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by Harold Pace

Modifying a World Class 5-Speed Manual Transmission for Use in a Street Rod.

The 5-speed Borg-Warner/Tremec T-5 is one popular gearbox. Thousands have been stuffed into everything from lowly Chevetttes to Nissan 280ZX Turbos, but they're most commonly found in Mustangs, F-body Camaros and Firebirds, and Chevy S-10 pickups. Muscle car fans can probably use one of the tougher versions as-is, but if you decide to slide one of these lightweight (75 pounds) and reasonably-priced boxes into a street rod or vintage pickup, you may be up against packaging problems.

There are over 250 versions of the T-5, with a seemingly endless variety of gear ratios, shifter locations, speedometer fittings and strength requirements. Unfortunately, we only have room to show you one of the most common T-5 conversions for street rods. It all comes down to a matter of class – World Class, to be exact.

When the first T-5s came out in 1982, there were separate versions to take 4-, 6- and 8-cylinder mills. The ratios varied with each application, but they all incorporated flat roller bearings, bronze synchro rings and other cost-saving measures. The stoutest V-8 versions were only good for 265 lb-ft of torque.

In 1985, Ford complained that this wasn't tough enough for their hotter 'Stangs, so B-W countered with a beefed-up World Class (WC) version. The weaker versions were then nicknamed "non-World Class" (NWC). Both versions continued in production, with the WC models usually reserved for Mustang and Camaro V-8s.

The WC featured many improvements, including a stronger bearing structure. This upped the torque ceiling to about 400 lb-ft, but the T-5 isn't a racing box, and even a WC will not live long if subjected to abuse. However, they sell in salvage yards or online from \$50 to \$500, making them one of the greatest 5-speed gearbox bargains around.

Here's the catch. If you're planning to use a GM drivetrain, the only source of WC boxes is the 1988 to 1992 Camaro/Firebird. The shifter is located at the rear of the tail housing, putting it too far back for use in most rods and vintage pickups with narrow cockpits or bench seats. Even if you have buckets, the rearward-mounted shifter fails to mimic the placement of the venerable Ford and GM transmissions of the past. But there is a solution.

Best of Both Worlds

The Chevy S10 had non-WC T-5s (with 14-spline input shafts) behind its four and six-cylinder sewing-machine motors. To fit in the pickup cab, the tail housing features a shifter location shoved all the way forward to the gearbox housing. It's enough to make the S10 box a good fit for rods and pickups with low-horse engines. Many restorers do just that, selecting one out of a V-6 S10. However, if you have too much power for a NWC box, don't despair. You can have the best of both worlds (WC muscle with S10 shifter placement) with a reasonable amount of work and money simply by swapping the S10 shift rail cover and tail housing onto the WC box. And to show you how, we're going to build a hybrid S10 WC box to bolt in our GMC 6-powered 1927 Model T Bonneville racer.

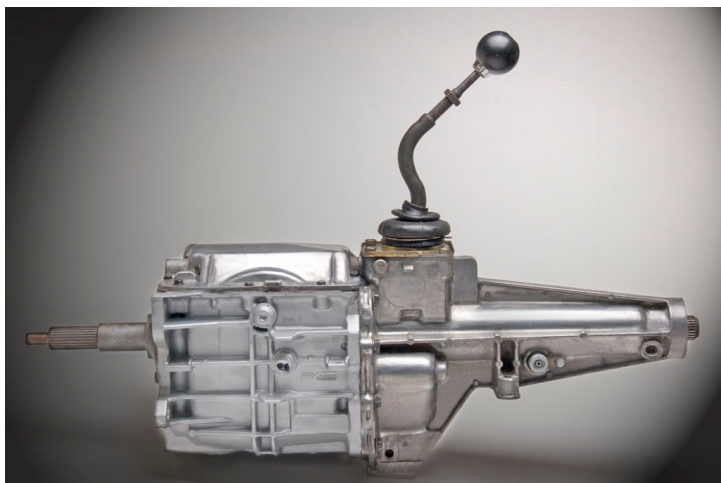
First you need to pick your options, with two commonly available ratios for the 26-spline Camaro V-8 WC box. There is also the matter of speedometer drives on the S10 tail housing. The 1982-1988 S10 used a mechanical speedo driven off the side of the housing. In 1989, a digital dash option featured an electronic speedo with a different tail housing tailored to fit the sending unit, so some 1989 tail housings fit mechanical speedos, others digital. From 1990 on, all S10 T-5s were set up for digital only. The only way to convert a digital S10 tail housing to mechanical is via an expensive adapter (\$400 from www.transmissioncenter.net).

