CLUTCH,

GEARBOX, &

OVERDRIVE

NOTICE

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ADAPTING A 'J' TYPE OVERDRIVE TO AN EARLY CAR

Skill Level B

With TR 6s getting a bit hard to find and with more of them being parted out, it stands to reason us everyday drivers are going to be doing some early/late parts switching. I recently got into more than I bargained for in switching to a 'J' type overdrive. I knew the mounts for late transmissions were different but I never thought they would change the frame mounts for the crossmember. To top it off, the 4 or 5 piece abortion they cobbled up for standard gearboxes in late cars takes double jointed fingers to get at anything. The biggest problem doesn't come from the mounting (although this is no 10 minute job), but from the 'J" type solonoid being perilously close to the old frame bracket for the crossmember. You can, of course, just cut off part of the bracket. I chose a harder method of only trimming it back to near the holes. This saves the bracket for reversion to an older trans and gives a place to fasten the frame adapter shown.

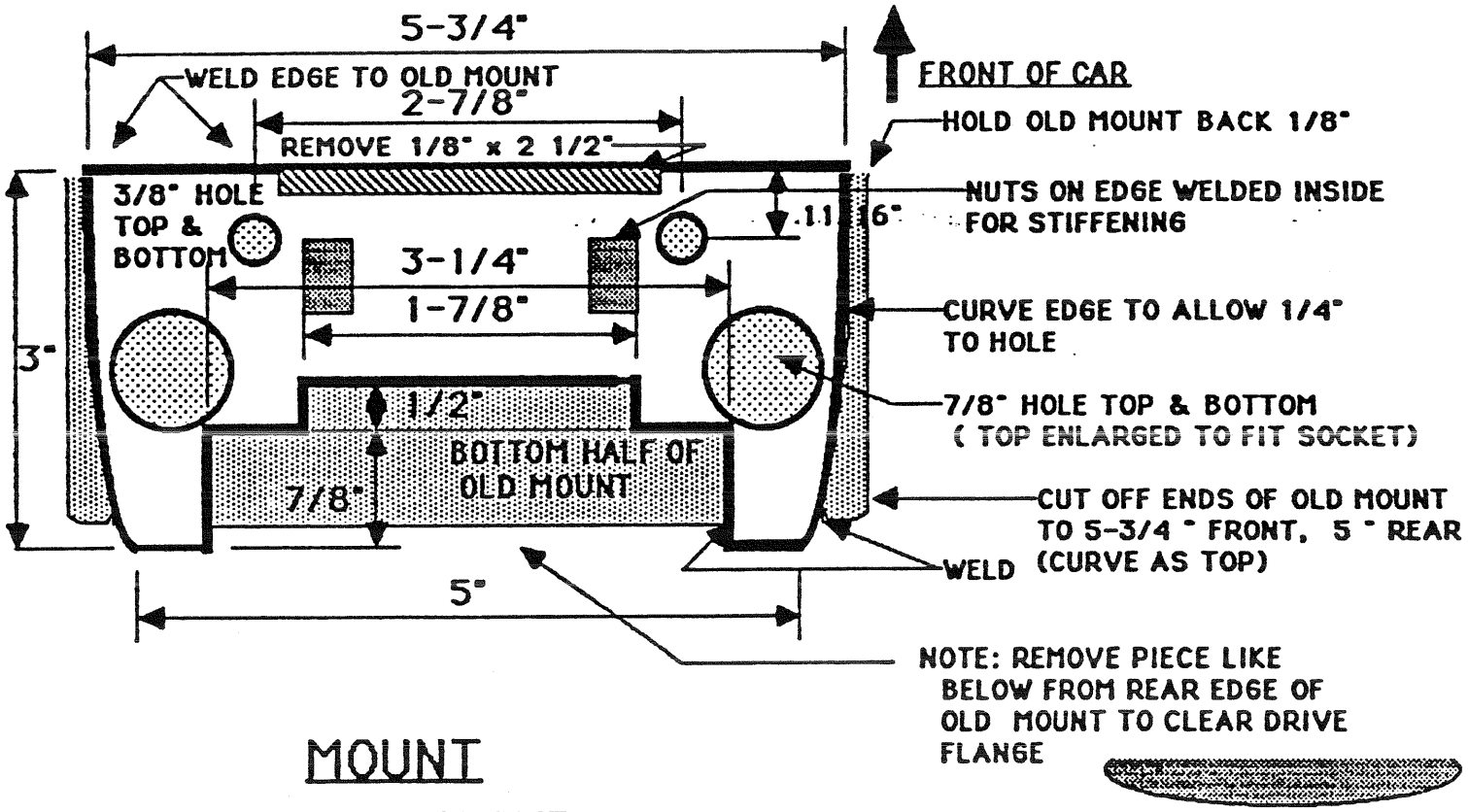
I realize the drawings leave something to be desired due to the limitations of the Macintosh computer, but I'm just not able to take the time or have the skill to do them by hand. The job is probably most easily approached by thinking of it as two jobs - the mount and the adapter. Also, cutting the various pieces out of stiff paper first will help you fit and visualize things better and save a lot of wasted work due to mistakes. The mount and adapter shown below use Clevite 66385 shock bushings (for Ford ?) available at most parts stores, half of the old mount, and 1/8" or 3/16" plates. Welding is held to a minimum of off car work and everything else can be done with hand tools. However, a high speed air driven cut-off tool helps a lot in cutting and shaping the 1/8" plate.

