NOTICE

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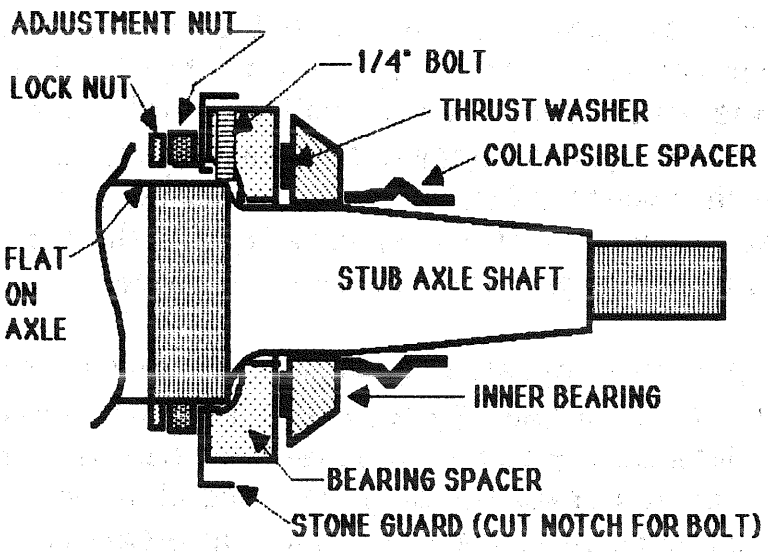
MODIFYING THE REAR HUB WHEN REBUILDING

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

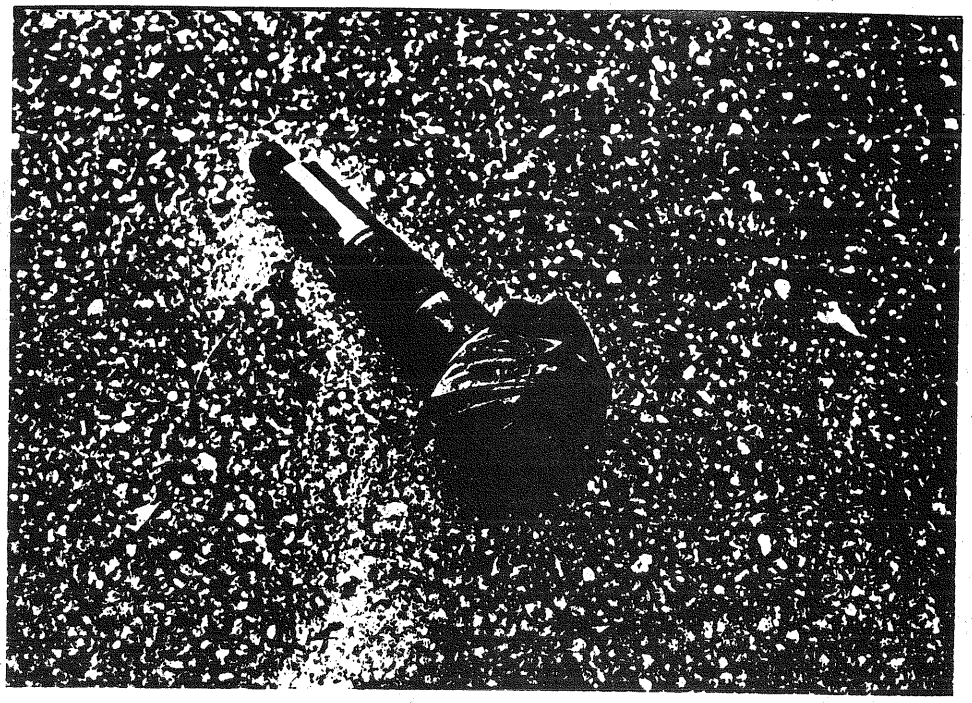
bearing cone. This is a hardened chrome steel washer that is machined to exactly .030" thickness. Do not use a plain washer or an .060" race. Plain washers will wear away as fast as the spacer and the .060" race may move the hub out so far that the spacer is not inside the seal. The theory here is that 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

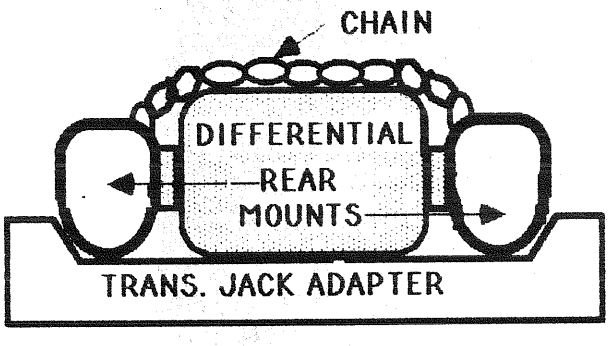
One of the long term problems with TR6s is failure of the pinion gear. This usually occurs at reasonably high mileages - so high that it took me awhile to catch on. I now have a collection of broken pinion gears - never the ring gear- sufficient to hypothesize that the pinions as manufactured have a 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.

