Ford Model A
Electronic Voltage Regulator
Overview and Installation

Introduction

The output voltage of a Model A generator is regulated by manually moving a brush within the generator that supplies current to the field coils. The challenge is finding the optimum brush setting to match the car's electrical needs so that the battery is neither being drained or being overcharged. If the battery is being overcharged, the battery electrolyte can boil off. Conversely, if the generator output is set too low (i.e. lights on) the battery will drain. The better solution is to constantly regulate the generator output depending on the vehicle's electrical requirements.

Model A Voltage Regulator Background

A gentlemen active in the Model A community – Tom Wesenberg – designed and produced an Electronic Voltage Regulator (EVR) for a variety of Model A generators including the Long Style and Powerhouse. Sadly, Tom passed away in early 2022. The voltage regulation principle Tom used in his EVR is well known. However, Tom's design was unique because it was located within the generator housing enabling Model A owners to maintain the stock look of the generator in their vehicles. My EVR was inspired by Tom's original design.

The EVR, similar to moving the third brush in the generator, regulates the current to the field coils to control the power output of the generator. A standard Model A generator will generally output over 9V until the load matches the third brush setting. The EVR allows for a maximum generator output voltage of 7.2 volts which is the optimum charge voltage for a 6V battery. As a secondary benefit, the EVR continues to regulate the power to the field coils in the event the generator is disconnected from the battery. Disconnecting a generator from the battery causes a runaway effect resulting in high currents in the field coils and commutator arcing ultimately creating high temperatures which destroy the generator wiring.

As a precaution always ground the output post of the generator if the generator becomes disconnected from the battery during driving.

Installing the Long Style Generator EVR

1. The EVR will only work on a 6V positive ground system and on the long-style generator.
2. Make sure the generator, battery and cutout are in good working condition before installing the EVR and ensure the car's wiring from the generator through to the terminal box and battery has no loose connections. The EVR will not work properly if the Cutout is not functioning properly or if the generator field coils or armature are compromised. A poor battery may not charge or cause high current draws.
3. Determine whether you have a diode or relay cutout. If in doubt, using a multimeter, connect the meter leads to the 2 cutout terminals, then reverse the meter leads. If you have a diode cutout, the meter should show near zero resistance in one direction but show infinite resistance in the other direction. A relay cutout should be adjusted to engage around 6.5 volts.
4. If you use a diode cutout, then you must cut the yellow jumper wire (color may vary) and make sure the wire ends don't contact anything. The cut jumper wire increases the voltage output of the EVR to compensate for the voltage loss (approx. 0.6V) that occurs across a diode cutout.
5. Remove the band at the rear of the generator and the rear end plate, then remove the field and output wires from their brushes.
6. Remove the two screws holding the adjustable brush ring holders, then remove the ring. Reinstall the screw for the ground brush wire if removed. Retain the adjustable brush and Y clips if you ever want to uninstall the EVR later.
7. Install the supplied screw with star washer through the circuit board, then through the spacer, then into the end plate as shown in Figure 1. The screw is tacked with solder for shipping so turn the screw a couple of times until the solder breaks before mounting the circuit board to the rear plate. Use a star washer under the screw head to ensure good electrical continuity and make sure the EVR is firmly secured. A dab of urethane or silicon glue can be applied to the pad on the underside of the EVR to better secure it. Make sure there is clearance at the end of the circuit board for the generator bolt. The generator through bolt holds the EVR in place so ensure the circuit board end "hook" aligns with the bolt hole. Please contact me for:
    a. installation in an early '29 generator (rear bearing) - a small modification to the notch in the circuit board is required.

b. installation on a ’33 to ’36 back plate - a hole must be drilled and tapped in the back plate

8. Install the EVR and generator output wire to the generator output brush as shown in Figure 2. If the brush falls out, note that the short end of the brush taper always faces the pivot post for that brush.
9. Install the end plate onto the generator by pulling the brushes out as the armature slides into the rear plate bushing/bearing.
10. Check clearances. Make sure the generator output brush contacts the commutator properly and the spring mechanism provides constant firm pressure. Make sure the brush can move in and out freely. It is preferable if the original flexible output wire is used or a multistrand (silicon) flexible wire is used as a replacement. Regular stiff stranded wire can inhibit the brush movement and commutator contact.
11. Install the field wire under the screw on the aluminum heat sink using the supplied star washer and screw as shown in Figure 3. Tighten carefully to avoid the threads in the aluminum from stripping.
12. Check the clearances between the wires, terminals and the case to avoid shorts and ensure the wires are well away from the armature to prevent rubbing.

Steve Blancard has a great youtube video on how to install the EVR here - https://www.youtube.com/watch?v=SWQdF3xKaaY.

