

REAR AXLE

GROUP 4

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PART 4-1

GENERAL AXLE SERVICE

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Two types of axles are covered in this group. The **integral carrier** type axle is used only in Mustang and Falcon 6-cylinder models. In this type axle, the differential carrier is inte-

gral with the axle housing. The **removable carrier** type axle is used in Mustang and Falcon 8-cylinder models, and all Comet and Fairlane models. In this type axle, the differ-

ential carrier is bolted to the axle housing and can be removed from the housing for service. A limited-slip differential is available as optional equipment in either type axle.

1 DIAGNOSIS AND TESTING

DIAGNOSIS GUIDE

Certain rear axle and drive line trouble symptoms are also common to the engine, transmission, tires, and other parts of the car. For this reason, be sure that the cause of the trouble is in the rear axle before adjusting, repairing, or replacing any of the axle parts.

REAR AXLE NOISE DIAGNOSIS

Noise characteristics in a rear axle are more difficult to diagnose and repair than mechanical failures. Slight axle noise heard only at a certain speed or under remote conditions must be considered normal. Axle noise tends to peak or be more pronounced at varying speeds and the

noise is in no way a sign of trouble in the axle.

Where noise is present in an objectionable form, loud and/or at all speeds, the first efforts should be made to isolate the noise. Rear axle noise is quite often confused with other noises such as tire noise, transmission noise, driveshaft vibration and universal joint noise. Isolation of the noise in any one unit requires skill and experience. An attempt to eliminate a slight noise may baffle even the best diagnostic experts. Axle noises fall into two basic categories: gear noise and/or bearing noise.

Gear Noise

Abnormal gear noise can be rec-

ognized since it produces a cycling pitch and will be very pronounced in the speed range at which it occurs, usually under drive, float, cruise or coast conditions. Gear noise tends to peak in a narrow speed range or ranges, while bearing noise will tend to remain constant in pitch.

Bearing Noise

Defective bearings will produce a whine that is constant in pitch and varies with vehicle speed. This fact will help distinguish between bearing and/or gear noise.

1. Pinion bearing noise can be identified as a constant grinding noise. Pinion bearings are rotating at a higher speed than differential side

bearings or axle shaft bearings. The noise is most noticeable at a slight pull between 18 to 25 miles per hour.

2. Wheel bearing noise may be confused with rear axle noise. To differentiate between wheel bearings and rear axle, drive the car on a smooth road at medium low speed. With traffic permitting, turn the car sharply right and left. If noise is caused by wheel bearings, the noise will increase on the defective bearing because of side loading.

3. Side bearings will produce a constant grinding noise of a slower nature than pinion bearing. (side bearing noise cannot be determined by the wheel bearing test), but will be in the same frequency as axle shaft bearings.

Also, certain trouble symptoms are common to both the conventional and locking differential axles, while still other symptoms are found only in the locking differential.

To determine whether the car is equipped with a conventional or a locking differential, check the car warranty plate and the axle ratio tag. Refer to CAR IDENTIFICATION at the front of this manual.

LIMITED-SLIP DIFFERENTIAL

The limited-slip differential can be

checked for proper operation without removing the carrier from the axle housing.

Jack up one rear wheel and remove the wheel cover. On a car with a removable carrier type axle, install tool T59L-4204-A on the axle shaft flange studs as shown in Fig. 1. On a car with an integral carrier type axle, use tool T65K-4204-A.

Using a torque wrench of at least 200 ft-lbs capacity, rotate the axle

shaft. **Be sure that the transmission is in neutral gear, one rear wheel is on the floor, and the other rear wheel is raised off the floor.** The torque required to continuously rotate the shaft should be a specified in Part 4-3. The initial breakaway torque may be higher than the continuous turning torque, but this is normal. The axle shaft should turn with even pressure throughout the check without slipping or binding.

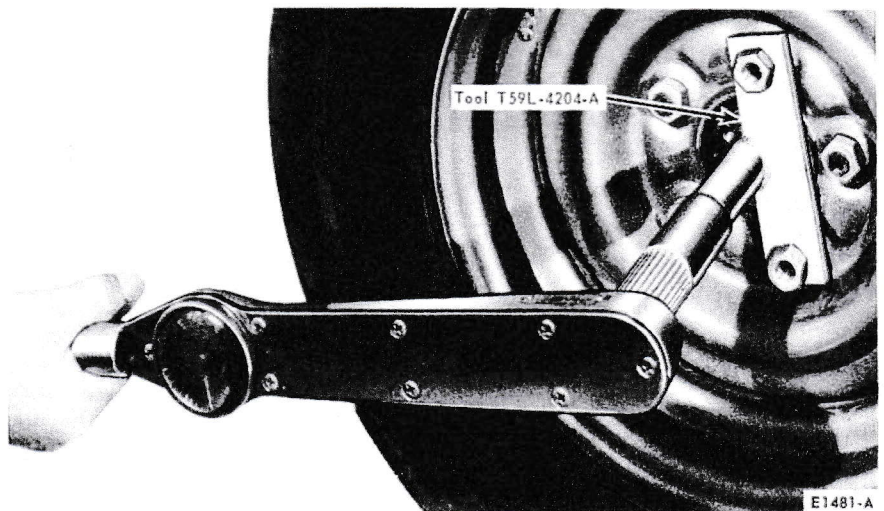


FIG. 1—Checking Limited-Slip Differential

REAR AXLE TROUBLE SYMPTOMS AND POSSIBLE CAUSES

EXCESSIVE REAR AXLE NOISE (ALL REAR AXLES)

Since gears are in mesh, some rear axle noise is normal. However, excessive noise often indicates the beginning of other troubles in the axle.

A road test can help determine whether the noise is being caused by trouble in the rear axle or in other parts of the car. **Before road-testing the car, make sure that the tire pressures and the rear axle lubricant level are normal. Then drive the car far enough to warm the axle lubricant to its normal operating temperature.**

With the car stopped and the transmission in neutral, run the engine at various speeds. If the noise still exists during this test, it probably comes from the engine or the exhaust system.

To determine if the noise is being caused by the rear axle or the tires, drive the car over several different types of road surfaces. Smooth asphalt or black-top roads minimize tire noises. Tire noises may be eliminated by cross-switching the tires. Snow tires often cause noises not heard with conventional tires.

Noise caused by a worn or damaged wheel bearing is often loudest when the car is coasting at low speeds, and it usually stops when the brakes are gently applied. To find the noisy bearing, jack up each wheel and check each bearing for roughness while the wheel is rotating, provided that the car is equipped with a conventional differential.

If all possible external sources of noise have been checked and eliminated, and the noise still exists, road-test the rear axle under all four driving conditions—drive, cruise, float, and coast. Any noise produced by the sidegears and pinions in the differential case will be most pronounced on turns. A continuous whine under a light load between 20 and 35 miles per hour indicates rough or brinnelled pinion bearings. If the tone of drive, coast and float noise differs with speed and if the noise is very rough and irregular; worn, rough or loose differential or pinion shaft bearings are indicated. Remove, disassemble, and inspect the axle.

REAR AXLE TROUBLE SYMPTOMS AND POSSIBLE CAUSES (Continued)

EXCESSIVE REAR AXLE BACKLASH (ALL REAR AXLES)	Excessive backlash in the axle driving parts may be caused by worn axle shaft splines, loose axle shaft flange nuts, loose U-joint flange mountings, excessive backlash between the drive pinion and ring gear, excessive backlash in the differential gears, or bearings which are worn or out of adjustment.
ONE WHEEL SPINS EXCESSIVELY (LIMITED-SLIP DIFFERENTIAL ONLY)	Use the procedure given under limited-slip differential for checking the locking differential while the unit is in the car. If the torque required to rotate one rear wheel is less than the specified minimum, the differential is not functioning properly. To repair the unit, remove it from the axle housing.
AXLE HAS A HIGH-PITCHED, CHATTERING NOISE ON TURNS (LIMITED-SLIP DIFFERENTIAL ONLY)	Drive the car in a fairly tight circle, making five circles clockwise and five counterclockwise. This will permit the lubricant to work in between the clutch plates. If the noise does not disappear during this driving test, it is probable that the axle does not have the approved Ford lubricant. The lubricant may be checked by draining two tablespoonfuls from the axle and mixing it with an equal amount of white alcohol, such as rubbing alcohol. Mix the lubricant and alcohol thoroughly and let it stand for at least two minutes. If the sample now has a blue tint, the lubricant is approved Ford lubricant. If it has a yellow tint, it is not the correct lubricant. Drain and refill the axle with the approved lubricant. It is not necessary to flush the axle housing. After refilling the axle drive the car in fairly tight circles clockwise and counterclockwise. The chattering noise should disappear as soon as the new lubricant works in between the clutch plates.

If the torque reading is less than the specified minimum, check the differential for improper assembly.

A car equipped with a limited-slip differential will always have both wheels driving. If, while the car is being serviced, only one wheel is raised off the floor and the rear axle is driven by the engine, the wheel on the floor will drive the car off the stand or jack.

GEAR TOOTH CONTACT PATTERN CHECK

Paint the gear teeth and roll a pattern as described in Section 3. After diagnosing the tooth pattern as explained here, make the appropriate adjustments as outlined in Section 2.

In making a final gear tooth contact pattern check, it is necessary to recognize the fact that there are three different types of gear set, hunting, non-hunting and partial non-hunting. Each type is determined by the ratio and the number of teeth in the gears. The non-hunting and partial non-hunting types can be identified by the paint timing marks on the pinion and ring gear teeth (Part 4-2, Fig. 30). See Part 4-3 for complete identification specifications.

THE IDEAL TOOTH PATTERN

Figs. 2 and 3 show the ideal tooth pattern. **This pattern is not a rigid standard but merely a general rule.**

In general, desirable tooth patterns should have the following characteristics:

- The drive pattern should be fairly well centered on the tooth.
- The coast pattern should be centered on the tooth but may be slightly toward the toe.
- Some clearance between the pattern and the top of the tooth is desirable.
- There should be no hard lines where the pressure is high.

The individual gear set need not conform exactly to the ideal pattern in order to be acceptable. Characteristic differences between the three

types of gear sets as well as differences between individual gear sets of the same type will result in patterns that are acceptable yet different from those shown in Fig. 3.

HUNTING GEAR SET

In a hunting-type gear set, any one pinion gear tooth comes into contact with all drive gear teeth. In this type, several revolutions of the ring gear are required to make all possible gear combinations.

Acceptable Pattern

The drive pattern shown in Fig. 4 was rolled on a hunting-type gear set. Since each pinion tooth came into contact with each ring gear tooth, the pattern is a result of the com-



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FIG. 2—Ideal Tooth Pattern—Integral Carrier Type Axle

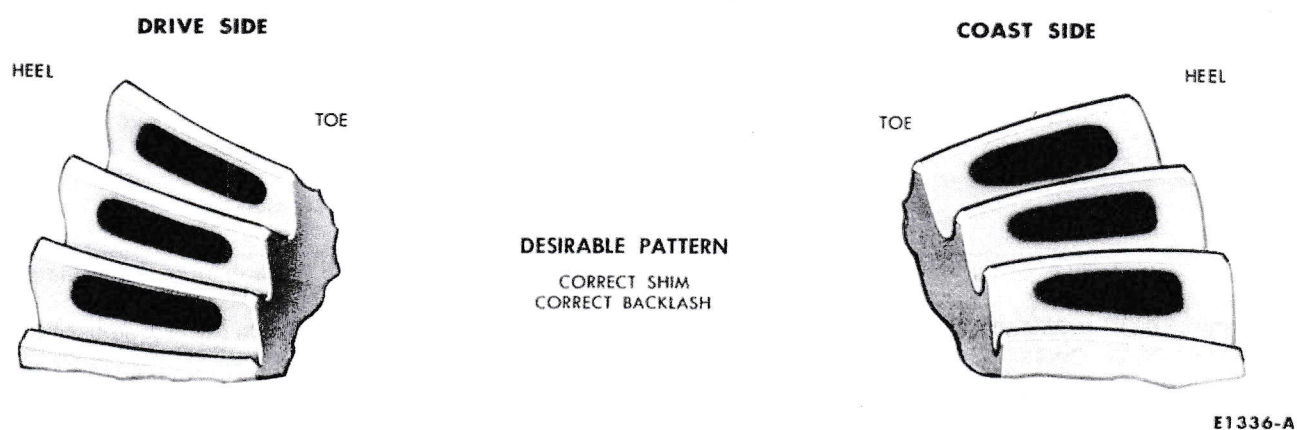


FIG. 3—Ideal Tooth Pattern—Removable Carrier Type Axle

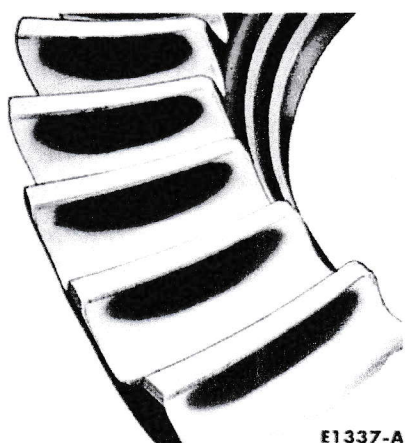


FIG. 4—Acceptable Hunting Gear Pattern

bined tooth contacts. Therefore, the pattern is uniform from tooth to tooth.

Unacceptable Pattern

An erratic tooth pattern on a hunting gear set indicates gear runout and possible need for gear replacement.

A pattern that is uniform, but off center indicates a change in shim or backlash (Figs. 9 or 10).

NON-HUNTING GEAR SET

In a non-hunting type gear set, any one pinion gear tooth comes into contact with only a few ring gear teeth. In this type, only one revolution of the ring gear is required to make all possible tooth contact combinations.

Acceptable Patterns

The drive patterns shown in Figs. 5 and 6 were rolled on two different non-hunting type gear sets. The pattern in Fig. 5 runs from the tooth center toward the toe and then back

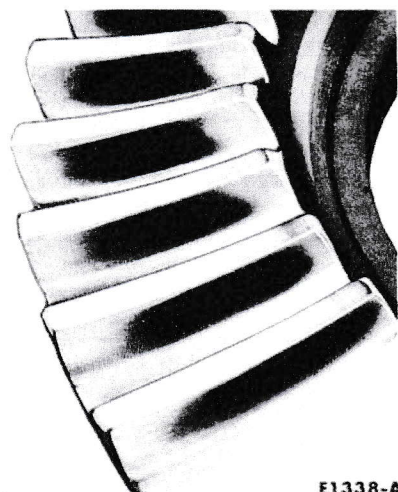


FIG. 5—Unacceptable Non-Hunting Pattern—Center-Toe-Center

to center. The pattern in Fig. 6 runs from the tooth center toward the heel and then back to center. These patterns are not unusual for non-hunting gear sets and are acceptable. The pattern on any one ring gear tooth was formed by only one pinion tooth coming into contact with it. Because of this limited tooth contact, the non-hunting pattern can be more erratic than the hunting pattern and still be acceptable. Likewise, the coast pattern on a non-hunting gear set is usually less uniform tooth to tooth than it would be on a hunting gear set (Fig. 7).

Fig. 8 shows a pattern rolled on another gear set. In this case, the pattern is fairly uniform from tooth to tooth.

Unacceptable Patterns

A non-hunting gear set should be checked for runout and possible replacement if the pattern runs from the tooth center toward the toe and

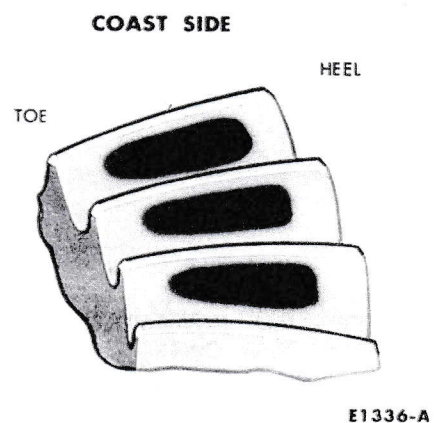


FIG. 6—Unacceptable Non-Hunting Pattern—Center-Heel-Center



FIG. 7—Acceptable Non-Hunting Gear Set—Coast Pattern

back to center on some gear teeth (Fig. 5) while on other teeth of the same gear, the pattern runs from the tooth center toward the heel and back to center (Fig. 6).

A non-hunting gear set requires a



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FIG. 8—Acceptable Non-Hunting Pattern—Uniform

change in shimming or backlash when its pattern tends to concentrate toward the heel or toe, top or bottom of most teeth (Figs. 9 and 10).

PARTIAL NON-HUNTING GEAR SET

In a partial non-hunting type gear

set, any one pinion tooth comes into contact with only part of the ring gear teeth, but more than one revolution of the ring gear is required to make all possible gear tooth combinations.

Tooth to tooth pattern uniformity will usually be in between the hunting and the non-hunting patterns. Partial non-hunting gear set patterns will usually be less uniform than hunting gear set patterns, but more uniform than non-hunting gear set patterns.

SHIM AND BACKLASH CHANGES

The patterns shown in Figs. 9 and 10 are typical of gear sets that have either an incorrect backlash or an incorrect shim adjustment. Since each gear set rolls a characteristic pattern, the patterns in Figs. 9 and 10 should be considered as typical only and should be used as a guide rather than a rigid standard. The drive pattern is rolled on the convex side of

the tooth, and the coast pattern is rolled on the concave side.

The movement of tooth contact patterns with changes in backlash and shimming can be summarized as follows:

Integral Carrier Type Axle

1. Thinner shim with the backlash constant moves the pinion farther from the ring gear.

a. Drive pattern moves toward the top of the tooth (face contact) and toward the heel.

b. Coast pattern moves toward the top of the tooth and slightly toward the toe.

2. Thicker shim with the backlash constant moves the pinion closer to the ring gear.

a. Drive pattern moves deeper on the tooth (flank contact) and slightly toward the toe.

b. Coast pattern moves deeper on the tooth and toward the heel.

3. Decreasing backlash moves the drive gear closer to the pinion:

a. Drive pattern (convex side of gear) moves slightly lower and toward the toe.

b. Coast pattern (concave side of gear) moves lower and toward the toe.

4. Increasing backlash moves the ring gear away from the pinion:

a. Drive pattern moves slightly higher and toward the heel.

b. Coast pattern moves higher and toward the heel.

If the patterns are not correct, make the changes as indicated. The differential case and drive pinion will have to be removed from the carrier casting to change a shim. When re-installing the pinion and ring gear of a non-hunting or partial non-hunting gear set, be sure that the marked tooth on the pinion indexes between the marked teeth on the ring gear (Fig. 30, Part 4-2). Refer to Pinion and Ring Gear Tooth Contact Adjustment, Section 2.

Removable Carrier Type Axle

1. Thicker shim with the backlash constant moves the pinion farther from the ring gear:

a. Drive pattern moves toward the top of the tooth (face contact) and toward the heel.

b. Coast pattern moves toward the top of the tooth and slightly toward the toe.

