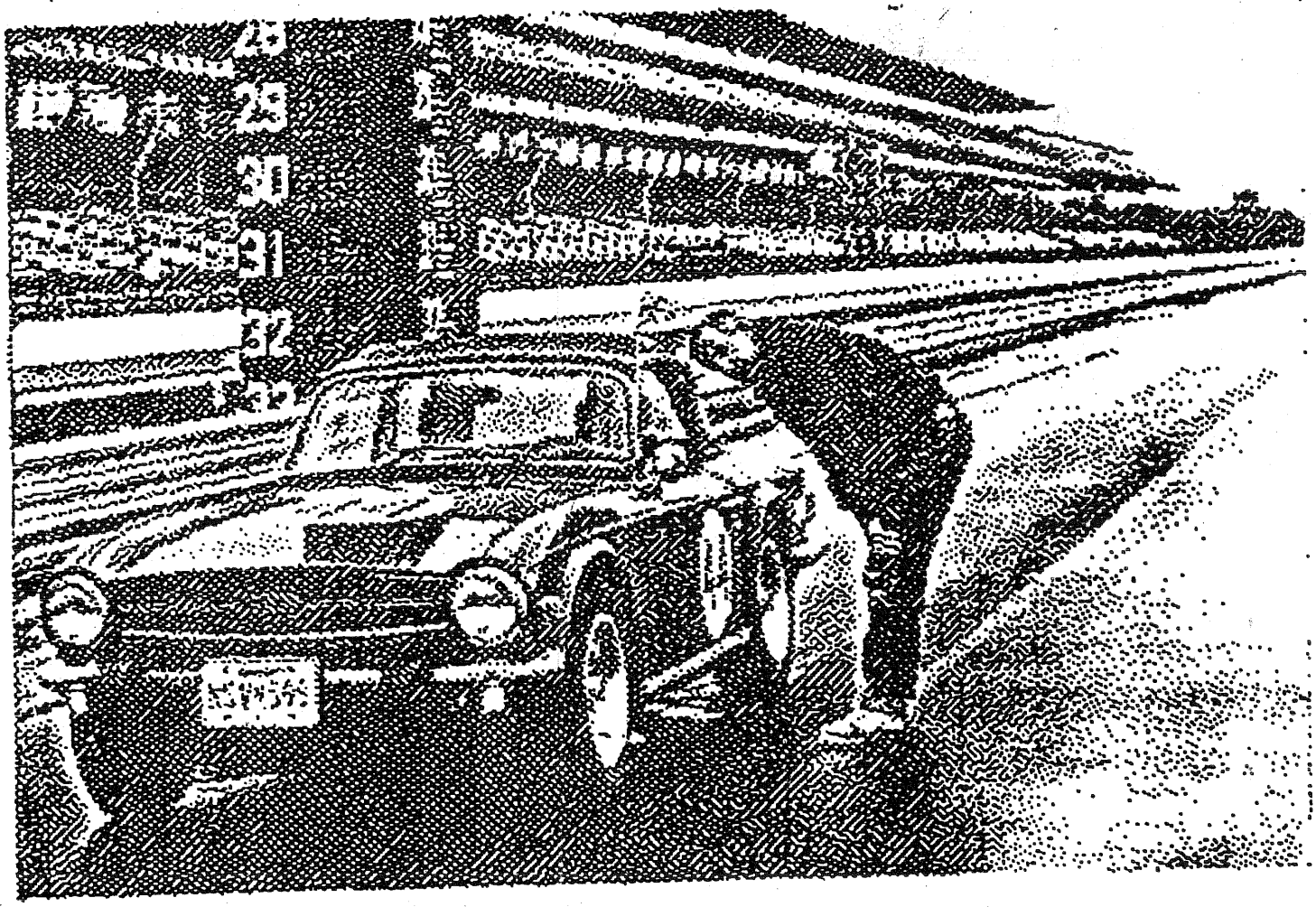
SIX TECH

by Leonard Renkenberger



NOTICE

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WHEN YOU HAVE A FROZEN GAS LINE

