New Commercial Airliner Rapidly Deploys Customizable Mission Recording System

CURTISS-WRIGHT

DEFENSE SOLUTIONS

Challenge

- Modern, state-of-the-art flight recorder system
- Complete turnkey system with integration
- Unexpectedly high data throughput

Solution

- Industry-leading modern flight recorder manufacturer
- Outsourced the system selection and integration
- Altered the flight data management system quickly

Results

- Fully ED-112A compliant flight data, datalink, voice, and image recording system
- Successfully delivered and integrated a fully certified system
- Solved data throughput without impact on the program schedule
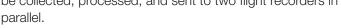
Challenge

A new aircraft development program wanted to deploy the most modern avionics systems available to ensure the aircraft could compete against the newest on the market. They had a need for a flight data recording system that would not only satisfy the latest regulatory requirements but also meet upcoming standards while providing additional data. They decided on a fully ED-112A compliant system that could capture a full complement of data. This included the mandatory data, datalink, cockpit voice, and image data (both from a cockpit camera and ARINC-818 data as supplied to the glass cockpit displays). All of this needed to be collected, processed, and sent to two flight recorders in parallel.

The program team required a complete system solution, including not only the flight recorders, but also a flight data management unit (FDMU) and supporting equipment. Lacking the in house expertise to select, test, and integrate this system, they sought a partner that could deliver a complete turnkey solution.

During the course of system integration testing on the aircraft, it was discovered there was an issue with the ARINC-664 switch (a form of dual-redundant Ethernet). There were various systems attached to this switch, each requiring a certain amount of bandwidth. It was found that the total amount of data passing through it could exceed the total available bandwidth which would result in lost data. Several options were considered to reduce the amount of data, including reducing the data sent to and from the FDMU (which acts as a conduit of data that includes receiving, processing, and sending data to the flight recorders).

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Fortress - Fully ED-112A qualified flight data, voice, datalink and image recorder

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Solution

After investigating the available options, Curtiss-Wright was chosen to provide what would become the world's first ED-112A compliant recorder. Curtiss-Wright has been a leading designer of proven cockpit voice and flight data recorders for over 60 years, and today's product line meets all current and anticipated regulations (including ED-112A and 25 hour voice / datalink recording).

Curtiss-Wright delivered a complete system, which included the flight recorders, FDMU, recorder independent power supply (RIPS), microphones, camera, cockpit control unit, a wireless link system, as well as some other items, to provide a twelve line replaceable unit (LRU) solution. This system was primarily developed in-house with a few items being sourced externally. Curtiss-Wright then fully tested the system and managed its integration onto the aircraft for certification.

To address the problem where the ARINC-664 switch was being saturated by the higher than anticipated data throughput, the FDMU, a Curtiss-Wright enhanced flight data management unit (EFDMU), was modified. The flight recorders were originally designed to ARINC 767 data standards, where all data (parametric, voice, image etc.) is encoded in ARINC-664. The chosen solution was to modify the EFDMU to output the flight data as ARINC-717 data via a separate link and send this to the flight recorder. The voice, data link, and image data would still be encoded in ARINC-664 and sent via the switch. This reduction in data would lower the ARINC-664 switch's throughput requirements, but would also mean making changes to the EFDMU. Such changes relatively late in a program are typically expensive and result in delays while the modifications are implemented.

Results

A fully ED-112A compliant flight data, datalink, voice, and image recording system was successfully delivered, tested, and integrated onto the aircraft. This has received the relevant technical standing orders (TSO), and the system is fully certified to be used in commercial flights. The aircraft flight recording system is one of the most modern implemented and can provide comprehensive data to operators or to accident investigators in the event of an incident.

The change in the EFDMU to alter the data formatting and routing to the recorder would normally require a significant modification that could result in months of delay and add considerable costs to the development. However, because the EFDMU was built upon a modular architecture that utilized existing commercial off-the-shelf (COTS) technologies, the change was simple and quick. A module capable of encoding ARINC-717 was added to the chassis and, following some reprograming and testing, all that was required was rewiring the connector. This modification was implemented in a few short weeks with little additional cost.

EFDMU: Flexible ARINC-600 Data Management