

REHABbing A PREWAR GEMMER STEERING GEAR

By David Williams

That Chris-Craft used a number of automotive components in its boats is well known. The Gemmer steering gear in the 1939 Chris-Craft 19-foot Custom Runabout that my son, Skip, and I are restoring is typical of this.

According to the 1950 volume of *Motor's Auto Repair Manual*, an auto mechanics reference on automotive engines and related components of the time, our Gemmer steering gear was used in 1935 and 1936 Fords, Hudsons, and Terraplanes, as well as 1937 to 1939 Willys.

Though our unit showed no outward problem signs, given its nearly 70 years of age, we thought it best to give it a thorough going over.

Disassembly was quite easy. (Note: though this article is written on the reassembly, it is configured in such a manner that starting at the end and reading forward will show how to disassemble the unit.)

Figure 1 shows the parts of the unit after disassembly and clean up. There was very little rust on most of the parts; nevertheless after a good cleaning, most of the parts were given a wash with naval jelly, then a coat of Rust-Oleum® primer followed by a heavy coat of black Rust-Oleum gloss enamel. The only time-consuming task was getting the old grease out of the main housing. All parts were found to be in remarkably good and reusable condition, with the exception of two cork gaskets, or seals.

1. ASSEMBLING THE WORM GEAR IN THE MAIN HOUSING

Figure 2 shows the parts making up this assembly step. The main housing is shown on the left with the worm gear (which is on the end of the steering wheel shaft) on the top. Other parts in this step are shown nearby, including two bearings and a bearing cup. The first step is to seat one of the bearings (we noted where each came from and put them back accordingly) in the main housing. We used ample white lithium grease in installing these. The bearing will slip over the thin tube extending to the right of the housing and seat at the other end. Next the worm gear is slid on the thin tubing, seating on the bearing. There is a top and bottom to the bearings so make sure they are properly aligned. Figure 3 shows the worm gear seated in the housing. Next, the other bearing is slid down the worm gear shaft; then the bearing cup. Apply ample grease in the bearing installation.

Figure 4 shows these parts in place with the next parts to be installed nearby—gaskets and a collar. There were five thin spacer gaskets used between the housing and the collar in our

unit, and they were all reusable. The next step is to simply slip the gaskets and then the collar down the worm-gear shaft, then bolt the collar in place. Figure 5 shows this step completed.

2. ASSEMBLING THE CROSS SHAFT WITH SECTOR GEAR

Figure 6 shows the main housing with worm gear installed. In the middle is the cross shaft with what is known as the sector gear at its base, and on the right is the bearing housing for the cross shaft. The cork gasket that goes between the two housings is also shown.

As might be expected, the original cork gasket was not reusable. We made a replacement using an art store circle cutter and 1/8-inch cork/rubber gasket material from a local automotive store. Before final cutting we made a number of trials using cardboard. The outside diameter had to fit in the groove seen on the main housing, while the inside diameter had to fit snugly on the bearing housing.

The cross shaft with sector gear will slip very easily into the main housing as shown in Figure 7. The cork gasket has also been slipped into place here. Notice in Figure 6 the split conical part to the left of the cork gasket and above the lock washers. This is an eccentric jam sleeve that goes into the upper right-hand hole of the bearing housing. Figure 8 shows a close up of the jam sleeve in the cross shaft housing nut. The nut will turn about an eighth of a turn. This is used to adjust the “lash” or play between the worm and sector gears.

At his point it is a good idea to align the worm gear shaft such that when the steering wheel goes on it, the wheel has your preferred spoke alignment. Remove the cross shaft and sector gear first and then—after the worm gear shaft is properly positioned—replace the cross shaft so the sector gear is in the middle of the worm gear.

Now place the bearing housing down over the cross shaft and onto the four studs in the main housing. The jam nut is probably best turned as far counter-clockwise as it will go, when putting these two units together, but you may have to play with it to find the best location for joining the units.

The eccentric sleeve will probably be pushed up and out of position in this assembly process, but it can be easily tapped back down. Hand tighten the nuts on the studs after putting on the lock washers. Note that the small lock washer goes on the stud coming through the jam nut. Figure 9 shows the two housings bolted together. Now turn the unit over and screw in the slotted screw with the nut shown at the bottom of Figure 7. Be sure to add the lock washer. This is an adjustment screw

Figure 1: The Gemmer Steering Unit after disassembly and clean up



Figure 2: Parts making up assembly step 1



Figure 3: Worm gear seated in housing



Figure 4: Bearings and bearing cup in place, gaskets and collar ready for installation



for fixing the lateral movement of the cross shaft. Assuming you didn't move the lock nut when removing the screw at disassembly, you can simply replace the screw and nut combination with the lock washer, and there will be no change in the lateral movement. If you moved the lock nut on disassembly, move the screw in and out until the cross shaft moves freely when turning the worm gear shaft. Then tighten the lock nut.

The final step in assembling the gear is adjusting the lash, or play, between the worm and sector gears. The nuts on the studs holding the main housing and cross-shaft housing are still loose at this point. Turn the eccentric jam nut as far counter-clockwise as it will go, then slowly turn it clockwise, stopping frequently to test the play at the end of the cross shaft. Adjust to the point at which there is minimum play at the shaft end. Then tighten the nut on the stud and the nuts on the other three studs. The steering gear is now basically assembled.

