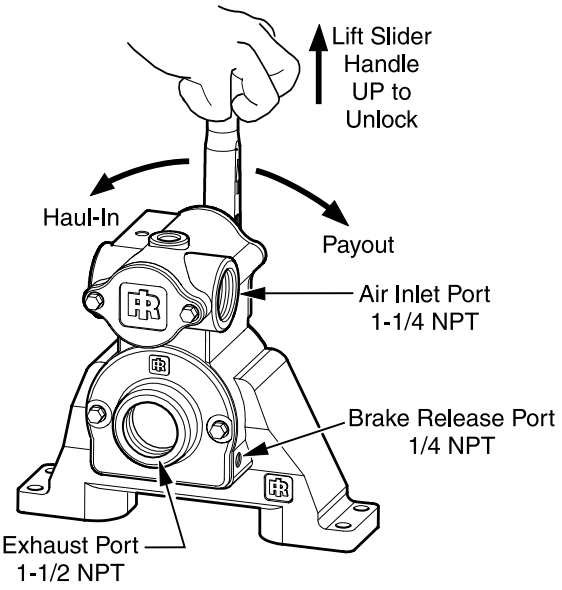
The spring loaded, motor mounted, live air manual throttle control valve is standard to, and normally supplied with, this winch. Optional remote throttle controls are available. Reference model code on winch nameplate and compare it to the "SPECIFICATIONS" section of this manual to determine your configuration. Throttle controls provide operator control of motor speed and direction of drum rotation.

Motor Mounted Air Throttle (new style)

Refer to Dwg. MHP1809 on page 12.
The spring loaded, live air, manual control throttle valve mounts to rotary valve housing on the motor.

To operate control valve, place palm of hand on control knob and wrap fingers around flange of sliding handle. Squeeze fingers, lifting sliding handle up to unlock control lever. Shift control lever in desired direction to payout or haul-in wire rope.

As viewed from air motor end, move control throttle handle to the right (clockwise) to payout wire rope and to the left (counterclockwise) to haul-in wire rope. Avoid sudden movements of the control valve to ensure smooth operation of winch.
When released, handle will return to the neutral or center position. The sliding handle will drop down to engage and lock the control handle in place.

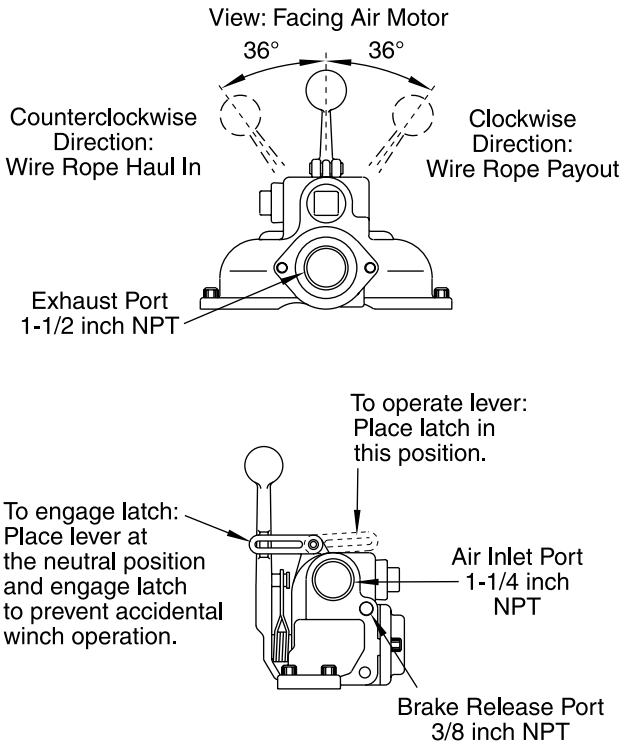


(Dwg. MHP1809)

Motor Mounted Air Throttle (old style)

Refer to Dwgs. MHP0566 on page 12 and MHP2061 on page 56.
The spring loaded, live air, manual control throttle valve (260) mounts directly to the rotary valve housing on the motor.

As viewed from air motor end, move control throttle handle to the right (clockwise) to payout wire rope and to the left (counterclockwise) to haul-in wire rope. Avoid sudden movements of control valve to ensure smooth winch operation.

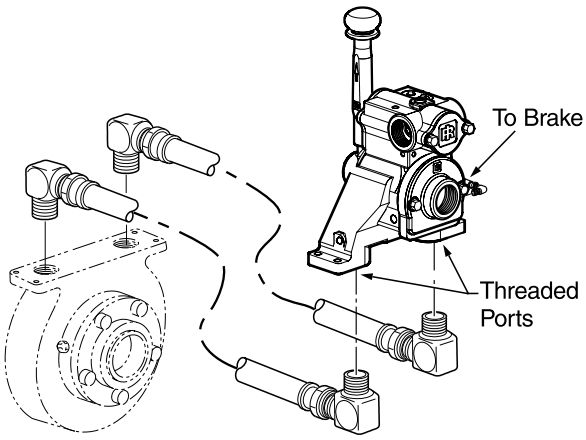


(Dwg. MHP0566)

Remote Mounted Air Throttle (optional feature)

Refer to Dwg. MHP2043 on page 12.
Provides for remote mounting of winch control at a fixed location up to 20 feet (6 metres) away from winch motor. Air hoses connect throttle to winch motor to provide winch operation.

When viewed from exhaust port side move control throttle handle to the right (clockwise) to payout wire rope and to the left (counterclockwise) to haul-in wire rope. Avoid sudden movements of control valve to ensure smooth winch operation.



(Dwg. MHP2043)

Underwound Operation (optional feature)

Underwound operation is where wire rope haul-in or payout is off the bottom of drum. This is a special operation and requires a winch specifically designed for this usage.

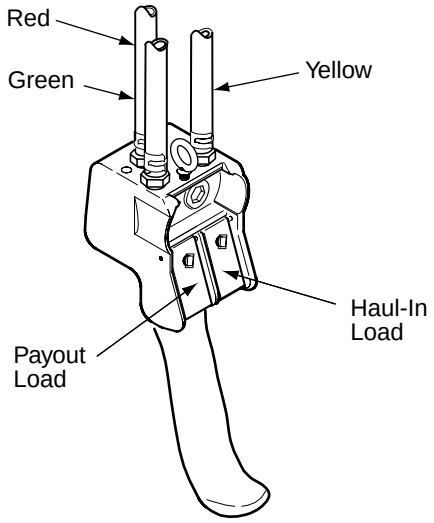
Underwound operation requires a Reverse Bias valve installed in the control valve.

Control valve operation will be opposite as shown in Dwg. MHP1809 on page 12. As viewed from air motor end, lift slider handle up to unlock control lever. Move control throttle handle to the left (counterclockwise) to payout, and to the right (clockwise) to haul-in.

Remote Pilot Pendant Throttle (optional feature)

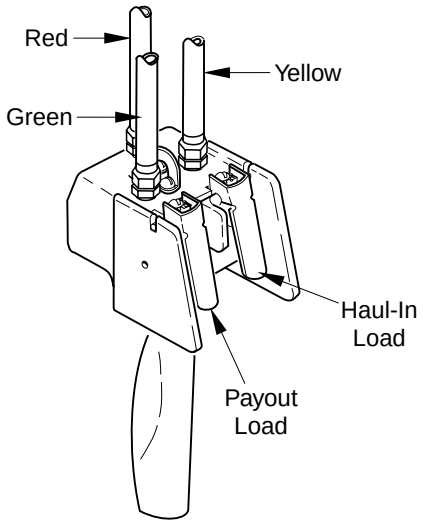
Refer to Dwgs. MHP1311 and MHP2233 on page 13.
Provides for remote winch control at distances of up to 50* feet (15 metres) away from winch. The pendant pilot control throttle is a two lever movable control station for winch operation. Pilot pressure from pendant pilot control throttle activates winch control valve. The winch control valve, located on winch motor, controls motor speed and direction of drum rotation. Direction of rotation is determined by the pendant lever depressed.

Pendant Hose and Operating Levers (new style)



(Dwg. MHP2233)

Pendant Hose and Operating Levers (old style)



(Dwg. MHP1311)

***** For distances greater than 50 feet (15 metres) contact **Ingersoll-Rand** Technical Support for control suitability.

Depress pendant levers using smooth, even movements. To operate winch using pendant:

1. To haul-in, depress 'RIGHT' lever.
2. To payout, depress 'LEFT' lever.
3. To throttle operating speed, regulate amount pendent lever is depressed. Depress lever fully for maximum speed; partially for slower speeds.
4. To stop haul-in or payout operation, release pendant lever. Lever will spring return to off position and winch operation will stop.

Remote Pilot Lever Throttle (optional feature)

Refer to Dwg. MHP2065, item 358 on page 58.
Provides for remote winch control at distances of up to 50* feet (15 metres) away from winch. The lever pilot control throttle is a fixed mount lever control station for winch operation. Pilot pressure from lever pilot control throttle activates winch control valve. The winch control valve, located on winch motor, controls motor speed and direction of drum rotation. Direction of rotation is determined by direction in which lever is shifted.

***** For distances greater than 50 feet (15 metres) contact **Ingersoll-Rand** Technical Support for control suitability.

Emergency Stop and Overload System

Refer to Dwg. MHP2163 on page 54.
Air supply line is connected to air Control Valve. When Emergency Stop or Overload Valve is activated, all winch movement will stop.

⚠ CAUTION

• If winch continues to move (payout load) after Emergency Stop activates, brake(s) are not holding load and may require adjustment or repair.

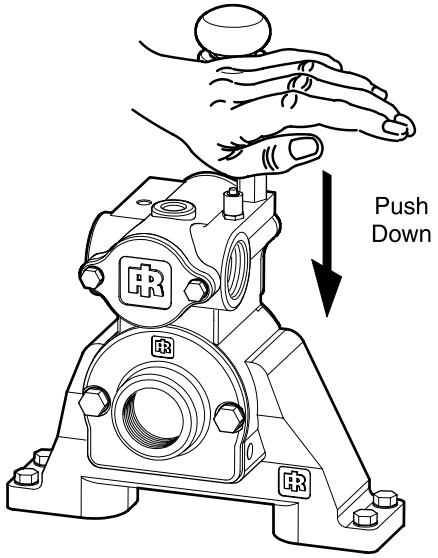
When Control Valve senses a preset pressure difference between ports, a pilot signal is sent to stop flow of air, all winch movement will stop.

Emergency Stop (optional feature)

Refer to Dwg. MHP2047 on page 14.
Emergency stop device is located on the Control Valve. When activated, winch drum rotation will immediately cease. To activate emergency stop, conduct the following:

1. Depress (push down) red palm valve, located on top of control valve.

Emergency Stop Operation



(Dwg. MHP2047)

NOTICE

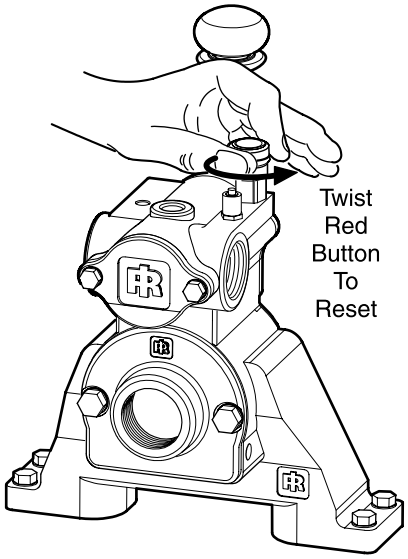
• If winch overload occurs, overload device, if equipped, also stops winch. To operate winch after an overload, reduce load and reset overload.
• Cannot be added to earlier versions of the K5C2 control valve. Refer to Dwg. MHP2054 on page 52.

Emergency Stop Reset

Refer to Dwg. MHP2048 on page 14.

1. Rotate red stop button, in counterclockwise direction until red stop button 'pops' up.
2. Winch is ready to resume operation.

Emergency Stop Reset



(Dwg. MHP2048)

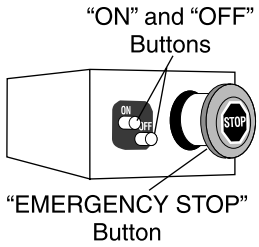
Overload Device (Optional Feature)

An overload device is available on winches with the emergency stop option. Overload device operation is based on differential pressure between air motor inlet and exhaust. The overload device is factory preset to actuate at 150% (± 25%) of winch rated capacity. When an overload condition is sensed, the valve poppet closes, to cut off supply air to winch, stopping winch operation. If an overload shutoff occurs, winch load must be reduced. Reset the overload valve and operate winch in payout direction to lower load.

Emergency Stop (old style)

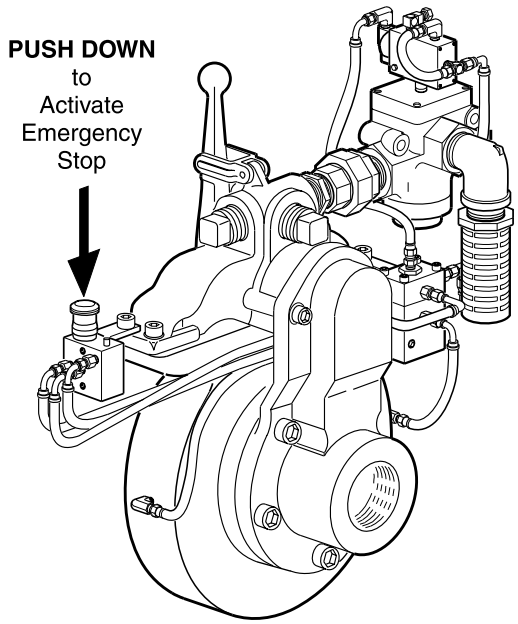
Refer to Dwgs. MHP1485 on page 14, MHP0754 on page 14 and MHP2070 on page 66.
The emergency stop device is located to the side of the Control Valve on local control models, and on pendant on remote controlled models. When activated, winch drum rotation will immediately cease. To activate emergency stop valve conduct the following:
Depress (push down) red stop button (red stop button is the same for local control and pendant control).

Emergency Stop Valve Operation (old style)



(Dwg. MHP0754)

Emergency Stop Operation (old style)



(Dwg. MHP1485)

NOTICE

• If winch overload occurs, overload device, if equipped, also stops winch by activating the emergency stop device. To operate winch after an overload, reduce load and reset emergency stop.

Reset Emergency Stop Valve:
Refer to Dwg. MHP0754 on page 14.
1. Rotate black ring, located under red stop button, in clockwise direction until red stop button 'pops' up.
2. Depress emergency stop valve 'ON' button.
3. Winch is ready to resume operation.

Brakes

Manual Band Brake (optional feature)

Refer to Dwg. MHP0627 on page 48.
Manual band brake may be applied by turning brake handwheel (104) in a clockwise direction and released by turning handwheel counterclockwise. Brake must be kept properly adjusted to hold the required load. Refer to "MAINTENANCE" section for adjustment instructions.

Automatic Band Brake (optional feature)

Refer to Dwg. MHP2329 on page 50.
The automatic band brake (139) is a spring applied, air released brake which utilizes an air actuated, spring loaded cylinder (134), that automatically disengages brake when motor is operated. Air pressure in cylinder overcomes spring pressure to release brake. When control valve is placed in neutral position, air in cylinder (134) is vented and spring automatically engages brake to prevent drum rotation.
The clevis (51) must be kept properly adjusted to hold required load. Refer to 'Adjustment' on page 23 in "MAINTENANCE" section.

Automatic Disc Brake

Refer to Dwg. MHP0873 on page 46.
The automatic disc brake is a spring applied, air released brake. Using an air actuated, spring loaded brake piston (10), brake automatically disengages when motor is operated and engages when throttle is returned to neutral position. Air pressure ported through brake housing (21) shifts brake piston (10) which overcomes spring pressure, disengages friction plates (16) and releases brake. When control valve is placed in the neutral position, air is vented and springs (9) shift brake piston to engage brake and prevent drum rotation.

⚠WARNING

• Winches with NO disc brake option (refer to nameplate on winch upright) are designed for pulling applications ONLY.

NOTICE

• Winches with NO disc brake option (refer to nameplate on winch upright) will have a disc brake housing; however, there will be NO internal brake components.

Emergency Lowering Procedure

⚠ CAUTION

• The following procedure describes use of winch to lower loads when supply of air to winch has been interrupted. The procedure must only be used on winches with a band brake and after all other established methods have been exhausted.

The lowering speed of load using this procedure is dependent upon the weight of load, amount of wire rope on drum, and position of load in the lifting system.

To use winch to lower load when air supply has been interrupted conduct the following:
1. Engage manual band brake.
2. Remove brake line between disc brake and motor. Connect a functioning air line to disc brake port and pressurize to 60 psi (4.1 bar).
3. Slowly disengage manual band brake using brake handwheel (104). Regulate speed of load using manual band brake.

Drum Locking Pin (optional feature)

Refer to Dwg. MHP2066 on page 74.
The drum locking pin is mounted to the winch outboard upright, (opposite end to motor). It should be engaged if a load is temporarily suspended. The drum locking pin is operated by rotating a pin between two slots, one shallow and the other deep.

To engage:
1. Rotate drum flange (96) to align one of twelve holes with lock pin (136). Pull out, straight away from outboard upright, pull rod (140) and rotate 90°. Align pin (135) with deep groove in drum cap and allow spring loaded lock pin (136) to insert into drum flange hole.

To disengage:
1. Pull out, straight away from outboard upright, pull rod (140) and rotate 90°. Align pin (135) with shallow groove in drum cap. Ensure locking pin (136) is clear of drum (96) flange.

⚠WARNING

• Ensure that all braking mechanisms are engaged and all personnel are clear of winch load and rigging before disengaging locking pin.
• Extremely difficult locking pin release is an indication that the load is held by locking pin and braking mechanisms are not functioning properly. Do not release locking pin until load control is established.

LUBRICATION

To ensure continued satisfactory operation of the winch, all points requiring lubrication must be serviced with correct lubricant at the proper time interval as indicated for each assembly.

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

INTERVAL	LUBRICATION CHECKS
Start of each shift	Check flow and level of air line lubricator (approximately 6 to 9 drops per minute required at maximum motor speed).
	Check winch motor oil level.
Monthly	Lubricate components supplied by grease fittings.
	Inspect and clean or replace air line filter.
	Check reduction gear oil level.
Yearly	Drain and refill winch reduction gear oil.
	Drain and refill winch motor oil.

Note: Intervals are based on winch operation in a normal environment as described in "INSPECTION" section. In 'Heavy' or 'Severe' operating conditions adjust lubrication intervals accordingly.

General Lubrication

Correct lubrication is one of the most important factors in maintaining efficient winch operation.

1. The recommended grade of oil must be used at all times. Use of unsuitable oil may result in excessive temperature rise, loss of efficiency and possible damage to lubricated components. Refer to "Recommended Lubricants" section.
2. Drain and replace oil in motor, disc brake and reduction gear after the first 50 hours of initial winch operation. Thereafter, drain and replace oil according to operating environment as defined by "Periodic Inspection" interval table in "INSPECTION" section, or more frequently if desired.
3. Always inspect removed oil for evidence of internal damage or contamination (metal shavings, dirt, water, etc.). If indications of damage are noted, investigate and correct before returning winch to service.
4. After winch operation, allow oil to settle before topping off.
5. Always collect lubricants in suitable containers and dispose of in an environmentally safe manner.

Recommended Lubricants

Reduction Gear and Disc Brake Lubricant

Temperature	Type Oil
Below 32° F (0° C)	ISO VG 68 (SAE 2 EP)
32° to 80° F (0° to 27° C)	ISO VG 100 (SAE 3 EP)*
Above 80° F (27° C)	ISO VG 150 (SAE 4 EP)

* Units are shipped from factory with ISO VG 100 (SAE 3 EP) lubricant. Reduction gear capacity is approximately 5 quarts (4.8 litres).

Air Motor Lubricant

Temperature	Type Oil
Below 32° F (0° C)	ISO VG 46 (SAE 10W)
32° to 80° F (0° to 27° C)	ISO VG 68 (SAE 20W)*
Above 80° F (27° C)	ISO VG 100 (SAE 30W)

* Units are shipped from factory with ISO VG 68 (SAE 20W) lubricant. Motor oil capacity is approximately 3 quarts (2.8 litres).

NOTICE

• Do NOT use synthetic lubrication in air motor. Synthetic lubricants will result in oil blowing by piston rings.

Grease

Temperature	Grease
-20° to 50° F (-30° to 10° C)	EP 1 multipurpose lithium based grease
30° to 120° F (-1° to 49° C)	EP 2 multipurpose lithium based grease

Component Lubrication

Motor

Refer to Dwg. MHP2126 on page 17.
The motor is splash lubricated by oil in motor housing and has no other means of lubrication. It is therefore important to use only good quality, non-detergent motor oil to ensure maximum performance and minimum downtime for repairs. Refer to "Recommended Lubricants" in this section.

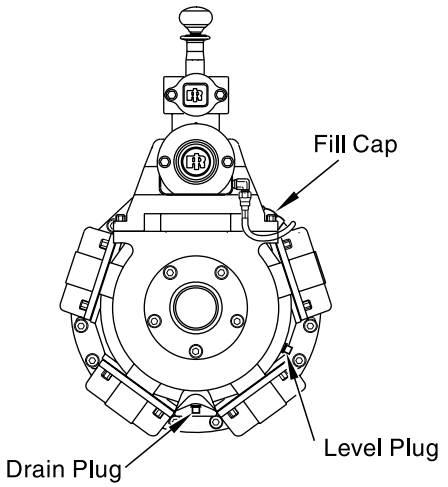
Oil capacity for the K5B-550 motor is 3 quarts (2.8 litres). Add oil through filler opening until oil flows from level plug hole. Add oil slowly to prevent spilling.

The motor should be level checked daily, or at the start of each shift after any accumulated water has been drained off. When motors are operated in temperatures below freezing, wait long enough at end of shift for water to separate from oil but not long enough for it to freeze. Drain water then refill to level plug (218) located on side of motor housing (217). If desired, all the oil may be drained at the end of the shift and the motor refilled with new oil.

Oil Capacities

COMPONENT	QUANTITY
K5B Motor	3 qts (2.8 litres)
Reduction Gear Assembly	5 qts (4.8 litres)
Disc Brake	Receives oil from Reduction Gear Assembly

Motor Lubrication Locations



(Dwg. MHP2126)

Reduction Gear Assembly

Refer to Dwg. MHP0567 on page 17.
It is recommend that the first oil change be done after approximately 50 hours initial operation. Always inspect removed oil for evidence of internal damage (metal shavings, dirt, water, etc.).

The reduction gear assembly is filled to the correct levels prior to shipment from the factory. Check oil level before initial winch operation. This component is splash lubricated by oil in the housing and has no other means of lubrication. It is therefore important to use high quality Extreme Pressure (EP) rust and oxidation inhibited gear oil to ensure maximum performance and minimum down time for repair.

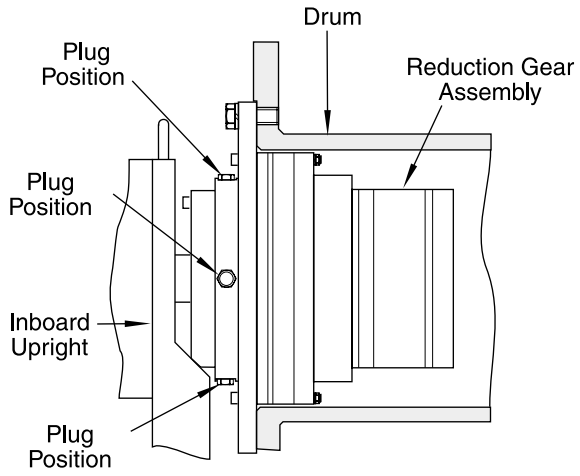
To ensure correct performance, highest efficiency and long life, it is essential that lubricating oil be maintained at correct level. Rotate drum until fill plug is located at top dead center then add oil up to level plug hole. Oil capacity for reduction gear assembly is 5 quarts (4.8 litres).

⚠ CAUTION

• Do not over fill. Excess oil will reduce operating efficiency and increase oil temperature.

To check oil level, position the removable plug at the top. Remove plug, then slowly operate winch to rotate plug hole to the 3 or 9 o'clock position. Check if oil runs out. Slowly reverse the procedure until plug hole is returned to the top position. Install plug.

Reduction Gear Lubrication Plug Locations



(Dwg. MHP0567)

Air Throttle (old style)

Refer to Dwg. MHP2061 on page 56.
Periodically, depending on winch usage and severity of environment, lubricate lever air throttle (local and remote) with recommended grease at grease fitting (246).

Disc Brake

Oil from reduction gear assembly also provides lubrication for disc brake. After an oil change or winch overhaul remove breather plug (22) and pour a small amount of oil (6 to 8 fluid ounces [0.2 litres.]) through breather hole in brake housing to initially lubricate brake discs. Refer to "Recommended Lubricants" in this section. Reinstall breather plug before operation of winch or brakes.

Band Brake Handle

Lubricate grease fitting monthly 3 or 4 times with 2 to 3 pumps of a grease gun. Refer to "Recommended Lubricants" in this section.

Seals and Bearings

If winch is disassembled, clean all parts thoroughly and coat bearings and seals with clean grease. Refer to "Recommended Lubricants" in this section. Use sufficient grease to provide a good protective coat. Lubricate grease fittings monthly with 2 or 3 pumps of a grease gun.

Drum Locking Pin (optional feature)

Refer to Dwg. MHP2066 on page 74.
Lubricate at least once every year, depending on environment and duty cycle. Clean all parts thoroughly and coat with clean grease. Pack gland cavity with grease. Refer to "Recommended Lubricants" in this section. Use sufficient grease to provide a good protective coat. Lubrication will help to prevent rust and allow easier locking pin operation.

Wire Rope

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

1. Clean with a brush or steam to remove dirt, rock dust or other foreign material on surface of wire rope.

⚠ CAUTION

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

2. Apply a wire rope lubricant, **LUBRI-LINK-GREEN**® or ISO VG 100 (SAE 30W) oil.
3. Brush, drip or spray lubricant weekly, or more frequently, depending on severity of service.

INSPECTION

Inspection information is based in part on American National Standards Institute Safety Codes (ASME B30.7).

⚠ WARNING

• All new or repaired equipment should be inspected and tested by personnel instructed in safety, operation and maintenance of this equipment to ensure safe operation at rated specifications before placing equipment in service.
• Never use a winch 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 and operation of this equipment and include observations made during routine equipment operation. Periodic inspections are thorough inspections conducted by personnel trained in safety, operation and maintenance of this equipment. ASME B30.7 states inspection intervals depend upon the nature of critical components of the equipment and severity of usage. Inspection intervals recommended in this manual are based on intermittent operation of winch eight hours each day, five days per week, in an environment relatively free of dust, moisture and corrosive fumes. If winch is operated almost continuously, or more than eight hours each day, more frequent inspections will be required. Careful inspection on a regular basis will reveal potentially dangerous conditions while still in the early stages, allowing corrective action to be taken before 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 equipment in service.

Records and Reports

Inspection records, listing all points requiring periodic inspection should be maintained for all load bearing equipment. Written reports, based on severity of service, should be made on condition of critical parts as a method of documenting **periodic** inspections. These reports should be dated, signed by the person who performed inspection, and kept on file where they are readily available 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 equipment in continuous service, frequent inspection should be made by operators 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. WINCH. Prior to operation, visually inspect winch housings, controls, brakes, side rails and drum for indications of damage. Do not operate winch unless wire rope feeds onto drum smoothly. Any discrepancies noted must be reviewed and inspected further by personnel instructed in the operation, safety and maintenance of this winch.
2. WIRE ROPE. Visually inspect all wire rope which can be expected to be in use during the day's operations. Inspect for wear and 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 winch until discrepancies have been reviewed and inspected further by personnel knowledgeable on wire rope safety and maintenance procedures.

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."

3. AIR SYSTEM. Visually inspect all connections, fittings, hoses and components for indication of air leaks. Repair any leaks or damage.
4. BRAKES. During winch operation test brakes. Brakes must hold load without slipping. Automatic brakes must release when winch motor throttle is operated. If brakes do not hold load, or do not release properly, brakes must be adjusted or repaired.
5. WIRE ROPE REEVING. Check reeving and ensure wire rope is properly secured to drum. Do not operate winch unless wire rope feeds onto drum smoothly.
6. LUBRICATION. Refer to "LUBRICATION" section for recommended procedures and lubricants.
7. PENDANT (optional feature). Ensure operation of pendant levers is smooth and winch is responsive to pendant control. Pendant levers must return to neutral when released.
8. MANUAL THROTTLE LEVER. Ensure operation of manual throttle lever is smooth and winch is responsive to lever movement. Lever must return to neutral and lock in place when released. If winch responds slowly or controls stick, do not operate winch until all problems have been corrected.

9. LIMIT SWITCHES (optional feature). If equipped, ensure limit switches engage and prevent operation at the required set point and with drum rotating in the correct direction. Ensure limit switch properly resets.
10. MOTOR. During operation check motor housing for excess heat build up. Housing should not be hot to touch. Listen for grinding or knocking noises. Ensure air supply lubricator provides 6 to 9 drops per minute of ISO VG 32 (SAE 10W) oil when winch is operating at rated capacity. Operate winch slowly in both directions to verify operation.

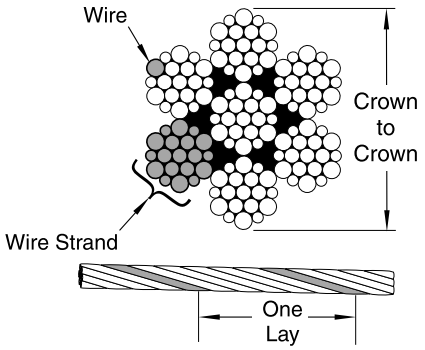
Periodic Inspection

Periodic inspection intervals for winch use under various conditions is listed below:

NORMAL	**HEAVY**	**SEVERE**
yearly	semiannually	quarterly

Disassembly may be required as a result of frequent inspection findings or in order to properly inspect individual components. Disassembly steps are described in "MAINTENANCE" section. Maintain written records of periodic inspections to provide an accumulative basis for continuing evaluation. Inspect all items listed in "Frequent Inspection." Also inspect the following:

1. SIDE RAILS AND UPRIGHTS. Check for deformed, cracked or corroded main components. Replace damaged parts.
2. FASTENERS. Check retainer rings, split pins, capscrews, nuts, and other fasteners on winch, including mounting bolts. Replace if missing or damaged and tighten if loose.
3. DRUM AND SHEAVES. Check for cracks, wear or damage. Replace if necessary.
4. WIRE ROPE. In addition to "Frequent Inspection" requirements, also inspect for the following:
    a. Build-up of dirt and corrosion. Clean with steam or a stiff wire brush to remove dirt and corrosion if necessary.
    b. Loose or damaged end connection. Replace if loose or damaged.
    c. Check wire rope anchor is secure in drum.
    d. Verify wire rope diameter. Measure diameter of wire rope from crown-to-crown throughout life of wire rope. Recording of actual diameter should only be done with wire rope under equivalent loading and in the same operating section as accomplished during previous inspections. If actual diameter of wire rope has decreased more than 1/64 inch (0.4 mm) a thorough examination of wire rope should be conducted by an experienced inspector to determine the suitability of wire rope to remain in service. Refer to Dwg. MHP0056 on page 19.



