Form P6541
Edition 2
March, 1982

OPERATION AND MAINTENANCE MANUAL
for
SERIES 25UWB114 WINCHES

WARNING

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

Always operate 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 2" (51 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 pages 3 and 4.
b. BRAKES: Visually check for proper adjustment. Lift a capacity or near capacity load a few inches off the floor and check ability of braking system to stop and hold the load without excessive drift. Rotate the Brake Adjusting Screw (133) counterclockwise when facing the Brake Handle (136) to tighten the Brake.
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:

a. Inspect Brake and Locking Dog components for wear or damage.
b. Check all bolts or fasteners.
c. 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, at the Company's option, invalidate all warranties.

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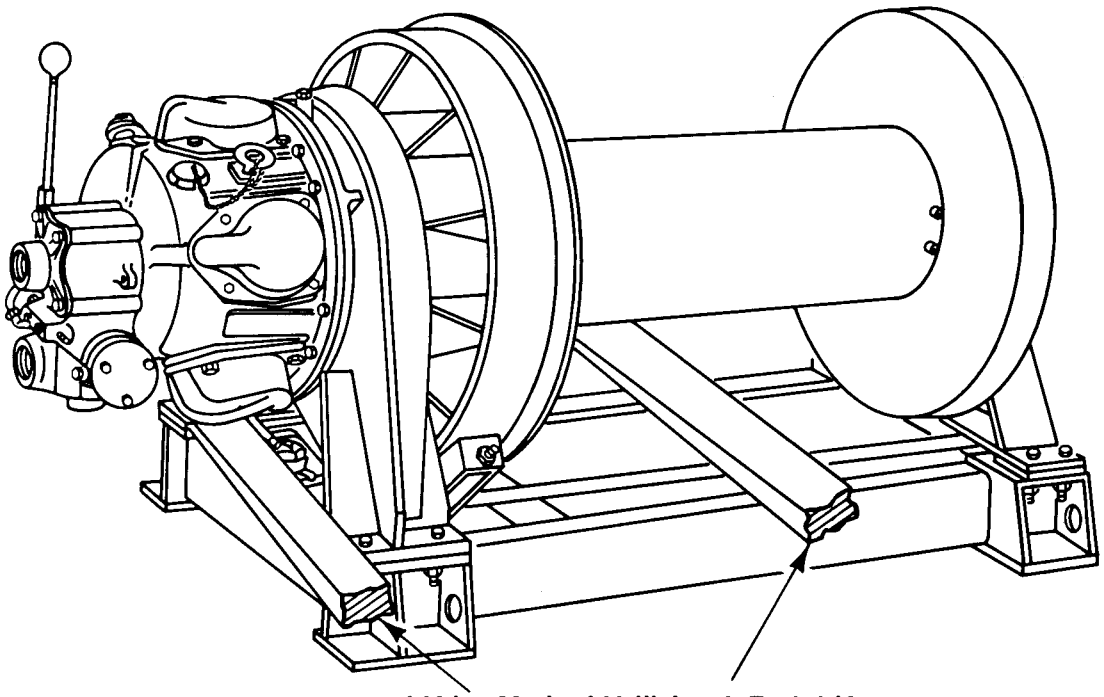
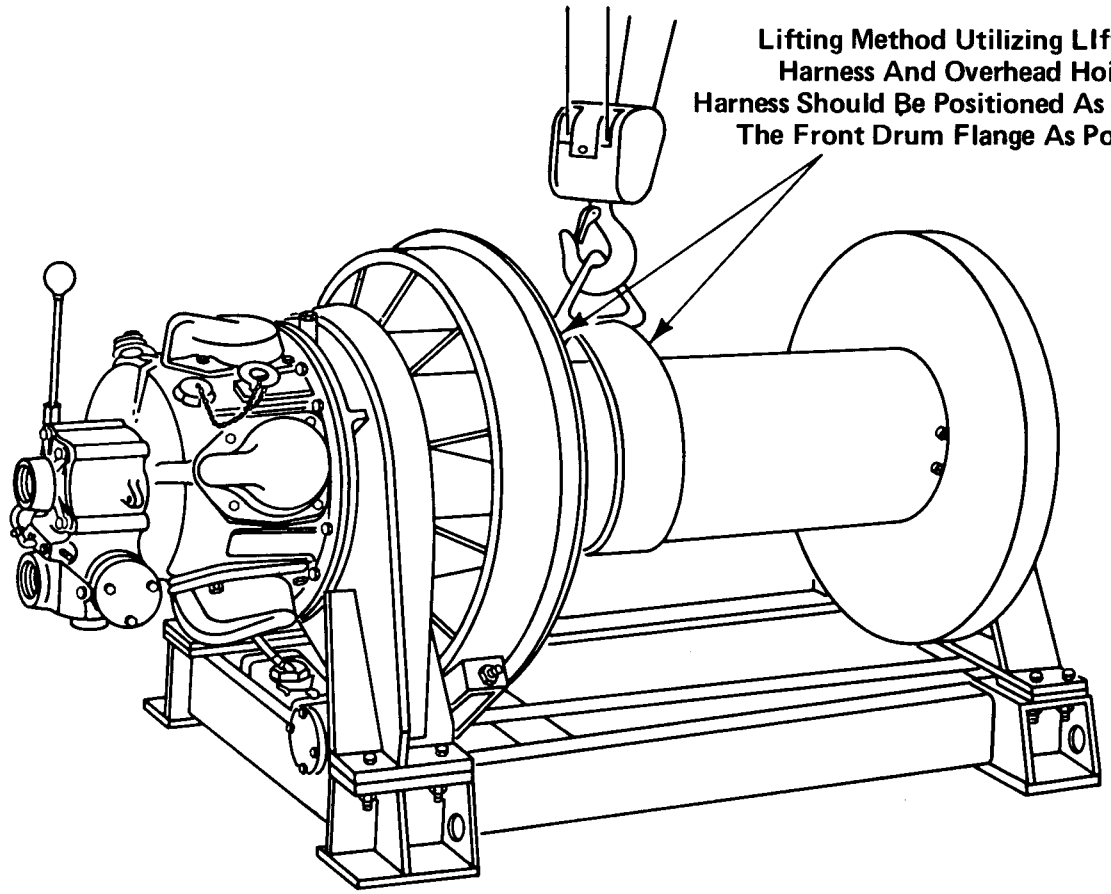
AIR WINCHES



Lifting Method Utilizing A Fork Lift
With One Fork Beneath Winch Drum
And The Other Beneath The Motor



Lifting Method Utilizing LIfting
Harness And Overhead Hoist
Harness Should Be Positioned As Close To
The Front Drum Flange As Possible

(Dwg. TPC442)

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 brakes, locking dog, 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. Engage locking dog before leaving load suspended.
28. Do not engage locking dog while drum is in operation.
29. Do not leave a load suspended for any extended period—never unattended.
30. Never splice a sling chain by inserting a bolt between links.
31. Do not force a chain or hook into place by hammering. Do not insert the point of the hook into a chain link.
32. Do not expose the sling chain to freezing temperatures, and do not apply sudden loads to a cold chain.

LUBRICATION

Warning: Lubricate the motor before using the Winch and check gear case oil level. To avoid leakage during shipment, the oil was drained from the motor. A quantity of oil sufficient for one filling is contained in the can packed with the Winch. Before using the Winch, make certain the Drain Plug (3) is securely threaded into place. Unscrew the Vent Cap (4) and pour the entire contents of the can (1-1/2 quarts) into the opening in the top of the Motor Case (1). The Oil Level Plug (2) may be removed to check the oil level and then reinstalled.

Motor Lubrication

Check oil daily and maintain the level with the 1/8" pipe plug opening in the side of the Motor Case.

When the Winch is subjected to temperatures above freezing:

After the Winch has been idle for several hours of overnight, loosen the Drain Plug (2) and allow the accumulated water to drain. After draining the water, tighten the Plug and remove the Oil Level Plug from the side of the Motor Case. Unscrew the Vent Cap (4) and pour a sufficient quantity of the recommended oil through the opening to bring the oil level up to the side opening.

When the Winch is subjected to freezing temperatures:

Allow the Winch to remain idle long enough for the water content in the Motor Case (1) to separate from the oil, but not long enough for it to freeze. Drain the water and replenish the oil as above. Should this procedure be impractical, drain the entire contents from the Motor Case immediately after operation ceases, and pour the oil back into the Motor Case before resuming operation. If not drained a sufficient quantity of water will eventually accumulate so that the Oil Splasher (46) will freeze fast to the Motor Case.

For a temperature range of 30° F to 80° F (-1° C to 26° C), use Ingersoll-Rand Medium Oil No. 50 or SAE 20 or 20W motor oil.

For temperatures below 30° F (-1° C), use SAE 10 or 10W motor oil.

For temperatures above 80° F (26° C), use SAE 30 motor oil.

Gear Lubrication

Every sixty to ninety days, remove the Plug at the side of the Gear Case (70) and check the oil level. If the level is not visible, add a sufficient amount of the recommended lubricant to the Gear Case to bring the level to the bottom of the plug hole.

For temperatures above 32° F (0° C), use Texaco Meropa [T] * No. 3 (AGMA3EP) or its equivalent.

For temperatures below 32° (0° C), use Texaco Meropa No. 1 (AGMA1EP) or its equivalent.

Brake Lubrication

Warning: Lubricate the brake parts (131, 132, 133 and 134) before operating the Winch. Apply a small amount of 20W to 50W motor oil directly to all working parts. Do not get oil on the brake lining.

Locking Dog

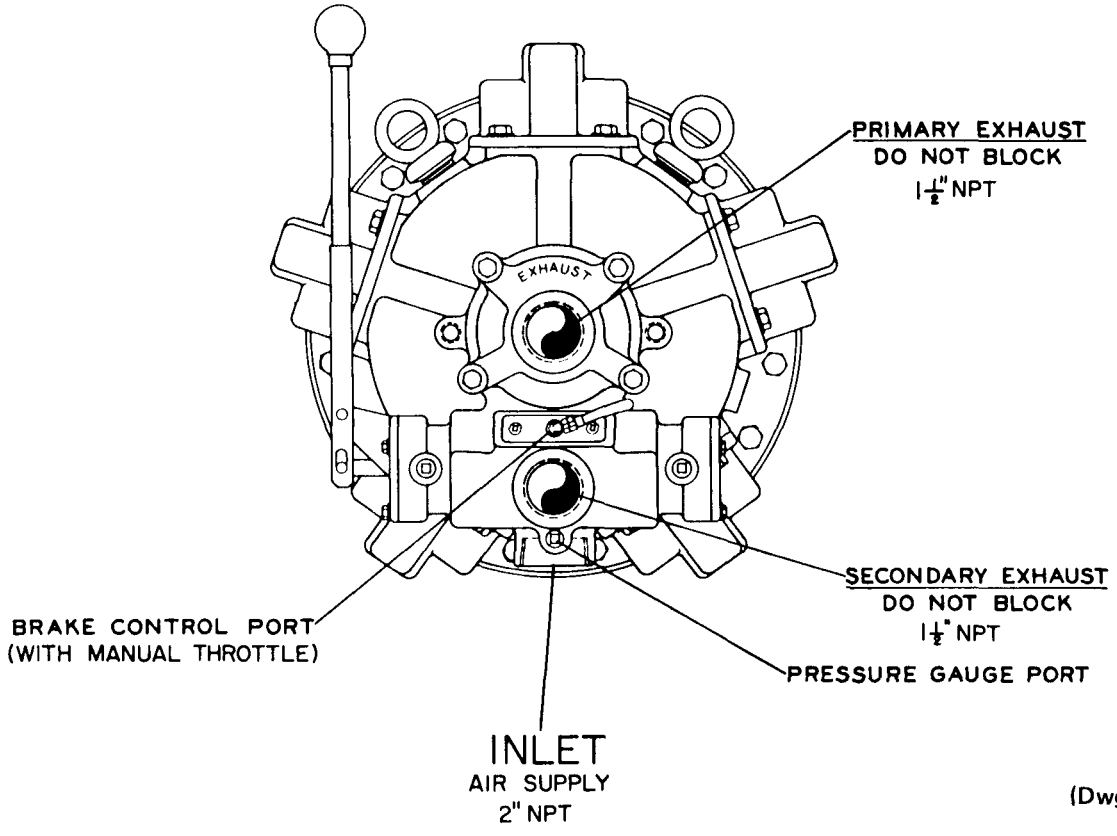
At least once yearly, depending on the environment and duty cycle, lubricate the internal parts and external surface of the Locking Dog (114) with Ingersoll-Rand No. 11 Grease or Tenneco Anderol[T**] 786 to help prevent rust.

