Large Aircraft Rapidly Deploys Customizable Mission Recording System

CURTISS–WRIGHT

DEFENSE SOLUTIONS

Challenge

- Custom solution with constantly changing requirements and low production numbers
- Low impact on operational turnaround time and maintenance
- Limited available space in cockpit

Solution

- Rapid prototype approach prior to production
- Modular COTS hardware
- Minimized footprint in a constrained area by splitting system in two

Results

- Prototype available during flight test
- Flexible and future-proof system
- Space-optimized and maintenance-friendly solution

Challenge

A manufacturer of a large military aircraft required a mission recording system to collect engineering data from around the aircraft and store it on a recorder for post-mission analysis. The data would be used to understand how the aircraft is flying and operating during its mission in order to uncover any optimizations that could be achieved, or aid in investigations should any incidents occur during a mission.

The aircraft is produced in low numbers for customers with different requirements. As not all aircraft have identical systems, the mission recording solution needed to be easily customizable. Developing systems for any new aircraft is a learning experience, and so the aircraft manufacturer wanted to deploy the solution in time for flight tests so they could develop a better understanding of what data was most useful. They could then make adjustments to the design before the final line replaceable unit (LRU) entered production.

Another requirement was that the system should allow for a rapid turnaround post-mission and should be easy to maintain. Operators wanted to be able to grab the data from the recorder immediately, without the need for any special support infrastructure or tools. As with most aircraft, the room within the cockpit is in high demand and the mission recorder system needed to fit within a limited space to maximize the amount of displays and controls the pilots have access to.

TRUSTED PROVEN LEADER

NET/REC/002 Ethernet network recorder

Solution

The chosen solution was to split the system into two elements: a modular Acra KAM-500 data acquisition unit (DAU) and a NET/REC compact recorder unit from Curtiss-Wright connected via an Ethernet link.

A modular DAU was chosen for two reasons. For one, it allowed the aircraft manufacturer to meet their requirements using off-the-shelf modules that were already proven in the field. This meant the solution could be quickly available, without any need for custom hardware development, and thus ready in time for aircraft flight tests. The second reason was this approach meant any future requirements could be easily met by altering the module set within the DAU, as opposed to having to try and alter a custom-designed unit. It also allows for future expandability should additional systems be added to the aircraft and require monitoring.

The advantage of splitting the system is twofold. A split system helps keep the cockpit mounted recorder's size to a minimum by separating out all the data acquisition functions. Another useful aspect of the LRU being remote from the cockpit is it provides easier access to modify, upgrade, or troubleshoot the data acquisition elements. A cockpit mounted unit would be much more complicated and difficult to remove to perform any maintenance or modifications, compared to accessing a unit in an avionics bay, for example. Because the KAM-500 is designed to operate in harsh conditions and tested to the DO-160 standard, it could be mounted almost anywhere without any concerns about reliability in challenging environments.

The NET/REC recorder stores data in the open PCAP file format onto a removable caddy that uses standard solid-state drives. This means the mission recorder does not delay aircraft turnaround time as data can be offloaded by simply removing a replaceable drive.

Results

A prototype mission recorder system was delivered rapidly to the customer. Once a production design was finalized, a production unit was then manufactured in low quantity, with modifications to the LRU occurring when required to accommodate customer-specific alterations.

The result was an easily modifiable, upgradeable, future-proof solution. The DAU is only ever one module change away from meeting a new requirement, while the recorder's recording capacity can easily be increased if required. With the data stored in an open standard format, there was no requirement for the customer to buy custom software. The aircraft data can be offloaded rapidly, as anyone can remove and replace a drive for the fastest possible turnaround time, without requiring the additional time or complexities that would happen with a wireless link.

Locating the recording unit in the cockpit and housing the DAU remotely makes it easier and more cost-efficient to adapt or upgrade a system. It also means overall spare cost was lowered due to the separation of functions; if there are faults or if only one element needs alterations, then only that element needs to be sent back and replaced.

KAM/CHS/13U KAM-500 chassis - 13 slots