



Alone up in the air

The ILA2006 Berlin Air Show held May 16-21 is always a good place to see new things that move through the air. Approximately 250,000 visitors (25 percent more than last year) had the opportunity to see the Airbus A380, the world's largest commercial aircraft, and the Barracuda, an Unmanned Aerial Vehicle (UAV) from EADS (Germany and Spain). The Barracuda is a heavyweight UAV at 3.25 metric tons, including the CompactPCI-based mission control system. It is very large at approximately 8.25 meters (26 feet) in length with a wingspan of 7.22 meters (23 feet). This jet-powered UAV is propelled by a turbine delivering 14 kilonewtons of thrust. It is the largest UAV built in Europe by European companies. It successfully flew over southern Spain prior to being shown in Berlin. This is not a rebuilt aircraft. It was designed from the ground up to become a UAV for commercial and military applications.

EADS and industrial partners such as SBS Technologies Europe built this high-performance, all-electric plane in an extremely short time by using COTS products with a proven record of reliability and high availability. The body was completely built from EADS patented Carbon-Fiber Composites (CFC) to save on dead weight, leaving more weight for scientific or military payloads. Except for the landing gear, everything is controlled electrically (steer-by-wire), not using any hydraulics. The wings are exchangeable to suit different types of operating conditions, such as slow-speed sailing at high altitudes or precise contour following very low above ground at very high speeds.

The Barracuda UAV operates completely automatically and autonomously (including takeoff and landing) based on mission data uploaded into the onboard advanced mission system. Plans call for many different applications including *network-centric operations* and *intelligent UAVs* that can switch from surveillance to reconnaissance or completely change the mission during unmanned flights.



Figure 1

Figure 1 shows the Barracuda alone on another mission without remote control guidance.

Engineers from SBS Technologies in Augsburg (Germany) built the Mission Management Computer (MMC) under contract directly from EADS. The rugged enclosure (AVC series) is equipped with four CompactPCI 3U backplanes (22 slots total), arranged in a dual redundant configuration in two sections. A four-port Ethernet hub provides redundant communication between the modules (boards) in the system in addition to the CompactPCI parallel bus. The enclosure and boards are all conduction cooled. The two CPU boards (CM4) are 3U PowerPC SBCs. Two dual-channel boards provide the 1553 interfaces, and a digital I/O board handles various functions. Two power supplies feed the two redundant computer sections.

SBS Technologies supplied a mission-ready system completely tested and equipped with board support packages for use with the VxWorks real-time operating system from Wind River Systems, Inc. The electronic systems on the UAV jet are built in an open architecture configuration from commercially available products. This approach generates a versatile system that adapts quickly to widely differing applications. The CompactPCI backplanes built by SBS Technologies for EADS have a large number of empty slots remaining to be equipped with different modules for a variety of missions.

Ready for (virtual) launch

Launching a missile is an expensive operation. Simulating it with electronics and software is obviously much less costly. MEN Micro Elektronik GmbH (Germany) has built a 3U CompactPCI system for a government institute, using seven CPU boards in one 19-inch chassis. One of these CPUs acts as a control unit and the other six CPUs are execution units. The communication load is very high. That is why six Ethernet dual-channel PC•MIP (ANSI/VITA 29) mezzanine modules (P16) on two PC•MIP carrier cards are required in addition to the Ethernet channel on the CPU card. Digital I/O channels and a motion counter are implemented on M-Module (ANSI/VITA 12) mezzanines. The M81 module provides 16 output channels (0 V and 36 V, up to 500 mA each) and the M82 module has 16 input channels (0 V to 40 V). The motion counter M-Module (M72) has four independent cascadeable 32-bit channels (optically isolated) usable as timers, counters, or comparators.

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