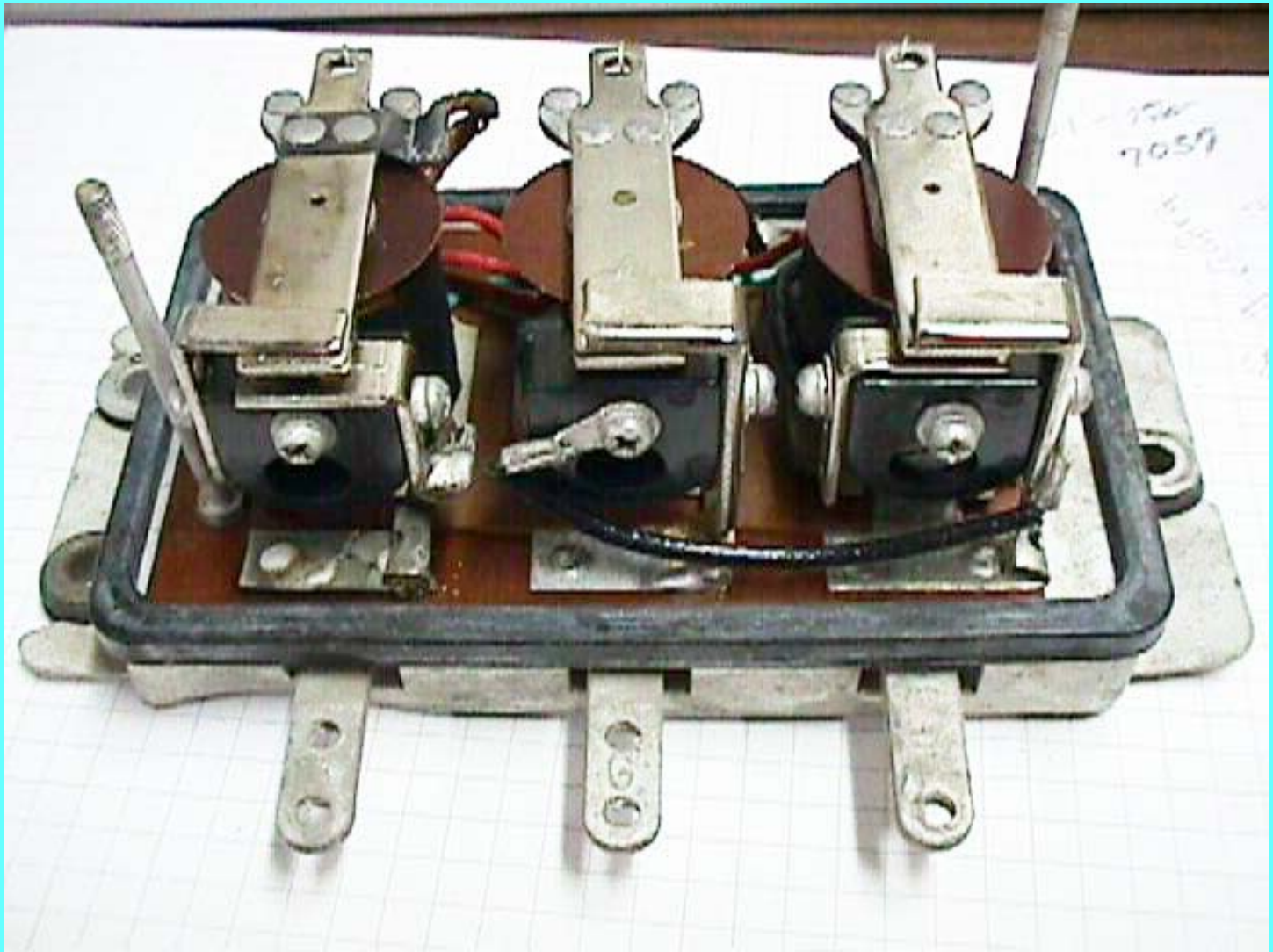
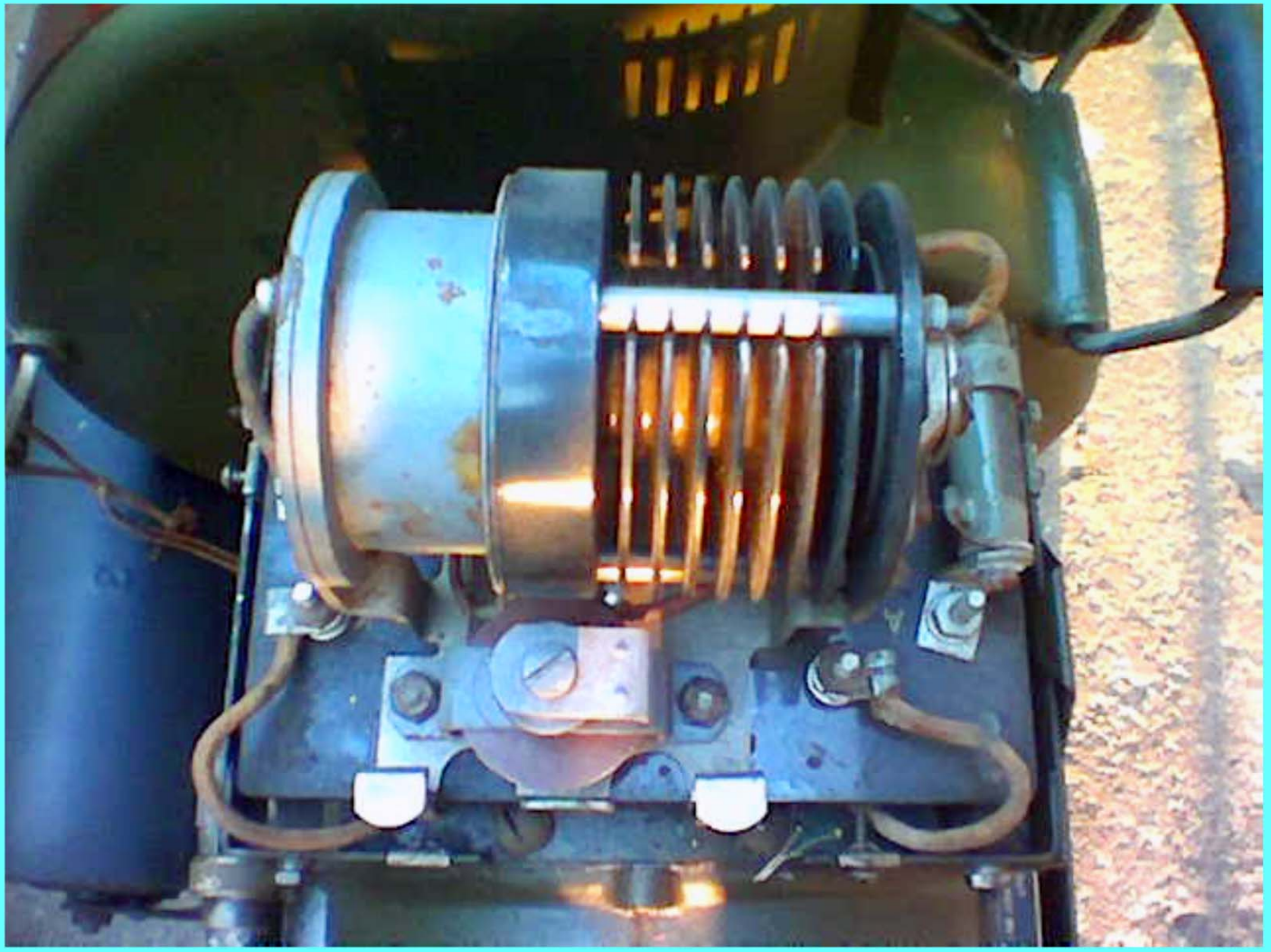
