V11100
16V OVER-VOLTAGE SENSOR
FOR 14V ALTERNATOR CONTROLLERS/VOLTAGE REGULATORS

Features:	Benefits:
• Over-Voltage Sensor, IC Sensed	* Less Temperature Sensitive, More Precise
• Voltage Reg Relay Diode Built-in	* Extends the Life of the Voltage Regulator Relay

Over-Voltage Trip: 16.0V ± 0.4V. Max Current: 0.2A

The V11100 Over Voltage (OV) Sensor provides power to the voltage regulator OV Relay in the Cessna aircraft 14V alternator electrical system. The V11100 is a normally closed electronic switch which opens when it senses a voltage that exceeds 16V.

OVER VOLTAGE (OV) PROTECTION.

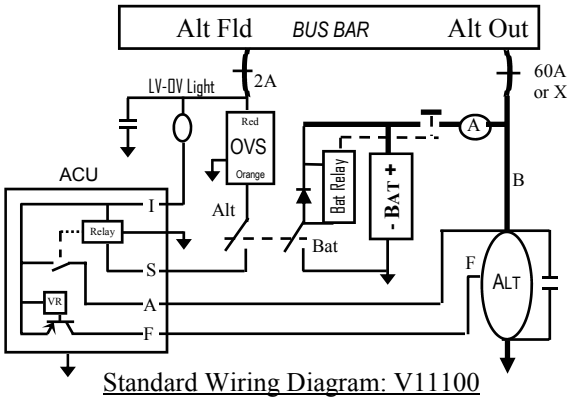
The OV Sensor provides OV protection by turning off the OV relay inside the controller if the bus voltage exceeds 16V. With the relay off, the Controller and the alternator turn off to protect sensitive avionics equipment and the battery.

VOLTAGE REGULATION.

The Voltage Regulator, with Remote Voltage sense of the Alternator output, keeps the bus voltage constant by controlling the alternator's field current: increasing it when the system load increases and decreasing it when the load drops.

LOW & OVER VOLTAGE WARNING.

A warning light connected between pin I and the bus comes on to warn the pilot if the bus voltage exceeds the OV level or the alternator is off-line due because there is no voltage on pin S.



Standard Wiring Diagram: V11100
Separate OVS & Voltage Regulator

Use the V11100 OVS with ZEFTRONICS part numbers R15100, R15100 Rev A; Electrodelta VR600; Lamar PFT DGR6; Cessna C6110001-0101/2,-0201.

- **We manufacture Alternator Controllers that combine Voltage Regulation with OV Protection and other functions.**

By Femi G. Ibitayo

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ZEFTRONICS
Electrical Charging Systems Solutions

V11100
16V OVER-VOLTAGE SENSOR

HOW THE SYSTEM WORKS

Closing the Bat switch applies the battery voltage to *pin A* of the alternator controller (ACU, regulator). With voltage at *pin A* (Alt switch off), the LV light comes on, indicating that the alternator is off-line.

Closing the Alt switch applies battery voltage to *pin S* through the Over Voltage Sensor (OVS). The OVS' output controls a relay inside the alternator controller. With power applied to *pin S,* that relay's normally open (NO) contacts connects *pin A* and *pin I*.

With power on *pin S*, current flows from the alternator's Bat terminal through the Controller's voltage regulator to the alternator's field. The regulator keeps the bus voltage constant (around 14V) by controlling the alternator's field current. It increases the field current with increase in system load and decreases it, with a decrease in the system load.

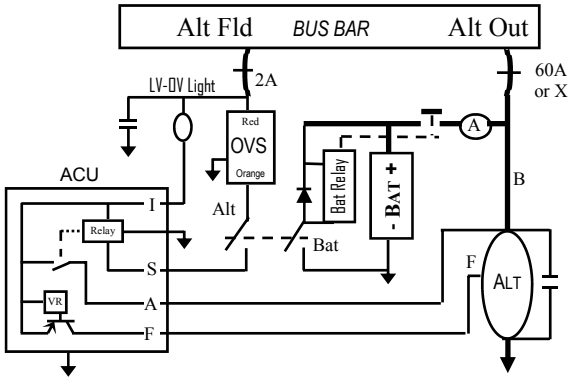
Since the whole field current (max about 3.5 Amps) flows from the alternator's Bat terminal to pin A of the controller, abnormal increases in wire, connection, or junction resistances will cause poor voltage regulation and or fluctuating charge meter, panel lights, and bus voltage.

