

# Section N

## TRANSFER CASE

(C-8A, C-15A)

The single speed transfer case used on the above models is a gear box, containing three gears, with two output shafts, one for the front axle and one for the rear.

The unit is located between the frame side rails, to the rear of the transmission and is mounted at an angle to equalize angularity of the two propeller shafts. Mechanism for engaging and disengaging the front axle is provided in the unit and connected to a lever located in the cab to the left of the operator. For complete instructions on the use of the transfer case, refer to "Operating Instructions" in Section "B" of this manual.

The purpose of the transfer case is to transfer power to the rear axle alone, or under extreme conditions, to both the rear and the front axle.

### Shafts and Bearings (Refer to Fig. 1)

The main drive shaft (53), from the transmission is carried on two tapered roller bearings. The front bearing cone (51), fits against a shoulder of the main drive shaft. The front bearing cup (6), is held in the case (1), by the cap (9), which also carries an oil seal (10).

The rear bearing cone (51), fits against a shoulder on the main drive shaft (53), and is held in place by a nut (50), and lock wire (49).

The idler shaft (59), is supported by two tapered roller bearings (57). The front and rear bearing cones are held to the shaft by nuts (56), and lock rings (55). The front bearing cup (15), is located in the case (1), and held in place by the cap (18). The rear bearing cup (15) is located in the cover (5) and held in place by the cap (12). The speedometer drive gear (60) is keyed to the forward end of the idler shaft (59).

The driven shaft (64), to the rear axle, is supported at both ends by the tapered roller bearings (62-65). The front bearing cup (27), is carried in the case (1) and held in place by the front axle declutch carrier (33) and the rear bearing cup (27) is located in the case cover (5) and held in position by the driven shaft rear bearing cap (24) which also carries an oil seal (23).

The declutch shaft (38) is supported in the carrier (33) by two opposed tapered roller bearings (40) which are held apart by the spacer (41). The bearing cups (39) are pressed into the carrier. The front cup (39) is held in place by the cap (44) which also carries an oil seal (45) while the rear cup is pressed against a shoulder in the carrier housing (33).

Adjustments to all shafts and bearings are made by adding or reducing the quantity and thickness of shims under the bearing caps.

### Gears

The main drive gear (52), the idler shaft gear (58) and the driven shaft gear (63) are helical cut, pressed onto their respective shafts and are in constant mesh. The sliding hub (36) used with the front axle declutching mechanism, is located on the declutch shaft (38) and is meshed with the splines on the driven shaft (64) when the front axle is engaged.

### Oil Seals

Oil seals are used at the front of the main drive shaft (53), the front of the declutching carrier (33) and at the rear of the driven shaft (64). The seals are large, spring loaded leather type and effectively prevent loss of lubricant.

The leather is held in close contact with the outer surface of the shaft yoke by the spring. Whenever the unit is disassembled for inspection or other service requirements the seals should always be replaced. Replacement of the oil seals at regular overhaul periods is more economical than premature replacements of more expensive parts, due to failure, through lack of lubricant, lost by the worn oil seals.

### Transfer Case Removal

If it should be necessary to remove the transfer case for overhaul or replacement, the following procedure should be followed:

1. Place a suitable container under the transfer case and remove the drain and filler plugs to allow the lubricant to drain from the transfer case. After draining, replace the plugs.
2. Disconnect the front and rear axle propeller shafts and the transmission propeller shaft at the transfer case end. To do this, separate the universal joint yokes, as directed in Section "H" of this manual.
3. Remove the cotter pin and clevis pin attaching the front axle control rod to the transfer case.
4. Remove the speedometer cable at the transfer case idler shaft front bearing cap by loosening the knurled nut with a pair of pliers, so that the cable can be removed from the driven gear shaft.

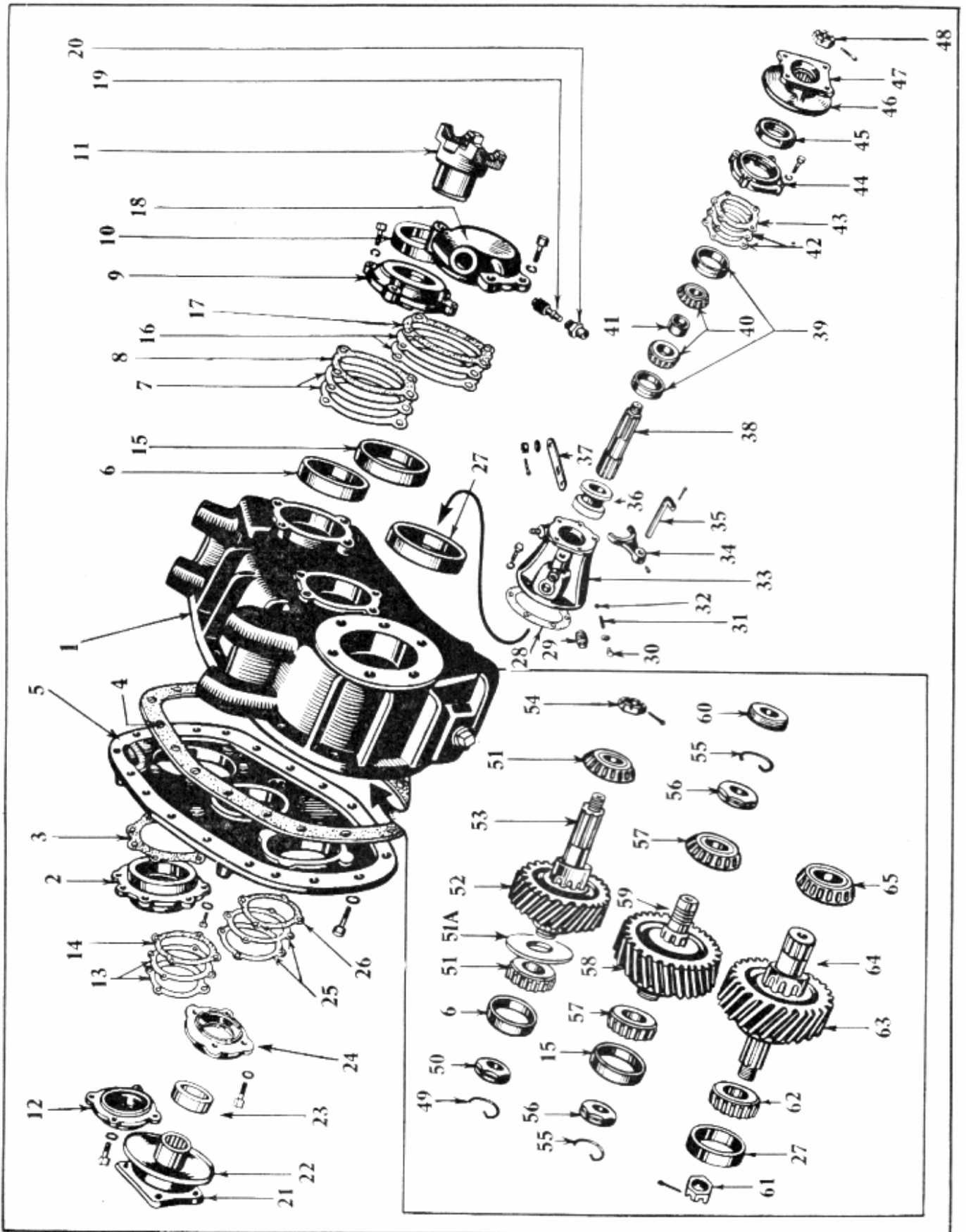


Fig. 1—Exploded View of Transfer Case

## CAPTION FOR FIG. 1

- |  |  |
|--|--|
| 1—Transfer Case                                | 33—Declutch Shaft Carrier                                |
| 2—Main Drive Shaft Rear Bearing Cap            | 34—Declutch Shift Fork                                   |
| 3—Main Drive Shaft Rear Bearing Cap Gasket     | 35—Declutch Shift Shaft                                  |
| 4—Transfer Case Cover Gasket                   | 36—Declutch Sliding Hub                                  |
| 5—Transfer Case Cover                          | 37—Declutch Shift Lever                                  |
| 6—Main Drive Shaft Front and Rear Bearing Cups | 38—Declutch Shaft  |
| 7—Main Drive Shaft Front Bearing Cap Shims     | 39—Declutch Shaft Bearing Cups                           |
| 8—Main Drive Shaft Front Bearing Cap Gasket    | 40—Declutch Shaft Bearing Cones                          |
| 9—Main Drive Shaft Front Bearing Cap           | 41—Declutch Shaft Bearing Spacer                         |
| 10—Main Drive Shaft Front Bearing Cap Oil Seal | 42—Declutch Carrier Cap Shims                            |
| 11—Universal Joint Yoke                        | 43—Declutch Carrier Cap Gasket                           |
| 12—Idler Shaft Rear Bearing Cap                | 44—Declutch Bearing Cap                                  |
| 13—Idler Shaft Rear Bearing Cap Shims          | 45—Declutch Shaft Bearing Cap Oil Seal                   |
| 14—Idler Shaft Rear Bearing Cap Gasket         | 46—Declutch Shaft to Flange Dust Shield                  |
| 15—Idler Shaft Front and Rear Bearing Cups     | 47—Declutch Shaft Flange                                 |
| 16—Idler Shaft Front Bearing Cap Shims         | 48—Declutch Shaft Flange Nut                             |
| 17—Idler Shaft Front Bearing Cap Gasket.       | 49—Main Drive Shaft Rear Bearing Retaining Nut Lock Ring |
| 18—Idler Shaft Front Bearing Cap               | 50—Main Drive Shaft Rear Bearing Retaining Nut           |
| 19—Speedometer Driven Gear                     | 51—Main Drive Shaft Front & Rear Bearing Cone            |
| 20—Speedometer Driven Gear Sleeve.             | 51A—Main Drive Shaft Washer                              |
| 21—Driven Shaft Flange                         | 52—Main Drive Gear                                       |
| 22—Driven Shaft Dust Shield                    | 53—Main Drive Shaft                                      |
| 23—Driven Shaft Rear Bearing Cap Oil Seal      | 54—Main Drive Shaft Yoke Retaining Nut                   |
| 24—Driven Shaft Rear Bearing Cap               | 55—Idler Shaft Bearing Lock Nut Lock Ring                |
| 25—Driven Shaft Rear Bearing Cap Shims         | 56—Idler Shaft Bearing Lock Nut                          |
| 26—Driven Shaft Rear Bearing Cap Gasket        | 57—Idler Shaft Front & Rear Bearing Cone                 |
| 27—Driven Shaft Front and Rear Bearing Cups    | 58—Idler Gear  |
| 28—Declutch Shaft Carrier Gasket               | 59—Idler Shaft   |
| 29—Declutch Carrier Plug                       | 60—Speedometer Drive Gear                                |
| 30—Declutch Shift Shaft Lock Screw             | 61—Driven Shaft End Nut                                  |
| 31—Declutch Shift Shaft Lock Spring            | 62—Driven Shaft Rear Bearing Cone                        |
| 32—Declutch Shift Shaft Lock Ball              | 63—Driven Gear   |
|  | 64—Driven Shaft  |
|  | 65—Driven Shaft Front Bearing Cone                       |

## TRANSFER CASE—N - 4

6. Place a suitable support under the transfer case assembly preparatory to loosening the four mounting bolts.
7. The four mounting bolts are wired together in pairs to serve as a locking device. After removing this wire the four mounting bolts may be removed and the transfer case freed from the chassis. It will be necessary to use an open end wrench of the correct size to remove the two upper mounting bolts as there is only a small space between the transfer case cross member and the body, in which a wrench may be used.

### Transfer Case Replacement

1. Raise the transfer case assembly into position, using a lift jack if a more suitable means is not available.
2. Install the four mounting cap screws "J" fastening the assembly to the frame cross member and to the support bracket "K" Fig. 10. One composition shim (rubber and fabric) "L" and one steel shim "M", are normally used at each cap screw. These shims are located between the transfer case mounting boss and the cross member at the top; between the mounting boss and the support bracket at the bottom.
3. Adjust each cap screw to 30-35 ft. lbs. tension. Use firm pressure on an 8" wrench where the body design does not allow sufficient room to use a tension wrench. Lock the upper pair of cap screws together, using No. 14 gauge wire. Route the lock wire through the heads of the cap screws, as shown in Fig. 11, so that if either cap screw tends to back off it tightens the other. Lock the lower pair of cap screws in the same manner.
4. Replace the speedometer cable, and the three universal joint flanges.
5. Adjust the front axle declutching controls and connect the control rod to the declutching shift lever.
6. When the transfer has been completely installed, it should be filled with the correct lubricant as specified in the "Lubrication" section of this manual.

### DISASSEMBLY

(Refer to Fig. 1)

Place the complete transfer case (1) in the special fixture, J-1716, illustrated in Fig. 13. Use of this fixture facilitates disassembly and re-assembly, as it permits rotating the assembly to different positions.

Before the transfer case is disassembled, the outside of the case should be thoroughly cleaned.

Rotate the transfer case so that the front of the case points upward, lock the fixture and proceed as follows:

1. Remove the cotter pins and nuts holding the universal joint flanges to the main drive shaft and the front and rear output shafts. Use a soft hammer and tap the flanges off the shafts.
2. Remove the speedometer driven gear (19) at the front of the idler shaft bearing cap (18) using a  $\frac{7}{8}$ " open end wrench.
3. Remove the capscrews holding the mainshaft front bearing cap (9), the idler shaft front bearing cap (18) and the front axle declutching carrier assembly (33). When the declutching carrier has been removed, lay it aside and disassemble later as directed.

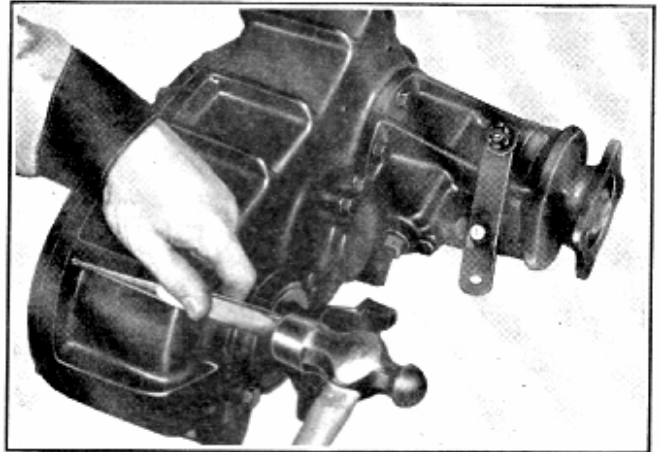


Fig. 2—Removing Cover Dowel Pins

**NOTE:**—When removing the caps be sure that the quantity and thickness of shims are noted so that the same quantity and thickness will be replaced at reassembly.

4. Rotate the case in its fixture so that the rear of the case, or cover side, is upward.
5. Remove the cap screws holding the idler shaft rear bearing cap (12) and the driven shaft rear bearing cap (24). When removing these bearing caps note quantity and thickness of shims as explained above.
6. The rear cover (5) is held to the case by cap screws and two tapered dowel pins. The tapered dowels should be removed from the cover and case, using a punch as illustrated in Fig. 2. Remove the cap screws and lock-washers, using a  $\frac{1}{8}$ " wrench.
7. When the cap screws have been removed, the cover assembly (5) may be removed from the case (1), as illustrated in Fig. 3.
8. The main shaft (53) with bearings (51) and main drive gear (52), the idler shaft (59) with bearings (57), idler gear (58) and speedometer gear (60), and the driven shaft (64) with bearings (62-65) and driven gear (63) can now be lifted out of the case, (1).
9. When the case assembly has been disassembled as directed above, the bearings and



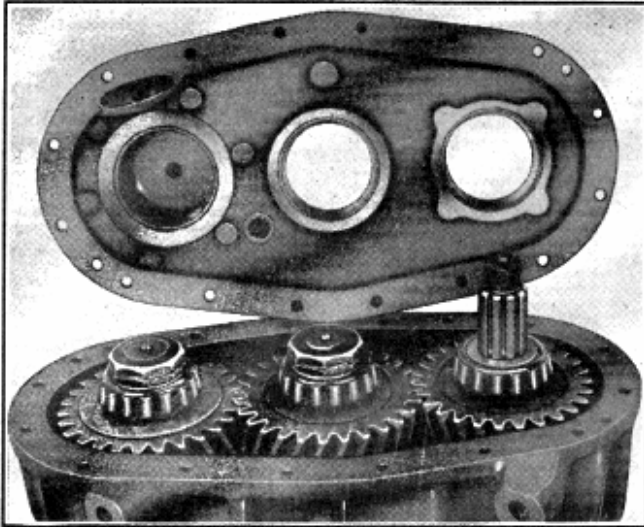


Fig. 3—Transfer Case with Rear Cover Removed, Showing Gears and Shafts

gears can be washed in a suitable cleaning fluid and inspected to determine if further disassembly is necessary to replace any parts.

#### Declutching Carrier

The disassembly of the declutching carrier on the single speed transfer case is identical with that of the two speed. Refer to Page N-17 for instructions covering the disassembly of the declutching carrier.

#### Mainshaft (Refer to Fig. 1)

Place the mainshaft (53) in a vise, using soft jaws so that shaft splines will not be damaged.

1. The mainshaft rear bearing nut (50) is held with a lock wire (49). Remove the lock wire as is shown in Fig. 4, and then remove the nut.
2. Use bearing puller (C.S. 1047) as illustrated in Fig. 5, and remove the mainshaft front bearing (51).

