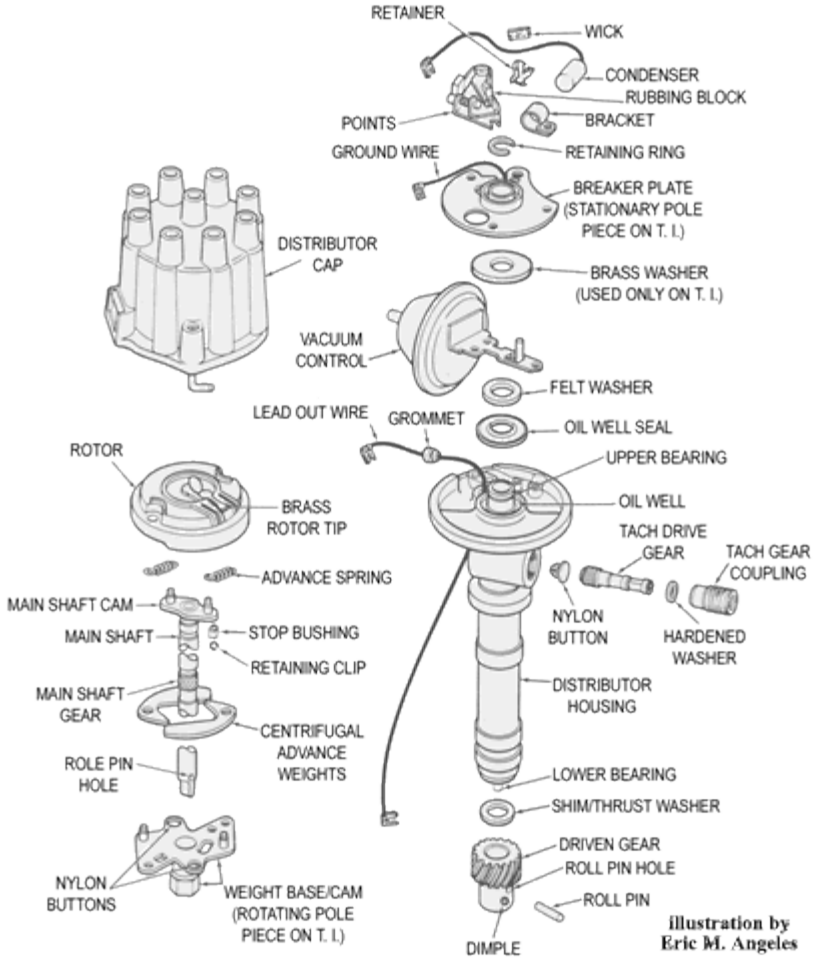
1962 THROUGH 1972 TACH DRIVE DISTRIBUTOR RESTORATION

By Dave Fiedler

This article covers both Transistor Ignition and points style Corvette distributors from 1962 to 1972. Fuel Injection distributors are not specifically addressed; however, many items will apply to these distributors as well. My definition of *restoration* is to bring a distributor back to its original appearance and function by reconditioning the original parts, replacing parts only when absolutely necessary, and using the correct parts for replacement. It is not a process of gutting the distributor of all its original Delco components, substituting "will-fit" reproduction or aftermarket parts and then calling it restored – a distributor must function properly to be called restored. True restoration takes time, experience, patience and resourcefulness.

A general misconception is that distributors are sealed for life devices that never need attention with the exception of changing points, condensers, caps and rotors. This misunderstanding may stem from the GM service manuals which state that distributors have "permanent type lubrication and no periodic maintenance is required". However the manuals do not adequately address long term wear issues, which leads into the first steps of restoring a tach drive distributor.



1962 - 1972 CORVETTE TACH DRIVE DISTRIBUTOR

Disassemble, Clean & Inspect

After the distributor is completely disassembled and cleaned with a solvent degreaser, then each part can be inspected for wear problems. Areas of typical wear and the solution are as follows:

A. Main shaft gear and tach drive gear- The most common problem is sheared gear teeth on both parts. This is usually accompanied by excessive tach drive gear end clearance (also see items C & F).

Solution: If the main shaft and tach drive gears are sheared then replacement is the only solution. When the main shaft is replaced it is extremely important to use a shaft that has the same cam brazed onto the end. GM used (38) different main shaft cams in tach drive distributors from 1962 to 1972.This cam is fundamental to the centrifugal advance curve because it determines the shape of the curve as well as controlling other functional characteristics (see article "All TI Distributors Are Not Equivalent" THE CORVETTE RESTORER Vol. Twenty-One, Number One, Summer 1994). If an identical main shaft cannot be found, the original cam should be removed and brazed onto a good shaft. One should be careful to orient the cam in the same angular position (with respect to the roll pin hole) as it was on the original main shaft. Caution: It is possible that substituting a main shaft with a different cam will have a detrimental effect on the performance of the vehicle.

B. Main shaft and lower bearing- The bearing is usually worn to an oval shape due to the side thrust produced by the drive (cam) gear. When wear is present the bearing will have circumferential grooves that are mirrored in the main shaft.

