



# *Apache Logistics Division*



## *Connecting The Maintainer Apache Logistics and Modernization*

Oswald Ingraham  
Apache Logistics Division  
Redstone Arsenal, AL  
256-842-1109



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- Purpose:
  - Describe the Technical and Operational benefits of automated data transmission from operational units in support of the Life Cycle Manager and Condition Based Maintenance
  - Discuss Apache use of the implementation of CLOE enablers in OIF and OEF
  - Describe Self-diagnosing/Self-reporting Concepts on Apache Platforms
  - Describe Existing Communications Infrastructure
  - Demonstrate (Video) Information Movement, Use, and Timely Display to Support the War fighter, Maintainer, and Life Cycle Managers



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## Who Benefits From CLOE ?

### Platform/Soldier



- At-platform digital data
- Reduced reporting burden
- Rapid, flexible log commo
- One trip with the right parts & tools to complete the job the first time

### Tactical CDR



- Enhanced SA
- Improved mission turnaround
- Improved combat readiness

### Logistician



- Near real-time platform/fleet status
- Tailor log requirements - parts, ammo & fuel
- Improved logistics SA

### Life Cycle Manager



- Improved safety management
- Enhanced fleet management
- PM/OEM can focus product improvements on reliability drivers
- Accurate forecasting

### Enterprise



- 2-way CBM data flow
- Accurate demand forecasting
- Fill pipeline based on actual consumption
- Suppliers get more lead time to meet demand
- Increased component surveillance

