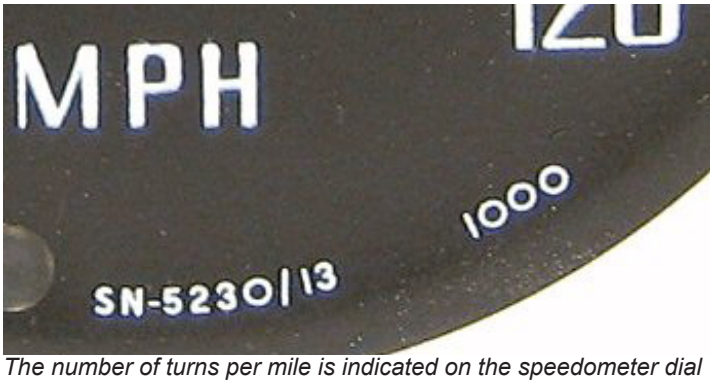
Are Your Speedos Correctly Adjusted? by Rick Astley

With the invaluable help of fellow member Gene Johnson, I recently acquired an overdrive for my 1970 MGB roadster. It took me only a day to pull the engine and fit it and what a difference it makes, it is like having an automatic transmission in 3rd and 4th gears. I revel in being able to flick the switch and cruise at a relatively slow engine speed and just flick it again when I need a little more acceleration. However, there was one odd thing, the car seemed to be moving a lot faster than the speedometer indicated, Luckily, before I was pulled over for speeding, I learned that it was indeed going quite a bit quicker. The error was significant. When in a residential area and indicating the posted 35 mph limit, I was apparently moving at nearly 45 mph; while in Canada on the 401 doing the prescribed 100 kph or 62 mph, I was doing 128 kph or 79 mph (yes you can sustain that speed with an overdrive).

The speedometer was obviously not suited to the output gearing of the drive from the overdrive transmission. Gene came to my aid once again by rescuing the speedometer from the same car from which the transmission came. Every Smiths speedometer has a number on it that indicates the cable revolutions per mile or kilometre. My old speedometer required 1280, while the new one was marked 1000. On some older MGBs it is 1080.



The number of turns per mile is indicated on the speedometer dial

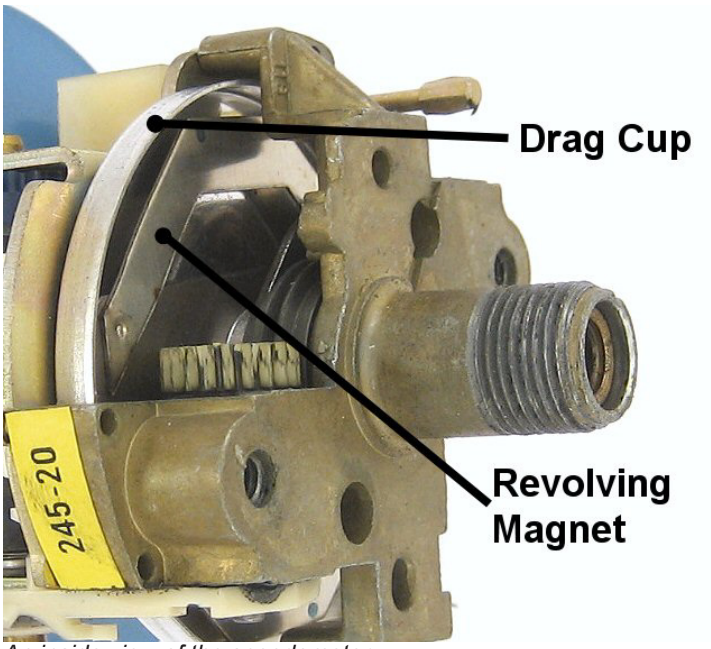
Changing a speedometer can be a pain — literally. Access to the under-dash area is very limited and generally requires a lot of swearing as the hands get scratched during the blind operation of removing and installing the gauge fixtures, illumination lamp, ground terminal and, hardest of all, the speedometer cable. After doing all of that, I was disappointed therefore to find that the odometer was still slightly inaccurate and that the speed measurement was nearly as bad as before.

My odometer actually records low now. Using the mile posts on the highway, it was recording about 2.1 miles each 2 miles, an error of some 5%. I suspected it was a tyre issue and so turned to the club's resident tyre expert, Doug Butcher. Doug told me that although the aspect ratio was not listed on tyres when the MGB was first produced, the recommended 165-SR-14 on my car were of the standard ratio for the period for radial ply tyres of 80% and so equate to a 165 80SR 14. If the car originally had cross ply tyres, then the standard aspect ratio, Doug says, would have been 90%. My current 175 P70 14 tyres though wider, are slightly lower profile and would result in the odometer reading marginally low. My odometer error isn't entirely explained away by the tyre size but maybe I am running them a little softer than originally recommended. If you have different tyres and/or wheels from standard you can calculate the speed difference yourself but, if you have web access, there is a great calculator on a Miata site. We have made a quick link to it at: www.wdmgc.com/speed.htm.

Using the mile-posts I also tried to estimate the speed error of the newly fitted speedometer. I tried to keep to a constant 60 mph which means that the car should travel one mile each minute. It's hard to keep a constant speed in traffic with no cruise control and to do any accurate timing, but using the sweep hand on my watch, at an indicated 60 mph, I travelled a mile in about 50 seconds, so I was doing about 72 mph! It was time to do something about the problem.

Modern speedometers are wholly electronic in operation, using electrical pulses taken from a sender at the output of the transmission and a very accurate quartz clock. The system counts the pulses over a sample time period and calculates the speed and distance travelled.

