X-57 Cockpit Display System and Features

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AIAA/IEEE Electric Aircraft Technologies Symposium (EATS), 12 June - 16 June 2023

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X-57 Cockpit Display System (CDS)

Overview

- Displays propulsion and energy systems data
- Supplements standby instrumentation
- COTS parts
- CAN bus
- V&V Testing Aide

Lab Units



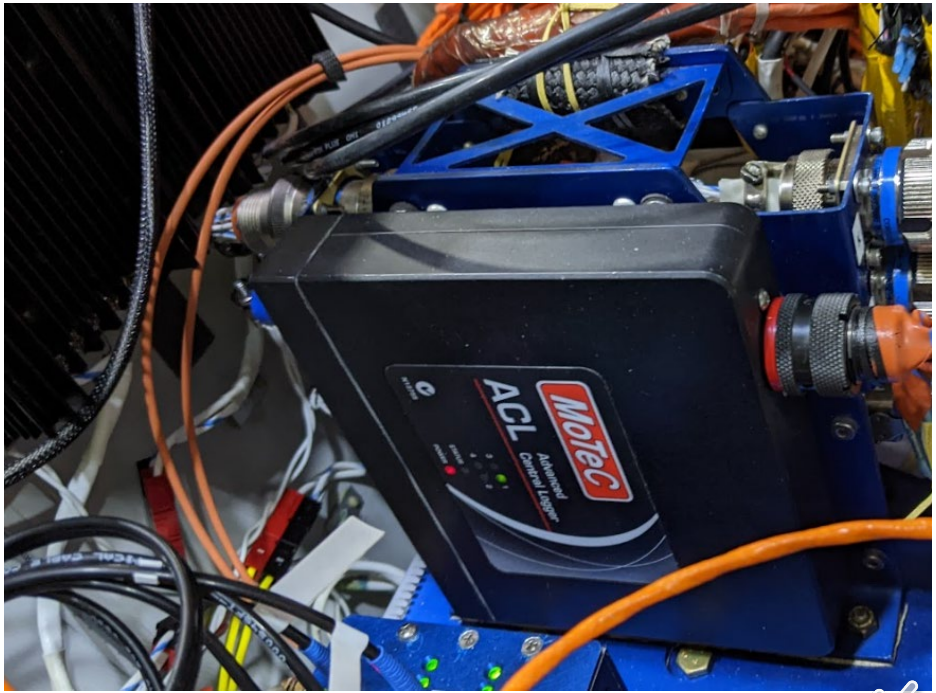
Multifunction Display (MFD)

- Model D175
- 5 in^2 screen
- 10 color LEDs
- 1 Mb/second
- 7 different pages



Advanced Central Logger (ACL)

- Cockpit Display Computer
  - Maximum temperatures
  - Power
  - Torque
- Required for Synchronous Versatile Input Module (SVIM) communications
  - SVIM “master” device