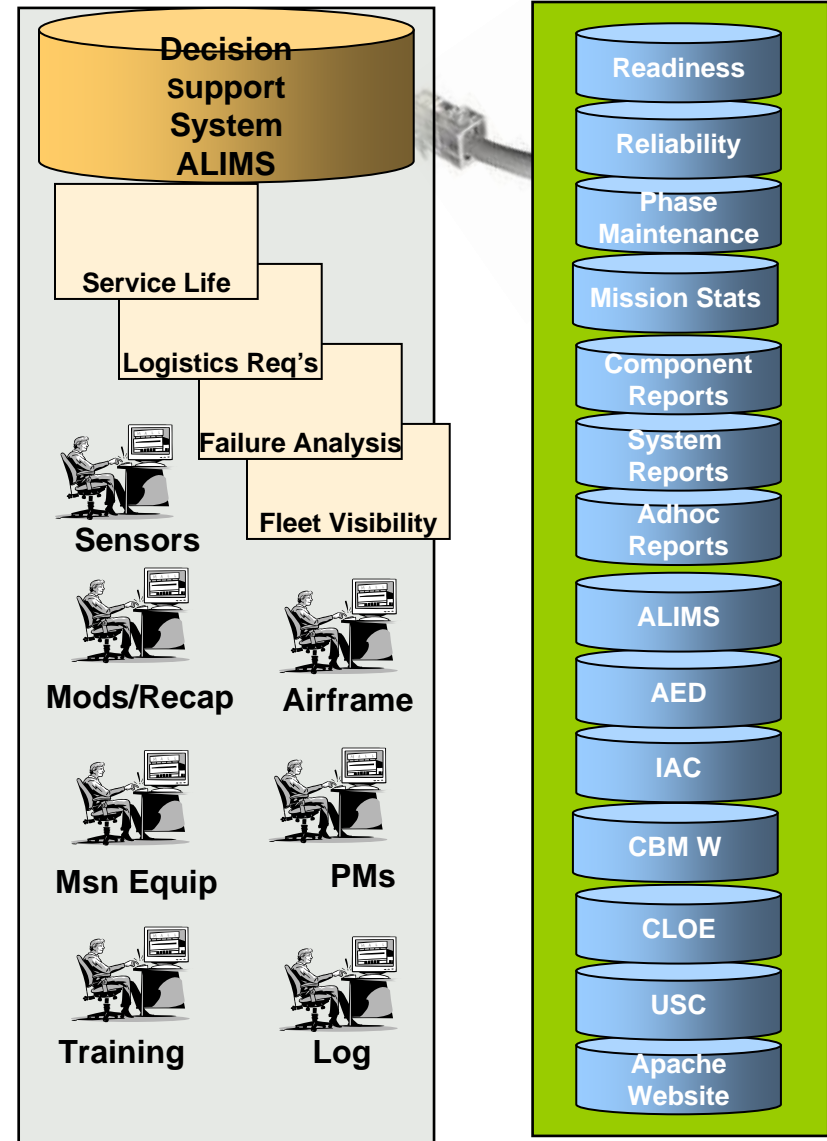
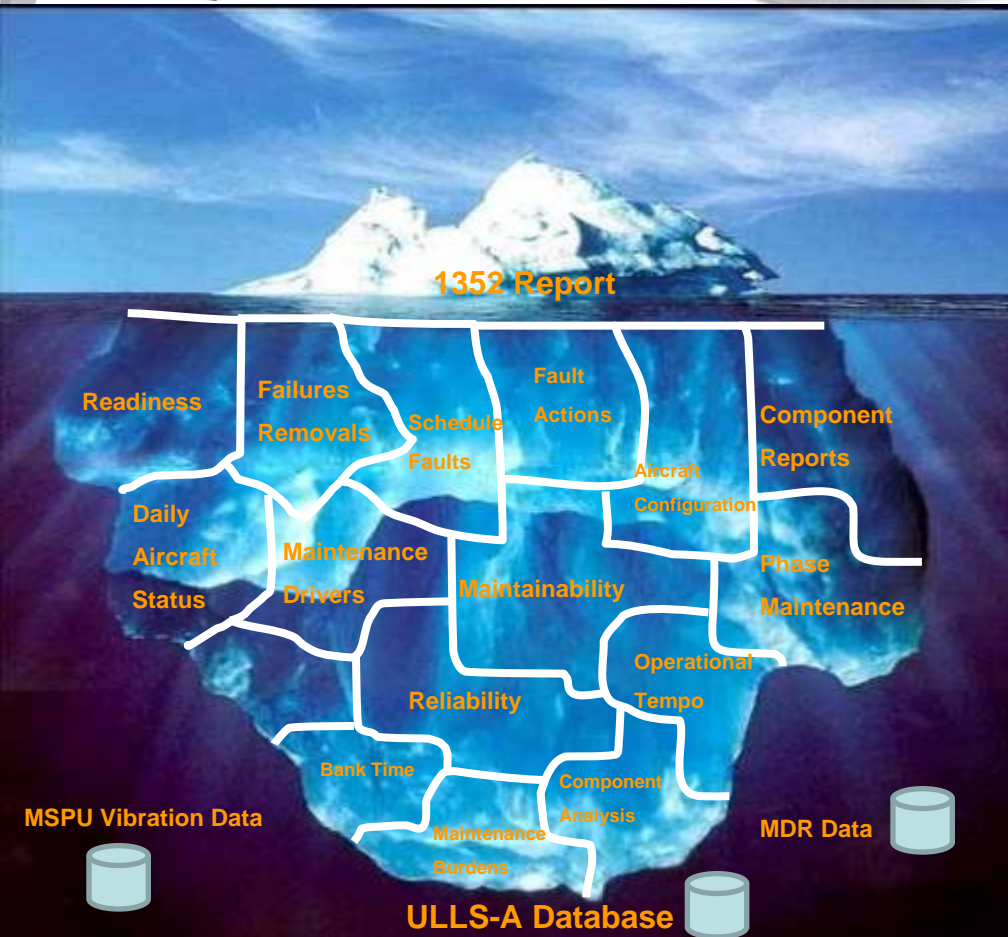
28 October 2008

*“ You can run, but you will die tired”*



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## Why is the CLOE important ?





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## **Enablers required to support CBM data movement**

- Electronic Logbook:
  - Single point data collection at-platform
- Heath and Usage Monitor
  - Modernized Signal Processing Unit (MSPU) – Mechanical Diagnostics
  - Maintenance Data Recorder (MDR) – Electrical Diagnostics
- Digital Technical Manual
  - Interactive Electronic Technical Manual Level IV
- Digital Maintenance Management System
  - Unit Level Logistics System – Aviation (Enhanced) (ULLS-A- E)
- Wireless Networking
  - Very Small Aperture Terminal
  - Combat Service Support Automated Information Systems Interface
- Two Way Data Flow Facilitator
  - Joint Technical Data Integration (JTDI)

