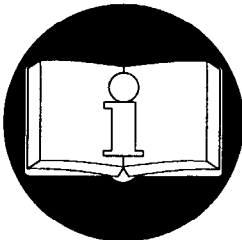
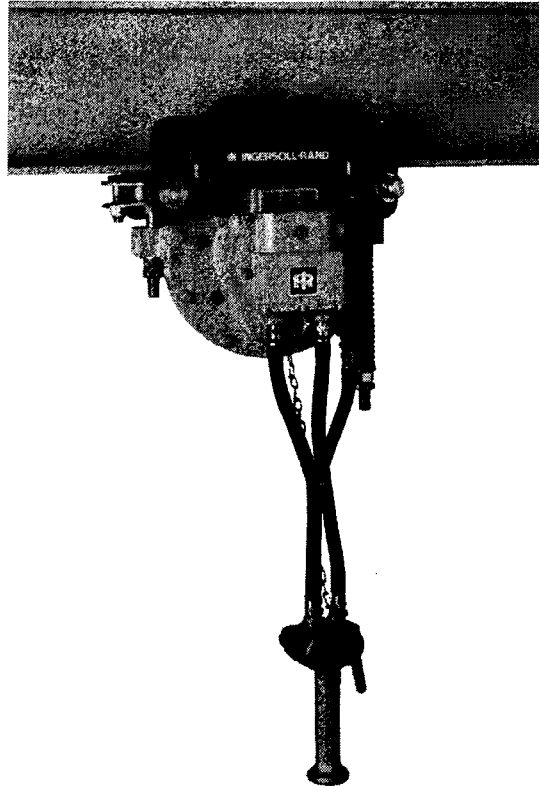


# PARTS, OPERATION AND MAINTENANCE MANUAL for MODEL MTK TRACTOR



**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 tractor for lifting, supporting, or transporting people or lifting or supporting loads above people.**

**Always operate, inspect and maintain this tractor in accordance with American National Standards Institute Safety Code ( ASME B30.16) and any other applicable safety codes and regulations.**

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

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**INGERSOLL-RAND®**  
**MATERIAL HANDLING**

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## SAFETY INFORMATION

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

### Danger, Warning, Caution and Notice

Throughout this manual there are steps and procedures which, if not followed, may result in a 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 *minor* 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 tractor or attached equipment for lifting, supporting, or transporting people or lifting or supporting loads above people.
- The supporting structures and load-attaching devices used in conjunction with this tractor must provide adequate support to handle all hoist operations plus the weight of the tractor, hoist and attached equipment. This is the customer's responsibility. If in doubt, consult a registered structural engineer.

#### NOTICE

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

The National Safety Council, Accident Prevention Manual for Industrial Operations, Eighth Edition and other recognized safety sources make a common point: Employees who work near cranes or assist in hooking on or arranging a load should be instructed to keep out from under the load. From a safety standpoint, one factor is paramount: conduct all lifting operations in such a manner that if there were an equipment failure, no personnel would be injured. This means keep out from under a raised load and keep out of the intended path 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, connected 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 B30.16 and are intended to avoid unsafe operating practices which might lead to injury or property damage.

**Ingersoll-Rand** recognizes that most companies who use tractors have a safety program in force in their plants. In the event 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 people trained in safety and operation of this product to operate and maintain this tractor.
2. Make sure the direction of travel is in the same direction as shown on the tractor controls.
3. Make sure the tractor-trolley is free to move in both directions and will clear all obstructions.
4. Make sure all persons stay clear of the suspended load and intended load path.
5. Avoid swinging the hoist load.
6. Warn personnel of an approaching load.
7. Promptly report any malfunction, unusual performance or damage regarding the tractor.
8. Inspect the tractor on a regular basis, replace damaged or worn parts, and keep appropriate maintenance records.
9. Use the tractor manufacturer's recommended spare parts when repairing the tractor.
10. Never exceed the tractor-trolley capacity.
11. Never use a damaged tractor or a tractor that is not working correctly.
12. Never operate the tractor unless the load is centered under the hoist.
13. Never allow your attention to be diverted from operating the tractor.
14. Never use the tractor to support or transport people.
15. Never leave a suspended load unattended.
16. Never allow sharp contact between two tractors, or between a tractor and any obstruction.
17. Never remove or obscure the warning or safety labels, plates or tags on the tractor.
18. Never use the tractor to support or hang any load. The tractor is designed as a towing device only.
19. Avoid unnecessary or sudden stops and starts when moving a load.
20. At all times, avoid moving loads above people.
21. Use extreme care to avoid contacting any obstruction with a moving load.
22. When a "DO NOT OPERATE" sign is placed on the tractor controls, do not operate the tractor until the sign has been removed by designated personnel.

## WARNING LABEL

Each tractor is supplied 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 may be shown smaller than actual size.

### NOTICE

- Warning label is located on trolley side plate. Warning label may not be shown actual size. Refer to the parts list for part number.



# SPECIFICATIONS

The MTK tractor-trolley is designed for towing a trolley and hoist combination along an overhead beam system. Trolley movement occurs by way of a drive wheel which is driven by an air motor through a three reduction gear case. The motor is air activated and is connected directly to the air supply line. The motor direction is controlled by depressing one of the levers on the pendant handle valve assembly or by operating one of the rope pulls. A spring-set, air-released disc brake is used to stop and prevent rotation of the drive when the motor is de-energized.

When the motor is energized, the motor brake is energized. Energizing the brake moves the brake piston, compressing the springs, thereby releasing the brake. When the motor is de-energized, the brake piston is de-energized causing the compressed springs to move the brake piston. This clamps the friction discs between the mounting plate, pull plate and two stationary plates, and applies braking torque to the motor and gear train. The friction discs are driven by a brake driver which is coupled directly to the input shaft.

## Model Code Explanation:

Example: MTKS-207AF

MTK   S   -   2   07   A   F

Series: = MTK

Trolley Wheel Types:

S = Cast Iron Wheels (standard)

B = Bronze Wheels (S•COR•E)

Motor Controls:

0 = No Pendant

1 = Rope Control

2 = 1 Motor Pendant (2 lever)

3 = 2 Motor Pendant (4 lever)

4 = 3 Motor Pendant (6 lever)

Control Length:

07 = 7 feet (2 metres) [Standard]

XX = Specify Length\* (XX = feet)

Flange Width:

A = 2.66 to 6.25 inches (68 to 159 mm) flange width

D = 6.26 to 12.00 inches (160 to 305 mm) flange width

Options:

F = Free Wheel Function Kit

M = Manual Brake Release Kit

### Notes:

- \* Specify control lengths greater than 7 feet (2 metres). Contact your Ingersoll-Rand distributor or the factory for control acceptability of pendant hose lengths greater than 20 feet (6 metres). Metric lengths are provided for reference only. Order lengths in feet.

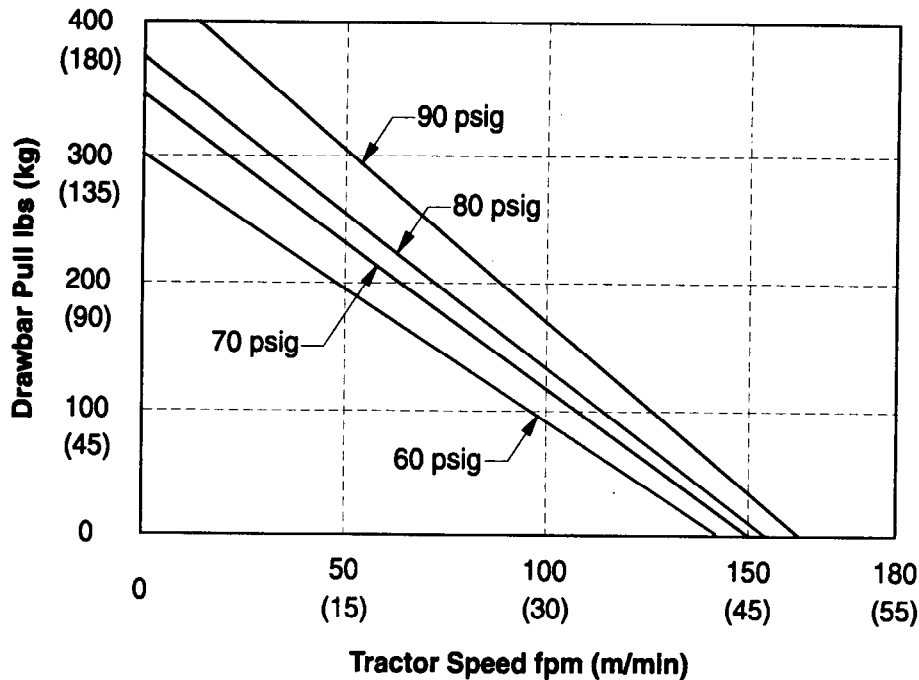
## MTK Tractor-Trolley General Specifications

Drawbar Pull		Towed Load Based on Beam Conditions (metric tons*)		Speed		Minimum Beam Curve Radius	
lb	kg	Flat, Dry, Good	Curved, Slick, Poor	ft /min.	metres/min.	inches	mm
400	180	6	3	21	6.4	30	762
300	135	4-1/2	2-1/2	57	17.4		
200	90	3	1-1/2	86	26.2		
100	45	1-1/2	3/4	117	35.7		
0	0	0	0	165	50.3		

Note: Specifications based on 90 psig at average air consumption of 35 scfm (6.3 bar at 1.00 cu m/min) air flow at the motor. Air consumption operating range is 25 - 45 scfm (0.7 - 1.3 cu m/min) depending upon load and air pressure.

\* One metric ton = 2000 kg (2,200 lb).

## Performance Graph



## INSTALLATION

Prior to installing the tractor, carefully inspect it for possible shipping damage. Tractors are shipped from the factory fully lubricated.

### ⚠ 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 tractor to use.

There are two wheel contour styles used on three types of beams. These are the tapered wheel for standard beams, and the flat wheel for wide flange beams and patented monorail beams. The wheels supplied with Ingersoll-Rand tractors are universal, allowing operation on flat or tapered flange beams or tracks. Make certain your tractor is properly installed. A little extra time and effort in so doing can contribute a lot toward preventing accidents and helping you get the best service possible. Always make certain the supporting member from which the tractor is suspended is strong enough to support the weight of the tractor, the attached hoist, the weight of a maximum rated load, plus a generous factor of at least 500% of the combined weights.

### Tractor Installation

(Ref. Dwg. MHP0683)

The following procedures cover the installation of the tractor as a complete unit.

### NOTICE

• When installing the tractor-trolley assembly, arrange the spacers and washers so a 1/16 to 1/8 in. (2 to 3 mm) space exists between the guide rollers and the beam flange. Also ensure the spacers and washers are equally distributed on each side of the tractor.

### ⚠ WARNING

• Make sure the rail or beam track is clean.

1. Raise the tractor-trolley assembly into position beneath the beam.
2. Assemble the tractor-trolley halves around the beam, and install the tractor mounting hardware. Securely tighten all mounting capscrews and nuts.
3. Torque the shaft (11) nuts (1) to 260 ft lb (350 Nm) or 200 ft lb (271 Nm) if threads are lubricated.
4. After installation, make certain the side plates (5) are parallel to each other and perpendicular to the plane of the beam flange.
5. Adjust the wheel pressure as described in "Wheel Pressure Adjustment" in this Section.
6. Connect the air lines to the appropriate connections.
7. Connect the draw bar to the tractor assembly. Secure the draw bar using the draw bar pin. Secure the draw bar pin using the cotter pin.