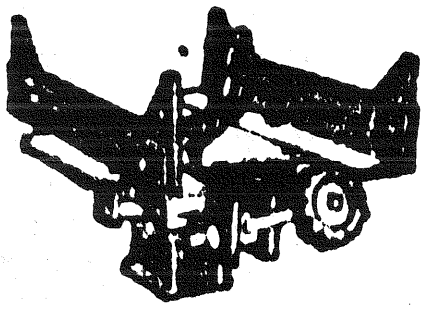


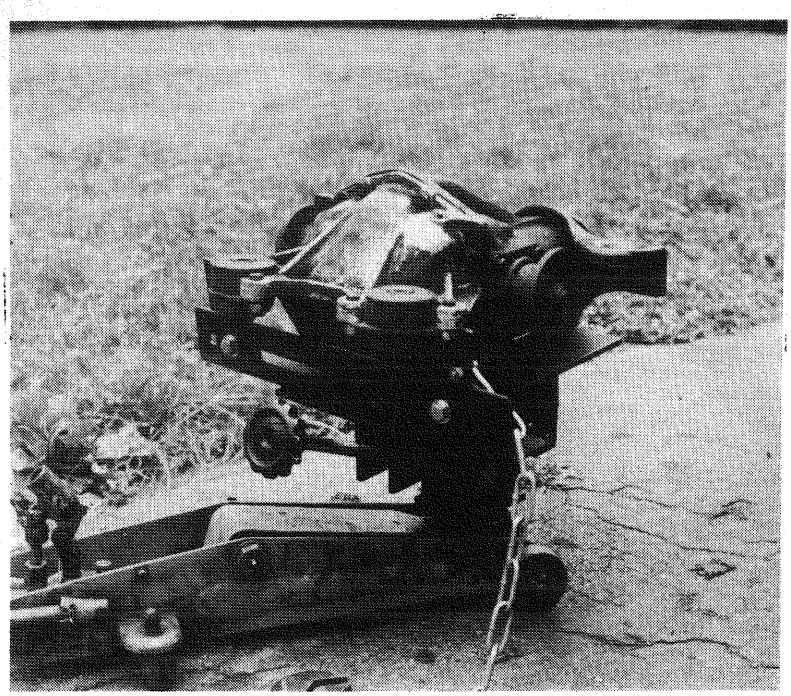
Since (I think) my original differential pinion gave out at a mileage above 60,000 to 75,000 miles and the rest were used it is not easy to determine when they go. The point of all of this for you is to evaluate the odds when buying a used differential or, even more, a rebuilt one. At the price being 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.

