CLARK

LOG SKIDDER
200 SERIES
WINCH
MANUAL 3231-R3

PUBLICATION NO. 3231-R3

Printed in USA

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FOREWORD

This manual has been prepared to provide both the customer and the serviceman with all the information and instructions they will require to maintain and repair the Clark 200 Series Winch.

The care that has been taken during the design, the manufacture, and the selection of materials of this component, warrants the small outlay of personal attention and the costs involved to provide proper lubrication, inspection and adjustment at regular intervals. This effort will be repayed many times over by lower cost operation and a longer, trouble-free service life.

We urge the mechanic to study the instructions in this manual carefully to become familiar with the parts of the winch, its principles of operation and its troubleshooting and adjustments. We also recommend the use of this manual as a reference during all maintenance and repair procedures.

Whenever parts must be replaced, use only the Genuine Clark Parts listed in the machine Parts Manual. The use of non-approved, "will-fit" parts can interfere with the proper operation and the performance of the components. The Clark Equipment Company does not warrant repairs, replacement parts, or any failures that result from the use of parts not supplied or approved by the Clark Equipment Company.

Information on servicing the Transmission Mounted Winch Power Take-Off Clutch Unit is available in transmission shop manual supplement Publication Number SMS-18PTO.

IMPORTANT: ALWAYS supply the Distributor with the machine AND component model and serial number when you order parts.

TROUBLESHOOTING PROCEDURE

Before you service any of the winch components, check to see if the winch control lever linkage is correctly installed and check the control cable for proper adjustment. Make sure the control lever moves freely in both directions to the end of its stroke. If the lever and the control valve do not operate properly, the winch will not function.

PROBLEM	REASON	REMEDY
The winch lacks power or will not pull the load in the WINCH-IN mode.	The oil level in the transmission/ converter system is low.	Bring the oil in the system to the correct level.
	There is a leak in the system hoses, tubes or fittings, and air is entering the system.	Check the system for leaks and repair, replace or tighten where necessary.
	The transmission suction screen is plugged with foreign material.	Remove the suction screen and wash it in a solvent.
	The transmission clutch pressure is too low.	Troubleshoot the transmission/convertor hydraulic system (See your machine operator's manual).
	There is internal leakage in the winch control valve.	Troubleshoot the winch control valve assembly.
	The clutch discs in the transmission mounted winch P.T.O. clutch are worn or damaged.	Replace the clutch discs or any other damaged parts (See the appropriate shop manual).
	The free-spool clutch discs are slipping because oil has leaked onto the discs.	Replace the clutch discs and the ring gear carrier oil seal.
	The free-spool clutch discs are worn or improperly shimmed.	Replace the clutch discs and make the required free-spool adjustments.
	The pinion sprag is installed backwards.	Remove the sprag, invert its position in the input cap and reinstall the assembly.
The winch will not hold the load in the HOLD mode.	The cable is slipping because the ferrule is not fastened properly to the cable drum.	Fasten the cable ferrule securely to the cable drum.
	The hoses to the winch control valve are not installed to the correct ports.	Check the installation of the hoses and correct if necessary.
	There is internal leakage in the winch control valve.	Troubleshoot the winch control valve assembly.
	The free-spool clutch discs are slipping because oil has leaked onto the discs.	Replace the clutch discs and the ring gear carrier oil seal.
	The free-spool clutch discs are worn or improperly shimmed.	Replace the clutch discs and make the required free-spool adjustments.
	The pinion sprag is slipping or installed backwards.	Remove the sprag and check it for wear. Check to see that it is installed properly.

TROUBLESHOOTING PROCEDURE

PROBLEM	REASON	REMEDY
The winch will not operate properly in the FREE-SPOOL mode.	The winch control lever will not stay in the free-spool position.	Check the detent ball and spring in the winch control valve.
	The free-spool adjusting bolt is adjusted too tightly.	Check to see that the wear button is in good condition adjust the bolt for proper free-spooling (See your machine operator's manual).
	There is a restriction in the hose from the control valve to the side of the winch.	Check the hose for restrictions and correct the condition if necessary.
	The piston shaft seal in the free-spool clutch is worn or damaged.	Replace the seals.
	The free-spool clutch pressure is low.	Troubleshoot the transmission/convertor hydraulic system (See your machine operator's manual).
	The drum is binding with the winch housing.	Tighten the mounting bolts and replace any defective parts.
	The free-spool clutch discs do not move freely inside the cable drum.	Check the clutch discs and the disc hub for nicks or burrs and make sure the piston apply springs are working properly.
	The free-spool clutch discs are slipping because oil has leaked onto the discs.	Replace the clutch discs and the ring gear carrier oil seal.
	The free-spool clutch discs are too tight inside the cable drum assembly.	Check to ensure the correct quantity of discs and make the required free-spool adjustments.
There is LOW OIL PRESSURE at the P.T.O. clutch but all other pressures are correct.	There is internal leakage in the winch control valve.	Troubleshoot the winch control valve assembly.
	There is internal leakage in the transmission mounted winch P.T.O. clutch.	Check the oil seals in the P.T.O. clutch circuit.
There is LOW OIL PRESSURE at the P.T.O. clutch and at the transmission clutches.	The oil level in the transmission/converter system is low.	Bring the oil in the system to the correct level.
	The transmission suction screen is plugged with foreign material.	Remove the suction screen and wash it in a solvent.
	The transmission clutch pressure regulating valve and/or the convertor charging pump are/is not operating properly.	Check these components and repair or replace them if necessary.

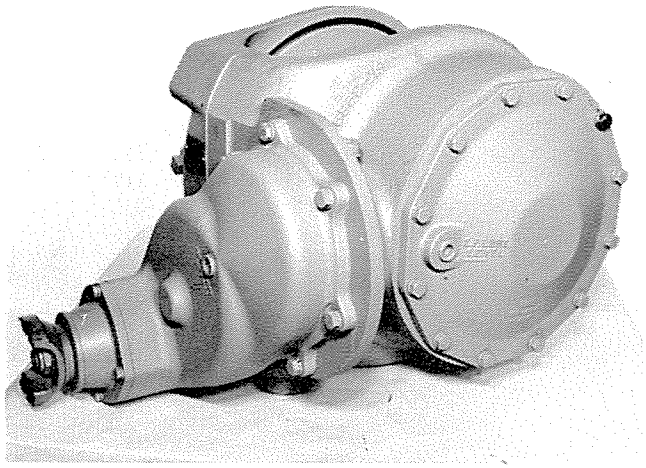
OVERHAUL PROCEDURE

These instructions give an explanation of the correct procedure for disassembly and assembly of the Clark WD-200 winch.

Before you begin disassembly, clean the outside of the winch thoroughly to prevent contamination of internal mechanisms and drain both the drop gear housing and the ring gear cover through the appropriate drain ports.

⚠ WARNING: The WD-200 winch weighs approximately 375 kg (825 lb).

NOTE: If only the Free-Spool components of the winch are to be serviced, it is not necessary to drain the lube oil. The breather should be removed and temporarily replaced with a 3/8 in pipe plug to prevent oil loss when the winch case is turned over.



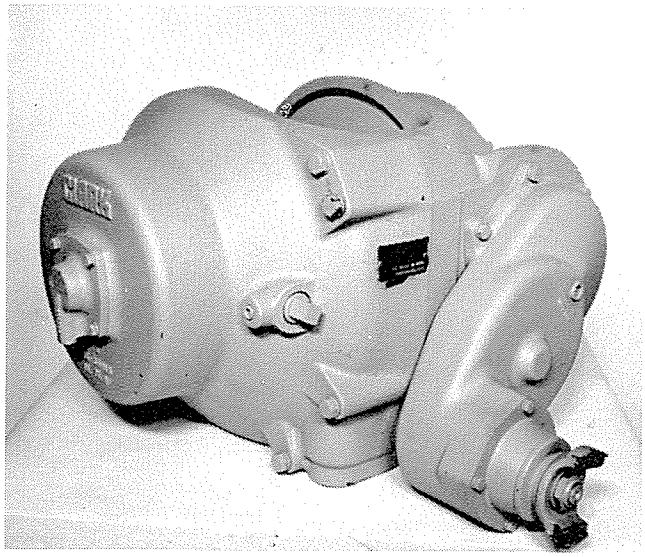


Figure 1
The Clark WD—200 winch.

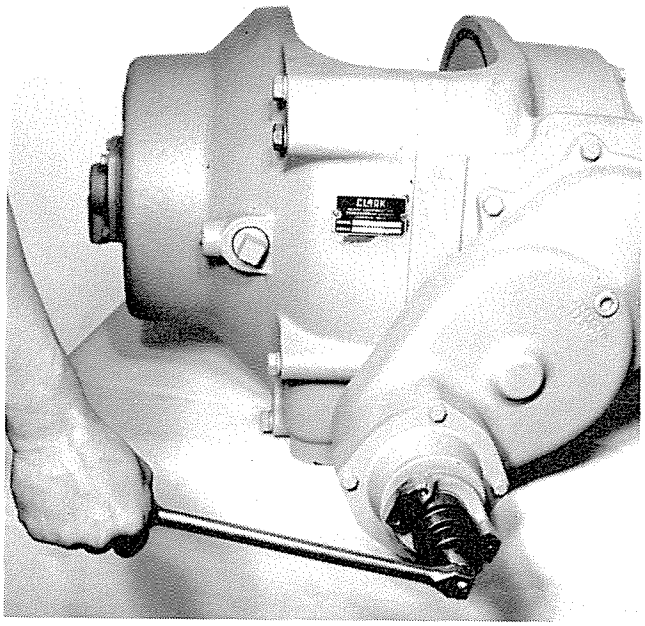


Figure 2
Loosen the input flange nut.

NOTE: The pinion sprag will prevent the flange from turning.

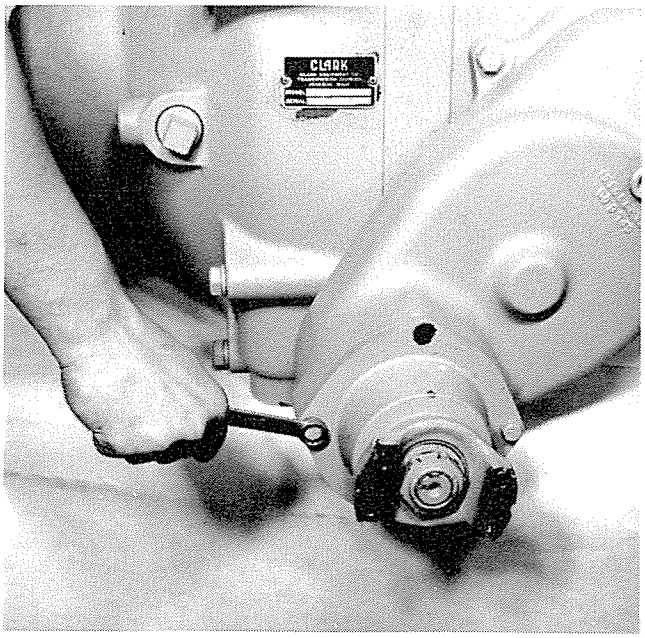


Figure 3
Remove the input shaft bearing cap mounting bolts.

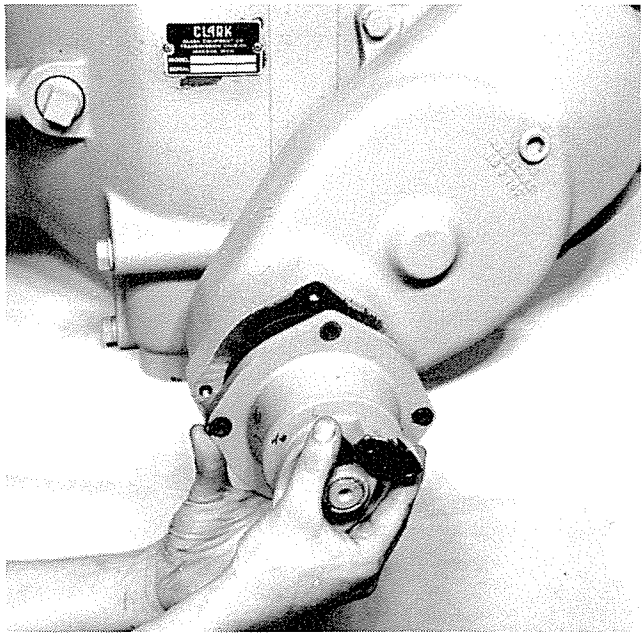


Figure 4

Place a container under the cap and remove the input shaft assembly.

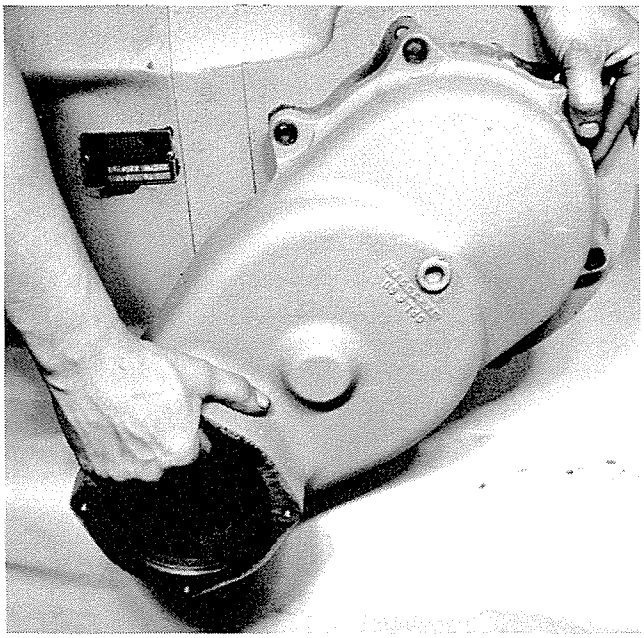


Figure 6

Remove the drop gear housing assembly.

Figure 5

Remove the drop gear housing mounting bolts.

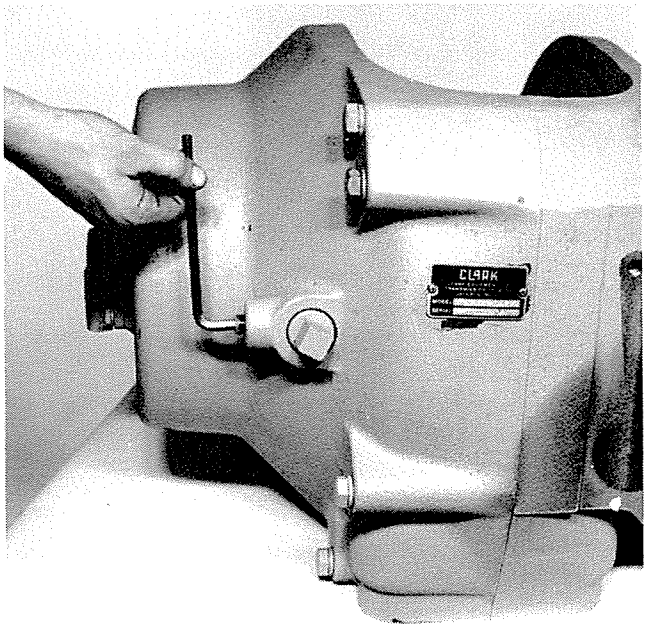


Figure 7

Remove the lock plug that secures the adjusting bolt wear button.

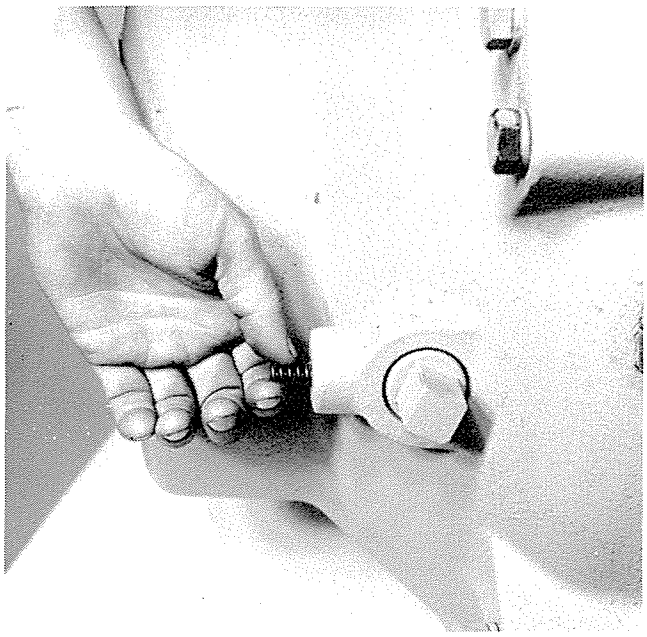


Figure 8

Remove the spring.

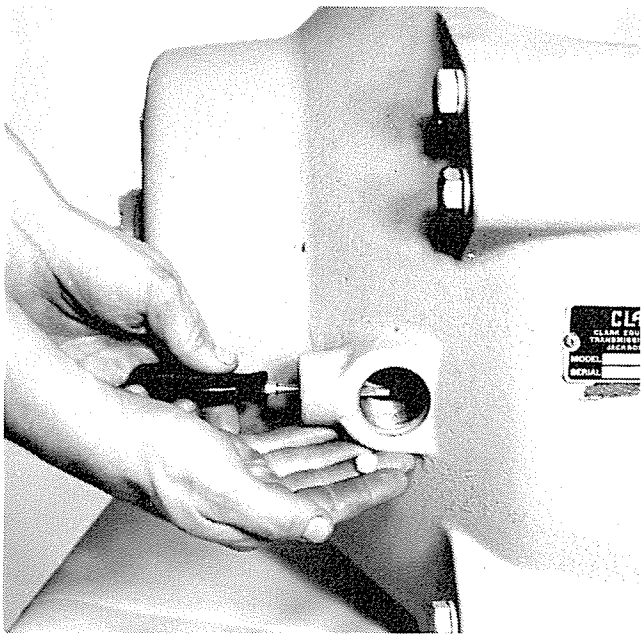


Figure 10

Remove the adjusting bolt pipe plug.

Figure 9

Remove the adjusting bolt and spring.

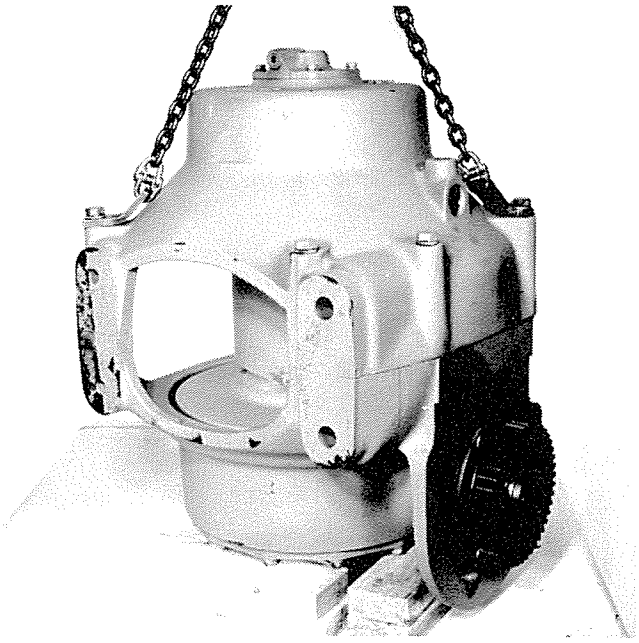


Figure 11

Fasten a chain and hoist to the winch housing case half using the case half mounting bolts and position the winch housing flange half on pieces of wood as shown.

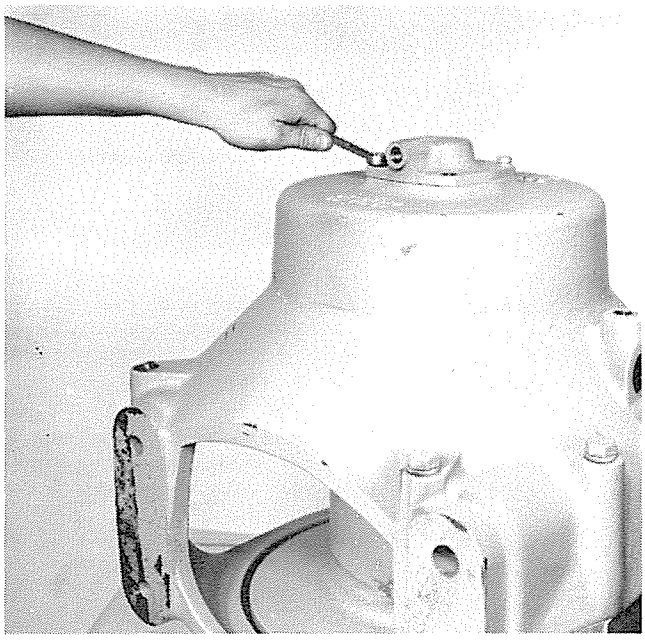


Figure 12

Remove the chain and remove the clutch piston bearing cap mounting bolts.

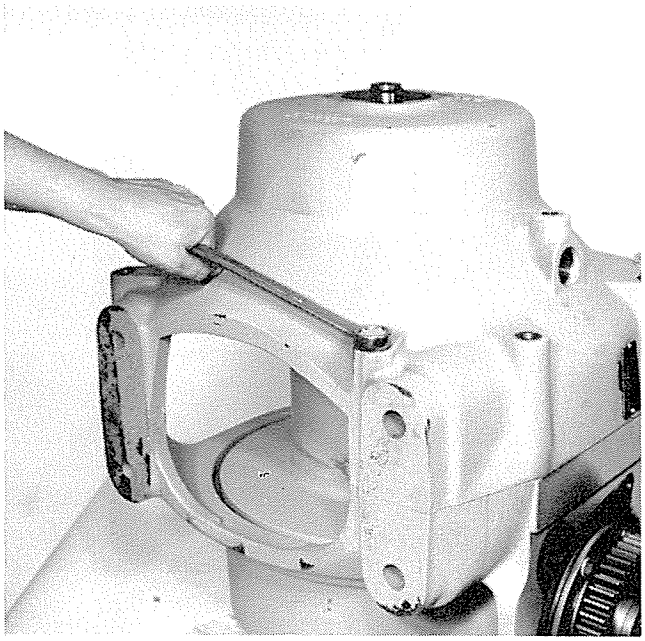


Figure 14

Remove the remaining winch housing case half mounting bolts.

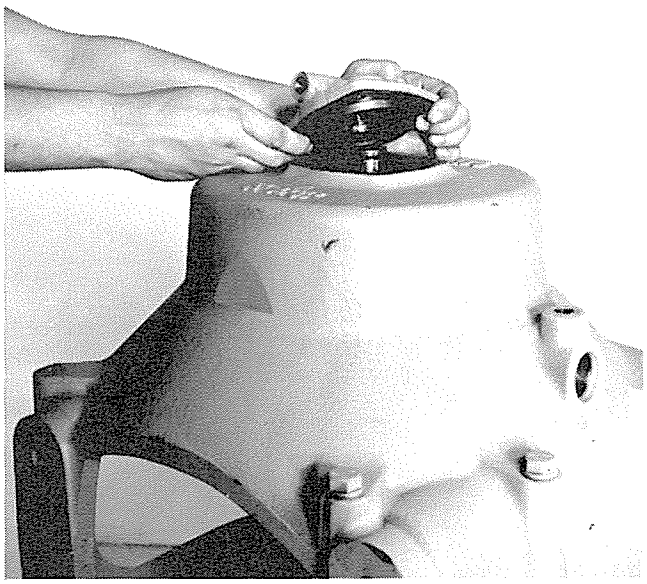


Figure 13

Remove the bearing cap, gasket, and sleeve assemby.

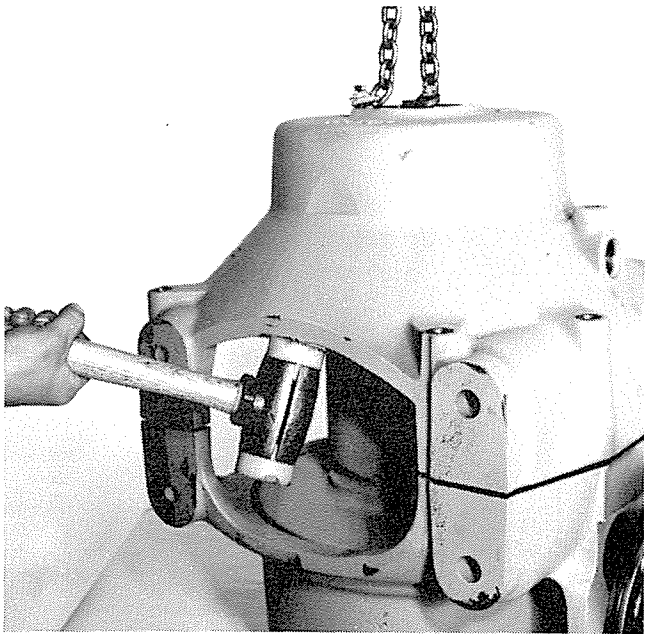


Figure 15

Fasten a chain to the winch housing case half using two of the clutch piston bearing cap mounting bolts, raise the hoist slightly and tap the case half with a mallet to separate the winch housings. It may be necessary to pry between the top of the cable drum and the (top) winch housing case half with two flat pry bars placed 180° apart to free the housing.

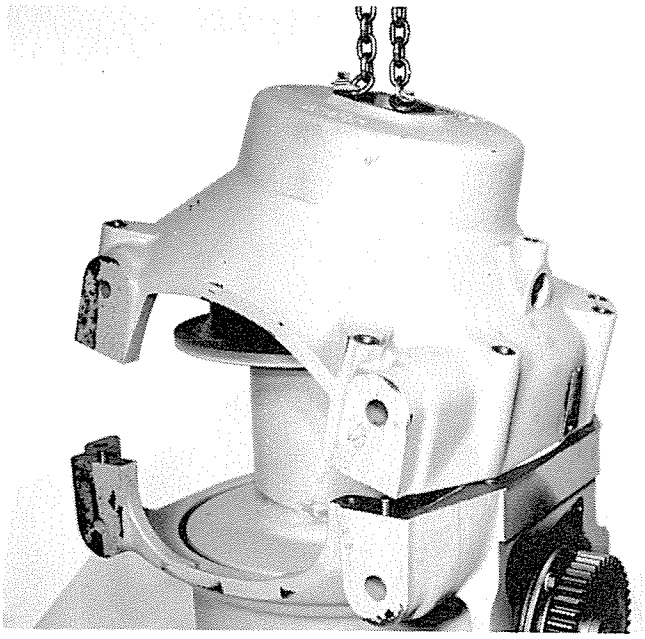


Figure 16

Lift off the winch housing case half.

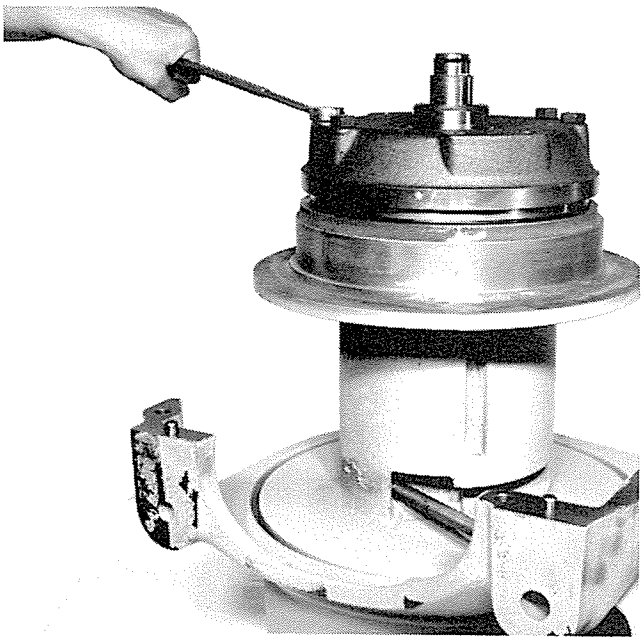


Figure 17

Remove the free-spool clutch piston housing mounting bolts, loosening the bolts alternately, leaving four bolts, two on each side of the clutch piston housing. Loosen the remaining bolts alternately and evenly until the spring tension has been removed.