3. ASSEMBLING THE GEAR AND THE PILLOW BLOCK

Figure 9 also shows the pillow block (which will attach the gear to the boat) and the parts for attaching it to the steering gear. Note the two cork seals in the lower right of the picture. The pillow block simply fits over the cross shaft and onto the three studs on the cross-shaft housing and is held in place by first the flat washers and then the lock washers and nuts. Don't tighten these completely until placing the unit in the boat, as the pillow block allows for some adjustment at installation.

Originally there was a 1/4-inch cork seal that fit around the cross shaft in the pillow block. We were unable to find that size cork/rubber gasket material, so made two 1/8-inch seals out of the same gasket material we used for the gasket shown in Figure 6. Figure 10 shows the pillow block in place with the cork seals inserted. Figure 10 also shows the metal washer and spring used to hold the cork seals in place when the pitman arm is placed on the splined cross shaft; the latter is held in place with the large nut and lock washer shown. The metal washer fits against the cork seal and the spring against it.

4. ASSEMBLING THE HORN BUTTON AND THROTTLE LEVER TO THE THROTTLE TUBE

Figure 11 shows the parts that make up the throttle and horn assembly. At the top is the throttle tube with a three-eared plate affixed to the end. Below the throttle tube is the horn wire; this should have a contact on the end and a centering cup, as shown. If the contact is not in good condition some rework may be necessary. On the bottom right is the horn button; to the left of it the contact cup, then a lock washer and the screw that holds the contact cup into the horn button. Next to the throttle lever is a fiber washer, and next to it the horn spring. On the left of the horn spring is the retaining spring that holds the whole assembly together. Also shown is the steering wheel/shaft key and the nut that holds the wheel to the steering shaft.

Begin the assembly by placing the horn button in the throttle lever, then—working from the underside—place the fiber washer over the horn button throat and fasten the contact cup in the button with the screw and lock washer. Figure 12 shows these steps completed. Note, once these steps are taken, the horn button will move loosely in the throttle lever, but will not come out. Also shown in Figure 12 is the throttle tube with the

horn wire threaded through it. The horn wire contact and centering cup are clearly shown, as is the three-eared throttle plate.

Now turn the throttle lever/horn button assembly upside down, place the horn button spring over the screw holding the cup in place, and then place the throttle tube with the horn wire in it into the throttle lever. The ears of the throttle tube plate should fit into the slots in the throttle lever. Figure 13 shows the completed assembly with the retaining spring lying on top. The final step is to fit the retaining spring into the groove in the throttle lever.

5. ADDING THE THROTTLE MECHANISM

Now return to the steering gear as shown in Figure 10 and slip the steering column over the steering shaft and onto the collar shown in Figure 5; clamp it in place. See Figure 14. Next, mount the steering wheel on the steering shaft and put the long throttle tube assembly (shown in Step 4) through the wheel hub and down the steering shaft. Figure 15 shows the end of the steering gear with the throttle tube protruding and the components making up the throttle control laid out beside it. (Note: the horn wire has been removed from this figure for ease of viewing.)

First, attach the “+”-shaped bracket to the housing using the two 1/4-20 bolts. Have the open ends of the cross bracket facing down. Next, slide the brass stop-arm on the throttle tube with the open end “grasping” one of the open ends of the cross bracket. Lastly, slide the throttle arm on the throttle tube and tighten in place using the bolt and nut shown. The final assembly should appear as in Figure 16.

You will probably have to make some positioning adjustment on the throttle arm when attaching the linkage in the boat.

Happy steering! 🚢

Figure 5: Main housing assembly complete

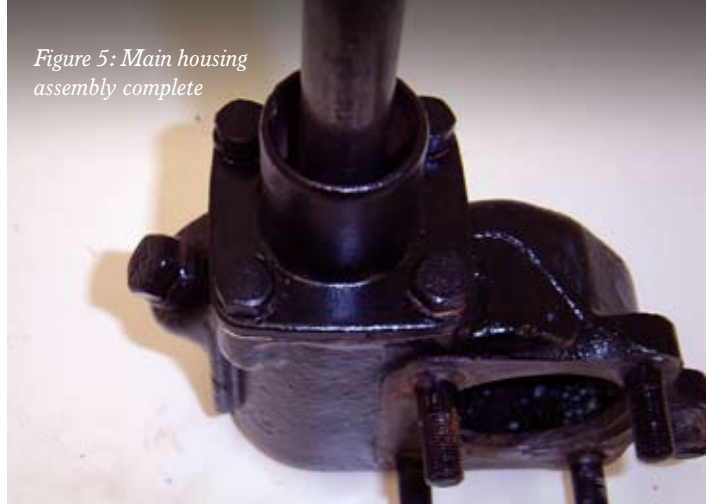


Figure 6: Main housing, cross shaft with sector gear and cross shaft housing



Figure 7: Cross shaft inserted in main housing



Figure 8: Eccentric jam sleeve in cross shaft housing jam nut



