rollers and cam rollers.

- 6. Remove cam roller retainer and springs. Use extreme care when removing springs so as not to distort them.
- 7. Remove free wheeling control sleeve and key.
- 8. Remove arbor (C-716), front and rear roller bearings and spacer from countershaft gear.

#### Assemble Countershaft

- Install key and free wheeling control sleeve.
- Hook anchor end of two springs in holes in cluster gear so they wrap in a right-hand direction from anchor end, Fig. 12.
- 3. Place roller cage over gear with lugs over spring anchors and rotate clockwise until cage lugs are over slots in control sleeve. Be sure ends of springs have snapped into grooves in cage.
- 4. Slide control sleeve forward until cage lugs are fully engaged in sleeve.
- Place free wheeling rollers in place, using cup grease to hold them in position, and install thrust washer over rollers.
- 6. Place free wheeling gear on countershaft gear.
- 7. Install set of 45 roller bearings between free wheeling and countershaft gear.

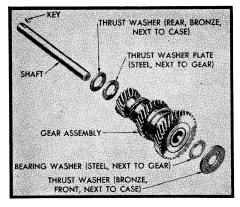


Fig. 13 Countershaft gear assembly and thrust washers

- 8. If countershaft roller bearings have been removed, place special arbor through countershaft gear set and stand assembly on bench with free wheeling gear up.
- Place 3 or 4 rollers in bottom of the hole. Install countershaft bearing spacer and set of 27 roller bearings in front end of countershaft. Then install countershaft gear bearing thrust washer and front thrust washer.
- Turn countershaft assembly over and stand it on its forward end.

- 11. Install set of 27 rollers in rear end of gear. Then place steel thrust plate next to cluster gear.
- 12. Place countershaft assembly in bottom of case, being sure to keep thrust washers in place, Fig. 13.
- 13. Do not install countershaft until drive pinion has been installed in case. Allow arbor to enter front hole, Fig. 10, and slide rear bronze thrust washer between steel washer and case.
- 14. The cluster gear end play should be .002" to .008", measured with a feeler gauge between thrust washer and case at the rear. Different thickness bronze washers are available (.087", .090", .093" and .096") for obtaining proper end play.

#### Lubrication

Drain and refill to the bottom of the filler plug hole every 10,000 miles or once a year. Use No. 10-W engine oil regardless of climatic conditions.

The capacity of the transmission for an oil change is 3 pints. However, if the transmission extension housing has been removed and drained for any reason, add an additional ½ pint to the 3 pints previously specified. The additional ½ pint will work its way back to the extension housing after the transmission has been in operation for approximately 5 minutes.

# **Transfer Case Section**

#### **MODEL 91000**

#### Linkage Adjust, Fig. 1

All adjustments must be made with the front axle disengaged and transfer case in high range.

Disconnect de-clutch and shift rods
 at shift lever (do not remove or use
 stabilizer rod for adjustment pur-

3. Position shift lever so that knob lies approximately one inch forward of lower portion of instrument panel. With knob in this position, lower portion of shift lever should be positioned as far forward in slot as transfer case control shift lever bolt (extending from stabilizer bracket) will permit. The lever bolt nut should be no more than finger tight at all times and shift lever must move freely in slot.

rod end.

 Make sure transfer case is fully retracted and the de-clutch shift rail is fully extended.

5. If after above steps have been taken de-clutch rod end is not in alignment

with hole, adjust by loosening lock nut at yoke end of rod and turning rod as required to obtain correct alignment.

 Adjust shift rod in same manner as de-clutched rod except that shift rod must be shortened <sup>1</sup>/<sub>16</sub>" after obtaining correct rod-to-hole alignment.

