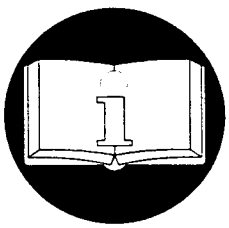
"LIFTSTAR" AIR WINCHES FG 600/CN SERIES

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.

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INGERSOLL-RAND
MATERIAL HANDLING

TABLE OF CONTENTS

TABLE OF CONTENTS

SAFETY INFORMATION

This manual provides important information for all personnel involved with the safe installation, operation and proper maintenance of this product. Even if you feel you are familiar with this or similar equipment, you should read and understand 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 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 winch for lifting, supporting, or transporting people or supporting loads over people.
• The supporting structures and load-attaching devices used in conjunction with this winch must provide and 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 qualified registered engineer.

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 line of force of any load.

INGERSOLL-RAND Material Handling winches are manufactured in accordance with the latest ASME B30.7 standards.

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 Brodway, New York, NY 10018.

NOTICE

• Using other than genuine INGERSOLL-RAND Material Handling parts will void the warranty.

SAFE OPERATING INSTRUCTIONS

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

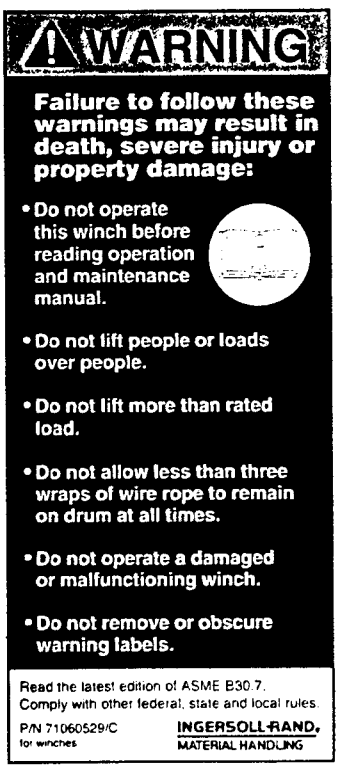
INGERSOLL-RAND recognizes that most companies who use winches have a safety program in force in their plants. In the event that some conflict exists between a rule set forth in this publication and a similar rule already set by an individual company, the more stringent of the two should take precedence.

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.

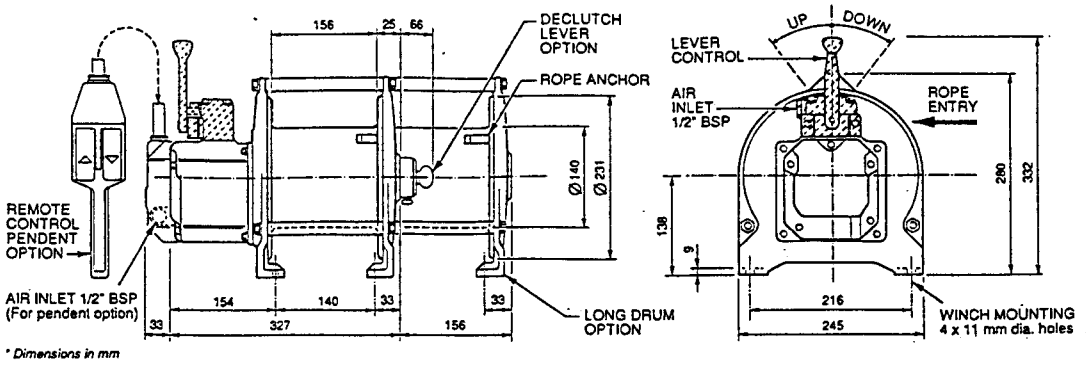
1. Only allow personnel trained in safety and operation to operate and maintain a winch.
2. Only operate a winch if you are physically fit to do so.
3. When a "DO NOT OPERATE" sign is placed on the winch, do not operate the winch until the sign has been removed by designated personnel.
4. Before each shift, check the winch for wear or damage.
5. Never lift a load greater than the rated capacity of the winch. See warning labels 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 in the vicinity of the wire rope as it spools onto the 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. 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 winch is supplied from the factory with the warning tag shown. If the tag is not attached to your unit, order a new tag and install it. See the parts list for the part number. Read and obey all warnings and other safety information attached to this winch. Tag may not be shown actual size.



SPECIFICATIONS



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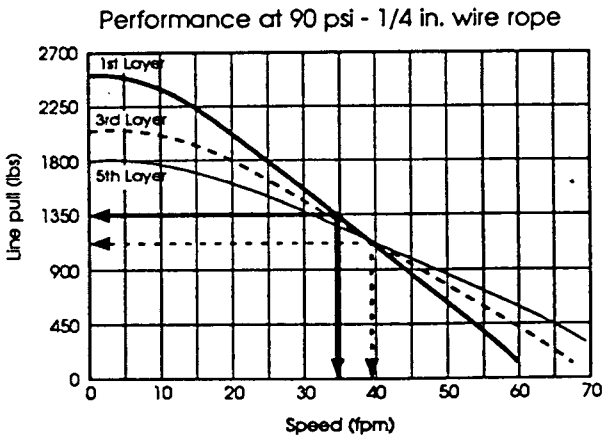
Air Pressure : 90 psig (6.3 bar)
Air Flow : 78 scfm (2.2 cu.m/min)
Drum Size :
Barrel dia. 5-1/2 in. (140 mm)
Flange dia. 9-3/32 in. (231 mm)
Length Between Flanges : 6-1/8 in. (156 mm)
For short drum model
Length Between Flanges : 12-1/4 in. (312 mm)
For long drum model
Drum Wire Rope Storage Capacity :
1/4 in. (6 mm) wire rope : 297 ft. (90 m)
For short drum model
5/16 in. (8 mm) wire rope : 164 ft (50 m)
For short drum model
1/4 in. (6 mm) wire rope : 592 ft. (180 m)
For long drum model
5/16 in. (8 mm) wire rope : 328 ft. (100 m)
For long drum model
Line Pull Hoisting :
Maximum full drum line pull 1,350 lbs (613 kg)
Line Pull Pulling :
Maximum full drum line pull 2,200 lbs (1000 kg)
Line Speed :
Maximum speed with no load 65 fpm (20 m/min)
Winch Weight :
Without wire rope 62 lbs (28 kg) Short drum model
Without wire rope 87 lbs (39,5 kg) Long drum model

Performance at 90 psi - 1/4 in. wire rope



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HOW TO ORDER

Example : FG 600-PH4M-CN
1,350 lbs capacity, with 4 m of control pendent, and drum guard.

Séries	Ratings	Drum	-	Control	Pendent Hose Length	-	Clutch	-	Option
FG	**600**	**L**	-	**PH**	**4M**	-	**CN**	-	**GP**

FG	**L** = Long drum *No letter* = Short drum	*No letter* = Lever throttle on winch *P H* = Remote control pendent handle (aluminium) *PHR* = Brass pendent handle	2M = 2 meters (sid.) *X X M* = Specify length in meters	*CN* = Clutch fitted as standard	G = Drum Guard P = Marine paint Z = Sand blast, and primer

DESCRIPTION

The FG 600-CN is an air powered planetary winch designed for lifting applications. The winch utilizes a disc brake which is automatically applied if there is a lack of air pressure. The output from the externally mounted air gear motor is transmitted through a coupling and shaft to the planetary reduction. The planetary reduction drives a ring gear which is connected to the wire rope drum through the output shaft. The brake is spring applied and released by pilot air pressure when the winch is operated. In the event of a loss of air pressure the brake automatically applies.
The FG 600-CN is equipped with a manually operated free wheel clutch. The free wheel clutch permits unloaded wire rope to be pulled from the drum by hand.

INSTALLATION

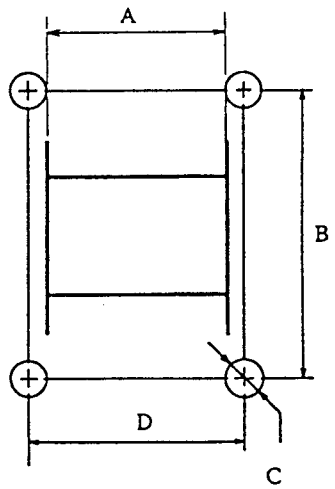
Prior to installing the winch, carefully inspect it for possible shipping damage.

⚠ 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

1. If winch is to be mounted in one position be sure the mounting surface is even and of sufficient strength to handle the rated load and prevent possible binding of the winch.
2. Make sure the mounting surface is flat to within 1/32 inch (0.8 mm). Shim if necessary.
3. Mounting bolts must be 3/8 in. (10 mm) diameter, Grade 8 or better. Use self-locking nuts or nuts with lockwashers.
4. Torque mounting bolts evenly.