(Dwg. MHP0056)

5. ALL COMPONENTS. Inspect for wear, damage, distortion, deformation and cleanliness. If external evidence indicates damage, disassemble as required to conduct a detailed inspection. Inspect gears, shafts, bearings, sheaves, springs and covers. Replace worn or damaged parts. Clean, lubricate and reassemble.
6. BRAKES. Individually test brakes installed to ensure proper operation. Brakes must hold a **125%** rated load at full drum without slipping. If indicated, by poor operation or visual damage, disassemble and repair brake(s). Check all brake surfaces for wear, deformation or foreign deposits. If brake lining thickness is less than minimum, as described in "MAINTENANCE" section, replace brakes. Clean and replace components as necessary. Adjustments cannot be made to disc brake. The disc brake must be repaired as described in "MAINTENANCE" section.
7. FOUNDATION OR SUPPORTING STRUCTURE. Check for distortion, wear and continued ability to support winch and rated load. Ensure winch is firmly mounted and that fasteners are in good condition and tight.
8. LABELS AND TAGS. Check for presence and legibility of labels. Replace if damaged or missing.
9. DRUM GUARD (optional feature). Verify fasteners are tight and in good condition. Ensure guard is in good condition.
10. EMERGENCY STOP VALVE (optional feature). During winch operation verify emergency stop shut-off valve operation. Valve must stop winch operation quickly. Valve must reset properly. Refer to 'Emergency Stop Valve' in "OPERATION" section for procedures.
11. OVERLOAD DEVICE (optional feature). Ensure overload device is properly set to stop winch when the load exceeds 150% (+/- 25%) of winch rated capacity. If winch does not shut down, contact your distributor or factory for repair information.
12. LIMIT SWITCHES (optional feature). Operate winch in both directions to activate limit switches. Limit switches should engage (stop winch operation) at established settings (+/- 2 feet [+/- 0.6 metre]). Reset switch by operating winch in opposite direction. Refer to 'Limit Switch Adjustment' on page 25 in "MAINTENANCE".

Winches Not in Regular Use

1. Equipment which has been idle for a period of one month or more, but less than six months, shall be given an inspection conforming to requirements of "Frequent Inspection" before being placed in service.
2. Equipment which has been idle for a period of over six months shall be given a complete inspection conforming with requirements of "Periodic Inspection" before being place in service.
3. Standby equipment shall be inspected at least semiannually in accordance with requirements of "Frequent Inspection". In abnormal operating conditions equipment should be inspected at shorter intervals.

INSPECTION AND MAINTENANCE REPORT

Ingersoll-Rand Force 5 Series FA10 Air Winch

Model Number:		**Date:**
Serial Number:		**Inspected by:**
Reason for Inspection: (Check Applicable Box)		
	1. Scheduled Periodic Inspection (___Quarterly ___Semiannually ___Yearly)	**Operating Environment:** Normal _____ Heavy _____ Severe _____
	2. Discrepancy(s) noted during Frequent Inspection	
	3. Discrepancy(s) noted during maintenance	
	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		NOTES
	Pass	Fail	Repair	Replace	
Uprights and Side Frames					
Drum Band Brake (125% Load Test)					
Disc Brake (125% Load Test)					
Drum Band Brake (Visual Inspection)					
Disc Brake (Visual Inspection)					
Motor					
Limit Switches					
Controls					
Air System					
Fasteners					
Reduction Gears					
Labels and Tags			- - -		
Shafts					
Emergency Stop Valve					
Overload Device					
Guards					
Wire Rope Anchor			- - -		
Other Components (list in NOTES section)					

TESTING	Pass	Fail	NOTES
Operational (No Load)			
Operational (10% Load)			
Operational (Maximum Test Load *)			

* Maximum test load is **125%** of rated line pull. Testing to more than **125%** of the rated load may be required to comply with standards and regulations set forth in areas outside the USA.

This form may be copied and used as an inspection/maintenance record.

TROUBLESHOOTING

This section provides basic troubleshooting information. Determination of specific causes to problems are best identified by thorough inspections performed by personnel instructed in safety, operation and maintenance of this equipment. The chart below provides a brief guide to common winch symptoms, probable causes and remedies.

Symptom	Cause	Remedy
Winch will not operate.	No air supply to winch.	Check air supply line connections and hoses.
	Winch is overloaded.	Reduce load to within rated capacity.
	Disc brake does not release.	Pressurize disc brake release port and check for leakage. Replace brake piston seals if leakage is found. Ensure air pressure at inlet to disc brake is at least 60 psig (4.1 bar/410 kPa).
	Shipping plugs may still be in place.	Remove shipping plugs in valve and motor exhaust ports.
	Band Brake does not release.	Disengage manual band brake.
Load continues to move when winch is stopped.	Band brake is slipping.	Check band brake adjustment on page 23 and brake band lining wear.
	Winch is overloaded.	Reduce load to within rated capacity.
	Winch motor controls sticking.	Check pendant/throttle levers spring return to normal (neutral) positions when released.
Winch does not lift load.	Motor may be damaged.	Remove and disassemble motor as described in “MAINTENANCE” section on page 22. Examine all parts and replace any that are worn or damaged.
	Insufficient air supply.	Verify air supply pressure and volume at winch inlet meets the requirements listed in “SPECIFICATIONS” section on page 5. Clean air line filter.
Throttle or pendant lever moves but winch does not operate.	Motor may be damaged.	Disassemble and clean the motor and replace any broken or damaged parts.
	Insufficient air supply.	Ensure the air pressure at the winch inlet is at least 90 psig (6.3 bar/630 kPa) at rated volume. Clean air line filter.
	Air leak.	Check hose and fitting connections. Inspect hose(s) for breaks. Tighten fittings and repair or replace hoses as necessary.
Motor runs hot or makes excessive noise during operation.	Low oil level.	Check oil levels in the motor. Add oil as required to obtain the proper level.
	Improper lubrication.	Replace oil with type recommended in “LUBRICATION” section on page 16. Set lubricator to provide 6 to 9 drops of oil per minute at maximum winch operating capacity.
	Water in oil.	Drain and refill with recommended oil. Operate winch with no load slowly, in both directions. If noise still exists or motor overheats disassemble and repair motor.
	Damaged or broken piston or connecting rod.	Disassemble and repair motor.
Winch runs slow.	Improper hose or fitting sizes.	Check fittings, connections and hoses for correct size and length. Replace parts that may cause restricted air flow. Inspect air line filter.
	Motor may be damaged.	Remove and disassemble motor as described in “MAINTENANCE” section on page 22. Inspect all parts and replace all worn or damaged parts.
	Brake(s) not releasing.	Refer to brakes in “MAINTENANCE” section on page 22.
Air lines freeze.	Water in air supply.	Install or drain air system moisture traps, moisture collecting air receivers and compressor aftercoolers. After corrective actions have been taken, disconnect lines at winch inlet and purge with clean, dry air or nitrogen prior to attaching to and operating winch.
Throttle lever hard to actuate, or lever does not spring return to neutral.	Valve body sticking in bushing.	Lubricate valve through grease fitting with recommended lubricant. Refer to ‘Air Throttle’ on page 17 in “LUBRICATION” section.

Symptom	Cause	Remedy
Automatic Band Brake:		
Brake cylinder will not release.	Band brake out of adjustment.	Adjust band brake to maintain correct cylinder stroke.
	Leaking cylinder seals.	If air is noticed escaping from cinder breather when attempting to release brake, replace or repair cylinder.
	Dirty filter in air supply.	Clean or replace filter.
	Faulty dump valve.	Check dump valve exhaust port. Air should exhaust when control valve handle is neutral. If no air escapes, replace dump valve.
Automatic Disc Brake:		
Brake cylinder will not release.	Band brake out of adjustment.	Adjust band brake to maintain correct cylinder stroke.
	Leaking cylinder seals.	If air is noticed escaping from cinder breather when attempting to release brake, replace or repair cylinder.
	Dirty filter in air supply.	Clean or replace filter.
	Faulty dump valve.	Check dump valve exhaust port. Air should exhaust when control valve handle is neutral. If no air escapes, replace dump valve.

MAINTENANCE

⚠WARNING

• Never perform maintenance on winch while it is supporting a load.
• Before performing maintenance, tag controls:

WARNING - DO NOT OPERATE - EQUIPMENT BEING REPAIRED.

• Only allow service personnel trained in safety and service on this winch to perform maintenance.
• After performing any maintenance on winch, test winch to 125% of its rated capacity before returning to service. Testing to more than 125% of rated capacity may be required to comply with standards outside the USA.
• Shut off air system and depressurize air lines before performing any maintenance.

Maintenance Intervals

The Maintenance Interval chart is based on intermittent operation of winch eight hours each day, five days per week. If winch operation exceeds eight hours per day, or use is under HEAVY or SEVERE conditions, more frequent maintenance should be performed. Refer to “Periodic Inspection” in the “INSPECTION” section for additional information.

INTERVAL	MAINTENANCE CHECK
Start of each shift (Operator or Maintenance Personnel)	Make a thorough visual inspection of winch for damage. Do not operate winch if damaged.
	Operate winch at low RPM in both directions. Winch must operate smoothly without sticking, binding or abnormal noises. Check operation of brake(s).
3 Months (Maintenance Personnel)	Inspect band brake friction linings. Clean or replace parts as required. Adjust band brake as necessary.
Yearly (Maintenance Personnel)	Inspect winch gearing, shafts and bearings for wear and damage. Repair or replace as necessary.
	Check all supporting members, including foundation, fasteners, nuts, sheaves and rigging, etc. for indications of damage or wear. Repair or replace as required.

Thermoplastic Coating

Thermoplastic coating is an extremely tough and durable coating designed to take the toughest treatment without chipping or peeling. Special steps must be taken to protect the coating when parts are removed, replaced and if excessive environmental or operational conditions have damaged the coating.

Cleaning Parts

The area to be coated must be clean and free from loose coating. Remove any surface corrosion. To paint thermoplastic coated parts, parts must be sand blasted in order to ‘rough up’ the surface for proper paint adhesion. Sand blasting will not remove thermoplastic coating (abrasive material will bounce off).

Loose coating can be removed by cutting with a sharp cutting tool (chisel, putty knife or knife).

Heat Source

WARNING

• When using an open flame be aware of materials around the work area. Some solvents, lubricants and materials are extremely flammable.
• Drain all components of lubricants, water or any other fluids. Remove, or open all vents and drains. Components will be hot and may discharge hot fluids or gases. Allow sufficient time for components to cool, or cool off components, prior to handling. Gaskets, seals, 'O' rings, and any components that may be damaged should be removed prior to applying coating.

Thermoplastic coating is heat applied. The surface of the component to which thermoplastic coating is being applied must be maintained at a temperature of 150º to 170° F (66° to 77° C). A small propane torch (**Ingersoll-Rand** Part No. 71308886) or heat gun (**Ingersoll-Rand** Part No. 71308894) can be used.

NOTICE

• When using a heat source always keep it moving. Small circles work best. Failure to do so will result in a scorched area at the repair.

The choice of heat gun or propane torch depends on the size of area to be coated and amount of time available to accomplish the task. The propane torch heats surfaces faster, but is hard to control and can scorch the coating. The heat gun is slower, easier to control and generally results in a better looking finish.

Repairing Surfaces

For minor repairs to the thermoplastic coating conduct the following:

1. If under laying surface is not corroded and the scratch is less than 1/16 inch (1.6 mm) wide the surrounding thermoplastic coating can be heated until material flows together. For clean surfaces with damage greater than 1/16 inch (1.6 mm) heat area and then apply thermoplastic coating powder **(Ingersoll-Rand** Part No. 71308902 [2 oz. (56.7 g)] to fill area. Continue heating until coating liquefies and flows together with existing coating.
2. Corrosion in damaged area must be removed. Sandblast or wire brush the area to remove corrosion. If corrosion exists, ensure corrosion has not penetrated below surface of existing thermoplastic coating. This can usually be easily determined by checking to see if coating is loose around the corroded area. Cut away coating as necessary to expose corrosion for removal. If damaged area is less than 1/16 inch (1.6 mm) wide the surrounding thermoplastic coating can be heated until material flows together. For surfaces with damage greater than 1/16 inch (1.6 mm) heat the area and then apply thermoplastic coating powder, **Ingersoll-Rand** Part No. 71308902 [2 oz. (56.7 g)], to fill the area. Continue heating until coating liquefies and flows together with the existing coating.
3. Allow the repaired area to cool. Quenching with water is acceptable. Inspect the repair. Rough spots, minor scorching and excess coating deposits can be wet sanded to remove imperfections. To return the gloss finish, reheat the surface carefully.

For large bare surfaces or new parts:
Coating these components can be done more economically and with better end results by using an electrostatic powder application process or flamespray process. Contact **Ingersoll-Rand** Technical Assistance for more information.

Adjustments

Disc Brake Adjustment

Disc brake adjustment is **not** required. If disc brake does not hold rated load disassemble and repair.

If brake assembly is removed or disassembled ensure breather (23) is installed and located at top of brake housing during reassembly.

Manual Band Brake Adjustment

Refer to Dwg. MHP0627 on page 48.

1. Release wire rope tension on drum.
2. Rotate handwheel (104) counterclockwise to release brake bands.
3. Loosen nut (120) and turn adjustment screw (127) to provide 1/16 to 1/8 inch (1.6 to 3.2 mm) gap between band lug and end of adjustment screw when brake is applied.
4. When correct gap is obtained tighten nut (120).
5. Check brake band is partially lifted from drum diameter to reduce drag when brake is not in use.

CAUTION

• When any part of brake lining thickness measures 0.062 inch (2 mm) or less, brake bands (128) must be replaced.

Automatic Band Brake Adjustment (optional feature)

Refer to Dwg. MHP2329 on page 50.

1. Remove cotter pin (57) at link stud (56).
2. Apply air to brake cylinder (134) and remove pin (58) to disconnect link stud (56) from brake band (59).
3. Turn link stud (56) clockwise to increase cylinder rod extension. Turn link stud (56) counterclockwise to decrease cylinder rod extension.
4. Assemble link stud (56) to brake band (59) with pin (58) and cotter pin (57). Release air to brake cylinder (134).
5. Brake should hold rated load (refer to "INSPECTION" section on page 18) when cylinder (134) is retracted. Brake band should not drag on drum when cylinder is extended.
6. Install cotter pin (57). Bend ends of cotter pin to secure link stud to brake band when adjustment is complete.
7. With brake "On", adjust screw (127) to just touch brake band (59).

Pilot Air Control Valve Adjustment (optional feature)

Refer to Dwg. MHP0141 on page 57.
If winch operating speeds differ from performance specifications pilot air control valve may require adjustment. Loosen nut (271) and adjusting screw (270), located in valve end cap (268), until drum speed for no-load haul-in equals drum speed for full load payout. Adjust screw 'OUT' (turn counterclockwise) to increase speed; adjust screw 'IN' (turn clockwise) to decrease speed. It is suggested that a chalk mark be placed on drum flange so that drum rpm can be accurately counted.

Overload Valve Adjustment

Refer to Dwg. MHP2216 on page 24.
5/16 or 8 mm open ended wrench required.

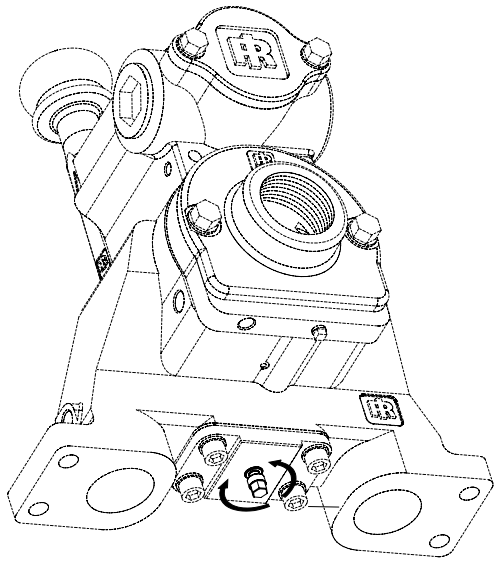
1. Adjust overload valve by turning adjustment screw located at bottom of Control Valve.
2. Rotating adjustment screw **clockwise** will **increase** pressure required to activate overload valve.

WARNING

• This adjustment can cause overload device to NOT activate before winch's safety limit is exceeded. This procedure should only be done by personnel trained in testing and servicing this winch.

3. Rotating adjustment screw **counterclockwise** will **decrease** pressure required to activate overload valve.

Overload Valve Adjustment



(Dwg. MHP2216)

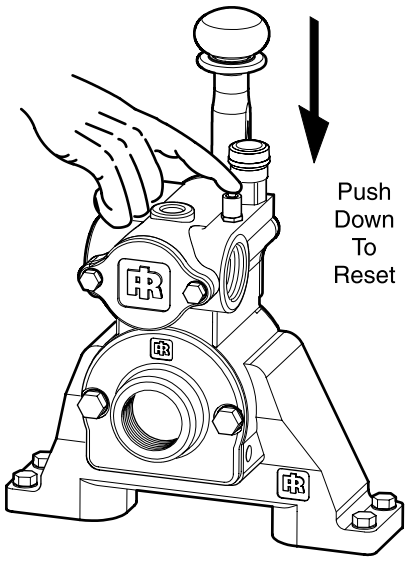
Checking Overload Valve Setting

1. Attach load line to a load that is calibrated to the maximum load for which winch is rated.
2. Move control lever to haul-in position. If winch does not lift load, adjust the adjustment screw as described in 'Overload Valve Adjustment'.

Setting the Overload

1. Attach load line to a load that is calibrated to 150% of winch rated capacity. Shift control lever to haul-in position.
   a. If overload valve activates, reset overload valve. Winch is ready for normal operation.
   b. If winch lifts load, lower load. Turn adjustment screw counterclockwise in 1/4 turn increments until overload valve activates when control lever is shifted to haul-in position. After each 1/4 turn, retest winch.

Overload Valve Reset



(Dwg. MHP2049)

Overload Valve Adjustment (old style)

Refer to Dwg. MHP1295 on page 25.

1. Adjust overload valve by turning setscrew located at bottom of Delta-P valve.
2. Rotating setscrew **clockwise** will **increase** pressure required to activate overload valve.

WARNING

• This adjustment can cause overload device to NOT activate before winch's safety limit is exceeded. This procedure should only be done by personnel trained in testing and servicing this winch.

3. Rotating setscrew **counterclockwise** will **decrease** pressure required to activate overload valve.

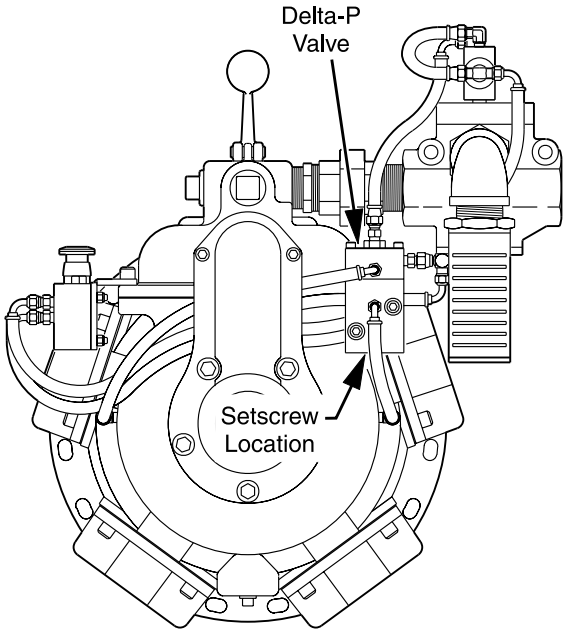
Check Overload Valve Setting (old style)

1. Attach load line to a load that is calibrated to the maximum load for which winch is rated. Move control lever to haul-in position. If winch does not lift load, adjust the setscrew as described above.

Setting the Overload (old style)

1. Attach load line to a load that is calibrated to 150% of winch rated capacity. Shift control lever to haul-in position.
   a. If overload valve is activated, reset emergency stop valve. Winch is ready for normal operation.
   b. If winch lifts load, lower load. Turn adjustment screw counterclockwise in 1/4 turn increments until overload valve is activated when control lever is shifted to haul-in position. After each 1/4 turn, retest winch.

Overload Valve Adjustment



(Dwg. MHP1295)

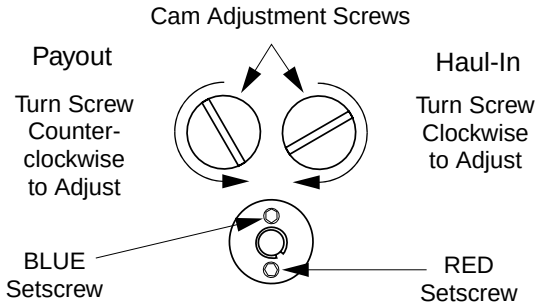
Limit Switch Adjustment (old style)

⚠ CAUTION

• Maintain at least 3 tight wraps of wire rope on the drum at all times. Ensure wire rope full drum top layer is a minimum of 1/2 inch (13 mm) below drum flange edge. Refer to Dwg. MHP0487 on page 8.

Adjustments described are as viewed when facing limit switch assembly from wire rope takeoff side of winch.

Limit Switch Adjustment



(Dwg. MHP0607)

To set winch maximum wire rope payout limit switch:
Refer to Dwg. MHP2071 on page 68.

1. Remove cover plate (495) from top of limit switch (480).
2. Loosen blue setscrew in center of limit switch, below cover plate.
3. Position winch wire rope at desired payout position.
4. Rotate left cam adjustment screw **counterclockwise** until it fully activates cutoff valve, causing system air to vent. 2-3/4 turns of the cam adjustment screw are required for each full cam revolution.
5. Hold cam adjustment screw in position (venting air) and tighten blue setscrew to lock cam in place.
6. If required, adjust haul-in limit switch. Test winch setpoints by operating winch through three complete cycles to ensure consistent limit switch operation within +/-2 feet (0.6 metre) of setpoints.
7. Install cover plate when final adjustments are complete.

To set winch maximum wire rope haul-in limit switch:

1. Remove cover plate (495) from top of limit switch (480).
2. Loosen red setscrew in center of limit switch, below cover plate.
3. Position winch wire rope at desired haul-in position.
4. Rotate right cam adjustment screw **clockwise** until it fully activates the cutoff valve, causing system air to vent. 2-3/4 turns of cam adjustment screw are required to each full cam revolution.
5. Hold cam adjustment screw in position (venting air) and tighten red setscrew.
6. If required, adjust payout limit switch. Test winch setpoints by operating winch through three complete cycles to ensure consistent limit switch operation within +/-2 feet (0.6 metre) of setpoints.
7. Install cover plate when final adjustments are complete.

Disassembly

General Disassembly Instructions

The following instructions provide necessary information to disassemble, inspect, repair, and assemble the winch. Parts drawings are provided in parts section.

If a winch is being completely disassembled for any reason, follow the order of topics as they are presented.

It is recommended that all maintenance work on winch be performed in a clean dust free work area.

In the process of disassembling winch, observe the following:

1. Never disassemble winch any further than is necessary to accomplish needed repair. A good part can be damaged during the course of disassembly.
2. Never use excessive force when removing parts. Tapping gently around the perimeter of a cover or housing with a plastic mallet, for example, is sufficient to break the seal.
3. Do not heat a part with a flame to free it for removal, unless part being heated is already worn or damaged beyond repair and no additional damage will occur to other parts.

In general, winch is designed to permit easy disassembly and assembly. Use of heat or excessive force should not be required.

4. Keep work area as clean as practical, to prevent dirt and other foreign matter from getting into bearings or other moving parts.
5. All seals and ‘O’ rings should be discarded once they have been removed. New seals and ‘O’ rings should be used when assembling winch.
6. When grasping a part in a vise, always use leather-covered or copper-covered vise jaws to protect the surface of part and help prevent distortion. This is particularly true of threaded members, machined surfaces and housings.
7. Do not remove any part which is a press fit in or on a subassembly unless the removal of that part is necessary for repairs or replacement.
8. When removing ball bearings from shafts, it is best to use a bearing puller. When removing bearings from housings, drive out bearing with a sleeve slightly smaller than outside

diameter of bearing. The end of sleeve or pipe which contacts bearing must be square. Protect bearings from dirt by keeping them wrapped in clean cloths.

Winch Disassembly

NOTICE

• Remove band brake if equipped. Refer to 'Manual or Automatic Band Brake' disassembly section on page 26 for specific instructions.

Refer to Dwgs. MHP0930 on page 38, MHP1007 on page 42, MHP0875 on page 44, and MHP0873 on page 46.
1. Remove wire rope from drum.
2. Operate winch to position reduction gear drain plug at its lowest position.
3. Relieve pressure in air lines by operating winch control several times after air supply has been disconnected.

WARNING

• Shut off, bleed down and disconnect air supply line before performing any disassembly procedures.
• The weight of a winch with a 24 inch (610 mm) long drum and no wire rope is 3550 lbs (1610 kgs). Exercise caution when lifting and moving winch.

4. Disconnect and tag air lines.
5. Remove winch from its mounting and take to a suitable work area before beginning disassembly.
6. Remove lower case pipe plug (218) on K5B motor housing (217) and allow oil to drain into a suitable container and dispose of in an environmentally safe manner. Loosen vent cap (210) to vent motor housing.
7. Drain oil from reduction gear assembly by removing one plug (406) when positioned at it's lowest point. Refer to Dwg. MHP0567 on page 17 in "LUBRICATION" section.
8. For winches with a disc brake remove pipe plug (24) in brake housing (21) to drain brake oil. If winch is equipped with a drum band brake the winch outboard end (opposite motor end) must be elevated to prevent draining oil from contaminating brake band lining.

WARNING

• K5B air motor weighs approximately 260 lb. (118 kg). Adequately support air motor before removing motor mounting capscrews.

Motor Removal

Refer to Dwg. MHP1007 on page 42 and MHP0873 on page 46.
1. For winches with a disc brake, remove tubing (27) and fittings from control valve to brake housing (21).
2. Remove capscrews (4) and lockwashers (3) securing motor assembly to motor adapter (6).
3. Using a hoist to support motor, pull motor straight away from winch. Refer to the "Motor Disassembly" section if motor disassembly is required.

Disc Brake Removal

All **FA10** winches have a disc brake housing (21). Those with NO disc brake option (refer to nameplate on winch outboard upright) will use steps 1, 3, 4 and 9 through 11 only.

Refer to Dwgs. MHP0930 on page 38 and MHP0873 on page 46.
1. Alternately and evenly loosen eight capscrews (2) until brake spring compression has been relaxed. Remove capscrews, motor adapter (6) and 'O' ring (15).
2. Remove brake reaction plate (8) and springs (9).
3. Remove seal sleeve (14). Remove 'O' ring (13) from inside sleeve (14).
4. Remove brake housing (21) and 'O' ring (33). If brake housing sticks, tap it with a plastic mallet until parts separate.
5. Remove five friction plates (16) and four drive plates (17).
6. Remove brake piston (10) from brake housing (21). Tap lightly with a plastic mallet to separate parts if necessary.
7. Remove seals (11 and 12) from brake piston (10).
8. Remove retainer ring (18) from input shaft (7) and remove splined hub (19).
9. Remove retainer ring (36) from inside drum shaft (41) and pull out input shaft (7) along with bearing (37). If necessary tap with plastic mallet.
10. If coupling (49) came out with input shaft (7) remove at this time. If not reach into drum shaft (41) and remove coupling (49). Remove retainer ring (45) from inside coupling (49).
11. Remove retainer ring (38) from input shaft (7) and press shaft out of bearing (37).

Frame Disassembly

Refer to Dwg. MHP0930 on page 38.
1. Support drum (96).
2. Remove capscrews (119) and lockwashers (117) which secure side rails (98) to inboard upright (42). Drive out dowel pins (183).
3. Remove inboard upright (42).
4. Remove capscrews (39) from drum shaft (41). Drive out dowels (40). Pry drum shaft (41) from upright (42).
5. Remove 'O' ring (43).

Manual Band Brake Disassembly (optional feature)

NOTICE

• Remove band brake if equipped. Refer to 'Manual or Automatic Band Brake' disassembly section on page 26 for specific instructions.

If your winch does not have a band brake go to step 7.
Refer to Dwgs. MHP0930 on page 38 and MHP0627 on page 48.
1. Remove nuts (102), lockwashers (103) and U-bolts (109).
2. Remove nut (110), handwheel (104), bearing (111) and tube (112).
3. Pull out brake screw (114). Catch spring (113) as brake screw clears.
4. Remove capscrews (116) and lockwashers (117). Remove anchor (118) and plate (122).
5. Slide brake band halves (128) off drum (96).
6. Remove capscrews (124) and nuts (115) and separate brake band halves.
7. Remove capscrews (196) and lockwashers (3).
8. Tap end cover (193) loose and remove.
9. Remove capscrews (192).
10. Remove shaft retainer (191).
11. Remove spacer (189).
12. Remove remaining capscrews (119) and lockwashers (117) that attach side rails (98) to outboard upright (184). Drive out remaining dowel pins (183) and remove side rails (98).
13. Pull outboard upright (184) away from drum (96).
14. Remove bearing (188) and seal (187).

Automatic Band Brake Disassembly (optional feature)

NOTICE

• Remove band brake if equipped. Refer to 'Manual or Automatic Band Brake' disassembly section on page 26 for specific instructions.

Refer to Dwg. MHP2329 on page 50.

Actuator Disassembly:

1. Automatic Brake
   a. Disconnect and remove hose, fittings and exhaust valve (71) from cylinder (134).
   b. Remove cotter pin (57) and pin (58) from link stud (56) and brake band (59).
   c. Remove cotter pin (44) and pin (46). Separate clevis (51) from lever arms (34) and (61).
   d. Remove cotter pin (44) and pin (65). Remove cylinder (134) from bracket (74).

WARNING

• It is not recommended to disassemble cylinder (134) due to extreme pressure of loaded spring. Contact factory for service.

Reduction Gear Removal

Refer to Dwg. MHP0930 on page 38 and MHP0875 on page 44.

1. Position drum (96) vertically (with reduction gear assembly facing up).
2. Remove capscrews (39) holding adapter (52) onto drum.
3. Install two 1/2 -13 NC x 2 inch capscrews into threaded holes in outer bolt pattern ring of adapter (52). Use these capscrews as jacking bolts to break seal. Attach suitable lifting eyes to these bolts and lift reduction gear assembly out of drum and place on a clean work surface.
4. Remove all plugs (406) from reduction gear.
5. Remove capscrews (50) and nuts (48). Using a hammer and punch, tap spring pins (404) into support (405). With a plastic mallet, tap adapter (52) until it is free of support (405).
6. Replace plugs (406) and loosely tighten.

NOTICE

• It is extremely important to maintain a clean work area when reduction gear assembly is disassembled.

Reduction Gear Disassembly

Refer to Dwg. MHP0875 on page 44.

NOTICE

• Disassembly is not recommended.

1. Place reduction gear assembly on a clean work bench. Have a couple of wooden blocks available to prevent assembly from rolling around. There will also be a small amount of oil remaining in housing so have some absorbent material readily available.
2. Using a hammer and punch, drive spring pins (404) in, until they are completely in input housing (424).
3. Remove capscrews (401) and using a plastic mallet, tap seal support (400) until loose and remove.
4. Remove oil seal (402) and 'O' ring (403).
5. Remove capscrews (425).
6. Using a plastic mallet tap support (405) and ring gear (409) to separate.
7. Remove 'O' ring (408) and bearing (407).
8. Pull out planetary support (410) assembly.
9. From planet gear side reach into planetary support hub and remove retainer ring (420). Spacer (422) may be on shaft (445) or still in spacer (418). Remove at this time.
10. Push spacer (418) out of planetary support and remove 'O' ring (419).

NOTICE

• Do not disassemble planetary gears from their housings unless required to replace damaged parts. Disassembly directions 11 and 12 apply only to planetary gears (415) housed in planetary support (410). For information on other planetary assemblies (430 and 440) contact your Ingersoll-Rand distributor or the factory.

