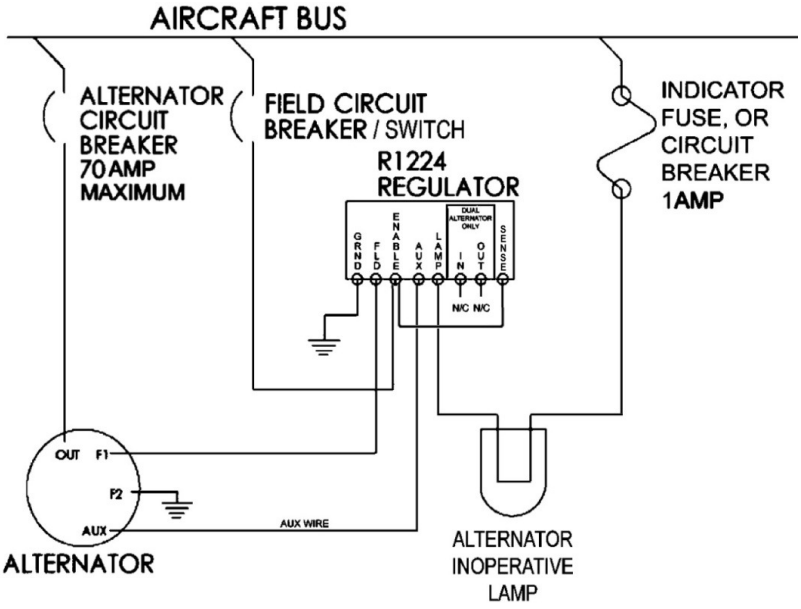
R1224 REGULATOR THEORY



First, the connections:

Barrier Strip

1. **Ground** This is aircraft ground. The baseplate of the R1224 is GROUND, as well.
2. **Field** This is the power from the regulator to one of the alternator's two rotor brushes. The other alternator rotor brush is connected to GROUND. Power from the R1224 makes the alternator's rotor (the part that spins) an electromagnet, causing the alternator to generate power.
3. **ENABLE** This is the power from the aircraft to the R1224 regulator. It needs to be connected to the aircraft bus through a 5A breaker because the overvoltage protection in the R1224 works by shorting the ENABLE pin to ground, tripping the breaker.
4. **AUX** If connected to the "AUX" or "STATOR" pin of the alternator, this signal allows the R1224 to sense that the alternator is not turning and, as a result, turn the LAMP on. If the alternator (such as Ford) does not have an AUX connection, or if the installer does not wish to hook it up, then a jumper must be installed between AUX and ENABLE on the R1224.
5. **LAMP** This is the connection for an optional indicator lamp. It is an "open collector" transistor driver and can sink up to 100mA safely. Connect one wire of the indicator lamp to a fused source of power from the aircraft bus and the other lamp wire to LAMP on the R1224.
6. **MASTER OUT** This connection provides a signal to control a "Slave" regulator in a dual-alternator, load-balancing installation.
7. **SLAVE IN** This connection is the "Slave" R1224 regulator's input. A signal from the "Master" R1224 regulator will turn off the "Slave" R1224's internal voltage control circuit and slave its operation to the "Master" regulator. If the signal from the "Master" R1224 goes away for a short period of time, the "Slave" R1224 will resume independent operation

8. **SENSE** This is the input voltage to the R1224's voltage control circuit. The R1224 will apply power to the alternator's rotor when the voltage on SENSE is below the regulator set point. A good voltage sense point is the ENABLE connection of the R1224. For this reason, a jumper is factory-installed between SENSE and ENABLE on the R1224. Some installers wish to sense voltage at the output of the alternator or at some other point. If such is desired, remove the factory-installed jumper and connect SENSE to the desired point.

THEORY ***Field-drive*** The R1224 is a totally solid state device using a Field-Effect driver IC to pulse-width modulate the FIELD signal. A regulator control IC is employed to sense voltage on the SENSE terminal and provide the pulse-width modulated signal.

THEORY ***Overvoltage Protection*** The R1224 has two independent overvoltage circuits. The first turns on the LAMP and reduces the pulse-width modulated signal to the FIELD (alternator rotor) to minimum width. If the voltage continues to rise, a Silicon Controlled Rectifier (SCR) "Crowbar" circuit shorts the ENABLE connection to ground, limiting the rise of the voltage while tripping the series circuit breaker.

THEORY ***Lamp Circuit*** This "open collector" transistor driver can sink up to 100mA safely. It draws current between the LAMP terminal and ground when:

- There is no voltage on the ENABLE terminal. This may indicate that the series breaker is tripped.
- There is no voltage on the AUX terminal. This may indicate that the alternator is not turning (engine stopped or belt broken).
- Overvoltage has been detected.

Theory ***Master-Slave Operation*** In a dual-alternator, load-balancing installation, one alternator/regulator combination is designated as "Master" and the other alternator/regulator combination is designated as "Slave". Wiring is normal except that the OUT connection of the "Master" R1224 is connected to the IN terminal of the "Slave" R1224. The voltage control circuit of the "Master" R1224 controls the output of both. If the "Master" R1224 fails, the "Slave" alternator/regulator combination will operate independently.