#### Transfer Case Removal

- 1. Drain lubricant.
- 2. Disconnect stabilizer, shift and de-

INSTRUMENT PANEL-SHIFT LEVER KNOB BOOT-FLOOR PAN-STABILIZER ROD SHIFT BRACKET **LEVER** DE-CLUTCH ROD TRANSFER CASE CONTROL SHIFT ∠SHIFT **LEVER** STABILIZER ROD BOLT-NUT ROD TRANSFER CASE

Fig. 1 Linkage adjustments. Transfer case 91000

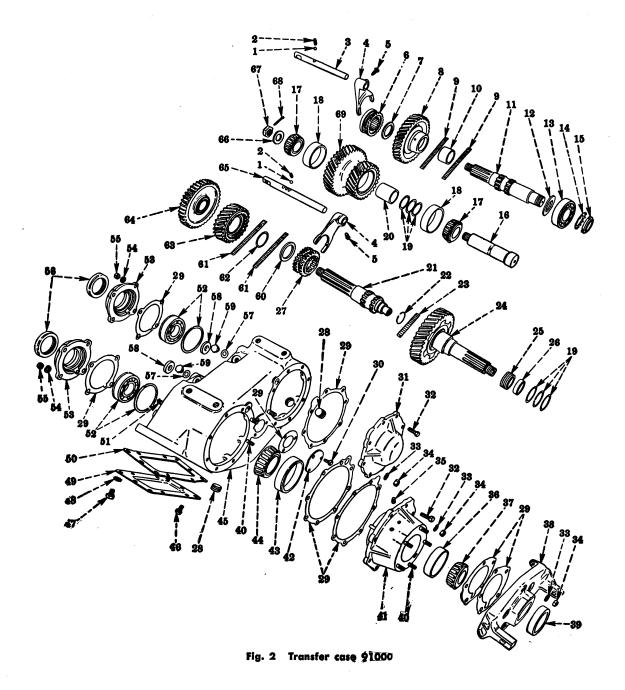
- clutch rods at transfer case end. Do not lose stabilizer rod yoke spacer.
- 3. Disconnect both propeller shafts at transfer case.
- 4. If equipped with power take-off, disconnect PTO output shaft (or shafts).
- Disconnect control cable at top of PTO housing by loosening lock nut where cable enters shift plug on PTO.
- 6. Turn PTO control handle (at instrument panel) counter-clockwise to unscrew cable from PTO shift plug.
- 7. Remove speedometer cable.
- 8. Disconnect hand brake cable at brake cam levers.
- 9. Support transfer case with suitable jacks.
- Unfasten and lower transfer case from vehicle.

#### Transfer Case Install

For installation purposes it is preferable to use a jack for guiding the transfer case into proper mounting position. If power take-off was removed, reinstall and align. Then install the transfer case by reversing the order of removal.

by reversing the order of removal.

To adjust the power take-off control cable (if equipped), first push PTO shift plug into its housing until ball is fully seated in detent. If a helper is available the control handle can be turned clockwise to thread the cable into the shift plug at the PTO unit. If an assistant is not available, turn the cable with suit-



Per Description

Key Description

Sepring, shift bar poppet

Spring, shift bar poppet ball

Spring, shift bar poppet ball reand from output barit outer bearing

Spring, shift bar poppet ball

Spring, shift bar poppet ball serion output shaft outer bearing oil baring retainer output drive gear

Spring, shift bar poppet ball serion output barit over bearing oil serion output shaft outer bearing oil serion

able pliers underneath the vehicle. Adjustment is correct when the shift plug is in the last detent (plug fully retracted) and instrument panel control handle is fully pushed in.