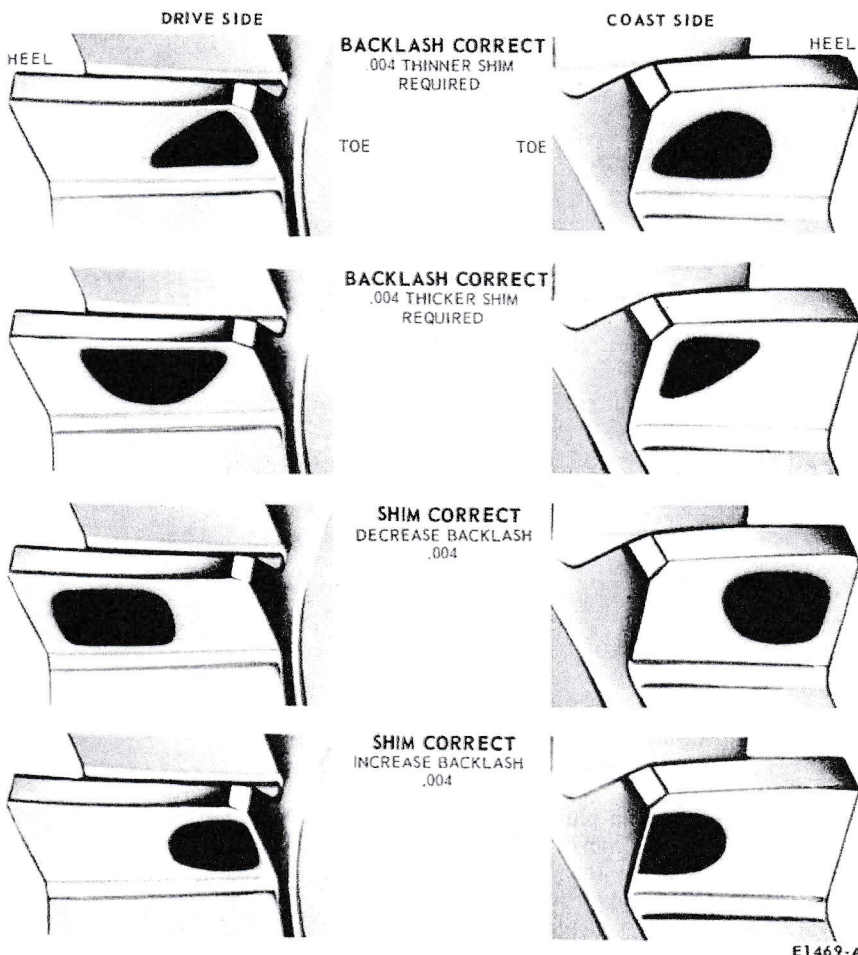
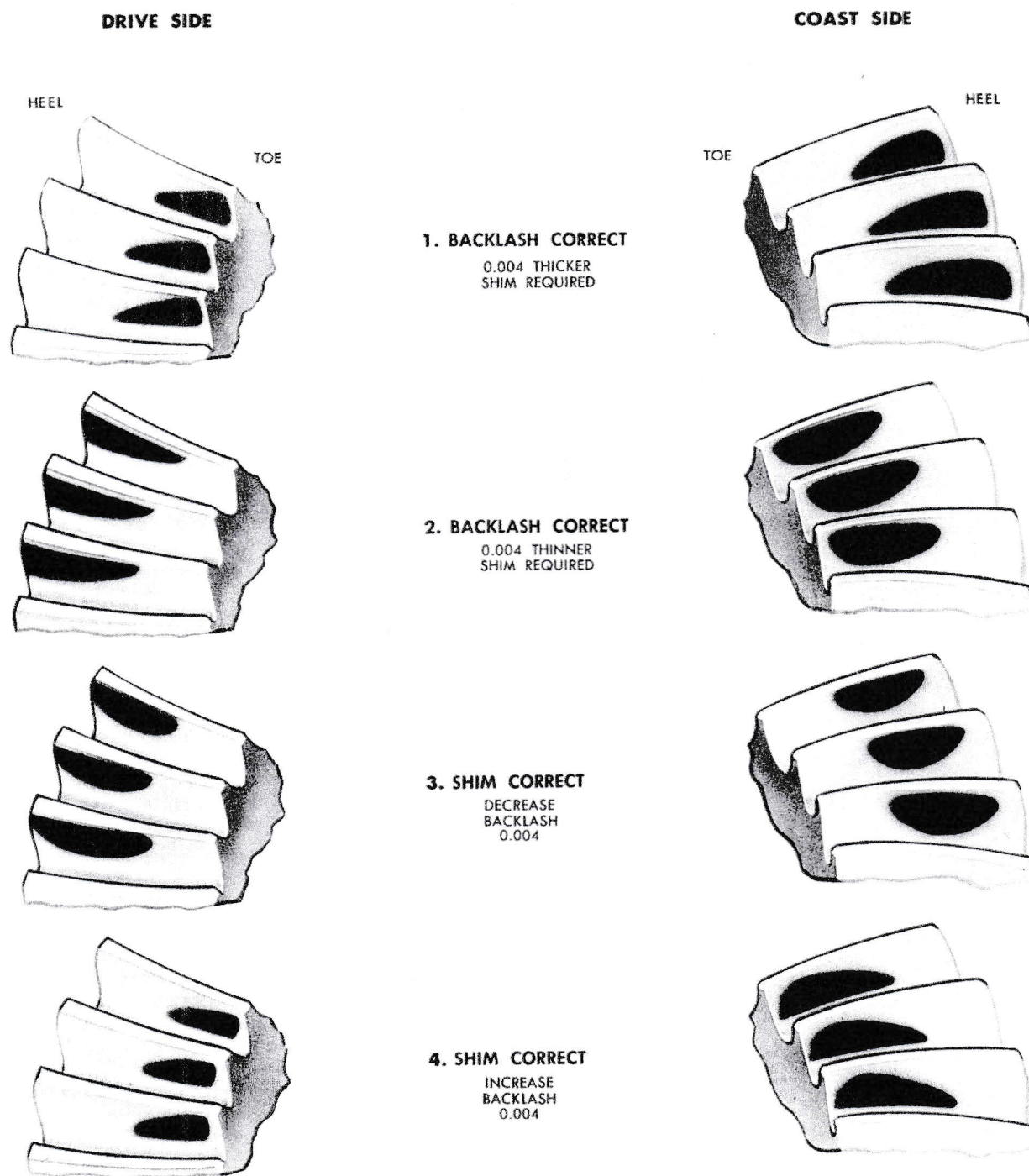


FIG. 9—Typical Gear Tooth Contact Patterns Indicating Shim or Backlash Change—Integral Carrier Type



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FIG. 10—Typical Gear Tooth Contact Patterns Indicating Shim or Backlash Change—Removable Carrier Type

2. Thinner shim with the backlash constant moves the pinion closer to the ring gear.

a. Drive pattern moves deeper on the tooth (flank contact) and slightly toward the toe.

b. Coast pattern moves deeper on the tooth and toward the heel.

3. Decreasing backlash moves the

ring gear closer to the pinion:

a. Drive pattern moves slightly lower and toward the toe.

b. Coast pattern moves lower and toward the toe.

4. Increasing backlash moves the ring gear away from the pinion:

a. Drive pattern moves slightly higher and toward the heel.

b. Coast pattern moves higher and toward the heel.

If the patterns are not correct, make the changes as indicated. The pinion need not be disassembled to change a shim. All that is required is to remove the pinion, bearing, and retainer assembly and install a differ-

ent shim. When reinstalling the pinion and retainer assembly of a non-hunting or partial non-hunting gear

set, be sure that the marked tooth on the pinion indexes between the marked teeth on the ring gear (Fig.

30, Part 4-2). Refer to Pinion and Ring Gear Tooth Contact Adjustment, Section 2.

2 COMMON ADJUSTMENTS AND REPAIRS

PINION AND RING GEAR TOOTH CONTACT ADJUSTMENT

Two separate adjustments affect pinion and ring gear tooth contact. They are pinion location and backlash (Figs. 11 and 12).

Individual differences in matching the differential housing and the gear set require the use of shims to locate the pinion for correct contact with the ring gear. On the integral carrier type axle, the pinion locating shim pack is installed between the pinion rear bearing cone and the pinion gear (Fig. 11), whereas, on the removable carrier type axle, the shims are installed between the pinion retainer and the carrier (Fig. 12). Due to this difference in shim position, it should be noted that adding or removing shims in the integral carrier type (Fig. 11) causes the pinion to move in a direction exactly opposite to the pinion movement caused by adding or removing shims in the removable carrier type (Fig. 12).

When adjusting either type axle,

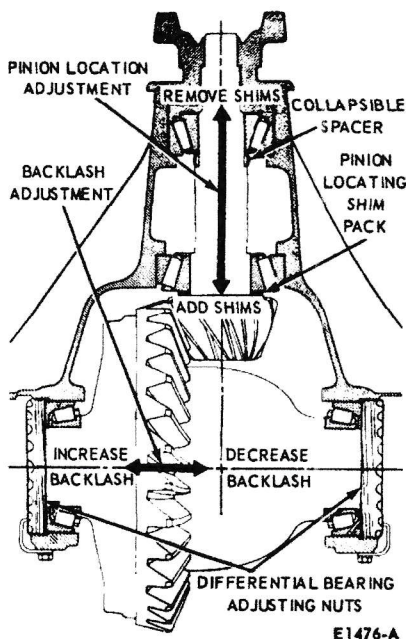


FIG. 11—Pinion and Ring Gear Tooth Contact Adjustment—Integral Carrier Type Axles

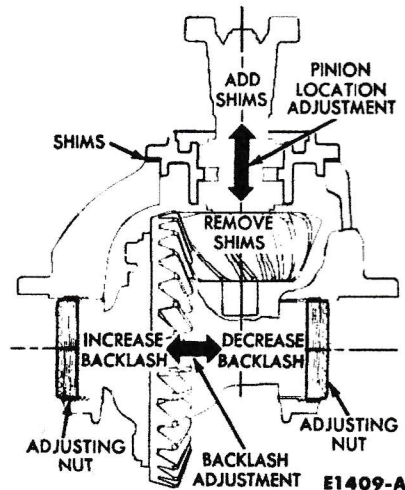


FIG. 12—Pinion and Ring Gear Tooth Contact Adjustment—Removable Carrier Type Axles

shims should be added to or removed from the original shim pack only as indicated by the tooth pattern check described in the foregoing Section 1. When adjusting the integral carrier type axle, add shims to move the pinion toward the ring gear; remove shims to move the pinion away from the ring gear (Fig. 11). When adjusting the removable carrier type axle, remove shims to move the pinion toward the ring gear; add shims to move the pinion away from the ring gear (Fig. 12).

The tooth pattern check also indicates whether the ring gear should be adjusted away from or toward the pinion to increase or decrease backlash between the gears.

If the tooth pattern check indicates a change in backlash only, follow the procedure under Backlash and Bearing Preload Adjustments. If the tooth pattern indicates a change in shim thickness, follow the procedure under Pinion Location.

BACKLASH AND DIFFERENTIAL BEARING PRELOAD ADJUSTMENTS

To secure a more uniform control of differential side bearing preload in service repairs, a dial indicator set-up such as shown in Fig. 13 is used.

In both types of axle (Fig. 11 and 12), the ring gear is moved away from or toward the pinion as described in the following procedure.

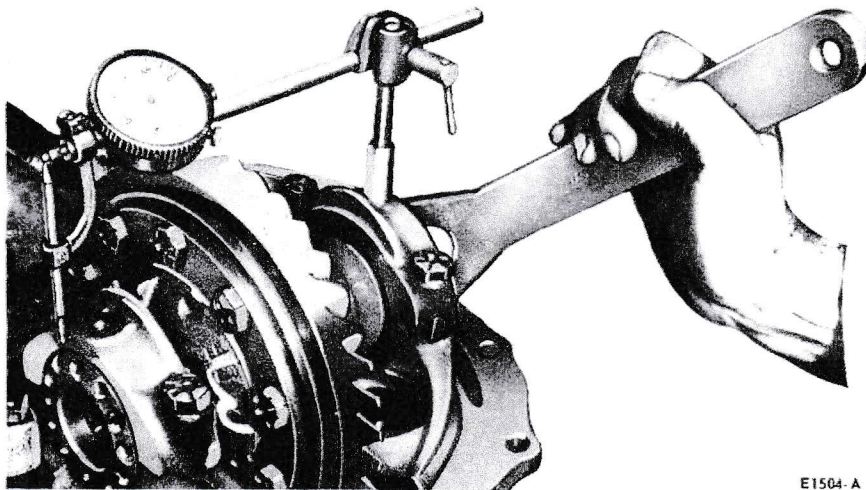
1. Remove the adjusting nut locks, loosen the differential bearing cap bolts, then torque the bolts to (15 ft-lbs on integral carrier type axles; 20 ft-lbs on removable carrier type axles) before making adjustments.

2. The left adjusting nut is on the ring gear side of the carrier. The right nut is on the pinion side. Loosen the right nut until it is away from the cup. Tighten the left nut until the ring gear is just forced into the pinion with no backlash then rotate the pinion several revolutions to be sure no binding is evident. (Recheck the right nut at this time to be sure that it is still loose.) Tightening the left nut moves the ring gear into the pinion to decrease backlash, and tightening the right nut moves the ring gear away.

3. Loosen the left adjusting nut 1 to 1½ notches. Tighten the right nut until it first contacts the bearing cup. Rotate the drive gear several revolutions in each direction while the bearings are loaded, to seat the bearings in their cups to be sure no bind is evident. **This step is important.**

4. Install a dial indicator as shown in Fig. 13.

5. Again loosen the right nut to release the pre-load. If there is any backlash between the gears as shown by the dial indicator, tighten the left nut just enough to remove this backlash. At this time, make sure that one of the slots in the left nut is so located that the lock can be installed without turning the nut. Carefully tighten the right nut until it just contacts the cup. On integral carrier type axles, set a preload of 0.008 inch case spread for new bearings and 0.003 to 0.005 for the original bearings. On removable carrier type axles, the preload is 0.012 inch case spread for new bearings and 0.005 to 0.008 for the original bearings. As preload is applied from the right side, the ring gear is forced away from the pinion and usually results in the correct backlash.



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FIG. 13—Adjusting Side Bearing Preload

6. Torque the differential cap bolts to specification (15ft-lbs).

7. Measure the backlash on several teeth around the ring gear. If the measurements vary more than (0.002 inch—integral carrier type; 0.003 inch—removable carrier type) there is excessive runout in the gears or their mountings, which must be corrected to obtain a satisfactory unit. If the backlash is out of specification, loosen one adjusting nut and tighten the opposite nut an equal amount, to move the ring gear away from or toward the pinion. **When moving the adjusting nuts, the final movement should always be made in a tightening direction. For example, if the left nut had to be loosened one notch, loosen the nut two notches, then tighten it one. This insures that the nut is contacting the bearing cup, and that the cup cannot shift after being put in service.** After all such adjustments, check to be sure that the case spread remains as specified for the new or original bearings used.

8. Again check the tooth contact pattern. If the pattern is still incorrect, a change in pinion location (shim thickness) is indicated.

PINION LOCATION

Integral Carrier Type Axle

1. Remove the differential case and the drive pinion from the car-

rier casting, and then remove the pinion bearings as described under Removal of Differential Case and Drive Pinion in Section 4.

2. Measure the original shim thickness with a micrometer. Increase or decrease the shim thickness as indicated by the tooth pattern check described in the foregoing Section 1 and shown in Fig. 9.

3. Install the corrected shim pack and the bearings on the pinion, and then install the pinion and the differential case in the carrier casting as outlined under Installation of Drive Pinion and Differential Case in Section 4 of Part 4-2.

4. Adjust the backlash between the ring gear and pinion as outlined in the foregoing procedure.

5. Make a tooth pattern check. If the pattern is still unsatisfactory, repeat this procedure changing the shim thickness each time until a satisfactory tooth pattern is obtained.

Removable Carrier Type Axle

1. Remove the attaching bolts and the pinion and bearing retainer assembly from the carrier.

2. Measure the original shim thickness with a micrometer. Increase or decrease the shim thickness as indicated by the tooth pattern check described in Section 1.

3. Replace the pinion retainer O-ring (Fig. 47, Part 4-2). Coat the O-ring with axle lubricant before installing. **Do not roll the O-ring into the groove. Snap it into position.**

4. Being careful not to pinch the O-ring, install the pinion and bearing retainer assembly in the carrier with the corrected shim pack.

Before installing the pinion and bearing retainer assembly, determine which type of gear set is being used. The **non-hunting** and **partial non-hunting** types can be identified by the paint timing marks on the gear teeth (Fig. 30, Part 4-2).

If the gear set is of the **non-hunting** or **partial non-hunting** type, clean the teeth on both the pinion and ring gear so that the timing marks are visible. Rotate the differential case and drive gear assembly in the carrier until the marked teeth on the ring gear are opposite the pinion entry hole. Place the pinion retainer assembly in the carrier so that the marked tooth on the pinion indexes between the marked teeth on the ring gear (Fig. 30, Part 4-2).

In almost every case of improper assembly (gear assembled out of time), the noise level and probability of failure will be higher than they would be with properly assembled gears.

When installing the **hunting** type gear set (no timing marks), assemble the pinion and retainer assembly into the carrier without regard to the matching of any particular gear teeth.

5. Install the retainer-to-carrier mounting bolts and torque to specifications.

6. Adjust the backlash between the ring gear and pinion as outlined in the foregoing procedure.

7. Make a tooth pattern check. If the pattern is still unsatisfactory, repeat this procedure changing the shim thickness each time until a satisfactory tooth pattern is obtained.

3 CLEANING AND INSPECTION

INSPECTION BEFORE DISASSEMBLY OF CARRIER

The differential case assembly and the drive pinion should be inspected before they are removed from the housing. These inspections can help to find the cause of the trouble and to determine the correction needed.

On removable carrier type axles, mount the carrier in the holding fixture shown in Fig. 14.

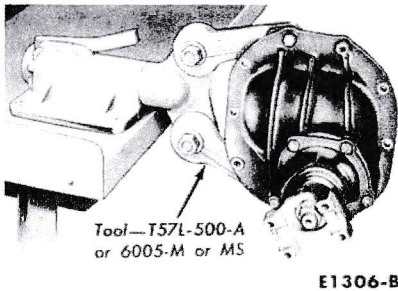


FIG. 14—Bench Fixture for Carrier Overhaul—Removable Carrier Type Axle

Wipe the lubricant from the internal working parts, and visually inspect the parts for wear or damage.

Rotate the gears to see if there is any roughness which would indicate defective bearings or chipped gears. Check the gear teeth for scoring or signs of abnormal wear.

Check the differential case and the drive pinion for end play.

Set up a dial indicator (Fig. 15 or 16) and check the backlash at several points around the ring gear.

Backlash should be within specifications as outlined in the Specifications Section, Part 4-3.

To check the gear tooth contact, paint the gear teeth with the special compound furnished with each service ring gear and pinion. Wrap a cloth around the drive pinion flange to act as a brake. Rotate the ring gear back and forth (use a box wrench on the ring gear attaching bolts for a lever) until a clear tooth contact pattern is obtained.

Certain types of gear tooth contact patterns on the ring gear indicate incorrect adjustment. Noise caused by incorrect adjustment can often be corrected by readjusting the gears. Typical patterns and the necessary corrections are explained under Gear Tooth Contact Pattern Check in Section 1.

Gear tooth runout can sometimes

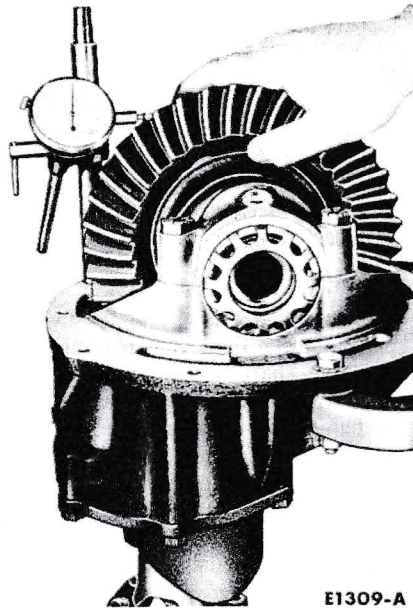


FIG. 15—Checking Backlash—Removable Carrier Type Axle

be detected by an erratic pattern on the teeth. However, a dial indicator should be used to measure the runout of the back face of the ring gear, as shown in Fig. 16 or 17. Refer to Specifications Section for maximum allowable runout.

Loosen the differential bearing cap bolts, and then torque to specification. Remove the adjusting nut locks. Carefully loosen one of the adjusting nuts to determine if any differential bearing preload remains. If at least one notch of preload remains, the differential bearings may be re-used, provided they are not pitted or damaged.

INSPECTION AFTER DISASSEMBLY

Thoroughly clean all parts. Al-

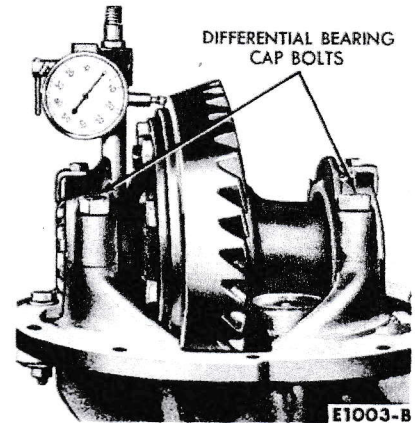


FIG. 17—Checking Drive Gear Runout—Removable Carrier Type Axle

ways use new solvent when cleaning bearings. Do not spin bearings with compressed air. Oil the bearings immediately to prevent rusting. Inspect the parts for any major defects. Clean the inside of the housing before rebuilding and installing the parts.

When a scored gear set is replaced, the axle housing should be washed thoroughly and steam cleaned. This can only be done effectively if the axle shafts and shaft seals are removed from the housing. Inspect individual parts as outlined below.

GEARS

Examine the pinion and ring gear teeth for scoring or excessive wear. **Extreme care must be taken not to damage the pilot bearing surface of the pinion.**

The pattern taken during disassembly should be helpful in judging if gears can be re-used. Worn gears cannot be rebuilt to correct a noisy

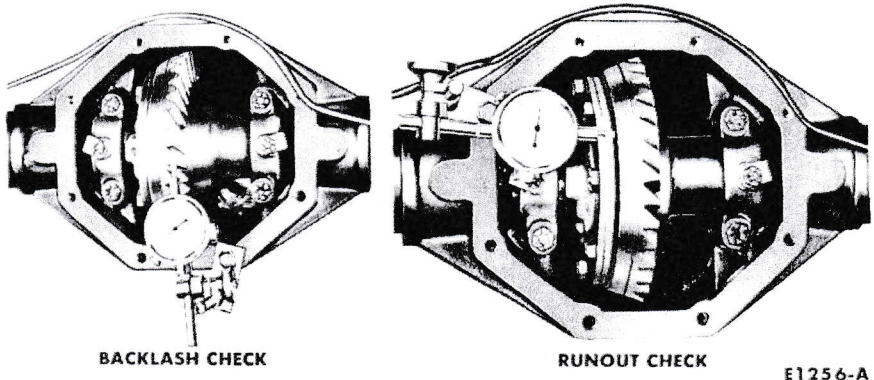


FIG. 16—Checking Backlash and Runout—Integral Carrier Type Axle

condition. Gear scoring is the result of excessive shock loading or the use of an incorrect lubricant. Scored gears cannot be re-used.

Examine the teeth and thrust surfaces of the differential gears. Wear on the hub of the differential side gear can cause a chucking noise known as chuckle when the car is driven at low speeds. Wear on splines, thrust surfaces, or thrust washers can contribute to excessive drive line backlash.

BEARING CUPS

Check bearing cups for rings, scores, galling, or erratic wear patterns. Pinion bearing cups must be solidly seated. Check by attempting to insert a 0.0015-inch feeler between these cups and the bottoms of their bores.

CONE AND ROLLER ASSEMBLIES

When operated in the cups, bearing rollers must turn without roughness. Examine the roller ends for wear. Step-wear on the roller ends indicates that the bearings were not preloaded properly or that the rollers were slightly misaligned.

If inspection reveals either a defective cup or a defective cone and roller assembly, **both parts should be replaced to avoid early failure.**

DIFFERENTIAL BEARING ADJUSTING NUTS

Temporarily install the bearing caps and test the fit of the adjusting nuts in their threads.

The nuts should turn easily when the caps are tightened to 15 ft-lbs (integral carrier type) or 20 ft-lbs

(removable carrier type). The faces of the nuts that contact the bearing cups must be smooth and square. Polish these with a fine abrasive on a flat surface. Replace the nuts or examine the threads in the carrier, if their fit is not proper. Be sure that the bearing caps and adjusting nuts are on the side which they were machined to fit by observing the punch marks and scribe marks made during disassembly operations.

DRIVE PINION FLANGE

Be sure that the ears of the flange have not been damaged in removing the drive shaft or in removing the flange from the pinion. The end of the flange that contacts the bearing cone (integral carrier type) or the oil slinger (removable carrier type) as well as the flat surface of the pinion nut counterbore must be smooth. Polish these surfaces if necessary. Roughness aggravates backlash noises, and causes wear of the flange with a resultant loss in pinion bearing preload.

