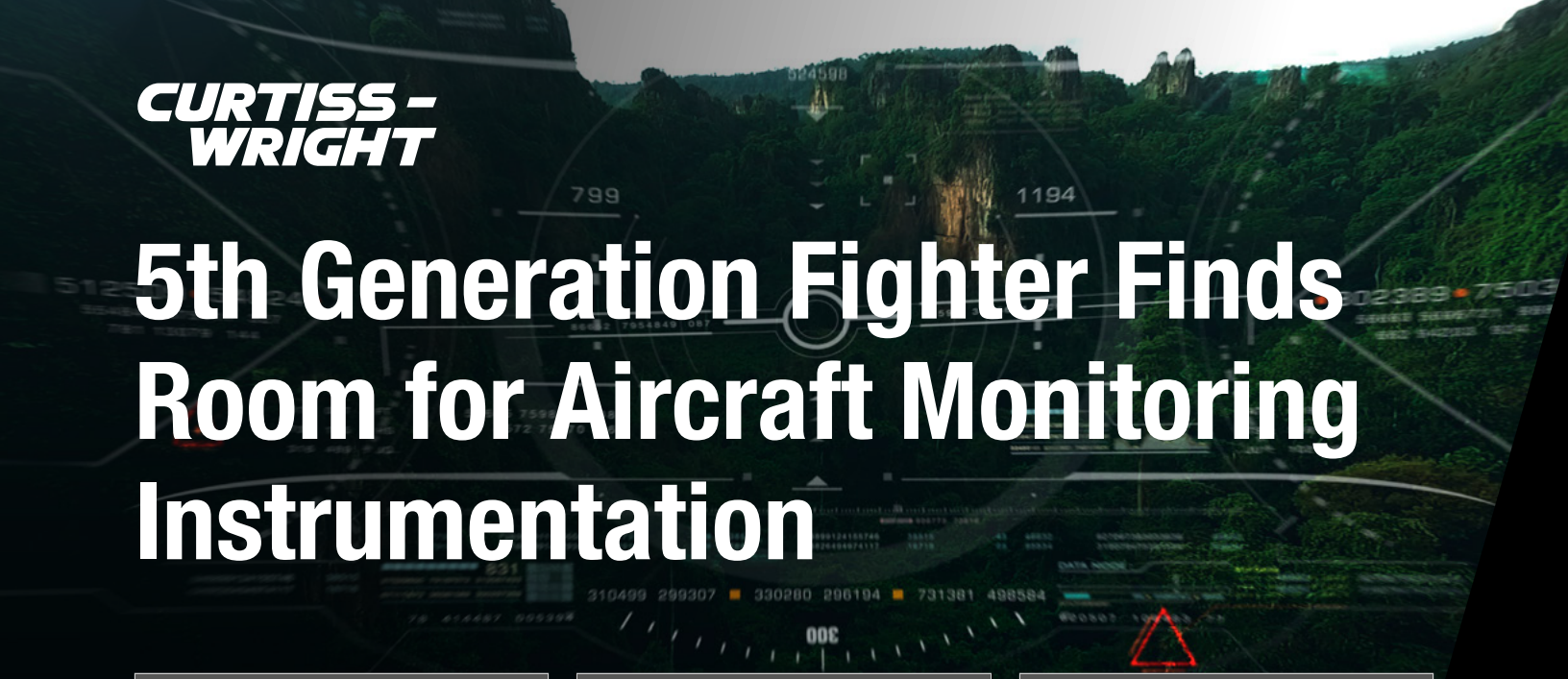

5th Generation Fighter Finds Room for Aircraft Monitoring Instrumentation

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

Result

- A full complement of stores and monitoring equipment
- Flexible data acquisition through a modular architecture
- Previously unknown issues uncovered

Challenge

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

However, the available space and mounting locations for FTI are 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 aerodynamics and stealth characteristics.

Ideally, the FTI has minimal size, weight, and power (SWaP) requirements and is adaptable to support evolving program and systems requirements to lower 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 – transmitting critical data in real-time over a bandwidth-limited RF telemetry link.

Solution

A customer testing a modern fighter aircraft needed to solve the above challenges. They were seeking a new SWaP-optimized data acquisition and recorder solution from an organization with a proven record of providing similar solutions with quick turnarounds. Curtiss-Wright started a program to create the Advanced Data Server and Recorder (ADSR) series to meet this need. Weighing only 5 lb. (2.3 kg), the ADSR reduced size and weight by ~50% compared to traditional alternatives while supporting data storage up to 3 TB. Designed to provide high-speed Ethernet data capture in rugged environments, these small form-factor recorders support various data types via up to four plug-in factory-installable 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 buses. 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’s capability for real-time sifting of critical data enables the 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.

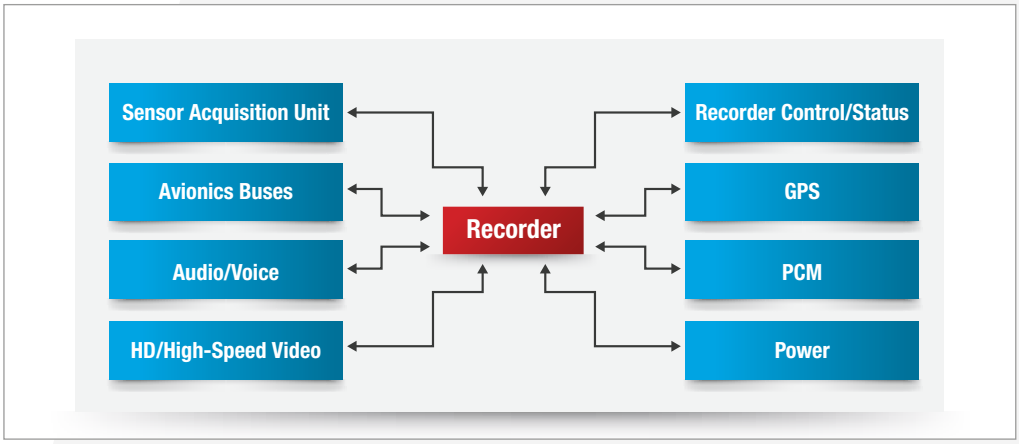

Figure 1: The ADSR can take in a variety of data and package it into a PCM stream

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 make it suitable for a fleet-wide installation. The platform’s unique data acquisition needs were accommodated, and changes to requirements during the program were also implemented promptly, thanks to the system’s modularity. The data cherry-picking capability helped to ensure as much relevant data as possible could be telemetered.

Having the system permanently installed on the platform and 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 could result in aircraft downtime or, worse, a grounded fleet. 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. The Curtiss-Wright customer is now capturing large volumes of data and is providing insights. To date, the ADSR has already been instrumental in identifying an anomaly that would not be known but for mining ADSR data across the fleet.