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## **SAE NTSB Vehicle Recorder TOPTEC Symposium Panel 2 Aviation**

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# **Accident Recorder Survivability / Crashworthiness Requirements**

## **Recorder Independent Power Supply (RIPS)**

### **TOPICS**

- **Why a RIPS?**
- **NTSB Safety Recommendations A99-16 and 17**
- **Why connect the CVR to the RIPS?**
- **Additional RIPS Information**

# **Accident Recorder Survivability / Crashworthiness Requirements**

**Aviation accident and incident investigations have been hindered by a loss of data acquisition due to recorder power interruptions.**

**Not a survivability requirement - the RIPS provides continued recording of audio (data) into the survivable recorder during power interruptions.**

**Today's aviation recorders are very crash survivable!  
Additional gains through uninterrupted recordings.**

# Why a RIPS?

Aircraft electrical power to recorders gets interrupted during incidents for various reasons:

- **Loss of engines - resultant loss of power generation - this could be due to engine separation, lightning, bird ingestion, FOD, error**
- **Loss of the power and signal lines - between sources and the recorder due to mechanical, explosive or fire effects**

# Why a RIPS?

What's Needed: RIPS provides backup power independent of the aircraft generated power busses

- Uninterrupted data collection due to power failures
- Maintain data collection during a very critical period
- Reduce missing data challenges during Investigation

# Why a RIPS?

## Accidents involving Recorder power interruptions

- ValuJet 592 DC-9 No CVR or FDR data 40-50 seconds
- TWA 800 747 No CVR or FDR data 40-50 seconds
- SilkAir 185 737 No CVR or FDR data during 35K' rapid descent
- Swissair 111 MD-11 No CVR or FDR data for 6 minutes
  
- Overseas National Airways 032 DC-10 JFK, NY 1975
- Southern Airways 242 DC-9 New Hope, Georgia 1977
- American Airlines 191 DC-10 Chicago, IL 1979
- United Airlines 811 747 Honolulu, HI 1989

# **NTSB Safety Recommendation A99-16**

**Retrofit after 1 January 2005, all CVR's on all airplanes required to carry both a CVR and an FDR with a CVR that meets:**

- TSO C-123a**
- is capable of recording the last 2 hours of audio**
- is fitted with an independent power source that is located with the digital CVR and that automatically engages and provides 10 minutes of operation whenever aircraft power to the recorder ceases, either by normal shutdown or by a loss of power to the bus.**

# **NTSB Safety Recommendation A99-17**

**Aircraft manufactured after 1 January 2003, that must carry both a CVR and DFDR be equipped with two combined recorder systems (CVR/DFDR)**

- One as near the cockpit as practicable the other as far aft as practicable**
- Both capable of recording all mandatory data parameters for 25 hours**
- Both capable of recording all cockpit audio and CPDL messages for the last 2 hours**
- Cockpit system provided with a RIPS**

# Why connect the CVR to a RIPS?

RIPS to power the CVR or Combi - not the FDR

- CVR is a self contained lower power (10W) system
- CVR provides power to the Cockpit Area Microphone
- CVR collects flight deck aural environment and flight crew communications
- FDR requires support of multiple sensors and a FDAU, relies on the availability of other systems for data parameter information, and has increased and differing power requirements over CVR

# RIPS Implementation

- Install as close as possible to the recorder
- 2 hour recorders (Class I)
- Holdup for 10 minutes - prevent overwrite of data
- Operates on 115 VAC 400Hz or +28VDC
- Provides +28VDC to CVR or Combi
- RIPS designed for frequent power cycles
- Recharge time 15 minutes
- <50 ms after loss of A/C power

# **RIPS Specifications**

- **ARINC Characteristic 777 Recorder Independent Power Supply**
- **EUROCAE ED-112 MOPS FOR CRASH PROTECTED AIRBORNE RECORDER SYSTEMS - Section 5**
- **FAA Draft TSO dated 6/07/02 for RIPS**

# RIPS Installations



**ARINC 777 Stand alone**

**Integrated CVR Tray**



# Summary and Conclusions

- Various causes for power loss
- RIPS provides Recorder power during very critical period for continued data collection
- 10 minutes holdup
- RIPS will be TSO'd
- Stand alone or CVR tray integrated design

# **Accident Recorder Survivability / Crashworthiness Requirements**

**Thank You**  
**SAE/NTSB TOPTEC**

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