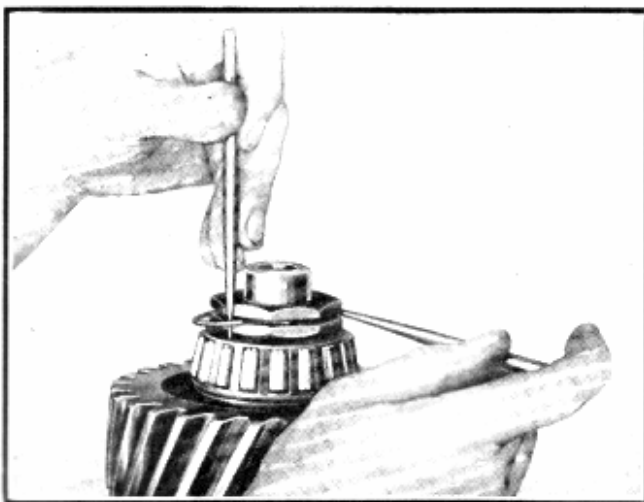


Fig. 4—Removing Bearing Lock Nut Snap Ring

3. Place the mainshaft (53) and main drive gear (52) in an arbor press with the front end down. Support the assembly by the gear (52) and press on the rear end of the main drive shaft. This operation will remove the rear mainshaft bearing (51) and the gear from the shaft.

**NOTE:**—Bearing puller (C.S. 1047) may be used to remove any of the transfer case shaft bearings as shown in Fig. 5.

#### Idler Shaft

1. Remove the speedometer drive gear (60) from the shaft, using puller, J-1737, as shown in Fig. 19.
2. Remove the lock rings (55) from the nuts (56) and remove both nuts.
3. Using bearing puller C.S. 1047, as shown in Fig. 5, remove the front bearing (57) from the shaft.
4. Place the assembly in an arbor press, with the rear bearing upward and press the shaft from the gear and bearing.

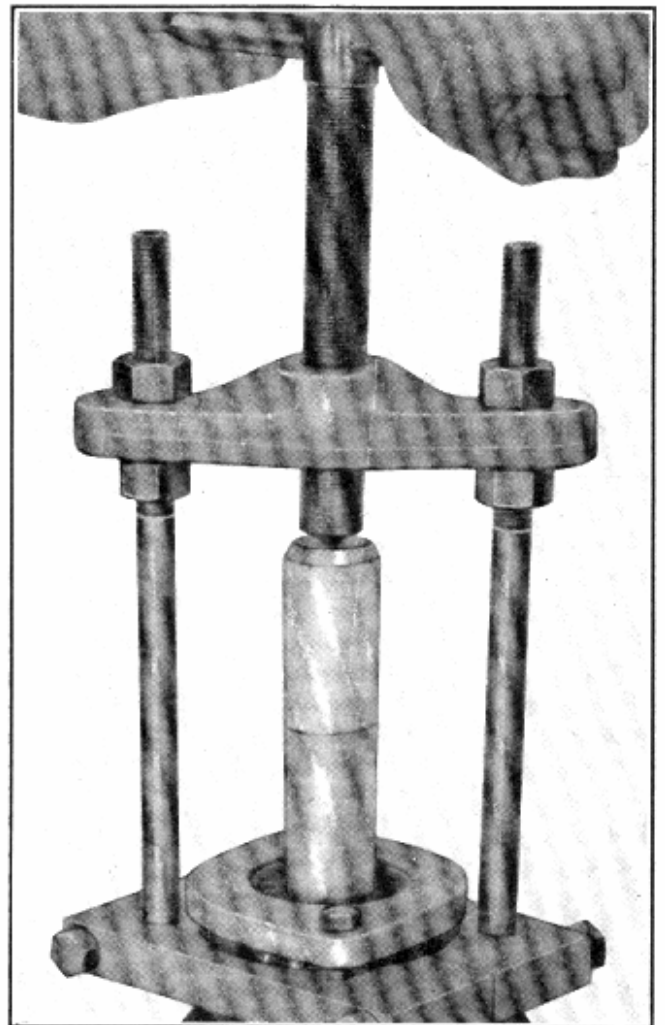


Fig. 5—Removing Tapered Roller Bearings, Tool No. C.S.-1047

## Driven Shaft

1. Remove the front bearing, using puller C.S. 1047.
2. Place the assembly in an arbor press, with the rear bearing upward and press the shaft from the gear and bearing, as shown in Fig. 6.

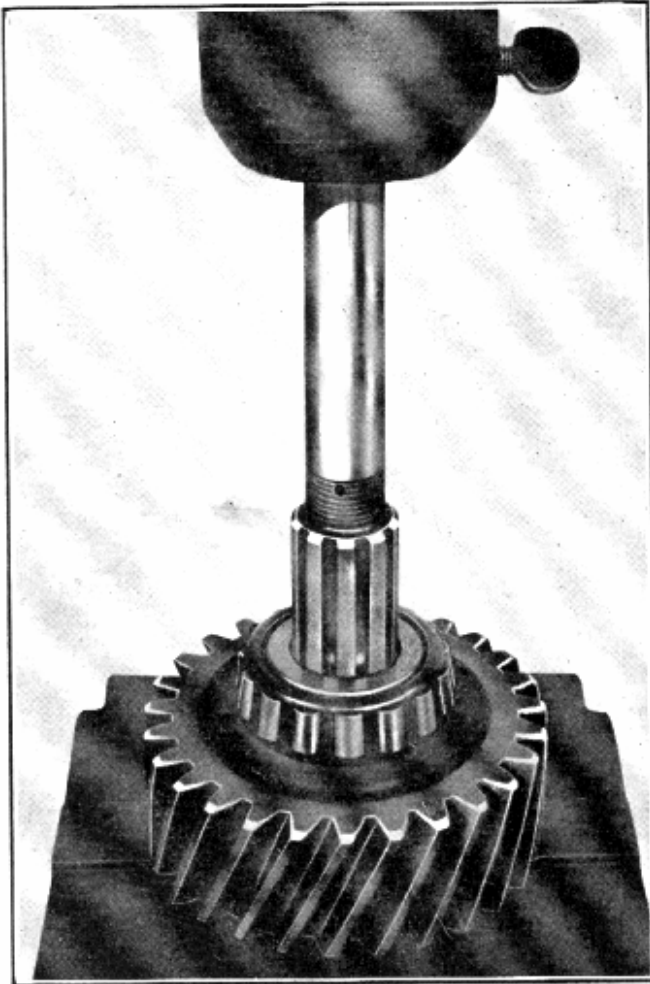


Fig. 6—Removing Gear and Bearing from Shaft in Arbor Press

## INSPECTION

### Bearings

Place all bearings in a suitable cleaning fluid and allow them to remain there long enough to loosen any hardened lubricant. Then remove the bearings from the cleaning fluid and carefully inspect the rollers and cones for chipping, cracks or worn spots and pitting, to determine the fitness of the bearings for further use. After inspection, dip the bearings in oil and wrap them in a clean cloth or paper to protect them from dirt until they are needed.

In addition to cleaning the bearings as directed above, the following inspections should be made:

1. Carefully examine the teeth of all gears for nicks and "galled spots". Do not take any

chances with gears which are appreciably nicked or scored. All nicks may be removed with a "slip-stone" or hone.

2. Inspect the faces of the gear teeth. Gears which are cracked or have chipped teeth, or spots where case hardening is worn through should be replaced.
3. Inspect the case and cover for evidence of the idler shaft gears rubbing. If a condition of this nature is found, it indicates that the shaft is not properly located in the case.
4. Check the clearance between the splines in the declutch sliding hub (36) and the declutch shaft (38) and the driven shaft (64). If it exceeds the limits specified at the end of this section, the necessary parts should be replaced.

### Case and Cover

1. Thoroughly wash out the case and cover with a suitable cleaning fluid.
2. Clean the oil hole in the case and declutching carrier at the driven shaft front bearing.
3. Clean the oil hole in the cover at the main shaft rear bearing.
4. The breather air cleaner at the main drive gear rear bearing cap should be removed and cleaned in a suitable cleaning fluid. Allow the element to drain dry, then dip it in engine oil and again allow it to drain, before using.
5. Examine the case and cover for cracks or other damage, which might affect the operation of the unit.

### Bearing Cups

Wipe the surfaces of the bearing cups clean and examine them for signs of pitting, cracks, or chipping of the surface hardening. If necessary they can be removed from the case, cover or declutch carrier with a soft punch and a hammer, excepting the one in the main shaft rear bearing cap, which can be removed with a suitable puller.

### Oil Seals

Spring loaded, leather type, oil seals are used at the front of the mainshaft, rear of the front axle output shaft and the front of the declutching carrier.

These seals have their bearing surfaces on the machined hubs of the flanges of the three shafts referred to above. In order to prevent lubricant leaks it is essential that the bearing surfaces on the flanges and the seals be in good condition. The seals must be replaced when the transfer case is overhauled and the flanges should be carefully inspected for score marks and wear and replaced if necessary.

**NOTE:**—New oil seals should be soaked in Neatsfoot Oil until they become pliable before they are installed in the case.

An oil seal replacing tool (J-1722) should be used as shown in Fig. 26 to assure proper installation of the leather seals. When installing seals it is important that they seat fully in the caps. The use of the replacing tool assures proper installation of the seals.

**IMPORTANT:**—New seals should not be installed until all bearings have been adjusted, because of the drag they would cause on the shafts which could be mistaken for bearing tension.

## REASSEMBLY

### Declutching Carrier

The reassembly of the declutching carrier used on the single speed transfer case is identical to that used on the two speed. Refer to Page N-19 for instructions covering the reassembly of the declutching carrier.

### Mainshaft (Refer to Fig. 1)

1. Support the mainshaft gear (52), front end up on an arbor press, and insert the splines

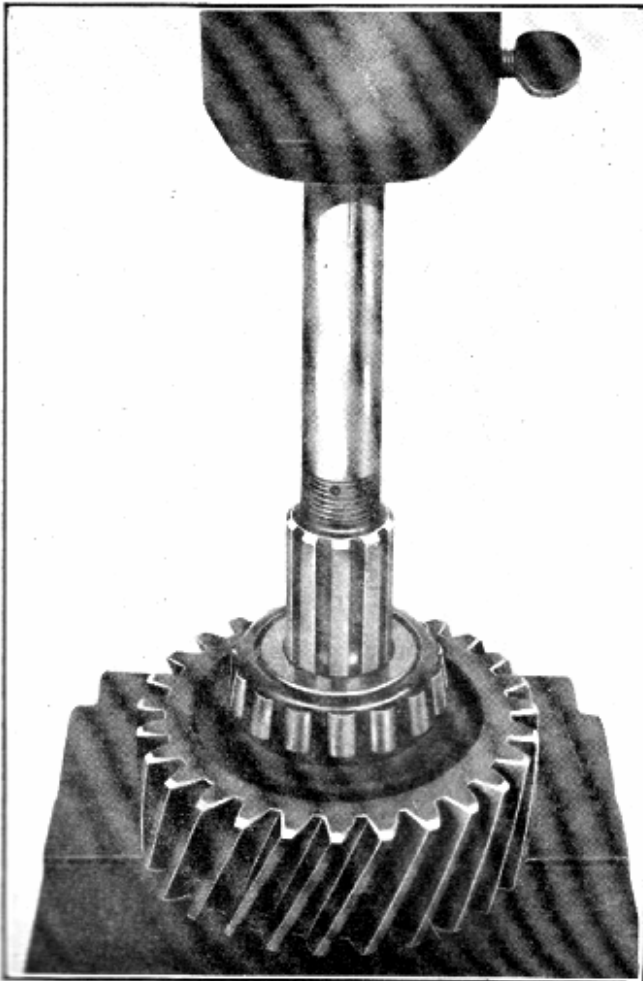


Fig. 7—Pressing Gear on Shaft

of the main shaft (53) into the splines of the gear. Press the shaft into the gear until it rests solidly against the shoulder of the shaft, (Fig. 7). If it is not assembled correctly it will be impossible to establish proper clearance between the gear face and the cover.

2. Using bearing cone replacing tool J-1718, drive or press the mainshaft front bearing cone (51) on, until it seats firmly against the shoulder on the shaft. The wider side of the bearing cone should face in.
3. Install the washer (51A) on the shaft and using bearing cone replacing tool J-1718, drive or press the mainshaft rear bearing cone (51) on the shaft solidly, against the main drive gear. The proper method of using this tool is shown in Fig. 8.

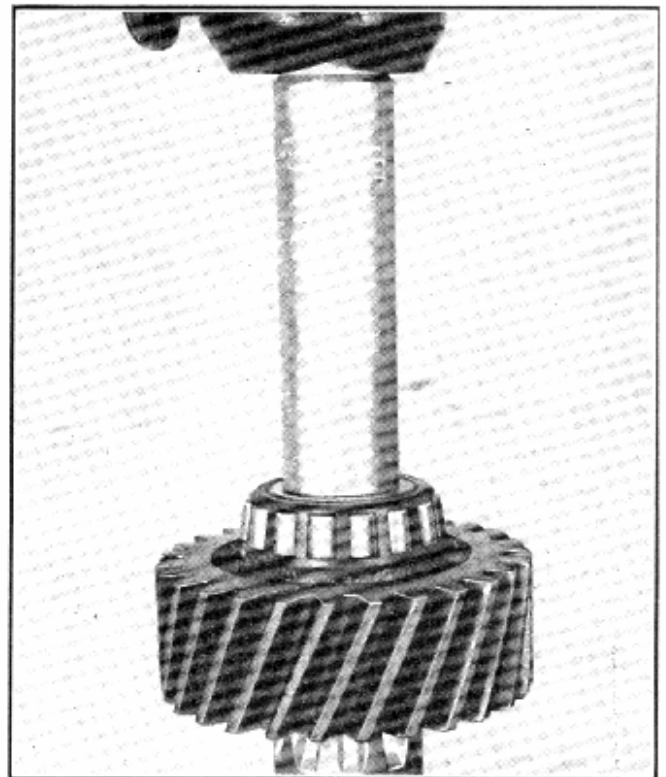


Fig. 8—Installing Main Shaft Rear Bearing, Tool No. J-1718

4. Install and tighten the mainshaft nut (50) then lock it in place with the lock ring (49). Make certain the lock snaps into the hole in the shaft to provide a permanent lock.

### Idler Shaft and Driven Shaft

The reassembly of these two shafts is exactly the same procedure as that of the mainshaft except the idler shaft has the speedometer gear pressed on the front end of the shaft.

Replace the speedometer gear (60) on the idler shaft, using an arbor press.

Be sure that all gears are pressed firmly against the shoulders on the shafts, so that proper clear-

ances will be established when assembly is complete.

### CASE REASSEMBLY AND ALIGNMENT OF GEARS

(Refer to Fig. 1)

1. If the bearing cups have been removed from the case or cover they should be replaced, using a brass drift. Care should be taken to see that the bearing cups are not cocked.
2. Install the front axle declutching carrier assembly to the case using a new gasket (28) between the carrier and the case. Be sure that the oil passage hole at the bottom of the case lines up with the similar passage hole in the carrier, also that the gasket does not obstruct the oil passage in either the carrier or the case. See Fig. 35.

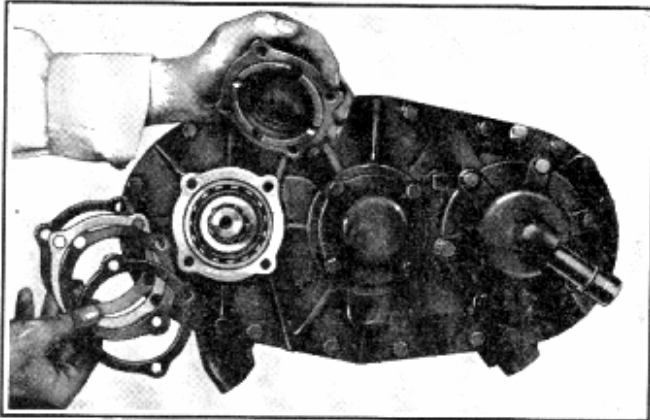


Fig. 9—Installing Bearing Caps

3. Install the idler shaft and main shaft front bearing caps (18) and (9), new gaskets (17 and 8) and shims (16 and 7) as illustrated in Fig. 9. Use the same shim pack thickness on the caps as was used at disassembly. The shims on the idler shaft bearing caps are used for two purposes, first of which is to provide means of making the bearing adjustments, and secondly, removing shims from the front bearing cap and adding the same thickness under the rear cap, or vice versa, provides a means of properly locating the idler gear in relation to the other two gears and the case.

**NOTE:**—The idler shaft is the only one that has shims at both the front and rear bearing caps. It will, therefore, be necessary to align the idler shaft gear in a centralized position so that its face will be flush with the other two gears. See Fig. 34.

4. Install the main, idler and driven shafts and gear assemblies in their correct position.
5. Tap the rear end of each shaft with a soft hammer to firmly seat the front cup of each bearing against the cap.

6. Lay a straight edge across the open side of the case to check for clearance between each gear and the side of the straight edge, as illustrated in Fig. 33. As long as there is sufficient space between the gears and the straight edge to prevent the gears from rubbing the cover in actual service, the alignment is correct.
7. If there is no clearance between the gears and straight edge, the main shaft and driven shaft assemblies should be removed and checked for correct gear and bearing installation to the shafts. The main and driven shafts cannot be adjusted in relation to the case, so they will be in the correct position providing the bearings, gears and shafts are assembled correctly.
8. Lay a straight edge across the face of the gears, as shown in Fig. 34, and check the alignment of the gears with respect to each other. Since the idler shaft is the only one adjustable, it will be necessary to either add or remove shims from the front bearing cap (18) until the face of the idler gear is flush with the faces of the main drive and driven gears.

