# ADAPTER SECTION

# CARCO MODELS
# PS, PSM AND PSC WINCH

**PURPOSE OF YOUR MOUNTING INSTRUCTIONS**

This adapter text is general information. Details for individual tractor models are located on the adapter drawing included with this section. Follow the instructions carefully.

NOTES: Purchased parts, such as bearings and oil seals may be substituted with parts of equal quality on the manufacturer's recommendation, and with the approval of Pacific Car and Foundry Company.

Be sure to give correct part number, part name, and complete serial number of winch when ordering; also name and model of tractor on which the winch is mounted.

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## EQUIPMENT NEEDED FOR INSTALLATION:

1. Two-ton capacity hoist.

2. One-half inch capacity portable drill.

3. 1300 lb./ft capacity torque wrench.

4. Cutting or burning and welding equipment.

## PREPARING THE TRACTOR

Remove paint from mounting surface of winch and tractor. Clean area around cover plate over tractor P.T.O. opening and remove cover plate.

Remove plugs from tapped holes in tractor rear face and install studs using LOCTITE Sealant Type AV on threads.

> NOTE: Be sure installed studs extend from rear face of tractor transmission the distance specified on the adapter drawing.

Install socket head NYLOK set screws or plugs in tapped holes around P.T.O. opening, if required. Use sealing compound on threaded items, particularly if holes are drilled through to a wet compartment.

Rework tractor sheet metal and guards as shown to permit installation of hydraulic pump, hoses, filters and control cables. Refer to adapter drawing for details. Install trim as shown to avoid chafing of hoses and cables.

## PREPARING AND MOUNTING THE WINCH

Brake Drain Openings

Two openings are provided in the brake assembly portion of the winch case to drain condensation. One opening is positioned in the mounting face of the winch, and is at the lowest point when winch is resting on the shipping and storage skids. The second opening is located at the bottom of the case when the winch is assembled to the tractor.

> NOTE: Be sure to install hex socket pipe plug in shipping drain hole before assembling winch to tractor. The square head pipe plug should be installed in the bottom of the brake housing if the winch is operated partially submerged in water or mud. If installed, it must be removed periodically to permit condensation to drain from brake housing.

Check tractor P.T.O. opening and remove sharp edges to prevent damage to O-ring.

Check fit of P.T.O. shaft and coupling splines with tractor shaft or coupling and winch bevel pinion shaft.

Be sure P.T.O. shaft length will provide minimum of 1/8" end clearance with winch installed.

Clean grease from groove in carrier, install O-ring in groove, and lubricate O-ring and P.T.O. opening in tractor.

Be sure hydraulic system fittings are installed in winch if required, before attaching winch to tractor.

Slide P.T.O. shaft and coupling on winch bevel pinion shaft. Hoist and guide winch toward tractor, making sure winch P.T.O. shaft slides over tractor P.T.O. shaft or into tractor coupling. Route control cables up through pre-cut holes to control stand position. Position winch on studs and secure with hex nuts and cap screws as shown.

> NOTE: Do not force winch on with studs or cap screws.

## INSTALLING HYDRAULIC PUMP

The hydraulic pump may be gear driven or belt driven depending on the particular tractor model. Refer to adapter drawing or pump group pages for installation details.

On belt drives, be sure sheave and bushings are assembled to align tractor pulley and pump pulley. On gear driven pumps, be sure components are assembled as shown on pump group pages to ensure proper engagement of pump drive coupling and driving member of tractor.

Install fittings in pump prior to installation, if necessary.

NOTE: When removing engine or transmission drive cover for installation of gear drive pumps, be careful to avoid any foreign matter entering case.

## INSTALLING HOSES (INTERNAL FILTERS)

NOTE: Always cap or plug hoses during installation to avoid entrance of contaminants.

Install fittings in suction and pressure ports of pump. Install fittings in winch case cover suction and pressure ports.

Install hose end and clamps on one end of suction hose and connect to suction fitting at pump. Route hose to suction strainer port in winch case cover as shown on adapter drawing. Cut hose to fit (see drawing for approximate length) and clean thoroughly. Fill suction line with oil to prime hydraulic pump. Install hose end and clamps and connect to suction strainer port on winch case cover.

Connect one end of pressure hose to pump. Route pressure hose from pump pressure port to case cover pressure port at winch.

Fasten hoses with clamps and brackets as required to avoid chafing in service.

## INSTALLING HOSES (EXTERNAL FILTERS)

Position filter bracket or brackets and drill holes as required or use existing holes as shown. Use filter bracket as template or to mark hole locations.

Install fittings in pressure and suction filter ports and position as shown on the adapter drawing.

Install filters on brackets. Do not install filter guards until after hoses are installed, tightened and checked for leaks.

NOTE: Always cap or plug hoses during installation to avoid entrance of contaminants.

Install fittings in suction and pressure port of pump if not previously installed.

Install hose end and clamps on one end of suction hose, and connect to suction fitting at pump. Route hose to suction filter as shown. Cut hose to fit (see drawing for approximate length) and clean thoroughly. Fill hose with oil, install hose end and clamps, and connect to outlet fitting of filter.

Connect one end of pressure hose to pump. Route pressure hose from pump to pressure filter and connect to inlet fitting. Fasten suction and pressure hoses with clamps and brackets as required to avoid chafing in service.

Install hose end and clamp on one end of remaining suction hose. Starting near suction port on winch, route fitting end of hose forward and connect to inlet fitting on suction filter. Route pressure hose and connect to outlet fitting on pressure filter.

Connect pressure hose to inlet fitting on winch. Cut suction hose to fit (see drawing for approximate length) and clean thoroughly. Install hose end, clamps, union and connect to outlet fitting on winch.

Fasten hoses with clamps and brackets as required.

## MOUNTING CONTROL STAND PS MODELS

Position control stand on bracket as shown on adapter drawing.

Using holes as template drill or mark holes as required and secure control stand as shown.

Insert control cable housing into bore on winch housing assembly and secure with set screw and jam nut as shown.

Install control cable core into control cable pin.

Adjust control cable core until a measurement of 5-1/8" is achieved from upper end of threads on cable housing to center of pin securing cable core to control stand lever.

When adjustment is correct, install control cable and secure with pin and clip to control stand lever.

With control handle in neutral position, place control cable in control stand housing and secure with nuts and star washer.

## MOUNTING CONTROL STAND PSM AND PSC MODELS

Refer to adapter drawing in adapter section of this manual for location of control stand and routing of cables. Install control stand mount on tractor and route control cables to control stand.

Insert end of shift control cable into control stand and secure cable housing to stand with set screw and jam nut. Place shift handle in neutral (clutch release position). Be sure control valve is in neutral position.

Thread jam nut and yoke on cable end until holes in yoke and hole in lever are aligned. Install pin and lock yoke with jam nut.

Insert end of brake control cable into control stand and secure cable housing to stand with set screw and jam nut.

Thread jam nut and yoke on cable until cable threads engage full length of yoke threads. Align yoke with brake handle and install pin. Lock yoke with jam nut. Adjust brake band clearance.

## BEFORE OPERATING

Install pressure gauge, if used. Installation instructions are included in gauge package.

Remove gauge hose from winch and install master pressure gauge of at least 500 PSI capacity.

Be sure winch is filled with proper oil, as specified in the Operator's Section. Fill front suction line with oil to prime hydraulic pump. Reconnect line to filter fitting.

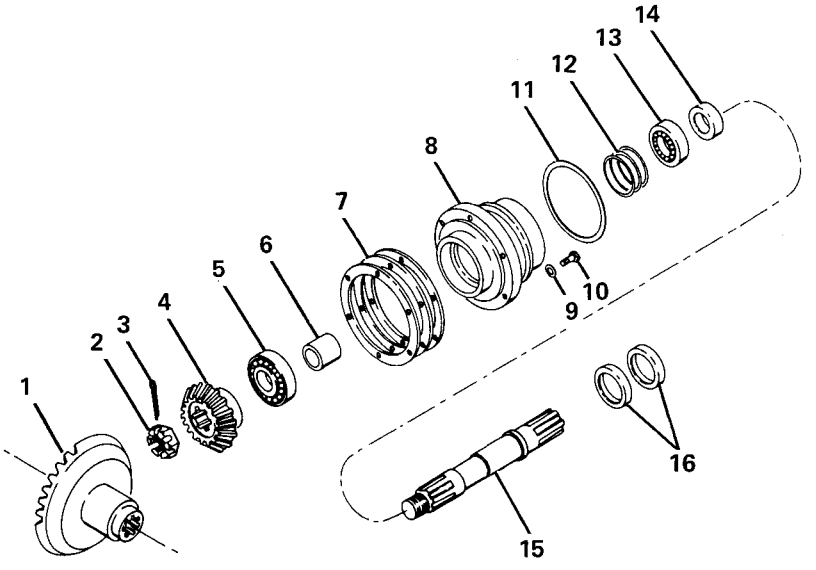
Start tractor engine, and allow to run at low idle for five minutes to circulate oil through hydraulic system. Move control handle to each position and check to see that winch operates properly in each position. If controls require adjustment, perform adjustment procedures specified in the Service Section for PS Models, or PSM and PSC Models.

Check and adjust relief valve pressure (operating pressure), if required. Refer to Service Section for adjusting instructions. Check complete unit and hydraulic connections for leaks.

Stop tractor engine.

Remove master gauge and reconnect operating range gauge hose at winch or manifold. Install covers or filter guards as required.

## BEVEL GEAR AND BEVEL PINION CARRIER ASSEMBLY



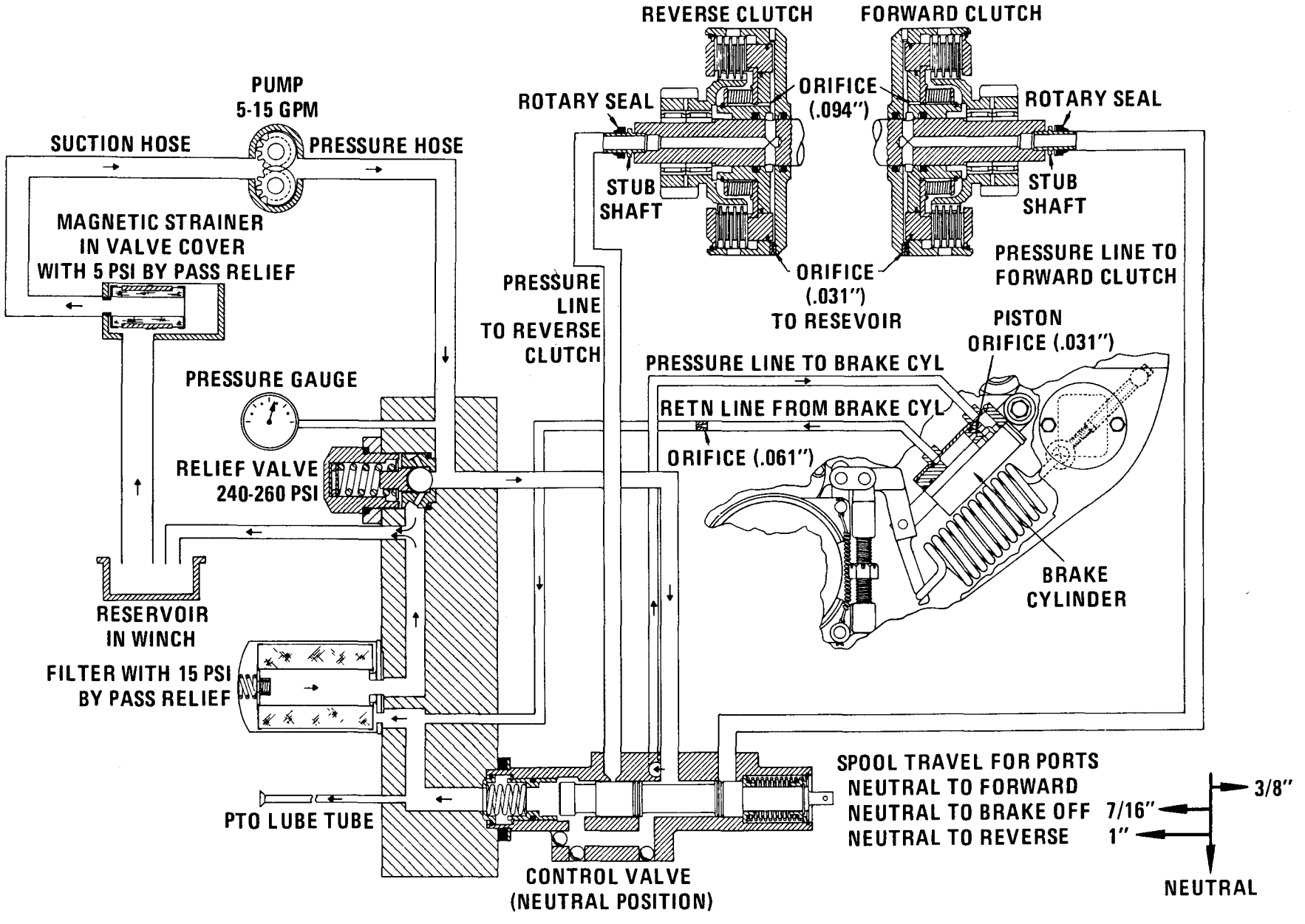

**GEAR SET NO. 44326 – RATIO 1.53/1**

| REF. | CARCO PART NO. | NAME AND DESCRIPTION | QUAN. PER UNIT |
|---|---|---|---|
| 1 | 44325 | Bevel Gear (29 Teeth) | 1 |
| 2 | Y-743-1 | Nut | 1 |
| 3 | 16288-1232 | Cotter Pin, 3/8 x 2 | 1 |
| 4 | 44324 | Bevel Pinion (19 Teeth) | 1 |
| 5 | 15173 | Tapered Roller Bearing Cup | 1 |
| | 15175 | Tapered Roller Bearing Cup | 1 |
| 6 | 45084-5 | Spacer | 1 |
| 7 | 16237 | Shim Set, TIMKEN 29 | 1 |
| 8 | 44297 | Carrier | 1 |
| 9 | 16064-8 | Washer, 1/2 | 6 |
| 10 | 16047-812 | Cap Screw, 1/2 UNC x 1-1/2 H.H. | 6 |
| 11 | 16262-438 | O-Ring, NAT'L. 622765 | 1 |
| 12 | 45088 | Shim Set | 1 |
| 13 | 15148 | Tapered Roller Bearing Cup | 1 |
| | 15149 | Tapered Roller Bearing Cone | 1 |
| 14 | 44791 | Sleeve | 1 |
| 15 | 44333 | Pinion Shaft | 1 |
| 16 | 16343-11 | Oil Seal, NAT'L. 455079 | 2 |

NOTE: The Bevel Gear Set above is standard for the adaption indicated. Below are optional gear combinations to provide a range of line speeds and pulls for various winching requirements. Important – Prior to ordering or quoting on any optional Bevel Gear Set be sure to check with factory on availability, and if the gear set would be recommended for the application.

| GEAR SET NO. | BEVEL GEAR | | BEVEL PINION | | RATIO |
|---|---|---|---|---|---|
| | Part No. | Teeth | Part No. | Teeth | |
| 44314 | 44313 | 35 | 44312 | 9 | 3.89/1 |
| 44317 | 44316 | 35 | 44315 | 11 | 3.18/1 |
| 44320 | 44319 | 32 | 44318 | 13 | 2.46/1 |
| 44323 | 44322 | 31 | 44321 | 16 | 1.94/1 |

# HYDRAULIC SCHEMATIC CARCO POWER SHIFT WINCHES

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CARCO POWER SHIFT WINCHES
HYDRAULIC SCHEMATIC

# Lubrication Chart

### Power Shift Winches
### (Winch Only)

E-30-PS ..... 14 Quarts

F-50-PS-PSC-PSM ..... 38 Quarts

G-80-PS-PSC-PSM ..... 56 Quarts

J-120-PS-PSC-PSM ..... 57 Quarts

External Filters–Add approximately 2.5 gallons to fill suction filter, pressure filter, hoses, fittings and hydraulic pump.

1-1/4" hose capacity per foot–12.87 feet = one gallon capacity.

3/4" hose capacity per foot–36.12 feet = one gallon capacity.

Filters in Winch–Add approximately one gallon to fill suction strainer sump, pressure return filter, hoses and hydraulic pump.

### Sliding Gear Winches

E-30-SG ..... 15 Quarts

F-50-SG ..... 39 Quarts

G-80-SG ..... 56 Quarts

J-120-SG ..... 57 Quarts

**Lubrication for above winches:**

Fill to proper level with approved tractor transmission oil.

CAUTION: Oil for power shift winches must meet following requirements:

ATF DEXRON® or
HTF TYPE C-2

Refill at tractor transmission intervals. Lubricate with general purpose grease.

## OPERATOR'S SECTION

# CARCO MODEL F-50-PS PSM AND PSC WINCH

(WITH INTERNAL FILTERS)

CONTENTS



## GENERAL DESCRIPTION

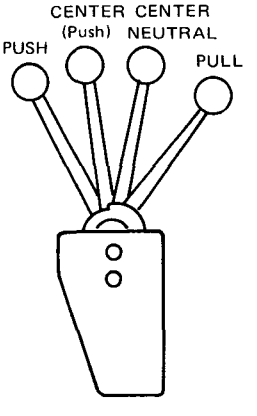
The Carco power-shift winch is a single-drum unit that mounts on the rear face of the tractor main frame, and is driven by the tractor transmission. The winch control system valve is operated from the tractor operator's seat by a single-lever manual control that permits the winch to be operated in forward (pull-in) direction, reverse (payout) direction, brake-on, and brake-off. The winch can be converted from overwound to underwound cable drum rotation without additional parts.

NOTE: See PS, PSM, or PSC sections for correct operation.

## PS WINCH OPERATION

The control handle is connected through a flexible cable to a control lever and to the control valve spool located in the valve housing assembly. Depending on the position of the control handle, and therefore the valve spool, pressurized hydraulic oil is ported to energize the forward and reverse clutches or to release the brake.

| Valve Handle Position PS-PSM-PSC | Drum Action | Forward Clutch | Reverse Clutch | Brake |
|---|---|---|---|---|
| Pull | Forward (Winch In) | ON | OFF | OFF |
| Center Neutral | Brake-On | OFF | OFF | ON |
| Center (Push) | Brake-Off | OFF | OFF | OFF |
| Push | Reverse (Pay Out) | OFF | ON | OFF |





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A-2252-F-7-15-73

Before operating the winch, with tractor stationary, set tractor transmission selector and throttle for proper operating power and speed.

Shift Operation

The winch is in neutral and the brake is set when the control handle is in the center position. Pulling the control handle back against the stop energizes the forward clutch and releases the brake to wind in. Pushing the handle forward against the stop energizes the reverse clutch and releases the brake.

Brake Operation

The brake is applied by spring tension when the winch control valve spool is in the open position or when the hydraulic system oil is not pressurized. When the valve control handle is moved to forward or reverse positions, pressurized oil is ported to the brake cylinder, forcing the brake cylinder open, rotating the brake arm, and extending the brake spring to release the brake. When the control handle is pushed forward to the lock plate (brake-off) position between brake-on and reverse, the brake is released without engaging either clutch.

## PSM & PSC WINCH OPERATION

The PSM and PSC winches are controlled with a dual handle control stand allowing independent operation of either the brake or the forward or reverse clutch.

The shift control handle is connected through a flexibile cable to the control valve spool located in the winch. Depending on the position of the control handle, and therefore the valve spool, pressurized hydraulic fluid is ported to engage either the forward or the reverse clutch.

The mechanically-actuated brake connected through a flexible cable to the brake control lever, provides maximum control of the load at all times. Safe operation is assured in that loads can be powered in or out against the brake.

> CAUTION: When operating the winch against an applied brake, use only the amount of braking force necessary to control the load. Operation against excessive brake force for extended periods of time can result in damage to the clutches. When operating with a partially applied brake for extended periods of time, stop periodically to avoid overheating brake lining.

Shift Operation

The winch is in neutral (clutches released) when the shift control handle is in the center position. Pulling the control handle back against the stop engages the forward clutch to wind in. Pushing the shift control handle forward against the stop engages the reverse clutch.

> NOTE: For smooth winch operation release the brake as either clutch is being applied.

Brake Operation

The brake control lever is equipped with a ratchet sector and spring applied pawl assembly controlled by a lever on, or a push button in the brake lever handle. This feature allows the brake to be pre-set for the desired amount of braking force.

The brake is applied when the brake control handle is pulled back with sufficient force. To release the brake, pull the brake control handle back slightly, depress the pawl button or lever and move the brake control handle forward.

Free Spool Operation

The free spool is operated by a control stand, with two positions. The control stand is connected through a flexible cable to a shift fork, which holds the clutch gear in disengaged position.

To operate the free spool, pull the control lever back and lock in drum free position (towards operator). The gear train is now disconnected from the cable drum allowing cable to be pulled off with little effort.

The winch must be operated with the free spool engaged. In this position the control lever is locked in the drum engaged position. (Away from the operator.) Power is then transmitted to the cable drum through the gear train and cable can be powered in or out by the operator using the forward or reverse clutch.

CAUTION: Serious damage to the free spool assembly and to the winch can result, if the following conditions are not observed.

Do not shift winch into the free spool position when winch gear train is under load.

Do not engage the winch clutches (forward or reverse) when winch is in free spool position.

Do not move the tractor when winch is in free spool position.

## LUBRICATION, PS, PSM & PSC

Gear Case

Before operating winch, be sure it is filled to oil level plug with proper grade and weight of oil as shown in chart and on identification plate.

After one week or 40 hours of operation, whichever occurs first, drain winch and refill with clean oil.

Fill winch through 1-1/4" oil level port in right side of winch case.

Use type of oil as follows:

1. Oil recommended by tractor manufacturer for power-shift transmission.
2. Hydraulic transmission fluid, Type C-2.
3. Automatic transmission fluid, Dexron®

Change oil, pressure filter, and clean suction filter after each 200 hours or one month of operation, whichever occurs first.

NOTE: High humidity and wide ranges of temperature may cause condensation within the winch. Remove magnetic drain plug from bottom of winch case and drain water from case periodically before starting day's operation, to prevent corrosion or rusting of internal parts.

Cable Drum Lubrication

After each 200 hours or 1 month of operation, whichever is sooner, lubricate the cable drum brake-side bearing through the grease fitting in the cable drum. Use general purpose grease. Grease sparingly to avoid damage to oil and dirt seals. Winch line must be removed in order to lubricate.

NOTE:

For adjustments on any winch components, refer to the Service Section of this manual.

## TROUBLE SHOOTING THE WINCH

Preliminary Procedures

If winch does not operate correctly, perform a visual inspection for obvious faults, such as leaking oil, unusual noise, and loose, damaged, or broken parts. If cause of trouble is not readily apparent, check operation of winch in each of the four positions, as described in the following operating test, and determine the trouble. The numbers following the trouble refer to item numbers in the TROUBLE column of the trouble shooting table. When the trouble has been isolated, use the table to determine the cause and correction procedures. Procedures given in the CORRECTION column are covered in the Service Section, unless otherwise stated.

Operating Test

### BRAKE-ON

Normal Conditions: Brake applied, forward clutch released, reverse clutch released.

Operating Problems:

1. Brake does not hold
   - A. Oil on band . . . . . 3
   - B. Brake band adjustment too loose . . . . . 2
   - C. Brake apply spring adjustment too loose . . . . 7
   - D. Valve spool position incorrect . . . . . 5
   - E. Brake cylinder jammed in extended position . . . . 16
2. Winch winds in wire rope
   - A. Forward clutch assembly defective . . . . . 11
   - B. Forward clutch pinion bearings defective . . . . . 11
   - C. Valve spool position incorrect . . . . . 5
3. Tractor converter stalls
   - A. Both clutch assemblies and/or clutch pinion bearings defective . . . . . 11
   - B. Defective bearings on bevel gear shaft or bevel pinion shaft . . . . . 18
4. Winch pays out wire rope
   - A. Reverse clutch and brake defective . . . . . 14

### BRAKE OFF

Normal conditions: Brake released, forward clutch released, reverse clutch released.

Operating Problems:

1. Brake does not release
   - A. Low pressure in hydraulic system . . . . . 1
   - B. Valve spool positioned incorrectly . . . . . 5
   - C. Brake band adjustment too tight . . . . . 4
   - D. Brake apply spring adjustment too tight . . . . 6
   - E. Brake cylinder jammed closed . . . . . 17
   - F. Brake drag spring tension excessive . . . . . 8
   - G. Brake shaft, idler shaft, drum shaft bearings, and/or gears have failed . . . . . 19

2. Winch winds in wire rope

   A. Brake drag spring tension insufficient . . . . . 9
   B. Forward clutch assembly and clutch pinion defective . . . . . 10, 11
   C. Oil level too high . . . . . 20

3. Converter or engine stalled

   A. Both clutch assemblies and/or clutch pinion bearings defective . . . . . 12
   B. Defective bearings on bevel gear shaft or bevel pinion shaft . . . . . 18

## FORWARD (WINCH-IN)

Normal Conditions: Brake released, forward clutch engaged, reverse clutch released.

Operating Problems:

1. Winch does not pull

   A. Low pressure in hydraulic system . . . . . 1
   B. Valve spool positioned incorrectly . . . . . 5
   C. P.T.O. drive failure . . . . . 21

2. Winch pulls, brake overheats

   A. Low pressure in hydraulic system . . . . . 1
   B. Brake band adjustment too tight . . . . . 4
   C. Brake apply spring adjustment too tight . . . . 6
   D. Brake cylinder closed . . . . 17

3. Winch stalls tractor converter or engine

   A. Brake band adjustment too tight . . . . . 4
   B. Brake apply spring adjustment too tight . . . . 6
   C. Reverse or both clutch assemblies and clutch pinion bearings defective . . . . . 13
   D. Defective bearings and/or gears in winch transmission . . 22

## REVERSE (PAY OUT)

Normal Conditions: Brake released, forward clutch released, reverse clutch engaged.

Operating Problems:

1. Drum does not pay out

   A. Low pressure in hydraulic system . . . . . 1
   B. Valve spool positioned incorrectly . . . . . 5
   C. P.T.O. drive failure . . . . . 21

2. Tractor converter stall

   A. Brake band adjustment too tight . . . . . 4
   B. Brake spring adjustment too tight . . . . . 6
   C. Forward or both clutch assemblies and clutch pinion bearing defective . . . 10, 11, 12
   D. Defective bearings and/or gears in winch transmission . . 22

3. Winches in

   A. Forward clutch locked and reverse develops no torque . . . . . 15

## TROUBLESHOOTING TABLE

| TROUBLE | CAUSE | CORRECTION |
|---|---|---|
| 1. Low pressure in hydraulic system. | Relief valve out of adjustment. | Adjust relief valve. See Relief Valve Adjustment. |
| | Relief valve seized open. | Clean suction strainer and replace return filter. Clean and adjust relief valve. See Relief Valve Adjustment. Replace defective relief valve. |
| | Pump drive belt slipping, or pump coupling or drive broken or worn. | Tighten belt, or replace defective parts. |
| | Suction strainer and/or return filter dirty. | Clean suction strainer and replace return filter. |
| | Low oil level in winch. | Fill to proper oil level with oil specified on lubrication plate. |
| | Air leak in suction line or suction strainer. | Repair piping or filter as as required. |
| | Defective pump. | Replace pump. |
| | Internal leak in pressure system at tubing, bevel shaft, clutch assembly, or brake release cylinder seals. | Inspect internal seals and piping. Replace as required. |
| | Control valve assembly damaged or worn. | Repair or replace control valve. |
| 2. Brake band adjustment too loose. | Brake lining worn. | Adjust brake. See BRAKE ADJUSTMENT. |
| | Brake adjustment loosens with use. | Make certain brake rod adjustment lock is functioning. |
| 3. Oil on brake band. | Oil leak in brake compartment. | Inspect cylinder, hose, fittings, bevel shaft cap, and brake shaft seal carrier. Repair or replace defective parts. |
| 4. Brake band adjustment too tight. | Incorrect adjustment. | Adjust brake. See BRAKE ADJUSTMENT. |

| TROUBLE | CAUSE | CORRECTION |
|---|---|---|
| 5. Valve spool positioned incorrectly. | Control cable not threaded to proper depth in valve spool, or improper adjustment at control lever. | Adjust cable into spool until correct adjustment is made. See control stand adjustment. |
| | Control cable damaged and binding. | Replace control cable. |
| | Valve spool seized. | Disassemble and clean up spool and body. |
| | Valve centering spring weak or broken. | Replace valve spring. |
| 6. Brake apply spring adjustment too tight. | Incorrect adjustment. | Adjust spring tension. See BRAKE ADJUSTMENT. |
| 7. Brake apply spring adjustment too loose. | Incorrect adjustment. | Adjust spring tension. See BRAKE ADJUSTMENT. |
| 8. Brake drag spring tension excessive. | Variations in spring caused by manufacturing tolerances. | Stretch spring to increase hook to hook distance. |
| 9. Brake drag spring tension insufficient. | Brake lining worn out. | Replace brake lining on brake band. |
| 10. Forward clutch assembly defective. | Clutch plates warped. | Replace plates. Check system for low pressure and correct as required. |
| | Piston return springs weak and broken. | Replace springs. |
| | Clutch piston seized. | Clean up parts and replace as required. |
| 11. Forward clutch pinion bearings defective. | Bearings broken or seized. | Replace pinion bearings. |
| 12. Both clutch assemblies and/or clutch pinion bearings defective. | Clutch plates warped. | Replace plates. Check system for low pressure and correct as required. |
| | Piston return springs weak and broken. | Replace springs. |
| | Clutch piston seized. | Clean up parts and replace as required. |
| | Bearings broken or seized. | Replace pinion bearings. |

| TROUBLE | CAUSE | CORRECTION |
|---|---|---|
| 13. Reverse or both clutch assemblies and clutch bearings defective. | Clutch plates warped. | Replace plates. Check system for low pressure and correct as required. |
| | Piston return springs weak and broken. | Replace springs. |
| | Clutch piston seized. | Clean up parts and replace as required. |
| 14. Reverse clutch and brake defective. | Brake lining worn. | Adjust brake. See BRAKE ADJUSTMENT. |
| | Brake adjustment loosens with use. | Make certain brake rod adjustment lock is functioning. |
| | Oil leak in brake compartment. | Inspect cylinder, hose, fittings, bevel shaft cup, and brake shaft seal carrier. Repair or replace defective parts. |
| | Incorrect adjustment. | Adjust spring tension. See BRAKE ADJUSTMENT. |
| 15. Forward clutch locked and reverse develops no torque. | Locked or seized forward clutch. Reverse clutch does not function. | Remove and disassemble clutches to determine causes of failure. Repair or replace defective parts. |
| 16. Brake cylinder jammed in extended position. | Brake cylinder rod or piston head damaged and seized in open position in cylinder. | Rebuild or replace brake cylinder assembly. |
| | Hydraulic oil trapped in brake cylinder. | Inspect winch-to-brake hose assembly. Inspect control valve assembly. Repair or replace defective parts. |
| 17. Brake cylinder jammed closed. | Brake release cylinder return line orifice plugged or undersize. | Clean and check diameter of orifice. Orifice should be .060". |
| | Excessive oil leaking by brake cylinder piston. | Replace piston seals. Check piston orifice diameter. Should be .031". |
| | Brake release cylinder rod or piston head damaged and seized in closed position in cylinder. | Rebuild or replace brake cylinder as required. |

| TROUBLE | CAUSE | CORRECTION |
|---|---|---|
| 17 (Continued) | Hydraulic oil blocked from entering brake cylinder. | Inspect winch-to-brake hose assembly. Inspect control valve assembly. Repair or replace defective parts. |
| 18. Defective bearings on bevel gear shaft or bevel pinion shaft. | Bevel shaft bearing carriers adjusted too tight. | Replace bearings and readjust providing proper shaft end clearance. See data sheet in Service Section. |
| | Secondary failure resulting from clutch pinion bearing failure and thrust loading from clutch spacers. | Repair clutch. Replace bearings and readjust. |
| 19. Brake shaft, idler shaft, drum shaft bearings and/or gears have failed. | Gear train overloaded. | Replace defective parts. Operate within limits of winch. |
| 20. Oil level too high. | Filling winch reservoir when tractor is not in level position. | Reduce level of oil to proper height. |
| 21. P.T.O. drive failure | P.T.O. coupler failure or P.T.O. shaft failure. | Replace defective parts. |
| 22. Defective bearings and/or gears in winch transmission. | Gear train overloaded. | Replace defective parts. Operate within limits of winch. |

# SERVICE SECTION

# CARCO MODEL F-50-PS PSM AND PSC WINCH

## (WITH INTERNAL FILTERS)

CONTENTS




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2257-F-10-1-74
SUPERSEDES
2257-F-11-1-73

## GENERAL INSTRUCTIONS

This manual contains procedures for complete disassembly and assembly of the winch, and also provides adjustment procedures required during and after repair or overhaul. The necessary clearances, backlash, and other data for proper reassembly of the winch are given in the assembly section of the components or in the data sheet at the end of this section.

