

# CHEVY/GMC Half Tons

## 1940-'54

" Spend some time in the **FAST** lane! "



### 3.55:1 RING & PINION

- \* Cruise at 65 MPH !
- \* Fits stock driveline
- \* A bolt-in installation

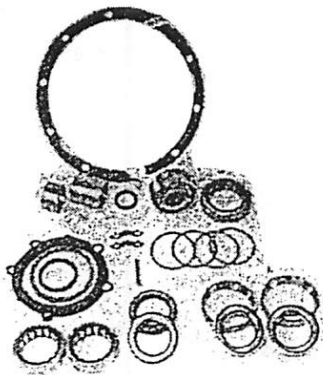


Optional installation kit includes everything needed to make rearend new!

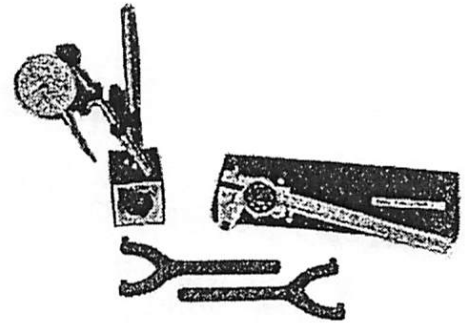
\* Complete Detailed Instructions Included.

\*'54's use '40 - '53 diff. spool cast. #3652336

# The Installation Kit



Front Torque Tube Bush	}	\$39.95
Rear Torque Tube Bush		
Rear Torque Tube Seal		
Front Pinion Bearing		\$59.95
Rear Pinion Bearing		\$45.00
Pinion Shims		\$4.95
Carr. Bearing (2)	ea.	\$19.95
Axle Bearing (2)	ea.	\$34.95
Axle Bearing Seals (2)	ea.	\$6.95
Front Gasket		\$3.00
Rear Gasket		\$4.95
Ball Seal Kit		\$7.95
U-Joint Locks (pr.)		\$5.00
Total Price Separately		\$294.45

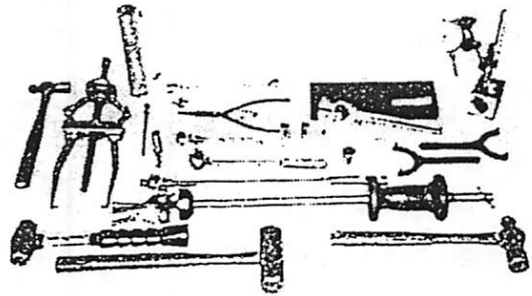


Want to equip yourself First Class?

Dial indicator (with magnetic stand), graduated in thousandths (one rev. equals .100). Essential to jobs like degreasing in a camshaft, etc. only \$59.95.

6" precision dial caliper. (.100 per rev.) Incl. carrying case, only \$34.95

Carrier bearing adjusting wrenches, just \$24.95/pr.



Most of the tools necessary to install the ring and pinion set. In the accompanying instructions, you'll be given "lo-buck" hints on substituting for some items shown. The tube standing toward upper left, for example, is an everyday length of 1 1/4" galvanized pipe which serves perfectly to install the front pinion bearing and both torque tube bushings!

## Installation Introduction

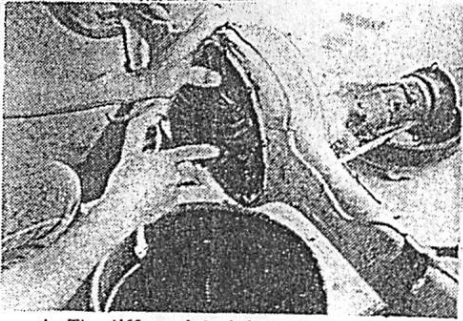
First, let's establish that you are smart enough. Even though you may not have attempted this before, and recognizing that you may be a bit slow, this is a job that mere mortals have accomplished; chances are, you can do it. For starters: The "rearend" doesn't have to be removed! That is, the "banjo housing" — with its brake drums, U-bolts, emergency brake cables, etc. — is not even disturbed. The whole operation centers around the third-member — the differential housing, with the torque tube attached — that carries the ring and pinion, the spider gears, and axle gears — all removed as a unit, then disassembled and re-assembled. And, the ring and pinion are really no mystery — they are simply the two gears that let the power from the engine turn the corner, converting the whirling motion of the driveshaft into the rotation of the axles — a 90° transfer.

While exact procedures will differ slightly with the years of the trucks involved, the procedure begins with exposing and splitting the U-joints; that is: Slipping the ball housing back down the torque tube, and detaching the rear U-joint yoke from the front one, thus letting the front of the torque tube down. A small hydraulic ("bottle") jack under the torque tube during the process will aid control. You'll want a drip pan under the ball housing to catch the transmission grease, too.

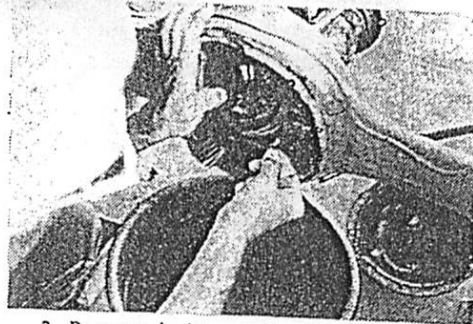
With that done, we can move to the rearend, where the rest of the job takes place, and begin with the picture showing the differential cover removed. Now, we're getting down to business....

**NOTE: THIS RING AND PINION SET IS NOT INTENDED FOR INSTALLATIONS EXCEEDING 350 HORSEPOWER!**

of axle stands, as shown in photo. DO NOT WORK UNDER ANY SORT OF JACK BY ITSELF! (NOTE: Secure the vehicle with some sort of axle stands, as shown in photo. DO NOT WORK UNDER ANY SORT OF JACK BY ITSELF!)



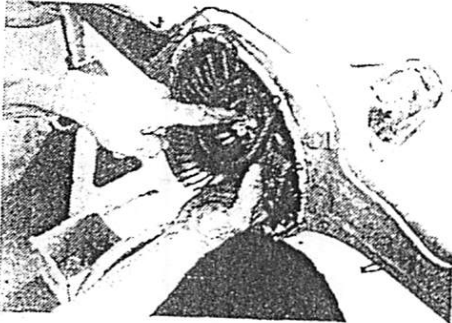
1. The differential pinion shaft lock screw is indicated.



