

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:

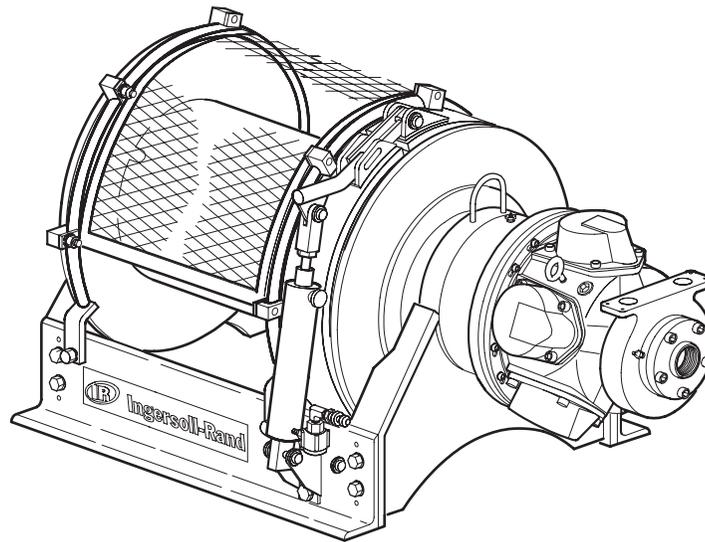
Model:	Publication No.
FA2, FA2.5, FH2, FH2.5	MHD56046
FA5	MHD56042 and MHD56220
FA10	MHD56252
FA2.5A	MHD56236
FA2B and HU40A	MHD56207
FH10MR	MHD56212
Fulcrum Electric	MHD56277
LS500HLP/ LS1000HLP	SAM0004

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

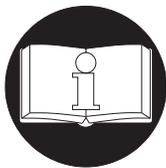
- We strongly recommend that ALL maintenance on **Ingersoll-Rand** equipment be carried out by personnel certified by **Ingersoll-Rand**, or by **Ingersoll-Rand** Authorized Service Centers.
- Contact the Factory if in doubt about installation, operation, inspection and maintenance instructions.
- Use 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.

PARTS, OPERATION AND MAINTENANCE MANUAL

force **5**TM **AIR WINCHES** for **MODEL FA5-DCOKR**



(Dwg. MHP2413)



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 unless winch is approved for Man Rider® applications. Do not lift or support 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.

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SAFETY INFORMATION

This manual provides important information for all personnel involved with the safe installation, operation and proper maintenance of this product. Even if you feel you are familiar with this or similar equipment, you should read this manual before operating the 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 unless winch is approved for Man Rider® applications. Do not lift or support loads over people.**
- **The 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 intended path of any load.

The Occupational Safety and Health Act of 1970 generally places the burden of compliance with the user, 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. Refer to 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 information required to install, operate, maintain and repair the products described herein.

It is extremely important that mechanics and operators be familiar with 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 product to operate and maintain this winch.
2. Only operate a winch if you are physically fit to do so.
3. When a **“DO NOT OPERATE”** sign is placed on winch, or controls, do not operate winch until sign has been removed by designated personnel.
4. Before each shift, check winch for wear and damage. Never use a winch that inspection indicates is worn or damaged.
5. Never lift a load greater than rated capacity of the winch. Refer to labels attached to winch or 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 winch drum.
8. Always rig loads properly and carefully.
9. Be certain the load is properly seated in saddle of hook. Do not support load on tip of hook.
10. Do not **“side pull”** or **“yard”**.
11. Always ensure that you, and all other people, are clear of the path of the load. 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 slack out of wire rope when starting a lift or pull. Do not jerk the load.
14. Do not swing a suspended load.
15. Do not leave a suspended load unattended.
16. Never operate a winch with twisted, kinked or damaged wire rope.
17. Pay attention to the load at all times when operating the winch.
18. Never use the winch wire rope as a sling.
19. After use, or when in a non-operational mode, winch should be secured against unauthorized and unwarranted use.

WARNING LABEL

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

⚠ WARNING

Failure to follow these warnings may result in death, severe injury or property damage:

- Do not operate this winch before reading operation and maintenance manual. 
- Do not lift people or loads over people.
- Do not lift more than rated load.
- Do not allow less than three wraps of wire rope to remain on drum at all times.
- Do not operate a damaged or malfunctioning winch.
- Do not remove or obscure warning labels.

Read the latest edition of ASME B30.7.
Comply with other federal, state and local rules.

P/N 71060529/C
for winches

INGERSOLL-RAND®
MATERIAL HANDLING

SPECIFICATIONS

Winch Standard Features:

Series (Capacity):

FA5-DCOKR = Force 5 Air Powered Decoker Winch (5 metric ton / 5,000 lbs.)

Drum Flange Diameter:

Standard Flange: 27.25 inch (692 mm) diameter

Drum Length (Distance between drum flanges):

16 inch (406 mm)

Drum Brake:

Automatic Drum Brake

Disc Brake:

Automatic Disc Brake

Other Features:

Drum Guard

Drum Lock

Press Roller

Muffler

Control Valve (optional)

Control Console: †

Refer to Parts, Operation and Maintenance Manual Form No. MHD56249 for control console information.

Model Configurations:

FA5-DCOKR = Standard model, refer to above winch features

FA5-DCOKR-1 = Standard model with K5C2 control valve mounted to winch.

FA5-DCOKR-200 = Standard model and K5C2 control valve shipped loose for customer mounting

FA5-DCOKR-10 = Standard model 5/8 in grooved drum for overwound.

FA5-DCOKR-U10 = Standard model 5/8 in grooved drum for underwound.

FA5-DCOKR-E/O = Standard model with air over electric controls for overwound. †

FA5-DCOKR-UE/O = Standard model with air over electric controls for underwound. †

Notes: † Not covered in this manual.

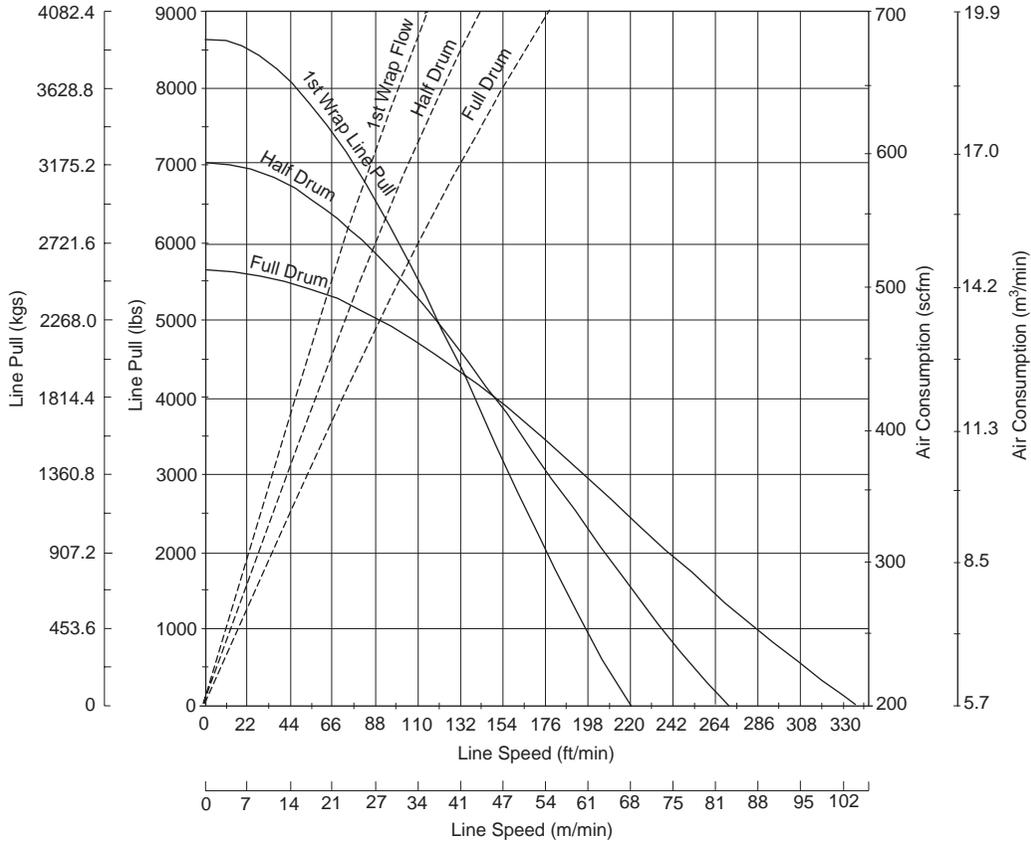
* Cold weather parts are not covered in this manual contact factory.

General Specifications:		Model	
		FA5-DCOKR	
Air System	Rated Operating Pressure	90 psig (6.3 bar)	
	Air Consumption (at rated pressure and load)	700 scfm	20 cu.m/min
Rated Performance (at rated pressure / volume)	Full Drum Line Pull	5,000 lbs	2,267 kgs
	Mid Drum Line Speed	100 fpm	30 m/min
	Max Stall Pull - 1st Layer	8,400 lbs	3,810 kgs
	Ship Weight	1,710 lbs	776 kgs
Air Motor Pipe Inlet Size		1-1/4 inch	32 mm
Minimum Air System Hose Size		1-1/2 inch	38 mm
Drum Barrel Diameter		15 inches	381 mm
Drum Flange Diameter		27.25 inches	692 mm
* Drum Wire Rope Storage Capacity (feet / metres)	Drum Length (inches)	Wire Rope Diameter	
		5/8 inch	16 mm
	16	1,020 ft	311 m

* 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

FA5-Decoker Winch



(Dwg. MHP2430)

Description of Operation

FA5-Decoker winches are air powered, planetary geared units designed for lifting and pulling applications. **FA5-Decoker** winches are available with either an internal automatic disc brake, and an automatic band brake.

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

FA5-Decoker winches are provided with a disc brake assembly consisting of friction plates splined to a hub which in turn is connected to the drive shaft from the air motor. Brake friction plates are clamped to the drum shaft through a spring applied piston. The brake remains applied until the winch control valve is operated and winch payout or haul-in occurs. Air is introduced into the brake piston chamber, which is formed between brake piston and brake housing, causing the brake piston to react, compressing brake springs and releasing friction plates allowing motor shaft to rotate. A power failure or sudden loss of air will immediately cause the spring applied brake to engage.

The automatic drum band brake operates by applying a friction force between automatic drum brake band and winch drum. The automatic drum band brake operation is similar to disc brake operation; they are both fully disengaged in the haul-in and payout direction.

INSTALLATION

Prior to installing 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 "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. MHP0133, on page 7, and Table 1, on page 7, and Table 2 on page 7.

Care must be taken when moving, positioning or mounting the 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 weight of your winch by referring to "SPECIFICATIONS" section on page 5. Lift winch 3 to 4 inches (75 to 100 mm) off ground.

Verify winch is balanced and secure before continuing lift.

Mount winch so axis of drum is horizontal and that 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.

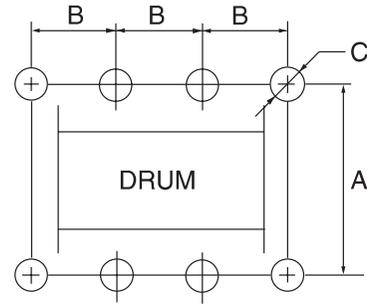
1. The winch mounting surface must be flat and of sufficient strength to handle rated load plus weight of winch and attached equipment. An inadequate foundation may cause distortion or twisting of winch uprights and side rails resulting in winch damage.
2. Make sure mounting surface is flat to within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

- Mounting Surface Tolerance

Drum Length	Mounting Surface Minimum Flatness	
	inch	mm
16	0.08	2.03

3. Mounting bolts must be 3/4 inch (18 mm) Grade 8 or better. Use self-locking nuts or nuts with lockwashers.
4. Tighten 3/4 inch (18 mm) mounting bolts evenly and torque to 380 ft lbs (515 Nm) for dry thread fasteners. If fasteners are plated, lubricated or a thread locking compound is used, torque to 280 ft lbs (380 Nm).
5. Maintain a fleet angle between sheave and winch of no more than 1-1/2°. The 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. Refer to Dwg. MHP0498 on page 7.
6. Do not weld to any part of winch.

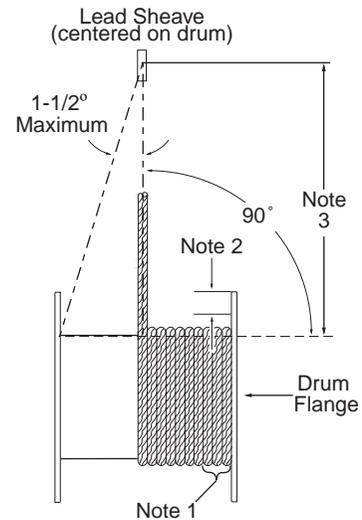
Winch Bolt Hole Mounting Dimension Drawing



(Dwg. MHP0133)

- Winch Bolt Hole Mounting Dimensions

Dimension	Drum Length (inches)	
	inch	mm
"A"	31.25	794
	9	229
"B"	13/16	20
	4	



(Dwg. MHP0498)

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 5.
3. For correct fleet angle, maintain a minimum of 1.6 ft (0.5 m) per inch of drum length. Example: for 16 inch drum length locate lead sheave at least 25.6 ft (7.8 m) from drum.

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. MHP2417 on page 8 and MHP2418 on page 9.**

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.