**NOTE:**—In order to simplify idler shaft bearing adjustment, a note should be made of the thickness of shims removed or installed at the front bearing cap, when making the above adjustment, so that an equal amount will be removed or installed at the rear bearing cap. Shims used at the front and rear caps are not interchangeable.

9. If the above work has been correctly carried out, the three gears will be in their correct position in relation to the case and to each other, and will be ready for bearing adjustment. The idler shaft front bearing cap should be left installed with the same quantity of shims that was determined for the correct gear alignment.

### BEARING ADJUSTMENT

To obtain proper bearing adjustment, each shaft must be adjusted separately, as there must be no tooth contact to interfere with the checking of bearing bind or end play. Oil seals must be removed while bearing adjustments are made.

#### Main Shaft Bearings (Refer to Fig. 1)

1. Install the main shaft and bearing assembly in the case. Do not install idler or driven shaft. Be sure the rollers are oiled with engine oil.
2. Place the rear cover (5) and a new gasket (4) in position on the case.
3. Temporarily install the two tapered dowel pins to line up the cover with the case, install the cap screws and tighten evenly and securely, starting at the centre and working toward each end alternately.

4. Install the rear bearing cap (2) if it has been removed from the cover (5), using a new gasket (3).
5. Install the yoke (11), and nut (54), tighten and rap the flange back and forth with a soft hammer to make sure that the bearing cups seat firmly against the caps.
6. Turn the shaft by hand to determine whether or not the bearings are under tension.
7. Remove the flange and front bearing cap and remove or replace shims to increase or decrease the thickness enough to cause the shaft to drag slightly when turned by hand.
8. Reassemble bearing cap and flange.
9. Turn the shaft by hand to make sure the correct amount of shims have been removed or added. If tests indicate that further adjustment is necessary repeat the above operations until the shaft does drag slightly when turned by hand. Micrometers should be used when selecting shims.
10. Remove the flange and bearing cap and install sufficient shims to allow the shaft to turn freely without any end play.

**Each time shims are added the shaft must be tapped back and forth to ensure that bearing cups are seated firmly against the caps.**

**When the desired adjustment has been established do not again disturb the bearing caps.**

#### Idler and Driven Shaft Bearings

The adjustment of the idler and driven shaft bearings of the single speed transfer case is identical to that of the two speed. Refer to "Idler Shaft Bearings" and "Driven Shaft Bearing" adjustment, pages N-22 and 23.

#### GEARS AND COVER TO CASE REASSEMBLY

1. After the bearings have been adjusted install the main and idler shaft and gear assemblies in their proper positions in the case.
2. Install the cover (5), using a new gasket and install the cap screws, but do not tighten. Install the two tapered dowel pins to properly align the cover and case and then tighten the cap screws securely and evenly, starting at the centre and working to each end, alternately.
3. Install a new oil seal (23) in the driven shaft rear bearing cap (24). Install the cap over the shaft and start the retaining cap screws but do not tighten. Install the universal joint flange (21) over the shaft and through the oil seal to centralize the cap and oil seal, then

tighten the retaining cap screws securely. Install the universal joint flange retaining nut (61), tighten securely and lock in place with a cotter pin.

4. Remove the main drive shaft bearing cap (9) and install a new oil seal (10). Reinstall the cap (9) and universal joint yoke (11) following the same procedure as outlined in paragraph 3. Install the flange retaining nut (54) and lock in place with a cotter pin.

#### AIR CLEANER

Remove the air cleaner and wash the filter element in a suitable cleaning fluid. Allow it to dry and then dip it in engine oil. Allow the excess oil to drain from the element before replacing. The air cleaner should be cleaned regularly. For further information on servicing this unit see "Operating Instructions" section of this manual.

#### FRONT AXLE CONTROL LEVER ADJUSTMENT

(Refer to Fig. 1)

The linkage connecting front axle control lever in the cab to the declutching lever (37) Fig. 1, must be carefully adjusted so that the declutching gear will be fully engaged or disengaged. Adjustment is necessary when the shift shaft poppet ball (32), does not seat in the shift shaft (35) at the declutching carrier.

Following are the instructions for making linkage adjustment:

1. Disconnect the rod, connecting the declutching lever to the control lever in the cab, at the adjustable yoke end.
2. Move the declutching lever (37) at the transfer case, to be sure that the poppet ball is seating in the shift shaft (35). As the shaft is moved, the feel of the shaft will indicate when the poppet ball is seated. Leave the shaft "out" or in the disengaged position.
3. Note the position of the control lever in the cab, as it should be slightly forward of an upright or vertical position. When the control lever is in this position, the clevis pin at the control rod should line up with the hole in the declutching lever (37).
4. If the clevis pin and hole do not line up, the lock nut behind the adjustable yoke should be loosened and the linkage adjusted so the clevis pin will slide through the hole in the declutching lever.
5. Install the clevis pin and cotter pin. Be sure the yoke lock nut is again tightened.



## TRANSFER CASE

(C-30, C-60S, C-60L, C-GT.)

The transfer case used on these vehicles is essentially a two-speed transmission which provides a gear ratio in addition to that of the transmission. It is equipped with three power take-off shafts, one for the front axle, one for the rear axle and one for the power take-off, to operate the winch or other equipment.

The unit is located between the frame side rails to the rear of the transmission, and is mounted at an angle to equalize angularity of the propeller shafts. Mechanism for engaging or disengaging the front axle, also high and low speeds, or the power take-off when equipped, is provided in the unit and is connected to a shift lever, located in the cab to the left of the driver. For complete instructions on the use of the transfer case, refer to "Operating Instructions" in Section "B".

**Shafts and Bearings (Refer to Fig. 12)**

The main drive shaft (86) from the transmission is carried on two ball bearings (83) one on either end of the shaft. The front bearing is located in the case (23) and is held in place by the cap (34) which also carries the oil seal (35). The rear bearing (83) is located in the bearing cage (13) which is held in place by the power take-off carrier (11).

The power take-off shaft (8) is supported in the carrier (11) by two opposed tapered roller bearings (9), which are pressed on the shaft (8). The bearing cups (6) are pressed into the carrier housing (11), the rear cup (6) is held in place by the cap (2) which also carries the oil seal (3).

The idler shaft (92) is carried by two tapered roller bearings (89), the front and rear bearings are held to the shaft by the nuts (88) which are locked in place by the lock rings (87). The front bearing cup (41) is located in the case (23) and held in place by the cap (44). The rear bearing cup (41) is located in the cover (23) and held in place by the cap (38). The speedometer driven gear (93) is keyed to the front end of the idler shaft (92).

The driven shaft (95) is carried by two tapered roller bearings (94-97). The front bearing cup (54) is located in the case (23) and held in place by the front axle declutch carrier (60). The rear bearing cup (54) is located in the case cover (23) and held in place by the rear bearing cap and the brake flange (51), which also carries the oil seal (50).

The declutch shaft (65) is supported in the carrier (60), by two opposed tapered roller bear-

ings (67), which are held apart by the spacer (68). The bearing cups (66) are pressed into the carrier. The front cup (66) is held in place by the cap (71), which also carries the oil seal (72), while the rear cup (66) is held in place by a shoulder in the carrier housing (60).

**Gears**

The main drive gear (78), the idler gear (90) and the driven gear (96) are all helical cut and arc in constant mesh. The main shaft sliding gear (85) meshes with the internal teeth of the main drive gear (78) when in high gear, and with the low speed gear (91) on the idler shaft (92) when in low gear. The main drive gear (78) is fitted with a bushing (77) and floats on the main shaft (86), when the transfer case is in low gear or neutral. The end play of this gear is controlled by the thrust washers (84-79) and held in position by the lock ring (80).

The sliding hub (63) used with the front axle declutching mechanism, is located on the declutch shaft (65) and is meshed with the splines on the driven shaft (95) when the front axle is engaged.

The sliding hub (10) used with the power take-off mechanism, is located on the power take-off shaft (8), and is meshed with the clutch hub (82) on the mainshaft (86) when the power take-off is engaged. The clutch hub is pinned to the mainshaft (86), the pin being held in place by the lock ring (81).

**Oil Seals**

Oil seals are used at the front of the main shaft (86), the rear of the power take-off shaft (8), the front of the declutching carrier (60) and the rear of the driven shaft (95). The seals are large, spring-loaded, leather type and effectively prevent loss of lubricant. The leather is held in close contact with the outer surface of the universal joint companion flange hub by a spring. Whenever the unit is disassembled for inspection or other service requirements, the seals should always be replaced, as replacement of the oil seals at regular overhaul is more economical than premature replacements of more expensive parts, due to failure through lack of lubricant lost by the worn oil seals.

**Transfer Case Removal**

If it is necessary to remove the transfer case for overhaul or replacement, the following instructions are recommended:



1. Place a suitable container under the transfer case and remove the drain and filler plugs. Allow the lubricant to drain and then replace and tighten the plugs securely.
2. Disconnect the front and rear axle propeller shafts, the power take-off shaft when equipped, and the transmission propeller shaft at the transfer case end. To do this separate the universal joints as directed in the rear axle section under the heading of, "Propeller Shaft Removal."
3. Disconnect the hand brake control rod where it is connected to the propeller shaft brake band.
4. Remove the speedometer cable at the transfer case idler shaft front bearing cap, by loosening the knurled nut with a pair of pliers so that the cable can be removed from the driven gear shaft.
5. Remove the cotter pin and clevis pin attaching the front axle control rod to the transfer case.
6. Disconnect the high-low shift rod at the shift rail of the shift tower.
7. When the vehicle is equipped with a power take-off, disconnect the control rod at the transfer case end.
8. Place a suitable support under the transfer case assembly, preparatory to loosening the four mounting bolts.
9. The four mounting bolts are wired together in pairs to serve as a locking device. After removing this wire the four mounting bolts may be removed and the transfer case freed from the chassis. It will be necessary to use an open end wrench of the correct size to remove two upper mounting bolts as there is only a small space between the transfer case cross-member and the body in which a wrench may be used.

### Transfer Case Replacement

1. Raise the transfer case assembly into position using a jack if a more suitable means is not available.

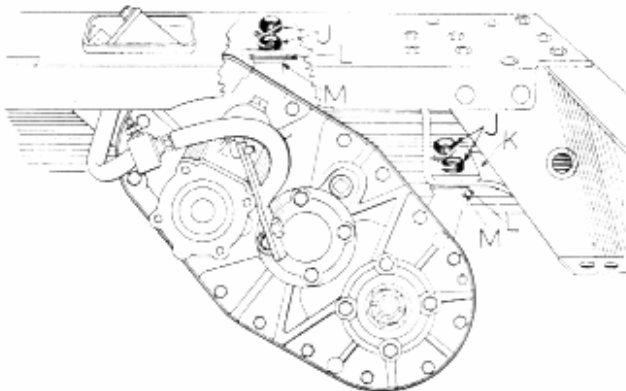


Fig. 10—Transfer Case Mounting

2. Install the four mounting cap screws "J" fastening the assembly to the frame cross member and to the support bracket "K" Fig. 10. One composition shim (rubber and fabric) "L" and one steel shim "M", are normally used at each cap screw. These shims are located between the transfer case mounting boss and the cross member at the top and between the mounting boss and the support bracket at the bottom.

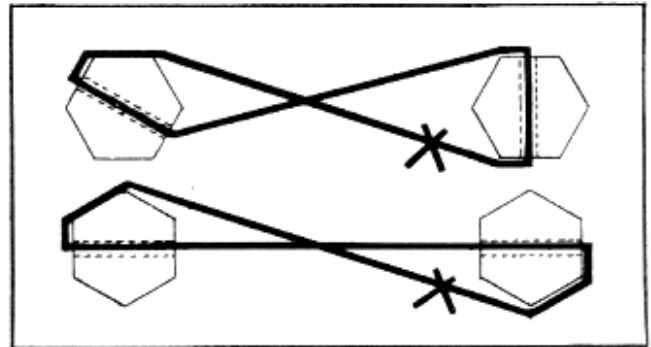


Fig. 11—Locking Mounting Cap Screws

3. Adjust each cap screw to 30-35 ft. lbs. tension. Use firm pressure on an 8" wrench where the body design does not allow sufficient room to use a tension wrench. Lock the upper pair of cap screws together, using No. 14 gauge wire. Route the lock wire through the heads of the cap screws, as shown in Fig. 11, so that if either cap screw tends to back off it tightens the other. Lock the lower pair of cap screws in the same manner.
4. Connect the speedometer cable, the universal joints, propeller shafts and the hand brake pull rod to their respective positions. Adjust the hand brake as instructed in the "Brake Section" of this manual.
5. Connect the front axle declutching control rod, the high-low shift rod, the power take-off control rod and adjust as instructed under the heading, "Transfer Case Control Linkage Adjustment."
6. When the transfer case has been completely installed it should be filled to the proper level with lubricant as specified in the "Lubrication Section" of this manual.

### DISASSEMBLY

(Refer to Fig. 12)

1. Install the complete transfer case in the special holding fixture J-1716, illustrated in Fig. 13. The use of this fixture facilitates disassembly and reassembly as it permits rotating the case to various positions.

Before the transfer case is disassembled the outside of the case should be thoroughly cleaned.

