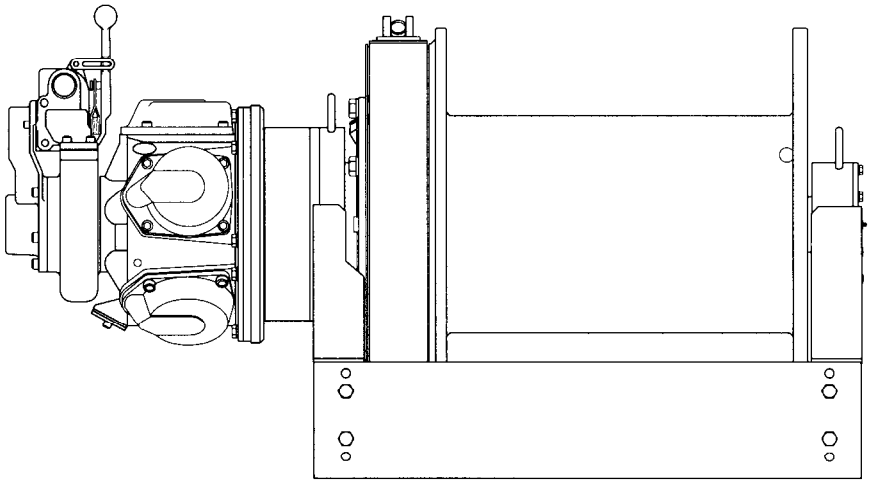
Form MHD56037

force 5™ AIR WINCHES

MODEL FA5

PARTS, OPERATION AND MAINTENANCE MANUAL



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

⚠WARNING

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

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

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

Form MHD56037
Edition 2
February 1994
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INGERSOLL-RAND®
MATERIAL HANDLING

TABLE OF CONTENTS

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 an injury. The following signal words are used to identify the level of potential hazard.

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

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

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

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

Safety Summary

⚠ WARNING

- **Do not use this winch for lifting, supporting, or transporting people or lifting or supporting 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 Material Handling winches are manufactured in accordance with the latest ASME B30.7 standards.

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

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

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

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

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

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

SAFE OPERATING INSTRUCTIONS

The following warnings and operating instructions have been adapted in part from American National (Safety) Standard ASME B30.7 and are intended to avoid unsafe operating practices which might lead to injury or property damage.

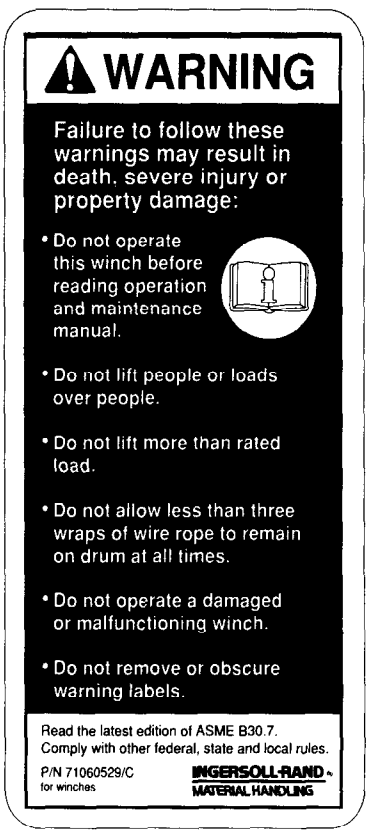
Ingersoll-Rand recognizes that most companies who use winches have a safety program in force at their facility. In the event that some conflict exists between a rule set forth in this publication and a similar rule already set by an individual company, the more stringent of the two should take precedence.

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

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

WARNING LABEL

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



SPECIFICATIONS

MODEL CODE

Example: FA5-24MK320P — **FA5 - 24 M K 320 P**

Series (Capacity):

Model FA5 (5 metric tons / 11,000 lbs)

Drum Flange Height or ManRider®:

- = **Standard flange: 27 inch (660 mm) diameter**
T = Tall flange: 35 inch (890 mm) diameter
MR = ManRider® (Refer to FA5 ManRider® Supplement Form #MHD56042)

Drum Length (Distance between drum flanges):

12 = 12 inch (306 mm)
16 = 16 inch (406 mm)
24 = 24 inch (610 mm) [Standard]
30 = 30 inch (760 mm)
36 = 36 inch (915 mm) [Tall flange only]

Drum Brake:

A = Automatic Drum Brake
M = Manual Drum Brake
X = None

Disc Brake:

K = Automatic Disc Brake
X = None

Control:

1 = Winch mounted lever throttle (Standard)
* 2XX = Remote full flow lever throttle (XX = Specify hose length (feet). Max 20 ft. (6 metres))
* **3XX = Remote pilot pendant throttle (XX = Specify hose length (feet). Max 50 ft. (15 metres))**
* 4XX = Remote pilot lever throttle (XX = Specify hose length (feet). Max 50 ft. (15 metres))

Options: **

7 = Drum Grooving (Number = wire rope size in sixteenths, e.g. 7/16 inch)
D = Drum Divider Flange and additional wire rope anchor
G = Drum Guard
L = Drum Locking Pin
P = Marine 812 top coat
R = Ingersoll-Rand K6U-A501 air motor ***
S = Rotary Limit Switch *** ****
T = Tensioning Manifold ***
Z = Sand blast and Carbozinc primer only

Notes:

* Remote throttles are provided with 10 feet (3 metres) of hose. Specify hose lengths greater than 10 feet. For lengths greater than 20 ft. (6 metres) with the Remote Full Flow Throttle, or 50 ft. (15 metres) with the Remote Pilot Lever and Remote Pilot Pendant Throttles contact your Ingersoll-Rand distributor or the factory for control acceptability. Metric lengths are provided for reference only, order lengths in feet.

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

*** The K6U-A501 air motor, Rotary Limit Switch and Tensioning Manifold are not covered in this manual. For information on these optional features contact your nearest Ingersoll-Rand distributor or the factory.

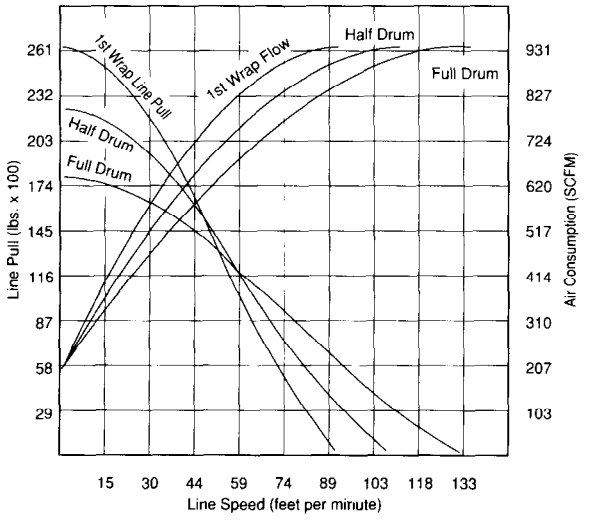
**** Includes mandatory remote full flow lever or remote pilot pendant throttle with 10 feet (3 metres) of hose. Contact Ingersoll-Rand for application suitability. Not available with Ingersoll-Rand K6U-A501 motor.

General Specifications:		Model			
		FA5		FA5T	
Air System	Rated Operating Pressure	90 psig (6.2 bar)			
	Air Consumption (at rated pressure and load)	700 scfm	20 cu.m/min	700 scfm	20 cu.m/min
Rated Performance (at rated pressure / volume)	Full Drum Line Pull	11,000 lbs	4,490 kgs	8,400 lbs	3,810 kgs
	Mid Drum Line Speed	65 fpm	20 m/min	80 fpm	24 m/min
	Max Stall Pull - 1st Layer	24,000 lbs	10,886 kgs	24,000 lbs	10,886 kgs
	FA5-24MX1 Net Weight	1,720 lbs	780 kgs		- - -
	FA5T-24MX1 Net Weight	- - -	- - -	1,915 lbs	869 kgs
Air Motor Pipe Inlet Size		1.25 inch	32 mm	1.25 inch	32 mm
Minimum Air System Hose Size		1.5 inch	38 mm	1.5 inch	38 mm
* Drum Wire Rope Storage Capacity (feet / metres)	Drum Length (inches)	Wire Rope Diameter			
		0.625 inch	**16 mm**	**0.625 inch (16 mm) diameter wire rope not recommended for use on FA5T winches.**	
	12	937 ft	247 m		
	16	1106 ft	335 m		
	24 (Standard)	1681 ft	509 m		
	30	2112 ft	640 m		
		0.75 inch	**18 mm**	**0.75 inch**	**18 mm**
	12	515 ft	164 m	1174 ft	371 m
	16	698 ft	222 m	1592 ft	503 m
	24 (Standard)	1064 ft	338 m	2426 ft	766 m
	30	1338 ft	425 m	3053 ft	963 m
	36 (Tall flange only)	- - -	- - -	3679 ft	1160 m
		0.875 inch	**20 mm**	**0.875 inch**	**20 mm**
	12	374 ft	151 m	838 ft	310 m
	16	509 ft	205 m	1139 ft	420 m
	24 (Standard)	778 ft	312 m	1742 ft	641 m
	30	979 ft	393 m	2194 ft	807 m
	36 (Tall flange only)	- - -	- - -	2646 ft	973 m

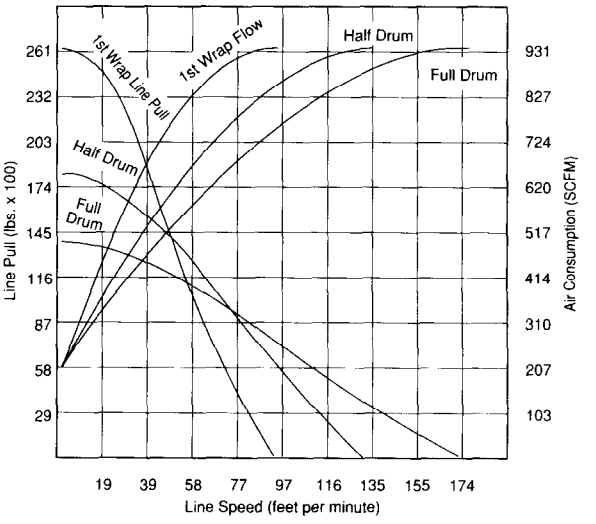
* Wire rope storage capacity based on wire rope top layer located a minimum of 1/2 inch (13 mm) below drum flange as specified in ASME B30.7. The wire rope storage capacities listed may vary from figures stated elsewhere.

Performance Graphs

FA5 Winch



FA5T Winch



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

⚠ CAUTION

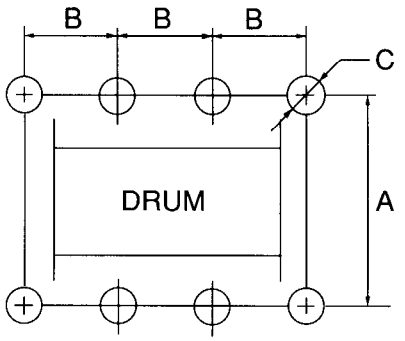
• Owners and users are advised to examine specific, local or other regulations, including American National Standards Institute and/or OSHA Regulations which may apply to a particular type of use of this product before installing or putting winch to use.

Mounting

(Refer to Dwg. MHTPA0133 and Table 1.)
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 the lug locations are improper for your specific installation, great care should be taken to ensure that the winch, when lifted, will be properly balanced. Determine the weight of your winch by refering to the "SPECIFICATIONS" section. Lift the winch 3 to 4 inches (75 to 100 mm) off the ground. Verify winch is balanced and secure before continuing lift.
Mount the winch so the axis of the drum is horizontal and that the motor vent cap is not more than 15° off top vertical center. If the winch is to be mounted in an inverted position, the motor case must be rotated to position the vent cap at the top.

1. The winch mounting surface must be flat and of sufficient strength to handle the rated load plus the weight of the winch and attached equipment. An inadequate foundation may cause distortion or twisting of the winch uprights and side rails resulting in winch damage.
2. Make sure the mounting surface is flat to within 0.005 inch (0.127 mm) per inch of drum length. Shim if necessary.
3. Mounting bolts must be 3/4 inch (18 mm) Grade 8 or better. Use self-locking nuts or nuts with lockwashers.

Winch Bolt Hole Mounting Dimensions



(Dwg. MHTPA0133)

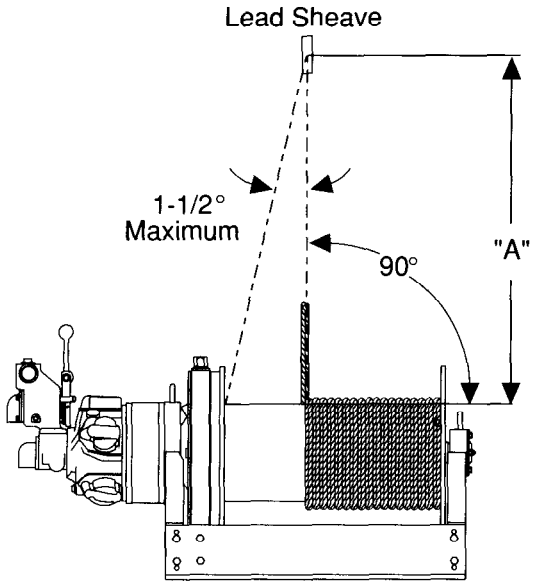
Table 1

Winch Bolt Hole Mounting Dimensions

Dimension		Drum Length (inches)				
		12	16	24	30	36*
"A" FA5	inch	31.25				- - -
	mm	794				
"A" FA5T	inch	34.25				
	mm	870				
"B" (with Drum Brake)	inch	7.5	9	10.5	10	11.5
	mm	190	229	267	254	292
"B" (without Drum Brake)	inch	6	6.25	9	12	14
	mm	152	159	229	305	356
"C"	inch	13/16				
	mm	20				
Bolt Hole Qty each Side Rail		4			5	

* 36 inch drum length applies to FA5T (tall flange) only.

4. Tighten 3/4 inch (18 mm) mounting bolts evenly and torque to 380 ft. lbs. (515 Nm) for dry thread fasteners. If the fasteners are plated, lubricated or a thread locking compound is used, torque to 280 ft. lbs. (380 Nm).
5. Maintain a fleet angle between the sheave and winch of no more than 1-1/2°. The lead sheave must be on a center line with the 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. MHTPA0487.
6. Do not weld to any part of the winch.



"A" = 1.6 feet (0.5 metre) per inch of drum length:

"A" = 19.2 feet (5.85 metres) for 12 inch drum.
"A" = 25.6 feet (7.80 metres) for 16 inch drum.
"A" = 38.4 feet (11.7 metres) for 24 inch drum.
"A" = 48.0 feet (14.6 metres) for 30 inch drum.
"A" = 57.6 feet (17.5 metres) for 36 inch drum.

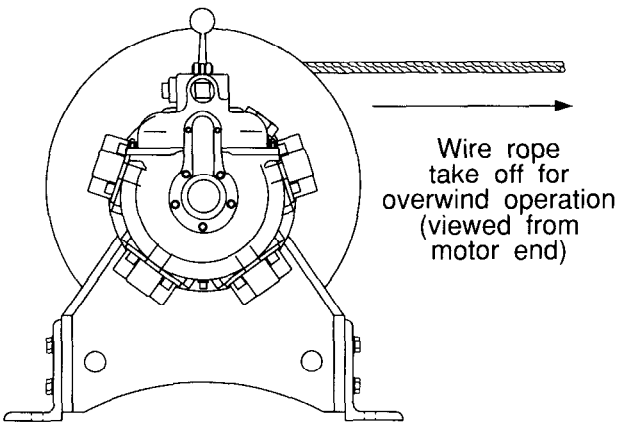
(Dwg. MHTPA0487)

Wire Rope

⚠ CAUTION

• Maintain at least 3 tight wraps of wire rope on the drum at all times.

• Install the wire rope to come off the drum for overwind operation. (Normal application.) Refer to Dwg. MHTPA0564.



(Dwg. MHTPA0564)

NOTICE

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

Wire Rope Selection

Consult a reputable wire rope manufacturer or distributor for assistance in selecting the 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 the 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 the static or dead load but also loads resulting from acceleration, retardation and shock load. Consideration must also be given to the size of the winch wire rope drum, sheaves and method of reeving. Wire rope construction must be 6 X 19 or 6 X 37 IWRC right lay to permit correct installation of wire rope anchor. Refer to Table 2 for minimum and maximum recommended wire rope diameters.

Table 2

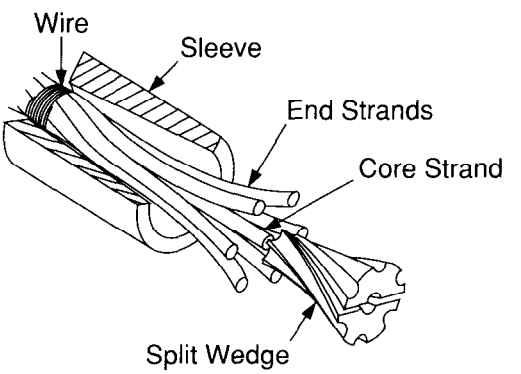
Minimum and Maximum Wire Rope Size				
Model	Minimum		Maximum	
	inch	mm	inch	mm
FA5	5/8	16	7/8	22
FA5T	3/4	20		

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

Installing Wire Rope

(Refer to Dwg. MHTPA0166.)

1. Cut wire rope to length in accordance with the wire rope manufacturer's instructions.
2. Feed the end of the wire rope into the wire rope anchor hole in the drum and pull through approximately one foot (305 mm) of wire rope.