8. Ensure beam stops are in place and secure.
9. Supply air power to the tractor and operate the tractor along the entire length of the beam to ensure tractor-trolley operation is satisfactory.

## Adjustments

### Wheel Pressure Adjustment (standard)

(Ref. Dwg. MHP0770)

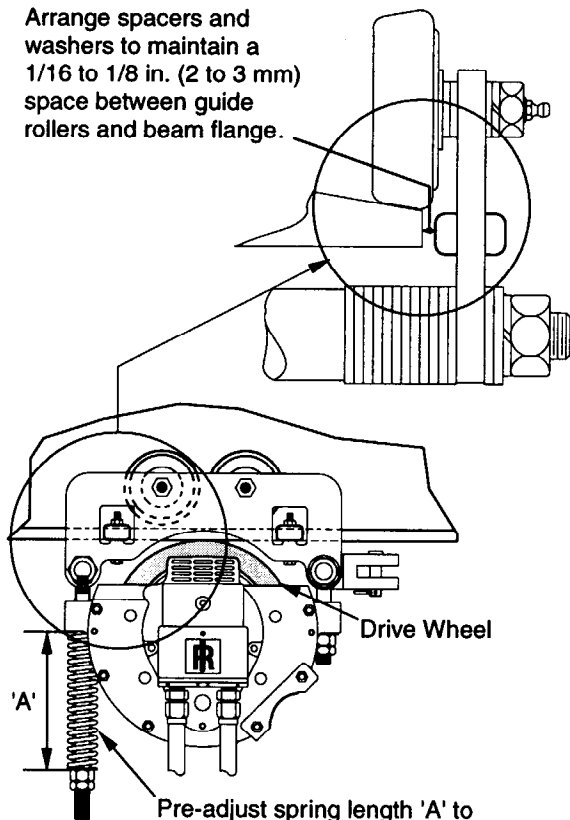
To prevent wheel slippage, adjust the length of the spring (18) to 5.75 to 6 in. (146 to 152 mm). If the wheel continues to slip, reduce the spring length until there is no perceptible wheel slip. Do not reduce spring length any more than necessary.



• Excessive wheel loads will reduce the life of the drive wheel and increase loadings on bearings and the motor.

### Spacer and Spring Adjustments

Arrange spacers and washers to maintain a 1/16 to 1/8 in. (2 to 3 mm) space between guide rollers and beam flange.



Pre-adjust spring length 'A' to 5.75 to 6.00 in. (146 to 152 mm); then adjust enough to prevent drive wheel slippage on beam.

(Dwg. MHP0770)

### Wheel Pressure Adjustment (Freewheel option)

(Ref. Dwg. MHP0772)

Thread the end of the cylinder (141) shaft approximately 1/2 in (13 mm) into suspension shaft (17). To prevent wheel slippage, use the hanger (13) to increase (or decrease) the contact force of the wheel assembly (55) on the beam flange. Loosen locknut (16) and adjust nut (15) as necessary to prevent wheel slip. Retighten locknut. Do not adjust any more than necessary.



• Excessive wheel loads will reduce the life of the drive wheel and increase loadings on bearings and the motor.

## Air System

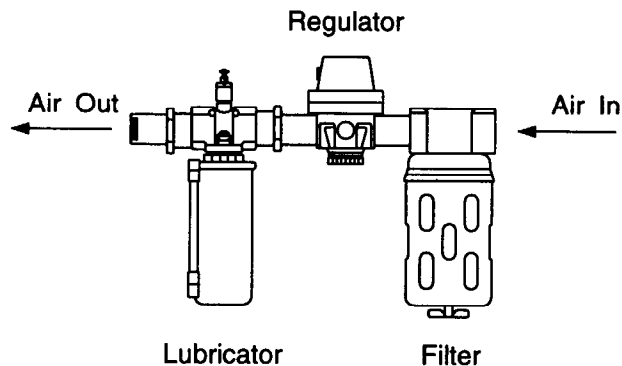
The supply air must be clean, lubricated and free from water or moisture. A minimum of 90 psig at 35 scfm (6.2 bar/620 kPa at 1.00 cu m/min) at the tractor motor is required to provide rated tractor capacity.

### Air Lines

The inside diameter of the tractor air supply lines must not be smaller than 1/2 in. (13 mm) based on a maximum of 50 ft. (15 m) between the air supply and the tractor. Contact the factory for recommended air line sizes for distances greater than 50 ft. (15 m). All air supply lines should be purged, using dry air or nitrogen, before making final connection to unit inlet. Supply lines should be as short and straight as installation conditions will permit. Long transmission lines and excessive use of fittings, elbows, tees, globe valves, etc. cause a reduction in pressure due to restrictions and surface friction in the lines. If quick-disconnect fittings are used at the inlet of the hoist, they must have at least a 3/8 in. (9.5 mm) air passage. Use of smaller fittings will reduce performance.

## NOTICE

• Always use an air line filter and lubricator with an MTK tractor.



(Dwg. MHP0191)

### Air Line Lubricator

(Ref. Dwg. MHP0191)

Always use an air line lubricator with MTK tractors. Use a lubricator having an inlet and outlet at least as large as the inlet on the tractor motor. Install the air line lubricator as close to the air inlet on the tractor motor as possible. Refer to the "ACCESSORIES" section for the recommended Filter-Lubricator-Regulator.



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

The air line lubricator should be replenished daily and set to provide lubrication at a minimum rate of 1 to 3 drops per minute, adjusted at maximum tractor speed, of SAE 10W oil or a good grade of hydraulic oil.

### CAUTION

• **Do not use automotive type detergent oil. Detergents will delaminate the motor vanes and cause premature failure.**

#### **Air Line Filter**

(Ref. Dwg. MHP0191)

It is recommended that an air line strainer/filter be installed as close as practical to the motor air inlet port to prevent dirt from entering the motor. The strainer/filter should provide 10 micron filtration and include a moisture trap. Clean the strainer/filter monthly to maintain its operating efficiency.

#### **Motor**

For optimum performance and maximum durability of parts, operate air motor at 90 psig at 35 scfm (6.2 bar/620 kPa at 1.00 cu m/min) air pressure. Use a 1/2 in. (13 mm) diameter air hose. The air motor should be installed as near as possible to the compressor or air receiver.

#### **Initial Operating Checks**

Tractors are tested and adjusted for proper operation prior to leaving the factory. Before the tractor is placed into service, the following initial operating checks should be performed.

#### **Checking Direction of Rotation**

(Refer to Dwg. MHP0774 in "OPERATIONS" section)  
Since the direction of rotation of motors can be reversed by interchanging air lines it is important that motion travel is in correct relationship with the pendant control levers. Carefully check the directional rotation of the motor as follows:

1. Connect the air lines.
2. Depress the FORWARD lever and note the direction of tractor travel. If travel relationship does not correspond to the lever being depressed, stop operation. Do not allow the tractor to come into contact with any object. Do not depress the REVERSE lever at this time.
3. If the tractor travel is forward when the FORWARD lever is depressed, proper installation has been attained.
4. If the tractor travels in reverse when the FORWARD lever is depressed, proper installation has not been attained. To correct this, interchange the motor air lines.

#### **Brake Check**

### WARNING

• **If the brake fails to stop and hold the tractor stationary, do not attempt to operate the tractor until proper repairs and/or adjustments are performed. Malfunction of the brake may allow an uncontrolled load shift. Failure to observe this precaution can lead to injury or death and/or property damage.**

If the tractor brake does not hold the towed load stationary, disassemble and repair the brake as described in the "MAINTENANCE" section.



The four most important aspects of tractor operation are:

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

## **WARNING**

• **Do not use this tractor or attached equipment for lifting, supporting, or transporting people or lifting or supporting loads above people.**

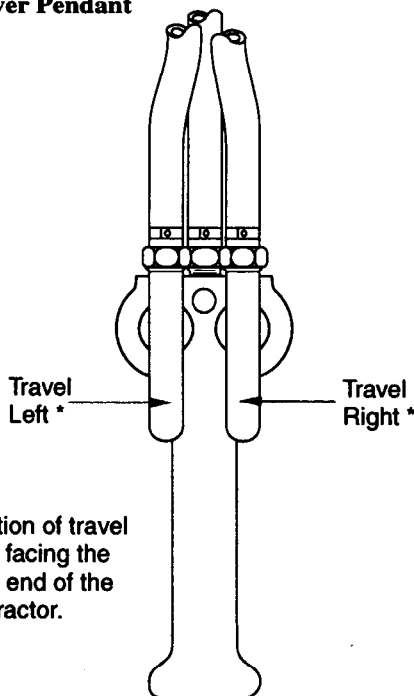
### **Live Air Pendant Control (standard feature)**

(Refer to Dwg. MHP0774)

Two-lever live air pendants provide for operation of the tractor-trolley only. Install the pendant to the tractor motor such that the operation of the pendant results in tractor operation as described below.

1. When facing the motor end of the tractor, the tractor should move to the operator's left when the left pendant lever is depressed.
2. When facing the motor end of the tractor, the tractor should move to the operator's right when the right pendant lever is depressed.

### **Two-Lever Pendant**



\* Direction of travel when facing the motor end of the tractor.

(Dwg. MHP0774)

### **Pilot Air Pendant Control (optional features)**

Additional pendant controls are available with one, two or three function applications. These pendants provide pilot air to the optional valve chest assembly attached to the air motor. For additional information on these options contact your nearest **Ingersoll-Rand** distributor or the factory.

### **Freewheel (optional feature)**

(Refer to Dwg. MHP0772)

The freewheel assembly allows for manual tractor-trolley operation. When the pendant lever is released the drive wheel assembly is physically disengaged from the beam flange by the air operated cylinder.

When the pendant lever is depressed the cylinder automatically shifts to engage the drive wheel assembly with the beam flange and allow the tractor to operate along the beam.

### **Brake Release Kit (Model MLK-K390)**

The brake release kit allows for manual release of the tractor-trolley brake.

For additional information on this option contact your nearest **Ingersoll-Rand** distributor or the factory.

For "Installation and Parts List" information request **Ingersoll-Rand** Manual Form Number P6652.

## ⚠ 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 tractor that inspection indicates is damaged.

Frequent and periodic inspections should be performed on equipment in regular service. Frequent inspections are visual examinations performed by operators or personnel trained in safety and operation of this equipment and include observations made during routine equipment operation. Periodic inspections are thorough inspections conducted by personnel trained in the safety, operation and maintenance of this equipment. Inspection intervals depend upon the nature of the critical components of the equipment and the severity of usage. Careful inspection on a regular basis will reveal potentially dangerous conditions while still in the early stages, allowing corrective action to be taken before the condition becomes dangerous.

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

### Records and Reports

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.

### 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. **TRACTOR.** Prior to operation, visually inspect tractor housings, controls, side plates, drive wheel, trolley wheels and beam for indications of damage. Any discrepancies noted must be reviewed and inspected further by authorized personnel instructed in the operation, safety and maintenance of this tractor.
2. **AIR SYSTEM.** Visually inspect all connections, fittings, hoses and components for indication of air leaks. Repair any leaks or damage.

