Connecting The Maintainer
Apache Logistics and Modernization

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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

"You can run, but you will die tired"
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Why is the CLOE important?

Unit

Pipeline

Decision support System
ALIMS

Service Life
Logistics Req's
Failure Analysis
Fleet Visibility

Sensors

Mods/Recap
Airframe

Msn Equip
PMs

Training
Log

Decision

Status

Maintenance drivers

Maintenance configuration

Maintenance procedures

Component analysis

Component reports

Operational tempo

Bank time

MSPU vibration data

ULLS-A database

Condition base maintenance data

Readiness
Reliability
Phase maintenance
Mission stats
Component reports
System reports
Ad hoc reports
ALIMS
AED
IAC
CBM W
CLOE
USC
Apache website
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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)
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.
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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
1-101st - OEF
4/3 ACR – OIF
3-101st – Ft Campbell
1-1 ACR – OIF
1-4 Avn – Ft Hood
4-4 Avn – Ft Hood
1-82nd – Ft Bragg
21st Cav – Ft Hood
1-227 – Ft Hood
4-227 – Ft Hood
Korea – Pending
Germany - Pending

MSPU Ground Station
IETM
JTDI
ULLS-A (E)
MTFC
Engine ETM
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What is Unit Level Logistics System - Aviation (Enhanced)? (ULLS-A) (E)

Data Flow

Management

Functionality

Flexibility

Capabilities
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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

Engines
- Tail Gear Box and Tail Swash plate

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

Intermediate Gearbox
Hanger Bearings
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.
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