Before starting make sure the two mounting holes in the bottom of the overdrive case (just rearward of the speedo drive) are not stripped. It is a bitch to put Heli-coil inserts in them

or tap them out to 3/8" once the unit is in the car (I prefer enlarging them to 3/8" x 24 fine thread. To do this you must have a regular tap and a bottoming tap).

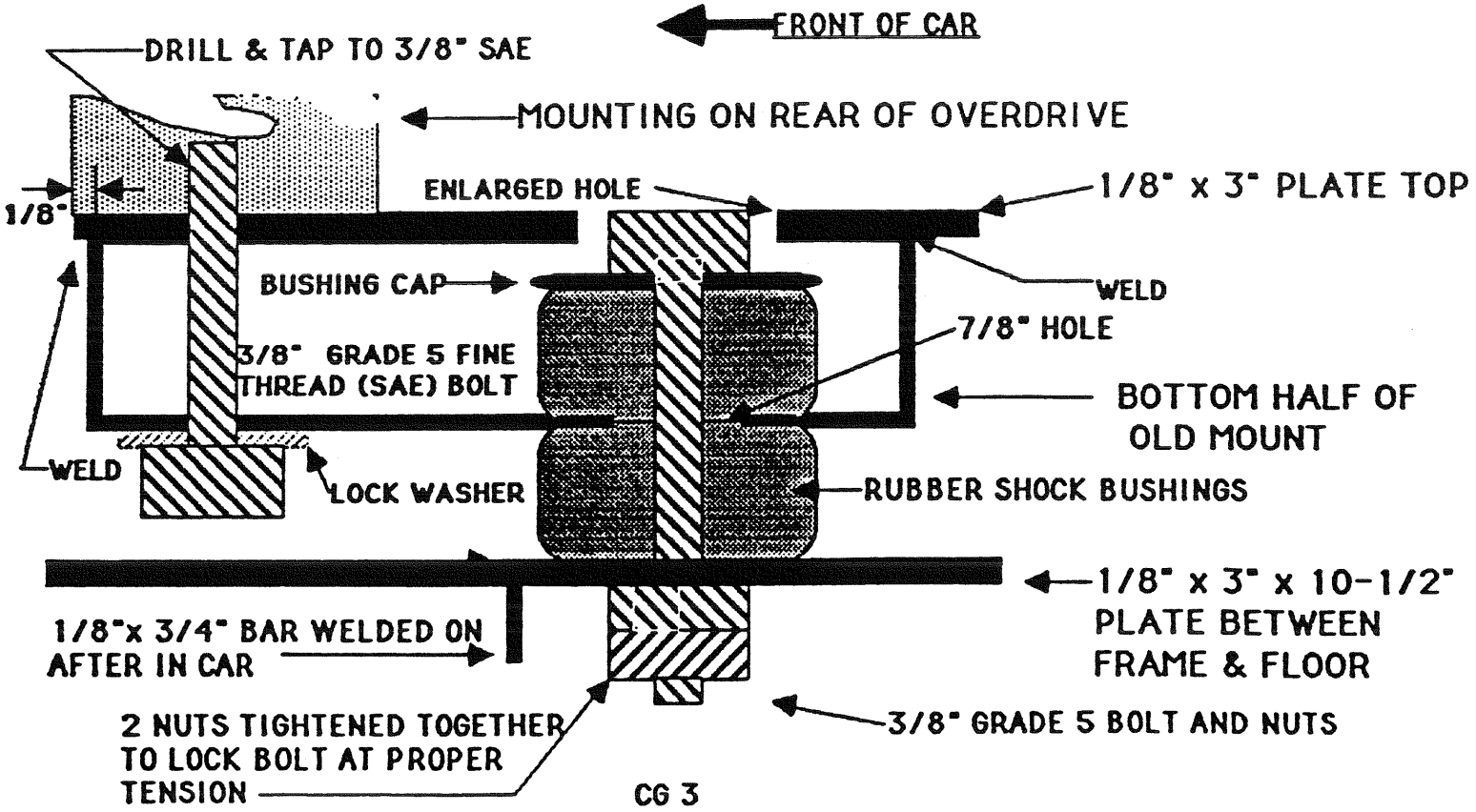
First let's make the mount. Take the old early type mount and seperate the top and bottom halves if they aren't already seperated. Cut, scrape, burn, or whatever the rubber off. Cut off the ends to roughly the dimensions shown or a little larger if you don't mind trimming later. Make the curved cut-out for the driveshaft flange in the rear side. It should be half the depth. Cut out the top but do not drill the holes. Have it welded to the old mount bottom and have the nuts shown on the drawing tack welded inside. Be sure you have made the slight cut out in the front edge of the top and that it projects slightly on the front. Drill the holes, using a hole saw for the 7/8" ones. There was not room on the drawing for the location dimensions of the 7/8" holes. Drill them 1-5/8" from the front edge and 4" apart. Enlarge the top 7/8" hole as shown to give clearance for a 9/16" socket. Trial fit the mount. You may have to enlarge one of the 3/8" holes slightly" to insure getting the bolts into the overdrive case straight. Use the longest bolts possible, but not too long, with lock washers. These holes are too highly stressed. To help relieve the load, I advise bending a piece of 1/8" x 1/2" mild steel bar over the top of the overdrive case directly above them and using 5/16" bolts through the top mount plate to draw the bar tightly down on the case (try to visualize a glorified exhaust pipe clamp and I think you'll see what I mean). The 1/8" x 3" x 10-1/2" plate shown in the section is the rear plate of the adaptor.

