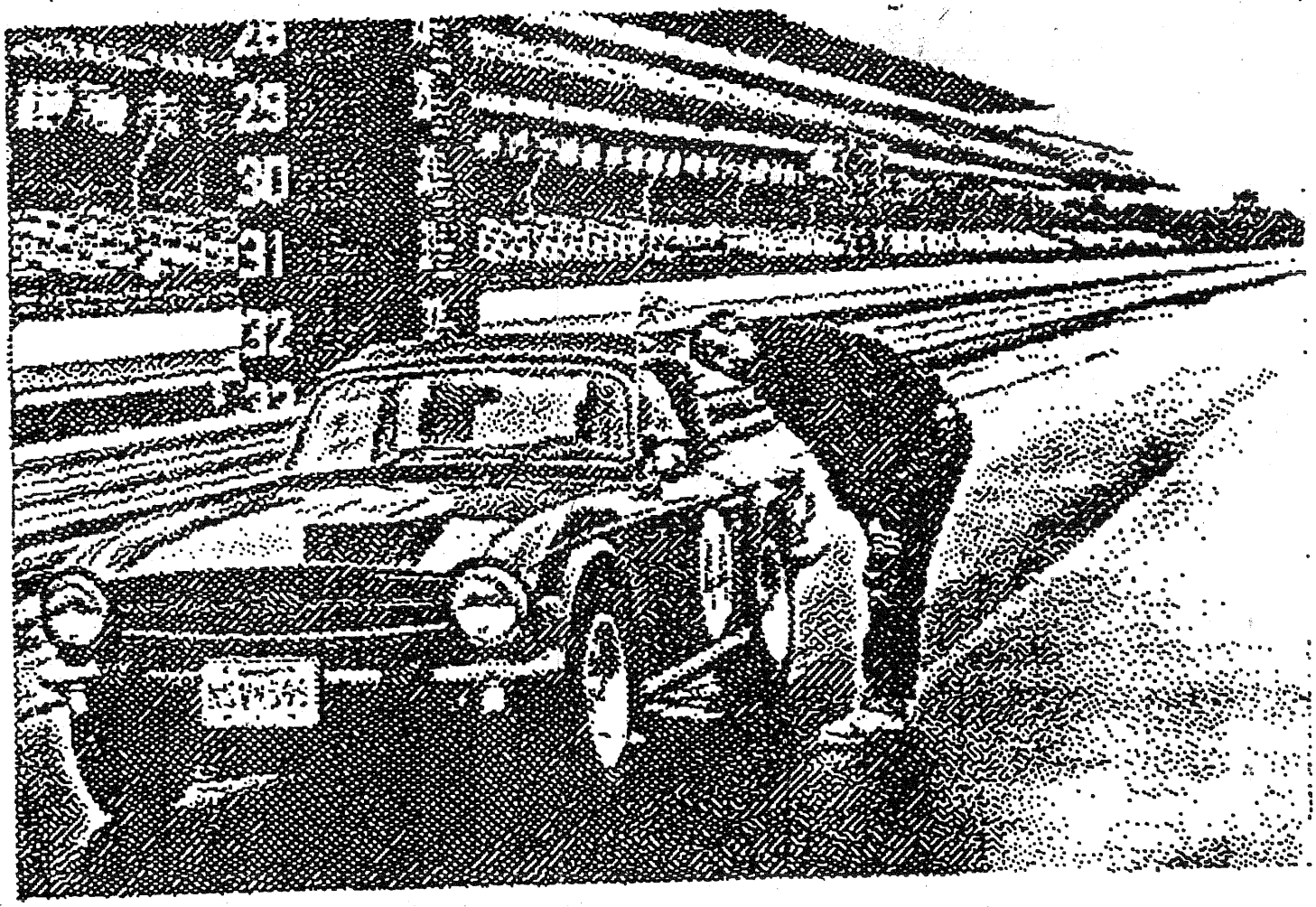
SIX TECH

by Leonard Renkenberger



NOTICE

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INDEX TO SUPPLEMENT #1 TO SIX TECH

WHEN YOU HAVE A FROZEN GAS LINE

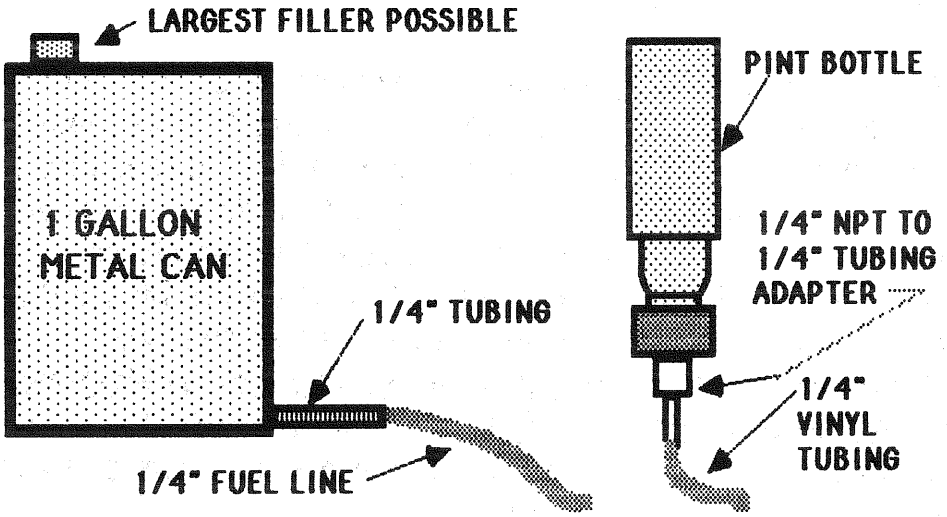
Skill Level C

Those of you who drive your cars in the winter have no doubt learned the hard way that TR 6s are very prone to frozen fuel lines. This is probably due to the tank being more vertical than horizontal, being "inside" the car where it is heated by the interior (causing condensation when it cools), and just because it is British. The best prevention is, of course, "gas line antifreeze". The problem here is anticipating the weather to put it in and the affect it has on fuel systems (it is alcohol and is harmful to older fuel systems like ours). However, sometimes you just don't have a choice.

But when you do get hung out and it freezes up on you here are a couple of helpful items you can make. Usually you come to a sputtering halt about 1/4 mile from home on a cold morning because the fuel in the carbs will carry you that far. However, by then you've sucked the water into the fuel line or filter where it has frozen. Putting "antifreeze" in the tank will help but it takes a LONG time for the alcohol to get to the ice. A simple solution which is meant only to get you a short distance at very low speed in an emergency is show below left. It will set on the top of the footwell on the passenger side and connect to the fuel line just ahead of the carbs.

Solder the 1/4" tubing into the can (the can should be thoroughly rinsed and very near full of water to prevent fumes from being present and exploding). Attach about 3 feet of 1/4" fuel line to the tubing with a clamp. Put a 1/4" x 1 1/2" bolt in the other end of the fuel line and clamp it in place to keep the gas from running out. Put another clamp on this end for use when you close off the fuel line from the fuel pump as described below. To use on the car, remove the car fuel line just in front of the front carb. Remove the bolt from your temporary fuel tank hose and quickly put this hose on the fuel tube to the carbs and clamp it. Put the bolt in the fuel line from the pump and clamp the bolt in place to prevent a gusher of fuel should your ice decide to let go.

Once you're home, use the other rig to dispurse "gas line antifreeze" back through the fuel line until the ice melts by attaching it to the fuel line <u>to</u> the fuel pump. It will take quite a while since the alcohol must mix by working its way back the fuel line by gravity and chemical solution. This can be any type of plastic bottle with a cap about 1" diameter. I used a rubbing alcohol bottle. Incidently, you can use rubbing alcohol (isopropyl) if you can't get methanol "antifreeze". Drill the plastic cap and tap (cut threads in it) with a 1/4" pipe thread (NTP) tap. Screw a 1/4" NTP to 1/4" tubing plastic adapter into it(available at most any hardware in the plumbing department). It should fit tight but it helps to put some fast drying hard setting Permatex on the threads.



BETTER AIR FILTERS

Nobody ever remembers to change air filters. On TR 6s this is especially bad because most have the oil fumes from the engine dumping into them or through them, clogging them quickly. A great replacement is K & N 56-1620. It is a permanent filter with a porous metal element that is washable. It also helps with emmission system problems as described on the next page. They should be available at most speed shops or motorcycle shops. Try the latter first.

A FAULTY CARBON CANNISTER OR EMISSION SYSTEM CAN RUIN YOUR ENGINE - A SAFE ALTERNATIVE

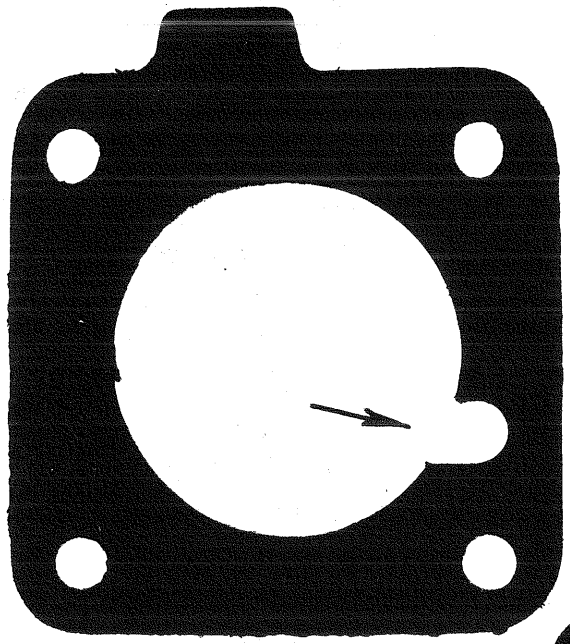
All Skill Levels

First let me tell you Big Brother does not allow you to tamper with the emission system. Then let me remind you most TR 6 systems have lived about twice their expected design life. Next let me point out that virtually all of them work by having things like crankcase fumes and gas tank fumes sucked into the carbs. Now let me tell you that the quickest way to destroy an engine without abusing it is to run a lean mixture such as that caused by leaky emission equipment. Follow the systems back and you'll see most dump into the front carb at the back - after the fuel is introduced to the correct volume of air.

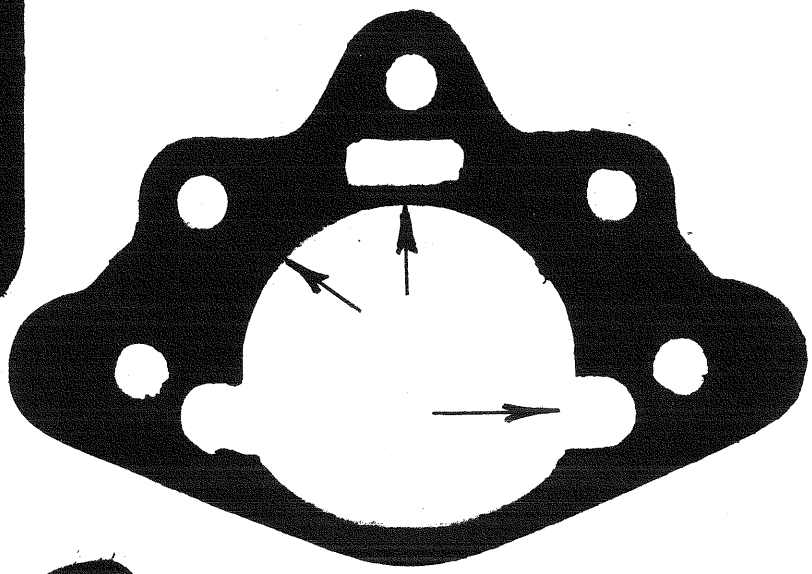
There is only one set up that I know of that takes care of crankcase fumes , the main culprit, and yet insures a leaking oil filler cap isn't allowing air to be sucked into the carbs behind the jet. That is to run a hose from the tube on the side of the valve cover to the air cleaner. Very early cars did this but the problem was it ran into the side of the air cleaner element and soon became clogged. This sometimes caused built up crankcase pressure to spray oil out the dipstick hole all over the left side of the engine. The K & N air cleaners mentioned on the previous page do it right. The oil fumes are introduced behind the element and thus do not gum it up. Simply insert the plastic fittings that come with the K & Ns into the punch out provided and run a 15/32" PCV hose to the valve cover tube. A PCV valve in the hose is recommended. You can use a 'Y' fitting and run to both air cleaners or just use one. Plug the fitting where the hose formerly ran into the carb and plug the hose you took off. For those cars having the carbon cannister piped to the front carb, if you plan to keep this set up be sure it is top notch or you'll soon burn up # 3 piston due to the lean mixture. Now if I were to mess with this set up (which I never would, EPA, honest) I would route this hose down below the frame and leave it open and plug the carb fitting. If in doubt, any hose entering the intake system behind (closer to engine) than the throttle plates in the carbs is a potential source of air leakage and a lean mixture- which means burned pistons.

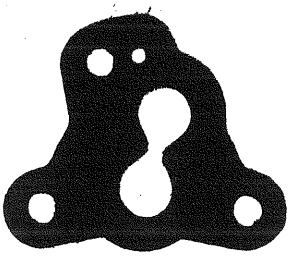
THE RIGHT WAY TO INSTALL CARB SPACERS AND GASKETS

There are vents to the float bowl and the vacuum piston on the front of the carb as well as a vacuum passage on the rear. It is possible to block these by improper installation of the carb to air cleaner gasket (not all have duplicate holes to prevent this like the one shown) or the carb to manifold gaskets and spacers. This can drive you up the wall because the car will start but then run worse and worse. Make sure the holes marked with the arrows are properly placed.



VIEWED FROM RIGHT (PASENGER) SIDE OF CAR





IN MOST CARB REBIULD KITS THERE IS ANOTHER GASKET WITH 2 HOLES INSTEAD OF THE STOCK FIGURE 8 HOLE FOR THE AIR BLEED VALVE. USE THE ONE WITH 2 HOLES.

DIAGNOSIS OF REAR END NOISES

Having now lived with a TR-6 as daily transport since March 26, 1970 (about 300,000 miles on one car and an unknown amount on a "back up" car owned for about 5 years) my biggest concern has become the rear half of the chassis. The differential, differential mounts, rear axles, rear hubs and rear frame crossmembers in most cars have lasted a normal lifetime, so they really don't deserve criticism. However, we're now faced with making these cars last forever and this means finding ways to recognize the serious and not so serious problems in this area of the car. Some jobs you can do with basic skills- some require a lot of skill and specialized tools. The actual procedures for most are described in other articles in SIX-TECH and the 6-PACK newsletter. For the average owner, finding the problem is probably more traumatic than effecting the cure. This article will hopefully help you identify the area you need to attack.

