SERVICE SECTION

CARCO MODEL J-120-PS PSM AND PSC WINCH

(WITH INTERNAL FILTERS)

CONTENTS PAGE

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2325-F-9-15-77
SUPERSEDES
2325-F-10-1-74

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.

Lubrication Chart

Power Shift Winches
(Winch Only)

Fill to proper level with approved lubricating oil.

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

ATF DEXRON®
HTF TYPE C-2
MIL-L-2104-C Grade 10

Lubricate the left hand cable drum bearing with general purpose grease.

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

Use approved direct drive tractor transmission lubricant in sliding gear winches.

or

SAE 90 MPL Gear Oil -0° to 90°F (-18° to 32°C)
SAE 140 MPL Gear Oil above 90°F (above 32°C)

Lubricate the left hand cable drum bearing with general purpose grease.

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

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

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

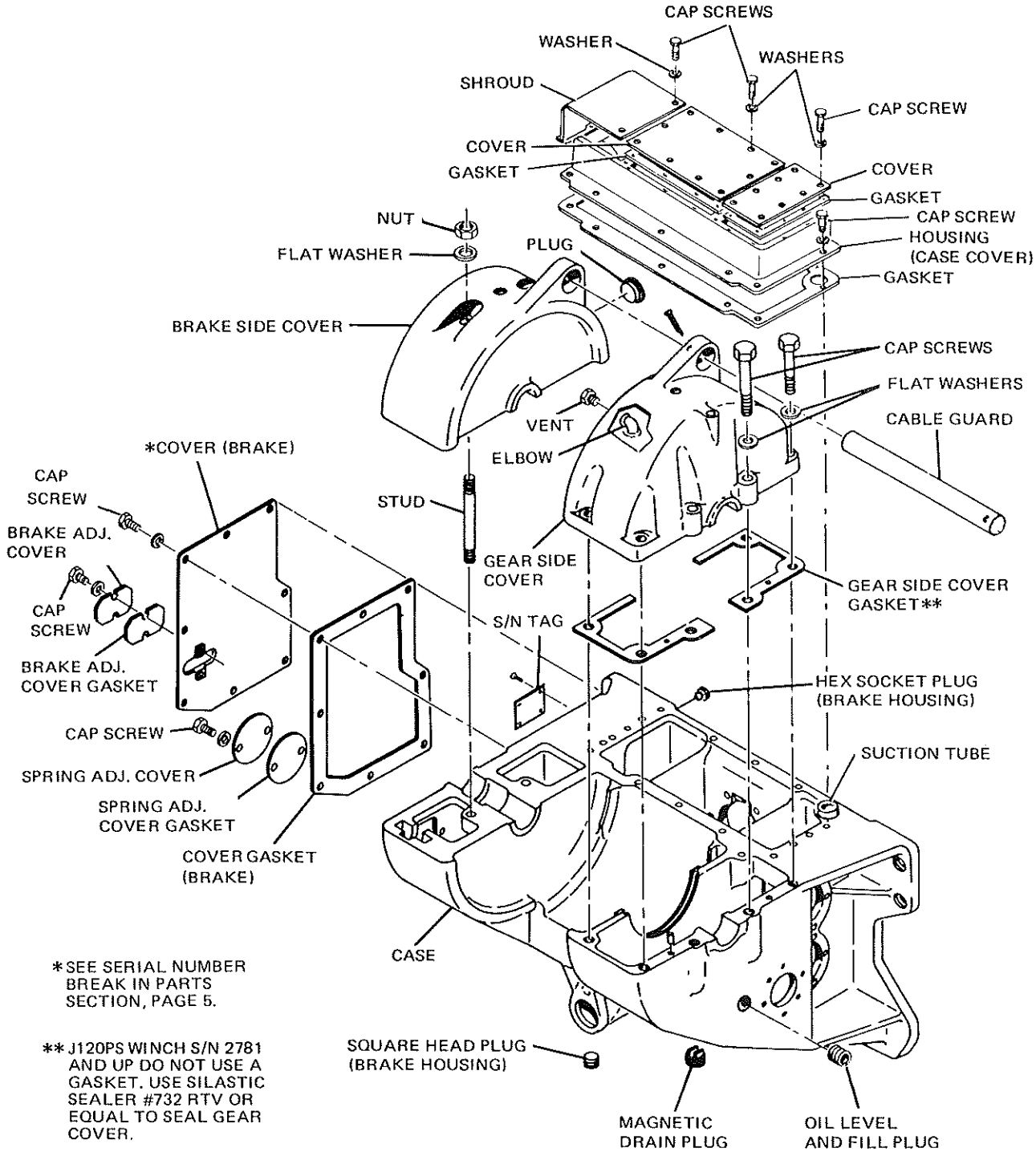


FIGURE 1
CASE

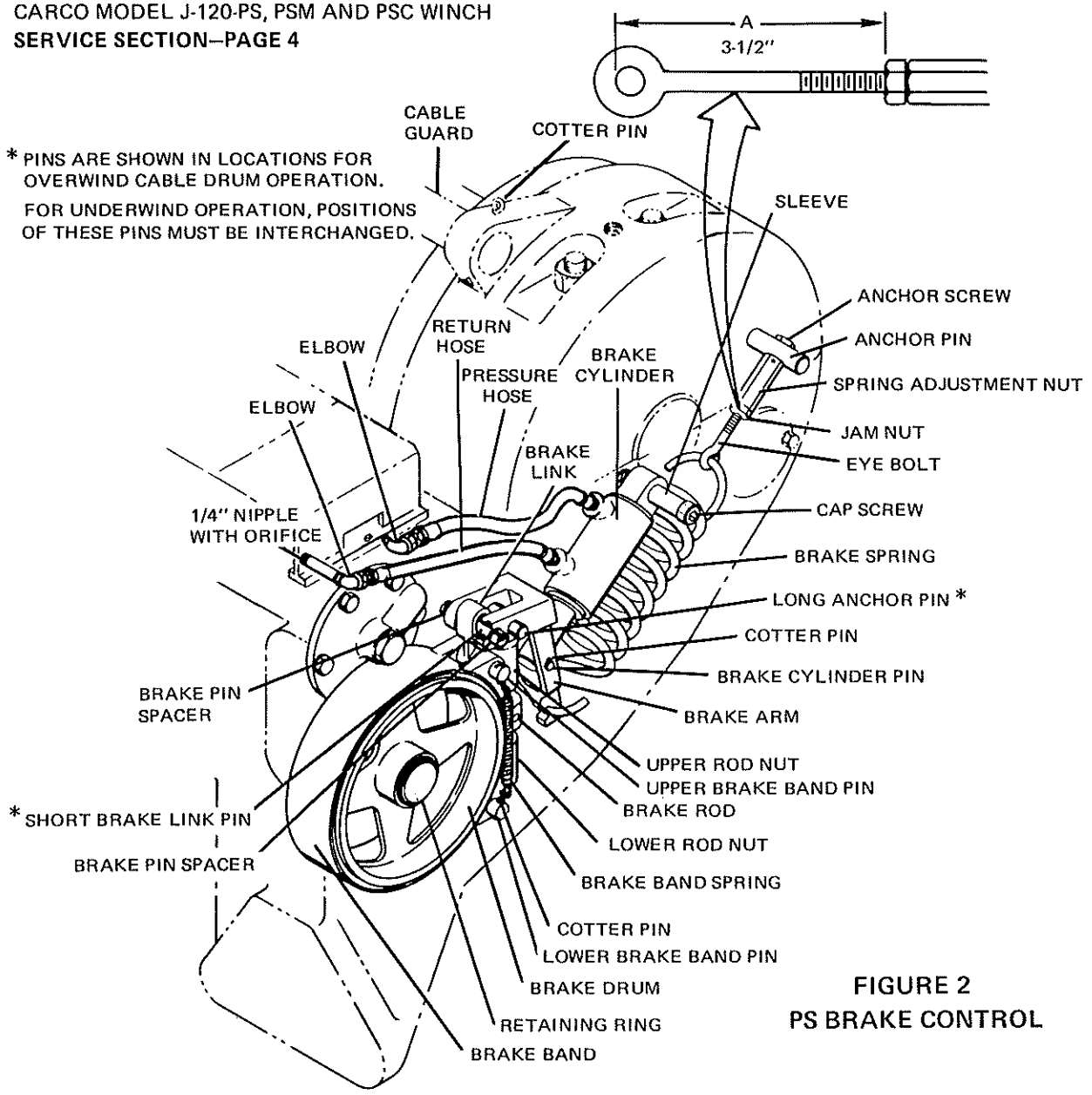


FIGURE 2
PS BRAKE CONTROL

BRAKE CONTROL PS WINCH

Disassembly

See Figure 1, page 3 and Figure 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 Figure 1, page 3 and Figure 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. To complete this change refer to page 21 under Bevel Gear Shaft.

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.

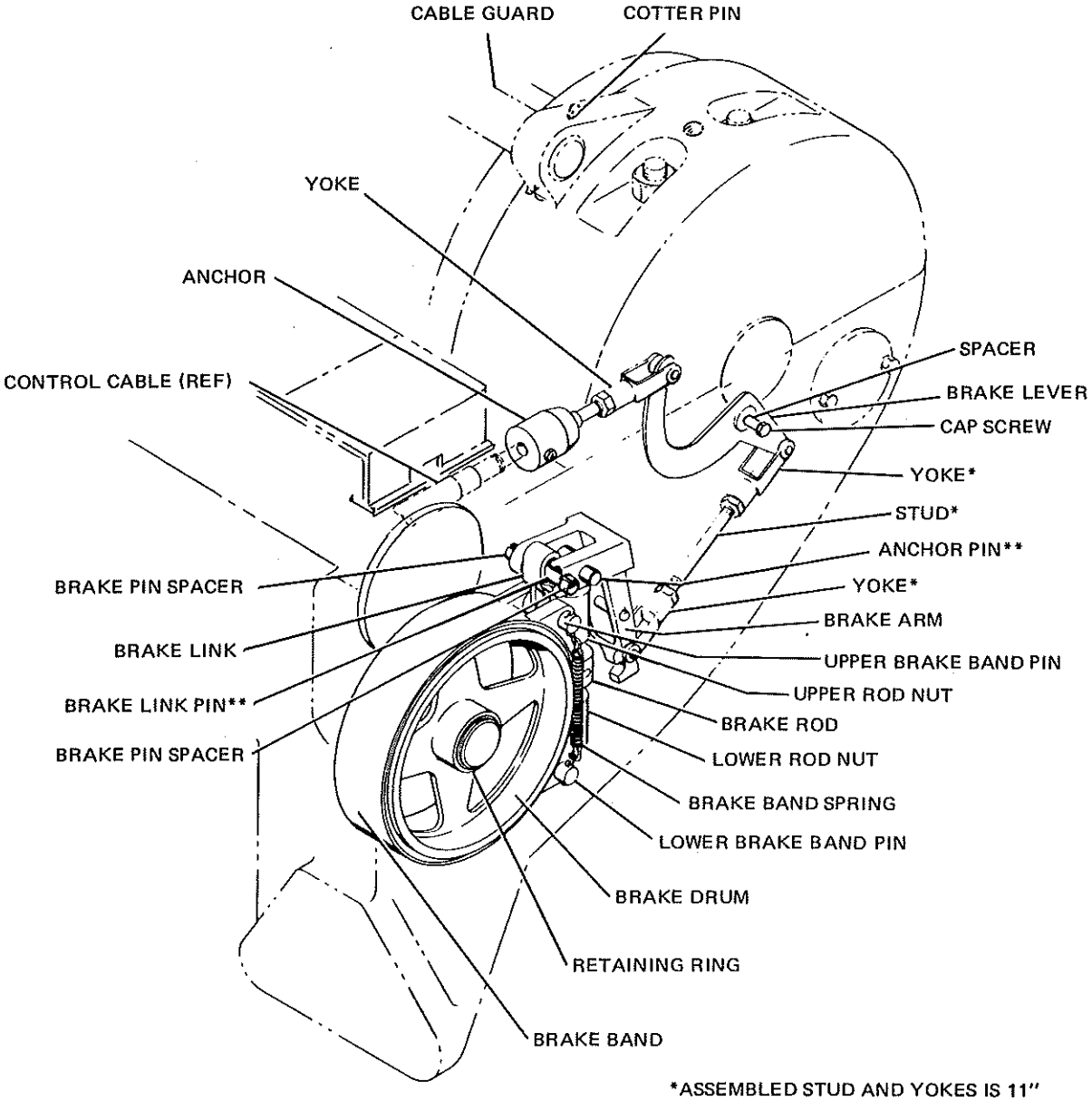
With tractor engine stopped, remove orifice from brake cylinder return line and reinstall line.