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5. Maintain a fleet angle between the sheave and winch of no more than 1-1/2 degrees. For every inch of drum length, the lead sheave must be at least 1.6 feet (0.5 m) from the drum.
6. Do not weld to any part of the winch.

Bolt Hole Dimensions

	with short drum	with long drum
"A"	6-1/8 in. (156 mm)	12-1/4 in. (312 mm)
"B"	8-1/2 in. (216 mm)	8-1/2 in. (216 mm)
"C"	7/16 in. (11 mm)	7/16 in. (11 mm)
"D"	5.51 in. (140 mm)	11.65 in. (296 mm)

Wire rope

⚠ CAUTION

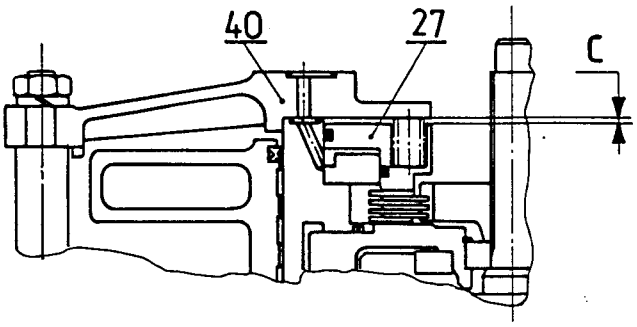
• Maintain at least 3 wraps of wire rope on the drum at all times.
• Install the wire rope to come off the drum in an underwind position as indicated on the direction of rotation tag.

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 meets all applicable industry, trade association, 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 diameter for lifting or lowering 1/4 in. or 5/16 in. (6 or 8 mm). Maximum wire rope diameter is limited by the wire rope anchor.

Installing Wire Rope

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 smaller anchor hole in the wire rope drum and pull through approximately one foot (0.3 m) of wire rope.
3. Tuck the end of the wire rope back into the wire rope anchor pocket forming a loop in the wire rope.
4. Insert the wire rope anchor and pull the wire rope through the slot tightening the wire rope around the wire rope anchor.



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⚠ CAUTION

• Make sure the first wrap of wire rope is flush against the drum flange.

5. Pull the wire rope anchor into position in the drum anchor pocket.

Wire Rope Spooling

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

Safe Wire Rope Handling Procedures

1. Always use gloves when handling wire rope.
2. Never use wire rope which is frayed or kinked.
3. Never use wire rope as a sling.
4. Always ensure wire rope is correctly spooled and first layer is tight.

Rigging

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

Safe Installation Procedures

1. Do not use wire rope as a ground 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.
5. Always maintain at least three full wraps of wire rope on the drum.

Air supply

The air supply must be clean and free from moisture.

Air Lines

The inside diameter of the winch air supply lines should not have be smaller than 1/2 in. (13 mm) for flexible lines and 3/8 in. (10 mm) for connectors. Before making final connections, all air supply lines should be purged before connecting to system inlet. Supply lines should be purged before connecting to system 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.

Air Line lubricator

Always use an line lubricator with these motors. Use a lubricator having an inlet and outlet at least as large as the inlet on the motor. Install the lubricator in the air line just ahead of the motor.

NOTICE

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

The air line lubricator should be replenished daily and set to provide 2 to 3 drops per minute of SAE 30W oil (minimum viscosity 135 Cst at 104° F (40°C)). Winches are delivered with the gear box filled with oil.

Motor

For optimum performance and maximum durability of parts, operate air motor at 90 psi at 70 scfm (6.3 bar/630 kpa at 2.2 cu.m/min) air pressure and volume. The winch 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 some light oil should be injected into the inlet connection to allow good lubrication.
2. When first operation 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 for a period of more than one month the following start-up procedure is recommended.

1. Pour a small amount of gasoline fluid in the motor inlet port.
2. Operate the motor for 10 seconds to flush out any impurities.
3. Pour small amount of oil in the motor air inlet port.
4. Operate the motor for an additional 2 to 3 seconds. The winch is now ready to work.

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 the operation of this winch to operate the winch.
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.

⚠ WARNING

• The FG 600-CN Winch is not designed or suitable for lifting, lowering or moving persons. Never lift loads over people.

Winch Control

The winch spring loaded manual control throttle is mounted to the air motor.

When viewed from the air motor end move the control throttle handle to the right (clockwise) to pay out wire rope. When viewed from the air motor end move the control throttle handle to the left (counterclockwise) to haul in wire rope. To ensure smooth operation of the winch sudden movements of control valve should be avoided.

Remote Pilot Pendant Throttle (optional)

The pendent control throttle is equipped with two separate levers for winch operation. Pilot pressure from the pendant throttle activates the winch control valve. Direction of drum rotation is controlled by whichever lever is depressed.

⚠ 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.

Free Wheel Clutch

To disengage the free wheel clutch pull out the spring loaded plunger until it clears the groove in the handle shaft. Maintain a hold on the plunger knob and pull out the free wheel clutch handle. Release the spring loaded plunger so it locks back into the shaft groove. Gently pull and push on the free wheel clutch handle to check plunger is engaged.

⚠ WARNING

• Never disengage clutch with a load on the wire rope.

• Winch controls must be in the neutral position before operating the free wheel clutch.

To engage the free wheel clutch pull out the spring loaded plunger until it clears the groove in the handle shaft. Maintain a hold on the plunger knob and push in the free wheel clutch handle. Release the spring loaded plunger so it locks back into the shaft groove. Gently pull and push on the free wheel clutch handle to check plunger is engaged. It may be necessary to rotate the drum slowly by hand to allow the clutch drive shaft to engage.

LUBRICATION

Wire Rope

Refer the wire rope manufacturer's recommendations. At a minimum observe the following :

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

⚠ CAUTION

• Do not use an acid-based solvent or other cleaning fluid.

2. Apply a wire rope lubricant or SAE 30W oil.
3. Brush, drip or spray lubricant weekly, or more frequently, depending on severity of service.

Reduction Gear Assembly

Winches are delivered with the gear box filled with oil. Replace the oil in the reduction housing at least once every year. If the winch is used at a normal frequency, the oil in the reduction housing is suitable for one years operation without changing. However, when the winch is used at a high frequency, the oil may need to be changed on a more frequent basis.

To ensure correct performance, highest efficiency and long life, it is essential that the lubricating oil be maintained at the corect level. 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 of the gears.

The reduction gear assembly is filled and shipped with SAE 80W90 oil having a kinematic viscosity of 145 mm^2/s at 40°C (104°F) from the factory. Use only high quality lubricants in the reduction gear assembly such as
high grade EP type oil or the equivalent. Fill the reduction gear assembly until the working rim is covered.
Oil capacity : 4 fl oz. (12 cl)

Below 32°F (O°C)	SAE 50W	EP4
32° to 80°F (0° to 27°C)	SAE 90	EP4
Above 80°F (27°C)	SAE 140	EP4

Drum Bushings

Lubricate grease fittings monthly with 2 or 3 pumps of a grease gun. Rotate the drum slowly as grease is being applied. For temperatures -20° to 50°F (-29° to 10°C) use a multipurpose lithium-based EP1 grease. For tempereatures 30° to 120°F (-1° to 49°C) use a multipurpose lithium-based EP2 grease.

Seals and Bearings

If winch is disassembled, clean all parts thoroughly and coat bearings and seals with clean grease. Use sufficient grease to provide a good protective coat.

Free Wheel Clutch

If winch is disassembled, apply a light coating of grease to the plunger and clutch handle shaft.

Storage

For exchange winches or winches that will not be operated for extended periods pour a small amount oil into the motor inlet port or supply line. Operate the motor for 2 to 4 seconds to lubricate the motor parts then plug the air inlet port

INSPECTION

There are two types of inspection, the frequent inspection performed by the operator while using the winch and periodic inspections performed by personnel trained in the operation and maintenance of this winch. 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.

Any deficiency revealed through inspection must be reported to an appointed person. A determination must be made as to whether a
deficiency constitutes a safety hazard before resuming operation of the winch.

Records and Reports

Some form of inspection record must be maintained for each winch, listing all points requiring periodic inspection. A written report should be made monthly on the condition of the critical parts of each winch. These reports should be dated, signed by the person who performed the inspection, and kept on file where they are readily available for review.