INSTALLATION

Mounting

Be sure the Winch is on a suitable supporting structure and is properly mounted with a minimum of ten 3/4 inch Grade 5 cap screws. The need for guards should be determined at the time of installation.

Mount the Winch so the axis of the Rope Drum (101) is horizontal and the Cylinder (57) between the two Vent Caps (4) is at top vertical center.



(Dwg. TPB682)

* Trademark of Texaco, Inc.

** Trademark of Tenneco Chemicals Co.

Hose and Hose Connections

Use a 2" (51 mm) hose with a suitable 2" male hose fitting for attaching the air supply to the Valve Chest. Smaller hose and fittings will reduce the efficiency of the Winch.

Be sure to install a quick operating air shutoff valve close to the Winch to allow the air supply to be interrupted when leaving the Winch unattended.

OPERATION

1. The user must see that the proper size cable is kept in satisfactory condition. The rope may be anchored to the drum by inserting the cable end into the slot in the drum and securely tightening the two setscrews. In use, no less than two full wraps of rope shall remain on the drum with the cable fully let out.
2. The Winch is assembled so that when the rope is wound on the drum as indicated by the nameplate, the controls will operate as stated. The controls will operate differently if other than the standard H5W-526 Rotary Valve is used. The Winch will not operate properly if the cable winding direction is changed.
3. **For overwinding Winches**, with the throttle mounted on the left side when facing the motor end of the Winch, the rope will wind in when the manual throttle lever is pulled toward the operator and unwind when the throttle lever is pushed away from the operator.
   For underwinding Winches, with the throttle mounted on the right side when facing the motor end of the Winch, the rope will unwind when the manual throttle lever is pulled toward the operator and wind in when the throttle lever is pushed away from the operator. The throttle is spring loaded to the center (off) position. **WARNING**: The air supply to the Winch should be turned off when the Winch is left unattended.
4. The manual brake may be applied by pushing down on the lever and released by pulling up. If the brake lever is pushed down to its extreme position, it should lock in that position until pulled back. An automatic brake is available which will release when the motor is operated. The brake must be kept properly adjusted to hold the required load.
5. A Locking Dog is mounted on the end of the Winch opposite the motor. It should be engaged if a load is left suspended. It may be engaged by pulling out on the handle, turning it horizontal and releasing so that the handle slots slide over the locating pins allowing the Locking Dog to engage one of the drum lugs. The Locking Dog may be disengaged by pulling on the handle and turning it vertical. The Locking Dog should not be engaged while the drum is in motion.
6. This Winch is available either with or without a clutch. The clutch must never be disengaged when there is a load on the Winch. It should be disengaged only if the cable is to be unwound by means other than the Winch motor and should then be re-engaged.
7. To disengage the clutch: Pull the lever lock pin out of the hole behind the lever and then pull the clutch lever away from the rope drum. The lever lock pin may be inserted in front of the lever if the lever is to be kept disengaged. To re-engage the clutch, see that the lever lock pin is not inserted in its hole and allow the clutch lever to move toward the drum. It may be necessary to operate the Winch very slowly until the clutch pins find the holes in the ring gear. With the clutch lever fully forward, the lever lock pin should then be reinserted in the hole behind the lever. The clutch pins must be fully engaged before applying the load to the Winch.

MAINTENANCE

Brake Band (130) Replacement

Warning: Remove the load from the Winch and engage the Locking Dog before disassembling the brake. Be certain to shut off the air to the Winch before performing maintenance.

Remove a Brake Band from a manual brake as follows:

1. Release the tension on the brake by lifting the Brake Handle (136).
2. After loosening the Brake Adjusting Screw Jam Nut (137), rotate the Brake Adjusting Screw (133) in a clockwise direction and remove it.
3. Rotate the Brake Handle and assembled clevis far enough to allow it to be removed from the end of the Brake Band. Rotate the Brake Adjusting Block (134) to remove it from the end of the Brake Band.
4. Remove the Anchor Pin Cotter and withdraw the Brake Anchor Pin (131).
5. Remove the Brake Band from the Winch.

Remove a Brake Band from an automatic brake as follows:

1. Remove the Brake Springs (154) from the top of the Automatic Brake Lever (157). **Warning**: Use caution when removing the Springs. Make certain hands are clear of the Spring when its tension is released.
2. Remove the Brake Spring Cotter (156) from the Automatic Brake Lever and remove the upper Brake Spring Pin (155).
3. Remove the Cotter and the Cylinder Clevis Pin.
4. Loosen the Brake Adjusting Screw Jam Nut (137). Remove the Brake Adjusting Screw (133).
5. Rotate the Automatic Brake Lever and assembled Clevis far enough to allow them to be removed from the end of the Brake Band (130). Rotate the Brake Adjusting Block (132) and remove it from the Brake Band.
6. Remove the Brake Band from the Winch.

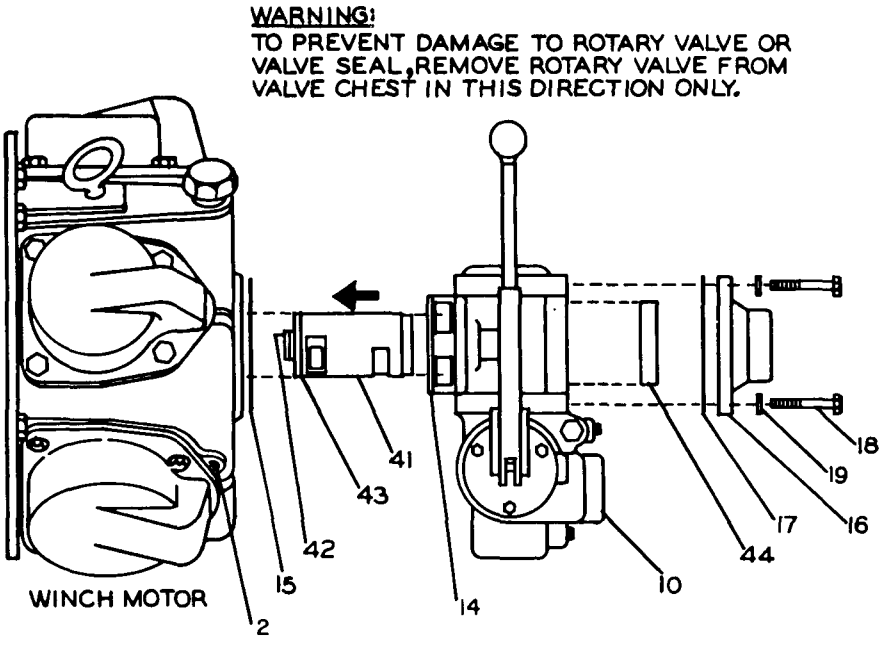
Install a Brake Band (130) for manual brake as follows:

1. Align the brake anchor pin hole in the end of the Brake Band with the hole in the brake anchor and slide a Brake Anchor Pin (131) through the aligned holes. Retain the Anchor Pin with a Brake Anchor Pin Cotter.
2. Insert the Brake Adjusting Block (132) into the brake adjustment end of the Brake Band so the bosses engage the slots and the tapped hole is parallel with the slots.
3. Assemble the Brake Clevis Block (134), Brake Handle Clevises (135) and the Brake Handle (136) or Automatic Brake Lever (157) with the bosses of the Clevis Block engaging the slots in the Handle Clevises.
4. Insert the assembled Handle or Lever into the adjustment end of the second Brake Band so the bosses on the Handle Clevises engage the slots on each side.
5. Thread the Adjusting Screw (133) with the Jam Nut (137) into the Brake Adjusting Block and the Brake Clevis Block at the same time. The left-hand threaded end of the Adjusting Screw engages the Brake Adjusting Block.
6. Adjust the brake tension by rotating the Brake Adjusting Screw.
7. Tighten the Jam Nut (137).

Install a Brake Band (130) for automatic brake as follows:

1. Complete steps 1 through 7 as indicated in installation of Brake Band for manual brake.
2. Install the Cylinder Clevis Pins and Cotters.
3. Install the Brake Spring Pin (155) into the Automatic Brake Lever (157) and retain with two Brake Spring Cotters (156).
4. Install the four Brake Springs (154) making sure they seat into their respective grooves in both the lower and upper Brake Spring Pins.
5. Adjust the brake tension by rotating the Brake Adjusting Screw.
6. Tighten the Jam Nut (137).

Rotary Valve Replacement



(Dwg. TPD665)

The Rotary Valve (41) incorporates a Seal Ring. The Ring may be replaced separately or with the Rotary Valve. (See illustration above.)

Disassembly

1. Loosen and remove the four Valve Chest Cap Screws (18) and Lock Washers (19).
2. Remove the Valve Chest Cover (16) and Valve Chest Cover Gasket (17) allowing the Rotary Valve Bearing (44) and Rotary Valve to remain in the housing.
3. Remove the Valve Chest (10) by pulling it away from the Winch motor. Jack Screws No. HU-932 may be inserted in the two bosses if required.
4. Press the Rotary Valve (41) through and out the crank end of the Valve Chest. (See illustration above.)
   Warning: To prevent damage to the Rotary Valve (41) or Valve Seal (43), remove in the direction of the arrow as shown in the illustration above.

Assembly

1. Install the Rotary Valve Bearing (44) in its groove in the exhaust end of the Valve Chest (10).
2. Set the Valve Chest, motor side up, supporting the Bearing on a solid surface.
3. Using a standard automotive ring compressor around the Rotary Valve Seal (43), press the entire Rotary Valve (41) down the Valve Chest bore until the Rotary Valve seats firmly into the Rotary Valve Bearing (44). Install the Valve Chest Seal (14) and Gasket (15).
4. With the Throttle Lever (33) in a vertical position, align the key and Rotary Valve Pin (42) in the Rotary Valve with their respective slot and hole in the Motor Crank and insert the assembled Valve Chest/Rotary Valve into the Motor Case.
5. Attempt to turn the Rotary Valve at the exhaust end by hand. If this can be done, the key is not engaged in its slot. Remove the Valve Chest/Rotary Valve Assembly and repeat step 4 until the key is engaged.
6. After key engagement, install the Valve Chest Cover Gasket (17) and Valve Chest Cover (16).
7. Install the 3/8" Lock Washers (19) and the Valve Chest Cap Screws (18).

