Form P6777
Edition 1

OPERATION AND MAINTENANCE MANUAL

for

SERIES 2UW WINCHES

WARNING

These Winches are not to be used for lifting or lowering people

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

FOR TOP PERFORMANCE AND MAXIMUM DURABILITY OF PARTS, OPERATE THIS WINCH AT 90 psig (6.2 bar/620 kPa) AIR PRESSURE WITH 3/4" (19 mm) DIAMETER HOSE.

OPERATING PRACTICES

The two most important aspects of Winch operation are: (1) Allow only qualified people to operate a Winch and (2) Subject each Winch to a regular inspection and maintenance procedure.

A qualified operator must be physically competent. He must have no health condition which might affect his ability to react, and he must have good hearing, vision and depth perception. The qualified Winch operator must be carefully instructed in his duties and must understand the operation of the Winch, including a study of the manufacturer's literature. He must thoroughly understand proper methods of hitching loads. He should have a good attitude regarding safety and should refuse to operate under unsafe conditions.

Regular inspection procedures should be set up, rigidly adhered to and recorded by or under direction of a qualified person. On Winches in continuous service, inspection should be made at the beginning of each shift. The items to be checked include, but are not limited to:

a. LUBRICATION: See lubrication instructions on page 2.
b. STOPPING ABILITY: Lift a capacity or near capacity load a few inches off the floor and check ability of the Winch to stop and hold the load without excessive drift.
c. WIRE ROPE AND HOOKS; Visually inspect the wire rope. Replace it **AT ONCE** if there is indication of fraying, or if it is crushed, cut or otherwise damaged. Follow cable manufacturer's recommended practice for proper use and inspection of wire rope.
   Hooks should be checked for wear, increase in throat opening, and bending.
d. CONTROLS: See that controls function properly and return to neutral when released.
e. GENERAL: Check to see that mounting fastenings are secure, unworn and undamaged. Be alert for unusual visual or audible signs which could indicate a defect. Do not operate the Winch until the defect has been determined and corrected.
   Periodically, depending on the severity of the service:

1. Inspect clutch actuating components for wear or damage.
2. Check all bolts or fasteners.
3. Inspect the Winch structure for damage.

Notice: The use of other than genuine Ingersoll-Rand replacement parts may result in decreased Winch performance and increased maintenance, and may invalidate all warranties.

Refer All Communications to the Nearest Ingersoll-Rand Office or Distributor.

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INGERSOLL-RAND®

AIR WINCHES

OPERATING INSTRUCTIONS

1. Read the manufacturer's instructions before operating the Winch.
2. Never lift a load greater than the rated capacity of the Winch.
3. Never use the Winch rope as a sling.
4. Always stand clear of the load.
5. Never use the Winch for lifting or lowering people, and never stand on a suspended load.
6. Never carry loads over people.
7. Before each shift, check the Winch for wear or damage. Check clutch, throttle, etc.
8. Periodically inspect the Winch thoroughly and replace worn or damaged parts.
9. Follow the lubrication instructions.
10. Do not disengage clutch with a load on the Winch. Be sure clutch is fully engaged before operating Winch.
11. Do not "side pull" or "yard".
12. Always rig the Winch properly and carefully.
13. Never operate a Winch with twisted, kinked or damaged wire rope.
14. Be sure cable winds properly on drum.
15. Ease the slack out of the wire rope and sling when starting a lift. Do not jerk the load.
16. Be certain there are no objects in the way of a load or hook when operating the Winch.
17. Be certain the air supply is shut off before performing maintenance work on the Winch.
18. Shut off air supply while Winch is unattended.
19. Properly secure the Winch before leaving it unattended.
20. 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.
21. Do not allow unqualified personnel to operate a Winch.
22. Do not swing a suspended load.
23. Do not operate a Winch if you are not physically fit to do so.
24. Do not do anything you believe may be unsafe.
25. Do not use the Winch rope as a ground for welding. Do not attach a welding electrode to a Winch or sling chain.
26. Do not divert your attention from the load while operating a Winch.
27. Do not leave a load suspended for any extended period–never unattended.
28. Never splice a sling chain by inserting a bolt between links.
29. Do not force a chain or hook into place by hammering. Do not insert the point of the hook into a chain link.
30. Do not expose the sling chain to freezing temperatures, and do not apply sudden loads to a cold chain.

LUBRICATION

Warning: Lubricate the motor and check the fluid level of the Gear Case Assembly (60) before using the Winch. To check the fluid level of the Gear Case, set the Winch on a level surface and remove the Gear Case Pipe Plug (64). The oil should be level with the bottom of the Pipe Plug hole. If it is not, fill the Gear Case to that level with a good quality 90W Worm Gear Oil. **Caution: Do not substitute any other oil.**

Motor Lubrication

The importance of proper lubrication cannot be emphasized too strongly for the 2UW Winch. It is imperative for top performance and maximum durability of components. We recommend the use of an Ingersoll-Rand Lubricator No. NL-12, installed in the air line, as close as possible to the Winch. **Check the oil level of the Lubricator daily and refill as necessary.** A good quality SAE10 or 10W nondetergent motor oil is sufficient for proper lubrication in most temperatures.

Clutch Lubrication

Each time the Gear Case oil level is checked, apply a light coat of SAE10 or 10W non-detergent oil to the Clutch Shaft (48).

INSTALLATION

Mounting

Make certain the Winch is on a suitable supporting structure and that it is properly mounted and secured with four 5/8" Grade 5 Cap Screws or four 16 mm Grade 8.8 Cap Screws. The need for Guards should be determined at the time of installation.

HOSE AND HOSE CONNECTIONS

Use 3/4" (19 mm) I. D. hose with a suitable hose fitting to attach the air supply to the Valve Body Cover (28). The use of smaller hose and fittings will reduce the efficiency of the Winch.

