



G1XX0P

GENERATOR CONTROLLER: VREG, REVERSE CURRENT, CURRENT LIMIT FOR TYPE B 10 TO 50 AMP DELCO-REMY GENERATOR SYSTEMS

Features:

- Voltage Regulation, IC Sense Referenced
- Electronic Controlled Generator Build-up
- Electronics Field Controller/Switching
- Field-to-Ground Fault Protection (GFP)
- Current Limit, IC Sensed & Controlled
- Reverse Current Protection
- GCU induced Over Voltage (OV) Protected
- Trouble-Shooting Lights on Unit

Benefits:

- * Increase Regulator Life. Not Temperature Sensitive
- * Prevents Regulator cycling at low RPM
- * Increase Regulator Life & Eliminate Regulator Noise
- * Protects against grounded generator field
- * More Precise Current Limit
- * Prevents Battery Current Flowing to the Generator
- * GCU will not cause OV fault in the system
- * Reduce Trouble-Shooting Time

Voltage Regulation: 14.2V \pm 0.4V. Max Field Current: 3A.

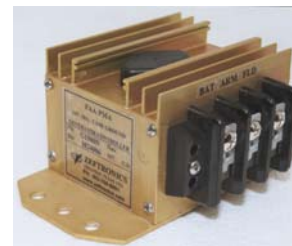
The Generator provides power used in charging the battery and running other electrical systems in the aircraft. The current flowing through the field of a Generator controls its output current. The **Generator Control Units (GCU)** have **Voltage Regulation with Generator Build-up, Field-to Ground Protection, Current Limiter, Reverse Current Protection, and on unit Trouble-Shooting Lights.** See page 2 for more.

The **Generator Build-up** function allows the rotating generator to build-up its output from a low residual voltage to the system's voltage regulation point.

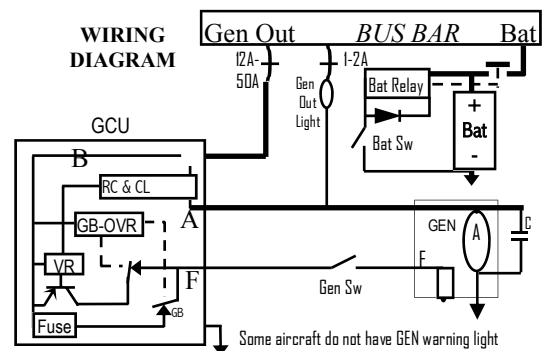
The **Voltage Regulator (VR)** controls the Generator's field to keep the aircraft electrical system voltage at a specific level. This controller has a "Type B" regulator which excites the field of the alternator by providing controlled power to one side of the field (F), with the other side connected to ground.

The **Current Limiter (CL)** controls the maximum output current the generator can produce. It turns off the field excitation when the output current exceeds the CL set point (determined by the generator's current rating). It allows normal field excitation when the generator output is below the GCU CL set point.

The **Reverse Current (RC) Protection** circuit blocks the battery current from going back to the generator. It allows current to flow only from the generator to the battery and system.



This unit is not FAA approved. You must get FAA approval to use it in a TC'd aircraft system.



Part No	Volt	Amp	Replaces	P/N
G1100P	14	10		
G1150P	14	15		
G1250P	14	25		
G1350P	14	35		
G1500P	14	50		

The GCU's design will cause the field current path (between the field and Battery) to open if the field control device becomes internally shorted. This means that the GCU will not induce Over-Voltage (OV) problems into the system. *The GCU does not protect the system against externally induced OV faults.*



G1XX0P

GENERATOR CONTROLLER: HOW THE SYSTEM WORKS

The Generator provides power used in charging the battery and running other electrical systems in the aircraft. The current flowing through the field of a Generator controls its output current. The **Generator Control Units (GCU)** have **Voltage Regulation with Generator Build-up, Field-to Ground Protection, Current Limiter, Reverse Current Protection, and on unit Trouble-Shooting Lights**.