Motor Disassembly

1. Engage the Locking Dog Handle (117), shut off the air and remove all piping and air hoses connected to the motor.
2. Unscrew and remove the Motor Case Drain Plug (3) to drain the oil from the Motor Case (1).
3. Loosen and remove the ten Motor Case Bolts (68) and Lock Washers (69) from the Motor.
4. Remove the Motor Case from the Gear Case.
5. Loosen and remove the Motor Gasket (67) from the Gear Case.
   Note: Any Cylinder and the Piston operating in it can be removed independently of the others. However, all Cylinders and Pistons must be removed before the Crank can be withdrawn.
6. Loosen and remove four Cylinder Bolts (60) and Cylinder Bolt Washers (61) from the Motor.
7. Lift off the Cylinder Head (57), Cylinder Sleeve (58) and Cylinder Gasket (59) from the Motor.
8. Rotate the Crank until the Piston (62) from which the Cylinder Head was removed is at top dead center.
9. Remove the two Snap Rings (65), Wrist Pin (66) and Piston from the Connecting Rod (51).
10. Repeat steps 6 through 9 to remove the remaining Cylinders and Pistons.
11. The Crank Assembly can now be removed by pulling on it with one hand while tapping the face of the Motor Case with a soft hammer.
12. Remove the Valve Chest (10) and Rotary Valve (41) as indicated on page 7.

Crank Disassembly

1. Remove the Crank Lock Pin Cotter (50). Unscrew the Crank Lock Pin Nut (49) and remove the Crank Lock Pin (48) from the Crank.
2. Separate the two sections of the Crank and remove the Connecting Rod Rings (54), Connecting Rods (51), Connecting Rod Bushing (53) and Connecting Rod Sleeve (52).
3. If the Valve End Crank Bearing (55) and Drum End Crank Bearing (56) need to be replaced, use a bearing puller to remove them.

Crank Assembly

Note: The two sections of the Crank are matched before final machining, and the web of each section is stamped with an identification mark. Only sections bearing identical markings can be used together. Therefore, if two or more Cranks are disassembled at one time, check the web of each section before reassembly to make sure that only matched parts are assembled together.

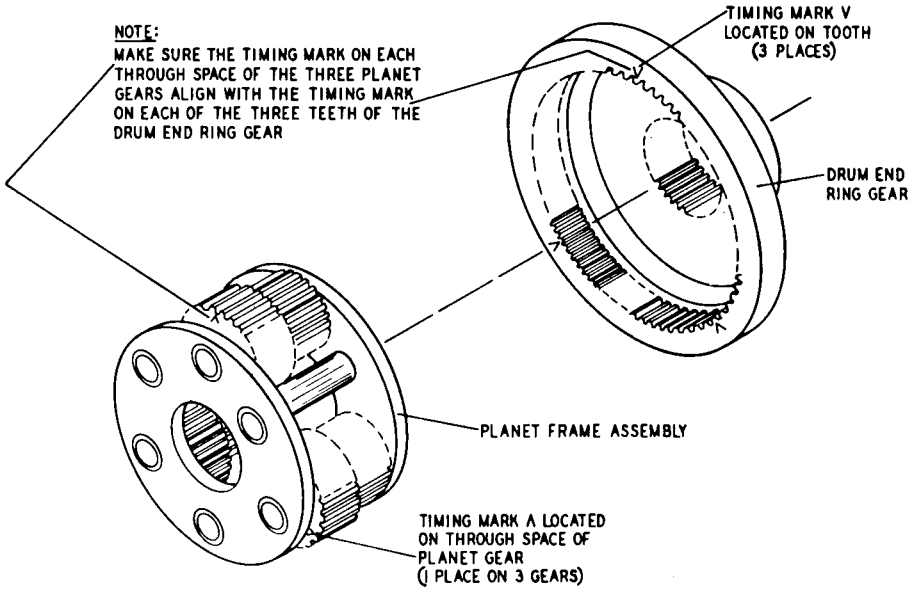
When reassembling, lubricate each part with a light film of oil. See recommended lubrication requirements on pages 3 and 4.

1. Slide the Connecting Rod Sleeve (52), **plain** end first (there is a tang on one end), over the crank pin.
2. Slide the Connecting Rod Bushing (53) over the Connecting Rod Sleeve.
3. Place the Connecting Rod Ring (54), radiused end last, over the Connecting Rod Bushing.
4. Place the Connecting Rods (51) around the Connecting Rod Bushing, entering the foot of each Rod into the space between the Bushing and the Ring. **Note**: Make sure feet face the same direction.
5. Slide the second Connecting Rod Ring, radiused end first, over the feet of the Connecting Rods.
6. Join the two sections of the Crank so that the tang on the Connecting Rod Sleeve enters the slot in the crank web, and the holes for the Crank Lock Pin (48) are aligned.
7. Insert the Crank Lock Pin into the larger end of the tapered hole, apply the Crank Lock Pin Nut (49) and after tightening the nut securely, lock it into position with the Crank Lock Pin Cotter (50).
8. Using a sleeve that contacts only the inner ring of the Valve End Crank Bearing (55), press the bearing onto the short shoulder end of the Crank until it contacts the shoulder. Using a sleeve that contacts only the inner ring of the Drum End Crank Bearing (56), press the bearing onto the long shoulder end of the Crank until it contacts the shoulder.

Motor Assembly

1. Install the Valve Chest and Rotary Valve to the Motor Case. The Valve Chest and Rotary Valve support the Valve End Crank Bearing (55). The Rotary Valve Seal Ring can be installed on the Rotary Valve and the Rotary Valve installed from inside the Motor Case.
2. With the Motor Case (1) supported open end facing up, install the Crank Assembly into the Motor Case. Make sure the tang at the end of the Rotary Valve (41) enters the slot in the end of the Crankshaft and the Rotary Valve Aligning Pin (42) enters the hole in the Crankshaft. Also, make sure the Valve End Crank Bearing (55) seats into the recess of the Valve Chest (10). The face of the Rotary Valve should butt against the face of the Crank.
3. Slide the Oil Regulating Ring (64) over the Piston and position it into the bottom groove of the Piston. Slide the Piston Ring (63) over the Piston and position it into the top groove of the Piston.
   Caution: Make sure the sharp edge of the Oil Regulating Ring is toward the bottom or open end of the Piston. **Do not** spread the rings more than necessary to slip them over the Piston.
4. Install one Wrist Pin Retaining Ring (65) into a wrist pin groove in the Piston.
5. Using the HU-933 Piston Ring Compressor, slide it over the Piston to hold the Oil Regulating Ring compressed into its groove.
6. Start the Cylinder Sleeve (58) down over the Piston and over the top ring. **Note**: The top Piston Ring can be compressed with the fingers to allow it to enter the sleeve. **Do not** slide the sleeve past the wrist pin hole. Slip a Cylinder Gasket (59) over the Piston and against the lower side of the sleeve flange.
7. Rotate the Crankshaft until one of the connecting rods is at top dead center. Place the Piston (62), Cylinder Sleeve, Cylinder Gasket and Ring Compressor over the top of the Connecting Rod (51) so that the Wrist Pin Retaining Ring faces the motor flange. Install the Wrist Pin (66) from the opposite side.
8. Install the second Wrist Pin Retaining Ring. Make sure both Wrist Pin Retaining Rings are seated in their respective grooves.
9. Continue to slide the Cylinder Sleeve downward against the Piston Ring Compressor until the Cylinder Sleeve is fully seated into the Motor Case. **Important**: Rotate the Crank until the Piston is at the bottom of its cycle. The Piston Ring Compressor can now be retrieved through the motor.
10. Install a Cylinder Head (57), four Cylinder Bolts (60) and four Cylinder Bolt Washers (61) (copper washers). Tighten securely.
11. Repeat steps 3 through 10 to install the remaining cylinders.
12. Install the Motor Gasket (67) into the recess of the Gear Case (70).
13. Install the Motor Case onto the Gear Case making sure the motor bolt holes in the Motor Case align with the threaded tapped holes in the Gear Case.
14. Install the ten Lock Washers (69) and Motor Case Bolts (68). Tighten alternately until the Motor Case is securely fastened to the Gear Case.
15. Install the Drain Plug (3). Fill the Motor Case with oil as prescribed under Lubrication on pages 3 and 4.

Planet Gear Frame Assembly

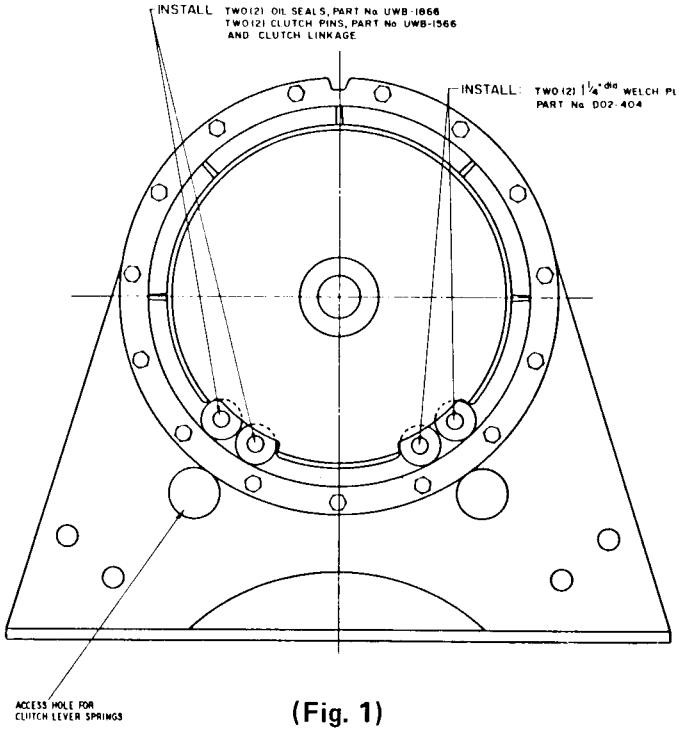


(Dwg. TPC440)

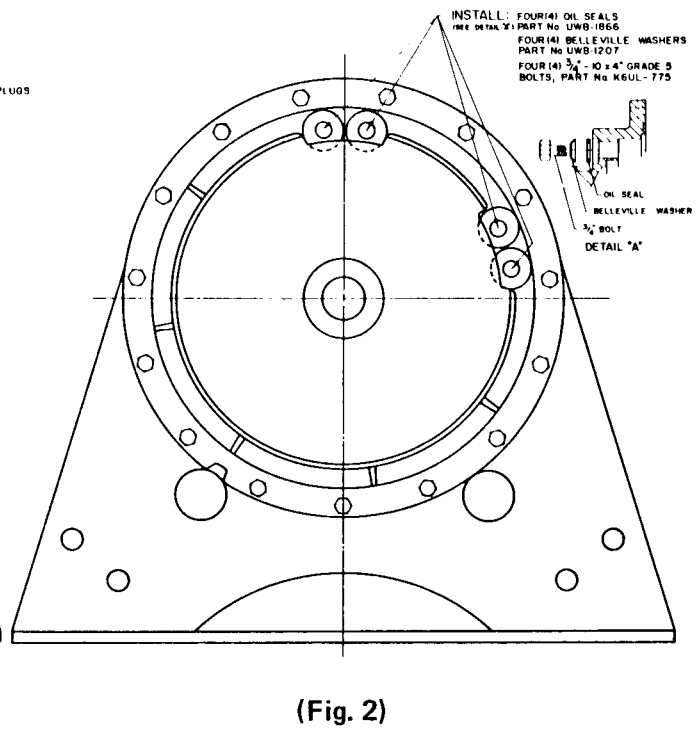
To maintain the proper timing of the gear train when inserting the Planet Gear Frame Assembly (84) into the Drum End Ring Gear (81) of the Winch, proceed as follows:

1. Make sure the Drum O-ring (83) is installed on the rope drum shaft.
2. Inserting the Planet Gear Frame Assembly (84) into the Drum End Ring Gear (81), align the timing mark of the through space on each of the three Planet Gears with the timing mark on each of three locations on the Drum End Ring Gear. (See illustration above.)
3. Install the Motor End Ring Gear (80) over the Planet Gear Frame Assembly making sure the teeth of the Planet Gears and the Motor End Ring Gear mesh properly.
4. Install the Gear Case Cover (89), which includes the Motor Pinion (75) and Gear Case Cover Seal (90), onto the mounted gear frame making sure the motor pinion teeth properly engage the planet gear teeth.