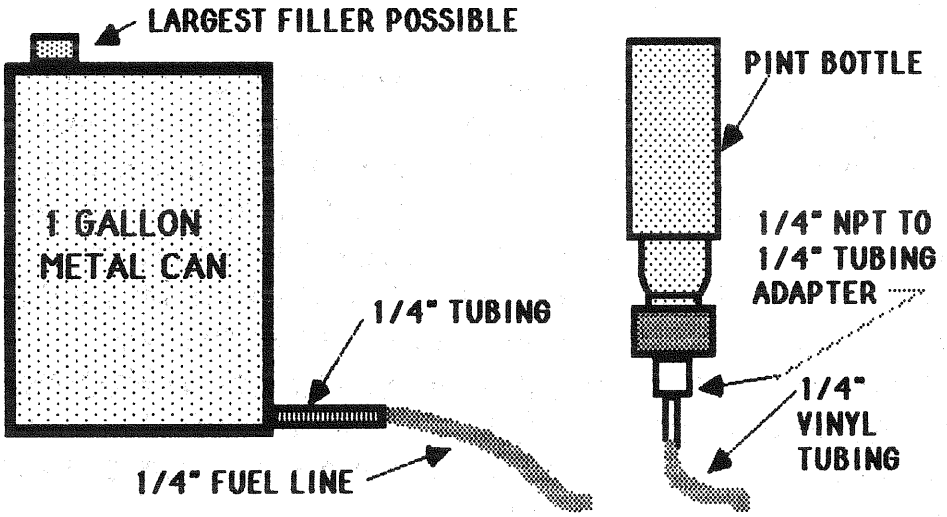
Skill Level C

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

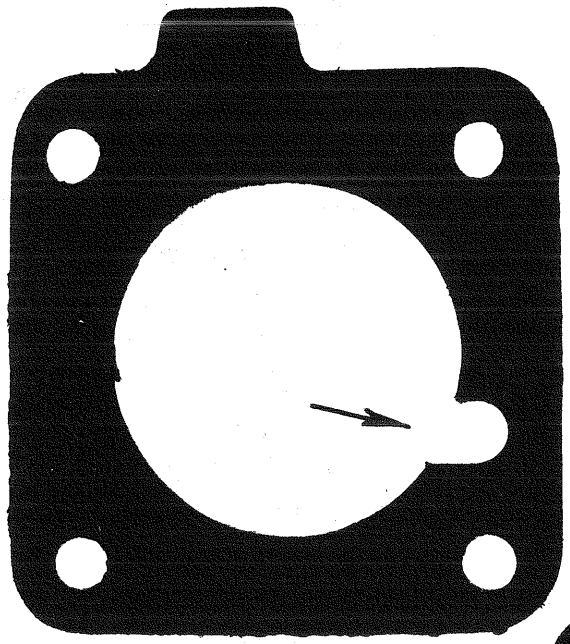
All Skill Levels

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.

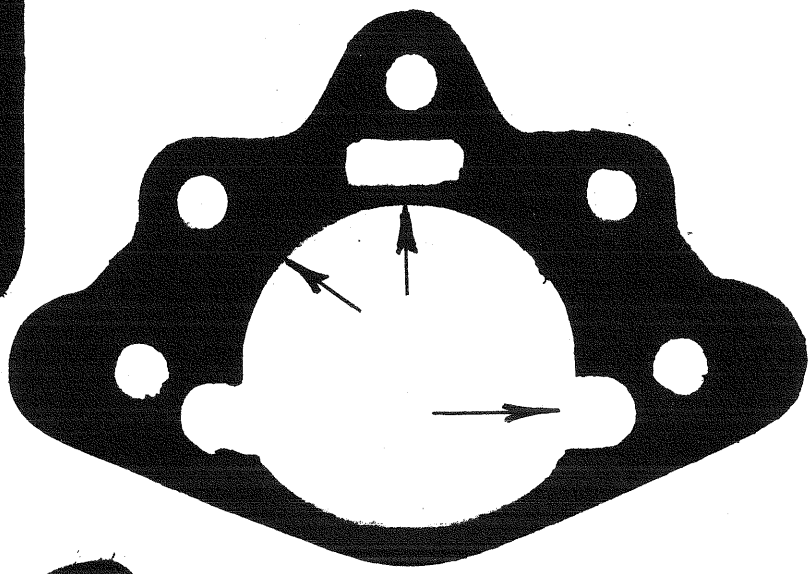
There is only one set up that I know of that takes care of crankcase fumes , the main culprit, and yet insures a leaking oil filler cap isn't allowing air to be sucked into the carbs behind the jet. That is to run a hose from the tube on the side of the valve cover to the air cleaner. Very early cars 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.

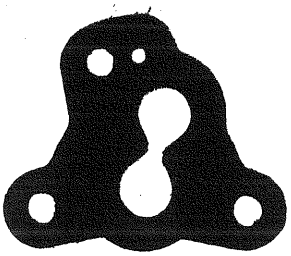
THE RIGHT WAY TO INSTALL CARB SPACERS AND GASKETS

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.