(Dwg. MHTPA0166)

3. Wrap the wire rope with wire a distance from the end equal to the wedge length plus one inch (25 mm).
4. Slide the sleeve over the end of the wire rope so the larger diameter of the taper bore is nearest the end of the wire rope.
5. Spread the end strands of the wire rope and insert the split wedge until it is below the end of the wire rope.

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

⚠ CAUTION

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

Wire Rope Spooling

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

Rigging

Make sure all wire rope blocks, tackle and fasteners have a sufficient safety margin to handle the 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 the 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 the wire rope over a sharp edge. Use a correctly sized sheave.
4. When a lead sheave is used, it must be aligned with the center of the drum. The diameter of the lead sheave must be at least 18 times the diameter of the wire rope. Refer to Dwg. MHTPA0487.
5. Always maintain at least three full, tight wraps of wire rope on the drum.

Air Supply

The air supply must be clean and free from moisture. The air consumption for the **FA5** and **FA5T** is 700 scfm (20 cu. m/min) at rated operating pressure of 90 psig (6.2 bar) at the motor.

Air Lines

The inside diameter of the winch air supply lines must not be less than the sizes shown in Table 3. Before making final connections, all air supply lines should be purged with clean, moisture free air or nitrogen before connecting to winch inlet. Supply lines should be as short and straight as installation conditions will permit. Long transmission lines and excessive use of fittings, elbows, tees, globe valves etc. cause a reduction in pressure due to restrictions and surface friction in the lines.

Table 3

Minimum Allowable Air Supply Line Sizes		
Model	**inch**	**mm**
FA5	1-1/2	38
FA5T		

Air Line Lubricator

(Refer to Dwg. MHTPA0191.)
Always use an air line lubricator with these motors. The lubricator must have an inlet and outlet at least as large as the inlet on the motor. Install the air line lubricator as close to the air inlet on the motor as possible.

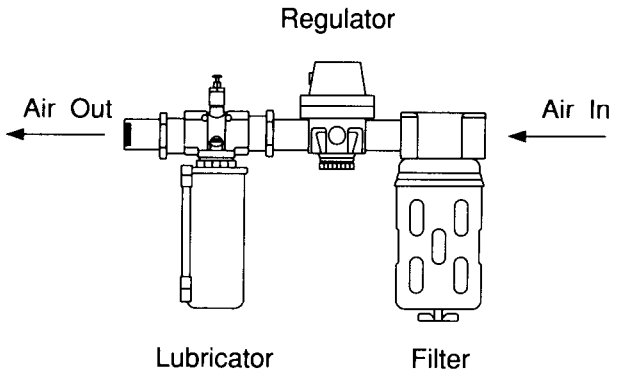
⚠ CAUTION

• Lubricator must be located no more than 10 ft. (3 m) from the motor.

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

Air Line Filter

(Refer to Dwg. MHTPA0191.)
It is recommended that an air line strainer/filter be installed as close as practical to the motor air inlet port, but before the lubricator, to prevent dirt from entering the 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. MHTPA0191)

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 the motor or an aftercooler at the compressor that cools the air to condense and collect moisture prior to distribution through the supply lines are also helpful.

Motor
For optimum performance and maximum durability of parts, provide an air supply of 90 psig at 700 scfm (6.2 bar/620 kpa at 20 cu.m/m) as measured at the K5B motor inlet. The air motor should be installed as near as possible to the compressor or air receiver.

Initial Operating Checks

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

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

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

1. Give the winch an inspection conforming to the requirements of "Winches Not in Regular Use" in the "INSPECTION" section.
2. Pour a small amount of 10W oil in the motor inlet port.
3. Operate the 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 the 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 the winch capacity and weight of load at all times.

⚠ CAUTION

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

⚠ WARNING

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

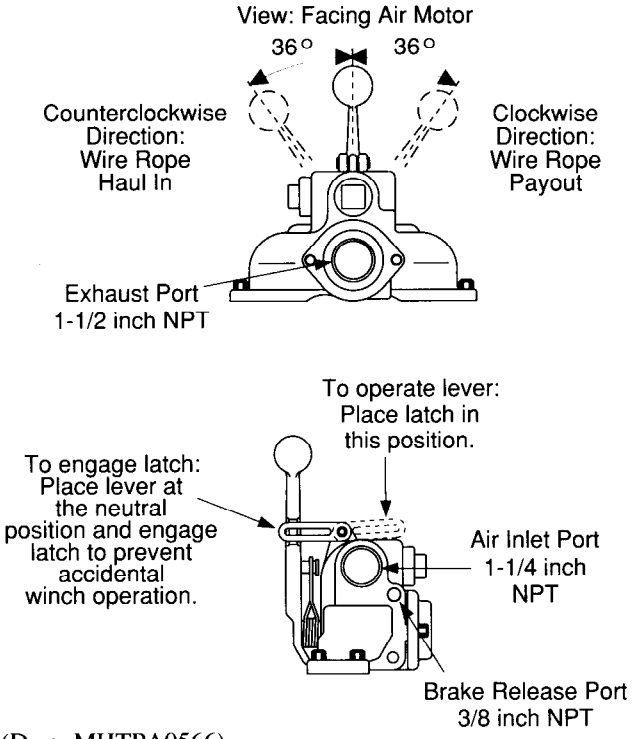
Winch Controls

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

Winch Mounted Live Air Throttle (standard feature)
(Refer to Dwgs. MHTPA0566 and MHTPA0165.)
The spring loaded, live air, manual control throttle valve (260) mounts to the air motor.
As viewed from the air motor end, move the control throttle handle to the right (clockwise) to pay out 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 winch is not in use, engage latch to prevent inadvertant movement of the control throttle.

Remote Live Air Throttle (optional feature)
(Refer to Dwg. MHTPA0161.)
Provides for the remote mounting of the winch control at a fixed location at up to 20 feet (6 metres) away from the winch motor. Air hoses connect the throttle to the winch motor to provide winch operation.
Move the control throttle handle to the right (clockwise) to pay out 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.

Live Air Throttle Control Valves



(Dwg. MHTPA0566)

Remote Pilot Pendant Throttle (optional feature)
(Refer to Dwg. MHTPA0167.)
Provides for remote winch control at distances of up to 50* feet (15 metres) away from the winch. The pendant pilot control throttle is a two lever movable control station for winch operation. Pilot pressure from the pendant pilot control throttle activates the winch control valve. The winch control valve, located on the winch motor, controls the motor speed and direction of drum rotation. Direction of rotation is determined by the pendant lever depressed.

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

Remote Pilot Lever Throttle (optional feature)
(Refer to Dwg. MHTPA0167, item 358.)
Provides for remote winch control at distances of up to 50* feet (15 metres) away from the winch. The lever pilot control throttle is a fixed mount lever control station for winch operation. Pilot pressure from the lever pilot control throttle activates the winch control valve. The winch control valve, located on the winch motor, controls the motor speed and direction of drum rotation. Direction of rotation is determined by the direction in which the lever is shifted.

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

Winch Brakes

Manual Drum Brake
(Refer to Dwg. MHTPB0153.)
The manual drum brake may be applied by pushing down on the handle (104) and released by pulling up. If the handle is pushed down fully, it should lock in that position and prevent drum rotation, until released by the operator. The brake must be kept properly adjusted to hold the required load. Refer to the "MAINTENANCE" section for adjustment instructions.

Automatic Drum Brake (optional feature)
(Refer to Dwg. MHTPB0153.)
The automatic drum brake is a spring applied, air released brake which utilizes an air actuated, spring loaded cylinder (110), that automatically disengages the brake when the motor is operated. Air pressure in the cylinder overcomes spring pressure to release the brake. When the control valve is placed in the neutral position, the air in the cylinder (110) is vented and the spring automatically engages the brake to prevent drum rotation.
The cylinder clevis (107) must be kept properly adjusted to hold the required load.

Automatic Disc Brake (optional feature)
(Refer to Dwg. MHTPA0152.)
The automatic disc brake is a spring applied, air released brake. Using an air actuated, spring loaded piston (10), the brake automatically disengages when the motor is operated and engages when the throttle is returned to the neutral position.
Air pressure ported through the brake housing (21) overcomes spring (9) pressure and moves the piston (10) which releases the brake. When the control valve is placed in the neutral position, the air is vented, spring pressure overcomes air pressure and spring (9) pressure moves the piston, engages the brake and prevents drum rotation.

Drum Locking Pin (optional feature)

(Refer to Dwg. MHTPB0155.)

The drum locking pin is mounted to the winch on the outboard upright, opposite the 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).

To engage:

1. Rotate the drum (80) so that one of the twelve holes in the flange aligns with the locking pin (136). Pull out, straight away from the outboard upright, pull rod (140) and rotate counterclockwise 90°, aligning pin (135) with the deep groove in gland (138). Release pull rod and ensure locking pin engages and is seated in the drum hole and gland deep groove.

⚠WARNING

• Ensure that all braking mechanisms are engaged and all personnel are clear of the winch load and rigging before disengaging the locking pin.

• Extremely difficult locking pin release is an indication that the load is held by the locking pin and the braking mechanisms are not functioning properly. Do not release the locking pin until load control is established.

To disengage:

1. Pull out, straight away from the outboard upright, pull rod (140) and rotate clockwise 90°. Align pin (135) with the shallow groove in gland (138) and release pull rod. Ensure locking pin (136) is clear of the drum (80) flange and pin is seated in the gland shallow groove.

LUBRICATION

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

The lubrication intervals recommended in this manual are based on intermittent operation of the winch eight hours each day, five days per week. If the winch is operated almost continuously or more than the eight hours each day, more frequent lubrication will be required. Also, the 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 the performance of the winch. Approval for the use of other lubricants must be obtained from your **Ingersoll-Rand** distributor. Failure to observe this precaution may result in damage to the winch and/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

Oil

	Temperature	Type Oil
1.	Below 32° F (0° C)	SAE 10W
2.	32° to 80° F (0° to 27° C)	SAE 20W
3.	Above 80° F (27° C)	SAE 30W

Grease

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

Component Lubrication

General Lubrication

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

1. Drain and replace oil in the motor, disc brake and reduction gear after the first 50 hours of initial winch operation. Thereafter, drain and replace oil according to the operating environment (yearly in NORMAL and HEAVY; quarterly in SEVERE), or more frequently if desired.
2. 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.
3. After winch operation, allow oil to settle before topping off.
4. Always collect lubricants in suitable containers and dispose of in an environmentally safe manner.

Motor

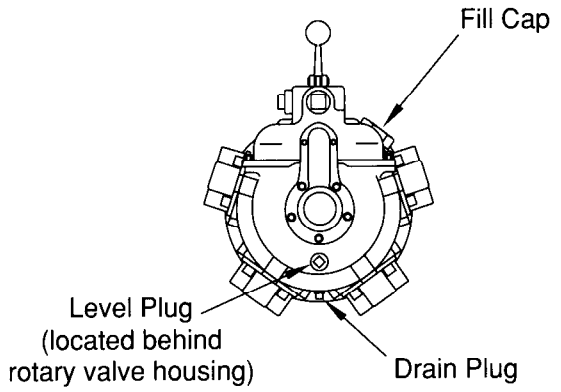
(Refer to Dwg. MHTPA0565)

The motor is splash lubricated by the oil in the 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 the 'Recommeded Lubricants' section.

Oil capacity for the K5B-546 motor is 3 quarts (2.8 litres). Add oil through the filler opening until oil flows from the level plug hole. Baffles are installed in the motor at each motor fill port. 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 the water then refill to the level plug (218), located on the side of motor housing (217). If desired, all the oil may be drained at the end of the shift and the motor refilled with new oil.

K5B Motor Lubrication Locations



(Dwg. MHTPA0565)

Wire Rope

Follow the 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 the surface of the wire rope.

⚠ CAUTION

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

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

Reduction Gear Assembly

(Refer to Dwg. MHTPA0140)

The reduction gear assembly is filled and shipped with oil from the factory. Check oil level before initial winch operation.

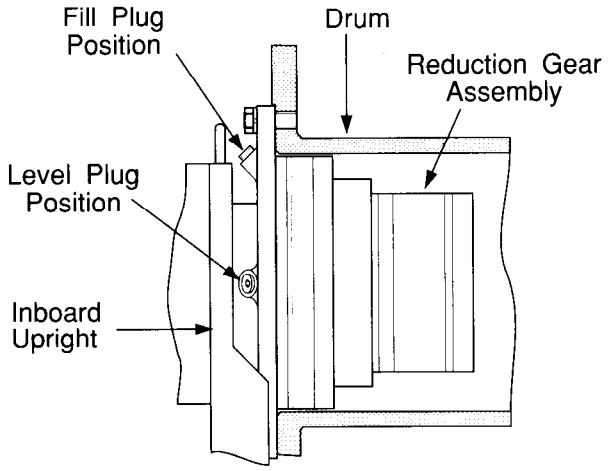
To ensure correct performance, highest efficiency and long life, it is essential that the lubricating oil be maintained at the correct level. Rotate the drum until the fill plug is located at top dead center then add oil up to the level plug hole. Oil capacity for the reduction gear assembly is 4 quarts (3.8 litres).

⚠ CAUTION

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

The recommended grade of oil must be used at all times since the use of unsuitable oil may result in excessive temperature rise, loss of efficiency and possible damage to the gears. Refer to the 'Recommeded Lubricants' section. Use only high quality lubricants in the reduction gear assembly such as motor oil, high grade hydraulic oil or their equivalents.

Reduction Gear Lubrication Plug Locations



(Dwg. MHTPA0140)

Disc Brake

(Refer to Dwg. MHTPA0152)

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

Seals and Bearings

If winch is disassembled, clean all parts thoroughly and coat bearings and seals with clean grease. Refer to the 'Recommeded 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. MHTPB0155)
Lubricate at least once every month, depending on the environment and duty cycle, through grease fitting (139) located in the gland (138) 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 the 'Recommeded 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, altered or modified 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 defective.

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 the safety, operation and maintenance of this equipment. ASME B30.7 states inspection intervals depend upon the nature of the critical components of the equipment and the severity of usage. Careful inspection on a regular basis will reveal potentially dangerous conditions while still in the early stages, allowing corrective action to be taken before the condition becomes dangerous.
Deficiencies revealed through inspection, or noted during operation, must be reported to designated personnel instructed in safety, operation and maintenance of this equipment. A determination as to whether a condition constitutes a safety hazard must be decided, and the correction of noted safety hazards accomplished and documented by written report before placing the equipment in service.

Records and Reports

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 the condition of critical parts as a method of documenting **periodic** inspections. These reports should be dated, signed by the person who performed the 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 the actual condition of wire rope as determined by periodic inspections.

Frequent Inspection

On equipment in continuous service, frequent inspection should be made by operators at the beginning of each shift. In addition, visual inspections should be conducted during regular operation for indications of damage or evidence of malfunction (such as abnormal noises).

1. WINCH. Prior to operation, visually inspect winch housings, controls, brakes, sideplates and drum for indications of damage. Do not operate the winch unless the wire rope feeds onto the drum smoothly. Any discrepancies noted must be reviewed and inspected further by authorized personnel instructed in the operation, safety and maintenance of this winch.
2. WIRE ROPE. Visually inspect all wire rope which can be expected to be in use during the day's operations. Inspect for wear and damage indicated by distortion of wire rope such as kinking, "birdcaging," core protrusion, main strand displacement, corrosion, broken or cut strands. If damage is evident, do not operate winch until the discrepancies have been reviewed and inspected further by personnel instructed in the operation, safety and maintenance of this winch.

NOTICE

• The full extent of wire rope wear cannot be determined by visual inspection. At any indication of wear inspect the 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. CONTROLS. During operation of winch, verify response to control is quick and smooth. If winch responds slowly or movement is unsatisfactory, do not operate winch until all problems have been corrected.

5. 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, the brakes must be adjusted or repaired.
6. WIRE ROPE REEVING. Check reeving and ensure wire rope is properly secured to the drum.
7. LUBRICATION. Refer to the "LUBRICATION" section for recommended procedures and lubricants.
8. LIMIT SWITCHES. If equipped, ensure limit switches engage and prevent operation at the required set point and with the drum rotating in the correct direction. Ensure limit switch properly resets.

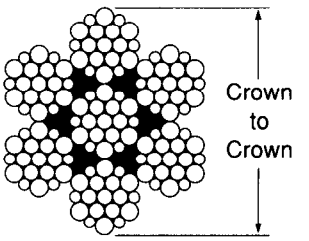
Periodic Inspection

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

NORMAL	HEAVY	SEVERE
yearly	yearly	quarterly

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

1. SIDE FRAMES 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 Inpsection 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 the diameter of the wire rope from crown-to-crown throughout the life of the wire rope. Recording of the actual diameter should only be done with the wire rope under equivalent loading and in the same operating section as accomplished during previous inspections. If the actual diameter of the wire rope has decreased more than 1/64 inch (0.4 mm) a thorough examination of the wire rope should be conducted by an experienced inspector to determine the suitability of the wire rope to remain in service. (Refer to Dwg. MHTPA0056).



(Dwg. MHTPA0056)

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 with full drum without slipping. If indicated by poor operation or visual damage, disassemble and repair brake(s). Check all brake surfaces for wear, deformation or foreign deposits. If brake lining thickness is less than minimum as described in the "MAINTENANCE" section replace brakes. Clean and replace components as necessary.
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. LIMIT SWITCHES. If equipped, verify limit switch prevents winch operation at set point limits. Adjust set points as necessary. Ensure limit switch properly resets.

