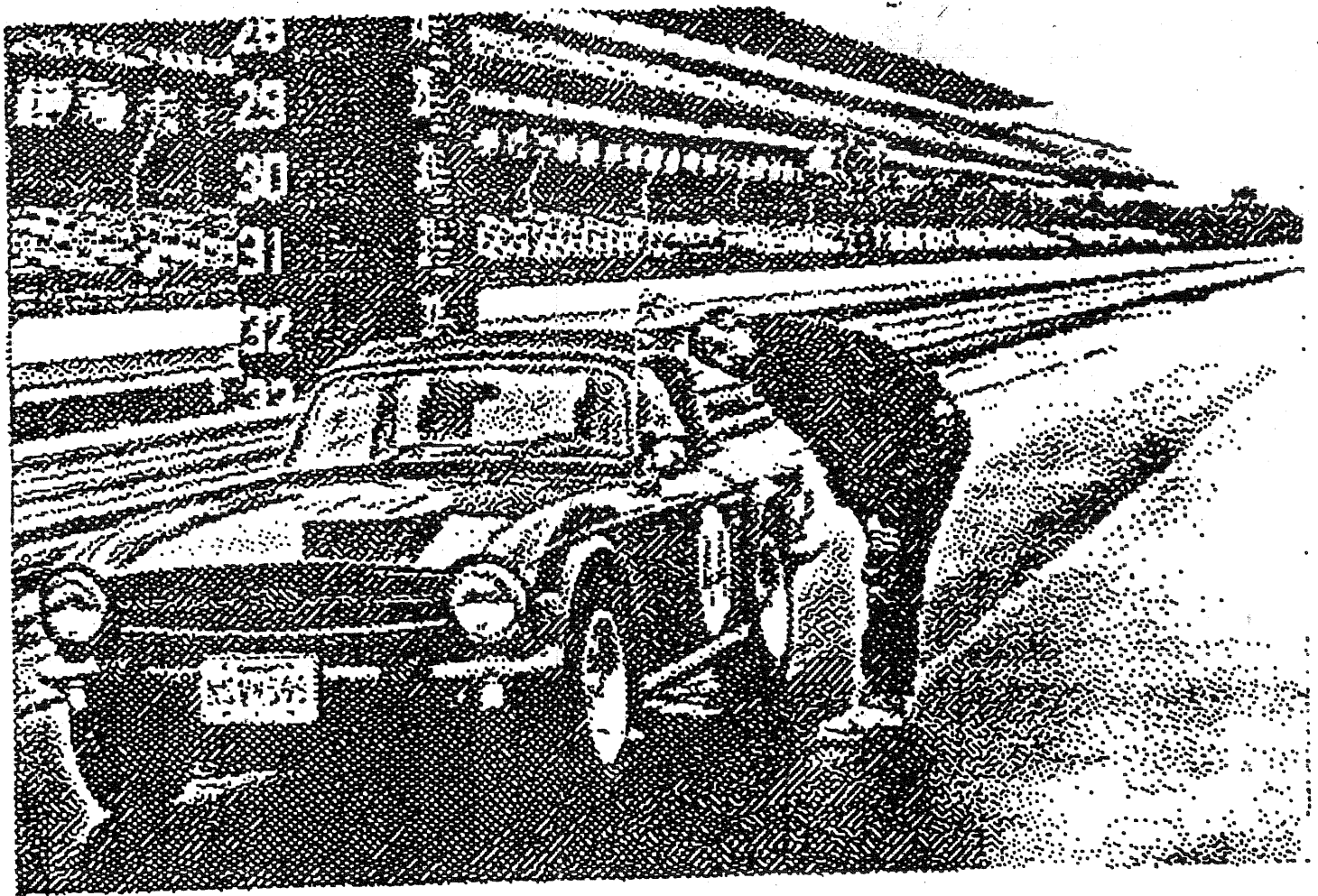


SIX TECH

by Leonard Renkenberger



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PREFACE

This manual is dedicated to the TR-6, the car I have always referred to as the M6-TC of the '70s. These happen to be, in my opinion, two of the greatest cars ever built. They are not the fastest, the most powerful, the best handling, the most valuable or the best at anything matter of fact. Perhaps that's why I feel they are so great. They were the epitome of sports car in their day and, most important, the average guy could afford them. The TC was the first and the TR-6 was the last. My TC has been with me since 1960 and the one TR-6 since March 26, 1970. I can not imagine what it would be like not having them - especially driving the TR-6 every day and the TC for occasional pleasure use on nice days and trips. All those poor souls chugging down the road in their 1987 Zappobiles sure are missing a lot in life.

Where am I coming from and why did I prepare this book? I'm not sure. However, by attempting to help you and encourage you to keep your TR-6 on the road I'm really helping myself too. The more these cars are driven and restored the more parts suppliers are encouraged to keep making those vital gears, switches, and such. That keeps the cars drivable and so we go around the cycle again. I have a belief that if you know something, you have a duty to pass that knowledge on. I also believe this is doubly true in old car circles because you aren't going to learn it "on the job". I'm not talking about things you can find in shop manuals - they're written for people who already know what they are doing (or at least think they do). I'm concerned with the inherent weakness the manufacturer sure as Hell isn't going to mention in his manual, or the improvement of an assembly by substituting parts that technology hadn't invented when your car was built. I'm not suggesting I know it all - far from it. I've merely attempted to pass on some of the lessons I've learned behind the wheel and underneath a TR-6 for over 300,000 miles. I would like to encourage you to do the same.

There has been no attempt made to make this a "professional" looking publication - nor even too much of an attempt to use the correct grammar and spelling. There has been, however, a real attempt to explain things clearly in language the non-pro can understand. I hope we have succeeded on this latter point above all else.

You will be amazed at how much work you can do yourself if you have a few basic tools, preferably more than one shop manual and, most importantly, the confidence to try. Most jobs can really be subdivided into several smaller jobs and by doing this you'll find it is not so overwhelming as you may have thought. For example, body repair and a paint job seems mighty intimidating. However, if I said you could remove the left front fender, you'd probably agree. If I then said take a 1/4" drill and a grinding disc and grind the rust away from the edges of a rust hole in that fender you'd again agree you could do it. Then if you just put a fiberglass patch on the back, a little plastic filler on the front and sand it

a little, you've fixed the fender. Now you'd know you could do the other three. By then you'd probably be very justified and smart to take the rest of the job to a pro; but, you would have gained a tremendous amount of self confidence. Of course it is also obvious that you can't jump into a complete engine rebuild if you've never even been able to change the oil. Strive to gain skill but know your limits.

Many of the articles deal in basics, and more important they deal specifically in TR-6s. By that I mean not a generic article like all the "How to" books have. I once bought a "How to Fix your TV" Book. Trouble was the resistors and rectifiers in my TV weren't in the same place as the ones on the generic TV. I threw the book and TV out together. I promise you that you'll know how to do the job on your TR even though you can't do it on a lawnmower. The theory and tune-up articles are, I think, good examples of this. Incidentally, I can't fix lawnmowers either!

Also I'd like to qualify the difficulty level of the articles we present when applicable so that you don't feel intimidated by a job you could easily do but just don't know you can. The grading would work something like this:

D: Requires ability to recognize box end wrench and lift with both hands after appropriate study and preparation.

C: Able to open hood (bonnet) and know what carburetors (I spell in U.S. not British) look like - well, at least which side of engine they are on.

B: Knows what a torque wrench is and how to use it for something other than a hammer.

A: Able to remove a major assembly such as engine or differential and, with some help from manuals, disassemble and re-assemble it.

A+ Donald Healey, Bob Tullius, and Richard Petty call you "Your Highness".

SIX TECH

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ENGINE,

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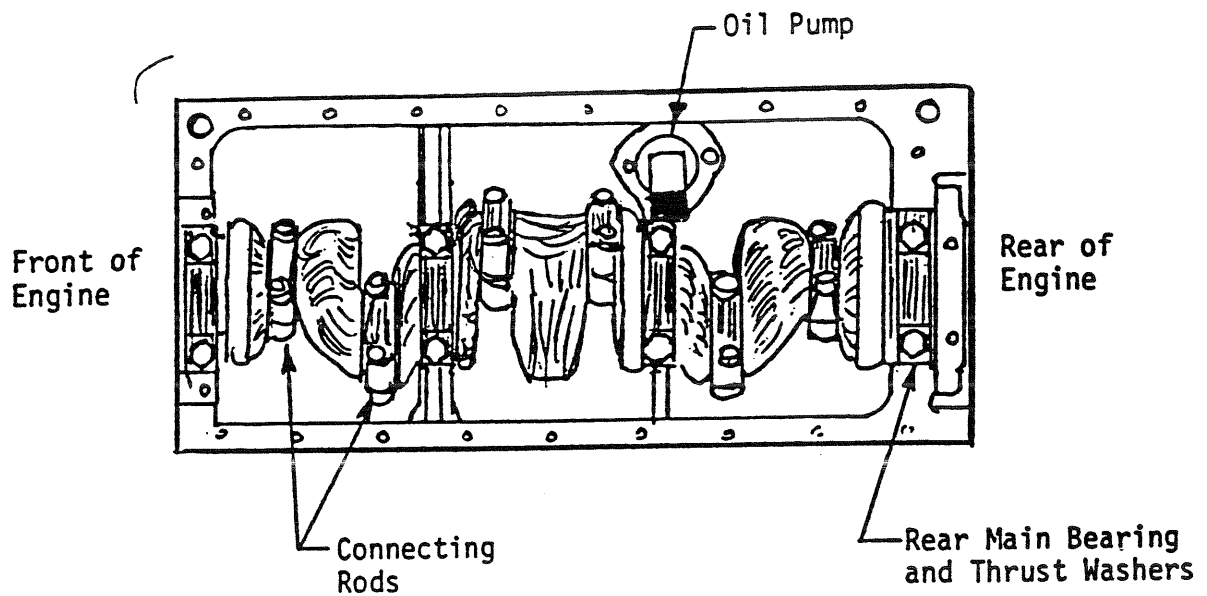
VALVE GEAR,

AND MANIFOLDS

DOUBLE ENGINE LIFE WITH FREQUENT BEARING CHANGES

In no more than a day you can renew the connecting rod and main bearings in your TR-6. The only special tool required is a torque wrench. If this is done at about 50,000 mile intervals and accompanied by reasonably regular oil changes your crankshaft should last 200,000 miles without requiring a regrind. It is well worth the effort since a crank regrind requires engine removal and total disassembly plus about \$150 of machine shop work.

The car should be firmly supported on ramps and/or jack stands. Oil pan removal is straight forward, there are no obstructions. Remove one connecting rod cap at a time (noting that they can not be rotated 180 degrees) and remove the bearing shell. The other bearing half can be removed from the rod by carefully pushing on the end without the anti-spin notch with a blunt screwdriver. It will then slide down around the crankshaft. On this first rod you should clean and dry the crank and use Plasti-gauge to check the clearance of the new bearing. This is done by laying a piece of Plasti-gauge transverserly across the new bearing in the connecting rod cap, then installing the cap and torqueing the bolts to specifications or a little less. Plasti-gauge is a fine plastic string of exact diameter. When the bearing is tightened against the crankshaft the plastic is flattened. The closer the clearance between the bearing and the crankshaft, the thinner (therefore wider) the plastic becomes. The cross-sectional area of the string doesn't change so area divided by width equals thickness. Loosen the bolts, remove the cap and compare the width of the Plasti-gauge with the widths shown on the wrapper for different clearances. Repeat for other rods except for checking clearances. Always use a torque wrench when tightening engine bolts.



VIEW FROM BOTTOM OF ENGINE

Replacing main bearings is essentially the same process except for removing the aluminum cap below the front main and checking clearance. To check the main clearance you must either check one of the center mains or apply upward pressure on the rear of the crank. The latter is necessary because the flywheel and crankshaft weight will deflect the rear of the crankshaft downward giving a faulty reading. A handy tip on changing upper main bearings is given in the next article.

Probably the most important bearings are the ones rarely replaced, the thrust washers. These are two half circular rings that go in front and behind the upper rear main bearing. They are easily replaced. Unfortunately until recently there were no oversizes available and excess play lets the bearings wear very fast and drop out with disastrous results.

CHANGING UPPER MAIN BEARINGS

A simple way to change upper main bearing shells is to loosen all the caps a little. Usually, you can then push gently on

the end of the bearing shell with a screwdriver to start the bearing sliding around the crankshaft. It is then removable with your fingers.

However, it seems there is always the one that won't come. For the stubborn one try the following: Cut off a 20 penny nail 1" below the head. File any sharp edges off the head and bend the head to match the oil hole in crank. Turn the engine over by hand (removing spark plugs makes this much easier) until the oil hole is visible. Place the cut off nail in the oil hole and rotate the crank by hand until the nail pushes the bearing shell out. The new bearing shell can be installed the same way but go slow and be careful you don't screw up a bearing.

FREQUENT ENGINE THRUST WASHER REPLACEMENT IS A NECESSITY

All Skill Levels

In the preceding articles I have urged you to replace the engine bearings about every 50,000 miles or less (less on high mileage cars). This greatly prolongs the life of the crankshaft and therefore delays considerably the time when the engine must come out of the car. This is a job you can do in an afternoon with just basic tools, a set of ramps if possible, and a torque wrench (don't skimp on the torque wrench, it is a very important tool required to accurately tighten the bearing caps). If you don't feel you have the skill, have the job done, but don't put it off.

The most important part of the job, however, appears to be the least important - the thrust washers. These are the little half circle things above the rear main bearing. The factory says the end play (distance the crankshaft can move from front to back between these washers) should be .006" to .008" (6 to 8 thousandths of an inch). I've always maintained this was

excessive and, when coupled with high mileage and poor or no oil changes, resulted in the crankshaft "beating" back and forth until the thrust washers wore thin enough to drop out. Once the thrust washer drops out the crankshaft and the engine block eat each other up rapidly. I had this happen on an engine and I know several others that have had the same misfortune. It is an expensive lesson, given that a new crank and block goes for about \$500. Until recently, however, there was little you could do about it because thrust washers didn't come in oversizes.

Since oversize thrust washers have become available I've had occasion to take the pan off an engine I build with great care using a new block and crank. The mileage was 19,870 or say 20,000. When I built the engine I used an end float of .002". When I dropped the rear main bearing and examined the crankshaft and the thrust washers they looked fine, with a mirror polish. However, the end float was .007". Now, let's just use a straight arithmetic projection of this wear to say 60,000 miles. That .005" growth in end play would be .015" - one hell of a lot. Also, the more wear, the greater distance the crankshaft has to travel back and forth; ergo, the harder it can "pound" on the thrust washer. Therefore the increase in end play is likely to be exponential rather than arithmetic and at 60,000 miles the damn things could easily drop out.

It used to be thrust washers were available in only stock sizes. For some time now, the Roadster Factory has had oversize sets. By mixing these you can come up with a combination that will get you in the .002" to .004" range.

Take extreme care to make sure you have the proper side against the crankshaft. Even experienced mechanics put them in backwards.

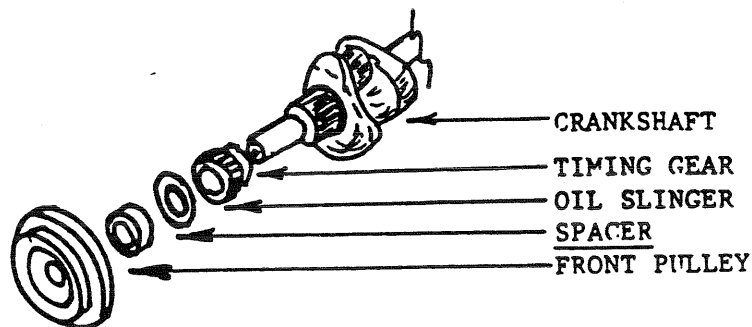
Don't put the job off. It's like saying you're going to look into AIDS prevention next month - once it has happened there ain't no cure Clyde!

ENGINE FRONT OIL SEAL IMPROVEMENT

Skill level A/B

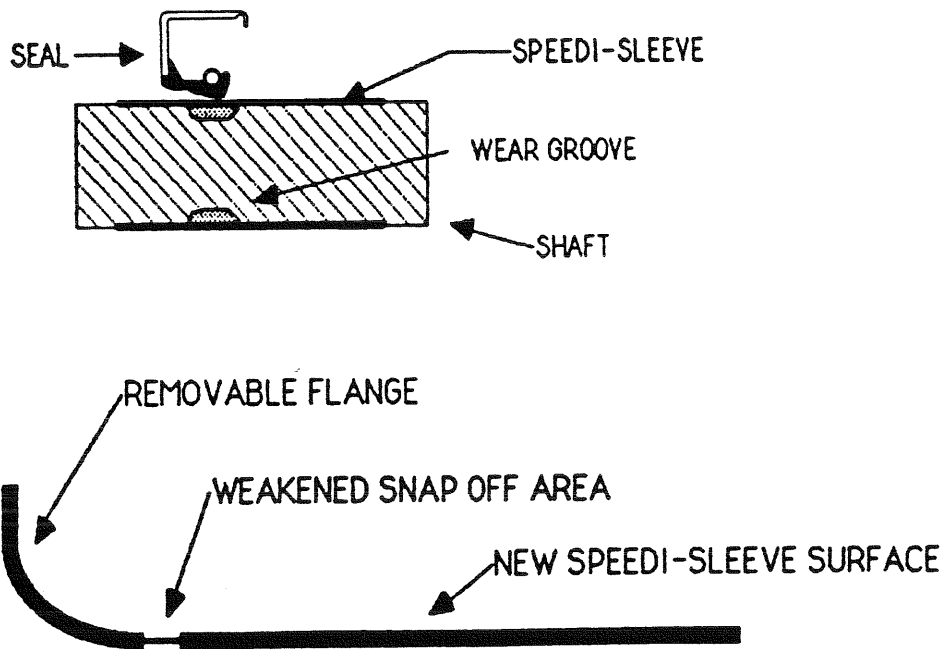
When rebuilding an engine or even when just replacing the front seal in the timing cover most people just put in a new seal and assume all will be well. Not necessarily so! Due to the seal location, low and at the front of the car, it catches a lot of grit, water, and leaking oil. Combined these make a wonderful grinding compound and a groove - usually not too deep - develops in the spacer (see illustration below). In most cases a new seal will still work with some shaft wear, but in the case of the TR-6 the seal barely contacts the crankshaft spacer to begin with. There are three ways to cure this:

1. A new spacer for \$25.
2. A speed-sleeve over the spacer (see accompanying article) for \$20 or so. This has the advantage of increased shaft diameter.
3. Reversing the spacer on the crankshaft to provide a new wearing surface.



SPEEDI-SLEEVES - A BETTER IDEA

There are a lot of instances, like on axle shafts, front spindles, and engine timing gear covers, where neglect and high mileage have resulted in hardened seals cutting a groove in the shaft. This usually means that new seal won't work well or even work at all. SPEEDI-SLEEVES are the cure. They are precision machined stainless steel sleeves of thin (.005 inches or so) steel with a flared end on them. They are driven over the worn area of the shaft using a tube much like exhaust pipe to drive against the flange. Once the SPEEDI-SLEEVE is in place the flange can be broken off and removed or left in place. They come in sizes from 1/2 inch in diameter through 8 inch diameter. Cost for a 2 inch sleeve is about \$20 and a 1 inch is about \$10. Available at most industrial bearing suppliers.



MATCHING A NEW OR REBORED BLOCK AND NEW PISTONS

Skill level B

Many owners and even professional mechanics assume engine blocks and pistons are automatic fits, especially new ones. It just isn't so, and this applies to putting new pistons in a rebored block as well as a new block. Due to machining tolerances of both pistons and blocks there can be more than acceptable clearance, or worse, too little clearance. Manufacturers compensate for this by indexing the pistons and the block with a size code and then match like coded pieces at assembly. I'm told that things were so bad with Chrysler back in the '30s that they even had to do it to crankshaft bearings. Triumph apparently didn't have too bad of tools since they only had three ranges of pistons and bores of .0004" each on early engines and two ranges of .0006" on later engines.

Piston to block clearance should be about .0025". However, let's say you have a late block with the lower limit of the smaller range (2.9405) and you get late pistons with the upper limit (2.9391). You would have .0014" clearance, or a hair more than half enough (with the lower/upper mix of early parts the pistons wouldn't even go in). The usual result of this is skuffed pistons and cylinder walls which leads to early high oil consumption. But it can also cause broken pistons, broken piston rings, and seized pistons with disastrous results. The early codes are F, G, and H from smallest to largest respectively. The late codes are A and B.

REPAIRING THE OIL PRESSURE LINE

Skill level C/D

This article is supplement by the article on curing and preventing rocker shaft and cam failure. Please read it too. It is a very easy to break the plastic line that carries oil from the oil distribution gallery to the gauge. It is located behind

and slightly above the oil filter. By now most of these formerly tough pliable nylon tubes are getting brittle and a good bump will break them. This usually happens right at the adaptor between the line and the engine. Your first feeling of utter panic is normal but not justified. Simply remove the adaptor and take it to your local auto parts store - It doesn't have to be an import parts place because the threads on these fittings are the same as U.S.. Get a double ended male compression sleeve fitting of the same thread, a female nut or fitting and a compression sleeve for 3/16" tubing. Simply put the male fitting in the engine block, slide the female fitting compression sleeve (which resembles a little barrel) over the tubing and insert the tubing into the male fitting. Tighten the nut enough to squeeze the compression sleeve tight on the tube but don't overdo it - remember the tube isn't metal. In the event you have broken the line in the middle, simply use the above plus another female nut and compression sleeve to join the two halves of the sleeve.

OIL ALL OVER THE LEFT SIDE OF YOUR ENGINE

The problem is a blocked breather hose at the valve cover. This article will appear in the first yearly supplement. If you need a copy now it will be sent on request.

ROCKER SHAFT SET SCREW

Skill level D

Next time you add oil take an extra second to look into the valve cover while the filler cap is off. If it looks like someone sprayed silver paint in there or looks very dry (oil free) the odds are the set screw has come out of the rocker shaft.

If you don't remove the valve cover for the above reasons first, the next time you set the valves it would be a good idea to check or tighten the set screw.

The rocker shaft is prevented from rotating or moving fore and aft by a single screw in the rear rocker stand. Worse still is the fact that this screw has a countersunk phillips head - the worst possible fastening devise to tighten. What makes this screw so important is the location of the oil gallery in the rear rocker stand and rocker shaft. If the screw comes out all the oil goes straight up the screw hole and the rockers run dry except for splash oiling; or worse, the shaft rotates and the oil supply is totally cut off. I've seen this on more than one TR-6 so take the extra minute the next time you adjust your valves.

Remove the screw. Clean the screw and hole in the rocker stand and shaft thoroughly with spray brake cleaner or CRC Lectromotive Cleaner (same stuff but brake cleaner is cheaper). Apply Loctite liberally to the screw and threads. Use a screwdriver tip for you 3/8" ratchet to get the screw sufficiently tight.

CURING/PREVENTING ROCKER SHAFT, ROCKER AND CAM FAILURE

Skill level B/C

Awhile back I received a spurt of phone calls about rocker arm, rocker shaft, cam, lobes and cam follower failure. Most were apparently from dry running or insufficient oil. This struck me as a rather strange thing because I had never encountered it (with the exception that follows) in any of my TR-6 engines - even the one with 275,000 miles on it. The exception is that I have seen engines on which the set screw for the rocker shaft had come loose. This screw is located in the top of the rear rocker pedestal and the above article deals with it in detail.

This screw's function is to keep the shaft from rotating or moving fore or aft. It also happens to be in the top of the same hole which carries oil up through the engine block and cylinder head to the rocker shaft. It is a phillips head screw and they are notorious for being impossible to tighten sufficiently. When it comes out, either the oil shoots straight up or the shaft turns

and cuts off the flow of oil. In either case the result is no oil to the rockers and shaft. The cure is a clean screw and Lock-tite. Of course, I immediately asked the callers about this but none had experienced it.

My thoughts then returned to those good old days of my youth when I used to hang around my uncles machine shop. This was after WW II in a town near the Pennsylvania Turnpike and although I was only 10-12 years old I was struck by the fact that two of the "best" cars of the day - Lincoln V 12 and Buick- were burning up engines and valve gear at those "high" turnpike speeds of 60 MPH while the Fords just rolled on by. The cause was plugged up oil passages and the cuprit was sludge. Sludge is accumulated dirt and broken down oil which was common in those days before detergent oil. It appears that this same fate befell at least the valve gear of a couple of these TR-6's. One of the callers had also had a replacement rocker shaft go bad in only 100 miles. He felt that dry or not that was too quick and I agree. I've heard that some non-Stanpart shafts are not hardened and this seems to bear that out.

The reason I thought back to those old cars (and wasted the paragraph above) was the cure the mechanics used on the Buicks (I don't recall the Lincolns being cured except for another engine). The Buicks had an oil passage that fed the rocker assembly very similar to the TR-6 set up. The cure was to tap the oil supply very close to the oil pump, tap the hole in the cylinder head and then connect the two with a supplemental oil line of 1/8" copper tubing. The same thing will work for a TR-6.

The take-off point is the connection for the oil pressure line just behind the fuel pump. A tee fitting is used to connect the extra line.

The connection at the cylinder head is the plug at the left rear corner.

The easiest type of fittings to use are the compression fittings mentioned in the preceding article on repairing the oil pressure line. However, for safety sake (or "insurance") I'd

suggest threaded fittings. If in doubt what fittings you will need, just take the plug from the head and the fitting in the block at the oil pressure line to the parts store and let them find the fittings you will need.

Oh yes, I forgot the cam lobes and followers. They are lubricated by the oil that has passed thru the rockers and is running down over them on its way back to the sump. The followers can be checked if the rocker system and push rods are removed. A cam check requires considerably more work and skill (call me if you need help). ABOVE ALL, USE DETERGENT OIL!

Also a lesson learned here is to check reproduction shafts for hardness before installing."

CYLINDER HEAD AND MANIFOLD INTERCHANGES

Skill Level B/C

Give your late model higher compression and more power, or add real duals to your early model, or... You mathematicians can probably come up with more possible combinations here than a punk rocker can find colors of eyeshadows, but here's what does and doesn't fit. Incidentally, this was learned as the result of a cooked engine and head on our TR-6 engined TVR. Remember kids - putting a TR-6 engine in a TVR is like putting Victoria Principal between Jerry Falwells' sheets.

1. Either head can be used on either block.
2. Head gasket must match block (early/early or late/late.
3. Either exhaust manifold will fit either head. Surprise!
4. The manifold gasket and intake manifold must match the head. It appears possible to use the late manifold (which I

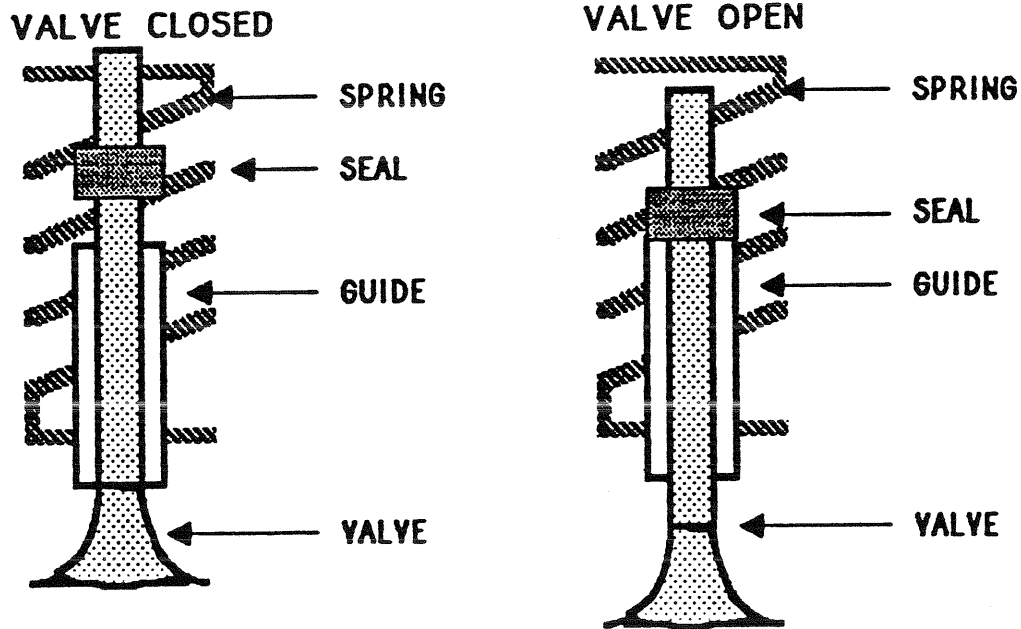
suspect has better flow) on an early head but the porting work is beyond the capability of most of us.

5. The pushrods, rocker shaft, and rockers are the same but the rocker adjustment screws aren't (trust me, I broke a rocker on a shaved early head/late block combo). Match the screws to the head !

For a real rocket try the early head shaved .050" with the late exhaust manifold, 8 degrees ignition advance, and pre '72 carbs. The TVR went like hell for 300 feet until it overheated again. Those creeps in Blackpool never did figure out the radiator couldn't be a foot below the water pump.

THE BLUE CLOUD, THE SIGN OF VALVE GUIDE WEAR & WHAT TO DO

When you let off the gas and brake reasonably hard, then accelerate again, and your TR 6 puts out a cloud of blue smoke you have worn valve guides. Aside from the embarrassing smoke, you really aren't a candidate for a major engine overhaul unless the smoke is pretty bad. There are other causes of smoking, of course, like bad rings, but these cause more constant smoking. TR 6s don't have seals on the valve guides like most cars do. These seals are usually little rubber rings on the valve stem that come down against the end of the valve guide when the valve opens. They keep oil from being sucked down the valve stem into the cylinder. This suction is especially high when the throttle is closed and the reason the blue cloud occurs then. With any appreciable wear in the valve guide a fair amount of oil is sucked in. It is not burned but is largely vaporized, thus the cloud. The best sign of when you need to do something is given by the spark plugs. Excessive oil usually shows up as a heavy white/gray chalky deposit on the plugs at abnormally low miles (like 2000-3000 miles) with the accompanying rough running. If you are going to do a valve job or have one done be sure to use valve guide seals from a Chevy V-8 (or most any engine with the same size valve stems). These seals are usually available separate from a complete gasket set.



EASY VALVE GUIDE REPLACEMENT

SKILL LEVEL B

One of the things you can do to save a few bucks on a valve job is to replace your own valve guides. Usually you have the machinist install new guides and then ream them to the proper inside diameter. This is no longer necessary and the job is a lot easier than you think. The valve guides are just pressed into the head and can be driven out. The trick is that to drive them out easily and to install the new guides you must have a stepped tool which has a pilot shaft the diameter of the inside of the guide, a body diameter slightly less than the outside diameter of the guide, and a larger upper shaft on which you pound.

Two things make this job easy and save you some bucks. First, The Roadster Factory has valve guides which do not have to be reamed - they are the correct size to start. Second, is a valve guide driver set from K-D Tools, part # 812. It costs about \$20 and has 3 drivers (I think you can even buy the TR 6 size separately). It should be available at any parts store serving the auto trade. Make sure you measure the height above the head of your old guides first for reference and try freezing your new guides to make them easy to install.

RAISING YOUR OIL PRESSURE AND CHECKING BEARING CONDITION

Skill Level D

Just forward of the oil filter on the drivers side of the engine there is what appears to be a large nut about 1" in diameter and 2" long. This is the oil pressure relieve valve assembly. Its purpose is to keep the oil pressure from becoming too high and to return unneeded oil to the sump. It does this when the pressure becomes great enough to compress the spring and let the piston off the seat in the engine block (see illustration). The excess oil is returned to the sump and the required oil continues to flow through distribution passages to the bearings, etc.

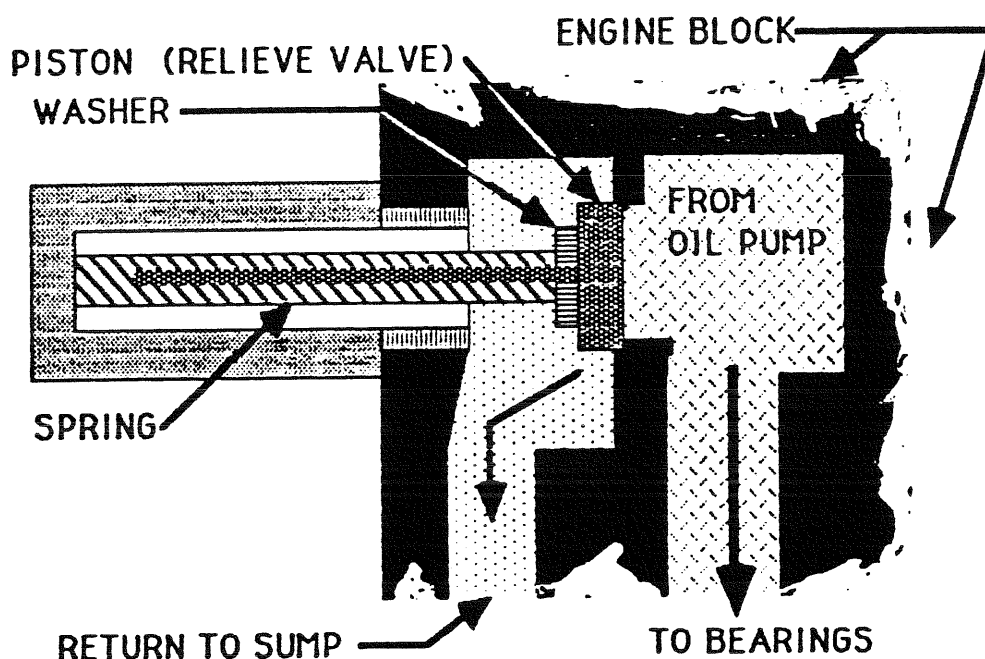
A problem can arise with the spring that will lower your oil pressure and cause needed oil to be returned to the sump when engine speed is high. The springs are just cut from a continuous coil rather than being individual springs. A very small difference in length can make a considerable difference in pressure exerted by the spring and this appears to be the case with many. You can be damn sure these springs aren't calibrated.

To correct this problem simply place a number 10 flat washer between the head of the piston (valve) and the spring to insure the spring is compressed enough. However, if one washer is good that doesn't mean two is better. You must be sure you're not raising the pressure too much. It is highly unlikely that your pump is strong enough to put out enough pressure to really harm anything (over 100 P.S.I.) but it could happen.

To determine if you have a relief valve problem or a worn out engine do the following. Use 20-50 oil. Thoroughly warm up the engine by driving about 20 miles at highway speeds (35 or 40 in winter). Observe the oil pressure at 60 to 70 MPH. If the pressure is below 50 to 55 P.S.I. you have a relief valve problem or worn bearings. Stop and let the engine idle. If your engine is in good condition the oil pressure should be about 25 P.S.I. If it is appreciably lower you have excess bearing and/or crankshaft clearances but it still won't hurt to try this.

Remove the body and the valve assembly being careful not to lose the sealing washer. Install the No. 10 washer as shown and reinstall the assembly. Start the engine. If the pressure is above 25 or 30 P.S.I. when hot, gas the engine a few times and observe the pressure at about 2500 to 3000 RPM. If it exceeds 75 P.S.I. with the engine thoroughly hot you should remove the washer or use a thinner one. Try it on the road. If you haven't gained any pressure you can try another washer but you are probably wasting your time and risking too much pressure when cold.

It has been my observation with TR 6 engines that the oil pump can only produce about 60 to 75 P.S.I. at 70 MPH when the oil is hot and that most relief valves do open some at higher speeds.



DON'T RAISE YOUR OIL PRESSURE AND DROP YOUR TEMPERATURE

All Skill Levels

The oil pressure part of this is not directly applicable to TR 6s because they have an oil return passage on which the pressure relief valve works (see the preceding article). But it probably applies to some of the older cars many of you have in which the oil pressure regulator (note this does not say relief valve) was integral to the only passage from the oil pump to the bearings. The cool running part applies to any car.

