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Rear End Booklet

M.V. MORA

Rear End Booklet

The purpose of this booklet is to deal-with the rear end and differential gears as a unit and to give a good photographic, breakdown and disassembly of the entire unit. Quite often many restorers are scared to become involved in a restoration of the rear end. I do hope however, that through this booklet enough insight is provided to give you a working familiarity with all components.

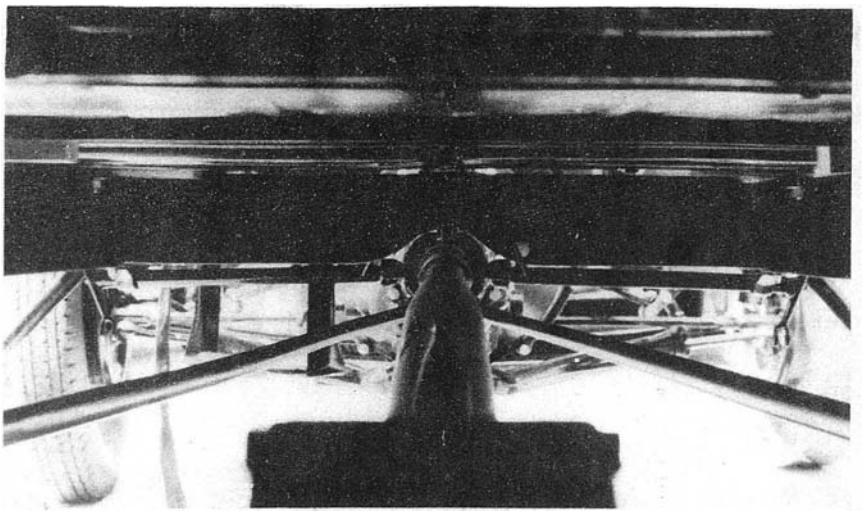
To remove the rear end from the car you must first disconnect shock absorbers and the rear brake rods. It would be a very good idea to also unbolt the housing which holds the U -Joint since this could get into a bind and crack.

The next procedure is to jack up the frame and place it on good stands. At that time you will be able to remove the four nuts holding the gear spring to the frame. Note: At this time if you still have the rear fenders on your car you will have to remove both tires and let the rear end rest on a dolly. Now the rear end can be pulled out.

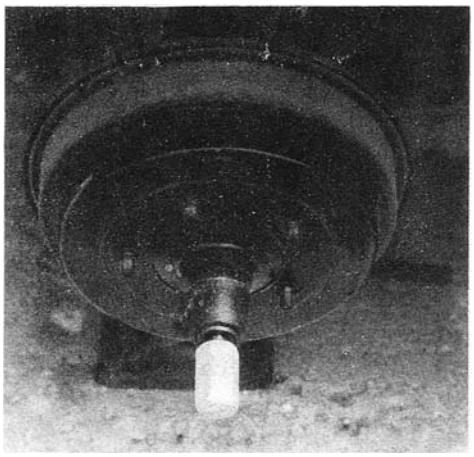
After its' removal as a unit it is a good time to inspect the rear radius rods. If for some reason they are bent they must be straightened. However, heating to straighten will often distort them due to the stretching of the metal. It is best to replace them. Bent rods can cause undue strain and stress on the gears and can lead to their failure.

To start you must remove both hub nuts. At that time you will either have

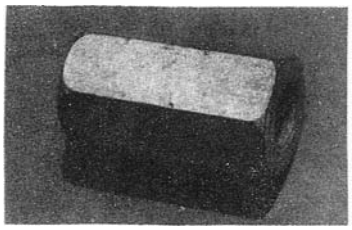
to use a hub puller or hub knocker as pictured to remove these hubs.



Viewing the rear axle assembly installed in the "A". Note the two radius rods pointing toward the front of the torque tube. It is absolutely necessary that these rods be straight.



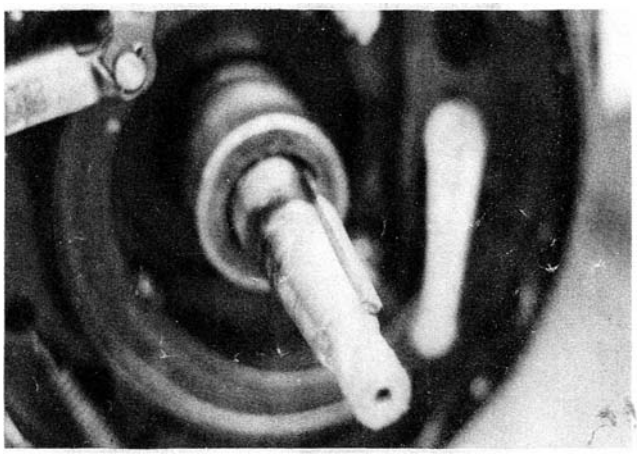
The removal of the rear hub will require a hub puller or knocker. Pictured is the inexpensive hub knocker. To remove hub, screw on knocker, tap lightly and the hub will back off.



