

POWER-GATE INSTALLATION INSTRUCTIONS

Variable Voltage Regulator

Congratulations on your POWER-GATE purchase! POWER-GATE is designed to provide years of trouble-free operation. Please read the instructions in their entirety prior to undertaking installation. Like any work performed around batteries, electrical circuits, vehicles, and moving parts, exercise caution to insure safe installation and use. If you are not familiar with alternators, batteries, electrical circuits, or basic auto/marine-electrical architecture, seek the assistance of a professional installer. Failure to install POWER-GATE correctly may cause poor performance, premature product failure, personal injury, or possibly damage to the vehicle or vehicle accessories.



The manufacturer is not responsible for damage incurred due to improper installation.

PRE-INSTALLATION

PACKING LIST:

- POWER-GATE Regulator
- 6 foot wire harness assembly
- Optional Hall Effect Current Sensor

WHAT YOU WILL NEED:

- Digital multi-meter
- Wire stripper
- Soldering torch, solder, and flux

INSTALLATION INSTRUCTIONS

- Step 1** With engine off, remove all wires and cables from negative terminal of all batteries.
- Step 2** Select desired location for POWER-GATE Regulator; keep the following points in mind:
- Distance to alternator and battery.
 - Easy access to the POWER-GATE Regulator
 - Footprint doesn't conflict with other wires, cables, reservoirs, rotating parts etc...
 - Adequate distance from high-heat sources like exhaust manifold
 - Shield from moisture. The device has basic moisture protection but is by no means water-proof.
- Step 3** Mount the regulator using the two mounting holes. The device is best mounted in a vertical orientation so that water does no pool on it's face.
- Step 4** Wires from 10-pin harness per the guidelines on the following page(s). The alternator's control configuration must be determined to be A, B, or brushes isolated before field wires from the control harness are connected.
- Step 5** Connect optional hall effect current sensor loop with the arrow pointing in the direction of the current flow. The primary alternator output cable should pass through the loop, and the sensor should not be placed near other wire or cable harnesses, as electrical noise may disrupt the sensor which will in turn cause the Amperage LED display to provide a false reading
- Step 6** **BEFORE RECONNECTING BATTERIES**, verify that your installation matches the diagram.
- Step 7** Restore ground connections on both batteries.
- Step 8** TURN VOLTAGE ADJUST KNOB COUNTER-CLOCKWISE UNTIL IT STOPS. THIS INSURES ALTERNATOR VOLTAGE WILL BE LESS THAN SYSTEM VOLTAGE
- Step 9** Switch ignition "ON" but do not start vehicle. Verify that the regulator is powered-up. Nothing is getting hot or is shorted.
- Step 10** Start vehicle and adjust voltage up SLOWLY until desired voltage is achieved. Use a digital multi-meter to verify that the regulator is charging at the desired voltage level.



Wiring Harness

1	2	3	4	5
6	7	8	9	10

(As viewed from the wire side of the connector)

1	Battery	Gray	GY
2	Alternator +	Orange	OR
3	Current Sensor +	Brown	BR
4	Field +	Blue	BL "B" Circuit
5	Field +	Blue	BL "B" Circuit
6	Ground	Black	BK
7	Switched 12v	Violet	VI
8	Current Sensor	White	WH
9	Field -	Green	GN "A" Circuit
10	Field -	Green	GN "A" Circuit



OVER-VOLTAGE DAMAGE CAN OCCUR.



CONNECTING TO AN ALTERNATOR

POWER-GATE uses a pulse-width modulation (PWM) regulator in lieu of the traditional transistor regulator. The PWM regulator provides a more refined, precise, and efficient way to regulate both the amperage and voltage from an alternator.