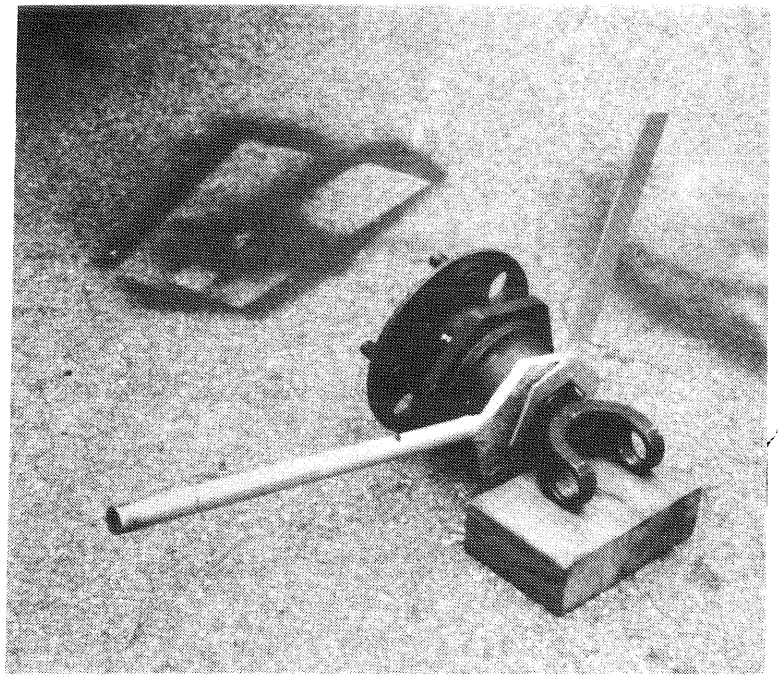


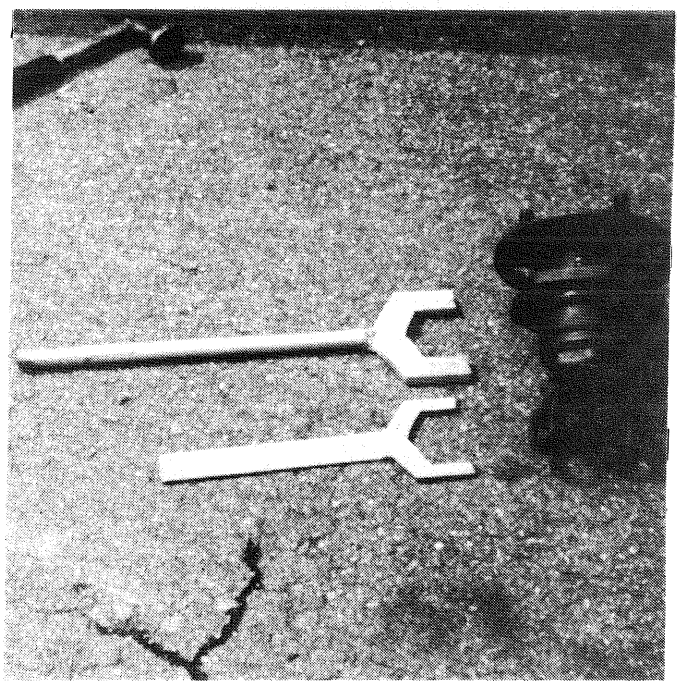




REAR HUB BEARING ADJUSTMENT WRENCHES

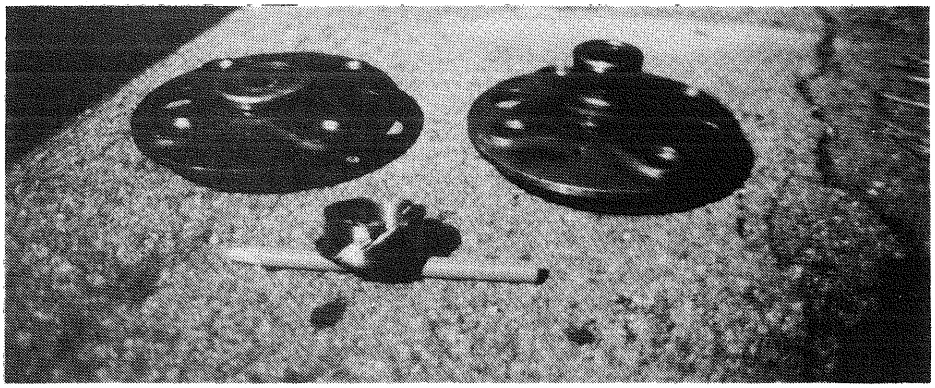
The wrenches shown will aid considerably in adjusting hub bearings, especially when setting end play on a rebuilt hub. Incidentally, it is a lot easier to set the required .002" if the hub is free of the axle assembly as shown here. The thickness of the adjustment nut wrench and the lock nut wrench are 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.