Solution: Main shaft wear is usually restricted to the area in contact with the lower bearing. Minor circumferential grooves can be removed from the main shaft by using fine grit abrasive tape and a lathe or similar means to rotate the shaft while polishing. An original main shaft is .489" in diameter- this diameter should not be reduced during polishing by any more than .001" in the area of the bearings. If the main shaft is heavily scored, then it will be necessary to replace it (see Solution A.) For bearing replacement, the lower bearing can be driven from the housing with a suitable drift. The housing should be measured to determine what size of bearing is needed. Delco machined the housings anywhere from .639" to .645" in diameter. A bearing with an outside diameter of .002" greater than the housing bore should be pressed into place and then reamed to the proper clearance- .0005" to .002" larger than the main shaft diameter. Bearing material should be bearing bronze not Oilite, brass or silicon bronze. Note: Upper bearings have not been mentioned because they generally see very little wear since there are no side forces acting on them. If an upper bearing needs to be replaced follow the same procedure outlined for the lower bearing.

C. Distributor housing where tach drive gear contacts the inside surface- The tach drive gear is heat-treated steel, which makes it very hard, unlike the cast iron housing which is relatively soft. Due to marginal lubrication and the thrust load produced from two mating gears (which is in the direction of the housing) the hardened tach gear bores a hole into the soft housing creating excessive end clearance. Note, for mid-1970 and newer distributors, including service distributors, Delco addressed this problem by making a minor change to the

housing. The fix was a nylon button that was added in such a way that the tach gear would bear against it. This redesign is easily detected since it is accompanied by a thru hole in the housing that is necessary to locate the nylon button.

Solution: Although there are many ways to repair this problem, most of the solutions destroy the originality of the housing. One method that preserves the originality involves the use of a custom-made spacer that is attached to the end of the tach gear. The procedure goes as follows: The distributor housing is set up in a Bridgeport-type mill so that the tach drive cavity worn area is perpendicular to the axis of the tach drive gear. The damaged area is then milled to produce an unblemished bearing surface. Next the tach gear, washer and coupling are installed in the housing and the distance between the end of the tach gear and the new surface that was generated is determined. The last step is to custom make a spacer from bearing bronze to a thickness that will allow .010" endplay in the tach drive gear. Since this spacer is held in place by the tach gear, a hole must be drilled in the end of the gear so that a protrusion on the spacer can be pressed into the gear.

D. Advance weights/main shaft cam interface- this fretting type wear is caused by almost constant relative motion between these two parts and is aggravated by a lack of lubrication. The wear, if present, will be visible as indentations at the points of contact.

Solution: Since the main shaft cam is so important, as previously discussed, every effort should be taken to restore the original cam. Shallow indentations can usually be removed by using a die grinder with a fine grit wheel to uniformly remove material while maintaining the original contour. The surface should then be polished with a sanding roll. Advance weight contact point indentations can also be ground smooth, however if much stock removal is required (which would alter the geometry of the weight) the result would be a change in the advance curve. If that is the case, the advance weights will have to be replaced using the correct style (four different part numbers were used.)

E. End of distributor housing where the driven gear shim contacts cast iron surface- For various reasons this surface is sometimes scored and worn in an irregular pattern. A poor bearing surface at this location can usually be seen by looking at the shims that mate with the housing. The shims will show non-uniform contact.

Solution: When this surface is scored or worn unevenly, the only solution is to machine the housing (using a lathe) in order it to get a good bearing surface.

F. Main shaft centerline to tach drive gear centerline problem- This is not a wear problem, but it is a condition that exists in an estimated ten percent of tach drive distributor housings. The problem is that the centerlines were machined too closely by Delco, causing abnormal wear between the main shaft gear and the tach drive gear. Deformed or sheared teeth on both gears can be a result of this problem. Assuming the upper and lower bearings are within specification, it is best identified by installing a new main shaft, coupling and tach drive gear into the housing and then rotating the main shaft to check for binding. The main shaft should turn freely in both directions.

Solution: If the centerline spacing is marginally out of specification, select fit of parts (coupling, tach gear and main shaft) may solve the problem. Otherwise, the only solution is to have the housing machined correctly. Since the position of the tach gear is already determined, or at least very difficult to change, the only option is to shift the main shaft centerline. This has to be done by a very competent machine shop that can jig bore the bearing bores in the housing to the specified center to center distance of .425". Oversized bearings (on the outside diameter) will have to be made to fit the bores. Ream the I.D. of the bearings as in Solution B. **This procedure is very tedious and would significantly add to the cost of a restoration.**

G. Bearing misalignment- This is a condition where the upper and lower bearings are not on the same centerline. This condition can be detected by slowly sliding a new main shaft through a good top bearing and into the lower bearing. If there is misalignment you can feel the shaft hit the edge of the lower bearing and when fully inserted the shaft will not turn freely.