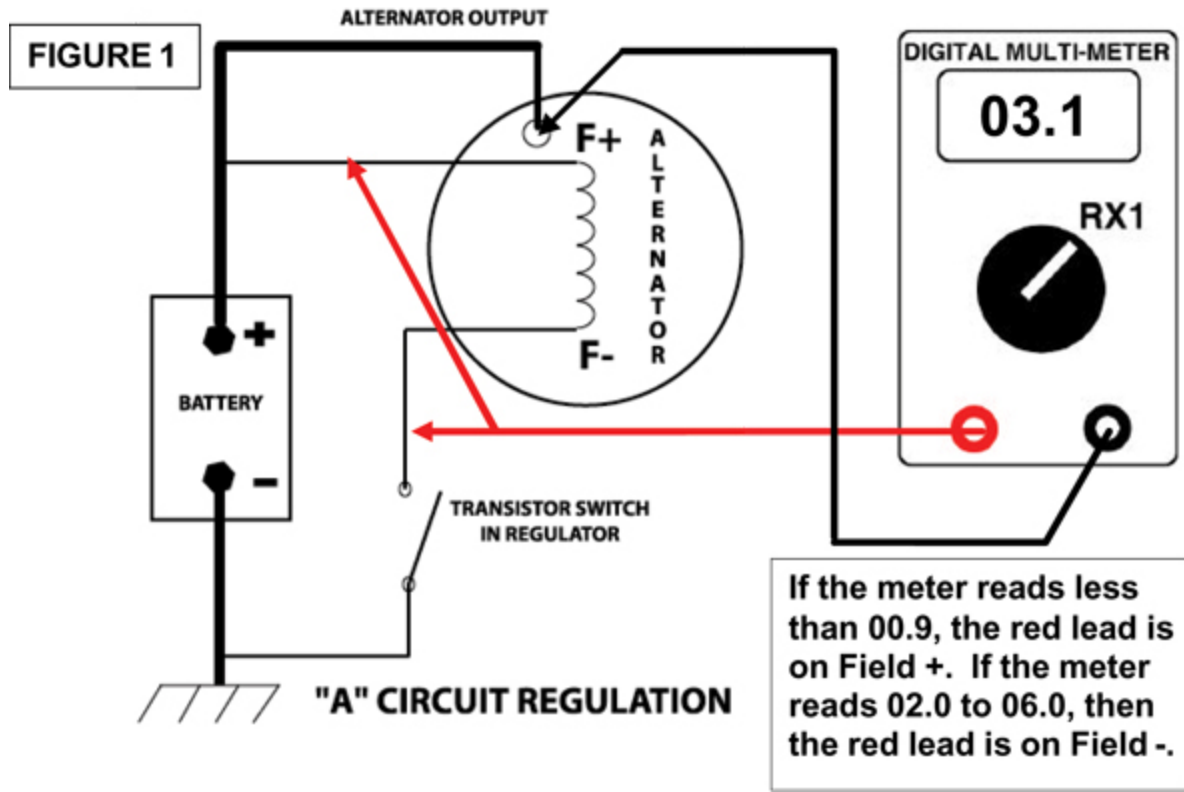
Regardless of whether the alternator's regulator is internal or external, alternators are designed with a specific type of connection commonly known as "A" circuit or "B" circuit regulation. A third configuration we call "brushes isolated," meaning both field brushes are isolated from battery, ground, stator, etc... and because they are totally isolated, they can be regulated with either an "A" or "B" circuit regulator.

The following pages will detail "A" circuit, "B" circuit, and "brushes isolated" configurations, how to connect a POWER-GATE regulator based upon an alternator's electrical configuration.

You can determine the type of regulation using an ohmmeter or the resistance function of a digital multimeter. Connect the black test lead to the alternator output stud. Then place the other test lead on the field at one of the brushes or on a terminal labeled "F". If the resistance indicated is less than one ohm ([01.0] on the RX1 scale, if the meter is not an auto-ranging type of meter), the alternator is set up for "A" circuit regulation. If it reads ([O/L] or infinite), the alternator is set up for "B" circuit regulation or "brushes isolated" configuration. To determine which, move the lead that is on the alternator output stud to the case of the alternator. If the reading is low...less than one ohm, then the alternator is set up for "A" circuit regulation. If the meter indicates an open connection or "O/L" then the alternator is configured with isolated brushes.