OPERATION

1. The user must see that the proper size cable is kept in satisfactory condition. The cable must be anchored to the Rope Drum (70) by inserting the cable end into the hole in the Drum and securely tightening the two Rope Drum Setscrews (71). In use, no less than two full wraps of cable must remain on the Drum with the cable fully let out.
2. To operate the Throttle Lever (32), lift the Throttle Lever Lock (36) and move the Lever as described below. **Reset the Throttle Lever Lock immediately after each use.** This Winch is designed for either overwinding or underwinding use and the Throttle Lever operates as follows:
   For overwinding winches and with the operator's right hand on the Throttle Lever and the operator facing the Winch, the cable will **unwind** when the Throttle Lever is **pushed away** from the operator and **wind** when the Lever is **pulled toward** the operator.
   For underwinding winches, and with the operator's right hand on the Throttle Lever and the operator facing the Winch, the cable will **unwind** when the Throttle Lever is **pulled toward** the operator and **wind** when the Lever is **pushed away** from the operator.
   Warning: Disconnect the air supply to the Winch whenever the Winch is left unattended.
3. The Clutch **must** be engaged to operate this Winch. **Warning: Never disengage the Clutch when there is a load on the Winch.** The Clutch should only be disengaged if the cable is to be unwound by means other than the Winch motor. After unwinding the cable, immediately re-engage the Clutch.
4. **To disengage the Clutch**, pull the Clutch Handle (49) outward and, when fully extended, rotate the Handle 90° so that the Handle will seat on the raised bosses of the Gear Case Cover (65).
   To re-engage the Clutch, pull the Clutch Handle outward to clear the bosses on the Gear Case Cover. Rotate the Handle 90° and allow the Clutch Handle to move inward until the Clutch Jaw (44) snaps into engagement. Rotate the Rope Drum (70) to check for positive engagement.

DISASSEMBLY

General Instructions

1. Remove any load from the Winch.
2. Shut off the air supply to the Winch and disconnect the air lines.
3. Do not disassemble the Winch any further than necessary to replace or repair damaged parts.
4. Do not remove any part which is a press fit in or on a subassembly unless the removal of that part is necessary for repair or replacement.
5. Whenever 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.
6. Do not disassemble this Winch unless you have a complete set of new gaskets, seals, O-rings and vanes.
7. Do not attempt to wash sealed bearings.

Disassembly of the Drum and Gearing

1. Unwind the rope and remove it from the Rope Drum (70) by loosening the two Rope Drum Setscrews (71).
2. Remove the four Motor Mounting Screws (17) and lift the assembled motor and valve assembly off the Gear Case (60).
3. Remove the Gear Case Pipe Plug (64) and drain the oil from the Gear Case.
4. Remove the Clutch Handle Retaining Ring (50) and slide the Clutch Handle (49) off the Clutch Shaft (48).
5. Remove the eight Gear Case Cover Mounting Screws (68) and Lock Washers (69).
6. Using a small, flat blade screwdriver, pry the Gear Case Cover (65) from the Gear Case. **Note**: Some oil will be in the Gear Case and will spill out when the Cover is removed.
7. Remove the Clutch Shaft Oil Seal (66) from the Gear Case Cover. **Note**: Have a new Seal on hand because the Seal will be damaged during the removal process.
8. While holding the Outer Clutch Spring Cup (51) and Inner Clutch Spring Cup (53) against the pressure of the Clutch Spring (52), remove the four Outer Cup Mounting Screws (54) and Lock Washers (55).
9. Separate the Cups and Spring from the Clutch Jaw Assembly (44).
10. Remove the Clutch Jaw Retaining Ring (45) and slide the Clutch Jaw off the Clutch Shaft.
11. Remove the three Spacer Tube Bolts (82) and remove the three Drum Spacer Tubes (81).
12. Support the gear case end of the Rope Drum (70) to keep it from falling and carefully pull the Gear Case from the Rope Drum.
13. Set the Gear Case upright with the motor end of the Worm (41) upward.
14. Remove the Worm Oil Seal (42). **Note**: Have a new Seal on hand because the Seal will be damaged during the removal process.
15. Using snap ring pliers, remove the Upper Worm Bearing Retaining Ring (40).
16. While rotating the Worm Gear, slowly pull the Worm out of the Gear Case. **Note**: The Lower Worm Bearing (43) must remain in place inside the Gear Case.

Disassembly of the Drum and Gearing (Continued)

17. Lay the Gear Case down on one end with the Worm Gear (56) upward.
18. Using snap ring pliers, reach through the cast openings in the Worm Gear and remove the Front Bearing Retaining Ring (59).
19. Remove the Worm Gear by lightly tapping the Gear Case on a workbench with the Worm Gear downward.
20. Using snap ring pliers, remove the Rear Bearing Retaining Ring (58) and pull the Worm Gear Bearing (57) from the hub of the Worm Gear.
21. Remove the Drum Shaft Oil Seal (22) from the Gear Case. **Note**: Have a new Seal on hand because the Seal will be damaged during the removal process.
22. If the Lower Worm Bearing (43) must be replaced, pull it from the Gear Case.
23. Remove the six Front Drum Shaft Mounting Screws (74) and pull the Front Drum Shaft (72) from the Rope Drum.
24. Remove the Drum Shaft Locknut (80) from the Rear Drum Shaft (76).
25. Reaching through the Rope Drum with a 1-1/8" socket on a long extension, unscrew and remove the Rear Drum Shaft.
26. Using snap ring pliers, remove the Bearing Retaining Ring (78) and pull the assembled Shaft and Bearing out of the Rope Drum.
27. If the Rear Drum Shaft Bearing (77) must be replaced, press the Bearing from the Rear Drum Shaft.