3. **PENDANT AND ROPE CONTROLS.** During operation of tractor, verify response to control is quick and smooth. If tractor responds slowly or movement is unsatisfactory, do not operate tractor until all problems have been corrected.
4. **BRAKE.** During operation, test brake. Brake must hold load without slipping. Brake must release when motor throttle is operated. If brake does not hold, or does not release properly, the brake must be repaired.
5. **LUBRICATION.** Refer to the "LUBRICATION" section for recommended procedures and lubricants.

### Periodic Inspection

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

NORMAL	HEAVY	SEVERE
yearly	semiannually	quarterly

Disassembly may be required as a result of frequent inspection findings or in order to properly inspect 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 PLATES.** Check for deformed, cracked or corroded main components. Replace damaged parts.
2. **FASTENERS.** Check retainer rings, split pins, capscrews, nuts, and other fasteners on tractor. Replace if missing or damaged and tighten if loose.
3. **TROLLEY WHEELS.** Check for cracks, wear or damage. Replace if necessary.
4. **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, springs and covers. Replace worn or damaged parts. Clean, lubricate and reassemble.
5. **BRAKE.** Test brake to ensure proper operation. If indicated by poor operation or visual damage, disassemble and repair brake. Check all brake surfaces for wear, deformation or foreign deposits. Clean and replace components as necessary.
6. **SUPPORTING STRUCTURE.** Check for distortion, wear, and continued ability to support tractor, associated components and rated load. Ensure tractor is correctly mounted. Fasteners must be in good condition and tight. Beam rail must be clean and free from grease and oil.
7. **LABELS AND TAGS.** Check for presence and legibility of labels. Replace if damaged or missing.
8. **MOTOR.** If performance is poor, disassemble the motor and check for wear or damage to bearings, shafts and vanes. Clean, lubricate and reassemble. Replace damaged parts.

### **Tractors 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 more than six months shall be given a complete inspection conforming with the requirements of "Periodic Inspection" before being placed in service.
3. Standby equipment shall be inspected at least semiannually in accordance with the requirements of "Frequent Inspection."
4. In abnormal operating conditions, equipment should be inspected at shorter intervals.

### **Tractor-Trolley Storage**

If the tractor-trolley has been operated and is to be stored for more than six months, it should be protected as follows:

1. Reduce spring (18) compression by backing off on (turning clockwise) nut (15). Refer to Dwg. MHP0683.
2. Every six months, remove the tractor-trolley from storage and operate it on a test bench for a few minutes. Flood motor with air line lubrication before returning to storage.



• **An air motor flooded with air line lubricant (oil) will force oil into the exhaust when operated.**

3. Every six months, disassemble the brake. Inspect the brake piston and brake plates for corrosion. Remove any corrosion which is present using fine emery paper.
4. Every twelve months, inspect the control system components for corrosion, and if necessary, clean, repair or replace components.

## TROUBLESHOOTING

This section provides basic troubleshooting information. 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 tractor-trolley symptoms, probable causes and remedies.

SYMPTOM	CAUSE	REMEDY
Tractor fails to stop when control lever is released.	Worn brake friction discs.	Inspect brakes. Replace brake friction discs if the thickness is less than 0.090 inch (2.29 mm) as described in "MAINTENANCE" section.
	Pendant malfunction.	Inspect and repair pendant. Refer to applicable pendant repair procedure.
	Valve chest malfunction (rope and pilot control pendants only).	Inspect and repair valve chest.
Tractor does not respond quickly or correctly to pendant or rope control.	Low air pressure.	Check air supply is 90 psig at 35 scfm (6.2 bar/620 kPa at 1.00 cu m/min) of dry lubricated air at the tractor motor inlet.
	Air hoses to motor or pendant are improperly connected.	Ensure hoses are properly connected. Refer to "Checking Direction of Rotation" in "INSTALLATION" section.
	Pendant malfunction.	Inspect and repair pendant. Refer to applicable pendant repair procedure.
	Valve chest malfunction (rope and pilot control pendants only).	Inspect and repair valve chest, pilot control or pilot control pendant.
Tractor does not stop or start promptly.	Tractor is overloaded.	Reduce towed load to within rated capacity of the tractor. Refer to "SPECIFICATIONS" section.
	Wheel is slipping.	Check for proper wheel tension. Adjust tension as described in "Wheel Pressure Adjustment" in "INSTALLATION" section.
	Motor is damaged.	Inspect motor as described in "INSPECTION" section. Repair or replace motor parts as described in "MAINTENANCE" section.
	Brake is not holding/releasing.	Inspect brake as described in "INSPECTION" section and repair as described in "MAINTENANCE" section.
Gear case leakage.	Seals and/or gaskets are worn or damaged.	Disassemble and replace seals and gaskets. Refer to "MAINTENANCE" section.
Low power or low speed.	Low air pressure at motor inlet.	Check air supply is 90 psig at 35 scfm (6.2 bar/620 kPa at 1.00 cu m/min) of dry lubricated air at the tractor motor inlet.
	Worn or broken air motor vanes.	Disassemble and repair air motor. Install complete new set of vanes and springs. Refer to "MAINTENANCE" section.
	Improper lubrication, dirt buildup in motor, or clogged inlet filter.	Inspect motor as described in "INSPECTION" section. Flush motor as described in "Motor Information" of "MAINTENANCE" section. Establish and maintain proper lubrication as described in "LUBRICATION" section. Replace inlet filter.
Wheel spins or slip.	Improper spring adjustment or beam track contamination.	Check proper spring adjustment for wheel to beam contact. Clean beam track.
	Drive wheel and shaft assembly is damaged.	Disassemble and replace drive wheel assembly. Refer to "MAINTENANCE" section.

# LUBRICATION

To ensure continuing satisfactory operation of the tractor, 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 tractor eight hours each day, five days each week. If the tractor is operated almost continuously or more than one shift, 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 tractor. 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 tractor and/or its associated components.

INTERVAL	LUBRICATION CHECKS
Start of each shift (Operator)	Check flow and level of air line lubricator (approximately 2 drops per minute required when operating at maximum tractor speed).
3 Months (Quarterly) (Maintenance personnel)	Inspect and clean or replace air line filter.
	Lubricate trolley wheel axle shafts.
6 Months (Semi-annually) (Maintenance personnel)	Lubricate all pivot points.

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

### Gears and Gear Bearings

If disassembled for repair or inspection, lubricate the planet gears and bearings as described in "Planet Carrier Assembly" in the "MAINTENANCE" section. Lubricate with **Ingersoll-Rand** No. 11 grease.

### Air Line Lubricator

The air line lubricator should be replenished daily and set to provide lubrication at a minimum rate of 1 to 3 drops per minute, adjusted at maximum tractor speed, of SAE 10W oil or a good grade of hydraulic oil.

### ⚠ CAUTION

• Do not use automotive type detergent oil. Detergents will delaminate the motor vanes and cause premature failure.

### Trolley Wheel Axles

Lubricate the trolley wheel axles at least every three months using recommended grease via the grease fittings provided.

### Recommended Grease

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

### Pivot Points

Lubricate pivot points (latches, levers, linkages, pin, etc.) with recommended lubricant every three months. Apply a few drops of lubricant to exposed pivot points. Remove excess lubricant which may be present after lubricating.

### Recommended Lubricants

Temperature	Type Oil
-10° to +10° F (-23° to -12° C)	SAE 80W
+10° to +90° F (-12° to +32° C)	SAE 90W
Above 90° F (above 32° C)	SAE 140W

**⚠ WARNING**

- Never perform maintenance on the tractor while it is connected to 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 tractor to perform maintenance.

**NOTICE**

- Do not increase spring compression any more than necessary to operate tractor-trolley smoothly. Excessive wheel loads will decrease the life of the rubber tire and increase loadings on bearings.

**Motor Maintenance**

**⚠ WARNING**

- Turn off air system and depressurize air lines before performing any maintenance.
- Tag the valve which feeds the tractor to prevent power from being applied to the tractor while repairs are being performed. Injury or death can result if this precaution is not observed.

**Motor Information**

If the motor operates sluggishly, flush it with a clean, nontoxic, nonflammable commercial solvent in a well-ventilated area.

To flush the motor, disconnect the air line and pour 6 to 8 cc of solvent into the inlet. Attach the air hose and, while keeping your face away from the exhaust air, slowly increase the air flow until there is no trace of the solvent in the exhaust.

After flushing, shut off the air supply and disconnect the air hose. Pour 6 to 8 cc of a premium, high viscosity index hydraulic oil in the air inlet side of the motor. Rotate the rotor shaft by hand in both directions several times so all the internal parts are thoroughly lubricated. Reconnect the air supply line. Increase the air flow slowly so the internal parts of the motor will be covered with a film of oil.

If the motor is still low in power, disassemble, inspect and repair or replace components as necessary.

**Air Motor Vane Replacement**

(Ref. Dwg. MHP0691)

Vanes will last for many hours of operation, depending upon the speed of the motor, operating pressure, lubrication and preventative maintenance. Periodically check the vanes for wear. If worn or damaged, replace as a set. Order Vane Repair Kit MLK-K4243-7.

**NOTICE**

- Always replace air motor vanes as a set; never replace only an individual vane.

INTERVAL	MAINTENANCE CHECK
Start of each shift  (Operator or Maintenance Personnel)	Make a thorough visual inspection of the tractor for damage. Do not operate the tractor if damaged.  Operate the tractor at low RPM in both directions. Tractor must operate smoothly without sticking, binding or abnormal noises. Check the operation of the brake.
3 Months  (Maintenance Personnel)	Check all the supporting members, including the trolley wheels and trolley wheel shafts, etc. for indications of damage or wear. Repair or replace as required.
Yearly  (Maintenance Personnel)	Inspect the tractor gearing, shafts and bearings for wear and damage. Repair or replace as necessary.  Inspect the brake friction discs and motor vanes. Clean or replace parts as required.

**Adjustments**

**Tractor Wheel Adjustment**

(Ref. Dwgs. MHP0683 and MHP0691)

Tractor operation is dependent on the wheel assembly (55) being in solid contact with the lower part of the beam rail. If the tractor does not operate smoothly along the rail length, the most likely cause is wheel slippage. To adjust the wheel, conduct the following:

1. Inspect the wheels, including trolley wheels, for cleanliness.
2. Inspect rail for cleanliness.
3. Loosen locknut (16) on spring bolt (17).
4. To adjust spring (18) tension, turn nut (15) clockwise to increase spring compression; counterclockwise to decrease compression.
5. Adjust spring to between 5.75 and 6.00 inches (146 and 152 mm).
6. When adjustment is complete, tighten locknut (16) on nut (15) to lock in place.

## Tractor Removal

The following procedure describes how to remove the tractor from its mounting as a complete unit. To disassemble in place, refer to "Trolley Disassembly."

### WARNING

• **Disconnect air supply and tag the tractor control to prevent air from being applied to the tractor while repairs are being performed. Injury or death can result if this precaution is not observed.**

1. Tag the controls and disconnect the air lines to the tractor at the tractor motor inlet.
2. Remove the draw bar pin and separate the draw bar from the tractor.

