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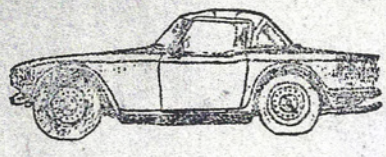

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"T"-SERIES

TECH NOTES

ISSUED BY

THE CHESAPEAKE CHAPTER
NEW ENGLAND MG T REGISTER

CHESAPEAKE CHAPTER

TECHNICAL MANUAL

FOR MG 'T' SERIES

This technical manual has been compiled from all the technical articles that have appeared in our Chapter's newsletter, The Chesapeake Square Rigger since its inception in 1972. While this manual does not cover all areas of maintenance and repair of 'T' Series, it will serve as a supplement to the factory manuals and to the technical articles that have appeared in The Sacred Octagon, the newsletter of the New England MG 'T' Register.

While every effort has been made to edit and correct erroneous or obselete information, you should be aware that errors may still exist in these articles. Since some articles were written as much as eight years ago, materials or methods of doing repairs may have changed with the development of newer technology. If prices are given in an article, and it was written a few years back, then obviously those prices no longer apply. Most major articles are noted with the date of the Square Rigger in which they originally appeared. Products, businesses and repair specialists are mentioned in some articles. While not necessarily an endorsement, the listing is given as the specific product or service is the only one or by far the best choice.

Many members have contributed the articles that are included in this manual, but special thanks should go to our past and present technical advisors since the bulk of the articles were written by these three members, Chip Old, Len Renkenberger and Grady Cook. Thanks also go to Dick Embick for supplying all the back issues of the Square Rigger from the first issue for use in preparing this manual.

George Melick
Historian
Chesapeake Chapter
March 1980

TABLE OF CONTENTS

CHAPTER 1 - ENGINE PARTS AND REBUILD INFORMATION

CYLINDER HEADS, XPAG & XPEG STYLE Technote by Chip Old 9-72

At our July 23 Technical Session two different people asked the question "I'm using a TD head on a TF block. Will this cause any problems?" The answer is no. TB, TC, TD, TF and TF 1500 heads are not all exactly the same, but they are interchangeable.

The TB-TC-TD head has combustion chambers of 45.5 cc each, giving a 7.25-1 compression ratio. The intake valves in this head are 33 mm diameter, and the exhaust valves are 31 mm. This head is usually fitted with 1¼ inch carburettors. Used on any 1250 cc block (XPAG) regardless of whether the block is from a TB, TC, TD, TD Mk.II, or TF, this head will produce standard TB-TC-TD power: 54 horsepower. If this head is used on a TF 1500 (XPEG) block, you will lose power because this head has smaller valves and carburettors than the standard TF 1500 head.

The TD Mk. II and TF 1250 head has combustion chambers of 43.75 cc each, giving an 8.1 to 1 compression ratio. Valves are larger: 36 mm intake and 34 mm exhaust. This head is fitted with 1½ inch carburettors. Used on any 1250 cc block, this will give you about 57 HP. Used on a 1500cc block you will get a compression ratio of 9 to 1, and about 75 HP, but you will have to polish the combustion chambers to eliminate detonation-causing hot spots.

The TF 1500 head has 45.5 cc combustion chambers, just like the TB-TC-TD head, but because of the larger bore of the 1500 cc XPEG engine you get a compression ratio of 8.3 to 1. This head uses the same large valves and carburettors as the Mk. II and TF 1250, and on a 1500 cc block it will produce 68 horsepower. Used on any 1250 cc block, this head gives you standard TB-TC-TD compression ratio (7.25 to 1) but power will be raised very slightly because of the larger valves and carburettors.

As I said earlier, these heads are all interchangeable, but as you can see from the above you may end up with either more or less power than you originally had. There is only one important thing to watch for when you are swapping heads from one engine to another. The heads used on TB, TC and TD engines up to engine number XPAG/TD2/22734 were cast with oblong water holes (actually sort of banana shaped). This head is often referred to as the "banana head", and it is designed to use ½ inch reach spark plugs (Champion L-series). Starting with engine number XPAG/TD2/22735 and continuing with the TF and TF 1500, the heads were cast with round water holes. This type head is often called the"round head" for obvious reasons, and it is designed to use 3/4 inch reach spark plugs (Champion N-series). You must use the correct plugs for whichever head you are using, regardless of which type plug your engine originally called for. Half-inch reach plugs will work in a round head, but the engine probably won't run very well because the plug will be shrouded by the longer plug hole. Three-quarter inch reach plugs will extend out into the combustion chambers of a banana head, and once carbon builds up on the exposed threads you'll never get the plugs out. These exposed threads are also a potential hot spot which can cause pre-ignition or detonation. What's even worse, the over-long plug might interfere with the top of the piston in some cases, and I don't think I need to tell you what that will do to your engine.

Since I mentioned some engine numbers earlier, The "TD2" designation in the engine number does not mean it is a TD Mk. II engine; it simply means that the engine has a larger flywheel and an 8 inch clutch instead of the 7¼ inch clutch used in earlier engines. A lot of TD owners seem to be confused about this, judging by the application forms we have been receiving.

CYLINDER HEADS, REVISITED by Chip Old 4-73

In the Aug/Sept 1972 CSR I described the cylinder heads used on the various models, and I tried to explain what happens when you switch heads from one model to another. A couple of people have told me that they were confused by the article, and one said outright that he didn't believe that a TF block with a TD head will only produce TD power (54.4 hp) instead of TF power (57 hp). It's true, and here's why:

All XPAG engine blocks are essentially the same, whether used in a TB, TC, TD, TD Mk II, or TF 1250. They all have a 66.5 mm bore, 90 mm stroke, and 1250 cc displacement. There were minor detail changes made from 1939 to 1954, but these changes have no effect on the power output. The only difference (as far as power is concerned) between the TB-TC-TD (54.4 hp) and the TD Mk II-TF (57 hp) is in the cylinder head. The Mk II and TF heads have larger valves and ports, higher compression ratio, and larger carburetters, thereby producing more power. The power increase comes from the cylinder head, not from the cylinder block. Therefore, if you switch from a TF head to a TD head, you lose power. O.K?

FLYWHEEL 3-77

For a quick example, let's consider the lowly flywheel. If you have ever built an engine before you have probably carefully installed the crankshaft and bearing, then fitted the flywheel. This is so standard a routine that you don't look at a book and fit the flywheel automatically. Not so on the XPAG/XPEG! Some sadistic so&so at Abingdon designed the block so that the flywheel will not clear the installed crankshaft. It must be fitted to shaft first and installed as a unit. An hour or so later, you are right back where you started from.

Seldom, if ever, do the manuals tell you to examine the flywheel face for more than scoring. You look at your flywheel and it has a few minor ripples, so you decide it is OK. But, what about those little blue tinged streaks and spots? They and the ripples are potential trouble warnings. For a lousy $5-10 you can have the flywheel refaced.

Also examine the flywheel mounting bolt holes in the rear crankshaft flange and the bolts. This is especially important if you have a shop work on these components. If the bolts look new and shiny silver and have three radial lines on the head you have potential disaster on your hands. The original bolys are high tensile strength metric or Whitworth. However, S.A.E. standard

off the shelf, mild steel bolts have nearly the same thread pitch and can be used. Impossible? I know a shop in Virginia that has worked on a lot of 'T' engines where this is done. Check the torque in the flywheel bolts after the flywheel and crank are installed. Otherwise you may be taking the transmission out to tighten them in a few miles.

Considering the fact that flywheel removal means engine removal and nearly complete disassembly, it is well worth the few extra minutes and bucks to have a first class flywheel.

ED. NOTE: This article appeared in TSO, Vol. X, No.3 of May/June 1974

BIG END BOLTS: MAYBE THIS IS THE WEAK LINK FROM #3271 LEN RENKENBERGER,
5 Miller Fall Ct., Derwood, Maryland 20855

In the process of rebuilding TD 28910 EXL/NA, I dutifully had the engine machine work done by the best people in the area. I then started to assemble this fine piece of precision machinery. My machinist and I agreed that my big end bolts (connecting rod bolts to us Yanks) looked very tatty and were not to be trusted. Since I had heard of several engines giving out with thrown rods, I felt extra care should be taken in the area of rods and big end bolts.

I began by having the rods straightened, resized, magnafluxed and balanced. New "high-strength" big end bolts and nuts were ordered from a prominent supplier. Since the supplier's invoice arrived about two weeks after the goods, I had no way of knowing that they actually sent their "standard-strength" bolts. So I proceeded to install them. With the first bolt I began to suspect something was amiss since the self-locking nut supplied with the bolt required 13 ft. lbs. torque to turn it on the bolt. Should this be added to the 27 ft.-lbs. specified for the big end bolt? Further checking proved all bolts to be the same. I called Chip Old for advice (it's nice having the Tech Ed in your Chapter). He was also uncertain and inquired of the supplier. The answer he got was not entirely satisfactory.

CHIP:(Tech Editor's note: If I remember correctly, the problem turned out to be that the thread pitch on the bolts did not match the thread pitch in the nuts, so naturally a lot of force was required to screw them together. I tested a number of nuts of the same type used by Len on a good big end bolt, and found that the maximum torque required was 20 in.-lbs. (less that 2 ft.-lbs.) even after the crimped locking portion of the nut was fully engaged in the thread of the bolt. Before the crimped portion engages the threads, the nut should be perfectly free-running on the bolt. Back to Len)

The supplier has since acknoweledged that I received faulty bolts, replaced them, and said that they would advise all customers of this. The "standard strength" bolt used in the test described later was not a faulty one.

About this time I decided to hunt around for other useable bolts. Weeks later, I had found only two not wholly satisfactory solutions (more on these later). I then began some improvised tests since I was not willing to sacrifice my engine.

Here I must digress to loosely define certain terms and properties of steel. Steel has an ultimate strength, a strain (tension in the case of a bolt) at which the internal structure breaks down and the steel begins to stretch or twist with less force than was originally applied. Yield strength, or Elastic Limit, is the amount of strain which the steel will withstand and still return to its original length. Beyond the elastic limit, it takes less force (tension) to stretch the steel any given length, indicating that permanent weakening has occurred. A bolt must not be loaded beyond this tension. Yield strength (2% above elastic limit) is the strength used in the design of a bolt

To relate this to our specific big end problem, we must convert tension in the bolt to the torque required to turn the nut as we tighten it, thereby creating the tension in the bolt. Since we are concerned only with the torque readings at which the bolt reaches the above critical points, I have not included any back-up data (such as unit stresses, etc.) in the data which follows.

According to the shop manuals, the original castellated nut on the original big bolt is to be torqued to 27 ft.-lbs. or to the next split-pin hole. This could mean that the nut might have to be turned almost 1/6 of a turn (a full flat of the nut) past the point where the correct torque reading was reached. Notice in the data below that the elastic limit is reached very close to one flat beyond 27 ft.-lbs. Because of this, I feel certain that quite a few rod failures are due to overtightening the bolts while trying to reach that next split-pin hole. (Tech Editor's note: Sorry to keep butting in, but it should be noted at this point that when a castellated nut is used the correct procedure is to grind down the bottom of the nut until a split-pin hole is reached when the specified torque reading is reached. Tightening past the specified torque to reach a hole is definitely bad practice, even if that's the way the shop manual says to do it.) **RENK: I don't agree with Chip Old on grinding down nut. How do you grind them perfectly flat and square to bolt? Bolt will bend and force will cause rupture.**

TORQUE READINGS BOLT TYPE	AT ELASTIC LIMIT	FULL FLAT PAST 27 ft.-lbs.	AT FAILURE
1. Original XPAG/XPEG	40 ft. lbs.	40-42 ft-lbs.	46-ft.-lbs.
2. Standard Strength Replacement	38 ft.-lbs.	36-38 ft.-lbs.	42 ft.-lbs.
3. High Strength Replacement	38 ft.-lbs.	38-40 ft.-lbs.	46 ft.-lbs.

As you can see, the original bolt was as good or better than the "high-strength" replacement, There is a great danger in drawing conclusions from only one bolt of each type and by not making direct tensile tests by stretching the bolts in a laboratory. Extensive tests by someone better qualified than I should be made on a large quantity of big-end bolts.

However, based on the above results I would make several recommendations. Unless you are certain that your bolts have never been over-tightened, discard them. Use "high-strength" replacement bolts with self-locking nuts. Torque them to 27 ft.-lbs. plus the torque required to turn the self-locking nut on the bolt. Use Loctite or a similar thread-locking compound in addition to the self-locking nuts. If you don't have a good torque wrench, rent one. I cannot overstress the importance of using a torque wrench; use one, or don't do the job.

Now for the two alternative bolts I mentioned earlier. One is from a 2-Litre Ford Capri. It will take 50 ft.-lbs. torque before failing. The problem is that it is slightly shorter than the XPAG/XPEG bolt and therefore some of the threaded portion of the shank (which is small diameter) is inside the rod cap. This may allow the cap to flex. Also, the thread pitch is coarser, so that the torque to tension ratio varies and the 50 ft.-lbs. may be misleading. However, I may still use this bolt in my engine.

The most promising bolt seems to be from a BSA motorcycle. This bolt is a "waisted" type with machined bearing areas at the ends and center. It is the right length, but it is about .025 in larger in diameter than the XPAG/XPEG bolt, so the bolt holes in the rods will require reaming if someone has an expendable rod to send to me, I will test this bolt and report my findings. I feel that this may be the bolt to use.

ED. NOTE: Also appeared in TSO of Nov/Dec 1974

BY F.E. 'CHIP' OLD - BIG END BOLTS REVISITED

Len Renkenberger reports that he has received several letters in response to his article "Big End Bolts: Maybe This is The Weak Link" (TSO, May/June 1974, p. 25) from readers interested in converting to the Ford or BSA bolts and nuts mentioned in his article. Len has promised to pursue the matter farther and report his findings in this column, but in the meantime, please understand that you undertake this conversion at your own risk. The use of the Ford or BSA bolts in the XPAG/XPEG engine has not been tested. Len mentioned them only as possible substitutes for the original AEF 123 bolt and AEF 131 nut. At this point we don't know whether they will be acceptable substitutes. However, if you still want to attempt the conversion (and I admit that original type bolts are getting hard to find), please consider the following points.

The Ford bolt (part #C3A2-6214-A) is the correct diameter for only about three-quarters of it's length. The remaining portion is slightly smaller, which means that it might not provide sufficient stiffness in the big end cap. There is no simple way to get around this problem. Also, this bolt is slightly sh[illegible] than AEF 124, so that the Ford nut (C3D2-6212A) does not screw all the way on. The use of Loctite or a similar thread-locking compound should negate this problem. and such a compound should be used anyway since the Ford nut is not self-locking and has no provision for a split pin.

The BSA motorcycle bolt is an excellent design and seems to be super strong. However, it is .025 in. larger in diameter than AEF 123, so that the holes in the connecting rods will require reaming. This is a tricky operation requiring absolute accuracy. As one reader has already discovered, not many machinists are willing or able to do this sort of work. Once the holes are reamed to a snug fit on the bolts, the connecting rods must be resized, since it is unlikely that the big end cap will still be in the exact same position relative to the rod. A flat must be ground on one side of the bolt head (which is round) so that it will register properly in the rod. The BSA bolt is slightly longer than AEF 123, so a hardened steel washer will have to be put under the nut to prevent it from bottoming on the bolt threads.

Proceed with extreme caution, and with the understanding that the end result might not be as satisfactory as AEF 123. AEF 123 is admittedly hard to find these days, but it fits properly and is more than strong enough to handle the XPAG/XPEG even when modified far above the original power rating.

ENGINE PAINT FOR EARLY TCs 6-73 by Chip Old

In the March/April issue I mentioned that early TC engines were supposedly painted green instead of red like the later ones, and I asked if anyone could verify this. Len Renkenberger wrote that the engine and gearbox in his TC 0724 are painted a shade of green very similar to the color used on his 1959 Sprite and 1965 Midget. I assume this is the BRG used on many BMC products. Len says that this appears to be the original coat of paint. Can anyone else add to this information? Ray Holtzapple, of York, Penna., who gave me the following tip. Ray said that Citroen Vermillion paint, #AC402, is very close to the dark red originally used on our engines. He said he saw a number of engines in California painted that color, and that the results are quite good. I wish I had known that earlier. I discovered the hard way that when you try to darken bright red by adding some black, the result is mud. I have heard that on early TCs (before chassis #7000 or thereabouts) the engines were painted green, as were the engine compartments regardless of the exterior color of the car. I've never seen one done that way. Has anyone else?

VALVE SPRI'GS 6-73 by Chip Old

This tip for TD Mk. II, TF. and TF 1500 owners isn't new by any means, but a lot of people don't seem to have caught on yet. The valve springs originally specified for those models are a bit strong at 150 lbs. pressure with the valve open. This supposedly allows the engine to rev to 6500 RPM before valve crash (float) occurs. Unfortunately, that heavy spring pressure also wears out the cam lobes and cam followers (lifters) at an alarming rate.

That 6500 RPM limit is very nice for racing, but how often do you actually run your engine that fast? Probably never. The next time you do a valve job, replace the 150 lb. springs with the 123 lb. springs used on the TC and standard TD. These lighter springs make life much easier for the cam and lifters, and you'll still be able to rev to almost 6000 RPM if you get the urge. This also applies to any of you who plan to modify your TC or standard TD to Stage I or Stage II specifications. Forget about the heavier valve springs; they aren't worth it.

Is Your Overheating Due To A Reversed Head Gasket 1979

While we were doing an impromptu head gasket change on Frank Valez's car at the Mini-Gof, someone casually mentioned the XPAG head gasket being symetrical. Actually it isn't, but the bolt pattern is and it can be installed with either side up. Since gaskets aren't marked "TOP" anymore, this could happen. This will result in the cooling passages at the rear of the head being blocked since there are no equivalent front passages. It only takes a minute to find if this has been done. There is a cover plate on the rear of the head that is removeable with a screwdriver or offset screwdriver. Remove it and insert a wire or screwdriver downward into the water passage. It should go well down into the block. If it stops immediately, your gasket is backwards and the passage is blocked. You can do a visual double check with a mirror.

BALL & ROLLER BEARI'GS 6-73 by Chip Old

If you ever need to replace a ball or roller bearing, shop around locally before you mail order one from Moss, Abingdon, or any of the other parts suppliers. There are many bearing supply houses in the Baltimore-Washington area, and they can supply almost any bearing you might need. Their prices are usually around 15% lower than the mail-order suppliers, and you don't have to wait for the U.S. Mail to bring the bearings. Take the old bearings with you to be sure you're getting the correct replacement.

Engine Torques 7-78

The following is a summary of required torques to use during your rebuild.

Rocker Bolts- (BE CAREFUL)	large 43 FT # small 29 FT #	Nut on Front of Cam	50 FT #
Con Rod Bolts	27 FT #	Timing Chain Cover	21 FT #
Gudgeon Pin Piston *	33 FT #	Oil Pump Bolts	12-15 FT #
Main Bearing Bolts	63 FT #	Nut on Front of Crank	50 FT #
Flywheel Nuts to Crank	50 FT #	Pan Bolts	25 FT #
		Cylinder Head Nuts	50 FT #

No!

* Note: Book figure, 30# or less is safer. 6.

From The Tech Editor - Grady 2-80

Last month I said I was going to discuss engine work, so here goes. Now is probably an appropriate time because I've been through three engines in the past 3-4 months, one an XPAG and two Triumph TR 3/4's so things are relatively fresh in my mind.

As usual I'm not going to attempt to talk you through a step by step engine rebuild for it's all in the manual. In fact the three most important pieces of advice I can give you are:

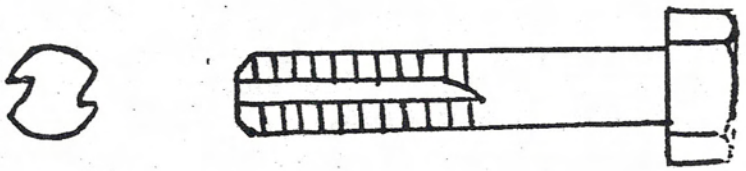
1. READ YOUR WORKSHOP MANUAL!
2. CHECK EVERYTHING!
3. ASSUME NOTHING!

Every good mechanic keeps his manual available and refers to it often. Even Renk, (don't believe that bunk about him not owning a manual) though he generally uses it for specs and delights in finding a better way of doing things. Instead I'm going to discuss my observations of many common mistakes made even by experienced mechanics and offer some tips.

If you get your engine torn down and the crankshaft looks good, no scoring, etc., and you lack proper micrometer, "Plastigage" will give you a very good reading of a taper and/or an out of round condition. Plastigage is a thin spagetti-like, tightly controlled wax, which can be purchased for pennies at most auto parts stores. You simply use it in accordance with instructions, ie. put a short piece lengthwise on each journal and lightly torque (say ½ of spec) the new bearings and cap in place. Then remove the cap and bearing and "read" the gage. If it's of equal width and in spec you are perhaps OK, but if it reads a different clearance at each end (significantly wider at one end) you have a taper. Assuming you don't have a taper, rotate the crank 90° and repeat. If the clearance is gaged the same you're probably in good shape. (If you are the nervous type, the proceedure repeated 4 times at 45° may make you feel better.) If you are wondering why not fully torque the bolts, read on.

While you have the engine down I strongly recommend cleaning every thread, external and internal. Wirebrushing, preferably on a power wheel, will clean bolts and studs, if you don't have a die. If you don't have a tap for internal threads, clean a bolt of the correct size and grind a couple of grooves lengthwise 180° apart in the threads. (See Fig. 1) Carefully and thoroughly remove all burrs and you have a good thread chaser.

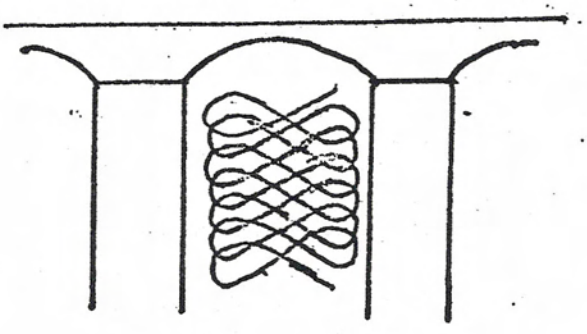
Fig. 1



This cleaning of the threads assures easy reassembly, and eliminates errors in proper torquing due to tight and dirty threads. And for gosh sakes use the proper threaded bolt. I recall reading a while back someone advocating using 5/16 x 24 UNF for 8mm x 1 metric, his argument being that you only have about 1/2 thread interference per 1/3 inch and you can force it - - -DON'T! Close only counts in horse shoes. In reality, you have .002" interference per thread and that is a bunch for properly cut threads!

If you are not boring the engine, make sure you cut the ring ridge out at the top of the cylinders. I've pulled apart two engines lately that some clown reringed without reaming the ridge out and every top compression ring was shattered. Sure, I know some rering sets have a notch in the top compression ring to prevent this, but a reamer is relatively inexpensive ($20) and using it only takes a few minutes. Also make sure you hone the walls to break the glaze. Keep the hone moving up and down such that you get roughly a figure 8 pattern on the walls to assure pooper seating of the rings.

Fig. 2



Check the ring end gap per the manual. This may make you decide to bore the engine if you haven't already. If you have already bored, check anyway, you may have to file the ring ends to get the gap in spec. We did in Jan's engine.

While we are on rings, be careful that you put the gaps of the two compression rings at 180° from each other. Oil consumption will be ridiculously high if you allow them to be lined up or even too close.

It's probably a good idea to get the head done by a shop. Very few of us have the proper valve seat grinder or valve facing machine. Lapping is rarely adequate as the valves get hammered pretty badly. I dare say none of us have the facilities to put in new valve seats to correct a "pocketed" or recessed valve.

When reassembling the rocker assembly triple check that the oil feed hole in the shaft is properly lined up with the proper pedestal and the oil feed hole in the head. I recently saw an experienced mechanic, even after being cautioned, still put the oil feed hole at the wrong end. The engine would have only lasted minutes had it not been discovered.

Watch gasket holes! Some gaskets appear symmetrical and can be physically reversed, but not function properly. The XPAG head gasket is a good case in point. Every hole in a part that has a corresponding hole in the mating part is there for a reason. If the gasket doesn't have a hole there, you better turn it over, (and you may even have to cut your own hole).

Always tighten and properly torque every bolt, or nut, bend over locking tabs and insert cotter pins when you affix them. Don't think you will put in a lot of them and tighten them later - - you'll miss some or forget. Of course, with heads, pans, covers and some other parts, proper torquing sequence is important so all bolts in any one of them must be inserted and run in before torquing. The point is, do it one cover or piece at a time.

Now for torquing. Get a good torque wrench, use it properly and conform to specs. I'm the kind of nut that believes in running through a torque sequence 3 or 4 times, each time increasing the torque 1/3 or 1/4 of spec until spec is reached, e.g. for 80 ft.-lbs. I'll torque in proper sequence to 20 ft.-lbs., then 40 ft.-lbs., 60 and finally 80. Don't torque to the spec and then give it an extra "tug" for good measure. Avoid repeated torquing and loosening, however. It's rather hard wear on the female threads in aluminum and cast iron. Worse, however, is that some tests have shown that high strength bolts fail at as little as 1/3 what they could have originally carried, when torqued to their spec and loosened as few as five times*. This is reportedly the cause of the Kansas City, Missouri, Kemper Arena roof failure. *ENR - 8-16-79.

Now let me contradict myself in one instance and jump into the big-end bolt fracas. I don't believe the 27 ft.-lb. spec is necessary and I personally advocate stopping at 24 ft.-lbs. If you compare the 8 x 1 mm big-end bolt with the very close 5/16 x 24 you will see that 27 ft.-lb. exceeds specs for grade 8 aircraft 24 ft.-lbs. and in fact is nearly equal to "super" grade bolts 27.5 ft.-lbs. of the latter size. Ask Renk sometime about Ruth's TD running around for an unknown period of time with a carriage bolt holding one rod cap on. (ED. NOTE: See pages 3, 4 and 5).

If you are having trouble getting some of the big-end bolts torqued to spec with the cotter pin hole lining up with the castellated nut, i.e. you get to spec and have 1/2 flat or more to go, try interchanging some of the nuts. I know Chip Old says the proper way is to remove the nut, grind a few thou off and try again, but few, if any, of us have the proper equipment to grind a nut and hold square or flatness. I've had tremendous success just interchanging nuts.

Hints from the Dutch Newletter "Square Front"

XPAG/XPEG CYLINDER HEADBOLTS - If your original headbolts cannot be used anymore, ask a Datsun dealer for headbolts from a Datsun A-12. (Ed. note, must be 1200cc engine.) They have to be shortened about 6mm, but the material in these bolts is better than the original MG.

VALVE COVER SEAL FOR XPAG/XPEG ENGINES - Use the valve cover seal from a Fiat 124. The pushrod engine, not the overhead cam version.

12-75

RUST & GASKET ARTICLE FOR THE 'SQUARE RIGGER' by Dick Embick

In the past, I have noticed many cases where engines have a component vulnerable to rust. I am referring to the square steel plate which is screwed on the rear of the head.

Sure as God made little green apples, yours is rusting (perhaps through) at this momment.

If for any reason you have to pull the head off your engine, remove this plate clean the rust away on the inside and coat with marine clear epoxy for a lifetime guarentee.

Another thing I discovered is with patience, exacto knife, and old patterns you can virtually make every gasket for your engine except three: a rear main oil seal, manifold, and head gaskets. These can be ordered separately from Moss Motors.

The graphite coated wicks located in the front of the sump and timing chain cover can be rebent and flipped upside down for reuse if not badly damaged.

Sheets of cork, various thicknesses are not expensive. Plus I use laundry soap boxes for cardboard gaskets and paper bags for thin paper gaskets.

The oil pump gasket is easy if you coat the face with ink for an impression on the paper bag material.

Engine overhauls are getting rather expensive and this is one good cost saving.

TABLE · HEXAGONS AND THREADS — U.S., UNIFIED AND BRITISH

Across-flat dimensions and threads per inch of S.A.E., Unified, Whitworth, British Standard Fine and British Standard Pipe threads (Whitworth, B.S.F. and B.S.P. have same hexagon dimensions for different thread sizes)

Bolt Diameter (inches)	Across-flat (A/F) Dimensions						Threads per inch						
	S.A.E.			Unified		Whitworth	S.A.E.		Unified		Whitworth	B.S.F.	B.S.P.*
	Nut	Bolt Head	Setscrew Head	Nut	Bolt	Nuts and Bolts	Coarse (A.N.C.)	Fine (A.N.F.)	Coarse (U.N.C.)	Fine (U.N.F.)			
1/8	—	—	—	—	—	—	—	—	—	—	—	—	28
1/4	7/16	3/8	7/16	7/16	7/16	·525	20	28	20	28	20	26	19
5/16	9/16	1/2	1/2	1/2	1/2	·600	18	24	18	24	18	22	—
3/8	5/8	9/16	9/16	9/16	9/16	·710	16	24	16	24	16	20	19
7/16	3/4	5/8	5/8	11/16	5/8	·820	14	20	14	20	14	18	—
1/2	13/16	3/4	3/4	3/4	3/4	·920	13	20	13	20	12	16	14
9/16	7/8	7/8	13/16	7/8	13/16	1·01	12	18	12	18	12	16	—
5/8	1	15/16	7/8	15/16	15/16	1·10	11	18	11	18	11	14	14
3/4	1 1/8	1 1/8	1	1 1/8	1 1/8	1·30	10	16	10	16	10	12	14
7/8	1 5/16	1 5/16	1 1/8	1 5/16	1 5/16	1·48	9	14	9	14	9	11	14
1	1 1/2	1 1/2	1 5/16	1 1/2	1 1/2	1·67	8	14	8	12	8	10	11
				Heavy	Series				Heavy	Series			
1 1/8	1 11/16	1 11/16	1 1/2	1 13/16	1 13/16	1·86	7	12	7	12	7	9	—
1 1/4	1 7/8	1 7/8	1 11/16	2	2	2·05	7	12	7	12	7	9	11
1 3/8	2 1/16	2 1/16	—	2 3/16	2 3/16	2·22	6	12	6	12	6	8	—
1 1/2	2 1/4	2 1/4	—	2 3/8	2 3/8	2·41	6	12	6	12	6	8	11
1 5/8	—	—	—	—	—	2·58	—	—	—	—	5	8	—
1 3/4	2 5/8	2 5/8	—	2 3/4	2 3/4	2·76	5	—	5	—	5	7	11
2	3	3	—	3 1/8	3 1/8	3·15	4 1/2	—	4 1/2	—	4 1/2	7	11

* *Bore diameter. Thread is finer than B.S.F., diameter for diameter*

CHAPTER 2 - OIL, OIL PRESSURE AND OIL FILTERS

TC vs. TD and TF OIL PRESSURE By Len Renkenberger

No one has ever been able to tell me why the TC Driver's Handbook lists proper oil pressure as 50 - 70 P.S.I., while the TD - TF pressure is only 25 - 40 P.S.I. at road speed. There are no changes internally between the engines to account for this. I am not sure, but I think I may have stumbled onto the answer to this.

One of the TF's we recently acquired ran 25 P.S.I. whether hot or cold, yet it appeared to be healthy otherwise. New oil and filter didn't help. So, I started looking for pressure leaks, etc. I noticed the flex hose connected to the oil pressure gauge was feeding off the upper end of the external line from the oil gallery to the head. Since this car is fairly original and since the hose was the original type, I assume it was placed that way when new and is quite possibly the original hose. Since all the cars I had seen had the hose attached at the lower (oil gallery) end, I reversed the oil line and hose. What do you know - instant 60 P.S.I. at hot idle.

This tube which feeds only the rocker arms and shaft is made very small to restrict the amount of oi - probably to prevent bleeding pressure from more critical areas and so as not to fill your rocker cover with oil before it can drain back to the pan. Since the hose was attached to the upper end of the line where the oil passage becomes larger, the pressure is decreased in proportion to the increase in passage area.

Why might the folks at Abingdon decided to change pressure monitoring points? I don't know, unless it was the fact that the point most distant from the pump is a more reliable indicator of trouble in the system. However, roaring down the road at 4000 R.P.M. with 25-30 P.S.I. on a 100 P.S.I. oil pressure gauge should worry the hell out of most drivers. Therefore, I would rather just assume my rockers are getting oil and have a psychological boost from seeing the old needle hanging on 60 P.S.I.

O.K. you guys out there in the peanut gallery, let's hear it, am I right or wrong?

DON'T RAISE YOUR OIL PRESSURE AND DROP YOUR TEMPERATURE

3-78

Now everyone knows that MG owners always tell the truth. George Washington would have probably owned an MG, had he lived just a little longer. There are, however, two areas where MG owners tend to get a little elastic with the truth. One is in how much oil pressure their MG has and how cool it runs.

The concepts of engines running cool with lots of oil pressure is a carry-over from the "good old days" when non-detergent oils and alcohol anti-freeze were in common use. They were very true then because those old oils thinned and broke down rapidly with increasing temperature. Alcohol anti-freeze, of course, boiled off at relatively low temperatures. Today's multi-grade detergent oils thrive on 200°+ temperatures and modern anti-freeze doesn't boil away.

A common way to raise oil pressure in any engine is by placing washers behind the pressure regulator spring. The idea is to get lots of pressure so oil will be forced into the minute parts in great quantities. Well, 'taint so. Who says? Good old Bernoulli. Bernoulli's principle of physics says, in effect, "where the pressure is high, the velocity is low, and vice versa." So what you are doing by raising the pressure is restricting the flow of oil past the check valve. Theoretically, you could have 20 P.S.I. oil pressure and have your engine run safely forever while an engine with 100 P.S.I. would cook the oil on the bearings and blow up in minutes. You don't believe it. OK, consider this: Rolls-Royces of the contemporary period of our MG's run 20 P.S.I. at road speed and 4 P.S.I. at idle. How many Rolls engines have you heard of with scored bearings?

Regarding temperature, use anti-freeze year round, and remember that it not only prevents freezing but boiling as well. For example, in a pressure system such as the TF has, it can raise the boiling point to as high as 250°. Those traffic jam temperatures won't hurt your oil either.

A good rule of thumb for any car is that half a gauge of oil pressure or even slightly less at road speed is safe, and with anti-freeze/anti-boil coolant, 100° c. is a perfectly safe temperature.

OIL FILTER CONVERSION

By Mike Hughes 8-75

Some TCs and TDs have a cast aluminum oil filter housing that uses a replaceable element. Unfortunately the proper size filter element is now unknown so the following modification will allow you to use a Purolator MF-39 paper element. Procure the domed pressure plate, felt washer, steelwasher and spring from a MGA filter housing. These parts can be bought new at Manhattan, etc., for about two dollars. The pressure plate will have to be drilled out to accomodate the larger diameter bolt. Then assemble in this order: housing cover, bolt through housing cover, spring, metal washer, fibre washer, pressure plate, filter element. In position the top of the element will contact the inside top surface of the housing and the bottom of the element will contact the pressure plate and insure proper filtration. Do not under any circumstace use a felt element as it is not wrapped on the outside. Felt elements are sucked into the exit part of the filter housing and very effectively drop your oil pressure to nothing flat.

SPIN-ON OIL FILTER FOR EARLY XPAG 3-77

We all are painfully aware of the high cost and scaracity of those throw-away filters. Here is a conversion which enables you to use a spin-on Opel filter costing about $3.75. Total cost of the adaption will be about $20 or less. Another advantage is not worring about cracking one of those brass filter feed lines by twisting while changing filters. Oil pressure will be as good or better than before and I think the oil will be more thoroughly filtered.

I attempted to keep the conversion free of any need for outside labor or manufactured parts. I was only partly successful. You may have to have the base plate made (about $10) and the brazing done. The base plate can be cut out with a hacksaw as it does not have to be a perfect circle. The 3/4" hole in the center can be made with a rotary burr or file and electric drill. It does not have to be precisely centered.

There are two general types of filters in use but yours could be different so refer to the sketches before you start. You must have a sound used filter to start with. Cut away the bottom ½ immediately below the jointure of the two halves. Remove all internal filters and packing. Proceed according to the type filter you have.

ORIGINAL TYPE On these, the banjo bolt fittings are about 1" long and extend into the cannister. The fittings needed are available at any auto parts store. They are Edelman #B-46 and #B113, ¼" x 1½" brass niple and 3/8" x ¼" female reducer. The adaptor for the filter is BAP-GEON # 48 0300 2. Total cost is about $3.25.

Most original types had the top crimped over the bottom half and were soldered together. Remove the remaining edge of the bottom piece by bending back the crimped edge. Now cut the 1/8" steel plate to a diameter that will give enough edge space to braze, once the crimped edge has been bent back as far as you want for appearance sake (3 ½" - 3 9/16" ±). Drill a hole in the center and enlarge to 3/4". Check the diameter of the filter gasket and drill 6 to 8 ¼" holes in a circle mid-way between the center hole and the gasket circle in the plate.(these are oil returns and location is not critical). Screw the nipple into the female fitting firmly. Screw the nipple into the top banjo bolt fitting 2 or 3 threads only (you must leave room for the banjo bolt to tighten). Screw the 5/8" S.A.E. nut onto the female fitting 4 - 5 turns. Screw the adapter fitting into the nut until it is snug against the female fitting. Drop the 1/8" base plate over the adapter and check fit. The large end of the adapter should be about 1/16" - 1/8" beyond the plate. If all fits well, the plate is now ready to braze in place. The outer edge must be sealed, the edges of the 3/4" hole need only to be tacked to the smaller part of the adapter. Any brass or flux on the larger threaded part of the adapter must be removed.

REPLACEMENT TYPE On these the banjo bolt fitting is very shallow. The fittings are galvanized pipe available in any hardware store. The filter adapter is BAP-GEON #48 0300 2.

Tap a 5/8" S.A.E. nut to 3/8" pipe thread (they are close but not close enough). If you are having the brazing done, you will have to do some fitting in advance from here on. If you are doing the brazing, center the nut over the top banjo fitting and braze the entire outer edge of the nut to the top of the cannister. screw the 3/8" x 1½" nipple into the nut about 3 - 5 threads. Screw the coupling onto the nipple. Screw the adapter into the coupling (note it is a very sloppy fit). Drill a hole in the center of the 1/8" base plate and enlarge to 3/4". Drop the base plate over the adapter and check that you have sufficient room to braze the outer edge of the cannister. Screw the adapter in or out until the shoulder of the larger portion is 1/16" - 1/8" above the plate when pressed finger tight into the coupling. Remove the base plate. Check the diameter of the filter gasket and drill 6 to 8 1/4" holes for oil returns in a circle anywhere between the center hole and the gasket circle.

If you are having the brazing done, you must now have the nut welded into the top of the cannister and then go back thru the fitting process above.

Braze or tack the adapter into the coupling while pressing the adapter in place (leaving it sloppy will allow dirty oil to leak thru when in use and may tilt the filter to the extent it will not seal). Drop the base plate over the adapter and braze entire outer edge to cannister. Braze or tack the adapter to the plate being careful not to get any brass or flux on the large threaded portion.

