REAR AXLE

CONTENTS

SERVICE DIAGNOSIS

Condition	Possible Cause	Correction
REAR WHEEL NOISE	(a) Wheel Loose.	(a) Tighten loose wheel nuts.
	(b) Spalled wheel bearing cup or cone.	(b) Check rear wheel bearings. If spalled or worn, replace.
	(c) Defective, brinelled wheel bearing.	(c) Defective or brinelled bearings must be replaced. Check rear axle shaft end play.
	(d) Excessive axle shaft end play.	(d) Readjust axle shaft end play.
	(e) Bent or sprung axle shaft flange.	(e) Replace bent or sprung axle shaft.
SCORING OF DIFFERENTIAL GEARS AND PINIONS	(a) Insufficient lubrication.	(a) Replace scored gears. Scoring marks on the pressure face of gear teeth or in the bore are caused by instantaneous fusing of the mating surfaces. Scored gears should be replaced. Fill rear axle to required capacity with proper lubricant. See Specification section.
	(b) Improper grade of lubricant.	(b) Replace scored gears. Inspect all gears and bearings for possible damage. Clean out and refill axle to required capacity with proper lubricant. See Lubrication section.
	(c) Excessive spinning of one wheel.	(c) Replace scored gears. Inspect all gears, pinion bores and shaft for scoring, or bearings for possible damage. Service as necessary.
TOOTH BREAKAGE (RING GEAR AND PINION)	(a) Overloading.	(a) Replace gears. Examine other gears and bearings for possible damage. Replace parts as needed. Avoid Overloading.
	(b) Erratic clutch operation.	(b) Replace gears, and examine remaining parts for possible damage. Avoid erratic clutch operation.
	(c) Ice-spotted pavements.	(c) Replace gears. Examine remaining parts for possible damage. Replace parts as required.
	(d) Improper adjustment.	(d) Replace gears. Examine other parts for possible damage. Make sure ring gear and pinion backlash is correct.
REAR AXLE NOISE	(a) Insufficient lubricant.	(a) Refill rear axle with correct amount of the proper lubricant. See Specification section. Also check for leaks and correct as necessary.
	(b) Improper ring gear and pinion adjustment.	(b) Check ring gear and pinion tooth contact.
	(c) Unmatched ring gear and pinion.	(c) Remove unmatched ring gear and pinion. Replace with a new matched gear and pinion set.
	(d) Worn teeth on ring gear or pinion.	(d) Check teeth on ring gear and pinion for contact. If necessary, replace with new matched set.

Condition	Possible Cause	Correction
	(e) End play in drive pinion bearings.	(e) Adjust drive pinion bearing preload.
	(f) Side play in differential bearings.	(f) Adjust differential bearing preload.
	(g) Sure-Grip Differential moan and chatter.	(g) Drain and flush lubricant. See procedure in Sure-Grip section of Group 3.
LOSS OF LUBRICANT	(a) Lubricant level too high.	(a) Drain excess lubricant by removing filler plug and allow lubricant to level at lower edge of filler plug hole.
	(b) Worn axle shaft oil seals.	(b) Replace worn oil seals with new ones. Prepare new seals before replacement.
	(c) Cracked rear axle housing.	(c) Repair or replace housing as required.
	(d) Worn drive pinion oil seal.	(d) Replace worn drive pinion oil seal with a new one.
	(e) Scored and worn companion flange.	(e) Replace worn or scored companion flange and oil seal.
	(f) Clogged breather.	(f) Clean breather thoroughly.
	(g) Loose carrier housing bolts or housing cover screws.	(g) Tighten bolts or cover screws to specifications and fill to correct level with proper lubricant.
OVERHEATING OF UNIT	(a) Lubricant level too low.	(a) Refill rear axle.
	(b) Incorrect grade of lubricant.	(b) Drain, flush and refill rear axle with correct amount of the proper lubricant. See Specification Section.
	(c) Bearings adjusted too tightly.	(c) Readjust bearings.
	(d) Excessive wear in gears.	(d) Check gears for excessive wear or scoring. Replace as necessary.
	(e) Insufficient ring gear to pinion clearance.	(e) Readjust ring gear and pinion backlash and check gears for possible scoring.

REAR AXLE NOISE DIAGNOSIS

Most rear axle failures are relatively simple to locate and correct, although rear axle noise is a little more difficult to diagnose and make the necessary repairs. The most essential part of rear axle service is proper diagnosis of the problem.

All rear axles are noisy to a certain degree. Gear noise is usually associated with older axles, but this is not always true. New axles can also be noisy if they are not properly adjusted or lack lubrication. Usually when new improperly set gears are noisy; the disturbing noise cannot be "adjusted out" once the gears are broken in. Recent experience has shown that axle gears can often be readjusted to reduce excessive gear noise, if they have been operated at normal break-in speeds for less than 500 miles. Regardless of what you've heard to the contrary, noisy gears will not get quieter with added mileage . . . they will stay the same or get worse.

Slight axle noise heard only at certain speeds or under remote conditions must be considered normal. Axle noise tends to "peak" at varying speeds and the noise is in no way indicative of trouble in the axle.

If axle noise is present in an objectionable form, loud or at all speeds, an effort should be made to isolate the noise as being in one particular unit of the vehicle. Many noises, reported as coming from the rear axle actually originate from other sources such as tires, road surfaces, wheel bearings, engine, transmission, exhaust, propeller shaft vibration, universal joint noise or body drumming. A thorough and careful check should be made to determine the source of the noise before any disassembly and teardown of the rear axle is attempted.

The complete isolation of noise in any one unit requires considerable skill and previous experience. Eliminating certain type noises often baffle even the most experienced personnel. Often such practices as raising tire pressures to eliminate tire noise, listening for the noise at varying speeds under different load conditions such as; drive, float and coast, and under certain highway conditions, turning the steering wheel from left to right to detect wheel bearing noise, will aid even the beginner in detecting certain alleged axle noises. Axle noises normally fall into two categories: gear noise and bearing noise.

To make a good diagnostic check for rear axle noise, a thorough road test is necessary. Select a level smooth blacktop or asphalt road. This will reduce tire noise and body drumming. Drive the car far enough to thoroughly warm up the axle to normal operating temperature.

Drive the car and note speed at which noise occurs.

Then stop car and, with clutch disengaged or automatic transmission in neutral, run engine slowly up and down through engine speeds, corresponding to car speed at which noise was most pronounced, to determine if it is caused by exhaust roar, or other engine conditions. Repeat, while engaging and disengaging clutch (transmission in neutral), to determine if noise can only be isolated by removing propeller shaft and operating transmission in high).

TIRE NOISE

Tire noise is often mistaken for rear axle noise even though the noisy tires may be located on the front wheels. Tires that are unbalanced or worn unevenly or have surfaces of non-skid type design, or worn in a saw tooth fashion are usually noisy and often produce noises that seem to originate in the rear axle.

Tire noise changes with different road surfaces, but rear axle noise does not. Inflate all tires to approximately 50 pounds pressure (for test purposes only). This will materially alter noise caused by tires, but will not affect noise caused by rear axle. Rear axle noise usually ceases when coasting at speeds under 30 miles per hour; however, tire noise continues, but with lower tone, as car speed is reduced. Rear axle noise usually changes when comparing drive and coast, but tire noise remains about the same.

Distinguish between tire noise and differential noise by noting if noise varies with various speeds or sudden acceleration and deceleration; exhaust and axle noise show variations under these conditions while tire noise remains constant and is more pronounced at speeds of 20 to 30 miles per hour. Further check for tire noise by driving car over smooth pavements or dirt roads (not gravel) with tires at normal pressure. If noise is caused by tires, it will noticeably change or disappear and reappear with changes in road surface.

FRONT WHEEL BEARING NOISE

Loose or rough front wheel bearings will cause noise which may be confused with rear axle noises; however, front wheel bearing noise does not change when comparing drive and coast. Light application of brake while holding car speed steady will often cause wheel bearing noise to diminish, as this takes some weight off the bearing. Front wheel bearings may be easily checked for noise by jacking up the wheels and spinning them, also by shaking wheels to determine if bearings are loose.

Rear suspension rubber bushings and spring insulators help to dampen out rear axle noise when properly and correctly installed. Check to see that no metallic interference exists between the springs and springs hangers, shackles or "U" bolts. Metal to metal contact at those points may result in telegraphing road noise and normal axle noise which would not be objectionable if properly installed and tightened to specifications.

GEAR NOISE

Abnormal gear noise can be recognized easily because it produces a cycling tone and will be very pronounced through the speed range in which it occurs. Gear noise may be developed under one or more of the following conditions, "drive", "road load", "float" or "coast". Gear noise usually tends to peak in a narrow speed range or ranges. Gear noise is more prominent between 30 to 40 mph and 50 to 60 mph. Abnormal gear noise is quite rare and if present it usually originates from scoring of the ring and drive pinion gear as a result of insufficient or improper lubrication of the axle assembly. The differential side gears and pinions very seldom cause trouble as they are only under loads when the rear wheels travel at different speeds; such as when turning corners.

When objectionable axle noise is heard, note the driving condition and speed range. Remove the differential and carrier from the axle housing on the 8-3/4" axle. Perform a tooth contact pattern check to determine if the best possible pattern has been obtained. If pattern is found to be unacceptable, reshim and adjust to obain the best possible pattern. If after readjustment noise still persists, replace with new gear set.

PRE-DISASSEMBLY INVESTIGATION

A close examination of the rear axle assembly prior to disassembly can reveal valuable information as to the extent and type of repairs or adjustments necessary. This information coupled with the road test results will provide a basis for determining the degree of disassembly required. Since the most frequent causes of axle noise are improper backlash or differential bearing preload, or both, a few simple adjustments may be all that is necessary to correct the complaint.

Therefore, before disassembly the following checks should be made; drive gear and pinion backlash, pinion bearing preload, and tooth contact pattern and these results recorded and analyzed. It is felt that these measurements and their results will aid you in making the necessary repairs to the axle assembly.

BEARING NOISE (DRIVE PINION AND DIFFERENTIAL)

Defective or damaged bearings generally produce a rough growl or grating sound, that is constant in pitch and varies with the speed of the vehicle. This fact will allow you to diagnose between bearing noise and gear noise.

Drive pinion bearing noise resulting from defective or damaged bearings can usually be identified by a constant rough sound. Front pinion bearing noise is usually most pronounced on "coast", whereby rear pinion bearing is loudest on "drive". Pinion bearings are rotating at a higher rate of speed than the differential side bearings or the axle shaft bearings. These particular noises can be picked up best by road testing the vehicle in question on a smooth road (black top). However, extreme caution should be taken not to confuse tire noise with bearing or gear noise. If doubt should exist tire treads should be examined for irregularities that will often produce such noise.

Differential bearing noise will usually produce a constant rough tone which is much slower than the noise caused by the pinion bearings.

REAR WHEEL BEARING NOISE

Defective or damaged rear wheel bearings produce a vibration or growl which continues with car coasting and transmission in neutral. A brinneled rear wheel bearing causes a whirring noise. Spalled rear wheel bearings normally produce a noise similar to a growl, created from either flaked or pitted rollers or bearings races. Unless the damage is severe, rear axle bearing noise is seldom heard above 30 mph.

To differentiate between wheel bearings and gear noise, road test the vehicle on a smooth road (blacktop) at medium and low speed. With traffic permitting, swerve the vehicle sharply right to left. If the noise in question is caused by wheel bearings, it will usually increase when the vehicle is swerved and will probably be coming from the bearing on the loaded side. If the noise in question cannot be isolated an inspection of bearings will be necessary.

KNOCK AT LOW SPEEDS

Low speed knock is usually caused by brinneled universal joints or differential side gear hub to counterbore clearance being too great. Inspect and replace universal joint or differential case and side gear as required.

DRIVE-LINE SNAP

A snap on a sudden start, either forward or reverse, may be caused by a loose companion flange. Remove the propeller shaft and flange and reinstall 180 degrees from original position. Pinion bearing preload and pinion nut torque must be reset to original settings upon reinstallation.

BACKLASH CLUNK

Excessive clunk on acceleration and deceleration can be caused by anyone of the following items or a combination; (excessive clearance between) (1) Differential pinion shaft to differential case, (2) Axle shaft to differential side gear splines, (3) Differential side gear hub to differential case counterbore, (4) Differential side gear to pinion, (5) Worn thrust washers, (6) Drive gear backlash. Measure and inspect components and replace as required and/or adjust to proper specifications.

ENGINE AND TRANSMISSION NOISE

Sometimes noises which seem to originate in the rear axle are actually that of the engine or transmission. To diagnose which unit is actually causing the noise, observe the approximate vehicle speed and conditions under which the noise is most pronounced; stop the vehicle in a quiet place to avoid any interfering noises. With engine running and transmission in neutral, run engine slowly up and down through engine speeds corresponding to approximate car speed at which the noise was most pronounced. If a noise similar is produced in this manner it usually can be assumed that the noise was caused by the engine or transmission and not that of the rear axle.

PROPELLER SHAFT VIBRATION

Objectional vibrations at high speed (65 MPH or higher) may be caused by a propeller shaft that is out of balance or worn universal joints. Out of balance may be due to a damaged or bent shaft.

To determine whether propeller shaft is causing the vibration in question; road test the vehicle through speed range and note speed at which vibration is most pronounced. Shift transmission into lower gear range and drive car at same engine speed as when vibration was most pronounced in direct drive and note any effect on vibration.

If the vibration is still present at the same engine speed, whether in direct drive or in the lower gear, since the propeller shaft speed varies, this cannot be the fault. If the vibration decreases or is eliminated in the lower gear, then propeller shaft is at fault and should be rebalanced or replaced.