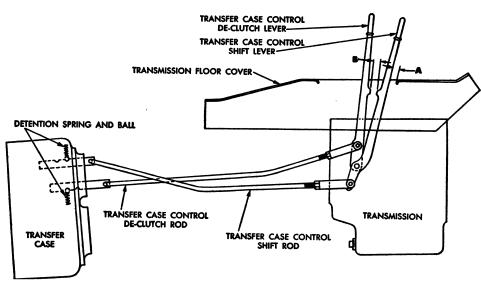
#### Transfer Case Overhaul, Fig. 2

- 1. The front output shaft drive gear bearing and input shaft drive gear bearing each consist of 70 roller bearings divided into two rows and separated by a spacer. To assemble the gear and bearings on their respective shafts, coat the bore of the gear with grease and position rollers and spacer in gear. Place a thrust washer against each gear hub to retain bearing rollers in gear and assemble on shaft.
- 2. The end play of the input shaft and front output shaft bearing retainers for their respective bearing is controlled by gaskets. To determine the correct thickness or number of gaskets required, position the bearing retainers and check the clearance between retainer and case with a feeler gauge. Select a gasket or gaskets about .005" thicker than the indicated clearance.
- 3. The correct preload of the rear axle output shaft bearings is obtained by the use of shims. To obtain bearing preload, it is necessary to assemble shaft assembly. Install shim or shim pack removed during disassembly for making the first bearing adjustment check. Place shaft and bearing retainer assembly on open jaws of a vise in a vertical position so output shaft is free to rotate. Turn shaft until bearing rolls smoothly. Using an inch-pound torque wrench, check the preload on the bearings with the wrench in motion. If the preload is not within 15-30 in. lbs. add or remove shims as required. Following the final adjustment, remove the brake drum and install hand brake support. Install oil seal in support. Reinstall brake drum and torque nut to 140-160 lb. ft.
- 4. Idler gear bearing adjustment is accomplished by reassembling the gear and components and checking the bearing end play with a dial indicator. Place the idler gear assembly in a vise with soft jaws, clamping the shaft at the large end. Install bearing cone on shaft against shoulder. Install spacer and the shims removed at disassembly. Assemble the balance of the parts and torque the nut to 140-160 lb. ft. Rotate idler gear until bearings roll freely. The bearings are properly adjusted when the shaft rotates freely without end play.
- The two-speed clutch should be installed on input shaft with the recess side of the gear toward the front of the transfer case.

## MODEL T-223

#### Shift Lever Adjustment, Fig. 3

Unfasten and withdraw shift and de-clutch rods from lower end of transfer case shift lever, located at transmission.



Control rod adjustments. Transfer case 39360

- 2. At transfer case, loosen lock nuts and turn eyebolts into shift rails until about  $\frac{1}{2}$  to  $\frac{5}{8}$ " of thread is exposed above lock nuts (after lock nut is tightened securely).
- Push shift rail into transfer case until poppet ball engages "high range"
- Push de-clutch rail from transfer case until poppet ball seats in "disengaged" detent.
- With both shift rails positioned as outlined, place shift lever in "disengaged high" position (bolt should then be practically centered in slot in shift lever as shown).
- In this position the distance (centerto-center) between shift rod end hole (lower hole in shift lever) and lever mounting bracket bolt hole should be %" for 6-cylinder models ("A", Fig. 3) and 4" for V8 engines ("B", Fig. 3).

FNGAGED-

HIGH

ENGAGED-

ENGAGED-

LOW

NEUTRAL

DISENGAGED-

HIGH

- 7. While maintaining position of hole in shift lever and required dimension "A" or "B", align shift rod with lower hole in shift lever. If rod and hole are not in alignment, loosen lock nut at rod end clevis and turn rod as required to obtain correct alignment. Repeat this procedure on de-clutch rod.
- If satisfactory performance still cannot be obtained after adjustment, remove de-clutch and shift rods and check length of each. De-clutch rod is 45.88", control shift rod 43.30". Measure rods in straight line from end of rod (clevis removed) to center of bend at shift lever end.

#### Transfer Case Removal

- Drain lubricant.
- Disconnect speedometer and parking brake cables.
- Disconnect one input and two output shafts.
- Disengage de-clutch and shift rods from transfer case shift rails.
- Support transfer case with jacks. Then unfasten and lower unit from

#### Transfer Case Install

Reverse foregoing procedure to install outlined previously.

