



Electronic Tachometer, Part I

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This is the first in a series of articles detailing the operation, repair, and calibration of the Smiths electronic tachometer fitted to the Austin-Healey 3000, series BJ8. The tachometer was supplied by Smiths Motor Accessory Division and is identified as the RVI 2602/00 or the later RVI 2602/OOA rationalized movement.

With the advent of transistors, Smiths was able to develop TTL (transistor-transistor logic) circuits to replace the earlier mechanical mechanisms and cables.

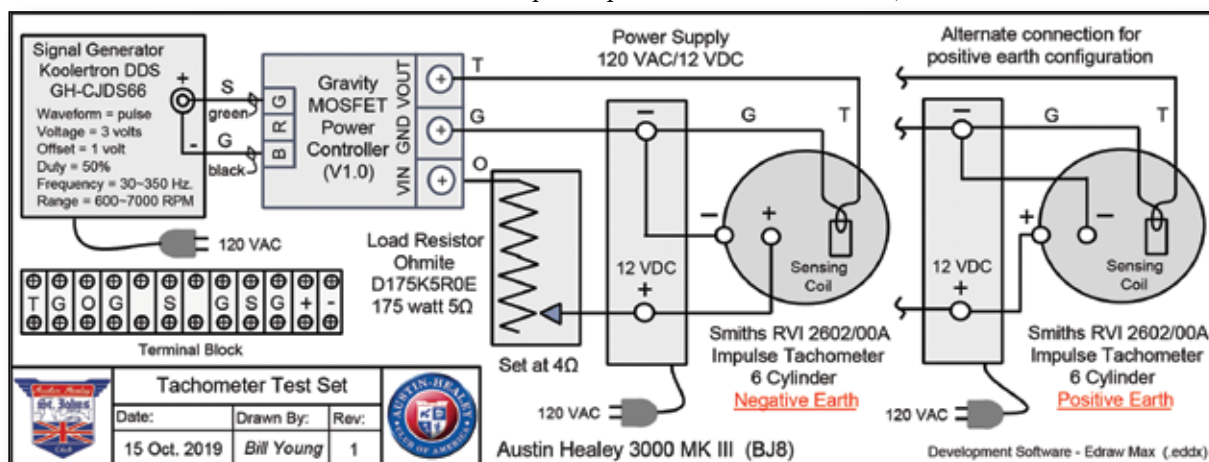
Various types of tachometers were manufactured having different logic configurations.

The RVI 2602 series tachometer uses two transistors in a monostable multivibrator configuration. I will discuss this in further detail in the next installment.

The tachometer is known as an "impulse" type, sensing pulses to the ignition coil. The Austin-Healey ignition system has a set of points to switch 3-4 amps of coil current to produce a spark. The tachometer senses these current pulses using a current transformer to transfer these pulses to the tachometer circuitry without any direct connection to the ignition circuit. This keeps voltage spikes present on the low voltage side of the coil from damaging the relatively fragile transistors, capacitors, and zener diode inside the tachometer.

In order to prepare and develop a plan to be able to bench test and calibrate this type of device, I first had to build a bench testing setup. I wanted to be able to simulate the engine RPM from "idle" to "red line." I selected a signal generator that could provide a pulse output that