The concept of engines running cool with lots of oil pressure is a carry over from the "good old days" when non-detergent oil and alcohol antifreeze were in common use. These ideas die hard and some people still think this way. The concept was very true back in the 40s and 50s because those old oils thinned and broke down quite rapidly with increasing temperature. Alcohol antifreeze, of course, boiled off at relatively low temperatures. Today's multi-viscosity detergent oils thrive at temperatures of 250° and more. In fact, at lower temperatures they absorb condensation which forms harmful acids in the oil. Modern antifreezes also do quite well at elevated temperatures.

A common way to raise oil pressure is by placing washers behind the oil pressure regulator spring. The idea is that with lots of pressure oil will be forced into all the tiny parts in great quantities. Well, 'taint so. Who says? Good old Bernoulli. Bernoulli's principal of physics says, in effect, "where the pressure is high, the velocity and volume are low, and vice versa". So, what you are doing by raising the pressure is making it more difficult for the pump to push oil through the regulator, thus lowering the quantity of oil delivered to the bearings. Theoretically you could have huge oil passages through which great amounts of oil could flow without impedance and the pressure would only be, say 20 P.S.I. On the other hand, if you close the passage down to 1/4", the pump will

be pushing like mad in a vain attempt to supply large amounts of oil and the pressure would be very high. You don't believe it ? Well, consider this: Most Rolls-Royces prior to 1960 or so run 20 P.S.I. on the road and 4 P.S.I. or less at idle. When was the last time you saw one of them with fried bearings ?

Regarding temperature, use antifreeze year round, and remember that it not only prevents freezing, but prevents boiling to some extent.

A good rule of thumb for any engine is that half a gauge of oil pressure at road speed is safe and that a full shot of antifreeze will let you get by with 250⁰ f.

ALWAYS USE TWO MANIFOLD GASKETS

Skill level C

If your TR 6 has suddenly taken to idling fast or seems to have a miss on a cylinder or two that show good compression and good spark, you may well have a blown manifold gasket. TR 6s are very prone to this. To change the gaskets don't disassemble the carbs, etc. Just take the heater hoses off the manifold, disconnect the throttle at the lever near the firewall, and disconnect the brake booster hose. Remove the manifold bolts and the manifolds will pull back out of the way. A 6" and a 3" extension together are just right for getting under the manifold. When reinstalling those clamps under the manifold use a mirror and flashlight to check their position.

To prevent the problem simply use two manifold gaskets with the asbestos faces against each other. Torque the bolts, then retorque after the engine is hot, and again a day or two later.

**CARBURETTORS,
FUEL SYSTEM,
AND EMISSION
SYSTEM**

**MODIFICATIONS AND
REPLACEMENTS FOR THE
ZENITH - STROMBERG CD
CARBURETTORS ON TRIUMPH
TR-250 AND TR-6**

MODIFICATIONS TO MAKE YOUR ZENITH STROMBERGS WORK

NOTE: Federal law prohibits the modification of engine fuel and emission control systems. Therefore the following article is for informational purposes only for those persons wishing to use their cars on private property only. Otherwise, Big Brother will get us both.

The carbs on your TR-6 are basically a good design and reasonably dependable. The reason they don't work too well too long is due to the changes required to meet the dictates of the clean air freaks. The problems of being unable to adjust them revolve about the Big Brother Mandate to make cars non-adjustable.

"But", you say, "the late (72-76) cars are adjustable". "The better to fool you with my dear" to quote a big toothed guy from another fairy tale. The range of adjustment is not broad enough to be of much help on new carbs let alone ones with worn jets and needles. The reason true fixes are so hard is because the Brits really did their homework for once. No cheap and dirty fix was made to meet the emission requirements. At first glance you'd swear you could just take the adjustable jets and the air valves out of a TR-4 Stromberg. However, you'll find the jet doesn't screw in far enough and the air valve (or piston as I call them) is a different length. Some models, such as those on Mercedes even mount different.

First, you should be familiar with the carbs, or at least read up on everything you can find in back issues of the 6-PACK newsletters and in the manuals available. Haynes puts out one that will do as a guide as does Interauto. I believe both are available from The Roadster Factory, at parts stores, and from Motorbooks, Minneapolis, Minn.

What is proposed below is actually several options or combinations. Which one is best for you depends on your skills and budget and on whether you are looking for a minimum cost and labor fix or looking for the ultimate in adjustment. I'll go into the pros and cons of each at the end. Briefly the options are:

1. Modify your early or late carbs to use adjustable jets from TR-4 or Volvo 175 CD carbs.
2. Replace your carbs with TR4 or Volvo carbs.
3. Replace the needles and fixed jets within your carbs with new needles of the same type and remake the jets (new not available).
4. Replace your carbs with H6 or HS6 SU carbs from a TR-3, TR4, or Volvo.

Within these choices are several sub-options related to various needles and jets used on your carb or the used carbs you purchase.

1. Modify your carbs to adjustable jets.

For this modification you will need a set of pre-1968 Stromberg 175 CD carbs. These may be somewhat hard to find and the price will vary from free to \$50 or more. With the exception of the jet assembly (the only part we'll use), the condition is not important. You will also need new needles, (more on needle selection later) new .100" jets (the stock TR-4 jet) for the jet assembly, and a major rebuild kit for the TR-6 carb. Unless the TR-6 kit contains the 'O' rings for the jet orifice and the jet adjusting screw, you will also need a rebuild kit for a TR-4. The TR-6 kit I got from Beck-Arnley didn't have them but a kit someone gave me made by Techlit Co. (*350-487-1) has everything you'll need. Unfortunately, I can't tell you where to get the latter but I believe The Roadster Factory carries them. Another source for these 'O' rings and others is your local industrial bearing supplier listed in the yellow pages. However, you must insist on ones made of NITRILE or BUNA-NITRILE or other materials impervious to fuel including alcohol since some fuels and additives contain alcohol. Sizes are 114 and 011. If in doubt, spring for a TR-4 carb kit.

First, remove the air valve, diaphragm, and cover assembly chamber from the TR-4 carb and unscrew the entire jet assembly from the carb body. Disassemble the jet assembly for rebuilding later. See Illustration 1.

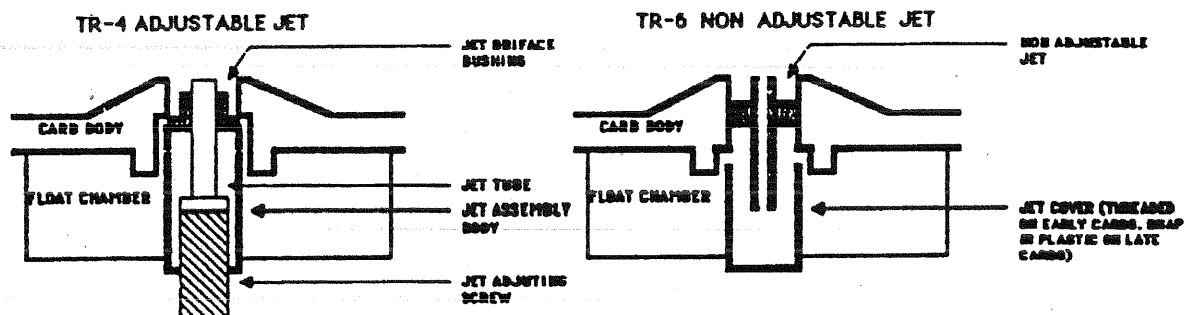


Illustration 1

Remove the air valve, diaphragm and cover assembly and the float chamber, float, etc. from your TR-6 carbs. Notice the void where the adjustable jet was in the TR-4 carb. The TR-6 carb has a pressed in fixed jet here which can not be moved up and down. Drive out this jet with a punch. In the adjustable TR-4 carb the jet moves in relation to the tapered needle to adjust fuel volume by closing or enlarging the jet opening around the needle. If you compare the carbs you'll see the threaded portion of the holes are identical. However, the depth of recess in the TR-6 carb body is about $5/16"$ less than in the TR-4 carb. This, coincidentally, is about the thickness of the TR-4 jet orifice bushing. We are going to remove this amount of material from the TR-6 carb body so that it will accept the adjustable TR-4 jet. Disassemble the TR-6 carbs as much as possible to facilitate the machining and to avoid damage.

You are now ready for the machine shop work.

To modify the carb body as shown in Illustration #2 you will need to find a machine shop with a vertical mill and having a $3/4"$ counterbore with a $3/8"$ pilot. (A tool to cut flat ends in holes). It is possible to do the job with a GOOD drill press if it does not have too much "run-out" (oscillation off true rotation). The $3/4"$ hole can also be deepened with an end milling cutter, a tool a machine shop is more likely to have.

Counter bore jet well with a bit bigger than the jet and centering washer , but small enough to not remove any threaded material (3/4" dia or less). Counter bore must be 0.290"-0.295" deeper than factory depth of jet well. Needle bore must stay at 0.375" for adjustable needles, and opened up to 0.400" for fixed needles.

Clamp the carb body on the work table upside down. The work surface and the bore must be perpendicular. The top of the body is true perpendicular to the bore. The .375" hole must be aligned with the pilot on the counterbore. Remove .290" to .295" from the flat face of the main bore. The chamfered edge is not relevant. If for any reason you want to experiment with fixed needles, the .375 hole should be enlarged to .400".

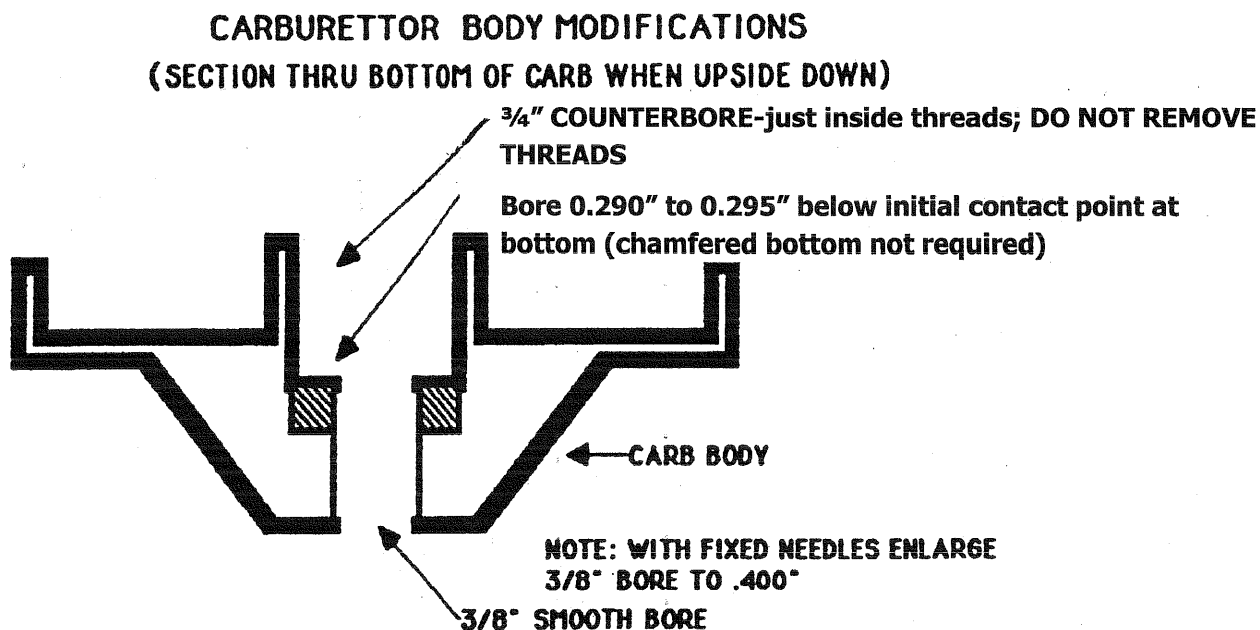


Illustration 2

If you are using the stock needle assembly, you merely need to slip in the rebuilt adjustable TR-4 jet assembly (see Illustration 3) including the jet orifice bushing and its washer and you're in business except for adjustment. Start the adjustment by bringing the jet flush with the bridge and back down 3 turns. Follow the procedure in the TR-4 manuals for checking adjustment. Unless your carbs are in pretty fair condition (low miles and gaskets, etc. recently replaced) I'd at least replace the float needles (don't forget to adjust), the bowl gaskets from a TR-6 kit and the diaphragms from a TR-6. It is also advisable to replace the TR-4 jet (Roadster Factory has them) and the tiny 'O' ring jet seal in the base of the jet orifice bushing and the 'O' ring at the base of the adjustment screw. Obviously the more extensive the rebuild the better the carbs will work. Such things as cleaning the temperature compensator, etc. are very important. On high mile cars, even rebushing the bodies and installing new throttle shafts and seals may be needed.

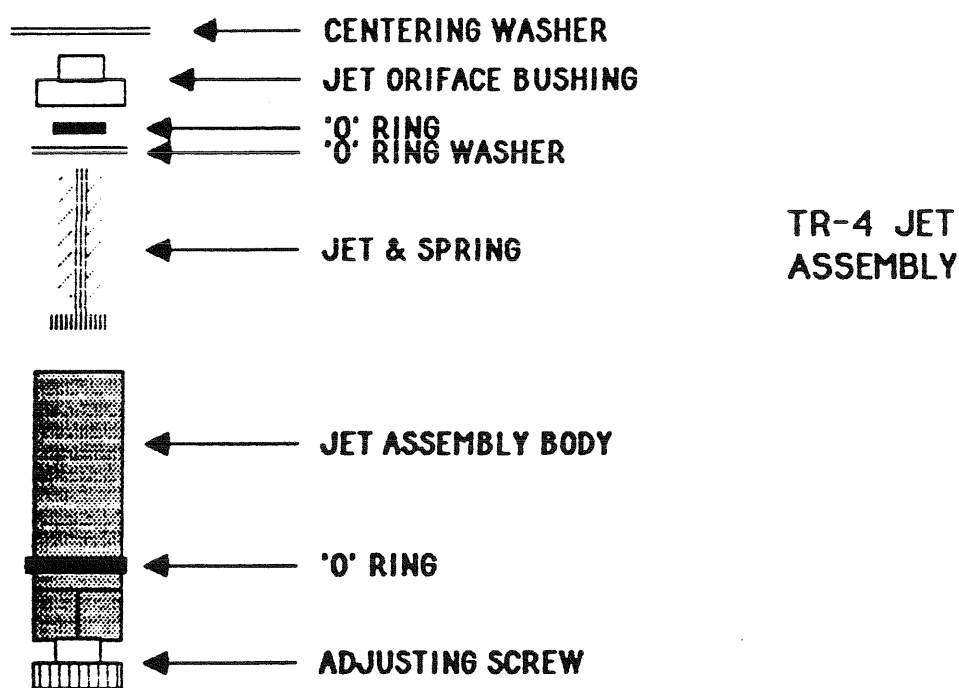


Illustration 3

Replace the TR-6 needles regardless. With the early non-adjustable type, install the flat shoulder of the needle flush with the face of the air valve. With the late type, adjust all the way down in the lean position as per the manuals.

Let's back up here and go into the needles a little bit. In the early non-adjustable carbs the needle was richer than in the late carbs. Emission standards were lower and not so hard to meet with an engine which had been designed many years before Rachel Carson ever thought about writing "Silent Spring" and when the price of oil was about \$10 a barrel. The later needles were a best attempt to meet the clean air standards without engine mods which would break a "little" outfit like British Leyland. Therefore you may want to consider using the early needles regardless of the model carbs you have. Personally, I recommend them but modifications are needed.

The early non-adjustable needle body has an outside diameter (O.D.) of .246" to fit a bore in the air valve of .250". The late needle incorporates the adjustment feature so the air valve bore must be larger to accomodate the extra parts involved. The O.D. of the later needle body is .309". With the early needle there is a small lock screw recessed deeply in the side of the air valve near the bottom which simply holds the needle in place. With the late needle what appears to be a lock screw is actually only a locating screw which fits into a slot in the needle body. This screw keeps the body from turning but allows the threaded inner adjusting screw to move the needle up and down a few turns. The adjusting screw is turned by a special tool having an allen head (hex head). This tool is available from The Roadster Factory. There is also an 'O' ring seal in this little mess because the bore must go all the way into the oil reservoir in order to have a way to turn the needle. So, if you can't keep oil in the tops of your carbs this is the problem and the 'O' ring should be replaced. Contrary to some articles I've seen in parts suppliers newsletters this whole assembly is not hard to get apart and install a new 'O' ring.

To use the early needle in the late air piston it is necessary to have a brass bushing put in the bottom to reduce the hole from .309" to .248" -.250". The hole for the locating screw should be drilled all the way through to the center bore and tapped to the same thread as the screw. You will need to put the needle adjusting screw with its 'O' ring back in to keep the oil from running down the needle.

If you're really into this thing and want to experiment with the older needles, of which there are literally hundreds of types, you will have to bush the air valve bore down to .123"-.125" to hold the .121"-.122" needle and increase the .375" bore in the carb body to .400" to allow for centering room for the jet on the fixed needle.

2. Replace your carbs with TR-4, Volvo, or other pre-1968 175CD Strombergs

TR-4s, Volvos, and some other cars including Jags used Strombergs for a short period. I think this was because S.U.s couldn't make the emission levels or due to the corporate infighting when British-Leyland and Standard-Triumph merged. Either way, since they weren't used long they are a little hard to find. When you do find them, they are usually cheap but many times have considerable wear on the throttle shafts and the body where the shaft goes through. The body can be bored out and have a bushing pressed in, however, and new shafts are available.

You can use these carbs in stock TR-4 form if you wish. However, the needles are set up for a 2.2 litre engine so, to oversimplify the problem, you'll be running too lean at higher RPMs. This is easily corrected by using TR-6 needles. It appears that the early TR-6 needles can be removed from the spring loaded piece in which they float and be placed directly in an unaltered TR-4 air valve. I have never actually done this but it is obviously the best bet. To use the floating adjustable or non-adjustable needles, however, you will have to have the needle bores in the TR-4 carb air valves reamed out to the proper size (.248"-.250" for early non-adjustable needles and

.310" for the adjustable needle). It should be noted that the TR-6 needles can not be adjusted in the TR-4 air valve and that the early needle has a richer profile over most of the range than the late needle. Set the flat shoulder of the needle, not the body, flush with the face of the air valve. The air valves and suction chambers are not interchangeable with the TR-6 carbs, nor is the diaphragm. The above is the only internal modification needed.

You should totally rebuild the TR-4 jet assembly and install it prior to removing the TR-4 needle if you are going to use the floating TR-6 needles. Run it all the way up to the bridge of the carb and center the jet on the needle. This is necessary because centering the jet on the floating TR-6 needle is difficult. An alternative here is to carefully place a piece of shim stock around the jet oriface bushing to hold it snugly centered in the bore of the carb body.

The TR-4 carbs will bolt right up to your manifold on exactly the same centers as the TR-6 carbs. This allows use of the TR-4 choke linkage between carbs as is. However the TR-4 used only one choke cable that ran through a rather convoluted course to the front carb. It came up through the choke lever and the end was clamped in a tab cast in the carb body just below the suction chamber. You can simply take one of the choke cable supports off the TR-6 carbs and mount it on the tab. Slip the end of the choke cable thru the choke lever and secure it with a clamp like the one used on the heater cable (Roadster Factory parts #609123, trunnion, cable and #559980, screw, securing). The only real work here is adapting the longer connecting shaft between the TR-4 carbs to the TR-6 lever. You can simply cut two pieces off the TR-4 shaft and braze them on the ends of the TR-6 shaft. However, the TR-4 carbs open in the opposite direction so you have a little manipulation to do here.

All other rebuilding and adjusting operations are straight TR-4 as per the manuals.

3. Replace the needles and jets in your carbs with new needles and remake the jets

Due to the floating nature of the needles, they apparently wear abnormally fast and also wear the jet. Actually, gasoline is abrasive and apparently the swirling action of the fuel laps them round and round resulting in rapid wear especially in the low speed area of the needle.

This option is at first glance pretty straight forward except for redoing the jet. However, the non-adjustable nature of the early needle makes it very tricky on those carbs. In theory at least, they must be set exactly as the originals. I've set the early needles all the way up per the competition manual and they've worked well for about 300,000 miles. On the other hand, the car is running about 11:1 compression and runs rich enough that it starts without choking if the temperature is over 25⁰ F. Gas mileage is about 24 MPG regardless of speed or traffic. Although it is difficult to gauge, try to set the early needle so the shoulder of the actual needle, not the needle body, is flush with the bottom of the air valve.

The jet is the difficult part, and if you have any doubts you can pull the following off, stop here and just give the carb a thorough rebuild. The jet upper diameter is .375" (3/8") and has a slight shoulder around its upper face. Use a punch which is very close to the diameter of the bore in the carb body (.375"), or better yet, a brass dowel with a squared off end to gently drive the jet down and out of the bore. Do not drive on the actual face with the jet orifice (see Illustration 4). Take the jet to a quality machine shop and tell them you want it reamed out to the inner diameter of the bottom and a brass sleeve or dowel inserted approximately the length of the present inner portion. This dowel must then be bored to EXACTLY .100" and the hole must be very accurately centered. A couple of thousandths oversize on the hole and you will have a mixture which is too rich. An alternate is to use some stainless steel tubing which I found being used in the medical and instrumentation fields. It is .120" outside diameter and .100" inside. This takes the

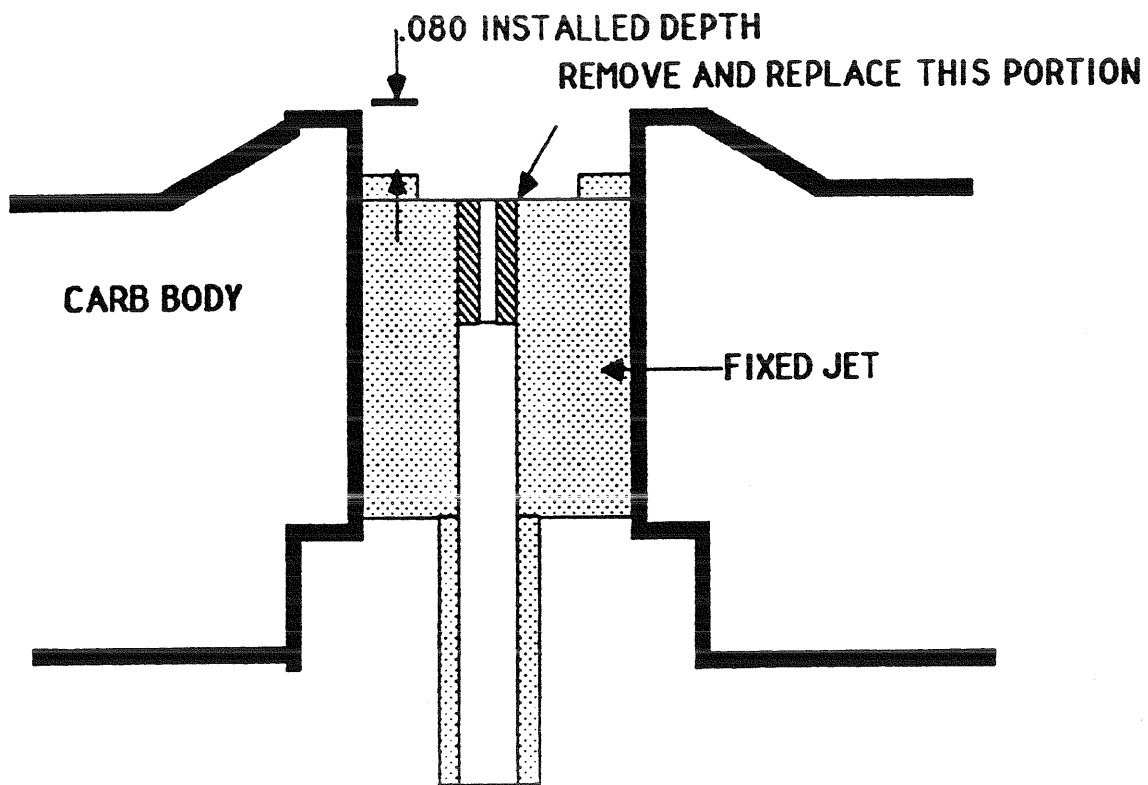
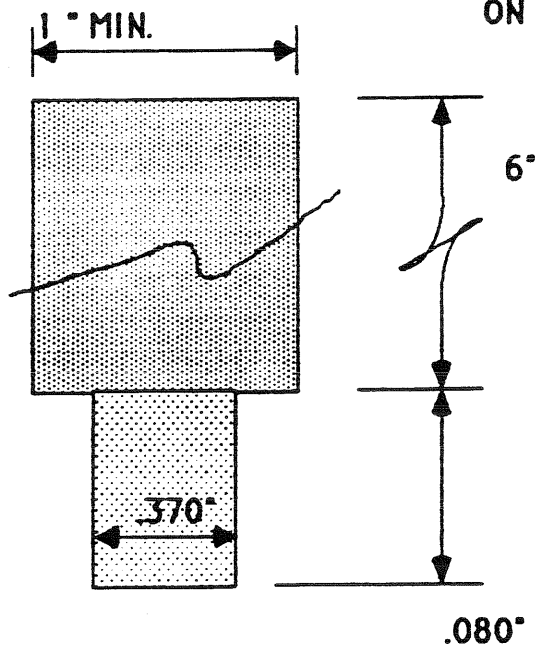


ILLUSTRATION 4

NOTE: VERTICAL
SCALE IS REDUCED
ON BOTH DRAWINGS



JET INSTALLATION TOOL

ILLUSTRATION 5

pressure off getting the hole precisely .100". How easy it is to find I don't know. You will need to make a tool as shown in Illustration 5 to install the jet. The installed depth to the upper shoulder of the jet is .080". Before removing the jet it might be advisable to have a machinist check the depth to the jet shoulder and have your tool made accordingly. To the best of my knowledge they are all the same but the Brits aren't known for consistency. To ease installation, place the jet overnight in your freezer to shrink it.

As with the other options, the more you do to rebuild the carb the better. This is especially true of the float needle, temperature compensator, and plugging the by pass valve.

4. Replace your carbs with SU H6 or HS6 carbs from a TR-3, TR-4, or Volvo

These carbs are everywhere. They (SUs, not HS6s) were virtually the only carbs used on British cars from the early 1930's. When you find them, they are usually cheap but many times have considerable wear on the throttle shafts and the body where the shaft goes through. The body can be bored out and have a bushing pressed in, however, and new shafts are available. Many people prefer them to Strombergs because they do not have the diaphragm in the suction chamber and are a little more basic (crude). Many sources offer them rebuilt exchange and in good working order. If you select this option, you might want to consider a rebuilt pair to start. You'll also need an SU shop manual.

You can use these carbs in stock form if you wish and many people do. However, the needles are set up for a 2.2 litre engine (2.0 for the Volvo). Even though they do have similar power curves, simply stated, you'll be running too lean at higher RPMs. This is easily corrected by using early TR-6 needles with the spring loaded body removed. The early TR-6 needles have an outside diameter (O.D.) of .121"-.122" and can be placed directly

In an unaltered SU suction piston (air valve in the Stromberg). This is obviously the best bet. Not so the late needle which has a larger OD. To use the floating adjustable or non-adjustable needles, you will have to have the needle bores in the SU carb pistons reamed out to the proper size (.248"-.250" for early non-adjustable needles and .310" for the adjustable needle). It also appears that to do this you will have to be damn careful or you'll go into the oil chamber. The only reason for using the floating needle would be because the SU jet is hard to center and still compress its crude cork gaskets enough to keep the jet from spinning and not adjusting. It should be noted that the early TR-6 needle has a richer profile over most of the range than the late needle. Set the flat shoulder of the needle, not the body, flush with the face of the suction piston. You may also have to experiment with piston return springs to prevent too rich or too lean of mixture on acceleration. There are hundreds of needles and many return springs around, so if your up to it you can play around with an infinite number of combinations.

Rebuild the SU by the manual being sure you soak the cork gaskets in CRC or other light oil for at least a day first.

For the throttle linkage, follow the instructions under the option for TR-4 Strombergs. The SU choke hookup is about as simple as anything can be, at least if your using TR-3 (and probably TR-4 carbs, but I don't have one to look at). One caution here though is that the choke return springs on SUs rarely pull the jet all the way up. So, you will need to not choke and grind away on the starter, run rich so it will start without choking, or get out and push the jet home each time you start the car.

Summary and recommendations

There you have it. No clear cut, bolt on miracles. Why didn't I mention Webers? Well, Webers are a logical choice if you want to spend the bucks. I'm not a purist but I'd bet a lot of you are, or will be when the cars get a little older, more valuable, and

competitive at car shows and the TRials. Even now the Strombergs available don't look quite like the originals. Getting Webers or new Strombergs and stashing the originals away in a warm dry place is also a possibility. However, I've tried to gear this to the guy or gal that is using his or her car frequently - not necessarily daily- and just wants it to run like a decent TR-6 should without spending a fortune.

Option 1, modifying your existing carbs, is my choice all around because the carbs look the same unless you put a mirror under the air cleaner. You can stop at just replacing the jet assembly with the TR-4 assembly if you like and finish the job later. The sub-option of early needles is my recommendation. - On the other hand, the late adjustable needles will enable you to make small mixture adjustments from above. You may have to do this because your carbs can now be set to optimum mixture. When the weather changes the mixture changes (cold air is denser therefore giving a leaner mixture). The new needles and TR-4 jets are almost a necessity if you are to get the full benefits - which should include more power. Counterboring the carb bodies costs me \$20 each in the Washington D.C. area where nobody can do anything mechanical and those that can charge accordingly.

I don't know if getting the TR-4 carbs will be too hard. It shouldn't be. That is the one thing I don't like about this option. It seems a shame to use just the jet assembly and toss the rest. Still, nobody seems to want TR-4s. I don't agree, I think they are real bargains. However, most people feel they are parts cars for TR-3s and TR-6s. Enough soul searching, let your conscience be your guide.

Rebuilding the entire carb will make a big difference by itself. Plug the by pass valve. Most of those tiny diaphragms are shot and they aren't in any of the kits. The temperature compensator and other improvements over the TR-4 Stromberg make a big difference which is another good thing about this option.

Option 2 has a couple of advantages - simpler carbs are easier to work on. This option probably has the third lowest end cost (either SUs or option 3 can be cheapest depending on the circumstances). If you are lucky and get a set of good carbs you will only have to put in the needles. You can also have someone do a straight forward rebuild on them and just use the TR-6 needles. If you don't do your own work, this will save some bucks but it will cost a bit to get the linkages fabricated and fitted.

There could still be some performance problems depending on weather (without the temperature compensator they slow way down in hot weather) and will require more frequent tuning. With the stock TR-4 needles, this is especially true.

Option 3 might be very attractive to you in part if you are not too skilled and have the later carbs. If you were only to change the needles, it requires a minimum of tools, skill, and money. You don't even have to take the carbs off. Also, you haven't really altered anything so the "screw-up factor" is eliminated. Many times this helps a lot where the needles have been backed out too far and no longer really adjust when turned, or where eliminating needle wear only is sufficient for a while. If you need to go further and are in an industrial area the machine work on the jets and the tool should probably cost \$20 and again is a fairly straight forward job. You don't have to go into the temperature compensator and all the confusing stuff on the sides of the carb. However, I can not overstress how close that .100" bore must be. For example some SU rebuild kits sold for MG TDs (1250 c.c. engine) in the '70s were the same ones the maker used for MGA (1500 to 1622 c.c.) and contained .100" jets instead of the .090" required for the TD. You could crank the jet all the way up and the TD usually still ran rich enough to foul plugs within a few low speed miles. That mere .010" was just far too much extra jet orifice area. Another thing to keep in mind is that The Roadster Factory may some day get new jets or have them made.

Option 4 gives you a whole new thing to learn. The SU may resemble the Stromberg in operation but working on them is a whole lot different. This has been tried by a few owners, and there was recently an article on TR-6 performance in one of those small struggling magazines on this and other TR-6 mods in which a shop in Florida claimed great things for their SU conversion. To the best of my knowledge, nobody has gone into changing the needles and the air piston springs and this is where you are most likely to run into trouble with this set up. I've told you how to take care of the needle problem, and to a degree, the spring from a TR-4 SU should work well since the amount of vacuum on the piston across most of the power range should be similar. Stiffer springs make the piston move slower, giving a richer mixture on acceleration. You can also play with the viscosity of the oil in the air piston damper- thicker oil make the piston move slower, thus giving a richer mixture on acceleration, and, conversely, thinner oil gives a leaner mixture. SUs are just about the simplest and most reliable carbs ever made. This simplicity does have a price, however. They can hardly be described as performance carbs and, as with the TR-4 Strombergs, they will run slower and rougher with increasing air temperatures and engine heat. Frequent adjustment is almost a given. The choke is one of the worst and the rubber washers on the float bowl mounting go hard, break, and leak if the car is rarely driven. There are many models and types in the 1 3/4" size - some with automatic chokes and other peculiarities so you need to know whence they came. If you are a novice and you want a carb that you can understand and work on this is your baby - just be sure they are off a TR-4. You may also notice your engine looks like something is missing since they are considerably smaller than the Strombergs. As with the TR-4 Strombergs, the linkage adjustment will add to the cost if you don't do it yourself.

ADDENDA TO ZENITH STROMBERG CARB MODIFICATIONS

ADDENDUM #1

Re. Option #3. New jets are available from Joe Curto, 230-22 58th Ave., Bayside, N.Y. 11364 at \$8 each.

ADDENDUM #2

PERTAINS TO ZENITH-STROMBERG SECTION ONLY

The replacement TR 4 jets now available from some (probably all) suppliers are, in my opinion, inferior and should be used only if the old jet is noticeably and severely worn. The replacement has a sharp top edge where the original has a chamfered edge. This sharp edge cuts the 'O' ring if the 'O' ring is placed between the oriface and the 'O' ring washer then the jet pushed thru (which is the proper way to insure 'O' ring seating). The replacement is two pieces, a shoulder and a tube, either pressed or cemented together. The tube is also .001" larger than very good stock old ones I have measured. In some instances the jet will bind in the jet oriface bushing making the jet non-adjustable. It is also possible for the shoulder to separate, again causing the jet to be unmoveable.

Obtain New Old Stock (NOS) needles or use good used ones initially (it is easy to change them and retune the carbs later). Replacement early TR 6 needles now available from most (all ?) suppliers are made by the same firm. I have used only one set (certainly not enough on which to base firm convictions) and feel the car does not perform as well as with reasonably good old needles. Again this can't be determined without some sophisticated test equipment so it is only my opinion.

Despite the above, the main objective, to have adjustable Strombergs, can be accomplished.

ADDENDUM # 3

The replacement of lean running emission system carburettors with adjustable carbs should increase power and smoothness but DECREASE gas mileage. To establish a normal cruising range for your car, it is advisable to fill the tank at not more than 200 miles for the first 1000 miles of operation.