Universal joints are probably the easiest to fix but sometimes the hardest to notice until they become critical. This is because they develope slowly at first and then rapidly. Vibration without noise or only a slight click is the basic sign. The vibration is heaviest under acceleration, a little less on deceleration, and greatly diminished under a light or coasting throttle. To check for it, jack up the rear or, preferable, put the car on ramps and securely chock the front wheels in both directions. If on ramps, have a helper sit in the car with the brakes on and the car in 4th gear while you carefully jack up one side with the jack under the spring until the tire clears the ramp. The jack should be supported on a solid concrete block (never a regular cell block) or wood blocking at least the height of the ramp. Get out from under the car and have your helper cautiously release the brakes. Make sure you have plenty of light to observe movement. Have your helper move the free wheel back and forth. If you have more than 10 degrees of movement, you have something to be concerned about but don't panic yet. For now disregard the differential and wheels - just look at the axles. Watch each universal carefully (you may have

to pull the rubber boat back on the inner ones). If you see the axle move relative to the hub or differential stub axle flange just as the wheel comes to the end of its swing, the universal has at least one bad cup of bearings. It is usually only one that goes and it is almost always dry. Therefore, you should look at them twice (180 degrees apart) or even at each individual cup. Even if you don't see movement but you see rust around the small rubber boot, you've got a problem. You can delay the inevitable if you have rust by greasing the joint if you have a universal with a grease fitting or a plug which can be removed to fit a grease fitting. Sometimes a person can feel this better than see it by placing a finger tip between two of the caps. Obviously, caution is in order in this case. Driveshaft universals can be checked in the same way. While performing this operation you can also check the sliding joint in the middle of the axle. Some play is normal but not much. Many times these are dry. They can be greased in place with a little care (see separate article on this). Excessive (relatively) play is not really a cause to panic but it does, of course, add to that 10 degree swing. It usually is heard as a not too harsh snapping sound when starting forward or backing - especially when changing direction. You may also hear and see the axle sort of "snap" outward as you jack the car up. This is sudden movement in the joint caused by sudden release of friction between the two surfaces but is not always caused by a dry joint breaking loose.

Worn wire wheel and adaptor splines will be heard as a sharp snap and usually be accompanied by a corresponding feedback through the brake pedal. It will occur each time you brake or go on and off throttle quickly. Have your helper apply the brake while you rotate the wheel back and forth. If you see movement, the splines are worn and/or the knock-off is loose. A badly worn spline will begin to snap again within a few miles of tightening the knock-off.

Hub bearing wear is a serious problem because they are very difficult to repair. They usually start as a faint growling sound and get louder over a relatively long period. To check, have the wheel off the ground and the brakes off. Grasp the wheel at the top and bottom and try to wobble (top in, bottom out and then

the opposite) Any appreciable movement means worn bearings. There are several related articles in SIX-TECH on repair and maintenance. It is a good idea to check hubs even if you don't have noise.

Noises and movements within the differential are difficult to sort out. A whine or not too deep a growl that is most noticeable about 30-40 mph and is usually only heard on forward motion (disappears when coasting/letting off gas) indicates bad ring gear(crown wheel in Brit) and pinion gear mesh. In rare cases it can just be that you are nearly out of gear oil. However, most times it is far more serious. If you have a used differential and the noise hasn't been there long you may be lucky in that someone did not tighten the nut on the front of the pinion shaft sufficiently when they removed the driving flange to replace the front seal and the damage hasn't been done yet. This nut must be tightened to 100 foot pounds with a torque wrench or the pinion will move back causing a mis-match of the pinion gear with the ring gear and a corresponding whine.

Very much movement and the pinion teeth break. Very many miles and the gears are permanently mismatched and noisey with eventual breakage. This can be checked on the car by removing the driveshaft from the differential and moving it to the side. Here you'll have to make a judgement call if there is a lock wire in the nut. Does it look like a factory job? If so, probably won't help to check the nut, it will already be fully tight. If it looks like a piece of coat hanger, some dim-wit has been there before you. You can tighten the nut by placing an old 3/8" bolt in one of the flange holes and turning until it jams against one of the bolts which hold the mount on the front of the differential. You can then torque the nut without straining the pinion. Use some Loctite because 9 times out of 10 the castleations in the nut won't line up with the hole in the pinion anyhow. In the more serious case the pinion bearings are worn or bad or the shims that position the assembly have started to break up. To check for this, have your helper turn the wheel back and forth and give it a little more force at the ends of the swing while you watch the flange at the front of the differential. If it seems to come to the end of the swing and then suddenly snap and turn a little

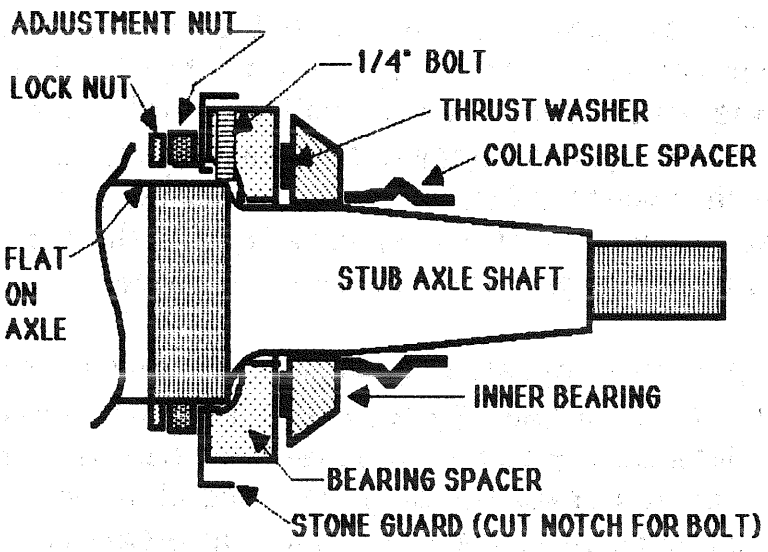
more (as if some holding force had been overcome) the pinion is moving back and forth and you've won the big one. The differential needs immediate rebuilding. See rebuild article in SIX-TECH.

One problem that has no noise signal is worn spacers on the sun gears (2 of them are refered to as planet gears in Brit), letting them move away from each other. These are the four small gears, two being on the inner ends of the axles, that let the axles turn at different speeds. Excessive motion of the raised wheel and axle with virtually no resistance or movement of the driveshaft is a visual sign. This is not really a problem except that you know it shouldn't be there. The spacers are bronze and come in different thicknesses. You could probably change them in the car by dropping the rear cover of the differential. However, you'd still need to obtain various sizes and fit by trial and error.

Last but not least is the right front differential mount. The torque of the engine tries to twist the driveline in a clockwise direction when you start out from still. This twisting pushes down on the right side of the front mount particularly. After the car is under way the torque is mostly taken by the drivetrain and the mount returns to normal. However, each start and on-off throttle motion twists this mount up and down some. This hammering of the rubber mounts eventually breaks them down and the shock transmitted to the frame eventually causes metal fatique (cracking) of the mount on the frame. The rubber can also go "dead" with age so you can't escape replacement regardless. The sound associated with this problem is a dull thump when starting out reasonably fast. You generally won't get the sound on gentle starts unless the rubber mounts are really bad. If you have any doubt about the age or condition of the rubber mounts replace them. The alternative is a broken frame mount- a fairly expensive repair. I suggest putting the car on ramps and while the differential is down having a reinforcement welded into the frame. An article with pattern is in SIX-TECH.

MODIFYING THE REAR HUB WHEN REBUILDING

SKILL LEVEL B



I recently had to go back into a couple of hubs I had rebuilt between 5 and 8 years ago (an acceptable service for a rebuild). They showed signs of a problem nearly every hub I've ever disassembled had. Almost all had a deep groove in the bearing spacer, indicating that the spacer was being held by the seal and turning with the hub. This makes it turn against the inner cone of the bearing. Since it is soft and the bearing race is hard it wears away leaving the bearing free to move. It is supposed to stay on the axles, being held tight by the bearing which is, in turn, held tight by the collapsed spacer between the bearings. As to whether it moves because the bearings wear or because there is .002 " of end play to begin with doesn't really matter. The challenge, then, is to make the spacer stay put. Two methods are given below. Frankly they are untried but I feel they have to make an improvement. They can be used together or alone. I used both and, hopefully, in about 10 years I can tell you they help.

The first and simplest thing is to put a Torrington TRA 1828 race for a radial thrust bearing between the spacer and the

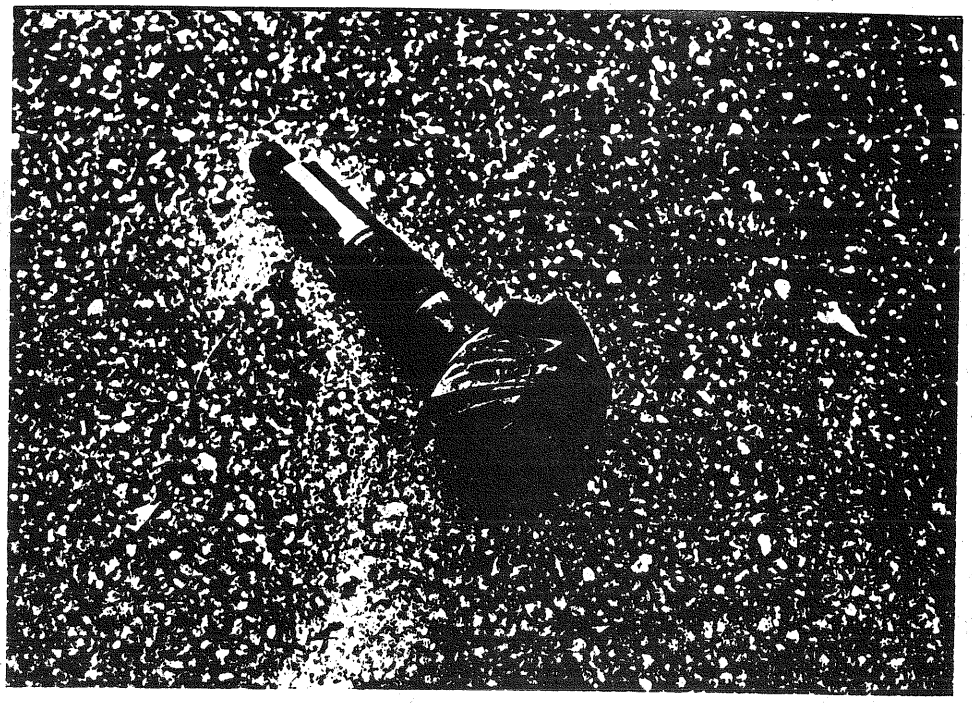
bearing cone. This is a hardened chrome steel washer that is machined to exactly .030" thickness. Do not use a plain washer or an .060" race. Plain washers will wear away as fast as the spacer and the .060" race may move the hub out so far that the spacer is not inside the seal. The theory here is that the hard bearing race and the hard thrust washer can't wear each other out if there is even the lightest amount of grease present. There is also a much larger surface against the spacer and this spreads the pressure over a much larger area than if the narrow face of the wheel bearing cone were against the spacer.

The second method is to physically prevent the spacer from turning by placing a bolt through it that sets firmly on the flat on the stub axle. Because the spacer is relatively narrow, has only a narrow portion of it over the axle flat, and also has a narrow area near the edge to contact the seal, this bolt must be carefully placed. It should be 1/16" or less from the outer edge of the spacer. The bolt should be a grade 5 1/4" x28 N.F.. Place the adjusting nut on the axle, place the spacer on the axle, then turn the adjuster until the spacer is roughly in its normal position. You should be able to see a shiny band on the axle where the spacer has been turning and this is where it should be when you position the bolt. Put Lock-tite on the threads of the bolt and the hole. Hold the spacer firmly against the nut. Tighten the bolt snugly with your fingers then about 1/2 a flat or less with a wrench to insure it doesn't spin. Let set overnight. Try turning the spacer. If it moves either way, redo the bolt. If the bolt is properly positioned carefully cut it off and file to the curve of the spacer. Actually, this is not as critical as it sounds because the bolt should be clear of the seal. Be careful you don't file the surface the seal rides on.

Reassemble and adjust the hub. A little Lock-tite between the spacer and axle and between the wheel bearing cones and axle is also good insurance against spinning.

DEFECTIVE PINION GEARS IN USED OR REBUILT DIFFERENTIALS

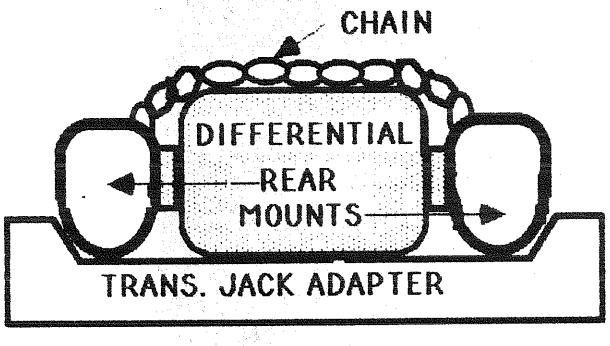
One of the long term problems with TR6s is failure of the pinion gear. This usually occurs at reasonably high mileages - so high that it took me awhile to catch on. I now have a collection of broken pinion gears - never the ring gear- sufficient to hypothesize that the pinions as manufactured have a metalurgical flaw. Every one of the ten or so that I have is broken deep within the gear at the base of one, usually two, teeth (see the photo). The break is also characterized by a rather clean front to back break indicating a "cold joint" type flaw caused by the forming metal not being hot enough to be homogenous.