REAR AXLE ASSEMBLY 8¾" RING GEAR

INDEX

GENERAL INFORMATION

The 8-3/4" Rear Axle Assembly shown in (Fig. 1), is a semi-floating type and may be divided into four subassemblies; flanged axle drive shafts with related parts (Fig. 2.) differential with drive gear, drive pinion with carrier, and the axle housing. Servicing of the above mentioned subassemblies, with exception of the axle housing may be performed without removing the complete rear axle assembly from the vehicle.

Gear ratio identification numbers will be stamped on a metal tag and attached by means of the rear axle housing-to-carrier bolt.

Some 8-3/4" large stem differential and carrier assemblies have incorporated a collapsible spacer which bears against the inner races of the front and rear bearing. This collapsible spacer is used to establish preload on the pinion bearings.

Adjustment of pinion depth of mesh is obtained by placing a machined shim between the pinion head and the rear pinion bearing cone.

The differential bearings are larger on both the conventional and Sure-Grip Differentials and are not interchangeable with previous years bearings.

The Sure-Grip Differential is available as optional equipment in the 8-3/4" rear axle assembly. The new Sure-Grip Differential is of a two piece construction similar to the old type and is completely interchangeable with the previous type and will be serviced as a complete assembly only. Refer to the "Sure Grip Differential" Section of the Axle Group for the servicing procedure.

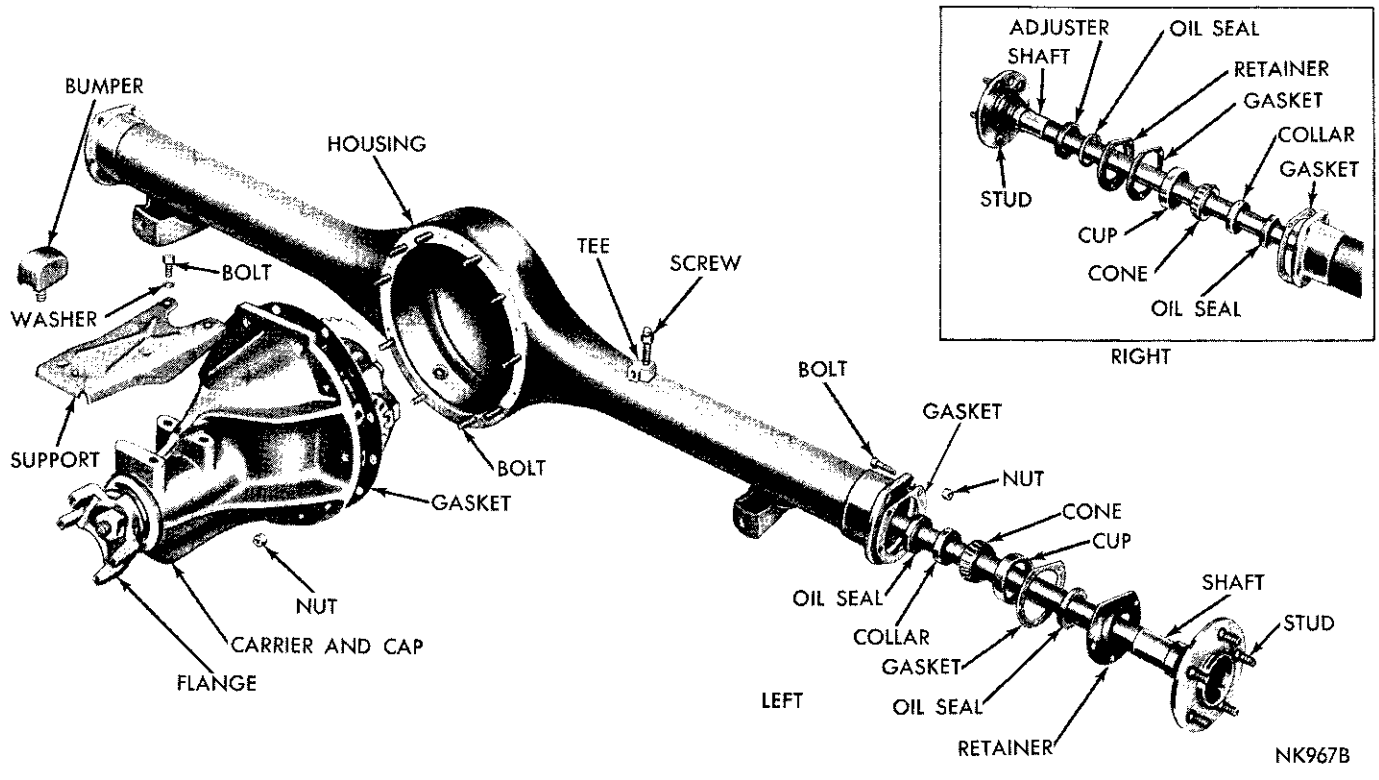

Fig. 1—8-3/4" Rear Axle Assembly

SHOULD THE REAR AXLE BECOME SUBMERGED IN WATER, THE LUBRICANT MUST BE CHANGED IMMEDIATELY TO AVOID THE POSSIBILITY OF EARLY AXLE FAILURE RESULTING FROM CONTAMINATION OF THE LUBRICANT BY WATER DRAWN INTO THE VENT.

SERVICE PROCEDURES

AXLE SHAFTS AND BEARINGS

CAUTION: It is absolutely necessary that anytime an axle assembly is serviced, and the axle shafts are loosened and removed, the axle shaft gaskets and inner axle shaft oil seals must be replaced.

The service procedures for the removal and installation of the axle shaft bearings and collars differ on the Imperial, due to a change in the material hardness of the collar. It will be necessary that this procedure be followed to assure that axle shaft is not damaged in any way during the servicing.

Removal (All models)

(1) With wheels removed, remove clips holding brake drum on axle shaft studs and remove brake drum.

(2) Using access hole in axle shaft flange, remove retainer nuts, the right shaft with threaded adjuster in retainer plate will have a lock under one of the studs that should be removed at this time.

(3) Attach axle shaft remover Tool C-3971 (Fig. 3) use Tool C-3971 and adapter SP-5168 on Imperial only, to axle shaft flange and remove axle shaft. Remove brake assembly and gaskets.

(4) Remove axle shaft oil seal from axle housing using Tool C-637 (Fig. 4).

(5) Wipe axle housing seal bore clean and install a new axle shaft oil seal using Tool C-839 (Fig. 5).

Disassembly (All Models except Imperial)

CAUTION: To prevent the possibility of damaging axle shaft seal surface, slide protective sleeve SP-5041 over the seal surface next to bearing collar.

CAUTION: Under no circumstances should axle shaft collars or bearings be removed using a torch. The use of a torch in the removal of the axle shaft collars or bearings is an unsafe practice, because heat is fed into the axle shaft bearing journal and thereby weakens this area.

(1) Position axle shaft bearing retaining collar on a heavy vise or anvil and using a chisel, cut deep grooves into retaining collar at 90° intervals (Fig. 6). This will enlarge bore of collar and permit it to be driven off of axle shaft.

(2) Remove bearing roller retainer flange by cutting off lower edge with a chisel (Fig. 7).

(3) Grind a section off flange of inner bearing cone (Fig. 8) and remove bearing rollers (Fig. 9).

(4) Pull bearing roller retainer down as far as pos-

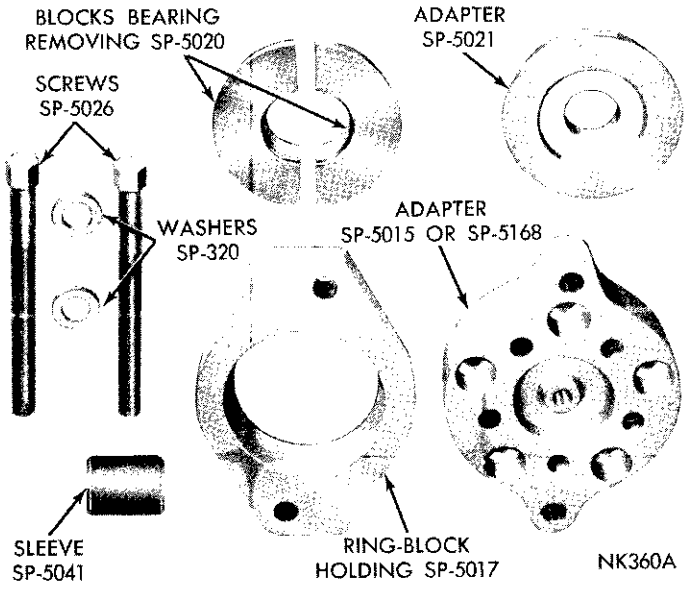

Fig. 3—Tool Set C-3971

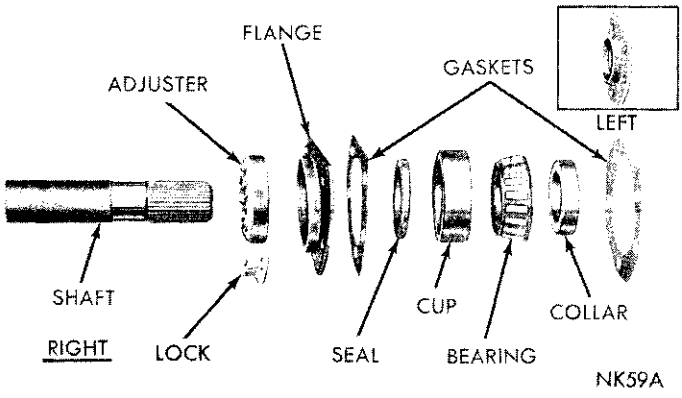

Fig. 2—Axle Shaft Disassembled

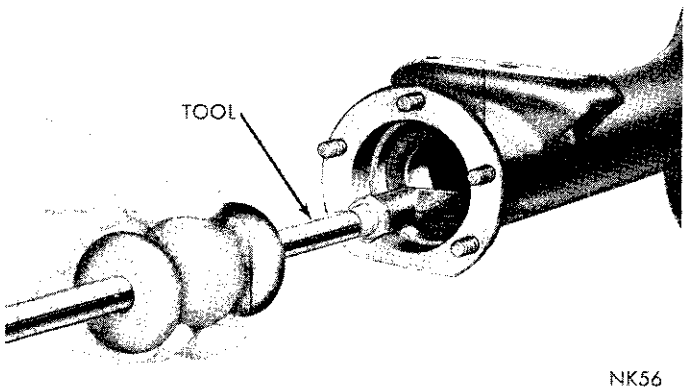

Fig. 4—Removing Axle Shaft Oil Seal

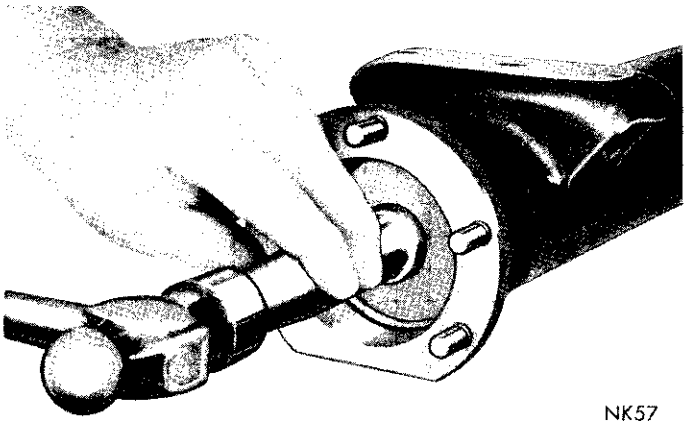

Fig. 5—Installing Axle Shaft Oil Seal

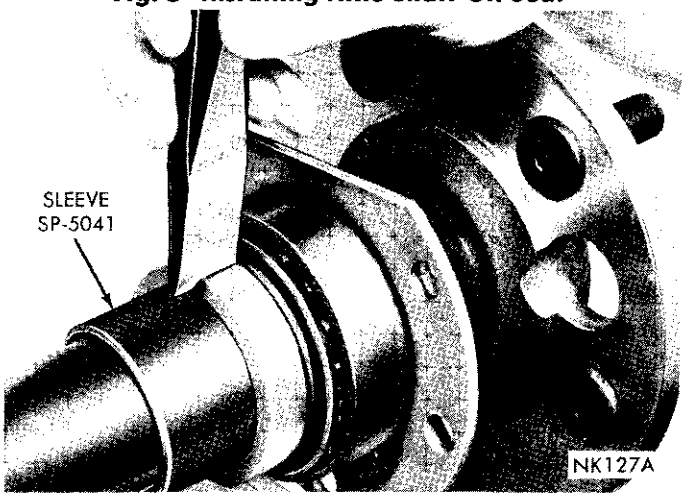

Fig. 6—Notching Bearing Retainer Collar

sible and cut with a pair of side cutters and remove (Fig. 10).

(5) Remove roller bearing cup and protective sleeve SP-5041 from axle shaft.

CAUTION: Sleeve SP-5041 should not be used as a protector for the seal journal when pressing off the bearing cone, as it was not designed for this purpose.