If the field of the alternator shorts to ground, the controller will be damaged. To get **field-to-ground short protection** update to the R15100 Rev A.

If the bus voltage exceeds about 16V, the Over Voltage Sensor (OVS) will open and thus remove power from *pin S*. Removing power from *pin S* will turn off the controller and take the alternator off line.

LV-OV Light

The LV-OV light on the instrument panel indicates the condition of the charging system. See the trouble-shooting section for how this function operates.



INSTALLATION & TROUBLE-SHOOTING INSTRUCTION

With the Master switch closed, **engine off.**

- The voltage on the Red wire of the V11100 and the Bus should be the battery voltage. If there is 0 Volt on the Red wire, look for a defective Alt Fld circuit breaker, loose wire, or open connection between the bus and the Red wire.
- The voltage on the orange wire should be 0.05-.6V less than the voltage on the Red. If there voltage on the Red wire and the Orange wire is 0 V, look for a ground short on pin S of the alternator controller/ voltage regulator. The short could be in the regulator or between the ground shield and pin S.
- Pin S of the regulator should have the same battery voltage as the Orange wire. If pin S' voltage is 0-9V, open the Alt switch, measure the voltage on the Orange wire. If the voltage is the equal to the Bus voltage, replace the Over Voltage Sensor.
- On the voltage regulator: the voltages measured on pins A, S, and I should be the Bus (battery) voltage. The voltage on pin F will be 0.5 to 2V less than the bus voltage. If the voltage on pin F is the same as on pins A, S, and I, look for an open circuit in the field/ field wiring of the alternator.
- **With the engine on,** Master (BAT & ALT) switch closed, at 1500RPM, the voltage on bus, pins A, S, and I should read 13.9V-14.3V. If the voltage is lower than 13.9V repair loose connection or dirty contacts between the regulator's pin A and alternator's battery terminal.
- If the Bus voltage goes to 16V, and the voltage on pin S of the voltage regulator is 0V, then pins S and A are swapped or the OV relay in the regulator is welded. Replace the regulator.

TROUBLE-SHOOTING THE SYSTEM

For help on how to solve problems in the system, see the Trouble-Shooting Notes (TSN) page and or TechCards.

INSTRUCTIONS FOR CONTINUED AIRWORTHINESS MAINTENANCE

This device is not field repairable or serviceable. For all service, repair or overhaul needs, return it to ZEFTRONICS or a ZEFTRONICS approved repair station.
For all periodic inspection and test requirement, use the pre and post installation procedure listed above.
Contact us with tech support questions that are not addressed at Zeftronics.com or in the TSN or TechCards.

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TROUBLE-SHOOTING THE SYSTEM

14V Type B alternator system on Cessna

Check the condition of the ACU

1. With the master switch (Bat & Alt) on, at the ACU connector, measure the indicated voltages.

   Pin I: _____ Pin A: _____ Pin S: _____
   Pin F:_____ Bus _____

The voltages on pins I, A, S should equal bus'.

The voltage pin F should be 0.5-2V less than the bus'. *If the pin I voltage is less than bus voltage, look for bad LV-OV light, broken wire from LV-OV light, grounded pin I or damaged controller.*
If the pin A voltage is less than bus', look for corrosion on the BAT terminal, socket for pin A on the airframe ACU connector, or wire (from ALT Bat to pin A) with high resistance. This may cause fluctuating charge meter or bus voltage, and may cause over-voltage and nuisance tripping (i.e. alternator dropping off-line).
If the pin S voltage is less than bus', look for a grounded pin S or damaged controller. Pin S to ground on the controller is about 400Ω.
If the pin F voltage is the same as the bus voltage, look for a damaged or un-grounded controller. If it is 0V, look for a grounded ALT field.

