

Text and photos by Bud Bryan

**T**hat alarming "KaWhump" was unmistakably notification from that Hali' that it wasn't going any farther. Fortunately, I was less than a block away from driveway, garage, and the best shoulder in life to cry on—the wife's.

The old quick change which had weathered the storms of horsepower on more than a few record attempts while upon that great alkaline wasteland called Bonneville, and in fact had actually done its part to add a new page to Speed Week history books, now wailed a different tune. One unfamiliar enough to these ears to know that gear lubricant wasn't the only thing astir in that aluminum cased contraption out back.

I had ripped off many a trouble-free mile with the retired Holmes-Kugel race car Halibrand after reinstating it for active duty in the AV8. Now, with two Street Rod Nationals' treks etched into its gearing's ancient groove work, plus the wear and tear a few miles worth of West Coast cruisin' provided, I had the sneakin' hunch that a night or two hence, I'd be creeper bound 'neath a disabled 'duster.

What the ruined ring 'n' pinion's rhythmic racket failed to convey to me—with its Huck Finn-ish rendition of Stick Run Along the Pickets—the now heavily silvered lubricant I was inspecting now had me convinced: No doubt about it, there was no doubt, time for teardown!

Now I have to be honest with ya', fellas. When you live in the big city, close to those who practice vital professions, those a body finds little time to master himself, the temptation simply to "pay" is often far stronger than the will to "do." Too, there is the prospect—when paying for a service—that the end result (usually) comes closer to the perfection desired than does the job a dummy like me turns in. So . . . with the disjointed Halibrand having been wrestled free of the hardware that gripped it, strong armed from floor to pickup, mit housings and axles in their usual places, the next stop was delivering the whole works to a place unlikely to exist anywhere but in sunny ol' So-Cal.

Estrada House . . . commonly known as "Pepe's Place."

Big names in drag racing are known to seek both refuge from the circuit and ways to Pep(e) up their racing rearends and transmissions at this humble house of quick-cures. Now "bulletproof" is a fitting enough term, and though we all tend to use it a bit loosely in conversations about the mechanical temperament of our beloved bombs (knowing full well we speak in ideals—not facts), "it" is possible to attain. In fact, Pepe peddles bulletproofing. It's packaged for shipment to almost anywhere, and wears the label of "Mar-Tuffed." Mr. Estrada has come up with a commodity that should appeal greatly to street rodders, particularly those running a quick change rearend.

That, friends, is why I sought this man's services, which I found at Pepe's Rearends, 15715 Garfield Ave., Paramount, Calif. 90723. What does the Pepe process entail? Thought you'd ask that; and if you will, please turn to photo No. 1 ● >>>>

**If you insist on running a "quickie,"  
set it up so you can enjoy it.**

# PEPE UP YOUR QUICK CHANGE



*This scene repeats itself many times at local swap 'n' sells all over the country. Commonly seen are the Halibrands, the first production quick change unit to use the straddle-mounted (1934-1948 Ford) ring and pinion gear sets. Introduced in the '40s, and used for dry lakes, track oval racing, this center section is now used in street roadsters, coupes and sedans, sprint cars and modifieds. Prices for used units range from \$50 to \$250, depending on condition. Happy hunting! New units, includes V8 center section, 3.78 ring and pinion (less gear changes, open drive kit optional at additional cost), will run you around two bills.*