So how do you tell which ratio a given box has? Good luck. T-5s are identified by a metal or paper ID tag bearing a number starting with 1352. Be warned, there are other numbers stamped on the main and tail housings that don't correlate to the ratios. Plus, you have no way of knowing if the gearbox has already been swapped with parts from another.

There are lists of T-5 tag numbers on the internet (www.britishv8.org), but for our purposes we're going to stick with #1352-175, 176, 195 or 196 (1988-1989 F-body V-8 WC). These are the only WC Camaro T-5s with mechanical speedometer drives and differ only in fifth gear ratios. Model numbers 1352-175 and 195 have the 0.73 fifth, while the other two have the 0.63. We found a 176 online for \$500 – expensive, but recently rebuilt and available nearby. Bargain-chasers sometimes find these for \$200 to \$300, but what you usually end up with in that price range is a non-WC box for the earlier Camaro V-8s (better than the V6 version but not as strong as a WC T-5).

The S10 part of our combo arrived complete with master cylinder, slave and an 8-ball shift knob. (How could we resist? Running on the Salt can include both speed *and* style!) It was a little high at \$100, considering that all we needed was the top cover and tail housing, but most salvage yards won't part out a gearbox. These can sometimes be had for as little as \$50, but the early mechanical speedo models are starting to get scarce. Once you have all the parts in hand, the whole deal should go together fairly smoothly in just a few days. And once installed, your modified World Class 5-speed should make your rod a class act.

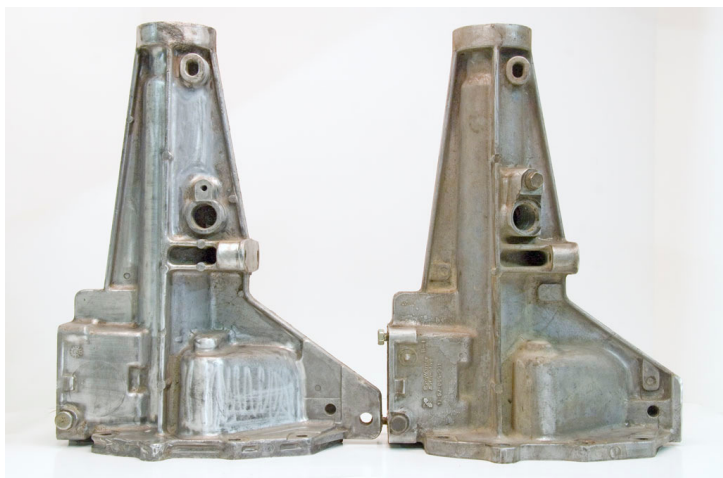
Captions



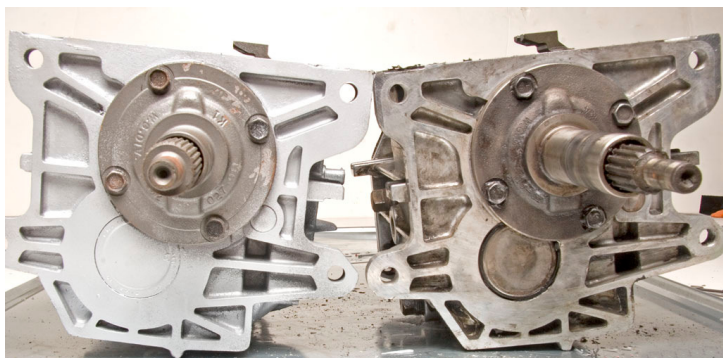
A polished World-Class T-5 with S10 top and tail housing will look right at home in a rod or classic pickup and stand up to over 300 horses, provided you don't lean on it too hard.