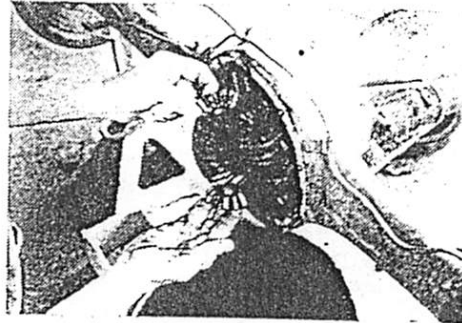
2. Remove it by rotating the differential carrier so that the screw clears the carrier bearing caps.



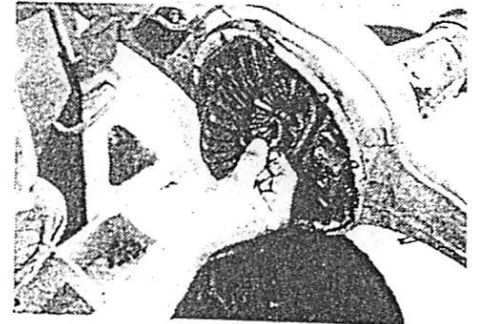
3. Reaching over the top of the diff. carrier, start the diff. pinion shaft out. This also releases the axle shaft spacer block.



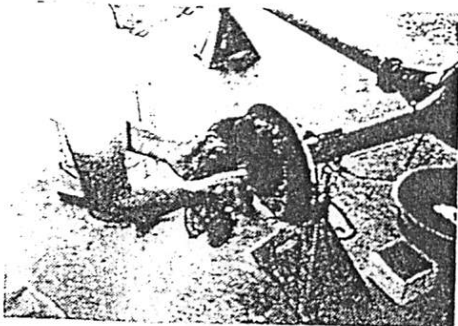
4. Rotating the diff. carrier now will allow removal of the spider gears. Note that they are directly opposite each other. You'll replace them this way, so that they roll into alignment with the diff. carrier pinion shaft holes.



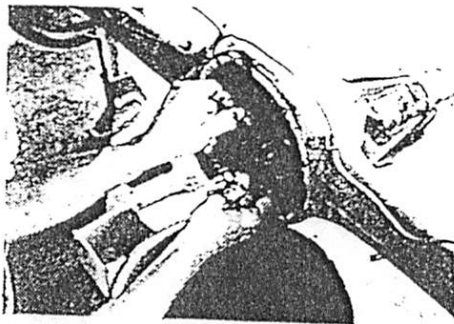
5. Gotcha!



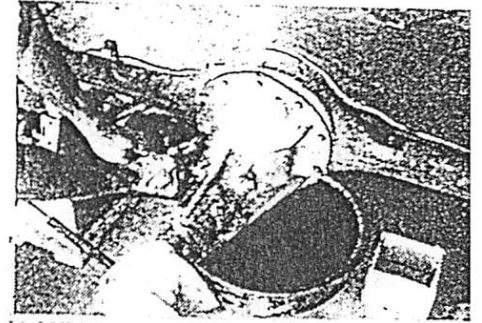
6. Pushing in on each axle will allow removal of the C-shaped retaining clip, shown in hand.



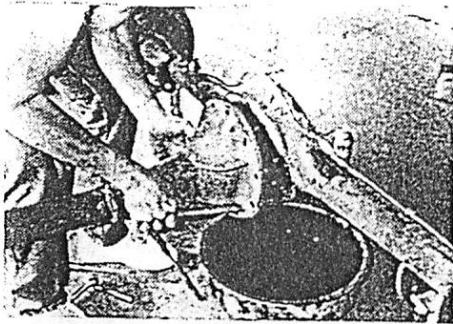
7. Now the axles can be removed. (Again, this whole job can be done with the rearend under the vehicle. This out-of-truck unit simply facilitated the photo demonstration).



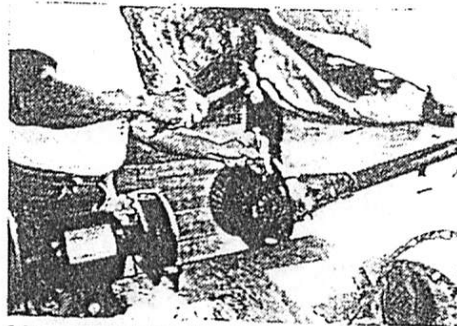
8. The axle gears may also be removed now; or, you may wait till you have the complete 3rd-member out.



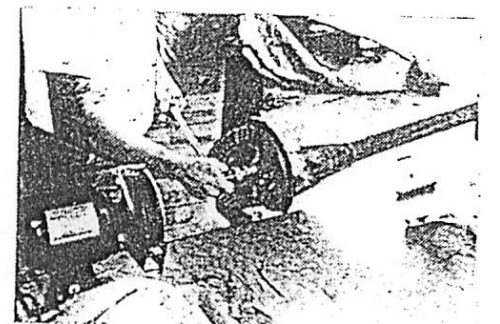
9. That is accomplished by simply removing the corresponding nuts at the front of the 3rd-member, and....



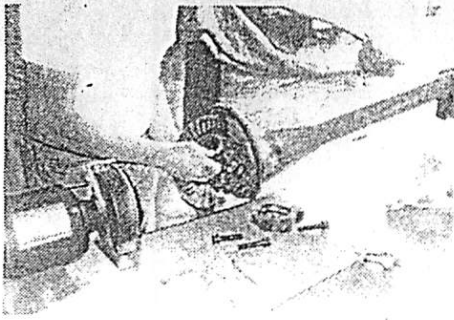
10. pulling it off the studs. (Note: if it is necessary to "urge" the piece to come unstuck — with a couple of screwdriver wedges, for example — be careful not to scar the gasket surface of either housing).



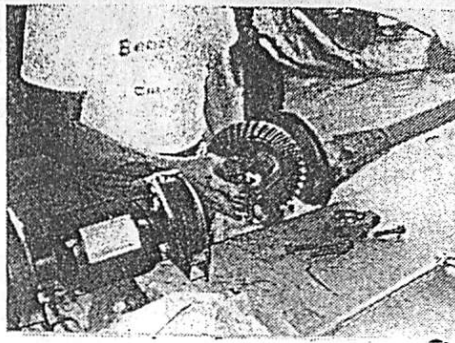
11. Begin disassembly by marking one side of the carrier and its matching bearing cap with a center punch, so that these mated pieces will be put together during re-assembly. They are machined together during manufacture, just like engine main bearing caps. (You'll mark that side's carrier bearing nut, too. Fig. 16).



