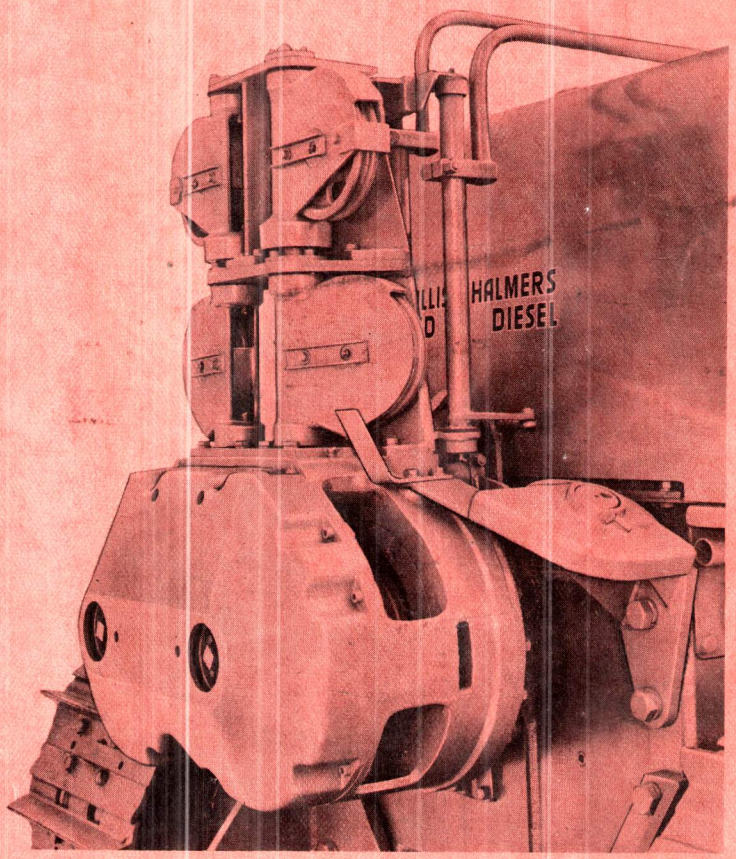
SERVICE MANUAL

MODEL 75
POWER CONTROL UNIT



ALLIS-CHALMERS MFG. CO.

MILWAUKEE, WISCONSIN, U. S. A.

LITHO. IN U. S. A.

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AVOID ACCIDENTS

MOST ACCIDENTS, WHETHER THEY OCCUR IN INDUSTRY, ON THE FARM, AT HOME OR ON THE HIGHWAY, ARE CAUSED BY THE FAILURE OF SOME INDIVIDUAL TO FOLLOW SIMPLE AND FUNDAMENTAL SAFETY RULES OR PRECAUTIONS. FOR THIS REASON MOST ACCIDENTS CAN BE PREVENTED BY RECOGNIZING THE REAL CAUSE AND DOING SOMETHING ABOUT IT BEFORE THE ACCIDENT OCCURS.

REGARDLESS OF THE CARE USED IN THE DESIGN AND CONSTRUCTION OF ANY TYPE OF EQUIPMENT THERE ARE MANY CONDITIONS THAT CANNOT BE COMPLETELY SAFEGUARDED AGAINST WITHOUT INTERFERING WITH REASONABLE ACCESSIBILITY AND EFFICIENT OPERATION.

A careful operator is the best insurance against an accident. The complete observance of one simple rule would prevent many thousand serious injuries each year. That rule is:
Never attempt to clean, oil or adjust a machine while it is in motion.

NATIONAL SAFETY COUNCIL

FOREWORD

This manual is prepared to provide the customer and the maintenance personnel with complete information and instructions on the installation, operation, lubrication, and maintenance of the "Allis-Chalmers" Model 75 Power Control Unit (Rear Double Drum). Extreme care has been exercised in the designing, selection of materials, and the building of the unit. By proper maintenance, the utmost satisfaction in performance and service will be obtained.

In order to become familiar with the various components of the unit, it is urged that the operator and the maintenance personnel study the instructions in this manual and use it as a reference when installing, operating, lubricating, and repairing the unit.

To assure the best results and to maintain the original quality built into the unit, it is important that Genuine "Allis-Chalmers" Parts be used when new parts are required.

IMPORTANT: Always furnish the Dealer with the Serial Number of the unit when ordering parts.

Many owners of "Allis-Chalmers" equipment employ the Dealer's Service Department for all work other than routine care and adjustments. This practice is encouraged as our dealers are kept well informed by the factory regarding advanced methods of servicing "Allis-Chalmers" products and are equipped to render satisfactory service.

PRICE $2.00

INDEX

DESCRIPTION AND SPECIFICATIONS

A. DESCRIPTION

The "Allis-Chalmers" Model 75 Power Control Unit (Rear Double Drum) is of the multiple disc clutch and brake band type and is designed for mounting on the "Allis-Chalmers" Models HD-15, HD-16, HD-20, and HD-21 Tractors. The control unit is used primarily to control cables for the operation of bulldozers, gradebuilders, rippers, and pull-type scrapers. The unit can also be adapted for use on other tractors of comparable horsepower and speed.

An adapter assembly, consisting basically of a shaft (with couplings), ball bearing, and adapter housing is used between the rear of the tractor and the power control unit for adapting the power control unit to the tractor. The shaft (with couplings) of the adapter connects the transmission top shaft of the tractor to the input pinion of the power control unit.

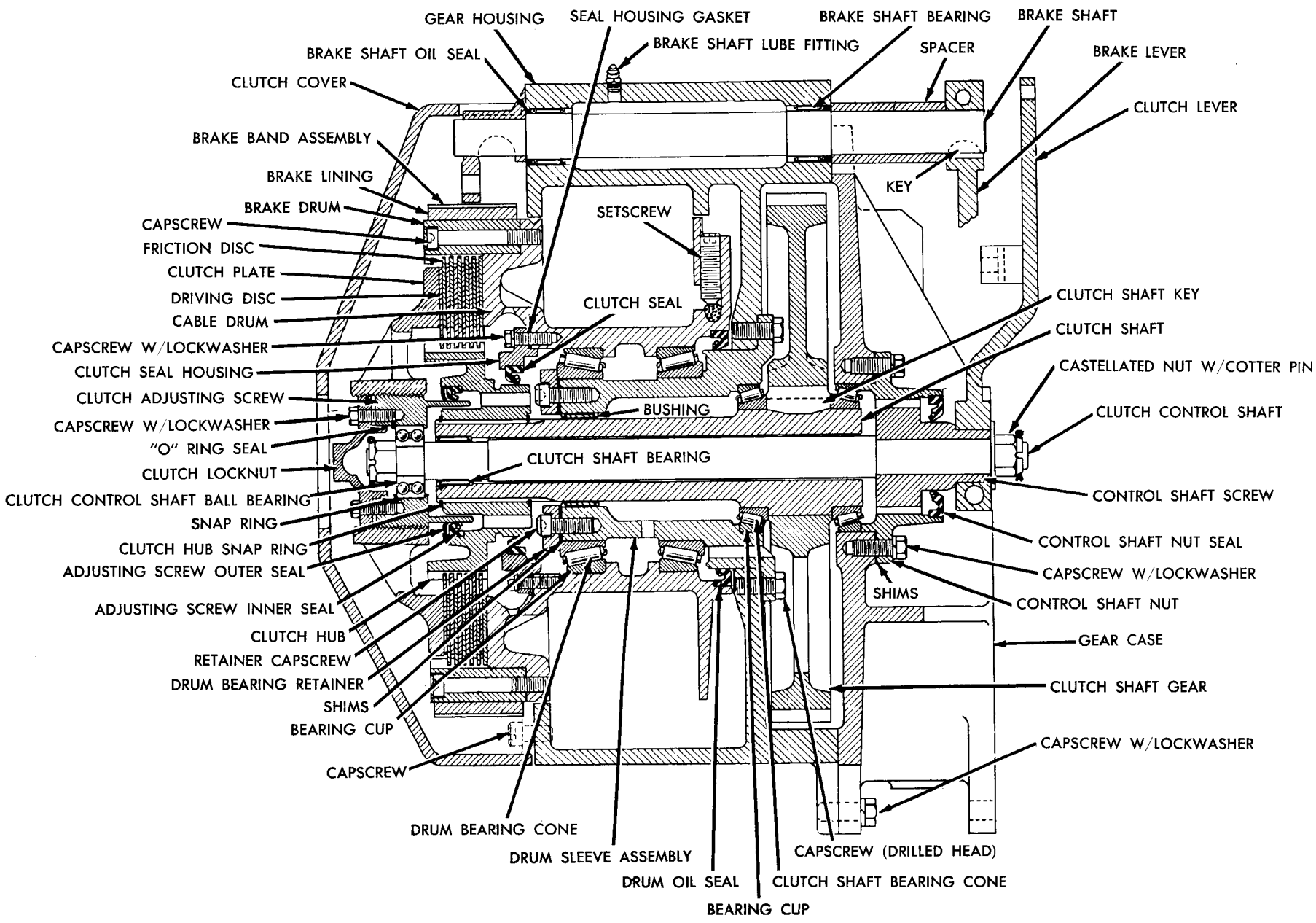
The input pinion of the power control unit is in mesh with and drives a driving gear which is installed on and keyed to the shaft portion of an intermediate gear. The intermediate gear (driven by the driving gear) is in mesh with and drives the left hand clutch shaft gear and this gear drives the right hand clutch shaft gear. The clutch shaft gears drive the clutch shafts and the multiple disc clutches. The input pinion and the intermediate gear are supported by roller bearings. Each clutch shaft is supported at the front end by two tapered-roller bearings and by a bushing type bearing at the rear end. Each cable drum is supported by two tapered roller bearings.

The ball bearing used on the shaft of the adapter assembly receives lubrication from the bevel gear compartment of the tractor. The gears, bearings, etc. of the power control unit are lubricated by the oil supply within the gear case of the power control unit. A lip-type oil seal, installed on the front end of the input pinion of the power control unit, is used to retain the lubricant within the gear case of the power control unit. This oil seal also prevents oil from the bevel gear compartment of the tractor from entering the gear case of the power control unit.

Each cable drum of the unit is controlled independently by means of a multiple disc clutch and brake band which are inter-connected by a system of levers and a cam. The brake and clutch mechanisms are designed for quick easy adjustments.

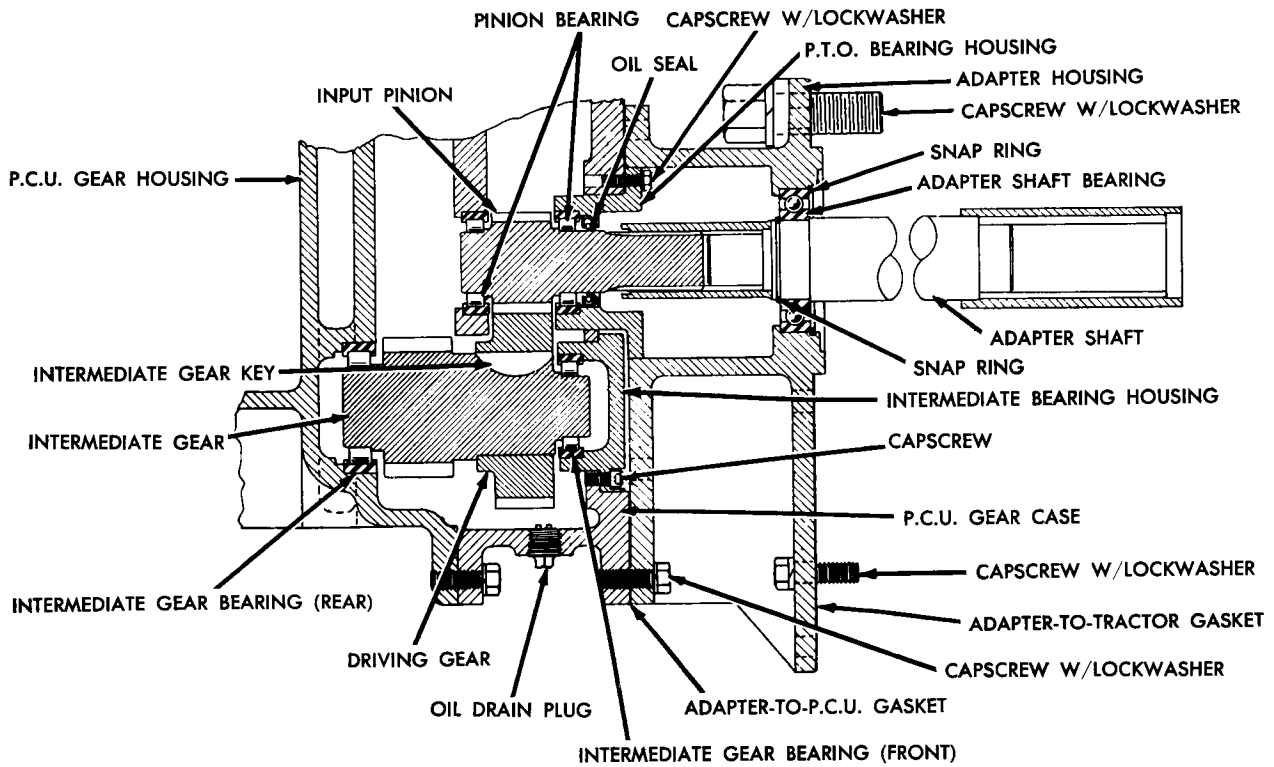
Two fairlead sheave assemblies are provided on each side of the control unit for guiding the cable on and off each cable drum. Each fairlead is supported at the top and bottom by tapered roller bearings. Each sheave is supported by a roller bearing.

Two control levers are provided for controlling the operation of the unit. The left hand lever is used for operating the left cable drum and the right hand lever for operating the right cable drum. The control levers may be raised or lowered to obtain the desired height and may be lengthened or shortened as desired.



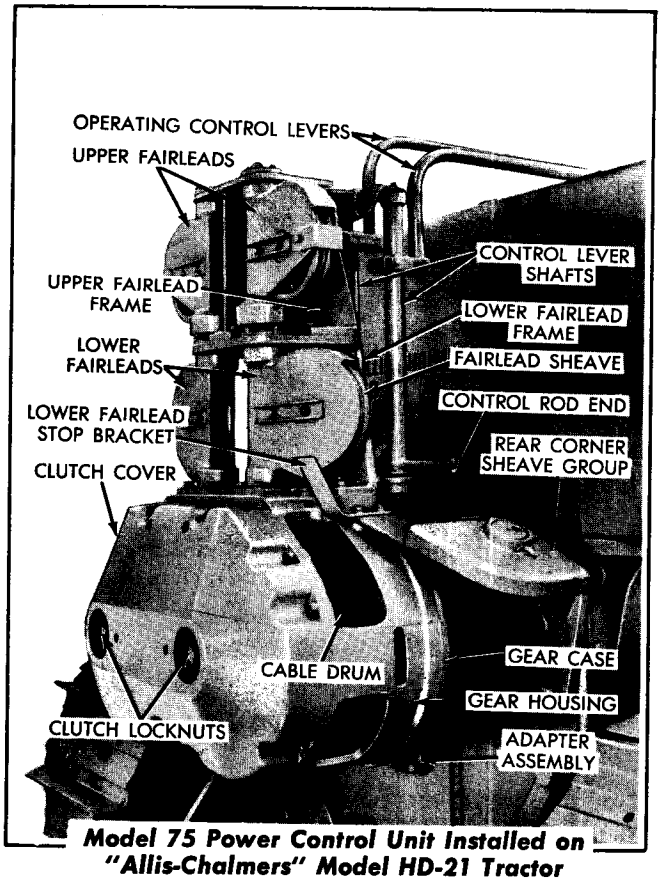
Power Control Unit Brake and Clutch — Sectional View

FIG. 1



Adapter, Input Pinion, and Intermediate Gear — Sectional View

FIG. 2



Model 75 Power Control Unit Installed on "Allis-Chalmers" Model HD-21 Tractor

FIG. 3

B. GENERAL SPECIFICATIONS

Type	Multiple Disc Clutch
Location	Rear
Number of Drums	2
Drum Diameter	8¾ in.
Drum Flange Diameter	16 in.
Drum Length	5 in.
Area Friction Surfaces Each Clutch — Square Inch	735
Clutch Facing	Bi-Metallic
Brake Diameter	16 in.
Brake Width	3 in.
Effective Brake Area — Square Inch	147
Sheave Pitch Diameter	9½ in.
Drive	Spur Gear
Standard Gear Reduction	9.32
Line Speeds:	
(Bare Drum) —	
HD-16A and HD-15A	400 F.P.M. @ 1600 R.P.M.
HD-20	420 F.P.M. @ 1700 R.P.M.
HD-21AC and HD-16AC	450 F.P.M. @ 1800 R.P.M.
(Full Drum) —	
HD-16A and HD-15A	675 F.P.M. @ 1600 R.P M.
HD-20	710 F.P.M. @ 1700 R.P.M.
HD-21AC and HD-16AC	760 F.P.M. @ 1800 R.P.M.
Cable Capacity (½")	225 ft.
Approximate Weight (Including Adapter) pounds	1965

Bearings:

Transmission and Drum	Ball and Roller
Sheaves — Fairlead	Roller
Sheaves — Upper Frame	Roller

Lubrication:

Transmission and Drum	Automatic from Gear Case
Sheaves	Pressure-Type Lubricating Fittings

The Allis-Chalmers Manufacturing Company reserves the right to make changes in the above specifications or to add improvements at any time without notice or obligation.