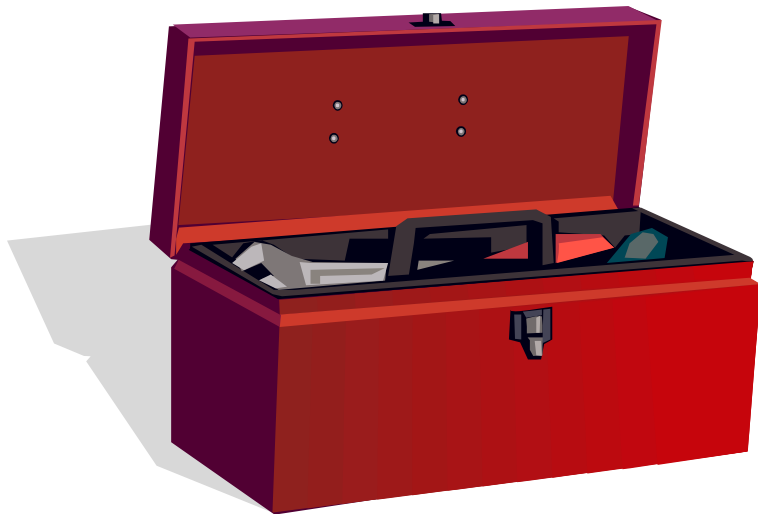


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## **Apache Aircraft Logbook**

- The aircraft electronic logbook is a “Software Tool Box,” utilizing software applications to support Maintenance operations.
- All CBM data is collected at the platform via aircraft downloads to the electronic logbook
- A common *Architecture* is required to migrate data from at platform to the Life Cycle level to better support the war fighter



***Hardware Tool Box***



***Software Tool Box***



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## Wireless Tablet Computers

- 1-229th Avn, Ft Bragg NC deploys to OIF Feb 2004 utilizing wireless logbooks and wireless infrastructure
- MSPU requires Tablet computer for Rotor Track and Balance
- CASCOM changes hardware configuration of Aircraft logbooks to Tablet Computers
- Army G-4/ CASCOM in-progress replacing all STAMIS logbooks with tablet computers





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## Apache Electronic Logbook