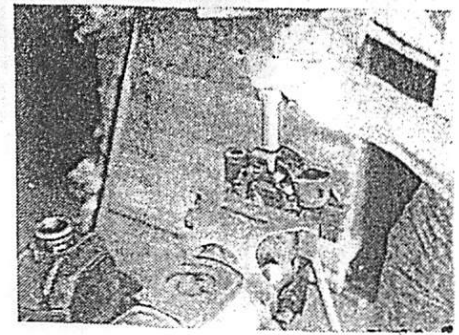
12. Now, loosen the carrier bearing cap bolts.



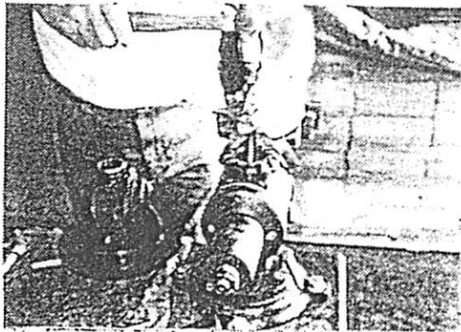
13. And, begin their removal.



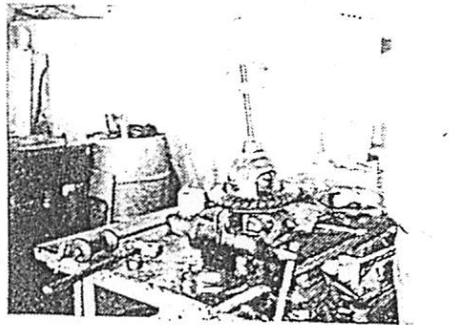
14. The carrier is yours.



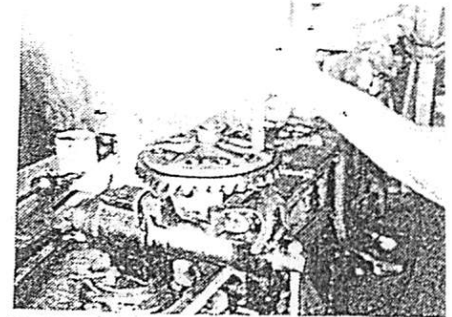
15. Remove the carrier nut lock clips and mark the one from that side.



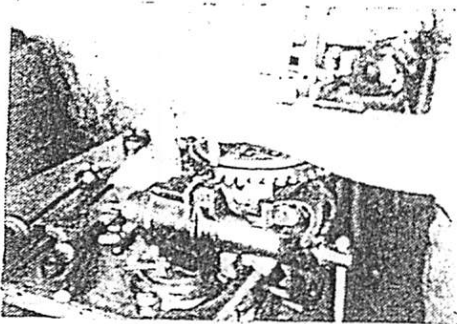
16. Just like that. Now you know which pieces belong together!



17. Now, remove the carrier bearings. (You don't have a special puller as shown?? No sweat! Provided you are counting on replacing these during re-assembly...set your slide hammer up 2-jaw style, with the fingers in. Pull off the outer bearing shell. This destroys the bearing for sure, then pull off the inner race with the same process.) Note: Brass vise jaws being used on important surfaces.



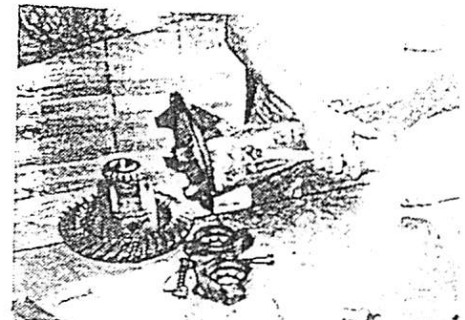
18. Finally, the ring gear bolts are loosened and removed.



19. Then, the ring gear is tapped off by running the mandril around its exposed edge.



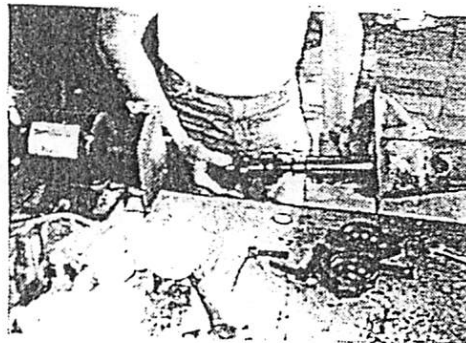
20. And, the carrier is lifted free. Pinion/-driveshaft removal is all that remains!



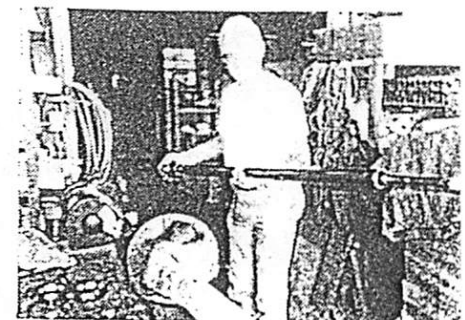
21. Begin by loosening the front pinion bearing retaining screw lock nuts (what a mouthful!). Take all (3) screws out entirely.



22. Drive the propshaft out, using some sort of mandril (here, a brass hammer in between). NEVER pound directly on important parts.



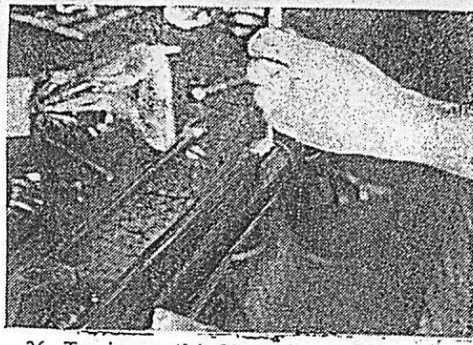
23. Step around behind again, and...



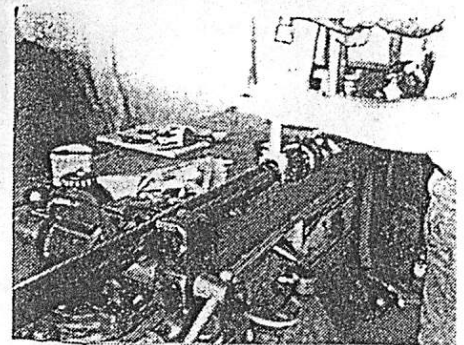
24. You have a 6-foot pinion



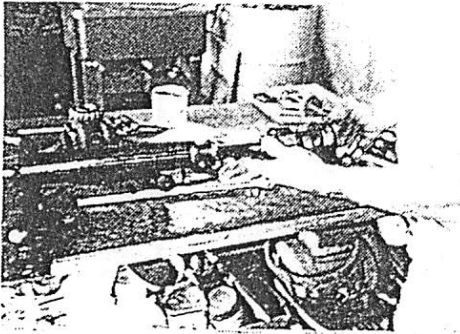
25. Grind the head off of (the end of) the pinion dowel pin.