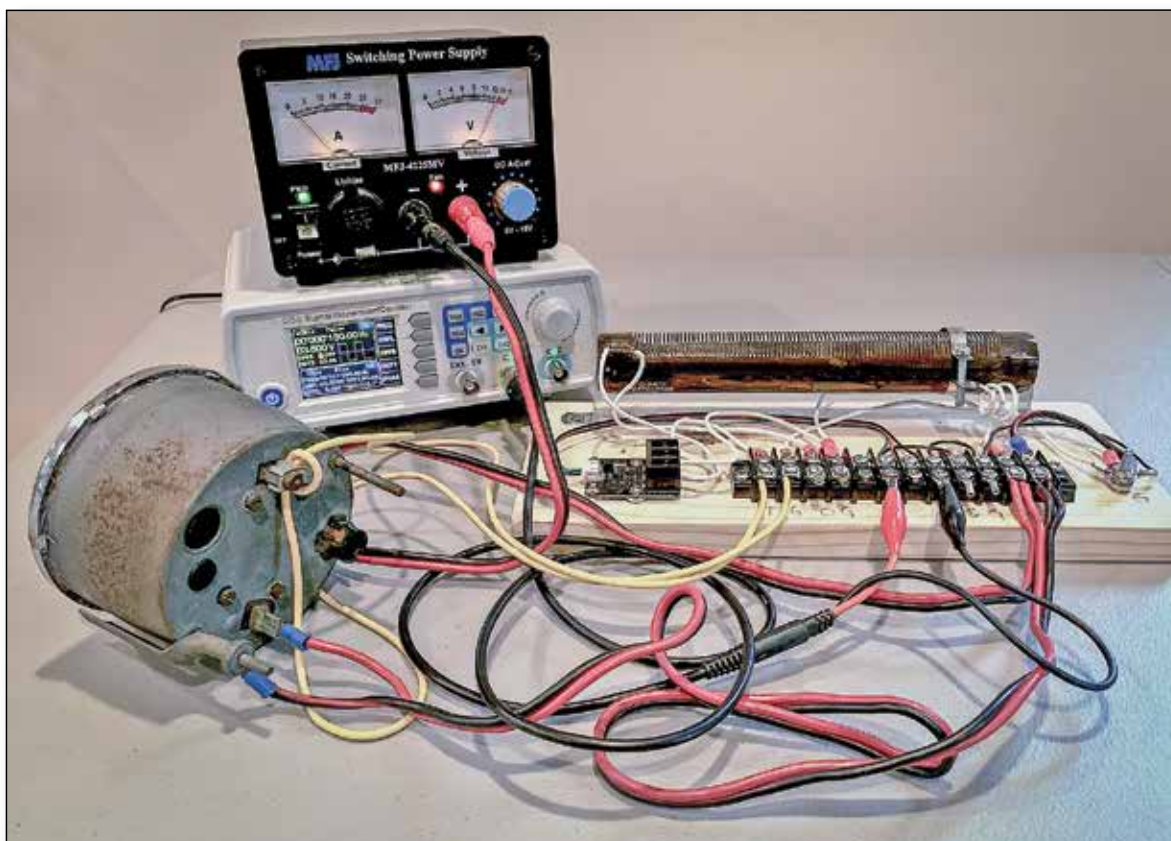
could be adjusted for waveform (pulse), amplitude (3 volts), duty (50 percent), offset (1 volt), and frequency (30-350 Hz.). The Austin-Healey six cylinder engine fires three times per revolution, so with a little mathematics, I determined that a pulse train of 30 Hz. (30 pulses per second) equaled 600 RPM (30 pulses per second X 60 seconds)/3 pulses per revolution = 600 RPM while a pulse train is 350 Hz. (350 pulses per second) equaled 7000 RPM (350 pulses per second X 60 seconds)/3 pulses per revolution = 7000 RPM).



The signal generator did not have enough power output to drive the tachometer that was designed to operate on the 2-4 amps of ignition coil current. Therefore, I had to build an amplifier circuit using a 12 VDC power supply, MOSFET switching transistor, and a 5 ohm adjustable load resistor to create the high power circuit. See the accompanying diagram, "Tachometer Test Set."



