Upgrading Your C-130 Avionics…
The Cost of Doing Nothing

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C-130H Fleets Face Many Challenges

- Declining Budgets
- Commonality
- Fuel Costs
- CNS/ATM Compliance
- Safety
- Life Cycle Costs
- Reliability
- Technical Support
- Training
- Situational Awareness
- Acquisition Cost
- Aircraft Availability
- Mission Capable Rates

C-130 Sustainment Costs are Crushing you!
Why Upgrade Your C-130’s…
Why Perform a C-130 Avionics Upgrade?

• C-130 CNS/ATM Compliance
  - 8.33 kHz V/UHF (Europe mandate since 2007; Singapore, US coming)
  - Mode S Enhanced Surveillance (Europe mandates by country today; Singapore)
  - ADS-B (Out) (USA mandate 2020; Singapore/Australia today)
  - P-RNAV (RNP-1) Precision Area Nav (Europe mandates by country today)

• Sustainment Savings
  - Aging Electro-mechanical Instruments
  - Rapid, Low Cost, Low Risk
  - Fuel Efficiency by reducing basic weight

• Mission Improvements
  - Digital Moving Map
  - Electronic Flight Bag
  - Datalink Integration

Without an avionics upgrade the C-130H is becoming obsolete!
CNS/ATM Requirements Roadmap
Communication-Navigation-Surveillance/Air Traffic Management

Communication
- VHF Voice/Data
- SATCOM Voice
- SATCOM Datalink
- HF Datalink
- AFN
- CPDLC
- ADS-C

Navigation & Navigation Safety
- RNP
- RNAV
- VNAV
- TOAC
- FM Immunity
- RVSM
- TAWS
- Windshear

Surveillance
- Mode 5 / S
- TCAS II
- ADS-B: Auto Position Broadcast

Surveillance
- Mode S
- Enhanced Surveillance
- RNAV-10
- GBAS
- Cat I
- FAWS
- Civil SATCOM Datalink & Voice 2007-2010

CNS/ATM requires compliance – TODAY!
Is CNS/ATM really that important?

- April 3, 1996, USAF CT-43 (B737) crashes in Europe with 35 passengers – no survivors
- Aircraft was flying an NDB approach in marginal weather in mountainous terrain
- Accident was a wake-up call for the importance of Precision Navigation and CNS/ATM in the US Air Force

Availability of an RNAV approach could have prevented this accident
### C-130H Avionics Life Cycle Cost Analysis

<table>
<thead>
<tr>
<th>Mean Time Between Failure (MTBF)</th>
<th>Before Upgrade</th>
<th>After Upgrade</th>
<th>Reliability Improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication Radios</td>
<td>108 hrs</td>
<td>1911 hrs</td>
<td>1,769%</td>
</tr>
<tr>
<td>Flight Mgmt System (FMS)</td>
<td>102 hrs</td>
<td>1847 hrs</td>
<td>1,811%</td>
</tr>
<tr>
<td>Primary Flight Instruments</td>
<td>134 hrs</td>
<td>1463 hrs</td>
<td>1,092%</td>
</tr>
<tr>
<td>Navigation Radios</td>
<td>73 hrs</td>
<td>1170 hrs</td>
<td>1,603%</td>
</tr>
<tr>
<td>Automatic Flight Control System</td>
<td>96 hrs</td>
<td>3219 hrs</td>
<td>3,353%</td>
</tr>
<tr>
<td><strong>Annual Cost to Sustain</strong>¹</td>
<td><strong>$516k</strong></td>
<td><strong>$32k</strong></td>
<td></td>
</tr>
</tbody>
</table>

¹Repair Costs estimated by Rockwell Collins service center

²Digital Engine Instrument Display Systems provides additional saving (~$2700 repair cost per gauge)

*An avionics upgrade can save $4.9M per aircraft over 10 years!*
A recent C-130H upgrade removed 931lbs in basic aircraft weight

<table>
<thead>
<tr>
<th>Basic Weight Impact</th>
<th>Gallons per A/C</th>
<th>Fuel Price</th>
<th>Fleet Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1,000 lbs</td>
<td>4,438</td>
<td>$3.73</td>
<td>$44,417(^1)</td>
</tr>
<tr>
<td>10 Year Savings(^2)</td>
<td>44,380</td>
<td>-</td>
<td>$1,655,374</td>
</tr>
</tbody>
</table>

\(^1\) Lbs Reduced x CoW / Fuel Density x Flying Hours/Yr x Price of Fuel = Annual
\(^2\) Assumes 4 aircraft fleet

A fleet of 4 aircraft could save $1.7M in Fuel over 10 years
# Key Attributes of a C-130 Avionics Upgrade Program

## Functionality | Minimum User Requirements
--- | ---
CNS/ATM 2020 Mandates | RNP-1; Mode S; ADS-B; 8.33 KHz VHF Communication
Mission Capability | C-130 specific military functionality:  
- Integrated airdrop release point computations (CARP/HARP)  
- Search & Rescue Patterns  
- Tactical Approach to Landing Zone (LZ)
Airworthiness Certification | DoD Certification or equivalent
Production  
- Schedule  
- Installation | Production installation in less than 3 months per aircraft  
95% confidence schedule  
B-kit TRL > 7; MRL > 7  
Maximizing Fielded Solutions (COTS/NDI)
Reliability, Maintainability and Supportability (RM&S) | System MTBF greater than 300 hrs  
DMSMS through 2040  
Component commonality to allied partners  
Maximize Reuse of Existing LRUs

Meets All Technical Requirements at lowest life cycle cost
C-130 Cockpit prior to CNS/ATM Modification
C-130 Cockpit with CNS/ATM Modification
Rockwell Collins Engine Instrument Display System

- Replaces 32 analog engines instrument gauges and 11 ancillary gauges
- Independent, Fully Automatic Operation
- Intelligent Detection & Display Software
- Capable on both engine types
- Alternate Display Mode allows Video Source
- 800 Hours of Recording
Summary

- C-130’s require avionics upgrades to meet CNS/ATM mandates
- C-130 Tactical Mission features proven on over 160 aircraft
- Rockwell Collins’ Flight2 avionics system has achieved Lockheed Martin certification

- Investment Protection
  - Avionics Life Cycle: \( 4.9M \times 4 \text{ ac} = 19.6M \) (10 yrs)
  - Fuel savings: \$1.7M (10 yrs)

- Return on Investment: \$21.3M

- Additional cost savings on replacing analog engine instruments
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