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

INSPECTION AND MAINTENANCE REPORT
Ingersoll-Rand Force 5 Series Air Winch

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

Reason for Inspection: (Check Applicable Box)

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

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

COMPONENT	CONDITION		CORRECTIVE ACTION		NOTES
	Pass	Fail	Repair	Replace	
End Frames and Side Frames					
Drum Band Brake (125% Load Test)					
Disc Brake (125% Load Test)					
Drum Band Brake (Visual Inspection)					
Disc Brake (Visual Inspection)					
Motor					
Limit Switches					
Controls					
Air System					
Fasteners					
Reduction Gears					
Labels and Tags			- - -		
Shafts					
Wire Rope Anchor Wedge			- - -		
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.

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 problems, probable causes and solutions.

PROBLEM	CAUSE	SOLUTION
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.
	Shipping plugs may still be in place.	Remove shipping plugs in valve and motor exhaust ports.
Load continues to move when winch is stopped.	Drum brake is slipping.	Check drum brake adjustment and brake band lining wear.
	Winch is overloaded.	Reduce load to within rated capacity.
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. Examine all parts and replace any that are worn or damaged.
	Insufficient air supply.	Verify air supply pressure and volume at winch inlet meets the requirements listed in the "SPECIFCATIONS" section. Clean air line filter.
Throttle lever moves but winch does not operate.	Motor may be damaged.	Disassemble and clean the motor and replace any broken or damaged parts.
	Insufficient air supply.	Ensure the air pressure at the winch inlet is at least 90 psig (6.2 bar) at rated volume. Clean air line filter.
Motor runs hot or makes excessive noise during operation.	Low oil level.	Check oil level in the motor. Add oil as required to obtain the proper level.
	Improper lubrication.	Replace oil with type recommended in the "LUBRICATION" section.
	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. Inspect all parts and replace all worn or damaged parts.

PROBLEM	CAUSE	SOLUTION
Air lines freeze.	Water in air supply.	Install or drain air system moisture traps, moisture collecting air receivers and compressor aftercoolers. After corrective action has been taken, disconnect lines at winch inlet and purge with clean, dry air or nitrogen.

Automatic Drum Brake:

Brake cylinder will not release.	Drum brake out of adjustment.	Adjust drum brake to maintain correct cylinder stroke.
	Defective cylinder seals.	If air is noticed escaping from the cylinder breather when attempting to release the 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 the air pressure at the inlet to the disc brake is at least 50 psig (3.4 bar).
	Defective piston seals.	Inspect the brake breather. If air escapes from the brake breather when attempting to release the brake, the brake seals must be replaced.
	No release pressure at the brake port.	Check for proper operation of winch controls.
	Sticking brake piston.	Apply 50 psig (3.4 bar) to the brake release port and check for brake disc movement. (Brake discs can be viewed through the brake breather hole.) If brake discs do not move, disassemble and inspect the disc brake as described in the "MAINTENANCE" section.

⚠WARNING

• Never perform maintenance on the winch while it is supporting a load.
• Before performing maintenance, tag controls:
DANGER - 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 the 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 the winch eight hours each day, five days per week. If winch operation exceeds eight hours per day, or use is under HEAVY or SEVERE conditions, more frequent maintenance should be performed. Refer to 'Periodic Inspection' in the INSPECTION section for interval guidance.

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

Reduction Gear Assembly

It is recommend that the first oil change be done after approximately 50 hours initial operation. Always inspect removed oil for evidence of internal damage (metal shavings, dirt, water, etc.).
Check the oil in the reduction housing as recommended in the "LUBRICATION" section. If low, replenish. The oil should be changed at least once every year.
Refer to the "LUBRICATION" section for recommended oil.

Adjustments

Disc Brake Adjustment

Disc brake adjustment is not required. If the disc brake does not hold the rated load disassemble and repair.
If the brake assembly is removed or disassembled ensure the breather (23) is installed and located at the top of the brake housing during reassembly.

Manual Drum Brake Adjustment

(Refer to Dwg. MHTPB0153)

1. Release wire rope tension on the drum.
2. Raise handle (104) to free brake bands (128).
3. Remove cotter pin (102) and pin (101).
4. Rotate link stud (103) clockwise to increase brake torque.
5. Install pin (101) and check adjustment.
6. Brake should be adjusted until brake lever over center position can be attained with 50 to 100 lb. (23 to 45 kg) force on the handle (104).
7. Install cotter pin (102) when adjustment is completed.

⚠CAUTION

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

Automatic Drum Brake Adjustment

(Refer to Dwg. MHTPB0153)

1. Remove cotter pin (102) and washer (129) at adjustment clevis (107).
2. Apply air to the 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 and readjust if necessary.
6. Install cotter pin (102) and second washer (129) to secure clevis to brake lever when adjustment is complete.

Pilot Air Control Valve Adjustment (optional feature)
(Refer to Dwg. MHTPA0141)
If winch operating speeds differ from performance specifications the pilot air control valve may require adjustment. Loosen nut (271) and adjust adjusting screw (270), located in the valve end cap (268), until drum speed for no-load haul-in equals the drum speed for full load pay-out. It is suggested that a chalk mark be placed on the drum flange so that drum rpm can be accurately counted.

Disassembly

General Disassembly Instructions
The following instructions provide the necessary information to disassemble, inspect, repair, and assemble the winch. Parts drawings are provided in the parts section. If a winch is being completely disassembled for any reason, follow the order of the topics as they are presented. It is recommended that all maintenance work on the winch be performed in a clean dust free work area.
In the process of disassembling the winch, observe the following:

1. Never disassemble the winch any further than is necessary to accomplish the needed repair. A good part can be damaged during the course of disassembly.
2. Never use excessive force when removing parts. Tapping gently around the perimeter of a cover or housing with a 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 the part being heated is already worn or damaged beyond repair and no additional damage will occur to other parts.

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

4. Keep the 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 the winch.
6. When grasping a part in a vise, always use leather-covered or copper-covered vise jaws to protect the surface of the part and help prevent distortion. This is particularly true of threaded members, machined surfaces and housings.
7. Do not remove any part which is a press fit in or on a subassembly unless the removal of that part is necessary for repairs or replacement.
8. When removing ball bearings from shafts, it is best to use a bearing puller. When removing bearings from housings, drive out the bearing with a sleeve slightly smaller than the outside diameter of the bearing. The end of the sleeve or pipe which contacts the bearing must be square. Protect bearings from dirt by keeping them wrapped in clean cloths.

Winch Disassembly
(Refer to Dwg. MHTPC0157)

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

⚠WARNING

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

4. Disconnect and tag the air lines.
5. Remove the 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 the oil to drain into a suitable container. Loosen fill cap (210) to vent the motor housing.
7. Drain oil from the 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. MHTPA0140 in the "LUBRICATION" section. If the winch is equipped with a drum band brake the winch outboard end (opposite the motor end) must be elevated to prevent draining oil from contaminating the brake band lining.
8. For winches with a disc brake 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 the air motor before removing the motor mounting capscrews.

10. Remove the capscrews (4) and lockwashers (3) securing the motor assembly to the motor adapter (6). Using a hoist to support the motor, pull the motor straight away from the winch. Reference the applicable **Motor Disassembly** section if motor disassembly is required.

Instructions 11 through 17 apply only to winches with a disc brake.

11. Alternately and evenly loosen the eight capscrews (1) until the brake spring tension has been released. Remove capscrews and motor adapter (6).
12. Remove the brake housing (21). If the brake housing sticks, tap it with a brass hammer until the parts separate.

Note the position of all brake parts for reassembly.

13. Remove the three friction plates (16) and two drive plates (17).
14. Remove springs (9) from brake piston (10).
15. Remove brake piston (10) from brake housing (21). Tap lightly with a plastic mallet to separate parts if necessary.
16. Remove seals (11) and (12) from brake piston (10).
17. Loosen the capscrew in collar (18) and slide collar from shaft (35) with the splined hub (19). Remove retainer ring (32) and spacer (34) from shaft (35).
18. Remove retainer ring (36) from the bore of the drum shaft (41).
19. Pull shaft and bearing assembly from the drum shaft (41).
20. Support the drum (80) and remove capscrews (39) from the drum shaft (41). Pry drum shaft (41) from the inboard upright (42).
21. Remove capscrews (85) and lockwashers (86) which secure the side rails (82) and (83) to the inboard upright (42). Drive out dowel pins (87).
22. Remove inboard upright (42).
23. Remove end cover (95), capscrews (97) and lockwashers (96) from the outboard upright (84).
24. Remove capscrews (93) and shaft retainer (92) from the drum (80).
25. Remove drum and reduction gear assembly.
26. Remove the remaining capscrews (85) and lockwashers (86) which attach the side rails (82 and 83) to the 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 the gear carrier (47) to the drum (80).
29. Install two 3/4 inch - 10 NC x 3 inch long capscrews into the threaded holes in the outer bolt pattern ring of the gear carrier (47). Use these capscrews to break the seal, and remove the reduction gear/gear carrier assembly from the drum (80).

To disassemble the reduction gear refer to the **Reduction Gear Disassembly** section.

Manual or Automatic Drum Brake
(Refer to Dwg. MHTPB0153)
Actuator Disassembly:

1. Automatic Brake
   a. Disconnect and remove hose, fittings and dump valve (112) from the cylinder (110).
   b. Remove cotter pin (102) and pin (101) from the link stud (103) and brake band (128).
   c. Remove cotter pin (102), washers (129) and pin (106). Separate the clevis (107) from brake lever (105).
   d. Remove cylinder (110) from bracket (118).
2. Manual Brake:
   a. Remove cotter pin (102) and pin (101) from handle (104) then remove handle (104) from brake band (128).

Brake Disassembly:

3. Remove capscrews (119), lockwashers (117) and stop plate (126).
4. Use a hoist to raise the winch approximately 6 in. (15 cm). Separate the brake band (128) halves and rotate the brake band assembly slowly until it can be removed from the drum (80).
5. Remove cotter pins (102) and pins (121) so brake band halves (128) can be removed from the arm (124). Lower winch when brake band assembly has been removed.

Reduction Gear Disassembly
(Refer to Dwg. MHTPC0157)

NOTICE

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

1. Place the reduction gear assembly on a clean work bench such that the end containing bearing (49) is down.
2. Remove capscrews (75) and pry off cover (73).
3. Remove ring gear (72), planet assembly (67) and sun gear (69).
4. Remove and discard 'O' rings (62) from ring gear (72).
5. Remove four pins (74) from between cover (73) and spacer (71) and store in a safe place.
6. Remove spacer (71), ring gear (63) and sun gear (66).
7. If required, remove thrust plate (55) from sun gear (66). Remove and discard 'O' rings (62) from ring gear (63).
8. Remove capscrews (60) from the input housing (59). Separate input housing from gear carrier (47).
9. Remove planet assembly (58).
10. Remove ring gear (53). Remove three dowel pins (52) from between input housing (59) and gear carrier (47) and store in a safe place.
11. Remove and discard 'O' rings (51) from ring gear (53).
12. Remove retainer ring (57) and sun gear (56). If required, remove thrust plate (55) from sun gear.
13. Remove planet assembly (54).
14. Remove retainer ring (50) and bearing (49) from gear carrier (47).

NOTICE

• Do not disassemble planetary gears from their housings unless required to replace damaged parts. For information on the planetary assemblies (54, 58 and 67) contact your Ingersoll-Rand distributor or the factory.

K5B Motor Disassembly
(Refer to Dwg. MHTPC0156)

1. Remove the five capscrews (253) from the exhaust flange (254). **Do not** remove the two capscrews (255) from the throttle valve assembly (260).
2. Remove the rotary valve housing (247) by pulling it out of the motor housing (217) as an assembly with the exhaust flange (254).

⚠ CAUTION

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

3. Remove rotary valve (250) by pulling it out from the assembly through the motor housing end of the 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 the four capscrews (200). Remove head gasket (209).
6. Remove mounting adapter (6) by removing capscrews and then pulling mounting adapter straight off.
7. Pull the cylinder liner (208) straight out.
8. Position the piston (204) at the top of its stroke. In this position, with the cylinder liner pulled out in step 7, the wrist pin (203) can be removed. Remove one retainer ring (205) from either side of piston (204). Push the wrist pin (203) out by hand from one side. If the wrist pin is too tight it is acceptable to carefully heat the piston to 200° F (93° C) or less and then push the 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 the motor housing.

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

Crankshaft Disassembly

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

K5B Motor Live Air Throttle Valve
(Refer to Dwg. MHTPA0165)

NOTICE

• Match mark throttle valve parts to ensure proper re-assembly.

1. Remove the two capscrews (302) and lockwashers (304) that hold the valve body retainer (305).
2. Mark the square end on the valve body (316) and the handle (300) to ensure correct orientation during re-assembly.
3. Drive out pin (301) and remove handle (300).
4. Make note on how the spring (303) is positioned before removing it. Pull valve body (316) out of the valve bushing (314) while disconnecting the spring (303).
5. Remove seal rings (315) from valve body (316).
6. Check parts for score marks or wear.
7. Measure clearance between the valve bushing (314) and valve body (316). Clearance between valve bushing and valve body should not exceed 0.002 inch (0.05 mm) or excessive air leakage will occur.

Cleaning, Inspection and Repair

Clean all winch component parts in solvent (except the drum brake bands and disc brake friction plates). The use of a stiff bristle brush will facilitate the removal of accumulated dirt and sediments on the housings, frame and drum. If bushings have been removed it may be necessary to scrape old Loctite® from the bushing bores. Dry each part using low pressure, filtered compressed air. Clean the drum brake band using a wire brush or emery cloth. Do not wash the drum brake band in liquid. If the 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 the shaft.
4. Inspect all threaded items and replace those having damaged threads.

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

Repair

Actual repairs are limited to the 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. The cost of the part is often minor in comparison with the cost of redoing the job.
3. Smooth out all nicks, burrs, or galled spots on shafts, bores, pins, or bushings.
4. Examine all gear teeth carefully, and remove nicks or burrs.
5. Polish the edges of all shaft shoulders to remove small nicks which may have been caused during handling.
6. Remove all nicks and burrs caused by lockwashers.

Assembly

General instructions

- use all new gaskets and seals.
- replace worn parts.
- assemble parts using match marks attached during disassembly. Compare replacement parts with originals to identify installation alignments.
- lubricate all internal parts with a mixture of half oil (as recommended in the "LUBRICATION" section) and half molydenum disulfide lubricant compound (eg. STP).

K5B Motor Live Air Throttle Valve Assembly

(Refer to Dwg. MHTPA0165)

NOTICE

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

1. Install seal rings (315) on each end of valve body (316).
2. Install valve body (316) into valve bushing (314).
3. Insert valve bushing (314) into valve housing (311). Ensure ports in bushing and flat cutout in valve body are properly aligned with housing ports as shown in Dwg. MHTPA0165.
4. Install valve body retainer (305) with two capscrews (302) and lockwashers (304). Torque capscrews to 25 ft. lbs. (34 Nm).
5. If removed, re-install spring retaining stud (306) and torque to 25 ft. lbs. (34 Nm).
6. Install spring (303) and handle (300) on square shaft of valve body (316). The spring (303) ends must straddle the spring retaining stud (306) on throttle handle (300). Install roll pin (301).
7. Check throttle handle moves fully left and right without sticking or binding. Throttle handle should center, by spring force, automatically when released.

K5B Motor Assembly

(Refer to Dwg. MHTPC0156)

1. Assemble throttle valve assembly (260), gasket (248) and exhaust flange (254) to rotary valve housing (247) using four capscrews (257) and lockwashers (223). Install the two capscrews (255) and lockwashers (256) that attach exhaust flange (254) to throttle valve housing.
2. Tighten capscrews (255 and 257) to 25 ft. lbs. (34 Nm). Throttle handle should move fully left and right without sticking or binding, and should center (by spring force) automatically when released.
3. Assemble bearing (252) to rear of rotary valve (250) by pressing only on the inner race of the bearing. With the exhaust flange (254) down install rotary valve (250) into rotary valve housing (247). Slide rotary valve out of the rotary valve housing far enough to install seal ring (251) on the crank shaft end of the rotary valve (250). Slide rotary valve back into the rotary valve housing (247).
4. Install 'O' ring (244) into motor housing (217).
5. Install the rotary valve housing gasket (243) onto rotary valve housing (247). With the exhaust flange down on the bench, install motor housing (217) on to rotary valve housing (247). Check for any evidence of damage to 'O' ring (244) when the rotary valve housing is fully engaged. Install and tighten capscrews (253) to 50 ft. lbs. (68 Nm).
6. If removed, press crank bearing (228) on crank assembly (231). Apply pressure only on the inner race of the bearing.
7. Place crank assembly (231) on a work bench with the oil slinger (230) down and slide the sleeve (232) (with tang up) on the crankpin.
8. Slide connecting rod bushing (233) over the sleeve (232) and first connecting rod ring (234) with the chamfer up.
9. Install the connecting rods (206) in the same order as removed, with all feet pointing in the same direction, using the first connecting rod ring (234) to hold one side of the connecting rod feet.
10. Slide the second connecting rod ring (234) over the other side of the connecting rod feet with the chamfer on the ring facing down (toward the stem of the connecting rod).
11. Slide the crank shaft valve end over the crank pin while simultaneously aligning the tang on the sleeve (232) with the slot in the crank shaft.

12. Rotate and position the crank shaft valve end relative to the crank pin to allow installation of the lock pin (235).
13. Tap the lock pin (235) in place and install the pin nut (237). Torque nut to 60 ft. lbs. (81 Nm).
14. Install cotter pin (236).
15. Install roll pin (240) and bearing (228) into the valve end of the crank shaft.
16. Check that all connecting rods move freely around the crank. Position the crank assembly (231) into the motor housing (217). Ensure the bearing (228) is seated and connecting rods (206) are centered in the cylinder holes.