Frequent Inspection

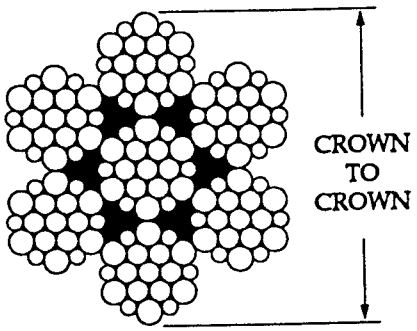
On a winch in continuous service, frequent inspection should be made at the beginning of each shift. In addition, visual inspections should be conducted during regular service for any damage or evidence of malfunction.

1. OPERATION. Check for visual or abnormal noises which could indicate a defect. Do not operate a winch unless the wire rope feeds onto the winch drum smoothly. If wire rope binds or jumps, clean and lubricate the wire rope. If problem persists, replace the wire rope. Do not operate the winch until all defects have been corrected.
2. AIR SYSTEM. Check air lines, valves and other components for leakage. Repair if necessary.
3. WIRE ROPE. Wire rope is a consumable item which must be replaced when worn. The following list is a guide to the accepted standards by which wire rope must be judged and is not presented as a substitute for an experienced inspector.
   a. Damage, such as bird cages, kinking, core protrusion, crushing, heat damage, and main strand displacement.
   b. Corrosion and nicking.
   c. Wear of crown wires. Replace at 1/3 wear of any crown wire.
   d. Broken wires or strands, particularly at connections. Replacement is necessary if one wire is broken at a connection ; six wires broken within one lay ; three wires broken in one strand within one lay.
   e. Lubrication.
   Replace wire rope if any doubt exists as to wire rope serviceability.
4. WIRE ROPE REEVING. Check reeving and ensure wire rope is properly secured to the drum.
5. CONTROLS. See that controls function properly and control handle returns to neutral center when released.

Periodic Inspection

According to ASME B30.7, frequency of periodic inspection depends on the severity of usage : NORMAL : yearly ; HEAVY : semi-annually ; SEVERE : quarterly. Disassembly may be required for HEAVY or SEVERE usage. Keep accumulative records of periodic inspections to provide a basis for continuing evaluation. Inspect all the items in a frequent inspection plus the following :

1. FASTENERS. Check, capscrew, nuts, pins and other fasteners on winch and air system. Replace if missing and tighten or secure if loose.
2. ALL COMPONENTS. Inspect for wear, damage, distortion, deformation and cleanliness. If external evidence indicates the need, disassemble. Check gears, shafts, bearings, springs and covers. Replace worn or damaged parts. Clean, lubricate and reassemble.
3. DRUM AND SHEAVES. Check for damage or excessive wear. Replace if necessary.
4. BRAKE. Perform functional load test on winch. Check ability of the brake to hold rated load.
5. LABELS AND TAGS. Check for presence and legibility. Replace if necessary.
6. WIRE ROPE. Besides the items in a frequent inspection, inspect for the following.
   a. Build-up of dirt and corrosion. Clean if necessary.
   b. Loose or damaged end connection. Replace if loose or damaged.
   c. Check wire rope anchor is secure.
   d. Changes in the size of the wire rope diameter. Periodically measure the diameter of the wire rope from crown-to-crown throughout the life of the wire rope. The actual diameter should be recorded when the wire rope is under equivalent loading and in the same operating section. If the actual diameter of the wire rope has decreased more than 1/64 in. (0.4 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. (ref. Dwg. D6310012)



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7. FOUNDATION. Check for the continued ability to handle the imposed loads.

Winches Not in Regular Use

A winch which has been idle for a period of one month or more, but less than six months, shall be given an inspection conforming with the requirements of "Frequent Inspection" before being placed into service.
A winch which has been idle for a period of over six months shall be given a complete inspection conforming with the requirements of "Periodic Inspection". Standby winches shall be inspected at least semi-annually in accordance with the requirements of "Frequent Inspection". If abnormal operating conditions apply,n winches may require a more frequent inspection.

TROUBLESHOOTING

This section provides the information necessary for troubleshooting this winch. The troubleshooting guide provides a general outline of problems which could be experienced with normal use of this winch. It lists the symptom, the possible cause, and the possible remedy for the trouble being experienced.

SYMPTOM	CAUSE	REMEDY
Winch will not operate.	No air supply to winch.	Check connections and hoses in air supply line.
	Winch is overload.	Reduce load to within rated capacity.
Load continues to move when winch is stopped.	Brake is slipping.	Check brake friction discs and springs. See "MAINTENANCE" section.
	Winch is overloaded.	Reduce load to within rated capacity.
Winch will not lift load or does not lift rated capacity.	Winch is overloaded.	Reduce load to within rated capacity.
	Motor may be damaged.	Inspect motor. See "MAINTENANCE" section.
	Brake is not releasing.	Check brake release pilot hole is not restricted. Check seals on brake piston are not damaged.
	Insufficient air supply.	Check air supply pressure and volume.
Oil leaks from drum bushing area.	Reduction assembly is leaking.	Disassemble winch and inspect reduction assembly seals.
Low power.	Low air pressure at the inlet	Check air pressure at the inlet while winch is running.
	Worn or damaged motor gears.	Inspect motor. See "MAINTENANCE" section.
	Improper lubrication or dirt building up in the motor.	Lubricate as instructed in "LUBRICATION" section. If this does not help, flush the motor as instructed in the "INSTALLATION" section.
	Winch binds during operation.	Check winch mounting surface is flat and does not distort during winch operation.
Motor does not operate smoothly.	Worn or broken rotor bearings.	Examine each bearing. Install new bearings as necessary.

⚠ 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 qualified service presonnel to perform maintenance.
- After performing any maintenance on the winch, test winch to 125% of its rated capacity before returning to service.
- Do not use Trichloroethylene to clean parts.

Motor

Use the following procedure to remove the motor.

1. Disconnect and tag the air lines.
2. Position several blocks fo wood on the work bench and stand the winch in a vertical position with the motor end up. Make sure the weight of the winch does not rest on the free wheel handle or cause damage to the free wheel parts.
3. Remove the four capscrews which connect the air motor to the end bracket and remove the motor.

Brake

It is recommended that the brake assembly be removed for maintenance and inspection once each year.

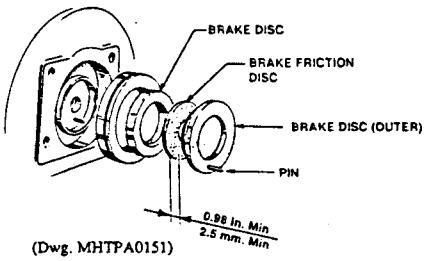
Adjustment

No brake adjustment is required.

Use the following procedure to remove the brake.

1. Disconnect and tag the air lines.
2. Set the winch in a vertical position with the motor end up.
3. Remove the four capscrews (34) which connect the air motor to the end bracket and remove the motor.
4. Remove the coupling sleeve (5), plate (26), brake disc (27) and cylinder piston (25).

No further disassembly is required if only the brake is to be serviced.



(Dwg. MHTPA0151)

(Dwg. D6180004)

Inspect the brake disc for wear. If brake disc thickness is less than 0.01 in. (2,5 mm) replace brake disc.

NOTICE

- **Original brake disc thickness is 0.126 in. (3,2 mm)**

General Disassembly Procedures

The following instructions provide the necessary information to disassemble, inspect, repair, and assemble the winch. Refer to the winch assembly drawing 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 on a bench.

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 and housings.
7. Do not remove any part which is press fit in or on a subassembly unless the removal of that part is necessary for repairs or replacement.

Disassembly Instructions

Winch Disassembly

1. Disconnect and tag the air lines.
2. Remove winch from its mounting and set in a clean work area on a sturdy work bench.
3. Position several blocks of wood on the work bench and stand the winch in a vertical position with the motor end up. Make sure the weight of the winch does not rest on the free wheel handle or cause damage to the free wheel parts.
4. Remove the four capscrews which connect the air motor to the end bracket and remove the motor. Set the motor to one side for further disassembly if needed.
5. Remove the coupling sleeve (26), retainer ring (28), brake disc (27) and cylinder piston (25).
6. Remove the nuts (3) and lockwasher (4) securing the front end cover (35). Lift off the front end cover.
7. Remove the reduction gear assembly and set to one side for further disassembly if needed.
8. Remove the spacer (6).
9. Separate the drum (46) from the rear end cover (47).
10. Remove drum bearing (1) and drum bushings (17) if they are to be replaced.
11. Remove the clutch (51).
    - 11.1 Unscrew the handle (56) and pull the plunger (52) to remove axle (57), clutch (51) and the spring (60).
    - 11.2 If necessary remove retainer rings (53, 54) to clutch (51) and remove bearing (61) from axle (57).
    - 11.3 Remove screws (58), plunger body (55) and the plunger (52).
12. Remove spacers (5), nuts (3) and washers (4) from rear end cover.

