1953-1962 Corvette Steering Gear Assembly

by David Harrington

THE STEERING GEAR PARTS LAYOUT is taken from the CORVETTE SERVICING GUIDE (1962 edition S-12), which thoroughly covers this topic as well as other major technical areas going back through 1953 (**Fig. 12**). This service (shop) manual can be purchased through your favorite literature vendor. If you do not have a source let met know because this manual is a must for any Corvette straight axle owner/enthusiast.

The 1953-62 Corvette steering gear assembly sometimes seems to be an area of mystery and the unknown. To my knowledge, prior to this article, there have been four other articles written. Three in the NCRS Restorer Magazine, and one in the SACE Straight Talk publication. These articles have been included with this text to the editor for publication if room permits. Hopefully this presentation may also shed some light and understanding as to the functional anatomy of the '53-'62 Corvette steering gear assembly.

A few months ago I ran a small personal advertisement concerning some steering parts, and to my amazement found that a great number of straight axle owners throughout the country seem to have steering gear problems, such as I once had with my 1960 Corvette. Most of the people I have talked with have virtually the same problem, and that is 8 degrees or more excessive "slack or play" in the steering wheel from the center position, or . . . the dreaded culprit, a "DEAD or HARD spot(s) which may occur when turning the steering wheel at any point in the turning radius. At one time I even thought of removing the steering gear assembly from my car, but for fear of what I might find inside the gear housing, along with little or no knowledge of the subject, and no real availability of parts, frustration just led me to "put up" with this problem for awhile.

It wasn't until several months ago that I befriended an excellent mechanic from the "old school", who specializes in pre-seventy Corvettes, small block Chevy engines, drag-raced classics in the late fifties, and is one who still likes a challenge. Because of him I became mentally prepared to tackle the steering project. With a 2½ year old restoration behind me, and a fairly "high point" car, I felt it was time to try and eliminate a steering problem that had plagued me for so long. This would have been a much easier task to accomplish had I been prepared to restore the steering when the car was originally torn down but . . . no, restorations aren't supposed to be made easy. So on we go.

Steering Assembly Removal

1. Remove the engine compartment lid (hood). 2. Disconnect the "positive" battery cable. 3. Pull the steering wheel (use a puller) and all necessary brackets, and wires from the mast jacket located inside the cockpit. (**Fig. 7, VIEW A.**) 4. Fuel injected cars of course remove the air breather assembly. 1961 and 1962 models remove radiator reservoir tank. The left exhaust manifold need not be removed. 5. Remove lower left side heat shielding if appplicable with radio option. 6. Loosen the lock nut and turn the lash adjuster a few turns counterclockwise to remove the close meshing of the worm gear teeth and the sector roller wheel (**Fig. 2, Photo H**). 7. Disconnect drag link from the pitman arm (**Fig. 1**). 8. Remove the pitman arm from the steering sector shaft (use a puller) and the steering gear housing from the frame (**Fig. 7, VIEW B**). 9. With a friends help rotate gear assembly to clear frame and engine while bringing it up and forward to remove from engine compartment. Helper can assist the mast jacket through the fire wall.

Dismantling Steering Gear Assembly and Inspection

Now we get to the "Nitty Gritty". The steering section shown in the referenced shop manual (**ST-12**) (**Fig. 7**) 6as a great guide to the technician 25 or 30 years ago. It was also a necessary aid in showing the steering systems' mechanics, maintenance, adjustments and alignments. Thirty plus years later we have a somewhat different scenario than those who were working on a "steering gear box" only 2 to 10 years old. Today's Corvette is maybe? . . . The one that has been "setting-up" for the last 15 years, the one that has been under water for the last few years, or maybe the one that hit two street curbs and caught fire. You get the drift. I have been inside quite a few of these old gear assemblies over the last several months, as I'm sure some of you have over many years. IT'S NOT A PRETTY PICTURE! If you attempt this yourself, mount a clothespin on your nose, as thirty year old grease, if there is any left in the gear housing, can be Pole-Cat stinky. Also be prepared for the possibility of some water and GOO to come pouring out. 1. Place assembly in vise and loosen lock nut on the worm bearing adjuster cup (**Parts 1 and 2**) in the steering gear parts layout. 2. Put a pan under assembly to catch bolts or whatever else comes out of the housing. 3. Loosen lock nut on end of sector shaft (**Part #16**) in **Fig. 12.** Remove four bolts holding side cover and pull cover (**Part #15**) along with sector shaft and roller wheel assembly (**Part 11**) from housing (**Part #7**) NOTE: if sector shaft does not clear housing easily, turn the worm shaft by hand to release sector hrough side of housing. 6. Remove adjuster cup (**Fig. 12, Parts 1 and 2.**) 7. Draw the worm gear and shaft from the housing. Lay worm and shaft (**Part 4, Photo D**) in safe area on