NOW

1-3 Avn – OIF

3-3 Avn – OIF

1-101<sup>st</sup> - OEF

4/3 ACR – OIF

3-101<sup>ST</sup> – Ft Campbell

1-1 ACR – OIF

1-4 Avn – Ft Hood

4-4 Avn – Ft Hood

1-82<sup>nd</sup> – Ft Bragg

21<sup>st</sup> Cav – Ft Hood

1-227 – Ft Hood

4-227 – Ft Hood

Korea – Pending

Germany - Pending



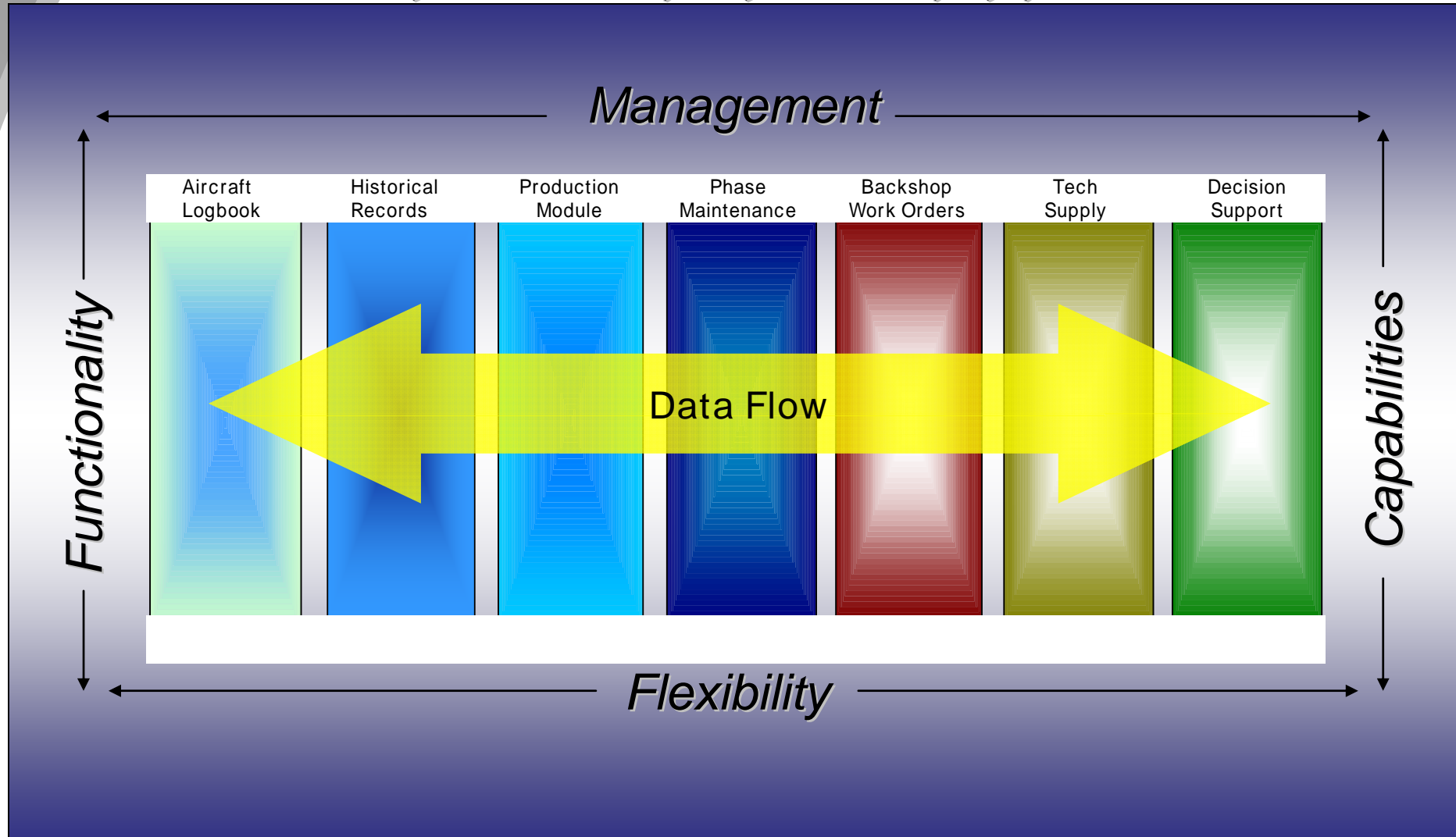




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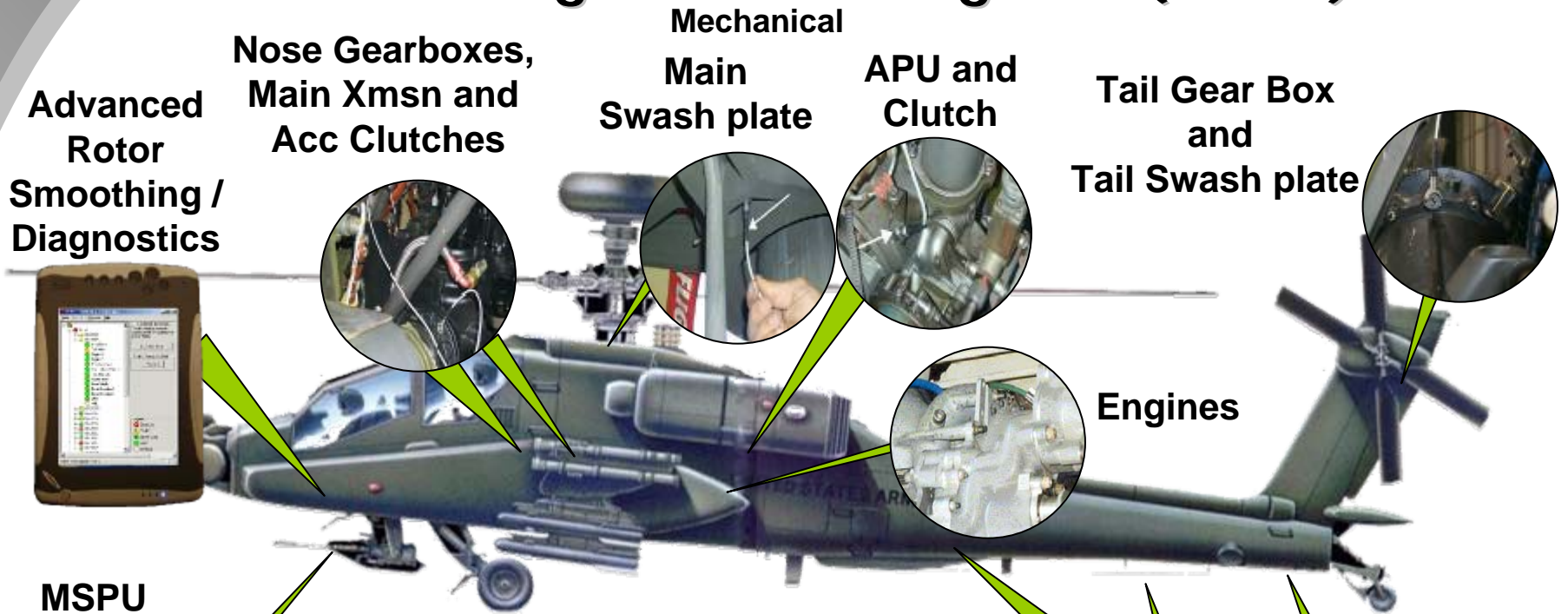
## What is Unit Level Logistics System -Aviation (Enhanced)? (ULLS-A) (E)