Solution: The housing will have to be jig bored in a fashion similar to Solution F; only this time the objective is to correct the alignment of the bearing bores while maintaining the correct tach gear to main shaft centerline distance. **Again very tedious.**

H. Vacuum controls- This is not an obvious wear issue, but it is what you cannot see that could create a problem. The rubber diaphragm inside the crimped housing develops tears that will cause the control to not actuate and it will also allow air to enter the engine (vacuum leak.) For this reason, old vacuum controls do not tend to be very reliable and they are usually not cosmetically attractive.

Solution: Replacing vacuum controls presents a dilemma, as GM/Delco stopped making vacuum controls in 1994. An outside source currently makes all the controls and they are packaged under the Delco name. Unfortunately, these controls do not look like and are not numbered like the originals. Originals were stamped with the last three digits of the seven digit GM part number. These three digits were followed by another number that indicated the total amount of advance the control would provide. Current controls are stamped with a *B* followed by a number that has no functional significance. Some reproduction controls are available which look very similar to the originals, but they miss the target on function. Best advise- look for N.O.S. vacuum controls.

I. Weight base/cam (on point-style distributors)- Inspect the cam for wear caused by the rubbing block on the points pivot arm.

Solution: Minor score marks can be removed from the cam by using a 3M Scotch-Brite deburring wheel or equivalent abrasive. Replace the weight base/cam if the score marks cannot be removed or if the cam lobes are worn below .987" diametric reading from peak to peak. Note: If this part needs to be replaced use an identical part- check and compare the three digit stamped-in code number. Ten different part number weight base/cams were used.

Cosmetic Restoration

After all parts are repaired or replaced and everything is functionally correct (a trial fit of parts is a good idea at this point), the cosmetic segment of restoration can begin. The housing usually requires the greatest amount of attention. After thorough solvent cleaning, the housing may have some paint left on it as well as some rust. Media blasting with glass beads is probably the best means to prepare the housing for painting. Care should be taken not to let any glass beads come in contact with the bearings or other internal surfaces. Broken down glass beads are difficult to remove from this area and they are abrasive in nature. Remnants of glass beads will quickly destroy not only the bearings, but also the main shaft. After preparation, the housing should be masked (no paint on the portion that goes in the engine) and painted with a semi gloss black. After cleaning, other distributor components can be carefully media blasted, cleaned again and then be either treated with a rust inhibitor or replated, whichever was original for that particular part.

Assembly

When everything is cleaned, painted and plated to satisfaction, the distributor is ready for assembly as follows:

1. Repack the upper oil well (cavity surrounding upper bearing) with an oil absorbent material; a folded 3”x 3” piece of gauze is suitable. Saturate the packing with oil (20wt. non-detergent motor oil is preferred). Note: Due to contamination, I do not attempt to use the saw dust like material that was originally packed in the well.

2. Install a new plastic seal (still available from GM under part number 1950569 for 10-pack) in the counterbore above the oil well and then position the felt washer on top of the seal. Saturate the felt with 20wt. oil.

3. Install the nylon button in the housing for the tach drive gear (mid 1970 and later housings) as well as the nylon buttons (first used in 1967 to provide improved wear pads for the weights) on the weight base/cam (rotating pole piece on TI).

4. Install the vacuum control.

5. Install the lead out wire and grommet before locating breaker plate with new points and condenser. With TI distributors the brass washer and stationary pole piece assembly are located over the upper bearing instead. Secure either of these parts with the original retaining ring. Note: When working on point-style distributors, pay attention to the ground wire that is crimped to the breaker plate, because these wires can break at the crimp causing a loss of ground (repair as needed.)

6. Next, install the stop bushing and retaining clip onto the pin located on the underside of the main shaft cam. The weight base/cam (rotating pole piece on TI) can then be positioned onto the main shaft using a high quality grease to fill the two grooves (on the shaft) that the weight base will slide over.

7. With a generous amount of lubricant (20wt. oil again) on the main shaft and bearings, insert main shaft into housing.

8. The driven gear is then slid onto the main shaft and shims/thrust washers are added (.030” shims are available under GM part number 1837617) as necessary to provide approximately .010” endplay. When the endplay is correct, a new roll pin can be driven into place. Note: When correctly installed, the dimple on the driven gear will line up with the brass tip on the rotor.

9. Install the weights and springs using a lubricant at weight pivot points and between weight tips and main shaft cam.

10. The last assembly step is to install the tach drive gear and coupling, again using a high quality grease to lubricate the gears. Make sure the hardened washer is located between the gear and the coupling.

Testing

For a restoration to be complete, the distributor should be inspected using a distributor machine. Several functional characteristics can be checked with this equipment, but the most important one is the centrifugal advance curve. GM published advance specifications using three, and sometimes four, data points (advance @ a given rpm) to establish a curve. It may take some time and a selection of advance springs, but if the internal parts (main shaft cam, stop bushing, weight base/cam or rotating pole piece and advance weights) are correct, then the advance curve should meet the specifications. Each distributor part number (53 different part numbers used from 1962 to 1972) has specific internal components that work in combination to produce a centrifugal advance curve that is optimum for that application. It is this advance curve that helps generate maximum horsepower throughout the rpm range.

One final word on centrifugal advance curves: Experience has taught me that if an engine is stock and the car is street driven, then the original advance curve works best, period!

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