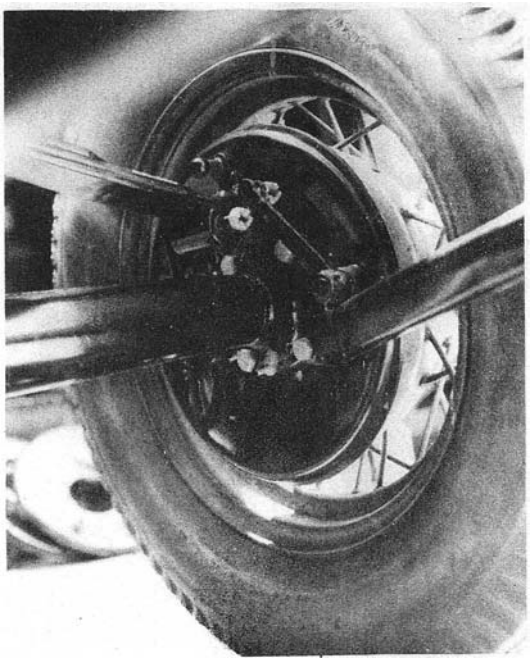
Hub Knocker

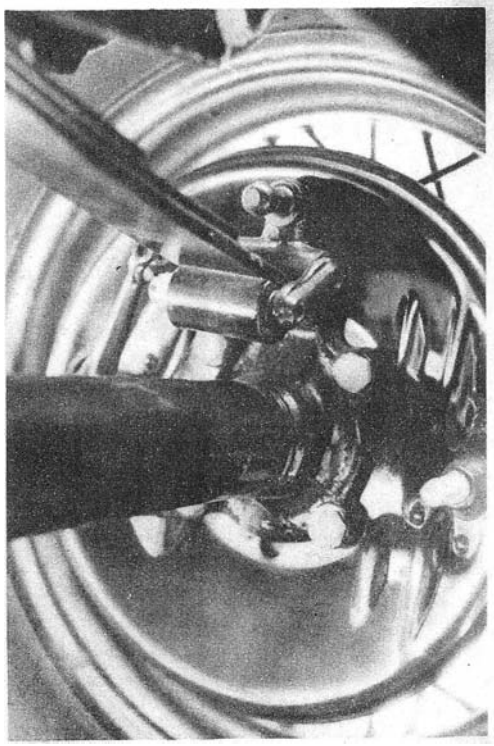
Before removal be sure all brake adjusting wedges have been completely backed off. If using the less expensive hub knocker, just screw it on and tap on it. This hitting will cause a vibration which will cause the rear hub to back off the tapered axle.

Once the rear hubs have been removed, note that there is a key at each rear axle. These keys should be removed and replaced with new ones. Play in these keys can lead to damage of rear axle gears due to the jerking motion they can cause once the clutch has been disengaged.



The axle key installed on the axle shaft. Replacement of this key is an absolute necessity.

