

Chills, Hot Flashes and Voltage Regulation: Extended Battery Life

Our original carbon-pile, 1930s-technology Birddog voltage regulators are susceptible to changes in temperature. In fact, our -20 Organizational Maintenance Manuals call for adjustment of the output voltage if temperatures change. Implicit in the table (Chapter 12, Section II, para 12-48 [Voltage Regulator] Adjustment – December 1968 edition) is the need for extreme adjustment based on OAT. Not so! If you follow the -20's table, you might do damage to your battery and avionics.

If you have a solid-state regulator – as do alternator conversions – there's no need to read further except for info on an easy way to check your system's voltage. But, if you still have a generator with the carbon-pile regulator, read on...

The *operating* temp of the carbon-pile regulator influences its output voltage, *not* the OAT. Because Cessna had the foresight to install the regulator and battery in the cabin near the firewall and heater outlets, both operate year-round in a narrow temperature range. The "Below 32°(F)" section of the -20 manual's chart is pointless – unless you don't have a functioning heater and are operating in the Far North. Running output voltage up to the high end of 29.5 ± 0.5 V per the -20's chart will be very, very tough on your battery and perhaps some avionics. With prices of NOS dry-stored lead-acid batteries tickling the \$600+ level and modern recombinant gas batteries nearly matching that, gaining extra years of battery life is significant.

So, what to do?

First – Check your generator's regulated output voltage. Garmin's portable GPS aviation models display your aircraft's system voltage on one of the pages *IF* you're powering it with aircraft power. Scroll through your pages, find it. (Consult the manual as a last resort.) You'll see your electrical system's operating voltage of the moment. Check it at cruise RPM, under a typical daylight electrical load.

Next – Compare your value against battery and avionics manufacturers' recommendations. Their recommended voltages are identical regardless of battery type. That recommendation is 28.0 to 28.5V; ideally 28.2V. Assumed is a properly functioning reverse current relay, the loadmeter confirming positive generator output starting around 1,250 RPM (+ 0, -50 RPM).

Finally – Adjust the output voltage as necessary. My system's Minnesota seasonal changes required an approx 0.2–0.3V increase to remain at the target 28.2V value during the winter. Conversely, I'd lower the voltage back to the 28.2V value in late Spring. For both, I used the GPS-displayed bus voltage value and avoided the -20 manual's more complex ground-based procedure. The adjustment itself is easy; just a small twist of the carbon pile regulator's rheostat. (Back off the jamb nut first.) If you're a purist, though, Chapter 12, Sec II will lead you through the process. Chapter 12, Sec II and its Figure 12-3 (Dec '68 edition's numbering) shows the location of the rheostat on the regulator chassis. Precisely follow the preparation steps. A digital meter helps.

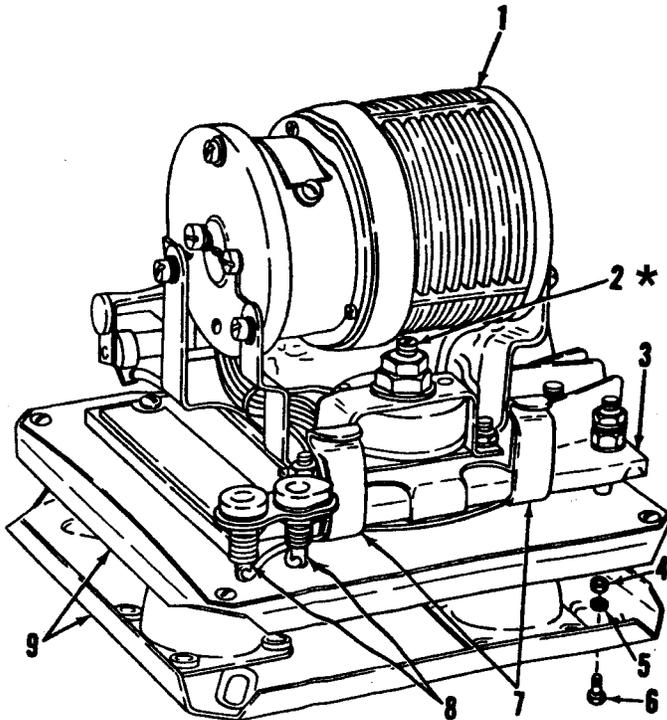
Results

I'm in year nine of my Concord RG24-15M battery. At last annual, load testing showed it still exceeds the published capacity for new -15Ms. For the first 4.5 years of its life, it operated in a carbon-pile regulated system, benefiting from the small seasonal adjustments described above. Since then, it's been operating in a stable solid-state alternator-based system. I routinely check the operating voltage using my Garmin 396's aircraft electrical system's voltage readout, prepared to adjust the output to 28.1–28.2V if necessary. With the alternator, it hasn't been. My 24V Aviation model BatteryMinder continually desulfates and "float" charges the battery whenever the plane's not in the air. But that's another story...

For that story and much, much more, check out your IBDA website's merchandise page: <http://www.ibdaweb.com/shop-ibda.html> Scroll down to the Technical Sessions I & II CD. That could be the best \$20 investment you'll find for maintaining and optimizing your Birddog.

The Carbon Pile Regulator

TM 55-1510-202-20



1. VOLTAGE REGULATOR
- * 2. VOLTAGE RHEOSTAT ADJUSTING SCREW *
3. BASE ASSEMBLY
4. NUT
5. WASHER
6. BOLT
7. SPRING CLIPS
8. VOLTMETER TEST JACKS
9. SHOCK MOUNT

AVN 000785

Figure 12-3. Voltage regulator assembly

Good Luck!

(P.S. I finally replaced the Concord RG battery - halfway into year 14!)

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