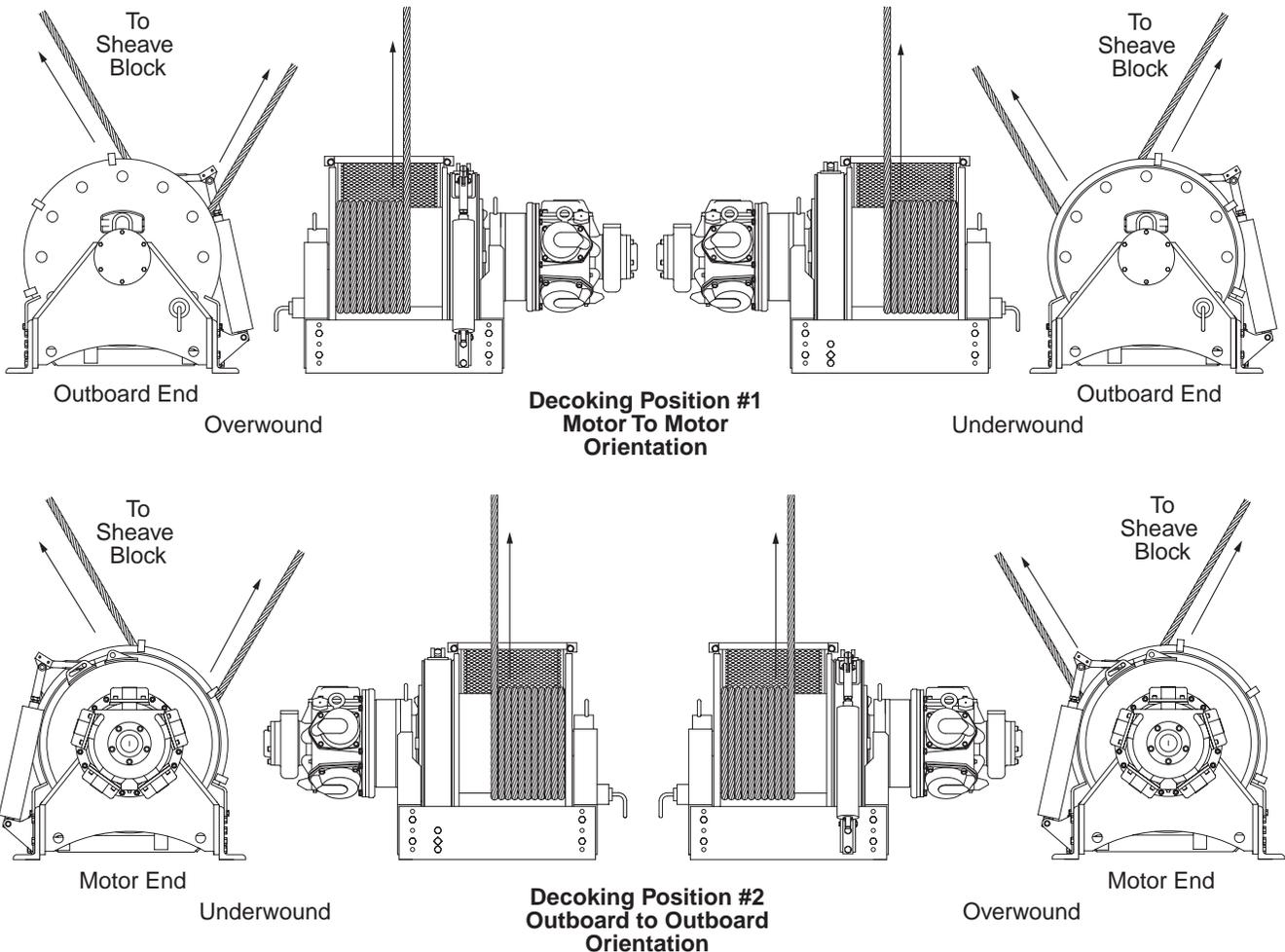
When considering wire rope requirements the actual working load must include not only static or dead load but also loads resulting from acceleration, retardation and shock load. Consideration must also be given to the size of winch wire rope drum, sheaves and method of reeving. Wire rope construction should be 6 X 19 or 6 X 37 IWRC EIPS right regular lay. Refer to Table 3 on page 8 for minimum and maximum recommended wire rope sizes.

Minimum and Maximum Wire Rope Size

Model	Minimum		Maximum	
	inch	mm	inch	mm
FA5-DCOKR	5/8	16	7/8	22

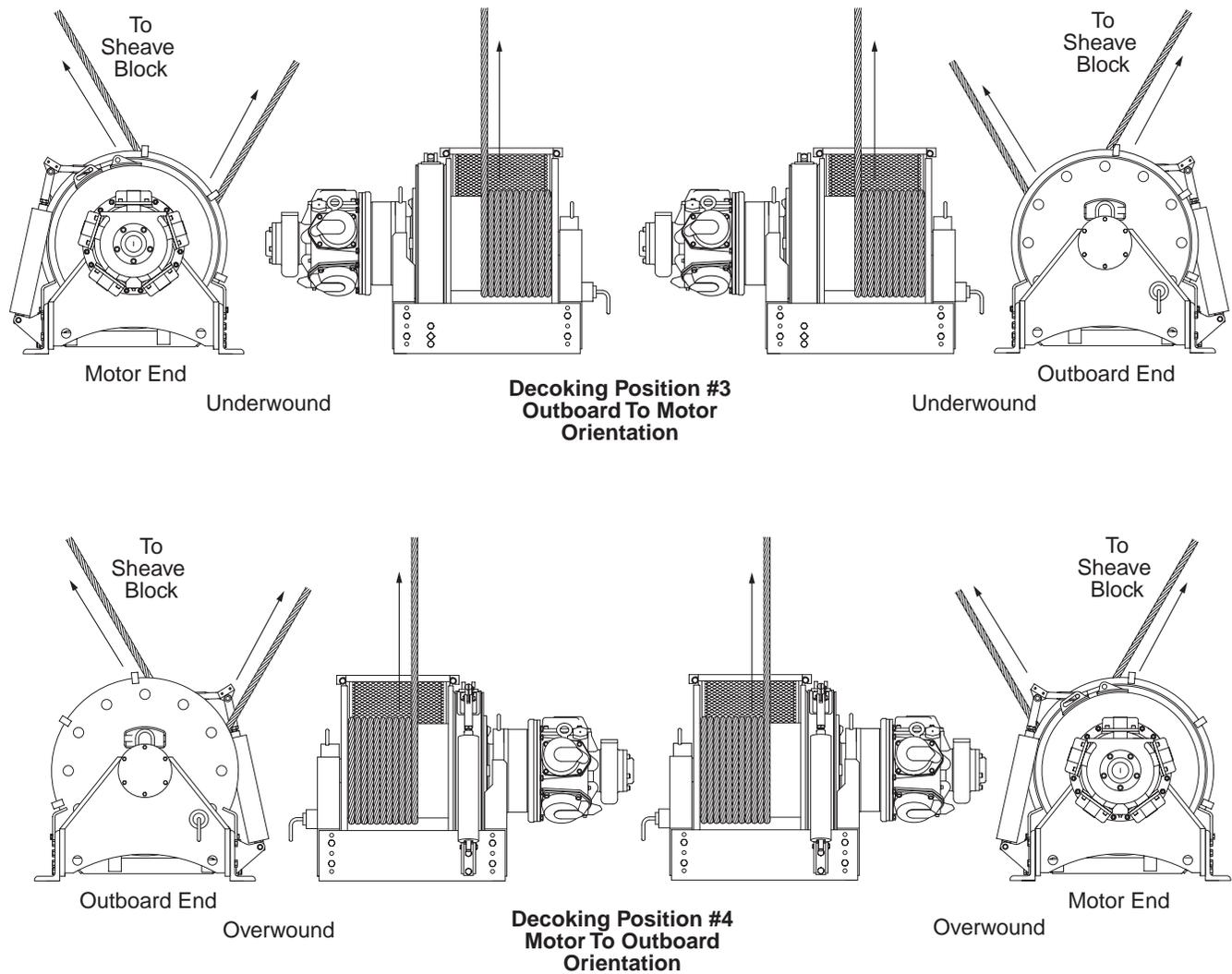
Note: Maximum wire rope diameter is limited by size of wire rope anchor hole. Refer to parts list for correct wire rope anchor part numbers.

Wire Rope Take-off Angles for Positions 1 and 2



(Dwg. MHP2417)

Wire Rope Take-off Angles for Positions 3 and 4



(Dwg. MHP2418)

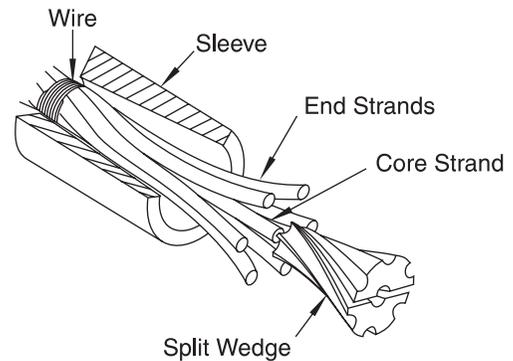
Installing Wire Rope



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

Refer to Dwg. MHP0166 on page 9.

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 the end of wire rope.
5. Spread end strands of wire rope and insert split wedge until it is below the end of wire rope.



(Dwg. MHP0166)

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



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

Safe Wire Rope Handling Procedures

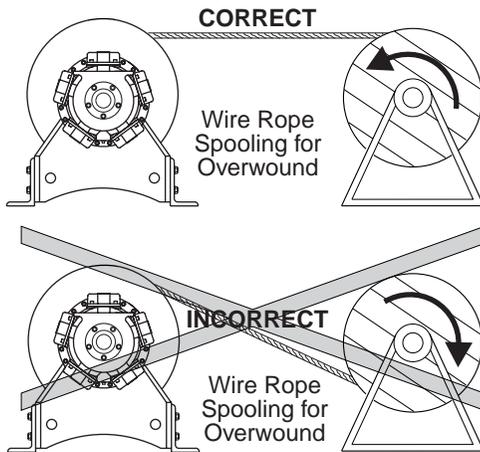
1. Always use gloves when handling wire rope.
2. Never use wire rope which is frayed or kinked.
3. Never use wire rope as a sling.
4. Always ensure wire rope is correctly spooled and the first layer is tight against drum.
5. Always follow wire rope manufacturers' recommendation on use and maintenance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

Wire Rope Spooling

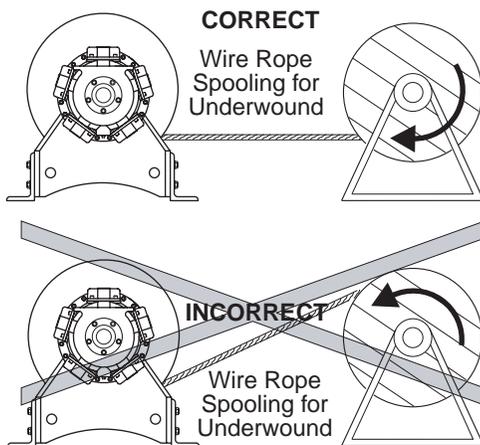
Refer to Dwg. MHP2419 and MHP2420 on page 10. To compensate for uneven spooling and decrease in line pull capacity as drum fills up, use as short a wire rope as practical. When rewinding apply a minimum 1,000 lbs (454.4 kgs) of tension to the end of wire rope to eliminate slack. This helps achieve level wind 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. MHP2420)



(Dwg. MHP2419)

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. 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 7.
5. Always maintain at least three full, tight wraps of wire rope on drum.

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 **FA5-Decoker** air motor is 700 scfm (20 cu. m/min) at rated operating pressure of 90 psig (6.3 bar) 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 on page 10. 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 lines.

- Minimum Allowable Air Supply Line Sizes

Model	inch	mm
FA5-DCOKR	1-1/2	38

Air Line Lubricator

Refer to Dwg. MHP0191 on page 11. 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

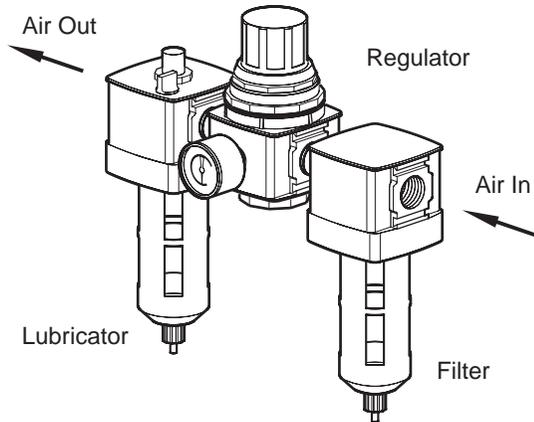
- Lubricator must be located no more than 10 ft. (3 m) from motor.
- Shut off air supply before filling air line lubricator.

The air line lubricator should be replenished daily and set to provide 6 to 9 drops per minute of ISO VG 32 (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 11.

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 the strainer/filter periodically to maintain its operating efficiency.



(Dwg. MHP0191)

Air Pressure Regulator

If an air pressure regulator is used, install between lubricator and filter. Refer to Dwg. MHP0191 on page 11.

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 or 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 port. 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 700 scfm (6.3 bar/630 kPa at 20 cu. m/m) as measured at motor inlet. The air motor should be installed as near as possible to compressor or air receiver.

Initial Operating Checks

Winches are tested for proper operation prior to leaving 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 inlet connection to provide initial lubrication.
2. When first operating winch it is recommended that motor be operated slowly in both directions for a few minutes.

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

1. Give the winch an inspection conforming to requirements of "Winches Not in Regular Use" in the "INSPECTION" section on page 5.
2. Pour a small amount of ISO VG 32 (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, the structure supporting rigging and winch, do not "two-block" the end of wire rope.

* Two blocking occurs when winch wire rope is multi-reeved using two separate sheave blocks which are allowed to come into 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 manufacturers' literature. The operator must thoroughly understand proper methods of hitching loads and must have a good attitude regarding safety. It is the operator's responsibility to refuse to operate winch under unsafe conditions.

⚠ WARNING

• Winch is not designed or suitable for lifting, lowering or moving persons. Never lift loads over people.

Winch Controls

Controls that are located remote from winch on a control console. Refer to Parts, Operation and Maintenance Manual, Form No. MHD56248.

Winch Mounted Throttle Control Valve (optional)

Refer to Dwg. MHP1809 on page 12.

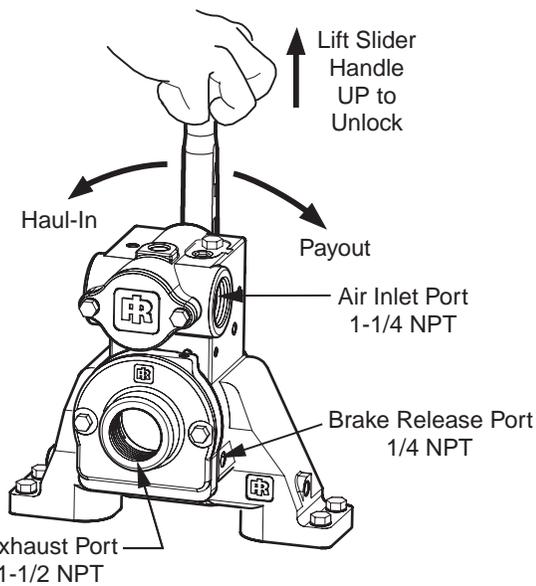
The spring loaded, live air, manual control throttle valve mounts to the rotary housing.

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 the air motor end, move the 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 the 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.

Winch Mounted Throttle Control Valve



(Dwg. MHP1809)

Underwound Operation (optional)

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.

Winch Brakes

Automatic Drum Brake

Refer to Dwg. MHP2429 on page 36.

The automatic drum brake is a spring applied, air released brake which utilizes an air actuated, spring loaded cylinder (110), 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 (110) is vented and spring automatically engages brake to prevent drum rotation.