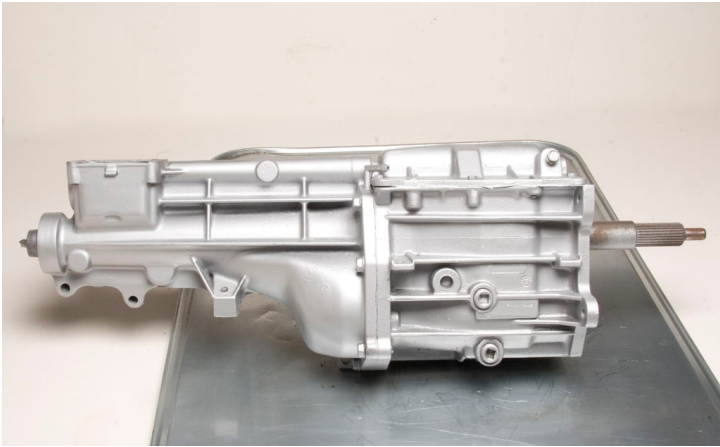
The S10 tail housing is on the left. Note that the shifter box is near the front (gearbox end) of the housing, while the Camaro tail housing at right locates the shifter at the very back. Before you re-install the S10 tail housing, replace the rear seal and the tail shaft bushing (if available). The rear transmission mount is in the same place on both housings, but differs from a T10/Muncie, so you may have to move your chassis mount.



These two S10 tail housings look alike at first, but note the angle of the speedometer drive hole. The one on the left is angled just below the main shaft centerline, so the small mechanical speed drive gear can sit just below the main drive gear on the shaft. The housing at right is for a digital sending unit, and the speedo hole is pointed directly at the main shaft. Converting this for use with a mechanical speedo is expensive. A Camaro tail housing can be swapped from digital to mechanical with no mods.



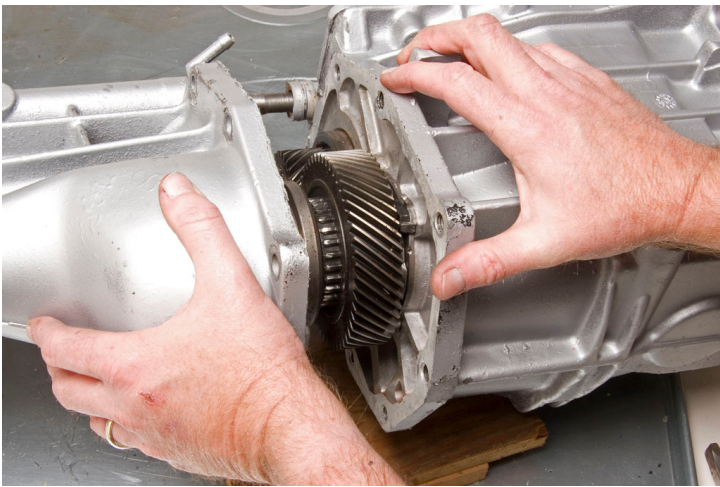
A quick look at the front of these two boxes identifies the one on the left as a WC box. Note the round bearing retainer to the left and below the main shaft. This has two circles on WC versions, one inside the other. On the NWC version (right), the retainer looks like a freeze plug. The four bellhousing mounting holes will need to be drilled or reamed out to half an inch.



This is our WC box that was removed from a Firebird. Note the rearward position of the shifter. If you have bucket seats, you might be able to use it as-is.



First we take off the shifter, and then drive out the pin that holds the shift finger to the top plate shaft. Drive the pin all the way out, or it will come back to haunt you when reassembling the unit. Underneath the finger is a spring and a detent ball, so don't drop them when you slide the finger off the shaft. Bag the pin, spring, finger and ball to keep them secure.