NOTICE

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

17. Rotate the 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 the connecting rod (206) with wrist pin (203) and retaining rings (205).
18. Install a new cylinder head gasket (209) before installing the cylinder liner (208).
19. Install the cylinder liner (208) over the piston (204) by compressing both piston rings (202 and 207) with a single band ring compressor.
20. Install cylinder head (201) over the cylinder and secure cylinder head to motor housing (217) with four capscrews (200). Torque capscrews to 60 ft. lbs. (81 Nm).
21. Repeat Steps 17 through 20 with the remaining cylinders.

NOTICE

• When installing the two lowest cylinder heads (201), use seal washers on capscrews (200).

22. Rotate motor by hand. Motor should rotate without binding.
23. Install mounting flange (216) and gasket (226) on the front of the motor housing (217). Make sure notches on both parts are aligned.
24. Lightly lubricate 'O' ring (5) and install in groove on motor adapter (6).

NOTICE

• 'O' ring, item 5 listed in step 24 refers to part number 51459 as shown on winch assembly Dwg. MHTPC0157. This part must be placed between the mounting flange (216) and motor adapter (6).

25. Temporarily install capscrews and nuts finger tight to retain motor adapter (6).
26. Install eye bolts (213) and vent cap assemblies (210) in the motor housing (217).
27. Ensure oil drain and level plugs are installed.

Reduction Gear Assembly
(Refer to Dwg. MHTPC0157)

NOTICE

• It is important to maintain a clean work area when the reduction assemblies are reassembled. During reassembly clean each part thoroughly and lightly coat with the appropriate lubricant as described in 'Recommended Lubricants' of the "LUBRICATION" section.
• If the planetary assemblies (54, 58 or 67) have been disassembled into their component parts and assistance is required for assembly, or parts replacement, contact your Ingersoll-Rand distributor or factory.

1. Install bearing (49) and retainer ring (50) in gear carrier (47).
2. Lubricate and install 'O' rings (51) on ring gear (53).
3. Align capscrew holes and dowel pins 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. 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 the capscrews in a diametrically opposed pattern to allow for equal compression of the housing onto the ring gear (53) and gear carrier (47). When the ring gear and input housing flanges are flush with the gear carrier torque capscrews to 145 ft. lbs. (197 Nm).
7. Install dowel pins (52) and tap into position until slightly below the input housing flange.
8. Install planet assembly (58) onto sun gear (56).
9. Lubricate and install 'O' rings (62) on ring gear (63).
10. Install dowel pins (70) in ring gear (63) so they extend an equal distance on both sides of ring gear.
11. Align capscrew holes and dowel pins and install ring gear (63) on input housing (59). Using a soft hammer or mallet, carefully tap dowel pins and ring gear (63) onto input housing until mating flanges are flush. Ensure 'O' rings are not damaged during installation.
12. Place thrust bearing (55) in sun gear (66) and install sun gear into planet assembly (58).
13. Install planet assembly (67) onto sun gear (66).
14. Align capscrew holes and dowel pins and install spacer (71) onto ring gear (63). Using a soft hammer or mallet, carefully tap spacer onto ring gear until mating flanges are flush. Ensure 'O' rings are not damaged during installation.

15. Lubricate and install 'O' rings (62) on ring gear (72).
16. Using a soft hammer or mallet, carefully tap ring gear (72) onto spacer (71). Ensure 'O' rings are not damaged during installation.
17. Install sun gear (69) in planet assembly (67).
18. 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 (72). 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 the cover onto the ring gear (72) and spacer (71). When the cover, ring gear and spacer flanges are flush torque capscrews to 32 ft. lbs. (42 Nm).
19. Install dowel pins (74) and tap into position until slightly below the cover flange.
20. Place a bead of Loctite® 515 sealant on the surface which mates with the gear carrier. Sealant location should be inside the bolt pattern.
21. 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).
22. Install two dowel pins (40) and tap into position until slightly below the gear carrier flange.
23. Apply thin coat of Loctite® 609 to the outside of seal (43) and, with seal lip facing out, install in gear carrier (47).

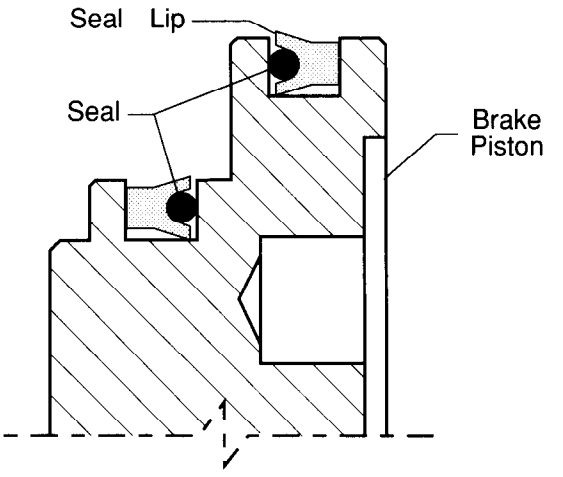
Winch Assembly

(Refer to Dwg. MHTPC0157)

1. Clean both mating surfaces on the inboard upright (42) and install drum shaft (41) through the bore aligning the dowel pin holes.
2. Install dowel pins (40) flush or slightly below the surface of the 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 the shaft (35). Lightly coat inner bearing race bore with Loctite® 609. Install retainer ring (38).
5. Install shaft and bearing into the drum shaft (41) so smaller splined end enters first. Install retainer ring (36) in bore of drum shaft (41).

Instructions 6 through 17 cover winches with a disc brake. For winches without a disc brake skip to instruction 18.

6. Install spacer (34) on shaft (35). Install splined hub (19) so splined side on outside diameter goes on first. Install capscrew in locking ring (18) and place on shaft (35). Maintain pressure on the locking ring to keep it against the splined hub (19) and tighten capscrew in locking ring (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 (21) so brake port is in the 2 o'clock position (as viewed from the motor end). Install drain plug (24) in brake housing (21) at the 6 o'clock position.
10. Install fitting (22) and breather (23) in the top of the brake housing (21).
11. Lubricate friction plates (16) with a light motor oil (refer to 'Recommended Lubricants' in the "LUBRICATION" section). Install friction plates (16) and drive plates (17) in brake housing (21). Begin with a friction plate (16) then alternate with drive plates (17) between friction plates (16). Ensure the 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. MHTPA0139.



(Dwg. MHTPA0139)

13. Install brake piston assembly in brake housing (21) so stepped side enters first. Gently tap into position using a soft mallet until seated.
14. Install one brake spring (9) in each of the brake spring holes.
15. Lubricate and install 'O' ring (5) in the groove on the brake housing (21).

NOTICE

• 'O' ring, item 5 listed in step 15 refers to part number 51460 as shown on disc brake Dwg. MHTPA0152. This part must be placed between the brake housing (21) and motor adapter (6).

16. Install the brake reaction plate (8) in the motor adapter (6).
17. Install the seal adapter (15) in the mounting flange (216), if required.

18. Two of the threaded holes in the motor adapter (6) are centered between the mounting bolt holes. Install motor adapter with these two holes in the 6 o'clock position.
19. Secure motor adapter (6) 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. On disc brake equipped winches install shaft extender (7) on end of shaft (35). On winches without disc brake install seal sleeve (14) on shaft (35).
21. Lubricate and install 'O' ring (5) in groove on the motor adapter (6).
22. Ensure seal adapter (15) and oil seal (2) are installed in the bore of the motor assembly. Seal lip must face into the motor assembly.

⚠WARNING

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

23. If motor assembly is being mounted with the winch in a vertical position, install one short bolt and nut to keep motor mounting flange (216) 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 the 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 the 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 the dump valve (30) and elbow (26).

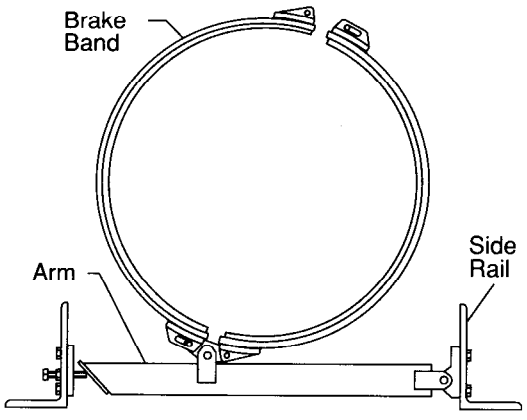
Drum Assembly

1. Stand drum in an upright position. Align splines and carefully lower inboard upright and drum shaft (41) assembly (42) onto drum (80).
2. Using a 'C' clamp, secure the inboard flange assembly to the 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 the drum.
4. Pack bearing (49) with grease and install in outboard upright (84).
5. Install outboard upright (84) on the 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 the mating surface of the 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 the side rails.
12. Tighten the eight capscrews (85) evenly. Torque to 140 ft. lbs. (190 Nm).
13. Mount winch to foundation as described in 'Mounting' in the "INSTALLATION" section.

Drum Brake Assembly

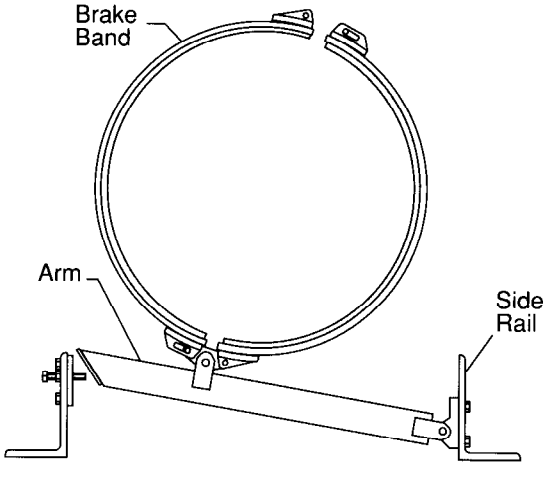
(Ref. Dwg. MHTPB0153)

1. Install pivot bracket (122) on the end of arm (124) with pin (121), washer (123) and cotter pin (102). Recessed side of the threaded hole must be toward the band side.
2. Install connecting link (125) on the arm (124) and secure in position with pin (121), washer (123) and cotter pin (102). Assemble connecting link (125) so curved surface matches contour of the brake band.
3. Install halves of brake band (128) to the connecting link (125) and secure with pins (101), (121) and cotter pins (102).
4. Lift the winch assembly, with a suitable hoist, approximately 6 inches (15 cm) off the floor or work bench.
5. Position the brake band sub-assembly around the brake diameter on the drum (80) until the arm (124) lays at the bottom. When positioned, lower the winch.
6. Mount pivot bracket (122) on the inside surface of the side rail (83) and secure in position with capscrews (116) and lockwashers (117).
7. Screw link stud (103) into handle (104) and install the handle (104) in the lug on the end of the brake band (128). Lubricate the pivot points being careful not to get grease on the brake band lining.
8. Pull the halves of the brake band together and install pin (101) through the lug on band (128) and the link stud (103) of the handle assembly.
9. Install stop plate (126) on the inside of the side rail (82) with capscrew (119) and washer (117). Install adjusting screw (127) and locknut (120) through the side rail (82) and stop plate (126) until it contacts the arm (124). (Refer to Dwg. MHTPA0173)



(Dwg. MHTPA0173)

On FA5T winches install stop plate (126) at the top edge of the side rail (131). (Refer to Dwg. MHTPA0174)



(Dwg. MHTPA0174)

10. Adjust brake as described under **'Adjustments'** in the "MAINTENANCE" section.

Automatic Drum Brake Actuator Assembly

11. Install bracket (118) on side rail (83) with capscrews (116) and lockwashers (117).
12. Screw nut (108) and clevis (107) onto cylinder rod.
13. Attach brake lever (105) to brake band (128).
14. Install cylinder (110) so it connects with bracket (118) and brake lever (105). Use pins (106), washers (129) and cotter pins (102) to secure in position.
15. Install dump valve (112), fittings and hose (115) to the cylinder (110).
16. Adjust automatic brake as described under **'Adjustments'** in the "MAINTENANCE" section.

Testing

Operational Test

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

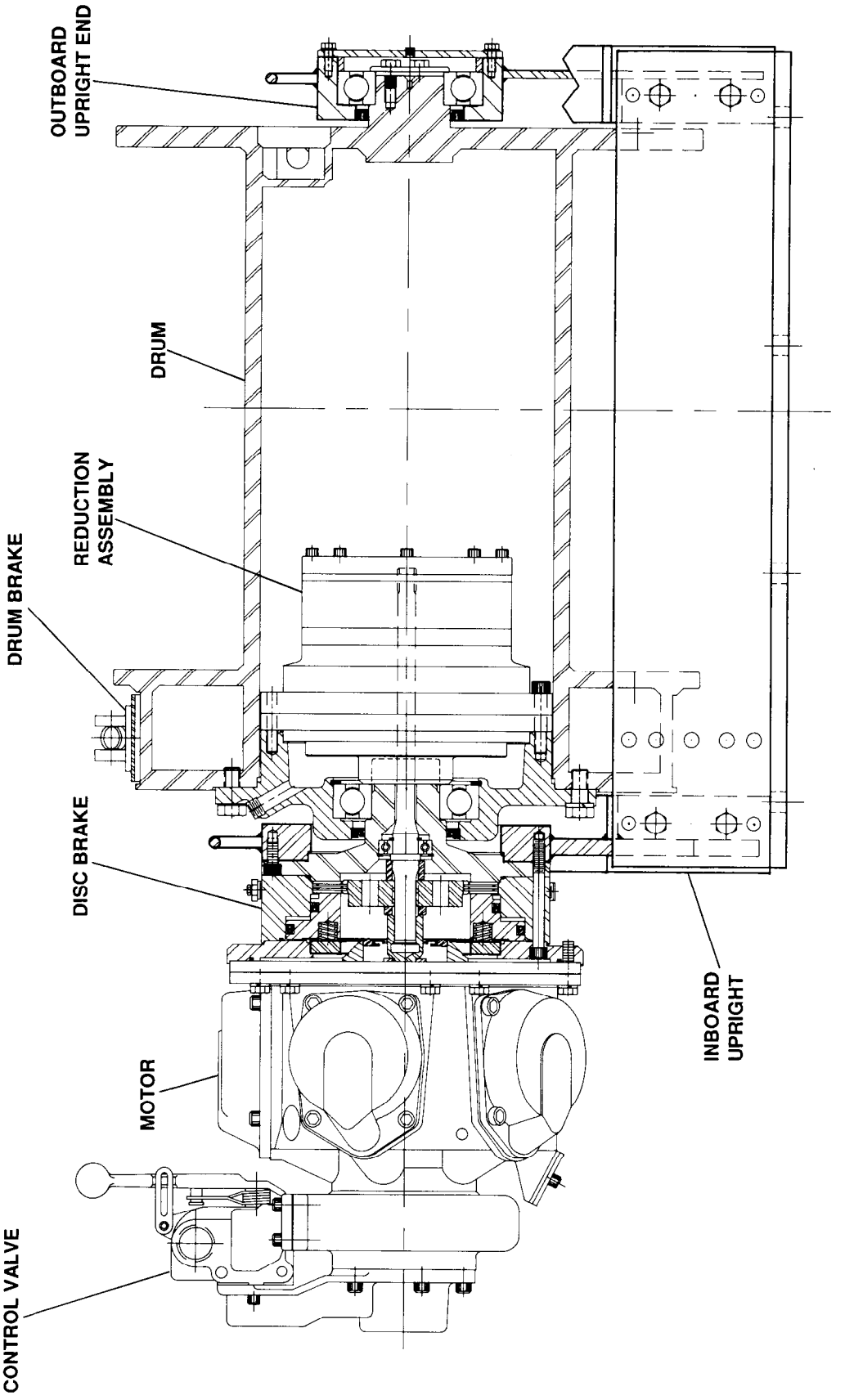
1. Check oil level in motor, reduction gear assembly and disc brake are correct. Top off levels as required before operation as described in the "LUBRICATION" section.
2. To initially 'break in' new or overhauled motors operate without load, in both directions, for 2 hours at 100 - 200 RPM.
3. New Drum 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, extensively repaired, or altered 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 the winch. Test loads shall not be less than **100%** of rated line pull and must not exceed **125%** of the rated line pull. To test the winch at **125%** of the rated load apply the following load with the wire rope on the first layer of the drum:

FA5 Winch	**19,970 lb. (9,058 kg)**
FA5T Winch	**19,970 lb. (9,058 kg)**

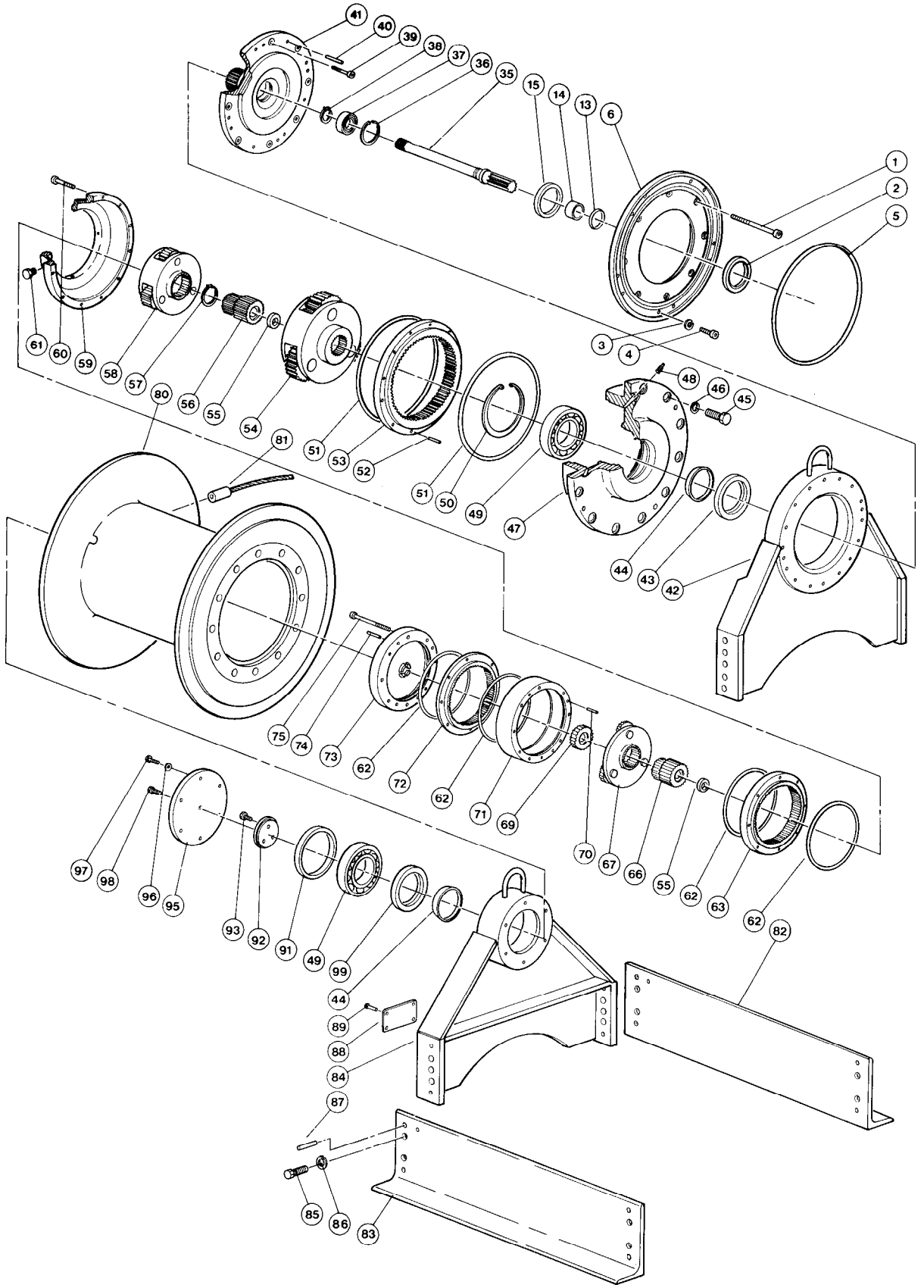
FA5 WINCH ASSEMBLY DRAWINGS REFERENCE DIAGRAM



FA5 WINCH DRAWINGS AND PARTS LISTS TABLE OF CONTENTS

Description **Page No.**

DRUM, BASE AND REDUCTION GEAR ASSEMBLY DRAWING



(Dwg. MHTPC0157)

DRUM, BASE AND REDUCTION GEAR ASSEMBLY PARTS LIST

ITEM NO.	DESCRIPTION OF PART	QTY TOTAL	PART NUMBER	ITEM NO.	DESCRIPTION OF PART	QTY TOTAL	PART NUMBER
1	Capscrew	8	50910	59	Input Housing	1	71068589
• 2	Oil Seal	1	51873	60	Capscrew	12	71068605
3	Lockwasher	10	50201	61	Plug	4	71068571
4	Capscrew	10	50197	• 62	'O' Ring	4	52149
• 5	'O' Ring	1	51459	63	Ring Gear	1	71068548
6	Motor Adapter	1	14227	66	Sun Gear	1	71068530
• 13	'O' Ring (Drive Shaft)	1	54462	67	Planetary Assembly	1	71068498
14	Sleeve	1	10598	69	Sun Gear	1	71068662
15	Seal Adapter	1	16354	70	Dowel Pin	4	71068472
35	Shaft	1	10579	71	Spacer	1	71068522
36	Retainer Ring	1	52298	72	Ring Gear	1	71068514
• 37	Bearing	1	51870	73	Cover	1	71068654
38	Retainer Ring	1	51872	74	Dowel Pin	4	71068464
39	Capscrew	8	52380	75	Capscrew	8	71066736
40	Pin, Dowel	12	52334	80	Drum	1	***
41	Drum Shaft	1	14020	81	**Wire Rope Anchors:**		
42	Upright, Inboard	1	***		5/8 inch (16 mm)	1	52306
• 43	Seal	1	51464		3/4 inch (19 mm)		52000
* 44	Seal Sleeve	1	51466		7/8 inch (22 mm)		52308
45	Capscrew	12	52829	82	Side Rail (Front - RH)	1	***
46	Lockwasher	12	51012	83	Side Rail (Back - LH)	1	***
47	Gear Carrier	1	15418	84	Outboard Upright	1	***
48	Plug, Fill and Drain	2	51467	85	Capscrew	8	50872
49	Bearing	2	51455	86	Lockwasher	8	50203
50	Retainer Ring	1	71018196	87	Dowel Pin	10	51468
**	Reduction Gear Assembly	1	51721	88	Nameplate	1	71106967-R
				89	Screw, Drive	4	50915
• 51	'O' Ring	2	71106728	91	Spacer	1	15458
52	Dowel Pin	3	71106710	92	Shaft Retainer	1	15457
53	Ring Gear	1	71068639	93	Capscrew	3	51086
54	Planetary Assembly	1	71068621	95	End Cover	1	15459
• 55	Thrust Bearing	2	71068647	96	Lockwasher	6	50200
56	Sun Gear	1	71068613	97	Capscrew	6	50829
57	Retainer Ring	1	71068597	98	Plug	1	54246
58	Planetary Assembly	1	71068555	• 99	Seal	1	51463

• Recommended spare.

* Seal sleeve, item 44 is no longer used and is not available as a replacement part. For units purchased with seal sleeves requiring replacement contact your Ingersoll-Rand distributor or the factory.

** Reduction Gear Assembly includes item numbers 51 through 75.

*** Refer to UPRIGHT ASSEMBLY PARTS LIST, DRUM ASSEMBLY PARTS LIST and SIDE RAIL ASSEMBLY PARTS LIST for parts information. RH = Right Hand Side, LH = Left Hand Side as viewed from the winch motor end. Inboard is end closest to motor; outboard is end farthest away from motor.

UPRIGHT ASSEMBLY PARTS LIST

INBOARD UPRIGHT (ITEM 42)	QTY TOTAL	PART NUMBER	OUTBOARD UPRIGHT (ITEM 84)	QTY TOTAL	PART NUMBER
Standard Drum Flange (27 inch)	1	10789	Standard Drum Flange (27 inch)	1	10790
Tall Drum Flange (35 inch)	1	10787	Tall Drum Flange (35 inch)	1	10788

DRUM ASSEMBLY PARTS LIST

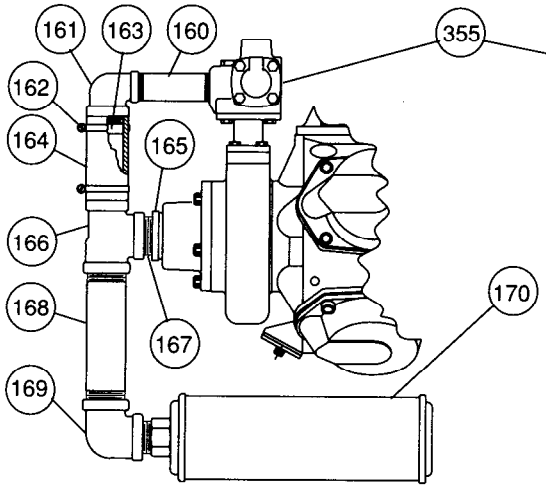
DRUM (ITEM 80) WITH BAND BRAKE	QTY TOTAL	PART NUMBER	DRUM (ITEM 80) WITHOUT BAND BRAKE	QTY TOTAL	PART NUMBER
Drum - Standard Flange Height (27 inches):					
Drum (12 inches long)	1	10860-2	Drum (12 inches long)	1	11378-2
Drum (16 inches long)		10860-3	Drum (16 inches long)		11378-3
Drum (24 inches long)		10860-5	Drum (24 inches long)		11378-5
Drum (30 inches long)		10860-6	Drum (30 inches long)		11378-6
Drum - Tall Flange Height (35 inches):					
Drum (12 inches long)	1	11043-2	Drum (12 inches long)	1	11380-2
Drum (16 inches long)		11043-3	Drum (16 inches long)		11380-3
Drum (24 inches long)		11043-5	Drum (24 inches long)		11380-5
Drum (30 inches long)		11043-6	Drum (30 inches long)		11380-6
Drum (36 inches long)		11043-9	Drum (36 inches long)		11380-9

SIDE RAIL PARTS LIST

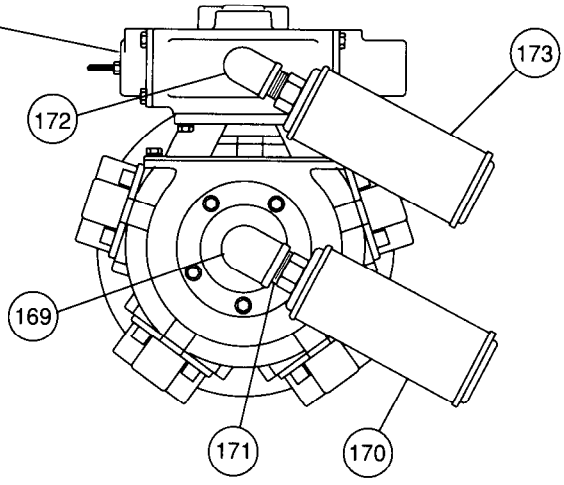
SIDE RAIL (ITEM 82) RIGHT HAND	QTY TOTAL	PART NUMBER	SIDE RAIL (ITEM 83) LEFT HAND	QTY TOTAL	PART NUMBER
Side Rail for drum with band brake:					
with 12 inch Drum	1	11381-2	with 12 inch Drum	1	11385-2
with 16 inch Drum		11381-3	with 16 inch Drum		11385-3
with 24 inch Drum		11381-5	with 24 inch Drum		11385-5
with 30 inch Drum		11381-6	with 30 inch Drum		11385-6
Side Rail for drum without band brake:					
with 12 inch Drum	1	11386-2	with 12 inch Drum	1	11386-2
with 16 inch Drum		11386-3	with 16 inch Drum		11386-3
with 24 inch Drum		11386-5	with 24 inch Drum		11386-5
with 30 inch Drum		11386-6	with 30 inch Drum		11386-6
with 36 inch Drum		11386-9	with 36 inch Drum		11386-9

MUFFLER ASSEMBLY DRAWINGS AND PARTS LIST

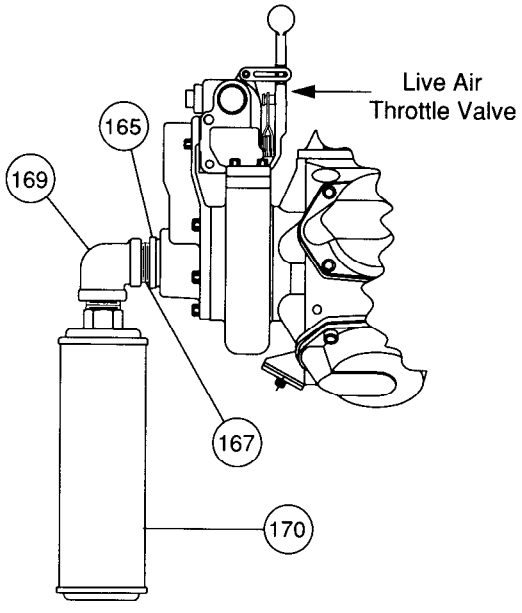
K5B Motor Muffler with Remote Actuated Pilot Control Valve (Old Style)



K5B Motor Mufflers with Remote Actuated Pilot Control Valve (New Style)



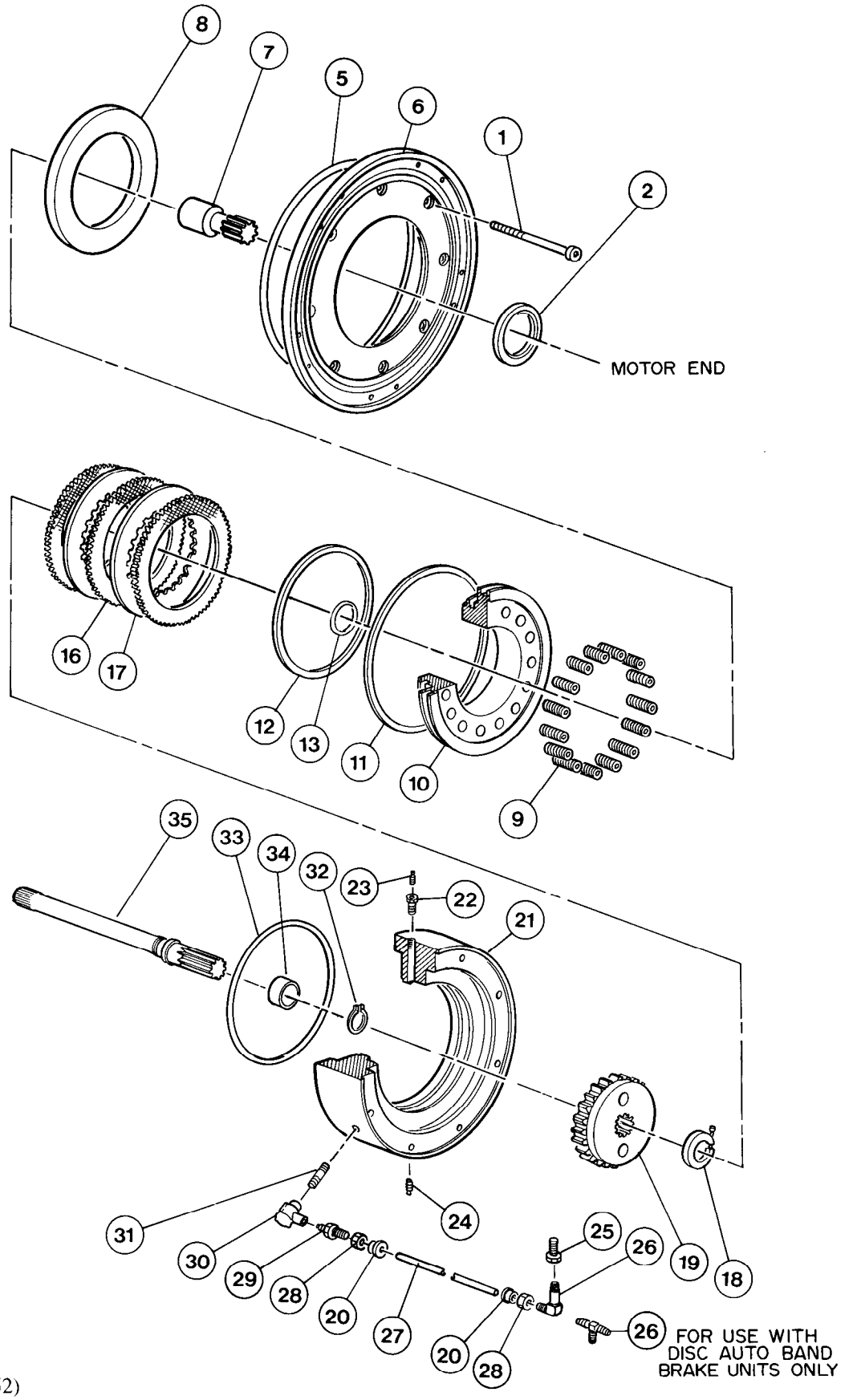
K5B Motor Muffler with Live Air Throttle Valve



(Dwg MHTPA0570)

ITEM NUMBER	DESCRIPTION OF PART	QTY TOTAL	PART NUMBER	
K5B Motor with Live Air Throttle Valve				
165	Reducer Bushing	1	71057459	
167	Pipe Nipple	1	71057467	
169	Pipe Elbow	1	71057434	
170	Muffler	1	50594	
K5B Motor with Remote Actuated Pilot Valve			**Old Style**	**New Style**
160	Pipe Nipple	1	71057491	- - -
161	Pipe Elbow	1	71033450	- - -
162	Hose Clamp	2	71033500	- - -
163	Pipe Nipple	2	71057483	- - -
164	Hose	1	71033492	- - -
165	Reducer Bushing	1	71057459	- - -
166	Pipe Tee	1	71057442	- - -
167	Pipe Nipple	1	71057467	
168	Pipe Nipple	1	71057475	- - -
169	Pipe Elbow	1	71057434	
170	Muffler	1	50594	
171	Pipe Nipple	1	- - -	51704
172	Pipe Elbow	1	- - -	52103
173	Muffler	1	- - -	52465