⚠ WARNING: Failure to follow this instruction can result in serious bodily injury because of the very high spring tension.

NOTE: Insert a bar between the cable groove and the winch case half to stop the drum from turning.

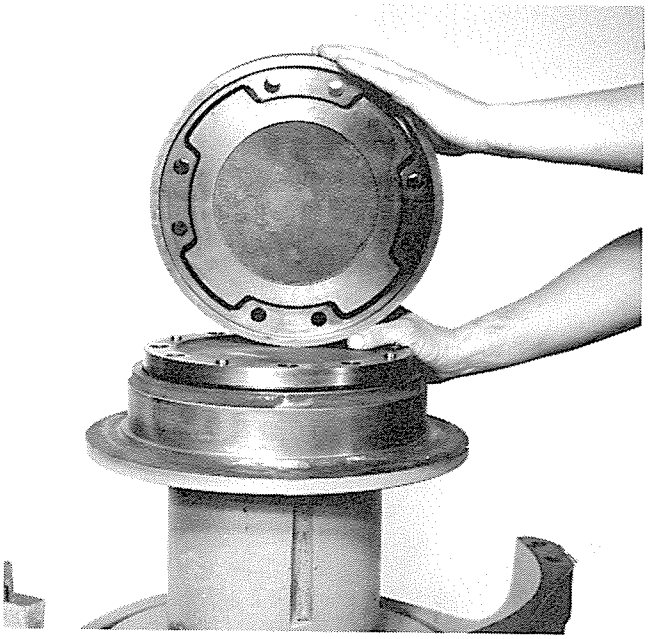


Figure 18

Remove the free-spool clutch piston housing and piston assembly.

DISASSEMBLY OF THE CLUTCH PISTON

Figure 19

Use an air hose to facilitate the removal of the clutch piston. Apply air pressure to the port on the end of the piston housing, covering the end of the air nozzle with a cloth to avoid oil spray and to seal the port.

NOTE: The piston housing may be full of oil.

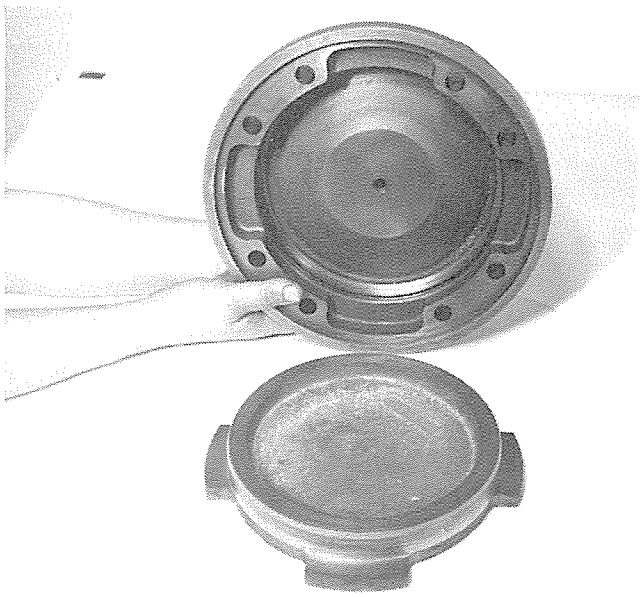


Figure 20
Lift the housing from the dislodged piston.

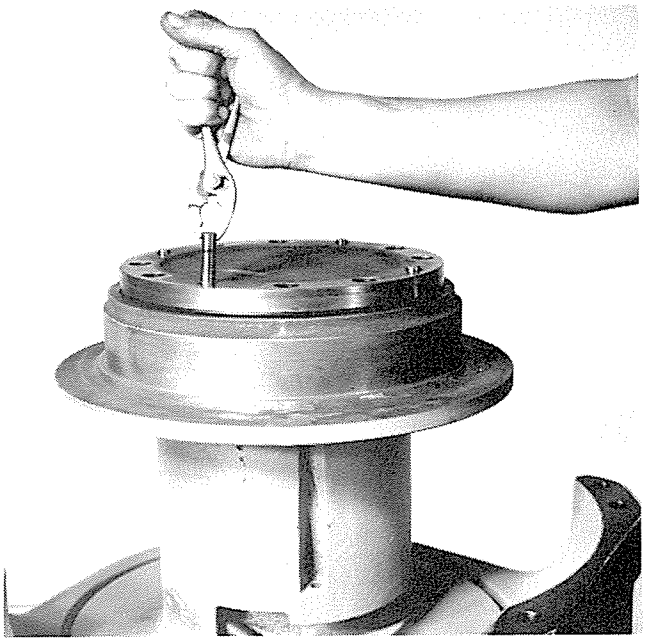


Figure 22
Remove the clutch release pins and O-rings.

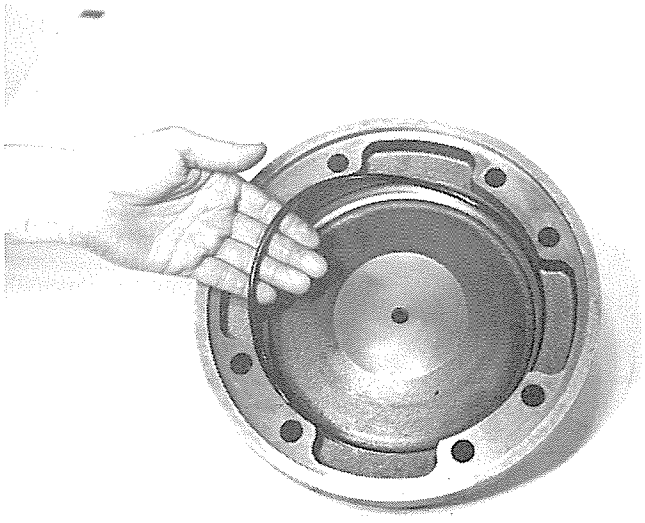


Figure 21
Remove the clutch piston housing O-ring.

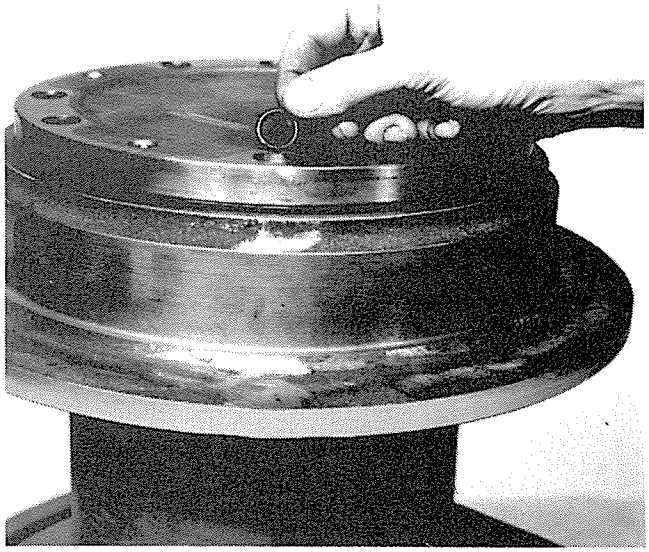


Figure 23
Remove the cable drum mounting bolt O-rings.

Figure 24

Use pry bars to remove the baffle plate, clutch disc hub and clutch drive shaft from the cable drum.

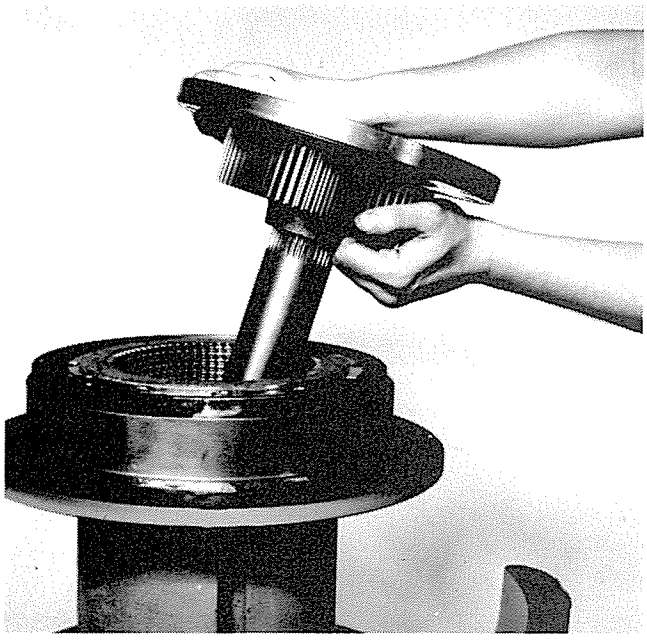


Figure 25

Remove the baffle plate, clutch disc hub and clutch drive shaft from the cable drum.

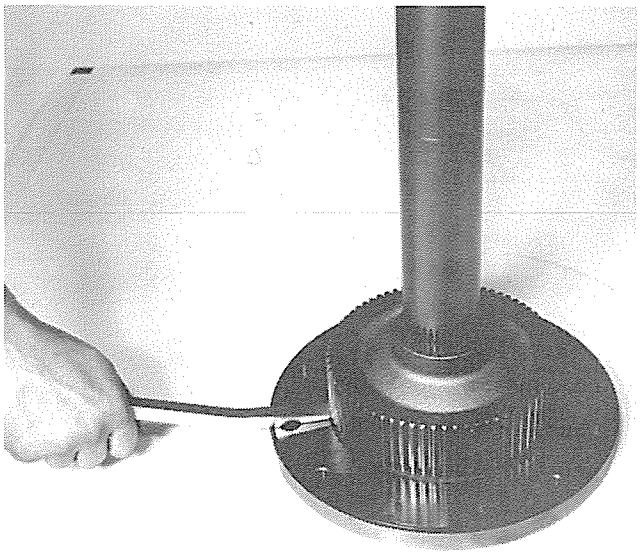


Figure 26

Carefully pry the baffle plate from the clutch disc hub.

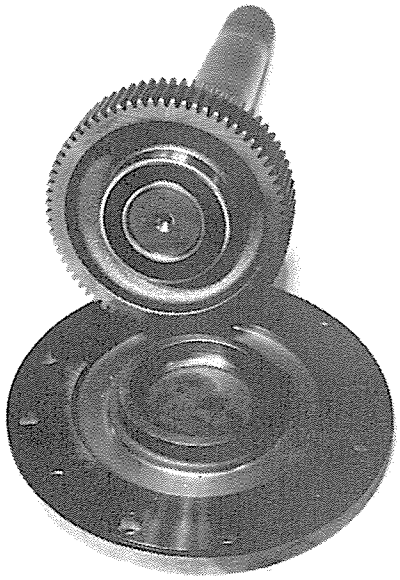


Figure 27

Remove the baffle plate from the shaft.

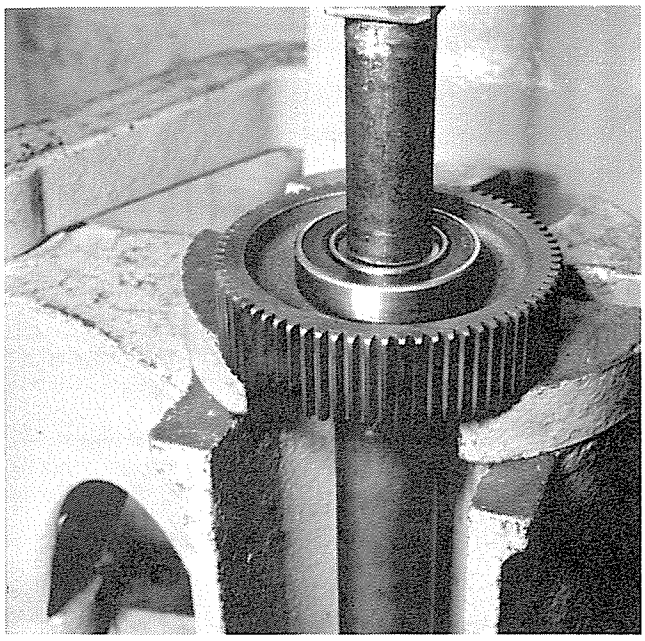


Figure 28

Use a press to remove the bearing and clutch disc hub from the clutch drive shaft.

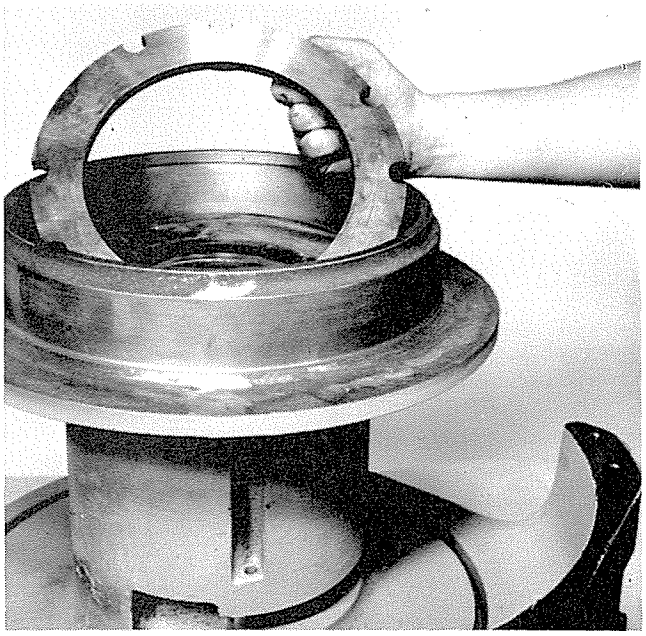


Figure 30

Remove the clutch pack end plate.

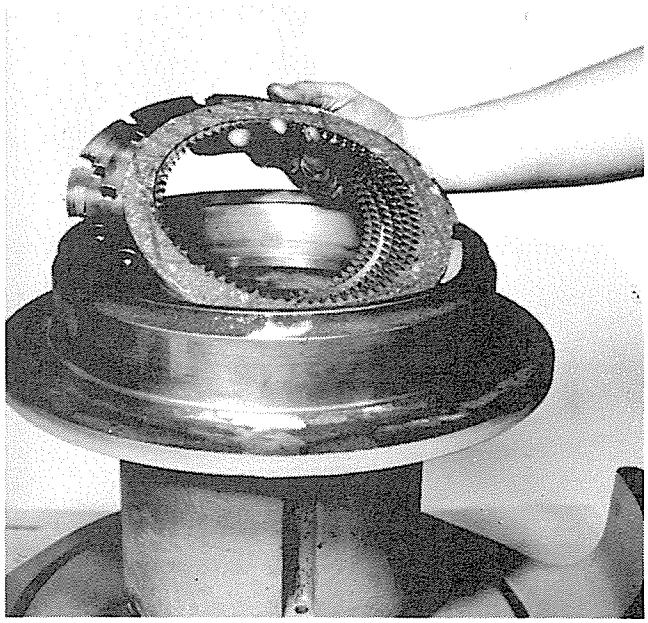


Figure 29

Remove the free-spool clutch discs from the cable drum.

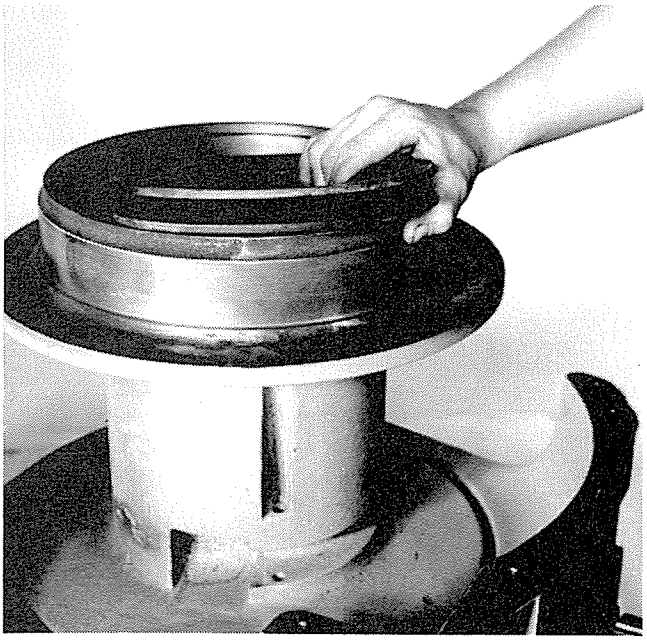


Figure 31

Remove the piston apply springs (Belleville washers) from the cable drum.

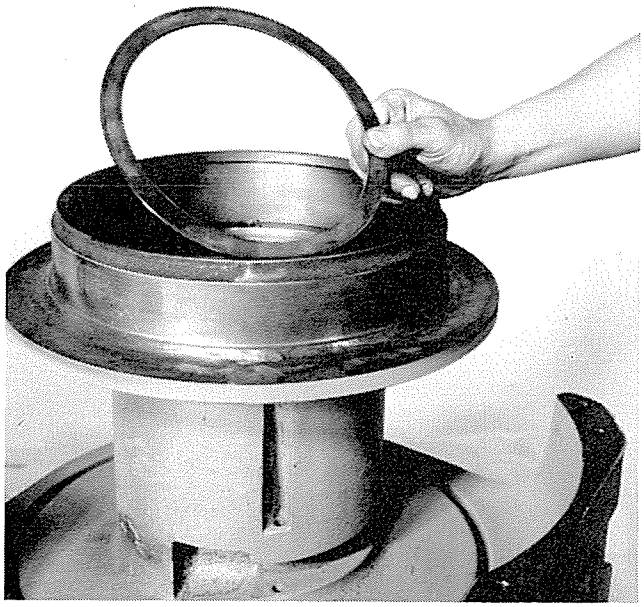


Figure 32

Remove the piston spring shim(s) from the cable drum and tag the shim pack to facilitate reassembly.

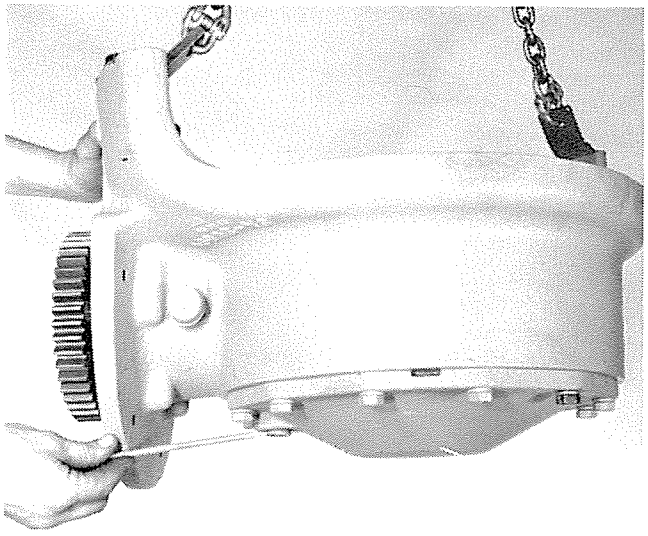


Figure 34

Fasten a hoist to the winch case half and lift the case half enough to remove the ring gear housing filler plug and drain any existing lubricant into a suitable container. Turn over the case half to expose the ring gear cover.

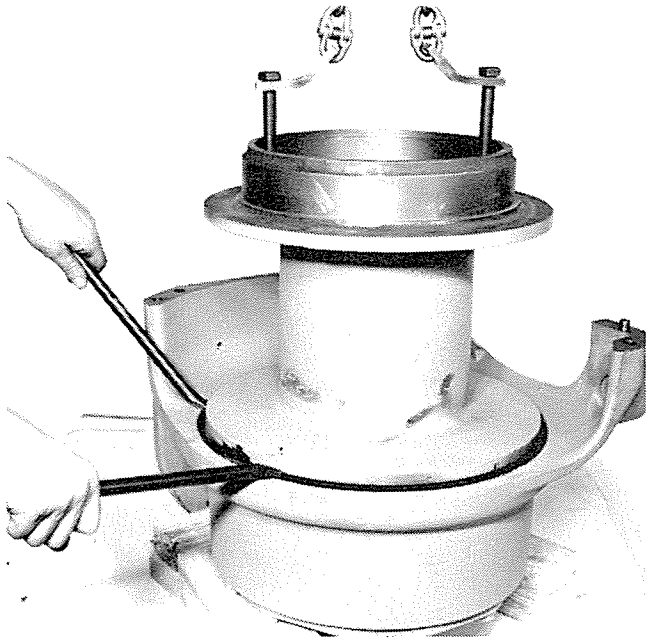


Figure 33

Fasten a hoist to the cable drum using two of the free-spool clutch piston housing mounting bolts, lift the cable drum slightly and pry the case half from the cable drum.

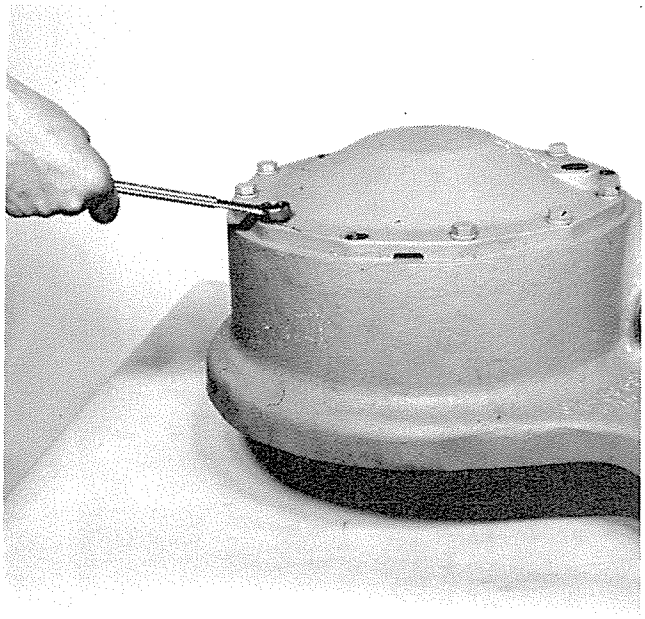


Figure 35

Remove the ring gear cover mounting bolts.

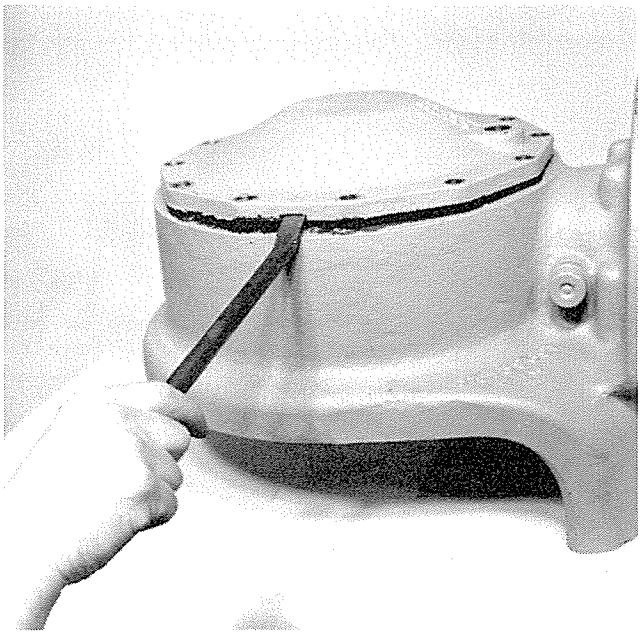


Figure 36

Pry the ring gear cover using the pry slot in the outer edge of the cover.

Figure 38

Remove the ring gear outer bearing cup and shims and tag the shim pack to facilitate reassemly.

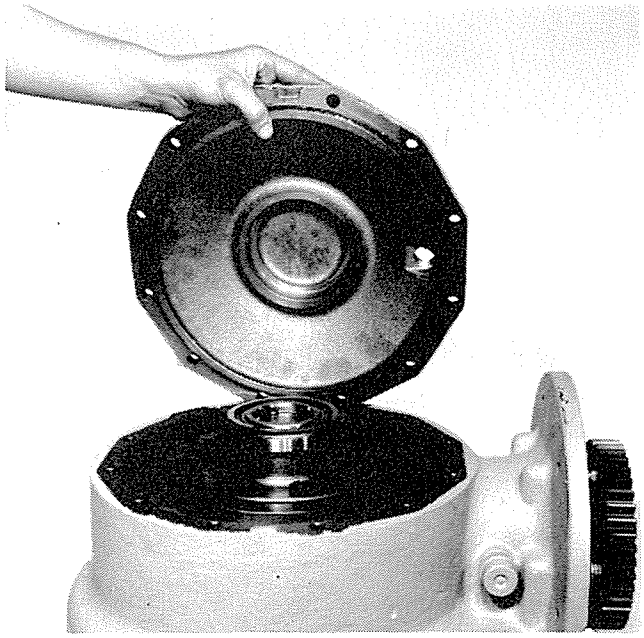


Figure 37

Remove the ring gear cover.

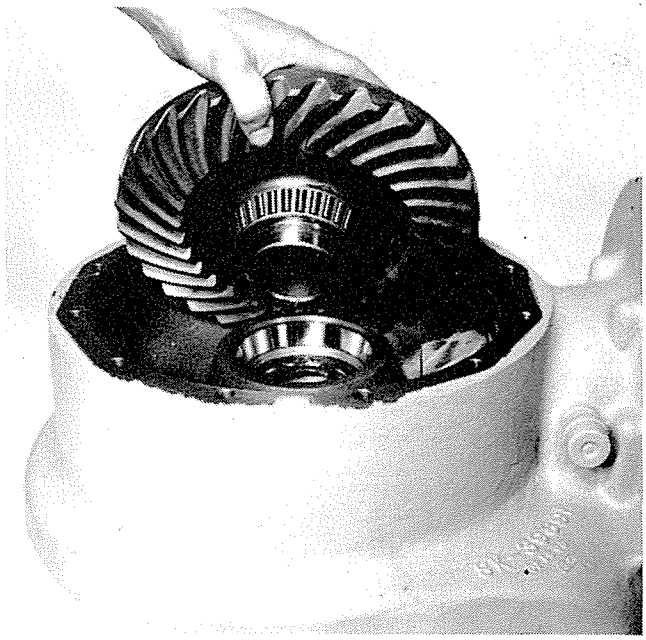


Figure 39

Remove the ring gear and bearing assembly.

Figure 40

Remove the ring gear inner bearing cup and shims and tag the shim pack to facilitate reassembly.

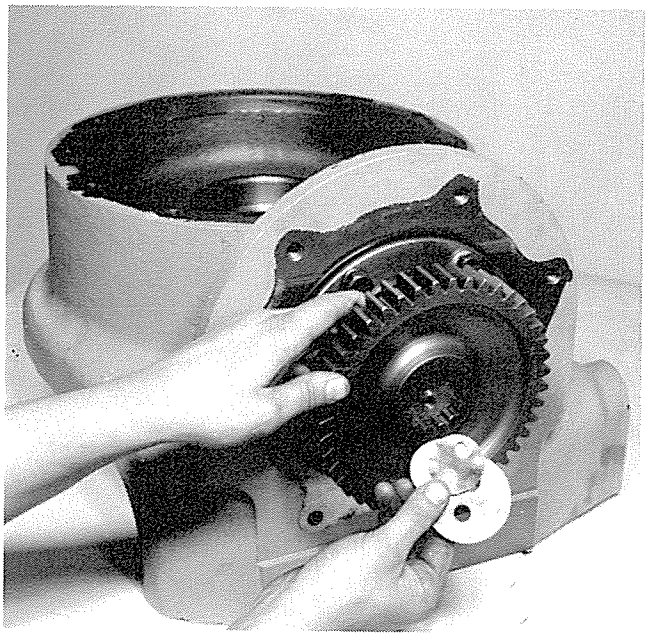


Figure 42

Remove the drive gear retainer, shims, and drive gear and tag the shim pack to faciliate reassembly.

Figure 41

Remove the drive gear retainer bolts.