Drum Bushings

Inspect drum bushings for wear. If thickness is less than .040 in. (1 mm) replace drum bushings.

NOTICE

• Original thickness of drum bushings is .060 in. (1.5 mm)

Reduction Gear Assembly

Disassembly

1. Stand the reduction gear assembly in a vertical position so the output shaft is down.
2. Remove the capscrews (37)
3. Remove the front end-cover (35) and 'O'ring (31)
4. Carefully pour the reduction gear assembly oil into a suitable container.
5. Remove the drum shaft (34) from the gear housing by tapping gently a soft hammer on the shaft spindle (42).
6. If necessary remove bearing (19), oil seal (36) and fixed annular gear (15) from the drum shaft (34)
7. Remove the retainer ring (48)
8. Remove satellites support output annular gear end shaft spindle assembly, by tapping gently with a soft hammer on the output shaft (45).
9. Remove bearings (9, 12) and oil seal (8) from gear housing (10).
10. Remove the retainer rings (21, 38), the shaft spindle (42) and bearing (20)
11. Push out satellite axles (39) and remove satellites (40), bearings (43) and spacers (41).
12. Remove the retainer ring (13).
13. Remove the bearing (12) and output annular gear (11).

Cleaning, Inspection and Repair

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

Cleaning

⚠ CAUTION

• A bearing that appears loose or rotates roughly must be replaced. Failure to observe this precaution will result in bearing and/or winch component damage.

Clean all winch component parts in solvent (except for the brake friction disc). The use of a stiff bristle brush will facilitate the removal of accumulated dirt and sediments in the drum and reduction assembly. If drum bushings have been removed it may be necessary to carefully scrape old Loctite® from the drum bushing bore. Dry each part using low pressure, filtered compressed air. Clean the brake friction disc using a wire brush or emery cloth. Do not wash the brake friction disc in liquid. If the brake friction discs are oil soaked, they 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 all bearings for play, distorded races, pitting and roller or ball wear or damage. Inspect bearings for freedom of rotation.

4. Inspect shafts for ridges caused by wear. If ridges caused by wear are apparent on shafts, replace the shaft. Inspect all surfaces on which oil seal lips seat. These surfaces must be very smooth to prevent damage to the seal lip.
5. Inspect all threaded items and replace those having damaged threads.
6. Inspect the brake stationary plates and friction disc for oil. If the friction discs have become oil-soaked, replace them. If the stationary plates have become glazed, sand them lightly using fine emery cloth and a flat surface as backing. Inspect the remaining brake parts for warpage or other damage, and replace damaged parts as necessary. Replace the input pinion shaft oil seal.

Measure the thickness of the brake friction disc. The brake friction disc must show an even wear pattern. If the brake friction disc is 0.01 in. (2,5 mm) or less, replace the disc.

Inspect drum bushings (47) for wear, if thickness is less than 0.039 in. (1 mm), replace drum bushings.

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. Do not use steel wool.

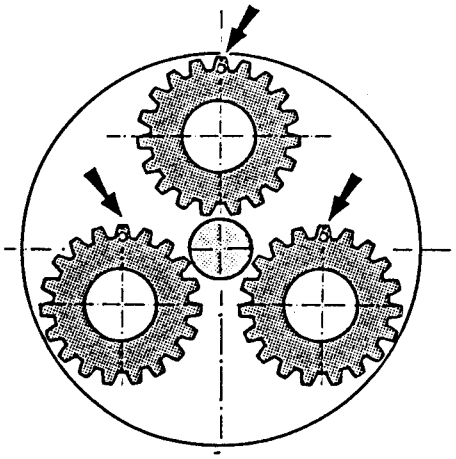
1. Worn or damaged parts must be replaced. Refer to the applicable Parts Listing for specific replacement parts information.
2. Inspect all remaining parts for evidence of damage. Replace or repair any part which is in questionable condition. The cost of the part is often minor in comparison with the 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.
7. Replace all gaskets, oil seals, and 'O' rings any time the winch is disassembled for repair.

Winch Assembly

Assembly of the gear box is the same as disassembly in opposite order.

⚠ CAUTION

• For assembly of planet gears, each planet gear must be positioned with the timing mark as shown on drawing D6180005



(Dwg. D6180005)

1. After assembly of satellite support (44) with the output annular gear (11) and the shaft spindle (42), check for good indexing of planet gears and repeat the above operation if necessary.
2. Drum bushing assembly :
   2.1 Scrape old Loctite ® from the drum bushing bore and apply a bead of Loctite ® 406 on the smooth face of drum bushings.
   2.2 Install drum bushing in drum bushing bore taking care separate the gaps of the drum bushings to 3.9 ins. (100 mm) do not allow any clearance between drum bushings and drum.
   2.3 Lubricate drum bushings with grease.
   2.4 Install the drum on the gear box assembly.
   2.5 Lift out the drum to check for good positioning of drum bushings.
3. When reassembling the motor on the winch beware of the positionning of the coupling sleeve and the pin (29)
   - position the ring (26) with the pin at the bottom.
   - mount the motor housing assembly without the spring.
   - Remove the motor housing assembly.
   - Put the spring in their housing.
   - Reassemble the motor housing assembly with springs.
   - Check for correct assembly by compressing the springs.

NOTICE

• Periodic lubrication of drum bushings can be done by grease nipple on the front end-cover

Carefully clean disc (49) with petroleum and compressed air.

Fill up the gear box with oil SAE 80W90
kinematic viscosity 145 mm²/s at 40°C (104°F)
capacity of gear box

Control Valve Disassembly (ref. Dwg. D6180006)

1. Remove screws (2) and lock washers (3).
2. Remove the valve assembly from the motor.
3. Tap out the pin (10).
4. Extract the control lever (1).
5. Remove screws (9).
6. Remove stop (11).
7. Remove the spring (6).
8. Pull out the rotary valve (8).

NOTICE

• Localize the mounting position of the rotary valve in the valve housing.

9. Remove 'O' ring (7)

Inspection
Worn or damaged parts must be replaced, polish the edges of rotary valve to remove small nicks if necessary.

Control Valve Assembly
Assembly of control valve is the same as disassembly in opposite order.

NOTICE

• Mounting of rotary valve must be done carefully to avoid damage. Lubricate rotary valve before assembly.

Lubricate spring (6).
Screws (9) must be secured with Loctite ® No. 243.

Air Gear Motor removal (ref. Dwg. D6180007)
1. Stand winch in a vertical position on the rear end-cover.
2. Remove the 4 screws which secure the motor to the mounting flange.
3. Remove motor and control valve assembly.
4. Remove the 4 screws which secure the control valve to the motor and remove the control valve.

Air Gear Motor Disassembly
1. Remove the 'O' rings (11), springs (1) and coupling sleeve (5).
2. Remove the screws (17) and lock washers (16).
3. Remove the motor housing (12).
   3.1 Remove the gaskets (15, 29).
   3.2 Remove 'O'rings (32).
4. Remove screws (30).
5. Remove the motor cover (28). If necessary, remove bearings (22), 'O' rings (11) and pins (27).
6. Remove the motor housing (10) ; remove the distance tube (14), stopper (20), spring (25), rear stops (19) and the 'O' rings (9).
7. Immobilize the motor rotors with an axle between the teeth and remove nuts (6).
8. Remove the motor rotors (13, 26) ; remove the shaft segments (23) and internal ring.
9. Remove the screw (33) and the washer (31).
10. Remove ball bearings (7).

Inspection
• inspect gears and remove nicks or burrs
• inspect and replace bearings if necessary
• inspect motor body and smooth out all nicks or burrs
• inspect the valve and smoth and all nicks or burrs

Air Gear Motor Assembly
Assembly of motor is the same a disassembly in opposite order.

NOTICE

- Before assembly lubricate bearing with grade 2 grease.

- After mounting of ball bearings, the marking of this bearings must appear.

- After assembly of the air motor, it must turn smothly in both direction.

- The screws (30) the nuts (6) must be secured with Loctite ® 243.

Pendant control disassembly
1. Remove the male butt-ends (1) and the ring (9).
2. Remove the retainer ring (2).
3. Put down the rear covers (4) with the 'O' ring (5).
4. Remove the springs (3).
5. Remove the "slide valve assemblies" (6) with the quad ring (8).
6. Remove the springs (7).
7. Remove the valve cone assemblies (10)
8. Remove the screws (12).
9. Take out the axle (11) in order to put down the levers (13).