11. Place planetary support (410) in a container. Holding the planet gear (415) with one hand, slowly push planet gear shaft (417) out of support. Carefully remove planet gear. When thrust bearings (413) become free squeeze together with fingers. Once spring pins (412) are free they may fly out or roller bearings (414) might start to fall out. Remove planet gear assembly and carefully place in container.
12. Slide thrust bearings (413) off ends of planet gear (415) and push out all roller bearings (414) into container.
13. Separate ring gear (409) from input housing (424) and remove 'O' ring (408).
14. Remove spacer (423).
15. Remove capscrews (439).
16. Separate input housing (424) from ring gear (436) and remove 'O' ring (434).
17. Remove retainer ring (427) from input housing (424) and pull out cylinder roller bearing (426).
18. Remove sun gear (429) and spacer (428), separate the two.
19. Remove planetary assembly (430).
20. Remove sun gear (433) and spacer (422), separate the two.
21. Remove retainer ring (435) from sun gear (433).
22. Tap out spring pins (437). Separate ring gear (436) from input housing (438) and remove 'O' ring (434).
23. Tap out spring pins (443). Remove capscrews (448) and separate input housing (438) from ring gear (444) and end cover (446).
24. Remove planetary assembly (440) and 'O' ring (442).
25. Remove 'O' ring (442) and shaft (445).
26. Remove capscrews (452) and separate front cover (450). Remove thrust plate (449) and gasket (447).
27. Remove adjusting screw (453).

K5B Motor Disassembly

Refer to Dwg. MHP1007 on page 42.

1. Remove five capscrews (253) from exhaust flange (254).
2. Remove rotary valve housing (247) by pulling it out of motor housing (217) as an assembly with exhaust flange (254).

CAUTION

• Do not remove exhaust flange (254) until rotary valve (250) has been removed from rotary valve housing (247).

3. Remove rotary valve (250) by pulling it out from assembly through motor housing end of rotary valve housing (247).
4. Remove exhaust flange (254) by removing capscrews (253) and control valve assembly (500).

5. Remove each cylinder (201) by removing four capscrews (200). Remove head gasket (209) and discard.
6. Remove mounting flange (216) by removing capscrews (4) and lockwashers (3), and then pulling mounting flange straight off.
7. Position one piston (204) at top of its stroke. In this position, wrist pin (203) can be removed. Remove one retainer ring (205) from either side of piston (204). Push wrist pin (203) out by hand from one side. If wrist pin is too tight it is acceptable to carefully heat piston to 200° F (93° C) or less and then push wrist pin out.

NOTICE

• If piston, wrist pin, connecting rod or cylinder head are to be reassembled, number each set. Also add radial alignment marks for each piston and cylinder head to motor housing.

8. Remove remaining pistons as described in step 7 as required. To remove crank assembly, all pistons and cylinder heads must be removed.
9. Crank assembly (231) can now be removed, with oil slinger (230), by pulling straight out from motor housing (217). Use care while guiding connecting rods (206) through inside of motor housing.

Crankshaft Disassembly

1. Remove cotter pin (236) and pin nut (237).
2. Remove lock pin (235) by carefully driving it out of its location. Use care not to damage threads.
3. Pull crankshaft valve end (231) off the crankshaft.
4. Remove connecting rod rings (234), bushing (233), sleeve (232) and connecting rods (206). Record the five connecting rod (206) numbers and foot directions so they can be reinstalled in the same order.
5. Oil slinger (230) does not have to be removed unless damaged. If removal is required heating of the five screws (229) may be required to loosen Loctite® connection.

K5C2 Control Valve Disassembly

Refer to Dwg. MHP2054 on page 52.

Handle Removal

If handle is not damaged it is not necessary to disassemble completely.
1. Carefully pry off plug (535).
2. Remove capscrew (501) and washer (502).

NOTICE

• Observe spring (537) connection during disassembly. This spring is under tension and is required to return handle to neutral position.

3. Carefully pull handle assembly from reverse valve (543). Remove spring (537).
4. Using a suitable wrench, remove handle post (532) from hub valve (536). Separate spring (533) and slide handle (534).
5. Separate handle post (532) and knob (531).

Reverse Valve Removal

1. Remove capscrews (538), (525) and washers (524) from seal bracket (539). Remove seal bracket from housing. Remove and discard 'O' rings (541) and (542).
2. Remove capscrews (501) and washers (502) from exhaust flange (555). Remove flange from housing. Remove and discard 'O' ring (542).
3. Remove reverse valve (543) out exhaust flange side of housing. Allow ball (516) to drop out of bushing (544) and remove ball (516).
4. Remove bushing (544) out exhaust flange side of housing.

NOTICE

• Dowel pin (545) allows the bushing to be removed only from the exhaust flange side of housing. Ball (516) retains reverse valve (543) in bushing (544).
• Do not remove reverse valve (543), bushing (544) and ball (516) at the same time, damage may occur to bushing.

Piston Removal

1. Remove capscrews (501) and washers (502) from piston cover (519). Remove cover and discard gasket (518).
2. Remove capscrews (501) and washers (502) from poppet cover (503). Remove cover and discard gasket (504).
3. Remove the following items from housing poppet bore: spring (505), poppet cap (506) and poppet seal (507).
4. Using finger, from poppet side, push piston (522) out of housing. Remove 'O' rings (521) and (523) and discard.

Pilot Valve Removal

If Pilot Valve is not damaged it is not necessary to disassemble completely.
1. Remove plug (512).
2. Remove pilot valve assembly (items 509, 511 and 513 through 515) as an assembly.
3. Pilot seat (514) is threaded into valve housing (517). Using a large flat tipped screwdriver, engage slots in pilot seat and remove.
4. Using finger pressure, hold pilot rod in pilot seat. Remove retainer ring (515).
5. Separate spring (509) and pull pilot rod out of pilot seat. Remove and discard 'O' rings (511).

K5C2-E Control Valve Disassembly

Refer to Dwg. MHP2163 on page 54.

Handle Removal

Follow disassembly instructions for K5C2 Control Valve.

Reverse Valve Removal

1. Remove capscrews (538), (525) and washers (524) from seal bracket (539). Remove seal bracket from housing. Remove and discard 'O' rings (541) and (542).
2. Remove capscrews (721) and washers (502) from exhaust flange (555) and exhaust adapter (723). Remove and discard 'O' rings (542) and (722).
3. Remove reverse valve (543) out exhaust flange side of housing. Allow ball (516) to drop out of bushing (544) and remove ball (516).

4. Remove bushing (544) out exhaust flange side of housing.

NOTICE

• Dowel pin (545) allows the bushing to be removed only from the exhaust flange side of housing. Ball (516) retains reverse valve (543) in bushing (544).
• Do not remove reverse valve (543), bushing (544) and ball (516) at the same time, damage may occur to bushing.

Piston Removal

Follow disassembly instructions for K5C2 Control Valve.

Pilot Valve Removal

Follow disassembly instructions for K5C2 Control Valve.

Emergency Stop Removal

1. Remove adapter (706) and E-Stop button (705).
2. Remove plunger (707). Remove and discard 'O' rings (703).
3. Pull spring (711) out of valve housing and discard.

Overload Valve Removal

1. Remove cap (700). Remove and discard grommet (701).
2. Pull out plunger (702), remove and discard 'O' rings (703).
3. Remove capscrews (501) and washers (502) from cover (719) underneath valve housing.

NOTICE

• Cover (719) retains spring (718). To remove capscrews (501) and washer (502) unscrew in a crisscross pattern.

4. Remove adjusting screw (720).
5. Remove and discard 'O' ring (716), gasket (714) and 'O' ring (713) from piston.
6. Do not remove seal from piston, if piston appears damaged or warn replace.

Control Valve Disassembly (old style)

Refer to Dwg. MHP2061 on page 56.

NOTICE

• Match mark throttle valve parts to ensure proper reassembly.

1. Remove capscrews (302) and lockwashers (107) that hold valve retainer (305).
2. Mark square end on valve body (316) and handle (300) to ensure correct orientation during reassembly.
3. Drive out pin (301) and remove handle (300).
4. Note spring (303) position before removing it. Pull valve body (316) out of valve bushing (314) while disconnecting spring (303).
5. Remove seal rings (315) from valve body (316).
6. Inspect parts for score marks or wear.
7. Measure clearance between valve bushing (314) and valve body (316). To prevent excessive air leakage, the maximum allowable clearance is 0.002 inch (0.05 mm). If clearance is excessive replace complete valve body with valve bushing. The components are manufactured as a matched set.

Pendant Disassembly

Refer to Dwg. MHP2069 or MHP2280 on page 64.
1. Remove fittings (349) and lifting eye (390).
2. Unscrew plugs (394). Remove springs (395) and balls (396).
3. Rap out pin (397) and remove levers (463).
4. Remove setscrews (465) from pendant handle (464).
5. Remove valve assemblies (462). Ensure 'O' rings (393) and (399) are removed with valve assemblies. Discard 'O' rings.
6. Remove plug (470) or emergency stop valve (391) from pendant handle (464).
7. Remove retainer ring (468) and exhaust washer (467).

Drum Locking Pin Disassembly (old style)

Refer to Dwg. MHP2066 on page 74.
1. Ensure pull rod (140) is engaged in drum cap deep groove to relieve spring compression.
2. Depress lock pin (136) into drum cap cavity to allow access to retainer ring (138).
3. Remove retainer ring (138) from pull rod (140). Release spring tension by slowly removing lock pin (136) from drum cap cavity.

Drum Locking Pin Disassembly (new style)

Refer to Dwg. MHP2066 on page 74.
1. Remove capscrews (143) and washers (144).
2. Remove as an assembly items (135 - 137 and 140 - 145). Bearing (145) is pressed in and should not be removed unless damaged.
3. Remove lock pin (136), spring (137) and drum cap (142).

NOTICE

• Lock pin (136) is spring loaded and should be remove with care.

4. Remove pull rod (140), grip (141) and pin (135) as an assembly.

Cleaning, Inspection and Repair

Cleaning

Clean all winch component parts in solvent (except band brake bands and disc brake friction plates). Use of a stiff bristle brush will facilitate removal of accumulated dirt and sediments on housings, frame and drum. If bushings have been removed it may be necessary to carefully remove old Loctite® from bushing bores. Dry each part using low pressure, filtered compressed air. Clean band brake band using a wire brush or emery cloth. Do not wash band brake band in liquid. If band brake band lining is oil soaked, it must be replaced.

Inspection

All disassembled parts should be inspected to determine their fitness for continued use. Pay particular attention to the following:
1. Inspect all gears for worn, cracked, or broken teeth.
2. Inspect all bushings for wear, scoring, or galling.
3. Inspect shafts for ridges caused by wear. If ridges caused by wear are apparent on shafts, replace shaft.
4. Inspect all threaded items and replace those having damaged threads.

5. Inspect drum band brake lining for oil, grease and glazing. If drum band brake lining is oil-soaked replace brake bands as a set. Remove glazed areas of band brake lining by sanding lightly with a fine grit emery cloth.
6. Measure thickness of drum band brake lining. If band brake band lining thickness is less than 0.062 inch (2 mm) anywhere along edges replace brake bands (128) as a set.

Repair

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

1. Worn or damaged parts must be replaced. Refer to 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. Cost of the part is often minor in comparison with cost of redoing the job.
3. Smooth out all nicks, burrs, or galled spots on shafts, bores, pins, or bushings.
4. Examine all gear teeth carefully, and remove nicks or burrs.
5. Polish the edges of all shaft shoulders to remove small nicks which may have been caused during handling.
6. Remove all nicks and burrs caused by lockwashers.

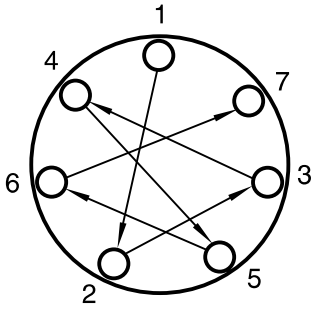
Assembly

General instructions

- Use all new gaskets and seals.
- Replace worn parts.
- Assemble parts using match marks attached during disassembly. Compare replacement parts with originals to identify installation alignments.
- Lubricate all internal parts with a mixture of half oil (as recommended in the “LUBRICATION” section) and half molybdenum disulfide lubricant compound (eg. STP®).
- When torquing capscrews and the pattern contains over three capscrews, use a crossing tightening sequence. Refer to Dwg. MHP0990 on page 30.

Tighten capscrews in three steps to prevent warping and provide a tight seal.

1. Snug all capscrews.
2. Tighten all capscrews to 1/2 final torque value (using a crossing pattern).
3. Tighten to final torque (using a crossing pattern).



(Dwg. MHP0990)

K5C2 Control Valve Assembly

Refer to Dwg. MHP2054 on page 52.

Reverse Valve Assembly

1. Insert reverse valve (543) into bushing (544) with ball slot oriented UP.
2. Insert bushing (544) and reverse valve (543) into valve housing (517) from exhaust flange side, ensuring that groove in bushing is aligned with pin (545).
3. Lubricate ‘O’ ring (542) and place it in groove in exhaust flange (555).
4. Secure exhaust flange (555) to valve housing with capscrews (501) and washers (502).
5. Insert ‘O’ ring (541) into seal bracket (539). Lubricate ‘O’ ring (542) and place into groove in seal bracket.
6. Place seal bracket over end of reverse valve. Using finger pressure, press until seal is seated on reverse valve and seal bracket is seated on valve housing. Secure with washers (524) and capscrews (525) and (538).

Pilot Valve Assembly

1. Lubricate and install ‘O’ rings (511) on pilot shaft (513).
2. Insert this assembly into pilot seat (514).
3. Using fingers, keep pilot rod located fully in pilot seat and place spring (509) over end. Secure with retainer ring (515).
4. Drop ball (516) through pilot valve hole. Do not grease ball.
5. Pilot Valve Assembly (items 509, 511 and 513 through 515) is installed as an assembly.
6. Apply thread sealant Loctite 567® to pilot seat (514), place pilot valve assembly into valve housing. Use a large flat tipped screw driver to engage slots in pilot seat and tighten until pilot assembly is 1/8 in. (3.175 mm) from housing bore.
7. Insert plug (512) and tighten.

Piston Assembly

1. Lubricate and install ‘O’ rings (521) and (523) on piston (522).
2. Insert assembled piston into valve housing (517) from handle side.
3. Secure with gasket (518), piston cover (519), washers (502) and capscrews (501).
4. Place poppet seal (507) into poppet cap (506). Place this assembly into valve housing and seat on piston (522).
5. Place spring (505) over this assembly.
6. Secure with gasket (504), poppet cover (503), washers (502) and capscrews (501).

Handle Assembly

1. Grease valve hub (536) shaft and place slide handle (534) over valve hub (536). Insert spring (533) into slide handle (and over valve hub).
2. Screw handle post (532) over this assembly and tighten.
3. Place knob (531) on handle post (532) and tighten.
4. Place spring (537) over reverse valve handle end in seal bracket.

NOTICE

• Spring (937) will have to be ‘Cocked’ over stud in seal bracket. This will ensure handle returns to neutral.

5. Place handle assembly over reverse valve end. Slide handle will have to be lifted slightly to allow pin to fit into slot in seal bracket.

6. Secure handle assembly to reverse valve with washer (502) and capscrew (501). Press plug (535) into handle assembly to cover capscrew. Check control handle movement. Correct any discrepancies.

K5C2-E Control Valve Assembly

Refer to Dwg. MHP2163 on page 54.

Reverse Valve Assembly

1. Insert reverse valve (543) into bushing (544) with ball slot oriented UP. Apply grease to ball (516) and insert into ball slot of reverse valve (543) through bushing (544).
2. Insert bushing (544), reverse valve (543) and ball (516) into valve housing (517) from exhaust flange side, ensuring that groove in bushing is aligned with pin (545).
3. Lubricate 'O' rings (542) and (722), and place in grooves in exhaust adapter (723).
4. Lubricate 'O' rings (542) and place in grooves in exhaust flange (555).
5. Secure exhaust adapter with exhaust flange to valve housing with capscrews (721) and washers (502).
6. Insert 'O' ring (541) into seal bracket (539). Lubricate 'O' ring (542) and place into groove in seal bracket.
7. Place seal bracket over end of reverse valve. Using finger pressure, press until seal is seated on reverse valve and seal bracket is seated on valve housing. Secure with washers (524) and capscrews (525) and (538).

Pilot Valve Assembly

Follow assembly instructions for K5C2 Control Valve.

Piston Assembly

Follow assembly instructions for K5C2 Control Valve.

Handle Assembly

Follow assembly instructions for K5C2 Control Valve.

Emergency Stop Assembly

1. Insert spring (711) into valve housing (917).
2. Place 'O' rings (703) on plunger (707).
3. Insert plunger into valve housing.
4. Screw adapter (706) and E-Stop button (705) into valve housing.
5. Tighten adapter until snug, do not over tighten.

Overload Valve Assembly

1. Replace 'O' rings (703) on plunger (702).
2. Insert plunger (702) with 'O' rings in valve housing (917).
3. Replace grommet (701) in cap (700).
4. Install and tighten cap (700) flush to valve housing.
5. Replace piston (712) if appears damaged or warn.
6. Insert 'O' ring (713) on piston (712).
7. Replace gasket (714).

NOTICE

• Cover (719) retains springs (718), adjustment nut (717) and plate (715). Insert capscrews (502) and washers (501) in a crisscross pattern until tightened evenly.

8. Insert adjusting screw (720), refer to 'OPERATION' section for overload valve adjustment.

Control Valve Assembly (old style)

Refer to Dwg. MHP2061 on page 56.

NOTICE

• During assembly align parts using match marks made during disassembly.

1. Install seal rings (315) on each end of valve body (316).
2. Install valve body (316) into valve bushing (314).
3. Insert valve bushing (314) into valve housing (311). Ensure ports in bushing and flat cutout in valve body are properly aligned with housing ports as shown in Dwg. MHP2061 on page 56.
4. Install valve retainer (305) and secure with capscrews (302) and lockwashers (107). Torque capscrews to 25 ft. lbs. (34 Nm).
5. If removed, reinstall spring retainer (306) and torque to 25 ft. lbs. (34 Nm).
6. Install spring (303) and throttle handle (300) on square shaft of valve body (316). Spring (303) ends must straddle spring retainer (306) on throttle handle (300). Install roll pin (301).
7. Check throttle handle moves fully left and right without sticking or binding. Throttle handle should center, by spring force, automatically when released.

Pendant Assembly

Refer to Dwg. MHP2069 or MHP2280 on page 64.

1. Assemble protectors (461) and 'O' rings (393) and (399) on valves (462).
2. Insert valve (462) assemblies into pendant handle (464).
3. Install setscrews (465) in pendant handle.
4. Install balls (396), springs (395) and plugs (394) into pendant handle.
5. Install plug (470) or emergency stop valve (391) into pendant handle.
6. Install fittings (349) and lifting eye (390) into top of pendant handle.
7. Facing pendant handle operation side, place levers (463) such that lever direction indicators show 'UO' on left hand side and 'DOWN' on right hand side. Install pin (397) ensuring pin inserts through levers and locates on opposite side of pendant handle.
8. Install exhaust washer (467) and secure with retainer ring (468).
9. Attach hoses to fittings located on top of pendant handle.

NOTICE

• Screws (398) are installed in pendant levers allowing adjustment of pendant levers.

K5B Motor Assembly

Refer to Dwg. MHP1007 on page 42.

1. Assemble throttle valve assembly (260), gaskets (546) and exhaust flange (254) to rotary valve housing (247) using four capscrews (257) and lockwashers (223).
2. Install bearing (252) on rotary valve (250) by pressing only on inner race of bearing. With exhaust flange (254) down install rotary valve (250) into rotary valve housing (247). Slide rotary valve out of rotary valve housing far enough to install seal ring (251) on crank shaft end of rotary valve (250). Slide rotary valve back into rotary valve housing (247).
3. Install 'O' ring (244) into motor housing (217).
4. Install rotary valve housing gasket (243) onto rotary valve housing (247). With exhaust flange down on bench, install motor housing (217) on to rotary valve housing (247). Check for any evidence of damage to 'O' ring (244) when rotary valve housing is fully engaged. Install capscrews (253) and torque to 50 ft. lbs. (68 Nm).
5. If removed press crank bearing (228) on crank shaft assembly (231). Press only on inner race of bearing.
6. Place crank assembly (231) on a work bench with oil slinger (230) down and slide sleeve (232) (with tang up) on crankpin.
7. Slide bushing (233) over sleeve (232) and first connecting rod ring (234) with chamfer up.
8. Install connecting rods (206) in same order as removed, with all feet pointing in same direction, using first connecting rod ring (234) to hold one side of connecting rod feet.
9. Slide second connecting rod ring (234) over other side of connecting rod feet with chamfer on ring facing down (toward stem of connecting rod).
10. Slide crank shaft (231) (valve end) over crankpin while simultaneously aligning tang on sleeve (232) with slot in crank shaft.
11. Rotate and position crank shaft (valve end) relative to crankpin to allow installation of lock pin (235).
12. Tap lock pin (235) in place and install pin nut (237). Torque nut to 60 ft. lbs. (81 Nm).
13. Install cotter pin (236).
14. Install roll pin (240) and bearing (228) into valve end of crank shaft.
15. Check that all connecting rods move freely around crank. Position crank assembly (231) into motor housing (217) with bearing (228) seated and connecting rods (206) centered in cylinder holes.

NOTICE

• Make certain that roll pin (240) and three lugs on rotary valve (250) line up with corresponding hole and lugs on crank shaft.
• Do not allow rotary valve (250) to slide back in rotary valve housing (247). If rotary valve slides in too far, seal ring (251) will lockup in internal grooves of rotary valve housing (247) and restrict further assembly.

16. Rotating crank assembly, position one connecting rod (206) at the top of its stroke. Install a piston (204) with its rings (202 and 207) to connecting rod (206) with wrist pin (203) and retaining rings (205).
17. Install a new cylinder head gasket (209) before installing cylinder (201).
18. Install cylinder (201) over piston (204) by compressing both piston rings (202 and 207). Secure cylinder head to motor housing (217) with four capscrews (200). Torque capscrews to 60 ft. lbs. (81 Nm).
19. Repeat Steps 17 through 20 with remaining cylinders.
20. Rotate motor by hand. Motor should rotate without binding.
21. Press bearing (228) into motor side of mounting flange (216).
22. Install mounting flange (216) and gasket (226) on large base side of motor housing (217). Make sure notches on both parts are aligned. Temporarily secure parts with one capscrew (4), lockwasher (3) and a 1/2-NC nut.
23. Lightly lubricate 'O' ring (5) and install in groove on motor adapter (6).

NOTICE

• 'O' ring (5) listed in step 23 refers to part number 51459 as shown on winch assembly Dwg. MHP0930 on page 38. This part must be placed between mounting flange (216) and motor adapter (6).

24. Install eye bolts (213) and vent cap assembly (210) in motor housing (217).
25. Ensure oil drain (225) and level plugs (218) are installed.

Reduction Gear Assembly

Refer to Dwg. MHP0875 on page 44.

NOTICE

• During assembly of components apply a light coat of Loctite® 242 to all threaded fasteners. Clean all mating surfaces. 'O' rings can be held in place with a coating of EP grease applied to groove.
• It is extremely important to maintain a clean work area when reduction gear assembly is reassembled. During reassembly clean each part thoroughly and lightly coat with appropriate lubricant as described in "Recommended Lubricants" of "LUBRICATION" section.

1. If removed, install planetary gears (415) into planetary support (410) as follows:
   a. Install a pair of spring pins (412) into holes in planetary support (410).
   b. Install and center roller spacer (416) in planet gear (415) bore.
   c. Place 40 roller bearings (414) in each side of planet gear (415), a light coat of grease will help to hold them in place. Place a thrust bearing (413) on each side of planetary gear assembly and squeeze.
   d. Depress one spring pin (412) and slide planetary gear assembly over it. Depress other side and tip gear assembly into planetary support. Rotate gear assembly around spring pins until shaft hole aligns.
   e. Push planet gear shaft (417) into place. Repeat for remaining two gear assemblies.
   f. Ensure each planet gear (415) rotates freely, without sticking or binding.
2. Fasten thrust plate (449) to front cover (450) with screws (453) and loosely tighten.
3. Place a new gasket (447) on end cover (446). Install capscrews (452) through front cover (450), gasket (447) and into end cover (446) and tighten.
4. Lubricate and install new 'O' ring (442) into groove on end cover (446). Apply a bead of Loctite® 515 sealant to mating surface.
5. Align ring gear (444) with spring pins (443) and press ring gear on end cover (446). Apply a bead of Loctite® 515 sealant to mating surface.

6. Lubricate and install new 'O' ring (442) into input housing (438).
7. Slide shaft (445) into planetary assembly (440). Insert this assembly into ring gear (444).
8. Align spring pins (443) with input housing (438) and press down.
9. Insert capscrews (448) through end cover (446) and into input housing (438) and torque to 50 ft. lbs. (67 Nm).
10. Lubricate and install new 'O' ring (434) into groove on input housing (438). Apply a bead of Loctite® 515 sealant to mating surface.
11. Align ring gear (436) with spring pins (437) and press down.
12. Install retaining ring (435) onto sun gear (433) and slide down shaft (445) into planetary assembly (440).
13. Install spacer (422) into sun gear (433).
14. Install planetary assembly (430) into ring gear (436).
15. Slide sun gear (429) onto shaft (445) and into planetary assembly (430). Insert spacer (428) into sun gear (429).
16. Insert bearing (426) into input housing (424). Install retainer ring (427).
17. Lubricate and install new 'O' ring (434) into groove on input housing (424). Apply a bead of Loctite® 515 sealant to mating surface.
18. Align spring pins (437) with input housing (424) and press down.
19. Insert capscrews (439) through input housing (438) and into input housing (424) and torque to 145 ft. lbs. (195 Nm).
20. Insert spacer (423) into input housing (424) with bevel facing housing.
21. Lubricate and install new 'O' ring (419) onto outer groove on spacer (418). Insert spacer (422) into center recess in spacer (418). Place this assembly into planetary support (410) from planet gear end.
22. Insert retainer ring (420) in planetary support to hold spacer assembly in place.
23. Lubricate and install new 'O' ring (408) into groove in input housing (424). Apply a bead of Loctite® 515 sealant to mating surface.
24. Align ring gear (409) with spring pins (404) and push down.
25. Insert planetary support assembly into ring gear (409).
26. Lubricate and install new 'O' ring (408) into groove in support (405). Apply a bead of Loctite® 515 sealant to mating surface.
27. Align support (405) with spring pins (404) and push down.
28. Insert capscrews (425) through input housing (424) into support (405) and torque to 220 ft. lbs. (295 Nm).
29. Insert ball bearing (407) into support (405).
30. Insert oil seal (402) into seal support (400) (lip facing out).
31. Lubricate and install new 'O' ring (403) in groove in support (405). Apply a bead of Loctite® 515 sealant to mating surface.
32. Align bolt holes with seal support (400) and support (405).
33. Insert capscrews (401) through seal support, into support and tighten.
34. Turn adjusting screw (453) in until end play is eliminated then back it out two turns.

Reduction Gear Installation

Refer to Dwg. MHP0930 on page 38 and MHP0875 on page 44.

NOTICE

• During assembly of components apply a light coat of Loctite® 242 to all threaded fasteners.
• Clean all mating surfaces. 'O' rings can be held in place with a coating of EP grease applied to groove.

1. Place drum (96) in vertical position, with reduction gear side facing up.
2. Remove plugs (406) from reduction gear support (405). Apply a bead of Loctite® 515 sealant on reduction gear surface that mates with adapter (52).
3. Place adapter (52) on reduction gear and align bolt holes. There is one place on adapter with no hole, this should be positioned over one of plug (406) holes. This becomes the drain/fill location (other 3 plugs will be blocked). Install capscrews (50) through adapter (52) and attach nuts (48), torque to 205 ft. lbs. (278 Nm). With a hammer and punch, drive spring pins (404) into adapter (52) until about 1/16 inch (1.5 mm) below surface.
4. Apply a bead of Loctite® 515 sealant to surface of drum (96) where adapter (52) will mate.
5. Install two 1/2 in.-13 NC x 2 in. capscrews with suitable lifting eyes into threaded holes in outer bolt pattern ring of drum adapter (52). Lift reduction gear assembly into drum (96). Align bolt holes and install capscrews (39) through adapter (52) and into drum (96), torque to 205 ft. lbs. (278 Nm).
6. Place drum in horizontal position.

Manual Band Brake Assembly (optional feature)

If your winch does not have this option go to next section.
Refer to Dwg. MHP0627 on page 48.

1. Clamp top of brake bands (128) together with a C-clamp.
2. Slide this assembly over drum (96).
3. Install capscrew (124) and nut (115) through bottom blocks on brake bands (128) and tighten.
4. Remove C-clamp.
5. Install brake screw (114) through lugs on top of brake bands (128), with spring (113) located between lugs.
6. Slide tube (112) over brake screw (114) followed by bearing (111).
7. Thread handwheel (104) onto brake screw (114) and loosely tighten.
8. Thread nut (110) onto brake screw (114) until 1/4 inch (6.5 mm) of threads are exposed.
9. Place anchor (118) over rear lug on bands (128). Rotate bands (128) until bolt holes in anchor align with holes in rear side rail (98).
10. Install capscrews (116) and lockwashers (117) through anchor (118), side rail (98) and into plate (122) and tighten.
11. Install adjustment screw (127) through nut (120) and into support (126). Expose 1/4 inch (6.5 mm) of threads.
12. Install capscrews (119) and lockwashers (117) through side rail (98) and into support (126) and tighten.
13. Tighten handwheel (104) all the way tight. Screw adjustment screw up or down until there is 1/16 to 1/8 in. (1.6 to 3.2 mm) clearance between screw (127) and lug on brake band (128).
14. When handwheel is loosened, brake band (128) should NOT touch drum surface. If band does touch drum then decrease gap in 1/16 inch (1.5 mm) increments until band does not touch.
15. With handwheel (104) fully tightened, place capscrews (106) through lockwashers (107) and bracket (108) into brake band (128). Tighten loosely.
16. Place U-bolt (109) over tube (112) and through bracket (108). Place lockwashers (103) and nuts (102) onto U-bolt (109) and tighten loosely.
17. Move bracket (108) up or down until tube (112) is level. Tighten capscrews (106) and nuts (102).

Automatic Band Brake Assembly (optional feature)

Ref. Dwg. MHP2329 on page 50.

Automatic Band Brake Actuator Assembly:

1. Install bracket (74) on side rail (98) with capscrews (116) and (67), and washers (63).
2. Install cylinder (134) to clevis (51).
3. Press bushing (54) into lever arms (34) and (61), and attach pivot nut (55).
4. Install capscrews (25), washers (32), spacers (35) with nut (60) onto lever arms (34) and (61).
5. Install cylinder (134) so it connects with bracket (74) and between lever arms. Use pin (46) and (65) and secure with cotter pins (44). Bend ends of cotter pin to secure cylinder when adjustment is complete.
6. Install fitting (73), dump valve (71), fittings and hose (69) and (68) to the cylinder (134).
7. Adjust automatic brake as described under 'Adjustments' on page 23 in the "MAINTENANCE" section.

Frame Assembly

Refer to Dwg. MHP0930 on page 38.