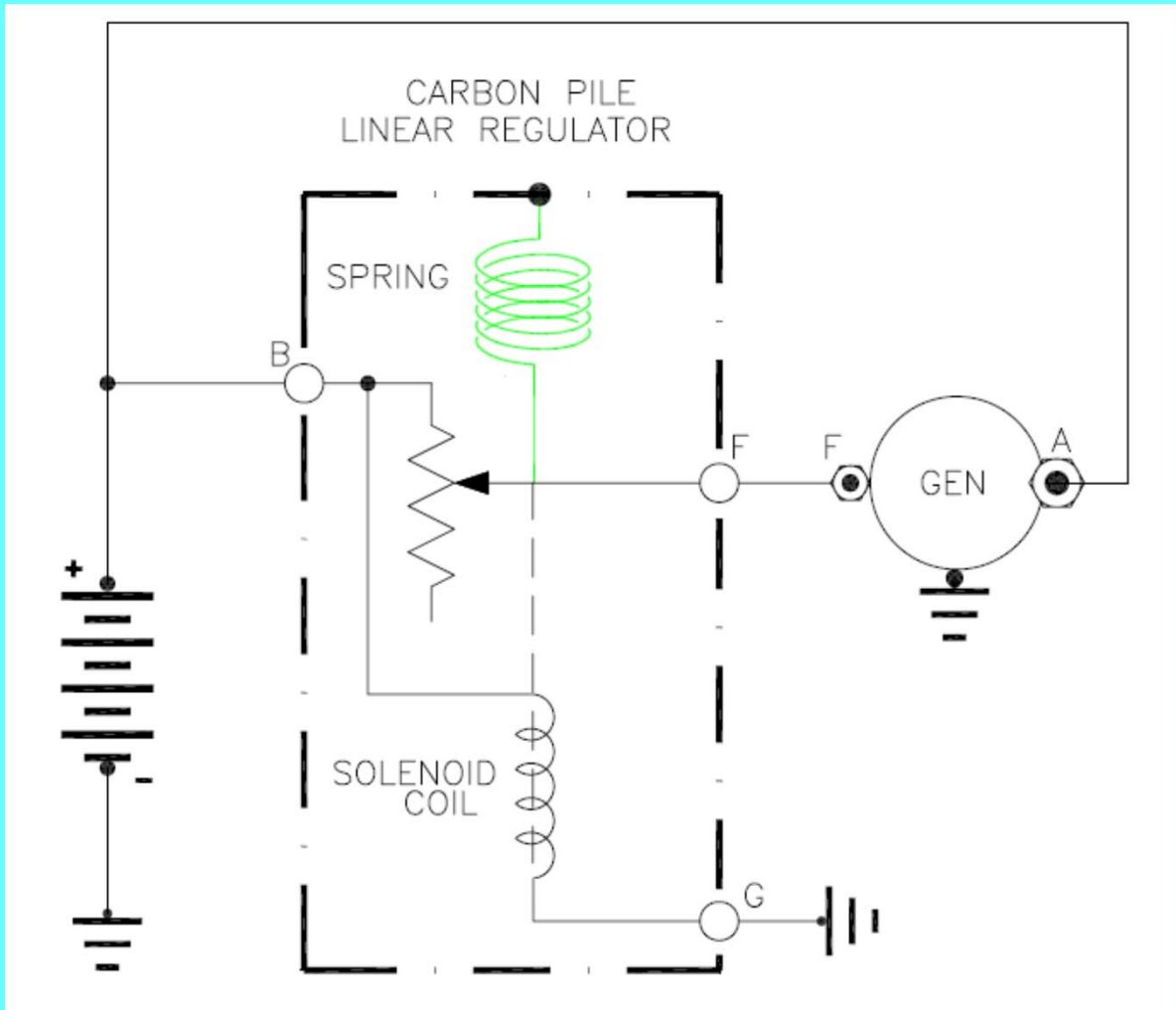
Voltage Regulators