(6) To avoid scuffing seal journal when bearing

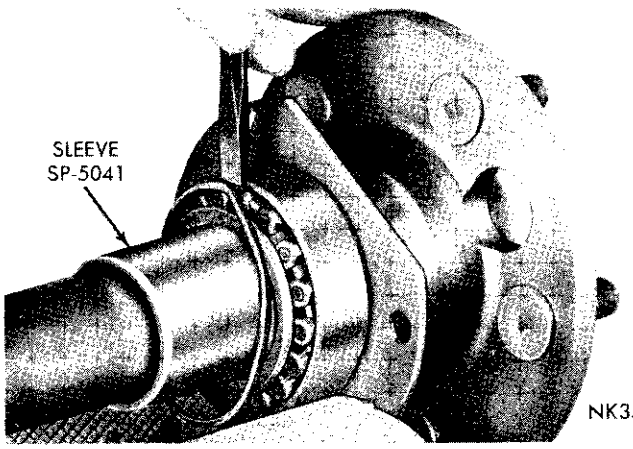

Fig. 7—Removing Roller Retainer

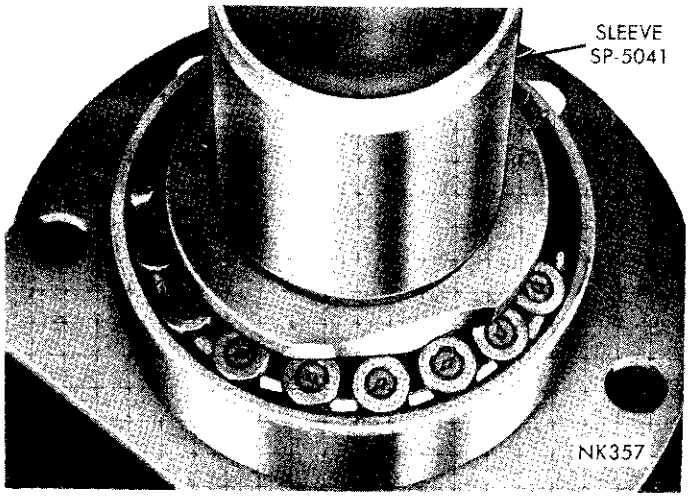

Fig. 8—Flange Ground Off Inner Cone

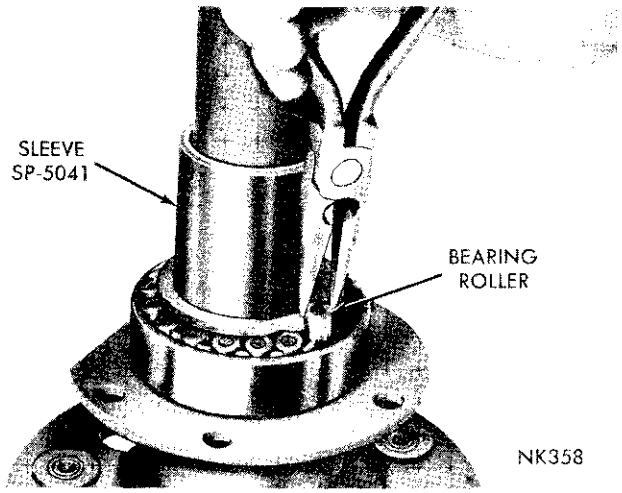

Fig. 9—Removing Bearing Rollers

cone is being removed, it should be protected by single wrap of .002 thickness shimstock held in place by a rubber band (Fig. 11).

(7) Remove the bearing cone using Tool C-3971 (Fig. 3). Tighten bolts of tool alternately until cone is removed (Fig. 12).

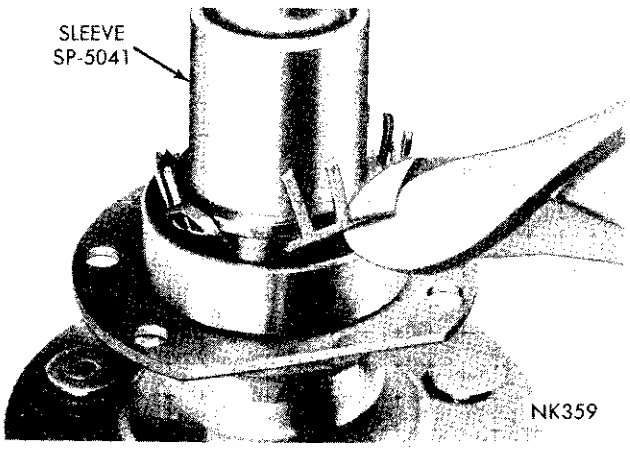

Fig. 10—Cutting Out Roller Bearing Retainer

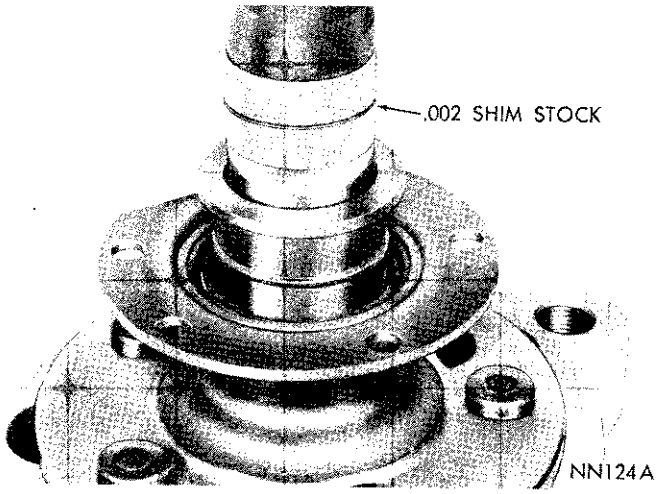

Fig. 11—Seal Journal Protection

(8) Remove seal in bearing retainer plate and replace with new seal.

Assembly

(1) Install retainer plate and seal assembly on axle shaft.

(2) Lubricate wheel bearings with Multi-Purpose Grease NLGI Grade 2 EP.

(3) Install a new axle shaft bearing cup, cone and collar on shaft using Tool C-3971 (Fig. 13) and tighten bolts of tool alternately until bearing and collar are seated properly.

(4) Inspect axle shaft seal journal for scratches and polish with #600 crocus cloth if necessary.

Disassembly (Imperial)

CAUTION: Under no circumstances should axle shaft collars or bearings be removed using a torch. The use of a torch in the removal of the axle shaft collars or bearings is an unsafe practice, because heat is fed into the axle shaft bearing journal and, thereby weakens this area.

(1) Slide protective sleeve SP-5041 over the seal

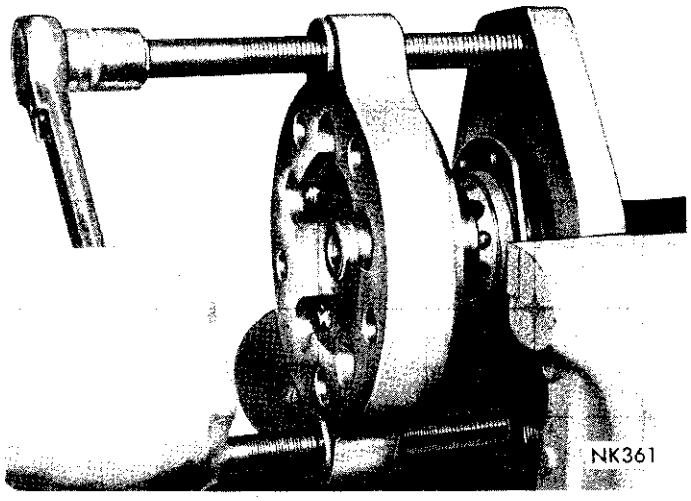

Fig. 12—Removing Bearing Cone with Tool C-3971

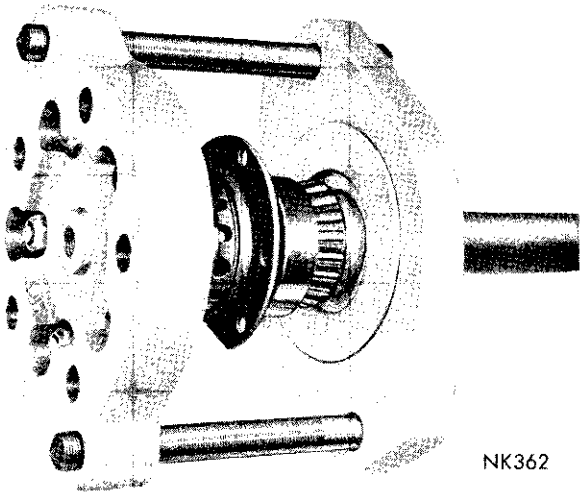

Fig. 13—Installing New Bearing and Collar

surface next to bearing collar and tape in place. This will prevent the possibility of seal surface being damaged during the cutting of roller retainer, grinding of collar and inner bearing race and splitting of collar.

(2) Remove bearing roller retainer flange by cutting off lower edge with a chisel (Fig. 7).

(3) Grind axle shaft collar in one position to approximate thickness of protective sleeve SP-5041. At same time grind a portion of inner bearing race so bearing rollers can be removed (Fig. 14).

(4) Position axle shaft bearing retaining collar on a heavy vise or anvil and using a chisel, cut a groove into collar at position that you previously ground. Collar should split and, which in turn will enlarge bore and permit collar to be driven off of axle shaft.

(5) Remove bearing rollers at ground section of inner bearing race (Fig. 9).

(6) Pull bearing roller retainer down as far as possible and cut with a pair of side cutters and remove (Fig. 10).

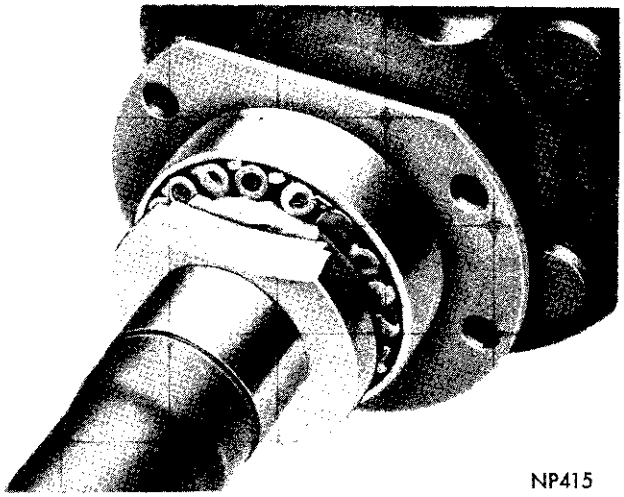

Fig. 14—Collar and Inner Race Ground Prior to Removal (Imperial)

(7) Remove roller bearing cup and protective sleeve SP-5041 from axle shaft.

CAUTION: Sleeve SP-5041 should not be used as a protector for the seal journal when pressing off the bearing cone, as it was not designed for this purpose.

(8) To avoid scuffing seal journal when bearing cone is being removed, it should be protected by a single wrap of .002 thickness shimstock held in place by a rubber band (Fig. 11).

(9) Remove bearing cone using Tool C-3971 and adapter SP-5168. Tighten bolts of tool alternately until cone is removed (Fig. 12).

(10) Remove seal in bearing retainer plate and replace with new seal.

Assembly (Imperial)

(1) Install retainer plate and seal assembly on axle shaft.

(2) Lubricate wheel bearings with Multi-Purpose Grease NLGI Grade 2 E.P. or equivalent.

(3) Install a new axle shaft bearing cup, cone on axle shaft using Tool C-3971 and adapter SP-5168 (Fig. 13) and tighten bolts of tool alternately until bearing is seated properly. Repeat same step for installing the collar.

(4) Inspect axle shaft seal journal for scratches and polish with #600 crocus cloth if necessary.

Installation

(1) Clean axle housing flange face and brake support plate thoroughly. Install a new rubber asbestos gasket on axle housing studs, followed by brake support plate assembly on left side of axle housing.

(2) Apply a thin coating of Multi-Purpose Grease, NLGI Grade 2 E.P. or equivalent to the outside diameter of the bearing cup prior to installing in the bearing bore. This operation is necessary as a corrosion preventative.

(3) Install foam gasket on the studs of axle housing and carefully slide axle shaft assembly through oil seal and engage splines in differential side gear.

(4) Tap end of axle shaft lightly with a non-metallic mallet to position axle shaft bearing in housing bearing bore. Position retainer plate over axle housing studs. Install retainer nuts and tighten 30-35 foot-pounds. Start by tightening bottom nut.

(5) Repeat step (1) for right side of axle housing.

(6) Back off threaded adjuster of right axle shaft assembly until inner face of adjuster is flush with inner face of retainer plate. Carefully slide axle shaft assembly through oil seal and engage splines in differential side gears.

(7) Repeat step (4).

AXLE SHAFT END PLAY

CAUTION: When setting axle shaft end play, both rear wheels must be off the ground, otherwise a false end play setting will occur.

(1) Using a dial indicator mounted on the left brake support (Fig. 15), TURN THE ADJUSTER CLOCKWISE UNTIL BOTH WHEEL BEARINGS ARE SEATED AND THERE IS ZERO END PLAY IN THE AXLE SHAFTS. BACK OFF THE ADJUSTER COUNTERCLOCKWISE APPROXIMATELY FOUR NOTCHES TO ESTABLISH AN AXLE SHAFT END PLAY OF .008-.018 INCH.

(2) Tap end of left axle shaft lightly with a non-metallic mallet to seat right wheel bearing cup against adjuster, and rotate axle shaft several revolutions so that a true end play reading is indicated.

(3) Remove one retainer plate nut, install adjuster lock. If tab on lock does not mate with notch in adjuster, turn adjuster slightly until it does. Install nut and tighten 30-35 foot-pounds.

(4) Recheck axle shaft end play. If it is not within the tolerance of .008-.018 inch, then repeat adjustment procedure.

(5) Remove dial indicator and install brake drum, drum retaining clips and wheel.

REAR AXLE HOUSING

Removal

(1) Raise vehicle and support body at front of rear springs.

(2) Block brake pedal in the up position using a wooden block.

(3) Remove rear wheels.

(4) Disconnect hydraulic brake hose at connection on left side of underbody.

(5) Disconnect parking brake cable.

