CASE STUDY

5th Generation Fighter Finds Room for Aircraft Monitoring Instrumentation

CURTISS-WRIGHT

DEFENSE SOLUTIONS

Challenge

- Limited room for data acquisition and recording hardware
- Unique data type requirements
- High data rates and long mission times

Solution

- Ultra-compact recorder with built-in data acquisition
- Customized data acquisition for storage and transmission
- High speed and large capacity recorder

Results

- A full complement of stores and monitoring equipment
- Multiple data types acquired through modular architecture
- Previously unknown issues uncovered

Challenge

Like most aircraft, military airborne platform production is preceded by extensive flight tests to verify the aircraft and its sub-systems' performance. The development testing phase doesn't require the aircraft's full suite of permanently fitted sub-systems and stores, creating adequate room for mounting the Flight Test Instrumentation (FTI), including the recorders.

The available space and mounting locations for FTI and recorders becomes severely limited for operational aircraft. The traditional solution of mounting an external pod for collecting operational and mission data isn't an option for modern 5th generation aircraft as it negates the aerodynamics and stealth characteristics.

An additional issue linked with FTI and recorder size, weight, and power (SWaP) is the number and types of data from the aircraft sensors and buses that must be acquired and recorded. The need is for a compact FTI data acquisition and recorder that also adapts to the evolving program and systems requirements and lowers the platform development risk.

As test and mission times grow, the amount of data collected and recorded from the high data rate buses grows exponentially. The need for real-time mission and safety critical data, at the ground mission control room, imposes another requirement for the FTI data acquisition and recorder – namely transmission of critical data, in real-time, over a bandwidth limited RF telemetry link.

INFO: CURTISSWRIGHTDS.COM
EMAIL: DS@CURTISSWRIGHT.COM

TRUSTED PROVEN LEADER

ADSR-4003Z-1 - Advanced Data Server and Recorder

Solution

A customer carrying out testing on a modern fighter aircraft approached Curtiss-Wright with the set of above challenges. They were seeking a new class of SWaP optimized data acquisition and recorder – relying on our proven record of providing similar solutions with quick turnarounds. This kicked off a program to create a new generation of recorders with data acquisition capability.

The compact Advanced Data Server and Recorder (ADSR) series of data aggregator and recorders was the result. Weighing only 5 lb (2.3 kg), the ADSR reduced both size and weight by ~50% compared to traditional alternatives, while supporting data storage up to 768 GB. Designed to provide high-speed Ethernet data capture in rugged environments, these small form-factor recorders support an extensive variety of data types via up to four plug-in I/O modules within the fixed outline dimensions.

The ADSR allows critical data to be "cherry picked" in real-time from the bulk data collected and recorded from the busses. The cherry-picked data is packaged into PCM and sent via an RF link for real-time monitoring, for example, to a ground mission control room. The ADSR capability for real-time sifting for critical data enables transmission of mission critical data over the bandwidth limited RF telemetry links. At the same time, the bulk data (e.g. video, bus, and sensor) is recorded on three separate cartridges for post-mission analysis.

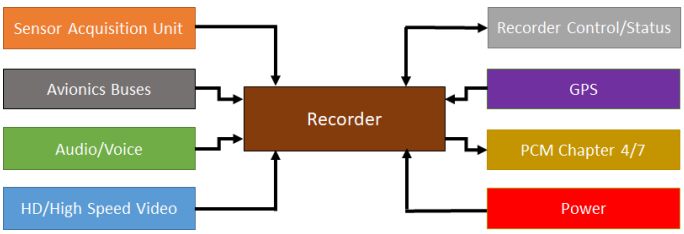

Figure 1: The ADSR can take in a variety of data and package into a PCM stream

Results

The ADSR's compact size and capabilities enabled the end user to successfully install and operate a comprehensive aircraft monitoring instrumentation solution while carrying a full complement of equipment and stores. Its data storage capability, SWaP, and affordability also means it may be used for fleet-wide installation.

The platform's unique data acquisition needs were accommodated and changes to requirements that occurred during the program were also implemented, in a timely manner thanks to the system's modularity. The data cherry picking capability helped to ensure as much data as possible, and the right data, could be telemetered.

Having the system permanently installed on the platform, constantly collecting data means information is always available in the case of an incident or if anomalous behavior is detected. In the past, if a problem on an aircraft was suspected or found, there would be a long delay before test equipment could be installed and tests carried out. This would potentially result in aircraft downtime or worse, a grounded fleet. Having a system such as the ADSR installed fleet-wide means if an anomaly is discovered in one aircraft, data from other aircraft can be examined to help determine if the issue is localized to that specific aircraft or inherent throughout the fleet.

Large volumes of data are being now captured by the Curtiss-Wright customer and is providing insights. To-date, the Curtiss-Wright's ADSR has already been instrumental in identifying an anomaly that would not be known but for the mining of ADSR data across the fleet.