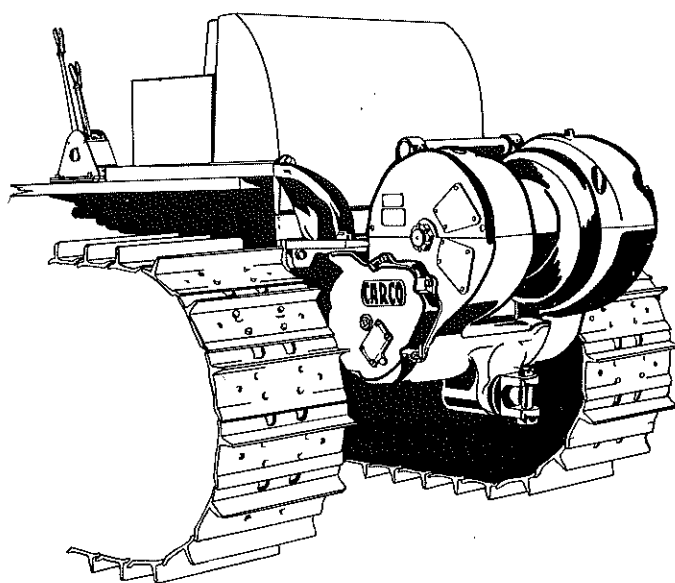


SERVICE SECTION  
FOR CARCO SERVICE AND PARTS MANUAL

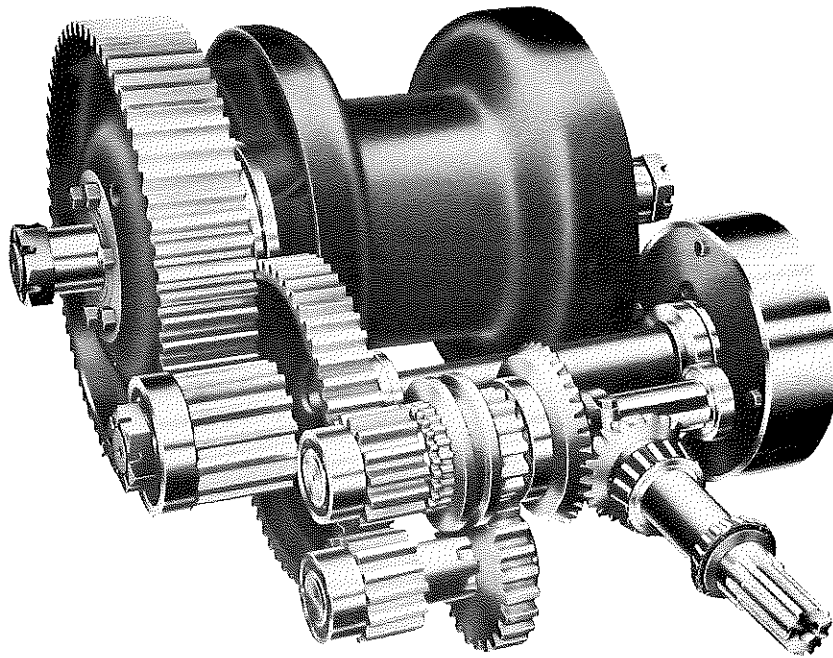
# Carco Model J-Winch Series 10



#### THE PURPOSE OF YOUR SERVICE SECTION

This Service Section is designed to provide a general knowledge of the working mechanism, operation and proper maintenance procedure of this unit. The operator is urged to thoroughly read this manual and thereby acquaint himself with the correct operational and maintenance procedure. The Service Section includes General Information, Lubrication and Adjustment Instructions, as well as the Disassembly and Assembly Information.

**PACIFIC CAR AND FOUNDRY COMPANY**  
RENTON, WASHINGTON, U.S.A.



**WINCH WITH CASE REMOVED**

## SERVICE INSTRUCTIONS

### GENERAL DESCRIPTION

The Carco Model J-10 Winch is a rugged, heavy duty, single drum unit designed for heavy logging operations and general contract utility work. Drum rotation may be reversed at the discretion of the user and a free-wheeling brake is optional equipment at additional cost.

A general knowledge of the working mechanism, operation and proper maintenance procedure, will add many years to the serviceable life of the unit and reduce service and repair costs to a minimum. The user is therefore urged to study this manual thoroughly before placing the unit in operation.

### OPERATION

The Model is designed for operation from the tractor seat through controls mounted on the left hand fender. These controls consist of a gear shift (B, Figure 1) and brake lever (A, Figure 1) which are connected to the winch through a system of control cables and adjustable yokes.

Figure 1 illustrates a winch with the control cables mounted in place. When the brake hand lever is in the full forward or released position, the cable drum becomes free-spooling. Pulling the brake lever to the rear, or toward the operator, tightens the externally wrapped brake band around

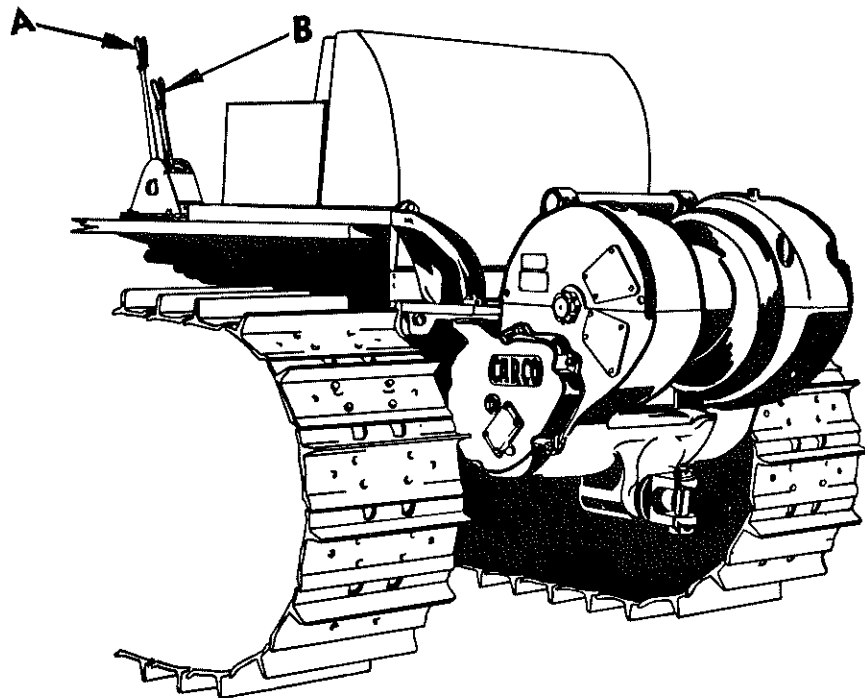


FIGURE 1

## SERVICE INSTRUCTIONS

the brake drum and holds the cable drum in a fixed position. A ratchet and pawl on the brake lever holds it in position until released by squeezing the brake lever grip.

The gear shift lever (B, Figure 1) is operated in conjunction with the tractor master clutch. When this lever is in the vertical position, the winch gears are in neutral. When the tractor master clutch is disengaged, the gear shift lever may be moved to the front or rear of the vertical position depending upon the desired direction of rotation of the cable drum.

### CABLE DRUM ROTATION

This winch is designed to provide a heavy pull on the incoming line and a fast line speed in reverse. Standard factory assembly provides these conditions on an overwinding line, or when wound onto the top of the cable drum. It is possible, however, to underwind the cable onto the bottom of the drum and use the faster speed with a correspondingly lighter pull on the incoming line. This arrangement, however, gives a slower payout speed.

The bevel gears in the winch can be assembled to give the lower line speed and greater pull on either an overwinding or an underwinding line. To make this changeover see sections entitled Reversing The Bevel Gear and Adjustment Of Bevel Gear And Pinion.

Some Model J-10 Winches when so requested, are equipped with a free-wheeling brake unit. When changing from an overwinding to underwinding line or vice versa, it will also be necessary to reverse the free-wheeling brake drum. See section entitled Free-Wheeling Brake Unit.

### CABLE WINDING

| CABLE DRUM SIZES      | Standard | High Capacity |
|-----------------------|----------|---------------|
| Barrel Diameter ..... | 13"      | 10"           |
| Flange Diameter.....  | 24"      | 24"           |
| Barrel Length .....   | 12"      | 16"           |

#### CABLE CAPACITIES

|              |      |      |
|--------------|------|------|
| 7/8" .....   | 415' | 647' |
| 1" .....     | 320' | 498' |
| 1 1/8" ..... | 252' | 393' |
| 1 1/4" ..... | 204' | 318' |

When winding cable onto the drum a few simple precautions will ensure long wear and best service. Avoid kinks which weaken the cable by making sure the reel on which it was shipped is free to rotate as the cable is unwound. If the cable is received in a coil, start with the outside wrap and roll the cable along the ground after securing the free end of the cable.

The first layer of cable should be wound so that the coils hug together. This will tend to produce a uniform and close wound first layer which in turn will make the successive layers uniform. This will tend to make the cable spool on and off the drum evenly when in actual use. Improperly wound cable will become crossed when the load is relieved and then become crushed and weakened when the load is picked up again. When winding the first layer on the drum it is recommended that a left lay be used for an overwinding line and a right lay for an underwinding line.

## SERVICE INSTRUCTIONS

### THE BRAKE AND ITS ADJUSTMENT

If the brake has lost its braking effect, due to brake lining wear, the only adjustment necessary to compensate for this wear, is to take up on the adjusting nut (4, Figure 2A) until the brake is fully on when the brake

control lever, located on the tractor fender, is in approximately the vertical position.