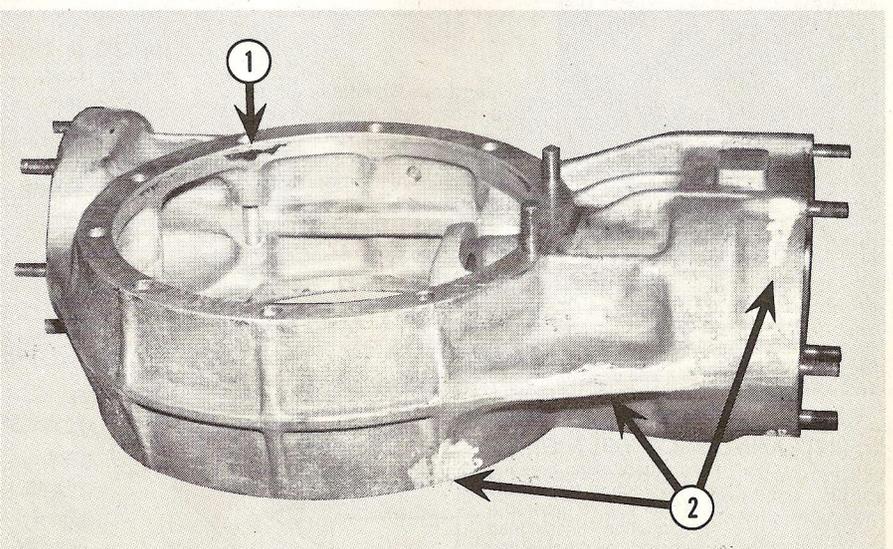


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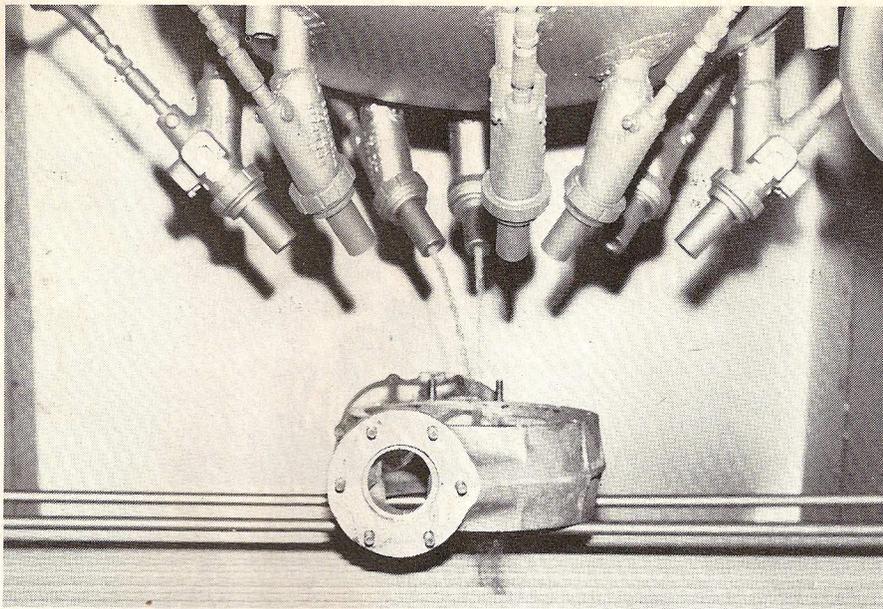
1) Following disassembly, case is tossed into the cooler, packed with carbon dioxide, left there for 48 hours. The results are shown here. This cold stabilization process is used on cast aluminum to resolve grain boundaries within the casting and remove age embrittlement. In other words, freezing makes for a stronger case.

2) Arrow 1 pinpoints casing flange which had to be dressed with hand grinder to accommodate "new" ring gear. Arrow(s) 2 indicate exterior trouble spots which before dressing with grinder and file were gouges in aluminum, called stress risers. Unless these are removed, stress cracks can develop.

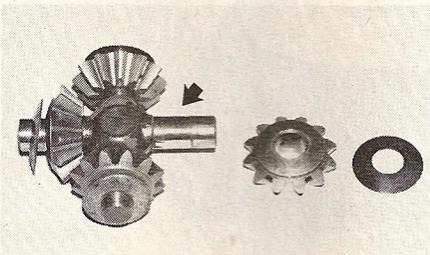
3) This vital step ensures longevity, and can be considered part of the bullet-proofing, or in Pepe's terms, "Mar-Tuffing." Shot peening will greatly lengthen the fatigue life of parts subjected to bending or twisting stresses. And not only is the elastic strength of the metal increased, shot peened parts come from nozzle cabinet sparkling clean and ready for assembly. Studs are masked to protect threads.



