

NOTES ON SETTING UP MMM & TABC TYPE STEERING

Some time ago in an MG internet discussion I maintained my defence of the TABC Type Bishop Cam steering against the fitting of inappropriate modern replacement steering systems, and threatened to write some notes to help with setting up the TA/B/C steering properly. This was the result. Though written with Bishop Cam steering in mind, the principles of chassis and steering set up apply to all our cars and many others of the period.

The following is not intended to be definitive, and many dimensions etc are not included here. It IS intended to get you to look at your car's steering in an holistic manner, and to help you improve it's steering characteristics to what was the original and quite satisfactory standard, even in todays conditions.

Our cars are old and mostly worn. There is probably no one single thing anyone can do to improve their steering, but many small things will produce a well balanced, light and accurately steering car. Anyone doing a full rebuild is in an ideal starting position to get it right.

Anyway, take this on board and it will keep you all out of mischief this or next winter!!!

HERE GOES THEN.....

CHASSIS -

This is the place to start --- Is the chassis square and are the dumb irons not twisted???

Put the car on a flat surface and drop a series of plumb line points onto the floor from key chassis points (Works Instruction Guide has a plan of these chassis points). Tolerance between the major chassis diagonal between front spring shackle pin and rear spring front shackle pin outer point is plus/minus 1/4 inch.

Check a lot more dimensions, particularly the front of the chassis for accident damage or any other possible distortion or twisting, or even a hidden chassis crack!!! particularly under the wing above the axle line. Also check that all the dumb iron and cross member rivets are still tight - these slacken off or break over time, they might even have been replaced by bolts at some stage.

Remember also that a heavily rusted chassis will flex far more than an unrusted one. In particular look for rust around the dumb irons, and the rear spring forward mounting point and body mounting bracket.

SPRINGS -

The springs make a huge difference to the steering and feel of the TA/B/C on the road. An old, dry spring with rust between the leaves is not much better than a solid bar - This rust can be a real problem. Even springs that look good at first sight can be a nightmare when taken apart. Dismantle, Bead blast - reassemble with a thick oil and there is a vast difference in road ride and handling. Keep them well oiled (every 500 miles) – the graphite impregnated aerosols the motor cycle guys use on their chains is ideal for this - it goes on thin and soaks in then firms up. Otherwise the Springs should be oiled with a thickish oil of about 250 grade (or same heavy grade as the steering box will be perfect) grease is no good at all, as it won't seep in between the leaves. Jack the car up by the chassis to relieve weight on the springs and so separate the leaves a bit when oiling them.

Over time the springs will sag, or be distorted under shock - check them against specification (see "Blowers Manual" for drawings and dimensions). If the springs have the wrong curves, the front axle sits wrongly and steering geometry automatically becomes distorted.

A key element with the front spring is the condition of the front pin, and of the hole (the eye) in the spring. Replacing just the pin is not much use if the eye of the spring is oval.

TA/B SPRING TRUNNIONS -

The condition of the spring ends and trunnion bearings (of both front and rear springs) is most important, as is the condition of the trunnion housings themselves, these can show tremendous wear inside the cast iron casting, (and the TA/B MMM rear spring trunnion housing extension is notorious for wearing away after the bearing has long gone – I've seen springs "fall" through the top of these and the chassis drop to the ground!!!).

There should only be about 0.003 - 0.005 inch clearance between the bronze trunnion and the spring, both vertically and crosswise, the same for the trunnion bushes in the housings. Now this can be a problem because few reproduction spring makers seem to bother with this dimension, and seem happy to use non standard steel stock which is too thin, and in some cases I've seen, too narrow as well, so that when the trunnions are offered up it looks like they already have 50,000 mile wear on them in both vertical clearance and side play. The trunnion bearings can be narrowed to fit crosswise, and suitable shim material needs to be made up anyway to correctly fit new trunnion bushes in the housings, but the vertical clearance is impossible to adjust you might have to get the local machine shop to make a special for your spring, which is no big problem.

Check the finish of the trunnion end of the spring, it is a bearing surface so polish off any of the black mill scale from the heat treatment process on a new spring, or well clean an old one, and also remove any paint before assembling otherwise it will all go to act as grinding paste!

The trunnion bearings and the front spring pin should be lubricated with a good heavy grease (e.g. Castrol LM) every 500 miles. Jack the car up by the chassis to relieve weight on the springs when greasing to let the grease onto the top bearing surface of the spring. Make sure the rubber gaiter is in place to stop water and road grime entering the bearing. The rear spring front bush rubber should be in good condition and not perished or decomposing.

TC SPRING HANGERS -

After the war the factory could not get access to bronze for the spring rear trunnions due to government restrictions. They were looking for cost cutting anyway, so they did away with the firmly located pre war spring rear trunnion assemblies, and used the much more flexible rubber bush spring hangers instead. These are somewhat floppy sideways compared with the well located MMM TA/B set up, so it loses a bit on the curves, but does make the ride slightly softer on the straights. The ride difference between a well set up TA/TB and TC is quite noticeable, the TA/TB winning every time for corners and road holding but being a harder ride on bumpy straights. Hence the racers preference of an XPAG engine in a TA chassis.