### WARNING

• **Support the tractor before attempting to remove the mounting hardware. The tractor weighs 75 lb (34 kg). Failure to adequately support the tractor before removing the mounting hardware will result in the tractor falling to the floor causing injury or death and/or property damage.**

3. Disconnect the tractor assembly from the trolley by removing locknut (16) and loosening nut (15) on spring bolt (17) until spring compression is relaxed. Remove locknut (16), nut (15) and washer (14) from hanger (13). Remove nut (15), washer (14) and spring (18) from spring bolt (17).
4. Before removing trolley, note the arrangement of spacers (2) on the outside and inside of side plates (5) for reassembly.
5. Remove nuts (1) and spacers (2) from shafts (11) on one side of trolley. Separate parts and remove side plates (5) from beam.
6. Move tractor and trolley to a suitable work area before starting disassembly or repairs.

## Disassembly

The following instructions provide the necessary information to disassemble, inspect, repair and assemble the tractor. When needed, for special installation and operation checks, references are made to the "INSTALLATION" section of this manual. Assembly drawings of the tractor are provided at the back of this manual for reference. Tractor disassembly is divided into three separate sections:

1. Brake and Gear disassembly.
2. Motor end disassembly.
3. Drive Wheel disassembly.

If a tractor-trolley is being completely disassembled, follow the order of the topics as they are presented. It is recommended that all work on the tractor involving disassembly be performed on a bench. Minor repairs to the brake and air motor can be accomplished while the tractor is in its normal operating position.

## General Disassembly

In the process of disassembling the tractor-trolley, observe the following:

1. Never disassemble the tractor-trolley 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 apply heat to a part to free it for removal unless the part being heated is already worn or damaged beyond repair and further damage will not be caused.

In general, the tractor-trolley 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 gaskets, seals and 'O' rings should be discarded once they have been removed. New gaskets, seals and 'O' rings should be used when assembling the tractor.
6. Make certain all hoses are clearly marked before disconnecting them. This will ensure proper reconnection.

## Brake and Gear Disassembly

(Ref. Dwg. MHP0691)

1. Unscrew the four shoulder bolts (85) and remove the assembled housing (82).
2. To disassemble the housing (82), proceed as follows:
  - a. Remove the capscrews (90) and the plate (89).
  - b. Place the assembly, pressure plate (80) downward, on an arbor press or place the assembly vertically in a vise.
  - c. Using the press or vise, compress the pressure plate (80) enough to allow removal of the nut (88). While holding the housing (82) against the compression of the springs (81), hold the capscrew (79) with a wrench and remove nut (88).
  - d. Slowly release assembly until spring compression is fully relaxed. Remove assembly from press or vise.
  - e. Pull off the pressure plate and push the piston (86) from the housing. Remove and discard 'O' rings (83 and 87).
3. Remove brake discs (78) and plates (77) from brake housing (73).
4. Remove retainer ring (76) and brake driver (75). Remove seal (70) from brake housing (73) and discard.
5. Grasp the brake housing (73) and pull it away from the tractor housing (57) just far enough to expose the two cutout areas at the rear of the tractor housing. Rotate the brake housing until the large diameter of each planet gear (64) is aligned with a cutout area. Withdraw the ring gear (69) and planet carrier assembly as a unit.

6. Remove the gasket (68).
7. Pull the brake housing (73) from the bearing (66). If it sticks, lightly tap on the rear of the planet carrier (65) with a plastic hammer to loosen it.
8. Separate the ring gear (69) from the brake housing, if required.
9. Using a bearing puller, remove the bearing (66).
10. Remove the shafts (61) by pressing them toward the short hub end of the planet carrier (65).
11. Do not remove the needle bearings (63 or 67) from the planet gears (64) or planet carrier unless repair is required.

### Motor End Disassembly

(Ref. Dwg. MHP0691)

1. Remove the entire brake mechanism. Refer to "Brake and Gear Disassembly" in this section.
2. Remove capscrews (92) and (93). Remove the valve chest (29).
3. Remove the capscrews (32) and remove the valve chest plate (33).
4. Grasp the rear end plate (39) and pull the entire assembled motor from the tractor. If the assembly sticks, tap on the brake end of the motor shaft (48) with a soft drift.

### NOTICE

• If the cylinder dowel (45) separates from the assembled motor, insert a long pin into the dowel pin hole to align the front end plate (44) during removal.

5. Grasp the motor shaft (48) vertically with copper-covered vise jaws.
6. Remove the retainer ring (37).
7. Separate the rear end plate (39) and bearing (38), cylinder (43), cylinder dowel (45), vanes (40), rotor (42), front end plate (44) and bearing (46).

### Drive Wheel Disassembly

### NOTICE

• The brake assembly up to and including retainer ring (76) and brake driver (75) must be removed before drive wheel disassembly. If the wheel assembly (55) separates into its component parts, consisting of the drive wheel and axle, do not attempt to repair. These parts are sold as an assembly only.

1. Remove six capscrews (50) and lockwashers (51). If air inlet bracket (52) is used, note position during removal of capscrews (50).
2. Separate the motor housing (53) from the tractor housing (57).
3. Remove drive wheel (55). Remove bearings (54) and (56). Inspect bearings. Discard if worn or damaged.
4. Inspect drive wheel (55) axle for scoring or damage. Inspect motor housing (53) and tractor housing (57) bearing seating surfaces for damage. Repair minor scoring using emery paper. Replace if major damage is evident.

### Trolley Disassembly

(Ref. Dwg. MHP0683)

Once the tractor is removed from its mounting, the trolley is easily accessible for disassembly.

### NOTICE

• Note the position of washers (2) on the inside and outside of side plates (5) before disassembly. This will assist in reassembly of the trolley onto the beam.

1. Remove nuts (1) from shafts (11).
2. Remove side plates (5).
3. Separate component parts.

### Cleaning, Inspection and Repair

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

#### Cleaning

### ! CAUTION

- Bearings that are loose, worn or rotate in the housing or on the shaft must be replaced. Failure to observe this precaution will result in additional component damage.
- Do not use trichloroethylene to clean parts.

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

#### Inspection

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

1. Inspect 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. Measure the thickness of the brake discs (78). If the brake discs are less than 0.090 in. (2.29 mm) replace the brake discs (78).
6. Check mufflers (34) and (116) for damage or excessive dirt.
7. Check bearings for freeness of rotation and wear. Replace bearings if rotation is rough or bearings are excessively worn. It is recommended that all bearings and 'O' rings removed be replaced.
8. Inspect bearing (67) wear area on brake driver (75) and in planet carrier (65) for ridges or galling. If either condition exists, replace parts.
9. Inspect motor vanes, rotor and components for wear or damage. Replace worn or damaged parts.



## Repair

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 minor 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.
7. Replace all seals, 'O' rings and gaskets.

## Assembly

### General Instructions

1. The tractor is constructed of various modules. The following instructions will first describe how to assemble the individual modules and finally, how to assemble a complete tractor from the assembled modules.
2. Always press on the inner ring of a ball-type bearing when installing the bearing on a shaft.
3. Always press on the outer ring of a ball-type bearing when pressing the bearing into a bearing recess.
4. Always press on the stamped end of a needle-type bearing when installing the bearing into a bearing recess.
5. Whenever grasping a part with 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, housings and machined surfaces.
6. Always clean and wipe every part (except the brake parts) with a thin film of oil before installation.
7. Never wash sealed bearings in solvent or any other cleaner.

### Trolley Assembly

(Ref. Dwg. MHP0683)

1. Insert hanger (13) into groove of tongue (12) and slide on shaft (11).
2. Reinstall inside washers (2) on shaft (11) as noted during disassembly.

## NOTICE

• If placement of washers is not known, install equally to both ends of both shafts (11) as necessary to ensure a 1/16 to 1/8 in (2 to 3 mm) space between the guide rollers (3) and beam flange. Refer to 'Wheel Pressure Adjustment' in "INSTALLATION" section and Dwg. MHP0770.

3. Slide spring bolt (17) on shaft (11) and install spacers (10) to each side of bolt. Install required inside washers (2).
4. Install side plates (5) and equal number of washers (2) with nuts (1) on shafts (11). Do not tighten nuts.
5. Place on beam and adjust washers (2) to obtain clearance of 1/16 to 1/8 in (2 to 3 mm) between guide rollers (3) and beam flange.
6. Tighten nuts (1) to 260 ft lb (350 Nm) or 200 ft lb (271 Nm) if threads are lubricated.

### Drive Wheel Assembly

1. Install bearings (54 and 56) on drive wheel (55) assembly.
  - a. Press bearing (54) on the plain (short) hub of drive wheel (55) axle.
  - b. Press bearing (56) on the splined (long) hub of drive wheel (55) axle.
2. Install drive wheel (55) into tractor housing (57). Ensure the splined hub of wheel axle and bearing (56) are facing tractor housing and that bearing seats into housing.
3. Align motor housing (53) and tractor housing (57) capscrew holes and assemble. Ensure bearing (54) seats into motor housing (53).
4. Install six capscrews (50) with lockwashers (51) and tighten by securing capscrews in a criss-cross pattern. Motor housing (53) and tractor housing (57) mating flanges must be in full contact.

## NOTICE

• If an air inlet bracket (52) is used, install with capscrews (50) and lockwashers (51) as part of housing assembly procedure.

### Planet Carrier Assembly

1. Press a new bearing (63) into each end of the planet gears (64). Seat each bearing 1/64 in. (0.5 mm) below the face of the gear.
2. Work a liberal amount of **Ingersoll-Rand** No. 11 grease into the bore of the bearings so each of the individual needles or rollers are covered.
3. Stand the planet carrier (65) on the table of an arbor press with its short hub upward.
4. Wipe a thin film of **Ingersoll-Rand** No. 11 grease on both faces of one of the planet gears, and place a thrust washer (62) on each face. The grease will help retain the washers in position.
5. Slide the planet gear, large diameter upward, and thrust washers into the planet carrier (65). Align with holes in carrier. Secure in position by installing shaft (61).

## NOTICE

• The direction of shaft installation is important. The holes in the web of the carrier are slightly tapered to retain the shaft. Make certain you install the shafts (61) from the short hub-end side of the carrier.

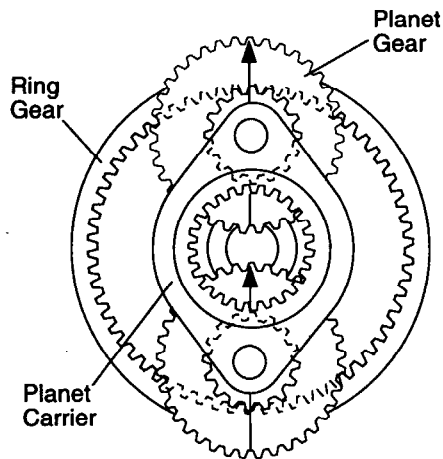
6. Install the second planet gear with its thrust washers.
7. Work a liberal amount of **Ingersoll-Rand No. 11 grease** into the bore of the bearing (67) so each individual needle or roller is covered. Press the bearing (67) into the bore of the planet carrier.
8. Stand the planet carrier (65) on its short hub and press the bearing (66), retainer ring first, on the long hub.
9. Install a capscrew seal (71) into each of the four capscrew holes in brake housing (73). The tapered end of the seal must face the shoulder side of the brake housing.
10. Install 'O' ring (72) in brake housing (73).
11. Align the grooves on the outer edge of ring gear (69) with the capscrew holes in brake housing (73). Press ring gear, flange side first, onto brake housing shoulder. Ensure 'O' ring (72) fits into the ring gear (69) tapered groove.

