

Flexible COTS Data Capture and Crash Protected Recording for Small Fleets

**CURTISS -
WRIGHT**

DEFENSE SOLUTIONS

Challenge

- Upgrade to meet ED-112 regulations
- Obsolescence replacements for small fleet
- Meet new and changing requirements

Solution

- Turn-key FDAU+FDR
- Flexible system; expandable to meet future needs
- DO-160/178/254 and ED-112A solution

Results

- Flexibility – mixed digital/analog configurations
- Lower risk – adapting to evolving requirements
- Smoother operation – configuration/integration services

Challenge

The Flight Data Recorder “Black Box” has continually evolved since its introduction in the 1950s, progressing from mechanically driven wire to high-capacity solid-state memory.

International aviation authorities periodically mandate equipment upgrades to better reflect new technology and to better address new findings from accident investigations. The introduction of new regulations can become a challenge for fleet operators as non-compliant equipment is potentially very disruptive to continued operations.

Curtiss-Wright saw a recent example of this as a new regulation challenge was encountered by Polish helicopter operators, who needed to become compliant with ED-112, Table II-A.2 by June 1st, 2016. The older model helicopters

were originally designed in the mid/late 20th century and have been gradually adapted to EASA and EU regulations.

Replacing a crash protected flight data recorder (FDR) on a relatively new aircraft is usually straight-forward. Often the parameters to be recorded will be available on an avionics bus and there are many commercial off-the-shelf (COTS) solutions available to meet ED-112 regulations. On older aircraft, only some of the required parameters are available in digital form. Many others can only be obtained directly via the original transducers and sensors. Thus it becomes necessary to source not only an FDR, but to also source and integrate a Flight Data Acquisition Unit (FDAU) which can reliably capture all the required data from around the aircraft and provide this in a format suitable for the FDR.



FDAU and MPFR

Solution

The ideal resolution for many fleet operators is a low-cost, turn-key solution that makes compliance with new regulations pain-free. Such a solution removes project risks and costs associated with the introduction of new recording regulations, and allows for operations to continue as normal.

Curtiss-Wright provides a range of versatile flight recorders suitable for just this type of application, in this instance the compact Multi-Purpose Flight Recorder (MPFR) was used. The MPFR is fully approved for all current requirements, is compact and low weight and totally solid state, making it ideal for space and mass constrained applications or instances where the installation in unconventional locations is needed. It also combines a Cockpit Voice Recorder function, should such be required.

An Acra KAM-500 modular data acquisition unit was used as the FDAU. The KAM-500 is a highly configurable system which can address the data capture requirements “out of the box”, including less common sensors and busses. It can also encode captured data into a format suitable for FDRs.

The example FDAU+FDR system shown in Figure 1, is a typical configuration provided for flight recorder system upgrades, and a similar system was provided to the Polish helicopter operators. This provided access to all possible data sources (new and old), via swappable interfaces modules, providing a flexible solution that is ideal for fleets with varied installation requirements.

Curtiss-Wright was able to provide the complete FDAU+FDR and replay system as a turn-key solution, with full pre-configuration services for the target platform.

Results

Being able to effectively collect data from unusual collections of sensors and transducers (e.g. 1980s era synchro transducers, 2000s era retro-fitted RVDT sensors, 2020s era Fibre-Bragg Gratings) all in one FDAU. This results in an optimal size FDAU solution that works out of the box without requiring expensive bespoke design for lower production numbers. The users in Poland, as in many other countries, have highlighted the importance of being able to capture all parameters with a single data acquisition system, be they analog, discrete or digital.

The modular FDAU solution offers flexibility during actual aircraft integration that results in lower risk. Curtiss-Wright has found customers around the world commonly experience unplanned specification changes late in the integration phase. This can be disastrous to maintaining schedules and budgets but using a modular system drastically reduces this risk and customers who have used this approach have all been able to continue their programs without delays or additional development. This is because an interface change, simply means a module swap in the FDAU instead of a redesign of an entire system.

Having the option of turn-key integration for FDAUs, FDRs, quick access recorders, and associated peripherals removes much of the risk associated with a new Avionics integration. Many customers have opted for solutions that ship pre-configured as this approach tends to result in a much smoother program for fleet operators.

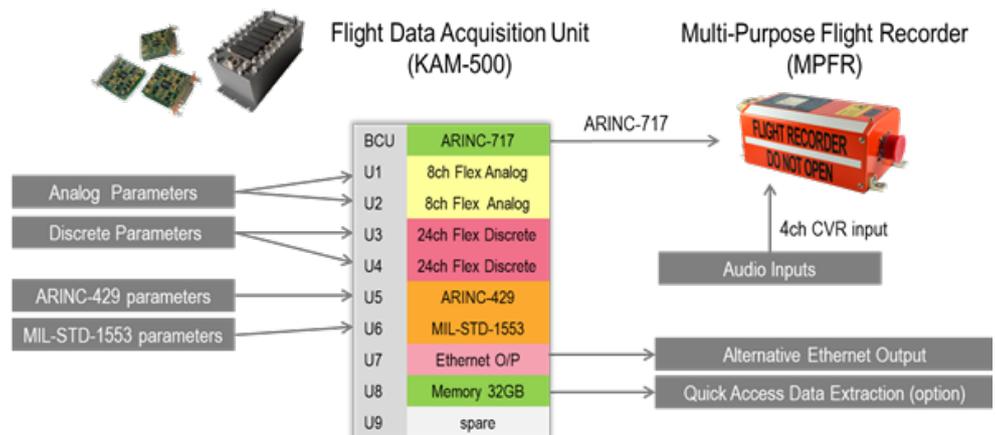


Figure 1: Typical FDAU+FDR upgrade system, capturing and recording analog, discrete and digital parameters, and providing for future expansion to address new requirements.