With the installation of a part in the braking mechanism, or the installation of a winch to a tractor, or perhaps if the adjustment is made as above and the brake does not produce

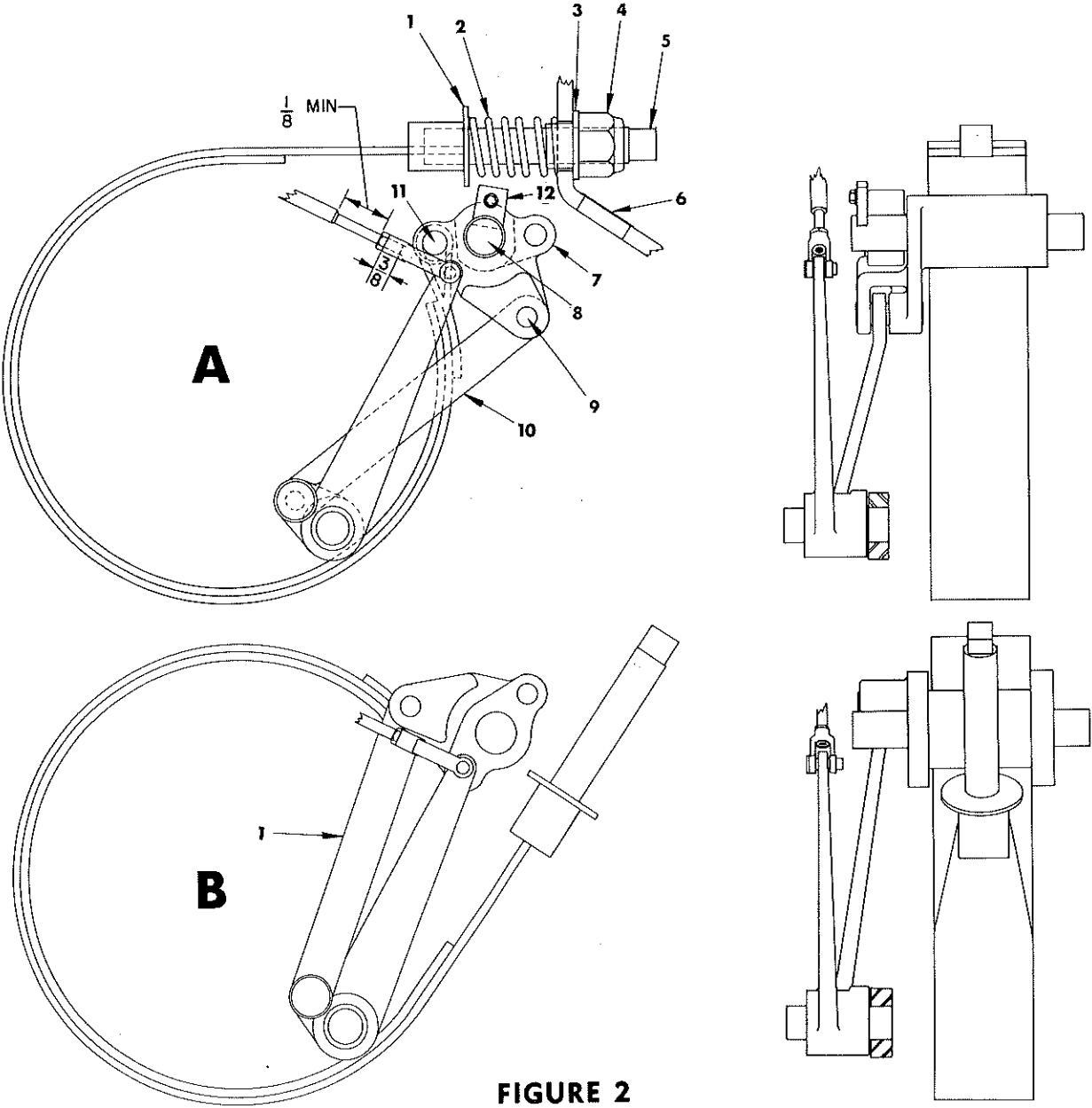


FIGURE 2

## SERVICE INSTRUCTIONS

the braking effect desired, the following brake adjustment should be carried out.

Remove the cover plate (*K, Figure 14*) and back off on the adjusting nut (*4, Figure 2A*) until the brake hand control lever, located on the tractor fender, can be placed in the fully on position and in this position produce no braking affect.

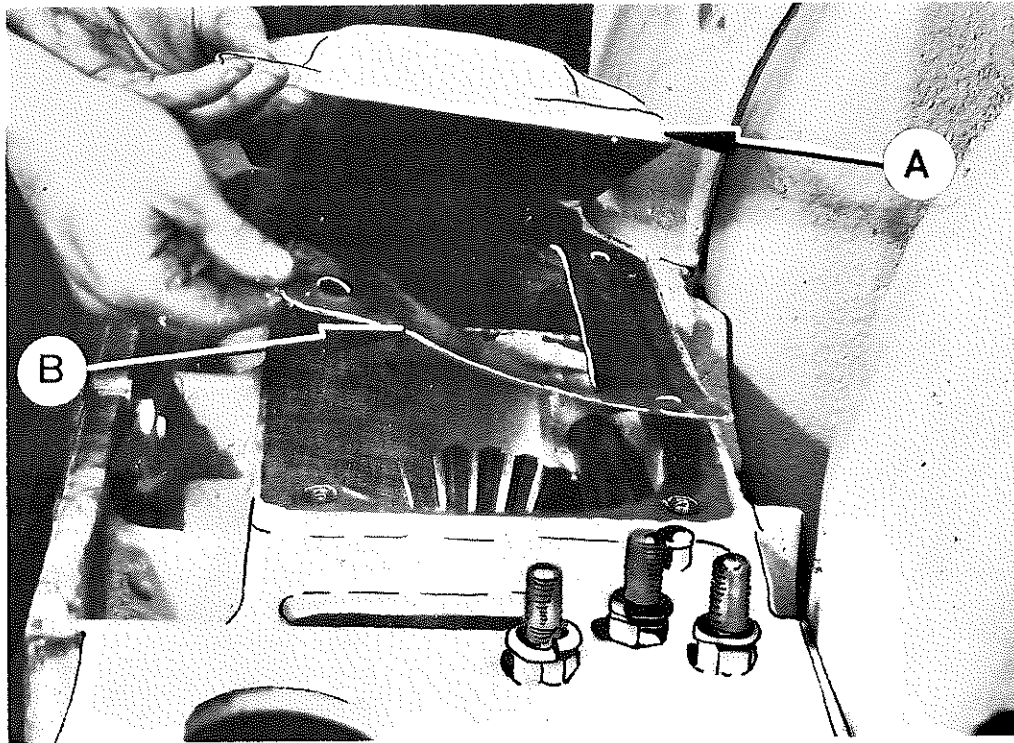
Place the brake hand control lever in the fully On position. Remove the brake housing cover (*E, Figure 14*) to see if there is at least 1/8 of an inch distance between the control cable guard shoulder and the hex jam nut as shown in Figure 2A. If there is not the required distance of 1/8 of an inch the following method of correction should be used. Check to see if the control cable yoke, at this, the brake linkage end of the cable, is screwed on to the control cable approximately 3/8 of an inch. Now disconnect the control cable from the hand lever and pull on the yoke moving the cable toward the control stand, until the distance between the control cable guard shoulder and the hex jam nut is the required 1/8 of an inch. With the control cable in this position, make the adjustment if any is necessary, to align the control cable yoke with the base of the brake hand control lever, and insert the yoke pin and cotter.

Take up on the adjusting nut (*4, Figure 2A*) until the brake is fully on when the brake hand control lever is in the vertical position. After this adjustment has been made, the only further adjustment necessary is to compensate for the brake lining wear by tightening the adjusting nut (*4, Figure 2A*).

When a J-10 winch is received from the factory it is set up for a over-

wound line, which provides a heavy pull on the incoming line and a faster speed in the paying out of the line. If for any reason these conditions are desired to be reversed, and a under wound line found more desirable, the free-wheeling brake unit and bevel gear must be reversed. For the reversing of the bevel gear see section entitled the Reversing Of The Bevel Gear. For the reversing of the free-wheeling brake unit the following procedure is recommended;

Remove the cover plate (*K, Figure 14*). Remove the brake link cover (*B, Figure 14*). Set the brake hand control lever in the off position to aid in the removal of the brake lever pin (*B, Figure 15*). Lift the linkage inside of the case and remove the brake link pin (*A, Figure 15*) through the opening in the case left by the removal of the brake link cover. Remove the brake housing cover. The control cable need not be removed from the brake housing cover as shown in Figure 16. Loosen the adjusting nut (*4, Figure 2A*) several turns and remove the brake band stud, spring, washer, and bushing (*5, 2, 1 and 3, Figure 2A*). Remove the brake band pin (*11, Figure 2A*). To facilitate the removal of the brake cam shaft (*8, Figure 2A*), remove the hex head capscrew, lockwasher and locking plate (*12, Figure 2A*). This will make possible the removal of the brake cam (*7, Figure 2A*), with the connection link and pin (*10 and 9, Figure 2A*) in place. Remove the brake band from the case. If the winch is equipped with free-wheeling brake unit, the unit must be taken from the shaft, by removing the hex nut and cotter key, and place the unit back on the shaft with the face of the unit which was facing outward now facing inward.



**FIGURE 3**

Break the weld and remove the thin disk (6, *Figure 2A*) which covers the lower hole in the case compartment, which is exposed by the removal of the cover plate (K, *Figure 14*). If the facilities are available, the disk may be welded over the upper hole. This is done to prevent dirt from entering the braking mechanism. Replace the brake band around the brake drum so that the square anchor is rear-ward and pointing up-ward and rear-ward. Re-assemble the brake stud, stop nut, spring, bushing and washer (5, 4, 2, 3, and 1, *Figure 2A*) on the end of the brake band. This is done through the opening produced by the removal of the steel disk. Re-assemble the brake cam and connection parts. Rotate the brake cam so that the brake link (1, *Figure 2B*) is toward the tractor from the brake cam shaft as shown in *Figure 2B*.

Connect the brake band to the brake cam with the brake band pin and secure the pin with a cotter key. Replace the brake housing cover (E, *Figure 14*). Through the opening in the brake housing cover line up the holds in the linkage and insert the brake link pin (A, *Figure 15*). Drop the linkage and insert the brake lever pin (B, *Figure 15*). Fix the cover plate in position by installing the four cap screws and lockwashers, (C, *Figure 14*). For the adjustment of the brake see above.

*NOTE: Figure 2A illustrates the components of the J-10 brake on a winch which is over-wound. Figure 2B illustrates the components of the J-10 brake on a winch which is under-wound.*

## SERVICE INSTRUCTIONS

### THE GEAR SHIFT AND ITS ADJUSTMENT

The winch has a constant mesh gear train with a sliding internal gear clutch. The only adjustment necessary is in varying the length of the gear shift control cable.

To adjust the gear shift control cable to the proper length, the following procedure is recommended.

With the control stand mounted on fender and the control cable connected to the gear shift lever, turn the cable drum with the tractor power. Compress the hand lever on the gear shift lever so that it is free from the detents and move the lever back and forth feeling the forward and reverse gear. Note the distance of travel of the dog on the gear shift

lever. To find the mid-point of this travel if the point is not located on the center detent, the distance from this point to a point located at the center of the middle detent should be compensated for by adjusting the control cable yoke the required amount. With the adjustment completed, connect the cable to the lever on the control stand.