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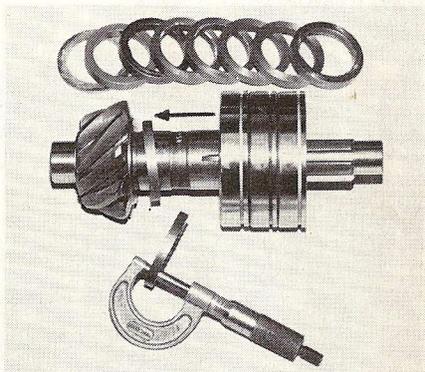
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4) These spanking new differential spider or pinion gears have been shot peened, Mar-Tuffed, (now Rockwell 42-46) for improved fatigue life and surface oil retention qualities. This way lubricant film is less apt to be squeezed out when gears mesh under load. Pinion shafts (arrow) come with gears from old Ford parts emporiums—get gennies—and are case hardened, therefore are not shot peened. Spacers (right) may or may not be needed, also a genie Ford item.

5) Rockwell hardness testing is conducted on new Halibrand pinion gear that has been heat treated. This will prevent cracking under shock loads, like those fuel dragsters and funny cars are capable of. Pepe followed his usual formula in prepping ring and pinion gears for my street roadster. Pinion should Rockwell low 50's, ring gear, low 60's following heat treat.



6

6) Pinion gear and bearing spacing is critical for proper tooth mesh between pinion and ring gear. Spacers come in varying thicknesses, but ours, with all new gears, took a .230-in. thick spacer nicely. Pepe has spacers made up per each job's specs. Bearings are Max-type, used in group of three; front bearing rests against spacer.

7) Pinion retainer is trimmed .090-in. on lathe to compensate for added thickness of the three Max bearings. Aircraft Allen bolts replace original retainer hardware, threads in case are chased with proper tap. Never force a screw into aluminum.

8) This is a comparison between old pinion gear bearings and spacer (top), and new Max-type bearings (below). Three Max bearings by New Departure, # 307-B, replace two old bearings and spacer. Narrower but stronger Max units carry 11 balls and sturdier cage, where old bearings have only 8 balls. Third Max bearing does two things: adds to pinion support and makes up the space left by deletion of spacer ring and old (wider) bearing.

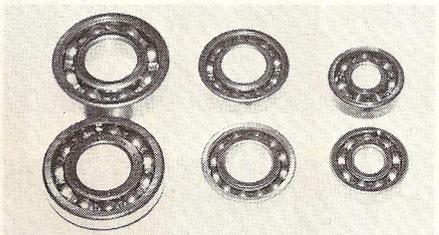
9) Again for comparison sake, old bearings top, new Max bearings bottom. From left to right, use pinion gear # 307-B as discussed; (center) lower driveshaft rear support bearing by New Departure # 1206 (Max-type); spur gear or back cover support bearing by New Departure # 1304 (Max-type). Note that Max bearings contain more balls, boast stronger cages. Front lower driveshaft bearing is not shown and, unlike the rear driveshaft bearing, is a double sealed unit from Norma or Fifner, # 306 (Max-type). Seals



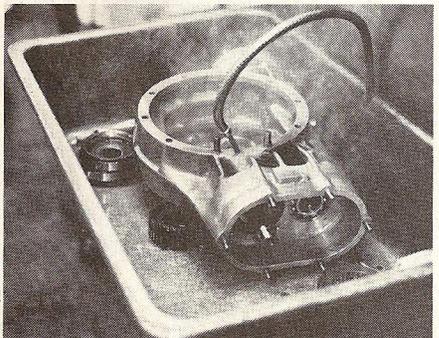
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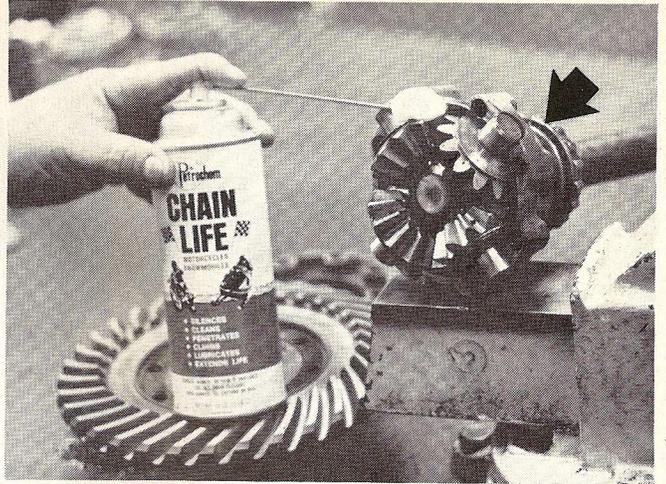
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prevent gear lube leakage through forward output area. If you use open-drive setup from Halibrand, seal plate and seal are provided. Pinion gear front support bearing not shown, use # MRY. 1205-EM by Bower.