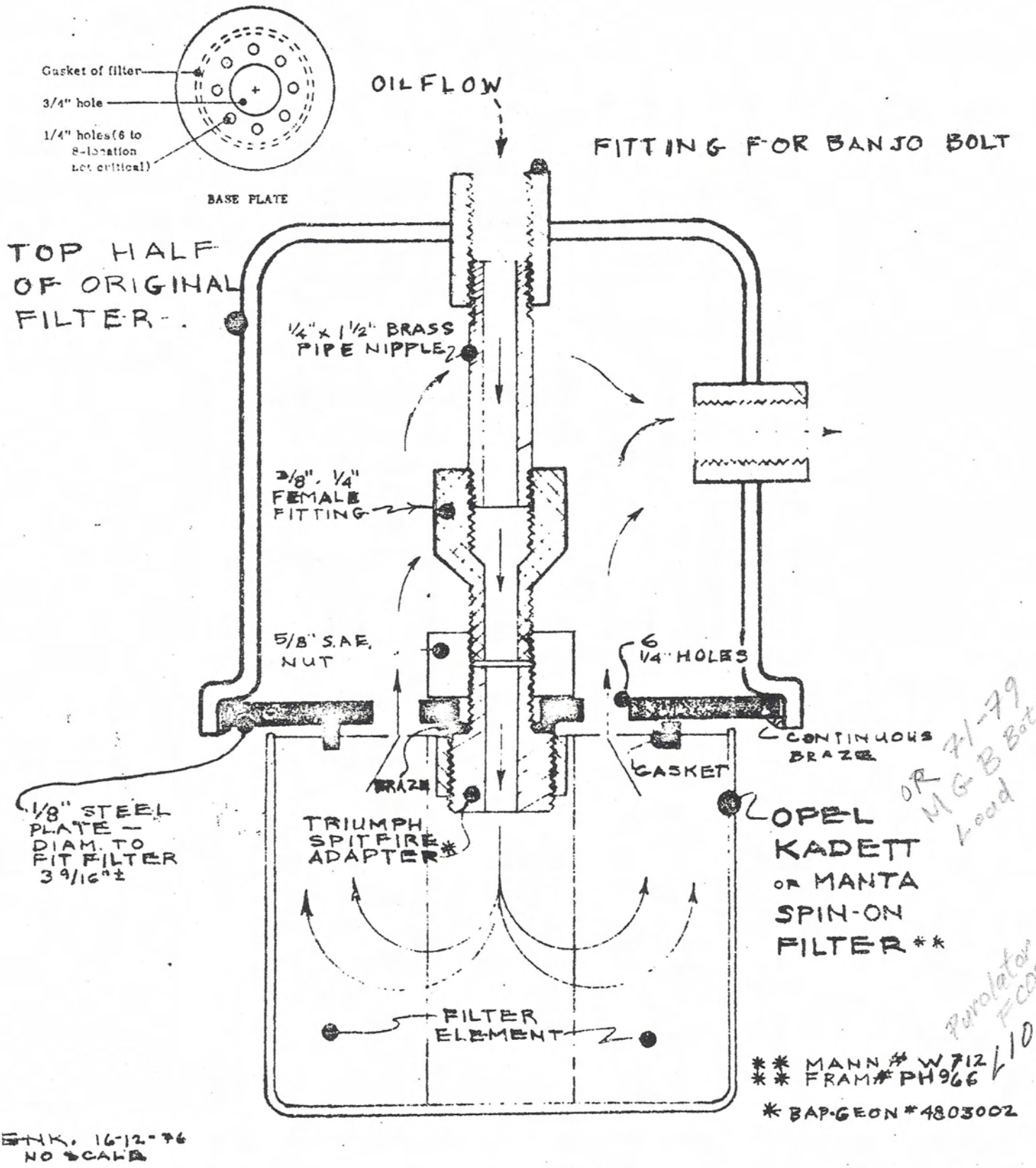
BOTH TYPES Check that the top banjo bolt will screw into the cannister far enough to seal. A 3/8" drill should pass freely through the fittings; if not, drill out any obstructions. Fit Filter.

If you are a concours type, you can flatten the bottom of the new spin-on filter with a hammer and wooden block, solder on a small bolt or screw, drill a hole in the bottom center of the discarded lower portion of the old filter, and bolt it over the spin-on filter.

Addendum to Early XPAG Spin-On Oil Filter Conversion 4-77

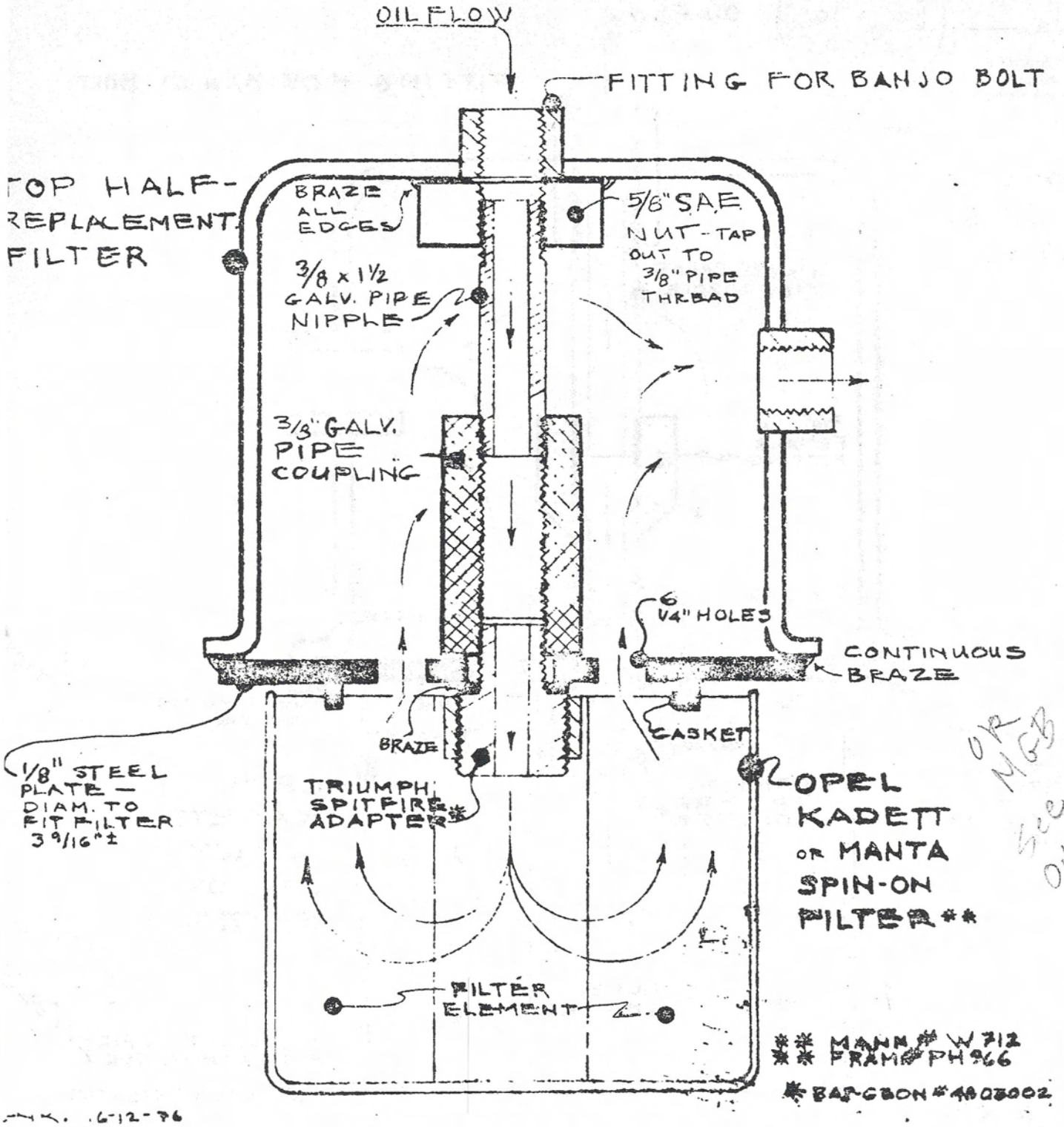
When the converted filter is installed you will see that the bottom lip of the mounting braket is bearing on the side of the spin-on filter. You must either remember to loosen the bracket a little each time you change filters,or you must revise the brass feed lines to the original half of the cannister to drop the cannister enough for the bracket to bear entirely on it. I prefer the first method, but be careful not to overtighten the bracket to the point where you will cause the filter to leak. A filter wrench of the type using a 3/8" ratchet drive will help considerably in removing the used filters in the future.

The Fram filter is a little longer than the Mann and there is some slight possibility of it interfering with the clutch linkage on some left hand drive TDs.



SPIN-ON FILTER FOR EARLY XPAG

(ORIGINAL TYPE FILTER)



CNK. 6-12-96
NO SCALE

SPIN-ON FILTER FOR EARLY XPAG

(REPLACEMENT TYPE)

16.

8-75

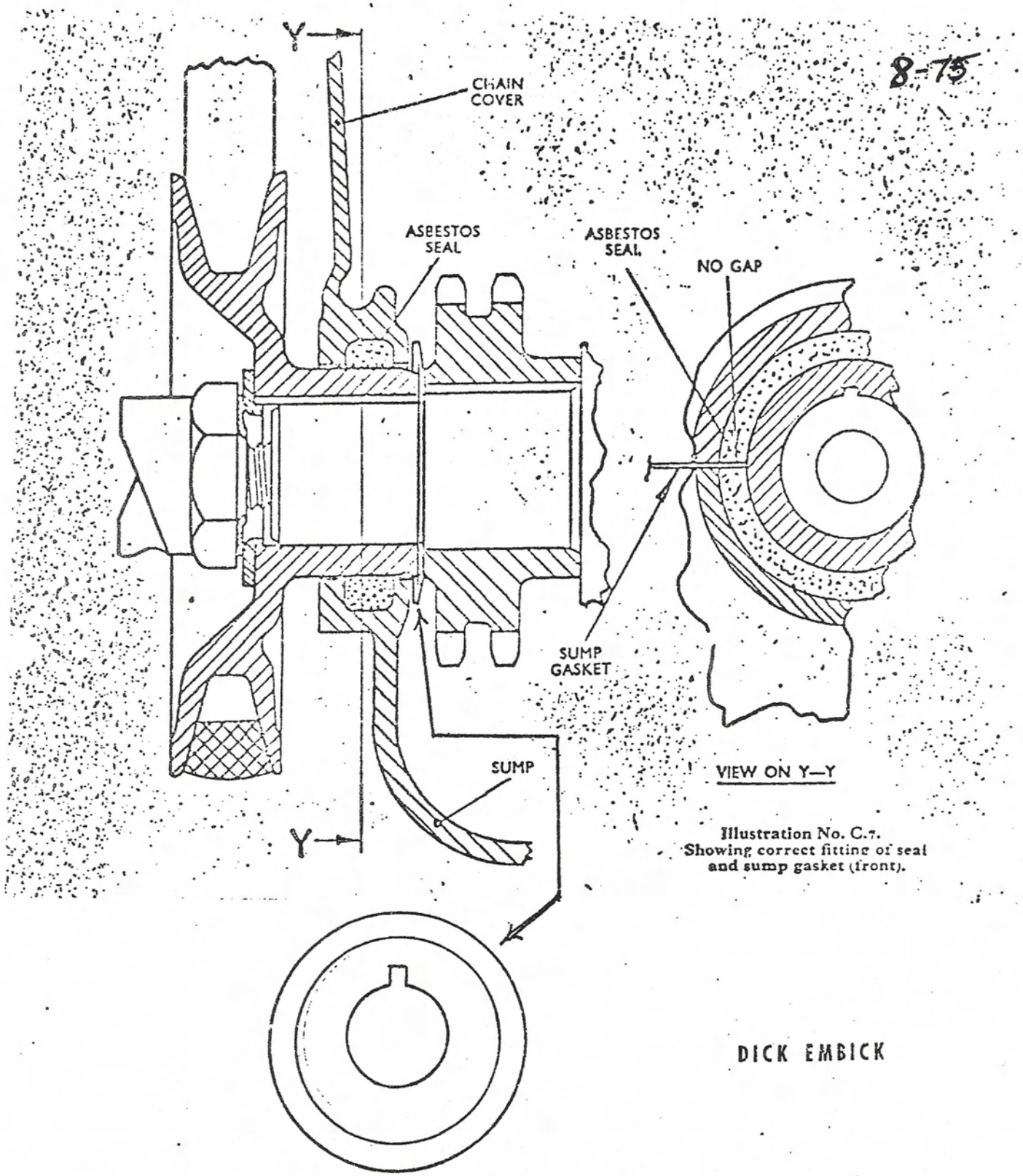


Illustration No. C.7.
Showing correct fitting of seal and sump gasket (front).

DICK EMBICK

SUBJECT: POSITION OF OIL THROW (DISHED) WASHER IN YOUR "XPAG" ENGINE -

IN CASE DURING YOUR ENGINE REBUILD, YOU MIGHT BE CONFUSED AS TO WHICH WAY AROUND THIS "CUPPED" WASHER FACES; THIS EXTRACTION FROM THE "MG YA" MANUAL PICTURES IT QUITE CLEARLY !

TECH TIP -- GEAR OIL 5-77

Valvoline Oil Co. is now producing a multi-viscosity high performance gear oil which should be especially good for use in 'T's. It is an 85 W-140, which in simple terms means it has the cold properties of a thinner 85 viscosity oil and the properties of a heavier 140 when hot. This means more consistant lubrication at any time.

One bonus here for those who own a TC and also a TD or TF is the use of the same gear oil in all T's (TC's require 140 and TD/TF require 90) at least in the hotter summer months when most "T" touring is done. For cooler wheather I'd use Volvoline H.P. 80W-85W-90 in the TD/TF rear axle and maybe in the transMISSION.

The main benefit is in what it will do for your 'T' in the way of gear longevity. This oil, designated, "Valvoline High Performance Gear Lube", has been designed for high speed, high torque, high horsepower conditions. It meets all API (American Petroleum Institute) and military specifications for gear oil including heavy truck use. True, your 'T' does not meet any of the above -- it certainly is not a high horsepower, high torque, high speed machine. Then why use H.P. Gear Lube? Because your 'T' gears and your gear box bearings take a lot of load due to their small sizes and the amount of heat they operate under. Remember driving your TD on a 100° day and feeling real pain (not just discomfort) from the gearbox heat on your right foot? Heat causes standard gear oils to get thinner. The thinner they get the less they are able to keep the gears and bearings apart. This metal to metal contact causes rapid bearing and gear wear (otherwise known as "cluster gear clunk" to you TD/TF owners). The constant viscosity additives (polymers) of H.P. Gear Lube resist thinning and retain a "cushion" of oil between the metal parts. In the operating range of 100°-130°F. the viscosity of 80W-85W-90 and 85W-140 is nearly the same. At 210°F. the 85W-140 is just touching the top viscosity of the API 90 range. Based on the above and the type of use your "T" will get you can choose a lube to suit your specific needs.

One thing you must not do is mix H.P. with conventional gear lube. Drain the gear box and differential when they are as hot as possible so that you remove as much oil and contamination as possible. Some old lube with remain -- especially in the TD/TF differential. Drain and refill everything with H.P. again in 100-500 miles to remove all traces of the old gear oil.

Two other tips: First, change gear oil "by the book" mileage and age wise. Second, DO IT YOURSELF and keep the area around the filler CLEAN. More gear wear is caused by some creep in a gas station knocking in dirt with the gear lube gun than you would ever believe.

Your cluster gear will thank you.

I have been informed by Volvoline that 85W-140 is now only available in 5 gallon cans (it's still worth getting), but that 80W-85W-90 is available in quarts and cases of 12 quarts.

A catalog of products (VM-68; 5-76) with properties and useages is available from Valvoline Oil Co., Ashland, Kentucky.

12-76

THE GREAT OIL CONTROVERSY

By Len Renkenberger

Probably no single automotive subject is discussed with as much conviction and as little actual or factual knowledge as is what type and weight of oil to use.

A British magazine and a U.S. magazine, both dedicated to old cars, both carried articles on this subject in recent issues. Since I am certainly no expert, I will merely pass on a synopsis of the article and leave the conclusions to you. The British article was very factual and was by a research chemist for a world-renowned oil firm. The other article on synthetic oils was very short and just stated some pro's and con's.

Synthetics are now widely accepted by industry in general and one of the most critical and performance minded industries anywhere, aviation. These "oils" can withstand far greater pressures than regular oils. It is claimed that contaminants and dilutants are carried off but not dissolved since they are not products of the same source such as oil and gas. Change cycles are 30,000 miles or 18 months for cars that are in storage a lot. Since the film strength is so high, the life so long, etc, what are the reasons for not using it? Briefly, cost and inconvenience. It requires a series of oil and filter changes to be fully effective. It is compatible with oil, but its physical qualities are diminished in proportion to the oil contaimed. Another problem, related to the changes, is cost. From two to four filters, and sometimes oil, changes are required in the first 10,000 miles. At $4-5 a quart, this gets expensive. Some require laboratory checks at regular (infrequent) intervals to analyze the condition and determine if a change is needed.

Now to the subject which should be of more interest to most of you, modern oils. The most controversial point, multi-viscosity vs. single weight, is handled first. Multi-grades are vastly superior in viscosity to temperature relationship. They have better oxidation resistance, are better able to resist high temperature varnish formation on valves and pistons. They have much greater film strength due to additives so they work better in areas where oil supply may be marginal. Since they stay thicker at higher temperatures, they don't break down under high local temperatures. Conversely, they don't thicken when cold.

Does this mean single grade oils used when these cars were new (1930's, 40's, and 50's) were deficient? No, they were O. K. for the cars of that era. But without additives the capabilities to absorb sludge and impurities were very limited. In other words, the oil stayed clean and the engine got dirty.

Then why do the oil companies still make straight grade oils? Simply because some people demand them. VW & Porsche actually specify them.

What about change intervals? An old engine for which the original change interval was 1000 miles should be perfectly O.K. for longer changes with a modern multi-grade. Actually, for infrequently used cars the change should be based on time - every three months.

How about changing over from single to multi-grade? The multi-grade will immediately begin releasing all the accumulated sludge and contamination. Change at 500-1000 miles, then at your regular interval.

Another important point made was that multi-grades do not work at all well in overcooled engines. We have all been thoroughly indoctrinated in the concept that cool engines are best. Not so. Multi-grades absorb or emulsify water vapors formed when an engine runs cool. This forms that milky looking mess around filters and breathers. Since our cars are not noted for "keeping their cool", we should have no problems here.

TABLE · LIQUID MEASURES (SMALL)—BRITISH, U.S. AND METRIC

Imperial Pints—U.S. Pints—Litres

Imperial Pints	U.S. Pints	Litres	Imperial Pints	U.S. Pints	Litres	Imperial Pints	U.S. Pints	Litres	Imperial Pints	U.S. Pints	Litres
	¼	·12		2½	1·18	4		2·27	9		5·11
¼		·14	2¼		1·28		5	2·36	10	12	5·67
	½	·24		2¾	1·30	4¼		2·41	10⅛		6·00
½		·28	2½	3	1·42		5¼	2·48	11		6·24
	¾	·36	2⅝		1·50	4⅜		2·50	11¼	13½	6·39
¾		·43		3¼	1·52	4½		2·56	12		6·82
	1	·47	2¾		1·56		5½	2·60	12½		7·00
⅞		·50		3½	1·65	4¾		2·69	12½	15	7·10
1		·57	3		1·71		5¾	2·72	13		7·38
	1¼	·59		3¾	1·77	5	6	2·84	13⅜	16½	7·80
1¼	1⅓	·71	3¼		1·84	5¼		3·00	14		8·00
	1½	·83		4	1·89	6		3·41	15	18	8·52
1½		·85	3½		2·00	6¼	7½	3·55	15⅝		9·00
	2	·95		4¼	2·01	7		4·00	16		9·08
1¾		1·00				7½	9	4·25	16½	19½	9·23
	2¼	1·06	3¾	4½	2·13	8		4·54	17		9·65
2		1·14		4¾	2·25	8⅝	10½	5·00	17½	21	10·00

SPARKING PLUGS Technote by Bud Aro

Back in the Aug./Sept. issue of CSR, Chip Old wrote a good technote on T-Series cylinder heads (note the reprint in the latest TSC). As Chip noted, the spark plugs for these heads were originally Champions: TB, TC, and TD up to engine #22734 used an L10S plug, and TD from engine #22735, TF, and TF-1500 used an NA8 plug. In recent years, both of these original plug types have been discontinued, with the L7 replacing the L10S and the N5 replacing the NA8. Both replacements are in the middle of the heat range and require a .025 inch gap.

There are several alternate choices if you prefer a colder or a hotter plug. Some of these are listed below along with a cross reference to equivalents from other manufacturers. For Champion plugs, the higher the number, the hotter the plug. An explanation of the letters and numbers used by Champion to describe their plugs is reproduced on the next page.

Champion	AC	KLG	Lodge	Autolite	Bosch
L5	42FF	F100	2HN 3HN	- -	- -
L7	44FF	- -	H14 HN	- -	- -
L10	45FF	F70	C14 CN	- -	- -
N3	42XL	FE100	2HLN 3HLN	- -	W240T2 W215T28
N4	43XL C41N C42N	FE75	HLN 2HL HF2HL	AG2 AG2M	WG190T28 W175T2
N5	44XL C44XL	FE70	HL14 HINP	AG3 AG3M	- -
N6	C44N 45XL	- -	HBLN	AG4 AG4M	W160T2
N8	46XL 47XL	FE50	CLNH CLN14P CL14 CLN	AG7 AGZ7	W145T2
N21	- -	FE20	BL14 BLN	AG9	W95T2

SPARKING PLUG INFO

SPRING 76

All of which leads to the plug data below. Before you go on, perhaps a word about plugs would be in order. As a general rule, use the hottest plug possible. This sort of has to be done by trial and error. If, after some miles, your plug insulator tips are light grey or brown, they are right. If they are white and blistered, the plug is too hot. Always check after the car has been driven at highway speeds, never after idling or cold starts. Extended tip plugs allow the plug insulator and electrodes to be cooled by the incoming fuel charge, and this gives a more uniform spark. If you are having problems with your engine "dieseling" or running on after you shut it off, try extended tips. Always turn your engine over by hand with the extended tip plug installed just to double check that it doesn't hit the piston. A little clay or gum on the end of the plug will also indicate the amount of clearance. After you turn the engine over, remove the plug and slice through the clay to see how much clearance you have. Always visually check the thread reach of the plug against your old plug before installing.

The following has been interpololated from old Bosch catalogs and what could be found in Champion racing plug manuals and newer catalogs. Where more than one plug is listed, the top one is hotter. Heat increases with numbers in Champion. With Bosch the higher the number the colder the plug. Start with same heat range as the original plug.

	Champion	Champion Extended Tip	Champion Resistor (Y is ext. tip)	Bosch	Bosch Extended Tip
TC-Early TD	L-10 L-85* (L-85 replaces L-10S)	L-85 L-85	X L-10 RL-87Y RL 12-Y XL-85	W145T1 W175T1*	W145T35 W175T35 W200T35
Late TD-TF	N-5* (N-5 replaces NA-8)	N-12-Y N-10-Y N-9-Y	RN-12-Y RN-10-Y RN-9-Y	W145T2 W175T2* W200T2	W145T30 W175T30 W200T30
TD Mk II from Eng. # 17029	N-4 ? N-3 ?		XN-4 ?	W240T2*?	

NOTES:

1. Champion resistor designations can be either X or R for same no. plug.
2. *Manufacturer's recommended plug.
3. ?Bosch recommendation. Appears too cold.

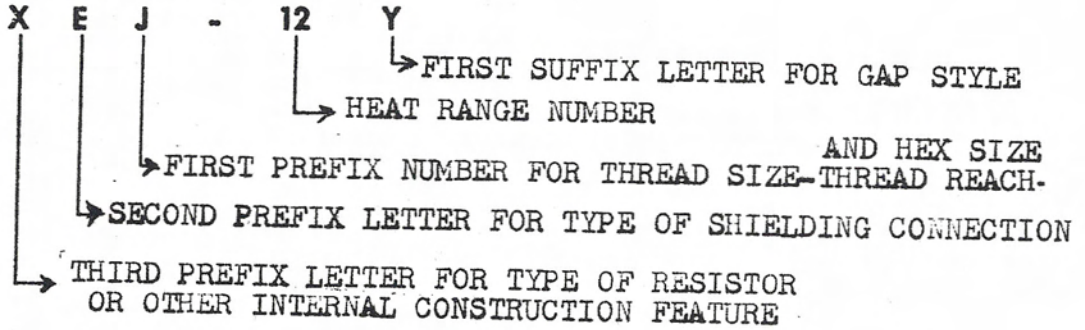
2-73

DEPENDABLE **CHAMPION** SPARK PLUGS

SALES SYMBOLS

The sales symbol is composed of a "Heat Range" number, together with prefix and suffix letters, to indicate major features of the plug design. Each letter has a definite meaning. Heat range numbers indicate the general application (automotive, aviation, racing, special feature or application) of the plug design. In any series, the higher the number, the hotter the plug.

A TYPICAL SYMBOL IS:



HEAT RANGE NUMBER

Automotive, Marine and Ordnance Plugs	1 - 25	Racing Plugs	51 - 75
Aircraft Plugs	26 - 50	Special Features or Applications	76 - 99

FIRST PREFIX LETTER

FIRST LETTER TO LEFT OF NUMBER

Letter	Thread Size	Reach	Hex
Y	10 mm	¼"	⅝"
Z	10 mm	.492"	⅝"
G	10 mm	.750"	⅝"
P	12 mm	.492"	13/16"
R	12 mm	¾"	¾" or 13/16"
J	14 mm	⅛"	13/16"
J (After C)	14 mm	⅛"	¾" or 13/16"
J (After D)	14 mm	.325" Tapered Seat	⅝"
H	14 mm	7/16"	13/16"
L	14 mm	½" or .472"	13/16"
L (After B)	14 mm	.460" Tapered Seat	⅝"
N	14 mm	¾"	13/16"
N (After B)	14 mm	.708" Tapered Seat	⅝"
E	14 mm	.680"	13/16"
F	18 mm	.460" Tapered Seat	13/16"
D	18 mm	½"	⅜" Stock
M	18 mm	½"	⅜" or 11/16"
K	18 mm	All	1"
B	18 mm	13/16"	⅜" Milled
U	18 mm	1⅛"	⅜" Milled
W	⅜"-12	All	15/16" or 1"
C	⅜"-18	All	1⅛"
S	1⅛"-12	.600"	1" Milled
None	½"-14 Pipe Thd	All	15/16" or 1⅛"

SECOND PREFIX LETTER

SECOND LETTER TO LEFT OF NUMBER

Letter	Description
None	Unshielded
E	Shielded ⅝" - 24
M	Shielded ⅝" - 24 Ordnance
H	Shielded ¾" - 20
S	Shielded 1 1/16" - 24 Whitworth
T	Low Profile - Shorty
C	See First Prefix Letter "J" Short Plug - Bantam
B	See First Prefix Letter "L" and "N"
D	See First Prefix Letter "J" - Short Plug

23.

THIRD PREFIX LETTER

Resistor or Special Internal Feature

BECOMES SECOND LETTER TO LEFT OF NUMBER

(IF PLUG IS UNSHIELDED)

Letter	Description
None	No Resistor or Special Internal Feature
R	Resistor - Less than 6000 ohms
X	Resistor - Over 6000 ohms
U	Auxiliary Gap

FIRST SUFFIX LETTER

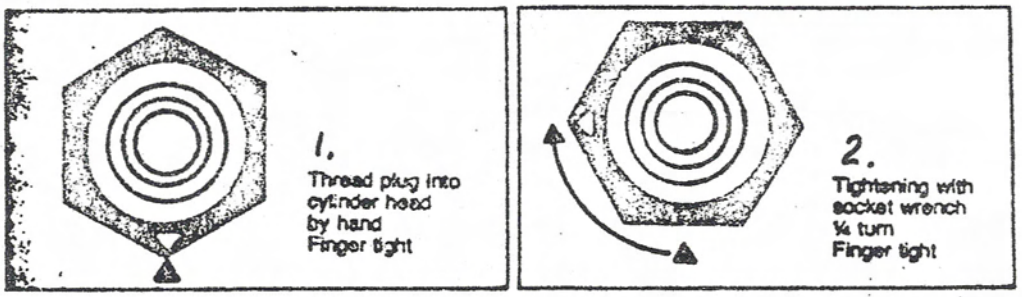
GAP STYLE

Letter	Description
None	Conventional
B	Two Ground Electrodes
C	Protruding Nose, Round Ground Electrode, Sawed Gap
D	Protruding Nose, Round Ground Electrode
F	Three Ground Electrodes
G	Fine Wire - Gold Palladium Electrode
J	Cutback Ground Electrode, includes Modified Gap
N	Four-Prong Aircraft Type
P	Fine Wire - Platinum Electrode
R	Push Wire
V	Surface Gap
Y	Protruding Nose

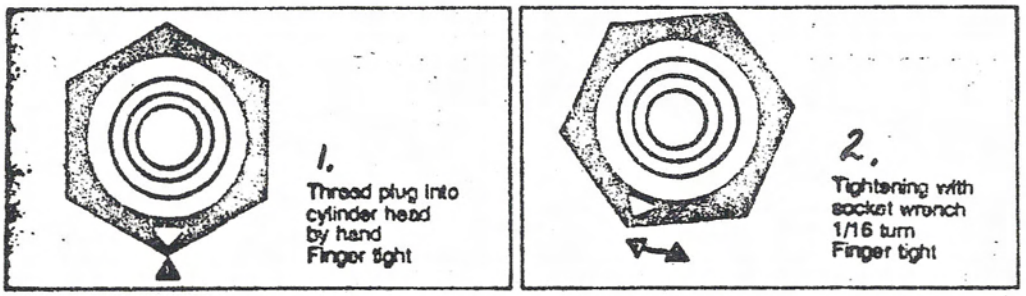
INSTALLING SPARK PLUGS * WITH AND WITHOUT A TORQUE WRENCH
REPRINT FROM THE CHAMPION SERVICE CORNER MAGAZINE

10-79

GASKET TYPE PLUGS



TAPERED SEAT PLUGS

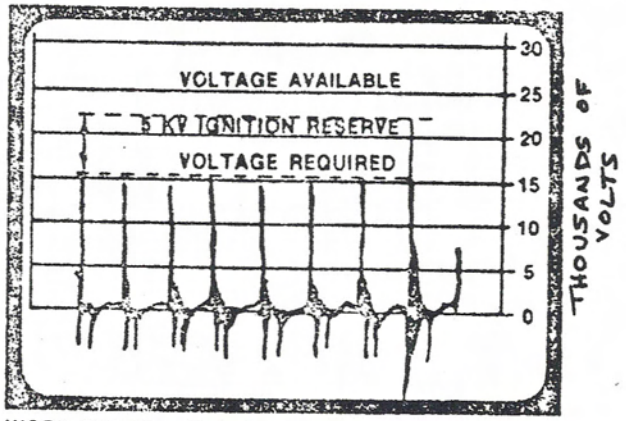


TORQUE RECOMMENDATIONS

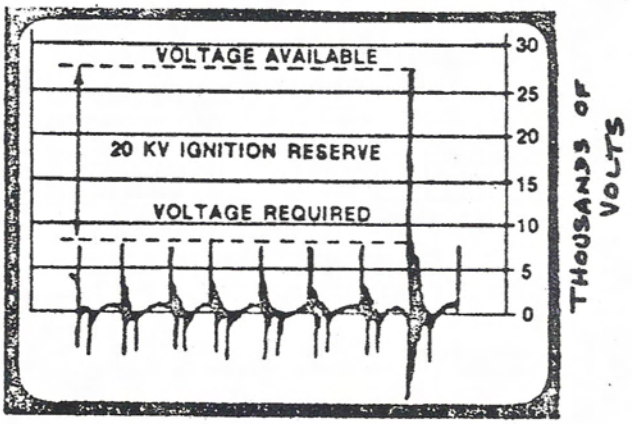
SPARK PLUG THREAD SIZE	CAST IRON HEADS W/Torque Wrench	CAST IRON HEADS w/o Torque Wrench	ALUMINUM HEADS w/Torque Wrench	ALUMINUM HEADS w/o Torque Wrench
GASKET TYPE				
10mm	8-12 lb. ft.	1/4 Turn	8-12 lb. ft.	1/4 Turn
12mm	10-18 lb. ft.	1/4 Turn	10-18 lb. ft.	1/4 Turn
14mm	26-30 lb. ft.	1/4 to 3/8 Turn	18-22* lb. ft.	1/4 Turn
18mm	32-38 lb. ft.	1/4 Turn	28-34 lb. ft.	1/4 Turn
TAPERED SEAT				
14mm	7-15 lb. ft.	1/16 Turn (Snug)	7-15 lb. ft.	1/16 Turn (Snug)
18mm	15-20 lb. ft.	1/16 Turn (Snug)	15-20 lb. ft.	1/16 Turn (Snug)

*Mazda Rotary Engine requires only 8-13 lb. ft. (1/4 turn)

NEW SPARK PLUGS AND A PROPER FUNCTIONING IGNITION SYSTEM INSURES AN ADEQUATE HIGH VOLTAGE RESERVE FOR PLUG FIRING



WORN SYSTEM—OLD PLUGS



GOOD SYSTEM—NEW PLUGS

MORE ON SPARKING PLUGS 6-73 by Bud Aro

Sparking plugs can sometimes reveal a great deal of information about how your engine is operating. It takes only several minutes to remove one for a quick check, and this may be time well spent. Consider the prices and availability of parts today, compared to five years ago, and the name of the game is Preventive Maintenance. Here are some things to look for:

CONDITION	IDENTIFICATION	CAUSE
Normal	Rusty brown to greyish tan powder deposit.	Regular or unleaded fuel
	Or: White powder deposit	Highly leaded fuel
Oil Fouling	Wet sludgy deposits	Worn piston rings, worn valve guides.
Gas Fouling	Dry black fluffy deposits	Fuel/air mixture too rich, defective coil, breaker points or ignition cable.
Burned or Overheating	White, burned or blistered insulator nose & eroded electrodes.	Inefficient engine cooling, ignition timing advanced too far, wrong fuel, too hot a plug, low fuel pump pressure, weak mixture.
Carbon Fouling	Hard, baked-on black carbon.	Too cold a plug, weak ignition, defective fuel pump, dirty air cleaner, rich mixture.

Starter Switch Malfunction: SPRING 76

Since MGA and TD-TF share the same starter, starter switch, and many other parts, I thought this might be of interest to you 'T' owners.

The other evening I hopped into my daughter's MGA and pulled the starter cable with no results. The ignition warning light was still glowing brightly, so I knew the battery was OK. A couple of pulls on the starter switch under the bonnet didn't help. There happened to be a hammer lying on the garage floor, so I planted the hammer head firmly across the starter switch terminals, and the starter kicked into action immediately. You can do this with any reasonably heavy metal object, such as your wire wheel hammer, pliers, battery jumper cables, wheel wrench, even the crank. Just make sure the gearbox is in neutral and the ignition switch is on.

The switch may be faulty or just have dirty contacts, so don't automatically throw it away. Try it several times after you "jump" it. If it still doesn't work, replace it.

MAKE YOURSELF HEARD BY Len Renkenberger 1-75

One of the problems with a "T" or any car of its type is the danger of the clod who literally doesn't see you or know you are on the road.
For about $30 and 2 hours work you can rectify this on TD's and TF's. Moss Motors makes a kit to convert the steering wheel medallion to a horn button. With minor modification this can be made into a satisfactory unit. A pair of Marchal air horns from Universal Imports or similar Fiamm unit will supply the noise.

Install the Moss kit as directed except for the worthless foam rubber insulated connector which mounts on the steering shaft. Discard this and use a copper sleeve for plumbing pipe instead. Get a sleeve which is 1 1/8" inside diameter. Cut completely through the sleeve lengthwise on one side and about halfway through on the other. Spreading the fully cut side will result in the sleeve bending at the other cut without distorting. Cut a piece of bike inner tube, any thin rubber or a couple of large rubber "O" rings to fit the inside diameter of the sleeve. Now slip the spread sleeve over the steering shaft, insert the rubber insulator and bend the sleeve back together. Use a radiator hose clamp to bring the sleeve together, being sure to place the wire from the horn button under the clamp.

Use a right angle mending bracket from the hardware store or make your own to mount the horns by bolting the bracket through the hole in the front cross member about halfway between the left side rail and the grease fitting. You will find that the horns will <u>just</u> fit with the bulb ends up under the radiator and the trumpets pointing slightly downward and forward. This should place them out of sight behind your license plate where they can be protected from excess water and dirt. The compressor can be mounted under the bonnet or, as mine is, under the fender on the bolt through the fender and frame rail (be sure to check wheel clearance when turned). The relay mounts conveniently and is unseen in the battery well. Connect the relay lead to the fuse block on the same terminal as the regular horns. Then go scare the hell out of some guy in a Pimpmobile!

1-79

<u>Battery Box Liner</u>---The other day while wrestling with connecting the heater in TD 18276, I pulled a slick one. The AMCO Battery box liner I had installed was too long to let the Tach and Speedometer cables pass around it and through the usual holes without interference. I needed to move them from the large heater hose holes beneath the battery box to make room for the heater hoses. Then I discovered my "Old Pal/Woodstream" #BB-100 battery box. You've probably seen them in sporting goods stores. They are used by boaters and RV' enthusiasts to carry spare batteries. Generaly white with a red lid. Well, anyway they are cut short for the 10½ inch battery, so I threw the lid away, cut down the bottom part and presto, plenty of room for the Tach and Speedo cables. Besides that BB-100 was only $3.50 or $4.00. Know anyone that wants a slightly used AMCO Battery Liner?

QUICK & EASY A 4 WAY FLASHERS FOR YOUR 'T'

Ever had a panic situation when the 'T' died in the worst possible spot? Flashers sure would have helped wouldn't they?

Here are 3 quick & inexpensive ways to do it.

1. If you have turn signals to begin with & a simple non-canceling toggle switch to operate them. Connect one 16 gauge wire to the #4 terminal of the turn signal relay & one wire to the #8 terminal. Connect these to the terminals of a simple on/off toggle switch mounted in any convenient place. To operate your 4 way flashers, turn on the turn signal for either side & turn on your 4 way flasher switch.

2. If you have the self canceling or "timer" turn signal switch, wire as above. To operate you will have to keep turning the timer back on.

3. If you have no turn signals. Splice a 16 gauge wire to the stop light wire (easiest to find in the vicinity of the master cylinder). Run it to a conveniently mounted toggle switch, then to a 2 terminal turn signal flasher (2 light type) then to the hot side of the fuse block. Actually this will give you flashers in the rear only but that is the important end in an emergency.

If God Meant It To Have A Radio, He Would Have Put One In It, or, (Spark Plugs, Radios, and Other Trivia)

SPRING 76

by Len Renkenberger

Before going to GOF South, I decided to put an AM radio in TD 28910, but I did not want the radio or an unsightly aerial showing. A simple solution was to place it under the running board on two fabricated brackets and secured on two of the front and rear left running board bolts. The antenna base is mounted to the front bracket and the tip is placed through the rear one. Most aerials are just the right length. However, the tip cannot touch the rear bracket, so you must center the aerial and fill the hole with G.E. or Dow Silicone seal (available at all hardwares). The lead-in cable can be run up through the "roll bar" and out through a hole drilled about half-way around the curve of the bar. The lead-in should be as short as possible, so the radio should be in or under the glove box. The AM radio used was a Pace 143. See page 18 for info on resistor spark plugs.

After much research by Bill Larkin, it was determined that Pace 134 C.B. radios were best for car-to-car communication while caravaning. In this case, an external antenna is a must, but the very small and attractive chrome ones Bill found are easily mounted on the license plate bracket. Again, the roll bar comes into use. Bill simply used two radiator hose clamps to mount the radio bracket. This leaves the radio free for quick and easy removal when you leave the car out of sight.