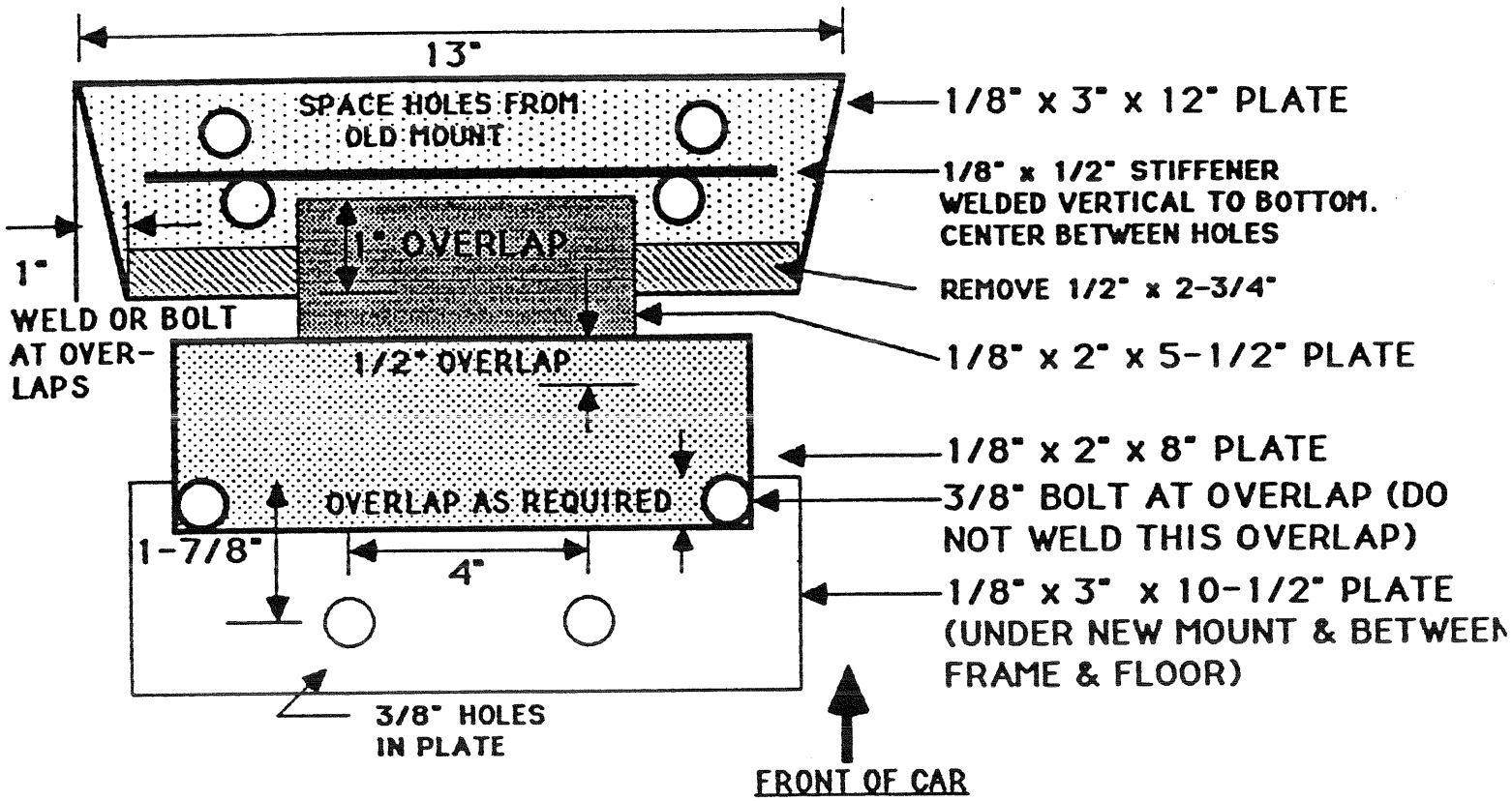
Now for the adaptor. If you wanted, you could just use the rearmost plate shown and weld it to the frame. However, the intent here is to make something you can bolt in. The 4 pieces of plate shown can be bolted together but it is easier to have the front 3 welded in a shop, then fit them to the rear one in the car and drill and bolt that connection. This way it is also easily removed. The holes at the front bolt to the old crossmember mount (use the crossmember for a pattern). The rear holes are