bench. 8. Remove lock nut from the lash adjuster and screw the lash adjuster through the side cover (**Fig. 2, Part #16 & 12**). The lash adjuster can then be removed from the slot on the sector shaft (**Fig. 2, Part 11, Photo H**).

Inspection

Photo A shows the entire sector roller assembly. Notice the lash, nut and shim (**Photos G & H**); the two needle bearings, one being wider than the other (**Photo C**); The grease seal next to the splines for the pitman arm (**Photo A**). Also in (**Photo A**) you will notice the worm gear is still in the housing with the worm shaft removed. Notice the "blind spline" which mates the worm and worm shaft together in (**Photo D.**) This view may dispel any rumors that the worm gear and shaft were welded together. You laugh? I have had people tell me they were told to remove the worm by cutting it from the shaft! Thoroughly clean all parts in solvent and dry with cloth. Lets now get to the major problem area(s) which cause steering "slack" and or the "hollow/dead" space that may be felt through the steering wheel. The sector shaft ROLLER WHEEL is where 95% of the above mentioned troubles are found. The outer edges of the wheel rotate, and are "driven" against the worm gear spinals (teeth) in a push-pull motion (**See Photos H & J**). After thirty plus years of this action, even as hard as this steel is (Rockwell hardness of 58-61 on the C scale with special carbide steel going into the 80 range), leaves a curvature or concave surface of varying degrees on the wheels' outer edges. In this case the lash adjustment is not enough to remove this kind of slack. Repair of the roller wheel has and is being done by some people. I have been involved with doing this type of repair and I can tell you it is a very specialized technique and does require a knowledge of metals along with professional machining to produce a safe steering part. The roller wheel bearings total 22, eleven riding on either side of the wheels' inner/outer races, which are held together with a lock "snap" ring & groove (**Photo B**).

In more severe cases where a car has been subjected to a harsher environment or by stressed steering linkage, the roller wheel edge can show severe "patch" pitting, chip holes, or steel flaking (**Photo B**). Let me add however, that sparse pin-head pitting will not affect having slack or hollow steering. Factory fresh original wheels were not perfectly smooth. Vary rarely have I seen severe wear to the worm gear which is within the same Rockwell hardness as the roller wheel. The sector shaft needle bearings parts (**#10, Photo C**), the worm gear cone bearings (**Parts 3 and 5**), and races (**Parts 6 and 2, Photo E**), are usually found to be in fairly good condition only if a sufficient amount of quality gear grease (packing) is found surrounding all the components and no water has penetrated the housing. The mast jacket bearing assembly (**Part #17, Photo F**) has ELEVEN 1/8 inch ball bearings. The bearing assembly itself can be taken apart, cleaned and relubricated. The housing side cover GASKET (**Part #14, Photo A**) will be destroyed when the cover is removed so a replacement will be necessary. The packing rubber and retainer (grease seal) (**Part #8/9, Photo C**) usually has deteriorated and will need replacing. Check the sector shaft lash adjuster end for proper clearance. Check the lash shim to see if it has been altered (**Figure #17, Photo G**) shows the relation of the roller wheel and worm gear if the lash adjuster had been turned to far clockwise which would "lock up" the steering completely. (**Photo H and J**) show a side and frontal view of how the gears "ride" and properly function in the housing. When repacking housing I have found the best lubricant is a CV front wheel drive joint lube which will not "channel" when cold and not "break down" when hot.

Always check steering linkage (**see Fig. 1**). Check the tie rod ends for any "looseness" or wear (**Fig. 20**). 2. Check the steering connection rod (drag link) (**Fig. 5**). In general all steering linkage should be thoroughly inspected to eliminate any possibility of additional steering "slack" outside the gear housing.