26. Tap it out. (It's 5/16" diam., incidentally, so use a punch the correct size).



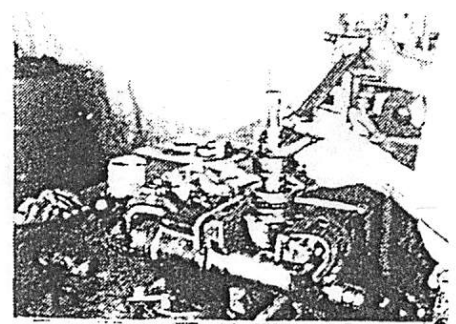
27. A typical ball-joint knocker nudges the pinion out easily. (See, we told you we'd show you lo-buck procedures. You oughta see the godawful tool GM shows for this in the old service manuals!). Seriously, this is not a tapered or press fit, just straight splines, so it isn't tough.



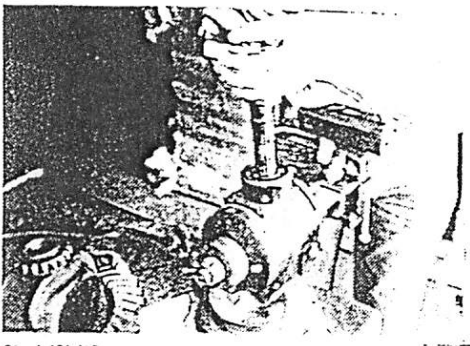
28. Once it comes unstuck, it's EZ out.



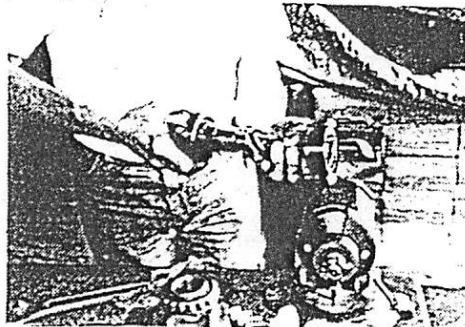
29. The pinion nut is another story...A very large pipe wrench, a big crescent wrench, and a 3 ft. cheater will generally serve to loosen this feller. (It is installed at 200-240/ft. lbs.!). Remember that when you're putting it back together, hear???



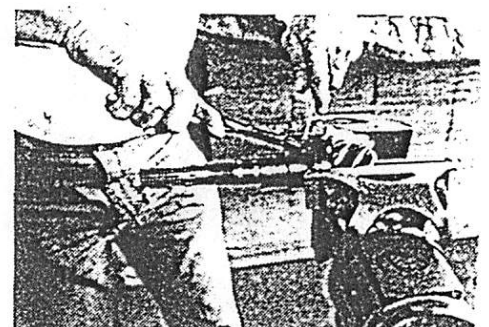
30. Note how the front lip of the pinion nut is spiked into a special groove on the pinion shank to further lock it into place. But, with the nut loose now, finish its removal. (Again, the brass vice jaws).



31. A couple of good, firm raps on something very solid will start the front pinion bearing sliding off. (The pinion nut lock groove is visible here). This special procedure is also known as the "Po' boy's bearing puller".



32. Check the order of the parts in hand, so that you reinstall them properly: To the rear, the pinion roller bearing; just ahead of it, the snap ring and oil-control washer (flat surface against bearing); then, the front pinion bearing retainer (flat side to bearing; beveled side to rear, so tapered screws perform their wedge effect); then, the massive, doublerow front pinion bearing (watch for the special note about which way it's installed, coming up).



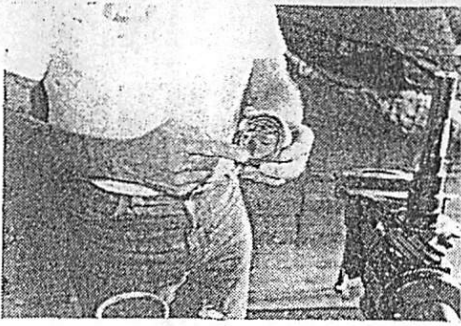
33. Remove the only snap-ring in the whole assembly.



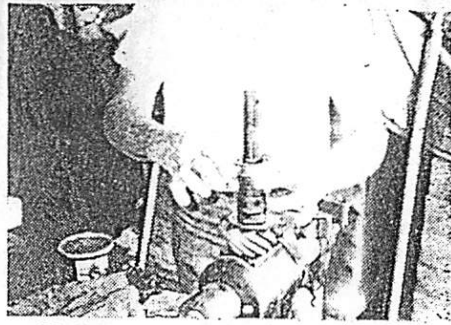
34. And, finally, the rear pinion bearing! Take a break now and gloat just a little; this is as far as it goes. Everything from here is reconstruction. Let's turn to making it new....

Time here to pause and note that "it's clean-up time". Wash the diff. carrier, the driveshaft, and the torque tube with solvent, making sure that any gritty little critters get the brush-off. We want this to last, and last, and last... Personally, I make a torque tube swab out of an old broom handle and a shop rag, thoroughly cleaning the inside of the tube after pounding out the inner torque tube bushing and seal with a 6' length of 1" pipe with a nipple of the "business" end (toward the bushing). Just stick it up the tube till you feel it hit something — that'll be the bushing and seal; then, punch it out with the BFH.

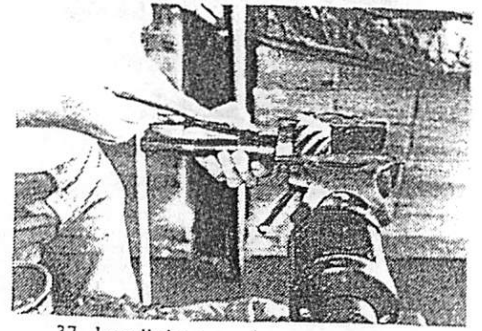
That's done, it's pay-off time — putting all-new parts together to form a pleasurable, functioning unit! Lube everything thoroughly during assembly. Remember, grease bugs eat less than rust!