The **Generator Build-up** (or automatic field flashing) function allows the rotating generator to build-up its output from a low residual voltage to the system's voltage regulation point. Closing the Gen (Field) switch when the a generator is rotating causes current to flow from the GCU to the field in the generator. This current flow rapidly increases the generator output voltage from a few volts until the build-up cut off occurs and the voltage regulator takes over the control of the generator. At the build-up cut off point, the GB switch inside the GCU opens and stays open until the Gen Field switch and Bat switches are reset. This prevents generator cycling problems seen in other voltage regulators.

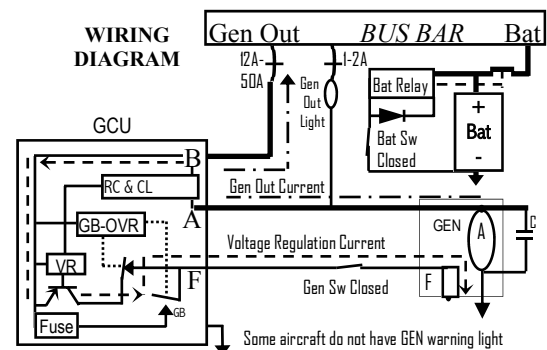
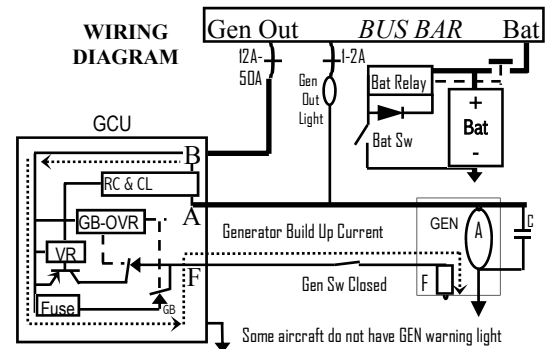
The **Voltage Regulator (VR)** controls the Generator's field to keep the aircraft electrical system voltage at a specific level. This controller has a "Type B" regulator which excites the field of the generator by controlled powering of one side of the field (F), while the other side is grounded. The VR electronic switch turns the field current on/off so fast (several times a second) that the output voltage of the generator stays at the VR set point. As long as the generator's output voltage is less than the VR set point the switch is closed, current flows, and the Generator's output increases. When the generator's output voltage exceeds the VR set point, the switch opens, current flow stops, and the generator's output decreases.

Field-to-Ground Short Protection

Should the generator's field become shorted to ground, the field-to-ground short protector turns off the Voltage Regulator. The OV (Red) and VR (Red) on the GCU, as well as the GO light on instrument panel come on.

Trouble-Shooting Lights (TSL) on the GCU

- VR is Red to indicated field-to-ground fault or OV.
- Green VR indicates field current from GCU or open field.
- CL is Red to indicate generator Current Limit level.
- GO is Red to indicate generator off-line condition.
- OV is Red to indicate GCU OV protection trip.



The **Current Limiter (CL)** controls the maximum output current the generator can produce. It turns off the field excitation when the output current exceed the CL set point (determined by the generator's current rating). It allows normal field excitation when the generator output is below the GCU CL set point.

The **Reverse Current (RC) Protection** circuit blocks the battery current from going back to the generator. It allows current to flow only from the generator to the battery and system.

Protection against GCU induced OV fault.

The GCU's design will cause the field current path (between the FLD and Bat) to open and turn the VR off if the field control device becomes shorted. This means that the GCU will not induce Over-Voltage (OV) problem into the systems. **The GCU does not protect the system against externally induced OV faults.**

The generator system experiences OV fault when the field wire (between the field and generator) or field post becomes shorted to the ARM or Bat. OV protection against such faults require the placement of a Line Contactor or OV Disconnect relay between the generator and the GCU's armature terminal. The ZEFTRONICS G1XXVP GCU packages provides such OV protection.



G1XX0P

GENERATOR CONTROLLER: TROUBLE-SHOOTING THE SYSTEM

CHECKING THE RESIDUAL VOLTAGE AND POLARITY OF THE GENERATOR

Connect a voltmeter between the generator's ARM and ground. At 1300 RPM, the generator's output or residual voltage should be positive (greater than +1.6V).

Residual Voltage _____ V @ _____ RPM

A negative voltage reading indicates a generator that has a reverse polarity. **Do not connect the GCU to a generator with reversed polarity.**

Turn off the engine and Polarize the generator by flashing the field.