PINION RETAINER—REMOVABLE CARRIER TYPE AXLE ONLY

Be sure that the pinion bearing cups are seated. Remove any chips or burrs from the mounting flange. Clean the groove for the O-ring seal and all lubricant passages. If the cups were removed, examine the bores carefully. Any nicks or burrs in these bores must be removed to permit proper seating of the cups.

CARRIER HOUSING

Make sure that the differential bearing bores are smooth and the

threads are not damaged.

Remove any nicks or burrs from the mounting surfaces of the carrier housing.

DIFFERENTIAL CASE

Make sure that the hubs where the bearings mount are smooth. Carefully examine the differential case bearing shoulders, which may have been damaged when the bearings were removed. The bearing assemblies will fail if they do not seat firmly against the shoulders. Check the fit (free rotation) of the differential side gears in their counterbores. Be sure that the mating surfaces of the two parts of the case are smooth and free from nicks or burrs.

LIMITED-SLIP DIFFERENTIAL PARTS

Inspect the clutch plates for uneven or extreme wear. The dog-eared clutch plates must be free from burrs, nicks, or scratches which could cause excessive or erratic wear to the bonding material of the internally splined clutch plates. The internally splined clutch plates should be inspected for condition of the bond, bonding material, and wear. Replace the bonded plates if their thickness is less than 0.085 inch or if the bonded material is scored or badly worn. Inspect the bonded plate internal teeth for wear. Replace them, if excessive wear is evident. Bonded plates should be replaced as a set only.

Examine all thrust surfaces and hubs for wear. Abnormal wear on these surfaces can contribute to a noisy axle.

Inspect the Belleville spring for proper free height of ¼ inch.

PART

4-2 REAR AXLES

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1 DESCRIPTION AND OPERATION

IDENTIFICATION

A metal tag stamped with the model designation and gear ratio is secured to all Ford-produced axles under one of the rear cover-to-housing bolts (integral carrier type) or the carrier-to-housing bolts (removable carrier type). The first five spaces on the top line are reserved for the model designation letters such as WCY-E, WDJ-C, or WEA-B. These letters indicate a specific combination of the following factors: conventional or limited-slip axle; diameter of ring gear; small or large wheel bearings; and the gear ratio. It is important, therefore, to use the model designation for obtaining the correct replacement parts.

CONVENTIONAL AXLES

DESCRIPTION

Integral Carrier Type Axle

The rear axle assembly is an integral-type housing, hypoid design, with the centerline of the pinion set below the centerline of the ring gear (Fig. 1).

The semi-floating axle shafts are retained in the housing by ball bearings and a bearing retainer at the axle housing outer ends.

The differential assembly is mounted on two opposed tapered roller bearings. The bearings are retained in the housing by removable caps. Differential bearing preload and drive gear backlash is adjusted by nuts located behind each differential bearing cup.

The drive pinion assembly is mounted on two opposed tapered roller bearings. Pinion bearing preload is adjusted by a collapsible spacer on the pinion shaft. Pinion and ring gear tooth contact is adjusted by shims between the rear bearing cone and pinion gear.

A cover on the rear of the differential housing provides access for inspection and the removal and installation of the differential assembly and drive pinion.

Removable Carrier Type Axle

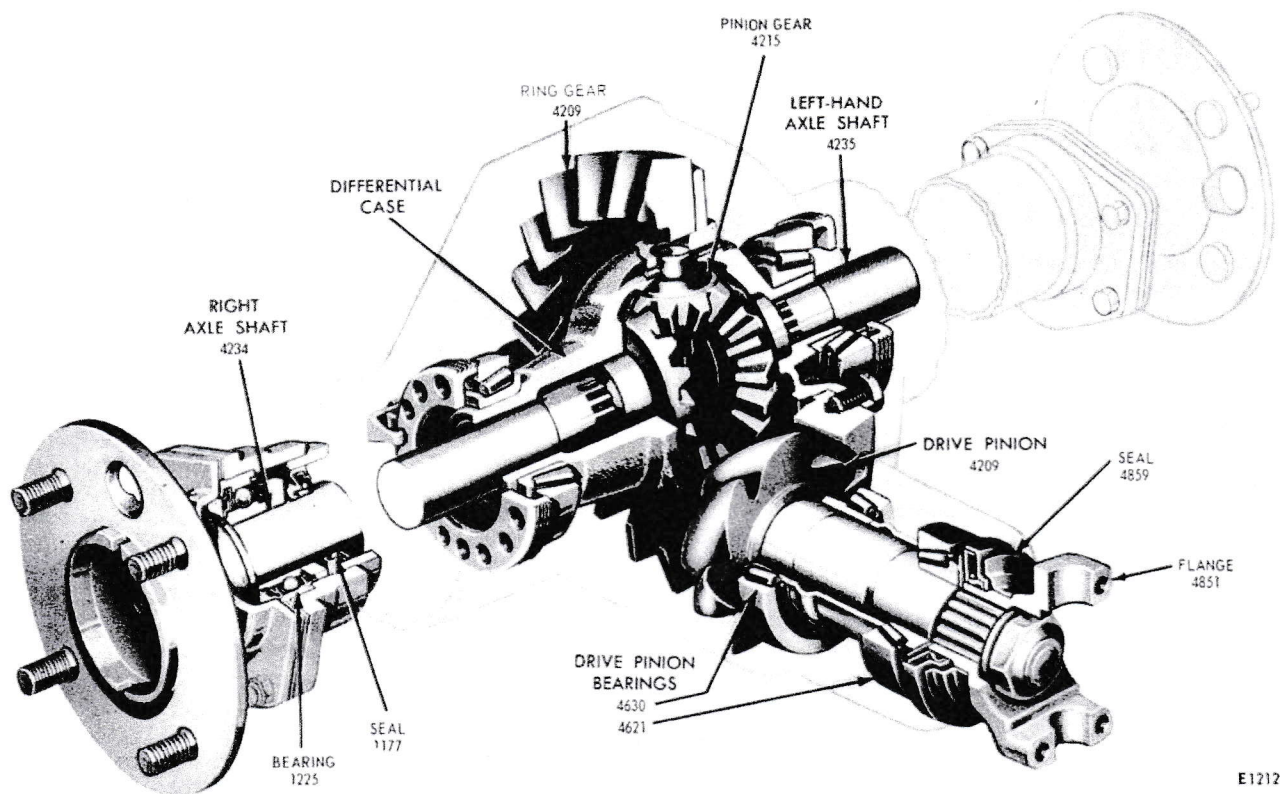
The rear axle is of the banjo-housing, hypoid gear type, in which the centerline of the pinion is mounted

below the centerline of the ring gear (Fig. 2).

The integral pinion gear and shaft and the pinion bearings are assembled in a pinion retainer, which is bolted to the carrier. In this axle, the pinion is straddle mounted; that is, the pinion is supported by bearings both in front of and to the rear of the pinion gear. Two opposed tapered roller bearings support the pinion shaft in front of the pinion gear. A straight roller (pilot) bearing supports the pinion shaft at the rear of the pinion gear. Pinion and ring gear tooth contact is adjusted by shims between the pinion retainer and the carrier housing.

The differential assembly is mounted on two opposed tapered roller bearings, which are retained in the carrier by removable caps. The entire carrier assembly is bolted to the axle housing.

Ball bearing assemblies (rear wheel bearings) are pressed onto the outer ends of the axle shafts and set in the outer ends of the axle housing. These bearings support the semi-float-



E1212-D

FIG. 1—Typical Rear Axle Assembly—Integral Carrier Type Axle

ing axle shafts at the outer ends. The inner ends of the shafts spline to the differential side gears. Bearing retainer plates hold the shafts in the housing. The left and right axle shafts are not interchangeable, because the left axle shaft is shorter than the right.

OPERATION

The rear axle drive pinion receives its power from the engine through the transmission and drive shaft. The pinion gear rotates the differential case through engagement with the ring gear, which is bolted to the case outer flange. Inside the case, there are two differential pinion gears mounted on the differential pinion shaft which is pinned to the case. These pinion gears are engaged with the side gears, to which the axle shafts are splined. Therefore, as the differential case turns, it rotates the axle shafts and rear wheels. When it is necessary for one wheel and axle shaft to rotate faster than the other, the faster turning side gear causes the pinions to roll on the slower turning

side gear to allow differential action between the two axle shafts.

LIMITED-SLIP DIFFERENTIAL AXLE

The locking differential is provided as optional equipment in both the integral and the removable carrier type axle.

DESCRIPTION

The axle assembly, except for the differential case and its internal components, is identical to the conventional axle.

A constant-friction locking differential, which employs automatic transmission-type clutch plates to control differential action, is available as optional equipment (Fig. 3).

Four steel clutch plates are locked into the differential cover. Three bronze, bonded clutch plates are splined to the left-hand axle shaft. A Belleville spring washer maintains a constant pressure between the steel and bonded clutch plates so that the clutch is always engaged.

OPERATION

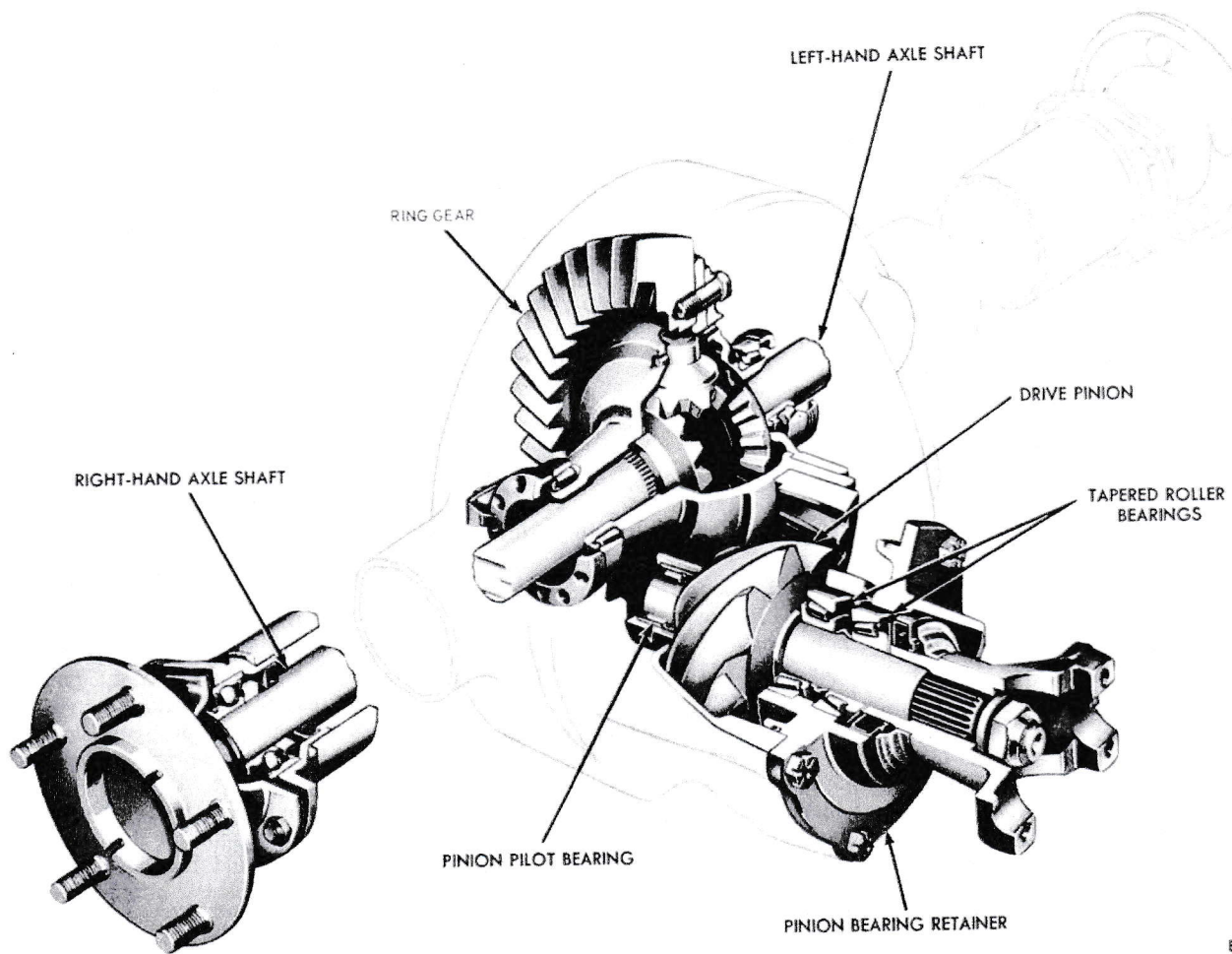
The pressure between clutch plates opposes differential action at all times. When the car turns a corner the clutch slips allowing normal dif-

ferential action to take place. Under adverse weather conditions, where one or both wheels may be on a low-traction surface such as snow, ice or mud, the friction between the clutch plates will transfer a portion of the usable torque to the wheel with the most traction. Thus, the wheel that is on ice or snow will not spin, but will have a tendency to operate with the opposite wheel in a combined driving effort.

When performing the following procedures, refer to Part 4-1, Section 3 for cleaning and inspection procedures.

CARE OF AXLE

The lubricant level should be checked every 6000 miles, with vehicle in normal curb attitude. The lubricant level should be at the lower edge of the filler plug hole. It is unnecessary to periodically drain the axle lubricant. The factory fill should remain in the housing for the life of the vehicle, except when repairs are made. The specified lubricant should be installed when the axle is overhauled.



E1304-B

FIG. 2—Rear Axle Assembly—Removable Carrier Type Axle

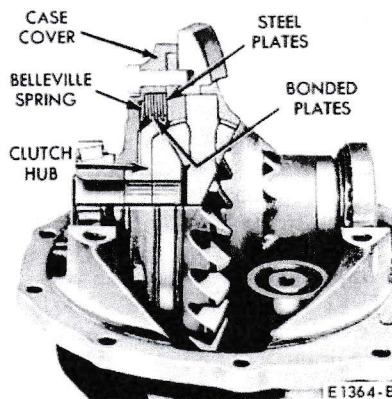


FIG. 3—Typical Limited-Slip Differential

2 IN-CAR ADJUSTMENT AND REPAIR

REAR AXLE SHAFT, WHEEL BEARING AND OIL SEAL REPLACEMENT

The rear axle shafts, wheel bearings, and oil seal can be replaced without removing the differential as-

sembly from the axle housing.

1. Remove the wheel and tire from the brake drum.

2. Remove the Tinnerman nuts that secure the brake drum to the axle housing flange, and then remove

the drum from the flange.

3. Working through the hole provided in each axle shaft flange, remove the nuts that secure the wheel bearing retainer plate. Then pull the axle shaft assembly out of the axle

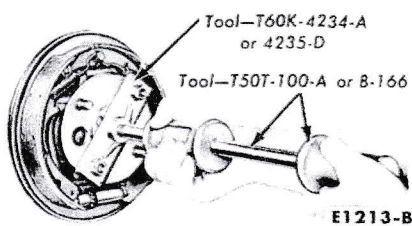


FIG. 4—Removing Axle Shaft—Integral Carrier Type Axle

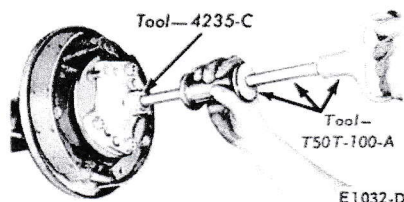


FIG. 5—Removing Axle Shaft—Removable Carrier Type Axle

housing (Fig. 4 or 5). The brake carrier plate must not be dislodged. Install one nut to hold the plate in place after the axle shaft is removed.

4. If the rear wheel bearing is to be replaced, loosen the inner retainer nick by nicking it deeply with a cold chisel in several places (Fig. 6). It will then slide off easily.

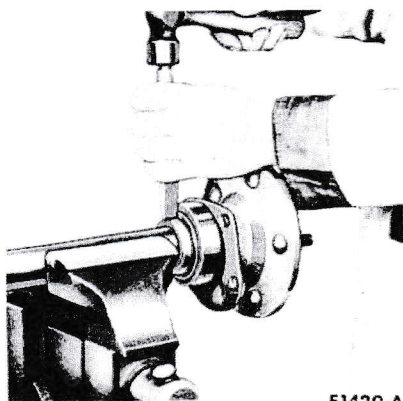


FIG. 6—Removing Rear Wheel Bearing Retainer Ring

5. Remove the bearing from the axle shaft with the tool shown in Fig. 7 or 8. If the push-puller operation shown in Fig. 8 is used, be sure that the puller arms contact the flat surface of the axle shaft flange rather than the bolt heads. Also with this method, be careful not to damage or burr the oil seal journal as the bearing breaks loose.

6. Whenever a rear axle shaft is

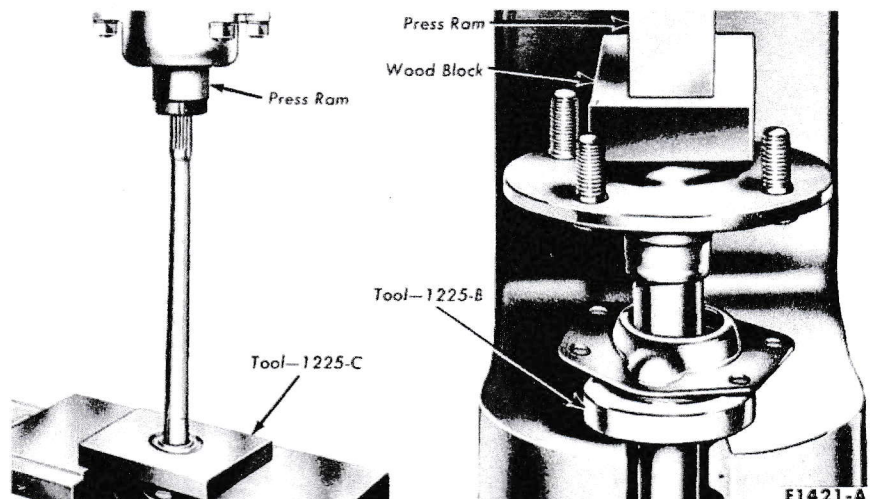


FIG. 7—Removing and Installing Rear Wheel Bearing—Comet

removed, the oil seal must be replaced. Remove the seal with the tools shown in Fig. 9. Soak new oil seals in SAE 10 oil for ½ hour before installing.

7. Inspect the machined surface of the axle shaft and the axle housing for rough spots or other irregularities which would affect the sealing action of the oil seal. Check the axle shaft splines for burrs, wear or damage. Carefully remove any burrs or rough spots. Replace worn or damaged parts.

8. Lightly coat wheel bearing bores with ball joint grease (C3VY-19586-B).

9. Place the retainer plate on the axle shaft, and press the new wheel bearing on the shaft with the tool shown in Fig. 7 or 8. The bearing should seat firmly against the shaft shoulder. Do not attempt to press on both the bearing and the inner retainer ring at the same time.

10. Using the bearing installation tool, press the bearing inner retainer ring on the shaft until the retainer seats firmly against the bearing.

11. Wipe all lubricant from the inside of the axle housing in the area of the oil seal before installing the new seal.

12. Wipe a small amount of oil resistant sealer on the outer edge of the seal before it is installed. Do not put sealer on the sealing lip.

13. Install the new oil seal with the tools shown in Fig. 9. Installation without use of the proper tool will distort the seal and cause leakage. Be sure the new seal has been soaked in SAE 10 oil for ½ hour.

14. Place a new gasket on each

side of the brake carrier plate, and then carefully slide the axle shaft into the housing so that the rough forging of the shaft will not damage the oil seal. Start the axle splines into the side gear, and push the shaft in until the bearing bottoms in the housing.

15. Install the bearing retainer plate on the mounting bolts at the axle housing, and install the attaching nuts. Torque the nuts to specifications.

16. Install the brake drum and the drum attaching nuts.

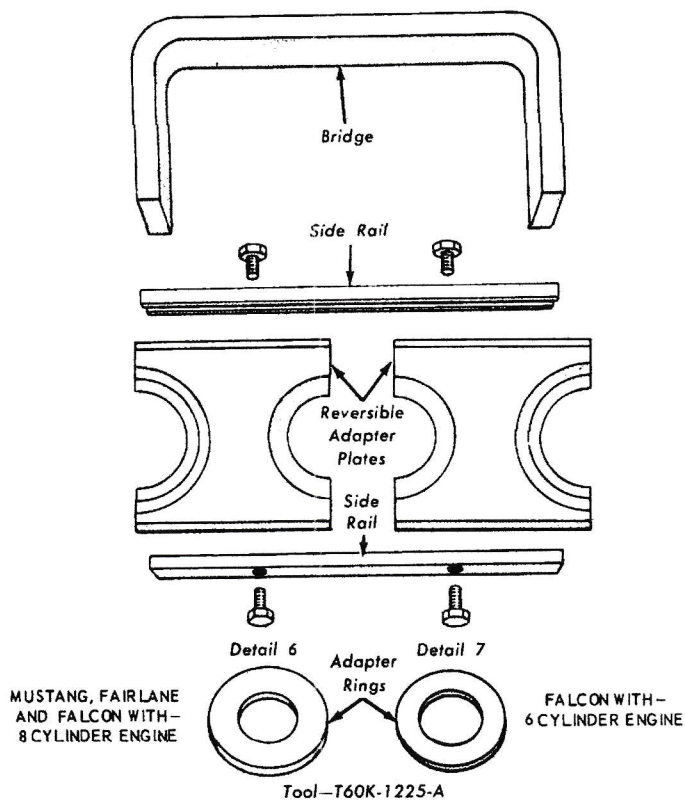
17. Install the wheel and tire on the drum.