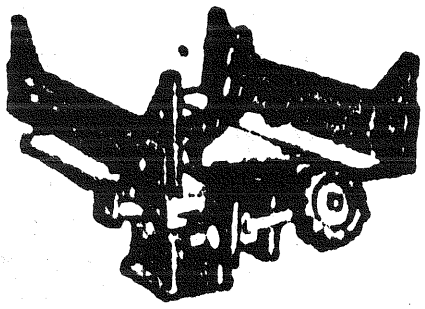


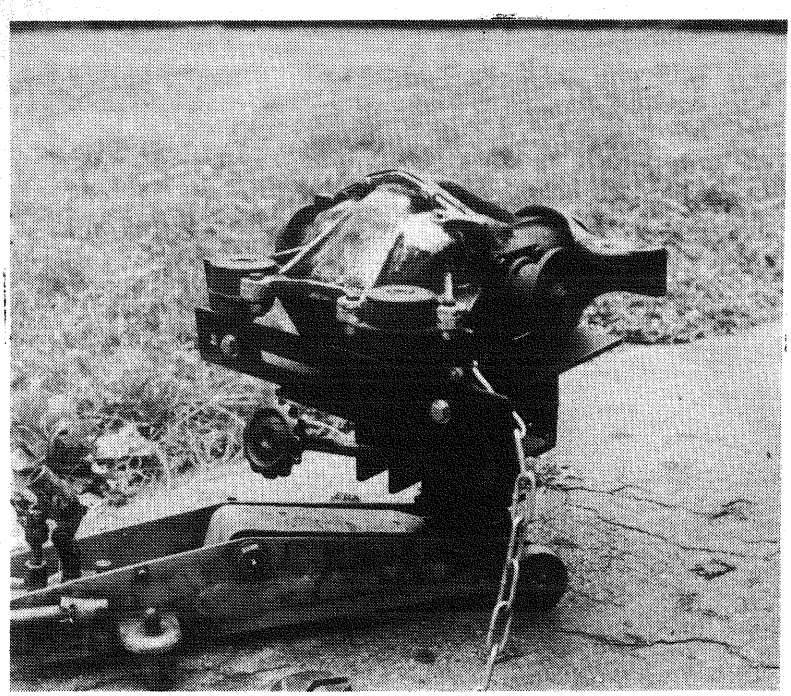
Since (I think) my original differential pinion gave out at a mileage above 60,000 to 75,000 miles and the rest were used it is not easy to determine when they go. The point of all of this for you is to evaluate the odds when buying a used differential or, even more, a rebuilt one. At the price being asked for rebuilt units by most suppliers, I'd ask for a guarantee that the ring and pinion are <u>new</u>. As for used units, explain the gamble you're taking to the seller and try to get it for a price that is reasonable in case it only lasts a couple thousand miles (I've had this happen a couple of times), say under $100.

EASY DIFFERENTIAL REMOVAL

For years I removed and replaced differentials by putting the car on ramps, laying the unit on my chest, and playing Arnold Schwartensomething. There is a better way and it isn't too expensive, especially if you have an old floor jack around that you don't use or trust much. Places like Harbor Freight (1-800 -423-2567) and J.C. Whitney sell transmission adapters like the one shown to bolt onto that old jack for about $50 (even buying a new jack will cost less than having a shop do the job). Simply use the chains that come with the adapter to secure the unit to the jack as shown in the drawing and the photo . The adapter tilts fore and aft allowing easy alignment.

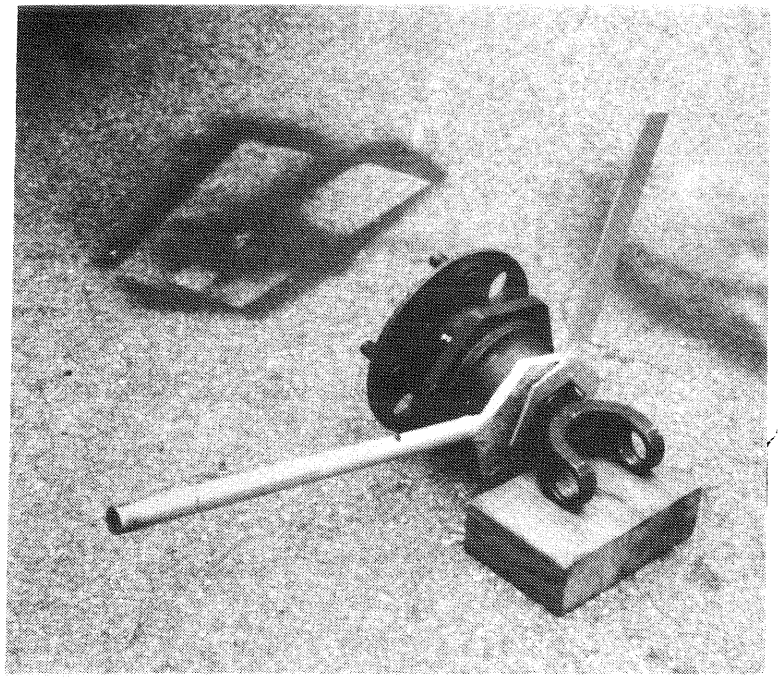


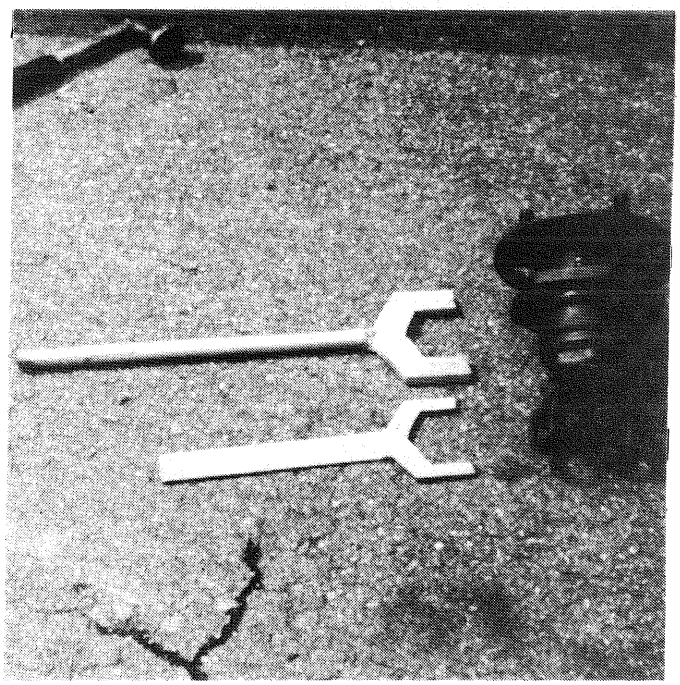




REAR HUB BEARING ADJUSTMENT WRENCHES

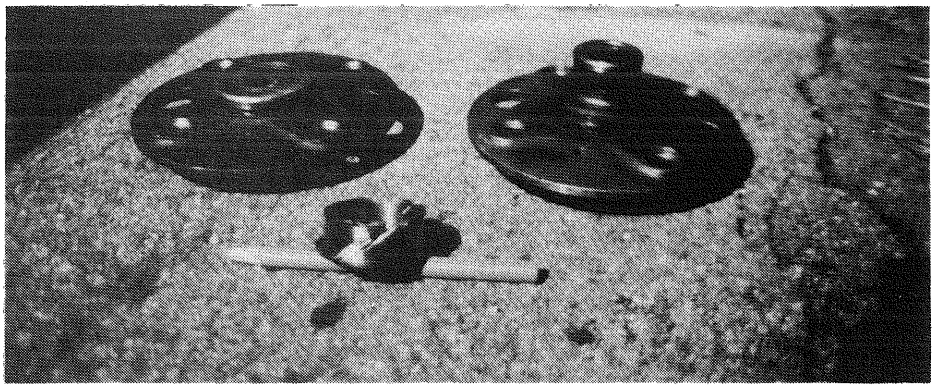
The wrenches shown will aid considerably in adjusting hub bearings, especially when setting end play on a rebuilt hub. Incidentally, it is a lot easier to set the required .002" if the hub is free of the axle assembly as shown here. The thickness of the adjustment nut wrench and the lock nut wrench are dictated by the thickness of the respective nuts. The adjusment wrench should be 3/8" thick and about 3/4" wide on each side. The handle is 5/8" rod 12" long. Weld securely. The lock nut wrench is 1/8" stock 5/8" wide on the sides with an 8" handle.





REAR HUB FLANGE REMOVAL FORCE

Any time someone tells you they can remove a hub flange without a special tool show them this photo. The force required to remove the flange at left pulled it apart at the base of the bearing. Think about that! The race in front was removed by cutting diagonally very carefully with an air drive cut-off tool and then spread with a chisel.



FRONT BRAKE CALIPER PISTON REMOVAL. TWO METHODS

Skill Level B/C

First let me emphasize - never separate the halves of a brake caliper. It may look like the logical thing to do but the internal seals can't be bought and the bolts must be torqued very accurately. Here are two ways to extract those seemingly impossible to remove pistons - the messy way and the messier way.

Here is the first method. Remove the caliper, take out the pads, then reconnect the brake line. Use a metal bar and small (3") clamp to hold one piston in the fully retracted position as shown in photo #1.

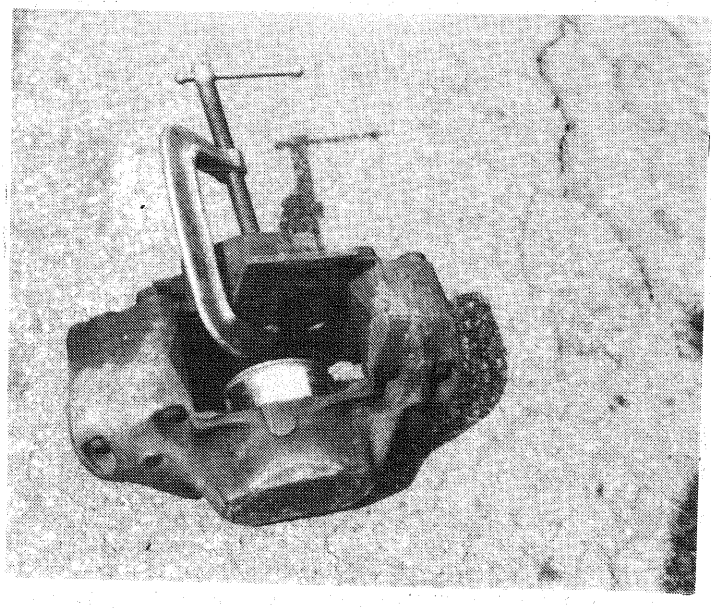


PHOTO #1

Have a helper pump the brakes until the other piston pops out. It is advisable to have a big rag wrapped around the caliper to catch any splash since brake fluid is one of the best paint removers ever invented. This can usually be done much easier using an air gun held against the end of the short brake line that goes from the hose to the caliper - that is, if you have a compressor. A word of caution is in order here. You are dealing with a trememdous amount of pressure. Should the piston not decide to cooperate, an average person can apply enough pressure on the pedal to exert 2000 pounds per square inch at the caliper and the caliper piston has an area of more than 3 square inches. Never put your fingers between the pistons, 6000+ pounds of pressure can sever them ! After you have thoroughly cleaned the piston and the groove in the caliper,

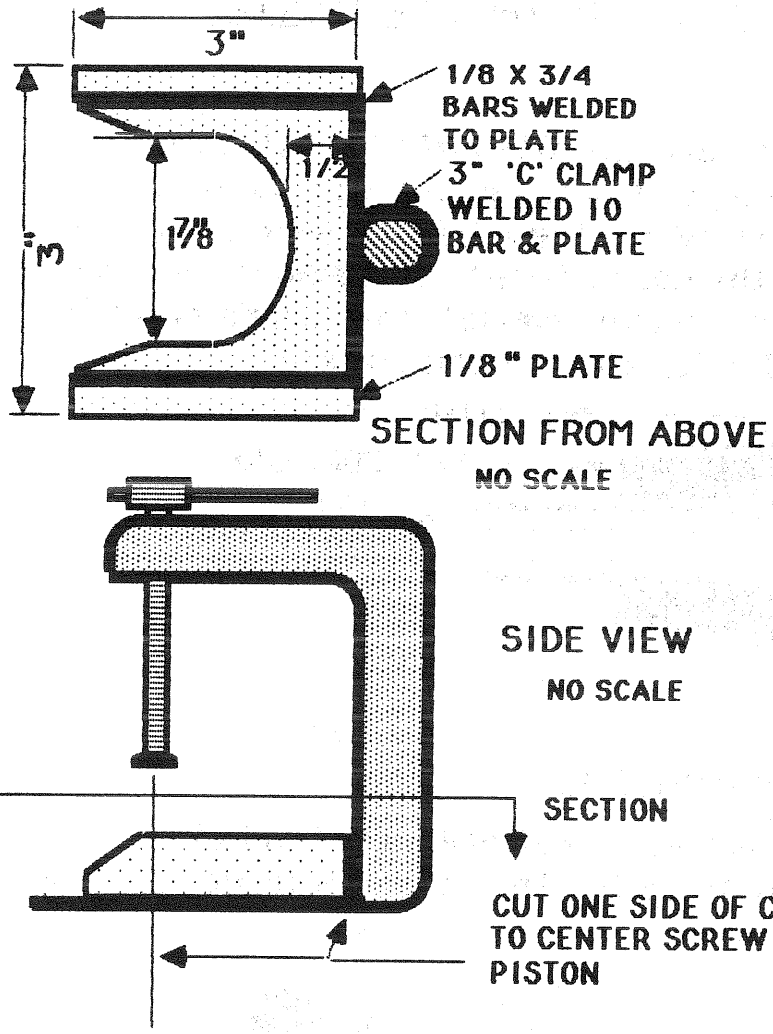
insert the new seal in the groove and put some brake lube (never use grease or oil on brake parts) on the piston and the seal. You should be able to press it back in by hand if you grip both sides and exert even pressure. Be careful not to cock it or you may cut the seal. Put your clamp and bar on the rebuilt side, connect the brake line again, and have your friend pump out the other piston.

