The Ryan Overdrive

by Tom Endy

The Ryan overdrive is a factory built overdrive designed for the Model a Ford. They were manufactured in Denver, Colorado and marketed between 1990 and 2000. They were discontinued after that, however, quite a few were sold. They were available in two gear ratios 33% and 23%. The operation of the overdrive was very simple. A separate gearshift handle shifted either in or out of overdrive.

I purchased my first Ryan Overdrive (23%) in 1994 when I acquired my Victoria. It is still installed in the car and after 24 years and 50,000 miles it has been indestructible. I later acquired a second used Ryan overdrive (33%) and installed it in a 1929 Model A Ford coupe I owned at the rime. I also installed a 411:1 ring & pinion gear set and it worked very well. The Ryan overdrive pre-dated the Mitchell overdrive.

The Ryan overdrive is not compatible with the Victoria, the A-400, and the 1931 two door phaeton as it conflicts with the dropped floor pan. In order to provide the required clearance in my Victoria I had to remove the dropped floor pan and cut away the back portion that is under the back seat and have a panel welded in place.

Some people will tell you the Ryan overdrive is “noisy”. What they do, is “sing” when the overdrive is engaged. The noise is coming from the straight cut gears. I don’t think the singing noise is objectionable. Once you get used to it, you don’t even notice it.

Another problem is where the two radius rods connect to the forward end of the overdrive. This arrangement was not thought out well. Instead of the hole being integrated into the lower circumference of the tube as Henry did, it is a rectangular box with a hole in it that hangs down below the front end of the forward tube and is welded in place. This arrangement can allow it to constrict with the service brake cross shaft and render you without brakes. It is best to grind some material off the bottom of the box and make certain the brake cross shaft swings freely and allows a sufficient clearance between the radius rod mount and the service brake cross shaft.

The Ryan overdrive shifts with a single shift lever on the floor. All the way back is out of overdrive, shifting forward there is a neutral position, and all the way forward it is in overdrive. The shifting in and out of overdrive is accomplished by pushing in the clutch and shifting. There is a unique built in synchromesh. The design is very simple with four robust gears that do not come out of mesh with each other. There is a mechanism between two sets of gears that moves latterly to lock the input and output shaft together for out of overdrive; when shifted into overdrive all four gears are in the drive train. This is how shifting is accomplished.

At a recent swap meet I came across a vender that had a Ryan overdrive for sale at a ridiculously low price. There was no way I could walk past it without buying it. The overdrive had never been installed; it was still in the box. It had been manufactured back in 1992 and acquired by MAFCA that year and was the grand raffle prize at their national membership meet in December. They even had the Ryan Company inscribe the MAFCA raffle information in raised letters on the removable side plate of the overdrive housing.

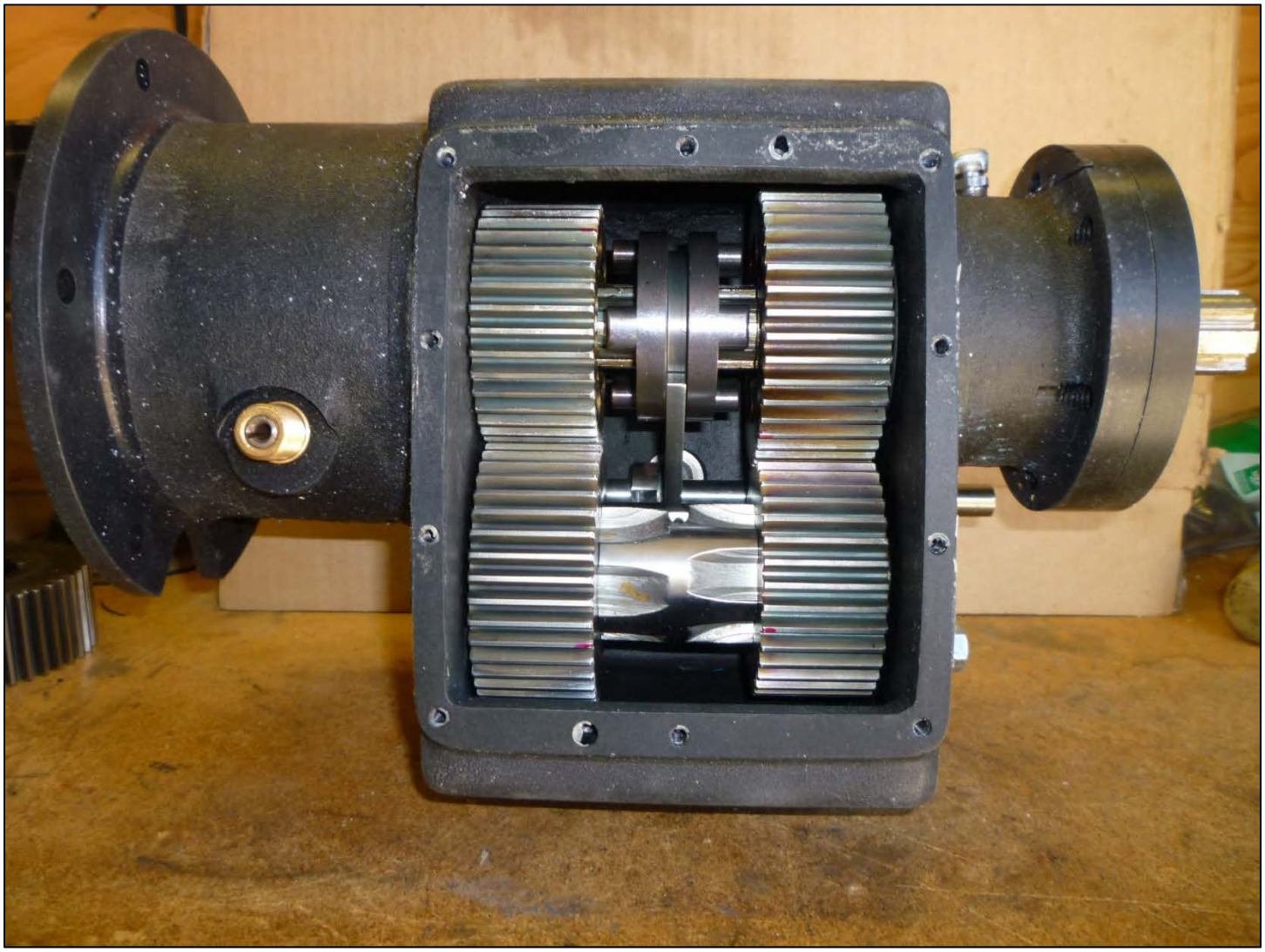
The winner of the overdrive in 1992 had taken it home and stored it away still in the box for 26 years. When I inventoried the components before I bought it everything was there except the shifting lever and the replacement speedometer cable. The shifting lever is very simple and can easily be fabricated. An alternative is to purchase a shifting lever from the Mitchell overdrive people as their shift lever will bolt right up.

The literature that came with the Ryan vaguely alluded to the fact that the gear ratio was 23%. To verify this I removed the side plate and counted the gear teeth and was able to figure out that the overdrive is indeed a 23%, which is very desirable.

The photos on the following pages describe the Ryan overdrive and shows its installation onto a Model A rear axle assembly.

The removable side plate bears the inscription of the 1992 MAFCA grand prize.

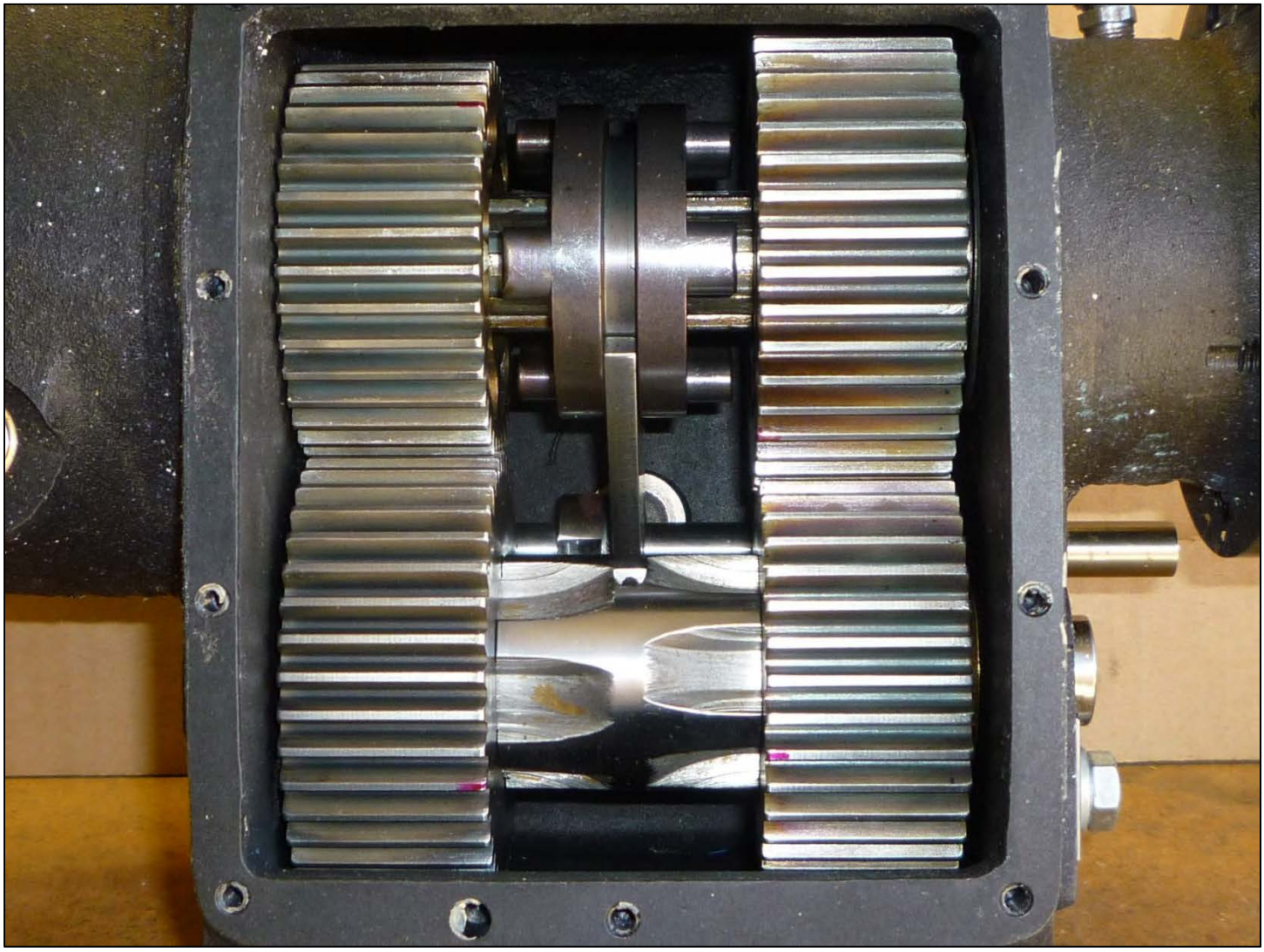
The side plate was removed and I was able to count the teeth on each of the four gears. I was also able to mark the input shaft and the output shaft. While shifted into overdrive I rotated the input shaft one full rotation. The output shaft rotated about one and one quarter rotation, pretty close to 23%.



With the side plate removed the teeth on each gear was counted. The upper two gears are the “shifting gears” Note the mechanism between them that moves back and forth horizontally and locks into slots in the sides of the gears. It is shown in the neutral position. When the shifter is moved to the right the overdrive is out of overdrive. When shifted to the left it is in overdrive.