REMOVAL AND REPLACEMENT OF DRIVE PINION OIL SEAL

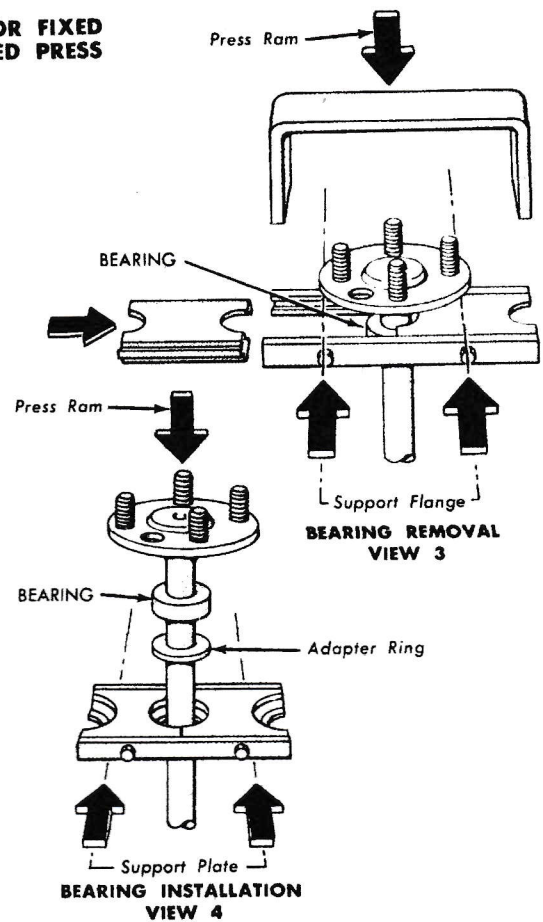
Replacement of the pinion oil seal on either type axle involves removal and installation of only the pinion shaft nut and the universal joint flange. However, this operation disturbs the pinion bearing preload, and this preload must be carefully reset when assembling.

1. Raise the car and install safety stands. Remove the rear wheels and brake drums.

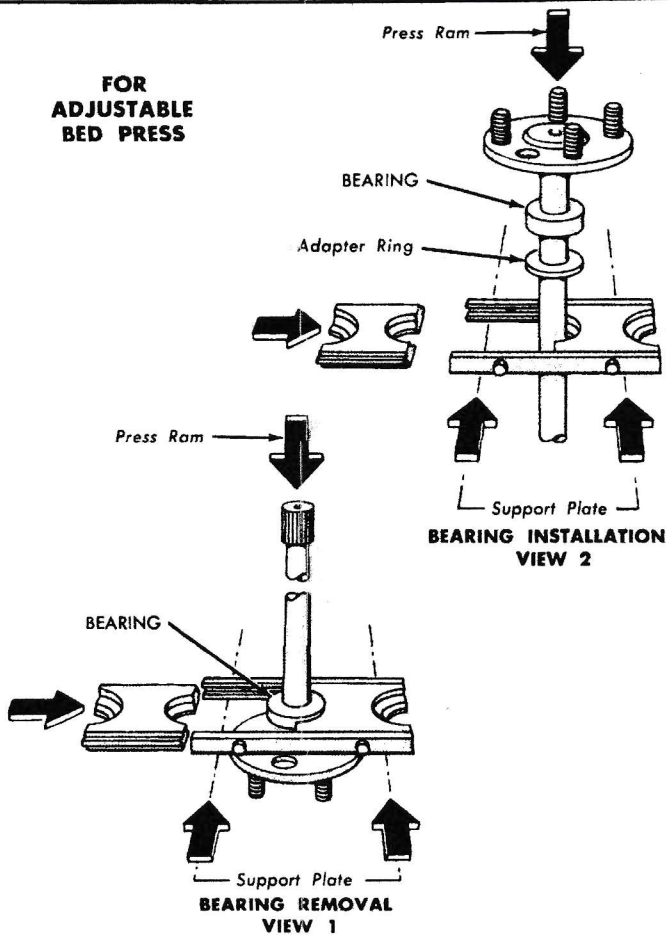
2. Make scribe marks on the drive shaft end yoke and the axle U-joint flange to insure proper position of the drive shaft at assembly (Fig. 14). Disconnect the drive shaft from the axle U-joint flange. Be careful to avoid dropping the loose universal joint bearing cups. Hold the cups on the spider with tape. Mark the cups so that they will be in their original position in relation to the flange when they are assembled. Remove the drive shaft from the transmission extension housing. Install an oil seal re-



FOR FIXED BED PRESS



FOR ADJUSTABLE BED PRESS



FOR PUSH-PULLER OPERATION

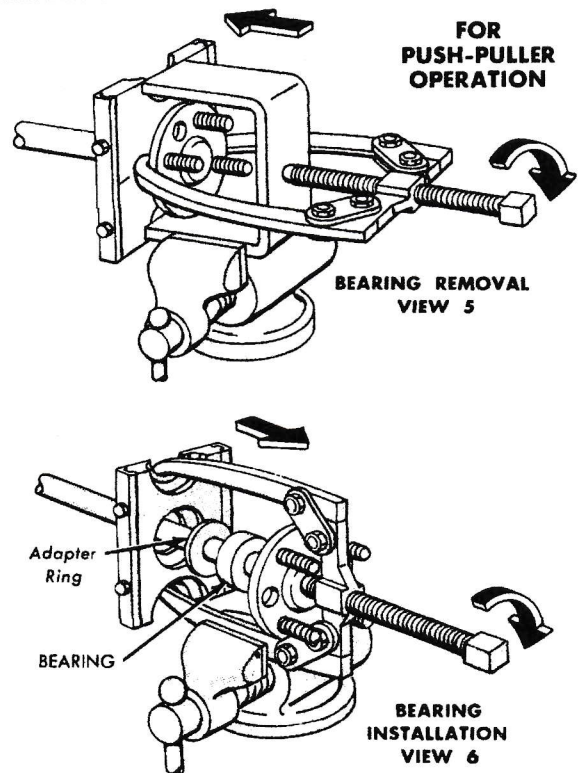


FIG. 8—Removing and Installing Rear Wheel Bearing—Falcon, Mustang and Fairlane

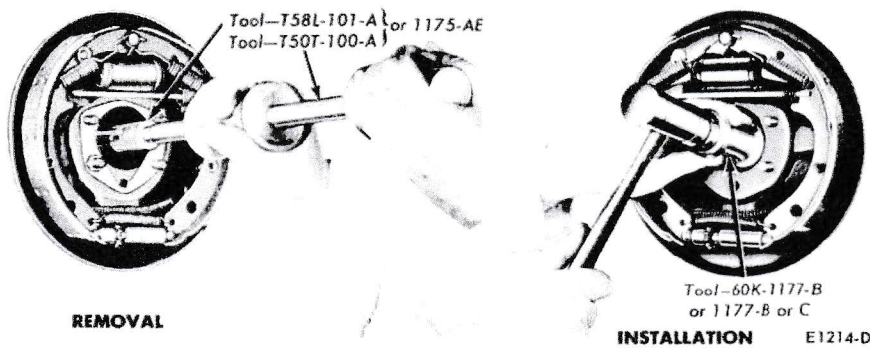


FIG. 9—Removing and Installing Axle Shaft Seal

placer tool in the transmission extension housing to prevent transmission leakage. Refer to the transmission group for the appropriate tool.

3. Install an in-lb torque wrench on the pinion nut. Record the torque required to maintain rotation of the pinion shaft through several revolutions.

4. While holding the flange with the tool shown in Fig. 10, remove the integral pinion nut and washer.

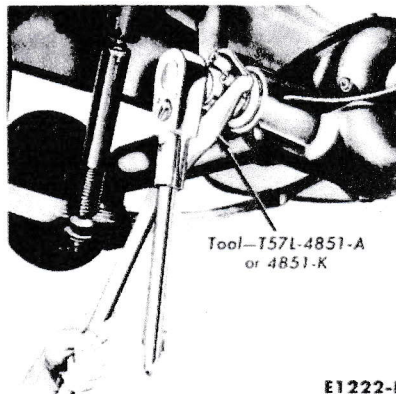


FIG. 10—Typical Drive Pinion Shaft Nut Removal

5. Clean the pinion bearing retainer around the oil seal. Place a drain pan under the seal, or raise the front of the car higher than the rear.

6. Using the tool shown in Fig. 11, remove the pinion U-joint flange.

7. Using the tool shown in Fig. 37, remove the drive pinion oil seal.

8. Clean the oil seal seat.

9. Coat the outer edge of the new seal with a small amount of oil resistant sealer. **Do not put any of the sealer on the sealing lip.** Install the seal in the retainer, using the tool shown in Fig. 12 on integral carrier type axles. With removable carrier type axles, use tool T62F-4676-A or 4676-H on all except cars equipped with high performance engines. On cars equipped with high perform-

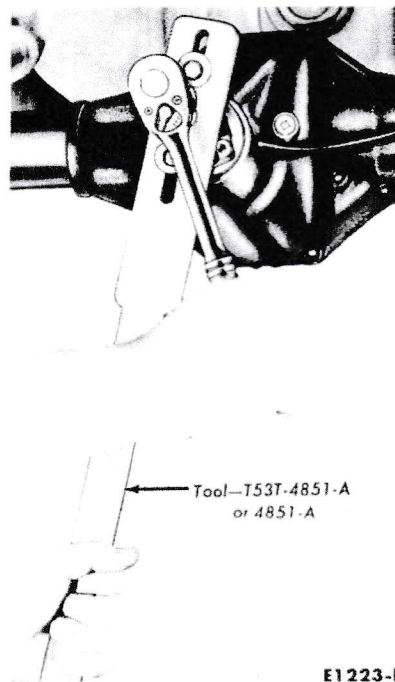


FIG. 11—Typical Drive Pinion Flange Removal

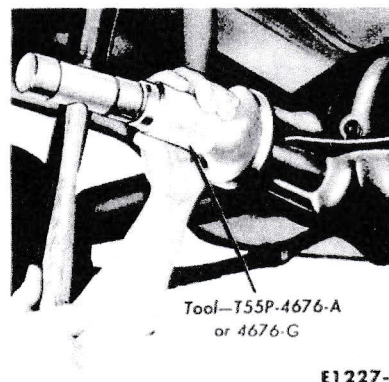


FIG. 12—Typical Drive Pinion Flange Seal Installation

ance engines, use tool 58L-4676-A or 4676-F.

10. Check splines on the pinion

shaft to be sure they are free of burrs. If burrs are evident, remove them by using a fine crocus cloth, working in a rotational motion. Wipe the pinion shaft clean.

11. Apply a small amount of lubricant to the U-joint splines.

12. Align the punch mark on the U-joint flange with the mark on the end of the pinion shaft, and install the flange. With removable carrier type axles, it will be necessary to use the tool shown in Fig. 50 to install the flange.

13. Install a new integral nut and washer on the pinion shaft. (Apply a small amount of lubricant on the washer side of the nut.)

14. Hold the flange with the tool shown in Fig. 36 while tightening the nut.

15. Tighten the pinion shaft nut, rotating the pinion occasionally to insure proper bearing seating, and take frequent preload readings until the preload is at the original recorded reading established in step 3.

16. After original preload has been reached, tighten the pinion nut slowly, until an additional preload has been placed on the bearings, as shown below:

Removable Carrier: 8 to 14 in-lbs.

Integral Carrier: 6 to 12 in-lbs.

The preload should not exceed the amount indicated above, or bearing failure may result. Under no circumstances should the pinion nut be backed-off to lessen preload. If this is done, a new pinion bearing spacer must be installed. In addition, the U-joint flange must never be hammered on, or power tools used.

17. Remove the oil seal replacer tool from the transmission extension housing. Install the front end of the drive shaft on the transmission output shaft.

18. Connect the rear end of the drive shaft to the axle U-joint flange, aligning the punch marks made on the drive shaft end yoke and the axle U-joint flange (Fig. 14).

19. Check the lubricant level. Make sure the axle is in running position. Add whatever amount of specified lubricant is required to reach the lower edge of the filler plug hole.

INSTALLATION OF A NEW UNIVERSAL JOINT FLANGE

1. Raise the car and install safety stands. Remove both rear wheels and brake drums.

2. Disconnect the drive shaft from the axle U-joint flange. **Be careful to avoid dropping the loose**

universal joint bearing cups. Hold the cups on the spider with tape. Mark the cups so that they will be in their original position in relation to the flange when they are assembled. Remove the drive shaft from the transmission extension housing. Install an oil seal replacer tool in the transmission extension housing to prevent transmission fluid leakage. Refer to the transmission group for the appropriate tool.

3. Install an in-lb torque wrench on the pinion nut. Record the torque required to maintain rotation of the pinion shaft through several revolutions.

4. While holding the flange with the tool shown in Fig. 36, remove the integral pinion nut and washer.

5. Clean the pinion bearing retainer around the oil seal. Place a drain pan under the seal, or raise the front of the car higher than the rear.

6. Using the tool shown in Fig. 36, remove the U-joint flange.

7. Check splines on the pinion shaft to be sure they are free of burrs. If burrs are evident, remove them by using a fine crocus cloth, working in rotational motion, then wipe clean.

Apply a small amount of lubricant to U-joint splines.

8. Install the U-joint flange using the tool shown in Fig. 50.

9. Install a new integral nut and washer on the pinion shaft. (Apply a small amount of lubricant on the washer side of the nut.)

10. Hold the flange with the tool shown in Fig. 35 while the nut is being tightened.

11. Tighten the pinion shaft nut, rotating the pinion occasionally to insure proper bearing seating, and take frequent preload readings until the preload is at the original recorded reading established in step 3.

12. After original preload has been reached, tighten the pinion nut slowly, until an additional preload of 8 to 14 in-lb over the original reading

is reached. (The preload should not exceed 8 to 14 in-lb over the original reading, or bearing failure may result.)

Under no circumstances should the pinion nut be backed off to lessen preload. If this is done, a new pinion bearing spacer must be installed. (In addition, the U-joint flange must never be hammered on, or pneumatic tools used.)

13. Remove the oil seal replacer tool from the transmission extension housing. Install the front end of the drive shaft on the transmission output shaft.

14. Connect the rear end of the drive shaft to the axle U-joint flange, aligning the scribe marks made on the drive shaft end yoke and the axle U-joint flange (Fig. 14).

14. Check the lubricant level. **Make sure the axle is in running position.** Add whatever amount of specified lubricant is required to reach the lower edge of the filler plug hole.

3 REMOVAL AND INSTALLATION

REAR AXLE HOUSING— INTEGRAL CARRIER TYPE AXLE REMOVAL

1. Raise the car and support it with safety stands under the rear frame member.

2. Drain the lubricant from the axle.

3. Disconnect the drive shaft at the drive pinion flange.

4. Disconnect the lower end of the shock absorbers.

5. Remove the wheels, brake drums and both axle shafts as outlined in the foregoing Section 2.

6. Remove vent hose front vent tube (Corbin clamp) and remove vent tube from brake tube junction and axle housing.

7. Remove the hydraulic brake T-fitting from the axle housing. **Do not open the hydraulic brake system lines.** Remove the hydraulic brake line from its retaining clip on the axle housing.

8. Remove both axle shaft oil seals with the tools shown in Fig. 9.

9. Remove both brake carrier plates from the axle housing and suspend them above the housing with mechanic's wire. The hydraulic brake lines and the parking brake cables are still attached to the brake carrier plates.

10. Support the rear axle housing on a jack, and then remove the spring clip nuts. Remove the spring clip plates (Fig. 13).

11. Lower the axle housing and remove it from under the car.

12. If the axle housing is being replaced, transfer all the differential and pinion parts to the new housing. See Section 4, Major Repair Operations.

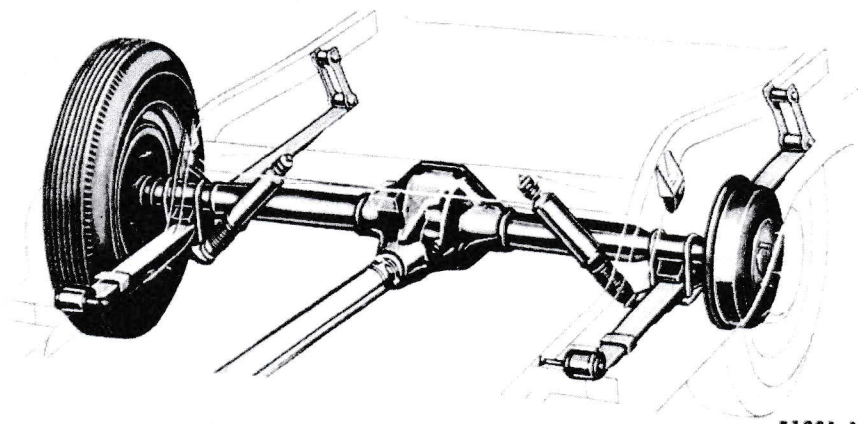
INSTALLATION

1. Raise the axle housing into position so that the spring clip plates

can be installed. On a Comet or Fairlane position the spring upper insulators and retainers between the axle housing and springs and install the lower insulators. Torque the spring clip nuts to specification.

2. Place the brake carrier plates in their normal position on the axle housing. Use new gaskets on each side of the brake carrier plates.

3. Install new axle shaft oil seals with the tool shown in Fig. 9. Soak the new seals in light weight engine oil (SAE 10) for ½ hour before installing them. **Installation without use**



E1231-A

FIG. 13—Rear Axle Installation—Integral Carrier Type

of the proper tool will distort the seal and cause leakage. Coat the outside edges of the new oil seal with a hardening type of sealer such as Permatex No. 2 or its equivalent.

4. Install the axle shafts, brake drums and wheels as outlined in the foregoing Section 2.

5. Attach the hydraulic brake line T fitting to the axle housing, and secure the hydraulic brake line in its retainer on the axle housing.

6. Install vent tube to brake tube junction and install vent hose to vent tube.

7. Raise the axle housing and connect the shock absorbers.

8. Connect the drive shaft at the drive pinion shaft.

9. Fill the axle with the proper grade and amount of lubricant.

10. Road test the car.

DIFFERENTIAL CARRIER— REMOVABLE CARRIER TYPE AXLE

REMOVAL

1. Raise the car on a hoist and remove the two rear wheel and tire assemblies.

2. Remove the two brake drums (3 Tinnerman nuts at each drum) from the axle shaft flange studs. If difficulty is experienced in removing the drums, back off the brake shoes as explained in Part 2-2.

3. Working through the hole provided in each axle shaft flange, remove the nuts that secure the rear wheel bearing retainer plate. Pull each axle shaft assembly out of the axle housing (Fig. 5). Install a nut on one of the brake carrier plate retaining bolts to hold the plate to the axle housing after the shaft has been removed. **Whenever a rear axle shaft is removed, the wheel bearing oil seal must be replaced.** Remove both seals with the tools shown in Fig. 9.

4. Make scribe marks on the drive shaft end yoke and the axle U-joint flange to insure proper position at assembly. Disconnect the drive shaft at the rear axle U-joint, remove the drive shaft from the transmission extension housing. Install an oil seal replacer tool in the housing to prevent transmission leakage. Refer to the transmission group for the appropriate tool.

5. Place a drain pan under the carrier and housing, remove the carrier retaining nuts, and drain the

axle. Remove the carrier assembly from the axle housing.

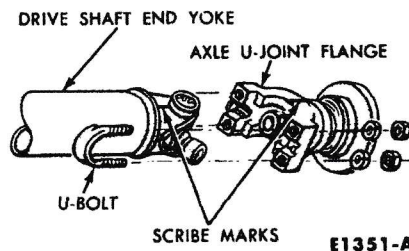
INSTALLATION

1. Clean the axle housing and shafts using kerosene and swabs. To avoid contamination of the grease in the sealed ball bearings, do not allow any quantity of solvent directly on the wheel bearings. Clean the mating surfaces of the axle housing and carrier.

2. Position the differential carrier on the studs in the axle housing using a new gasket between carrier and housing. Install the copper washers and the carrier-to-housing retaining nuts, and torque to specifications.

3. Remove the oil seal replacer tool from the transmission extension housing. Position the drive shaft so that the front U-joint slip yoke splines to the transmission output shaft.

4. Connect the drive shaft to the axle U-joint flange, aligning the scribe marks made on the drive shaft end yoke and the axle U-joint flange during the removal procedure (Fig. 14). Install the U-bolts and nuts and torque to specifications.



**FIG. 14—Drive Shaft-to-Axle
U-Joint Connection**

5. Soak two new rear wheel bearing oil seals in SAE 10 oil for ½ hour before installation. Wipe a small amount of an oil resistant sealer on the outer edge of each seal before it is installed. **Do not put any of the sealer on the sealing lip.** Install the oil seals in the ends of the rear axle housing with the tool shown in Fig. 9.

6. Install the two axle shaft assemblies in the axle housing. The shorter shaft goes into the left side of the housing.

When installing an axle shaft, place a new gasket on each side of the brake carrier plate and carefully slide the axle shaft into the housing so that the rough forging of the shaft will not damage the oil seal. Start the axle splines into the differential side gear, and push the shaft in until the bearing bottoms in the housing.

7. Install the bearing retainers on the attaching bolts on the axle housing flanges. Install the nuts on the bolts and torque to specifications.

8. Install the two rear brake drums and the drum retaining (Tinnerman) nuts.

9. Install the rear wheel and tire assemblies.

10. If the rear brake shoes were backed off, adjust the brakes as outlined in Part 2-1.

11. Fill the rear axle with specified lubricant.

AXLE HOUSING—REMOVABLE CARRIER TYPE AXLE

REMOVAL

1. Remove the carrier assembly from the axle housing as outlined in the foregoing procedure.

2. Position safety stands under the rear frame members.

3. Disengage the brake line from the clips that retain the line to the axle housing.

4. Disconnect the vent tube from the rear axle housing.

5. Remove the brake carrier plate assemblies from the axle housing, and support them with wire. Do not disconnect the brake line.

6. Disconnect each rear shock absorber from the spring clip plate and position out of the way.

7. Lower the rear axle slightly to reduce some of the spring tension. At each rear spring, remove the spring clip (U-bolt) nuts, spring clips, and spring clip plate. Remove the spring lower insulator and retainer. See Part 3-2.

8. Remove the rear axle housing from under the car.

INSTALLATION

1. Position the rear axle housing on the rear springs. On a Comet or Fairlane, position the spring upper insulators and retainers between the axle housing and springs, and install the lower insulators.