The cylinder clevis (107) must be kept properly adjusted to hold required load.

Automatic Disc Brake

Refer to Dwg. MHP2425 on page 34.

The automatic disc brake is a spring applied, air released brake. Using an air actuated, spring loaded piston (10), the brake automatically disengages when motor is operated and engages when throttle is returned to neutral position.

Air pressure ported through brake housing (21) overcomes spring (9) pressure and moves piston (10) which releases brake. When control valve is placed in neutral position, air is vented, spring pressure overcomes air pressure and spring (9) pressure moves piston, engages brake and prevents drum rotation.

Drum Locking Pin

Refer to Dwg. MHP2426 on page 42.

The drum locking pin is mounted to winch on outboard upright, opposite motor. It should be engaged if a load is left suspended. The drum lock is operated by rotating a pin between a shallow groove (disengaged) and a deep groove (engaged).

LUBRICATION

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

The 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 the 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 winch performance. Approval for use of other lubricants must be obtained from your **Ingersoll-Rand** distributor. Failure to observe this precaution may result in damage to winch and/or 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 the "INSPECTION" section. In 'Heavy' or 'Severe' operating conditions adjust lubrication intervals accordingly.

Recommended Lubricants

Reduction Gear Recommended Lubricant

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

* Units are shipped from factory with ISO VG 100 (3 EP) lubricant. Reduction gear capacity is approximately 2 quarts (1.9 litres).

Air Motor and Disc Brake Recommended Lubricant

Temperature	Type Oil
Below 32° F (0° C)	ISO VG 32 (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).

Recommended Grease

Temperature	Type Oil
-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

NOTICE

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

Component Lubrication

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 (yearly in NORMAL and HEAVY; quarterly in SEVERE), 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.

Motor

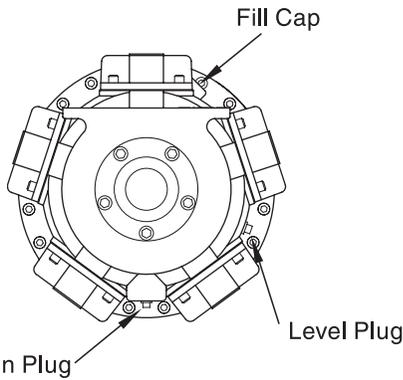
Refer to Dwg. MHP2422 on page 14.

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' section.

Oil capacity for the K5B-546 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 (225), located on side of motor housing (217). If desired, all oil may be drained at end of shift and motor refilled with new oil.

K5B Motor Lubrication Locations



(Dwg. MHP2422)

Reduction Gear Assembly

Refer to Dwg. MHP0140 on page 14.

It is recommended 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.).

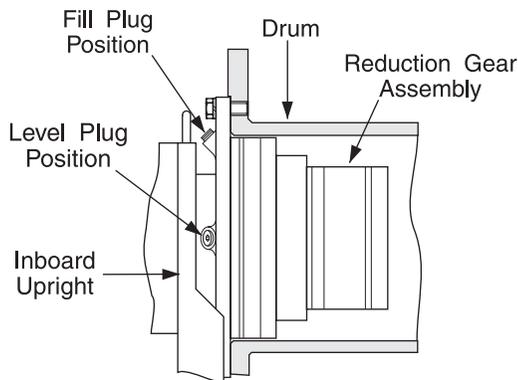
The reduction gear is filled to the correct levels prior to shipment from the factory. Check oil level before initial winch operation. This component is splash lubricated by oil in the housing and has no other means of lubrication. It is therefore important to use high quality Extreme Pressure (EP) rust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

CAUTION

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

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 4 quarts (3.8 litres).

Reduction Gear Lubrication Plug Locations



(Dwg. MHP0140)

Disc Brake

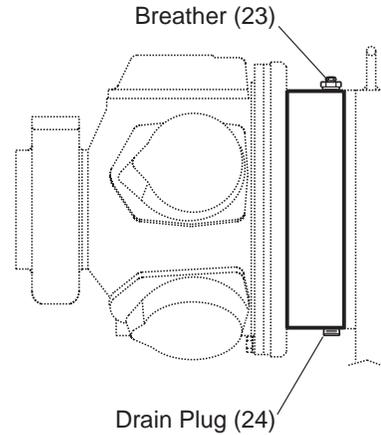
Refer to Dwg. MHP1348 on page 14.

The friction plates and drive plates are in a self contained oil bath and have no other means lubrication. After an oil change or winch

overhaul remove the breather (23) and pour a small amount of oil [4 to 6 ounces (0.2 litres)] through breather hole in brake housing. Allow oil to fully settle between fillings.

NOTICE

• **If too much oil is added excess oil will be discharged through breather plug when control valve is actuated.**



(Dwg. MHP1348)

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 wire rope manufacturer.**

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

Seals and Bearings

If winch is disassembled, clean all parts thoroughly and coat bearings and seals with clean grease. Refer to 'Recommended Lubricants' 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

Refer to Dwg. MHP2426 on page 42.

Lubricate at least once every month, depending on environment and duty cycle, through grease fitting (170) located in gland cap (165) with 2 or 3 pumps of a grease gun.

If drum locking pin is disassembled, clean all parts thoroughly and coat with clean grease. Refer to 'Recommended Lubricants' section. Use sufficient grease to provide a good protective coat.

Lubrication will help to prevent rust and allow easier locking pin operation.

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. The 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(s) must be decided, and correction of noted safety hazard(s) 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 authorized 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 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 (such as abnormal noises).

1. WINCH. Prior to operation, visually inspect winch housings, controls, brakes, side rails and drum for indications of damage. Do not operate winch unless the wire rope feeds onto drum smoothly. Any discrepancies noted must be reviewed and inspected further by authorized personnel instructed in 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 the 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 the drum. Do not operate winch unless wire rope feeds onto drum smoothly.
 6. LUBRICATION. Refer to "LUBRICATION" section for recommended procedures and lubricants.
 7. 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 lubricated air supply provides 6 to 9 drops per minute of ISO VG 32 (SAE 10W) oil when winch is operated at rated capacity. Operate winch slowly in both directions to verify operation.
 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.

Periodic Inspection

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

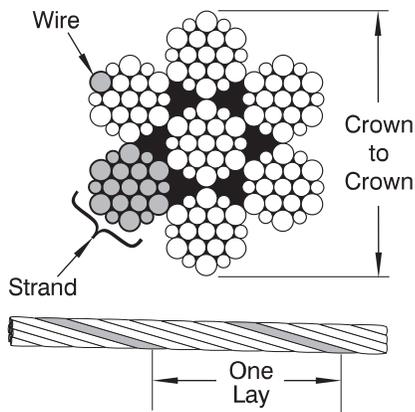
NORMAL	HEAVY	SEVERE
yearly	semiannually	quarterly

Disassembly may be required as a result of frequent inspection findings or in order to properly inspect individual components. Refer to "MAINTENANCE" section on page 20. 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 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 suitability of wire rope to remain in service. Refer to Dwg. MHP0056 on page 16.
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 mid 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.** Verify fasteners are tight and in good condition. Ensure guard is in good condition.

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 placed in service.
3. Standby equipment shall be inspected at least semi-annually in accordance with requirements of "Frequent Inspection". In abnormal operating conditions, equipment should be inspected at shorter intervals.



(Dwg. MHP0056)

INSPECTION AND MAINTENANCE REPORT

Ingersoll-Rand Force 5 Series FA5-Decoker Air Winches

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 ACTION		NOTES
	Pass	Fail	Repair	Replace	
Uprights and Side Rails					
Drum Band Brake (125% Load Test)					
Disc Brake (125% Load Test)					
Drum Band Brake (Visual Inspection)					
Disc Brake (Visual Inspection)					
Motor					
Controls					
Air System					
Fasteners					
Reduction Gears					
Labels and Tags			---		
Shafts					
Wire Rope Wedge			---		
Wire Rope			---		
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 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 50 psig (3.4 bar/340 kPa).
	Shipping plugs may still be in place.	Remove shipping plugs in valve and motor exhaust ports.
	Drum brake does not release.	Disengage manual drum brake, or refer to 'Automatic Drum Brake Adjustment' on page 20.
Load continues to move when winch is stopped.	Drum brake is slipping.	Check drum brake adjustment on page 20 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 or does not lift rated capacity.	Motor may be damaged.	Remove and disassemble motor as described in the "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 requirements listed in the "SPECIFICATIONS" section on page 5. Clean air line filter.
Motor runs hot or makes excessive noise during operation.	Low oil level.	Check oil level in motor. Add oil as required to obtain proper level.
	Improper lubrication.	Replace oil with type recommended in "LUBRICATION" section on page 13. 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 the "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 20.
Throttle control valve moves but winch does not operate.	Motor may be damaged.	Disassemble and clean motor, replace any broken or damaged parts.
	Insufficient air supply.	Ensure air pressure at 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 hose(s) as necessary.
Air lines freeze.	Water in air supply.	Install or drain air system moisture traps, moisture collecting air receivers and compressor after-coolers. After corrective action has been taken, disconnect lines at winch inlet and purge with clean, dry air or nitrogen.

SYMPTOM	CAUSE	REMEDY
Automatic Drum Brake:		
Brake cylinder will not release.	Drum brake out of adjustment.	Adjust drum brake to maintain correct cylinder stroke.
	Leaking cylinder seals.	If air is noticed escaping from cylinder 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 in neutral. If no air escapes, replace dump valve.
Automatic Disc Brake:		
Brake fails to release.	Low air supply pressure.	Ensure air pressure at inlet to disc brake is at least 50 psig (3.4 bar/340 kPa).
	Leaking piston seals.	Inspect brake breather. If air escapes from brake breather when attempting to release brake, replace brake seals.
	No release pressure at brake port.	Check for proper operation of winch controls.
	Sticking brake piston.	Apply 50 psig (3.4 bar/340 kPa) to brake release port and check for brake disc movement. If brake discs do not move, disassemble and inspect disc brake. Refer to "MAINTENANCE" on page 20.

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 maintenance 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" on page 15 in "INSPECTION" section for interval guidance.

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 drum brake friction linings. Clean or replace parts as required. Adjust drum 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.

Adjustments

Disc Brake Adjustment

Refer to Dwg. MHP2425 on page 34.
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.

Automatic Drum Brake Adjustment

- Refer to Dwg. MHP2429 on page 36.
1. Remove cotter pin (102) and washer (129) at adjustment clevis (107).

2. Apply air to brake cylinder (110) and remove pin (106) and second washer (129) to disconnect clevis from brake lever (105).
3. Turn adjustment clevis (107) clockwise to increase cylinder rod extension. Turn clevis counterclockwise to decrease cylinder rod extension.
4. Assemble clevis (107) to brake lever (105) with washer (129) and pin (106). Release air to brake cylinder (110).
5. Measure cylinder rod extension. Length should be 1 to 1-1/2 inches (25 to 37 mm). Readjust if necessary.
6. Install cotter pin (102) and second washer (129) to secure clevis to brake lever when adjustment is complete.
7. With brake "On", adjust screw (127) to just touch arm (124).

Disassembly

General Disassembly Instructions

The following instructions provide necessary information to disassemble, inspect, repair, and assemble 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 perimeter of a cover or housing with a soft hammer, 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. The 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 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

Refer to Dwg. MHP2421 on page 30, MHP2424 on page 32 and MHP2425 on page 34.

1. Remove wire rope from drum.
2. Operate winch to position reduction gear drain plug at it's lowest position.
3. Relieve pressure in air lines by operating winch control several times after air supply has been shut off.

WARNING

• **Shut off, bleed down and disconnect air supply line before performing any disassembly procedures.**

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 drain plug (225) on K5B motor housing (217) and allow oil to drain into a suitable container. Loosen vent cap (210) to vent motor housing.
7. Drain oil from reduction gear assembly by removing one plug (48) when positioned at it's lowest point, and one plug (48) from it's highest point to vent. Refer to Dwg. MHP0140 on page 14 in "LUBRICATION" section. Elevate winch outboard end (opposite from motor end) to prevent draining oil from contaminating brake band lining.
8. Remove pipe plug (24) in brake housing (21) to drain brake oil.
9. Remove drum band brake, drum guard and any other externally mounted winch attachments.

WARNING

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

10. Remove capscrews (4) and lockwashers (3) securing motor assembly to motor adapter (6). Using a hoist to support motor, pull motor straight away from winch. Refer to 'Motor Disassembly' section if motor disassembly is required.
11. Alternately and evenly loosen eight capscrews (1) until brake spring tension has been released. Remove capscrews (94) and motor adapter (6).
12. Remove brake housing (21). If brake housing sticks, tap it with a soft faced hammer until parts separate.

Note position of all brake parts for reassembly.

13. Remove springs (9) from brake piston (10).
14. Remove brake piston (10) from brake housing (21). Tap lightly with a plastic mallet to separate parts if necessary.
15. Remove three friction plates (16) and two drive plates (17).
16. Remove seals (11) and (12) from brake piston (10).
17. Loosen capscrew in collar (18) and slide collar from drive shaft (35) with splined hub (19) and spacer (44) from drive shaft (35).
18. Remove retainer ring (36) from bore of drum shaft (41).
19. Pull shaft and bearing assembly from drum shaft (41).
20. Support drum (80) and remove capscrews (39) from drum shaft (41). Pry drum shaft (41) from inboard upright (42).
21. Remove capscrews (85) and lockwashers (86) which secure side rails (82) and (83) to inboard upright (42). Drive out dowel pins (87).

22. Remove inboard upright (42).
23. Remove end cover (95), capscrews (97) and lockwashers (96) from outboard upright (84).
24. Remove capscrews (93) and shaft retainer (92) from drum (80).
25. Remove drum and reduction gear assembly.
26. Remove remaining capscrews (85) and lockwashers (86) which attach side rails (82) and (83) to outboard upright (84). Drive out dowel pins (87).
27. Remove bearing (49) and seal (99) from outboard upright (84).
28. Remove capscrews (45) and lockwashers (46) securing gear carrier (47) to drum (80).
29. Install two 3/4 inch - 10 NC x 3 inch long capscrews into threaded holes in outer bolt pattern ring of gear carrier (47). Use these capscrews to break seal. Remove reduction gear carrier assembly from drum (80).

NOTICE

• **It is not recommended to disassemble reduction gear. If disassembly is unavoidable refer to 'Reduction Gear Disassembly' section.**

Automatic Drum Brake Disassembly

Refer to Dwg. MHP2429 on page 36.