LUBRICATION

A. SPECIFICATIONS OF LUBRICANTS

1. PCU-75 Gear Housing

Use a good grade of MILD EXTREME PRESSURE gear lubricant of the LEAD NAPHTHENATE NON-CORROSIVE type. Use a lubricant having a viscosity of SAE 90 for all temperatures. NOTE: *It is permissible to use SAE 140 in extreme high temperature operation.*

2. Pressure Gun Lubricant

Use a ball and roller bearing lubricant with a minimum melting point of 300° F. at all points where pressure-type lubricating fittings are provided. This lubricant should be in a viscosity range so as to assure easy handling in the pressure gun at the prevailing atmospheric temperature, and MUST be waterproof.

B. LUBRICATION INSTRUCTIONS

Check the oil level of the gear case after every 50 hours of operation. Remove the oil level plug (Fig. 11) from the lower left side of the gear case and the oil filler plug (Fig. 11) from the upper left side of the gear case. Add oil as necessary to raise the oil level even with the oil level plug opening, then install and tighten the oil level and filler plugs.

Change the oil in the gear case after each 1000 hours of operation. Remove the oil drain plug (Fig. 11) from the bottom of the gear case and allow the oil to drain. Clean the drain plug, then install and tighten securely. Fill the gear case to the proper level with the specified lubricant (CAP. 5 qts.).

Remove the breather (Fig. 11) from the upper left side of the gear case after each 200 hours of operation. Wash the breather thoroughly in clean fuel or solvent, saturate in clean oil, and reinstall.

Lubricating fittings are provided at various points on the Power Control Unit. Use the specified pressure gun lubricant and lubricate at the intervals given below:

10-HOUR SERVICE

Upper and Lower Fairlead Bearings
Fairlead Sheave Bearings
Control Lever Shaft (Upper and Lower Bearings)

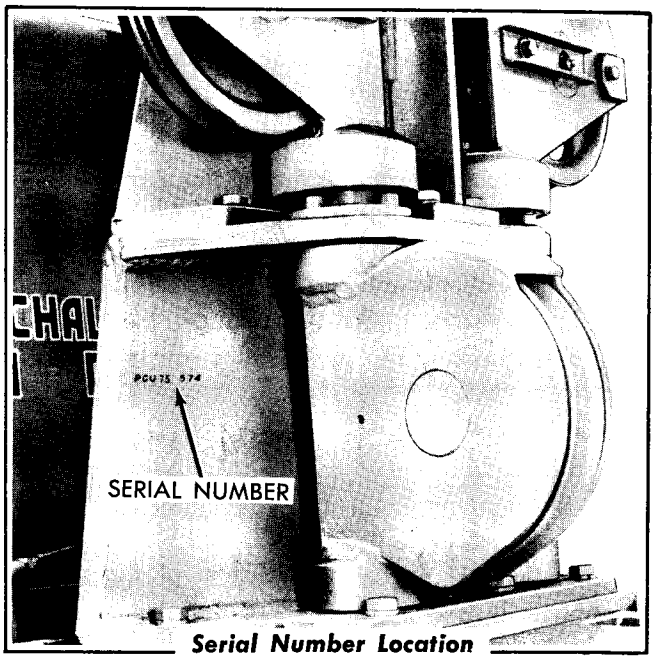
50-HOUR SERVICE

Brake Shaft Bearings
Control Rod Ends
Follower Rollers

SERIAL NUMBER

On all parts orders and in all correspondence relative to the power control unit, it is necessary that the serial number be given. This will properly identify the particular unit and will assure obtaining the correct replacement parts for it.

The serial number is stamped in the left rear side of the lower fairlead frame.



Serial Number Location

FIG. 4

OPERATING INSTRUCTIONS

Two operating control levers (Fig. 3) are provided on the Model PCU-75 Power Control Unit (Rear Double Drum) to engage or disengage the cable drum clutches and to actuate the cable drum brakes. The right hand cable drum is used for operating the bulldozer and the left hand drum is usually used for ripper operation. NOTE: *When the power control unit is used for operating scrapers, the right hand drum is reeved to the bowl cable and the left hand drum to apron and ejector cable.*

The power control unit is driven from the transmission top shaft, therefore, the engine must be running and the engine clutch engaged to place the unit in operation.

When either of the operating control levers is moved to the left, a screw type engagement mechanism rotates the corresponding clutch control shaft in the direction to force the clutch friction discs into contact with the clutch driven discs, which in turn drive the cable drum and winds the cable onto the drum.

When either of the operating control levers is in "NEUTRAL," the corresponding clutch is disengaged, the brake is applied, and the load is held.

The reverse rotation of each cable drum is controlled by its brake, which is automatically applied by a spring and lever, but which can be released when desired by the operator moving the operating control lever to the right. Movement of the operating control lever to the right causes the cam follower of the clutch lever to rotate the brake shaft in the direction to release the brake.

Moving either operating control lever to the right as far as it will go (to the lock-out position) will hold the corresponding brake in the fully released position and permits the cable drum to be turned by hand for cable replacement.

To "RAISE" the dozer moldboard, engage the clutch of the control unit by pulling the right hand operating control lever toward the operator, then return the control lever to "NEUTRAL" when the moldboard is raised to the desired height. Returning the control lever to "NEUTRAL," disengages the clutch, allows the brake to be applied automatically by a spring, and the moldboard will remain in the position to which it has been raised.

To "LOWER" the moldboard, release the brake of the control unit by pushing the right hand operating control lever away from the operator, then

return the control lever to "NEUTRAL" when the moldboard is lowered as desired. When operating the PCU, engage the clutch with quick full movement of the control lever to reduce clutch slippage and overheating. Release the brake only enough to allow the moldboard to lower slowly; this will keep the load under control and avoid unspooling and kinking of the cable.

When the operating control lever is pushed away from the operator as far as it will go, the brake is fully released and the cable drum can turn freely.

IMPORTANT: *As a safety precaution, always lower the dozer moldboard to the ground when the tractor and dozer are not in use and when making repairs, adjustments, or servicing the unit.*

When the PCU is used for scraper operation, do not travel with the bowl and the apron raised to their extreme height. Lower the bowl and the apron enough for extra cable movement necessary when turning or traveling over uneven ground, otherwise the cable may be broken.

POWER CONTROL UNIT BRAKE AND CLUTCH ADJUSTMENTS

A. GENERAL

The brake and clutch mechanisms of the power control unit are designed for quick and easy adjustments. In order to obtain the highest degree of performance and efficiency, it is very important that the proper adjustments be maintained at all times.

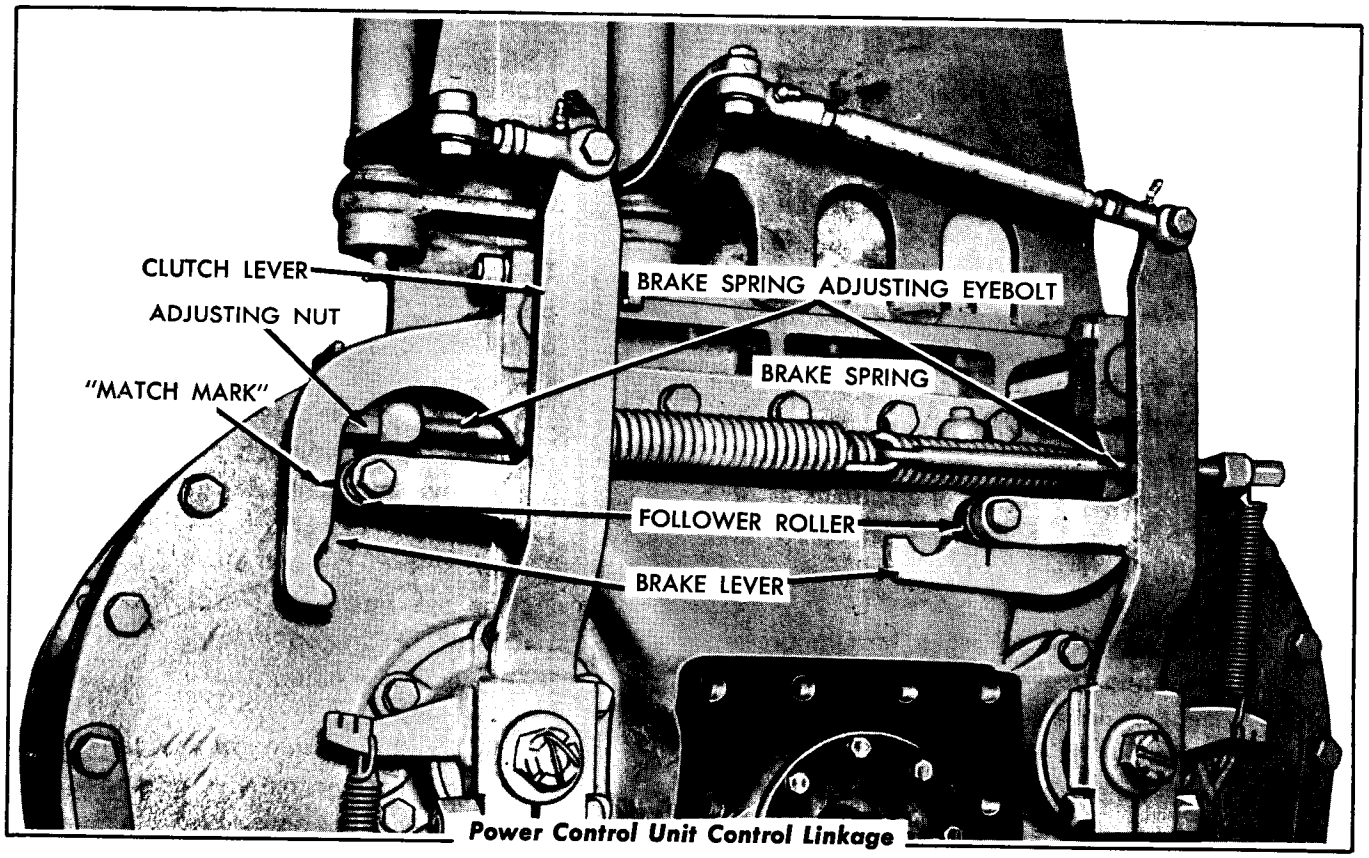
Each clutch and brake assembly of the unit is operated by its own control lever system. Moving the operating control lever toward the operator rotates the clutch control shaft in the direction to engage the clutch. Moving the operating control lever away from the operator actuates the brake release by means of a follower roller (Fig. 5) which contacts the cam surface on the edge of the brake lever. CAUTION: *When the operating control lever is in its extreme position (away from the operator) it is in its full release position and permits the cable drum to turn freely.*

A "match mark" (Fig. 5), stamped on each brake lever at the factory, is provided for locating the proper neutral point of contact between the follower roller and the brake lever. A corresponding "match mark" (Fig. 6) is provided on the gear housing, just above the pointer of each brake shaft to which the brake band links are attached.

As the brake band lining wears, the follower roller contact point moves away from its "match mark" (Fig. 5), changing the free movement of the clutch engagement. NOTE: *Excessive free movement is noticeable through the operating control levers as extended travel; therefore, it is necessary to check the brake adjustment BEFORE adjusting the clutch.*

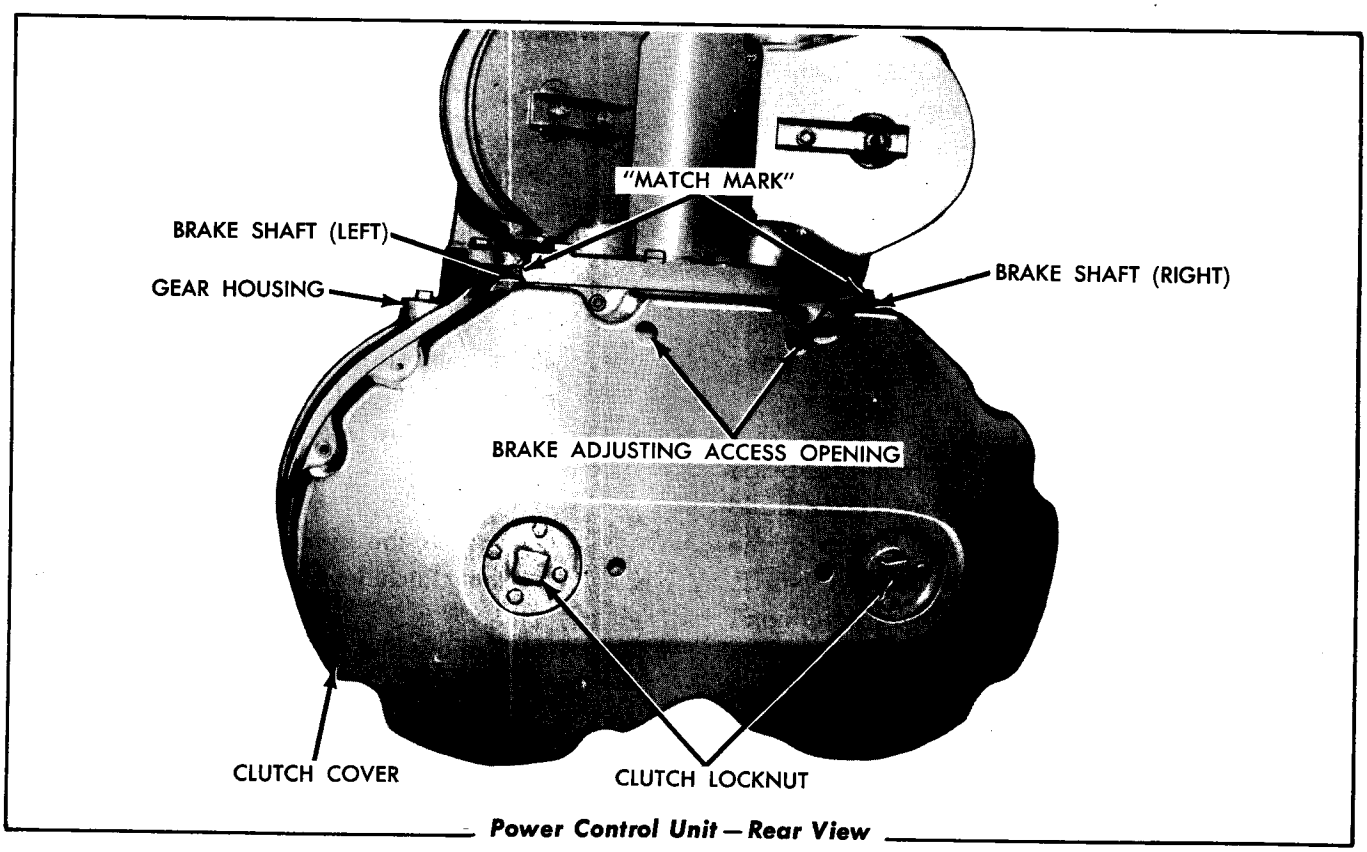
B. ADJUSTMENTS

As the clutch discs and the brake band linings wear, it is necessary to make adjustments to compensate for this wear. The procedure for adjusting the left and right clutch and the left and right brake are the same.



Power Control Unit Control Linkage

FIG. 5



Power Control Unit — Rear View

FIG. 6

1. Brake Adjustment

a. To adjust the brake, insert the end of a screwdriver through the brake adjusting access opening (Fig. 6) in the upper rear of the clutch cover and engage it with the slotted flange on the brake adjusting sleeve (Fig. 7). With the access opening as a pry base, turn the adjusting sleeve as follows:

(1) For the left hand brake, turn the brake adjusting sleeve, by prying upward on slotted flange with the screwdriver, until the pointer of the brake shaft lines up with its "match mark" (Fig. 7) on the gear housing.

(2) For the right hand brake, turn the brake adjusting sleeve, by prying downward on the slotted flange with the screwdriver, until the pointer of the brake shaft lines up with its "match mark" (Fig. 7) on the gear housing.

b. When the pointer of the brake shaft is in line with its "match mark" (Fig. 6) on the gear housing, the follower rollers will also be in line with their corresponding "match mark" (Fig. 5) on the brake lever.

NOTE: *As the "match marks" for the follower rollers are located on the front of the unit, the use of a mirror is required when checking the point of contact of each follower roller with its corresponding brake lever.*

c. All of the above brake adjustments provide only the proper setting of the brake band and levers to obtain proper action at the neutral and brake release positions. NOTE: *It is important that the above adjustments be made or checked first.* Thereafter, to increase or decrease the holding capacity of the brake it is necessary only to adjust the tension of the brake springs.

d. The brake springs (Fig. 5) are adjusted at the factory for average service. For severe service, it may be necessary to increase the tension by tightening the adjusting nuts (Fig. 5) located on the brake spring adjusting eye bolts. CAUTION: *DO NOT TIGHTEN THE SPRINGS MORE THAN IS NECESSARY TO HOLD THE LOAD WITHOUT SLIPPING.*

e. To increase or decrease the holding capacity of the brake by spring tension, adjust as follows:

(1) To increase the tension on the right brake spring, tighten adjusting nut on the eye bolt connected to right spring; the adjusting nut is accessible from the left side of the unit. Turn the nut onto the eye bolt, about ½ turn at a time, until the desired holding capacity of brake is obtained.

(2) Adjust the tension on the left brake spring in same manner as above; the adjusting nut is accessible from the right side of the unit.