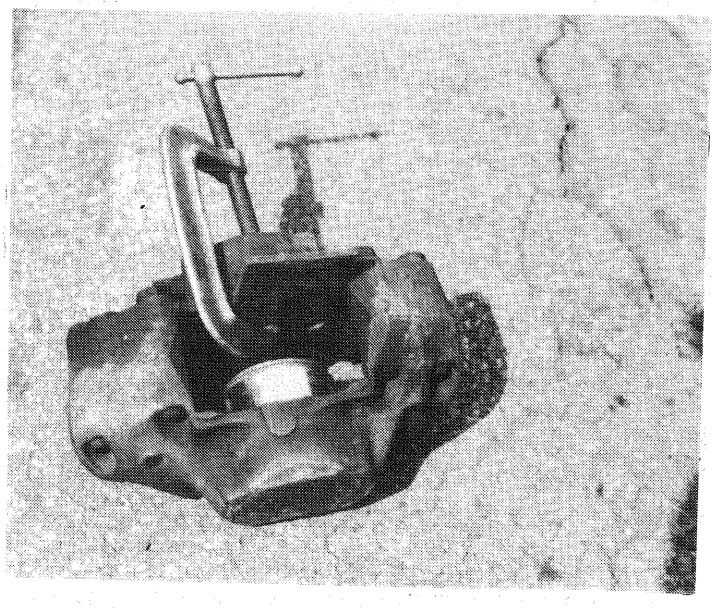


PHOTO #1

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,

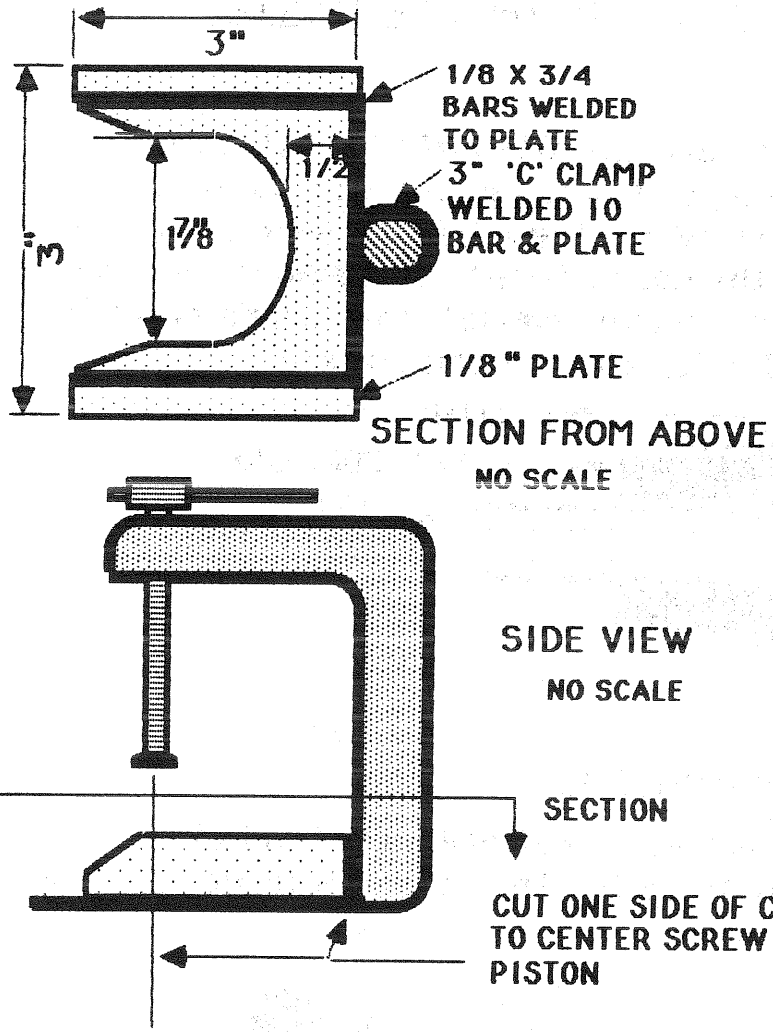
insert the new seal in the groove and put some brake lube (never use grease or oil on brake parts) on the piston and the seal. You should be able to press it back in by hand if you grip both sides and exert even pressure. Be careful not to cock it or you may cut the seal. Put your clamp and bar on the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

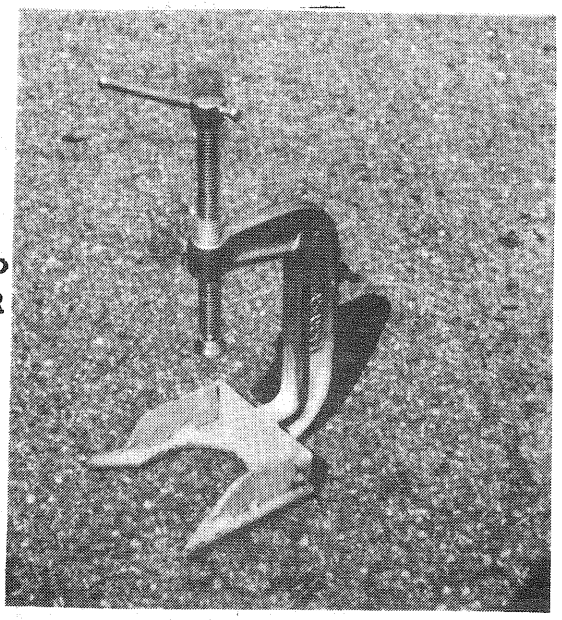
Method 2 requires a little machine shop work, or it can be done by the average home mechanic who has a few more tools and time than average. However, it is a lot less traumatic and messy. Basically, the tool shown following this article simply converts the 'C' clamp to pulling instead of squeezing. The 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.