- **Virtually every alternator and generator is tasked with maintaining system bus voltage within some specified boundaries while supplying enough power to support system energy requirements**
- **Output voltage from these devices is proportional to shaft RPM and field excitation flux.**
- **Field voltage requires constant adjustment to compensate for variations in engine speed and system energy demands.**
- **From the very earliest implementation of electrical systems on vehicles of all types, some form of regulator was tasked with . . .**
    - **Maintain desired bus voltage**
    - **Prevent current overload (*)**
    - **Prevent reverse flow of power into the generator when the engine is stopped (*)**

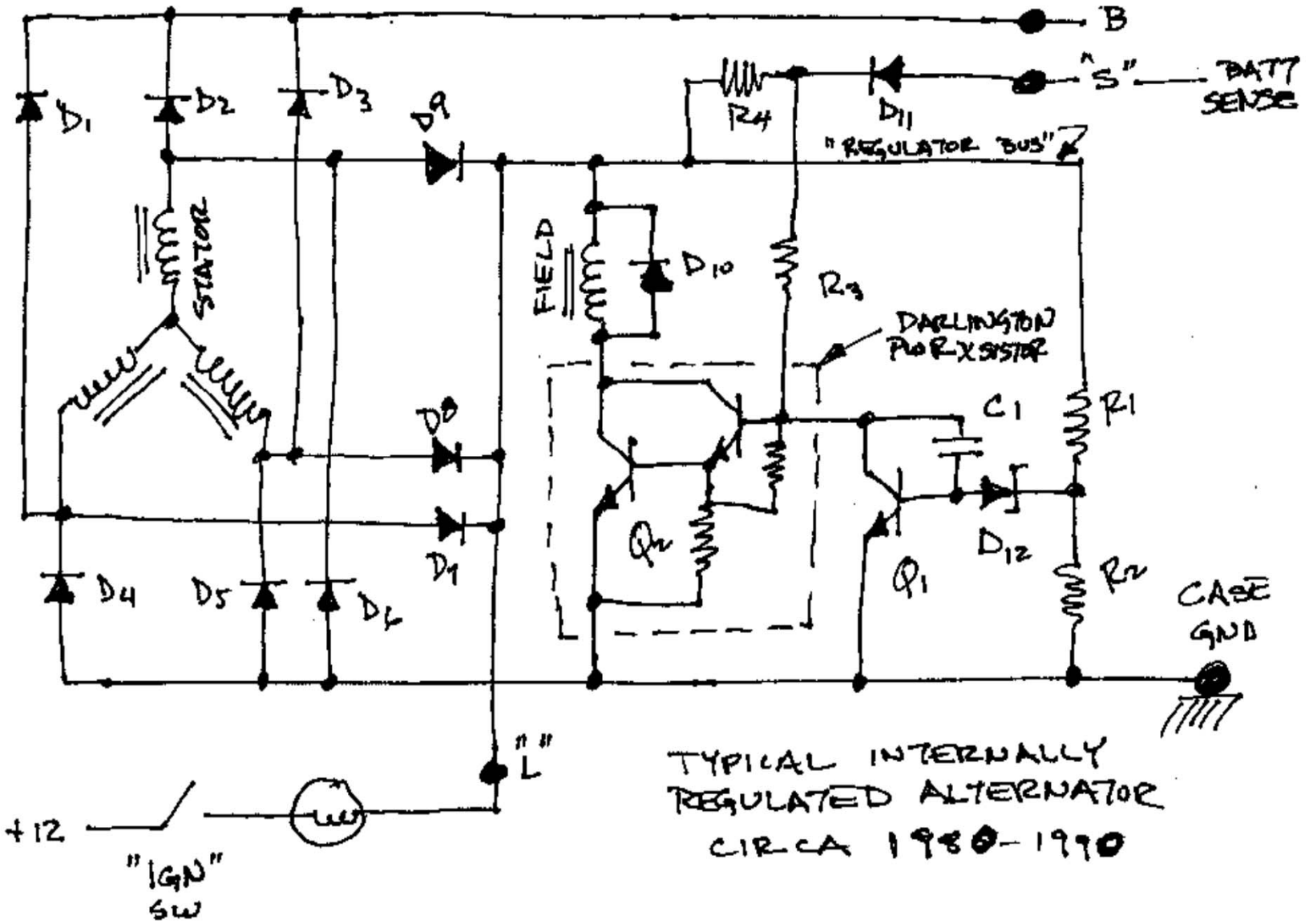
(*) Generators only - not necessary for alternators