NOTE: For repair, disassemble the winch only to the extent necessary to accomplish the required replacement of parts.

Before starting any replacement procedures, be sure to clean thoroughly the parts to be removed, and adjacent areas, to prevent entry of dirt and sand into the winch. Do not leave any ports or access openings exposed to the weather. Seal or cap the openings to prevent entry of dust, moisture, or other foreign material. Protect all exposed hydraulic ports and fittings with caps or plugs to prevent contamination of the hydraulic system.

During disassembly, care should be taken not to damage gaskets, shims, seals, and O-rings that are to be reused. Replace any such parts that are damaged or otherwise defective. Certain O-rings and seals specified in the replacement instructions must not be reused. In general, seals and O-rings that work under operating hydraulic pressures, or that require extensive disassembly to replace, should be replaced with new parts at time of reassembly.

During assembly, coat threads of all cap screws that penetrate the gear and clutch compartments, using suitable mastic sealing compound. Take care to prevent excess sealing compound from entering the winch case, as it tends to clog the filters.

Maintain strict cleanliness during rebuild to prevent entry of dirt or moisture into winch case. Hydraulic components should be rebuilt in a clean, controlled atmosphere such as exists in an engine or hydraulic repair area.

## PREPARATION FOR WINCH REMOVAL

Clean winch and rear of tractor to prevent entry of dirt into winch or tractor transmission case during removal and disassembly.

Loosen pipe plug from right side of case to permit complete draining of oil.

Remove magnetic pipe plug from bottom of winch to drain oil.

Disconnect hydraulic hoses from winch case.

Disconnect winch control cable from control stand and remove from valve housing.

Support winch with suitable hoist or chain block, and remove nuts, cap screws, and lock washers securing winch to tractor.

When winch and P.T.O. shaft have been removed from tractor transmission, cover opening in rear of tractor to prevent entry of dirt.

CAUTION: To prevent damage to pump do not run tractor engine after oil is drained from winch unless winch hydraulic pump is disconnected from tractor engine.

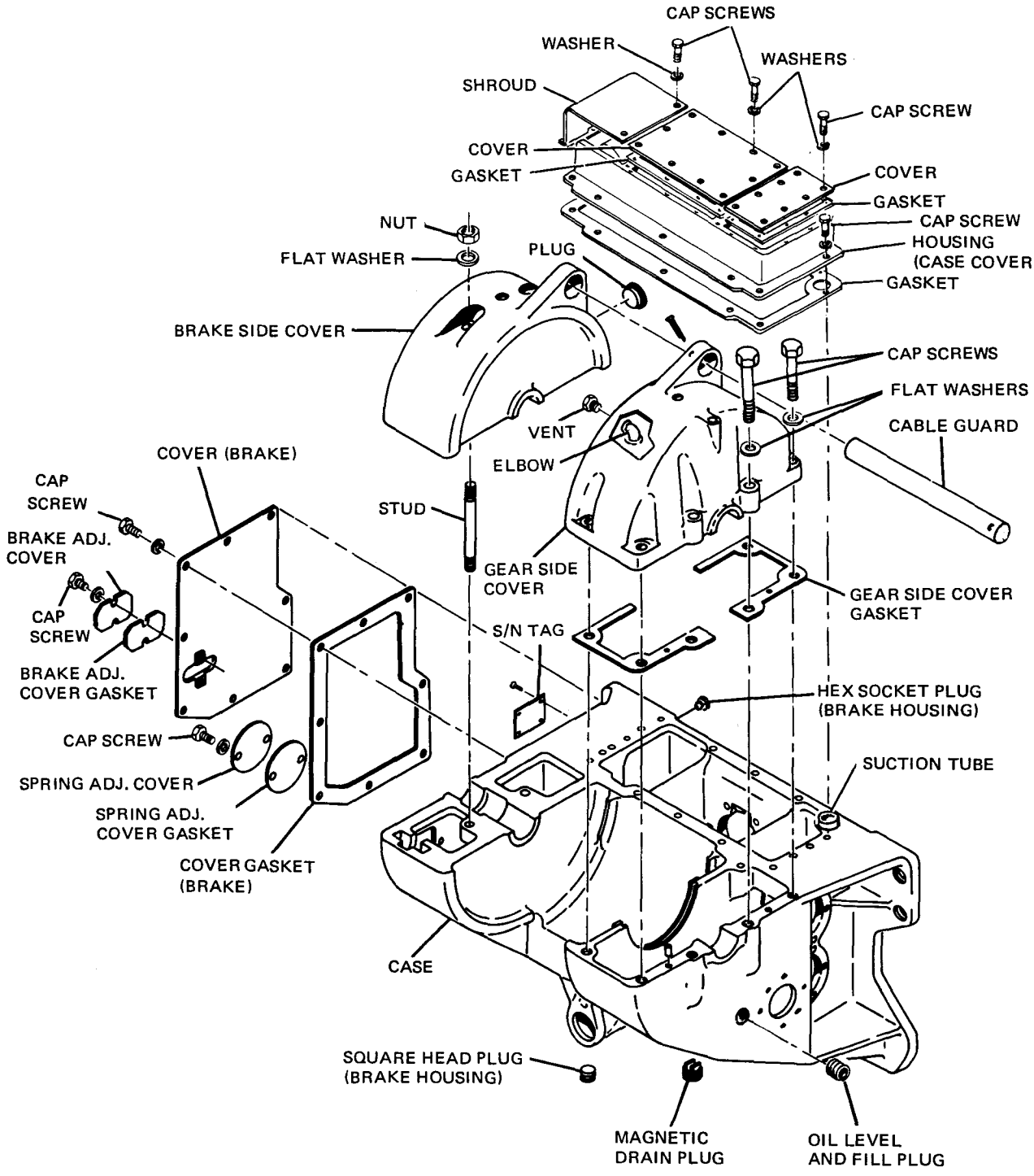



**FIGURE 1**
**CASE**

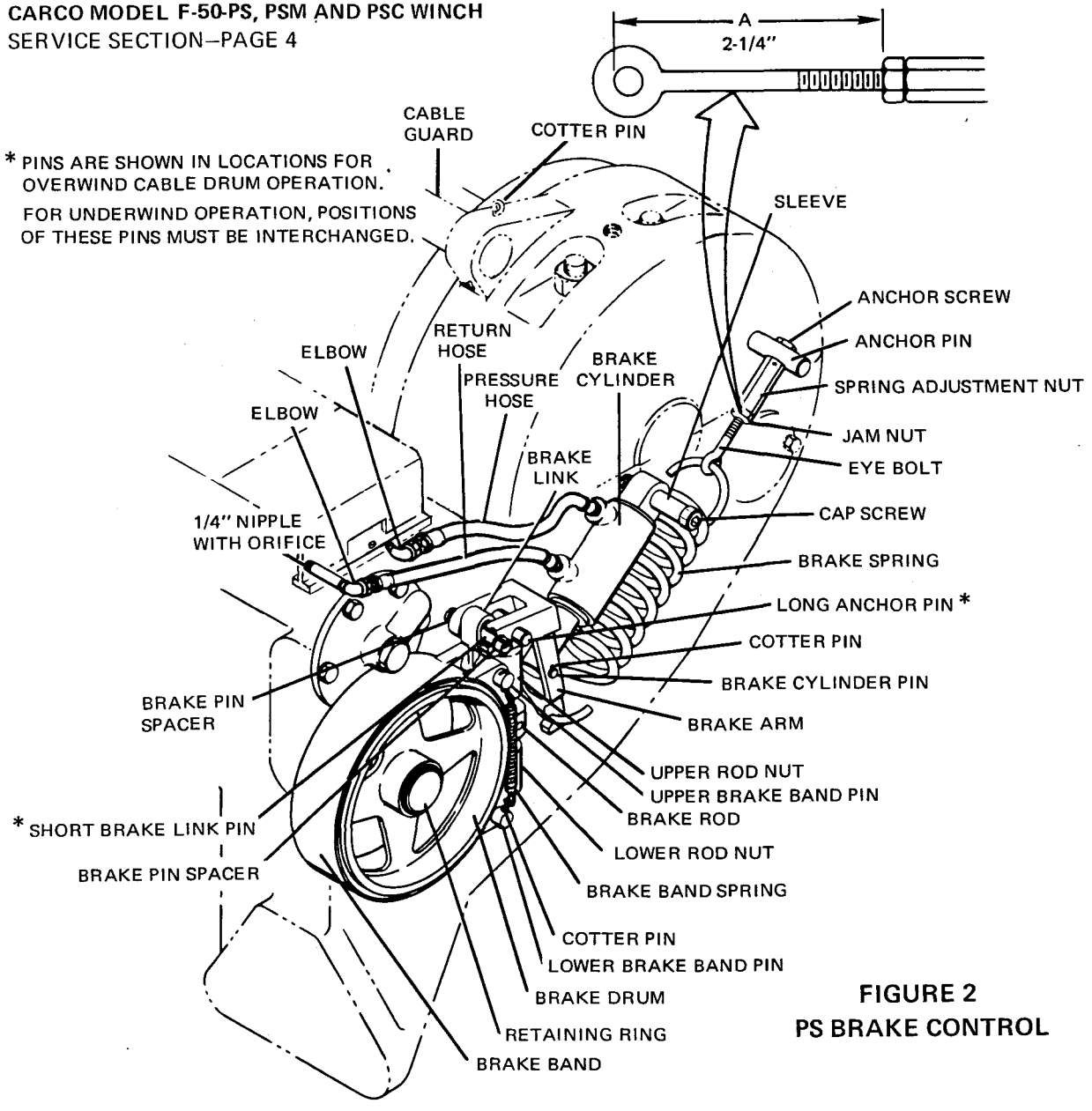



**FIGURE 2**
**PS BRAKE CONTROL**

## BRAKE CONTROL PS WINCH

Disassembly

See Figures 1 and 2.

NOTE: Observe strict cleanliness while working on any part of the winch.

Remove side cover (brake).

If winch is mounted on tractor and is in working order, start tractor engine and move control lever to brake-off position to release brake. Remove brake band pins, brake pin spacers, and tension spring. Stop engine.

If winch is removed from tractor, or is inoperable, remove spring adjustment cover and loosen brake spring adjustment nut until brake spring is free of tension, then remove brake band pins and brake band spring.

Remove retaining ring securing brake drum to shaft, and remove drum. Remove brake band assembly.

Disconnect brake hoses from fittings at winch case. Remove return line elbow and

nipple from case. Remove elbow from nipple and check condition of orifice. Orifice should be .060" diameter.

If brake spring is still under tension, loosen brake spring adjustment nut as required to loosen spring, and disconnect spring from brake arm.

Remove brake cylinder anchor screw. Remove brake arm anchor pin, using suitable puller threaded into hole in pin if necessary, and remove cylinder, brake arm, and brake rod assembly. Disassemble brake cylinder from brake arm.

Assembly

See Figures 1 and 2.

Assemble brake arm to brake cylinder with brake cylinder pin and cotter pin. Assemble brake link to arm with brake link pin.

Position assembled brake cylinder and brake arm in winch, and secure brake cylinder with cap screw and sleeve. Engage brake spring with end of brake arm.

Position brake rod assembly in winch and install anchor pin through brake arm and brake rod nut and into pin recess in winch case.

NOTE: If winch is being assembled for underwound drum operation, interchange the long and short brake pins; the longer pin will then be installed through the end hole of the brake arm and the slotted hole of the brake link.

Be sure spacer rings are installed in winch case at each end of the shorter pin.

Connect brake hoses to fittings in winch case.

Place brake band in winch. Install brake drum on brake shaft and install retaining ring.

Secure ends of brake band assembly to brake rod and brake link with pins, and connect brake band spring with cotter pins.

Brake Clearance Adjustment

Start tractor engine and shift winch to brake-off position. Be sure brake is fully released.

Adjust brake rod until brake band is tight, then back off brake rod four or five hex flats. Adjust so a flat side of the rod nut is flat against the brake rod spring.

Brake Spring Tension Adjustment

Adjust eye bolt securing spring to dimension "A", Figure 2.

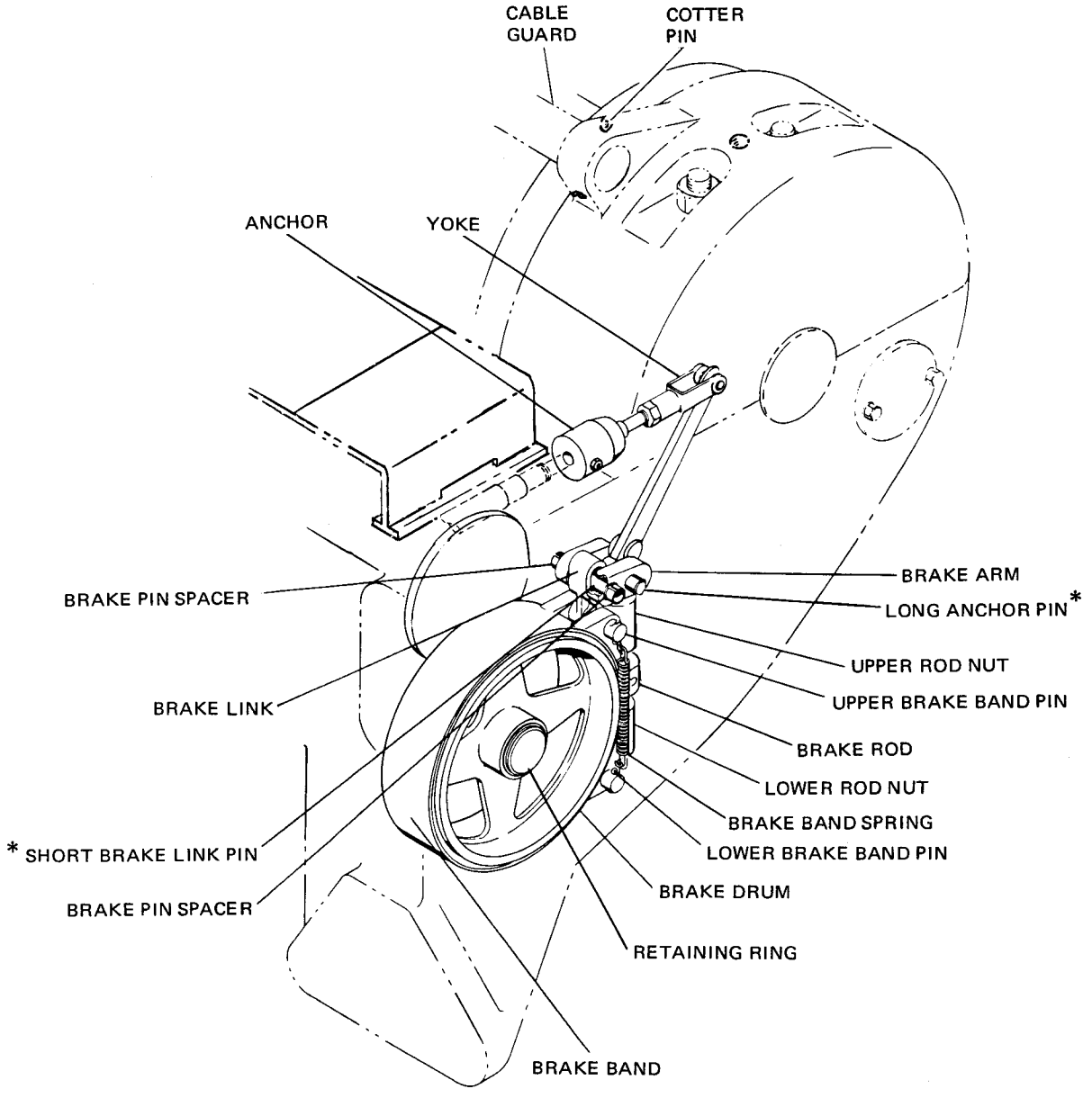
With tractor engine stopped, remove orifice from brake cylinder return line and reinstall line.

Loosen jam nut and turn spring adjustment nut as required to increase or decrease spring tension. Brake should start to release at approximately 175 PSI and must be fully released at 190-200 PSI. Do not overtension.

Replace orifice in return line.

Tighten jam nut and install spring adjustment cover or brake side cover.

Do not allow brake to slip or drag over extended periods of time.




* PINS ARE SHOWN IN LOCATIONS FOR OVERWIND CABLE DRUM OPERATION.

FOR UNDERWIND OPERATION, POSITIONS OF THESE PINS MUST BE INTERCHANGED.

## FIGURE 3
## PSM AND PSC BRAKE CONTROL

## BRAKE CONTROL PSM & PSC WINCH

### Disassembly

See Figure 3.

NOTE: Observe strict cleanliness while working on any part of the winch.

Remove brake cover. See Figure 1.

If winch is mounted on tractor, move brake control handle to brake-off position to release brake. Remove upper and lower brake band pins and tension spring.

Remove retaining ring securing brake drum to shaft, and remove drum. Remove brake band assembly.

If brake linkage is to be removed, proceed as follows:

Remove cotter pin securing cable guard, and remove guard.

Remove anchor pin.

Remove hex nuts and washers securing brake side cover, and lift up cover. Brake linkage will come out with cover.

Remove yoke pin assembly to separate brake arm from control cable end yoke.,

### Assembly

If brake linkage was disassembled, connect upper end of brake arm to control cable end yoke.

Lift brake side cover with brake arm over case, and lower into case. Guide arm into position. Secure cover with hex nuts and washers.

Install cable guard and cotter pin.

Connect brake link to brake arm with brake link pin (shorter pin).

Position brake arm and install anchor pin (longer pin) in first part of brake arm. Position assembled brake rod and upper and lower rod nut and complete installation of pin.

NOTE: If winch is being assembled for underwound drum operation, interchange the long and short pins; the anchor pin (longer pin) will then be installed through the end hole of the brake arm and the slotted hole of the brake link.

Be sure spacer rings are installed in winch case at each end of the shorter pin.

Place brake band in winch. Install brake drum on brake shaft and install retaining ring.

Secure ends of brake band assembly to brake rod and brake link with pins, and connect brake band spring to cotter pins in brake band.

### Brake Band Clearance Adjustment

Stop tractor engine.

Move brake control handle to brake off position.

Adjust brake rod until brake band is tight, then back off brake rod four or five hex flats. Adjust so rod nut is flat against the brake rod lock spring affixed to inside of lower rod nut.

Install brake cover or brake adjustment cover when adjustments are correct.

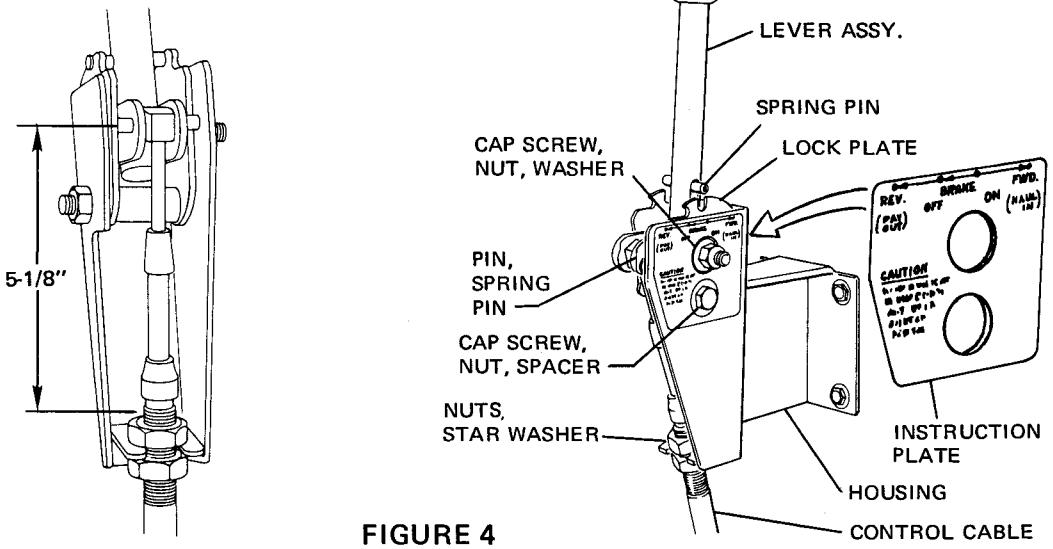



**FIGURE 4**
**PS CONTROL STAND**

## CONTROL STAND PS WINCH

### Removal

See Figure 4.

Remove clip and pin securing control cable to control lever.

Loosen nuts securing cable housing to control stand housing and remove cable.

Remove cap screws and nuts securing control stand to seat or bracket and remove stand.

To remove control cable, loosen jam nut and set screw securing cable to housing assembly (case cover) and turn cable core counterclockwise to remove from control cable pin.

### Disassembly

Remove nuts, washers and cap screws securing spacers, spring, lock plates and handle assembly to control stand housing and remove components.

Remove ball and spring pin from the lever assembly and remove inner tube of handle.

### Assembly

See Figure 4.

Install inner tube in lever assembly and secure with spring pin.

Install ball on lever assembly.

Position lock plates, handle assembly, spacers and spring in housing and secure to housing with cap screws, washers and nuts.

Install control stand to seat on bracket and secure with cap screws and nuts.

If control cable was removed from winch housing assembly (case cover) remove the valve housing cover.

NOTE: For routing of control cable see adapter section of this manual.

Install O-ring if removed on control cable housing and insert cable core in bore of housing.

Secure housing in bore with set screw and jam nut making sure set screw does not damage O-ring as it enters groove on cable housing.

NOTE: On some units, the control cable housing is secured to anchor bracket by U bolt and nuts.

Thread control cable core into control cable pin on lever assembly.

Adjust control cable core until a measurement of 5-1/8" is achieved from upper end of threads on cable housing to center of pin securing cable core to control stand lever.

When adjustment is correct, install control cable and secure with pin and clip to control stand lever.

With control handle in neutral position, place control cable in control stand housing and secure with nuts and star washer.

## CONTROL STAND PSM & PSC WINCH

### Removal

See Figure 5.

Remove yoke assembly from control cables.

Loosen jam nut and set screw securing cables to stand and remove cables.

Remove cap screws or nuts securing stand to brackets and remove stand.

### Installation

Refer to installation drawing in adapter section for location of control stand and routing of control cables. Install control stand, mount on tractor and route control cables to control stand.

Insert end of shift control cable into control stand and secure cable housing to stand with set screw and jam nut. Place shift handle in neutral (clutch release position). Be sure control valve is in neutral position.

Thread jam nut and yoke on cable end until holes in yoke and hole in lever are aligned. Install pin and lock yoke with jam nut.

Insert end of brake control cable into control stand and secure cable housing to stand with set screws and jam nut.

Thread jam nut and yoke on cable until cable thread engage full length of yoke threads. Align yoke with brake handle and install pin. Lock yoke with jam nut. Adjust brake band clearance. See Figure 3.

The control stand may be installed for right- or left-hand mounting on tractor. See adapter drawing and parts list section of this manual.

Start tractor engine. Move control levers to each position and check to see that winch operates properly in each position. If controls require adjustment, repeat procedures as listed.

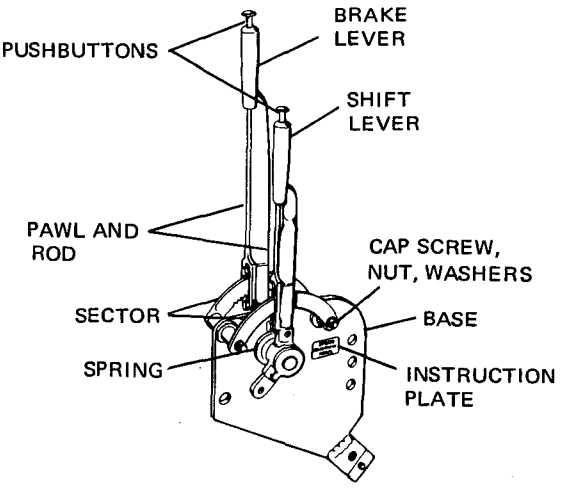



**FIGURE 5**
**PSM/PSC CONTROL STAND**

## CASE COVER

Removal

See Figures 1 and 6.

If winch is mounted on tractor, clean case cover and valve housing assembly, tractor fuel tank and tank guard.

Loosen jam nut and set screw, or U bolt and nuts securing control cable housing.

Remove pin at control stand end of cable.

Turn cable core counterclockwise to remove core from control cable pin in valve housing. Remove cable from housing.

Disconnect pressure and suction hose from control valve housing and catch any hydraulic fluid that drains from hoses.

Plug disconnected hoses to keep clean.

Remove covers and gaskets from control valve housing being careful not to damage gaskets.

Disconnect all hydraulic tube nuts from connectors on control valve.

Remove operator warning gauge hose from elbow on manifold.