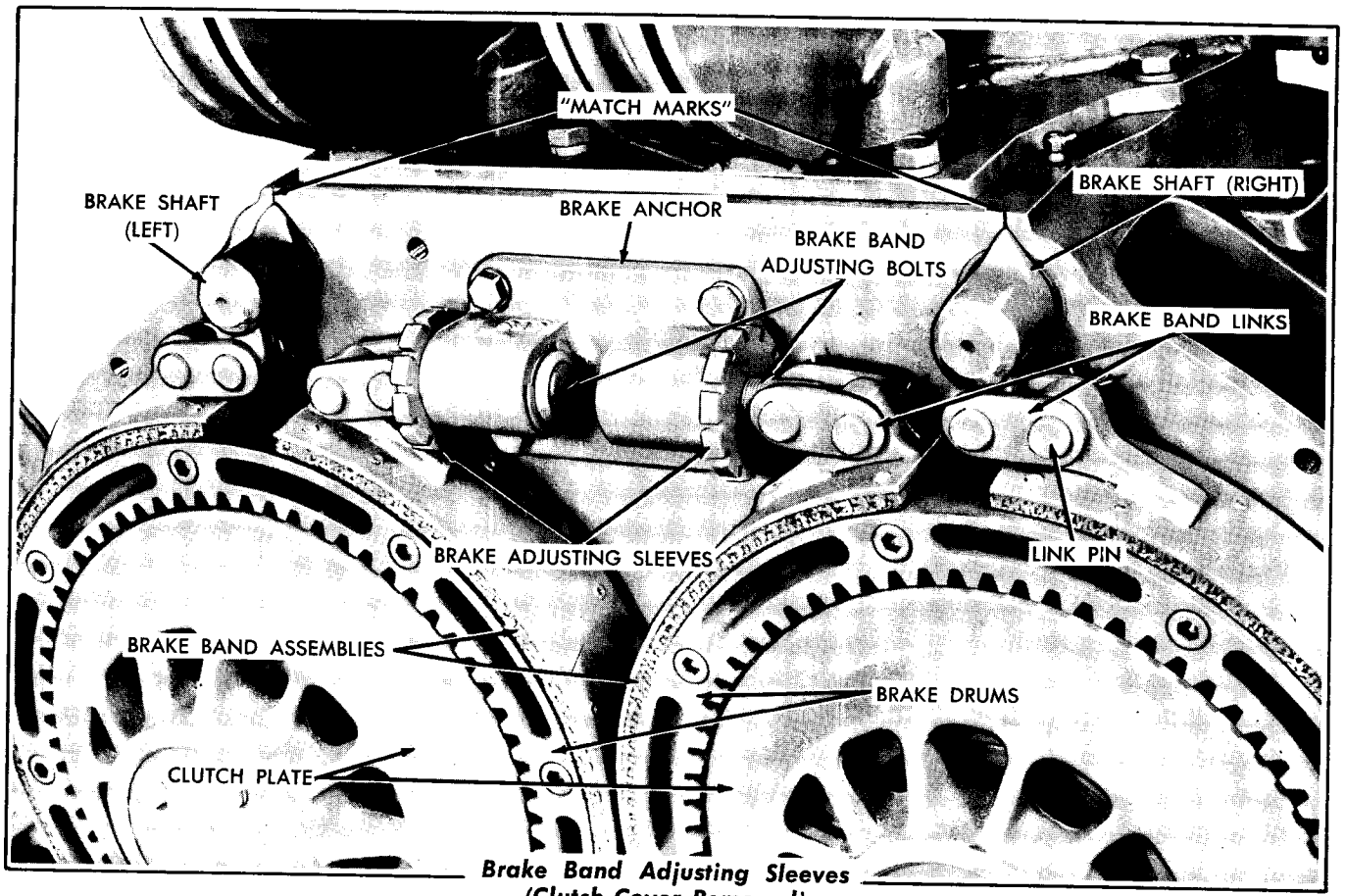
2. Clutch Adjustment

a. NOTE: *The brakes MUST be checked and properly adjusted before adjusting the clutches.* Check and adjust the brakes as instructed above.

b. With the operating control lever in "NEUTRAL," measure between the face of the clutch control shaft nut and the clutch lever as shown in Fig. 8. This measurement should be ⅜". Adjust the clutch control shaft as follows:

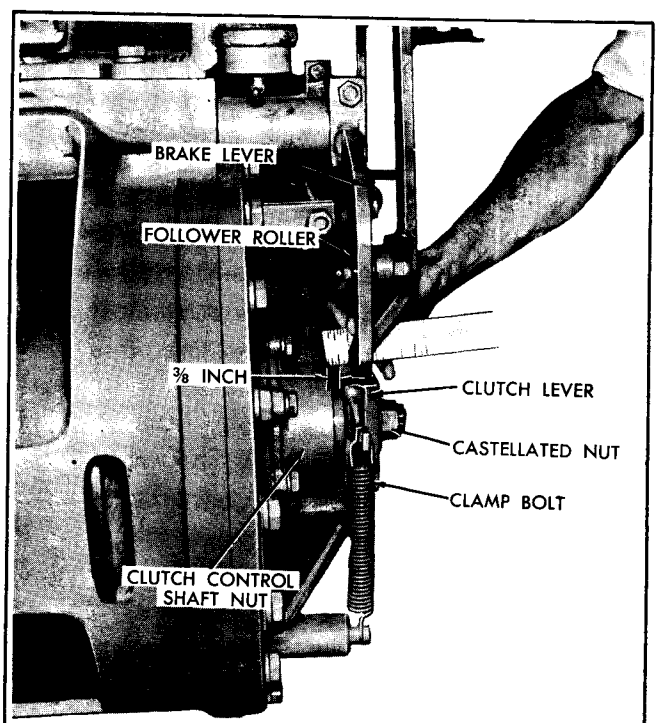
(1) Loosen the clamp bolt in the hub of the clutch lever (Fig. 8).

(2) Remove the cotter pin from castellated nut on the front end of the clutch control shaft. Hold the follower roller against the brake lever at the "match mark," then turn the castellated nut onto the control shaft until the clutch lever is ⅜" from the face of the clutch control shaft nut.



Brake Band Adjusting Sleeves (Clutch Cover Removed)

FIG. 7



Measuring the Position of Clutch Lever on the Control Shaft

FIG. 8

(3) When the proper position is obtained, install the cotter pin and tighten the clamp bolt securely.

(4) Check and readjust the brake if necessary.

c. Loosen (DO NOT REMOVE) the four capscrews attaching the clutch lock nut (Fig. 6) to the clutch adjusting screw.

d. Insert a heavy duty screwdriver, or suitable bar, through the lower drilled hole in the clutch cover (left side for left clutch and right side for right clutch) and between the spokes in the clutch plate until the screwdriver engages the clutch hub teeth. This will prevent the rotation of the clutch plate when adjusting.

e. To tighten the clutch, turn the clutch lock nut and adjusting screw assembly counterclockwise, ¼ to ½ turn at a time, until there is 6" free movement of the operating

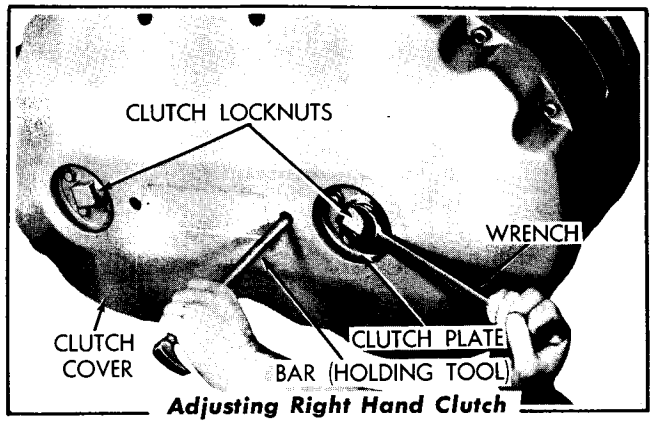
control lever (between neutral and set positions). This measurement is to be taken at the end of the operating control lever.

IMPORTANT: *Adjust for more than 6" free movement if desired; never adjust for less than 6" free movement as this will cause overheating of the clutch.*

f. To loosen the clutch, turn the clutch lock nut and adjusting screw assembly clockwise, ¼ to ½ turn at a time, until there is 6" free movement of the operating control lever (between neutral and set positions).

g. When the proper clutch adjustment has been obtained, tighten the four capscrews attaching the clutch lock nut to the adjusting screw. NOTE: *If for any reason it has been necessary to remove the clutch lock nut from the clutch adjusting screw, reassemble as follows:*

(1) Make sure the "O" ring seal (Fig. 17) is seated in the groove provided.



Adjusting Right Hand Clutch

FIG. 9

(2) Turn the clutch lock nut in until it bottoms (becomes tight) against the adjusting screw.

(3) Back off the lock nut ½ to ¾ turn, then line up the holes and install the four capscrews.

(4) Check the clutch adjustment.

INSTALLATION INSTRUCTIONS

A. General

The PCU-75 can be mounted on "Allis-Chalmers" Models HD-15, HD-16, HD-20, and HD-21 Tractors and can also be adapted for use on other tractors of comparable horsepower and speed.

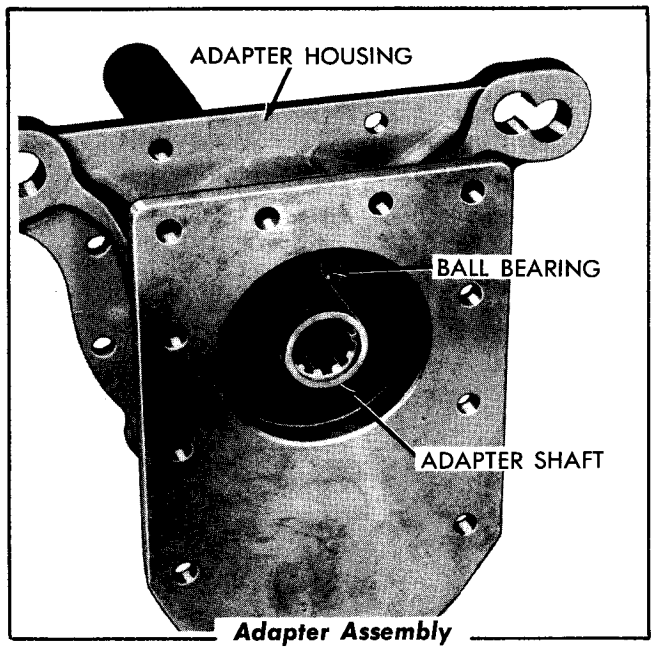
Two adaption groups, each consisting basically of a shaft (with couplings), ball bearing, adapter housing, and the necessary parts for mounting the P.C.U. on the rear of the tractor, are available. One adaption group is applicable for the Models HD-15 and HD-16 Tractors and the other group for the Models HD-20 and HD-21 Tractors. Also, two rear corner sheave groups, which are required for "Allis-Chalmers" cable operated bulldozers and gradebuilders, are available. One rear corner sheave group is applicable for the Model HD-16 Tractor and the other group for the HD-21 Tractor.

B. Installation of Adapter Assembly and P.C.U. on "Allis-Chalmers" Models HD-16 and HD-21 Tractors

1. Remove the bevel gear compartment rear cover and gasket from the rear of the steering clutch and final drive housing of the tractor.

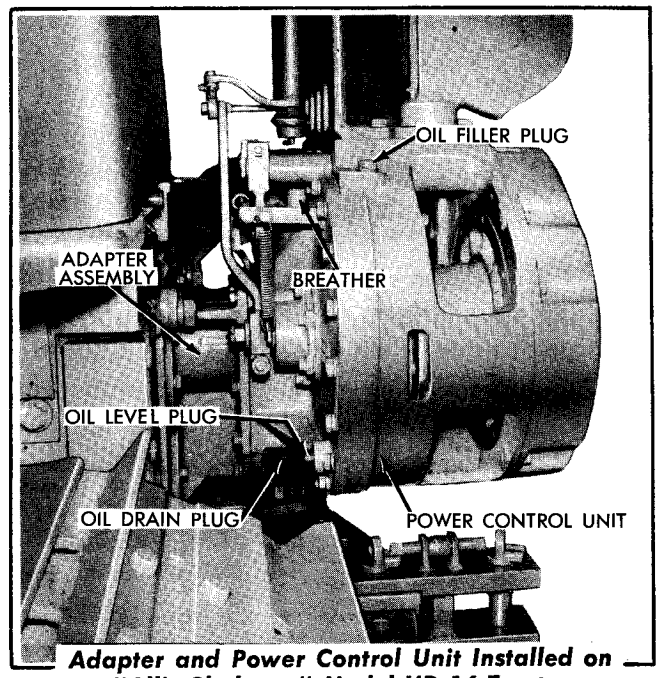
2. Remove the thread protecting plugs (and four capscrews on the HD-21) from the rear of the steering clutch and final drive housing, at the locations where capscrews must be installed to attach the adapter assembly (Fig. 10) to the rear of the tractor.

3. Place the adapter-to-tractor gasket in position on the adapter assembly. Install the assembly in position on the rear of the tractor, installing the coupling on the front end of the adapter shaft onto the end of the transmission top shaft. Secure the adapter assembly to the rear of the HD-15 and HD-16 Tractors using ten ⅝" NF x 1¾" capscrews and lockwashers and two 1¼" NF x 3½" capscrews and lockwashers. Secure the adapter assembly to the rear of the HD-20 and HD-21 Tractors using twelve ⅝" NF x 2" capscrews and lockwashers and two 1¼" x 3½" capscrews and lockwashers.



Adapter Assembly

FIG. 10



Adapter and Power Control Unit Installed on "Allis-Chalmers" Model HD-16 Tractor

FIG. 11

4. Lubricate the ball bearing of the adapter assembly with clean oil for initial lubrication.

5. Place the adapter-to-P.C.U. gasket in position on the rear face of the adapter assembly. Install the power control unit in position on the adapter, inserting the end of the P.C.U. input pinion into the rear coupling of the adapter shaft. Secure the P.C.U. to the adapter assembly using twelve 5/8" x 1 3/4" capscrews and lockwashers. Tighten all capscrews securely.

6. Loosen the clamp bolts of the operating control levers and adjust the levers for the desired height and position.

7. If the power control unit is to be used for bulldozer operation, refer to Fig. 3 and install the rear corner sheave and the lower fairlead stop bracket as shown.

8. Fill the power control unit to the proper level with the specified lubricant. For initial lubrication, thoroughly lubricate all points, where lubricating fittings are provided, with pressure gun lubricant.

CABLE

A. Cable Requirements

1. Specification: 6 Strand, 19 Wire, Preformed, Left or Right, Lang Lay, Wire Center, Improved Plow Steel.

2. The cable on each cable drum should be of sufficient length as to leave about two complete turns of cable on the drum when the equipment being handled is at its maximum *OUT* or *DOWN* position. However, an excessive amount of cable will only become worn and useless on the drum and will also increase the load required on the clutches, etc. to operate the equipment due to the larger pitch diameter of the spooled cable.

3. For bulldozer operation, 6 turns of the cable on the cable drum with the moldboard at ground level is satisfactory.

4. For scraper operation, allow for 2 turns on the left hand drum when the ejector is at the extreme rear position and the apron down. Allow 5 or 6 turns on the right hand drum when the scraper bowl is at ground level.

5. For rippers, provide 6 to 8 turns on the left hand drum when the tooth points are at ground level.

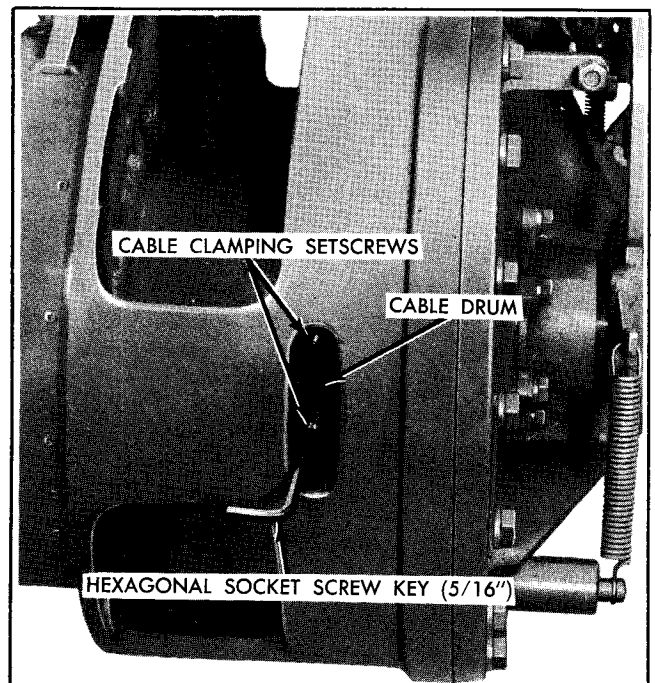
B. Cable Replacement

1. Before replacing the cable, disengage the engine clutch, place the gear shift lever in "NEUTRAL," and stop the engine.

2. Push the operating control lever of the P.C.U. to the right as far as it will go; this releases the brake so that the cable drum may be turned by hand.

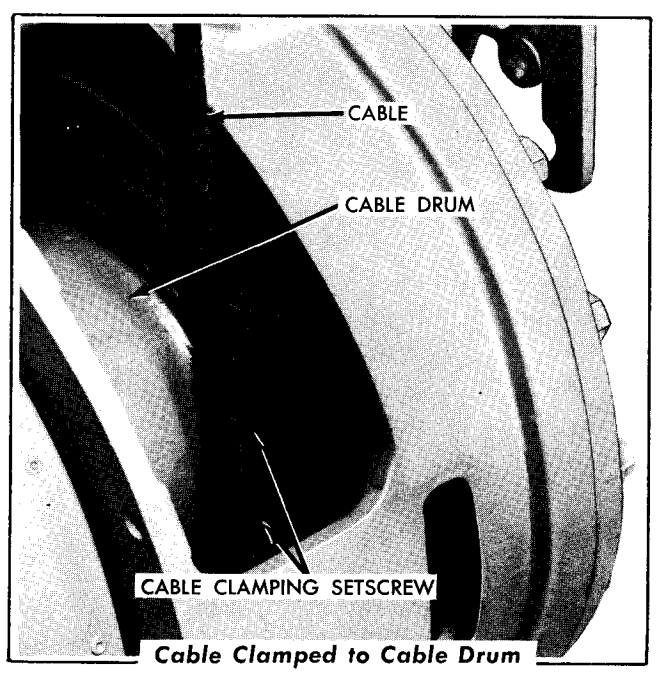
3. Each cable drum is fitted with a cable groove at the flange end and has a boss with two 5/8" socket-head setscrews (Fig. 12) for clamping the end of the cable in groove. Turn the cable drum so that the setscrews are accessible through the access opening in the gear housing, then loosen the two setscrews.