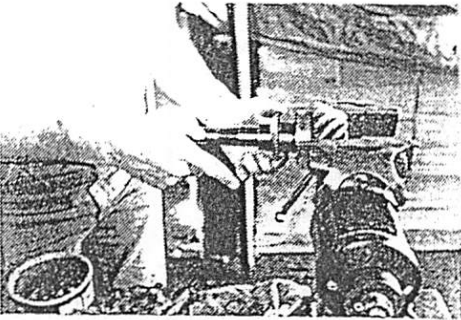
35. Rear pinion bearing comes first. A liberal dose of wheel bearing grease assures no dry running during initial break-in.



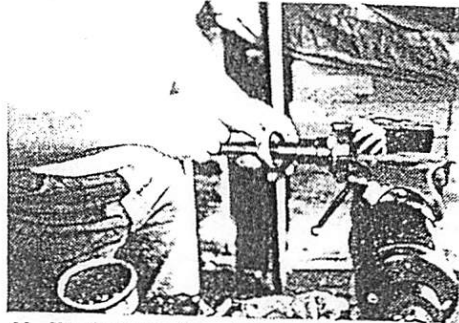
36. It's a slip-on, either side down.



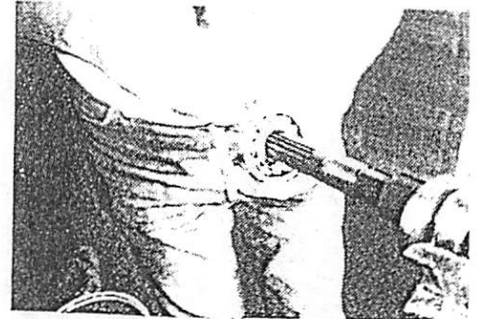
37. Install the snap ring.



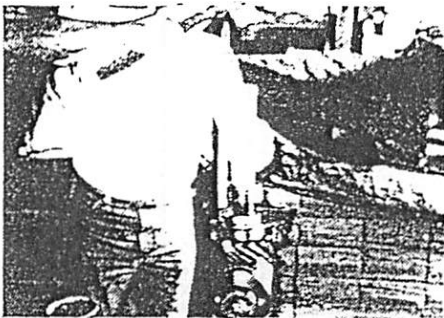
38. Then, the oil control washer, bell forward, away from the bearing.



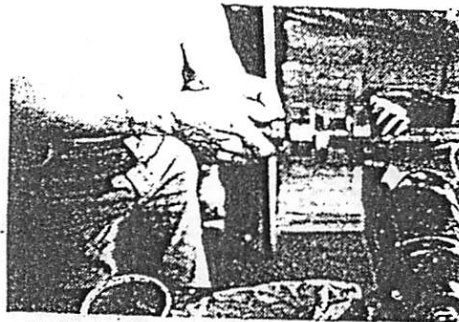
39. The front bearing retainer goes on with the bevel toward the rear.



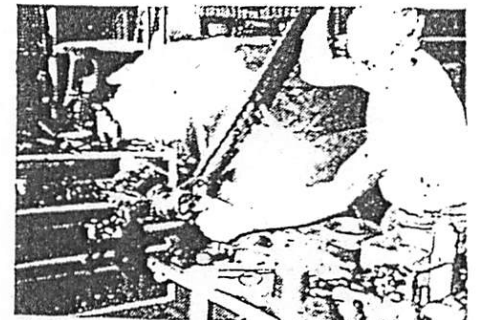
40. Now, pay attention, 'cause this is important: The big, double-row front pinion bearing goes on with the loading notch toward the pinion. The pencil points it out.



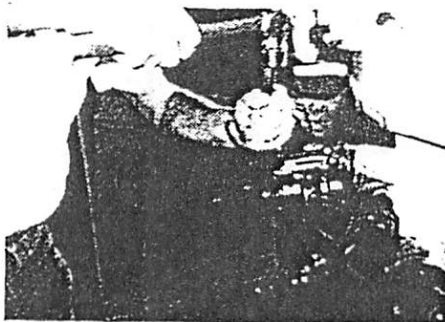
41. We're making commitment now...Installing the front bearing with our super high-tech, specially designed, double-throw-down piece of 1 1/4", galvanized (pipe), Chevy truck pinion bearing tool.



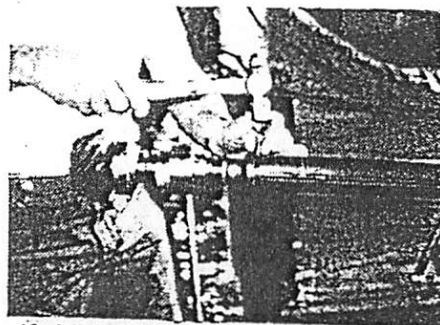
42. Next, the pinion nut.



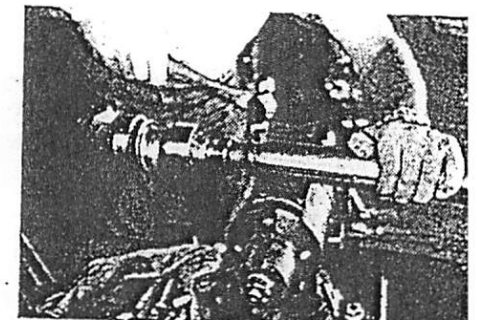
43. Do you remember what the torque specs are for the nut? Extra points if you do! (200-240ft. lbs. if you forgot). You're there when the front legs of the work bench rise 6" off the floor!



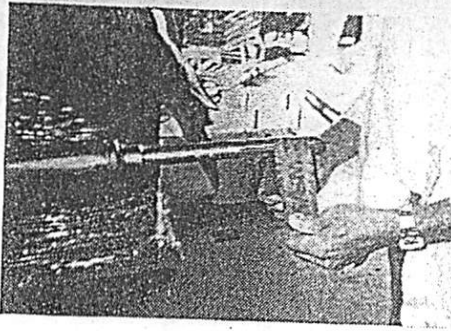
44. Break the lip of the nut into the pinion locking groove, just like it was done at the factory, using a sharp chisel.