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.



*ASSEMBLED STUD AND YOKES IS 11" FROM CENTER TO CENTER OF YOKE PINS.

**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, MANUAL BRAKE

Disassembly

See Figure 3.

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

Remove brake cover. See Figure 1, page 3.

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 capscrew and spacer that acts as pivot for brake lever.

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

Remove yoke pins and disassemble brake linkage as required to replace parts.

Assembly

If brake linkage was disassembled, connect brake lever, brake arm, stud, and yokes to form a subassembly. Thread jam nuts and yokes onto stud, and adjust position to obtain a center-to-center spacing of yoke pins of 11 inches. Turn yokes to align, and tighten jam nuts.

Connect upper end of brake lever to control cable end yoke.

Remove capscrews and washers securing access cover and remove cover.

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

Working through access opening, position brake lever to align with capscrew hole, and install capscrew with spacer. Install access cover.

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. To complete this change refer to page 21 under Bevel Gear Shaft.

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.

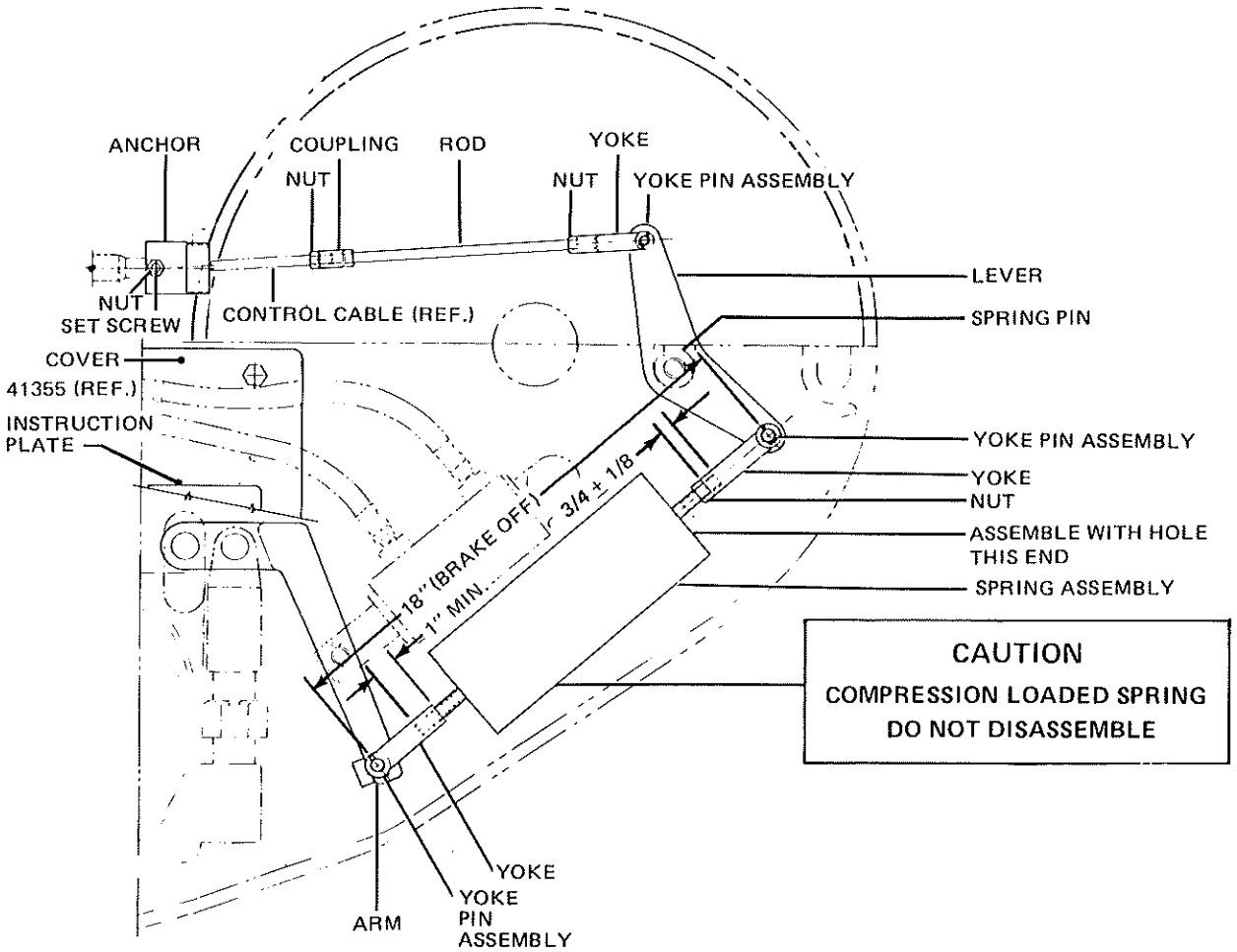


FIGURE 4
BRAKE CONTROL PS/IB (INCHING BRAKE)

BRAKE CONTROL PS/IB (INCHING BRAKE)

Disassembly

See Figure 1, page 3; Figure 2, page 4; and Figure 4.

Remove brake cover.

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

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

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

Remove cotter pin securing cable guard, and remove guard.

Remove yoke pin assembly to separate brake lever from spring assembly.

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

Remove yoke pin assembly to separate brake lever from cable rod.

Loosen jam nut and set screw on cable anchor and remove cable anchor and rod assembly from cover.

Loosen jam nut securing control cable to coupling and remove rod assembly as required to replace parts. Pull cable from cable anchor.

Remove spring assembly from the brake arm and remove yokes and jam nuts from spring assembly.

CAUTION: Brake spring is under compression. Do not disassemble brake spring assembly. Replace brake spring assembly if repair is needed.

To remove the brake cylinder and its components, see Figure 2, page 4.

Assembly

To assemble brake band, drum, arm, pins and cylinder refer to Figure 2, page 4.

NOTE: Be sure and install the brake cylinder rod in the upper hole on the brake arm.

If rod assembly was disassembled connect rod, coupling, and yoke to form a subassembly.

NOTE: Rod must be installed 1/2 inch into coupling and 7/8 inch into yoke. Secure coupling and yokes with jam nuts.

Install set screw and jam nut on cable anchor and screw anchor to cover.

Place control cable in anchor and secure with set screw and jam nut. Install jam nut on control cable core.

Thread rod assembly coupling on control cable core and secure with jam nut.

Install spring pin in brake lever and secure lever to yoke on rod assembly with pin assembly.

Lower brake side cover and rod assembly over studs. Guide brake lever and spring pin into position and secure cover to case with hex nuts and washers.

Place jam nut and yokes on spring assembly rod ends. Adjust yoke 3/4 ± 1/8 inch on rod end having hole in end cap, and position in winch case fastening yoke to brake lever, with pin assembly. Adjust other yoke 1 inch minimum on rod end and secure to brake arm with pin assembly.

NOTE: With brake in off position, center to center holes of yokes on spring assembly rod ends must measure 18 inch.

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 a flat side of the rod nut is flat against the brake rod spring.

Install brake cover.

BRAKE CONTROL – HEAVY DUTY BRAKE

Winches with heavy duty brake, use control stand number 48582 or 49434.

To disassemble or assemble follow the instructions described under their appropriate numbers.

For futher instructions, see Service Section, Figure 19, page 33 or Parts List Section, page 12 and 13.

CONTROL STAND PS WINCH

Removal

See Figure 5.

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.

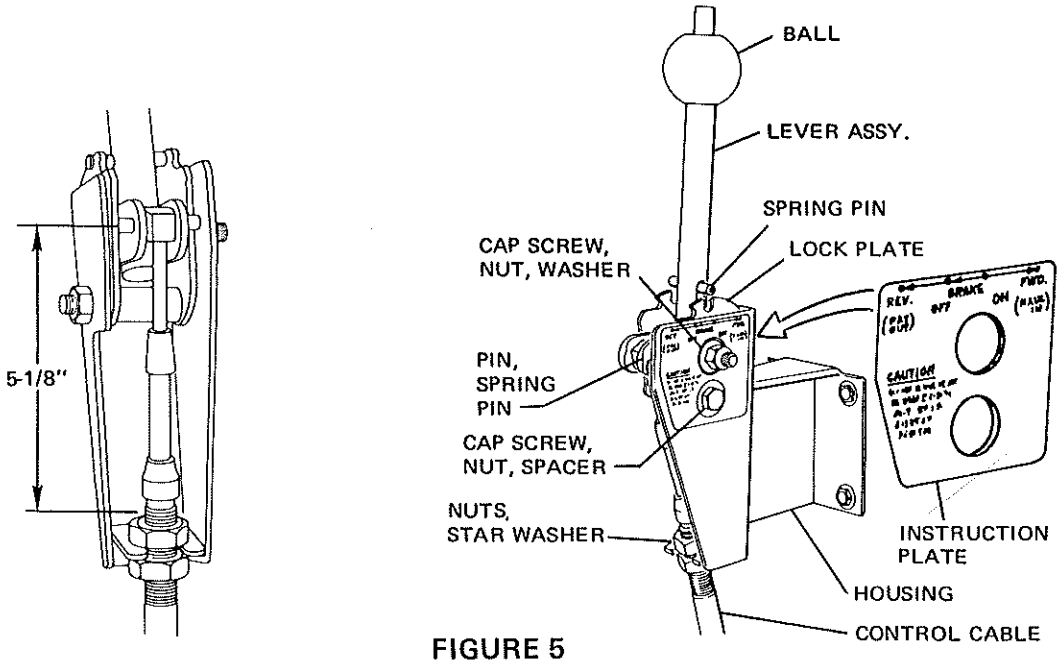


FIGURE 5
PS CONTROL STAND

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

Assembly

See Figure 5.

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, No. 48582

Removal

See Figure 6.

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

Remove 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, page 6.

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.