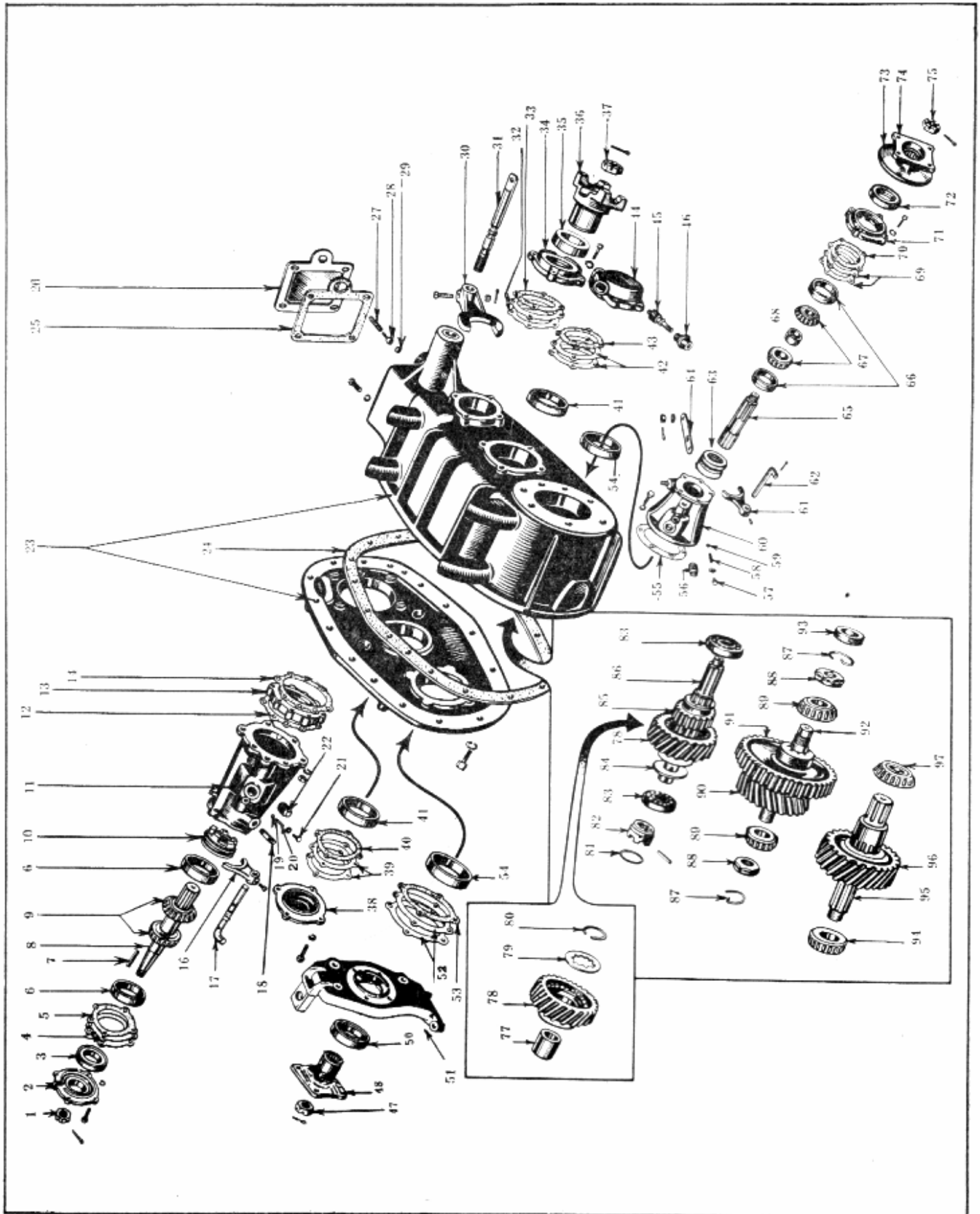


Fig. 12—Exploded View of Two Speed Transfer Case

## CAPTION FOR FIG. 12

1. Power Take-off Shaft End Nut.
2. Power Take-off Bearing Cap.
3. Power Take-off Shaft Oil Seal.
4. Power Take-off Shaft Shims.
5. Power Take-off Bearing Cap Gasket.
6. Power Take-off Front and Rear Bearing Cups.
7. Power Take-off Shaft Key.
8. Power Take-off Shaft.
9. Power Take-off Front and Rear Bearing Cones.
10. Power Take-off Sliding Clutch.
11. Power Take-off Carrier.
12. Power Take-off Carrier Gasket.
13. Main Drive Shaft Rear Bearing Cage.
14. Main Drive Shaft Rear Bearing Gasket.
16. Power Take-off Shift Fork.
17. Power Take-off Shift Shaft.
18. Power Take-off Shift Lever Stud.
19. Power Take-off Shaft Lock Ball.
20. Power Take-off Shift Shaft Lock Ball Spring.
21. Shift Shaft Lock Ball Screw.
22. Power Take-off Carrier Plug.
23. Transfer Case and Cover.
24. Transfer Case Cover Gasket.
25. Gear Shift Shaft Cover Gasket.
26. Transfer Case Shift Shaft Cover.
27. Gear Shift Lock Ball Spring.
28. Gear Shift Lock Ball Plunger.
29. Gear Shift Lock Ball.
30. Transfer Case Gear Shift Fork.
31. Transfer Case Gear Shift Shaft.
32. Main Drive Shaft Front Bearing Cap Shims.
33. Main Drive Shaft Front Bearing Cap Gaskets.
34. Main Drive Shaft Front Bearing Cap.
35. Main Drive Shaft Front Bearing Cap Oil Seal.
36. Universal Joint Yoke.
37. Main Drive Shaft Front Yoke Retaining Nut.
38. Idler Shaft Rear Bearing Cap.
39. Idler Shaft Rear Bearing Cap Shims.
40. Idler Shaft Rear Bearing Cap Gasket.
41. Idler Shaft Front and Rear Bearing Cups.
42. Idler Shaft Front Bearing Cap Shims.
43. Idler Shaft Front Bearing Cap Gasket.
44. Idler Shaft Front Bearing Cap.
45. Speedometer Driven Gear.
46. Speedometer Driven Gear Sleeve.
47. Driven Shaft Flange Retaining Nut.
48. Driven Shaft Flange.
50. Driven Shaft Rear Bearing Cap Oil Seal.
51. Hand Brake Flange and Driven Shaft Rear Bearing Cap.
52. Driven Shaft Rear Bearing Cap Shims.
53. Driven Shaft Rear Bearing Cap Gasket.
54. Driven Shaft Front and Rear Bearing Cups.
55. Declutch Shaft Carrier Gasket.
56. Plug.
57. Shift Shaft Lock Screw.
58. Declutch Shift Shaft Lock Spring.
59. Declutch Shift Shaft Lock Ball.
60. Declutch Shaft Carrier.
61. Declutch Shift Fork.
62. Declutch Shift Shaft.
63. Declutch Sliding Gear Clutch.
64. Declutch Shift Lever.
65. Declutch Shaft.
66. Declutch Shaft Bearing Cups.
67. Declutch Shaft Cones.
68. Declutch Shaft Bearing Spacer.
69. Declutch Carrier Cap Shims.
70. Declutch Front Bearing Cap Gasket.
71. Declutch Bearing Cap.
72. Declutch Shaft Oil Seal.
73. Declutch Shaft Flange Dust Shield.
74. Declutch Shaft Flange.
75. Declutch Shaft Flange Retaining Nut.
77. Main Drive Gear Bushing.
78. Transfer Case Main Drive Gear.
79. Main Drive Gear Front Thrust Washer.
80. Main Drive Gear Thrust Washer Ring.
81. Power Take-off Drive Clutch Pin Snap Ring.
82. Power Take-off Drive Clutch.
83. Main Drive Shaft Front and Rear Bearings.
84. Main Drive Gear Rear Bearing Thrust Washer.
85. Main Drive Shaft Sliding Gear.
86. Main Drive Shaft.
87. Idler Shaft Bearing Lock Nut Snap Rings.
88. Idler Shaft Bearing Lock Nuts.
89. Idler Shaft Front and Rear Bearing Cones.
90. Transfer Case Idler Gear.
91. Idler Shaft Low Speed Gear.
92. Transfer Case Idler Shaft.
93. Speedometer Drive Gear.
94. Driven Shaft Rear Bearing Cone.
95. Transfer Case Driven Shaft.
96. Transfer Case Driven Gear.
97. Driven Shaft Front Bearing Cone.

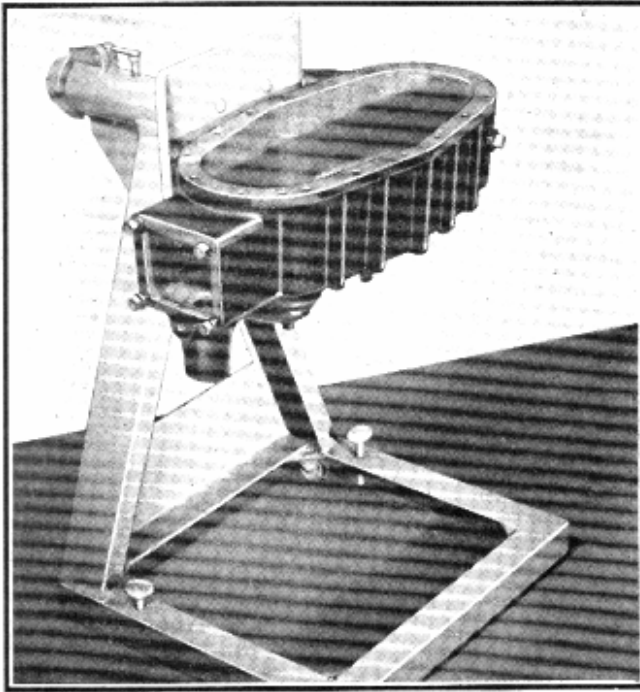


Fig. 13—Transfer Case Holding Fixture,  
Tool No. J-1716

2. Remove the cotter pins and nuts holding the universal joint flanges to the front of the declutching carrier shaft, the front of the main shaft, the rear of the driven shaft and the rear of the power take-off shaft when equipped. Use a soft-faced hammer and tap the flanges off the shafts.
3. Remove the speedometer gear sleeve (46), the driven gear (45) from the front of the idler shaft bearing cap (44).
4. Remove the cap screws and the front main shaft bearing cap (34), the front axle declutching carrier assembly (60) and the idler shaft bearing cap (44):

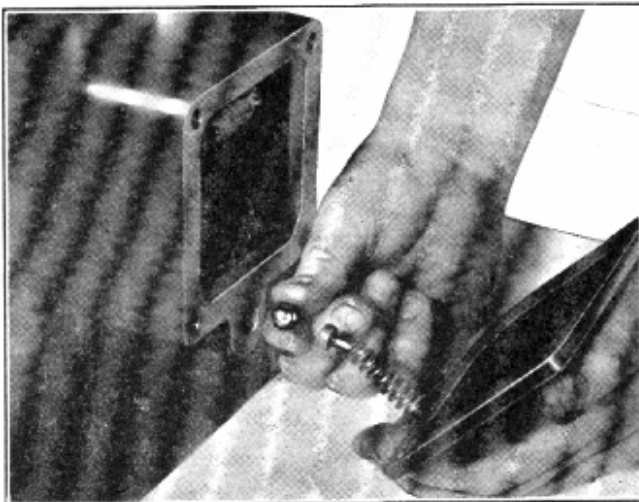


Fig. 14—Gear Shift Cover, Spring, Plunger and Ball are Removed and Installed in Order Shown

**CAUTION:**—When removing the bearing caps be sure that the quantity and thickness of the shims used under each cap are noted so that the same shims may be used at reassembly.

5. Rotate the transfer case until the gearshift cover is pointing upwards. Remove the cap screws and the cover (26), the shift shaft lock ball spring (27), the lock ball plunger (28) and the lock ball (29). See Fig. 14.

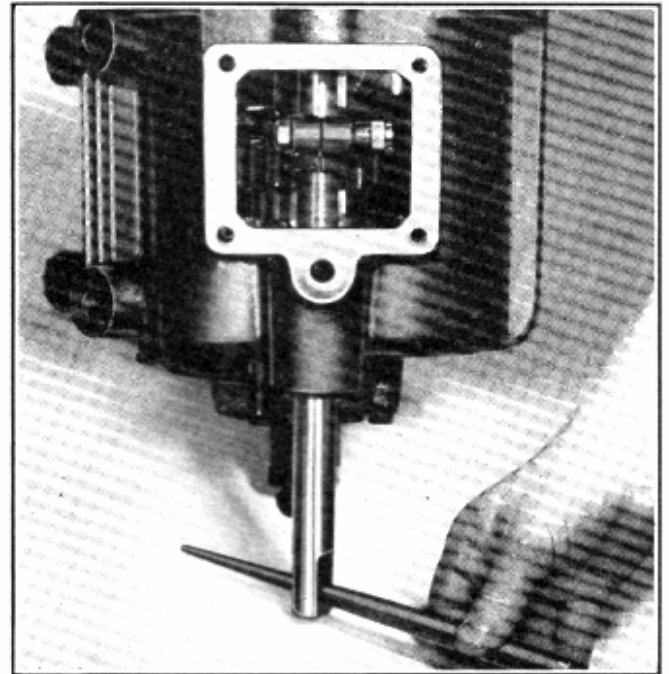


Fig. 15—High and Low Speed Shifter Shaft is Threaded into Shift Fork as Shown

6. Remove the cotter pin and loosen the clamp bolt in the gearshift fork (30). Turn the threaded shaft (31) out of the shifter fork (30) as shown in Fig. 15.

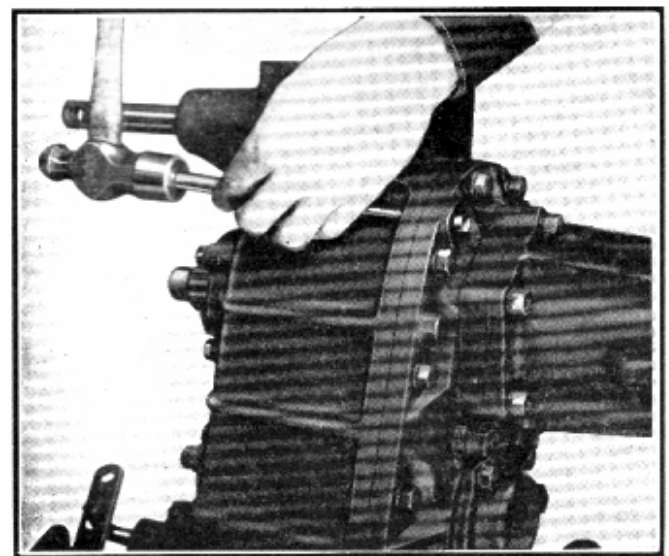


Fig. 16—Driving Out Cover Dowels

7. Rotate the case in the fixture so that the cover or rear of the transfer case is up. Remove the cap screws and the driven shaft bearing cap and brake flange (51) and the idler shaft bearing cap (38). When removing these bearing caps note quantity and thickness of shims as explained previously.
8. Remove the retaining nuts and the power take-off carrier (11), lay it aside and disassemble later as directed.

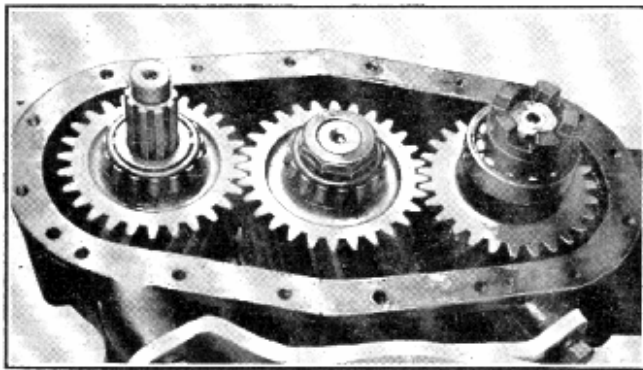


Fig. 17—Transfer Case with Cover Removed Showing Gears and Shafts

9. Drive out the two dowel pins toward the rear of the case as illustrated in Fig. 16 and remove the cap screws and cover from the case. Fig. 17 illustrates the transfer case with the cover removed.
10. The mainshaft (86), the idler shaft (92) and the driven shaft (95) with gears, can now be removed from the case.

#### Mainshaft (Refer to Fig. 12)

If inspection indicates that the mainshaft assembly must be disassembled for repair, proceed in the following manner:—

1. Clamp the mainshaft assembly in a vise, using soft plates over the jaws so that the shaft splines will not be damaged.
2. Remove the power take-off clutch (82) from the end of the shaft by first removing the locking ring (81) and driving out the tapered pin with a 1/8" pin punch.
3. Place the mainshaft assembly in an arbor press, with the rear or clutch end facing upward. Support the assembly by the front face of the mainshaft gear (78) and press on the rear end of the mainshaft as shown in Fig. 18. This operation will remove the rear ball bearing (83), the rear thrust washer (84) between the bearing and the mainshaft gear (78). Note that the chamfer side of the rear thrust washer is installed towards the rear

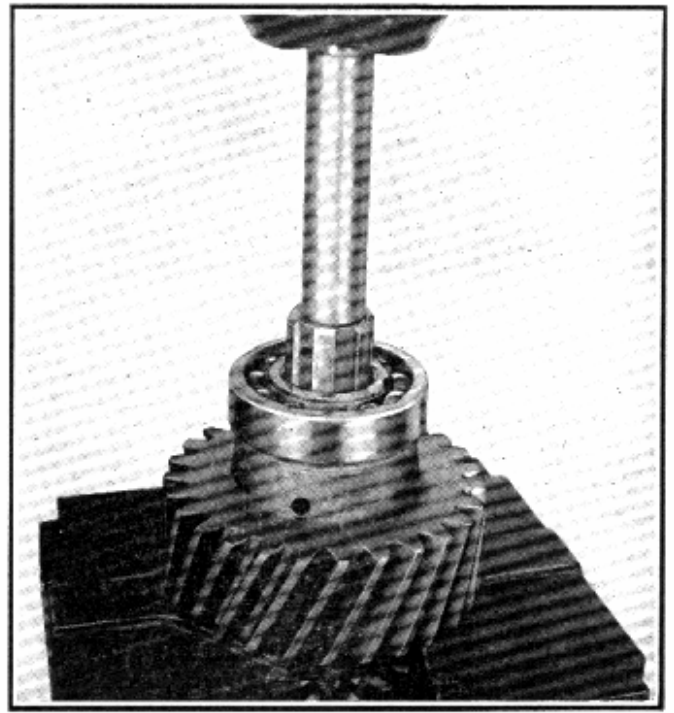


Fig. 18—Pressing off the Mainshaft Rear Bearing

- bearing. This washer should be replaced if found to be worn or scored.
4. Lift off the front thrust washer (on the front side of the mainshaft gear) and examine it for wear or scoring. This washer is splined and bears against a locating snap ring. The snap ring should be renewed at the time of overhaul to avoid possible breakage in the future.
5. To remove the mainshaft sliding gear (85) and the mainshaft front bearing (83) support the assembly in an arbor press by the rear face of the sliding gear (85) and apply pressure to the front end of the mainshaft.

#### Idler Shaft (Refer to Fig. 12)

1. Clamp the idler shaft and gear assembly in a vise with the speedometer gear end up. Soft plates should be used on the jaws of the vise to prevent damage.
2. Using puller J-1737 as illustrated in Fig. 19 pull the speedometer gear (93) from the idler shaft. Using a narrow punch, tap the woodruff key from the shaft.
3. Remove the lock rings (87) from the nuts (88) as shown in Fig. 20 and remove both nuts.
4. Place the idler shaft and gear assembly in an arbor press with the front end of the assembly facing upward. Support the assembly by the rear face of the low speed gear (91) and press on the front end of the shaft as shown in Fig.



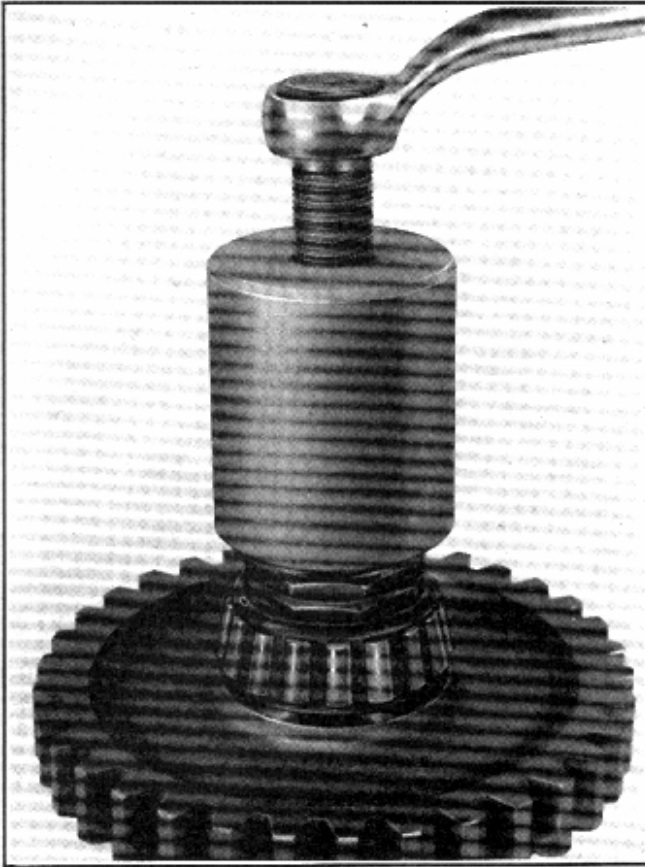


Fig. 19—Removing Speedometer Gear, Tool No. J-1737

21. This operation will remove the front bearing cone (89) and idler shaft low speed gear (91) from the shaft.

5. Turn the assembly end for end with the rear end of the shaft up. Pressing on the rear end of the idler shaft will remove the rear bearing cone (89) and the idler shaft high speed gear (90).