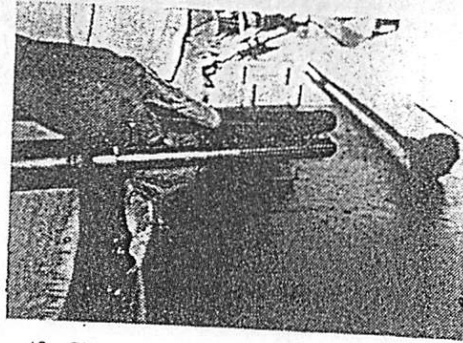
45. Insert the pinion assembly into the drive shaft splines, and tap in the dowel pin. (The dowel hole can only be aligned one way, since it comes out through a tooth on one side and through a groove on the other.)



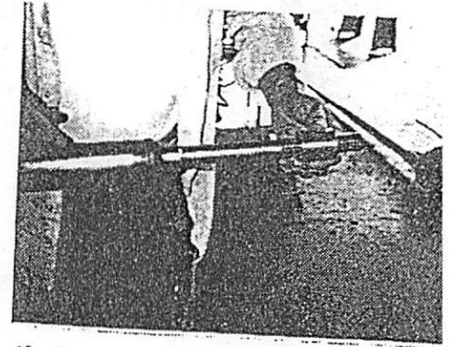
46. Many light, frequent taps around the edges of the pin, securing its underside on something very solid. Flare out first one end, then the other.



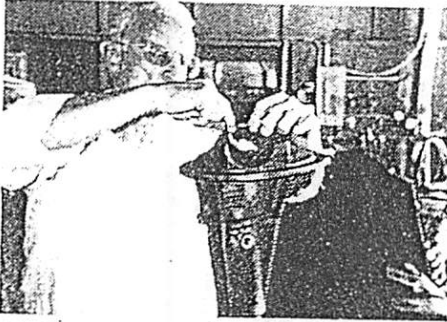
47. Turn attention to the business end of the propshaft, giving the splines and shaft a light touch, as needed, with some emery (about #320 works fine).



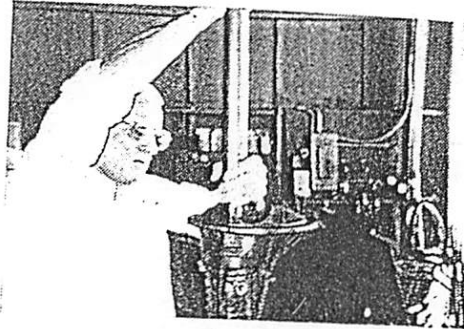
48. Clean down in the splines with a wire brush.



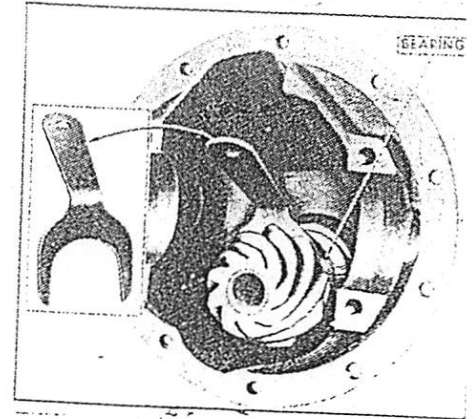
49. Check the inner torque tube bushing fit now. When the driveshaft is installed, with lash adjusted, you'll not want to remove it to make these parts mate!



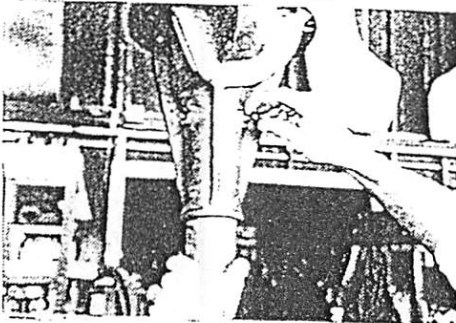
50. Dropping the trial shims into a vertical torque tube assures that they'll not be wrinkled or crushed by inserting the drive-shaft assembly. **IMPORTANT NOTE:** The better the first guess of proper shim thickness, the less work this whole project is. The installations we've done here so far have all fallen in the .026-.028 category. That can be achieved by simply adding the .010 in the kit to the .016 or .018 you removed during disassembly.



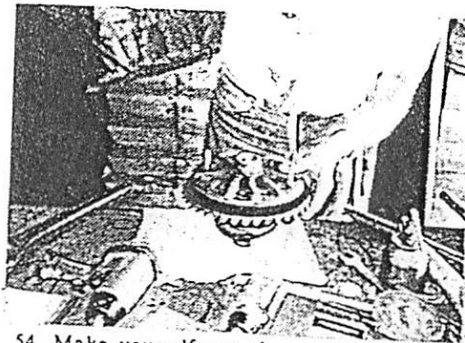
51. Slip the assembled driveshaft into the torquetube, with Tool J-4050 inserted between the pinion face and rear bearing (Fig. 51-A), taking care to not wrinkle the shims, and observing that the front bearing retaining ring is visible through the lock-bolt holes. When a solid "bottoming" sound is heard, that means the rear bearing has arrived in position. Now, remove J-4050, allowing the front bearing to rest on the shims. The retaining ring should be just visible.



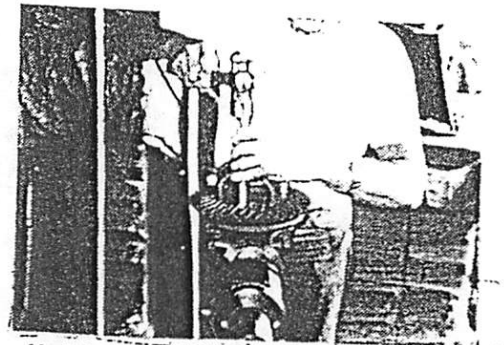
51A. Showing use of tool J-4050.



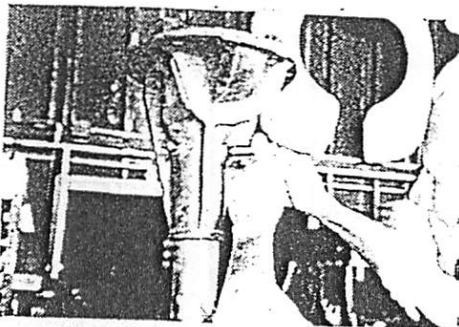
52. Insert the retaining ring lock bolts, and ....