"A" CIRCUIT

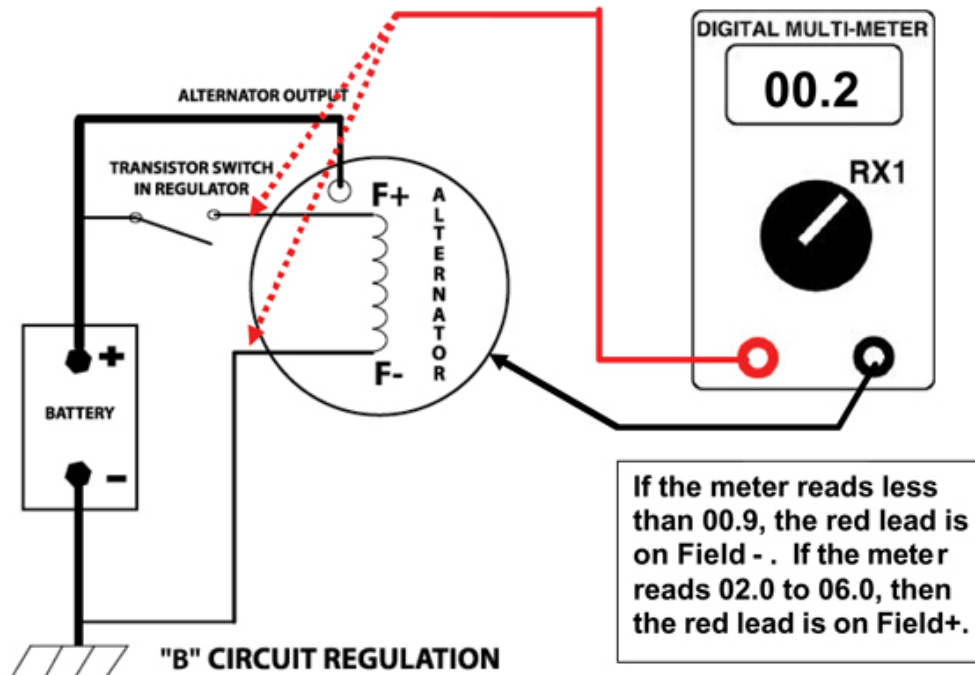
In alternators referred to as "A" circuit, see Figure 1, the positive terminal of the field (Field +) is connected directly to the battery positive terminal or, to a "diode trio" which provides a voltage source derived from the three stator phases. The negative terminal of the field (Field -) is connected to a transistor in the regulator that is rapidly switched to ground according to the difference in the "float" battery voltage and the desired battery voltage.



"B" CIRCUIT

In "B circuit" alternators (see Figure 2) the Field - terminal is connected directly to ground, while the Field + terminal is switched rapidly on and off to the Battery positive terminal or the diode trio.

