Aerospace Communications Security Technologies Demonstrated

In light of the events of September 11, 2001, NASA senior management requested an investigation of technologies and concepts to enhance aviation security. The investigation was to focus on near-term technologies that could be demonstrated within 90 days and implemented in less than 2 years.

In response to this request, an internal NASA Glenn Research Center Communications, Navigation, and Surveillance Aviation Security Tiger Team was assembled. The 2-year plan developed by the team included an investigation of multiple aviation security concepts, multiple aircraft platforms, and extensively leveraged datalink communications technologies. It incorporated industry partners from NASA's Graphical Weather-in-the-Cockpit research, which is within NASA's Aviation Safety Program.

Two concepts from the plan were selected for demonstration: remote "black box," and cockpit/cabin surveillance. The remote "black box" concept involves real-time downlinking of aircraft parameters for remote monitoring and archiving of aircraft data, which would assure access to the data following the loss or inaccessibility of an aircraft. The cockpit/cabin surveillance concept involves remote audio and/or visual surveillance of cockpit and cabin activity, which would allow immediate response to any security breach and would serve as a possible deterrent to such breaches.


View from the cockpit camera.

The datalink selected for the demonstrations was VDL Mode 2 (VHF digital link), the first digital datalink for air-ground communications designed for aircraft use. VDL Mode 2 is beginning to be implemented through the deployment of ground stations and aircraft avionics installations, with the goal of being operational in 2 years.

The first demonstration was performed December 3, 2001, onboard the LearJet 25 at Glenn. NASA worked with Honeywell, Inc., for the broadcast VDL Mode 2 datalink capability and with actual Boeing 757 aircraft data. This demonstration used a cockpit-mounted camera for video surveillance and a coupling to the intercom system for audio surveillance. Audio, video, and "black box" data were simultaneously streamed to the

ground, where they were displayed to a Glenn audience of senior management and aviation security team members.
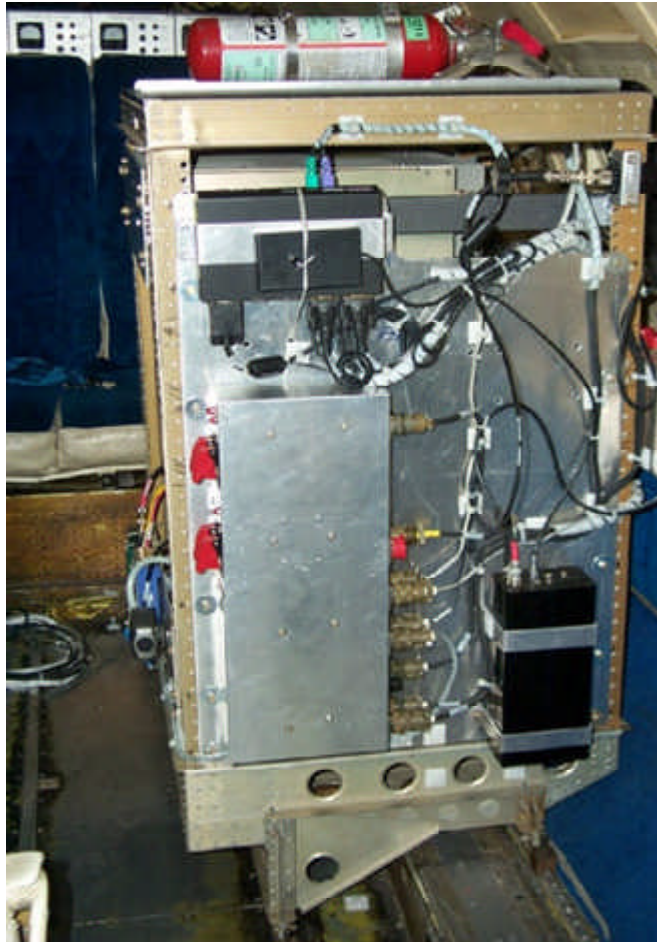
Aviation security equipment rack, installed in the LearJet.

The second demonstration was performed January 31, 2002, also onboard the LearJet 25. NASA worked with ARINC, Inc., for the bidirectional VDL Mode 2 datalink and with Teledyne, Inc., for aircraft data. This demonstration provided the same audio, video, and "black box" streaming data, and it showed the capability of controlling the operation from the ground. Also demonstrated were a self-contained, battery-powered global positioning system (GPS) receiver and an aircraft communication addressing reporting system (ACARS) transmitter, which could be triggered onboard or from the ground to transmit aircraft position reports. This transmitter could only be turned off by a command from the ground.

The LearJet, used in the aviation security demonstrations.

These feasibility demonstrations showcased technologies that could be implemented within 2 years. However, much work still needs to take place for these and other technologies to be integrated into the near-term aviation communications infrastructure.

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