If one is unfamiliar with the J-10 Winch or winches of similar design and operation, there is another way in which the shifting mechanism may be adjusted. The procedure will be described in the following paragraph:

Disconnect the control cable from the hand lever and set the hand lever in a neutral position, remove the top cover plate (A, Figure 3). Move the control cable until the gear coupling

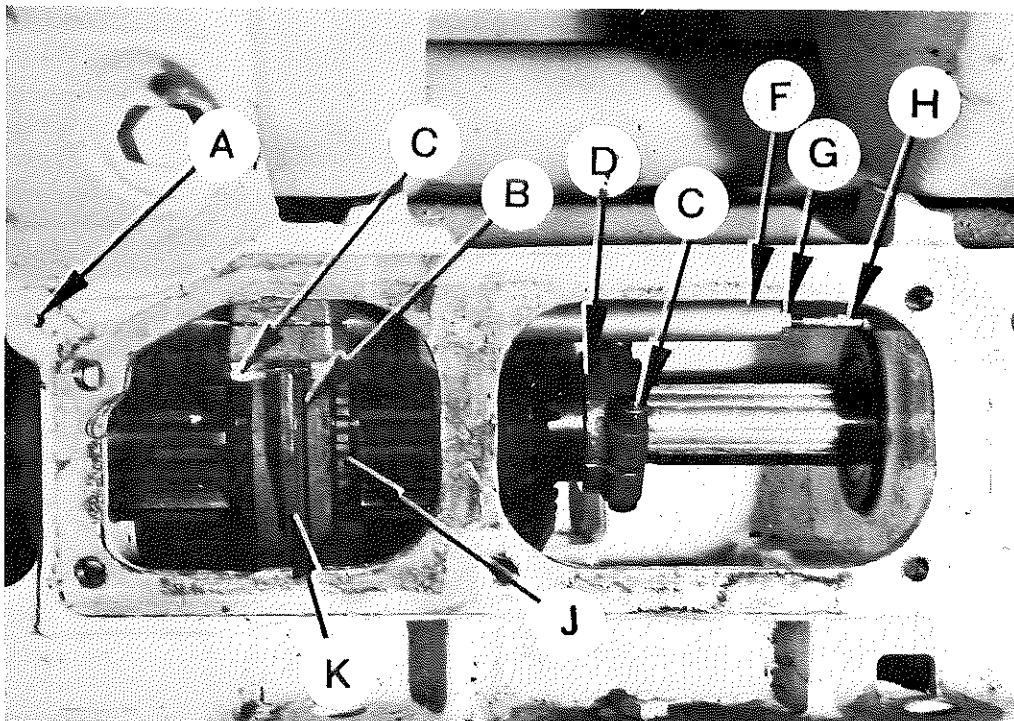


FIGURE 4

## SERVICE INSTRUCTIONS

(E, Figure 4) is centered on the clutch gear (J, Figure 4). With the gear coupling in this position, connect the control cable yoke to the gear shift hand lever. Now since the gear coupler was adjusted with an equal amount of travel the gears will be engaged an equal amount. All of these operations may be followed and checked through the opening left by the removal of the top cover plate (A, Figure 3).

The gear shift mechanism is more thoroughly described in the sections entitled Assembly Of The Bevel Gear Shaft and Assembly Of The Counter Shaft.

## ADJUSTMENT OF BEVEL GEAR AND PINION

When assembled at the factory, the bevel pinion and gear (A and E, Figure 6) is adjusted with the proper amount of backlash and the proper tooth bearing. Normal backlash is the amount of space allowed between the face of the teeth of the bevel gear and pinion when they are in mesh. In the J-10 Winch, this backlash is from .008 inches to .012 inches. Variations from this backlash tolerance will cause the gears to run noisily, the teeth to wear excessively and could result in breakage of gear teeth.

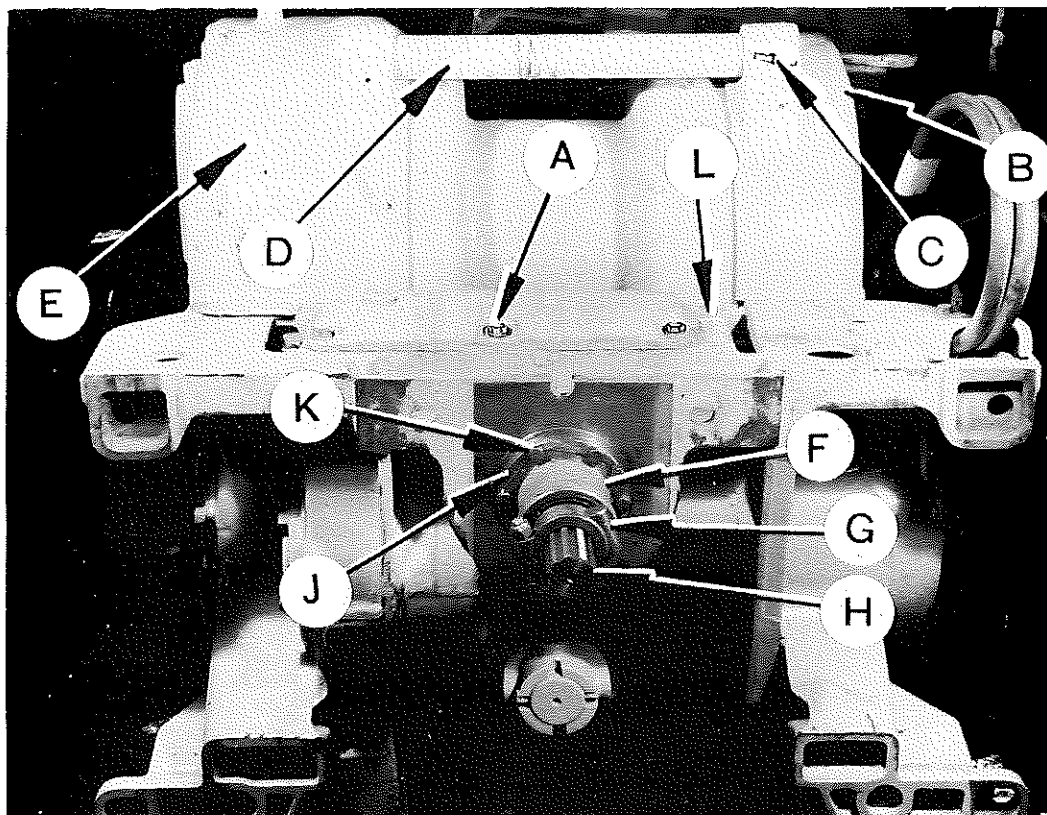


FIGURE 5

## SERVICE INSTRUCTIONS

Adjustment of the backlash and mesh is accomplished by changing the position of the bevel gear (A, Figure 6) on the shaft (C, Figure 6) and in the case of the bevel pinion (E, Figure 6) by changing the number or thickness of shims (D, Figure 6) between the P.T.O. housing (F, Figure 6) and the bearing carrier (H, Figure 6). Both adjustments may be necessary to obtain the proper backlash and mesh. Adjustment of the bevel pinion will necessitate removal of the winch from the tractor. (See Dis-Assembly Of Bevel Gear Shaft and Dis-Assembly Of Bevel Pinion Shaft).

Before adjusting the bevel gear (A, Figure 6) check the bevel gear shaft for end play. Using a bar, behind the clamp nut (B, Figure 6) pry the shaft back and forth. If any movement is detected in the shaft it will be necessary to remove the existing end play as described in the following paragraph:

Remove the capscrews (C, Figure 8) from the bearing housing (B, Figure 8) and insert two larger capscrews, which are used to hold the brake cover to the winch case, in the threaded holes in the bearing housing. Using these capscrews (B, Figure 7) as lifters,

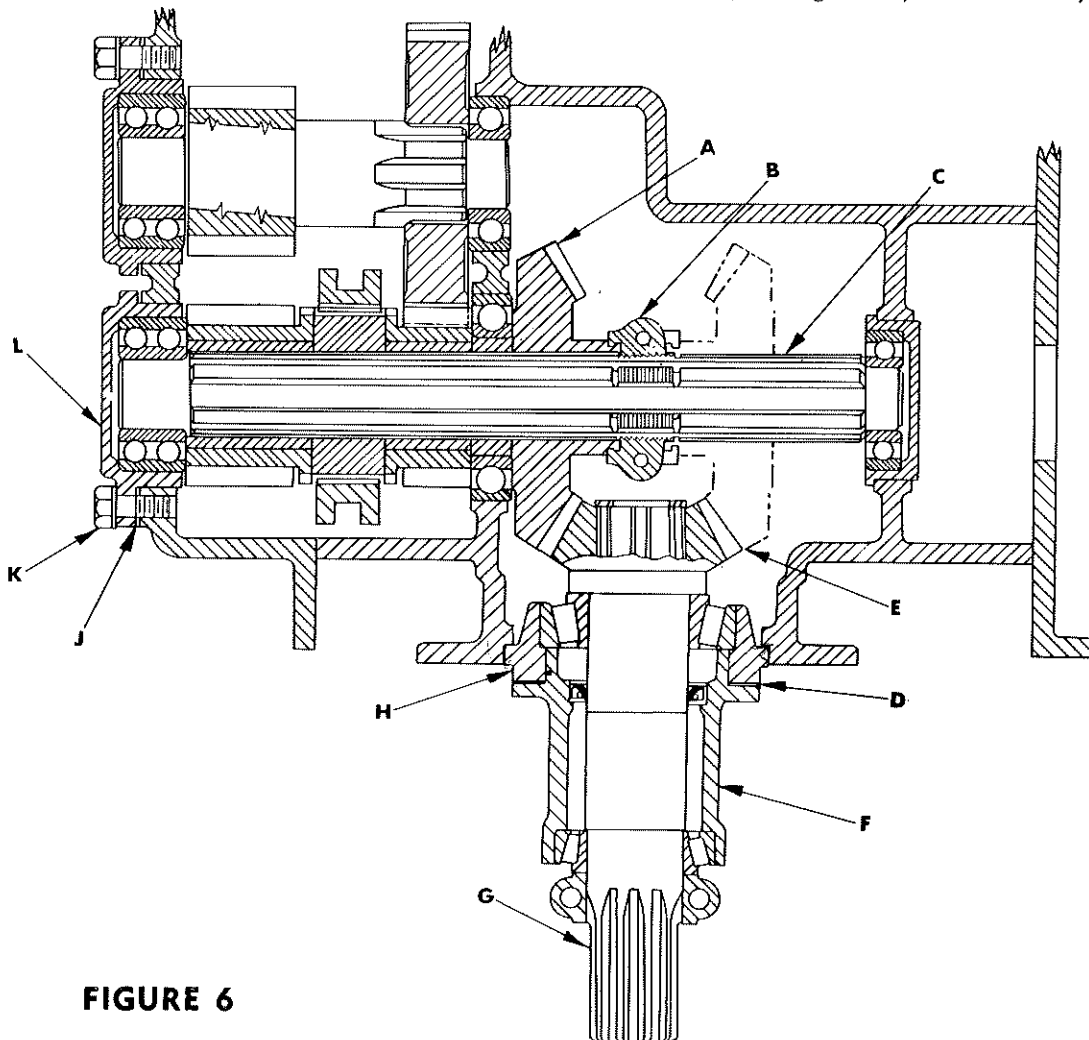


FIGURE 6

## SERVICE INSTRUCTIONS

tighten them alternately, until the bearing housing is forced from the winch case. Remove the shims (*A*, *Figure 7*) from under the bearing housing to take out the end play.

After all end play in the bevel gear shaft has been eliminated, adjust the bevel gear as follows:

To position the bevel gear, loosen the two bolts (*E*, *Figure 4*) in the split clamp nut; but only loosen them enough to require the clamp nut to be turned with force. To turn the clamp to its required position, drive it with a hammer, using a block of wood to protect it from damage. After the bevel gear has been positioned, tighten the clamp nut with the bolts and elastic stop nuts.