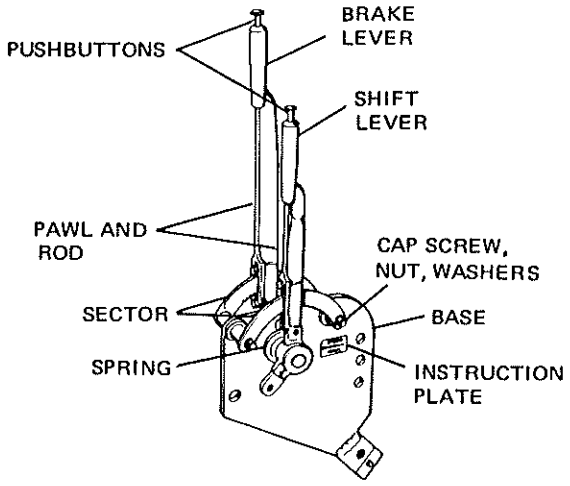


FIGURE 6
PSM/PSC CONTROL STAND No. 48582

BRAKE CONTROL STAND No. 49434

This is a single lever brake control stand and is the latest control stand used to manually operate the brake along with the PS control stand on PSM, PSC, Heavy Duty Brake and PS/IB (Inching Brake) Winches. For removal of PS control stand see Figure 5, page 11 and Parts List Section, page 30 and 31.

Removal

See Figure 7.

Remove yoke assembly from control cable. Remove U clamp from arm and remove cable. Remove cap screws and nuts securing stand to bracket and remove stand and bracket.

Installation

Refer to installation drawing in adapter section for location of control stand and routing of control cable.

Place end of brake control cable or control stand arm and secure cable housing to arm with U clamp, washers and nuts.

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. To adjust brake band clearance, see Figure 3, page 7.

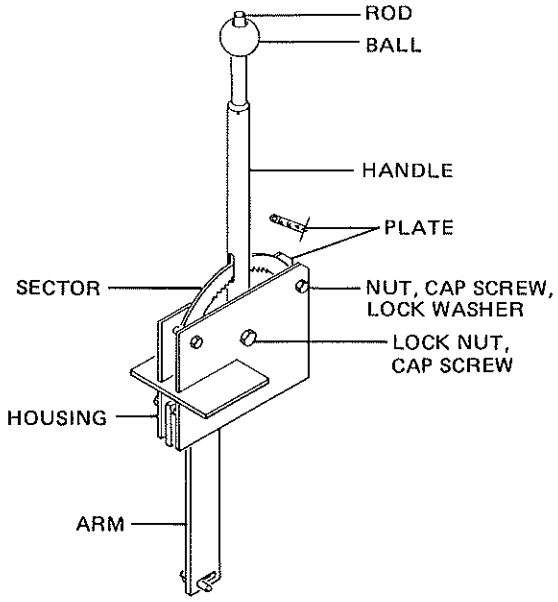


FIGURE 7
BRAKE CONTROL STAND No. 49434

CASE COVER

Removal

See Figure 1, page 3 and Figure 8.

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. 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.

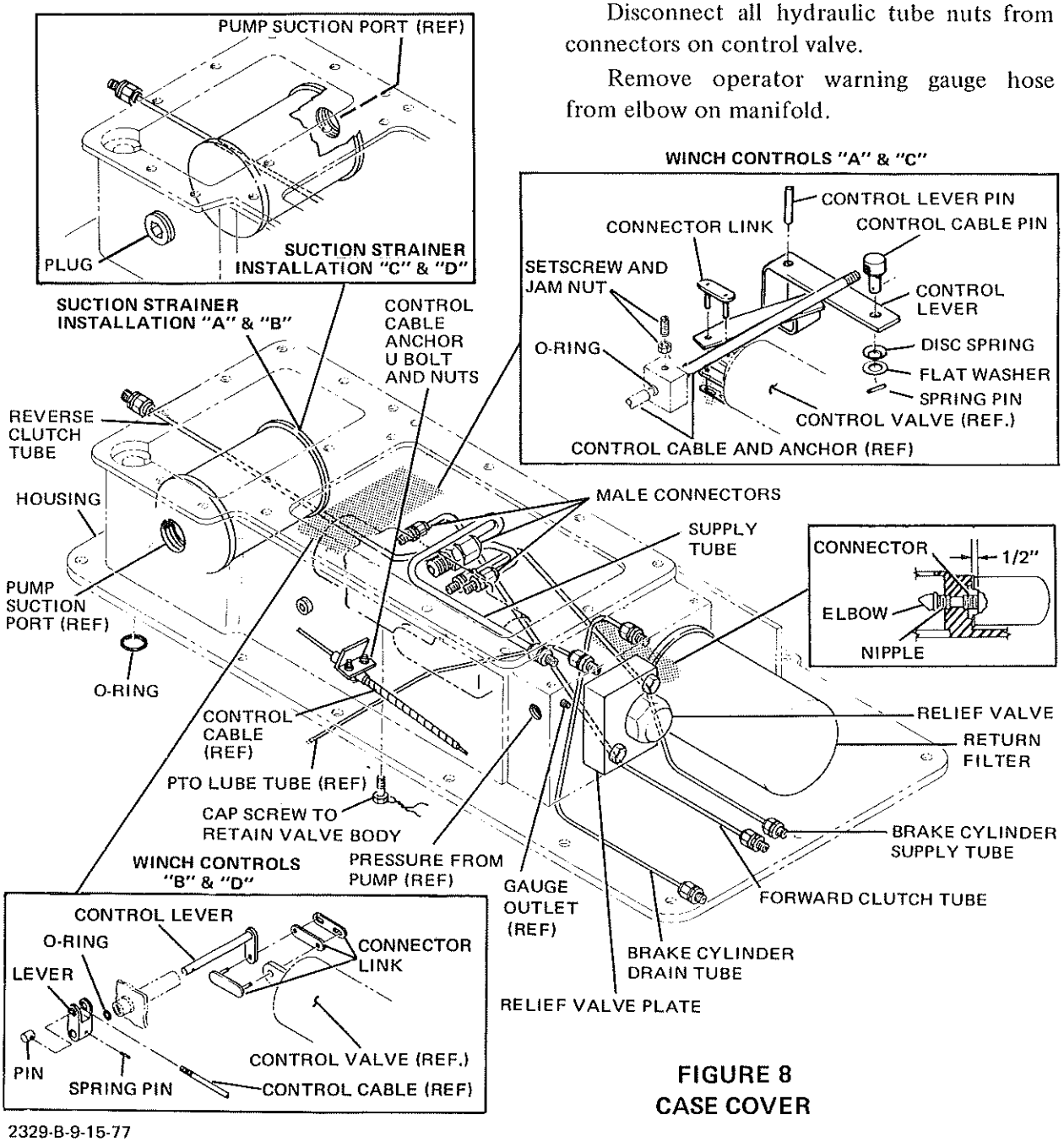


FIGURE 8
CASE COVER

BRAKE CONTROL STAND No. 49434

This is a single lever brake control stand and is the latest control stand used to manually operate the brake along with the PS control stand on PSM, PSC, Heavy Duty Brake and PS/IB (Inching Brake) Winches. For removal of PS control stand see Figure 5, page 11 and Parts List Section, page 30 and 31.

Removal

See Figure 7.

Remove yoke assembly from control cable. Remove U clamp from arm and remove cable. Remove cap screws and nuts securing stand to bracket and remove stand and bracket.

Installation

Refer to installation drawing in adapter section for location of control stand and routing of control cable.

Place end of brake control cable or control stand arm and secure cable housing to arm with U clamp, washers and nuts.

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. To adjust brake band clearance, see Figure 3, page 7.

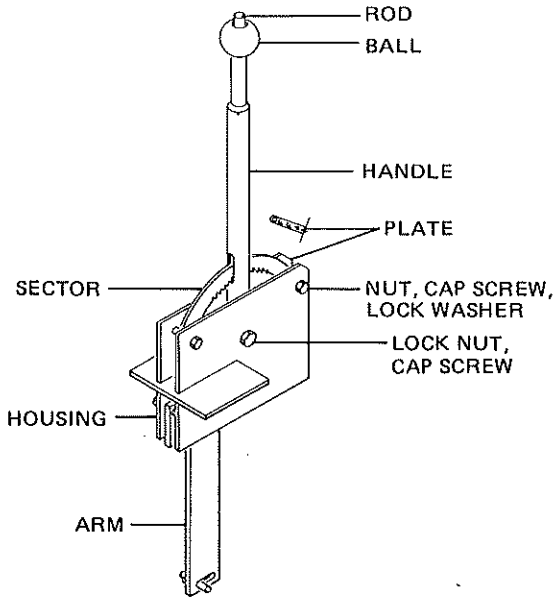


FIGURE 7
BRAKE CONTROL STAND No. 49434

CASE COVER

Removal

See Figure 1, page 3 and Figure 8.

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. 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.

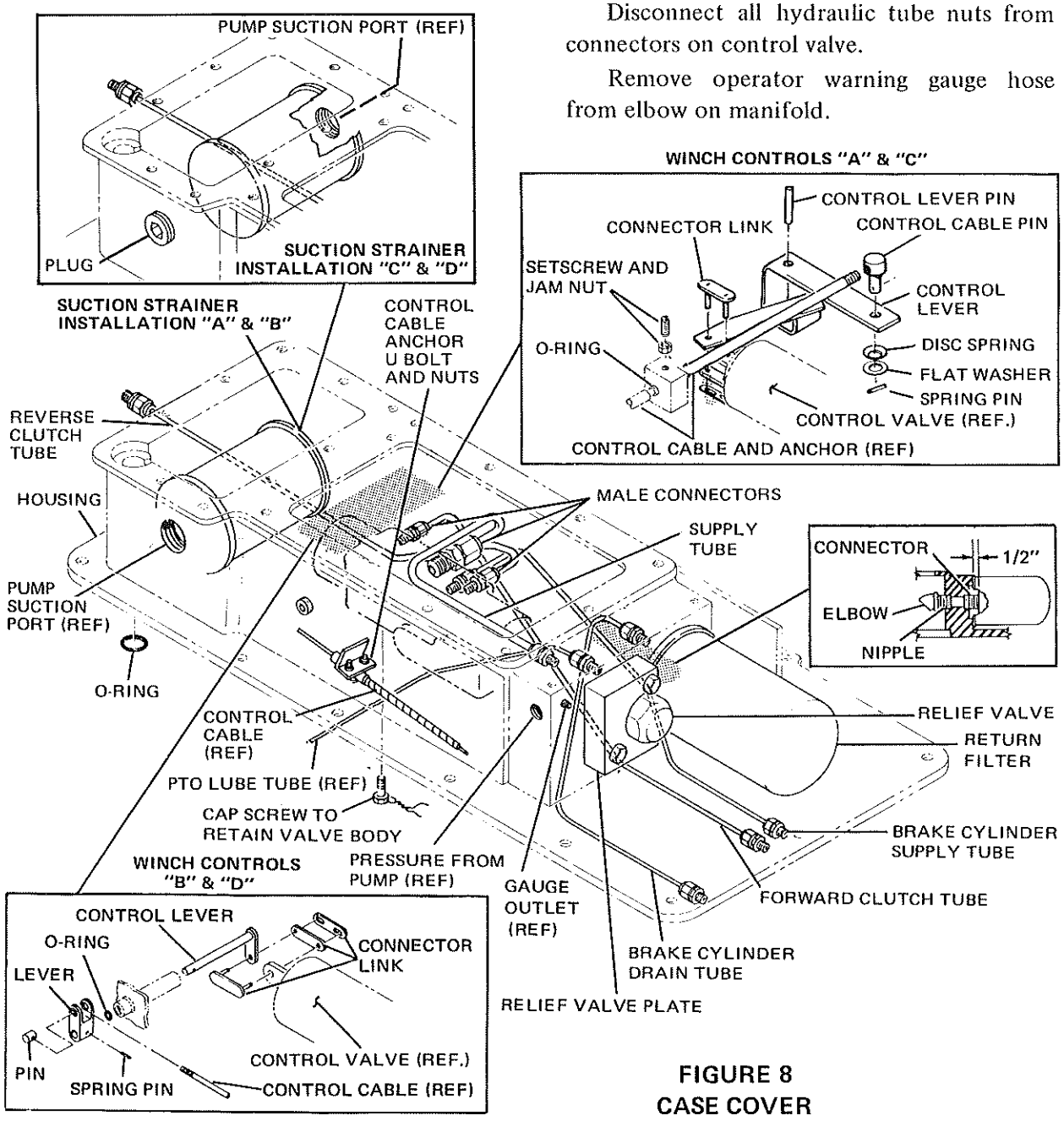


FIGURE 8
CASE COVER

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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 AND C

See Figure 8.