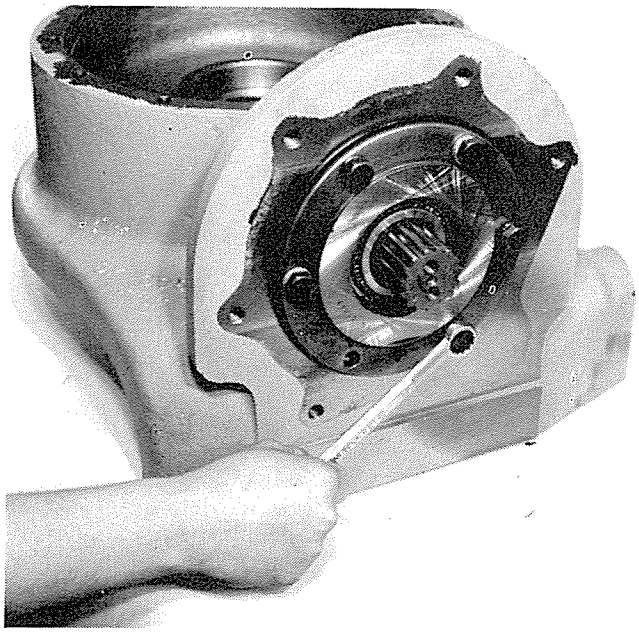


Figure 43

Remove the pinion bearing carrier mounting bolts and O-ring.

Figure 44

Pry the end of the pinion gear from the centre of the ring gear housing to remove the pinion gear and carrier.

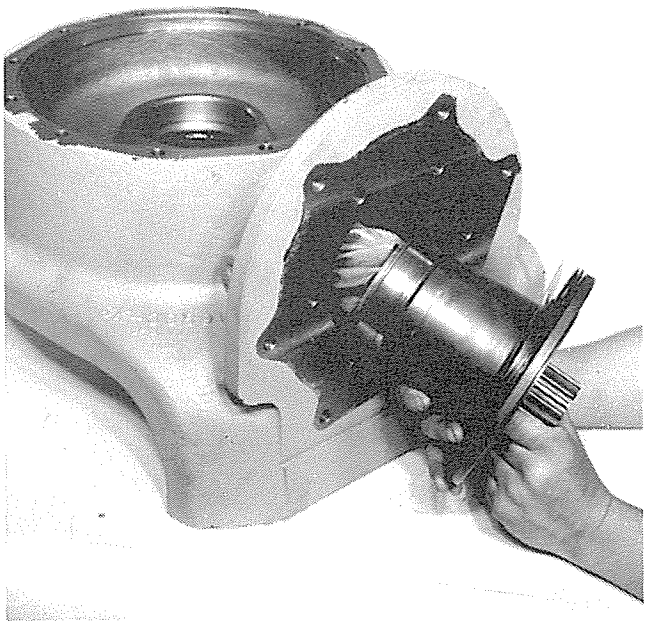


Figure 45

Remove the pinion gear and carrier assembly and the bearing carrier shims from the case half and tag the shim pack to facilitate reassembly.

DISASSEMBLY OF THE PINION GEAR

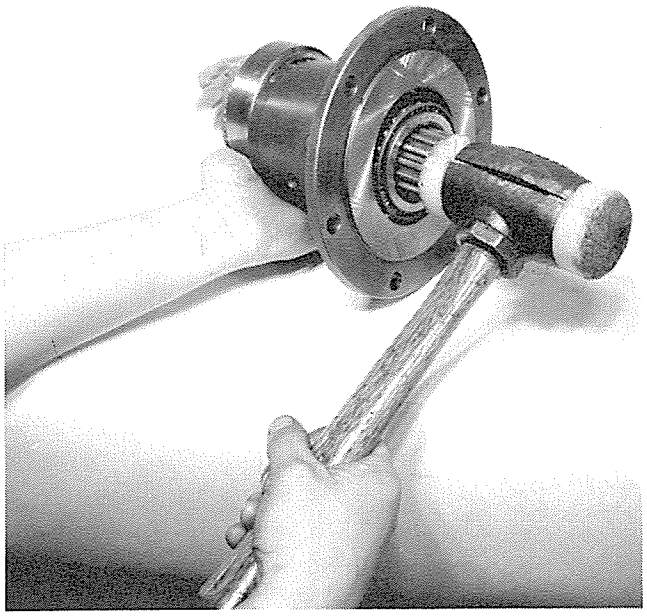


Figure 46

Tap the splined end of the pinion shaft with a rubber mallet to remove the pinion gear and bearing assembly from the pinion carrier.

DISASSEMBLY OF THE RING GEAR

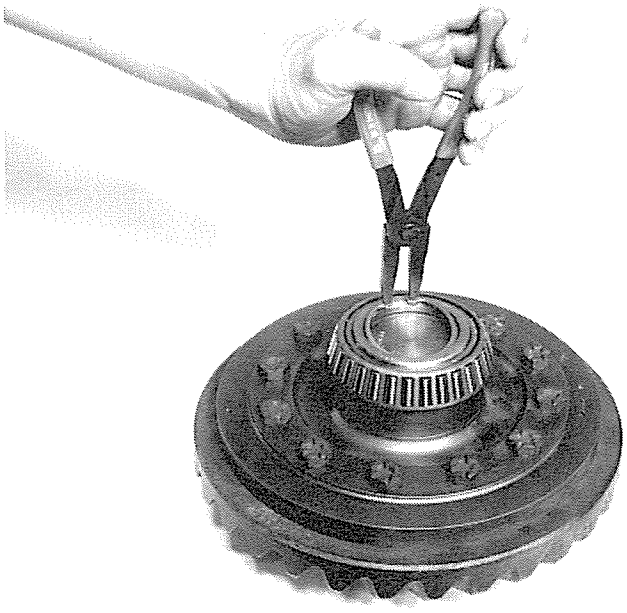


Figure 47

Remove the clutch shaft plug snap ring.

Figure 48

Support the back of the ring gear assembly and tap out the clutch shaft plug.

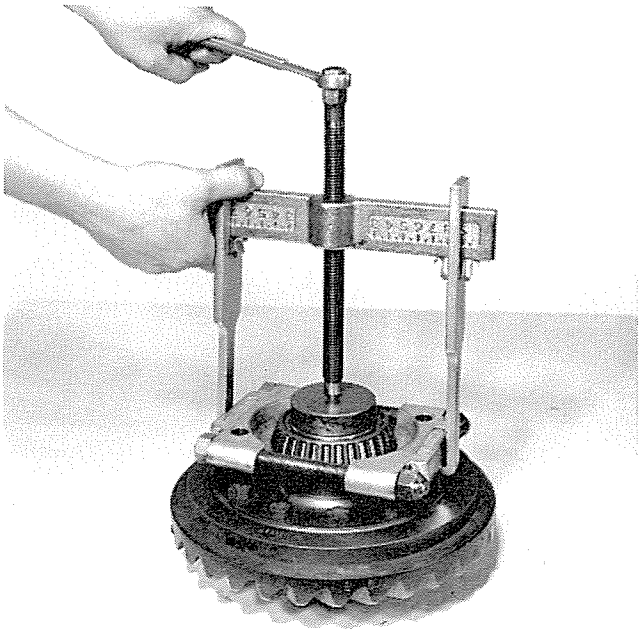


Figure 50

Use a split bearing puller to remove the outer ring gear carrier bearing cone.

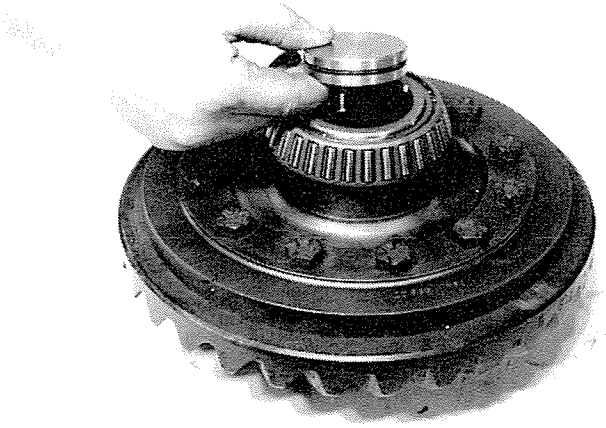


Figure 49

Turn the ring gear assembly over and remove the clutch shaft plug and O-ring.

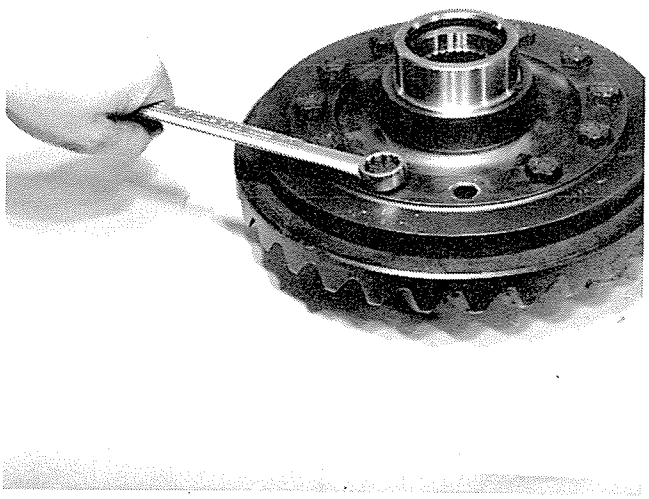


Figure 51

Remove the ring gear mounting bolts.

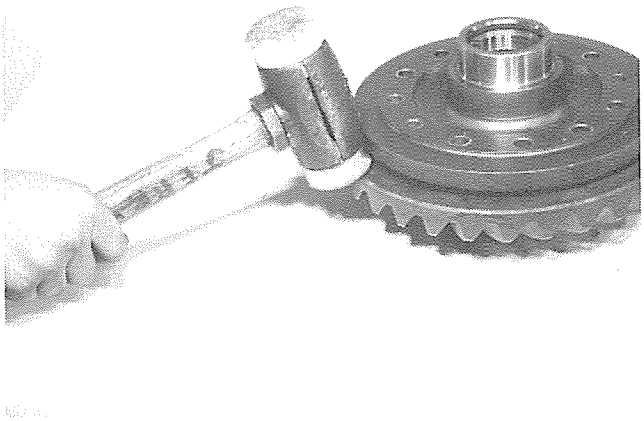


Figure 52

Use a rubber mallet to strike around the ring gear edge to remove the ring gear.

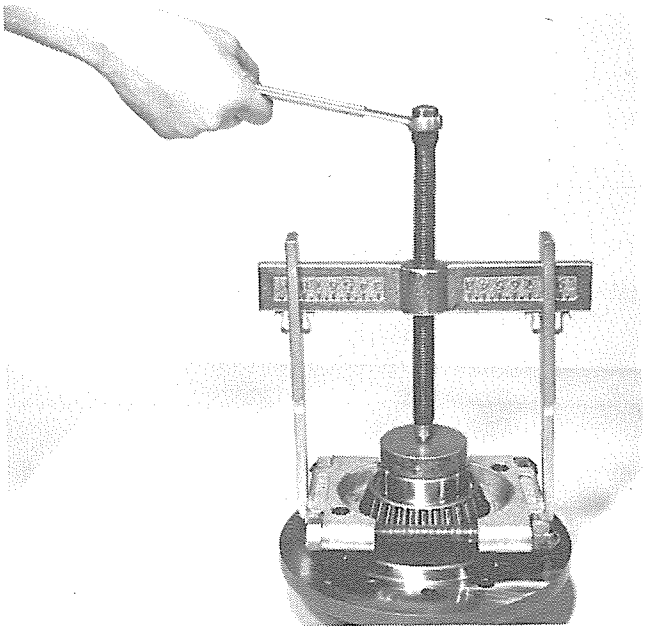


Figure 53

Turn the assembly over and use a split bearing puller to remove the inner ring gear carrier bearing cone.

DISASSEMBLY OF THE DROP GEAR GROUP

Figure 54

Remove the intermediate gear shaft and O-ring from the drop gear housing.

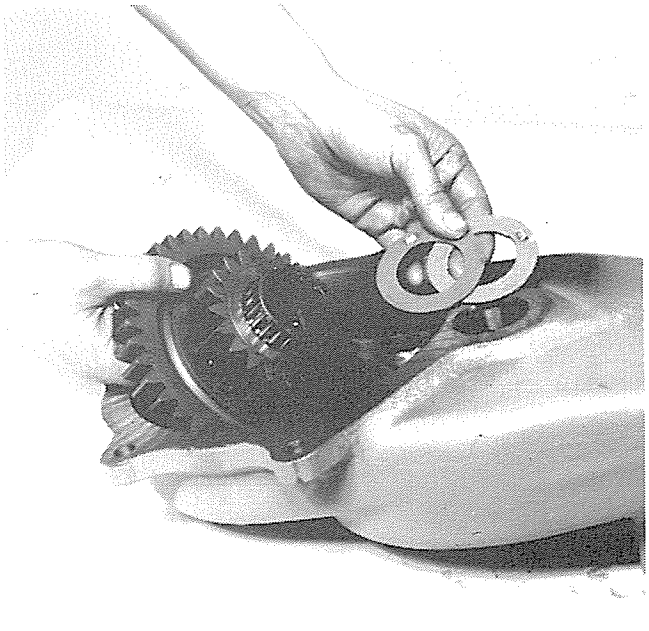


Figure 55

Remove the intermediate gear, bearings, spacer, and thrust washers from the drop gear housing.

DISASSEMBLY OF THE INPUT SHAFT GROUP

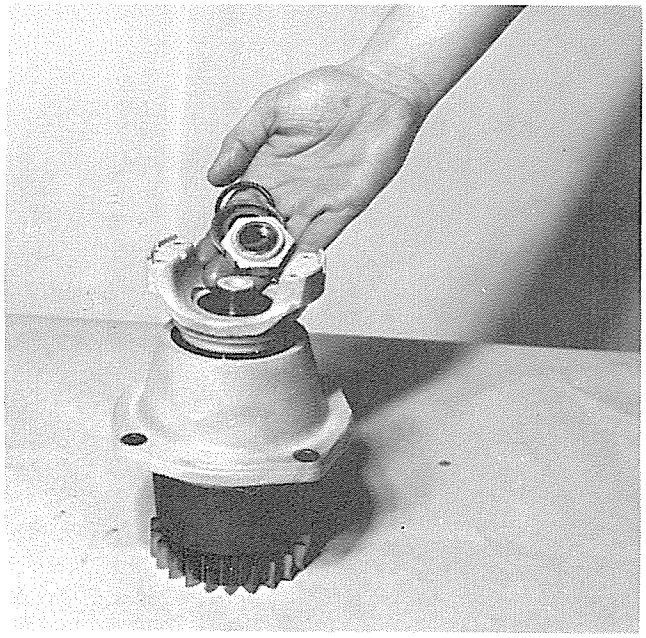


Figure 56

Remove the input flange nut (loosened at the beginning of the disassembly), washer, and O-ring.

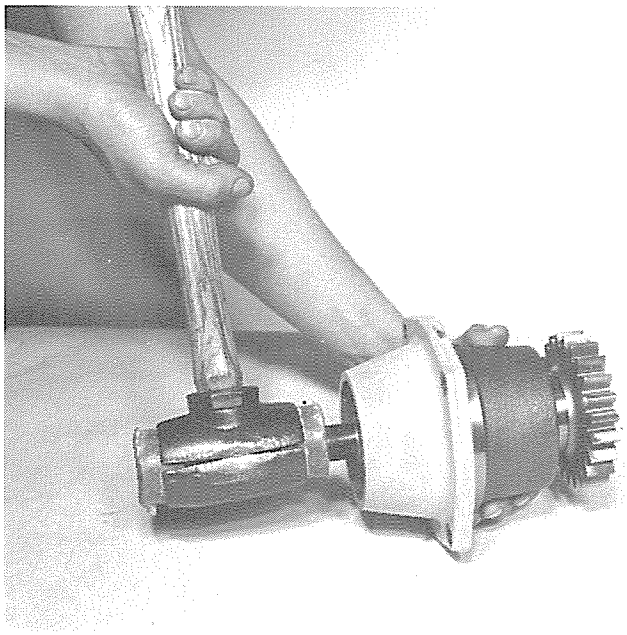


Figure 58

Remove the input shaft.

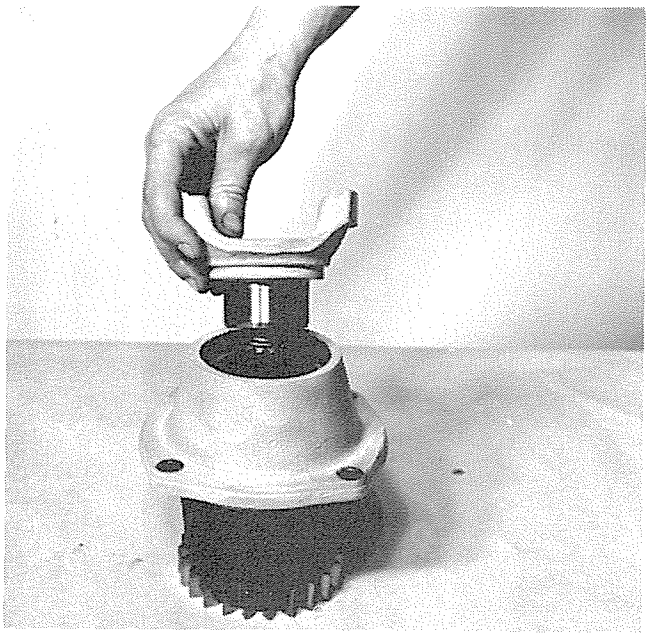


Figure 57

Remove the input flange from the input shaft.

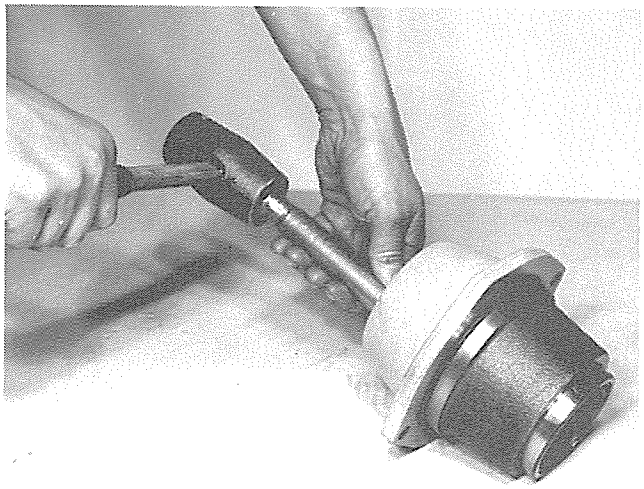


Figure 59

Remove the input shaft rear bearing from the input cap.

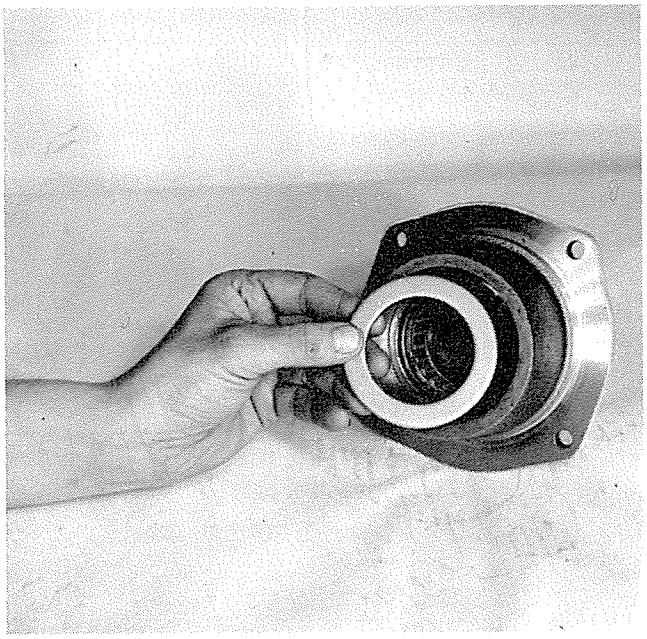


Figure 60

Remove the sprag rear spacer.

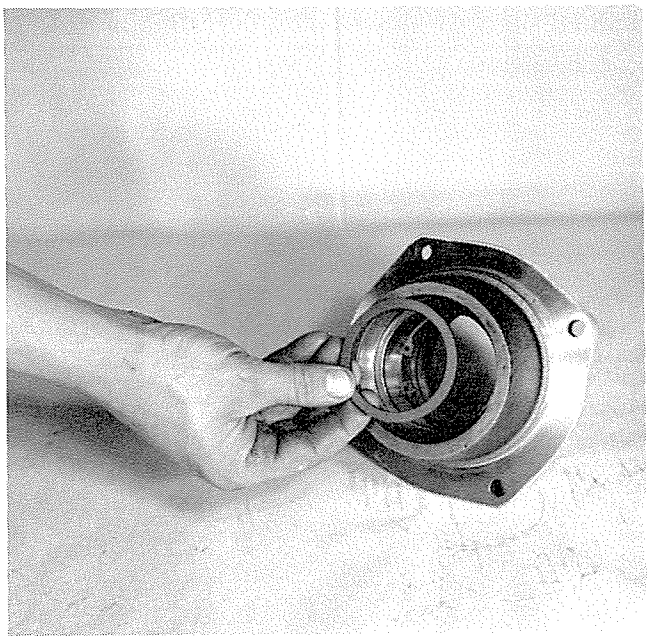


Figure 62

Remove the sprag front spacer.

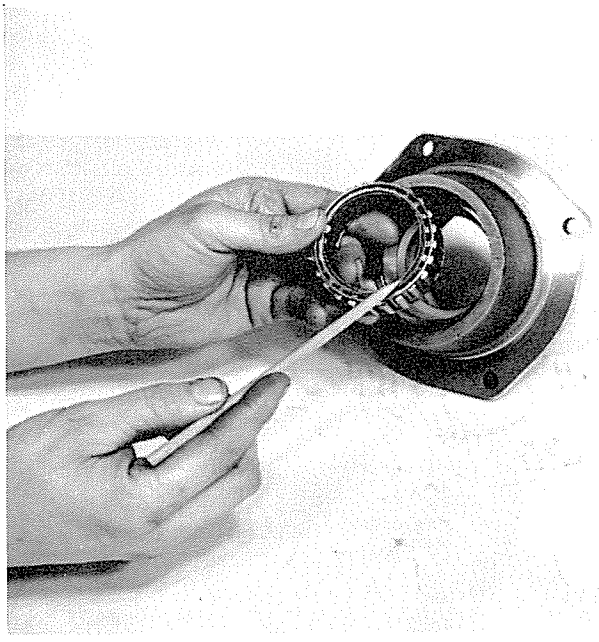


Figure 61

Remove the sprag.

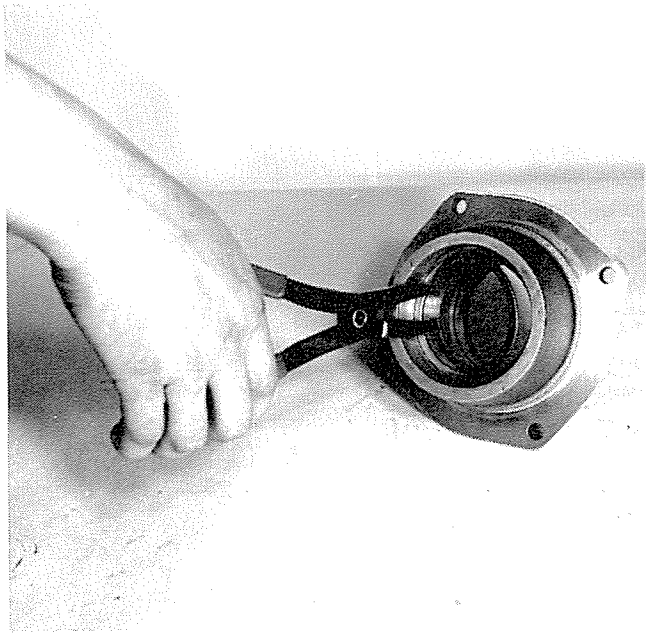


Figure 63

Remove the sprag front spacer snap ring.

Figure 64

Turn the assembly over and remove the input flange oil seal.

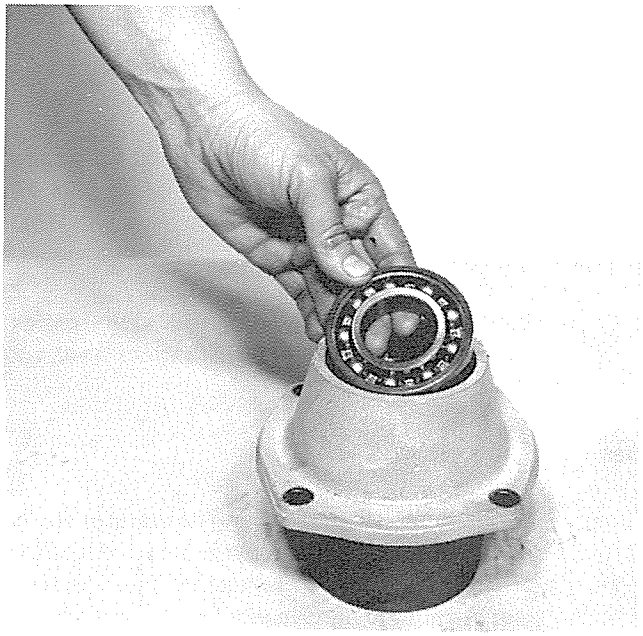


Figure 66

Remove the input shaft front bearing.

Figure 65

Remove the input shaft front bearing snap ring.

Figure 67

Remove the cable drum oil seal, bearing retaining ring, and bearing from the winch case half.

CLEANING AND INSPECTION

CLEANING

Clean all parts thoroughly using a solvent type cleaning fluid. Immerse the parts in the fluid and use a brush to completely remove old lubricant and foreign material from the parts.

⚠ WARNING: Take care to avoid skin rashes, fire hazards, and the inhalation of vapors when you use solvent type cleaners.

Bearings

Remove the bearings from the cleaning fluid and strike the larger sides of the cones flat against a block of wood to dislodge solidified particles of lubricant. Immerse them again in cleaning fluid to remove any remaining particles. Repeat the above operation until the bearings are thoroughly clean. Dry the bearings with moisture-free compressed air. Be careful to direct the air stream across the bearings to avoid spinning them. DO NOT spin the bearings while drying them. Bearings may be rotated slowly by hand to facilitate the drying process.

IMPORTANT NOTE: The clutch piston bearing, the clutch disc driveshaft front bearing, and the cable drum bearing (Items 1, 11, and 25 on Page 43 and 44) on newer Clark winches (See Figure 121 - NOTE) are prepacked, sealed bearings. Wipe these bearings clean with a soft, lint-free cloth and wrap them in the same until they are installed. DO NOT wash these bearings in a solvent OR ANY other type of cleaning fluid. Washing these bearings will render them useless. In addition, these bearings require no repacking during installation.

INSPECTION

Careful inspection of all parts is very important. Replacement of all parts showing wear or stress now will reduce costly and avoidable failures later.

Bearings

Carefully inspect all rollers, cages and cups for wear, chips or nicks to determine the fitness of bearings for further use. NEVER replace a bearing cone or cup individually, replace the mating cup or cone at the same time. After inspection, dip the bearings in a clean, light oil and wrap them in a clean, lint-free cloth or paper to protect them until they are to be installed.

Oil Seals, Gaskets, and Retaining Rings

It is more economical to replace spring loaded oil seals, O-rings, metal sealing rings, gaskets and snap rings when the winch is reassembled than it is during a premature overhaul that may be required to replace these parts in the future. Further loss of lubricant through a worn seal can result in the failure of more expensive parts of the assembly. Sealing members should be handled carefully, particularly when they are being installed. Cuts, scratches or curling under of the lip of a seal seriously impairs its efficiency. Apply a thin coat of Permatex No. 2 to the outer diameter of the oil seal to ensure an oil tight fit with the retainer. When assembling new metal sealing rings, they should be lubricated with a light, non-fibre grease to secure them in their grooves to facilitate assembly of the mating members. Lubricate all O-rings and seals with Approved Automatic Transmission Fluid BEFORE reassembly.