1. Disconnect and remove hose, fittings and dump valve (112) from cylinder (110).
2. Remove cotter pin (102) and pin (101) from link stud (103) and brake band (128).
3. Remove cotter pin (102), washers (129) and pin (106). Separate clevis (107) from brake lever (105).
4. Remove cotter pin (102) and pin (134). Remove cylinder (110) from bracket (118).
5. Remove capscrews (119), lockwashers (117) and stop plate (126).
6. Use a hoist to raise winch approximately 6 inches (15 cm). Separate brake band (128) halves and rotate brake band assembly slowly until it can be removed from drum (80).
7. Remove cotter pins (102) and pins (121) so brake band halves (128) can be removed from arm (124). Lower winch when brake band assembly has been removed.
8. Refer to "Brake Lining Instruction Sheet" (Form MHD56142) for brake lining replacement procedures.

K5C2 Control Valve Disassembly (optional feature)

Refer to Dwg. MHP2427 on page 40.

Handle Removal

It is not recommended to disassemble handle.

1. Carefully pry off plug (935).
2. Remove capscrew (901) and tablock washer (909).

NOTICE

• **Observe spring (937) connection during disassembly. This spring is under tension and is required to return handle to neutral position.**

3. Carefully pull handle assembly (930) from reverse valve (943). Remove spring (937).

Reverse Valve Disassembly

1. Remove buttonhead screws (938), capscrews (925) and washers (924) from seal bracket (939). Remove seal bracket from housing. Remove and discard 'O' rings (941) and (942).
2. Remove capscrews (901) and washers (902) from exhaust flange (955). Remove flange from housing. Remove and discard 'O' ring (942).
3. Move reverse valve (943) out exhaust flange side of housing until ball (916) is visible on reverse valve. Allow ball (916) to drop out of bushing (944) and remove ball (916).
4. Remove bushing (944) out exhaust flange side of housing.

NOTICE

- Dowel pin (945) allows the bushing to be removed only from the exhaust flange side of housing. Ball (916) retains reverse valve (943) in bushing (944).
- Do not remove reverse valve (943), bushing (944) and ball (916) at the same time, damage may occur to bushing.
- Take care to not allow ball (916) to drop in motor. If this occurs it may be necessary to disassemble motor to retrieve ball (916).

Piston Disassembly

1. Remove capscrews (901) and washers (902) from piston cover (919). Remove cover and discard gasket (918).
2. Remove capscrews (901) and washers (902) from poppet cover (903). Remove cover and discard gasket (904).
3. Remove the following items from housing poppet bore: spring (905), poppet cap (906) and poppet seal (907).
4. From poppet side, push piston (922) out of housing. Remove 'O' rings (921) and (923) and discard.

Pilot Valve Removal

NOTICE

- For easier removal it is recommended to use I-R pilot valve tool (920). This must be purchased separately.

If pilot valve is not damaged it is not necessary to disassemble completely.

1. Remove plug (912).
2. Remove pilot valve assembly (910) as an assembly.
3. Discard and replace pilot valve assembly (910) if necessary.

Reduction Gear Disassembly

Refer to Dwg. MHP2421 on page 30.
Reduction gear disassembly is not recommended. If disassembly is unavoidable use the following steps.

NOTICE

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

1. Place reduction gear assembly on a clean work bench such that end containing bearing (49) is down.
2. Remove capscrews (75) and pry off cover (73).
3. Remove ring gear (63), thrust bearing (71) and sun gear (66).
4. Remove and discard 'O' rings (62) from ring gear (63).
5. Remove four pins (74) from between cover (73), ring gear (63) and spacer (71) and store in a safe place.

6. Remove capscrews (60) from input housing (59). Separate input housing from gear carrier (47).
7. Remove planet assembly (58).
8. Remove ring gear (53). Remove three dowel pins (52) from between input housing (59) and gear carrier (47) and store in a safe place.
9. Remove and discard 'O' rings (51) from ring gear (53).
10. Remove retainer ring (57) and sun gear (56). If required, remove thrust plate (55) from sun gear.
11. Remove planet assembly (54).
12. Remove retainer ring (50) and bearing (49) from gear carrier (47).

NOTICE

- Do not disassemble planetary gear assemblies (54) and (58).

K5B Motor Disassembly

Refer to Dwg. MHP2424 on page 32.

If equipped with a muffler, remove muffler (170), pipe nipple (171), pipe elbow (169) and pipe reducer (171) before starting disassembly on main motor.

1. Remove five capscrews (1) from exhaust flange (253).
2. Remove rotary valve housing (247) by pulling it out of motor housing (217) as an assembly with exhaust flange (253).
3. Remove rotary valve (250) by pulling it out from assembly through the motor housing end of rotary valve housing (247).
4. Remove exhaust flange (254) and throttle valve assembly (260) by removing capscrews (255) and (257), respectively.
5. Remove each cylinder head (201) by removing four capscrews (200). Remove head gasket (209).
6. Pull cylinder liner (208) straight out.
7. Position piston (204) at top of its stroke. In this position, with cylinder liner pulled out in step 7, 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 liner are to be re-assembled, number each set. Also add radial alignment marks for each piston and cylinder liner to motor housing.

8. Remove remaining cylinder liners and pistons as described in steps 7 and 8. To remove crank assembly, all pistons and cylinder liners 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 pin threads.
3. Pull crankshaft valve end (231) off crankshaft.
4. Remove connecting rod rings (234), connecting rod bushing (233), sleeve (232) and connecting rods (206). Record five connecting rod (206) numbers and foot directions so they can be re-installed in same order.
5. Oil slinger (230) does not have to be removed unless damaged. If removal is required, heating of five screws (229) may be necessary to loosen Loctite® connection.

Cleaning, Inspection and Repair

Clean all winch component parts in solvent (except drum brake bands and disc brake friction plates). The 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 scrape old Loctite® from bushing bores. Dry each part using low pressure, filtered compressed air. Clean drum brake band using a wire brush or emery cloth. Do not wash drum brake band in solvent. If drum 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 drum brake band linings are less than 0.062 inch (2 mm) thick anywhere along edges replace brake bands (128) as a set.
7. Inspect cylinder bores. Minor scratches in bore lining may be repaired by lightly honing to remove. Refer to tolerances listed below for acceptable clearances. Replace liner if deep scratches or gouges are apparent. Measure inside diameter of liner. If measurement is greater than 4.764 inches (121 mm) replace liner. 'Ring Gap' may also be used to determine wear; place compression ring into liner, using a piston, push ring until approximately half way in liner and measure 'Gap' — 0.003 inch (0.076 mm) is normal; replace rings, or liner, if 'Gap' exceeds 0.020 inch (0.51 mm).

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 the applicable parts listing for specific replacement parts information.
2. Inspect all remaining parts for evidence of damage. Replace or repair any part which is in questionable condition. Cost of the part is often minor in comparison with cost of redoing 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 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 rust and oxidation inhibiting lubricant, ISO VG 100 (SAE 30W).

K5C2 Control Valve Assembly (optional feature)

Refer to Dwg. MHP2427 on page 40.

Reverse Valve Assembly

1. Insert reverse valve (943) into bushing (944) with ball slot oriented UP, approximately 2-1/2 in. (64 mm).
2. Insert bushing (944) and reverse valve (943) into valve housing (917) from exhaust flange side, ensuring that groove in bushing is aligned with pin (945).
3. Insert ball (916) onto reverse valve platform. With finger, push ball (916) in housing until ball hits end of reverse valve.
4. Holding ball (916) in position on reverse valve platform, rotate reverse valve from neutral position to approximately 45 degrees in either direction. Ball will 'walk' up side of reverse valve platform and move in ball hole in bushing.

NOTICE

- **Do not rotate reverse valve past a 90 degree position, it may result in the ball (916) falling in motor.**
5. Slowly push reverse valve, while still in the 45 degree position, the rest of the way in housing until flush with surface. From other side of valve rotate reverse valve back to neutral position, ball should be seated in ball slot at that time.
 6. Lubricate 'O' ring (942) and place it in groove in exhaust flange (955).
 7. Secure exhaust flange (955) to valve housing with capscrews (901) and washers (902).
 8. Insert 'O' ring (941) into seal bracket (939). Lubricate 'O' ring (942) and place into groove in seal bracket.
 9. 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 (924) and capscrews (925) and (938).

Pilot Valve Assembly

NOTICE

- **For easier installation it is recommended to use I-R pilot valve tool (920). This must be purchased separately.**

1. Install pilot valve assembly (910).
2. Apply thread sealant Loctite 567® to pilot valve assembly (910), place pilot valve assembly into valve housing. Use a large flat tipped screwdriver to engage slots in pilot seat and tighten until pilot assembly is 1/8 in. (3.175 mm) from housing bore.
3. Insert plug (912) and tighten.

Piston Assembly

1. Lubricate and install 'O' rings (921) and (923) on piston (922).
2. Insert assembled piston into valve housing (917) from handle side.

- Secure with gasket (918), piston cover (919), washers (902) and capscrews (901).
- Place poppet seal (907) into poppet cap (906). Place this assembly into valve housing and seat on piston (922).
- Place spring (905) over this assembly.
- Secure with gasket (904), poppet cover (903), washers (902) and capscrews (901).

Handle Assembly

- Place spring (937) 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.**

- 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.
- Secure handle assembly (930) to reverse valve with tab lock washer (909) and capscrew (901), torque to 15 ft lbs. (21 Nm). Washer (909) has small tab on side, engage with small hole in handle.
- Bend tabs of washer (909) over flats of capscrew.
- Press plug (935) into handle assembly to cover capscrew. Check control handle movement. Correct any discrepancies

K5B Motor Assembly

Refer to Dwg. MHP2424 on page 32.

Winch Mounted Throttle Control Valve:

- Assemble throttle valve assembly (900), gasket (946) to rotary valve housing (247) using capscrews (951) and lockwashers (949). Torque to 25 ft lbs (34 Nm).

Motor:

- Install two seal rings (251) on each end of rotary valve (250). Place bearing (252) onto the rear of rotary valve (250) and press into position. Press only on bearing inner race. With rotary valve housing (247) exhaust flange down, install rotary valve into housing.
- Install ‘O’ ring (244) into motor housing (217).
- Install rotary valve housing gasket (243) onto rotary valve housing. With exhaust flange down on bench, install motor housing (217) onto rotary valve housing. Check for any evidence of damage to ‘O’ ring when rotary valve housing is fully engaged. Install and tighten capscrews (1) to 50 ft lbs (68 Nm).
- If removed, press crank bearing (228) on crank assembly (231). Apply pressure only on inner race of bearing.
- Place crank assembly on a work bench with oil slinger (230) down and slide the sleeve (232) (with tang up) on crankpin.
- Slide connecting rod bushing (233) over sleeve (232) and first connecting rod ring (234) with chamfer up.
- 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.
- Slide second connecting rod ring over other side of connecting rod feet with chamfer on ring facing down (toward stem of connecting rod).
- Slide crank shaft valve end over crank pin while simultaneously aligning tang on sleeve (232) with slot in crank shaft.
- Rotate and position crank shaft valve end relative to crank pin to allow installation of lock pin (235).

- Tap lock pin (235) in place and install pin nut (237). Torque nut to 60 ft lbs (81 Nm).
- Install cotter pin (236) and bend ends over.
- Install roll pin (240) and bearing (228) into valve end of crank shaft.
- Check that all connecting rods move freely around crank. Position crank assembly into motor housing (217). Ensure bearing (228) is seated and connecting rods (206) are centered in cylinder holes.

NOTICE

• **Make certain 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 to slide back in rotary valve housing (247). If rotary valve slides in too far, seal ring (251) will lock-up in internal grooves of rotary valve housing (247) and restrict further assembly.**

- Rotate crank assembly until one connecting rod (206) is at the top of its stroke. Install a piston (204) with its rings (202) and (207) to connecting rod with wrist pin (203) and retaining rings (205).
- Install a new cylinder head gasket (209) before installing cylinder liner (208).
- Install cylinder liner over the piston by compressing both piston rings and with a single band ring compressor.
- Install cylinder head (201) over cylinder and secure cylinder head to motor housing with four capscrews (200). Torque capscrews to 60 ft lbs (81 Nm).
- Repeat Steps 17 through 20 with remaining cylinders.
- Rotate motor by hand. Motor should rotate without binding.
- Install mounting flange (216) and gasket (226) on front of motor housing. Make sure notches on both parts are aligned.
- Lightly lubricate ‘O’ ring (5) and install in groove on motor adapter (6).

NOTICE

• **‘O’ ring (5) listed in step 24 refers to part number 51459 as shown on winch assembly Dwg. MHP2421 on page 30. This part must be placed between mounting flange (216) and motor adapter (6).**

- Temporarily install capscrews and nuts finger tight to retain motor adapter (6).
- Install eye bolts (213) and vent cap assembly (210) in motor housing.
- Ensure oil drain and level plugs (225) are installed.

Reduction Gear Assembly

Refer to Dwg. MHP2421 on page 30.

NOTICE

• **It is important to maintain a clean work area when reduction assemblies are reassembled. During reassembly clean each part thoroughly and lightly coat with appropriate lubricant as described in ‘Recommended Lubricants’ on page 13 of the ‘LUBRICATION’ section.**

- Install bearing (49) and retainer ring (50) in gear carrier (47).
- Lubricate and install ‘O’ rings (51) on ring gear (53).
- Align capscrew holes and dowel pins (52) with gear carrier (47) and install ring gear (53). Ensure ‘O’ rings are not damaged during installation.

4. Install planet assembly (54).
5. Install thrust bearing (55) into sun gear (56). Install retainer ring (57) on sun gear and locate in planet assembly (54).
6. Install planet assembly (58) onto sun gear (56).
7. Align capscrew and dowel holes and install input housing (59). Apply a light coating of Loctite® 242 to capscrew (60) threads and install by hand. Equally tighten capscrews in a diametrically opposed pattern to allow for equal compression of housing onto ring gear (53) and gear carrier (47). When ring gear and input housing flanges are flush with gear carrier torque capscrews to 145 ft lbs (197 Nm).
8. Install dowel pins (52) and tap into position until slightly below input housing flange.
9. Lubricate and install 'O' rings (62) on ring gear (63).
10. Align capscrew holes and dowel pins and install ring gear (63) on input housing (59). Ensure 'O' rings are not damaged during installation.
11. Place thrust bearing (55) in sun gear (66) and install sun gear into planet assembly (58).
12. Align capscrew and dowel holes and install cover (73). Use a soft hammer or mallet to carefully tap the cover until flush with ring gear (63). Apply a light coating of Loctite® 242 to capscrew (75) threads and install by hand. Equally tighten the capscrews in a diametrically opposed pattern to allow for equal compression of cover onto ring gear (63) and spacer (71). When cover, ring gear and spacer flanges are flush torque capscrews to 32 ft lbs (42 Nm).
13. Install dowel pins (74) and tap into position until slightly below cover flange.
14. Place a bead of Loctite® 515 sealant on surface which mates with gear carrier. Sealant location should be inside bolt pattern.
15. Align capscrew and dowel holes and install reduction gear assembly into drum. Apply a light coating of Loctite® 242 to capscrew (45) threads and install capscrews and lockwashers (46). Torque capscrews to 255 ft lbs (346 Nm).
16. Install two dowel pins (87) and tap into position until slightly below gear carrier flange.
17. Apply thin coat of Loctite® 609 to outside of seal (43) and, with seal lip facing out, install in gear carrier (47).