The large flange on the left bolts to an adapter plate that is attached direct to the front flange of the banjo. The brass fitting between the rear flange and the gear housing is where the speedo cable attaches.

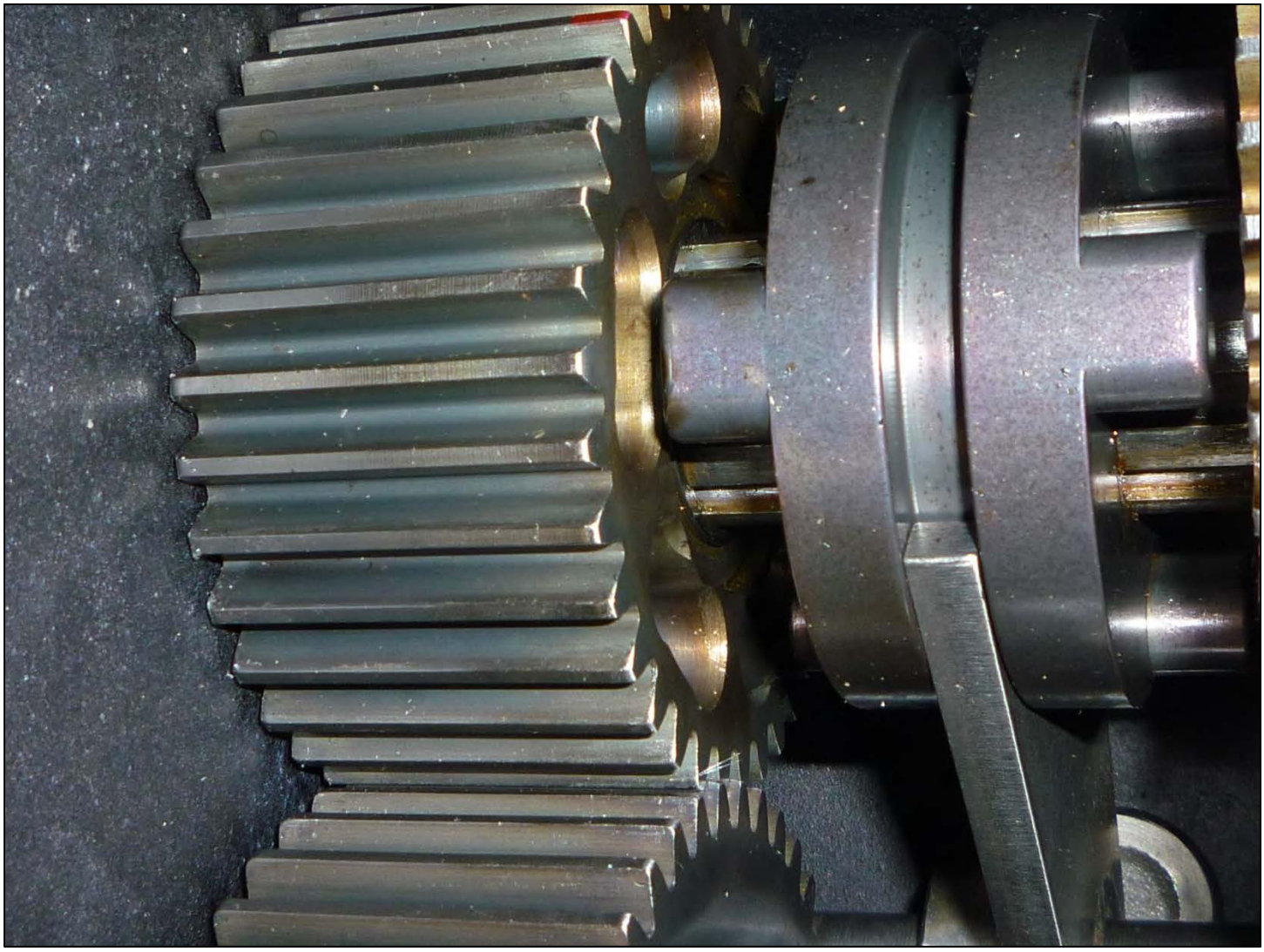
The flange on the right attaches to a front tube that replaces the stock torque tube.



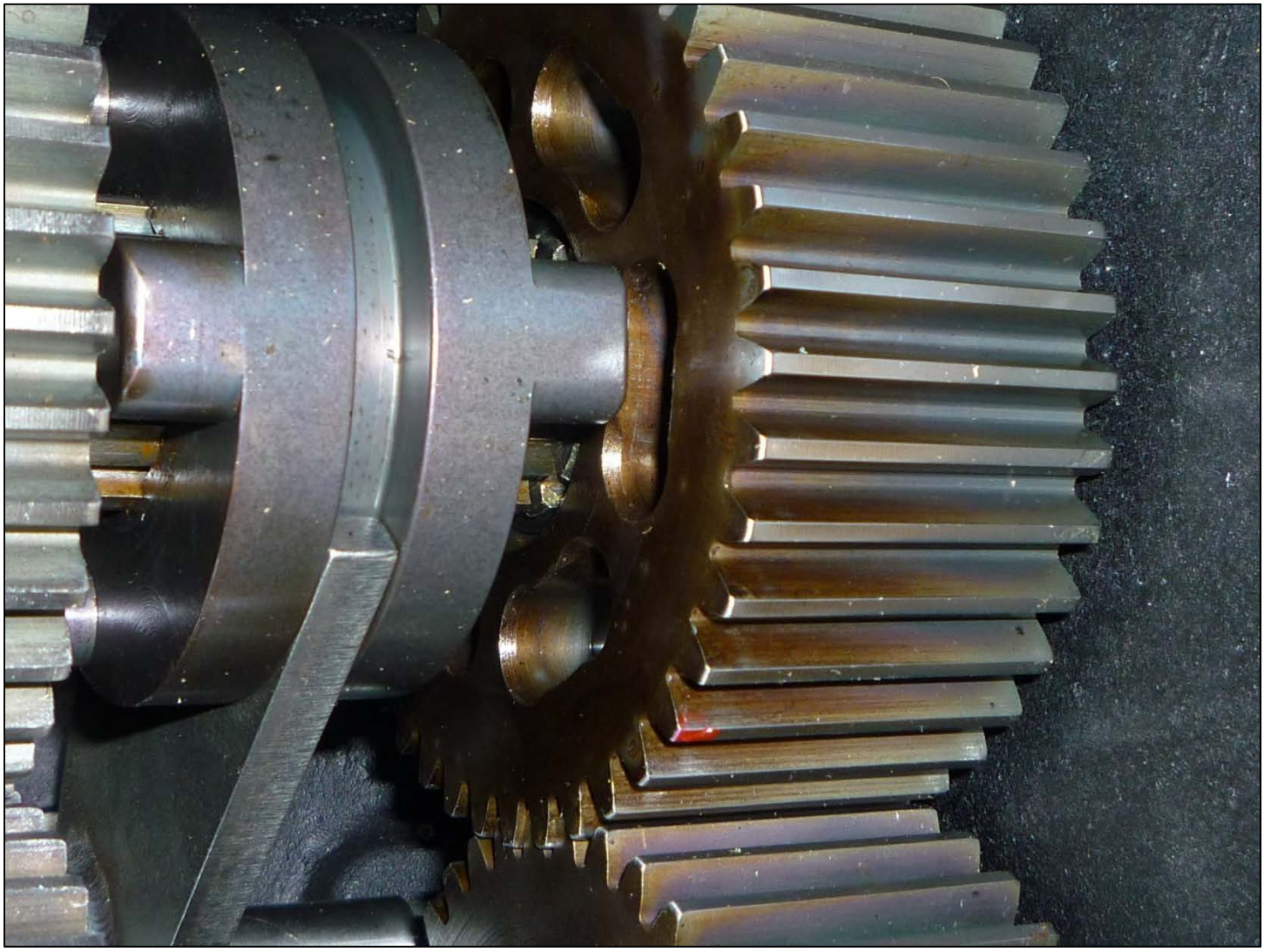
A closer look at the four gears: The red markers on the edge of the gear teeth (finger nail polish) was used as a reference to count the gear teeth.

Theory of operation:
When shifted <u>out</u> of overdrive the two top gears and the shafts they ride on are locked together and the input on the right is driving straight through to the output on the left.

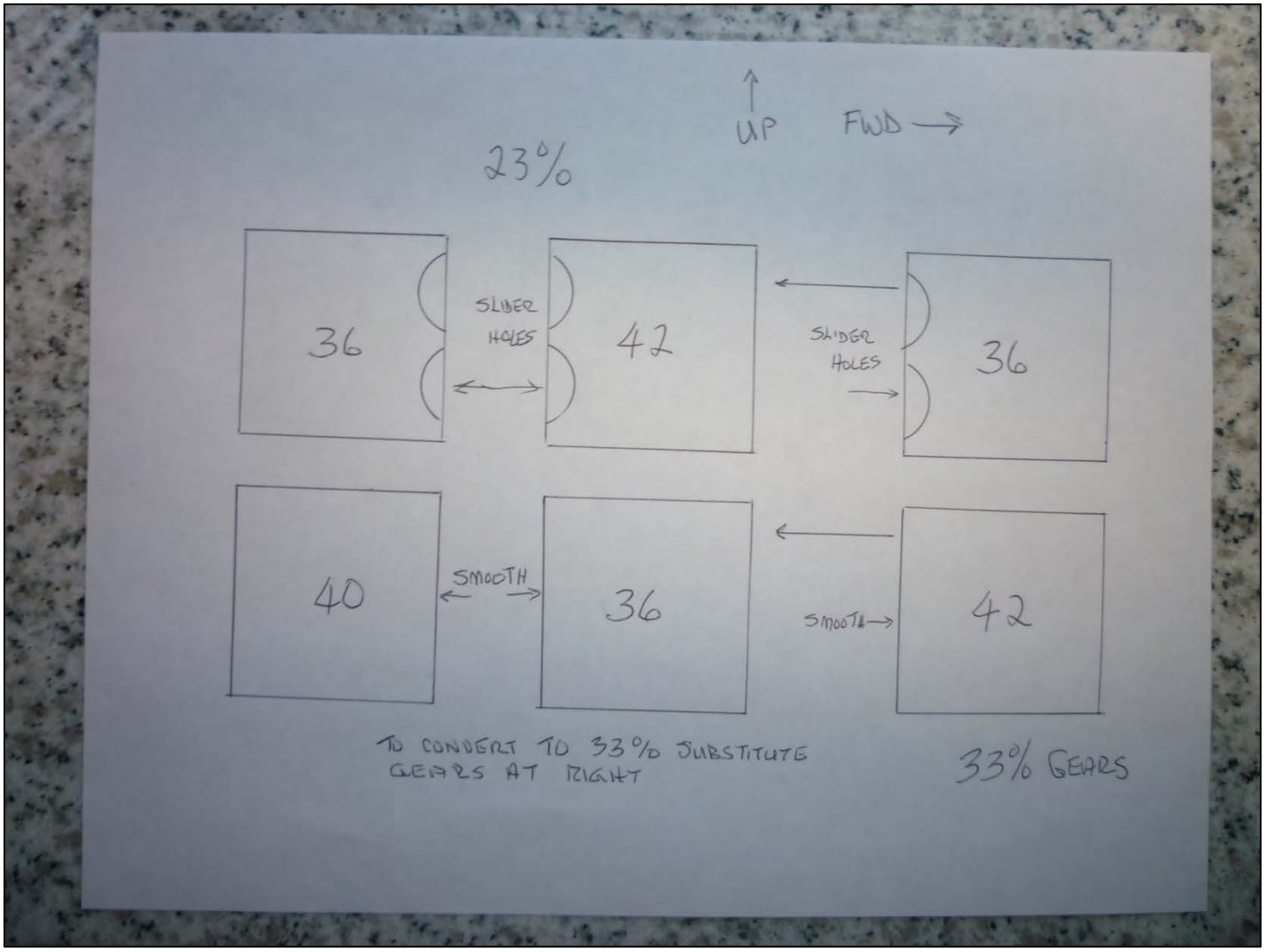
When shifted <u>into</u> overdrive the top gear on the right is driving the gear directly below it and the two lower gears are locked together on the same shaft. The lower gear on the left is then driving the upper gear on the left, which is driving the output shaft on the left.