Remove the tail housing bolts and tap gently with a plastic hammer to separate it from the main housing. *Don't* use a screwdriver to pry it apart, or you will damage the aluminum housings.



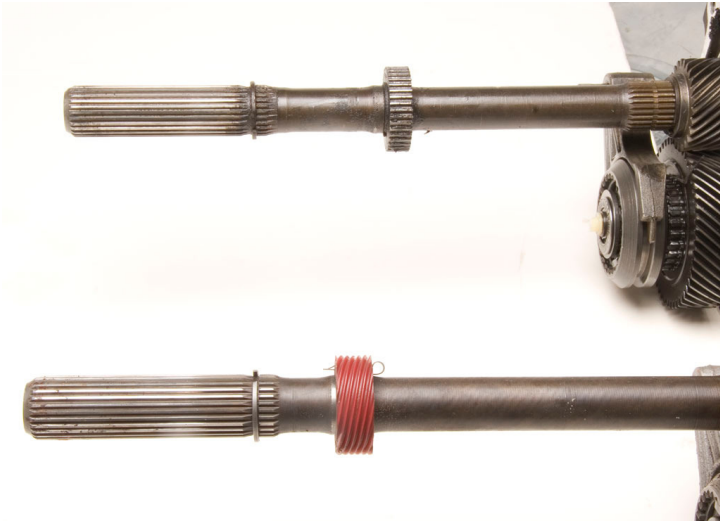
Remove the top cover bolts, noting that two of them have shoulders to center the plate. Handle with care, as the top bolts are thin and can break and/or strip easily.



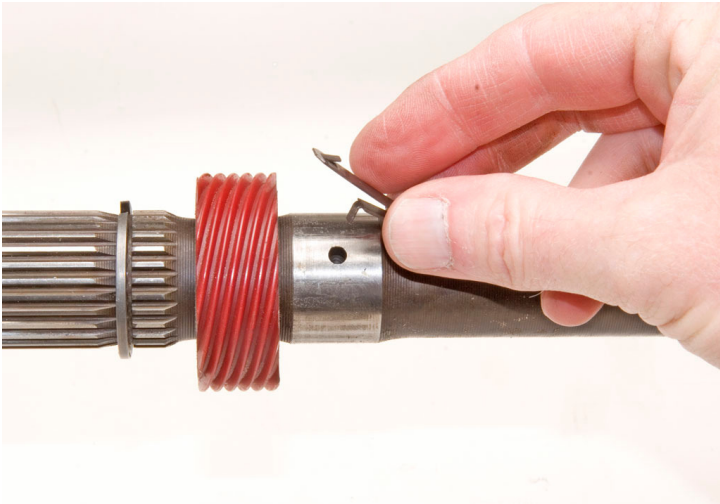
To remove the top, tap with a plastic hammer to break loose the seal, and then gently pry at the corners where there is a shelf provided for that purpose.



Remove the top by pushing away from you using your thumbs before lifting the lid off.



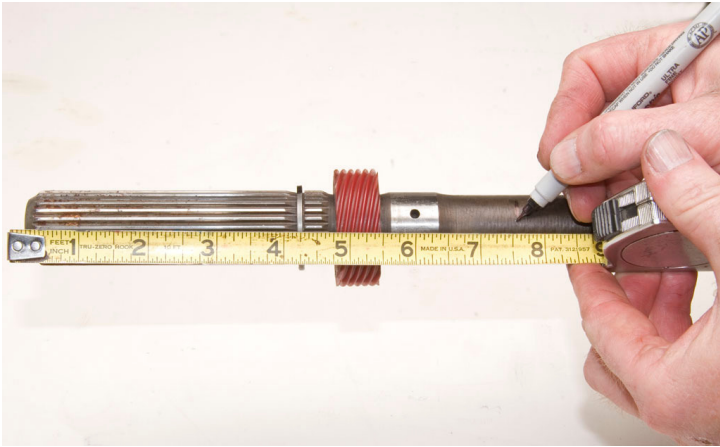
The main shafts on the Camaro and S10 transmissions are the same length, but the speedometer gears are usually in different locations. Note that the S10 shaft on top has the straight-cut gear for the digital speed, while the Camaro shaft on the bottom has a red plastic helical gear for the mechanical unit. You can go either way on the speedo, just make sure both transmissions are set up for the same type. Or, you can forgo the entire speedo operation and use the tach or a GPS device to check your speed.