In both instances, engine static becomes a problem. There are many ways to eliminate this, but the only one that I know of without having unsightly resistors on your ignition wiring is to use resistor type spark plugs. Then absolutely nothing shows.

Technote by Chip Old 5-72

LIGHT BULBS FOR THE T-SERIES

Finding light bulbs for your T can be a frustrating experience since British bulb numbers (as given in our owners manuals) are not the same as U.S. bulb numbers. Most auto supply stores don't seem to have the conversion chart needed for finding the U.S. replacements. The problem is made worse by the fact that British bulbs are rated in Watts, while U.S. bulbs are now all rated by candlepower, so you can't pick a replacement by matching specifications. Since no local auto supply stores sell British bulbs, you are almost certain to come away empty handed unless you know the proper U.S. bulb number before you go shopping.

The following chart gives the proper U.S. numbers for the various bulbs used in TC, TD, and TF lamps. TA and TB lamps are mostly the same as the TC. There are several British bulbs for which there are no exact U.S. replacements, and in such cases the nearest equivalent is listed.

Bulb Location	British No.	U.S. No.
Headlamps: TC	171	1124
Headlamps: TC/EXU,TD,TF	301	see note 1
Foglamp (FT27): early TC (bayonet Base)	2	1073 or 1143
Foglamp (SFT462): late TC (flange base)	162	none
Sidelamps: TC,TD (w/o turn signals)	207	89
Sidelamps: TC/EXU, TD,TF (with turn sigs)	369	1176
Tail Lamp: TC (D Lamp)	207	89
Stop Lamp: TC (D Lamp) (see note #2)	207	89
Stop/Tail: TC/EXU (twin round lamps)	369	1176
Stop/Tail: TD (straight bayonet base)	369	1176
	or 189	1176
Stop/Tail: TD,TF (staggered bayonet	361	1016
	or 353	1034
Lisence Plate Lamp: TC/EXU,TD	989	57
License Plate Lamp: TF	222	57
Panel Illumination; TC, TD, TF	986 or 987	1446
Map Light: TC	207	89
Map Light: TF	987	1446
30 MPH Warning Light: TC	207	89
Ignition Warning Light: TC,TD (2.5 V) (note 3)	970	223 or 233
(12 V) (note 3)	986 or 987	1446
Fuel Warning Light: TC,TD (2.5 V) (note 3)	970	223 or 233
(12 V) (note 3)	986 or 987	1446
Warning Lights: TF	987	1446

Note #1: No. U.S. replaceeent. Find Lucas bulb or replace entire lens/reflector assembly with a U.S. No. 6012 sealed beam unit.
Note #2: This is the bulb originally specified but it is only 6 Watts, not really bright enough for a stop light. For safety try an 18 Watt bulb (British No. 221, U.S. No. 1141).
Note #3: Some sockets have built in resistors and use a 2.5 Volt bulb, others have no resistor and use a 12 Volt bulb. Be sure to get the correct bulb or else the light won't work.

CHAPTER 4 - CARBURATION SYSTEM

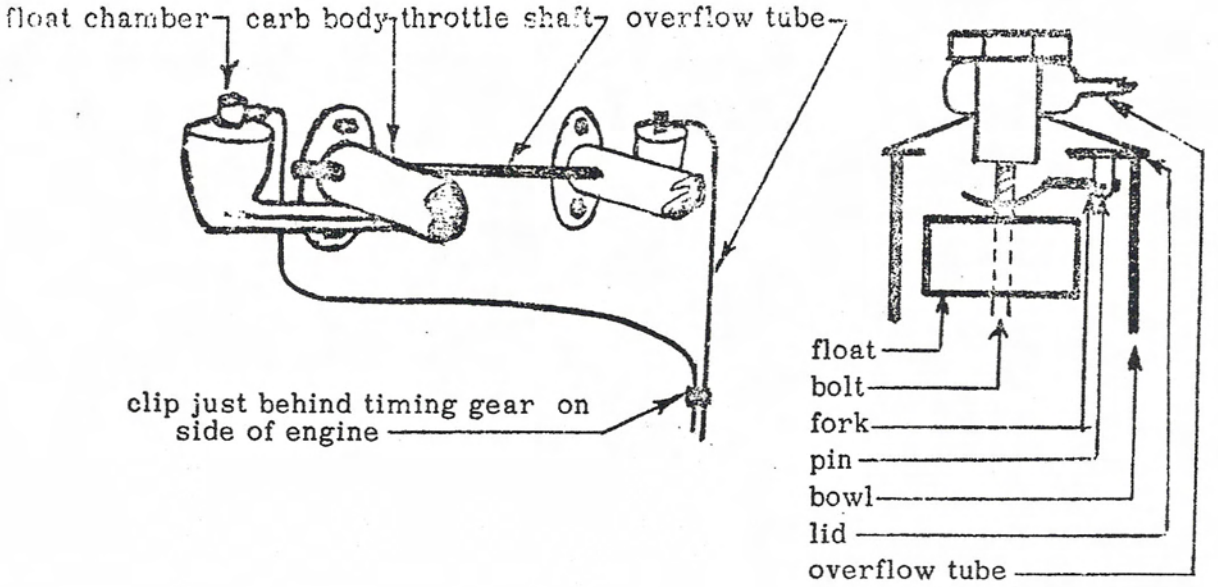
WHEN AN S.U. CARB REACHES VOTING AGE 12-77

Chances are very good that by this time many a Neanderthal has beat about your S.U.'s with everything from a screwdriver to a stone axe. Chances are also good that they are not working well, even though you have "rebuilt" them.

There is nothing mysterious about S.U.'s; in fact, just the opposite. They are the simplest carb made and the most reliable. Why then do most people have so much trouble with them? Mostly because they are thinking in terms of a carb with 30-50,000 miles on it, instead of one with perhaps 150,000 miles and 20+ years of abuse. You can check the following few areas where old age begins to show without any special tools or skills. You can rebuild an S.U. 8,000 times using every part in the rebuild kits and it won't help if these areas aren't covered.

First is worn throttle shafts and carb bodies. Depress the throttle about 1/4 to 1/2 open. Take hold of the linkage between the carbs and try to move it up and down. If you can see or feel movement where the shaft goes through the carb body, the carb body and/or throttle shaft is worn. This causes erratic running because it varies the air to fuel ratio as the worn shaft wobbles about in the worn hole of the body. Also, each time you try to adjust the idle speed, you'll get a different setting. There is only one cure. Have the body holes reamed out and bushings installed along with new shafts. The only place I know to have this done is Britain West, Pleasant Ridge Road, Brantford, Ontario, Canada N3T 5L5. If you can strip the carbs down to the bare bodies with throttle plates and shafts, it will cost about $28 a pair. If you can't take the carb apart, write them for a quote on the whole carb rebuild.

Another trouble spot is the float assembly. First and most important here is the overflow tube. On 90% of the carbs I've seen, these have been cut off. In case a float sticks, this allows gas to run out onto your nice hot exhaust system. Guess what happens then! Unless you like fried MG, replace these. The ones from Moss are very hard and a bit of a problem to bend. The ones from Britain West are softer but too short to reach from the rear carb to the clamp of the front of the engine. I suggest one of each. Next remove the lid and look at float. Remove it and shake to listen for gas inside. Check the bolt the float surrounds and slides up and down on. If it is rusty, the float can catch on it and bind, thus causing flooding. Now turn the lid over and take hold of the fork. If it can move from side to side, it is worn and should be replaced. Remove the pin that holds the fork to the lid and examine both the pin and lid. If either is worn, they must be replaced. These parts are not in most rebuild kits, and it is not uncommon for the pin to be worn to 1/2 the original diameter or less. Wear in any of the three parts will cause binding and hold the float down. If all appears well so far, take a 7/16" diameter bolt and try to slide it between the inverted lid and the curve of the fork. If it just clears, the float will shut the gas off at the right time. If it will not go, then the float will rise too far before the fork closes the needle valve, thus causing flooding.



CARB MIXTURE ADJUSTMENT AND SPARK PLUGS

Always be sure your "T" is thoroughly warmed up before setting the carbs. As a general rule, if you set the mixture on a barely warm engine or even one warmed up in the driveway, the mixture will be too rich once the car has reached its true operating temperature.

Of course, if you've got to be off on your adjustment, it's best to be too rich than too lean (within reason, that is).

A way to check on your mixture is by "reading" the spark plugs. Plugs will tell you an awful lot if you know what to look for. To "read" them, you must run the car at moderate speed until completely warm. Then, driving with as little stopping as possible, return home. As you approach the driveway, throw in the clutch and turn off the key. Do not let the engine idle at all. Remove the plugs. If they are light brown or grey, your mixture is roughly OK, and your plugs are the right heat range. If they are black and sooty, your carbs are too rich or the plugs are too cool a heat range (the latter is not very likely). If the front two plugs don't look like the back two, your carbs aren't synchronized. If they are white and blistered, they are too hot a heat range.

ANYTHING CAN HAPPEN.....

Things aren't always what they seem. Don't take anything for granted. Murphy's Law. Say it however you want, but there are times when nothing reasonable seems to solve your problems. The reason for this is simply an unreasonable cause.

Here are a couple of examples if you can wade through the boring checks of things that didn't work. If you can't, read the morals.

I bought a TF on which the carbs had been freshly rebuilt by a highly regarded expert in the vicinity of 10th and New York Avenue, N.W. The carbs were installed on the manifold, etc., and the whole works was ready to bolt onto the engine. This I did. Then I tried to tune the beast - and I tried and ... One carb adjusted reasonably but nothing helped the other. Finally pulling the damper assembly (dashpot and piston)® I found rich MGA needles. Pulling the jets revealed they were also MGA. There is no way those jets could be adjusted lean enough. After some choice words and installing used 'T' series needles and jets I was ready to go. Wrong. Still dead on #1 and 2. Pulled the wires and had lots of spark. Compression check was good on all four. Switched plugs from 1 and 2 to 3 and 4 and vice-versa. Now 3 and 4 were dead. You guessed it. Bad plugs. They were brand new and a brand I have used for 20 years without a failure but they were dead and not because of the carbs being rich either. Lesson: Don't take anything for granted.

Another TF carb tale: I was asked to cure a TF with what the owner was told was a bad distributor. The carbs had been rebuilt a few hundred miles and a few months before. The whole ignition system checked out fine but #1 and 2 were definitely in trouble. The plugs were badly sooted from raw gas. Gas poured from the front carb but the rear one was dry. The trottle spindles were badly worn but the rest of the carb appeared to be correctly rebuilt. This is until I tried to install a new float needle in the cover of the fuel bowl. The supports in the bowl cover on which the float hinges were too long. The float could not close the needle thus letting the fuel pump pour its full capacity into that carburetor. What happened? We later found a broken float needle body in the rear of the car. This indicated our backyard mechanic had broken it off in the float bowl cover and replaced the cover with one with longer supports for the float. The car ran (but not too well) until the extremely rich mixture on that carb killed the plugs on the two adjacent cylinders. Moral 1: Always suspect everyone else's work. 2. Don't trust a gas station mechanic with your 'T'. All "them furrin cars" are not alike and he can't "fix anything but a broken heart" like he claims.

RENEWING CHOKE, THROTTLE, STARTER, AND OTHER CONTROL CABLES. 4-77

Those old cables can not be replaced in kind but you can salvage the all important knob and fascia end and resuse it.

All that is needed is a cable of longer length from a MGB, Midget, TR, etc. and soldering iron or propane torch. Usually the stranded cable and cover are the same as "T" or close enough. The knob dashboard mount doesn't matter as they are to discarded.

The individual original cable may vary, but the following is the general procedure. Usually there is a tiny ratcheting clip inside the fascia end of the housing. This is what holds the choke out when you pull it out. This is held in place by a spring collar on the outside. Slide the collar back to release the pressure on the little clip. Remove the inner cable from the original assembly. Usually, the cable is soldered into the end of the metal piece fitted to the knob. Heat and remove the old cable. If the cable is notsoldered, but is crimped in, drill it outwith a proper size drill. It is soft and drills easily. Cut the other cable off at the knob end. Insert this into your original knob assembly and solder in place by heating the metal pull piece and letting the solder be drawn in.

Next remove the cable housing from the original fascia piece. It is usually either soldered or crimped. If crimped, it can be removed by pulling it hard enough to "unwind" it. Cut the new cable housing at the fascia piece, Insert into your original fascia piece and solder. Insert the cable, cut cable and housing to proper length and you have a renewed original.

(Editors note. I had an original knob and good outer cable, only a "shot" stranded cable, and it was very easy to solder in a "renewed" inner cable and keep the fascia original. The replacement cable assemblies do not fit the existing holes in the fascia.)

12-76

ORIGINAL TD - TF AIR CLEANERS By the Big Dummy

You may be inadvertently choking off the air supply to your engine as a result of trying to keep it clean.

If you use the spray on emulsion type engine cleaners, which most of us use, you must wash this off with water.

The big dummy recently did this, then decided to clean the air filter. I was surprised to find a mess of emulsified oil and water in the cleaner - at least twice the quantity of the oil the filter is to hold.

The cause of this is water sprayed on the filter top and thru the opening running down inside the filter. You would be amazed how much water can get in that little slot.

SU Carburetors Grady Cook 11-79

Last time we left off with adjusting the carburetors during a tune up. Let me say from the outset that I'm one of those folks that love SU carbs. They are the epitomy of simplicity. Most of the problems with SU's over the years are the result of (1) ignorance, (2) tinkering, or (3) a combination of (1) and (2). I find that once they are properly set up they are good for years.

It is impossible to add anything original to all that has already been written about SU's so this article will be a compilation from many sources, and a poor memory. I'm writing this away from home without benefit of my manual so forgive me if I repeat too much from it.

First, the SU carburetor is a variable venturi type, in fact the original and only one for many years until the Zenith-Stromberg came along. In recent years Ford has experimented with a variation on the theme.

The principle advantage of the variable venture is that it keeps the air velocity high as it flows over the fuel jet for better atomization.

To understand how it works in general, refer to figure 1. When the engine is not running, the piston (12) rests on the bridge (8), leaving a few thousandths of an inch for air to pass through to start the engine. When the engine is running a manifold vacuum exists downstream of the throttle butterfly. A lesser vacuum exists between the butterfly and the piston, and is controlled by the throttle. This latter vacuum also creats a vacuum in the chamber above the piston, via the orifice (15), causing the piston to rise slightly, enlarging the venturi (hence variable venture --- clever, huh). When the throttle is opened wider, a deeper vacuum is created between the butterfly and piston which in turn pulls a deeper vacuum in the chamber causing the piston to rise further, again adjusting the size of the venturi. Simultaneously, this piston withdraws the tapered needle (11) out of the jet (10) making a larger annular ring for the fuel to be drawn through, thereby enriching the mixture.

When you adjust the mixture with the adjusting nut (6) you merely adjust the initial vertical position of this jet with respect to the needle and thus the annular ring. Similiarly, when you pull out the choke, you merely pull the jet further down, temporarily, to enlarge the ring and enrich the mixture.

The damper oil well unit performs two functions; it causes a slight time lag between the throttle opening wider and the piston rise, which slightly enriches the mixture during acceleration (same function as a throttle pump in a conventional Detroit carb) and it prevents oscillations of the piston. Note that the piston lifting pin and piston spring are not used on the 1¼ SU's used on MG'T's.

The first step in tuning the carbs is to assure that the float needle valve is working properly and the float level is correct. To do this just remove the cover, check with a 3/8" test bar as shown in fig. 2, and adjust if necessary. If the valve is working you should not be able to blow through the fuel line connection with the valve held lightly closed, and it should readily fall open when released. A quick check can also be performed by removing the chamber and piston, and running the electric fuel pump until it shuts off. If it shuts off and no fuel is leaking, the valve is working. Look down into the jet and you should be able to see the raw fuel down about a millimeter, if the float level is correct. If you can't see the fuel, or if it is flowing through the jet into the carb, you need to adjust the level and or change the valve.

While you have the chambers off and pistons out, clean them off thoroughly. Use a carburetor cleaner to soak the dirt and carbon like material off.

Don't: 1. bend the needle,
2. sand, scour or scrape the piston or chamber,
3. mix up the pistons or chambers (they are lap fit and not interchangeable)

Do: 1. be careful
2. lightly oil the piston rod and chamber sleeve,
3. assure the needle shoulder is flush with the bottom of the piston,
4. make sure the jet is centered - if not, loosen the jet locking screw (5) and center it. (If you don't have a centering tool, 3 flat wooden toothpicks spaced around the jet will hold it centered while you tighten up the jet screw.)

Also, while the piston is still out, guage the size of the jet with a set of numbered drills. I forget the drill numbers, but as I recall there are drills .089", .091", and .093". If the .089" drill shank will fit in the jet and not the .091", you are in superb shape. If the .091" will fit and not the .093", the jet will probably still be OK. If, however, the .093" fits you better look for new jets because you will never be able to lean the carbs sufficiently.

Synchronize the throttle butterfly valves by loosening one of the clamps at either end of the throttle shaft connecting rod between the two carbs, Back off the idle speed adjusting screws (2) on each carb until they are free of the stop, i.e. until the butterfly is fully closed. Then using a piece of paper as a feeler guage, run the idle screws in until they just drag on the paper, and re-tighten the clamp. Note the position of the screwdriver slot in the idle adjusting screws and from now on, turn them each identical amounts,

Replace the pistons and vacuum chambers, making sure that as you alternately and slowly tighten the screws holding the chambers, that the piston will always fall to the bridge with a solid "click". If as you finally get them tight, the piston sticks, and the jet is centered, try rotating the chamber 180°. As many of you know, this ofter takes several frustrating attempts before the piston will fall with that positive click. Sometimes the jet must be recentered, and if trouble persists, recheck the needle for a bend.

I usually fill the damper well with oil and replace the damper at this time. If you use one of the kits with the wire that fits in the damper hole with the connecting wire between them leave the dampers out and use your kit. Personally, I can watch the pistons easier than the wires.

STart the engine, bring it up to operating temperature and adjust the idle speed to about 700 rpm. It is adviseable to drive it around the block to "blow it out" before adjusting thecarbs. If fact, after idling several minutes while doing this adjusting, it always needs to be blown out before continuing.

Assuming that you started out with both jets at about the same initial height, the pistons should be at about the same position while idling. Now use a long thin instrument such as an awl or ice pick, and being careful not to let your hands obstruct the air flow, insert it into each carb in succession and carefully lift the piston about 1/32 - 1/16", and each time listen to what the engine speed does - - speed up or slow down.

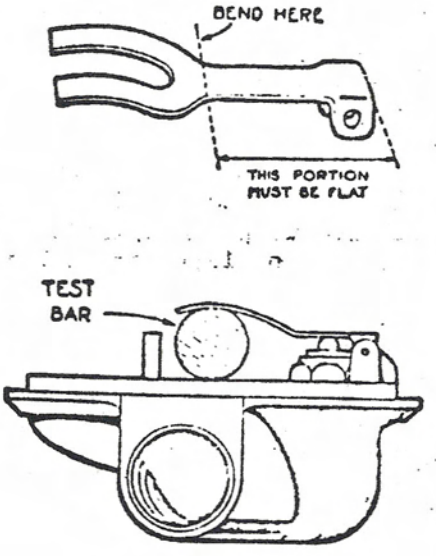
Here is what happens. If the mixture is too rich, when you lift the piston you allow more air in, leaning the mixture towards what it should be and the engine speeds up. You should therefore screw the jet adjusting nut up a "couple of flats" and repeat the proceedure. If on the other hand, the mixture is too lean, when you lift the piston you lean the mixture even more from the optimum and the engine slows down. You should then screw the jet adjusting nut down a couple of flats and repeat.

Remember, after several minutes of idling while fooling with this, take it 'round the block to blow it out. Also remember to continually adjust the idle speed back to spec.

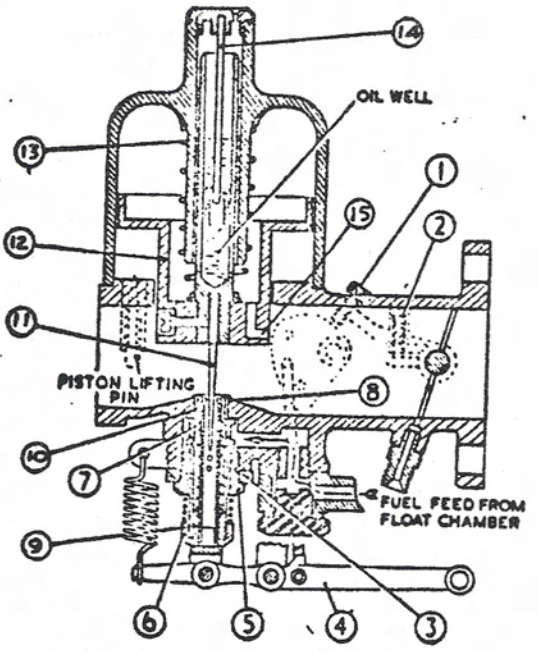
Eventually when you reach the proper setting for each carburetor, and you do the piston lifting bit, the engine rpm will remain unchanged, or maybe rise slightly momentarily and quickly fall back. Some say to enrich them now by two flats, but I usually don't because the air filter when replaced (you do use and air filter don't you) enriches the mixture by about the right amount.

Now that the butterflys are in sync, and the mixture right, the pistons should always be at the same height and should dance (rise and fall) in unison when the throttle is opened and closed. If they do not and one leads the other significantly, maybe you forgot to put oil in one of the dampers or perhaps some butcher drilled one of your dashpots oversize as some#@&*ç#! did to one of mine at some time or another before I obtained the car.

Oh yes, you can do the stethoscope bit with the length of tubing, but the proceedure described above is easier and more effective, at least for me.



~~Fi~~gure 2



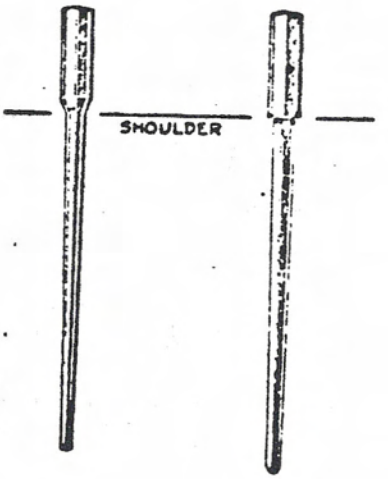


Figure 3

CHAPTER 5 - FUEL PUMP AND FUEL TANK

4-73

FUEL PUMP ADJUSTMENT

by Dick Embick

Most of the T-Series shop manuals describe the proper method for adjusting the S.U. fuel pump, but if you want to try an alternate method, read on. I have always been very lucky by threading the inside points on exactly eight turns. Another way is to count the number of turns it takes to remove the old points, and then turn the new points on the same amount.

However, if you really want to go "pro", read the manual or check with Bob Pickard for his procedure of adjustment by clicking the diaphram in and out with your thumb. This requires the removal of the base of the pump, and the loss of temper as eleven brass washers fall out an roll under the work-bench, but it's very accurate.

The single contact points originally used are now replaceable by the newer double contact points which insure longer life and better reliability.

FUEL PUMPS, FUSES, AND OTHER SEEMINGLY UNRELATED ITEMS

6-77 RENK

Rather than just tell you to do this operation or that I would like to incorporate a personal experience or two into some tech tips. The reason for this is not to bore you with the travels and tribulations of TD 28910, but to illus rate how elusive someproblems can be and to show you that trouble shooting is sometimes a long equation with many parts-- not a simple 2&2= answer thing. Bear with me, the most important leasons are at the end.

Two years ago Mac Spears, Ruth and I went to Nashville by TDs. Outside of Knoxville we hit the damnedist(?) rain storm I ever saw. On went the wipers and the lights, no time to dig out the sidecurtains. Half hour later two TDs signaled a left turn, swung into a motel and opened the doors to let the water out. As we turned in, I turned off the wipers and lights. Next morning we headed out in beautiful weather. In what could be charitably described as a rural area of Tennessee. TD 28910 developed a cough and then a spastic lurch and finally died. Then I heard the S U fuel pump rattling away. Out of gas said I. No, because the low level light had never even blinked. Check the level light bulb--fine. Must be a split diaphragm. Pulled the pump apart--fine. Tried another pump just in case. We were back in business. A mile down the road and cough, putt, etc. again. Coast to a stop. No tell-tale click from the S U. Pull the fuel line and turn on the key. Gas spurts forth. A mile down the road and cough, putt, etc. all over again. More swearing and such which I will spare you. THE PROBLEM? Remember the left turn in the rain? As I turned on the turn signal, I switched off the wipers and stopped. Next day was great, so no wipers were needed and I didn't have occassion to signal a turn. To sum it up here is what happened: The wipers, turn signals, stop lights, low level fuel light are all on the same circuit. The load of wipers and turn signal had been OK, but when I put on the brakes the fuse blew. Thus no fuel warning light. When we ran out of gas I was going uphill both times but coasted over the top. Thus fuel available until the next hill. End of Aesop's fable, right? Wrong!

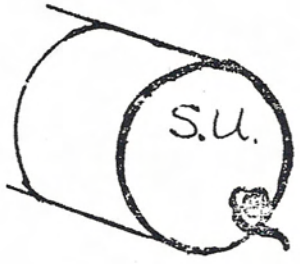
When you part an SU fuel pump at the diaphragm and put it back together immediately it will always leak. The second pump I used was an TF/MGA type (high pressure) which floods a TD at low speeds (another lesson, by the way). If the plastic cap end where the wire fastens on has a bulge on half the end it is a high pressure job and should not be used. (See drawing at end of story). Therefore, when I got to Nashville, I installed the old (actually new) pump. Naturally it leaked a little but it ran fine. Over a period of time the gas that seeped out each time the car was shut off began to eat up

acrylic enamel on the firewall. Another tip--gas will eat up acrylic enamel but won't touch lacquer. Therefore, I decided to rebuild the pump. Having great faith in God and Al Moss (not necessarily in that order) I took out the spare diaphragm I had carried for a year or two and installed it "by the book". By that I mean I exerted pressure on the diaphragm before tightening the retaining screws. Usually I don't bother, I just leave the diaphragm as installed after adjusting for point travel (see manual). It didn't work too well, always pumped a little instead of shutting of when the carbs were full and the car would die occasionally if I took off immediately after starting especially in hot weather. I swore I would never do anything by the book again but I could live with the thing until I had time to rebuild again.

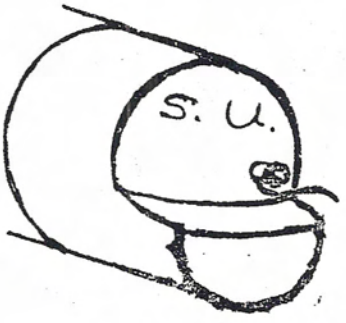
Well, after about one season of this, we nearly got killed when the car starved out on I-95 coming onto a ramp. Enough of this stuff- ordered a new diaphragm from "Him". Again I install it and the gasket between the castings by the book. Same !c/o'()[] symptoms. Test the pump on a battery and water I used slowly receeded from the top of the outlet pipe. Ah! Leaking check valve. Three check valves from other pumps, two pump bases, and several evenings later I had not made any headway when it hit me. The !c/o'()[] (double that) gasket from good old Moss. I had only two gaskets from the two diaphragms I had bought during all my struggles. They were symmetrical, not having the portion which goes around the passage between the chambers of the two base castings. Therefore, gas could bleed thru this area at low speeds when actually the pump should be shutting off due to back pressure from the carbs. At higher speeds the gas didn't have time to go this route. Broke open a 20 year old pump, took out the gasket, and installed it in the newer pump and you guessed it kiddies-runs like a top. I always check the diaphragm and adjustment carefully but who ever gives a flat gasket a second glance?

Next day we went to the MiniSOF. A member walks up to me and says, "I'm having this problem with my carbs. Done everything. It stumbles . " In my best Far Eastern mystic know it all manner, I said, "You just rebuilt the fuel pump with a diaphragm from Moss didn't you?" When he got over marvelling at my clairvoyance, I offered to read the tea leaves in his beer mug.

Remind me sometime to tell you about the TF carbs. It only takes 73 pages to get to the punch line.



TD/TC Pump



TF/MGA Pump

Fuel Problems

9-78

Been badmouthing your good old SU fuel pump? Maybe you should start checking your fuel lines and filters. I was recently suffering fuel starvation problems on TD 18276 and I checked everything but the obvious. One cold winters day I blamed ice in the fuel line, and then with the onset of spring I became convinced that the fuel pump was dying. But, it was so intermitent I didn't see how it could be the fuel line. I had scoured it internally with steel wool during rebuild (by pulling it through the line with a wire.) I had also rinsed the gas tank with muriatic acid, rinsed it and coated it with Randolphs Aircraft Sloshing Compound. Then I discovered the little filter in the gas tank. It was totally blocked with varnish from old gasoline, etc. After cleaning it I was back in business. The SU fuel pump had been performing Yeoman's service. I've heard of others removing the filter completely, but I certainly do not recommend that method. Just soak it thoroughly in a good quality paint stripper and it will come out shining like a new penny.

Fuel Tank Sending Unit Leak

DICK EMBICK 9-78

After a 30 month rebuild and reassembly, I discovered, much to my chagrin, that I had a fuel leak around the sending unit. Among other things, it was marring my paint. Upon removal and examination it was clearly obvious that the cast housing was far from flat. Had I used a thick cork gasket all might have been OK. The gasket I had cut from regular gasket paper was too thin to be very forgiving even with the Permatex being used. I very carefully straightened the cast housing with a small brass mallet on the edge of my table saw as best as I could. Then I machined a hole in a piece of flat ¼ inch thick aluminum the same size as the hole in the gas tank. I glued a piece of 400 wet/dry sandpaper on the piece of aluminum, cut the hole out, inserted the sending unit in it and with a rotary motion I lapped the mating surface of the cast housing perfectly flat within 20-30 minutes. Another gasket, Permatex, and no more leaks.

TABLE · LIQUID MEASURES (LARGE)—BRITISH, U.S. AND METRIC

Imperial Gallons—U.S. Gallons—Litres

Imperial Gallons	U.S. Gallons	Litres	Imperial Gallons	U.S. Gallons	Litres	Imperial Gallons	U.S. Gallons	Litres	Imperial Gallons	U.S. Gallons	Litres
·83	1	3·8	5	6	22·7	10½		48	16		73
⅞		4·0	5½		25·0	10¾	13	49	16½		75
1		4·5	5¾	7	26·5	11		50	16⅝	20	76
1¼	1½	5·7	6		27·3	11½		52	17		77
1·6	2	7·6	6½	7½	28·4	11⅝	14	53	17½	21	80
1¾		8·0	6⅝	8	30	12		54	18		82
2		9·1	7		32	12½		55	18½	22	83
2½	3	11·4	7½	9	34	12½	15	57	18¾		85
2⅝		12·0	7¾		35	13		59	19	23	87
3		13·6	8		36	13¼	16	60	19¼		90
3½	4	15·1	8½	10	38	14		63	20	24	91
3¾		16·0	8¾	10½	40	14½	17	64	20¼	25	94
3¾	4½	17·0	9		41	14½		65	21		95
4		18·2	9⅛	11	42	15	18	68	21½	26	98
4½	5	18·9	9⅞		45	15¾		70	22		100
4½		20·0	10	12	45·4	15¾	19	72			

TECH TRIVIA GAS TANK PRESERVATION LEN R. 4-77

Gas tank leaks have been a blight on old car owners for years. Back in the old days, one had to solder patches onto metal which was barely strong enough to hold the gas in. This was O.K. for most cars, but not for an exposed tank like the "T". "T" tanks are now being made but the price is really up there.

Fortunately, modern technology as come to your aid. You can leak-proof and strengthen any tank strong enough to hold up its own weight. Even if your tank doesn't leak you should rust proof it before the inevitable happens.

First lets's take strengthening a rusty tank or sealing one with more than just pin holes since that is the harder job. If you don't know where your leaks are, fill the tank with water and you'll find them. Drain the tank and air dry it thoroughly. (Incidentally, NEVER solder on a tank unless it has been dried and then thoroughly rinsed with water immediately before the soldering. Steel and rust retain latent gasoline.) Remove all fittings, tape up everything but the filler neck. Pour 2 quarts of muriatic acid into the tank and slosh about to remove rust if you think you have more loose rust than shaking the tank would remove. Drain and let dry.

Plug all drain and screw holes to prevent the materials we are about to use from entering them. Obtain 2 quarts of fiberglass resin and a couple extra tubes of catalyst hardener at your friendly auto or boat supply store. Mix and pour in the tank. Shake and turn the tank thoroughly until the resin is well distributed. You can drain off the excess or keep turning until it starts to set and all remains in the tank. This step should be repeated at least once more for a weak tank. If you have structurally poor areas on the unseen exterior areas of the tank, these can be repaired by cleaning the area to shiny bare metal with a sanding disc, coating with resin, adding a couple layers of fiberglass fabric liberally coated with resin The finish faces can be treated this way too, but require some skill in hiding your work. Call me if you contemplate finish face repairs.

You have no doubt seen gas tank sealers advertised at $6-15 a quart. They are merely aircraft tank sloshing compound in another package. Besides being too costly this way, it is very hard to thoroughly coat a tank with only one quart. Go to any aircraft service or parts facility and ask for Randolph's Sloshing Compound. It is about $15 a gallon. Locally it is available from Piedmont Aviation in Alexandria.

Sealing requires the same drying, etc. as above. Slosh the sealer thoroughly, drain, slosh again, preferably several days later.

One gallon will do about three "T" tanks. I even coat the float sending unit and gasket (not the float) with the sloshing compound just before installing. Sloshing compound remains tacky and will pick up and hold any foreign objects which enter the tank (like the good garbage you can buy in our gasoline).

CHAPTER 6 - TRANSMISSION, CLUTCH AND LINKAGE

REPLACING CLUTCH RELEASE SHAFT BUSHINGS & BRAKE PEDAL SHAFT BUSHINGS

BY the Big Dummy 8-75

Having developed the art of hindsight into a precise science, I will pass on these bits of knowledge gained that way. When redoing your "T" always use a new clutch disc and especially a new pressure plate. Also replace the bushings in the bell housing for the clutch release bearing shaft. I have twice had to remove the transmission and replace the clutch due to chattering and grabbing clutches. The grabbing is due to weak pressure plate springs and the chatter to bad bushings in the bell housing.

If you have a TD-TF above all rebuild the brake and clutch shaft bushings before you put the fender on. This is one hell of a job after the car is on the road.

Now to my never-by-the-book methods of accomplishing the needed repairs. Remove the bellhousing. If you cannot get the lock pin out of the release bearing holder (don't try, you won't be able to) you can take the clip off the right end of the shaft and drive the bushing and shaft IN until the bearing holder hits the opposite inside surface. Use a socket just a shade smaller than the hole (a 5/8 Craftsman for 3/8 drive works fine) for driving the bushing without damage. Now place the new bushing (which you have had in the freezer for the last day to shrink it) in as far as possible. You will find that WITH THE SHAFT INTO THE NEW BUSHING you can drive the new and old bushs in until the new bush is flush. The opposite side is treated the same way. The old bushing doesn't hurt anything inside because it is still tight in the bore. What if it won't go all the way in? So what. The amount you can drive the old bush in to begin with is equal to the original length of the old bushing. Just cut the new one off flush. Replace the pressure plate and clutch disc by the book (but don't tell anybody I said to do it that way).

Now that Chip Old and other mechanical purists have turned green, let me proceed to the clutch/brake pedal shaft. Don't believe all that stuff about removing the transmission or the fender. Just take out the floor board. Using a long screwdriver that doesn't have too sharp a point drive the shaft in toward the transmission, having first taken the lock bolt out of the clutch pedal and removed the plate off the inner side of the pedal box. Now use a small screw driver ($\frac{1}{4}$" wide, again with rounded corners) and drive up at an angle on the edge of the bushings. When the edge begins to bend, drive the screwdriver straight in and you will find you can peal a strip out of the bushing. Collapse the remains and remove. The new bushings will go into the frame without too much effort if they are frozen first and the bushing frame tube both oiled with very light oil. Again, a socket can be used to protect the bushing. You can use a tire iron blocked against the pedal box to lever the bushings in. But, work fast, especially with the outer bushing, to get it in before it expands.

Clutch Pedal 1" OD

68

ED NOTE: See part interchange info on bushing, bottom of page 60.

DEPARTMENT OF HARD KNOCKS 6-73 by Chip Old

On the XPAG/XPEG engine, the clutch release bearing shaft rides in two oilite bushings which are pressed into bores in the sides of the clutch housing. These bushings are supposedly self-lubricating, but not being overly clever in that respect, they tend to wear rather rapidly. I ordered two new bushings from Moss, and when they arrived I pressed out the old bushings, cleaned the bores, and started to press in the first new bushing. When it was about three-quarters of the way in, the clutch housing split along the bushing boss. Now I have to have the housing heli-arc welded (it's aluminum) and have the hole re-bored. I could have avoided this agravation if I hadn't made three basic mistakes. First, I ordered the bushings from Moss Motors, even though I vowed never to buy anything from that company a long time ago.

Secondly, I assumed that the new bushings were the right size. After all, I ordered the part number listed in the catalog for that application, and I think I should be able to expect to get properly made parts. Based on my past experiences, I should have known better.

Thirdly, I didn't bother to measure the new bushings before I tried to press them in. Only after the damage was done did I measure them, and I found that the outside diameter of both bushings were .020" larger than the bores into which they were supposed to fit. A bushing is supposed to be a press fit in it's bore, but this means that it should at most be .001" - .002" larger than the bore. Twenty thou is way too much. The soft aluminum clutch housing must have stretched enough at first to compensate for the oversize bushing, because no undue ammount of pressure was needed to press it in. However, even aluminum can stretch only so far, and when it reached it's limit it cracked.

A sad tale like this naturally has to have a moral, so read on. Regardless of your source of parts (Moss or otherwise), you should always inspect new parts thoroughly before you try to install them. Luckily, I broke a part that can be repaired. You might not be so fortunate.

TD CLUTCH LINKAGE Mini-Technote 9-72

This one's a quickie. At the tech session someone asked whether or not an early TD with a cable operated clutch can be converted to the rod operated clutch used on later TD's. The answer is yes, and you end up with a smoother and more trouble-free clutch. All you need is the correct rod from a late TD to replace the old cable, and you may have to modify some of the brackets slightly. The best idea is to examine a rod-clutch TD to see exactly what parts and modifications are necessary. The rod is adjusted in the same manner as the old cable. Someone else at the tech session supplied the answer to this one; I don't remember who, but thanks anyway.

USEFUL PARTS INTERCHANGES 5-75 By Anonymous Parts Bin Searcher

1. 8" clutch pressure plate, disc, & release bearing. Use MGA. They are the same but most local parts people don't list Ts anymore.

2. TD-TF transmission gaskets & seals. Seal at front of transmission (mounted in rear of clutch housing) Chicago Rawhide 10067. Rear of rear transmission casing - BAP GEON S 8085 or REPCO P4127-12062 or, if you happen to be replacing the rear bearing, get a bearing with a self contained seal from Specialties Inc. (sorry, no bearing number until I rebuild a gearbox). Make the gasket paper ones from sheets OF SAME THICKNESS available at any auto store.