The speedometers in our MGs, and all cars of their era, use a cable that spins a magnet inside the speedometer. The magnet is in close proximity to an aluminium disk called a drag cup. The drag cup is mounted on the same shaft as the indicting needle, which has a light snail spring attached to it that ensures the needle returns to zero. When any magnetic field crosses a conductor, it causes a current to flow and the faster the field crosses it, the stronger that current is. Moreover, when a current flows in any conductor, it produces a magnetic field around itself, the higher the current, the stronger the field. The aluminium cup is not magnetic, but it is an electrical conductor. The spinning magnet induces a current in the cup that itself creates its own magnetic field that attracts itself to the magnet. The drag cup therefore tends to try to follow the magnet, but is held back by the spring. The faster the magnet rotates in response to the speed of the vehicle, the more current is induced in the cup, the greater the cup current's resultant magnetic field and the stronger is attraction to the magnet and its ability to overcome the force of the spring. In



An inside view of the speedometer

this way, the indicating needle, mounted on the same shaft as the cup, reads higher as the speed increases.

Being a well known cheapskate, I decided to try to adjust the speedometer myself. I knew that the indicating needle is only pushed onto its shaft and that it should be possible to rotate it relative to the shaft, spring and drag cup, so changing its reading. All I had to do was devise a method of determining the real speed. Not possessing a stroboscope or any of the other specialized tools used by an instrument house, I looked around my workshop.

The set-up I used is shown in the photo above. When I fitted the overdrive I had to buy a longer speedometer cable and so I had a spare one available. I attached that to the opened speedometer. Now I needed something to drive it and for that I chose my electric drill. That drill has three features that are very important for this job, it can be run in reverse to emulate the normal rotation direction of the cable, it has a latching trigger and the speed can be controlled. As it happens, my drill's adjustment control is rather course, but I found that my wood router's speed control was able to provide very fine adjustment; it is shown at centre right of the picture. I also found that I needed to put some weight on the cable jacket to stop it from riding away from the drill and pulling the inner cable out of the back of the instrument. I also needed a stop watch, and that I found that as a function on old digital watch I had thrown in a drawer; once fitted with a new battery, it worked fine.

First I set the drill at a speed that indicated 60 mph on the speedometer. Then I timed how long it took for the odometer to turn over one mile. It took only 52.20 seconds, not that far off my estimate made while timing between mile-posts. Remember too that my odometer isn't absolutely accurate. I could have chosen to compensate for that, but decided not to do so.

The speed calculation is 3,600 ÷ time for 1 mile. In this case, 3,600 ÷ 52.20 ≈ 69 mph. I then took the speedometer in hand and turned the drag cup until the needle on the front read 60 mph. I gripped the cup hard to lock it at this point and then rotated the needle against the stationary shaft so that it indicated 69 mph. I repeated the test and found I had to make a small additional adjustment. I then checked the speed first over a longer period and then at 30, 40 and 50 mph. It worked fine on the bench and has since proven to work accurately in the car. I think any fast speedometer may be adjusted in this way but I believe my 15% error represents the maximum possible for a slow instrument. That's because the spring now hardly returns the needle to zero and there is some noticeable, but acceptable, flutter at low speeds.

Our headline is obviously a deliberate *double entendre*, referring also to a story I heard many years ago about Speedos, those swimming briefs popular with would-be macho men who cruise the beaches of the Mediterranean.

Tony and Frankie were good friends but Frankie was always jealous of the way Tony seemed to be able to attract more girls than he did.

"How do you do it Tony?" Frankie complained one day, "I don't seem to he half the success you do!"

"If I tell you my secret", Tony whispered, "you must swear not to tell a living soul. I put a potato in my Speedos".

"Wow", said Frankie, "that's a great idea, I'll try it today"

"When they met later that day, Tony asked Frankie how it got on.

"Fine friend you are", moaned Frankie, "I did worse than ever."

I think I see the problem", said Tony, "your supposed to put the potato at the front!"

Stay Cool Dude!

by Harry Mac Lean

I recently read an article in which a so called expert claimed that water is the best coolant to use in an MG, or any early car for that matter. This could not be further from the truth.

Overheating problems can be caused by many things other than just hot weather. For a couple of reasons, you should be running a 50/50 mix of antifreeze. First, if you have that mixture in your car you don't need to worry about Michigan winters as it will be protected down to about -40°. Secondly, antifreeze boils at a higher temperature than water, so will help prevent boil-over.

If you are having a overheating problem with your LBC then the very first thing you should check is the radiator cap. Later LBCs are pressurized at about 15 lbs and for every one pound of pressurization the boiling temperature of the coolant increases 3°. Pure water boils at 212°F but under 10 pounds of pressure, it won't boil until it reaches 242°F degrees. If you use a specialized radiator coolant the boil-over temperature will be even higher.

Radiator caps are checked using a radiator pressure tester and it takes only about 5 minutes to do this. The next thing to check is the radiator itself. This can be done by getting the car hot, that means driving it about 20 miles or so, then shutting the car off and putting your hand against the radiator core in several spots — it should be warm all over. If it has cool or cold spots then the radiator either needs to be "rodded" out or replaced. If there are loose fins on the radiator then the whole thing should be replaced because that is a sign of impending failure.

If the car continues to overheat then you probably should have the head gasket checked, this being an MG weakness.

Don't forget the thermostat. A 180°F 'stat' is a good choice for an MGB. Anything lower and your car will not get the best fuel mileage because running cooler reduces the fuel burn rate inside the engine.

One last but very important thing. IF YOU EVER OVERHEAT YOUR CAR, WAIT UNTIL IT COOLS DOWN BEFORE OPENING THE RADIATOR CAP! Otherwise, a very dangerous situation could occur that can result in bad scolding, especially if you hear cracking and popping noises inside the cooling system. Also, if you wait, you may not have to use so much coolant fluid to top-up the system.