TUNE UP

&

IGNITION

DISTRIBUTOR REBUILD

Skill Level C

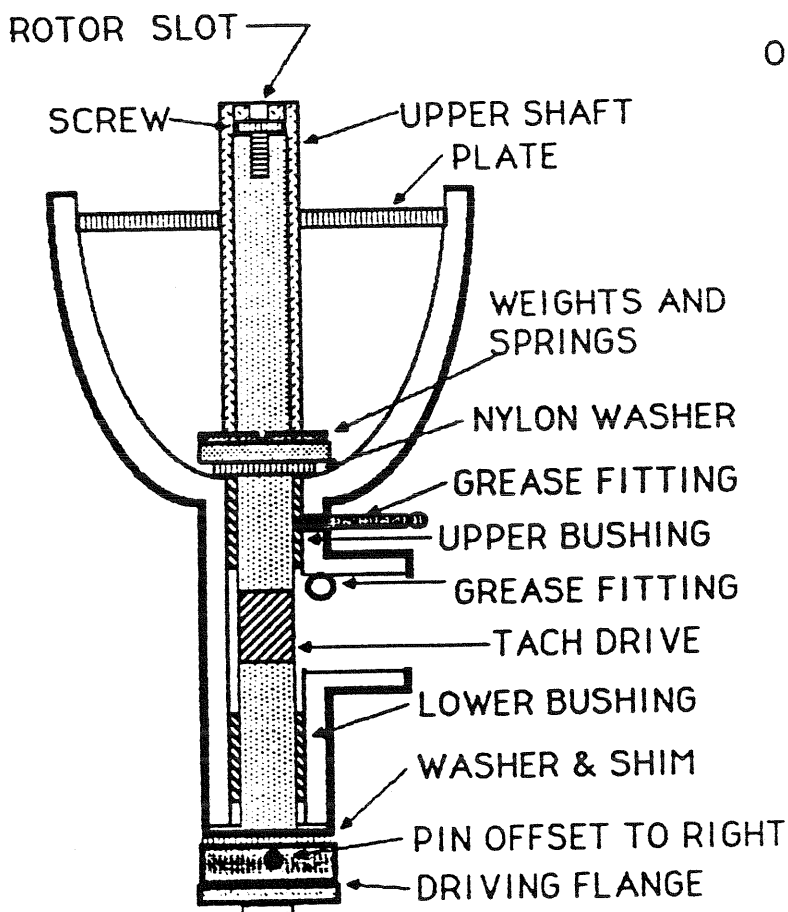
The lowly distributor is largely forgotten except for changing or setting points and the condensor. With cars that lead a normal 5 to 10 year life before crushing that is about all the distributor needs - even a Lucas unit. With many of our cars nearing the end of their second normal life of 100,000 miles, some of those distributors are getting pretty well had. There are basically three things that happen with high mileage that cause trouble in a TR distributor - (1) Wear in the bushings, especially the upper one, due to lack of lubrication, (2) binding of the upper shaft to the lower shaft, thus keeping the advance weights from working, again due to lack of lubrication, (3) the tach drive gear freezes up and strips due to -yep, Charlie, you guessed it, lack of lube. The weights will almost always be good. One spring will be larger and loose. It is supposed to be.

Now it seems easy enough to solve these problems. Just clean and oil the upper shaft and put in new bushings. After all, bushings are bushings and they come in all sizes (almost). However, the Joe Lucas factor enters into it. It is hard to believe that a manufacturer, even a British one, would go to the trouble to make special bushings that are a weird size - not normal inch or metric - but that is just what they've done. Additionally, you can't buy the bushings from Lucas. This leaves you to pay an outrageous price for a rebuilt distributor. Or, to have bushings custom machined. The latter makes sense since oilite bushings are about \$2 or less each. You will need two 3/4" x 3/8" bushings x 3/4" long. However, for the tach gear, you're out of luck for now since they are not available.

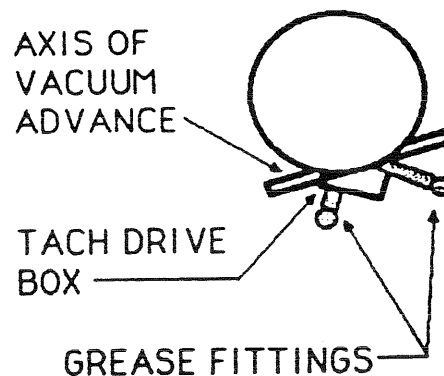
With the rotor pointing to number one ignition wire in the cap, remove the distributor. Disassemble your distributor using a manual and noting how it comes apart, especially the drive flange. It should be offset to the right when the rotor notch is facing you. Check you housing and shaft sizes to make sure

of the dimensions required for the new bushing. These should be .744" outside and .489" inside diameter. Once you have your new bushings made, put them in the freezer overnight to make them easier to install. Think ahead and have a driver with nearly .744" diameter and a squared off end to drive the bushings in. Once the new bushings are in, drill and tap the body for the 1/4" x 28 grease fittings shown. See the front and rear hub articles on where to get long grease fittings.

Now you're ready for reassembly, except for checking end play. Place the driving flange on the shaft and put the pin in just enough to fully align the hole. Use feeler gauges to check the gap between the bottom of the body and the flange. Shims are not available, but if you have enough wear to have a gap of .030" or more (a lot of wear) you can use a race from a Torrington radial needle bearing available from bearing suppliers. The best source I know of for thin shims is a shop handling electric motors for furnaces, etc. Play of .010" is good.



ORIENTATION OF FITTINGS
(TOP VIEW OF DISTRIBUTOR)



Replace the high tension lead from the coil and the terminal block (the plastic thing on the side next to the engine). These are cheap but nobody ever bothers to replace them. It is also a good idea to replace the ground wire (moving plate earthing lead in the manuals). This must be an ultra-fine very soft wire or it will break causing you no end of grief until you find the cause. The best source I know of is old auto supply stores. They will usually have a dusty box of them around which will be long enough for you to cut and solder to your plate. Don't discount these two wires as unimportant! Not that it will help much, but the weights, *54413922, are the same as E Type Jags.

ACCURATE SETTING OF IGNITION POINTS AND THE IGNITION TIMING

Skill Level C/D

Unless you are fortunate enough to have a Triumph expert in your area, you must take your chances on frequent maintenance like tune-ups with some jerk in a gas station. As your car gets older, you're going to have to do these things yourself. One of the first things the novice must learn to handle is ignition timing. This essentially is three jobs: (1) setting points (2) choosing, gapping, and installing spark plugs (3) setting timing. Use the manual for basic guidance augmented by the following.

The points must be set before the timing. Setting new points requires only a set of feeler gauges and a screwdriver. Setting used points requires a dwell meter, a simple device to use which costs about \$20, and is highly recommended for accuracy of setting point gap over your perhaps marginal skill with the feeler gauges. The only potential for screw up is the insulated bolt where the wires attach. This varies with the brand of points (some have a plastic bolt) but you need to be sure the wires do not touch the metal post but do touch the spring. The reason you need the dwell meter for used points is shown in Illustration 1 below. The deposit on one point causes a faulty gap reading with feeler gauges.

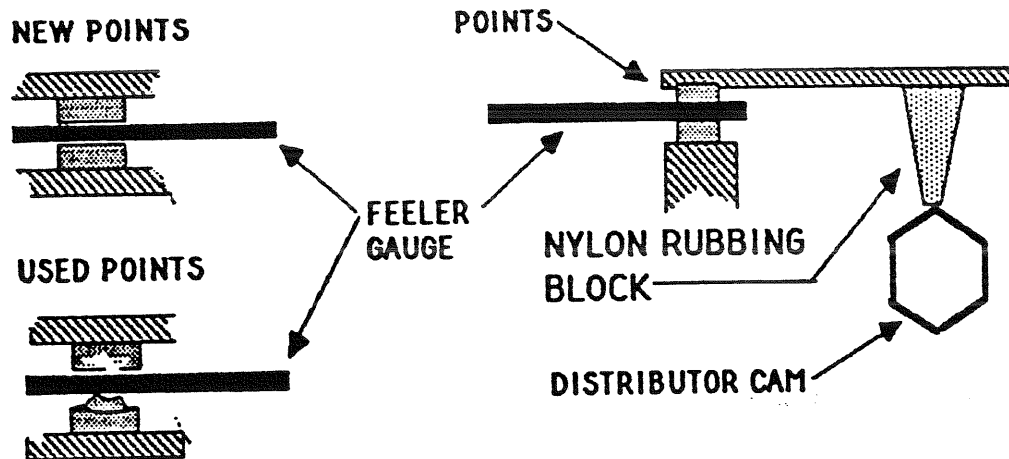
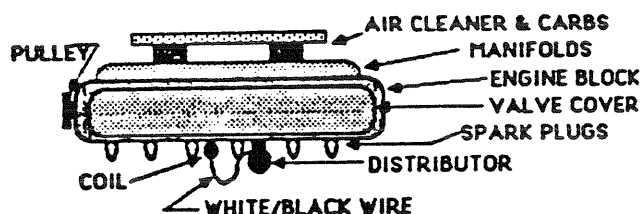


ILLUSTRATION 1

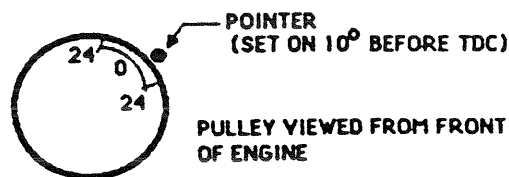
ILLUSTRATION 2

Turn the engine by hand (easy if the plugs are out) in the normal direction of rotation (this is necessary to offset stretch in timing chain) until the rubbing block and the cam are aligned on a point of the cam as shown in Illustration 2 above. Then set the points to a slight drag on the feeler gauges.

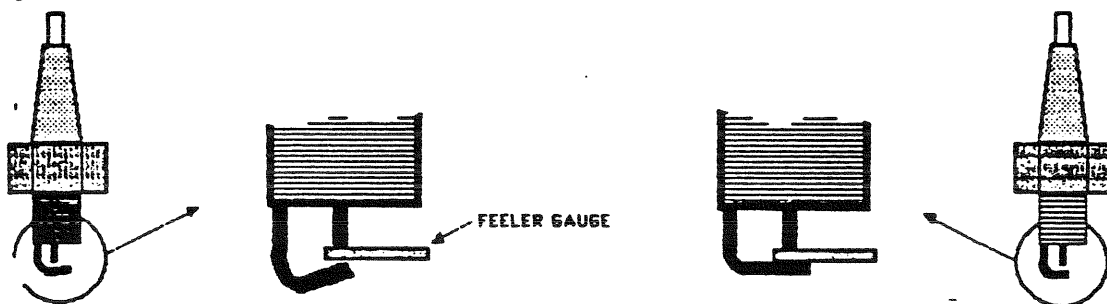
Next, again turn the engine in the proper direction until the timing pointer and the marks on the pulley are aligned to 10° Before top dead center. Attach one lead of a static (engine not running, as opposed to dynamic which means running) timing light to either end of the white/black wire from the coil to the side of the distributor and the other lead to a ground. An inexpensive static timing light can be made as shown in the following article. Loosen the pinch bolt at the base of the distributor and turn the distributor about 30° in the opposite direction to the rotation of the arrow on the rotor. Turn the ignition on. Turn in the direction of normal rotation until the light just goes on. Tighten the pinch bolt.



TOP OF ENGINE VIEWED FROM DRIVERS SIDE

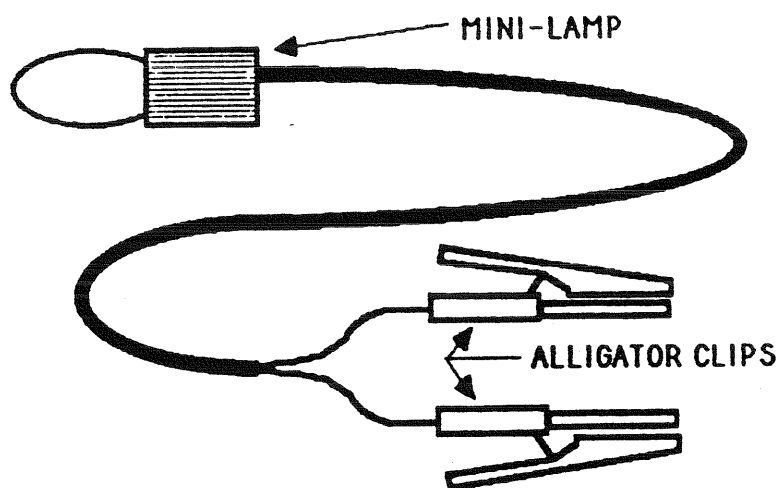


The correct plug for a US Specification TR 6 is Champion N-12-Y or YC, not N9Y which is for fuel injected cars. New plugs are not gapped to .025". Just bending the electrode (as shown on left) will result in an incorrect gap. Place a .020" or .022" feeler gauge between electrodes and tap the right side electrode until it is level (as at right). Then tap for final adjustment using a regular wire gapping gauge.



HOME MADE STATIC TIMING LIGHT FOR UNDER \$5

Skill Level D



A Radio Shack mini-lamp #272-1140, a section of speaker wire or other 2 conductor wire (preferably with a red and a black lead), and two alligator clips (one red, one black) from a Radio Shack test clip set # 270-374 are all you need.

**CLUTCH,
GEARBOX, &
OVERDRIVE**

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 solenoid 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.

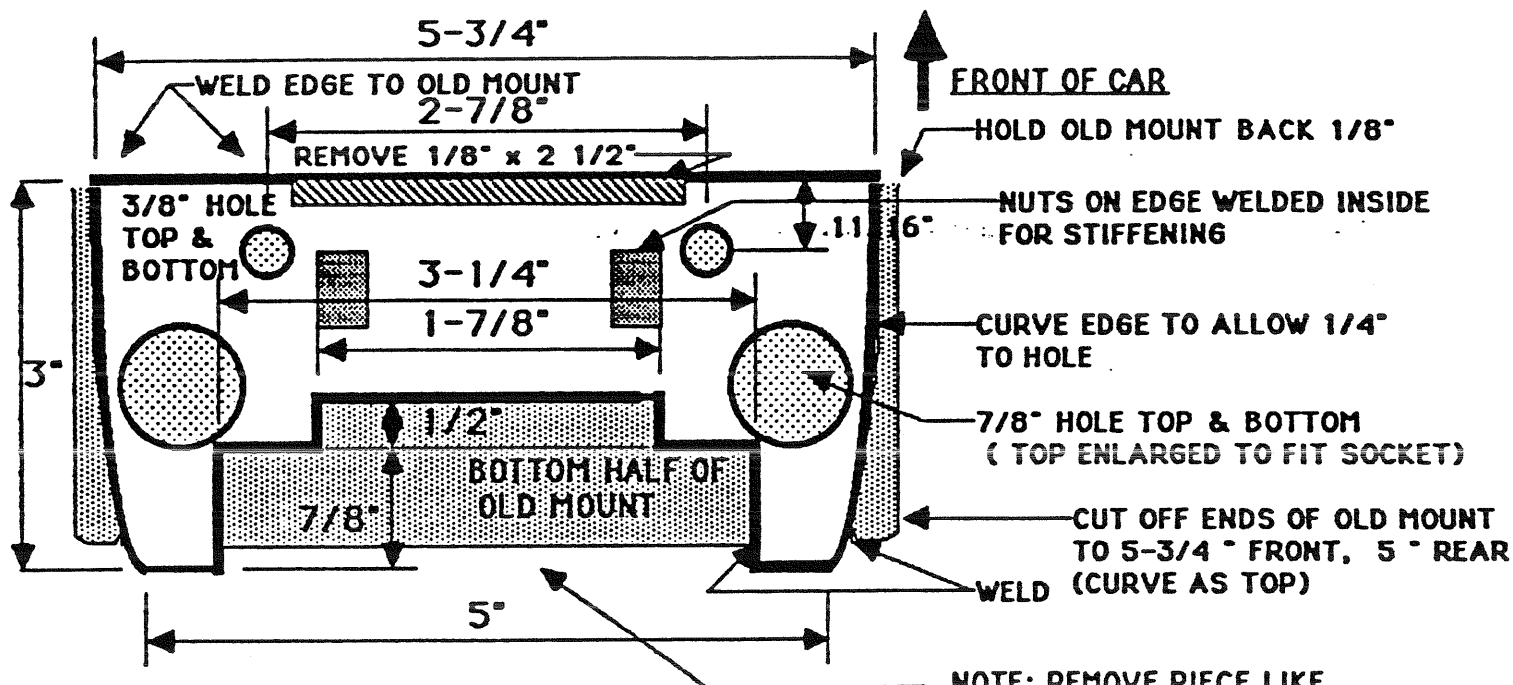
I realize the drawings leave something to be desired due to the limitations of the Macintosh computer, but I'm just not able to take the time or have the skill to do them by hand. The job is probably most easily approached by thinking of it as two jobs - the mount and the adapter. Also, cutting the various 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).

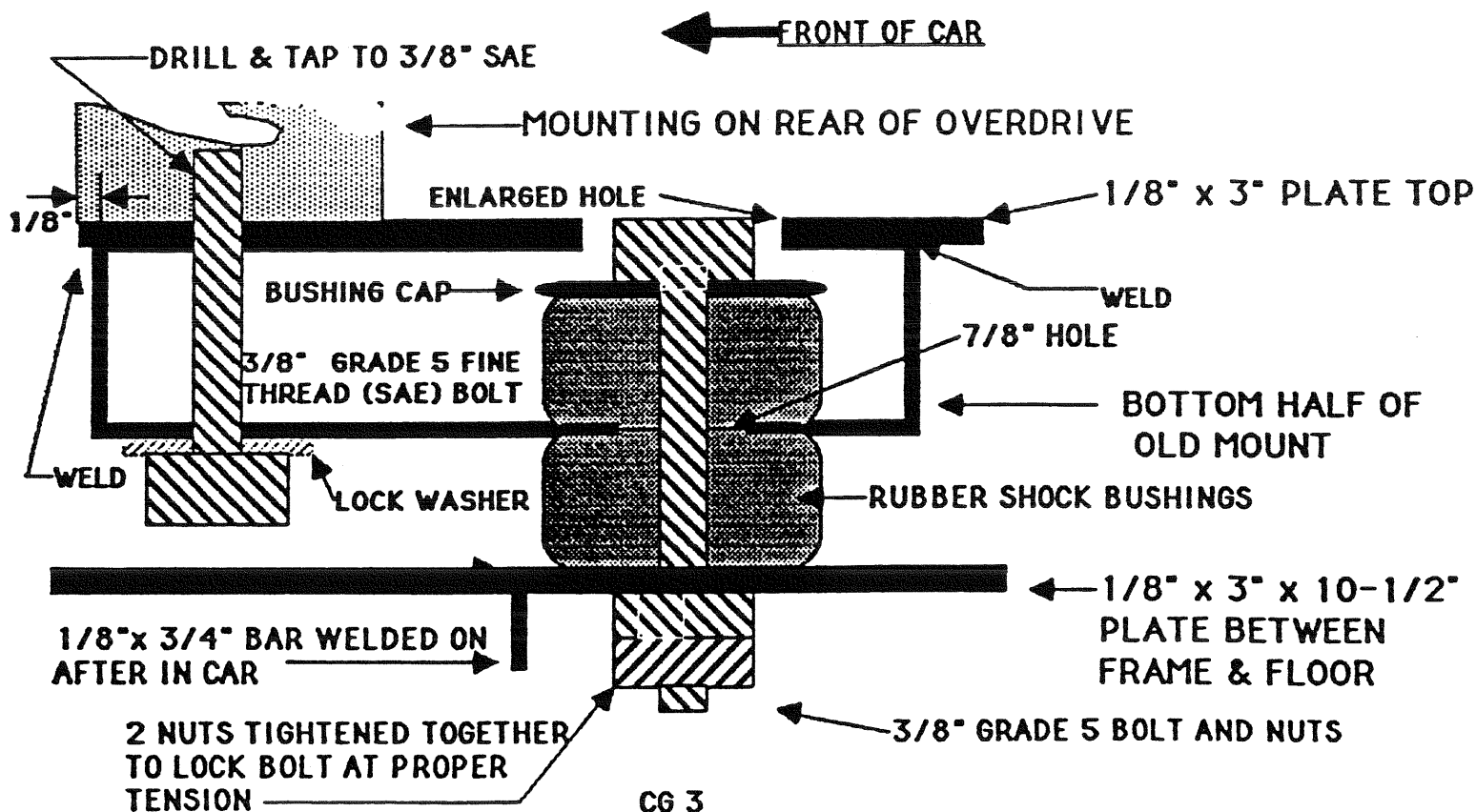
First let's make the mount. Take the old early type mount and separate the top and bottom halves if they aren't already separated. Cut, scrape, burn, or whatever the rubber off. Cut off the ends to roughly the dimensions shown or a little larger if you don't mind trimming later. Make the curved cut-out 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.

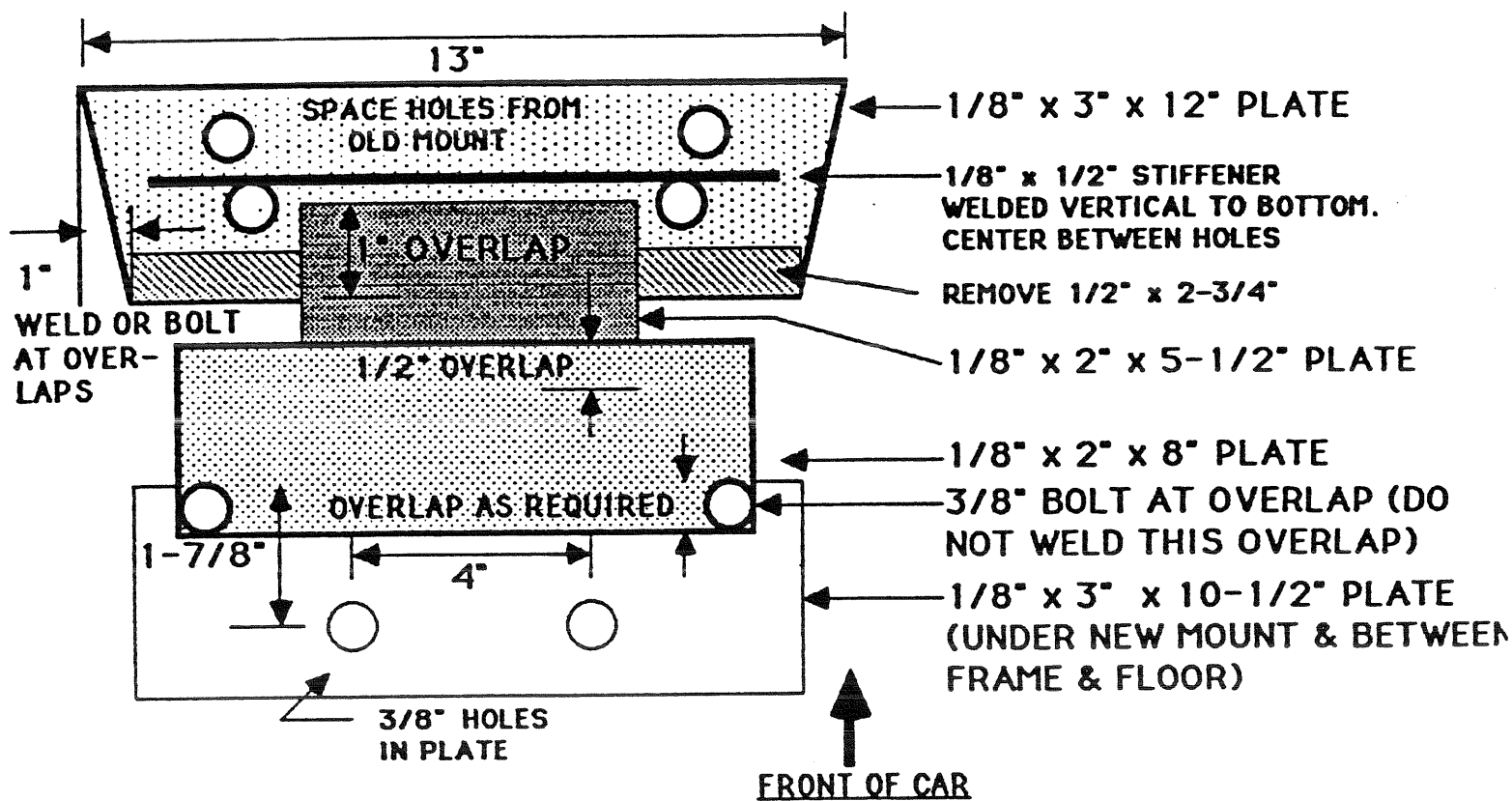
Now for the adaptor. If you wanted, you could just use the rearmost plate shown and weld it to the frame. However, the intent here is to make something you can bolt in. The 4 pieces of plate shown can be bolted together but it is easier to have the front 3 welded in a shop, then fit them to the rear 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

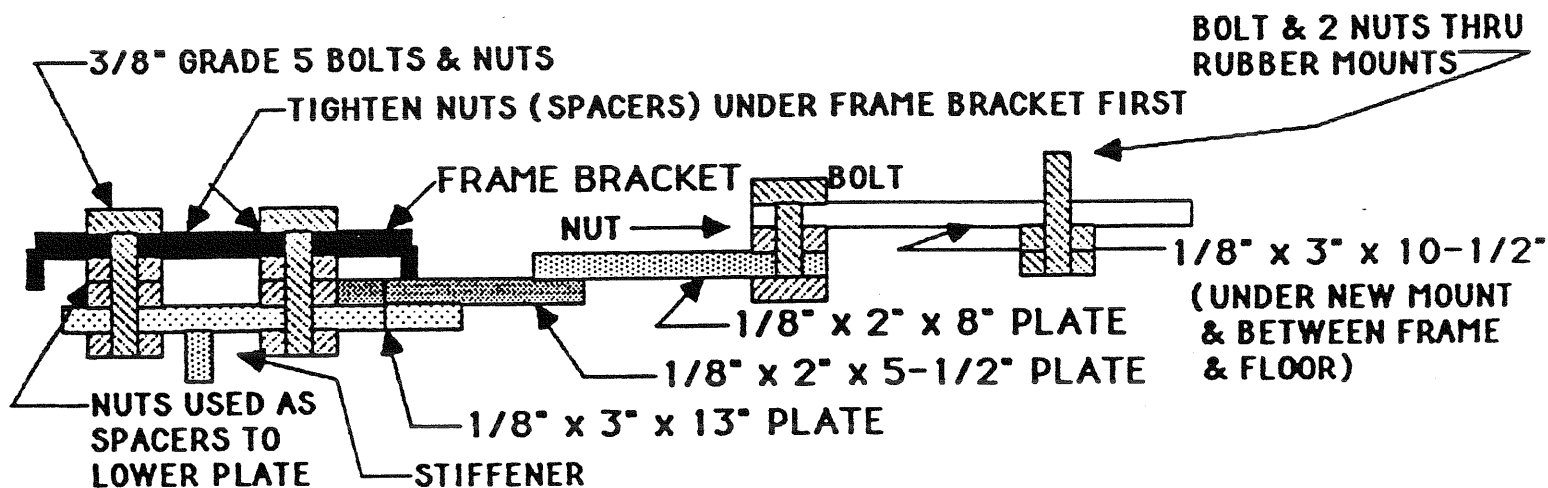
TOP VIEW ABOVE
ENLARGED SECTION BELOW





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 solenoid 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

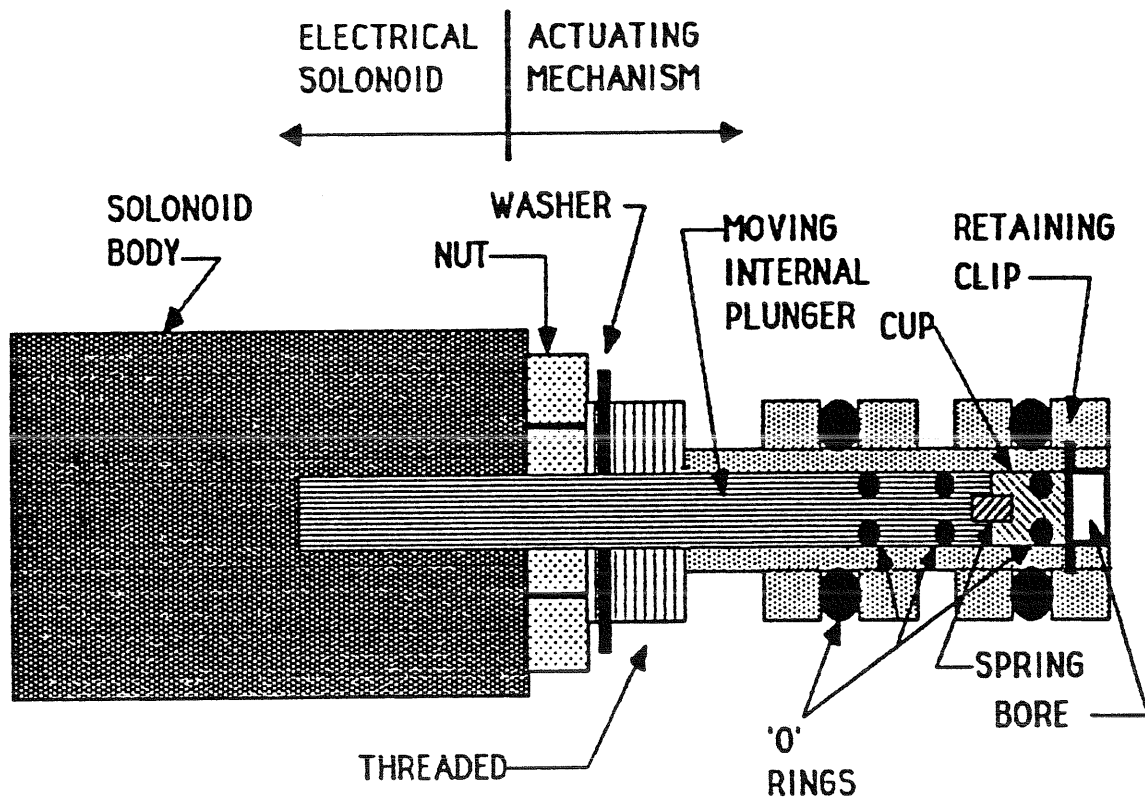
If your J Type overdrive isn't working, here's a cheap and relatively easy job that will probably bring it back to life.

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 solenoid. 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 solenoid and they're cheap. Wrong! Maybe other solenoids 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 suspect everything but the solenoid. 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 lose their elasticity and ability to seal. Of course Lucas only sells complete solenoids, 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 solenoid 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 solenoid. 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 solenoid 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 new disc above. Do you really think 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.

Do not 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 enough 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. Don't over tighten. 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 usually 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.

DIFFERENTIAL,

REAR AXLES,

AND

DRIVESHAFT

REAR HUBS - PROBABLY THE BIGGEST PROBLEM YOU WILL EVER FACE WITH YOUR TR-6

(Note: Although this job may be beyond the level of your skills and equipment, make sure you give this information to the person doing the work).

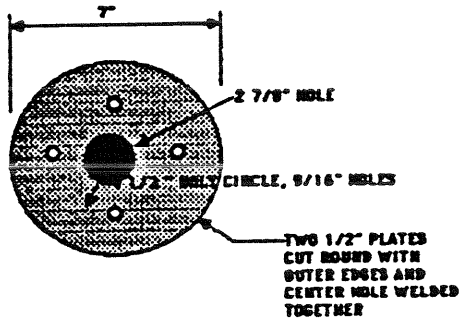
I don't wish to start off on a negative note, but I will tell you that as sure as Dolly Parton stands out in a crowd, the rear wheel bearings on your TR 6 will go dry and need replacing. I'll also tell you right off that the longer you ignore this problem the less chance you will have of successfully rebuilding your hubs. The importance of doing this job at an early date can not be overstated. The inner bearing has a relatively small contact area with the stub shaft. Unfortunately, it goes dry and the inner bearing race begins spinning on the stub shaft. If this happens the odds of saving the stub shaft become 50/50 at best.

If you look at a better cross sectional view of the hub assembly than the one below you will see that the hub has a tapered inner bore which is held in place on the stub shaft by a woodruff key and a nyloc nut. It looks like you could just loosen the nut and disassemble the whole mess. Ain't so Charley. I have put 30 tons of pressure on these things in a press and not been able to separate them. With the tool described below and shown in the illustration you have a chance (my average to date for rebuilds is about 60% success). Without it you've got a better chance of hitting the numbers. The "tool" is made from 3/4 inch or thicker plate steel (mine is two 1/2 inch plates liberally welded together). Its purpose is to stiffen the hub flange. Without it, the force required to separate the hub from the stub shaft will bend and destroy the hub - GUARANTEED.

You will also need a hub puller with 4 legs (most have 3, make sure you can get extra legs before you buy). Mine is a New Britain P99 purchased from a NAPA dealer. Again a negative

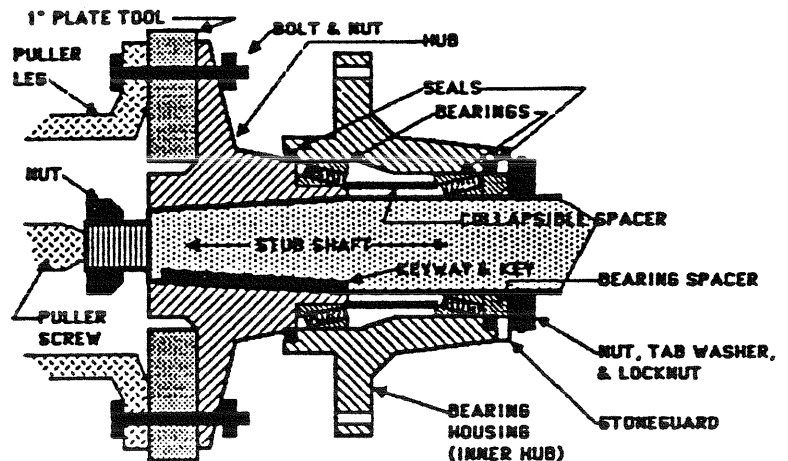
note - the puller may not be able to exert the force required, and you may need a press. The problem with a press is getting sufficient support under the hub due to its proximity to the bearing housing and the extreme pressure required.

TR 6 REAR HUB REMOVAL TOOL

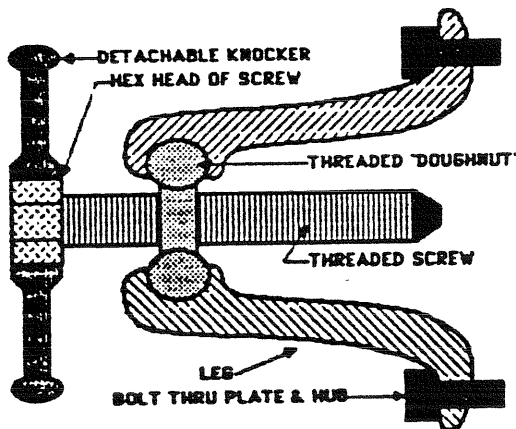


ADDITIONAL TOOLS REQUIRED ARE A 4 LEG HUB PULLER AND GRADE 8 BOLTS AND NUTS LONG ENOUGH TO GO THRU THE HUB FLANGE, THIS TOOL, AND THE HUB PULLER LEGS.

HUB ASSEMBLY WITH REMOVAL TOOLS



TYPICAL PULLER USED WITH PLATE



After all that, let's get on a positive note and start making the tool and disassembling the hub unit. The plate can be made from 1/2" base plates for steel building columns at a much lower cost than having it fabricated from sheet steel (look under structural steel in the yellow pages). The holes for the hub bolts must be drilled with a drill press. The center hole is

most easily made by drilling 1/4 inch holes nearly edge to edge on a circle slightly smaller than the finish diameter. The hole is then finished by carefully cutting the metal between holes away with a torch and then finishing and smoothing the edge by cutting with the torch or grinding with a heavy grinder.

Remove the axle assembly from the car. Remove the wire from one end of the rubber boot on the axle assembly and carefully separate the halves of the axle. Keep the splines covered and clean. Knock out the wheel studs. Remove the nyloc nut from the stub shaft and reverse the nut, turning the outer end down until flush with the end of the stub shaft. This will keep the tremendous pressure on the end of the spindle from mushrooming it (yes, there IS that much pressure). Using four 1/2 inch x 2 1/2 inch (or 3 inch) bolts with washers, attach the tool and hub puller to the hub assembly as shown. These bolts and nuts must be grade 8. Hardware store bolts are usually grade 2. Grade 5 can be found at most auto supplies and grade 8 at bolt and fastener suppliers or aircraft suppliers (again to the yellow pages). Lightly grease the washers. Snug down the bolts evenly so that the puller screw is centered on the stub shaft and then torque them to about 65 - 70 foot pounds (ft. lbs.). Tighten the wheel puller until you think it is ready to break (unless you are lucky enough to have the hub separate first). Keep watching the bolts. Should they elongate appreciably or the washers get deformed due to the high pressure, release some of the pressure on the puller and torque the bolts down again. It is very hard to hold the hub assembly while you are hammering with all your might to tighten the puller. It helps to place a tire iron transversely between two legs of the puller and to have a friend help by standing on it, etc. Heat the back side of the hub with the torch (adjacent to the bearing housing) as much and rapidly as possible. Quickly tighten the hub puller even more if possible. If still not free, hit the hub with a few hard hammer blows in the area behind the flange (about where the arrow of the 'hub' note is pointing in the illustration). Again a negative note - some assemblies won't come and must be pressed, some hubs will actually shear at the outer face of the outer bearing from the force, and some won't come regardless. Let me say in advance that this part is going to be a very traumatic experience. But look at it this way - you've nothing to lose since a bad hub is of no value.