### ⚠ CAUTION

• The ring gear (69) and planet gears (64) must be correctly aligned during assembly.

12. Align the ring gear (69) and planet gears (64) as follows:
  - a. Stand the ring gear (69) brake housing (73) assembly upright.
  - b. Align the arrows and scribe lines located on the planet gear (64) faces in a straight line as shown in Dwg. TPD35-1.
  - c. Maintain the gear alignment and insert carrier assembly, bearing (66) end first, into ring gear (69). Press together to fully seat bearing into brake housing (73).

#### Planet Gear Alignment



(Dwg. TPD35-1)

13. Apply a thin film of grease to gasket (68) and place gasket on ring gear (69).
14. Install gear assembly into tractor housing (57). Place gears such that the splined hub of the drive wheel (55) engages the splined hub of the planet gear/carrier assembly. Adjust to align the planet carrier assembly to the tractor housing cutout areas and align the brake housing (73) and tractor housing capscrew holes.

#### Brake Pressure Plate Assembly

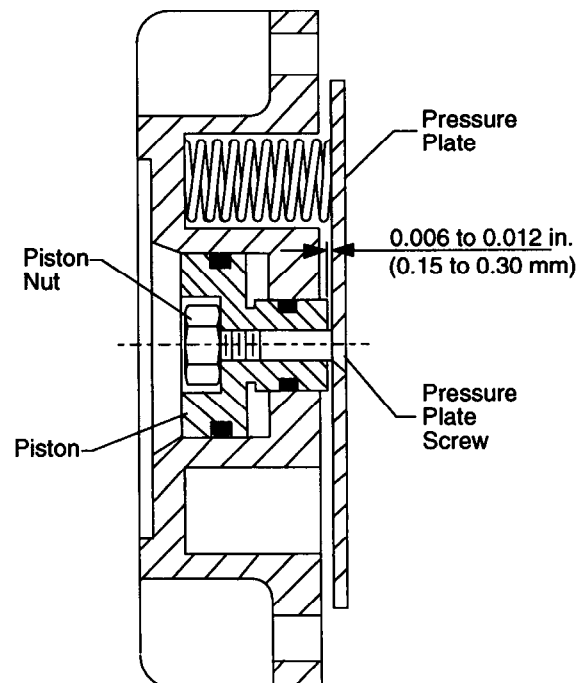
1. Lightly coat the 'O' rings (83 and 87) with 'O' ring lubricant, and install them in their respective grooves on the piston (86).
2. Taking care not to cut the 'O' rings, slide the piston into the housing (82).
3. Place the housing on the workbench with the three spring cavities facing upward.
4. Place a spring (81) into each cavity.
5. Install the capscrew (79) so the capscrew head enters the counterbore in the pressure plate (80). Place the pressure plate and capscrew on the springs (81) so the capscrew enters the hole in the piston.
6. Using a vise, carefully compress the pressure plate on the housing until the capscrew threads protrude through the piston (86) end. Install nut (88) on the capscrew.
7. Remove the assembly from the vise.
8. Adjust the capscrew and nut until a 0.006 to 0.012 in. (0.15 to 0.30 mm) gap exists between the pressure plate and piston. Refer to Dwg. MHP0488.

### NOTICE

• When adjusted, the piston (86) should free float between the nut (88) and pressure plate (80). Ensure piston moves freely between nut and pressure plate.

9. Install plate (89) into the recessed end of the housing (82), and install the two capscrews (90).

#### Brake Spring and Piston Housing Assembly



(Dwg. MHP0488)

### Brake Assembly to Tractor

1. Install the brake driver (75) on splined end of motor shaft (48) and secure using retainer ring (76).
2. Loosely secure brake housing (73) to tractor housing (57) using the shoulder bolts (85) to prevent rotation. Rotate brake driver (75) several revolutions. Ensure planet gears, motor shaft and ring gear (69) are properly meshed and that rotation is smooth without sticking or binding.
3. Install a brake plate (77). Align notches in brake plates (77) with capscrew holes in brake housing (73). Install a brake disc (78) followed by a brake plate (77), brake disc (78) and two brake plates (77).
4. Install brake pressure plate assembly onto brake housing (73). Align mating faces of the housing (82) to brake housing. Install lockwashers (84) and shoulder bolts to secure housings.
4. Withdraw the guide rod from the motor and install the cylinder dowel (45) such that the tapered end enters first.
5. Insert the mufflers (34) into the recess in the valve chest plate (33).
6. Insert the bearing (35) into the recess on the same side of the valve chest plate as you inserted the mufflers.
7. Place the gasket (36) on the motor housing (53). Install the valve chest plate and secure with capscrews (32).
8. Stand the tractor upright on the brake end. Place the gasket (31) on the valve chest plate (33) making certain the small flapper is properly positioned in the recess between the two ports.

### CAUTION

• If the valve chest gasket is flipped over, the flapper will not be in the recess between the two ports, and the brake will not release.

### Motor Assembly

1. Install the retainer ring (49) into the annular groove near the center of the motor shaft (48).
2. Grasp the motor shaft vertically with copper-covered vise jaws so the short-splined end is upward.
3. Press the bearing (46) into the front end plate (44), and the bearing (38) into the rear end plate (39).
4. Slide the front end plate and bearing, bearing side first, on the motor shaft until it seats on the retainer ring.
5. Slide the rotor (42), counterbored end first, on the motor shaft until it contacts the front end plate.
6. Place a vane (40) and vane spring (41) into each vane slot in the rotor (42).
7. Set the cylinder (43) on the rotor, aligning the dowel hole in the cylinder with the dowel hole in the front end plate.
8. Slide the rear end plate and bearing, flat side first, on the hub of the motor shaft until it contacts the cylinder. Align the dowel hole in the rear end plate with the dowel hole in the cylinder.
9. Install the retainer ring (37) into the annular groove on the end of the motor shaft.
10. Insert a 1/8 in. (3 mm) steel guide rod about 12 in. (305 mm) long into the dowel holes in the end plates and cylinder to maintain alignment of parts, and remove the assembly from the vise.
9. Center the two round rubber discs in their recesses in the valve chest plate.
10. Place the valve chest (29) on the gasket (31), and install capscrews (92) and (93).
11. Install the gasket (28) and valve chest plate (27) on the valve chest (29). Secure with the six capscrews (26).
12. Install the fittings (25) in the valve chest plate (27).

### Tractor Assembly onto Trolley

### WARNING

• Support the tractor while mounting onto trolley. The tractor weighs 75 lb (34 kg). Failure to adequately support the tractor assembly can result in the tractor falling, causing injury or death and/or property damage.

### Motor Assembly to Tractor

1. Place the motor retainer washer (47), dished (concave) side first, on the front end plate and engage the dowel hole in the washer with the guide rod.
2. While aligning the guide rod with the dowel hole in the bottom of the housing bore, slide the assembled motor into the motor housing (53).
3. Insert the motor shaft (48) into the wheel assembly until it meshes with the planet gears.
1. Raise tractor such that the trolley's hanger (13) and spring bolt (17) slide into the tractor housing (57) holes.
2. Install washer (14) and nut (15) onto hanger (13).
3. Install spring (18), washer (14) and nut (15) onto spring bolt (13).
4. Remove tractor support so its weight fully rests on hanger and spring bolt assemblies.
5. Adjust spring compression as described by "Drive Wheel Adjustment" in the "INSTALLATION" section.

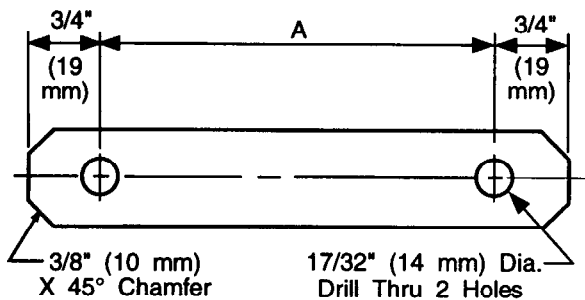
- Using locknuts (16), secure nuts (15) on hanger (13) and spring bolt (17).

## Drawbar

Drawing MHP0118 shows how to make a suitable Drawbar, while drawing MHP0119 illustrates a "universal" Drawbar (Part No. TVH50A-704) available from **Ingersoll-Rand**. The latter is long enough for practically any application, and the spacing of the holes is such that it can be cut to produce one or more intermediate length drawbars.

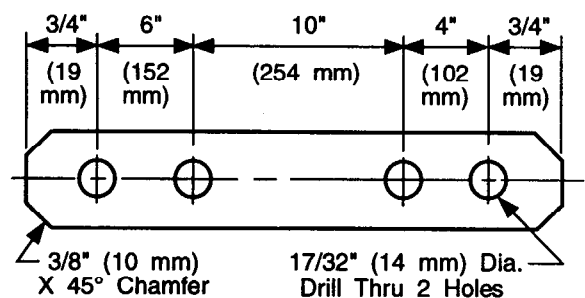
Use 3/8 x 1-1/2 in. (9.5 x 38 mm) cold rolled steel. It is unnecessary to cut the corners if the unit is used only on a straight track. Dimension "A" must at least equal the distance between the centers of the Drawbar pin hole in the clevis on the trolley and the one on the hoist when the trolley and hoist are as close as possible to each other on the track.

### Basic Drawbar Drawing



(Dwg. MHP0118)

### Part Number TVH50A-704 Drawing



(Dwg. MHP0119)

Drawings MHP0118 and MHP0119 are not shown to scale.

Drawbar yoke kits have been established for connecting tractors to trolley-mounted hoists. Refer to the "Drawbar Yoke Kit" table for a list of hoists with trolleys and the available drawbar yoke kits.

## Testing

Upon completion of maintenance and/or repairs, conduct the following to ensure proper operation of this equipment prior to placing in service.

### NOTICE

- Following the installation of an assembled tractor, perform the initial operating checks described in "Initial Operating Checks" in the "INSTALLATION" section.

## Brake

### ⚠ WARNING

- If the brake fails to stop and hold the tractor stationary, do not attempt to operate the tractor until proper repairs and/or adjustments are performed. Malfunction of the brake may allow for an uncontrolled load shift. Failure to observe this precaution can lead to injury or death and/or property damage.

If the tractor brake does not hold the towed load stationary, disassemble and repair the brake as described in the "MAINTENANCE" section.

## Control

Verify pendant or pull chain control. Tractor must operate in correct direction and operation must be smooth, without sticking or binding. Response to control must be quick and release of control lever or pull chain must result in an immediate stopping of tractor movement.

## Drive Wheel

During operation, observe drive wheel. Drive wheel must not slip. Adjust as necessary.

## Operation Test

- With tractor-trolley unloaded, operate along the entire length of beam, in both directions. Operation must be smooth, without sticking or binding.
- With tractor-trolley connected to a trolley-hoist combination holding rated load, operate along the entire length of beam, in both directions. Operation must be smooth, without sticking, binding or evidence of tractor overloading.