Gears and Shafts

If the magna-flux process is available, use the process to examine the parts. Check the teeth on all gears carefully for wear or damage. If gear teeth have areas where the case hardening is worn through or cracked, replace the gear. Small nicks can be removed with a suitable hone. Inspect the shafts and quills to ensure they are not sprung or bent. Be sure there are no twisted splines and that the shafts are true.

Housings, Covers, etc.

Inspect all housings, covers and bearing caps to ensure that they are thoroughly cleaned and that mating surfaces and bearing bores, etc. are free from nicks or burrs. Check all parts carefully for cracks or conditions which could cause leakage or failure.

REASSEMBLY

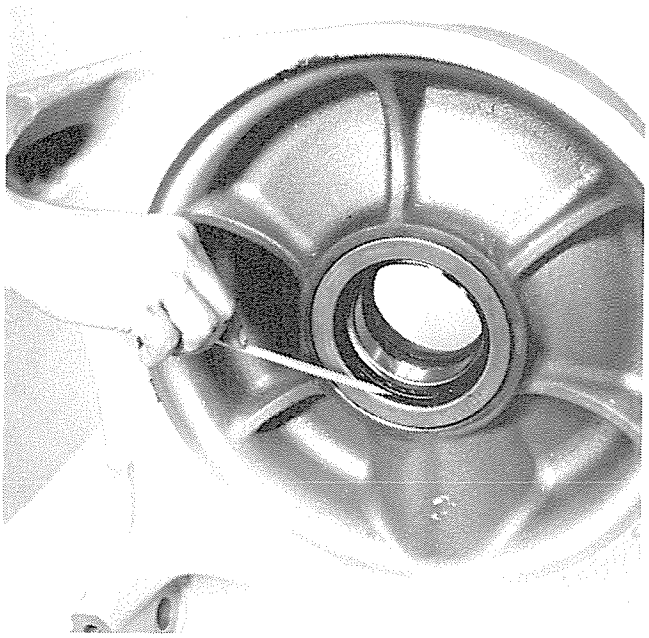


Figure 68

Install the cable drum bearing and retaining ring into the winch case half. If you have an older winch (See Figure 121 - NOTE), pack the bearing with Mil Spec. #G-23827A/Clark spec. #240050 grease. Newer winches have sealed, prepacked bearings that require no prepacking. Apply Permatex to the outer diameter of the cable drum oil seal and install the seal with the lip facing the bearing.

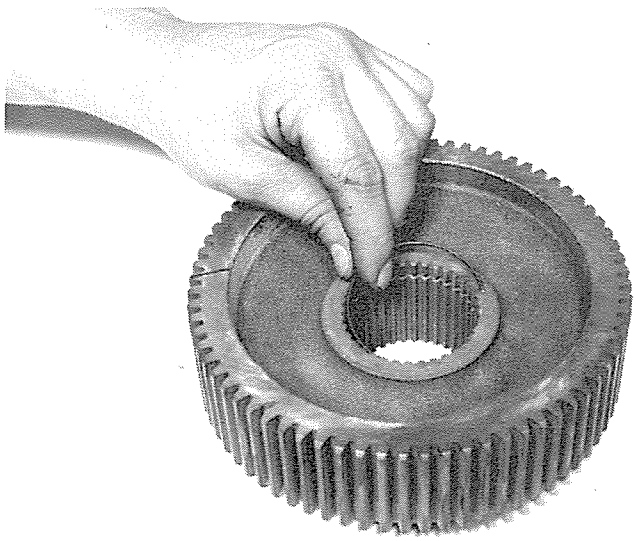


Figure 69

Install the wire locating ring in the clutch disc hub.

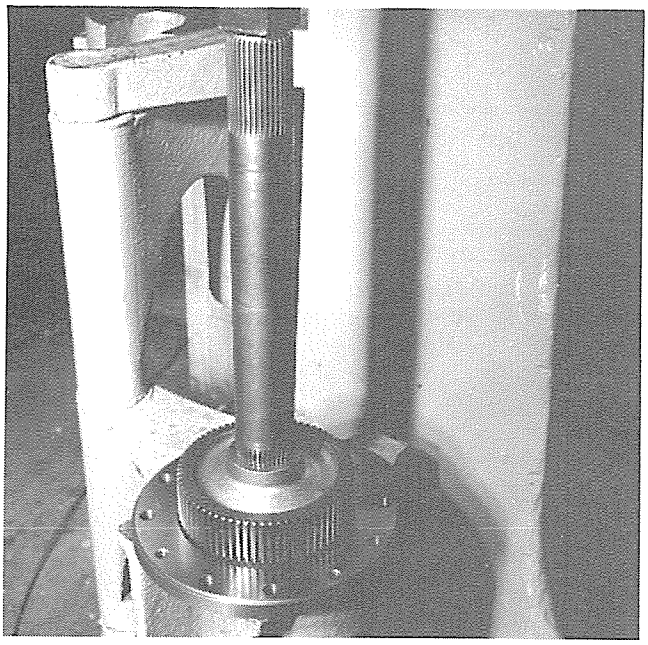


Figure 70

Install the cable drum drive shaft into the disc hub and the bearing into the baffle using a press. Be sure that the shaft and the hub are properly seated in the baffle.

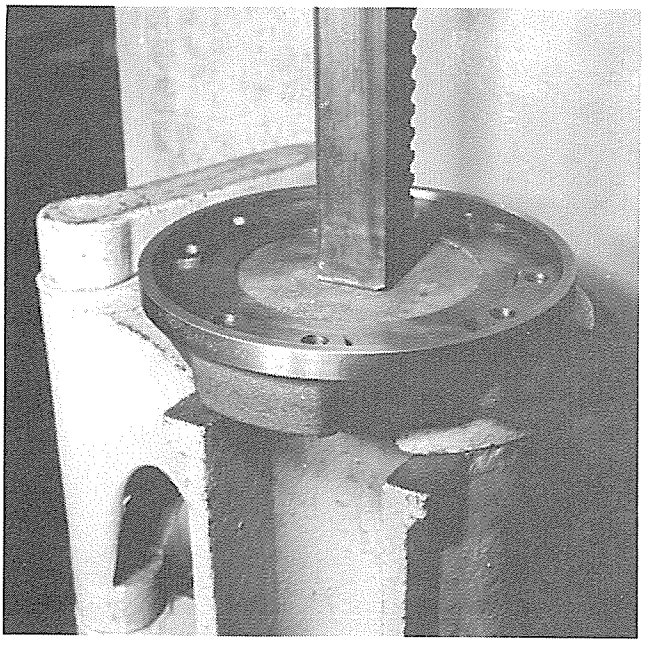


Figure 71

Immerse a new piston O-ring in Approved Automatic Transmission Fluid (See Page 48) for five minutes. Install the O-ring into the piston housing and install the piston. Take care not to damage the O-ring.

NOTE: The O-ring groove in the piston housing must be thoroughly cleaned before the O-ring is installed.

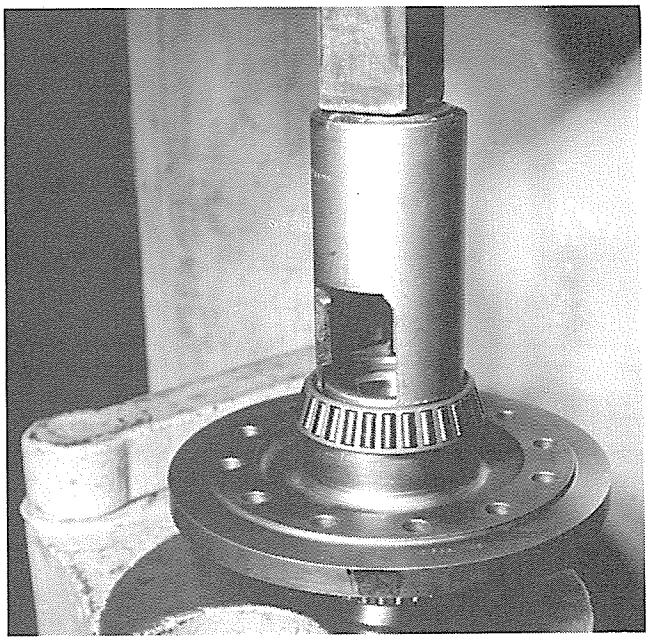


Figure 72

Install the ring gear carrier bearing cones on the ring gear carrier using a bearing press.

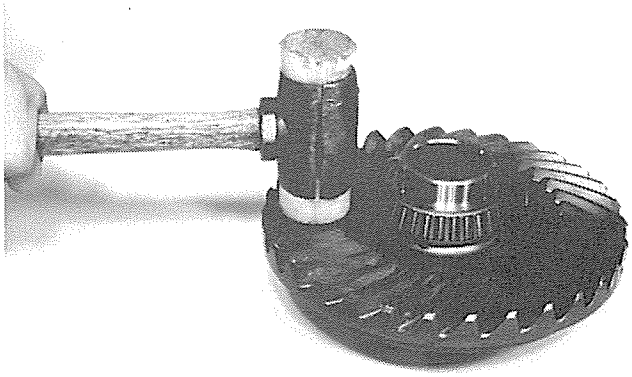


Figure 73

Install the ring gear on the ring gear carrier and tap it into place with a rubber mallet.

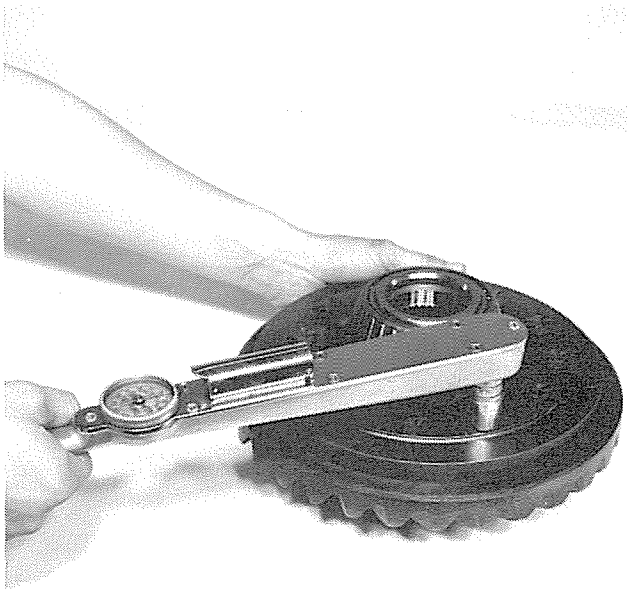


Figure 74

Turn the ring gear and carrier assembly over and install the ring gear mounting bolts. Tighten them alternately across the face of the ring gear to a torque of 110 to 120 N•m (80 to 90 lbf.ft).

ASSEMBLY OF THE DROP GEAR GROUP

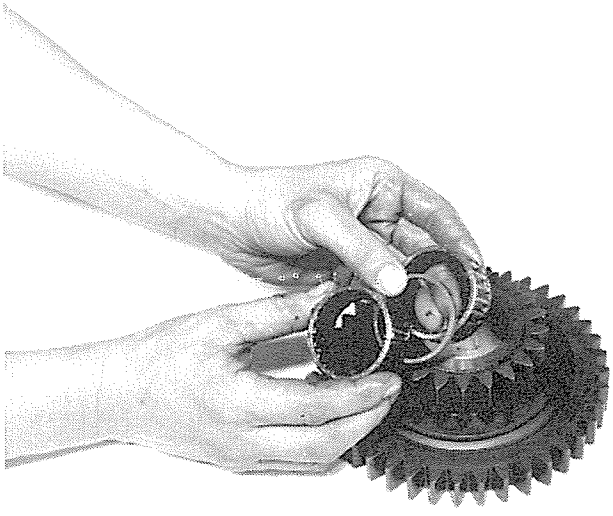


Figure 75

Install the two bearings and the bearing spacer into the intermediate gear.

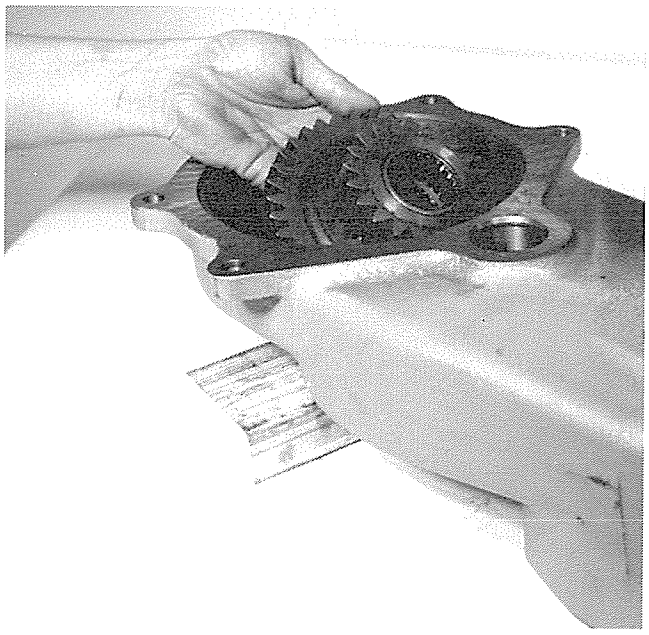


Figure 76

Install the intermediate gear into the drop gear housing so the centre hole aligns with the shaft hole "A" in the housing.

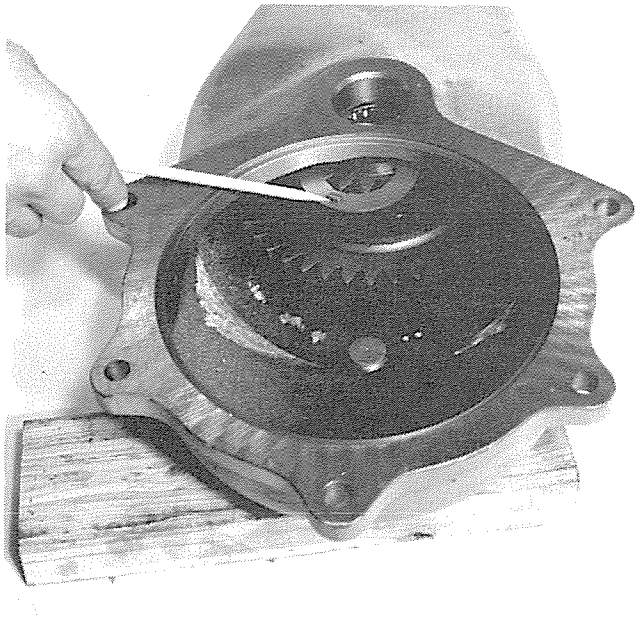


Figure 78

Position the intermediate gear and install the top thrust washer with the lock tab inserted into the groove provided.

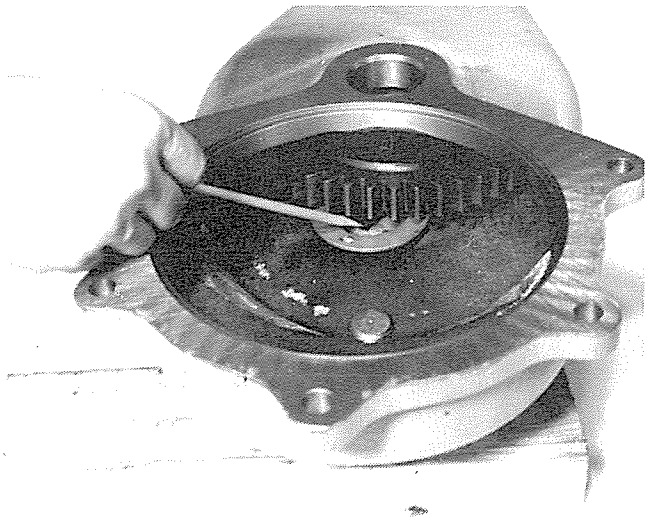


Figure 77

Position the lower thrust washer with the lock tab inserted into the groove provided.

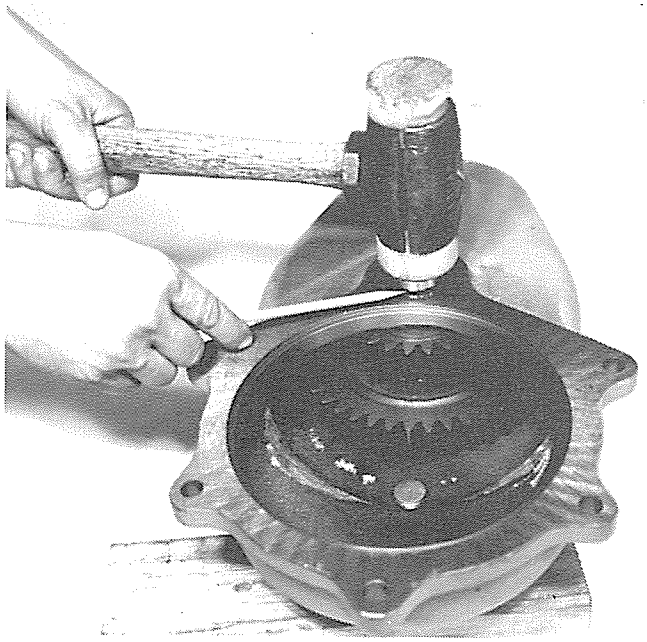


Figure 79

Install a new O-ring on the intermediate gear shaft and install the shaft into the hole in the drop gear housing through the centre of the gear.

ASSEMBLY OF THE PINION GEAR

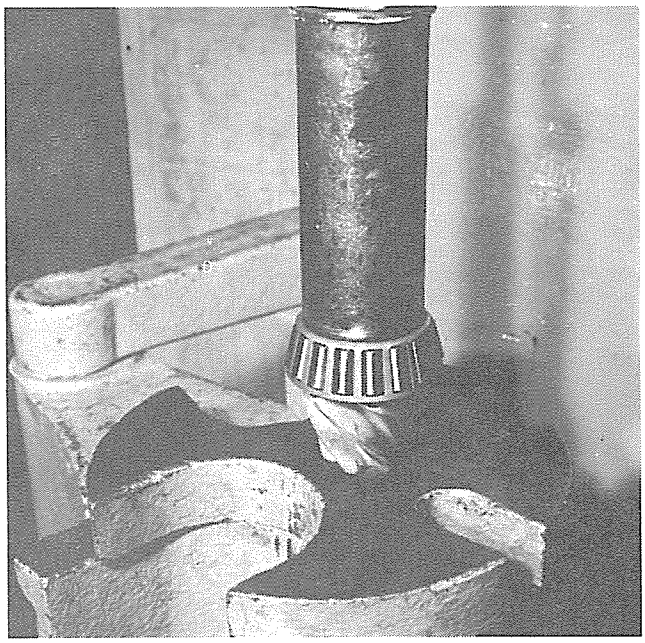


Figure 80

Use a press to install the pinion shaft rear bearing cone on the pinion shaft until it contacts the pinion gear.

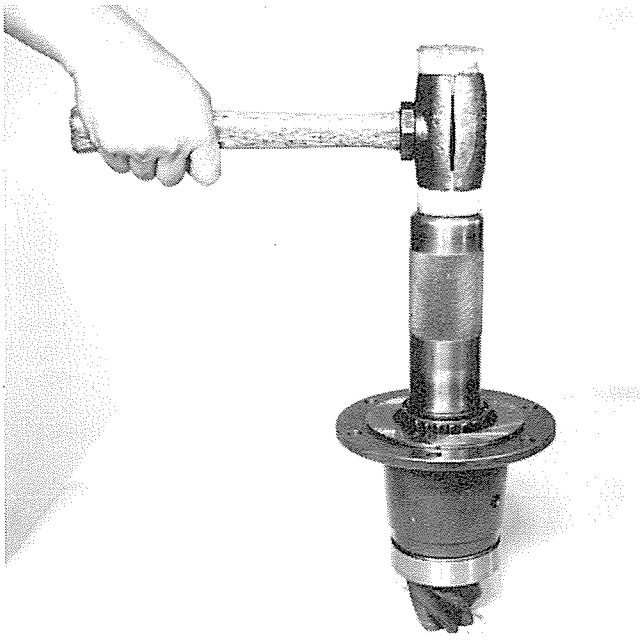


Figure 82

Position the pinion shaft bearing carrier and the upper bearing cup onto the pinion shaft, and tap the upper bearing into position.

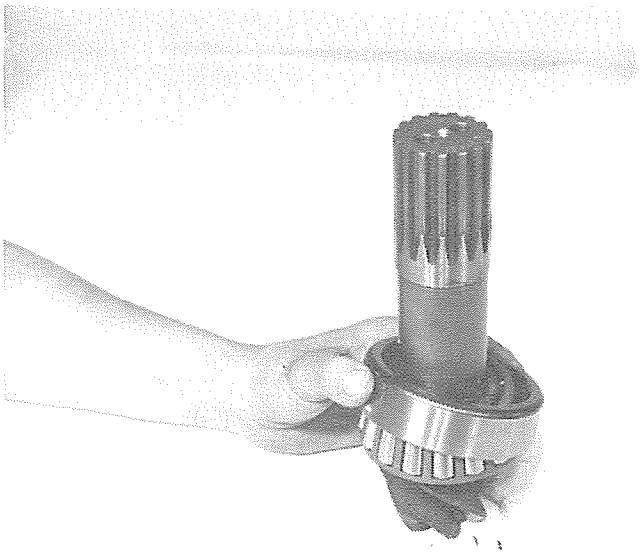


Figure 81

Install the rear bearing cup over the cone.

ASSEMBLY OF THE INPUT SHAFT

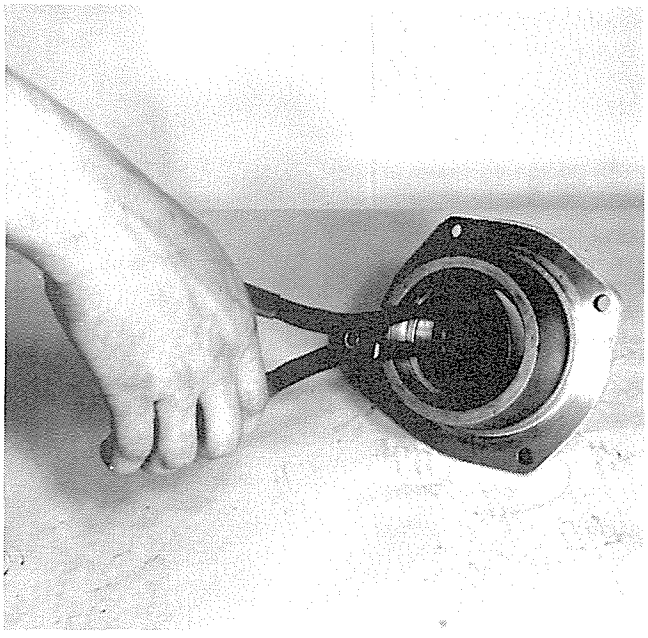


Figure 83

Install the sprag front spacer snap ring into the input cap.

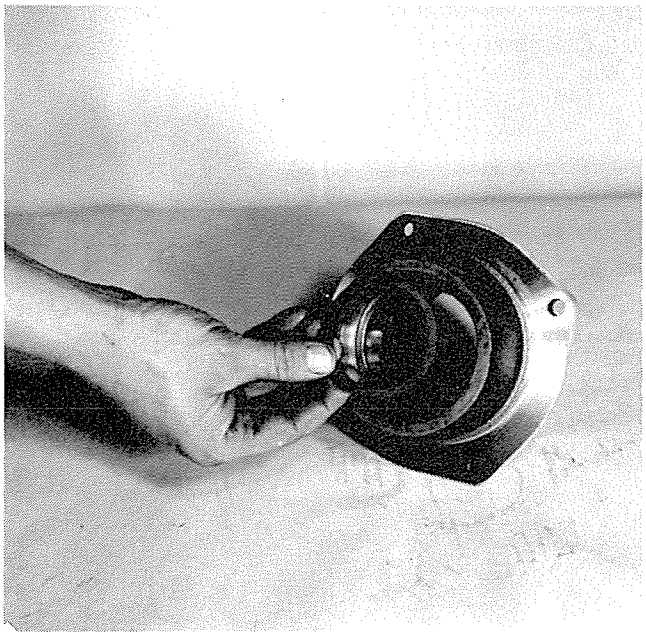


Figure 84

Install the sprag front spacer.

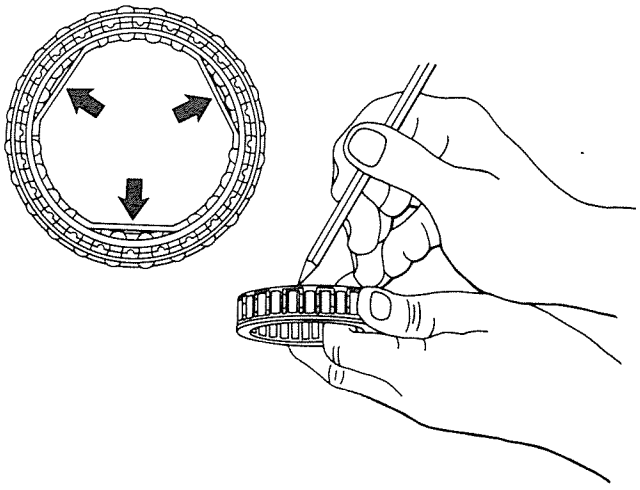


Figure 86

Sprag drag strip position.

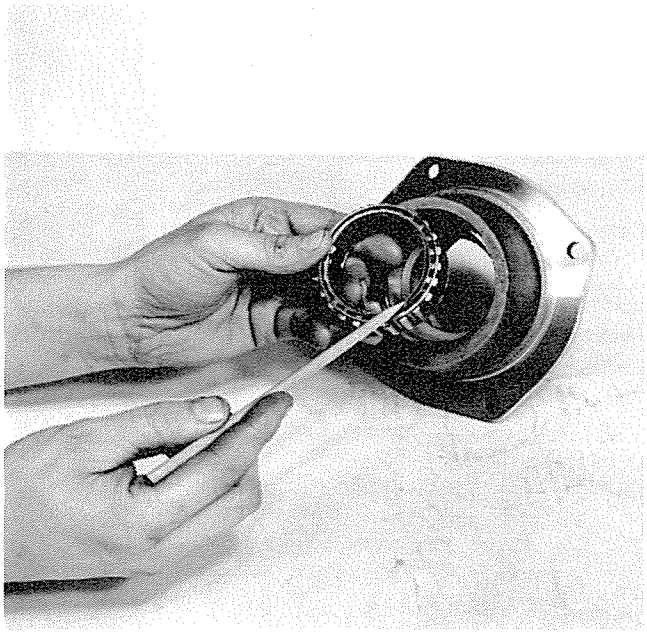


Figure 85

With the sprag assembly locating ring in position (making sure the drag strips are down), install the sprag assembly into the input cap (See Figure 93 - NOTE).

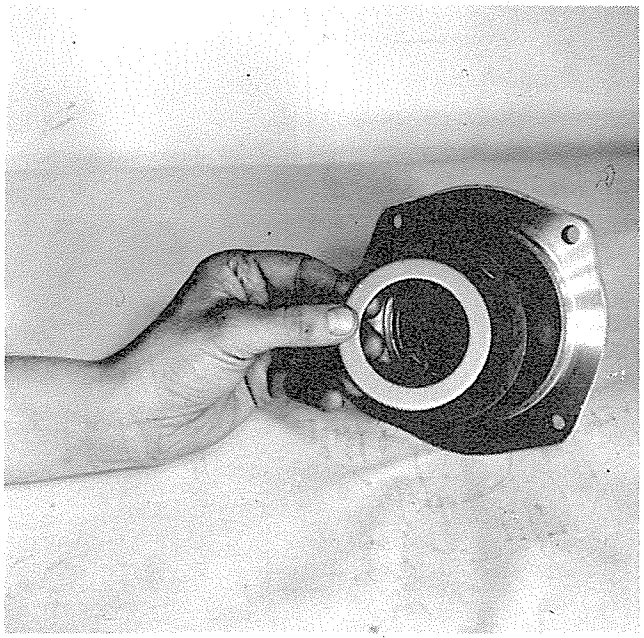


Figure 87

Install the sprag rear spacer.