The rubber bushes should be in good condition, and perishing or the dreaded oily decomposition should be a sign to fit new bushes.

Another consequence of the bushes was that the spring alignment was slightly different at the front and so the famous wedge was introduced after the first few thousand off the production line as a result of customer feedback from the dealers, to bring the front axle caster angle back into alignment and lighten the steering. I feel that MMM, TA and TB users should NEVER need to use the wedge as this will upset the front steering geometry, but early TCs should have the wedge retro fitted (with the thin end to the front of the car). If the wedge helps earlier cars its usually because something else is wrong elsewhere.

REAR AXLE, SPRINGS AND TRUNNIONS -

REAR WHEEL ALIGNMENT AND ATTACHMENT TO THE SPRINGS –

Why talk about the rear end??? Because the rear axle, if not well located to stay in line, will steer the car on every bump and corner, even if the front is perfect. Everything said about the front springs applies to the rear ones.

The rear wheels can steer the car. One of the main reasons why this can happen is if the rear axle is not in line, which can be due to the forward spring pin being bent, or the axle mounting pin points on two unmatched springs being at different positions on each spring. Check you have the same wheel base on both sides of the car!!!

Also check the mounting bracket on the axle itself which has a habit of breaking to leave the bottom of the plate attached to the spring and the axle bent at an angle or even floating free. My brother's car had a broken rear axle mounting – every time he accelerated the axle shifted and the car turned left - it made for interesting driving!

Rear shock absorber condition and correct tyre pressure is also important as a low pressure will cause the rear end to sway alarmingly on corners.

FRONT AXLE -

This is rarely in the same shape as it left the factory. It is made of a fairly soft material, and although it rarely breaks, seems to bend very easily, upsetting all the steering angles. It is fairly easy to reset with a bit of heat and patience.

First realign the spring plate faces to take out any twist, this can be done quite effectively with straight edges and oxy-acetylene. Then with a couple of long 0.075 inch diameter ground steel bars in the king pin holes, set up the castor and king pin angles to specification against the spring plate faces as the reference datum.

Check the king pin holes, the new 0.075 inch king pins should be a light push fit, but often there are worn holes and they might have become oval, so that the cotter pins will not hold them firmly. It is possible to shrink the king pin eye and re-ream to size - this is not to be undertaken lightly!!!

Finally make sure the axle is fitted the right way round!!! The TC has some embedded alpha-numeric markings which should be to the REAR of the axle. The TA and TB don't and I think the only way to check properly is to take the axle off and put it on a flat plate, then measure the king pin angles.

KING PINS -

It's obvious that if there is movement in the king pins, then the steering will be affected. Play in the pin and bushes will show itself by jacking up the axle and rocking the wheel top and bottom across the car, there should be no more than 3/16 inch movement at the top of the tyre. It's a good idea to lightly clamp the brake drum to the brake back plate so as not to confuse wheel bearing movement with play in the King Pins. Next lever the whole wheel up and down and check for Vertical play in the thrust washers - there should be only 0.004 inch in a new set, but anything up to 0.010 is usually acceptable if greased regularly – more and a thicker spacing shim is called for.

A potential big problem is if the eye of the axle itself has worn, usually as a result of the cotter pin working loose, which makes it difficult to set the king pin solidly in the axle - this fit should be a hard hand press fit before the cotter is fitted.

FRONT HUBS AND WHEEL BEARINGS -

Ensure these are in good condition. Check the bearings to make sure they run freely and are not pitted on the balls or the races. Check also that neither the stub axle nor hub housing have been worn down so that the bearing becomes a slack fit in either. I now always fit wheel bearings with a coat of a bearing lock liquid to ensure a firm fit on shaft and housing.

Finally with the knock-off nut slack, check the splines. Lock the brake and turn the wheel on the hub - there should be less than a half inch movement at most at the tread if the wheel and hub splines are reasonable. Slack splines at the rear can give a characteristic "Clonk" on Acceleration and braking, even with the K/O knocked up solid.

TRACK RODS AND ENDS -

The rods must be dead straight to minimise flexing. Track rod end ball joints must be round, not with worn flats on them. Make sure the spring is not squashed tight over time or worse, broken. The correct adjustment of the ball clearance is to tighten up with a screwdriver by hand until solid, then back off half a turn and fit the split pin to the end screw.

WHEELS -

If they are untrue, buckled, or have loose spokes they will distort the steering on the road, and particularly under braking. Jack up the wheel and spin them and ensure they run true. Then are the spokes tight? -- run a wood stick or pencil round the spokes and check the sound - any loose spokes will give a dull sound, a correct spoke a decent "Ping". With the front axle king pin angle already checked and corrected if needed, check the camber angle again at the wheel - there might be a problem with a bent stub axle though I've only seen this once – they more often crack right off, rolling off down the road complete with the wheel – so get these crack tested.

TYRES -

Jack the wheels up and check that the tyre is in good condition and runs true on the rim and that the rim is not buckled. There are usually a series of thin rings moulded into the rubber next to the rim to help determine whether the tyre is seated correctly on the rim.