To maintain proper drive line balance when reassembling, make scribe marks on the propeller shaft universal joint and the pinion flange before removal.

(6) Disconnect propeller shaft at differential yoke

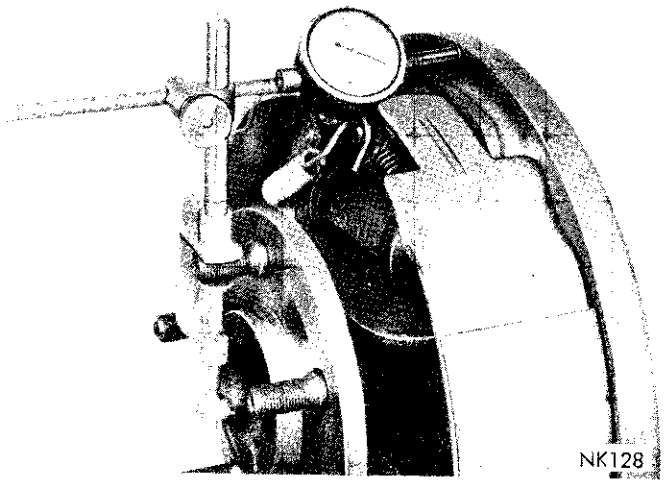

Fig. 15—Measuring Axle Shaft End Play

and secure in an upright position to prevent damage to front universal joint.

(7) Remove shock absorber from spring plate studs and loosen rear spring "U" bolt nuts and remove "U" bolts.

(8) Remove the assembly from vehicle.

Installation

(1) With body of vehicle supported at front of rear springs, position the rear axle assembly spring seats over the spring center bolts.

(2) Install spring "U" bolts and tighten nuts to 45 foot-pounds and install shock absorbers on spring plate studs. (DO NOT OVER TIGHTEN "U" BOLT NUTS.)

(3) Install propeller shaft (match scribe marks on propeller shaft universal joint and pinion flange). Tighten clamp screws to 15 foot-pounds.

(4) Connect parking brake cable.

(5) Connect hydraulic brake hose, bleed and adjust brakes.

(6) Install rear wheels.

(7) If carrier was removed from axle housing during the removal operation, fill axle with proper amount and type of lubricant; see "Specifications" in Lubrication section Group "O".

Welding Rear Axle Housing

The axle housing should be completely disassembled if it is to be welded with arc welding equipment. It is also possible to weld the assembled housing with gas welding equipment, if precaution is taken to protect gaskets and heat treated parts.

DIFFERENTIAL AND CARRIER

Removal

(1) Remove flanged axle drive shafts.

(2) Disconnect rear universal joint and support propeller shaft up and out of the way to prevent damage to the front universal joint.

(3) Remove the rear axle lubricant.

(4) Loosen and remove the carrier-to-housing attaching nuts and lift the carrier assembly from axle housing.

Disassembly

Side play and runout check taken during disassembly will be very useful in reassembly.

(1) Mount carrier in Stand DD-1014 and attach dial indicator Tool C-3339 to differential carrier flange in a position so pointer of indicator squarely contacts back face of ring gear (Fig. 16). With a screw driver positioned between bearing cap and differential case flange, then using a prying motion determine if side play is present. If side play is evident, remove adjuster lock and loosen adjuster slightly and retighten adjuster sufficiently to eliminate side play.

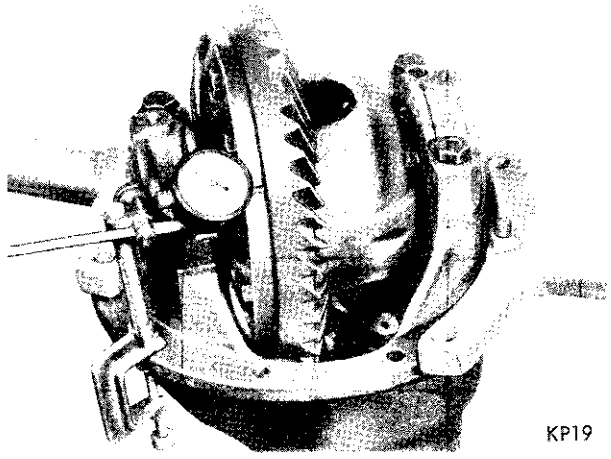

Fig. 16—Checking for Runout and Zero End Play

(2) Rotate drive gear several complete revolutions while noting total indicator reading. Mark drive gear and differential case at point of maximum runout. The marking of differential case will be very useful later in checking differential case runout. Total indicator reading should be no more than .005 inch. If runout exceeds .005 inch the differential case may be damaged, and a second reading will be required after drive gear has been removed. This operation is covered during "Differential Disassembly". Remove dial indicator.

(3) With Tool C-3281 hold companion flange and remove drive pinion nut and Belleville washer.

(4) Install companion flange remover Tool C-452 and remove flange (Fig. 17).

(5) Using a screwdriver and hammer, remove the drive pinion oil seal from the carrier.

(6) While holding one hand over nose end of carrier, invert carrier in stand. The front pinion bearing cone, shim pack and bearing spacer (where used) will drop from carrier.

(7) Apply identifying punch marks on differential bearing pedestals of carrier, differential bearing caps and bearing adjusters for reassembly purposes (Fig. 18).

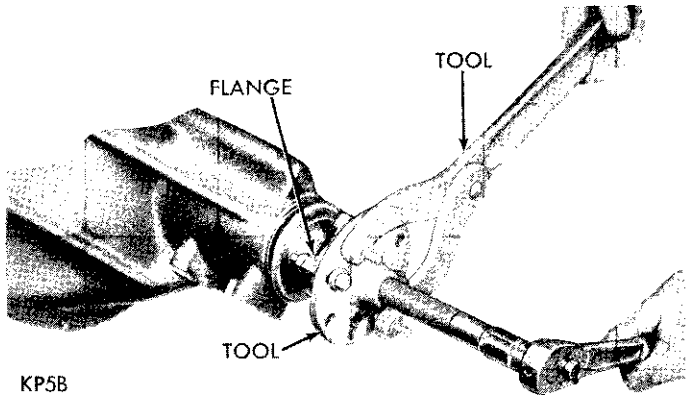

Fig. 17—Removing Companion Flange

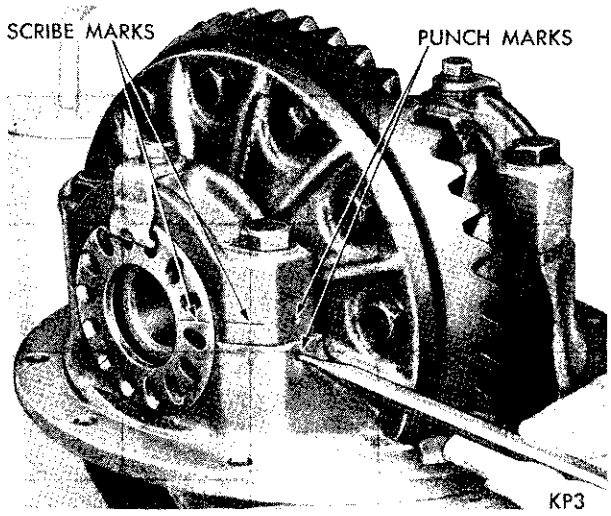

Fig. 18—Marking Bearing Caps and Adjusters

(8) Remove both differential bearing adjuster lock screws and locks.

(9) With a 3/4 inch socket, loosen bearing cap bolts (one on each side) and back off bearing adjusters slightly using spanner wrench Tool C-406A; to remove differential bearing preload. Remove bearing cap bolts, caps and bearing adjusters.

(10) Remove differential and ring gear assembly with bearing cups. Differential bearing cups must be kept with respective bearing cones.

(11) Remove drive pinion and rear bearing assembly from carrier.

Rear Pinion Bearing Removal

(1) Remove drive pinion rear bearing from large stem pinion with Tool C-293 and four (4) No. 37 plates (Fig. 19).

(2) Using a flat end brass drift, remove front and rear pinion bearing cups.

DIFFERENTIAL CASE

Disassembly

(1) Mount differential case and ring gear assembly in a vise equipped with soft jaws (brass).

(2) Remove drive gear bolts. BOLTS ARE LEFT HAND THREAD. With a non-metallic hammer, tap drive gear loose from differential case pilot and remove.

(3) If drive gear runout exceeded .005 inch in step 2 (under "Carrier Disassembly"), recheck the case as follows: Install differential case and respective bearing cups in carrier.

(4) Install bearing caps, cap bolts and bearing adjusters. Tighten bearing cap bolts down lightly and screw in both adjusters with spanner wrench Tool C-406A.

(5) Tighten cap bolts and adjusters sufficiently to prevent any side play in bearings.

(6) Attach a dial indicator Tool C-3339 to carrier flange so pointer of indicator squarely contacts drive gear surface of differential case flange between outer edge flange and drive gear bolt holes (Fig. 20).

(7) Rotate differential case several complete revolutions while noting total indicator reading. This reading must not exceed .003 inch runout. If runout is in excess of .003 inch, differential case must be replaced. **In a case where the runout does not exceed .003 inch it is often possible to reduce the runout by positioning the drive gear 180° from point of maximum runout when reassembling drive gear on differential case.**

(8) With a flat nose drift and hammer, remove differential pinion shaft lock pin from back side of drive gear flange. (The hole is reamed only part way through, making it necessary to remove lock pin from one direction.)

(9) With a brass drift and hammer, remove differential pinion shaft and axle drive shaft thrust block.

(10) Rotate differential side gears until each differential pinion appears at large opening of case.

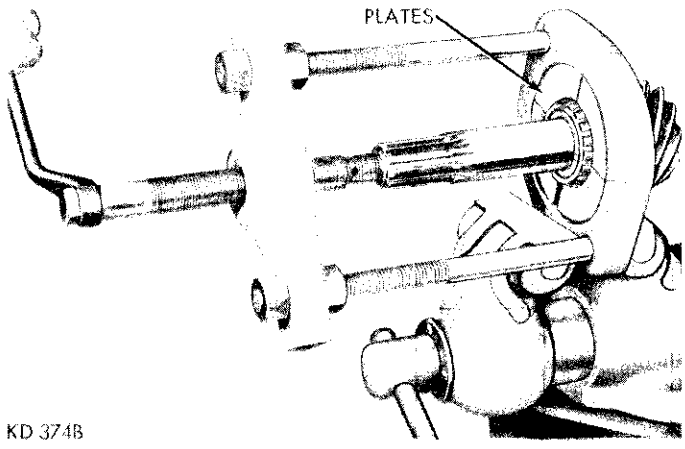

Fig. 19—Removing Drive Pinion Rear Bearing

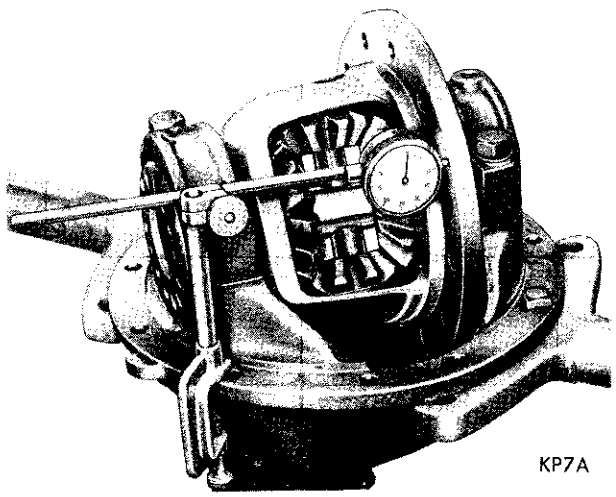

Fig. 20—Checking Drive Gear Mounting Flange Face Runout

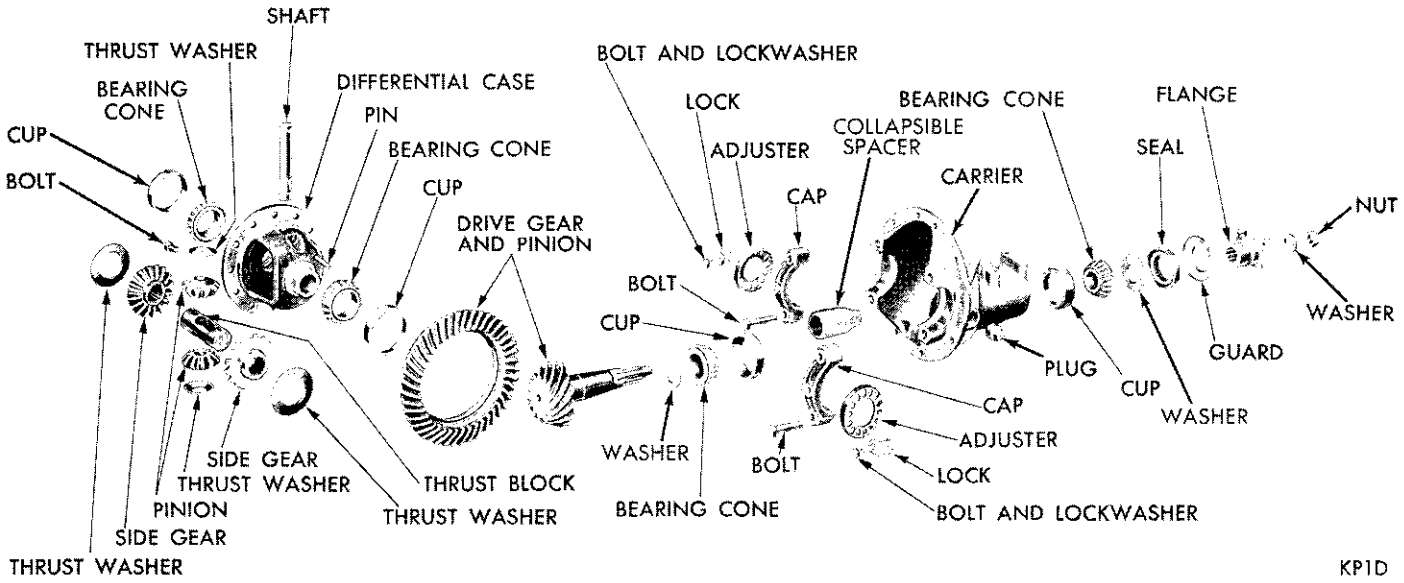

Fig. 21—Differential Carrier Assembly (Large Stem Tapered Pinion)

Remove each pinion and thrust washer at that time.