The shaft is thicker underneath the plastic speedo gear. The gear is retained by a metal clip located by a shallow hole drilled in the shaft. Here, we have released the clip and tapped the gear off of the raised area. Some gears are held on by balls and lock pins, but we recommend the clip type.



Measure the length from the end of the shaft to the center of the S10 speedo gear.



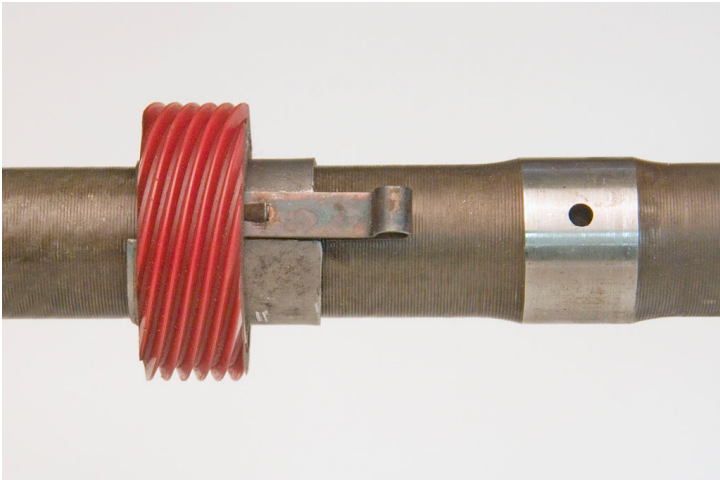
Transfer the measurement to the Camaro shaft and mark it with a Sharpie pen.



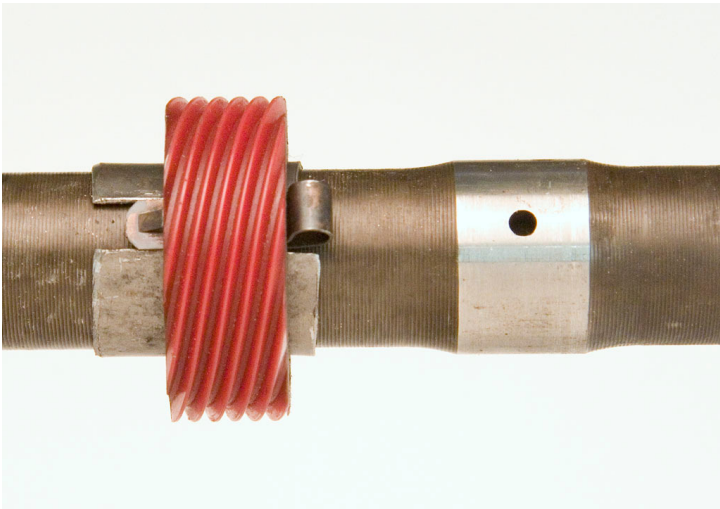
Drill a new hole to the depth and diameter of the clip pin. After rounding off two titanium drill bits, we decided to order a 1/8-inch solid-carbide spade-tip drill bit from Enco (use-enco.com) for \$7.95, and it worked like a charm. Don't drill any deeper than necessary – it weakens the shaft.



The two holes are not far apart. Note that the shaft is thicker where the gear was located. You will need to make a shim from steel and/or brass to put under the gear in its new location.



Cut the shim material to leave a slot for the clip to fit in, and bevel one edge to help the gear slide over it. The gear and shim are about to be tapped over the clip, which has already been placed in the hole.