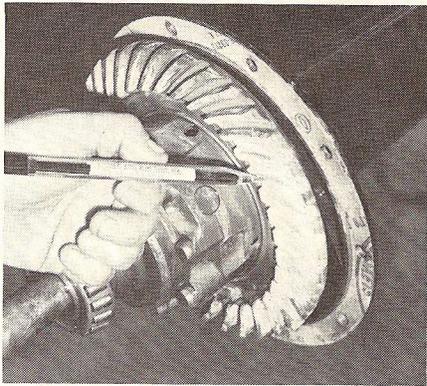
10) Heating the center section and rear cover are necessary for bearing installation. Heat in oven at 350° for half hour, wear protective gloves while inserting these bearings: pinion front support (main pinion bearings slide onto pinion gear), rear lower driveshaft bearing. Sealed front lower driveshaft bearing is installed cold. Red Loctite "22" is a must on back cover bearings and pinion front support bearing, use sparingly. All other bearings, simply coat with oil and tap lightly into place using wooden butt of hammer. Never force bearings into case, and never heat bearings! If case is properly heated, assembly should be simple. This assembled center section is cooling in solvent parts bath.



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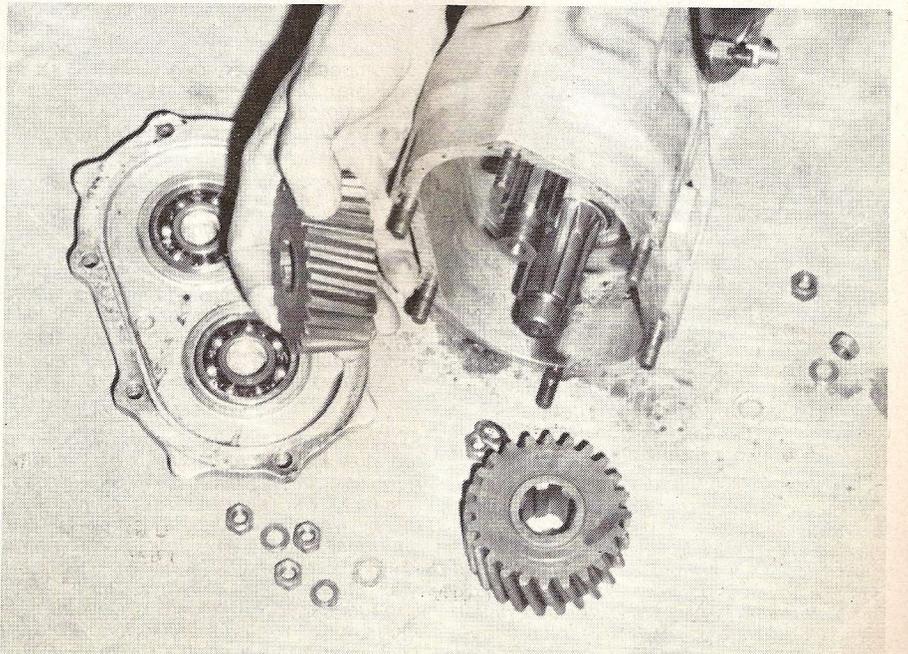
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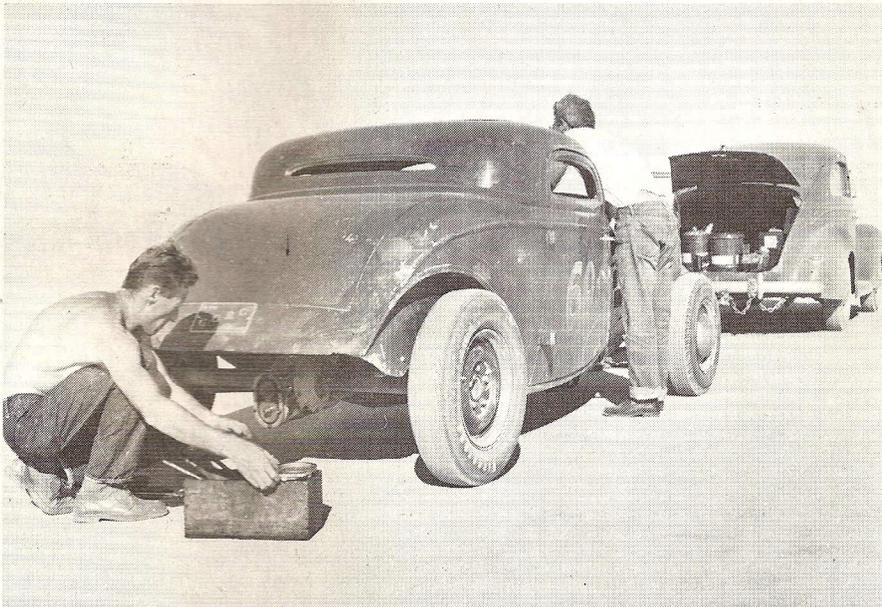
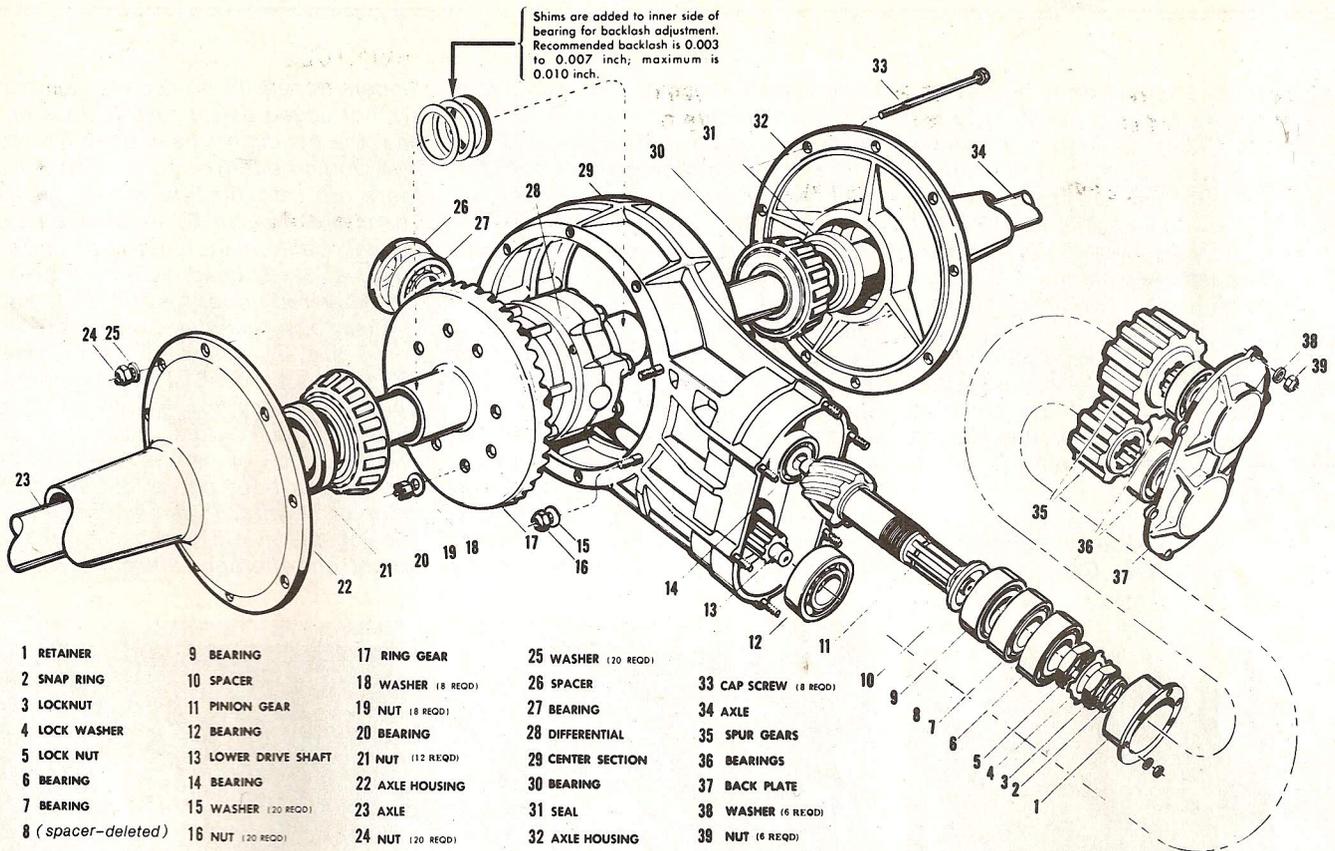
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11) Lower driveshaft snout is dressed on lathe with emery cloth as shown. Bearing surfaces are main concern for proper seating, watch for burrs around splines. And with a used shaft always check for run out, discoloration, which indicates friction heat, lack of service and improper clearances. Shaft is final item of assembly procedure.