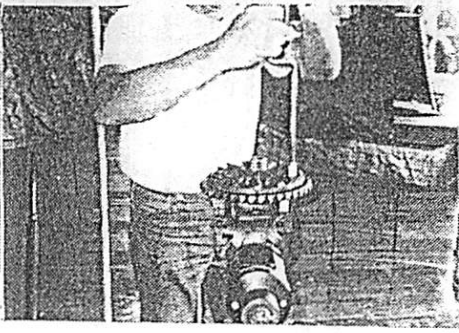
54. Make yourself two ring gear alignment dowels by cutting the heads off a couple of  $\frac{1}{4}$  x 24 (SAE/fine thread) bolts, about 2 $\frac{1}{2}$ " or 3" long. Hacksaw a screwdriver slot in the blunt end of each for easy installation and removal. The ring gear fits the diff. carrier very snugly, so alignment of the bolt holes must happen at this stage.



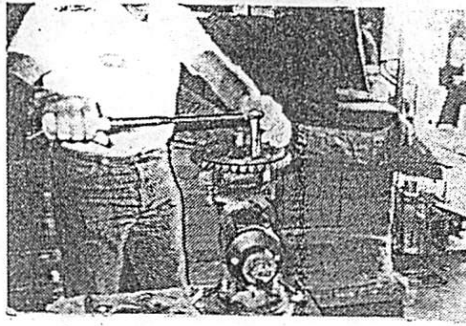
55. Using a mandril, gently and evenly tap the ring all the way down onto the carrier lip.



53. Snug them up evenly.

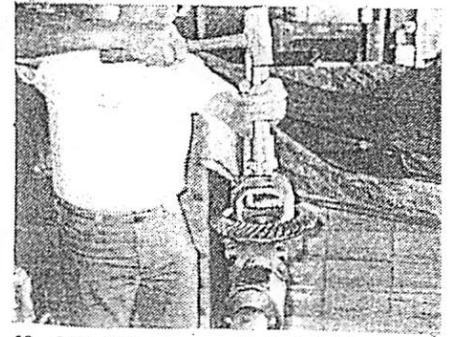


56. Install the ring gear bolts, being careful not to cross-thread any.



57. Bring 'em up snug in a systematic rotation, a few ft./lbs. at a time, finishing at 40-60 ft./lbs.

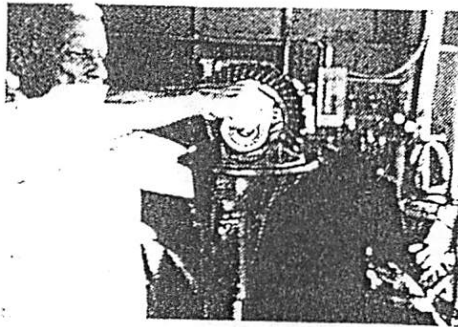
**URGENT NOTE:** Disregard the 85-95 ft./lbs. figure in the Installation Section of the factory shop manuals! That is wrong, wrong, wrong! They finally get it right in the Specifications Section: 40-60 ft./lbs. Exceeding this reading will stretch or break the bolts!



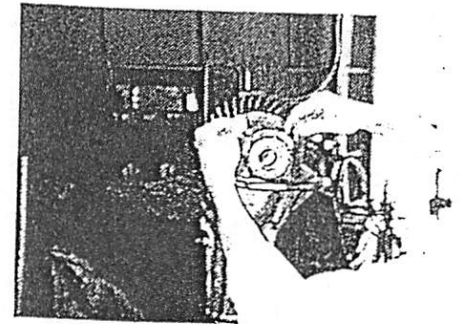
58. OK! OK! I know this isn't fair. I made a special tool for this little step; but a large hammer head might work. However you do this, do NOT pound on the perimeter of the carrier bearings. The pressure must only go on the center race. (It seems that a chunk of 2" pipe might be used, but only very carefully). Note roller taper direction.



59. Oil is, perhaps, better on these for installation purposes than heavy grease, which might affect lash settings or adjustment.



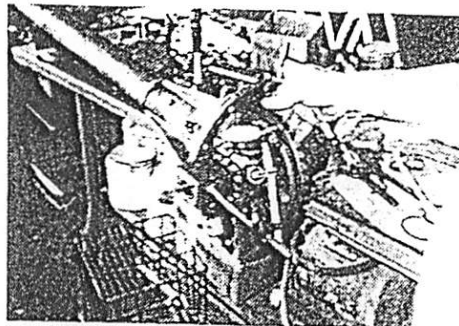
60. Set the diff. carrier, with carrier bearing cones, into the 3rd member, tentatively.



61. Here's where those punched marks pay off: Give bearing caps and adjusting nuts a trial fit, being careful not to cross-thread. You'll know you're right when the cap sits down flush on the saddle. Prove the fit by turning the nut in its threads.



62. The remaining moves will best be done with the torque tube horizontal again. Snug the carrier bearing cap bolts for a trial adjustment.

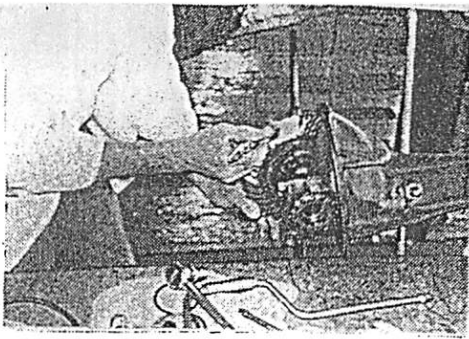


63. Momentarily disregard backlash between ring and pinion by taking the slack out of the bearing adjusters, to check ring gear runout. It should be plus/minus (.002).



64. Now set dial indicator for lash check. Moving carrier to the Rt. lessens lash; to the L. increases it. Any move of the nut on one side is taken up by moving the other nut the opposite direction. "Park" the nuts with holes straddling "12 o'clock" — that is, the hole for the lock clip bolt (on the bearing cap). Ideal lash should fall between (.008-.012), no tighter! Make sure that driveshaft motion is not contributing to the reading. Use a friend or some means to hold it still.





65 When the correct backlash is established, paint a section of the ring gear for a wear-pattern check. This is going to tell you whether the shim thickness is correct or needs modifying. (Sure would be nice to be right on the money the first time!)