Disassembly of the Motor

1. Loosening each Screw a little at a time, remove the four Valve Body Mounting Screws (30) and separate the Throttle Valve Body Assembly (18) from the motor Cylinder Assembly (9). **Note**: When separating the Valve Body from the Cylinder, the Throttle Lever Assembly (32) is free to fall out of position. Do not allow the Lever Assembly to drop and do not lose the two Valve Body Seals (19) located between the Valve Body and Cylinder. Also, the Valve Body Cover Assembly (28) is under pressure from the Valve Springs (24 and 27). Do not allow the Cover to spring off or the Springs to become lost.
2. Using a small screwdriver, remove the Rear Cover Retaining Ring (4) and lift the Rear Cover (2) and Rear Cover Seal (3) out of the Rear End Plate (1).
3. Using snap ring pliers, remove the Front Rotor Bearing Retaining Ring (16) and slide the Front Rotor Bearing (14) and Front Rotor Bearing Wavy Washer (15) off the shaft of the Rotor (7). **Note**: It may be necessary to tap the rotor shaft with a plastic hammer to loosen the Bearing and Thrust Washer.
4. Separate the Front End Plate (12) from the Cylinder being careful not to damage or bend the two End Plate Alignment Pins (10). Check the Front End Plate Seal (13) and, if necessary, replace it.
5. Separate the Cylinder from the Rear End Plate being careful not to damage or bend the two End Plate Alignment Pins. **Note**: The Vanes (11) are under pressure from the three Vane Push Pins (8). Do not allow the Vanes or Push Pins to pop out and become lost when sliding the Cylinder off the Rotor.
6. Remove the Vanes and Push Pins. **Note**: Each of the Push Pins consists of three individual components–a pin holder, a pin and a spring. Be careful not to lose them.
7. Loosen the locking setscrew in the Rear Rotor Bearing Retaining Nut (6) and remove the Nut.
8. Support the Rear End Plate with the Rotor downward on the table of an arbor press and press the Rotor out of the Rear Rotor Bearing (5).

Disassembly of the Control Valve

1. If the motor was not disassembled, perform Step 1 in the section **Disassembly of the Motor.**
2. Remove the Valve Body Mounting Screws (30), Valve Body Cover (28), Valve Body Gasket (29), two Inlet Valve Springs (24) and two Exhaust Valve Springs (27). Remove the Muffler (90) from the Valve Body Cover.
3. From the motor end of the Throttle Valve Body (18), push the two Inlet Valves (21) and two Exhaust Valves (25) out of the Valve Body. **Note**: Each Inlet Valve has two Seals (22 and 23) while each Exhaust Valve has one Seal (26).
4. Replace the Lower Valve Seal (22), Upper Valve Seal (23) and Exhaust Valve Seal (26) if they are nicked or worn.

Cleaning the Parts for Inspection

1. Wipe all grease, dirt, etc. from the sealed bearings. **Do not wash sealed bearings with kerosene or solvent. Washing will dilute and contaminate any sealed-in lifetime lubricant.**
2. Wash all parts except sealed bearings with clean kerosene or a good quality commerical solvent and dry the parts with compressed air.

Inspection of Parts

1. Replace all gaskets and O-rings.
2. Examine all oil seals. If they appear worn or distorted, replace them. **Replace any oil seal that was removed during disassembly of the Winch.**
3. Examine all ball-type bearings. They should run freely without any rough spots or binding. Replace any bearing that gives an indication of wear.
4. Inspect the Vanes (11) for chipping, wear, checks, etc. Make certain the Vanes fit freely in the rotor vane slots. We recommend that a complete set of new Vanes be installed whenever the motor is disassembled.

ASSEMBLY

General Instructions

1. Always press on the inner ring of a ball-type bearing when installing the bearing on a shaft.
2. Always press on the outer ring of a ball-type bearing when pressing the bearing into a bearing recess.
3. Whenever grasping a part in a vise, always use leather-covered or copper-covered vise jaws to protect the surface of the part and prevent distortion. This is particularly true of threaded members and housings.
4. Apply a thin coat of SAE10 or 10W non-detergent oil to all parts, especially the Vanes (11), Rotor (7) and the bore of the Cylinder (9).
5. Apply a thin coat of O-ring lubricant to all O-rings.

Assembly of the Drum and Gearing

1. Press the Rear Drum Shaft Bearing (77) onto the Rear Drum Shaft (76).
2. Install the assembled Shaft and Bearing, threaded end of the Shaft trailing, into the bearing recess at one end of the Rope Drum (70).
3. Secure the Bearing and Shaft by installing the Bearing Retaining Ring (78).
4. Reaching through the Rope Drum with a 1-1/8" socket on a long extension, screw the Rear Drum Shaft into the Rear Drum Support (79). Tighten the Rear Drum Shaft to 60 ft-lb (81 N m) torque.
5. Install the Drum Shaft Locknut (80) and tighten it to 60 ft-lb (81 N m) torque.
6. Install the Front Drum Shaft (72) on the opposite end of the Rope Drum with the hub end out. Secure the Shaft with the six Front Drum Shaft Mounting Screws (74) and Lock Washers (75). Tighten the Mounting Screws to 28 ft-lb (38 N m) torque.
7. If the Lower Worm Bearing (43) was removed, install it in the recess in the Gear Case (60).
8. Press the Drum Shaft Oil Seal (62), lip side in, into the bore in the rope drum end of the Gear Case. Press the Seal in until it is flush with the hub on the rope drum end.
9. Place the Front Bearing Retaining Ring (59) around the hub of the Worm Gear (56).
10. Press the Worm Gear Bearing (57) onto the hub of the Worm Gear until it seats against the shoulder on the hub.
11. Using snap ring pliers, install the Rear Bearing Retaining Ring (58) in the groove on the hub of the Worm Gear.
12. Lay the Gear Case on the table of an arbor press with the large open end up. Carefully insert the Worm Gear, Bearing end first, into the bearing bore in the Gear Case. A light press with the arbor press should seat the Bearing in the bearing bore.
13. Using snap ring pliers, reach through the cast openings in the Worm Gear and install the Front Bearing Retaining Ring in the groove in the gear case bearing bore.
14. Press the Upper Worm Bearing (39) onto the internally splined shaft of the Worm (41).
15. Insert the assembled Worm and Bearing into the worm bore in the Gear Case, carefully aligning the lower bearing diameter of the Worm with the bore of the Lower Worm Bearing and meshing the Worm with the Worm Gear. Push the Worm and Bearing into the Gear Case, allowing the Worm Gear to rotate, until the groove for the Upper Worm Bearing Retaining Ring (40) is exposed. Install the Retaining Ring in the groove.
16. Press the Worm Oil Seal (42), lip end first, into the bore and onto the upper end of the Worm. Be careful not to turn the lip of the Seal inside out. Continue pressing the Seal until the trailing flat end is approximately flush with the upper end of the Worm.
17. Insert the Clutch Shaft (48), small end first, through the Clutch Jaw (44) from the jaw end. Install the Clutch Jaw Retaining Ring (45) in the groove on the Clutch Shaft to retain the Clutch Jaw.
18. Place the Clutch Jaw on the Worm Gear so that the lugs on the Jaw engage the lugs on the Gear.
19. Place the Inner Clutch Spring Cup (53), large end first, over the Clutch Shaft against the Clutch Jaw.
20. Place the Clutch Spring (52) on the Inner Clutch Spring Cup and place the Outer Clutch Spring Cup (51), large end first, on the Clutch Spring.
21. Fasten the Outer Clutch Spring Cup to the Worm Gear with the four Outer Cup Mounting Screws (54) and Lock Washers (55). Tighten the Screws to 80 in-lb (9 N m) torque.