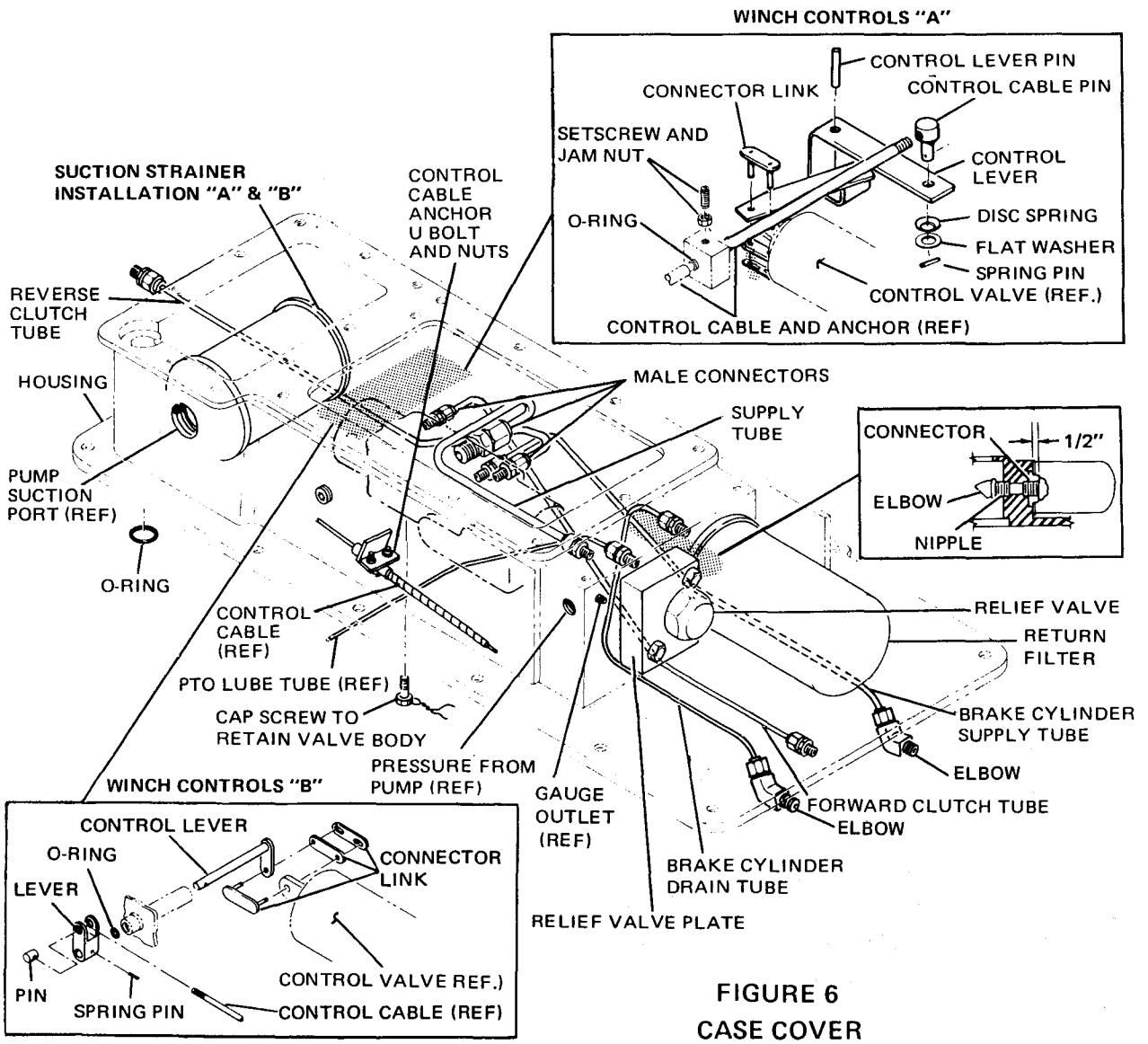



FIGURE 6
CASE COVER

2261-B-10-1-74
SUPERSEDES
2261-B-11-1-73

Remove cap screws and washers securing valve housing to case.

Raise valve housing assembly straight up approximately 1-1/2" to clear suction tube and remove from case.

Remove gasket from case.

Remove all hydraulic tubes from winch case, marking each for correct installation during reassembly.

Installation

Install hydraulic tubes in winch case as marked during disassembly.

NOTE: Be sure all tubes clear clutch housing after assembly.

Inspect and install new gasket if necessary on winch case.

Install new O-ring, if required, in suction tube groove and lubricate with light oil.

Position valve housing over case opening to clear suction tube and lower housing to case being careful not to damage O-ring and suction tube as housing is lowered. Secure housing to case with cap screws and washers.

Connect all hydraulic tubes to correct position on connectors on control valve.

Connect pressure, suction and operator warning gauge hoses to their proper fittings on valve housing and manifold.

## CONTROL LEVER A

See Figure 6A.

Removal

Disconnect control cable at control stand pin. Turn control cable core counterclockwise to remove from control cable pin and control lever.

Remove connecting link from control valve.

Remove control lever pin anchoring control lever to housing assembly and remove control lever assembly from housing.

Disassembly

Remove spring pin, disc spring and washer securing control level pin to control lever assembly and remove control lever pin.

Assembly

Install control lever pin in control lever assembly and secure with washer, disc spring, and spring pin.

NOTE: Install enough disc springs as required to remove all slack in the control lever pin.

Installation

Install assembly in valve housing and secure to housing with control lever pin.

Thread control cable into control lever pin.

Secure control valve to control lever with connecting link.

Install control cable and secure with nuts and star washer.

NOTE: For installation of control stand and cable, see Figure 4.

## CONTROL LEVER B

See Figure 6B.

Removal and Disassembly

Disconnect control cable at control stand. Turn control cable core counterclockwise to

remove from control cable pin at valve housing.

Remove connecting link from control valve and control lever assembly.

Remove spring pin securing lever to control lever shaft.

Remove all sharp edges on end of shaft and push control lever assembly out of valve housing.

Remove O-ring from control lever bore.

Assembly and Installation

Lubricate and install new O-ring, if required, in control lever bore of valve housing.

Lubricate control lever shaft and push assembly through bore in valve housing and O-ring.

Install lever on end of shaft and secure with spring pin.

Install connecting link to control valve and control lever assembly.

Thread control cable in control cable pin and install cable to control stand.

NOTE: For installation of control stand and cable, see Figure 4.

## RETURN FILTER

See Figure 6.

Removal

Remove shroud over return filter.

Turn filter counterclockwise to remove from manifold.

Discard old filter.

NOTE: To install the connector between the filter and manifold, clean threads on connector and manifold with Loctite Primer Grade T (or equivalent). Apply Loctite Studlock (or equivalent) on threads and install connector into manifold to a depth of 1/2". See Figure 6.

Installation

Coat gasket surface with oil and install new filter on manifold making sure that the gasket on the filter is not damaged in any way.

Tighten filter to manifold until gasket is up against manifold loosely, then turn filter another 3/4" turn to seal gasket.

## SUCTION STRAINER

See Figure 6.

Removal

Remove cap screws, cover, and gasket over suction strainer.

Turn strainer counterclockwise and remove strainer.

Disassembly

Remove clip and magnets from around screen. Clean screen and components in solvent or with a soft brush and solvent. Dry screen and components before reassembly.

Reassembly

Assemble screen and components and secure with clip making sure assembly is securely held together.

Installation

Install cleaned strainer in case cover and tighten securely.

Reinstall cover, gasket and cap screws making sure gasket is not damaged in any way.

## CONTROL VALVE

### Removal

Refer to case cover removal, Figures 1 and 6.

Remove cap screws, cover and gasket from valve housing.

Remove hydraulic tube nuts from connectors on control valve.

Remove connecting link from control valve spool.

Remove lockwire and cap screw securing valve to plate underneath control valve.

Remove control valve out of the manifold being careful not to damage valve seal on removal.

Remove valve seal and washer.

Remove connectors from control valve body.

### Disassembly

See Figure 7.

Remove retaining ring from each end of valve.

NOTE: Use arbor press to compress springs slightly to facilitate removal of retaining rings.

Pull spool with springs and stops out of control cable end of body. Remove retaining ring from end of spool and remove spring stops and small spring.

Remove spring stop and spring from opposite end of valve. Using a soft drift, press piston from valve body.

Remove retaining ring from piston. With O-ring removed, install piston in valve body.

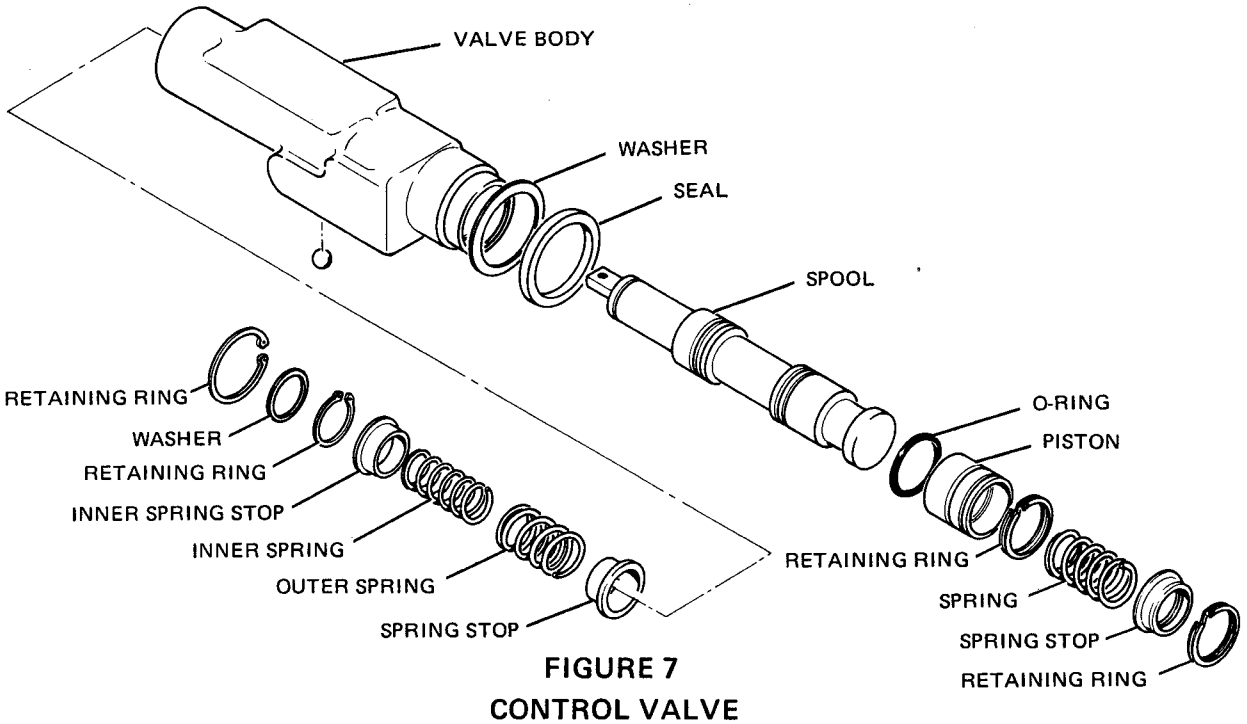



**FIGURE 7**
**CONTROL VALVE**

Be sure piston slides freely in and out of body.

Inspect O-ring for wear and replace if necessary.

Assembly (Control Valve)

See Figure 7.

Install O-ring and retaining ring on piston. Lubricate O-ring, piston, and valve body with light oil.

Press piston evenly into body.

Using arbor press, install piston spring and stop in body and secure with retaining ring.

Assemble inner spring stop, small spring and outer spring stop on spool and secure with retaining ring.

Lubricate assembled spool with light coating of oil and insert spool in body through control cable end.

Install outer (large) spring and washer and secure with retaining ring.

Installation (Control Valve)

Install connectors in control valve body.

Install seal washer on manifold end of control valve and install new valve seal if required. Lubricate seal before installation.

Position control valve in valve housing and install seal end of valve in manifold.

Install cap screw up through plate underneath and into control valve and tighten to secure valve to plate. Secure cap screw with lockwire.

Connect hydraulic tube nuts to corresponding connectors in valve body, starting with innermost to allow maximum room for wrench.

NOTE: Be sure tubes do not turn as nuts are tightened on connectors.

Secure connecting link to valve spool.

Install gasket, cover and cap screws.

## RELIEF VALVE

Removal

See Figure 6.

Remove cap screws securing shroud to valve housing and remove shroud.

Turn relief valve counterclockwise to remove valve from the plate, being careful not

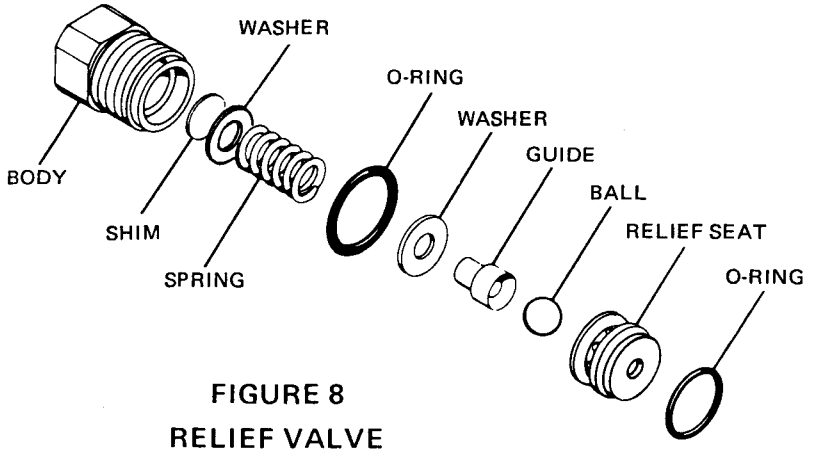



FIGURE 8
RELIEF VALVE

to drop the valve components as the valve is removed.

Remove the O-ring from relief valve bore in manifold.

NOTE: Removal of the relief valve plate is not necessary and should not be removed.

Disassembly

See Figure 8.

NOTE: All disassembly and assembly of the relief valve must be done in a clean area.

Remove spring, washer, guide, and ball from seat.

Inspect ball and seat. Be sure ball is smooth, and inspect seat for contamination that might cause ball to stick. Be sure seat does not have excessive wear and that ports are clean.

Shims may be removed by inverting body and tapping the open end lightly on a soft surface.

Remove O-ring from valve body.

Assembly

See Figure 8.

Install O-ring on valve body.

Install ball, guide, and washer and spring in seat. Place shims and washer in body and place body over spring.

Installation

See Figure 8.

Install inner O-ring in relief valve bore in manifold and be sure it is seated properly.

NOTE: Be sure O-ring does not slip out of position while installing rest of relief valve components.

Assemble ball seat, ball, guide, washer and spring, and insert into bore in plate and manifold.

Install O-ring on valve body and thread valve body into relief valve bore in plate and tighten moderately. DO NOT OVER-TIGHTEN.

Relief Valve Adjustment

Stop tractor engine.

Install gauge of 0 to 400 PSI range in 1/4 NPT port on case cover.

Start tractor engine and place control handle in brake-off position.

CAUTION: Before operating winch in clutch positions, be sure wire rope is removed or secured in a manner which will allow cable drum to turn without interference or damage to winch and wire rope.

Check pressure reading on gauge. Pressure must be 240 to 260 PSI at low idle.

If pressure setting requires readjustment, stop tractor engine and remove valve body.

Remove shims between spring and end of body to reduce pressure. Add shims to increase pressure.

Reinstall valve body.

Start tractor engine and place control stand in brake-off position.

Check pressure reading on gauge. Pressure must be 240 to 260 PSI at low idle.

Place control stand in clutch positions. Pressure reading must be 240 to 260 PSI at low idle.

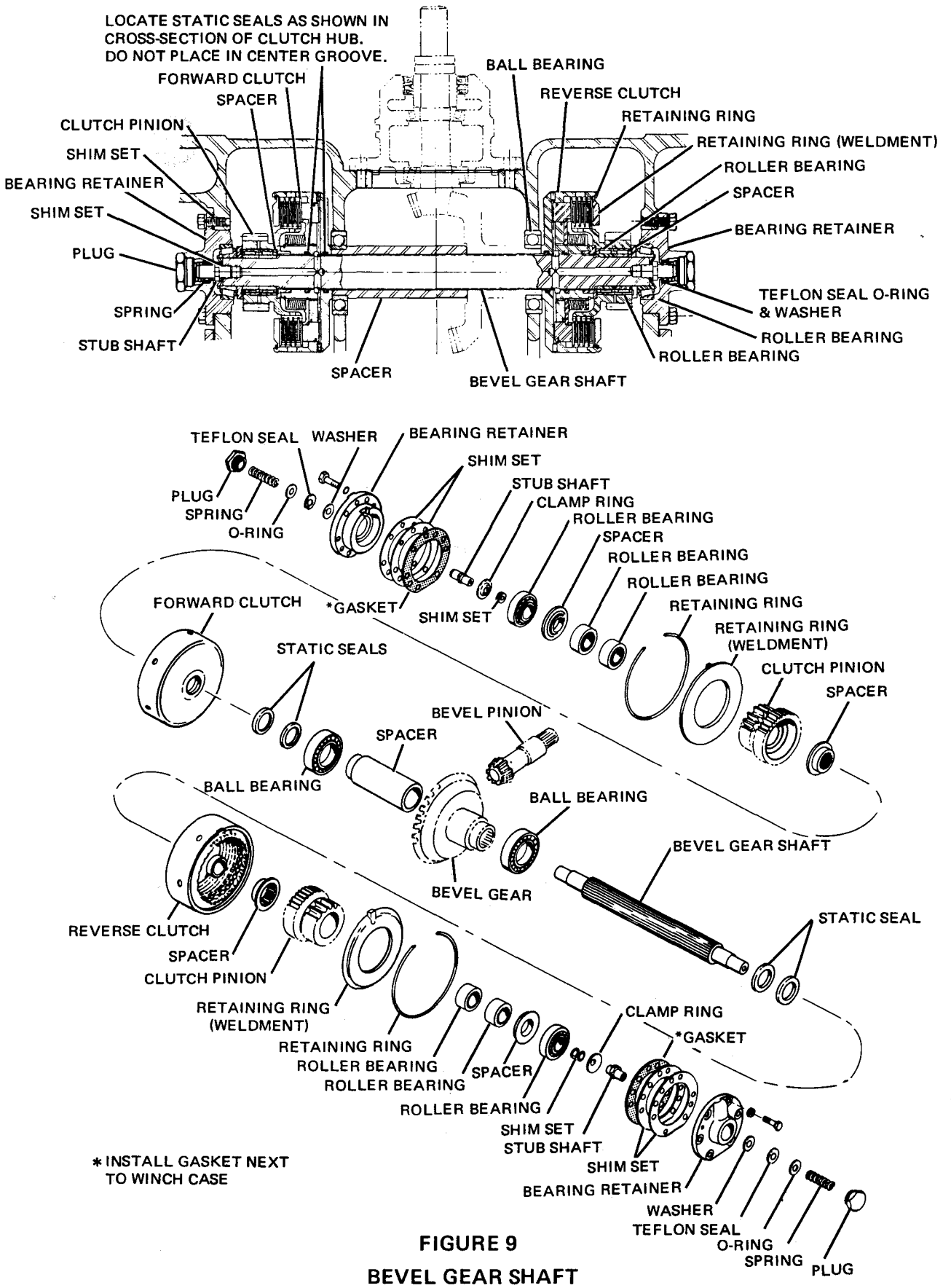



**FIGURE 9**

**BEVEL GEAR SHAFT**

## BEVEL GEAR SHAFT

Removal

See Figure 9.

Remove case cover. Refer to Figure 1, CASE COVER, Removal.

Remove brake drum and band. Refer to Figure 2, BRAKE CONTROL, Disassembly.

Remove bearing retainer at each end of bevel gear shaft.

Thread cap screws into two threaded holes in bearing retainer and tighten screws alternately to jack retainer from case, or use puller SK-7733. Remove and mark shims for proper installation during reassembly. Remove plug, seal spring, teflon seal, and washer from each carrier.

Unscrew stub shaft from each end of bevel gear shaft and remove shims and clamp ring. Mark shims for proper installation at time of reassembly.

Block clutch housing or bevel gear against web of case.

Thread eyebolt SK-8029-50 through plate SK-8028 and into threaded hole in outer surface of clutch assembly to support reverse or forward clutch. Use jam nut to maintain clutch position. See Figure 10.

Using shaft and cap puller SK-7733, or strong back SK-8031 and 3/4 UNF stud and nut, pull shaft until roller bearing cone and spacer is released, and catch bearing cone and spacer. Continue pulling shaft until it is clear of clutch, and lift clutch out of case. Mark clutch pinion bearings for proper reassembly.

NOTE: If tracks interfere with complete removal of bevel gear shaft, slide shaft first one way, then the other, to clear clutches. For complete removal of shaft, it may be necessary to remove one track shoe; otherwise winch may have to be removed from tractor.

Support remaining clutch in same manner, pull shaft free of case, and remove clutch. Remove other bearing cone and spacer from shaft with bearing puller.

NOTE: If it is necessary to drive shaft out of case, thread a 3/4 UNF cap screw into end of shaft to protect threaded hole in shaft.

The winch must be removed from tractor to remove bevel pinion carrier and pinion. Remove carrier and pinion marking shims for proper installation during reassembly.

NOTE: If carrier or pinion parts are to be replaced, refer to Figures 12 and 12A for Disassembly and Assembly Procedures.

Using a soft drift or wooden block, drive bevel gear toward the center of winch to press spacer and bearing from case. Remove spacer and bevel gear. Remove ball bearings from spacer and bevel gear.

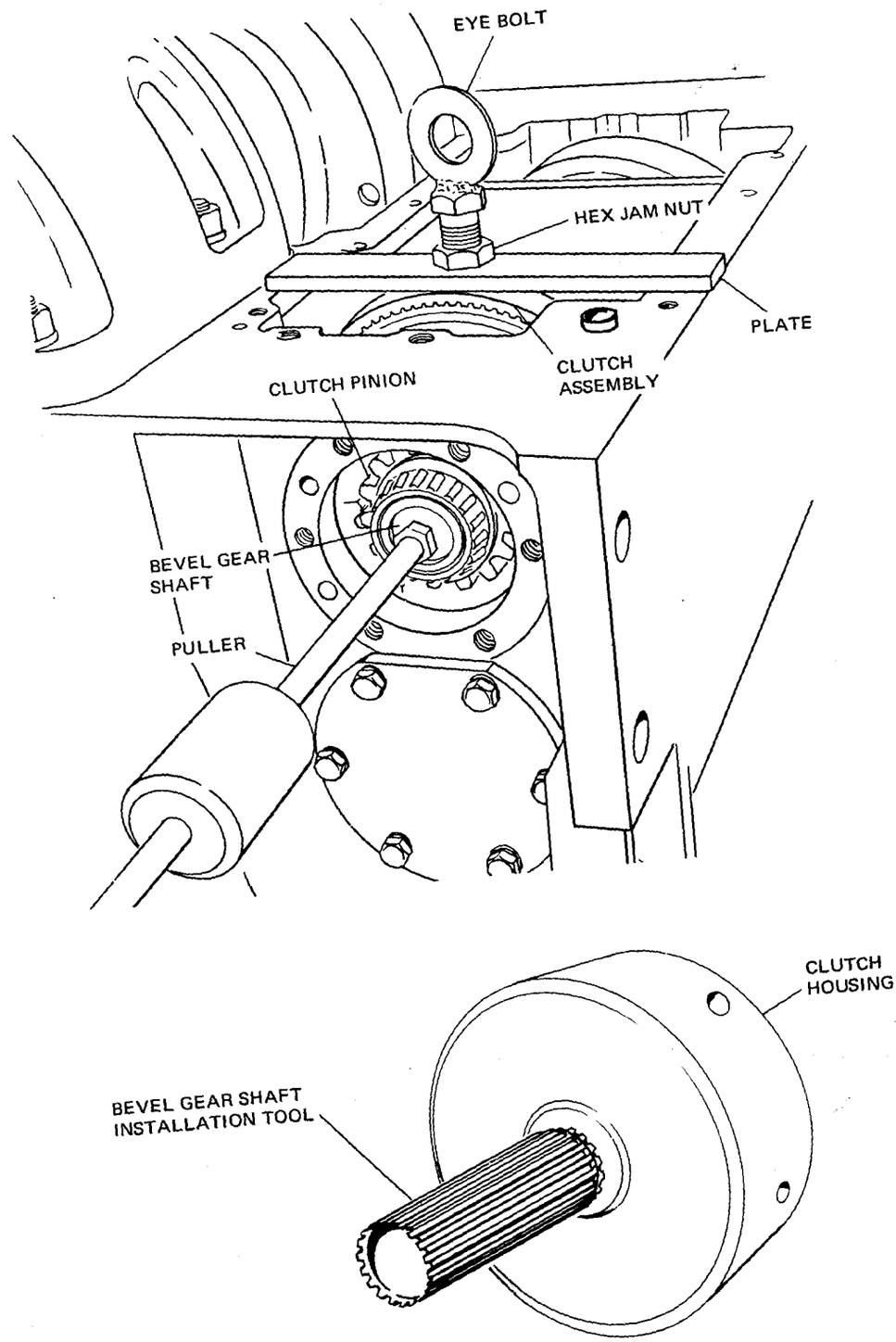



FIGURE 10
FIELD SERVICE TOOLS

Installation

See Figure 9.

Install ball bearings on bevel gear and bevel gear spacer. Install gear and spacer in winch case.

Pull shaft through bevel gear and spacer, turning as necessary to align splines.

Pull bevel gear shaft back sufficiently to permit installation of forward clutch.

Align spines of forward clutch, static seals and splined spacer for installation of bevel gear shaft installation tool.

Coat shaft installation tool No. 46259 with light oil and install tool with open end towards bevel gear shaft in clutch housing.

Support clutch and pinion assembly with plate SK-8028 and eyebolt SK-8029-50. See Figure 10.

Position forward clutch in winch case and carefully push or pull bevel gear shaft through clutch, aligning splines of installation tool with splines of bevel gear shaft.

Push or pull bevel gear shaft through forward clutch sufficiently to allow for installation of reverse clutch.

Install installation tool in reverse clutch. Support and position clutch in same manner as forward clutch in winch case.

Pull or push bevel gear shaft back through reverse clutch.

Remove installation tool.

Center bevel gear shaft so same amount of shaft extends beyond clutch pinion on each side, being sure all slack is removed from between components on shaft.

NOTE: Using light emery cloth, remove all marks or burrs, if any, from bearing races on bevel gear shaft so pinion bearings can be installed freely.

Lift or pry clutch pinion up slightly to center clutch pinion on shaft and install inner bearing races in clutch pinion.

Install spacer over end of bevel gear shaft into clutch pinion.

Complete installation of other clutch assembly in same manner.

Install tapered roller bearings on ends of shaft, using stud SK-8027, nut and bearing press SK-8026 to press bearings into place. Use two bearing presses simultaneously (one on each end of shaft) to press shaft components together. Bearings must be equally positioned on shaft, within 1/32".

Be sure all spacers, bearing races, and clutch housings are seated so no clearance remains between components on shaft.

Position shims and clamp ring on each end of shaft. Be sure shims are in same position from which they were removed. Add or remove shims as necessary to provide slight compression of clamp ring against bearing cone. Install stub shaft. Check stub shaft for runout. Total runout must not exceed 0.010". Use hardwood drift to tap high point of runout to align, if necessary.

Install bevel pinion and carrier, installing shims in same position from which removed, if no new parts were installed.

NOTE: Install bevel pinion and carrier with oil trough facing up.

Install shims on each bearing retainer in same poisiton from which removed, and install bearing retainers on winch case.

NOTE: Install fiber shim in innermost position under carrier.

Remove or add shims under bevel pinion carrier as required to set bevel gear contact pattern.

See Figure 11 for correct gear contact pattern.

Adjust bevel gear backlash and bevel gear shaft end clearance, if necessary.

Remove or add shims under bevel shaft bearing retainers to set bevel shaft end clearance to 0.005 to 0.010 inch. Transfer shims from one bearing retainer to the other as required to set backlash between bevel gear and bevel pinion to 0.008 to 0.012 inch. See Figure 9.

Install seal back-up washer, teflon seal, O-ring, and seal spring in each carrier, and install plugs.

Install brake drum and band. Refer to BRAKE CONTROL, Assembly.

Install case cover. Refer to CASE COVER, Installation.

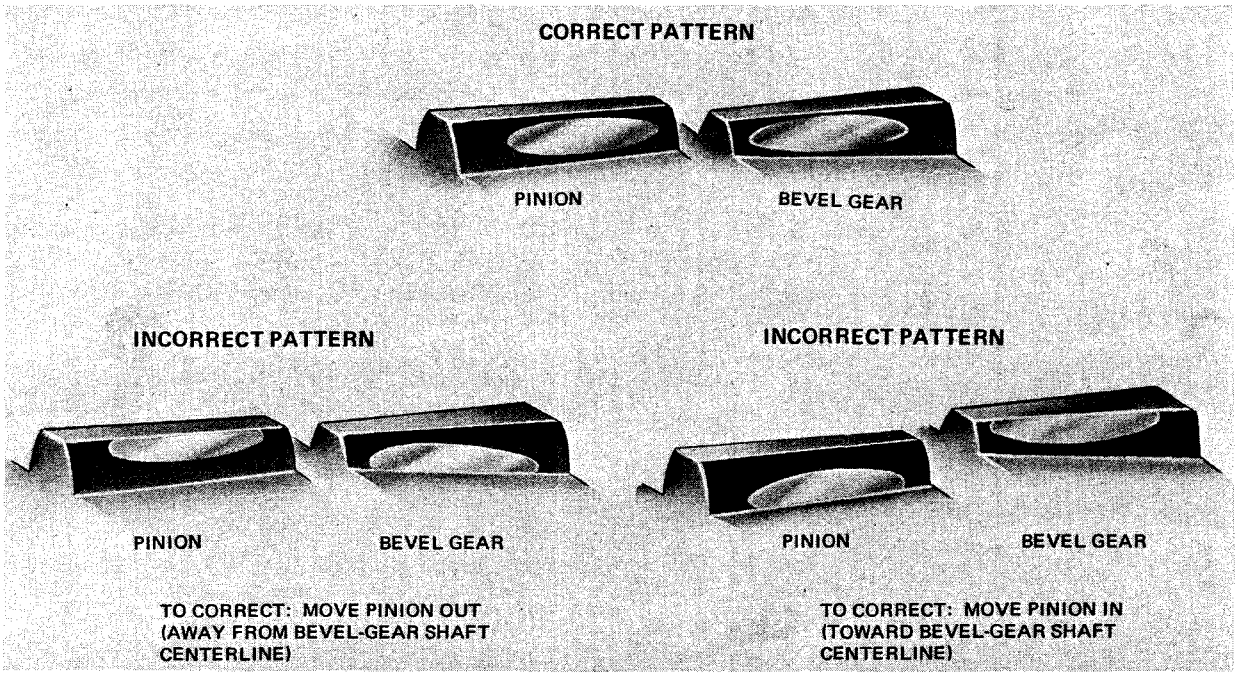



**FIGURE 11**
**GEAR TOOTH CONTACT PATTERNS**

## BEVEL PINION & CARRIER

Two-Piece Pinion and Carrier

Disassembly

See Figure 12.

Remove O-ring from carrier.

Remove cotter key, nut and pinion from shaft. Press shaft towards oil seal end of carrier to remove.