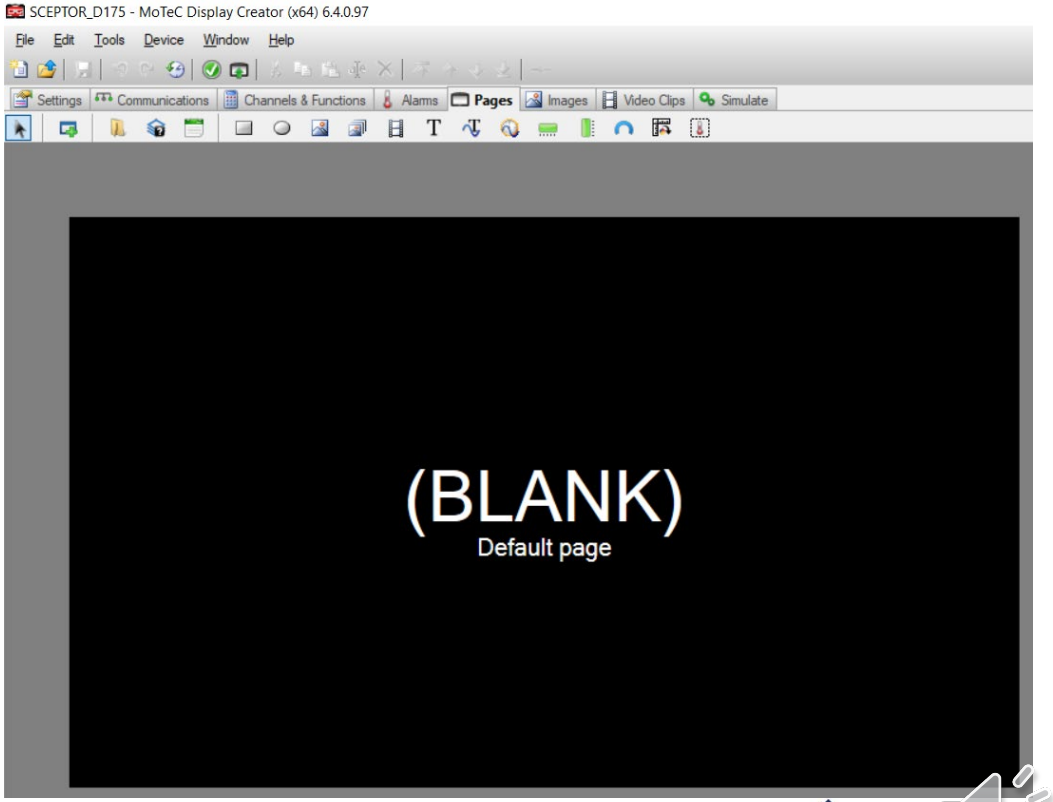
SVIM

- Data acquisition units
- One per nacelle
- Samples temperatures
- Samples propeller pitch



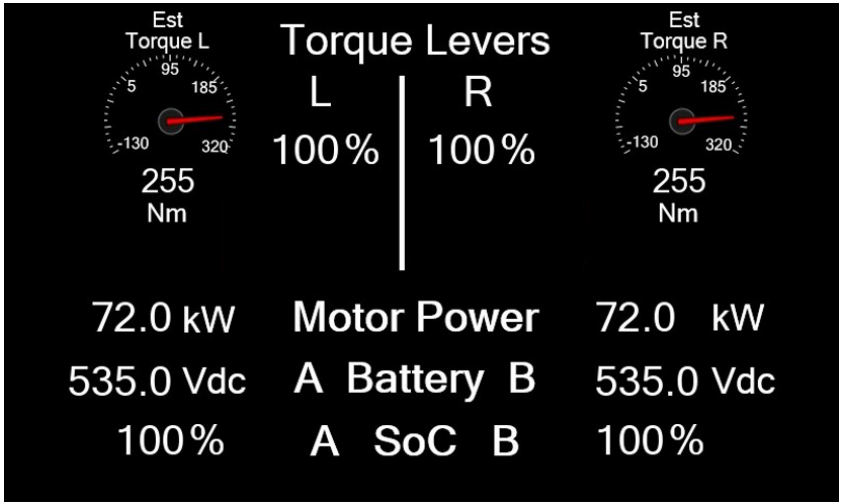
Software

- MFD load
  - 7 flight candidate pages
- ACL-SVIM load
  - LED logic
  - Computations
  - SVIM channels

