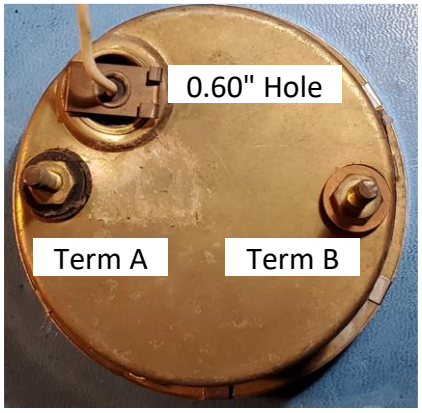
Vintage Faria Tachometers
Rev. 2.0

Faria made a number of electronic tachometers in the 60s and 70s that were popular with the muscle car crowd. They also made ’65 & “66 Shelby, Sprint Falcon, Mustang Rally pack, T-Bird and Thunderbolt Rotunda Tachometers, some of which are now quite valuable.

I decided to analyze one of these tachometers, a 4k RPM model acquired from eBay.. (I also have just the meter from a 10K RPM model as well.) I later received a Faria tachometer from a 1966 Shelby GT350. There are 2 sections to this document, the 4K Faria analysis section and the slightly different 9K GT350 analysis after that section

4K Faria Analysis



All of the vintage Faria tachometer documentation on the internet indicates that the Faria tachometers are wired between the ignition switch and the coil positive, which implies that they are current driven tachometers. There also is no indication that the tachometers are polarity sensitive since there is no information differentiating between the two terminals. I have arbitrarily marked the terminals A and B.

I measured the resistance across the terminals with a 4-wire Kelvin ohmmeter and measured 0.015 Ohms regardless of polarity. There are no other terminals (other than the illumination bulb socket) so the tachometers are powered by the signal.

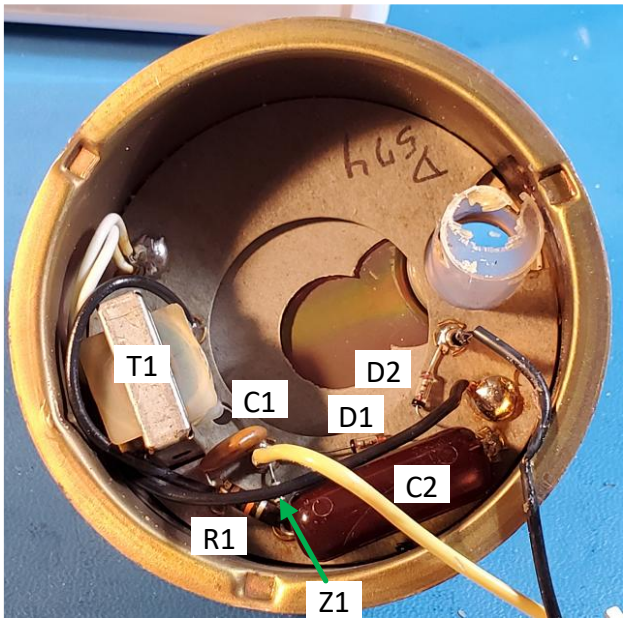
The illumination bulb is an automotive 1895 bulb.

I drove the tachometer with a variable current calibration took and learned that it takes a calibration square wave of about 1.5A to reliably drive the tachometer. That means about 1.5A when the points are closed and 0A when the points are open.