Assembly of the Drum and Gearing (Continued)

22. Position the Gear Case Cover (65) on the table of an arbor press with the counterbored end of the central hole upward. Press the Clutch Shaft Oil Seal (46), lip end up, into the bore until the lip is flush with the bottom face of the counterbore.
23. Install the Gear Case Gasket (63) and Gear Case Cover over the Clutch Shaft and against the Gear Case. Secure the Cover with the eight Gear Case Cover Mounting Screws (68) and Lock Washers (69). Tighten the Screws to 28 ft-lb (38 N m) torque.
24. Install the Clutch Handle (49) on the Clutch Shaft and secure it by installing the Clutch Handle Retaining Ring (50) in the groove on the Clutch Shaft. Pull the Clutch Handle and rotate it 90 degrees to disengage the Clutch Jaw.
25. Set the Gear Case upright on a workbench and carefully assemble it with the Rope Drum and Rear Drum Support. Being careful not to damage any Seals, insert the Front Drum Shaft through the Gear Case and into the central bore of the Worm Gear.
26. Place a Drum Spacer Tube (81) between each set of bosses on the Gear Case and the Rear Drum Shaft Support. Place a Tube Bolt Lock Washer (83) on each Spacer Tube Bolt (82).
27. Insert the Spacer Tube Bolts through the Drum Spacer Tubes and thread them into the Gear Case. Tighten the Bolts to 60 ft-lb (81 N m) torque. **Note**: Make certain the Rope Drum rotates freely.
28. Through the opening for the Gear Case Pipe Plug (64), fill the Gear Case to the bottom edge of the hole with 90W Worm Gear Oil and install the Plug.
29. Install the two Rope Drum Setscrews (71) in the cable retention holes in the Rope Drum.