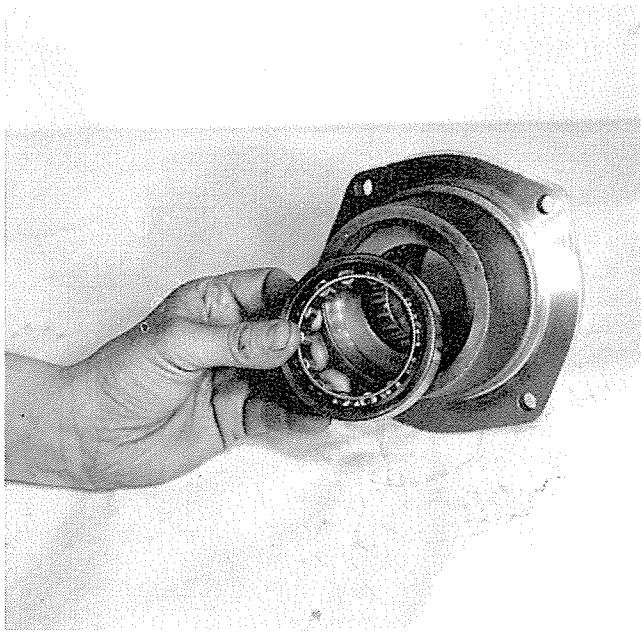


Figure 88
Install the input shaft rear bearing.

Figure 90
Install the input shaft front bearing snap ring.

Figure 89
Turn the assembly over and install the input shaft front bearing.

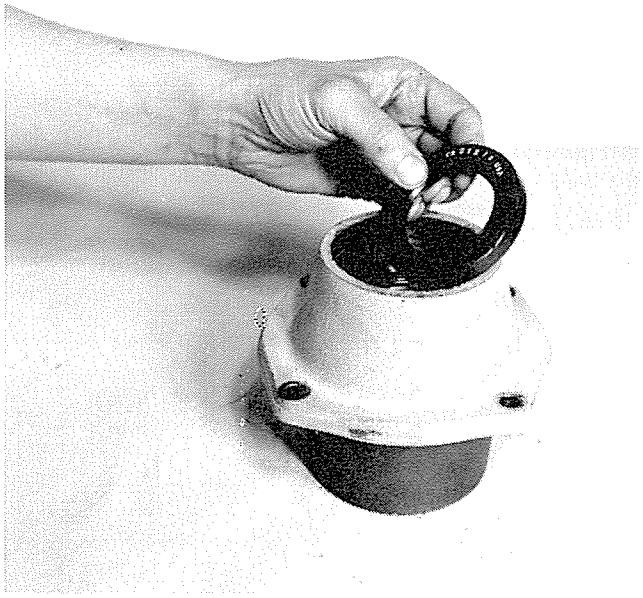


Figure 91
Install the input flange oil seal.

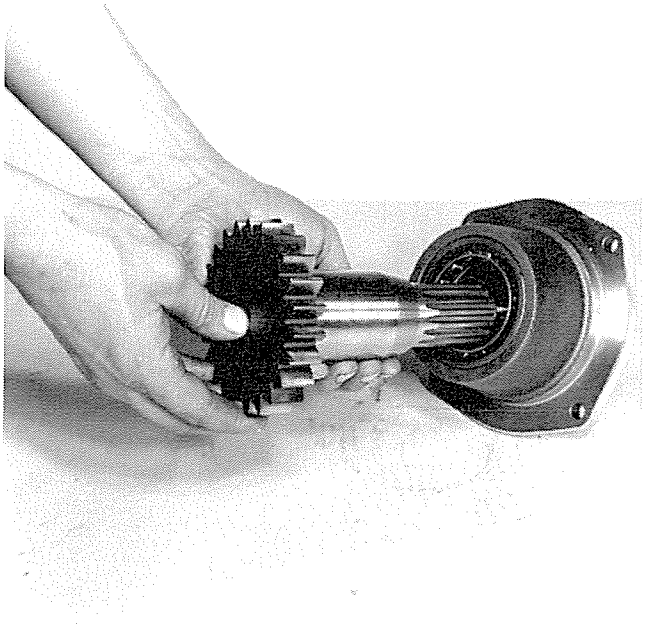


Figure 92

Install the input shaft completely into the sprag and bearing assembly.

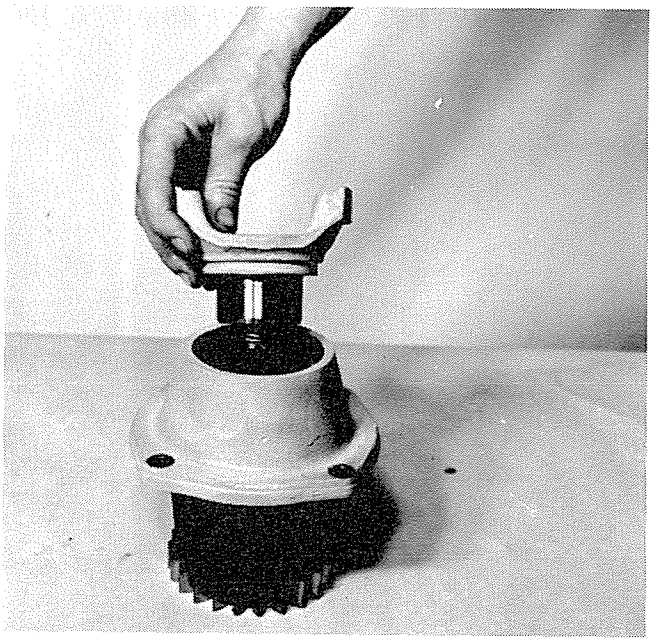


Figure 93

Install the input flange onto the splined end of the shaft.

NOTE: The flange and shaft MUST turn clockwise, NOT counterclockwise. If the flange and shaft turn counterclockwise the sprag was installed backwards and it must be disassembled and installed correctly.

INSTALLATION OF THE RING GEAR

Figure 94

Apply Approved Automatic Transmission Fluid to the outside diameter of the ring gear carrier oil seal and install the oil seal into the ring gear half of the winch housing.

NOTE: The lip of the seal must be installed upwards.

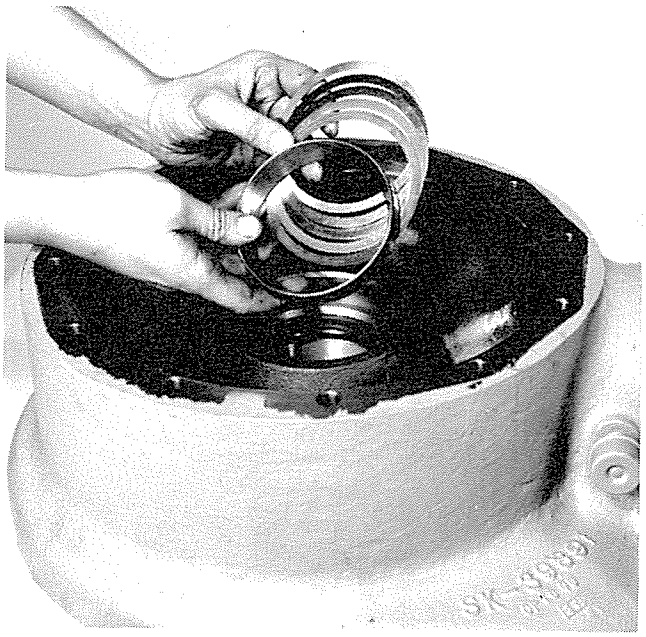


Figure 95

Install the same shims removed in disassembly and the inner ring gear carrier bearing cup into the bearing bore in the ring gear housing.

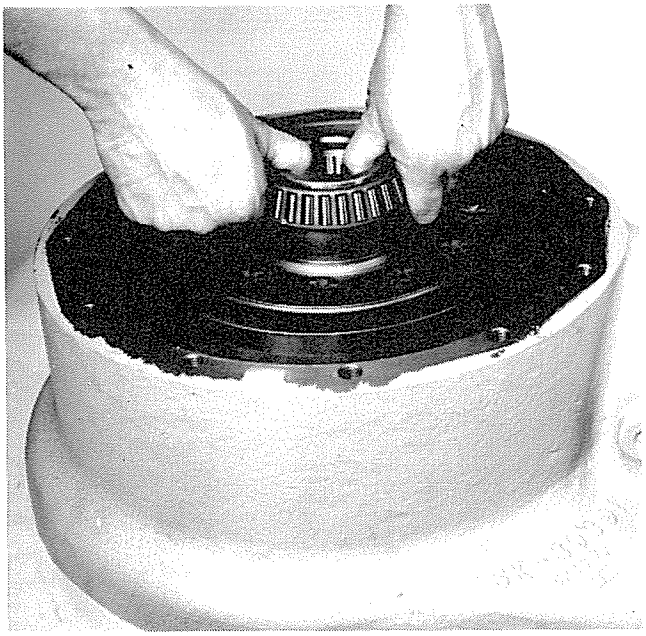


Figure 96

Install the ring gear and carrier assembly into the bearing cup.

NOTE: Take care not to damage the oil seal.

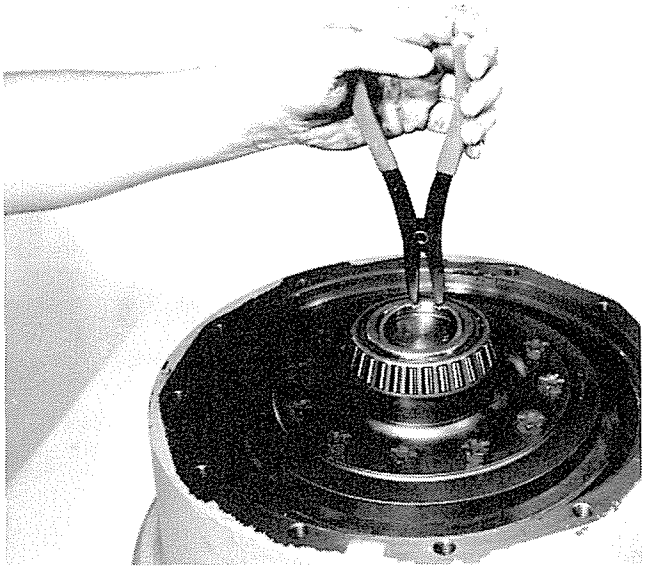


Figure 98

Install the ring gear shaft plug retaining ring.

Figure 97

Install a new O-ring onto the ring gear shaft plug and install the plug into the ring gear bearing.

Figure 99

Install the same shims removed in disassembly into the bore in the centre of the ring gear cover. Coat the diameter of the bearing cup with heavy grease to hold the cup in position and install the bearing cup into the ring gear cover on top of the shims.

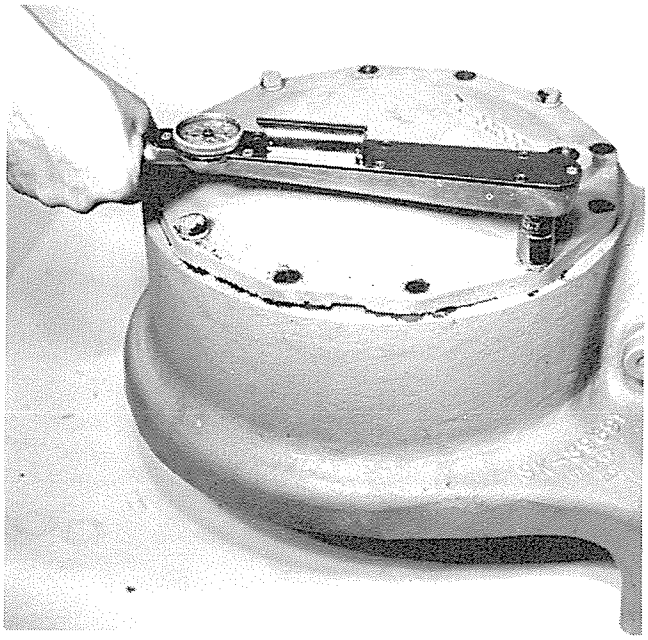


Figure 100

Position the ring gear cover over the ring gear so the bearing cup seats on the cone and install four bolts equally spaced around the cover. Tighten the bolts to a torque of 110 to 120 N•m (80 to 90 lbf.ft).

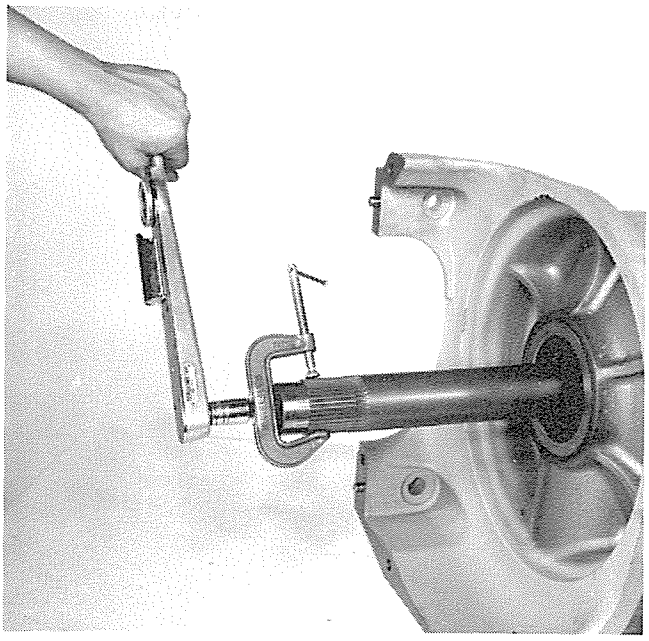


Figure 101

Insert the clutch drive shaft into the ring gear and fasten a modified "C" clamp (See Figure 102) to the shaft. Use a torque wrench to measure the rolling torque of the ring gear.

NOTE: The rolling torque should be between 5,6 and 6,8 N•m (50 and 60 lbf.in). Add ring gear cover shims to increase the torque, or subtract shims to decrease the torque to achieve the desired value.

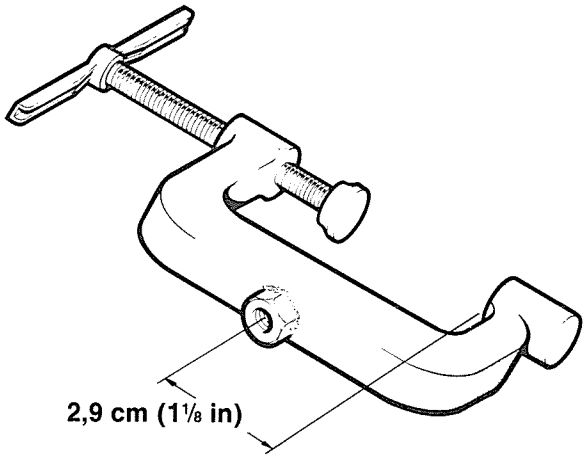


Figure 102

Modified "C" clamp.

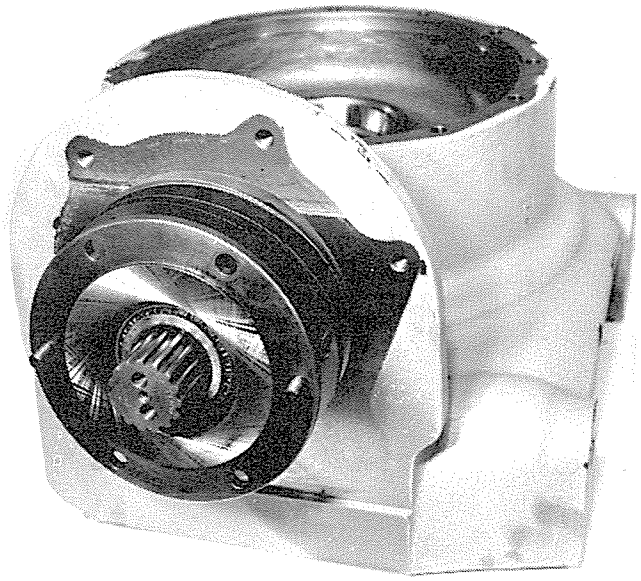


Figure 103

After the desired rolling torque value is achieved, remove the ring gear cover and the ring gear assembly. Install the same shims removed in disassembly as well as the pinion shaft and the bearing carrier assembly into the winch case half. Note the use of the two aligning studs to facilitate installation.

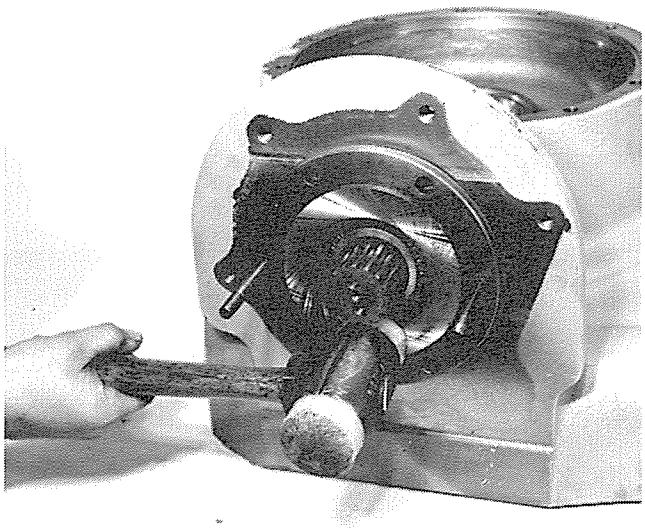


Figure 104

Tap the bearing carrier into position with a rubber mallet.

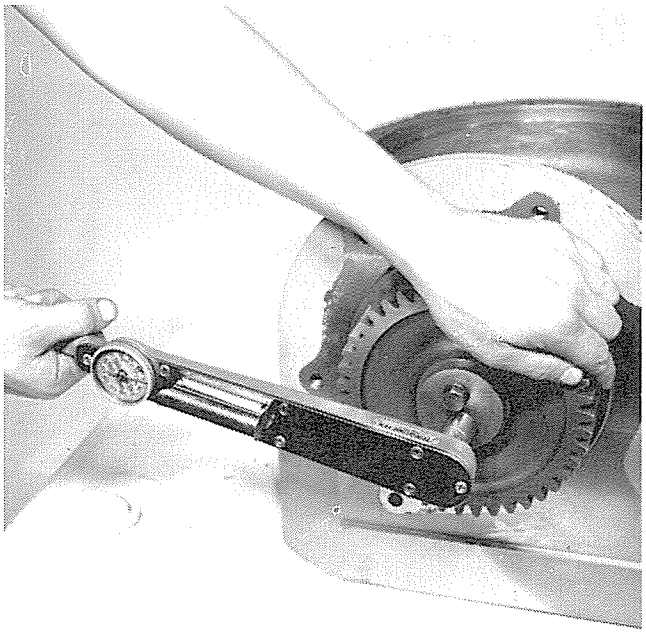


Figure 106

Install the drive gear retainer mounting bolts and tighten them to a torque of 80 to 90 N•m (60 to 65 lbf.ft).

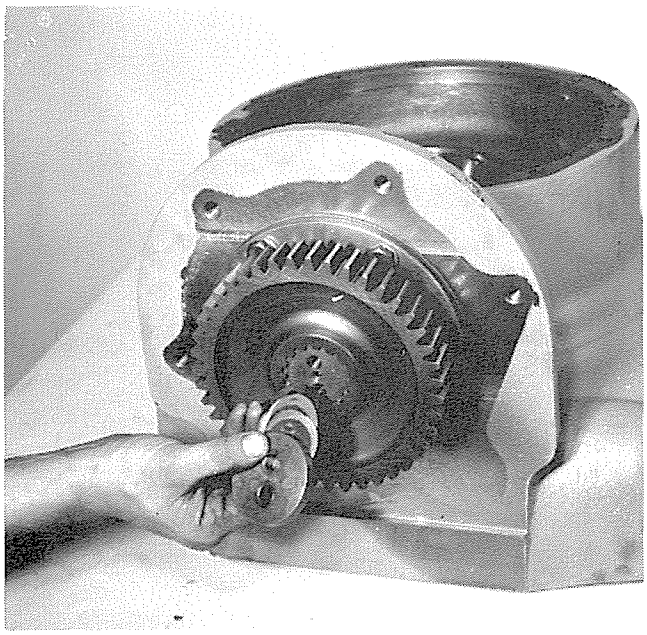


Figure 105

Install four carrier mounting bolts and then remove the aligning studs. Install the pinion drive gear on the end of the pinion shaft. Install the same shims removed in disassembly and the drive gear retainer.

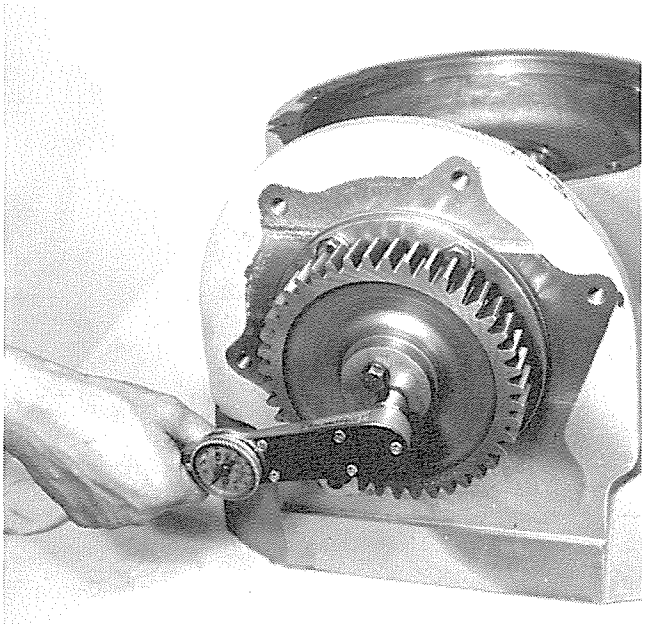


Figure 107

Measure the rolling torque of the pinion shaft. The rolling torque should be between 5,6 and 6,8 N•m (50 and 60 lbf.in). Add bearing carrier shims to decrease the torque, or subtract shims to increase the torque to achieve the desired value.

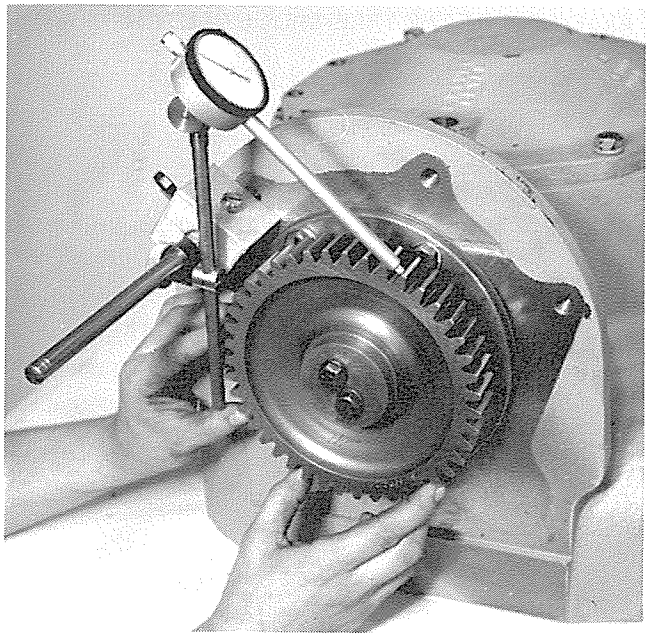


Figure 108

Reinstall the ring gear and carrier assembly and the ring gear cover and install four ring gear cover mounting bolts. Install a dial indicator on the pinion mounting surface with the pointer against one of the drive gear teeth and measure the backlash at three locations 120° apart. All of the values must be between 0,46 and 0,81 mm (.018 and .032 in). To increase the backlash, remove shims from the ring gear cover and add them to the ring gear housing. To decrease the backlash, remove shims from the ring gear housing and add them to the ring gear cover.

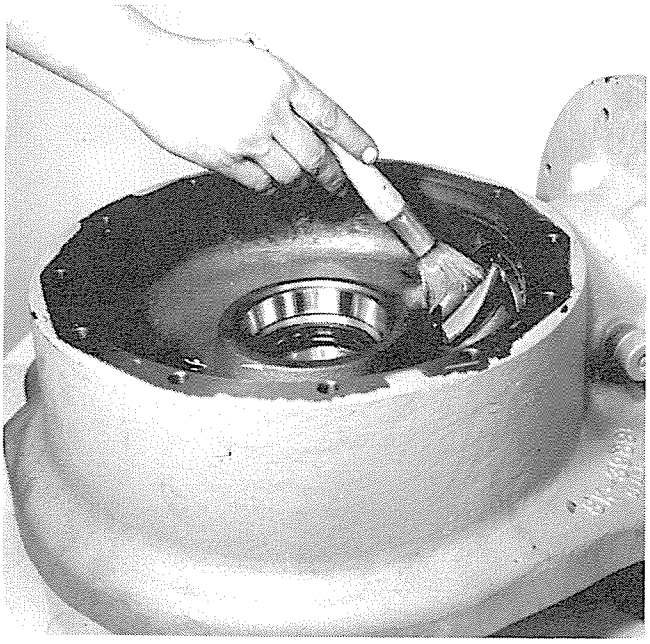


Figure 109

Remove the ring gear cover and the ring gear and carrier assembly. Paint the pinion gear and check the tooth contact.

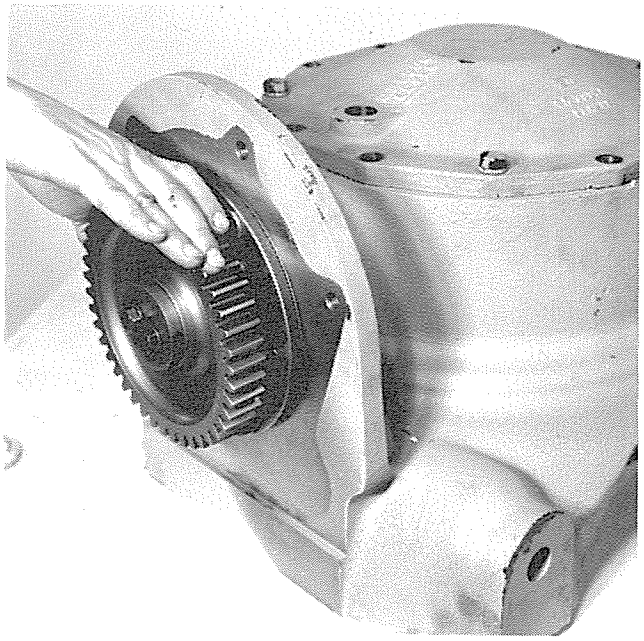


Figure 110

Reinstall the ring gear and carrier assembly and the ring gear cover, install four cover mounting bolts. Rotate the pinion drive gear twice in each direction to imprint the tooth contact (between the ring and pinion gears) pattern on the ring gear.

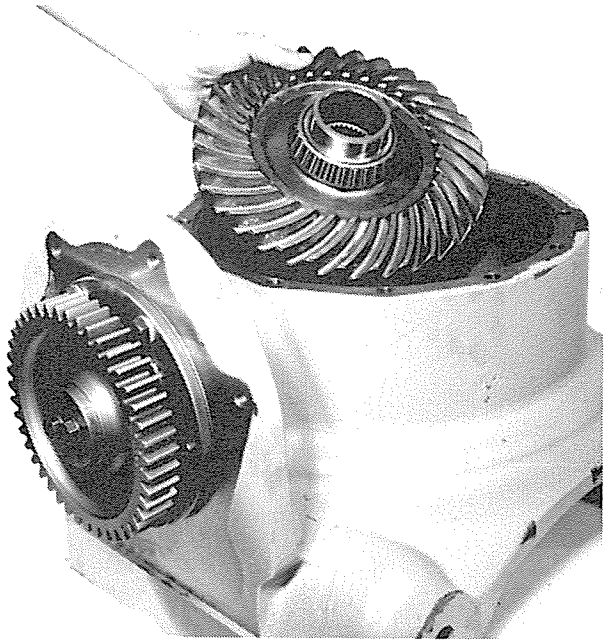


Figure 111

Remove the ring gear cover and the ring gear and carrier assembly and check the tooth contact. Refer to the tooth contact chart on Page 42 for instructions on tooth contact.