## PARTS ORDERING INFORMATION

The use of replacement parts other than **Ingersoll-Rand Material Handling** may invalidate the Company's warranty. For prompt service and genuine **Ingersoll-Rand Material Handling** parts, provide your nearest Distributor with the following:

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

Tractor Model Number: \_\_\_\_\_

Tractor Serial Number: \_\_\_\_\_

Date Purchased: \_\_\_\_\_

### 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. Tractors 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 tractor is provided inside the back cover of this manual.

### NOTICE

- **Ingersoll-Rand Replacement Parts are specifically designed to ensure optimum performance of your equipment.**
- **Use of other than genuine Ingersoll-Rand Material Handling parts may adversely affect safe operation and may also void the warranty.**
- **Continuing improvement and advancement of design may cause changes to this tractor which are not included in this manual. Manuals are periodically revised to incorporate changes. Always check the manual edition number on the front cover for the latest issue.**

### Disposal

When the life of the tractor-trolley has expired, it is recommended the tractor-trolley be disassembled, degreased and parts separated as to materials so 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

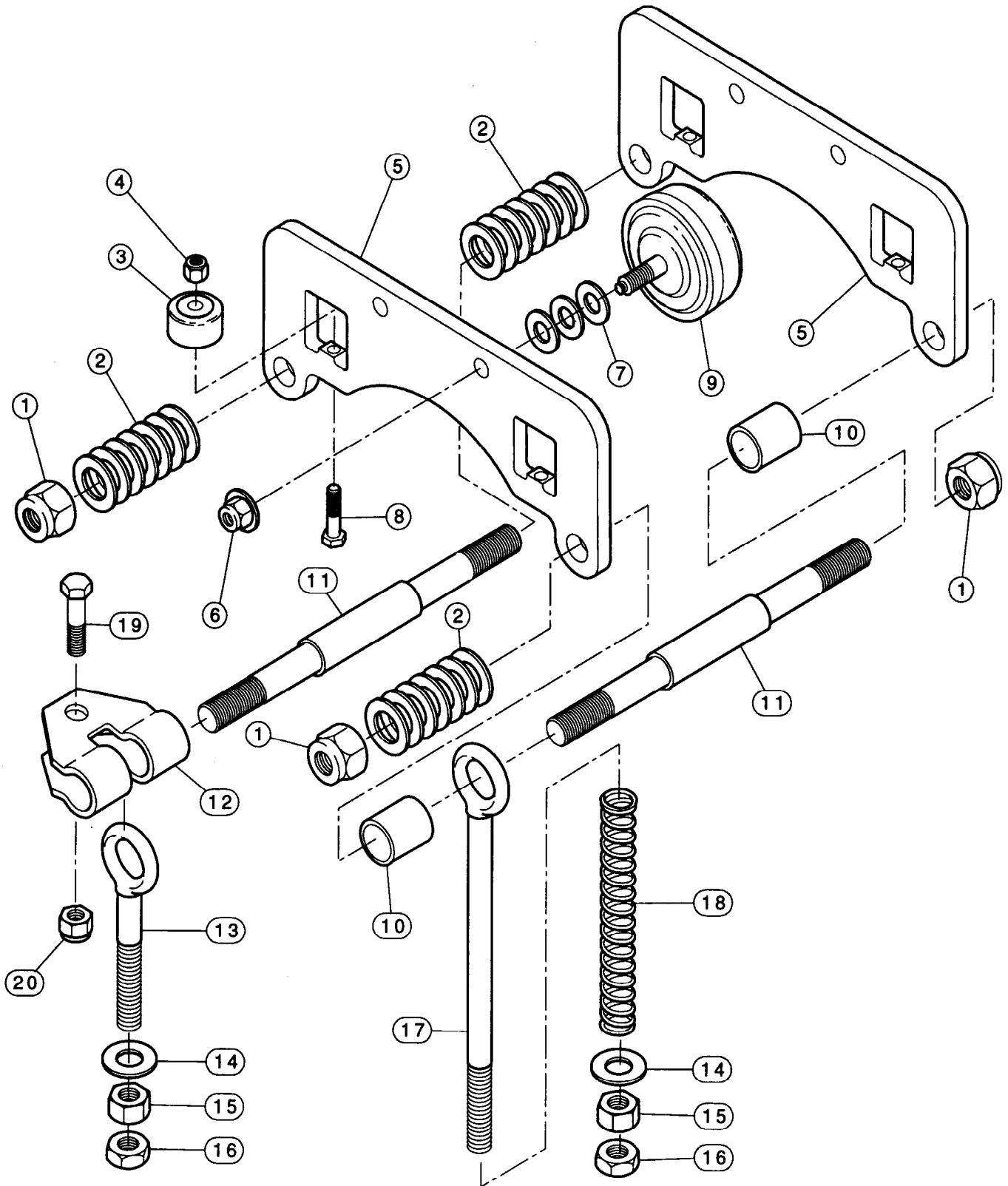
#### **Ingersoll-Rand Material Handling Douai Operations**

111, avenue Roger Salengro  
59450 Sin Le Noble, France  
Phone: (33) 27-93-08-08  
Fax: (33) 27-93-08-00

## ASSEMBLY DRAWINGS AND PART LISTS TABLE OF CONTENTS

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# TROLLEY ASSEMBLY DRAWING

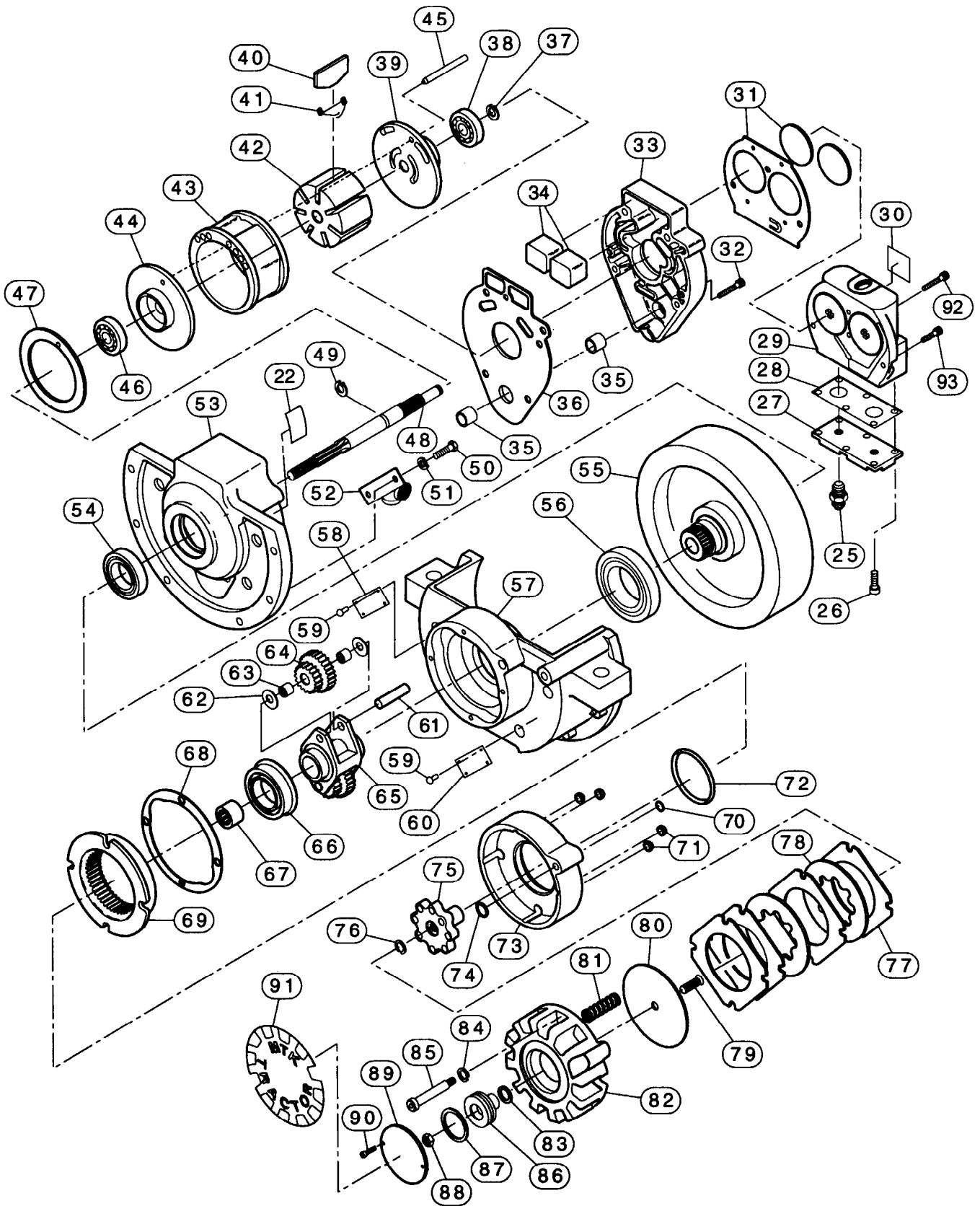


(Dwg. MHP0683)

## TROLLEY ASSEMBLY PARTS LIST

ITEM NUMBER	DESCRIPTION OF PART	QUANTITY TOTAL	PART NUMBER
1	Nut	4	MTK-864
2	Washer (2.66 to 6.25 in. [68 to 159 mm])	88	MTK-748
	Washer (6.26 to 12.00 in. [160 to 305 mm])	128	
3	Guide Roller	4	MTK-719
4	Nut	4	MTK-440
5	Side Plate	2	MTK-690
6	Nut	4	MTK-418
7	Washer	12	MTK-725
8	Capscrew	4	MTK-863
9	Wheel (Cast Iron - Standard)	4	MTK-A691
	Wheel (Bronze - S•COR•E feature)		MTK-AR691
10	Spacer	2	MTK-711
11	Shaft (2.66 to 6.25 in. [68 to 159 mm])	2	MTK-746-A
	Shaft (6.26 to 12.00 in. [160 to 305 mm])		MTK-746-D
12	Tongue (Includes item 19 and 20)	1	MTK-703
13	Hanger	1	MTK-699
14	Washer	2	MTK-741
15	Nut	2	MTK-776
16	Locknut	2	MTK-18
17	Spring Bolt	1	MTK-713
18	Spring	1	MTK-715
19	Capscrew	1	Order Item 12
20	Nut	1	Order Item 12

# TRACTOR ASSEMBLY DRAWING



(Dwg. MHP0691)