DISC BRAKE ASSEMBLY DRAWING



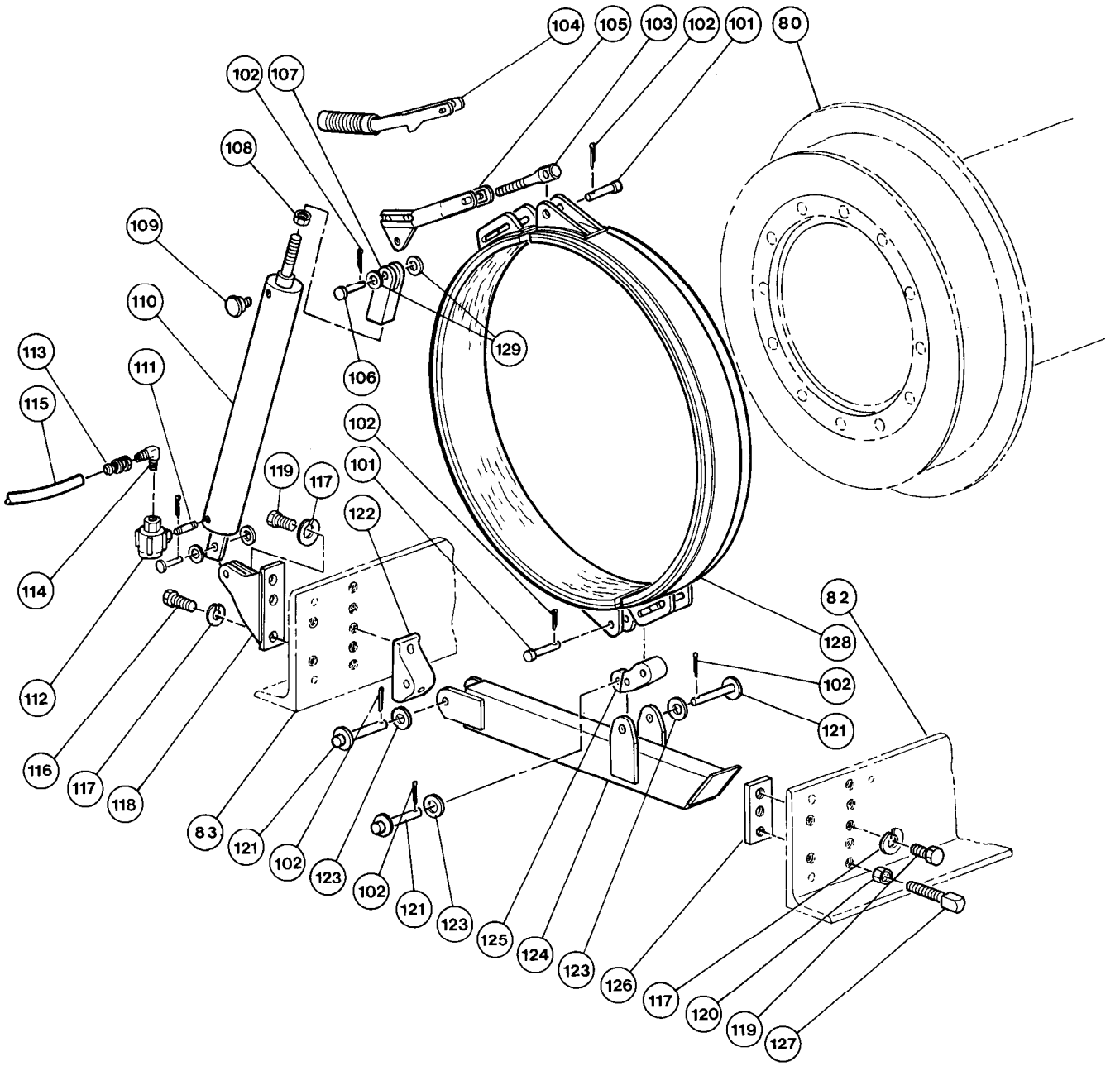
(Dwg. MHTPA0152)

DISC BRAKE ASSEMBLY PARTS LIST

ITEM NUMBER	DESCRIPTION OF PART	QUANTITY TOTAL	PART NUMBER
1	Capscrew (with Disc Brake)	8	51471
• 2	Oil Seal	1	51873
• 5	'O' Ring	1	51460
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
• 13	'O' Ring	1	54462
• 16	Friction Plate	3	50772
• 17	Drive Plate	2	50773
18	Collar	1	71039333
19	Splined Hub	1	10600
20	Sleeve, Fitting	2	55014
21	Brake Housing	1	11322
22	Fitting, Reducer Bushing	1	51803
• 23	Breather	1	51857
24	Pipe Plug	1	50801
25	Fitting	1	54659
26	Elbow Fitting	1	71056972
	Tee Fitting (for units with auto drum band brake and disc brake only)	1	52181
27	Tubing	1	52520
28	Nut, Fitting	2	55013
29	Vented Fitting	1	51814
• 30	Dump Valve	1	50276
31	Fitting, Nipple	1	50859
32	Retainer Ring	1	50904
• 33	'O' Ring	1	51458
34	Spacer	1	18683
35	Shaft	1	10903

• Recommended spare.

DRUM BRAKE ASSEMBLY DRAWING



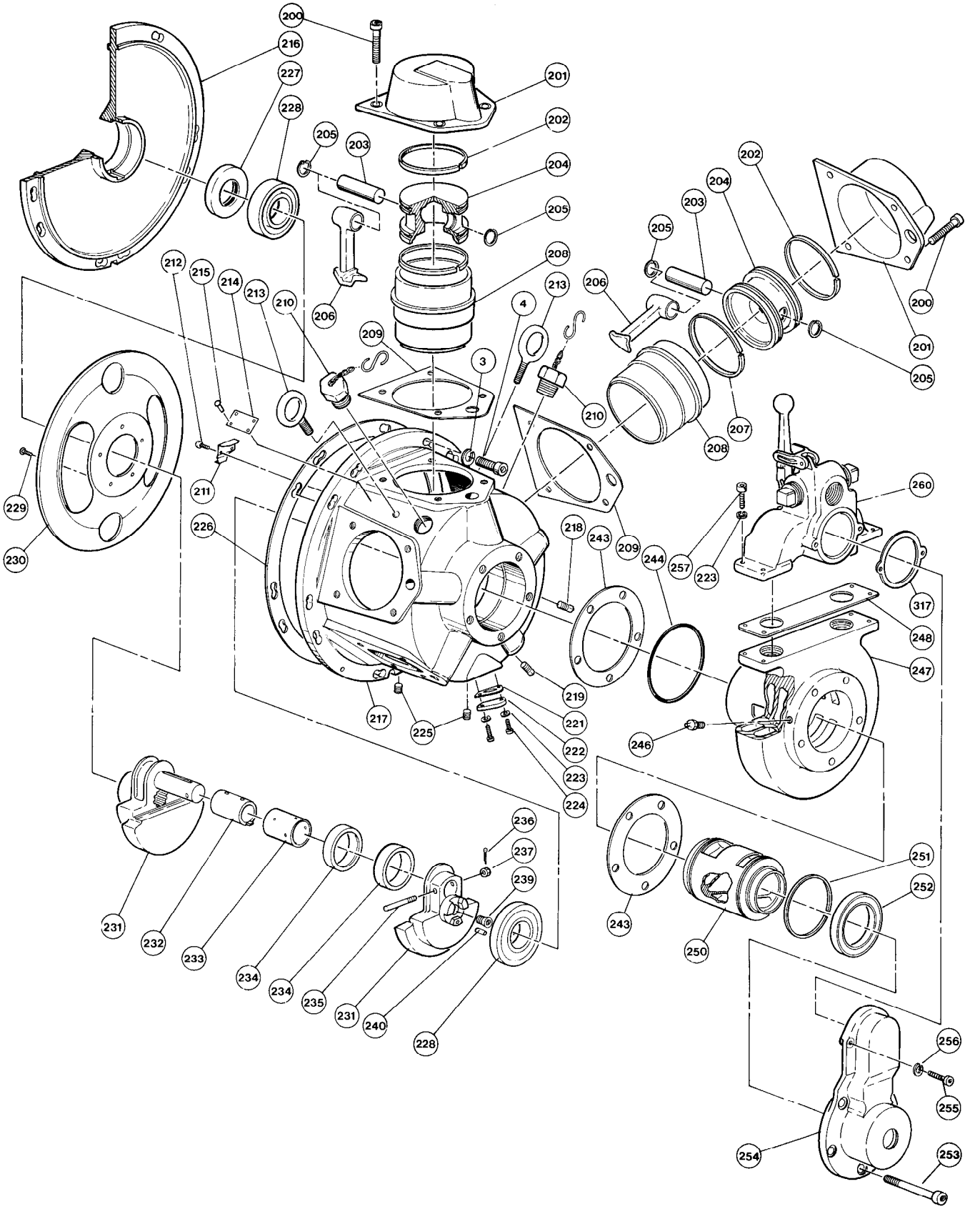
(Dwg. MHTPB0153)

DRUM BRAKE ASSEMBLY PARTS LIST

ITEM NO.	DESCRIPTION OF PART	QUANTITY TOTAL	PART NUMBER	
			MANUAL BRAKE	AUTOMATIC BRAKE
Standard 27 inch flange:				
80	Drum with band brake (12 inch long)	1	10860-2	
	Drum with band brake (16 inch long)		10860-3	
	Drum with band brake (24 inch long)		10860-5	
	Drum with band brake (30 inch long)		10860-6	
Tall 35 inch flange:				
80	Drum with band brake (12 inch long)	1	11043-2	
	Drum with band brake (16 inch long)		11043-3	
	Drum with band brake (24 inch long)		11043-5	
	Drum with band brake (30 inch long)		11043-6	
	Drum with band brake (36 inch long)		11043-9	
Common Parts:				
101	Pin	2	4308-S-1	4308-S-1
102	Cotter Pin	See ( )	51937 (5)	51937 (7)
103	Link Stud	1	4115	
104	Brake Lever - Manual Brake	1	4127	- - -
105	Brake Lever - Automatic Brake	1	- - -	13149
106	Pin	2	- - -	8609
107	Clevis	1	- - -	8586
108	Nut	1	- - -	50159
109	Breather	1	- - -	51953
110	Cylinder	1	- - -	8575
111	Fitting	1	- - -	52331
• 112	Dump Valve	1	- - -	51954
113	Fitting	2	- - -	52329
114	Elbow	1	- - -	52330
115	Hose	1	- - -	50923
116	Capscrew	3	- - -	50873
117	Lockwasher	5	50203	
118	Bracket	1	- - -	11329
119	Capscrew	3	50850	
120	Nut	See ( )	51844 (1)	51844 (2)
121	Pin	3	4307-S	
122	Pivot Bracket	1	10881	
123	Washer	As Req'd	71053904	
124	Arm (27 inch Drum flange)	1	10883	
	Arm (35 inch Drum flange)		10884	
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	5	52914	

• Recommended spare.

K5B MOTOR ASSEMBLY DRAWING



(Dwg. MHTPC0156)

K5B MOTOR ASSEMBLY PARTS LIST

ITEM NO.	DESCRIPTION OF PART	QTY TOTAL	PART NUMBER
**	Motor Assembly	1	K5B-546
3	Lockwasher	10	50201
4	Capscrew	10	14227
200	Capscrew	20	52317
201	Cylinder Head	5	K5B-H505
• 202	Compression Ring	1 Set	K5B546-KRING
203	Wrist Pin	5	HU-514A
* 204	Piston	5	*
205	Retainer Ring	10	902A45-632
206	Connecting Rod	5	K5B-509
• 207	Oil Ring	Refer to Item 202	
208	Cylinder Liner	5	K5B-L505-47
• 209	Head Gasket	1 Set	K5B-507-5
201	Vent Cap Assembly	2	K5B-A303
211	Baffle	2	K5B-528
212	Screw	4	J-376
213	Eye Bolt	2	KU-888
214	Nameplate	1	K5B-301
215	Drive Screw	4	R4K-302-12
216	Mounting Flange	1	K5B-502
217	Motor Housing	1	K5B-501
218	Pipe Plug (Oil level)	1	ROH-377
219	Pipe Plug	1	TC-368
• 221	Gasket	1	K5B-1002
222	Cover Plate	1	K5B-1001
223	Lockwasher	6	D02-321-10
224	Capscrew	2	119A2A202
225	Pipe Plug (Drain)	3	GA57-95
• 226	Gasket	1	K5B-592

ITEM NO.	DESCRIPTION OF PART	QTY TOTAL	PART NUMBER
• 227	Oil Seal	1	K5B-270
228	Crank Bearing	2	K5B-518
* 229	Button Head Screw	5	*
* 230	Oil Slinger	1	*
231	Crank Assembly	1	K5B-A516
232	Sleeve	1	K5B-519
233	Bushing	1	K5B-511
234	Connecting Rod Ring	1	K5B-510
235	Lock Pin	1	HU-K520
236	Cotter Pin	1	D02-524
237	Pin Nut	1	D02-394
239	Flat Head Screw	1	139A2A266
240	Roll Pin	1	WF171-15
• 243	Gasket	2	K5B-928
• 244	'O' Ring	1	20A11CM248
246	Grease Fitting	1	23-188
247	Rotary Valve Housing	1	K5B-545
• 248	Gasket	1	K5B-547
250	Rotary Valve	1	K5B-526
• 251	Seal Ring	1	K5B-607
• 252	Bearing	1	K5B-97
253	Capscrew	5	51471
254	Exhaust Flange	1	K5B-276
255	Capscrew	2	119A2A200
256	Lockwasher	2	D02-321-10
257	Capscrew	4	51766
260	Valve Assembly	1	K5B-REMOTE
317	Gasket	1	K5B-275

• Recommended spare.

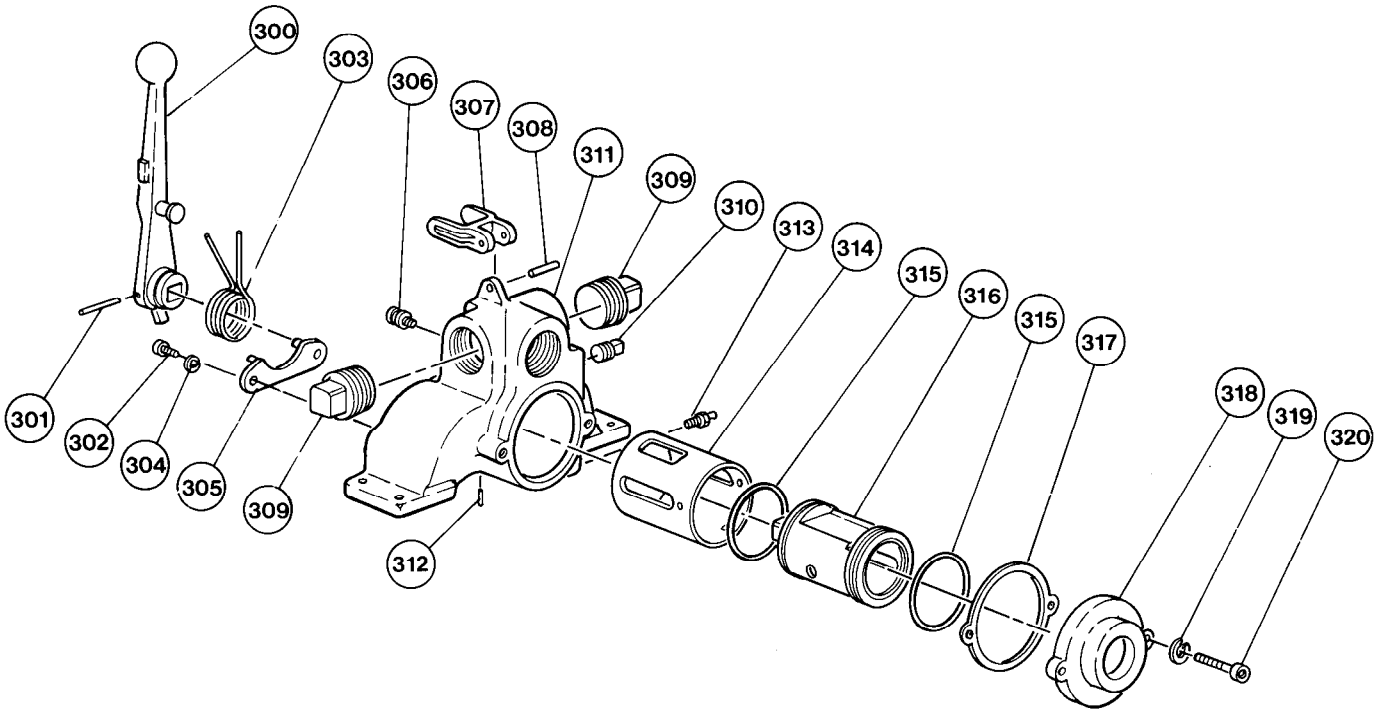
* Parts not sold separately. Refer to the "K5B Motor Assembly Kit List."