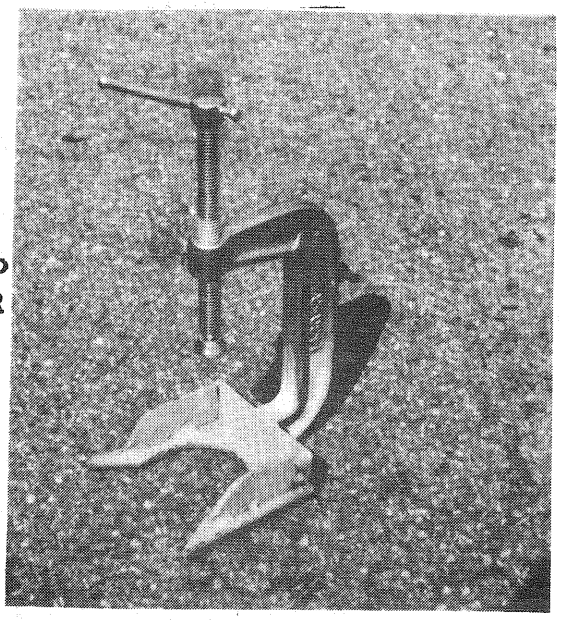
Method 2 requires a little machine shop work, or it can be done by the average home mechanic who has a few more tools and time than average. However, it is a lot less traumatic and messy. Basically, the tool shown following this article simply converts the 'C' clamp to pulling instead of squeezing. The 1 7/8" radius must be fairly accurate. I suggest you use a 1 3/4" hole saw to make a hole, cut the straight sides at 1 3/4" and then grind or file to final fit after all welding, using a piston as a guide. Of course Mig welding would save warping but I had very little warping with my gas torch, and in fact, cut everything to final size first. I would suggest a steel clamp rather than the malleable iron one shown since the latter must be brazed rather than welded. Also, unless you are very accurate in your cutting and welding, you will not have the plate exactly 90 degrees to the clamp or have the screw exactly centered over the piston. Therefore, as you tighten the tool the piston will probably cock a little. Do not use excessive force on the screw. Instead use a screwdriver to pry the tool upward. You'll feel and see the piston pop upward. Normally, about 2 turns of the screw at a time is adviseable before prying on it. It ain't the ideal solution but it's cleaner than the above, and - hey, we never promised you a rose garden.

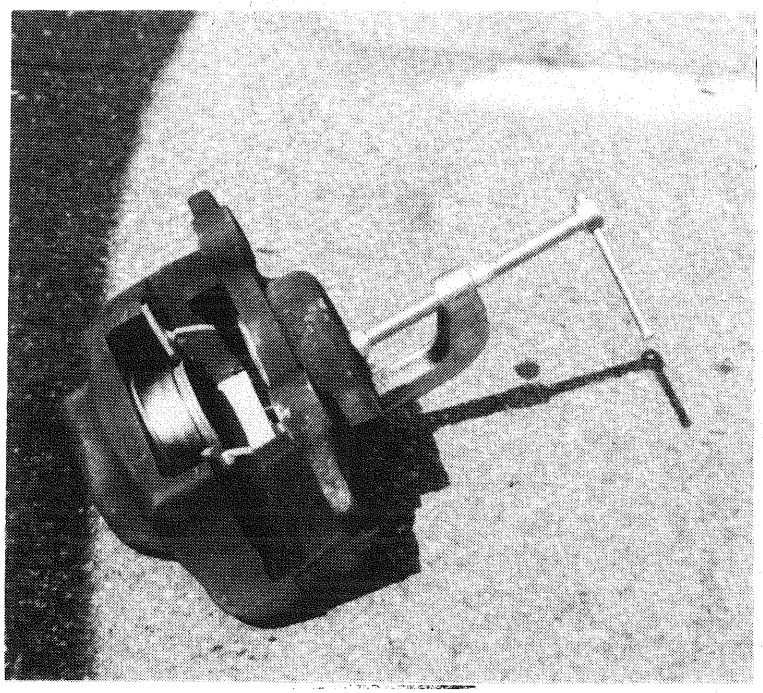
Photos on next page show tool, tool in piston groove, and screwdriver "aiding" tool.

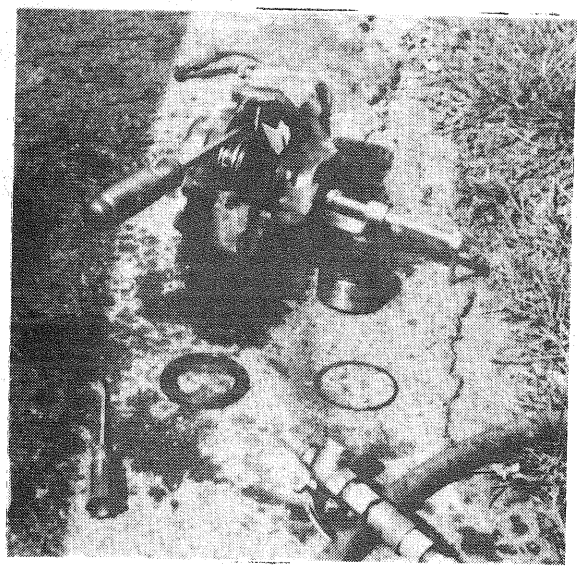
FRONT BRAKE CALIPER PISTON REMOVAL CLAMP

Most owners with C level or less experience and skills feel front brake caliper rebuilding is beyond them because of the difficulty of removing the piston. However, with the tool shown here they can easily disassemble the caliper. Most of the parts can be fashioned with hand held power tools and then welded by a pro.



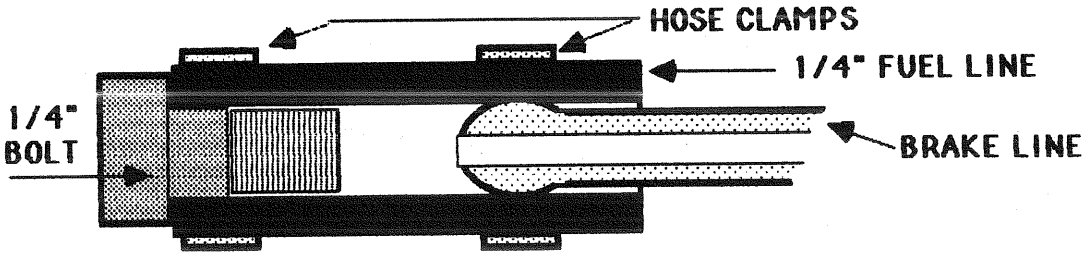






CAPPING A BRAKE LINE WHILE WORKING ON A CALIPER OR BRAKE CYLINDER

Here is a handy devise to save the mess of fluid all over the driveway, and most important, save having to bleed the brakes if all the fluid runs out. Simply put the fuel line over the brake tube bulb flare and tighten the hose clamps. Remember, in case you haven't seen it elsewhere in this manual, that brake fluid is a great paint remover. Flush with water immediately.



EASY MASTER CYLINDER CAP REMOVAL

Master cylinder caps are not often removed and tend to stick. Here is a simple way to do it. The tool is a large size oil filter wrench.

BETTER BRAKE PADS

Sintered bronze and other metallic brake pads are nothing new. However, for many years the only ones available were not really suited for street use. REPCO and other manufacturers have changed that and you may want to try them. I've recently put some semi-metallic pads made by Certified in Canada and available through many import car parts dealers on my '71 and the difference is impressive. Deceleration is noticeably better and pedal effort is greatly reduced at low speeds.

Now before you run out and buy a set, let me point out some factors to consider.

1. Braking in the wet required much more time (and obviously distance) with greatly increased effort to wipe the pads dry.

2. Certified pads are only available for the late (72-76) cars which have more pad surface and smaller mounting pin holes. Why this was done has always been a mystery to me since the master cylinder, caliper, and wheel cylinder bores remained the same. The cars became heavier over the next 4 years due to collision bumpers but the increase was roughly proportional front to rear. Regardless of the reason, the increased wiping area could cause lock up under panic braking with some narrow or hard rubber tires. I once fitted the late Girling pads to a '70 with Michelins and it required very careful footwork when the brakes were warm to prevent lock up. Currently, I have 215/70 Goodrich TAs fitted. The increased tire width and soft rubber successfully transmit the additional grip to the pavement. Obviously, you will also have to drill out the holes on early pads REPCO metallics have a little of the rain problem too. If you live in the desert metallics are fine; but if you live in Seattle, stick to Girlings.

TIRE UPDATE

Tires have been a cronic problem with TR6's virtually from day one. The original Michleins that most of us ordered with the car and as replacements were real greased pigs in the rain. For

a short time there were a few decent tires available like Pirellis, Continentals, and European Uniroyals. The last time I discussed tires was a few years ago. At that time, I felt that the show and pleasure only cars should be shod with Michelin red lines and that Vredesteins were the best all round choice with Uniroyals for the wet. I also mentioned Avons as the worst tire I had ever experienced in my life.

Times have changed (but Michelins haven't). There are now even fewer tires of 185 x 15 or similars sizes to choose from. There are lots of cheap 205/75 x 15s out there. However, they are too deep in section to use and will feel like you're driving one of those rediculous jacked up trucks. There are always the 60 and 50 section tires which, in addition to costing $150 or more, can not be used on the narrow (5 1/2") TR 6 wheels in a size big enough to keep your engine from revving at far higher RPMs compared to road speed. Even 215/65s raise the revs considerably. Goodrich TAs in 215/70 x 15 are almost exactly the same diameter as original red lines. The "widest" and "tallest" tire you should use is a 215/70 x 15, although Goodrich lists 225/70HR15 TAs for 5.5 to 8.5 inch rims. Even then you should only use a quality tire like Goodrich TAs, COMP TAs, or Euro TAs; Pirelli P-5s; Goodyear Gatorbacks; or similar (no department store specials). I can't tell you about Jap tires because I won't use them. The new generation of tires such as the TA and the Gatorback with their big blocky soft tread are vastly better in the rain than the tires we considered top rain tires in the early 70s. I've found the TAs and Euro TAs on my 3 cars virtually impossible to hydroplane. Conversely, they are extremely sensitive to excess camber and tend to follow ruts in the road. They also magnify worn steering, so be sure your front end is in mint condition.

My choices: For the show car - Michelin red lines or raised white letter super tires. For the moderately driven car on a budget - Vredestein 205/70 x 15. For the hard driver - TAs or P-5s.

Since this seems to be a very frequent subject of tech inquiries, please pass on your experiences with various tires to us for inclusion in the 6-PACK newsletter.

REPLACEMENT BONNET RELEASE CABLES

The inner (603468) and outer (603469) cables from The Roadster Factory, and I presume other sources, are not as original. While the daily driver will be very happy with them, many of you purists will not be. The outer cable is sheathed in plastic (good for us every day drivers since it keeps the water out). Secondly, the flat side on the threaded mounting end is off 90^0. Instead of the pull handle being vertical it is horizontal, which means there isn't room for the handle between the mount and the scuttle. The solution for this is simply to bend the mounting bracket (which is at an angle to the scuttle) straight, thus moving the mounting hole out enough to allow the handle to be horizontal.

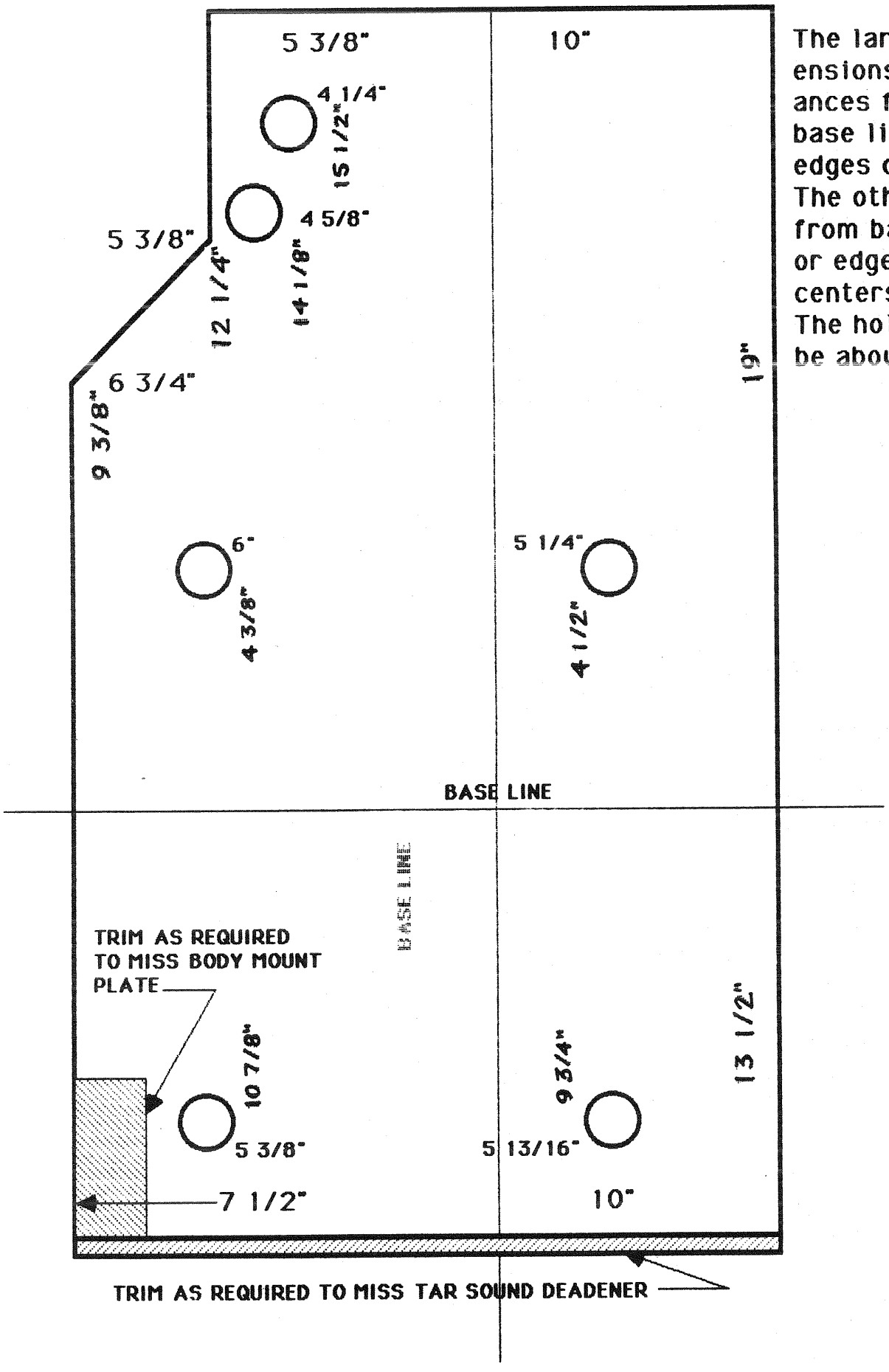
FLOORBOARD FIX FOR THE NON-WELDER &/OR A TIGHT BUDGET

Skill Level C

The time to stop severe floor rust is before it gets too serious. If you've developed a few small holes it does not mean it is necessary to replace the whole floor, especially since this is a major job which involves cutting into the sills, etc. The first step is to clean all the rust possible off the floor with a 1/4" drill and wire brush wheel.