NOTICE

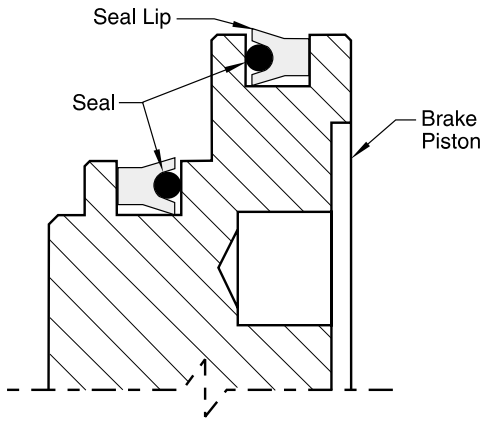
• During assembly of components apply a light coat of Loctite® 242 to all threaded fastener.
• Clean all mating surfaces. 'O' rings can be held in place with a coating of EP grease applied to groove.

1. Install oil seal (187) in outboard upright (184) with lip toward drum.
2. Pack bearing (188) with grease and install in outboard upright (184).
3. Install outboard upright (184) on drum end. Ensure assembly is kept centered on seal and journal during this step.
4. Install shaft retainer (191). Secure by installing capscrews (192) and torque to 30 ft. lbs. (41 Nm).
5. Install spacer (189).
6. Apply a bead of Loctite® 515 sealant to mating surface of outboard upright (184) and install end cover (193). Secure with capscrews (196) and lockwashers (3), torque to 30 ft. lbs. (41 Nm).
7. Lubricate and install 'O' ring (43) onto drum shaft (41).
8. Insert drum shaft (41) into inboard upright, aligning dowel pin holes.
9. Install dowel pins (40) flush or slightly below surface of drum shaft (41).
10. Install capscrews (39) and torque to 125 ft. lbs. (170 Nm).
11. Install inboard upright (42) onto reduction gear input shaft. Ensuring that splines on drum shaft (41) align with splines on reduction gear.
12. Install side rails (98) to uprights (42) and (184) and loosely secure using capscrews (119) and lockwashers (117).
13. Tap dowel pins (183) into position until flush with side rails.
14. Tighten capscrews (119) evenly. Torque to 140 ft. lbs. (190 Nm).

Disc Brake Installation

Refer to Dwgs. MHP0930 on page 38 and MHP0873 on page 46. Winches with NO disc brake option (refer to nameplate on winch outboard upright) will use steps 1 – 3, 6, 13, 15 and 17.

1. Remove seals from bearing (37). Lightly coat input shaft (7) with Loctite® 609 and press bearing (37) onto input shaft (7). Install retainer ring (38).
2. Insert retainer ring (45) into middle of coupling (49). Place onto reduction gear end of input shaft (7).
3. Install input shaft assembly into drum shaft (41). Install retainer ring (36) in bore of drum shaft (41).
4. Slide splined hub (19) onto input shaft (7), gear teeth side in first. Install retainer ring (18).
5. Place five friction plates (16) and four drive plates (17) onto splined hub (19). Lubricate all plates with ISO VG 46 (SAE 10W) oil. Starting with a friction plate (16), then drive plate (17) until all plates are used.
6. Lubricate and install 'O' ring (33) into back of brake housing (21).
7. Locate brake port. This should be 45 degrees to the right of top center. There are two other ports which should be straight up and straight down (one becomes drain the other becomes vent).
8. Install pipe plug (24) into lower port in brake housing (21). Install reducer bushing (22) and breather (23) into top port on brake housing (21).
9. Slide brake housing (21) over brake plates. Apply a coating of ISO VG 100 (SAE 3EP) oil to inside surface of brake housing (21).
10. Lubricate and install seals (11) and (12) in brake piston (10) grooves so lips face each other. Do not over stretch seals during this procedure. Refer to Dwg. MHP0139 on page 34.



(Dwg. MHP0139)

11. Install brake piston assembly into brake housing (21), ensuring that lips of seals are not pinched or rolled over. Gently tap into position using a plastic mallet until seated (cover brake port, during tapping, oil can spray out).
12. Lubricate and install brake springs (9) into each brake piston hole.
13. Lubricate and install 'O' ring (15) into top groove in brake housing (21).
14. Tap reaction plate (8) into motor adapter (6).
15. Mount motor adapter (6) to drum shaft (41). There is one pair of bolt holes in outer pattern that are centered on a pair of bolt holes on inner pattern. The small diameter outside pattern are motor mounting holes. The large diameter inside pattern are brake housing mounting holes. This matched pair should be in the 6 o'clock position.
16. There are two methods to compress springs (9) and fasten capscrews (2).
    a. Use three, 1/2-NC x 5 inch socket head capscrews and evenly space them around motor adapter (6), mark each position. Evenly tighten them down (compressing springs). Install regular capscrews (2) and torque to 125

ft. lbs. (170 Nm). Remove the three extra long capscrews and replace with capscrews (2) and torque to 125 ft. lbs. (170 Nm).

b. Press down brake piston (10) until capscrews (2) can engage threads and torque to 125 ft. lbs. (170 Nm).

17. Place 'O' ring (13) into seal sleeve (14). Slide onto input shaft (7) with beveled end facing out.

Motor Installation

Refer to Dwg. MHP1007 on page 42.

WARNING

• The K5B air motor weighs approximately 260 lb. (118 kg). Adequately support air motor while installing motor mounting capscrews.

1. Install 'O' ring (13) into center of sleeve (14). Slide this assembly onto input shaft (7). Ensure that bevel is facing motor. Apply a coating of grease over sleeve and exposed input shaft.
2. Apply a coating of grease to oil seal (227) and crank bearing (228) in motor.
3. Lubricate and install 'O' ring (5) in groove in motor adapter (6).
4. Slide motor over input shaft (7). Be careful not to damage oil seal. Motor might have to be rotated around input shaft slightly to align splines.
5. Remove 1/2 in. nut from mounting flange (216). Push motor until flush with motor adapter (6). Insert capscrews (4) and lockwasher (3) through motor into motor adapter (6) and torque to 85 ft. lbs. (115 Nm).
6. On winches with a disc brake install fitting (31) into brake housing port. Attach dump valve (30) to fitting (31) followed by vented fitting (29). Connect air line assembly (28, 20 and 27) between vented fitting (29) and hose fitting (26) which is screwed into control valve.

Mounting Control Valve

1. Secure Control Valve Assembly to intake manifold using capscrews (551) and lockwashers (549). Use new gaskets (546) between control valve and manifold.
2. Test control valve for proper operation. Lift slide handle and move handle all the way in one direction and release hand. Control handle should return and lock in the neutral position. Repeat for other direction.
3. Connect brake line.
4. Connect air supply line.

Brake Connection

Refer to Dwg. MHP2239 on page 72.
Winches without overload valve and/or emergency stop will use configuration 3. Disc and automatic band brake will require a tee at disc brake port, contract Factory for replacement.

Winches with an overload valve and/or emergency stop will use configuration 4, and require a tee at brake port.

Reconnecting Winch

1. Fill K5B motor with 3 quarts. (2.8 litres) oil. Refer to "LUBRICATION" section.
2. If reduction gear fill plug is in a good position fill with 5 quarts (4.8 litres) oil. Refer to "LUBRICATION" section. If not, and winch is equipped with a disc brake then put 2 quarts (1.8 litres) of oil in disc brake assembly. Add the additional 3 quarts (3 litres) when air is connected to winch and fill plug can be rotated to the top. If there is no disc brake assembly then prior to operating winch fill with oil.
3. Move winch back to mounted site and fasten in place. Refer to "INSTALLATION" section.
4. Reconnect all air lines. Slowly return air pressure to winch.
5. Install wire rope. Refer to "INSTALLATION" section.

Testing

Operational Test

Prior to initial use, all new or repaired winches shall be tested to ensure proper operation.

1. Check oil level in motor, reduction gear assembly and disc brake are correct. Top off levels as required before operation as described in "LUBRICATION" section.
2. To initially 'break in' new or overhauled motors operate without load, in both directions, for 15 minutes at 100 - 200 RPM.
3. New Band Brake Band Lining Run-in Procedure: All new band brake band linings require a 'run-in' period. Operate winch without load in payout direction while gradually applying brake. Allow brake to slip for approximately one minute. Winch motor may stall as band brake band lining fully engages. Do not allow brake to overheat.
4. Check operation of brakes. Adjust band brake if necessary as described in "MAINTENANCE" section.
5. Check operation of limit switches, locking mechanisms and all safety devices when equipped.
6. Check foundation mounting fasteners are secure.
7. Install drum guard when provided.

Load Test

Prior to initial use, all new or extensively repaired winches shall be load tested by or under the direction of a person trained in safety and operation of this winch and a written report furnished confirming the rating of winch. Test loads shall not be less than **100%** of rated line pull and should not exceed **125%** of rated line pull.

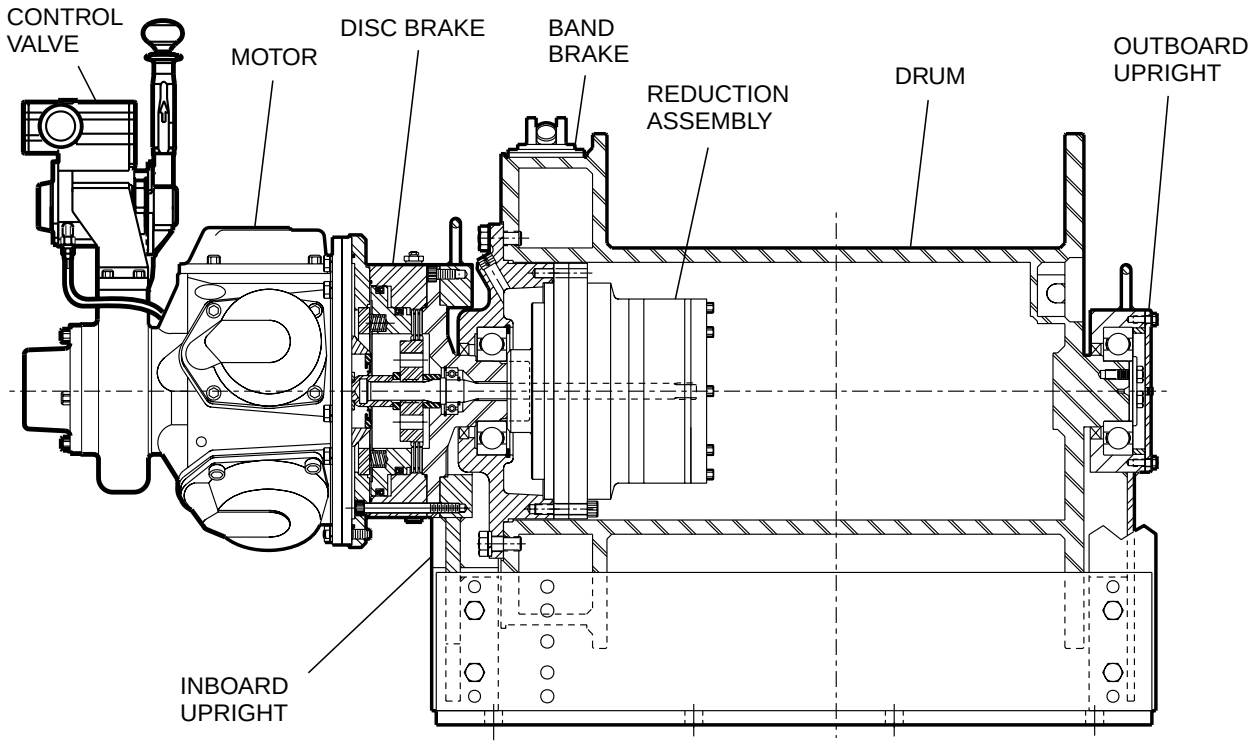
To test winch at **125%** of rated load apply the following load with wire rope on first layer of drum:

FA10 Winch (test load) 34,500 lb. (15,698 kg)

NOTICE

• Testing to more than 125% of rated line pull may be required to comply with standards and regulations set forth in areas outside of the USA.

WINCH ASSEMBLY DRAWING REFERENCE DIAGRAM

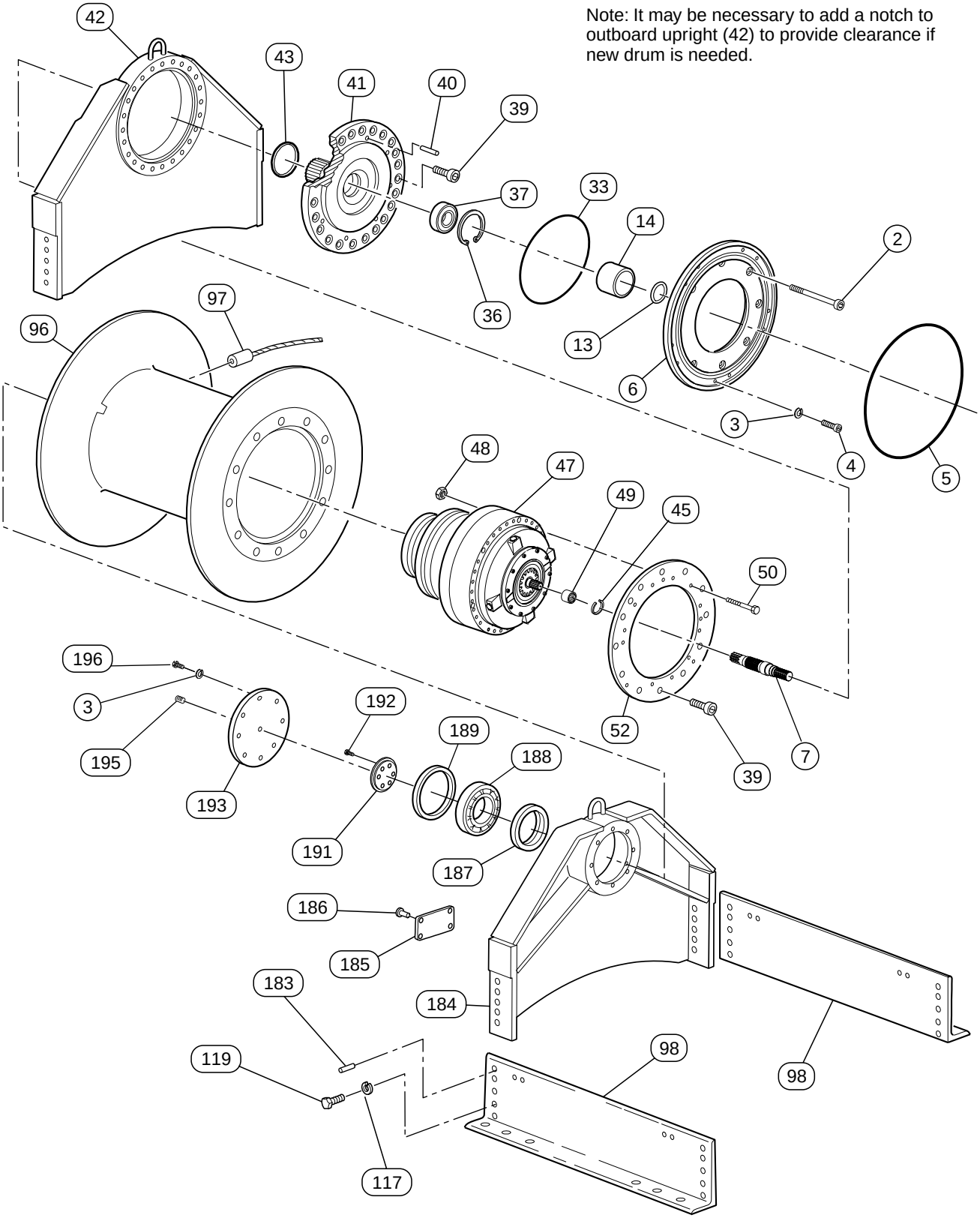


(Dwg. MHP1493)

WINCH PARTS LISTS TABLE OF CONTENTS

Description **Page No.**

DRUM, BASE AND REDUCTION GEAR ASSEMBLY DRAWING



(Dwg. MHP0930)

DRUM, BASE AND REDUCTION GEAR ASSEMBLY PARTS LIST

Item No.	Description of Part	Total Qty	Part Number	Item No.	Description of Part	Total Qty	Part Number
2	Capscrew (with disc brake)	8	71087100	52	Adapter †	1	28582
3	Lockwasher	18	50181	96	Drum	1	**
4	Capscrew	10	52379	97	Wire Rope Anchor - 3/4 inch	1	52000
• 5	'O' Ring	1	51459		Wire Rope Anchor - 7/8 inch		52308
6	Motor Adapter	1	14227		Wire Rope Anchor - 1 inch		52325
7	Input Shaft †	1	11595		Wire Rope Anchor - 1-1/8 inch		71087316
• 13	'O' Ring (Drive Shaft)	1	52537	98	Side Rail	**	**
14	Sleeve	1	11711	117	Lockwasher	8	51012
• 33	'O' Ring	1	51460	119	Capscrew	8	50902
36	Retainer Ring	1	52678	183	Dowel Pin	8	53770
• 37	Bearing	1	50998	184	Upright, Outboard †	1	11657
39	Capscrew	42	71323166	185	Nameplate	1	71106967-R
40	Pin, Dowel	5	51468	186	Screw, Drive	4	50915
41	Drum Shaft †	1	14167	• 187	Seal	1	52535
42	Upright, Inboard †	1	11658	188	Bearing	1	52534
43	'O' Ring	1	52536	189	Spacer	1	11613
45	Retainer Ring	1	52541	191	Shaft Retainer	1	11612
47	Reduction Gear Assembly	1	11626	192	Capscrew	6	50183
48	Nut	18	50812	193	End Cover	1	11614
49	Coupling †	1	11901	195	Plug	1	54292
50	Capscrew	18	53769	196	Capscrew	8	51086

• Recommended spare for one winch, 2 years of normal operation

** Refer to DRUM ASSEMBLY AND SIDE RAIL PARTS LIST

† These parts also come in a cold weather version. For winches with a – C in model code, adding CH (DNV) or CHA (ABS) to the end of these part numbers is required to retain winch certification. Example: Order Drive Shaft (item 41) part number 14167 as part number 14167CH or 14167CHA.

Drum for Winches with Serial Number A1140701 and Thereafter.

Drum (Item 96) With Band Brake	Total Qty	Part Number	Drum (Item 96) Without Band Brake	Total Qty	Part Number
Drum (16 inches (406 mm) long) †	1	28597-3	Drum (16 inches (406 mm) long) †	1	28596-3
Drum (20 inches (508 mm) long) †		28597-4	Drum (20 inches (508 mm) long) †		28596-4
Drum (24 inches (610 mm) long) †		28597-5	Drum (24 inches (610 mm) long) †		28596-5
Drum (30 inches (760 mm) long) †		28597-6	Drum (30 inches (760 mm) long) †		28596-6
Drum (34 inches (864 mm) long) †		28597-7	Drum (34 inches (864 mm) long) †		28596-7
Drum (36 inches (915 mm) long) †		28597-10	Drum (36 inches (915 mm) long) †		28596-10
Drum (40 inches (1016 mm) long) †		28597-8	Drum (40 inches (1016 mm) long) †		28596-8
Drum (50 inches (1270 mm) long) †		Contact Factory	Drum (50 inches (1270 mm) long) †		28596-9

Note: If a new drum is needed to replace an existing drum, winches with serial numbers prior to and including A0900601 will also have to order new adapter (52).

Side Rail Parts List

L H Side Rail (Item 98) With Band Brake	Total Qty	Part Number	R H Side Rail (Item 98) With Band Brake	Total Qty	Part Number
Drum (16 inches (406 mm) long) †	1	11988-3	Drum (16 inches (406 mm) long) †	1	11946-3
Drum (20 inches (508 mm) long) †		11988-4	Drum (20 inches (508 mm) long) †		11946-4
Drum (24 inches (610 mm) long) †		11988-5	Drum (24 inches (610 mm) long) †		11946-5
Drum (30 inches (760 mm) long) †		11988-6	Drum (30 inches (760 mm) long) †		11946-6
Drum (34 inches (864 mm) long) †		11988-7	Drum (34 inches (864 mm) long) †		11946-7
Drum (36 inches (915 mm) long) †		11988-10	Drum (36 inches (915 mm) long) †		11946-10
Drum (40 inches (1016 mm) long) †		11988-8	Drum (40 inches (1016 mm) long) †		11946-8
Drum (50 inches (1270 mm) long) †		11988-9	Drum (50 inches (1270 mm) long) †		**

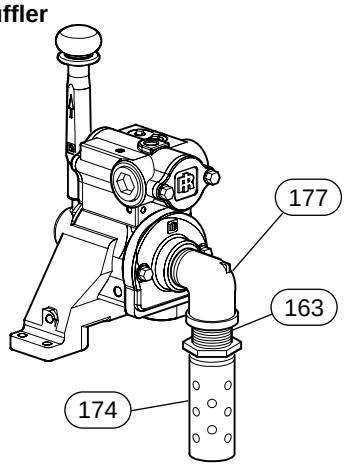
Side Rail (Item 98)) Without Band Brake	Total Qty	Part Number
Drum (20 inches (508 mm) long) †	2	11698-4
Drum (24 inches (610 mm) long) †		11698-5
Drum (30 inches (760 mm) long) †		11698-6
Drum (34 inches (864 mm) long) †		11698-7
Drum (36 inches (915 mm) long) †		11698-10
Drum (40 inches (1016 mm) long) †		11698-8
Drum (50 inches (1270 mm) long) †		11698-9

** Contact your nearest **Ingersoll-Rand** distributor or the factory for additional replacement part information.

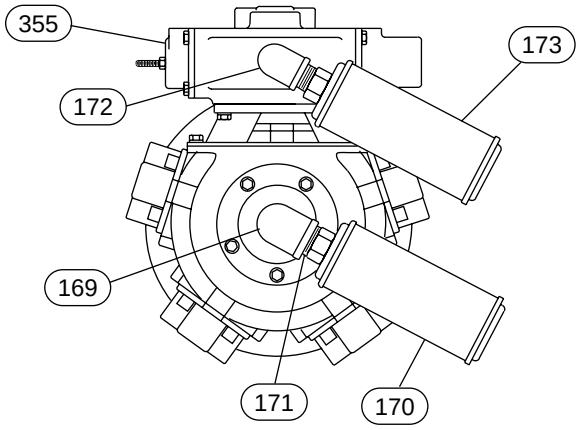
† These parts also come in a cold weather version. For winches with a – C in model code, adding CH (DNV) or CHA (ABS) to the end of these part numbers is required to retain winch certification. Example: Order Drive Shaft (item 41) part number 14167 as part number 14167CH or 14167CHA.

MUFFLER ASSEMBLY DRAWINGS AND PARTS LIST

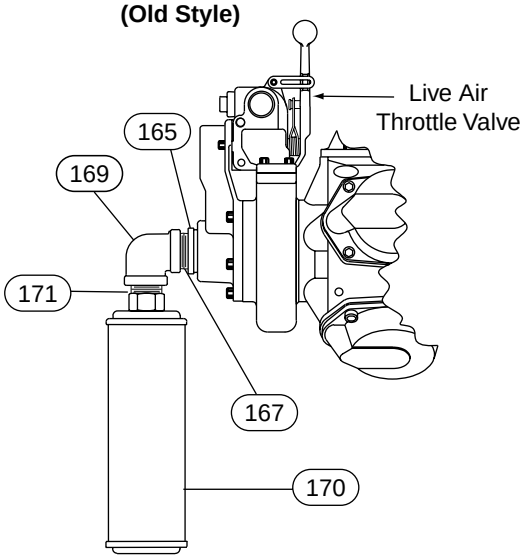
K5C2 Control Valve Muffler



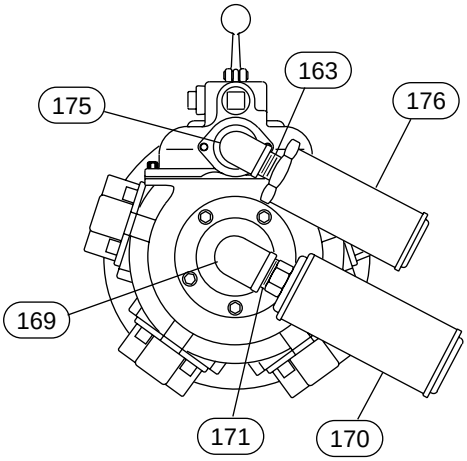
K5B Motor Mufflers with Remote Actuated Pilot Control Valve



K5B Motor Muffler and K5B Control Valve with Long Exhaust Manifold (Old Style)



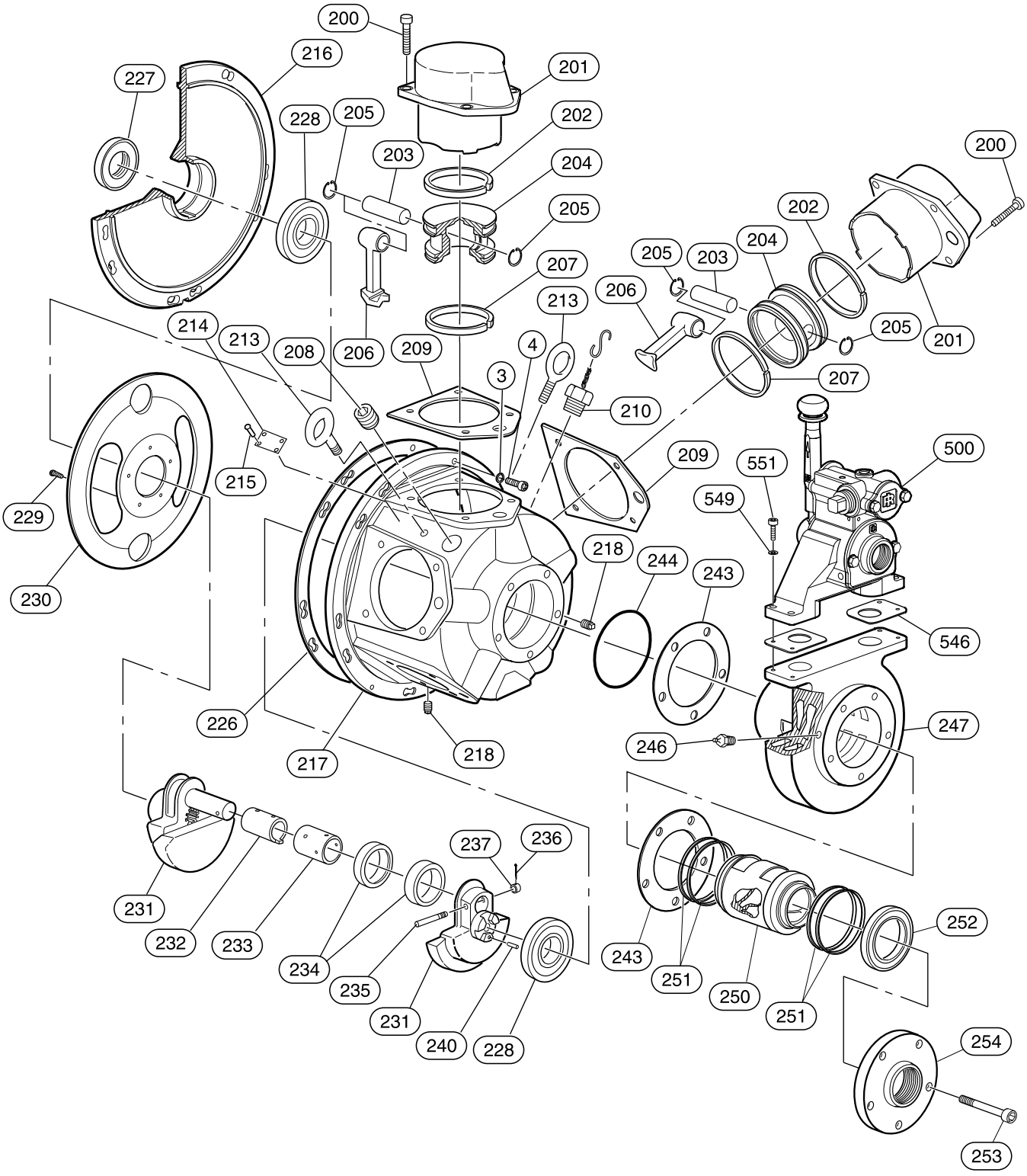
K5B Motor Muffler with Round Exhaust Manifold K5B Control Valve with Muffler



(Dwg. MHP2038)

Item No.	Description of Part	Total Qty	Part Number
163	Pipe Nipple	1	71057483
165	Reducer Bushing	1	71057459
167	Pipe Nipple	1	71057467
169	Pipe Elbow	1	71057434
170	Muffler	1	50594
171	Pipe Nipple	1	51704
172	Pipe Elbow	1	71127484
173	Muffler	1	52465
174	Muffler	1	52472
175	Pipe Elbow	1	54513
176	Muffler	1	71264360
177	Pipe Elbow	1	71273676
355	Valve Assembly	1	20993

K5B MOTOR ASSEMBLY DRAWING



(Dwg. MHP1007)

K5B MOTOR ASSEMBLY PARTS LIST

Item No.	Description of Part	Total Qty	Part Number	Item No.	Description of Part	Total Qty	Part Number
199	Motor Assembly**	1	K5B-550	231	Crank Assembly	1	K5B-A516
3	Lockwasher	10	50181	232	Sleeve	1	K5B-519
4	Capscrew	10	52379	233	Bushing	1	K5B-511
200	Capscrew	20	52317	234	Connecting Rod Ring	2	K5B-510
201	Cylinder	5	K5B-505	235	Lock Pin	1	HU-K520
202	Compression Ring	1 Set	K5B550-KRING	236	Cotter Pin	1	53456
203	Wrist Pin	5	HU-514A	237	Pin Nut	1	D02-394
204	Piston*	5	*	240	Roll Pin	1	54257
205	Retainer Ring	10	902A45-632	243	Gasket	2	K5B-928
206	Connecting Rod	5	K5B-509	244	'O' Ring	1	20A11CM248
207	Oil Ring	1 Set	K5B550-KRING	246	Grease Fitting	1	53095
208	Plug	1	71263297	247	Rotary Valve Housing	1	K5B-545
209	Head Gasket	1 Set	K5B-507-5	250	Rotary Valve	1	K5B-526EQ-RS
210	Vent Cap Assembly	1	26604	251	Seal Ring	1 Pack	K5B-607A
213	Eye Bolt	2	KU-888	252	Bearing	1	50138
214	Nameplate	1	K5B-301	253	Capscrew	5	51471
215	Drive Screw	1 Pack	R4K-302-12	254	Exhaust Flange	1	K5B-276M
216	Mounting Flange	1	K5B-502	500	Valve Assy. (New Style)	1	K5C2
217	Motor Housing	1	K5B-501A		Valve Assy. (Old Style)		Not Available order K5C2
218	Pipe Plug	2	54912				
226	Gasket	1	K5B-592-1	546	Gasket	1 Set	27115
227	Oil Seal	1	51873	549	Lockwasher	4	71376370
228	Crank Bearing	2	51066	551	Capscrew	4	71369276
229	Button Head Screw	5	K5B-541				
230	Oil Slinger	1	K5B-540				

* Parts not sold separately. Refer to the "K5B Motor Assembly Kit List."
** Motor Assembly consists of items 3, 4, 200 through 260, and 546.