3. Clutch housing bushings on release bearing shaft- Boston B1214-10 from Specialties Inc.

CHAPTER 7 - REAR AXLE, RATIOS AND CONVERSIONS

GEARS, GEARS, AND MORE GEARS — Technote by Chip Old 7-72

In the rear axle of every car there lives a set of gears called the "ring and pinion", but although these gears play an important role in the operation of the car, not very many people seem to fully understand exactly what they do. It's really quite simple. The pinion gear is connected to the driveshaft (or propellor shaft if you prefer the British term), which is in turn connected to the engine via the transmission, so that the pinion turns at the same speed as the engine when the car is in high gear. The ring gear (crown wheel to the British) is connected to the axle shafts, which are in turn connected to the rear wheels, so that the wheels turn at the same speed as the ring gear. The ring gear and the pinion gear are meshed together, and since the ring gear is always larger than the pinion, it turns more slowly than the pinion. For example, if you have a pinion gear with ten teeth and a ring gear with twenty teeth, the pinion will have to turn twice for every one turn of the ring gear. This is expressed as a gear ratio of 2:1. These gears are usually refered to by their ratio, but they are also sometimes identified by the number of teeth on each gear. Thus this particular example would be called a 10/20 gearset.

Using the same example, and supposing that your car is in high gear with the engine (and therefore the driveshaft and the pinion gear) turning over at 4000 RPM, you can see that the ring gear (and therefore the axle shafts and the wheels) are turning at 2000 RPM, or half the engine speed. This reduction is necessary for the simple reason that without it the engine could not move the car! These reduction gears act as sort of a lever to make the engine's work easier. They multiply the torque of the engine, much like a lever multiplies the power of your muscles when you are trying to move a heavy object.

If you think about this for a while, you can see that by changing the ratio of the ring and pinion you can tailor a car to suit the conditions under which it is usually run. For example, if you run your car at highway speeds on fairly level ground you don't need a lot of torque multiplication, so you might get by with a high speed ratio like the 10/20 (2:1) used as an example above. However, if most of your driving is in stop and go traffic or in hilly country, you will need more power at the rear wheels. In this case you might be happier with a lower ratio such as 3:1. This multiplies the engine torque more, so that you get quicker acceleration and more power on hills. The problem with this is that with the 3:1 ratio the engine turns at a higher speed in relation to the road speed of the car, making it less suitable for high speed highway use. This is where this article applies to our old classic MG's.

The gear ratios used above as samples are not likely to be found in any real car. I used them to simplify the explanation. Most of our old MG's use ratios somewhere around 5:1, which means that at modern highway speeds our engines are turning over at high RPM's which they were never meant to hold for long periods of time. Remember that these cars were designed for the English roads of twenty years ago: narrow, winding, with relatively low speed limits. This gearing was perfect for those conditions, but not for our modern American superhighways. For example, a TD with the standard 8/41 (5.125:1) gears and standard 5.50 X 15 tires is turning almost 4200 RPM at 60 MPH. As several of us have found out the hard way, XPAG innards don't always last long at those speeds.

Most of us keep our engine speeds down below 4000 RPM in deference to the advanced age of our cars. There are a few of us, however, who do insane things like driving to work every day at 65 MPH, or like entering 1000 mile high speed marathons. There is some hope for this latter group. The MG Car Company made several alternate gear ratios for the T-series, and although they are no longer available at your friendly neighborhood dealer's parts counter, they can still be found if you try hard enough.

There were two gearsets made which fit the TA, TB, and TC rear end. An 8/41 (5.125:1) ratio was standard on the TB and TC, and with the standard 4.50 X 19 tires this gives you 15.84 MPH road speed for every 1000 RPM engine speed. An 8/39 (4.875:1) ratio was standard on the TA, giving 16.67 MPH per 1000 RPM. The 8/39 gears will fit the TB and TC, giving the same speed as the TA.

Three gearsets were made for the TD and TF. An 8/41 (5.125:1) ratio was standard on the TD, and with the standard 5.50 X 15 tires this gives you 14.42 MPH per 1000 RPM. An 8/39 (4.875:1) ratio was standard on the Mk II and TF, giving 15.195 MPH per 1000 RPM. A 9/41 (4.555:1) ratio was optional for all TD and TF models, giving 16.259 MPH per 1000 RPM.

There were other optional ratios made for these cars, but they were intended for slow mud-slogging trials work and are not at all suitable for road use as they produce low road speeds at comparatively high engine RPM's.

Notice that there were 8/41 and 8/39 gearsets made for all models. They are <u>not</u> all interchangable. All TA-TB-TC gearsets are interchangable, and all TD-TF gearsets are interchangable, but they are not interchangable between those two groups since they use two entirely different types of rear axle assemblies.

The NEXT two charts [redacted] show what effect these different gear ratios have on the car. The first chart shows the different engine speeds you will get at road speed of 60 MPH with the different ratios. Both charts are accurate only if the original tire sizes are used: 4.50 X 19 for the TA-TB-TC, and 5.50 X 15 for the TD-TF. The speeds will be different if larger tires are used, and the advantages of this will be discussed later.

<u>Engine Speeds At 60 MPH</u>

<u>Gear Ratio</u>	<u>TA-TB-TC</u>	<u>TD-TF</u>
8/41 (5.125:1)	3839 RPM	4161 RPM
8/39 (4.875:1)	3599 RPM	3949 RPM
9/41 (4.555:1)	- - -	3690 RPM

Or if you prefer to look at it from a different angle, the next chart shows the road speeds you will get at engine speeds of 3000 RPM and 4000 RPM with the different ratios. Most of us seem to cruise somewhere in this RPM range.

Road Speeds At 3000 RPM & 4000 RPM

	TA-TB-TC		TD-TF	
Gear Ratio	3000 RPM	4000 RPM	3000 RPM	4000 RPM
8/41 (5.125:1)	47.5 MPH	63.4 MPH	43.3 MPH	57.7 MPH
8/39 (4.875:1)	50.0 MPH	66.7 MPH	45.6 MPH	60.8 MPH
9/41 (4.555:1)	- - -	- - -	48.8 MPH	65.0 MPH

As you can see, the TA, TB and TC get a higher road speed at any given engine RPM than the TD and TF, regardless of which gear ratio you use. This is because the 19 inch tires used on the earlier models are larger in diameter than the 15 inch tires used on the later models. The larger diameter tires roll farther for each revolution of the wheel, so the car moves faster. If you carry this idea on further, you can see that the effective ratio of the whole rear axle (including gears and tires) can be changed a little bit simply by altering the tire sizes. The larger the diameter of the tire you use, the higher the road speed will be at any given engine RPM. For example, a TA, TB, or TC with the 8/39 gears and standard 4.50 X 19 tires goes 66.7 MPH at 4000 RPM. If you put on 5.00 X 19 tires, you get 69.4 MPH at 4000 RPM. The half inch difference in tire size makes almost a 3 MPH difference in road speed. This can be used to great advantage on the TD and TF since there is a large selection of tire sizes available in the 15 inch range. Keep in mind, though, that the use of very large tires on the narrow original rims can lead to some messy handling problems.

Before you all rush out to buy high speed ring and pinion gears for your cars, you should consider the disadvantages. First, it isn't easy to swap those gears. The TA-TB-TC rear axle is fairly simple, so if you follow the instructions in the manual slowly and carefully you shouldn't have any problems. The TD-TF rear end is a more modern and more complicated hypoid design, so you might be wise to take it to an expert.

The second disadvantage is that changing to a higher speed rear end ratio (either by re-gearing or by fitting larger tires) will enable you to travel faster at any given RPM, but it will cost you some acceleration and hill climbing power. For general around town puttering, where the RPM's never get very high anyway, you will probably be happier with the original ratio. But, if you enjoy the open road, or if you drive to work every day on a superhighway, or if you plan to enter next year's Marathon (don't we all?), you will probably appreciate the lower RPM's you get at high speeds with the 8/39 or 9/41 gears and/or larger tires, even if it means you might have to shift down more often in traffic and on hills.

TECH SECTION

9-74

SUBSTITUTING THE MGA REAR AXLE IN THE MG-TD By Mac Spears

The best way to begin is to quote from Chip Old's standard reference work entitled "Gears, Gears, and More Gears" originally printed in the Chesapeake Chapter Newsletter Vol I No. 4, Jun/Jul 1972, and reprinted in the TSO, Sept/Oct 1973. His material has been rearranged slightly for emphasis.

> ". . . a TD with the standard 8/41 (5.125:1) gears and standard 5.50x15 tires is turning almost 4200 RPM at 60 mph. Remember that these cars were designed for the English roads of 20 years ago; narrow and winding with relatively low speed limits. There are a few of us, however, who do insane things like driving at 65 mph or like entering 1000 mile high speed marathons. There is some hope for this latter group."

The author first ran the following advertisement in the TSO and other antique auto publications:

> WANTED: #2873 Mac Spears... Alternate rear axle with ratio of 9/41 (4.555:1) for TD or information on interchange of standard TD rear axle to some comparable ratio indicated. Trying to get a little more speed on way to next GOF.

Three persons responded quickly to my appeal for information and mentioned the potential or satisfactory use of the MGA rear axle. This confirmed and strengthened my resolve to retire the present TD rear axle. If others had some success with this conversion, why couldn't anyone.

Fortunately, an MGA rear axle was spotted with disk wheels similar to those on a TD. Closer examination revealed that the MGA disk wheel has a 4 lug pattern (versus the 5 lug pattern on a TD wheel). Further, the MGA wheel has 12 slightly oval cutouts versus 15 on the TD wheel.

It goes without saying that the time and expense of this substitution job would vary from that encountered by others; Yet the purchase of some items like brake shoes were necessary because they are wider for the MGA than the TD. The expense record is presented first and a step by step procedure follows.

The Expense Record

MGA Rear End w/ 2 wheels	$ 20.00
Brake Shoes	8.00
Bearing Hub (1) [1]	17.85
Axle-Hub Gaskets	.40
Grease Seals (2)	2.44
Brake Cylinder Kit (2)[2]	3.88
Propeller Shaft Kit (2)[3]	15.50
Clevis pins (2)	.44
MGA rim, extra wheel	6.00
Lub for rear housing	6.68
Dulux Enamel Paint (1 qt)	3.55
Tube	3.95
Sandblast 3 rims	9.00
Welding spring supports[4]	42.00
Sub-Total	$139.69
Tax and Shipping	4.15
TOTAL	$143.84

NOTE: 1974 PRICES!

1. Purchased with other items from local import car dealer just before weekend in hopes of installing same. Paid way too much for this item.
2. These were not necessary as the brake cylinders on TD rear are same as MGA and were rebuilt in the complete restoration performed earlier. Items considered spares.
3. Purchased in anticipation that removing TD rear end affords excellent opportunity to overhaul. Mechanical Advisor indicated overhaul unnecessary. Item considered a spare.
4. Purchase for welding service of $36.00 was completely unnecessary in that it involved making and welding two supports to axle housing to line up with springs. Later this was accomplished and final welding cost $6.00.

Step By Step Procedure

1. Examine the MGA rear axle and look for tell-tale signs that grease seals are bad, excessive lubricant on pinion flange, in brake drums or brake shoes coated.

2. Degrease so you can see the true shape of the housing. Drain out the old lubricant. Do not refill now. Gear ratio is stamped on top of third member housing.

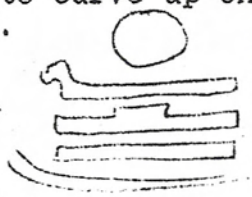
3. Turn brake drums by hand to ascertain condition of bearings (on this rear axle, one bearing was very rough and the amount of lubricant on inside of drum indicated seal on same side was bad).

4. Move the backing plates 180° so that wheel cylinders are in location similar to those on a TD backing plate.

5. Remove MGA brake lines, wheel cylinders, etc. Remove TD rear axle, but first remove rear brake lines at flexible hose point and wheel cylinders; lay all this aside for now, then when MGA rear axle is slipped into place install later.

6. At this point, the work begins on the MGA rear axle. Replace bearings, if necessary, you'll need a puller and ingenuity to remove hub. Replace hub seals (probably out to do this in any case). Note: the LH threaded axle hub nut should be on left side. Cut off the spring supports on the axle housing. It has been brought to my attention that these can be cut off and re-welded to line up with TD rear springs or new ones fabricated to resemble those on a TD. My experience cost $36 in going this route; not only did the newly welded spring supports fail to line up with the TD rear springs but I could never be sure that the propeller shaft would be positioned right. Also weld on rear of third member housing a small piece of flat iron, drill hole to secure brake lines behind MGA axle housing.

7. Slide MGA rear end in place. Between the axle shaft housing itself and steel plate that hold the top rubber spring pads in place, make a flat iron piece similar to latter but thicker and leave long enough to curve up on end and drill hole to secure emergency brake cables.



8. Secure propeller shaft to pinion flange and use new bolts and nuts; tighten up the U bolts. Before tightening all the way, now is the time to line everything up -- axle housing distance between springs, pitch of propeller shaft. Tighten U bolts up.

9. Replace lubricant. If everything is OK, it can't be over-filled at this point. Make sure the rear plug is clear and no dirt or paint is there.

10. Drive it. After testing out and retightening the U bolts several times over a period of time, have the fabricated metal plate welded or spot welded to the axle housing. Of course it would do OK for probably a long time as is, but one reason for welding it; suppose you want to remove rear end at some future date then the necessity of lining everything up again is eliminated.

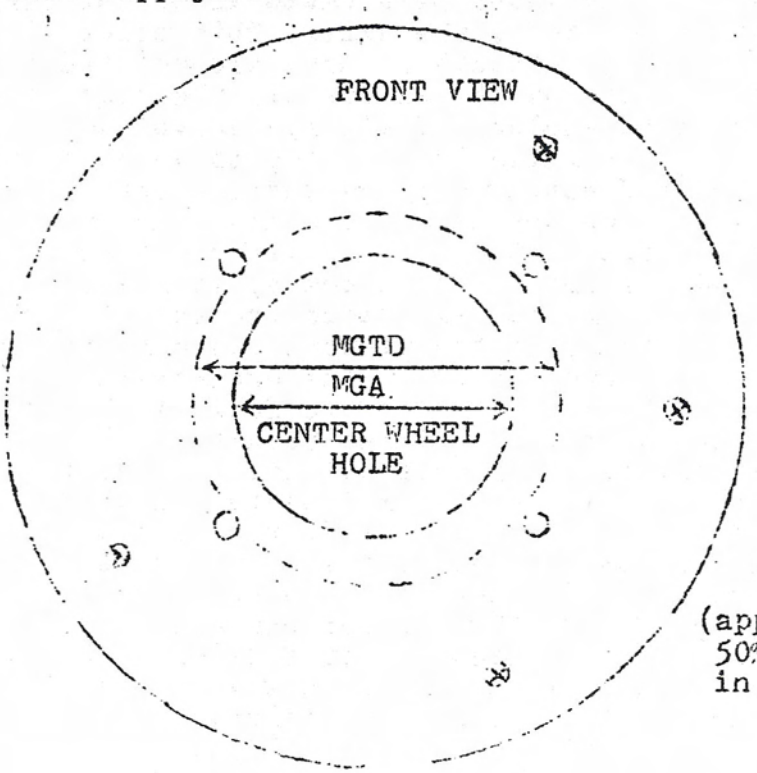
It is hoped that this information will be of help to anyone considering this kind of swap. For one thing with an MGA 10/43 (4.3:1) ratio rear end you loose acceleration and hill climbing capability but you sure slice the RPM's at comfortable and higher cruising speeds. Although the author probably failed to give some invaluable piece of technical information that someone will need later, there is a good reason. He doesn't know all the technical stuff; in fact, conceptually why should a ratio 10/43 v. 8/41 mean so much. If it bothers anyone, refer back to Chip's article. For myself, I like the results and the joy of motoring is greatly enhanced especially when you pull the TD away from a tail-gating SOB. But after you do this performance speed event slow it down to normal safety speeds for the TD because your speedometer is off.

Tenative Fini To Story: Question, now that you have an MGA rear end, what happens if you have a flat rear tire a 1000 miles from home? The difference immediately noticed is that the MGTD wheel has a 5 lug hole pattern and the MGA has a 4 lug hole pattern.

11-74

The answer is to apply some of that "ole southern ingenuity". Why not use an adaptor plate to run the TD spare wheel temporarily (to next service station but not much further) on the MGA 4 lug hub pattern. And so the adaptor was made according to my specifications by the friendly but expensive specialists in welding: Huyler and Thompson, Springfield, Virginia.

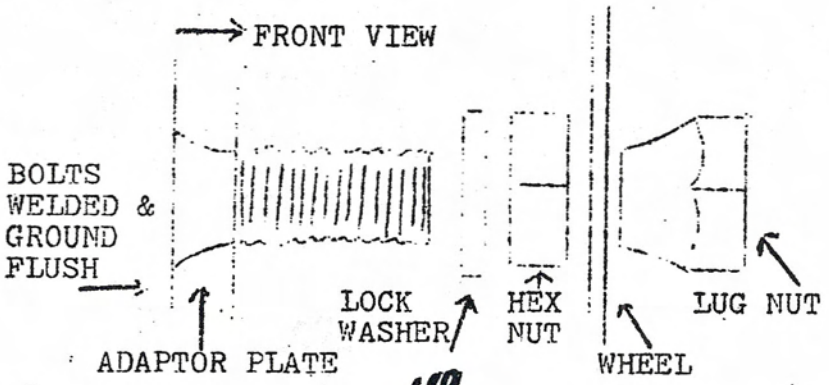
The diagram is the actual pattern used for making the adaptor using a piece of 3/8" stock. I furnished 4 new hub bolts that fit MGA lug nuts; available locally from most any auto supplyhouse.



(approximately 50% reduction in size)

MGA Lug Pattern - holes are countersunk slightly to accept MGA Lug Nuts (Tapered).

MGTD Lug Pattern, See Side View. Note that only four holes are present; the 5th hole almost overlaps the MGA pattern where bolt is at top left.



Rear Axle Ratios and Wire Wheels
for TDs

11-78

These two subjects are probably the most constantly discussed and debated in the ' T' Register-- even more than trailering.

Having just finished a job requiring both the above plus a brake change and Volvo transplant, I'll try to pass on the combinations available and the advantages/disadvantages of all except the Volvo- that's too hot a subject.

Axle Ratios: The TD engine is a high revving, low torque design. Which doesn't have much twisting power to turn the rear wheels. To change to a numerically lower axle ratio in effect lessens the engines ability to "twist", or turn, the axle. This means slower acceleration and poor hill climbing. However, these are not the most important factors. Bearing loads on the engine are the biggest single factor. If I may introduce an anology, I'll try to explain in simple terms why too high of a gear ratio is damaging to your engine. It's like a see-saw or lever effect. The engine turning the drive shaft can be likened to the force on the end of the lever and the axle ratio to a divider of that force. Since our lever requires more power to move a given load the shorter it becomes, likewise the engine is required to produce more power. Since the ability to produce power has n't changed, this means the pistons and connecting rods in the engine have to push down harder on the crankshaft to apply the required effort to move the load. It therefore follows that if these parts are working harder than intended, the result will be early failure.

The TD/TF engine simply does not have enough power to move the car satisfactorily with the 4.11 MGA gears. With the 4.3 ratio, the acceleration and climbing ability suffer noticably. In fact I'd say the loss could even be equated to the reduction in bearing life.

It is my personal feeling that the 4.87 TF rear axle is the best combination except for TF 1500s which can easily handle 4.55 TF gears or MGA rear. A TD used basically for flatland touring could possibly use the 4.55 MGA conversion Moss sells. However this kit has some very big disadvantages I' ll elaborate on below.

As to the combinations available they are:

1) Wire wheels only: Chip Old covered this pretty thoroughly in T.S.O. awhile back so I'll just add that TF brakes and rear axles are required and are virtually impossible to find.

2) MGA wire wheels and rear axle: A conversion to MGA wire wheels requires the relocation of rear axle mounts and handbrake cable mounts. Most important is the change of front brake line fittings, they are deceptively similar threads. Like it or not, it also raises the rear axle ration to 4.3, or if a MKII MGA rear is used, 4.11.

3) TD disc wheels in front - MGA rear axle and wheels in rear: Aside from the things mentioned immediately above this has one very serious disadvantage. While you do not have to change the front brakes, you do have to change the rear brakes along with the rear axle. This puts larger, more powerful brakes in the rear. Under deceleration more of the weight of the car is transfered to the front wheels the harder you brake. Under panic conditions

this would almost certainly result in the rear wheels locking up and loss of control and skidding. You will also have a spare tire problem-- MGA wheels are 4 bolt and TD are 5.

4) MGA rear axle, MGA brakes and disc wheels front and rear: This one is obvious from the above two.

5) Moss conversion to 4.55 gears-stock TD rear: I believe Chip covered this, but I'll add that aside from the initial cost it requires a lot of very good machine shop work-probably $300 or so.

6) Moss gear set in stock MGA rear end: If you have decided to go MGA wire wheels and/or brakes this will give you the 4.55 ratio for a lot less. Any competent auto machine shop can install these gears (which are MGA to begin with), probably for $50 or less.

IS YOUR REAR END SAFE? By Len Renkenberger 11-76

I recently participated in the Bi-Centennial Rallye of the Colonial Captials with Tony Roth in his unrestored TD, and a close call we had prompted me to write this before you don't happen to be so lucky. We lost a rear wheel at "considerable speed." It grazed one rallye car and narrowly missed another. The cause? Worn splines in the brake drum.

Most of us have checked axle condition when installing brakes or when rebuilding our cars. If the axle splines looked good you probably didn't look at the splines in the brake drum hub. If you did and they were worn what did you do? Probably nothing since few of us have extra drums. You may have tightened the lock nut on the axle down extra hard to hold it in place. Well, that ain't enough cousin. The tremendous leverage (torque) of repeated acceleration and deceleration will cause the hub to rotate on the axle shaft as much as the gap in the splines allows. This in turn will begin to wear on the large retaining nut on the axle. The nut will eventually become loose enough to turn freely. When the nut becomes a little loose it will begin to turn back and forth until it shears the cotter pin (that's Yank for split-pin). Because the original type cotter pin is unusually large most of us use too small a cotter pin which just allows the nut to work faster. This process can take many thousands of miles or a few hundred. We had no spare drum to change and we had to tighten the nut and replace the split pin three times in 1000 miles.

What can you do if you have poor splines in the only hubs you own? One thing is use one of those new miracle anaerobic products which is specifically made for mounting worn splines and pulleys. One I would recommend is Loctite Retaining Compound #601-31. The next thing is to use a split pin which fits the hole (an excellent substitute discovered by Ernie Betts is a ten penny nail). Third, is to check everything often.

If you feel a little sideways twitch when you snap down on the gas or let off suddenly, odds are that you have a loose rear hub. Don't risk your rear end -- check it now.

8-75

BIGGER BRAKES AND LONGER LEGS FOR YOUR TD By Len Renkenberger

You will probably recall an excellent technical article by Mac Spears a while back telling you how to install an MGA rear axle assembly in your TD. This conversion raises the final drive ratio to 4.3:1 (early MGA) or 4.1:1 (late MGA, too high for most stock TDs), thus giving a higher road speed for any given engine speed.

Mac was very happy with his conversion except for the problem of having 4 bolt MGA rear wheels and 5 bolt TD fronts. This causes a spare wheel dilemma. I had one further reservation. That was that in the event of an emergency stop the larger MGA rear brakes would lock up due to higher braking power and could cause some control problems. Whether this is right or not is still a matter of conjecture.

Well, to get on with it, completing the conversion to the matching MGA front brakes and wheels is amazingly simple. Find an MGA 1500 (1955-59) with disc steel wheels. Remove the brake drum and hub INCLUDING THE SPACER BEHIND THE INNER BEARING by taking off the spindle nut. Remove or cut the brake hose. Remove the four bolts holding the brake backing plate to the spindle, marking which end is up and left and right wheels. Repeat the removal process on the TD.

You can use the original wheel bearings (TD & MGA are the same) but use the MGA spacer between. However, it is highly recommended that you use tapered roller bearings listed in the last CSR.

To go one step further and use MGA 1600 disc brakes and/or wire wheels you must interchange the entire spindle assembly between the shock and the lower control arm. This also will require some additional research as the spindle arm connecting to the tie rod is different. They may interchange or you may have enough adjustment in your tie rod.

Don't let go of any of the original parts. You may turn purist again some day or sell your car to a purist.

USEFUL PARTS INTERCHANGES BY THE ANONYMOUS PARTS BIN SEARCHER

5-75

1. TC Rear wheel bearing. DELCO 7208 will work but a bearing having a larger radius on the edges of the inner race would be better.

2. Rear Wheel Bearings are not known to be one of the weaker points of the TD & TF. Therefore, you are not likely to have one about in case of need. There is a handy "off the wall" replacement available. Just ask your local MG dealer or import parts house for a MG-B bearing & seal. Now the bad news -- it cost $33.82 at BAP-GEON. It's a better bearing than original but Moss sells the original for $10.00.

Eliminating TC Rear Brake & Bearing Woes 6-79

If you were to survey the TCs on the road it's a sure bet 50% or more would have gear oil in the rear brakes. This is caused by three factors (1) poor design, (2) wear and (3) owner ignorance. All three can be compensated for by new improved sealed bearing and seals.

The poor design is in the location of the filler plug and coupled with owner ignorance causes overfilling. The proper procedure is to remove the plug on the opposite side of the differential, then fill until lube flows out this opening which is lower than the filler.

Once gear oil has found its way to the hub bearing due to overfilling the rear end, it dilutes the grease in the bearing and can then pass on to the hub seal. If there is any wear in the seal or play in the bearing, oil will find its way past the seal and into the brakes.

If you have tried new seals to no avail and assuming you're not overfilling the rear end, the problem no doubt lies in the hub bearings, or axle housing. A slight amount of wear at the point where the hub bearing sets on the axle tube is multiplied in movement at the point of the rotating seal. To cure this use Locktite #35 Shaft Mount Compound to take up the wear on the axle housing tube. Make sure the retaining nut is tight.

It is also highly recommended that you use a new improved type bearing. There are two reasons for this, (1) the old bearing is more than likely the original and has a fair amount of wear and play (2) the new bearing can be had with a seal on both sides. The sealed bearing combined with a new hub seal gives you, in effect, triple insurance against gear oil in your brakes.

The double sealed bearing to use is SKF #62082 RSJ. Other similar bearings may not have a large enough radius on the inner race (Fafnir, for example) where it shoulders on the axle housing so be careful if you can't get an SKF brand. These are available at any bearing distributor, such as Specialties, Inc. in Rockville, Md.

The original seals now seem hard to find. However, there are two good or better replacements. One is the front wheel seal from an MGB. BAP-GEON part #NA448. The other is Chicago Rawhide #18962 available at bearing suppliers.

Another annoying leak point is at the front of the differential. This is because there is no seal, only a reverse spiral groove in the cover plate that is supposed to turn the oil back into the differential housing. Obviously, when you back up it turns oil out of the housing. Add wear and you have an annoying, although not dangerous, leak. Previous TSO'S and CSR'S have warned about the notoriously weak pinion bearings so when you replace them try the following. Obtain a front wheel seal for a Triumph TR-6. It is a metal and felt seal. Remove the metal portion and part of the felt. Leave enough felt, about 2/3, to be lightly compressed when placed in the recess in the center of the inner side of the front cover.

12-76

TC PINION BEARINGS By Len Renkenberger

Since I cautioned you on TC pinion bearings in my last piece of word pollution, I thought I should expand on the subject.

A while back T.S.O. carried a short piece by Chip Old showing the remains of the front pinion bearing from his TC & stating that this was a weakness we should all check on. As I recall (heresy - I don't save my T.S.O.'s) it did not explain how easy it was to replace the bearings. I did mine immediately and since then, we have had a "pinion party" at our house, replacing two others. All were bad. At the outside it is a four-hour job. If you have the same crummy manual I have, you will need instruction, so here it is.

The bearings are available locally from Specialties, Inc., Alexandria, Va., or Cheverly and Rockville, Md., or any bearing supply house. The front bearing is Delco NDH #5305 and the rear is Delco NDH #U1305TMI. Cost is about $25 for both.

Wipe all the protective grease off the outer and inner races of the new bearings where they will contact the shaft or housing. Put the bearings in a plastic bag to prevent moisture (condensation) entering them and place in your freezer for an hour or so. Remove just before installation.

Jack up rear of car and firmly support it under the frame. Drain lubricant. Remove the four bolts that secure the rear of the driveshaft to the flange on the pinion gear. Push the driveshaft up into the tunnel and out of the way (a beer can holds it there nicely - thank you, Don Bills). Now remove the nuts from the four studs just to the rear of the car from the pinion flange. You should now be able to pull the pinion assembly forward and remove it. If not, try tapping lightly on back side of the flange with a lead, nylon, or copper hammer to loosen it. Don't drive a screwdriver into the jointure with the axle housing. There are thin shims there that must not be damaged.

Remove the split pin (that's Limey for cotter pin) from the nut on the forward end of the pinion shaft. Grip the rear of the pinion flange with a pipe wrench (you concours types will have to find another way if you don't want it scarred up). Using a torque bar for a 1/2" drive socket set and the pipe wrench, you should be able to remove the nut holding the flange in place. Tap on the end of the shaft with a lead, plastic, etc. hammer and drive it back thru the flange. You will also be driving it thru the front bearing and out the rear of the housing. Watch you don't drive the shaft on out and have it fall on the floor - those teeth are fragile and expensive. You will note that half of the rear bearing and a spacer which goes between bearings come with the shaft. You should now decide if you want to replace both

bearings or only the front (more on this below). Normally, only the front bearing gives trouble. Looking inside the housing you will see the outer race of the rear bearing still in place. Remove the snap ring which retains the race. There are two reliefs cut into the inside of the housing behind this which will allow you to drive the race out by tapping it alternatively on both sides with a punch or large blunt screwdriver. Be careful not to burr up the rear of the housing by setting it on something. We were able to have one man hold the housing while the other drove out the race. Remove the front bearing (or remains thereof) in the same manner.

Clean everything like you were doing open heart surgery. Press the new front bearing into the housing. Don't drive on the inner race - you will damage the balls of the bearing. Install the spacer in the housing. Press the rear bearing into the housing. Supporting the inner race of the front bearings, drive the pinion shaft thru both bearings. If any of the race-to-shaft or race-to-housing surfaces are not a press fit, you must use Loc-Tite (or equal) medium strength bearing sealant. Fit the flange and snap ring.

Remove the shims which should still be on the front of the differential housing and clean them and the mating surface thoroughly. Refit shims and pinion assembly. Refill axle with 140 or 85/140 gear lube.

Additional notes: On the three units checked, the new bearings were from .001 to .002 inch thinner (front to rear) than the old. On the front bearing this does not matter as the pinion is positioned from the rear face of the bearing by the spacer and the rear bearing. The only way you can compensate for this is to remove a like thickness large shim from the jointure of the pinion assembly housing and differential housing. Since you cannot buy these, you can't adjust with new shims. The alternative is to leave the old rear bearing on the shaft. I don't believe the difference to be significant, but I will readily yield on this to anyone who has adjusted a TC ring and pinion set and can tell us if it changes the gear mesh enough to be seen.

Do not use steel hammers or pipe supports when removing and installing components. Sleeves for plastic plumbing drain pipe (the tough white kind) for houses can be used for support.

If still not sure, take this and the pinion assembly to a machine shop for the pressing work.

It took longer to write it than to do it. But, if you want moral support, come on over to my digs and we'll have a pinion party again.

PECULIARITIES OF THE T SERIES AXLES By Len Renkenberger 11-76

First, the TC. This unit has one area of design weakness and two areas where your innocent ignorance can do some damage. The design wekness is the double row ball bearing on the pinion shaft. When the soft bronze carriers in the bearing break up they let the pinion shaft oscillate. This results in turning the gears to neat little silver nuggets in the bottom of the housing. Removal ofthe pinion assembly and bearing replacement requires no special tools and only about two hours. The areas of ignorance are the type of lube used and the lube level. TCs use 140 weight (viscosity) hypoid gear oil not 90 as most other cars. Incidentally, Castrol has discovered that the extreme pressure additives in modern gear oils cause some brass and bronze compounds to deteriate. This may be another cause of pinion bearing failure. The modern bearing contains no bronze parts. Now to the correct oil level. You will note a protrusion on the left side of the center housing shaped like a tobacco pipe bowl. This is the filler. The natural thing to do is fill it to the top as you would in any other car. Wrong! The results will be a loss of rear brakes and "icky-poo" all over your silver painted wire wheels as the oil seeps thru the not too well sealed hubs. There is a plug on the opposite side of the center section about 2 inches lower than the filler. The correct procedure is to remove this plug and pour gear lube into the filler only until it begins to run out of this hole. Everybody knows that you say? Ask some TC owners, you'll be surprised.

Another area where you would be wise to do a little checking is the axle splines where the axle is pressed into the hub. This is supposed to be a thirty ton press fit but there are a lot of TC's running around with a finger pressure fit. Jack up the wheel and remove the knock-off spinner. IF the end of the axle shaft is protruding much beyond the inner face of the hub, it's a sure bet you got a problem Charlie Brown! If you're not sure, turn the wheel back and forth as far as possible. Look and listen for movement between axle and hub. If still not sure, place a steel rod (6" extension for ½" drive ratchet will work) on the end of the axle and drive in smartly with a hammer. If it moves at all it is too loose. The cure for any axle which does not practically fall out under its own weight is application of one of the new anaerobic sealants. The axle and hub can be removed simply by taking off the six bolts and two screws you see protruding thru the brake drum. Drive the axle out of the hub. THOROUGHLY clean the hub splines and the axle splines. Examine for wear. Even if they are badly worn (especially the hub) you have nothing to lose so you might as well proceed. Apply Loc-Tite medium speed (Grade N) primer to both surfaces. Allow to dry. Apply Loc-Tite #35 high strength sealant. Place hub face down on a piece of masonite or wood to prevent damage to threads. Drive axle into hub until outer end is flush with inner face of hub. Alow 24 hours to set. While in the area it might also be a good idea to check or renew the axle seals. Loc-Tite products are available from Specialties Inc., Alexandria Va.; Cheverly, Md.; and Rockville, Md. The smallest sizes available will be ample.

Now the TD/TF: No internal problems here; in fact no problems at all. But there is a simple thing you can do to increase the drivability of your car. There is a great deal of torsional whip on a TD rear axle which you don't feel unless you are a keen mechanic and you drive "briskly." What happens is the axle is not held securely by the "U" bolts which attach it to the spring. This results in the whole axle housing turning when you "get-on" the gas, let off, or when you brake. This is very hard on universal joints. Sure, the "U" bolts look tight. But take them off and you will find nice shiney grooves in the axle housing where it has been pivoting in the "U" bolts. A cure for this which I have used in the past was to take the buffer plates which were fitted between MGA "U" bolts and axles to cure this problem and install them on the "T" axle. They were a perfect fit. Recently, MGA axles have been no easier to find than "T"s so it did you little good to know this. Now, however, that great knight in the white hat, Al Moss, has come to your rescue. Moss Motors now has these buffer plates for $2.00.each. Order part #267560. You should also order MGA "U" bolts as they are longer and give room for taking up when fitted and two uts to insure the nuts will not loosen. Or, you can use "nyloc" self locking nuts since the MGA bolts are SAE thread. If you don't think' these nuts work loose just ask a certain guy with a Clipper Blue TC about his experience at the Williamsburg GOF last year.

WAGON TRAIN

DALE LINDSAY 2-78

It's a bright Sunday afternoon, zero chance of rain, no football games on the boob tube, and the temperature is hovering around the seventy degree mark. What better time to load mama in the buddy seat and go for a spin in the Trusty "T"? (Ed: SORRY JACK!)

Soon you're buzzing along the highway with the wind whipping through your hair and whistling, through all those built-in leaks that give your classic "character". The speedometer is reading a comfortable 55MPH as you take in the scenery in front, to the sides and occasionally, behind you. There's only one problem .... the scenery behind you consists of an endless string of cars, trucks, and buses, all of which seem to be a trifle testy with your speed. Sure, your speedometer says 55, but everybody wants to pass you. Before you start grumbling under your breath about all the speed demons on the road, consider one thing - you may not be going as fast as you think!

The attached charts may be of some help in determining if your speedometer is correct. Maybe you are running a tire size (diameter), transmission speedometer drive gear, or rear end ratio that wasn't original on your model car. Check it out. For those who want a higher top speed, the charts will show you which combination of tire size and rear end ratio will get it for you. At the very least it might explain why it seems that every bus driver on the road wants to park his Greyhound in your side curtain compartment.