Remove spacer, forward bearing cone and seal sleeve from shaft.

Remove oil seals and bearing cups from carrier.

Assembly

See Figure 12.

Using Type B, Type CV Bearing Mount or Nut Lock Loctite compounds, coat inside diameter of seal sleeve. Follow manufacturer's instructions for use.

Install sleeve on shaft.

Install forward bearing cone on shaft.

NOTE: Listed below are the correct spacer and shim sets to be used, when any carrier or bearings are replaced. Use original spacer removed if no parts were replaced.

| Winch | Spacer | Shim Set |
|---|---|---|
| F-50 | 45084-5 | 45088 |
| G-80 | 45087-5 | 45089 |
| J-120 | 45090-5 | 45091 |

Select correct spacer and install on shaft.

Install cups in carrier, using correct shims as listed in chart, under forward bearing cup to obtain correct bearing end play. Shim to obtain bearing end play from .002 loose to .002 tight. Adding shims will decrease end play, removing shims will increase end play.

Install shaft in carrier.

Install rear bearing cone on shaft.

Install pinion and lock nut on shaft. Tighten nut to 150-300 lb./ft. and check bearing preload. Maximum torque without seals installed should not exceed 10 lb./in. For tooth contact pattern, see Figure 11.

Install cotter key through nut and shaft.

Install oil seals into carrier, inner seal with lip toward winch transmission, outer seal with lip toward transmission.

Recheck bearing preload. Seals will add 5 to 10 lb./in. preload.

Install O-ring on carrier.

One-Piece Pinion and Shaft Disassembly

See Figure 12A.

Remove O-ring from carrier.

Remove lock nuts from forward end of shaft. Press pinion out rear of carrier.

Remove seal sleeve, spacer and rear bearing cone from shaft.

Remove oil seals and bearing cups from carrier.

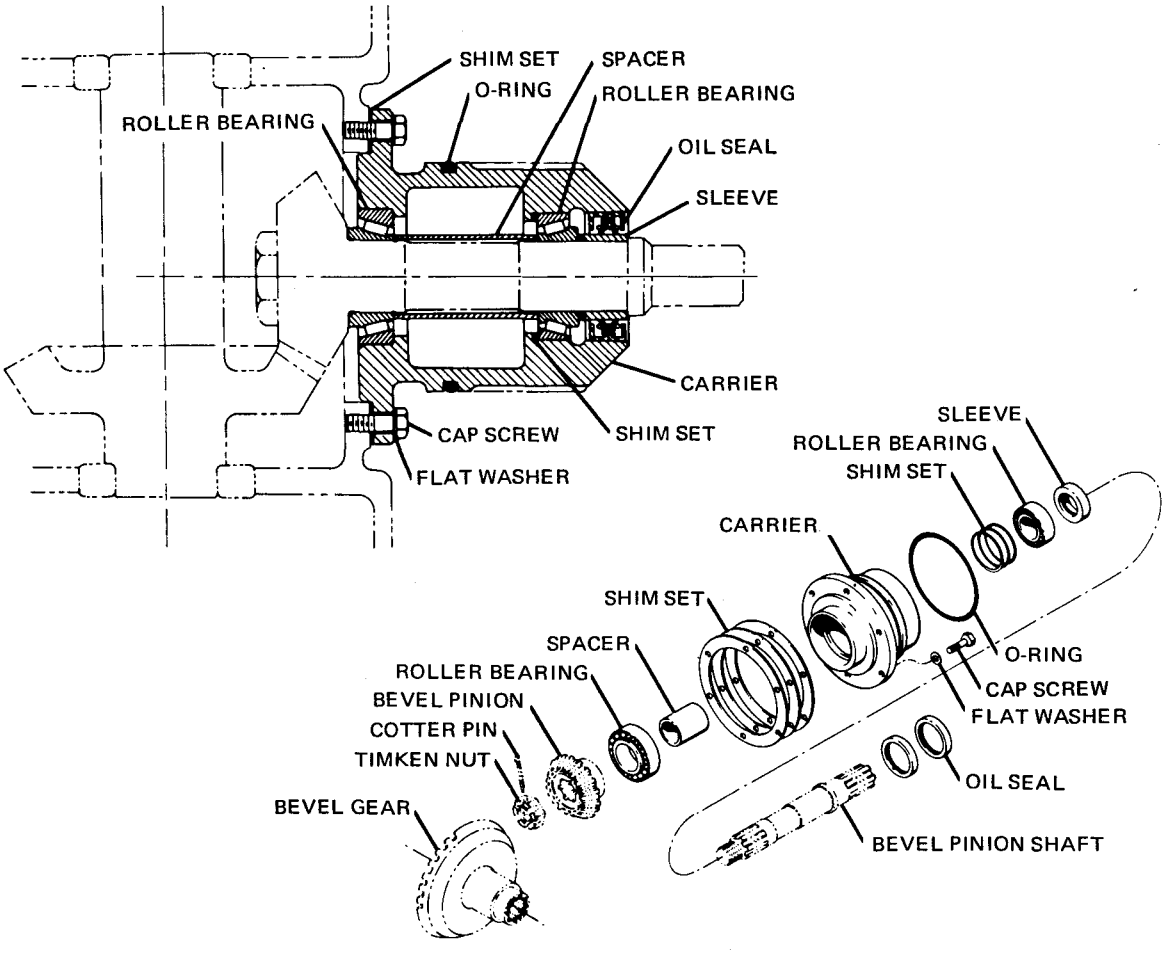



FIGURE 12
TWO PIECE BEVEL PINION AND SHAFT

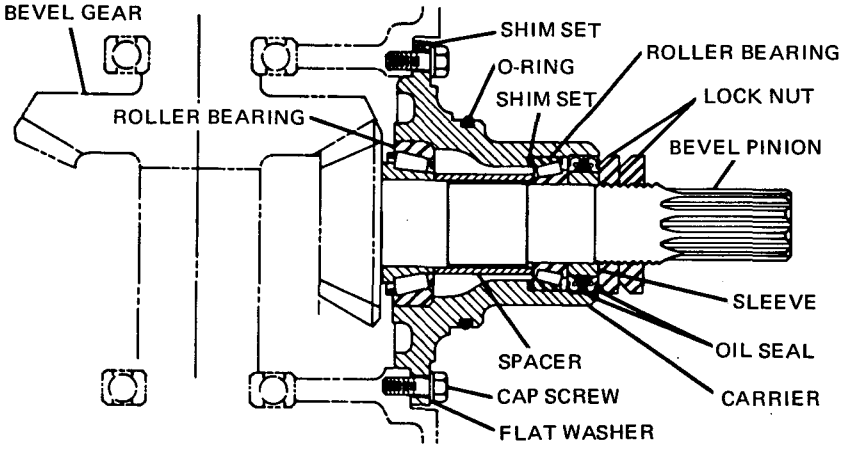



FIGURE 12A
ONE PIECE BEVEL PINION AND SHAFT

Assembly

See Figure 12A.

Press rear bearing cone on shaft.

NOTE: Listed below are the correct spacers and shim sets to be used, when any carrier or bearings are replaced. Use original spacer removed if no parts were replaced.

| Winch | Spacer | Shim Set |
|---|---|---|
| F-50 | 45084-5 | 45088 |
| G-80 | 45087-5 | 45089 |
| J-120 | 45090-5 | 45091 |

Select correct spacer and install on shaft.

Install cups in carrier using correct shims as listed in chart,under forward bearing cup to obtain correct bearing end play. Shim to obtain bearing end play from 0.002 loose to 0.002 tight. Adding shims will decrease end play, removing shims will increase end play.

Install shaft in carrier.

Install seal sleeve and one lock nut on shaft.

Tighten nut to 150-300 lb./ft. and check bearing preload. Maximum torque without seals installed should not exceed 10 lb./in. Correct by adding or removing shims under forward bearing cup. For tooth contact pattern, see Figure 11.

After adjustments are correct, remove lock nut and seal sleeve.

Using Type B, Type CV Bearing Mount or Nut Lock Loctite compounds coat inside diameter of seal sleeve and lock nuts. Follow manufacturer's instructions for use.

Install seal sleeve on shaft.

Install oil seals into carrier, inner seal with lip toward winch transmission, outer seal with lip toward tractor transmission.

Install one nut on shaft and tighten nut to 150-300 lb./ft. Install second nut and secure in same manner.

Recheck bearing preload. Seals will add 5 to 10 lb./in. preload.

## CLUTCHES

Disassembly

See Figure 13.

Remove clutch. Refer to BEVEL GEAR SHAFT, Removal.

Remove retaining ring from clutch body and remove retaining ring (weldment). Slide clutch pinion out of clutch. Remove splined spacer from pinion.

Remove clutch pinion bearing outer races, noting position for re-assembly. Note marks for matching races.

Similarly note match marks and position of pinion bearing inner races and remove inner races.

Lift clutch plates out of body, and mark plates so that they may be returned in the same order to maintain established wear pattern.

Using suitable press, compress ring retainer against springs, and remove retaining ring. Remove retainer and clutch springs. Remove return ring.

Invert clutch over a soft surface, such as wood, and drop clutch onto surface to remove clutch piston.

Remove two static seals from clutch body.

Remove piston seals from piston and clutch housing.

Inspection

Inspect clutch discs for damage, warping, and excessive wear. Measure thickness of discs while stacked in operating position. Minimum thickness of pack is 1-1/8". If total thickness is less than this amount, replace discs. Replace warped or damaged plates.

Inspect clutch piston for damage and wear. If pistion is damaged or shows excessive wear, replace pistion.

Inspect orifice dowel. Be sure opening is 0.031".

Check piston seal wear. If piston seals installed protrude less than 0.015" from surface of piston or clutch body, replace seals.

Assembly

See Figure 13.

Clean all clutch parts thoroughly before reassembling.

Install piston seals in clutch housing and on piston. Lubricate seals, after installation, with SAE 10W oil to facilitate installation of piston.

NOTE: Do not oil seals before installation in housing and piston. To do so tends to prevent seals from seating properly.

Position pistion in housing and press evenly into place until piston bottoms in housing.

Install return ring in clutch housing with hole in ring aligned with pin in housing. Position springs with one spring over pin. Install ring retainer over springs and, using suitable press, compress springs sufficiently to permit installation of retaining ring. Install retaining ring so that sharp edge on inner diameter faces outward.

Clutch pinion bearings must be installed as a set. Observe marks made at time of disassembly.

Install pinion bearing outer races in clutch pinion, and position so that outer faces of bearings are flush with side surfaces of pinion.

NOTE: If new clutch pinion bearings are used, mark inner and outer races before separating as a set.

Install spacer and pinion gear in clutch.

If original clutch discs are used, install discs in same order from which they were removed, observing marks made at time of disassembly.

If new or unmarked clutch discs are installed, begin with a disc splined in the outer circumference, then alternate with inner- and outer-splined discs until there is a total of five outer-splined discs and four inner-splined discs, concluding with an outer-splined disc.

Install clutch disc retaining ring (weldment) and install retaining ring. Be sure ring is fully seated in groove in body.

Install two new splined static seals in clutch housing bore.

NOTE: Use of grease for lubrication of I.D. of seals is not recommended, as it may prevent visual determination of alignment of seal splines with those on clutch housing. Use light oil.

Carefully align static seal splines with those in clutch housing and install bevel gear shaft installation tool. Install lifting eyebolt through plate SK-8028 and in threaded hole in outer surface of clutch housing and support clutch. See Figure 10. Lower clutch into winch case and align clutch pinion and brake shaft gear.

Adjust nut on eyebolt, and rotate bevel gear and spacer to align internal splines for installation of bevel shaft.

Install bevel gear shaft. Refer to BEVEL GEAR SHAFT, Installation.

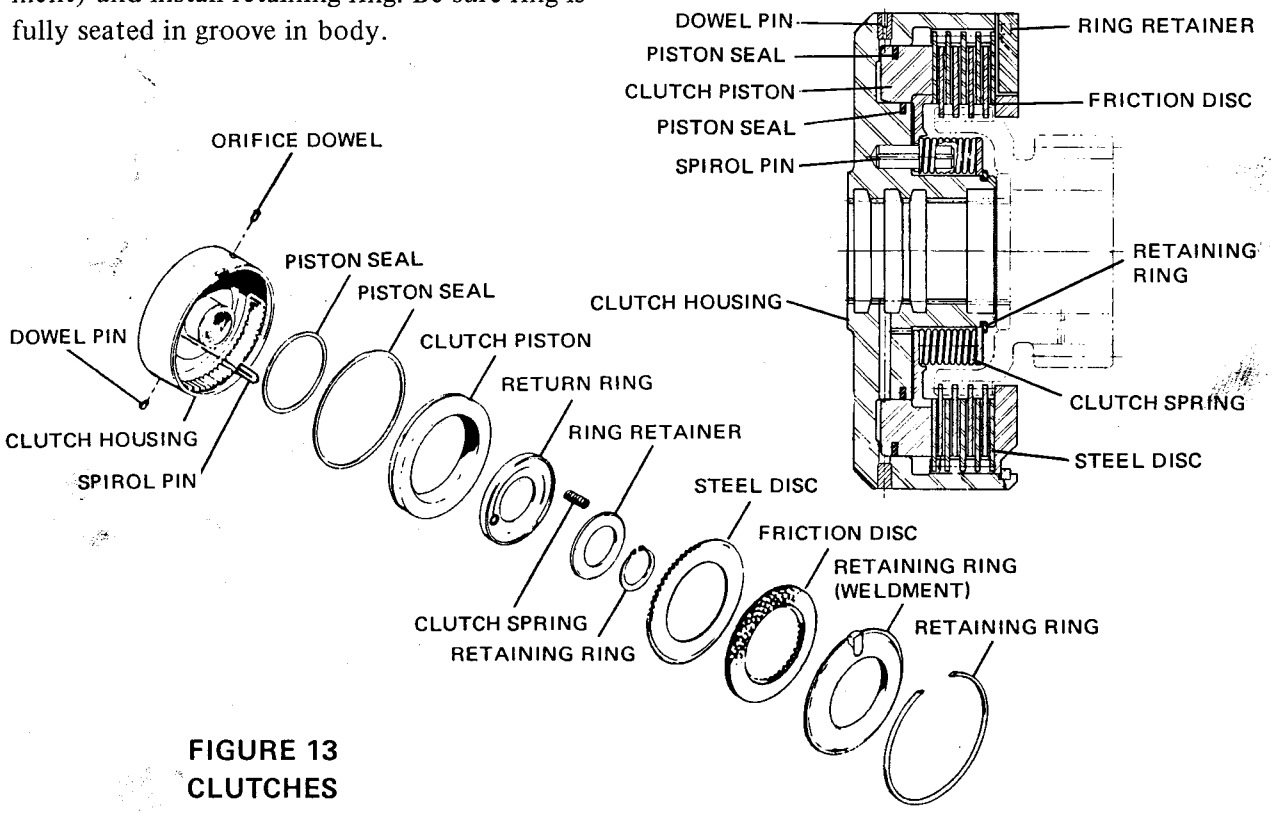



**FIGURE 13**
**CLUTCHES**

## BRAKE CYLINDER

Removal

Refer to BRAKE CONTROL, Disassembly.

Disassembly

See Figure 14.

Rotate Brake cylinder so ports face downward, and work piston back and forth to remove oil.

Inspection

Inspect piston, rod, and inside of tube for scoring, scratches, and excessive wear. Replace parts that are scratched, scored, or worn beyond the point where a leak-free seal can be obtained.

Inspect orifice in piston. Orifice should be 0.031".

Inspect seals, O-rings and wiper for cuts, distortion and deterioration. Replace any defective part.

Remove rod head lock set screws.

Push the rod head into the cylinder tube to remove the retaining ring and pull the rod, rod head and piston from the tube.

Remove piston nut and piston from rod. Remove back-up washer and seal from piston.

Remove rod head from piston end of rod. Remove rod wiper and inner and outer O-rings from rod head.

Brake cylinder return line orifice should be 0.060".

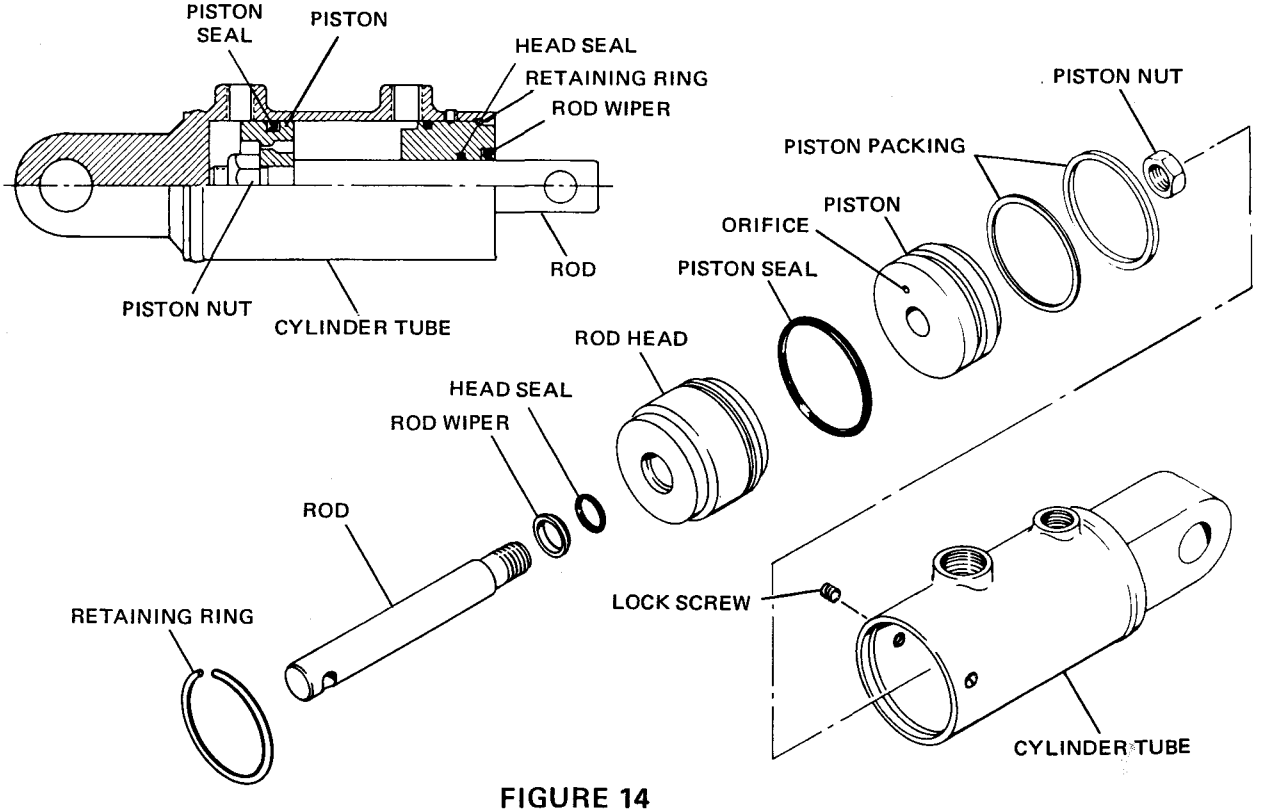



**FIGURE 14**
**BRAKE CYLINDER**

Assembly

See Figure 14.

Install rod wiper and rod O-ring in rod head bore. Lubricate with SAE 10W oil after installing. Install rod head from piston end to prevent possible damage to wiper and O-ring by hole in outer end of rod.

Position piston on rod. Install piston seal and back-up washer on piston, with lip of seal facing toward threaded end of rod. Secure piston with piston nut.

Install head seal on rod head. Lubricate pistion seal and head seal with SAE 10W oil and insert piston carefully into end of cylinder tube. Push piston rod straight into tube, being careful not to damage seal or O-ring on retaining ring or set screw groove in outer end of tube.

When pistion is approximately halfway into tube, push rod head into tube. Install the retaining ring in groove of cylinder and make sure rod head is pulled back tight against retaining ring. Install and tighten head lock set screws.

Installation

Refer to BRAKE CONTROL, Assembly.

## IDLER SHAFT

Removal

See Figure 15.

Remove drum shaft. Refer to DRUM SHAFT, Disassembly.

Remove idler shaft cover. Mark shims for correct position at time of reassembly.

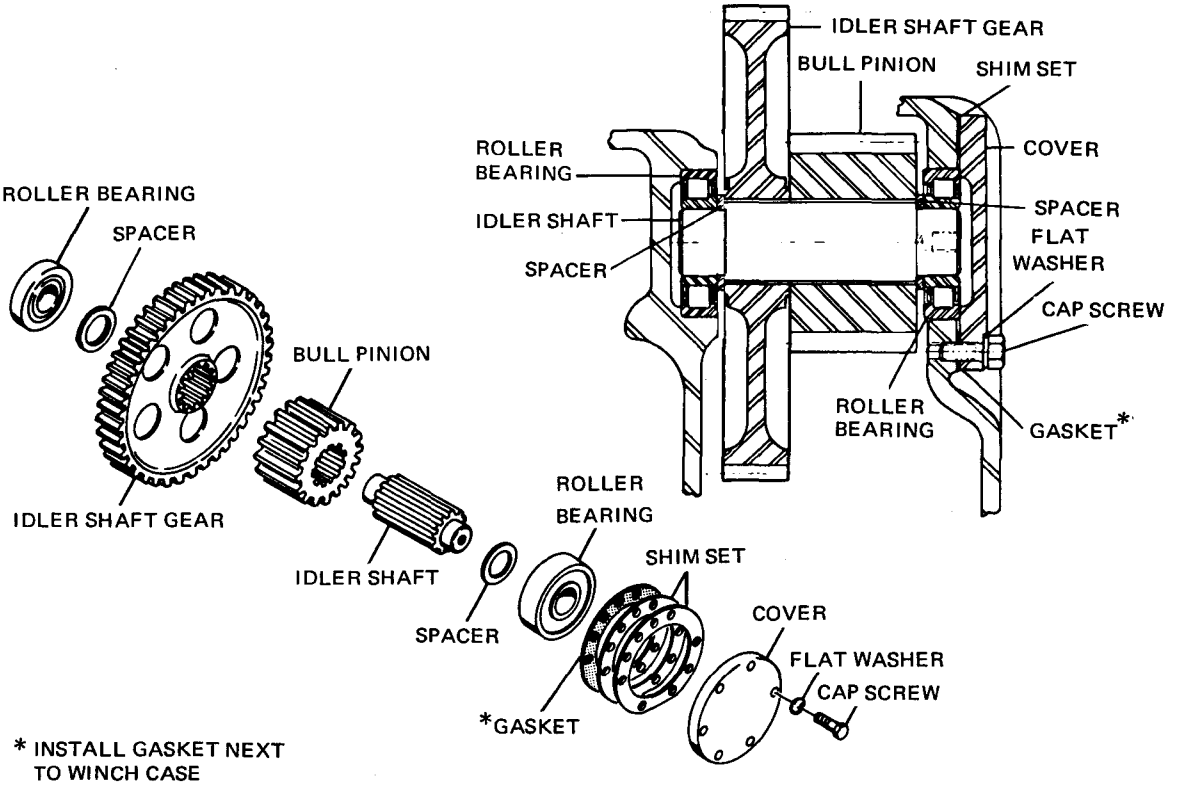



FIGURE 15
IDLER SHAFT

Using shaft and cap puller SK-7733 and idler shaft puller adapter SK-8030-2, remove idler shaft and outer bearing. Remove outer bearing and spacer from idler shaft. Remove bull pinion and idler gear through bull gear opening in winch case.

Remove inner bearing.

Installation

See Figure 15.

Install inner bearing.

Support bull pinion in housing and insert idler shaft through pinion. Support idler shaft gear in housing and push idler shaft through gear, turning as necessary to align splines.

Be sure idler shaft is installed with drilled end of shaft outward.

Press idler shaft and spacer into inner bearing.

Install spacer and outer bearing into bearing bore onto idler shaft.

Install shims, gasket, and cover on case, being sure shims are in same position from which they were removed, and secure cover.

NOTE: Install gasket next to winch case.

If new parts are used, shim as required to adjust end clearance.

Install drum shaft. Refer to DRUM SHAFT, Assembly.

## BRAKE SHAFT

Removal

See Figure 16.

Drain oil from winch.

Remove brake band and brake drum. Refer to BRAKE CONTROL, Disassembly.

Refer to BRAKE CONTROL, Assembly.

If brake shaft gear is to be removed from case, remove forward clutch. Refer to BEVEL GEAR SHAFT, Removal.

Remove brake shaft cover. Remove seal carrier from brake side of shaft in same manner. Mark shims under covers for proper position at reassembly.

If oil seal is to be replaced, remove seal from carrier.

Using a soft drift, drive brake shaft out the gear side, taking pinion and bearing with it. Remove bearing, spacer, and pinion from brake shaft. Remove retaining ring from each end of shaft.

Lift brake shaft gear and spacer out of winch case.

Pull ball bearing from brake side of case.

Installation

See Figure 16.

Install ball bearing in brake shaft bore on brake side of case.

Install two retaining rings in grooves at each end of brake shaft.

Insert brake shaft from gear side, position spacer and brake shaft gear, and rotate brake shaft gear to align splines with those on shaft. Insert shaft until gear rests against retaining ring.

Slide brake shaft pinion and spacer on gear end of shaft. Install ball bearing on gear end of shaft.

If oil seal was removed from seal carrier, install a new seal in carrier and install carrier in bore, being sure to install shims in same position from which they were removed. If new parts were installed, shim as necessary while adjusting end clearance in brake shaft.

NOTE: Install gasket next to winch case.

Secure carrier to case with cap screws and washers

Install cover and shims on gear side of case in same manner, adjusting end clearance, if necessary, by adding or removing shims.

Install bevel gear shaft assembly. Refer to BEVEL GEAR SHAFT, Installation.

Install brake band and brake drum. Refer to BRAKE CONTROL, Assembly.

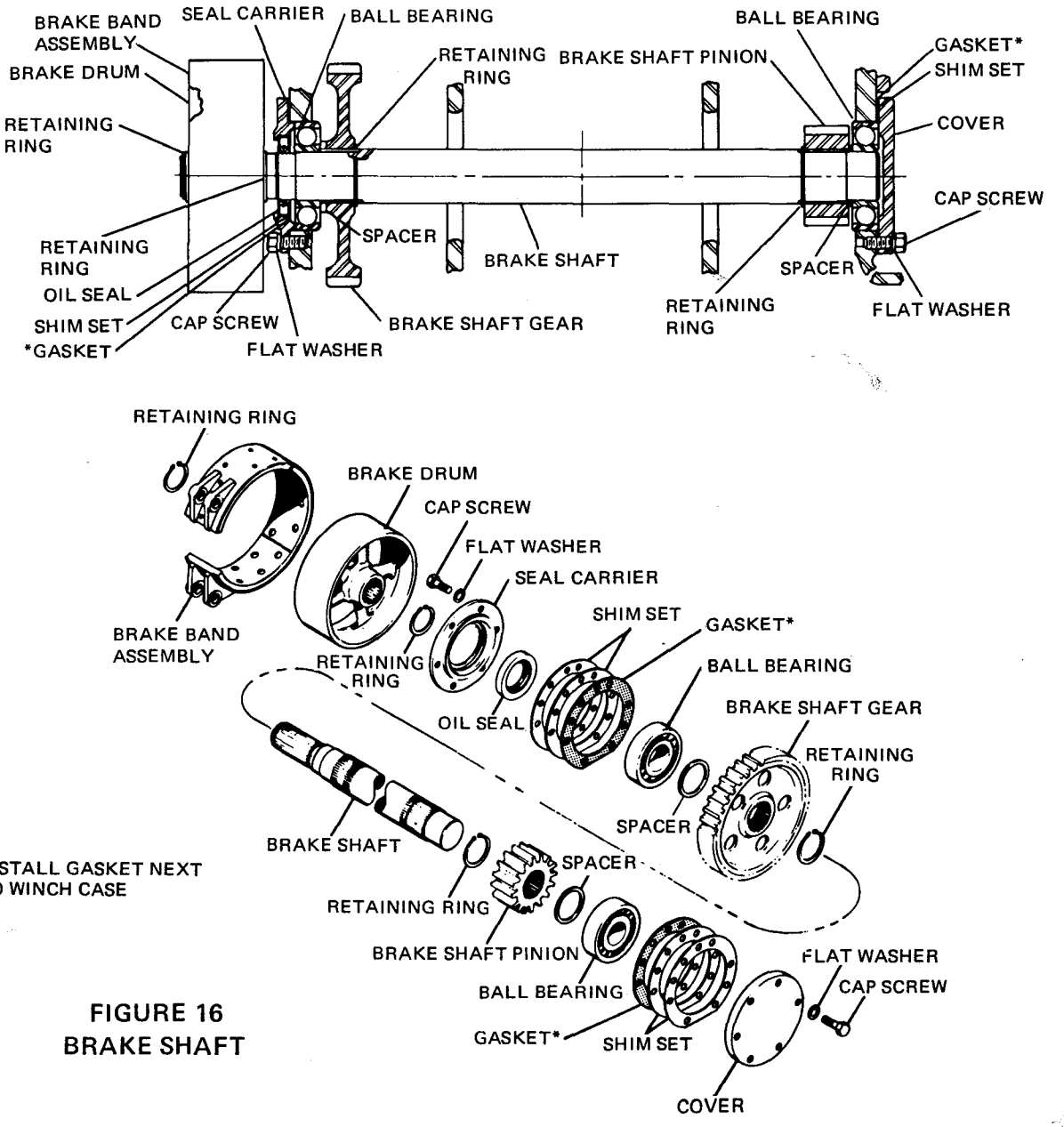



FIGURE 16
BRAKE SHAFT

## DRUM SHAFT (STANDARD)

NOTE: Refer to page 33 for service instructions on FREE SPOOLING CABLE DRUM.