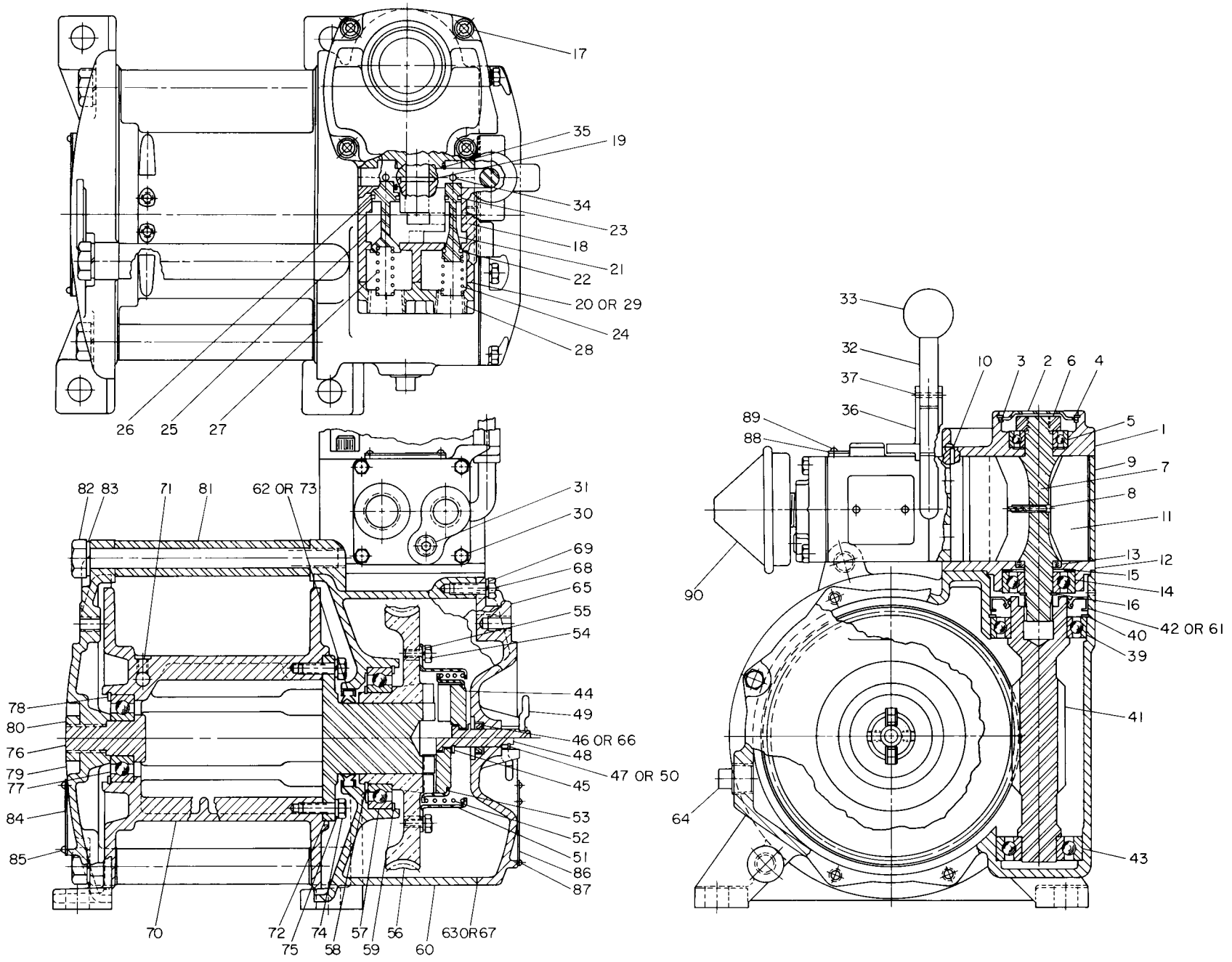
Assembly of the Motor

1. Place the Rotor (7) on the table of an arbor press with the threaded shaft upward. Install the Rear End Plate (1), flat end first, over the threaded shaft against the rotor body.
2. Press the Rear Rotor Bearing onto the shaft and into the bearing recess in the End Plate. Continue pressing the Bearing onto the shaft until the End Plate will not rotate.
3. Remove the assembly from the press and grasp the Rotor in copper-covered vise jaws with the End Plate and Bearing upward. Using a plastic hammer, tap the End Plate upward and away from the rotor body until a gap of 0.001" to 0.004" (0.025 to 0.1 mm) exists between the rotor body and End Plate. Check the gap with feeler gauges. Install the Rear Rotor Bearing Retaining Nut (6) on the rotor shaft and tighten it snug against the Bearing. Using a 3 mm hex wrench, tighten the locking setscrew in the Retaining Nut and recheck the gap between the End Plate and rotor body.
4. Remove the assembly from the vise and stand it on a workbench, End Plate downward. Using needle nose pliers, install a Vane Push Pin (8) in each of the three cross-drilled holes in the bottom of the rotor vane slots. **Note**: Each Pin is a three-piece assembly consisting of a pin holder, a pin and a spring.
5. Coat each of the six Vanes (11) with light oil and install them in the rotor vane slots with the tapered sides of the Vanes against the Vane Push Pins.
6. Examine the End Plate Alignment Pins (10) in each end of the Cylinder (9). If the Pins are bent or broken, install new Pins. **Note**: The pin pattern is different on each end of the Cylinder. Make certain the correct end of the Cylinder is aligned with the Rear End Plate.
7. Compressing the springs in the Vane Push Pins far enough to allow the Cylinder to slip over the Vanes, place the Cylinder over the Rotor and onto the Rear End Plate making certain the Alignment Pins align with the holes in the End Plate. Lightly tap the Cylinder onto the End Plate until it seats. Check to make certain the Rotor turns freely.
8. Examine the Front End Plate Seal (13) for wear. If the Seal is worn or damaged, replace it with a new Seal, lip side toward the Rotor.
9. Install the Front End Plate (12), flat side first, over the splined hub of the Rotor making certain the End Plate Alignment Pins in the Cylinder align with the holes in the Front End Plate. Lightly tap the End Plate until it seats against the Cylinder.
10. Drop the Front Rotor Bearing Wavy Washer (15) into the bearing recess in the Front End Plate. Install the Front Rotor Bearing (14) over the splined hub of the Rotor and push it into the bearing recess in the Front End Plate against the Wavy Washer.
11. Compress the Wavy Washer with the Bearing and using snap ring pliers, install the Front Rotor Bearing Retaining Ring (16) in the annular groove on the hub of the Rotor.
12. Invert the assembled motor so that the Rear End Plate is upward. Install the Rear Cover Seal (3) and Rear Cover (2), hub end out, in the large counterbore of the Rear End Plate.
13. Using a small screwdriver, install the Rear Cover Retaining Ring (4) to secure the Rear Cover.
14. Set the motor aside and assemble the Control Valve.

Assembly of the Control Valve

1. If the Throttle Lever Assembly was disassembled, proceed as follows:
   (a) Install the two Throttle Lever Retaining Rings (35) in the annular grooves.
   (b) Press the two Valve Actuator Pins (34) into the Throttle Lever (32) so that an equal length of Pin projects out each side of the Lever.
   (c) Install the open end of the Throttle Lever Detent Spring (Part No. 2UW-978) into the slots in the lower end of the Throttle Lever Lock (36).
   (d) Slide the Lever Lock, spring end first, onto the threaded end of the Throttle Lever.
   (e) Align the slot in the Lever Lock with the small hole through the Lever and press the Throttle Lever Pin (37) through both pieces. Make certain the Pin is flush with the outer surface of the Lock.
   (f) Thread the Throttle Lever Knob (33) onto the Throttle Lever and set the assembly aside.
2. Lubricate and install an Exhaust Valve Seal (26) in the groove of each Exhaust Valve (25).
3. Lubricate and install an Upper Valve Seal (23) and a Lower Valve Seal (22) in their respective grooves on each Inlet Valve (21).
4. Lubricate the four valve bores in the Throttle Valve Body (18) and install the two Exhaust Valves in the two large bores and the two Inlet Valves in the two smaller bores. Push the Valves into the bores until they seat.
5. Lubricate and install the two Valve Body Seals (19) in the counterbores on the face of the Valve Body that contacts the Cylinder (9).
6. Place the assembled motor on a workbench with the mounting surface for the Valve Body upward and the splined end of the rotor shaft toward you.
7. With the Throttle Lever Knob (33) on your right and pointing away from you, lay the assembled Throttle Lever (32) into the half round groove in the Cylinder. Make certain the two Throttle Lever Retaining Rings (35) fit into the clearance grooves in the cylinder body.
8. Align the half round groove in the Valve Body with the Throttle Lever and Cylinder. Being careful not to dislodge the Valve Body Seals, place the Valve Body on the Cylinder making sure the Throttle Lever Retaining Rings enter the clearance grooves in the Valve Body.
9. Place an Exhaust Valve Spring (27) in the counterbore at the end of each Exhaust Valve.
10. Place an Inlet Valve Spring (24) on the hub at the end of each Inlet Valve.
11. Install the Valve Body Gasket (20) on the face of the Valve Body.
12. Insert two Valve Body Mounting Screws (30) into diagonally opposite holes in the Valve Body Cover (28).
13. Align the largest pipe tapped hole in the Cover with the Exhaust Valves.
14. Carefully guide the Mounting Screws through the holes in the Gasket and into the Valve Body while lowering the Valve Body Cover into position on the Valve Springs. Make certain the Springs are seated in their respective counterbores in the Cover.
15. Compress the Cover against the Springs and thread the Mounting Screws into the Cylinder. Install the two remaining Mounting Screws and tighten all four Screws to 12 ft-lb (16 N m) torque. **Note:** Work the Throttle Lever back and forth while checking the Valves for correct operation through the pipe tapped holes.
16. Lubricate the rotor spline with Ingersoll-Rand No. 11 Lubricant and insert the shaft of the Rotor into the splined end of the Worm.
17. Align the motor mounting holes with the threaded holes in the Gear Case and install the four Motor Mounting Screws (17). Tighten the Screws to 20 ft-lb (27 N m) torque.
18. Thread the Muffler (90) into the large exhaust port in the Valve Body Cover.