Pendant control assembly (ref. Dwg. D6310027)
1. Assembly of the pendant control is the same as disassembly in opposite order.
2. Adjustment
   2.1 Connect the inlet of the pendant to 100 psi (7 bar) pressure air supply.
   2.2 Connect a monometer at the outlet of the lever to be adjusted.
   2.3 Put some Loctite ® No. 243 on the adjustment screw.
   2.4 Tighten the adjustment screw to obtain a pressure of 15 psi (1 bar) without actioning the lever.
   2.5 Release the adjustment screw by a half turn (pressure must fall down to zero).

2.6 Push the lever.
Check that pressure reaches 93 ± 7 psi (6.5 ± 0.5 bar).
Check that there is not leak at exhaust.

2.7 Release the lever, exhaust must be made by a rapid pressure reduction.

2.8 Repeat operations "2.6 and 2.7" from 2 to 3 times.

2.9 Disconnect the manometer. Check that there is no leak when the lever is not activated.

2.10 Repeat the operations from 2 to 9 with each lever.

TESTS

Testing

Operational Tests

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

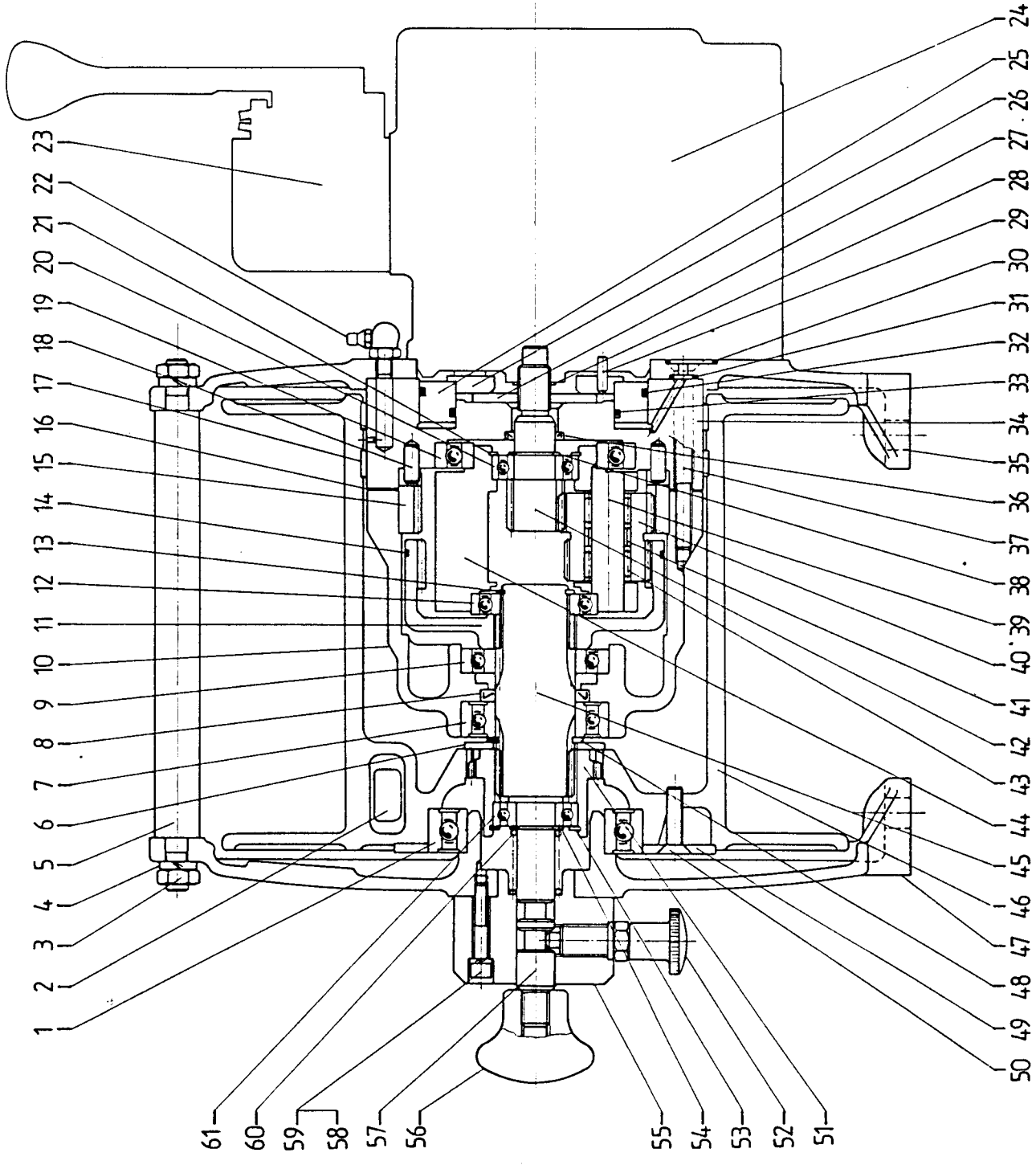
1 - Operate winch in both directions with no load.
2 - Check operation of free wheel and brake.
3 - Check operation of limit switches and other safety devices when provided.
4 - Check all winch mounting bolts are secure.

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 the operation and service of this winch and a written report furnished confirming the rating of the winch. Test loads shall be more than 125 % of the rated line pull.

NOTES

WINCH ASSEMBLY DRAWING



(Dwg. D6180009)

WINCH ASSEMBLY PARTS LIST

ITEM NO.	DESCRIPTION OF PART	TOTAL QTY	PART NO.
1	Bearing	1	5005-0010
2	Wire rope wedge	1	9618-0006
3	Nut	6	4300-0211
4	Split washer	6	4520-0010
5	Tie rod spacer (6-1/8 in. lg drum)	3	9618-0004
	Tie rod Spacer (12-1/4 in. lg drum)	3	9618-0069
6	Spacer	1	9618-0024
7	Bearing	1	5005-0006
8	Oil seal	1	5801-7530
• 9	Bearing	1	5080-0006
10	Gear housing	1	9618-0005
11	Output annular gear	1	9618-0008
12	Bearing	1	5080-0005
13	Retainer ring	1	4780-2139
• 14	'O' ring	1	5821-2629
15	Fixed annular gear	1	9609-0038
• 16	Gasket	1	9618-0042
17	Bushing	2	9618-0058
18	Pin	2	4600-1116
19	Bearing	1	5080-0009
20	Bearing	1	5000-0002
21	Retainer ring	1	4770-3032
22	Grease nipple	1	6710-2227
23	Air control valve	1	
24	Air gear motor	1	
25	Brake piston	1	9609-0113
26	Plate	1	9618-0012
• 27	Brake disc	1	9609-0049
28	Retainer ring	1	4770-0012
29	Pin	1	4640-6118
• 30	'O' ring	1	5821-8129
• 31	'O' ring	1	5821-2529 •
• 32	'O' ring	1	5823-2329
• 33	'O' ring	1	5823-2229
34	Drum shaft	1	9618-0057
35	Front end-cover	1	9618-0002
• 36	Oil seal	1	5801-9830
37	Screw	4	4110-3903
38	Retainer ring	1	4770-0015
39	Satellite axle	3	9609-0039

WINCH ASSEMBLY PARTS LIST

ITEM NO.	DESCRIPTION OF PART	TOTAL QTY	PART NO.
40	Satellite	3	9618-0009
41	Spacer	3	9609-0026
42	Shaft spindle	1	9618-0011
43	Bearing	6	5650-1713
44	Satellite support	1	9618-0041
45	Output shaft	1	9618-0061
46	Drum (6-1/8 in. lg drum)	1	9618-0056
	Drum (12-1/4 in. lg drum)		9618-0071
	Exhaust washer	6	6760-0303
	Ring	6	4780-0639
47	Read end-cover	1	9618-0063
48	Retainer ring	1	4770-0029
49	Disc	1	9618-0064
50	Screw	4	4110-1203
51	Clutch	1	9618-0062
52	Plunger	1	6628-8132
53	Retainer ring	1	4770-3032
54	Retainer ring	1	4770-0014
55	Plunger body	1	9618-0060
56	Handle	1	6956-6232
57	Axle (drum lg 6-1/8 in.)	1	9618-0059
	Axle (drum lg 12-1/4 in.)		9618-0072
	Pin	1	4650-0532
58	Screw	3	4130-7906
59	Lock washer	3	4520-0005
60	Spring	1	6918-8932
61	Bearing	1	5000-0002
62 *	Drum guard (6-1/8 in. lg drum)	1	7618-0057
	Drum guard (12-1/4 in. lg drum)		7618-0059
63 *	Steel lubricator 3/4" BSP	1	7397-1909
64 *	Steel lubricator 3/4" x 1/2" BSP	1	7618-0056
65 *	Steel air filter 3/4" BSP	1	7428-2079
66 *	Steel lubricator 3/4" x 1/2" BSP	1	7618-0055
67 *	Filter - Lubricator (F.L.) 1/2" BSP	1	7999-0065
67 *	Filter - Regulator - Lubrificator (F.R.L.) 1/2" BSP	1	7999-0064
68 *	Galvanised wire rope 6,5 mm Ø Break load 3880 kg - per m.	1	6972-0006
69 *	Galvanised wire rope 10 mm Ø Break load 6700 kg - per m.	1	6973-0010