MGT REGISTER - CHESAPEAKE CHAPTER
RPM TO SPEED CONVERSION CHART
FOURTH GEAR (1.00:1 TRANSMISSION RATIO)

KEY TO REAR END RATIOS
MGTD 5.125:1, MGTF 4.875:1, MGA 4.55:1

TIRE DIAMETER 23	TYPE MGTD	TYPE MGTF	TYPE MGA
RPM	MPH	MPH	MPH
2000	26.71312	28.08303	30.08896
2100	28.04878	29.48718	31.59341
2200	29.38444	30.89133	33.09785
2300	30.72009	32.29548	34.6023
2400	32.05575	33.69963	36.10675
2500	33.39141	35.10379	37.6112
2600	34.72706	36.50794	39.11565
2700	36.06272	37.91209	40.62009
2800	37.39837	39.31624	42.12454
2900	38.73403	40.72039	43.62899
3000	40.06968	42.12454	45.13344
3100	41.40534	43.52869	46.63789
3200	42.741	44.93284	48.14233
3300	44.07665	46.337	49.64678
3400	45.41231	47.74115	51.15123
3500	46.74797	49.1453	52.65568
3600	48.08362	50.54945	54.16013
3700	49.41928	51.9536	55.66457
3800	50.75494	53.35775	57.16902
3900	52.09059	54.7619	58.67347
4000	53.42625	56.16606	60.17792
4100	54.7619	57.57021	61.68236
4200	56.09756	58.97436	63.18681
4300	57.43322	60.37851	64.69126
4400	58.76887	61.78266	66.19571
4500	60.10453	63.18681	67.70016
4600	61.44019	64.59096	69.2046
4700	62.77584	65.99512	70.70905
4800	64.1115	67.39927	72.2135
4900	65.44715	68.80342	73.71795
5000	66.78281	70.20757	75.2224

MGT REGISTER - CHESAPEAKE CHAPTER
RPM TO SPEED CONVERSION CHART
FOURTH GEAR (1.00:1 TRANSMISSION RATIO)

KEY TO REAR END RATIOS
MGTD 5.125:1, MGTF 4.875:1, MGA 4.55:1

TIRE DIAMETER	TYPE	TYPE	TYPE
24	MGTD	MGTF	MGA
RPM	MPH	MPH	MPH
2000	27.87456	29.30403	31.39717
2100	29.26829	30.76923	32.96703
2200	30.66202	32.23443	34.53689
2300	32.05575	33.69963	36.10675
2400	33.44948	35.16483	37.67661
2500	34.84321	36.63004	39.24647
2600	36.23693	38.09524	40.81633
2700	37.63066	39.56044	42.38618
2800	39.02439	41.02564	43.95604
2900	40.41812	42.49084	45.5259
3000	41.81185	43.95604	47.09576
3100	43.20557	45.42125	48.66562
3200	44.5993	46.88645	50.23548
3300	45.99303	48.35165	51.80534
3400	47.38676	49.81685	53.3752
3500	48.78049	51.28205	54.94505
3600	50.17422	52.74725	56.51491
3700	51.56794	54.21245	58.08477
3800	52.96167	55.67766	59.65463
3900	54.3554	57.14286	61.22449
4000	55.74913	58.60806	62.79435
4100	57.14286	60.07326	64.36421
4200	58.53659	61.53846	65.93406
4300	59.93031	63.00366	67.50392
4400	61.32404	64.46886	69.07378
4500	62.71777	65.93407	70.64364
4600	64.1115	67.39927	72.2135
4700	65.50523	68.86447	73.78336
4800	66.89895	70.32967	75.35322
4900	68.29268	71.79487	76.92308
5000	69.68641	73.26007	78.49294

MG1 REGISTER - CHESAPEAKE CHAPTER
RPM TO SPEED CONVERSION CHART
FOURTH GEAR (1.00:1 TRANSMISSION RATIO)

KEY TO REAR END RATIOS
MGTD 5.125:1, MGTF 4.875:1, MGA 4.55:1

TIRE DIAMETER 24	TYPE MGTD	TYPE MGTF	TYPE MGA
RPM	MPH	MPH	MPH
2000	27.87456	29.30403	31.39717
2100	29.26829	30.76923	32.96703
2200	30.66202	32.23443	34.53689
2300	32.05575	33.69963	36.10675
2400	33.44948	35.16483	37.67661
2500	34.84321	36.63004	39.24647
2600	36.23693	38.09524	40.81633
2700	37.63066	39.56044	42.38618
2800	39.02439	41.02564	43.95604
2900	40.41812	42.49084	45.5259
3000	41.81185	43.95604	47.09576
3100	43.20557	45.42125	48.66562
3200	44.5993	46.88645	50.23548
3300	45.99303	48.35165	51.80534
3400	47.38676	49.81685	53.3752
3500	48.78049	51.28205	54.94505
3600	50.17422	52.74725	56.51491
3700	51.56794	54.21245	58.08477
3800	52.96167	55.67766	59.65463
3900	54.3554	57.14286	61.22449
4000	55.74913	58.60806	62.79435
4100	57.14286	60.07326	64.36421
4200	58.53659	61.53846	65.93406
4300	59.93031	63.00366	67.50392
4400	61.32404	64.46886	69.07378
4500	62.71777	65.93407	70.64364
4600	64.1115	67.39927	72.2135
4700	65.50523	68.86447	73.78336
4800	66.89895	70.32967	75.35322
4900	68.29268	71.79487	76.92308
5000	69.68641	73.26007	78.49294

MGT REGISTER - CHE PEAKE CHAPTER
RPM TO SPEED CONVERSION CHART
FOURTH GEAR (1.00:1 TRANSMISSION RATIO)

KEY TO REAR END RATIOS
MGTD 5.125:1, MGTF 4.875:1, MGA 4.55:1

TIRE DIAMETER 25	TYPE MGTD	TYPE MGTF	TYPE MGA
RPM	MPH	MPH	MPH
2000	29.036	30.52503	32.70539
2100	30.4878	32.05128	34.34066
2200	31.9396	33.57753	35.97593
2300	33.39141	35.10379	37.6112
2400	34.84321	36.63004	39.24647
2500	36.29501	38.15629	40.88174
2600	37.74681	39.68254	42.51701
2700	39.19861	41.20879	44.15228
2800	40.65041	42.73504	45.78755
2900	42.10221	44.26129	47.42281
3000	43.55401	45.78755	49.05808
3100	45.00581	47.3138	50.69335
3200	46.45761	48.84005	52.32862
3300	47.90941	50.3663	53.96389
3400	49.36121	51.89255	55.59916
3500	50.81301	53.4188	57.23443
3600	52.26481	54.94505	58.8697
3700	53.71661	56.47131	60.50497
3800	55.16841	57.99756	62.14024
3900	56.62021	59.52381	63.77551
4000	58.07201	61.05006	65.41078
4100	59.52381	62.57631	67.04605
4200	60.97561	64.10256	68.68132
4300	62.42741	65.62881	70.31659
4400	63.87921	67.15507	71.95186
4500	65.33101	68.68132	73.58713
4600	66.78281	70.20757	75.2224
4700	68.23461	71.73382	76.85767
4800	69.68641	73.26007	78.49294
4900	71.13821	74.78632	80.1282
5000	72.59001	76.31258	81.76347

CHAPTER 8 - STEERING ASSEMBLY

HOW TO GET A TIE ROD END OFF WITHOUT DESTROYING HALF THE FRONT SUSPENSION

By the Troll Who Lives Under the TD 12-76

Tie rod ends and other tapered fittings can sometimes be most difficult to remove. If you beat on the threaded end after you remove the nut, you will mushroom it. Since the tie rod end is bad, you may feel this doesn't matter. Well, how are you going to get that blob thru the hole in the spindle arm even if you do get it loose?

Simply strike the end of the spindle arm sharply with a hammer (preferably straight on so it can't give any) and the tie rod end will pop out clean and easy.

S I M P L E F R O N T E N D A L I G N M E N T

On most "T's" in relatively good order, the front wheel alignment requires little adjustment. It is rather hard for caster (fore and aft tilt of the spindle on which the wheel turns) and camber (tilt of the spindle from top to bottom toward the center of the car) to be out if all mechanical parts are in good condition.

The other adjustment, toe-in (wheels being angled slightly toward each other at the front, if viewed from above the car), is not quite as dependable. Nudge a curb or a good bump, and you can knock it out. If your front end is tight and yet you have tire wear on the edges, chances are this is your problem.

All you need to check the toe-in is a flat, relatively smooth surface, a jack, 3 nails, and a six-foot 2 X 4. Jack up a wheel securely, hold the pointed end of a nail against the center of the tire, and spin the wheel. You will note that this makes a clean line around the tire. If the line and tread don't run concentrically, you either did not hold the nail securely or you have a crooked tread and/or bent wheel. Let the wheel down. Repeat this operation on the opposite wheel.

Bounce the front gently by pressing up and down on the bumper to level the suspension. Now place the 2 X 4 on its narrow edge in front of the wheels and mark the locations of the lines on the tire on the 2 X 4. Remove the 2 X 4 and drive a nail (the longer the better) in each marked location firmly enough to hold the nail in place, but leaving the greatest part of its length projecting vertically. Cut the heads off the nails. Place the 2 X 4 firmly on its narrow side across the front of the tires so that tops of the nails just touch the tire, and adjust the nails to line the tops up with the lines on the tires. Now move the 2 X 4 to the back side of the tires and check the location of the tops of the nails against the lines on the tire. Adjust the tie rod end(s) until the nail to line distance is the same front to rear less the specified toe-in at the front. If your wear is all on one wheel, adjust only that side; otherwise, adjust evenly on both sides.

Lower Trunion Bushes — Hank Giffin

These bushes are in all liklihood worn on your TD/TF if you haven't yet replaced them, by looking at the trunion you can see if the trunion is being held in the center of the rubber bush. Insure you check the set at the rear (under), as on my MGA they went first if the trunion shaft is toward the top, of the bush, you should probably replace them, as the rubber inside is worn.

Replacing the bushes in accordance with Len's tech article in the NOV.'77 CSR takes several hours (or less if you aren't babysitting), cost $8.80 for the 8 bushes needed (use MGB items) and can definately improve road handling and high speed touring.

TD-TF RACK SEAL & FRONT SUSPENSION BUSHING REPLACEMENT 11-77

LEN

We have all heard the gripes, justified I feel, about the poor service life of the rubber front end components the major suppliers handle. The worst of these seem to be the steering rack "bellows" & the 8 bushings on the inner end of the lower control arm. Since I don't have a shop manual anymore & since I'm not sure of my terminology, these are #38 & #4 in the illustration on page 14 of your Moss catalog. A much better bushing is available from your local M.G. dealer or BAP-GEON. Just ask for this same component for an M.G.B. Unfortunately, a better rack seal is not available but I can tell you an easier way to install them.

Again, because I don't have a manual, I'll digress to make a point. I was replacing the above bushings when Bill Porter dropped by. He told me he didn't know it could be done my way. It reminded me of a passage in that book he wanted us all to read (Zen & the Art of Motorcycle Maintenance) where the hero says people with natural abilities don't use manuals & can do a job several ways; whereas the manual will lead you to believe there is only one unequivocable way to do it. The point is, don't believe it. Look & think. Now, let's return to the job.

As I recall, the manual tells you to use all kinds of special tools to assemble the spring, spring pan, bushings, and lower control arms. If you are assembling the whole front suspension skip the next paragraph. If only replacing the bushings read on.

Raise the car and block up the frame on one side of the car. Remove the wheel. Using a scissor or hydraulic jack placed under the spring pan at the inner side of the coil spring, take up some of the tension of the spring - but not enough to raise the car. The arm should first be removed from the side on which the lower link nut is located. Remove the nut from the pivot shaft (inner end of the whole assembly bolted to frame) Remove the two 1/4" whitworth bolts holding the arm to the spring pan, cautiously as they may have some tension. Remove the nut from the bolt thru the lower link and tap the bolt inward just enough to clear the arm you are removing. Remove arm and discard bushings. Spray new MGB bushings with Armorall or rubber lube. Place in the arm and install on pivot shaft; install nut finger tight. Next

you will need two 1/2" x 4"± bolts, and two punches or screwdrivers that will fit the small holes for the spring pan bolts. Bring the large hole in the outer end of the arm in line with the link bolt. Place one of the 1/2" bolts thru the arm and against the link bolt. Drive (gently) the link bolt out being careful not to displace any seals or washers (these are easily replaced at this time). Use the other 1/2" bolt to drive this bolt back out. Now drive the second bolt out with the original link bolt. Confusing? Not really. What you have done is reverse the direction of the link bolt so it will keep everything together when you are ready to remove the other arm. It is also now holding the first arm in place. By maneuvering the punches you can now put the small spring pan bolts in place. Tighten the spring pan bolts and the pivot nut sequentially (a few turns each at a time). If you tighten the pan bolts only you will strain them and also compress the inner rubber bushing too much. You are now ready to repeat the process (except link bolt reversal on the other arm.

To install the whole assembly with the spring you will need either some 5/16" bolts in decreasing lengths from 6" to 2" in increments of 1" (4 of each) or four 6" lenghts of "all-thread" rod & 8 nuts. Assemble the spring pan, arms, pivot shaft, & bushings with the pivot shaft brackets which bolt to the frame held in place by two bolts. Detach the pivot shaft & swing the assembly down. Place spring in spring pan & into crossmember. Using a jack with a top wide enough not to slip off, raise the assembly by jacking up the pivot shaft or the inner edge of the spring pan. When the pivot shaft is within reach of the crossmember, place the bolts or "all-thread" rods thru the crossmember and pivot shaft. Tighten sequentially until the pivot shaft is in place. Replace "all-thread" rods with original bolts one at a time.

Now, to replace the rack seals. Simply break the tie rod end lock nut lose, then turn it back until it just touches the tie rod end. Usually the accumulated crud on the threads will hold it firmly enough that it will not turn easily. If you find it does turn easily, just losen it several turns and put a little lock-tite or Permatex on the threads, then turn back down until it touches the tie-rod just inboard from the end of the threads. Turn the tie rod by a wrench on this flat until it is free of the tie rod end. Remove old rubber seal. While you're at it, check the ball joint at the inner end of the tie rod for loseness. Liberally coat the inside of the new seal with Armorall or rubber lube. With a little cautious stretching and a small blunt screwdriver you can work the new seal over the nut. Screw the tie rod back into the tie rod end until the nut again just touches. Hold the tie rod by the flats and turn the nut firmly tight against the tie rod end.

One final note. If not using original bolts, use aircraft grade bolts. The hardware store variety are not strong enough and may let you down with a bang - literally.
Next time: Backyard front end alignment.

TC & TD-TF WHEEL BEARINGS By Len Renkenberger 5-75

Everybody has their ideosyncrasies and one of mine has always been a mistrust of ball bearings & bushings. So when I discovered a little wobble in a front wheel of the TD, I remembered that it has ball bearings. I also recalled having this trouble with the TC a few years ago and how I cured it. So, if you have a little persistant play in your wheels read on for the cure.

Note that all T's have 2 ball bearings with a spacer between. This spacer holds the bearings exactly the right distance apart to prevent excessive side load when you snug up the spindle nut and to position the balls for maximum bearing surface contact. However, when anything wears; be it bearing, spindle, or whatever there is no way to compensate. Tightening the nut just tightens the inner races of the ball bearings against the spacer.

The solution is to use tapered roller bearings WITHOUT the spacer. Be sure to install the bearing cones (the inner half of the 2-piece bearing) with the small ends pointing toward each other. The spindles, the hubs, and the surfaces of the bearing that contact them should be clean and dry. Just before assembly apply Bearing-Lock to these surfaces. This will prevent the bearing race from turning if there has been some wear on the spindle or in the hub from the old race turning (not all that uncommon with old ball bearings). After the assembly has been installed, tighten the spindle nut until you have about 10-15 ft. lb. of torque on the nut. Turn the wheel several times. If the torque lessens noticeably snug up the nut again. After you are sure all play has been taken out of the assembly, loosen the nut and then turn down finger tight. Advance just far enough to get the cotter pin installed but do not tighten beyond 2-3 ft. lb.

The tapered rollers are available from Specialties Inc., Alexandria, Cheverly, or Rockville. The part numbers are:

	TD-TF		TC	
Outer Brg. Cup	Timken	07204	Timken	07204
Outer Brg Cone	Timken	07079*	Timken	07079*
Inner Brg. Cup	Timken	26283	Timken	07204
Inner Brg Cone	Timken	26118	Timken	07097*

*Note similar but reversed No.- not a mistake!

Seal 54x72x8 mm* Chicago Rawhide 14938

*Recommend Stock Seal if obtainable.

TD STEERING BUSHING by Len Renkenberger 1-75

The rather crude felt bushing at the top of the TD steering column is at best a backyard approach. It also seems to be the type of thing you just never remember to add to your order to Moss. It can be easily and inexpensively replaced with an oilite bushing of 1 1/8" inside diameter and 1 5/16" outside diameter available from Specialties Inc., Alexandria, Va. and from Cheverly and Rockville, Md. Ask for Bost B-1821-8. Cost is $1.94.

One more thing must be done which the world's biggest dummy (me) didn't do --- remove the old felt remnants. I didn't and they sure make it tough to drive the bush the last 3/8" or so; even when you use a large socket to drive the bushing. It also makes for a little firmer steering for a few hundred miles.

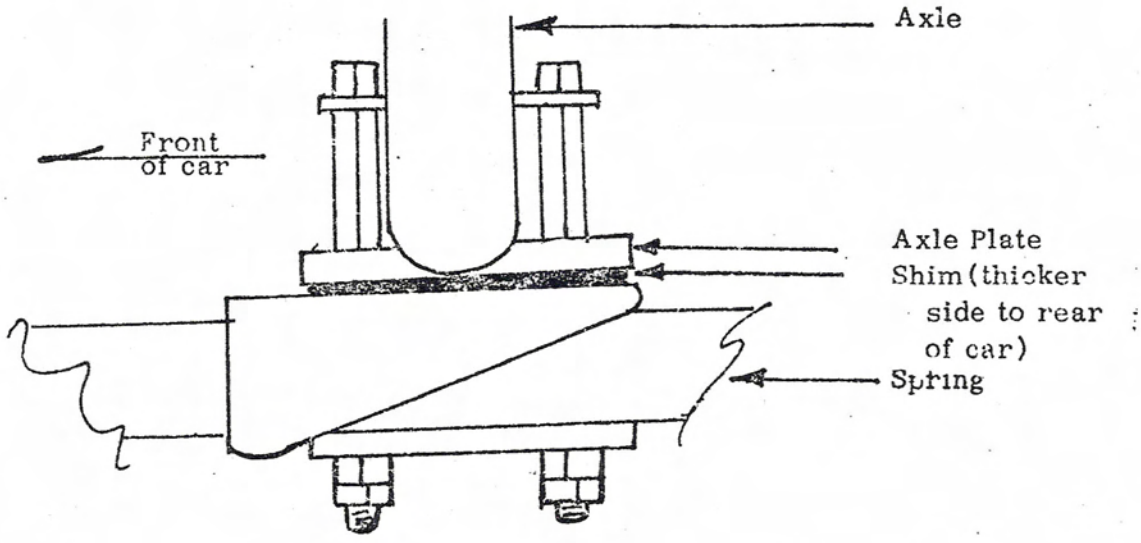
PRECISION STEERING FOR TC's & OTHER LIES 2-78 LEN

Last fall I rebuilt the TC Front end completely & I can't really say it helped much. I have since added the late TC caster reducing shims (part #261 190 in Moss catalog) & a Tomplins kit. I would recommend the shims as worthwhile. If you're not sure your TC has them see the sketch below. They are directional so make sure you install them as shown. On a scale of 1 to 10, I'd rate the Tompkins kit at a minus 328. I think it allows the pivot arm of the sector shaft to flex which makes all that supposedly infinite adjustment null & void. Also, the big Moss ad doesn't tell you, but there is some machine shop work needed. In addition, mine either had the wrong bearing or something missing as I had to buy another bearing race to make it work.

Strange as it seems, one of the best things to help TC steering is new rear springs. TC's tend to oversteer anyhow & week rear springs compound the problem. The king pin bushings are directional & must be installed right. My trusted machinist let his young helper do mine & he put one in backwards. Grease goes straight out the top-in about 1000 miles it is badly worn. Lesson: Anyone under 40 probably has never seen an old beam axle type spindle & doesn't realize how the bushings go. Get an old timer to install them.

TC owners are about as truthful about their steering as TD owners are about their oil pressure. Next time one tells you about his great steering, ask him to let you try it. I for one am convinced that it is only one step above the old two ropes we used on our soapbox cars & that nothing short of changing the leverage ratio between sector shaft & pitman arm will cure it.

In addition, I recommend two accessories -- a pair of St. Christopher medals - one for your badge bar & the other pined to your underwear.



Steering Wheel Rebuild

SPRING 76
by Cheap Charlie

There you stand with the TD/TF just about ready to roll (sure, there's lots to do, but that stuff can be done after the wheels turn). The only thing stopping you is the steerin' wheel. All that's left of yours is the hub, spokes, and a wire where the rim was. There are a lot of things you'd rather spend fifty clams on. Besides - that glossy, gorgeous new wheel sould really make your scruffy interior look bad. Is that what's troublin' you, cousin? Well, lift your head up... and all that rot. Cheap Charlie has come to your rescue. How does about $4 - $5 for a super colossal, genuine, fake racing type lookin' wheel grab you?

Break the remains from the wire rim except the little portion that covers the ends of the spokes (leave only the portion on the spokes). The remains on the spoke ends are built up or repaired using a small amount of the 2 component body repair epoxies, such as White Knight, Bondo, etc., being careful not to go outward beyond the wire rim. File or sand them to a satisfactory shape. Wrap rope around the rim in a tight continuous coil except where you must go past the spokes. Use small rope for a thin rim, heavy rope for a fat one. When you have fully wrapped the rim, fray the end of the rope and hold it in place with plastic electrical tape or masking tape. Use some more epoxy filler to shape the voids where the rope crossed the area opposite the spoke ends. If you have some fiberglass resin handy, mix up a small batch with only enough hardener to make it set up slowly. Either brush it on the rope and spoke end area or make a trough from an aluminum pie plate (ala Mrs. Smith type pies) and rotate the wheel rim through this several times to saturate the rope. If you don't have the resin, skip this as the resin is about two bucks. Let stand until hardened.

Wrap the rim tightly with two to four layers of friction tape in alternating directions. Follow with one or two wraps of electrical tape. In both cases, stay on the outer edge in the spoke area. Spray paint the hub and spoke ends. Cover rim with a "Sport Grip" or any brand of lace on steering wheel cover. These are frequently on sale at accessory stores for about two clams. O.K., Nuvolari, go get 'em.

RACK AND PINION LUBRICATION By Grady JULY 1979

Another basic point I was reminded of was lubrication - proper and complete! This little beauty of an MGA had never had a thing but Castrol GTX in it - crankcase oil was spotless, transmission and differential "A" OK. But, when I got to the front end - what a letdown. First I discovered someone had apparently put grease in the rack and pinion rather than 90 weight Hypoid, which made ~~for hard steering.~~ Then I couldn't get any zert to accept grease. Removal and inspection revealed grease (?) as dry and hard as the surface of the great Salt Flats. Disassembly, cleaning, lubrication and reassembly is the only answer. A time consuming price to pay for some one not taking a half hour periodically to grease it properly. It does not take long, is not difficult and will save you lots of misery and money in the long run if you attend to this little detail.

CHAPTER 9 - BRAKING SYSTEM

TECH SESSION

Technical Advisor - Len
Spring Brake Tune-up with an Added Note for TC's 4-78

Spring is the best time to make sure your brakes are top notch. Brakes that were fine last summer may have gone bad if the car sat all winter, or at the very least have taken on condensation which means rust and pitting of brake cylinders.

If the rubber seals in your brakes are more than 3 or 4 years old, it's cheap insurance to renew them. If your cylinders were not new when you bought or rebuilt your car, it's foolish not to check the bores of them and renew the rubber. New TC cylinders can't be bought so you will have to accept rebuilds at periods in keeping with their condition. Slightly pocked cylinders wear rubber parts rapidly. Drain the system completely and as you disassemble each cylinder lay the parts out in order so you won't have any doubts when reassembling. TD/TF cylinders are pretty cut and dry so I won't dwell on them. A few special notes on TC's later.

While you're at it, new hoses aren't a bad idea. For some reason nobody ever replaces hoses.

Assuming your brakes are only a year or so old, all you need do is flush them with new fluid. I've found the following to be the easiest way to do this.

Insert a paper towel or two into the reservoir to soak up as much old fluid as possible. Don't get it on the paint. Brake fluid is a great paint remover. After you've removed as much old fluid as possible, open a bleeder screw on one of the wheel cylinders and pump until you get only air. Fill the master cylinder and pump and bleed until you get fluid at the open wheel cylinder. Continue bleeding at this cylinder until you see new fluid. It is usually lighter in color since the old fluid is clouded by absorbed water or condensation. Continue bleeding for several more pumps to be sure all old fluid has been flushed out. Move to each of the other wheels and bleed and flush until you are sure the lines and cylinders are filled with new fluid.

I won't go into the old Lockheed fluid only versus U.S. brake fluid controversy here and now. Just look at it this way - is your T worth going any way but first class? Use Lockheed (British) in the yellow cans - not Wagner - Lockheed (U.S.).

Tech Session (continued)

Now to the TC's. TC brakes are pretty straightforward except for a few relatively minor points. However, those points may conceivably cause problems. First, the master cylinder "tin can". This is especially prone to rust for a couple of reasons. One, if you don't drain it totally and refill it, the condensation just stays in the bottom since the port which lets fluid into the cylinder proper is about an inch above the bottom and water goes to the bottom. Secondly, it's right beside the exhaust pipe which accelerates condensation through extreme heating and cooling. The heat is also hard on the rubber parts. Next comes the cotter keys which go through the brake shoe hold down posts (about in the middle of the shoe). I have seen shoe movement due to new lining wearing in, etc. cause the washers to nearly shear these in 3-5,000 miles. When you disassemble the wheel cylinders, you should find some asterisk shaped thin metal washers behind the rubber cups. These are intended to prevent the spring from cutting into the cup. Originally, the rubber cup had a little projection on the rear which went into a hole in this washer and held it in place. New seals don't provide for this. Carefully bend two of the tabs of the washer over the spring, but only over the end coil as it will be flexed by movement and break if you bend it over more coils. In that event, or if you just insert it and hope it gets into place, there is a slight possibility of it causing damage to the rubber parts and brake failure. Take good care of these washers as they are no longer made. These parts are another reason to rebuild brakes often as they are rather fragile and the condensation attacks them quickly.

TD/TF Handbrake Cables 4-78

The ones from Moss are bad news. The housing is too short and not large enough in diameter. This results in ends going about an inch or more too far forward, meaning the springs can't be installed and you'd have to pull the lever clear to the rear bumper to get it tight. Since the housing is too small, the attachment clamp won't hold the cable in place. They also require either drilling the guides in the floorboard out or filing the corners off the hex portion of the threaded end, otherwise they won't go through the holes. Lastly, for you purists, they bear no resemblance to original. Bill Porter advised me Abingdon's cables are as original.

USEFUL PART INTERCHANGE BY THE ANONYMOUS PARTS BIN SEARCHER

5-75

Brake Pedal bushing. Use two needle bearings one ½" long and one 5/8" long x .750 inside diam. x .8725 outside diam.

"T" SERIES BRAKES

A Chapter friend has a TC which he drives quite a bit, and lately I have been needling him because he has grease in the rear wheels and problems with one front brake dragging. Finally, he told me it wasn't because he didn't want to work on the brakes, but he was afraid to. I had always reasoned that the most important two things on your car are brakes and steering, and therefore I totally rebuild the brakes every 2-3 years and flush them every spring. However, I could see my friend's point and began to wonder if any of you had reasoned the same way - that is, that your brakes work now and if you mess with them they may not.

The value of your "T" aside, you're betting your posterior on those brakes. Therefore, it makes sense to have them first class. No excuses. If you don't know who rebuilt your brakes and when, do it now. The following is not the easiest or quickest way, but it is the most fail-safe for those not sure of themselves.

Begin by purchasing all hoses, a master cylinder kit, and kits for all four wheels. Remove the master cylinder, loosening the brake line before you undo the mounting bolts. Carefully take it apart, noting on paper the order in which parts were removed and the direction in which they faced, especially the rubber parts. Wash all the metal parts in carbon-tet. or some other solvent that will evaporate without leaving residue - not gasoline. Check the bore for pits, especially in the bottom and the area where the rubber cup is located when the unit is assembled. If there is nothing but a smooth shiny cylinder, you're in luck. If not, replace the cylinder. What about TC cylinders which are no longer available, you say? Well, in either case, you should now visit your local auto machine shop, not the local Cheap-Cheap, Quick-Quick Brake Service, Inc. If the cylinder was smooth, have the machinist lightly hone it. If it was pitted, put yourself in his hands. Maybe he can hone it clean. In either case, ask him to check the diameter of the piston and if necessary "knurl" it to bring it to the proper diameter. "Knurling" is a process whereby a hard die is pressed in the metal in a grid pattern. The grid displaces the metal into little diamond-shaped "mounds". This increases the effective diameter of the part and gives a new wearing surface. The piston should always be checked because some are aluminum and wear rapidly. Also, in the case of TC's, the push rod is at an angle, and this causes rapid wear on part of the piston. Speaking of TC push rods, make sure the little ball and socket joint is not worn to the point where the ball can come out. In the case where the cylinder has been honed quite a bit, the piston must be a close fit in order to assure proper seating of the rubber seal. Back to the irreplaceable TC cylinder. A badly corroded cylinder can be lined, that is, bored out and have a thin sleeve inserted under high pressure and then honed to size. Given no other choice, this can be done, but it is a big bucks job.

Assuming you were lucky, you are now ready to reassemble your freshly honed and cleaned (don't forget the little hole to the reservoir; honing leaves abrasives) cylinder. Place the check valve and spring with metal shield into the cylinder. Make sure the shield is on the end of the spring facing out of the cylinder or the spring will cut through the rubber seal in no time flat. Now place the rubber cup in the cylinder, having lightly coated it with brake fluid. Make sure the "lip" goes into the cylinder first and that it doesn't get folded over. This rubber cup is the heart of the whole system and keeping it clean (even of oil from your skin) and undamaged can't be emphasized too much. Next goes a very thin brass washer and then the piston. After assembly and installation, loosen the brake line about 1-2 turns. Fill the cylinder with fluid. Pump slowly until fluid begins to come out around the brake line fitting rather profusely. Tighten the fitting. Remove and replace all rubber flex lines at this time.

Now pick a wheel cylinder, any cylinder. In the case of TD/TF front wheels, use the "second" cylinder (the one at the end of the line). Open the bleed screw and pump the pedal until you see clean fresh fluid coming out. What you have just done is to purge the line of old fluid. Place the rubber cap from the bleed screw on the line or just let the fluid drain out. Repeat all the rebuild instructions above for the cylinder. For convenience, do both cylinders on each TD/TF front wheel at the same time. Rebuild the other wheels in the same manner.

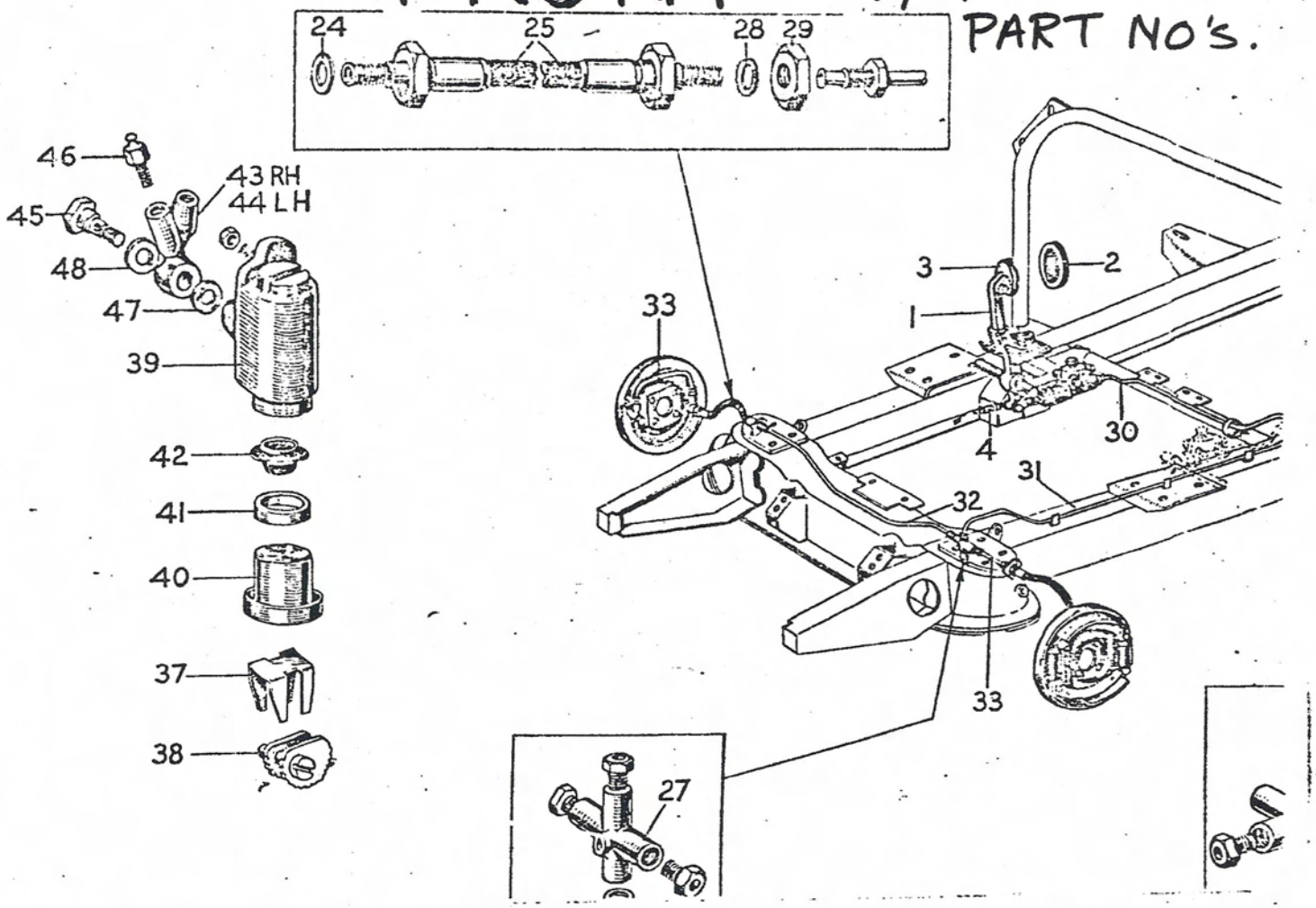
Bleed the brakes by the book, and you're ready to go. If you do all the work, the total cost should be well under $50. If you remove the parts and have your machinist do everything else, it should still not top $100. If your "T" and your posterior aren't worth that much to you, please don't follow me in a caravan.

ED. NOTE: TC Master Cylinder also fits TA.

PITTED AND RUSTED WHEEL AND MASTER CYLINDERS 1980

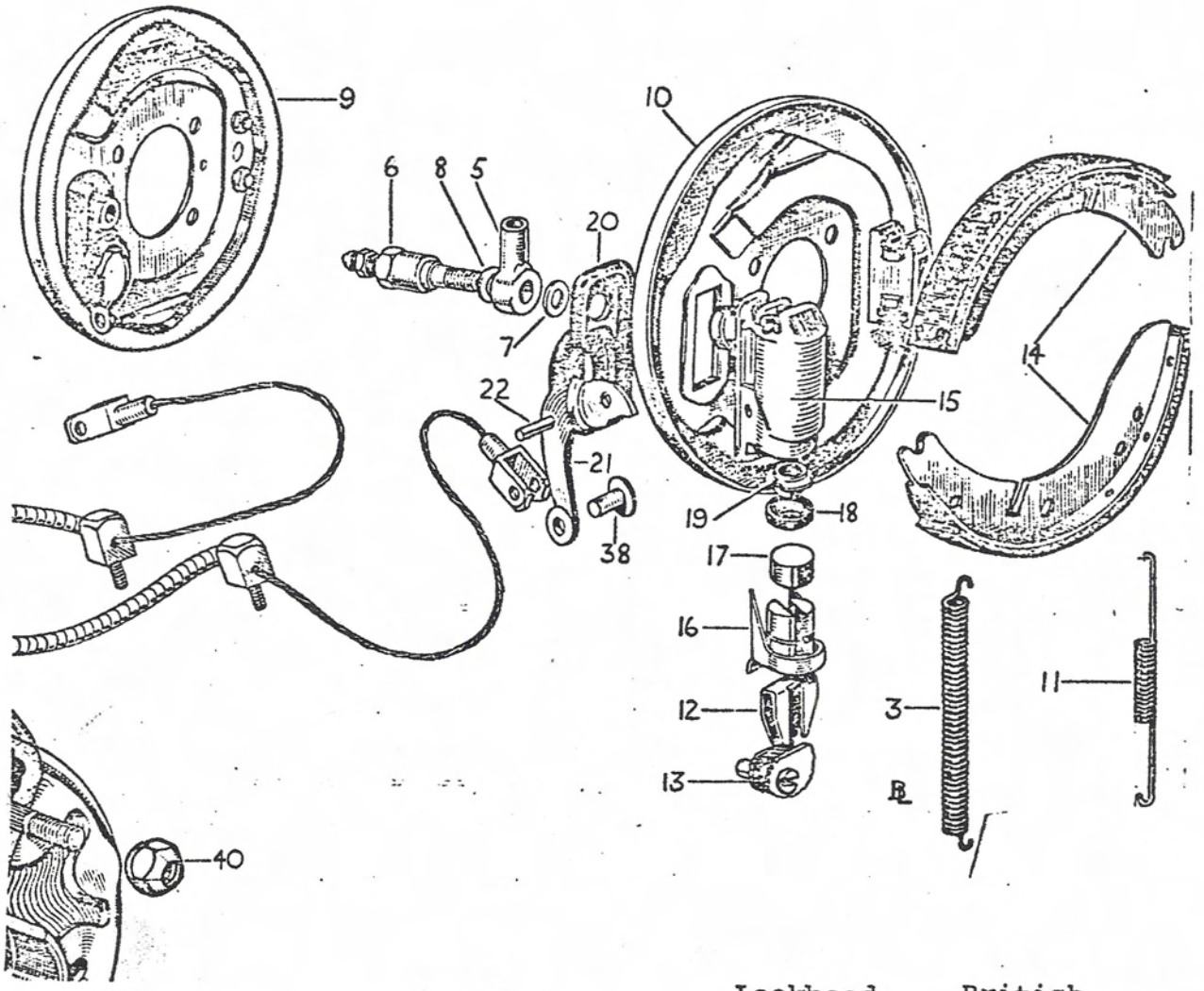
White Post Restorations of White Post, VA can now solve the problem of a badly pitted cylinder that is irreplaceable. They can bore and sleeve any wheel or master cylinder to the original size bore with a brass sleeve. This process will benefit you in several ways. You effectively have a brand new cylinder, the brass sleeving will cost you less than a new cylinder even if a replacement is available and the brass sleeve will not rust or pit. Current cost (Sept. 79) for this service is $ 18.00 for a wheel cylinder and $ 24.00 for a master cylinder. Their address is: White Post Restorations, White Post, Virginia 22663.

FRONT - TD/TF BRAKE PART NO's. 7-78



Ill. No.	Description	Lockheed Part No.	British Leyland	Reqd.
29	Locknut	?	2K8686	2
25	Brake hose		?	2
24	Copper washer small	KI44516	3H2287	2
	Banjo adaptor bolt	21999	27H7167	2
	Copper washer large	KI44518	3H550	2
	Banjo connection	22477	27H7189	2
	Copper washer small	KI44516	3H2287	2
45	Connection bolt	21992	7H7847	4
48	Copper washer large	KI44518	3H550	4
43	Banjo connection-right	23592	?	1
44	Banjo connection-left	23593	?	1
46	Bleeder screw	21995	27H7166	4
47	Copper washer small	KI44516	3H2287	4
39	Front wheel cylinder	30284	?	4
37	Mask-shoe adjuster	25253	7H7930	4
38	Adjuster-brake shoe	34137	7H7931	4

REAR - TD/TF
BRAKE PART NUMBERS



Ill. No.	Description	Lockheed Part No.	British Leyland	Reqd.
15	Rear wheel cylinder	33668	27H7394	2
7	Copper washer small	KL 44516	3H2287	2
5	Banjo connection	22477	27H7189	2
8	Copper washer large	KL 44518	3H550	2
6	Banjo adaptor bolt	21999	27H7167	2
	Blender screw	21995	27H7166	2
12	Mask-shoe adjuster	25253	7H7930	2
13	Adjuster-brake shoe	34137	7H7931	2
3	Spring-shoe pull off	21727	27H7159	2
11	Spring-shoe tension	25472	27H7278	2

CHAPTER 10 - SPRINGS AND SHOCK ABSORBERS

4-73

THE CARE AND FEEDING OF LEAF SPRINGS by Chip Old

Tired of your teeth rattling whenever you drive on anything other than a glass-smooth road? Believe it or not, you can do something about it. Our cars, especially the TC and earlier models, ride rather hard to start with because when they were designed stiff springs were thought to be necessary for good handling. This natural stiffness is only made worse when the original lubrication dries up and dirt works it's way in between the leaves of the springs. This causes extra friction between the leaves, and in really bad cases the spring takes on all the characteristics of a solid steel bar!

The manuals for the TC and earlier models reccommend that the front and rear springs be greased every now and then. To do this, you should first clean off the outside surface of the spring with a wire brush. Next, jack up the car under the chassis to take the weight off the spring. Then pry apart the clips that hold the leaves together, allowing the leaves to spread apart slightly. You can spread them even more by wedging a screwdriver between them. If you have access to compressed air, it's a good idea to blow the accumulated dirt out from between the leaves. Now you have to somehow work grease in between the leaves. Good luck! Try using a thin knife blade. Once that's done, let the car down off the jack, bend the clips back around the leaves, and you're ready to go. The improvement in the ride will be quite noticeable, especially if the springs have been neglected for a long time.

The only catch to this is that the grease will wash out from between the leaves when you ride in heavy rain, and dirt will again work it's way between the leaves, so you're right back where you started. The only solution to this problem is to cover the springs somehow. At one time, you could get rolls of a sort of extra-flexible adhesive tape to wrap around the springs. I haven't seen this for sale recently, but if you can find some the proper drill is to clean and lube the springs as described above, then wrap the tape around the springs. This keeps the grease in and dirt and water out. Don't try to use regular adhesive tape or electrician's tape; it isn't flexible enough. An even better solution is to install a set of the leather spring gaiters which are available from Octagon Sports Cars, Abingdon Spares and others. These gaiters are quite effective in keeping out dirt and water, and they usually have built-in grease fittings which make future lubrication considerably easier.