HOW TO FLASH THE GENERATOR'S FIELD:

1. With the engine off, disconnect the Generator Controller (GCU) / Regulator
2. Close the Field or Gen switch.
3. At the GCU: Touch the battery wire to the generator's Field wire 5 times for 3-5 seconds. Caution: Take safety precaution to prevent being hurt by electrical sparks generated by touching the two wires.
3. Connect a voltmeter between the generator's ARM and ground. At 1300 RPM, the generator output or residual voltage should be >+1.6V.
ARM Voltage _____ V @ _____ RPM

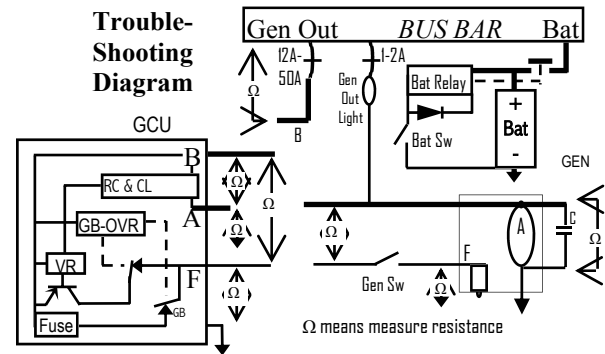
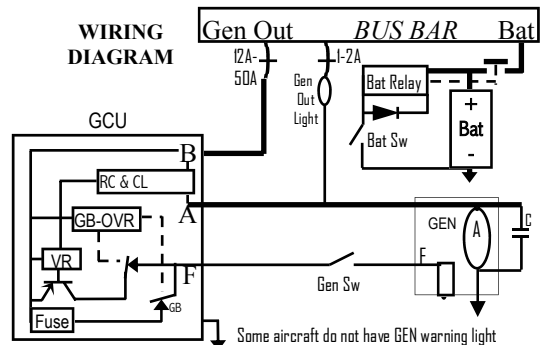
Refer to the Trouble-Shooting Diagram

1. Disconnect the GCU from the system.
2. On the wires removed from the GCU, with the field switch open measure the resistances at the points indicated by Ω. Record the values.

At the Generator Measured	Typical Value
ARM to GND _____ Ω	0.1Ω (Max)
FLD to GND _____ Ω	6-10Ω

At the GCU Measured	Typical Value
ARM to BAT _____ Ω	>150Ω
ARM to GND _____ Ω	>2KΩ
FLD to GND _____ Ω	>2KΩ
FLD to BAT _____ Ω	1Ω (Max)
BUS to B _____ Ω	0.1Ω (Max)

If all the measurements are as specified, connect the GCU to the system and retest the Generator Electrical Charging System (GECS).



No voltage regulation or Generator not Coming on-line

- With the Bat & Gen/Field switches on, engine off, measure Battery voltage at the GCU BAT and FLD terminals. If the measured values are as specified, perform the resistance measurements called for on this page and on page 4.
- If the generator is coming on line after 1400 RPM, remember that *some Generator overhaul shops use armature windings with excessively high resistance. A high Armature resistance will cause the generator to come on-line at engine speed above 1400 RPM. A 50A generator with ARM to GND resistance of 0.4Ω may not come on line until the generator's residual voltage overcomes that internal resistance at a higher speed. That is just Ohm's law.*

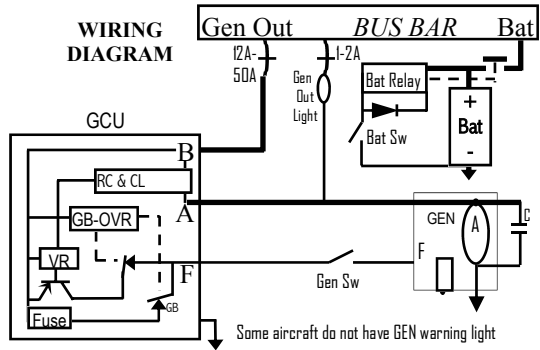
CAUTION & REMINDERS

1. Directly connecting power to the field to see if the generator produces current is not a good indication that it is working properly. Doing so can lead to excessive system voltage, which may damage batteries, radios, GCU, etc. This practice will not always identify a defective regulator because it may hide field or armature defects that can damage a regulator/GCU.
2. Some Generator overhaul shops use armature windings with excessively high resistance. A high Armature resistance will cause the generator to come on-line at engine speed above 1400 RPM.