Method 1: Better but hazardous ! Wash with muriatic acid (do this in the summer outside with lots of ventilation. The fumes are corrosive and will also burn your lungs) until all rust is removed. Cover the floors with at least 3 layers of fiber-glass mat or fabric well saturated with resin, making sure you have no air bubbles under it. Using 12" to 18" square pieces makes the job easier but you must overlap all edges by 6".

Method 2: Paint with Permatex "Extend" or other product which converts rust to a protective coating. Caulk all holes with a waterproof, not water resistant, caulking compound or silicone sealer. Make a new floor (Japanese cars make good patches) as shown on the next page and install with pop rivets at 4" on center each way. Caulk all edges.



The larger dimensions are distances from the base lines to the edges or offsets. The others are from base lines or edges to centers of holes. The holes should be about 1" diam.

FRONT END WEAR DIAGNOSIS AND HOMEMADE ALIGNMENT EQUIPMENT

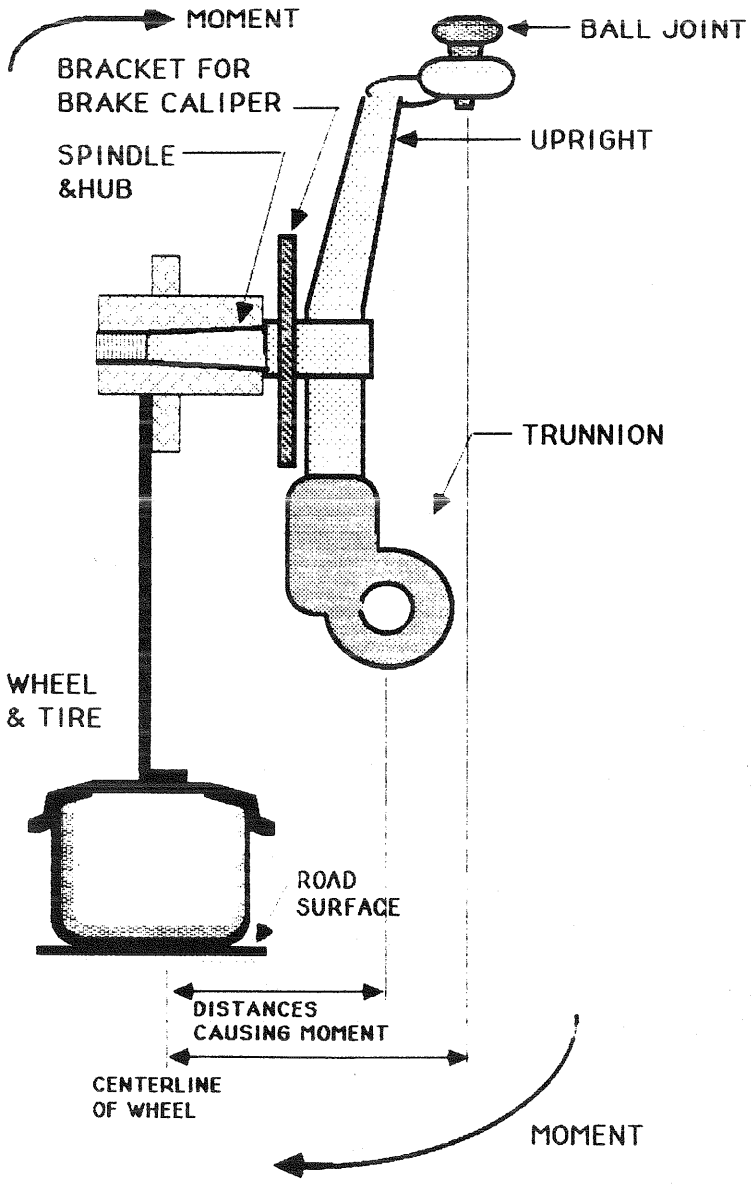
Skill Level B

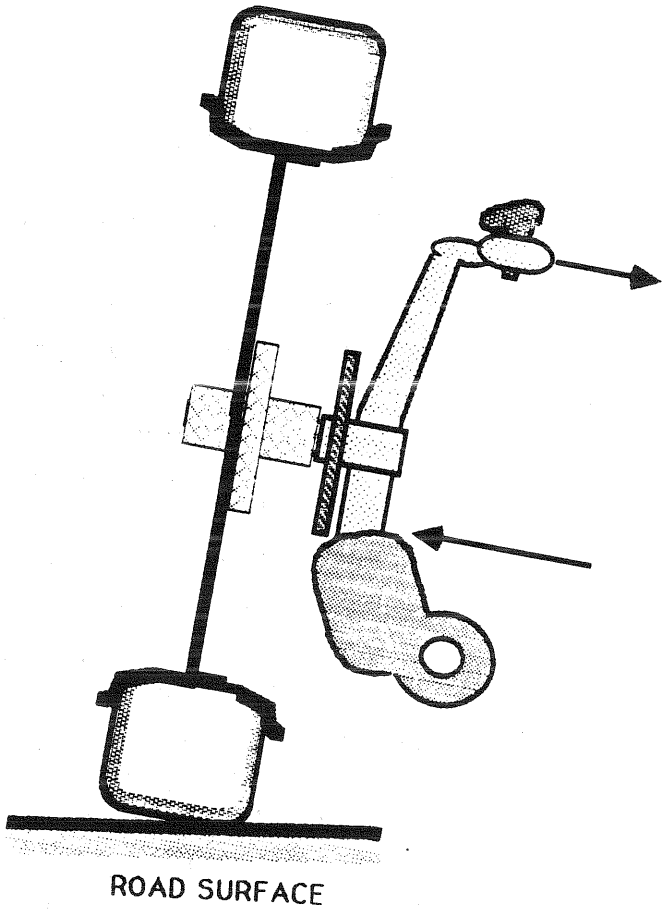
First, "read" the tires. This requires a brief description of the design of the suspension first, but here's what the tires should tell you and why.

The wheel is mounted on the hub and spindle which, in turn, are mounted on the upright or vertical link; which, in turn, is held by a ball joint at the top and an ancient device called a trunnion at the bottom. Because the trunnion is threaded inside it can turn right and left and because it has a bolt through an offset which mounts it to bushings in the lower control arm it can go up and down. Because the upright and spindle are outboard of the mounting points, and the wheel rotates on the spindle, the distances between the center of the wheel and the center of the ball joint and trunnion bolt become "moment arms" rotating about the mounting points. (moment is an engineering term meaning force rotating about a point at any distance. The distance being the "arm", or lever). Shown below is a drawing of the normal position of the upright and the position with worn ball joints or trunnions. Supplement these with the drawing on page FS 8 and your shop manual.

Any wear in upper suspension (ball joints at the outer end of the upper control arm and rubber bushings at the inner end) lets the top of the wheel move in. Conversely, wear in the lower parts (nylon outer bushings, bronze trunion, or inner rubber bushings) lets the bottom of the wheel move out. This will cause wear on the inner side of the tire. The wear will be proportionately greater from inside to outside. Toe out (wheels pointing away from each other at front) or conversely toe in (wheels pointing toward each other) will cause uneven wear on the inside in the first case and outside in the latter.

Worn steering parts like steering rack or rubber mounts, tie rod ends, ball joints, and trunnions usually cause vibration on braking, steering wheel jiggle at varying speeds, and uneven (or chunking) wear on tires.

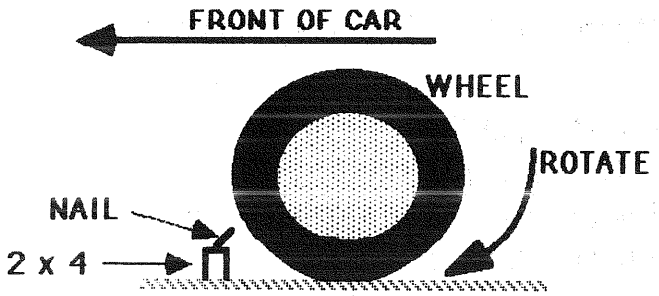




There are 3 basic front end alignments: (1) Camber, or tilt of the wheel from vertical in the left/right direction, (2) Toe in as explained above, and (3) Caster, or lean of the top of the upright in the front/rear direction. Caster is pretty much beyond our scope here but if all parts are good it shouldn't change (for that matter neither should anything else). Here are a couple of fairly close methods to check camber and toe-in. Do toe-in first and then go back and do it again if you change camber.

On as flat and level a surface as you can find, move the car back and forth to make sure the steering is on straight ahead. Use a straight 2x4 about 6' long as a toe-in gauge by driving a

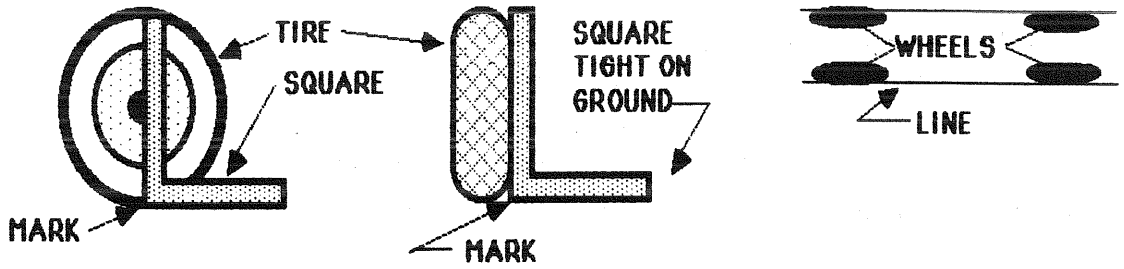
10 penny finishing nail in about 1/2" near one end. Pull the nail out and drive it into the 2 x4 with the point out. Jack up the wheel and rotate the tire in the "backing up" direction. Place the 2x4 so the nail point is as close as possible to the center of the tire and against the tire. You'll see the nail will scribe a line on the tire. Do the same on the opposite wheel. Back the car up about 4' and then pull forward about the same. This returns the tires to normal after being let off the jack. Position another nail at the other end of the 2x4 so that the nails are on the scribed lines when the 2x4 is placed in front of the tires.



Move the 2x4 to the rear of the wheels and check the nails against the lines. If the nails are inside the lines, move both tie-rods out a turn (or in if the nails are outside the lines), then repeat the back up and forth and test procedure until the nails are on the line both front and rear or less than 1/2 the thickness of the lines inside the lines at the rear of the tire.

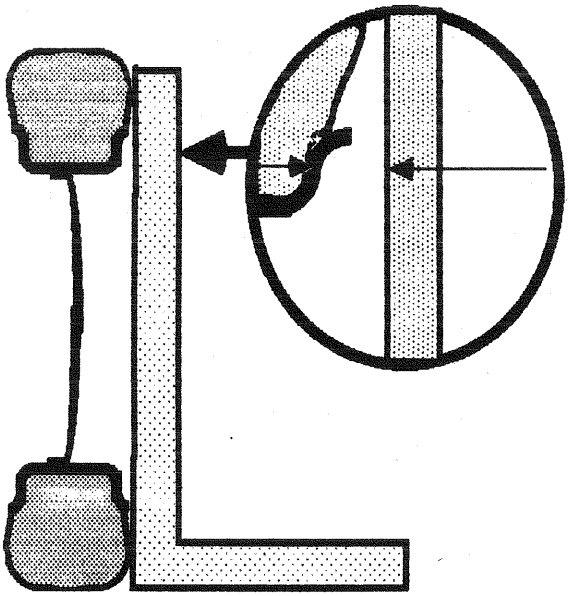
To check the camber, again make sure the wheels are in the straight ahead position and the tires are normally set on the ground. You will need a carpenters metal square with 24 inch sides to establish a line from the outside of the rear tire to the outside of the front tire and, finally, as your camber gauge.

Use the square with one leg pointing toward the front or rear of the car (parallel to tire) to make a mark on the ground at the front to rear center of the wheel using the hub cap medallion or wire wheel knock-off as a guide. Turn the square pependicular to the wheel, hold it as vertical as possible and tight on the ground. Mark the inner corner of the square. Use a 2x4, chalk line, or other means to strike a line between these last two points (the outside of the rear tire to the outside of the front tire).



MARKING LINE BETWEEN OUTSIDE OF FRONT AND REAR TIRES

Now lay the square on the ground with one leg on the front/back line. Move the square to the vertical center reference point. Mark another line at this point perpendicular to the front/rear line. Place the square vertically on the new reference line, as in the center drawing above, against the bottom of the tire.



Measure the distance to the rim at the top and bottom where shown, not at the very edge. Measurements should be equal or 1/16 inch less at the bottom, NEVER MORE. To move the bottom of the wheel out add shims equally at the front and rear lower inner control arm mounts. A word of caution - clean and oil the mount bracket bolts, they will be rusty and will strip easily.

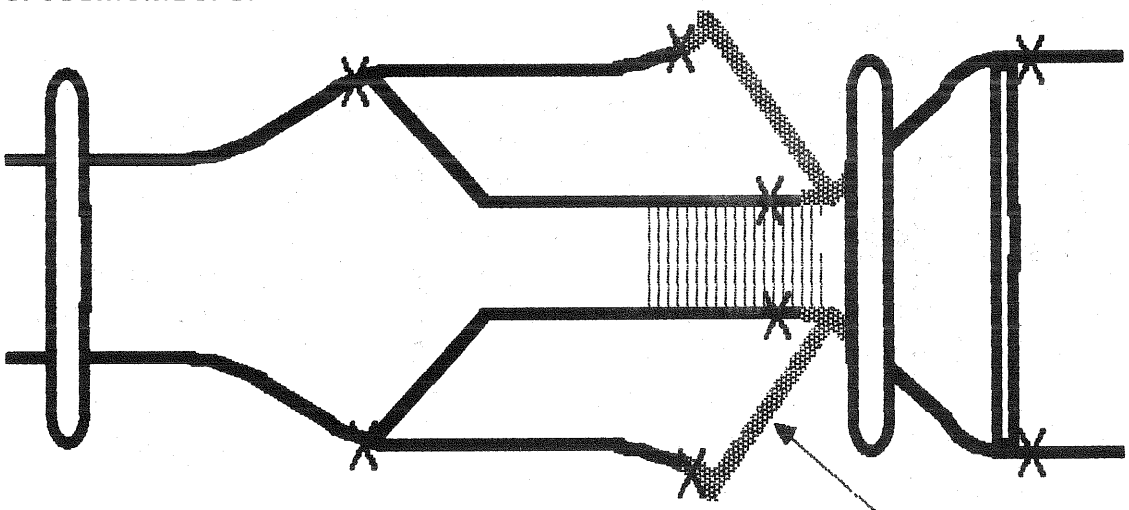
See page FS 3 for a recommended mount reinforcement.