MOUNT

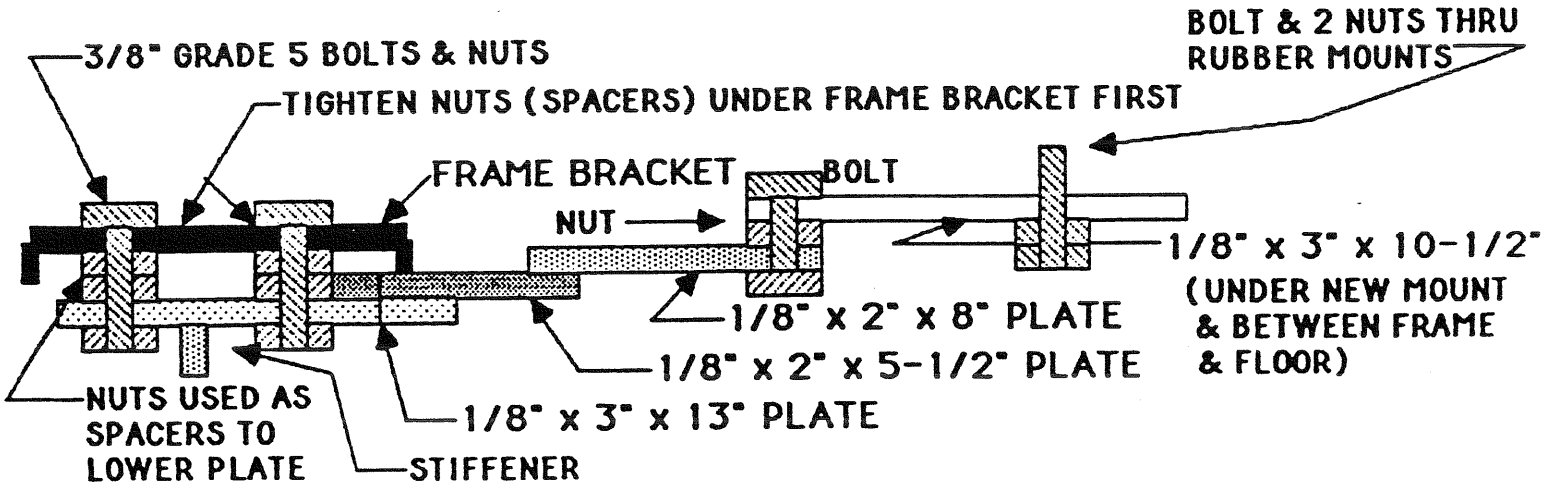
TOP VIEW ABOVE
ENLARGED SECTION BELOW





FRAME ADAPTER

TOP VIEW ABOVE
ENLARGED SECTION BELOW



for the mount. You will need to grind away a little of the mount to prevent the solonoid striking the old crossmember bracket. With everything in place and tight you want to have 2" or less from the top of the mount to the rear adaptor plate to prevent the drive shaft hitting the tunnel. You will also have to make a new exhaust pipe mount.

Once you have made a few trial runs and are sure everything is OK, have the rear plate of the adapter welded to the frame rails and have a stiffener