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 5, page 11.

CONTROL LEVER B AND D

See Figure 8.

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 5, page 11.

RETURN FILTER

See Figure 8, page 14.

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 8, page 14.

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 8, page 14.

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, Figure 1, page 3 and Figure 8, page 14.

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 9.

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.

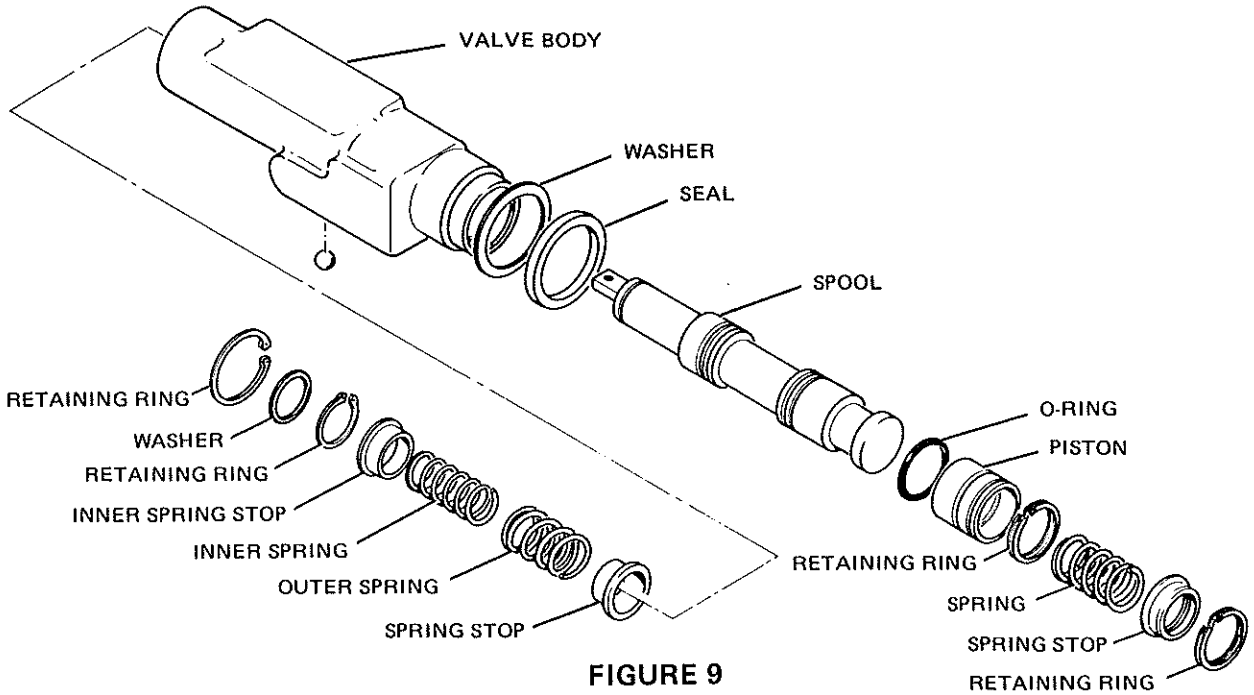


FIGURE 9
CONTROL VALVE

Be sure piston slides freely in and out of body.

Inspect O-ring for wear and replace if necessary.

Assembly (Control Valve)

See Figure 9, page 17.

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 8, page 14.

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

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

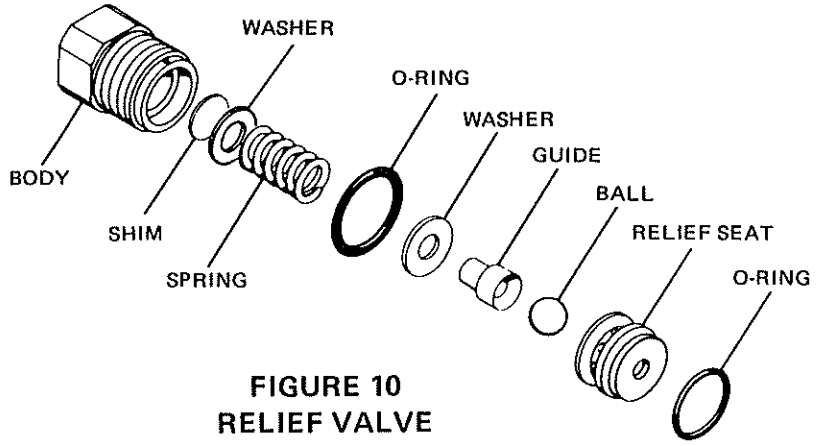


FIGURE 10
RELIEF VALVE

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 10.

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 10.

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 10.

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.

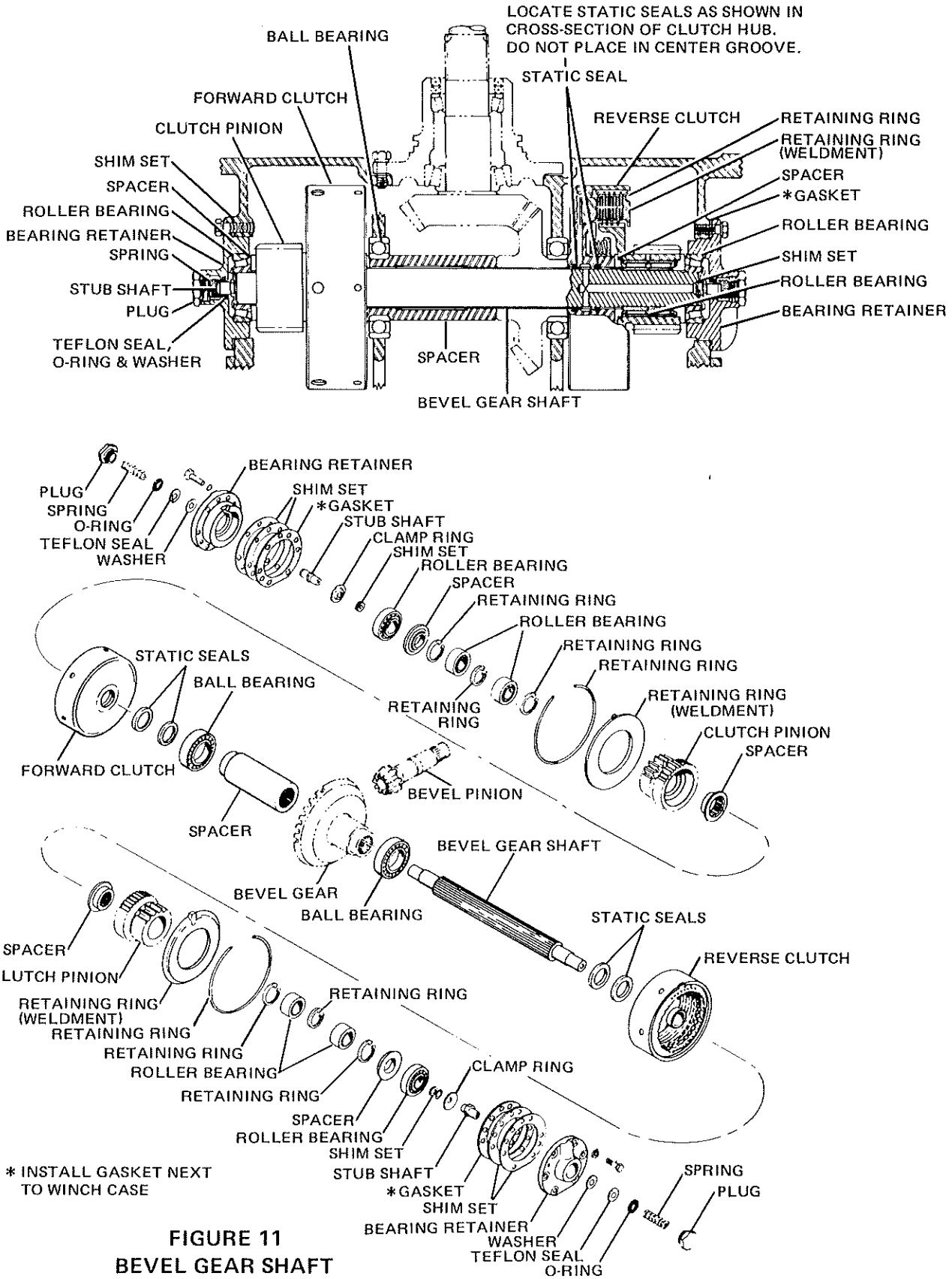


FIGURE 11
BEVEL GEAR SHAFT

2332-B-9-15-77
SUPERSEDES
2332-B-3-15-75

BEVEL GEAR SHAFT

Removal

See Figure 11.

Remove case cover. Refer to Figure 1, page 3, CASE COVER, Removal.

Remove brake drum and band. Refer to Figure 2, page 4, 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-8029-120 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 12, page 22.

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 14 and 15, page 26 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. Mark bevel gear position before removing. Remove spacer and bevel gear. Remove ball bearings from spacer and bevel gear.

REVERSING CABLE DRUM ROTATION

To change winch from overwind to underwind or vice versa, reverse positions of the bevel gear and bevel gear spacer and reverse positions of the brake anchor pin and brake link pin. Refer to Figure 2, page 4, Figure 3, page 6, or Figure 4, page 8 under Brake Control.