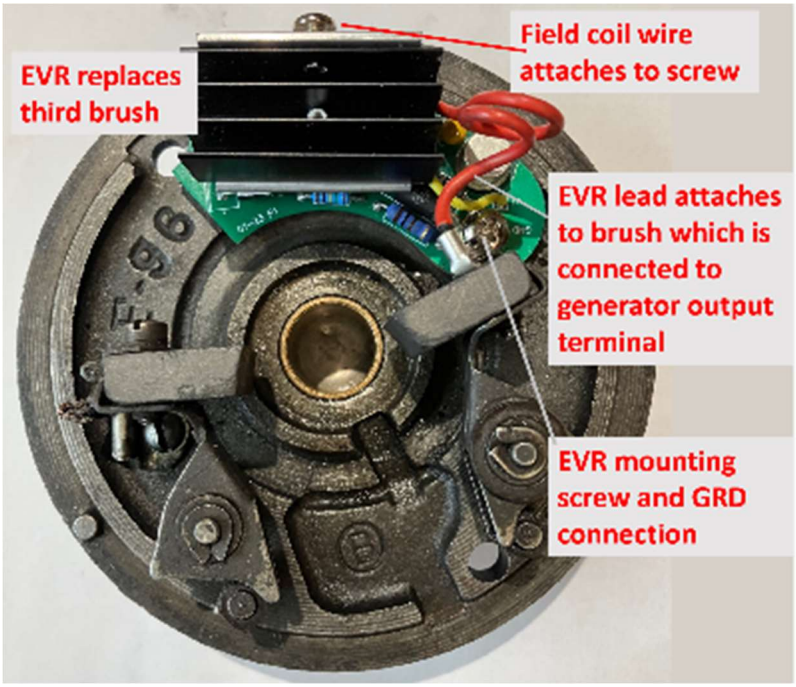

Figure 1 - EVR Installation

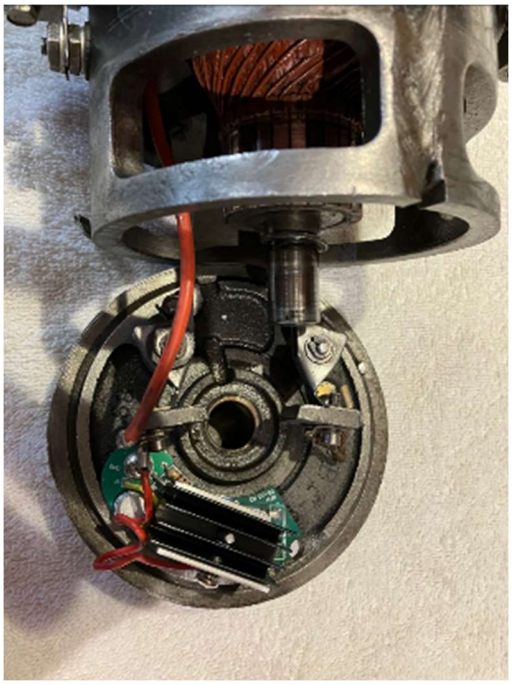

Figure 2
Generator Output Wire Connected to Back Plate

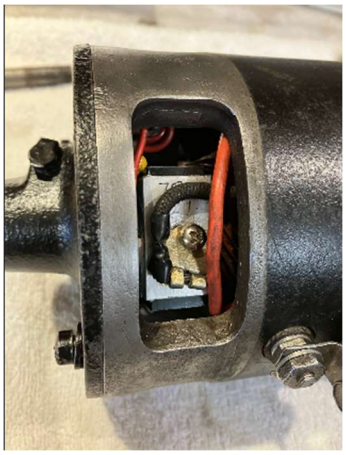

Figure 3 - EVR Connection to Field Coil Wire

EVR Operation and Trouble Shooting

The Generator needs to be at an engine driving RPM to activate the EVR.

Don't expect to see the same high amp reading after installing the voltage regulator that you saw with the stock unregulated generator. With an EVR and a good battery the ammeter will usually show between 5 and 10 amps right after starting the engine, then within a few minutes the charge should taper back to 1 or 2 amps. The output amperage tapers back to almost zero when the battery achieves a charge voltage of 7.2v. This will occur at driving engine RPM, not idle. A poor battery or wiring connections my affect this.

With a charged battery at driving engine RPM, when the lights are turned on the ammeter may show a discharge initially and then return to a small charge. The ammeter may show a discharge at idle.

At fast idle, if you have 7 to 8 volts at the generator output stud, but only battery voltage (6.3 V) on the cutout output side, then the cutout needs to be serviced or replaced. Similarly, after installing the EVR (and making sure it was installed correctly), and if you still see no charge on the Ammeter, jump a wire across the 2 cutout terminals to bypass the cutout. If you now see an ammeter charge you know the cutout needs repair or adjustment. This could also indicate a problem with the generator field coils or armature.

It is normal to see the ammeter needle fluctuate at low RPMs as the generator does not have enough RPM to create power to continuous engage the EVR. If the needle still fluctuates and driving RPM check the cutout and loose wiring conditions.

If the EVR is properly installed and the generator is showing low voltage at the generator output stud there may be issues with the generator (see below). This is why it is important to make sure the generator is functioning properly before the EVR is installed.

The output of a generator varies with RPM with or without the EVR. If you drive a low engine RPMs for sustained periods (parades) with the headlights on, consider LED headlight bulbs.

WARNING: The EVR is not recommended for use with Sealed Beam or 50cp incandescent headlamp bulbs. The Model A generator is designed to supply up to 12 amps and the EVR regulates maximum current output at 10 Amps. For prolonged night driving LED headlamp bulbs are recommended.

Do not attempt to charge a dead or defective battery with an EVR equipped generator with the headlights on or other high electrical loads drawing high current. This will create excessive current draw and may compromise the Generator and the EVR.

Common Generator Problems

Brushes not seated properly to the commutator – this really affects performance. Steve Blancard has a great video on youtube on how to properly seat brushes.

Terminal post wire restricting brush movement – often the terminal post wire has been replaced by a stiff 12 gauge wire that restricts the brush movement and contact with the commutator. This type of wire should be replaced with a multi-strand flexible silicon wire.

Ground brush strap connection – damaged wire or loose connection.

Loose connections – check all connections for tightness and continuity.

Shorted Output Terminal – the terminal is shorted to the frame sometimes caused by the field coil grounding terminal or contact with the through bolts. With the output brush lifted off the commutator there should be infinite resistance between the terminal post and the generator housing.

Cutout – electromechanical cutout voltage set too high or too low.

For more information, please contact me at:

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