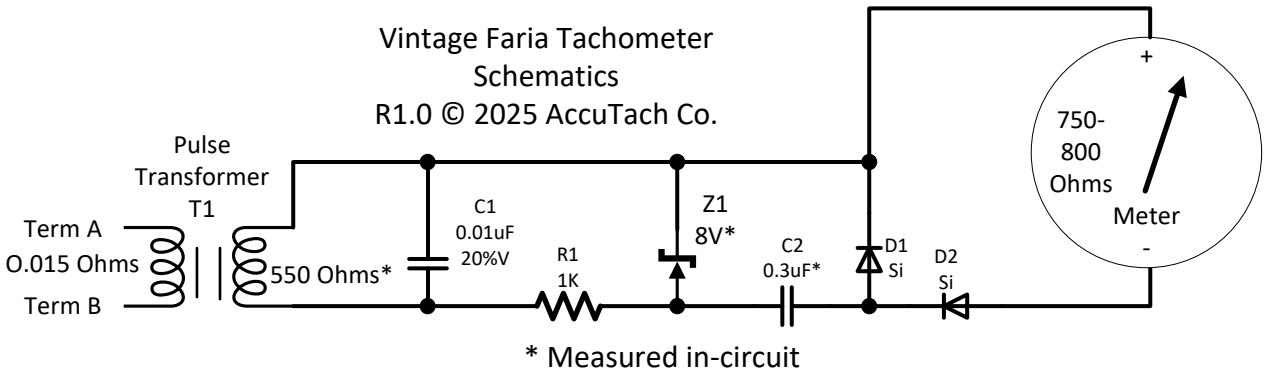
The tachometer was accurate up to 3000 RPM. With a 4000 RPM reference signal, the tachometer read 3900 RPM.

The bezel and glass of the tachometer are removed by uncrimping all of the metal tabs around the rim of the case. When the bezel is removed, the meter will come out of the case. Two wires, black and yellow, plug into pins on the circuit board. They can be unplugged and the meter removed, exposing the electronics.

Here are photos of the tachometer with the bezel removed and then with the meter removed:



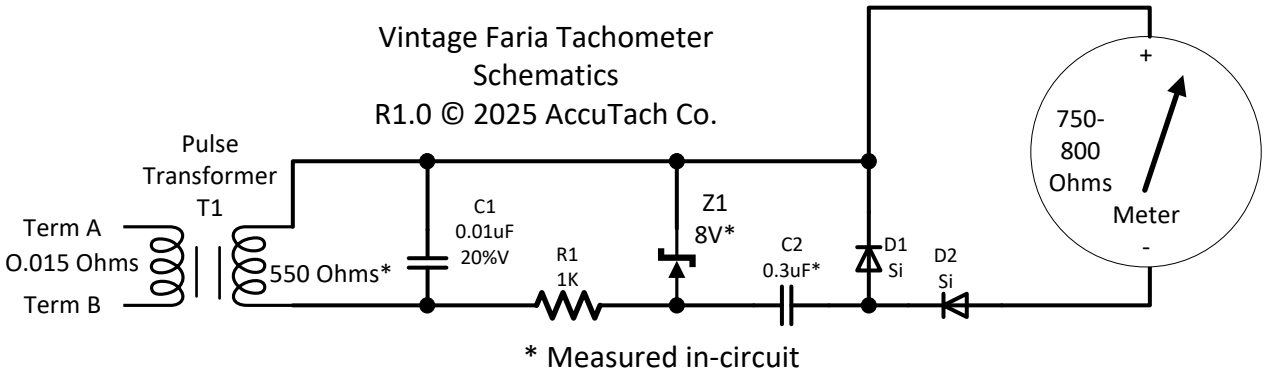
Note: The circuit board is riveted to the back of the case. Here are the schematics of the tachometer circuit:



Theory of operation

When a 1.5A or better current pulse goes through T1, it generates a 50V positive pulse on the output on the rising edge of the input and then a 40V negative pulse on the output on the falling edge: Here's a photo of the output of T1:

Schematics again for reference:



When the top of T1 is negative, C2 is discharged through D1, with no current flowing through the meter. When the top of T1 goes positive, C2 is charged to 8V through the meter and D2, deflecting the meter. Z1 ensures a consistent charge of energy for each pulse by limiting each charge to 8V. Here is a shot of the voltage across Z1 being limited to 8V:

Bench Testing and Diagnosis

Without opening up the tachometer, you should test the transformer input winding with an ohmmeter. If there is an open circuit, then the tachometer has likely had the primary winding or the wire to the transformer burned out and the tachometer will need to be opened.