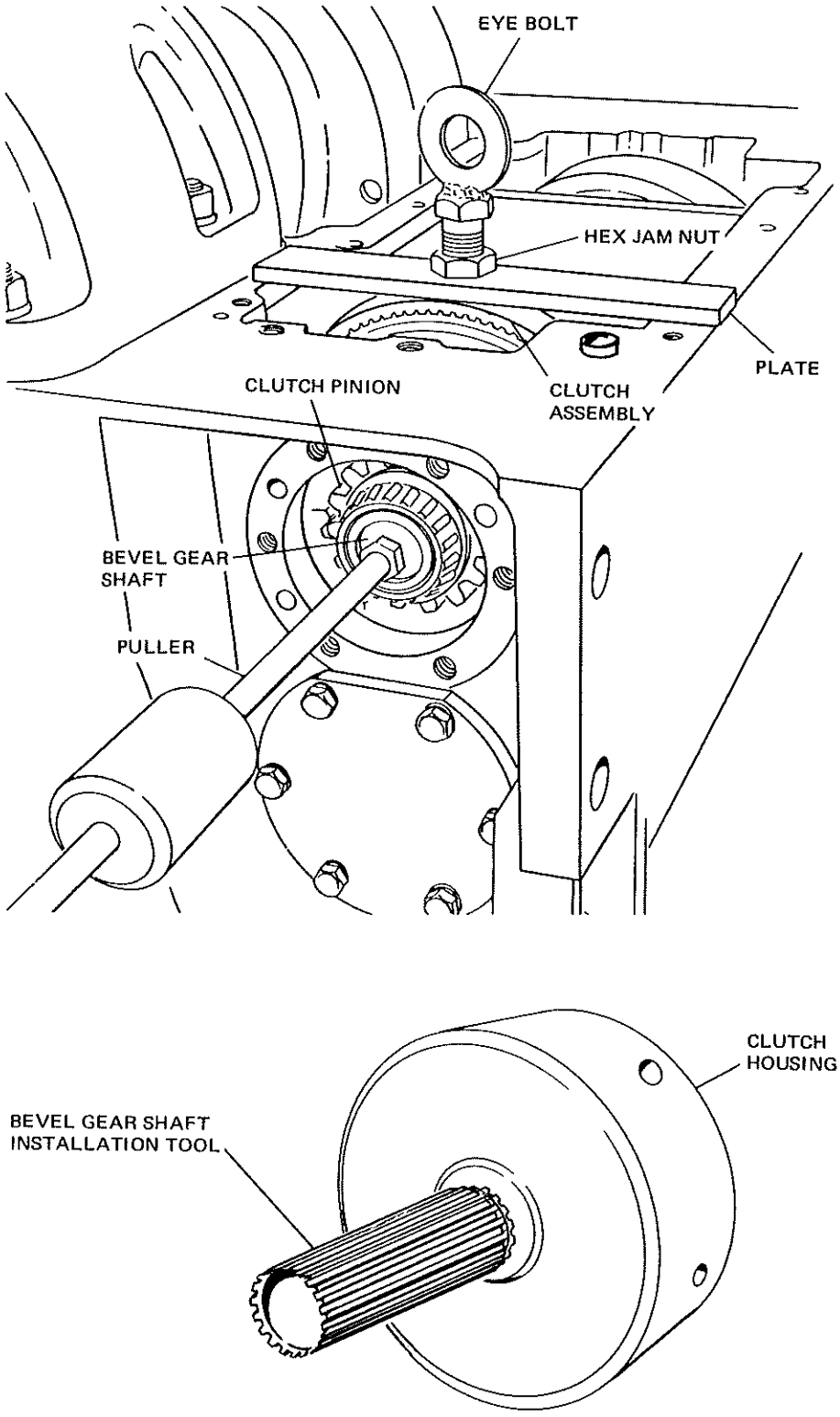


FIGURE 12
FIELD SERVICE TOOLS

Installation

See Figure 11, page 20.

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. 46252 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-8029-120. See Figure 12.

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.

NOTE: Degrease threads in bevel gear shaft and on stub shaft and apply Loctite Screw Lock or equal. Follow manufacturers in instructions for use.

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.

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 13 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 11, page 20.

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.

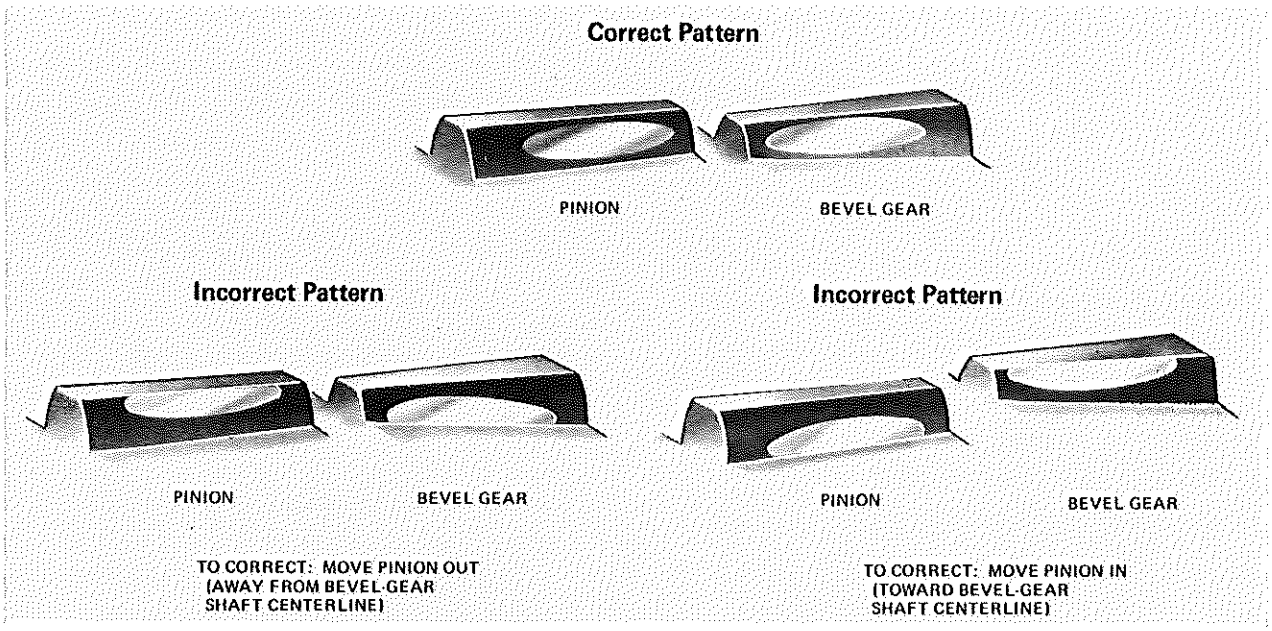


FIGURE 13
GEAR TOOTH CONTACT PATTERNS

BEVEL PINION & CARRIER

Two-Piece Pinion and Carrier

Disassembly

See Figure 14, page 26.

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 14, page 26.

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 13.

Install cotter key through nut and shaft.

Install oil seals into carrier, inner seal with lip toward winch transmission, outer seal with lip toward tractor 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 15, page 26.

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.

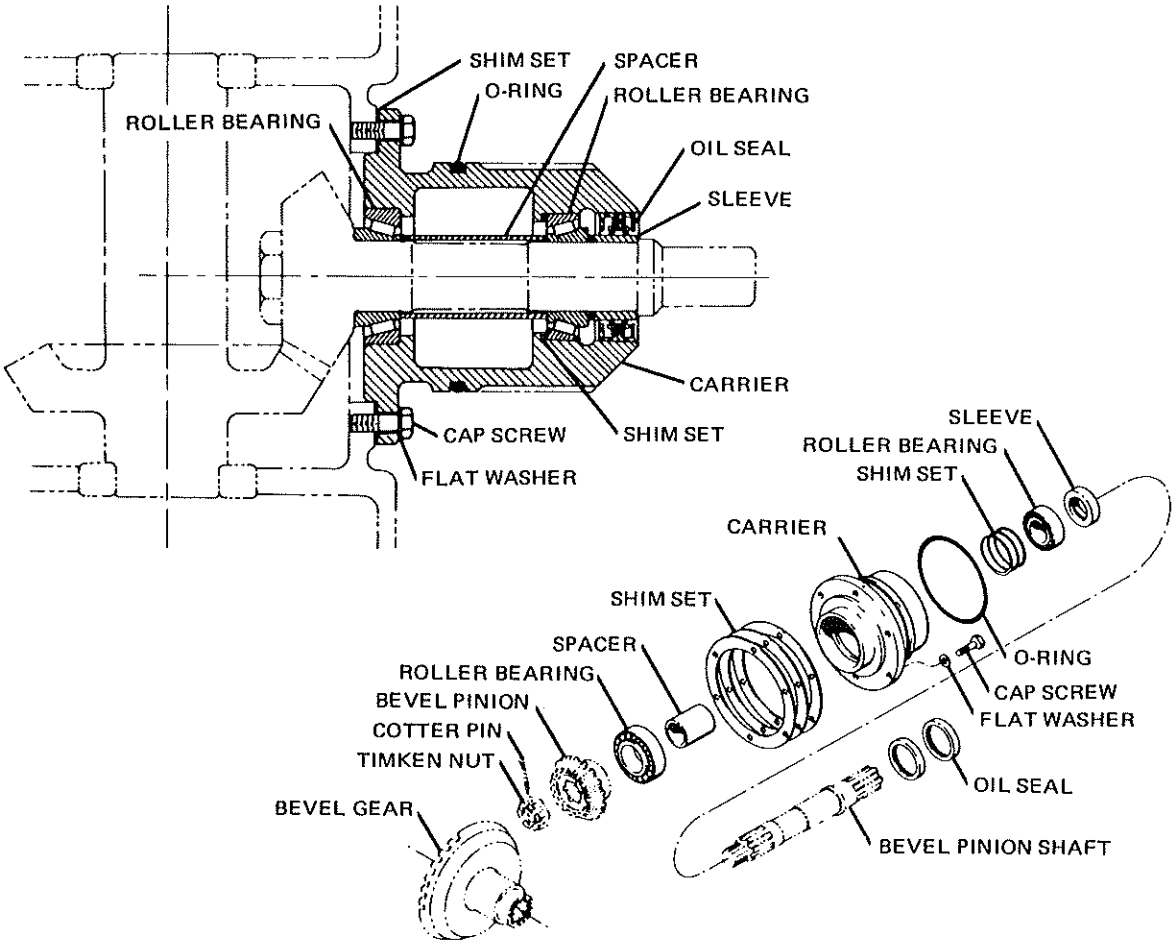


FIGURE 14
TWO PIECE BEVEL PINION AND SHAFT

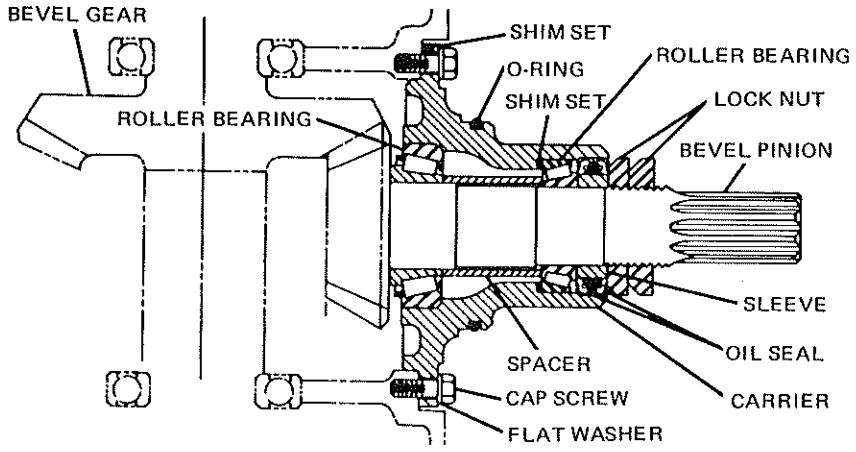


FIGURE 15
ONE PIECE BEVEL PINION AND SHAFT

Assembly

See Figure 15.

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 13, page 24.

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 16.

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 1-1/4". 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 16.

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 retaining rings and pinion bearing outer races in clutch pinion. Position the outer faces of the bearings so they clear the inner edge of the respective retaining ring grooves.

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.

NOTE: In some circumstances, it is possible for the clutch pinion to move outward sufficiently to allow the second from the inner clutch disc (steel disc) to drop off the clutch pinion splines. To prevent this possibility, bend tooth toward clutch pinion, three places equally spaced on second inner disc (steel) 3/16 to 1/4" with a 1/8" radius. Always make sure this disc is assembled in this position on any reassembly of the clutch packs. See Figure 16.