Checking the backlash is an important step in adjusting the bevel gear and pinion and should be undertaken with care. The following method is recommended:

Bend a quarter to one half inch tip on a piece of lead wire of approximately 1/16 inch in diameter and of convenient length. Hook the tip of this wire over the edge of the heel, or larger end of the teeth, and rotate the bevel gear by setting the shifter in neutral and turning the bevel gear shaft with a bar so that the wire will pass through the gears. Be sure the wire is passed through the gears at the heel portion. Avoid placing the wire in such a manner that it might fit around a tooth rather than against one side of a tooth and against the side of the opposing tooth. After removing the wire, measure the flattened surface with a micrometer to ascertain the amount of backlash.

The correct tooth bearing can be checked by applying marking compound to the gear and pinion and noting the contact area of the teeth after the

bevel gear shaft has been turned over. An ideal setting under these conditions will show the bearing to be approximately three fourths of the length of the tooth, starting at the toe and extending toward the heel. Thus under full load the bearing area will be distributed over the entire length of the tooth. The bearing area on the pinion teeth should be somewhat higher on the tooth surface than on the bevel gear teeth as shown in *Figure 9*.

To adjust the bevel pinion, the bevel pinion assembly should be removed from the winch case.

Remove the bevel pinion assembly by tapping the sides of the P.T.O. housing (*F*, *Figure 6*) and at the same time force is applied by prying outward with a bar, forcing the P.T.O. shaft away from the bevel gear shaft.

After the P.T.O. assembly has been removed from the face of the tractor remove the hex nut and cotter key. Remove the lock wire from the capscrews which hold the P.T.O. housing (*F*, *Figure 6*) to the bearing carrier (*H*, *Figure 6*). Remove the capscrews and separate the carrier from the P.T.O. housing. Make the adjustment by adding or removing shims (*D*, *Figure 6*) between the carrier and the housing. Adding shims will move the pinion out, away from the bevel gear shaft, where-as removing shims will move the pinion in toward the bevel gear shaft. Install or remove the necessary shims to properly position the bevel pinion and re-assemble the pinion assembly. Place a new length of lock wire in the capscrew heads and re-install the assembly in the winch case.

## REVERSING THE BEVEL GEAR

Some model tractors, to which the

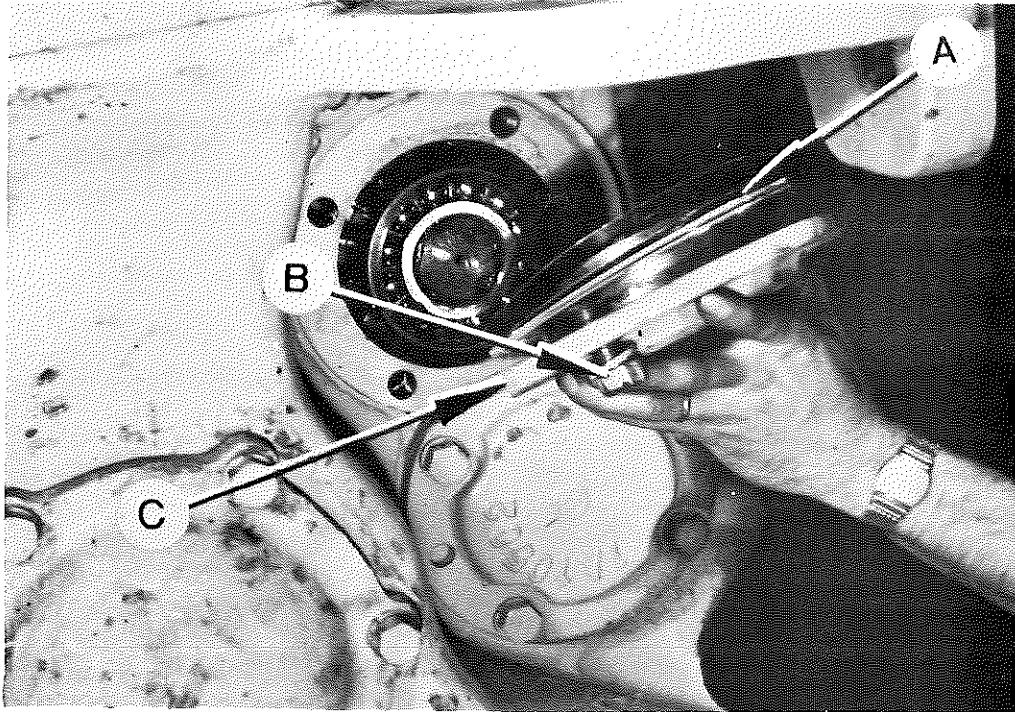


FIGURE 7

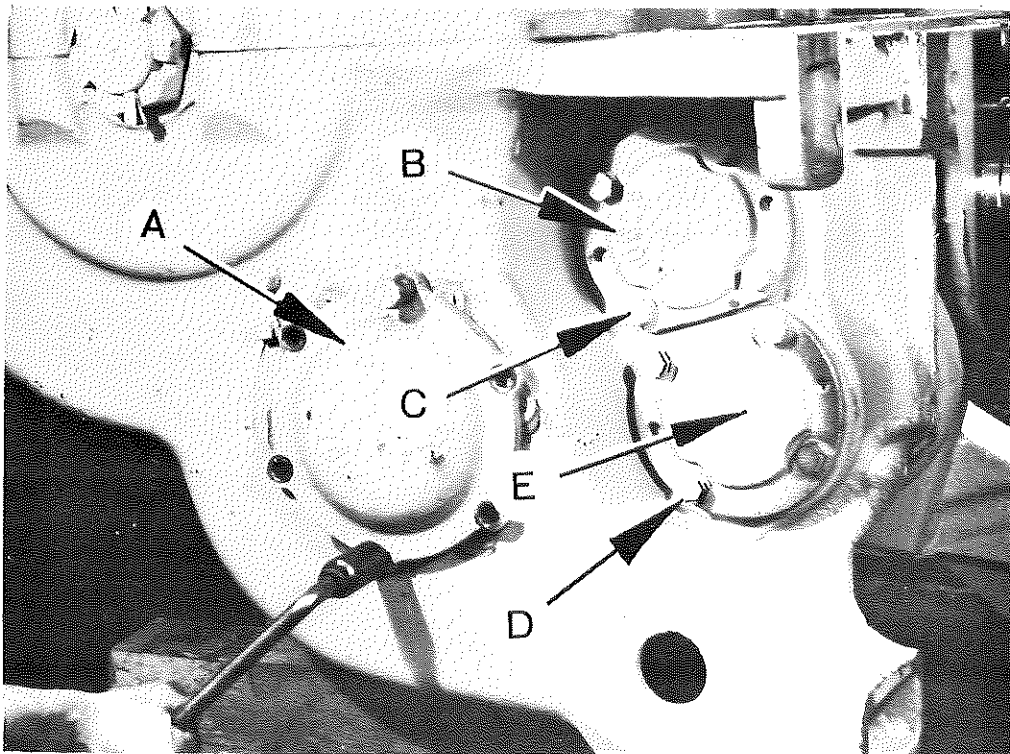


FIGURE 8

## SERVICE INSTRUCTIONS

Model J-10 Winch is adaptable, require the reversal of the bevel gear from the standard factory assembly; and/or if it is desired that the direction of the cable drum rotation be changed, the position of the bevel gear must be reversed. Proceed as follows:

Remove the top cover plate as shown in Figure 3. Remove the bearing carrier and shims as shown in Figure 7. Remove the clamp nut (*D*, Figure 4). Tap the bearing carrier, located on the brake side of the shaft, until it is free from the case. Remove the carrier and bearing from the shaft. Continue to drive the shaft until the bevel gear can be removed. Reverse the previous position of the gear and slide it onto the shaft. Follow the positioning of the gear with the spacer, which is supplied for some model tractors; but if the spacer has not been supplied, write or call Pacific Car And Foundry Company, Renton, Washington, and the spacer will be shipped upon request. Replace the bearing and bearing carrier in the winch case. Now drive the bevel gear shaft toward the brake side until it is positioned in the carrier. Replace the bearing carrier (*B*, Figure 8). With the shaft in position install and tighten the adjusting nut. See paragraph entitled Adjustment Of Bevel Gear And Pinion. Now that the reversal of the bevel gear has been completed, replace the top cover plate and gasket (*A* and *B*, Figure 3).

### FREE WHEELING BRAKE UNIT ROTATION

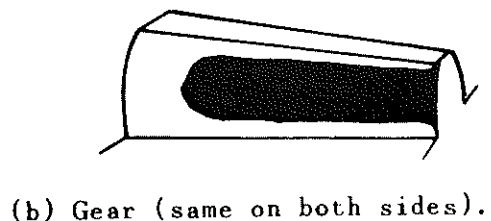
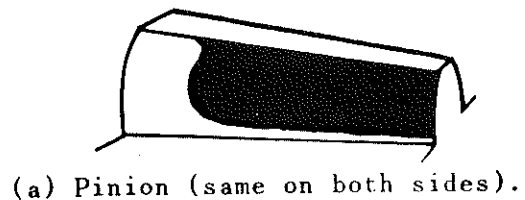
Model J-10 Winches are equipped with a free-wheeling brake unit, but can be equipped with the standard solid brake drum. The free-wheeling brake unit has a ratchet and pawls which allow the brake to act in only

one direction of rotation. If at any time it is desired to change from underwind to overwind or vice versa, it will be necessary to reverse the brake drum.

Remove the brake housing cover to make the drum and brake shaft accessible. To reverse the drum, remove the cotter key and large nut (*B* and *C*, Figure 10) from the end of the brake shaft and slide the drum from the shaft. Turn the drum over and re-install so that the side which faced outward now faces the interior of the winch case.

### DIS-ASSEMBLY OF WINCH CASE AND DRUM SHAFT

After removing the cotter key (*C*, Figure 5) from the cable guard (*D*, Figure 5) remove the cable guard. Pull the two cotter keys (*D*, Figure 11) one on either side of the winch, which locks the two large hex nuts (*E*, Figure 11) on the end of the drum shaft. Loosen these hex nuts, but do not remove them from the shaft until



Ideal Tooth Bearing for  
Straight Bevel Gears.