2. Install the spring clips (U-bolts), spring clip plate, and nuts. **Torque the spring clip nuts evenly to specifications.**

3. If a new axle housing is being installed, remove the bolts that retain the carrier plate and bearing retainer from the old housing flanges. Position the bolts in the new housing flanges to hold the brake carrier plates in position. Install the carrier plates with new gaskets to the axle housing flanges.

4. Connect the vent tube to the axle housing.

5. Position the brake line to the axle housing, and secure with the retaining clips.

6. Raise the rear axle housing and springs enough to allow connecting

the rear shock absorbers to the spring clip plates. Connect the lower stud of each shock absorber to its spring clip plate, and install the bushing, washer, and nut on the stud. **Be sure the spring clip plate is free of burrs.** Tighten the nut to specified torque.

7. Install the carrier assembly and the two axle shaft assemblies in the axle housing as outlined in the Installation procedure under Differential Carrier—Removable Carrier Type Axle.

4 MAJOR REPAIR OPERATIONS—INTEGRAL CARRIER TYPE AXLE

DISASSEMBLY

All service operations on the differential case assembly and the drive pinion assembly can be performed with the housing in the car.

REMOVAL OF DIFFERENTIAL CASE AND DRIVE PINION

1. Raise the car and support it on the underbody, so that the rear axle drops down as far as the springs and shock absorbers permit.

2. Remove the cover from the carrier casting rear face, and drain the lubricant. On a Mustang, the muffler assembly must be removed to provide clearance for removing the cover.

3. Perform the Inspection Before Disassembly of Carrier in Part 4-1, Section 3.

4. Remove both rear wheels.

5. Remove the brake drums.

6. Working through the hole provided in the axle shaft flange, remove the nuts that attach the wheel bearing retainers to the axle housing.

7. Pull the axle shafts with the tool shown in Fig. 4. Install a nut on one of the brake carrier plate attaching bolts to hold the plate to the axle housing after the shaft has been removed. **Whenever a rear axle shaft is removed the wheel bearing oil seal must be replaced.** Remove both seals with the tool shown in Fig. 9.

8. Make scribe marks on the drive shaft end yoke and the axle U-joint flange to insure proper position of the drive shaft at assembly (Fig. 14). Disconnect the drive shaft from the axle U-joint flange. **Be careful to avoid dropping the loose universal joint bearing cups.** Hold the cups on the spider with tape. Mark the cups so that they will be in their original position in relation to the flange when they are assembled. Remove the drive shaft from the transmission extension housing. Install an oil seal replacer tool in the transmission extension housing to prevent transmission leakage. Refer to the transmission group for the appropriate tool.

9. Remove the differential bearing

adjusting nut locks (Fig. 15).

10. Mark one differential bearing cap and the case (Fig. 16) to help position the parts properly during assembly.

11. Remove the differential bearing cap bolts and bearing caps. **Hold the differential case assembly in the housing after the caps are removed.**

12. Remove the differential case and bearing cups (Fig. 17).

13. Hold the drive pinion flange and remove the pinion nut (Fig. 10).

14. Remove the pinion flange (Fig. 11).

15. With a soft-faced hammer, drive the pinion out of the front bearing cone and remove it through the rear of the carrier casting.

16. Drive against the pinion front bearing cone, and drive the pinion flange seal and the bearing cone out of the front of the carrier casting.

17. To remove and install the pinion rear bearing cone use the tools in Fig. 18.

18. Measure the shim which is found under the bearing cone with a micrometer. Record the thickness of the shim.

DISASSEMBLY OF CONVENTIONAL DIFFERENTIAL CASE

1. If the differential bearings are to be removed, use the tools shown in Fig. 19.

2. Remove the bolts that attach the ring gear to the differential case. Press the ring gear from the case or tap it off with a soft-faced hammer.

3. With a drift, drive out the differential pinion shaft lock pin (Fig. 20).

4. Drive out the pinion shaft with a brass drift. Remove the gears and thrust washers.

DISASSEMBLY OF LIMITED-SLIP DIFFERENTIAL CASE

1. Place the differential case in a hydraulic press, and apply about one ton pressure across the case bearing hubs while removing the drive gear

attaching bolts. This procedure will contain the spring pressure between the differential case and cover until after the bolts are removed, and thereby prevent stripping of the threads.

2. Release the hydraulic press ram, and remove the differential case cover.

3. Remove the Belleville spring (Fig. 21).

4. Remove the steel and the bonded clutch plates.

5. Remove the differential clutch hub, outer side gear, and thrust washer.

6. Remove the ring gear from the differential case.

7. Drive out the differential pinion shaft lock pin.

8. With a brass drift, drive out the differential pinion shaft. Then remove the pinion gears, inner side gear and thrust washers.

PARTS REPAIR OR REPLACEMENT

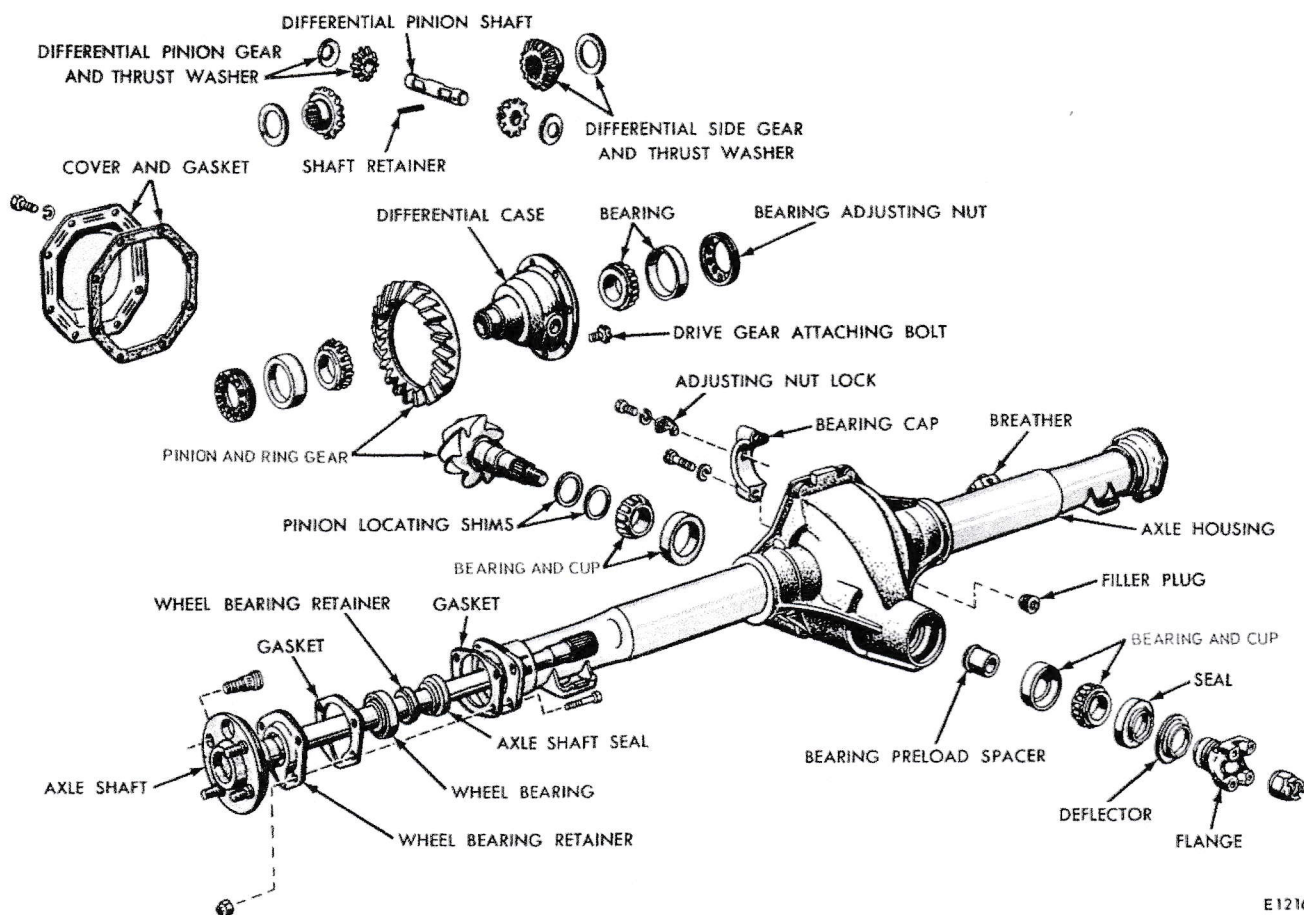
Clean and inspect all the parts as outlined in Part 4-1, Section 3. Before assembling the carrier, repair or replace all parts as indicated by the inspection.

The principal replacement operations are covered in the following procedures. All other repair or replacement operations are performed during Cleaning and Inspection Part 4-1, Section 3, or during the Assembly in this section.

PINION BEARING CUPS

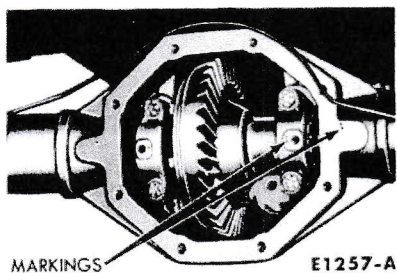
Do not remove the pinion bearing cups from the carrier casting unless the cups are worn or damaged.

If the pinion bearing cups are to be replaced, drive them out of the carrier casting with a drift. Install the new cups with the tool shown in Fig. 22. Make sure the cups are properly seated in their bores. If a 0.0015-inch feeler gauge can be inserted between a cup and the bottom of its bore at any point around the



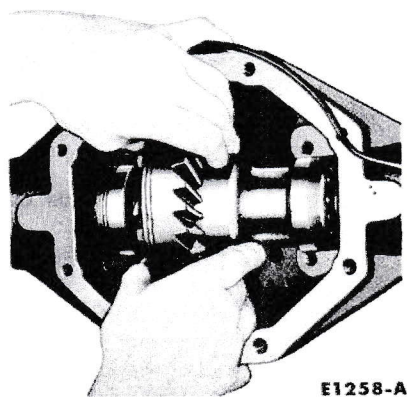
E1216-E

FIG. 15—Disassembled Rear Axle



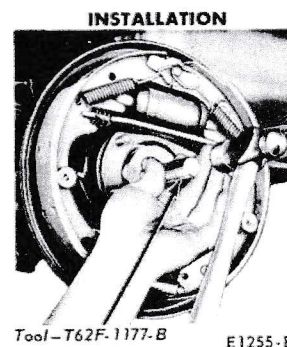
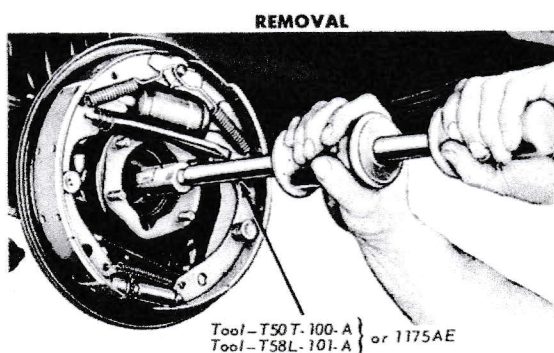
E1257-A

FIG. 16—Typical Differential Bearing Cap Marking



E1258-A

FIG. 17—Differential Case Removal or Installation



E1255-B

FIG. 18—Pinion Rear Bearing Cone Removal and Installation

cup, the cup is not properly seated.

Whenever the cups are replaced, the cone and roller assemblies should also be replaced.

DRIVE PINION AND GEAR SET

Individual differences in machining the carrier casting and the gear set require a shim between the pinion rear bearing cone and the pinion gear to locate the pinion for correct tooth contact with the ring gear. In order to adjust the shim pack to the correct thickness for a given gear

set, each pinion gear is marked with an adjustment number such as the +2 marking in Fig. 23.

When replacing a ring gear and pinion it should be noted that the original factory installed shim is of the correct thickness to adjust for individual variations in both the carrier casting dimension and in the original gear set dimension; therefore, to select the correct shim thickness for the new gear set to be installed, follow these steps:

1. Measure the thickness of the

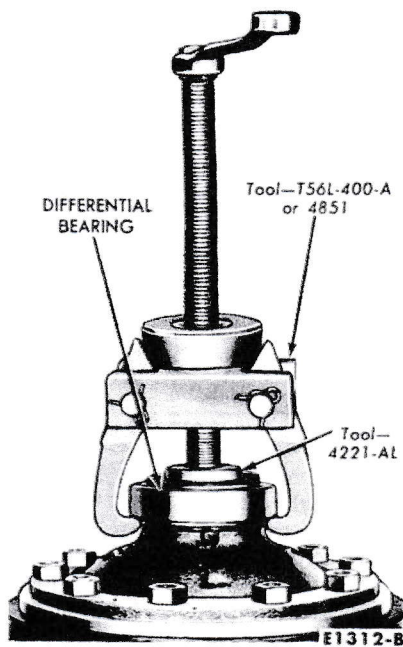


FIG. 19—Differential Bearing Removal

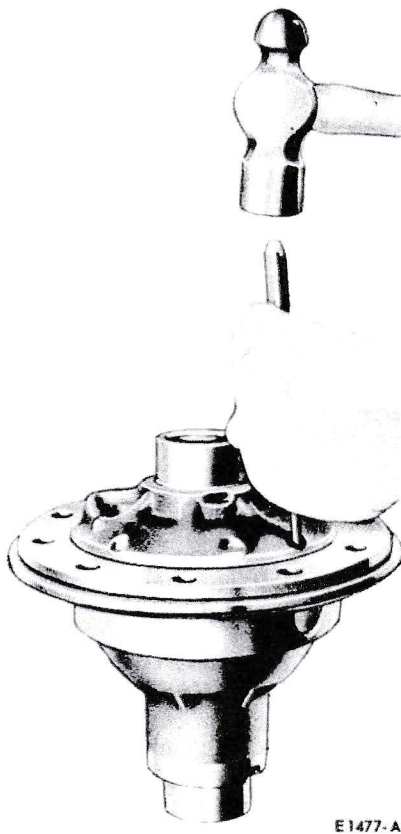


FIG. 20—Differential Pinion Shaft Lock Pin Removal

original shim with a micrometer.

2. Note the shim adjustment number on both the old pinion and the new pinion.

3. Refer to Table 1 to determine

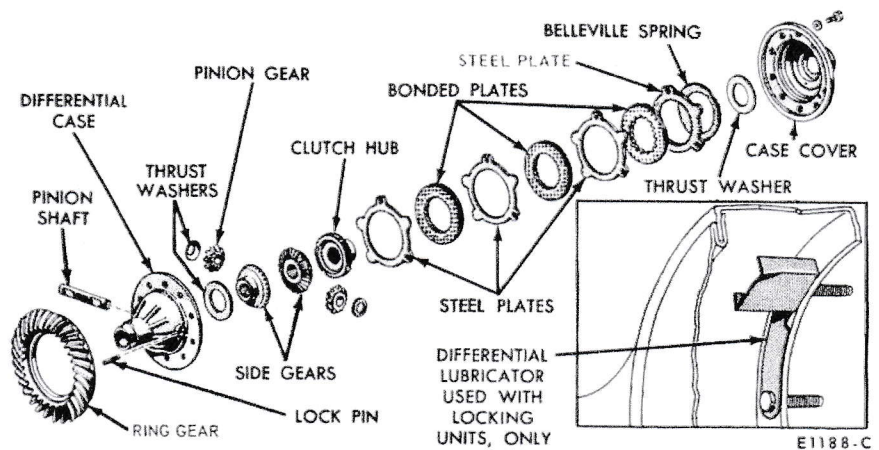


FIG. 21—Locking Differential Assembly

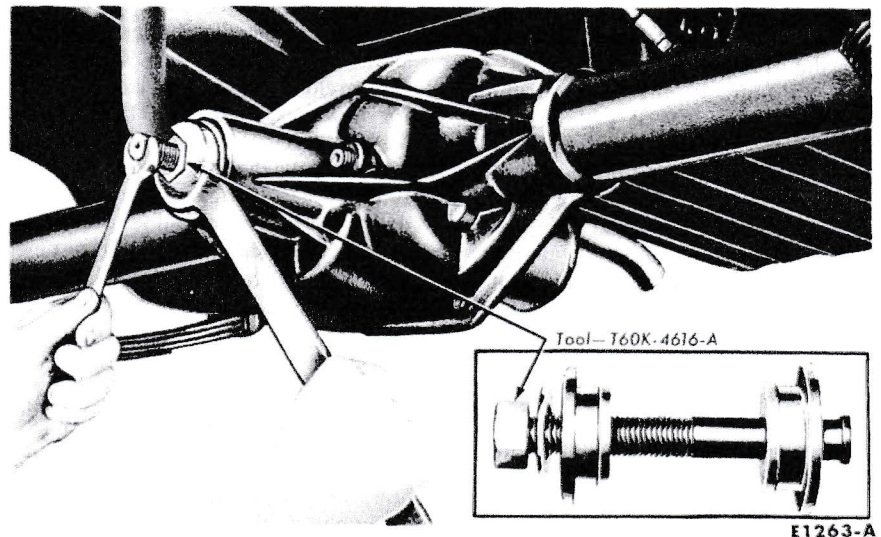


FIG. 22—Pinion Bearing Cup Removal or Installation

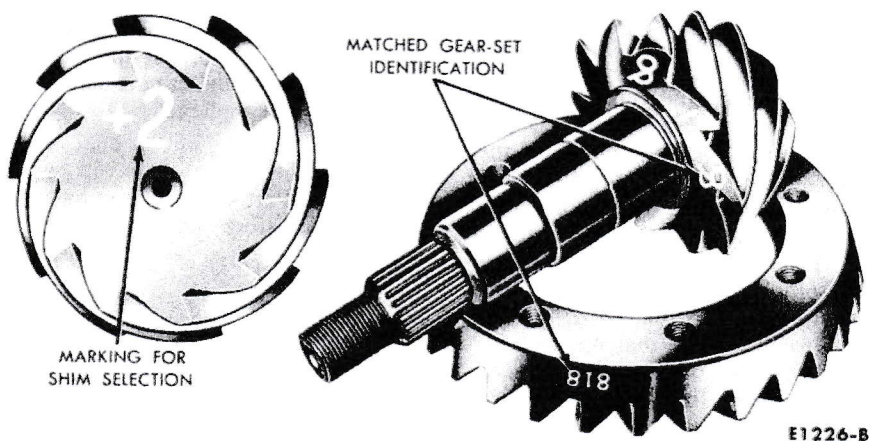


FIG. 23—Gear Set Markings

the correct amount of shim thickness change. The amount shown in Table 1 under the old pinion shim adjustment number and in line with the new pinion number is the amount of **change** that should be made to the

original shim thickness.

If the old pinion is marked +4, for example, and the new pinion is marked -2, the table indicates that 0.006 inch of shim stock should be added to the **original shim** pack.

TABLE 1—Drive Pinion Adjusting Shim Thickness Changes (Inch)

Old Pinion Marking	New Pinion Marking								
	−4	−3	−2	−1	0	+1	+2	+3	+4
+4	+0.008	+0.007	+0.006	+0.005	+0.004	+0.003	+0.002	+0.001	0
+3	+0.007	+0.006	+0.005	+0.004	+0.003	+0.002	+0.001	0	−0.001
+2	+0.006	+0.005	+0.004	+0.003	+0.002	+0.001	0	−0.001	−0.002
+1	+0.005	+0.004	+0.003	+0.002	+0.001	0	−0.001	−0.002	−0.003
0	+0.004	+0.003	+0.002	+0.001	0	−0.001	−0.002	−0.003	−0.004
−1	+0.003	+0.002	+0.001	0	−0.001	−0.002	−0.003	−0.004	−0.005
−2	+0.002	+0.001	0	−0.001	−0.002	−0.003	−0.004	−0.005	−0.006
−3	+0.001	0	−0.001	−0.002	−0.003	−0.004	−0.005	−0.006	−0.007
−4	0	−0.001	−0.002	−0.003	−0.004	−0.005	−0.006	−0.007	−0.008

If the **original** shim pack was lost or if a new carrier casting is being installed, substitute a **nominal** 0.018 inch shim for the **original**, and follow the foregoing procedure for a trial build-up. If any further shim change is necessary, it will be indicated in the tooth pattern check.

A new ring gear and pinion should always be installed in an axle as a matched set (never separately). **Be sure that the same matching number appears on both the drive pinion and the ring gear.** Note the number 818 in Fig. 23.

4. After determining the correct shim thickness as explained in the foregoing steps, install the new pinion and ring gear as outlined under Assembly.

DIFFERENTIAL CASE, BEARINGS, AND DRIVE GEAR

If the ring gear runout check (before disassembly) exceeded specifications, the condition may be caused by a warped gear, a defective case, or excessively worn differential bearings.

To determine the cause of excessive runout proceed as follows:

1. Assemble the two halves of the differential case together **without** the ring gear, and press the two differential side bearings on the case hubs.

2. Place the cups on the bearings and set the differential case in the carrier.

3. Install the bearing caps and adjusting nuts as outlined in steps 11 thru 14 under Installation of Drive Pinion and Differential Case in this section.

4. Tighten the right nut two notches beyond the position where it first contacts the bearing cup. Rotate the differential case several revolutions in each direction while the bearings are loaded to seat the bearings in their cups. **This step is important.**

5. Again loosen the right nut to release the preload. Check to see that the left nut contacts the bearing cup. Using the dial indicator set-up shown in Fig. 13, Part 4-1, adjust the preload to 0.012 case spread for new bearings or 0.005 to 0.008 for the original bearings, if re-used.

6. Check the runout of the differential case flange with a dial indicator. If the runout does **not now** exceed specifications, install a new ring gear. If the runout still exceeds specifications, the ring gear is true and the trouble is due to either a defective case or worn bearings.

7. Remove the differential case from the carrier and remove the side bearings from the case.

8. Install **new** bearings on the case hubs, and again install the differential assembly in the carrier **without** the ring gear.

