



Reprinted from
Avionics
January 2007

'If all aircraft systems and equipment could be designed and manufactured to operate at the full spectrum that has come to be known as Wild frequency, the benefits to the industry would be tremendous.'

Frequency Change

As the avionics industry moves toward realization of the all-electric aircraft, in which flight systems rely more on electric drives and actuation than ever before, the impact on the designs of electric power systems is tremendous. With these systems continually increasing in size, and with technology continually on the march, the need for generation and control of significantly increased onboard aircraft electric power becomes ever more critical.

As flight systems evolve from traditional hydraulic, to electrically controlled/hydraulically powered, to electrically (or optically) controlled/electrically powered, one of the key design requirements for new power generation will be the ability to provide high-quality power generation at variable generator frequencies. An equally important requirement will be for electrical equipment and systems to be able to utilize the wide variable frequency, or "Wild" frequency, of 350 to 800 Hz output by the variable frequency generators.

Surprisingly, in a recent survey of avionics engineers, only one-third of all respondents stated that they believe Wild frequency will one day surpass 400 Hz as the standard alternating current (AC) in avionics equipment. (View survey results at www.behlman.com/pr/06/b-survey.pdf.) Despite the fact that two out of three respondents expect 400 Hz to remain the dominant standard AC, it is clear that power requirements for the avionics industry are changing to meet the evolving needs and capabilities of a broad range of aircraft, ground support and test equipment.

As avionics engineers and aircraft manufacturers work toward the all-electric aircraft, the ability for an aircraft's electrical systems to harness and utilize the Wild frequency becomes critical. Engine speed has a direct effect on aircraft AC power generation. Although the majority of aircraft flight time is at engine speeds comfortably producing 400 Hz power, the frequency can vary from roughly 400 to 800 Hz during takeoff and landing. In military aircraft, the frequency is likely to vary during many combat maneuvers as well. To keep the AC power frequency at a constant 400 Hz presently requires equipment to convert the variable speed mechanical power produced by the engine to the constant frequency AC power traditionally used by aircraft systems.

This conversion equipment adds weight, maintenance, costs and complexity that can also contribute to the reduced reliability of the aircraft. If all aircraft systems and equipment could be designed and manufactured to operate at the full spectrum that has come to be known as Wild frequency, the benefits to the industry would be tremendous.

In civil aerospace applications, the Airbus A380 and the Boeing B787 Dreamliner passenger jets provide compelling examples of where electrical power trends in the avionics industry are headed. Not quite "all-electric" but rather "more-electric" aircraft, both feature an increased use of electric motors and motor controllers to replace hydraulic actuation. Rather than traditional standard 115 Vac, 400 Hz generators, both aircraft also feature variable speed generators that adapt to the changing speed of the engines powering them. Indeed, on both aircraft, the adaptation of Wild frequency power generation systems has introduced the benefit of significantly reduced complexity compared to the constant speed hydro-mechanical devices run by previous fixed-frequency power systems.

A strong indicator of the shift is the increase in requests for AC power units with Wild frequency capabilities, as reported by power supply manufacturers. Behlman Electronics has witnessed the trend and is studying the impact that the adoption of Wild frequency will eventually have on ground support and avionics test equipment. Logically, if Wild frequency is to become widely accepted as the prevalent AC power in avionics, ground support and test equipment capable of providing Wild frequency power ranges will be essential.

To help gauge this trend, Behlman sponsored the aforementioned survey of avionics engineers and now has established a "Wild Frequency Information Center" at www.behlman400hzpower.com/wf.htm. Interested parties are invited to send their comments or questions about wild frequency to Behlman via that page. We will endeavor to answer all questions, and will share whatever information is appropriate with all who have an interest in the future of Wild frequency. **AVS**

Ron Storm is vice president, marketing and sales, with Behlman Electronics, Hauppauge, N. Y.