welded to the bottom. Be careful on the left side to cover the fuel line with lots of wet rags or other insulation !

One additional note. You can use MGB transmission mounts in lieu of the shock bushings. They must be skewed a bit and are a tight fit. However, they do not provide the positive prevention of torque lift tearing the left mount loose that the shock bushing/bolt combination provides.

REPAIR YOUR 'J' TYPE OVERDRIVE AND SAVE $211.75 ON A SOLONOID

Skill Level C

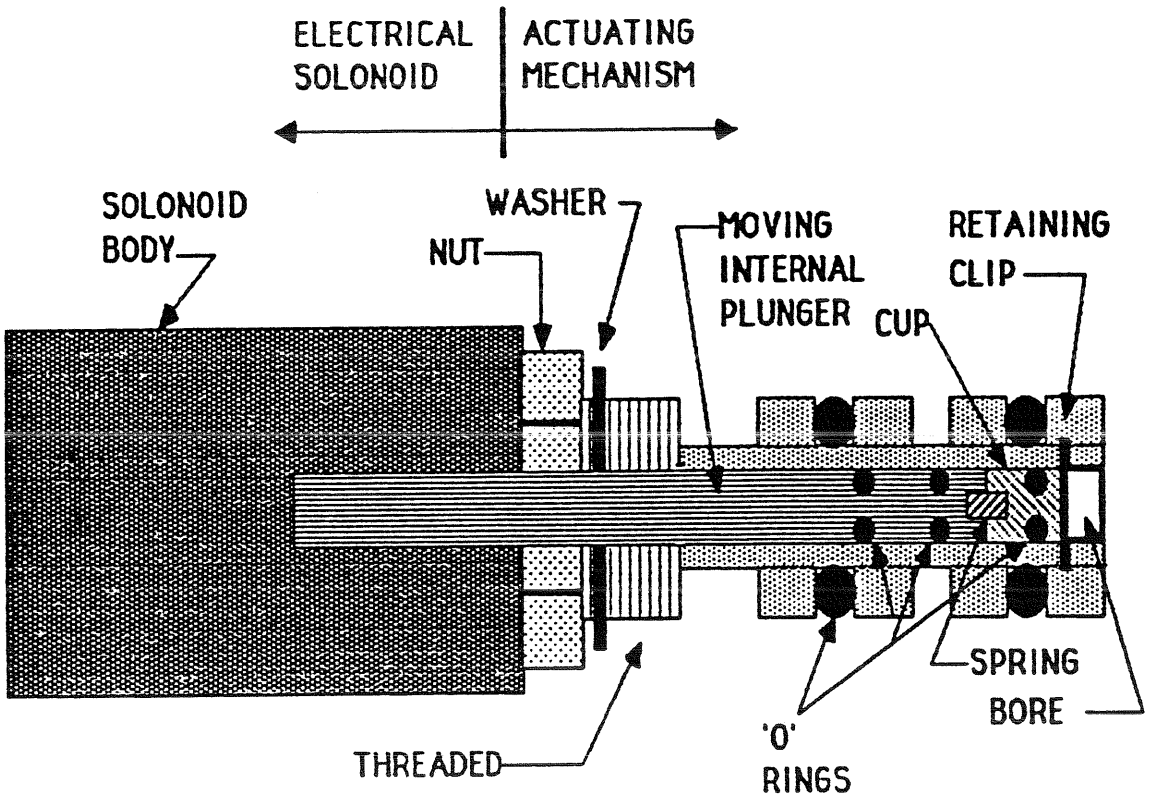
If your J Type overdrive isn't working, here's a cheap and relatively easy job that will probably bring it back to life.