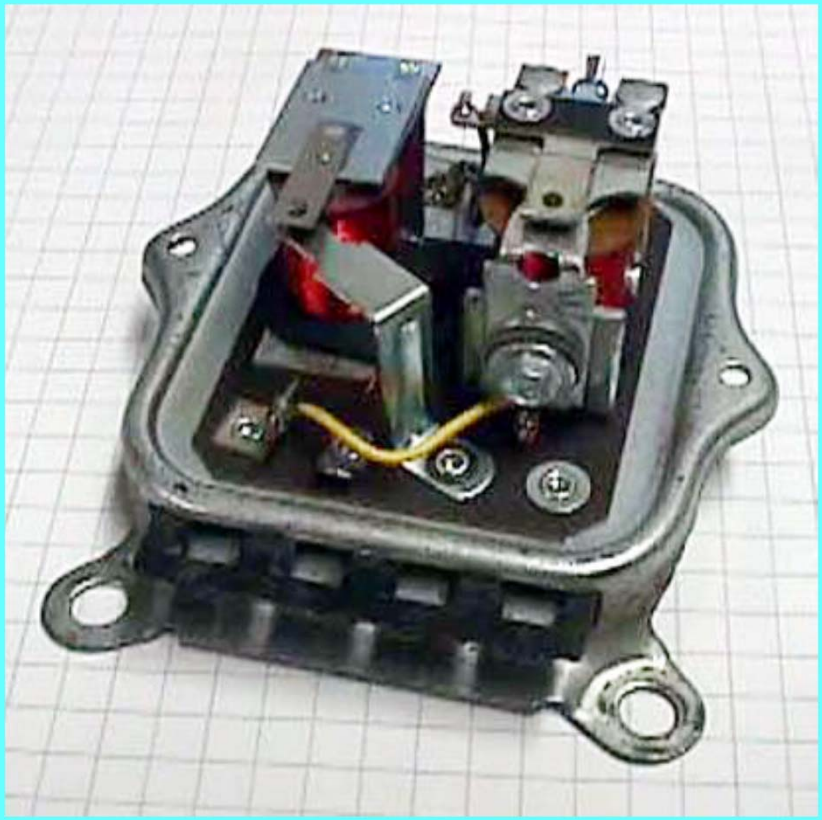

CARBON PILE
LINEAR REGULATOR
SPRING
B
F
F
GEN
A
+
-
SOLENOID
COIL
G

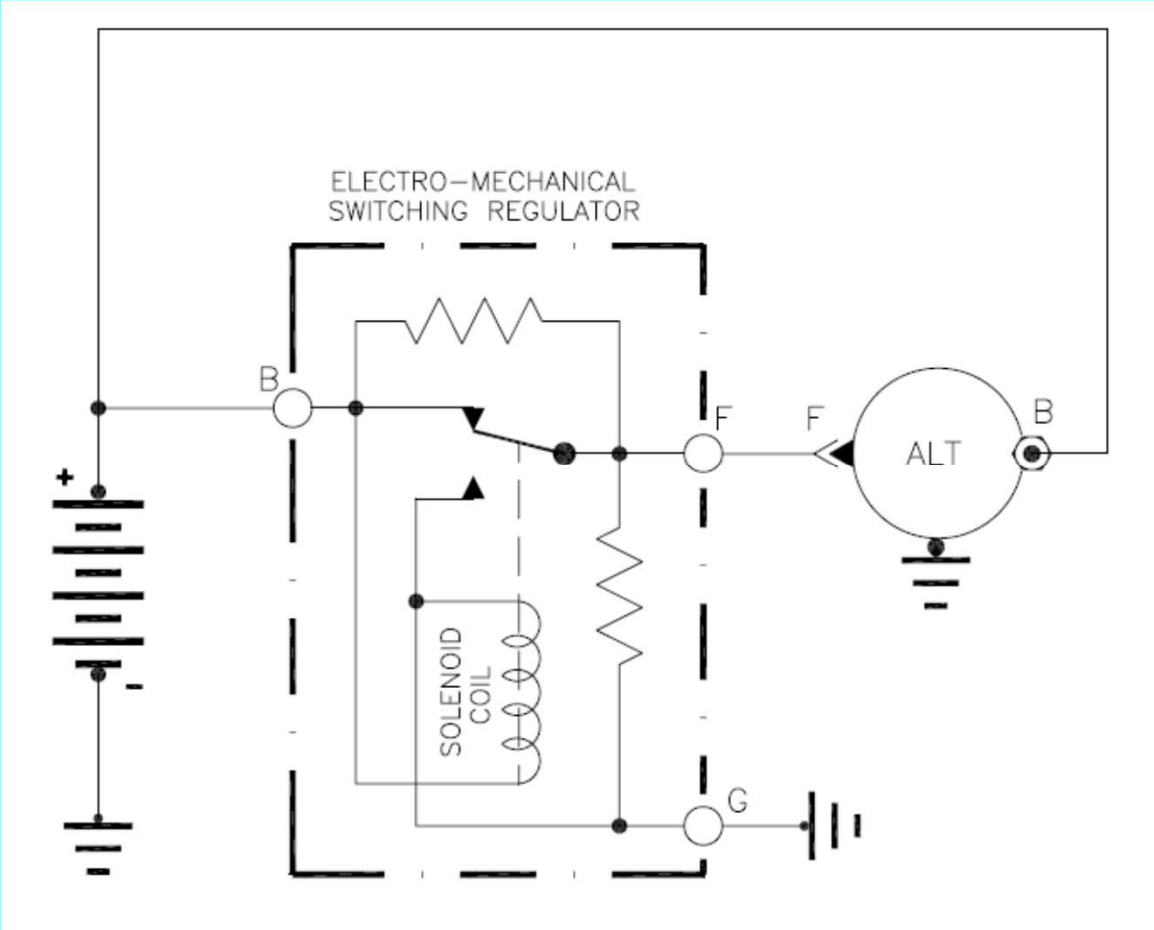
Stability in a variable world . . .