After removing the hub and bearing housing from the stub shaft, remove the seals and bearing inner races (or cups) from the bearing housing. Clean everything thoroughly. Look for a worn stub shaft at the inner bearing and for a worn bearing spacer, especially the face which is against the bearing.

Clean all grease from the outer races of your new bearings. Put them back in the box and seal the box. Put the boxed races in the freezer for at least an hour and preferably a day. This shrinks them and makes them easier to install. Install quickly and make sure they are both all the way in and pointed in the right direction. Install the seals making sure the open side faces toward the center of the housing. Clean the inner races of the bearings. Heating them slightly (too much heat will ruin them) in an oven or the sun will help in installation. Pack the bearings with grease, but not the races. Install the outer bearing on the hub. Back off the lock nut and adjusting nut on the stub shaft all the way. Place some grease in the bearing housing. Install the inner bearing cone in the bearing housing. Install the bearing spacer on the stub shaft with a liberal amount of fast setting Permatex behind it to keep it from spinning later and scoring the stub shaft. Check that grease will not be able to get on the stub shaft or inner race of the inner bearing during assembly. A little Loctite Bolt Lock (not Bearing Lock) should be used to insure the inner race can't spin on the stub shaft. Lightly coat the tapered portion of the stub shaft with anti-seize compound (you may want to take it apart someday). Install the bearing housing, a new collapsible spacer, and the hub on the stub shaft and tighten the new nyloc nut to 100 - 110 ft. lbs. (it must be very tight). Incidentally, you do not need the collapsible spacer if you use elementary care in adjustment and have the bearing spacer on which the inner seal rides on secured from turning with Permatex.

Not having the collapsible spacer there enables you to feel adjustment just like you would with a front wheel bearing. The following is only applicable if you do not use the collapsible spacer. Tighten the adjusting nut to an estimated 10-12 ft. lbs.

of torque. Rotate the bearing housing several times to insure the bearings are seated. Loosen the adjusting nut to relieve all preload on the bearings. Tighten the adjusting nut until just snug - no load. Tighten $1/12$ (Note: $1/12$, not $1/2$) turn more (there are six flats on the nut, index the nut and turn $1/2$ a flat). Tap the back face of the bearing housing toward the hub with a hammer, then try prying them apart with a screwdriver in the space between them. If the housing moves, the adjusting nut exercise must be repeated. A dial indicator or use of feeler gauges will greatly enhance your ability to accurately determine end play.

With the collapsible spacer, just keep tightening and checking until there is .002" or less play. A no tools method that is more time consuming is to mount the hub assembly (not the complete axle assembly) on the car. Install the wheel, then grasp the wheel at the top and bottom and try to wiggle it. Any play in the bearings will be greatly magnified by wheel movement. Remove the assembly. Tighten a turn or less and try again, repeating until there is no play. If uncertain about getting it too tight, opt for a slight amount of wheel wiggle.

Set the locknut and tab and reassemble the axle halves making sure you have not cut the rubber boot by overtightening the wire. It is desirable to clean and grease the splines while you have the axle apart.

A wrench for the adjusting nut can be rather easily cut from $1/8$ " sheet steel.

Bearings - SKF or Timken

Inner Cup- L44610

Inner Cone- L44649

Outer Cup- LM29710

Outer Cone- LM29749

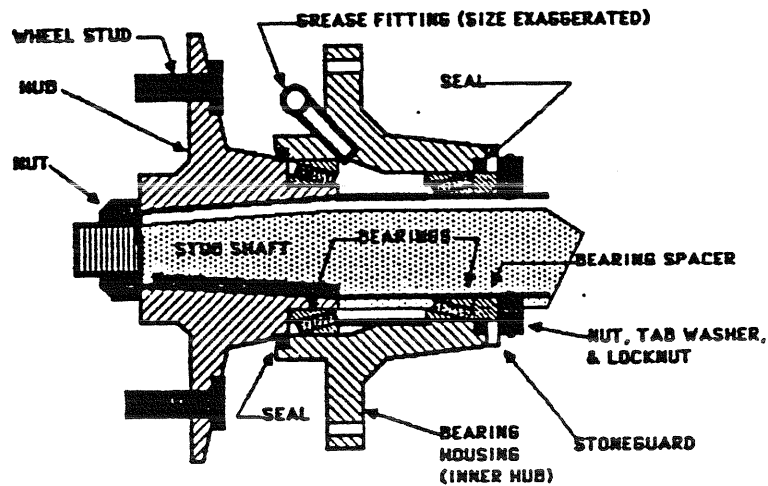
Seals - BAP-GEON * NA261 and *NA530

EXTENDING THE LIFE OF REAR HUBS

Skill Level D (Part 1)

Skill Level B/C (Part 2)

HUB ASSEMBLY



Two major problems affect almost every TR 6 sooner or later. They are frame rust and rear hub failure. Fortunately for most cars both come rather late in life. Unfortunately a fair number of cars are needlessly junked because of rust. However, that's another subject. What we have here is a very easy method to greatly extend the life of your hubs and a little more work that will perhaps extend them for the life of the car.

If you look at the drawing of the hub above (or better, a good one in a manual) you'll see a resemblance between the rear hub and the front one. Both have tapered bearings and a means of adjusting the distance between them until they are just snug against the bearing cones (commonly called races). But since the front has a much simpler job to do it turns on the stub axle whereas the axle turns the rear hub. What I'm leading up to is this - since you regularly grease (pack is the common term) and adjust the front bearings why shouldn't you pack and adjust the rear? The truth is you should. However, on the TR 6 rear axle that would be a job requiring special disassembly tools which are no longer available and professional mechanic level skills.

The first part of this project, modifying the hub so it can be greased is easy and can be done on the car with the brake drum removed. It helps to remove the brake shoes too but if you have uncertainties about that, work around them. We are simply

going to drill a hole in the hub where shown in the sketch on an angle (about 45°) that will take the hole into the cavity between the bearings and then install a grease fitting. It is best to drill this hole from the side or bottom of the hub to prevent cuttings from getting into the hub. Drill slowly, stop often, and put grease on the end of the drill each time to carry away the cuttings. The latter is especially true when breaking through into the cavity. I know this sounds Mickey Mouse, but if you take your time it will work just fine. The initial hole should be with a $1/8"$ drill. Follow with a $15/64"$ or $7/32"$ to a depth of $1/4"$ to no more than $3/8"$. Then tap that hole with a $1/4" \times 28$ fine thread tap. You may only get a turn or two on the tap before it hits bottom. That's OK. Follow with a $1/4" \times 28$ bottoming tap. Bottoming taps have full threads all the way to the end as opposed to the starting threads of a regular tap. This will give you sufficient threads in the hole to hold the new fitting. A few shots of spray carb cleaner will clean any fine cuttings out the hole.

Now comes the bad news - the grease fitting. Because it is necessary to drill at the intersection of the hub and the hub flange, we need a long grease fitting. All those available at most auto parts stores are too short for the threads to reach the hole. The original fittings for early TR 6 universal joints were about 1" long and are just perfect. However, they are no longer available. I have found fittings like this at a local truck parts supply which are made by Imperial-Eastman. Try that approach first. The next alternative is to use a short piece of tubing threaded inside for the grease fitting on one end and outside on the other end to go in the threaded hole in the hub - a sort of extension. With this set up you should remove the extension and plug the hole with a $1/4"$ bolt after greasing. The last alternative is a grease injector needle. This is literally a grease fitting adapted to a large hypodermic needle. Just put the needle in the hole in the hub and pump away on your grease gun. The grease injection needle is made by Plews Division of Parker Automotive, Eden Prairie, MN 55344, part 05-037 and

cost \$3.50 at my local auto parts store. As above, plug the hole with a 1/4" bolt after. Also consider making the hub hole the size of the needle, .050", although that's a pretty small hole to drill by a hand held drill. Lastly, the grease. Don't completely fill the hub. Grease is an insulator of sorts and too much causes drag on bearings. About 20 to 25 pumps should do and about 5 to 10 thereafter when servicing at about 20,000 to 25,000 miles.

Now for the adjustment. First, test for play in the bearings by installing the wheel if you have removed it for the above job. Grasp the wheel at the top and the bottom and firmly try to wiggle it by pushing with one hand and pulling with the other. If there is any play you'll feel it. Begin by removing the axle assembly as described in the manuals. If you try to turn the stoneguard it may or may not turn but turning is one sign of looseness. If it does not turn make sure it is not bent against the hub or otherwise hung up because turning this guard is one of the ways to tell if your adjustment is right. Bend back the tabs on the nut and locknut and loosen the locknut. Let me digress here long enough to suggest two ways of turning these thin nuts. One is to cut a wrench from 1/8" steel plate and the other, the Fred Flintstone method, is to pound on the corners at an angle with a dull chisel and hammer - driving the nut. You can now either just tighten down on the nut while turning the hub until you have about 25 foot pounds of torque on the nut, back off until it is free of torque, then tighten until just snug - or; you can tighten a little while turning the hub, check for spin on the stoneguard, and repeat until the stoneguard doesn't turn anymore. Tighten the locknut but don't bend the tabs over. Install the axle assembly with only the hub end bolted up. Install the wheel and again check for wobble. If you have any, remove the assembly and tighten the nut and locknut one flat (1/6) turn at a time and again check for wobble until the wobble is gone. You should check that the hub turns with just a little effort each time. If the hub begins to get tight it means the bearing spacer has been badly grooved by the bearing and is tight against the bearing race. This, in turn, means rebuild time.

GREASE FITTINGS FOR REAR HUBS AND UNIVERSALS

Here is an alternative for the grease fitting problem cited in the previous article and in "Prolong The Life of Wheel Bearings And Make Maintenance Easier". It obviously is also applicable to axle and driveshaft universals.

I discovered a really bad axle joint on the way home from work and necessity dictated I take what my local import parts dealer had to offer. It was a GMB made in Japan. Now I don't think much of Japanese products, and especially things like bearings, but.... The up side was that it had a grease fitting and that fitting happened to be about 1/2" long - enough to reach in the hub discussed above. Most universals you get now do not have grease fittings and are "lubed for life". Personally I believe that their life is shorter without greasing. The box said it contained only preservative grease and should be fully lubricated. The down side is that all the grease came out of one of the caps next to the grease fitting and therefore little, if any, got to the other caps. Typical Japanese part. I suggest you keep the fitting and throw the u-joint away.

DIFFERENTIAL REBUILD WITHOUT THE FACTORY TOOLS

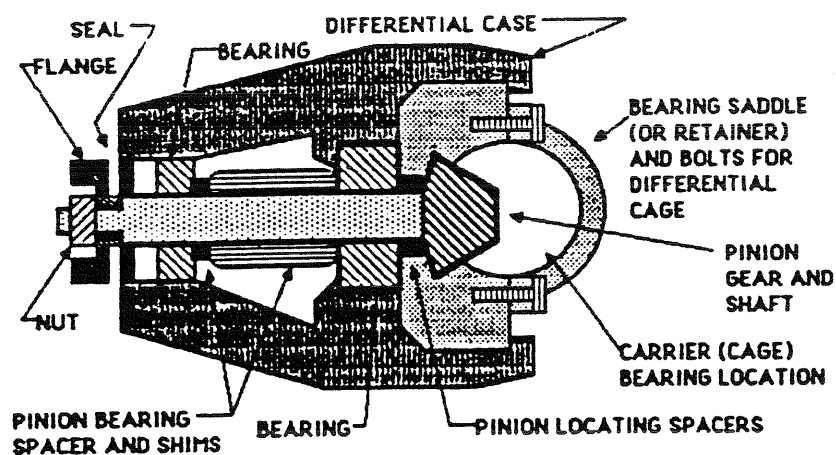
Skill Level A/B

From the looks of the pile in the shed, I've used up about 8 to 10 rear ends since March 26, 1970 (the day my first TR 6 and I met). We've been together ever since and it and two stable mates have blown those rears. The interesting thing is that alway they break two pinion teeth and the teeth break off deep in the gear. That suggests perhaps insufficient hardening and or just plain metal fatigue. Unfortunately, we can't do anything about the metallurgy. However, another thing I've noticed in early rears is excessive "slop" when, for example, turning a wheel back and forth. It is very difficult to tell if this is in the sun gears

or the pinion. I'm prone to thinking some is gear wear and a lot of it is in pinion bearing wear and associated end play (fore and aft movement of the pinion) which spells sure death for the gears if the play gets very big. I haven't had the opportunity to get into many differentials, but the bearings on most showed wear. Late differentials have a collapsible spacer and are bad news. I won't go into them. If you have any doubts whatever, the pinion bearings should be replaced, the bearing preload be adjusted, and the mesh with the ring gear checked. This same general measuring procedure can be used to set up a new ring and pinion.

To do a check and rebuild you will not need any special tools but you will need a few tools not in the average tool box and some you'll have to make from the sketches below. You will need an inside micrometer (optional), a 1" micrometer to measure shims and a lot of new sorted and sized shims, a dial indicator, an OTC 1024 (or similar) 2 jaw gear puller for the carrier bearings, a means of removing the rear pinion bearing (usually your friendly machine shop), and a good torque wrench, plus an inch pound torque wrench that goes down to 12 in. lbs.

A section of the differential is shown below with the terms I tend to use. I suggest you also refer to a factory manual or the Bentley reprint. Also shown are the various home made tools and gauges.



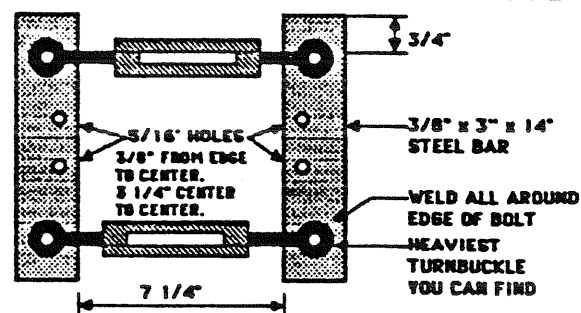
SECTION THROUGH DIFFERENTIAL-
CROWN WHEEL AND CARRIER (CAGE)
ASSEMBLY AND REAR COVER NOT SHOWN

The first tool you will need to make is a spreader for the case. The drawing is rather self explanatory. It simply bolts to the case and you turn the turnbuckles to relieve the preload on the carrier assembly so you can remove it.

Do not overdo this. In most cases about one turn past firm is

required. This tool does not have to be a work of art! The only precision needed is in placing the 5/16" holes. Bolt the bars to the case before having the turnbuckles welded to them. Stuff the case with rags and cover the gears to prevent weld from getting in or sticking to a gear.

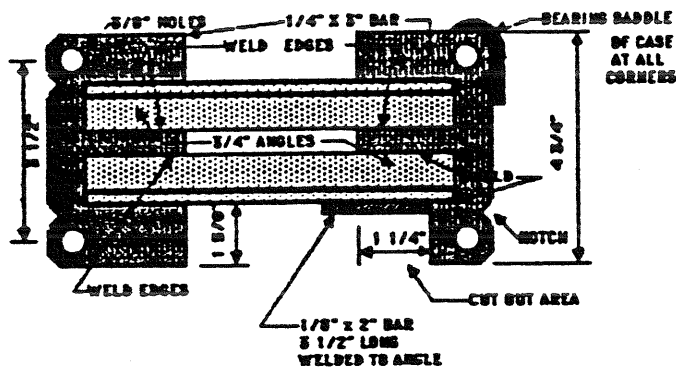
DIFFERENTIAL SPREADING TOOL



After you have removed the carrier and ring gear assembly you are ready for the next home made tool, the pinion depth gauge. Two methods are shown. The no inside micrometer method shown in three of the sketches below requires some fair cutting, drilling and welding but it should cost less than the micrometer. Cut and drill all your pieces at home and then have them welded. Make sure you don't get weld inside the case. The vertical piece must have a very straight lower edge and should be welded last with about .025" to .050" shims or feeler gauges under it to insure it is truly parallel to the pinion head. Hopefully, your gauge won't be too warped; but if it is, it should still bolt down true enough for our purposes. After everything has cooled, carefully measure the clearance to the pinion from both ends of your gauge and record it (it should be the same).

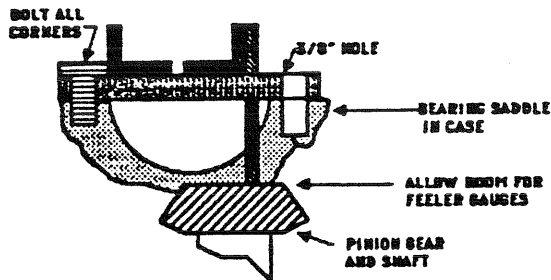
The second method is shown in the box and it requires only two small straight 1/2" square steel bars, three washers about .096" to .100" thick (all must be equal thickness), and the inside micrometer. The bars can be obtained in almost any hardware store in those racks of various sizes and shapes of metal or from an industrial bearing and fitting type supply. They are surprisingly straight but you will probably have to check a few in the store with a straight edge and give the ones

PINION DEPTH GAUGE FOR USE WITHOUT MICROMETER

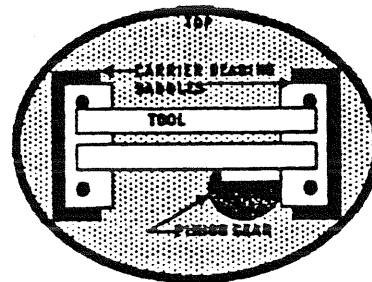


↑ TOP VIEW

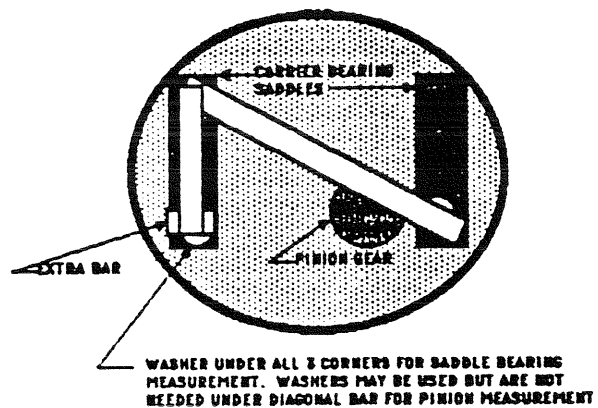
↓ SIDE VIEW



REAR VIEW OF DIFFERENTIAL CASE SHOWING TOOL LOCATION



LAYOUT OF 1/2\"/>



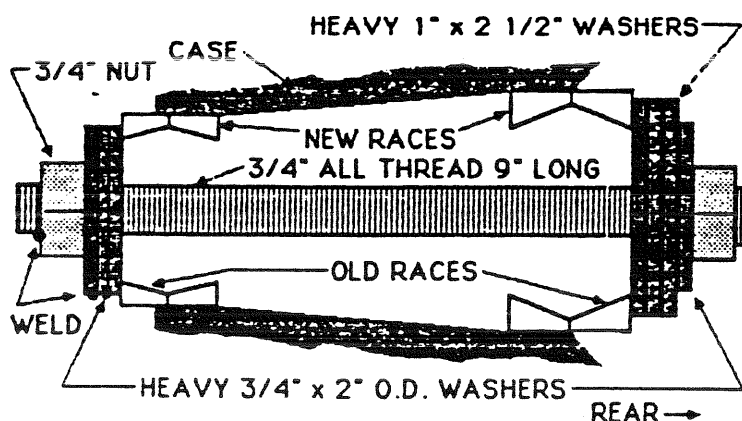
you buy a light once over with a file to remove high spots. They usually come in 12" lengths. Cut one to 7 3/4" and one to 4 1/4". You only need about 3/4" of the second one now, but we'll use it.

First measure from the bar laid diagonally (without washers) across the carrier bearing saddles to the pinion head with the inside micrometer. This should be about 2.154" or 2.155". Next check the depth of the saddle by placing washers under the ends of the diagonal bar, placing a washer and your 3/4" long piece of bar on the other end of the bearing saddle, and then placing your 4 1/4" bar on top. The measurement should be about 1.424" after subtracting the thickness of the washers and the bar. This

subtracted from the other measurement should give a bottom of bearing saddle to pinion dimension of about .730" or .731". With your existing pinion gear, spacer, and new bearings it should be about the same. For those unfortunate enough to be setting up a new ring and pinion I have derived the .730" from only two used differentials. I suspect for a new set it might be .725". A "round number" seems logical, but then we're dealing with a British product here and logic never prevailed in British motor car design (no bitch, just fact!).

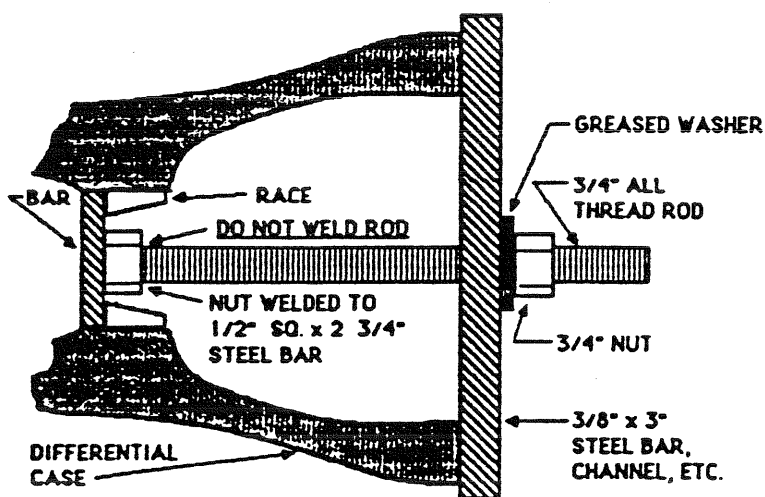
Once you have the pinion out the fun begins. With a new pinion you're just going to have to guess the first time and use the spacer from your old pinion. Here we come to one of those things that infuriate me with Brits, so bear with me through a tirade. It seems only the factory had access to the .040" more or less spacers. You'll notice the pinion head shims available from Roadster Factory come in .003", .005", .010". Why the difference? Because they are entirely different and must be placed behind the rear bearing race in the case. Now it is one hell of a job to pull that race and put it back in many times (which you may well have to do since even .001" in pinion depth makes a difference). Usually a used pinion will require about .002" or .003" less. To accomplish this, use a Torrington radial needle bearing race *TRA 2031 which is .030" \pm in place of the factory spacer and then those damn thin ones behind the race. I wish I could tell you this is the last time you'll mess with these damn shims, but you'll probably be into them several times. See the tools for removing and replacing the race below. Truthfully, when installing the race you'd probably do better to weld a tube handle onto the washers and old race and drive it in. Freezing it will help a lot. Next, it is time to try to set the preload on the pinion bearings. Start by placing the original spacer and shims on the shaft plus about .010" of new shims. Put on the front bearing, driving flange, and nut. Torque the nut down a little at a time until the shaft no longer turns freely or you reach 90 foot pounds (ft. lbs.) of torque on the nut. However, in no case should it take more than 12 inch pounds (not foot pounds) to

turn the pinion. If too tight, add shims; if too loose, take some out. Unfortunately, this is a trial and error job. It is eased a little if you have a way of pressing the shaft back through the front bearing as opposed to pounding it back with a lead or rubber (never steel) hammer. Hopefully, you will have about .730" saddle to pinion. If you don't, just record what you do have and come back to pinion depth later.



REAR PINION BEARING RACE
INSTALLATION TOOL

REAR PINION BEARING RACE
EXTRACTION TOOL

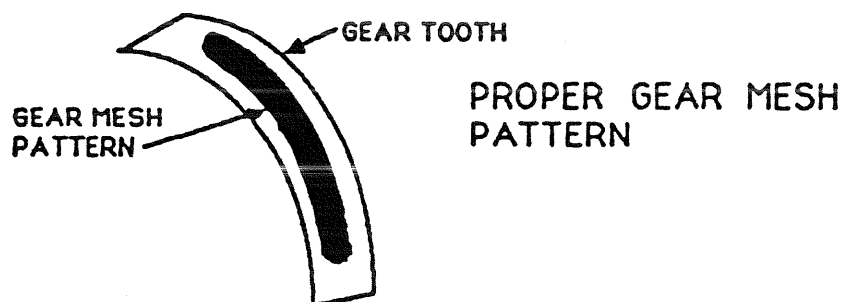


Next pull the carrier bearings with the OTC puller. You may find it keeps slipping off the bearing race due to the shims. In this case you will have to cut away the part of the shim in the recess of the carrier or bind the puller with a 'C' clamp so the jaws can't spread.

Take .003 " shim (which is the pre-loaded amount) off of the driven or "teeth" side and all shims off the other side. Use feeler gauges behind the bearing to take out all tranverse (side to side) movement. The manual calls it axial but I find transverse confuses less people. Check for transverse movement with feeler gauges until there is none.

Next check for backlash. Set a dial indicator in the longitudinal direction (front to back) against the outer end of a tooth. Press the ring gear firmly against the pinion in one direction and zero the dial indicator. Turn the ring gear in the opposite direction and note the dial indicator reading. It should be .004" to .006". If it is more you need to move the ring gear toward the pinion. Conversely, if you feel the teeth binding when you try to turn it, add shims on the "teeth" side of the carrier. Install the pre-load shim and shims equivalent to your feeler gauges and recheck. Before you get too deeply into this, check the meshing pattern of the teeth both in the driving and backlash directions. To check the mesh, coat both sides of a couple of ring gear teeth with machinists blue. With a friend's help, or whatever, place some resistance to turning on the ring gear, then turn the pinion in the driven direction. You will see a place where the bluing has been squeezed away along the center of the tooth and that is your pattern. It should look like the sketch. Reverse this to check the back side of the gears. Generally, contact toward the outer end of the gears indicates the pinion needs to be moved rearward and, of course, forward if the contact is at the other end. However, it is easier to try to make adjustments on the carrier assembly so try this first if you have too much or too little backlash. From here on it is purely trial and error drudgery. Hopefully, you'll be lucky. I can not emphasize too much how important the proper meshing

pattern is. It may not be as big as the example but it must be in the center and as long and as wide as possible. Otherwise, your gears are doomed to an early death. Incredibly the factory manual never mentions checking this.



Again, use this with the manual. The main purpose here is not to give you a different method, but to show you how to make the tools that at least give you a fighting chance.

Here are the bearing and seal numbers if you want to get them locally.

Differential bearings (all numbers are Timken):

Front pinion cup 15100-SR Front pinion cone 15245

Rear pinion cup 3188 - S Rear pinion cone 3120

Carrier cone 16150 Carrier cup 16283

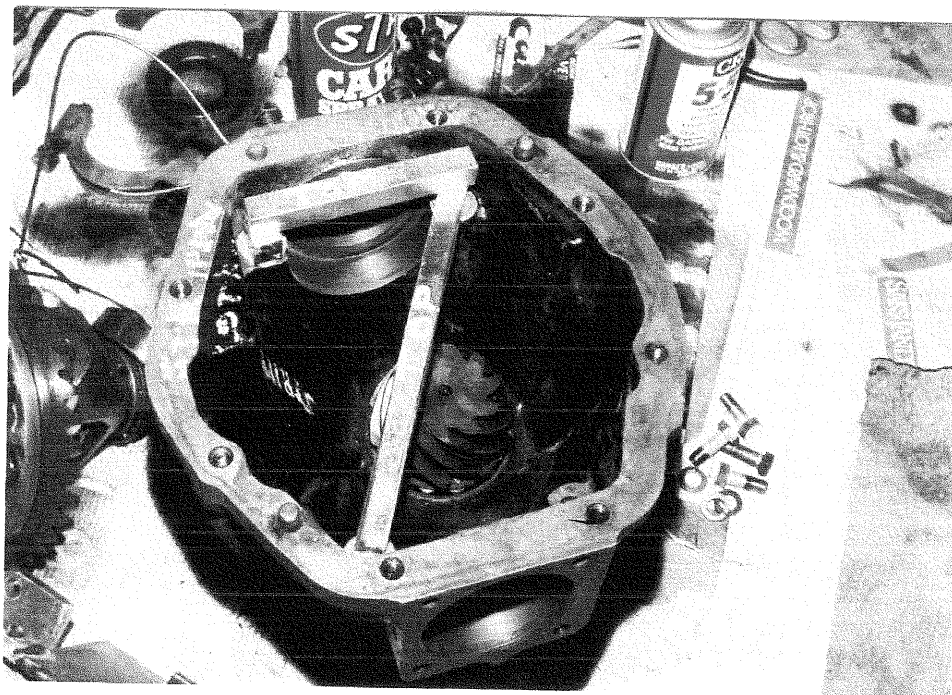
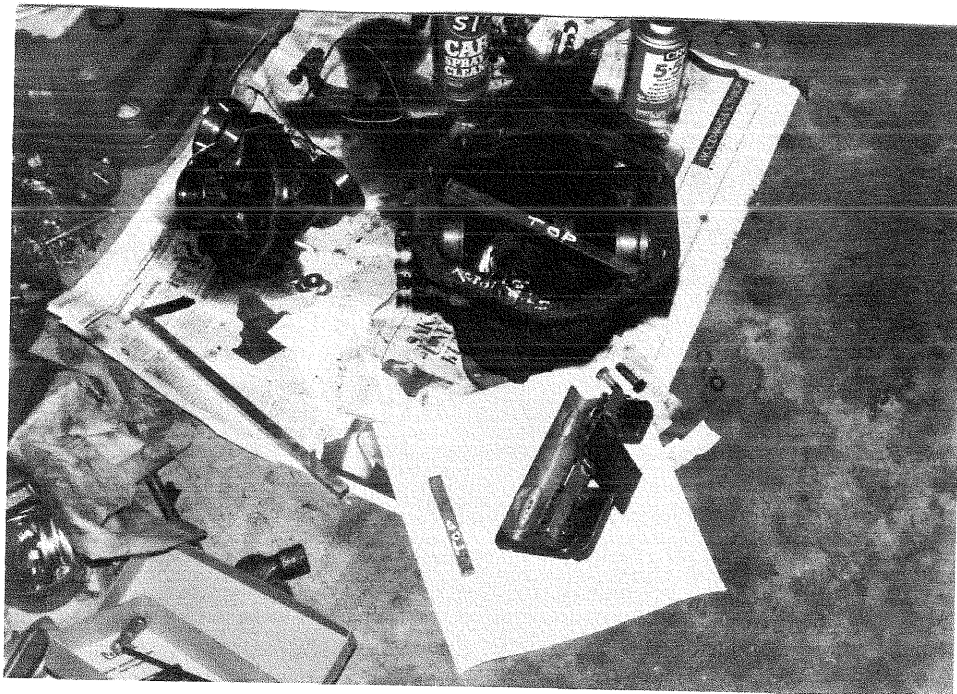
Stub axle bearing: Nidec 1652DC TNTG 18 (sealed both sides)

Pinion seal: National 470487-N (better) or CRI 15207

Stub axle seals: CRI 16054

Magnetic drain plug: Oil-Tite #65203 from Motormite Mfg. Div.,
3400E. Walnut St., P.O. Box 1800, Colmar, Pa. 18915

Top photo shows gauge for use without micrometer below case with short bar for micrometer method. Bottom photo shows micrometer method bars in place.



**STEERING AND
FRONT SUSPENSION,
SHOCKS AND
SPRINGS**

RACK AND PINION MOUNTS - STOCK AND SOLID(with a consumer bulletin on the latter)

The rubber rack and pinion mounts on the TR-6 have generally been denounced as causing undo play in the steering, etc. Actually, if they are replaced periodically they serve a good purpose providing - and this is where the complaints really should be aimed - the complete steering and suspension system is in good condition. Think back to when your car was new. Did you really have any complaint about play in the steering? Their purpose was to dampen shock transmitted through the steering assembly and they do a reasonable job of this. Remember, any shock absorber anywhere in the suspension makes the suspension last longer.

The problems come from worn suspension, worn tie rod ends, out of balance wheels, etc. The rubber mounts actually magnify these by letting the rack move with the offending force. Also, the unknowing try to tighten the clamp down on the rubber rather than replace it. We have one TR-6 on which the former owners Chevy expert friend snapped one of the bolts off and put a wing nut on the few remaining threads. Luckily we discovered it before driving the car. Even the knowledgable can overtighten these bolts.

New rubber mounts should be installed every 10,000 miles. The clamps should be torqued to 25 ft. lbs. and always have new nylock nuts. The clamps should be held as far to the outside of the car as possible to insure the rubber is held tightly. Tighten the rear nuts first using a deep socket and trying to use the socket and ratchet extension as a lever against the hole through the crossmember to put some force on them toward the outside.

The modified mount kits sold by Moss Motors under part # 667 298, and perhaps by others, are a good alternative for certain purposes. There is no doubt that they will add some

precision to the steering. The degree of this is not so great, however, that you will notice much - if at all. Obviously they also eliminate the periodic replacement of the rubber mounts if that bothers you. They do not have the shock dampening effect mentioned above but then I doubt any of you are looking for Rolls-Royce smoothness in your TR. I have found them to be helpful on one TR with a slight but persistent front end shake at speed. The car has very wide high speed tires which tend to be hard to balance (aren't all TR wheels impossible to balance?). These mounts help arrest a fair amount of this shake. All things considered I'd recommend them unless you drive on a lot of roads with potholes and other steering banging surfaces.

There is one word of caution to those of you who already have the solid mount kits. Some of these (I have no idea how many) had a lower block which was the same width as the upper aluminum piece. This does not go against the shoulders on the rack which were just to the outside of the rubber mount clamps. Therefore, it is possible for the steering rack to move about 1" if the U-bolts come loose or one should break. Also, you can bolt up the steering in any old location. True, it is not too likely to happen but that much movement could cause lose of control. If you have one of these sets I'd advise contacting the supplier for the wider replacement blocks.

PREVENTIVE MEDICINE FOR FRONT SUSPENSION MOUNT WOES

Skill level C

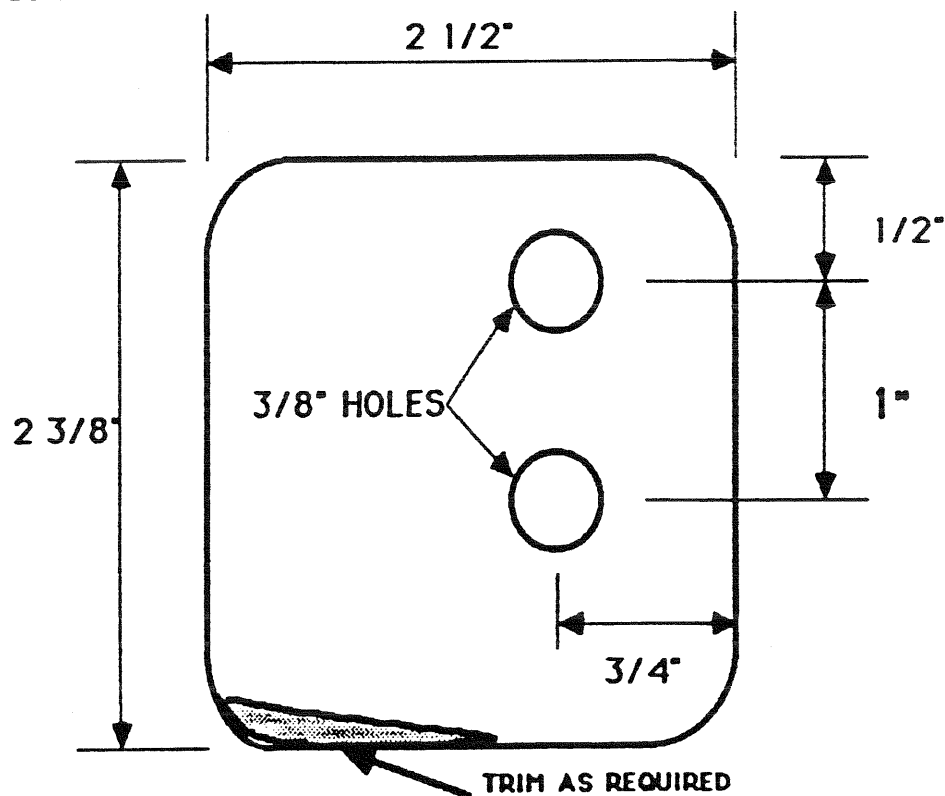
Front suspension mounts, especially the rear ones, on TR frames are known for tearing away from the frame. Once this has happened it can be fixed but is sometimes difficult if the mount has also cracked or broken up around the two mounting holes for the lower suspension arms. The purpose of this article and the following one is to help you prevent this with relatively little effort, and to assure you that if it does happen it can be fixed. Refer to the photos with the following article to see the area we are talking about.