If the input winding reads close to 0 Ohms, the tachometer can be driven with a distributor/coil setup to see if it is functional. Checking the calibration with that setup is difficult. To bench test the tachometer, a high-current (1.5A) audio frequency pulse train must be generated. The easiest way to check the calibration of one of these tachometers is to use a TechnoVersions Tach Tester in I-drive mode (https://www.technoversions.com/TachometerTester.html). The AccuTach Smiths Tachometer Calibrator does not generate a high enough current pulse to properly drive the tachometer. This tachometer showed that it was calibrated for an 8 cylinder engine. The calibration markings on the back of many of these tachometers have disappeared. Note that adding capacitance to C2 increases needle deflection.

Bench testing can tell the number of cylinders that the tachometer was calibrated for and how accurate the tachometer is. A TechnoVersions TachMatch I-drive unit can be used to recalibrate one of these tachometers for a different number of cylinders.

Repair prospects

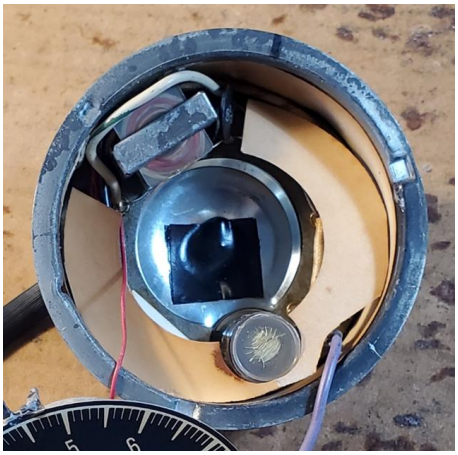
If the meter is bad, the tachometer is beyond repair. Diodes and capacitors can be replaced if they fail, but it may be difficult to access the circuit board to replace them. If the meter is good, it is possible to cut the wires going to the tachometer terminals and to the meter and rewire the meter wires to the external terminals. After that is done, a Technoversions TachMatch unit can drive the tachometer in Vintage mode. If you need more than 8000 RPM, contact AccuTach Co. for a custom calibrated transmitter for your tachometer. In either case, this will also make to possible to change the number of cylinders that the tachometer is calibrated for.

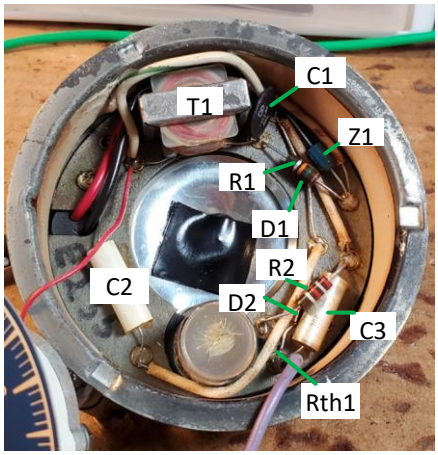
9K GT350 Analysis

I received a non-functional 9K Faria tachometer from a customer with an authentic 1966 Shelby GT350 to try to repair.