FIGURE 9

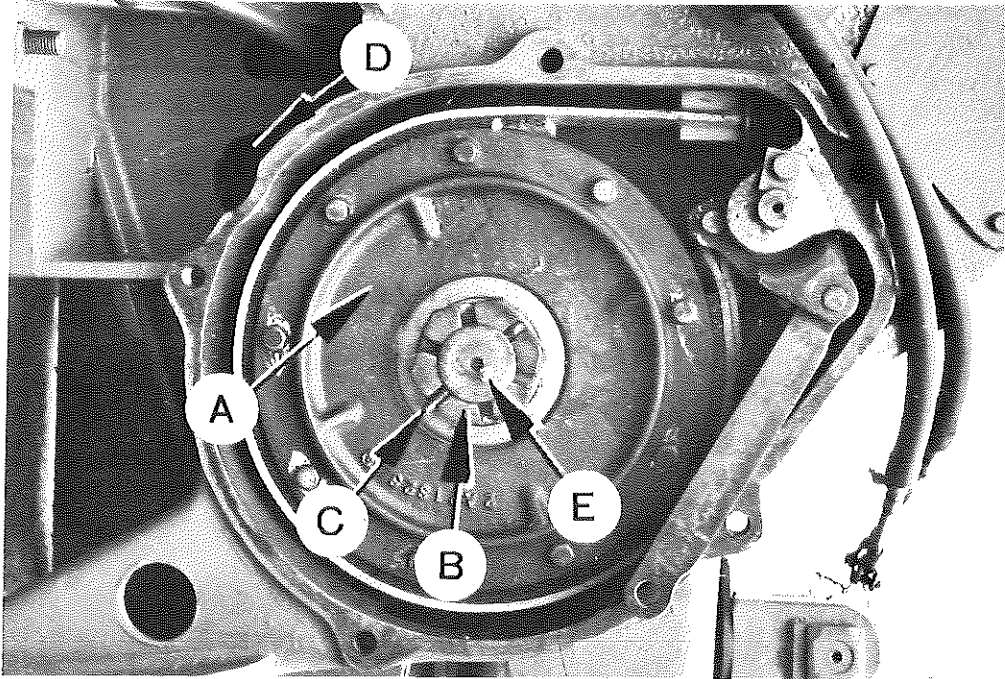


FIGURE 10

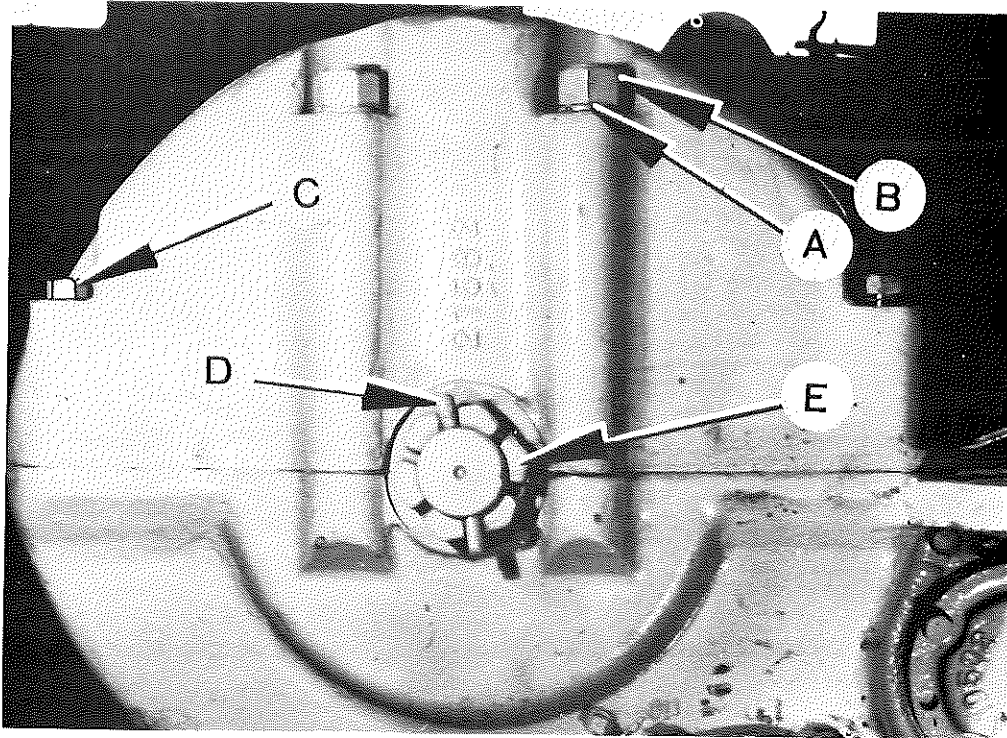


FIGURE 11

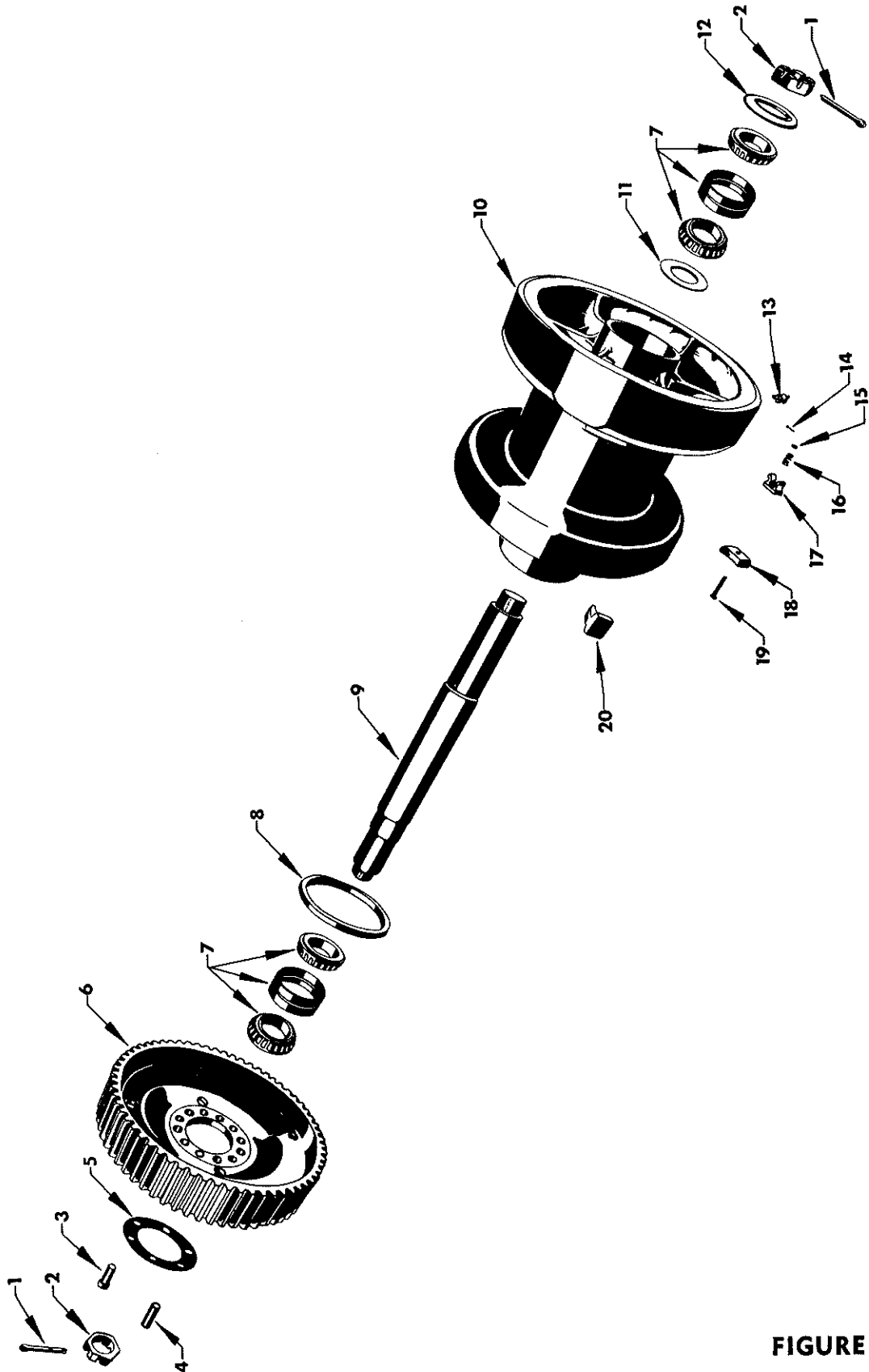


FIGURE 12

## SERVICE INSTRUCTIONS

the cable drum and shaft has been lifted from the winch. This is done to protect the thread on the cable drum shaft from possible damage during handling operation.

Remove the 1-1/4 NF hex nuts and lockwashers (B and A, Figure 11). Two are located on the gear cover and two on the case flange. Remove the four 7/8 x 6 NF hex head capscrew and copper washer (C, Figure 11). Now both the case flange and gear cover can be removed.

After the removal of the gear cover and case flange, the cable drum may be removed with the aid of a chain block. The correct position of the

cable drum for removal is shown in Figure 18. Note the position of the four bolt heads. With the bolts in this position the cable drum may be removed without the heads of the bolts catching on the lip on the case. Set the cable drum, bull gear end upward, on wooden blocks, having the blocks spaced far enough apart so that they won't touch the inner hub of the cable drum.

Remove the large hex nut. Bend the lugs on the bolt ring (5, Figure 12) to release the six capscrews which hold the bull gear to the cable drum. Remove the capscrews (3, Figure 12) and pull the bull gear (6, Figure 12)