As you have probably guessed by now, the whole clean and lube procedure takes a lot of time, but it's the best way to do the job. If you want to try a shortcut, go to any motorcycle shop and buy a spray can of chain lubricant. This stuff is very thin and volatile, but when it evaporates it leaves behind a film if thich grease or a layer of a dry lubricant like graphite or molybdenum sulphide, depending on which brand you use. Spray the chain lube generously over the spring and let it penetrate between the leaves. Do not use the car for several hours so that the volatile carrier will have time to evaporate. The results are not quite as good as the normal method, but it is certainly a lot easier! I used the spray lube on my TC's springs for about 8000 miles with good results, but I found it necessary to re-lube about every thousand miles

Those of you with TDs and TFs have it a lot easier. To start with, you only have two leaf springs to worry about, and they have rubber spacers between the leaves, so that the leaves never really rub together. These springs should never be lubricated with a petroleum based lubricant, since this will eventually destroy the rubber. If you must lubricate them, use one of the silicone or soap based lubes designed for this purpose. Otherwise, just clean the springs and cover with tape or leather gaiters. The coil springs used at the front naturally require no lubrication.

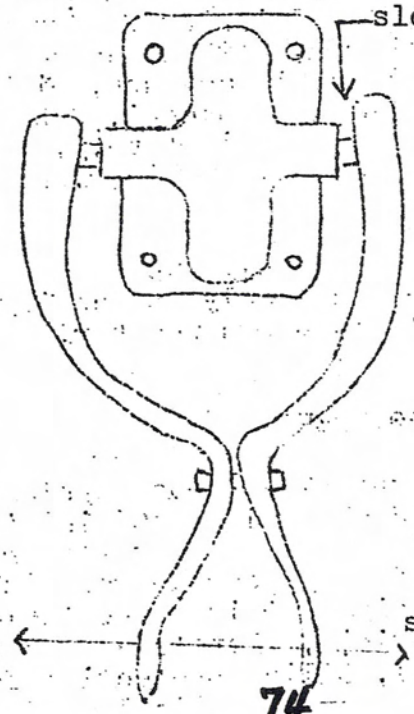
Needless to say, you should examine the springs for wear when you clean and lubricate them. A neglected spring will wear at the points where the end of one leaf rubs against the longer leaf next to it. The result is a groove or thin spot which weakens the leaf. When this wear is excessive, say more than .020", the leaf is likely to break, as I found out the hard way. This can be dangerous, and the only way to avoid it is to clean, inspect and lubricate the springs on a regular basis.

LOOSE FRONT END MAY BE SHOCKS 3-75 By Dick Embick

Last month my MG YA flunked State Inspection due to play in the right front wheel.

I have replaced many front end parts on a TD and since the Y is basically the same suspension; I proceeded to replace the upper and lower King pin bushings (mine were somewhat loose, but really not bad). Upon further investigation after dismanteling, I found the arms on the shock absorber happened to be where the real "slop" was.

I will not go into detail concerning rebushing shock arms, but merely wish to point out that this could be your problem someday instead of bad wheel bearings or King pin bushings.



CHAPTER 11 - COOLING SYSTEM

1-77

TD OVERHEATING

By Mike Hughes

Having just rebuilt my engine (which had succumbed to a combination of underoiling, overheating, and back-asswards assembly), I am determined that it will not be necessary to do it again. The oil pump is functioning perfectly. Great pains were taken to assemble the engine properly with new components wherever possible. However, once all this is done, it has to be driven before one knows how cool it will run - or how hot.

My engine ran hot. Let me describe the conditions under which it gets hot and then I will describe various cures. All of these cures have been applied to my engine with good results. Please pardon if I editorialize but I must point out that some of my "Fix-its" involve the replacement of stock, original items with non-originals.

When I start my engine it is cold. It warms up fairly slowly - more rapidly if driven right away. Once warmed up the following overheating situations occur:

(1) Idling - At a stop light, the engine overheated and the idle would rise and fall, rise and fall, between 500 and 900 RPM at about 10 cycles per minute. To drive away from the light, it is necessary to choke it fully to accelerate smoothly and I had to keep it choked until the temperature lowered.

(2) It ran cool up to 3700 RPM night or day. After that speed, it would heat up and could not be cooled down except by reducing to about 3000 RPM for a period of time and choking the carbs. At 4500 RPM it took only 7 minutes to overheat. (I've never ran it past that point which is my self-imposed red line). Even so, if I get off the highway and have to stop or even slow down significantly on the exit ramp, the temperature gauge shoots up immediately.

(3) Climbing hills was next to impossible as when it overheats, the power came down which required a downshift which raised the revs which causes more overheating which .... you get the picture.

All these overheating situations are preceded by the engine operating at normal temperature for extended periods of time, although the engine can be compelled to overheat simply by starting it up cold and idling it for about 15 minutes.

From the above descriptions you can guess what some of the problems might be: ignition, timing, and carburetors. New plugs, points and wires will help a bit here. Use Champion L-10 for slow driving or L-7 which is a colder plug for high-speed driving

on earlier cars and the corresponding plugs for later heads. Earlier heads have teardrop water jackets and later cars have round water jackets. Using a dwell tach, set the points at 60° (degrees) at 700 RPM. Copper core or steel core wires come in handy as they conduct better and are compatible with original style distributor caps. Set the timing by the book using the static method. Important: if the timing is not right, none of the following (except Fix-it #1 will have much effect on engine cooling. In fact, I set the timing, did all of these things to my car and subsequently determined that the main problem can be fixed as follows:

Fix-it #1 - Make sure that the distributor is clamped tight! These old cars allow for a certain looseness in the hole in the block through which the distributor drive goes and it is possible that even when the distributor is clamped tight so that it won't rotate, you may still be able to rock it back and forth in its hole. You will notice that the engine runs faster when the distributor is rocked towards the engine and slower when rocked away. Place a washer between the clamp and the pinch bolt. What this will do is hold the clamp snug against the block so that it is not free to move along the shank of the pinch bolt between its head and the block. Now the timing will not be affected by involuntary movement of the distributor.

Make sure your carburettors are adjusted properly for mixture and are synchronized. A Unisyn is a must for this operation. A too lean mixture will burn much hotter than a richer mixture and will cause hot spots which will cause uneven cooling and increase ring and cylinder wall wear. A too rich mixture won't burn completely and will leave unburned gas on the cylinder walls which will mix with the oil and affect lubrication. Make sure the needles move freely in the jets and that the jets are not worn. Also check for slop in the butterfly shaft. Rebuild the carbs as necessary. The above two items are derigueur for trouble-free operation of any engine but are essential to the cool running of an XPAG which stands for eXtra Persnickety About its Gasoline - every G-damned adjustment!

Fix-it #2 - For those of you who are beset by overheating and find that twenty dollars for a new thermostat is against your religion, I have a solution.

Go to your local parts store or Sears Auto Centre, etc. and pick up a regular thermostat in your favorite head range (Sears Part # 28-78539). (I prefer 160° in the summer and 180° in the winter for all my cars but since my TD is not driven much in the winter, I just keep the 160° in year round.) Also procure a four-inch piece of new scrap tail pipe 1 3/4" diameter from your local Midas Muffler Shop. I stress new pipe because you don't want little bits of rust, carbon, and oil to foul up your nice clean coolant, now, do you?

Drain and flush your cooling system; then loosen the top hose and by-pass hose. Remove your thermostat housing from the engine, pry loose the brass bracket (3) from the bottom and with a hack saw cut loose the brass bellows from the bracket at the inside of the bracket. Save the bracket. With a pair of vise grips, grab the dashed valve at the top of the thermostat and bend it back and forth on its stem until the stem fatigues and breaks. Withdraw all the hardware from the interior of the thermostat housing.

With a grinding wheel, grind down the edges of the thermostat so that it will fit inside the housing from the bottom. Do not grind it only enough to fit into the recessed groove at the very bottom of the housing from which you extracted the brass bracket because when the engine is cold and the thermostat is closed, the coolant will not be allowed to recirculate within the engine through the by-pass hose but will rather build up pressure behind the closed thermostat until such time as the gasket at the back of the head blows (or even the head gasket itself), or the water pump seals cease to seal, or a freeze plug pops out, etc., etc. Break with a drift and a light hammer the cast bracket inside the housing and fit the thermostat up against the remaining stubs. Now you should be able to see the orifice for the by-pass. Grind down the piece of tailpipe so that when the brass bracket is returned to its recessed groove, it fits snugly up against the thermostat and wedges it up against the stubs of the housing. Also grind a notch about one inch wide and 1/4 inch deep at the thermostat end of the tailpipe through which the coolant may flow to the by-pass when the thermostat is closed.

Assemble the components in the order pictured, as described above. Replace the housing on the engine, refit the hoses, top up the coolant, and enjoy your nice cool "T". Total cost? About $2.50 for the thermostat and maybe fifty cents for the tail pipe section (if the man doesn't look at you funny and give it to you free!) and about an hour's time on a Tuesday afternoon.

Fix-it #3 - This particular fix-it is so obvious that a great many concours fanatics will not use it. Go down to Manhattan Auto and procure one #12H4244 fan which costs about $14.00. Remove the four 1/8 W bolts and the hardware they secure carefully from the front of the water pump and fit this item. Close the bonnet and allow no one to peek at your lovely red engine as this item is a cute little bright yellow 7-blade plastic fan, guaranteed not to rust, bust, collect dust or run down the street without you in the seat! A gread deal of air is sucked through the radiator at idle by this fan, than by the stock unit which relieves the stoplight problem and the exit ramp problem because air continues to be sucked through the radiator at a high rate of speed even after the velocity of the car ceases to push air

through the front. If you want to improve the air flow situation even more, try bending the grille slats in just a tad to provide less resistance.

Fix-it #4 is also so obvious a thing to do and a great many more concours fanatics employ the method than the rest of us, I'm afraid. Keep that engine clean! You don't work hard under a thick blanket under the hot sun in the summer and you shouldn't ask your engine to, either. Heat does radiate off the block and my hurricane fan does blow it away so don't keep it trapped under a blanket of horrid, greasy yeach.

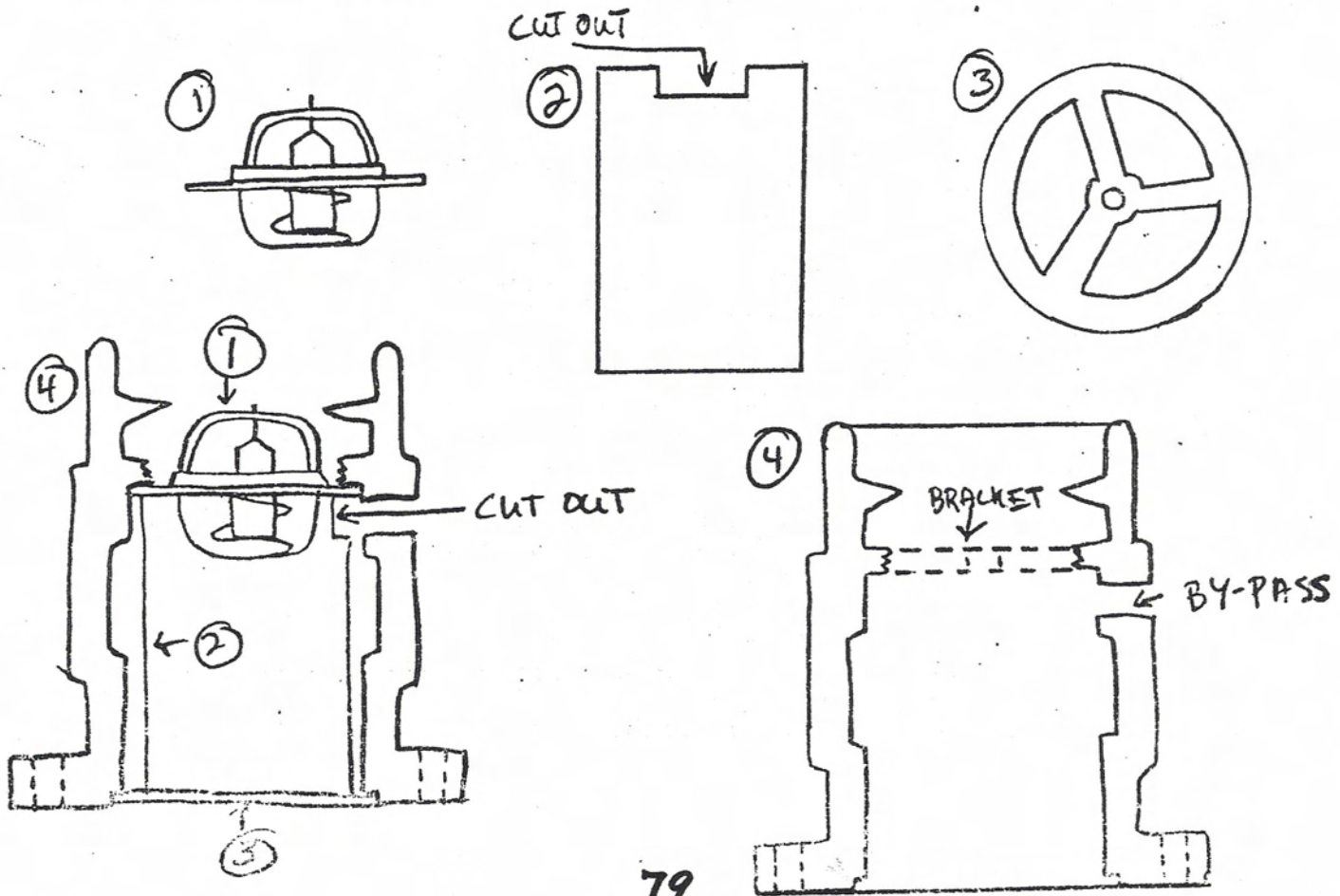
Fix-it#5 is something that I did to prove a theory to a friend and it worked so well that I retained it for everyday use. You recall that in the section on thermostats I mentioned that, when the thermostat is closed, water ciculates via a by-pass hose back into the block without going through the radiator. What this does is allow the coolant to heat up inside the engine until it reaches sufficient temperature to affect the thermostat without building up pressure within the block. Once this is done, and the thermostat is open, the coolant then circulates through the radiator, releasing its excess heat there. But there is a catch. Water still circulates through the by-pass hose, re-entering the engine uncooled. That skirted ring in the original thermostat hardware shut-off flows through the by-pass automatically when the thermostat opened but the modern day components such as I use are not designed to do so. So why not put a valve in the by-pass hose so that you can shut-off the water flow through it when the engine reaches operating temperature? There are two ways to handle this. Cut your existing hose in half and insert the valve or be super fancy-shamancy and run six feet of heater hose back along the frame from the thermostat housing, through the firewall to a valve behind the dash and then back out through the firewall along the top of the head and into the bottom pipe. This saves having to do a Chinese firedrill every time you want to open or close the valve. This measure is only really necessary if your engine is super finicky, like my Morris (Garages).

Fix-it #6 is a cold water ALL bottle which fits quite nicely between the fender and the tabular firewall support bracket over on the right hand side of the engine compartment. Run about two feet of rubber hose from the end of the copper overflow pipe to the bottle and make sure that the end of the hose reaches the bottom of the bottle. Fill the bottle all the way full and start the engine. Top up the coolant in the radiator and force water through the overflow pipe which you may have to <u>gently</u> pull up to the very top of the radiator opening so that the water level is right up at the top before any flows out through the overflow. Replace the cap and make sure that it is getting an air tight seal against the rubber grommet. Start the engine, let it idle until it is hot and shut it off. If you listen carefully, you will hear air bubbling out the coolant recovery bottle. Then you will notice that after the water is finished flowing out the top of the bottle that the water level will actually start to decrease.

Basically what this does is to catch the coolant as it expands and exits the overflow and stores it in such a way that, when the engine is shut off and the coolant within the system contracts, it will be sucked back into the system. This serves a two-fold purpose: it saves boiling away expensive antifreeze solution and it keeps all air out of the cooling system because no air is being sucked in to replace that volume of coolant displaced when the coolant expanded. Thus the boiling point of the coolant is raised since there are no air bubbles diluting the density of the solution. And since there are no air bubbles the danger of corrosion is lessened because there is no excess of oxygen in the system to take part in the oxidation process.

Fix-it #7 - Oil is a coolant, too. And it is the only coolant that has access to some vital moving parts of your engine: the crank and bearings. An oil cooler which will fit XPAG engines is marketed by Moss and is highly recommended as it will extend the life of your bearings and your oil, add to your oil capacity, and lower the temperature of your block and crank by a few precious degrees. While I haven't as yet installed one, it is on order and I'll let you know how it works later.

Enjoy your nice cool 'T' (the cockpit might be cooler now, too, since there is less engine room heat to radiate through the firewall). Oh, incidentally, you don't <u>have</u> to use a cold water ALL bottle for your coolant recovery system - any bottle that is a similar size and configuration will do - but in case you haven't figured this out by now, every little bit helps.



FROM THE CHAIRMAN BRON PROKUSKI

Hope everyone read Mike Hughes' article on TD overheating in the last issue. If you've had similar problems - take some action now so that the car and you are ready for the summers events. On the thermostat subject, an additional alternative is to install a Stant S-330(160) or S-330H(180) in the top ridge of the thermostat housing. Drill and tap the inside upper ridge of the housing for three small brass screws with corresponding holes in the lip of the thermostat. I've done this on the TD and TC and thermostat changing becomes a 15 minute job. All that is needed is draining of about two quarts of water, removal of the top radiator hose - which is flexible enough, and removal of the screws.

THERMOSTATS REVISITED 5-77

There seems to be at least 50 different ways to do this job. In response to Mike Hughes' article, I received a note from Tony Roth. Tony uses the same method Bron described in the above article. My method is to use a pellet or flap (not bellows) type thermostat. I just set it on top of the housing (no trimming needed) and run two loops of wire from the bottom of the thermostat to the three bladed piece in the bottom of the housing. Let's hear your method!

Draining and Refilling Anti-freeze 1-79

Many of you I'm sure wonder why it is necessary to drain and refill "good" anti-freeze, so I'll say just a few words about it.

First, we know that all good modern anti-freezes have a variety of additives or inhibitors; the principal one for rust prevention essentially "coats " the cast iron engine block, but there is usually another to "coat" the copper in the radiator. Without this one the copper can react with the rust inhibitor and form cuprous-ic salts which can then act as a catalyst and accelerate rust!

To complicate matters even more, iron oxide or rust is the primary ingredient in silt. Because the engine and cooling system are of dissimilar metals, the silt can essentially be "electro plated" in the raditor core in the presence of an electrical potential between the engine and radiator (which is clearly possible). (Rolls Royce insulates the dynamo) You can see, this is a problem that compounds itself,----

Now, these inhibitors do wear out! High velocities at points in the cooling system continously erode the protective coatings, which must be replaced, and on and on. Suffice it to say that with the cost of anti-freeze being as modest as it is and 'T' engines as valuable as they are, its just a good idea to drain, flush, and refill at least every two years.

CHAPTER 12 - BODY AND BODY PARTS

FACING UP TO BODY ROT

3-78

(OR, IF I CAN DO IT SO CAN ANY OTHER DUMMY)

Soorner or later you must take an honest look at the body tub or the old "T" & admit it is probably 20% fibergalass & Bondo. What hurts is the fact that this 20% is at the bottom or "foundation" of the body. That wood did more than just provide something to bend the metal over 20 years ago. It literally, holds it up.

Most of us try to just replace the worst wood & fiberglass the rusted sills or live with the door latches that don't have any wood to bolt into any longer. To do so is only to prolong the agony.

I feel most members make two mistakes here. First, they convince themselves the task is impossible & quit. Or, they tear the body tub apart to the last nut & bolt & prove to themselves it's impossible.

Those little old elves in Abingdon were not the magicians we'd like to think they were, who magically took a couple sheets of tin, a tree, a knife, & skill & turned it into a car. They had fitting jigs. I propose you do it very slowly & one step at a time, on the car. Everyone I've ever discussed body rebuilds with who had taken the tub off the frame had all kinds of trouble when it came to fitting doors, fenders, & hood. No wonder. If you don't have jigs you need existing members to fit to. For example let's say you fit the door posts & sill all at once to the bare frame. Even the best wood will give you 10-20° of movement front to rear at the top of the posts. How do you insure having the sill in the exact position on the sub frame relative to the firewall, etc?

Once you conceed the main wood sill & door post bottoms are rotten, you'll also have to admit the front body panel, or rocker panel, is almost certainly too rusted & patched to not warrant replacement ($30+ from Fenton Bagley.) The rear body panels will also be rusted but replacement is expensive, difficult, and usually unnecessary.

The following applies specifically to the TD. The TF is much the same. The TC more difficult because there is no metal post reinforcing to position the wooden hinge post by.

Remove floorboards, upholstery, etc. from that side of car. Cut the panel below the door horizontally about half way up to the bottom of the door opening, or just above the main wooden sill member (sketch #1). If the rear panel is solid metal don't touch it. If it is filler or fiberglass break this away along the same line. Remove the rotted sill and bottom of the posts.

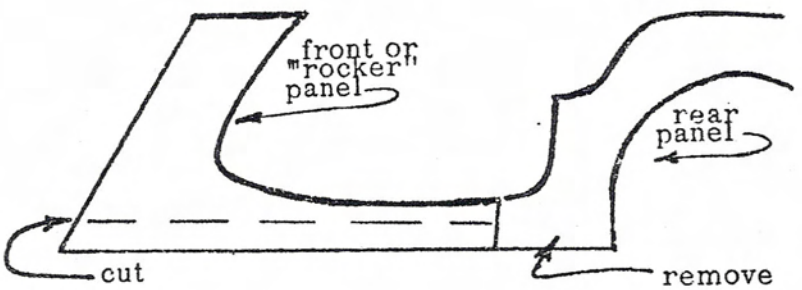
Remove the door by removing hinge screws & bolts from the post. Using a small chisel or screwdriver & sharp blows with a hammer, cut off the heads of the panel nails up the post & as far as the upper curve of the rear panel. Carefully bend the edge out away from the wood. Working up & down the edge of the panel, pry it out far enough to remove the old wooden post. Note position of wood screws. The panel may split at the corner of the door opening. This is covered later. If there is any filler or "Bondo" in the area of the lower post it must be removed. Using a hammer & a toe dolly (this is a body shop tool) or a piece of thick steel about 2" square as a backer, flatten out the areas where the hinge bolts & door stop have dented the metal. Carefully reshape the hinge pockets in the panel. Use a wood rasp to put about a 1/8" radius on the corners of your new wood post. Insert the post & position it using the hinge cut outs for a guide. Use 4 to 6 clamps (with pieces of wood to prevent denting panel) to hold the post tightly in position. Make sure it is turned as far "into" the car as possible. Allowing the inner corner of the post to be toward the front of the car will move your door forward and out (sketch 2). Trial fit the sill to the post. The top of the sill should be level with the angle iron subframe. Trim the sill joint as needed. Mark the counter-sunk holes in the frame on the sill. Remove the sill and drill these for #8 screws. Clamping the sill to the angle frame and the wooden post, drill 4 holes thru the post and into the sill only big enough for the threaded portion of a #10 wood screw to grasp securely. Now enlarge these thru the post only, enough to be firmly snug

on the smooth part of the screw and countersink the holes. Use # 10 x 1½" or #10 x 1¼" screws. An old carpenter's trick at this point is to wet the threads & rub them on a bar of soap to lubricate the threads & ease installation. Drill for and install #8 screws in door post for reinforcement panel. Drill four ½" holes thru the sill & the angle iron or try to hit the previously drilled holes for the thru bolts. Make sure you are not where a running board bolt will go. Countersink these with a ½" or larger drill enough that the heads of carriage bolts can be drawn down flush or below the level of the sill face. Draw down the carriage bolts firmly. Install the #8 screws in the angle frame with a stubby or offset screwdriver. Using the old post as a guide for the angle, etc. drill hinge bolt holes. Making sure the metal is all tightly in place, bend the inner edge of the panel back in place & nail it.

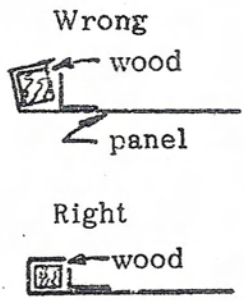
Install the door. Check for clearance. At the front it should be about 1/8", at the bottom ¼". Using a low flame & working rapidly to minimize burning the wood, braze the tear at the corner of the door opening.

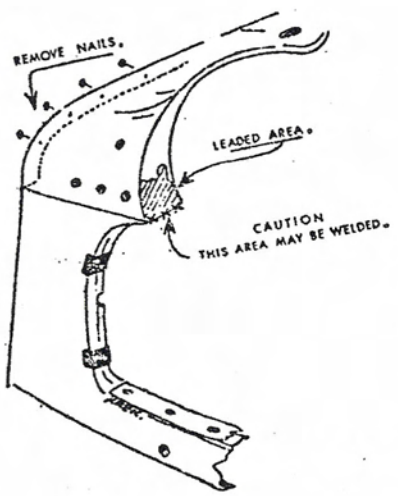
Next time we'll take on the front post & firewall wood.

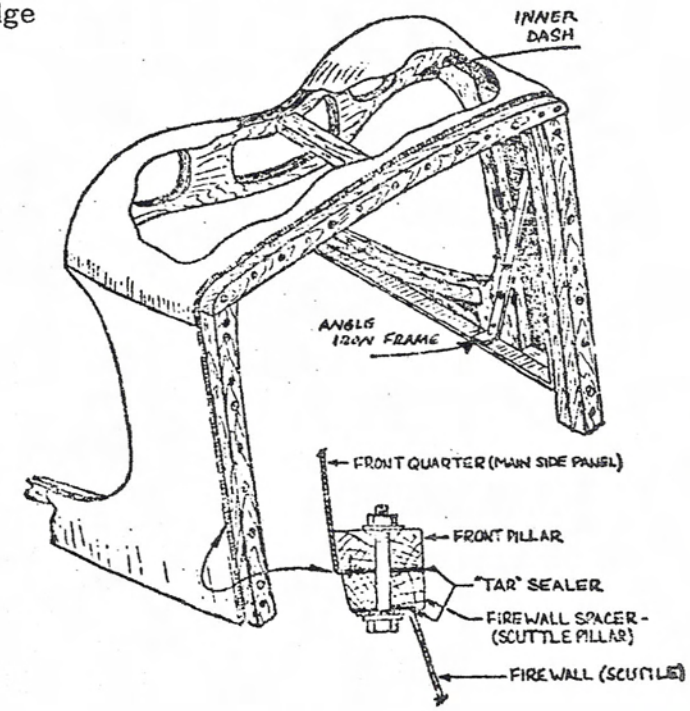
SKETCH 1



SKETCH 2





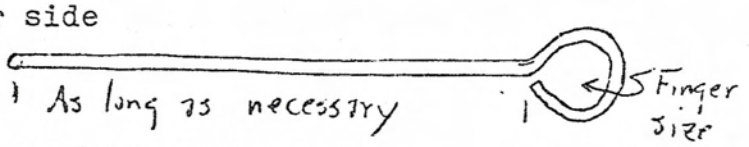


A Solution for Drafty Side Curtains

1-79

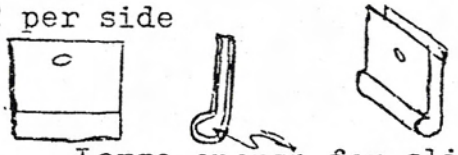
I recently read a piece from the Dutch MG T Club newsletter on the above subject. Without repeating all the dimensions, what the author suggested was making a slider bar out of a brass rod (brazing rod) in the general shape of a long skinny eye bolt, and two guides about ¾" wide out of thin brass stock. Bolt the guides to thetop of the side curtain and move the slide forward to engage the "lip" of the windscreen when the door is shut.

Slide - 1 per side



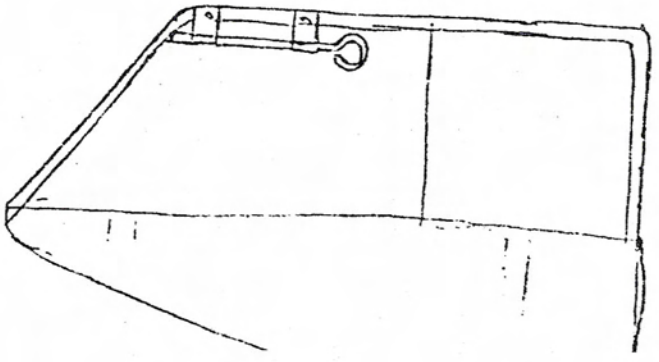
as long as necessary

Guides - 2 per side



Large enough for slide

Installed



WINDSCREEN SEAL REJUVENATION

By Len Renkenberger 11-76

If your T series glass is in good shape and the chrome and such is good but that cork-rubber gasket between the glass and frame is shot here is a fast remedy.

When that 20 plus year old cork starts to disintegrate you run the risk of the glass rattling on the frame and cracking. There is also the rain problem. If you try to remove those little countersunk phillipshead screws at the corners of the screen in order todisassemble and renew it you will problably smash the glass in sheer frustration.

Instead pick up a tube of GE or DOW silicone seal (black or clear) at the hardware store. Run a small rat-tail file (handle-end) or other sharp object between the screen and frame removing as much of the old gasket as possible. Follow with a bead of Silicone Seal, working slowly to force as much as possible deep into the void between glass and frame. Wipe any excess as you go. Be thorough, as the sealant is hard to remove when dry. Even if your gasket is in fine shape a thin layer of Silicone Seal will add to its life.

SAFETY CATCH FOR TD-TF DOORS 12-75 By Nalph Rader

Do you ever get a bit nervous about those 'T' series doors opening at the front as you watch them flexing in and out on turns? Do you have visions of what would result if it did pop open? Unfortunately there are many 'T's around with weak door posts, worn latches, etc. on which the odds of a disaster are pretty good. If you have any doubts about your doors here is an inexpensive and quickly installed safety catch.

Get a hood hold down kit at your local hot-rod store or most any accessory store. This consists of a set of pins which bolt on the body of the car and go thru the hood. Then a large spring clip is placed thru a hole in the pin to prevent the hood from coming up. Actually, all this is to tell you what youre looking for, the parts described so far are thrown away. What you really need are the cables which hold the spring clips to the car. These are just wire in some kits, but in most are 1/8" cable covered with clear vinyl and are about 15" long. You want the vinyl coated type. Note that there is a small loop on each end of the cable with a neat little compressed tubular clamp. Cut off one loop. Take the cut end and run it through the loop on the opposite end. This will form a "lasso" on the end which can be slipped over the lever on the inside door handle and adjusted to form a loop just large enough to slip on and off. Take the other end and loop it over the "roll-bar" cowl brace behind the dash. Using the U-bolt type cable clamps available at your hardware store you can secure the cable at any length desired. I keep mine as short as possible so that, in the event the door did open, the wind can't get a good bite on the door.

Incidentally, the cable is available in the hardware store for less than buying the hood hold-down kit. The problem is that those neat little tubing type clamps are not. I have been looking for them for nearly a year. If you find them let us all know.

CHAPTER 13 - INSTRUMENTS

TD SPEEDOMETER/TACHOMETER SERVICING By Len Renkenberger 12-75

Note that this does not say repair. Perhaps it should since what I have outlined below will solve 90% of all 'T' series instrument problems. But, since I am in no way an expert on adjustment or repair and all you will be doing is cleaning and oiling let's call it maintenance. Given below is the procedure for the speedo. The tach is easier. If you can do this, you can do the tach.

First, make sure your cable is turning freely and neither end is rounded off and slipping. If the cable is free and your problem involves a needle that oscillates badly (or used to) then you probably just need a little cleaning.

You will need a jewelers screwdriver, a small pair of needle nose pliers, some alcohol and thin no-lint type rag. Also, make very careful notes of how you remove things.

If you are lucky enough to have a trip meter setting extension, remove it. Remove the chrome rim and glass by turning in either direction. Remove the tiny screws on each side of the needle which hold the face in place. Remove the two large screws on each side of the needle which hold the face in place. Remove the two large screws on the rear which hold the mechanism in the case. Tip the bottom of the face forward as far as possible, being careful not to bend or loosen the needle (turning the needle to about 30 mph helps). You should now be able to remove the mechanism from the case.

Remount the face. Looking at the left side of the unit, you will see a bright disc, parallel to the face, which moves when you move the needle. It should have a notch in it for an index mark, but in the event it doesn't, make your own index mark. With the needle on the 0 mph peg, reference your index mark on the casting which makes up the rear part of the mechanism. This is very important because without this reference your speedo will require recalibration by an expert or else you will have to do it by trial and error which involves removing and disassembling for each trial. Using pieces of cloth to prevent scratches, slip the points of the pliers around the needle and GENTLY lever it off. Remove the face. Remove the springs holding the catch levers for the tripmeter and odometer. These levers are at the top right and lower left of the instrument. You will note that the meter dials are mounted in a plate braket which is held to the cast yoke rear portion by 4 small screws (1 is a very small one under the tripmeter catch lever). You can now seperate the two "halves" of the instrument. You will note that there is a slender needle pointed shaft projecting from the rear of the disc which you indexed. Clean this thoroughly with alcohol as well as the recess in the odometer drive gear from which you removed it. Now remove the brass drive gear from the yoke casting. Clean both and apply a very small amount of a very light oil. Apply a minute quantity of oil on the needle shaft.

Reassembly is the reverse of the above.

The above was written from memory and I think it is complete. In the event you have trouble or get confused just go slow and make notes of how parts were removed, its really quite easy.

TACHOMETER DRIVE RATIO 4-73 by Chip Old

Someone at the March 18 Banquet asked me if I knew what the gear ratio is in the tachometer drive on the back of the dynamo. Unfortunately, I didn't remember at the time. Also unfortunately, in the hustle and bustle of the banquet I forgot who wanted to know, so I hope he's reading this.

According to one of the manuals I have, the tach drive ratio for all T-Series models is 2.25 to 1, and this ratio is also stamped on the drive in my TC. This type of tach drive is used on several different British cars, but the ratios may not all be the same, so be careful if you swap from one car to another. If you use the wrong ratio, your tachometer will naturally be highly inaccurate.

USEFUL PART INTERCHANGE BY THE ANONYMOUS PARTS BIN SEARCHER

TD speedometer cable. Use a Borg-Warner 2517/2005 that can be found at any good auto parts store. 5-75

A good source locally for the repair and servicing of speedometers and tachometers is Emrico's, 6606 Glassl Court, Alexandria, Virginia. Phone: 765-4703. They specialize in foreign speedometers and tachometer makes including the English Smiths and Jaeger.

PAINT REPAIR

By The Old Master Painter

There is an excellent tool available for repair of an area too large for a touch-up brush and too small to paint with a regular spray gun. It's called PreVal Auto Sprayer. It consists of a high pressure aerosol can about 1½"x4" with a small glass jar on the base. One PreVal will spray 16 oz. of paint. The actual spray is at low enough pressure and volume so that areas as small as 2" square can be done as well as larger areas such as a wheel or at most a splash pan.

If you are lucky enough to have lacquer paint you can make a perfect repair providing you have some of the original paint. With enamel you will have a trace of blending on the edges.

After the damaged area has been repaired with epoxy or putty, prime the area and as little of the adjacent area as possible. Sand repair and about 1" to 2" beyond edges with 600 wet sandpaper and plenty of water, sanding lighter as you go further from repair. Wash area with a cleaner such as "Kleen-Easy" to remove silicone wax and grease. With lacquer you must not have any bare metal areas so these spots must be primed and sanded again. Spray a light coat followed by two medium coats with enamel. With lacquer apply one light coat followed by 3 or more medium coats. In both cases work out a little more from the center with each coat.

If you used lacquer, it can be rubbed out with rubbing compound followed by polishing compound after 3-4 hours. This is also true for lacquer repairs on enamel paint. Acrylic enamel repairs should set for several days.

The PreVal is available from Mattos Inc. (DC, Va, & MD) for about $2.50. Aerosol refills are about $1.75.

POSITIVE RUST PREVENTION

MG's and rust have become synonymous to those of us who live in the East. So, when we restore our cars, we go to great expense to paint frames and interior sides of panels with "rust-proof" paints. Most of these are little more than over-priced standard enamels. What's more, gasoline and oil will remove them until they have aged for many months.

There is a better way. Devcon Z is the name, and what it does is almost too good to be true. Devcon Z is 95% pure zinc (the stuff bolts, pipes, etc. are galvanized with to prevent corrosion) and 5% epoxy binder. Most paints, even red lead, prevent rust by reducing moisture penetration. However, when scratched or chipped, corrosion quickly begins and keeps expanding. The zinc coating, on the other hand, forms galvanic cells which slowly form zinc oxides over the scratch to prevent further rust. Devcon Z costs about $12 a quart. It is also very difficult to mix, so have the dealer shake it on his machine.

To get the aesthetic surface you desire, topcoat with acrylic or epoxy enamel. Epoxy is highly toxic. Do not breath fumes, even for a second or two. There is no anti-toxin. You're either careful or you're dead.

A BEITER BODY FILLER

3-78

In some correspondence with Rolls-Royce regarding my aluminum bodied Bentley, I was somewhat surprised to be informed that R-R is now using epoxy body filler for repair to the standard steel bodied cars. I know the ultra-purists are horrified at the thought of using epoxy, but this ahould be enough of an endorsement. If epoxy is good enough for R-R, it should be good enough for you. It's alot cheaper than lead and alot easier to use.

The Clausen Co. makers of leather restoration products of some renown, introduced a body filler last year which is high in resins and has a good consistency at any temperature. This means it will resist sagging on vertical surfaces and will not shrink as do cheap fillers which use little resin and alot of talc. It also bonds very well to aluminum. It is now available locally in gallons only at about $11.50 from Mattos, Inc.

Do It Yourself Paint and Body Work

1-79

It seems to me that more people are intimidated by paint and body work than mechanical work, yet the former is much more forgiving. That is to say that mistakes are easily rectified without nearly as dire consequences.

Now I'm not going to tell you body repair and painting is easy, but with normal manual dexterity, its more patience and perserverence than anything else. Petersen Publications have a couple of very informative books on the subject-"Basic Bodywork and Painting" ($2.95) and "Auto Restoration Tips and Techniques" ($4.95)- reasonable enough just to find out if you want to attempt it on your own. Most paint manufactures have "Repaint Manuals" available for a very nominal fee. Ditzlers is excellent with color photos of common problems, causes and corrections.

Getting down to the basic economics of it, you can almost pay for a modest but reasonably complete set of tools and equipment with the savings from just a single paint job.

Compressor	$150-200 - up
Spray Gun	30-up
Sandblaster	30-up
Basic Body Tools	50-up
SolidOx Torch	30-40

Compare that to $1000 or even $500 for body work and a paint job.

Before you pull out the ball peen and sledge though, go to the public library where you can check out a book and read! Improper beating on the metal only does more damage, and steadily applied force where possible is best, (prying clamping etc.).

FRAME FINISHING

1-75

Len Renkenberger recently found an expoxy paint which sticks "like you can't believe". It's called NU-TILE Epoxy by Illinois Bronze Powder & Paint Co., Lake Zurich, Ill., 60047. It is made primarily for appliances. He could find it only in Avocado & Golden Harvest but it comes in many colors including black.

