Old cars and new fuels

By Rick Astley

The magazine *Hagerty's*, owned by the company that insures most classic cars in the USA, recently published the first findings of a study it commissioned from Kettering University concerning the use of E5 and E10 fuels (gasoline containing 5% and 10% ethanol) in classic cars. It happens that the first tests completed were those on a 1958 MGA, so while we don't have permission to reprint the article as a whole, it's worth looking at the findings and revisiting the issue of using modern fuel formulations in our old cars. In fact it's an especially good time to do so with over 67% of the US gasoline supply already being E5 or E10, often without labeling, and Canada mandating E10 fuel by May of this year.

Reliability

Hagerty's stated reason for commissioning the tests was that all those it could find so far were simple long term immersion tests performed on fuel system components and that even some of those were suspect, having been funded my parties interested in the promotion of ethanol.

Kettering University tested the MGA for 3,000 hours, comparing the running performance with E10 and against that with E0 (gasoline with no ethanol content). No difference in carburetor or fuel pump performance was found and inspection showed no blockages or sticking of moving parts. It was reported, however, that there were *"indications that operating an SU-equipped vehicle over a long period of time may require more frequent fuel system maintenance to replace seals and remove varnishes and particulate buildup on components, such as the dashpot damper, the inside of the dashpot and on the throttle shaft. Softening or cracked seals and gaskets could allow leakage, and the varnish could impede throttle shaft operation."* A steel drum, rather than the car's gas-tank, was used as a fuel reservoir and corrosion was observed to be forming inside it, *"suggesting that it may be prudent to coat or seal steel fuel tanks."*

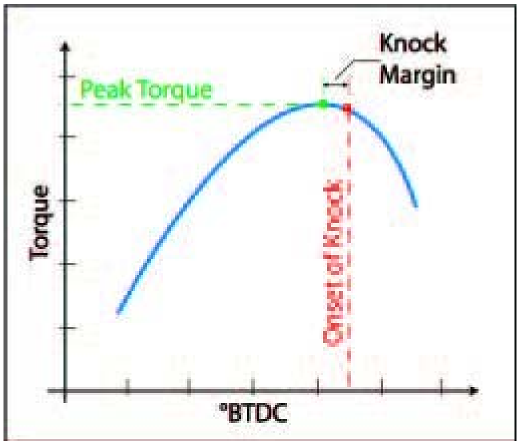
Data from elsewhere suggests that ethanol eventually separates from gasoline, forming a waxy deposit that if allowed to dry becomes more like a varnish. Moreover, some of the wax falls to the bottom of the fuel, be it in the tank or carburetor float chamber, where it combines with other deposits to form sludge. I can attest to this, having reported in the November/December edition of *The Can-Am Connection* that the float of my lawn mower's carburetor had become glued to the bottom of its chamber after the prior winter's storage and that my intention was to run its carburetor, and those of my MGs, dry before storage this winter. At the time of writing I've yet to see how effective that strategy has been in the mower but the MGs certainly started and run fine. Also, I remain conflicted as to whether the fuel tank should be left as full as possible, risking waxing, or nearly empty, exposing more inner tank surface to corrosion.

Performance

The *Hagerty's* article begins, *"Modern gasoline blends are far removed from those for which most collector vehicles were designed."* This echoes something I wrote in my MGB Electrical book regarding ignition timing, arguing that modern fuels have such different burn rates to those used when MG determined the optimum ignition timing, that the timing of the ignition using the factory data is now futile. I made the text more generic for a later book concerning British classic cars in general, and it reads as follows.

"Different fuel types and mixtures have different burning rates and so require a different ignition setting to ensure maximum combustion pressure is reached at about 10° after TDC. There is no point in trying to find the optimum timing for the car unless the carburetors have been properly tuned beforehand and the same octane rating fuel is always used. Note that the usual recommendation is 98 octane for high compression engines and 93 octane for the low compression engines both measured by the RON system used in the UK. This equates to 93 and 88 octane respectively when measured by the North American (RON + MON)/2 method.

The graph shows how engine torque varies as the ignition timing changes in degrees before top dead centre (°BTDC). Note that as the ignition timing is advanced, the engine torque increases until a point is reached when the spark occurs too early and the onset of 'knock' is heard. Knock and pinking or pinging are technically different phenomena but for most purposes they can be considered the same thing. Once knock occurs, torque – and brake horsepower with it – reduces *substantially and piston damage may occur. The so-called knock margin is very small on high compression engines and so the peak torque point can usually be established by finding the timing setting that produces knock and then retarding the ignition timing just enough to eliminate it.*



To find the optimum timing for a particular car, with a tank full of the recommended fuel, drive the car uphill and try to accelerate without changing down a gear. Do you hear pinking (pinging) (a tinkling or rattling sound) that disappears when you decelerate or shift down?

- *If so, try retarding the engine until the noise no longer occurs. If it is evident that retarding the engine is futile, the pinking persisting but the engine losing power, then you need to use a higher octane fuel or, if none is available, an octane booster. Remember that pinking is extremely harmful and every effort should be taken to avoid it.*
- *If there is no pinking, gradually advance the ignition timing until it can just be perceived, then back it off until the effect disappears.*

This method of timing, although not textbook, results in the best timing for your car and with your fuel, without damaging knock or ping. "

I used this method on my own stock, but worn-out, 1970 MGB roadster, and while those who follow it on club events disappear in a cloud of blue smoke, after using a sophisticated accelerometer I can report that it's 0-60 mph acceleration beats that given for the car in the original published road tests. While I describe the method as "not textbook", in fact modern cars cope with flex-fuels largely by using the same technique. A piezoelectric knock-sensor, which is essentially a specialized microphone, is attached to the engine block. The car's engine control module advances the ignition until the sensor tells it that knock has occurred, whereupon the module retards the ignition just enough to eliminate it.

Unfortunately, none of the foregoing fully addresses the issues associated with modern fuel in our collector cars but I hope that awareness will help us identify and avoid problems down the road. ■