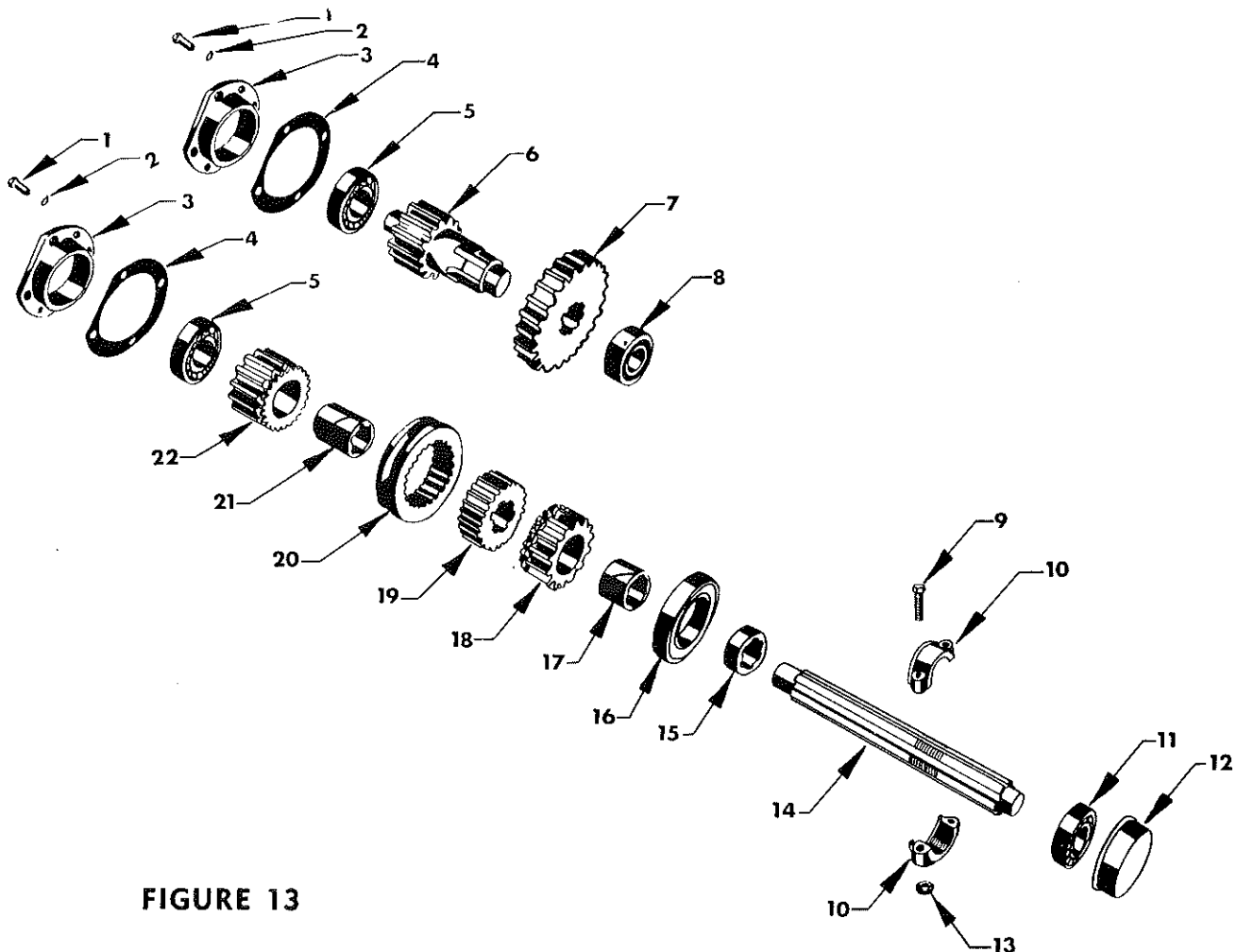


FIGURE 13

## SERVICE INSTRUCTIONS

from the drum. Drive the cable drum shaft (9, Figure 12) toward the brake side. After the shaft has been driven 2 or 3 inches lay the cable drum on its side. Now complete the operation of driving the cable drum shaft out through the brake side. This will force the ring dirt seal, timken roller bearing, and spacer washer (11, 7 and 12, Figure 12) out of the cable drum. To complete the cable drum dis-assembly remove the second timken roller bearing and large oil seal (7 and 8, Figure 12) located on the bull gear side of the drum. *NOTE: A chain block should be used in the dis-assembly of the J-10 Winch due to the weight of some of its parts.*

### DIS-ASSEMBLY OF BEVEL PINION SHAFT

The winch must be removed from the tractor to work on the Bevel Pinion Assembly. The first step in the dis-assembly is to remove the top cover plate (A, Figure 3) for access to the bevel pinion shaft end. Remove cover by the removal of the five capscrews and lockwashers (A, Figure 5). Pry with a bar on the end of the bevel pinion shaft while tapping the pinion housing back and forth with a brass bar.

After the bevel pinion assembly has been removed from the winch case, remove the locking nut (G, Figure 5) by loosening the two hex bolts and elastic stop nuts and sliding the nut from the shaft. Cut the locking wire (J, Figure 5) and remove the six drilled head capscrews (K, Figure 5). Drive the bevel pinion shaft (G, Figure 6) from the P.T.O. housing (F, Figure 6) and bearing carrier (H, Figure 6). With the shaft removed the P.T.O. housing and bearing carrier

can be pulled apart. To complete the dis-assembly tap the bearing from the P.T.O. housing and remove the bearing from the shaft.

### DIS-ASSEMBLY OF BEVEL GEAR SHAFT

Remove the four hex head capscrews and lockwashers from the bevel gear bearing housing. Thread two capscrews removed from the brake shaft bearing housing into the two threaded holes in the bevel gear bearing housing (B, Figure 7). Tighten alternately on these capscrews to lift the housing from the shaft. Care should be taken not to damage the shims (A, Figure 7) between the flange on the bearing housing and the winch case. Remove the top cover plate if it has not already been removed as described above in the paragraph entitled Dis-Assembly Of The Bevel Pinion. With the top cover plate removed cut and remove the locking wire in the two drilled head capscrews (C, Figure 4). Remove the capscrews. Remove the socket head set screw (A, Figure 4). Extract the spring now exposed. Loosen the jam nut (G, Figure 4) and unscrew the shifter rod (F, Figure 4) from the control cable (H, Figure 4) after the two set screws (L, Figure 5) have been removed. The control cable is free and can be pulled from the winch case. Pull the shifter rod far enough toward the brake side of the winch to allow the steel ball, which rest on the detents in the shifter rod to drop into the shifter rod opening. Now push the rod in the other direction, forcing out the end plug and steel ball. Remove shifter rod from case. With shifter rod removed the shifter fork (K, Figure 4) can be lifted from the gear coupler (B, Figure 4). For the removal of

## SERVICE INSTRUCTIONS

the clamp nut (D, Figure 4) remove the two bolts and elastic stop nuts (E, Figure 4). With a brass bar, drive the bearing carrier (12, Figure 13) from its seating in the winch case through the access hole (11, Figure 10) on the brake side. This will also force the bearing (11, Figure 13) out of the winch case. Remove the bearing and bearing carrier (11 and 12, Figure 13) and continue to drive the shaft out of the winch removing the bushings, bearings and gears through the access hole located at the top of the winch case as soon as they are clear of the shaft. To complete the dis-assembly of the bevel

gear shaft remove the shaft and the inner bearing (16, Figure 13).

### DIS-ASSEMBLY OF BRAKE SHAFT

Remove the brake link cover (B, Figure 14) from the brake cover (E, Figure 14). Pull the brake lever pin (B, Figure 15). Lift the brake linkage inside of the brake housing cover and remove the brake link pin (A, Figure 15). By removing the five capscrews and lockwashers from the brake cover, the cover can be removed.

Disconnect the control cable (C, Figure 16) from the brake link lever (F, Figure 16) by removing the cotter

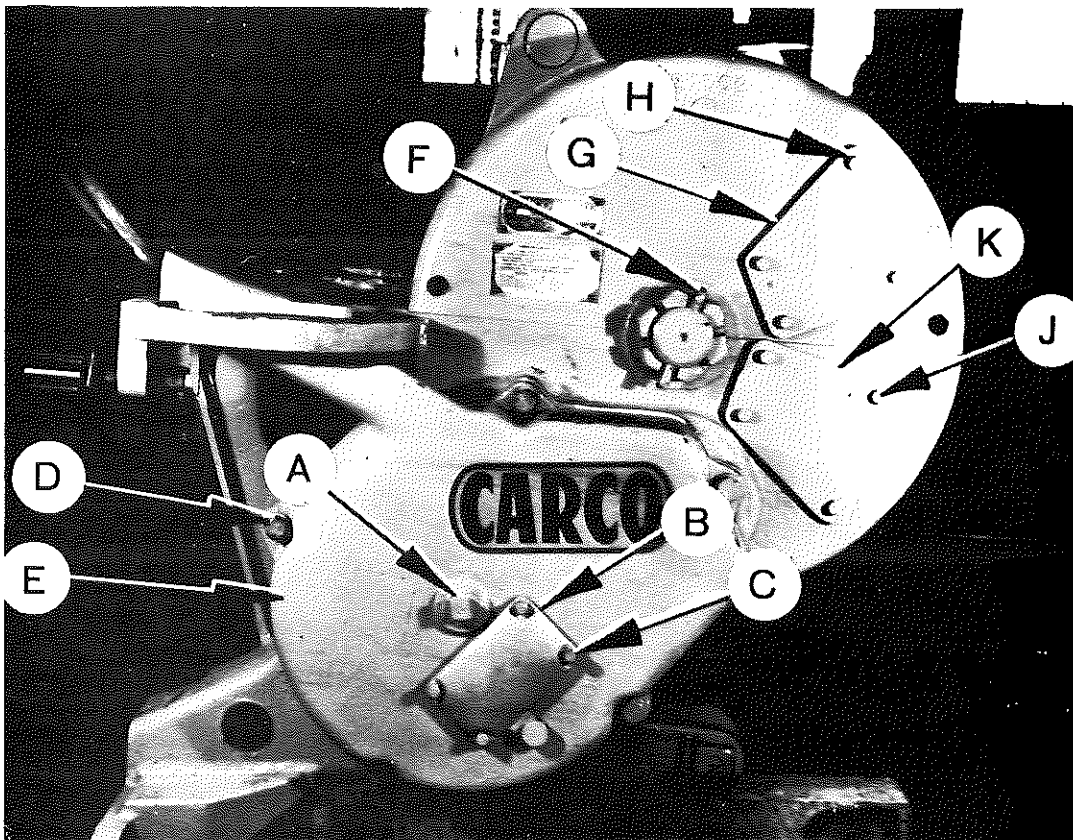


FIGURE 14

## SERVICE INSTRUCTIONS

key in the yoke pin and extracting the pin (G, Figure 16). Remove yoke and jam nut (E and D, Figure 16) from the control cable. By backing off the hex jam nut (A, Figure 16) the set screw (B, Figure 16) can be loosened and the control cable removed from the brake cover.

Remove the alemite fitting (E, Figure 10) on the end of the brake shaft to prevent its damage. Pull the cotter key (C, Figure 10) and remove the hex nut. This will enable you to remove the brake drum (A, Figure 10) from the shaft. After the brake drum has been removed, remove the spacer (18, Figure 17). Remove the bearing seal ring (15, Figure 17) which is held in place with two flat head capscrews. To continue the dis-assembly of the brake drum shaft remove the six hex head capscrews which retain the bearing housing. Using two capscrews taken from the brake housing cover as lifters tighten them alternately to force the bearing cover from its position on the winch case as shown in Figure 8. Remove the cotter key and large hex nut (21 and 4, Figure 17). Use a brass bar and a hammer to drive the shaft toward the brake side of the winch. As the shaft is being driven, the first part free will be the ball bearing (6, Figure 17) at the near side of the shaft. Next will be the needle bearing on the brake side (13 and 14, Figure 17). Care should be taken not to drop the gears as they are driven free from the shaft, as dropping them could damage their teeth and would require their replacement. The continuance of the driving will drive the shaft and the seal tube (12, Figure 17) from the winch. By tapping on the bearing (9, Figure 17) it will force the bearing and the two oil seals