He used it on a frame because he noted the popular brand rust-proofing paint he had used on TD 28910's frame scratched easily and could be washed off by gas or brake fluid several weeks after application. Apply two medium light coats and follow with Rustoleum later for insurance and to get the color of your choice.

The Dipper & Welding vs. Sandblasting Rust & Fiberglass Repair by Renk

JAN 1980

My personal feeling on restorations is one of balancing cost and labor against purity. I feel that the best way to obtain a structurally sound body at reasonable cost is to sandblast and repair with fiberglass and epoxy.

Welding in repair panels has two disadvantages. First, a set of torches and tanks costs about $300 or more. Also, unless you are highly skilled, the heat will warp flat panels and these are usually the ones needing repair.

What has given fiberglass repair an undeserved bad reputation is improper surface preparation. Most amateur restorers make a feeble pass or two with a wire wheel or sanding disc and then slap on the glass. The glass soon cracks and peels away.

Sandblasting gives a totally rust free and slightly roughened surface for fiberglass, epoxy, paint and even lead to bond to. This is most important in the "unseen" areas like fender wells and such. A comparison of surface condition can best be illustrated by wetting a sandblasted surface and a chemically stripped one.

The stripped metal can be left exposed to rain sometimes for days before it rusts. Blasted metal, however, will begin to turn brownish in minutes thus indicating totally clean metal.

What about cost? Dipping a body tub now runs $200+. For that you can buy a good pressure fed sandblaster like a Truman 50 or such and still have it to use for other jobs in the future. Disadvantages are the clean-up after and the time. However, most of you will spend as much time getting a tub to the stripper and then wait two weeks to get it back. Stripping also removes rust in places where you can't paint and where the surface rust is acting as a barrier to new rust. Stripping also ruins wood regardless of what strippers claim.

There is one major disadvantage with sandblasting - it will warp larger flat surfaces unless done very carefully. I usually handle these areas in the following manner. For trunk lids and doors I only blast around the edges. These are usally the only rusty areas. Never blast a hood. The remainder can be stripped with paint remover. For rust removal on areas like the flat part of an MGA fender for example, cut the air pressure down to about 10 P.S.I. and use lots of sand. Check constantly for signs of warping. Conversely, fenders, hoods and such can easily be transported to the dipper and stripped for about $20 each.

ANOTHER EPOXY PAINT FOR FRAME FINISHING

1980

Another epoxy paint suitable for frames and similar applications is Ferrothane by Flecto. It is carried locally by Hechinger's. It contains a rust-resistant ingrediant and comes in a variety of bright colors. No primer is required and it comes in spray cans as well as in cans up to quart size. WARNING: EPOXY FUMES CAN KILL

Catalyst Hazard

1979

At a safety conference held in Vancouver, B.C., an eye specialist described a hazard that could affect each of you and your families. That hazard is the catalyst or hardener that is added to fiberglass resin before the resin is applied. The eye specialist stated that a drop of this catalyst in the eye will progressively destroy the tissue of the eye and result in blindness, unless immediate action is taken (within 4 seconds) to wash the catalyst from the eye. Furthermore, once the chemical has started to destroy the eye, there is known way to stop the destruction or of repairing the damage.

The specific toxic agent involved is MEKP (Methyl ethyl ketone peroxide). In tests using laboratory animals, MEKP in solutinns of varying concentrations was found to cause eye problems ranging from irritation to severe damage. The maximum concentration producing no appreciable irritation was a solution containing only 0.6% MEKP. Material published on the subject indicates that washing an affected eye within 4 seconds after contamination prevented injuries in all cases, but no known chemical neutralizer has been reported. Suggested protection for catalyst users is protective glasses and the immediate availability of a source of bland fluid (such as water) for thorough washing of ocular tissues.

The hazard associated with fiberglass resin was previosly unknown to those attending the conference, although many had used fiberglass resin at home or at work. The hazard may be unknown to you also, and to your wives and children who may use a similar kind of resin and catalyst when working with fiberglass or hardeners used in liquid casting plastic.

Before using any of these catalysts, check their chemical composition and take appropriate measures. The cost of a pair of safety goggles is a small price for the protection of eyesight.

MEKP is also found in many commonly used paints and finishes, most commonly of which are epoxy paints.

PAINT SYSTEMS By Len Renkenberger 1980

This is intended not to be a "how to paint" article. Rather, it is a concise list of compatible products to use that will give you several optional routes to achieve the desired results. In general enamel type primers will give the most trouble free results over the years but will take appreciabely more time and work to apply. Lacquer finishes will give a softer, deeper look and mistakes can be rubbed out. Enamel finishes are more durable. Eurethene finishes are most durable but the fumes produced while applying are LETHAL and their use is not recommended for any but the most experienced painter. When a product name is used it will be a DuPont product but other name brands are just as good. A recommended source for ready and constant reference is AUTOMOTIVE REFINISHING, Principles and Techniques. ($4.95 from E. I. DuPont deNemours & Co., Refinish Division, Wilmington, Delaware 19898).

The following grades of sandpaper are recommended for the various stages of preparation and painting. Use grades 40 and 80 for leveling filler. Use grades 240 and 220 for smoothing and leveling primers and putty. Use grades 400 and 360 for sanding under enamel topcoats. Use grade 400 for final sanding under initial lacquer topcoat. Use grade 600 for any sanding between lacquer topcoats. Use a worn grade 600 for smoothing prior to compounding.

The following outline breaks down the various routes you can take in the preparation, priming and other steps in applying the three types of finishes.

I. Acrylic or Nitro-Cellulose Lacquer Finish

A. Preparation

1. If already painted, rinse down with PrepSol.
2. If not painted, rinse down with metal conditioner and then a conversion coat. (Note that different products are used if the body panels are steel or aluminum.)

B. Priming

1. If steel body panels, you have choice of:

a. Lacquer base primer
b. Preparakote (enamel base primer)
c. Corlar(eurethene base primer)
d. 100S (lacquer base primer)

2. If aluminum body panels, you have choice of:

a. Zinc-Chromate followed by Preparakote
b. Corlar
c. 100S

C. Sealer - use after applying any of above primers.

D. Topcoat - use the slowest drying thinner consistant with the weather. Apply wet for maximum gloss and flow.

E. Finishing - Let dry as long as possible (minimum of 48 hours) and then hand compound out.

II. Acrylic or Alkyd Enamel Finish

A. Preparation - same as in Part I for Lacquer.

B. Priming

1. If steel body panels, you have choice of:

a. Lacquer base primer
b. Preparakote
c. 100S

2. If aluminum body panels, you have choice of:

a. Zinc-Chromate followed by Preparakote
b. Corlar
c. 100S

C. Sealer - Use after applying any of the above primers.

D. Topcoat - Use the slowest drying thinner consistant with the weather. Use a hardener if you intend to compound out the finish.

E. Finishing - None required unless ageing or hardener used. If compounding, first use grade 600 sandpaper to level the surface and then machine buff out with polishing compound. Finish off by applying McGuire's Mirroglaze.

III. Polyeurethene (Imron) Finish

A. Preparation - Same as in Part I for Lacquer.

B. Priming - For steel and aluminum panels, you have choice of:

1. Corlar
2. 100S

C. Topcoat - Apply as with enamel except an accelerator and a special fish-eye eliminator additive can be added. Do not use the regular fish-eye eliminator additive. Note that Eurethene fumes are LETHAL, there is NO ANTI-TOXIN.

D. Finishing - None except to congratulate yourself that you're still alive.

CHAPTER 15 - TUNE-UP AND NON-STARTING TIPS

IGNITION TIMING 12·77

Most all manuals tell you to set your ignition timing "static", or in other words, with the engine not running. The reason for this is that the 'T' series mechanical advance (a system of weights acting under centrifugal force which advance the timing with engine speed) begins to work at a very low R.P.M. If you were to try setting the timing with the engine running you could be doing it with the spark partially advanced by the mechanical advance being operative.

The manuals advise lining up the timing mark on the front pulley with the pin on the timing gear cover, then turning the distributor until the points just break apart & discharge the spark to the plug. This is a very difficult thing for the novice to do. An inexpensive 12 volt test light from Lafayette or Radio Shack can be used to make it much easier. If you want, you can even make one by using an old Christmas tree light socket and bulb & attaching two alligater clips to the wires (about one foot of wire will do). Clip one wire to the thin wire on the side of the distibutor which goes to the coil. Turn the distributor until the light goes on. Your timing should be perfect.

I emphasised that should because it is very possible to mess up badly at this point, especially if you are setting up a new engine and not just checking the timing. If you visually set the distributor (with the cap off) so that the rotor is pointing toward where #1 plug lead should be there is a good chance you will put the cap on & turn the distributor the wrong way until the light goes on. There is even a chance the engine will run like this (many 6 & 8 cly. cars will) with disastrous detonation problems. To check yourself you will need a cheap neon tube type timing light $5± at Penn-Jersey, Sears, etc.). Put some white paint on the timing notch in the crankshaft pulley. Connect the timing light leads to the #1 plug & the #1 plug wire. Start the engine & reduce idle speed by backing off carb idle speed screws until the engine is barely running. Pointing the light at the pulley should make the white spot appear to be standing still. It also should appear very near, but not necessarily right on, the pointer.

Another alternative is the use of a D. C. "power" timing light. This is a light which uses battery (D. C.) power to give a brighter flash when #1 plug fires. Cost is about $25 - $40. With this system simply hook up the light according to instructions you got with it. With the timing mark lined up and the ignition switch on but the engine not running, simply turn the distributor until the timing light flashes (it will not stay on). You can check the timing by simply starting the engine & reducing the idle as described above.

TECHNICAL SECTION

ADVISOR - GRADY

Did you ever try unsuccessfully to start your car, knowing full well the good old SU pump was clicking away and you had fuel in the tank? Ignition problems, right? Probably. Well everyone knows how to pull a spark plug wire, hold it about ½" from the engine block while cranking the engine and watch for a spark. Where do you go from there if you only have a weak spark or none at all? Trail and error replacement, right? Wrong! Not if you use the following handy dandy trouble shooting procedure.

First, test the primary circuit, for the secondary circuit cannot be checked until the primary is working. Remove the distributor cap and rotor, and turn the engine until the ignition points are closed. Remove the high tension lead from the center of the distributor cap and hold it about ½" from the engine block.. With the ignition switch on, open and close the points with a pencil or other convenient dielectric object. A good stong spark indicates a good primary circuit and coil. Conversely no spark means primary circuit problems or bad coil.

Next test the points. Turn the engine until the points are open. Now use a small screwdriver (awl, scribe, etc.) and make contact between the moveable part of the points and the distributor backing plate. Move the screwdriver up and down, repeatedly making and breaking contact between the moveable half of the points and the backing plate. A good strong spark now between the high tension lead and block indicates bad points. Weak or no spark means other primary circuit problems than the points or coil. While checking the points in this manner, note also whether or not a smaller spark arced the gap between the screwdriver tip and backing plate while being raised up and down. No spark indicates a shorted condenser or a break in the primary circuit.

To further check the condenser, simply remove it from the circuit . (Remember its purpose is to prolong point life.) Again move the screwdriver tip up and down and observe for a spark. A spark now from screwdriver to back plate that was not present with the condenser connected in the circuit indicates a shorted condenser. Still no spark at this point means an open in the primary circuit, so check for a frayed wire in the distributor.

Once you get things in good apparent order thus far test, repeat the first test of the primary circuit above. Still no spark at this point means a bad coil or high tension wire. A good spark means trouble with the cap, rotor, or spark plug wires.

The rotor may be checked for shorts by removing the distributor cap and holding the high tension lead near the rotor while cranking the engine. If you get a spark, better replace the rotor.

The distributor cap may be checked for cracks (and defective plug wires also) by cranking the engine in a very darkened place, or at night. If it looks like a minature electrical

storm around the distributor cap you probably have a cracked cap and better replace it. If you observe sparks from any of the spark plug wires to any part of the engine, the insulation has broken down and new plug wires are the answer.

Well there you have it, and it is valid for virtually all conventional ignition systems. Keep in mind also one of the points from a recent article by Renk that it is possible (probable?) with our MG's for the tach drive to rotate a bit and eas ily short out on the low voltage connection screw on the side of the distributor of the XPAG engine and put you out of business.

EDITOR'S NOTE: SEE ARTICLE BELOW

DISTRIBUTOR PLATES, DISTRIBUTOR CAPS, AND TACH DRIVE

3-78

Coming back from the Saratoga GOF, TD 28910 had developed a miss -- nothing bad, but irritating. As we wheeled into a New Jersey Turnpike gate (in the middle, naturally), the TD died.

My first thought was that most common of "T" series ignition problems: the tach drive vibrating loose and touching the wire from the distributor to the coil. Not the problem. More on this below.

What had caused our predicament (try pushing a "T" across six lanes of New Jersey *X#$@XX*#'s) was a loose distributor plate. The two small screws that hold the plate to the housing had vibrated loose and that left the plate free to wobble until the points wouldn't open. A few days ago, it happened again. I figure it happens every 10-15,000 miles. To make sure it doesn't happen to you, I suggest you put a little Lock-Tite or other locking compound on these screws.

Back to the tach drive. If your distributor happens to be in a position where the tach reduction box can swing into contact with the small wire on the side, liberally coat the end of the wire and the bolt with Dow or G.E. Silicone Seal.

A similar incident years back also comes to mind. When I first got my TC on the road, it developed an erratic miss on acceleration and above 50 MPH at times. Rebuilding the fuel pump and changing coils didn't help. What had happened was that the little spring loaded graphite plunger in the center of the distributor cap had broken just above the face of the cap. Under normal running, the spark could jump to the rotor, but on a heavy throttle, it could not supply enough juice at the plug to ignite the richer mixture. Probably happens once in a million, but then it's those illogical things that blow your mind.

TECHNICAL TIDBITS **** Grady

10-79

TUNE-UPS

A few r·mblins this month covering some trivia about tune-ups. I don't profess to be particularly eloquent and am not going to duplicate the details in the manual, but just offer some tips frequently overlooked.

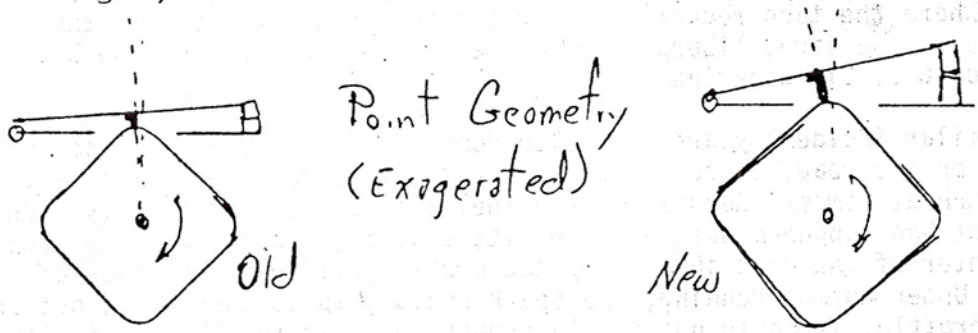
First, the proper sequence of events in a tune-up is:

1. adjust the valve lifters,
2. file and adjust, or change, the points,
3. set the timing,
4. clean and adjust or change the plugs and <u>then</u>
5. adjust the carburetors.

The most significant point is don't try to set the carbs <u>until</u> the valves and electrics (timing, points and plugs) are right.

The manual gives a sequence for setting the valves with certain other valves fully open. Just note that the sum of the two valve numbers (the one being adjusted and the one fully open) is always <u>nine</u>, then you will never have to refer to the manual again to adjust the valves. Just be sure you know the proper setting .012 or .019. The setting is generally determined by the engine serial number and is stamped on the valve cover. However, if you have a "replacement" valve cover it may be in error, so check the engine **S/N** and your manual (.019 for engines prior to XPAG/TD2/24116, and .012 for this number and later). Also if you have a replacement camshaft it may be different. The only certain way to know the setting is to know your camshaft number. (See Chip Olds article in the Feb. 79 TSO, page 33-34).

Most purists tell you to <u>always</u> check the ignition timing anytime you file, adjust or change the points. Technically they are right because of the different geometry caused by the different thickness of points and the height of a new point cam follower (see diagram). Practically, however, if the timing is correct before the points are changed, it should be correct afterwards, but it bears checking.

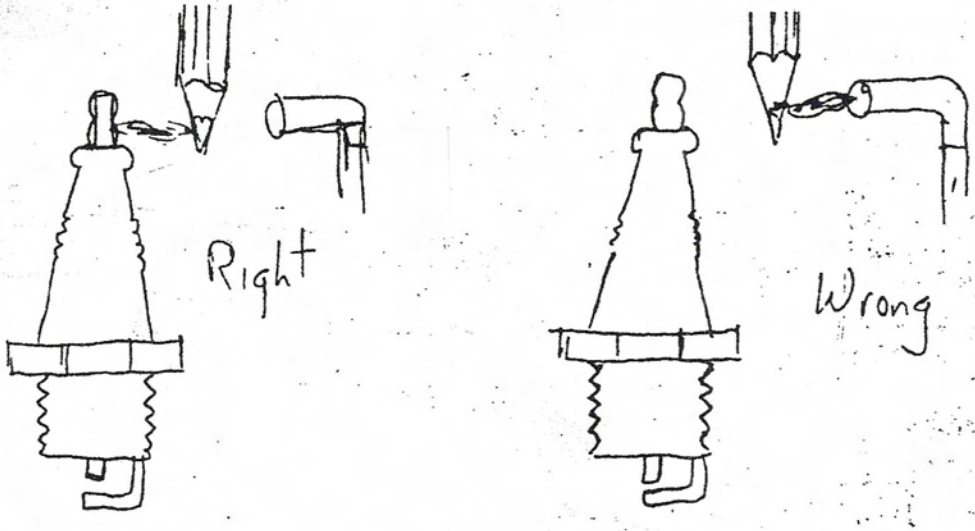


The manual gives the proceedure for statically setting the timing and it should be followed. True, a timing light will "function" with the Lucas ignition, but will probably give a false

reading because of the low engine r.p.m. at which the centrifugal advance begins to operate. Besides, it is so much cheaper to solder a couple of wire leads to a small 12 v. lamp than to buy a timing light.

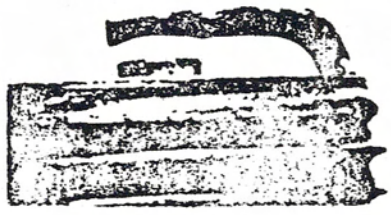
Don't take changing of the plugs too lightly either. It is important to do several things commonly overlooked. First, clean out the port area <u>after</u> loosening but <u>before</u> removing the plug. Do this with compressed air (preferably) or a small brush. This will prevent dirt and debris from falling down the cylinder. Next, I believe in a little light oil on the threads of the new plug. Proper plug gap (.020" - .022") is assured by use of a wire type guage rather than a flat feeler guage. Lastly proper torquing is advisable.

One last thing that is a good idea to check is coil polarity. If you have an original type Lucas coil with the SW and CB markings you can rely on that. White wire from fuze block to SW, and white with black from CB to the distributor. Incorrect coil polarity will allow an engine to run but may decrease the available firing voltage as much as 40%, cause hard starting and high speed miss. If you have an unmarked coil or are otherwise in doubt try the following test. Remove any plug wire and hold it about ¼" away from the plug with the engine running. Insert a sharp wooden pencil in this gap. If the spark flares and has a red tinge on the plug side of the pencil, the polarity is OK. If the spark flares on the cable side of the pencil, the polarity is wrong and the coil wires should be reversed.



Inspection of used plugs can also reveal incorrect coil polarity.

INCORRECT COIL POLARITY ▶



TECHNICAL TIDBITS - Grady

7-79

Watch that ground (earth)!! Recently while finishing a quick refurbishment of an MGA for Nancy I received a refresher leason to one I learned many years back - - - watch that "ground". I hear many folks fussing about Lucas electrics, so I must be plain lucky for they have never caused me significant misery with any of our three British cars. I thought for one fleeting day recently that the record had come to an end.

It seems that after finishing the "A", driving it to Niagra Falls and back without incident, that all was in order. Yet a few days later we were stranded over at Lindsays about 10:30 PM with no headlights - - parking lights were OK, but no headlights (higher current). A quick check with a trouble lamp showed I had power at the bulb, and "low and behold" I could even light up the headlight "ground" (with the headlight plugged in the circuit of course). Well it didn't require much to figure it was a bad ground. I jury rigged a makeshift ground to get us home and began searching the next day for the culprit. Sure enough, when loosening the fenders for inserting the new piping I had loosened the main headlight chassis ground. Of course it was in a most inaccessible location, but I managed to find it and tighten it. Presto - no more problems.

I have seen turn signals fail to flash, horns fail to honk, fuel pumps fail to pump, and regulators fail to regulate all because of faulty ground connections. Ever notice a car at night with one headlight very dim or almost out? Same problem - bad ground.

Point is, that ground is as vital a part of the circiut as the lead, so make sure it is good. This may mean scraping away a bit of your new paint at the grounding bolt and using a good star lock washer.

CHAPTER 16 - SPECIFICATIONS ON 'T's AND THEIR PARTS

NUTS AND BOLTS, MG STYLE 11-72 Technote by Chip Old

Most of you who work on your own cars have probably discovered by now that our pets are held together by a really wierd assortment of nuts and bolts. The threads don't match common American threads, and American wrenches won't fit most of them. Since several people asked about this at the Chesapeake Chapter's Tech Session last July, perhaps the following information will help clear things up a bit.

There are four basic thread forms used on T-series cars:

1. Whitworth Form: This thread form was originally proposed by Sir Joseph Whitworth in 1841, and was adopted as standard by British industry a few years later. It differs from our Unified National (formerly American National) thread form in that the Whitworth thread is rounded at the top and bottom and the angle formed by the sides of the threads is 55 degrees. Unified threads are described later on. Whitworth threads come in a coarse pitch called British Standard Whitworth (BSW), in a fine pitch called British Standard Fine (BSF), and in two pipe threads called British Standard Pipe (BSP) and British Standard Pipe Tapered (BSPT). Most of the bolts and nuts used on the T-series chassis and body are BSF, but you may occasionally find a BSW fitting thrown in to confuse things. The fuel line, oil line, and brake line fittings are all BSP.

2. British Association Form: This thread form was originally developed by the Swiss for very small watch and clock screws, and it was adopted by the British in 1903. The tops and bottoms of BA threads are rounded as in the Whitworth form, but the thread angle is only 47½ degrees. BA sizes are designated by the numbers 0BA through 16BA rather than fractional inches, with the lower numbers designating the larger sizes. BA threads are used in instruments and electrical componants, and in several places on the body and chassis where bolts or machine screws smaller than ¼ inch are required. Odd-numbered sizes (3BA, 5BA, etc.) are seldom used, and nothing smaller than 8BA is normally used in automotive work.

3. Lord Nuffield's Mad Metric Form: I made this name up since there is no "official" name that I know of for the bolts, nuts and studs used in the engine, AND transmission of our cars. These are real wierdos; the threads are an obsolete metric form (not modern ISO-metric standard), but the hex head sizes are Whitworth. To make matters worse, there isn't even any standardization of hex head sizes. Most of the engine bolts, for example, are 8 X 1 mm, but some have 3/16 W heads while others have 1/4 W heads. If you want to know how this wierd Whitworth-Metric combination came into being, you'll have to ask Lord Nuffield. No-one else seems to know the answer.

4. Unified Form: During World War II, the U.S.A., Great Britain, and Canada got together to decide on a standard thread form for all three to use, and the Unified form was the result. What actually happened was that we Americans were manufacturing much of Britain's war materials, so we said "Adopt our thread standards or else." As a result, Unified threads are the same as our old American National threads except that now we all call them Unified threads. The Unified thread is flat at the top and bottom, and the thread angle is 60 degrees, not at all like the Whitworth thread. British industry was a bit slow to re-tool for the new thread form, so it wasn't until about half way through the TD production run that Unified bolts and nuts began to appear on the MG, and then only in the rear axle and a few other minor parts. These bolts and nuts are identical to the Unified

National Fine (UNF) and Unified National Coarse (UNC) sizes used in America, even including the hex head sizes.

I have heard some claims to the effect that you can sometimes use American bolts (UNF or UNC) in British nuts (BSF or BSW) and vice-versa. Even if it could be done it wouldn't be a good idea since the thread angles are not the same (55 degrees for BSF & BSW, 60 degrees for UNF & UNC). The coarse threads (BSW & UNC) can be screwed together in some cases since they use the same thread pitches, but because of the difference in thread angle the threads won't make a full contact. You run the risk of a galled or stripped thread, and the result could be serious if the bolt and nut are in a highly stressed componant. Luckily there are very few BSW fittings used on the T-series, so this problem should never come up. The fine threads (BSF & UNF) do not have similar pitches, so you can't screw them together even if you want to. Compare the specifications at the end of this article and you'll see what I mean.

So much for the threads; now for the wrenches you need to turn them. You can use American and Metric sizes, but you need a set of each since American sizes will fit some British hex heads and Metric sizes fit the rest, but niether type will fit all. Also, none of the American or Metric wrenches will fit the British hex heads really well, so the eventual result will be rounded-off heads or sprung wrench jaws. The best solution is to buy the proper wrenches for the job. You need two different types for the early (pre-Unified) cars and three types for the later (post-Unified) models:

1. Whitworth or British Standard Wrenches: These wrenches will fit all bolts and nuts on the T-series except the small BA fittings and the Unified fittings on late TD's and TF's. The old name "Whitworth" wrench has recently been superceded by the name "British Standard" wrench, and the size designations have been changed to agree with the actual bolt sizes. For example, a BSF or BSW bolt with a shank diameter of 1/4 inch is now turned by a 1/4 BS wrench, whereas the old Whitworth wrench size for the same 1/4 inch bolt was 3/16 W. The bolts are exactly the same as they have always been, but the wrench size designations have changed. I don't know what the old Whitworth sizes are derived from; if any reader does know I'd like to hear from him. In actual practice, it doesn't matter which type you have since they both are made to turn the same fittings. Needed for all T-series.

2. British Association Wrenches: These fit the BA bolts and nuts used in various parts of the T-series, and they are numbered 0BA through 8BA just like the bolts and nuts. Needed for all T-series.

3. American Wrenches: These are needed only if you have a late TD or a TF with Unified fittings in the rear axle.

There are several sources of Whitworth, BS and BA wrenches. Snap-On, with distributors in most major cities, sells a large selection of BS and BA sizes. These are about the best you can buy in this country, and they are reccommended for anyone who gives his tools really hard use. Moss Motors sells a good selection in Whitworth and BA sizes, although for some reason the BA sizes are listed as "ignition wrenches." Made in England by Gordon, these are perfectly adequate for the use most of us will give them. J.C. Whitney sells a cheap set of open-end

wrenches in Whitworth sizes which are OK if you just want to be able to say you have a set of Whitworth wrenches. They aren't good for much else. Sears once sold a selection of Whitworth sizes in their excellent Craftsman line, but these are no longer available. There are others, but these are the only ones I have had any experience with. The following charts show what wrench sizes to use with which bolts and nuts. Happy Wrenching!

WHITWORTH FITTINGS

Nominal Diameter	Pitch (Threads/In.) BSF	BSW	Wrench Size Whitworth	BS
1/4 in.	26	20	3/16 W	1/4 BS
5/16 in.	22	18	1/4 W	5/16 BS
3/8 in.	20	16	5/16 W	3/8 BS
7/16 in.	18	14	3/8 W	7/16 BS
1/2 in.	16	12	7/16 W	1/2 BS
9/16 in.	16	12	1/2 W	9/16 BS

BRITISH ASSOCIATION FITTINGS

Size	Nom. Diam.	Pitch (Threads/In.)	Wrench Size
8BA	.087 in.	59.1	8BA
6BA	.110 in.	47.9	6BA
4BA	.142 in.	38.5	4BA
2BA	.185 in.	31.4	2BA
0BA	.236 in.	25.4	0BA

NUFFIELD'S MAD METRIC FITTINGS

Diam. & Pitch	Wrench (Whitworth)	Wrench (BS)
6 X 1 mm.	3/16 W	1/4 BS
8 X 1 mm.	3/16 W or 1/4 W	1/4 BS or 5/16 BS
10 X 1.5 mm.	5/16 W or 3/8 W	3/8 BS or 7/16 BS
12 X 1.5 mm.	7/16 W or 1/2 W	1/2 BS or 9/16 BS

UNIFIED FITTINGS

Nominal Diameter	Pitch (Threads/In.) UNF	UNC
1/4 in.	28	20
5/16 in.	24	18
3/8 in.	24	16
7/16 in.	20	14
1/2 in.	20	13
9/16 in.	18	12

You may have noticed that most of the bolts originally used on your T-series have a letter (usually D, R, or S) on the hex head. These are the designations used by British manufacturers to designate the tensile strength of the bolt. Unfortunately, British manufacturers are not as strongly bound to standards as are the SAE controlled U.S. manufacturers and German DIN manufacturers, but roughly speaking, "D", "R", and "S" signify low, medium, and high tensile strength respectively. Speaking in extremely rough terms, British Standard grade "S" is approximately equivalent to SAE grade 5, but there is such a great deal of variation between manufacturers that these letter designations actually have very little meaning by our SAE standards.

A BRITISH-AMERICAN AUTOMOTIVE DICTIONARY 2-73 by Chip Old

You have probably noticed by now that a lot of the terms used in your factory manuals are not the same as the terms commonly used in the U.S. The following list is by no means complete, but perhaps it will help clarify things:

British Term	American Term
Bonnet	Hood
Boot	Trunk
Cam Follower	Tappet
Contact Breaker	Ignition Points
Crown Wheel & Pinion (differential)	Ring & Pinion
Damper	Shock Absorber
Dashboard	Firewall
Dial (on an instrument)	Instrument Face
Dynamo	Generator
Earth	Ground
Facia Board	Dashboard
Fender	Bumper
First Motion Shaft (gearbox)	Input Shaft
Gearbox	Transmission
Gearchange	Gearshift
Gudgeon Pin	Piston Pin or Wrist Pin
Hood	Top
Hood Sticks	Top Frame
Inlet Valve	Intake Valve
Joint	Gasket
Jointing Compound	Gasket Cement
Laygear (gearbox)	Cluster Gear
Layshaft (gearbox)	Cluster Gear Shaft
Mixture Control	Choke
Mudguard	Fender
Paraffin	Kerosene
Petrol	Gasoline
Propeller Shaft	Driveshaft
Revolution Counter	Tachometer
Road Spring	Suspension Spring
Running-In	Breaking-In
Second Motion Shaft (gearbox)	Cluster Gear
Silencer	Muffler
Slow Running Control	Hand Throttle
Screenwiper	Windshield Wiper
Spanner	Wrench
Sparking Plug	Spark Plug
Sump	Oil Pan
Third Motion Shaft	Output Shaft
Welch Plug	Core Plug
Windscreen	Windshield
Wing	Fender

THE CAR NUMBER STORY — Chip Old

Some time ago we received an application from a prospective new member who wanted to know why we needed to know his car number and engine number, and also what all those letters attached to the numbers meant. Our Secretary/Treasurer answers the first question elsewhere in this issue, and an explanation of engine numbers appeared in CSR several issues ago. Information about car numbers has appeared in the SACRED OCTAGON from time to time, but for your enlightenment I've pulled it all together here and added some comments of my own.

Almost all M.G.'s through the TB Midget used a very simple and straightforward car numbering system, consisting of one or more letters (M,D,J,F,PA,etc.) to identify the series, followed by a group of numbers to identify the production number of the chassis. From the car number on these early models you can tell what series M.G. it is and what the chassis number is, but nothing more. For example, the car number of a J-Series Midget doesn't tell you whether the car is a J.1,J.2,J.3, or J.4, and the same applies to the F and L-Series Magnas and The K-Series Magnettes. The situation is even more confusing with the N-Series Magnette, where car numbers for the NA,NB,ND and NE are all prefixed by the letters "NA".

The TC continued this practice, but some effort was made to describe the car in more detail since for the first time in M.G. history some cars were set up specifically for the export market. As with the earlier models, the first letters (TC in this case) identify the series, and the group of numbers following the letters is the chassis number. In some cases there are additional letters attached to the car number, and these identify the export market for which the car was intended, as follows:

No Letters	-	Home Market
EXR	-	General Export, Right Hand Drive
EXR/K	-	General Export, RHD, Speedo in KPH
EXU	-	Export, United States

My TC Parts Manual (ADK 635) lists the EXR and EXR/K designations, but these were apparantly "in house" designations only, since these letters seem never to have actually been stamped on the maker's plate. Therefore, if your TC's maker's plate shows only the series letters and the chassis number, you could have either a Home Market version or one of the two General Export versions. On U.S. Export versions, the letters EXU were stamped on the plate, usually after the chassis number but sometimes in front of it. However, this version did not go into production until chassis number 7380 (late 1948), so TCs brought into this country for sale prior to that were probably mostly EXR versions. For those who are interested, a chart showing the differences between the four versions of the TC follows this article.

The TD continues this system, but in a slightly more elaborate form. As before, the first letters identify the series, but now we have two possibilities:

TD	-	M.G. Midget, Series TD
TD/C	-	M.G. Midget, Series TD Mk II

Also as before, the group of numbers following the letters is the chassis number, and there may be additional letters to identify the market for which the car was intended. On the TD maker's plate these extra letters are stamped BELOW the rest of the car number, but they are still part of the car number. The following are all the market designations I know of, but there are probably

others. If you can add to this list, please let me know:

No Letters	-	Home Market, RHD
EXR	-	General Export, RHD
EXL	-	General Export, LHD
EXRU	-	Export, RHD, United States
EXLU	-	Export, LHD, United States
EXL/NA	-	Export, LHD, North America

The earliest TDs sold in the United States seem to have been EXLU versions, while later ones were EXL/NA types.

For the TF, an entirely different type of coded numbering system was adopted. Although it looks very wrong compared to earlier car numbers, it does give us a more complete description of the car. To avoid confusion we'll use HDJ44/0501 as an example.

The first two letters are common to all TFs:

H - M.G. Midget
D - Two Seater

The third letter identifies the paint color:

A - Black	G - Brown	P - Ivory
B - Light Grey	H - CKD Finish	R - White
C - Dark Red	J - Dark Grey	S - Mid Grey
D - Dark Blue	K - Light Red	T - Light Green
E - Mid Green	L - Light Blue	U - Dark Green
F - Beige		

The first number identifies the market for which the TF was built:

1 - Home Market, RHD	3 - General Export, LHD
2 - General Export, RHD	4 - North America, LHD

The last number before the slash (/) identifies the type of paint:

1 - Synthetic	4 - Metallic
2 - Synobel	5 - Primed
3 - Cellulose	6 - Cellulose Body, Synthetic Wings

The number following the slash is simply the chassis number.

Referring back to our example (HDJ44/0501) we can see that it is an M.G. Midget, two seater, dark grey, North American Export model, left hand drive, metallic paint, chassis number 0501. Notice that there is nothing in the TF car number to indicate whether the car is a TF or a TF 1500. The only clue here is the engine number: XPAG/TF indicates the standard 1250cc TF engine, while XPEG indicates the 1466cc TF 1500 engine.

TC MODEL IDENTIFICATION

EQUIPMENT	HOME MODEL	EXR & EXR/K	EXU
Speedometer	In MPH	In MPH / In KPH	In MPH
Headlamps	8" high & low beam on left; high beam only on right	8" high & low beams on both sides	7", same as early TD. High & low on both sides.
Bumpers	None	None, except as fitted by dealers	Similar to TD, MG emblem on rear
Turn Indicators	None	None	Fitted as standard
Turn Indicator switch	None	None	On instrument panel in place of insp. lamp sockets.
Inspection Lamp Sockets	Bottom center of instrument panel	Bottom center of instrument panel	None
30 MPH Warning Light	On fascia to right of inst. panel	None	None
Map Reading Lights	One, to left of inst. panel	Two, both sides of inst. panel	Two, both sides of inst. panel
Side Lamps	Single filament bulb	Single filament bulb	Double filament bulb
Stop/Tail Lamps	Single "D" lamp	Single "D" lamp	Two round lamps, mounted high on sides of fuel tank
License Plate Lamp	Incorporated in "D" lamp	Incorporated in "D" lamp	TD type
Fog Lamp	On Badge bar	On Badge bar	None
Horn	On badge bar	On badge bar	TD type, mounted on firewall
Interior Mirror	None	On center of cowl	On center of cowl
Windscreen Glass	Triplex Toughened	Triplex Toughened	Triplex Laminated
"Made In England" Plate	None	Near maker's plate	Near maker's plate

XPAG EVOLUTION 6-73 Compiled by Chip Old

The XPAG engine with which we are all so familiar began life in 1939 as a modified version of the Morris XPJM and Wolseley XPJW passenger car engines, and it remained in production until 1954. During it's life it underwent a program of steady refinement so that the final TF version was in many respects a much better unit than the original TB version. The following are the major changes which were made over the years.

XPAG 0501	First TB engine. Triple valve springs, no timing chain tensioner, T -type oil filter with replaceable element.
XPAG 0883	First TC engine. Double valve springs, timing chain tensioner, throwaway cannister-type oil filter, but otherwise identical to TB version. Engine numbers carried on consecutively from TB.
XPAG 2020	Polished aluminum rocker arm cover with quick-release cap replaced pressed steel type.
XPAG 2720	Oil lines and filter brackets revised.
XPAG 2966	Pressed steel rocker arm cover replaced polished aluminum type.
XPAG 10813	Last TB/TC type XPAG.
XPAG/TD/0501	TA-TYPE OIL FILTER First Td engine. Water drain tap moved forward, oil bath air cleaner, smaller starter & dynamo, more teeth on flywheel ring gear, modified oil pump cover, combined choke & hand throttle on carbs, single front engine mount with stabilizer link, spacer under fan blades, new water outlet on head, new sump casting with brackets for clutch linkage. New engine number sequence.
XPAG/TD/2985	Oil filter brackets revised.
XPAG/TD/6482	New water pump with better seal.
XPAG/TD/7576	Oil pickup moved from side of sump to center.
XPAG/TD/9008	Longer rocker arm shaft, revised rocker arm layout.
XPAG/TD2/9408	Larger flywheel with 8" clutch replaced $7\frac{1}{4}$" unit. New block casting to accommodate new flywheel. Engine designation changed from "XPAG/TD" to "XPAG/TD2", but same numbering sequence retained.
XPAG/TD2/14224	New oil pump with integral oil filter.
XPAG/TD2/14948	Oil sump enlarged from 5 qt. to 6 qt.
XPAG/TD3/17029	(See note #1)
XPAG/TD2/17289	Shorter pushrods and longer adjusting screws.
XPAG/TD2/17969	New block casting with round water holes (were oblong in earlier blocks).
XPAG/TD2/18291	Better quality steel used in exhaust valves.
XPAG/TD2/20942	Distributor fixing method changed from separate steel clamp to cotter bolt in block. Distributor changed from Lucas type DKY4A to type D2A4. (See note #2)
XPAG/TD2/20972	Priming plug added to oil pump.
XPAG/TD2/22251	Clutch linkage changed from cable to rod.
XPAG/TD2/22735	New cylinder head casting with round water holes to match block. 3/4 inch spark plugs replace earlier 1/2 inch plugs.