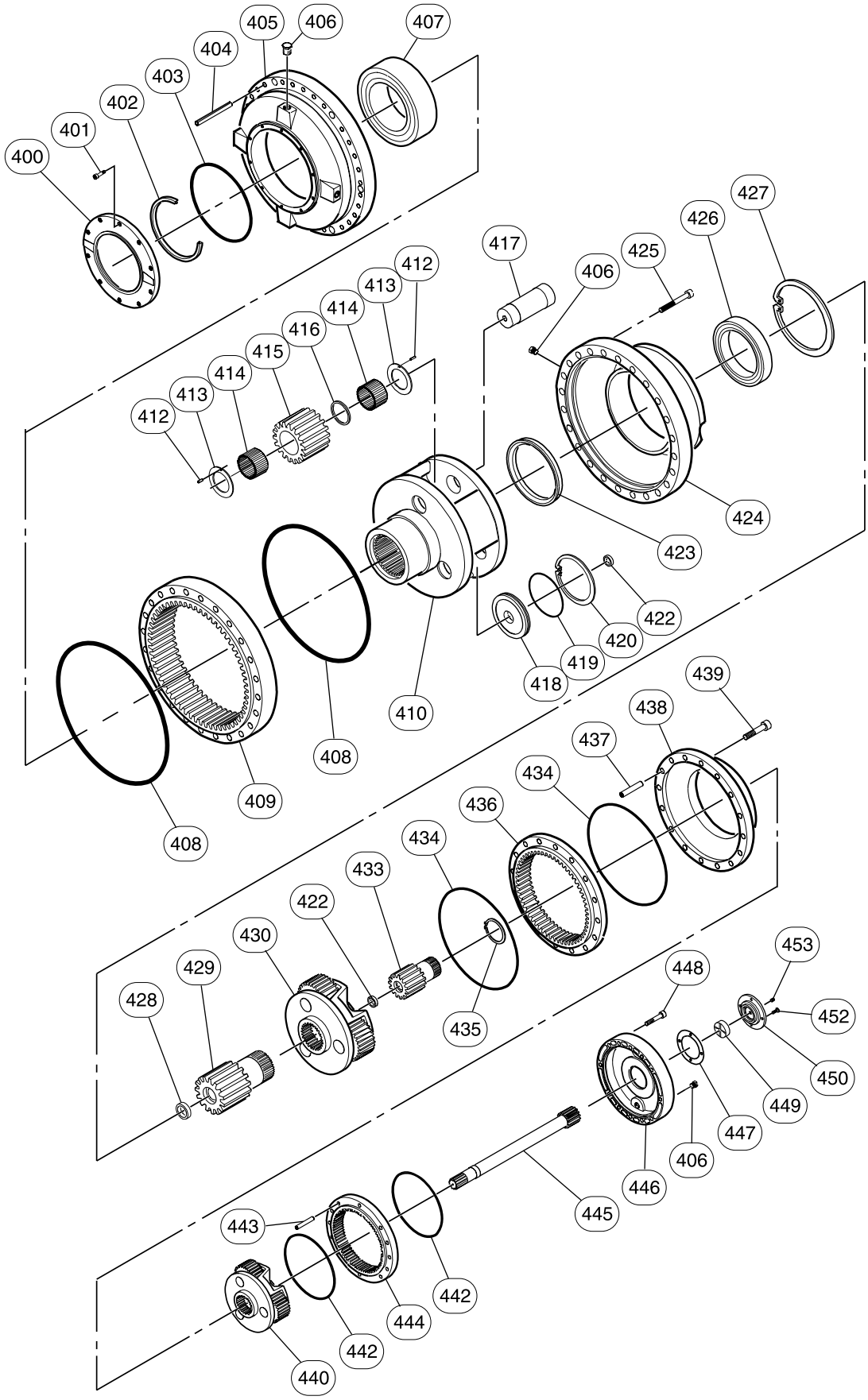
K5B Motor Assembly Kit List:

Item No.	Description of Part	Total Qty	Part Number
• ---	Motor Gasket Kit (includes items 202, 207, 209, 226, 243, 244, 248 and 317)	1	26823
231	Crank Assembly (includes items 206 and 228 through 237)	1	K5B-A516
250	Rotary Valve Assembly (includes items 243, 251 and 252)	1	K5B-526EQ-RS
261	Piston Assembly (includes items 202 through 205 and item 207)	1	K5B-A513-50

• Recommended spare for one winch, 2 years of normal operation

Note: Kit number K5B550-KRING consists of (5) Compression Rings item 202 and (5) Oil Rings item 207.

REDUCTION GEAR ASSEMBLY DRAWING



(Dwg. MHP0875)

REDUCTION GEAR ASSEMBLY PARTS LIST

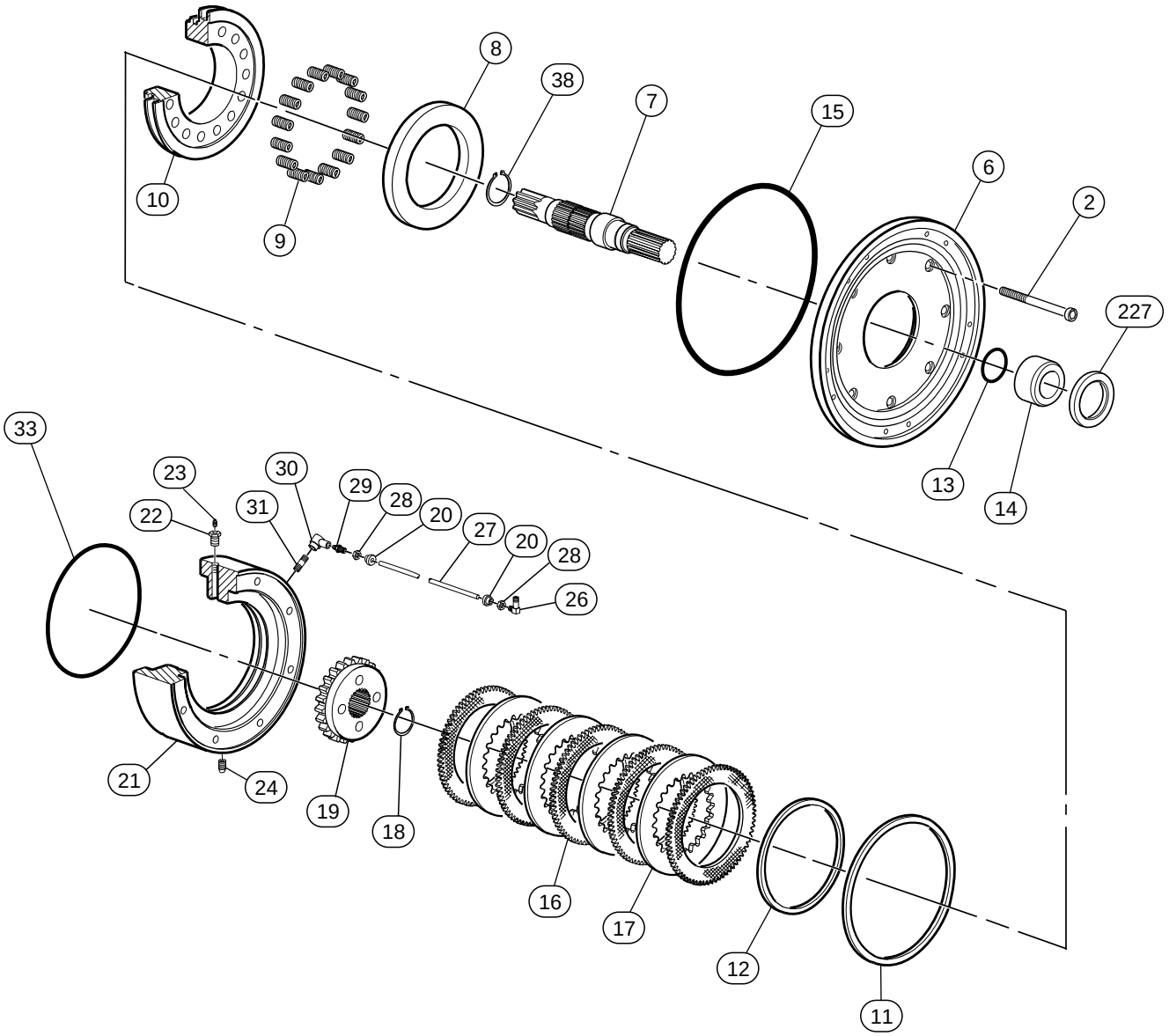
Item No.	Description of Part	Total Qty	Part Number
47	Reduction Gear Assembly (includes items 400 through 453)	1	11626
400	Seal Support	1	154-1773
401	Capscrew	5	154-2522
402	Oil Seal	1	71308175
403	'O' Ring	1	71308183
404	Spring Pin	3	154B2240
405	Support*	1	Order Item 47
406	Plug	15	71068571
407	Bearing*	1	Order Item 47
408	'O' Ring	2	71308209
409	Ring Gear*	1	Order Item 47
410	Planetary Support*	1	
412	Spring Pin*	6	
413	Thrust Bearing*	6	
414	Roller Bearings*	240	
415	Planet Gears*	3	
416	Roller Spacer*	3	
417	Planet Gear Shaft*	3	
418	Spacer*	1	
419	'O' Ring	1	71308217
420	Retainer Ring*	1	Order Item 47
422	Spacer*	2	
423	Spacer*	1	
424	Input Housing*	1	
425	Capscrew	3	154B2235
426	Cylinder Roller Bearing *	1	Order Item 47
427	Retainer Ring	1	71308241
428	Spacer*	1	Order Item 47
429	Sun Gear*	1	
430	Planetary Assembly*	1	
433	Sun Gear*	1	
434	'O' Ring	2	71106728
435	Retainer Ring	1	71068597
436	Ring Gear*	1	Order Item 47
437	Spring Pin	3	71106710
438	Input Housing*	1	Order Item 47
439	Capscrew*	12	
440	Planetary Assembly*	1	
442	'O' Ring	2	52149
443	Spring Pin	4	71068472
444	Ring Gear*	1	Order Item 47
445	Shaft*	1	
446	End Cover*	1	
447	Gasket	1	71308225
448	Capscrew	8	154-2528
449	Thrust Plate	1	154-1711
450	Front Cover	1	154-1802
452	Capscrew	4	154-2576
453	Adjusting Screw	1	154-2601

* Parts not sold separately.

Kit Description

Item No.	Description of Part	Total Qty	Part Number
---	'O' Ring Repair Kit (includes items 408, 419, 434 and 442)	1	27353

DISC BRAKE ASSEMBLY DRAWING



(Dwg. MHP0873)

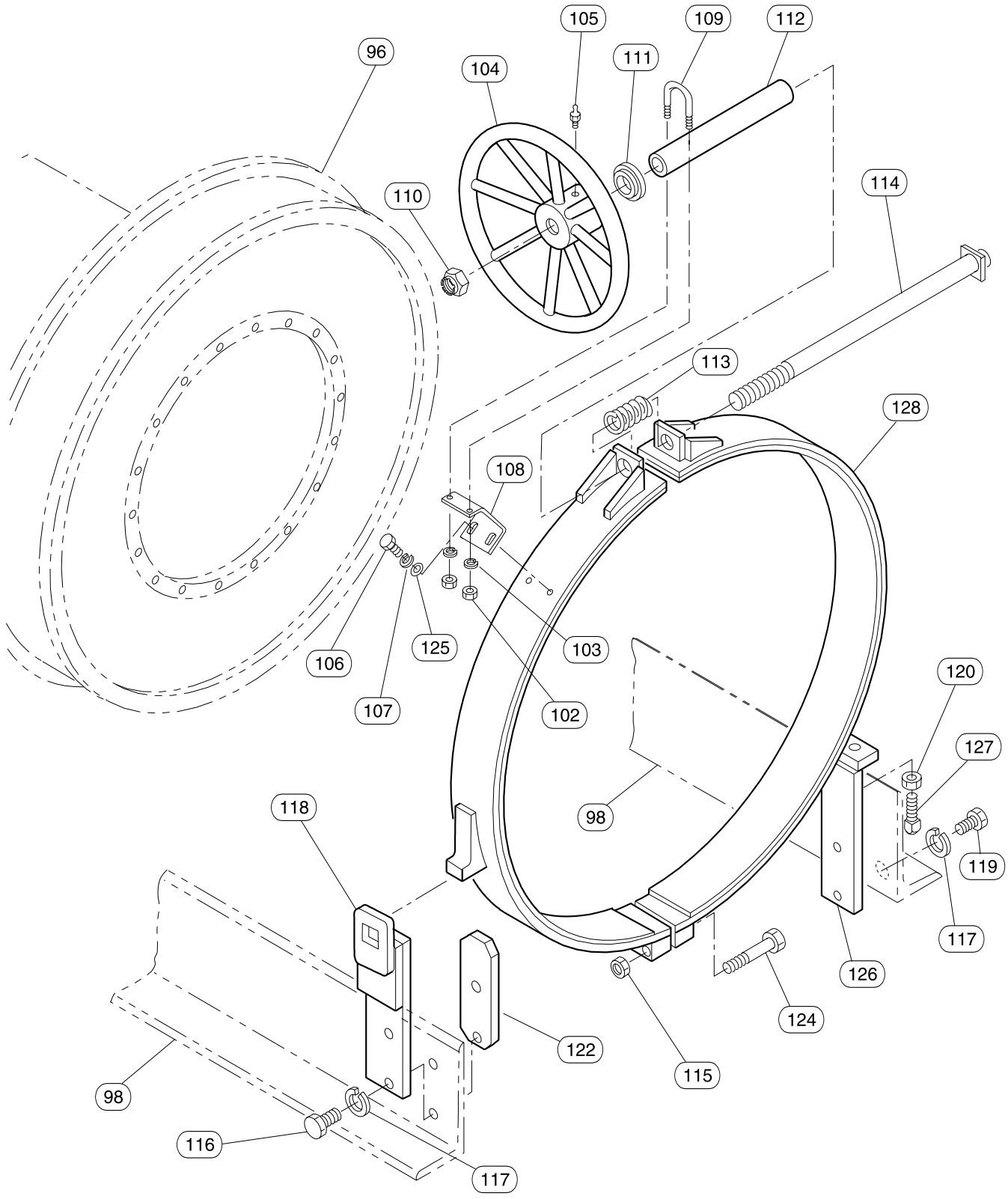
DISC BRAKE ASSEMBLY PARTS LIST

Item No.	Description of Part	Total Qty	Part Number
1	Disc Brake Assembly (includes items, 1, 7 through 12, and 15 through 31)	1	11708
2	Capscrew (with Disc Brake)	8	71087100
6	Motor Adapter	1	14227
7	Input Shaft (with Disc Brake) †	1	11595
8	Brake Reaction Plate	1	10597
9	Spring	15	50751
10	Brake Piston	1	15437
• 11	Seal	1	51461
• 12	Seal	1	51462
• 13	'O' Ring	1	52537
14	Seal Sleeve	1	11711
• 15	'O' Ring	1	51458
16	Friction Plate	5	50772
17	Drive Plate	4	50773
18	Retainer Ring	1	51761
19	Splined Hub	1	11594
20	Fitting, Sleeve	2	55014
21	Brake Housing	1	11593
22	Fitting, Reducer Bushing	1	51803
23	Breather	1	51857
24	Pipe Plug	1	50801
26	Fitting, Hose	1	71149975
27	Tubing	1	52520
28	Fitting, Nut	2	55013
29	Fitting, Vented	1	20770
30	Dump Valve	1	50276
31	Fitting, Nipple	1	50859
• 33	'O' Ring	1	51460
38	Retainer Ring	1	51192
• 227	Oil Seal	1	51873

• Recommended spare for one winch, 2 years of normal operation.

† These parts also come in a cold weather version. For winches with a – C in model code. adding CH (DNV) or CHA (ABS) to the end of these part numbers is required to retain winch certification. Example: Input Shaft (item 7) part number 11595 as part number 11595CH or 11595CHA.

MANUAL BAND BRAKE ASSEMBLY DRAWING (OPTIONAL FEATURE)



(Dwg. MHP0627)

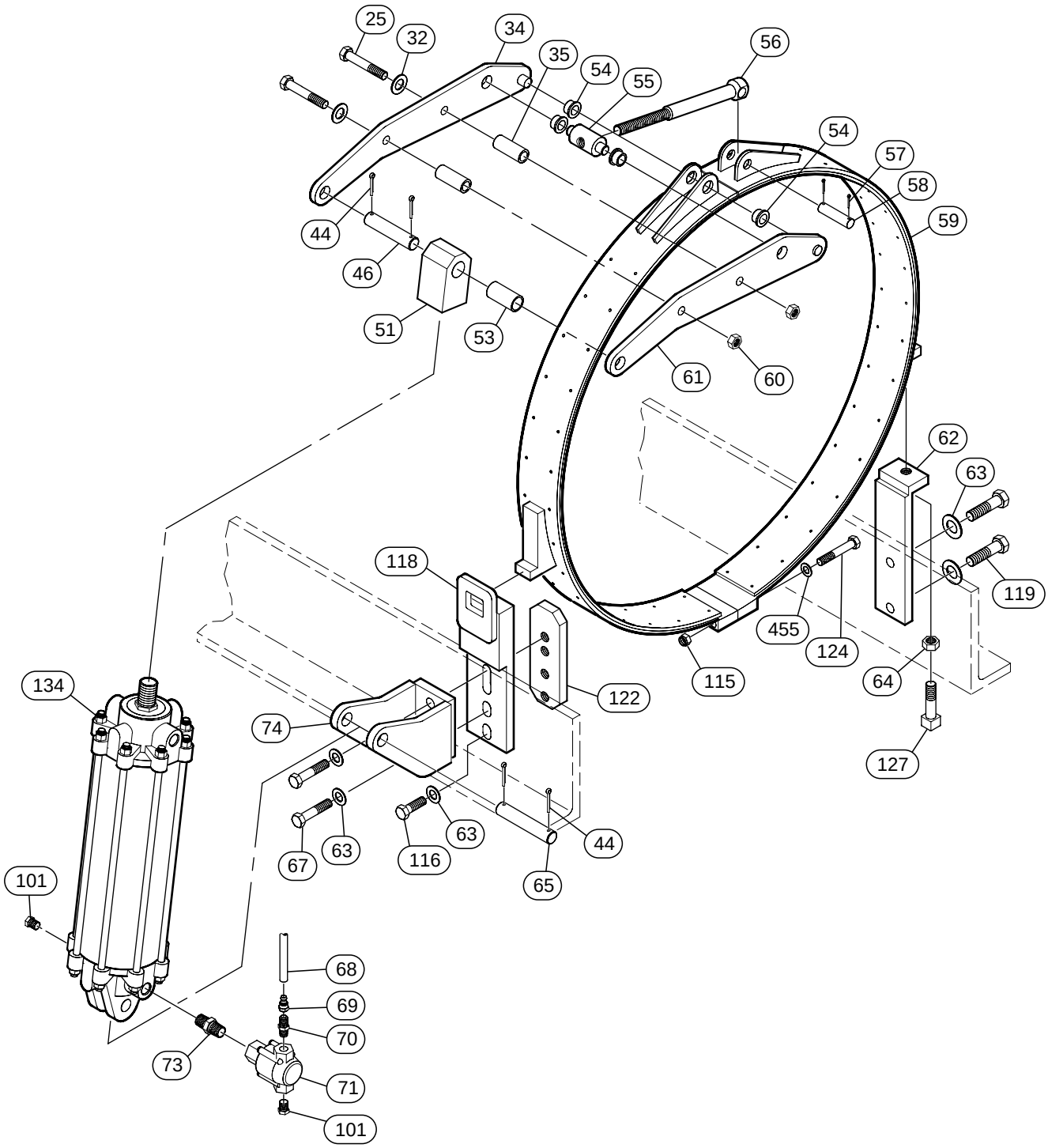
MANUAL BAND BRAKE ASSEMBLY PARTS LIST (OPTIONAL FEATURE)

Item No.	Description of Part	Total Qty	Part Number
96	Drum (for use with brake band)	1	Refer to Drum Assembly and Side Rail Parts List
98	Side Rail	2	
100	Manual Band Brake Assembly (includes items 104 through 128)	1	12205
102	Nut	2	Order item 109, ‘U’ Bolt
103	Lockwasher	2	Order item 109, ‘U’ Bolt
104	Handwheel	1	12183
105	Grease Fitting	1	51469
106	Capscrew	2	50853
107	Lockwasher	2	50200
108	Bracket	1	12203
109	‘U’ Bolt (includes items 102 and 103)	1	52701
110	Nut	1	51775
111	Bearing	1	52707
112	Tube	1	12204
113	Spring	1	52717
114	Brake Screw	1	12182
115	Nut	4	51750
116	Capscrew	2	54221
117	Lockwasher	4	51012
118	Anchor	1	12096
119	Capscrew	2	50902
120	Nut	1	50205
122	Plate	1	12084
124	Capscrew	4	54896
125	Washer	2	50177
126	Support	1	12094
127	Adjustment Screw	1	54424
• 128	Brake Band †	1 set	12083

• Recommended spare for one winch, 2 years of normal operation.

† These parts also come in a cold weather version. For winches with a – C in model code. adding CH (DNV) or CHA (ABS) to the end of these part numbers is required to retain winch certification. Example: Order Brake Band (item 128) part number 12083 as part number 12083CH or 12083CHA.

AUTOMATIC BAND BRAKE ASSEMBLY DRAWING (OPTIONAL FEATURE)



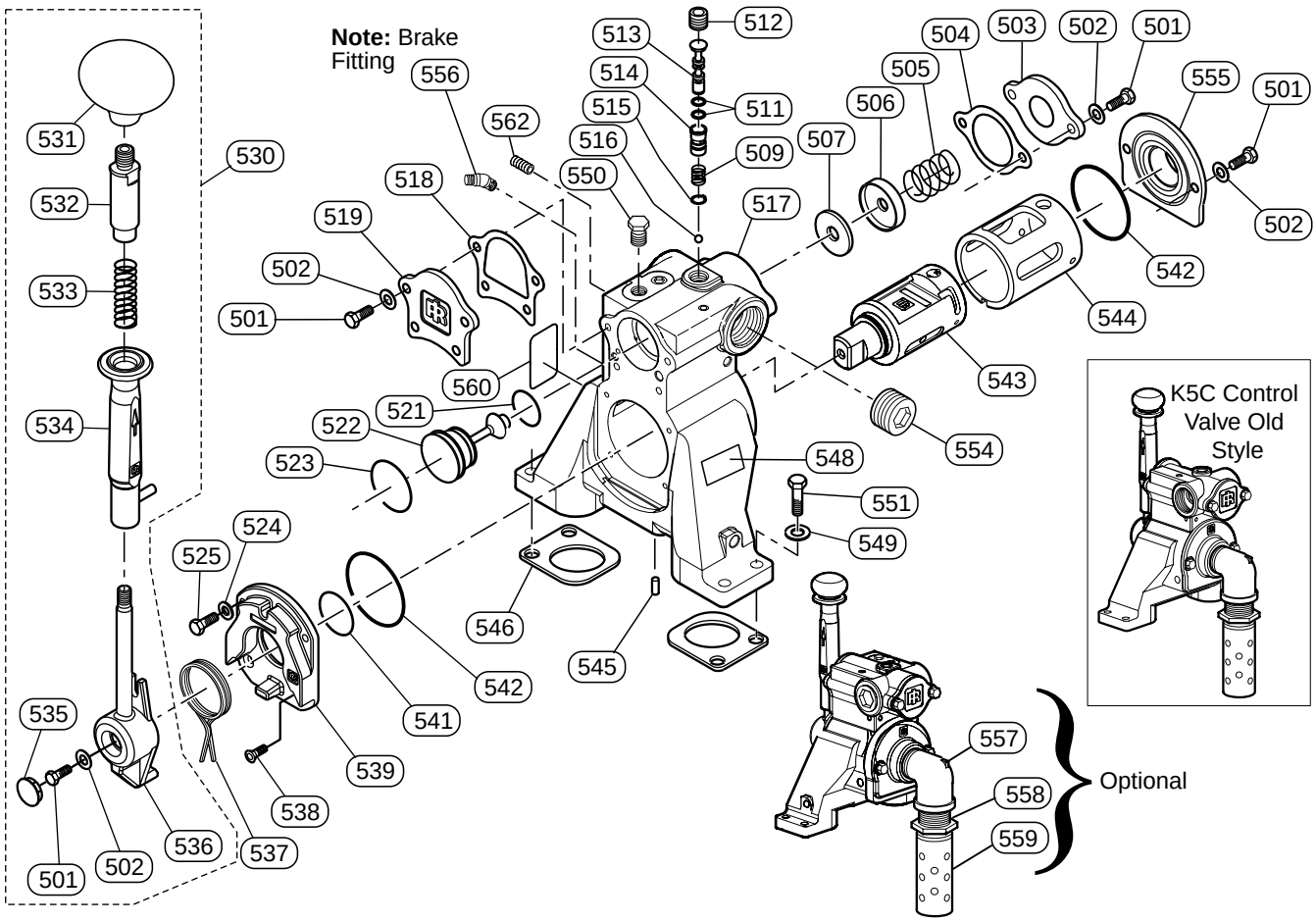
(Dwg. MHP2329)

AUTOMATIC BAND BRAKE ASSEMBLY PARTS LIST (OPTIONAL FEATURE)

Item No.	Description of Part	Total Qty	Part Number	Item No.	Description of Part	Total Qty	Part Number
139	Brake Band Assembly	1	28640	64	Jam Nut	1	50159
25	Capscrew	2	50912	65	Pin	1	28689
32	Washer	2	71293005	67	Capscrew	2	51010
34	Lever Arm, Left Side	1	28647	68	Hose	1	53245
35	Spacer	2	28654	69	Fitting	2	53954
44	Cotter Pin	4	50965	70	Fitting, Nipple	2	71009385
46	Pin	1	28688	71	Exhaust Valve	1	EV30-A
51	Clevis	1	28676	73	Fitting, Nipple	1	54913
53	Bushing	1	71393128	74	Bracket	1	28675
54	Bushing	4	71392203	101	Breather	2	71385611
55	Pivot Nut	1	28644	115	Locknut	4	51750
56	Link Stud	1	28643	116	Capscrew	1	54221
57	Cotter Pin	2	50957	118	Anchor	1	12096
58	Pin	1	28655	119	Capscrew	2	50902
• 59	Brake Band	1 Set	28641	122	Plate	1	12084
60	Nut	2	54661	124	Capscrew	4	54896
61	Lever Arm, Right Side	1	28648	127	Adjustment Screw	1	54424
62	Support	1	12094	134	Cylinder	1	71393151
63	Washer	5	52288	455	Washer	4	50182

• Recommend spare for one winch, two years of normal service.

K5C2 CONTROL VALVE ASSEMBLY DRAWING (NEW STYLE)



(Dwg. MHP2054)

K5C2 and K5C2-E Control Valve Service Kits

Item No.	Kit Description	Total Qty	Part Number
---	Seal Bracket Kit (includes items 524, 525, 538, 539, 541 and 542)	1	28733-S
---	Pilot Shaft Kit (includes items 509, 511, 513 and 515)	1	28696
---	Piston Kit (includes items 506, 507, 521-523)	1	28735-S
• 780	K5C2 Control Valve Service Kit (includes items 904, 907, 911, 915, 918, 921, 923, 941, 942 and 946)	1	27240
782	Handle Assembly Kit (includes items 901, 902, 931 through 936)	1	27239
784	Reverse Valve Kit (includes items 943 and 956)	1	27925-SX
• 786	Overload Valve Service Kit (includes items 701, 703, 712 through 714, 716, 722 and 942)	1	27995-X
• 788	Emergency Stop Service Kit (includes items 703 and 711)	1	27994-X
789	Emergency Stop Kit (Optional Feature)*	1	28026

• Recommend spare for one winch, two years of normal service.

* Kits can be installed to new style control valve. Refer to Dwg. MHP2054 on page 52.

K5C2 CONTROL VALVE ASSEMBLY PARTS LIST (NEW STYLE)

Item No.	Description of Part	Total Qty	Part Number	Item No.	Description of Part	Total Qty	Part Number
500	Control Valve Assembly	1	K5C2	535	Plug	1	71348965
501	Capscrew	9	71342034	536	Valve, Hub	1	Order Item 530
502	Washer	9	71303408	537	Spring	1	26966
503	Cover, Poppet	1	26997	538	Capscrew	2	71394407
504	Gasket, Poppet	1	27064	539	Seal Bracket	1	28733-S
505	Spring, Poppet	1	71351068	541	‘O’ Ring	1	71357198
506	Cap, Poppet	1	28734	542	‘O’ Ring	2	51651
507	Seal, Poppet	1	26991	543	Reverse Valve (Normal)**	1	27925-SX
509	Spring, Pilot Rod	1	71351076		Reverse Valve (Reverse Bias)**		28002
511	‘O’ Ring	2	28696		Reverse Valve (Unbiased)**		27707
512	Plug	1	71267561	544	Bushing (Normal)***	1	26686
513	Pilot Shaft	1	28696		Bushing (Reverse Bias)***		27450
514	Seat, Pilot	1	28696		Bushing (Unbiased)***		27706
515	Retainer Ring	1	28696	545	Pin	1	71146674
516	Ball	1	71127575	546	Gasket	2	27115
517	Valve Housing	1	*	548	Label, Throttle Direction	1	71352777
518	Gasket, Cover	1	26999	549	Washer	4	71376370
519	Cover, Piston	1	26998	551	Capscrew	4	71369276
521	‘O’ Ring	1	52537	554	Plug	1	71263297
522	Piston	1	28735-S	555	Exhaust Flange	1	26691
523	‘O’ Ring	1	71355796	556	Fitting	1	71367932
524	Washer	2	71271985	557	Fitting, Elbow	1	71273676
525	Capscrew	2	71348338	558	Fitting, Nipple	1	71057483
530	Handle Assembly (includes 501, 502, 531 through 536)	1	27239	559	Muffler	1	52472
				560	Label, Warning	1	71373229
531	Knob	1	71348353	562	Plug	1	28628
532	Handle Post	1	26951	563	Tag †	1	71392757
533	Spring	1	71348346	564	Rivets †	2	71028849
534	Handle, Slide	1	Order item 530				

* Not sold separately, order item 500.

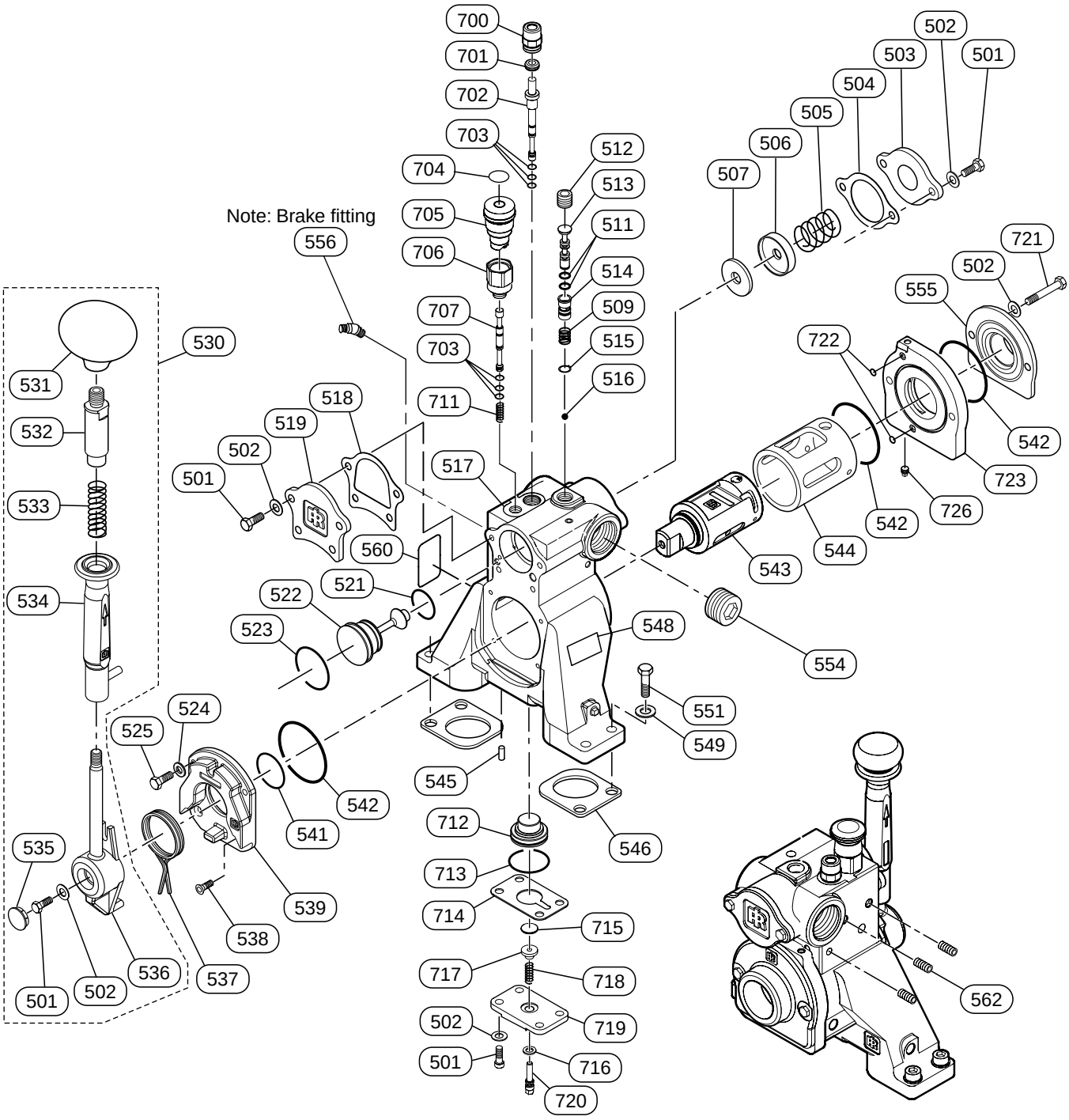
** Reverse Valve (Normal) for Standard Overwound operation. Reverse Valve (Reverse Bias) for Optional Underwound operation. Reverse Valve (Unbiased) contact factory for application.