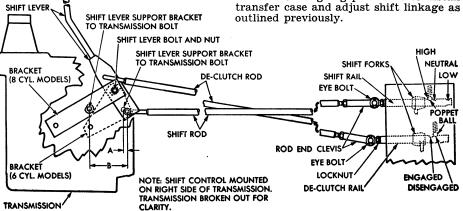


Fig. 3 Shift lever adjustments. Transfer case T-223

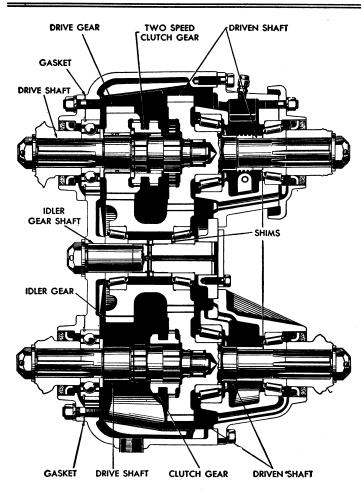


Fig. 5 Transfer case. Model 39360

#### Transfer Case Overhaul

During the servicing procedure, note the following: Under the front bearing cap will be found shims of varying thicknesses to be used in adjusting the idler shaft bearings. When reassembling, adjust bearings to no preload and no end play. The same applies to the shims which will be found under the front cover which are used to adjust bearings on the rear output shaft.

Under the front input shaft bearing cover will be found shims of varying thicknesses to adjust ball bearings to get end play or "float" up to a minimum of .015" on the input shaft.

## **MODEL 39360**

#### Control Rod Adjustments Fig. 4

- 1. Shift speed control lever to high
- speed position (forward).

  2. Shift de-clutch control lever to disengaged position (back).
- Check clearance between speed control lever and end of floor slot as shown at "A"; clearance should be about 1/2". Adjust for this clearance at control rod clevis.
- Check distance between lugs on control rods at "B". Space between two lugs should be a minimum of ½". Adjust de-clutch control rod clevis to obtain adjustment.

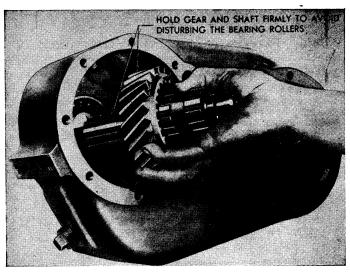


Fig. 7 Removing or installing drive gear and shaft from transfer case

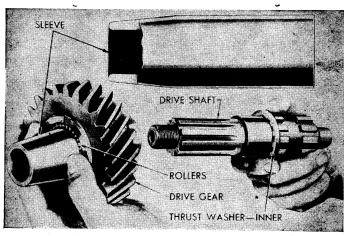


Fig. 10 Installing drive gear on shaft

# Transfer Case, Remove Disconnect the three propeller shafts

from the transfer case companion yokes. Disconnect speedometer cable, control rods and hand brake cable. Place a suitable jack under the transfer case and remove the case-to-bracket cap screws.

Install—Place a suitable jack under the transfer case and raise it in position. Attach case to mounting brackets. Connect speedometer cable, control rods, hand brake cable, and propeller shafts. Fill transfer case with correct lubricant to the lower edge of the filler plug opening. Check and make certain that the shift lever and declutch lever move the control rods to the limit of their travel. If not, disconnect rods at levers and shorten or

#### Disassemble

lengthen rods by adjustment of yokes.

- Remove three propeller shaft companion yokes, Fig. 5
- 2. Apply hand brake and remove companion yoke nut, Fig. 6.
- 3. Remove hand brake band, drum, and companion yoke.

- Remove brake support and speedometer pinion.
- 5. Remove upper drive gear bearing retainer. Note location of the two studs. They must be retained in their original position, for if cap screws are substituted, the ends of the cap screws may contact the idler gear and damage the transfer case.
- 6. Press upper drive gear out of retainer and remove bearing cups.
- Remove adjusting shims, spacer and speedometer gear from shaft. If replacement is necessary, pull bearing cone from shaft, and the rollers from the gear end of the shaft.
- 8. Remove lower driven gear bearing retainer and disassemble as outlined for the upper drive gear.
- 9. Remove shift rail poppet screws and springs.
- Remove shift fork screws, slide shift rails out of case, catching poppet balls, and remove shift forks.
- Pull sliding clutch gear from upper and lower driven shafts.
- 12. Grasp upper drive gear and shaft so as to keep parts firmly together to prevent loss of bearing rollers while

removing gear and shaft, Fig. 7. Remove gear and shaft out through rear opening of case. Pull drive shaft out of drive gear and remove bearing rollers and spacer.