Obtain a piece of 1/8" steel plate 3" wide by 1' 0" long or a plate 8" square. The latter is a common size used for base plates in building construction and is easily obtained from a building supply store. Structural steel fabricators and steel distributors listed in the yellow pages are other sources. Don't be too concerned if you have to buy a 10' length of 3" bar as you can use it for rear cross-member reinforcement described in a later article. You will need to make 4 reinforcement plates as shown in the sketch. These are relatively easy to make if you have an air compressor and air driven high-speed cut-off grinder and a 3/8" drill. It can be done with a hacksaw and a grinding stone in your 1/4" drill but that will take awhile. Please note that some trimming of edges will probably be required where shown in the sketch. It is also advisable to have one of the holes about 1/32" oversize to allow for misalignments.

Installation is easy and should take about 1/2 day. Preferably the front end should be raised as high as possible and the car securely blocked from tipping or rolling. Work on one suspension mount at a time. Remove the wheel. Place a jack under the spring. Jack up until the spring is compressed and until most of the load is removed (just before the frame is lifted off the support). Remove the nuts and washers from the suspension mounting bracket (a little WD-40 on the threads is advisable). Clean the mount "box" and trial fit the reinforcing plate. Trim as required with a grinder. Once the plate will seat

firmly against the mount, install the washers and new nuts. If the mounting bracket bolts do not extend fully through the nylon portion of the nuts delete the washers. Repeat the operation at the other three mounts. Incidentally, you do not need to be overly concerned if there is a crack between the holes in the mount box. This is common and the beginning stage of the total break-up of the mount. The reinforcing plate will remove all load from this area. If the damage is more extensive you may need a house call from a welder.

As soon as possible go to a competent welder with a lift that will get the car high enough for him to comfortably work under it. Have him weld at least the vertical edges of the reinforcing plate to the box. Total welding of the edges is not required, but basically more is better. Above all, keep the mount cool enough to not burn the rubber bushings. An additional and highly desirable effort is a reinforcement about 1" wide welded between the rear mount box and the frame just below the motor mount. Size and shape are not too important but the additional stiffness of the mount is.



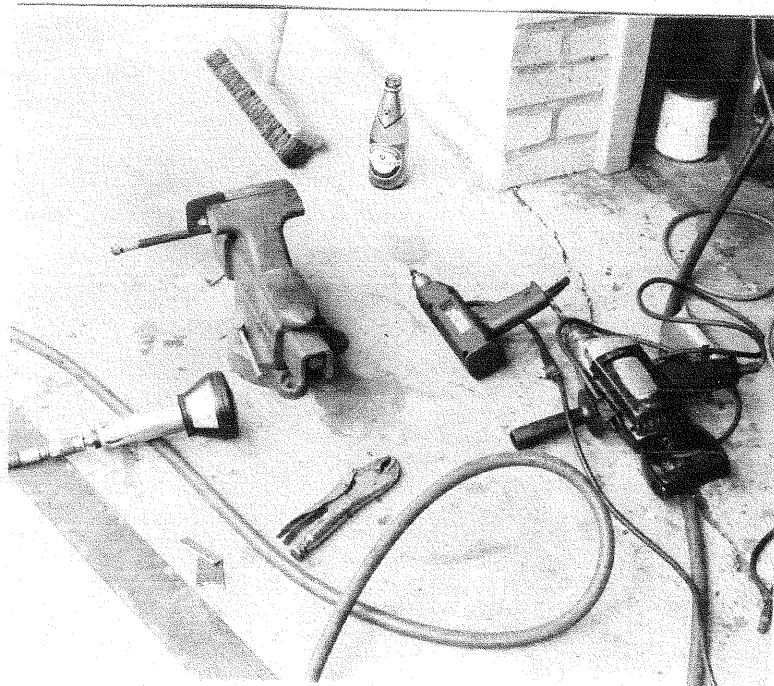
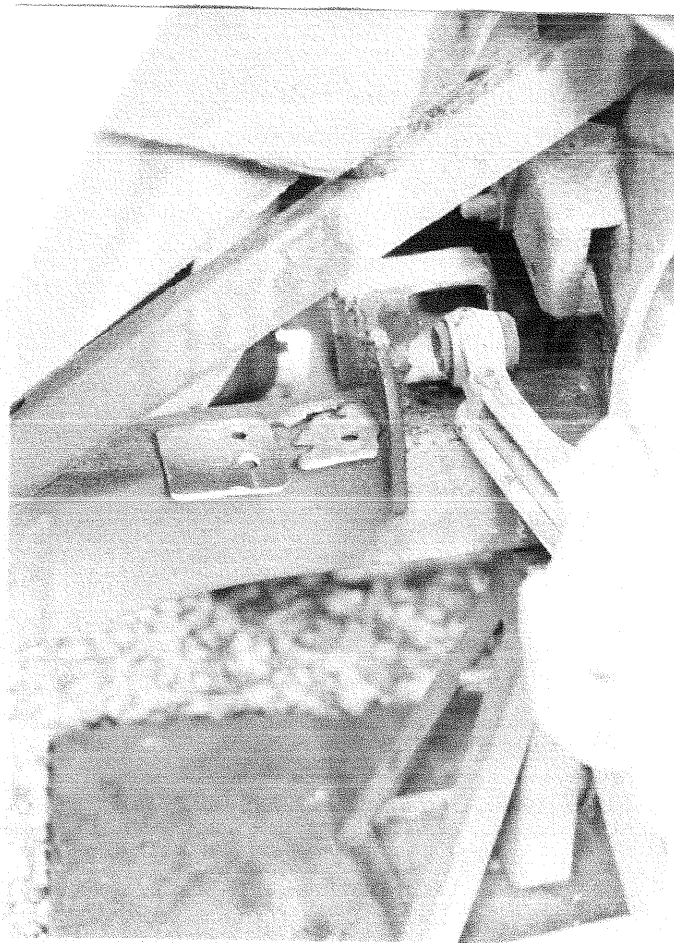
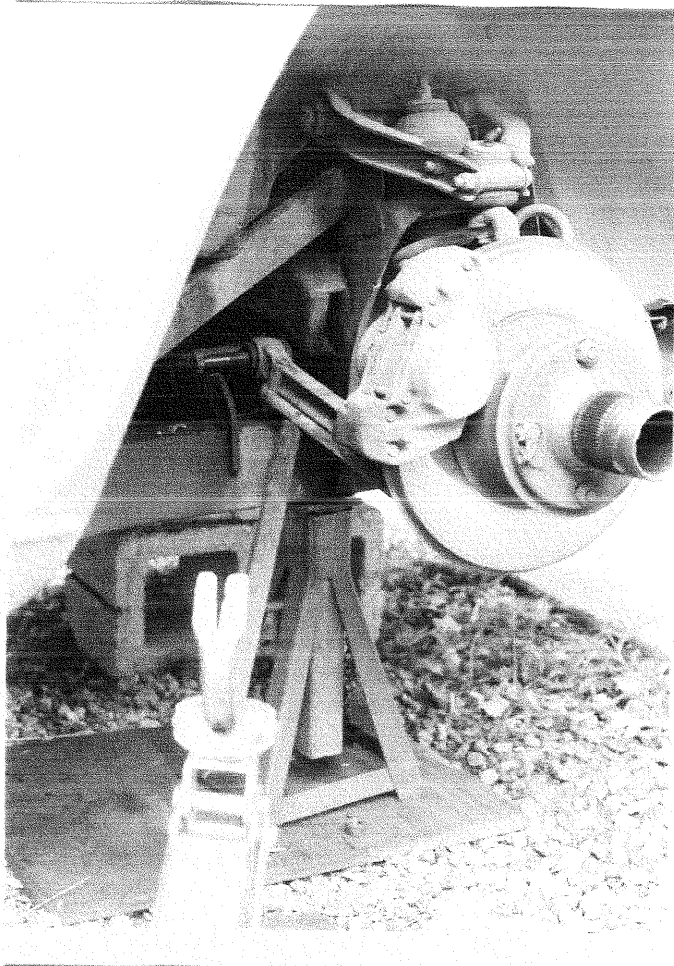
**FRONT SUSPENSION REINFORCEMENT PLATE
4 REQUIRED**

BUT WHEN IT DOES BREAK - FRONT SUSPENSION MOUNT REPAIR

Skill level B/C

The photos show a rear right mount which had torn loose at the frame rail and had been previously repaired. It had since cracked between the holes and then, through constant flexing, has fatigued and torn away at the periphery of the mount "box".

The hard part of any repairs to the suspension mounts is getting at the break. The obvious best method is to remove the whole suspension from the affected side. In the example shown here, the first photo shows a crowbar resting on the frame and a floor jack being used to raise the inner end of the lower control arm to first take the pressure off the bolt so that the bolt can be removed and then hold it out of the way. The bolt has been placed back in the bushing for reference only. Photo 2 shows the broken piece next to the mount "box" and a reinforcing plate such as mentioned in the previous article. Note the proximity of the motor mount just above and to the right of the box. A brace should be added here as mentioned in the previous article. Each case will obviously be different, but the following approach is basically the order of work. Place the reinforcement plate inside the box and carefully position it at the back face of the broken area. Now have your friendly neighborhood traveling welder weld the plate in place on the inner side of the "box" only. Grind away about 1/8" on the edges of the broken piece. Use 2 short bolts to bolt it in place over the reinforcing plate. Have the welder weld this in place. Remove the bolts. Grind the face as flat as possible with stones like those in photo 3 and a 1/4" drill. Photo 4 shows the tools to do the job easily - high speed grinder with cut-off wheel, 3" steel bar, vise, drills and vise-grips - however you can get by with less. The Augsburg beer is optional.



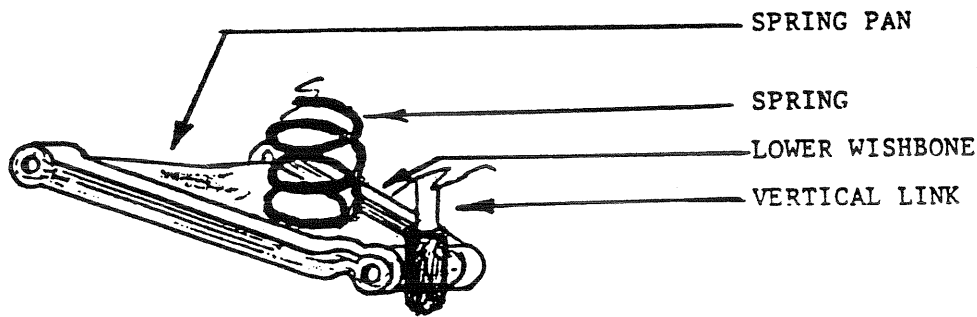
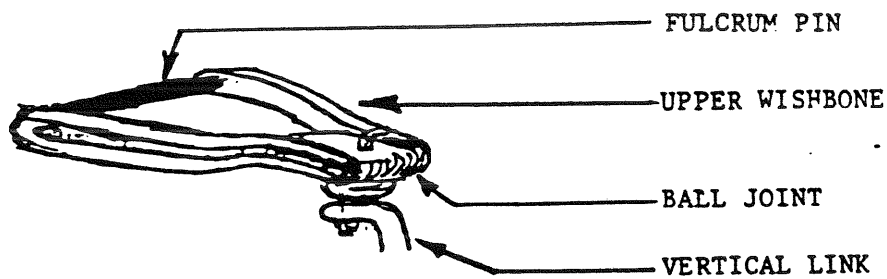
FRONT SUSPENSION REBUILD FOR THE BEGINNER

Skill Level C/D

This article is intended to guide the owner with no experience and a minimum of tools (a good jack and jackstand are musts) through a job which most TR 6s will need. Moreover, you do not need to do the whole job. You can do only those parts you feel capable of. Another thing that helps is to look at the front suspension as a series of jobs to be done step by step. When looked at in this context the job does not seem so overwhelming. There are quicker ways to do it and maybe better ways. However, those having the skills and or tools don't need any guidance from me. I realize lots of photos and drawings would help, but life's too short for me to attempt to do that. Frequent reference to shop manuals will help considerably.

There are 5 levels of frequency and difficulty to proper front end maintenance.

(1) Upper inner rubber bushings. These are easily replaced and are good for about a year or 15-20,000 miles. With the wheel removed and the full weight of the car resting on a jack or jackstand placed directly under the spring, remove both bolts holding the ball joint to the upper wishbones. Put the bolts back through one of the wishbones to keep the hub and brake assembly supported. Remove the cotter key, nut, and washer from the inner end of the loose wishbone. Use an up and down pumping motion as well as outward pressure to remove it and the old bushings. Use sandpaper if necessary to clean the fulcrum pin where the bushings were removed. Likewise clean the hole in the upper wishbone thoroughly. Lightly coat one of the new rubber bushings with Vaseline or Armorall and slip it on to the fulcrum pin. Coat another bushing and slip it into the outward facing side of the wishbone. Now place the wishbone and bushing over the fulcrum pin and adjust until both bushings are equally into the wishbone. Clean the washer and replace it, the bolt, and a new cotter pin. It is that easy! Now repeat for the other wishbone. Reconnect the ball joint.



LEFT FRONT SUSPENSION

(2) The next job in order of frequency and difficulty is replacement of the lower nylon bushings and steel bearings. Because the lower inner rubber and steel bushings (job #3) are most easily (not too easy - more on difficulty later) replaced at the same time when using this method, we'll cover both jobs at once. You will now need a safe support such as a jackstand under the frame and a jack directly under the spring. Raise on the jack until the car just lifts off the jackstand, then let down until the weight is barely on the frame. Remove the tie rod end from the steering lever (see the Easy Tie-Rod and Ball Joint Removal article for method). Look at the outer lower wishbone pivot bolt and nut. Start with the wishbone at the nut end. This way you will not have to take the bolt out and have the vertical link, brake, etc. hanging freely. Let me digress briefly to tell you the following is a lot easier with the brake disc and caliper removed. If you're going to do that job too, jump ahead and read up on it now.

Having the wishbone removed makes it much easier to do the bushing replacement work. If you have a vise you can probably replace the rubber and steel inner bushings by using deep sockets as show in Illustration 2.

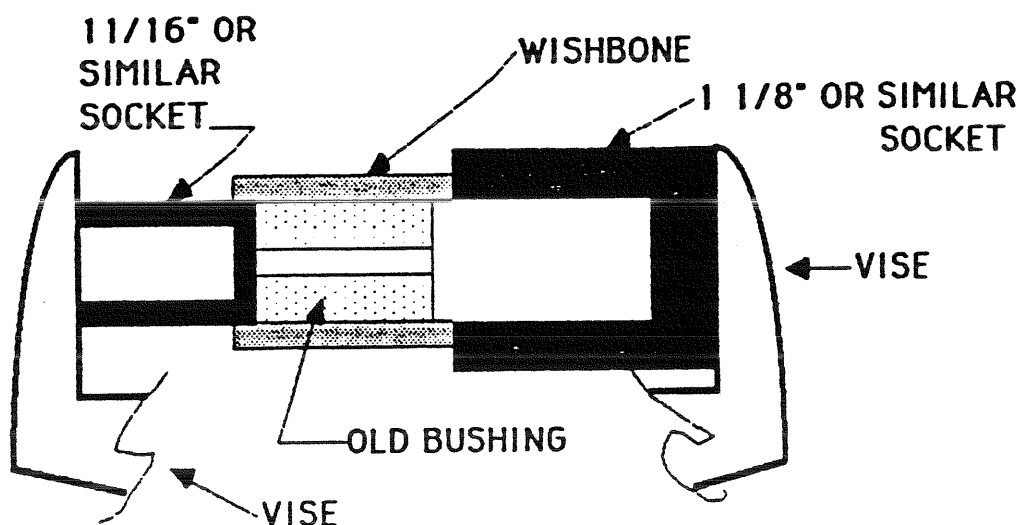


ILLUSTRATION 2

When you tighten the vise, the smaller socket pushes the old bushing through the wishbone and into the large socket. If you don't have a vise or can't use this method, any machine shop can press out the old bushings and press in the new.

The bushing must protrude equally on both ends. The new ones go in much better if coated with Armorall, soap, or Vaseline. Believe me you can't hammer them in and out. The outer bushings and steel bearing are a little easier. Lightly grease the inside of the hole in the wishbone. Liberally grease the inside of two of the tin water shields and the nylon bushings. Place the nylon bushings in the water shields without the rubber sealing rings. Assemble the nylon bushings, water shields, steel bearing, and thrust washers on both sides of the wishbone as they will be when fitted and place on a $1/2" \times 3"$ bolt (preferably threaded the entire length) and nut. Carefully tighten the nut until you have pressed the assembly fully into place. Remove the thrust washers. Place the wishbone back on the spring plate and, beginning with the inner stud, tighten just snug perhaps even leaving the outer bolt several turns loose.

Remember that they must be fully tightened later. Repeat the above for the other wishbone.

(4) At this point it is a good idea to examine the bottom trunnion for excessive play. Put a fair amount of sideways pressure on it and look for movement. Actually, considering the way most TRs are maintained, if the car has more than 50,000 miles they are probably in need of replacement anyhow. It is less overall work to do this now but, again, it expands the scope of this job some. At this point we're getting a lot of things torn apart at one time. I'll include it here and you take your choice. To remove the trunnion you must remove the hub and brake disc assembly and to remove the hub/brake disc you must remove the brake caliper. It may be difficult to break the caliper mounting bolts loose with the vertical link unsupported so do it before you have the lower wishbones loose. Also, there are thin shims between the caliper and the vertical link. Loosen both bolts several turns, then take one fully out. The shims for that bolt should fall away. Then remove the other bolt and shims. Make sure you note the numbers and locations of the shims because they may not be equal. Wire up or hang the caliper so that the brake hose is not supporting it. To remove the trunnion, you must remove the steering lock stop. The bolt for the stop is easily broken. Heat it as hot as possible as quick as possible to loosen. When you replace the trunnion, fill it about 1/8 full of grease and liberally grease threads of both trunnion and link. Screw the trunnion on as far as it will go, then back off as little as possible to put it in proper operating position. Install the stop loosely. If the trunnion turns freely in each direction far enough to hit the stop it is ok.

We're finally ready to put something together. Place the rubber sealing rings in the water shields for the lower outer bushings. Place a greased thrust washer on the bolt and slide the bolt into the front wishbone until it just pokes through the other side. Place another thrust washer, sealing ring, and water shield over it and try to get one to stay in the water shield on the inner side of the rear wishbone. Some stiff grease will help hold them in place. Right about now an extra set of hands sure helps if you can enlist someone. Slide the trunnion into place

between the wishbones, being careful not to dislodge the thrust washers. If it seems like the trunnion won't go, have your helper pry one of the wishbones away with a screwdriver. Push the bolt on through and put on the rear thrust washer, water shield, sealing ring and nut. Tighten the nut to about 55 foot pounds (or about as tight as you can manage with a 1/2" ratchet). Go to the next slot in the nut if possible and put in a cotter key which has no appreciable slop in the hole (5/32" as I recall and it is a hard size to get, most parts stores carrying only 1/8" and 3/16"). If you can't go tighter, slack the nut off some. However, this bolt must have considerable tension on it. Replace the hub assembly and brake caliper and the tie rod end (as well as anything I've forgotten).

(5) Not to again expand the job, but it is a good idea to repack (replace the grease) the wheel bearings and replace the seals while you have the caliper and hub/disc off. Be sure you put the seal in the right way -- felt face exposed, metal face against the bearing. Adjusting the bearing with a new seal is tricky because you must get it tight enough to compress the felt but not put pressure on the bearing. See the Wheel Bearing Adjustment When Installing a New Seal article for an easy way to do this.

WHEEL BEARING ADJUSTMENT WHEN INSTALLING A NEW SEAL

Skill Level D

First let me refer you to related articles on an alternate modern type seals, frequent adjustment indicated by low brakes when turning, and adding grease fittings for the bearings. These appear elsewhere in this section. However, it is not necessary that you read them first.

To install a new seal, you will need to remove the brake caliper and disc as per the previous article. The felt seal used on the TR 2 through TR 6 is a crude prehistoric type, long ago done away with even by MG. The problems are several - Insufficient sealing ability, water absorbtion, dirt collection,

short life, etc.. Additionally, a new seal must have the felt compressed to about half the original thickness. It is hard enough for the novice to learn the feel of adjustment let alone to be hindered by trying to guess if he is compressing the seal or beginning to tighten the bearing. The following encompasses both initial adjustment with a new seal and adjustment with an old seal.

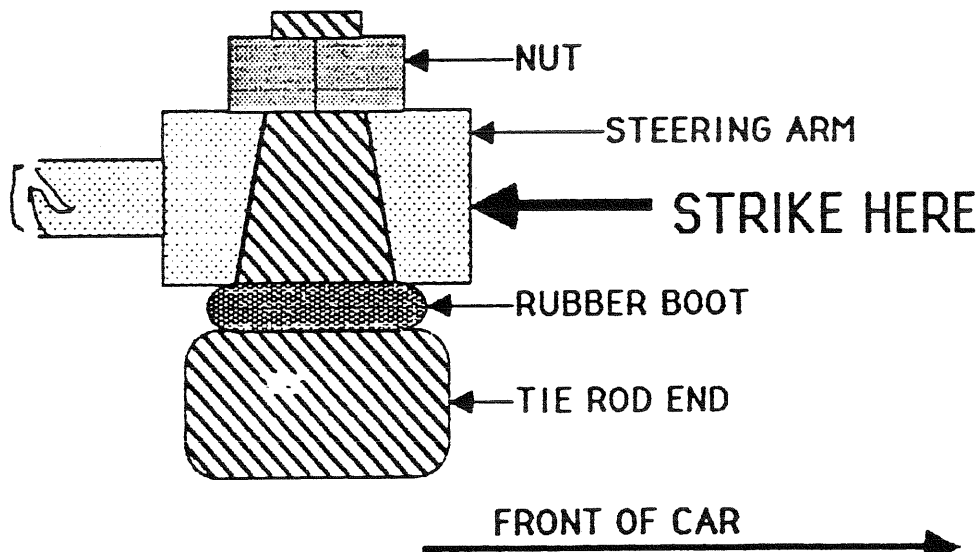
With the hubcap off, put the wheel on with two lug nuts snugged down. Use channel lock pliers or a wrench to tighten the spindle nut to a firm but light tension. Use of a torque wrench is ideal if you have one. Torque should be about 15 foot-pounds. Spin the wheel a few times. Loosen the nut until all tension is removed. Grasp the wheel firmly at the top and bottom and try to wiggle. You should be able to feel the play in the bearing. If not sure, tighten or loosen a little until you think you've got the hang of it. Tighten the nut again and spin the wheel. Loosen about one flat of the nut ($1/6$ turn), spin the wheel and test for play. Repeat until you feel play. Then tighten the nut one flat. Set the nut to the next slot of the nut in the tighter direction that will allow cotter pin installation. Note there are two holes in the spindle so you should not have to turn far. Use a new cotter pin of the correct size ($5/32"$ as I recall). Do not use a pin appreciably smaller than the hole. Bend over tightly. Remount the dust cap, wheel, and hub cap.

EASY TIE ROD END AND BALL JOINT REMOVAL

Skill Level D

To the novice it seems intuitive that to remove the tapered bolt portion of a tie rod end or ball joint it must be forced upward out of the taper. This is entirely true - except you can't do it by pounding on the end. All that accomplishes is mushrooming the threaded end. There are tools made for this which look like a two pronged fork with the prongs tapered to a

point. By driving the prongs under the ball part of the joint you force it upward. However, if you don't want to spend the bucks for one of these tools, there is another way. Simply loosen the nut except for the last few threads and then strike the end of the steering arm on the vertical link squarely with a large hammer. You may have to do this several times before the tapered part of the joint pops right out. Make sure you strike the vertical link or steering arm from the end which can't move as shown in the illustration. Be careful you do not hit the rubber boot. If you do, clean it thoroughly with lacquer thinner and patch liberally with silicone seal.



EASY FRONT WHEEL BEARING CAP REMOVAL

Skill Level D

According to the owners manual and some other incredibly nieve publications that little round black tin cap is easily removed by inserting a screw into the hole in the middle and simply turning the screw in against the end of the spindle and continuing to turn until the cap is forced out of the hub. If everyone who has done this successfully were to send me \$5, I couldn't make change for a nickel !

A better way is to weld (or have welded) a large washer to it. Be careful you don't weld the hole shut, it is a vent for the hub. Then you just grasp the washer with a pair of channel-lock pliers and wiggle the cap out. If you weld it on the car, be careful you don't set the wheel bearing grease on fire. However, the alternative is to half destroy the cap by hammering a screwdriver on the edge in several places trying to knock it outward.

SPEEDI-SLEEVES - A BETTER IDEA FOR FRONT END REBUILDS

There are several places in the front suspension where surfaces that are supposed to stay clean and smooth just can't beat the odds. For example, the upper inner fulcrum. This thing sets there in all the water, salt, and dirt you can find to drive through with no seal whatever save the rubber bushings. Naturally it is going to rust. And when it rusts, it eats up those rubber bushings like Dom Delouise (or however it is spelled) goes through pizzas. Stainless steel Speedi-sleeves are the cure. Simply file all the rust away and put a Speedi-sleeve over the ends where the bushings go. For a complete explanation of Speedi-sleeves see the Speedi-sleeve article in the Engine section. Other uses are to resurface spindles where seal wear or careless mechanics have chewed it up, the lower inner control arm hole , and the outer lower control arm hole if not too badly worn off center and it can be reamed out about .010".

FRONT WHEEL BEARING WEAR AND REPACKING WHEEL BEARINGS

Skill Level B/C

Due in part to the crude felt seal used with TR inner bearings this is not a maintenance item to be skipped over very many times before you have a dry bearing. I've seen them rusted with broken rollers and even frozen (semi welded from heat) to the spindle due to seal failure. Some cars seem to require far more frequent adjustment than others. All 3 of my cars have the same bearings, yet 2 require adjustment at least twice as often as the other.

Assuming you have a hub puller and a shop manual the job is rather easy so I won't go into the actual operation. Essentially just take the spindle nut off, remove the brake caliper (watch the shims don't get lost) and pull. Even if you don't have a hub puller the odds are you won't have a problem. Here are a few cautions and tips to keep in mind:

1. Always use a new seal.
2. Be sure you install the seal with the metal cup into the hub. The felt goes toward the spindle.
3. Moisten, but don't saturate, the seal with SAE 30 oil then coat the face of the felt with grease.
4. When installing the hub you will be deforming the metal of the seal and compressing the felt. Tighten the spindle nut to about 15 foot-pounds of torque and spin the wheel. Check that some torque remains, and if not, snug down the nut again. Loosen the nut. Retorque to about 3-5 ft.-lbs. or just a little pressure on the wrench. If you can't get the cotter pin in go looser or tighter, whichever requires less turn of the nut. Remember there are two holes and they don't both line up with the nut in the same position. Always use a new cotter pin. A cotter pin that is too small is worthless. It should be a snug fit in the hole.
5. Always remove all grease from the bearings and from inside the hub.
6. When cleaning the bearings, do not use gasoline because it etches the bearing. Use naphtha or kerosene, blow dry, then spray with brake or carb cleaner.

7. Clean the bearing inner race and the spindle thoroughly and apply a few drops of Locknut. Do not use Loctite Bearing Lock or you'll never get the bearing off again.
8. After a few days or 100 miles jack up the front end, grasp the tire at the top and bottom and try to wobble the wheel. If you have any perceptible play in the bearing you'll feel it. Retighten the bearings. This must be done with the assembly cold (not driven for several hours).
9. Check play and adjust if needed every 2000 to 5000 miles.
10. Use only the highest quality wheel bearing grease made for disc brakes.
11. Grease must be forced into the bearing between the rollers, not just smeared on the surface.

A GOOD CHEAP TOOL FOR PACKING BEARINGS

I found a neat tool at Penn-Jersey for packing bearings. It is two slightly dished disks about 4" in diameter with a threaded hole in the center. A hollow threaded tube with a grease fitting in the top and a hole through the side about 3/4" from the bottom end is screwed into the bottom disk. The bearing is then placed over the tube and the second disk is screwed onto the tube, sandwiching the bearing between. You then apply grease with a gun to the fitting until the grease starts coming out of the sides of the bearing. Disassemble the tool and clean the excess grease from the inner race of the bearing and you're ready to go.

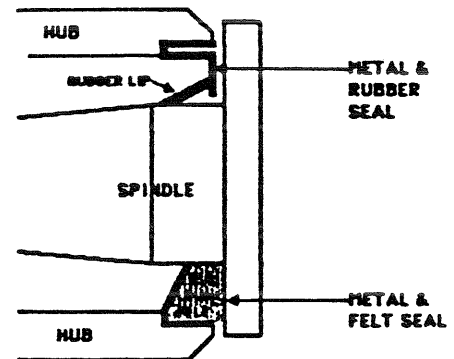
A BETTER FRONT WHEEL BEARING SEAL

Skill Level B/C

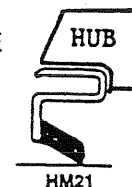
The stone age felt seal on TRs has always irritated the hell out of me. First because a new one must be compressed making accurate feel of wheel bearing adjustment difficult. Second because it takes on water, contributing to the inner bearing

going dry and failing. Third, and most important, many novices put them in backwards. It seems like TR 6 wheel bearings always need adjustment (indicated by a falling brake pedal after turning sharply when parking) and I feel seal induced bearing wear is at fault.

There is a modern seal which can be used and in my experience to date seems to work. Since the original seal worked against a vertical face on the spindle (lower half of illustration), the shoulder which conventional seals use in most cars and which we will use is quite narrow (upper half of illustration). Therefore, it is vital that you get the right seal. The correct seal is CR Industries 13612. A problem arises in that CR apparently makes two types of 13612. One is shaped like a conventional seal, but the one you need is a type HM 21 as shown here. This should be available from any bearing supplier listed in the yellow pages.



NOTE: THIS IS OPPOSITE HAND FROM ABOVE



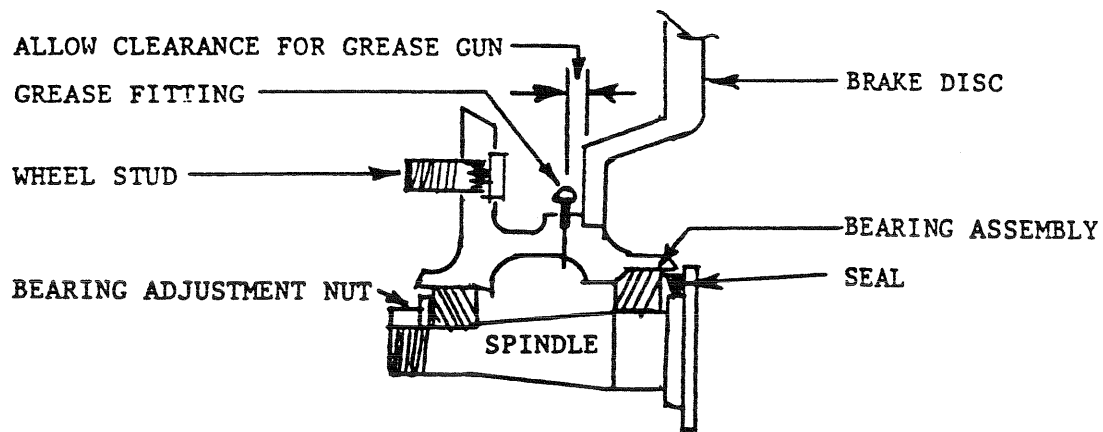
PROLONG THE LIFE OF WHEEL BEARINGS AND MAKE MAINTENANCE EASIER

Skill Level C

Repacking (renewing the lubricant) in front wheel bearings "by the book" requires removal of the front hub to gain access to the inner bearing, which in turns requires removal of the brake caliper. Caliper removal is a job which involves being careful that you don't lose the shims on the bolts and the near impossible task of getting the shims back on the bolts. This little exercise is a bitch and is enough to discourage many novice mechanics. The following can be done without hub and caliper removal. On the other hand, many of the pros just leave out the shims because they don't want to bother with them. The

shims are there to center the caliper on the disc and definitely should not be left out. It is also difficult for the inexperienced to adjust the bearings because they must learn the feel of compressing the antiquated felt seal; that is, are they compressing the felt or overtightening the bearing? These seals also absorb water and lead to premature bearing failure. See the previous article for a better seal if you feel you have the confidence to tackle caliper removal (it isn't that hard, you just have to think and be careful with the shims).

Here is a quick and easy way to help a car which has bearings in apparently good condition. Virtually anyone who can operate an electric drill and a tap can do it in less than half an hour per front wheel. Obviously it is still preferable to remove the hub, clean it, and do the drilling and tapping.



With the wheel removed and the car safely blocked up, locate the four bolts that hold the brake disc to the hub. In the "low spot" of the hub flange between the bolts, clean away as much rust as possible by chipping and brushing (rust dulls drills). Using a 1/8" drill, start drilling a hole as close to the edge of the flange as possible for a grease passage (see illustration).

The following sounds a little Mickey Mouse but if you take your time it will work fine. If you screw up, just plug the hole and move around the flange 90°. Once your hole is started (about 1/8" deep) rotate the hub so you will be drilling from the side or bottom. This way the drill cuttings fall away and can't go into the interior of the hub when you break through. Drill slowly, stop often, and put grease in the hole and on the drill bit. The grease will capture the cuttings. This is especially important when you break through. Again drilling in an upward direction, drill the hole out to 7/32" to a depth of from 1/4" to no more than 3/8". Tap threads in the hole using a 1/4" x 28 fine thread tap until the tap bottoms in the hole (don't force it). It is a good idea, but not absolutely necessary, to follow this with a bottoming tap (a tap which cuts full threads all the way to the bottom of a hole). A few gentle squirts with spray carb cleaner will wash out any fine cuttings. Now install a straight 1/4" x 28 threaded grease fitting. The ideal fitting is the one that came in the tool kit of early cars for use on the rear axle universals. It is about 1" long and is part #2, plate AU of the Roadster Factory catalog. However, I don't think they are available now. Most small fittings available at parts stores will do. I've used NAPA # 715-1081. You should visualize the location of the fitting before you drill to insure that your grease gun will have clearance to get to it.

Remove the tin cover over the adjusting nut and, if necessary, adjust the bearing. See item 4 of "Front Wheel Bearing Wear and Repacking Wheel Bearings" in this section for the proper method. Using a grease gun filled with quality wheel bearing grease, start filling the hub until grease starts to come out around the outer bearing. This should never be more than about 40 strokes of the gun even if the hub is totally dry. Replace the tin cap.