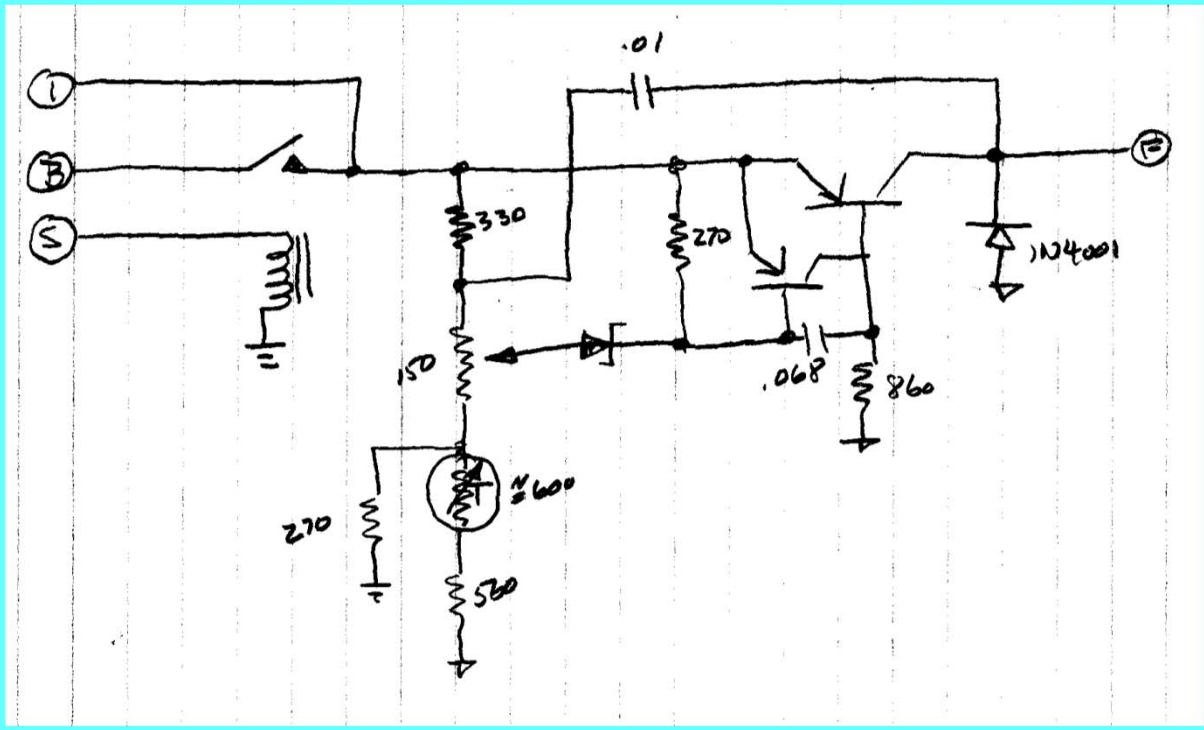



1 2 3 4 5 6 7

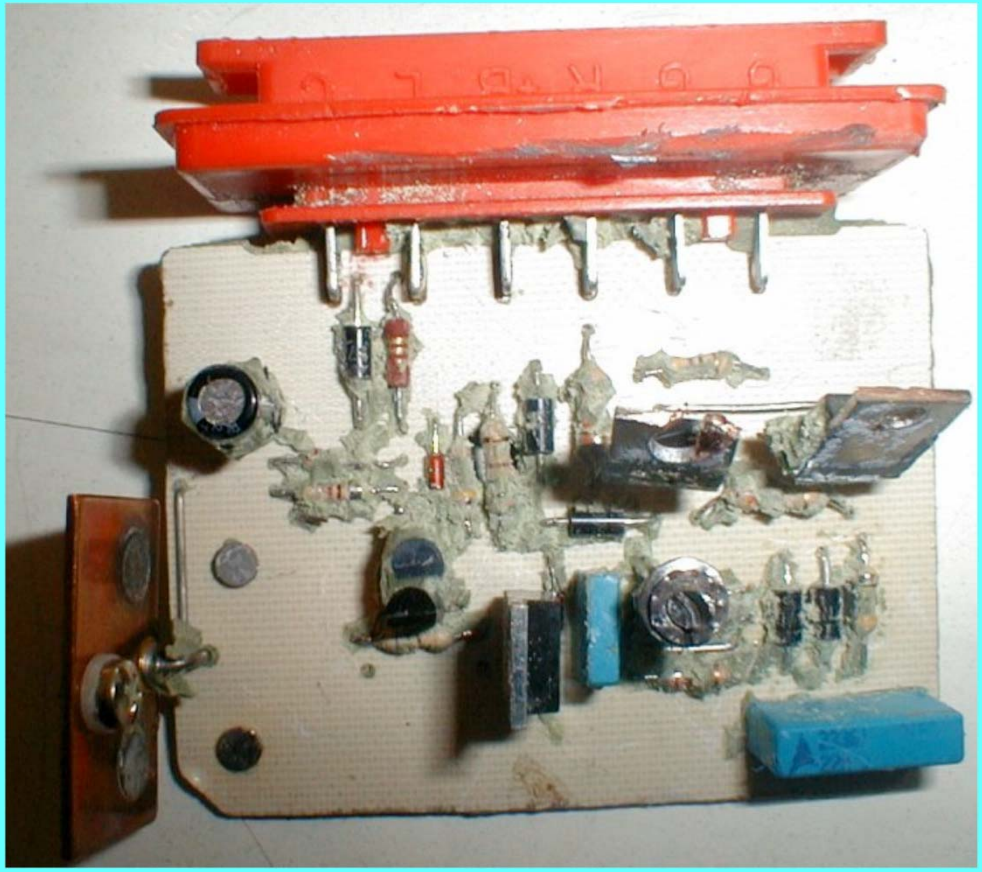
Voltage Regulators



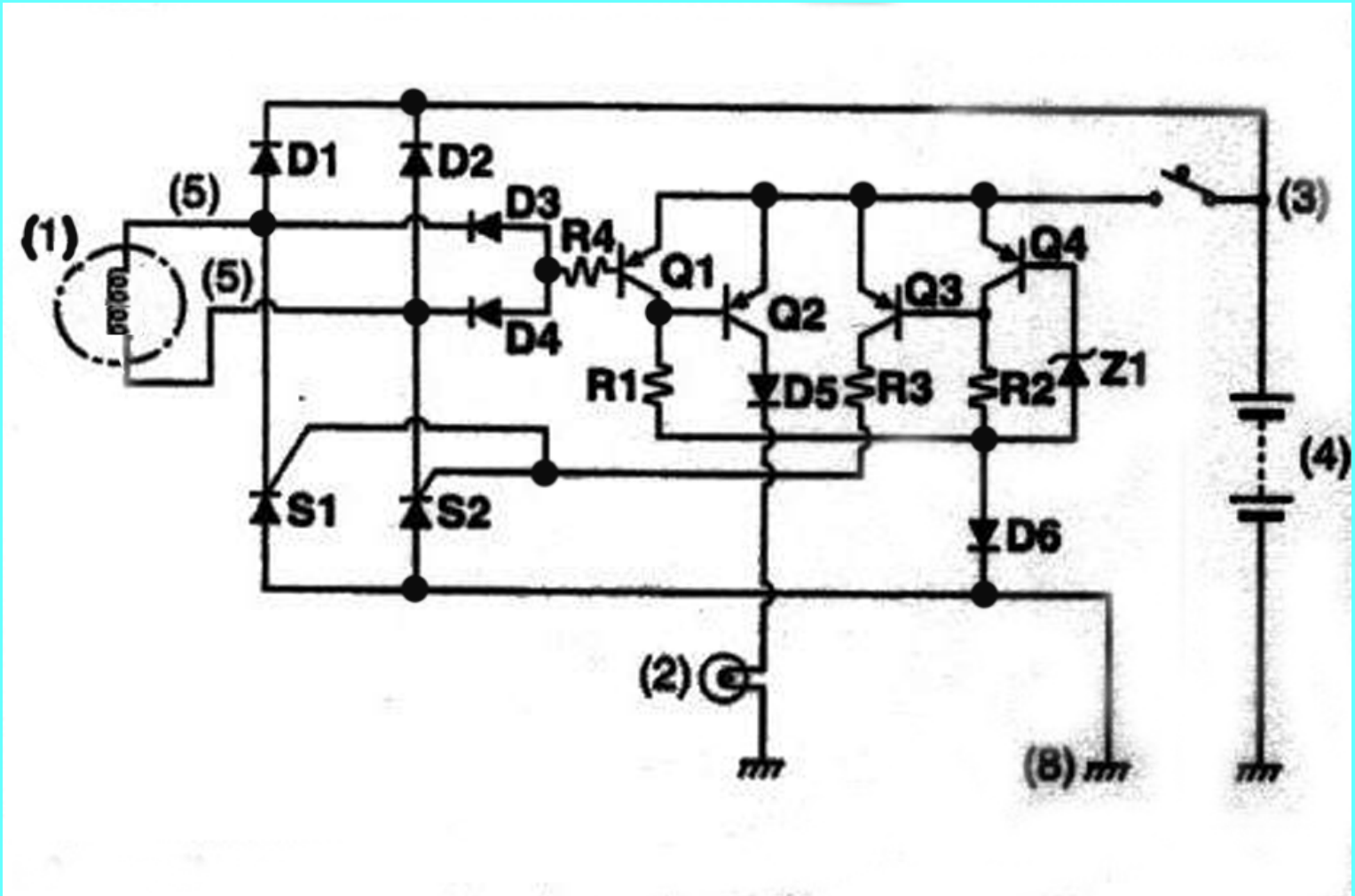

ELECTRO–MECHANICAL
SWITCHING REGULATOR
B
F
F
ALT
B
SOLENOID
COIL
G
+
-


I
B
S
F
.01
330
270
1N4001
150
.068
860
270
N-600
560

Stability in a variable world . . .