The two top gears have notches cut into them that face the shifting device between them. When shifting the shifting device comes in contact with the flat surface of the gear and slows it down some before the protrusions drop into the notches. This is the synchromesh operation.



The same operation for the other gear.



This is a sketch I made of the gears. The numbers indicate the number of teeth on each gear. The four gears shown at left are what is installed in a 23% overdrive. The two gears at right are what would be changed in order to change the gear ratio to 33%.

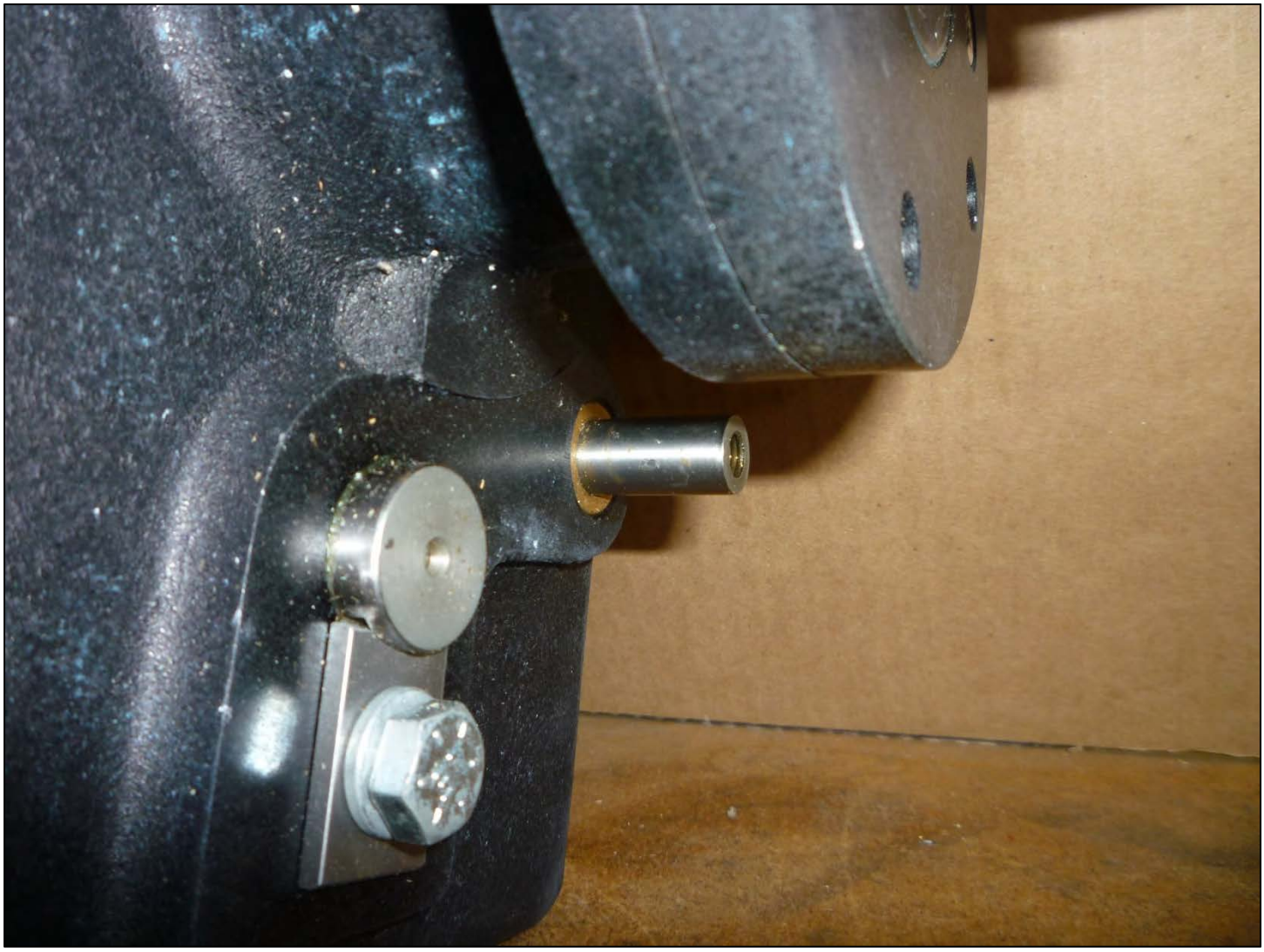
I have an extra set of 33% gears.

This photo shows the opposite side of the gear housing. The flange at the right bolts to the banjo with an adapter plate. The shaft end seen in the lower portion of the large flange at right is part of the speedo gear assembly. The plug in the center of the gear housing is the oil fill port. Oil servicing is fill to spill. At the top of the housing is the date code and serial number. I am told that the "L" in the serial number means low and is an indication that the overdrive is a 23%.

The hex nut with the set screw in the center to the right of the shift rail is called "the detent plunger". Its purpose is to apply pressure to the shift rail.

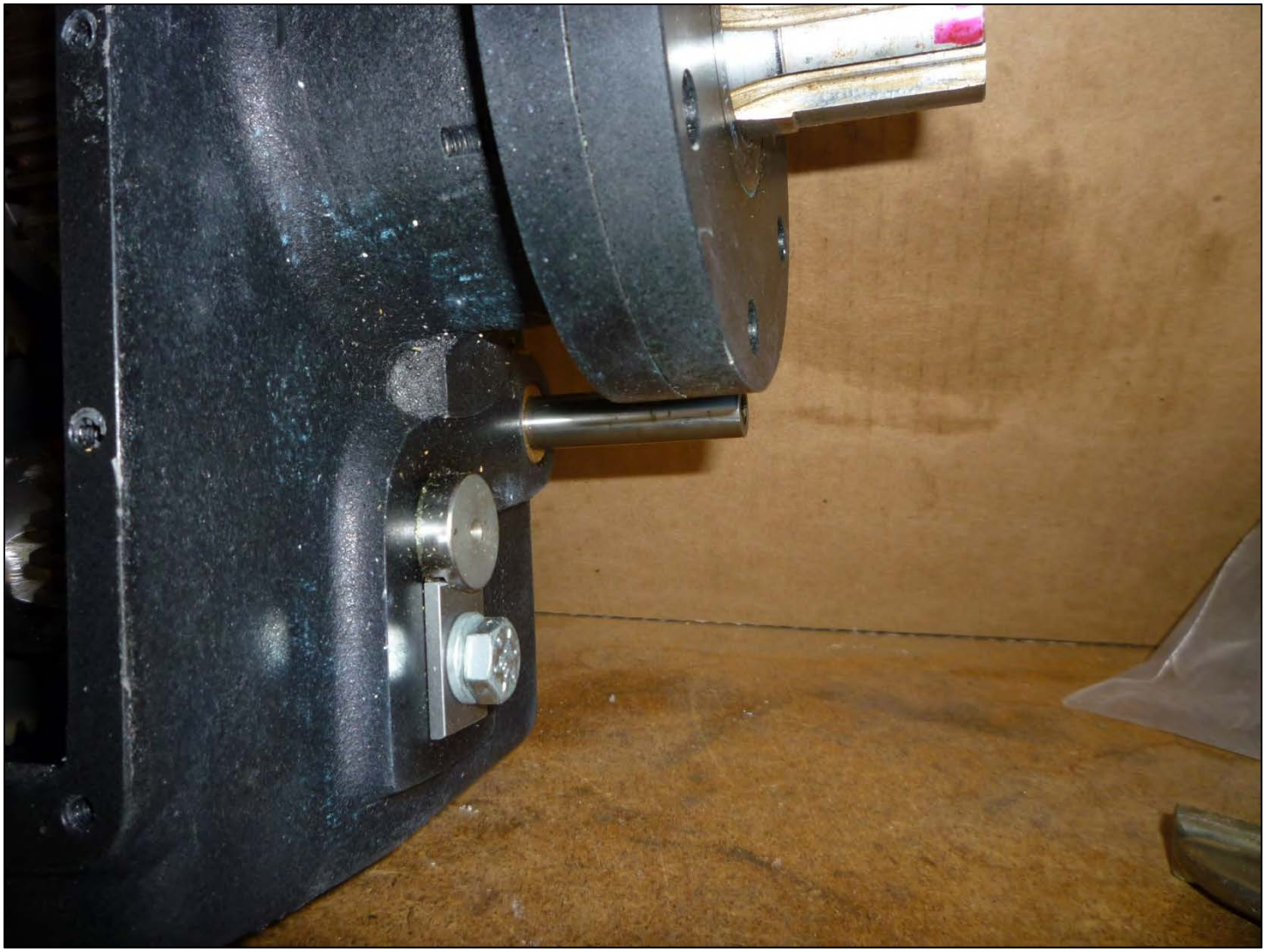
At the top of the flange on the left is a vent valve.

The 12-92 stamped on the upper right of the housing is the month and date of manaufacture.