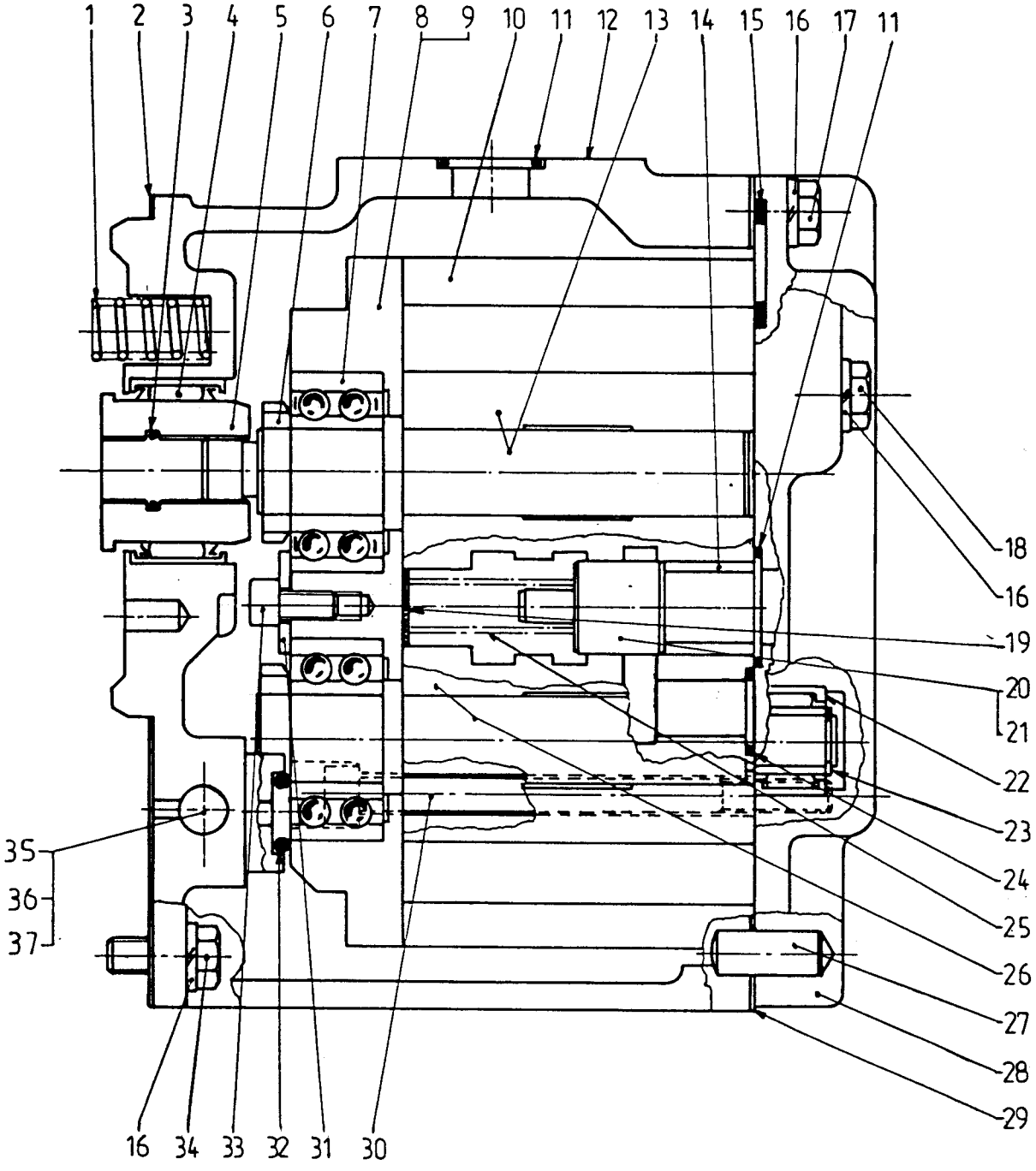
WINCH ASSEMBLY PARTS LIST

ITEM NO.	DESCRIPTION OF PART	TOTAL QTY	PART NO.
70 *	Thimble mount on rope	1	6972-9999
71 *	Safety hook mounted on thimble	1	6612-7832
72	Warning tag	1	7106-0529/C
73	Nameplate	1	7110-6991/A
74	IR logo	1	7110-6322

▪ Recommended Spare

* Optional parts not shown on drawing

LEVER CONTROL AIR GEAR MOTOR ASSEMBLY DRAWING



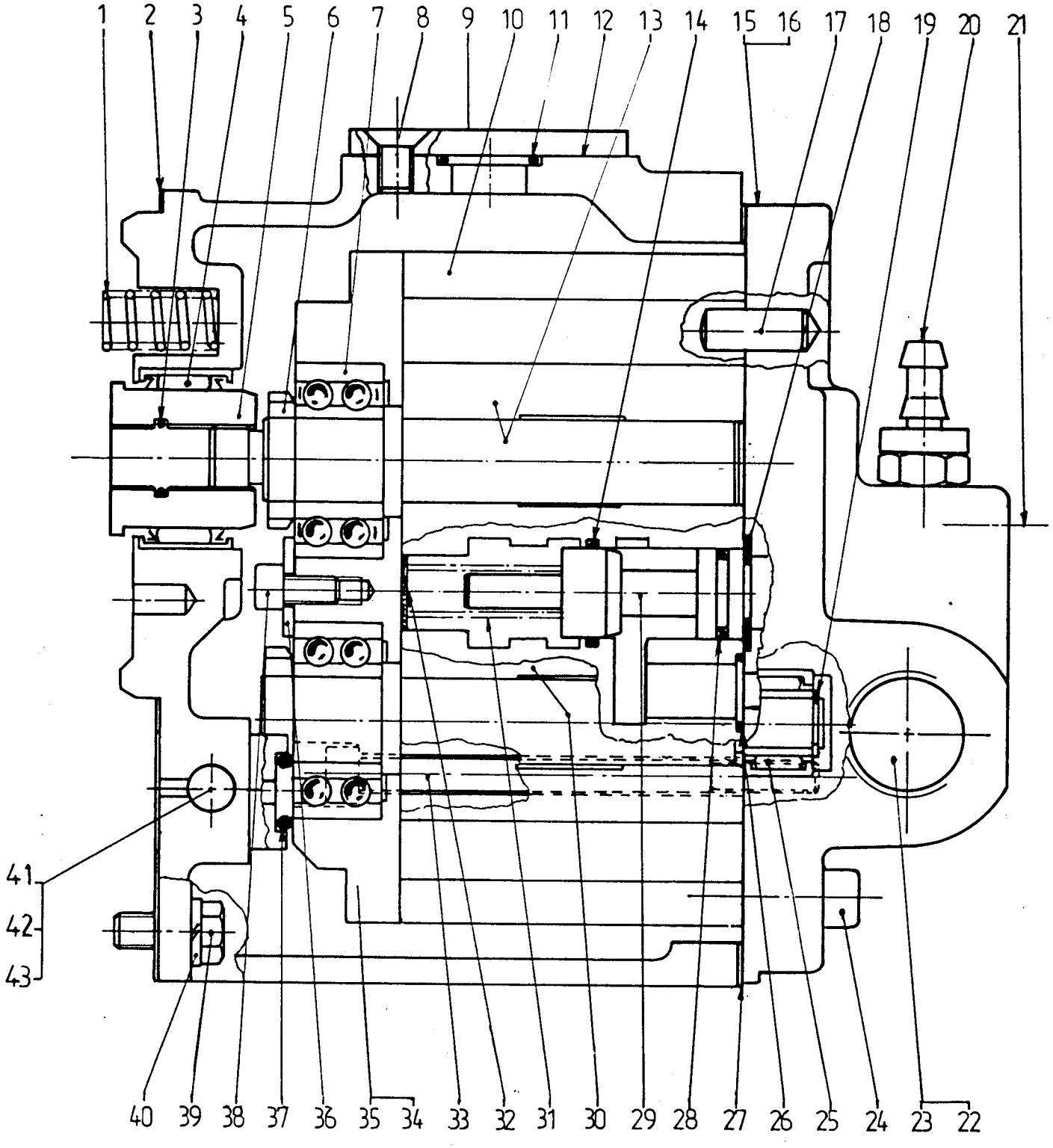
(Dwg. D6180007)