13. Remove lower drive gear and spacer.

Remove both upper and lower front bearing retainers. Drive ball bearings out of case and exercise caution to prevent dirt from getting into bearings. Drive oil seals out of bearing retainers.

15. Remove nut washer from front end of idler gear shaft. Screw arbor No. DD-582, if available, Fig. 8, threaded end of idler shaft and drive shaft out of case. When arbor has completely entered idler gear, unscrew shaft, leaving arbor in the This will prevent damage to adjusting shims. Remove idler and arbor from case through lower driven gear shaft opening. Remove arbor, bearings, shims and spacer.

#### Service Notes

- 1. All tapered roller bearings are adjustable by shims which are the same throughout the transfer case and are available in thicknesses of .004", .005", .0125" and .015".
- Both driven and drive shafts are the same.
- Both driven shaft bearing retainer gaskets are the same.
- Both shift forks are the same.
- Both ball bearings are the same. Both upper and lower drive shaft ball bearing retainer gaskets are the same, and are available in thicknesses of .009", .013", .018" and .022". Both driven shaft large roller bear-
- ings are the same.
- Both driven shaft small roller bearings are the same.
- All oil seals are the same.

#### Assemble

Before installing new oil seals, soak them in warm, thin engine oil for about 30 minutes and then roll with a smooth bar to make the leather pliable.

The adjustment of the idler gear shaft bearings must be checked and performed with the assembly out of the transfer case. Clamp the large end of the idler gear shaft vertically in a vise equipped with copper or lead jaw protectors. Do not lubricate the roller bearings as they must be dry and clean in order to obtain an accurate adjustment. Assemble one of the roller bearings on the shaft against the lower shoulder, then the spacer, adjusting shims, idler gear assembly (with small diameter gear up) and the other bearing. If the original adjusting shims have been lost or damaged, select a total of .030" in new shims as an initial pack. Slide spacer tool DD-853, if available. over end of shaft and install washer and nut, then tighten nut with a heavy duty socket wrench as tight as for final assembly, Fig. 9.

Remove and position idler gear and shaft in the vise. Shock both ends of the shaft with a brass drift and hammer to seat the bearings. Then oscillate the shaft back and forth until the bearings roll smoothly. The bearings are properly adjusted when the shaft rotates freely with no end play.

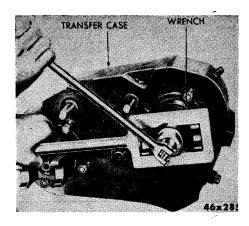


Fig. 6 Removing transfer case companion yoke nut

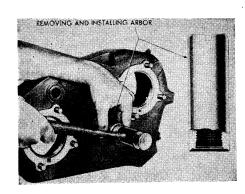


Fig. 8 Removing or installing transfer case idler gear shaft

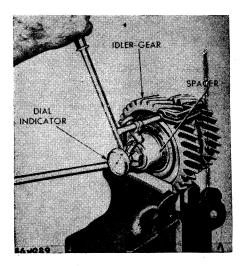


Fig. 9 Checking transfer case idler gear bearing adjustment

If the bearings are not in proper adjustment, reposition the shaft in the vise, and increase or decrease the thickness of the shim pack until a free rolling adjustment with no end play is obtained.

When the idler gear and shaft bearings are properly adjusted, remove the nut, washer and spacer tool, if used. Lubricate the bearings. If arbor No. DD-852, Fig. 8, has been used during disassembly, install the gear and bearing assembly, with arbor in place, in the case with the

large gear toward the front. Then insert the idler shaft and screw it into the arbor. Drive the idler shaft into place, as shown in Fig. 8, unscrew arbor, install washer and nut, and lock nut in place with cotter pin. Install plate with new gasket over idler gear shaft opening in

Tap both drive shaft ball bearings in case until snap rings seat against machined surface of case.

Drive oil seal into upper drive shaft bearing retainer with oil seal drift, and hold retainer in place against ball bearing without gaskets. Check clearance between bearing retainer and case with a feeler gauge, and select a gasket that will equal this clearance plus .005". Then install retainer and gasket. The oil drain cut-out opening in gasket and retainer should be located at drain hole in the

Check gasket clearance and install oil seal and bearing retainer.