DISENGAGING CLUTCH



(Fig. 1)



(Fig. 2)

(Dwg. TPA814)

WARNING

The Clutch must be fully engaged and the Locking Pin installed when a load is applied to the Winch. The Clutch must be disengaged only when there is no load on the Winch.

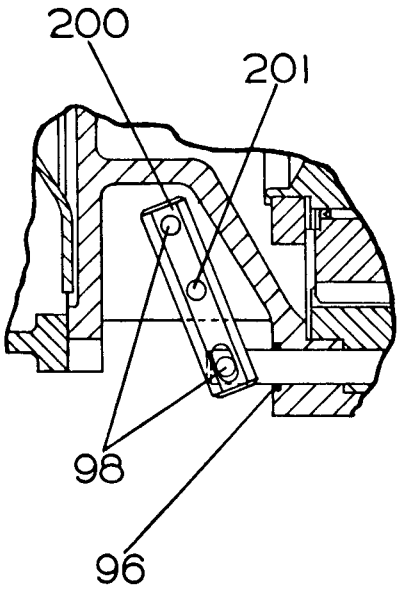
The Clutch and Automatic Brake features must not be combined together on any Winch in hoisting service or subjected to an overhauling load.

Operation of the motor on a Winch equipped with both an Automatic Brake and Clutch when the Clutch is disengaged will allow a suspended load to drop.

To convert from a clutch to a non-clutch or non-clutch to a clutch model Winch, follow the instructions on pages 11 and 12.

CONVERSION FROM CLUTCH TO NON-CLUTCH MODELS

1. Remove the Clutch Lever Self-Locking Pin and Cable.
2. Remove a Spring Pin Cotter and Washer.
3. Using a cotter pin puller, hook the loop of the Clutch Lever Spring (100) and remove the Spring.
   Warning: The Spring is under tension; remove it carefully.
4. Repeat steps 2 and 3 to remove the second Spring.
5. Remove the Lever Spring Pin (99) and the Clutch Lever Pins (98).
6. Remove the Clutch Lever (97).
7. Install the Clutch Lock Pin (200) from the Clutch Kit in place of the Clutch Lever making certain the middle hole of the Clutch Lock Pin will align with the hole in the Clutch Housing.
8. Secure the Clutch Lock Pin with the two Clutch Lever Pins.
9. Insert the headed Pin (201) furnished with the Clutch Kit, into the Clutch Lock Pin and the hole in the Clutch Housing and secure it with the Cotter (D02-524) also furnished with the Clutch Kit.



(Dwg. TPD804)

CONVERSION FROM NON-CLUTCH TO CLUTCH MODELS

1. Unscrew and remove the Drain Plugs (3) and (71). Drain the oil from the Motor Case (1) and Gear Case (70).
2. Remove the ten Motor Bolts (68) and Lock Washers (69) from the Motor Case (1).
3. Remove the Motor Case and set it aside.
4. Remove the four Ring Gear Bolts and four Belleville Washers from the Gear Case Cover (84).
5. Remove the four Oil Seals.
6. If the clutch is to be installed on the same side as the throttle, install two Oil Seals (96) on that side as follows:
   (a) Slip an Oil Seal onto a Clutch Engaging Pin (95). Place a 3/4" flat washer flush against the Oil Seal (opposite the Oil Seal lip) and a 3/4" x 5" (19 mm x 127 mm) pipe nipple against the flat washer.
   (b) Place the Clutch Engaging Pin (Oil Seal end) into one of the ring gear bolt holes in the Gear Case Cover.
   (c) Using a hammer, tap the pipe nipple to seat the Oil Seal.

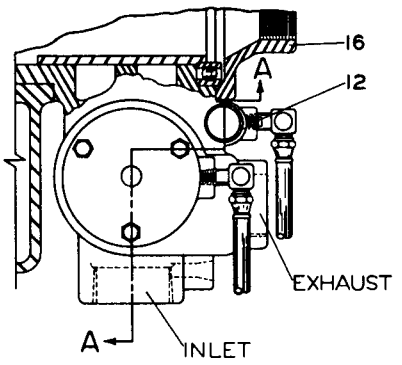
7. Using a 3/4" x 5" (19 mm x 127 mm) pipe nipple and a hammer, seat the two Welch Plugs (convex side out) into the remaining two ring gear bolt holes.
8. Slide a Clutch Engaging Pin into one of the ring gear bolt holes, to maintain alignment of the Motor End Ring Gear (80) and the gear case cover holes. **Note**: Make sure the Clutch Engaging Pin is inserted to a point where it only engages the Motor End Ring Gear (80) but not the tapped hole in the Gear Case.
9. Remove the fifteen Gear Case Cover Bolts (91) and Lock Washers (92).
10. Using a 24" (610 mm) long adjustable wrench to grip one of the ribs of the Gear Case Cover and maintaining force on the end of the Gear Case Cover, rotate the Gear Case Cover as shown in Figure 1 on page 10. **Note**: Make sure the Gear Case Cover Seal (90) stays in its groove. **WARNING**: Make sure the Gear Case Cover is rotated slowly and does not break free of the Gear Case.
11. Check the alignment of the Gear Case Cover, Motor End Ring Gear and Gear Case by sliding the two Clutch Engaging Pins into the gear case holes. If they do not slide in, adjust the Gear Case until alignment is obtained. **Note**: The Clutch Engaging Pins should slide in and out freely.
    Caution: If the Clutch Engaging Pins are pushed in too far, they could drop into the Gear Case (70).
12. Install the fifteen Gear Case Cover Bolts and Lock Washers. Tighten securely.
13. Install the Clutch Lever Springs (100) through the access hole in the frame (see Figure 1 on page 10) and onto the Gear Case Eyebolt (73).
14. Install the Clutch Lever (97) and the two Clutch Lever Pins (98).
15. Attach the Clutch Lever Locking Pin Cable under the Flat Washer and insert the Spring Pin Cotter.
16. Install the Lever Spring Pin (99).
17. Using a cotter pin puller, hook the loop of one of the Clutch Lever Springs and install it on the Lever Spring Pin. Install a 3/8" Flat Washer and Spring Pin Cotter.
18. Repeat step 17 to install the second spring on the opposite side of the Clutch Lever.
19. Install a new Motor Gasket (67) into the recess of the Gear Case Cover; then install the Motor Case onto the Gear Case Cover.
20. Install the ten Motor Case Bolts and Lock Washers into the Gear Case Cover. Tighten securely. Install the Drain Plugs (3) and (71) into the Motor Case and Gear Case. Tighten securely. Add the recommended lubricant (see Lubrication instructions on pages 3 and 4).

MANUAL VALVE CHEST CONVERSION TO REMOTE CONTROL

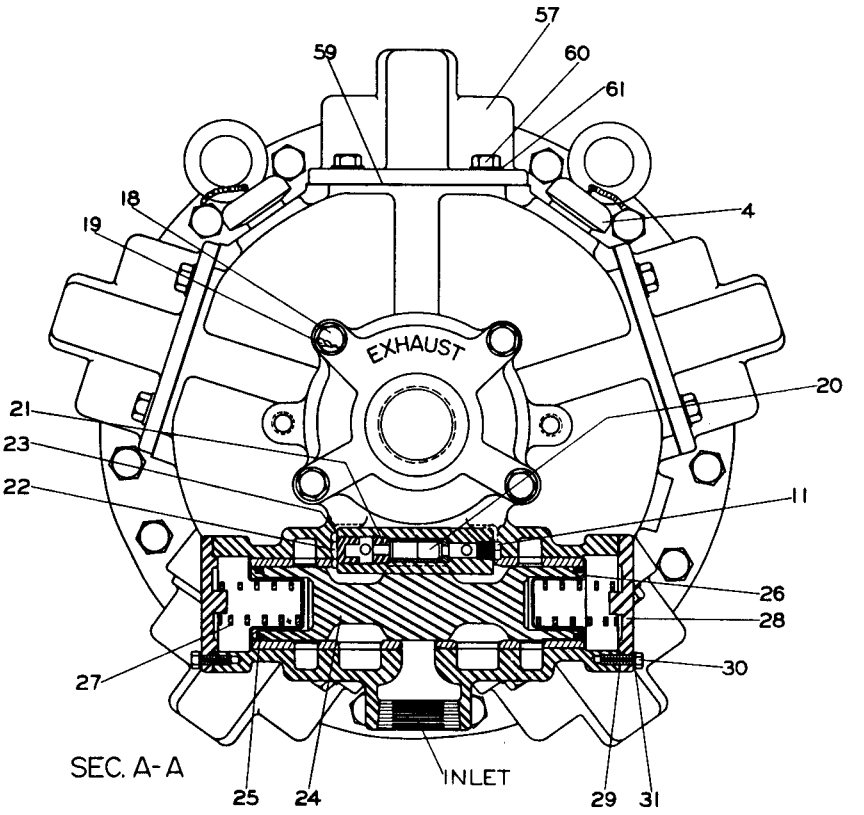
1. Disconnect the air supply to the Winch and disconnect the piping.
2. Remove the Spool Valve Cap (28), all Manual Throttle Parts listed on page 15, the Spool Valve Springs (27), the Spool Valve Spring Cups (26), the Spool Valve (24) and Spool Valve Seals (25).
3. Lubricate the Spool Valve Seals with O-ring lubricant and install them in the annular grooves on the Spool Valve.
4. Install the Spool Valve with the Spool Valve Seals in the Valve Chest (10).
5. Position a Spool Valve Spring Cup and Spool Valve Spring in the recess at one end of the Spool Valve.
6. Install the Spool Valve Cap Gasket (29) and Spool Valve Cap on the Valve Chest making certain the hub of the Spool Valve Cap is encircled by the Spool Valve Spring.
7. Secure the installed components with three of the Valve Cap Screws (30).
8. Repeat steps 5 through 7 on the opposite end of the Valve Chest.