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

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. See Notes.

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 12, page 22. 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.

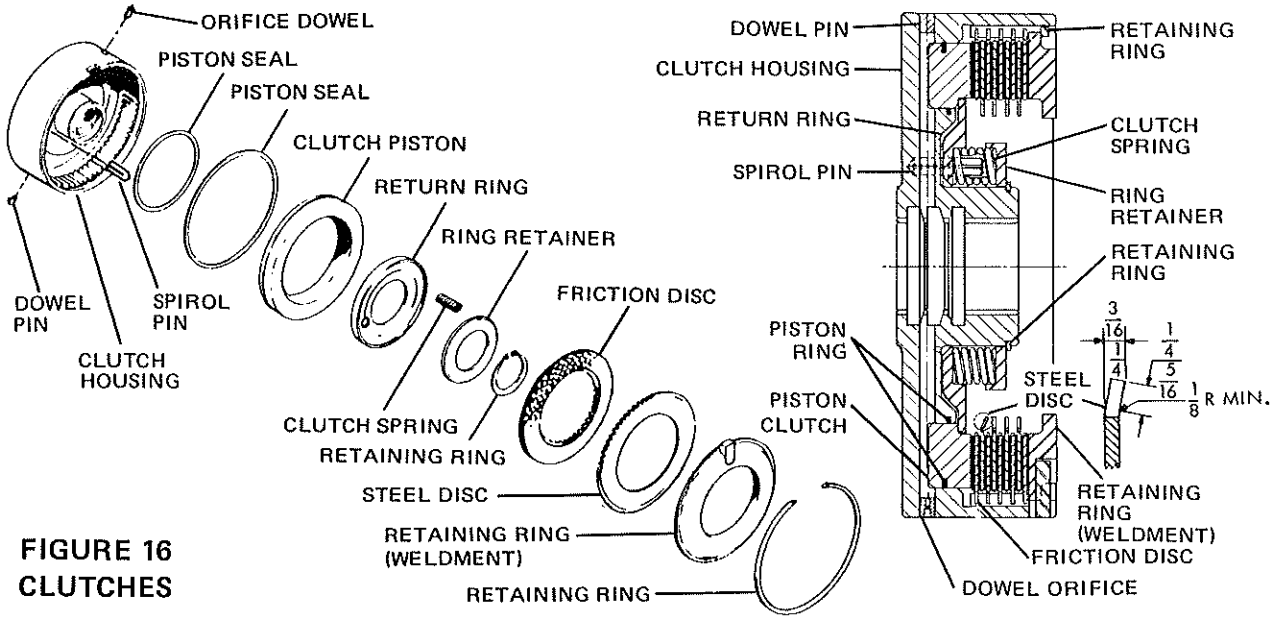


FIGURE 16
CLUTCHES

2337-F-9-15-77
SUPERSEDES
2337-F-3-15-75

BRAKE CYLINDER

Removal

Refer to BRAKE CONTROL, Disassembly.

Disassembly

See Figure 17.

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".

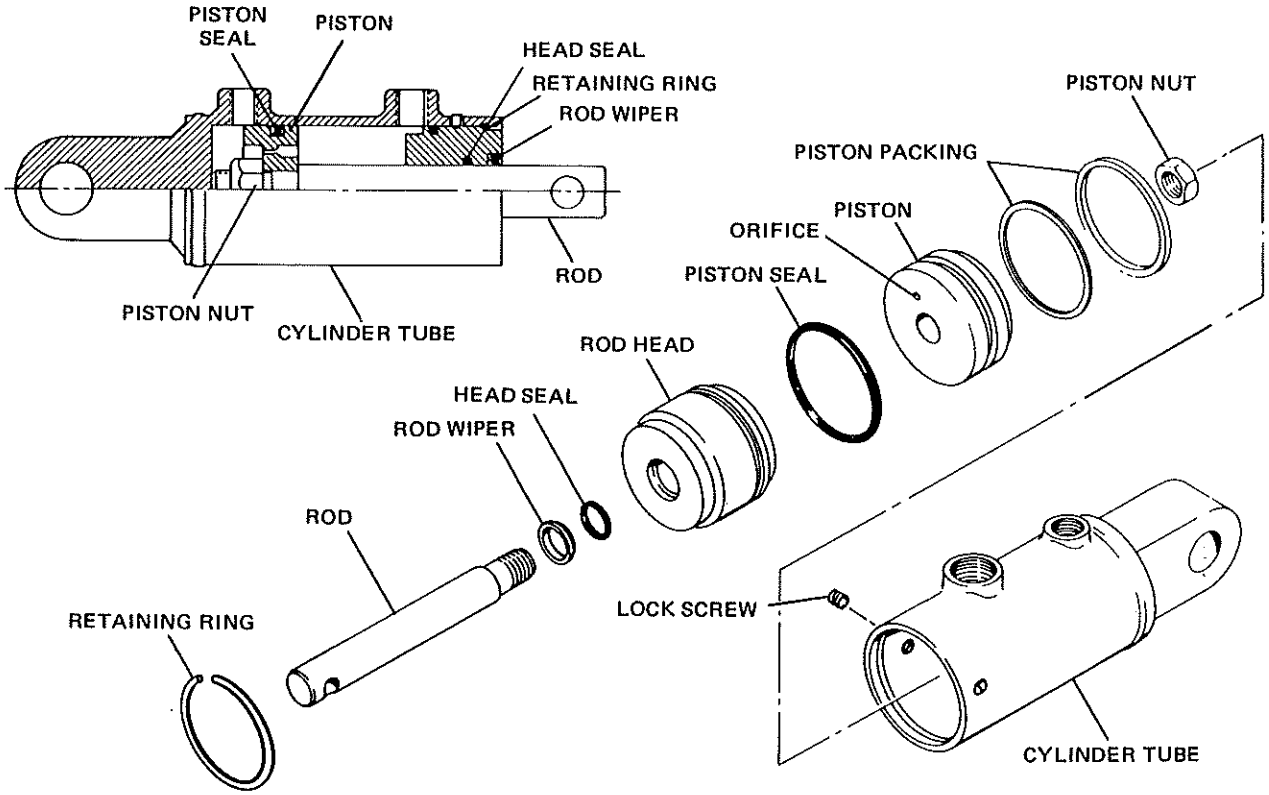


FIGURE 17
BRAKE CYLINDER

Assembly

See Figure 17.

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, STANDARD

Removal

See Figure 18.

Remove drum shaft. Refer to DRUM SHAFT, Disassembly.

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

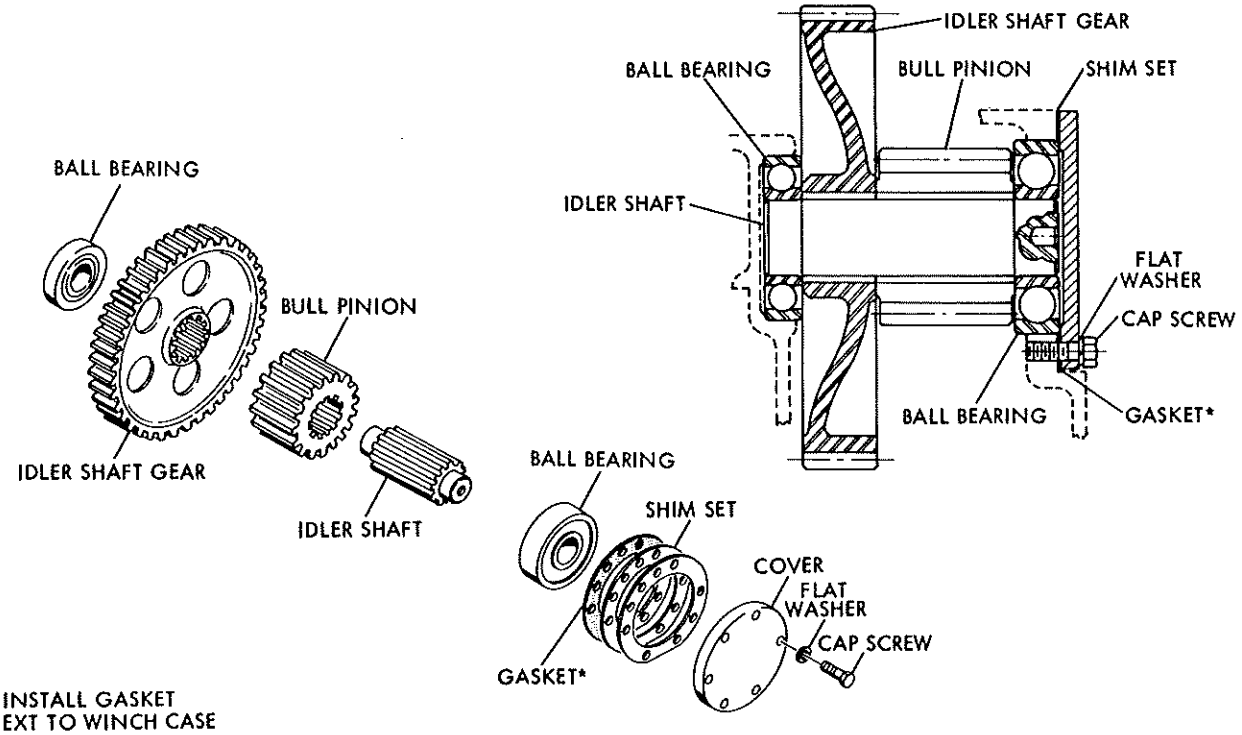


FIGURE 18
STANDARD IDLER SHAFT

Using shaft and cap puller SK-7733 and idler shaft puller adapter SK-8030-1, remove idler shaft and outer bearing. Remove outer bearing from idler shaft. Remove bull pinion and idler gear through bull gear opening in winch case.

Remove inner bearing.

Installation

See Figure 18, page 31.

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 into inner bearing.

Install 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.

IDLER SHAFT WITH HEAVY DUTY BRAKE ASSEMBLY

See Figure 19.

Remove brackets and brake guard assembly covering the brake drum. Loosen jam nut and set screw securing control cable to control cable pin. Remove control cable from control stand and turn control cable core counterclockwise to remove case from control cable pin.

Remove nuts and cotter pins securing brake lever and remove lever and pins.

Remove nuts and cotter pins from the brake rod and brake band pins. Remove cap screw, washer and cotter pins securing anchor links and remove pins, links, and brake rod. Remove spring and washer from brake rod.

Remove spring from hook bolt and band and remove band assembly. Remove hook bolt from bracket.

Remove cable drum assembly. Refer to Figure 21, page 38.