Coat bore of drive gear with heavy grease to facilitate installation of bearing rollers. Install one row of 35 rollers, then spacer and other row of same number of rollers. Insert Shaft Installing Sleeve No. DD-584, Fig. 10, in gear and position it so that taper is on the flat side of the gear. Insert serrated washer on shaft, slide shaft into installing sleeve and push sleeve out of gear with shaft. Slide washer on shaft against gear. Grasp shaft and gear as indicated in Fig. 10, so that rollers will not be dislodged and slide shaft through ball bearing and retainer. Install companion yoke, washer and nut.

Install two-speed clutch gear on upper drive shaft, with recessed side toward drive gear.

Place washer on lower drive shaft and slide shaft through ball bearing and retainer. Install companion yoke, washer and nut.

Install clutch gear on lower drive shaft, with teeth of clutch gear toward rear of case.

Start lock screw into one shift fork and place fork in groove of lower clutch gear (screw should point upward). Slide long shift rail into case and through fork. Flattened end of rail should be toward the front. Position rail properly and tighten fork screw and lock in place with a piece of wire. Install poppet ball, spring and screw.

Start lock screw in other shift fork and place fork in groove in upper clutch gear, with screw pointed down. Install other shift rail and position it in fork and tighten fork screw. Install poppet ball, spring and screw. Install shift rail oil seals.

The upper and lower driven gear shaft bearing must be adjusted before the retainer assemblies are installed in the case, as this adjustment cannot be performed properly when the transfer case is assembled. The adjustment procedure is, in general, the same and should be made without the brake support assembled to the upper retainer and with the oil seal removed from the lower retainer. If the bearing cups were removed, press them in the retainers. Do not lubricate the roller bearings as they must be dry and clean in order to obtain an accurate adjustment

Press the large bearing on the shaft

and against the gear, then slide the speedometer gear, spacer, and the original shims on the shaft. If the shims have been damaged or lost, select new shims to give a total thickness of .030" and install. Install driven gear shaft, outer bearing, companion yoke, washer and nut. Tighten nut as tight as for final assembly. Shock each end of the drive shaft with a brass drift and hammer, and revolve shaft until bearings roll smoothly. The shaft must be free rolling without end play for a correct bearing adjustment.

If the bearing adjustment is not cor-

rect, remove the shaft and gear and increase or decrease the thickness of the shim pack until a free rolling adjustment without end play is accomplished. When correct adjustment is obtained, remove companion yoke.

Remove companion yoke from lower driven gear shaft, lubricate bearings and install new oil seal, companion yoke, washer and nut. Position lower driven gear bearing retainer on case with lug of retainer covering shift rail opening in case. Install cap screws, nuts and wash-

Lubricate bearings and position upper driven shaft bearing retainer to transfer case with lug of retainer covering shift rail hole in case. Install cap screws, nuts and washers.

Drive a new oil seal in the brake support and install support to upper driven gear bearing retainer. Install hand brake drum and band. Tighten all but the upper driven shaft companion yoke nuts and lock with cotter pins. Install speedometer pinion.

Adjust hand brake so there is .010" to .012" clearance between lining and drum. Apply brake and tighten upper driven shaft companion yoke nut, and lock with a cotter pin.

