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What About Those Built-in Regulators?

Bob It worked, now you have scared me, I have been flying my RV-6 for almost eight years and over 800 hrs. with a $45.00 junk yard Chevy Sprint Nippon Dienso with no problems but I certainly don't want to fry all the goodies in the panel what would you suggest I do to protect my radios using the Nippon with A built in voltage regulator? I think you have touched on this before but I can't find the info. Thanks !

Didn't mean to scare you . . . in support of your own experience, I can point to millions of Nippon-Dienso machines that go to the junk yards still working after the rest of the car is scrapped. They are indeed very reliable machines . . . but what does that mean?

There are thousands of parts on single engine airplanes that have been shook, baked, spec'd, conformity controlled, pma'd, stc'd, tso'd, ad nauseam. Does that mean the part will never break? Of course not . . . airplane parts break every day. If airplane parts never broke, FBO shops would be out of business . . . As experimental airplane builders and drivers our options for development and maintenance of a comfortable flying machine are much better but some advice from the heart goes as follows:

Nuckolls' first law of airplane systems design sez: "Things break"

The second: "Systems shall be designed so that when things break, no immediate hazard is created."

The third: "Things needed for comfortable termination of flight require backup or special consideration to insure operation and availability"

The forth: "Upgrading the quality, reliability, longevity, or capability of a part shall be because you're tired of replacing it or want some new feature, not because it damned near got you killed."

If these tenants are observed, and it's not difficult to do, then it makes no difference where you buy your parts or how much money you spend on them. You're free to try any new part with the goal of seeing how long it will last or how well it will perform. It does require that you make sure that every failure mode is deduced and it's consequences evaluated.

In the case of your alternator's built-in regulator, I cannot tell you that the critter will never fail . . . indeed, failure-tolerant design philosophy dictates that I assume that it will fail (Rule #1). Right now, the best way we know for covering ourselves is to add backup protection (crowbar OV module or OV relay) to effect timely shutdown and warning of the failure (Rule #2). Then, if we have a battery on board with a known capacity, and we've architectured the bus structure to allow needed goodies to stay powered (Rule #3), we're sure to make it home so we can repair the bugger.

Many airplanes are flying with modern, very reliable, alternators featuring built-in regulators. Most of them will go the lifetime of the airplane with no unhappy events. A few will experience gross failure that may smoke other goodies in the airplane. The failure probably won't get anyone hurt or bend an airplane but it can be expensive . . . and it's so easy to avoid. B&C removes the regulators and brings brush leads to the outside so that all power necessary to excite the field comes through a single, OV protected path.

Adequate external regulators are available for $10-$30. A crowbar OV module is another $35 or build it yourself for about $15. Until we find a neater way to do it, this is my best recommendation. This pessimistic approach to systems design should the regulator in your alternator decide to be "one in a million" whereupon your may exercise the more pleasant options of Rule #4