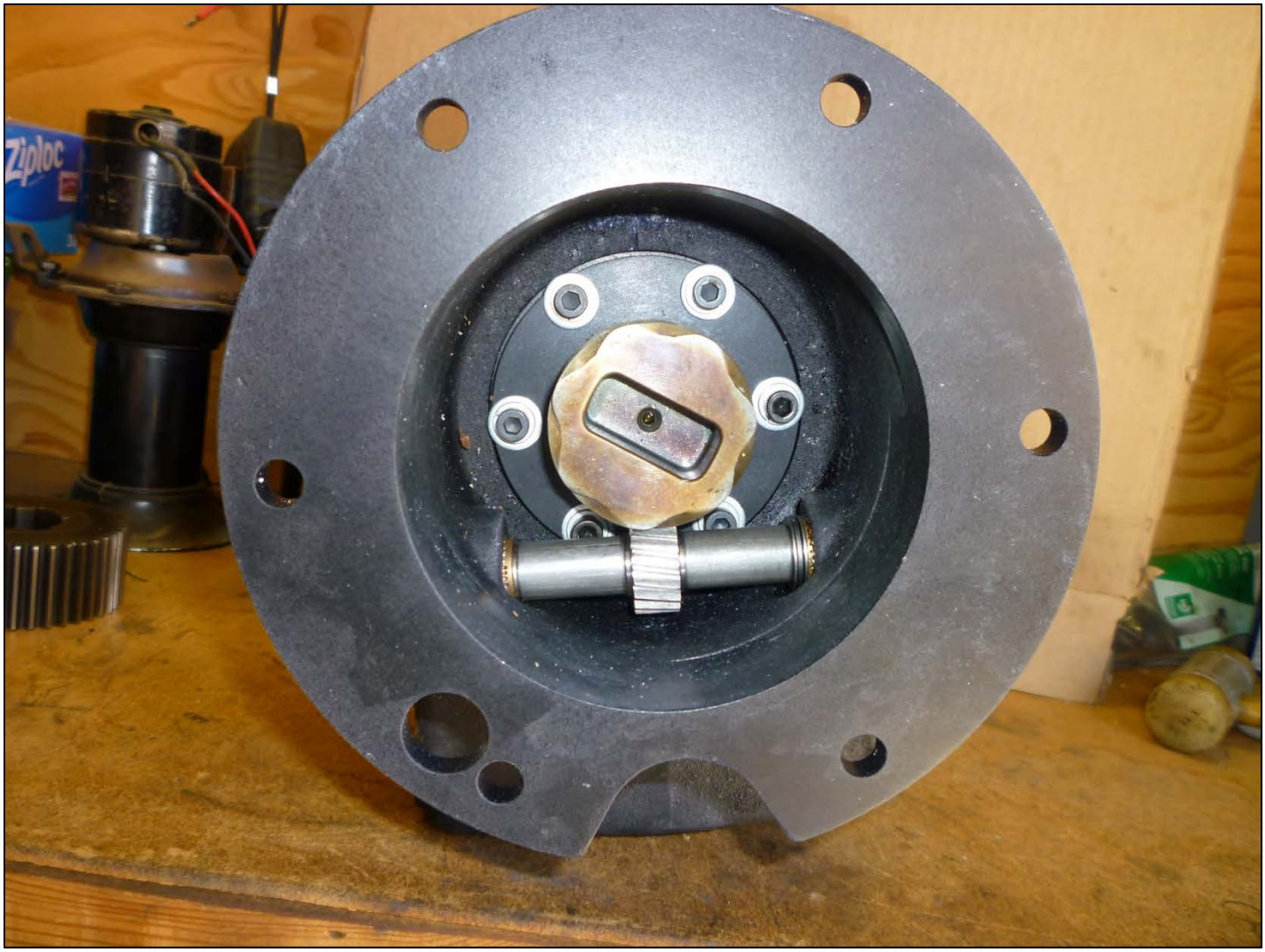


Seen here is the shafting shaft that protrudes out the front of the gear housing. Note the threaded end, this is where a shifting rod screws in that runs horizontally under the car to the shifter that bolts to the edge of the transmission tower.

The shaft is shown pushed in and is in the overdrive position.



The shaft is shown pulled out and is in the out of overdrive position.

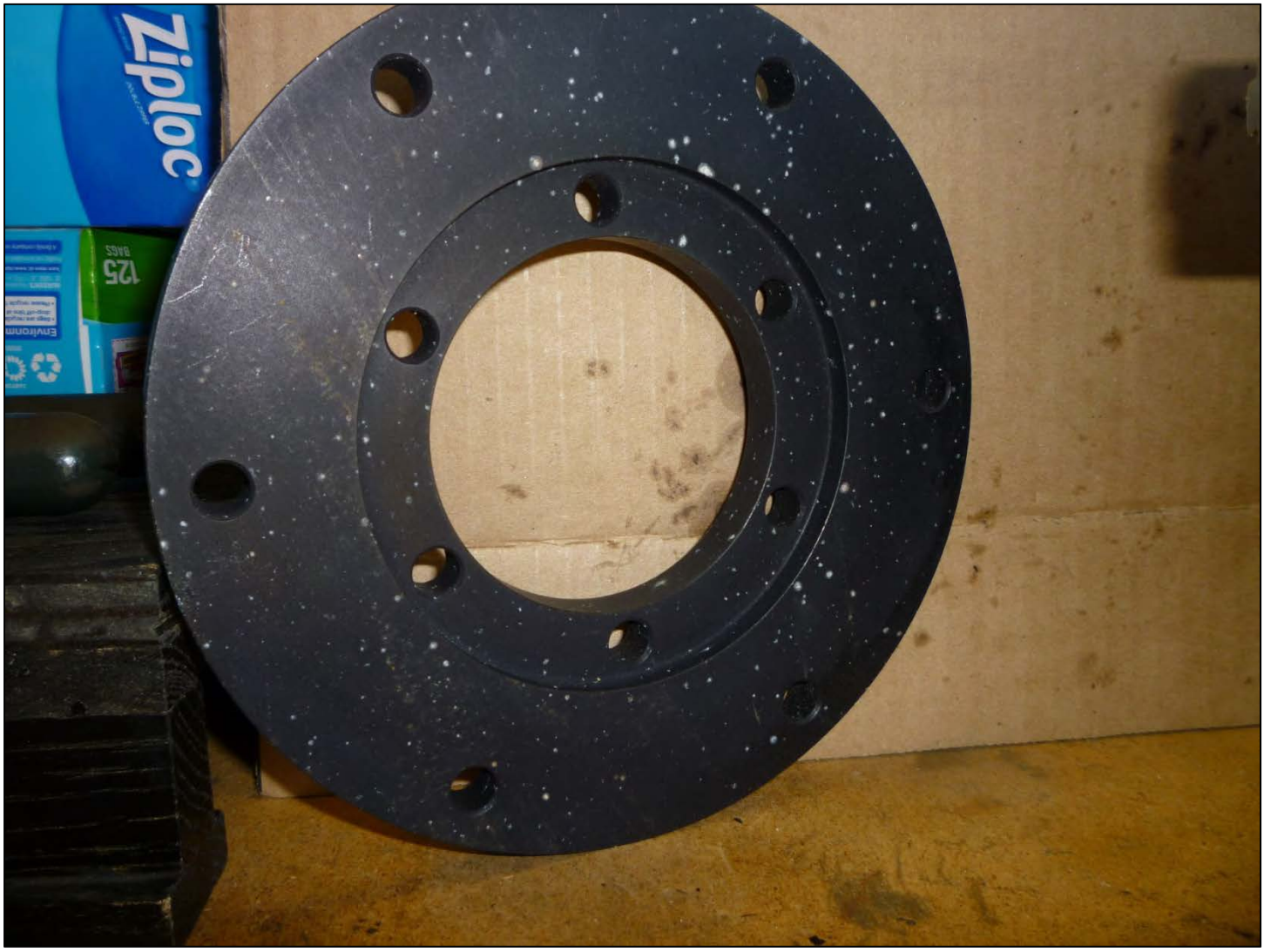


This photo is looking in from the end of the flange that bolts to the banjo. The cross shaft at the bottom with the gear is the speedo assembly.

In the very center is a rectangular recess in the end of the output shaft. This is where the stub shaft with the pinion gear attached mates up with the output shaft.

This is the stub shaft. The pinion gear assembly slides on over the locking key. On the right end there is a rectangular protrusion that slips into the mating rectangular recess in the output shaft inside the end flange of the Ryan gear housing.

This photo shows the rectangle on the end of the stub shaft that fits into a mating recess on the end of the output shaft. There is no indication what the number 012 means. Or maybe it is the word “ok”.



This photo shows the mounting flange adapter that bolts between the Ryan gear box and the flange on the banjo. A steel bearing retainer plate is installed between the banjo flange and the recess in the adapter plate.

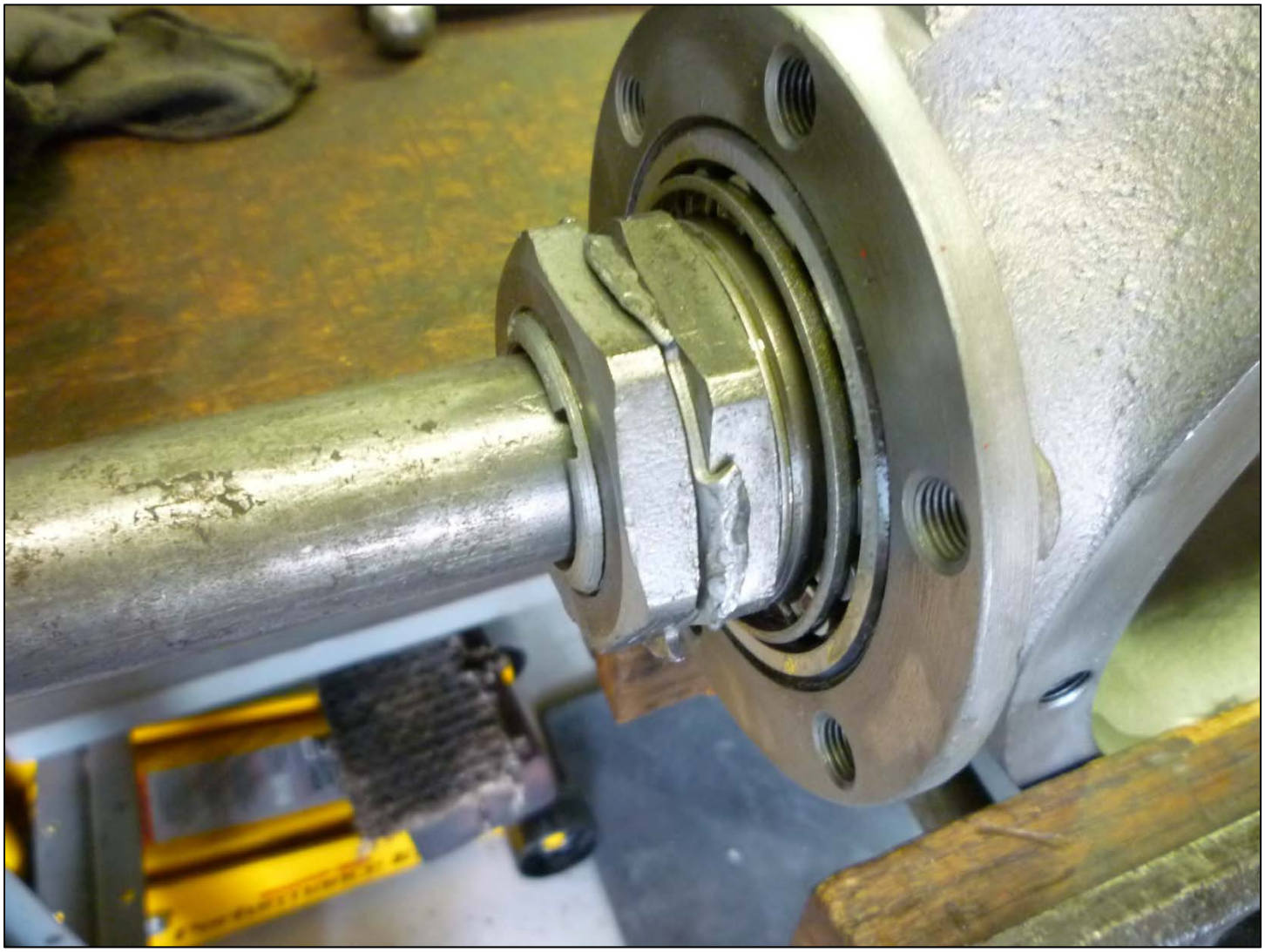
The side facing the camera with the recess attaches to the banjo and fits over the outside diameter of the banjo flange.

This is the bearing retainer that fits between the banjo flange and the adapter plate. Its purpose is to prevent the pinion bearing assembly from moving forward

Since the adapter flange fits around the outside of the flange of the banjo instead of up against it like the original torque tube does, there is nothing to prevent the entire pinion bearing assembly from moving forward other than the press fit. The inside diameter of this retainer is smaller than the bearing assembly and it prevents any forward movement.

The photo on the next page shows a pinion bearing assembly installed in a banjo. Look closely at the flange of the banjo and you can see the first circumference inside of the banjo flange; this is the pinion bearing race that is pressed into the banjo. The Ryan retainer, when installed, just catches this diameter and blocks any movement of the race, including the entire bearing assembly from going forward.

