

Case Study

Mil/Aero Applications

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— John Beres,
Electronics Engineer
Flight Test Group, FAA



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Falcon Electric's Power Solutions Helps The FAA Keep Flying Laboratories On Schedule

The FAA William J. Hughes Technical Center is the nation's premier aviation research, development, test and evaluation facility. The Technical Center serves as the national scientific test base for FAA programs and activities including test and evaluation of equipment for use in air traffic control, communications, navigation, airports, aircraft safety, and security. They develop innovative aviation systems and concepts, new air traffic control equipment and software. They also modify existing systems and procedures. The Center not only serves as a cornerstone for aviation advancements, but also is a key focal point for Homeland Security. Located 10 miles northwest of Atlantic City and covering over 5,000 acres, the facility consists of state-of-the-art laboratories, test and support facilities, adjacent to the Atlantic City International Airport.

The Flight Test Group is responsible for providing test support for various modified and new aerospace systems to be used in the National Airspace System. As part of their responsibilities, the group maintains a small fleet of aircraft used as flying laboratories. John Beres, a member of the Flight Test Group within the FAA Technology Center for Research & Development states, "These flying laboratories are readily modified in-house to support any and all equipment submitted to us for flight testing. This includes navigation, communication and various other non-flight related equipment requiring FAA developmental testing.

"For example, we recently provided testing for a client that was implementing a new computer and software system into an existing communication package. We were tasked with collecting the data, post-processing the information and providing all test results to the customer and FAA engineers so they could determine if the company's product could feasibly meet future FAA airborne communications requirements. The computers and communications gear were commercial off-the-shelf, or COTS products, and as such were designed to operate on 120Vac, 60Hz power. Due to the low cost and growing abundance of these off-the shelf products and the demand to use them onboard aircraft, our aircraft test beds must accommodate their power requirements. We needed to find a source of AC power that was able to take 115Vac, 400Hz power generated by the power systems on the aircraft and convert that to power for the COTS equipment to be evaluated."

On older aircraft, 400Hz power was maintained by a system which regulated the AC generator at a constant speed, regardless of the engine speed. To save weight, newer aircraft have removed this feature and simply allow the power to vary between 350Hz and 550Hz. This is commonly known as "Wild Frequency." This was the case with a Bombardier business jet recently purchased and configured as a flying test bed.

"To meet the power demands of the COTS equipment under evaluation, we needed to incorporate a device that would act as a frequency converter and provide the level of voltage regulation demanded by the equipment. Through our research we discovered that Falcon Electric's ED Series™ On-line Uninterruptible Power System (UPS) and Frequency Converter met most of our requirements, in addition to providing battery backup – should the power disturbance be of a sustained nature.

"Because we didn't want any adverse operation of the equipment being evaluated to affect the vital aircraft's power bus, we required Falcon Electric to customize the UPS with an FAA-compliant Remote Emergency Power Off, or REPO interface, that would support the connection of a remote shutdown switch," said Beres. The REPO switch can be used by the pilot, or data collection engineers in the event of a failure (electrical short) of the equipment under test which might affect the airplane's power system. In order to prevent inducing a fault to the aircraft's electrical system, the switch disconnects the test equipment from the main power system.

As an additional flight safety feature, our group required the ability to disconnect the UPS output, even on battery power. Falcon made the REPO modification and included a battery disconnect. Beres adds, "They modified the units to meet our specifications and went beyond what we asked for by designing the REPO interface to support the incorporation of a series of LEDs that could be placed in the pilot's field of view to indicate the switch status.

"Overall there are a few things that really impress us with Falcon Electric and the ED Series UPS that we have subsequently installed on-board our aircraft. First, is the flexibility and timeliness of the Falcon Electric engineers. We found that the Falcon team was willing and able to make modifications so that the ED Series met our requirements. The second thing that I liked is the small size and light weight of the ED Series itself. We recently moved away from our Boeing 727 test bed aircraft to a compact Bombardier business jet aircraft where space and weight are at a premium. The ED Series was a perfect fit in a very small aircraft. Finally, we found that the lead-time Falcon Electric quoted and delivered on this project turned out to be of tremendous value. This company provided us with a solution to our requirement of frequency and phase conversion of aircraft power into a standard 120Vac, 60Hz power for COTS computer and communications hardware. Falcon's staff of engineers, sales and support professionals were helpful throughout," stated Beres.