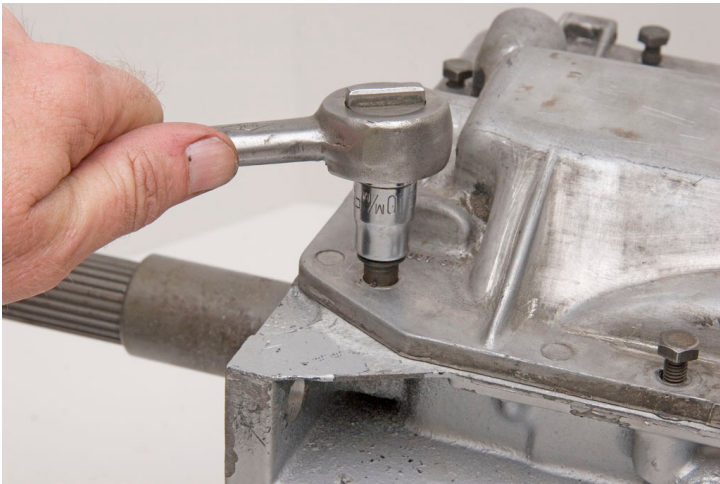
The speedo gear relocation is now complete. Some recommend using Devcon adhesive under the shim, or TIG welding it in place. Good advice, but we're going to go bare.



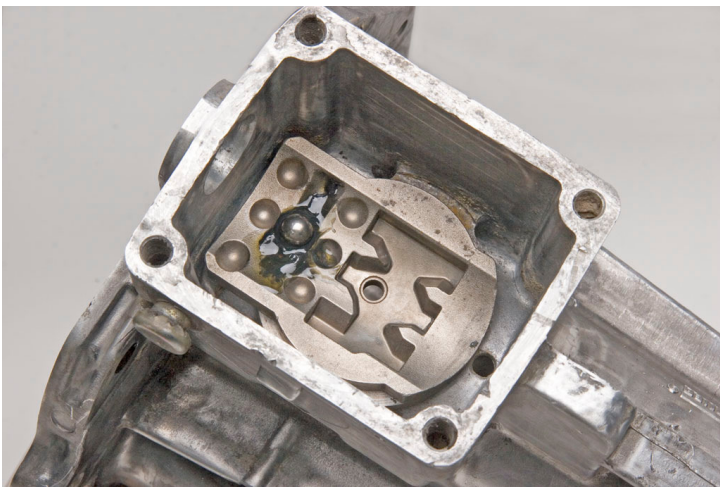
Apply a ring of RTV sealer (no gaskets) around the top of the gearbox housing. Make a ring around all the bolt holes.



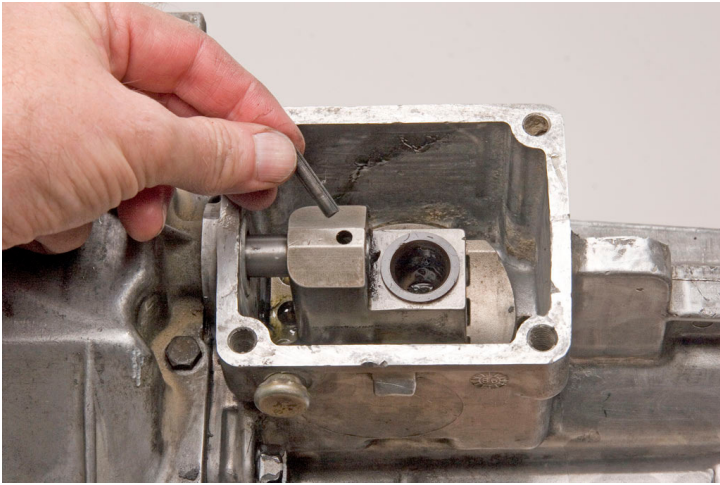
Installing the top is tricky. Put the gearbox and the shift linkage on the top into neutral. Lay the back edge in place without smearing the sealer, hold the top up at the front edge and make sure the shift forks are aligned with the grooves in the synchronizer sleeves. Move the top back away from you slightly, then pull it toward you as you lower it into place. Dry run this a few times before you apply adhesive.