Note the flat portion of the flange of the banjo: When the flange of an original torque tube is bolted up against it, it prevents the entire pinion bearing assembly from moving forward because the inside diameter of the torque tube flange catches the edge of the pinion bearing race.

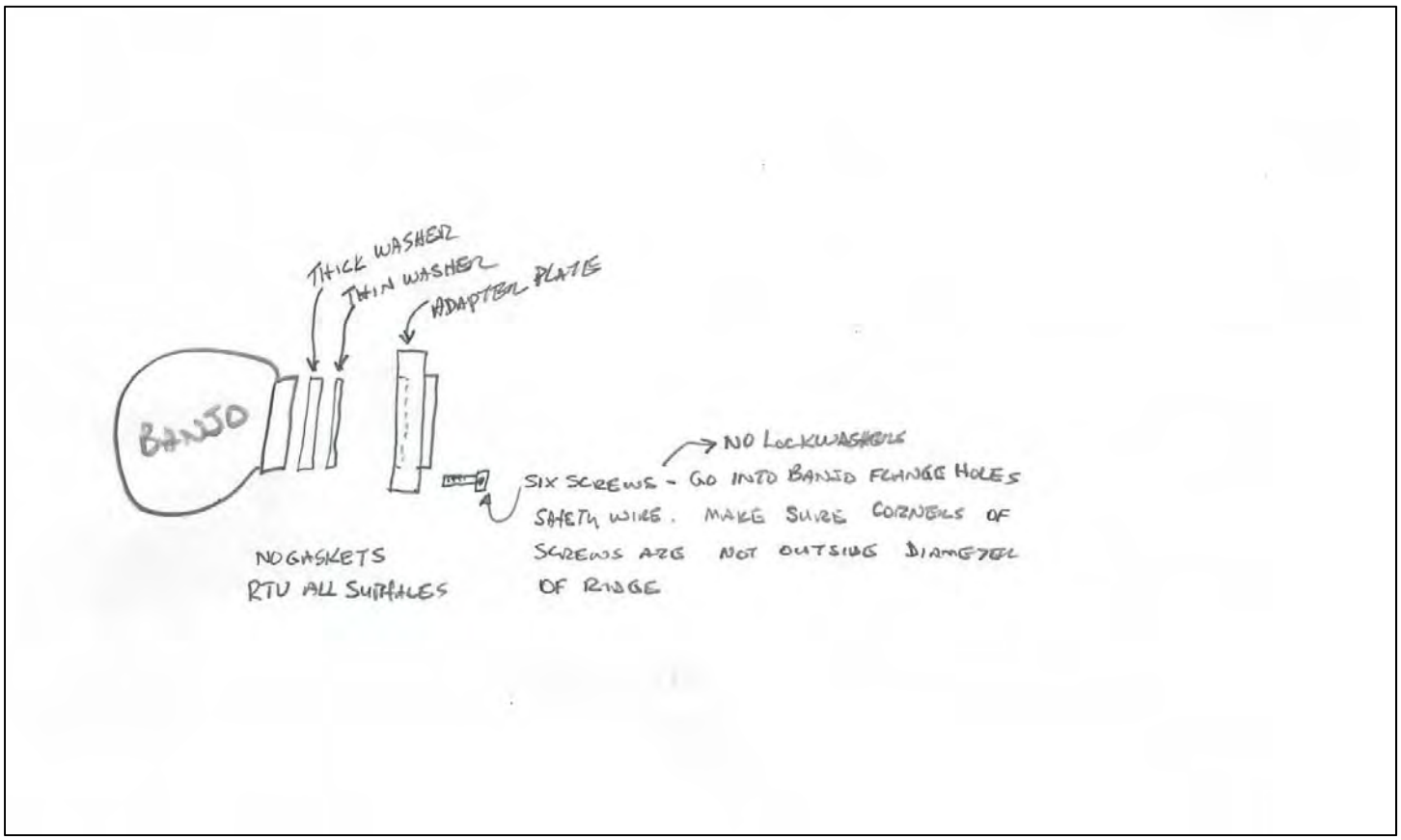


The Ryan adapter plate attaches to the flange such that it is around the outside circumference of the banjo flange to prevent the pinion bearing assembly from coming loose from the press fit and moving forward. When the Ryan retainer is installed it catches the edge of the pinion bearing race and blocks it from any forward movement.

The Ryan in my Victoria was installed in 1994, two years after (1992) the Ryan Kit I bought at the swap meet was manufactured. During those two years the Ryan Company discovered that any oil that got past the pinion bearing assembly piled up inside a cavity right at the output shaft. Right under the output shaft is the cross shaft for the speedo gear. It rides on a bushing on each side of the housing that oil can easily leak through.

For this reason an additional part was developed to deflect the oil, it was called an oil shield that was made of very thin metal and it installed just forward of the retainer. It had an inner diameter that was about a 1\4" smaller and acted as a baffle around the pinion bearing. Since one didn't come with the Ryan kit I purchased, I fabricated one from the bottom of a coffee can.

The oil shield is seen here at the lower right fabricated from the bottom of a coffee can.



This sketch was added to the installation manual that came with the Ryan Overdrive that I purchased and was installed in my Victoria in 1994. It shows the arrangement of the hardware attached to the banjo. The part described as the thick washer is the retainer that blocks the pinion bearing assembly from moving forward. The part described as the thin washer is the oil shield that deters oil from piling up inside the cavity at the output shaft of the Ryan.

The bolts that came with the 1992 kit do not have holes drilled into the hex head for safety wire. During the installation I will put lock-tight on the threads.

Shown here is the opposite side of the adapter flange. This side with the protrusion installs on the back side of the Ryan gear housing.

This photo shows the adapter flange mounted to the back side of the Ryan gear box. The banjo flange will insert into the recess on the adapter, along with the bearing retainer.

Note the cross shaft for the speedo gear. Each end of the shaft rides on a bushing in the housing. If this cavity fills with oil, it will leak past the two bushings.

This photo shows the adapter flange that mounts onto the banjo flange. The banjo flange sits inside a recess on the back side of the adapter. In between the adapter plate and the banjo flange is the steel bearing retainer plate.

This photo shows the hardware that came with the Ryan Overdrive kit.

The six bolts, nuts, and washers in the upper left are used to mount the adapter plate onto the back of the Ryan gear box. The adapter plate is shown directly below the bolts.

The six bolts in the center are used to bolt the adapter plate and the bearing retainer to the banjo flange. The bearing retainer is shown directly below the bolts.

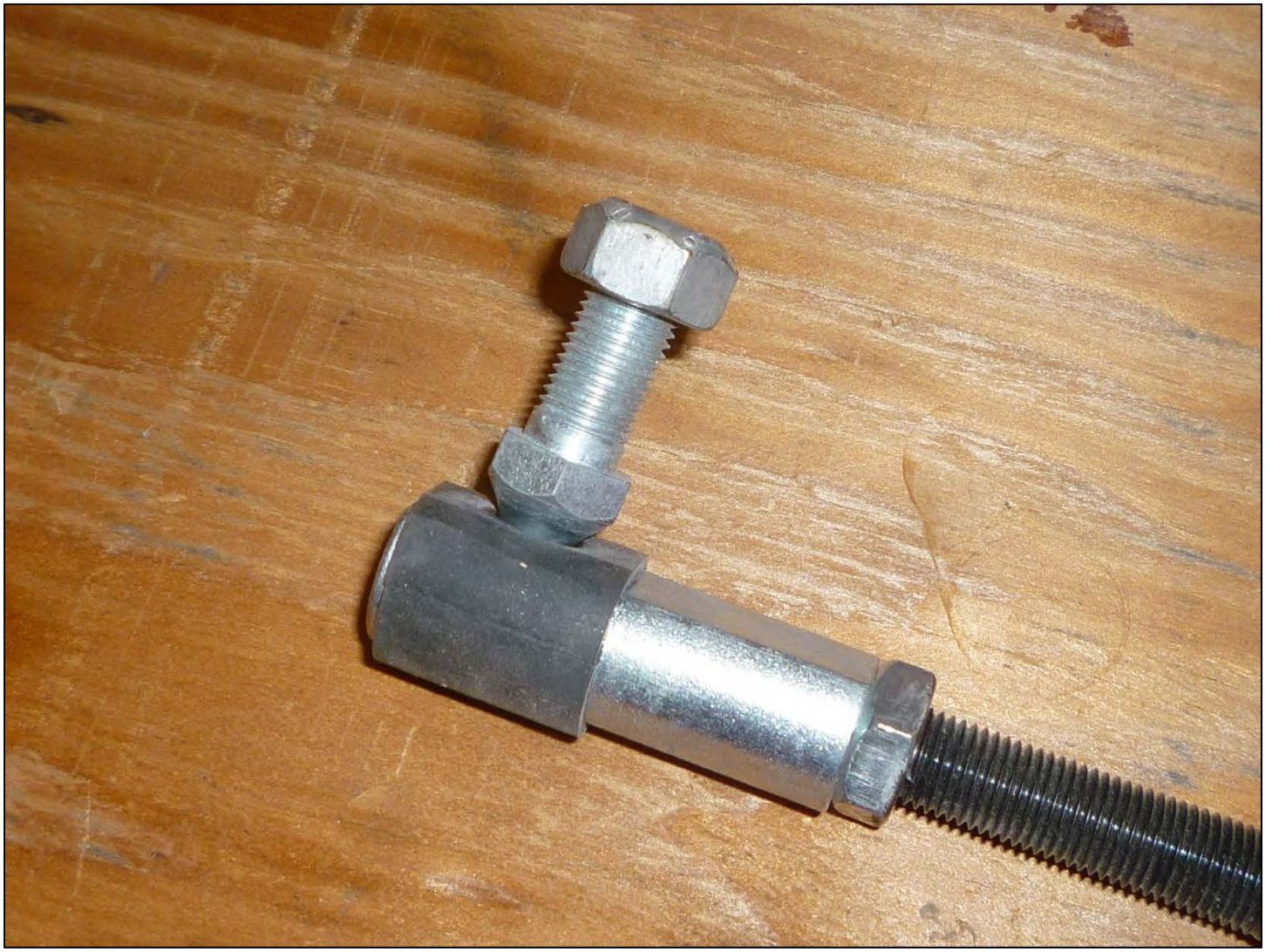
The six bolts and lock washers on the right are used to bolt the front tube to the front of the Ryan gear box. A gasket is used shown directly below.

The stub shaft is shown to the right of the adapter plate.

Shown here is the shift rod that is mounted horizontally under the car. The right end is threaded and screws into the shifting shaft protruding out the front of the Ryan gear box. It has a lock nut to lock it into place.

The other end is a pivot and is attached to the shifting mechanism that bolts to the edge of the transmission tower.

Shown here is the end of the shift rail that screws into the shifting shaft that protrudes from the front end of the Ryan gear case,



Shown here is the other end of the shift rail that connects to the shifting device that is mounted on the top of the transmission tower. A lever with a hole in it hangs down vertically that the end connects to. The nut is a jam-nut that will lock into place to allow the lever to pivot.

Shown here is the front tube section of the overdrive. This replaces the standard torque tube. I was surprised at how heavy it is, so I weighed it and it weighs 25 pounds and is about a foot shorter than a torque tube. The standard torque tube weighs only 6 pounds.

This photo shows a comparison of the radius rod mounting holes for the Ryan overdrive and a standard torque tube. Note how much lower the hole is located. This is a potential problem area.

This is a close up photo of a radius rod bolted to the front tube of the Ryan overdrive. Note how much extra material is located below the radius rod. On some installations this can contact the service brake cross shaft. Before installing in a car I will have this extra material milled off.