Don't forget to go back over the toe-in, and be sure never have positive camber. This same principle can be used at the rear end but rear alignment is much more sensitive so it is not recommended.

REAR SUSPENSION CROSSMEMBER REPAIR

Skill Level B

Many TR 6s, TR 250s, and TR 4 IRSs are needlessly junked or parted out because of frame rot. The rear crossmember can be repaired or replaced depending on your skills, budget and if you want a show car or a street car. A professional replacement that is virtually undetectable will cost about $1000 because there is a lot of labor involved to remove the suspension and differential in addition to skillful metal work. However, if you are just looking to make the old heep strong and safe again you can get by for a couple hundred or less by encasing the rusted crossmembers.

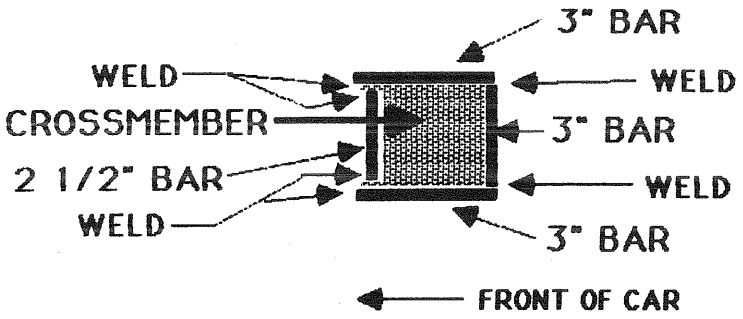


At the minimum you will need a good floor jack, a hard level surface and 8 jack stands or some solid concrete blocks (never place a car on blocks with open cells) and some wood 2x8s about 8" long to put on top of the block. Place where indicated by Xs above. Whatever you use for support make sure it can't topple in any direction. The car needs to be as high as possible, but safety first. You can get by with a lot of labor and a 3/8" drill and a good hacksaw - I've done it several times, but really a drill press and an air driven cut off tool are needed. Get a 20' bar of 3"x 1/8" steel from a steel supplier (see structural steel and fabricators in the yellow pages). They will usually shear it for you at little or no cost to 2' 0" lengths. Now the tough part- two of these sections need to be trimmed lengthways to 21/2".

Remove the axle, then the suspension, by the manual except disconnecting the brake line. You'll have some difficulty doing it, but loosen the lock nut on the aluminum suspension arm where the flex and solid brake lines join. Pry the clip loose and move the brake assembly free of the suspension arm. Pull the shock link through the hole in the center of the backing plate and hang the brake assembly over the shock arm.

Get new 3/8" x 3 1/2" grade 5 or grade 8 bolts for the mounting brackets. Make the front and back pieces as shown below. The front is easiest made in two pieces and should have vertical 1" x 1/8" stiffeners made up and welded about 1/2" each side of the nuts at some time. The back doesn't need stiffeners because of the large bearing area of the suspension brackets. The hole positions should be carefully measured on your car. You may have to make them 1/16" bigger to get the bolts through, but too large of holes will cause the bracket to move and cause alignment problems. I'd suggest enlarging only one of each pair of holes. Fit the front and back pieces and clamp in place. I strongly suggest making pieces to go forward and to the rear at the main frame rails at each end. The length will depend on your frame condition. Also, cover the large hole at the outer end of the main frame rail. Make the top from 3" bar and as long as possible. The inner end can be angled for maximum length on the rear side. Tap it in between the floor and the frame. Make a bottom from 3" bar. Remove the carpet from the car and your'e ready to call the welder. Two cautions (1) welding makes heat and the heat can cause interior smouldering fires hours later (2) TR frames are thin, especially rusty ones, a MIG or wire welder is recommended on the frame rails. An arc welder can be used but it will burn through unless the welder is really good. On the crossmember it doesn't matter because it is all 1/8".

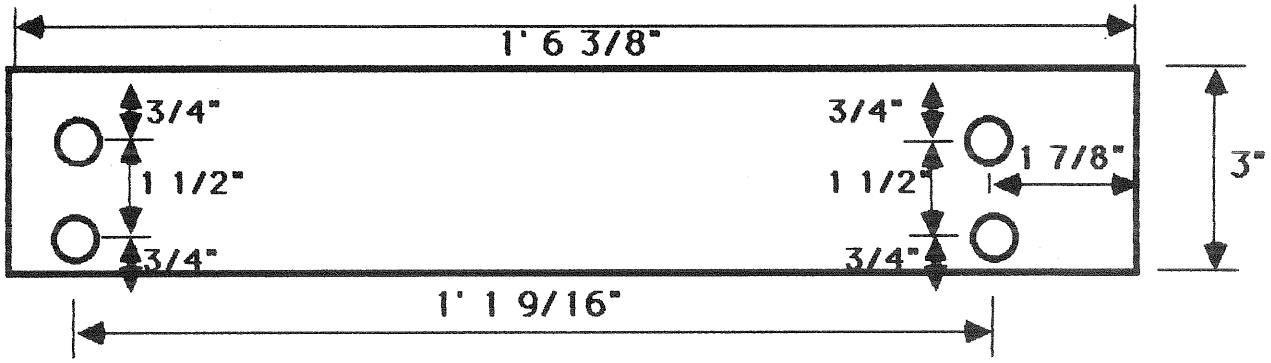
If you trim the bolt for the inner suspension bracket bushing to just the length of the nut it can usually be reversed (nut toward the frame) allowing you to remove the suspension arm at a later date without removing the bracket. The bushings should be replaced while you're doing this job (see page RS 4 in SIX TECH).



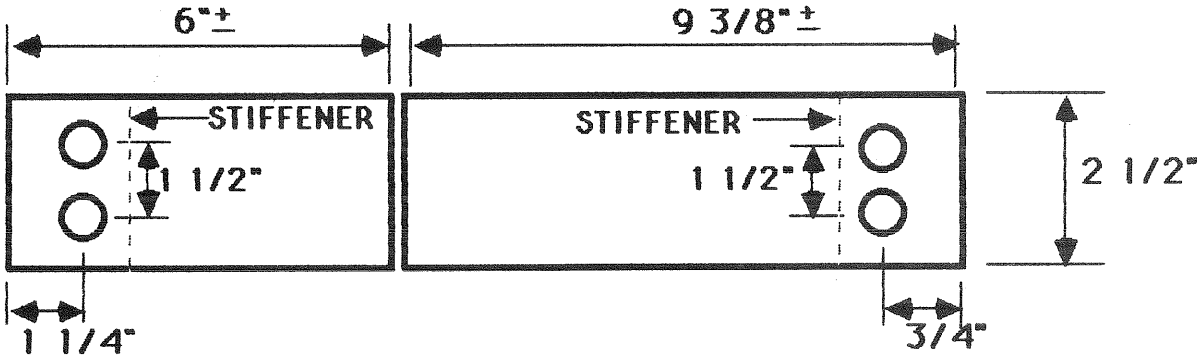
SECTION THROUGH CROSSMEMBER

NOTE: ALL WELDS SHOULD BE CONTINUOUS.

BACK - LEFT SIDE SHOWN FROM REAR



FRONT - LEFT SIDE SHOWN FROM FRONT



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

There is a basic trueism 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 creaping 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 Detriot 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 noticably 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 hightly 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

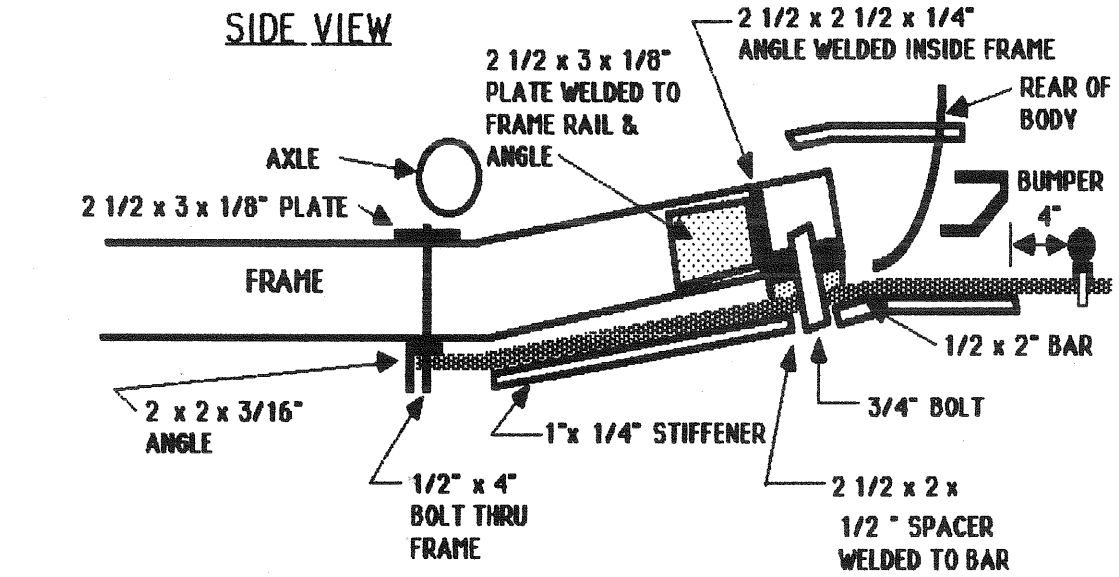
We are all conditioned to thinking the car that starts at the initial turn of the key is in fine condition. Essentially, that's very true. However, after your TR 6 has been setting for several hours the oil drains out of the system. On an engine with fair mileage on it you will notice a terrible clatter 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.

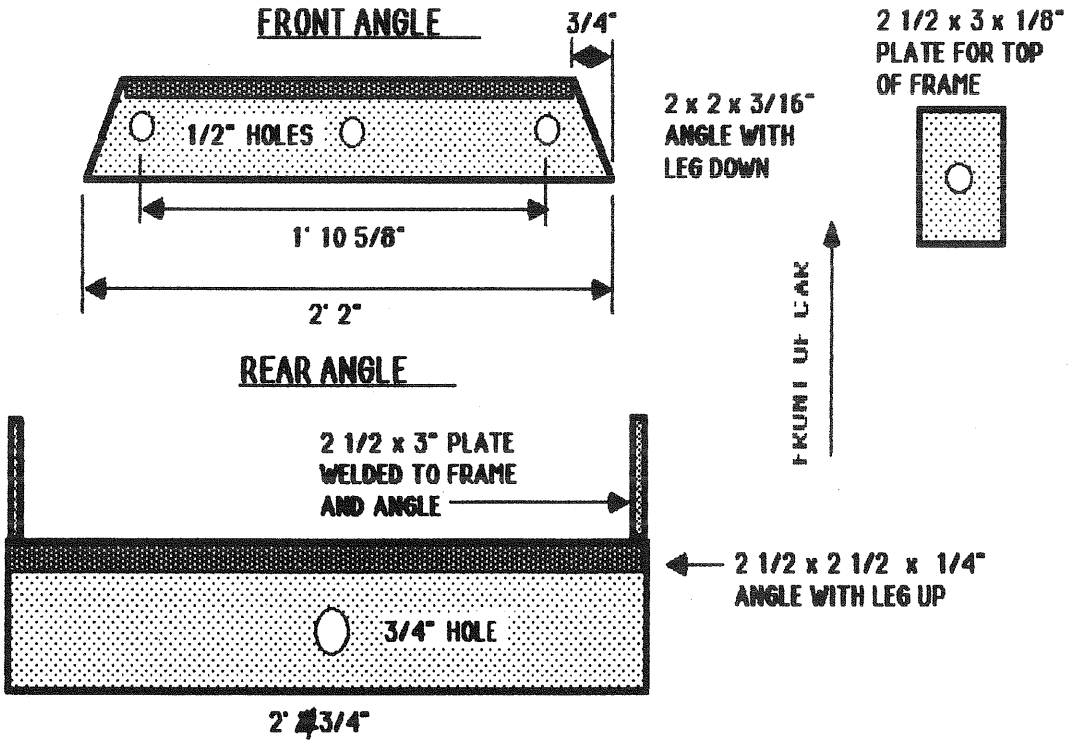
From now on instead of yanking out the choke and then hitting the key, leave the choke in and just let the engine spin for several seconds to start oil moving from the pump. This is especially true in cold weather when the engine probably won't fire anyhow until you choke it. I doubt that your battery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

REMOVEABLE AND OUT OF SIGHT TOW HITCHES FOR THE TR 6

Skill Level B

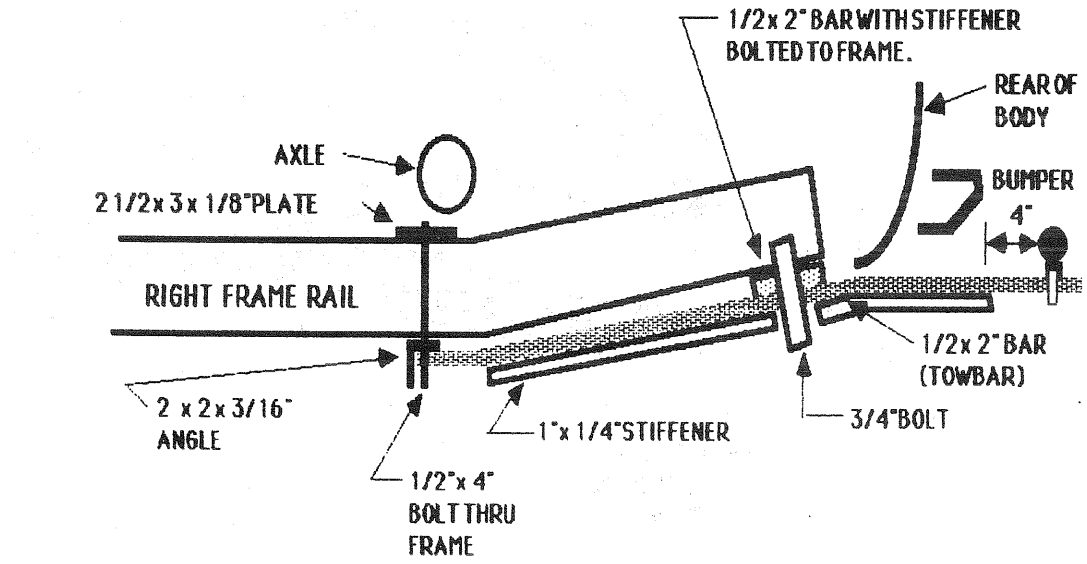
As the 6 PACK national meets spread farther from the East and Midwest and the trips get longer, a little trailer for spares and silly things like clothes would come in handy. And, in general, there are many times when most of us would like to have a hitch to tow something. These are set ups I have used for hitches. Due to extreme differences in workmanship, etc., they are presented for information only and are to be used at your own risk. See the disclaimer in SIX TECH.