Disassembly

See Figure 17.

Remove cotter pins securing cable guard, and remove guard.

Remove nuts from end of drum shaft.

Remove hex nuts and washers securing brake side cover, and remove cover.

Remove cap screws and washers securing gear side cover, and remove cover.

Using suitable hoist, lift drum and shaft assembly from winch case. Mark bull gear and drum for proper positioning during reassembly. Remove O-ring and set spacer from gear end of shaft.

Remove cap screws securing bull gear to drum, and remove lock plate and gear.

Pull shaft from brake end of drum. Remove oil seal, drum spacer, dirt seals, and bearing from shaft.

Remove bearing and oil seal from gear side of drum.

Assembly

See Figure 17.

Install oil seal in bore at gear side of drum. Install tapered roller bearing in gear end of drum.

Install inner dirt seal and tapered roller bearing on brake end of drum shaft. Insert drum shaft into brake end of drum. Install outer dirt seal, drum spacer, and oil seal on brake end of shaft.

Install oil seal on outer surface of drum at gear end.

Position bull gear on drum, observing location marks made at time of disassembly. Secure gear to drum with hex-head cap screws and lock plate.

NOTE: If either drum or bull gear is replaced, ream dowel holes as required and install oversize dowels.

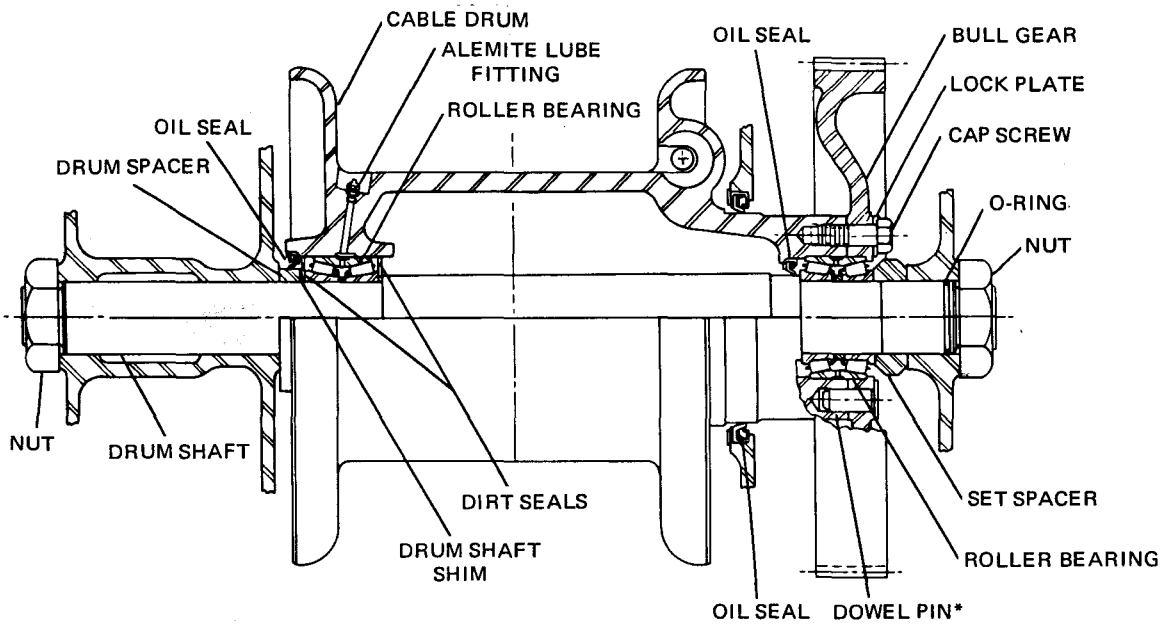
Install set spacer and O-ring on gear side of shaft, and, using a suitable hoist, lift assembled drum and shaft and lower into winch case, being careful to guide oil seal on gear end of drum into seal recess in case.

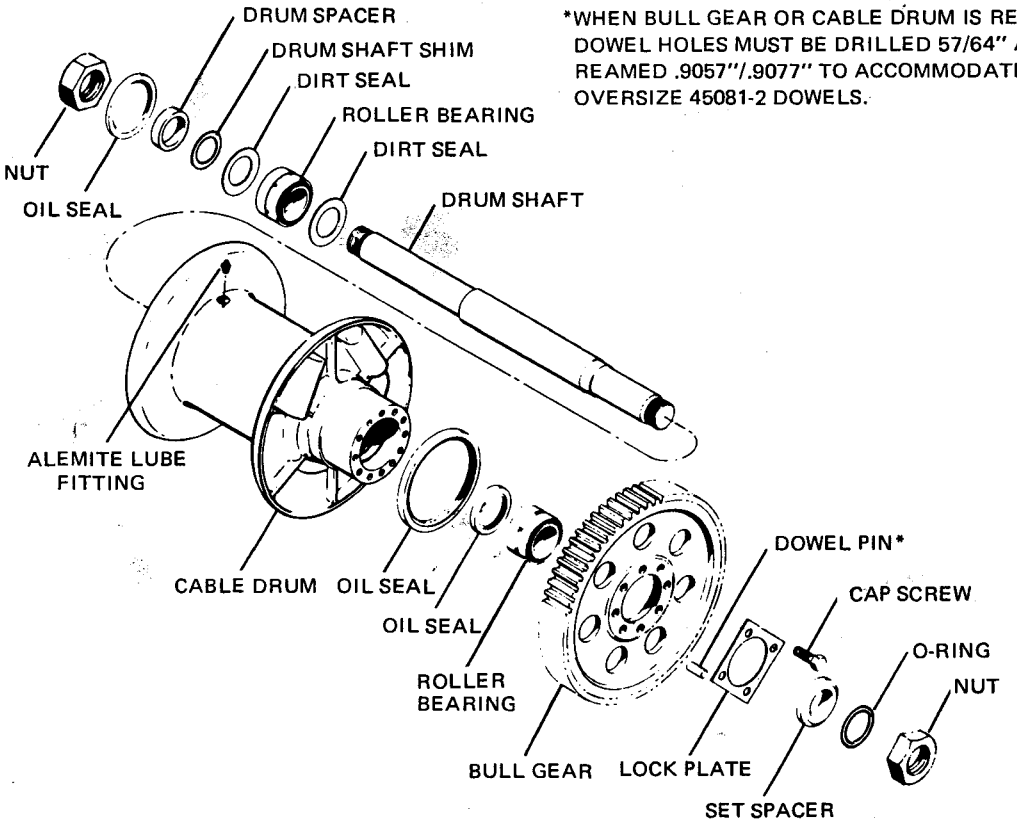
Install gear side cover with gaskets, using gasket compound, and secure to case with cap screws and washers. Trim surplus material from end of gaskets.

Install brake side cover and secure to case with nuts and washers.

Install nut on each end of drum shaft. Tighten nut on gear side first.

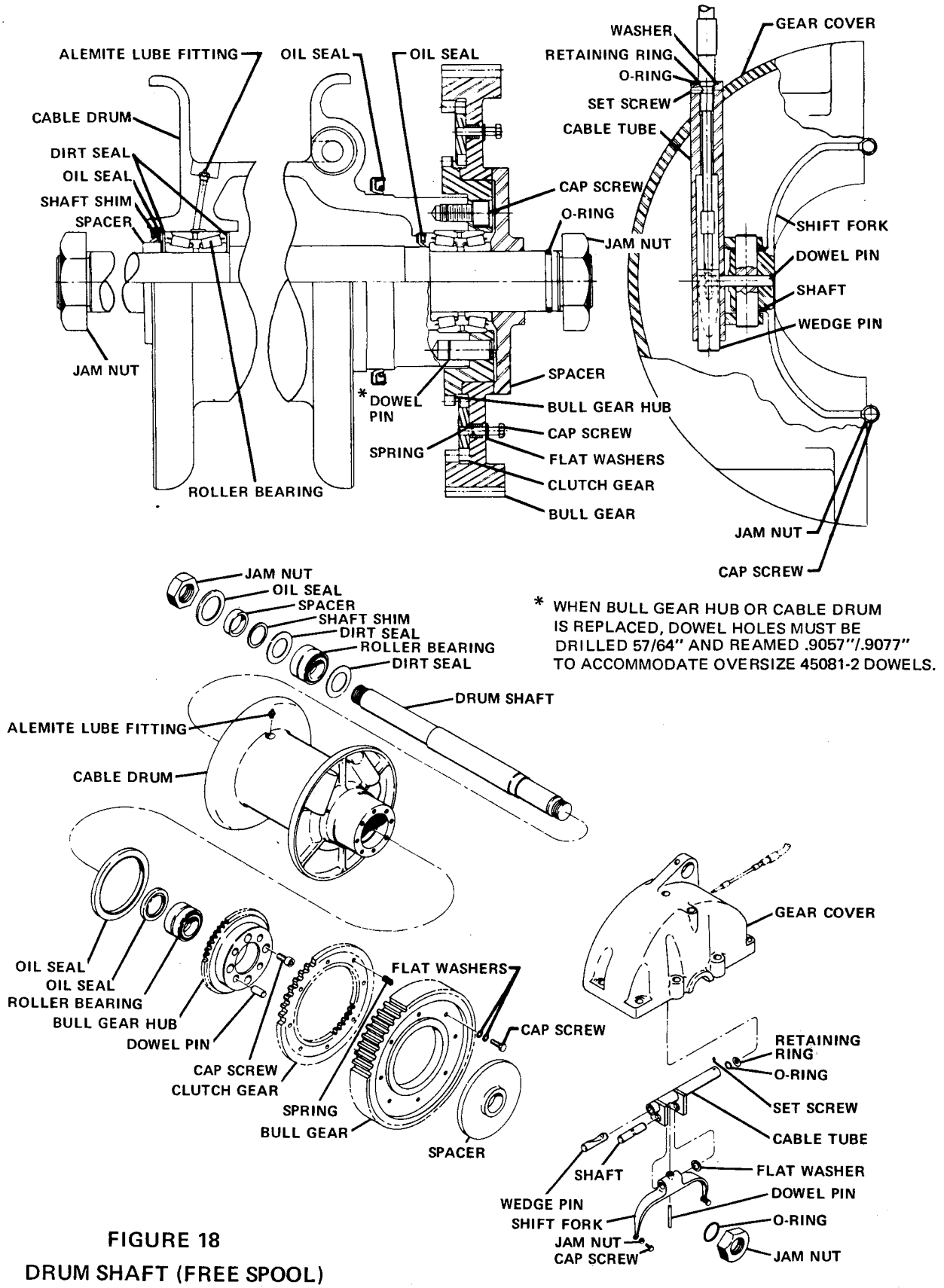
Install cable guard in case, and secure with cotter pin.




*WHEN BULL GEAR OR CABLE DRUM IS REPLACED, DOWEL HOLES MUST BE DRILLED 57/64" AND REAMED .9057"/.9077" TO ACCOMMODATE OVERSIZE 45081-2 DOWELS.

FIGURE 17
DRUM SHAFT (STANDARD)




* WHEN BULL GEAR HUB OR CABLE DRUM IS REPLACED, DOWEL HOLES MUST BE DRILLED 57/64" AND REAMED .9057"/.9077" TO ACCOMMODATE OVERSIZE 45081-2 DOWELS.

FIGURE 18
DRUM SHAFT (FREE SPOOL)

## FREE SPOOL DRUM SHAFT

### Disassembly

Refer to Figure 18.

Remove cotter pins securing cable guard, and remove guard.

Remove nuts from end of drum shaft.

Remove hex nuts and washers securing brake side cover, and remove cover.

Remove cap screws and washers securing gear side cover, and remove cover.

Using suitable hoist, lift drum and shaft assembly from winch case. Mark bull gear hub and drum for proper positioning during reassembly. Remove O-ring and spacer from gear end of shaft.

Remove cap screws, lock washers, and springs securing bull gear and clutch gear, and remove gears from shaft.

Remove cap screws securing bull gear hub to cable drum and remove from shaft.

Pull shaft from brake end of drum. Remove oil seal, drum spacer, shims, dirt seals, and bearing from shaft.

Remove bearing and oil seal from gear side of drum.

Remove control cable from control stand, unscrew control cable core from wedge pin, and pull cable core free. Remove hex socket set screw securing cable housing to cable tube and remove control cable. If O-ring and back-up ring remain in cable tube, remove O-ring and back-up ring.

Using a small drift, drive dowel pin down through cable tube. Remove shaft, wedge pin, and shift fork. Remove cap screws and jam nuts from shift fork.

### Assembly

Refer to Figure 18.

Install oil seal in bore at gear side of drum. Install tapered roller bearing in gear end of drum.

Install inner dirt seal and tapered roller bearing on brake end of drum shaft. Insert drum shaft into brake end of drum. Install outer dirt seal, drum spacer, shims, and oil seal on brake end of shaft.

Install oil seal on outer surface of drum at gear end.

Position bull gear hub on drum, observing location marks made at time of disassembly. Secure bull gear hub to drum with cap screws and dowel pins.

NOTE: If either bull gear hub or drum is replaced, ream dowel holes as required and install oversize dowels.

Insert flat washers on cap screws and insert through small end of stepped holes in bull gear. Place springs on cap screws and fasten clutch gear to bull gear.

Adjust clutch gear flush with bull gear—then place over shaft and onto clutch hub.

Place spacer over shaft and against tapered roller bearing.

Place shift fork, with flat washer on control cable side, in position and insert shaft.

Install wedge pin in cable tube, with threaded end towards control cable. Flat surface of wedge pin must be positioned to align with dowel pin.

Secure shift fork, shaft, and wedge pin in cable tube with dowel pin. Drive dowel pin to 1/16" depth in shift fork and stake edge of hole in three places.

Install O-ring and retaining ring on control cable against anchor shoulder, and insert in cable tube.

Install hex socket set screw in cable tube and secure cable housing.

Screw cable core in threaded portion of wedge pin until it bottoms.

NOTE: Be sure all moving parts move freely.

Place jam nuts on cap screws and install in shift fork.

Using adequate blocking, place cover assemblies on floor or bench with gasket surfaces facing up. Lower cable drum assembly into covers. Install and tighten gear side nut.

Assemble control stand to control cable so that threaded end of cable extends 1/4" beyond threaded lever pin. Set control lever in engaged position.

Swing fork to make dowel pin bear squarely on flat surface of tapered surface on wedge pin. Adjust cap screws on the fork so that each just touches the clutch gear.

Remove shaft nut and install O-ring on shaft. Lift cable drum assembly from covers and place in winch case, being careful to guide oil seal on gear end of drum into seal recess in case.

NOTE: If new parts were installed, press cable drum assembly towards gear side and install shims as necessary to remove clearance between spacer and case on brake side. Lift cable drum assembly and install shims on shaft—then lower assembly back into case.

Install gear side cover with gaskets, using gasket compound, and secure to case with cap screws and washers. Trim surplus material from end of gaskets.

Install brake side cover and secure to case with nuts and washers.

Install nut on each end of drum shaft. Tighten nut on gear side first.

Install cable guard in case and secure with cotter pin.

## SERVICE DATA

### CAP SCREW TORQUE VALUES (Grade 5)

| Bolt Size | Torque - lb/ft Min. | Max. | Bolt Size | Torque - lb/ft Min. | Max. |
|---|---|---|---|---|---|
| 1/4 | 9 | 10 | 7/8 | 420 | 470 |
| 5/16 | 19 | 21 | 1 | 630 | 710 |
| 3/8 | 33 | 37 | 1-1/8 | 850 | 950 |
| 7/16 | 53 | 60 | 1-1/4 | 1200 | 1350 |
| 1/2 | 80 | 90 | 1-1/2 | 2000 | 2300 |
| 5/8 | 160 | 180 | 1-3/4 | 3300 | 3700 |
| 3/4 | 290 | 320 | 2 | 5000 | 5500 |

The tabulated values in cap screws apply when:

Tapped holes have sufficient threads to prevent stripping female threads.

All threads are lubricated with engine oil or light grease.

Joints are rigid; no gaskets or compressible materials are used.

When coated or metallic plated bolts are used, or when lubricants other than engine oil or light grease are used, multiply values in the table by the following factors:

.85 when metallic plated bolts or nuts are used.

.75 when Parkerized bolts or nuts are used.

.70 when Molykote, white lead, or similar mixtures are used as lubricants.

.90 when hardened surfaces are used under the nut or bolt head, whichever is torqued.

## CLUTCH DATA

| | |
|---|---|
| Clutch disc pack minimum thickness | 1.125 in. |
| Clutch disc pack minimum clearance | 0.080 in. |
| Clutch piston ring wear: | |
| Large piston ring protrusion beyond outer surface of piston | 0.015 in. min. |
| Small piston ring protrusion beyond surface of housing | 0.015 in. min. |
| Orifice dowel opening | 0.031 in. |

## SERVICE DATA

### BEARING PRELOAD, GEAR BACKLASH, AND SHAFT END CLEARANCES

| | |
|---|---|
| Bevel pinion bearing adjustment: | |
| Bearing end play | 0.002 in. loose to 0.002 in. tight |
| Torque without carrier seals installed | max. 10 lb./in. |
| Bevel pinion nut torque | 150 to 300 lb./ft. |
| Bevel gear shaft end clearance | 0.005 to 0.010 in. |
| Bevel gear to bevel pinion backlash | 0.008 to 0.012 in. |
| Brake shaft end clearance | 0.010 to 0.020 in. |
| Idler shaft end clearance | 0.005 to 0.015 in. |

### BRAKE ASSEMBLY DATA

| | |
|---|---|
| Minimum thickness of brake lining | 0.250 in. |
| Brake cylinder piston orifice | 0.031 in. |
| Brake cylinder return line orifice | 0.060 in. |

# SPECIAL SERVICE TOOLS

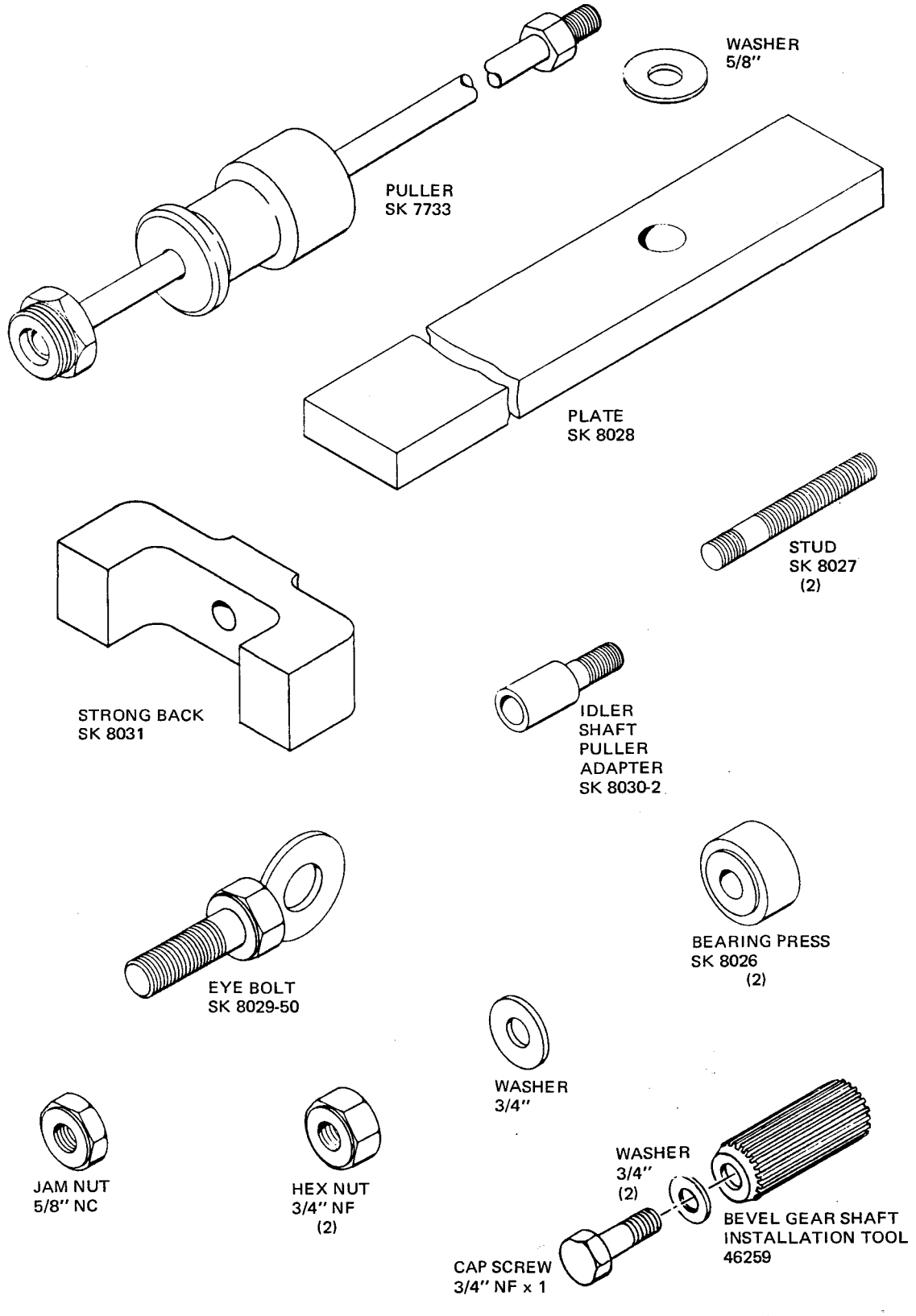



FIGURE 19

## PARTS LIST SECTION

# CARCO MODEL F-50-PS, PSM AND PSC WINCH

### (WITH INTERNAL FILTERS)

For control stand, cables, hydraulic hoses, pumps and fittings see adapter section of this manual

### CONTENTS



**Note:** Purchased parts, such as bearings and oil seals may be substituted with parts of equal quality on the manufacturer's recommendation, and with the approval of Pacific Car and Foundry Company.

**ATTENTION:** Be sure to give correct part number, part name and complete serial number of winch when ordering. Also name and model of the tractor on which the winch is mounted.


**PACIFIC CAR AND FOUNDRY COMPANY**

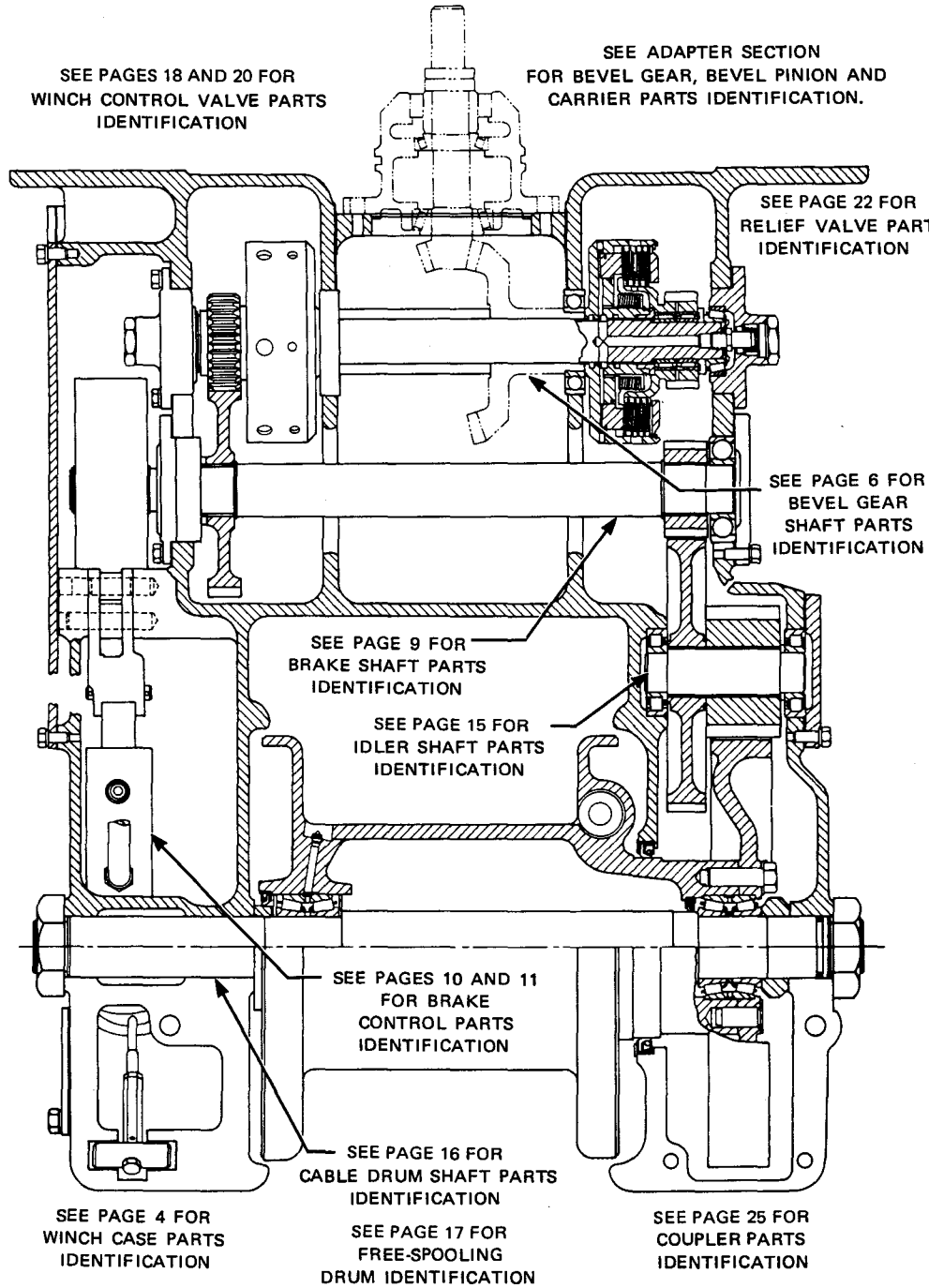
A DIVISION OF PACCAR

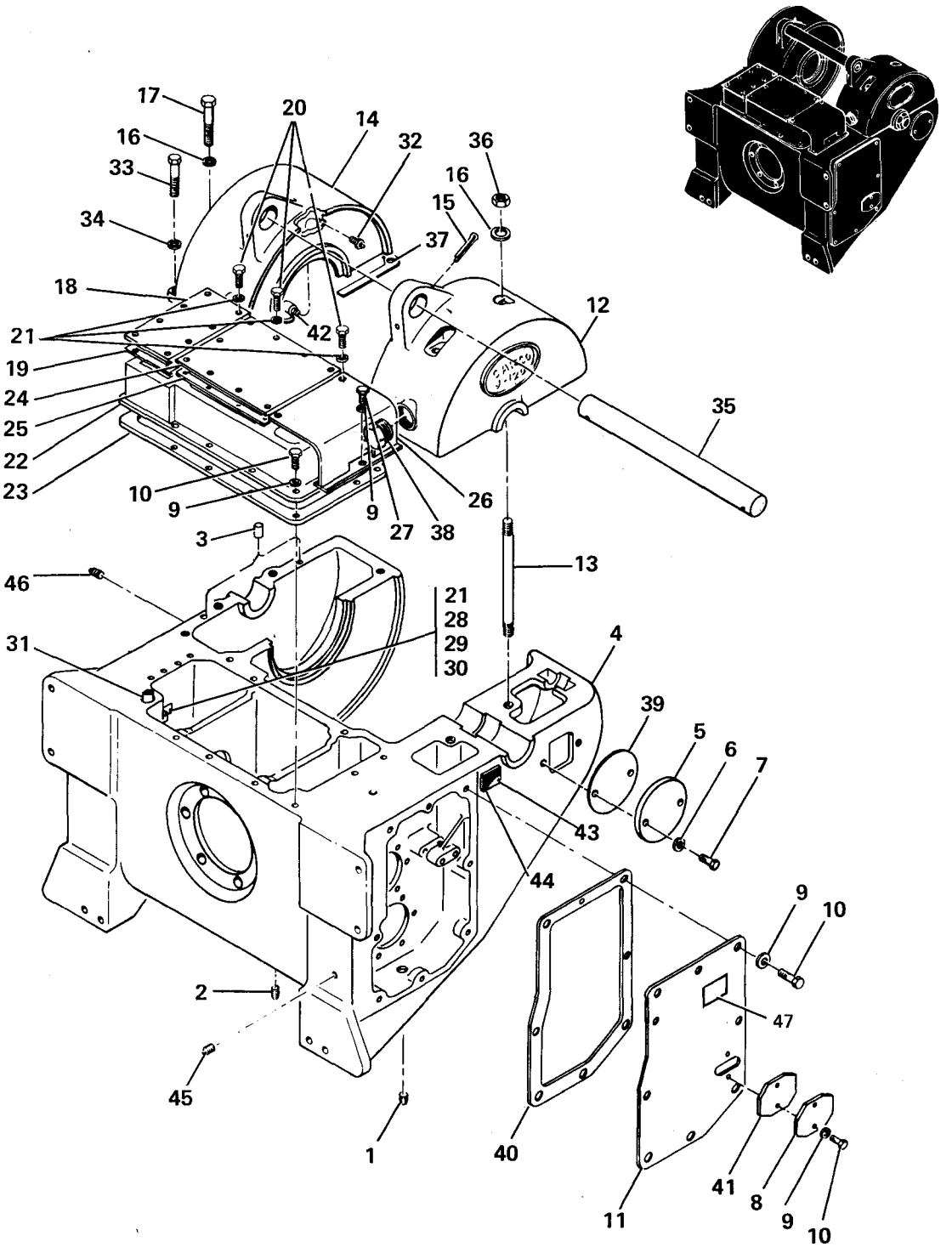
1400 North Fourth Street Renton, Washington 98055 (206) 235-2799
4401 West 44th Place Chicago, Illinois 60632 (312) 254-6950