You will probably never have to grease the bearings again but you should give them a pump or two of the grease gun and check adjustment every 5,000 mile (10,000 at most).

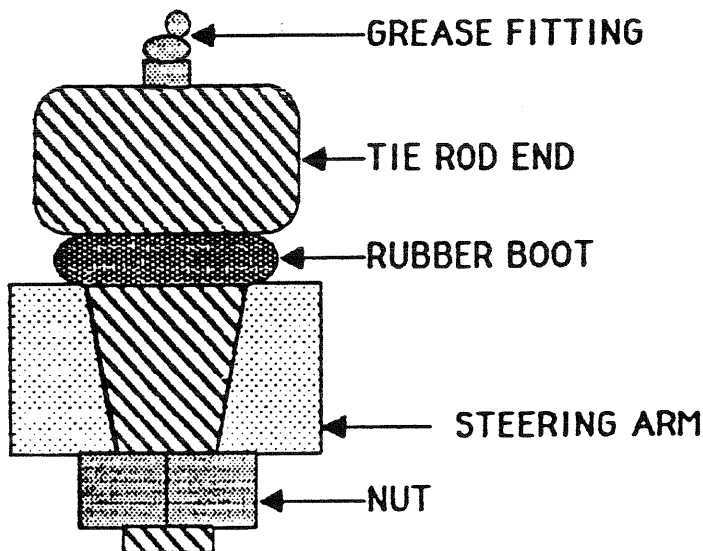
EXTENDED TIE ROD END LIFE

Skill Level D

Here is a simple trick which can extend the life of your tie rod ends considerably. This is especially true if the boots crack or come loose from the lip on the tie rod. The TR 6 tie rod end is mounted with the ball and socket up. This tends to make the small amount of grease put in a new ball joint run downward when hot, leaving the ball dry and prone to rapid wear. Simply install a grease fitting in the tie rod end and grease regularly.

Drill a $7/32"$ or $15/64"$ hole in the sheet metal plug in the top and tap this out to $1/4 \times 28$ fine thread. Do not run the tap in all the way to the full threads. Stop a little short. This will allow the grease fitting to get a firm fit in the rather thin metal. The drill, tap, and the grease in the joint should carry all the drill cuttings upward and away from the hole.

When you grease the tie rod end do not overfill the boot or it will come off the retaining groove. Only pump until you see the SLIGHTEST amount of movement of the boot, usually about 5 pumps.



OILING Your Steering Gear

Skill Level C/D

The owners handbook and all the other sources tell you to remove the plug from the top of the steering rack, put in a grease fitting, give it 5 pumps of 90 gear oil and refit the plug. In the first place, why in hell would you go to all the trouble to install and remove a grease fitting each time? Leave the thing in there. Secondly, you stand a good chance of breaking the important ground wire (the little black one) under the plug. Next, you wouldn't think you could find a grease fitting with the same threads in the U.S. Last, and most important, you can't find a grease gun that will pump gear oil!

First, remove the plug from the cap. Next remove the cap. Now that one's not as easy as it sounds because it's a big mama. However, it isn't too tight so judicious use of a large Crescent wrench, pipewrench, or Vise-Grips will usually do the job. Be careful you do not lose any of the thin washers under the cap. There are two ways to go here- the craftsman approach or the Fred Flintstone special. First, the F. F. method. Take the cap to an auto parts store and get a 1/8 x 27 pipe thread grease fitting and try it in the hole. Pipe threads are tapered so after a few turns the fitting may jam tight. If it does, you'll have to build up enough washers to make the ground wire tight. The Bugatti Especiale method is to get a 1/8 x 27 tap and tap the hole out. Reinstall the cap, the ground wire, and install a 1/8 x 27 threaded grease fitting.

Now the fun begins - trying to get gear oil into the rack. You will need a small, inexpensive grease gun - one of those ones about an inch in diameter and four inches long. Also get a flex hose for it about 12" long. Open the gun and place about 1/4" of the stiffest grease you can find on the plunger. Pull the plunger all the way back and fill the gun with 85-140 gear oil (80 W-90 will do but 85-140 will not leak out of the gun as easy). Assemble the gun, snap it on the grease fitting, and pump away until the gun is empty. That's it. Repeat about every 5,000 to 10,000 miles depending on whether your steering rack boots leak.

**REAR SUSPENSION,
SHOCKS AND
SPRINGS**

REVISING THE EARLY TR-6 REAR SUSPENSION GEOMETRY

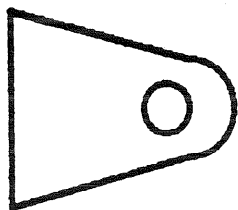
Skill Level B/C

Sometime in 1972 the factory changed the rear suspension mounting brackets. They supposedly did this to lessen squat on acceleration and to correct the definite negative camber the TR-6 took on after a few miles. It appears the springs were changed also but TR-6 rear springs are a real point of debate. At present I'd estimate there must be about 17 different varieties out there between the factory and the aftermarket suppliers. Essentially what they did was take the early inner bracket which was about symmetrical top and bottom (top illustration below) and move it to the outside. They then made a new inner bracket which was level on the bottom (lower illustration below), thus dropping the inner end of the suspension arm. Now to my mind this would swing the inner end lower and make the camber (tilt of wheel in at the top) worse. Anyhow it don't seem to work that way. So much for my career as a suspension designer at Lotus.

Since the factory did this and we all know that all factories at all times know what they are doing and are doing it for our benefit, it seems like a good idea for us to do the same. One small problem - the late inner bracket is not available.

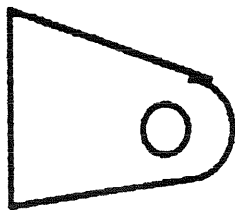
Since the early outer bracket is somewhere between the two, sloping more on the bottom than on the top (reverse of center illustration below), I reasoned that it might help to reverse the brackets and turn the former outer one over. After this profound and extended analysis I proceeded with the change, which was not too much of a job since I previously reversed the bolt thru the bushing in the suspension arm on the inner bracket. This can be done by putting about 3 washers under the bolt head when reassembling to keep the bolt from hitting the inner frame rail. Since you'll not be able to just drop the bushing bolts, and must pull the suspension with brackets attached back far enough to get the mounting bolts out of the frame, allow about a day for this job. Just use the drawings below for reference on positioning the brackets *and notches*

I *think* the rear squats less and maybe even has a *little* less camber. However the car does seem to handle better (more neutral in long sweeping curves). It has the latest version of the Roadster Factory "mild competition springs" which seem to me to be just about right. I have a set of their early competition springs which I got back at TRials 84 and they are so damn stiff I'm thinking of putting them in my Studebaker. Since I rarely have the opportunity or the nerve to push my TR-6 really hard on winding country roads, I believe we should make it clear that this is merely a report on something I tried and anyone doing it does so at their own risk.



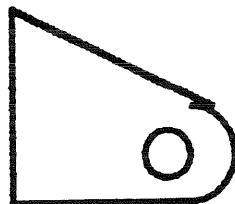
Early Inner &
Late Outer
1 Notch Up

Revised Early Outer
1 Notch Up



Early Outer
2 Notches up

Revised Early Inner
2 Notches Down



Late Inner
3 Notches up

REAR SUSPENSION BRACKETS

REAR SUSPENSION BUMP STOP REPLACEMENT

Skill level D

If it feels and sounds like you've just been rear ended by a tank when you hit a bump, chances are your rear springs are weak and the rear bump stops are gone. Spring replacement is relatively easy. It is covered in the manuals so we'll let that job slide for now. However, you can get into a real mess trying to replace the bump stops. The bump stops on the rear suspension are those rubber cone shaped things - one under the middle of the rear shock absorber arm and the other in the rear suspension arm (the big aluminum part the spring sets on). Above the latter there is a vertical protrusion on the body about 1 1/2" square which the rubber stop strikes when the suspension comes up all the way. Chances that either one still remain on your car are slim unless it has been driven gently from new. This is due to the very soft original rear springs and shocks.

Look for a washer about 1 1/2" in diameter with some traces of rubber on the face. Hopefully, you haven't tried to replace one of these and had it break off. The one in the suspension arm is especially prone to this since the metals are dissimilar (steel bolt on the stop and an aluminum suspension arm). The only cure in that case is to carefully center punch the broken bolt and drill it out. If you get off-center with the drill, you're in deep dog do Charlie.

The easy way is to heat the bolt. If there is any of the rubber left, cut it away with a knife or chisel. Now heat the top of the bolt as hot and rapidly as possible, dark red hot is ideal. An acetylene torch is best but a propane torch will do. If you are not sure the bolt is hot enough, try heating the aluminum base just below it. Let cool for about 10 to 20 seconds. Get a good grip on the washer part of the stop with a pipe wrench. Try turning with a steady, hard push. Do not hammer on the pipe wrench. If it doesn't give, try the torch again. Once it starts turning, squirt some WD-40 or other penetrant under the washer. It will probably burn off and little if any will get to the bolt, but keep it up as you keep turning the bolt. Within about 3 turns the stop should start turning out freely. When installing the new bump stop, coat the threads liberally with anti-sieze.

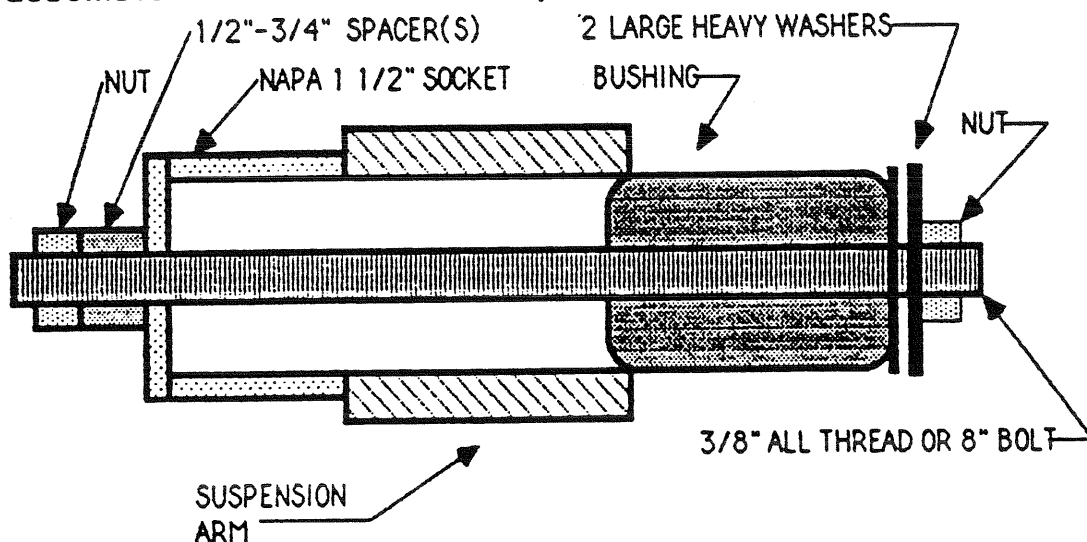
INSTALLING REAR SUSPENSION BUSHINGS WITH HAND TOOLS

Skill Level B

Many owners of cars with severe rear camber try new springs and virtually every weird gimmick you can think of but just won't concede their problem is worn bushings in the suspension arms. Maybe it is the cost of having it done or that they don't feel they can handle the job. Unless the rear of your car sets much lower than the front or the crossmembers are rusted out, the odds are you need bushings. Here is a way you can do it with an electric drill and hand tools in an afternoon.

Removing the suspension arm is adequately described in the manuals so I won't go into that. However, I can tell you that if you carefully loosen the brake line mounting lock bolt at the hose and the clip, you can ease the brake backing plate off without loosening the connection at the brake cylinder.

To remove the old bushing, drill as many holes through it as you can. The holes should be as large as possible but not allow the drill to cut into the suspension arm. The old bushing can then be easily knocked out. Clean the hole and coat liberally with Armorall. Coat the bushing liberally with Armorall and assemble it and the other components as shown below.



Tightening the bolt and nut (or all-thread rod and nuts) will ease the bushings nearly all the way in. Near the end you may have to use only the smaller diameter spacer, tightening it on the steel bushing sleeve to get the bushing fully in place.

REAR SPRINGS

There are 3 things which give TR-6 owners more trouble than probably all other complaints combined. First is rear frame rust, second is rear axles, and third is "good" rear springs. The first two you can control to some degree through reasonable maintenance. Really, we should not complain because most axles, and certainly frames, have lasted as long as the normal design life of the car. Springs, on the other hand were never really that good to begin with - especially on the early cars. Various aftermarket springs varied from some I felt like putting on my Studebaker truck because they were so stiff to some that had sagged virtually to the axles within a few weeks. Needless to say, with between 150,000 and over 300,000 miles on each of three TR-6s, we went through a lot of springs. I guess the most frustrating thing about all this was that the same terms, "stock", "competition", "mild competition", keep popping up in every suppliers ads. Are the "mild competition" the same from all suppliers? I doubt it.

I have yet to find my ideal pair. There is little doubt in my mind that the "competition" set (about 5 years old) I have on one early car are far stiffer, and perhaps longer, than the ones on the the other (Installed about 6 months ago) which I got from the same supplier.

I think there is a better way than the designations "stock", "competition", etc. Most (perhaps all) spring manufacturers code their springs with colors. The latest set of "mild competition" springs I got have a yellow and white code. I consider them just about right. They are maybe a little softer than I'd like, but certainly far better than the "God-awful stiff" ones on the other car. Also, to get the right camber and rear standing height they require the spacers sold by the major suppliers at another \$50 (high, but worth it when you see that they are machined aluminum). The '72 has the late suspension mounting brackets, which help dampen the rear end "squat" some, and is equipped with green and white code springs. I consider them acceptable. I'd recommend specifying in your order either if available (preferably the yellow/white).

BODY, PAINT,

GLASS, TOP,

INTERIOR,

WEATHERSTRIPPING,

ETC.

DASHBOARD WEEKEND

Skill Level C

There are three things that I can think of that you might want to do that require dash removal. They are 1) refinishing and replacing wood veneer, 2) revision of gauge layout, and 3) modification of wiper switch mounting hole. Why not do them all at once in a weekend.

Refinishing: The hardest part of this job is removing the instruments. It is easier if you have very thin 14" long fingers. However, if you don't, using the speedometer and tach holes for access helps. Reconnecting everything and/or making diagrams helps. Disconnect the battery. Start by removing the 2 screws holding the glove box door to its retaining bar. Next, remove the speedo by first removing the cable and then the little knurled nuts and retaining clamps. Make sure you note the black ground wires under the nuts. It will then pull out about 2" or 3" so you can see the other connections. Don't forget the trip meter reset knob under the dash. Using the same approach, remove the tach. Now remove the screws holding the wood dash to the panel. The whole dash will now slide out about 4" to 6". I prefer to remove one switch, gauge, or light at a time and reconnect them behind the wood panel but you can just as well make diagrams. The rheostat for the dash lights stays on the wood panel.

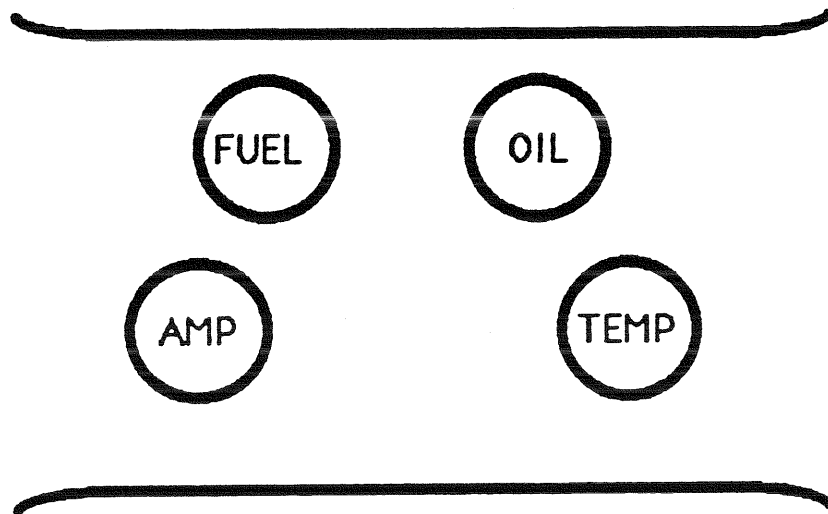
Let me hastily qualify that week-end. If your dash is badly cracked (cracks 1/2" to 1" apart over most of the dash) you can remove the old plastic coating within an hour to 2 hours at most. Use a sharp 3/4" wide wood chisel turned with the back (flat) side up to gently push under the edges of the cracked pieces and pop them up. The popping is done by pushing gently forward while prying upward on the chip (downward motion at back end of chisel handle). Otherwise you must sand or grind the plastic off and this is quite a job.

Now to the refinishing. If you want to have the original wood showing you'll have to be very careful removing the plastic overlay then sand it smooth. Be careful because the veneer is very thin. If you prefer a different wood, look under millwork or lumber in the yellow pages for suppliers of hardwood veneers. Depending on how exotic you get, it should cost \$5.00 to \$25.00. To apply the veneer sand the panel, wipe dust free, and apply liberal quantities of contact cement to it and the veneer per the instructions on the can. Pressing firmly with a hot iron helps.

There are many finishes you might use but it should be suitable for exterior conditions. Here is a suggestion for a durable and very quick finish. Refinishing with Fabulon is a quick method which results in a finish equal to urethane. It is available at most hardware stores. It is alcohol based, dries very quick and very hard. It is used for bowling lanes so it has to be tough. In addition to quick recoat time, it is not sensitive to curing time such as urethane. Most urethanes must set at least 24-48 hours between coats. If you recoat too soon, it all crinkles up. Most varnishes and urethanes give an amber tint to wood. Fabulon changes the color very little. Test finish a small area where the dash light rheostat knob will hide it to see what you'll get. You may want to stain the wood first.

Revision of Gauge Layout: By now I'm sure you have realized that the Brits make something the way they want it and don't worry about the rest of the world. Just because the rest of the world bought 90% of their cars didn't matter. A good example is the dashboards of their cars. They are made for right hand drive. With cars like the MG and TR the Brits conceded moving the two main instruments but the ones for the vital signs of engine life like oil pressure and temperature remain where they would be for right hand drive. This means they are hidden behind the steering wheel and your right hand while the two less important gauges are readily seen. Swapping the gauges is very simple. The wiring for the three electrical gauges is long enough to reach the other holes. The oil pressure line is just

long enough to reach the top right hole if you check the routing behind the dash and perhaps remove the rubber tie that usually holds it to the speedo cable and such under the hood. This tie is sort of a rubber version of a garbage bag tie. Insure that the line is supported and not able to be snagged by the steering column, etc.



Wiper Switch Mounting: As most of you know, the original Clear Hooter wiper switches are no longer made. The good news is that Clear Hooter is out of business - If anybody deserved it they did. Not even Lucas could consistently produce products of such consistently inferior quality. The bad news is that there is no close replacement for the Clear Hooter junk. Roadster factory now carries a Lucas switch that looks similar. It is described on page 53 of their summer '87 catalog. Since you have the dash off, using it is not too much of a job. However, their description of the dash mods falls to mention the wood dash must be at least partially removed and that the actual dash must also be filed out. Don't forget to do the latter while you have the wood dash out of the way.

ROCKER PANEL REPLACEMENT FOR THE EVERYDAY CAR

Skill Level B/C

I believe the correct name is outer sills. Regardless of the name, by now a lot of them are pretty rotten. I specified everyday car because this is going to be done in such a way that you can do it with fairly basic tools. If you're into showing and absolute authenticity, you'll have to go to a shop and pay about \$200 per side. If you don't mind using pop-rivets to attach them, and having a few of the rivets showing at the door post bottoms when you open the door this article is for you. The time required should be about one evening and one day. Start Friday evening and you'll have a day to spare for a little extra rust repair and rust proofing of the fenders.

Start by removing the front fender. The bumper does not have to be removed, but it makes the job a lot easier. There are 3 bolts under the headlight, 3 in the door post, 3 under the bottom of the rear into the rocker panel, and the ones you see on the top edge, plus one at the very top rear corner into the door post. Also remove the headlight because there is a brace behind it. Remove the bolts from the front of the rear fender. There are 3 in the back of the door post and 1 in the rocker. You will find it swings out about 6" with no problem. However, you must be extremely careful that you don't hit the door edge with the fender or vice-versa during this exercise. A few well placed rags taped on with masking tape is cheap insurance. Use stiff brushes and a strong cleaner like Simple Green or 409 to get everything as clean as you can, including the fender. That should pretty well take care of Friday evening and give things a chance to get dry.

Appraise the situation rust-wise and determine what else, if anything, beneficial you could do while the fenders are loose. Remember, paint and undercoat don't stick to rust, they accelerate it by trapping water. Grind away rust with a 1/4"

drill and an 80 grit or courser disc. Rust "converters" such as Extend are one of the better things available to the average guy who doesn't have \$20,000 worth of tools or the bucks to have his car professionally done.

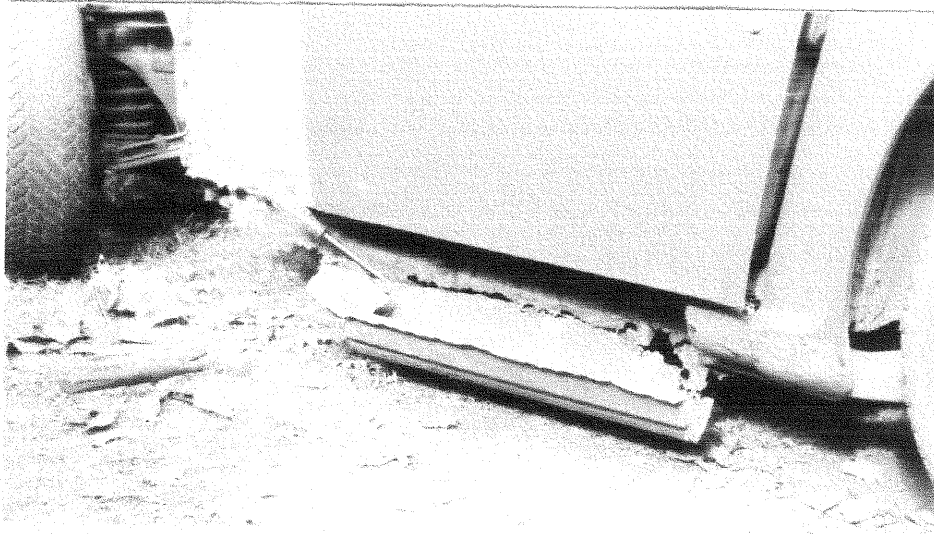
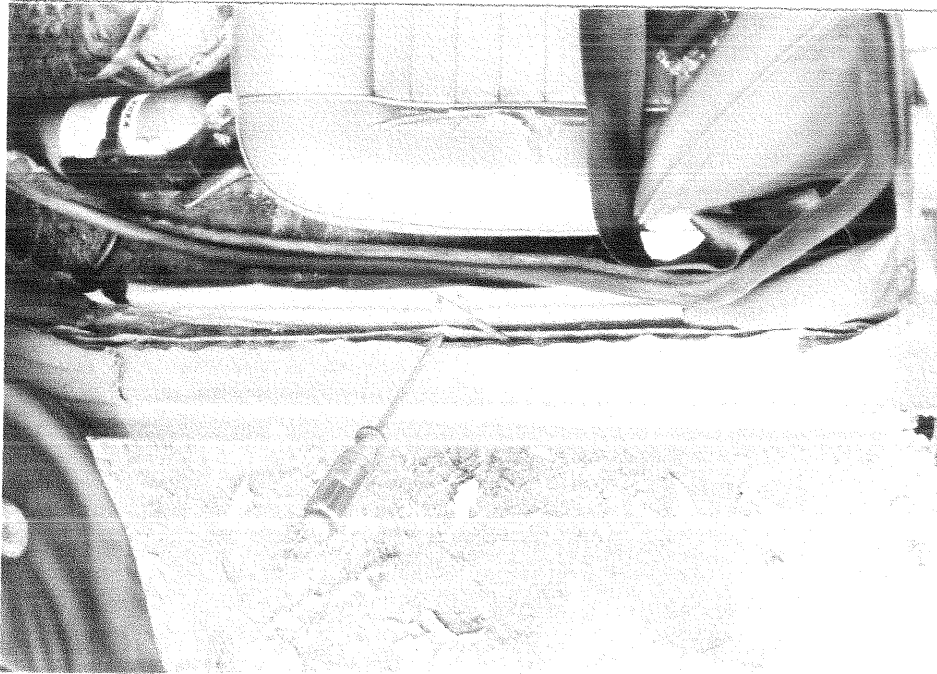
Begin by cutting the spot welds along the top of the - let me switch terms here because sill takes less time to write than rocker panel- sill. Use a large screwdriver to pry the panels apart as shown in photo 1, prying more on the sill than the inner sill. The wider you open the gap the better. Then use a small, sharp chisel as shown to cut the spot welds. Generally, the welds cut better if you go at them from both front and rear. Also cut nearly vertical or to the outside, trying to cut the outer sill metal rather than the inner sill. There are welds in the bottoms of the door posts too.

Incidentally, before I forget it, there are no drain holes below the door posts in replacement sills. You should drill at least a 3/8" hole there as the original had.

Photo 2 shows most of the rocker cut away. I used an air driven high speed grinder to do this but you can use chisels and tin snips. It might not be as neat of a cut but who cares, you're going to throw it away anyhow. Notice that in front of the door and behind the front fender the sill is sandwiched between the inner sill and the cowl. Cut this very close and bend it down flat. Next attack the lower welds. Once the sill is removed, you can again appraise the situation and determine what you'll do about the back side of the sill (actually part of the floor stamping). If the sill is bad, it's for sure this piece is just as bad or worse. The practical answer is to clean and straighten the remains as best you can and pop-rivet a 4" strip of sheet metal to it and the inner sill from front to back (sorry, I forgot to photograph this). Make sure the lower edge is level with the original bottom edge. Also make sure none of your rivets are where the bottom edge of the outer sill must be attached. When riveting the upper edge of this patch on the left side of the car be sure you don't drill into the wiring harness just inside on the floor.

Now you're ready for the big moment- the installation. The index is the door (which, incidentally, can move as can the door posts). The new sill will probably go in place in the rear easily but not go up under the door post. A little gentle lift with a floor jack (or any jack) will help but don't force it. Make sure it is not binding on the top as you apply upward pressure. Push the rear fender inward (you'll find it goes into place easily) and tap the sill back or forward to roughly line up the end of the exposed portion to the rear fender. The front edge of the exposed portion should also line up with the front of the door. Carefully close the door fully. Look at the gap under the door. If it looks reasonable, you're in business. If not check to see if you have a spot weld or other obstruction on the bottom of the door posts which is holding it down. Once the sill looks good start pop riveting the bottom edge to the lower inner sill and/or your patch. Next comes the top edge in the door opening area. The sill should be very nearly level with the inner sill. In both the above, the rivets should be 1/8" diameter, 1/8" reach, or preferably 1/4" reach, steel with steel mandrels (aluminum rivets don't compress enough before breaking) about 4" apart. An "L" shaped patch about 1 1/2" wide by 4" long (bend bottom leg out at 90 degrees about 1' long) on the front of the door post is advisable. See photo 3. The leg on the sill should be riveted as close to the bend as possible. A side brace is also desirable. However, the horizontal leg must be very short so it does not interfere with the sloped portion of the fender where it fits closely over the sill. The rear post is treated similarly.

You're now ready to bolt the fenders back on. Before you do, however, consider trying to prevent the cause of much of the rust you encountered by routing the damn vent drain hoses out of the area behind the front fender. Extending the hose through the splash shield makes all the difference in the world.



CARE AND FEEDING OF THE DOOR HINGES

SKILL LEVEL D

You say any dummy knows how to take care of a hinge, right? So then tell me when was the last time you did it? The hinges are a rather mundane piece and easily ignored. Add to this the fact that the amount of leverage that is applied to the hinge (the length of the door as opposed to the length of the hinge) and you can understand why you never really noticed them getting tight. However, when they do get rusty and tight that leverage works to flex the sheet metal in the door and doorpost. Metal fatigue and breakage of these thin surfaces can follow or even a frozen hinge that breaks a pin. The pin can also grind away at the moving side of the hinge (rust is a very good grinding compound) causing the hinge to let the door "droop" and not close correctly.

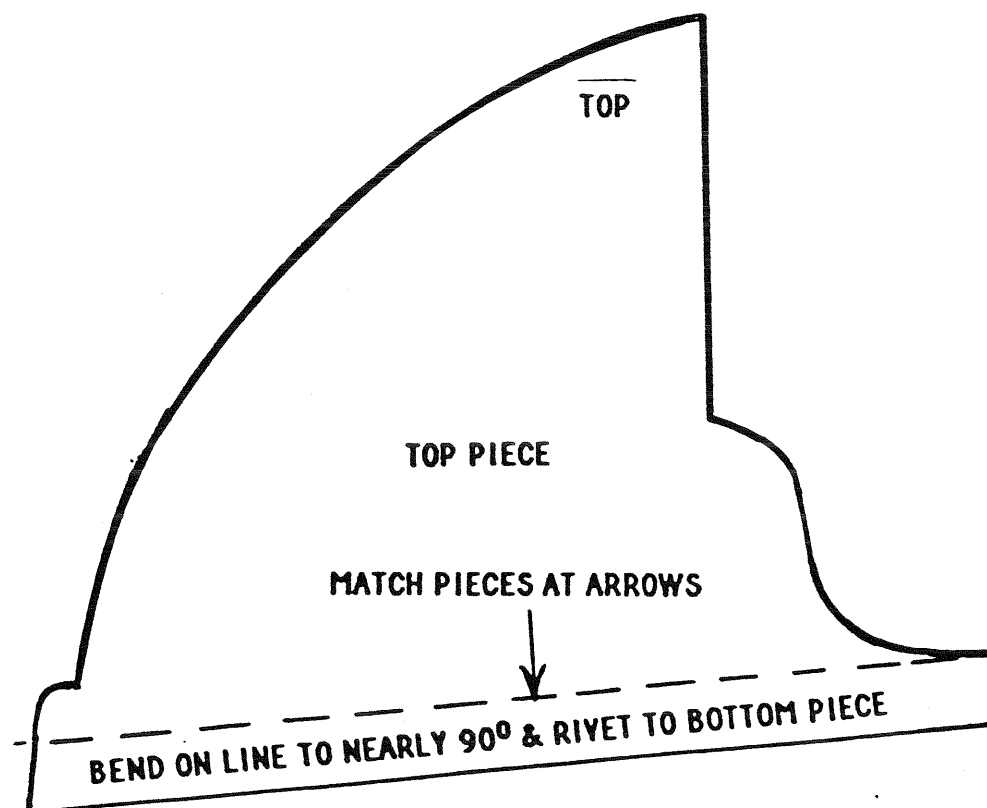
Odds are your hinges are a bit stiff. Unless they swing effortlessly, they are. First spray a little WD-40 or such on the top and bottom surfaces of the flat part of the hinge where the pin passes through and an even smaller amount at the joint between the hinge halves. The reason I say a little is because we are not trying to use the WD-40 as the main lubricant of the hinge. It is merely a means to carry heavier oil that will stay in place longer into the tight joints at the top and bottom and the two halves of the hinge. A day or two later put a small amount of 20W-50 or 30 weight oil in the same locations. All this is based on your using the car more or less daily, incidentally, and thereby working the hinges. Next liberally coat the top of the pins, the joints of the pins, and the metal surfaces surrounding them with oil. After a few days use you'll notice the hinge loosening up. Keep the whole area moist with oil from then on and you'll never have a hinge problem. To be most effective the hinge must be rather grubby looking with oil and crud (sorry about that you concurs types).

If your door stop cracks loudly when you close the door you better act fast or it isn't long for this world. A few frequent drops of WD-40 will help it a lot more than a glob of grease every 6 months. A few well placed drops of oil about the latch will help too- but that is another issue to be covered at another time.

FRONT FENDER RUST PREVENTION SPLASH SHIELDS

Skill Level D

There are two major rust areas peculiar to the TR 6 - the area over the taillight and the area around the headlight. There are, of course, several other places but these are the most persistent. To fix them correctly it is necessary to remove the fenders. However, for the relatively unskilled or those having fenders which are still rust free, the following may help to prevent rust over the headlights to the extent that a "Bondo" job will last for a couple years before the rust breaks thru again or stave it off for several years. This shield can be made and installed in less than 2 hours using nothing more than a pair of cheap sheet metal shears, a drill and 1/8" bit, some short (1/8") aluminum pop rivets and riveter, and a caulking gun and waterproof caulking. The pattern should give about 1" of overlap on the fender well and about 4 equally spaced pop rivets there will secure it. Use 22 gauge galvanized steel or aluminum available at any hardware store in small sheets. Clean and liberally caulk the fender well before installing. Caulk the edge abutting the fender after. Make a trial pattern from stiff paper first and trim to fit your car if necessary. Bend this piece to nearly 90° on the dotted line and rivet to lower piece. Match pieces or patterns at arrows. Next two pages are one piece.





TOP

MATCH PIECES AT ARROWS

TOP HALF OF LOWER PIECE

MATCH PATTERN TO BOTTOM
HALF OF LOWER PIECE PATTERN

B 10

TOP

LOWER HALF OF LOWER PIECE

CUT HERE FOR EASY FUTURE ACCESS TO BUMPER BOLTS

RUST PREVENTION FOR TR-6 REAR FENDERS

Skill Level D

That all too familiar bubbling over the tail lights is one of the ironies of the folks at Coventry trying to do something right and botching it. They sprayed undercoat in the area of the tail light by the pound. At first this sounds good, but what actually happens is that the stuff piles up on the top surfaces until gravity makes it fall away. Drying and shrinkage do the same. Therefore, the undercoat actually forms pockets to hold dirt which the wheels throw up. Each time this pocketed dirt gets wet it stays wet for days and weeks. Some cars are better, some worse but it happens to them all.

About one or two hours work will help a lot to prevent this rust. All you need is a pair of metal shears, a drill, a piece of 20 or 22 gauge steel sheet, 8 to 10 1 inch metal screws or pop rivets, a little undercoat and some butyl or urethane window caulking. Incidentally, van window cut outs are an excellent source of free sheet steel. I prefer cutting up Japanese hoods because they are thinner and softer, but then I'm prejudiced.

Cut out the full size pattern of the splash shields on the following pages and trial fit it. Cut the splash shields and bend them to fit. Paint and undercoat them. Clean the wheel well area thoroughly. Install onto the rear face of the fender wells and the frame to fender brace with the sheet metal screws or pop rivets. A desirable option is to caulk the back face of the splash shield where it contacts the wheel arch. Next caulk the joint between the shield and the clean fender surface. A desirable option is a final light or medium coat of spray undercoat over the whole thing. While you're in the area, clean and caulk the vertical groove at the front edge of the fender. This is a perfect mud trap. It is also nearly impossible to seal the area around the tail light opening in the rear fender well. First, remove the cardboard trunk side panels. Clean the light recess thoroughly. Caulk the hell out of the edges. Drill a 3/16 inch hole in the bottom (about under the side light wire) to let out the water that will get in no matter what you do.

TOP

BEND
LINE

MATCH TO
NEXT PAGE

B 13

MATCH
LINE

MATCH TO

PREVIOUS
PAGE

BEND LINE

MATCH

LINE

B 14

MATCH TO

FOLLOWING
PAGE

MATCH

LINE

MATCH TO

PREVIOUS
PAGE

← NOTE: IT IS DESIREABLE TO MAKE
AN ADDITIONAL PIECE TO FILL
BETWEEN THIS EDGE AND THE BODY.