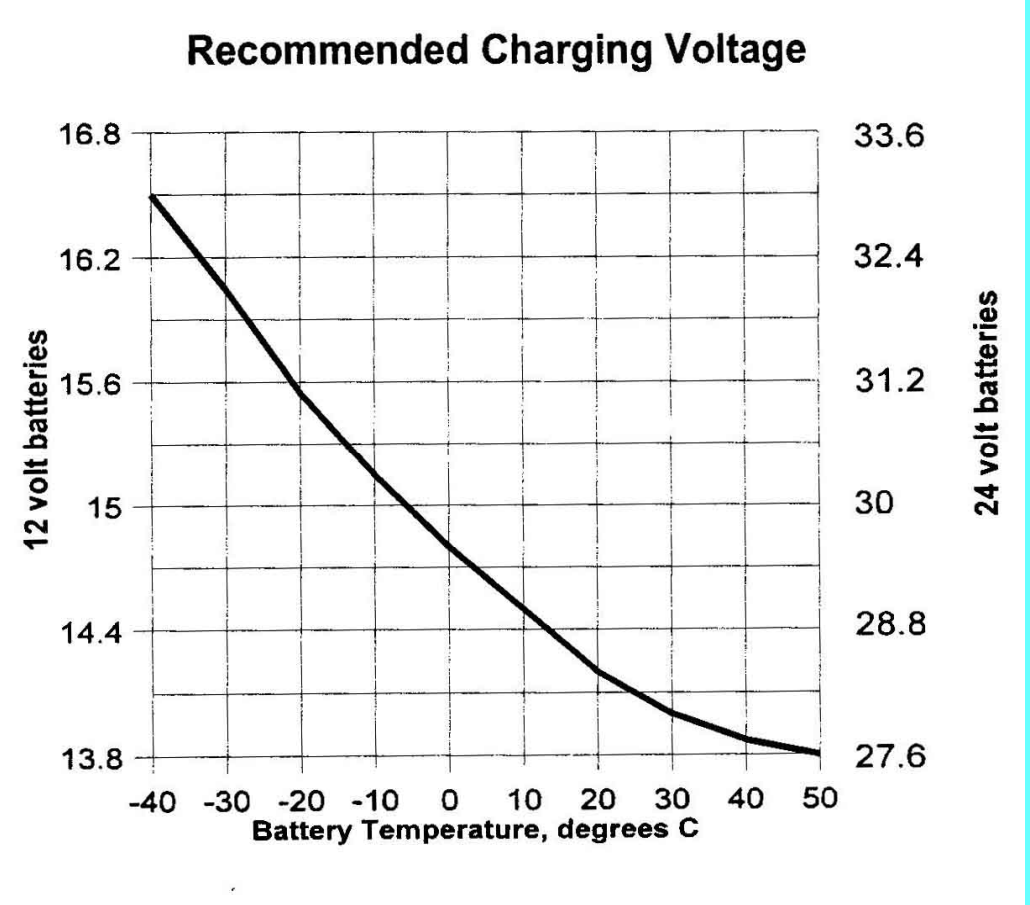
Voltage Regulators


D1
D2
D3
D4
R4
Q1
Q2
Q3
Q4
R1
D5
R3
R2
Z1
S1
S2
D6
(1)
(2)
(3)
(4)
(5)
(5)
(8)

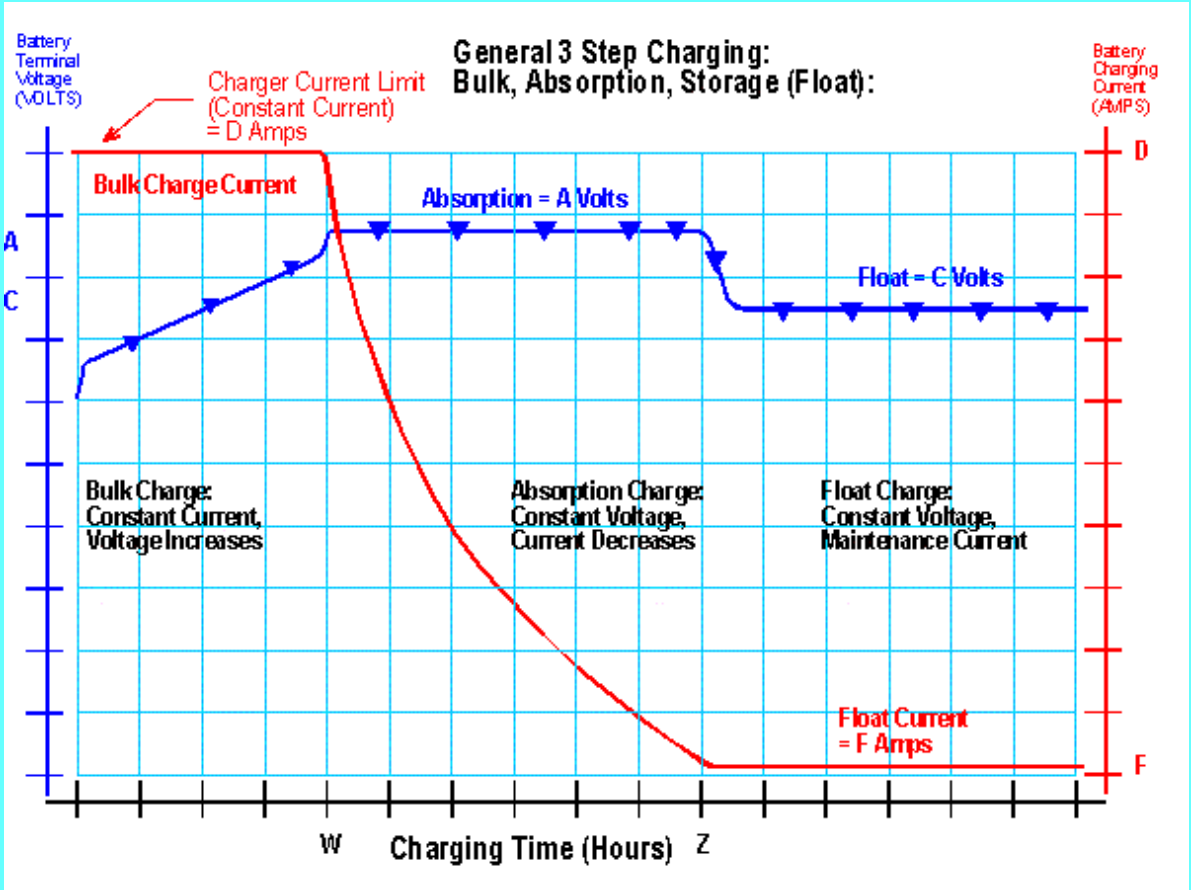
- **"Ideal" charging voltage for a battery is temperature dependent.**

- **I'm aware of only one battery temperature compensated regulator for aircraft (B&C).**

- **While these "ideal" conditions are part of the published battery data, virtually nobody bothers to schedule voltage with respect to temperature.**



Stability in a variable world . . .