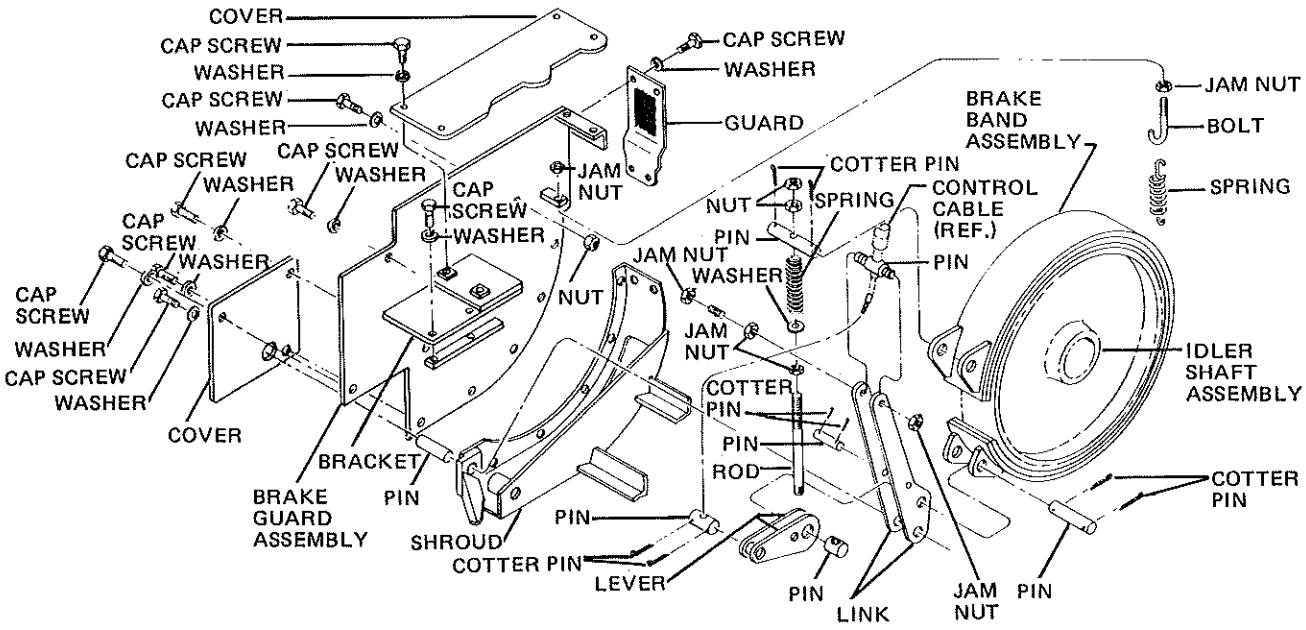
Remove cap screws, retainer, and brake drum from idler shaft.

Remove cap screws, and washers from bearing carrier.

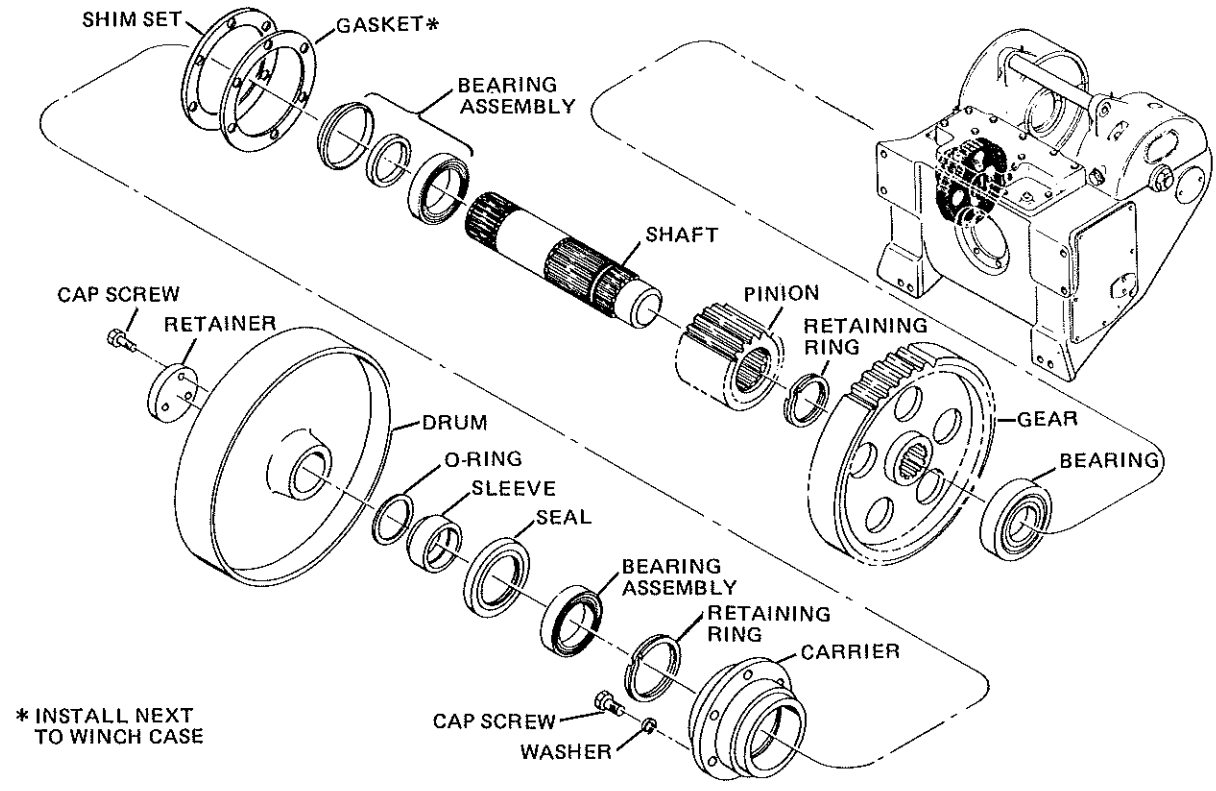
Using shaft and cap puller, SK-7733 and idler shaft puller adapter SK 8030-1, pull shaft from the inner bearing race and remove shaft assembly from the winch case. Remove and mark shims for correct positioning for reassembly.

Remove idler shaft gear up thru bull gear opening in winch case and remove inner bearing from case bore.

Remove the retaining ring and bull pinion from the idler shaft.



HEAVY DUTY BRAKE ASSEMBLY No. 49300



IDLER SHAFT ASSEMBLY No. 49315

FIGURE 19

Remove seal sleeve and O-ring from shaft.

Press idler shaft from the bearing carrier assembly and remove bearing cones.

Remove oil seal, retaining ring and bearing cups from bearing carrier.

Installation

See Figure 19, page 33.

Install inner bearing in case bore and place idler gear in winch housing.

Install bull pinion and retaining ring on idler shaft.

Press inner bearing cone on shaft up against bull pinion.

Support idler shaft gear in housing and push idler shaft through gear, turning as necessary to align splines. Press idler shaft into inner bearing in case bore.

Install retaining ring and bearing cups in bearing carrier.

Position gasket and shims on bearing carrier being sure shims are in the same position from which they were removed and secure bearing carrier to case with cap screws and washers. If new parts were used shim as necessary to adjust end play to 0.005 to 0.015 inch.

Install outer bearing cone on shaft up against outer bearing cup in bearing carrier.

Coat O-ring with light oil or grease and install in groove of seal sleeve. Install seal sleeve on shaft against the outer bearing cone.

Coat lip of oil seal with light oil or grease and install oil seal (lip towards bearing) in bearing carrier.

Install brake drum on shaft and secure with retainer and cap screws. Torque cap screws as shown in service data chart on page 40.

Place brake band assembly over brake drum and install hook bolt to bracket. Install spring on hook and clip on brake band.

Place anchor links over control cable pin and secure anchor links to case and lower end of brake band with cap screw, brake band pin and cotter keys. Secure control cable pin to link with jam nuts applying Loctite 85 or equal to threads.

Install upper brake rod pin in band assembly and secure with cotter pins.

Install jam nut and washer on long threaded end of brake rod and run nut down to lower sections of threads. Install spring over brake rod and up against washer.

Place threaded brake rod pin in anchor link. Push assembled end of brake rod up thru upper brake rod pin and screw lower portion of brake rod into brake rod pin in anchor link. Install nuts on brake rod and adjust brake band tight on brake drum.

Place brake levers over lower brake rod pin and secure with brake lever pins and cotter keys. Be sure and install the pin with threads in the outside hole of the brake lever.

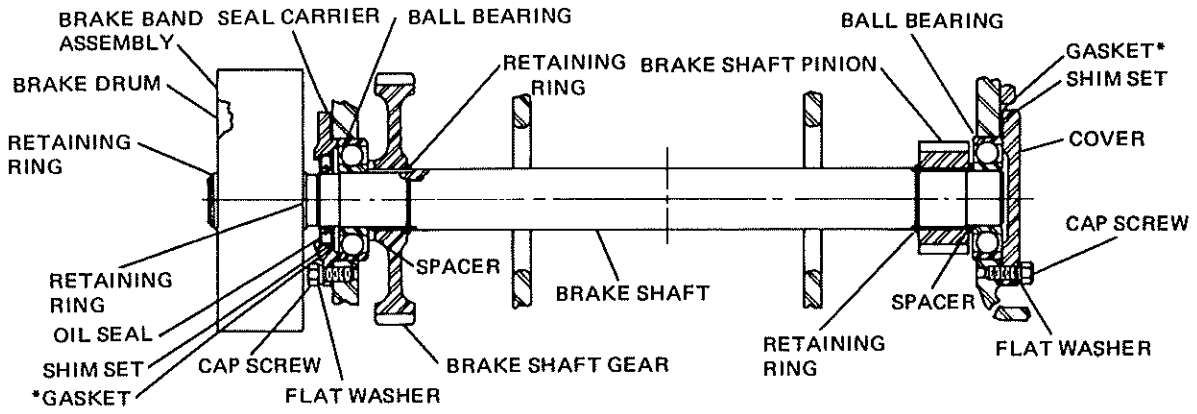
Install set screw and jam nut in control cable pin, leaving loose. Push control cable down thru hole in control cable pin and secure cable to pin with set screw and jam nut.

Place brake lever on control stand to off position. Thread jam nut and yoke on cable until cable threads engages full length of yoke threads. Lock yoke with jam nut. Screw yoke and control cable core into brake lever pin until brake lever and clevis hole line up. Install pin and secure with cotter key.

Tighten lower nut on brake rod to apply pressure to spring so brake band will be loose on brake drum when brake lever is in off position or when clutches are engaged. Tighten adjustment nut on hook bolt to apply pressure to spring so back side of brake band will not drag when band is in off position.

CAUTION: Use heavy duty brake only when clutches are not engaged or when shift lever is locked in brake-off position. When placing shift lever in locked brake-off position be sure heavy duty brake lever is placed in the ON position or load will be dropped.

Install brackets and brake guard assembly and secure with cap screws and nuts.