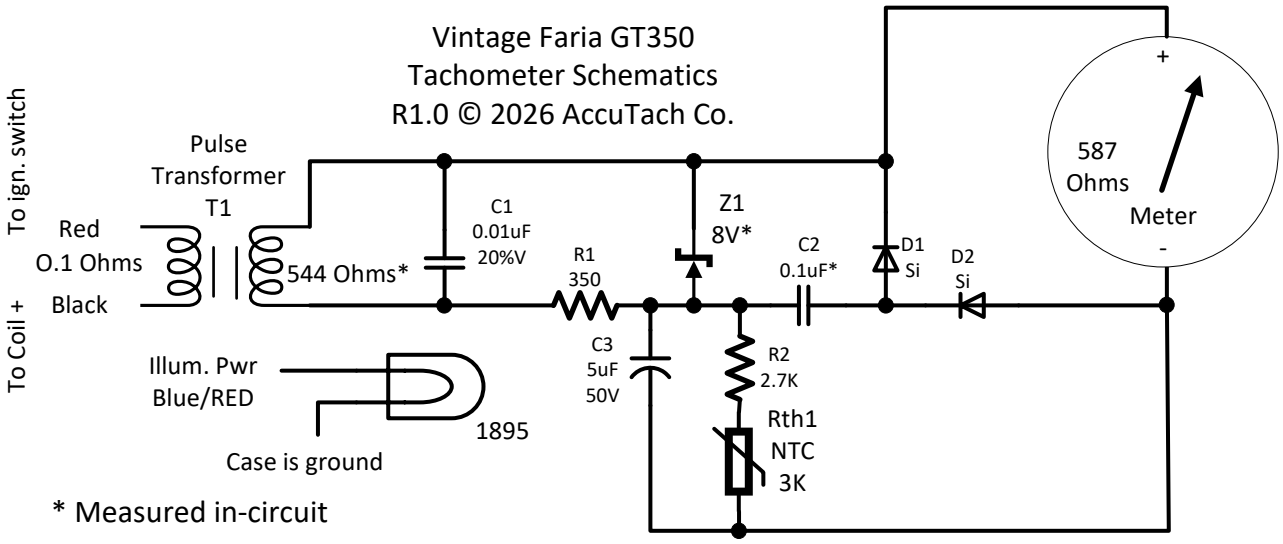
It is a little different from the other Faria tachometers in both the circuit and the tachometer connections. The previous tachometers had two stud terminals on the back of the case whereas the GT350 unit has two wires going through a strain reliever on the back of the case.

This tachometer has what look like a paper piece cut to provide electrical insulation between the circuit and the meter. Removing the paper reveals the circuit board which is riveted to the back of the case. Here are the components:





The circuit is very similar to the circuit in the 4K tachometer with the addition of some thermal compensation components. C3, R2 and Rth1 change resistance with temperature to compensate for the change in resistance of the copper deflection coil with temperature.



Meter Characterization

I have a 10K RPM meter and a 4K RPM meter for meter characterization.

Testing the meters shows some interesting anomalies. My Fluke ohmmeter measured the meter resistance correctly when the meter was connected either way. My Tektronix ohmmeter measured it correctly when the positive lead was connected to the meter's black lead and the negative lead was connected to the meter's yellow lead. But when the leads were reversed, the meter and the needle started bouncing wildly. I assume this has something to do with how the Tek measures resistance.

The 4K meter measured 750 Ohms while the 10K meter measured 800 ohms.

Here is the transfer function that I measured with both meters.

4K Meter		10K Meter	
RPM	Current	RPM	Current
4K	650uA	10K	650uA
		9K	570uA
		8K	510uA
3K	470uA	7K	440uA
		6K	390uA
2K	300uA	5K	320uA
		4K	250uA
		3K	180uA
1K	150uA	2K	110uA
		1K	50uA
0K	0uA	0K	0uA

It is clear that Faria uses a 650uA ammeter for all of their tachometers of this style. They put different faces on and calibrate the tach with the values of the circuit, most likely C2. This implies that faces could possibly be swapped and electronics tweaked to restore the functions of a valuable broken Faria tachometer.

Final notes

It is not clear how to best recalibrate these tachometers. I did learn that increasing the capacitance of C2 will increase the needle deflection so decreasing it should do the opposite.

Should you have a Faria tachometer with a burned out transformer, it may be possible to salvage it. You can test the meter by using an ohmmeter across the meter to see if you get an open circuit or 500-600 ohms. If the meter is an open circuit, it is dead. To salvage it, you will need to send it to a company such as Redline Gauge Works to have the meter and guts replaced with modern innards.

If the meter has resistance and the needle goes full scale when testing it with the ohmmeter (switch the leads if the needle moves the wrong way), then you can unhook the inner circuit from the outside terminals and run the meter wires to the terminals. Then you can use a Technoversions TachMatch unit in Vintage Mode to drive the meter. Follow the TachMatch instructions to install and calibrate the tachometer. BTW, it will be more accurate than the original circuit was.

AccuTach Co. would be happy to work with you if you have a vintage Faria-made tachometer that you would like to get working again.