Tech Basics: Glossary

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Definitions, Terms, and Basics of Common Charging Systems

ALTERNATOR is an alternating current electrical generator with a direct current output. After the aircraft engine begins running, it supplies all required system electrical current and charges the battery.

GENERATOR is an electromechanical device that converts mechanical energy into electrical energy. Aircraft generators produce direct current for all system electrical current needs.

VOLTAGE REGULATOR is a device that keeps the output voltage of an alternator or generator constant regardless of changes in speed, temperature, or electrical load conditions by controlling the field current.

VOLTAGE REGULATOR, Type A: A voltage regulator circuit that grounds one side of field (with power applied to the other) to control and keep the output voltage of an alternator or generator fairly constant regardless of changes in speed, temperature, or electrical load conditions. Examples of this regulator type are the WWII Delco-Remy vibrating generator regulator (replaced by modern ZEFTRONICS GXXXXN electronic Generator Controllers) or the Prestolite VSF7203 or VSF7403 alternator regulators (replaced by modern ZEFTRONICS R1510N or R2510N Alternator Controllers).

VOLTAGE REGULATOR, Type B: A voltage regulator circuit that powers one side of field (with ground applied to the other) to control and keep the output voltage of an alternator or generator fairly constant regardless of changes in speed, temperature, or electrical load conditions. Examples of this regulator type are the ZEFTRONICS Alternator Controllers like the R25400 (for Cessna), R1530B (for Beech), R15300 (for Mooney) and the R15V0L (for Pipers).

FIELD CURRENT is the electrical charge flowing from the voltage regulator through the field winding of an alternator or generator. It excites the alternator or generator to produce more current.

CURRENT SENSOR is a device that monitors the current going into or out of a system for current limiting or overcurrent protection or warning purposes. Examples of current sensors: **current limiter** and **reverse current protection.**

CURRENT LIMITER is a circuit or device that limits the amount of electrical current produced by a generator or alternator.

REVERSE CURRENT PROTECTOR is a device or electrical circuit that senses when current is coming into a generator instead of flowing out of it and prevents the battery current from flowing into the generator.

OVER-VOLTAGE PROTECTOR is a device that disconnects an over-excited alternator or generator from the aircraft electrical system because of its over-voltage condition. Sometimes these devices are called Over-Voltage Relays.

OVER-VOLTAGE is a condition in which alternator or generator puts out excessive voltage. A direct short between the bus or ground and the field of the alternator or generator may cause this condition.

OVER-VOLTAGE RELAY or circuit removes the field current or aircraft's electrical system from a generator or alternator that is producing excessive voltage.

LOW-VOLTAGE SENSOR / INDICATOR is a sensor that monitors and warns of a system or bus voltage that is at or below the battery voltage due to alternator or generator failure.

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REMOTE VOLTAGE SENSOR provides for better voltage regulation by sensing the aircraft system voltage right at the output of the alternator or generator.

ALTERNATOR OUT SENSOR senses the auxiliary or stator terminal of the alternator to determine if it is off-line (i.e. not supplying current to the aircraft electrical system) and turns on the Alternator Out (off) light.

PARALLELING RELAY or EQUALIZER circuit senses the difference in voltage or current outputs of two alternators or generators, ties them together, and equalizes their outputs.

GROUND FAULT PROTECTOR (GFP) is a circuit or device that turns off the equipment or device (e.g. voltage regulator, ACU, GCU, etc.) connected to it when there is a ground fault condition on the protected output.

GROUND FAULT is a condition caused by a device's input or output shorting to ground.

FIELD-TO-GROUND SHORT PROTECTION is the protection of the ACU or GCU against field winding, wiring, or brushes short to ground. See Ground Fault Protection

ALTERNATOR or GENERATOR CONTROLLER combines one or more of these functions: a Voltage Regulator, Over-Voltage Relay, Low-Voltage Sensor, Current Sensor, Paralleling Relay, Line Contactor Control etc. in one box. This box controls most of the alternator or generator functions.

TROUBLE-SHOOTING LIGHT (TSL, A SELF & SYSTEM DIAGNOSTIC FEATURE): A light mounted on a voltage regulator, alternator controller, etc. to indicate the working or fault conditions of the particular unit and/or system. It indicates good or defective voltage regulator or ACU, no power to voltage regulator, defective alternator switch, or circuit breaker, open or grounded alternator field, and open remote sensing wire. This original ZEFTRONICS innovation saves trouble-shooting time and money.

Closed Circuit is a circuit that forms a continuous path for the flow of current.

Open Circuit is a circuit whose continuous path for the flow of current is broken. For example by an opened switch, loose connection, or broken wire.

Ohm's Law: "The current, I, flowing in a conductor or resistor is linearly proportional to the applied potential difference, V, across it."

E.C. Young, The New Pengin Dictionary of Electronics, 1979

Resistance is the measure of a material's ability or tendency to resist the flow of electrical current. The unit of measurement for resistance is in Ohms (symbolized by Ω). Resistance is also the ratio of the voltage (potential difference) across a device to the current flowing through it.

Current is the measure of the rate flow of electricity through a material or device. The unit of measurement for current is in Ampere (symbolized by A). Current is also the ratio of the voltage (potential difference) across a device to its resistance.

Voltage is the measure of the potential difference across two points of a device through which current is flowing. The unit of measurement for voltage is in Volts (symbolized by V). Voltage is also the product of the current flowing through a device and its resistance.

Ohm's law algebraically expressed: **V** = **I** x **R**. → **Volts,** voltage **= Amps,** current **x Ohms**, Resistance.

Voltage, measured in Volts, V = I x R
Current, measured in Amps (A), I = V/R,
Resistance, measured in Ohms (Ω), R= V/I

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