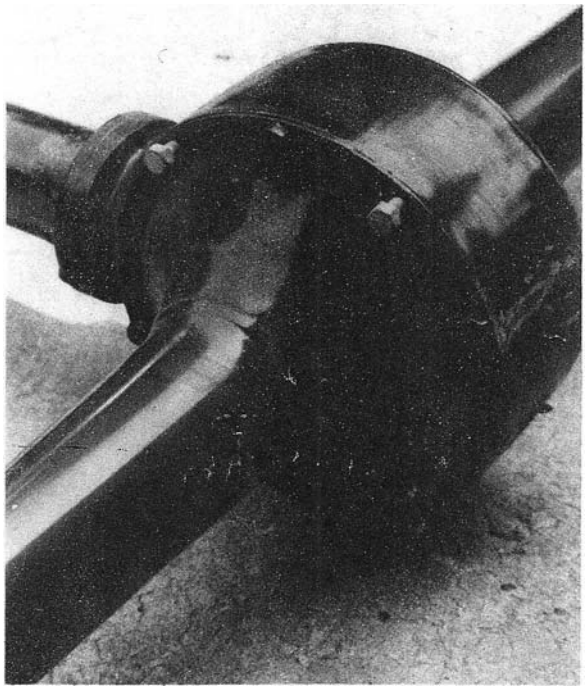


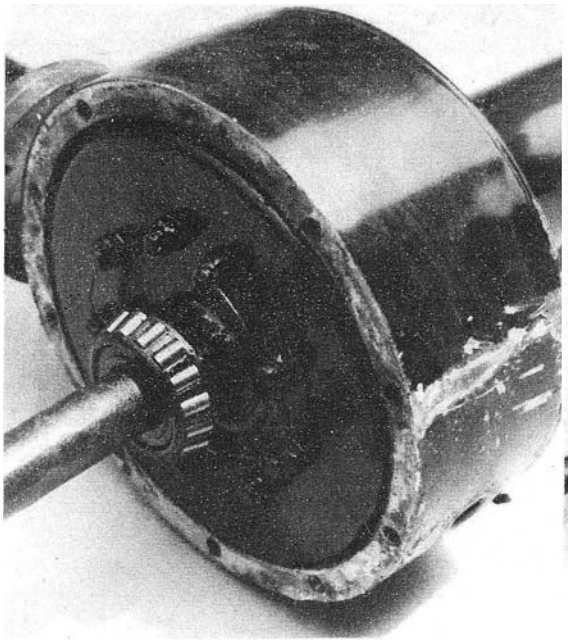


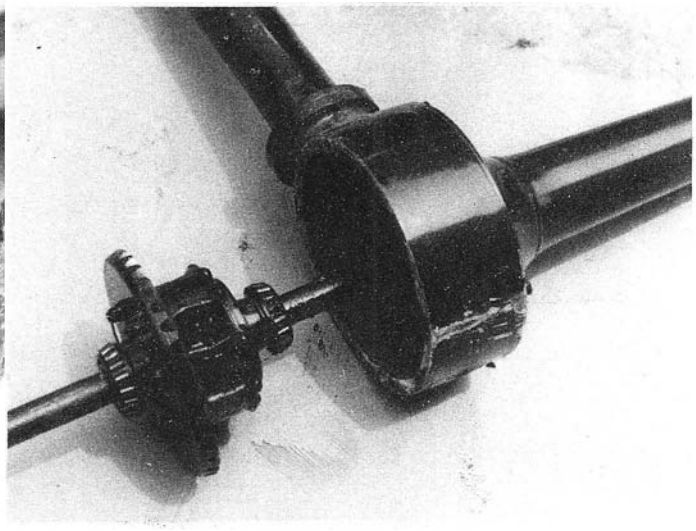
The two above photographs are views of the brake backing plates installed on the axle shaft. Note the four bolts in the center which must be removed so the backing plate can be separated from the axle housing.

Now proceed with the removal of the rear brake backing plate and the rear radius rods. Place the backing plates to the side along with other brake components for their restoration in the near future. If you are just wanting to make a visual inspection of the gears you can remove the drivers side axle housing. This removal will permit the pulling out of the entire ring gear and spider gear assembly with both axles attached as shown on the following page.

First it will be necessary to remove the bolts of the axle housing on the drivers side.