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## Modernized Signal Processing Unit (MSPU)



Advanced Rotor Smoothing / Diagnostics

Nose Gearboxes, Main Xmsn and Acc Clutches

Mechanical

Main Swash plate

APU and Clutch

Tail Gear Box and Tail Swash plate

Engines

Intermediate Gearbox

Hanger Bearings



**MSPU**

**3.4 lbs**

- Replaces Aviation Vibration Analyzer (AVA)
- Replaces SPU functionality
- Adds APU Clutch and Accessory Clutch Monitoring
- Adds 14 sensors for complete drive train diagnostics
- Archives data and automates transfer via Internet
- Combines w/MDR to Support Condition Based Maintenance
- Integrated with MIL-STD 1553 Bus
- Automatic data capture for Flight Regime Recognition
- Automated Rotor Track and Balance (RTB)
- 18 sensors monitor 53 components with 300+ Condition Indicators

**10.2 lbs**




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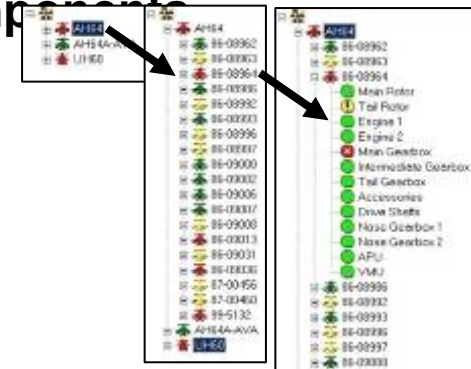


## Modernized Signal Processing Unit (MSPU) Mechanical

**Modernized Signal Processing Unit is a permanently installed rotor smoothing and machinery health monitoring system. The system provides recommended correction actions to maintain vibration levels at a minimum. MSPU also monitors the status or health of the dynamic drive system components and will advise whenever a limit parameter has been exceeded.**

**MSPU is composed of three primary components:**

- 1. Onboard System:**  
  
**MSPU**  
**Accelerometers;**  
**Tachometers;**  
**Tracker Panel; and**  
**Other Sensors.**



- 2. Personal Computer-Ground Based Station (PC-GBS).** PC-GBS runs on a PC-based Windows platform, which downloads processed data from the MSPU and interprets the data to provide recommended corrective actions.
- 3. Web-based infrastructure tools.** These tools consist of an internet utility designed to collect data from PC-GBS' software for fleet trends and engineering analyses.



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## Maintenance Data Recorder (MDR) Electrical

### Integrated ED/IETM

- Relative Health
  - On board Detect/Isolate/Identify
- IETM Launch from Fault/Exceedance
- Records Faults, Warning Caution Advisory (WCA) and Exceedances
- Captures IETM Maintenance Steps
- Records Flight Data - Engine HIT results, Flt Hrs, Landings, etc.
- Records selected state information
  - Power, flight, environmental, squat switch, MPD selection failures, etc.
- Records aircraft drive train sensors
  - Oil and hydraulic temperatures and pressures, torque, TGT, Ng, Np, Nr, etc.



### ED - Maintenance Data Recorder (MDR)

- Pre & Post Event Data Analysis (analog signals)
- Crash Survivable Safety analysis



Crash Survivable – Qualified to ED 55/56A