1949-54 Chevrolet Passenger Car/ Steering Ratios:

In desperation, due to the scarcity of Corvette steering gear parts and knowledge, these gear parts, if in good condition, could be used in the Corvette housing Passenger car gears will not, however, interchange with a Corvette worm and roller wheel or vice versa. The passenger car steering ratio is a 22.1:1 as compared to a Corvettes' 21.1:1. The fast steering adapter was introduced for Corvette in 1960 as a GM dealer aftermarket part to produce a 16.3:1 steering ratio (**Photo K and L**). Ratio Terminology: If you were able to turn the Corvette steering wheel in one direction 360 degrees 22.1 times, the sector shaft would rotate one full revolution.

Imagine the leverage of a large diameter 17" steering wheel going down to a 1 & 11/16 inch roller wheel. Talk about "torque". Engineers later realized this poor combination and in 1955 revised the Chevy passenger car gearing system while Corvettes' somewhat antiquated steering remained unchanged through 1962.

Dot Steering Rebuilders, a division of Dot Deco Products Co. now has a reproduction sector shaft ROLLER WHEEL (**Photo M**). Also available are parts, rebuild kits, and restoration services for the 1953-62 Corvette STEERING GEAR ASSEMBLIES. Due in late June will be a very correct reproduction 16.3:1 ratio FAST STEERING ADAPTER. If you would like more information you can write to the company, P.O. Box 6723, Sherwood, AR 72116. FAX (501) 753-6830.

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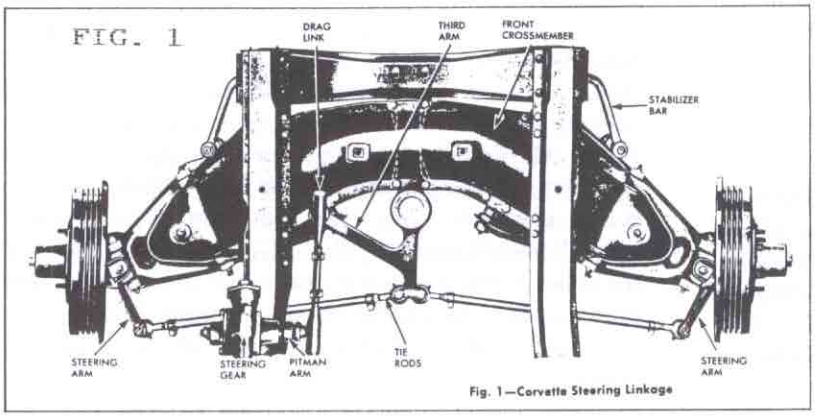


