WORKSHOP

Servicing the Smiths speedometer.

Steve Denner

The Smiths speedometer of the vintage years was an extremely popular instrument fitted by many British vehicle manufacturers, being available in several calibrations from 40mph to 100mph. My own 1926 car is fitted optimistically with a 100mph instrument, and I can be certain that it will never wear out the upper end of the dial.

However, of recent months it was making its presence felt by emitting an irritating rumble able to be heard clearly above the background rattle of timing gears and the 'B' flat from third gear.

Moreover, as is common with this instrument the little lever that resets the trip odometer had broken off and thus it was decided something had to be done about it.

Although the works inside the instrument seem to be nicely built the biggest weakness is that the case is made of Mazac (a die cast alloy sometimes referred to as "monkey muck"). This stuff is very fragile and in fact the reason the trip lever had fallen off was that the two little mounts cast into the body that carry the lever had broken. To make matters worse Mazac tends to "grow" with age (and perhaps also corrosion) so that the body becomes a very tight fit in its spun brass bezel housing. Considerable care is required to separate the two without damage. You can tell this is so by the number of instruments damaged beyond use that are on offer at the Bendigo swap meet.

I found the following worked well for me. First remove any of the small retaining screws securing the housing to the body (often there are none left if someone has been here before you). Using three bits of 3-ply or similar, about 1/4" by 3", fit them around the body with ends lodged on the lip of the rim and hold in place with an elastic band (as photo). Grip the instrument upside down in one hand and tap the ends of the wood splints with a small hammer, moving round the circle.

With luck the housing will start to separate from the body and when it is about half way off it should be possible to remove it fully with gentle pressure. Be careful in the final disengagement because the glass and silver plated "nest" will also come away and will not appreciate the long drop onto to your concrete floor.

Much of the works is now visible but there is not much that can be done until the indicator hand and dial are removed. The hand is very fragile and is a press fit on its spindle but is often very tight. Strongly recommended to make up a special forked tool to lever the hand with pressure as close as possible to the mounting boss. I ground a "V" notch in an old screwdriver (well, it's old now).

Separating the bezel from the body.

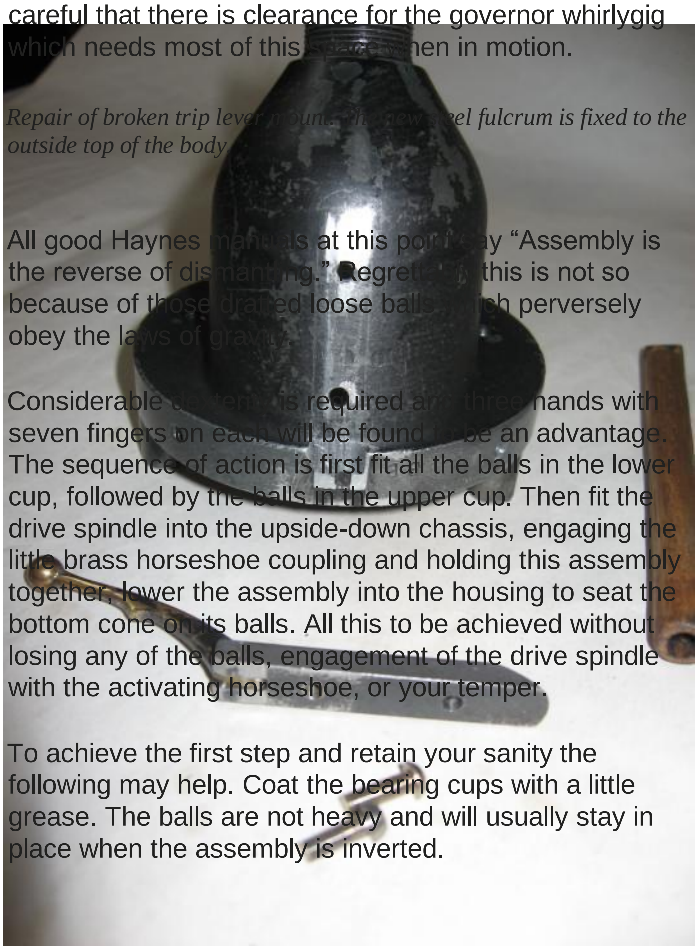
Put some protection on the face of the dial to prevent scratch damage while doing this. The dial will fall off once the hand is removed.