9. Check the case runout again with the new bearings. If the runout is **now** within limits, the old bearings were excessively worn. Use the new bearings for assembly. If the runout is still excessive, the case is defective and should be replaced.

ASSEMBLY

Refer to Part 4-1 for Cleaning and Inspection before starting assembly operations.

ASSEMBLY OF CONVENTIONAL DIFFERENTIAL CASE

1. Lubricate all the differential parts with axle lubricant, before they are installed in the case.

2. Place the side gears and thrust washers in the case.

3. Place the two pinion gears and thrust washers exactly opposite each other in the case openings and in mesh with the side gears.

4. Turn the pinions and thrust washers until the holes in the pinion

gears align with the pinion shaft holes in the case.

5. Start the pinion shaft into the differential case. Carefully align the shaft lock pin hole with the pin hole in the case. Drive the shaft into place and install the lock pin (Fig. 20).

6. Place the ring gear on the differential case and install the bolts. Torque the bolts to specification.

7. If the differential bearings have been removed, press them on as shown in Fig. 24.

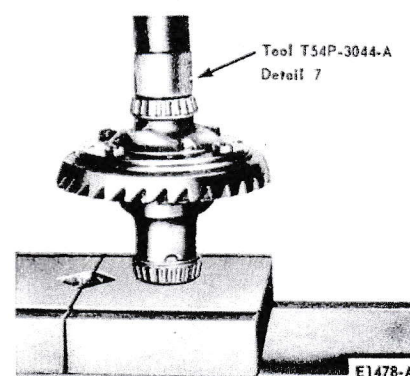


FIG. 24—Differential Bearing Installation

ASSEMBLY OF LIMITED-SLIP DIFFERENTIAL CASE

1. Place the side gear and thrust washer in the differential case (Fig. 24). **Lubricate all parts liberally with axle lubricant during assembly.**

2. With a soft-faced hammer, drive the pinion shaft into the case only far enough to retain a pinion thrust washer and pinion gear.

3. Place the second pinion and thrust washer in position, and drive the pinion shaft into place. **Carefully line up the pinion shaft lock pin holes.**

4. Install the pinion shaft lock

pin. The lock pin must not extend beyond the surface of the case.

5. Insert two 2-inch $\frac{7}{16}$ (N. F.) bolts through the differential case flange, and thread them three or four turns into the ring gear as a guide in aligning the ring gear bolt holes. Press or tap the drive gear into position.

6. Clamp the differential case in a soft-jawed vise. Install the other differential side gear on the differential pinion gears. Place the clutch hub on the side gear. Place the thrust washer on the hub (Fig. 25).

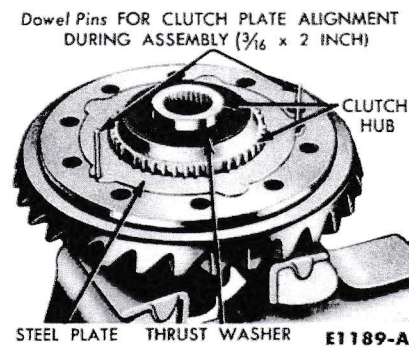


FIG. 25—Clutch Plate Installation

7. To align the clutch plates during assembly, insert two $\frac{3}{16}$ x 2 dowel pins into the differential case. Place a steel plate on the differential case so that the slots in the ears straddle the dowel pin (Fig. 25). Lubricate all the limited-slip differential parts with axle lubricant so that an accurate torque check can be made.

8. Place a bonded plate on the steel plate. Make sure the bonded plate inner spline teeth properly engage the hub spline. Assemble the remaining plates: a steel plate, a bonded plate, a steel plate, a bonded plate, and lastly a steel plate.

9. Place the Belleville spring on the top steel plate. The Belleville spring is assembled with the concave side down (Fig. 26). Carefully center the Belleville spring so that it will fit into the cover.

10. Place the differential case cover on the case (Fig. 27). Start the ring gear bolts.

11. Tighten the bolts evenly and alternately across the diameter of the drive gear. As the bolts are tightened the Belleville spring is compressed and the differential case and cover are pulled together.

12. Remove the dowel pins.

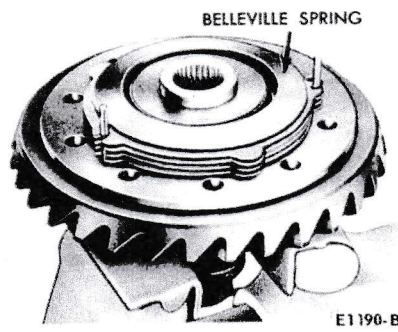


FIG. 26—Belleville Spring Installation

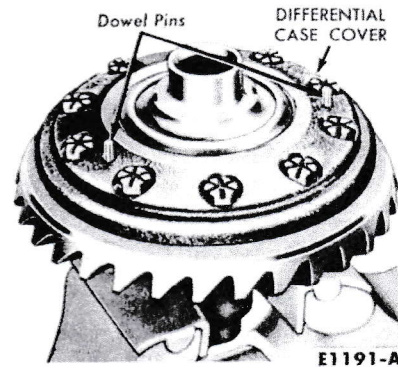


FIG. 27—Differential Cover Installation

13. Torque the case to ring gear bolts to specifications.

14. Check the torque required to rotate one side gear while the other side gear is held (Fig. 28). Ignore the torque required to start the side gear turning. The torque required to keep it moving steadily should be between 100 and 125 ft-lbs, if new clutch plates were installed. The torque should be at least 50 ft-lbs, if the original clutch plates were installed. If the required torque is not within these limits, check for improper assembly.

15. If the differential bearings have been removed press them on as shown in Fig. 24.

INSTALLATION OF DRIVE PINION AND DIFFERENTIAL CASE

1. Place the shim and pinion rear bearing cone on the pinion shaft. Press the bearing and shim firmly against the pinion shaft shoulder (Fig. 18).

2. Place a new pinion bearing preload spacer on the pinion shaft.

3. Lubricate the pinion rear bearing with axle lubricant.

4. Lubricate the pinion front bearing cone and place it in the housing.

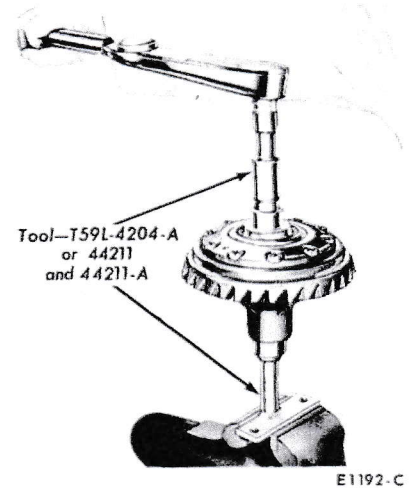


FIG. 28—Differential Torque Check

5. Coat the outside edge of a new oil seal with an oil resistant sealer and install it in the carrier casting (Fig. 12).

6. Insert the drive pinion shaft flange into the seal and hold it firmly against the pinion front bearing cone. From the rear of the carrier casting, insert the pinion shaft into the flange.

7. Place the flat washer on the pinion shaft and start the nut. Use a new nut. Hold the flange with the tool shown in Fig. 10 and tighten the pinion shaft nut. As the pinion shaft nut is tightened, the pinion shaft is pulled into the front bearing cone and into the flange.

As the pinion shaft is pulled into the front bearing cone, pinion shaft end play is reduced. While there is still end play in the pinion shaft, the flange and cone will be felt to bottom. This indicates that the bearing cone and flange have bottomed on the collapsible spacer.

From this point, a much greater torque must be applied to turn the pinion shaft nut, since the spacer must be collapsed. From this point, also, the nut should be tightened very slowly and the pinion shaft end play checked often, so that the pinion bearing preload does not exceed the limits.

If the pinion shaft nut is tightened to the point that pinion bearing preload exceeds the limits, the pinion shaft must be removed and a new collapsible spacer installed. **Do not decrease the preload by loosening the pinion shaft nut.** This will remove the compression between the pinion front and rear bearing cones and the collapsible spacer and may

permit the front bearing cone to turn on the pinion shaft.

8. As soon as there is preload on the bearings, turn the pinion shaft in both directions several times to set the bearing rollers.

9. Adjust the bearing preload to specification. Measure the preload with the tool shown in Fig. 29.

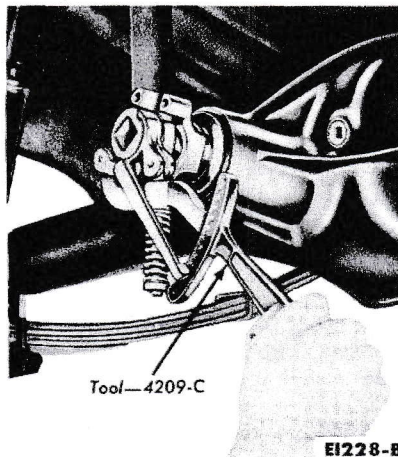


FIG. 29—Checking Pinion Bearing Pre-load

10. Wipe a thin coating of lubricant on the bearing bores so that the differential bearing cups will move easily.

11. Place the cups on the bearings and set the differential case assembly in the carrier casting (Fig. 17).

If the gear set is of the **non-hunting** or **partial non-hunting** type, assemble the differential case and ring gear assembly in the carrier so that the marked tooth on the pinion indexes between the marked teeth on the ring gear as shown in Fig. 30.

In almost every case of improper assembly (gears assembled out of time), the noise level and probability of failure will be higher than they would be with properly assembled gears.

When installing the **hunting** type

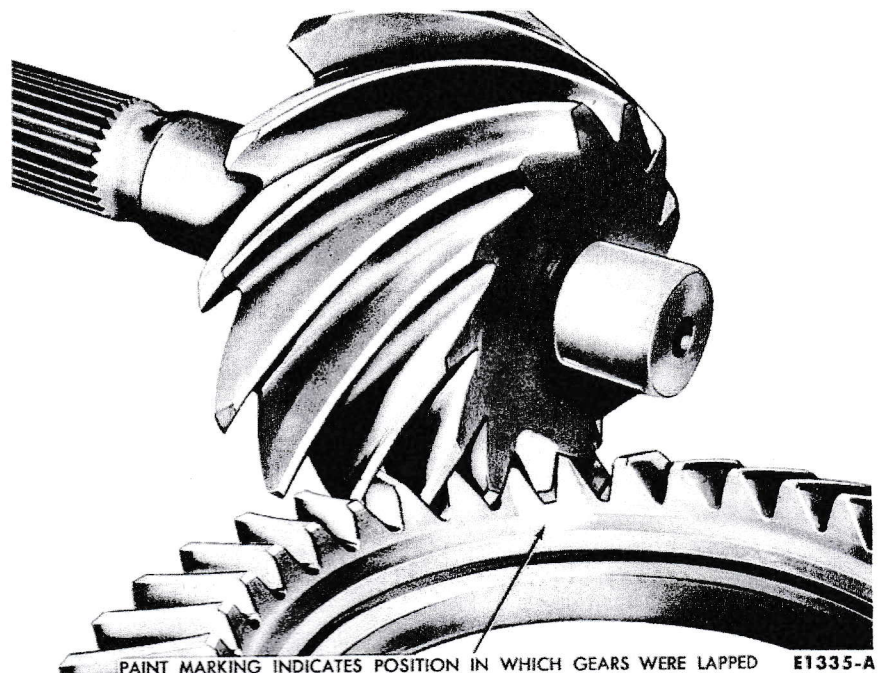


FIG. 30—Typical Gear Set Timing Marks

gear set (no timing marks), assemble the differential case and ring gear assembly in the carrier without regard to the matching of any particular gear teeth.

12. Slide the case assembly along the bores until a slight amount of backlash is felt between the gear teeth. Hold the differential case in place.

13. Set the adjusting nuts in the bores so that they just contact the bearing cups.

14. Carefully position the bearing caps on the carrier casting. Match the marks made when the caps were removed.

15. Install the bearing cap bolts and lockwashers. As the bolts are tightened, turn the adjusting nut with the tool shown in Fig. 31.

16. If the adjusting nuts do not turn freely as the cap bolts are tightened, remove the bearing caps and again inspect for damaged

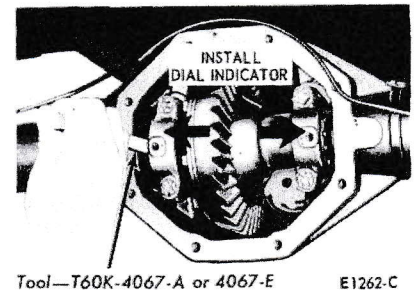


FIG. 31—Backlash and Bearing Pre-load Adjustment

threads or incorrectly positioned caps. Tightening the bolts to the specified torque is done to be sure that the cups and adjusting nuts are seated. Loosen the cap bolts, and torque them to only 5 ft-lbs before making adjustments. Refer to part 4-1 for backlash and bearing pre-load adjustment procedures.

5 MAJOR REPAIR OPERATIONS—REMOVABLE CARRIER TYPE AXLES

DISASSEMBLY

After removing the carrier from the axle housing as described in section 3, mount the carrier in a holding fixture and perform the Inspection Before Disassembly of Carrier as explained in Part 4-1, Section 3. Then disassemble the carrier as outlined in the following procedures.

REMOVAL AND DISASSEMBLY OF CONVENTIONAL DIFFERENTIAL CASE

1. Mark one differential bearing cap and the mating bearing support with punch marks to help position the parts properly during assembly of the carrier. Also, mark one of the bearing adjusting nuts and the carrier with scribe marks for proper

location during assembly (Fig. 45).

2. Remove the adjusting nut locks, bearing caps, and adjusting nuts. Then lift the differential assembly out of the carrier.

3. If the differential bearings are to be removed, use the tool shown in Fig. 19. On cars equipped with high performance engines, use tool T57L-4220-A.

4. Mark the differential case, cover, and ring gear for assembly in the original position.

5. Remove the bolts that attach the ring gear to the differential case. Press the gear from the case or tap it off with a soft-faced hammer.

6. With a drift, drive out the differential pinion shaft lock pin (Fig. 32) and separate the 2-piece differential case.

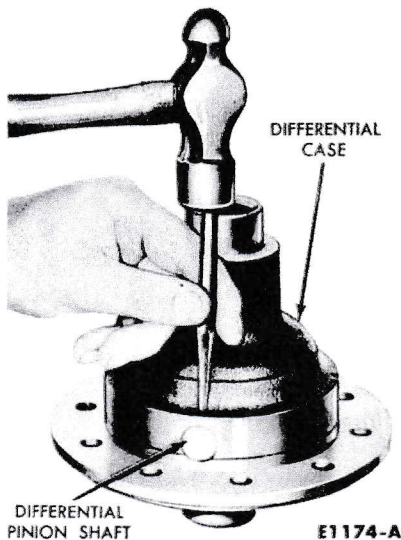


FIG. 32—Removing Differential Pinion Shaft Lock Pin

7. Drive out the pinion shaft with a brass drift (Fig. 33).

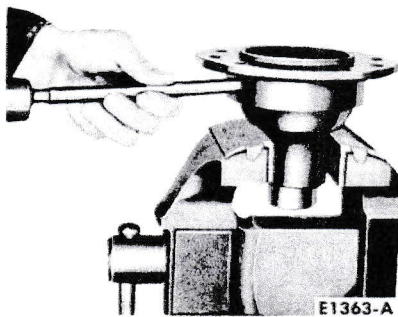


FIG. 33—Driving Out Differential Pinion Shaft

8. Remove the gears and thrust washers. (Fig. 34).

REMOVAL AND DISASSEMBLY OF LIMITED-SLIP DIFFERENTIAL CASE

1. Remove the differential case from the carrier and remove the

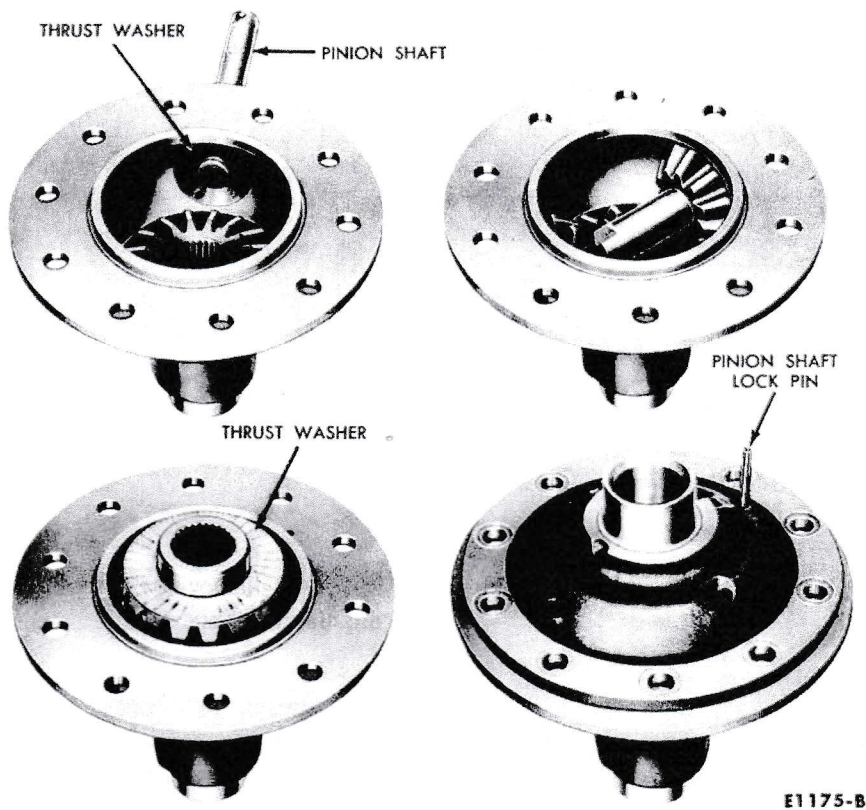


FIG. 34—Assembly of Differential Case

bearings from the differential as outlined in steps 1 through 4 in the foregoing procedure.

2. Place the differential case in a hydraulic press, and apply about one ton pressure across the case bearing hubs while removing the ring gear attaching bolts. This procedure will contain the spring pressure between the differential case and cover until after the bolts are moved, and thereby prevent stripping of the threads. Loosen alternate bolts an equal amount so that the spring pressure will release evenly.

3. Release the hydraulic press ram, and remove the differential case cover.

4. Remove the Belleville spring (Fig. 21).

5. Remove the steel and the bonded clutch plates.

6. Remove the differential clutch hub, outer side gear, and thrust washer.

7. Remove the ring gear from the differential case.

8. Drive out the differential pinion shaft lock pin.

9. With a brass drift, drive out the differential pinion shaft. Then remove the pinion gears, inner side gear, and thrust washers.

REMOVAL AND DISASSEMBLY OF DRIVE PINION AND BEARING RETAINER

1. Turn the carrier case upright, and remove the pinion shaft nut (Fig. 35). Then remove the U-joint flange (Fig. 36).

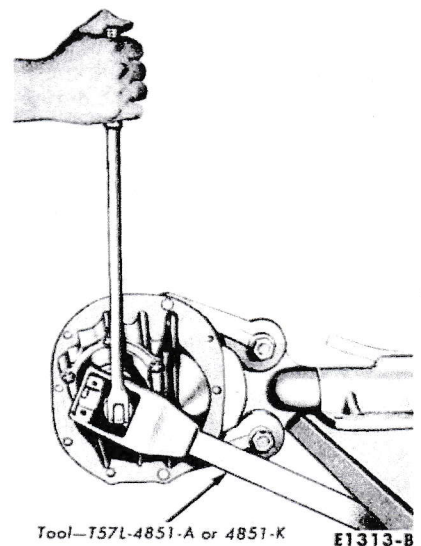


FIG. 35—Removing Pinion Shaft Nut

2. Remove the seal (Fig. 37) and the slinger.

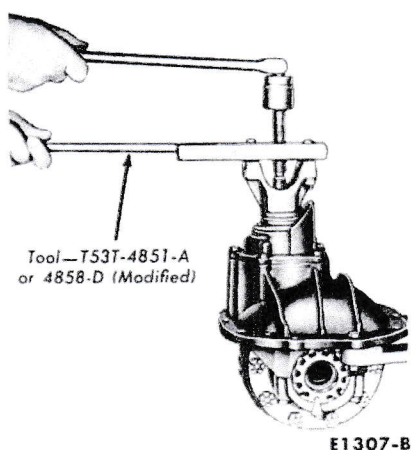


FIG. 36—Removing U-Joint Flange

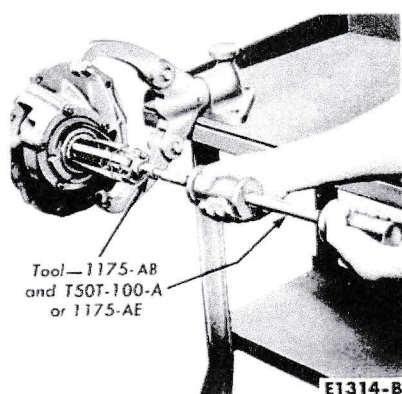


FIG. 37—Removing Pinion Seal

3. Remove the pinion, bearing, and retainer assembly from the carrier housing (Fig. 48). Measure the shim thickness with a micrometer. Record this original shim thickness. If a new gear set is installed during assembly, a new shim will have to be installed. The original shim thickness is one of the factors necessary in calculating the new shim thickness. **Extreme care must be taken not to damage the mounting surfaces of the retainer and carrier.**

4. Place a protective sleeve (hose) on the pinion pilot bearing surface. Press the pinion shaft out of the pinion front bearing cone (Fig. 38).

5. Press the pinion shaft out of the pinion rear bearing cone (Fig. 39).

PARTS REPAIR OR REPLACEMENT

Clean and inspect all the parts as outlined in Part 4-1, Section 3. Before assembling the carrier, repair or replace all parts as indicated by the inspection.