LEVER CONTROL AIR GEAR MOTOR ASSEMBLY PARTS LIST

ITEM NO.	DESCRIPTION OF PART	TOTAL QTY	PART NO.
1	Spring	4	6916-5532
2	Gasket	1	9618-0065
• 3	'O'ring	1	5821-8229
4	Bearing	1	5632-3225
5	Coupling sleeve	1	9618-0014
• 6	Nut	2	5700-0002
7	Bearing	2	5060-0002
8	Motor front plate	1	9609-0008
• 9	'O' ring	2	5822-2329
10	Motor housing	1	9609-0007
• 11	'O' ring	5	5822-0929
12	Motor housing	1	9618-0015
13	Motor rotor assembly	1	9609-0031
14	Spacer	1	9618-0039
• 15	Gasket	2	9618-0030
16	Lock washer	9	4520-0006
17	Screw	3	4100-0101
18	Screw	2	4100-7501
19	Rear stop	1	9412-0030
20	Stopper	1	9618-0038
21	Washer	1	9618-0037
22	Bearing	2	5646-1912
• 23	Shaft segment	2	4780-1339
24	'O' ring	2	5820-5029
25	Spring	1	6914-3932
26	Rotor assembly	1	9609-0030
27	Pin	6	4600-0416
28	Motor cover	1	9618-0029
• 29	Gasket	1	9618-0066
30	Screw	4	4130-0806
31	Swasher	1	9609-0032
• 32	'O' ring	2	5822-4929
33	Screw	1	4130-6706
34	Screw	4	4100-0201
35	Schuttle valve stop	1	9609-0223
36	Ball	1	6940-1625
• 37	'O' ring	1	5821-2229

• Recommended Spare

PENDENT CONTROL AIR GEAR MOTOR ASSEMBLY DRAWING



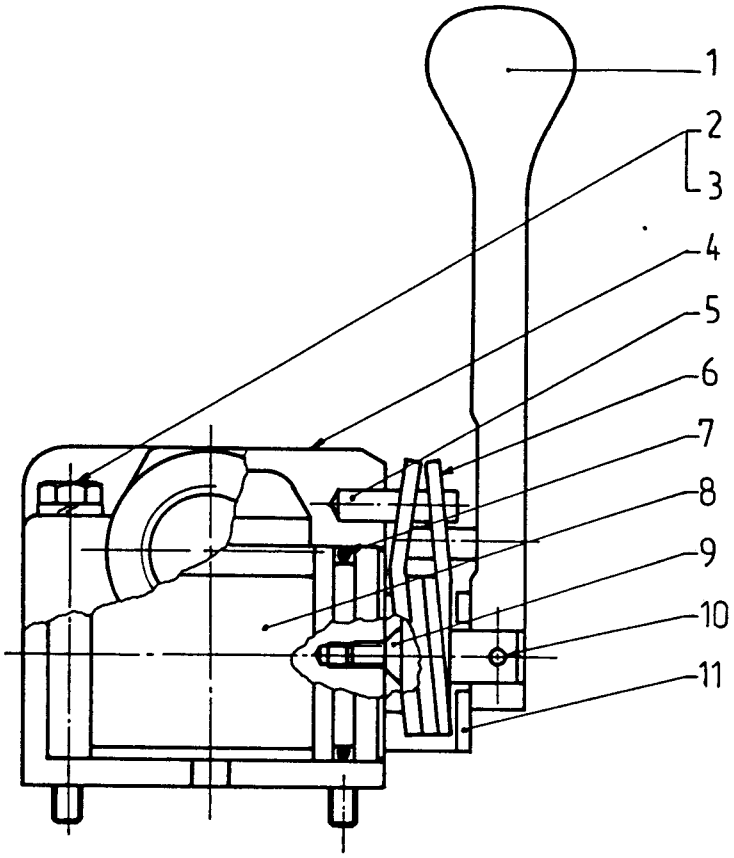
(Dwg. D6180008)

PENDENT CONTROL AIR GEAR MOTOR ASSEMBLY PARTS LIST

ITEM NO.	DESCRIPTION OF PART	TOTAL QTY	PART NO.
1	Spring	4	6916-5532
• 2	Gasket	1	9618-0065
• 3	'O'ring	1	5821-8229
4	Bearing	1	5632-3225
5	Coupling sleeve	1	9618-0014
• 6	Nut	2	5700-0002
7	Bearing	2	5060-0002
8	Screw	4	4110-3603
9	Cover	1	9618-0036
10	Motor housing	1	9609-0007
• 11	'O' ring	3	5822-0929
12	Motor housing	1	9618-0015
13	Motor rotor assembly	1	9609-0031
14	Quadring	2	5823-1229
15	Motor cover	1	9609-0079
16	Screw	2	4200-7407
17	Pin	6	4600-0416
18	Stop	2	9609-0042
• 19	Shaft segment	2	4780-1339
20	Butt-end	3	6165-2632
21	Screw	1	4200-5507
22	Filter	1	6190-9028
23	Retainer ring	1	4770-3018
24	Screw	4	4130-1006
25	Bearing	2	5646-1912
• 26	'O' ring	2	5820-5029
• 27	Gasket	1	9618-0066
28	Quadring	2	5822-8929
29	Slide valve	2	9424-0212
30	Rotor assembly	1	9609-0030
31	Spring	2	9424-0224
32	Rear stop	2	9412-0030
33	Screw	4	4130-0806
34	Motor front plate	1	9609-0008
• 35	'O' ring	2	5822-2329
36	Washer	1	9609-0032
• 37	'O' ring	2	5822-4929
38	Screw	1	4130-6706
39	Screw	4	4100-0201
40	Lock washer	4	4520-0006
41	Schuttle valve stop	1	9609-0223
42	Ball	1	6940-1625
• 43	'O' ring	1	5821-2229