Old and perished tyre rubber will also ruin steering. The cherished genuine 1930's Englebert 4.50x19 Racing tyres might look Great, but you might as well be on steel cart wheel rims. But seriously, there is a huge difference in texture between a new tyre and a ten year old one, no matter how much tread is left on it. Also tyres are made for different types of car – the Dunlop 4.50 x 19 B5 is ideal for T Types, others of the same size (but different material, tread and section) would not be, though they may be fine on an early 1920s Ford for example. Balancing of the wheel is important and not usually a problem with 450x 19 - the only real case of an unbalances wheel I saw was one where the guy had left a pair of pliers inside the cover! Correct tyre pressure should go without comment, but suffice to say that a few pounds below will make the steering very heavy and more still will make things uncontrollable.

TOE IN -

The TC data sheets say tracking should be adjusted to give a quarter inch toe in on the TC, and the TA and TB Factory data sheet specifies a full half inch. This is measured at the tyre bead rather than the wheel rim.

SHOCK ABSORBERS -

If these are not working they will allow the springs to keep the rear axle or front end bouncing after each bump with interesting results. As bad are two units which work but to different performance levels. Shock absorbers should always be replaced as matched pairs.

STEERING BOX –

Well “At last” I hear you say..... and the much maligned Bishop Cam box!!!.....even I will admit that neither the Marles Weller nor Bishop Cam box were the most advanced designs of the 1930's, but still, they did work and were appropriate to the market positioning of the MG when new. To be impressed - go drive an Austin 7! It contributes much to the well loved charismatic steering and feel that is the essence of the MMM and TABC Types, that was lost from the TD onwards. The key is good

maintenance and adjustment of both the boxes and the other aspects of the steering system, from chassis alignment onwards. The box should be filled with oil every 1500 miles with a thick oil at 250 grade (NEVER greased - the grease is too thick and will not circulate down the shaft).

STEERING BOX – Steering Wheel Shaft and Worm - Worm wear is not easy to see unless the peg has worn a clear "dent" in the middle. In general I've not found a lot of problem here as the follower peg seems to be the thing that wears most. There have been some replacement worms that were a bit soft though and these can wear, showing a burr on the edge of the worm. If the worm is worn it can be taken from the shaft and a new one pressed on and the end resecured by a weld. This is a good time to check that the shaft is dead straight.

STEERING BOX - WORM END CLEARANCE AND BEARING CONDITION - The worm (and shaft)

are located by two caged ballraces, and bearing cups in the housing casting. Sometimes the cages will disintegrate and excessive play will then develop in the shaft. Examine both the balls and cups for wear or pitting, and for any other damage and replace if necessary. I always set the end clearance at 0.005 inch, as per the top cover using only metal shims.

STEERING BOX - FOLLOWER PEG WEAR - An Achilles heel here - these pegs do wear but are easily replaced. They are a light press fit in the rocker shaft, and as long as the peg is not badly worn, and no one's done it already, it can be pressed out of the rocker shaft, turned through 90 degrees and replaced. Otherwise fit a new peg.

STEERING BOX - ROCKER SHAFT WEAR - Usually a problem. Both the shaft and the housing will wear, usually due to the use of grease in the box, grease being too heavy to flow down into the bearing surfaces - always use a very heavy oil in the box. The answer is to have the box rebored to an small oversize, (or thin sleeved to standard, but I don't like this idea so much), then build up the shaft with a decent thickness of chrome, so maintaining a minimum reduction in basic shaft diameter and housing material. Then the new rocker shaft bearing surface can be lightly ground back to just above standard size for final regrinding. I'd allow about 0.002 –0.003 inch clearance to encourage the lubricating oil seepage. You can't just sleeve the housing and undersize the shaft because of the drop arm splines, and I don't like the idea of removing so much metal from the housing that fitting roller bearings would require, the metal of the casing isn't good enough for that in my opinion.

STEERING BOX - TOP CLEARANCE AND COVER WEAR - The top of the rocker shaft wears the lid, especially in the centre. Have the lid surface ground back to flat, or perhaps better, make a new one from a sheet of high grade hard tool steel, then reassemble dry to allow 0.0015 to 0.002 inch clearance - adjust with the peg in the dead ahead position, by removal/addition of metal shims. You must use metal shims here, DO NOT use a paper or cork gasket on this joint. Note that the cover set up is done in the central position, at the part/full lock positions there is much more play built into the design.

STEERING BOX - DROP ARM SPLINE WEAR - It's often the case that the drop arm pinch bolt has worked loose at some time and the spline of either, or most often, both, the drop arm and the rocker shaft has been worn. There is no fix for this but to fit a new drop arm and a new rocker shaft.

OLD PARTS -

A final point -- you can usually stay in control following almost any breakage on the car except the steering. Some of our components may now be 60 years old. I am a great believer in crack testing steering components, old or new. Just think about what a broken stub axle, drag link, steering ball etc would do to you and the worse - the car!!!

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So there - that's a stab at it, there is probably much more could be done before this could be said to be a worthwhile document. As I said - its to give you some ideas. Get you pointed in the right direction so to speak.

Regards

Clive Sherriff

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