If the Winch was equipped with an automatic brake:

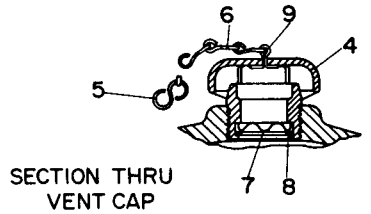
9. Reinstall the Valve Bracket (179) on the brake side of the Winch.
10. Remove the Neutral Exhaust Valve (174) from its bracket and drive out the Roll Pin retaining the arm.
11. Lift the Cover from the Valve and install the Piston and two Pins furnished with the Pilot Operator Adapter (304).
12. Replace the Cover on the Valve and reinstall the Roll Pin.
13. Install the Elbow (308) in the pilot port of the Neutral Exhaust Valve and reinstall the Valve on its bracket.
14. Convert the brake circuitry and install all Valves, Regulators, etc. as described in **REMOTE CONTROL INSTALLATION.**

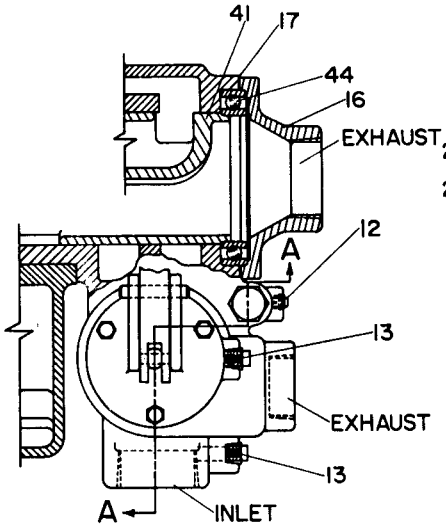


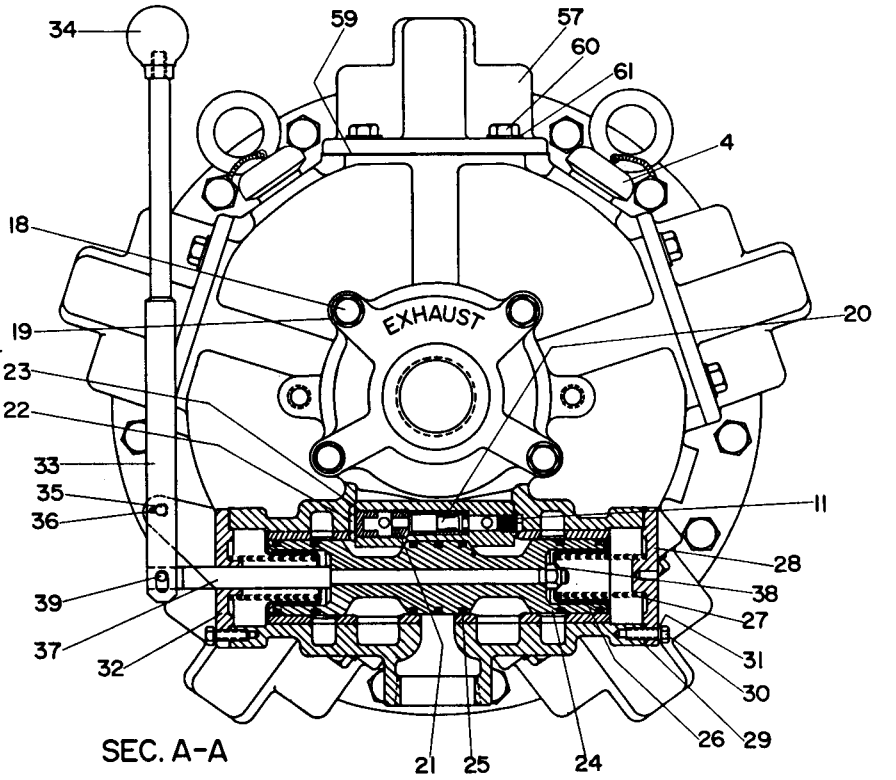
(Dwg. TPA919)



Remote Control Valve Chest

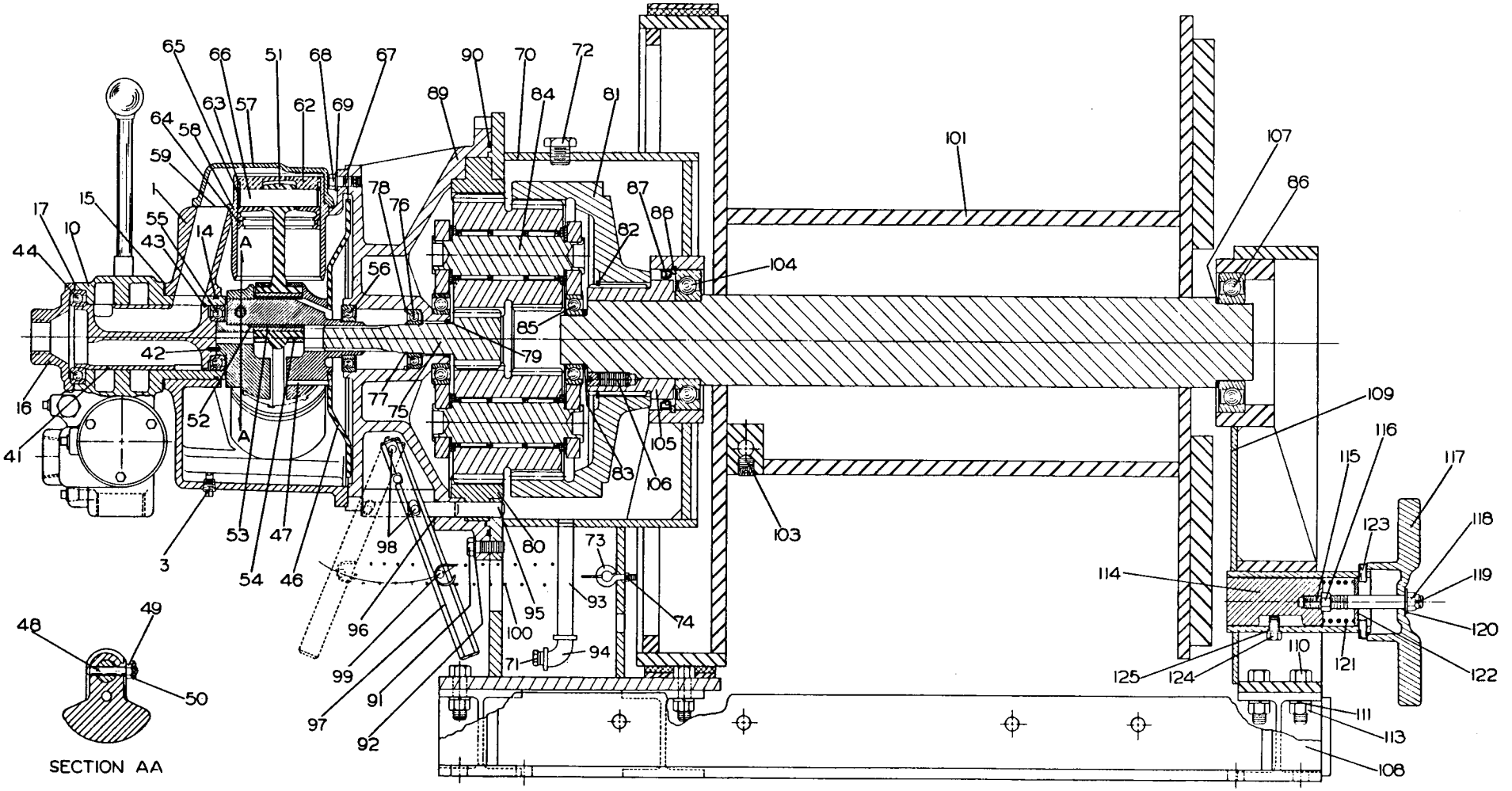






(Dwg. TPA648)

Manual Throttle Valve Chest



25UWB114 Winch with Manual Throttle, Manual Brake and Disengaging Clutch

MOTOR AND VALVE CHEST

		PART NUMBER FOR ORDERING			PART NUMBER FOR ORDERING	
1	Motor Case	H5W-501	32	Throttle Lever Bracket	K5W-596	Manual Throttle Parts
2	Oil Level Plug	D02-402	33	Throttle Lever	K5W-556	
3	Magnetic Drain Plug	K5W-29	34	Throttle Lever Knob	K5W-305	
*	Nameplate	K5W-99	35	Throttle Lever Pin	K5W-557	
*	Nameplate Screw (6)	R4F-302	36	Lever Pin Cotter (2)	D02-524	
*	Motor Case Eyebolt (2)	KU-888	37	Spool Valve Rod	K5W-255	
4	Vent Cap (2)	D02-303A	38	Valve Rod Nut (7/16"-14 thd.)	599-639	
5	S-Hook	D02-421	39	Valve Rod Pin	K5W-870	
6	Vent Cap Chain	D02-891	*	Valve Rod Pin Retainer	FEA100-118	
7	Vent Cap Screen	D02-889	41	Rotary Valve Assembly	H5W-A526	
8	Vent Cap Screen Retainer	6CND-233-1/2	42	Rotary Valve Pin	510-669A	
9	Vent Cap Cotter	D02-893	43	Rotary Valve Seal	101BMP-704-1	
10	Valve Chest	H5W-AB245	44	Rotary Valve Bearing	H5W-97	
11	1/4" Pipe Plug (2)	D02-402		Crank and Rod Assembly	H5W-A516	
12	1/8" Pipe Plug (2)	P250-368	*	Bare Crank (consists of 2 parts which are not sold separately)	H5W-516	
13	3/8" Pipe Plug (3)	JC3350-368	46	Oil Splasher	HU-540	
14	Valve Chest Seal	11BMP-338	47	Oil Splasher Long Rivet	HU-541	
15	Valve Chest Gasket	H5W-547	*	Oil Splasher Short Rivet (6)	231-712	
16	Valve Chest Cover	H5W-546	48	Crank Lock Pin	HU-520	
17	Valve Chest Cover Gasket	H5W-928	49	Crank Lock Pin Nut	D02-394	
18	Valve Chest Cap Screw (4)	12BMP-634	50	Crank Lock Pin Cotter	D02-524	
19	3/8" Lock Washer (4)	D02-321	51	Connecting Rod (5)	H5W-509	
20	Brake Valve	K5W-62	52	Connecting Rod Sleeve	HU-519	
21	Brake Valve Seat	K5W-65	53	Connecting Rod Bushing	H5W-511	
22	Valve Cap	D01-943	54	Connecting Rod Ring (2)	HU-510	
23	Valve Cap Gasket	D01-946	55	Valve End Crank Bearing	HU-518	
24	Spool Valve		56	Drum End Crank Bearing	HUD-895	
	for Manual Throttle	K5W-A246	57	Cylinder Head (5)	H5W-H505A	
	for Remote Control	K5W-ARC246	58	Cylinder Sleeve (5)	HH5D-L505A	
25	Spool Valve Seal (7 for Manual Throttle; 2 for Remote Control)	K5W-248	59	Cylinder Gasket (5)	H5W-507	
26	Spool Valve Spring Cup (2)	K5W-249	60	Cylinder Bolt (20)	D10-354	
27	Spool Valve Spring (2)		61	Cylinder Bolt Washer (20) (copper)	HU-504	
	for Manual Throttle	K5W-250	62	Piston Assembly (5)	HU-A513B	
	for Remote Control	K5W-RC250	63	Piston Ring (5)	HU-337	
28	Spool Valve Cap		64	Oil Regulating Ring (5)	HU-338	
	for Manual Throttle	K5W-251	65	Snap Ring (10)	902A45-632	
	for Remote Control (2)	K5W-RC251	66	Wrist Pin (5)	HU-514A	
29	Spool Valve Cap Gasket (2)	K5W-946	67	Motor Gasket	HH5D-592	
30	Valve Cap Screw (6) (5/16"-18 thd. x 1" long)	B8-240				
31	5/16" Lock Washer (6)	T11-58				

* Not illustrated.