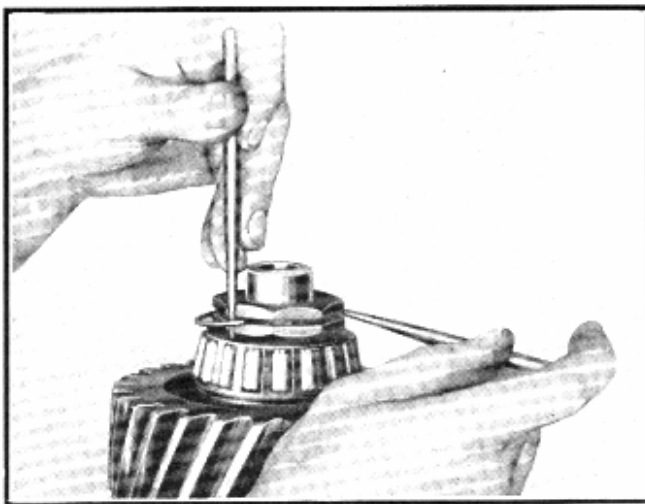


Fig. 20—Removing Bearing Lock Nut Snap Ring



Fig. 21—Pressing off Idler Shaft Gears and Bearings

#### Driven Shaft (Refer to Fig. 12)

1. Place the driven shaft and gear assembly in an arbor press so that the rear end of the shaft is facing upward.
2. Support the assembly on the front face of the driven gear (96) and press on the rear end of the driven shaft. This operation will remove the driven shaft rear bearing (94) and the driven gear (96) from the driven shaft.
3. If it is necessary to remove the driven shaft front bearing (97) it may be done by using puller (C.S.-1047) as illustrated in Fig. 5. If this tool is not available the bearing may be removed, using an arbor press, making certain that the force is applied to the inner bearing race.

#### Power Take-Off (Refer to Fig. 12)

1. Clamp the carrier in a vise having soft plates on its jaws to protect the housing from damage.
2. Remove the cap screws which attach the bearing cap (2) to the power take-off carrier (11).
3. Lift the cap assembly (2) from the carrier (11). Note the quantity and thickness of shims (4) that are used between the cap and carrier. These shims are used to obtain the proper bearing adjustment.



4. Remove the shift shaft lock ball screw (21). This will allow the poppet spring (20) and poppet ball (19) to be removed from the carrier (11).
5. Remove the plug (22), this will permit the use of a screw driver as illustrated in Fig. 22, to loosen the setscrew holding the shift fork (16) to the shifter shaft (17).
6. Remove the shifter fork (16) and the sliding clutch (10) from the large end of the carrier housing (11).
7. Place the carrier assembly in an arbor press with the rear or small end facing down. Press out the shaft (8) with the bearing cones (9) and the rear bearing cup (6).
8. If inspection indicates that the inner bearing cup (6) should be replaced, it can be driven from the carrier (11) with a brass drift punch and hammer. Place the carrier on a bench with the rear end down and tap the cup around the edge until it is removed from the carrier (11). During removal do not allow the bearing to become cocked in the carrier.
9. If further inspection indicates the necessity to replace the bearing cone (9) these should be removed and the new cones replaced with an arbor press.

#### Declutching Carrier (Refer to Fig. 12)

After the declutching carrier (60) has been removed from the case as previously described under, "Disassembly" further disassembly may be accomplished as follows.

1. Place the complete unit in a vise having soft plates on its jaws to protect the carrier from damage.
2. Remove the cap screws attaching the cap (71) to the carrier.
3. Lift the cap assembly (71) from the carrier (60). Note that a quantity of shims (69) are used between the cap and the carrier, these shims are used to obtain the proper bearing adjustment. The shims should be attached to the cap with a small piece of wire so that the same quantity will be used at reassembly.
4. Place the declutch carrier assembly in an arbor press, if necessary, to remove the shaft and bearings from the carrier. Support the carrier (60) at the front end and apply pressure at the inner end of the shaft (65), this will remove the shaft, two bearing cones (67), spacer (68) and outer bearing cup (66).
5. Remove the special cap screw (57) holding the poppet spring (58) and ball (59) in the declutching carrier (60).
6. Remove the cotter pin from the shift shaft (62), so that the shift lever (64) can be re-

moved from its shaft, after the nut at the pivot end is removed.

7. Removal of the pipe plug (56) in the carrier will permit the use of a screw driver, as illustrated in Fig. 22 to loosen the setscrew holding the shift fork (61) to the shift shaft (62).

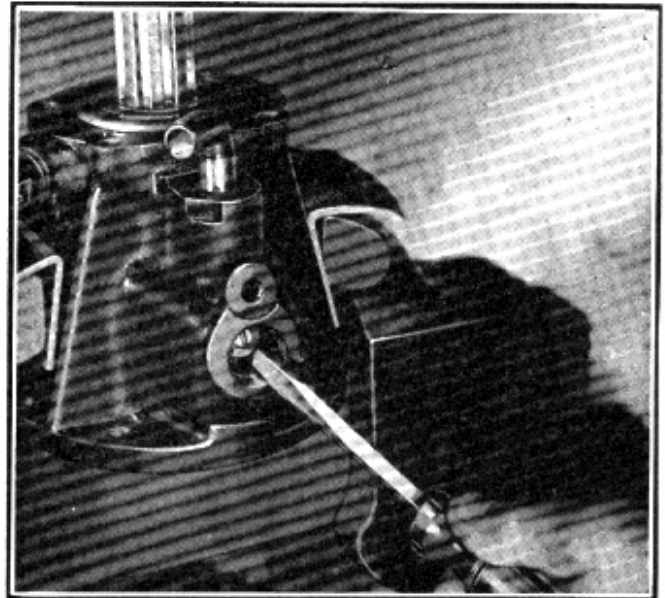


Fig. 22—Front Axle Shift Fork is Held to Shift Shaft by Set Screw as Shown

The shift fork and the sliding gear (63) can then be removed, as the shift shaft (62) is removed from the carrier.

## INSPECTION

### Bearings

Place all bearings in a suitable cleaning fluid and allow them to remain there long enough to loosen any hardened lubricant. After a thorough soaking, the bearings should be alternatively flushed up and down to remove as much of the old lubricant as possible. Then remove the ball bearings from the cleaning fluid and strike the larger open side of the bearings flat against a wood block to jar loose any heavier and harder particles of lubricant. Repeat this emersion and striking operation until it is evident that the bearings are clean. Blow out all the bearings being careful to direct the air pressure across the bearing surface to remove the last particles of old lubricant without spinning the bearing. Carefully inspect the balls, rollers and cones for chipping, cracks or worn spots, to determine the fitness of the bearings for further use. After inspection dip the bearings in engine oil and wrap them in clean cloth or paper to protect them until they are needed.

In addition to cleaning the bearings as directed above, the following inspections should be made:

## TRANSFER CASE—N - 18

1. Carefully examine the teeth of all gears for nicks and "galled spots". Do not take any chances with gears which are appreciably nicked or scored. All nicks may be removed with a "slip stone" or hone.
2. Inspect the faces of the gear teeth. Gears which are cracked or have chipped teeth, or spots where the case hardening is worn through, should be replaced.
3. Inspect the case and cover for evidence of the idler shaft gears rubbing. If a condition of this nature is found it indicates that the shaft is not properly located in the case.
4. Check the clearance between the splines in the declutch sliding hub (63) and the declutch shaft (65) and the driven shaft (95). If it exceeds the limits specified at the end of this section, the necessary parts should be replaced.

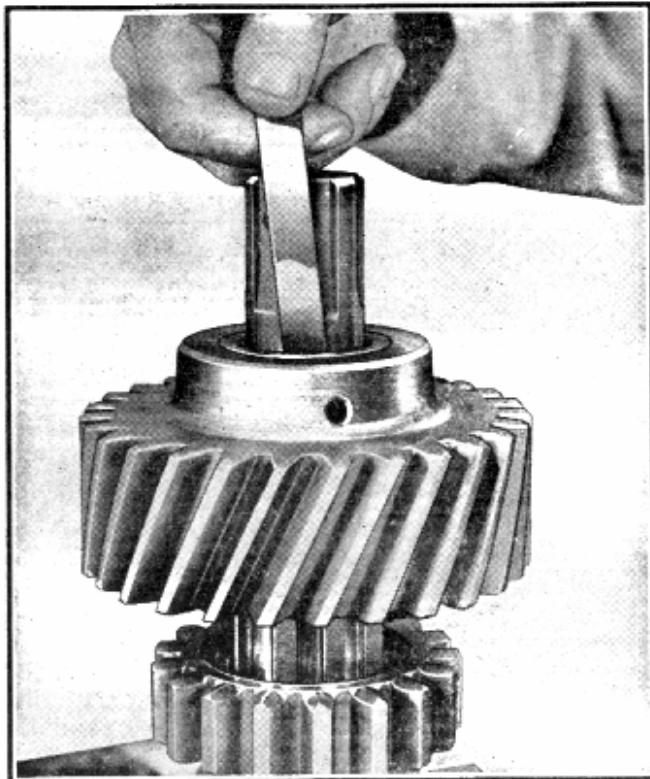


Fig. 23—Checking Clearance of Main Drive Gear Bushing

5. Check the clearance between the main drive gear bushing (77) and the main shaft (86) as shown in Fig. 23. If this clearance is not within the limits of .001" to .007" a new bushing should be installed in the main drive gear.
6. Check the front and rear thrust washers (79-84); if these parts are worn or scored they should be replaced.
7. Install the front thrust washer (79) over the shaft (86) and against the locating snap ring (80). Install the main drive gear (78) and

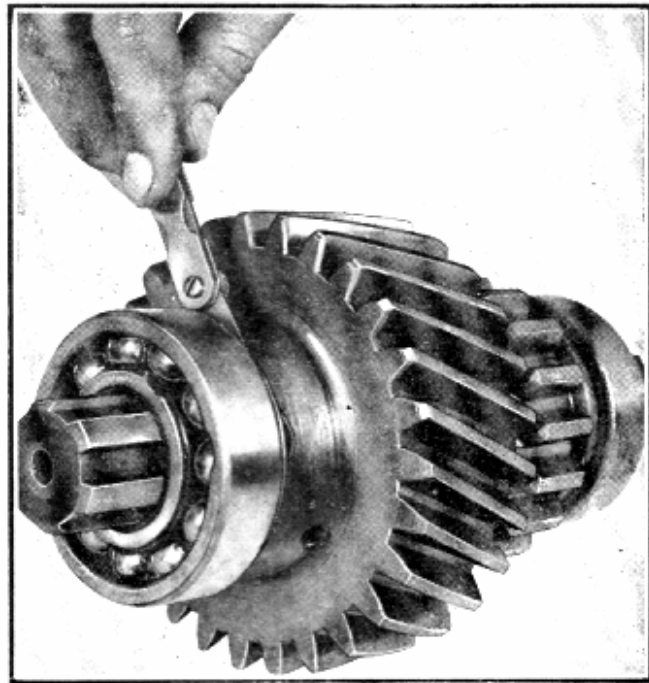


Fig. 24—Checking End Play of Main Drive Gear

the rear thrust washer (84) with the chamfered side of the thrust washer away from the gear.

8. Hold the thrust washer (84) against its seat on the shoulder of the shaft (86). With a feeler gauge measure the clearance between the hub of the main drive gear (78) and the thrust washer (84) as shown in Fig. 24. This clearance should be within the limits of .010"-.015".

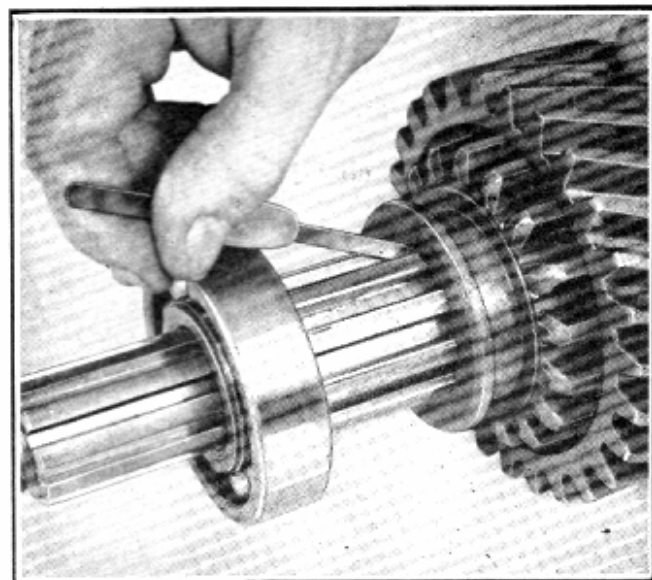


Fig. 25—Checking Clearance between Sliding Gear and Splines

9. Place the sliding gear (85) over the front end of the mainshaft, so that the shifter

groove of the gear faces towards the front of the shaft. Using a narrow feeler gauge, measure the clearance between the sliding gear and the mainshaft splines, as shown in Fig. 25. If this clearance is not within the .001" to .004" limit the worn parts should be replaced.

#### Cover

1. Thoroughly wash out the cover with a suitable cleaning fluid.
2. Clean the large  $\frac{1}{2}$ " oil hole and reservoir leading to the main drive shaft rear bearing.
3. Make certain the  $\frac{1}{4}$ " oil holes at the idler and driven shaft rear bearings are clean.

#### Case

1. Thoroughly wash out the case with a suitable cleaning fluid.
2. Make certain that the oil reservoir at the main drive shaft front bearing is clean and that the  $\frac{1}{4}$ " oil hole is not obstructed.
3. Clean the  $\frac{1}{4}$ " oil hole that passes through the case at the side of the idler shaft front bearing into the front bearing cap.
4. Clean the  $\frac{1}{2}$ " oil hole and reservoir at the driven shaft front bearing.
5. Examine the case for signs of cracks or other damage which might effect the future operation of the assembly.

#### Bearing Cups

Wipe the surfaces of the bearing cups clean and examine them for signs of pitting, cracks, or chipping of the surface hardening. If necessary they can be removed from the case, cover, de-clutch carrier, and power take-off carrier with a soft punch and a hammer.

#### Oil Seals

Spring-loaded, leather type, oil seals are used at the front of the main shaft, the front of the declutching carrier, at the rear of the driven shaft, and the rear of the power take-off carrier. These seals have their bearing surfaces on the machined hubs of the flanges of the shafts referred to above. In order to prevent lubricant leaks it is essential that the bearing surfaces on the flanges and the seals be in good condition. The seals must be replaced when the transfer case is overhauled, and the flanges should be carefully inspected for score marks and wear, and replaced if necessary.

**NOTE:**—New oil seals should be soaked in engine oil until they become pliable before they are installed.

An oil seal replacing tool J-1722 should be used to assure proper installation of the leather seals

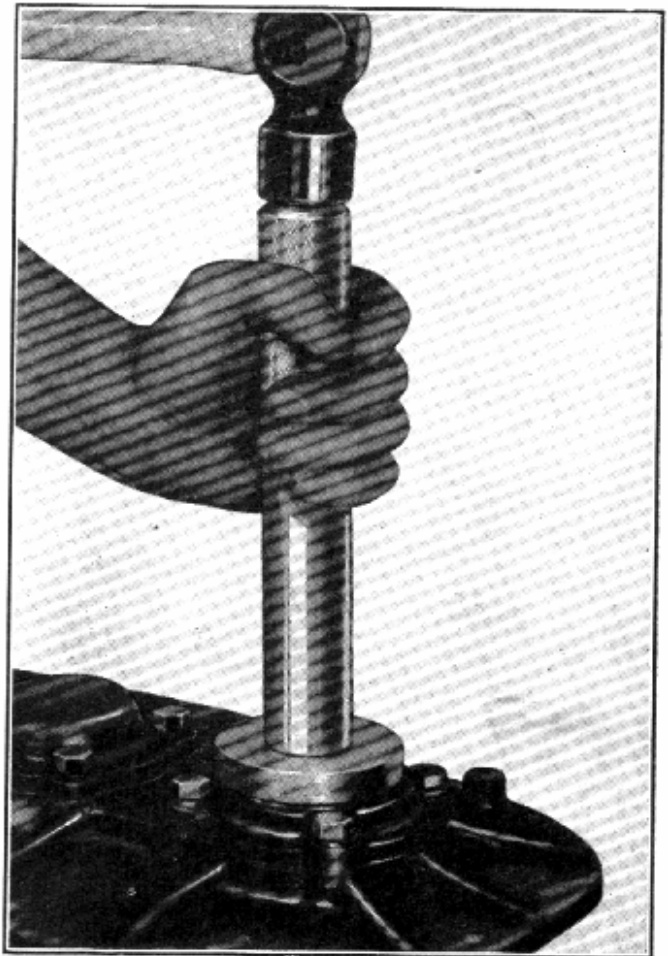


Fig. 26—Installing Oil Seal, Tool No. J-1722

as shown in Fig. 26. When installing seals it is important that they seat fully in the caps. The use of the replacing tool assures proper installation of the seals.

**IMPORTANT:**—New seals should not be installed until all bearings have been adjusted, because of the drag they would cause on the shafts which could be mistaken for bearing tension.