# **Rear Axle Section**

### REAR AXLES

Year	Make	Model	Type	Oil, Pts
1949-58	Dodge	1350	1 Speed	334
1949-58	Dodge	13800	1 Speed	$5\frac{1}{2}$
1949-58	Dodge	16600	1 Speed	11
<b>1949-5</b> 8	Eaton	①	1 Speed	<b>(4)</b>
<b>1949-5</b> 8	Eaton	② ③	1 Speed	$\widecheck{4}$
<b>1949-5</b> 8	Eaton	(3)	1 Speed	$\widecheck{4}$
1949-58	Timken	F147	1 Speed	$\widecheck{4}$
1949-58	Timken	H141	1 Speed	<u>(4)</u>
1949-58	Timken	L140	2 Speed	<u>(4)</u>
1949-58	Timken	QT140	2 Speed	$\widecheck{4}$
1949-58	Timken	ŘT140	2 Speed	$\widecheck{4}$
1949-58	Timken	H341	2 Sp. D. R.	$\widecheck{4}$
1949-58	Timken	L340	2 Sp. D. R.	$\widecheck{4}$
1949-58	Timken	QT340	2 Sp. D. R.	Ğ
1949-58	Timken	ŘT340	2 Sp. D. R.	$\widecheck{4}$
1957-58	Timken	Tandem	1 Speed	Ĭ.
1957-58	Timken	(5)	1 Speed	<u>(4)</u>
1950-57	Timken	Worm Dr.	1 Speed	9000000000000000

- -Semi-floating, two pinion type with two pinion bearings.
- -Full-floating, four-pinion type.
  -Full-floating, two-pinion type with three pinion bearings.
- -See Rear Axles Chapter for repairs and lubrication data.
- -Split housing type axle used at front of four-wheel drive trucks.

## 1949-58 SEMI-FLOATING **AXLE**

The drive pinion in these axles, Figs. 1 and 2, is held in position by the shoulders in the differential carrier upon which the pinion bearing cups seat. Pinion position is maintained by shims located between the pinion head and the rear bearing cone. Shims between the bearing spacer and the front bearing cone are used to adjust pinion bearings. The threaded nut type of differential bearing adjustment is used.

## Axle Shaft, Remove

- 1. Remove the wheel, hub and drum assembly. Do not strike the end of the axle shaft to loosen the hub as damage to the axle roller bearings and spacer block may result.
- Block the brake pedal so it cannot be depressed.
- Disconnect the brake line from the wheel cylinder.

- 4. Remove the axle shaft drive key and remove the brake support plate.
- If shims are removed from both ends of the axle housing, each set should be kept separate and assembled to its respective end of the axle housing to maintain the central location of axle shafts and wheels. When an axle shaft or bearing is replaced, the axle shaft end play should be checked and corrected as required.
- Remove the axle shaft and bearing.

#### Axle Shaft, Install

- Install inner oil seal (well soaked with oil) in the axle housing.
- Press bearing on axle shaft (if removed) applying pressure to the inner race.
- Pack bearing with short fiber wheel bearing grease and coat the bearing cup bearing surface.
- Place axle shaft in housing, working carefully to prevent damage to inner seal.
- 5. Drive bearing cup into housing.

- 6. Install outer oil seal in brake support and stake seal in place at four points.
- 7. Install shims and brake support.
- 8. Install nuts on housing studs and tighten from 30-35 lb. ft. torque.
- Axle shaft bearings are adjusted by removing or installing shims. Shims are available in thicknesses of .005", .010", .0125", .015" and .030". One or more shims should be used, as required, to obtain proper adjustment. Check axle shaft end play as follows:
- 10. Rap each axle shaft to be sure the bearings and cups are seated. Then place a dial indicator on the axle shaft in such a manner to locate the dial indicator stem on the end of the axle shaft. Pull out and push in the axle shaft to obtain end play reading on the indicator.
- 11. If the indicator reading shows less than .003" or more than .008" end play, remove the brake support plate and oil seal and add or remove shims as required. When adjusting these bearings, equal thicknesses of shims should be removed or installed on both the right and left sides of the axle housing to retain the central position of the axle shaft thrust
- Install key in axle shaft and install hub and wheel. Tighten axle nut from 142-150 lb. ft. torque.

#### Differential Carrier, Remove

- 1. Drain oil from housing by removing two bottom cap screws that fasten carrier to axle housing.
- Remove axle shafts.
- Disconnect rear universal joint and drop propeller shaft.
- Remove remaining carrier-to-housing cap screws and lift out carrier.

#### Differential Carrier, Install

- 1. Roll differential carrier under truck on dolly and lift assembly into housing.
- 2. Install cap screws and tighten evenly from 25-30 lb. ft. torque.
- Connect propeller shaft.
- Install axle shafts.
- Fill housing to proper level at bot-