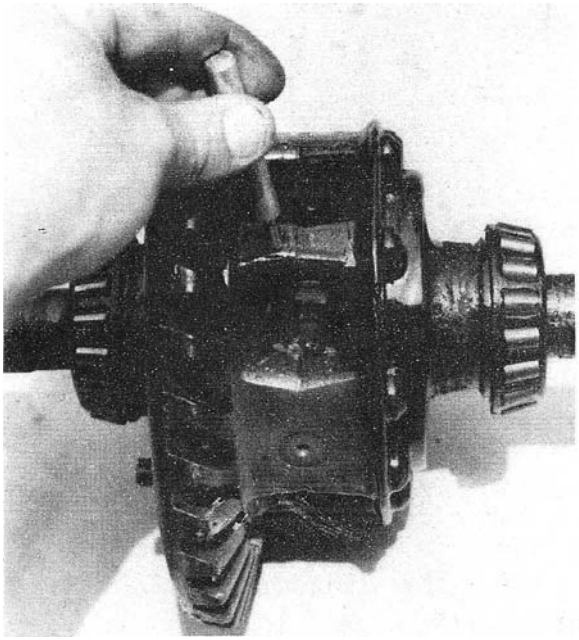




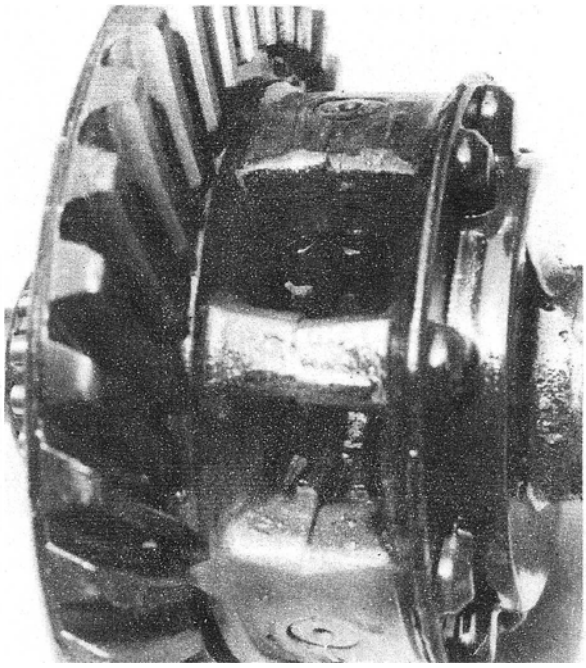


By removing the driver side axle housing both axles and ring gear can be removed by pulling in an outward direction.

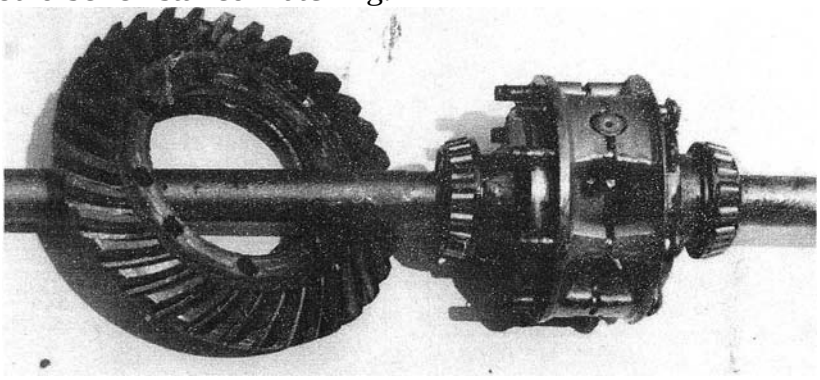
You can now unbolt the carrier housing. It is best to mark the housing to insure exact replacement of assembly.



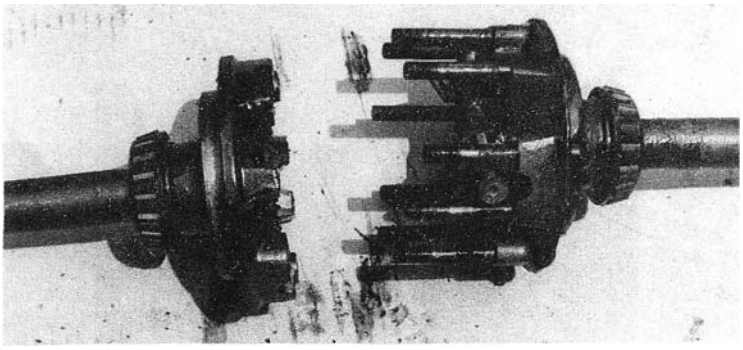
Be sure to mark the housing of the spider gear assembly. These are machine fitted & should be reinstalled matching.



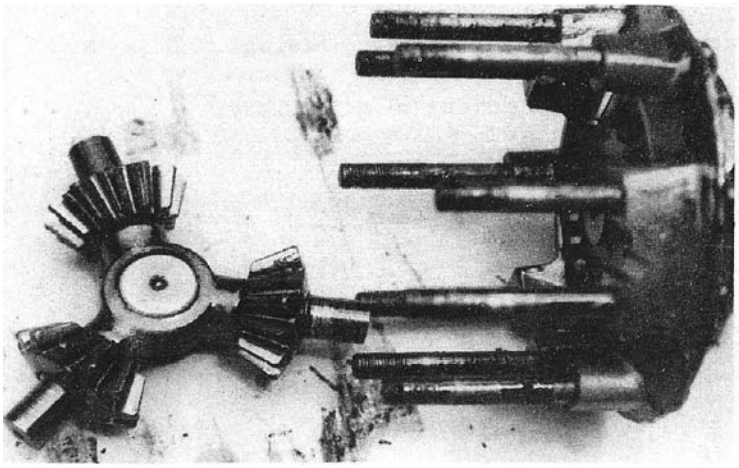
Close-up view of the ring gear and spider gear housing. Note the spider gears inside the housing. .