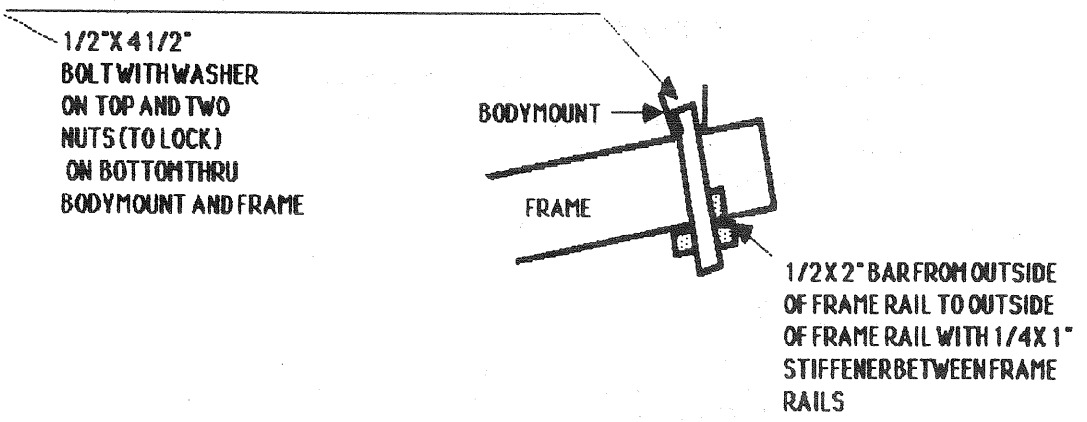




I have this set up on a car with a Monza exhaust but it should work on any car and should clear the stock muffler. I don't have a car with a stock exhaust to check it out but, at worst, it would require more spacers welded to the main member to lower it. However, there are many kinds of exhaust systems. If I were to make a light duty, no welding(almost), removable variation I would substitute a 1/2" x 2" bar with a 1" x 1/4" stiffener on top in lieu of the angle welded to the frame. This could be bolted to the rear of the frame utilizing the holes near the back of the frame rails <u>with stiffener plates inside the frame rails</u> or with bolts thru the body mounts as shown.

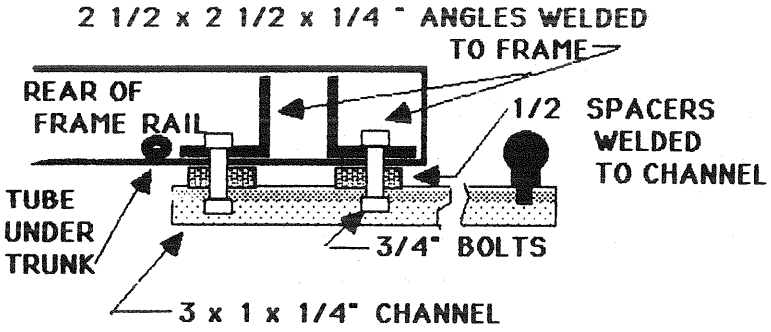
<u>VARIATION OF THE ABOVE</u>





I must emphasize that the above and the following are used for towing with a tow bar or a light load trailer, none is meant to take an appreciable tongue load.

ALTERNATE 1

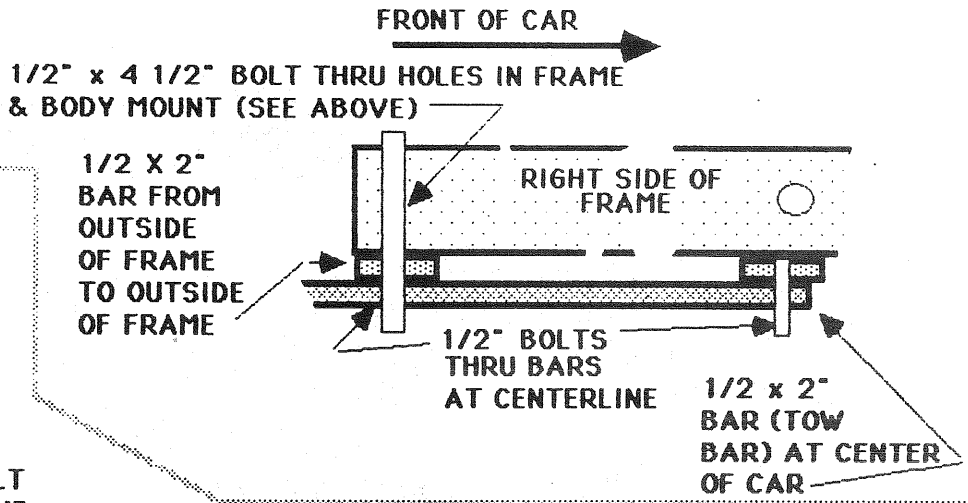


NOTE : FRAME SLOPES UP. CHANNEL MUST BE CUT AND LEVELED AT ABOUT REAR OF BODY

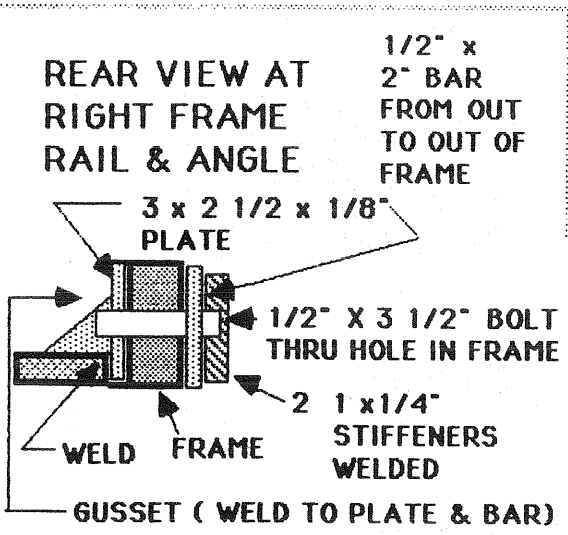
I have used this set up for years, once towing a Chevy wagon with it (the Chevy steered the TR and had to have a driver aboard). The angles are as far apart as possible. A plate between the vertical legs of the angles makes it rigid and the vertical weld was easier on thicker metal. The 3/4" nuts are welded on the top of the angles before installing. The frame is the weakest part of this set up.

ALTERNATE 2

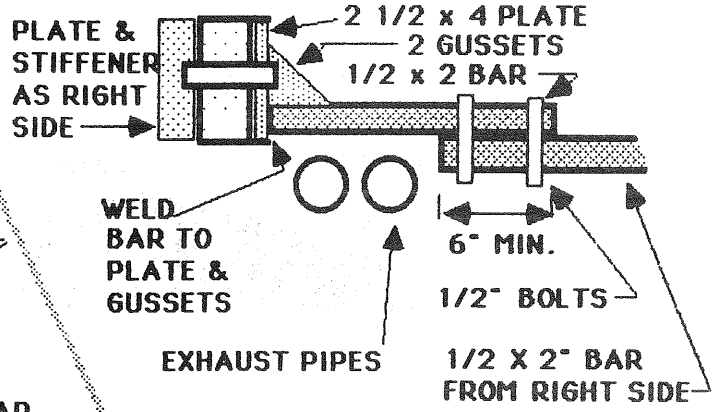
RIGHT SIDE VIEW



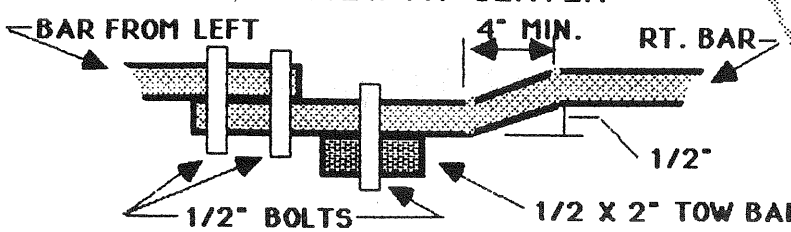
REAR VIEW AT RIGHT FRAME RAIL & ANGLE



REAR VIEW AT LEFT FRAME RAIL



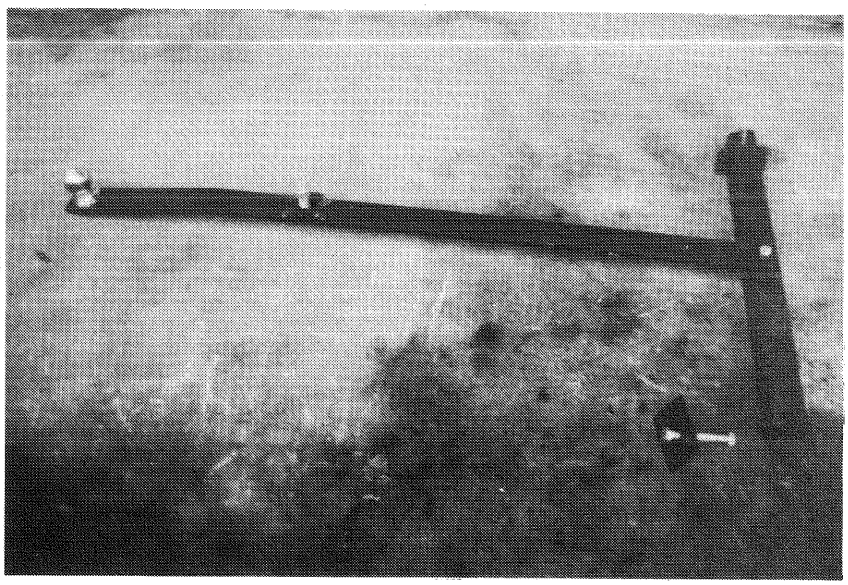
REAR VIEW AT CENTER



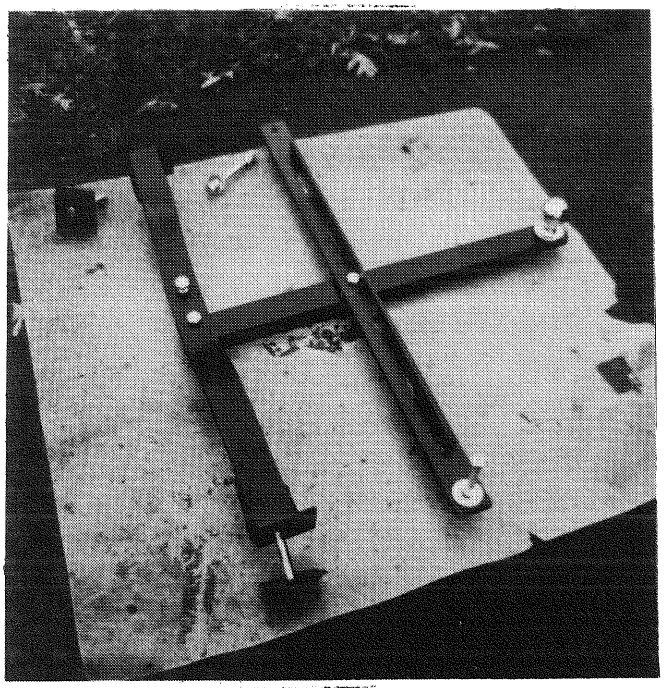
NOTE: IT IS BEST TO LAP BARS SO THAT ONE BOLT GOES THROUGH BOTH AND TOW BAR

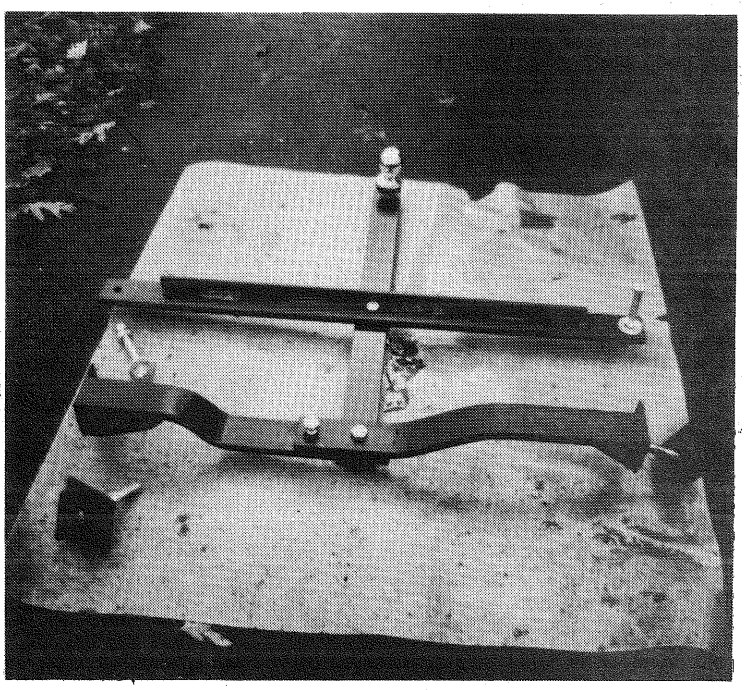
I think the drawing for Alternate 1 is pretty much understandable so I haven't added any photos. Alternate 2 could be used on a show car since it totally removes. The dimensions shown for the plates and 1/2" x 2" bar at the frame rails may be considerably different for different cars due to the close proximity of the hole in the frame, the mufflers used, and the tube under the trunk. The drawing is pretty hard to follow so I hope the photos help. The one shown is on my 4 Place TR 6 which has a Thrush muffler on the right side passing under it so the plates and gussets at the ends are upside down from the drawing

Shown at right is the hitch on SM 5. In this case, the angle welded at the rear of the frame was used so the 1/2" x 2" bar used in the variation on SM 6 is not shown.



Alternate 2 shown below.