*** Ensure Bushing matches Reverse Valve (Reverse Valve (Normal) and Bushing (Normal)). Mixing these components can result in erratic winch operation.

† Item not illustrated.

NOTE: For service kit descriptions and additional information refer to table on page 52.

EMERGENCY STOP AND OVERLOAD K5C2-E VALVE ASSEMBLY DRAWING



(Dwg. MHP2163)

EMERGENCY STOP AND OVERLOAD K5C2-E VALVE PARTS LIST

Item No.	Description of Part	Total Qty	Part Number
500	Control Valve Assembly	1	K5C2-E
501	Capscrew	11	71342034
502	Washer	13	71303408
503	Cover, Poppet	1	26997
504	Gasket, Poppet	1	27064
505	Spring, Poppet	1	71351068
506	Cap, Poppet	1	28734
507	Seal, Poppet	1	26991
509	Spring, Pilot Rod	1	71351076
511	'O' Ring	2	28696
512	Plug	1	71267561
513	Pilot Shaft	1	28696
514	Seat, Pilot	1	28696
515	Retainer Ring	1	28696
516	Ball	1	71127575
517	Valve Housing	1	*
518	Gasket, Cover	1	26999
519	Cover, Piston	1	26998
521	'O' Ring	1	52537
522	Piston	1	28735-S
523	'O' Ring	1	71355796
524	Washer	2	71271985
525	Capscrew	2	71348338
530	Handle Assembly (includes 501, 502, 531 through 536)	1	27239
531	Knob	1	71348353
532	Handle Post	1	26951
533	Spring	1	71348346
534	Handle, Slide	1	Order Item 530
535	Plug	1	71348965
536	Valve, Hub	1	Order Item 530
537	Spring	1	26966
538	Capscrew	2	71394407
539	Seal Bracket	1	28733-S
541	'O' Ring	1	71357198
542	'O' Ring	3	51651
543	Reverse Valve (Normal)**	1	27925-SX
	Reverse Valve (Reverse Bias)**		28002
	Reverse Valve (Unbiased)**		27707
544	Bushing (Normal)***	1	26686
	Bushing (Reverse Bias)***		27450
	Bushing (Unbiased)***		27706

Item No.	Description of Part	Total Qty	Part Number
545	Pin	1	71146674
546	Gasket	2	27115
548	Label, Throttle Direction	1	71352777
549	Washer	4	71376370
551	Capscrew	4	71369276
554	Plug	1	71263297
555	Exhaust Flange	1	26691
556	Fitting	1	71367932
557	Fitting, Elbow (refer to Dwg. MHP2054)	1	71273676
558	Fitting, Nipple (refer to Dwg. MHP2054)	1	71057483
559	Muffler (refer to Dwg.MHP2054)	1	52472
560	Label, Warning	1	71373229
562	Plug	3	28628
563	Tag †	1	71392757
564	Rivets †	2	71028849
700	Cap	1	27491
701	Grommet	1	71365779
702	Plunger	1	27490
703	'O' Ring	6	71127039
704	Label, Stop	1	95790099
705	Button, E-Stop	1	71372601
706	Adapter	1	27488
707	Plunger	1	27489
711	Spring	1	71365787
712	Piston	1	27964
713	'O' Ring	1	51768
714	Gasket	1	27493
715	Plate	1	27624
716	'O' Ring	1	71365795
717	Adjustment Nut	1	24374
718	Spring	1	71053730
719	Cover	1	27494
720	Screw, Adjusting	1	27571
721	Capscrew	2	71365811
722	'O' Ring	2	71138135
723	Adapter, Exhaust	1	27540
726	Plug	1	27945

* Not sold separately, order item 500.

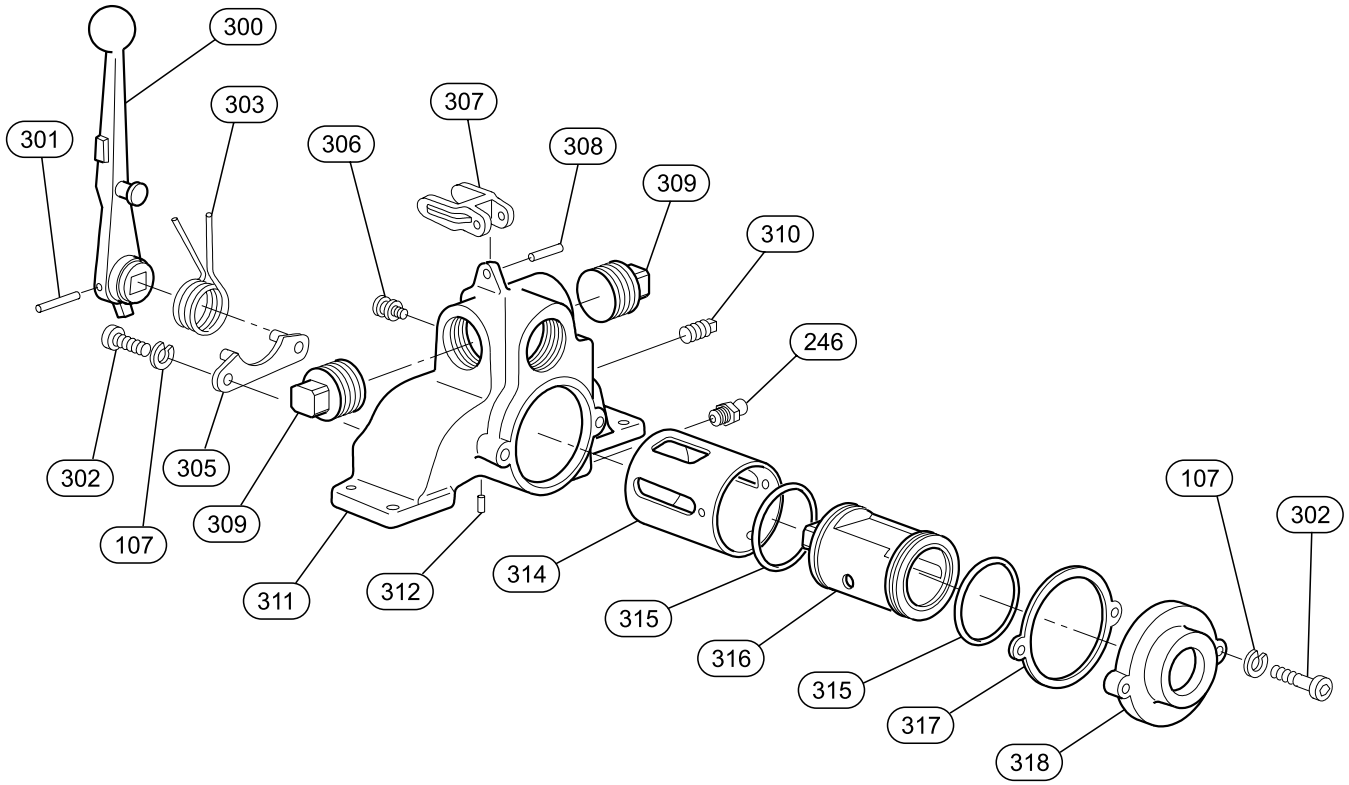
** Reverse Valve (Normal) for Standard Overwound operation. Reverse Valve (Reverse Bias) for Optional Underwound operation. Reverse Valve (Unbiased) contact factory for application.

*** Ensure Bushing matches Reverse Valve (Reverse Valve (Normal) and Bushing (Normal)). Mixing these components can result in erratic winch operation.

† Item not illustrated.

Note: For service kit descriptions and additional information refer to table on page 52.

CONTROL VALVE ASSEMBLY DRAWING AND PARTS LIST (OLD STYLE)



(Dwg. MHP2061)

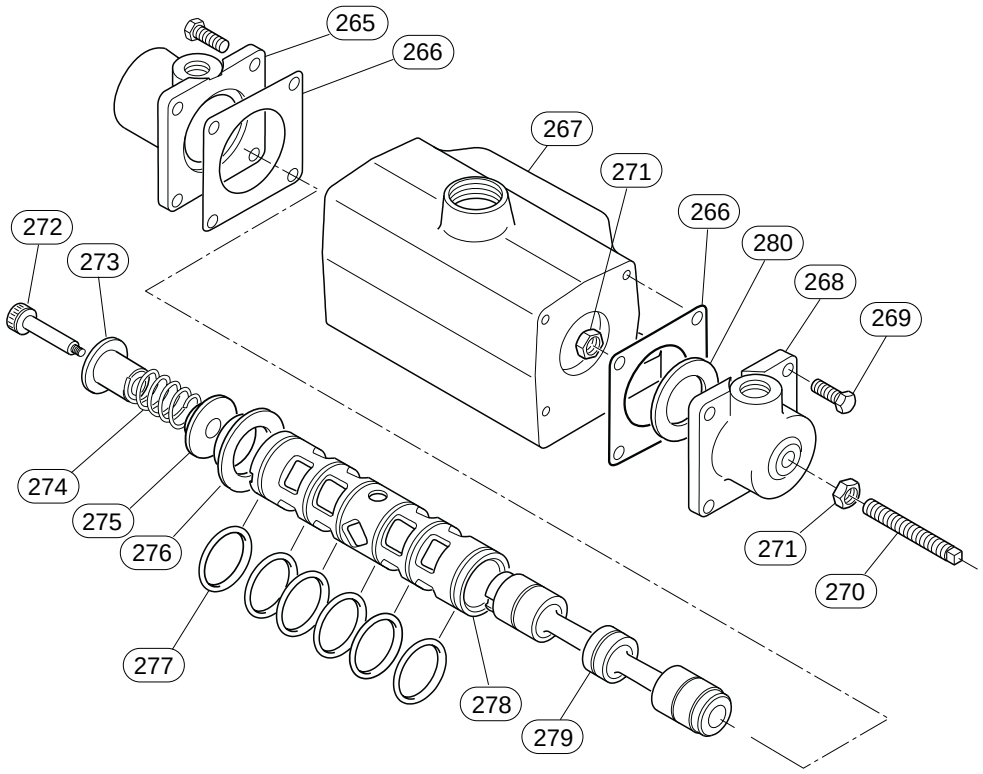
Item No.	Description of Part	Total Qty	Part Number
260	Valve Assembly (includes items107, 246, 300 through 318)	1	K5B-REMOTE
107	Lockwasher	4	50200
246	Grease Fitting	1	53095
300	Handle	1	K5B-556
301	Roll Pin	1	K5B-1115
302	Capscrew	4	71326110
• 303	Spring	1	K5B-412
305	Valve Retainer	1	K5B-1110A
306	Spring Retainer	1	K5B-553
307	Latch	1	K5B-869A
308	Roll Pin	1	HLK-20

Item No.	Description of Part	Total Qty	Part Number
309	Pipe Plug	2	E5UD-947
310	Pipe Plug	1	50822
311	Valve Housing (matched set with items 312 and 314)	1	K5B-1101
312	Roll Pin	1	25A13C92
314	Valve Bushing (matched set with item 311)	1	K5B-1101 *
• 315	Seal Ring	2	K5B-606
316	Valve Body	1	K5B-944
317	Gasket	1	K5B-275
318	Flange	1	KK5B-276S

• Recommended spare for one winch, 2 years of normal operation

* Order Valve Housing item 311

PILOT AIR CONTROL VALVE (OPTIONAL) ASSEMBLY DRAWING AND PARTS LIST



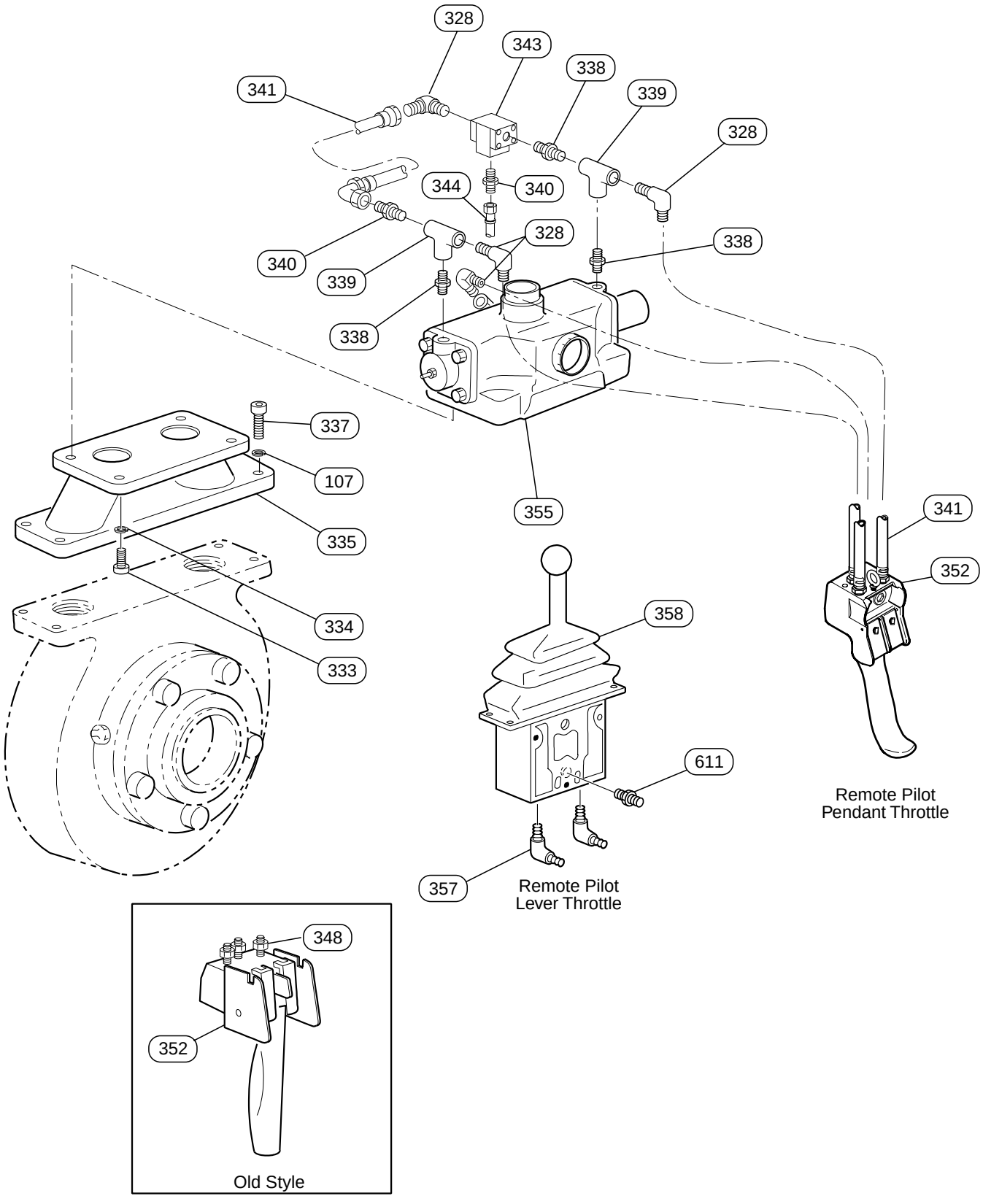
(Dwg. MHP0141)

Item No.	Description of Part	Total Qty	Part Number
			510 size
355	Valve Assembly (includes items 265 through 279)	1	20993
265	End Cap	1	71136725
266	Gasket	2	71136733
267	Valve Body	1	Not sold separately, order item 355
268	End Cap Assembly (includes items 270 and 271)	1	25591
269	Capscrew	8	71030118
270	Adjusting Screw	1	53545
271	Nut	2	50176
272	Shoulder Screw	1	54710
273	Guide	1	71136741
274	Spring	1	71136758
275	Washer	1	71136774
276	Spacer	1	71136766
277	'O' Ring	6	71136782
278	Valve Sleeve	1	Not sold separately, order item 355
279	Valve Spool	1	Not sold separately, order item 355
280	Washer	1	71332324

Kit Description		Part Number
• - - -	Pilot Air Control Valve Service Kit - Includes items 266 (Qty 2) and 277 (Qty 6)	71356406

• Recommended spare for one winch, 2 years of normal operation.

REMOTE PILOT AIR CONTROL (OPTIONAL) ASSEMBLY DRAWINGS



(Dwg. MHP2065)

REMOTE PILOT AIR CONTROL (OPTIONAL) ASSEMBLY PARTS LISTS

Remote Pilot Pendant Throttle Control

Item No.	Description of Part	Total Qty	Part Number
107	Lockwasher	4	50200
325	Fitting, Hose End	As Req'd	51029
326	Hose (bulk)	As Req'd	50923
328	Elbow Fitting	4	52182
333	Capscrew	4	54681
334	Lockwasher	4	50893
335	Manifold	1	13881
337	Capscrew	4	51780
338	Fitting, Nipple	3	54274
339	Fitting, Pipe Tee	2	54678
340	Fitting, Adapter	2	51814
341	Hose Assembly	1	17073-6
• 343	Shuttle Valve	1	50277
344	Hose Assembly (Brake)	1	17073-10
352	Control Pendant	1	PHS2E
355	Valve Assembly	1	20993
611	Fitting, Adapter	As Req'd	52092

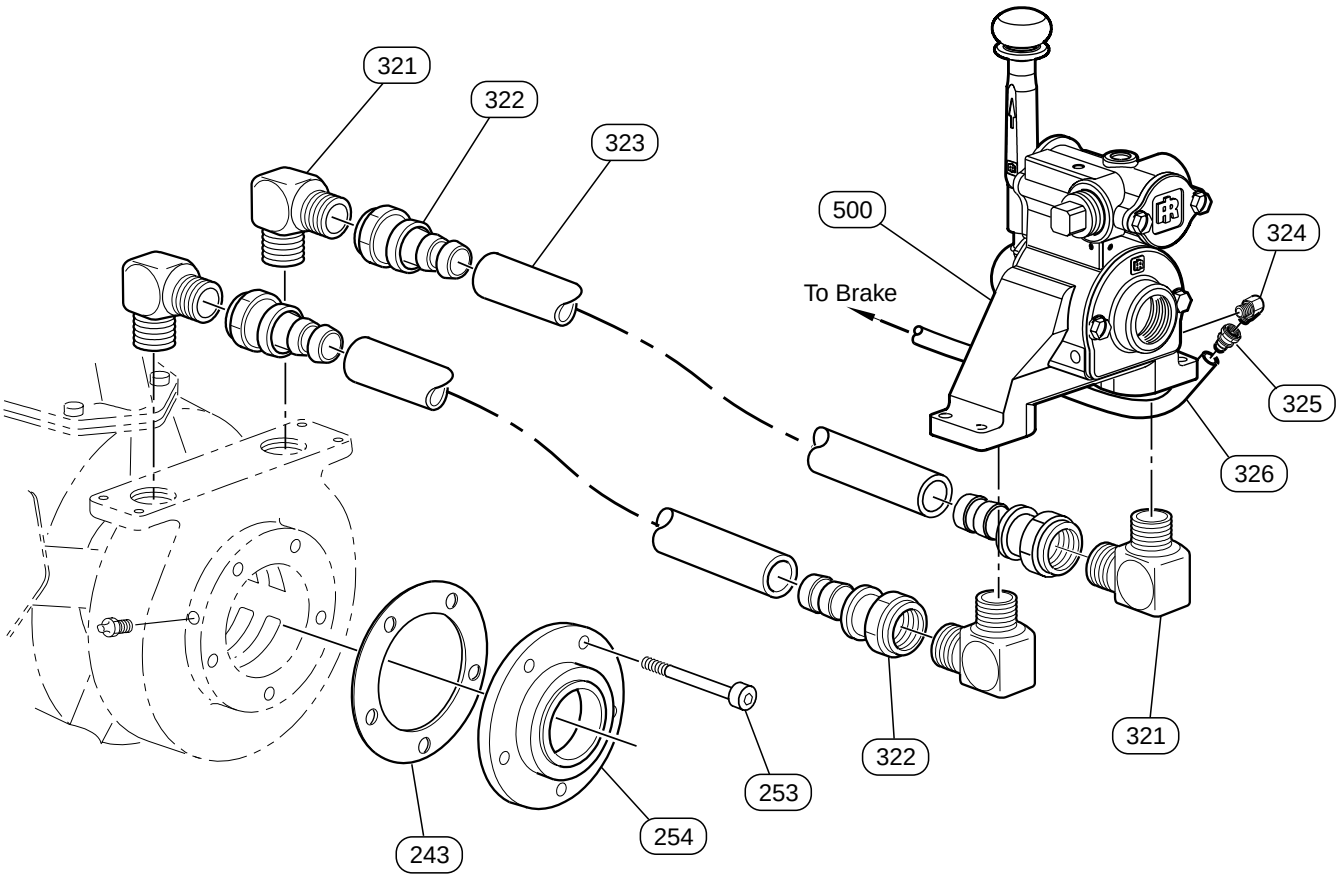
Remote Pilot Lever Throttle Valve Associated Components
Refer to Note

357	Fitting, Elbow	2	51281
358	Pilot Lever Throttle	1	71069561

• Recommended spare

Note: Contact factory for pendant hose assembly over 60 feet (18.3 m).

REMOTE LIVE AIR CONTROL (OPTIONAL) ASSEMBLY DRAWING AND PARTS LIST

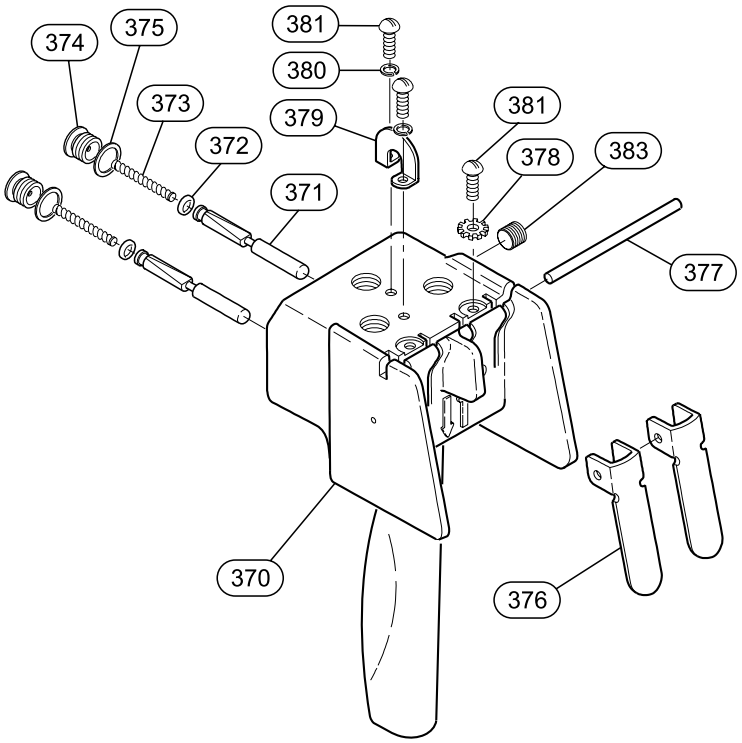


(Dwg. MHP2055)

Item No.	Description of Part	Total Qty	Part Number
243	Gasket	1	K5B-928
253	Capscrew	5	51471
254	Exhaust Flange	1	KK5B-276M
321	Fitting, Elbow	4	54270
322	Hose End	4	54738
323	Hose	2	54737-*
324	Fitting, Elbow	1	71018022
325	Fitting, Hose End	2	51029
326	Hose	1	50923-*
500	Control Valve Assembly	1	K5C2

* Add hose length (feet/metres). Maximum length = 20 feet (6 metres). Contact **Ingersoll-Rand** for information on control suitability for lengths greater than 20 feet (6 metres). Metres are for reference only; order quantities in feet.

PENDANT CONTROL ASSEMBLY DRAWING AND PARTS LIST (OLD STYLE)



(Dwg. MHP2062)

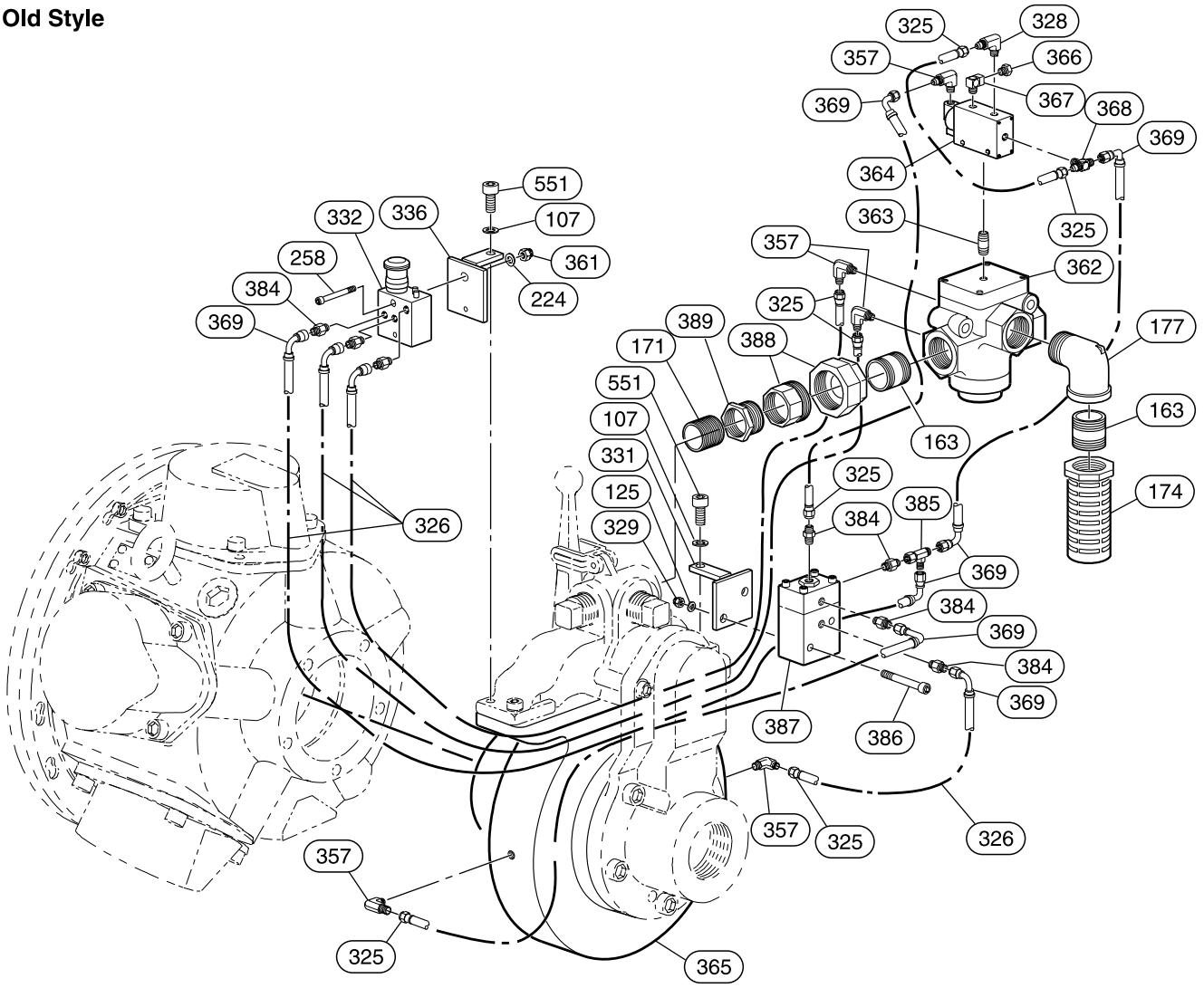
Item No.	Description of Part	Total Qty	Part Number
352	Pendant Assembly (includes items 370 through 381 and 383) Note: Pendant Handle only available as part of assembly item 370)	1	MLK-A269C
370	Pendant Handle	1	order item 352
371	Throttle Valve	2	MLK-K264B
372	Throttle Valve Face	2	R000BR1C-283
• 373	Spring	2	MKL-51A
374	Throttle Valve Cap	2	MLK-266A
• 375	Valve Cap Gasket	2	MLK-504
376	Lever	2	MLK-273
377	Throttle Lever Pin	1	DLC-120A
378	Pin Lockwasher	2	D02-138
379	Support	1	MLK-450
380	Lockwasher	2	H54U-352-10*
381	Handle Screw	4	HRE20A-68
382	Fitting, Adapter (not shown on drawing)	3	52092
383	Pipe Plug	1	54247

• Recommended spare for one winch, 2 years of normal operation.

* Sold in quantities of 10 only.