(Continued on Page 12.)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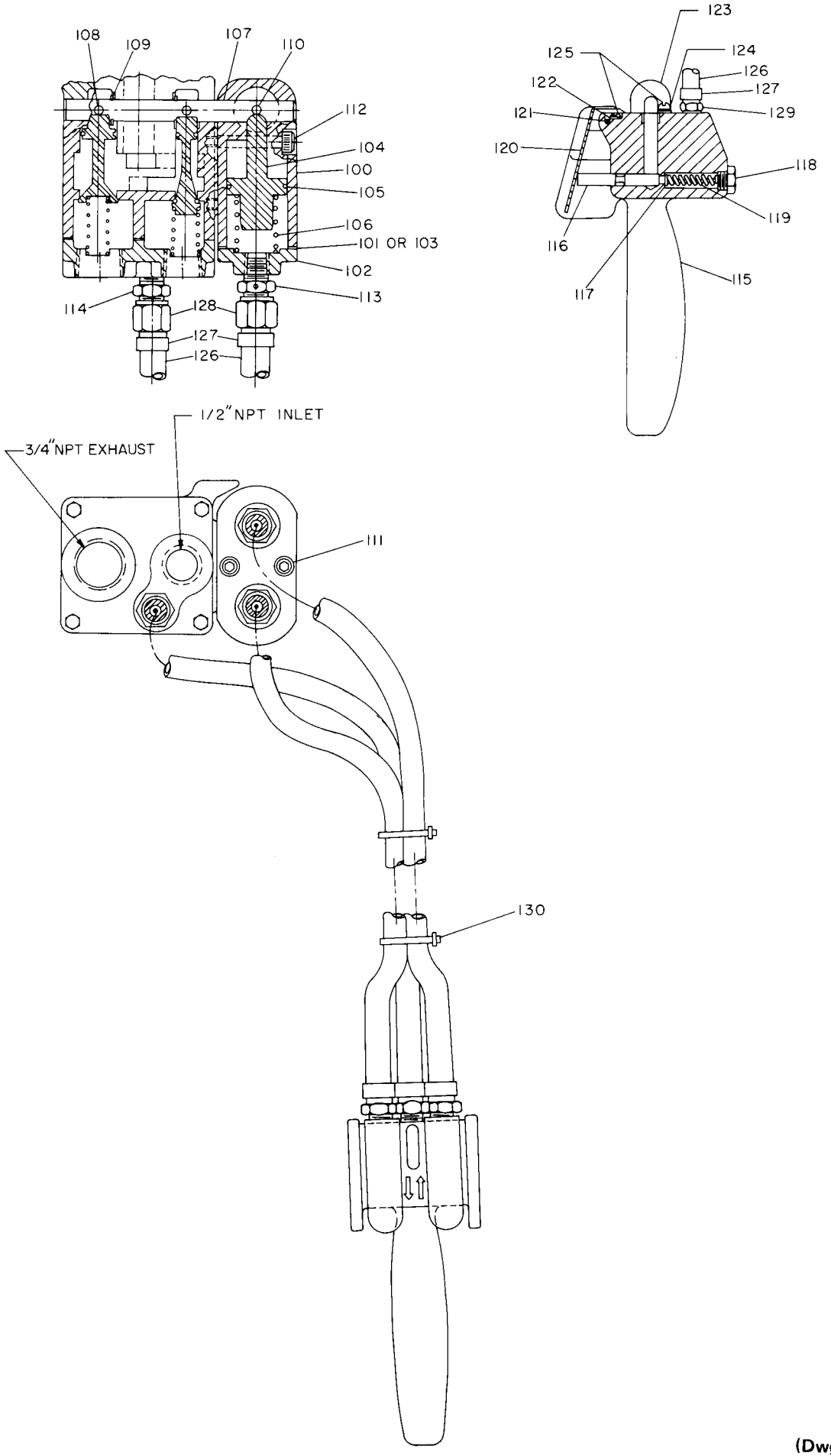
		PART NUMBER FOR ORDERING
1	Rear End Plate	2UW-12
2	Rear Cover Kit	2UW-K64
• 3	Rear Cover Seal	WBT180N-103
4	Rear Cover Retaining Ring	2UW-66
• 5	Rear Rotor Bearing	SS350-24
6	Rear Rotor Bearing Retaining Nut	SS350-65
7	Rotor	2UW-53
• 8	Vane Push Pin Assembly (includes 3 assembled Pins)	2UW-K001
9	Cylinder Kit	2UW-K3
• 10	End Plate Alignment Pin (4)	SS350-98
• 11	Vane Packet (set of 6 Vanes)	2UW-42-6
12	Front End Plate Kit	2UW-K11
• 13	Front End Plate Seal	2UW-14
14	Front Rotor Bearing	AM-318
15	Front Rotor Bearing Wavy Washer	SS350-224
16	Front Rotor Bearing Retaining Ring	2UW-732
17	Motor Mounting Screw (4)	2UW-25
18	Throttle Valve Body Kit	2UW-K245
• 19	Valve Body Seal (2)	AD100-18
• 20	Valve Body Gasket	2UW-252
21	Inlet Valve Kit (2)	2UW-K247
• 22	Lower Valve Seal	2UW-263
• 23	Upper Valve Seal	R000BR-210
24	Inlet Valve Spring (2)	2UW-267
25	Exhaust Valve Kit (2)	2UW-K246
• 26	Exhaust Valve Seal	85H-167
27	Exhaust Valve Spring (2)	2UW-266
28	Valve Body Cover Kit	2UW-K251
• 29	Valve Body Gasket	2UW-252
30	Valve Body Mounting Screw (4)	2UW-240
31	Valve Body Cover Pipe Plug	R0H-377
32	Throttle Lever Kit	2UW-K556
33	Throttle Lever Knob	2UW-558
34	Valve Actuator Pin (2)	2UW-256
35	Throttle Lever Retaining Ring (2)	2UW-257
36	Throttle Lever Lock	2UW-K977
37	Throttle Lever Pin	WWU10-74
*	Throttle Lever Detent Spring	2UW-978
39	Upper Worm Bearing	R4800-97
40	Upper Worm Bearing Retaining Ring	2UW-365
41	Worm Kit	2UW-K364
• 42	Worm Oil Seal	2UW-366
43	Lower Worm Bearing	SS800-24
44	Clutch Jaw Kit	2UW-K568
• 45	Clutch Jaw Retaining Ring	2UW-569
• 46	Clutch Shaft Oil Seal	2UW-856
• 47	Clutch Handle Retaining Ring	2UW-559