Winch Assembly

Refer to Dwg. MHP2421 on page 30 and MHP2425 on page 34.

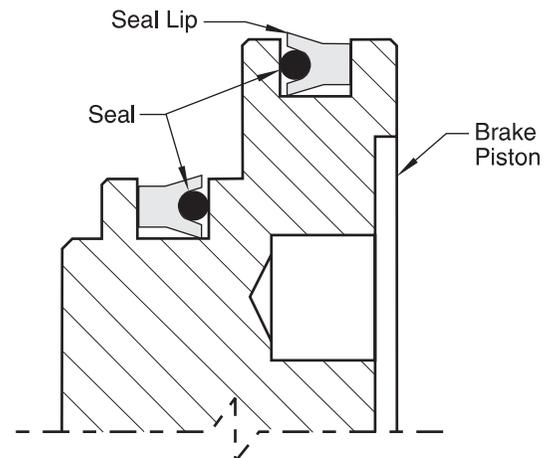
1. Clean both mating surfaces on inboard upright (42) and install drum shaft (41) through bore aligning dowel pin holes.
2. Install dowel pins (40) flush or slightly below surface of drum shaft (41).
3. Install eight capscrews (39). Lightly coat capscrew threads with Loctite® 242 and torque to 80 ft lbs (108 Nm).
4. Press bearing (37) onto drive shaft (35). Lightly coat inner bearing race bore with Loctite® 609. Install retainer ring (38).
5. Install shaft and bearing into drum shaft (41) so smaller splined end enters first. Install retainer ring (36) in bore of drum shaft (41).
6. Install splined hub (19) so splined side on outside diameter goes on first. Install capscrew in collar assembly (18) and place on drive shaft (35). Maintain pressure on collar assembly to keep it against splined hub (19) and tighten capscrew in collar assembly (18).
7. Lubricate and install 'O' ring (33) on hub of drum shaft.
8. Install brake housing (21) on drum shaft (41) being careful not to damage 'O' ring (33).
9. Position brake housing so brake port is in the 2 o'clock position (as viewed from the motor end). Install drain plug (24) in brake housing at the 6 o'clock position.
10. Install fitting (22) and breather (23) in the top of the brake housing.

11. Lubricate friction plates (16) with a light motor oil (refer to 'Recommended Lubricants' on page 13 in "LUBRICATION" section). Install friction plates (16) and drive plates (17) in brake housing. Begin with a friction plate then alternate with drive plates between friction plates. Ensure splined teeth mesh. Do not force plates into place during installation.
12. Lubricate and install seals (11) and (12) in brake piston (10) grooves so seal lips face each other. Do not overstretch seals during this procedure. Refer to Dwg. MHP0139 on page 25.
13. Install brake piston assembly in brake housing so stepped side enters first. Gently tap into position using a soft mallet until seated.
14. Install one brake spring (9) in each brake spring holes.
15. Lubricate and install 'O' ring (33) in groove on brake housing (21).

NOTICE

- 'O' ring (33) listed in step 15 refers to part number 51460 as shown on disc brake Dwg. MHP2425 on page 34. This part must be placed between brake housing (21) and motor adapter (6).

Brake Seal Installation



(Dwg. MHP0139)

16. Install brake reaction plate (8) in motor adapter.
17. Install seal adapter (15) in mounting flange (216), if required.
18. Two threaded holes in motor adapter (6) are centered between mounting bolt holes. Install motor adapter with these two holes in 6 o'clock position.
19. Secure motor adapter with eight capscrews (1) using Loctite® 242. Torque to 125 ft lbs (170 Nm). On winches with a disc brake install capscrews evenly to compress brake springs, and torque to 80 ft lbs (108 Nm). Do not allow plate to become cocked. Evenly hand tighten all capscrews before applying final torque.
20. Install shaft extender (7) on end of drive shaft (35).
21. Lubricate and install 'O' ring (5) in groove on motor adapter.
22. Ensure seal adapter (15) and oil seal (2) are installed in bore of motor assembly. Seal lip must face into motor assembly.

WARNING

- The air motor weighs approximately 260 lb. (118 kg). Adequately support air motor while installing motor mounting capscresws.

23. If motor assembly is being mounted with winch in a vertical position, install one short bolt and nut to keep motor

mounting flange from dropping off. Lower motor assembly carefully onto the shaft. Position throttle assembly at the top. Be careful not to damage oil seal (2). When correctly positioned remove bolt and nut and lower motor assembly the remaining distance.

24. Install the motor assembly to motor mounting plate using capscrews (4) and lockwashers (3). Lightly coat capscrew threads with Loctite® 242 and torque to 85 ft lbs (115 Nm).
25. On winches with a disc brake install fitting (31) in dump valve (30) and screw into brake release port. Install vented fitting (29) in dump valve (30). Install fitting (25) in valve assembly (260) with elbow (26). Install steel tube (27) between fitting on dump valve (30) and elbow (26).

Drum Assembly

1. Stand drum in an upright position. Align splines and carefully lower inboard upright and drum shaft assembly onto drum (80).
2. Using a 'C' clamp, secure inboard flange assembly to drum flange and set complete assembly in a horizontal position.
3. Clean seal surface and install oil seal (99) in outboard upright (84) with lip toward drum.
4. Pack bearing (49) with grease and install in outboard upright (84).
5. Install outboard upright (84) on drum end. Ensure assembly is kept centered on seal and journal during this step.
6. Install shaft retainer (92). Secure by installing three capscrews (93). Lightly coat capscrew threads with Loctite® 242. Torque to 30 ft lbs (41 Nm).
7. Install spacer (91).
8. Apply a light coat of Loctite® 515 sealant to mating surface of outboard upright (84) and install end cover (95). Secure using six capscrews (97) and lockwashers (96). Lightly coat capscrew threads with Loctite® 242. Torque to 30 ft lbs (41 Nm).
9. Install pipe plug (98) in end cover (95).
10. Install side rails (82 and 83) to uprights (42 and 84) and loosely secure using capscrews (85) and lockwashers (86).
11. Tap dowel pins (87) into position until flush with side rails.
12. Tighten eight capscrews (85) evenly. Torque to 140 ft lbs (190 Nm).
13. Mount winch to foundation as described in 'Mounting'. Refer to "INSTALLATION" section on page 7.

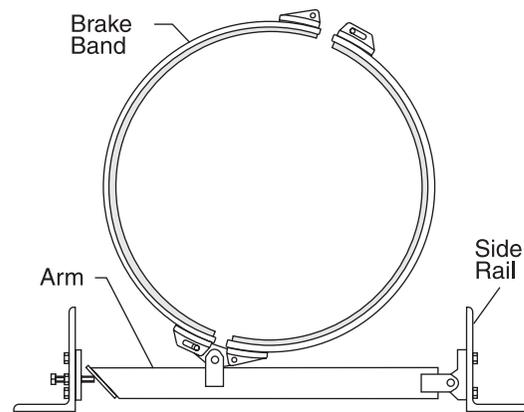
Automatic Drum Brake Assembly

Ref. Dwg. MHP2429 on page 36.

1. Install pivot bracket (122) on end of arm (124) with pin (121) and cotter pin (102). Recessed side of threaded hole must be toward brake band side.
2. Install connecting link (125) on arm and secure in position with pin (121), washer (123) and cotter pin (102). Bend ends of cotter pin over to secure. Assemble connecting link so curved surface matches contour of brake band.
3. Install halves of brake band (128) to connecting link and secure with pins (101), (121) and cotter pins (102). Bend ends of cotter pin over to secure.
4. Lift winch assembly, with a suitable hoist, approximately 6 inches (15 cm) off floor or work bench.

5. Position brake band subassembly around brake diameter on drum (80) until arm lays at bottom. When positioned, lower winch.
6. Mount pivot bracket on inside surface of side rail (83) and secure in position with capscrews (116) and lockwashers (117).
7. Screw link stud (103) into handle (104) and install handle (104) in lug on end of brake band (128). Lubricate pivot points being careful not to get grease on brake band lining.
8. Pull halves of brake band together and install pin (101) through lug on band (128) and link stud (103) of handle assembly.
9. Install stop plate (126) on inside of side rail (82) with capscrew (119) and washer (117). Install adjusting screw (127) and locknut (120) through side rail (82) and stop plate (126) until it contacts arm (124). Refer to Dwg. MHP0173 on page 26.

FA5-Decoker Band Brake Components



(Dwg. MHP0173)

10. Adjust brake as described under 'Adjustments' on page 20 in "MAINTENANCE" section.

Automatic Drum Brake Actuator Assembly

Refer to Dwg. MHP2429 on page 36.

1. Install bracket (118) on side rail (83) with capscrews (116) and lockwashers (117).
2. Screw nut (108) and clevis (107) onto cylinder rod.
3. Attach brake lever (105) to brake band (128).
4. Install cylinder (110) so it connects with bracket (118) and brake lever (105). Use pins (106) and (134), washers (129) and cotter pins (102) to secure in position.
5. Install dump valve (112), fittings and hose (113) and (115) to the cylinder (110).
6. Adjust automatic brake as described under 'Adjustments' on page 20 in the "MAINTENANCE" 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 the "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 Drum Brake Band Lining Run-in Procedure: All new drum brake band linings require a 'run-in' period. Operate the winch without load in the payout direction while gradually applying the brake. Allow the brake to slip for approximately one minute. Winch motor may stall as drum brake band lining fully engages. Do not allow brake to overheat.
4. Check operation of brakes. Adjust if necessary as described in the "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

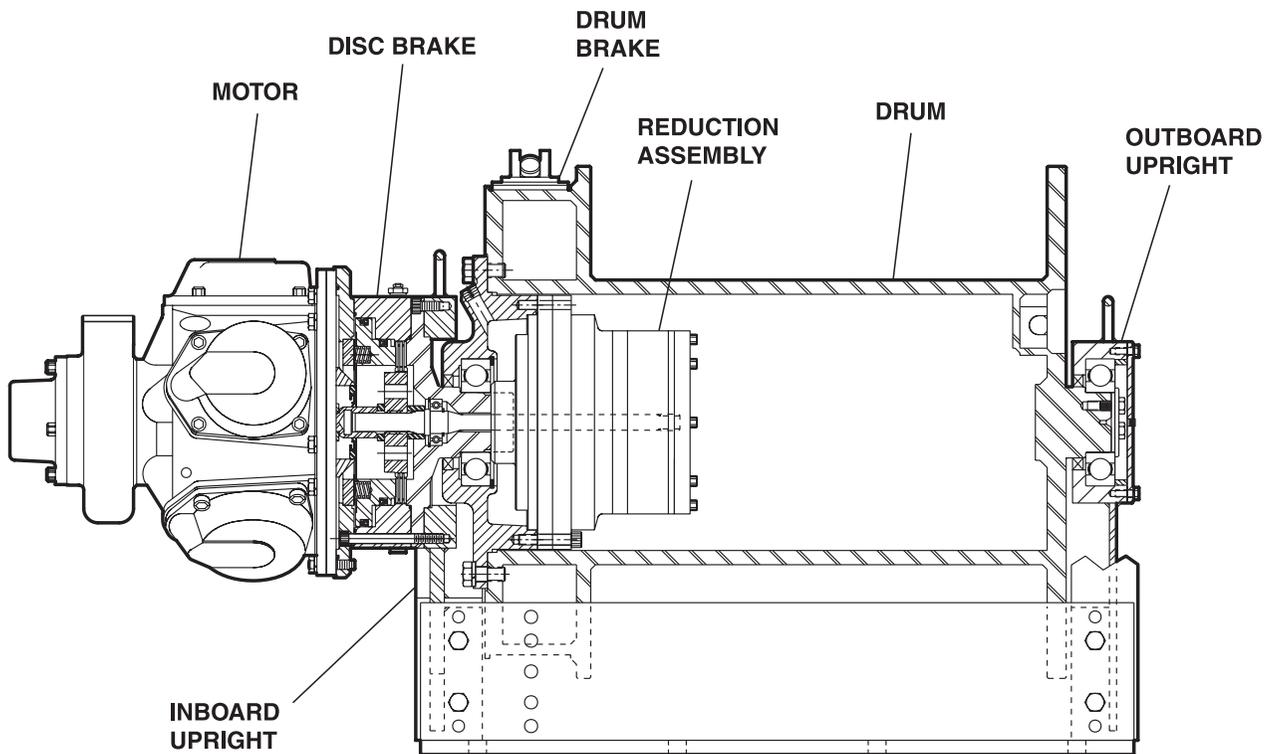
Prior to initial use, all new or extensively repaired winches shall be load tested by or under the direction of a person trained in safety and operation of this winch and a written report furnished confirming the rating of winch. Test loads shall not be less than **100%** of rated line pull and should not exceed **125%** of rated line pull. To test winch at **125%** of rated load apply following load with wire rope on the first layer of the drum:

FA5-Decoker 9,575 lbs (4,343 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.**