2276-F-10-1-74
SUPERSEDES
2276-F-12-1-73

# PARTS IDENTIFICATION INDEX DRAWING
# CARCO MODEL F-50-PS , PSM & PSC WINCH

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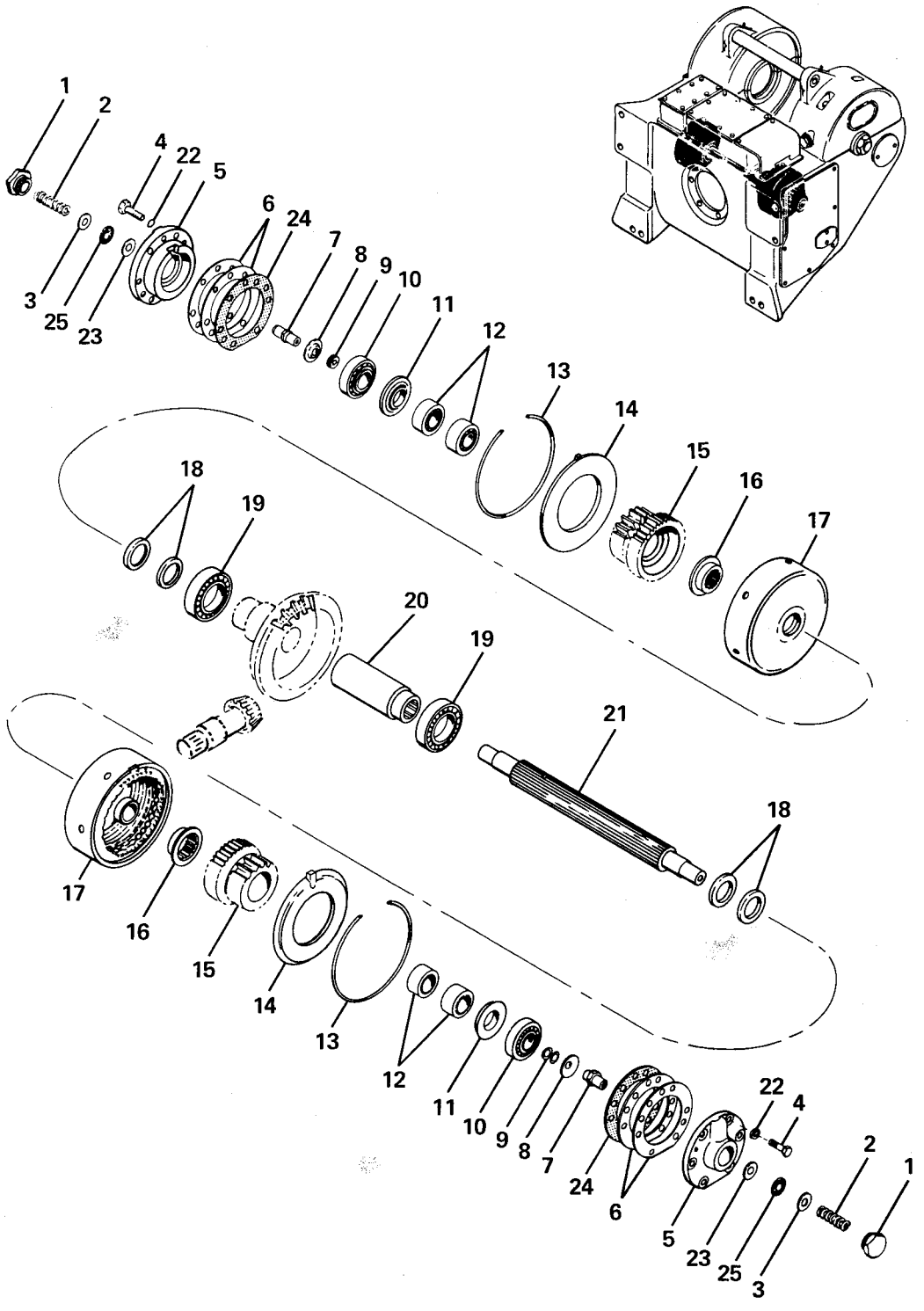
WINCH CASE

| | REF. | CARCO PART NO. | NAME AND DESCRIPTION | QUAN. PER UNIT |
|---|---|---|---|---|
| | 1 | 16169-8 | Plug, 1/2 NPT Sq. Hd. | 1 |
| | 2 | 16168-20 | Plug, 1-1/4 NPTF Mag. Sq. Hd. | 1 |
| | 3 | 16290-1616 | Dowel Pin, 1/2 x 1 | 2 |
| * | 4 | 49685 | Case Complete (includes items 12 and 14) | 1 |
| | 5 | 42048 | Cover | 1 |
| | 6 | 16064-10 | Washer, 5/8 | 2 |
| | 7 | 16047-1008 | Cap Screw, 5/8 UNC x 1 H.H. | 2 |
| | 8 | 44816 | Cover | 1 |
| | 9 | 16064-8 | Washer, 1/2 | 24 |
| | 10 | 16047-810 | Cap Screw, 1/2 UNC x 1-1/4 H.H. | 23 |
| | 11 | 45972 | Cover | 1 |
| * | 12 | 44415 | Cover | 1 |
| | 13 | 45050-1655 | Stud | 2 |
| * | 14 | 44440 | Cover | 1 |
| | 15 | 16288-1272 | Cotter Pin, 3/8 x 4-1/2 | 1 |
| | 16 | 16064-16 | Washer, 1 | 4 |
| | 17 | 16047-1628 | Cap Screw, 1 UNC x 3-1/2 H.H. | 2 |
| | 18 | 49337 | Cover | 1 |
| | 19 | 49338 | Gasket | 1 |
| | 20 | 16047-607 | Cap Screw, 3/8 UNC x 7/8 H.H. | 22 |
| | 21 | 16064-6 | Washer, 3/8 | 27 |
| | 22 | Ref. Only | Housing (see pages 16 and 18) | 1 |
| | 23 | 49341 | Gasket | 1 |
| | 24 | 49335 | Cover | 1 |
| | 25 | 49336 | Gasket | 1 |
| | 26 | 49345-50 | Shroud | 1 |
| | 27 | 16047-808 | Cap Screw, 1/2 UNC x 1 H.H. | 1 |
| | 28 | 16012-19 | Clip, KICKHAEFER CC2213 | 1 |
| | 29 | 16047-610 | Cap Screw, 3/8 UNC x 1-1/4 H.H. | 1 |
| | 30 | 16033-6 | Nut, 3/8 UNC Hex | 1 |
| | 31 | 48342-50 | Suction Tube | 1 |
| | 32 | 16249-1 | Relief Plug, ALEMITE 317400 | 1 |
| | 33 | 16047-1220 | Cap Screw, 3/4 UNC x 2-1/2 H.H. | 4 |
| | 34 | 16064-12 | Washer, 3/4 | 4 |
| | 35 | 49043-1 | Cable Guard (includes item 15) | 1 |
| | 36 | 16033-16 | Nut, 1 UNC Hex | 2 |
| ** | 37 | 44412 | Gasket | 2 |
| | 38 | 16220-38 | Plug, WHITE 1604-136-Y | 1 |
| | 39 | 44833 | Gasket | 1 |
| | 40 | 45914-2 | Gasket (Length 66") | 1 |
| | 41 | 44815 | Gasket | 1 |
| | 42 | 16150-2 | Elbow, 1/8 NPT 90° Street | 1 |
| | 43 | 16055-5 | Drive Screw, #10 x 3/8 Type U | 4 |
| *** | 44 | See Below | Name Plate | 1 |
| | 45 | 16167-8 | Plug, 1/2 NPT Hex Soc. | 1 |
| | 46 | 16169-20 | Plug, 1-1/4 NPT Sq. Hd. | 1 |
| | 47 | 49044 | Instruction Plate | 1 |

* Items 4, 12 and 14 cannot be ordered separately.

** For aluminum cover gasket order 48922-2.

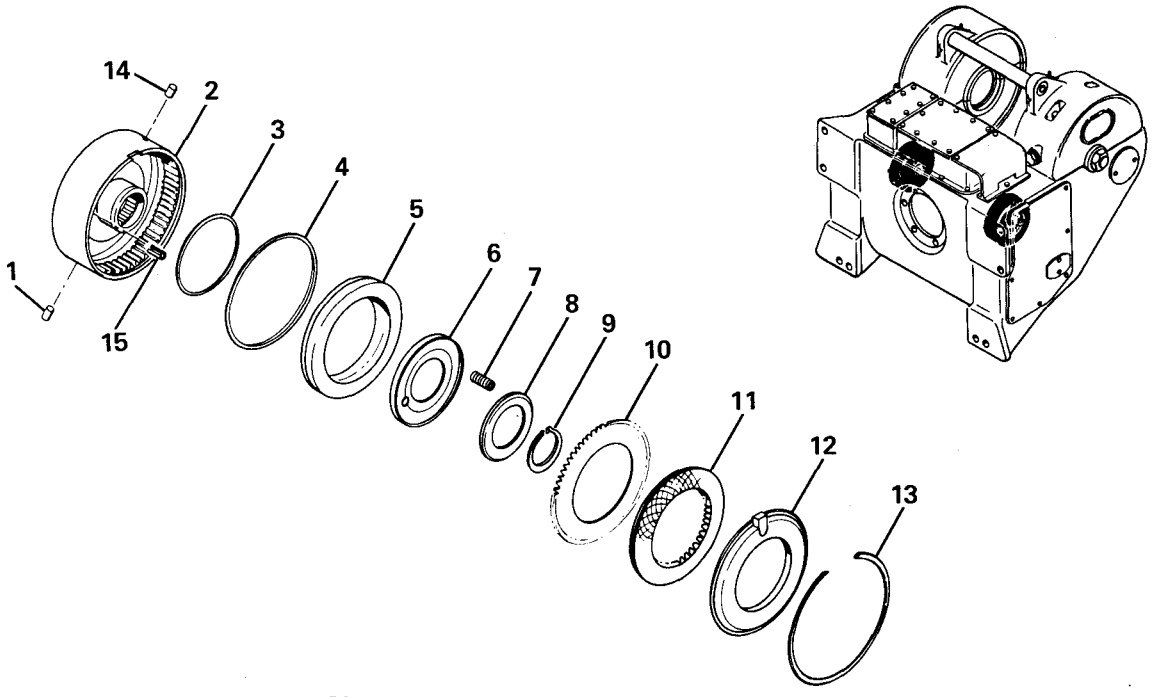
*** 49329 – Name Plate PS Models
45816 – Name Plate PSM, PSC Models




BEVEL GEAR SHAFT

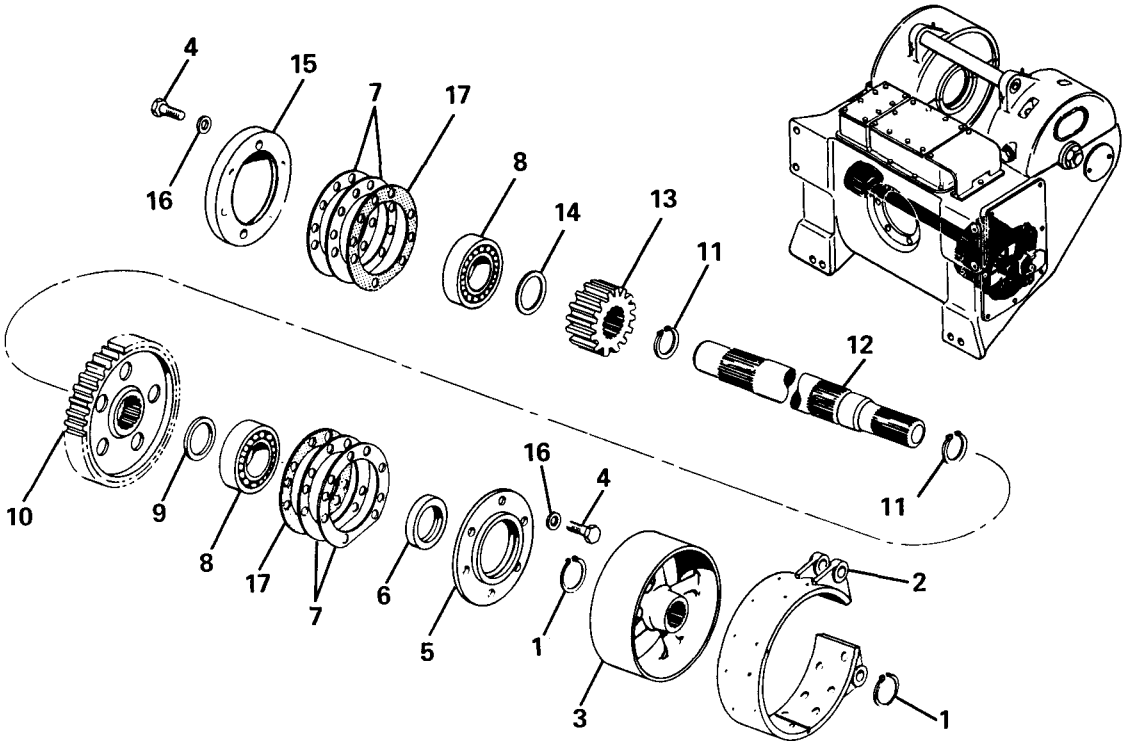
| | REF. | CARCO PART NO. | NAME AND DESCRIPTION | QUAN. PER UNIT |
|---|---|---|---|---|
| | 1 | 16166-20 | Plug, PARKER 05PO-20 | 2 |
| | 2 | 44753 | Spring | 2 |
| | 3 | 44949 | Seal (includes item 25) | 2 |
| | 4 | 16047-810 | Cap Screw, 1/2 UNC x 1-1/4 H.H. | 12 |
| | 5 | 44432 | Retainer | 2 |
| | 6 | 44431 | Shim Set | 2 |
| | 7 | 41742 | Stub Shaft | 2 |
| | 8 | 44478 | Clamp Ring | 2 |
| | 9 | 44336 | Shim Set | 2 |
| | 10 | 15179 | Brg. Cup | 2 |
| | | 15180 | Brg. Cone | 2 |
| * | 11 | 45018 | Thrust Washer | 2 |
| | 12 | 15253 | Brg. Set (Matched) | 2 |
| | 13 | 44446 | Retng. Ring | 2 |
| | 14 | 44343 | Retng. Ring | 2 |
| * | 15 | 48864 | Pinion | 2 |
| * | 16 | 45017 | Thrust Washer | 2 |
| | 17 | 44441 | Clutch (See Page 8) (includes items 13 and 14) | 2 |
| | 18 | 44452 | Seal | 4 |
| | 19 | 15030 | Ball Brg. | 2 |
| | 20 | 44451 | Spacer | 1 |
| | 21 | 44433 | Shaft | 1 |
| | 22 | 16064-8 | Washer, 1/2 | 12 |
| | 23 | 44940 | Washer | 2 |
| | 24 | 45028 | Gasket | 2 |
| | 25 | 16262-121 | O-Ring, NAT'L 610067 | 2 |

*NOTE:
In winches prior to Serial Number 242, if necessary to replace Clutch Pinion, item 15, (previously part number 44454), order new part number 48864 (Clutch Pinion) and also new Thrust Washers (items 11 and 16) part numbers 45018 and 45017 in combination sets only.




CLUTCH –NO. 44441

| REF. | CARCO PART NO. | NAME AND DESCRIPTION | QUAN. PER UNIT |
|---|---|---|---|
| 1 | 16290-808 | Dowel Pin, 1/4 x 1/2 | 1 |
| 2 | 44444 | Housing (include items 1 and 14) | 1 |
| 3 | 46242 | Seal | 1 |
| 4 | 46243 | Seal | 1 |
| 5 | 44445 | Piston | 1 |
| 6 | 44450 | Ring | 1 |
| 7 | 44449 | Spring | 16 |
| 8 | 44448 | Retainer | 1 |
| 9 | 16313-287 | Retng. Ring, TRUARC 5100-287 | 1 |
| 10 | 46134 | Steel Disc | 5 |
| 11 | 46133 | Friction Disc | 4 |
| 12 | 44343 | Retng. Ring | 1 |
| 13 | 44446 | Retng. Ring | 1 |
| 14 | 45415-1 | Orifice Dowel | 1 |
| 15 | 16295-1424 | Pin, SPIROL 437-1500-H-B-K | 1 |




## BRAKE SHAFT

| REF. | CARCO PART NO. | NAME AND DESCRIPTION | QUAN. PER UNIT |
|---|---|---|---|
| 1 | 16313-200 | Retng. Ring, TRUARC 5100-200 | 2 |
| 2 | 46602 | Brake Band Assembly (includes following) | 1 |
| | 46603 | Brake Block | 3 |
| | 16323-808 | Rivet, 1/4 x 1/2 Tub. Brass | 30 |
| 3 | 44420 | Brake Drum | 1 |
| 4 | 16047-810 | Cap Screw, 1/2 UNC x 1-1/4 H.H. | 12 |
| 5 | 44435 | Carrier | 1 |
| 6 | 16342-1 | Oil Seal, NAT'L. 415659 | 1 |
| 7 | 44431 | Shim Set | 2 |
| 8 | 15074 | Ball Brg. | 2 |
| 9 | 44463-2 | Spacer | 1 |
| 10 | 44436 | Gear | 1 |
| 11 | 16313-231 | Retng. Ring, TRUARC 5100-231 | 2 |
| 12 | 44434 | Brake Shaft | 1 |
| 13 | 44462 | Pinion | 1 |
| 14 | 44463-1 | Spacer | 1 |
| 15 | 44464 | Cover | 1 |
| 16 | 16064-8 | Washer, 1/2 | 12 |
| 17 | 45028 | Gasket | 2 |

CARCO MODEL F-50-PS WINCH
**PARTS LIST SECTION--PAGE 10**
**BRAKE CONTROL (SPRING APPLIED)**

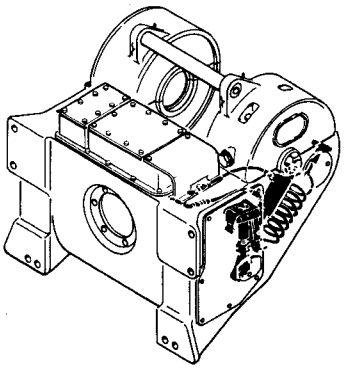
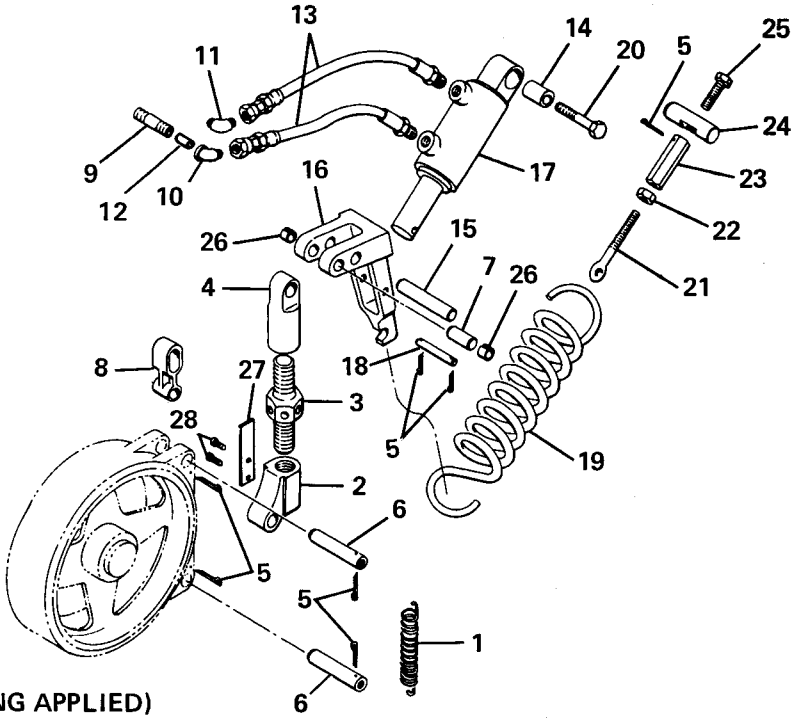


*DIAGRAM SHOWS PINS (ITEMS 7 AND 15) IN LOCATIONS FOR OVERWIND CABLE DRUM OPERATIONS.

FOR UNDERWIND OPERATION THE PIN LOCATIONS MUST BE INTERCHANGED




**BRAKE CONTROL (SPRING APPLIED)**

| REF. | CARCO PART NO. | NAME AND DESCRIPTION | QUAN. PER UNIT |
|---|---|---|---|
| 1 | 44107 | Spring | 1 |
| 2 | 44422-1 | Rod Nut | 1 |
| 3 | 44423 | Rod | 1 |
| 4 | 44426-1 | Rod Nut | 1 |
| 5 | 16288-420 | Cotter Pin, 1/8 x 1-1/4 | 7 |
| 6 | 44421 | Pin | 2 |
| * 7 | 44429 | Pin | 1 |
| 8 | 44427 | Link | 1 |
| 9 | 45805 | Nipple | 1 |
| 10 | 16142-46 | Elbow, WTHRHD. C5455 x 6 | 1 |
| 11 | 16145-66 | Elbow, WTHRHD. C5405 x 6 x 6 | 1 |
| 12 | 45806 | Orifice | 1 |
| 13 | 44118-13 | Hose | 2 |
| 14 | 46077-1 | Sleeve | 1 |
| * 15 | 44428 | Pin | 1 |
| 16 | 44437 | Arm | 1 |
| 17 | 45861 | Cylinder (See Figure 7) | 1 |
| 18 | 44438 | Pin | 1 |
| 19 | 40155 | Spring | 1 |
| 20 | 16047-1232 | Cap Screw, 3/4 UNC x 4 H.H. | 1 |
| 21 | 44206 | Eye Bolt | 1 |
| 22 | 16043-8 | Nut, 1/2 UNC Hex Jam | 1 |
| 23 | 40174 | Nut | 1 |
| 24 | 40175 | Pin | 1 |
| 25 | 42023 | Screw | 1 |
| 26 | 44687-2 | Spacer | 2 |
| 27 | 44806 | Spring | 1 |
| 28 | 16055-5 | Drive Screw, #10 x 3/8 Type U | 2 |

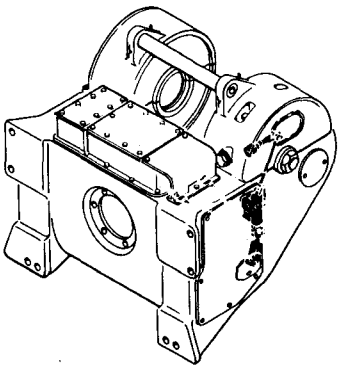
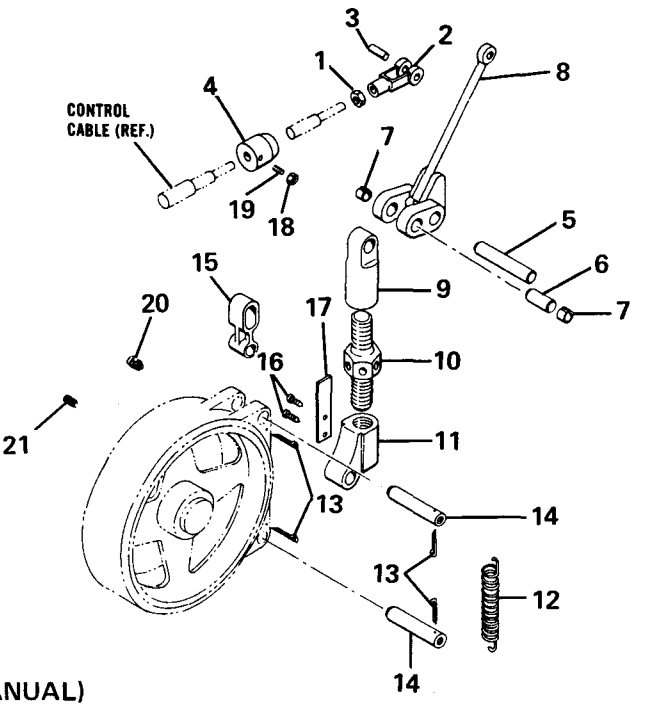


*DIAGRAM SHOWS PINS (ITEMS 5 AND 6) IN LOCATIONS FOR OVERWIND CABLE DRUM LOCATIONS.

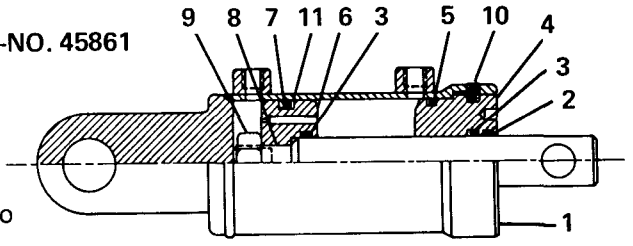
FOR UNDERWIND OPERATION THE PIN LOCATIONS MUST BE INTERCHANGED




## BRAKE CONTROL (MANUAL)

| | REF. | CARCO PART NO. | NAME AND DESCRIPTION | QUAN. PER UNIT |
|---|---|---|---|---|
| | 1 | 16044-6 | Nut, 3/8 UNF Hex Jam | 1 |
| | 2 | 16245-6 | Yoke, Cleve. 2708-4A | 1 |
| | 3 | 16246-6 | Pin, Cleve. 2708-1/2-4A | 1 |
| | 4 | 45351-1 | Anchor | 1 |
| * | 5 | 44428 | Pin | 1 |
| * | 6 | 44429 | Pin | 1 |
| | 7 | 44687-2 | Spacer | 2 |
| | 8 | 44984 | Arm | 1 |
| | 9 | 44426-1 | Rod Nut | 1 |
| | 10 | 44423 | Rod | 1 |
| | 11 | 44422-1 | Rod Nut | 1 |
| | 12 | 44107 | Spring | 1 |
| | 13 | 16288-420 | Cotter Pin, 1/8 x 1-1/4 | 4 |
| | 14 | 44421 | Pin | 2 |
| | 15 | 44427 | Link | 1 |
| | 16 | 16055-5 | Drive Screw, #10 x 3/8 Type U | 2 |
| | 17 | 44806 | Spring | 1 |
| | 18 | 16043-6 | Nut, 3/8 UNC Hex Jam | 1 |
| | 19 | 16056-620 | Set Screw, 3/8 UNC x 1-1/4 Hex Soc. | 1 |
| | 20 | 16169-6 | Plug, 3/8 NPT Sq. Hd. | 1 |
| | 21 | 16169-4 | Plug, 1/4 NPT Sq. Hd. | 1 |

## BRAKE CYLINDER–NO. 45861

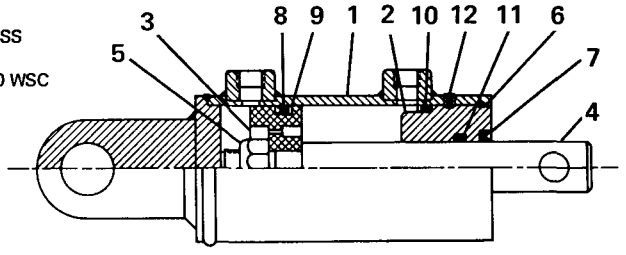



MANUFACTURER: REMCO
CARCO PART NO. 46473
REMCO PART NO. C-2-552

| | REF. | CARCO PART NO. | NAME AND DESCRIPTION | QUAN. PER UNIT |
|---|---|---|---|---|
| ** | 1 | | Tube | 1 |
| * | 2 | 16281-5 | Wiper, REMCO 472309 | 1 |
| * | 3 | 16262-214 | O-Ring, NAT'L. 622719 | 2 |
| ** | 4 | | Head | 1 |
| * | 5 | 16262-228 | O-Ring, NAT'L. 623006 | 1 |
| ** | 6 | | Piston | 1 |
| * | 7 | 16334-1 | Seal, C/R 710087 | 1 |
| ** | 8 | | Rod | 1 |
| | 9 | 16281-9 | Nut, REMCO 410504 | 1 |
| | 10 | 16054-404 | Set Screw, 1/4 UNC x 1/4 Hex. Soc. | 1 |
| * | 11 | 16301-1 | Back-up Washer, C/R 451069 | 1 |
| * | * | 46241 | Repair Kit (includes items 2,3,5,7 and 11) | 1 |

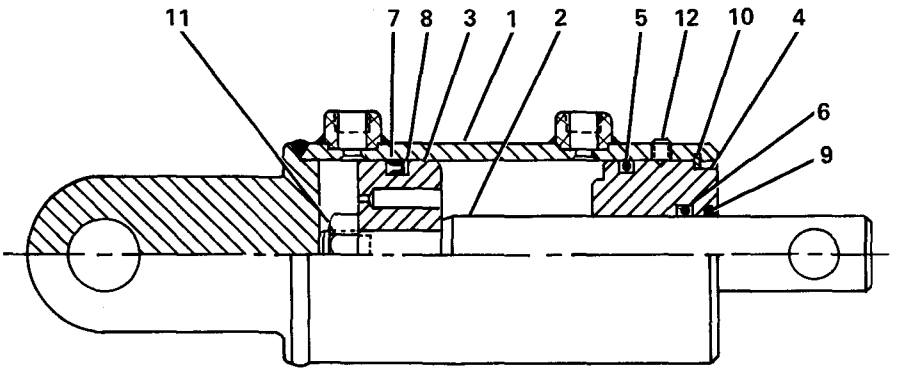
**Not spares items, order 45861 cylinder assy.