** Motor Assembly consists of items 200 through 260 and 317.

K5B Motor Assembly Kit List:

ITEM NO.	DESCRIPTION OF PART	QTY TOTAL	PART NUMBER
231	Crank Assembly (Includes items 206 and 228 through 237)	1	K5B-A516
261	Piston Assembly (Includes items 202 through 205 and item 207)	1	K5B-A513-47
262	Cylinder Assembly (Includes items 201 and 208)	1	K5B-A505-47

LIVE AIR CONTROL VALVE ASSEMBLY DRAWING AND PARTS LIST



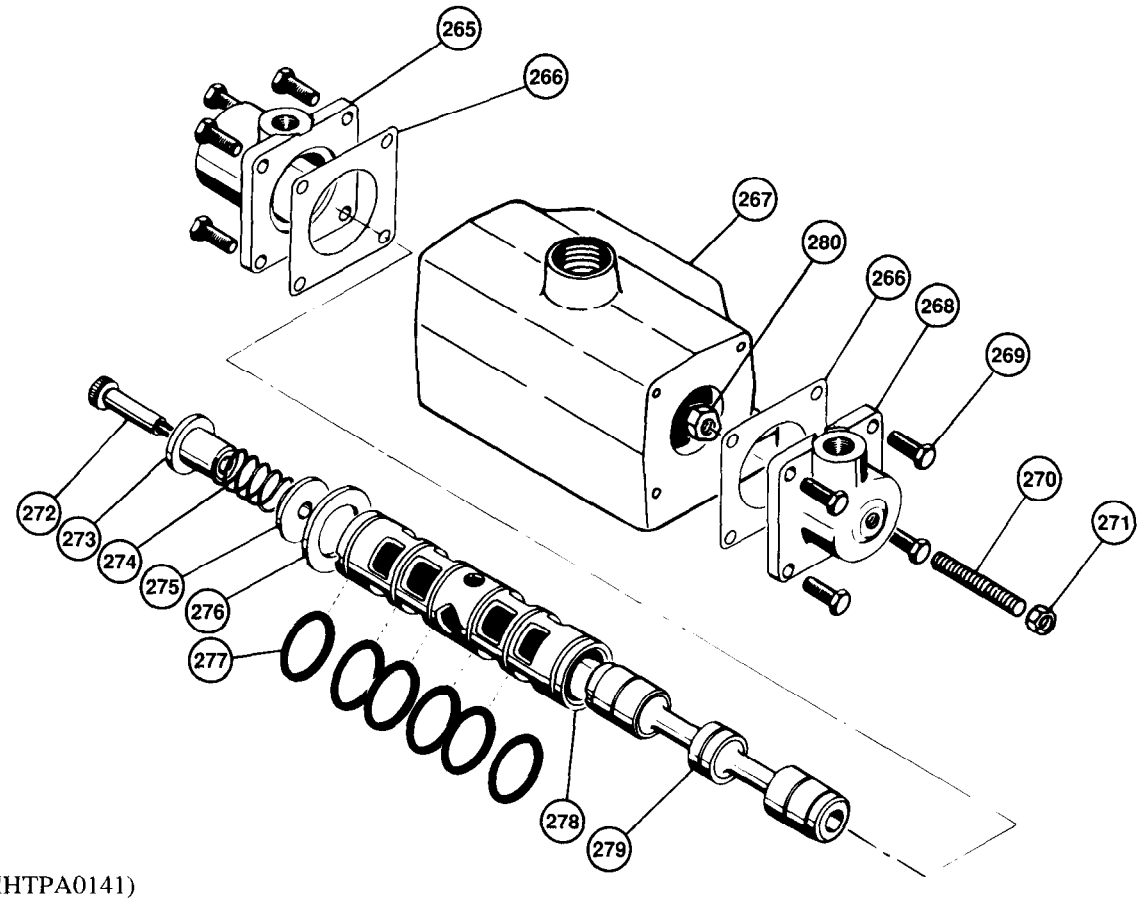
(Dwg. MHTPA0165)

ITEM NO.	DESCRIPTION OF PART	QTY TOTAL	PART NUMBER	ITEM NO.	DESCRIPTION OF PART	QTY TOTAL	PART NUMBER
260	Valve Assembly (Includes items 300 through 320)	1	K5B-REMOTE	311	Valve Housing (matched set with item 314)	1	K5B-1101
300	Handle	1	K5B-556	312	Roll Pin	1	25A13C92
301	Roll Pin	1	K5B-1115	313	Grease Fitting	1	23-188
302	Capscrew	2	50853	314	Valve Bushing (matched set with item 311)	1	K5B-1101
• 303	Spring	1	K5B-412				
304	Lockwasher	2	50200				
305	Valve Body Retainer	1	K5B-1110	• 315	Seal Ring	2	K5B-606
				316	Valve Body	1	K5B-944
306	Spring Retaining Stud	1	K5B-553	317	Gasket	1	K5B-275
307	Latch	1	K5B-869	318	Flange	1	KK5B-276S
308	Roll Pin	1	HLK-20	319	Lockwasher	2	D02-321-10
309	Pipe Plug	2	E5UD-947	320	Capscrew	2	50853
310	Pipe Plug	1	71026025	173	Muffler *	1	52465

• Recommended spare.

* Not shown on drawing. Refer to MUFFLER ASSEMBLY DRAWINGS AND PARTS LIST.

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



(Dwg. MHTPA0141)

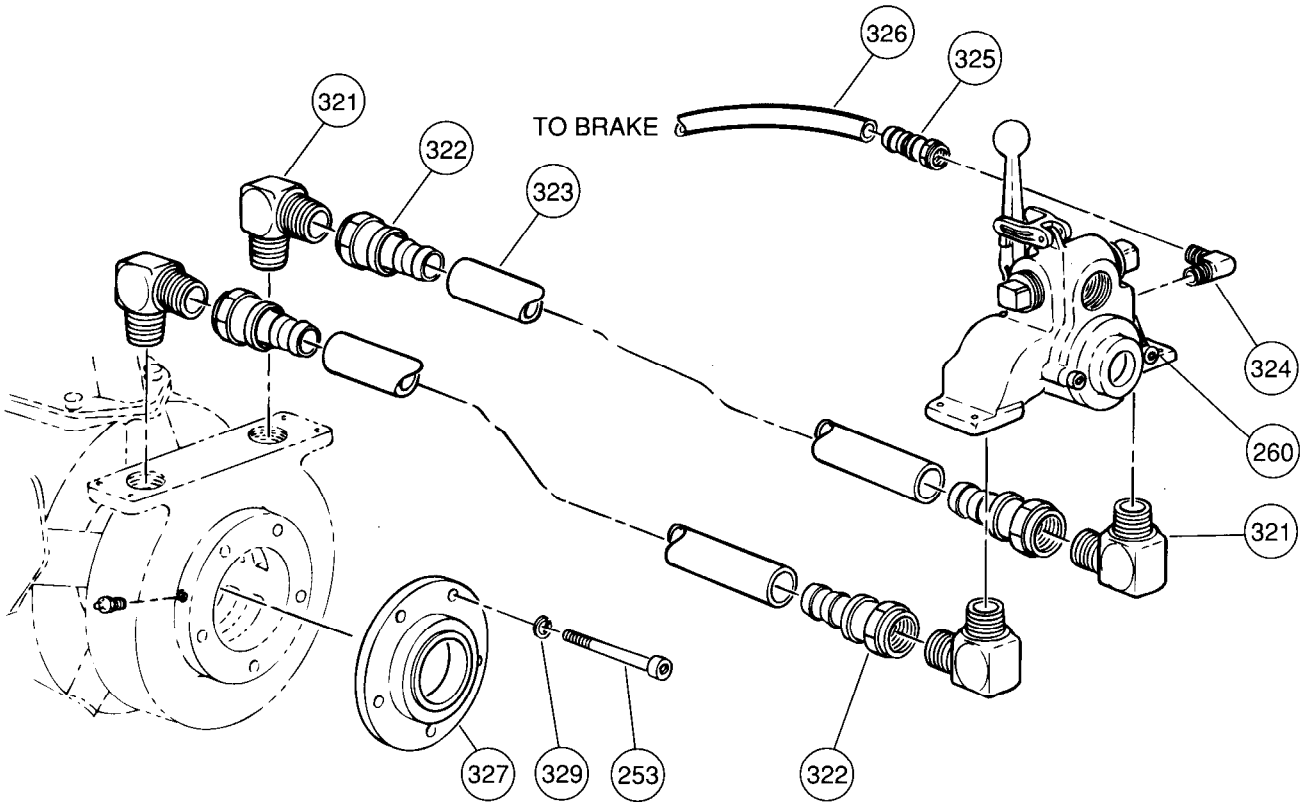
ITEM NO.	DESCRIPTION OF PART	QTY TOTAL	PART NUMBER	
			410 size *	510 size
355	Valve Assembly **	1	20992	20993
265	End Cap	1	52241	71136725
• 266	Gasket	2	52457	71136733
267	Valve Body	1	Not sold separately, order item 355	
268	End Cap (Inlet Side)	1	11778	
269	Capscrew	8	71030134	71030118
270	Adjusting Screw	1	71083968	
271	Nut	1	52265	
272	Shoulder Screw	1	54710	
273	Guide	1	52233	71136741
274	Spring	1	52240	71136758
275	Washer	1	52239	71136766
276	Spacer	1	52238	71136774
• 277	'O' Ring	6	51632	71136782
278	Valve Sleeve	1	Not sold separately, order item 355	
279	Valve Spool	1	Not sold separately, order item 355	
280	Stop	1	11777	

• Recommended spare.

* 410 are old style valves. Contact Ingersoll-Rand office or distributor for technical assistance in determining the correct valve.

** Valve assembly includes items 265 through 280.

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

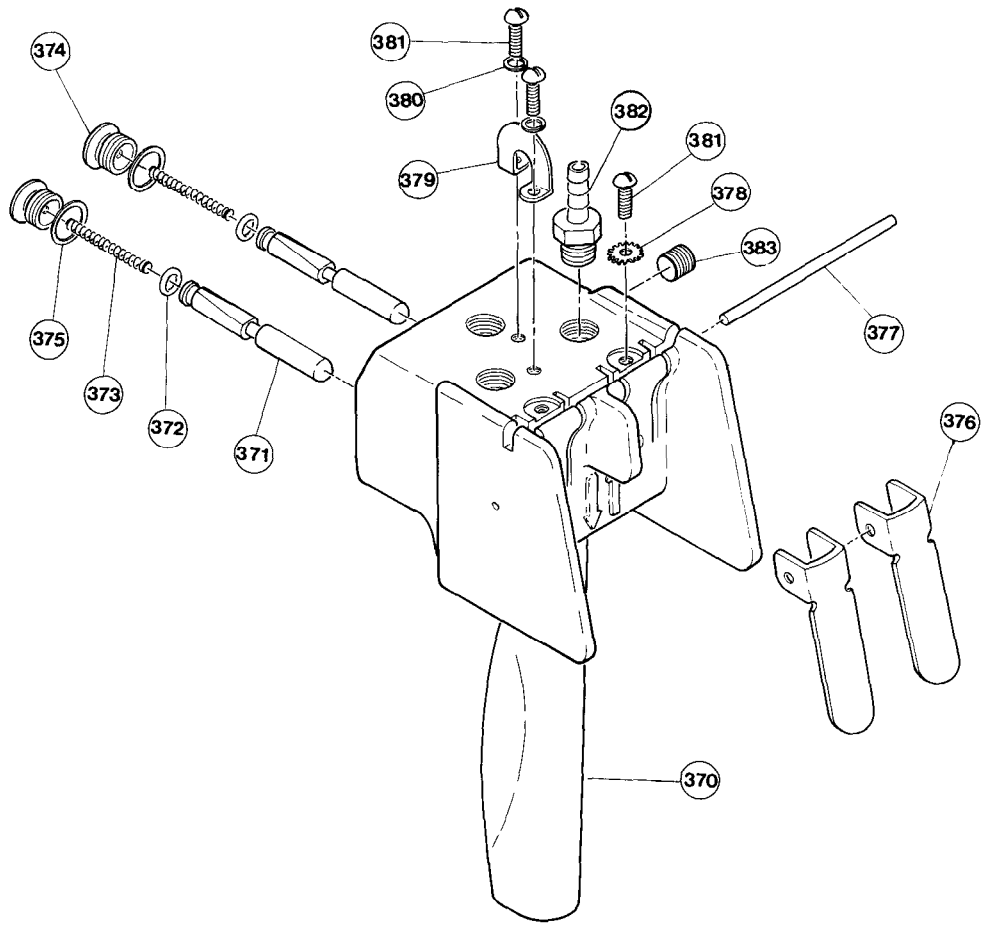


(Dwg. MHTPA0161)

ITEM NO.	DESCRIPTION OF PART	QUANTITY TOTAL	PART NUMBER
260	Control Valve Assembly	1	K5B-REMOTE
253	Capscrew	5	119A2A267
321	Elbow Fitting	4	71015457
322	Hose End	4	54738
323	Hose	2	54737-*
324	Elbow Fitting	1	52182
325	Hose End	2	51029
326	Hose	1	50923-*
327	Exhaust Cover	1	251P2559A
329	Lockwasher	5	50181

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

PENDANT CONTROL ASSEMBLY (OPTIONAL) DRAWING AND PARTS LIST



(Dwg. MHTPA0168)

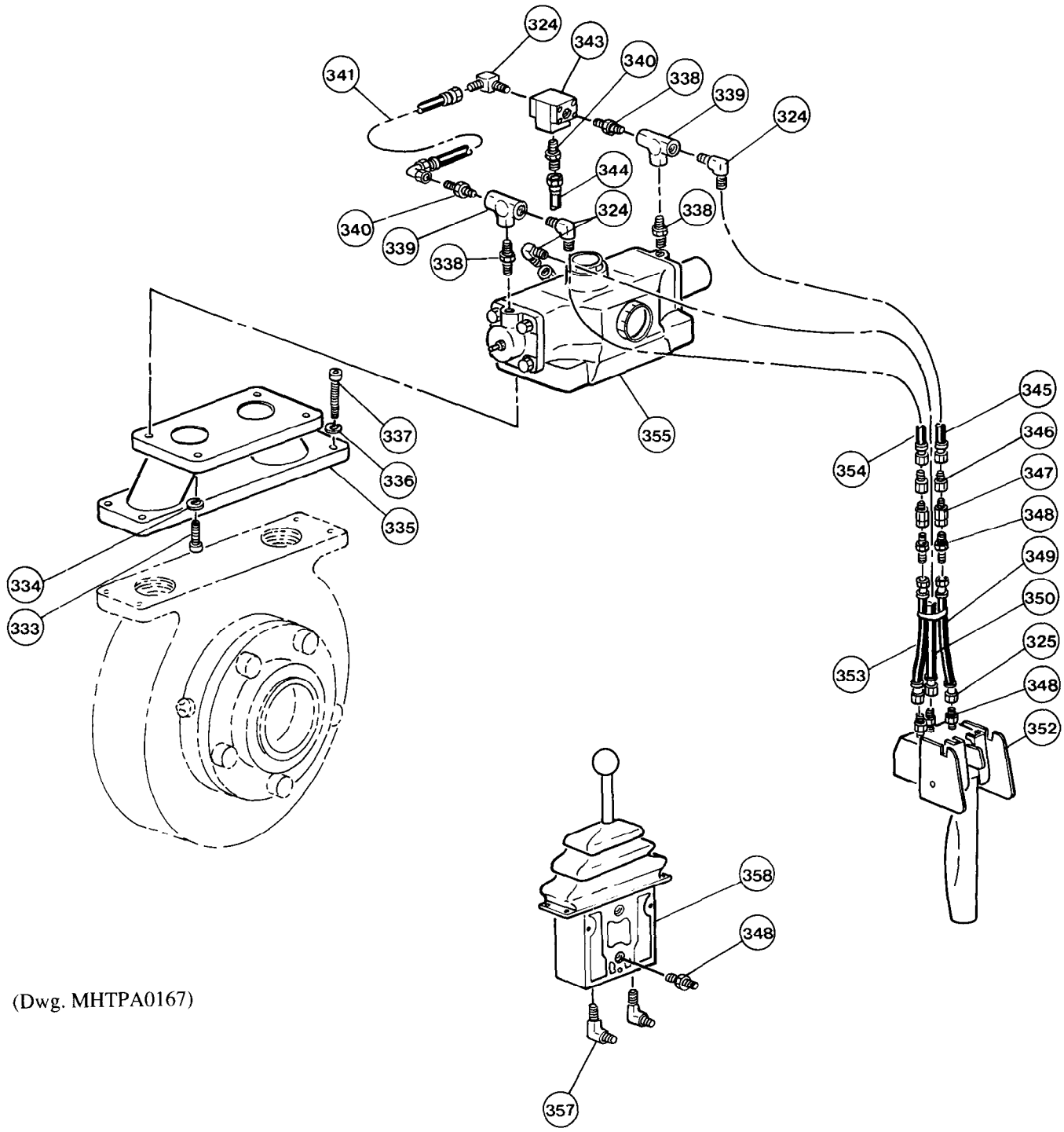
ITEM NO.	DESCRIPTION OF PART	QTY TOTAL	PART NUMBER	ITEM NO.	DESCRIPTION OF PART	QTY TOTAL	PART NUMBER
* 352	Pendant Assembly	1	MLK-A269A	377	Throttle Lever Pin	1	DLC-120A
** 370	Pendant Handle	1	MLK-269	378	Pin Lock Washer	2	D02-138
371	Throttle Valve	2	MLK-K264B	379	Support	1	MLK-450
372	Throttle Valve Face	2	R000BR1C-283	380	Lockwasher	2	H54U-352-10
• 373	Spring	2	MKL-51A	381	Handle Screw	4	HRE20A-68
374	Throttle Valve Cap	2	MLK-266A	382	Hose Fitting	3	52092
• 375	Valve Cap Gasket	2	MLK-504	383	Pipe Plug	1	54247
376	Lever	2	MLK-273				

• Recommended spare.

* Assembly includes items 370 thru 381 and 383.

** Not sold seperately; purchase item 353.

REMOTE PILOT AIR CONTROL (OPTIONAL) ASSEMBLY DRAWINGS



(Dwg. MHTPA0167)

REMOTE PILOT AIR CONTROL (OPTIONAL) ASSEMBLY PARTS LISTS

Remote Pilot Pendant Throttle Control

ITEM NO.	DESCRIPTION OF PART	QTY TOTAL	PART NUMBER			
			10 ft (3 m)	20 ft (6 m)	30 ft (9 m)	40 ft (12 m)
324	Elbow Fitting	4	52182			
325	Hose End Fitting	See ( )	51029 (6)	51029 (10)		51029 (14)
333	Capscrew	4	54681			
334	Lockwasher	4	50893			
335	Manifold	1	13881			
336	Lockwasher	4	51486			
337	Capscrew	4	50829			
338	Nipple Fitting	3	54274			
339	Pipe Tee Fitting	2	54678			
340	Adapter Fitting	2	51814			
341	Hose Assembly	1	17073-6			
• 343	Shuttle Valve	1	50277			
344	Hose Assembly (Brake)	1	17073-10			
345	Hose	See ( )	50923-(132)	50923-(242)	50923-(233)	50923-(245)
346	Adapter Fitting	As Req'd	- - -	71048284		
* 347	Exhaust Valve	As Req'd	- - -	20417		
348	Adapter Fitting	As Req'd	71048268			
349	Hose	See ( )	- - -	50923-(6)	50923-(123)	50923-(6)
350	Hose	See ( )	50923-(123)	50923-(252)	50923-(372)	50923-(492)
352	Control Pendant	1	MLK-A269A			
353	Hose	See ( )	- - -	50923-(6)	50923-(135)	50923-(6)
354	Hose	See ( )	50923-(120)	50923-(230)	50923-(233)	
355	Valve Assembly	1	19891			
** 356	Hose	See ( )	- - -	- - -	- - -	50923-(233)

Remote Pilot Lever Throttle Valve Associated Components

Note: Requires item #'s 325, 333 through 344 (Reference "Remote Pilot Pendant Throttle Control") plus the following parts. Part numbers and quantities are for a 30 foot (9 metre) hose assembly.