FA5-DECOKER WINCH ASSEMBLY DRAWINGS REFERENCE DIAGRAM

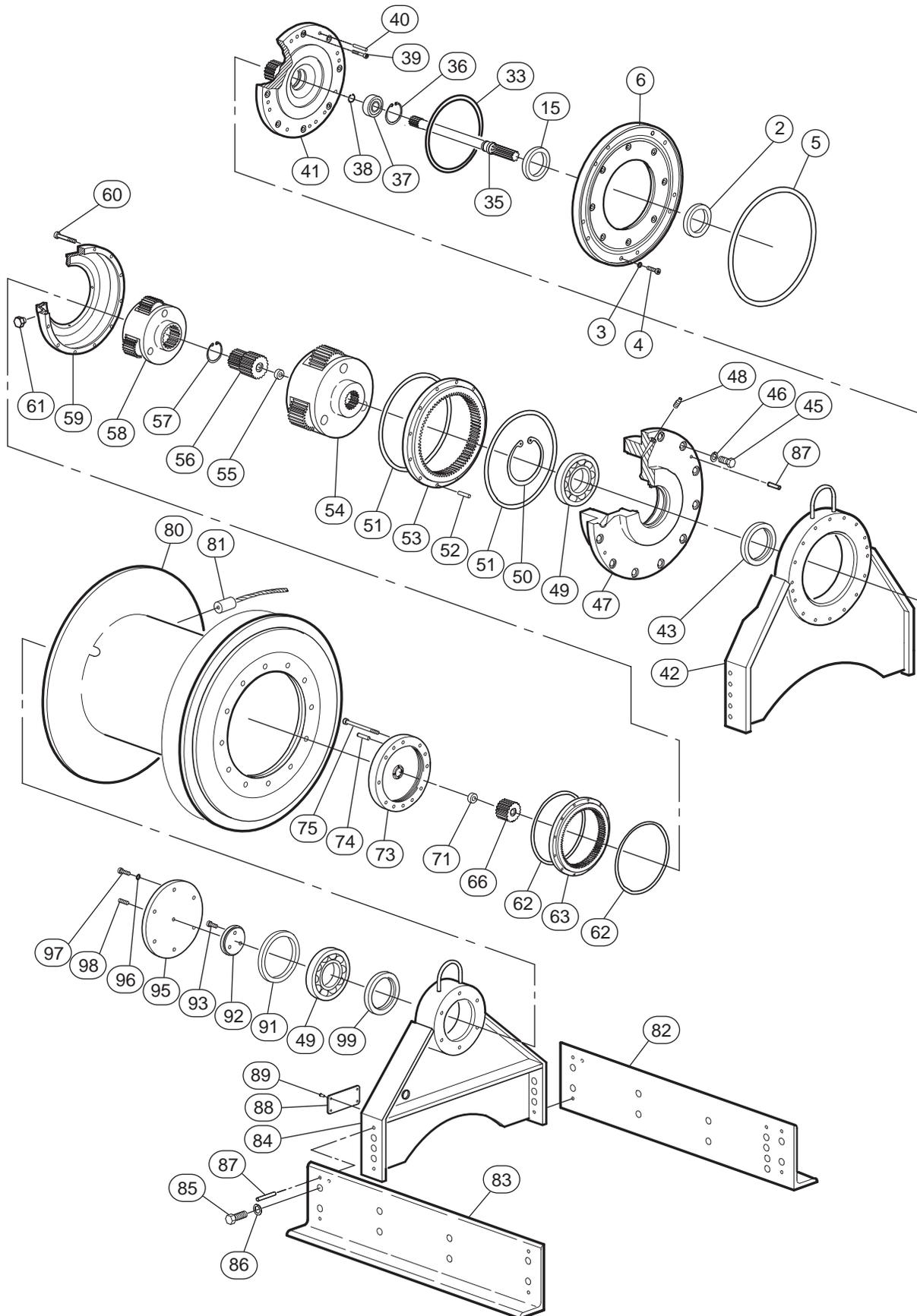


(Dwg. MHP2423)

FA5-DECOKER WINCH DRAWINGS AND PARTS LISTS TABLE OF CONTENTS

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DRUM, BASE AND REDUCTION GEAR ASSEMBLY DRAWING



(Dwg. MHP2421)

DRUM, BASE AND REDUCTION GEAR ASSEMBLY PARTS LIST

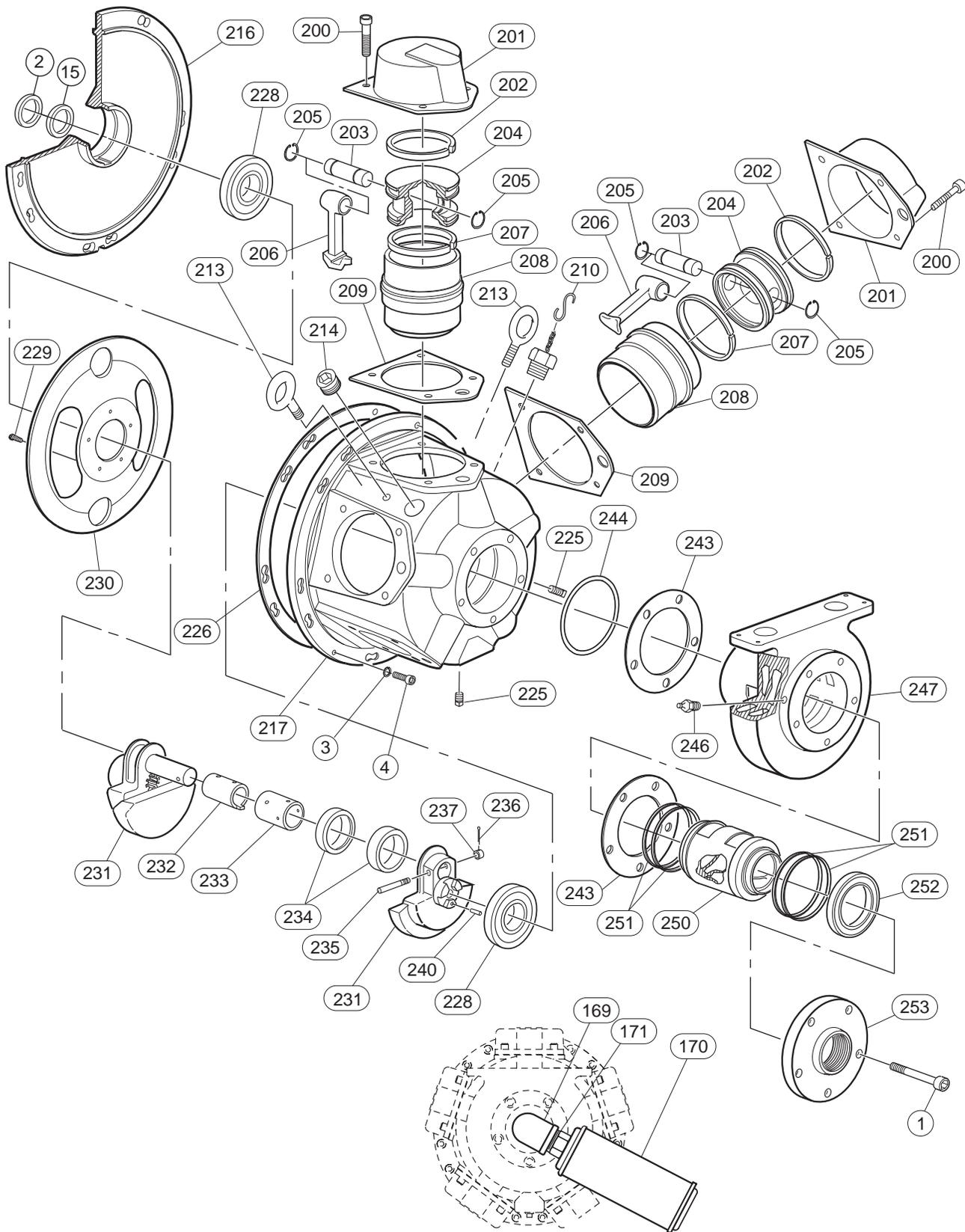
Item No.	Description of Part	Total Qty	Part Number	Item No.	Description of Part	Total Qty	Part Number	
• 2	Oil Seal	1	51873	59	Input Housing	1	Order Item 34	
3	Lockwasher	10	50181	60	Capscrew	12	71068605	
4	Capscrew	10	50197	61	Plug	4	Order Item 34	
• 5	'O' Ring	1	51459	62	'O' Ring	2		
6	Motor Adapter	1	14227	63	Ring Gear	1		
15	Seal Adapter	1	16354	66	Sun Gear	1		
• 33	'O' Ring	1	51460	71	Thrust Bearing	1		
34	Reduction Gear Assembly Ratio 29.58:1*	1	18288	73	Cover	1		
				74	Dowel Pin	4		
35	Shaft, Drive	1	18322	75	Capscrew	8		
36	Retainer Ring	1	52298	80	Drum 16 in (406 mm)	1		28825-3
37	Bearing	1	51870	81	Wire Rope Anchor 5/8 inch (16 mm)	1		52306
38	Retainer Ring	1	51872					
39	Capscrew	8	52380	82	Side Rail (Front - RH)	1	27677-3	
40	Pin, Dowel	2	52334	83	Side Rail (Back - LH)	1	27678-3	
41	Drum Shaft	1	14020	84	Outboard Upright	1	28824	
42	Upright, Inboard	1	10789	85	Capscrew	8	50872	
• 43	Seal	1	51464	86	Washer	8	50203	
45	Capscrew	12	52829	87	Dowel Pin	10	71266670	
46	Lockwasher	12	51012	88	Nameplate	1	**	
47	Gear Carrier	1	15418	89	Screw, Drive	4	71028849	
48	Plug, Fill and Drain	2	51467	91	Spacer	1	15458	
49	Bearing	2	51455	92	Shaft Retainer	1	15457	
50	Retainer Ring	1	71018196	93	Capscrew	3	51086	
51	'O' Ring	2	Order Item 34	94	Capscrew	8	50910	
52	Dowel Pin	3						
53	Ring Gear	1						
54	Planetary Assembly	1						
55	Thrust Bearing	1						
56	Sun Gear	1						
57	Retainer Ring	1						
58	Planetary Assembly	1						
					95	End Cover	1	15459
					96	Lockwasher	6	50200
				97	Capscrew	6	51780	
				98	Plug	1	54292	
				• 99	Seal	1	51463	
				---	'O' Ring Kit (includes 51 & 62)	1	27347	

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

* Reduction gear assembly (includes items 51 - 75). It is not recommended to disassemble reduction gear assembly.

** Nameplates not sold blank. Serial number of winch that nameplate is being order for is necessary to complete order.

K5B MOTOR ASSEMBLY DRAWING



(Dwg. MHP2424)

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-546L	217	Motor Housing	1	K5B-501A
1	Capscrew	5	51471	225	Pipe Plug (Drain)	3	54912
2	Oil Seal †	1	51873	226	Gasket	1	K5B-592
3	Lockwasher	10	50181	228	Bearing	2	51066
4	Capscrew	10	50197	229	Button Head Screw	5	K5B-541
15	Seal Adapter †	1	16354	230	Oil Slinger	1	K5B-540
165	Pipe Reducer*	1	71057459	231	Crank Assembly	1	K5B-A516
169	Pipe Elbow	1	71057434	232	Sleeve	1	K5B-519
170	Muffler	1	50594	233	Bushing	1	K5B-511
171	Pipe Nipple	1	51704	234	Connecting Rod Ring	1	K5B-510
200	Capscrew	20	52317	235	Lock Pin	1	HU-520
201	Cylinder Head	5	K5B-H505	236	Cotter Pin	1	53456
202	Compression Ring	1 Set	K5B-546-KRING	237	Pin Nut	1	D02-394
				240	Roll Pin	1	54257
203	Wrist Pin	5	HU-514A	243	Gasket	2	K5B-928
204	Piston	5	††	244	'O' Ring	1	20A11CM248
205	Retainer Ring	10	902A45-632	246	Grease Fitting	1	53095
206	Connecting Rod	5	K5B-509	247	Rotary Valve Housing	1	K5B-545
207	Oil Ring	1 Set	Order Item 202	250	Rotary Valve Assembly	1	K5B-526EQ-RS
208	Cylinder Liner	5	K5B-L505-47				
209	Head Gasket	1 Set	K5B-507-5	251	Seal Ring Kit	1 Set	K5B-607A
210	Vent Cap Assembly	1	26604	252	Bearing	1	50138
213	Eye Bolt	2	KU-888	253	Exhaust Flange Round	1	KK5B-276M
214	Pipe Plug	1	71263297	261	Piston Assembly **	1	K5B-A513-47
216	Mounting Flange	1	K5B-502A				

* Not illustrated, pipe reducer (165) is part of muffler assembly.

** Piston assembly (includes items 202-205 and 207)

† If ordering motor assembly (199) also order oil seal (2) and seal adapter (15). Motor assembly (includes items 1, 3, 4, 200-253 and 261)

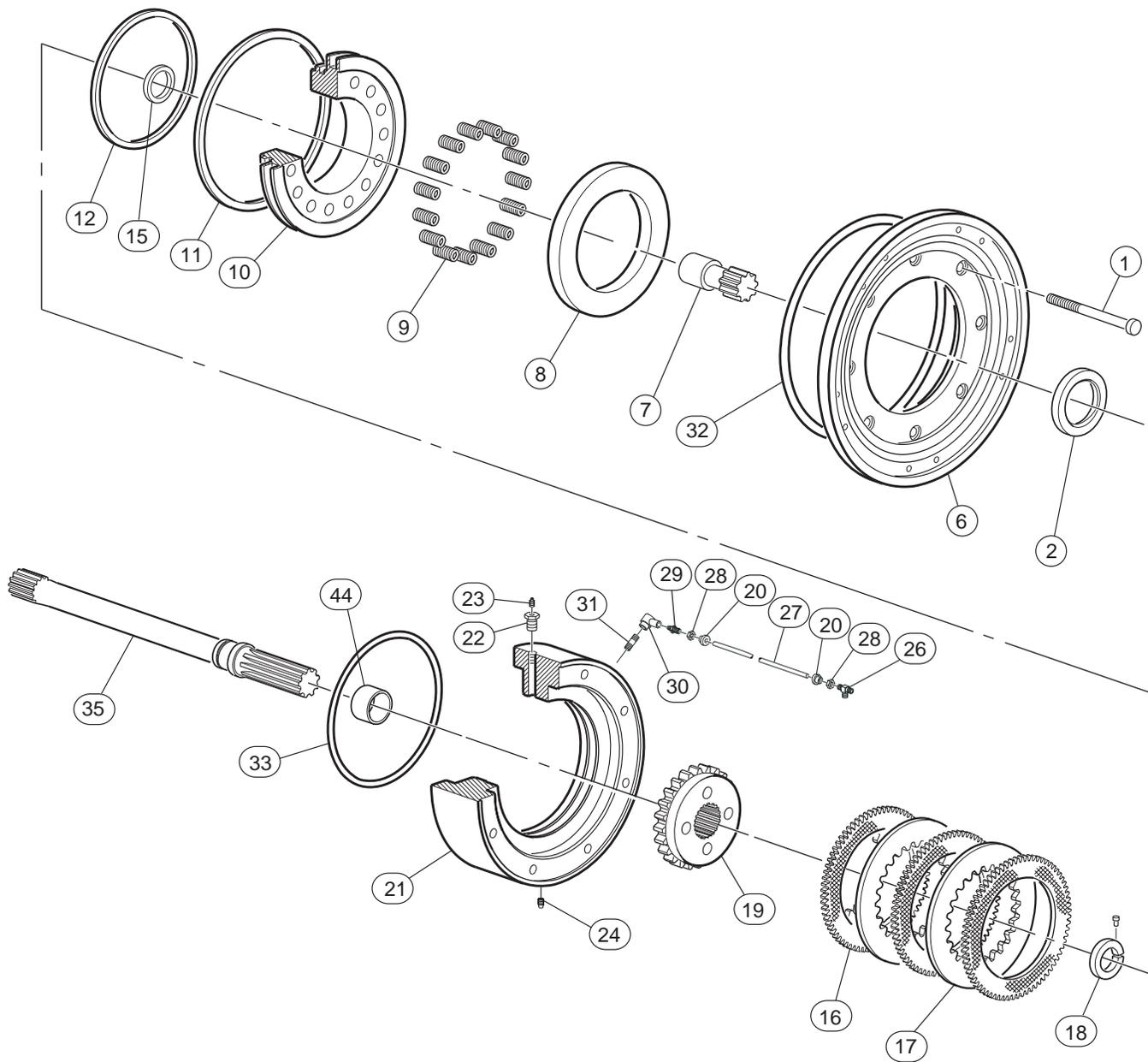
†† Not sold separately, order piston assembly (261).