4. NOTE: *The new cable should have each end welded or wire bound to permit easy threading.* Thread the new cable into the lower fairlead sheave, up and around the upper fairlead sheave, then down to the drum flange. Place the end of the cable into position in the groove of the cable drum and secure with the two setscrews. Refer to Fig. 13 which shows the cable in the groove and the first full turn.



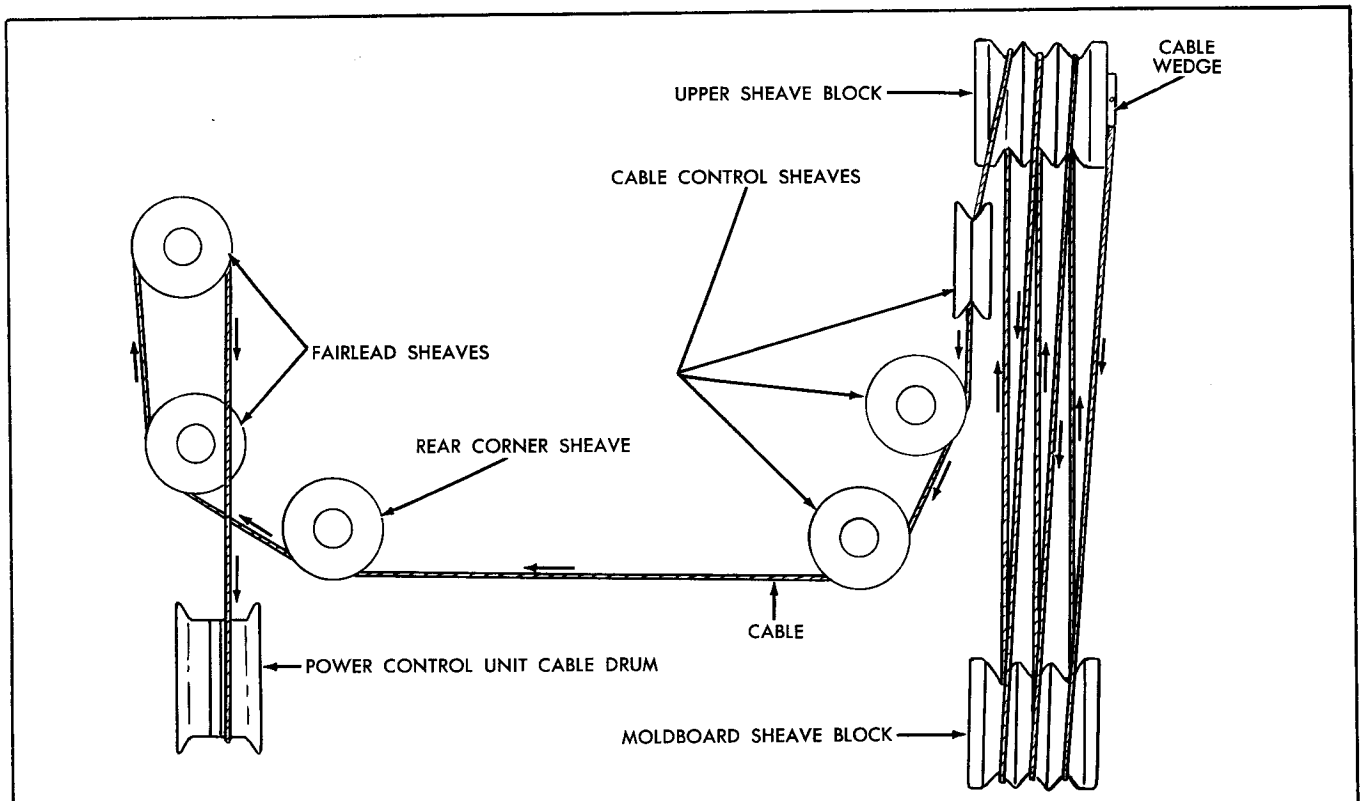
Cable Clamping Setscrews

FIG. 12



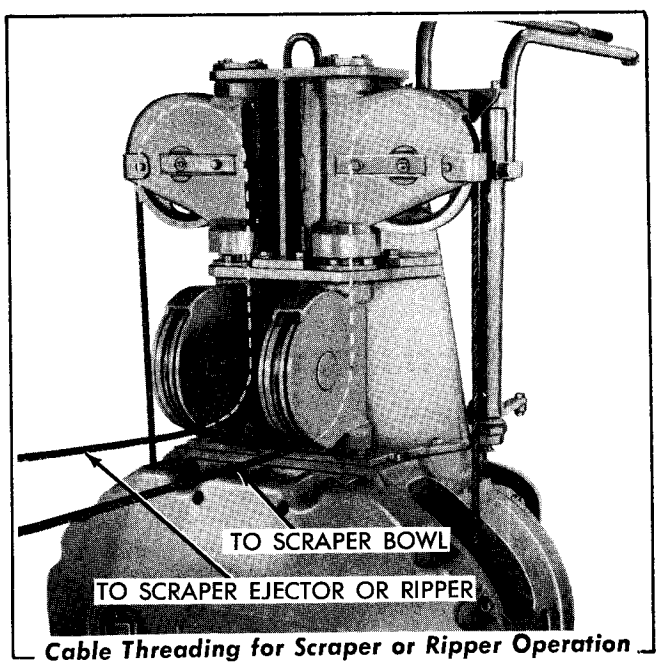
Cable Clamped to Cable Drum

FIG. 13



Cable Threading Diagram (for "Allis-Chalmers" Bulldozer or Gradebuilder Operation)

FIG. 14



Cable Threading for Scraper or Ripper Operation

FIG. 15

5. When threading the cable refer to Figs. 14 and 15, which shows the proper sequence for threading the cable.

6. Turn the cable drum one revolution, holding the cable taut. The cable can now be wound onto the drum with engine power. Start the engine and engage the engine clutch. With the engine operating at low idle speed, engage the clutch of the P.C.U. just enough to rotate the cable drum slowly so as to wind the loose cable onto the drum. Use a bar, or similar tool, to keep the turns wound closely together so that the cable will not be "crossed." The cable life will be much longer if the "spooling" is kept even and close at all times.

BRAKE LINING REPLACEMENT

A. General

Due to the variable operating conditions, specific time intervals for brake service are not given. As the brake linings wear, it is necessary to make adjustments to compensate for this wear (refer to "POWER CONTROL UNIT BRAKE AND CLUTCH ADJUSTMENTS," Paragraph B 1). Periodically remove the clutch cover, located over the brakes and clutches, and inspect the brake linings for wear. The linings must be replaced before they are worn to a point where the lining retaining rivets will contact and score the brake drums.

B. Replacement of Either Brake Linings

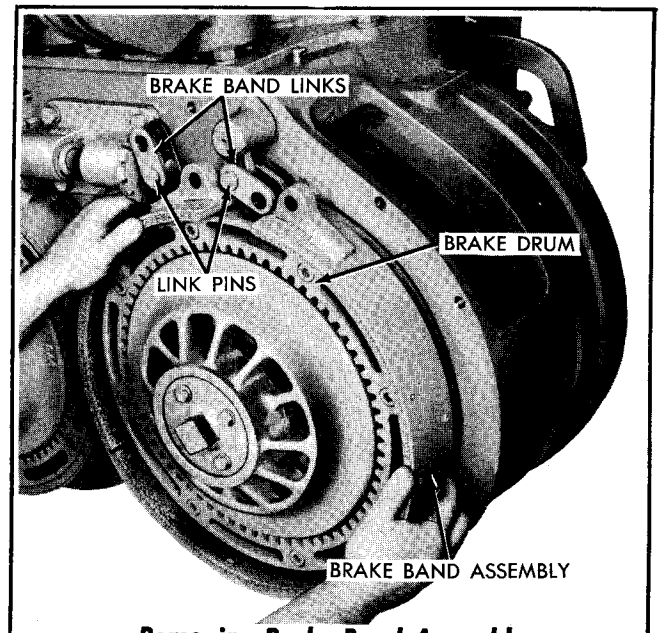
1. Remove the clutch cover.

2. Push the operating control lever of the P.C.U. to the right as far as it will go ("lock-out position").

3. Remove the cotter pins from the brake band link pins (Fig. 7) and remove the link pins.

4. Rotate the brake band assembly until the brake band links are free of the band and remove the band. Remove the lining retaining rivets and the old brake lining.

5. When installing new brake lining, use care and do not distort the brake band. Reshape the band assembly to the brake drum, if necessary, by the use of a soft hammer. Be sure to allow at least 1/16" gap between the ends of the lining segments when installing new lining.



Removing Brake Band Assembly

FIG. 16

6. Reinstall the brake band assembly by direct reversal of the removal procedure. Adjust the brake (refer to "POWER CONTROL UNIT BRAKE AND CLUTCH ADJUSTMENTS," Paragraph B 1).

CLUTCH DISC REPLACEMENT

A. GENERAL

Due to the variable operating conditions, specific time intervals for clutch service are not given. As the clutch discs wear, it is necessary to make adjustments to compensate for this wear (refer to "POWER CONTROL UNIT BRAKE AND CLUTCH ADJUSTMENTS," Paragraph B 2).

If the clutches slip under load, or if excessive pull is required on the operating control levers to engage the clutches, this is an indication of dirt or oil on the discs. The clutches should be disassembled, thoroughly cleaned, inspected, and the oil seals replaced if necessary.

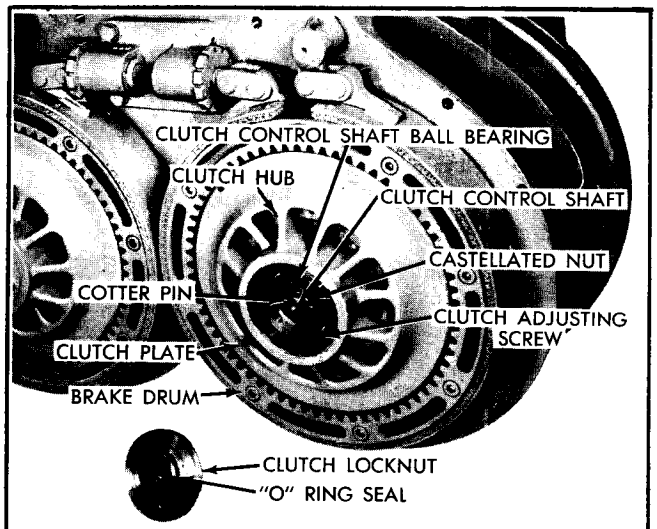
B. DISASSEMBLY OF CLUTCHES

NOTE: *The following procedure applies to either clutch.*

1. Remove the clutch cover. Remove the 4 capscrews from the clutch lock nut (Fig. 6) and turn the lock nut out of the clutch plate.

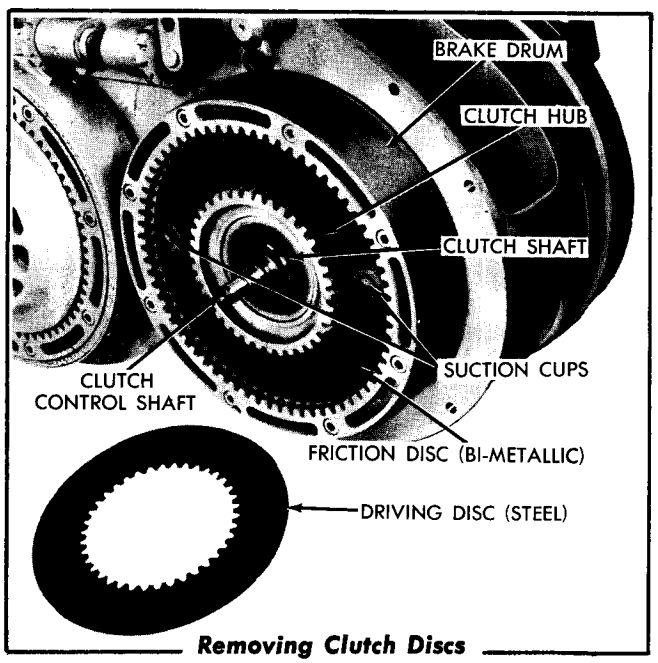
2. Remove the cotter pin and remove the castellated nut (Fig. 17) from the rear end of the clutch control shaft.

3. The clutch plate, with the clutch adjusting screw may now be removed from the clutch control shaft. NOTE: *If the clutch control*



Clutch Lock Nut Removed from Clutch Adjusting Screw

FIG. 17



Removing Clutch Discs

FIG. 18

shaft ball bearing (Fig. 17) is tight on the clutch control shaft, pull the operating control lever to the left (to the engaged position) to loosen the bearing.

4. The clutch discs may now be removed. Use suction cups, or magnetic tool, and withdraw the discs (6 bi-metallic and 6 steel discs) from the clutch hub and the brake drum.

C. CLEANING AND INSPECTION

1. Driving Discs (Steel Discs)

The specified thickness of a driving disc (steel disc) when new is .084" to .096". Inspect the discs for wear and scoring. The discs must be straight and flat within .015".

2. Friction Discs (Bi-metallic Discs)

The specified thickness of a friction disc (bi-metallic disc) when new is .152" to .157". Inspect the discs for wear, condition of teeth, and scoring. If the thickness of the friction discs is less than .125", or the discs are damaged or scored, new discs must be installed. The discs must be straight and flat within .015".

3. Clutch Hub and Brake Drum

Inspect the teeth of the clutch hub and the brake drum for wear, as heavy grooving may cause binding of the discs. Replace the hub and drum if necessary.

4. Adjusting Screw Inner Seal and Clutch Seal

The presence of oil on the clutch discs indicates a damaged oil seal. Replace the damaged oil seal (refer to "REPLACEMENT OF OIL SEALS").

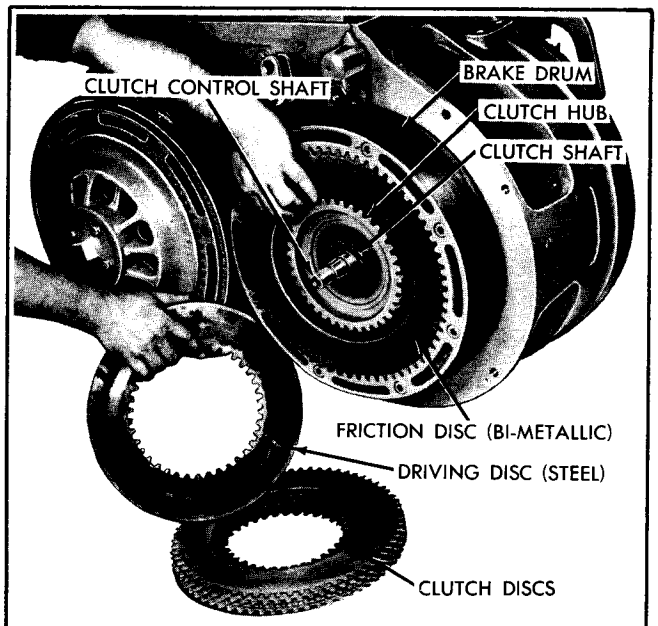
D. ASSEMBLY OF CLUTCHES

NOTE: *The following procedure applies to either clutch.*

1. Starting with a bi-metallic disc (friction disc) next to the cable drum, alternate with steel discs (driving discs) and bi-metallic discs until 6 bi-metallic and 6 steel discs have been installed.

2. Install the clutch plate, with the clutch adjusting screw and ball bearing, in position on the clutch control shaft. Make certain the operating control lever is moved to the "lock-out" position. Install the castellated nut (Fig. 17) in position on the clutch control shaft and tighten securely. Install the cotter pin.

3. Move the operating control lever to the "NEUTRAL" position. Screw the clutch lock nut (Fig. 6) into the clutch plate until the lock nut bottoms against the adjusting screw, then back the lock nut out ½ to ¾ turn and



Installing Clutch Discs

FIG. 19

line up the capscrew holes in the lock nut with the holes in the adjusting screw. Install the 4 capscrews (with lockwashers), but do not tighten until the clutch is properly adjusted.

4. Check the adjustment of the brake and adjust if necessary (refer to "POWER CONTROL UNIT BRAKE AND CLUTCH ADJUSTMENTS," Paragraph B 1).

5. Adjust the clutch (refer to "POWER CONTROL UNIT BRAKE AND CLUTCH ADJUSTMENTS," Paragraph B 2).

6. When the clutch is properly adjusted, tighten the 4 capscrews in the clutch lock nut. Install the clutch cover.

REPLACEMENT OF OIL SEALS

A. General

Oil leakage from the clutches indicates a damaged adjusting screw inner seal or clutch seal (or both). Oil leakage from around the front of the cable drum indicates a damaged drum oil seal. Refer to Fig. 1 for location of oil seals. If oil leakage is noted, new oil seals must be installed.