EMERGENCY STOP/OVERLOAD VALVE ASSEMBLY DRAWING AND PARTS LIST

Old Style



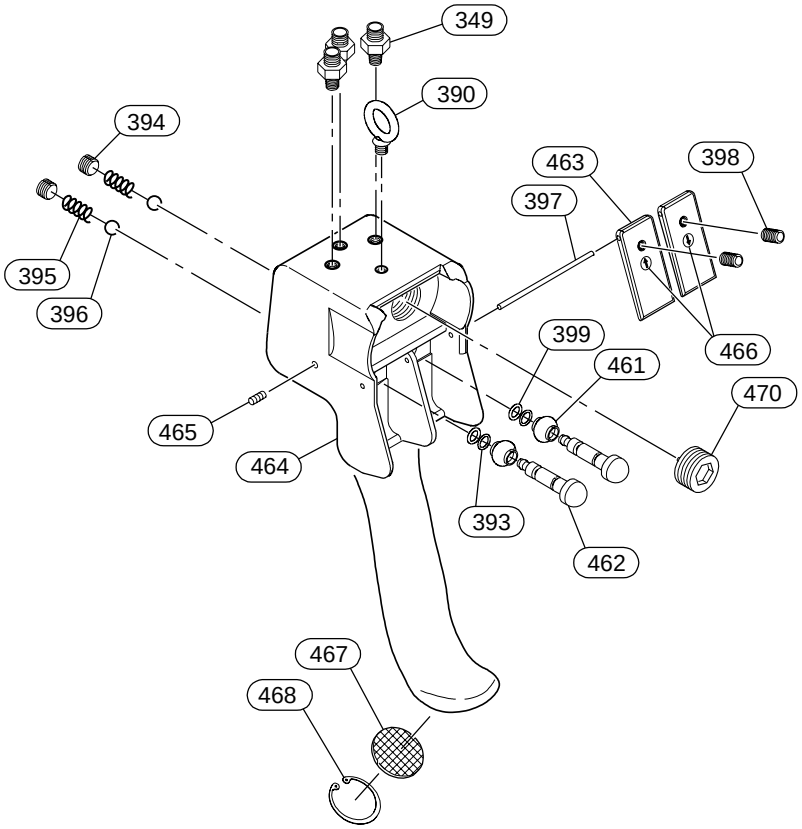
(Dwg. MHP2068)

Item No.	Description of Part	Total Qty	Part Number	Item No.	Description of Part	Total Qty	Part Number
107	Washer	2	50200	361	Nut	2	53541
125	Washer	2	50177	362	Valve, Shut-off	1	25541
163	Fitting, Nipple	2	71057483	363	Fitting, Nipple	1	52191
171	Fitting, Nipple	1	51704	364	Pilot Valve	1	71269039
174	Muffler	1	52472	365	Rotary Housing	1	24492
177	Fitting, Pipe Elbow	1	71273676	366	Breather	1	50595
224	Washer	2	51676	367	Fitting, Elbow	1	71034714
258	Capscrew	2	51079	368	Fitting, Tee	1	54081
325	Fitting, Hose End	7	51029	369	Fitting, Elbow	9	52179
326	Hose (bulk)	As Req'd	50923	384	Fitting, Connector	7	71078158
328	Fitting, Elbow	1	52182	385	Fitting, Swivel-Tee	1	71067789
329	Nut	2	50170	386	Capscrew	2	50848
331	Bracket, Overload	1	24491	387	Valve, Delta P	1	36360002
332	Emergency Stop Valve	1	35790066	388	Fitting, Pipe	1	71149355
336	Bracket, E-Stop	1	24490	389	Pipe Bushing	1	51706
357	Fitting, Elbow	5	51281	551	Capscrew	4	54240

SERVICE NOTES

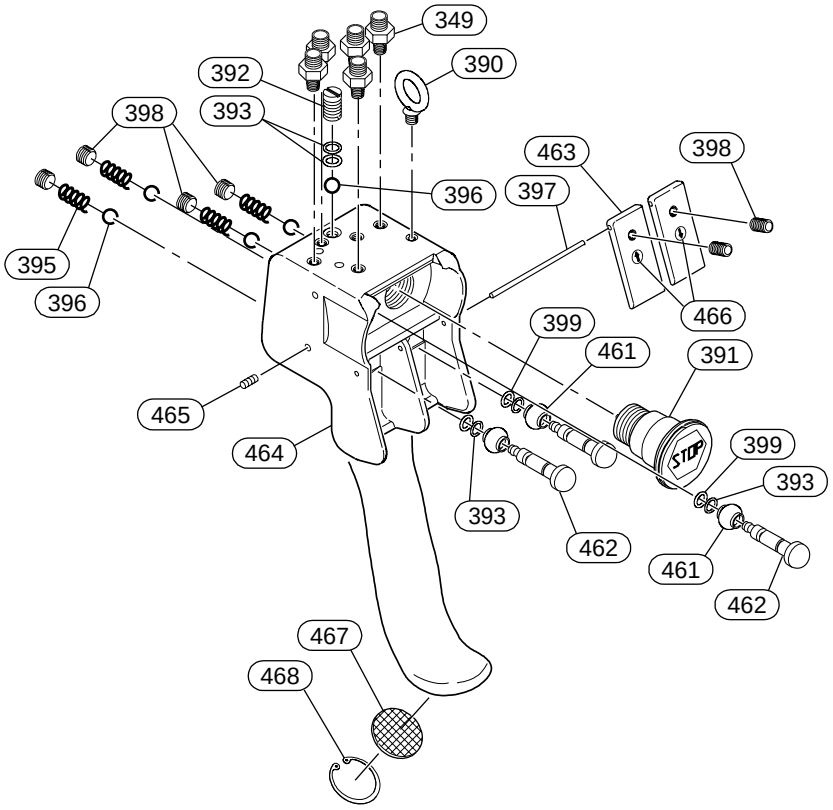
REMOTE PENDANT ASSEMBLY DRAWING

Pendant without Emergency Stop



(Dwg. MHP2280)

Pendant with Emergency Stop



(Dwg. MHP2069)

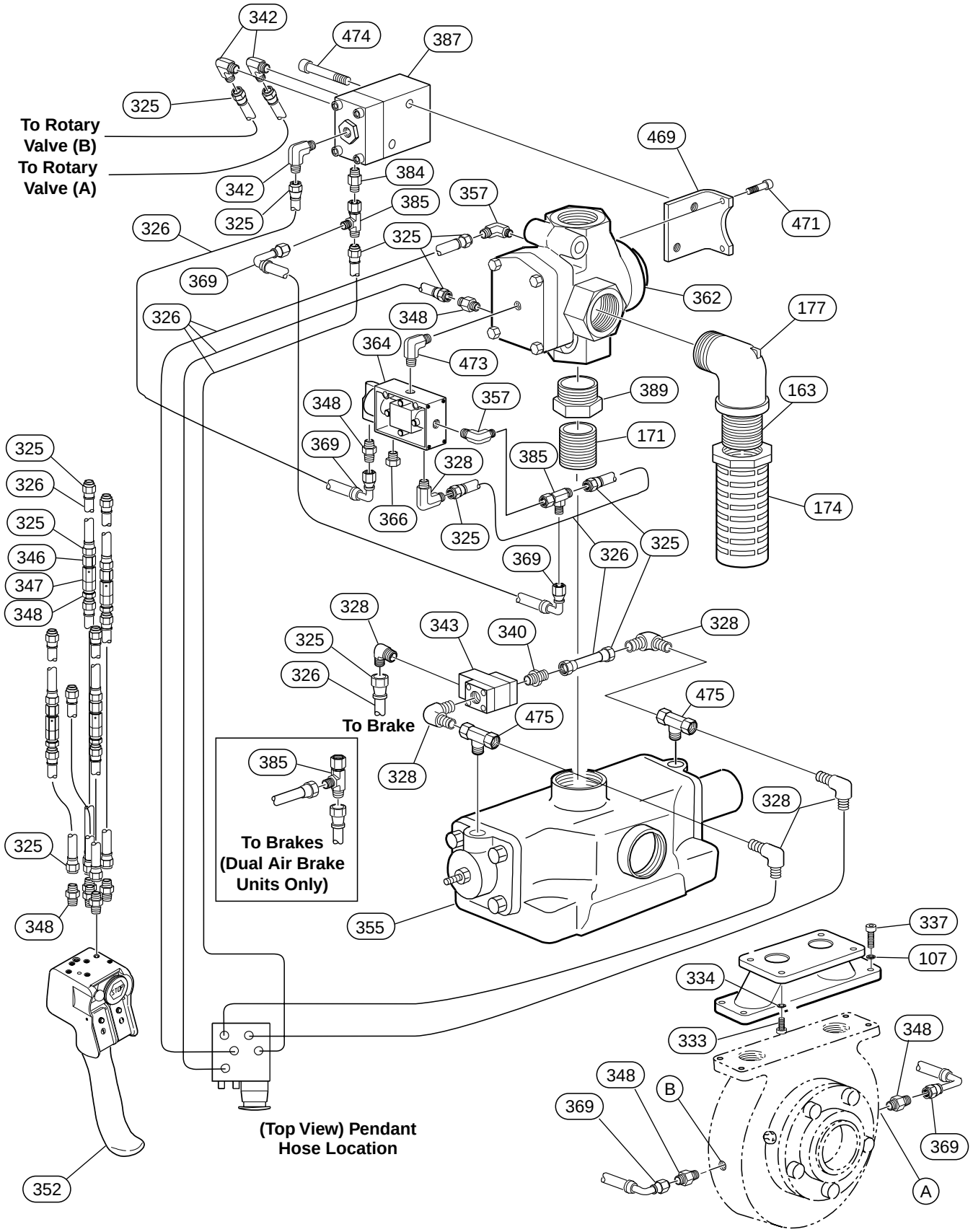
REMOTE PENDANT ASSEMBLY PARTS LIST

Item No.	Description of Part	Total Qty	Part Number	
			With E-Stop	Without E-Stop
352	Pendant Assembly*	1	PHS2E	PHS2E-U
390	Lifting Eye	1	64222332	
391	Emergency Stop Valve	1	95790108	- - -
392	Plug	1	95790106	
• 393	'O' Ring	2(5)	58209229	
394	Plug	2(4)	54292	
395	Spring	2(4)	69128541	
396	Ball	2(5)	69401625	
397	Pin	1	95790040	
398	Setscrew	2	42008607	
• 399	'O' Ring	2(3)	58235329	
461	Protector	2(3)	95790107	
462	Valve	2(3)	95790104	
463	Lever	2	95790122	
464	Pendant Handle	1	order item 500	
465	Setscrew	3(5)	71078158	
466	Label Kit	1	95790111	
467	Exhaust Washer	1	95790114	
468	Retainer Ring	1	47713030	
470	Plug	1	- - -	65129541

* Pendant Assembly includes items 390 to 399 and 461 to 468.

• Recommended spare for one winch, 2 years of normal operation.

PENDANT EMERGENCY STOP AND OVERLOAD ASSEMBLY DRAWING



(Dwg. MHP2070)

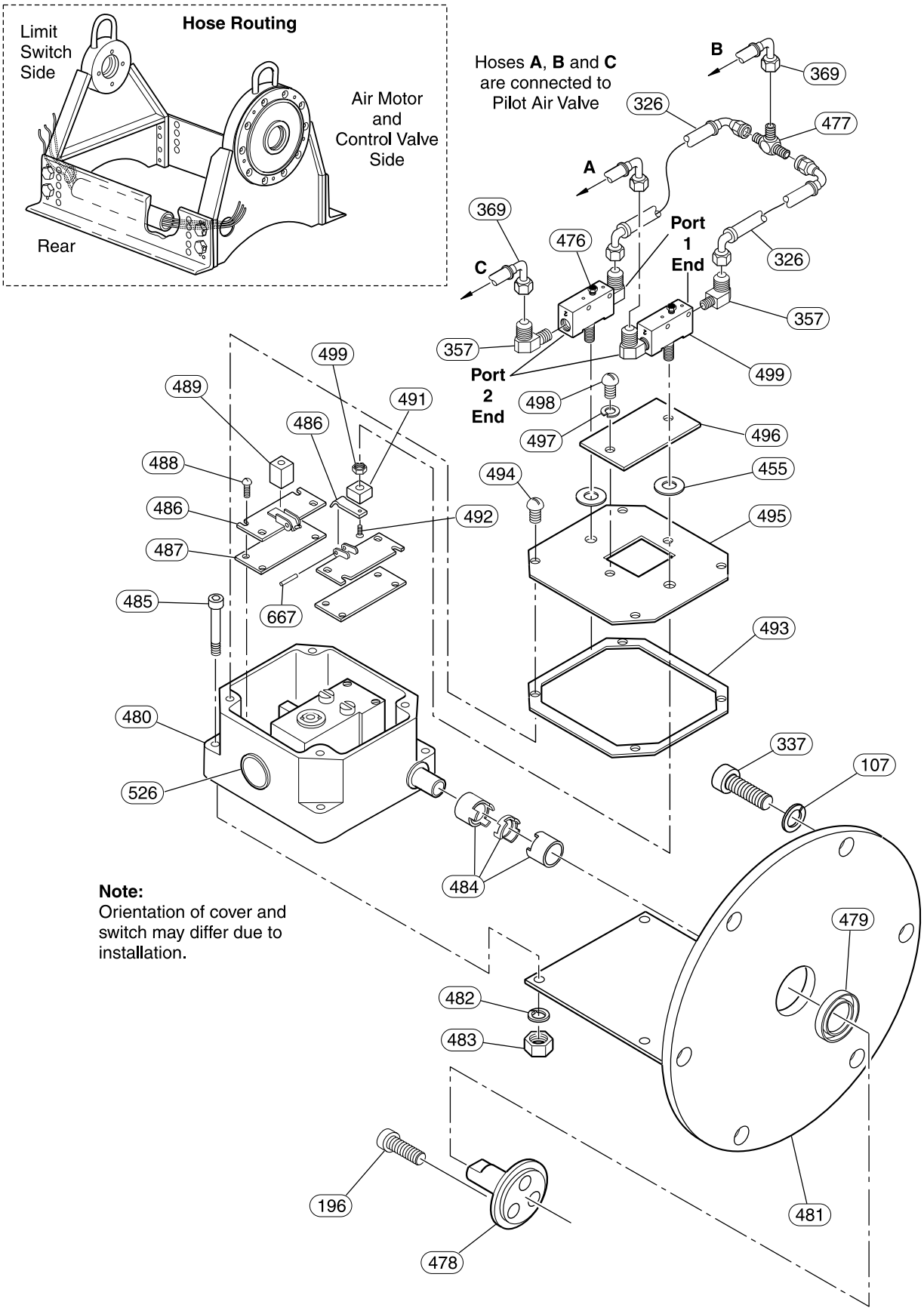
PENDANT EMERGENCY STOP AND OVERLOAD ASSEMBLY PARTS LIST

Item No.	Description of Part	Total Qty	Part Number
107	Lockwasher	4	50200
163	Fitting, Nipple	1	71057483
171	Fitting, Nipple	1	51704
174	Muffler	1	52472
177	Fitting, Pipe Elbow	1	71273676
325	Fitting, Hose End	As Req'd	51029
326	Hose (bulk)		50923
328	Fitting, Elbow	6	52182
333	Capscrew	4	54681
334	Lockwasher	4	50893
337	Capscrew	4	51780
340	Fitting, Connector	1	51841
342	Fitting, Elbow	3	71327316
343	Shuttle Valve	1	50277
346	Fitting, Connector	As Req'd	71048284
347	Valve, Exhaust*	As Req'd	20417
348	Fitting, Connector	13	71048268
352	Pendant Assembly	1	PHS2E-U
355	Valve Assembly	1	20993
357	Fitting, Elbow	2	51281
362	Valve, Shut-off	1	25541
364	Shuttle Valve	1	71269039
366	Breather	1	50959
369	Fitting, Elbow	5	52179
384	Fitting, Connector	1	71078158
385	Fitting, Swivel-Tee**	2 (3)	71067789
387	Valve, Delta P	1	36360002
389	Pipe Bushing	1	51706
469	Bracket	1	26148
471	Capscrew	2	71327324
473	Fitting, Elbow	1	54273
474	Capscrew	2	54240
475	Fitting, Tee	2	K6U-926

* Exhaust valves must be installed at 20 foot (6 metre) intervals. Item 347 includes items 346 and 348.

** Fitting, Swivel-Tee, item 385 quantity total = 2 for single brake/3 for dual brake applications.

LIMIT SWITCH ASSEMBLY DRAWING



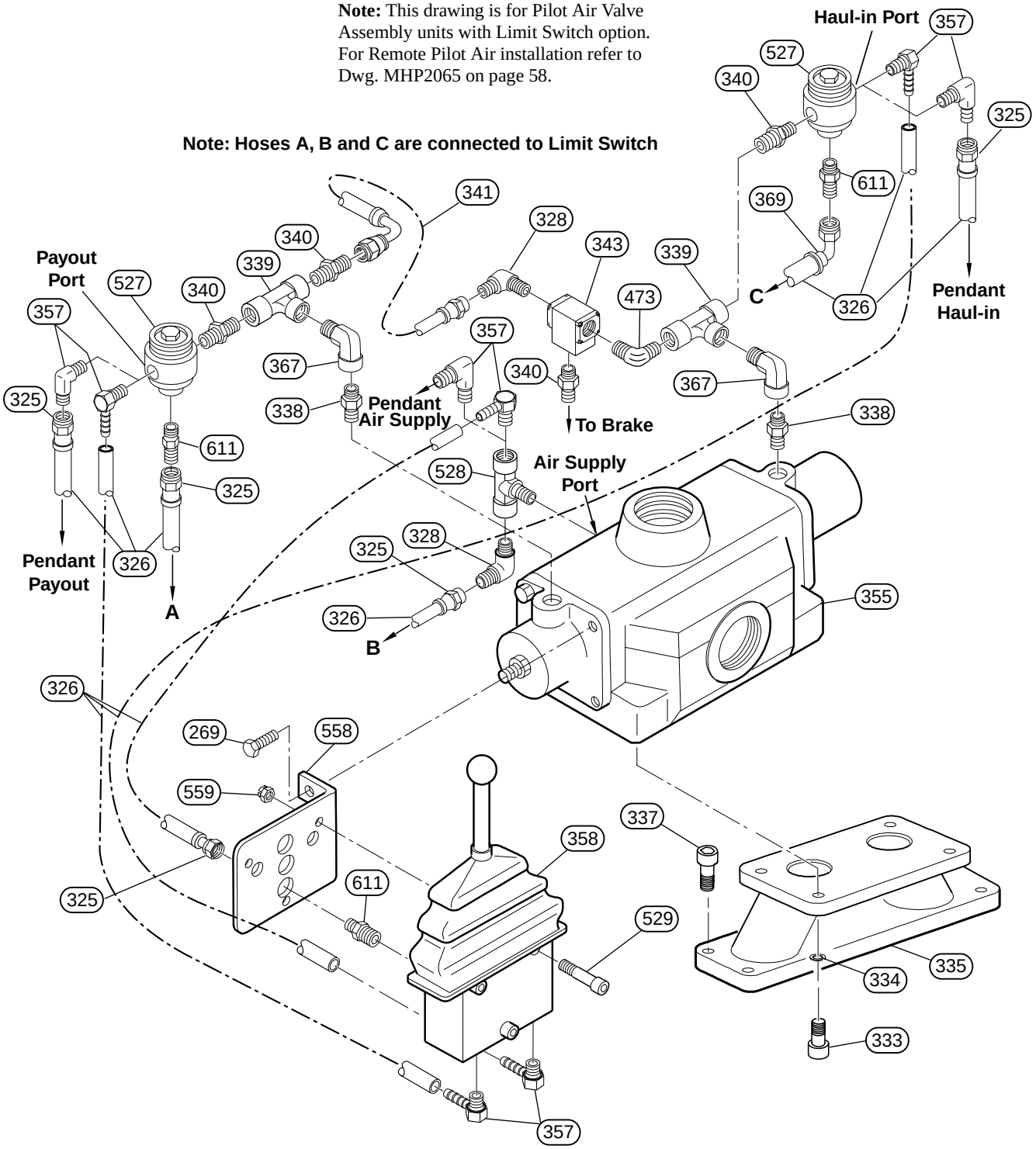
(Dwg. MHP2071)

LIMIT SWITCH ASSEMBLY PARTS LIST

Item No.	Description of Part	Total Qty	Part Number
107	Lockwasher	6	50200
196	Capscrew	3	51086
326	Hose (bulk)	As Req'd	50923
337	Capscrew	6	51780
357	Fitting, Elbow	4	51281
369	Fitting, Elbow	7	52179
455	Washer	2	50182
476	Breather	2	51559
477	Fitting, Tee	1	53940
478	Retainer (replaces Retainer, item 191, on standard winch)	1	114485
479	Seal	1	52382
480	Limit Switch Assembly (includes items 486-498)	1	27309-1
481	Bracket, Limit Switch	1	11484
482	Lockwasher	4	52909
483	Nut	4	54142
484	Coupling Assembly	1	52381
485	Capscrew	4	54493
486	Lever Assembly	2	Order item 480
487	Plate	2	2688
488	Capscrew	8	71055966
489	Block, Tall	1	27312
491	Block, Short	1	27311
492	Capscrew	2	53869
493	Gasket	1	Order item 480
494	Capscrew	4	
495	Cover Plate	1	
496	Access Plate	1	3394-B
497	Lockwasher	2	51801
498	Capscrew	2	71007009
499	Valve	2	71356430
526	Plug	1	71027494
667	Pin	1	Contact Factory

PILOT AIR VALVE PLUMBING ASSEMBLY DRAWING

Note: This drawing is for Pilot Air Valve Assembly units with Limit Switch option. For Remote Pilot Air installation refer to Dwg. MHP2065 on page 58.



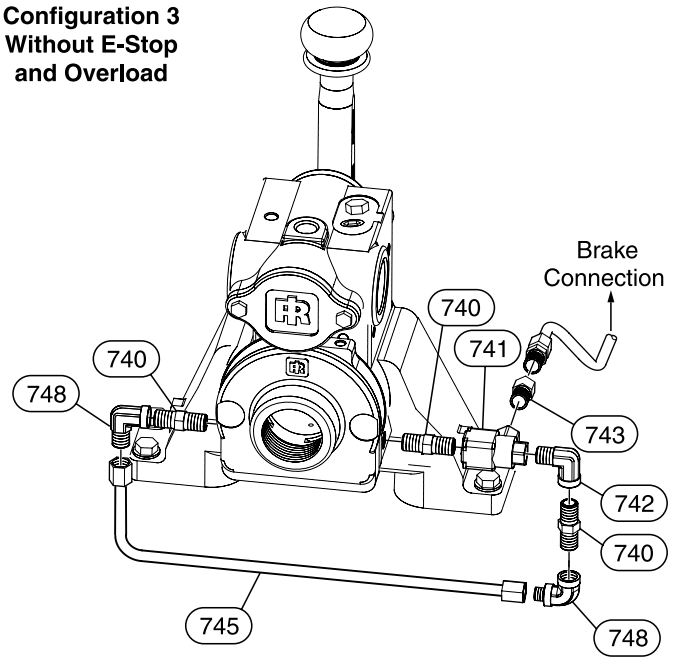
(Dwg. MHP2072)

PILOT AIR VALVE PLUMBING ASSEMBLY PARTS LIST

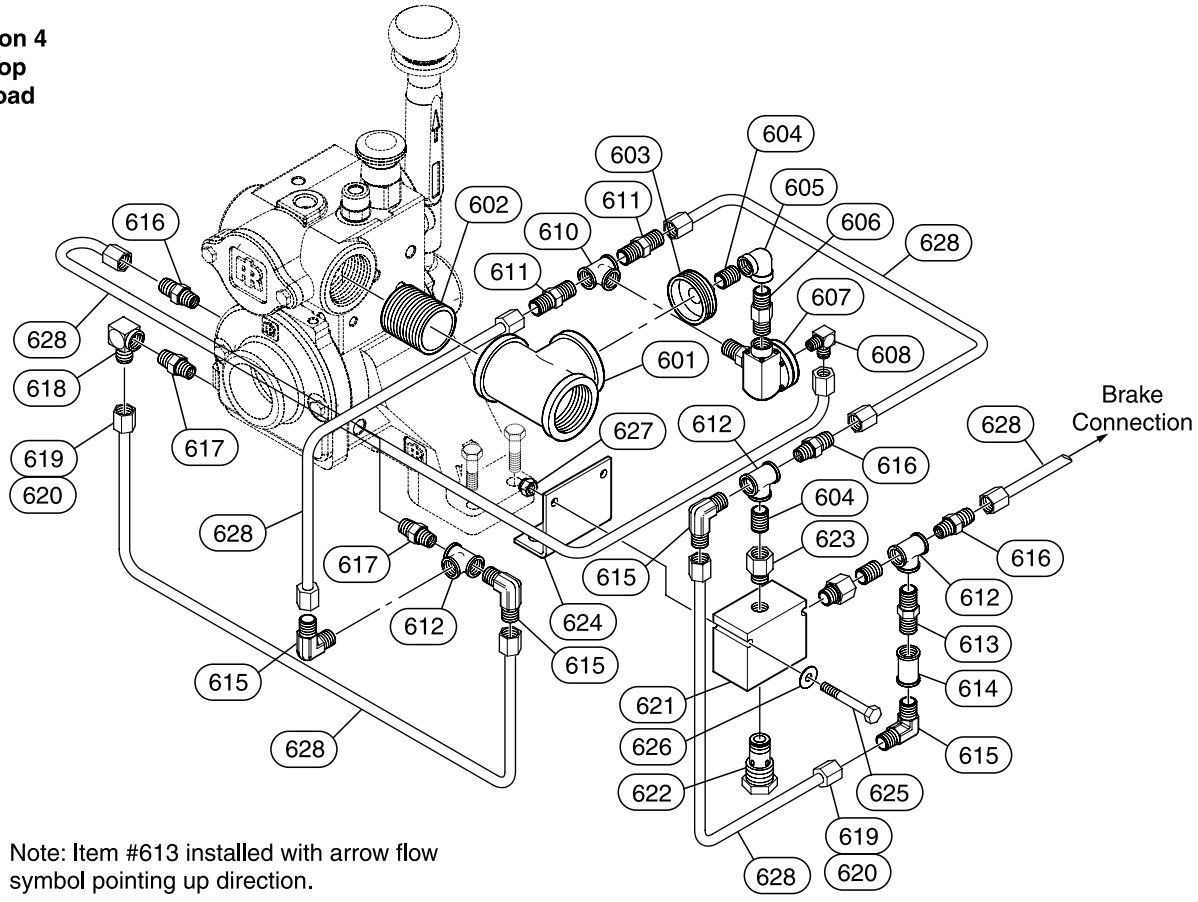
Item No.	Description of Part	Total Qty	Part Number
269	Capscrew	2	71030118
325	Fitting, Hose End	5	51029
326	Hose (bulk)	As Req'd	50923
328	Fitting, Elbow	2	52182
333	Capscrew	4	54681
334	Lockwasher	4	50893
335	Manifold, Adapter	1	13881
337	Capscrew	4	51780
338	Fitting, Connector	2	54274
339	Fitting, Tee	2	54678
340	Fitting, Connector	4	51814
341	Hose Assembly	1	17073-6
343	Valve	1	50277
355	Valve Assembly	1	20933
357	Fitting, Elbow (Pendent Control)	3	51281
	Fitting, Barbed (Pilot Control)	5	71062889
358	Throttle Valve Assembly	1	71069561
367	Fitting, Elbow	2	71034714
369	Fitting, Elbow	1	52179
473	Fitting, Elbow	1	54273
527	Valve	2	51756
528	Fitting, Tee	1	54977
529	Capscrew	3	71053763
558	Bracket	1	20231
559	Nut	3	54171
611	Fitting, Connector	3	52092

BRAKE LINE CONNECTIONS ASSEMBLY DRAWINGS

Configuration 3 Without E-Stop and Overload



Configuration 4 With E-Stop and Overload



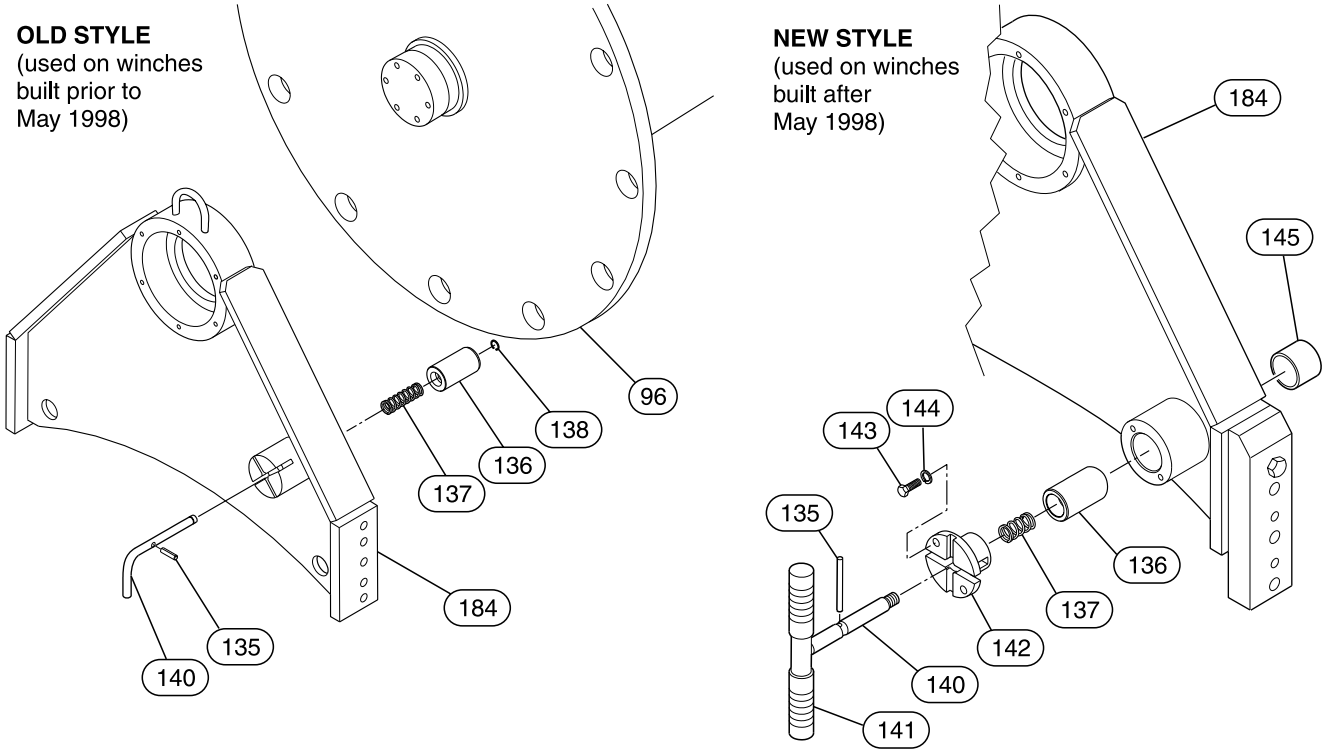
Note: Item #613 installed with arrow flow symbol pointing up direction.