(11) Remove both differential side gears and thrust washers.

Cleaning and Inspection (Fig. 21)

(1) Clean all parts in a fast evaporating mineral spirits or a dry cleaning solvent and with the exception of bearings, dry with compressed air.

(2) Inspect differential bearing cones, cups and rollers for pitting, spalling or other visible damage. If replacement is necessary, remove bearing cones from differential case with Tool C-293 and adapter plates No. 43 (Fig. 22).

(3) Inspect differential case for elongated or enlarged pinion shaft hole. The machined thrust washer surface areas and counterbores must be smooth and without metal deposits or surface imperfections. If any of the above conditions exist, satisfactory correction must be made or the case replaced. Inspect case for cracks or other visible damage which might render it unfit for further service.

(4) Inspect differential pinion shaft for excessive wear in contact area of differential pinions. Shaft should be smooth and round with no scoring or metal pickup.

(5) Inspect differential side gears and pinions, they should have smooth teeth with a uniform contact pattern without excessive wear or broken surfaces. The differential side gear and pinion thrust washers should be smooth and free from any scoring or metal pickup.

(6) Inspect axle shaft thrust block for excessive wear or visible damage. The wear surface on the opposite ends of the blocks, must be smooth.

(7) Inspect differential pinion shaft lock pin for damage or looseness in case. Replace pin or case as necessary.

(8) Inspect drive gear and pinion for worn or chipped teeth or damaged attaching bolt threads. If replacement is necessary, replace both the drive gear and drive pinion as they are available in matched sets only.

(9) Inspect drive pinion bearing cones, cups and rollers for pitting, spalling, excessive wear, or other

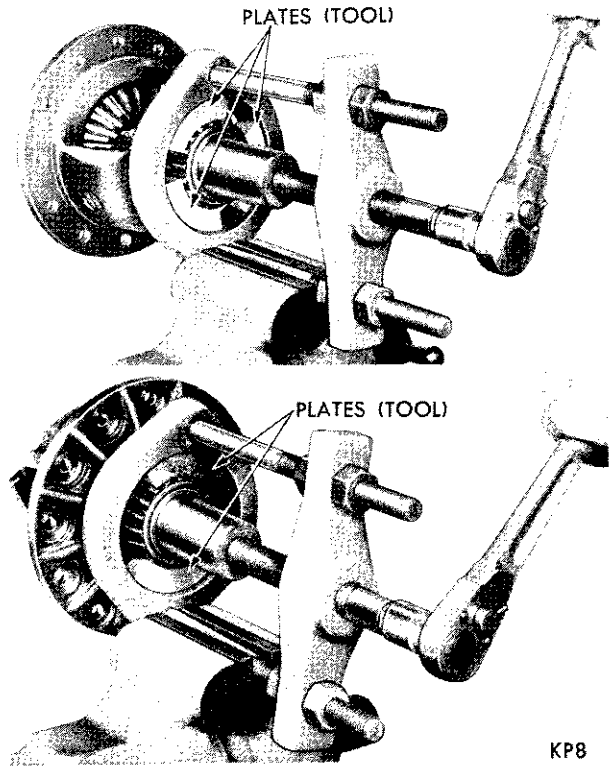

Fig. 22—Removing Differential Bearings

visible damage. If inspection reveals that either are unfit for further service, replace both cup and cone.

(10) Inspect differential carrier for cracks or other visible damage which would render it unfit for further service. Raised metal on the shoulder of bearing cup bores incurred in removing pinion cups should be flattened by use of a flat nose punch.

(11) Inspect drive pinion for damaged bearing journals and mounting shim surface or excessively worn splines. If replacement is necessary, replace both the drive pinion and drive gear as they are available in matched sets only.

(12) Inspect companion flange for cracks, worn splines, pitted, rough or corroded oil seal contacting surface. Repair or replace companion flange as necessary.

ASSEMBLY

LUBRICATE ALL PARTS BEFORE ASSEMBLY WITH LUBRICANT AS SPECIFIED IN (LUBRICATION GROUP "O")

(1) Install thrust washers on differential side gears and position gears in case.

(2) Place thrust washers on both differential pinions and through large window of differential case, mesh the pinion gears with the side gears, having pinions exactly 180 degrees opposite each other.

(3) Rotate side gears 90 degrees to align pinions and thrust washers with differential pinion shaft holes in case.

(4) From pinion shaft lock pin hole side of case, insert slotted end of pinion shaft through case, and the conical thrust washer, and just through one of the pinion gears.

(5) Install thrust block through side gear hub, so that slot is centered between the side gears.

(6) While keeping all of these parts in proper alignment, push pinion shaft into case until locking pin hole in pinion shaft is in exact alignment with its respective hole in case. Install pinion shaft lock pin through hole in case from pinion shaft side of drive gear flange. **The contacting surfaces of the drive gear and differential case flange must be clean and free of all burrs.**

(7) Using an Arkansas stone, relieve the sharp edge of the chamfer on the inside diameter of the ring gear (Fig. 23). **This is very important otherwise during the installation of ring gear on differential case, the sharp edge will remove metal from the pilot diameter of case and can get imbedded between differential case flange and gear; causing gear not to seat properly.**

(8) Position drive gear on differential case pilot, aligning threaded holes of drive gear with those in differential case flange.

(9) Insert drive gear screws (LEFT HAND THREADS) through case flange and into drive gear.

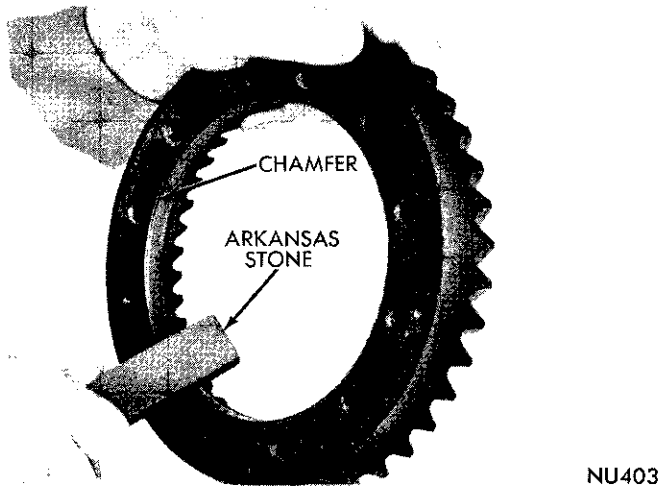

Fig. 23—Stoning Chamfer on Ring Gear

After all cap screws are properly started, tap drive gear against differential case flange with a non-metallic mallet.

(10) Position unit between brass jaws of a vise and alternately tighten each cap screw to 55 foot-pounds.

(11) Position each differential bearing cone on hub of differential case (taper away from drive gear) and with installing Tool C-4086 install bearing cones. An arbor press may be used in conjunction with installing tool.

CAUTION: Never exert pressure against the bearing cage, since this would damage the bearing.

PINION BEARING CUP INSTALLATION

(1) Position pinion bearing cups squarely in bores of carrier. Assemble Tool C-758-D4 (Fig. 24) by placing spacer SP-5387 followed by rear pinion bearing cone over main screw of tool and inserting it into carrier from gear side.

(2) Place front pinion bearing cone over main

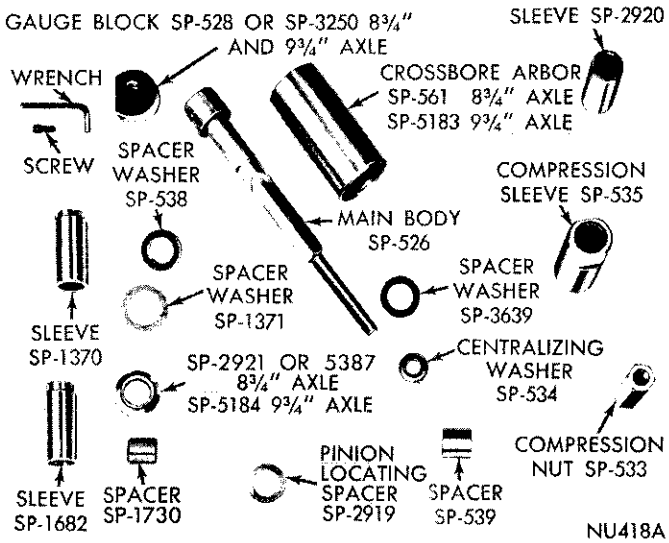

Fig. 24—Rear Axle Setting Gauge Tool C-758-D4

screw of tool followed by compression sleeve SP-535, centralizing washer SP-534, and main screw nut SP-533. Hold compression sleeve with the companion flange holding Tool C-3281 and tighten nut (Fig. 25) allowing tool to rotate as nut is being tightened in order not to brinnel bearing cone or cups. **Do not remove tool after installing cups.**

PINION BEARING PRELOAD AND DEPTH OF MESH SETTING USING TOOL C-758-D4

The 8-3/4" large stem differential and carrier assembly has incorporated a collapsible spacer which bears against the inner races of the front and rear bearings. This collapsible spacer is used to establish pinion bearing preload. The large stem pinion requires the depth of mesh adjustment first while pinion bearing preload is the last operation performed.

The position of the drive pinion with respect to the drive gear (depth of mesh) is determined by the location of the bearing cup shoulders in the carrier and by the portion of the pinion in back of the rear bearing. The thickness of the rear pinion bearing mounting shim suitable for the carrier can be determined by using Tool C-758-D4.

DEPTH OF MESH (Large Stem Pinion)

Inspect differential bearing cups and cones, carrier for grit and dirt or other foreign material. Clean all parts in fast evaporating mineral spirits or a dry cleaning solvent and with the exception of bearing cones, dry with compressed air. **Front Pinion Bearing Cone and Cup Must Never Be Reused Under Any Circumstances.**

(1) Assemble spacer SP-5387 to main section of tool followed by spacer SP-1730. Install rear pinion bearing cone over spacer SP-1730 and against spacer SP-5387 (Fig. 26).

(2) Insert assembly into carrier and install front pinion bearing cone over tool shaft and in its proper position in bearing cup. Install tool spacer, tool thrust washer and tool nut on shaft.

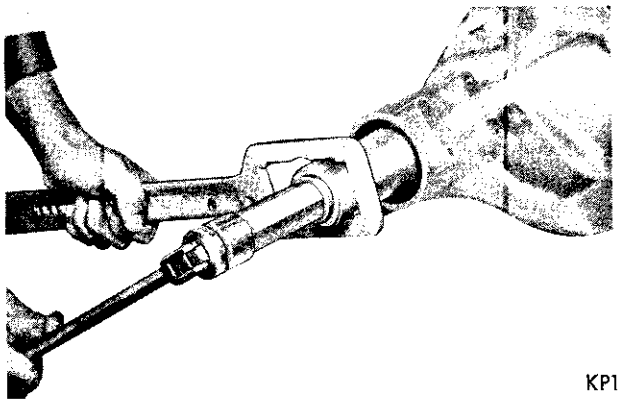

Fig. 25—Seating Bearing Cup in Carrier Housing

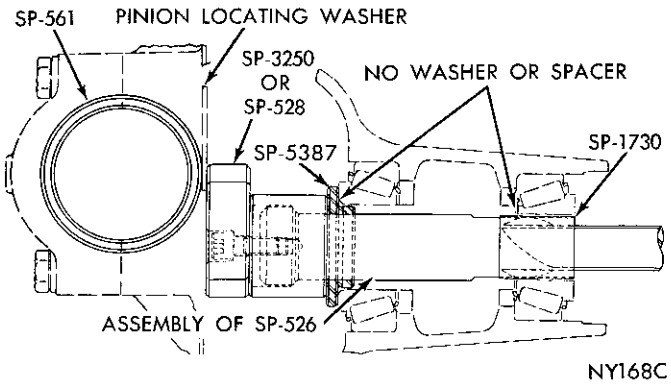

Fig. 26—Tool C-758-D4 Installed in Housing (8-3/4 Large Stem Pinion)

(3) With nose of carrier up, place flange holding Tool C-3281 on compression sleeve. Allow assembly to rotate while tightening nut to not more than 25-50 foot-pounds. **Always make sure bearing cones are lubricated with hypoid gear lubricant.**

(4) Turn tool several complete revolutions in both directions to permit bearing rollers to seat. After bearing rollers are properly seated, check bearing preload by rotating tool with an inch-pound torque wrench. The correct bearing preload should be from 20-30 inch-pounds for new bearings.

(5) With proper bearing preload set, invert carrier in stand and install gauge block SP-528 or SP-3250 to the main screw attaching it with Allen screw securely (Fig. 27). The flat portion of gauge block should be facing differential bearing pedestals.