• Recommended Spare

CONTROL VALVE ASSEMBLY DRAWING AND PARTS LIST

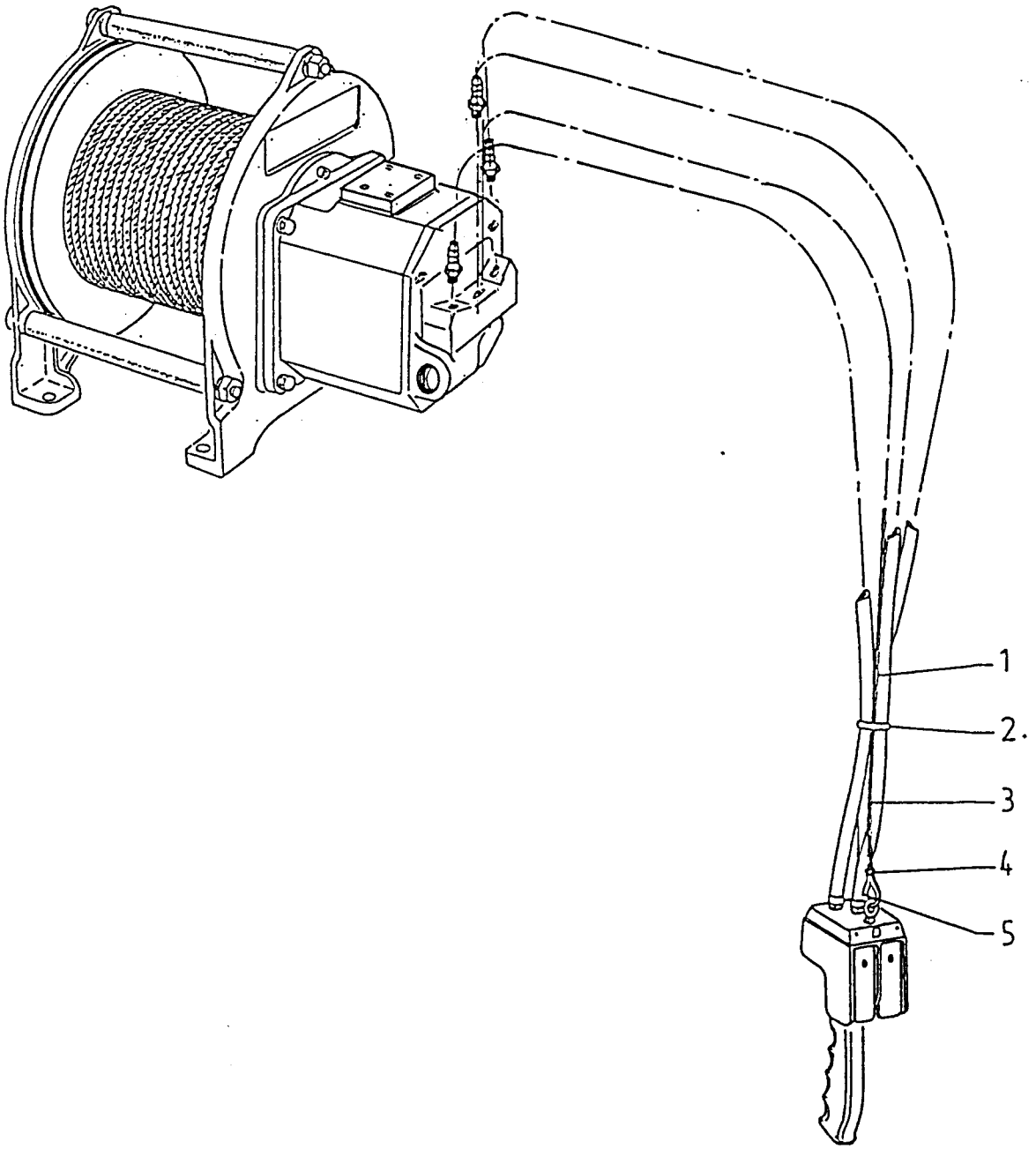


(Dwg. D6180006)

ITEM NO.	DESCRIPTION OF PART	TOTAL QTY	PART NO.
1	Control lever	1	9618-0031
2	Screw	4	4101-6601
3	Lock washer	4	5220-0006
4	Valve housing	1	9618-0032
• 5	Pin	2	4600-1216
• 6	Return Spring	1	9618-0035
7	'O' ring	1	5821-7629
8	Rotary valve	1	9618-0033
9	Screw	2	4110-3403
10	Pin	1	4650-7220
11	Stop	1	9618-0034

• Recommended Spare

OPTIONAL CONTROL ASSEMBLY DRAWING AND PARTS LIST

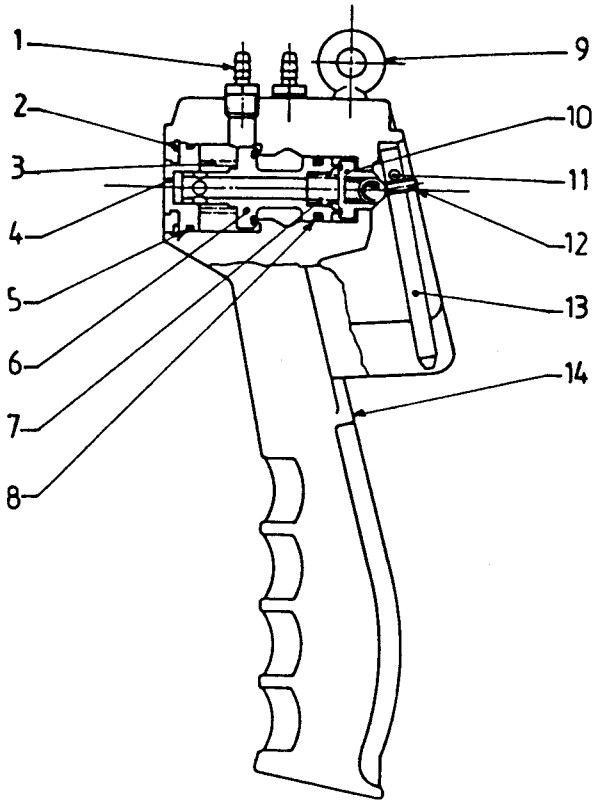


(Dwg. D6180011)

ITEM NO.	DESCRIPTION OF PART	TOTAL QTY	PART NO.
1	Hose	* 1,1	6802-4232
2	Clamp collar	* 1	6112-5132
3	Rope	* 0,35	6972-0004
4	Clamp collar	2	6112-5032
5	Thimble	1	6932-5332

* Quantity to be multiplied by the number of feet of remote control.

PENDENT CONTROL ASSEMBLY DRAWING AND PARTS LIST



(Dwg. D6310027)

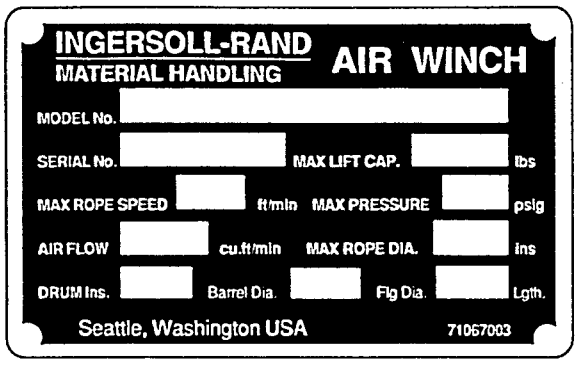
ITEM NO.	DESCRIPTION OF PART	TOTAL QTY	PART NO.
1	Butt-end	3	6165-2632
2	Retainer ring	2	4770-3028
3	Spring	2	6915-8732
4	Rear cover (aluminium version)	2	9579-0037
	Rear cover (bronze version)	2	9579-0053
• 5	'O' ring	2	5820-3729
• 6	Side valve assy (aluminium version)	2	9579-0035
	Side valve assy (bronze version)	2	9579-0051
7	Spring	2	6915-8632
• 8	Quadring	2	5823-0229
9	Ring	1	6422-2332
• 10	Valve cone assembly (aluminium version)	2	9579-0036
	Valve cone assembly (bronze version)	2	9579-0052
11	Axle	1	9579-0040
12	Screw	2	4200-7407
13	Lever	2	9579-0038
14	Valve casing (aluminium version)	1	9579-0034
	Valve casing (bronze version	1	9579-0050

• Recommended Spare

PARTS ORDERING INFORMATION

The use of replacement parts other than INGERSOLL-RAND Matérial Handling will 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 number and serial number as it appears on the nameplate.
2. Part number and part description as shown in this manual.
3. Quantity required.



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

Winch Model Number.....

Winch Serial Number.....

Date Purchased.....

Return Goods Policy
INGERSOLL-RAND will not accept returned goods for warranty or service unless prior arrangements have been provided from the location the goods were purchased.

NOTICE

- **Continuing improvement and advancement of design may cause changes to this winch 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.**

When the life of the winch has expired, it is recommended that the winch be disassembled, degreased and parts separated as to materials so that they may be recycled.
For additional information contact :

Ingersoll-Rand Material Handling
2724 Sixth Avenue South
Seattle, Wa 98124 USA
Phone: (206) 624-0466
Fax: (206) 624-6265
or
Ingersoll-Rand 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

NOTICE

- **Mineral based oils are recyclable, however, some oils such as glycols may be extremely toxic and must be identified and disposed of at an approved waste or disposal site in accordance with all local, state and federal laws and regulations.**

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 misused or abused, improperly maintained by the user, or where the malfunction of 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 and implied warranty lasts so that the above limitations may not apply to you.

This warranty gives you specific legal 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
2724 Sixth Avenue South
Seattle, WA 98124-0046
Phone: (206) 624-0466
Telex: 328795
Fax: (206) 624-6265

Regional Sales Offices

Atlanta, GA
111 Ingersoll-Rand Drive
Chamblee, GA 30341
Phone: (404) 936-6230

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
5533 East Olympic Blvd.
Los Angeles, CA 90022
Phone: (213) 725-2826

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

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

International

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/faxto:

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

Canada
National Sales Office
Regional Warehouse
Toronto, Ontario
51 Worcester Road
Rexdale, Ontario
M9W 4K2
Phone: (416) 675-5611
Fax: (416) 675-6920
Order Desk
Fax: (416) 674-6549

Regional Sales Offices

Calgary, Alberta
333 11th Avenue S.W.
Calgary, Abberta
T2R 0C7
Phone: (403) 261-8652

Edmonton, Alberta
1340 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) 278-2519

Latin America Operations
Ingersoll-Rand Production Equipment Group
730 N.W. 107 Avenue
Suite 300, Miami, FL
33172-3107
Phone: (305) 559-0500
Telex: 441617TLS UI
Fax: (305) 559-7505

Europe, Middle East and Africa
Ingersoll-Rand Equipements de Production S.A.
111, avenue Roger Salengro
59450 Sin le Noble, France
Phone: (33) 27.93.08.08
Fax: (33) 27.93.08.00

Asia - Pacific Operations
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