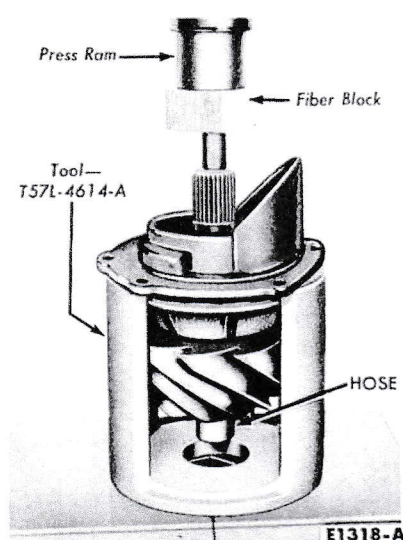


FIG. 38—Removing Pinion Front Bearing Cone

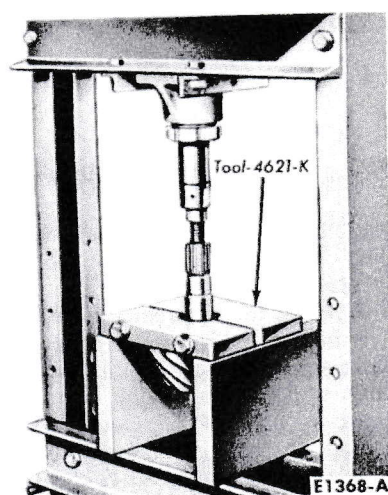


FIG. 39—Removing Pinion Rear Bearing Cone

The principal replacement operations are covered in the following procedures. All other repair or replacement operations are performed during Cleaning and Inspection Part 4-1, Section 3, or during the Assembly in this section.

PILOT BEARING

1. Remove the pilot bearing as shown in Fig. 40. Drive out the pilot bearing and the bearing retainer together. On cars with high performance engines, use handle adapter T53L-200A with tool 757L-4625-A or 4625-K.

2. Drive the new bearing in until it bottoms as shown in Fig. 41. On cars with high performance engines,

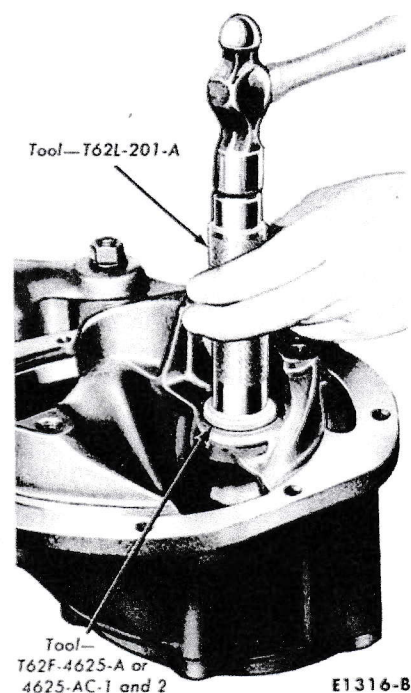


FIG. 40—Removing Pilot Bearing

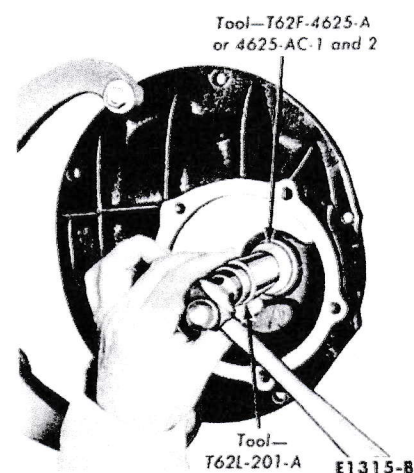


FIG. 41—Installing Pilot Bearing

use handle adapter 753L-200-A with tool 757L-4625-A, or 4625-K, or 4625-KA.

3. Using the same tool, install a new pilot bearing retainer with the concave side up.

PINION BEARING CUPS

Do not remove the pinion bearing cups from the retainer unless the cups are worn or damaged. The flange and pilot of the retainer are machined during manufacture by locating on these cups after they are installed in their bores. If the cups are worn or damaged, they should be removed and replaced as shown

in Fig. 42. On cars equipped with high performance engines, use the following tools: T57L-4614-A with T57L-4616-A for front cup removal except Comet; tool 4615-D for Comet front cup removal; T57L-4614-A with T57L-4616-A2 for front cup installation and T57L-4614-A with T55P-4616-A2 for rear cup installation.

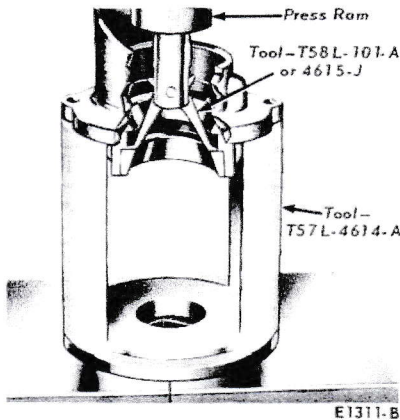


FIG. 42—Removing Pinion Bearing Cup

After the new cups are installed, make sure they are seated in the retainer by trying to insert a 0.0015-inch feeler gauge between the cup and the bottom of the bore.

Whenever the cups are replaced, the cone and roller assemblies should also be replaced.

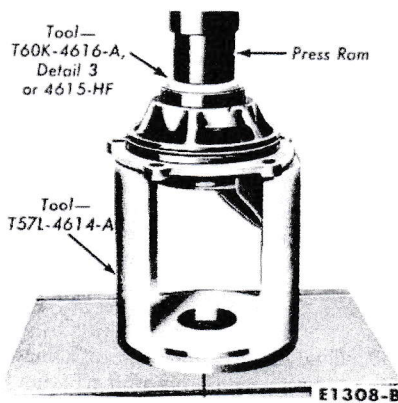


FIG. 43—Installing Pinion Bearing Cup

DRIVE PINION AND GEAR SET

When replacing a ring gear and pinion, note that the original factory installed shim is of the correct thickness to adjust for individual variations in both the carrier housing dimension and in the original gear set dimension. Therefore, to select

the correct shim thickness for the new gear set to be installed, follow these steps:

1. Measure the thickness of the **original shim** with a micrometer.
2. Note the shim adjustment number on both the old pinion and the new pinion. Each pinion gear is marked with an adjustment number such as the +1 marking in Fig. 44.

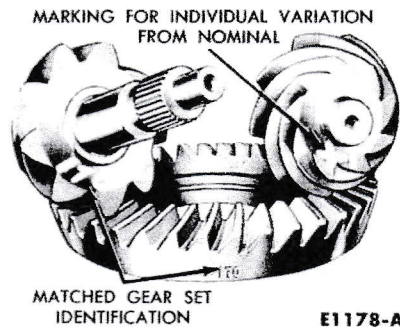


FIG. 44—Pinion and Ring Gear Markings

3. Refer to Table 2 to determine the correct amount of shim thickness change. The amount shown in the table under the old pinion shim adjustment number and in line with the new pinion number is the amount of **change** that should be made to the **original** shim thickness.

If the old pinion is marked +4, for example, and the new pinion is marked -2, the table indicates that 0.006 inch of shim stock should be removed from the **original** shim pack.

If the **original** shim pack was lost or if a new carrier housing is being installed, substitute a **nominal** 0.020-inch shim for the **original**, and follow the foregoing procedure for a trial build-up. If any further shim change is necessary, it will be indicated in the tooth pattern check.

A new ring gear and pinion should always be installed in an axle as a matched set (never separately). **Be sure that the same matching number appears on both the drive pinion and the ring gear.** Note the number 170 in Fig. 44.

4. After determining the correct shim thickness as explained in the foregoing steps, install the new pinion and ring gear as outlined under Assembly.

DIFFERENTIAL CASE, BEARINGS AND RING GEAR

If the ring gear runout check (before disassembly) exceeded specifications, the condition may be caused

by a warped gear, a defective case, or excessively worn differential bearings.

To determine the cause of excessive runout proceed as follows:

1. Assemble the two halves of the differential case together **without** the ring gear, and press the two differential side bearings on the case hubs.

2. Place the cups on the bearings and set the differential case in the carrier.

3. Install the bearing caps and adjusting nuts as outlined in step 11 thru 14 under Assembly and Installation of Conventional Differential Case in this section.

4. Tighten the right nut two notches beyond the position where it first contacts the bearing cup. Rotate the differential case several revolutions in each direction while the bearings are loaded to seat the bearings in their cups. **This step is important.**

5. Again loosen the right nut to release the preload. Check to see that the left nut contacts the bearing cup. Using the dial indicator set-up shown in Fig. 13, Part 4-1, adjust the preload to 0.012 case spread for new bearings or 0.005 to 0.008 for the original bearings, if re-used.

6. Check the runout of the differential case flange with a dial indicator. If the runout does **not now** exceed specifications, install a new drive gear. If the runout still exceeds specifications, the ring gear is true and the trouble is due to either a defective case or worn bearings.

7. Remove the differential case from the carrier and remove the side bearings from the case.

8. Install **new** bearings on the case hubs, and again install the differential assembly in the carrier **without** the ring gear.

9. Check the case runout again with the new bearings. If the runout is **now** within limits, the old bearings were excessively worn. Use the new bearings for assembly. If the runout is still excessive, the case is defective and should be replaced.

ASSEMBLY

Refer to Part 4-1 for Cleaning and Inspection before starting assembly operations. Fig. 45 shows the disassembled parts.

ASSEMBLY AND INSTALLATION OF DRIVE PINION AND BEARING RETAINER

1. Install the drive pinion rear

Grinding Marking	1	2	3	4	5	6	7	8	9
$\frac{+2}{+0}$	$\frac{+0.008}{+0.007}$	$\frac{+0.007}{+0.006}$	$\frac{+0.006}{+0.005}$	$\frac{+0.005}{+0.004}$	$\frac{+0.004}{+0.003}$	$\frac{+0.003}{+0.002}$	$\frac{+0.002}{+0.001}$	$\frac{+0.001}{0}$	$\frac{0}{-0.001}$
+2	+0.006	+0.005	+0.004	+0.003	+0.002	+0.001	0	-0.001	-0.002
+1	+0.005	+0.004	+0.003	+0.002	+0.001	0	-0.001	-0.002	-0.003
0	+0.004	+0.003	+0.002	+0.001	0	-0.001	-0.002	-0.003	-0.004
-1	+0.003	+0.002	+0.001	0	-0.001	-0.002	-0.003	-0.004	-0.005
-2	+0.002	+0.001	0	-0.001	-0.002	-0.003	-0.004	-0.005	-0.006
-3	+0.001	0	-0.001	-0.002	-0.003	-0.004	-0.005	-0.006	-0.007
-4	0	-0.001	-0.002	-0.003	-0.004	-0.005	-0.006	-0.007	-0.008

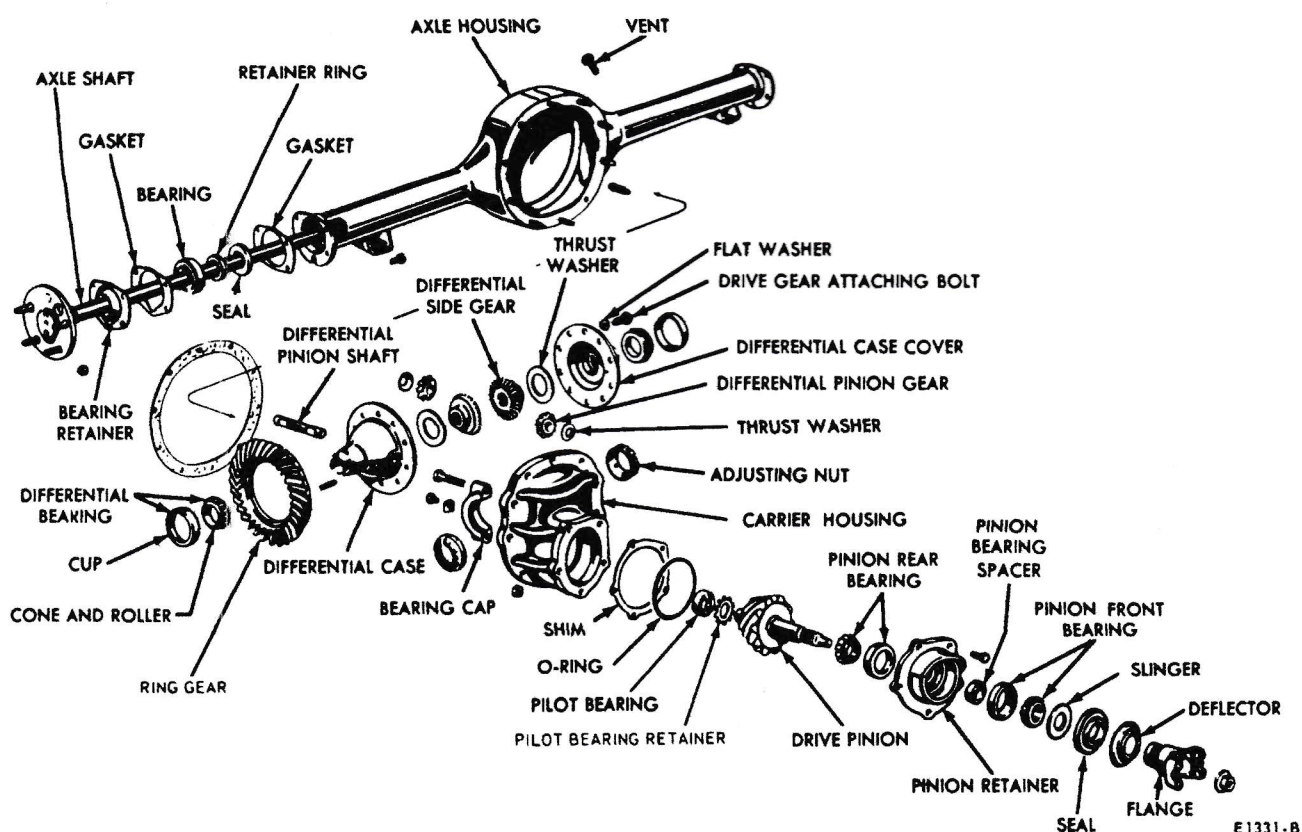


FIG. 45—Rear Axle—Disassembled

bearing cone and roller on the pinion shaft (Fig. 46). On cars equipped with high performance engines use tool T57L-4621-B along with tool 757L-4614-A as shown in Fig. 46. Place a new spacer on the pinion shaft (Fig. 47).

2. Place the bearing retainer on the pinion shaft, and install the front bearing cone and roller in the retainer. Press the front bearing cone and roller into position with the same tools as used in Fig. 46 for front bearing installation. On cars with high performance engines, use

T57L-4621-B along with tool T57L-4614-A.

3. Lubricate the O-ring with axle lubricant and install it in its groove in the pinion retainer. Be careful not to twist it. Snap the O-ring into position.

4. Place the proper shim on the carrier housing and install the pinion and retainer assembly being careful not to pinch the O-ring (Fig. 48).

5. Install the pinion retainer bolts. Torque bolts to specifications.

6. Place the slinger on the pinion shaft.

7. Coat the outside edge of a new oil seal with a small amount of a new oil resistant sealer. **Do not put any of the sealer on the sealing lip.** Install the seal in the bearing retainer (Fig. 49). On cars with high performance engines, use tool T58L-4676-A or tool 4676-F.

New seals should be soaked in SAE 10 oil for ½ hour before use.

8. Install the U-joint flange (Fig. 50).

9. Start a new integral nut and washer on the pinion shaft.

10. Hold the flange (Fig. 35) and

E1331-B

TABLE 2 — DRIVE PINION ADJUSTING SHIM THICKNESS CHANGES (Inches)

New Pinion Marking	Old Pinion Marking								
	−4	−3	−2	−1	0	+1	+2	+3	+4
+4	+0.008	+0.007	+0.006	+0.005	+0.004	+0.003	+0.002	+0.001	0
+3	+0.007	+0.006	+0.005	+0.004	+0.003	+0.002	+0.001	0	−0.001
+2	+0.006	+0.005	+0.004	+0.003	+0.002	+0.001	0	−0.001	−0.002
+1	+0.005	+0.004	+0.003	+0.002	+0.001	0	−0.001	−0.002	−0.003
0	+0.004	+0.003	+0.002	+0.001	0	−0.001	−0.002	−0.003	−0.004
−1	+0.003	+0.002	+0.001	0	−0.001	−0.002	−0.003	−0.004	−0.005
−2	+0.002	+0.001	0	−0.001	−0.002	−0.003	−0.004	−0.005	−0.006
−3	+0.001	0	−0.001	−0.002	−0.003	−0.004	−0.005	−0.006	−0.007
−4	0	−0.001	−0.002	−0.003	−0.004	−0.005	−0.006	−0.007	−0.008

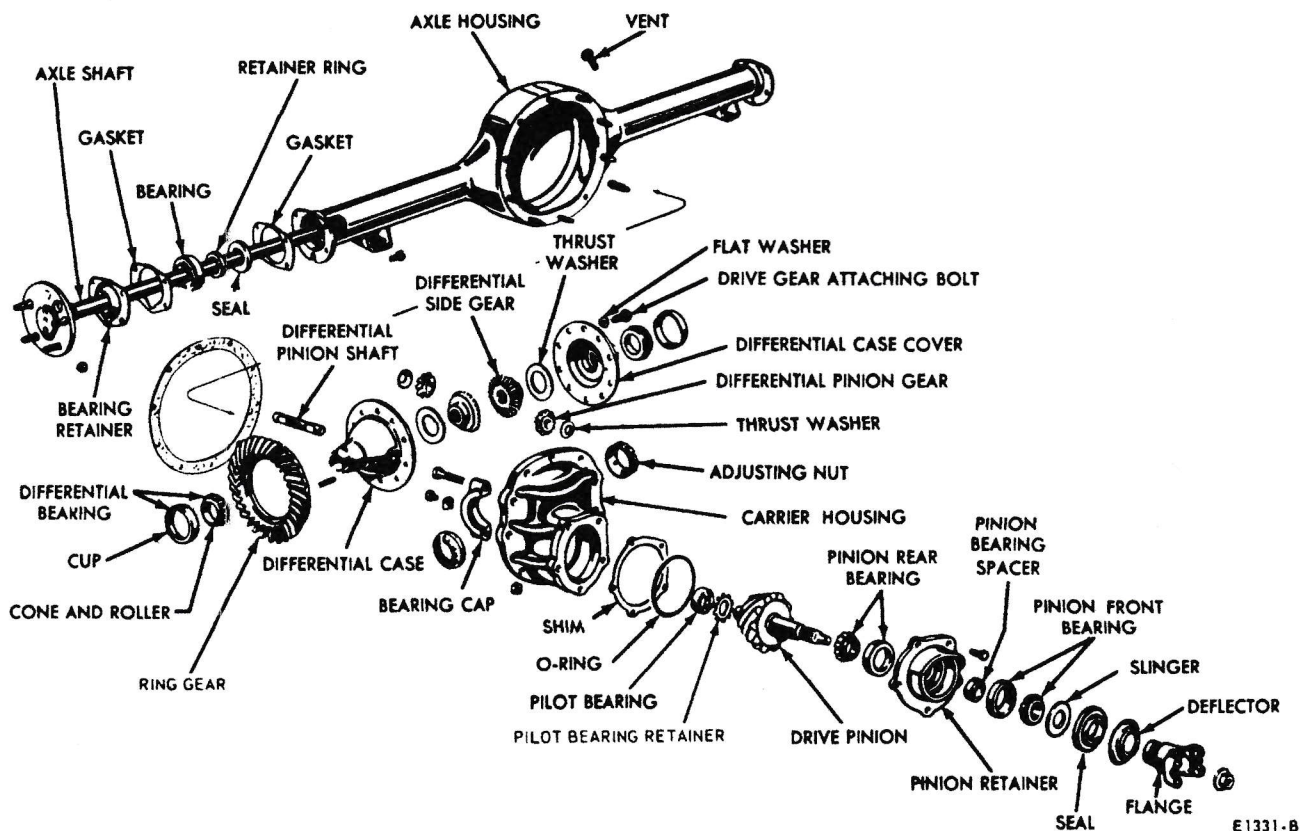


FIG. 45—Rear Axle—Disassembled

bearing cone and roller on the pinion shaft (Fig. 46). On cars equipped with high performance engines use tool T57L-4621-B along with tool 757L-4614-A as shown in Fig. 46. Place a new spacer on the pinion shaft (Fig. 47).

2. Place the bearing retainer on the pinion shaft, and install the front bearing cone and roller in the retainer. Press the front bearing cone and roller into position with the same tools as used in Fig. 46 for front bearing installation. On cars with high performance engines, use

T57L-4621-B along with tool T57L-4614-A.

3. Lubricate the O-ring with axle lubricant and install it in its groove in the pinion retainer. Be careful not to twist it. Snap the O-ring into position.

4. Place the proper shim on the carrier housing and install the pinion and retainer assembly being careful not to pinch the O-ring (Fig. 48).

5. Install the pinion retainer bolts. Torque bolts to specifications.

6. Place the slinger on the pinion shaft.

7. Coat the outside edge of a new oil seal with a small amount of a new oil resistant sealer. **Do not put any of the sealer on the sealing lip.** Install the seal in the bearing retainer (Fig. 49). On cars with high performance engines, use tool T58L-4676-A or tool 4676-F.

New seals should be soaked in SAE 10 oil for ½ hour before use.

8. Install the U-joint flange (Fig. 50).

9. Start a new integral nut and washer on the pinion shaft.

10. Hold the flange (Fig. 35) and

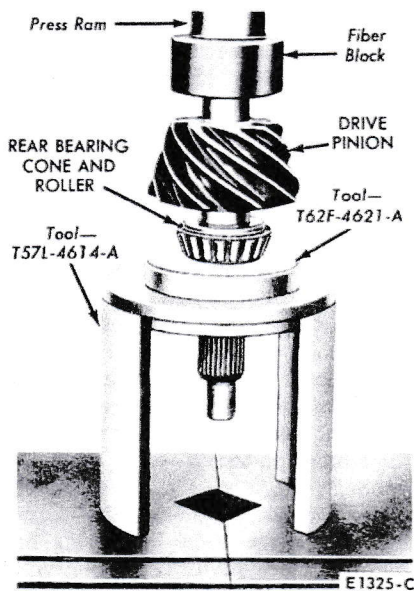


FIG. 46—Installing Pinion Rear Bearing Cone

pound torque wrench is not available tool 4209-C may be used in combination with tool 4209-C12. Correct preload will be obtained when the torque required to rotate the pinion in the retainer is as specified in Part 4-3. If the torque required to rotate the pinion is less than specified, tighten the pinion shaft nut a little at a time until the proper preload is established. **Do not overtighten the nut.** If excessive preload is obtained as a result of overtightening, replace the collapsible bearing spacer.