(6) Position tool arbor SP-561 in differential bearing pedestals of carrier (Fig. 28). Center the arbor so that an approximate equal distance is maintained at both ends. Position differential bearing caps and attaching bolts on carrier pedestals, and insert a piece

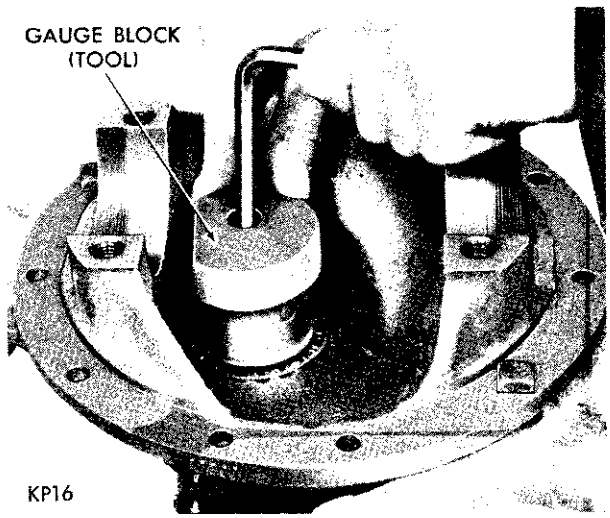

Fig. 27—Installing Gauge Block on Tool

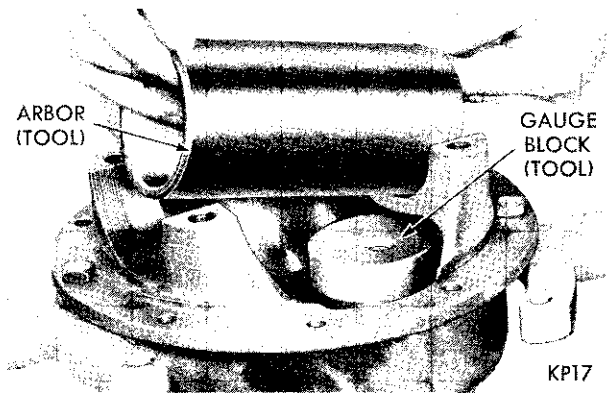

Fig. 28—Installing Arbor in Carrier

of .002 inch shim stock between arbor and each cap. Tighten cap bolts to 10 foot-pounds.

(7) Select a rear pinion bearing mounting shim which will fit between cross arbor and gauge block. This fit must be snug but not too tight (similar to the pull of a feeler gauge. (Fig. 29). This shim is then used in determining the correct thickness shim for installation.

(8) To select a shim for installation, read the marking on end of pinion head (—0, —1, —2, +1, +2, etc). When marking is —, (minus) add that amount to the thickness of shim selected in step (7). When the marking is + (plus), subtract that amount. Example: With a shim .036 inch thick and a pinion marked —2, install a shim .038 inch thick (.036 + .002 = .038). Example: With a shim .036 inch thick and a pinion marked +2, install a washer .034 inch thick, (.036 — .002 = .034) or when a shim .036 inch thick is too loose and .038 inch too thick, use .036 inch shim. Treat other pinion markings in a similar manner. Shims are available in one thousands of an inch increments.

(9) Remove differential bearing caps and remove tool arbor from carrier.

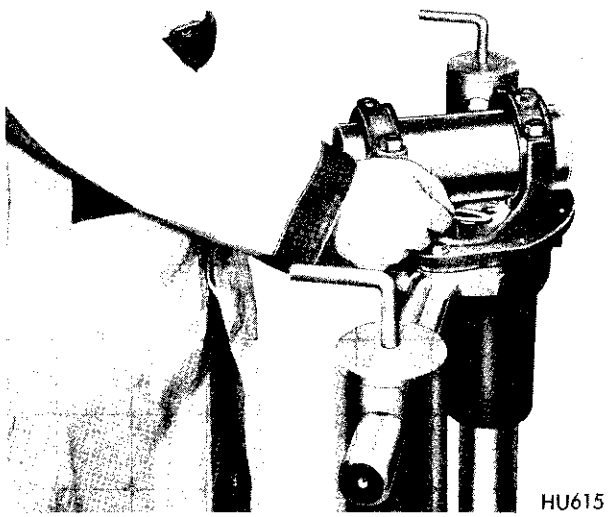

Fig. 29—Determining Spacer Thickness

(10) Reverse carrier in stand so nut of tool is in upright position. Loosen compression nut, and support lower portion of tool in carrier with one hand, remove tool nut, centering washer and compression sleeve. Lower tool down and out of carrier.

(11) Remove front pinion bearing cone from carrier housing.

(12) With stem of drive pinion facing up, add rear pinion bearing mounting shim you selected on pinion stem.

PINION BEARING PRELOAD (Large Stem Pinion)

(1) Position rear pinion bearing cone on pinion stem (small side away from pinion head). Make certain that the contacting surfaces of selected shim, rear bearing cone and pinion head are perfectly clean and free of any foreign particles.

(2) Lubricate front and rear pinion bearing cones with hypoid gear lubricant. Install rear pinion bearing cone onto pinion stem, using Tool C-3095, press bearing cone into place. An arbor press may be used in conjunction with tool.

(3) Insert drive pinion and bearing assembly up through carrier and install collapsible spacer followed by front pinion bearing cone on pinion stem. Install companion flange using Tool C-496 or DD-999 and holding Tool C-3281. This is necessary in order to properly install front pinion bearing cone on stem due to interference fit. Remove tool from pinion stem. **CAUTION:** During the installation of the front pinion bearing be careful not to collapse the spacer.

(4) Apply a light coat of sealer in seal bore of carrier casting and install drive pinion oil seal into carrier using Tool C-4109 or C-3980 (double lip synthetic rubber oil seal) or Tool C-3656 (single lip leather oil seal). The proper tool must be used in order to position the seal the proper depth into the carrier casting.

(5) With pinion supported in carrier, install anti-clang washer on pinion stem. Install companion flange with installing Tool C-496 or DD-999 and holding Tool C-3281.

(6) Remove tools and install Belleville washer (convex side of washer up) and pinion nut.

(7) Hold universal joint flange with holding Tool C-3281 and tighten pinion nut to remove end play in pinion, while rotating the pinion to insure proper bearing seating.

(8) Remove holding tool and rotate pinion several complete revolutions in both directions to permit bearing rollers to seat.

(9) Tighten pinion nut to 170 foot-pounds and measure pinion bearing preload by rotating pinion using an inch-pound torque wrench. The correct preload specifications are 20-35 inch-pounds for new bear-

ings or 10 inch-pounds over the original if the old rear pinion bearing is being reused. Correct bearing preload readings can only be obtained with nose of carrier in upright position. Continue tightening of pinion nut in small increments and checking pinion bearing preload until proper preload is obtained. Bearing preload should be uniform during **complete** revolution. A preload reading that varies during rotation indicates a binding condition which has to be corrected. The assembly is unacceptable if final pinion nut torque is below 170 foot-pounds or pinion bearing preload is not within the correct specifications.

NOTE: UNDER NO CIRCUMSTANCES SHOULD THE PINION NUT BE BACKED OFF TO LESSEN PRELOAD. IF THIS IS DONE A NEW COLLAPSIBLE SPACER MUST BE INSTALLED AND NUT RETIGHTENED UNTIL PROPER PRELOAD IS OBTAINED.

DEPTH OF MESH (Without Using Tool C-758-D4)

If the differential assembly was satisfactorily quiet before being disassembled, the drive pinion must be assembled with new pinion bearings. If replacement parts are installed, a complete readjustment is necessary; the proper thickness shim must be selected and installed. The drive gear and pinion are manufactured and lapped in matching sets and are available in matched sets only. The adjustment position in which the best tooth contact is obtained is marked on the end of the pinion head.

To obtain the proper pinion setting in relation to the drive gear, the correct thickness mounting shim must be selected before the drive pinion is installed in the carrier. The pinion bearing mounting shims are available in one thousands increments from .020-.038 inch. To select the proper thickness shim, proceed as follows: It will be noted that the head of the drive pinion is marked with a plus (+) or minus (—) sign followed by a number ranging from 1 to 4, or zero (0) marking.

If the old and new pinion have the same marking and if the original bearing is being reused, use a mounting shim of the same thickness. But if the old pinion is marked zero (0) and the new pinion is marked +2, try a .002 inch thinner shim. If the new pinion is marked —2, try a .002 inch thicker shim.

Pinion Bearing Preload (Large Stem)

After selecting the correct pinion bearing mounting shim and installing it behind the rear pinion bearing cone proceed as follows: Install the pinion assembly into the carrier. Install the new collapsible spacer followed by new front pinion bearing cone on pinion stem. Press front pinion bearing cone on pinion stem, being careful not to collapse the spacer.

Apply a light coat of sealer to drive pinion oil seal and carrier casting bore and install drive pinion oil seal with Tool C-4109 or C-3980 (synthetic rubber seal or Tool C-3656 (leather seal). Install anti-clang washer and universal joint flange, Belleville washer (convex side of washer up) and nut. Tighten the pinion nut to 170 foot-pounds and using an inch-pounds torque wrench rotate the pinion to determine preload. The correct preload specifications are 20-30 inch-pounds for new bearings or 10 inch-pounds over the original if the old rear pinion bearing is being reused. If preload is not correct, continue to tighten pinion nut in small increments and checking preload until preload on pinion bearings is correct. A minimum of 170 foot-pounds of torque is required on pinion nut. **Under no circumstances should the pinion nut be backed off to lessen preload. If this is done a new pinion bearing collapsible spacer must be installed and nut retightened until proper preload is obtained.**

Installation of Differential and Ring Gear in Carrier

(1) Holding differential and ring gear assembly with bearing cups on respective bearing cones, carefully install the assembly into carrier.

(2) Install differential bearing caps, on respective sides, making certain that identification marks on caps correspond with those on carrier. Install cap bolts and tighten bolts of each cap by hand.

(3) Install differential bearing adjusters, on respective sides, making certain that identification marks correspond. Screw adjuster in by hand. No attempt should be made to apply any excessive pressure at this time.

(4) Using spanner wrenches Tool C-406A to square bearing cups with bearing cone, turn adjusters "IN" until cups are properly square with bearings and end play is eliminated with some backlash existing between the drive gear and pinion (Fig. 30).

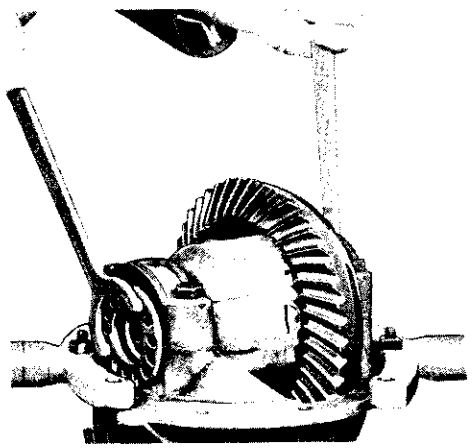

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Fig. 30—Adjusting Differential Bearings

(5) Tighten one differential bearing cap bolt on each side to 85-90 foot-pounds.

DRIVE GEAR AND PINION BACKLASH

Correct drive gear and pinion backlash when properly set is .006 to .008 inch at point of minimum backlash. Rotate drive pinion and ring gear several revolutions in both directions in order to seat the bearing rollers. This is necessary before setting backlash.

(1) Attach a dial indicator Tool C-3339 to carrier flange so pointer of indicator is squarely contacting one drive gear tooth (drive side) (Fig. 31).

(2) Measure backlash between drive gear and pinion at four positions, approximately 90 degrees apart. After point of least backlash has been determined, mark drive gear. **Do not rotate drive gear from point of least backlash until all adjustments have been completed.**

(3) Using Tool C-406A (spanner wrench) turn both bearing adjusters equally (in same direction) until backlash between drive gear and pinion is .0005 to .0015 inch. **This backlash variation is given to permit alignment and installation of the bearing adjuster lock, lockwasher and attaching screw. The adjuster must only be turned in a clockwise direction and under no circumstances should be backed off.**

(4) Install adjuster lock on bearing cap, back-face side of drive gear. Tighten lock screw to 15 to 20 foot-pounds.

Differential Bearing Preload

(1) Turn bearing adjuster (tooth side of drive gear) (Fig. 32) in a notch at a time (notch referred to is the adjuster lock holes) until backlash between drive gear and pinion is a minimum of .006 to .008 inch. This will preload differential bearings and establish correct backlash.

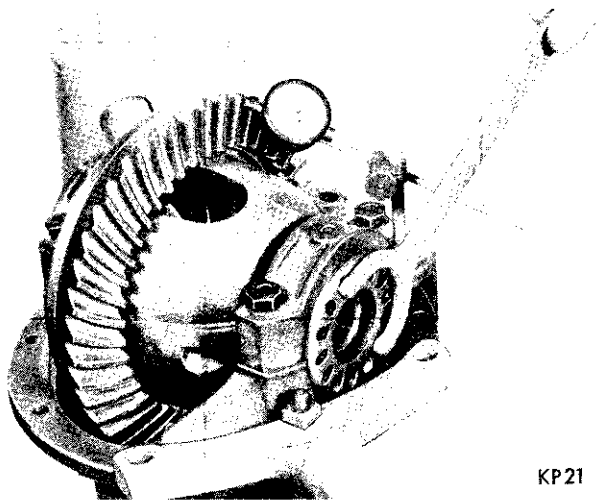


Fig. 31—Measuring Backlash between Drive Gear and Pinion

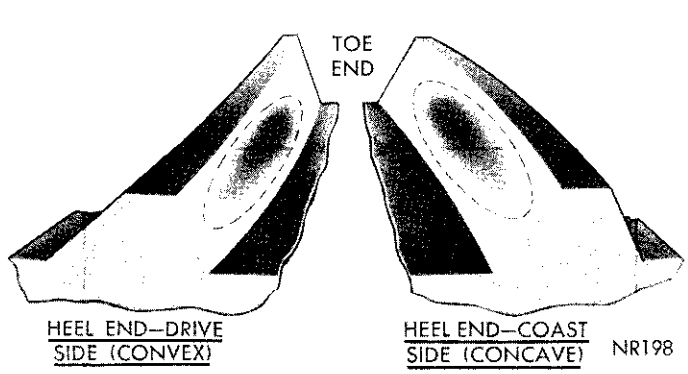


Fig. 32—Desired Tooth Contact Under Light Load

(2) Tighten the remaining two differential bearing cap bolts to 85-90 foot-pounds.