The J Type overdrive is much simpler than the older type A but is also not nearly as tough. This is no doubt due to Laycock-de Normanville adapting the first axiom of Detroit, "Cheaper is better (for us)". The Achilles heel of this unit is the solonoid. It is not only on the bottom of the unit where you can break it, but when it goes bad the failure is not easily detected (and it does go bad). No big deal, you say. After all it is only a solonoid and they're cheap. Wrong ! Maybe other solonoids are cheap but not this one. From The Roadster Factory

it is $212.75 at your door Charlie ! The irony of this is that 90% of them could be fixed for about $1. What makes failure so hard to detect in these abortions is the fact that they will loudly and firmly click open when you connect them to 12 volts. You then go on to check the operating pressure if you have the equipment and find that you only have 60 to 90 PSI instead of the 200 PSI minimum required to operate the pistons and the 400+ PSI specified pressure. You supect everything but the solonoid. However, the problem usually lies in the 5 lousy 'O' rings (the black dots in the drawing) incorporated in this typically poor Lucas design. Simply put, they go bad and leak. This is as much, or more, a factor of time as of mileage. Unless rubber parts are used regularly they go "dead" and loose their elasticity and ability to seal. Of course Lucas only sells complete solonoids, no components. However, you can beat the system because components like axles, etc. are made to fit bearings, seals, and 'O' rings - not the other way around. The proper 'O'rings to do this job are readily available.

Replacing the 'O' rings takes about 1/2 hour and they cost about 20¢ each. The bad news is that getting the solonoid out isn't too easy. Aside from access, you will need to grind down a 1" open end wrench in order to get at the very thin nut portion of the solonoid. You will also need a pair of inexpensive #0100 retainer (snap) ring pliers. Once out of the car, the rest is easy. Just follow the instructions below and refer to the drawing which vaguely resembles the shape and components of the unit (sorry, but life's too short for me to draw things by hand and type on labels).

Remove the internal retaining ring, or snap ring, from the hydraulic end of the unit. Inside you will find a silver colored cup with a hole in the center. Use a paper clip with a little hook bent in the end, or other means, to pull it out. Be very careful you do not lose the small spring behind it. Next extract the plunger. Pour a little solvent like laquer thinner in the solonoid body and shake it to clean it out. Remove all the the old 'O' rings. Coat the new 'O' rings with a little oil and slip them in place. Reassemble the unit.



The 'O' rings required are easily obtained from any industrial bearing supplier in the yellow pages. The numbers given below are for Precision Rubber Products Co., Hartman Dr., Lebanon, Tenn. 37087. However, I believe the numbers are universal.

Plunger: #007 - 5/32" x 9/32" x 1/16"
Cup: #010 - 1/4" x 3/8" x 1/16"
Body: #111 - 1/2" x 5/8" x 1/16" (check your old ring. I used a slightly thicker metric ring here)
Retaining ring: National 5000-37-SPP (Use 2, they are thinner)

WHAT NOBODY EVER TOLD YOU ABOUT CLUTCH JOBS

A clutch change is essentially a simple matter - yank the transmission, stick in a rebuilt disc (driven plate in your English shop manuals), and jam the trans back in. For a Toyota or some clunker that will become the rear fender of a Chevy next year that's OK, but not for the TR you are going to will to your grandchildren!

First, ramming the trans into the clutch or having its weight hanging on the clutch can screw up your new disc. Start with at least one good scissor or hydraulic floor jack (preferably two) and some wooden blocking. With a jack under the plate joining the engine/trans unit or the oil pan and the unit still together, raise it and remove the rear mount under the trans. Now let the unit down until the trans just touches the crossmember where the mount was removed. Place the other jack or blocking snugly under the bottom of the trans just forward of the drain plug. You can now remove and install the trans without it placing undue strain on the components. Note that by removing the mounting bracket for the clutch slave cylinder you can avoid bleeding the clutch. Notice I said <u>new</u> disc above. Do you really thing it is worth all this work to use parts rebuilt by the lowest bidder your parts supplier can find? Not me coach! Use a new pressure plate (driving plate) assembly and disc. There are two brands Borg & Beck, and Laycock. Actually, there's a third, Quinton-Hazell, which I wouldn't even put in a Datsun or a Yugo. I prefer the Laycock for longevity and less problems, but this is just opinion based on my experience.