Fig. 1—Corvette Steering Linkage

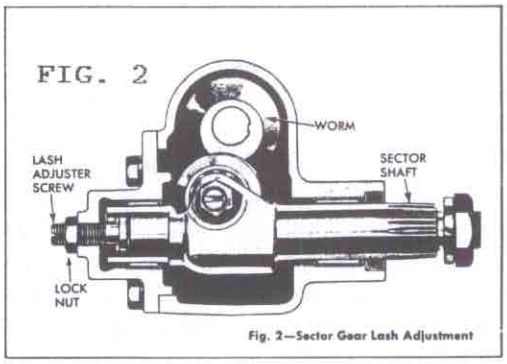


Fig. 2—Sector Gear Lash Adjustment

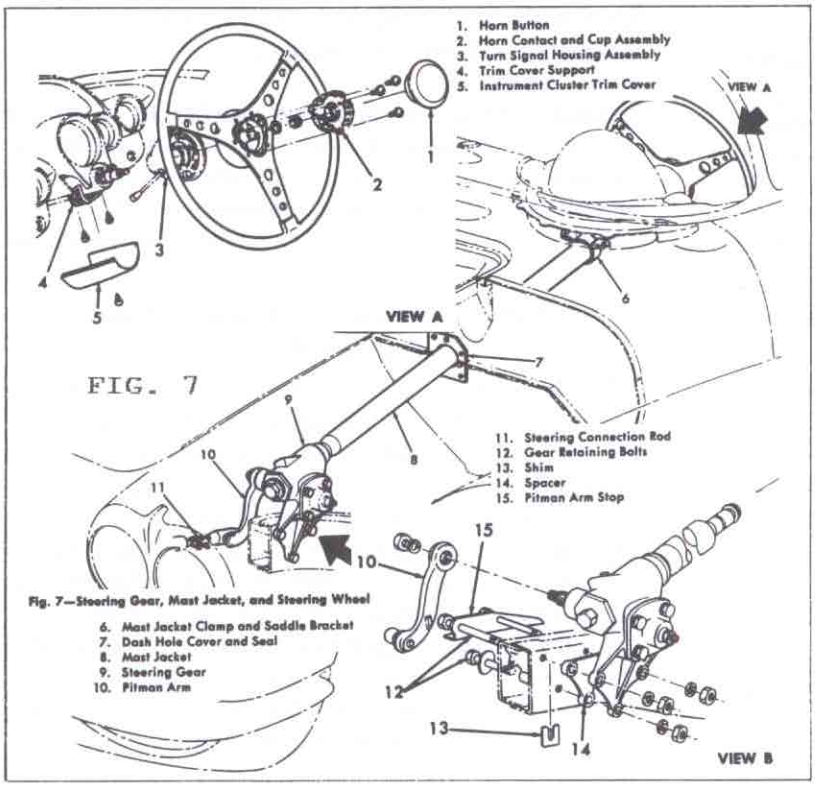


Fig. 7—Steering Gear, Mast Jacket, and Steering Wheel

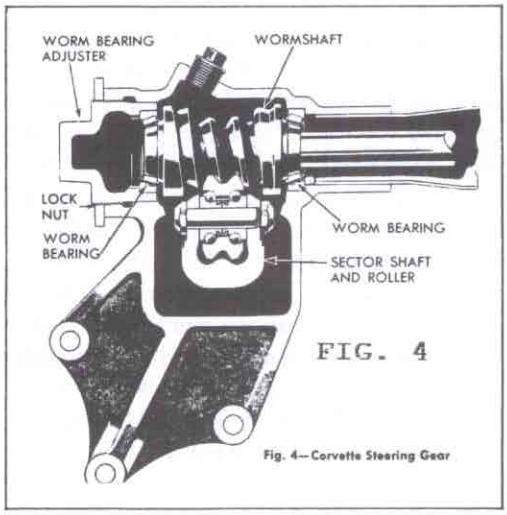


Fig. 4—Corvette Steering Gear

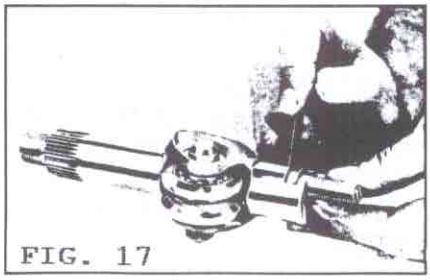


Fig. 17—Checking Sector Shaft Lash Adjuster End Clearance

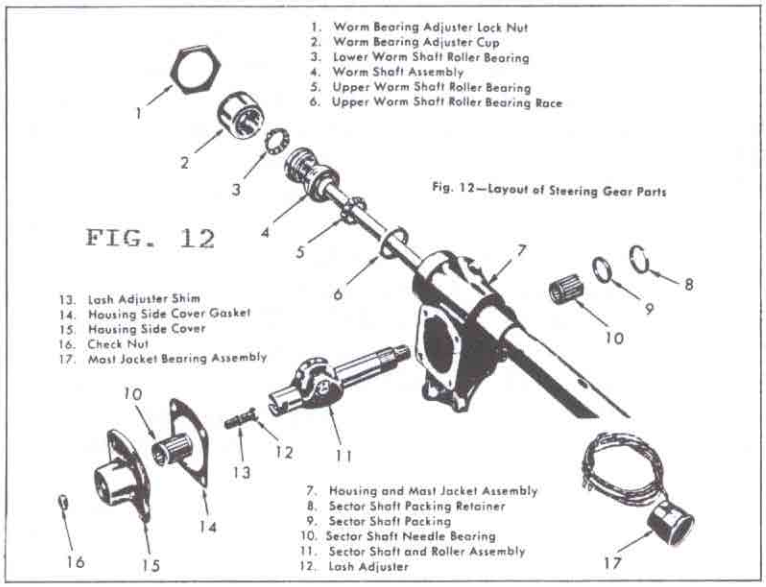


Fig. 12—Layout of Steering Gear Parts

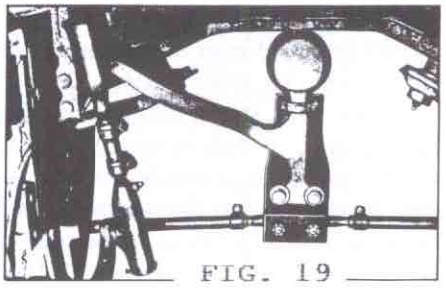
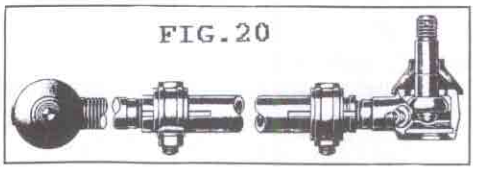