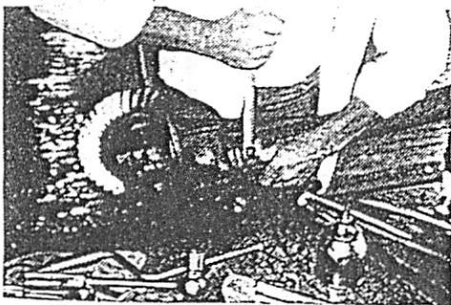
ROLL THE DRIVESHAFT AROUND UNTIL THE PAINTED SECTION OF THE RING GEAR APPEARS, SO A READING CAN BE HAD. IF CONTACT PATTERN LOOKS LIKE FIG. A, YOU MAY PROCEED, IF NOT, REMOVE THE CARRIER AND THE DRIVESHAFT, AND INSTALL ANOTHER SHIM THICKNESS. (TRY THIS FOR CONSOLATION: THE MORE TIMES YOU DO THIS, THE MORE "PROFESSIONAL" YOU'RE BECOMING. WHIMPER, WHIMPER).

NOTICE THE ATTENDENT PICTURES for proper wear pattern and solution. High tooth contact indicates that the pinion needs moved deeper into the ring gear (by adding shim thickness).

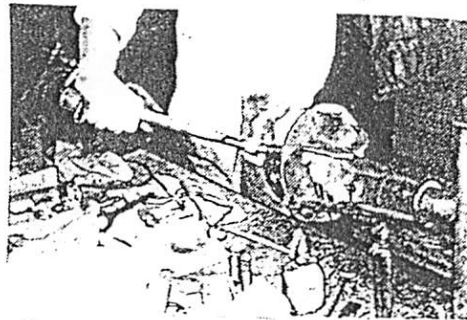
Low tooth contact calls for reducing shim thickness, moving pinion away from ring gear.

This procedure requires turning the driveshaft in the direction of driving rotation (clockwise as viewed from the splines), while some slight ring gear resistance is applied, giving maximum tooth contact. (A buddy can serve nicely here).

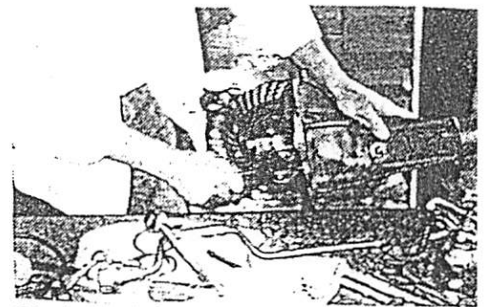
TOOTH CONTACT CHART		
	Tooth Contact	Condition
A		IDEAL TOOTH CONTACT
B		HIGH TOOTH CONTACT heavy on the top of the drive gear tooth profile
C		LOW TOOTH CONTACT heavy on root of the drive gear tooth profile



66. Give everything a final tightening — retaining lock bolts, and



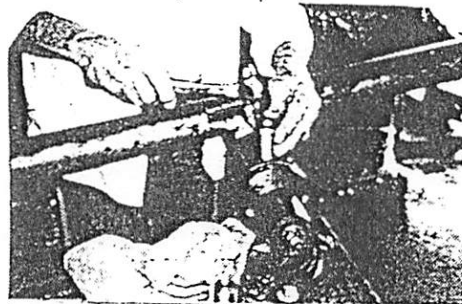
67. carrier bearing bolts. (Torque to 115-135/ft. lbs.)



68. Now go (2) notches past snug on the bearing nuts to give proper preload. DOUBLE-CHECK BACKLASH ONE MORE TIME.



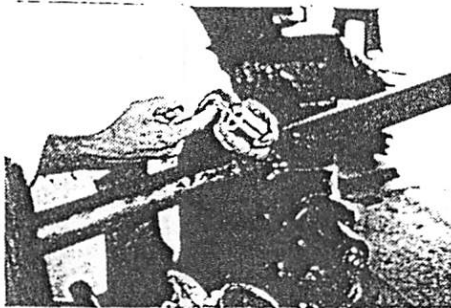
69. Attach carrier bearing nut lock clips.



70. Install torque tube grease seal into rear of rear bushing. This end will go in first. The metal shell is OUT when installed properly, putting the seal spring (tourniquet) toward the transmission.



71. A couple of little spikes will guarantee that nothing moves later.



72. A liberal dose of chassis or wheel bearing grease to prevent dry break-in.



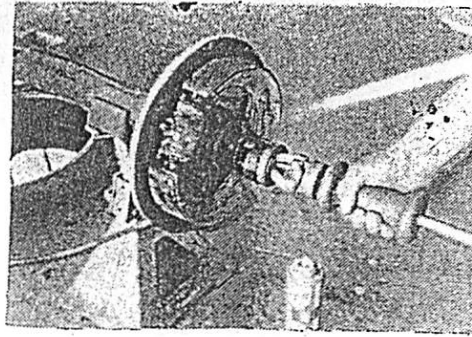
73. Our super-sophisticated galvanized bushing installer comes into play again. When this rear bushing is properly installed, it will be 5-15/16" into the tube. Check this measurement before installing the front bushing.



74. Light taps with a soft-face (brass) hammer get the front bushing started straight.



75. Bottom it against its shoulder.



76. Prepare the axle housing for its new occupant, by removing the old axle bearings, seals, and washer. Note: some slight bending "deformation" if you please, of the washer will occur in this process. Flatten it out, remove any burrs, and check its fit over the axle before reinstalling it with the new axle bearings and seals.

Now, who said you're not a differential mechanic???  
All that remains is to put it all back together!

#### LUBRICANT

It seems that there are as many voices in favor of straight 90W (mineral oil) as for 85/140. Your gear set should give service with either. Perhaps the most sensible thing is to use whichever is also in your transmission. Whichever you chose, remember, the two are not compatible, so keep the numbers straight!

#### BREAK-IN PROCEDURE

With brake drums and wheel reinstalled and lubricant up to level in differential, perform a 15 min. run-in with vehicle still on axle stands and engine idling with trans. in high gear. Check for leaks, excessive noise, and or/heating, then let diff. cool down.

Next, do (3) short, five-ten mile street trips, allowing for cool-down between each.

Your gear set should now be ready for years and years of normal service.

Looking for help in getting this done right?? Patrick's can install the Ring & Pinion into your 3rd member quickly and economically, leaving only the unit removal and reinstallation for you to perform. Call for shipping arrangements.

Warranty is limited to material and/or workmanship defect at time of shipment from the factory, and in no event shall seller have any liability for consequential damages of any kind resulting from a breach of this warranty. This warranty will be void on all products that show evidence of misapplication, improper installation, abuse, lack of proper maintenance, negligence, or alteration from original design. This warranty is in lieu of any other warranties, either express or implied, INCLUDING ANY IMPLIED WARRANTIES OF MERCHANTABILITY OF FITNESS FOR ANY PARTICULAR PURPOSE.