B. Replacement of Adjusting Screw Inner Seal

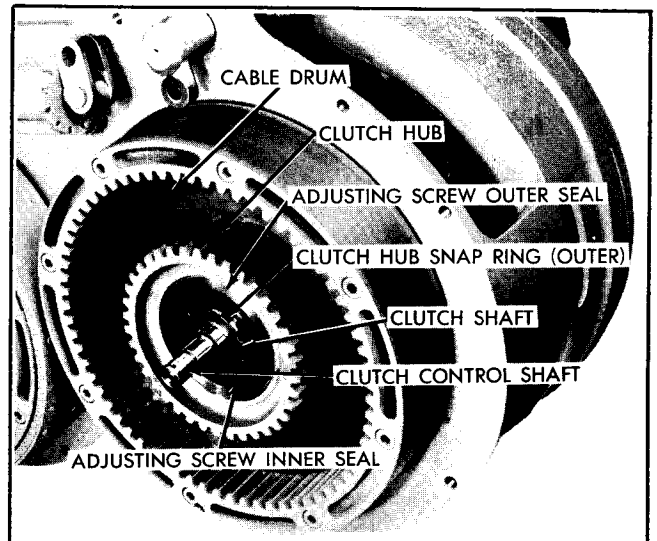
NOTE: *The following procedure applies to the replacement of the adjusting screw inner seal for either clutch.*

1. Disassemble the clutch (refer to "CLUTCH DISC REPLACEMENT," Paragraph B, Steps 1 thru 4).

2. Remove the clutch hub snap ring (Fig. 20) and pull the clutch hub from the clutch shaft.

3. Turn the clutch hub over (rear side downward), use a punch inserted into the drilled holes in the clutch hub (Fig. 22), and drive the outer oil seal from the clutch hub. Using a screw driver, or similar tool, remove the inner oil seal.

4. Wash and dry the clutch hub. Coat the in-

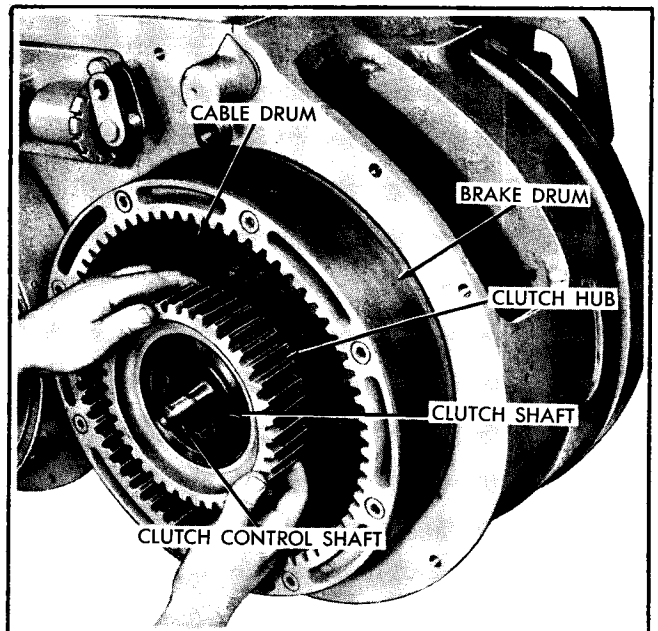


Adjusting Screw Outer and Inner Seals — Installed

FIG. 20

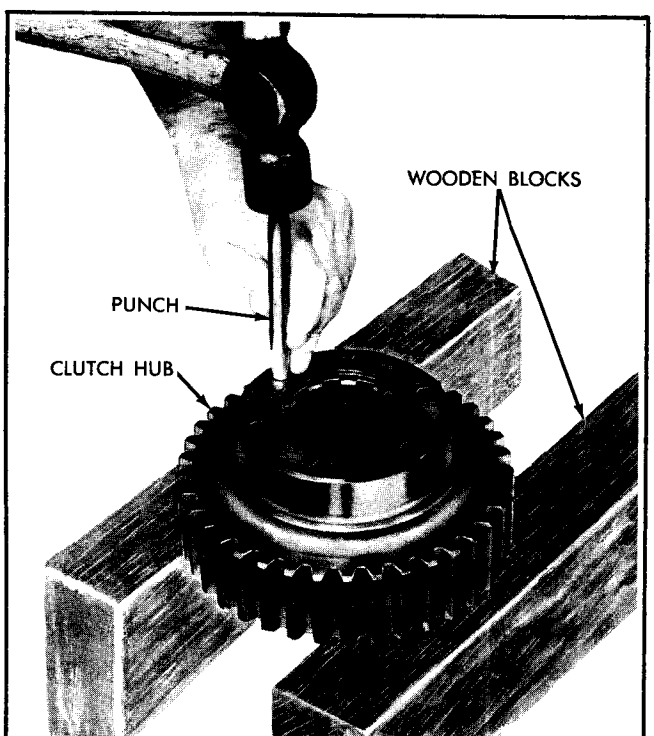
side diameter of the clutch hub (at the seal location) with liquid-type gasket cement. Start the new inner seal into position in the clutch hub and press it into the counterbore using finger pressure; this is a rubber seal and it may be pressed into the bore by hand pressure. NOTE: *Make certain that the seal is installed so that the sealing lip is towards the front of the clutch hub.*

5. Start the new outer seal into position in the clutch hub; tap the seal lightly with a hammer and drive it into position. NOTE: *Make*



Pulling Clutch Hub from Clutch Shaft

FIG. 21

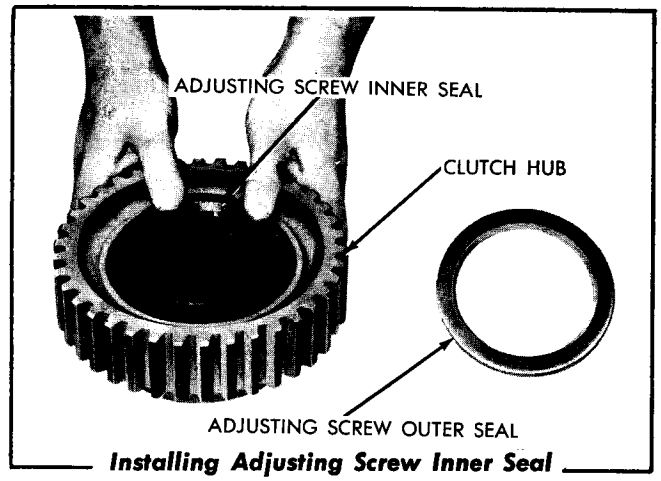


Driving Adjusting Screw Outer Seal from Clutch Hub

FIG. 22

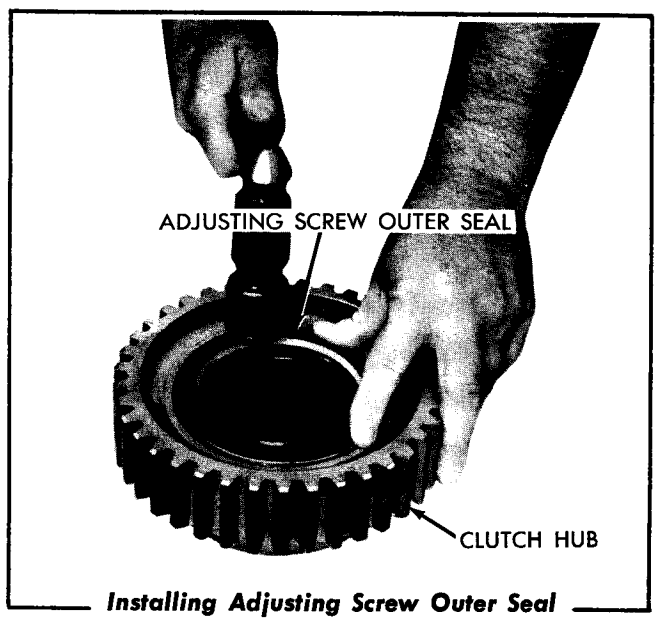
certain that the seal is installed so that the sealing lip is towards the inner seal.

6. Lubricate the seals with clean oil. Install the clutch hub in position on the clutch shaft and install the clutch hub snap ring (Fig. 20).



Installing Adjusting Screw Inner Seal

FIG. 23



Installing Adjusting Screw Outer Seal

FIG. 24

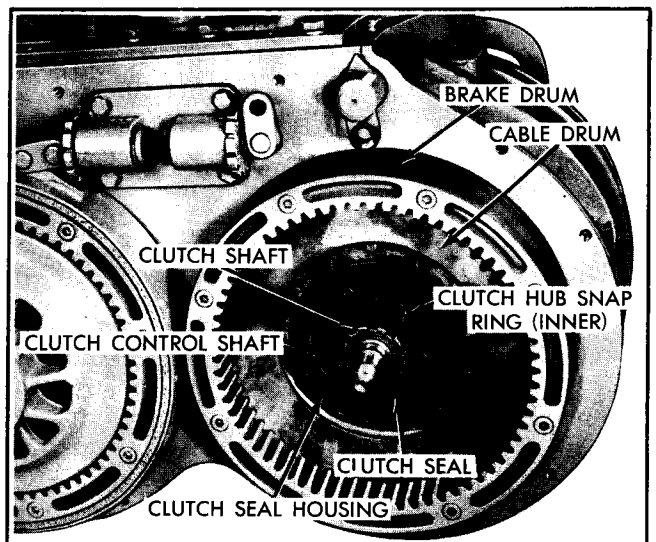
7. Thoroughly clean and dry the clutch discs. Assemble the clutch (refer to "CLUTCH DISC REPLACEMENT," Paragraph D, Steps 1 thru 3).

8. Adjust the clutch (refer to "POWER CONTROL UNIT BRAKE AND CLUTCH ADJUSTMENTS," Paragraph B 2).

C. Replacement of Clutch Seal

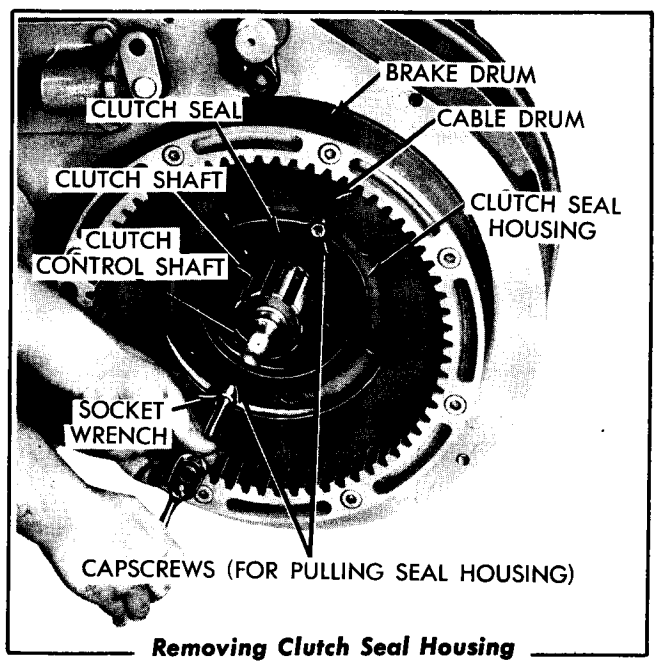
NOTE: *The following procedure applies to the replacement of the clutch seal for either clutch.*

1. Disassemble the clutch and remove the clutch hub following the procedure in Paragraph B, Steps 1 and 2 above.



Clutch Seal Housing — Installed

FIG. 25



Removing Clutch Seal Housing

FIG. 26

2. Remove the 6 capscrews and lockwashers attaching the clutch seal housing (Fig. 25) to the cable drum. The seal housing is provided with 2 tapped holes for puller screws; if the seal housing is tight, use two capscrews in these holes to free the housing.

3. Using a screw driver, or similar tool, remove the clutch seal from the clutch seal housing. Wash and dry the clutch seal housing.

4. Coat the inside diameter of the seal housing with liquid-type gasket cement. Start the new clutch seal into the seal housing and press it into position using finger pressure; this is a rubber seal and it may be pressed into the housing by hand pressure. NOTE: *Make certain that the seal is installed so that the sealing lip will be toward the cable drum bearing when the seal housing is installed.*

5. Lubricate the seal with clean oil. Install the seal housing, replacing the seal housing gasket if necessary. Secure the seal housing to the cable drum with 6 capscrews and lockwashers.

6. Install the clutch hub in position on the clutch shaft and install the clutch hub snap ring (Fig. 20).

7. Thoroughly clean and dry the clutch discs. Assemble the clutch (refer to "CLUTCH DISC REPLACEMENT," Paragraph D, Steps 1 thru 4).

8. Adjust the clutch (refer to "POWER CONTROL UNIT BRAKE AND CLUTCH ADJUSTMENTS," Paragraph B 2).

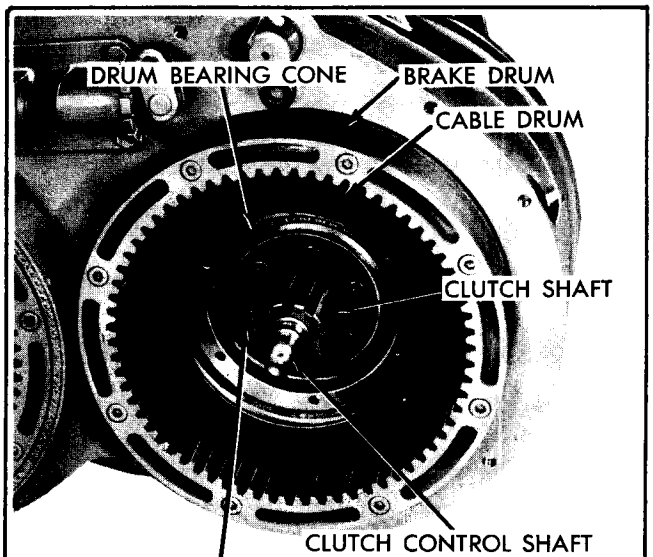
D. Replacement of Drum Oil Seal

NOTE: *The following procedure applies to the replacement of the drum oil seal for either cable drum.*

1. Remove the brake band assembly (refer to "BRAKE LINING REPLACEMENT," Paragraph B, Steps 1 thru 4). Loosen the cable from the cable drum.

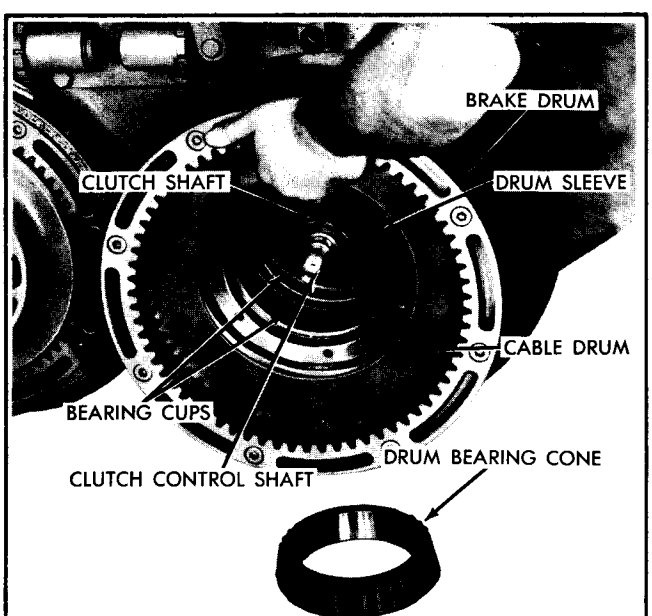
2. Disassemble the clutch, remove the clutch hub, and remove the clutch seal housing following the procedure in Paragraph C, Steps 1 and 2 above. Remove the other snap ring for the clutch hub.

3. Remove the 6 retainer capscrews from the



Cable Drum Bearing Retainer — Installed

FIG. 27



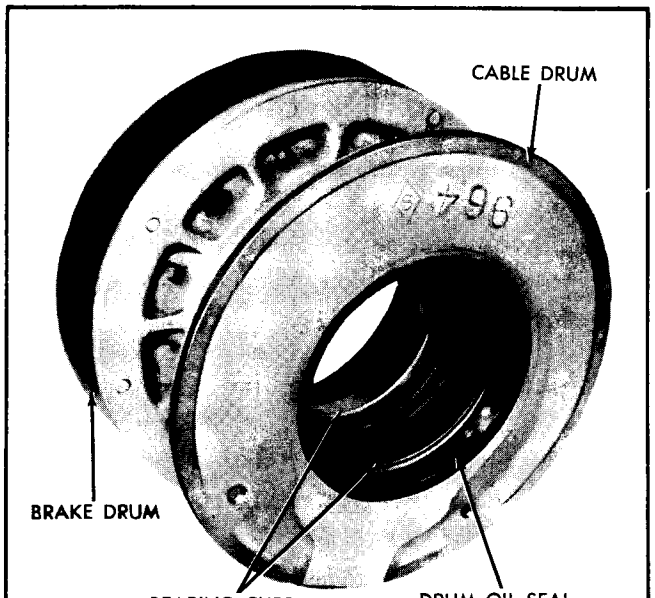
Removing Cable Drum

FIG. 28

drum bearing retainer (Fig. 27). Remove the drum bearing retainer and the shims. Tie the shims to the retainer to prevent loss.

4. Remove the cable drum from the drum sleeve. NOTE: *It may be necessary to place a wooden block against the cable drum and to strike the block with a hammer, to force the rear bearing cone from the drum sleeve.*

5. Using a screw driver, or similar tool, remove the drum oil seal from the cable drum. Clean



Cable Drum Oil Seal — Installed

FIG. 29

the counterbore (for the oil seal) in the cable drum. Also, make certain the drum bearing cones and bearing cups are clean and in good condition; replace the bearing cones and cups if necessary.