Do not back off the pinion shaft nut to establish pinion bearing preload. If the torque on the pinion shaft nut is less than 175 ft-lbs. after bearing preload is established, a new collapsible spacer must be used.

ASSEMBLY AND INSTALLATION OF CONVENTIONAL DIFFERENTIAL CASE

1. Place a side gear and thrust

line up the pinion shaft lock pin holes.

4. Place the second side gear and thrust washer in position (Fig. 34), and install the cover on the differential case. Install the pinion shaft lock pin. A pinion or axle shaft spline can be inserted in the side gear spline to check for free rotation of the differential gears.

5. Insert two $\frac{7}{16}$ (N. F.) bolts two inches long through the differential case flange, and thread them three or four turns into the ring gear as a guide in aligning the ring gear bolt holes. Press or tap the ring gear into position.

6. Install and tighten the ring gear bolts and washers evenly, and torque them alternately across the gear to specification.

7. If the differential bearings have been removed, press them on as shown in Fig. 52.

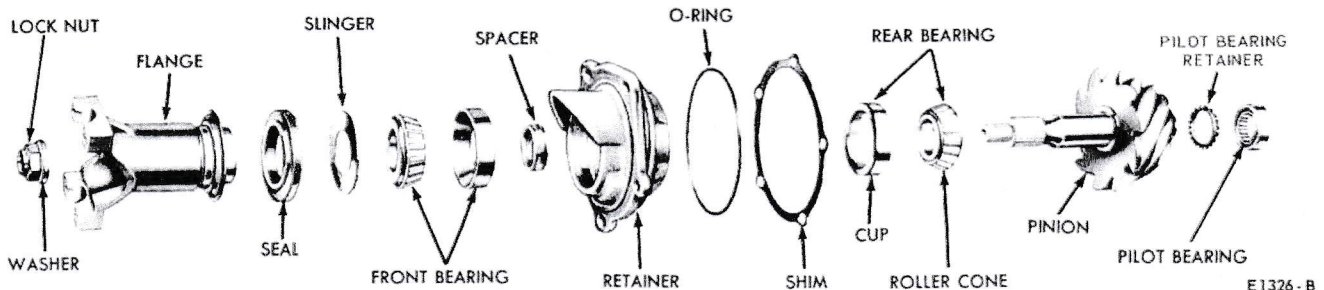


FIG. 47—Pinion and Bearing Retainer

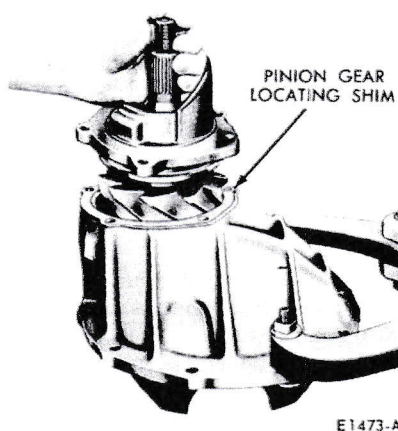


FIG. 48—Installing Pinion and Retainer

tighten the pinion shaft nut to 175 ft-lbs. Do not exceed 175 ft-lbs at this time. As the pinion shaft nut is tightened, rotate the pinion shaft frequently to allow the bearing to seat.

11. Check the pinion bearing preload as shown in Fig. 51. If an inch-

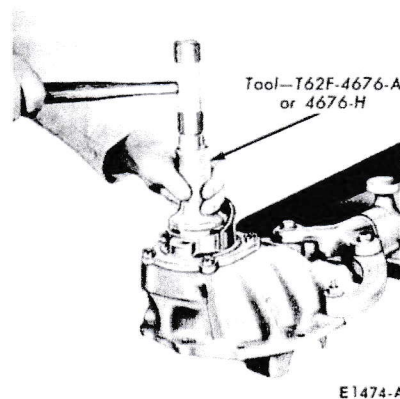


FIG. 49—Installing Oil Seal

washer in the differential case bore (Fig. 34). Lubricate all differential parts liberally with axle lubricant during assembly.

2. With a soft-faced hammer, drive the pinion shaft into the case only far enough to retain a pinion thrust washer and pinion gear.

3. Place the second pinion and thrust washer in position, and drive the pinion shaft into place. **Carefully**

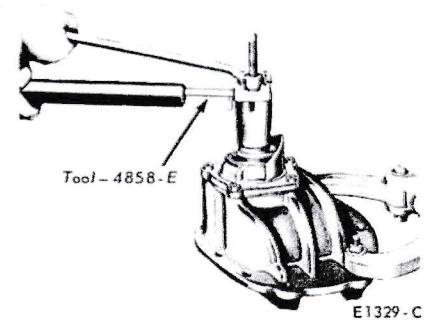


FIG. 50—Installing U-Joint Flange

8. Wipe a thin coating of lubricant on the bearing bores so that the differential bearing cups will move easily.

9. Place the cups on the bearings. If the gear set is of the **non-hunting** or **partial non-hunting** type, assemble the differential case and ring gear assembly in the carrier so that the marked tooth on the pinion indexes between the marked teeth on the ring gear as shown in Fig. 30.

In almost every case of improper

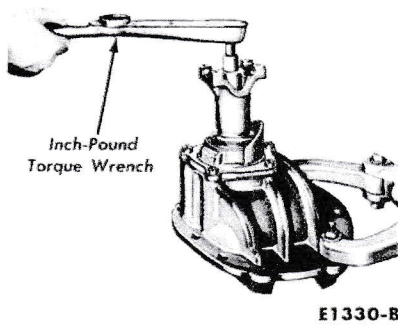


FIG. 51—Checking Pinion Bearing Pre-load

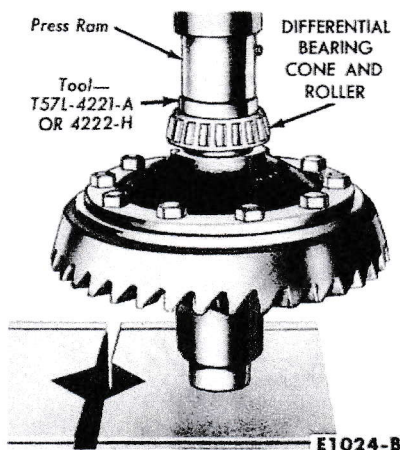


FIG. 52—Installing Differential Bearing

assembly (gears assembled out of time), the noise level and probability of failure will be higher than they would be with properly assembled gears.

When installing the hunting type gear set (no timing marks) assemble the differential case and ring gear assembly in the carrier without regard to the matching of any particular gear teeth.

10. Slide the assembly along the bores until a slight amount of backlash is felt between the gear teeth.

11. Set the adjusting nuts in the bores so that they just contact the bearing cups. The nuts should be

engaged about the same number of threads on each side.

12. Carefully position the bearing caps on the carrier. Match the marks made when the caps were removed.

13. Install the bearing cap bolts and alternately torque them to 70-80 ft-lbs.

14. If the adjusting nuts do not turn freely as the cap bolts are tightened, remove the bearing caps and again inspect for damaged threads or incorrectly positioned caps. Tightening the bolts to the specified torque is done to be sure that the cups and adjusting nuts are seated. Loosen the cap bolts, and torque them to only 25 ft-lbs. before making adjustments.

15. Adjust the backlash between the ring gear and pinion as outlined in Part 4-1, Section 2.

16. Be sure to make a final tooth pattern check before installing the carrier assembly in the axle housing.

ASSEMBLY AND INSTALLATION OF LIMITED-SLIP DIFFERENTIAL CASE

1. Place the side gear and thrust washer in the differential case (Fig. 21). Lubricate all parts liberally with axle lubricant during assembly.

2. With a soft-faced hammer, drive the pinion shaft into the case only far enough to retain a pinion thrust washer and pinion gear.

3. Place the second pinion and thrust washer in position, and drive the pinion shaft into place. Carefully line up the pinion shaft lock pin holes.

4. Install the pinion shaft lock pin. The lock pin must not extend beyond the surface of the case.

5. Insert two 2-inch $\frac{7}{16}$ (N. F.) bolts through the differential case flange, and thread them three or four turns into the ring gear as a guide in aligning the ring gear bolt holes. Press or tap the ring gear into position.

6. Clamp the differential case in a soft-jawed vise. Install the other differential side gear on the differential

pinion gears. Place the clutch hub on the side gear. Place the thrust washer on the hub (Fig. 25).

7. To align the clutch plates during assembly, insert two $\frac{3}{16}$ x 2 dowel pins into the differential case. Place a steel plate on the differential case so that the slots in the ears straddle the dowel pin (Fig. 25). Lubricate all the locking differential parts with axle lubricant so that an accurate torque check can be made.

8. Place a bonded plate on the steel plate. Make sure the bonded plate inner spline teeth properly engage the hub spline. Assemble the remaining plates: a steel plate, a bonded plate, a steel plate, a bonded plate, and lastly a steel plate.

9. Place the Belleville spring on the top steel plate. The Belleville spring is assembled with the concave side down (Fig. 26). Carefully center the Belleville spring so that it will fit into the cover.

10. Place the differential case cover on the case (Fig. 27). Start the ring gear bolts.

11. Tighten the bolts evenly and alternately across the diameter of the ring gear. As the bolts are tightened the Belleville spring is compressed and the differential case and cover are pulled together.

12. Remove the dowel pins.

13. Torque the case to ring gear bolts to specifications.

14. Check the torque required to rotate one side gear while the other side gear is held (Fig. 28). Ignore the torque required to start the side gear turning. The torque required to keep it moving steadily should be between 155 and 195 ft-lbs, if new clutch plates were installed. The torque should be a least 75 ft-lbs, if the original clutch plates were installed. If the required torque is not within these limits, check for improper assembly.

15. Install the side bearings on the differential case, and install the case in the carrier as described in steps 7 through 16 under Assembly and Installation of Conventional Differential Case.

PART 4-3 SPECIFICATIONS

REAR AXLE LUBRICATION

Axle Type	Ford Specification	Ford Part No.	Capacity
Integral Carrier	M2C28-B	C2AZ-19590-A	2½ Pints (Approximate)
Removable Carrier (Except with 289-4V Engine)	M-2C50-B	C1AZ-19580-E or F	4½ Pints (Approximate)
Removable Carrier (With 289-4V Engine)	M2C57-A	C2AZ-19580-D	5 Pints (Approximate)
All Axles Equipped With Locking Differential	Use M-2C50-B, plus 4 ounces of M-2C58-A (C1AA-19B546-A) additive per refill of M-2C50-B		

For temperatures above —25°F use SAE 90 Grade lubricant.
For temperatures below —25°F use SAE 80 Grade lubricant.

REAR AXLE—INTEGRAL CARRIER TYPE

DRIVE PINION ADJUSTING SHIM THICKNESS CHANGES—INCH

Old Pinion Marking	New Pinion Marking								
	—4	—3	—2	—1	0	+1	+2	+3	+4
+4	+0.008	+0.007	+0.006	+0.005	+0.004	+0.003	+0.002	+0.001	0
+3	+0.007	+0.006	+0.005	+0.004	+0.003	+0.002	+0.001	0	—0.001
+2	+0.006	+0.005	+0.004	+0.003	+0.002	+0.001	0	—0.001	—0.002
+1	+0.005	+0.004	+0.003	+0.002	+0.001	0	—0.001	—0.002	—0.003
0	+0.004	+0.003	+0.002	+0.001	0	—0.001	—0.002	—0.003	—0.004
—1	+0.003	+0.002	+0.001	0	—0.001	—0.002	—0.003	—0.004	—0.005
—2	+0.002	+0.001	0	—0.001	—0.002	—0.003	—0.004	—0.005	—0.006
—3	+0.001	0	—0.001	—0.002	—0.003	—0.004	—0.005	—0.006	—0.007
—4	0	—0.001	—0.002	—0.003	—0.004	—0.005	—0.006	—0.007	—0.008

REAR AXLE RATIOS, GEAR AND CODE IDENTIFICATION

Identification Tag	Ring Gear Diameter (Inches)	Type of Differential	Axle Ratio
WCY-R	7¼	Conventional	2.88:1
WCY-AA	7¼	Limited-Slip	
WCY-E	7¼	Conventional	3.20:1
WCY-AJ	7¼	Conventional	
WCY-L	7¼	Limited-Slip	

CONTINUED ON NEXT PAGE

REAR AXLE—INTEGRAL CARRIER TYPE (Continued)**ADJUSTMENTS**

	Inch
Backlash Between Ring Gear and Pinion	0.008-0.012
Backlash Variation Between Teeth	Max. 0.003
Runout of Backface of Ring Gear as Assembled	Max. 0.003
Thickness: Differential Side Gear Thrust Washers Differential Pinion Gear Thrust Washers	0.030-0.032 0.030-0.032
Ring Bearing Cone to Pinion Gear Nominal Shim	0.017
Shims Available:	0.008-0.024

TORQUE LIMITS

	Ft-lbs
Rear Cover Bolts	10-17
Differential Bearing Cap Screws	40-55
Differential Bearing Adjusting Nut Lock Bolts	12-25
Rear Shock Absorbers to Rear Spring Clip Plate Assembly Nuts	15-25
Universal Joint Bolt Nuts	7-10
Ring Gear Attaching Bolts	40-55
Rear Axle Shaft Bearing Retaining Nuts	30-40
Spring Clip Nuts (Rear Springs to Axle Housing)	13-20
Minimum Torque Required to Tighten Pinion Flange Lock Nut to Obtain Correct Pinion Bearing Preload	140
Pinion Bearing Preload New Bearings Used Bearings	17-27⊙ 6-12⊙
Differential Bearing Preload (Case Spread-Thousandths) New Bearings Used Bearings	0.008 0.003-0.005

⊙Inch-pounds

REAR AXLE—REMOVABLE CARRIER TYPE**REAR AXLE RATIOS, GEAR AND CODE IDENTIFICATION**

Identification Tag	Ring Gear Diameter (Inches)	Type of Differential	Axle Ratio	Identification Tag	Ring Gear Diameter (Inches)	Type of Differential	Axle Ratio
WCZ-E	7¾	Conventional	2.80:1	WDE-B	9	Conventional	3.00:1
WDJ-B	7¾	Limited-Slip	2.80:1	WEB-C	9	Conventional	3.25:1
WCZ-F	8	Conventional	3.00:1	WED-C	9	Limited-Slip	3.00:1
WDJ-C	8	Limited-Slip	3.00:1	WED-A	9	Limited-Slip	3.25:1
WCZ-S	8¾	Conventional	3.50:1	WDY-B	8	Conventional	3.25:1
WCZ-R	8¾	Conventional	3.89:1	WDY-C	8	Conventional	3.50:1
WDZ-A	7¾	Limited-Slip	2.80:1	WEA-B	8	Limited-Slip	3.50:1
WDW-C	8	Conventional	3.25:1	WDY-A	8	Conventional	3.00:1
WDW-E	7¾	Conventional	2.80:1	WEA-F	8	Limited-Slip	3.25:1
WDW-A	7¾	Conventional	2.80:1	WEA-A	8	Limited-Slip	3.00:1
WDW-D	8	Conventional	3.50:1	WEC-A	9	Conventional	3.00:1
WDZ-C	8	Limited-Slip	3.25:1	WEC-B	9	Conventional	3.25:1
WDW-B	8	Conventional	3.00:1	WEE-A	9	Limited-Slip	3.25:1
WDC-B	8	Limited-Slip	3.00:1	WEE-C	9	Limited-Slip	3.00:1

ADJUSTMENTS

	Inch
Backlash Between Ring Gear and Pinion	0.008-0.012
Maximum Backlash Variation Between Teeth	0.003
Maximum Runout of Backface of Ring Gear as Assembled	0.003

ADJUSTMENTS (Continued)

	Inch
Thickness Differential Side Gear Thrust Washers Differential Pinion Gear Thrust Washers	0.030-0.032 0.030-0.032
Nominal Pinion Locating Shim (By Ring-Gear Size) 7¾" and 8" 8¾" and 9"	0.022 0.015
Available Shims (In steps of 0.001 inch)	0.010-0.029

CONTINUED ON NEXT PAGE

REAR AXLE—REMOVABLE CARRIER TYPE (Continued)

TORQUE LIMITS

Description	7 $\frac{3}{4}$ "-8" Ring Gear Ft-lbs	8 $\frac{3}{4}$ "-9" Ring Gear Ft-lbs
Differential Bearing Cap Screws	55-70	70-85
Differential Bearing Adjusting Nut Lock Bolts	12-25	12-25
Carrier to Housing Stud Nuts	30-40	30-40
Pinion Retainer to Carrier Cap Screws	30-45	30-45
Ring Gear Attaching Bolts	65-80	65-80
Rear Axle Shaft Bearing Retainer Bolts	30-40	30-40
Rear Shock Absorber to Rear Spring Clip Plate Assembly Nuts	15-22	15-22
Pinion Flange U-Bolt Nuts	12-15	15-20
Spring Clip Nuts (Rear Spring to Axle Housing)	30-45	30-45
Minimum Torque Required to Tighten Pinion Nut to Obtain Correct Pinion Bearing Preload	175⊙	175⊙
Pinion Bearing Preload	New Bearings and New Seal	17-32 inch-pounds
	Used Bearings and New Seal	8-14 inch-pounds
Differential Bearing Preload (Case Spread-Thousandths)		0.012
New Bearings		0.005-0.008
Original Bearings		

⊙If this torque can not be obtained with a used spacer, install a new spacer.

REAR AXLES WITH LOCKING DIFFERENTIAL

Torque Check	Integral Carrier Type Axles	Removable Carrier Type Axles
Minimum torque required to turn axle shaft and side gear with one wheel on the ground	50 ft-lbs	75 ft-lbs
Bench Check After Assembly	With New Clutch Plates	100-125 ft-lbs
	With Original Clutch Plates	155-195 ft-lbs
	50 ft-lbs Minimum	75 ft-lbs Minimum

SPECIAL TOOLS

Ford Tool No.	Former No.	Description
T50T-100-A	B-166	Impact Hammer
T58L-101-A	—	Puller Attachment
T62L-201-A	—	Handle Adapter
T56L-400-A	4851-A	Puller
T57L-500-A	—	Bench Mounted Holding Fixture
T00L-1175-AB	1175-AB	Grease Seal Remover (Head Only)
T50T-100-A and T00L-1175-AB	1175-AE	Seal Remover
T60K-1177-B	1177-B	Rear Wheel Bearing Oil Seal
T60K-1225-A or T00L-1225-C	—	Axle Shaft Bearing Remover and Replacer
T00L-1225-B	—	Axle Shaft Bearing Remover
T60K-4067-A	4067-E	Axle Shaft Bearing Replacer
T00L-4209-C	4209-C	Differential Bearing Adjuster Nut Wrench
T00L-4221-AL	4221-AL	Pinion Tension Scale with T00L-4209-C12 Socket
T57L-4221-A	4222-K	Differential Bearing Cone Remover
T00L-4222-H	4222-H	Pilot (Use with T00L-4221-C or T00L-4851-A)
T60K-4234-A	4235-D	Differential Bearing Cone Replacer
T57L-4614-A	4614	Differential Bearing Cone Replacer
T00L-4615-J	4615-J	Rear Axle Shaft Assembly Remover Adapter
T60K-4616-A	4615-HF	Drive Pinion and Drive Pinion Retainer Assembly Support
T57L-4616-A	4625-HR	Drive Pinion Front Bearing Cup Remover
T57L-4616-A2	4615-D	Pinion Bearing Cup Replacer
T55P-4616-A2	—	Pinion Front Bearing Cup Remover
T00L-4621-K	4621-K	Pinion Front Bearing Cup Replacer
T62F-4621-A	—	Pinion Rear Bearing Cup Replacer
T62F-4625-A	4625-AC-1 & 2	Pinion Rear Bearing Cone Remover
T55P-4676-A	4676-G	Pinion Bearing Cone Replacer
T62F-4676-A	4676-H	Drive Pinion Pilot Bearing
T53T-4851-A	4851-A	Remove and Replacer
T57L-4851-A	4858-D	Drive Pinion Oil Seal Replacer
T00L-4858-E	4851-K	Drive Pinion Oil Seal Replacer
T59L-4204-A	4858-E	Flange (Universal Joint) Axle End Remover
T65K-4204-A	44211 and 44211-A	Universal Joint Flange Holder
		Companion Flange and Pinion Bearing Replacer
		Locking Differential Torque Check
		Locking Differential Torque Check Adapter

DRIVE PINION ADJUSTING SHIM THICKNESS CHANGES (inch)

New Pinion Marking	Old Pinion Marking								
	-4	-3	-2	-1	0	+1	+2	+3	+4
+4	+0.008	+0.007	+0.006	+0.005	+0.004	+0.003	+0.002	+0.001	0
+3	+0.007	+0.006	+0.005	+0.004	+0.003	+0.002	+0.001	0	-0.001
+2	+0.006	+0.005	+0.004	+0.003	+0.002	+0.001	0	-0.001	-0.002
+1	+0.005	+0.004	+0.003	+0.002	+0.001	0	-0.001	-0.002	-0.003
0	+0.004	+0.003	+0.002	+0.001	0	-0.001	-0.002	-0.003	-0.004
-1	+0.003	+0.002	+0.001	0	-0.001	-0.002	-0.003	-0.004	-0.005
-2	+0.002	+0.001	0	-0.001	-0.002	-0.003	-0.004	-0.005	-0.006
-3	+0.001	0	-0.001	-0.002	-0.003	-0.004	-0.005	-0.006	-0.007
-4	0	-0.001	-0.002	-0.003	-0.004	-0.005	-0.006	-0.007	-0.008