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Contrails

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CAvSoc

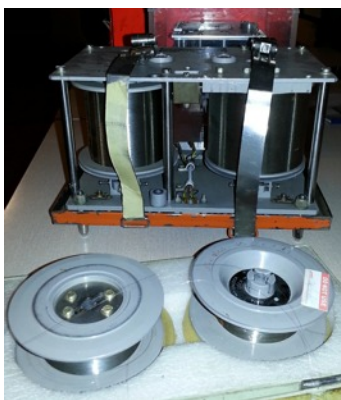
Flight Data Recorders Past, Present and Future

For our November talk Steve Leaper from Curtiss Wright gave us a talk about Flight Recorders – Past, Present and Future. He introduced the history of Penny and Giles, the original makers of flight recorders, before the company was taken over by Curtiss Wright in 2002. P&G was formed by Prof William Penny and Mr James Giles in 1955 to design and make high reliability wire wound potentiometers for aviation flight test purposes. During 1957 P&G made their first flight recorder using coated stainless steel wire to record onto and this meant they were well placed when flight recorders in aircraft became mandatory in 1963, partly as a result of the Comet disasters. By 1965 there were three operational divisions for various products and the company floated in 1986.

Early FDRs in 1967 were made for the Meteor and used a 0.002" coated stainless steel wire recording five parameters. Two years later the drums were holding 50 miles of wire holding up to 800 hours of data records. The 70's saw 1/2" stainless steel tape recording 12 tracks with an endless loop thus eliminating the need for regular removal of media. In the 80's FDRs in Harriers were using 1/4" magnetic tape, recording 1 hour audio and 2hr data, again on an endless loop. Each advance gave reductions in physical size and weight with better performance. When a P&G recorder was specified to replace an existing P&G unit on the Harrier, the CofG was altered so a compensating weight had to be added. Solid state recorders were developed in the 90's holding 25 hours data and 30 mins of audio in a storage space of 32Mb. By 2000 it was up to 100 hours data and four x 2 hours of audio so a slight change in emphasis. With solid state providing plenty of storage the development was now on improved crash survivability and location transmitters along with agreed international standards.

The European Organisation for Civil Aviation Equipment produced EUROCAE ED-112 issued in 2003 which addresses the Minimum Operational Performance Specification for Crash Protected Airborne Recorder Systems. The mandatory

requirements for aircraft required to carry them, divided into groups by weight and engine type, are specified in CAA document CAP731 'Approval, Operational Serviceability and Read-out of Flight Data Recorder Systems and Cockpit Voice Recorders'. Additionally, linked with ICAO, an approved Minimum Equipment List approved by the country's aviation authority also specifies serviceability requirements concerning FDRs.



Survivability specifications cover resistance to fire, and g forces and increasingly the requirements for an attached emergency locator transmitter and its operational parameters such as the period it can emit a signal. For example in 1958 the requirement was to survive 100g, a flame of 1100degC for 30 mins but there was no static penetration test. In 2010 the spec required 3,400g for 6ms, similar flame resistance, a crush resistance of 5,000 lbs for 5 minutes on each axis, a penetration resistance of 500lb dropped from 10ft with a 1/4-inch-diameter contact point, immersion in aircraft fluids (fuel, oil etc.) for 24 hours, immersion in sea water for 30 days and a hydrostatic pressure resistance equivalent to a depth of 20,000 ft. Development of flight data recorders was given a boost following the tragic Air France crash in the Atlantic when the flight recorders were not recovered for two years due to the depth and terrain at the wreckage site. Nevertheless that data was eventually recovered.

For the future it is noted that many aircraft already transmit maintenance and flight data in real time so in theory the parameters used in FDRs could be transmitted. Telemetry download links exist but a proportion of flights would need satellite connection and the bandwidth required could

be a problem. Whilst audio data could be transmitted, there is reluctance by pilots to allow this to happen due to privacy issues. Additional parameters in the future may include video recording in the cockpit as well. Steve hosted a lively Q&A session and showed recorders past and present which further enhanced a very interesting talk.

Snippets

Palmar revived - well one of its aircraft anyway which arrived in Bournemouth Aviation Museum in December. Article in Bournemouth Echo 16Dec13 showing Stephen Bath in the cockpit.

At Heathrow in July, a fire in a B787 Dreamliner was caused by the lithium manganese battery of the Emergency Locator Transmitter (not a CW unit!) housed in the tail. The AAIB noted that there was no fire suppression facilities in this area. Your editor travels in a B787 to USA in January with mixed feelings.

Meetings List

05Mar14 "Vanuatu" a South Pacific Airport by Tom Kelly

07 May14 AGM followed by "How to Make a Spitfire Mk26BV6" by Martin Laking

03 Sep14 Mission Aviation Fellowship by TBC

Visits - dates tba - names to Steve Robson

Planning is underway for a visit embracing the WW2 bunker at RAF Uxbridge and the deHavilland Heritage centre Salisbury Hall in North London