

“...and I hear this whine in my headset.”

Alternators have been one of the biggest improvements in aviation in the last 50 years. However, one of the most common and frustrating complaints about new alternator installations is that of noise in the headset.

It seems when the owner of the offending airframe pulls the 5A alternator circuit breaker, the noise stops. So that would indicate a bad alternator, right? Not so fast, cowboy.

Remember generators? How can we forget something as big around as your thigh and weighing more in pounds than the amps they put out? Not very impressive, but at least they did not generate “noise”. So what gives?

In the mid 1960’s, airframe manufacturers started installing alternators on production aircraft and generators started piling up in shop corners as pilots converted their planes by STC. One of the drawbacks of these conversions was the noise generated by a multi phase, alternating current, power-generating device: a.k.a. “the alternator.”

In an electrically “clean” aircraft, any alternator noise is well below the audible range. So if an aircraft exhibits a noise problem, either 1) an old capacitor may have failed, 2) there may be an alternator problem, or 3) most likely, you may have a bunch of little resistors in your system each contributing to the musical cacophony in the pilot’s headset. Every small point of resistance - a crimped terminal, a worn switch, an old circuit breaker, a poor ground or an old wire – increases noise. Combine enough of them and you just might have an audible whine in the headset.

The late Tom Rogers of Avionics West wrote an excellent article about noise called “Cessna’s Snap, Crackle, Pop.”

<http://www.avionicslist.com/articles/cessna-alternator-noise.php>

One point Rogers makes concerns ripple voltage. Industry standards base the allowable ripple voltage on a percentage of the alternators max output. A 70A alternator has a max allowable peak to peak of 1.9V but at normal loads, his max ripple of 1V is about right.

While his article is specific to Cessna products, most of the points he makes translate to all aircraft. Very seldom is the alternator the root cause of the problem. They are very simple spinning devices that typically either work or don’t work. Alternators rarely decompose into some freak noise-generating device. Rather the electrical system as a whole contributes numerous injections of noise to the aggregate whole.

So exactly how should one address a noisy electrical system problem? Re-wire the aircraft? Look for another solution? Cessna’s solution was to install a large capacitor to the system to filter the output directly from the alternator. Filters work well and are available from various sources.

Another solution is a multi-purpose filter that removes not only alternator noise but noise from other components as well. These filters are installed in the audio power circuits (radio, audio panel, i/c) and are often the most effective option for removing noise from your headset.

But, even filtering can fall short of removing the whine in your headsets if the source of the noise is a **ground loop**. The most common causes of ground loop problems in cockpits today are music players and Garmin 396 or 496 units plugged into an intercom or audio panel input (really now, how did we ever fly without XM radio in the cockpit?).

Music players and GPS devices powered by an aircraft power source such as a cigarette-lighter plug often inject an instant ground loop. Unplugging the device from the aircraft power source or from the intercom/audio panel typically eliminates the noise and indicates the need to install an isolation transformer/filter. A good isolation transformer/filter such as the PAC RCA Filter SNI-1/3.5 can be obtained for as little as \$15. This little device plugs between the audio device and your intercom/audio panel input.

If an audio source such as those mentioned above isn't the problem, you may have to do some rewiring to get rid of your ground loops. One common trick is to insulate all of the headphone jacks from the panel with insulating shoulder washers and to run a separate ground wire from each jack directly to the intercom/audio panel.

One of these solutions will solve most headset noise problems for most new alternator installations. Whether you are a Plane Power customer or not, Plane Power tech personnel are available M-F 8-5 CST to help solve your charging system installation problems. Feel free to give us a call.