6. Coat the counterbore (for the oil seal) in the cable drum with liquid-type gasket cement. Start the drum oil seal into position in the cable drum and press it into the counterbore using finger pressure; this is a rubber seal and it may be pressed into the bore by hand pressure. NOTE: *Make certain that the seal is installed so that the sealing lip is towards the front bearing cup in the cable drum.*

7. Lubricate the drum oil seal and the drum bearing cones with clean oil. Install the cable drum in position on the drum sleeve and install the rear bearing cone.

8. The cable drum bearings are properly adjusted when they have .002" to .003" pre-load. Install the drum bearing retainer with the original shim pack and tighten the retainer capscrews evenly. Turn the cable drum by hand and if the drum turns freely, remove a shim (or shims) from the shim pack until a slight pre-load is noted when turning the cable drum. NOTE: *Strike the cable drum*

with a soft hammer when adjusting the bearings, to make certain the bearings are properly seated.

9. Install the clutch seal housing (Fig. 25), replacing the oil seal and the seal housing gasket if necessary. Secure the seal housing to the cable drum with 6 capscrews and lockwashers.

10. Install the inner snap ring for the clutch hub (Fig. 25). Install the clutch hub in position on the clutch shaft and install the clutch hub snap ring (Fig. 20).

11. Thoroughly clean and dry the clutch discs. Assemble the clutch (refer to "CLUTCH DISC REPLACEMENT," Paragraph D, Steps 1 thru 5). Install and adjust the brake band assembly (refer to "BRAKE LINING REPLACEMENT," Paragraph B).

12. Adjust the clutch (refer to "POWER CONTROL UNIT BRAKE AND CLUTCH ADJUSTMENTS," Paragraph B 2).

E. Replacement of Control Shaft Nut Seal

NOTE: *The following procedure applies to the replacement of the control shaft nut seal for either side.*

1. Unhook and remove the clutch lever return spring (Fig. 43).

2. Remove the nut and capscrew attaching the control rod end to the control lever shaft (Fig. 3). Loosen the clamp bolt (Fig. 8) and remove the clutch lever from the clutch control shaft screw.

3. Using a screw driver, or similar tool, pry the control shaft nut seal (Fig. 31) from the control shaft nut.

4. Thoroughly clean the counterbore of the control shaft nut and the control shaft screw (at the seal location). Coat the inside of the counterbore of the control shaft nut with liquid-type gasket cement. Lubricate the control shaft screw and the sealing lip of the new oil seal with clean oil.

5. Start the new oil seal in position on the control shaft screw, making certain that the sealing lip of the seal is towards the rear. Press the oil seal into position in the counterbore of the nut; this is a rubber seal and it may be pressed into position by hand pressure.

6. Refer to Fig. 43 and install the clutch lever in position on the clutch control shaft screw; do not tighten the lever clamping capscrew at this time.

7. Refer to Fig. 43 and install the clutch lever return spring. Connect the control rod end to the clutch lever shaft.

8. Adjust the clutch (refer to "POWER CONTROL UNIT BRAKE AND CLUTCH ADJUSTMENTS," Paragraph B 2).

REPLACEMENT OF CLUTCH SHAFT GEARS, CLUTCH SHAFT BEARINGS, INTERMEDIATE GEAR, AND INPUT PINION

NOTE: *Refer to Figs. 1 and 2 when disassembling and assembling the power control unit. Also, keep the parts for each side (right and left) separated so that they may be reassembled in the same relative position.*

A. DISASSEMBLY

1. Drain the oil from the gear case.

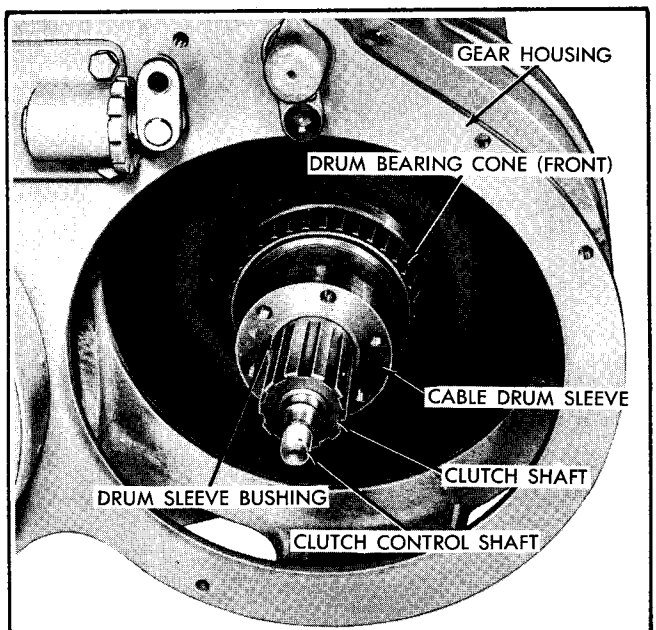
2. Loosen the cables from the power control unit. Remove the power control unit from the adapter assembly installed on the rear of the tractor.

3. Thoroughly wash and clean the power control unit. Remove both brake band assemblies (refer to "BRAKE LINING REPLACEMENT," Paragraph B).

4. Disassemble both clutches (refer to "CLUTCH DISC REPLACEMENT," Paragraph B, Steps 1 thru 4).

5. Remove both clutch hub snap rings (Fig. 20) and pull the clutch hubs from the clutch shafts. Remove the other snap rings (front rings) for the clutch hubs.

6. Remove the 6 capscrews and lockwashers attaching each clutch seal housing (Fig. 25) to the cable drum. Each seal housing is provided with 2 tapped holes for puller screws; if the seal housing is tight, use two capscrews in these holes to free the housing and remove each housing.



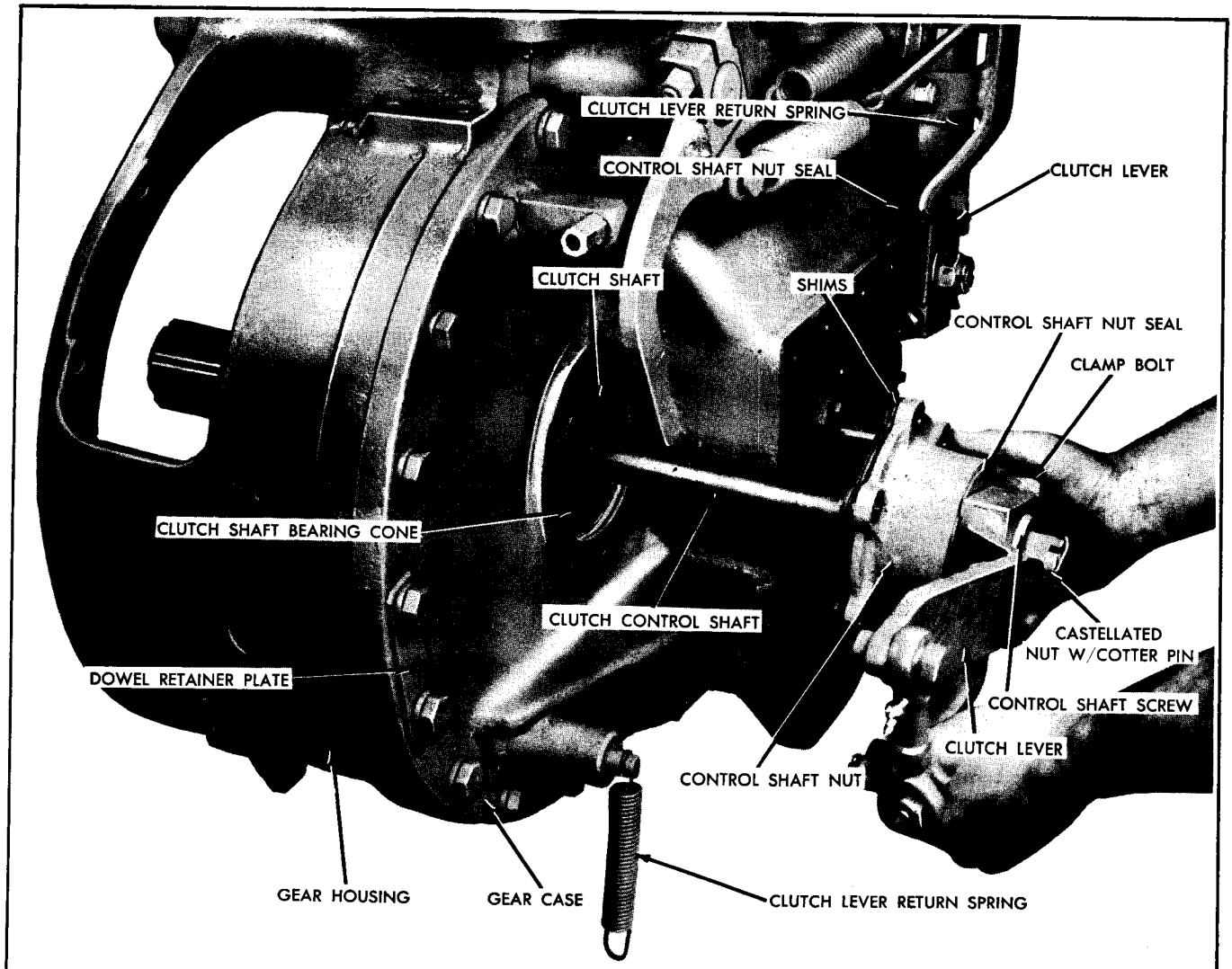
Cable Drum Sleeve (Cable Drum Removed)

FIG. 30

7. Remove the 6 retainer capscrews from each drum bearing retainer (Fig. 27). Remove each drum bearing retainer and shims. Tie the shims to their respective retainer to prevent loss.

8. Remove each cable drum from its drum sleeve (Fig. 28). NOTE: *It may be necessary to place a wooden block against the cable drums and to strike the block with a hammer to force the rear bearing cones from the drum sleeves.*

9. Unhook and remove each clutch lever return spring (Fig. 43).



Removing Clutch Control Shaft and Control Shaft Nut Assembly

FIG. 31

10. Remove the 6 capscrews and lockwashers attaching each control shaft nut (Fig. 31) to the gear case. Remove each control shaft nut, clutch control shaft, and clutch lever as an assembly by pulling forward on the clutch levers. Tie the shims to their respective control shaft nut to prevent loss.

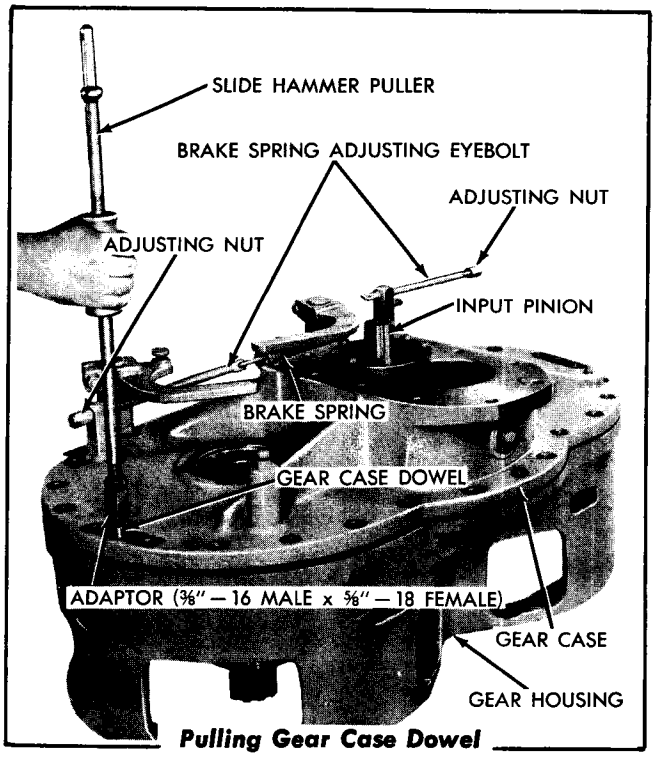
11. Remove the capscrews and lockwashers attaching the lower fairlead frame to the gear housing and remove the fairlead frame assembly.

12. Place the gear housing and gear case assembly, with the gear housing side downward, on a suitable bench so that the gear case can be removed. Place suitable blocking under the gear housing so that the clutch shafts are free of the weight.

13. Loosen the adjusting nut on the end of each brake spring adjusting eye bolt (Fig. 32) and remove the two brake springs.

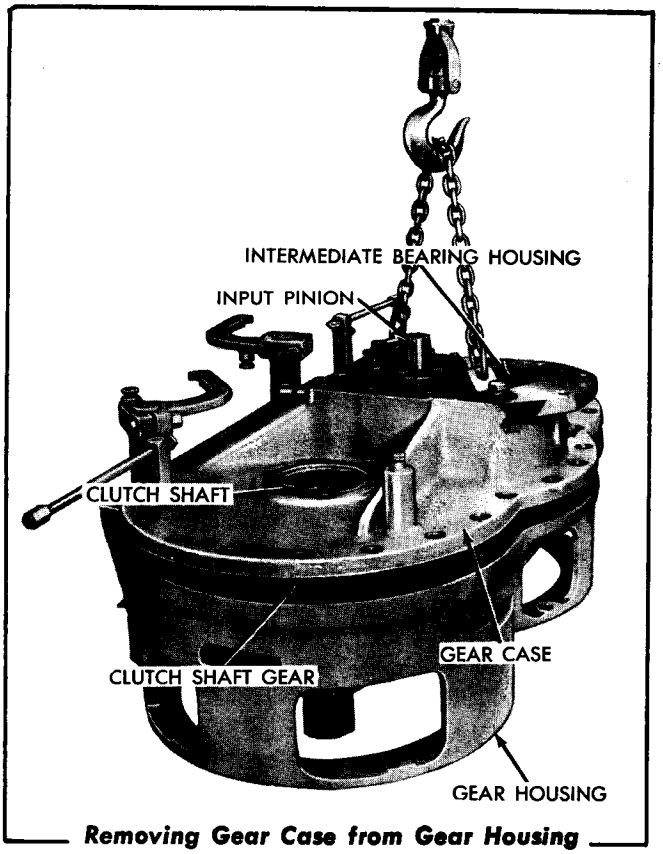
14. Remove the 28 capscrews attaching the gear case to the gear housing. Remove the 2 dowel retainer plates (Fig. 31). Using a slide hammer puller and adaptor, similar to the one shown in Fig. 32, pull the two gear case dowels.