(Dwg. MHP2239)

BRAKE LINE CONNECTIONS PARTS LISTS

Item No.	Description of Part	Total Qty	Part Number	
			w/ Emergency Stop and Overload	w/o Emergency Stop and Overload
601	Fitting, Tee	1	51707	- - -
602	Fitting, Pipe	1	51704	
603	Bushing	1	71039416	
604	Fitting, Nipple	3	51034	
605	Fitting, Elbow	1	51031	
606	Fitting, Connector	1	54679	
607	Valve	1	54672	
608	Fitting, Elbow	1	51281	
610	Fitting, Tee	1	71375372	
611	Fitting, Connector	2	52092	
612	Fitting, Tee	3	51812	
613	Valve, Check	1	71368609	
614	Fitting, Pipe	1	50861	
615	Fitting, Elbow	4	52182	
616	Fitting, Connector	3	51814	
617	Fitting, Connector	2	54274	
618	Fitting, Elbow	1	71375349	
619	Fitting	12	55014	
620	Locknut	12	55013	
621	Valve	1	71375380	
622	Valve, Check	1	71375398	
623	Fitting, Reducer	2	71375406	
624	Bracket, Support	1	28051	
625	Capscrew	2	54277	
626	Washer	2	51831	
627	Locknut	2	53541	
628	Tubing (Bulk)	As Req’d	52520	
740	Fitting, Connector	3	- - -	71367908
741	Shuttle Valve	1		50277
742	Fitting, Elbow	1		71372650
743	Fitting, Reducer	1		53939
745	Tubing, Assembly	1		52520
748	Fitting, Elbow	2		71367767

DRUM LOCKING PIN (OPTIONAL) ASSEMBLY DRAWING AND PARTS LIST



(Dwg. MHP2066)

Drum with Band Brake

Item No.	Description of Part	Total Qty	Part Number
96	Drum (16 inches (406 mm) long) †	1	Contact Factory
	Drum (20 inches (508 mm) long) †		
	Drum (24 inches (610 mm) long) †		
	Drum (30 inches (760 mm) long) †		
	Drum (34 inches (864 mm) long) †		
	Drum (36 inches (915 mm) long) †		
	Drum (40 inches (1016 mm) long) †		
	Drum (50 inches (1270 mm) long) †		

Drum without Band Brake

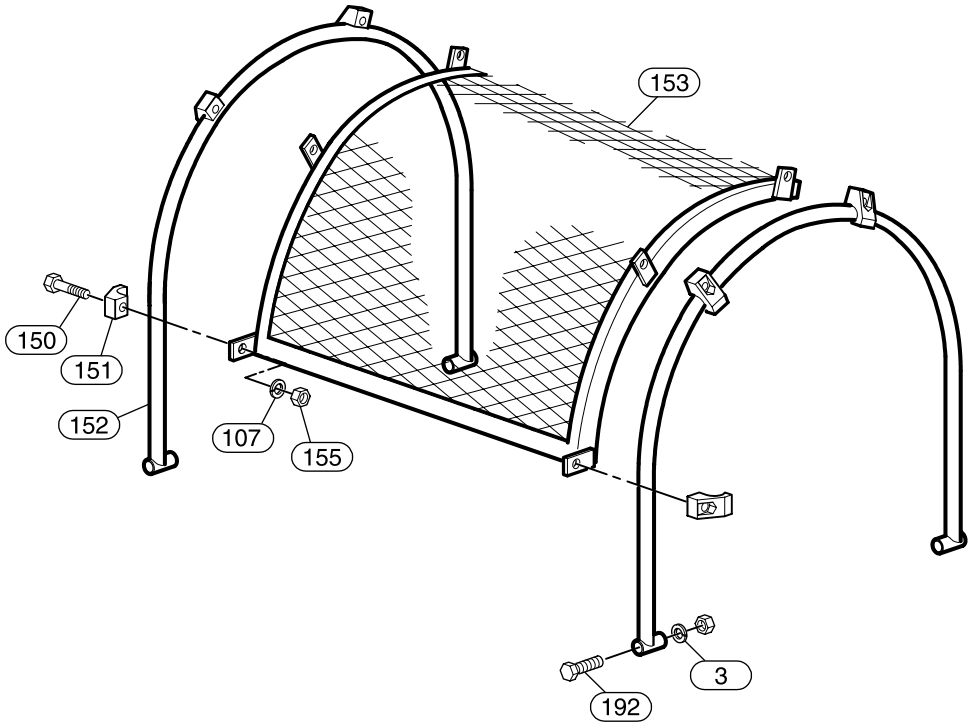
Item No.	Description of Part	Total Qty	Part Number
96	Drum (16 inches (406 mm) long) †	1	Contact Factory
	Drum (20 inches (508 mm) long) †		
	Drum (24 inches (610 mm) long) †		
	Drum (30 inches (760 mm) long) †		
	Drum (34 inches (864 mm) long) †		
	Drum (36 inches (915 mm) long) †		
	Drum (40 inches (1016 mm) long) †		
	Drum (50 inches (1270 mm) long) †		

Common Parts

Item No.	Description of Part	Total Qty	Part Number	
			New Style	Old Style
135	Pin	1	71316632	71001135
136	Lock Pin	1	26668	24121
137	Spring	1	71316624	71080881
138	Retainer Ring	1	---	54370
140	Pull Rod	1	26670	21073
141	Grip	2	51845	
142	Drum Cap	1	26669	
143	Capscrew	2	71316483	
144	Washer	2	51581	
145	Bushing	1	71342208	
184	Outboard Upright †	1	26672	24119

† These parts also come in cold weather version. For winches with a – C in model code, adding CH (DNV) or CHA (ABS) to the end of these part numbers is required to retain winch certification. Example: Order Outboard Upright (item 184) part number 26672 as part number 26672CH or 26672CHA.

DRUM GUARD (OPTIONAL) ASSEMBLY DRAWING AND PARTS LIST

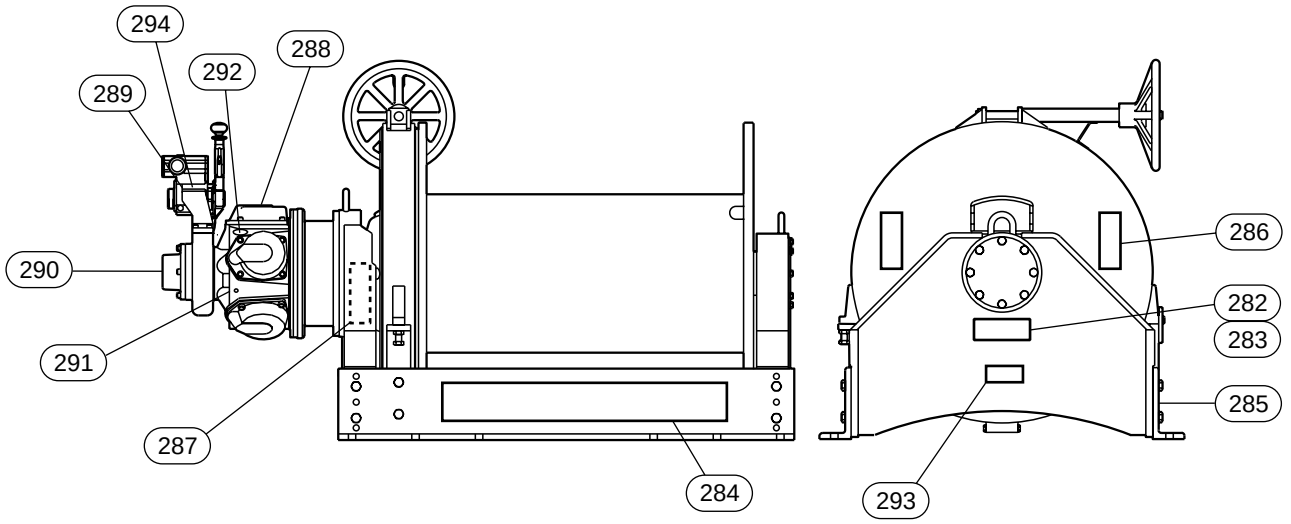


(Dwg. MHP2073)

Item No.	Description of Part	Total Qty	Part Number
3	Lockwasher	4	50181
107	Lockwasher	8	50200
149	Drum Guard Assembly (16 inches (406 mm) long)*	1	11987-3
	Drum Guard Assembly (20 inches (508 mm) long)*		11987-4
	Drum Guard Assembly (24 inches (610 mm) long)*		11987-5
	Drum Guard Assembly (30 inches (760 mm) long)*		11987-6
	Drum Guard Assembly (34 inches (864 mm) long)*		contact factory
	Drum Guard Assembly (36 inches (915 mm) long)*		11987-10
	Drum Guard Assembly (40 inches (1016 mm) long)*		11987-8
	Drum Guard Assembly (50 inches (1270 mm) long)*		contact factory
150	Capscrew	8	51579
151	Clamp	8	10399
152	Support	2	11947
153	Drum Guard (16 inches (406 mm) long)	1	11948-3
	Drum Guard (20 inches (508 mm) long)		11948-4
	Drum Guard (24 inches (610 mm) long)		11948-5
	Drum Guard (30 inches (760 mm) long)		11948-6
	Drum Guard (34 inches (864 mm) long)		contact factory
	Drum Guard (36 inches (915 mm) long)		11948-10
	Drum Guard (40 inches (1016 mm) long)		11948-8
	Drum Guard (50 inches (1270 mm) long)		contact factory
155	Nut	8	50198
192	Capscrew	4	50183

* Assembly includes items 3, 107, 150 - 153, 155 and 192

LABEL DRAWING AND PARTS LIST



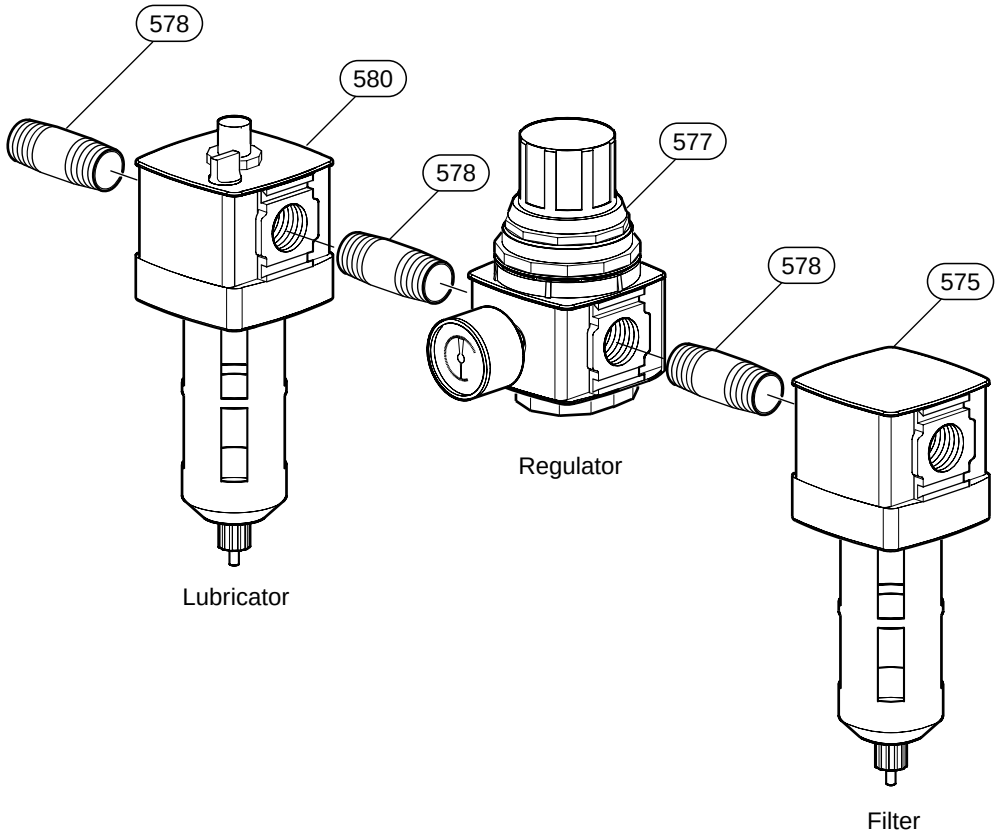
(Dwg. MHP0871)

Item No.	Description of Part	Total Qty	Part Number
281	Label Kits		
	16 - 36 inch long Drum with Band Brake (includes items 282 through 292)	1	22261-4S
	16 - 36 inch long Drum without Band Brake and all drums over 40 inches (includes items 282 through 292)		22261-5S
	16 - 36 inch long Drum with Band Brake -E versions (includes items 282 through 287 and 289 through 294)		24305-4S
	16 - 36 inch long Drum without Band Brake and all drums over 40 inches -E versions (includes items 282 through 287 and 289 through 292)		24305-5S
282	Nameplate	1	71106967-R
283	Rivet	4	71028849
284	Force Five Product Label (16 - 36 in. long Drums)	1	71111777
	Force Five Product Label (40 and 50 in. long Drums)		71109508
285	**Ingersoll-Rand** Label (16 - 36 in. long Drums)	1	71106272
	Ingersoll-Rand Label (40 and 50 in. long Drums)		71109102
286	Overwind Label	2	71109516
	Overwind -E only	1	96180103
287	Warning Label (Refer to sample on page 4)	1	71060529
	Warning Label -E only	1	96180100
288	Warning Label (Refer to sample on page 4)	1	71107130
289	Air Supply Label	1	71046395
290	Exhaust Label	1	71042196
291	Oil Supply Label	1	71043616
292	Caution Tag	1	71107148
293	General Label -E only	1	71153464
294	Control Valve Operation -E only	1	96180102

ACCESSORIES

Description of Part	Part Number
Lubricant	LUBRI-LINK-GREEN
Thermoplastic Powder (4 ounces)	71308902

AIR PREPARATION (OPTIONAL) ASSEMBLY DRAWING AND PARTS LIST



(Dwg. MHP0223)

Note: Actual components may not appear identical to items shown in drawing.

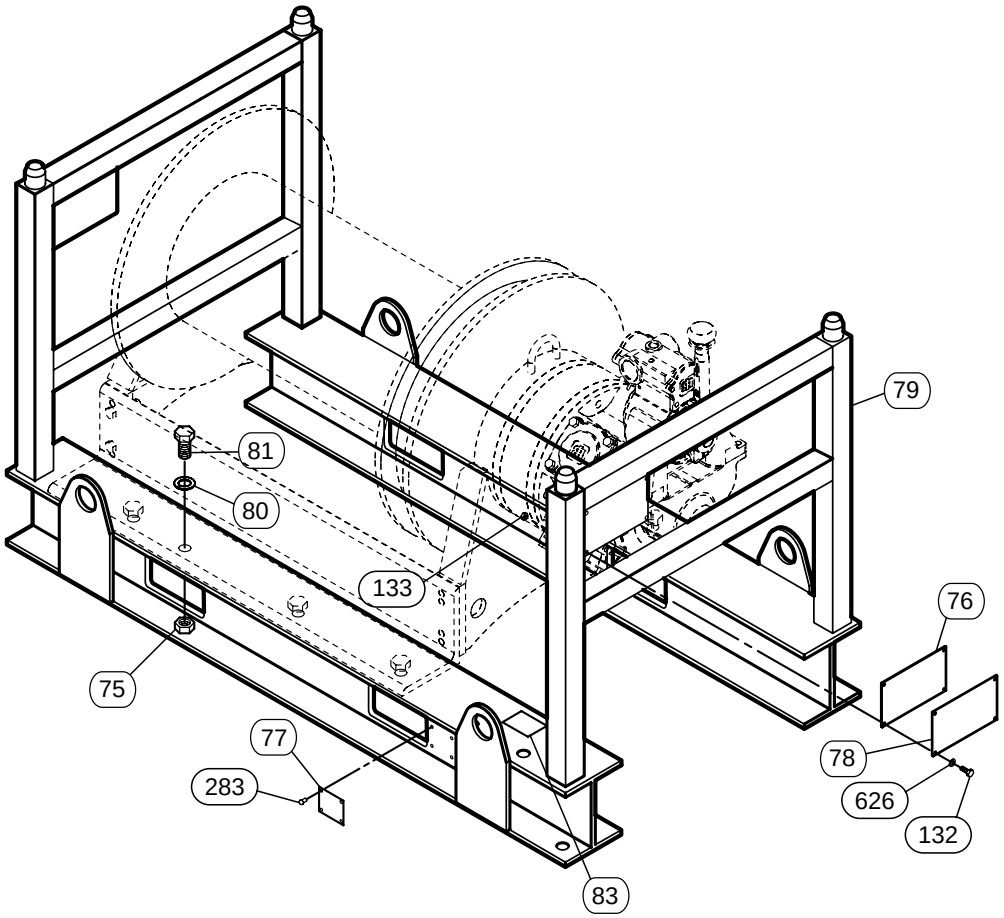
Item No.	Description of Part	Total Qty	Part Number
575	Filter	1	F35-0B-C28
577	Regulator	1	R40-0B-G00
578	Pipe Nipple (1-1/2 inch NPT)*	As Req'd	- - -
580	Lubricator	1	L40-0B-G00
**	Liquidator	1	8834-WI-000
**	Pipeline Stainer	1	K4U-A267AT

Air preparation components for 1-1/2 inch NPT system.

* Length as required for installation.

** Not shown on drawing.

CONSTRUCTION CAGE ASSEMBLY DRAWING AND PARTS LIST



(Dwg. MHP2045)

Item No.	Description of Part	Total Qty	Part Number	
			With Band Brake	Without Band Brake
75	Nut	12	50825	
76	Label, Specifications	1	Contact Factory	
77	Nameplate	1		
78	Cover	1	27426	
79	Construction Cage (16 inches (406 mm) long drum)	1	CC-FA10-16M	CC-FA10-16X
	Construction Cage (20 inches (508 mm) long drum)		CC-FA10-20M	CC-FA10-20X
	Construction Cage (24 inches (610 mm) long drum)		CC-FA10-24M	CC-FA10-24X
	Construction Cage (30 inches (760 mm) long drum)		CC-FA10-30M	CC-FA10-30X
	Construction Cage (34 inches (864 mm) long drum)		Contact Factory	
	Construction Cage (36 inches (915 mm) long drum)		CC-FA10-36M	CC-FA10-36X
	Construction Cage (40 inches (1016 mm) long drum)		CC-FA10-40M	CC-FA10-40X
	Construction Cage (50 inches (1270 mm) long drum)		CC-FA10-50M	CC-FA10-50X
80	Capscrew	12	71357735	
81	Lockwasher	12	52837	
83	Warning Label	1	71359384	
132	Capscrew	4	71359129	
133	Nut	4	53390	
283	Rivet	4	71028849	
626	Washers	4	51831	

COMMON PARTS LIST

Item No.	Description of Part	Part Number	Item No.	Description of Part	Part Number
2	Capscrew, SOCH, G8, 1/2 NC x 4-1/2	71087100	155	Nut, Hex, med, ZP 5/8 NC	50198
3	Lockwasher, ZP, 1/2	50181	163	Fitting, Nipple, 1-1/2 NPT, Close	71057483
4	Capscrew, SOCH, G8, 1/2 NC x 1-3/4	52379	165	Reducer Bushing, Galv, 2-1/2 NPT x 2 NPT	71057459
18	Retainer Ring, TRUARC #5100-156	51761	167	Pipe Nipple, 2 NPT, Close	71057467
22	Fitting, Reducer, 1/2 x 1/8 NPT	51803	169	Pipe Elbow, Galv, 90 Deg, 2 NPT	71057434
24	Pipe Plug, 1/2 NPT	50801	171	Fitting, Nipple, Galv, 1-1/4 NPT, Close	51704
25	Capscrew, HH, SST, G5, 5/8 NC x 4-1/2	50912	172	Pipe Elbow, Galv, Street, 1-1/4 NPT	71127484
26	Fitting, Hose, AQ 202414-4-4S	71149975	175	Pipe Elbow, Galv, Street, 1-1/2 NPT	54513
27	Tubing, SST, 1/4 OD x 0.035W	52520	177	Fitting, Pipe, Galv, Street, 1-1/2 NPT	71273676
31	Fitting, Nipple, Galv, 1/4 NPT x 2	50859	186	Screw Drive, SST, #6 x 3/8	50915
32	Washer, Flat, ZP, 5/8, 0.69 x 1.75 x 0.13	71293005	192	Capscrew, HH, ZP, G5, 1/2 NC x 1-1/2	50183
36	Retainer Ring, TRUARC #N5000-244	52678	195	Plug, SOCH, Galv, 1/8 NPT	54292
38	Retainer Ring, TRUARC #5160-118	51192	196	Capscrew, HH, ZP, G5, 1/2 NC x 1	51086
39	Capscrew, SOCH, G8, 1/2 NC x 1-3/4	71323166	200	Capscrew, SOCH, G8, 1/2 NC x 1-1/4	52317
43	'O' Ring, Parker #5-381	52536	205	Retainer Ring, TRUARC N5000-87	902A45-632
45	Retainer Ring, TRUARC #N5000-106	52541	208	Plug, SOCH, Galv, 1-1/4 NPT	71263297
48	Locknut, 5/8 NC	50812	213	Eyebolt, 5/8 Dia, Shank 1", Eye ID 1-3/8, 5/8 NC	KU-888
50	Capscrew, SOCH, G8, 5/8 NC x 7-1/2	53769	215	Drive Screw, Round Head, #6 x 1/4	R4K-302-12
57	Cotter Pin, SST, 0.16 x 2	50957	218	Pipe Plug, Galv, SQH, 3/8 NPT	54912
60	Nut, HH, MED, ZP, 5/8 NC	54661	224	Washer, Flat, ZP, 1/4	51676
63	Washer, Flat, SAE, ZP, 3/4	52288	229	Button Head Screw, SOCH, 1/4-20 x 1/2	K5B-541
64	Nut, Jam, HH, MED, ZP, 3/4 NC	50159	236	Cotter Pin, SST, 0.093 Dia x 1	53456
67	Capscrew, HH, ZP, G5, 3/4 NC x 3-1/4	51010	246	Grease Fitting, ALEMITE #1610-BL	53095
69	Fitting, AQ #4741-6B	53954	253	Capscrew, SOCH, G8, 1/2 NC x 5	51471
70	Fitting, AQ #2021-8-6S	71009385	258	Capscrew, SOCH, G8, 1/4 NC x 2-1/4	51079
73	Fitting, AQ #2081-12-8S	54913	269	Capscrew, HH, STL, G8.8, M8 x 25	71030118
75	Nut, HH, MED, ZP, 7/8 NC	50825	270	Adjusting Screw, SQH, G8, 3/8 NC x 1-3/4	53545
80	Capscrew, HH, SC1, G8, 7/8 NC x 3	71357735	271	Nut, ZP, 3/8 NC	50176
81	Lockwasher, ZP, 7/8, 0.89 x 1.47 x 0.22	52837	283	Rivet, SST, #6 x 1/4	71028849
105	Grease Fitting, SST, 1/8 NPT	51469	302	Capscrew, SOCH, G8, 3/8 NC X 3/4	71326110
106	Capscrew, HH, ZP, G5, 3/8 NC x 3/4	50853	309	Pipe Plug, SQH, 1-1/4 NPT	E5UD-947
107	Lockwasher, ZP, 3/8	50200	310	Pipe Plug, SQH, 1/4 NPT	50822
110	Locknut, ZP, 1 NC	51775	321	Fitting, Elbow, AQ 2024-20-24S	54270
115	Locknut, MED, ZP, 1/2-13UNC-2B	51750	322	Hose End, AQ, 4411-24S	54738
116	Capscrew, HH, ZP, G5, 3/4 NC x 2-1/2	54221	323	Hose, AQ FC300-24, 1-1/2	54737
117	Lockwasher, ZP, 3/4	51012	324	Fitting, Elbow, AQ 2023-4-4S	71018022
119	Capscrew, HH, ZP, G5, 3/4 NC X 2	50902	325	Fitting, Hose End, AQ 4797-4B	51029
120	Nut, HH, ZP, 1/2 NC	50205	326	Hose, 1/4 ID x 1/2 OD, 250 PSI W.P.	50923
124	Capscrew, HH, ZP, G5, 1/2 NC x 5	54896	328	Fitting, Elbow, AQ 2024-4-4S	52182
125	Washer, Flat, ZP, 3/8	50177	329	Nut, ZP, 3/8 NC	50170
127	Adjustment Screw, SQH, SST, G5, 3/4 NC x 3	54424	333	Capscrew, HH, G8.8, 1.5P, M10 x 25 mm	54681
132	Capscrew, PAN PH, 1/4-20 x 3/4	71359129	334	Lockwasher, ZP, 7/16	50893
133	Nut, HH, MED, SST, 1/4 NC	53390	337	Capscrew, ZP, HH, G5, 3/8 NC x 1	51780
138	Retainer Ring, TRUARC 5160-50	54370	338	Fitting, Connector, AQ 2083-4-4S	54274
143	Capscrew, HH, SST, G5, 3/8 NC x 1	71316483	339	Fitting, Pipe Tee, AQ 2090-4-4S	54678
144	Lockwasher, SST 3/8	51581	340	Fitting, Connector, AQ 2021-4-4S	51814
150	Capscrew, HH, SST 3/8 NC x 2-1/4	51579	342	Fitting, Elbow, AQ GG310-NP04-02	71327316

COMMON PARTS CONTINUED

Item No.	Description of Part	Part Number	Item No.	Description of Part	Part Number
346	Fitting, Connector, AQ 2022-2-4B	71048284	524	Washer, Flat, SST, 1/2	71271985
348	Fitting, Connector, AQ 2021-2-4B	71048268	525	Capscrew, HH, G8.8, M6-1.0 x 20 mm	71348338
357	Fitting, Elbow, AQ 2024-2-4S	51281	526	Plug, SOCH, 3/4 NPT	71027494
357	Fitting, Elbow, MEMCO 1/8-LB3	71062889	528	Fitting, Tee, AQ 2091-4-4S	54977
361	Nut, ZP, 1/4 NC	53541	529	Capscrew, SOCH, G8, 5/16 NC x 3	71053763
363	Fitting, Nipple, 1/8 NPT, Close	52191	538	Capscrew, SOCH, G10.9,M6-1 x 16 mm	71347207
367	Fitting, Elbow, AQ 2089-4-4S	71034714	549	Washer, Flat, SST 0.81OD x 0.411D x 0.07	71376370
368	Fitting, Tee, AQ 2030-2-4S	54081	551	Capscrew, HH,	71367276
369	Fitting, Elbow, AQ 191321-4	52179	559	Nut, ZP, 5/16 NC	54171
378	Pin Lockwasher, #8	D02-138	601	Fitting, Tee 1.25" galv.	51707
381	Support Screw, Brass, Round Head, #8-32 x 1/2	HRE20A-68	602	Fitting, Pipe 1.25" closed galv.	51704
383	Pipe Plug, Galv, SOCH, 1/16 NPT	54247	603	Bushing 1.25" x 0.25" NPT	71039416
384	Fitting, Connector, AQ GG110-NP04-02	71078158	604	Fitting, Nipple 1/4 NPT close	51034
385	Fitting, Swivel Tee, AQ 203102-4-4S	71067789	605	Fitting, Elbow 1/4 NPT galv.	51031
386	Capscrew, SOCH, G8, 3/8 NC x 2-1/2	50848	606	Fitting, Connector AQ #2083-4-2	54679
388	Fitting, Pipe, Galv, 1-1/2 NPT	71149355	608	Fitting, Elbow AQ #2024-2-4S	51281
389	Pipe Bushing, Galv, 1-1/2 x 1-1/4 NPT	51706	610	Fitting, Tee 1/8 NPT galv.	71375372
455	Washer, Flat, ZP, 1/2	50182	611	Fitting, Connector AQ #2021-2-4S	52092
471	Capscrew, SOCH, 6mm x 1-1/4	71327324	612	Fitting, Tee 0.25" galv.	51812
472	Pipe Bushing, Galv, 1-1/2 x 1-1/4 NPT	51706	614	Fitting, Pipe 0.25" NPT galv.	50861
473	Fitting, Elbow, 2085-4-4S	54273	615	Fitting, Elbow #2024-4-4S	52182
474	Capscrew, SOCH, G8, 3/8 NC x 1-1/2	54240	616	Fitting, Connector AQ #2021-4-4S	51814
475	Fitting, Tee, AQ 2091-4-4S	K6U-926	617	Fitting, Connector AQ #2083-4-4S	54274
477	Fitting, Tee, 2033-4-4S	53940	618	Fitting, Elbow AQ #2025-4-4S	71375349
482	Lockwasher, ZP, 3/16	52909	619	Fitting, Parker #4-TX-SS	55014
483	Nut, HH, ZP, #10 NF	54142	620	Locknut, Parker #4-BTX-SS	55013
485	Capscrew, SOCH, G8, #10 NC x 1-1/2	54493	623	Fitting, Reducer AQ #2216-4-6S	71375406
488	Capscrew, Round Head, #6 NC x 5/8	71055966	625	Capscrew, HH, SST, G5, 1/4 NC x 1-3/4"	54277
492	Capscrew, Flathead, SST,#19 NF x 3/8	53869	626	Washer, Flat, ZP, Type A Narrow, 1/4	51831
497	Lockwasher, ZP, 1/4	51801	627	Locknut, ZP, 1/4 NC, #21NE-040	53541
498	Capscrew, Brass, Round Head, 1/4 NC x 1/2	71007009	721	Capscrew, HH, M8-1.25 x 35mm long	71365811
501	Capscrew, HH, G8.8, M8-1.25 x 20 mm	71342034	740	Fitting, Connector Parker #1/4-FF-SS	71367908
502	Washer, Flat, SST, 5/16	71303408	742	Fitting, Elbow	71372650
512	Plug, SOCH, 3/8 NPT	71267561	743	Fitting, Reducer AQ #2021-4-4B	53939
515	Retainer Ring, TRUARC #5100-25-H-ST	71351092	748	Fitting, Elbow Parker #4-4 DBU-SS	71367767

Legend:

AQ	Aero Quip Fitting	**G5**	Grade 5 Fastener
HH	Hex Head	**NF**	National Fine Thread
Galv	Galvanized	**SQH**	Square Head
NC	National Course Thread	**ZP**	Zinc Plated
SOCH	Socket Head (requires Allen wrench/bit)	**G8**	Grade 8 Fastener
SST	Stainless Steel	**NPT**	National Pipe Thread

SERVICE NOTES

PARTS ORDERING INFORMATION

The use of other than **Ingersoll-Rand** replacement parts may result in decreased winch performance and may, at the company's option, invalidate the warranty.

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

Model Number _____

Serial Number _____

Date Purchased _____

When ordering replacement parts, please specify the following:
1. Complete model number and serial number as it appears on the nameplate.
2. Part number(s) and part description as shown in this manual.
3. Quantity required.

The nameplate is located on the winch outboard upright.

NOTICE

• Continuing improvement and advancement of design may cause changes to this equipment 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.
• Sections of this manual may not apply to your winch.

Return Goods Policy

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.

Winches which have been modified without **Ingersoll-Rand** approval, mishandled or overloaded will not be repaired or replaced under warranty. A printed copy of the warranty which applies to this winch is provided inside the back cover of this manual.

Disposal

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

For additional information contact:
Ingersoll-Rand
P.O. Box 24046
2724 Sixth Avenue South
Seattle, WA 98124-0046 USA
Phone: (206) 624-0466
Fax: (206) 624-6265

or

Ingersoll-Rand
Douai Operations
111, Avenue Roger Salengro
59450 Sin Le Noble, France
Phone: (33) 3-27-93-08-08
Fax: (33) 3-27-93-08-00

For additional information on the following products order the publication by the reference Part/Document number listed:

Publication	Part/Document Number
Brake Lining Replacement	MHD56142
Operation Manual – Version (multi-language)	MHD56101

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.

United States Office Locations

For Order Entry and Order Status

Ingersoll-Rand
Distribution Center
P.O. Box 618
510 Hester Drive
White House, TN 37188
Phone: (615) 672-0321
Fax: (615) 672-0801

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Ingersoll-Rand
P.O. Box 24046
2724 Sixth Avenue South
Seattle, WA 98124-0046
Phone: (206) 624-0466
Fax: (206) 624-6265

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www.irco.com

Regional Sales Offices

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Elmhurst, IL 60126-1102
Phone: (630) 530-3800
Fax: (630) 530-3891

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Houston, TX
450 Gears Road
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Houston, TX 77067-4516
Phone: (281) 872-6800
Fax: (281) 872-6807

Los Angeles, CA
13107 Lakeland Road
Santa Fe Springs, CA 90670
Phone: (562) 777-0808
Fax: (562) 7770818

Philadelphia, PA
P.O. Box 425
900 E. 8th Ave., Suite 103
King of Prussia, PA 19406
Phone: (610) 337-5930
Fax: (610) 337-5912

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:

Canada
National Sales Office
Regional Warehouse
Toronto, Ontario
51 Worcester Road
Rexdale, Ontario
M9W 4K2
Phone: (416) 213-4500
Fax: (416) 213-4510
Order Desk
Fax: (416) 213-4506

Regional Sales Offices
Edmonton, Alberta
Phone: (780) 438-5039
Fax: (780) 430-4300

Montreal, Quebec
3501 St. Charles Blvd.,
Suite 104
Kirkland, Quebec
H9H 4S3
Phone: (514) 695-9040
Fax: (514) 695-0963

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1200 Cliveden Avenue
Delta, B.C.
V3M 6G4
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Production Equipment Group
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33172-3107
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