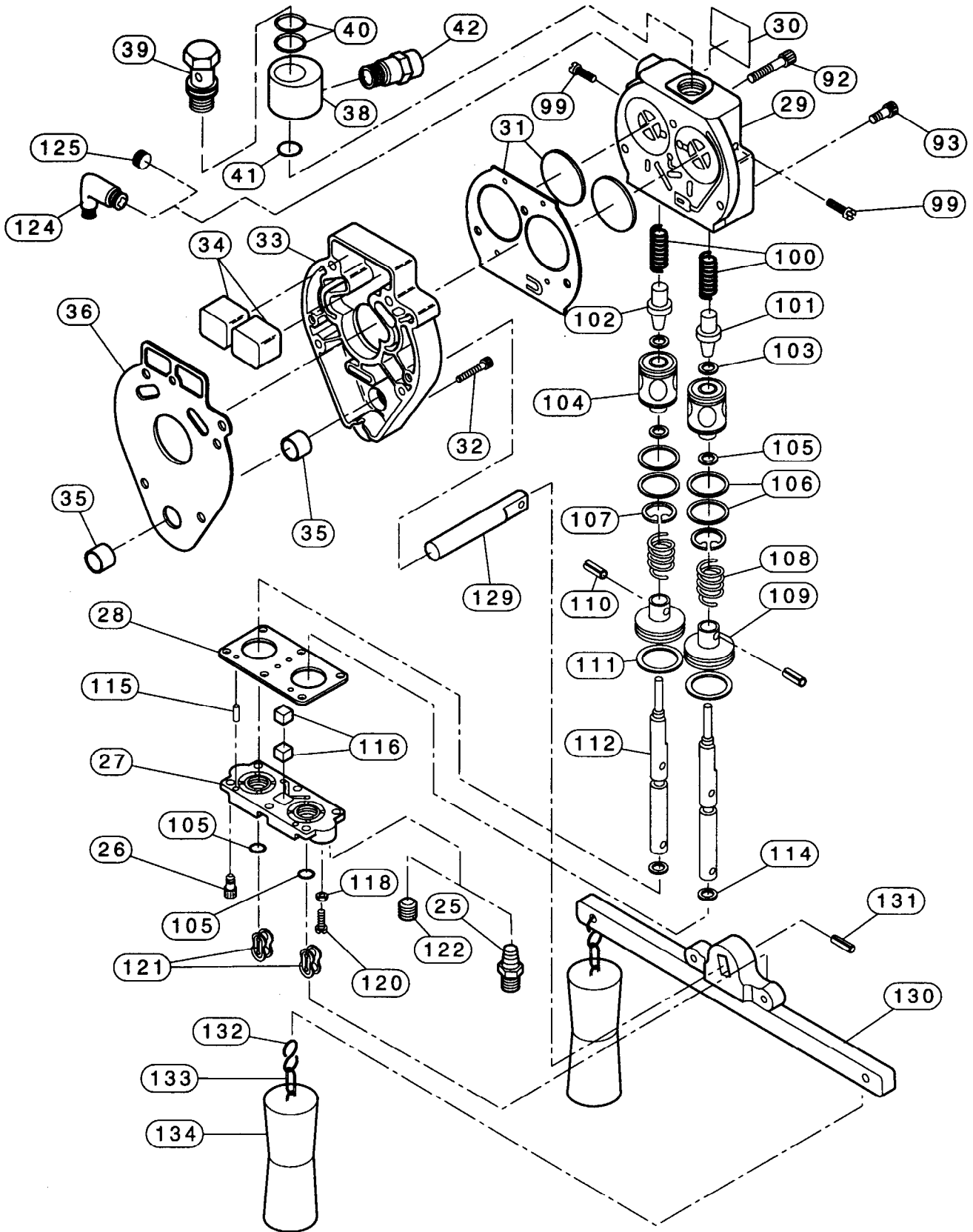


## TRACTOR ASSEMBLY PARTS LIST

ITEM NO.	DESCRIPTION OF PART	QTY TOTAL	PART NUMBER	ITEM NO.	DESCRIPTION OF PART	QTY TOTAL	PART NUMBER
22	Warning Label	1	04306445	60	Nameplate	1	MR-301S
25	Fitting, Nipple	2	71009815	---	Planet Assembly (incl's items 61 to 66)	1	ML50K-A8
26	Capscrew	6	MLK-240				
27	Valve Chest Plate	1	MTK-238				
* 28	Gasket	1	MLK-117A	61	Shaft	2	MR-191
29	Valve Chest	1	MTK-545	62	Thrust Washer	4	ML50K-361
30	I-R Logo	1	HRA20A-201	63	Bearing	4	ML50K-654
* 31	Gasket	1 set	MLK-928-80	64	Planet Gear	2	MR-10
32	Capscrew	5	5080-638-4	65	Planet Carrier	1	ML50K-8
33	Valve Chest Plate	1	MLK-549	66	Bearing	1	ML50K-97
* 34	Muffler	2	MLK-175	* 67	Bearing	1	ML50K-318
35	Bearing	2	R38M-603	* 68	Gasket	1	ML50K-31
* 36	Gasket	1	ML50K-445	69	Ring Gear	1	ML50K-406A
37	Retainer Ring	1	MLK-120	* 70	Seal	2	ML50K-21
38	Bearing	1	R2-24	* 71	Capscrew Seal	4	ML50K-271
39	Rear End Plate	1	MR-12	* 72	'O' Ring	1	HRA20A-990
* 40	Vane Kit (includes item 41)	1 set	MLK-K4243-7	73	Brake Housing	1	ML50K-346
41	Spring	1 set	MLK-43-7	* 74	'O' Ring	1	PS3-67
42	Rotor	1	MR-53	75	Brake Driver	1	ML50K-842
43	Cylinder	1	MLK-R3	76	Retainer Ring	1	ML50K-729
44	Front End Plate	1	MR-11	77	Brake Plate	4	ML50K-834A
45	Cylinder Dowel	1	R3H-434	78	Brake Disc	2	ML50K-855A
46	Bearing	1	TB-394	79	Screw	1	ML50K-805A
47	Motor Retainer Washer	1	MR-207	80	Pressure Plate	1	ML50K-K338A
48	Motor Shaft	1	ML50K-316	81	Spring	3	MLK-832
49	Retainer Ring	1	MLK-119	82	Housing	1	ML50K-395A
50	Capscrew	6	B8-240	* 83	'O' Ring	1	MLK-210
51	Lockwasher	6	T11-58-5	84	Lockwasher	4	D02-321-10
52	Air Inlet Bracket	1	MTK-581	85	Shoulder Bolt	4	ML50K-7
53	Motor Housing	1	MTK-502	86	Piston	1	ML50K-809
54	Bearing	1	MR-593	* 87	'O' Ring	1	R2C-103
55	Wheel Assembly	1	MTK-A653	88	Nut	1	ML50K-394
56	Bearing	1	MR-988	89	Plate	1	ML50K-981
57	Tractor Housing	1	MTK-300	90	Capscrew	2	CE110-354
58	Serial Number Plate	1	MR-301M	91	Decal	1	MTK-99
59	Drive Screw	8	R4K-302-12	92	Capscrew	1	518-104
				93	Capscrew	2	R0H-354-4

\* Recommended spare.

# PILOT OR PULL CHAIN AIR VALVE ASSEMBLY DRAWING



(Dwg. MHP0771)

## PILOT OR PULL CHAIN AIR VALVE ASSEMBLY PARTS LIST

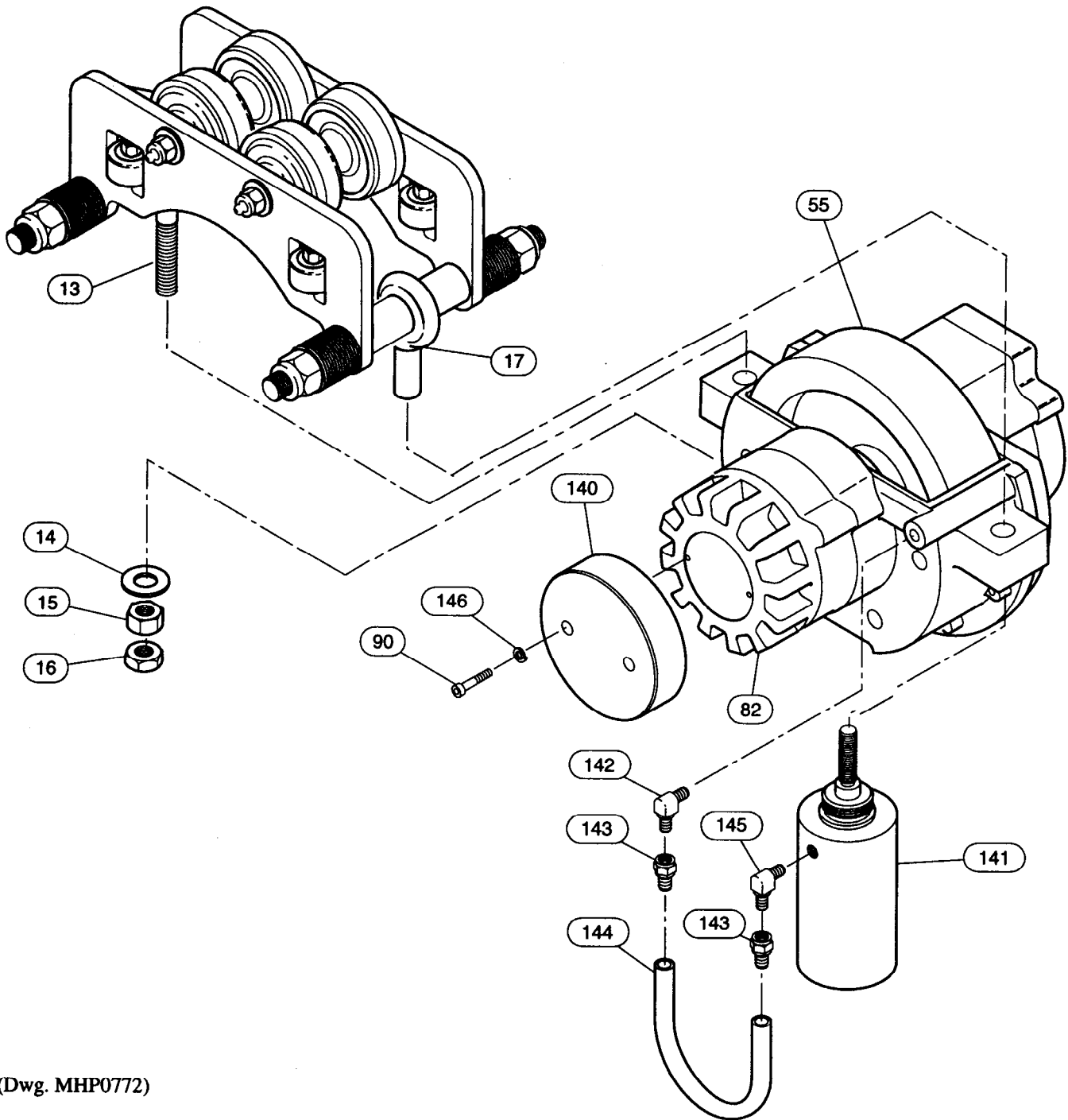
ITEM NO.	DESCRIPTION OF PART	QTY TOTAL	PART NUMBER	ITEM NO.	DESCRIPTION OF PART	QTY TOTAL	PART NUMBER
	Valve Chest Assembly (Includes items 26 through 120)	1	MLK-A545B	104	Seat Assembly	2	MLK-K615
				* 105	Seal, Shaft	4	R000BR-210
** 25	Fitting, Nipple	2	71009815	* 106	Seal, Seat	4	C321-606
26	Capscrew	6	MLK-240	107	Retainer Ring	2	MLK-218
27	Valve Chest Plate	1	MTK-238	108	Spring, Piston	2	MLK-250A
* 28	Gasket	1	MLK-117A	109	Piston	2	MLK-K246A
29	Valve Chest	1	MTK-545	110	Pin, Retaining	2	510-669A
30	I-R Logo	1	HRA20A-201	* 111	Seal, Piston	2	MLK-103
* 31	Gasket	1 set	MLK-928-80	112	Shaft, Piston	2	MLK-K655A
32	Capscrew	5	5080-638-4	* 114	Seal, Shaft Bottom	2	R0BR1C-283
33	Valve Chest Plate	1	MLK-549	115	Pin, Cover	2	MLK-241
* 34	Muffler	2	MLK-175	116	Muffler	2	MLK-236
* 35	Bearing	2	R38M-603	118	Locknut, Bleed Adjust	2	Q1-121
* 36	Gasket	1	ML50K-445	120	Capscrew, Bleed Adjust	2	MLK-370
38	Inlet Body	1	MLK-166	121	Link	2	MLK-224
39	Nipple	1	MLK-B4	* 122	Plug	2	R2-227
* 40	O' Ring	2	R4-210	** 124	Fitting, Elbow	1	UWD-161
* 41	Gasket	1	R18LF-21	* 125	Plug	1	R0H-377
42	Strainer	1	MLK-82	* 129	Shaft, Pull Chain	1	MTK-255
92	Capscrew	1	518-104	* 130	Throttle Lever	1	MLK-251PC
93	Capscrew	2	R0H-354-4	* 131	Pin	1	WF171-15
99	Capscrew, Seat Lock	2	AF160-305	* 132	'S' Hook	2	D02-421
100	Spring, Valve	2	MLK-942A	* 133	Pull Chain, Standard	Specify Length	CA110-B240
101	UP Valve Assembly	1	MLK-K102U		Pull Chain, S•COR•E		D02-1413
102	DOWN Valve Assembly	1	MLK-K1102D	* 134	Handle, Pull Chain	2	MR-415
* 103	Seal, Valve	2	MLK-211				

\* Recommended spare.