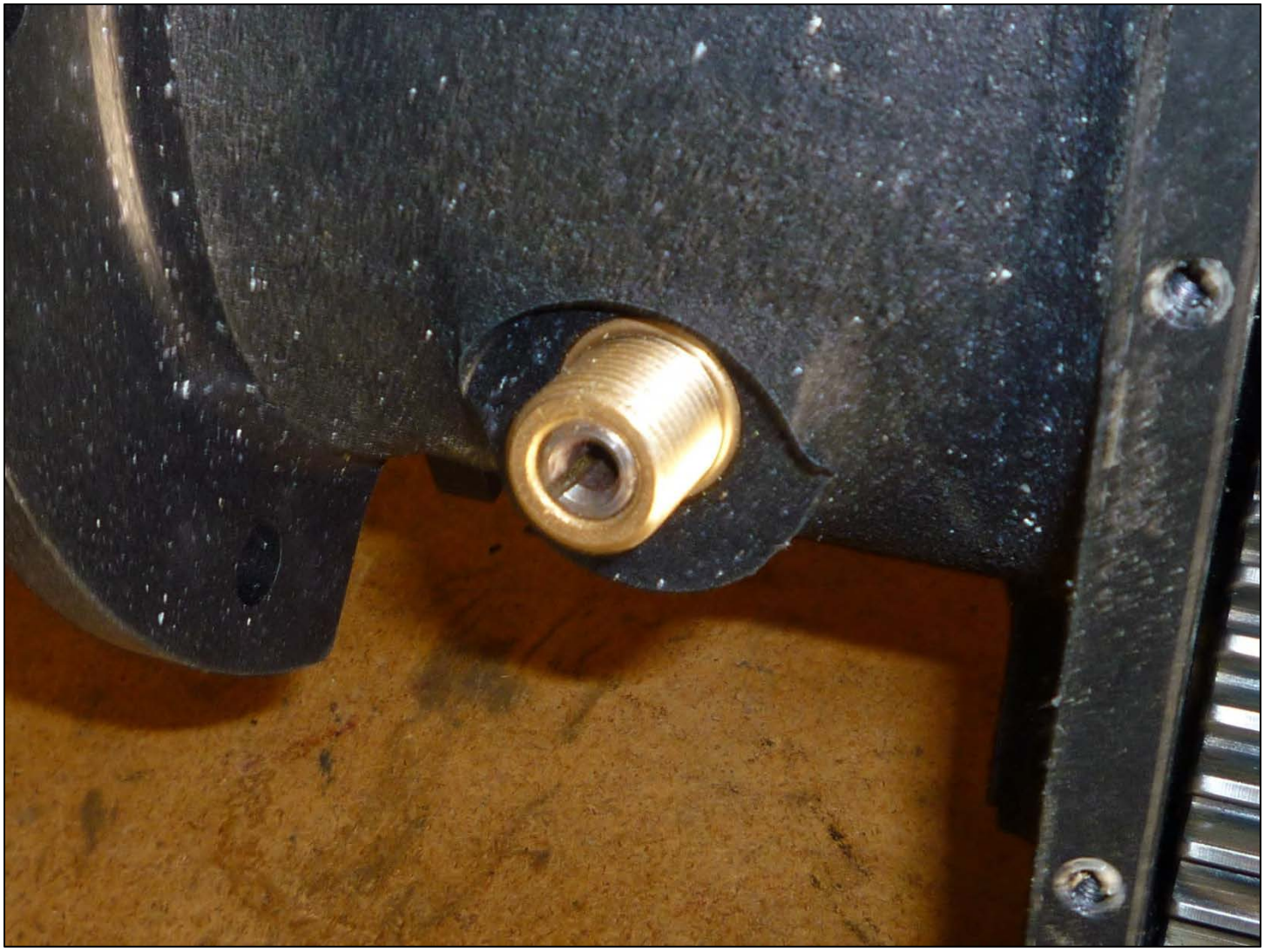
Shown here is the radius rod connection after it was milled and ground. About 3\8” of material was taken off the bottom and the corners rounded off with a grinder.

This photo shows the very front of the overdrive front tube where it connects to the U-joint attached to the rear of the transmission. Note, there is a roller bearing directly below the input shaft.

This photo shows the flange on the front tube section that bolts to the front of the Ryan gear box. Note there is an off-the-shelf spline coupler inside. This coupler should be easily removed as it is only slid onto a spline.

However, the Ryan folks applied a quantity of sealer to the spline before they installed it. After 26 years of sitting around the sealer has become hardened. The coupler does not want to come out, even with attaching vice grips and pulling. This is not a problem; I will just leave it in place and clean it up before installation.

The spline coupler fits over the splined shaft protruding out of the front flange on the Ryan gear box.



A close up view of the speedo cable connection: Note the inner cable connection requires a key connection instead of a square connection.

A close up view of the vent valve on top of the Ryan gear box:

INSTALLATION AND SERVICE MANUAL

MODEL A FORD 1928-1931

PICTURE OF ASSEMBLY

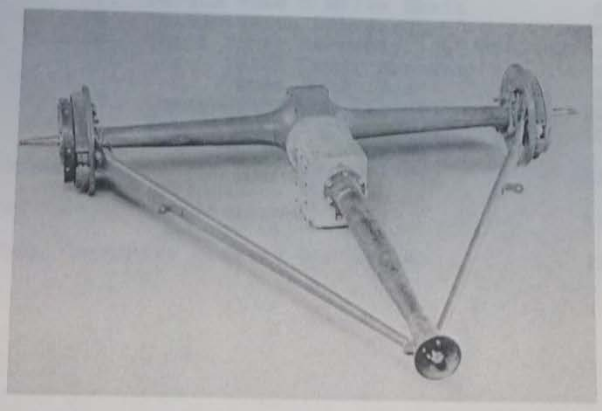


PLATE 1

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The photo in the owner's manual shows what the installation looks like before it is installed in a car.

This photo shows the Ryan overdrive that is installed in my Victoria. The overdrive was installed in 1994 and has acquired 50,000 miles since the installation and has been trouble free.

Note the connection of the speedo cable. This was a continuous cable supplied with the Ryan kit that runs from the speedo unit in the dash direct to the overdrive.

Note the connection of the shifting mechanism attached to the shift rod protruding out of the front of the Ryan gear box.

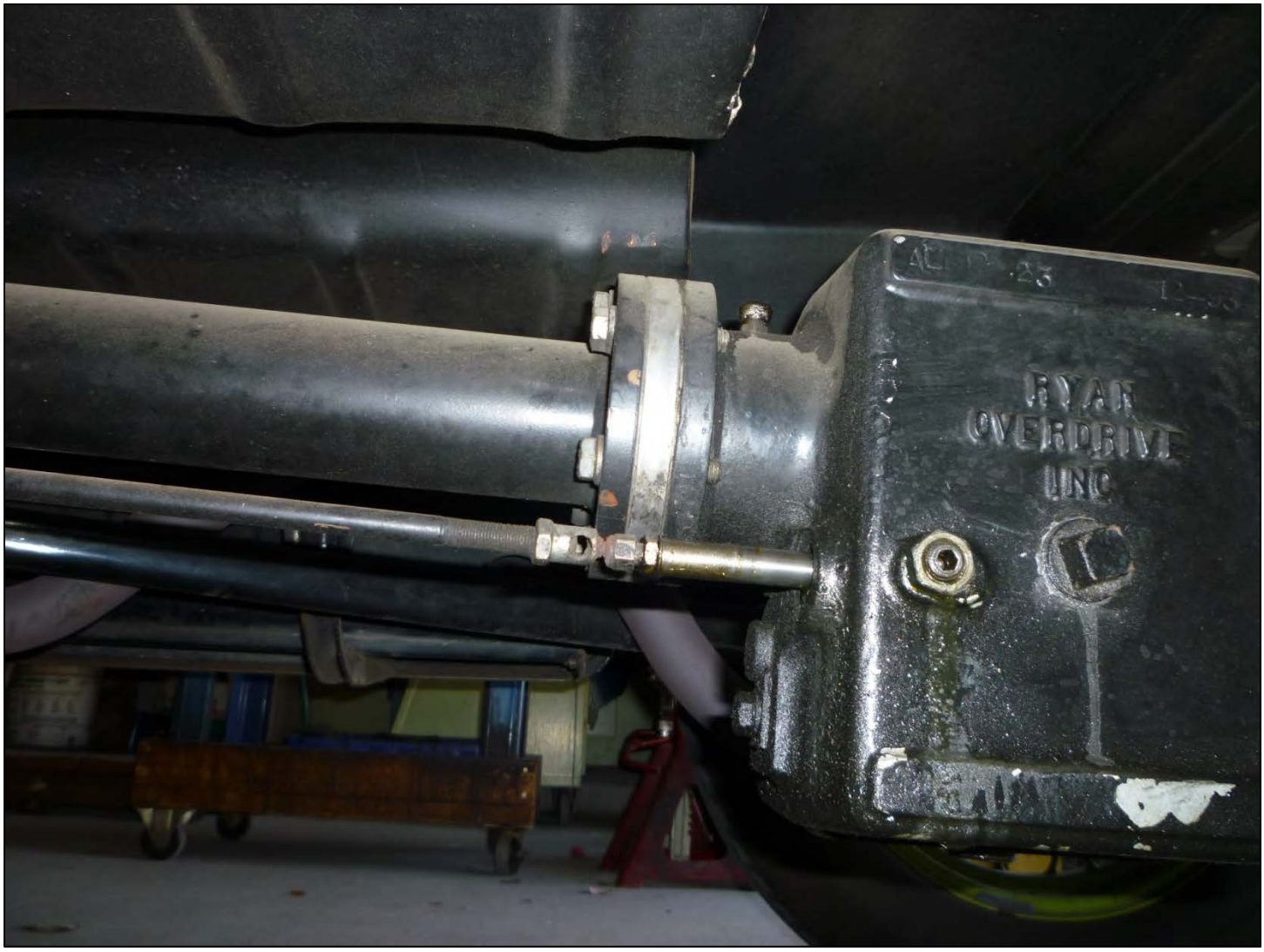
The area of the Victoria dropped floor pan directly above the Ryan gear box was cut away and a panel welded in place in order to provide additional clearance.

A close up view of the Ryan installation in my Victoria

Victoria Installation: Note where the two radius rods bolt up to the front section of the Ryan overdrive. This area is a potential problem as the hole assembly hangs down lower than a standard torque tube and can conflict with the operation of the service brake cross shaft.

When I did the installation I ground a significant amount of metal from underneath the hole.

The clearance area may vary from one car to another depending if there is any sagging in the frame or in the rear motor mounts.



Victoria Installation: Another view of the installation in my Victoria showing the shifting mechanism hook-up.

Note the number 23 stamped on the top edge of the housing. This is an indication the overdrive is a 23% gear ratio.

Victoria Installation: This is the shift lever in my Victoria. It is the modified mechanism that was delivered with the overdrive. I cut the handle shorter as it is much easier to reach between the seats.

SHIFT TOWER ASSEMBY

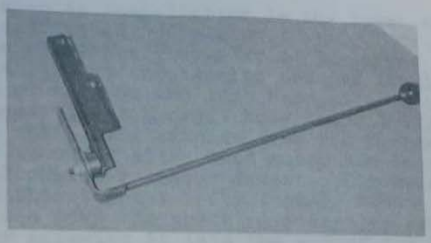


PLATE 6

a. Bolt the **shift tower bracket** to the left rear of your Model A Transmission (driver side). This installation will use the two (2) existing bolts in your Model A transmission.