2. If the Master switch is a split type, turn off the Alt Sw and measure the indicated voltages.

   Pin I: _____ Pin A: _____ Pin S: _____
   Pin F:_____ Bus _____

The voltages on pins I, S & F should be 0-2V, pin A should be battery or bus voltage.
If pin I has bus voltage on it, look for a short between pins A & I (internal or external to the controller). Disconnect the controller, a resistance of 0-1K between pins A & I indicates a damaged controller. Check the alternator Field & Power input wire

3. Disconnect/Remove the connector on the ACU. Measure the resistance at the identified points.

   Pin F to Gnd _____Ω. FLD to Gnd _____Ω
   Pin A to ALT Bat _____Ω

The normal Alt field resistance is 3-6Ω.
A lower or higher resistance may indicate problems with the alternator. Field resistance below 3Ω may indicate a short to ground, while higher than 6Ω dirty brushes or intermittently open field.

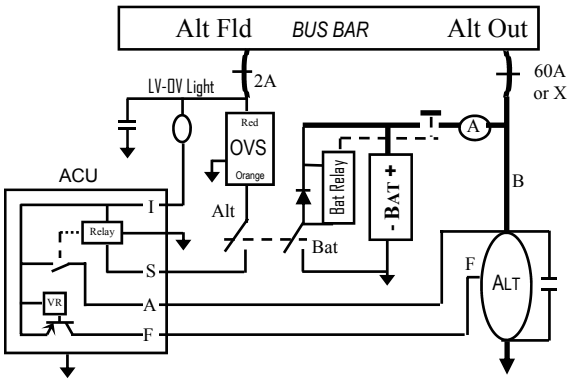
A BETTER TROUBLE-SHOOTING TECHNIQUE

The most common trouble-shooting technique involves replacing suspected defective parts until problem goes away. That shot-gun method is a very expensive and often unsuccessful. Using a more systematic approach to trouble-shooting alerts the user or mechanic to the conditions of the field circuit breaker, alternator switch, alternator controller, and alternator's field. This approach to trouble-shooting looks at the condition of the pre-controller, controller, and post-controller components.

PRE-CONTROLLER & OVS CONDITION: Check the condition of the alternator switch, the field circuit breaker, or the wiring from the Alt Bat to *pin* A on the controller is open.

OVS CONDITION: Are the voltages on pins I, A, S and F according to the installation test data on page 4? If not, use the information on these 4 pages to solve the problem. The Red wire on the OVS should have battery voltage and the Orange wire should be the same or less than 0.2V different.

POST OVS (Controller Relay) CONDITION: With the controller disconnected from the system, is the coil resistances measured from pin S to the case of the controller 380 to 420Ω?
With the controller installed in the system and the master switch on, is there battery voltage on the Red wire and the same voltage on pin S of the Controller? If there is battery voltage on pin S, then consider the OV good. One exception is the OVS that trips when the engine is rotating.



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Frequently Asked Questions & TECHCARD Notes

14V Type B alternator system on Cessna

TROUBLE-SHOOTING THE SYSTEM

Flickering / oscillating ammeter and panel lights.

Check the connections between the Alternator Bat terminal and the pin A input to the controller for high resistance, corrosion, dirt, loose or intermittent connection..

No voltage regulation

With the engine off and the Master switch on. Pins I, A, and S should measure Battery voltage, pin F should be 0.5 to 2V less the bus voltage.