<u>Do not</u> replace the release bearing (throw out bearing to those that speak American) unless it is making noise or feels rough when you turn it. I've had these "quality British products" as the Q-H box says, go bad and tear up a clutch in as little as 2000 miles.

There is now a tag attached to new Borg & Beck pressure plates that says the mounting bolts used with a Laycock clutch must be shortened if used with a Borg & Beck. I don't remember ever seeing one before about 1985 and therein may lie the cause of many people's clutch problems. I took a rebuilt Borg & Beck out of one of our cars and sure enought it had 7/8" bolts for a Laycock plate. The Borg & Beck uses 3/4". Both are 5/16" U.S. Course Thread. Why Triumph bothered with this or how the blokes at Coventry kept this straight on the assembly line is a mystery. If you have any suspicion that the clutch was ever changed in your TR, replace the bolts with grade 5, or preferably grade 8, bolts of the proper length available from industrial bolt

suppliers for a few cents each. Hardware store bolts are grade 2 and are only strong enough for uses like holding your license plates on.

Odds are the fork that acutates the release bearing is loose on its cross-shaft. This is a common TR weakness. There is probably also some play in the bushing for the end of the shaft on the side opposite the actuating lever. Use copious amounts of spray carb or brake cleaner to remove all traces of oil and crud from the shaft and bores in the bellhousing. To remove and replace this bushing simply remove the lock bolt and drive the bushing into the bellhousing with a suitable tool (I use a Craftsman 5/8" deep socket). Replace it with a B-1214-5 oilite bushing driven in far enough to clear the cross-shaft, locating bolt and then put the old bushing in the outer end of the bore. Freezing them first makes installation easy. You'll notice the manuals show a grease fitting on the cross-shaft. Unfortunately these pictures are from a TR-3 manual. Too bad the fittings were dropped.

Replacing the front seal in the trans is a must. It is in the sleeved front cover for the input shaft that the release bearing slides on. It is hard to get out and you may have to have a shop do it. The original seal is 2" O.D. x 1 1/4" I.D. x 1/2", (not an easy thickness to get), but I have used a 7/16" seal (National 450163) sucessfully and a Chicago Rawhide 12443 is exactly right. Carefully clean the mating surfaces before reinstalling the cover and coat with silicone seal. Make sure you have the oil passage lined up on the right side. Let the sealant set up a little before tightening down. <u>Don't over tighten.</u> These bolts go into aluminum.

Now we come to that miserable set screw, or screwed tapered pin to the Blokes, in the yoke. Clean everything and use Loc-tite on this thing and tighten about as tight as you can with an open end wrench. Use heavy wire for retaining (personally I feel this is wishful thinking, but try it).

Another never replaced item is the spigot bushing. With the very early cars the bushing is long enough that you can simply turn it around. To replace this you will have to remove the flywheel. This usally involves jamming the starter ring gear with a tire tool or screwdriver to keep it from turning. If in doubt, get an oilite bushing 1" O.D. x 1/2" I.D. x 1 1/16" long. A good torque wrench is an absolute must for flywheel installation.

Lastly, clean the hell out of the engine mounting plate and the transmission bellhousing. Dirt trapped here will soon wear away, leaving loose bolts and eventually a broken transmission case.

IF YOUR CLUTCH WON'T DISENGAGE AFTER REBUILDING AND BLEEDING THE SLAVE CYLINDER

Skill Level C

This is a fairly common problem for the novice TR mechanic. The cause is one that I've noted on other British hydraulics (like brakes on TR-3's). Apparently nobody ever told the Blokes at Triumph that air rises in liquids and they put the bleed screws below the top of the cylinder bore. The result is trapped air above the bleed screw. When you open the screw you get fluid but the air remains. When you close the screw and press on the pedal the air is compressed, thus giving only about half the required movement on the clutch release actuating arm. The cure is to first use a 7/16" deep socket to break the screw loose (an open end wrench will often round off the hex head).

Next remove the two mounting bolts and rotate the cylinder until the bleed screw is at the highest point. Now you can bleed the cylinder properly. In addition, I would recommend rebuilding both the clutch master cylinder and slave cylinder at the same time. If one goes bad the other can't be far behind and it is too messy a job to do twice.