K5B Motor Assembly Kit List:

Item No.	Description of Part	Total Qty	Part Number
---	Motor Gasket Kit (includes items 209, 226, 243 and 244)	1	26823
•	Air Motor Service Kit (includes items 3, 4, 200, 202, 207-209, 226, 243, 244, and 251)	1	71390181
251	Seal Ring Kit (includes 4 each seal rings)	1	K5B-607A

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

DISC BRAKE ASSEMBLY DRAWING



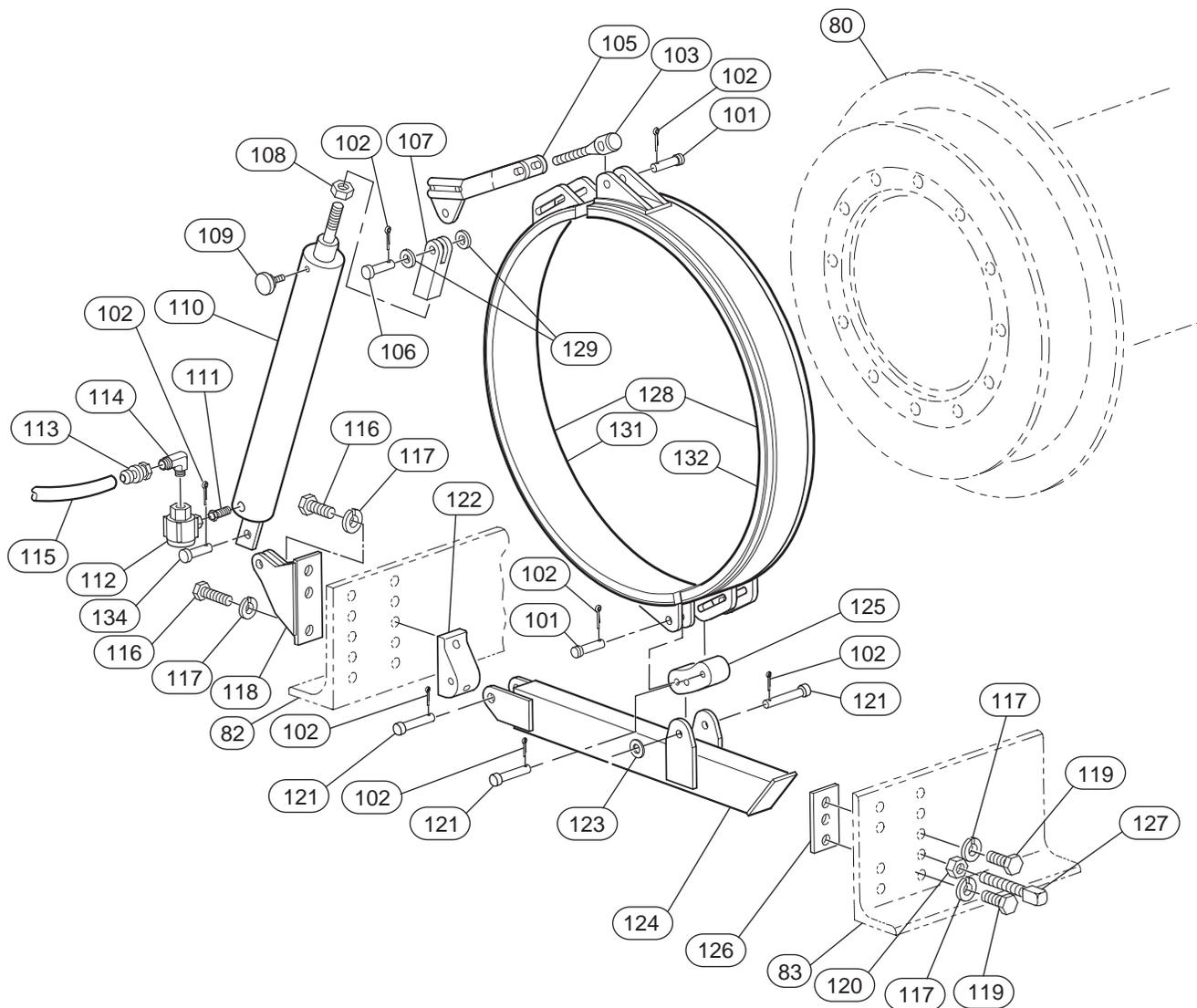
(Dwg. MHP2425)

DISC BRAKE ASSEMBLY PARTS LIST

Item No.	Description of Part	Total Qty	Part Number
64	Brake Assembly (includes items 1, 7-24, 27-32 and 44)	1	11366
1	Capscrew	8	51471
2	Oil Seal	1	51873
6	Motor Adapter	1	14227
7	Shaft Extender	1	10594
8	Brake Reaction Plate	1	10597
9	Spring	15	50751
10	Brake Piston	1	15437
• 11	Seal	1	51461
• 12	Seal	1	51462
15	Seal Adapter	1	16354
16	Friction Plate	3	50772
17	Drive Plate	2	50773
18	Collar Assembly	1	71039333
19	Splined Hub	1	10600
20	Fitting, Sleeve	2	55014
21	Brake Housing	1	11322
22	Fitting, Reducer Bushing	1	51803
23	Breather	1	51857
24	Pipe Plug	1	50801
26	Fitting, Tee	1	52181
27	Tubing	1	52520
28	Fitting, Nut	2	55013
29	Vented, Fitting	1	20770
30	Dump Valve	1	50276
31	Fitting, Nipple	1	50859
• 32	'O' Ring	1	51458
• 33	'O' Ring	1	51460
35	Drive Shaft	1	18322
44	Spacer	1	18683

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

AUTOMATIC DRUM BRAKE ASSEMBLY DRAWING



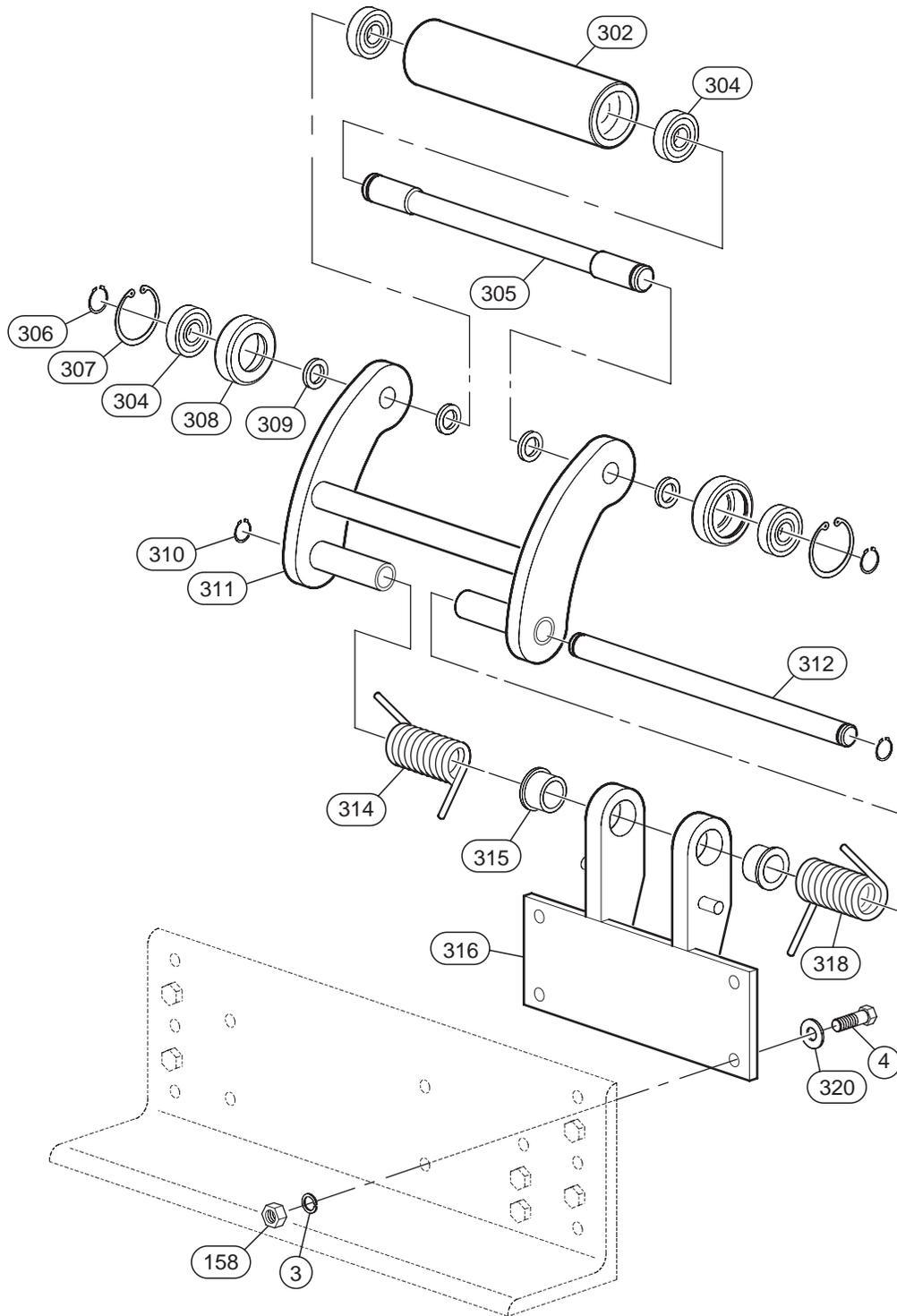
(Dwg. MHP2429)

AUTOMATIC DRUM BRAKE ASSEMBLY PARTS LIST

Item No.	Description of Part	Total Qty	Part Number
80	Drum 16 in (406 mm)	1	28825-3
82	Side Rail, Right Hand	1	27677-3
83	Side Rail, Left Hand		27678-3
101	Pin	2	4308-S
102	Cotter Pin	7	51937
105	Brake Lever - Automatic Brake	1	11349
103	Link Stud	1	4115
106	Pin	1	8609
107	Clevis	1	8586
108	Nut	1	50152
109	Breather	1	52384
110	Cylinder	1	8575
111	Fitting, Bushing	1	52006
112	Dump Valve	1	51954
113	Hose End	2	51029
114	Fitting, Elbow	1	54272
115	Hose (bulk)	As Req'd	50923
116	Capscrew	3	52014
117	Washer	5	71293005
118	Bracket	1	11329
119	Capscrew	2	71128193
120	Nut	2	54661
121	Pin	3	4307-S
122	Pivot Bracket	1	10881
123	Washer	As Req'd	52915
124	Arm (27 inch Drum flange)	1	10883
125	Connecting Link	1	10882
126	Stop Plate	1	10879
127	Screw, Adjusting	1	71033104
•128	Brake Band	1 Set	4103-SET
	Brake Band Lining Kit	1 Kit	4103-BLK
129	Washer	2	52914
134	Pin	1	22442

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

PRESS ROLLER ASSEMBLY DRAWING



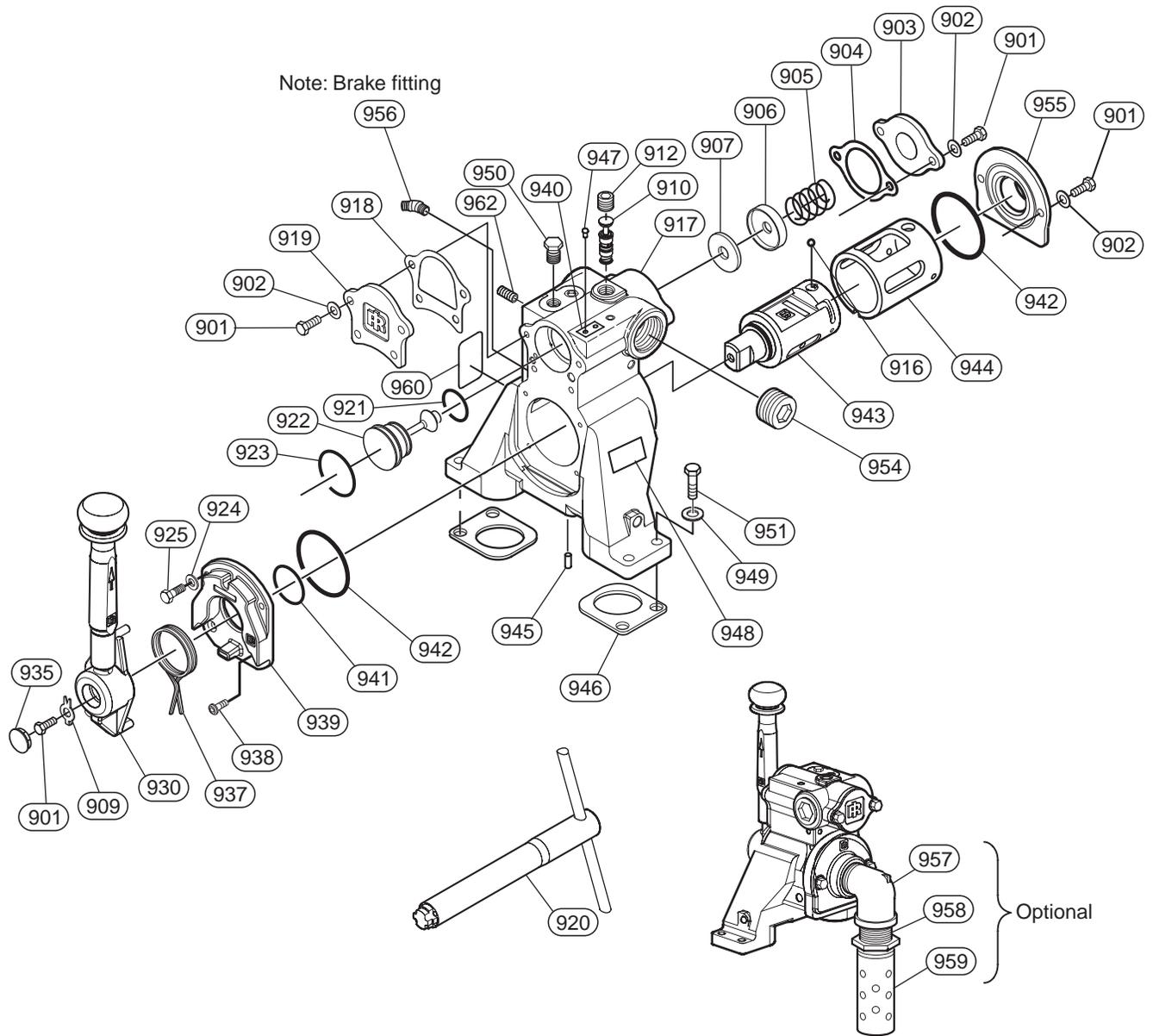
(Dwg. MHP2412)