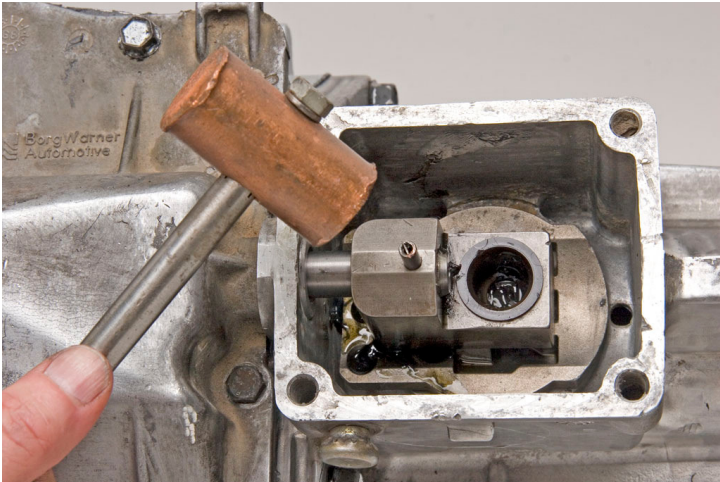
Tighten the top bolts to 7 to 10 pounds. These tiny bolts break easily and are frequently stripped, so take it easy. Stick a drift in the pin hole on the top shaft (it should be vertical) and try shifting the box. Better to find a problem now than later.



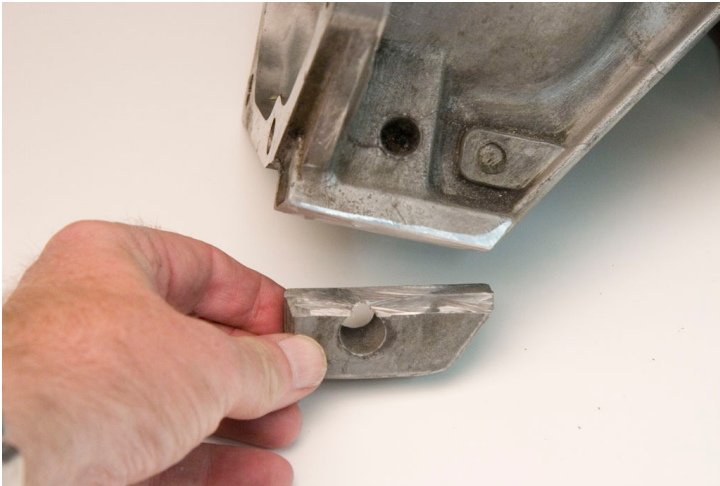
Place the detent ball into the center (neutral) position in the shifter box using assembly lube or grease to hold it in place.



Apply a ring of RTV around the back of the gearbox housing and slide the tail housing on over the mainshaft. As the top cover shaft protrudes into the shifter box, hold the shift finger (with the spring installed in the bottom) on top of the detent ball and then guide it onto the shaft as the housing goes on. (This is a *lot* easier said than done.) Once in place, reinstall the lock pin as shown.



Tap the pin into place and add a dollop of grease to the shifter cup. For high-perf use, we recommend an after-market shifter kit from Hurst (not shown). Fill the box with Dexron II *automatic* transmission fluid – *not manual* transmission fluid.



Low-riding rods can gain about an inch of ground clearance by cutting off this unneeded mount on the bottom of the housing. (We're hoping this little mod will ensure a record-breaking run on the Salt!)



Here's the box mocked up in our 1927 track roadster. Note the shifter location in relation to the seat – the Camaro tail housing wouldn't have fit. Neither would conventional side-shifter boxes like T10s and Muncies. The hybrid S10/Camaro T-5 is a great solution at a bargain price for rodders in need of a fifth gear for cruising.