

## Tech focus

***This month's focus is on new developments in the areas of communications and data collection/manipulation.***

### Arinc has patent-worthy ideas on flight data

Arinc has been awarded a U.S. patent for improved ways to access operational data from electronic systems on aircraft, including selective monitoring, display of parameters in near real time, data collection and storage, and transmission of data to the ground.

The method was developed to proactively monitor QARs and record selected data analysis, either to be transmitted air to ground via Arinc GLOBALink ACARS service, or manually downloaded after flight by CD or another portable-storage medium. Data could also be

tions, or landed with excessive force on a past flight," Stefani said. "It would be much more useful to see this data in real time and take the appropriate corrective action immediately rather than wait several weeks for data to be offloaded and subsequently analyzed."



Electronic flight bags such as this one from NavAero play a role in Arinc's vision for improvements in how flight data is collected and accessed.

The concept has immediate application to modern commercial aircraft, many of which are equipped with quick access recorders (QARs) that store voluminous amounts of data on board. Airlines must physically retrieve the data for periodic analysis—an inefficient process requiring trained personnel and proprietary data analysis.

With the patent, Arinc envisions use of an onboard network to extract selected data from aircraft QARs and other avionics. In addition to the use of portable data-handling devices such as electronic flight bags (EFBs) to store data on board, the vision involves real-time event analysis and ways to make the information available immediately to air crews or to ground maintenance personnel in a more convenient and timely manner.

physically carried off the plane on an EFB for analysis.

"There are upwards of 3000 aircraft using QARs today, and they have no easy way to extract critical data in real time," said Rolf Stefani, Senior Director of the Arinc Technology Innovation Center and the primary inventor of the patented methods. "The new Arinc patent provides for much faster visibility into parameters of interest to flight crews and airline management, for both operational and maintenance purposes."

QAR data is often collected weekly or biweekly. Much valuable information about aircraft operation or performance is thus historical and out-of-date when received, according to Arinc.

"Imagine data that shows a plane was subjected to severe turbulent condi-

The Arinc patent lies at the intersection of three expanding technologies—growing use of EFBs, widespread availability of QARs, and new integrated communications capabilities. The latter can advise flight crews in near real time via EFB technologies, or communicate information to the ground—via transmission in flight or broadband at the gate. Manual distribution on CDs, memory cards, or USB drives is also accommodated.

"Arinc has always played a central role, providing industry standards for aircraft data handling and communication," said Stefani. "All such data has a much higher value in real time, so it's natural for Arinc to take the initiative in making it more accessible."

Patrick Ponticel

## Raytheon throws the dice on UAV 'cockpit'

Raytheon's Universal Control System (UCS) is said to increase operator awareness and efficiency, while providing the ability to control multiple unmanned aircraft, reduce potential accidents, improve training, and decrease costs.

"We took the best-of-breed technologies from the gaming industry and coupled them with 35 years of Raytheon UAS [unmanned aerial systems] command-and-control expertise and developed a state-of-the-art universal 'cockpit' built around the operator," said Mark Bigham, Business Development Director for Raytheon's Intelligence and Information Systems group.



The UCS minimizes unmanned aerial system issues by being operator-centric, and both situation awareness and operational capabilities are enhanced to support mission success.

"We broke down the operator's tasks and objectives and constructed a system built entirely around them, rather than building the system around the air vehicle first, without input from the operators," he said. "Improvements included adding a wrap-around display to enhance operator effectiveness. We wanted to put the operator in the UAS cockpit virtually and dramatically enhance his or her situational awareness. UCS operators will have better situational awareness than any manned platform, which dramatically improves safety."

Raytheon designed and developed the UCS to meet operator demands and decrease human factors issues when operating a UAS. The enhanced operating system, with features such as adjustable hand and foot positions, addresses ergonomic concerns and caters to the

needs of the operators to help them perform their jobs more effectively, says the company. The success of UAS are largely dependent upon the operators who pilot remotely from the ground, often times

thousands of miles away.

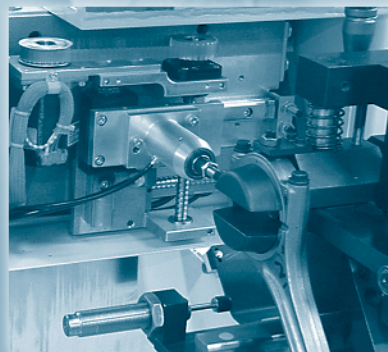
Operators have the option to stand or sit for increased flexibility in controlling multiple functions. Raytheon says the technology also provides a safer work

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Tech focus



Raytheon's Universal Control System (UCS) features a wrap-around display and dynamic picture-in-picture airspace and weather overlays, live target markers, and digital terrain elevation data.



Raytheon says that it designed the UCS around the operator rather than building the system and the vehicle first.

environment for operators, keeping their minds more focused to perform their missions more effectively and safer. The UCS system can control multiple dissimilar UAS simultaneously, with software designed and developed by Raytheon.

Raytheon developed an intuitive interface technology, which makes UAS operators more effective in learning the UCS and with significantly less training. The company also leveraged some of the billions of dollars the gaming industry had invested in developing advanced human interface technologies—such as thumb controls and hands-on throttle and stick—that are simple and intuitive.

A 2004 study by the FAA titled "A Summary of Unmanned Aircraft Accident/Incident Data: Human Factors Implications" stated that "A common theme across many of the mishaps reported involved a problem with the command interface to the system." The study also noted that human factors issues were present in 21% of Shadow incidents and to 67% of Predator accidents. According to Bigham, Raytheon is confident that the UCS will improve operator performance statistics such as these found in that study, and that the company looks forward to analyzing user results.

The UCS is based on flight-proven technology and a multi-platform, multi-sensor open architecture. It is also compliant to STANAG 4586, a specification that allows members of the NATO alliance to share information obtained by their UAVs.

Raytheon has developed a wide variety of UAS ground control systems for the U.S. military for more than 35 years. Most recently, Raytheon developed the Global Hawk ground system for the U.S. Air Force and the Tactical Control System for the U.S. Navy. The Global Hawk ground system was ranked as the "most automated of all systems," according to the FAA December 2004 study.

Jean L. Broge

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