#### REASSEMBLY

##### Declutching Carrier (Refer to Fig. 12)

1. When the inner bearing cup (66) has been removed from the declutching carrier, it is important that it be replaced so that it seats against the shoulder in the carrier, with the thickest side toward the rear. If the cup does not seat fully, or is cocked, it will be impossible to obtain proper bearing adjustment. The bearing cup replacing tool J-1719 should be used for this operation.
2. Install the inner bearing cone (67) on the shaft (65) with the large end of the bearing cone towards the front end of the shaft. Install the spacing sleeve (68) over the shaft. Install the outer bearing cone (67) on the

shaft (65) with the large end of the bearing cone toward the rear of the shaft. The bearing cone replacing tool J-1718 should be used when installing bearings to prevent damage to the cone, and to properly seat the bearings. Lubricate each bearing with engine oil.

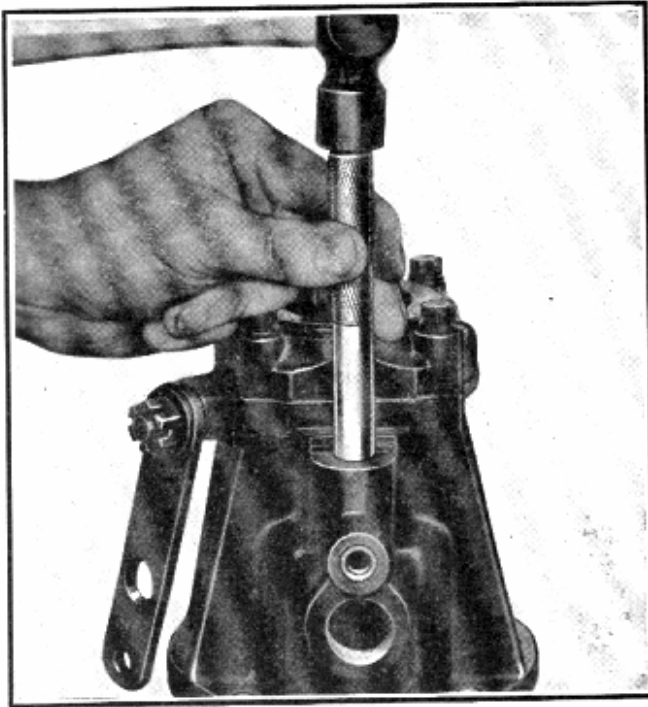


Fig. 27—Installing Shift Shaft Oil Seal, Tool No. J-1717

3. When it has been found necessary to replace the shifter shaft oil seal, replacing tool J-1717 should be used as shown in Fig. 27 to assure proper installation.
4. Install the shift fork (61), into the rear end of the carrier (60), with the long end of the fork hub toward the rear. Install the sliding gear (63) with the shift fork slot toward the rear and locate the shift fork in the slot of the sliding gear.
5. Install the declutch shaft and bearing assembly through the front of the carrier (60) and install the sliding gear (63) over the rear end of the shaft as it is pushed into place in the carrier. Install the outer bearing cup (66) in the carrier with the thick side toward the front.
6. Install the shift shaft (62) in the carrier (60) and through the hub of the shift fork (61). Line up the hole in the fork with the hole in the shaft and install setscrew, tighten securely with a screw driver as shown in Fig. 22. Prick punch the fork beside the screw to prevent loosening. Install the pipe plug (56) in the carrier.
7. Install the poppet ball (59) and spring (58) using the special plug (57) to hold them in place. The order in which these parts are installed is illustrated in Fig. 29.

8. Install the bearing cap (71) using a new gasket (70) and the same shims as were removed at disassembly.

**CAUTION:**—Be sure that the oil passage holes in the gasket, shims and cap, line up with the passage at the bottom of the carrier, as illustrated in Fig. 28.

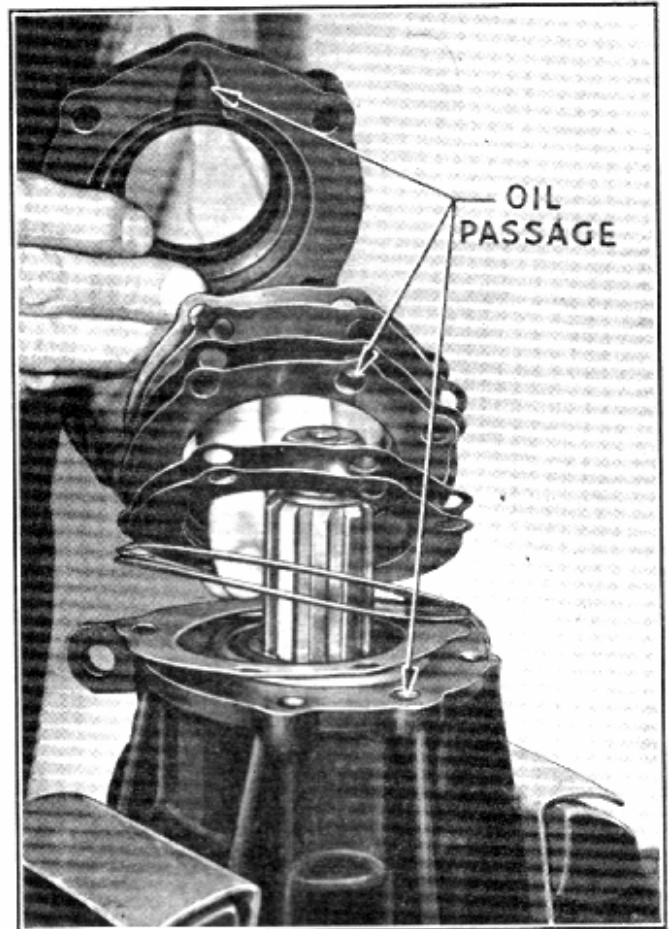


Fig. 28—Oil Passages in Declutching Carrier, Shim, Gasket and Cap Must Line Up as Shown

9. Tighten the cap screws attaching the cap to the carrier. Install the flange (74) and nut (75) and tighten securely.
10. Tap the flange back and forth to be sure the bearing cups are seated in the carrier housing. Turn the shaft (65) to determine if bearing drag, or end play exists. If the bearings are properly adjusted, the shaft (65) should turn freely without any perceptible end play. If this check or test indicates that the shaft (65) has end play, remove a sufficient number of the shims (69) from under the cap (71) to cause a slight bearing drag, then add just sufficient shims so that the shaft (65) turns freely without end play.
11. To properly adjust bearings that are under sufficient tension to drag or bind, it will be necessary to remove the cap (71) and add a



sufficient number of shims (69) so that the shaft (65) turns freely without end play.

**NOTE:**—Each time that shims are added or removed from the bearing cap it is necessary to install the universal joint flange and tighten the retaining nut securely, before checking bearing tension. If shims have been installed, it is important that the flange be tapped back and forth to properly seat the bearing races in the carrier housing. If this is not carried out a proper bearing adjustment cannot be obtained.

12. After the declutching carrier bearings have been properly adjusted, remove the cap (71) and install a new oil seal (72). Reinstall the cap, universal joint flange, retaining nut and tighten securely.

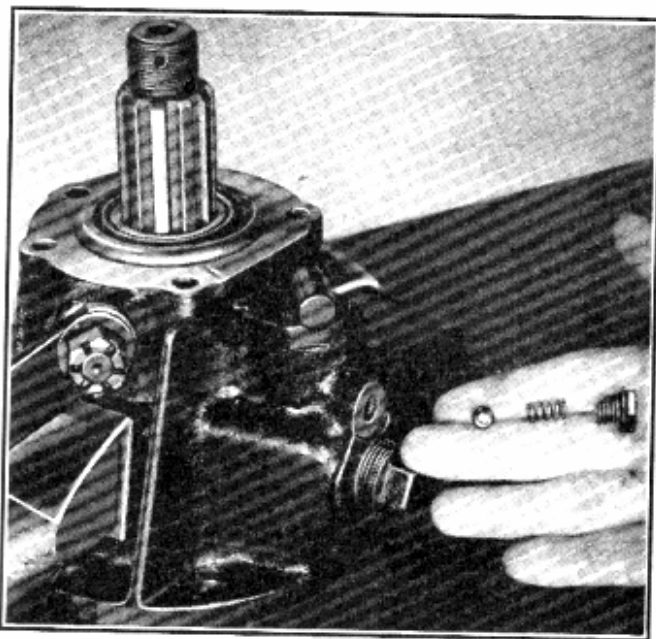


Fig. 29—Poppet Ball, Spring, Washer and Screw are Installed in Declutching Carrier in Order Shown

13. Attach the shift lever (64) to the shift shaft (62) using a flat washer and cotter pin to hold the lever to the shaft. Tighten the lever pivot stud nut and secure with a cotter pin.

#### Power Take-Off (Refer to Fig. 12)

1. If either of the bearing cones (9) have been removed, they should be replaced, using an arbor press for the rear bearing and bearing replacing tool J-1718 for the front bearing.
2. When the inner bearing cup (6) has been removed from the power take-off carrier it is important that it be replaced so that it seats against the shoulder in the carrier housing (11). If the cup does not seat fully or is cocked it will be impossible to obtain proper bearing adjustment.

3. When it has been found necessary to replace the shifter shaft oil seal, the replacing tool J-1717 should be used.
4. Install the power take-off shaft and bearing assembly in the front end of the housing (11) and install the outer bearing cup (6) in the carrier housing.
5. Install the outer bearing cap (2) with oil seal removed, using a new gasket (5) and the same quantity and thickness of shims as were removed at disassembly.
6. Tighten the cap screws attaching the cap (2) to the housing (11). Install the universal joint companion flange and retaining nut (1) and tighten securely.
7. Tap the flange to seat the bearing cups in the carrier housing. Turn the shaft (8) to determine if bearing drag or end play exists. If the bearings are properly adjusted the shaft (8) should turn freely without any perceptible end play. If this check indicates that further bearing adjustment is necessary, proceed with the adjustment as outlined in Paragraph 10 under the heading, "Declutching Carrier Reassembly".
8. After completing the bearing adjustment, remove the bearing cap (2) and install a new oil seal (3). Place oil seal installing tool No. XG-19846 over the end of the shaft (8). This is necessary to prevent damage to the oil seal. Install the cap (2) over the shaft and push into place, start the retaining cap screws but do not tighten. Remove the oil seal installing tool and install the universal joint flange, tighten retaining nut securely. Tighten the cap retaining cap screws.
9. Install the shift shaft (17) in the housing (11) as the fork (16) is slipped on the shift shaft (17) and the sliding clutch (10) is slipped over the splines on the shaft (8). When installing the shift fork (16) on the shift shaft (17), make certain that the long part of the shift fork is toward the outer end of the power take-off housing, also that the slot of the sliding clutch (10) is facing toward the rear end of the power take-off housing.
10. Line up the setscrew in the fork (16) with the hole in the shaft (17) then tighten the setscrew securely using a screw driver in a manner similar to that in Fig. 22. When the screw has been tightened, prick punch the fork beside the screw to prevent loosening. Replace the plug (22) in the carrier.
11. Check the poppet spring (20) with the specifications shown at the end of this section. If the spring is within the limits, assemble the poppet ball (19), spring (20) and special screw (21) in the order shown in Fig. 29.

#### Mainshaft (Refer to Fig. 12)

Replace parts found necessary during inspection and assemble the main shaft as follows.

1. Install the locating snap ring (80) in the machined groove in the centre of the mainshaft (86).

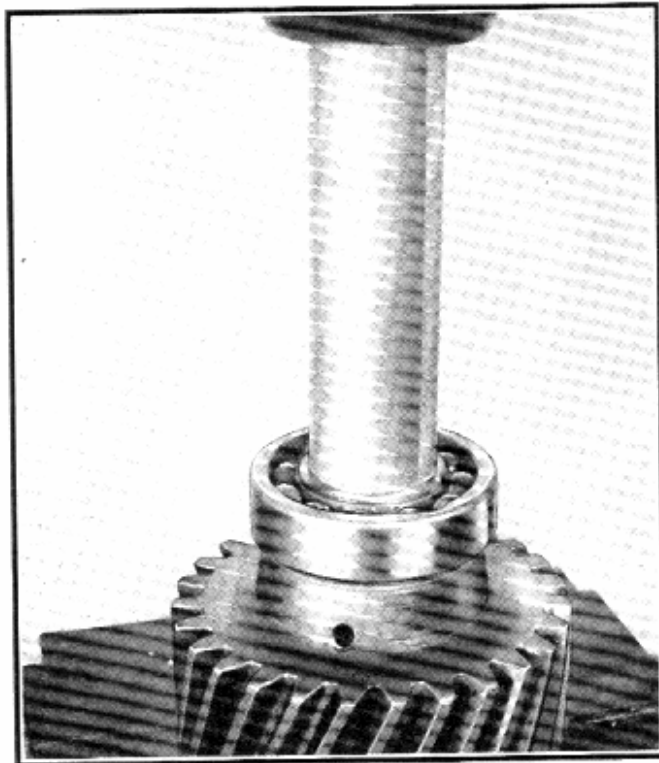


Fig. 30—Installing Main Shaft Rear Bearing, Tool No. J-1718

2. If it is found necessary to install a new bushing (77) in the main drive gear (78), it should be pressed into place using an arbor press. The oil holes in the bushing should line up with the holes in the gear hub.
3. Install the splined thrust washer (79) next to the snap ring (80) and the main drive gear (78) with bushing (77), over the shaft with the internal teeth of the gear facing the front end of the shaft, place the rear thrust washer (84) over the shaft so that the chamfered side of the washer faces away from the gear.
4. Install the rear bearing (83) on the shaft with the shielded side facing the gear. Replacing tool J-1718 shown in Fig. 30 should be used when installing the bearing to prevent damage to the cone and also to ensure a proper seat against the shoulder on the shaft. Lubricate the bearings with engine oil.
5. Place the sliding gear (85) on the front end of the mainshaft with the shifter fork groove to the front of the shaft.
6. To install the front bearing use the same procedure as outlined in Paragraph 3. Use enough pressure to seat the bearing tightly against the shoulder on the shaft.
7. Install the power take-off clutch (82) onto the rear end of the mainshaft. Line up the taper

pin holes and drive the pin securely into place. Install the locking ring (81) to make certain the taper pin does not fall out in service.

#### Idler Shaft (Refer to Fig. 12)

1. Place the low speed gear (91) over the front end of the idler shaft (92) with the longer hub of the gear facing toward the centre of the shaft. Support the front face of the gear and press on the rear end of the shaft until the shoulder of the shaft is  $\frac{1}{16}$ " of being flush with the front face of the hub of the gear. The dimension from the front end of the shaft to the face of the hub of the low speed gear should be  $1\frac{3}{8}$ ".
2. Place the high speed idler gear (90) over the rear end of the shaft (92). Support the rear face of the gear on an arbor press and press on the front end of the idler shaft (92) until the two gears (90-91) are flush with each other.

**NOTE:**—The hubs of the two gears should project an equal amount over the shoulders at each end of the shaft, approximately  $\frac{1}{16}$ ", otherwise the gears should be "centred" by pushing the shaft in the desired direction, supporting the assembly on the hub of either gear as required.

3. Install the two bearings (89) with the thick side of the cones toward the gears. Using tool J-1718 as shown in Fig. 31, press the bearings on the shaft flush with the face of the gears, being careful not to move the gears from their original setting.

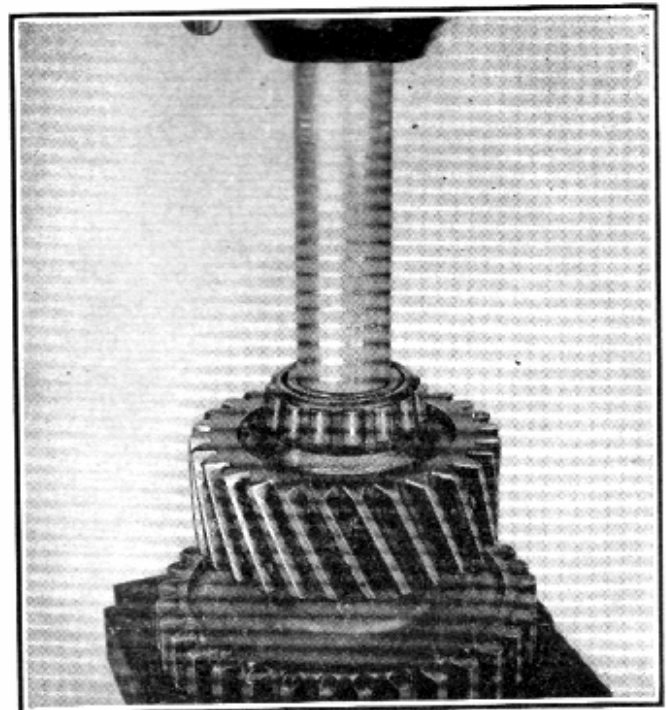


Fig. 31—Installing Idler Shaft Bearing, Tool No. J-1718



4. Install the bearing lock nuts (88), tightening them with equal tension at the same time so as not to disturb the position of the gears. Install the nut retaining rings (87), making certain that the locks are positioned in one of the key-ways in the shaft.
5. Install the speedometer gear key in the shaft key way, then press on the speedometer gear (93) until it is flush with the end of the shaft.

#### Driven Shaft (Refer to Fig. 12)

1. Using an arbor press, support the driven gear (96) and press the driven shaft into the gear until it is flush with the shoulder of the shaft.