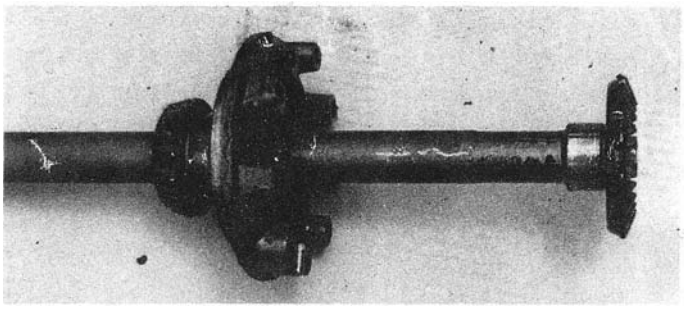
After removal of the nuts, the ring gear may be removed.



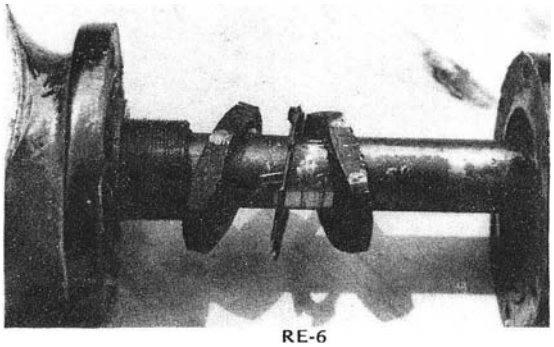
This shows the two axles separated with the housing still attached.



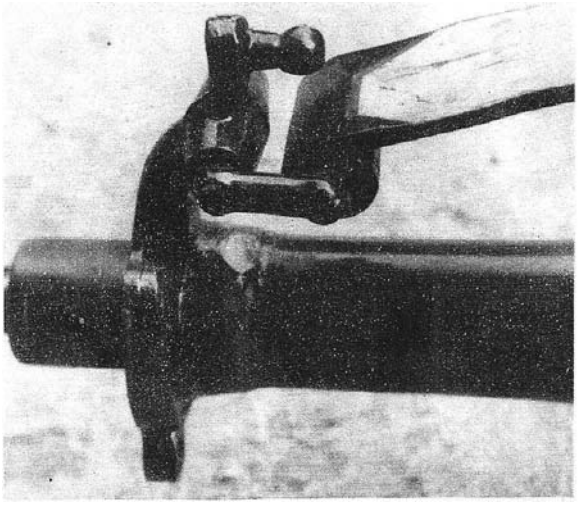
The spider gear may now be removed. Spider gears rotate with the axle and through the use of these gears enables the car to turn corners by having one wheel turning faster than the other. You can now slide off the carrier housings as shown.



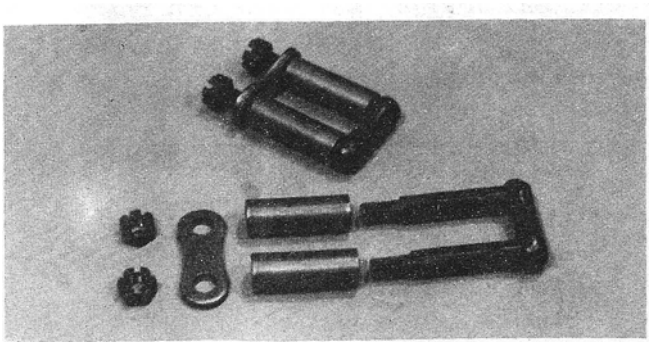
Next remove the passenger side axle housing and also remove the torque tube housing. With the removal of the torque tube housing you may note two large nuts with a locking plate. It will be necessary to inspect this plate and to bend up the ears which have· been crimped over the nuts. These nuts have the regular right hand threads, and may be very tight. Once unscrewed, you can slip the drive shaft through the banjo housing.



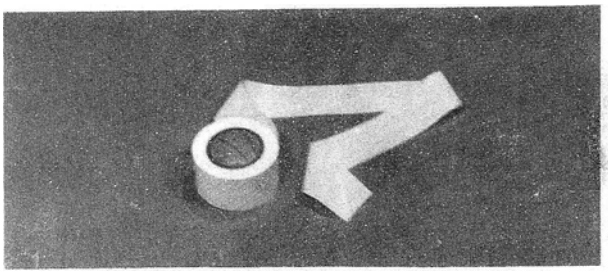
As noted in the picture on the right, it will be necessary to remove the rear spring before proceeding any further. By securing a spring spreader from a local rental agency the tension can be relieved on the springs & the spring shackles removed. It is absolutely necessary that the shackles be replaced since years of rust and stress have marked these items as un-useable.



