

Replacing an obsolete custom flight data recorder with an off-the-shelf solution



Challenge

- The existing Flight Data Recorder (FDR) solution had become obsolete, which resulted in aircraft being grounded
- Data from a number of different systems was needed, requiring custom data acquisition
- An off-the-shelf solution was required

Solution

- A modern FDR replacement with a long life
- A Flight Data Acquisition Unit (FDAU) was used to condition and convert data into FDR compatible data
- A modular Commercial Off-the-Shelf (COTS) system

Results

- A new recorder system was successfully installed
- Data was successfully captured from the FADEC, power management system, cockpit control unit, microphones and a warning unit
- A custom solution was implemented quickly and can be easily expanded or changed to meet future requirements

Challenge

A fleet operator of 14 rotorcraft wanted to update the existing obsolete Cockpit Voice Flight Data Recorder (CVFDR) with a new system. This led to aircraft being grounded as the CVFDR's were failing and on the Minimum Equipment List (MEL) – thus, classed as flight critical. The operator wanted a modern system that would be more reliable and be supported for a long time. The existing recorder contained data acquisition hardware that took data from a number of different systems including a FADEC, power management system, cockpit control unit, voice data and a warning unit.

This included parameters collected from RS-422, ARINC 429, synchro, power, discrete and accelerometer sensors that

were then fed into crash protected memory. The new recorder needed to replace the functionality of the old without the need for any significant alterations to other systems or wiring.

As the existing system was essentially custom developed, a replacement needed to be custom developed too, or use a COTS modular system approach. Custom designed systems generally take a long time and are expensive to develop. While this can be suitable for large production numbers, the operator only wanted to replace systems on 14 aircraft. Thus, using an existing COTS solution that could gather data and send it to another COTS CVFDR was chosen as the approach.



Cockpit Voice and Flight Data Recorder

Solution

The operator chose to use an established, standard off-the-shelf CVFDR that used a modular data acquisition system (DAS) to collect and condition data from the various onboard systems. The CVFDR chosen was an MPFR (Multi-purpose Flight Recorder) from Curtiss-Wright that conforms to a standard data interface (ARINC 757).

The MPFR records four channels of voice for 120 minutes (one wide band and three narrow band audio channels), a rotor tachometer interface, 25 hours of flight data recording at 512 words/second, and has provision for extra data recording. The MPFR was supplied with a cockpit control unit (to facilitate simple interfacing with the recorder) and a cockpit area microphone (used to capture ambient noise in the cockpit).

The chosen DAS was an Acra KAM-500 with six user slots, four of which contained modules that could interface with all the busses and sensors required. A controller module output the acquired data into an ARINC 717 stream. Four user modules were capable of meeting those needs which

left room for two future modules. The four modules captured the following data:

- 48x discrete signals (two 24 channel modules)
- 8x ARINC 429
- 8x differential ended inputs

Result

The replacement FDR system was successfully developed, quickly delivered and rapidly installed, stopping the grounding of aircraft. The custom solution was implemented swiftly using off-the-shelf components which could be easily expanded or changed to meet future requirements.

This solution captures the required voice data and information from various systems, such as the FADEC and a warning unit. The system uses Ethernet to download information into an analysis package very quickly (within minutes).

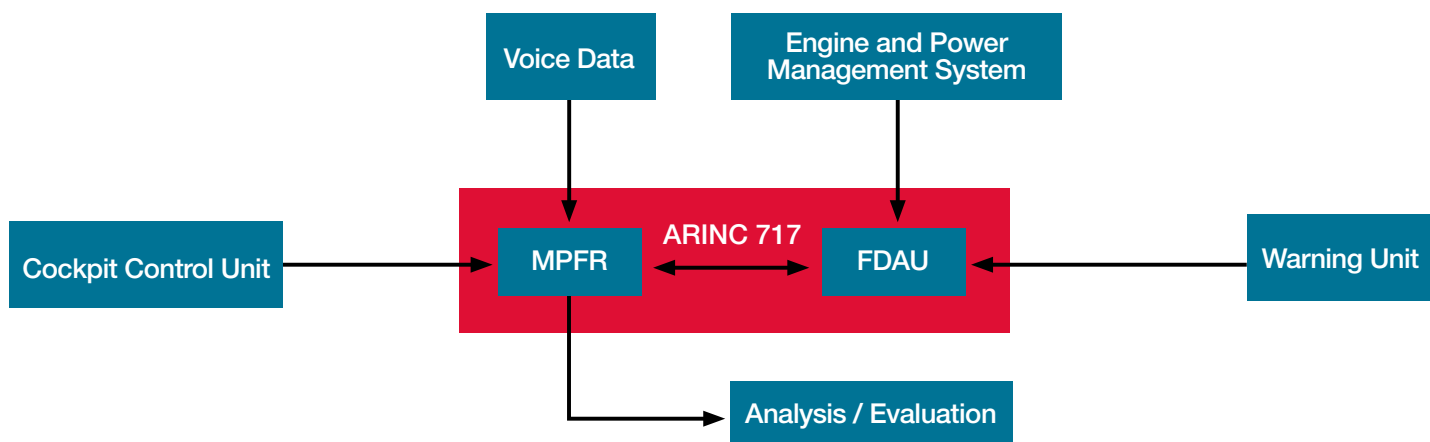


Figure 1: The original custom unit was replaced by two off-the-shelf units – one to gather and condition the data, and a standard flight data recorder.