MANUFACTURER: CROSS
CARCO PART NO. 46474
CROSS PART NO. 225020 WSC




| | REF. | CARCO PART NO. | NAME AND DESCRIPTION | QUAN. PER UNIT |
|---|---|---|---|---|
| ** | 1 | | Tube | 1 |
| | 2 | 16280-2 | Head, CROSS 1C3243 | 1 |
| | 3 | 16280-3 | Piston, CROSS 1C3279 | 1 |
| | 4 | 16280-4 | Rod, CROSS 1C3282 | 1 |
| | 5 | 16280-5 | Nut, CROSS 1A0146 | 1 |
| | 6 | 16280-6 | Retng. Ring, CROSS 1A0280 | 1 |
| * | 7 | 16280-7 | Wiper, CROSS 1A0014 | 1 |
| * | 8 | 16334-1 | Seal, C/R 710087 | 1 |
| * | 9 | 16301-1 | Back-up Washer, C/R 451069 | 1 |
| * | 10 | 16262-228 | O-Ring, NAT'L. 623006 | 1 |
| * | 11 | 16262-214 | O-Ring, NAT'L. 622719 | 1 |
| | 12 | 16054-404 | Set Screw, 1/4 UNC x 1/4 Hex. Soc. | 2 |
| * | * | 46241 | Repair Kit (includes items 7,8,9, 10 and 11) | 1 |

**Not a spares item, order 45861 cylinder assy.

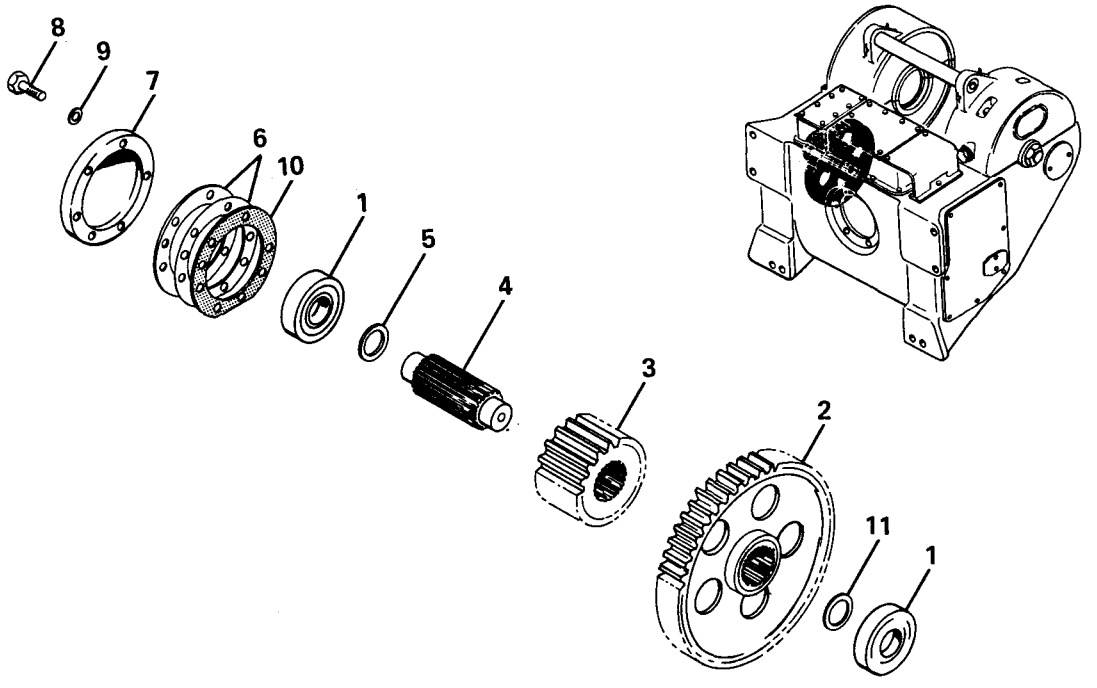



MANUFACTURER – REMCO
CARCO PART NO. – 49694
REMCO PART NO. – 021370

## BRAKE CYLINDER – NO. 45861

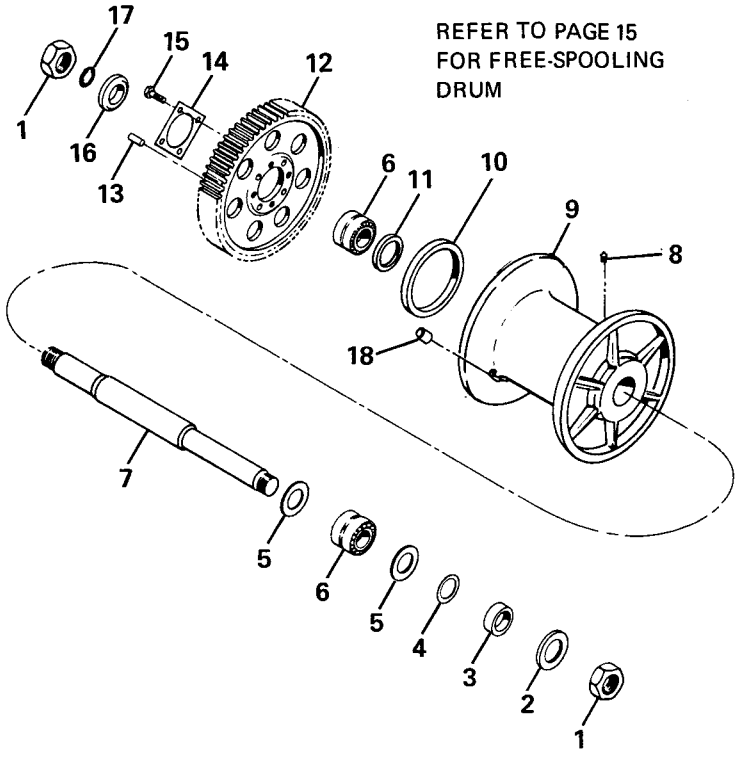
| | REF. | CARCO PART NO. | NAME AND DESCRIPTION | QUAN. PER UNIT |
|---|---|---|---|---|
| ** | 1 | | Tube | 1 |
| | 2 | 16281-17 | Rod, REMCO B-231428 | 1 |
| | 3 | 16281-18 | Piston, REMCO B-221364 | 1 |
| | 4 | 16281-19 | Head, REMCO B-261288 | 1 |
| * | 5 | 16262-228 | O-Ring, NAT'L. 623006 | 1 |
| * | 6 | 16262-214 | O-Ring, NAT'L. 622719 | 1 |
| * | 7 | 16334-1 | Seal, C/R 710087 | 1 |
| * | 8 | 16301-1 | Back-Up Washer, C/R 451069 | 1 |
| * | 9 | 16420-9 | Wiper, REMCO 904009 | 1 |
| | 10 | 16307-250 | Retng. Ring, SPIROLOX RRT-250 | 1 |
| | 11 | 16281-20 | Nut, REMCO 812063 | 1 |
| | 12 | 16056-404 | Set Screw, 1/4 UNC x 1/4 Hex Soc. Cup Pt. | 1 |
| * | * | 46241 | Repair Kit (Includes Items 5, 6, 7, 8 and 9) | 1 |

** Not a spares item, order 45861 cylinder assy.

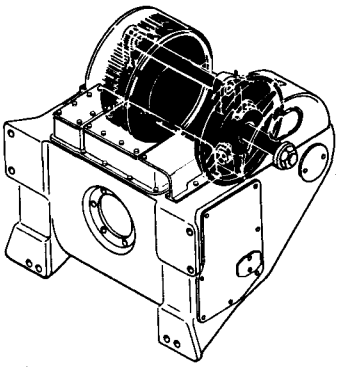



## IDLER SHAFT

| REF. | CARCO PART NO. | NAME AND DESCRIPTION | QUAN. PER UNIT |
|---|---|---|---|
| 1 | 15296 | Roller Brg. | 2 |
| 2 | 44468 | Gear | 1 |
| 3 | 44465 | Pinion | 1 |
| 4 | 48904 | Shaft | 1 |
| 5 | 44467 | Spacer | 1 |
| 6 | 44431 | Shim Set | 1 |
| 7 | 44464 | Cover | 1 |
| 8 | 16047-810 | Cap Screw, 1/2 UNC x 1-1/4 H.H. | 6 |
| 9 | 16064-8 | Washer, 1/2 | 6 |
| 10 | 45028 | Gasket | 1 |
| 11 | 48906 | Spacer | 1 |




REFER TO PAGE 15
FOR FREE-SPOOLING
DRUM



**DRUM SHAFT (STANDARD)**

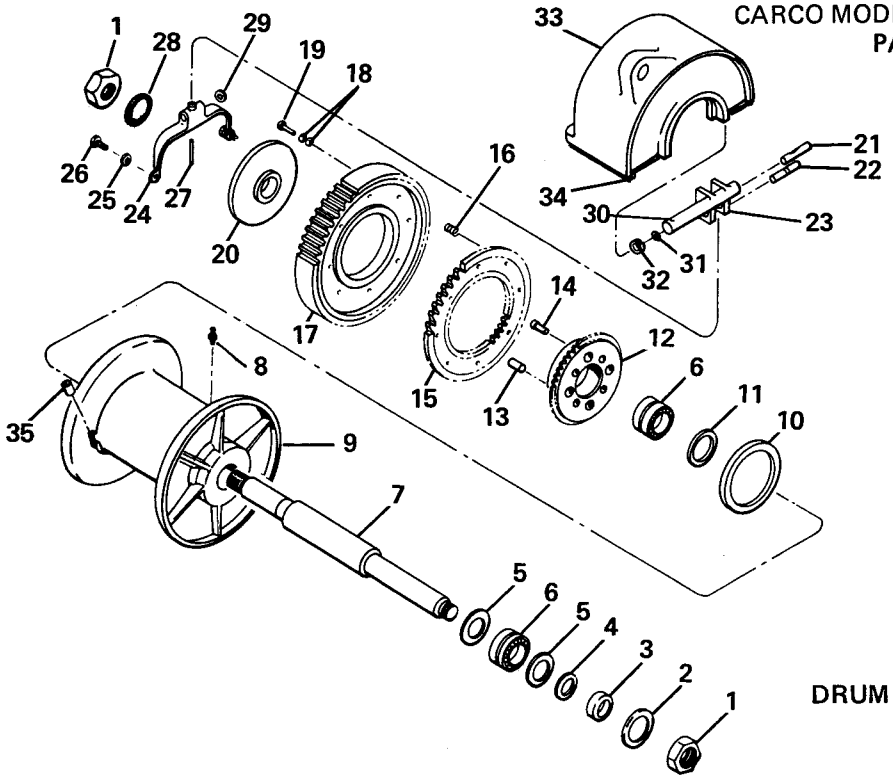
| | REF. | CARCO PART NO. | NAME AND DESCRIPTION | QUAN. PER UNIT |
|---|---|---|---|---|
| *** | 1 | 16044-40 | Nut, 2-1/2 UN Hex Jam | 2 |
| | 2 | 16343-21 | Oil Seal, NAT'L. 455379 | 1 |
| | 3 | 44457-1 | Spacer | 1 |
| | 4 | 44881 | Shim | 2 |
| | 5 | 44458 | Seal Washer | 2 |
| | 6 | 15200 | Brg. (Matched Set) | 2 |
| *** | 7 | 44459 | Shaft | 1 |
| | 8 | 16222-2 | Fitting, ALEMITE 1610BL | 1 |
| | 9 | 44456 | Standard Drum | 1 |
| * | | 44682 | High Capacity Drum (PSC Only) | 1 |
| | 10 | 16342-10 | Oil Seal, NAT'L. 415300 | 1 |
| | 11 | 16343-16 | Oil Seal, NAT'L. 455137 | 1 |
| | 12 | 44461 | Gear | 1 |
| ** | 13 | 45081-2 | Dowel Pin | 4 |
| | 14 | 44469 | Lock | 1 |
| | 15 | 16048-1218 | Cap Screw, 3/4 UNF x 2-1/4 H.H. | 4 |
| | 16 | 44460-3 | Spacer | 1 |
| | 17 | 16262-332 | O-Ring, NAT'L. 622735 | 1 |
| | 18 | 25457-3 | Ferrule for 1 Wire Rope | 1 |
| | | 25457-2 | Ferrule for 7/8 Wire Rope | 1 |
| | | 25457-1 | Ferrule for 3/4 Wire Rope | 1 |

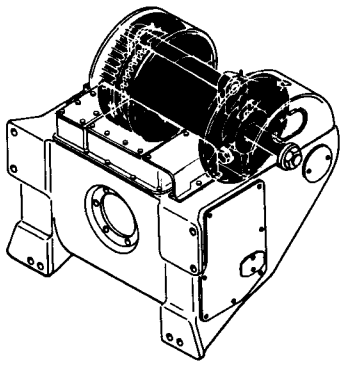
NOTES:

*Optional high capacity drum is standard on PSC models.

**When bull gear or cable drum is replaced, dowel holes must be drilled 57/64" and reamed .9057"/.9077" to accommodate oversize 45081-2 dowels.

***For extended drum shaft order 46925 shaft and 2 each 16041-14 nut, Timken TN 14.



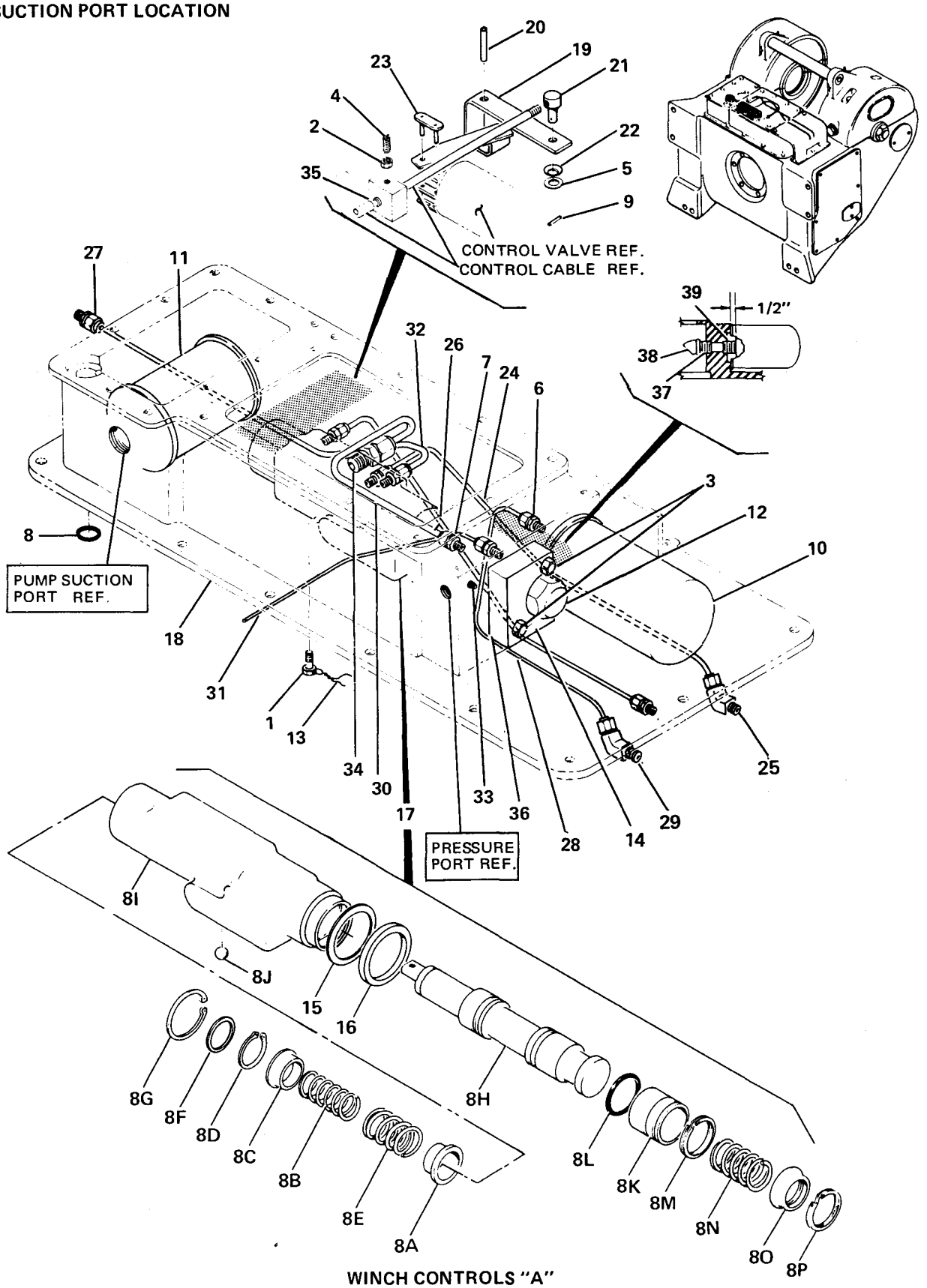



DRUM SHAFT (FREE SPOOLING)

| REF. | CARCO PART NO. | NAME AND DESCRIPTION | QUAN. PER UNIT |
|---|---|---|---|
| 1 | 16044-40 | Nut, 2-1/2 UN Hex Jam | 2 |
| 2 | 16343-21 | Oil Seal, NAT'L. 455379 | 1 |
| 3 | 44457-1 | Spacer | 1 |
| 4 | 44881 | Shim | As Req'd. |
| 5 | 44458 | Seal | 2 |
| 6 | 15200 | Brg. (matched set) | 2 |
| 7 | 44459 | Shaft | 1 |
| 8 | 16222-2 | Fitting, ALEMITE 1610B | 1 |
| 9 | 44456 | Cable Drum | 1 |
| 10 | 16342-10 | Oil Seal, NAT'L. 415300 | 1 |
| 11 | 16343-16 | Oil Seal, NAT'L. 455137 | 1 |
| 12 | 45977 | Hub | 1 |
| * 13 | 45081-2 | Dowel Pin | 4 |
| 14 | 16050-1210 | Cap Screw, 3/4 UNF x 1-1/4 Hex Soc. | 4 |
| 15 | 45976 | Gear | 1 |
| 16 | 16240-2 | Spring, LEE LC-045-G10 | 8 |
| 17 | 45975 | Gear | 1 |
| 18 | 16064-6 | Washer, 3/8 | 16 |
| 19 | 16052-616 | Cap Screw, NYLOK 3/8 UNC x 2 H.H. | 8 |
| 20 | 46355 | Spacer | 1 |
| 21 | 46098 | Pin | 1 |
| 22 | 46099 | Shaft | 1 |
| 23 | 46100 | Tube | 1 |
| 24 | 45982 | Fork | 1 |
| 25 | 16043-6 | Nut, 3/8 UNC Hex Jam | 2 |
| 26 | 16047-608 | Cap Screw, 3/8 UNC x 1 H.H. | 2 |
| 27 | 16290-1656 | Dowel Pin, 1/2 x 3-1/2 | 1 |
| 28 | 16262-332 | O-Ring, NAT'L. 622735 | 1 |
| 29 | 16064-16 | Washer, 1 | 1 |
| 30 | 16056-608 | Set Screw, 3/8 UNC x 1/2 Hex Soc. | 1 |
| 31 | 16262-114 | O-Ring, NAT'L. 622712 | 1 |
| 32 | 16309-827 | Retng. Ring, NAT'L. TRC 827 | 1 |
| 33 | 44440 | Cover | 1 |
| 34 | 44412 | Gasket | 2 |
| 35 | 25457-3 | Ferrule for 1 Wire Rope | 1 |
| | 25457-2 | Ferrule for 7/8 Wire Rope | 1 |
| | 25457-1 | Ferrule for 3/4 Wire Rope | 1 |

*When bull gear hub or cable drum is replaced, dowel holes must be drilled 57/64" and reamed .9057"/.9077" to accommodate oversize 45081-2 dowels.

CARCO MODEL F-50-PS, PSM & PSC WINCH
**PARTS LIST SECTION–PAGE 18**
**WINCH CONTROLS "A"**
**STANDARD CONTROL CABLE AND**
**SUCTION PORT LOCATION**




**WINCH CONTROLS "A"**
**ASSEMBLY NO. 49350-50**

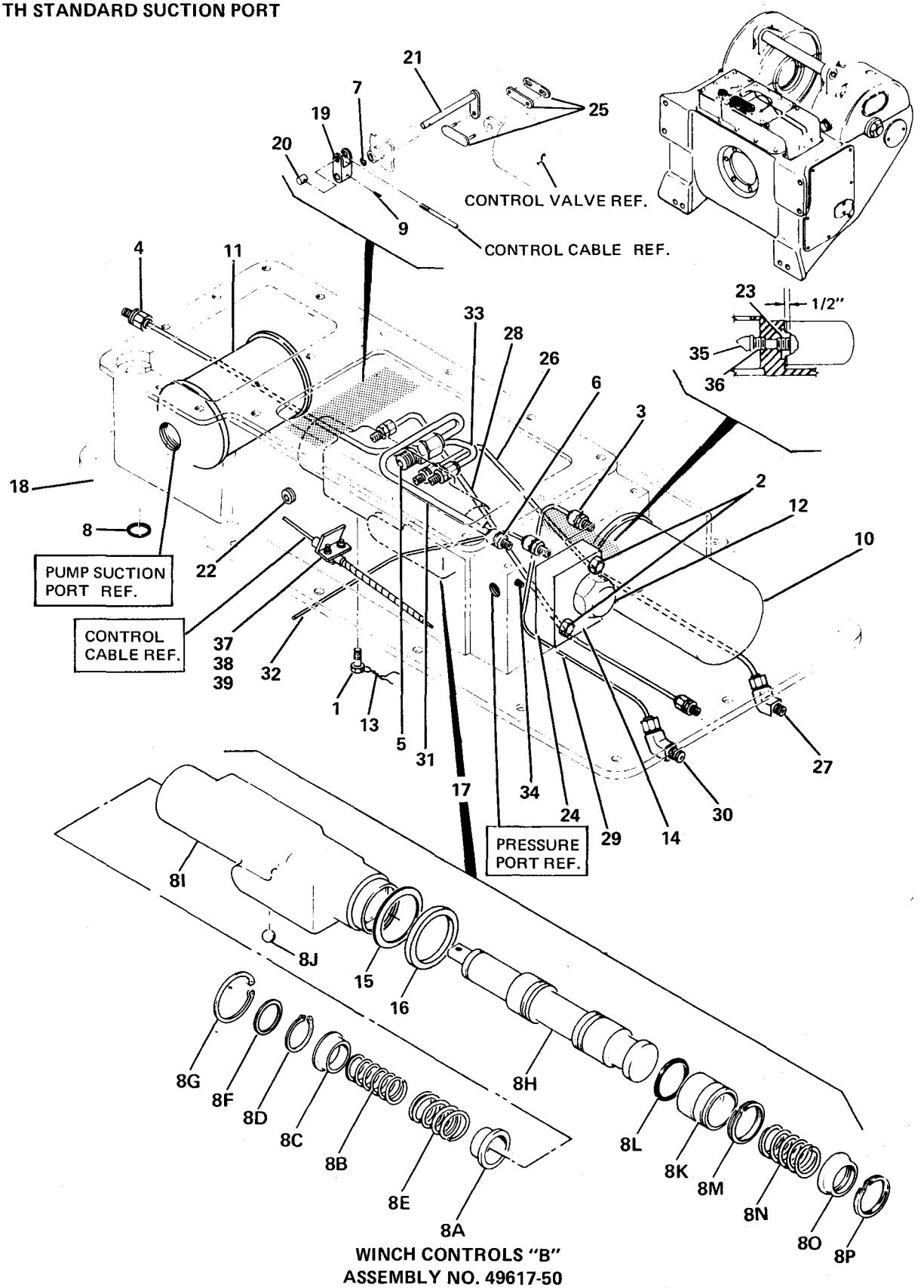
2283-B-10-1-74
SUPERSEDES
2283-B-12-1-73

## STANDARD CONTROL CABLE AND SUCTION PORT LOCATION

| | REF. | CARCO PART NO. | NAME AND DESCRIPTION | QUAN. PER UNIT |
|---|---|---|---|---|
| | 1 | 16024-9 | Cap Screw, 1/2 UNF x 1 Hex Dr. Hd. | 1 |
| | 2 | 16043-6 | Nut, 3/8 UNC Hex Jam | 1 |
| | 3 | 16047-610 | Cap Screw, 3/8 UNC x 1-1/4 H.H. | 2 |
| | 4 | 16056-610 | Set Screw, 3/8 UNC x 5/8 Hex Soc. Hd. | 1 |
| | 5 | 16064-8 | Washer, 1/2 | 1 |
| | 6 | 16129-44 | Connector, ANCHOR 4M-4JMS | 2 |
| | 7 | 16129-88 | Connector, ANCHOR 8M-8JMS | 1 |
| | 8 | 16262-220 | O-Ring, NAT'L. 622725 | 1 |
| | 9 | 16292-616 | Spring Pin, ROLLPIN 3/16 x 1 | 1 |
| | 10 | 16392 | Return Filter, BALDWIN BT-364 | 1 |
| | 11 | 16393 | Suction Strainer, MARVEL 610-5-M-40 | 1 |
| | 12 | 44960 | Relief Valve (See Page 18) | 1 |
| | 13 | 48125-1 | Lockwire, 16 Ga. x 12 | 1 |
| | 14 | 49318 | Relief Valve Plate | 1 |
| | 15 | 49323 | Seal Washer | 1 |
| | 16 | 49324 | Valve Body Seal | 1 |
| | 17 | 49325 | Control Valve | 1 |
| | 18 | 49328 | Housing | 1 |
| | 19 | 49330 | Control Lever | 1 |
| | 20 | 49331 | Control Lever Pin | 1 |
| | 21 | 49332 | Control Cable Pin | 1 |
| | 22 | 49333 | Disc Spring | As Req'd |
| | 23 | 16364-2040 | Connecting Link, ANS1 2040 | 1 |
| | 24 | 49366 | Brake Tube | 1 |
| | 25 | 16144-66 | Elbow, ANCHOR 6MAX-6JMS | 1 |
| | 26 | 49361 | Forward Clutch Tube | 1 |
| | 27 | 16129-66 | Connector, ANCHOR 6M-6JMS | 5 |
| | 28 | 49360 | Brake Return Line Tube | 1 |
| | 29 | 16144-44 | Elbow, ANCHOR 4MAX-4JMS | 1 |
| | 30 | 49353 | Valve Supply Tube | 1 |
| | 31 | 49359 | PTO Lube Tube | 1 |
| | 32 | 49362 | Reverse Tube | 1 |
| | 33 | 16169-4 | Plug, 1/4 NPT Sq. Hd. | 1 |
| | 34 | 16129-68 | Connector, ANCHOR 6M-8JMS | 1 |
| | 35 | 16262-208 | O-Ring, PARKER 2-208 | 1 |
| | 36 | 49519 | Gasket | 1 |
| | 37 | 16158-1211 | Nipple, 3/4 NPT x 1-3/8 | 1 |
| | 38 | 49657 | Elbow | 1 |
| | 39 | 50218 | Connector | 1 |
| | 8A | 44259-1 | Stop | 1 |
| * | 8B | 45548 | Spring | 1 |
| * | 8C | 45623 | Stop | 1 |
| | 8D | 16313-75 | Retn'g. Ring, TRUARC 5100-75 | 1 |
| * | 8E | 45549 | Spring | 1 |
| * | 8F | 45622 | Washer | 1 |
| | 8G | 16314-150 | Retn'g. Ring, TRUARC N5000-150 | 1 |
| ** | 8H | 49322 | Spool | 1 |
| ** | 8I | 49321 | Body | 1 |
| | 8J | 16217-8 | Ball, 1/2 Steel | 4 |
| ** | 8K | 45855 | Piston | 1 |
| | 8L | 16262-215 | O-Ring, NAT'L. 622720 | 1 |
| | 8M | 16308-131 | Retn'g. Ring, SPIROLOX RS-131 | 1 |
| | 8N | 45857 | Spring | 1 |

*Items 8B, 8C, 8E and 8F not serviced separately. Order spring repair kit 45813.
**Items 8H, 8I, and 8K are not serviced separately. Order 49325 control valve.