Fig. 19—Fast Steering Adapter (typical)



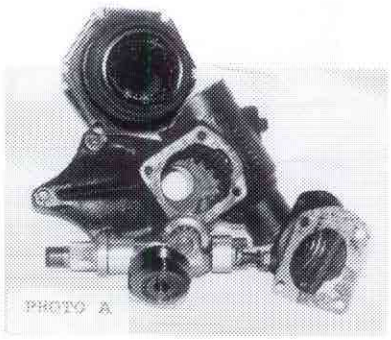
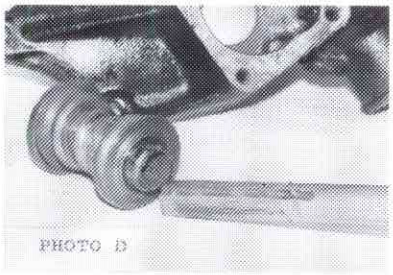


PHOTO A

PHOTO B

PHOTO C



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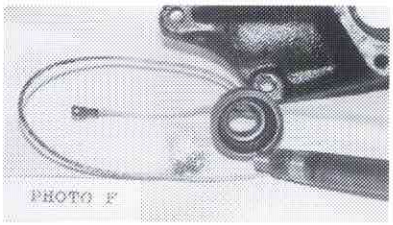

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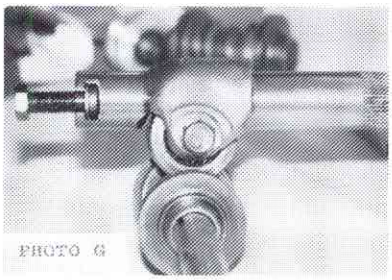

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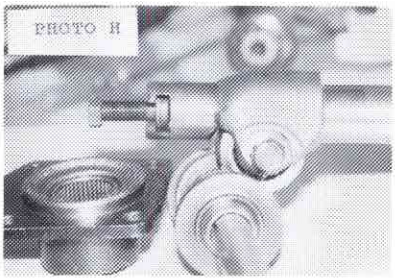

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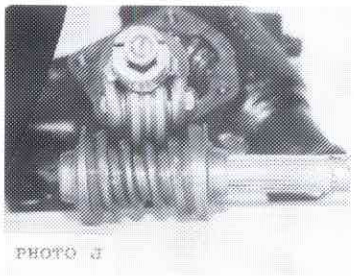

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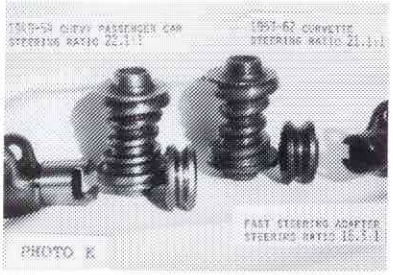

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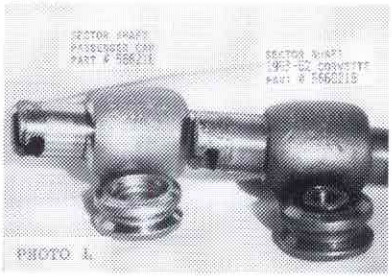

PHOTO L

PHOTO S

DOT PRODUCTS COMPANY

STEERING GEAR ASSEMBLY
1953-1962 CORVETTE
PARTS PRICING & REBUILD SERVICE

				MSR
ROLLER WHEEL W/BEARINGS	*(NRS)	(part # SW)	Reproduction	$149.00
ROLLER WHEEL (ORIGINAL)	(LOS)	(part # 11A)	Restoration	$125.00
ROLLER WHEEL BALL BEARINGS	(NS)	(part #11B)	Original wheel	$ 3 .00st
SECTOR SHAFT (only)	(LOS)	(part 11C)	Limited stock	$ 95.00
WORM GEAR (only)	(LOS)	(part #4)	Restoration	$125.00