SHIFT TOWER ASSEMBLY BOLTED TO YOUR OWN MODEL A TRANSMISSION

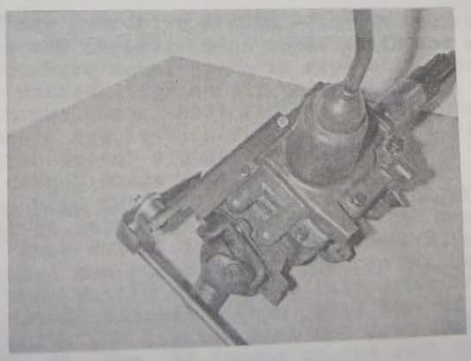


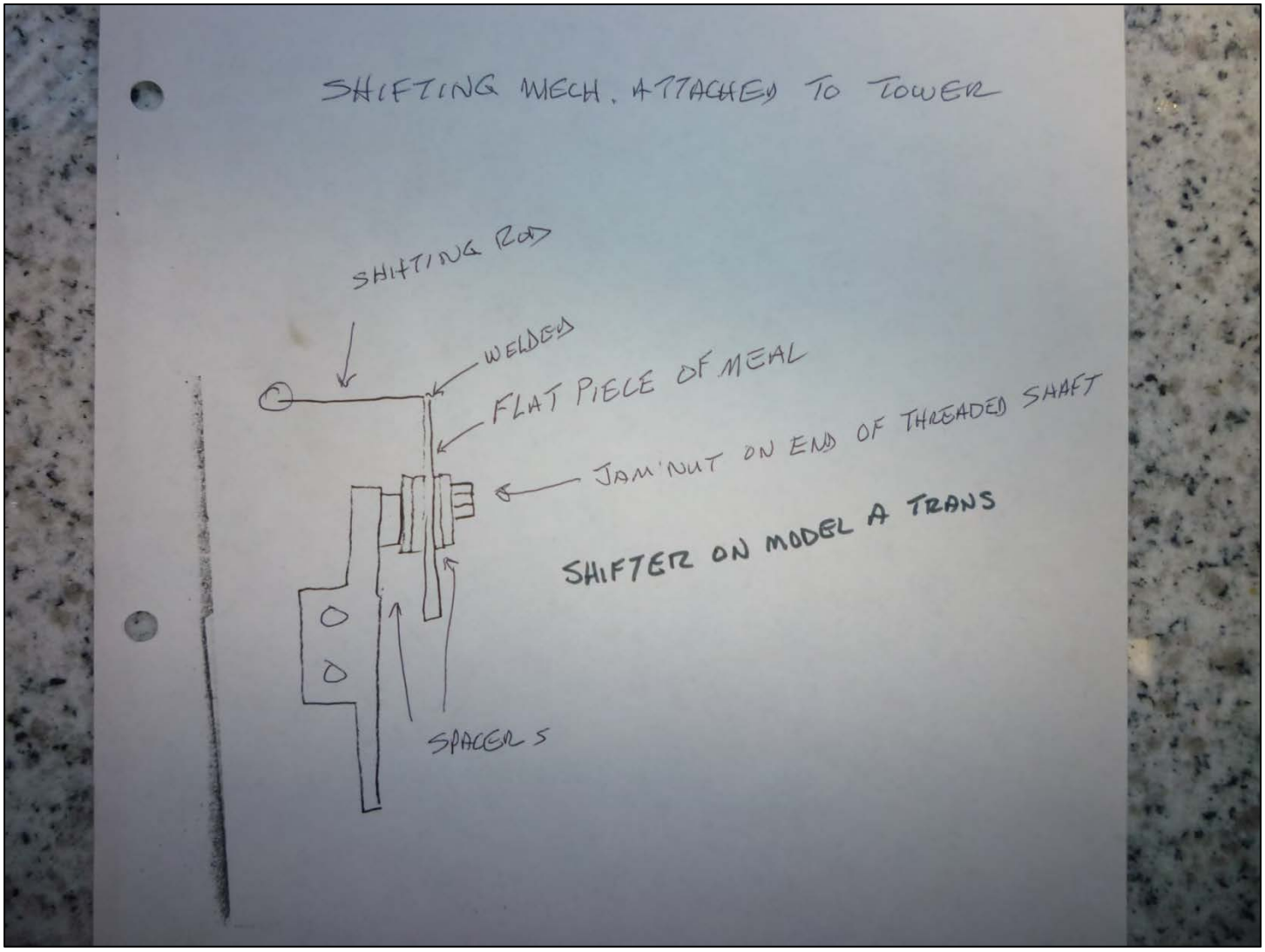
PLATE 7

b. Measure how you want your Upper Shift Rod which extends into the cab, to be bent. MARK IT IN THE CAR, then, remove it (tower assembly) from the car. *** TIP!! Hold leg of upper shift rod at 90 degree angle to bracket, or the bend will not be

The top photo shows the shifting mechanism supplied by the Ryan company that attaches to the top edge of the transmission tower. This item was missing from the kit when I purchased it at the swap meet.

A Mitchell overdrive shifter can be used as it will bolt right in and connect up to the Ryan.

A shifter similar to the Ryan shifter can easily be fabricated. The part that attaches to the tower is off-the-shelf angle iron.

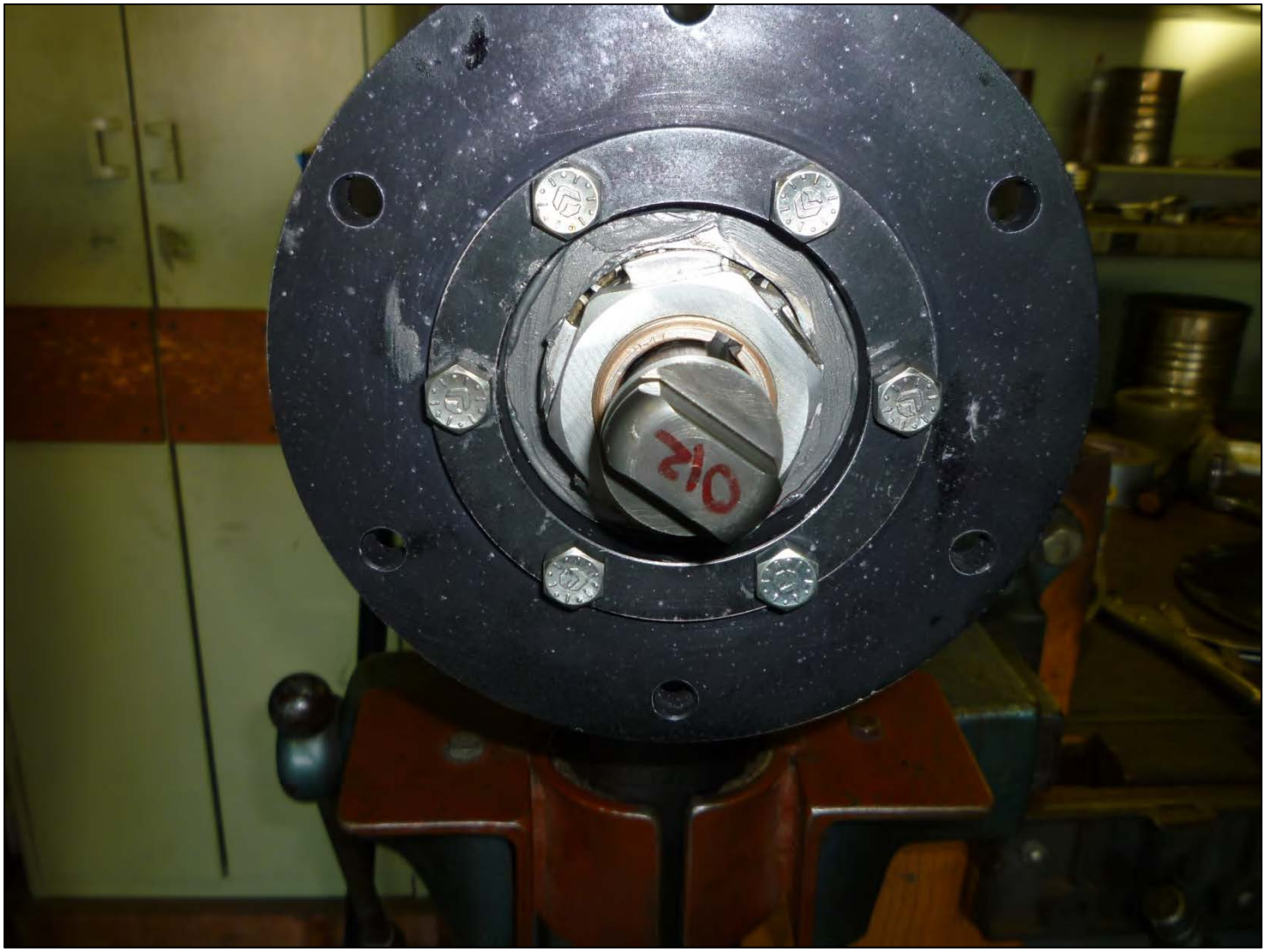


Shown here is a sketch of the Ryan shifter that mounts to the left side top of the transmission tower that is normally supplied with a Ryan overdrive. The device with the two holes on the left is off-the-shelf angle iron that can be fabricated to attach to two transmission tower bolts.

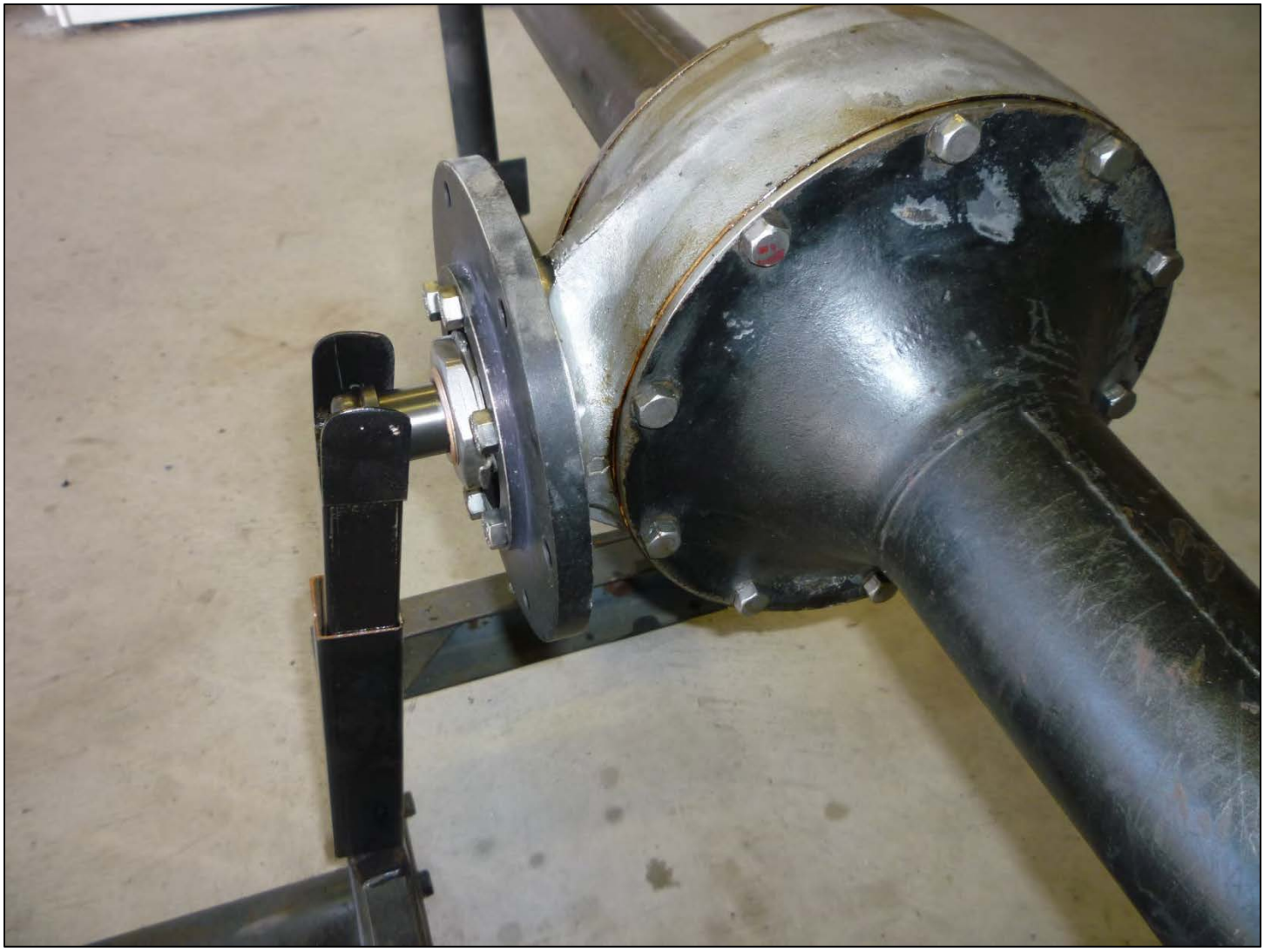
Shown here is a Mitchell overdrive shifting mechanism that can be used with the installation of a Ryan overdrive. The casting in the center bolts to the right side of transmission tower. The shift lever above slides through it. The bracket at the bottom is splined and attaches to the shift lever on the left side of the transmission and can adjust the angle of the shift lever. The Ryan horizontal rod that runs back to the Ryan gear box on the left side of the drive train attaches to the bracket at the bottom hole.