- **The technology exists to craft a vehicular voltage regulator designed to "do the best we know how to do" in battery maintenance.**
- **Not likely to happen . . .**

In a nutshell . . .

- **The architecture of choice for aircraft exists to craft a vehicular voltage regulator designed to “do the best we know how to do” in battery maintenance.**
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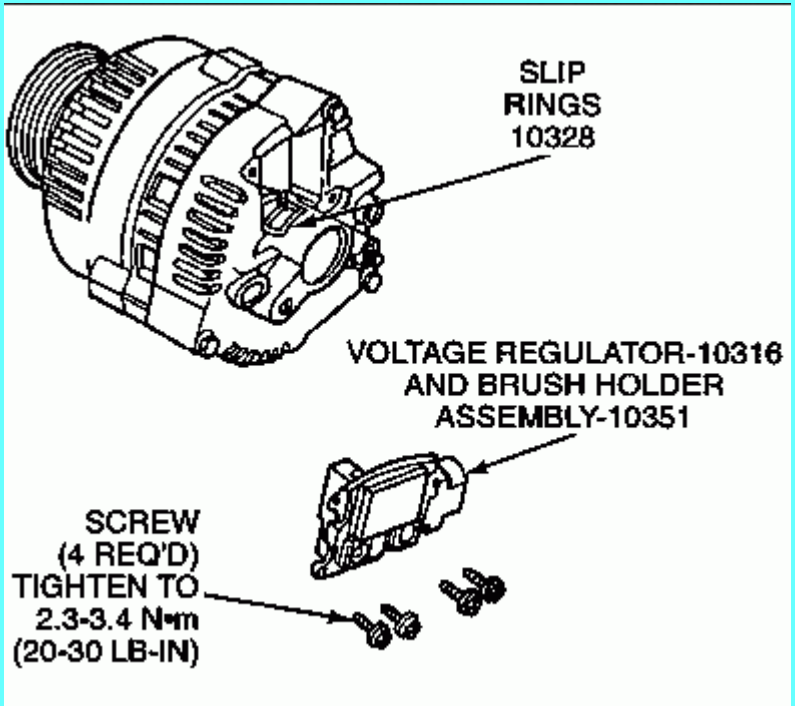

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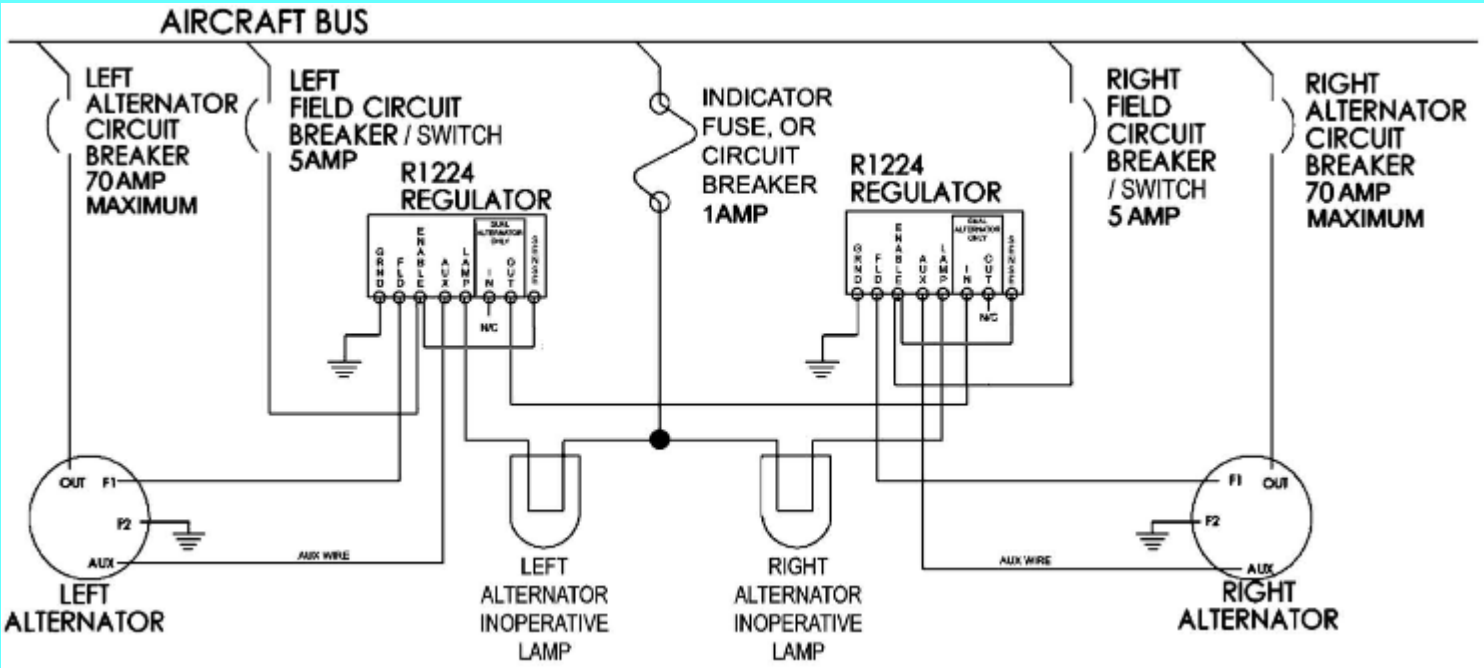

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