		PART NUMBER FOR ORDERING
48	Clutch Shaft	2UW-857
49	Clutch Handle Kit	2UW-K673
• 50	Clutch Handle Retaining Ring	2UW-559
51	Outer Clutch Spring Cup	2UW-963
52	Clutch Spring	2UW-700
53	Inner Clutch Spring Cup	2UW-962
54	Outer Cup Mounting Screw (4)	2UW-964
55	Mounting Screw Lock Washer (4)	2UW-965
56	Worm Gear	2UW-357
57	Worm Gear Bearing	48NB-764
58	Rear Bearing Retaining Ring	2UW-867
59	Front Bearing Retaining Ring	2UW-868
60	Gear Case Kit	2UW-K353
• 61	Worm Oil Seal	2UW-366
• 62	Drum Shaft Oil Seal	2UW-866
• 63	Gear Case Gasket	2UW-931
64	Gear Case Pipe Plug	2UW-354
65	Gear Case Cover Kit	2UW-K352
• 66	Clutch Shaft Oil Seal	2UW-856
• 67	Gear Case Gasket	2UW-931
68	Gear Case Cover Mounting Screw (8)	SS800-744
69	Mounting Screw Lock Washer (8)	2UW-745
70	Rope Drum Kit	2UW-K324
71	Rope Drum Setscrew (2)	2UW-381
72	Front Drum Shaft Kit	2UW-K459
• 73	Drum Shaft Oil Seal	2UW-866
74	Front Drum Shaft Mounting Screw (6)	SS800-744
75	Mounting Screw Lock Washer (6)	2UW-745
76	Rear Drum Shaft	2UW-460
77	Rear Drum Shaft Bearing	SS800-24
78	Bearing Retaining Ring	2UW-663
79	Rear Drum Support	2UW-677
80	Drum Shaft Locknut	2UW-664
81	Drum Spacer Tube (3)	2UW-565
82	Spacer Tube Bolt (3)	2UW-778
83	Tube Bolt Lock Washer (3)	2UW-779
84	Nameplate	2UW-301
85	Nameplate Drive Screw (4)	R4K-302
86	Clutch Tag	2UW-96
87	Clutch Tag Drive Screw (5)	R4K-302
88	Operation Tag	2UW-147
89	Operation Tag Drive Screw (4)	R4K-302
*	Lubricator Tag	TA-W-100
• 90	Muffler	2UW-A674
*	Drum Guard	2UW-298
*	Handle Kit (includes Handle [2], Mounting Bolt [2] and Lock Washer [2])	2UW-K417
*	Air Strainer	EU-A267

* Not illustrated.

• To keep downtime to a minimum, it is desirable to have on hand certain repair parts. We recommend that you stock one (pair or set) of each part indicated by a bullet (•) for every four tools in service.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3/4"NPT EXHAUST
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(Dwg. TPA1121)

		PART NUMBER FOR ORDERING
	Remote Control Kit	2UW-PAK269
	Remote Control Assembly	2UW-A545
100	Remote Control Housing Kit	2UW-K545
• 101	Housing Cover Gasket	2UW-946
102	Housing Cover Kit	2UW-K551
• 103	Housing Cover Gasket	2UW-946
104	Actuator Valve Kit (2)	2UW-K526
• 105	Actuator Valve Seal	SPP101-743
106	Actuator Valve Spring (2)	MLK-250A
107	Throttle Lever Rod Kit	2UW-K529
108	Valve Actuator Pin (2)	2UW-256
109	Throttle Lever Retaining Ring (2)	2UW-257
• 110	Lever Rod Actuator Pin	2UW-530
111	Housing Cover Mounting Screw (2)	2UW-540
112	Control Housing Mounting Screw (2)	2UW-541
113	Pendent Control Hose Adapter (1/4" NPT to 7/16-20 JIC 37° Flare with .042" diameter hole) (2)	2UW-166
114	Pendent Control Hose Adapter (1/4" NPT to 7/16-20 JIC 37° Flare)	2UW-165
	Preassembled Pendent and Hose Kit with 15 feet of Hose	2UW-K112-15
115	Pendent Handle Assembly	MLK-A269A
116	Pendent Throttle Valve (2)	MLK-K264A
• 117	Throttle Valve Face	R000BR1C-283
118	Pendent Throttle Valve Cap (2)	MLK-K266A
• *	Valve Cap Gasket	MLK-504
• 119	Pendent Throttle Valve Spring	MLK-51A
120	Pendent Throttle Lever (2)	MLK-273
121	Throttle Lever Pin	DLC-120
122	Pin Lock Washer (2)	D02-138
123	Strain Relief Support	MLK-450
124	Relief Support Lock Washer (2)	H54U-352
125	Handle Screw (4)	HRE20A-68
126	Control Hose (3)	H3A-15 1/2
127	Hose Clamp (6)	CA110-476A
128	7/16 x 3/16 Barbed Female Swivel Fitting (3)	MLK-162
129	1/8 NPT x 3/16 Barbed Straight Fitting (3)	MLK-170
130	Hose Tie (5)	HRE20A-283

* Not illustrated.

• To keep downtime to a minimum, it is desirable to have on hand certain repair parts. We recommend that you stock one (pair or set) of each part indicated by a bullet (•) for every four tools in service.