MOTOR AND VALVE CHEST (Continued)

		PART NUMBER FOR ORDERING
68	Motor Case Bolt (10) (1/2"-13 thd. x 1-1/2" long)	235-146
69	Lock Washer (10)	D10-322
70	Gear Case	UWB-1353
*	Gear Case Warning Plate	TA-147A
*	Gear Case Warning Plate Screw	D02-302
71	Magnetic Drain or Level Plug (3)	UWD-29
72	Vent Cap	C6H20A-19
73	Clutch Spring Eyebolt (2) (with nut)	UWB-1870
74	Eyebolt Lock Washer (2)	L01-67

GEARING PARTS

		PART NUMBER FOR ORDERING
75	Motor Pinion (15 teeth)	UWB-1319
76	Motor Pinion Bearing	D10-518
77	Inner Pinion Bearing Retainer	HRA30A-375
78	Outer Pinion Bearing Retainer	150BM-677
79	Motor Pinion Seal	C6H20A-271
80	Ring Gear, Motor End (81 teeth)	UWB-1797
81	Ring Gear, Drum End (78 teeth)	UWB-1798-114
82	Drum End Ring Gear Retainer	UWB-1370
83	Drum End O-ring	UWB-1369
84	Planet Gear Frame Assembly (for 114:1 Gear Ratio) (33 teeth and 30 teeth)	UWB-A1367-114
85	Planet Frame Bearing (2)	UWB-1368
86	Rope Drum Bearing (special; purchase from Ingersoll-Rand)	UWB-1466
87	Shaft Bearing Seal	UWB-1137
88	Shaft Bearing Retainer	UWB-1340
89	Gear Case Cover	UWB-1502
90	Gear Case Cover Seal	UWB-1931
91	Gear Case Cover Bolt (15) (1/2"-13 thd. x 1-1/2" long)	235-146
92	1/2" Lock Washer (15)	D10-322
93	Pipe Nipple (3/4" x 5")	NIP 3/4 x 5
94	Elbow (3/4")	P25-198

DISENGAGING CLUTCH PARTS (Clutch Models Only)

		PART NUMBER FOR ORDERING
95	Clutch Engaging Pin (2)	UWB-1566
96	Clutch Pin Oil Seal (2)	UWB-1866
*	1-1/4" diameter Welch Plug (2)	D02-404
97	Clutch Lever	UWB-1565
98	Clutch Lever Pin (2)	UWB-1571
99	Lever Spring Pin	UWB-1569
*	Spring Pin Cotter (6) (2 per pin)	D02-524
*	3/8" Flat Washer (6)	D02-419
100	Clutch Lever Spring (2)	UWB-1567
*	Clutch Lever Self-Locking Pin and Cable	UWB-1724
*	Clutch Operating Plate	UWB-32
*	Clutch Warning Plate	UWB-33
*	Plate Screw (8) (four for each plate)	D02-302

* Not illustrated.

CLUTCH CONVERSION KIT PARTS
(For converting a Clutch Winch to a Non-Clutch Winch)

		PART NUMBER FOR ORDERING
	Clutch Conversion Kit	UWB-K1600
200	Clutch Lock Pin	UWB-1600
201	Pin	UWB-1571
*	Cotter	D02-524

* Not illustrated.

ROPE DRUM AND BASE PARTS

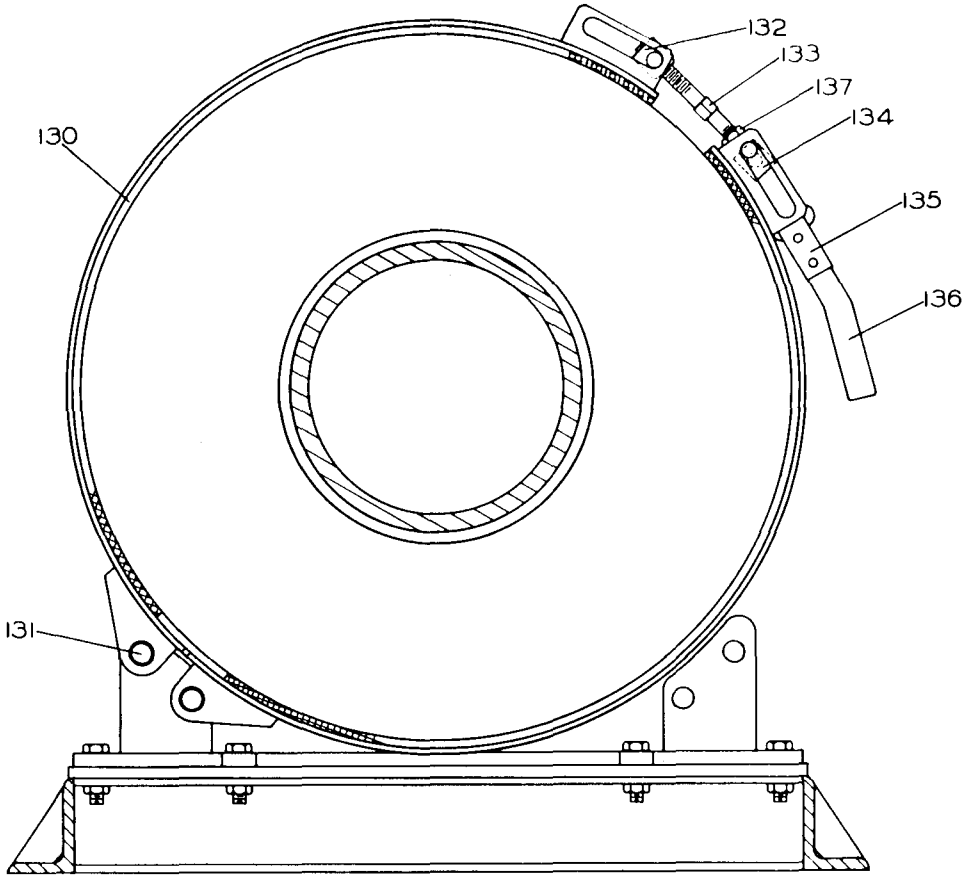
		PART NUMBER FOR ORDERING
101	Rope Drum Assembly	
	22" (559 mm) between flanges	UWB-A1324-1
	30" (762 mm) between flanges	UWB-A1324-2
103	Rope Drum Setscrew (2)	UWB-381
104	Rope Drum Bearing (special; purchase from Ingersoll-Rand)	UWB-1466
105	Rope Drum Spline	UWB-1324T
106	Rope Drum Spline Setscrew (6)	UWB-1867
107	Rope Drum Washer (3)	UWB-1469
108	Mounting Base	
	for 22" Drum	UWB-1564-1
	for 30" Drum	UWB-1564-2
109	Drum Support Bracket	UWB-1677
110	Support Bracket Bolt (16) (5/8"-11 thd. x 2-1/2" long)	UWB-1775
111	Support Bracket Bolt Lock Washer (8)	A-67
113	Support Bracket Bolt Nut (16)	HU-776
114	Locking Dog	UWB-671
115	Locking Dog Shaft	UWB-672
116	Shaft Lock Nut	HU-776
117	Locking Dog Handle	UWB-673
118	Handle Lock Nut	D02-394
119	Cotter Pin	D02-330
120	1/2" Washer	D10-807
121	Locking Dog Spring	UWB-700
122	Spring Washer	UWB-750
123	Spring Retaining Pin (2)	UWB-44
124	Locking Dog Stop Bolt (1/2"-13 thd. x 3/4" long, Grade 5)	UWB-354
125	1/2" Lock Washer	HRA20A-322

RING GEAR BOLTS
(Non-Clutch Models Only)
(refer to figure 2 on page 10)

		PART NUMBER FOR ORDERING
*	Bolt (3/4"-10 x 4 Grade 5) (4)	K6UL-775
*	Oil Seal (4)	UWB-1866
*	Belleville Washer (4)	UWB-1207
*	Plate Screw (8)	D02-302

* Not illustrated.

MANUAL BRAKE PARTS

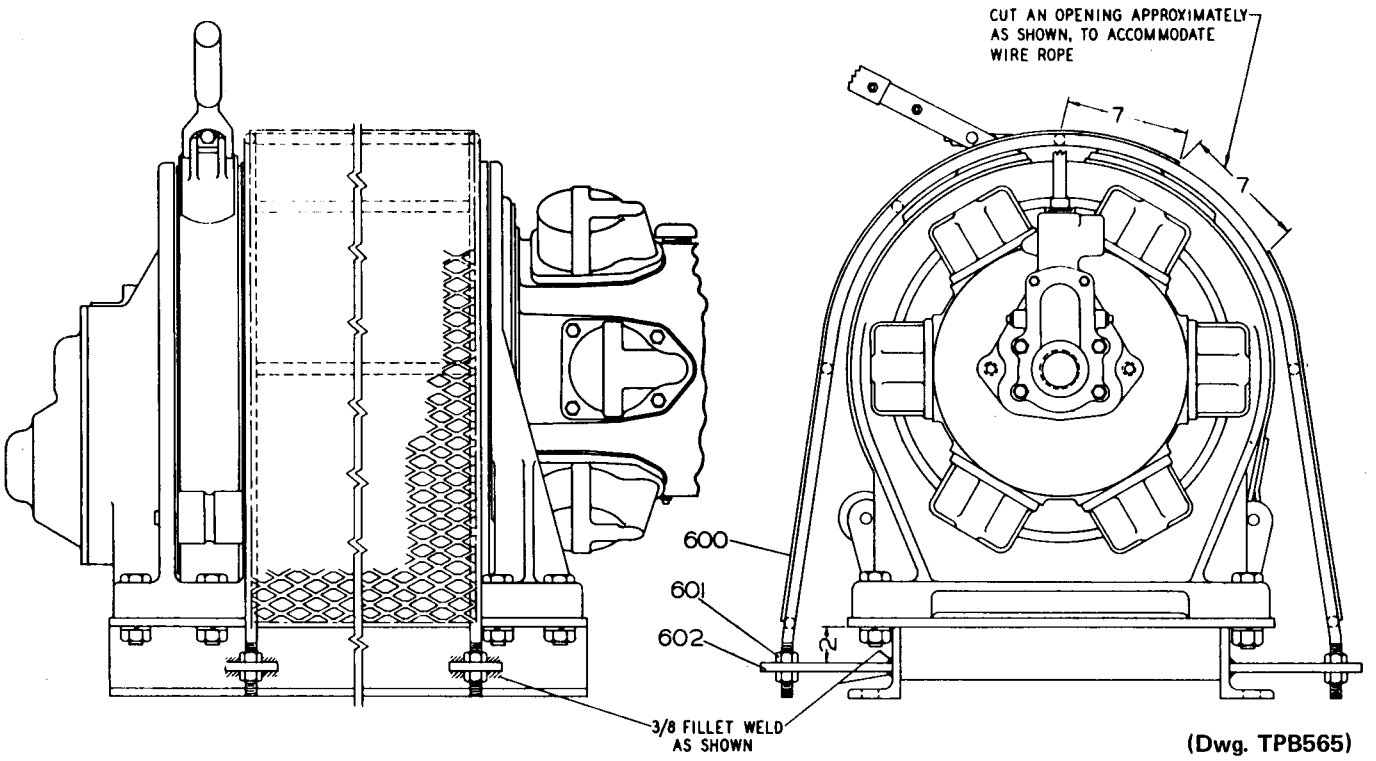


(Dwg. TPB681)

		PART NUMBER FOR ORDERING
130	Brake Band (2)	UWB-1101
131	Brake Anchor Pin (2)	UWB-1107
*	Anchor Pin Cotter (2)	207-126
132	Brake Adjusting Block	UWB-104
133	Brake Adjusting Screw	UWB-106
134	Brake Clevis Block	UWB-122
135	Brake Handle Clevis (2)	UWB-111
136	Brake Handle	UWB-113
137	Brake Adjusting Screw Jam Nut (5/8"-18 thd.)	B12-249
*	Brake Handle Bolt (2) (3/8"-16 thd. x 1-3/4" long, Grade 5)	D10-312
*	Handle Bolt Lock Nut (2)	WF171-13

* Not illustrated.