I mounted the components on a board and wired all to a terminal block for the bench connections. I added additional

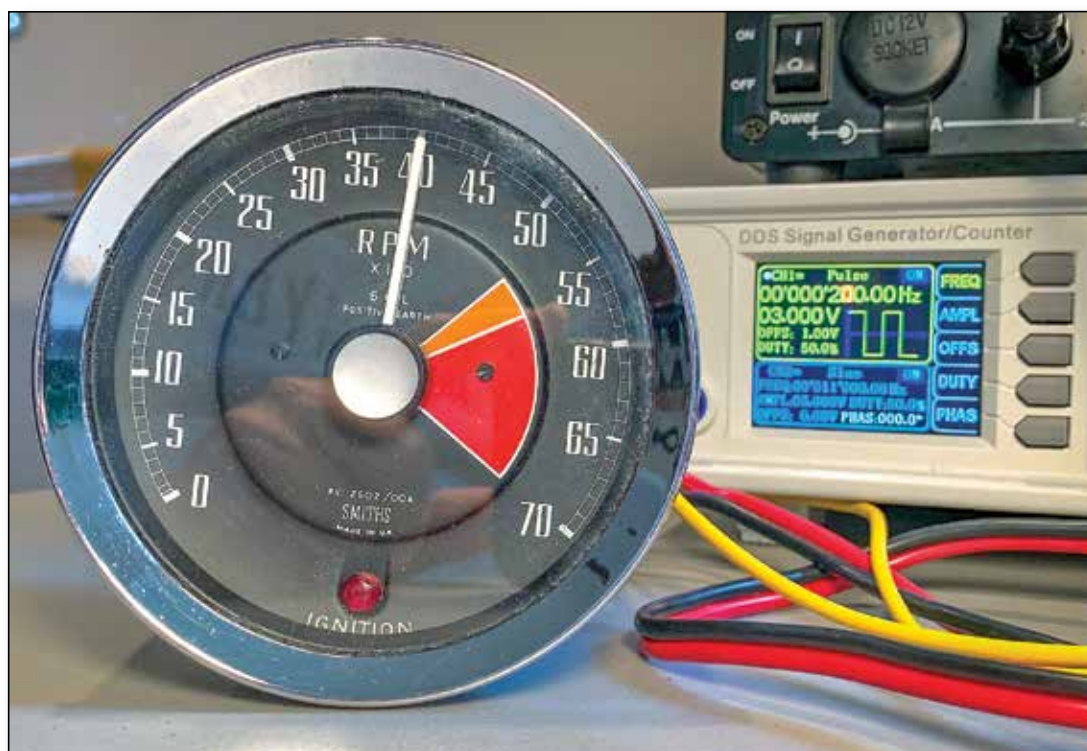


set and do a bench test. Removing the tachometer from the car is a bit tricky. While it is easy enough to pull out the illumination lamp, the ignition-warning lamp, and disconnect the power and earth wires, the white pulse-sensing wire loop is solid wired on a positive earth installation. Perhaps your car had been converted to negative earth, and the white wire had been cut and reversed. In either case, the U-shaped metal clip and support block sensing loop assembly needs to come out with the tachometer. See "Bench Test Setup."

terminal points for connecting a dual trace oscilloscope and digital voltmeter for further measurements and calibration to be discussed in future articles. See "Current Amplifier Board."

Do you ever wonder how accurate your tachometer reads over the RPM range? Perhaps you could build a similar test

With the tachometer on the bench it can be connected up for testing. At this point it is *very important* to know if the tachometer is positive earth or if it has been converted to negative earth. Incorrect connections will damage the electronic circuits. Correctly connect the positive and negative power and the pulse sensing loop to the test set. Turn on



the signal generator and DC power supply, set the frequency at 200 Hz (equal to 4000 RPM) and see if the tachometer indicates. If it doesn't, consider reversing the wires to the loop sensing circuit. If it is working, check out other RPM settings to determine accuracy over the range. I found that the original tachometers were no longer linear due to aging of the internal components.

If your tachometer isn't working or is reading incorrectly, the next articles will discuss the repair and calibration procedures to return the unit to proper operation. There will be some technobabble, pretty pictures, and electrical diagrams for sure. **HM**