(3) Install remaining adjuster lock, lockwasher and attaching screw. Tighten to 15-20 foot-pounds.

GEAR TOOTH CONTACT PATTERN

The gear tooth contact pattern will disclose whether the correct rear pinion bearing mounting shim has been installed and the drive gear backlash set properly. Backlash between the drive gear and pinion must be maintained within the specified limits until correct tooth contact pattern is obtained.

(1) Apply a thin film of red or white lead on both the drive and coast side of the drive gear teeth. Rotate drive gear one complete revolution in both directions while load is being applied with a round bar or screwdriver between the carrier casting and differential case flange. This action will leave a distinct contact pattern on both the drive and coast side of the drive gear teeth.

(2) Observe the contact pattern on the drive gear teeth and compare with those in figures 32, 33 and 35 to determine if pattern is properly located. With pinion depth of mesh and gear backlash set properly, your contact pattern should resemble that in (Fig. 32). Notice that the correct contact pattern is well centered on both drive and coast sides of the teeth. When tooth contact patterns are obtained by hand, they are apt to be rather small. Under the actual operating load, however, the contact area increases.

(3) If after observing the contact pattern you find it resembles that in (Fig. 33), the drive pinion is too far away from centerline of the ring gear, the contact pattern will appear high on the heel on drive side and high on toe on coast side. To correct this type tooth contact pattern, increase the thickness of the rear pinion bearing mounting spacer (Fig. 34), which will cause the high heel contact on drive side to lower and move toward the toe; the high toe contact on coast side will lower and move toward the heel.

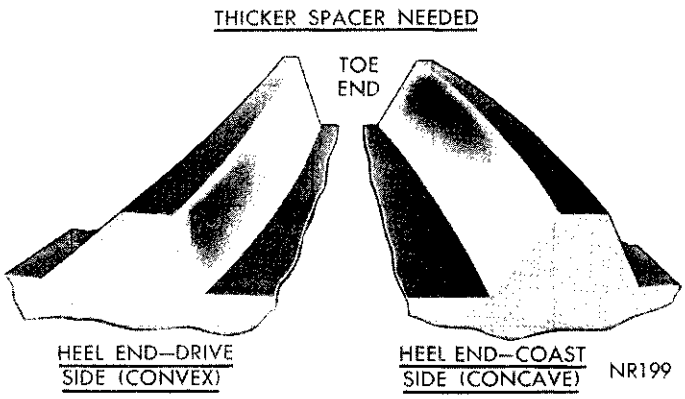


Fig. 33—Incorrect Tooth Contact Pattern (Increase Spacer Thickness)

(4) If after observing the contact pattern you find it resembles that in (Fig. 35), the drive pinion is too close to the ring gear, the pattern will appear low on the toe on drive side and low heel contact on coast side. To correct this type tooth contact pattern, decrease the thickness of the rear pinion bearing mounting spacer (Fig. 36), which will cause the low toe contact on drive side to raise and move toward the heel; low heel contact on coast side will raise and move toward the toe.

DIFFERENTIAL AND CARRIER

Installation

(1) Thoroughly clean the gasket surfaces of the carrier and rear axle housing.

(2) Using a new gasket, install the carrier assembly into the axle housing. Tighten the carrier to axle housing nuts to 45 foot-pounds.

(3) Refer to "Installation of Rear Axle Shaft," when installing and setting axle shaft end play.

(4) Install propeller shaft (match scribe marks on propeller shaft universal joint and pinion flange). Tighten clamp screws to 15 foot-pounds.

(5) Remove wooden block from under brake pedal and bleed and adjust brakes.

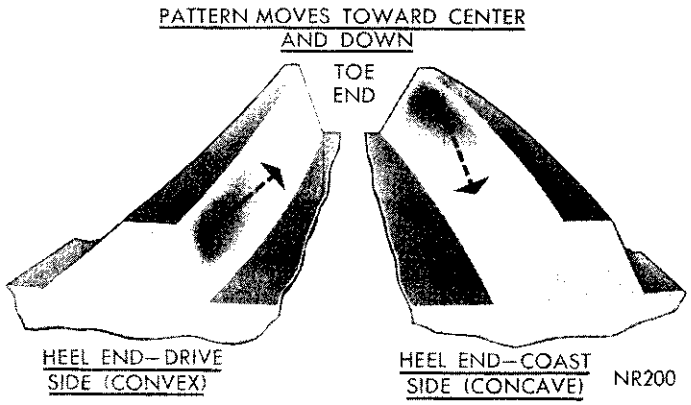


Fig. 34—Effect on Tooth Contact Pattern as Spacer Thickness is Increased

(6) Install rear wheels and tighten to 65 foot-pounds.

LUBRICATION

Refill axle assembly with Multipurpose Gear Lubricant, as defined by MIL-L-2105B (API GL-5) should be used in all rear axles with conventional differentials; Chrysler Hypoid Lubricant part number 2933565 is an oil of this type and is recommended or an equivalent be used.

In Sure-Grip axles on all 1970 Vehicles it is recommended that only Chrysler Hypoid Lubricant part number 2933565 or an equivalent be used. This lubricant, recommended for conventional differentials too, contains special additives to provide proper differential durability and performance.

Anticipated Temperature Range	Viscosity Grade
Above — 10°F.	SAE 90
As low as — 30°F.	SAE 80
Bleow — 30°F.	SAE 75

REMOVAL AND REPLACEMENT OF DRIVE PINION FLANGE AND OIL SEAL IN VEHICLE

On large stem carriers which use the collapsible spacer to obtain pinion bearing preload, the following procedure for the removal and replacement of the drive pinion flange and pinion oil seal must be followed to assure that the proper bearing preload is maintained in the axle assembly. If this procedure is not followed it could result in a premature failure of the axle.

(1) Raise vehicle on hoist and make scribe marks on propeller shaft universal joint, drive pinion flange and end of pinion stem.

(2) Disconnect propeller shaft at pinion flange and secure in an upright position to prevent damage to front universal joint.

(3) Remove the rear wheels and brake drums to prevent any drag or a possible false preload reading could occur.

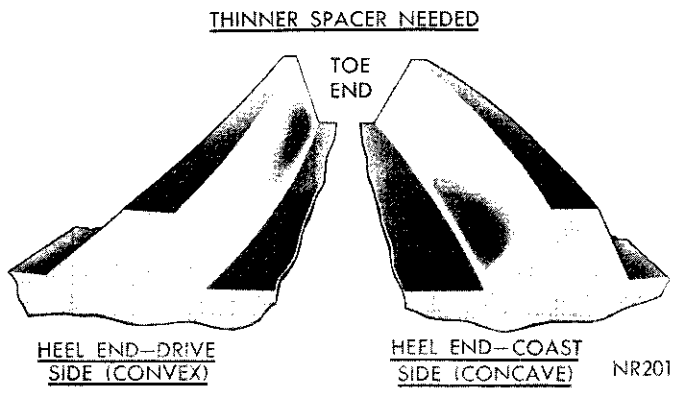


Fig. 35—Incorrect Tooth Contact Pattern (Decrease Spacer Thickness)

(4) Using inch-pound torque wrench C-685 measure pinion bearing preload by rotating pinion with handle of wrench floating, read the torque while wrench is moving through several complete revolutions and record. **This operation is very important because preload must be carefully reset when reassembling.**

(5) With Tool C-3281 hold companion flange and remove drive pinion nut and Belleville washer.

(6) Install companion flange remover Tool C-452 and remove flange. Lower rear of vehicle to prevent lubricant leakage.

(7) Using a screwdriver and hammer, remove the pinion oil seal from the carrier and clean the oil seal seat.

(8) Check splines on pinion shaft stem to be sure they are free of burrs or are not worn badly. If burrs are evident remove them using crocus cloth by working in a rotational motion. Wipe the pinion shaft clean.

(9) Inspect companion flange for cracks, worn splines, pitted, rough or corroded oil seal contacting surface. Repair or replace companion flange as necessary.

(10) Apply a light coat of sealer in seal bore of carrier and install drive pinion oil seal into carrier using Tool C-4109 or C-3980 (Double lip synthetic rubber oil seal) or Tool C-3656 (single lip leather oil seal). The proper tool must be used in order to properly position the seal the correct depth into the carrier casting.

(11) Position companion flange on pinion stem being careful to match scribe marks made previously before removal.

(12) Install companion flange with installing Tool C-496 or DD-999 and holding Tool C-3281.

(13) Remove tool and install Belleville washer (convex side of washer up) and pinion nut.

(14) Hold universal joint flange with holding Tool C-3281 and tighten pinion nut to 170 foot-pounds. Rotate pinion several complete revolutions to assure that bearing rollers are properly seated. Using an inch-pound torque wrench C-685 measure pinion bearing preload. Continue tightening pinion nut and checking preload until preload is at the original established setting you found in step 4. Under no circumstances should the preload be more than 5 inch-pounds over the established setting found at time of checking in step 4 of procedure.

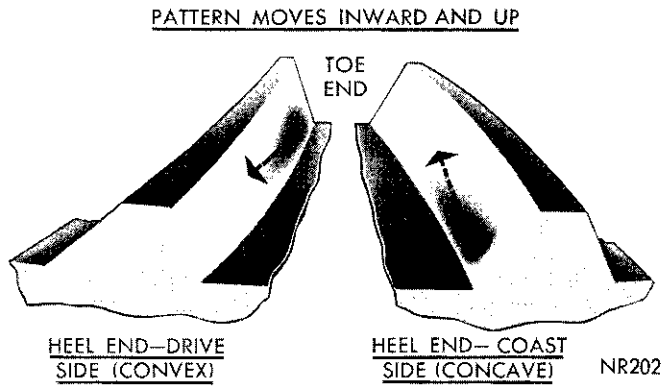


Fig. 36—Effect on Tooth Contact Pattern as Spacer Thickness is Decreased

Bearing preload should be uniform during a complete revolution. A preload reading that varies during rotation indicates a binding condition which has to be corrected. The assembly is unacceptable if final pinion nut torque is below 170 foot-pounds or pinion bearing preload is not within the correct specifications.

CAUTION: Never back off the pinion nut to lessen pinion bearing preload. If the desired preload is exceeded a new collapsible spacer must be installed and nut retightened until proper preload is obtained. In addition, the universal joint flange must never be hammered on, or power tools used.

(15) Install propeller shaft (match scribe marks on propeller shaft universal point and pinion flange). Tighten clamp screws to 15 foot-pounds.

(16) Install the rear brake drums and wheels and tighten nuts 65 foot-pounds.

(17) Raise the vehicle to a level position so axle assembly is at correct running position and check lubricant level. Add the correct type of lubricant required to bring lubricant to proper level.

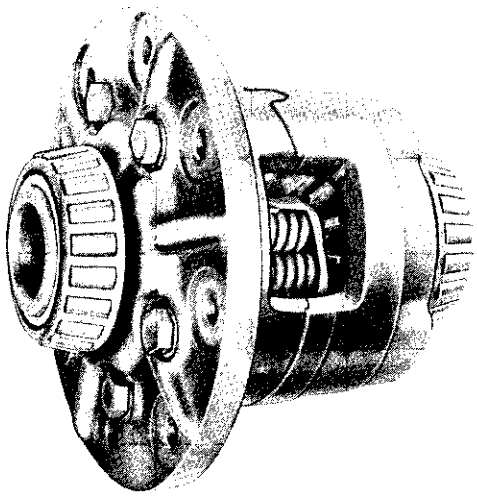
SURE-GRIP DIFFERENTIAL

INDEX

GENERAL INFORMATION

A new Sure-Grip differential being offered as a special equipment option in the 8-3/4″ rear axles (Fig. 1).

The Sure-Grip differential design is basic and simple and consists of a two piece case construction and is completely interchangeable with the conventional



NU404

Fig. 1—Sure-Grip Differential

differential and also the previous type Sure-Grip differential (Fig. 2).

A conventional differential allows the driving wheels to rotate at different speeds while dividing the driving torque equally between them. This function is ordinarily desirable and satisfactory. However, the total driving torque can be no more than double the torque at the lower-traction wheel. When traction conditions are not the same for both driving wheels, a portion of the available traction cannot be used.

The SURE-GRIP differential allows the driving wheel with the better traction condition to develop more driving torque than the other wheel, so that the total driving torque can be significantly greater than with a conventional differential.

SURE-GRIP is not a locking differential. In normal driving conditions the controlled internal friction is easily overcome during cornering and turning so that the driving wheels can turn at different speeds. Extreme differences in traction conditions at the driving wheels may permit one wheel to spin.

SURE-GRIP has been engineered to perform its specialized functions with minimum effect on normal vehicle operations.

The cone clutch SURE-GRIP differentials are similar to corresponding 8-3/4 conventional differentials except for the incorporation of the helix-grooved cones that clutch the side gears to the differential case. The grooves assure maximum lubrication of the clutch surface during operation. The cone brakes and side gears are statically spring preloaded to provide an internal resistance to the differential action within the differential case itself. This internal resistance assures an adequate amount of pull while under extremely low tractive conditions such as mud, snow or ice when encountered at one of the rear wheels.