DRUM GUARDS

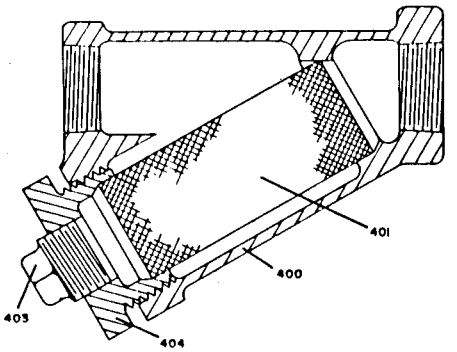


(Dwg. TPB565)

PART NUMBER FOR ORDERING

600	Drum Guard	
	for 25UWB1141	25UWB1141-298
	for 25UWB1142	25UWB1142-298
601	5/8"-11 thd. Nut (8)	K6U-8
602	Plate (4)	K6U-299

AIR STRAINER



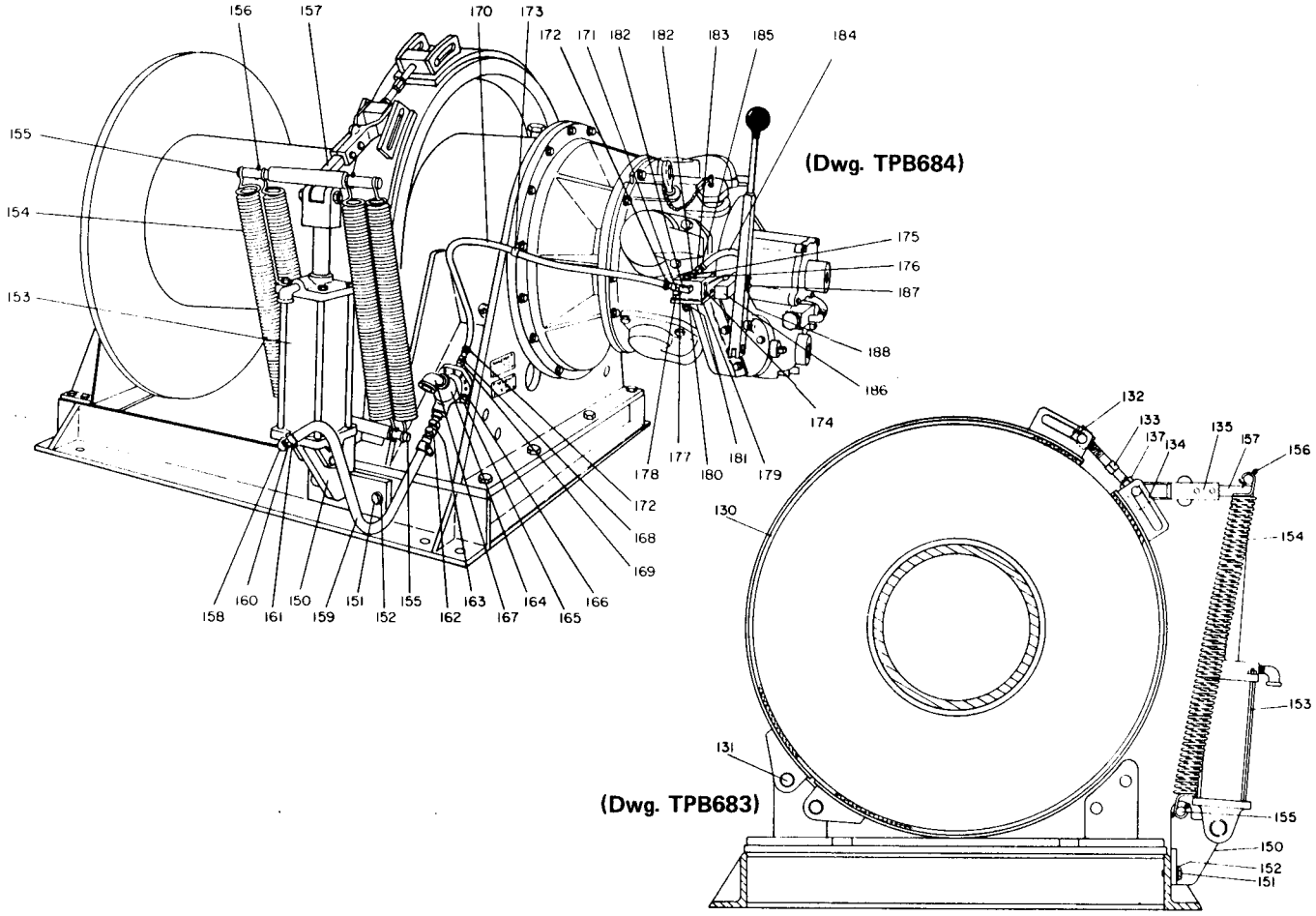
(Dwg. TPD122-1)

PART NUMBER FOR ORDERING

400	Air Strainer Assembly	SM450-A267AT
401	Air Strainer Screen	SM450-61AT
403	Air Strainer Plug	TA-464
404	Air Strainer Cap	SM450-268AT

AUTOMATIC BRAKE PARTS

Illustrated Manual Brake Parts 130 (2), 131 (2), 132, 133, 134, 135, 137, Anchor Pin Cotter (2), Brake Handle Bolt (2) and Brake Handle Bolt Lock Nut (2) are used on the Automatic Brake.