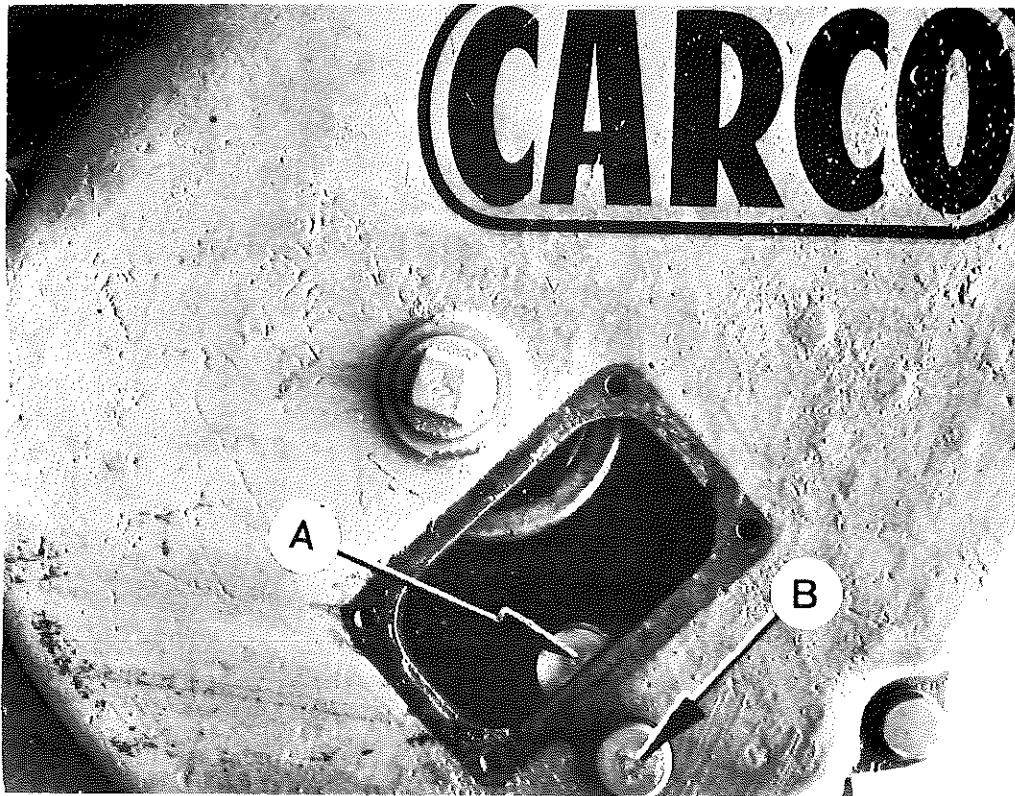
(10, Figure 17) out of the case toward the brake side, and complete the dis-assembly of the brake drum shaft.

### DIS-ASSEMBLY OF COUNTER SHAFT

Remove the four capscrews (D, Figure 8) from the counter shaft bearing housing. Using the same method as described above in the paragraph entitled Dis-Assembly Of Bevel Gear Shaft, remove the housing (E, Figure 8) and shims from the case. Using a brass bar drive the counter shaft (6, Figure 13) toward the bull gear side of the winch. When the shaft is free from the case it can be removed after the removal of the counter shaft gear (7, Figure 13). To complete the dis-assembly of the counter shaft remove the bearing (8, Figure 13) by forcing it out of the case in the same manner as the shaft.

### ASSEMBLY OF COUNTER SHAFT

Place the ball bearing (8, Figure 13) in the inner web of the winch case. After working the counter shaft (6, Figure 13) into the counter shaft opening in the bull gear side of the case, slip the counter shaft gear (7, Figure 13) onto the spline of the shaft. Continue to push the shaft until it has entered the ball bearing at the far side. Then tap the shaft with a brass bar until it is seated in its position in the bearing. Place the second ball bearing (5, Figure 13) on the shaft at the near side by tapping lightly with a brass bar. Place the required number of shims (4, Figure 13) on the bearing carrier hub and slide the carrier (3, Figure 14) into position on the counter shaft. Tap it on far enough to get the four capscrews (1, Figure 13) started.



**FIGURE 15**

Tighten the capscrews alternately to bring the carrier into position.

### ASSEMBLY OF BRAKE SHAFT

Place the double row ball bearing (9, *Figure 17*) in the inner opening of the winch case and tap into place with a brass bar. Following the bearing, position the two oil seals (10, *Figure 17*). Enter the brake drum shaft (11, *Figure 17*) from the brake side. As the shaft passes through the bearing, install the large gear (8, *Figure 17*). Proceed with the entrance of the shaft and as the shaft passes through the large gear install the bull pinion (7, *Figure 17*). Drive the shaft in until the collar on the shaft comes to rest against the ball bearing. Follow

the shaft with the seal tube (12, *Figure 17*). The seal tube should be positioned against the two oil seals. Place the needle bearings (13 and 14, *Figure 17*) on the shaft and position it against its respective collar. Position the spacer (18, *Figure 17*) on the shaft and against the needle bearings. To install the seal ring (15, *Figure 17*) place it on the shaft and over the spacer. Fix it into place with the two flat head capscrews. Slide the brake drum (19, *Figure 17*) into place and install the large hex nut and cotter key (B and C, *Figure 10*). Tap the ball bearing (6, *Figure 17*) onto the shaft on the bull gear side of the winch with a brass bar. Install the hex nut and cotter key (4 and 21, *Figure 17*). Place the required amount of shims (5, *Figure 17*) on the brake drum shaft

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bearing carrier (3, Figure 17) and position it on the shaft over the bearing. Install the six hex head capscrews and lockwashers (2 and 1, Figure 17). Tighten the capscrews alternately to pull the bearing housing into position without binding. Replace the alemite grease fitting (E, Figure 10) on the end of the shaft on the brake drum side. Slide the control cable end into the brake cover housing (E, Figure 14). After the cable is in its correct position tighten the set screw (B, Figure 16) and lock it with the jam nut (A, Figure 16). Screw the jam nut and control cable yoke (D and E, Figure 16) on the end of the control cable and position the brake lever (F, Figure 16) and install the yoke pin and cotter key (G, Figure 16). Install the brake housing cover (E, Figure 14) and put the five capscrews and lockwashers (D, Figure 14) in place and tighten.

Lift the linkage inside of the brake housing cover. Align the holes in the linkage and insert the brake linkage pin as shown in Figure 19. Drop the linkage and align the hole in the brake link lever (F, Figure 16) with the hole in the brake housing cover. The brake hand control lever, mounted on the tractor fender, should be placed in the fully off position for this alignment. Now insert the brake lever pin (B, Figure 15). Fix the brake link cover (E, Figure 14) into position with the four capscrews and lockwashers (C, Figure 14). For the adjustment of the J-10 brake see the paragraph entitled The Brake And Its Adjustment.

### ASSEMBLY OF BEVEL GEAR SHAFT

Place bearing and bearing carrier

(11 and 12, Figure 13) in the bevel gear opening at the brake side of the winch. Place the large bearing (16, Figure 13) in the opening located at the mid-shaft position. Enter the shaft (14, Figure 13) at the bull gear side and as the shaft enters into the winch, place the drive pinion, drive pinion bushing, clutch gear, gear coupling, drive pinion, drive pinion bushing and bearing bushing in place. Drive the shaft about six inches passed the bearing and place the bevel gear and adjusting nut (D, Figure 4) on the shaft. Continue to drive the shaft until it is seated in its position in the ball bearing at the far side of the winch. Place the double row ball bearing (5, Figure 13) on the end of the shaft and tap into position. Place the set of shims (4, Figure 13) onto the hub of the bearing carrier (3, Figure 13) and slide the carrier onto the bearing. Enter the four capscrews and lockwashers (1 and 2, Figure 13). Tighten them alternately to bring the carrier into its position. For the adjustment of the bevel gear see paragraph entitled Adjustment Of Bevel Gear And Bevel Pinion. Enter the control cable into the winch case at the brake side. Lock the cable into its position with the two socket head set screws (L, Figure 5) one located on top of the other. Now slide the shifter rod (F, Figure 4) into the case through the opening in the bull gear side of the winch.

As the rod enters the inner case put on the shifter fork (K, Figure 4) with the two holes facing the front of the unit or toward the face of the winch. Continue to slide the rod until it comes to rest touching the end of the control cable. Attach the shifter rod to the control cable

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by screwing one onto the other. See paragraph entitled the Gear Shift And Its Adjustment. Lock them together with the jam nut (G, Figure 4). Drop the steel ball down the opening at (A, Figure 4) followed by the spring. Fix the ball and spring into position by installing the set screw (A, Figure 4). Install the two drilled head capscrews (C, Figure 4) and secure them in place with a piece of locking wire.

### ASSEMBLY OF BEVEL PINION SHAFT

Place the ball bearing on the shaft (G, Figure 6) and tap into position. The other ball bearing goes into po-

sition in the P.T.O. housing (F, Figure 6). At the opposite end of the P.T.O. housing install the oil seal. Place the required number of shims (D, Figure 6) between the P.T.O. housing and the bearing carrier, see paragraph entitled Adjustment Of The Bevel Gear And Pinion. Install the four drilled head capscrews (K, Figure 5) and lock them in place with a length of locking wire (J, Figure 5) threading the wire from the outside hole in one capscrew into the inside hole in the next. Slide the bevel pinion shaft into the bearing carrier and P.T.O. housing. Tap with a brass bar until the shaft is seated in the bearing carrier. Install the clamp nut