**WINCH CONTROLS "B"**
**RELOCATED CONTROL CABLE LOCATION**
**WITH STANDARD SUCTION PORT**

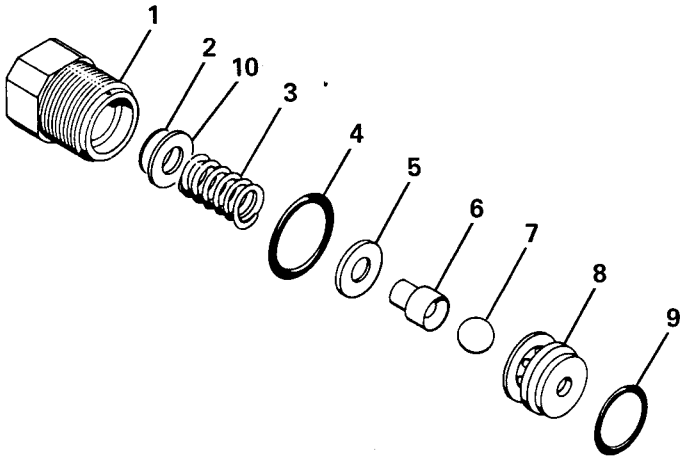



**WINCH CONTROLS "B"**
**ASSEMBLY NO. 49617-50**

## RELOCATED CONTROL CABLE LOCATION WITH STANDARD SUCTION PORT

| REF. | CARCO PART NO. | NAME AND DESCRIPTION | QUAN. PER UNIT |
|---|---|---|---|
| 1 | 16024-9 | Cap Screw, 1/2 UNF x 1 Hex Dr. Hd. | 1 |
| 2 | 16047-610 | Cap Screw, 3/8 UNC x 1-1/4 H.H. | 2 |
| 3 | 16129-44 | Connector, ANCHOR 4M-4JMS | 2 |
| 4 | 16129-66 | Connector, ANCHOR 6M-6JMS | 5 |
| 5 | 16129-68 | Connector, ANCHOR 6M-8JMS | 1 |
| 6 | 16129-88 | Connector, ANCHOR 8M-8JMS | 1 |
| 7 | 16262-014 | O-Ring, NAT'L. 610014 | 1 |
| 8 | 16262-220 | O-Ring, NAT'L. 622725 | 1 |
| 9 | 16292-616 | Spring Pin, ROLLPIN 3/16 x 1 | 1 |
| 10 | 16392 | Return Filter, BALDWIN BT-364 | 1 |
| 11 | 16393 | Suction Strainer, MARVEL 610-5-M-40 | 1 |
| 12 | 44960 | Relief Valve (see Page 18) | 1 |
| 13 | 48125-1 | Lockwire, 16 Ga. x 12 | 1 |
| 14 | 49318 | Relief Valve Plate | 1 |
| 15 | 49323 | Seal Washer | 1 |
| 16 | 49324 | Valve Body Seal | 1 |
| 17 | 49325 | Control Valve | 1 |
| 18 | 49731-50 | Housing | 1 |
| 19 | 49568 | Lever | 1 |
| 20 | 49569 | Pin | 1 |
| 21 | 49570 | Control Lever | 1 |
| 22 | 16167-8 | Plug, 1/2 NPTF Hex Soc. | 1 |
| 23 | 50218 | Connector | 1 |
| 24 | 49517 | Gasket | 1 |
| 25 | 16364-2040 | Connecting Link, ANS1 2040 | 1 |
| 26 | 49366 | Brake Tube | 1 |
| 27 | 16144-66 | Elbow, ANCHOR 6MAX-6JMS | 1 |
| 28 | 49361 | Forward Clutch Tube | 1 |
| 29 | 49360 | Brake Return Line Tube | 1 |
| 30 | 16144-44 | Elbow, ANCHOR 4MAX-4JMS | 1 |
| 31 | 39353 | Valve Supply Tube | 1 |
| 32 | 49359 | PTO Lube Tube | 1 |
| 33 | 49362 | Reverse Tube | 1 |
| 34 | 16169-4 | Plug, 1/4 NPT Sq. Hd. | 1 |
| 35 | 49657 | Elbow | 1 |
| 36 | 16158-1211 | Nipple, 3/4 NPT x 1-3/8 | 1 |
| 37 | 16033-6 | Nut, 3/8 UNC Hex | 2 |
| 38 | 16398-4 | U-Bolt, CABLECRAFT 161-010-4 | 1 |
| 39 | 16067-6 | Lock Washer, 3/8 | 2 |
| 8A | 44259-1 | Stop | 1 |
| * 8B | 45548 | Spring | 1 |
| * 8C | 45623 | Stop | 1 |
| 8D | 16313-75 | Retn'g. Ring, TRUARC 5100-75 | 1 |
| * 8E | 45549 | Spring | 1 |
| * 8F | 45622 | Washer | 1 |
| 8G | 16314-150 | Retn'g. Ring, TRUARC N5000-150 | 1 |
| ** 8H | 49322 | Spool | 1 |
| ** 8I | 49321 | Body | 1 |
| 8J | 16217-8 | Ball, 1/2 Steel | 4 |
| ** 8K | 45855 | Piston | 1 |
| 8L | 16262-215 | O-Ring, NAT'L. 622720 | 1 |
| 8M | 16308-131 | Retn'g. Ring, SPIROLOX RS-131 | 1 |
| 8N | 45857 | Spring | 1 |
| 8O | 45856 | Stop | 1 |
| 8P | 16305-156 | Retn'g. Ring, SPIROLOX RR-156 | 1 |

* Items 8B, 8C, 8E and 8F not serviced separately. Order spring repair kit 45813.
** Items 8H, 8I, and 8K are not serviced separately. Order 49325 control valve.




## RELIEF VALVE – NO. 44960

| REF. | CARCO PART NO. | NAME AND DESCRIPTION | QUAN. PER UNIT |
|---|---|---|---|
| 1 | 16271-57 | Body, GRESEN 1747 | 1 |
| 2 | 16271-54 | Shim, GRESEN 949 | As |
| | 16271-56 | Shim, GRESEN 1743 | Req'd |
| 3 | 16271-19 | Spring, GRESEN 953 | 1 |
| 4 | 16271-58 | O-Ring, GRESEN 1615 | 1 |
| 5 | 16271-59 | Spacer, GRESEN 1742 | 1 |
| 6 | 16271-60 | Follower, GRESEN 1744 | 1 |
| 7 | 16271-21 | Ball, GRESEN 014 | 1 |
| 8 | 16271-64 | Seat, GRESEN 3093 | 1 |
| 9 | 16271-61 | O-Ring, GRESEN 1718 | 1 |
| 10 | 16271-55 | Washer, GRESEN 1213 | 1 |

# CARCO® DELIVERY SERVICE REPORT
## CARCO WINCH PRODUCTS

RETURN TO
Pacific Car and Foundry Company
1400 North Fourth Street
Renton, Washington 98055
Attn: Service Dept.

A DIVISION OF PACCAR

DATE _____

**REPORT COVERS:**

☐ PREDELIVERY ☐ DELIVERY ☐ POST DELIVERY
Predelivery Report should be Submitted with Delivery Report.

WINCH MODEL _____ SERIAL NO. _____ TRACTOR MODEL _____ SERIAL NO. _____ HOURS _____

**NOTE:** Below are items related to the installation, operation, and servicing of this unit to be performed or discussed at time of predelivery, delivery or post delivery. Circle the (X) when the item has been performed. Check (√) in the column items not found acceptable. Briefly note any correction or recommendation needed under comments below. Use attached service report if needed.

| Item | PREDELIVERY SERVICE | DELIVERY SERVICE | DELIVERY INSTRUCTION | POST DELIVERY SERVICE | POST DELIVERY INSTRUCTION | NOT ACCEPTABLE ITEM |
|---|---|---|---|---|---|---|
| SHORTAGE OR DAMAGED IN SHIPMENT | X | | | | | |
| CHECKED PUMP AND DRIVE ASSEMBLY | X | | X | X | X | |
| PRIMED HYDRAULIC PUMP | X | | X | | | |
| CHECKED OIL LEVEL | X | X | X | X | X | |
| CHECKED CONTROL STAND AND CONTROL VALVE ADJUSTMENT | X | X | X | X | X | |
| HOSES, FITTINGS, CONNECTIONS CHECKED FOR LEAKS | X | X | X | X | X | |
| CHECKED BRAKE BAND ADJUSTMENT | X | | X | X | X | |
| POINTS TO BE LUBRICATED OR GREASED | X | | X | X | X | |
| CONDITION OF SUCTION AND PRESSURE FILTERS | X | | X | X | X | |
| CLUTCH LINKAGE ASSEMBLY (SLIDING GEAR) | X | | X | X | X | |
| COLD WEATHER STARTING AND OPERATION | X | X | X | X | X | |
| SAFETY INSTRUCTION DECALS INSTALLED | X | | X | | X | |
| MANUAL DELIVERED TO OWNER | | X | X | | | |

| Item | PREDELIVERY SERVICE | DELIVERY SERVICE | DELIVERY INSTRUCTION | POST DELIVERY SERVICE | POST DELIVERY INSTRUCTION | NOT ACCEPTABLE ITEM |
|---|---|---|---|---|---|---|
| TORQUED VALVE HOUSING CAPSCREWS TO 3/8 _____ 1/2 _____ 5/8 _____ FT/LBS | X | | X | X | X | |
| TORQUED STUD NUTS AND CAPSCREWS SECURING GEAR CASE COVERS TO _____ FT/LBS | X | | X | X | X | |
| TORQUED WINCH MOUNTING STUD NUTS AND CAPSCREWS TO _____ FT/LBS | X | | X | X | X | |
| STARTED ENGINE AND CHECKED OPERATION OF WINCH | X | X | X | X | X | |
| HYDRAULIC SYSTEM OPERATING PRESSURE 240-260 PSI AT LOW ENGINE IDLE OF _____ RPM | X | | X | X | X | |
| HYDRAULIC SYSTEM OPERATING PRESSURE 300-320 PSI AT HIGH ENGINE IDLE OF _____ RPM | X | | X | X | X | |

WINCH COMPONENTS INSTALLED PER INSTRUCTIONS. _____ YES _____ NO
COMMENT BELOW

COMMENTS: _____

The owner's signature below acknowledges that the unit was serviced in the manner indicated above, and that he received instructions as to its proper operation and maintenance.

OWNER'S SIGNATURE _____ ADDRESS _____ CITY _____ STATE _____ DATE MACHINE DELIVERED _____

LOCATION OF MACHINE _____ CITY _____ STATE _____ DATE POST-DELIVERY SERVICE _____

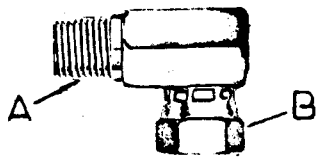
SELLING DEALER _____ ADDRESS _____ CITY _____ STATE _____

SERVICING DEALER _____ ADDRESS _____ CITY _____ STATE _____

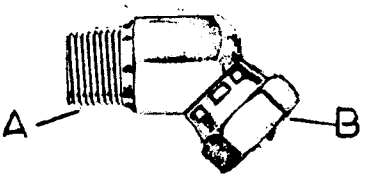
SIGNATURE OF SERVICING DEALER _____

OWNERS COPY

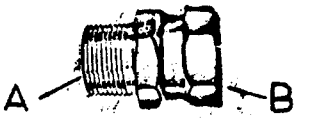
A- 2395



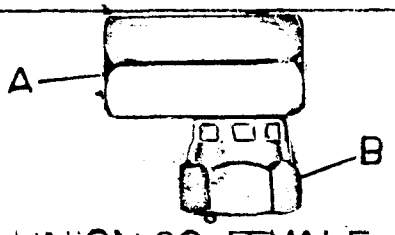

UNION, 90° MALE
PART NO. 16179-



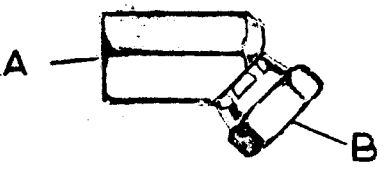

UNION, 45° MALE
PART NO. 16180-



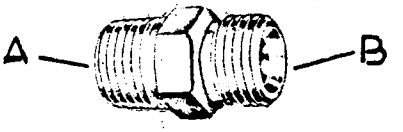

UNION, MALE
PART NO. 16182-




UNION, 90 FEMALE
PART NO. 16178-




UNION 45° FEMALE
PART NO. 16181-




ADAPTER
PART NO. 16112-

| DASH NO. | A NPTF (TAPER THREAD) | B NPSM (STRAIGHT THREAD) |
|---|---|---|
| -8 8 | 1/2 | 1/2 |
| -8 12 | 1/2 | 3/4 |
| -12 12 | 3/4 | 3/4 |
| -12 16 | 3/4 | 1 |
| -16 16 | 1 | 1 |

MATERIAL

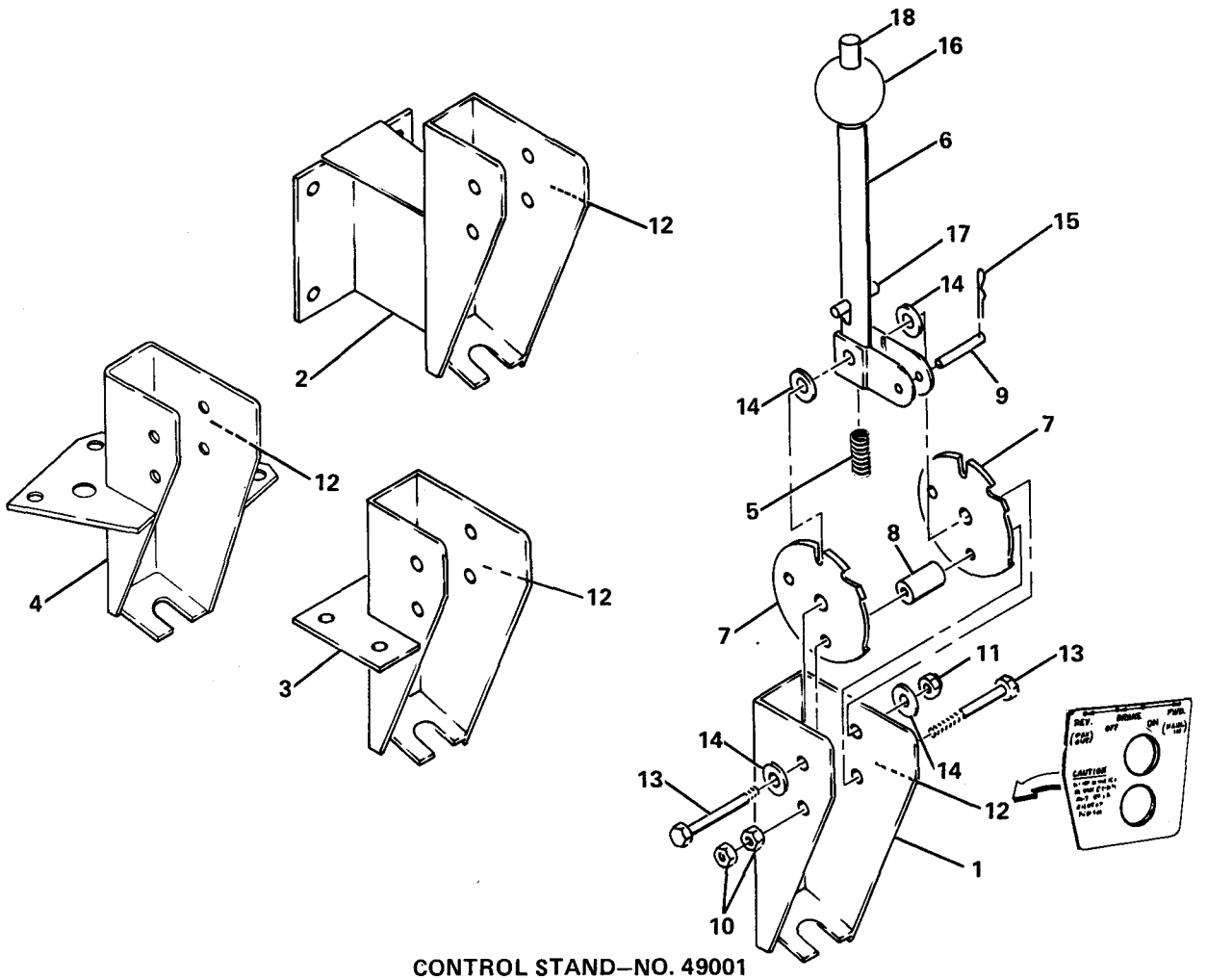
APPROX WT.

PACIFIC CAR AND FOUNDRY COMPANY — RENTON, WASHINGTON

| DRAFTSMAN RWA | DATE 3-23-73 | CHECKED [illegible] | DATE 3-23-73 |
|---|---|---|---|

# HYDRAULIC HOSE ADAPTER UNIONS

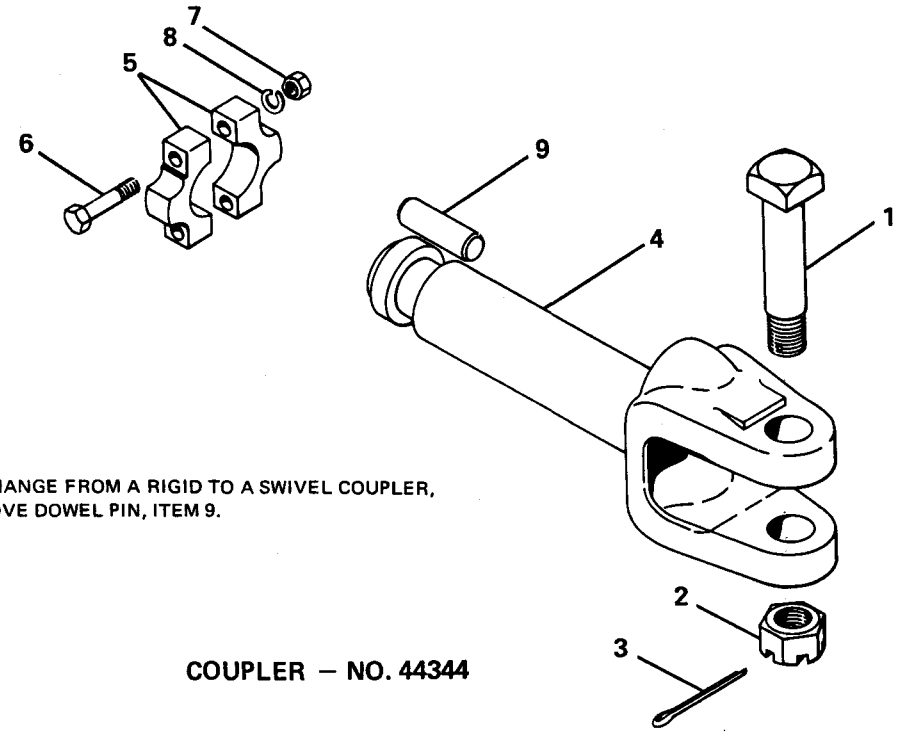
A- 2395




CONTROL STAND—NO. 49001

| | REF. | CARCO PART NO. | NAME AND DESCRIPTION | CONTROL STAND GROUP NO. QUANTITY 49001-1 | QUANTITY 49001-2 | QUANTITY 49001-3 | QUANTITY 49001-4 |
|---|---|---|---|---|---|---|---|
| | 1 | 49002-1 | Housing | 1 | | | |
| | 2 | 49002-2 | Housing | | 1 | | |
| | 3 | 49002-3 | Housing | | | 1 | |
| | 4 | 49002-4 | Housing | | | | 1 |
| | 5 | 41403 | Spring | 1 | 1 | 1 | 1 |
| * | 6 | 49003 | Lever Assy. | 1 | 1 | 1 | 1 |
| | 7 | 49007 | Lock Plate | 2 | 2 | 2 | 2 |
| | 8 | 49009 | Spacer | 1 | 1 | 1 | 1 |
| | 9 | 49010 | Pin | 1 | 1 | 1 | 1 |
| | 10 | 16033-6 | Nut, 3/8 UNC Hex | 2 | 2 | 2 | 2 |
| | 11 | 16039-66 | Lock Nut, ESNA 21NE-066 | 1 | 1 | 1 | 1 |
| | 12 | 49314 | Shift Instruction Plate | 1 | 1 | 1 | 1 |
| | 13 | 16047-620 | Cap Screw, 3/8 UNC x 2-1/2 H.H. | 2 | 2 | 2 | 2 |
| | 14 | 16064-6 | Washer, 3/8 | 4 | 4 | 4 | 4 |
| | 15 | 16381-13 | Hitch Pin, WESTERN WIRE WW-13 | 1 | 1 | 1 | 1 |
| * | 16 | 41404 | Ball | 1 | 1 | 1 | 1 |
| * | 17 | 16294-824 | Spring Pin, 1/4 x 1-1/2 | 1 | 1 | 1 | 1 |
| * | 18 | 49004 | Push Rod | 1 | 1 | 1 | 1 |

*Items 16, 17, and 18 are included in item 6.

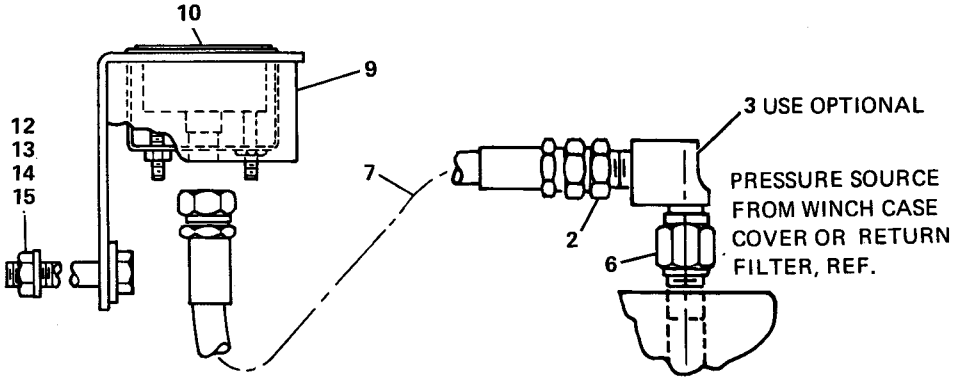


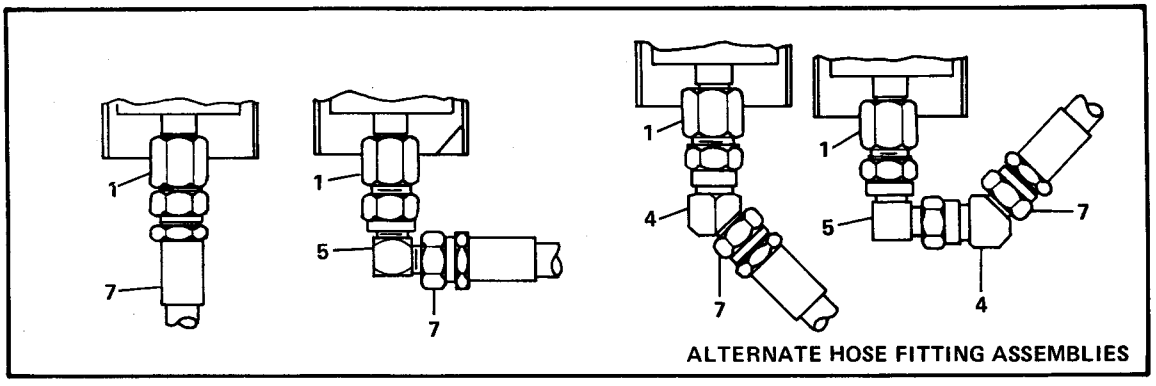

TO CHANGE FROM A RIGID TO A SWIVEL COUPLER, REMOVE DOWEL PIN, ITEM 9.

**COUPLER – NO. 44344**

| REF. | CARCO PART NO. | NAME AND DESCRIPTION | QUAN. PER UNIT |
|---|---|---|---|
| 1 | 32871-1 | Bolt (includes item 2 & 3) | 1 |
| 2 | Y-1216-1 | Nut (includes item 3) | 1 |
| 3 | 16288-836 | Cotter Pin, 1/4 x 2-1/4 | 1 |
| 4 | 32857 | Coupler | 1 |
| 5 | 45702 | Clamp (includes items 6, 7, & 8) | 1 |
| 6 | 16047-818 | Cap Screw, 1/2 UNC x 2-1/4 H.H. | 2 |
| 7 | 16033-8 | Nut, 1/2 UNC Hex | 2 |
| 8 | 16067-8 | Washer, 1/2 Lock | 2 |
| 9 | 32865 | Pin | 1 |

PRESSURE GAGE



ALTERNATE HOSE FITTING ASSEMBLIES

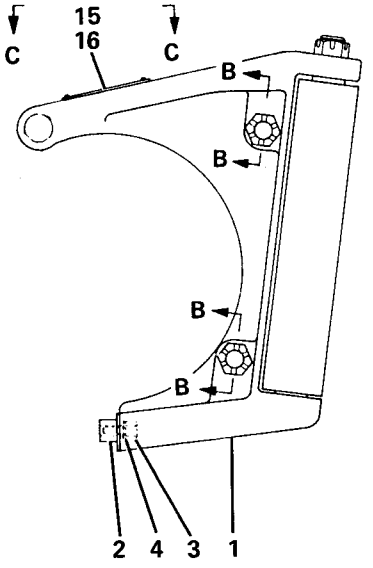
## PRESSURE GAUGE – NO. 48700-120

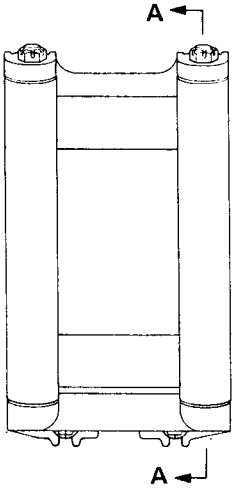
| | REF. | CARCO PART NO. | NAME AND DESCRIPTION | QUAN PER UNIT |
|---|---|---|---|---|
| | 1 | 16116-44 | Adapter, WTHRD. C5255 x 4 x 4 | 1 |
| | 2 | 16129-44 | Connector, WTHRD. C5205 x 4 x 4 | 1 |
| | 3 | 16171-44 | Elbow, WTHRD. 3400 x 4 | 1 |
| | 4 | 16184-44 | Union, WTHRD. C5356 x 4 | 1 |
| | 5 | 16185-44 | Union, WTHRD. C5506 x 4 | 1 |
| | 6 | 16362-44 | Snubber, CHEMIQUIP 25B-D | 1 |
| * | 7 | 44921-120 | Hose Assembly | 1 |
| ** | 8 | 45101 | Tag, Instruction–Not Shown | 1 |
| | 9 | 48687 | Bracket | 1 |
| | 10 | 48693 | Gauge | 1 |
| ** | 11 | 48712 | Sheet, Instruction–Not Shown | 1 |
| | 12 | 16047-620 | Cap Screw, 3/8 UNC x 2-1/2 H.H. | 1 |
| | 13 | 16033-6 | Nut, 3/8 UNC Hex. | 1 |
| | 14 | 16063-6 | Washer, 3/8 | 1 |
| | 15 | 16067-6 | Washer, 3/8 Lock | 1 |
| ** | 16 | Form A-2281 | Sheet, Instruction–Not Shown | 1 |

*48700-1 kit can be ordered, which is without item 7.

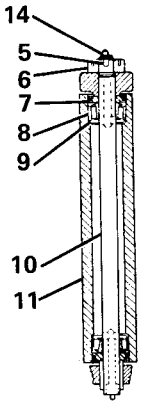
**Item 8, 11 and 16 are included in gauge kit.

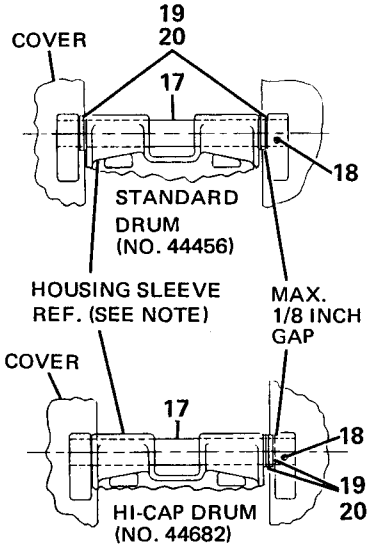
THIS FAIRLEAD IS NORMALLY FURNISHED AS A 3-ROLLER UNIT, WITH HORIZONTAL ROLLER IN TOP POSITION – IF A 4-ROLLER UNIT IS REQUIRED, AN ADDITIONAL ROLLER CAN BE SUPPLIED CONSISTING OF ITEMS LISTED IN COLUMN "A" IN PARTS LIST.



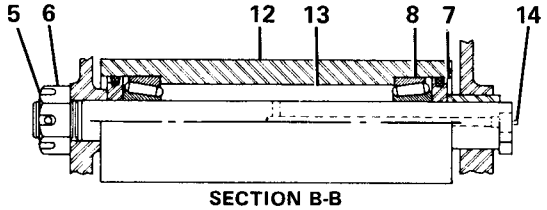




SECTION A-A
VERTICAL ROLLER




SECTION C-C




SECTION B-B
HORIZONTAL ROLLER

NOTE: AT INSTALLATION, POSITION HOUSING (ITEM 1) SO IT IS CENTERED AS NEARLY AS POSSIBLE ON CABLE DRUM. BURN END OF HOUSING SLEEVE IF NECESSARY, INSTALL ITEMS 19 AND 20 AS REQUIRED TO MAKE MAXIMUM GAP OF 1/8" BETWEEN SPACERS AND WINCH COVER.

**FAIRLEAD – PART NO.** { 44280-30 (3 ROLLER, USE WITH 44456 STD. & 44682 HICAP DRUM)
44280-40 (4 ROLLER, USE WITH 44456 STD. & 44682 HICAP DRUM)

| | REF. | CARCO PART NO. | NAME AND DESCRIPTION | QUAN. PER UNIT | "A" |
|---|---|---|---|---|---|
| | 1 | 44368 | Housing | 1 | |
| * | 2 | 49578 | Attaching Lug | 2 | |
| | 3 | 16047-1620 | Cap Screw, 1 UNC x 2-1/2 H.H. | 2 | |
| | 4 | 16348-6 | Washer, 1 | 2 | |
| | 5 | 16288-1240 | Cotter Pin, 3/8 x 2-1/2 | 3 | 1 |
| | 6 | 16036-24 | Nut, TIMKEN K8111 | 3 | 1 |
| | 7 | 30044 | Dust Guard | 6 | 2 |
| | 8 | 15235 | Brg. Cup | 6 | 2 |
| | | 15178 | Brg. Cone | 6 | 2 |
| | 9 | 30045 | Retainer | 4 | |
| | 10 | 30252 | Shaft | 2 | |
| | 11 | 30250 | Roller | 2 | |
| | 12 | 33958 | Roller | 1 | 1 |
| | 13 | 44371 | Shaft | 1 | 1 |
| | 14 | 16222-2 | Fitting, ALEMITE 1610B | 5 | 1 |
| | 15 | 26248 | Name Plate | 1 | |
| | 16 | 16055-5 | Drive Screw, #10 x 3/8 Type U | 4 | |
| | 17 | 49043-1 | Cable Guard | 1 | |
| | 18 | 16288-1272 | Cotter Pin, 3/8 x 4-1/2 | 1 | |
| | 19 | 49879-1 | Spacer | 2 | |
| | 20 | 49879-2 | Spacer | 2 | |

*Welds to Winch Case.