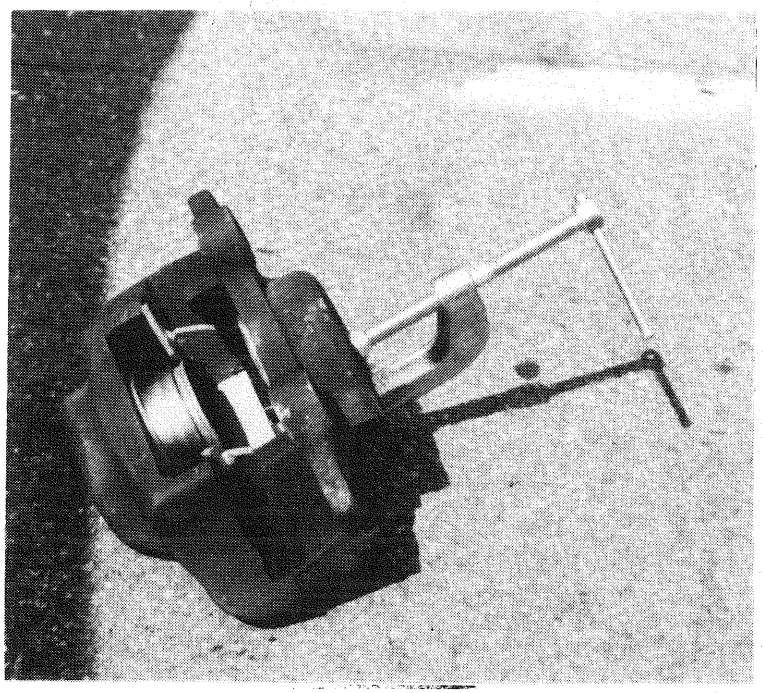
Photos on next page show tool, tool in piston groove, and screwdriver "aiding" tool.

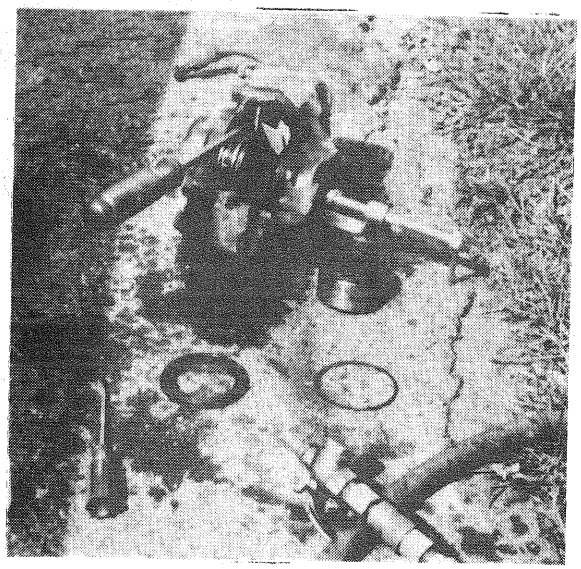
FRONT BRAKE CALIPER PISTON REMOVAL CLAMP

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.



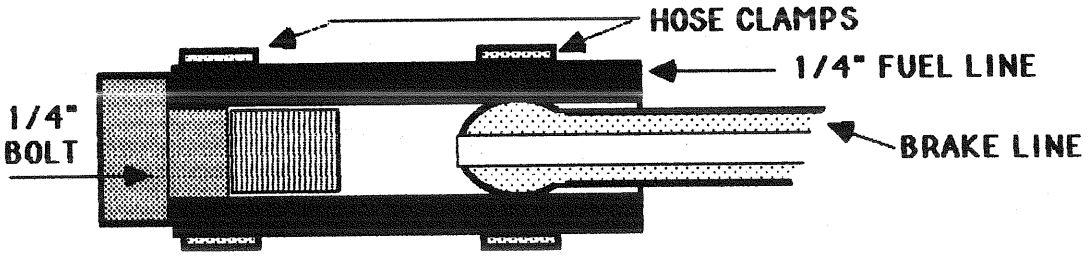






CAPPING A BRAKE LINE WHILE WORKING ON A CALIPER OR BRAKE CYLINDER

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.