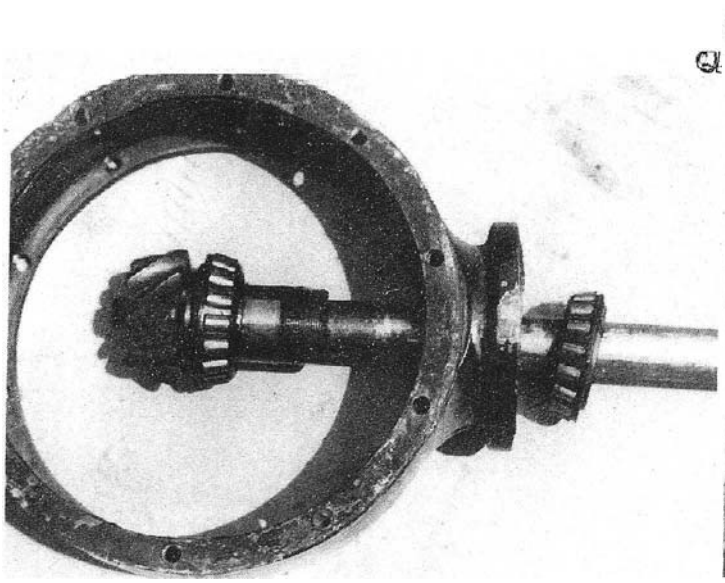
Once the spring has been removed, it is advisable to remove the center spring bolt and have each spring leaf sandblasted. Check each leaf for excessive pits & cracks. If for some reason ne spring leaf is cracked it would be a good idea to replace the entire spring assembly since one cracked leaf or more has caused undue stress on the other leaves. After the leaves have been sand blasted, they should be primed and a strip of Teflon applied between each leaf before re-installation of the center spring bolt. Teflon is better than any grease lubricant and will not leave an oil residue.

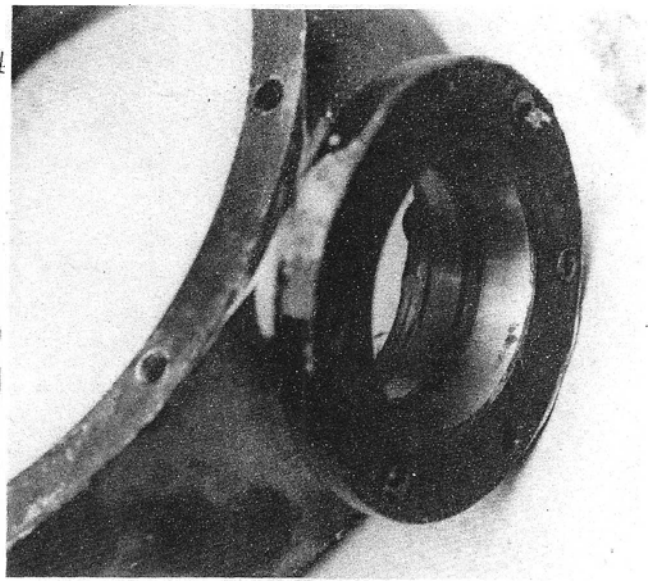


Pictured above are the rear spring shackles, one assembled, the other disassembled. It is an absolute must to replace them.



Teflon is used as an anti-rattle device between spring leaves and will not leave an 0il residue that other lubricants will.





As noted in the picture on the left, there are two tapered roller bearing s on which the pinion gear carrier rides. These bearings share what is known as a double race as pictured in the photo on the right and act as each bearing scone.

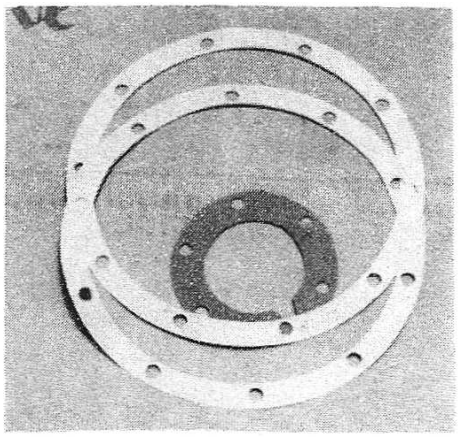
The removal of the pinion gear will require a gear puller. If you do not have a gear puller this operation can very economically be completed at a local machine shop for a few dollars. At this particular point the entire rear axle and gear assembly has been disassembled. It is best now to clean all parts in a good solvent and inspect gear bearing services and race services for pits, cracks, deep grooves and scoring. Replace them if any show these signs. Check all gears for the same and do not hesitate to replace them. It has taken quite a bit of work to get this far in the restoration and once you have your car fully restored you surely do not want to go back through and do it again. Just be sure!