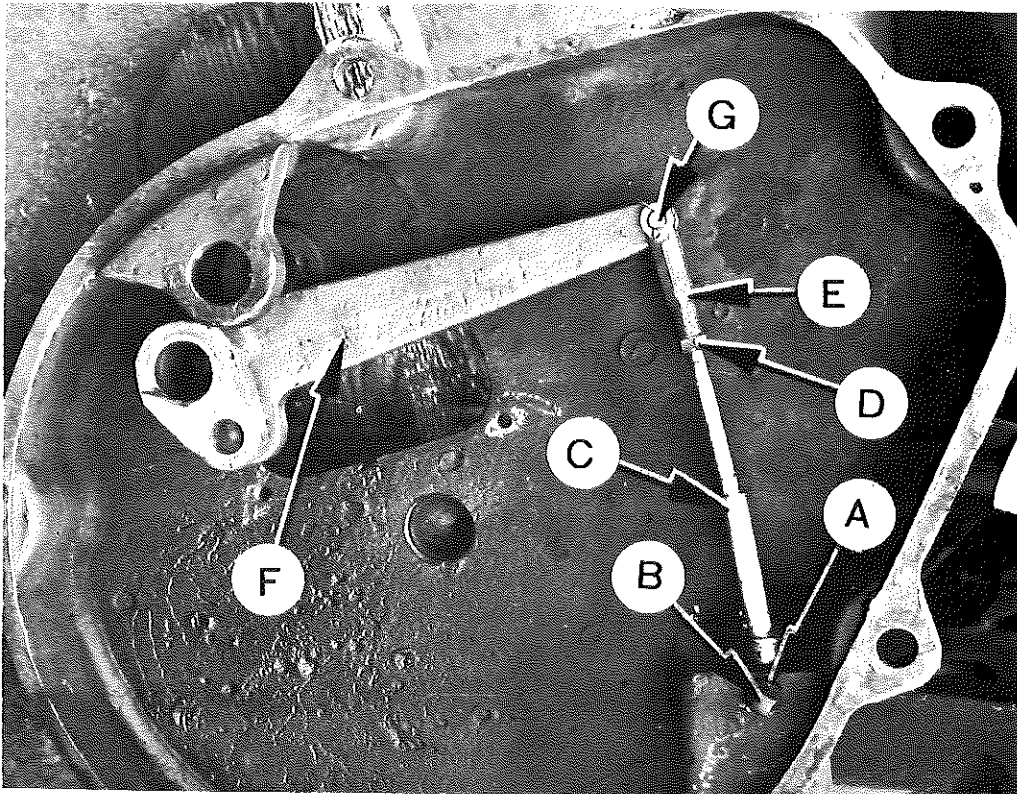


FIGURE 16

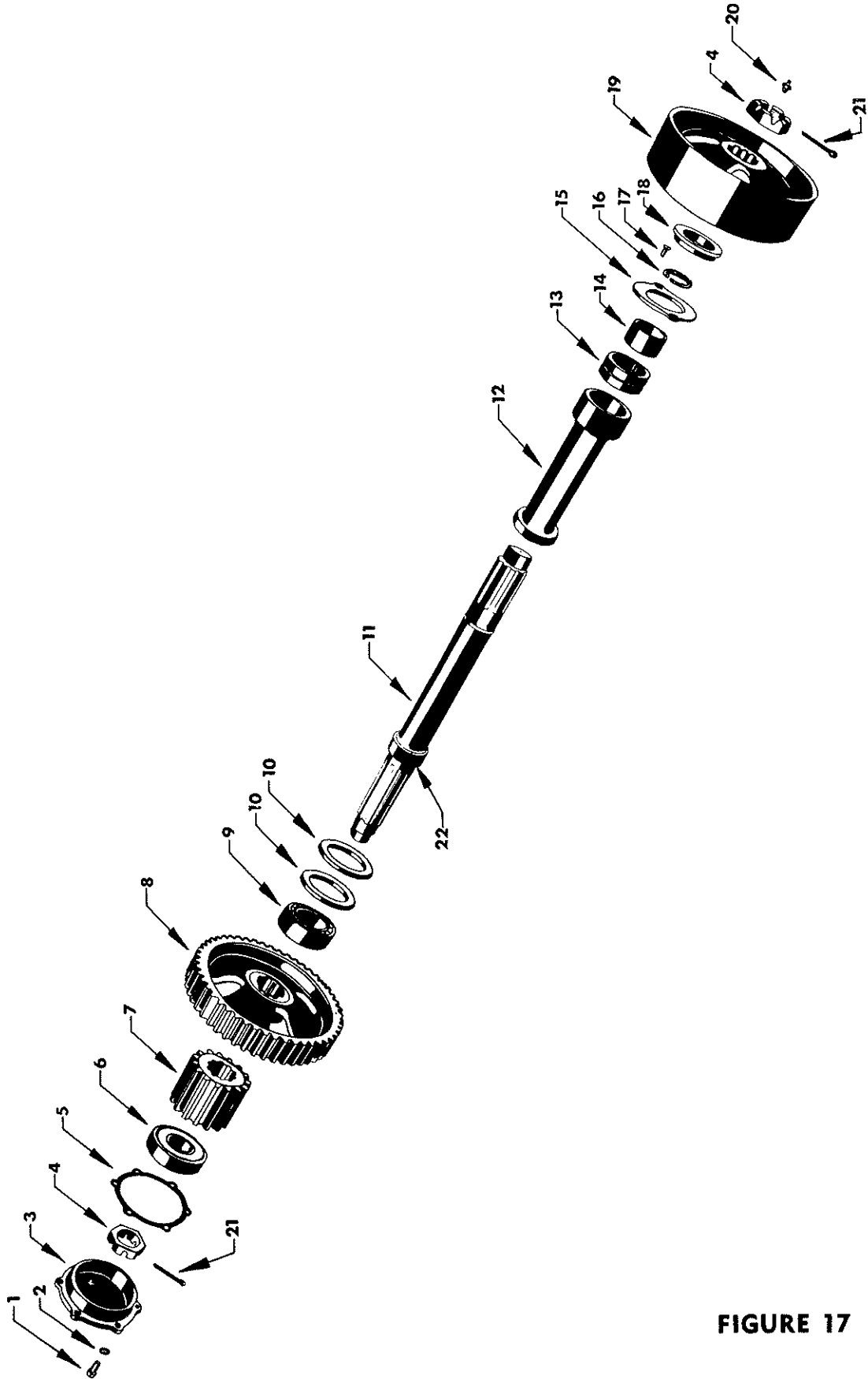


FIGURE 17

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(*G, Figure 5*) and secure it in its position by tightening the two elastic stop nuts on the bolts.

With the assembly now completed install it into the opening in the face of the winch case. Replace the top cover plate and gasket (*A and B, Figure 3*). Coat the gasket with some suitable gasket compound or a heavy grease if no gasket compound is available. Install the five capscrews and lockwashers. Take up on the capscrews until tight.

### ASSEMBLY OF WINCH CASE AND DRUM SHAFT

Install the large oil seal on the cable drum. Enter the brake drum shaft from the brake side. Tap it in until approximately equal portions of the shaft protrude from the cable drum. Place the dirt seal ring on the shaft and push it into place. Following the dirt seal, install the double row ball bearing on the same side of the winch. Continuance of the work on the brake side will involve the installation of the spacer washer (*12, Figure 12*). Install the double row ball bearing at the bull gear side of the winch.

Place the cable drum on wooden blocks having the blocks spaced four or five inches apart permitting the shaft on the brake side to protrude and yet leaving the unit in balance. Lay the large bull gear over the end of the shaft and install the six drive pins. Place the bolt locking ring over the shaft and onto the bull gear and install the six hex head capscrews. After the capscrews have been tightened, lock them in position by bending the tabs on the locking ring (*5, Figure 12*). Place the two large hex nuts on the cable drum shaft, one on either side. This is done to pre-

vent damage to the threads of the shaft during handling.

With assembly of the cable drum, as a unit complete, lift the assembly with some suitable lifting device, such as a chain block, onto the winch. Lower it into position with the capscrews in the same positions as in *Figure 18*. This arrangement is the only possible position for raising or lowering the cable drum assembly.

Place the case flange (*B, Figure 5*) on the winch. Install the 1-1/4 hex nuts and lockwashers (*A and B, Figure 11*) on the two large studs. Place the gear cover gaskets on the winch case. Coat them with a gasket sealing compound. Install the gear cover (*E, Figure 5*). Tighten the four capscrews (*C, Figure 11*) after copper washers and capscrews have been placed in their respective positions. Install the 1-1/4 inch hex nuts and lockwashers on the two large studs and tighten the nuts. Slide the cable guard (*D, Figure 5*) into the lugs on the gear cover and case flange and lock it into position with the cotter key (*C, Figure 5*).

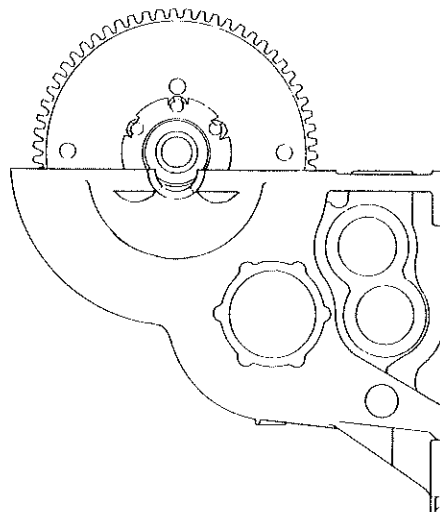


FIGURE 18

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### LUBRICATION

All internal gears and parts are lubricated by the splash from the oil reservoir inside the case. This level should be maintained between the pipe plugs on the right hand side of the winch. It requires approximately 9 gallons of oil. We recommend the following:

For summer temperature use 140 S.A.E. viscosity gear oil.

For winter temperatures down to 0°F., use 90 S.A.E. viscosity gear oil.

For temperatures below 0°F. use 10 S.A.E. viscosity motor oil.

This oil should be changed at approximately 625 hours of operation. (Based on 8 hours per day, 6 days a week, for 3 months.) Extreme pressure gear oils are not necessary. Use only the highest quality oils and

the S.A.E. 10 motor oil should be paraffin base if at all possible.

There are two alemite fittings. These should be greased once a week with a high temperature, full milled grease of best quality; One is located on the brake shaft and necessitates removing the pipe plug in the brake cover. Avoid using an excess of grease at this point to prevent any overflow running onto the brake drum. The other grease fitting is located on the drum and is easily accessible through a hole in the left side of the winch case.

Remove free-wheeling brake drum once a month for inspection and lubrication. Apply very sparingly high temperature grease (melting point 400°F.) to ratchet and pawls within the brake drum. Grease control stand levers once a week.

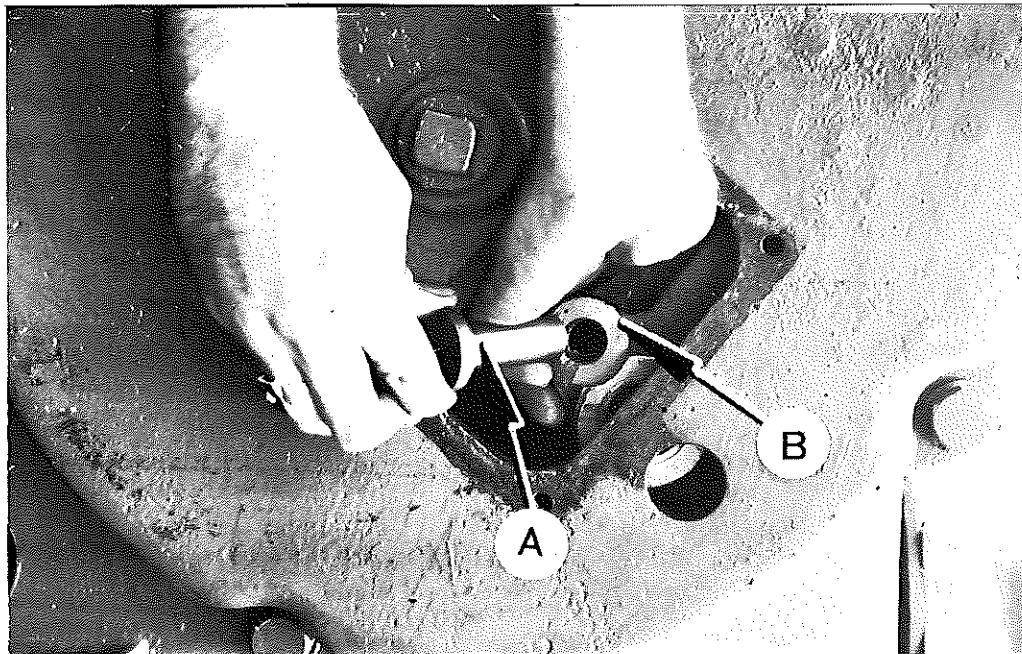


FIGURE 19