PRESS ROLLER ASSEMBLY PARTS LIST

Item No.	Description of Part	Total Qty	Part Number	Item No.	Description of Part	Total Qty	Part Number
300	Press Roller Assembly *	1	27676-6	309	Spacer	4	W27010/980 46
3	Lockwasher	4	50181				
4	Capscrew	4	50197	310	Retainer Ring	2	71345441
158	Nut	1	50171	311	Frame	1	27702-3
302	Roller, Long	1	27692-3	312	Shaft	1	27703-3
304	Bearing	4	53071	314	Spring (L.H.)	1	28804
305	Shaft	1	27690-3	315	Bushing	2	71396261
306	Retainer Ring	2	71053581	316	Base	1	28820-3
307	Retainer Ring	2	71345458	318	Spring (R.H.)	1	28805
308	Roller, Short	2	27693	320	Washer	4	71064844

* Press roller assembly includes 3, 4, 158, 302, 304-312, 314-316, 318 and 320

(OPTIONAL) K5C2 CONTROL VALVE ASSEMBLY DRAWING



(Dwg. MHP2427)

(OPTIONAL) K5C2 CONTROL VALVE ASSEMBLY PARTS LIST

Item No.	Description of Part	Total Qty	Part Number	Item No.	Description of Part	Total Qty	Part Number
900	Control Valve Assembly	1	K5C2-X	940	Tag, (No FA2B)	1	71392757
901	Capscrew	9	71342034	941	'O' Ring	1	71357198
902	Washer	8	71303408	942	'O' Ring	2	51651
903	Cover, Poppet	1	26997	943	Reverse Valve Kit (Normal)**	1	27925-X
904	Gasket, Poppet	1	27064		Reverse Valve (Reverse Bias)**		28002
905	Spring, Poppet	1	71351068		Reverse Valve (Unbiased)		****
906	Cap, Poppet	1	28734	944	Bushing (Normal)***	1	26686
907	Seal, Poppet	1	26991		Bushing (Reverse Bias)***		27450
909	Washer, Tablock	1	71398051		Bushing (Unbiased)		****
910	Pilot Valve Assembly	1	28696	945	Pin	1	71146674
912	Plug	1	71267561	946	Gasket	1 set	27115
916	Ball	1	D10-280	947	Rivet	2	71028849
917	Valve Housing	1	Note 1	948	Label, Throttle Direction	1	71352777
918	Gasket, Cover	1	26999	949	Washer	4	71376370
919	Cover, Piston	1	26998	950	Plug	1	71366348
920	I-R Pilot Valve Tool *	1	28690	951	Capscrew	4	71369276
921	'O' Ring	1	52537	954	Plug	1	71263297
922	Piston (Note 2)	1	28735-S	955	Exhaust Flange	1	26691
923	'O' Ring	1	71355796	956	Fitting	1	71367932
924	Washer	2	71271985	957	Fitting, Pipe Elbow	1	71273676
925	Capscrew	2	71348338	958	Fitting, Pipe Nipple	1	71057483
930	Handle Assembly	1	27239-1	959	Muffler	1	52472
935	Plug	1	71348965	960	Label, Warning	1	71373229
937	Spring	1	26966	962	Breather	1	51559
938	Buttonhead Screw	2	71394407	• 970	Service Kit (Note 4)	1	27240
939	Seal Bracket (Note 3)	1	28733-S				

* **I-R** pilot valve tool (920) is not sold with any valve parts and must be purchased separately

** Reverse Valve (normal) for standard overwound operation. Reverse valve (reverse bias) for optional underwound operation.

*** Ensure bushing matches reverse valve (reverse valve (normal) and bushing (normal)). Mixing these components can result in erratic winch operation.

**** Contact factory for (unbiased) Reverse valve and bushing.

Note 1: Valve housing (917) is not sold separately, order control valve assembly (900).

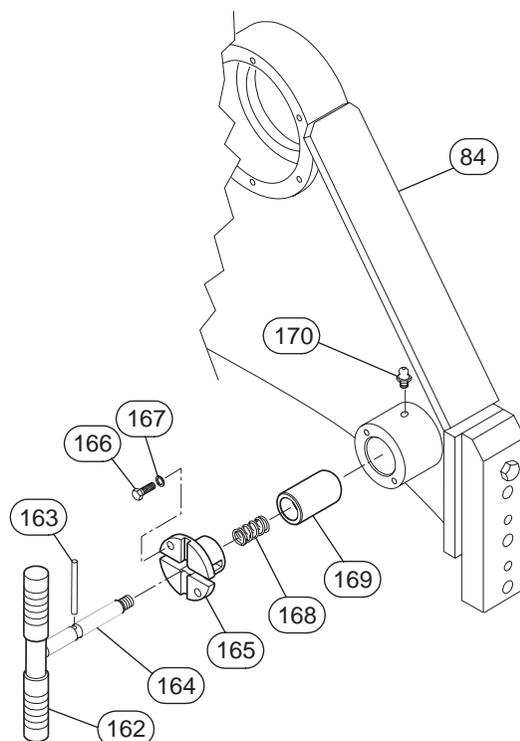
Note 2: Piston (922) not sold separately, includes (6) each of 901 and 902, items 904-907, 918, 921 and 923.

Note 3: Seal bracket (939) not sold separately includes (1) each of 901 and 909, items 924, 925, 935, 937, 938 and 940.

Note 4: Service kit (970) includes items 901, 902, 904, 905, 907, 909, 910, 912, 916, 918, 921, 923-925, 935, 937, 938, 941, 942, 946 949 and 951.

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

DRUM LOCKING PIN ASSEMBLY DRAWING AND PARTS LIST

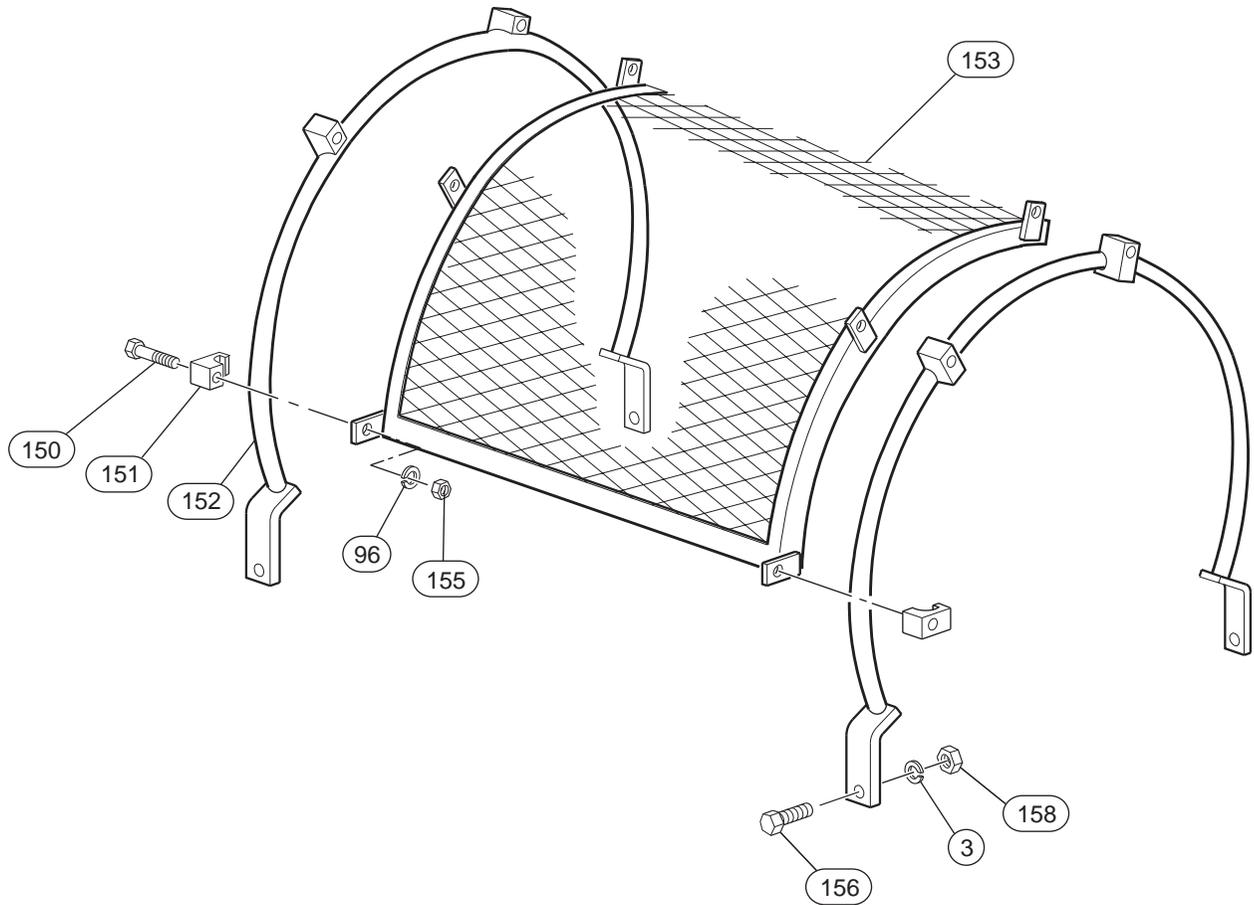


(Dwg. MHP2426)

Item No.	Description of Part	Total Qty	Part Number	Item No.	Description of Part	Total Qty	Part Number
84	Outboard Upright	1	28824	166	Capscrew	2	53890
160	Drum Locking Assembly *	1	25862	167	Washer	2	51581
162	Grip	2	51845	168	Spring	1	71316624
163	Dowel Pin	1	71316632	169	Lock Pin	1	25858
164	Pull Rod	1	25861	170	Grease Fitting	1	71111942
165	Gland Cap	1	25860				

* Drum Locking Assembly (includes items 162-170)

DRUM GUARD ASSEMBLY DRAWING AND PARTS LIST

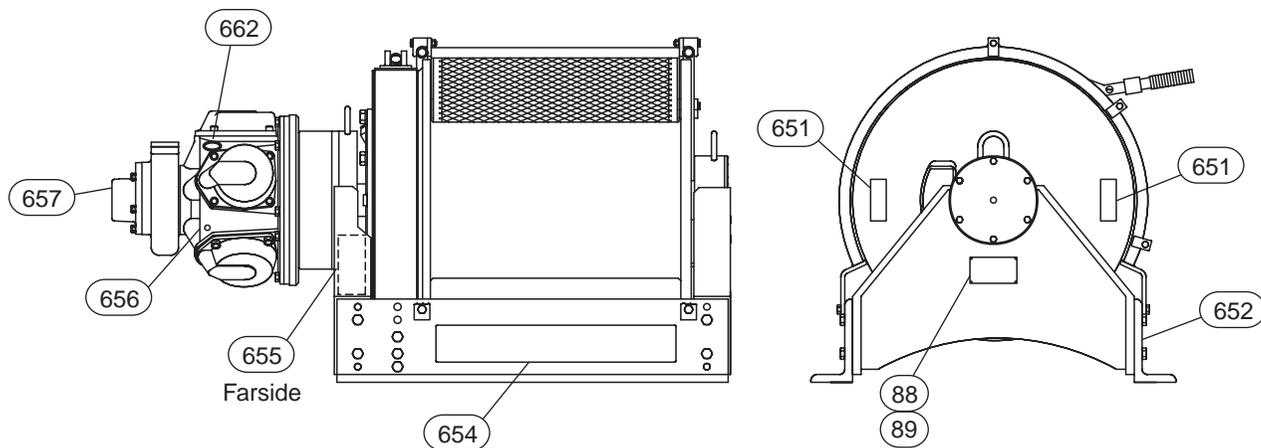


(Dwg. MHP0154)

Item No.	Description of Part	Total Qty	Part Number	Item No.	Description of Part	Total Qty	Part Number
149	Drum Guard Assembly *	1	10925-3	152	Support	2	10934
3	Lockwasher	4	50181	153	Drum Guard (16 in long drum)	1	10935-3
96	Lockwasher	6	50200	155	Nut	6	50198
150	Capscrew	6	71126742	156	Capscrew	4	50973
151	Clamp	6	10399	158	Nut	4	50171

* Drum Guard Assembly (includes items 3, 96, 150, 151-153, 155, 156 and 158)

LABELS AND TAGS



(Dwg. MHP2428)

Item No.	Description of Part	Total Qty	Part Number	Item No.	Description of Part	Total Qty	Part Number
650	Label and Tag Kit	1	Contact Factory	655	Warning Label	1	71060529
88	Nameplate **	1		656	Oil Level Label	1	71043616
89	Drive Screw	4	71028849	657	Exhaust Label	1	71042196
651	Winding Label	2	71109516	662	Check Oil Level Label	1	71107148
652	I-R Logo Label 16 in. long drum	1	71106272	663	Underwound Direction Label †	1	71110068
654	Product Label 16 in. long drum	1	71111777				

† Not illustrated

** Nameplates not sold blank. Serial number of winch that nameplate is being order for is necessary to complete order.

PARTS ORDERING INFORMATION

Use of other than **Ingersoll-Rand** replacement parts may adversely affect the safe operation and performance of this product.

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.**
- **Using other than genuine Ingersoll-Rand parts may void the warranty.**

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 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

SERVICE NOTES

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, Order Status and Technical Support

Ingersoll-Rand

P.O. Box 24046
2724 Sixth Avenue South
Seattle, WA 98124-0046
Phone: (866) 273-FAST (3278)
Fax: (206) 624-6265

Web Site:

www.airwinch.com

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

Latin America Operations Ingersoll-Rand

730 N.W. 107 Avenue
Suite 300, Miami, FL, USA
33172-3107
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