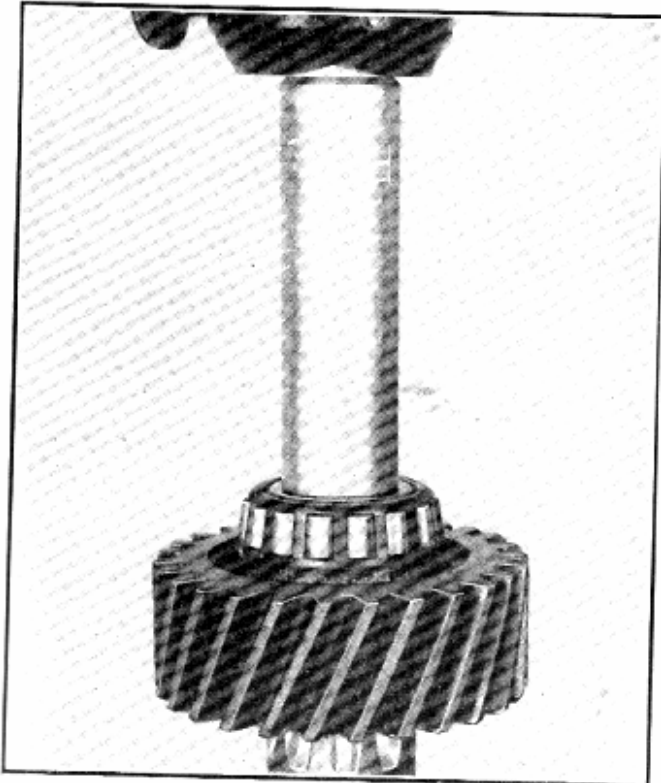


Fig. 32—Installing Driven Shaft Bearing, Tool No. J-1718

2. Install the front and rear bearings (94 and 97) on the driven shaft with the wide portion of each bearing facing towards the centre of the shaft. Press the bearings solidly onto the shaft, pressing on the inner bearing race with the aid of bearing installing tools J-1718 for the rear bearing and J-1721 for the front bearing. See Fig. 32.

#### CASE REASSEMBLY AND ALIGNMENT OF GEARS

1. If the bearing cups have been removed from the case or cover, they should be replaced using a brass drift. Care should be taken to see that the bearing cups are not cocked.
2. Install the idler shaft and main shaft front bearing caps (44) and (34), using new gaskets

and the same shim pack thickness on the caps that was removed at disassembly. The shims on the idler shaft bearing caps are used for two purposes, first of which is to provide means of making the bearing adjustments, and secondly removing shims from the front bearing cap and adding the same thickness under the rear cap, or vice versa, provides a means of properly locating the idler gear in relation to the other two gears and the case.

**NOTE:—**The idler shaft is the only one that has shims at both the front and rear bearing caps. It will therefore, be necessary to align the idler shaft high speed gear in a centralized position so that its face will be flush with the other two gears (see Fig. 31).

3. Place the idler shaft and gear assembly in the centre position in the case, so that the idler shaft or low speed gear (the larger of the two) is toward the front of the case.
4. Install the main drive shaft and gear assembly, and the driven gear and shaft in their correct positions.
5. Tap the rear end of each shaft with a soft hammer to firmly seat the front cup of each bearing against the cap.
6. Lay a straight edge across the open side of the case to check for clearance between each gear and the side of the straight edge as illustrated in Fig. 33. As long as there is sufficient clearance between the gears and the straight edge to prevent the gears from rubbing the cover in actual service, the gear alignment with respect to the case is correct.
7. If there is no clearance between the gears and straight edge, the main shaft and driven shaft

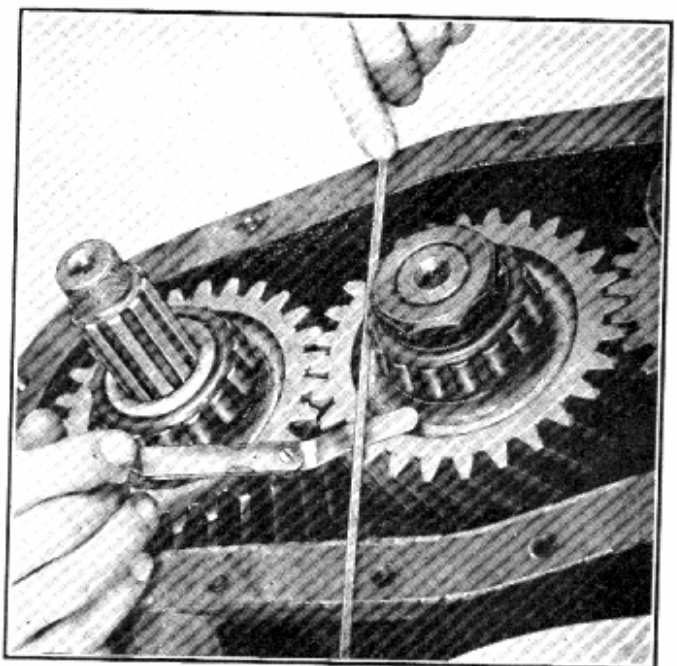


Fig. 33—Checking Clearance between Cover and Gears

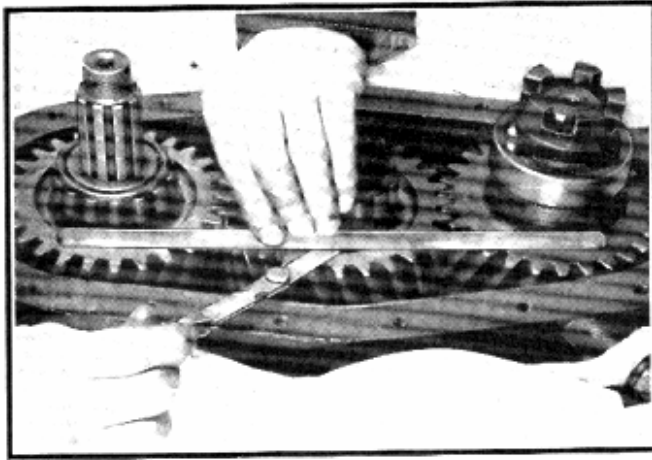


Fig. 34—Checking Alignment of Gears

assemblies should be removed and checked for correct gear and bearing installation to the shafts. The main and driven shafts cannot be adjusted in relation to the case, so they will be in the correct position providing the bearings, gears and shafts are assembled correctly.

8. Lay a straight edge across the face of the gears as shown in Fig. 34 and check the alignment of the gears with respect to each other. Since the idler shaft is the only one adjustable it will be necessary to either add or remove shims from the front bearing cap (44) until the face of the idler gear is flush with the faces of the main and driven gears.

**NOTE:—**In order to simplify idler shaft bearing adjustment a note should be made of the thickness of shims removed or installed at the front bearing cap, when making the above adjustment, so that an equal amount will be removed or installed at the rear bearing cap. Shims used at the front and rear caps are not interchangeable.

9. If the above work has been correctly carried out, the three gears will be in their correct position in relation to the case and to each other and will be ready for bearing adjustment. The idler shaft front bearing cap should be left installed with the same quantity of shims that was determined for the correct gear alignment.

### BEARING ADJUSTMENT

To obtain proper bearing adjustment each shaft must be adjusted separately, as there must be no tooth contact to interfere with the checking of bearing bind or end play. Oil seals should not be installed until the bearings have been adjusted.

#### Main Shaft Bearings (Refer to Fig. 12)

1. Remove the idler shaft and driven shaft gear and bearing assemblies from the case, leaving

the main shaft with the gear and bearing assembly in place. Oil the bearings before making adjustment.

2. Place the rear cover (23) and a new gasket (24) in position on the case.
3. Install the two tapered dowel pins to line up the cover with the case, install the cap screws and tighten evenly and securely, starting at the centre and working toward each end alternately.
4. Install the rear bearing cage (13) and the power take-off assembly (11), using new gaskets (12) and (14) and tighten retaining nuts securely.
5. Install the front yoke (36) and tighten the nut (37) securely. This is to firmly seat the front bearing (83) on the main shaft (86).
6. Using a soft faced hammer tap the yoke end of the main shaft towards the rear to seat the rear bearing (83) in the bearing cage (13).
7. Turn the shaft (86) to determine if bearing bind or end play exists. If the bearings are properly adjusted the shaft (86) should turn freely and the end play should not exceed .002". If this test or check indicates that the shaft has more than .002" end play, remove the yoke (36) and cap (34) and remove a sufficient thickness of shims (32) until a slight bearing drag is noticeable. Add just sufficient shims so that the shaft turns freely and the end play does not exceed .002".
8. To properly adjust bearings that are under sufficient tension to bind or drag, it will be necessary to remove the cap (34) and add shims so that the shaft turns freely with the end play not exceeding .002".

**NOTE:—**Each time that shims are added or removed, it is necessary to install the yoke (36) and tighten the retaining nut (37) securely, before checking bearing tension. If shims have been installed it is important that the yoke be tapped back and forth to properly seat the bearings in the case and bearing cage. If this is not carried out, a proper bearing adjustment cannot be obtained.

#### Idler Shaft Bearings (Refer to Fig. 12)

In order to adjust the idler shaft bearings it is necessary to remove the main shaft and gear assembly and proceed as follows.

1. Install the idler shaft in its position in the case with the speedometer drive gear toward the front. Oil the bearings with engine oil.
2. Replace the cover (23) and gasket (24) and install the two tapered dowel pins to align the cover with the case.
3. Install the cap screws and tighten from the centre toward each end alternately.

4. Tap the rear end of the idler shaft assembly to firmly seat the front bearing cup (41) against the front bearing cap (44).
5. With the rear bearing cup (41) installed in the cover, place the rear bearing cap (38) in place on the cover, using the same shim pack thickness as was removed at disassembly. Tighten the retaining cap screws securely.
6. Remove the front bearing cap (44) being careful not to alter the shim pack thickness and tap sharply on the end of the shaft to locate the rear bearing cup (41) against its cap (38).
7. Install the front bearing cap (44) using the same shim pack.
8. Remove the rear bearing cap (38) and increase or decrease the thickness of shims (39) to cause the idler shaft to drag slightly when turned by hand.

**NOTE:—**The idler shaft bearing adjustment is made at the rear bearing cap only, due to the fact that the gear face alignment was established by adjusting the shim pack at the front bearing cap.

9. Remove the rear bearing cap (38) and add sufficient shims so that the shaft and gear assembly turns freely without bind or end play. Before testing after adding shims it will again be necessary to remove the front cap (44) and rap the shaft to position the rear cup (41) against the rear cap (38).

After the desired adjustment is obtained do not again disturb the shim pack thickness.

#### Driven Shaft Bearings (Refer to Fig. 12)

Remove the cover and idler shaft and gear assembly and proceed as follows:

1. Install the front axle declutching carrier assembly to the case using a new gasket (55) between the carrier and the case. Be sure that the oil passage hole at the bottom of the case lines up with the hole in the carrier, also that the gasket does not obstruct the oil passage in either the carrier or the case, (see Fig. 35).
2. Lubricate the bearings and install the driven shaft and gear assembly in the case.
3. Install the cover (23) the gasket (24) and the two dowel pins to align the cover with the case. Install the cover retaining cap screws and tighten as outlined previously.
4. Install the rear brake flange and bearing cap (51) using a new gasket (53) and the same shim pack thickness that was removed at disassembly. Install the universal joint flange

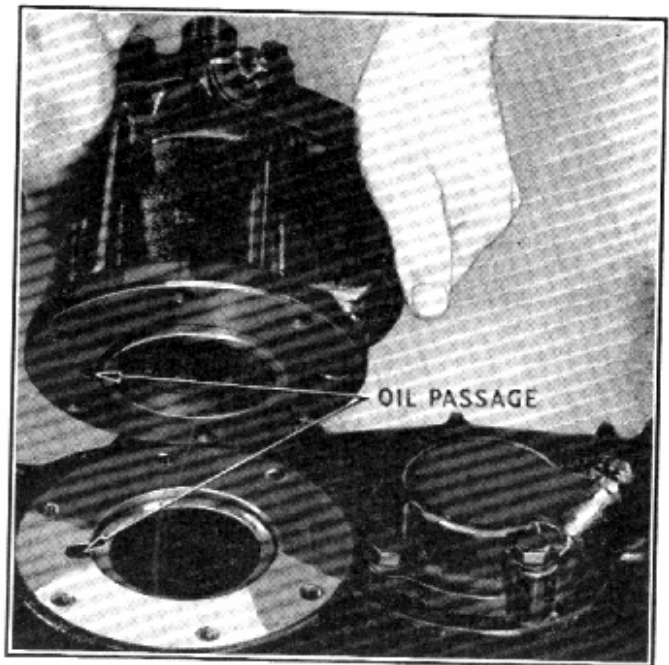


Fig. 35—When Installing Declutching Carrier and Gasket Be Sure That Oil Passage is Not Obstructed

- (48) and retaining nut (47) and tighten securely.
5. Using a soft faced hammer, rap the flange sharply back and forth to seat the bearings. Turn the shaft (95) to determine if bearing drag or end play exists. If the bearings are properly adjusted the shaft should turn freely without any perceptible end play. If this test indicates that the shaft (95) has end play, remove a sufficient number of shims (52) from under the cap (51) to cause a slight bearing drag, then add just sufficient shims so that the shaft (95) turns freely without end play.
6. To properly adjust bearings that are under sufficient tension to drag or bind, it will be necessary to remove the cap (51) and add a sufficient number of shims (52) so that the shaft turns freely without end play.

**NOTE:—**Each time that shims are added or removed from the bearing cap, it is necessary to install the universal joint flange (48) and tighten the retaining nut (47) securely before checking bearing tension. If shims have been installed the flange must be tapped back and forth to properly seat the bearings. If this operation is not carried out the bearings will not be properly adjusted.

7. When the adjustment has been properly established do not again disturb the shim pack thickness.

#### GEARS AND COVER TO CASE REASSEMBLY

1. After the bearings have been adjusted, install the main and idler shaft gear assemblies in their proper positions in the case.

2. Replace the cover (23) using a new gasket, install the cap screws, but do not tighten. Install the two tapered dowel pins to properly align the cover with the case and then tighten the cap screws securely and evenly, starting at the centre and working toward each end alternately.
3. Install a new oil seal (50) in the driven shaft rear bearing cap and brake flange (51). Install the cap and brake flange assembly over the driven shaft and start the retaining cap screws but do not tighten. Install the universal joint flange (48) over the shaft and through the oil seal to centralize the bearing cap and brake flange (51), then tighten the bearing cap and brake flange cap screws securely. Install the universal joint flange retaining nut (47) and tighten securely and lock in place with a cotter pin.
4. Before installing the three long cap screws which hold the propeller shaft brake flange (51) to the transfer case cover, determine the clearance between the flange and the cover, using a feeler gauge as shown in Fig. 36 and install the correct thickness of shims between it and the cover, then install the cap screws and tighten evenly and securely.

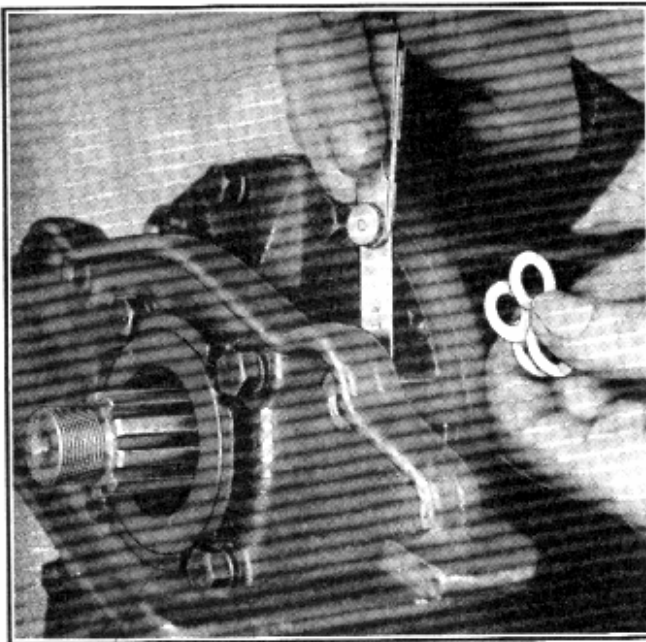


Fig. 36—Determining Shim Thickness for Hand Brake Flange

5. Remove the main drive shaft bearing cap (34) located at the front of the case and install a new oil seal (35). Assemble the cap to the case but do not tighten the cap screws. Install the universal joint yoke (36) over the shaft and through the oil seal to centralize the bearing cap and oil seal, then tighten the retaining cap-screws securely. Install the yoke retaining nut (37) tighten securely and lock in place with a cotter pin.

### High-Low Speed Shifter Fork Reassembly and Adjustment

1. If inspection shows that it is necessary to replace the shifter shaft oil seal, replacing tool J-1723 should be used as shown in Fig. 37, to assure proper installation.



Fig. 37—Installing Shift Shaft Oil Seal, Tool No. J-1723

2. Replace shifter shaft (31) in the case, threaded end first. Care should be taken not to damage the oil seal as the threaded end of the shaft is pushed in.
3. As the shaft is pushed into the approximate position, install the shift fork with the longest end of the hub facing towards the cover side of the transfer case. The fingers of the fork (30) should be in the sliding gear (85) groove.
4. Place the sliding gear (85) in the high speed position (tight up against the main drive gear (78)).
5. Thread the shifter shaft into the fork until the last poppet ball groove lines up with the poppet ball opening in the case.
6. Continue to turn the shaft approximately one and one half turns to provide the necessary clearance between the sliding gear (85) and the main drive gear (78).
7. Tighten the clamp bolt nut in the shift fork securely and lock it with a cotter pin.
8. Replace the poppet ball (29), plunger (28), and spring (27), and reinstall the cover (26), using a new gasket in the order shown in Fig. 14. Tighten the four cap screws attaching the cover to the case.