WORM BEARING ADJUSTER LOCK NUT & CUP	(LOS)	(part # 1 & 2)	$ 20.00
UPPER / LWR WORM SHAFT ROLLER BEARING	(NS)	(part # 3 & 5)	$ 20 .00pr
UPPER/LWR WORM SHAFT BEARING RACE 2	(NS)	(part #6)	$ 22.00 pr
GEAR ASSEMBLY HOUSING	(LOS)	(part 7)	$ 50.00
SECTOR SHAFT PACKING (grease seal)	(LOS)	(part #8 & 9)	$ 9.00
SECTOR SHAFT NEEDLE BEARINGS 2	(NS)	(part #10)	$ 20.00 pr
LASH ADJUSTER	(LOS)	(part #12)	$ 5.00
LASH ADJUSTER SHIM GM PART #605142	(NS)	(part #13)	$ 3.00
GASKET (housing side cover)	(NS)	(part # 14)	$ 3.00
HOUSING SIDE COVER	(LOS)	(part #15)	$ 20.00
CHECK NUT	(NS)	(part #16)	$ 2.00
MAST JACKET BEARING ASSEMBLY	(LOS)	(part #17)	$ 25.00
COMPLETE STEERING ASSEMBLY (all parts as listed)			$450.00
STEERING ASSEMBLY REBUILD SERVICE (see reverse page) parts +			$135.00
PASSENGER CAR INTERCHANGE (LOS) parts #4 & #11 limited stock			$175.00

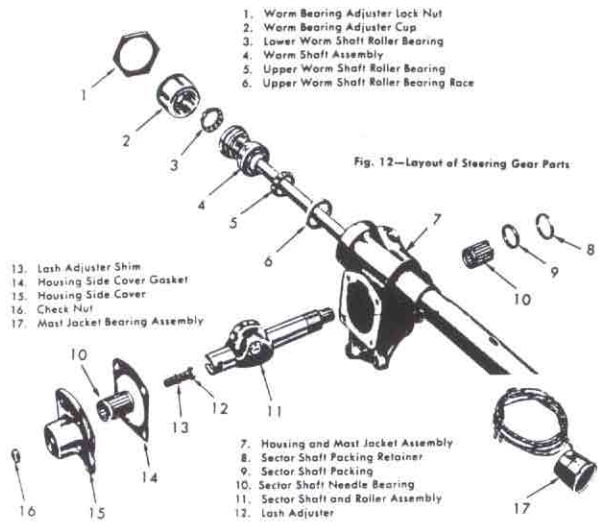

Fig. 12—Layout of Steering Gear Parts

Our steering gear parts and rebuild services are guaranteed to meet the original manufacturers specifications, quality, and tolerances. LOS are #1 condition original parts. All individually purchased steering gear parts are shipped with a reference guide which will aid in the proper and final installation, adjustments, and maintenance of the steering gear components. Dot Products is not responsible or liable for the clients improper or negligent installation and adjustments.

* NRS = New Reproduction Stock
NS = New Stock
LOS = Limited Orig. Stock

P .O. Box 6723
Sherwood, AR 72116
(501) 758-2177

TEN POINT STEERING GEAR REBUILD SERVICE

1. Completely disassemble steering gear housing and all components.
2. Remove all old grease and clean all parts and bearings.
3. Inspect all bearings for wear.
4. Inspect roller assembly for any pitting, and wear.
5. Inspect worm assembly for any excessive wear, chips, and nicks.
6. Check lash adjuster and shim for wear and proper spacing.
7. External housing surface is refurbished and painted to chasis black.
8. Replacement parts and original components are reassembled and repacked with a higher quality CV joint lubricant.
9. Steering gear assembly and components are weight stress tested. Lash adjustment is set to pre-installation specifications.
10. Complete steering maintenance and adjustment literature is provided for customers reference to properly complete installation to automobile.

GEAR LUBRICANT

It is recommended that a front wheel drive CV joint lube be used for best results in repacking the steering gears and housing. This lubricant will not break down when hot, and will not "Channel" when cold like the original chasis greases. CV lube usually comes in a vinyl bag and can be purchased at any auto parts store.

WORM GEAR REMOVAL

Contrary to rumor, the worm gear is not welded to the worm shaft. The two are mated with a 2½ inch splined taper. Therefore there is no need to remove the worm gear from the shaft with a hacksaw or cutting torch and destroy valuable parts. If you are not blessed with the correct GM J tool, press, or puller, the worm gear can be easily removed by opening a vice just enough to allow the worm shaft through vertically and letting the worm gear rest on top of the vice cushioned with a piece of wood or soft metal for protection. Using a ½ inch brass punch and hammer, hold the worm gear and punch with one hand and with the other tap the worm shaft down and through the worm gear.