At this point all further dis-assembly should be done over a large Tupperware box. Before going further examine carefully how the rotation of the drive spindle pulls the little horseshoe connection which ultimately moves the hand. When reassembling the instrument you will need to engage this horseshoe with the flange on the drive spindle and it is possible to fit it upside down in error. The instrument motion can be demounted by removing three screws; two of which are cheese head 6BA and easily visible and the third which is a countersunk head and hides behind the trip reset mechanism and requires the trip operating arm to be held down to expose it. You can now separate the motion from the body and wise virgins who read and acted on the first sentence will collect the ball bearings in the tupperware. Foolish virgins will have an “Oh s**t!” moment as the little balls roll under the bench from whence they can only be retrieved by the vacuum cleaner.

It will be evident now that there are two loose ball races (cup and cone) at either end of the drive shaft. Look carefully in the bottom of the mazac housing where there is a cup because there may still be some balls embedded in the pre-historic dried grease there. Similarly look carefully around the upper bearing cup in the chassis of the instrument for escapees. The upper race carries 9 off 1/16” balls. The lower race seems to use 1/8” balls on vintage instruments, whereas later instruments (such as fitted to pre 1933 MGs) seem to be 1/16” both top and bottom. (I have lost my notes as to how many of each are required but it will be evident when you fill the cup).

Close up of the drive spindle shows a badly pitted bearing cone (extreme right). This one is probably beyond salvage. Has any member experience of dismantling and refurbishing this pressed up assembly? The various speed ranges (60, 80, 100 etc) of the instruments are determined by the rate of the coil spring on the spindle.

The reason for the noise of the instrument was now evident; the upper cone on the drive spindle was badly pitted possibly through poor lubrication or lack of working clearance on assembly. I don’t think removal and replacement of the cones is a simple matter and being unwilling to use force I settled for mounting the spindle in the lathe and dressing the cone with a Swiss file and emery to give a more presentable bearing surface. I would be keen to hear if anyone has more experience at this point. I limited other work on the instrument to gentle cleaning with white spirit and cotton buds to remove most of the grime, followed with sewing machine oil where it looked useful. I know of an architect who using Indian ink and squirrel hair brushes has repainted all the little numbers on all the little dials on the odometer, but he has a steady hand as a result of a virtuous and alcohol free life. Those of us who usually spill at least some of our porridge should not attempt this. The remount of the trip lever was undertaken by fabricating a mild steel fulcrum to carry the brass trip lever. The remains of the mazac mounting were filed off and the body cleaned up with a file so that the brass housing is an easier fit on reassembly. The new mount is secured with two 2BA fastenings screwed into the body. The wall thickness is only about 1/8” which is not a lot of thread, but neither is there a lot of force on the fulcrum. if tempted to secure it using a nut inside the body be careful that there is clearance for the governor whirlygig which needs most of this space when in motion.



Repair of broken trip lever mount. The new steel fulcrum is fixed to the outside top of the body.

All good Haynes manuals at this point say “Assembly is the reverse of dismantling.” Regrettably this is not so because of those dratted loose balls which perversely obey the laws of gravity.

Considerable dexterity is required and three hands with seven fingers on each will be found to be an advantage. The sequence of action is first fit all the balls in the lower cup, followed by the balls in the upper cup. Then fit the drive spindle into the upside-down chassis, engaging the little brass horseshoe coupling and holding this assembly together, lower the assembly into the housing to seat the bottom cone on its balls. All this to be achieved without losing any of the balls, engagement of the drive spindle with the activating horseshoe, or your temper.

To achieve the first step and retain your sanity the following may help. Coat the bearing cups with a little grease. The balls are not heavy and will usually stay in place when the assembly is inverted.

Filling the bottom race is fiddly and can be made easier by fashioning a dowel about 4” long that just passes through the lower bearing cup. Drill a hole up the centre

of the dowel of sufficient diameter to insert the bottom end of the drive spindle. Insert the dowel into the lower cup race and pack the balls around it. This stops them being dislodged and falling through the centre and onto the floor (again).

With the spindle engaged in the chassis top bearing use the dowel to help lower the assembly into the instrument body...

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The rest of the reassembly is exactly as per Haynes manuals. Cut a new paper gasket to fit between the bezel and glass. This will help to keep moisture out and prevent the glass rattling.

Use proper silver cleaner to polish the plated “nest” ring and clean the glass both sides.