### AIR CLEANER

- When the transfer case is equipped with an air cleaner it will be necessary to clean the element every 2,000 miles, or under severe conditions, such as extensive driving over sandy or dusty roads, more frequent cleaning is recommended. To clean the air cleaner, proceed as follows:
- 1. Remove the air cleaner from the main shaft rear bearing cap and wash the filter element in a suitable cleaning fluid.
- 2. Allow the element to drain, then dip in seasonal engine oil. Allow the excess oil to drain from the element.
- 3. Reinstall the cleaner to the main shaft rear bearing cap.

When the transfer case is equipped with a power take-off no air cleaner is provided; instead there is an air vent on the power take-off housing which must be kept clear at all times.

### FILLING THE TRANSFER CASE

After a complete overhaul or the installation of a new transfer case unit, tighten the drain plug in the bottom of the case. REMOVE THE FILLER PLUG LOCATED IN THE COVER AND

FILL THE UNIT SLOWLY WITH LUBRICANT AS RECOMMENDED IN THE "LUBRICATION SECTION". IF THE LUBRICANT IS FORCED IN TOO FAST, IT MAY BUILD UP IN SOME OF THE OPENINGS AND GIVE THE FALSE IMPRESSION THAT THE UNIT IS FULL. DO NOT REPLACE THE PLUG IMMEDIATELY BUT ALLOW ANY EXCESS LUBRICANT TO DRAIN TO THE LEVEL OF THE FILLER PLUG HOLE. REPLACE PLUG AND TIGHTEN SECURELY.

In order to provide lubricant for the initial running in of the front axle declutch and power take-off, remove the filler plugs located on the upper side of the declutch and power take-off carrier housings and add  $\frac{1}{2}$  pint of lubricant to each housing. Install filler plugs and tighten securely.

### FRONT AXLE SHIFT ROD ADJUSTMENT

(Refer to Fig. 38)

The following are the instructions for making the linkage adjustment:

1. Disconnect the front axle shift rod (13) from the cross shaft lever (10) at the adjustable yoke end.

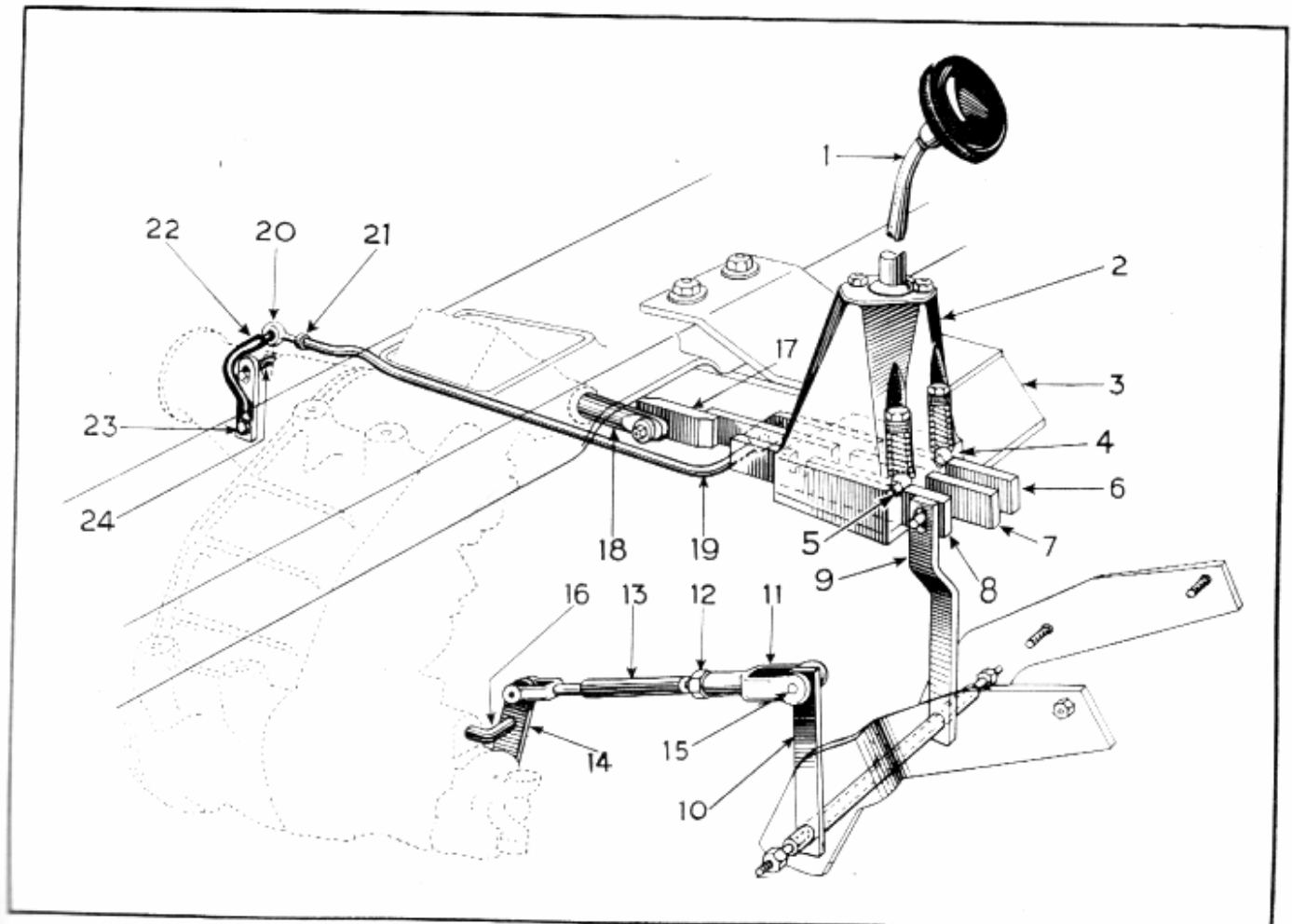


Fig. 38—Transfer Case Control Linkage



## TRANSFER CASE—N - 28

2. Move the declutching shift shaft lever (14) "out" or to the disengaged position until the poppet ball is seating in the disengaged groove of the shift shaft (16). As the shaft is moved, the feel of the shaft will indicate when the poppet ball is seated.
3. Place the shift tower lever into the front axle disengaged position by moving the lever to the left from the "High" position and then towards the rear of the vehicle until the poppet ball (5) in the front of the shift tower drops into the groove in the shift rail (8).
4. With the lever in this position turn the adjustable yoke (11) in or out until the clevis pin will slip into place without moving either of the levers.
5. Replace the clevis pin, install a new cotter pin and tighten up the adjustable yoke lock nut (12).

### POWER TAKE-OFF ADJUSTMENT

(Refer to Fig. 38)

The adjustment of the power take-off linkage is similar to that of the front axle linkage adjustment:—

1. Disconnect the power take-off shift rod (19) from the shift lever (22) at the adjustable yoke ball stud (20), by loosening the lock nut and turning stud out of lever (22).
2. Place the shift rail (6) in the disengaged position (by placing the shift lever in the neutral position and making certain the shift rail poppet ball (4) is seated in the groove of the rail).
3. Place the shifter shaft (24) in the disengaged position (by pulling it out of the case until the detent ball seats in the groove of the shaft).
4. With the shift rail (6) and the shifter shaft (24) in the above positions, either lengthen or shorten the shift rod (19) at the adjustable link (20) until the ball stud in the adjustable yoke (20) lines up with the shift lever (22). Tighten the lock nut (21) securely.
5. Assemble the adjustable yoke (20) to the shift lever assembly (22) until the threads bottom in the shift lever assembly. Tighten lock nut.
6. The pivot pin stud nut (23) should be tight enough to prevent excessive play in lever (22) and yet not bind at the pivot point.

### TRANSFER CASE SHIFT TOWER

The shift tower is adjusted and dowelled in place at the time of assembly. No further adjustment of the shift tower will be necessary unless a new assembly is being installed, or the shift tower

mounting brackets have become misaligned due to accident.

In Service the shift tower and gate plate will be dowelled and serviced as an assembly. Should it become necessary to install a new shift tower and gate plate assembly, this unit will have to be adjusted with respect to the controlling linkage and dowelled securely to the mounting brackets.

### Removal

To remove the shift tower the following is the recommended procedure:

1. Remove the tower seal plate from the floor around the gearshift lever.
2. Remove the gearshift lever assembly from the top of the shift tower, by removing the two cap screws and lifting the lever out.
3. Disconnect all control linkage from the shift rails.
4. Disconnect the gas line at the flexible hose under the floor plate and push to one side to permit removal of the shift tower.
5. Remove the two cap screws holding the detent balls and springs from the front of the shift tower.
6. Remove the four mounting bolts "B" Fig. 39, this will permit the shift tower to be lifted from the gate plate and shift rails from under the vehicle.
7. Remove the shift rails and examine the gate plate and shift tower to determine if replacement is necessary. If inspection reveals that the shift tower and gate plate are in good condition, it will not be necessary to remove the gate plate from the mounting bracket.
8. If it is necessary to install a new shift tower and gate plate assembly, drive out the two dowel pins holding the gate plate to the mounting bracket and remove the gate plate.

### Replacement

If the gate plate has not been removed from the mounting bracket, install the shift tower assembly as follows:

1. Place the shift tower in place on top of the gate plate.
2. Install the shift rails into position from the rear of the shift tower.
3. Install the four retaining cap screws from underneath the mounting bracket.
4. Install the detent balls, springs and cap screws in the front of the shift tower.
5. Install the shift lever and tighten the retaining cap screws.
6. Install the tower seal plate on the floor of the cab.



- Hook up all shift rail linkage and adjust as outlined under, "Transfer Case Control Linkage".

#### Adjustment and Dowelling (Refer to Fig. 39)

If it should be necessary to install a new shift tower and gate plate assembly or to align the original, due to misaligned mounting brackets, it will be necessary to adjust the shift tower assembly with respect to the controlling linkage and then dowel securely in place on the mounting bracket.

Following is the recommended procedure:

- Remove the gate plate from the shift tower assembly.
- Place the gate plate in position on top of the mounting bracket.
- Place the shift tower in place over the gate plate and install the shift rails to their respective positions from the rear of the shift tower.
- Install the four retaining cap screws "B" but do not tighten.
- Install the detent balls, springs and cap screws in the front of the shift tower.
- Connect the linkage to the shift rails.
- Move the shift tower by hand until the shift rails and linkage are in proper alignment, then tighten the retaining cap screws.

- Install the shift lever and check for free movement of the high and low speed shift, by moving the shift lever back and forth.
- If no binding is present, the shift tower is in alignment with the controlling linkage and ready for dowelling to its mounting bracket.
- From underneath the vehicle scribe a line "C" on the support bracket so that it passes through the centre line of the front and rear cap screws. Measure  $\frac{1}{2}$ " to the outside of this line and scribe another line "D", as shown in Fig. 39.
- Centre punch two marks "A" on this line  $1\frac{1}{4}$ " from each end and drill two  $\frac{3}{16}$ " holes through the mounting bracket and gate plate.
- Select a piece of bar stock that will just enter the hole and cut two pieces  $\frac{3}{4}$ " long. Drive the pins in the hole just past flush and prick punch the bracket to hold the pins in place.

#### ANALYSIS OF TROUBLES

Troubles which may be encountered in the operation of the transfer case, can be divided between three classes, those which occur in the shift tower, the control linkage, or the transfer case assembly.

To determine where the trouble lies, and what procedure should be used to make the corrections, the following checks as well as the service diagnosis listed at the end of this section will be of assistance.

#### Transfer Case Noises

Noise in the transfer case other than the normal gear whine will be caused by lubricant of improper viscosity, insufficient lubricant, worn or pitted gears or shaft bearings, gears not in correct alignment or loose mounting bolts. If the addition of new lubricant or the tightening of mounting bolts does not remedy the noise, the case must be disassembled according to the instructions given under "Disassembly".

#### Hard Shifting

The most common causes of hard shifting are, incorrect tire pressure, transfer case mounting bolts improperly adjusted or bottoming, misalignment of the shift tower assembly, or improper adjustment of the linkage.

Tire pressures have a very marked effect on the engagement or disengagement of the front axle. As there is no differential between the front and rear driving axles, it is important that the rolling radius of all tires be the same. Any difference in the rolling radius will cause a "fighting" action between the front and rear axles, one set of wheels attempting to turn faster than the other. This "fight" will cause a binding action on the front axle shift sleeve in the transfer case

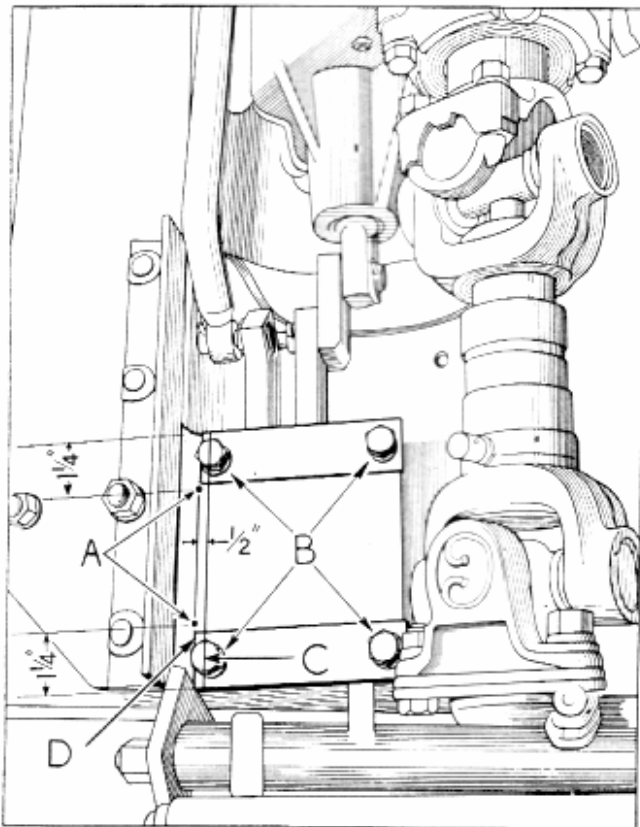


Fig. 39—Doweling the Shift Tower Gate Plate

and cause extremely hard shifting. If inflating the tires to the correct pressure does not eliminate the hard shifting, disconnect the linkage at the transfer case and test to see if it is binding, by shifting the lever. If the lever shifts freely, the binding is in the case or linkage.

Loose transfer case mounting bolts will cause hard shifting, especially where the vehicle is used in rough territory, due to the movement of the transfer case assembly binding the linkage. Bottoming of the mounting bolts will also cause this same condition.

Any misalignment between the shift tower and the mounting bracket will cause hard shifting. The shift tower linkage must be free, well lubricated, in correct alignment and properly adjusted for satisfactory results. Where any movement between the shift tower and the mounting bracket, or when a new shift tower or any parts are replaced, it will be necessary to drill and dowel pin the shift tower assembly to the mounting bracket.

**Front Axle Disengaging**

Disengaging of the front axle may be caused by a weak shift shaft detent spring, control linkage out of adjustment, shift rail detent spring weak or broken, or a worn sliding hub or shaft in the case assembly. Examine the detent springs to see if they meet the limits given in specifications at the end of this section.

**High or Low Gear Disengaging**

Slipping out of high or low gear may be caused by a weak detent spring on the high low shift shaft, control linkage out of adjustment or worn gears or shafts in the case assembly. Test the detent spring to see if it meets the limits given in the specifications at the end of this section.

**Lack of Lubricant**

If trouble arises in the transfer case caused from lack of lubricant, either the case was never properly filled, or a lubricant leak somewhere in the case has allowed it to escape. To determine which has caused the trouble, inspect the outer surface of the transfer case for signs of fresh lubricant escaping, indicating a leak in the assembly.

If it is not obvious from which point the lubricant is escaping, thoroughly clean the outside of the case and refill it to the correct level with the recommended lubricant. Road test the vehicle over various surfaces and speeds, and then carefully inspect the outside of the case to determine where the fresh lubricant is escaping from. Lubricant may escape from damaged seals, gaskets, loose filler and drain plugs, or a cracked case or loose cover.

The shift lever controls should have lubricant applied to the pins and linkage at regular lubrication periods to assure easy movement of the levers and controls.

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**SERVICE DIAGNOSIS AND CORRECTIVE METHODS**

**SYMPTOM AND PROBABLE CAUSE**

**REMEDY**

**Front Axle Declutch or Power Take-Off Disengages**

1. Poppet Springs Weak or Broken.
2. Shift Shaft Lock Ball Sticking.
3. Shift Linkage Out of Adjustment.
4. Shift Tower Out of Adjustment.

1. Replace Spring.
2. Remove Shifter Yoke Cover and Clean out Passage.
3. Adjust Linkage.
4. Adjust and Re-Dowel Shift Tower.

**Hi-Low Shift Slips out of Engagement**

1. Poppet Spring Weak or Broken.
2. Shift Shaft Lock Ball Sticking.
3. Hi-Low Shifter Shaft Out of Adjustment.
4. Shift Tower Out of Adjustment.
5. Mainshaft Sliding Gear Teeth Worn.
6. Excessive Clearance Between Mainshaft Splines and Sliding Gear.

1. Replace Spring.
2. Remove Shifter Yoke Cover and Clean out Passage.
3. Adjust Shifter Shaft into Yoke as Outlined.
4. Adjust and Re-dowel Shift Tower.
5. Replace Gear.
6. Replace Mainshaft and Sliding Gear.

**Transfer Case Noisy**

1. Excessive Play in Shaft Bearings.
2. Excessive Play in Main Drive Gear Bushing.
3. Worn or Pitted Bearings.

1. Adjust Bearings.
2. Replace Bushing.
3. Clean Oil Passages, Replace and Adjust Bearings.