The reassembly is probably the biggest item concerning the rear end that seems to frighten most restorers. By following the next procedures you should have no difficulty in completing this task.

The reassembly will be just the opposite of the procedures discussed above. First install the pinion bearing on the pinion gear. Press this assembly on the drive shaft. Do not forget to also install the key. Once completed, attach the pinion bearing nut & cotter pin. The whole assembly can then be inserted in the banjo housing. This will require the installation of the pictured nuts and locking plate At this time it will be necessary to check the preload on the bearings within the assembly. This will probably require the assistance of another person. If the preload is correct and by turning both axles in the same direction at the same time and at the same speed, a heavy drag will be felt. To check the backlash between the drive & pinion and ring gear, turn the drive shaft one way then the other way. There should be approximate1y 10 thousandths of an inch backlash. By the use of a heavier gasket or what might be considered a thicker gasket between the left axle housing that being the drivers side and the banjo housing you can increase the back lash of the driveshaft. A thinner gasket will decrease the backlash. From now on the reassembly will occur in same procedure as disassembly.

It is advisable to order an extra gasket set when ordering parts since it may be required to use an extra gasket or two to give correct backlash to the driveshaft. The rear end should be lubricated with 600 weight oil and checked periodically. The rear end reservoir is full of oil when it is approximately 1/4" from the top of the filler plug.

Gaskets used between the axle housing and the torque tube.



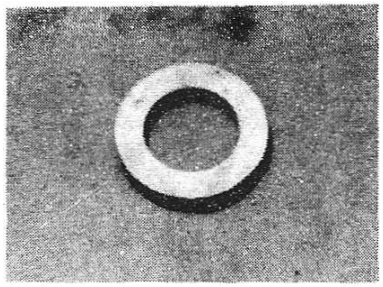
To get the proper adjustment here and the correct preload drag on the Bearings, it will be necessary to tighten the first nut down to approximately 18-20 inch pounds. Once done, the locking plate ends can be crimped down and the second locking nut can be installed.

Next install the ring gear, axle and carrier assembly together. Please do not forget to align the marks that were previously made on the carrier assembly during disassembly. The torque on these bolts should be between 30-35 foot pounds.

Be sure to install the locking wire removed disassembly. The backlash which can be defined as that amount of play from turning one axle one way & the other axle the opposite way should not exceed 10-15 thousandths of an inch.

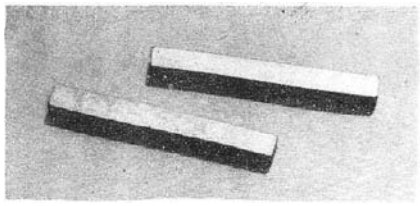
The end play which is defined as the movement of the axle shaft itself by pushing- it inward toward the other axle and pulling it outward should not exceed 20 thousandths of an inch.

It these limits were exceeded and if carrier assembly was free from dirt when being matched together, it may be necessary to order new gears due to excessive wear on some. After being sure that the backlash and end· play are within their limits you can now place the rear axle housings on. All bolts on those housings are to be torqued at 35 foot pounds.



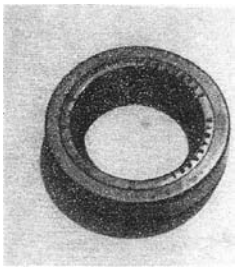
To reinstall the rear hub it will be necessary to place this asbestos washer between the hub and the axle nut. This will prevent leakage of grease from rear wheel bearing outward.