BEND

LINE

BEND

LINE

BOTTOM

B 15

ADDITIONAL REAR BODY SPLASH SHIELD

Skill Level D

Shown on the next page is a small additional splash shield which you can add to the rear fender shields shown in the previous article. It is attached to the bottom of the rear bumper brace tight against the frame rail by a couple of pop rivets or metal screws. It is best made from 22 gauge galvanized steel rather than aluminum because it needs some spring to the metal for good fit. It also helps to bend it slightly upward before installing to get a good fit, especially at the back. The back edge goes under the body edge and the side goes inside the fender where it will have a gap about 1/8" to 1/4" above the fender lip. You can put it totally inside if you wish but I found that it did not require any drilling of the body panels if installed as above. Caulk the rear edge with about a 1/4" bead of waterproof caulk, body sealer, or silicone. If properly bent the back edge will come up snug to the body. Caulk the side except for about 1/2" at the front to let trapped water out. Once in place, make a joiner piece about 6" long by 4" wide bent at about 90° on the 4" dimension and use this to join this shield to the one in the previous article. About 4 pop rivets should be ample to hold them together.

ADD 1/2" TO THIS LINE FOR CORRECT LENGTH, PLUS A
1/4" FLANGE BENT UPWARD. REMOVE 1/2" FROM OUTER
END OF FLANGE.

BACK EDGE

B 17

SELECTING A COLOR AND A PAINT SYSTEM

The following is intended for both those who wish to do their own painting and those who will have it done professionally. In both cases remember three basic principals (1) time is money unless it is your time (2) the more steps and products used, the higher the cost in time and materials (3) 90% of the cost of a show quality paint job is in the final body work, leveling of primer-filler coats and in sanding and buffing the finish (if you go to the additional step of sanding and buffing).

After you have read the following and decided on a system, go to your local body shop supplier, not a discount auto parts store, and get all the information on each product they have. This overview can not go into such things as spraying pressures, mixing proportions, etc. which are fully covered in the literature. I think you will also be pleasantly surprised at the information available and how helpful the paint technicians can be. Many manufacturers such as Dupont and Ditzler also put out complete product line books and books that tell you how to paint and how to trouble shoot your problems/mistakes.

COLOR SELECTION.

Color is a very personal thing. You may feel that not only the original color, but the original formula, must be used. For example, your Triumph TR 3 must be Signal Red lacquer, a hard formula to find. A bright red such as Porsche Guards Red, which is a current color is readily available in modern acrylic enamel or lacquer but it isn't original. If original is mandatory then you either have to find the formula or try to find some original paint which was protected from weather, undercoat staining, etc. and have the paint custom mixed to match it. Even then you're not out of the woods. For instance, I have the formula for MGA Old English White which can only be mixed in the old fashioned and troublesome nitro-cellulose lacquer or the equally troublesome alkyd enamel (more on these later). Incidentally,

British Racing Green is not a color. There are probably 50 to 100 different greens that have been used on British cars and even when a manufacturer labels it BRG, that doesn't mean a thing to the paint supplier without the formula. Conversely, you may have a car which only came in some drab or horrid color (the Brits were good at both. My MG TC was black with an apple green interior when new). How do you find "the" color? Well, there is the old adage that to win with an MG or a TR or a Jag it must be red. On the more practical side, here is a method for those that are not very good at visualizing. Try to find a car of similar shape and proportions (not necessarily size) and look at the colors used on it. For example, a Sunbeam Alpine/Tiger has roughly the same lines as the '57 Thunderbird which came in some pretty wild colors for the day. Or in the sedan arena, the Mercedes look Ford Granada. If a color similar to what you are considering can be seen on a similar car it can save you from making a terrible mistake or help you to decide on the "perfect" color. If you are totally undecided go to a shopping center on Saturday and just ride around looking at colors no matter what kind of car they are on. Another method is to paint a model. Now I know you don't want to paint your mint \$75 Matchbox MGA or Corgi TR 2. But there are thousands of Tootsie toy TDs, Jag 120s, and TR 3s out there that aren't good for anything else and will cost you about \$2. Lastly, do not rely on color chips in the paint dealers color books and above all do not trust a color in a sales brochure.

BODY WORK.

Body work is a whole additional art within itself and we won't cover it here. However, I will say that it is far harder to learn than painting. Most people make the mistake of thinking they can save money by doing the body work then having a pro paint the car. After the nice shiney paint is on they discover the body work that looked straight to them in primer usually has more ins and outs than Marilyn Monroe. For those doing their own body work, I strongly suggest you take time to apply a thin

coat of gloss black to each panel. This will clearly show any waves, dents you missed, etc.. Make the paint as shiny as possible but don't build up a heavy film. Do this by using rather thin paint, good quality thinner, and careful application. Look closely and turn the panel or move your viewing position to several angles to make sure it is straight and wave free. Also trial fit the parts first. This is especially true with cars having no finish body panels between the hood and fenders and trunk and fenders such as Triumph TR 3s. It is pure Hell to find the beautiful paint job you just finished or paid for ruined because a door edge hits a fender when you open the door, or a fender edge has to be reshaped because it doesn't have the same curve as the body where they meet.

WHICH CHOICE COMES FIRST - THE BASE OR THE PAINT ?

Which base products (primers, etching primers, sealers,etc.) you will use is somewhat dependent on which finish you chose. You may decide after reading the following that the finish you were absolutely convinced was the only way to go is going to take too much work and/or skill to do yourself or cost considerably more than you have budgeted. You are going to have to read through then back track to determine which of the considerable number of possible combinations best fits your skills, budget, etc.

One of the problems you face today is too many products. Years ago there were only two paints - nitro cellulose lacquer and alkyd enamel and you pretty much used the same products under both. I learned to paint with these and, believe me, you don't want to try. With nitro it is impossible to repair dark colors without a tell-tale ring. Rain drops will discolor it. It gets opaque and rainbows like an oil slick if put on in humid weather. Incidentally, this humidity problem also exist for acrylic lacquers discussed below. Nitro also dries very quickly and is hard to keep wet enough when spraying. There is only one good thing I can say about it - a black nitro job is the softest, richest black you'll ever see. Alkyd enamel is cheap and durable and has a good gloss. But you better be damn good and have a

dust and bug free paint area because it takes almost all day to dry. And, if you get a run in it you can't sand it out and repaint for about a week. Below we will go into most of the systems and variables within the systems using Dupont products for reference. Although you may find all the product numbers laborious reading, you'll find sorting out the multitude of products available more time consuming. Other products are just as good and in some instances you have more color choices. For example Ditzler has more fleet colors (colors not used for any specific vehicle) and Siken, a Dutch Urethane, comes in literally thousands of progressively changing shades. Before you rush to your Sikens dealer let me tell you it is very slow drying and difficult to use. Many pros won't touch it unless they can stick the car in an oven immediately.

METAL PREPARATION AND PRIMING.

The preparation - etching fillers, primers, etc. are the base of the job. If they aren't any good your money and time are wasted. For those having the job done, you'll have to trust the shop and you may want to skip ahead to the paint sections. For the do-it-yourselfer the base system depends to some degree on the finish you select. Basically, the primers and such for the "simpler" finishes - acrylic enamel and acrylic lacquer - are cheaper and there is less waste because they are "photochemical reactive", that is, dry by air and sunlight. Primers for some of the "exotic" finishes are two component which are hardened in a few hours or minutes by a catalyst additive. For a shop the wasted product costs for two component systems are relatively low because they shoot the whole car. However, for your small uses of priming a panel at a time or going back over spots the cost of waste can be relatively expensive.

To keep it simple and within the range of the most practical products here are the suggestions for primers and fillers.

Our economy job choice is washing bare metal with old fashioned Metal-Prep and its companion product Conversion Coating (or their equivalent for aluminum). Follow with one of

the single component (air dry) primers such as 181S or 100S listed below. There are cheaper primers such as lacquer primer-surfacers but they don't fill as well and tend to dry too quick causing a dusty coat with no adhesion. Thinner is important here also, as it is with the other primers listed below. Generally speaking the cheaper the thinner the quicker it dries. Thinners are available in three ranges of drying speed usually expressed as air temperature ranges such as 55° to 70°, 70° to 85°, and over 85°. Primers and primer-fillers must go on wet and "flash" dry (get a dull opaque look) before the next coat. Here, and with all following steps, you must sand and 'tack' with a tack rag between applications (not necessarily between coats, because you can lay on several coats of primer at one time with only flash time between coats).

The next choice is the higher tech, higher cost, one step method. Start by washing with Dupont 3832S Enamel Reducer (for enamel the term is reducer, for lacquer it is thinner). Follow with equal parts of 615S Variprime and 616S Converter. This latter is a two component system. Although it supposedly has a three day life, the amateur will no doubt waste a fair amount of it.

In either case, the next step is the same - 181S (red oxide) or 131S (gray) Fill & Sand primer surfacer thinned with 3661S lacquer thinner. For aluminum this must be preceded by 2085 zinc chromate primer. Zinc chromate is very thin with little color and runs very easily. It will be a real test of your spraying skills. An alternate that can be used on aluminum or steel is 100S. And if you're really looking for a good old time product with good filling qualities and excellent long term life (aging) there is the enamel base alkyd resin primer 3055S Preparakote. Minor imperfections should now be filled with either a "glazing putty", which is an air dry product that will shrink many months hence, or an epoxy putty such as Evercoat Polyester Glazing Putty. The latter is highly recommended. After you're sure you have all the waves and nicks filled, apply 1984S, 1985S, or 1986S Velvaseal sealer in preparation for the finish paint.

Again, the above are only for the "simpler" finishes - acrylic enamel and acrylic lacquer. I say simple but some of the derivative systems of these can get pretty exotic as you'll see below. However, the preparation and priming are the same. For Imron, the product that seems to quicken the pulse of the unknowing and impressionable, the Variprime/Fill and Sand system can be used but a special two component primer, Corlar (translation = \$) is recommended. When you buy a gallon of Corlar or Imron you really only get 3 quarts. Then you have to buy the catalyst.

FINISH COLOR SYSTEMS.

The basic differences here are in labor and gloss. Enamels are cheapest and easiest to apply with good gloss. Lacquers have more softness and depth and are more forgiving of the amateur, but must be rubbed out. Clear coats add gloss. Imron and like products have durability and high gloss but a plastic look and are generally much harder to apply smoothly.

Centarl acrylic Enamel.

This is your basic durable one component paint. What you see is what you get, so to speak. It is thinned with one of three reducers (8096S hot weather, 8093S mild weather, 8022S cold weather). Acrylic enamels dry dust free in about 1/2 to 2 hours. They are the least expensive (except for alkyd enamel) and the "left overs" can be saved and used later if kept frozen or without oxygen (as in a full can). Repairs are more difficult than lacquer because the spot repair goes " on top" whereas lacquer "melts into" the old finish. There are two variables here. The first, addition of 782S hardener, is highly recommended but the left overs can't go back in the can because 782S is a catalytic hardener. The other is sanding smooth with 1200 or 1500 wet sandpaper and then buffing with polishing compound. Let me digress for a minute to explain why you may want to sand and buff. When paint is sprayed, it is literally thousands of little drops being splashed on the surface. These little drops flow together in theory and with skill. Depending on the degree of the splattering effect and flow (or lack thereof)

Irregularities are left in the surface resembling the skin of an orange- hence the term "orange peel". On the other hand, if applied too lightly the paint will go on dry and dusty looking. By lightly sanding you can remove the orange peel or rough surface and then obtain a smooth surface by buffing out the sanding scratches. If you are going to do the latter make sure you put on enough paint. If you spray light coats this may be 5 coats as opposed to 3 heavy wet coats. The resulting finish is very nice with high gloss and easy to care for. This is what I recommend for the "driven" car.

Centari 2000.

A lot of todays paints are formulated to make up for the lack of skill of the painter in getting single stage paint on smooth enough to have a decent gloss and this is a good example. This is Centari with two gloss additives which essentially put more clear (which gives gloss) into the mix. For the do-it-yourselfer I see no advantages and I really don't know any pros using it.

Centari Basemaker Base/Clear System.

This is a two stage system which is especially good for metallics. However, the two stages require more than two components. As with 2000, it makes up for skill. Many of todays metallics are translucent and it is virtually impossible to get them on in single stage paints without the metallic sagging or running. The base color coat mixed with 8280S (warm weather) or 8260S (cool weather) Basemaker and 782S Activator can be applied virtually without regard for smoothness. It just has to be uniform, especially if metallic. Follow after sufficient drying time (1 to 4 hours) with 780S clear and 782S. The clear can then be "poured" on and if any runs occur they can be easily sanded out and buffed within a few days. This system is very time sensitive because the clear can soften the base and make it sag, but it allows the less skilled painter to put the color on with virtually no risk of runs or dull, dry finish. It is a Godsend for the amateur using metallics. It will also give more gloss than Centuri, especially if sanded and buffed.

Speedy Basemaker/Clear.

This is the second generation Basemaker. As with other paints, it is the next step in the never ending search for better finish quality with less user skill and at lower material and/or labor cost. The advantages of Speedy Basemaker over the Basemaker system are (1) no activator in the base coat (2) the color coat can be cleared in 5 to 15 minutes with either 780S Centari Clear or 1080S Euro Clear.

In my opinion the Basemaker or Speedy Basemaker system is the only way to go, especially for metallics, on high quality daily driven type cars. It will give you lots of gloss but it will not give you the depth of a lacquer or lacquer/clear job.

Uro Clear and Cronar.

I will mention these only briefly because they are rather specialized systems which can be used separately or in combination with Centari and each other. The Uro system also includes a high fill primer. Uro dries quicker than any other urethane clear and supposedly give more gloss than Centari Clear. For our purposes, consider it a variable of Centari Base/Clear. The Cronar system's biggest advantage is that it is isocyanate-free. This is the nasty stuff that does you in with products like Imron. Cronar has superior flowout and gloss. In single stage form, the enamel is mixed with 9404S Initiator and 9475S or two slower drying reducers. In two stage form, Cronar Base is mixed with 9365S or 9385S Basemaker and followed about 30 minutes later with 9500S Cronar Clear, 9504S Initiator, and 9575S or slower Catalytic Reducer.

Lucite Acrylic Lacquer.

Now we move from the enamels and urethane enamels into a whole different type of paint. Acrylic lacquer has a softer and deeper look than enamel. However, it chips and cracks easier and at an earlier age than enamel. As with single stage enamel, you have an easily used, put it back in the can product. Lacquer is very forgiving for the amateur and for repairs. If repairs are

skillfully done the new paint actually softens and bonds into the old (within limits). You only need to decide on the correct thinner for the temperature , 3696S hot weather, or 3602S cool, and perhaps some retarder. Most people put lacquer on too dry. It should go on wet and flow out, then glaze over with a slightly opaque look. Runs and mistakes are easily sanded out the next day and then the whole job can be buffed (all lacquer jobs must be rubbed out). An older product that helps with flow and gloss is 300S Uniforming Finish. It appears to be a combination clear coat and retarder and it is especially usefull to the relatively unskilled in blending a repair. No hardeners or special additives are needed. This system is my recommendation for the "class" show car or pampered street machine. If you want to blind them with glare, add a couple of final clear coats or move on to Imron and Cronar.

Lucite Basemaker Base/Clear System.

Here again we are into a system with variables, two component products, and more products to buy. Lucite Base Color is mixed with 8375S Basemaker or 3602S thinner. The clear coat can either be 380S Acrylic Clear Lacquer or 580S Urethane Clear Enamel with 582S Activator. The latter offers little if any advantage over the Centari/Clear system.

Imron.

What gave this product its great reputation was superior gloss and "hardness". However, this was in the days when clear coating was only done on Mercedes and a few other European cars. The "hardness" however still remains superior to anything readily available. Actually, it isn't hard. It is resilient and that is why it doesn't chip. If you were to examine a golf ball size mass of Imron, you'd find it would bounce just like the ball. With all the above products you start with a gallon of product and add thinners, activators, etc. However, with Imron, you get 3 quarts and add a pint of 195S Activator and a pint of 8575S or slower reducer to get a gallon of ready-to-spray product. Imron 500S Clear is now available for even more gloss. In my opinion, Imron has a plastic look

especially with dark colors and there is little reason to use it in light of its cost and the new base/clear systems. However, one area where it does excel is on frames and inner fenders which are exposed to stone chipping and fuel.

SAFETY.

Back in "the good old days" most painters sprayed without even a dust mask. With enamel your nose got full of sticky paint and with lacquer your lungs felt a little raw but, what the hell, we were tough. Today you might get by without a mask for the basic products if you are outside but for the urethanes and polyurethanes a cannister mask is mandatory. Once your lungs are coated with Imron it is very difficult to breath. Even if the film doesn't get you, the isocyanates will. Today, professionals even wear sealed full body coverage with hose fed fresh air. To put it as bluntly as possible, you don't get a second chance with this stuff. Read the product labels carefully and use the recommended correct OSHA approved safety equipment.

CORRECT SILVER OR MORE SILVER SILVER FOR YOUR WHEELS

If you're about to refinish your wheels you'll find there is no paint formula available for the wheels. Contrary to what you may think, silver ain't silver, so to speak. For example, General Motors silvers of the late '70s looked fine on a car but had a slight purplish cast when on a wheel. For those looking for the closest silver to the original, '74-'78 Ford Silver Poly (code 1G) applied a little wet is perfect. So much for purists.

For those who want a little more silver, try '75-'77 Porsche/VW Diamond Silver Poly (code L-97A). Ditzler's number is DAR2803 and Dupont's number is 43881AX. For some real sparkle, use Dupont Centari Basemaker base coat 43881-AWX, '75 Volkswagen Code LE7Y, followed by Centari Clear. Both the base and clear must have 782S Activator added.

Be sure you use a mask in accordance with the instructions on the paint product containers when spraying the above or any urethane type paint.

DOOR HANDLE ESCUTCHEON PROBLEM

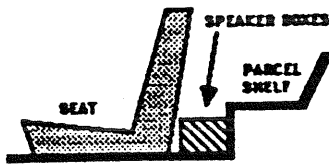
Take a good look at those black plastic things behind your door and window handles before you order new ones. The replacement (6233843) is about twice as thick. The alternative is to cut or file it down (life's too short).

WINDSCREEN TO DOOR GLASS SEALS

You originality types be forewarned. The replacement seal #620913 is considerably different than the original. It is larger in diameter and is foam rubber. This is not to imply it is unsatisfactory. It is not. In fact, considering the fit of some windows, it might be better. I do find the price (about \$6 a foot when most weatherstrip run \$1 to \$2 a foot) unreasonable. But then I always was a cheap bastard.

BUILT IN STEREO SPEAKERS FOR YOUR TR 6

Skill Level C/D

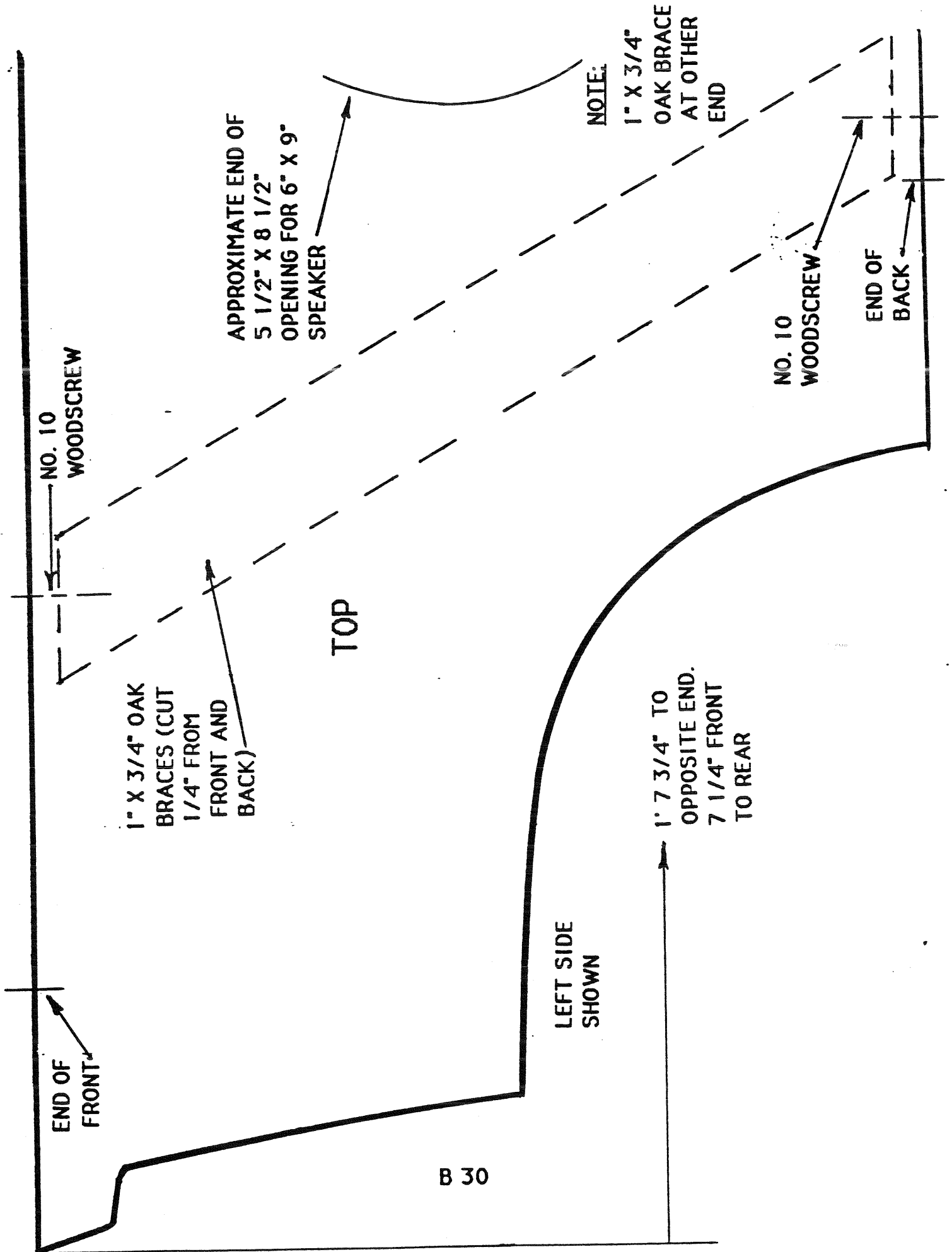


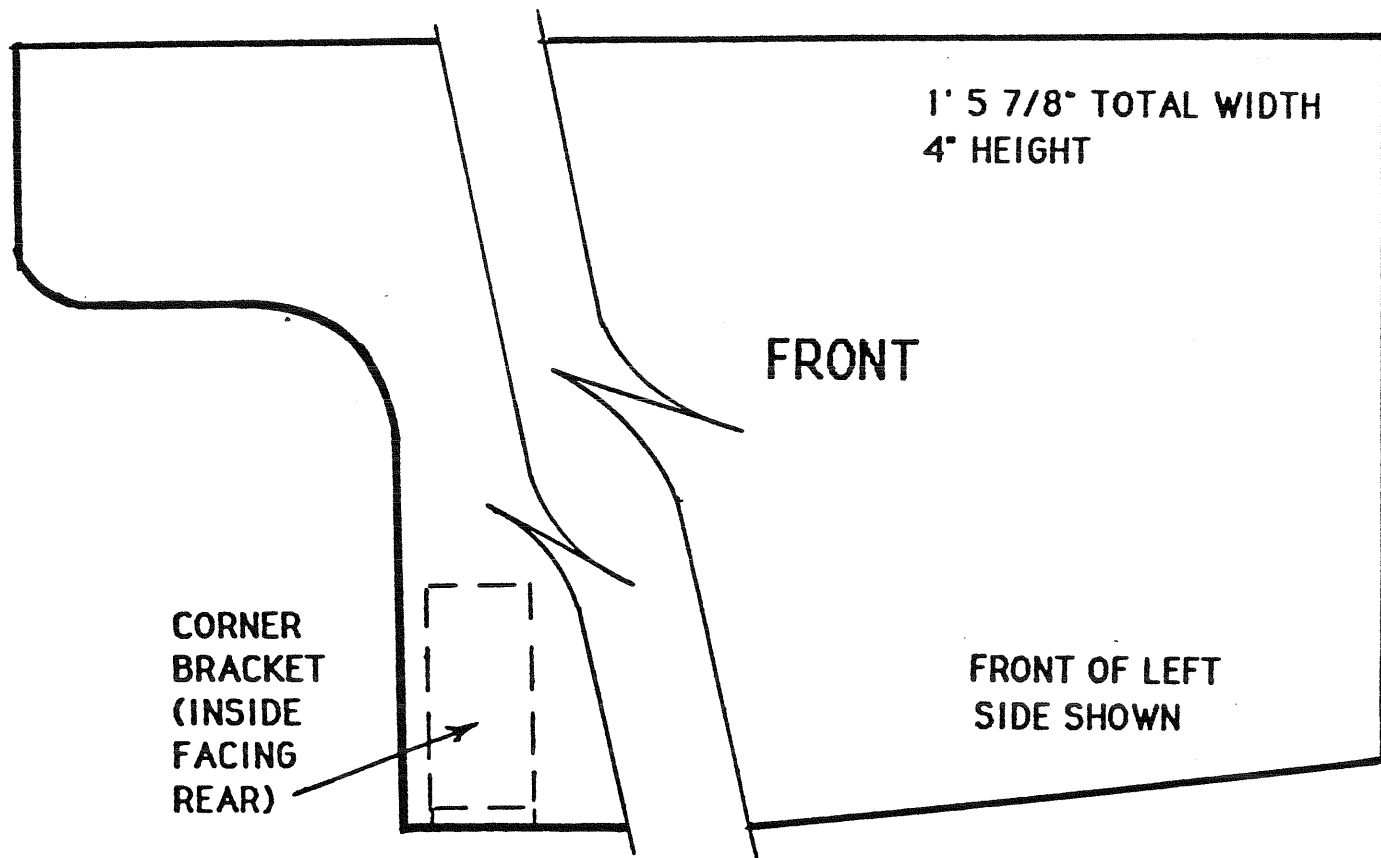
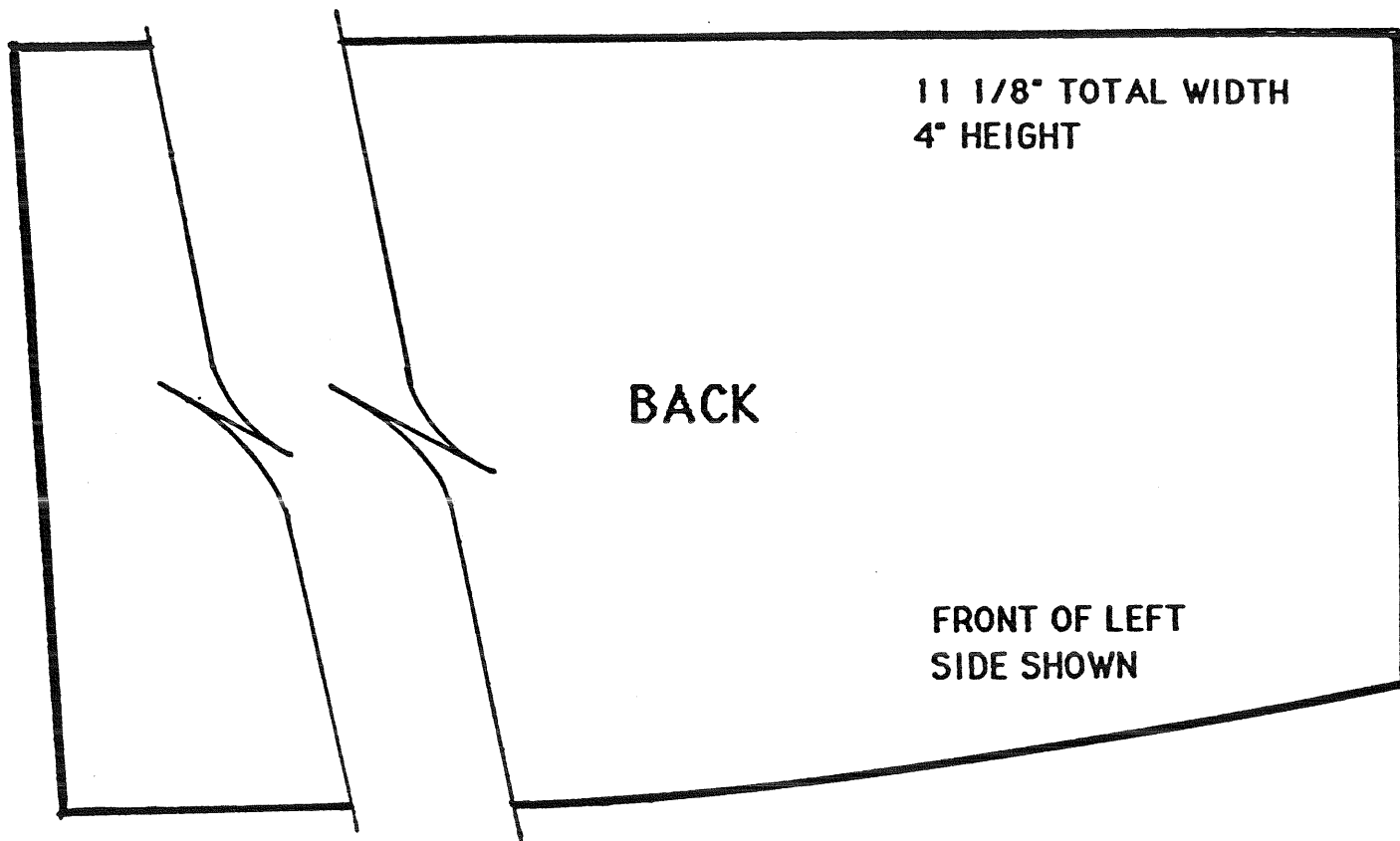
The speaker set up shown here will give you speakers with a built in look and utilize space that is virtually useless in most of our cars. They are not so tempting to thieves since they are not too noticeable and don't look like they are easily removeable.

Those of you over about 5' 10" or 6' should check legroom first.

These permanent boxes are made from 1/4" plywood, a piece of 1" x 3/4" oak molding, four 2" x 2" steel corner brackets, and a little bit of carpet or vinyl to match your carpet or upholstery. Full size patterns are shown on the following pages. It should take you less than half a day to make them using a hand or circular saw, a jig saw or sabre saw, and an electric drill. You should trial fit some cardboard templates of your own first.

Cut the top and draw on it the hole for the speaker. The hole does not need to be too neat since the speaker will be below the plywood. Then drill the holes for the speaker grill and bolts. These patterns were made for Jensen 6 x 9 speakers which were 4" deep. Should you use a deeper or larger speaker, make allowance in your patterns. Cut the oak (pine is too soft) braces, making sure you have 1/4" at each end for the front and back, and attach them to the underside of the top. Oak is hard and splits so drill all holes and use No. 10 screws. Attach the back to the oak braces. Drill and fit the front to the top and then remove the front. Attach two of the corner braces to the bottom of the front near the ends. Place the front on the car floor and place the box on it. When properly located, drill a hole for each of the brackets through the floor and fasten the front down with sheet metal screws. Cover the top with carpet or vinyl, leaving enough to fold down over the front and glue in place later, then bolt the speaker and speaker grill to the bottom and top respectively of the box top and place it in the car. Attach the box to the front with No. 10 screws in your predrilled holes.





THEFTPROOF SPEAKERS AND A PARCEL RAIL

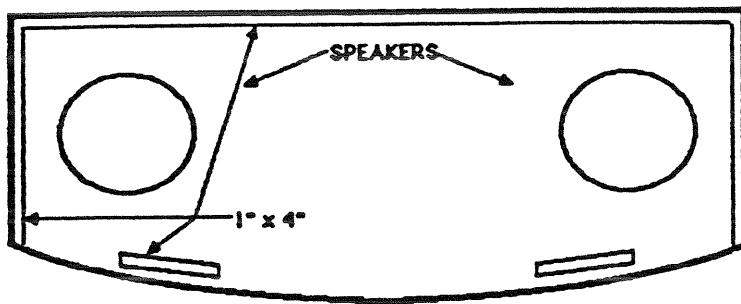
Skill Level D

After daughter, Shirl, had a set of very expensive surface mount speakers stolen from her TR-6, I devised the following inexpensive installation which is a visual deterrent at the minimum because of the built in appearance. Construction time is about one hour. Materials required are an 8' 1x4, a piece of plywood about 1' -6"x4', and some additional carpet or vinyl to cover the new parcel area.

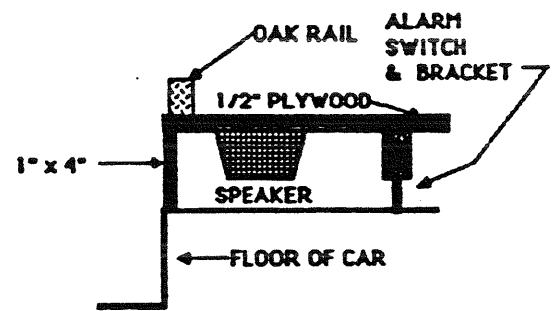
Start with the plywood cut to width. Nail the 1x4 to the front edge and the side. The sides should be cut to about 1' -4" or 1' -2" (length is not critical). Lay the new panel in place and measure the distance from the vertical edge of the floor to the overhanging edge of your new parcel shelf. Now mark off the rear edge of your plywood by this dimension from the rear upholstery panel. Cut the curved edge and install the rear 1x4 supports making sure they set in far enough to clear the forward sloping rear upholstery panel and do not set on the differential bump. Cut the speaker holes to fit and install the carpet.

If you are not going to use an alarm system place 2 right angle brackets on the shelf of the car where they can be attached to the side 1x4's. Working through the speaker holes, secure the new shelf in place to the brackets. Install the speakers with pop rivets, or use wood screws and grind the slots off to prevent removal. With an alarm, use brackets to position one or more plunger type switches under the shelf.

I have found that a finished 1x1 or 1x2 hardwood parcel rail at the front of the shelf is very worthwhile. It keeps everything from sliding forward and under the seats. Simply drill 3 holes vertically in the rail and secure it with pan head chrome wood screws. One last tip--paint over those nice shiny nameplates on the speaker grills with flat black model paint-- Jensen, Sanyo, etc. perks up interest much more than "unknown".



TOP



SECTION

**ELECTRICAL,
ALTERNATOR,
SWITCHES,
INSTRUMENTS,
AND RADIO**

ONE OF JOE LUCAS' MOST INSIDIOUS INVENTIONS

All Skill Levels

Picture yourself in the worst situation imaginable in your TR 6-- dark rainy night, on a country road, etc. and your car dies. The first thing you do is hit the 4-way flashers. Surprise! They don't work. If you ever took apart one of those hazard flasher switches on a car prior to *CC75,000 you'd see why. Inside is a loose little piece of copper, a little roller that looks sort of like a weight lifters dumbbell, and a good imitation of a ball point pen spring. If you look at a wiring diagram you'll see that in the normal position the dumbbell connects two terminals for the turn signal circuit. When you flick the switch, the ball point pen spring is supposed to flex in an arc and roll the dumbbell down to contact the two hazard flasher terminals. The neat thing is that it don't! Aside from the ridiculous \$16 plus shipping for this \$1.29 item, this damn thing can get your bacon cashed in. Pardon my emotions, but I'd like to put the President of Lucas in an electric chair with one of these switches in the circuit so he could use it to turn off the chair when the power comes on.

Anyhow to fix it is a simple job requiring less than an hour. You will need about 2 feet of #12 or #14 copper auto wire, 5 male spade connectors, 2 female connectors, and a Radio Shack #275-704A 12 volt, 20 amp switch panel (or equal part of your choice). The old switch is removed by depressing spring tabs on the top and bottom rear. It is much easier with the tach out; but then, it ain't all that easy to get the tach out. Assuming you have accomplished removal with most of the dash still in place, use about 4" of the #12 or #14 wire and two male spade connectors to join the green wires formerly connected to the top terminals. This puts your turn signals back in operation (check them). Tape the connectors to insure any bare part of the spades can't short out. Select the location for your replacement switch and mount it connecting a ground wire from the ground terminal to one of the mounting screws or any good ground. Using the other connectors and your wire extend the two purple wires to your switch. That's it, just test it and you're in business. If you have a '72, you'll find you have four wires on the flasher side of the Lucas switch.