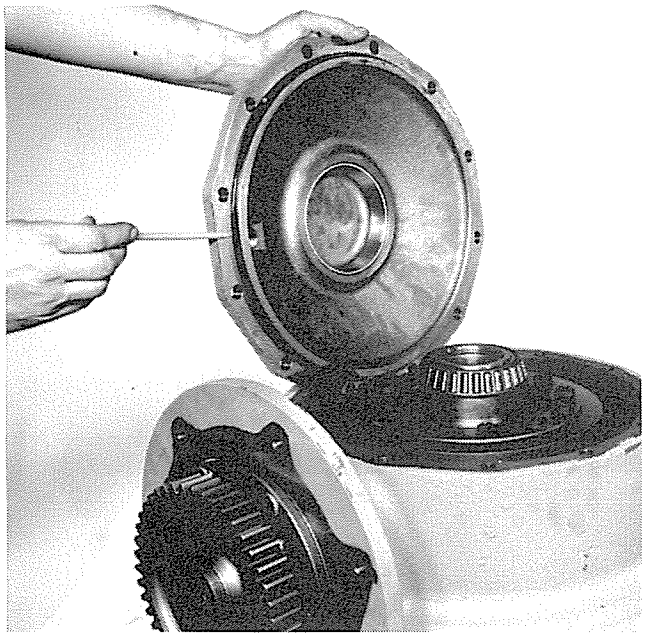


Figure 112

Reinstall the ring gear and carrier assembly and install a new O-ring on the cover.

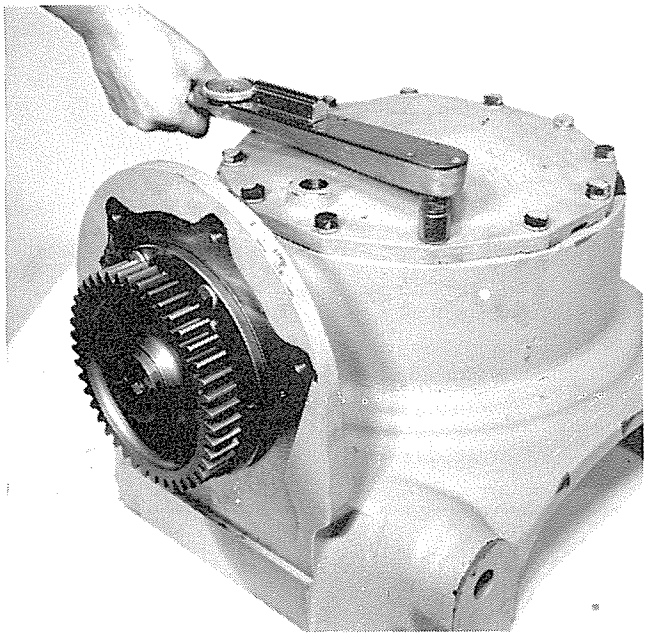


Figure 113

Install the ring gear cover and tighten the cover mounting bolts to a torque of 110 to 120 N•m (80 to 90 lbf.ft). Remove the pinion drive gear, install the remaining bolts in the pinion shaft bearing carrier and tighten all the bolts to a torque of 110 to 120 N•m (80 to 90 lbf.ft).

ASSEMBLY OF THE FREE-SPOOL CLUTCH

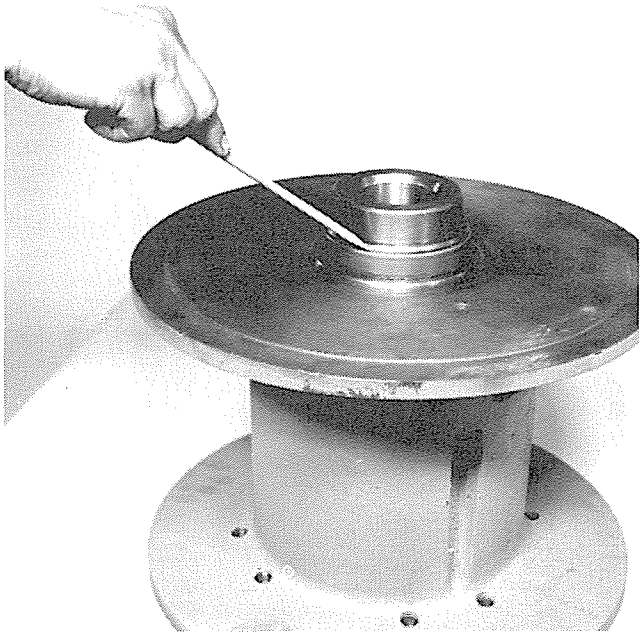


Figure 114

Install the wear sleeve on the cable drum.

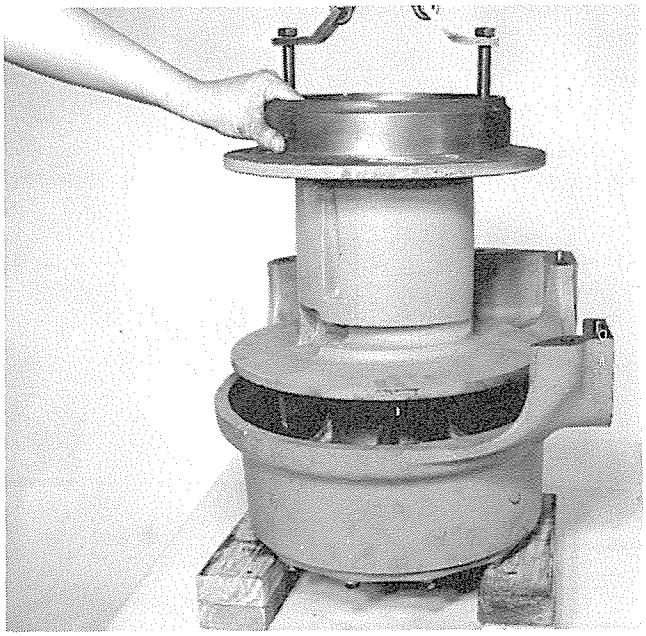


Figure 115

Install the cable drum into the winch case flange half.

NOTE: Take care not to damage the oil seal. Tap the drum into position if necessary with a mallet.

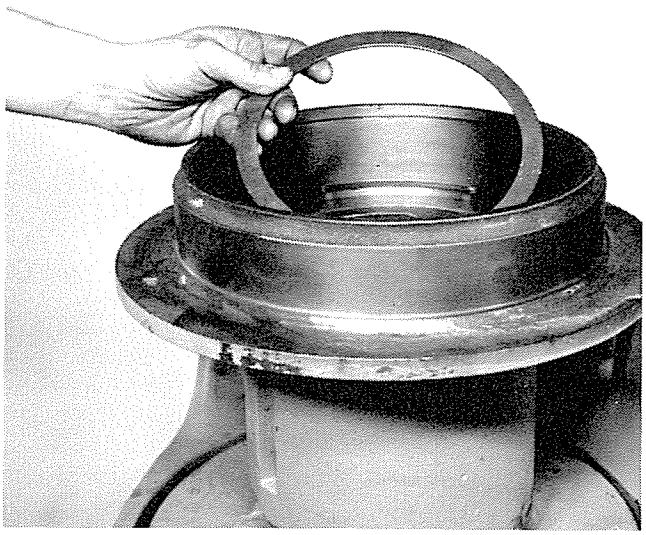


Figure 116

Install the same free-spool clutch apply spring (Belleville washer) shim(s) into the cable drum as were removed during disassembly.

NOTE: If the original shim(s) are not available, install two shims (See Figure 122).

Figure 117

Install the free-spool clutch apply springs (Belleville washers) into the cable drum (See Figure 118).

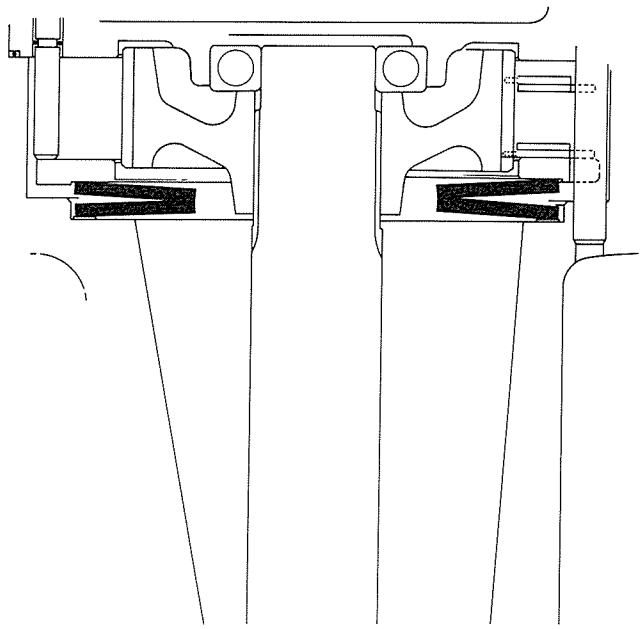


Figure 118

Belleville washer position.

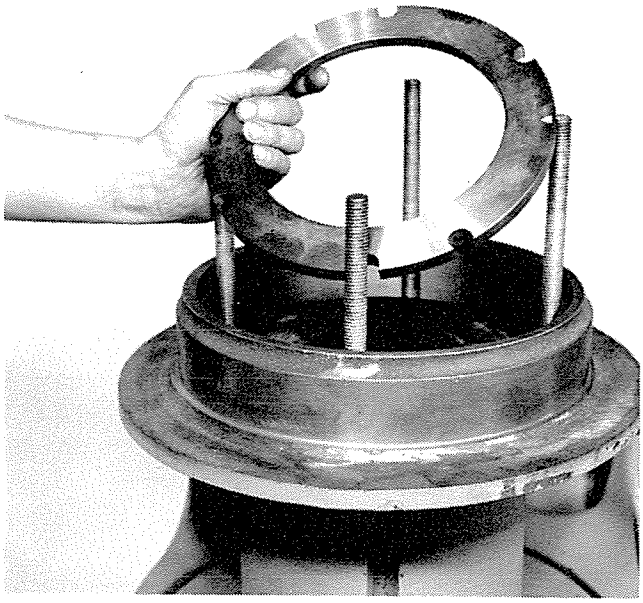


Figure 119

Apply a thin coating of Permatex #2 to the threads of the eight free-spool piston housing mounting bolt holes in the cable drum. Install four 5/8 in - 11 x 6 in long aligning studs into the cable drum as shown and install the free-spool clutch end plate.

NOTE: Make sure that the counter-bore on the end plate is down and that it is clean and free from oil or grease.

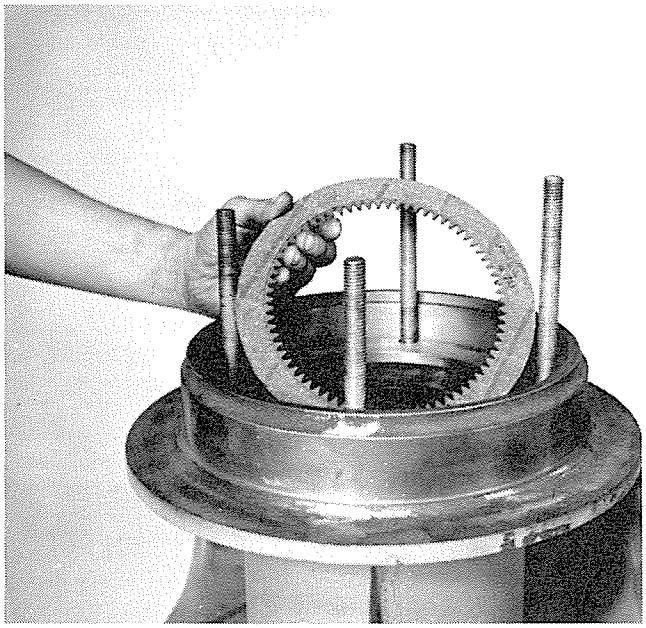


Figure 120

Install one friction clutch disc (with the teeth on the inner diameter).

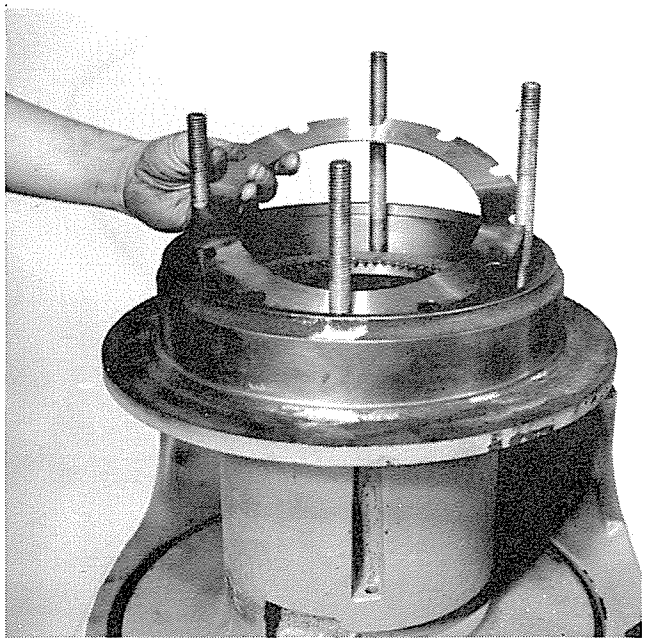


Figure 121

Install one steel clutch disc (with the teeth on the outer diameter). Alternate friction discs and steel clutch discs until 7 steel discs and 8 friction discs are installed.

NOTE: Older winches will have 6 steel discs and 7 friction discs. The thickness of the steel discs on the newer winches (with 7 discs) is 1,5 mm (.060 in) and on the older winches (with 6 discs) it is 2,6 mm (.105 in). In either case, you will start with a friction disc and end with a friction disc.

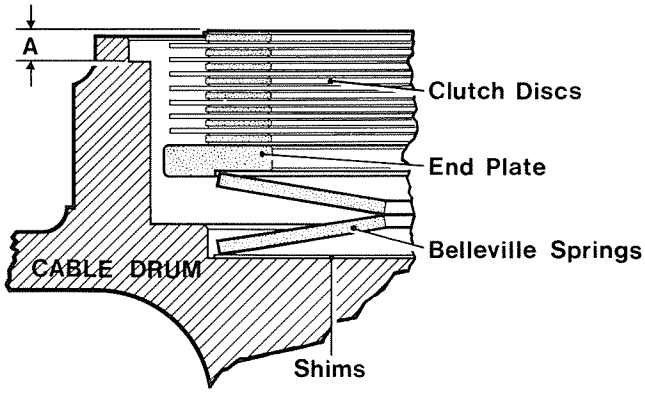


Figure 122

With all of the clutch discs in place, measure the distance "A" between the top of the last friction disc and the top of the main bore in the winch cable drum. The dimension should be between 7,62 and 8,25 mm (.300 and .325 in). If the value is not within these tolerances, remove the clutch discs, end plate and Belleville springs, and add (or subtract) shims to achieve the correct value.

NOTE: This step applies ONLY to the newer winches with 7 steel discs and 8 friction discs (See Figure 121 - NOTE).

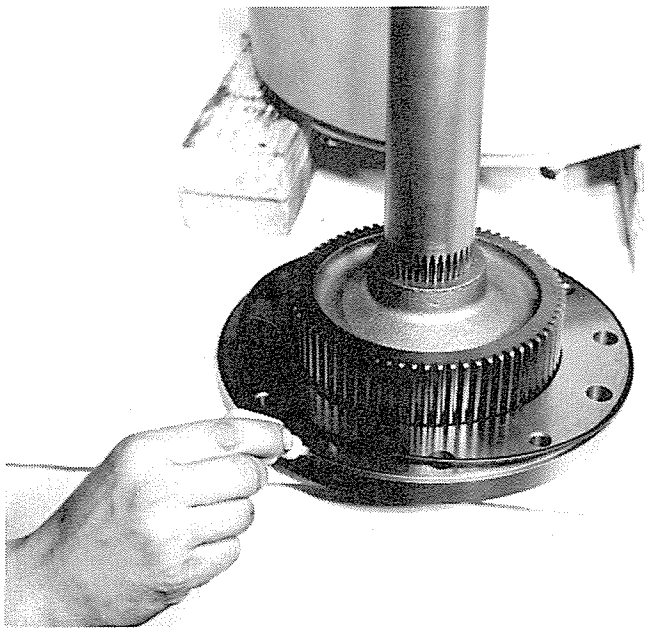


Figure 123

Install a new baffle plate O-ring using an adhesive to hold the O-ring in place.

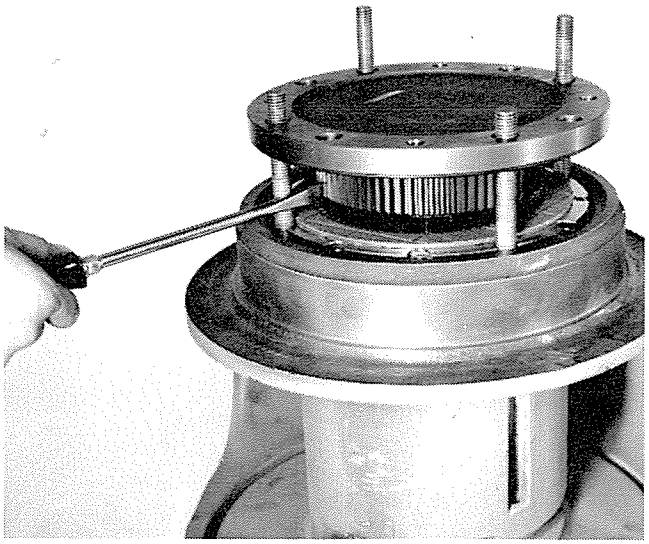


Figure 124

Install the cable drum drive shaft assembly through the clutch pack into the ring gear carrier using the aligning studs.

NOTE: Make sure that the clutch spring release pins locate on the free-spool clutch end plate.

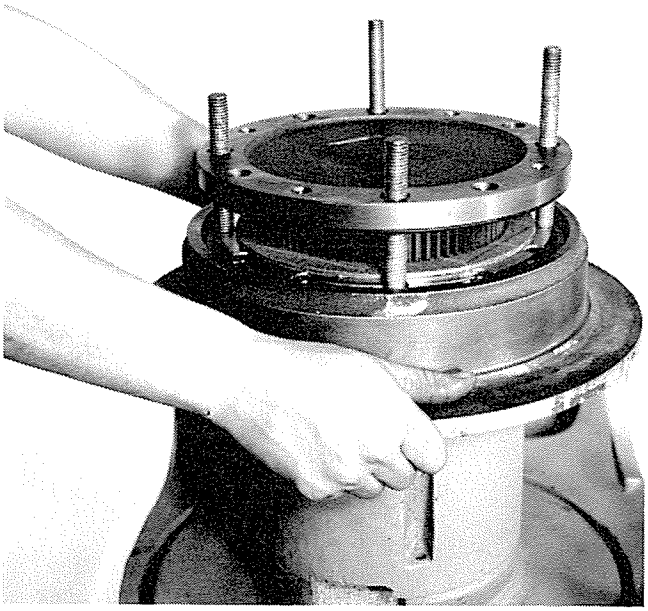


Figure 125

Turn the cable drum back and forth to spline the clutch disc hub with the friction discs.

Figure 126

Remove the aligning studs and, making sure you DO NOT move the cable drum (as this will cause misalignment), install the clutch spring pins and new O-rings into the baffle plate.

NOTE: Grease the O-rings prior to installation and rotate the pins carefully to insert them into the baffle plate.

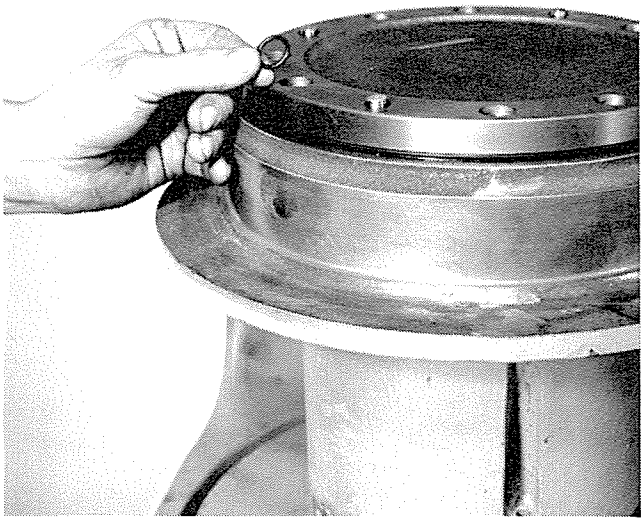


Figure 127

Grease new cable drum bolt O-rings and install them into the baffle plate.

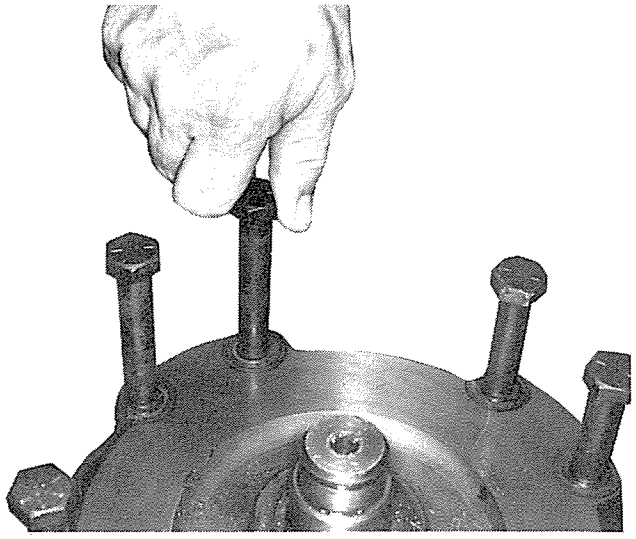


Figure 128

Position the piston housing assembly on top of the baffle plate and install the piston housing mounting bolts BY HAND past the O-rings to avoid damaging them.

NOTE: The piston housing mounting bolts should be carefully checked to see that there are no nicks or burrs along their lengths that could damage the O-rings. Repair any condition that could cause O-ring damage.

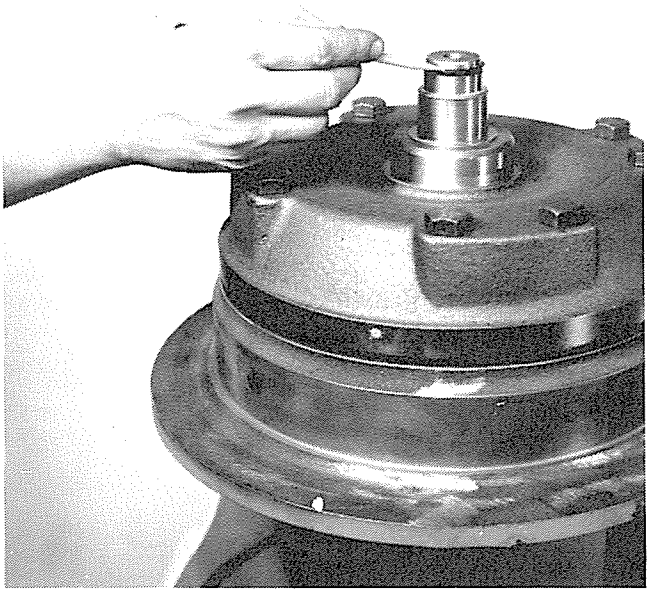


Figure 130

Install a new seal on the piston housing as shown making sure that the lip of the seal is facing out. Rotate the seal in the groove to ensure that it is seated properly. (See Figure 130A below).

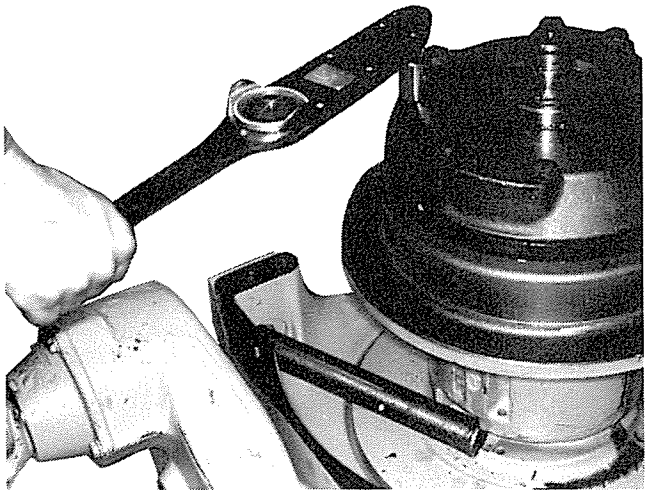


Figure 129

Insert a bar between the cable anchor on the drum and the housing to prevent the drum from turning and tighten the mounting bolts to a torque of 215 to 235 N•m (160 to 175 lbf.ft).

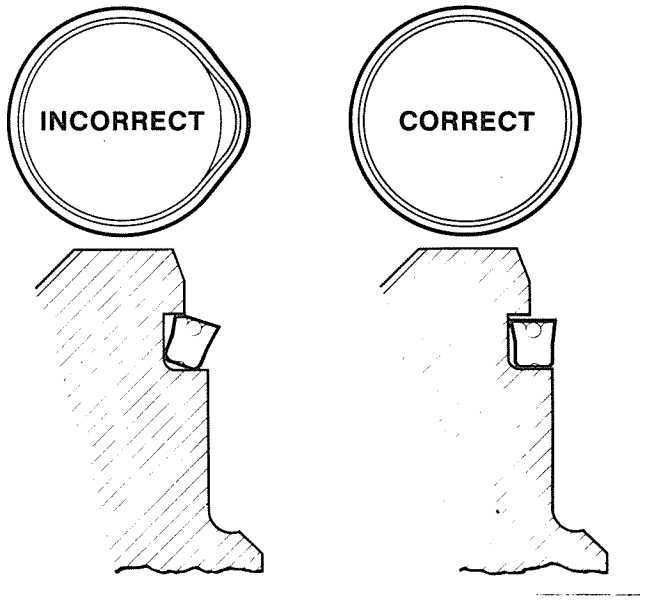


Figure 130A

Proper seal installation.

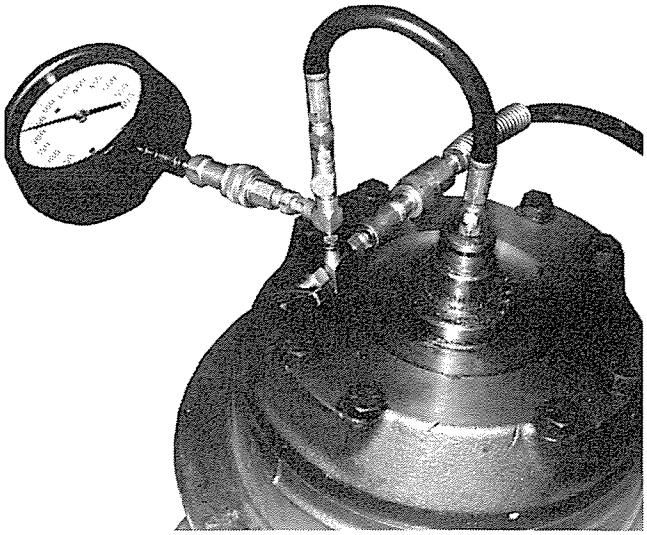


Figure 131

Connect a port-a-power, shut-off valve, and a 2.000 kPa (300 PSI) pressure gauge to the port on the end of the piston housing using a 1/8 in pipe fitting and pressurize the system to 1.520 kPa (220 PSI). Close the shut-off valve and maintain this pressure for five minutes. Watch to see that the pressure does not drop. If there is a pressure drop, there is internal leakage present.