During torque application to the axle, the initial spring loading of the cone brakes is supplemented by the gear separating forces between the side gears and differential pinions which progressively increases the friction in the differential. It should be remembered that the Sure-Grip differential is not a positive locking type and will release before excessive driving force can be applied to one wheel.

SURE-GRIP DIFFERENTIAL IDENTIFICATION

Identification of sure-grip differential assembly can easily be made by lifting both rear wheels off the ground and turning them. If both rear wheels turn in the same direction simultaneously, the vehicle is equipped with a Sure-Grip Differential. Another means of identification is by removing the filler plug and using a flashlight to look through the filler plug hole to identify the type of differential case.

SERVICE PROCEDURES

SURE-GRIP DIFFERENTIAL NOISE (Chatter—Moan)

Noise complaints related to rear axles equipped with cone-clutch SURE-GRIP should be checked to determine the source of the noise. If a vehicle ride check produces the noise in turns but not straight ahead, the probable cause is incorrect or dissipated rear axle lubricant. The following draining and flushing procedure has been established for the Sure-Grip Differential before it is removed from the vehicle and replaced.

CAUTION: When servicing vehicles equipped with Sure-Grip differentials do not use the engine to rotate axle components unless both rear wheels are clear off the ground. Sure-Grip equipped axles can exert a significant driving force if one wheel is in contact with floor and could cause the vehicle to move.

(1) With lubricant of rear axle assembly at operating temperature raise car on hoist so rear wheels are free to turn.

(2) Loosen and remove fill plug and using a suction gun remove as much of the old lubricant as possible.

(3) Fill axle to proper level with multi-Purpose Hypoid Gear Lubricant Part Number 2933565 or equivalent. Reinstall fill plug and tighten.

(4) Start engine of vehicle and engage in gear and run on hoist with rear wheels free to turn at approximately 40 MPH for ten (10) minutes. This thoroughly circulates the lubricant and brings it to operating temperature.

(5) Stop vehicle and remove the fill plug and using a suction gun remove as much of the lubricant as possible.

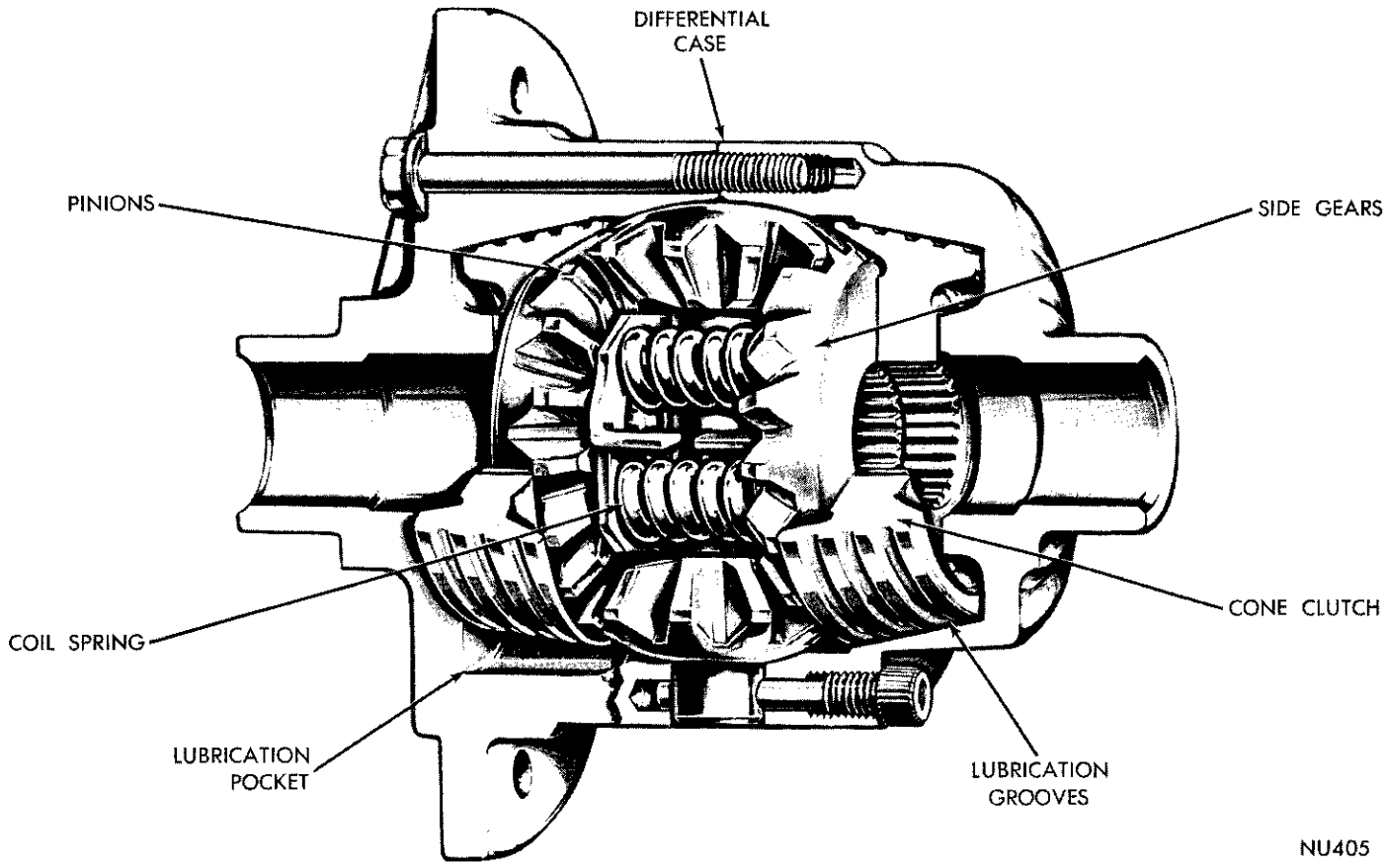


Fig. 2—Sure-Grip Differential (Schematic)

(6) Refill axle to proper level with multi-Purpose Hypoid Gear Lubricant Part Number 2933565 or equivalent. Reinstall fill plug and tighten.

(7) Lower vehicle on hoist and return to customer to drive and evaluate for approximately 100 miles to determine if lubricant corrects the noise complaint.

If after the vehicle is driven approximately 100 miles and the noise condition is still evident, remove the differential and carrier assembly and replace the Sure-Grip Differential. **The Sure-Grip Differential and the internal parts are serviced as an assembly only.**

TESTING SURE-GRIP DIFFERENTIAL

The Sure-Grip differential can be checked to determine if its performance is satisfactory without removing the differential and carrier assembly from the vehicle.

(1) Position vehicle on hoist with engine off and the transmission selector lever in park if automatic or in low gear if manual.

(2) Attempt to rotate wheel by applying turning force with hands gripping tire tread area (Fig. 3).

(3) If you find it extremely difficult, if not impossible to manually turn either wheel, you can consider the sure-grip differential to be performing satisfactorily. If you find it relatively easy to continuously turn either wheel smoothly then the differential is not performing properly and should be removed and replaced. The Sure-Grip Differential and internal parts are serviced as a complete assembly only. **Under no circumstances should the differential be removed and disassembled and reinstalled.**

SURE-GRIP DIFFERENTIAL

CAUTION: During removal and installation of axle shafts, DO NOT rotate one axle shaft unless both are

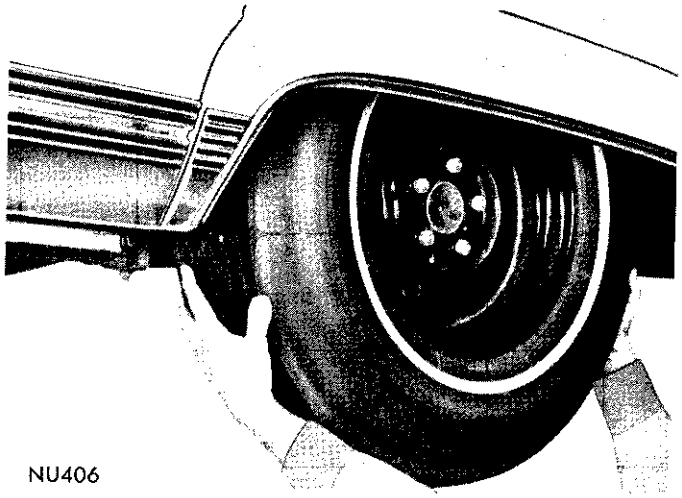


Fig. 3—Testing Sure-Grip Differential Effectiveness

in position. Rotation of one axle shaft without the other in place may result in misalignment of the two spline segments with which the axle shaft spline engages, and will necessitate difficult realignment procedures when shaft is installed.

Removal

Follow the same procedure outlined under conventional differential removal.

Cleaning and Inspection

(1) Clean the Sure-Grip differential assembly in a fast evaporating mineral spirits or a dry cleaning solvent and with exception of bearings, dry with compressed air.

(2) Inspect differential bearing cones, cups and rollers for pitting, spalling or other visible damage. If replacement is necessary, remove bearing cones from differential case using Tool C-293 and adapter plates No. 43.

(3) Visually inspect differential case for cracks or other visible damage which might render it unfit for further service.

Assembly

If during cleaning and inspection the differential bearings were found to be unfit for further use and were removed follow this procedure for installation of new bearings.

(1) Position each differential bearing cone on hub of differential case (taper away from drive gear) and with installing Tool C-4086, install bearing cones. An arbor press may be used in conjunction with installing tool. **CAUTION: Never exert pressure against the bearing cage, since this would damage the bearing.**

(2) If the ring gear was removed from the sure-grip differential case or is being replaced with a new ring gear for any reason, new nylok drive gear screws must be installed.

IMPORTANT: The procedure for installing the ring gear on differential case must be followed so the ring gear seats on the differential case properly.

(3) Using an Arkansas stone, relieve the sharp edge of the chamfer on the inside diameter of the ring gear (Fig. 23 in 8-3/4" Axle section of this group). This is very important, otherwise during the installation of ring gear on differential case, the sharp edge will remove metal from the pilot diameter of case and can get imbedded between differential case flange and gear; causing gear not to seat properly.

(4) Position ring gear on differential case pilot aligning threaded holes of ring gear with those in differential case flange.

(5) Insert drive gear screws (left hand threads) through case flange and into ring gear. After all cap screws are properly started, tap ring gear against differential case flange with a non-metallic mallet.

(6) Position differential case unit between brass jaws of a vise and alternately tighten each cap screw to 55 foot-pounds.

NOTE: Before installation of differential case into carrier lubricate the inside of differential assembly with Multi-Purpose Hypoid Gear Lubricant Part Number 2933565 or equivalent. Do not use any other lubricant other than this special lubricant.

(7) Follow procedure outlined in conventional axle assembly for setting drive pinion depth of mesh, drive gear backlash adjustment and bearing preload adjustment.

INSTALLING SURE-GRIP DIFFERENTIAL AND CARRIER ASSEMBLY

(1) Using a new gasket install carrier assembly in axle housing. Tighten mounting nuts to 45 foot-pounds.

(2) Refer to "Installation of Rear Axle Shaft", when installing axle shafts.

(3) Connect the rear universal joint.

(4) Before lowering the rear wheels of the vehicle to the floor, adjust rear brakes. **CAUTION: Both rear wheels must be raised off the floor when adjusting brakes.**

LUBRICATION

Every six months check the fluid level in the axle through the filler plug hole. When checking the level, be sure the vehicle is in a level position on an axle or drive on type hoist. "See Lubrication Section" for proper level of specific axle assembly.

In Sure-Grip Differentials, use only the Multi-Purpose Hypoid Gear Lubricant Part Number 2933565 or equivalent. Do not use any other lubricant other than this special lubricant.

SPECIFICATIONS

	8-3/4" Axle
TYPE	Semi-Floating Hypoid
Ring Gear Diameter	8.750
PINION BEARINGS	
Type	Tapered Roller
Number Used	2
Adjustment	
(Large Stem)	Collapsible Spacer
Pre-Load Torque (Seal Removed)	20 to 30 inch-pounds
DIFFERENTIAL BEARINGS	
Type	Tapered Roller
Number Used	2
Adjustment	Adjusting Nut
RING GEAR AND PINION	
Serviced in	Matched Sets
Ring Gear Runout	.005" Max.
Back Lash	.006 to .008"
DIFFERENTIAL SIDE GEAR CLEARANCE	
With Gauge	.001 to .012"
WHEEL BEARINGS	
Type	Tapered Roller
Adjustment	Adjusting Nut
End Play	.008-.018
Lubrication	Automotive Multi Purpose Grease NLGI grade 2

LUBRICATION

Capacity ..... 4.4 Pints (3-1/2 Pints Imp. Meas.)

Type .....Multi-Purpose Gear Lubricant, as defined by MIL-L-2105B (API GL-5) should be used on all rear axles; such a lubricant is available under Part No. 2933565 Chrysler Hypoid Gear Lubricant or an equivalent be used.

TIGHTENING REFERENCE

	8-3/4" Axle Pounds Foot	Inch
Differential Bearing Cap Bolts	90	
Ring Gear to Differential Case Bolts (Left Hand Thread)	55	
Drive Pinion Flange Nut (Large Stem)	170 (Min)	
Carrier to Axle Housing Bolt Nuts	45	
Axle Shaft Retainer Nuts	35	
Propeller Shaft Bolts (Rear)	15	
Spring Clip (U Bolt) Nuts	45	
Wheel Stud Nuts	65	
Shock Absorber Stud Nuts (Lower)	50	