15. Attach a chain to the gear case as shown in Fig. 33 and remove the gear case from the gear housing.



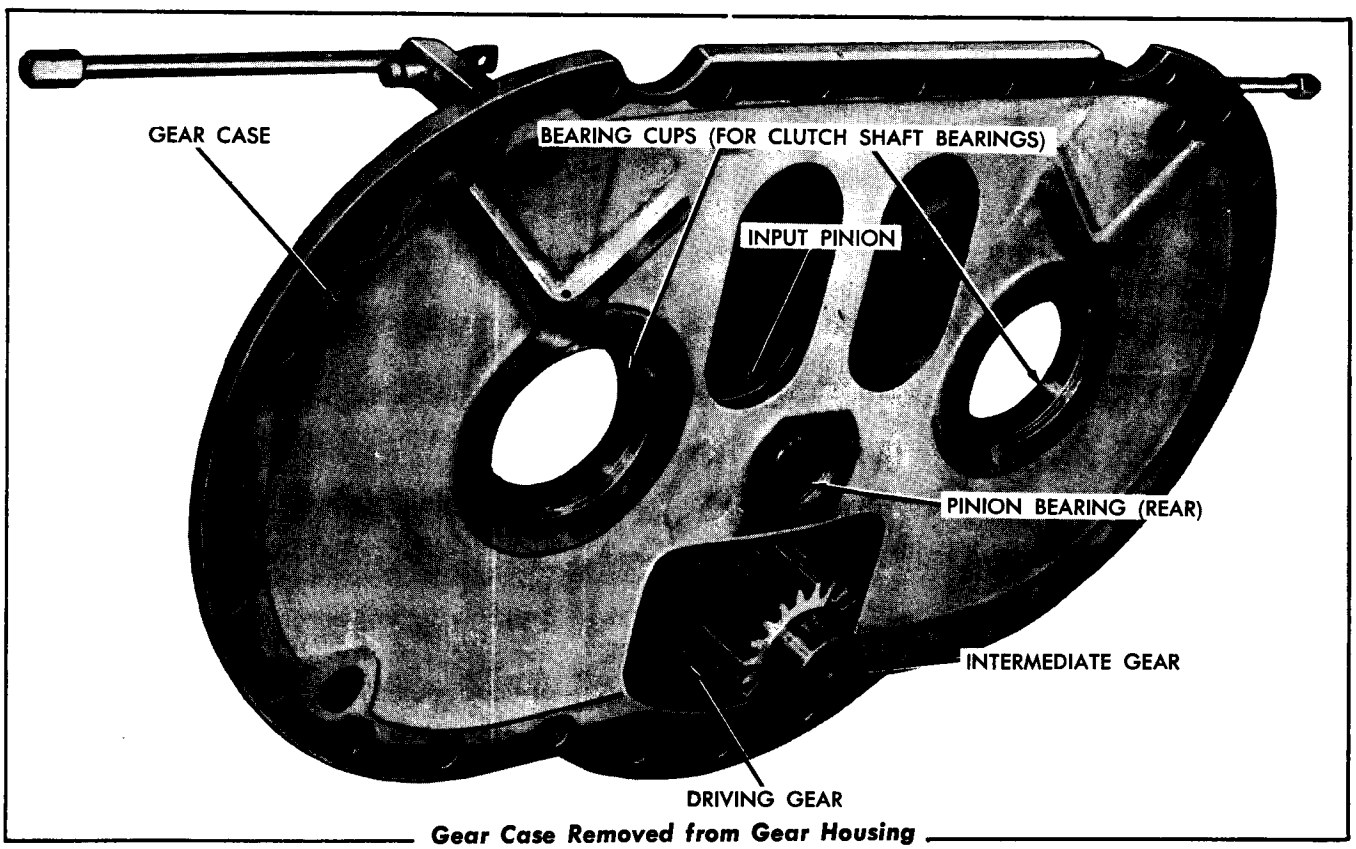
Pulling Gear Case Dowel

FIG. 32



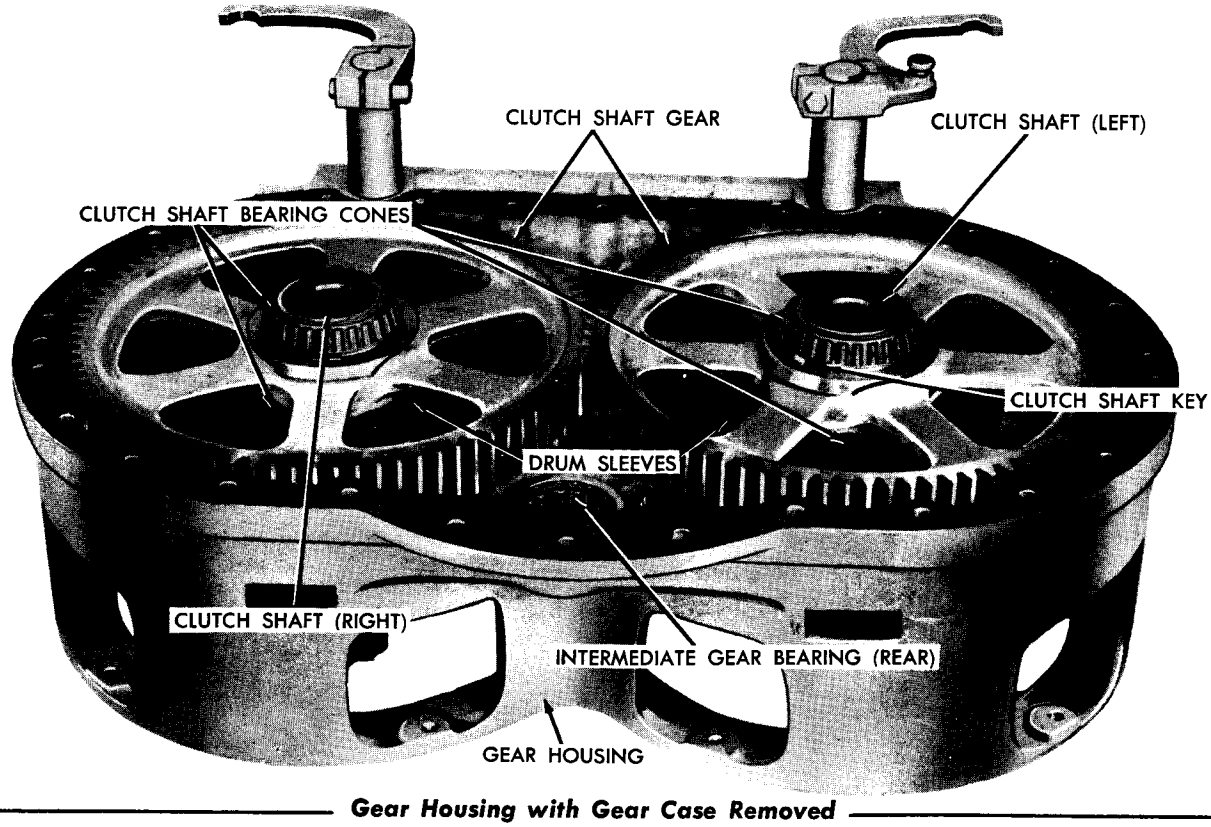
Removing Gear Case from Gear Housing

FIG. 33



Gear Case Removed from Gear Housing

FIG. 34



Gear Housing with Gear Case Removed

FIG. 35

16. Refer to Fig. 36 and raise and remove each clutch shaft gear. Remove the locking wire and remove the capscrews attaching each drum sleeve to the gear housing. Remove the drum sleeves from the gear housing.

17. Remove the 7 capscrews and lockwashers attaching the P.T.O. bearing housing (Fig. 38) to the gear case. Strike the rear end of the input pinion with a soft hammer and remove the input pinion and the bearing housing.

18. Remove the four capscrews attaching the intermediate bearing housing (Fig. 39) to the gear case. Strike the rear end of the intermediate gear with a soft hammer to drive the bearing housing from the gear case and remove the bearing housing.

19. Refer to Fig. 40 and remove the intermediate gear and the driving gear from the gear case.

B. CLEANING AND INSPECTION OF COMPONENTS

Thoroughly clean and inspect all components before reassembling.

1. Tapered Roller Bearings

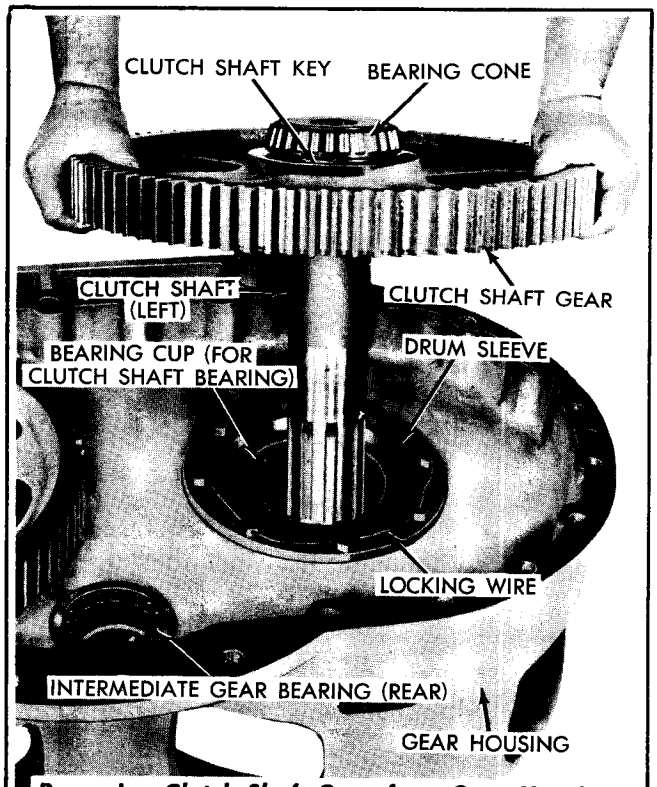
a. Thoroughly clean and inspect the bearings for worn and pitted rollers and races. Replace the bearing cones and bearing cups if necessary.

b. Always adjust the tapered roller bearings in accordance with the specifications. IMPORTANT: *Do not experiment.* Bearings properly set up will give satisfactory service for long periods of time, while bearings preloaded too much or set up too loose may fail in a comparatively short time.

c. Always lubricate the bearings with clean oil at assembly.

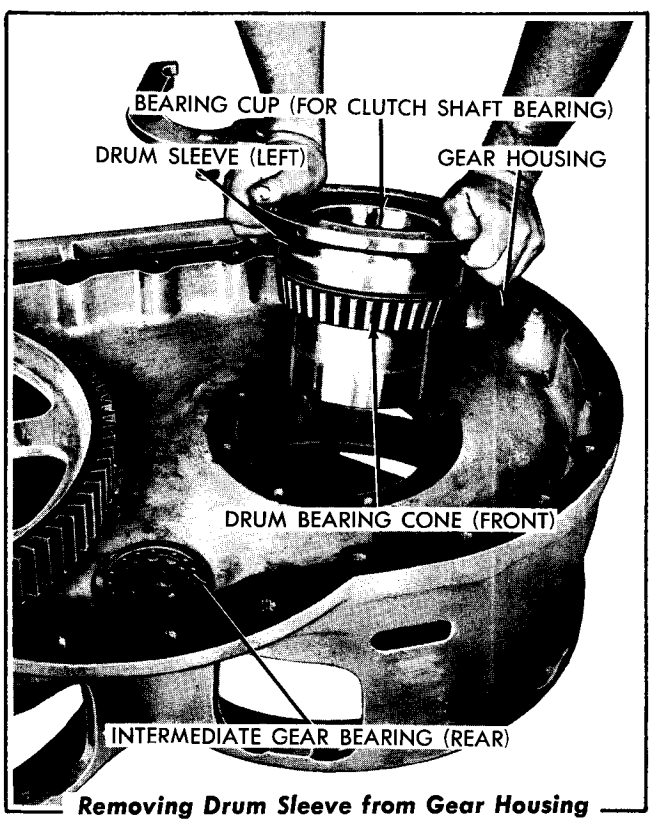
2. Roller Bearings

a. Clean and inspect the roller bearings to



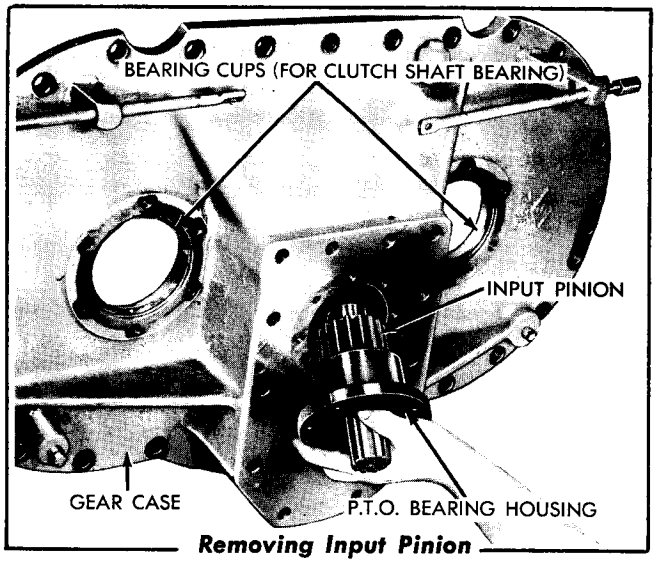
Removing Clutch Shaft Gear from Gear Housing

FIG. 36



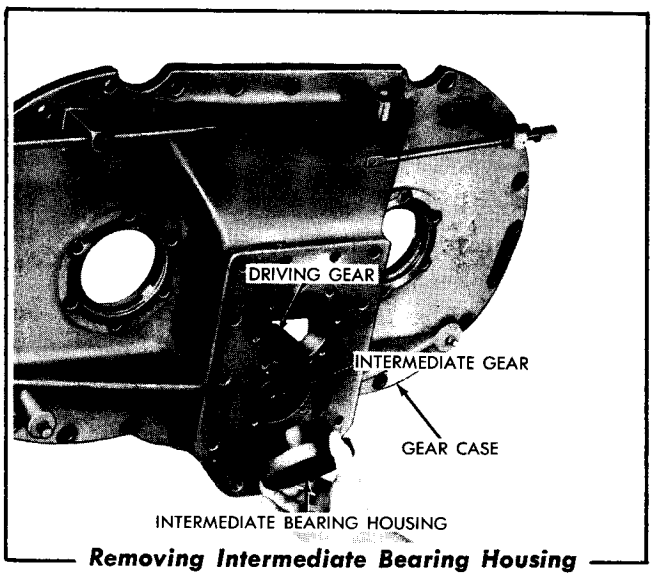
Removing Drum Sleeve from Gear Housing

FIG. 37



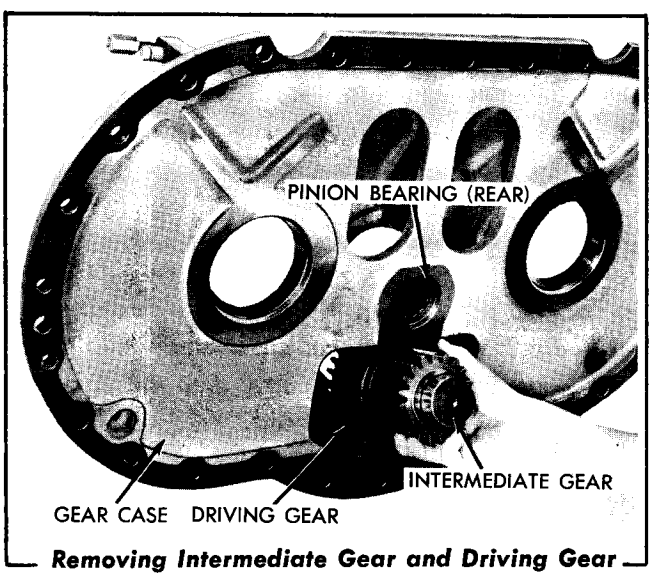
Removing Input Pinion

FIG. 38



Removing Intermediate Bearing Housing

FIG. 39



Removing Intermediate Gear and Driving Gear

FIG. 40

see that rollers are in good condition and turn freely.

b. Inspect the outer race of each bearing and make certain that the race is in good condition and is not pitted and badly worn. Make certain that journals of the gears are smooth and are in good condition.

c. Replace a bearing if it is not in good condition or shows excessive wear. Replace the gear, or gears, if the bearing journals are not smooth or show excessive wear.

d. Always lubricate the bearings with clean oil at assembly.

3. General

a. Do not use a bearing which is in bad condition except in emergencies.

b. Keep all bearings spotlessly clean and well lubricated to prevent rusting.

c. Use a press and a suitable sleeve or driver when installing bearings. If these are not available, a cold rolled soft steel rod and hammer may be used to drive the bearings into position.

d. When installing a bearing on a shaft, drive or press on the inner race; when installing a bearing in a bore, drive or press on the outer race.

e. Be careful not to strike the shield, snap ring, balls or rollers when using a rod and hammer to install bearings.

4. Drum Sleeve Bushings (Fig. 30)

a. Do not remove the bushings for inspection unless the bushings are loose in their bores or are excessively worn, then they must be removed and replaced.

b. Check the inside diameter of the bushing, located in the drum sleeve. The specified inside diameter of the bushing when new is 2.753" to 2.754". The specified outside diameter of the clutch shaft (at bushing location) is 2.746" to 2.747". This provides a running clearance of .006" to .008" between the bushing and the clutch shaft. If the clearance between these parts, due to wear, exceeds .015", the bushing must be replaced. If the clutch shaft is badly worn at the bushing location, both the bushing and the shaft must be replaced. Replace bushings as follows:

(1) Remove the old bushing from the drum sleeve.

(2) Use a press and a suitable sleeve, or driver, and install the new bushing.

(3) After installing the bushing in position in the drum sleeve, roll, burnish, or hone the inside diameter of the bushing to the specified dimension of 2.753" to 2.754".

5. Shafts and Splines

Inspect the shafts for worn areas and make certain they are not twisted or bent. Inspect the splines of the shafts for roughness, burrs, and wear. Remove all burrs and slight roughness from the splines with a mill file or stone. Try the mating components on the shaft splines to be sure that they slide freely on the splines.

6. Oil Seals

a. When any work has been done which involves the removal of a shaft from an oil seal, or the removal of an oil seal from the shaft, the sealing lip of the seal must be carefully examined.

b. The sealing lip must not be scratched, folded over, torn, or charred from heat. The lip must be flexible and the spring, located inside the lip, must have proper tension to return the lip to its proper position when the lip is pressed in by hand.

c. When installing an oil seal on a shaft, or a shaft through a seal, be sure to protect the sealing lip from damage which might be caused from a keyway, splines, threads, or a hole through the shaft. A scratch or

cut, or a fold in the lip of the seal, will render the seal useless.

d. Before installing a seal in its bore, coat the bore with liquid-type gasket cement.

e. Always lubricate the lip of the seal with clean oil at assembly.

7. Gaskets

When a gasket is removed, clean the gasket and inspect it for damage. If it is in good condition and is to be used again, immerse it in a container of clean oil and keep it in the container until it is needed. Do not use a gasket which is torn, hardened, or shrunken out of shape.

8. Gears

Thoroughly clean and inspect the gears for worn, pitted, chipped, or cracked teeth and replace the gears if necessary.

C. ASSEMBLY

NOTE: *Refer to Figs. 1 and 2 when assembling the power control unit.*

1. Install a drum bearing cone (front) in position on each drum sleeve (Fig. 37), if the cones have been removed. Install a bearing cup (Fig. 37) for each clutch shaft rear bearing cone in position in each drum sleeve, if the bearing cups have been removed.

2. Install each drum sleeve (Fig. 36) in position in the gear housing. Secure each sleeve to the housing with 8 drilled-head capscrews. Lock the capscrews with locking wire.

3. Install the intermediate gear bearing (rear) in position in the bore of the gear housing (Fig. 36), if the bearing has been removed.

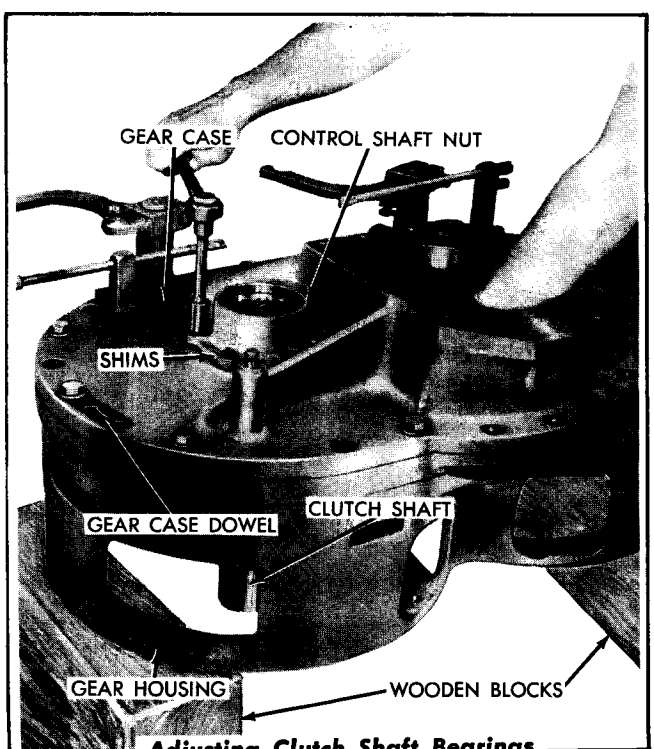
4. Install a key in the keyway of each clutch shaft and press a clutch shaft gear (Fig. 36) in position on each shaft, if the gears have been removed. Install the two clutch shaft bearing cones in position on each clutch shaft (Fig. 35), if the cones have been removed. Lubricate the bearing cones and the clutch shafts with clean oil.