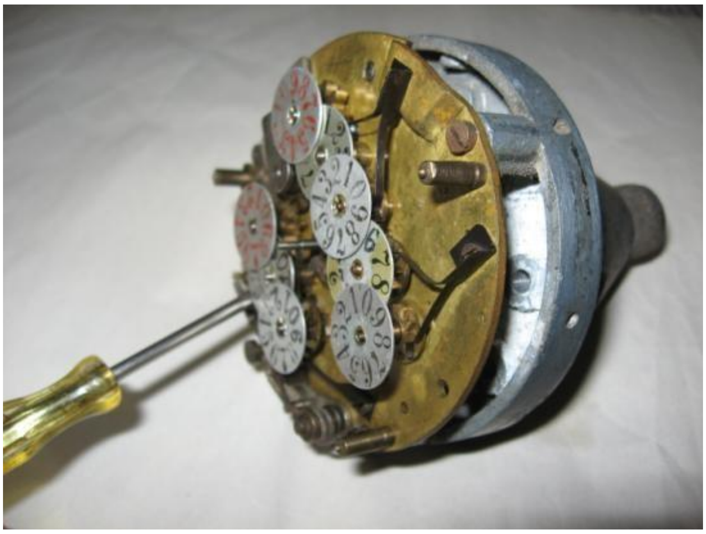
The top bearing cup is threaded into the chassis so that end float adjustment of the drive spindle can be achieved. Undo the locking screw in the chassis and back off the bearing cup just a little. Final end float adjustment is done only after the chassis has been screwed back onto the body mounts.

With the chassis inverted fit the nine 1/16” balls in the top cup. Again a small twist drill stood in the middle of the cup will make it easier. Now jiggle the drive spindle into place in the upper race, making sure the horseshoe lever is engaged correctly with the spindle.

Now lift the assembly and turn it the right way up ready to drop into the body. At this point it will be evident this is not going to work and there will be balls all over the bench (again). However if you insert the bottom end of the drive spindle into the axial drilling in the dowel you can lower the assembly of spindle and movement down into the body on the end of the dowel until the bottom cone is nicely seated in the bottom race. Now carefully hold it all together by fitting the two (easily accessible) cheese head 6BA screws to secure the chassis to the body. Now you can relax and breathe again and fit the hidden countersunk screw. Finally adjust the end float with the threaded top cup until there is just no perceptible axial movement but the spindle spins freely (and quietly, we hope) and tighten the locking screw.

Removing 90 years of scum makes a huge difference to the appearance of the instrument and this alone makes the exercise satisfactory. Is it any quieter? Perhaps. Is my hearing less sensitive?

Perhaps.



With dial and hand removed the chassis remains secured to the body with 3 screws. Screwdriver indicates location of adjustment for drive spindle end float.

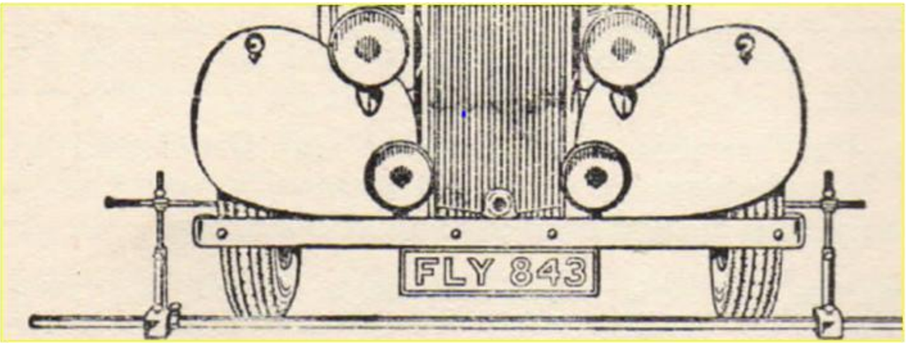
"For the sheer joy of driving …… I'd like to go there in an Alvis"

(Advertisement in The Motor 1952)