- If the measured voltage is different, see The voltages on pins I, A, S should equal bus' on page 3 for probable causes for the problem.
- If the pin F voltage is the same as the bus voltage, look for and correct open circuit or high resistance in the alternator's field or the wire between the field and pin F. The controller might not be properly grounded.
- If the pin F voltage is 0V and pins I, A, S have battery voltage, look for a grounded alternator field or field wire. If the field resistance is correct as shown in step 5 of the installation tests, send the ACU in for test/repair. If there is a field ground fault, repair it or replace the defective alternator.
- If the pin F voltage is correct, verify that the field resistance and the condition of the connections and wires between the ACU and the field are good.

Bus voltage remains at battery voltage (about 12V)

To solve this problem, see No voltage regulation.

Alternator carries only about half its rated output.

Look for an open stator wire or open diode in the alternator. Check the shunts and alternator output wires indicating an alternator that is current limiting.

Bus voltage drops with load increase

To solve this problem, see *Alternator carries only about half its rated output and or the condition of the wire/ connections between pin A and the alternator Bat terminal.*

LV-OV light does not work, everything else works

Disconnect the ACU. Turn on the Bat switch. Ground pin I. The light should illuminate. If it does not, the lamp is defective or the wires to or from it are broken

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

INSTALLATION TESTS. BEFORE INSTALLING THIS UNIT, PERFORM TESTS:

☐ 1. Read pages 1 to 3 and this page.

☐ 2. Check for and replace open, frayed, or broken wires. Clean thoroughly or replace corroded, dirty, or oxidized connections, terminals, contact, or poorly soldered wire junction.

☐ 3. Check for Open or Ground-shorted alternator field. Most 12V alternators have 3-6Ω field resistance. Verify that the resistance between pin S and the case of the Controller is 380-420Ω. A grounded pin S will damage the OVS. Repair or replace any alternator field or Controller with pin S that has a ground short.

☐ 4. With the engine off: Check voltage drops across the Field, Alt switch, Alt field circuit breaker and ACU. High voltage-drop means excessive junction resistance and will lead to many problems like: fluctuation ammeters, charge-meters and panel lights.

☐ 5. Perform and record the following tests with the **Master Switch Off**:

	12V Values	**Typical Values**
A. Field resistance at ALT	_____Ω	3 – 6Ω
B. Field resistance at ACU	_____Ω	3 – 6Ω
C. Field SW/C-BKR resistance	_____Ω	0 – 0.1Ω
D. ALT Bat to Pin A resistance	_____Ω	0 – 0.05Ω
E. ALT Out C/BKR resistance	_____Ω	0 – 0.05Ω

☐ 6. Perform and record the following tests with the **Master Switch On**:

Engine Off	**Bat Switch on**	**Alt Switch on**	**Typical Values**
A. Bus Voltage	_____V	_____V	12 – 13V
B Pin I Voltage	_____V	_____V	12 – 13V
C Pin A Voltage	_____V	_____V	12 – 13V
D Pin S Voltage	_____V	_____V	12 – 13V
F. Field Voltage	_____V	_____V	0.5-2V <VBus

☐ 7. **Post Installation.** If all tests are correct to or per steps 5 & 6, run the engine and record:

	12V System	**Typical value**
A. Bus voltage	_____V	13.8 – 14.3V

For tech help & other TechCards, call:
903-758-6661

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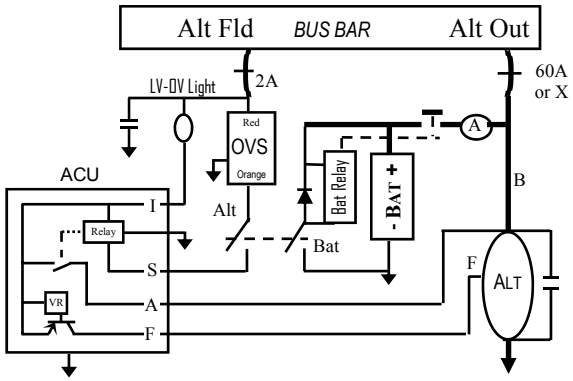
Electrical Charging System Solutions



In this **Type B** system: the controller is between the Bus and the Alternator's field. To control the bus voltage, the unit switches power to the field several times a second. The OVS opens when OV occurs.

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