5. With the gear housing placed on blocks as shown in Fig. 41, insert one of the clutch shafts (with clutch shaft gear and bearing cones) into position in the drum sleeve in the gear housing. NOTE: *Do not install both clutch shafts at this time.*

6. Install the bearing cups for each clutch shaft front bearing cone (Fig. 38) in position in the gear case, if the cups have been removed. Install the pinion bearing (rear bearing for the input pinion) in position in the bore of the gear case (Fig. 40), if the bearing has been removed. Lubricate the bearing with clean oil.

7. Place the gear case in position on the gear housing and install the two gear case dowels (Fig. 41). Install and tighten 12 of the attaching capscrews. Adjust the clutch shaft bearings as follows:

   a. The clutch shaft bearings are properly adjusted when they have .002" to .003" pre-load. Install the control shaft nut (Fig. 41) with the original shim pack and tighten the attaching capscrews.



Adjusting Clutch Shaft Bearings

FIG. 41

b. Turn the clutch shaft gear by hand and if the gear turns freely, remove a shim (or shims) from the shim pack until a slight pre-load is noted when turning the clutch shaft gear. If the clutch shaft gear is too tight, add a shim (or shims) as necessary. NOTE: *Strike the gear case (near the bearing bore) with a soft hammer when adjusting the bearings, to make certain the bearings are properly seated.*

c. When the bearings have been properly adjusted, remove the capscrews attaching the control shaft nut and remove the nut and the adjusting shims. Tie the shims to the nut to prevent loss.

d. Remove the capscrews attaching the gear case to the gear housing. Using a slide hammer puller and adaptor, similar to the one shown in Fig. 32, pull the two gear case dowels. Attach a chain to the gear case as shown in Fig. 33 and remove the gear case from the gear housing.

e. Raise and remove the clutch shaft gear.

f. Insert the other clutch shaft (with clutch shaft gear and bearing cones) into position in the other drum sleeve in the gear housing. Install the gear case in position on the gear housing and install the two gear case dowels. Install and tighten 12 of the attaching capscrews.

g. Install the other control shaft nut with the original shim pack and adjust the bearings for proper pre-load following the procedure given in Steps a thru c above.

h. Again remove the gear case from the gear housing as in Step d above. Insert the other clutch shaft gear back into position in the drum sleeve.

8. If the driving gear was removed from the intermediate gear (Fig. 40), install the intermediate gear key in the keyway of the intermediate gear. Press the driving gear into position on the shaft portion of the intermediate gear.

9. Install the intermediate gear bearing (front) in position in the intermediate bearing housing if it has been removed. Coat the rear surface of the bolting flange of the intermediate bearing housing with liquid-type gasket cement. Lubricate the bearing with clean oil. Place the intermediate gear (with driving gear) into position in the gear case and install the intermediate bearing housing. Secure the bearing housing to the gear case with 4 socket-head capscrews.

10. Insert the input pinion (Fig. 38) into position in the gear case and its rear bearing. Install the oil seal and the pinion bearing (front) in position in the P.T.O. bearing housing if they were removed. NOTE: *Make certain that the oil seal is installed with the sealing lip towards the bearing.* Lubricate the bearing and oil seal with clean oil. Coat the rear surface of the bolting flange of the P.T.O. bearing housing with liquid-type gasket cement and install the bearing housing. Secure the bearing housing to the gear case with 7 capscrews and lockwashers.

11. Clean and coat the machined surfaces (mating surfaces)of the gear housing and the gear case with liquid-type gasket cement. Lower the gear case (with components) into position on the gear housing. Install the two gear case dowels (Fig. 41). Place a dowel retainer plate (Fig. 31) in position over each dowel and install the 28 capscrews and lockwashers to attach the gear case to the gear housing. Tighten the capscrews securely.

12. Turn the gear housing so that the cable drum and the clutch components may now be installed.

13. Install the two bearing cups in position in each cable drum (Fig. 29), if they have been removed. Coat the counterbore (for the oil seal) in each cable drum with liquid-type gasket cement and install the drum oil seal (Fig. 29) in each drum. NOTE: *Make certain*

that each seal is installed so that the sealing lip is towards the front bearing cup in the cable drum. Lubricate the drum oil seal and the drum bearing cones for each drum with clean oil.

14. Install each cable drum in position on its drum sleeve and install the rear bearing cone for each drum. Adjust the bearings for each cable drum as follows:

    a. The cable drum bearings are properly adjusted when they have .002" to .003" pre-load. Install the drum bearing retainer (Fig. 27) with the original shim pack and tighten the retainer capscrews evenly.

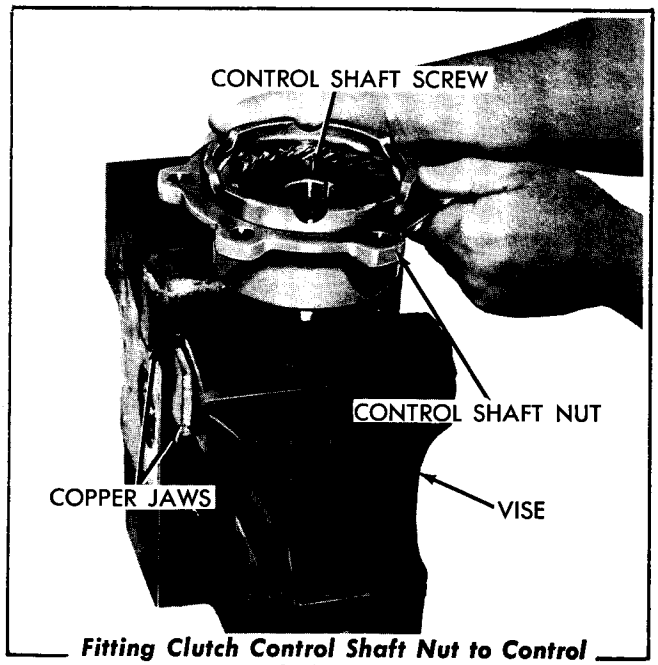
    b. Turn the cable drum by hand and if the drum turns freely, remove a shim (or shims) from the shim pack until a slight pre-load is noted when turning the cable drum. If the cable drum is too tight, add a shim (or shims) as necessary. NOTE: *Strike the cable drum with a soft hammer when adjusting the bearings, to make certain the bearings are properly seated.*

15. Install the inner snap ring for each clutch hub (Fig. 25).

16. If the clutch seals have been removed from the clutch seal housings (Fig. 25), coat the inside diameter of each seal housing with liquid-type gasket cement. Install a seal in each seal housing, making certain that each seal is installed so that the sealing lip will be toward the cable drum when the seal housings are installed. Lubricate the seals with clean oil. Install the seal housings, replacing each seal housing gasket if necessary. Secure the seal housing to the cable drum with 6 capscrews and lockwashers.

17. Install the clutch hubs (Fig. 20) in position on the clutch shafts and install a clutch hub snap ring to secure each clutch hub. Lubricate the oil seals in each clutch hub.

18. Before installing the clutch control shaft nuts and control shaft screws (Fig. 31), check and



Fitting Clutch Control Shaft Nut to Control Shaft Screw

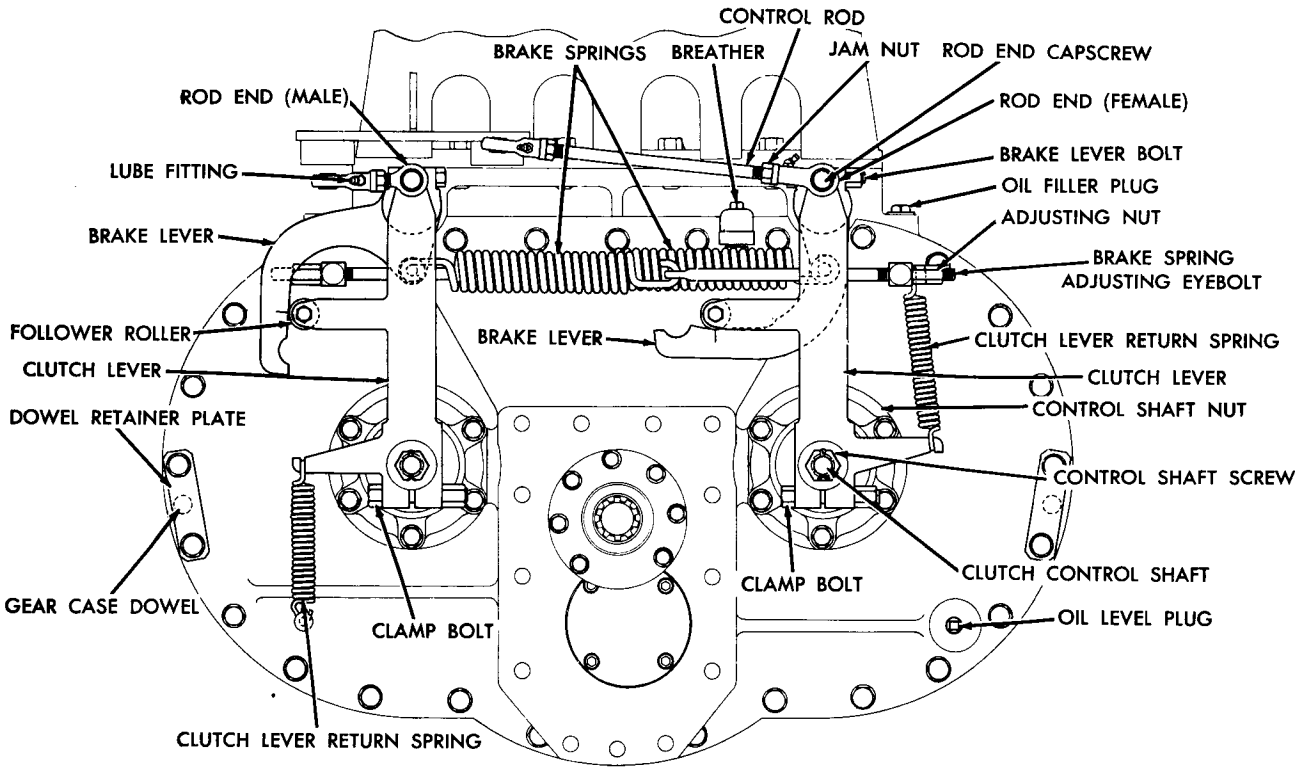
FIG. 42

make certain each screw moves freely in its respective nut. If the screw is tight in the nut, disassemble and clean these components. Lubricate the nut and screw with clean oil. Clamp the screw in a vise as shown in Fig. 42, and start the nut onto the screw. Work the nut on and off by hand until the nut is free on the screw.

19. Install a "WOODRUFF" key in position in the keyway of each control shaft and press the control shaft screws in position on the control shafts. Install and tighten the castellated nuts on the front ends of the control shafts and install the cotter pins. Install the control shaft screws in position in their respective control shaft nut.

20. Coat the inside of the counterbore of each control shaft nut (counterbore for seal) with liquid-type gasket cement. Lubricate the lip of each control shaft nut seal with clean oil and install the seals.

21. Install each clutch control shaft, with control shaft screw and nut and the shim pack, in position making certain that they are installed in the same position that they were installed in Step 7 above. Install the attaching capscrews and lockwashers and tighten securely.



Clutch and Brake Levers

FIG. 43

22. Assemble each clutch as follows:

    a. Starting with a bi-metallic disc (friction disc) next to the cable drum, alternate with steel discs (driving discs) and bi-metallic discs until 6 bi-metallic discs and 6 steel discs have been installed. Refer to Fig. 19.

    b. Install the clutch plate, with adjusting screw and clutch shaft ball bearing, in position on the clutch control shaft. Install the castellated nut in position on the rear of the control shaft and tighten securely. Install the cotter pin.

23. Install the fairlead frame assembly in position on the gear housing. Install the attaching capscrews and lockwashers. Tighten the capscrews securely.

24. Refer to Fig. 43 and install the two brake springs and adjusting eye bolts. Start the adjusting nuts but do not tighten at this time.

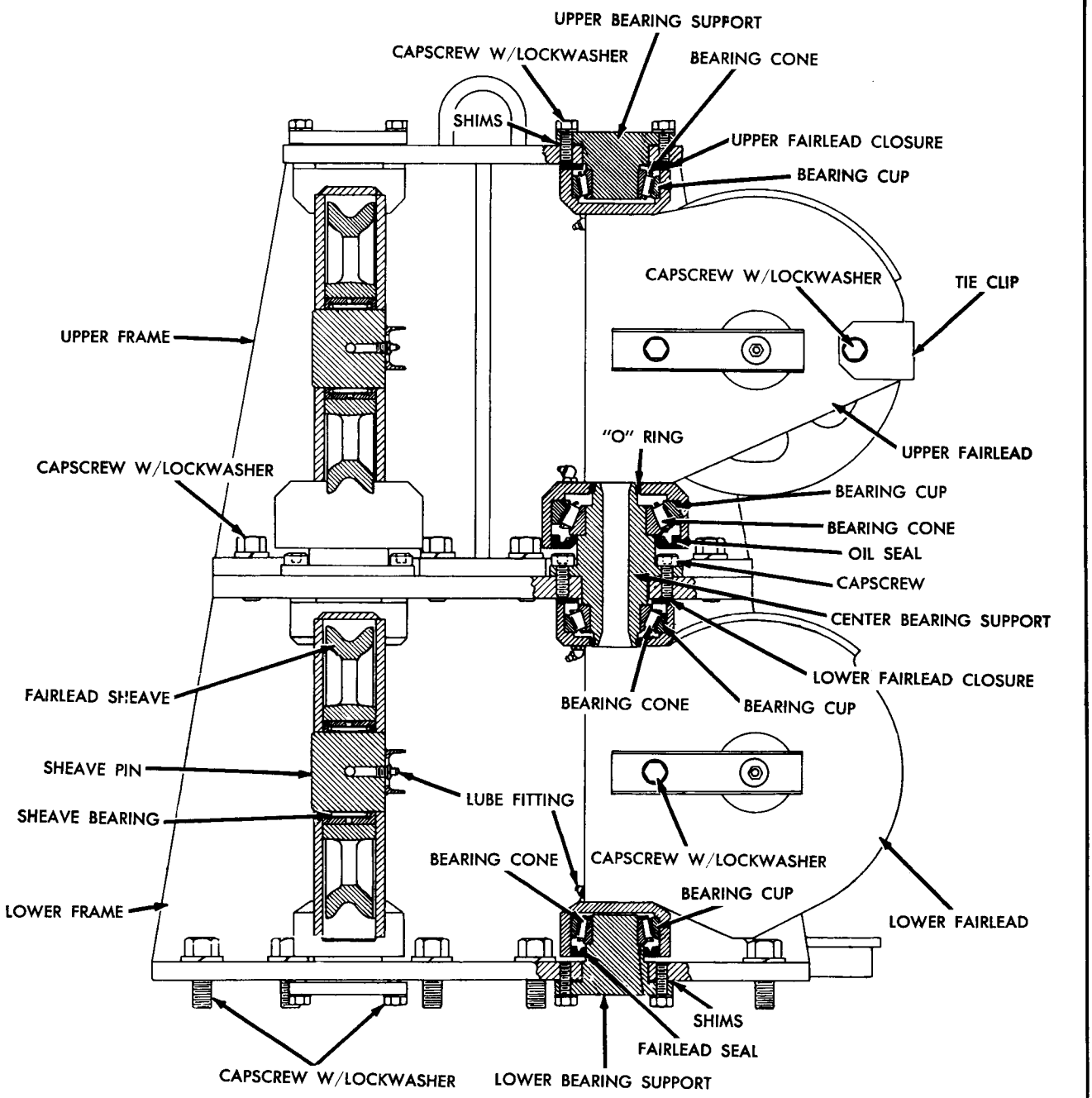
25. Refer to Fig. 7 and install the brake band assemblies. Adjust each brake (refer to "POWER CONTROL UNIT BRAKE AND CLUTCH ADJUSTMENTS," Paragraph B 1).

26. Refer to Fig. 43 and install the clutch levers as shown, but do not tighten the lever clamp bolts at this time. Adjust each clutch (refer to "POWER CONTROL UNIT BRAKE AND CLUTCH ADJUSTMENTS," Paragraph B 2). Install the clutch lever return springs as shown in Fig. 43.

27. Install the power control unit (refer to "INSTALLATION INSTRUCTIONS"). Attach the cable (or cables) to the cable drums (refer to "CABLE," Paragraph B).

FAIRLEADS

Each fairlead is mounted on tapered roller bearings as shown in Fig. 44. Shims are provided under the upper bearing support and above the lower bearing for adjusting the bearings. As wear occurs, indicated by looseness of the fairleads on its bearings, the respective bearing support should be removed and the necessary amount of shims should be removed to eliminate the looseness. NOTE: *Remove only the required number of shims to eliminate the looseness.* The bearings are properly adjusted when a slight pre-load is noted when moving the fairlead on its bearings.



Fairlead Assembly

FIG. 44