EMERGENCY WIPER SWITCH FOR EARLY (ROCKER SWITCH) CARS

Skill Level D

There is only one thing I think is inferior to Lucas products and that is Clear Hooter junk. This stuff isn't even worthy of a "Made in Taiwan" label. It was bad enough back in the days when your car was new, and the wiper and washer switches went bad after 10 uses, and you had to go to your TR dealer for a new one at a ridiculous price. Now you have to wait to get one from the Roadster Factory, and even they can't keep it from raining on your parade until the thing arrives.

For you guys (and gals) who enjoy driving your TR 6 every day there is a way to make do until your new defective switch arrives. Remove the old switch by pressing on the spring metal tab at the bottom of the switch and the back face of the dash with a screwdriver or your 8" long fingers until the bottom moves outward. Then, gently yanking the bastard the rest of the way out, disconnect the wire, throw it to the ground, and stomp the living hell out of it. Now you feel better don't you? Use any decent 12 volt rated on/off toggle switch from an auto parts store or Radio Shack (incidentally, I don't own stock in R.S.. It is just that their Taiwanese junk is so much better than Clear Hooters imitation of Taiwanese junk, and that they are always nearby), a few inches of 16 or 14 gauge wire, and two male spade connectors to make up your temporary switch. Plug your switch into the wires removed from terminals 2 and 3 of the Clear Fruiter switch and you're in business. In your zeal to stomp the living stuffin's out of the C.H. switch you may not have noticed which wires were where. These are supposed to be green and light green but then again they might not be. Live it up and play around until you hit a winning combination. In any case you are going to have to switch the wipers off when they are in a suitable location. Hey, for \$3 worth of Radio Shack stuff we don't offer automatic wiper parking.

THE STUDEBAKER ANSWER

Skill level C

Now for you guys with principals, who just won't crack open the old wallet for a piece of do-do like Clear Hooter, there is the complete conversion including 2 speeds and automatic wiper parking, to a Studebaker switch that has a life expectancy in the range of 17 times the life of the average Studebaker. Ask my daughter, Shirl, the one in her car has surpassed the life expectancy of 17,378 Clear Fruiterers. Write me, I'll tell you how to smuggle one out of South Bend, Indiana for \$8 or a junkyard for \$14.

EARLY WINDSHIELD WASHER SWITCH REPLACEMENT

Skill Level C

You've no doubt read my rantings about Lucas and Clear Hooter electrics for years if you have belonged to 6-PACK for more than one issue of the newsletter. Here is a perfect example of why I find them so intolerable. I bought a new washer switch and used it probably no more than ten times when it hung up. When you look at the innards you can understand why. They have a little piece of brass bent like a rocker and a tiny ball point pen spring that is supposed to bend when you push the button and thus push the rocker against a contact. If it was a \$2 item available at the local BAP-GEON I wouldn't get too upset. However, to pay the going rate plus shipping and wait for another defective switch is enough to make one buy a VW Beetle or a Studebaker.

The fix: You will need a soldering iron (or a hot nail- *seriously you can solder with a hot nail*), solder, about 2' of 18 gauge wire, two male terminals (the size with the red ends), about 2' of electrical tape or heat shrink tubing that is a little bigger than the wire, and one of two switches available at Radio Shack. The switches are #275-609 (2 to a pack, one red and one black, round button, \$1.69) and #275-618 (1 with square red button, \$1.49). These are rated 3 amps at 250 volts but if you don't tell them your car is 12 volt they will work anyhow (those Tlwanese products never were too smart).

Take the nut and washer off the Taiwanese switch. Cut one piece of 18 gauge wire about 1" and the other about 1/2" longer. The reason for the different length is to make them easier to feed through the nut. Bare about 1/4" on the end of each wire and solder them to the switch terminals. Be careful to keep your soldering neat because the nut has to go over them when the switch is installed. Cover the soldered terminals with the heat shrink tubing or tape. Install the male terminals on the other end of the wires.

Remove the old switch and bezel (the flanged piece). Keep the bezel. Push your new switch through the bezel at the top, middle, or wherever you choose. It will be a little tight but it will go. If you're fussy about appearance put some electrical tape on the back side of the bezel to cover the voids and then another like piece of tape inside the bezel on the front. Put the switch wires through the dash and thread the nut over them. Tighten the nut (not too much, it is a plastic switch) and connect the wires to the original wires (it makes no difference which is connected to which). You may be able to use a thin washer under the nut, and if so, this will make it easier to tighten.

I've been using one of these set ups for about 5 years without trouble and another for 3 years.

BEFORE YOU REPLACE THAT ALTERNATOR

All Skill Levels

Since most of us don't have the skills or equipment to rebuild an alternator we usually assume any trouble means exchange time to the tune of big bucks. Before you make your contribution to the perpetuation of the Prince of Darkness, take a few minutes and a couple of bucks to try two easy jobs. One is described below and the other in the following article.

The first one applies especially to early cars with two connector blocks plugging into the alternator. However, it can

happen to any unit. The problem lies in the female spade connectors inside the plastic block. They don't always make contact with the male spades on the alternator. A sure sign of this is an ammeter needle that flicks a lot. The cure is one of the replacement connector blocks mentioned in the factory notice on this problem (except you can't get them). The next best thing doesn't look too good, but then I never promised you a concours winner.

In order to not mix up the wires (instant bingo for the diodes), do the following. Working on one wire at a time, cut the wires just behind the plastic block. Using screwdrivers, pliers, nuclear fission, or any other means required remove the old female spade. Use a crimp type splice or whatever splicing method turns you on to add about 2" of the same gauge wire to the bare end. Slip this extension thru the hole in the connector block and attach a proper size female spade connector to the wire. Repeat this for the other wires. Anyone smarter than the average bear can then use the connector block as a guide to get the right wires on the right alternator spades.

ALTERNATOR BRUSHES - PREVENTIVE MEDICINE FOR THE HIGH MILE CAR

Skill Level C/D

I despise solid state electronics - not because they are complicated but because they require all kinds of exotic test equipment and because they are so fragile. With a generator you can do all kinds of stupid things and still not ruin it. With an alternator, the slightest wrong connection and it is instant diodes up. Therefore, when I say any of you can do this, believe me.

The brush set is available from the Roadster Factory for a few bucks. You will need a 1/4" drive ratchet, extension, and sockets, and a small phillips screwdriver. You will also need a shop manual or a parts manual with an exploded view of the alterator because life's too short for me to try to draw one.

When you remove the alternator from the car use caution on two things: (1) The plastic wiring connector blocks were faulty on some early cars and care must be used to make sure the wires inside them don't come loose and that they really contact the spades on the alternator on reinstallation. (2) There are two cylindrical spacers on the alternator mount. All too often the rear one is lost in the removal. If either is left out on reinstallation you will break the alternator casing.

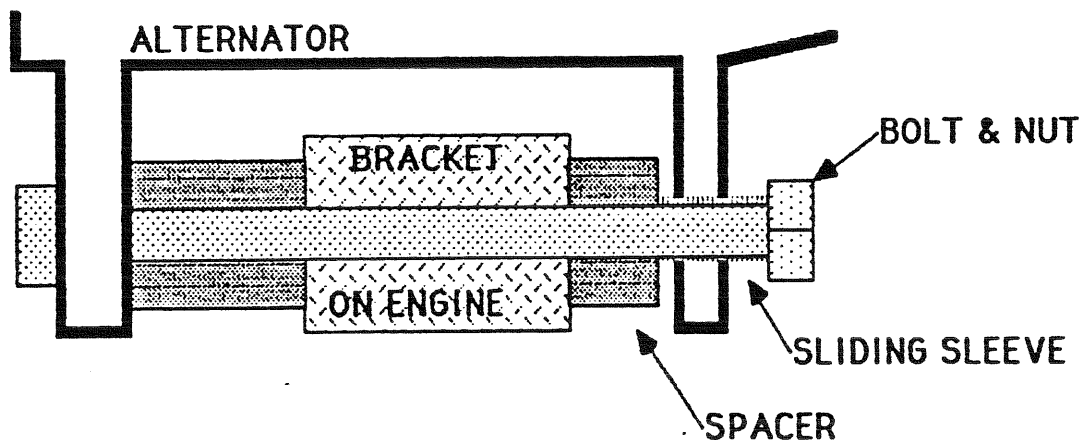
To change the brushes requires less than ten minutes. Use a 1/4" socket to remove the 2 retaining screws for the plastic rear cover. This exposes the rectifier pack and the brushbox assembly. Notice the two small metal straps across the rear of the brushbox. These are the brush holders and are an integral part of the brush set. Make sure you note the wiring connections to them. Depending on which alternator you have (15, 16, or 17 ACR) you may have to snip a male spade off the new brush holders. Bear down hard on your small phillips screwdriver when removing the screws retaining the old brush holder. Simply remove the old brushes and install the new. I recommend some anti-sieze on the screws. That's all there is to it You're done unless you want to spend a few more minutes on the cleaning operation described below.

There isn't much more you can do except clean the slip ring that the brushes contact and clean the inside of the brushbox. To do this requires a small degree of caution. Use a 5/16" socket to remove the 3 bolts which hold the alternator sections together. Low on the left side you will find a small slot in the drive end bracket where it meet the stator windings. Twist a large screwdriver in this slot to seperate the two. Be careful you do not pull the stator windings from the rear bracket. Use spray carb cleaner (lacquer thinner) or any solvent that does not leave a film to clean the inside of the brushbox and the slipring. Blow dry or let set until dry and then reassemble the unit.

ALTERNATOR MOUNTING WOES (or) DON'T LET A REDNECK MECHANIC TOUCH YOUR ALTERNATOR

Skill Level D

When my daughter Shirli's '72 was discovered by Andy it had been sitting in a body shop for 5 years or more. This body shop was one of those places that specializes in Macco type work and an occasional Mustang for a kid. They mentioned they had put on a new master cylinder and an alternator. It was easy to tell they hadn't had enough sense to bleed the brakes (there weren't any) but we never thought about the alternator. Sure enough about a month later the adjustment bracket broke. The problem was the packing piece (see illustration) between the mount on the engine and the front alternator bracket was missing.



When the long mounting bolt for the alternator is removed this piece can fall out without being noticed because it is below the alternator and out of sight. Two things can then happen. First the mounting bolt/nut can be tightened until the rear, front, or both mounts on the alternator break off. Or, the alternator moves fore and aft until something gives (the belt catches and breaks, the adjustment mount breaks, etc.).

Another thing that can happen is that the sleeve in the rear alternator bracket freezes in place (it is supposed to slide to allow for variation in the length of the mounting spacer and packing). It is to be worked rearward for this purpose when removing the alternator. Always put some WD-40 or other penetrating oil on both ends of this sleeve before removing an alternator. Ideally it should be kept oiled at all times and moved periodically because the dissimilar metals (aluminum alternator housing and steel sleeve) cause an expansive corrosion where they meet. This corrosion can lock the sleeve up tight.

The front spacer is still available, 147472, from Roadster Factory. The rear is no longer available but in a pinch a whole bunch of washers will do.

Alternator exchange requires only a 3/8" drive ratchet, a 3" extension for same, a 1/2" socket, a 1/2" open or box end wrench and a lever to pry the alternator sideways when tensioning (not too much) the belt. Either do it yourself or make sure the redneck knows about the spacer and packing.

EASY ALTERNATOR PULLEY REMOVAL

Skill level D

One of the problems of trading your Lucas, "Prince of Darkness", alternator on a rebuilt one (aside from the megabucks price) is the necessity of removing the pulley for reuse.

The usual method is to stick a screw driver between the cooling blades (bending them all to hell) or grabbing the pulley with a pipe wrench (bending it all to hell also plus chewing it up).

A better mouse trap idea is to use a spin-on oil filter wrench to hold the pulley. Filter wrenches come in several sizes and cost all the way to \$1.98 at the drug store or El Cheapo Auto Supply.

GM ALTERNATOR CONVERSION

Skill Level D

In Volume IV, Supplement 5 of the TR-6 Owners Club newsletter Greg Lund, their Competition columnist, included a very good article in his column on the use of Deco - Remy alternators (used on virtually all GM cars with air conditioning in the early '80s) in TR-6s. I love this type of substitution because it not only "beats the system" of ridiculous prices for inferior products but it significantly improves the performance of the car. Greg explained the electrical benefits of using this 63 Amp unit and described the rather simple modifications required for the installation. Unfortunately, his accompanying sketches never were published. This conversion is very practical because, among other reasons, GM alternators go for about \$25 at most any junkyard in the U.S. The following is not intended to take the place of Greg's article, merely to supplement it to the level where a person with 'D' level mechanical skills can make the change. I highly recommend you get a copy of the newsletter with Greg's article. The following also shows how to retain your original alternator plug in case you ever want to go purist in the future or carry your good Lucas unit around as an emergency spare.

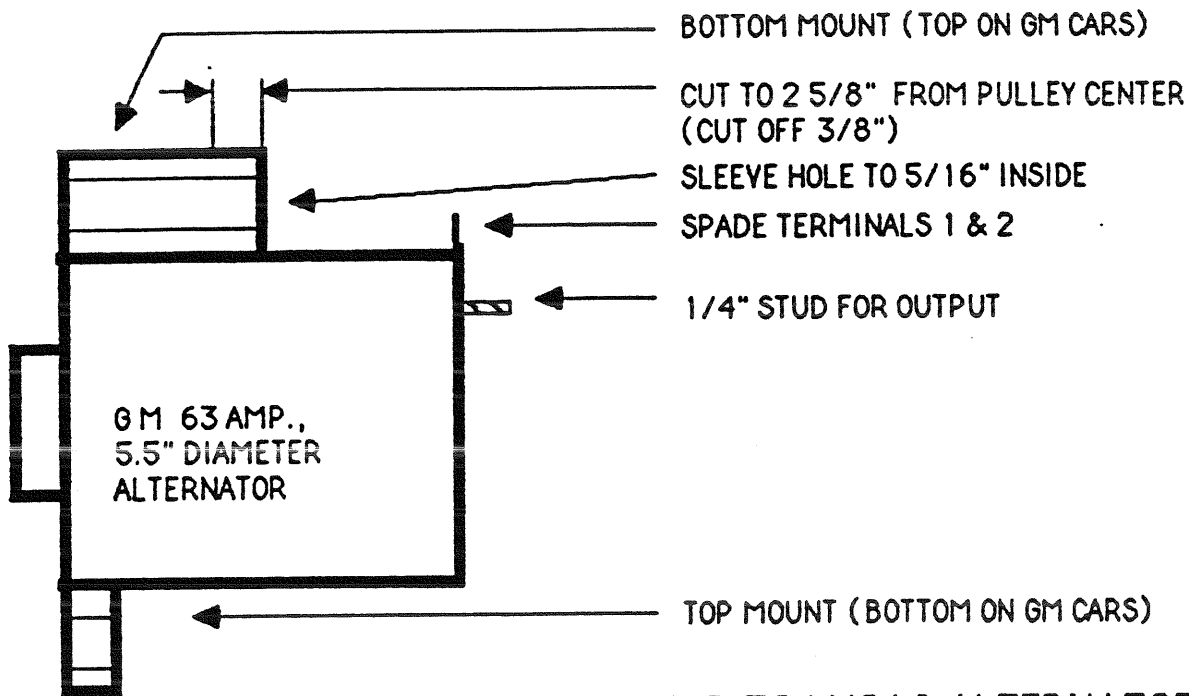
Before starting, get the things you will need in addition to the alternator.

Try to get the cover for the stud terminal when you get the alternator at the junkyard. Get the wire and the male, female and ring electrical terminals shown. The ones for the #14 wire will have blue plastic ends and the ones for the #10 will have yellow. A pair of inexpensive wire stripping and crimping pliers is highly recommended as is a low cost electrical multi-tester (about \$10 at Radio Shack). Get a one foot piece of 5/16" inside diameter copper tubing at the hardware store to make the sleeve for the mounting hole in the alternator bracket. Get a top quality fan belt 1" or 1 1/2" longer than stock. I used a Dayco 15445 which you may or may not be able to get. However, that number should tell any parts counter man what belt you need. A shorter mounting bolt (4") is needed. You will also need to buy, make, or

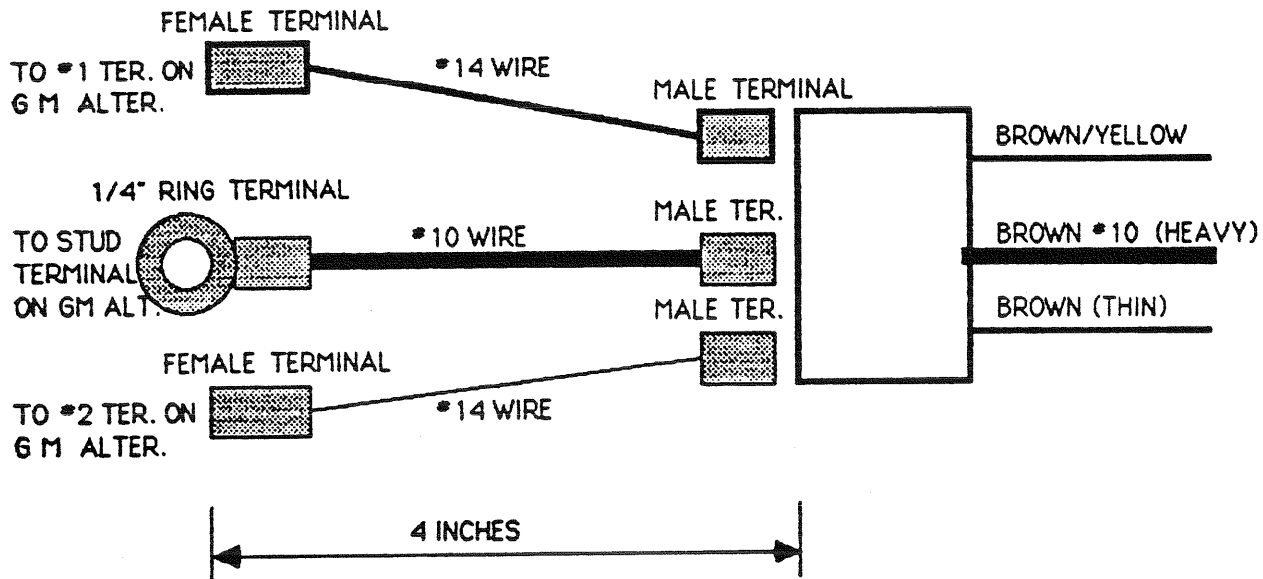
have made the adjustment bracket shown from 1/8" or thicker steel. The junkyard will probably sell you one that will do the job for a buck or two extra when you get the alternator. If you have a late (air pump equipped) car, see Greg's note on mount changes.

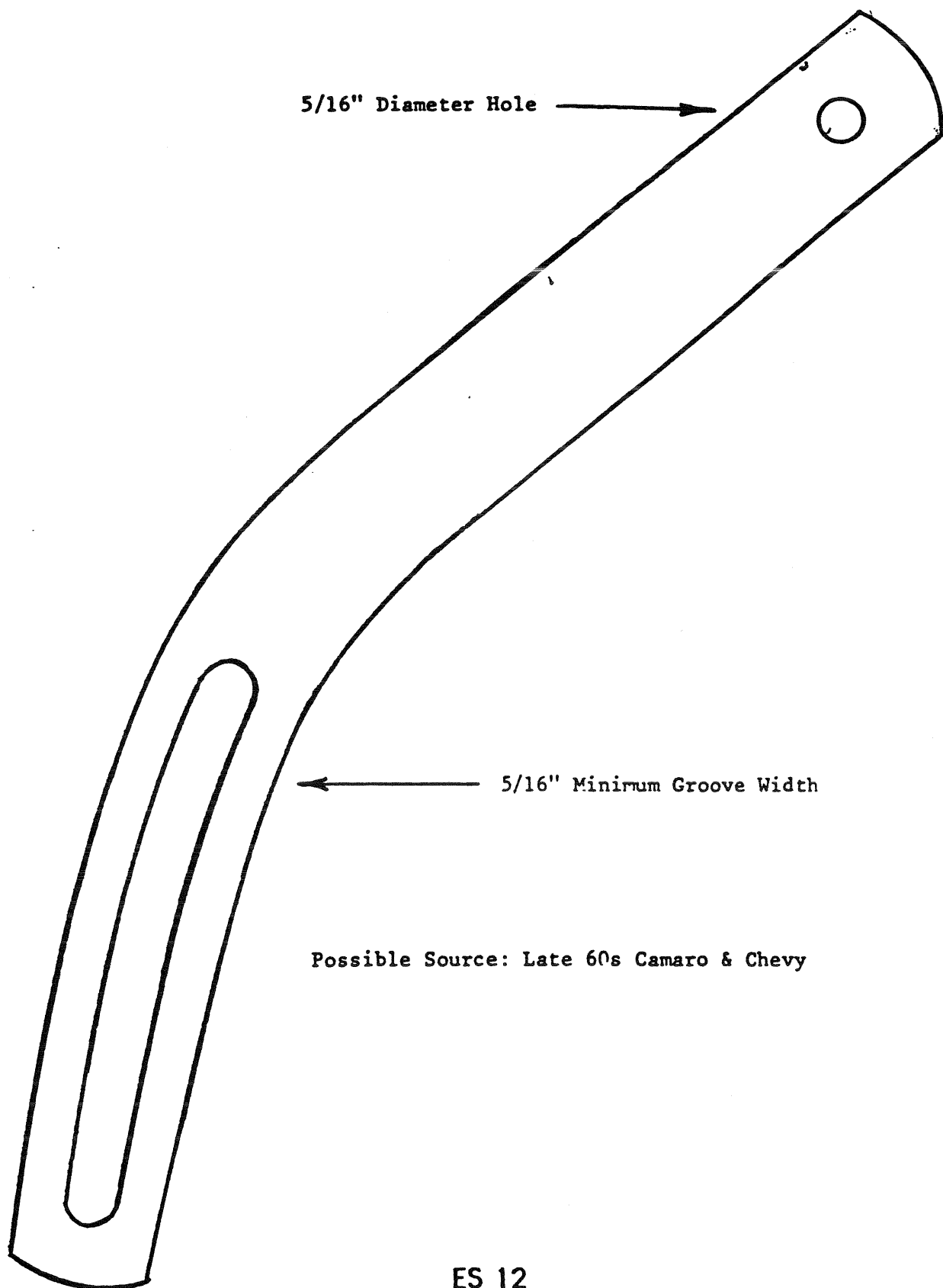
Disconnect the positive terminal of the battery. Remove the Lucas alternator and the fan belt. Sometimes TR-6 fan belts are pure hell to get over the fan extension. Use a 24" crowbar between the left front corner of the engine at the top of the oil pan and the frame bracket to move the engine back for clearance. Install the new belt on the engine. Check your alternator against the GM unit for distance from the center of the pulley groove to the back of the mount. You should need to remove 3/8" from the back of the GM unit. Do this carefully to remove the correct amount and to keep the end square. Cut a length of the copper tubing for a sleeve required to bring the 3/8" diameter hole in the GM unit down to the size of the TR-6 mounting bolt. This must not be longer than the modified mount. Usually the tubing will be a tight fit on the bolt so you may want to put it on the bolt first then mount the alternator. With the GM unit mounted loosely, put the fan belt on the pulleys and pull the alternator over to where the belt is close to proper tension. Try your new adjustment bracket. If all is well, adjust the tension, bolt it up and the mounting job is done.

The adaptor wiring drawing is self explanatory but you should check the wiring diagram in your owners manual or shop manual to be sure you have the proper wires. Don't be concerned if you have too many wires. Many early cars have a heavy black ground wire in the adaptor and a second small white adaptor. Above all, make sure you have the heavy #10 wire connected right. The thinner brown wire will be one that shows 12 volts on a multi-tester with the ignition turned off. Reconnect the battery. Start the car and watch the ammeter or voltmeter. Don't be concerned if your ammeter goes out of sight on the charge side for a second.



WIRING ADAPTOR TO LUCAS ALTERNATOR PLUG





Possible Source: Late 60s Camaro & Chevy

WIPER SWITCH REPLACEMENT, "ORIGINAL" OR CHEAP

Skill Level C

Original:

Those Clear Hooter switches we have all learned to curse are now no longer available. Clear Hooter has gone male connectors up and they deserve it! The Roadster Factory has found a replacement Lucas switch which can easily be made to look like the original. However, the bad side of this is it takes a fair amount of work to modify the dash.

If you look at the hole in your dash you'll see a silvery metal plate. This is fastened to the back of the wooden dash panel by three screws. In addition, behind this is the metal dash panel. Your choices are two - spend the next week filing the hole to the size of the opening in the wood dash (if you try a rotary file and electric drill you probably will hit the wood) or partly remove the wood dash which entails removing all instruments, removing the plate on the back of the dash, and still having to file the dash hole.

Then there is the wiring. The terminals are not in the same places and are too close to the edge. Bend the terminals inward slightly for the wire connectors to clear the dash hole (always connect the wires outside the dash, not behind). Do not connect the wires to the same numbered terminals as on the original switch. John Swauger of the Roadster Factory has advised that the proper connections are: Terminal 1 - Blue/ Lt. Green, 2 - Green, 4 - Red/Lt. Green, 5 - Brown/ Lt. Green.

If you're going to go to all this trouble, maybe you should consider doing the other dash jobs in the related articles at the same time.

Cheap:

The quick and dirty answer is to simply use a 12 volt 20 amp rated on/off toggle switch. Most available at Radio Shack

and car parts stores have a threaded body which is just right to fit through the behind dash bracket. Put two narrow type male spade connectors on the wires and connect these to the red and green/red wires for the original switch. If any metal of the spade is showing, wrap with electrical tape. The wiring must be connected behind the dash and the switch pushed through but this is no big deal. Aside from aesthetics, the only disadvantage to this is that you must be coordinated enough to turn the wipers off at the end of a sweep. They will not automatically return as with a regular wiper switch.

SPEEDOMETER AND TACH REPAIR

I've had two speedos fixed by Foreign Speedometer Service, 3061 Morse Rd., Columbus, Ohio 43229. Phone 475-2511. The results have been good and the price was about \$35.00 plus about \$2.50 for shipping. I'm not really sure it that is a flat rate or if it varies with the unit. In any case, it beats a hundred clams for a new one. Incidentally, one of the ones I had fixed was new, having only 500 miles on it. Damn Brits can't make anything right anymore. Come to think of it, their kids look a little funny lately.

STOP LIGHT/TAIL LIGHT WOES

Skill Level C&D

Here we go again knocking Joe Lucas. In this case maybe he doesn't deserve it because as near as I can recall these items worked reasonably well for the design life of the car. However, stop lights are damn important and I'll bet a lot of you don't have them. The items involved are the fuse block found at the rear of the vertical face of the inner drivers side fender, the stop light switch (a plastic plunger type) found at the top of the brake pedal, and the stop/tail lamp bulbholders. The quick and easy (and really probably the best) thing to do is buy all this trash new and just change parts.

The problem is the \$50.00 plus price and the fact that you usually need them like now, not a week from now.

For the parts changing option you won't need any special tools. For testing you'll need a multi-meter (about \$8.00 at Radio Shack) or similar electrical tester. To cure the bulbholder problem you'll need a soldering gun and a little skill operating it.

The stop light switch is seldom at fault but it is the quickest and easiest to test. Remove the two connectors. Place your multi-meter on the ohms (or resistance) setting. This is usually 1,000 ohms. Touch the red and black test leads together. The meter should peg itself. Now place the leads on the stop light switch terminals. The meter shouldn't move. With your third hand, depress the brake pedal and the meter should peg itself. If not replace the switch. Note that the switchs length is adjustable to make it turn on at the right time.

Now set the meter on the next higher setting than 12 volts (usually 15 or 50). Place the red test lead in the plain green wire from the stop light switch (usually two wires in one spade connector but check the wiring diagram or else test both wires). Turn on the ignition switch and then touch the black test lead to a good ground. The meter should read 12 volts more or less. If not, the problem is probably in the fuse block. The second fuse from the top should be the one that controls the stop lights, but check for the double green wire on the foreward side and a heavy white wire on the rear side of the fuse. Remove the fuse and push the fuse holders ends together to make them grip the fuse tighter. Clean them, the spade connectors and the female connectors of the wires with a grease remover like lacquer thinner, then use muriatic acid (rinse and dry thoroughly after), sandpaper, electrical contact cleaner, or even chrome cleaner and a toothbrush to remove corrosion. Test the white wire with the ignition on to see if it reads 12 volts. Replace the wires and fuse and again test at the stop light switch wire.

Next move to the bulb holders. The problem here is occasionally a loose conductor strap that runs from the outside

of the plastic case, but inside the rubber boot, and ends as the male spade connector. If it is loose, or the tab at the bulb base is dirty, it won't make contact.

About 99% of the time the problem is the ground. Look closely inside the plastic bulb holder and you'll see a copper tab about 1/8" wide and 1/4" long projecting from between the plastic bulb holder and the metal ring portion that snaps into the mounting hole in the tail light. This is the ground and the fact that it is not physically fastened to the ring is the key to the problem. This tab was just inserted in the plastic. With age the plastic shrunk and the tab no longer makes good contact with the metal ring. The cure is quick and easy. Use a Dremel tool, or anything you can think of like a file or nail, to clean and roughen the surface of the copper tab and especially the metal ring. Solder the two together using a soldering gun. This should do the job, but if you're still not sure or want an alternate method, solder a wire to the tab and put a ring or spade terminal on the other end. Drill a hole at a convenient spot on the body and attach this wire with a metal screw for a fail-proof ground.

SAFETY

AND

MISCELLANEOUS

IS YOUR PRIDE & JOY A CANDIDATE FOR A RALPH NADER WITCH HUNT? KEEPING IT SAFE!

There is a basic truism in the American mind related to automobile age and safety - that the older the car the less safe it will be. Unfortunately that is very true with the average daily driven, utilitarian use vehicle, which receives attention only when it fails to function. To some extent it is also true of our cars. Even though you try to maintain your car well, you may not even think of the old age factor creeping up on it. In many ways this should be of more concern with the car that is infrequently used than with the every day driver. For example, rubber parts such as brake seals need vibration and use. Condensation (water) is absorbed by brake fluid to a limit, then it precipitates out and settles to the bottom of the brake cylinder or caliper causing concentrated areas of rust pitting. This precipitation can not occur so easily in a car driven every day since the water is shaken about and held in suspension. Did you ever think about the fact that water gets inside your wire wheels thru the spoke holes, and that rust flakes could even now be sawing away at your inner tubes and tires?

True, state vehicle inspections are supposed to detect unsafe parts. However, they are today oriented, not forward looking. They can't detect a brake seal that has a good chance of going bad next month and don't consider those kinds of probabilities. When do you think they last checked the play in your rear wheel bearings. The answer is never - because they are used to Detroit products that don't have independent rear suspension.

Of course all of us want our TR-6 to be in top condition at all times. Obviously you don't want to loose your brakes or steering while decending the Rockies. Here is a basic checklist of things to do/have done to be reasonably confident your car is safe. However, don't consider this the sum total of things to check, I'm sure I've missed a lot. As a rule of thumb, reduce the mileage or time period by as much as 50% if the car is driven infrequently.

BRAKE FLUID: Every year, preferable in spring or fall. Bleed at each wheel until noticeably lighter color fluid appears (about 5-10 pumps). Keep topping up while bleeding with new (from a sealed can) Castrol LM. Note: Silicone not recommended for cars that set out for long periods without being driven.

BRAKE MASTER CYLINDERS, FRONT CALIPERS, AND REAR WHEEL CYLINDERS:

Rebuild every 2-5 years. Use only Girling or Lockheed kits and Castrol LM fluid. Silicone OK for daily driven cars. Check for uneven application.

CLUTCH MASTER & SLAVE CYLINDERS: Same as brakes.

STEERING RACK: Lube with 85-140 Gear Lube (not grease) every 2000 miles. See tech article for method. Check rubber boots every 2000 miles and replace if leaking. Also check that end clamps are tight. Rotate pinion gear 180 degrees if over 100,000 miles or if play at straight ahead position.

STEERING COLUMN: Replace rubber coupling every 5 years/50,000 miles. Make sure lower universal is not worn or frozen by rust. Make sure ground strap (for horn) is not frayed or broken. Check pinch bolt at lower universal is tight.

FRONT SUSPENSION: Every year/10,000 miles. Replace inner upper bushings. Check rubber boots on ball joints and tie rods. Lube all points. Every two years/20,000 miles. Replace outer lower nylon bushings and sleeves and 'O' ring seals, grease with silicone grease. Check for worn trunnions. Every five years/50,000 miles. Replace upper ball joints, tie-rod ends, inner lower bushings, shocks, sway bar hardware and rubber parts.

FRONT WHEEL BEARINGS: Every 2,000 miles. Check for play. Tighten if necessary. Always use a new cotter pin which is the correct size (5/32" as I recall) when adjusting. A correct fit is snug with no slop. Every 20,000 miles. Repack and replace seal. Every 50,000 miles. Replace wheel bearings.

REAR SUSPENSION: Every 5,000 miles. Check for worn universals (play and/or rust dust). Every 10,000 miles or yearly. Check for play in rear wheel bearings or dry bearings (rust dust around inner seal area). Rebuild universals or axle assembly if required.

TIRES: Every 2 weeks or when average daily temperature changes more than 20 degrees. Check pressure. Every 1,000 miles. Check for cuts, bumps, irregular wear, insufficient tread (replace before smooth, preferably with 10 % or more of tread left). Every 10,000 miles. Balance.

HAZARD FLASHERS: Every other day. Make sure these damn things work (they won't). Replace or repair as per the ES section.

HORN: Yearly. Remove horn button and horn brush (little plastic tube). Using cotton swab soaked in solvent such as carb cleaner, turn steering wheel back and forth while pressing swab on contact ring below steering wheel through brush hole. Also clean brush. Test to make sure you have good contact. Use of air horns is highly recommended.

LIGHTS: Every year (best in late Fall). Replace parking, stop/turn signal, and side marker bulbs, clean lenses. Check aim of headlights.

FUSE BLOCK: Every year (best in late Fall). Clean all contacts. Replace fuses. Lightly coat with silicone spray to lessen corrosion.

WIPER BLADES AND ARMS: Every year (best in late Fall). Replace blades or inserts. Replace arms if tension is insufficient.

SEAT BELTS: Every year: Check for frayed belts and inoperative reels.

EXHAUST SYSTEM: Every 5,000 miles. Check for leaks and frayed or broken hangers. Every 2 to 5 years. Replace.

DEFROSTERS: Every Fall. Check for air flow. Use a 195 degree thermostat in winter and renew it yearly.

INTERIOR: Ensure underdash and tunnel lamps work. Carry flashlight with fresh batteries (especially in winter).

TRUNK: Monthly. Check spare tire inflation. Carry flares and/ or safety triangle reflector, (also chains, container of sand, and blanket in winter).

DONT BE IN A HURRY FOR YOUR TR 6 TO FIRE UP

We are all conditioned to thinking the car that starts at the initial turn of the key is in fine condition. Essentially, that's very true. However, after your TR 6 has been setting for several hours the oil drains out of the system. On an engine with fair mileage on it you will notice a terrible clatter for a second after starting. That clatter is dry bearings beating on a dry crankshaft. I used to blame it on the oil filter draining because the filter lies horizontally and has no check valve to keep it full. The oil pump then must fill the filter before oil begins to flow to the bearings. But it appears to me the vertical spin-on filter kit from Roadster Factory doesn't improve this situation any. If the filter were the problem this set up would give instant oil pressure. The pump is probably having to prime itself too.

From now on instead of yanking out the choke and then hitting the key, leave the choke in and just let the engine spin for several seconds to start oil moving from the pump. This is especially true in cold weather when the engine probably won't fire anyhow until you choke it. I doubt that your battery will spin the engine long enough to get oil pressure on the gauge, but the longer you wait to pull that choke out the better.