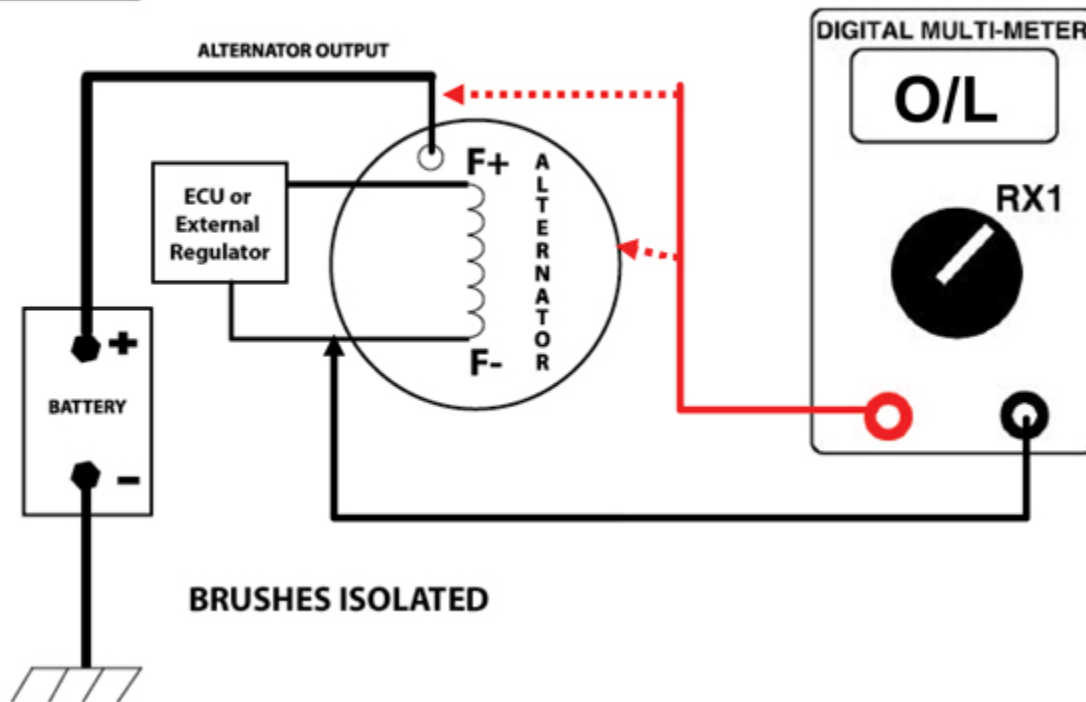
FIGURE 2



ISOLATED BRUSHES

In the case of "isolated brushes" (see Figure 3) neither end of the field winding is permanently connected. In such types of alternators, the field is connected to transistors that simultaneously connect the field terminals to the current source (battery or diode trio). The "brushes isolated" configuration is the most flexible as it can be regulated externally by either an "A", "B", or PWM regulator, as is used by the POWER-GATE Regulator.

FIGURE 3



CONNECTING FIELD CONTROL WIRES TO THE ALTERNATOR

Alternators can be confusing so if you're unsure of how to connect your POWER-GATE Regulator, please seek assistance from a qualified auto-electrical specialist.

For "A" circuit configured alternators, the **GREEN** field wires are to be connected to the control brush. Both **GREEN** wires are common to each other so you may run them in parallel which is desirable when connecting to large alternators or to cut down on resistance on longer runs. One **GREEN** wire may be used if using both in parallel is difficult.

For "B" circuit configured alternators, the **BLUE** field wires are to be connected to the control brush. Both **BLUE** wires are common to each other so you may run them in parallel which is desirable when connecting to large alternators or to cut down on resistance on longer runs. One **BLUE** wire may be used if using both in parallel is difficult.

For Brushes Isolated configured alternators, the **GREEN** field wires are to be connected to one brush, and the **BLUE** wires are to be connected to the other brush. There are no polarity restrictions in a brushes isolated configuration so it makes no difference which brush you designate for **GREEN** and which brush you designate for **BLUE**.

In-line fuses protect the field switching MOSFETS from damage should a short circuit to the alternator field control occur. Should a fuse blow, it's an indication of an internal alternator short, or the configuration diagnosis is incorrect.

ALTERNATOR CONSIDERATIONS

Unlike typical narrow range regulators, the POWER-GATE Regulator allows very wide adjustment of voltage. Many alternator components may not be suitable for higher voltage applications. If alternator voltage is increased to an incompatible level, regulator damage can occur, alternator damage can occur, battery damage can occur, and system damage may occur. The use of a POWER-GATE regulator can be dangerous and proper precautions and appropriate due diligence is necessary.

Understand your alternator and its limitations before connecting a POWER-GATE Regulator.

INCREASED ALTERNATOR VOLTAGE



- **Regulator Damage Can Occur**
- **Alternator Damage Can Occur**
- **Battery Damage Can Occur**
- **System Damage Can Occur**