CONVERTING FROM MANUAL CONTROL TO REMOTE CONTROL

To convert a manually controlled 2UW Winch to remote control, proceed as follows:

1. Remove any load from the Winch.
2. Shut off the air supply and disconnect the air supply lines.
3. Remove the four Motor Mounting Screws (17) and lift the assembled motor and valve assembly off the Gear Case (60).
4. Loosening each Screw a little at a time, remove the four Valve Body Mounting Screws (30) and separate the Throttle Valve Body (18) from the Cylinder (9). **Note**: When separating the Valve Body from the Cylinder, the Throttle Lever Assembly (32) is free to fall out of position. Do not allow the Lever Assembly to drop and do not lose the two Valve Body Seals (19) located between the Valve Body and Cylinder. Also, the Valve Body Cover is under pressure from the Valve Springs (24 and 27). Do not allow the Cover to spring off or the Springs to become lost.
5. Remove the Throttle Lever Assembly.
6. Install the two Throttle Lever Retaining Rings (109) in the annular grooves between the Actuator Pin holes.
7. Press the two Valve Actuator Pins (108) into the holes near the grooves in the Throttle Lever Rod (107). **Note**: Make certain an equal length of Pin projects out each side of the Rod.
8. Place the assembled motor on a workbench with the mounting surface for the Valve Body upward and the splined end of the rotor shaft toward you.
9. With the hole for the Lever Rod Actuator Pin (110) toward your right hand, lay the assembled Throttle Lever Rod into the half round groove in the Cylinder. Make certain the two Retaining Rings fit into the clearance grooves in the cylinder body.
10. Align the half round groove in the Valve Body with the Throttle Lever Rod and Cylinder. Being careful not to dislodge the Valve Body Seals (19), place the Valve Body on the Cylinder making sure the Throttle Lever Retaining Rings enter the clearance grooves in the Valve Body.
11. Place an Exhaust Valve Spring (27) in the counterbore at the end of each Exhaust Valve (25).
12. Place an Inlet Valve Spring (24) on the hub at the end of each Inlet Valve (21).
13. Install the Valve Body Gasket (20) on the face of the Valve Body.
14. Insert two Valve Body Mounting Screws (30) into diagonally opposite holes in the Valve Body Cover (28).
15. Align the largest pipe tapped hole in the Cover with the Exhaust Valves.
16. Carefully guide the Mounting Screws through the holes in the Gasket and into the Valve Body while lowering the Valve Body Cover into position on the Valve Springs. Make certain the Springs are seated in their respective counterbores in the Cover.
17. Compress the Cover against the Springs and thread the Mounting Screws into the Cylinder. Install the two remaining Mounting Screws and tighten all four Screws to 12 ft-lb (16 N m) torque.
18. Insert a small screwdriver in the hole in the Lever Rod and work the Rod back and forth while checking the Valves for correct operation through the pipe tapped holes.
19. Slide the Remote Control Housing (100) onto the Lever Rod with the counterbores for the Control Housing Mounting Screws (112) away from the Valve Body.
20. Align the Remote Control Housing with the Valve Body and install the two Control Housing Mounting Screws. Tighten the Screws to 16 ft-lb (22 N m) torque.
21. Make certain the Actuator Valves (104) are in the rearmost position against the Springs (106) and working through the hole in the Remote Control Housing, install the Lever Rod Actuator Pin (110) in the Lever Rod. Make certain that an equal length of Pin projects out each side of the Rod.
22. Install the two vented Pendent Control Hose Adapters (113) in the 1/4" NPT holes in the Housing Cover (102) of the remote control unit.
23. Remove the Valve Body Cover Pipe Plug (31) and install the unvented Pendent Control Hose Adapter (114) in its place.
24. Lubricate the rotor spline with Ingersoll-Rand No. 11 Lubricant and insert the shaft of the Rotor into the splined end of the Worm.
25. Align the motor mounting holes with the threaded holes in the Gear Case (60) and install the four Motor Mounting Screws (17). Tighten the Screws to 20 ft-lb (27 N m) torque.
26. Connect the center hose from the Pendent Control to the unvented Control Hose Adapter in the Valve Body Cover (28). Connect the other two hoses from the Pendent Control to the two vented Control Hose Adapters in the remote control Housing Cover. Make certain all connections are tight.
27. Connect the air supply lines and turn on the air supply to the Winch. Carefully check the operation of the Winch by working the Pendent Control several times. Interchange the Pendent Control Hoses at the Remote Control Unit if necessary to obtain the correct movement direction as marked on the Pendent Handle.

TROUBLESHOOTING GUIDE

Trouble	Probable Cause	Solution
Loss of Power	Worn motor parts	Remove and disassemble the motor as described in the section **Disassembly of the Motor.** Examine all parts and replace any that are worn or damaged. Use the following guidelines for determining unserviceable parts: 1. Vanes (11)–Install a new set of Vanes if any Vane is cracked, spalled or worn to the extent that the vane width is 0.67" (17 mm) or less at either end. 2. Rotor Bearings (5 or 14)–Replace the Bearing if any roughness or looseness is apparent. 3. Rotor (7)–Replace the Rotor if the body has deep scoring that cannot be removed by polishing with emery cloth. 4. Cylinder (9)–Replace the Cylinder if there are any cracks or deep scoring. 5. End Plates (1 or 12)–Clean up scoring on the face by rubbing it with emery cloth on a flat surface.
	Inadequate lubrication	Check the Lubricator, inlet hose and fittings to make sure they are airtight and free of leaks. Tighten all joints.
Motor runs but drum does not rotate	Clutch disengaged	Engage the Clutch.
	Worn or broken Worm Gear (56)	Replace the Worm Gear and Worm (41).
	Worn or broken Worm	Replace the Worm and Worm Gear.
Throttle lever moves, but Winch does not operate	Broken Valve Actuator Pins (34)	Replace the Valve Actuator Pins.
	Seized Inlet and/or Exhaust Valves (21 and/or 25)	Disassemble the Throttle Valve Body (18) and clean or replace the Valves.
	Broken motor parts	Disassemble and clean the motor and replace any broken parts.
	Inadequate air pressure	Increase the air pressure to provide 90 psig (6.2 bar/620 kPa) air pressure to the Winch.