Installation Instructions & Tech Notes

GENERATOR CONTROLLER: TYPE B SYSTEM



**OUR GOAL IS TO HELP YOUR SYSTEM OPERATE
BETTER AND HELP YOU BETTER UNDERSTAND ITS OPERATION.**

PRE-INSTALLATION TESTS.

BEFORE INSTALLING THIS UNIT, PERFORM TESTS:

1. Read the documents that came with the unit.
2. Disconnect the current voltage regulator or GCU.
3. Charge Gell-cell batteries before installing this unit.
4. Turn on the Gen Field switch
5. Check the Residual Voltage and Polarity of the Generator.
 - a. Connect a voltmeter between the Generator's ARM and ground.
 - b. At 1200 RPM, check the generator's output. The output should be positive (>1.6V). If it is negative, the generator has a reverse polarity. Do NOT connect the GCU to such generator. Turn off the engine, and flash the field.
6. Measure and record the following resistances separately, at the generator & the wires to the GCU, list them below.

At Generator At GCU Wire

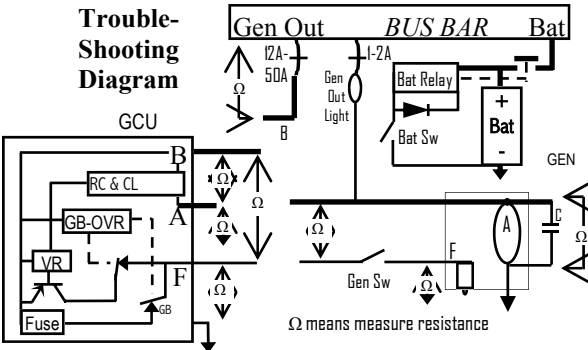
- | | | | |
|---------------------------|---------|---------|--|
| a. Gen Arm to Case-Ground | _____ Ω | _____ Ω | |
| b. Gen Fld to Case-Ground | _____ Ω | _____ Ω | |
| c. Gen Fld to ARM | _____ Ω | _____ Ω | |
| d. Bus-GCU BAT | | _____ Ω | |
7. If the measured values are out of the specified ranges (on page 3), check wiring, switches, circuit breakers or generator for problems.
 8. If the measured values are in the specified range, connect the unit and take these measurements.

a. ARM to Case-Ground	_____ V	0 - 0.1V	
b. FLD to Case-Ground	_____ V	~12V, Bat Voltage	
c. BAT to Case-Ground	_____ V	~12V, Bat Voltage	
a. Bus to Ground	_____ V	~12V, Bat Voltage	
 9. If the measured values are in the specified range, perform the post installation tests on page 3.

POST-INSTALLATION CHECK AND TESTS

With the BAT and FLD switches on and engine off, on the GCU the GO (Gen Out) and CL (Current Limit) lights should be on, Red; the VR (Voltage Regulator) should be on, Green; and the OV light off. *If the CL light is off remove the GCU and check the generator for correct polarity and wiring. If the VR is Red and OV Light is Red, there must be a field-to-ground condition.*

With the BAT and FLD switches on and engine running the generator should come on line at 1100 - 1400 RPM: the bus voltage should be 13.5V to 14.4V with 2-8 Amps load. At 1800 RPM the bus voltage should remain at 13.8V to 14.4V until about 5 Amps below the generator's current rating. The VR (Voltage Regulator) light should be on, Green. *If the VR is Red and OV Light is Red, there must be a field-to-ground or OV fault.*



**OUR GOAL IS TO HELP YOUR SYSTEM OPERATE
BETTER AND HELP YOU BETTER UNDERSTAND ITS OPERATION**

WE PROVIDE

Electrical Charging Systems Solutions

Electrical Charging Systems Solutions

*For tech help & tech cards,
call: 903-758-6661.
Fax: 903-236-9766
email: tech@zeftronics.com*