XPAG/TD2/24116	New camshaft with shorter duration and higher lift. Quieter and more durable, produced more low RPM power.
XPAG/TD2/26364	Scoop added to oil pickup.
XPAG/TD2/26635	Oil pump modified to hold prime.
XPAG/TD2/27551	Stronger steel used in crankshaft.
XPAG/TD2/27865	Valve guide height changed from 24 mm to 24.5 mm.
XPAG/TF/30308	First TF engine. Numbering sequence carried on from TD, but the prefix changed to "XPAG/TF". Cylinder head modified to Mk. II specifications, separate pancake air filters fitted, new water outlet & thermostat, but otherwise identical to late TD version.
XPAG/TF/31263	Oil pump modified to be self-priming.
XPAG/TF/~~31525~~ 36330	Last of the 1250 cc XPAG engines. Later TFs were fitted with the 1466 cc XPEG engine, which had a new block casting to allow the larger bore but was otherwise almost identical to the later XPAG/TF engines.

Note #1: The "XPAG/TD3" prefix was introduced at engine number 17029 to designate the TD Mk. II version of the XPAG, but this was not the first Mk. II engine. The Mk. II was produced almost from the very beginning of the TD production run, but Mk. II engines prior to #17029 used the same "XPAG/TD" or "XPAG/TD2" prefix as the standard TD. Even after the "TD3" prefix was introduced, there was no new numbering sequence started for the Mk. II, so the numbers shown in the list apply to both the standard TD and the Mk. II versions

Note #2: This list was compiled from the TC, TD and TF Service Parts Manuals and the TD/TF Shop Manual published by the M.G. Car Co., and from several commercial publications, so it is as accurate as is possible. Unfortunately, I have found from my own observation that the manuals are wrong in at least one case. The distributor mounting method was supposedly changed at engine number 20942, but engine number 21444 still has the earlier type mounting. There may be other similar inaccuracies, but despite them this list will still serve to show how the XPAG engine evolved over the years.

THE VARIETIES OF THE TC — Bill Porter 3-77

I suppose I'm some kind of a "detail Nut". (I wonder if I'm a Whitworth-Ihope so.) Anyway as I study the T series MG's, I am continually amazed at all of the variations one finds. In the past, and even now, many people have assumed that there was no rationale behind these variations- That "the guy on the assembly line just picked up whatever happened to be lying around".

In the case of the TC this is especially easy to believe. There are usually not many cars in any one place to compare. They were built in rather "primitive conditions and after all they have been modified over the years.

Chip Old's excellent article on colors in the August 1975 TSO shows that at least in terms of basic body, engine and upholstery colors there is a regular variation. That is, the basic varieties are predictable. For example, early cars were black with red, green or tan upholstery, etc. I wont go on with this, not everything is pinned down, especially dates of transition and suppliers may have mixed their batches differently, but the fact is that the basic differences look more and more regular or

predictableas more information comes in. At least when the guy on the assembly line reached for the can of paint, he found a color he expected to find.

In this article I'd like to introduce the reader to another series of regular variations, those in the three basic types of the TC. These are the "Home" model, the "Export, [redacted]" model, and the "Export, United States" model. RIGHT

What's the difference? The Export, [redacted] or "EXR" has a MADE IN ENGLAND plate under the patent plate on the left side of the battery box. This plate is the mark of any export model- look for it! The "EXR" also has what we think of as the normal headlight arrangement: two low beams and two high beams. Home models muddled through with one low beam. There is a variety of the EXR called the EXR/K. It features a speedometer calibrated in kilometers. You quessed it- for export to the Continent.

Now we come to the last type, the fairly scarce and interesting Export, United States or "EXU", This is an incredible car, nothing like any other TC except in basic body and chassis design. So far, for example, no TC has factory bumpers. Any bumpers you may have seen on otherwise original cars where fitted later. But the EXU has full moulded chrome bumpers with overriders. In the center of the rear bumper is an "MG" medallion, all factory stock. So far too, no TC had an inside rear view mirror. Again, people added these at a later date. The EXU has a TD type rear view mirror on the dash in addition to its normal outside mirror. Of course no TC had turn signals-even the TD didn't get them until 1953. But the EXU has turn signals! At the bottom center of the cluster panel is a large brown knobwith a light on top of it where where the trouble light plug should be. This is the turn signal indicator. The EXU has a license plate light like the TD's and the rear license plate is a bracket mounted above the rear bumper nearly hiding the bottom half of that beautiful spare wheel. Of course,all TC's have those beautiful 8" headlights...don't they? Not the EXU! It has TD size 7" headlights, though with the TC type "cats eye" lens. For rear lights, it has "bullet shaped" jobs mounted on the sides of the fuel tank near the top. A foglamp maybe? Surely its got a foglamp...Nope! But it does have TD type horns mounted on the battery box. The EXU has many other detail differences, like a "gold pearl" telescopic steering wheel, a high beam warning light, and of course, the MADE IN ENGLAND plate common to all export models. In fact, the EXU is so different it is the only TC to carry its designation next to the chassis number on the makers plate.

You say you've seen lots of cars with EXU next to the number and a turn signal switch on the cluster panel but without bumpers, a properly fitted TC horn, foglamp, D-lamps and 8" lights? Well- put yourself in the place of the poor guy who had just fallen in love with the TC in late '48 and got "one of those things"! You don't see many today that haven't been changed "back to original".

I happen to have an EXU, TC/EXU 7619 to be exact. However it doesn't have "bullet shaped" tail lights, "gold pearl" steering wheel among many other things. I figure that the guy on the assembly line probably just forgot to put those things on. (You never know about assembly line guys). But i wonder where he found the MGA choke knob? Now <u>that's</u> primitive!

CHAPTER 17 - MISCELLANEOUS INFORMATION

Those New Sealants and Adhesives for Metal Parts

SPRING 76

Most of us tend to not trust new "miracle" products. Also, with something as valuable and hard to replace as a 'T' series engine, we tend to use only tried and true products. Therefore, you may not want to trust substitutes for lock-washers and split pins. What I suggest is not substitution but "insurance".

Bolts and nuts, even the finest aircraft grade, that appear to have good snug threads actually have little contact area. Even the best polished shafts have surfaces like sandpaper when magnified enough to see the granular structure of the metal. The best interface fits have only about 20% contact. Vibration, flexing, heat and wear are constantly reducing this area.

The new anaerobic (hardens in the absence of air) sealants fill the voids surrounding the contact areas. Since they are non-shrinking liquids when applied, they key the entire mating surface with both a friction and pressure absorbing bond. That 80% contact area of the plastic sealant might easily stand the same compressive loads as the steel since it is distributed over a larger area.

For a little "insurance", try them. The following are Loctite products, but others are available.

Locking bolts, nuts, splined or keyed shafts, and threaded fasteners:
Loctite Threadlocking Adhesive/Sealant #242-31.

Locking studs, etc. <u>permanently</u>:
Loctite Threadlocking Adhesive/Sealant #271-31.

Locking wheel bearings to spindles and brake drum hubs, water pump bearings, bushings, etc.:
Loctite Retaining Compound #601-31.

Locking badly worn shafts to gears, impellers, etc. or to eliminate pins or keys:
Loctite Retaining Compound #35-31.

Sealing and locking brake and fuel lines:
Loctite Pipe Sealant #92-31 or #69-31.

Replacing Paper Gaskets:
Loctite Gasket Eliminator #504-31.

8-73 by Chip Old

BEARINGS AND SEALS

Len Renkenberger reports that Specialties Inc., 1406 Leslie Ave., Alexandria, Va. and 2511 Schuster Dr., Cheverly, Md. is an excellent source of ball and roller bearings and oil seals. Take your old one with you and they can match it. At the Alexandria store ask for Jerry Hollis. For those of you in the Baltimore area I can recommend Moffatt Bearings Co., 1141 Filmoor (just off Loch Raven Blvd., a short distance North of 25th St.). Moffatt has had almost every bearing I've ever needed.

Words of Wisdom
by: Boschman

3-79

Clean Hands

What's your excuse for not working on your M.G.? There are nearly as many excuses as there are owners who don't do their work. However, one of the frequent ones is that you can't work with people (or in the case of doctors, etc.- on people) with stained hands. To hell with the social stigmas; if you're hung up on someone getting the impression you work with your hands and looking down on you, you're in the wrong car club Charlie Brown. But just for argument sake, let's assume your roommate is turned off by stained hands, that is an excuse I can accept.

The following is something I used to do when I painted Taylorcraft airplanes. They were yellow with blue trim, and let me tell you it is hard as hell to get to first base with a fine young thing with green hands. To the point: First, wash your hands with Go-Jo or some other cleaner with some Comet or other cleanser added. If you've been painting with lacquer or enamel, substitute lacquer thinner for the forgoing. Second, scrub your hands with a brush and pure Clorox (be brave, your a big boy now). Third and last step is to deodorize your hands, and that will require washing with a dishwashing detergent and brush, then applying scented hand lotion. On rare occasions you may still offend the Gay who tries to kiss your hand; but, what the hell, you can't please everyone.

.....

Here's a semi-original idea that you might be unaware of - Having trouble getting that grimey old neglected engine cleaned up? Not exactly anxious to invest several dollars in Gunk or other brand degreaser? Well Cheer Up - help is as near as your laundry room. Mix up a solution of one part Tide and 2-3 parts water. I usually fill a quart jar about 1/3 full of Tide and slowly fill it on up with warm water. It makes a white milky solution without many suds. After protecting the precious electrical parts with plastic bags or something, apply the solution over the whole engine (or other part to be cleaned) either by spraying or brushing. I like to use a pumper type oil can because you can really direct the spray, however, brushing works very well. Allow it to stand 5-10 minutes and rinse with a water hose. You'll be amazed how clean it will come. Just one other word of caution - avoid the exterior paint job as that strong solution will really leave a mark if not rinsed immediately. I scrape off large hunks of grease and dirt, and really bad spots may require two applications, but it is inexpensive, quick and very effective.

.....

STORING YOUR 'T' FOR THE WINTER 11-77

WASHING Not just with the garden hose. Cold water at low pressure just doesn't get road salts and chemicals off. Go to one of those 25¢ do-it-yourself hot washes. First thing to do when you get there is spray the engine as much of the underside of the car as possible with gunk (or equal, as they say in government contracts.) When you're finished washing have rinsed top and bottom, and driven home, your 'T' should be clean and dry and ready for a good heavy wax job.

UPHOLSTERY TOP & SIDESCREENS Vic Pallizzi, the best trimmer I know of, recommended Amway Vinyl & Leather Upholstery Cleaner (not vinyl top cleaner) and I think it is the best going for vinyl. For leather, use Leatherique Leather Restorer (from Clausen Co., Fords, N.J.) The Rolls Royce people are absolutely paranoid about leather and they worship this stuff. 'Nuff said. Leave top up & side curtains installed. If possible take seats indoors where dry.

OUTSIDE STORAGE If you use a "waterproof" type cover put a good layer of soft towels, rags, or blankets under it and try to block off as much air movement under the car as possible. Condensation under the cover plays hell with some paints. If setting on soil or grass block up the car until tires are free of the ground and place a sheet of plastic under entire car. Touch up any paint chips or you're liable to find nice heavy rust spots next spring.

BRAKES & LUBES It's debateable whether it's best to flush brakes in the fall or spring. Brake fluids absorb condensation. Is it best to have fresh fluid in fall to absorb a maximum amount over the winter or fresh fluid in spring to get rid of winter condensation? For $2 worth of fluid you might want to do both. Next spring check for leaking cylinders and hoses. I'm a firm believer in NOT using non-detergent oils. If you use them, you had best run your engine once a week or more. They don't remove the gum and sludge which can easily cause frozen rings, or even a stuck piston, in an engine that sets idle for a winter. In the spring, turn the engine over with the key off until oil pressure builds up, then start it. A thorough all points lube job is also in order.

RUBBER PARTS A good heavy coat of "Armorall", repeated after a few days, & not wiped off.

COOLANT You need not renew it, but you should add a rust inhibitor & run the engine until thoroughly mixed. Incidentally, too strong a mix actually has a higher freezing point & is too thick for good heat transfer when the engine is running. 67% is maximum, 50% sufficient.

BATTERY Try to put it in another car. Setting, charged or discharged, is hard on a battery. Perhaps you can alternate it with the battery in the family tank. If not, remove from the car & set up off the ground. Rig up a headlight bulb, or some heavy user of current, with two wires & alligator clips. Attach it to the battery every couple weeks long enough to discharge the battery. Then recharge it with one of those home chargers. Or buy a lifetime battery & take it back every 3 - 4 years.

Remember, it takes pains to be beautiful.

ALTERNATIVE PART NAMES

(Terms used in ENGLAND are printed in heavy type)

Anti-roll bar, anti-sway bar, torsional stabilizer
Anti-sway bar, **anti-roll bar**, torsional stabilizer
Anti-sway bar, **lateral link**, Panhard rod

Balance gear, **differential**
Base chamber, **sump**, oil pan
Bonnet, hood

Change speed lever, **gear lever**, gear shift
Clutch shaft, **primary shaft**, stem wheel, main drive pinion, constant running pinion, first motion shaft
Connecting rod, **drag link**, side steering rod, side tube, fore-and-aft rod
Constant running pinion, **primary shaft**, clutch shaft, stem wheel, main drive pinion, first motion shaft
Core plug, **welch plug**, welch washer, expansion plug
Countershaft, **layshaft**
Crown wheel and bevel pinion, ring gear and pinion

Damper, **shock absorber**
Differential, balance gear
Differential cage, differential case
Differential casing, **final drive housing**, nose-piece
Drag link, connecting rod, side steering rod, side tube, fore-and-aft rod
Drop arm, side steering lever, Pitman arm
Dynamo, generator

Expansion plug, **welch plug**, welch washer, core plug

Fender, **wing**
Final drive housing, differential casing, nose-piece
First motion shaft, **primary shaft**, clutch shaft, stem wheel, main drive pinion, constant running pinion
Fore-and-aft rod, **drag link**, connecting rod, side tube, side steering rod

Gearbox, transmission
Gear lever, change speed lever, gear shift
Gear shift, **gear lever**, change speed lever
Generator, **dynamo**
Gudgeon pin, wrist pin, piston pin

Hood, **bonnet**

Idler arm, **relay lever**, support arm, transfer arm
Impeller (water pump), rotor
Induction manifold, intake manifold, inlet manifold
Inlet manifold, **induction manifold**, intake manifold
Inlet valve, intake valve
Intake manifold, **induction manifold**, inlet manifold
Intake valve, **inlet valve**

King pin, pivot pin, swivel pin, knuckle pin
Knuckle pin, **king pin**, pivot pin, swivel pin

Lateral link, Panhard rod, anti-sway bar
Layshaft, countershaft

Main drive pinion, **primary shaft**, stem wheel, clutch shaft, constant running pinion, first motion shaft
Mainshaft, sliding gear shaft, third motion shaft

Nose-piece, **final drive housing**, differential casing

Oil control ring, scraper ring
Oil pan, **sump**, base chamber

Pilot bearing, **spigot bearing**
Piston pin, **gudgeon pin**, wrist pin
Primary shaft, clutch shaft, stem wheel, main drive pinion, constant running pinion, first motion shaft
Panhard rod, **lateral link**, anti-sway bar
Pitman arm, **drop arm**, side steering lever
Pivot pin, **king pin**, swivel pin, knuckle pin

Relay lever, idler arm, support arm, transfer arm
Ring gear and pinion, **crown wheel and bevel pinion**
Rotor, **impeller** (water pump)

Scraper ring, **oil control ring**
Selector rod, selector bar, shift rail
Shift rail, **selector rod**, selector bar
Side steering lever, **drop arm**, Pitman arm
Side steering rod, **drag link**, connecting rod, side tube, fore-and-aft rod
Side tube, **drag link**, connecting rod, side steering rod, fore-and-aft rod
Shock absorber, damper
Sliding gear shaft, **mainshaft**, third motion shaft
Spigot bearing, pilot bearing
Steering column, steering mast
Steering knuckle, **stub axle**, swivel axle
Steering mast, **steering column**
Stem wheel, **primary shaft**, clutch shaft, main drive pinion, constant running pinion, first motion shaft
Stub axle, steering knuckle, swivel axle
Sump, oil pan, base chamber
Support arm, **relay lever**, idler arm, transfer arm
Swivel axle, **stub axle**, steering knuckle
Swivel pin, **king pin**, pivot pin, knuckle pin

Third motion shaft, **mainshaft**, sliding gear shaft
Tie bar, **track rod**, tie rod
Tie rod, **track rod**, tie bar
Torsional stabilizer, **anti-roll bar**, anti-sway bar
Track rod, tie rod, tie bar
Transfer arm, **relay lever**, idler arm, support arm
Transmission, **gearbox**

Welch plug, welch washer, expansion plug, core plug
Welch washer, **welch plug**, expansion plug, core plug
Wing, fender
Wrist pin, **gudgeon pin**, piston pin

INDEX OF TECHNICAL ARTICLES

INDEX

TO TECHNICAL ARTICLES VOL. I TO VOL. XIV

ADDITIONAL INFORMATION
ADDED AFTER PRINTING.

TECH ARTICLE:

TC STEERING

Renk

Actually, this is a semi-tech session. I'm going to pass on a few observations on TC's and one in particular. In my Co-Chairman's blurb you'll find mention of the circumstances behind my driving what was probably the smoothest TC I've ever driven. This TC could probably do quite well at a GoF Show of Cars but the owner gets his kicks just by doing little things to improve, but not noticably modify it. The contrast was very noticable for me because I drove it back to back with my TC which is a very hard riding, noisy, hard steering old bucket that goes like Hell. I think you'll find some of the things the owner has done to be quite interesting. There is no one great and wonderful secret here, just a lot of details that add up to a great driving TC.

Let me first back up a bit to what is the main point here-TC steering. A lot of TC owners used to be obsessed with steering. I guess since more TC's are showers as opposed to goers these days the interest has cooled some but I'll pass the following on to those of you who drive 'em.

First comes tires. When I did Roots, Bill Porter said it steered better than other TC's and credited this to the replica Dunlop tires as opposed to the Sears or Wards Model A Ford tires most of us are using. John Wright recently switched to Dunlops on his TC and felt it helped considerably.

Now let me tell you about Warner Banes' TC. As I said, I consider it the smoothest I've ever driven. Keep in mind that Warner is an engineer and surely spends a lot of time and analysis on his TC. It is in top mechanical condition all around and this obviously contributes to the feeling. Some of the things which also contribute to the smoothness are valves set at .015" (no problems in 10,000 miles), good brakes due to sealed rear wheel bearings (see the Chesapeake Tech Manual), tapered roller front wheel bearings (again, see our manual), plastic fan (ditto the manual), and probably a lot of details he never told me. However the steering modifications are the main thing, and they are significant.

Years ago a great controversy raged over putting needle roller bearings in the steering box and king-pins. Some said it was great, some said it made the front wheels wobble wildly from side to side due to lack of friction in what can charitably be described as a loose and crude system. As I recall, our manual goes into this too, Warner tried the needle bearings and found that they did indeed cause wild front wheel wobble. However, he also found something that stopped the wobble - a small steering damper from VWs and Mercedes. It fits between the frame and tie rod and looks like a small shock absorber. On Warner's TC it is mounted between the right spring mounting pad and the tie rod.

But the real winner is the drop arm (the British term) or pitman arm as we call it. This is the horizontal lever about 6" long on the bottom of the steering box. We are all familiar with the grinding metal to metal sound of a TC steering unit under parking conditions. The fact that this arm is too long and has too little leverage on the steering is the problem. Warner shortened it by ⅜" and credits this modification with most of the improvement in his car. You wouldn't believe the difference unless you drove it.

In the late '70s I restored a TC named "Roots" for Bill Porter. "Roots" had a colorful life which Bill related in TSO. At that time there was a lot of talk about the engine & firewall color. The tool box lid on Roots was excellent with no fading. Since Bill was absolutely fanatic about originality I contacted Dick Shepard, who ~~worked~~ was an engineer for Dupont, & he worked with me to obtain ~~a match~~ match. I recently found the formulas. Hopefully they will help ~~anyone~~ someone.

Also, for you purists, there was a debate at that time about door panels - leather or vinyl. Our TC is an early 46 & they are leather.

5 APRIL 1979

RENK,

NEW HERE'S THE PAINT. ALL PAINT FORMULAS ARE A VARIATION OF DUPONT DULUX 93-503

#3 IS AS FOLLOWS:

		GRAMS
VD	5450 ADDITIVE	40
6H	FAST GREEN	75
2	BLACK (HIGH STRENGTH)	245
5	FERRITE YELLOW	387
23	WHITE (HIGH RIDING)	940

TOO DARK!

#4 IS AS FOLLOWS:

		GRAMS
VD	5450 ADDITIVE	40
6H	FAST GREEN	75
2	BLACK (HIGH STRENGTH)	245
5	FERRITE YELLOW	387
23	WHITE (HIGH RIDING)	1000

TOO LIGHT?

#5 IS AS FOLLOWS:

		GRAMS
VD	5450 ADDITIVE	40
6H	FAST GREEN	75
2	BLACK (HIGH STRENGTH)	250
5	FERRITE YELLOW	398
23	WHITE (HIGH RIDING)	1011

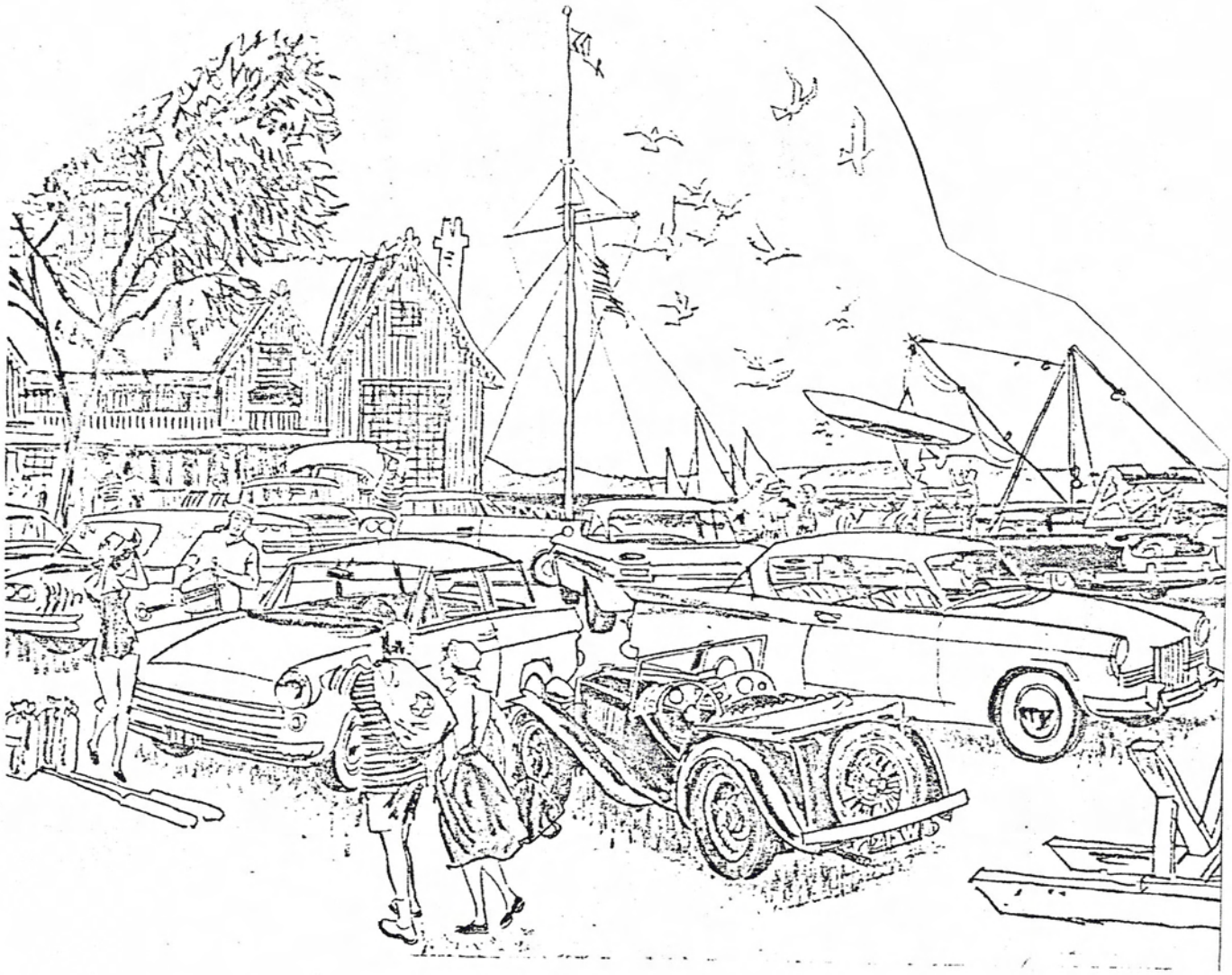
SLIGHTLY DARKER?

I AM GOING TO USE #5. IF PORTER'S TOOL BOX LID IS DIFFERENT FROM THE ENGINE, LET ME KNOW AND I'LL BRING SOME PIGMENT DOWN AT THE TECH (PAINTING) SESSION ON THE 14TH. SEE YA THEN.

DICK

TECH ARTICLE cont:

Now that sounds easy enough but let mecaution you a bit before you get out the saw and the Super-glue. The pitman arm is a critical part of the steering assembly and is under fairly high stresses at times. If your shortened arm breaks you're in deep chicken fat, kid. To do so I'd suggest lightly machining the surface to a uniform diameter and installing a steel sleeve over the joined halves. In any case consult the best welder you can find first. Warner uses Universal 4.75 tires. He found the Dunlops to be lumpy, hard to balance, and not wear well (observations I've heard Chip Old make many times).

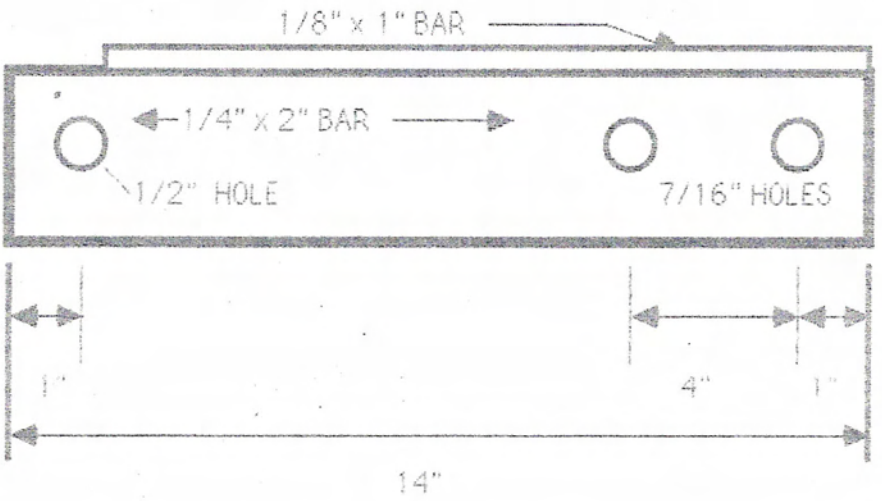


MAGNETIC DRAIN PLUG AND GOOD GEAR OIL FOR THE 'T' SERIES

T series differentials wear reasonably well but many are getting to where the hardening on the gear faces is mighty thin. Fine particles of this hardened metal are suspended in the gear lube as it circulates and this accelerates the wear. Changing the gear lube often helps and using quality lube helps too. Never use engine oil. Use only 80W-90 or 85W-140 Gear Lubricant manufactured to GL-5 or GL-6 specification. The TC originally took 140 and the TD/TF took 90. However, todays oils are so superior to the oils of the 50's you can take your pick.

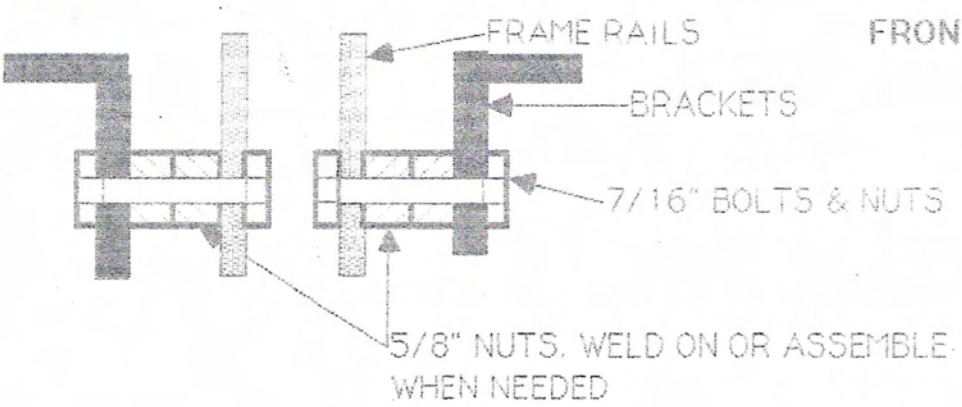
A magnetic drain plug can be installed literally in minutes. If you are hung up in ultra-purity then read no further. However, the plug really would only be detected under the most rigid of inspections and will do your car a lot of good. To install on the TD/TF, simply remove the old plug and tap out the hole to 1/2" x 20 SAE (fine) threads. The hole is already 1/2" but a different thread. There is ample metal to carry both sets of threads without stripping unless you play King Kong on the wrench. For the TC, drill the hole to 15/32" and carefully tap it to 1/2" x 20. You should get the plug first and check the threads, of course, just in case. The plugs are sold by NAPA parts stores and others. Unfortunately I don't have a part number but don't let the NAPA dealer tell you he can't get them. Use a compressible copper gasket (like those on spark plugs) or thoroughly clean the housing threads and apply silicone form-a-gasket or a thread sealant to the plug when installing. If you hard core purists are still with me, try filing the plug head square to resemble the original.

TC TOW BRACKETS



SIDE VIEW

ALSO REQUIRED
8- 5/8" NUTS &
4- 7/16" x 2"
GRADE 5 BOLTS
WITH NUTS



FRONT VIEW

Some time back I recall seeing a drawing for a TC tow bracket similar to thi
The problem was that it was built of very heavy steel, had some angles in it,
and required quite a bit of cutting and welding. The welding required here is
minimal, in fact you could use 1" x 3" angle or any other angle you can find a
eliminate welding. The assembly will be stronger if the nuts are welded.

To use, remove front shocks and install brackets using the 5/8" nuts in pairs
spacers to hold the bars clear of the fenders. Attach the tow bar by removin
clamps or "knuckles" and bolting the swivels (which permit vertical movemer
only) to the brackets. The front holes should be the size of your tow bar bolt
of course, but nearly all are 1/2".

(Continued from preceding page)

it takes less force (tension) to stretch the steel any given length, indicating that permanent weakening has occured. A bolt must not be loaded beyond this tension. Yield strength (2% above elastic limit) is the strength used in the design of a bolt.

To relate this to our specific big end problem, we must convert tension in the bolt to the torque required to turn the nut as we tighten it, thereby creating the tension in the bolt. Since we are concerned only with the torque readings at which the bolt reaches the above critical points, I have not included any back-up data (such as unit stresses, etc.) in the date which follows.

According to the shop manuals, the original castellated nut on the original big end bolt is to be torqued to 27 ft.-lbs. or to the next split-pin hole. This could mean that the nut might have to be turned almost 1/6 of a turn (a full flat of the nut) past the point where the correct torque reading was reached. Notice in the data below that the elastic limit is reached very close to one flat beyond 27 ft.-lbs. Because of this, I feel certain that quite a few rod failures are due to overtightening the bolts while trying to reach that next split-pin hole. (Tech Editor's note: Sorry to keep butting in, but it should be noted at this point that when a castellated nut is used the correct procedure is to grind down the bottom of the nut until a split-pin hole is reached when the specified torque reading is reached. Tightening past the specified torque to reach a hole is definitely bad practice, even if that's the way the shop manual says to do it.)

TORQUE READINGS

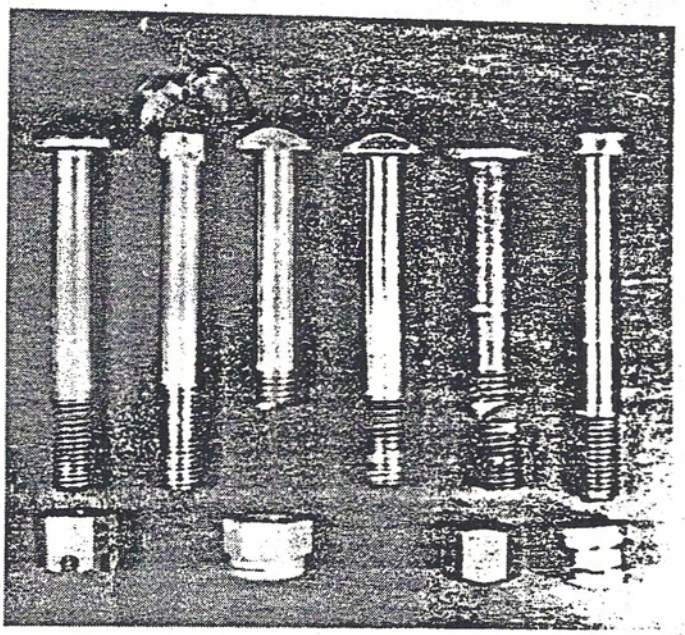
BOLT TYPE	AT ELASTIC LIMIT	FULL FLAT PAST 27 ft.-lbs	AT FAILURE
Original XPAG/XPEG	40 ft.-lbs.	40-42 ft.-lbs.	46 ft.-lbs.
Standard Strength Replacement	38 ft.-lbs.	36-38 ft.-lbs.	42 ft.-lbs.
High Strength Replacement	38 ft.-lbs.	38-40 ft.-lbs.	46 ft.-lbs.

As you can see, the original bolt was as good or better than the "high-strength" replacement, and better than the "standard-strength" replacement. There is a great danger in drawing conclusions from only one bolt of each type and by not making direct tensile tests by stretching the bolts in a laboratory. Extensive tests by someone better qualified than I should be made on a large quantity of big-end bolts.

However, based on the above results I would make several recommendations. Unless you are certain that your bolts have never been over-tightened, discard them. Use "high-strength" replacement bolts with self-locking nuts. Torque them to 27 ft.-lbs. plus the torque required to turn the self-locking nut on the bolt. Use Loctite or a similar thread-locking compound in addition to the self-locking nuts. If you don't have a good torque wrench, rent one. I cannot overstress the importance of using a torque wrench; use one, or don't do the job.

Now for the two alternative bolts I mentioned earlier. One is from a 2-Litre Ford Capri. It will take 50 ft.-lbs. torque before failing. The problem is that it is slightly shorter than the XPAG/XPEG bolt and therefore some of the threaded portion of the shank (which is a small diameter) is inside the rod cap. This may allow the cap to flex. Also, the thread pitch is coarser, so that the torque to tension ratio varies and the 50 ft.-lbs. may be misleading. However, I may still use this bolt in my engine.

The most promising bolt seems to be from a BSA motorcycle. This bolt is a "waisted" type with machined bearing areas at the ends and center. It is the right length, but it is about .025 in. larger in diameter than the XPAG/XPEG bolt, so the bolt holes in the rods will require reaming. If someone has an expendable rod to send to me, I will test this bolt and report my findings. I feel that this may be the bolt to use.



Tech Editor's note: Len gave me the bolts he tested, and I photographed them so that you can see exactly how each one failed. The bolt at the left is an original one, with its castellated nut below it. Notice that it didn't break, but the shank has necked down at the base of the threaded portion, indicating that it has been tightened beyond its elastic limit and has permanently stretched. Second and third from the left are "standard-strength" replacement bolts, with a self-locking nut. The head sheared off the first example, probably because there was no radius at the junction of the shank and the head. The second sheared across the threads. Fourth from the left is a "high-strength" replacement. The threads stripped out of the nut before the bolt could break, but notice that the threaded portion has started to neck down, indicating that the elastic limit has been passed. Fifth from the left is a Ford Capri rod bolt, which proved to be quite strong but unfortunately not quite long enough. At the right is a BSA rod bolt, which shows much promise. Notice the shape of the shank.

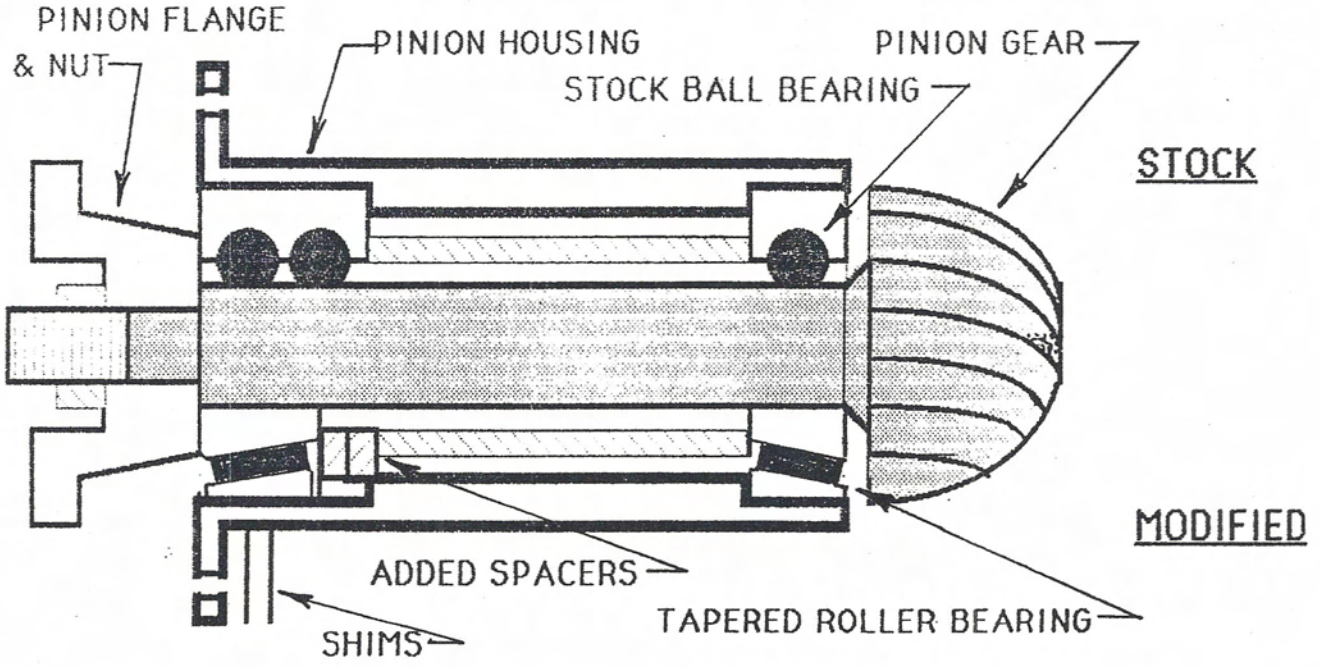
Replacement TD/TF Starter Motors
From #511 Ed Woods, 3125 Deerwood Dr., Allison Park, Pa. 15101

Al Feldt, whose XPEG engine I has just rebuilt, brought a new starter motor (Lucas #25149) with him when he picked up the car. He had purchased it from J.C. Whitney. We found that this starter has the heads of the through-bolts on the drive end, not on the commutator end as in earlier models. To fit this starter, it would be necessary either to countersink the bolt heads or to modify the engine block by grinding out the area where the bolt heads interfere.

My Lucas catalog shows the 25149 starter as the current replacement for all starters previously recommended for the TD and TF. I contacted Anthony Lane, branch manager of Lucas in Jacksonville, Florida, who replied that all previous TD/TF starters have been discontinued and that 25149 will

(Continued on next page)

TC Pinion



Better pinion bearings

16.003 mm thick

Cone/17098X

Cup/17244

This drawing was insented & not numbered. Verify if you use.

55a