Figure 132

After five minutes, release the pressure completely then increase the pressure slowly until the drum can be turned freely by hand and note the reading on the gauge. The pressure reading should be between 1.100 and 1.135 kPa (160 and 165 PSI). If the pressure reading is low, it will cause the free-spool clutch to slip during WINCH-IN and LOCK operations, and shims will have to be added below the Belleville washers. If the pressure reading is high, it will be hard or impossible to FREE-SPOOL, and shims will have to be removed.

NOTE: Each 0,64 mm (.025 in) shim will change the free-spool pressure by 20 to 50 kPa (3 to 7 PSI).

If shims must be added or removed, remove the piston housing assembly, piston, and baffle plate assembly, etc. (See Figure 17 thru Figure 32).

NOTE: It is not necessary to remove the baffle plate and the bearing from the clutch drive shaft (Figure 26 thru Figure 28). Add or remove enough shims to corect the pressure reading and reassemble the components (See Figure 116 thru 129) and recheck the pressure reading.

Figure 133

Install a new oil seal into the winch housing case half from the inside making sure the lip of the seal is toward the outside.

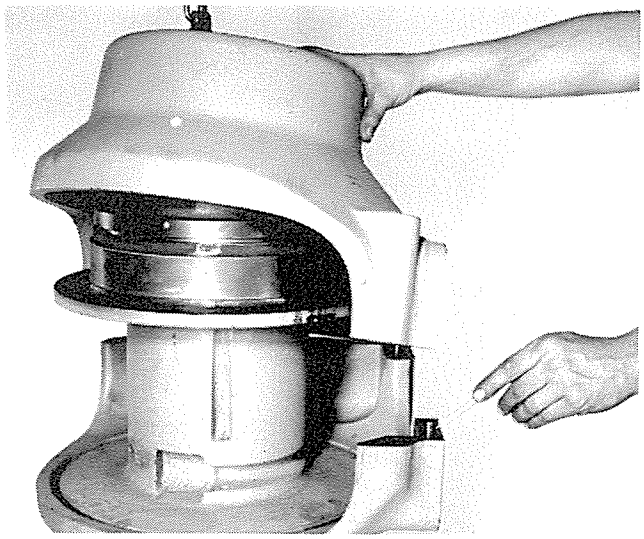


Figure 134

Install the winch housing case half on the winch housing pinion half, making sure the alignment dowels are in position and tap the case halves into position with a mallet.

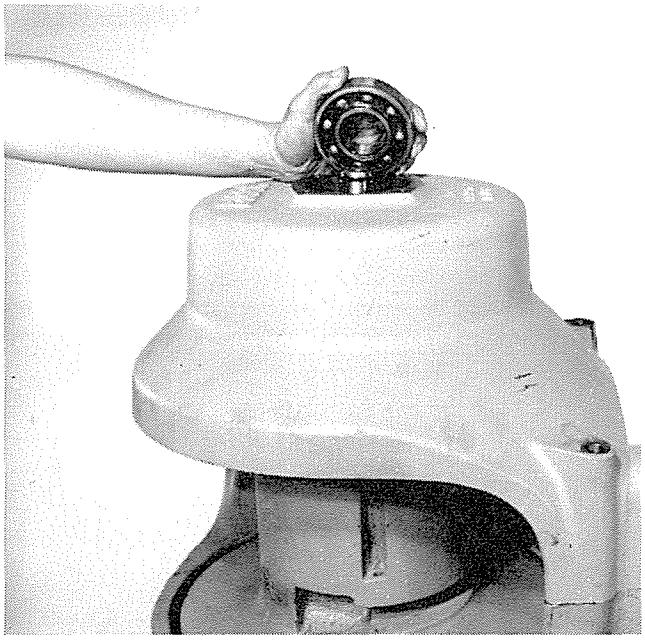


Figure 135

Install the clutch piston bearing into the winch housing on the end of the piston housing.

NOTE: If you have an older winch (See Figure 121 - NOTE), pack the bearing first with Mil. Spec. #G-23827A/- Clark Spec. #240050 grease. Newer winches have sealed, prepacked bearings that require no additional packing.

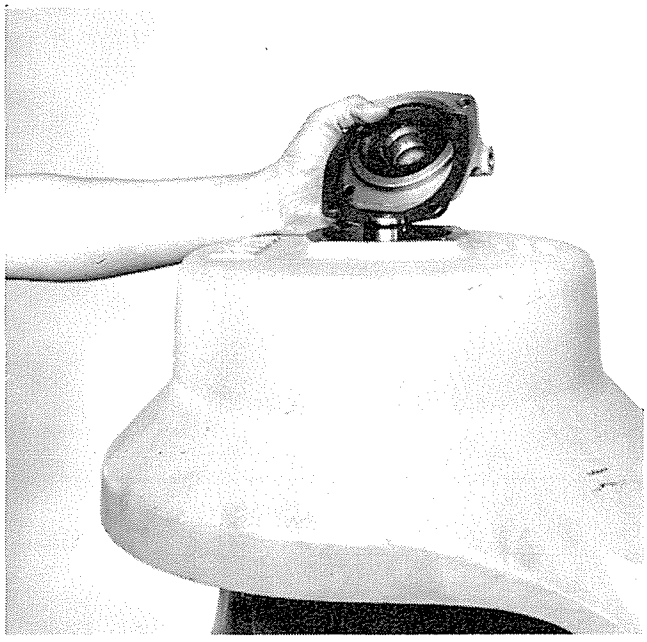


Figure 136

Lubricate the sleeve in the bearing cap with Approved Automatic Transmission Fluid and install the bearing cap and a new gasket with the port facing the bottom of the winch housing.

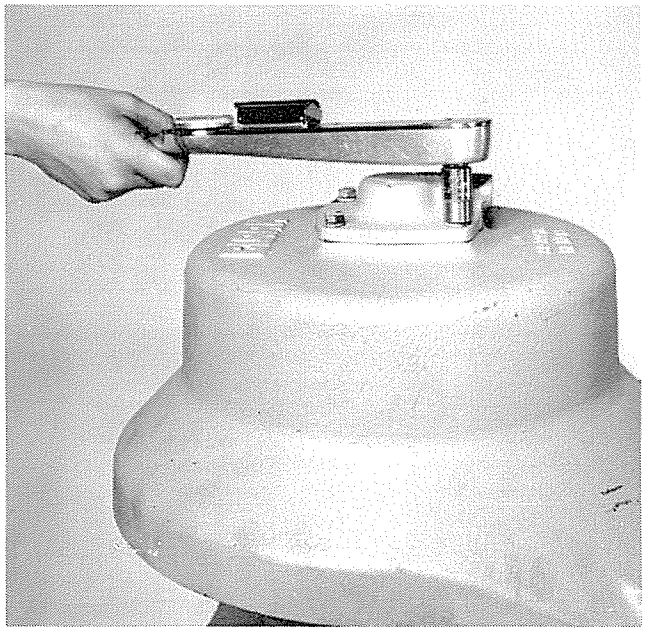


Figure 137

Install the bearing cap mounting bolts and tighten them to a torque of 45 to 50 N•m (33 to 36 lbf.ft).

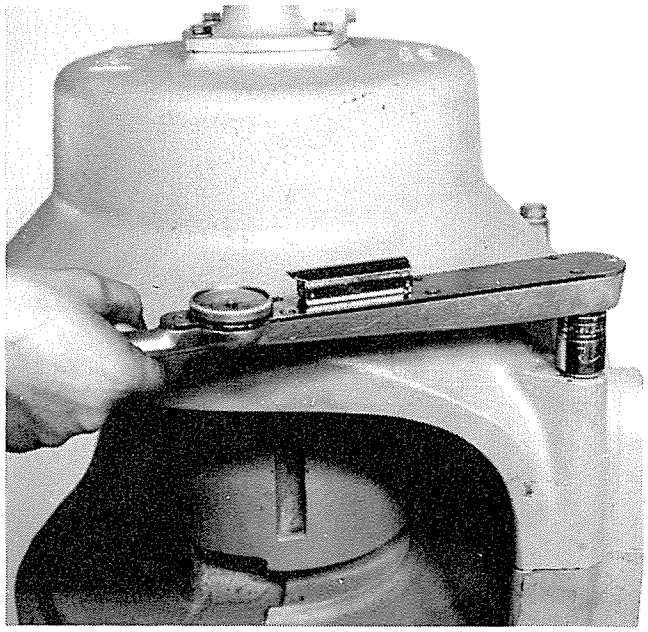


Figure 138

Install the winch housing mounting bolts and tighten them to a torque of 215 to 235 N•m (160 to 175 lbf.ft).

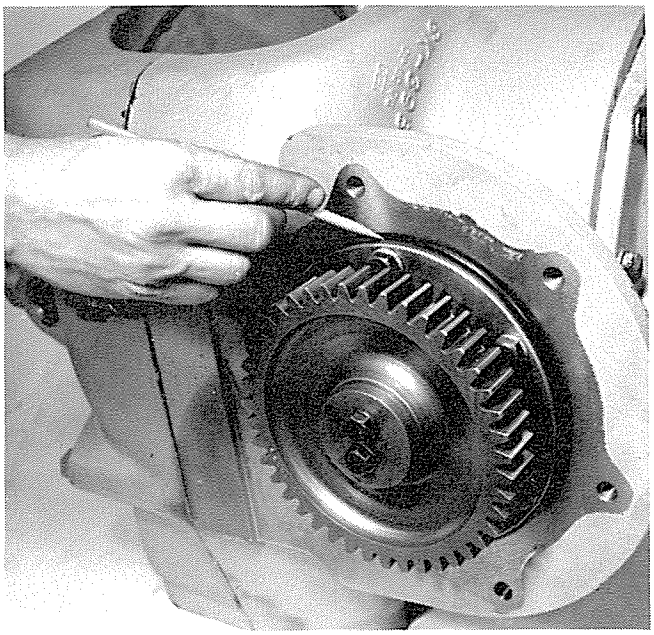


Figure 139

Install a new drop gear housing O-ring.

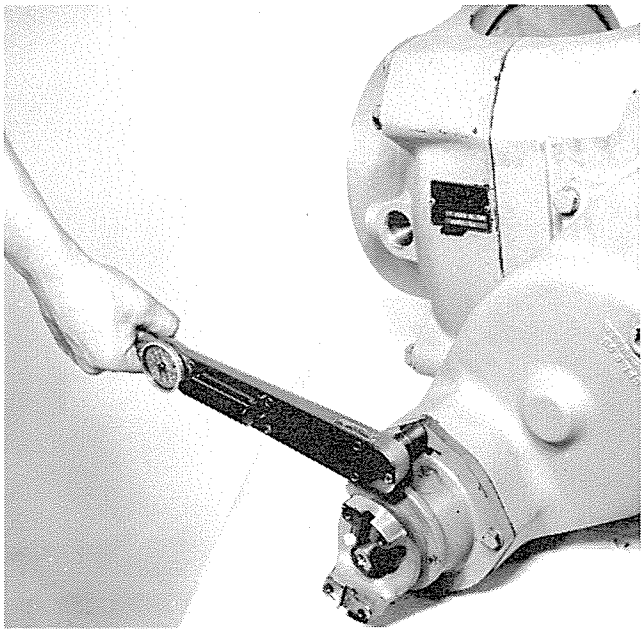


Figure 141

Install a new bearing cap O-ring, install the input shaft and bearing cap assembly into the dropbox and tighten the mounting bolts to a torque of 45 to 50 N•m (33 to 36 lbf.ft).

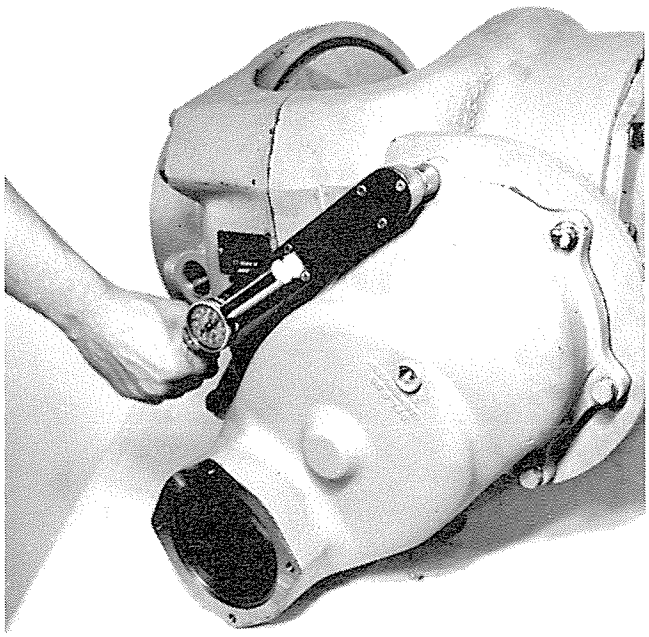


Figure 140

Install the drop gear assembly and tighten the mounting bolts to a torque of 110 to 120 N•m (80 to 90 lbf.ft).

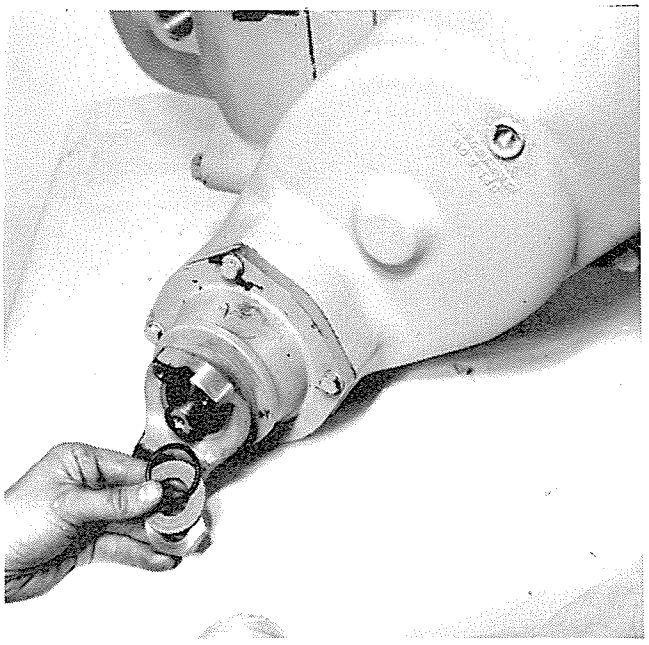


Figure 142

Install a new input flange O-ring and install the input shaft washer and the flange nut. Tighten the nut to a torque of 240 to 270 N•m (175 to 200 lbf.ft)

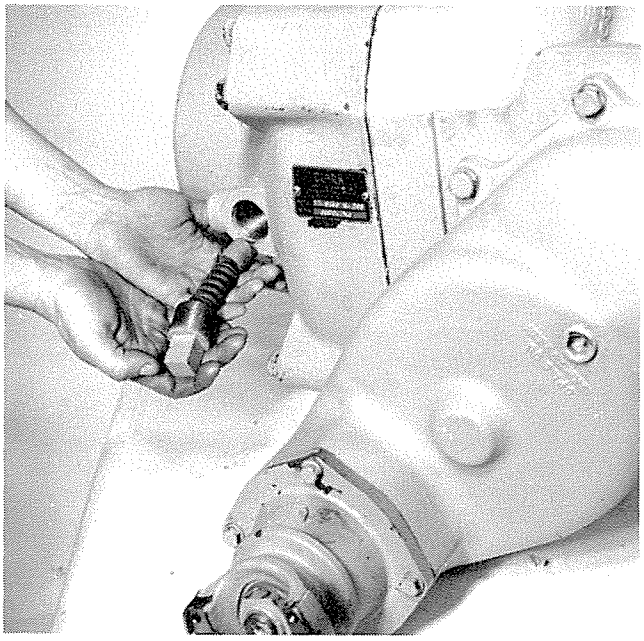


Figure 143

Install the free-spool wear button, spring and adjusting bolt.

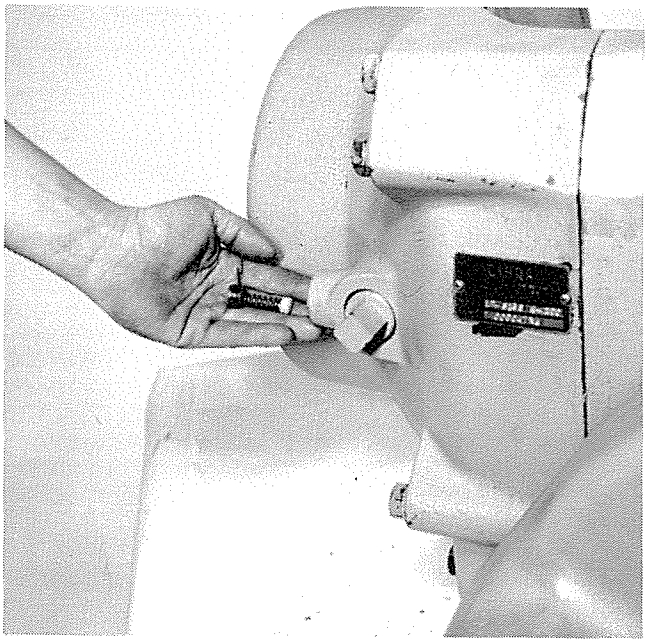
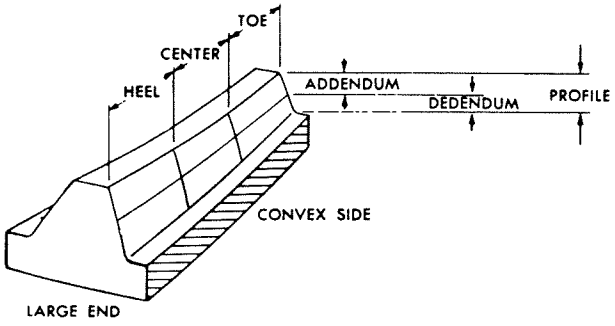
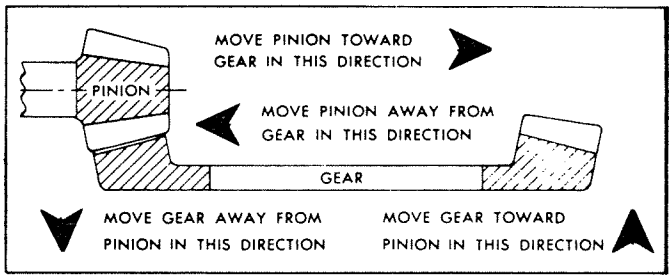


Figure 144

Install the lock button, spring and pipe plug.

TOOTH CONTACT FOR RING GEAR AND PINION





CONTACT SHOWN BELOW IS FOR A RIGHT HAND SPIRAL RING GEAR

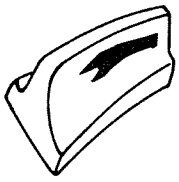
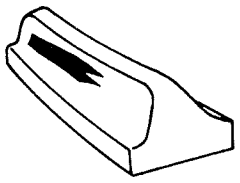


FIG. 1

CORRECT CONTACT ON BOTH SIDES OF TOOTH WHILE UNDER LIGHT LOAD.



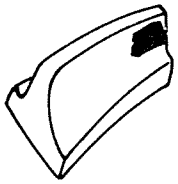


FIG. 2

TOE CONTACTING BOTH SIDES OF TOOTH – MOVE GEAR AWAY FROM PINION.

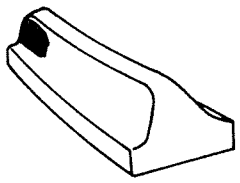
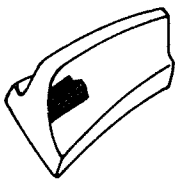


FIG. 3



HEEL CONTACTING BOTH SIDES OF TOOTH – MOVE GEAR TOWARD PINION.

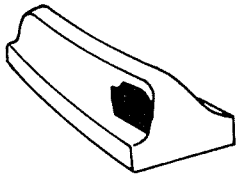
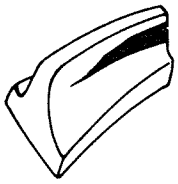


FIG. 4



LOW CONTACT ON GEAR AND HIGH CONTACT ON PINION – MOVE PINION AWAY FROM GEAR.

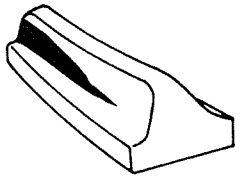
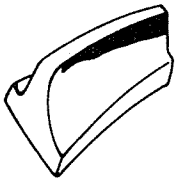
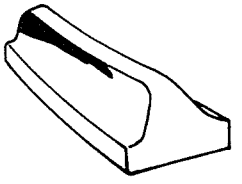
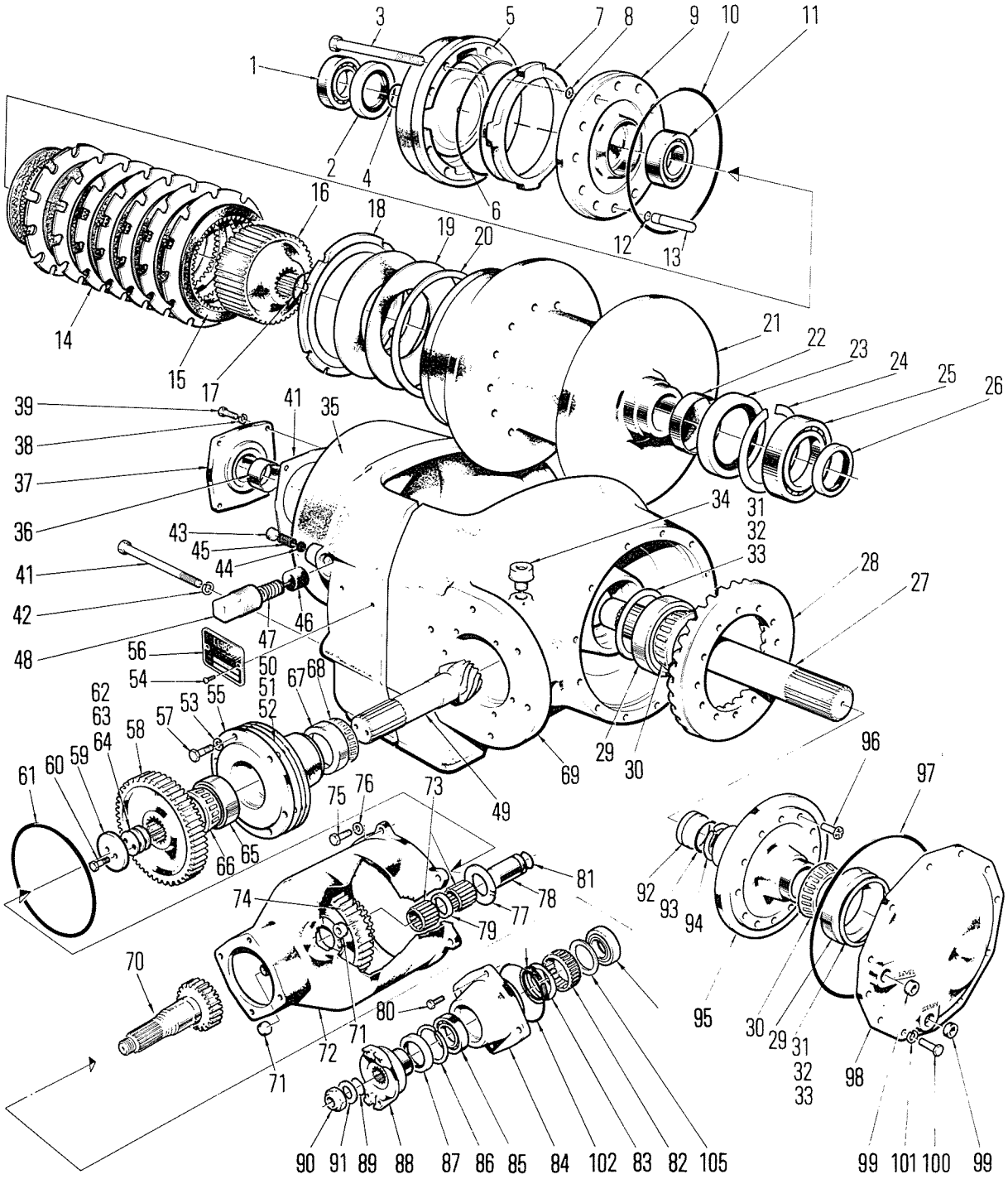


FIG. 5



HIGH CONTACT ON GEAR AND LOW CONTACT ON PINION– MOVE PINION TOWARD GEAR.