\* Pull Chain feature only.

\*\* Pendant control feature only.

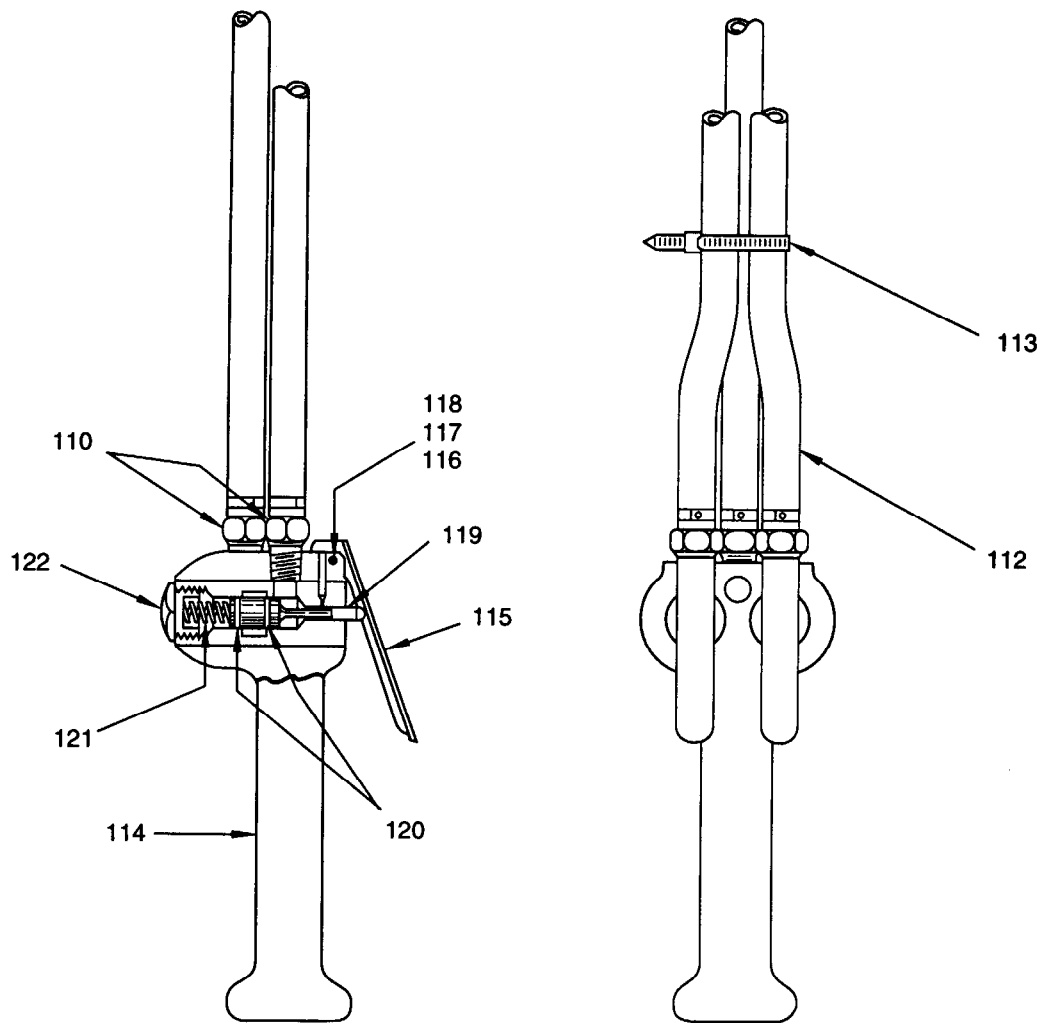
# FREEWHEEL ASSEMBLY DRAWING AND PARTS LIST



(Dwg. MHP0772)

ITEM NO.	DESCRIPTION OF PART	QTY TOTAL	PART NO.	ITEM NO.	DESCRIPTION OF PART	QTY TOTAL	PART NO.
13	Hanger	1	MTK-699	90	Capscrew	2	8U-628
14	Washer	1	MTK-741	140	Counter Balance	1	MTK-CTW
15	Nut	1	MTK-776	141	Cylinder	1	MTK-CYL
16	Locknut	1	MTK-18	142	Fitting, Elbow	1	MLK-161
17	Suspension Shaft	1	MTK-346	143	Fitting	2	51029
55	Wheel Assembly	1	MTK-A653	144	Hose	1-1/2 ft	50923
82	Housing	1	MTK-395CW	145	Fitting, Elbow	1	UWD-161

# PENDANT ASSEMBLY DRAWING AND PARTS LIST



(Dwg. MHP0106)

ITEM NO.	DESCRIPTION OF PART	QTY TOTAL	PART NUMBER
110	Fitting, Nipple	3	71009815
112	Hose	*	BH6C
113	Strap	3	HRE20A-283
** 114	Pendant Assembly	1	MR-269C
115	Lever	2	MR-273
116	Lever Pin	1	DLC-120A
117	Screw	2	MLK-SR662
118	Lockwasher	2	D02-138
119	Valve	2	MR-264
* 120	O' Ring	4	20A11CM111
121	Spring	2	D01-51A
122	Cap	2	D02-180A

\* Recommended spare.

\* Specify length in feet.

\*\* Includes items 110 and 115 through 122.

Note: Refer to Manual Form Number P6778 for 2 and 3 motor pendant information.

## KITS AND ACCESSORIES

DESCRIPTION OF KIT	KIT PART NUMBER
--------------------	-----------------

**Drawbar Yoke Kit:**

C6CA, C620C20, C640A17, C640A57, D660A15 and D660A35 Standard Headroom Hoists with Rigid Trolley	C6CA-K1
C620, C640, D660, D6100LH Standard Headroom and Low Headroom Hoists with Swivel Trolleys	C6H20A-K2
C640, D660 Low Headroom Hoists with Rigid Trolley	C640ALH-607
HL4500K, HL6000K and D6100LH with Rigid Trolley	D6100BLH-607
C6 and D6 Hoist with Rigid Trolley	CABLE-K1
A, B and MLK Hoist with Rigid Trolley	MR-K1

Free Wheel Kit	MTK-KFW
Wide Flange Kit (fits beam widths 6.26 to 12.00 in [160 to 305 mm])	MTK-K746D
Gasket Kit	MLK-K445
Manual Brake Release Kit	MLK-K390
Quick Exhaust Valve	MR-939-6

DESCRIPTION OF ACCESSORY	ACCESSORY PART NUMBER
Lubricant	LUBRI-LINK-GREEN
Touch-up Paint	FAP-237Y
I-R No. 11 Grease	11-1LB

**Air System (for 1/2 inch supply line):**

Filter	F20-04-G00
Lubricator	L30-06-G00
Regulator	R20-04-G00
Filter, Lubricator, Regulator Combination	C22-04-G00

## 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 the above limitations may not apply to you.

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

## IMPORTANT NOTICE

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

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

### **VISIBLE LOSS OR DAMAGE**

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

### **CONCEALED LOSS OR DAMAGE**

When a shipment has been delivered to you in apparent good condition, but upon opening the

crate or container, loss or damage has taken place while in transit, notify the carrier's agent immediately.

### **DAMAGE CLAIMS**

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

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

## United States Office Locations

### For Order Entry and Order Status

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

### For Technical Support

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

### Regional Sales Offices

**Chicago**  
888 Industrial Drive  
Elmhurst, IL 60126  
Phone: (708) 530-3800  
Fax: (708) 530-3891

**Detroit, MI**  
23192 Commerce Drive  
Farmington Hills, MI 48335  
Phone: (313) 476-6677  
Fax: (313) 476-6670

**Houston, TX**  
Suite 150  
2500 East T.C. Jester  
Houston, TX 77008  
Phone: (713) 864-3700

**Los Angeles, CA**  
11909 E. Telegraph Road  
P.O. Box 2525  
Santa Fe Springs, CA 90670  
Phone: (310) 948-4189  
Fax: (310) 948-1828

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

## International Office Locations

The following are 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  
Fax: (206) 624-6265

**Canada  
National Sales Office  
Regional Warehouse  
Toronto, Ontario**  
51 Worcester Road  
Rexdale, Ontario  
M9W 4K2  
Phone: (416) 675-5611  
Fax: (416) 213-4510  
**Order Desk**  
Fax: (416) 213-4506

### Regional Sales Offices

**Calgary, Alberta**  
44 Harley Road S.E.  
Calgary, Alberta  
T2V 3K3  
Phone: (403) 252-4180  
Fax: (403) 252-4462

**Edmonton, Alberta**  
1430 Weber Center  
5555 Calgary Trail N.W.  
Edmonton, Alberta  
T6H 5G8  
Phone: (403) 438-5039  
Fax: (403) 437-3145

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

**British Columbia**  
201-6351 Westminster Hwy  
Richmond, B. C.  
V7C 5C7  
Phone: (604) 278-0459  
Fax: (604) 278-1254

**Latin America Operations  
Ingersoll-Rand  
Production Equipment  
Group**  
730 N.W. 107 Avenue  
Suite 300, Miami, FL  
33172-3107 USA  
Phone: (305) 559-0500  
Fax: (305) 559-7505

**Europe, Middle East and  
Africa  
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

**Asia Pacific Operations  
Ingersoll-Rand (Japan) Ltd.**  
Shin-Yokohama Square Bldg.  
(5th Floor)  
2-3-12 Shin-Yokohama,  
Kouhoku-ku  
Yokohama-shi, Kanagawa  
Pref. 222 Japan  
Phone: 81-45-476-7800  
Fax: 81-45-476-7806

**Russia  
Ingersoll-Rand Company  
World Trade Center  
Office 1101**  
Krasnopresnenskaya Nab. 12  
Moscow, Russia 123610