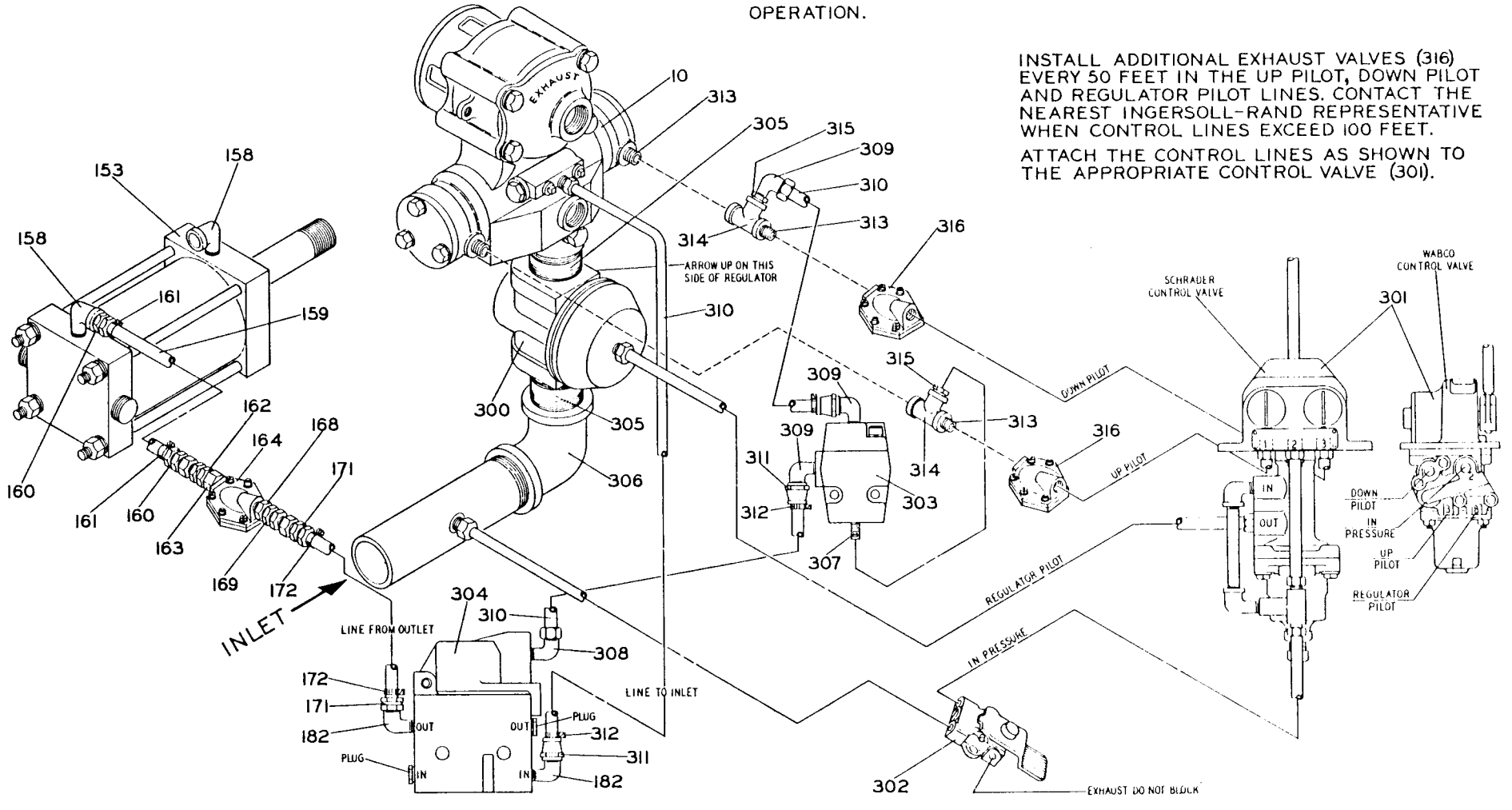


		PART NUMBER FOR ORDERING			PART NUMBER FOR ORDERING
	Automatic Brake Conversion Kit (also includes parts UWB-1866, UWB-1207 and K6UL-775 shown on page 10)	UWB-K1721	170	Exhaust Valve Hose (length as specified)	BH4A
150	Brake Cylinder Bracket	UWB-1721	171	Valve Hose Swivel (2)	UWD-162
151	Cylinder Bracket Cap Screw (2) (5/8"-11 thd. x 1-3/4" long)	DLC-439	172	Valve Hose Clamp (2)	K6U-4
152	Bracket Cap Screw Lock Washer (2) (5/8")	A-67	173	Valve Hose Clip	UWD-727
153	Brake Cylinder	UWB-1141	174	Neutral Exhaust Valve	UWB-911
154	Brake Spring (4)	UWB-726	175	Exhaust Valve Cap Screw (2) (1/4"-20 x 2-1/4")	150BM-104
155	Brake Spring Pin (2)	UWB-1735	176	Valve Cap Screw Washer (4) (1/4")	R3-94
156	Brake Spring Pin Cotter (2)	D02-330	177	Valve Cap Screw Lock Washer (2) (1/4")	L01-67
157	Automatic Brake Lever	UWB-1718	178	Valve Cap Screw Nut (2) (1/4"-20)	G8-120A
158	Brake Pipe Elbow (2)	UWD-581	179	Valve Bracket	UWB-910
159	Brake Hose (length as specified)	BH6A	180	Bracket Cap Screw (2)	G7-7A
160	Brake Hose Nipple (2)	E00-46	181	Bracket Cap Screw Lock Washer (2)	T11-58
161	Brake Hose Clamp (2)	K6U-4	182	Brake Hose Elbow (2)	UWD-161
162	Brake Hose Swivel	MR-129	183	Brake Hose Swivel (2)	UWD-162
163	Brake Hose Bushing (1/2" x 3/8")	UWD-285	184	Brake Hose (length as specified)	BH4A
164	Exhaust Valve	C6H20A-939	185	Brake Hose Clamp (2)	K6U-4
165	Valve Cap Screw (2)	M0V010AA-634	186	Neutral Exhaust Valve Cam	UWB-909
166	Valve Cap Screw Lock Washer (2) (1/4")	L01-67	187	Exhaust Valve Cam Cap Screw (2) (1/4"-20 x 1-1/2")	R22H-68
167	Exhaust Valve Elbow (1/2")	J3-388	188	Valve Cam Cap Screw Lock Washer (2) (1/4")	L01-67
168	Valve Hose Reducing Bushing (1/2" x 1/4" NPT)	N16-21			
169	Exhaust Valve Fitting (1/4")	UWD-165			

TYPICAL CONNECTIONS FOR OVERWOUND REMOTE CONTROL 25UWB WINCH WITH AUTOMATIC BRAKE AND VALVE LEVER MOUNTED ON THE RIGHT SIDE OF THE VALVE. REVERSING THE UP PILOT AND DOWN PILOT LINES WILL REVERSE THE DIRECTION OF THE CONTROL VALVE OPERATION.

INSTALL ADDITIONAL EXHAUST VALVES (316) EVERY 50 FEET IN THE UP PILOT, DOWN PILOT AND REGULATOR PILOT LINES. CONTACT THE NEAREST INGERSOLL-RAND REPRESENTATIVE WHEN CONTROL LINES EXCEED 100 FEET.

ATTACH THE CONTROL LINES AS SHOWN TO THE APPROPRIATE CONTROL VALVE (301).



(Dwg. TPA922)

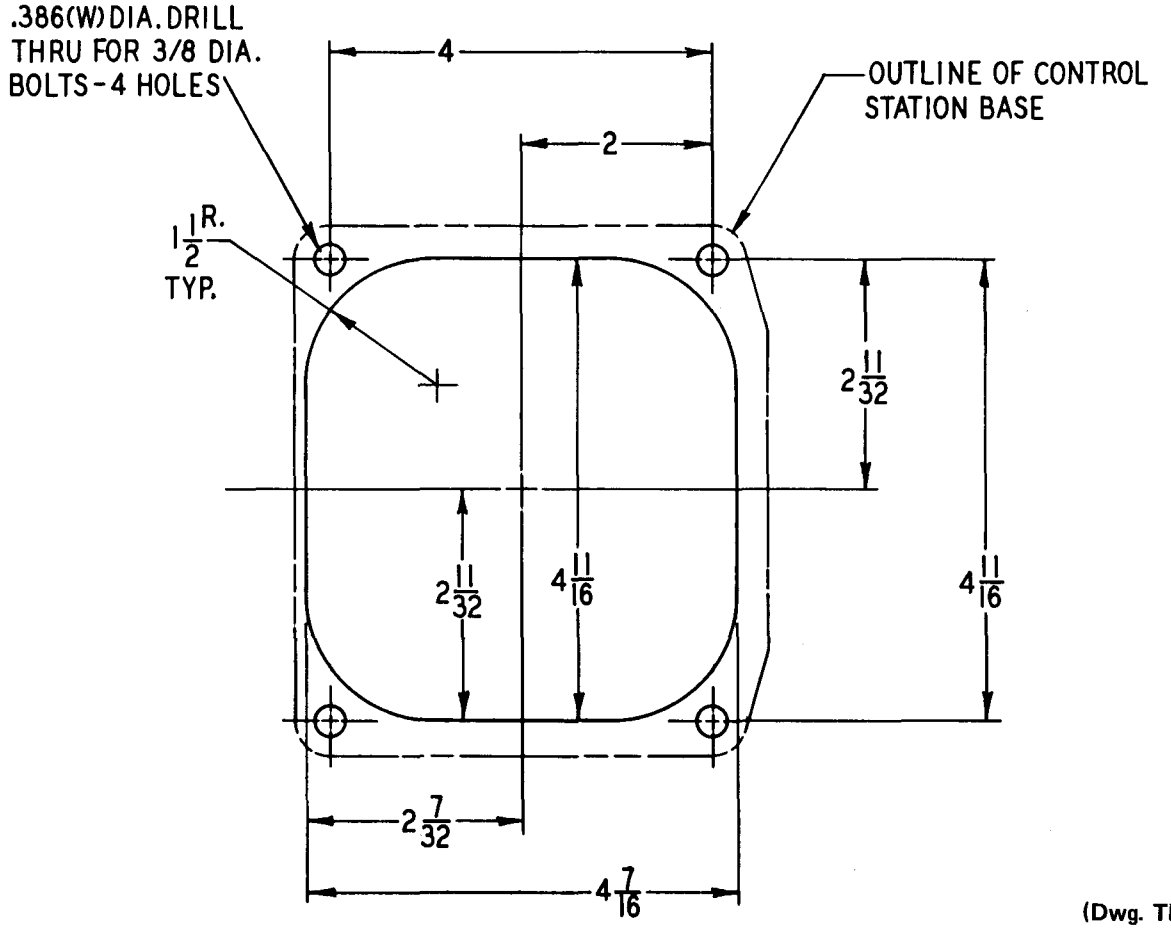
Piping Diagram for 25UWB Winch With Remote Control and Automatic Brake

		PART NUMBER FOR ORDERING
	Remote Control Conversion Kit (also includes illustrated items 24, 27 and 28).	UWB-K900
300	Regulator.	UWB-900
301	Control Valve	UWB-686
302	Foot Valve.	UWB-910A
303	Shuttle Valve	UWB-802
+ 304	Pilot Operator Adapter.	UWB-902
305	Nipple (2" NPT) (2).	PCG208AC-286
306	Elbow	UWB-904
307	Nipple (1/4" NPT).	HUS-908
308	Elbow (1/8" NPT).	MLK-161
309	Elbow (1/4" NPT) (3)	UWD-161
310	Hose (1/4" dia.) (length as specified).	BH4A
311	Swivel (4)	UWD-162
312	Clamp (4)	K6U-4
313	Nipple (3/8" NPT) (4)	D02-908
314	Tee (3/8" NPT) (2)	TA-409
315	Reducer Bushing (3/8" x 1/4") (2).	H-82
316	Exhaust Valve (3/8" NPT) (2)	MR-939

+ If the Winch being modified for remote control has an automatic brake, the Pilot Operator Adapter (304) must be installed in the Neutral Exhaust Valve (174). If the Winch being modified is not equipped with an automatic brake, the complete Valve and Adapter can be obtained by ordering a Block Valve (part number UWB-903).

REMOTE CONTROL INSTALLATION

1. Using the following drawing as a pattern, cut the mounting holes in the control panel to accept the Control Valve (301).



(Dwg. TPD799)

Control Valve Mounting Dimensions

2. Mount the Control Valve on the control panel and connect a Hose (310) from the outlet of the Control Valve to the pilot port of the main pressure Regulator (300) (refer to the Piping Diagram on page 21).
3. Mount the Foot Valve (302) in a convenient location and connect a Hose from the outlet of the Foot Valve to the inlet of the Control Valve by way of the Control Valve Tee.
4. Remove the two pipe plugs, one on each side of the Valve Chest (10), and install a Nipple (313) and Tee (314) in place of the plugs. Make certain the side leg of each tee points upward in relation to the Valve Chest.
5. Install a Reducer Bushing (315), a Nipple (307) and the Shuttle Valve (303) in the side leg of the Tee nearest to the Neutral Exhaust Valve (174) and the Pilot Operator Adapter (304).
6. Install a Reducer Bushing and Elbow (309) in the side leg of the remaining Tee.
7. Connect the installed Elbow to the end of the Shuttle Valve opposite its mounting Nipple with a Hose.
8. Connect the remaining unused port of the Shuttle Valve to the pilot port of the Neutral Exhaust Valve with a length of Hose.
9. Install a Nipple (305), Regulator (300), Nipple (305) and Elbow (306) in the inlet port on the underside of the Valve Chest with the Regulator flow direction toward the Valve Chest.
10. Connect a Hose from the inlet of the Foot Valve to the inlet pressure Pipe.

Hose and Hose Connections

Use a 2" (51 mm) hose with a suitable 2" (51 mm) male fitting for attaching the air supply to the Valve Chest. Smaller hose and fittings will reduce the efficiency of the Winch.

Be sure to install a quick operating air Shutoff Valve close to the Winch to allow the air supply to be interrupted when leaving the Winch unattended.

The need for exhaust piping and muffling should be determined at the time of installation. Do not restrict the exhausts.

The hoses from the Winch to the control panel should be made of stiff-walled tubing which will not expand under pressure. Copper tubing of 1/4" (6.5 mm) outside diameter or nylon tubing of 1/4" (6.5 mm) outside diameter meeting SAE J844d specifications is recommended with the appropriate fittings. If vibration is present, a short piece of flexible hose should be installed between the Winch or Control Valve and copper tubing. If the control lines exceed 50 feet (15 meters) in length, Quick Exhaust Valves, such as MR-939, should be installed every 50 feet. If the control lines exceed 100 feet (30 meters) in length, your nearest Ingersoll-Rand representative should be consulted because of time response lags in the control system.

The hoses must be connected to the ports as shown in the piping diagram.

After all connections are made and inspected, the Winch should be tested to insure proper control and proper direction of operation to the Winch.

KITS

Remote Control Conversion Kit: Includes all components necessary to convert a manual throttle to remote control.
No. UWB-K900 (03694114) for use on 25UWB114 Winch.

Automatic Brake Conversion Kit: Includes all components necessary to convert a manual brake to automatic.
No. UWB-K1721 (03692514) for use on 25UWB114 Winch.

Clutch Conversion Kit: Includes all components necessary to convert a clutch Winch to a non-clutch Winch.
No. UWB-K1600 (03718624) for use on 25UWB114 Winch.

Repair Kits: Ingersoll-Rand Company has a number of repair kits available for the 25UWB114 Winches. Request Form P6622 for a complete listing of kits available and the components included with each kit.

MAINTENANCE TOOLS

TOOL NUMBER FOR ORDERING	TOOL NAME FOR ORDERING	OPERATION
HU-933	Piston Ring Compressor.	Compressing the Piston Rings (63 and 64) when installing a Piston (62).
HU-932	Valve Chest Jack Bolt (2 required).	Withdrawing the Valve Chest (10) from the Motor Case (1).

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