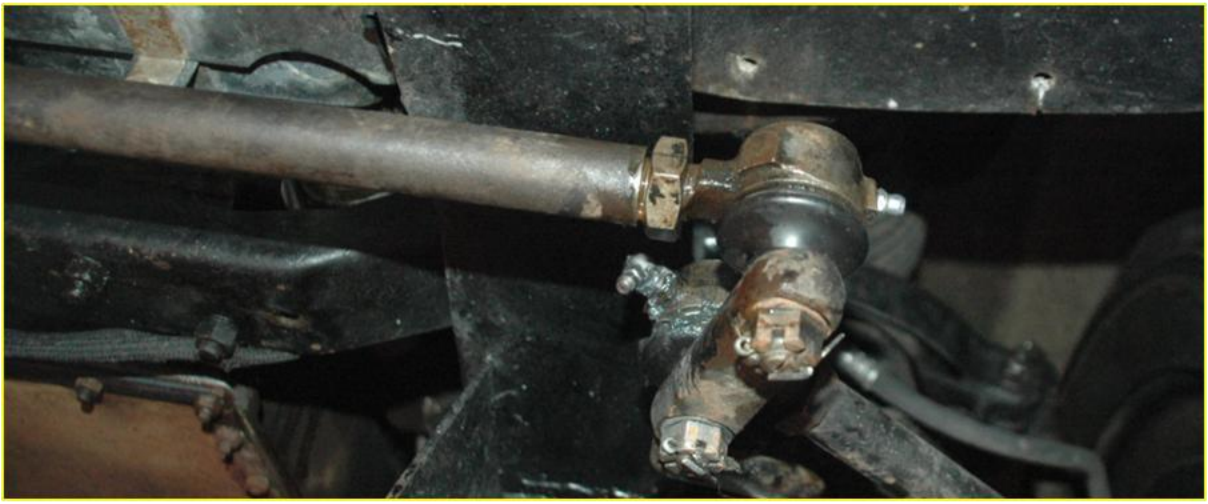
Three Litre cars - Wheel alignment

In 2012 I wrote about the poor handling of my TA21 when descending a windy section of the Dandenong Ranges on the outskirts of Melbourne. The tyres squealed around the bends and the car only drove well in a straight line. I later discovered that the ball joints had been replaced and that both steering side rod assembly lengths had been altered. It is my understanding that when new the lock nuts were tack welded to prevent any adjustment. No mention was made of their overall length in the Owner's Manual other than a comment that they were not to be adjusted. The result was that the toe in/toe out on turns had been significantly disturbed. Therefore the starting point for a Three Litre wheel alignment, be it done at home or by a garage, is to ensure that the side rod assemblies are of the correct and equal length between ball joint centres. This is where some confusion may exist as the Motor Trader Service Data Bulletin 202 of 1953 records the overall length between ball joint centres to be 13 1/8th inches however David Michie, the last service director for Alvis, writing in the April 1971 Alvis Owners Club Bulletin, (*see AOC Technical Compendium TA-TC, Section 4*) has the length at 13 ¼ inches. This is the measurement I have used with success. To achieve this setting I had made a simple tool from a thin piece of wood and hammered two small nails 13 ¼ inches apart right through the timber until their points came a good half inch out the other side. A small indentation at the base of each ball joint allowed the homemade tool to be accurately positioned.

As camber and castor are both fixed the only other adjustment is the toe setting. The Works stipulated a **0 - 1/16th** inch **toe out** and this was applicable from the TA21 through to the TF series. For those keen to do the job with original tools can usually find a period gauge on eBay, otherwise newer types are available. At the time of preparing this piece there was an American unit listed. The one I purchased was made by Dunlop and was the type typically found in a post war Australian local garage. A drawing of the unit is reproduced below and is from a Dunlop tyre booklet supplied with a new TA14 in 1946.



Given the gauges age it was in remarkably good condition. This unit is simple to use and quite accurate. As it came through the post my only requirement was to source the trammel which is a 6' length of galvanised pipe.
The toe setting procedure is straight forward. The first task is to undo the front tie rod ball joint lock nuts (*anti-clockwise direction*). The lock nuts can be quite difficult to budge. The tie rod is akin to a turnbuckle; rotating the bar in an anticlockwise direction will cause both wheels to toe in and vice versa.



I set the gauge in place now that the 2 lock nuts were undone and then recorded the starting point on the inches scale with a fine red pen. This can be seen in the calibration picture. It doesn't matter where one commences the initial reading on the gauge scale. The gauge is calibrated in both inches and millimetres. I just adjusted the arm and clamp to a section that had clear markings. The inch scale is marked in 1/16ths of an inch. {They are just visible between the larger 1/8th inch lines.}

Having made sure that all the gauge finger screws were tight I pulled the spring loaded calibration rod out to its locking position and then tipped the gauge on its side and rolled the car forward half a wheel rotation so that the toe reading was taken from the same rim positions. This lessened the possibility of out of true rims effecting the reading. The gauge was then pulled through and set up again this time in front of the wheels. With the lever released a reading could be taken and compared with the original. The tie rod was subsequently rotated in order get a zero toe reading, (i.e. the same as the starting point) as I have found zero toe to be quite satisfactory when running cross ply tyres.

As can be seen in the above photos the centre line of the wheel is the starting point for the measurement.
I repeated the process this time without rotating the wheels in order to see if the rims were true and they were.
Assuming that all adjustments have been done correctly and everything else is in proper order the steering wheel spokes should be symmetrical in the straight ahead position.

Postscript
In that earlier article I ended with a comment on regular steering arm inspection (see below) and I feel it is worth mentioning it again for there is not an overly generous amount of metal around where the side tie rod ball joint tapered end fits within <u>each</u> steering arm. If one of these were to fracture due to age related fatigue or other cause, then steering would be lost.

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You know it is time for a wheel alignment when you can change lanes by letting go the steering wheel!