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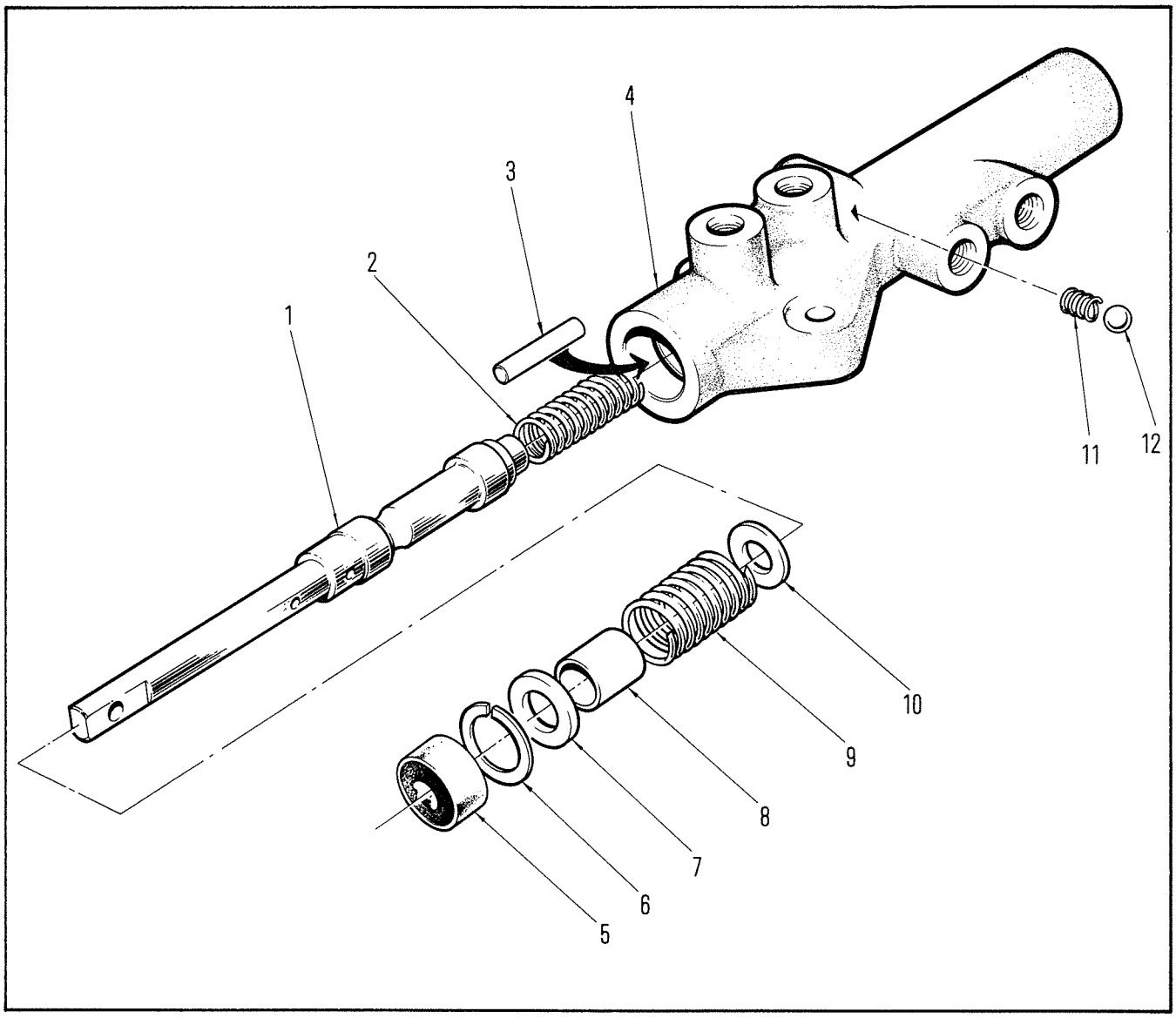
WINCH ASSEMBLY - 200

Item	Description	Qty
1	Clutch Piston Bearing	1
2	Clutch Piston Oil Seal	1
3	Piston Housing to Cable Drum Bolt	8
4	Clutch Piston Seal Ring	1
5	Clutch Piston Housing	1
6	Clutch Piston Housing O-ring	1
7	Clutch Piston	1
8	Cable Drum Bolt O-Ring	8
9	Baffle Plate	1
10	Baffle Plate O-Ring	1
11	Clutch Drive Shaft Front Bearing	1
12	Clutch Spring Release Pin O-ring	4
13	Clutch Spring Release Pin	4
14	Clutch Disc - Steel	*
15	Clutch Disc - Friction	*
16	Clutch Disc Hub (72 T)	1
17	Locating Ring	1
18	End Plate	1
19	Piston Apply Spring	2
20	Piston Apply Spring Shim	‡
21	Cable Drum	1
22	Wear Sleeve	1
23	Cable Drum Oil Seal	1
24	Cable Drum Bearing Retaining Ring	1
25	Cable Drum Bearing	1
26	Ring Gear Carrier Oil Seal	1
27	Clutch Drive Shaft	1
28	Ring Gear (31 T) (R.H.)	1
29	Ring Gear Carrier Bearing Cup	1
30	Ring Gear Carrier Bearing Cone	1
31	Ring Gear Bearing Shim (.004)	‡
32	Ring Gear Bearing Shim (.007)	‡
33	Ring Gear Bearing Shim (.010)	‡
34	Breather Assembly	1
35	Winch Housing - Case Half	1
36	Sleeve	1
37	Clutch Piston Bearing Cap & Sleeve Assembly	1
38	Bearing Cap Screw Lockwasher	4
39	Bearing Cap Screw	4
40	Clutch Piston Bearing Cap Gasket	1
41	Winch Housing Mounting Bolts	5
42	Winch Housing Bolt Lockwasher	5
43	Adjusting Bolt Lock Pipe Plug	1
44	Adjusting Bolt Lock	1
45	Adjusting Bolt Lock Spring	1
46	Adjusting Spring Wear Button	1
47	Adjusting Spring	1
48	Adjusting Bolt	1
49	Pinion Shaft (6 T) (L.H.)	1
50	Bearing Carrier Shim (.004)	‡
51	Bearing Carrier Shim (.007)	‡
52	Bearing Carrier Shim (.010)	‡
53	Bearing Carrier Screw Lockwasher	6
54	Name Plate Screw	2
55	Pinion Shaft Bearing Carrier	1
56	Name Plate	1
57	Bearing Carrier Cap Screw	6
58	Pinion Shaft Drive Gear (437)	1
59	Drive Gear Retainer	1
60	Drive Gear Retainer Cap Screw	2
61	Drop Gear Housing O-Ring	1
62	Pinion Shaft Drive Gear Shim (.004)	‡
63	Pinion Shaft Drive Gear Shim (.007)	‡
64	Pinion Shaft Drive Gear Shim (.010)	‡
65	Pinion Shaft Front Bearing Cup	1
66	Pinion Shaft Front Bearing Cone	1
67	Pinion Shaft Rear Bearing Cup	1
68	Pinion Shaft Rear Bearing Cone	1
69	Winch Housing - Flange Half	1
70	Input Shaft and Gear	1
71	Drop Gear Housing Drain Plug	2
72	Drop Gear Housing	1
73	Intermediate Shaft Gear Bearing	2
74	Intermediate Gear (37T - 21T)	1
75	Drop Gear Housing Cap Screw	5
76	Drop Gear Housing Screw Lockwasher	5
77	Intermediate Gear Thrust Washer	2
78	Intermediate Gear Shaft	1
79	Bearing Spacer	1
80	Bearing Cap Screw	4
81	Intermediate Shaft O-Ring	1
82	Sprag Assembly	1
83	Sprag Retaining Ring	1
84	Input Shaft Bearing Cap	1
85	Input Shaft Front Bearing	1
86	Bearing Retaining Ring	1
87	Bearing Cap Oil Seal	1
88	Input Flange	1
89	O-Ring	1
90	Input Shaft Nut	1
91	Input Shaft Washer	1
92	Clutch Shaft Plug	1
93	Clutch Shaft Plug O-Ring	1
94	Ring Gear Shaft Plug Retaining Ring	1
95	Ring Gear Carrier	1
96	Ring Gear Screw	12
97	Ring Gear Cover O-Ring	1
98	Ring Gear Cover	1
99	Ring Gear Cover Pipe Plug	1
100	Ring Gear Cover Screw	12
101	Ring Gear Cover Screw Lockwasher	12
102	O-Ring	1
103	Input Shaft Bearing Snap Ring	1
104	Input Shaft Rear Bearing	1
105	Sprag Rear Spacer	1

‡ As Required

* See Figure 121 - NOTE



WINCH CONTROL VALVE ASSEMBLY

Item	Description	Qty	Item	Description	Qty
1	Valve Spool	1	7	Spring Retaining Washer	1
2	Centering Spring	1	8	Valve Stop Spacer	1
3	Spool Stop Pin	1	9	Centering Spring	1
4	Control Valve Body	1	10	Centering Spring Retainer	1
5	Valve Spool Oil Seal	1	11	Detent Spring	1
6	Spring Washer Snap Ring	1	12	Detent Ball	1

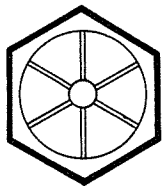
BOLT TORQUE CHART - GENERAL

NOTE: Use this chart only if the torque is not specified in the assembly instructions.

Thread Diameter		GRADE 5 Part Number Prefixes Coarse Thread 1C, 15C, 61D Fine Thread 2C, 16C, 62D		GRADE 8 Part Number Prefixes Coarse Thread 17C, 23C, 63D Fine Thread 18C, 24C, 64D		Socket Head and 12 Point Head Capscrews Part Number Prefixes Coarse Thread 25C, 73G, 93G Fine Thread 26C, 74G, 94G	
Fraction	**Decimal**	**N.m**	**lbf.ft**	**N.m**	**lbf.ft**	**N.m**	**lbf.ft**
1/4	0.2500	10	7	12-14	9-10	15-16	11-12
5/16	0.3125	20-22	15-16	24-27	18-20	31-34	23-25
3/8	0.3750	34-38	25-28	50-55	34-40	60-65	45-50
7/16	0.4375	55-60	40-45	80-90	60-65	95-100	70-75
1/2	0.5000	90-95	65-70	125-135	90-100	150-160	110-120
9/16	0.5625	125-135	90-100	170-190	125-140	205-225	150-165
5/8	0.6250	170-190	125-140	240-255	175-190	285-310	210-230
3/4	0.7500	300-330	220-245	405-445	300-330	490-540	360-400
7/8	0.8750	450-490	330-360	645-710	475-525	815-880	600-650
1 in	1.0000	645-710	475-525	985-1085	725-800	1220-1355	900-1000
1-1/8	1.1250	880-975	650-720	1425-1595	1050-1175	1760-1965	1300-1450
1-1/4	1.2500	1220-1355	900-1000	2000-2205	1475-1625	2510-2710	1850-2000
1-3/8	1.3750	1630-1830	1200-1350	2710-2980	2000-2200	3320-3660	2450-2700
1-1/2	1.5000	2035-2235	1500-1650	3523-3865	2600-2850	4270-4680	3150-3450
1-5/8	1.6250	2710-2980	2000-2200	4680-5150	3450-3800	5630-6240	4150-4600
1-3/4	1.7500	3390-3730	2500-2750	5830-6510	4300-4800	6910-7730	5100-5700
1-7/8	1.8750	4270-4745	3150-3500	7460-8270	5500-6100	8810-9760	6500-7200
2 in	2.0000	5150-5965	3800-4200	8810-9760	6500-7200	10575-11660	7800-8600

NOTE: The torque values shown are for fasteners coated with zinc phosphate and oil, and used with hardened plain or zinc phosphate and oil coated washers.

Grade 5 Identification
3 Radial Lines 120° Apart
on Heads of Bolts.



Grade 8 Identification
6 Radial Lines 60° Apart
on Heads of Bolts.

LUBRICATION

Use the lubrication chart to choose the appropriate type of oil for your specific operating condition.

Use the operator's manual for your specific machine to learn the oil capacity of the system.

Check the oil level in BOTH the drop gear housing AND the ring gear cover after EVERY 50 HOURS of operation.

<table>
<tr><th colspan="4">RECOMMENDED OILS for Clark 200 Series Winch</th></tr>
<tr><td>FACTORY FILL</td><td colspan="3">DEXRON II AUTOMATIC TRANSMISSION FLUID</td></tr>
<tr><td colspan="4">SUBSEQUENT FILL OR REFILLS</td></tr>
<tr><td>Prevailing Ambient Temperature</td><td colspan="3">Lubricant To Be Used</td></tr>
<tr><td rowspan="2">Above -23C (-10F)</td><td>SAE Grade
10W
10W</td><td>API Class
CC
CD</td><td>Military Spec
L-2104B
L-2104C</td></tr>
<tr><td colspan="3">Dexron or Dexron II Automatic Transmission Fluid</td></tr>
<tr><td>Above -34C (-30F)</td><td colspan="3">Dexron or Dexron II Automatic Transmission Fluid</td></tr>
<tr><td>Above -54C (-65F)</td><td colspan="3">CONOCO DN-600 Fluid</td></tr>
</table>

NOTE: The Clark 200 series winch has an isolated lube sump. Use the lubricants recommended above in this system. The free-spool clutch pressure is the only fluid connection between the transmission hydraulic system and the winch. Fill both level check points on the drop gear housing and the ring gear cover until the proper oil level is reached.

PRESSURES

The following chart shows the correct operating pressures in the winch for each operation. The pressures must be taken at low idle speed with the oil temperature between 82°C and 93°C (180°F and 200°F). All of the pressures listed are kPa (PSI) and there should be no more than 35 kPa (5 PSI) difference between all of the readings.

NOTE: Input brake is spring applied whenever the transmission mounted P.T.O. clutch is off.

FUNCTION	PRESSURE LOCATION		Input Brake (Applied?)	Pinion Sprag (Applied?)
	Free-Spool Clutch (Release) Pressure	P.T.O. Clutch (Winch-In) Pressure		
FREE SPOOL	1.240 to 1.520 (180 to 220)	0	Yes	No
WINCH IN	0 (Spring Applied)	1.240 to 1.520 (180 to 220)	No	No
HOLD	0 (Spring Applied)	0	Yes	Yes

VOLUME OF FLOW

Input Clutch (for lubrication) ..... 11.4 litres (2.5 Imp. gal/3 U.S. gal.) constant minimum

Free Spool Clutch ..... not necessary

OPERATION OF THE WINCH

The Clark winch is mechanically driven, however, several hydraulic and mechanical components control the operation of the winch.

The transmission mounted winch P.T.O. clutch on the output of the torque converter supplies engine power to the cable drum through the winch drive components.

The Winch Driveline Brake stops the drum from turning after the cable is winched-in without a load, allowing better cable drum control. This brake is mechanically applied automatically when P.T.O. clutch pressure is released by the P.T.O. clutch return springs.

The Pinion Sprag holds the load by preventing reverse rotation of the cable drum.

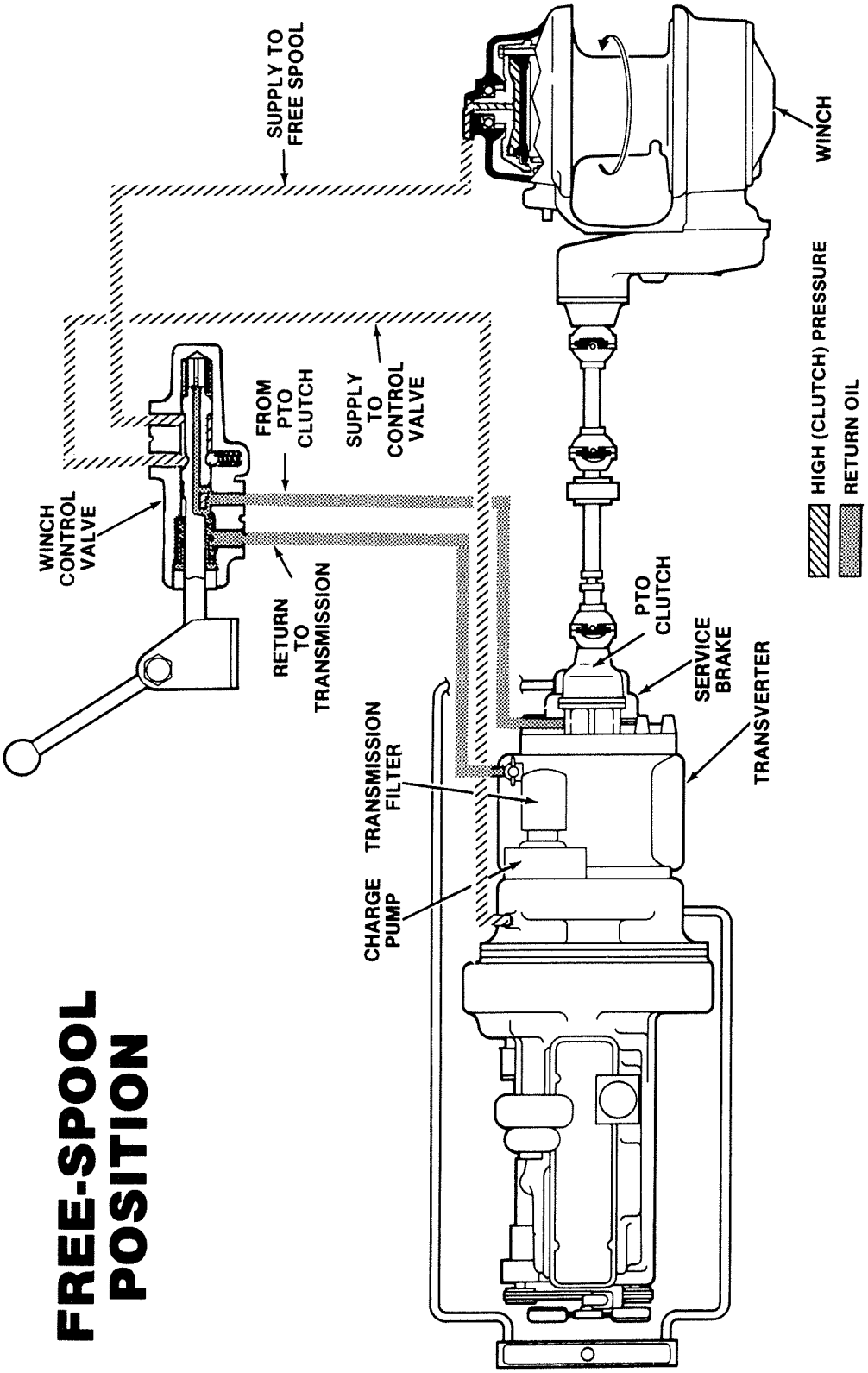
The Free Spool Clutch disconnects the cable drum from the drive components to permit the cable to be easily pulled from the drum.

The winch is controlled by a single control lever and a control valve with three detent positions.

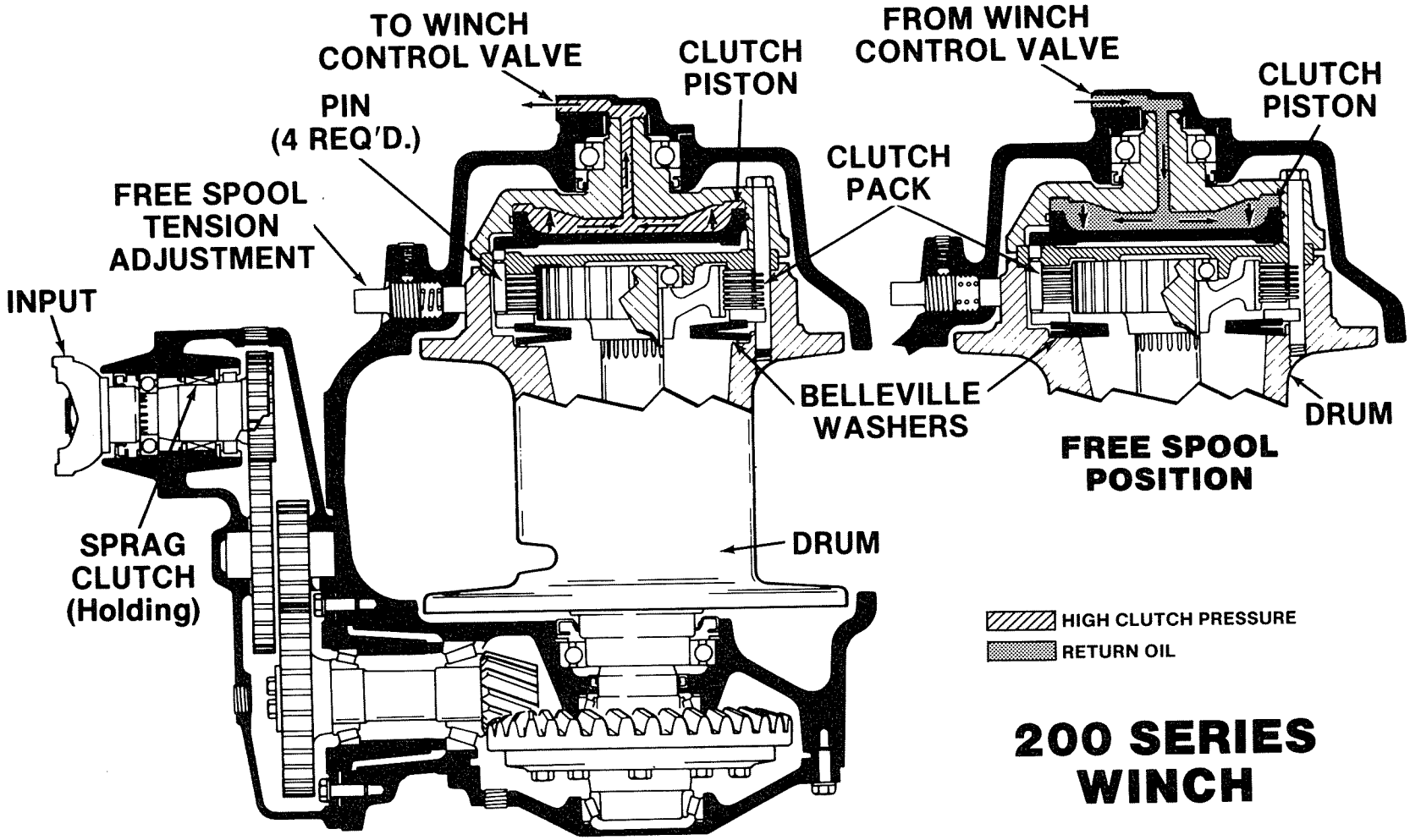
The WINCH-IN position permits the valve to actuate the transmission mounted winch P.T.O. clutch. For the purpose of safety, the lever will not remain in this position when it is released by the operator.

The center LOCK position blocks both P.T.O. clutch pressure and free-spool clutch pressure at the winch control valve.

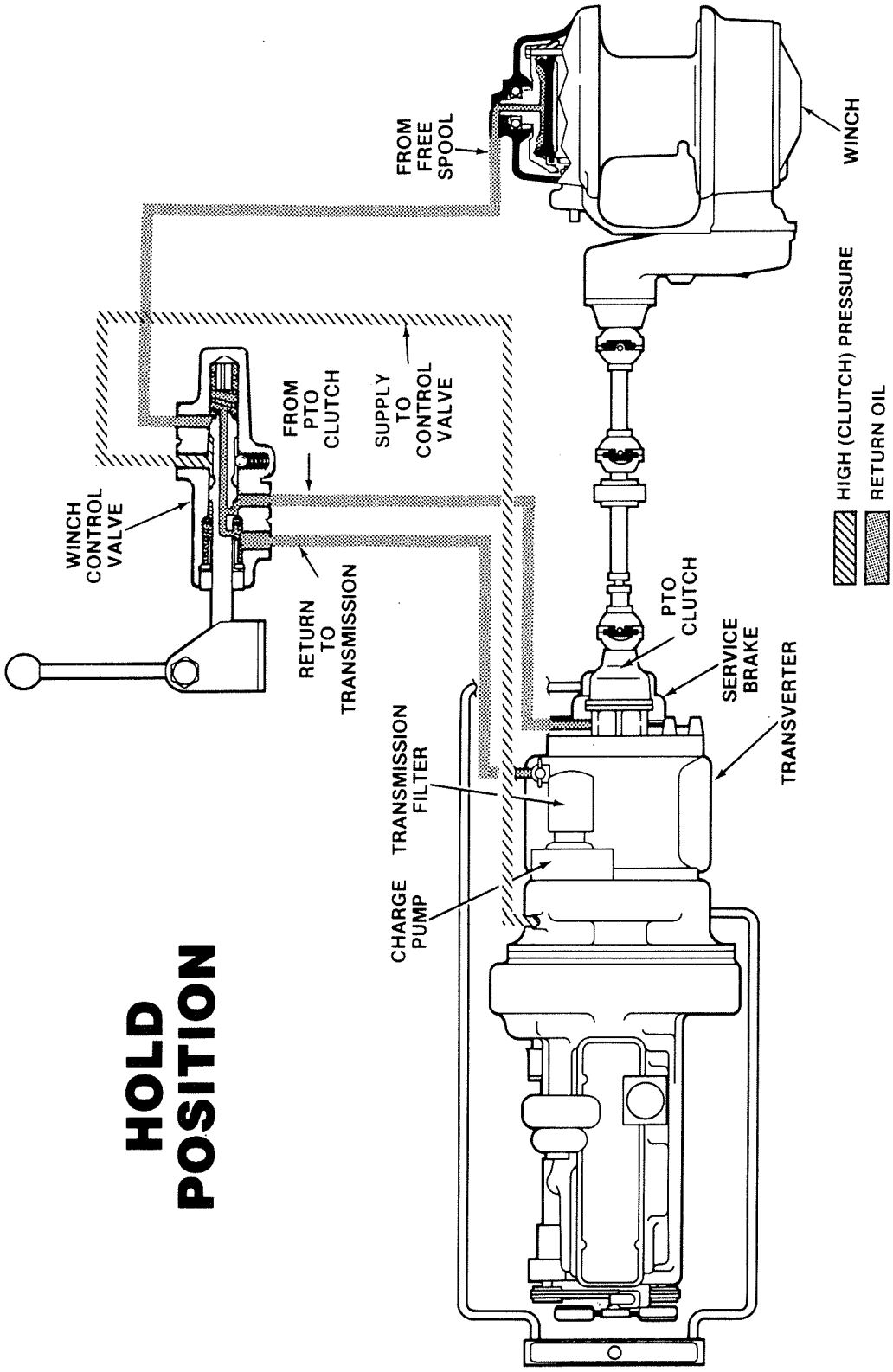
The FREE-SPOOL position permits the winch control valve to release the free-spool clutch assembly in the winch and allow the drum to be turned freely. This position is detented to maintain the FREE-SPOOL operation and allow the operator to release the lever and dismount from the machine to pull the cable from the cable drum. In this way, only one man is required for a log skidding operation.

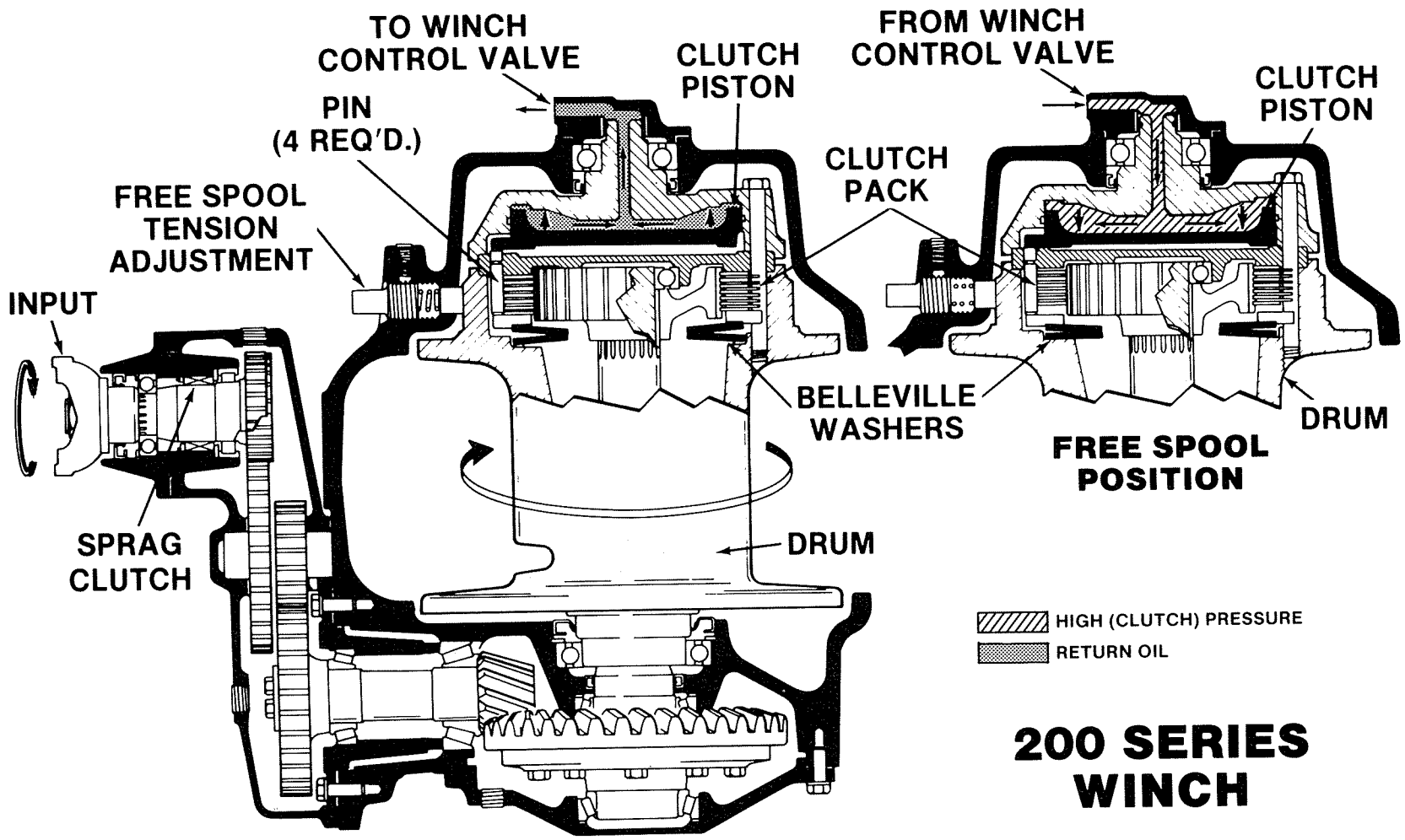


FREE-SPOOL POSITION



200 SERIES WINCH


HOLD POSITION
WINCH CONTROL VALVE
FROM PTO CLUTCH
SUPPLY TO CONTROL VALVE
FROM FREE SPOOL
WINCH
RETURN TO TRANSMISSION
PTO CLUTCH
SERVICE BRAKE
TRANSVERTER
TRANSMISSION FILTER
CHARGE PUMP
HIGH (CLUTCH) PRESSURE
RETURN OIL



200 SERIES WINCH

WINCH-IN POSITION