12) Differential case (stock Ford) assembly work is performed using this helpful product, Chain Life, by Petrochem. Differential spider gears have been installed using cupped spacers (from Ford) for proper lash. The carrier bearing (arrow) is another stock Ford item, as are shims they use—see exploded view. The basic setup used in this rearend with good result came from a '36 Ford passenger car. (Splined axle-gear setup from a '50 Merc is another way to go, replaces early (keyed hub) axle such as those used here, and is actually much stronger.) The old differential case thru-bolts are tightened to 47 ft. lbs. using a torque wrench, threads coated with blue Loctite "21."



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13) Perfect pinion gear/ring gear mesh pattern is desired as shown. Backlash should be within zero to 0.001-in. Adjusted thru use of carrier bearing shims, pinion gear spacer, and housing gaskets, and much trial and error, a true reading can be obtained by the use of white lead which is smeared on ring gear's tooth area as shown. Gaskets are standard early Ford items, come in two or three thicknesses—get several of each.

14) Here Pepe applies GE-made Silicone Seal from a tube. Other brands work just as well, and this solution is utilized because of its great sealing quality and compressibility when still wet. Applied to full circumference of house's flange, it is used only after final ring and pinion backlash and center section clearances have been decided on—it dries quickly. As the housing is slid over the axle and comes in contact with the aluminum

center section, the Silicone begins to ooze out or extrude under the pressure. This is desired, and once solution sets up following thru-bolt torquing, excess can be trimmed with razor blade.

15) Here we see the center section nearly completed. Pepe is not forcing or hurrying assembly. He is simply jolting center section with blows from a rubber mallet, carefully directing them at the raised boss in cast case. This jolting or shock procedure is important, as it allows the ring and pinion gears to freely settle-in and avoids force meshing of teeth during torquing. Thru-bolt and stud tightening sequence is not critical, however, tightening rates are: bolts—22 ft. lbs; studs—25 ft. lbs. Be sure retainer Allen bolt heads clear upper spur gear (arrow), and tighten to 14 ft. lbs. Center section breather (prevents pressure buildup) is seen inserted into housing (left). Common brass fuel line fitting is threaded (3/8-in. pipe) into place using blue Loctite "21," Neoprene hose clamped to it and this is routed up into body.

16) Many problems are caused by the use of these helical cut spur gears. Don't use them. Preferred are the straight-cut gears which, when rotating under load, automatically center themselves. Also use machined spacer (not shown), available from Halibrand, which rides on pinion shaft between spur gear and pinion shaft locknut.

17) Be sure to fill rearend with Torco 140 before installing in car. This allows you to check for leakage, removes danger of driving on "dry" gears. Requires 3 qts. for fill up. For break in, add one can of Chain Life, change at 200 miles. Happy Motoring!