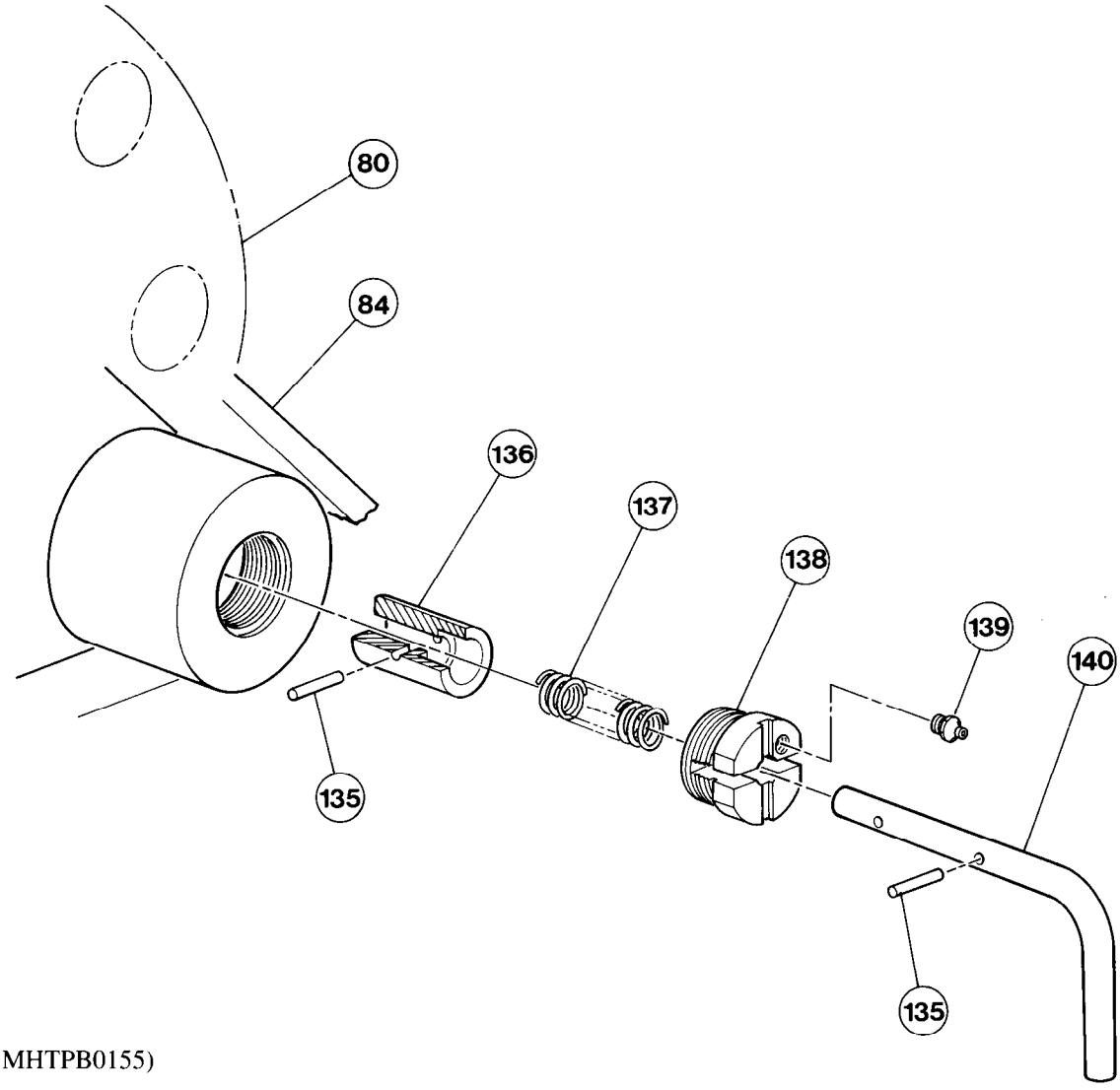
345	Hose	See ( )	50923-(233)
346	Adapter Fitting	2	71048284
* 347	Exhaust Valve	2	20417
348	Adapter Fitting	1	71048268
349	Hose	See ( )	50923-(135)
350	Hose	See ( )	50923-(372)
353	Hose	See ( )	50923-(123)
354	Hose	See ( )	50923-(233)
357	Elbow Fitting	2	51281
358	Pilot Lever Throttle	1	71069561

• Recommended spare.

* Must be installed at 20 foot (6 metre) intervals. Part number 20417 (item 347) includes items 346 and 348.

** Not shown. Install between exhaust valves. ( ) = Length in inches.

DRUM LOCKING PIN (OPTIONAL) ASSEMBLY DRAWING AND PARTS LIST

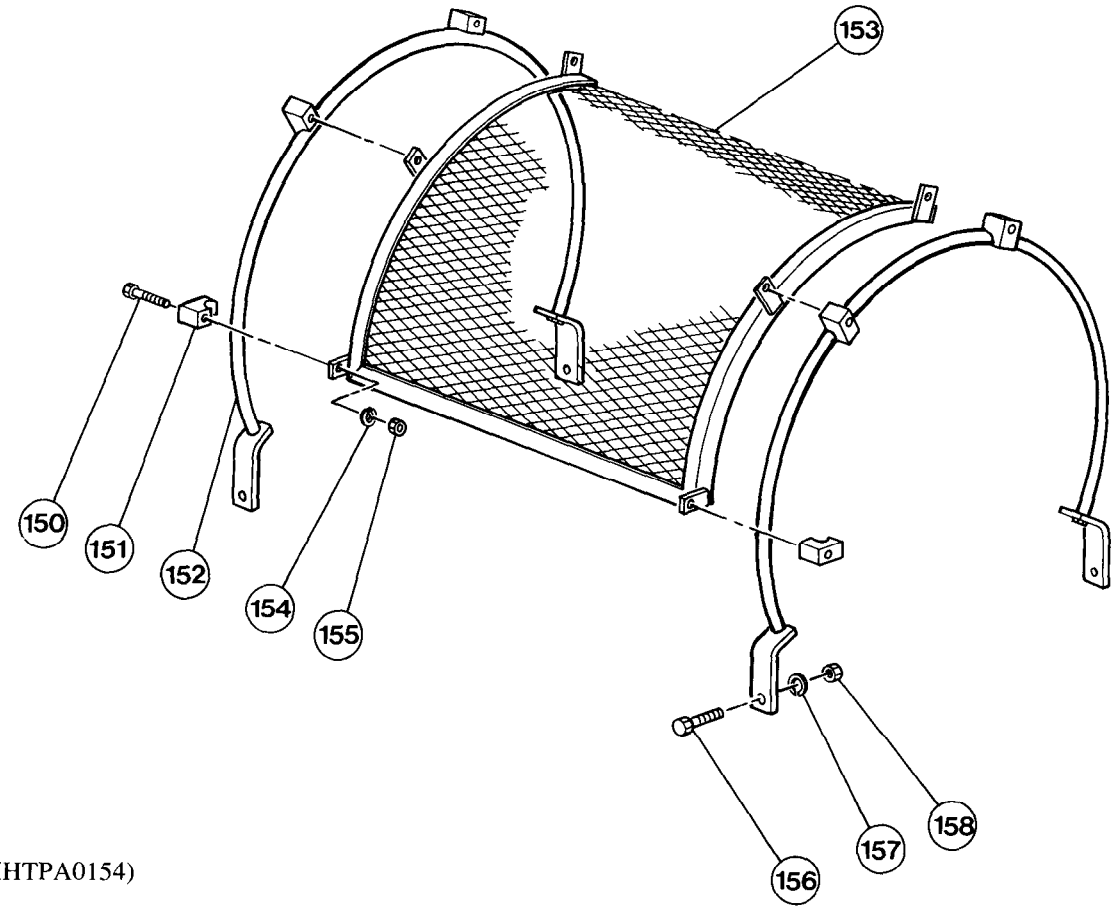


(Dwg. MHTPB0155)

ITEM NO.	DESCRIPTION OF PART	QTY TOTAL	PART NUMBER	ITEM NO.	DESCRIPTION OF PART	QTY TOTAL	PART NUMBER
* **Drum:**							
80	with band brake (27 inch Drum flange)	1	14954	80	without band brake (27 inch Drum flange)	1	14593
	with band brake (35 inch Drum flange)		14596		without band brake (35 inch Drum flange)		14955
Common Parts:							
84	Outboard Upright (27 inch Drum flange)	1	14946	136	Lock Pin	1	16328
				137	Spring	1	54453
	Outboard Upright (35 inch Drum flange)		14952	138	Gland	1	16329
				139	Grease Fitting	1	53498
135	Pin	2	51933	140	Pull Rod	1	16310

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

DRUM GUARD ASSEMBLY DRAWING AND PARTS LIST

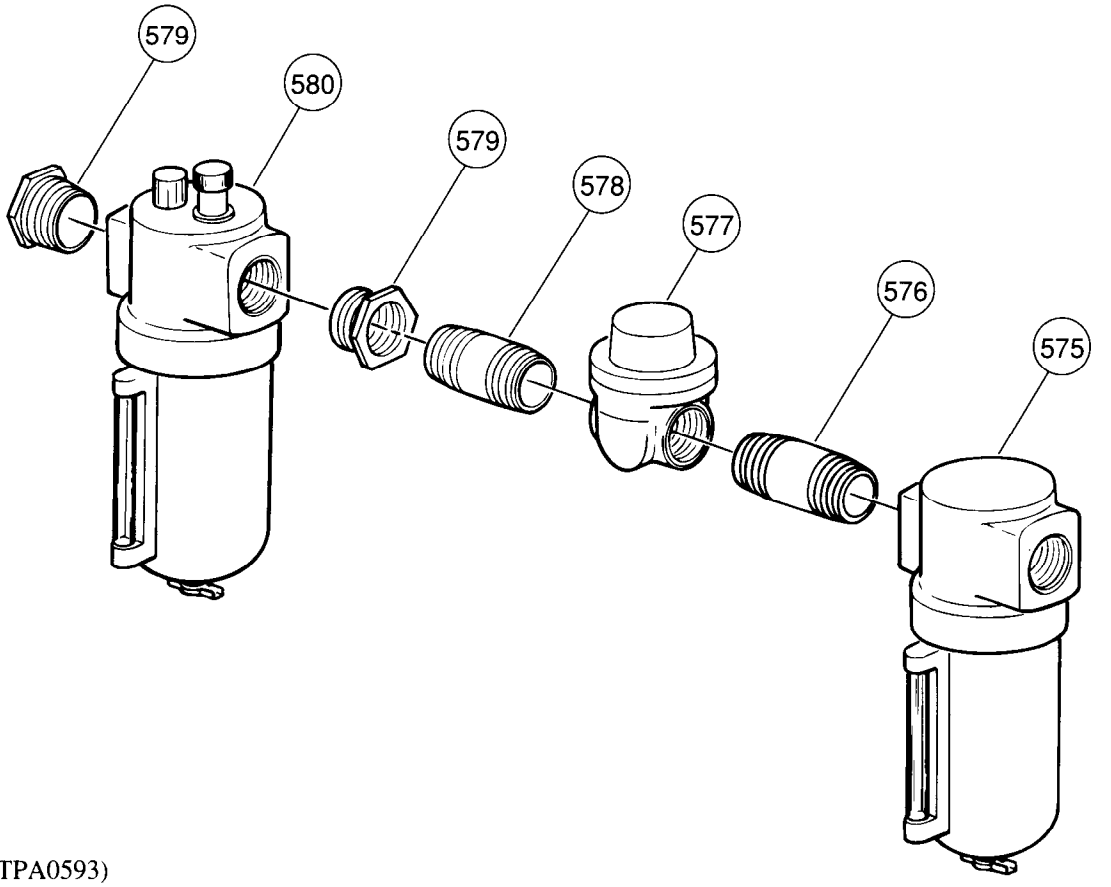


(Dwg. MHTPA0154)

ITEM NO.	DESCRIPTION OF PART	QUANTITY TOTAL	PART NUMBER	
			Standard Flange	Tall Flange
*	Drum Guard Assembly (12 inch long drum)	1	10925-2	10927-2
	Drum Guard Assembly (16 inch long drum)		10925-3	10927-3
	Drum Guard Assembly (24 inch long drum)		10925-5	10927-5
	Drum Guard Assembly (30 inch long drum)		10925-6	10927-6
	Drum Guard Assembly (36 inch long drum)		- - -	10927-9
150	Capscrew	6	51579	
151	Clamp	6	10399	
152	Support	2	10936	10929
153	Drum Guard (12 inch long drum)	1	10935-2	10932-2
	Drum Guard (16 inch long drum)		10935-3	10932-3
	Drum Guard (24 inch long drum)		10935-5	10932-5
	Drum Guard (30 inch long drum)		10935-6	10932-6
	Drum Guard (36 inch long drum)		- - -	10932-8
154	Lockwasher	6	51580	
155	Nut	6	51581	
156	Capscrew	4	50827	
157	Lockwasher	4	50201	
158	Nut	4	50199	

* Assembly includes items 150 through 158.

AIR PREPARATION ASSEMBLY DRAWING AND PARTS LIST



(Dwg. MHTPA0593)

ITEM NO.	DESCRIPTION OF PART	QTY TOTAL	PART NUMBER
575	Filter	1	F42-0A-000
576	Pipe Nipple	2	51670
577	Regulator	1	R30-0A-G00
578	Pipe Nipple	1	51704
579	Pipe Bushing	2	51706
580	Lubricator	1	L40-0A-G00

* Air preparation components for 1-1/4 inch NPT system.

ACCESSORIES

DESCRIPTION OF ACCESSORY	ACCESSORY PART NUMBER
Lubricant	LUBRI-LINK®
Touch-up Paint (Orange)	MHD-OR
Touch-up Paint (Yellow)	FAP-237Y

LABELS AND TAGS

DESCRIPTION OF PART	QTY TOTAL	PART NUMBER	DESCRIPTION OF PART	QTY TOTAL	PART NUMBER
* Label and Tag Kit	1	22261-XX	* Product Label	1	71111777
Warning Label	1	71107130			71109508
Warning Label	1	71060529	Rivets, Nameplate	4	71028849
Caution Tag	1	71107148	Exhaust Label	1	71042196
Nameplate	1	71106967	Oil Level Label	1	71043616
* Logo Label	1	71106272	Air Supply Label	1	71046395
		71109102	Winding Label	2	71109516

* Kit and Labels depend on drum size. Contact your Ingersoll-Rand distributor or the factory for assistance in ordering the correct kit.

PARTS ORDERING INFORMATION

The use of other than **Ingersoll-Rand Material Handling** replacement parts may invalidate the Company's warranty.
For your convenience and future reference it is recommended that the following information be recorded.

Model Number_____

Serial Number _____

Date Purchased_____

When ordering replacement parts, please specify the following:

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

The nameplate is located on the winch outboard upright.

NOTICE

• Continuing improvement and advancement of design may cause changes to this equipment which are not included in this manual. Manuals are periodically revised to incorporate changes. Always check the manual edition number on the front cover for the latest issue.
• Sections of this manual may not apply to your winch.
• Using other than genuine Ingersoll-Rand Material Handling 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.

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

or

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

HOIST AND WINCH LIMITED WARRANTY

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

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

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

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

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

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

IMPORTANT NOTICE

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

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

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

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

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

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

United States Office Locations

For Order Entry and Order Status

Ingersoll-Rand Distribution Center
P.O. Box 618
510 Hester Drive
White House, TN 37188
Phone: (615) 672-0321
Telex: 786573
Fax: (615) 672-0801

For Technical Support

Ingersoll-Rand Material Handling
P.O. Box 24046
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Fax: (206) 624-6265

Regional Sales Offices

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Fax: (313) 476-6670

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2500 East T.C. Jester
Houston, TX 77008
Phone: (713) 864-3700

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11909 E. Telegraph Road
Santa Fe Springs, CA 90670
Phone: (310) 948-4189
Fax: (310) 948-1828

Milwaukee, WI
12311 W. Silver Spring Dr.
Milwaukee, WI 53225
Phone: (414) 461-0973

Philadelphia, PA
P.O. Box 425
900 E. 8th Ave., Suite 103
King of Prussia, PA 19406
Phone: (215) 337-5930

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:

Ingersoll-Rand Material Handling
P.O. Box 24046
2724 Sixth Avenue South
Seattle, WA 98124-0046
USA
Phone: (206) 624-0466
Telex: 328795
Fax: (206) 624-6265

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National Sales Office
Regional Warehouse
Toronto, Ontario
51 Worcester Road
Rexdale, Ontario
M9W 4K2
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Fax: (416) 675-6920
Order Desk
Fax: (416) 674-6549

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44 Harley Road S.E.
Calgary, Alberta
T2V 3K3
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Fax: (403) 252-4462

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5555 Calgary Trail N.W.
Edmonton, Alberta
T6H 5G8
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Fax: (403) 437-3145

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