The next series of photos show the Ryan overdrive being installed onto a rear axle assembly that is going through an overhaul

The rear axle assembly being overhauled has been a straight forward effort. Shown here is the ring gear attached to the carrier with new bearings installed, and a new bearing on the pinion. The ring & pinion is an original 378:1 in excellent condition with matching numbers (9350).



The pinion assembly with the Ryan stub shaft has been installed and the adapter plate bolted to the banjo. The rectangle (called a tang) with the number 012 or the word “ok” will insert in a matching pocket in the end of the output shaft of the overdrive when installed. The instruction manual called out a torque value of 20 ft. lbs. for the six hex bolts, probably because the adapter is made of aluminum. I pulled them down a little tighter and applied some lock tight to the threads. It is also important that the corners of the six hex bolts do not protrude past the circumference of the protrusion on the adapter, as the overdrive housing has to sit over it when installed.

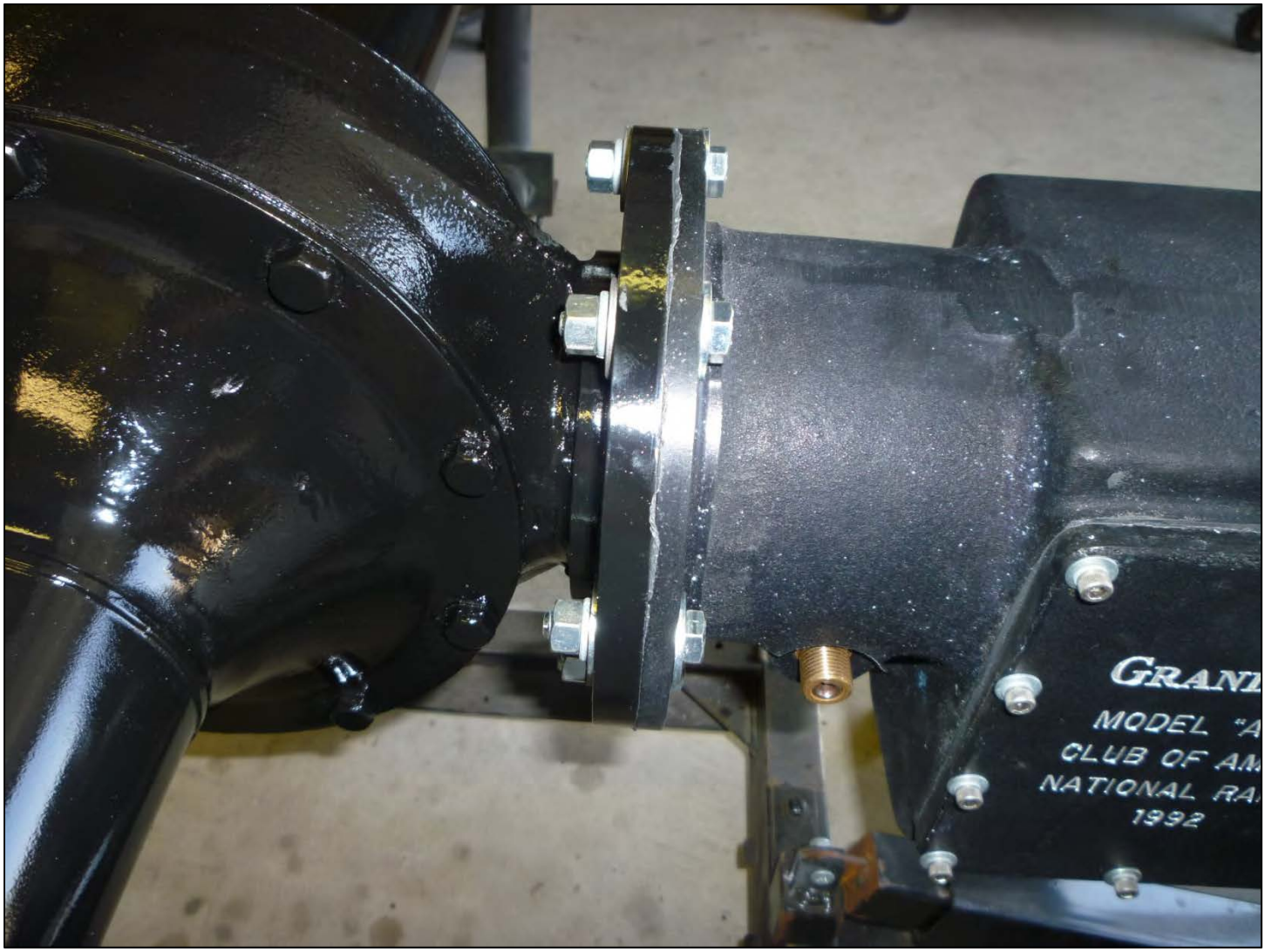


The rear axle assembly has been fully assembled and has the adapter installed and is ready for the addition of the rest of Ryan overdrive

The two axle housings will be sanded, the banjo has already been bead blasted, and all will be painted before progressing to install the Ryan gear box.

The rear axle assembly has been sanded down and painted. It is ready to have the remainder of the Ryan overdrive added to it.

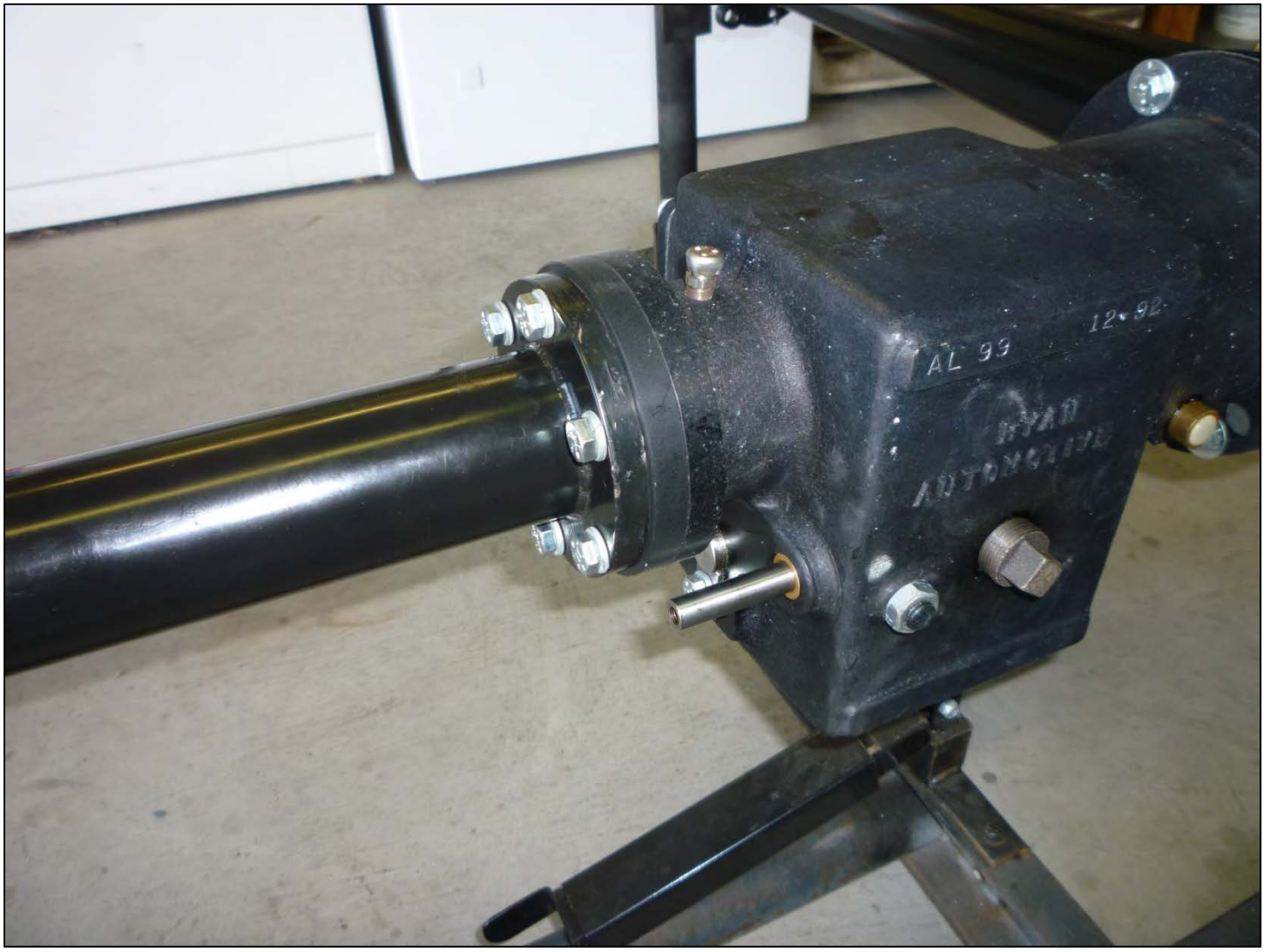
The gear housing portion of the Ryan overdrive has been attached to the banjo.



The Ryan overdrive gear box housing has been attached to the mounting adapter on the banjo with six bolts, washers, and nuts.

This photo shows the rear axle assembly with the Ryan gear box assembly attached. The next step is to install the front overdrive tube.

The front tube has been attached and the Ryan overdrive installation is complete.



The front tube was installed by attaching the spline sticking out the front of the gear box housing to the spline coupler inside the front tube. Six hex bolts hold the assembly together.

The last task is to make sure that the radius rods will bolt up to the entire assembly. If they don't, shimming or milling would be required where the front tube joins the housing.

However, this one was dead on.

Don't forget to put oil in the banjo and the overdrive gear box.

End of story!