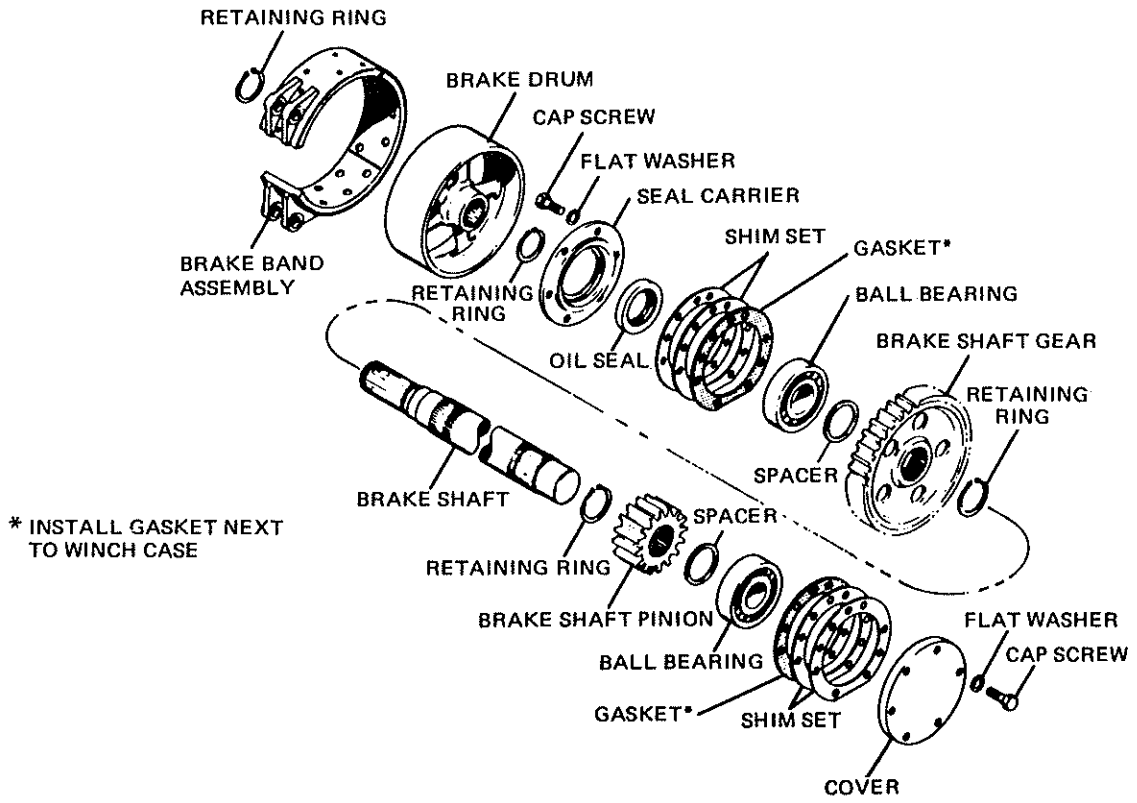


FIGURE 20
BRAKE SHAFT

BRAKE SHAFT

Removal

See Figure 20.

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 20.

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.

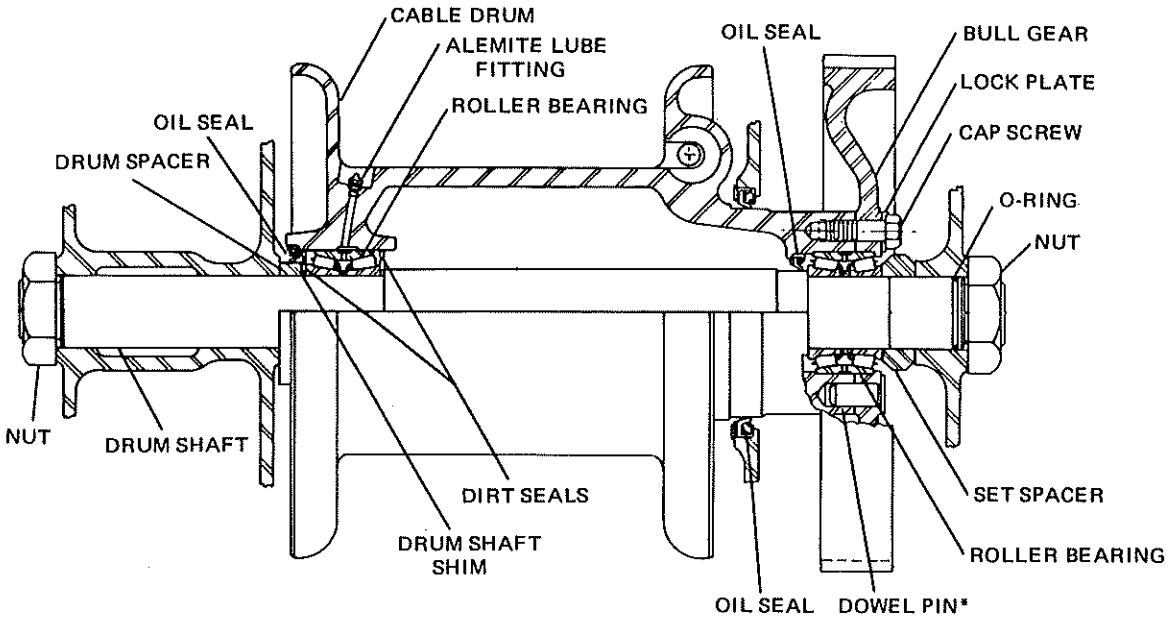
NOTE: Install gasket next to winch case.

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.



*WHEN BULL GEAR OR CABLE DRUM IS REPLACED, DOWEL HOLES MUST BE DRILLED 1-9/64" AND REAMED $\frac{1.1557"}{1.1577"}$ TO ACCOMODATE OVERSIZE 45081-6 DOWELS.

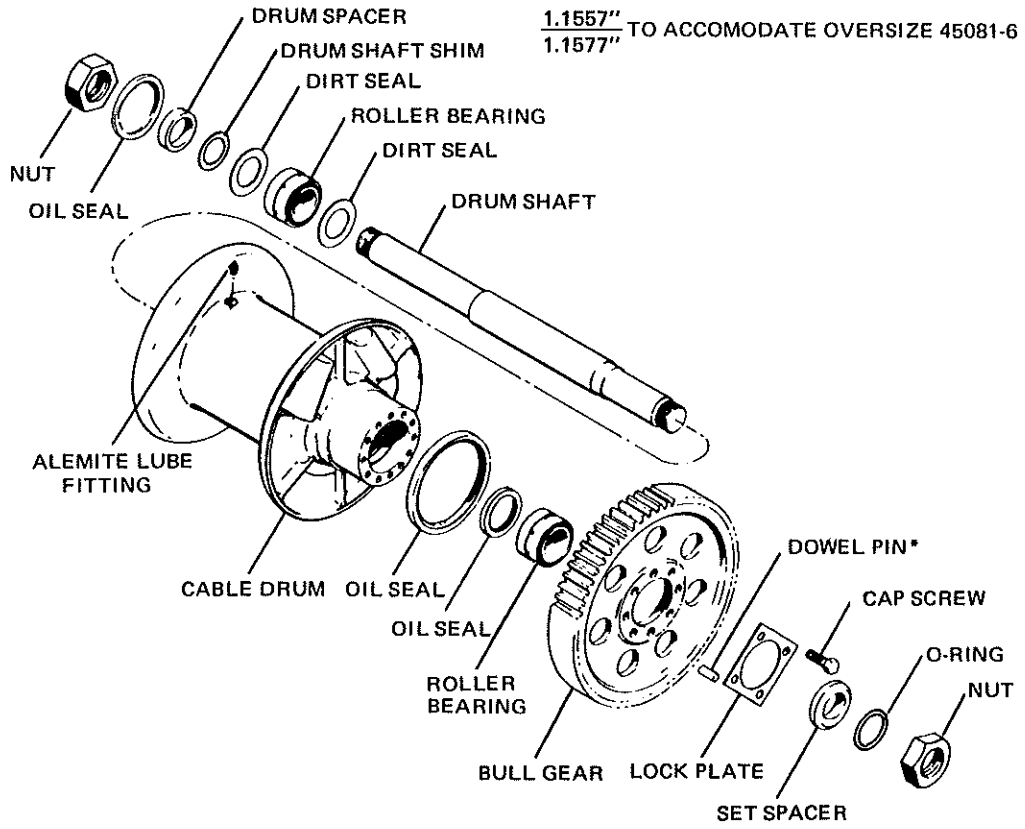


FIGURE 21
DRUM SHAFT

DRUM SHAFT

Disassembly

See Figure 21.

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.

NOTE: To change cable drum rotation refer to the brake control and bevel gear shaft service sections of this manual.

Assembly

See Figure 21.

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, being sure drum shaft does not turn while nut is being tightened.

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 ..... 1.250 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.
Stub Shaft Torque	75 to 80 lb./ft.
Drum Shaft Nut Torque	600 to 650 lb./ft.

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

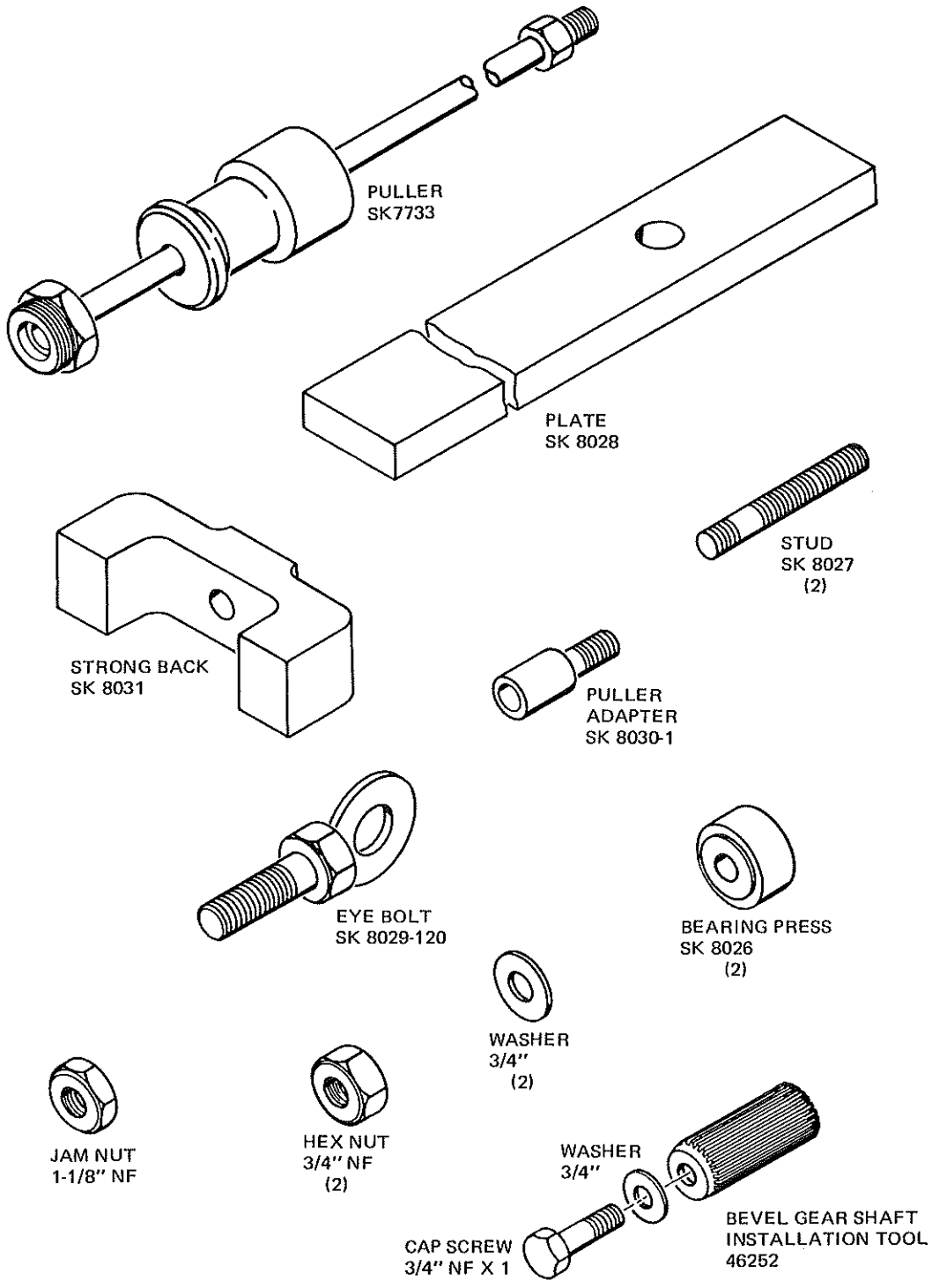


FIGURE 22