BOLT TYPES AND TORQUE

Bolts aren't just bolts. Those mail order "storehouses" you see with a zillion bolts (most too small to be of any use) for ten bucks are fine for putting on your license plates but don't use them on stressed parts of your car. There are 3 basic types of steel used for bolts and their strength varies considerably. Grade 2 have a tensile strength of 74,000 pounds per square inch (PSI) of cross-sectional area; grade 5, 120,000 PSI; grade 8, 150,000 PSI. Look for the markings shown below on the head. British markings are different. For virtually all applications on your TR 6 grade 5 will do, but if you are not reusing the original bolt, it won't hurt to use grade 8. Internal engine bolts are a whole different bag, use only factory replacements. The following torques are for fine (SAE) threads with SAE 10 oil or an equivalent lubricant on the threads. UNF and SAE are supposed to be the same but you should refer to your shop manual whenever possible because the torques listed (for UNF) are 10 to 15% lower. Torques in foot pounds (ft./lbs.)

Bolt Size	Grade 2 	Grade 5 	Grade 8 
1/4"	6	10	14
5/16"	12	19	29
3/8"	20	33	47
7/16"	32	54	78
1/2"	47	78	119
9/16"	69	114	
5/8"	96	150	
3/4"	150		

BEARINGS ARE BEARINGS

Contrary to popular belief bearings are not made to fit cars - exactly the opposite. When a manufacturer (even General Motors) designs an axle or a pump or a space capsule they must design it around generic bearings, seals, and bushings. Now this is not as difficult as it sounds since there are many types and thousands of sizes. The point is you can get the bearings or seals you need right there in River City should the need come up unexpectedly or if you don't want to wait for mail order. Sometimes you can even improve on the original. For example some ball bearings are made with built in seals on one side or both sides. If you have an application where chronic leakage occurs through the bearing area (such as early TR-3 or MGT Series rear hubs) simply use a sealed bearing in addition to a modern seal. It is a good practice to measure any bearing you remove and record the size, make, and part number (these interchange). I put them in the applicable section of the shop manual. Then, when a job comes up unexpectedly or you want to get the parts before tearing the car down, just take the numbers to an industrial bearing supplier listed in the yellow pages.

A BETTER SEAL IS NOT NECESSARILY A BETTER SEAL

I've basically always been a believer in overkill and using better materials than necessary. For example, using a needle roller bearing in lieu of a brass bushing or a double lip seal in place of a single lip or even, as in TR-6 front wheels, replacing the felt seals carried forth from horse drawn vehicle design. I'm not alone in this. Design engineers have always assumed double seals were better.

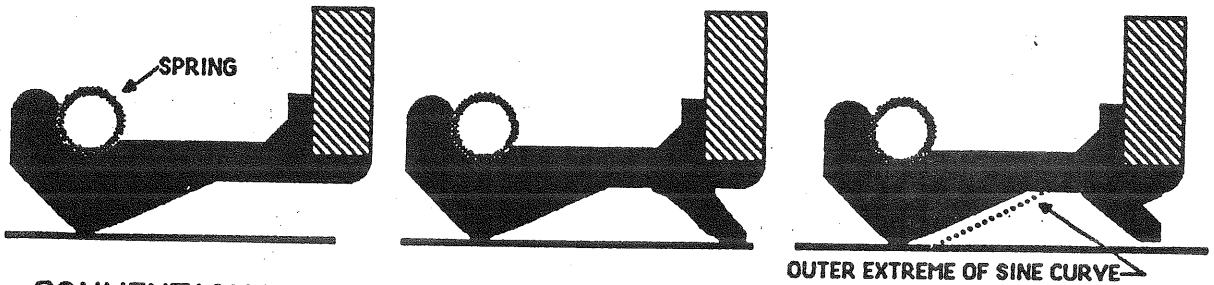
An interesting technical report by CR Industries blows this theory all to hell. Since it is not likely to grab your attention like a Playboy centerfold, I'll give you the meat of it.

In a dual lip seal, the spring loaded primary (inner) lip seals the oil in while the secondary non-spring loaded lip seals out dirt and dust. That certainly seems logical. CR's intensive

research shows that is not at all so. Heat is the enemy with seal materials, such as nitrile, causing hardening in the presence of oil. At 3000 RPM, (60 MPH in a non-overdrive TR 6) shaft temperature due to friction of the secondary seal was 145^0 vs. 63^0 for a single lip seal. Packing the dual lip seal with grease had no significant effect. Removing the secondary lip dropped the temperature of a dual lip seal from 145^0 to 60. What is more, temperature increases directly as RPM increases. As to dust and dirt ingestion, at the start the single lip seal lets in more dust but at 100-150 hours the two seals are equal. At 150 hours the ingestion by the dual lip seal increases dramatically. At 300 hours the dual lip was trapping and ingesting over twice the dirt of the single lip. In all cases failure was due to dirt lifting the primary lip, not due to lip wear.

WAVESEAL, THE WAVE OF THE FUTURE

If you stayed awake through the above, you'll find the following earthshaking. After several million hours of testing CR Industries has introduced Waveseal. Two things make it better. First, the primary sealing lip has a sine curve (the mathematical name of a smooth curve which swings smoothly from one side to the other ,alternately and equally on both sides of a line). That means it contacts more shaft surface to dissipate heat (the curved edge is longer than a straight edge). The in and out curved edge "pumps" dirt away and oil back in at the sealing edge. The double lip variety has a secondary dust shield which does not actually touch the shaft so you do not get the destructive heat build up encountered with normal double lip seals.



CONVENTIONAL DOUBLE LIP WAVESEAL

THAT OLD FROZEN BEARING TRICK

Few of us have the luxury of owning a hydralic press and bearing pullers to remove and install bearings. Given that you're willing to spend a little time and think ahead there is a way to beat this problem - at least the installation problem. Usually, when you are removing a bearing it is bad so it doesn't matter if you beat on the outer race. However, doing this to install a new bearing is a no-no because it damages the bearing.

Simply place the new bearing in the freezer of your refrigerator overnight. That will shrink it enough so that it will go into the bore of the part with little or no tapping on the inner race. Use a lead or copper hammer, never steel. In the opposite case- installing a bearing on a shaft - put the shaft in the freezer overnight. Think ahead and have a piece of pipe the correct size to fit against the appropriate installing race of the bearing. Pound on this pipe, not on the race or side to side on the race.

ANTI-SEIZE AND LOC-TITE

These are two items I find invaluable in the shop and virtually nobody ever remembers to buy. Anti-seize should be used on virtually all non-moving connections where excessive corrosion occurs. Examples are thermostat housing bolts, crankshaft pulley, tiny bolts, frame brace on TRs which must be removed to pull the engine, differential mounts on TRs with independent rear suspension, and any steel bolt in an aluminum part (this is especially important). Loc-tite, on the other hand, should be used on parts subject to moving, and especially those subject to loading and unloading (like connecting rod and wrist pin bolts) and all internal engine bolts. A <u>few drops</u> of the type used for bolts placed on front wheel spindles keeps the wheel bearing inner races from spinning. However, in virtually all of the above cases you should not overdo it and use bearing-lock because you'll never get the pieces apart again. With both products the surfaces should be clean and free of rust and oil.

CONVENIENT RUST REMOVER

Frequently you remove a bolt with the threads half full of rust and you can't find one like it in your bolt can. Or, you have a small piece of rusty sheet metal that you want to paint. Even if you want to clean surface rust off a fender, there is a product which will save you a trip to the metal stripper or the hardware store.

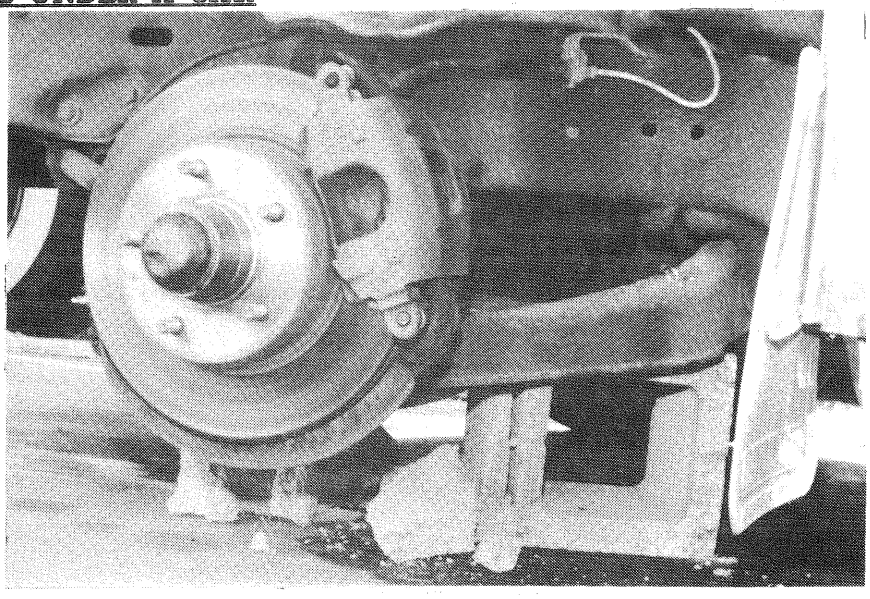
Muriatic acid is available at most hardware stores for about $5.00 a gallon. Its principal use is for cleaning masonry. However, it works great on steel. Simply put some in a plastic container and drop in your part. Clean or chip off all scaled rust first. Swishing the acid about speeds up the process, but you only need to let it set until the rust is gone.

Now the bad part. Muriatic acid, like any concentrated acid, will burn skin and puts off heavy, choking fumes which tend to not disipate quickly. Be sure to use it in an open area and hold your breath when near the container. Also use away from other metal parts so the fumes don't clean them. I once used some in the doorway of the garage for about an hour. The next day I found a lot of parts had been cleaned (which I didn't want cleaned) by the fumes and immediately attacked by summer humidity.

CAUTION: I've been told the acid causes an embrittlement action with some steels. Do not use on stressed parts like suspension.

NEVER USE CEMENT BLOCKS UNDER A CAR

The front suspension of this Detroitus Gigantus sat on this block just fine - for a while- about long enough for someone to have crawled under the car!



CAR	TR 6
OIL_CHANGED	
OIL_BRAND__TYPE	
OIL_FILTER_CHANGED	
OIL_FILTER_BRAND_NO	
TUNE_UP	
PLUG_MAKE_TYPE	
PLUGS_NEW	
AIR_FILTER_CHANGED	
AIR_FILTER_MAKE_NO	
TRANS_OIL_CHANGED	
TRANS_OIL_BRAND_TYPE	
REAR_END_OIL_CHANGED	
REAR_OIL_BRAND_TYPE	
LUBED	
WHEEL_BEARINGS_PACKED	
FRONT_BRAKES_NEW	
REAR_BRAKES_NEW	
FR_BRAKES_MAKE_NO	
REAR_BRAKES_MAKE_NO	
BRAKES_ADJUSTED	
BRAKE_FLUID_NEW	
BRAKE_FLUID_TYPE	
FR_SUSP_UPPER_BUSHING	
FR_SUSP_LOWER_BUSHING	
CARBS_REBUILT	
CARB_DIAPHRAGMS	
FUEL_PUMP_REBUILT	
ANTIFREEZE_NEW	
FREEZE_DEGREES_F	
WORK_REQUIRED	
PARTS_REQUIRED	
NOTE_#1	
NOTE_#2	
NOTE_#3	
NOTE_#4	

MAINTENANCE CHARTS

If you are like me, you can't remember when you did what to which car. The charts on this and the following page will help. The second is more detailed and will help you if you are the type that rebuilds or replaces parts near the end of their expected service life instead of waiting until they fail. This is a good practice to follow. As more of us drive greater distances to the 6 PACK TRIALS this becomes more important. It is a lot easier to replace a water pump, a universal joint, or most any other part at home than on the road. For you computer types that wish to customize a chart, this was done on Reflex database.

CAR	TR 6
OIL CHANGED	
OIL BRAND TYPE	
OIL FILTER NEW	
FILTER MAKE NO	
TUNE UP	
PLUG MAKE TYPE	
PLUGS NEW	
AIR FILTER NEW	
FILTER MAKE NO	
TRANS OIL NEW	
OIL BRAND TYPE	
DIFF OIL NEW	
OIL BRAND TYPE	
LUBED	
STEERING OILED	
FR WH BRGS PACK	
FR BRAKES NEW	
RR BRAKES NEW	
FR BR MAKE NO	
RR BR MAKE NO	
BRAKES ADJUSTED	
BRAKE FLUID NEW	
BRAKE FLUID TYPE	
FREEZE DEGREES F	
ANTIFREEZE NEW	
WORK REQUIRED	
WORK CONTINUED	
PARTS REQUIRED	
NOTE #1	
NOTE #2	
NOTE #3	
NOTE #4	

ENGINE REBUILT	
MAIN BEARINGS	
ROD BEARINGS	
THRUST WASHERS	
CLUTCH NEW	
VALVE JOB	
DISTRIBUTOR REBUILT	
POINTS NEW	
CONDERSER NEW	
IGNITION WIRES NEW	
WATER HOSES NEW	
FAN BELTS NEW	
FUEL PUMP REBUILT	
CARBS REBUILT	
CARB DIAPHRAGMS	
EXHAUST SYSTEM	
TIRES NEW	
TIRES ROTATED	
TIRES TYPE SIZE	
SPRINGS SWITCHED L TO R	
FRONT BALL JOINTS	
F SUSP UPPER INNER BUSH	
F SUSP LOW OUT BUSH	
F SUSP LOW IN BUSH	
STEERING RACK REBUILT	
STEERING RACK GAITERS	
RR AXLE LT INNER U JOINT	
RR AXLE LT OUTER JOINT	
RR AXLE RT INNER U JOINT	
RR AXLE RT OUTER U JOINT	
DIFFERENTIAL REBUILT	
MASTER CYLINDER REBUILT	
BRAKE CALIPERS REBUILT	
RR BR CYLINDERS REBUILT	

LONG DISTANCE TOWING OF A TR 6

Towing a car has always been a traumatic experience for me, mostly because I always had some cobbled up set up or too small a tow car. Some years back I bought a Pilot brand tow bar and it was well worth the price (about the same as renting it 3 times). Consider one and a tow hitch on one of your cars if you like the idea of being independent of the roll-back tow trucks that charge $75 or so a crack. Here are two things that you should do any time you tow and which are almost mandatory for safe towing more than a few miles at low speeds. (1) Disconnect the driveshaft to keep from damaging the transmission and rear end and secure it as shown below. (2) Remove the front bumper and bolt the tow bar through the bumper braces.