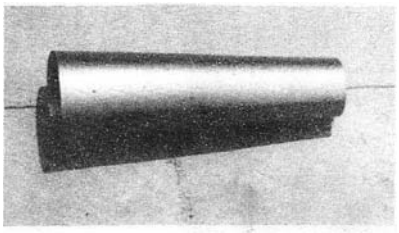
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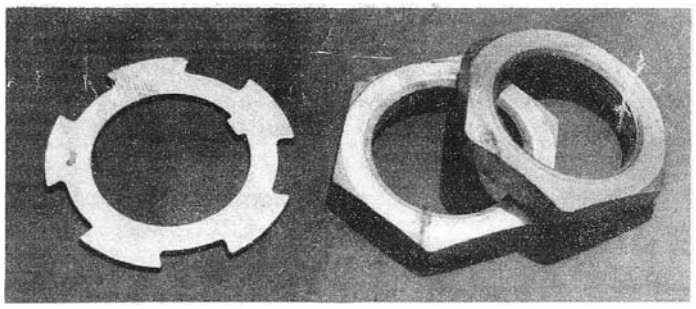
Axle keys. These should be inspected and replaced when necessary. Ill fitting keys can lead to damage of axles. This same axle key can be used on the drive shaft to hold the pinion gear in place.

The grease seal located at the end of each axle housing and at the end of the torque tube are all the same as pictured above.

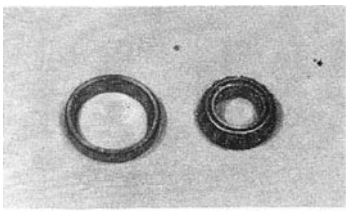




Axle shims which are used frequently when there is play between the hub and the axle once it has been installed. These shims will take up play on the tapered axle.

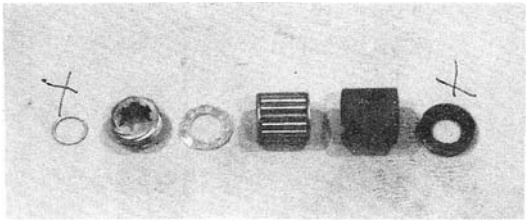


The pinion lock washer and two locking nuts which hold the pinion gear & bearings in place.



There are two differential bearing cups and four differential bearing s used in the rear axle. These cups and bearing s are interchangeable.

Order of as assembly of front drive shaft bearing & seal assembly from right to left: seal, bearing sleeve, bearing, speedometer thrust washer, speedometer gear, and ring.



It is imperative to replace the grease seals which are located at the end of each axle and front end of the torque tube. The assembly for the grease seal at the front of the torque tube has been pictured below. It will be necessary to remove the snap ring as pictured, speedometer gear, roller bearing and its' sleeve before the seal can be removed. The importance of this seal is to prevent rear axle grease from leaking to the u-joint assembly. As mentioned above there are two seals located at the ends of the axle housings. The purpose of these seals is to prevent rear axle leakage into the rear braking assembly. here are also seals in the rear brake hub next to the rear wheel, bearing. It is advisable o also replace this seal to prevent oil leakage from the rear wheel bearing to the braking assembly By taking a punch and inserting it through the hole where the axle in normal assembly is located, this circular seal can be driven out. To reinstall, it will be necessary to locate the seal in position by going through the opposite end of the axle housing, that being nearest the ring and pinion gear assembly. By using a long stick and tapping lightly on the seal, it can be pressed into place. Upon examination of these seals you will note that on the inside diameter it is beveled. This prevents the leakage of the rear axle grease. At the axle the beveled edge points toward the rear axle gears. The front seal at the U-Joint points toward the transmission.

After the rear axle has been assembled it will be necessary to add the proper lubricant, this being 600 weight oil. The assembly should be filled to the top of the filler hole and no more. Every 1000 miles it is advisable to check this level. It is highly recommended to have all outer housings thoroughly cleaned and sandblasted.

After cleaned, they should be primed and painted gloss black enamel. All bolts, nuts and cotter pins were plated originally. The rear axle holds approximately 1-1/2 pints of 600 weight oil.



PARTS NEEDED TO COMPLETE YOUR RESTQRATION

1. REAR AXLE GASKET SET. includes 2 housing gaskets & 1 t6rque tube gasket.

2. DRIVESHAFT KEY. For driveshaft to pinion gear.

3. RING & PINION (3.78 to 1) ORIGINAL. Machine matched gear set is made from nickel molybdenum alloy steel.

4. PINION DIFFERENTIAL BEARING. Two are used to support the rear axle gear.

5. DIFFERENTIAL BEARING CUP. Fits in rear axle housing ends.

6. HUB PULLER. Knock-off type.

7. AXLE KEY. A loose axle can damage your axle.

8. AXLE & DRIVESHAFT SEAL. Two in the rear axle housing s and one for the driveshaft.

9. PINION BEARING CUP. This is the special double sided cup located just behind the pinion gear.

10. 600 WEIGHT OIL. For lubrication of the differential.

11. SHACKEL KIT. Rear, original style.