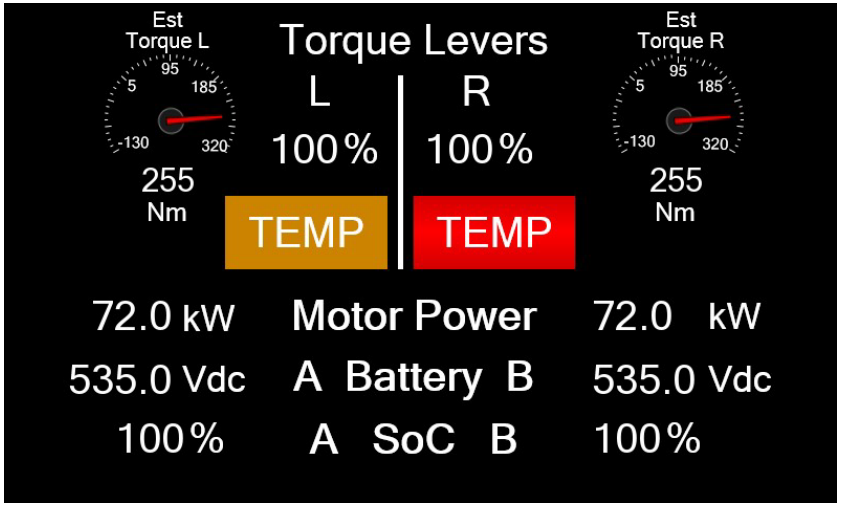


Page 1 (main)

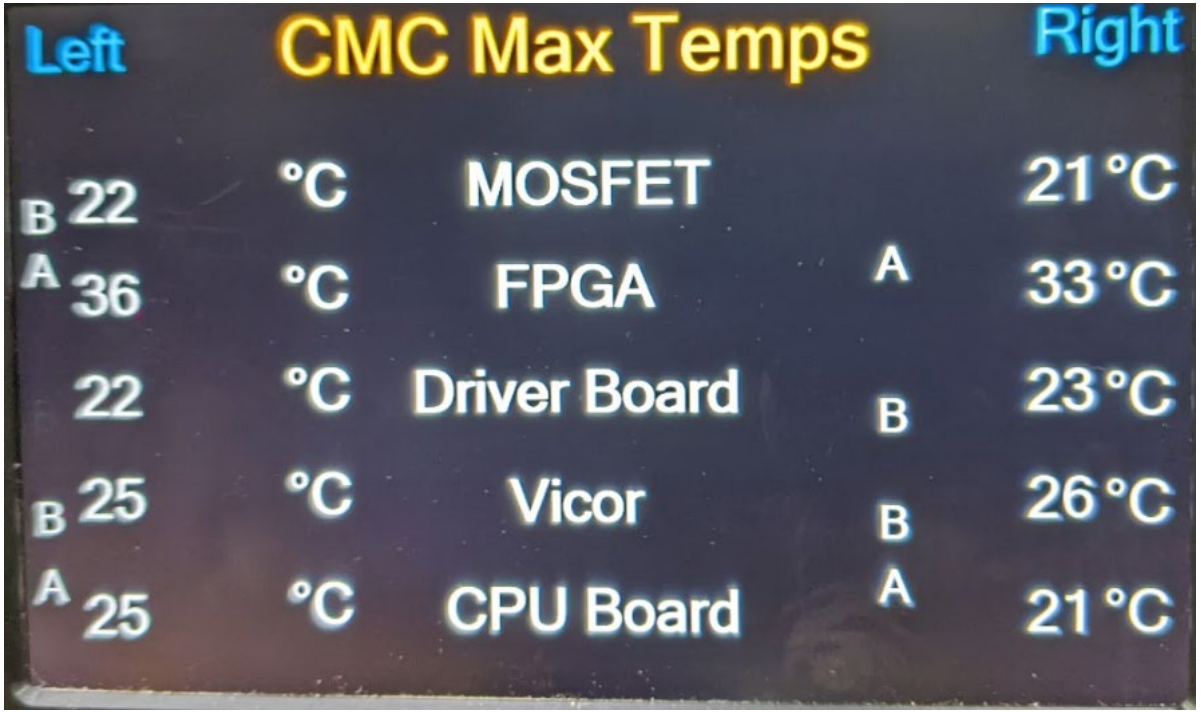
No Alerts



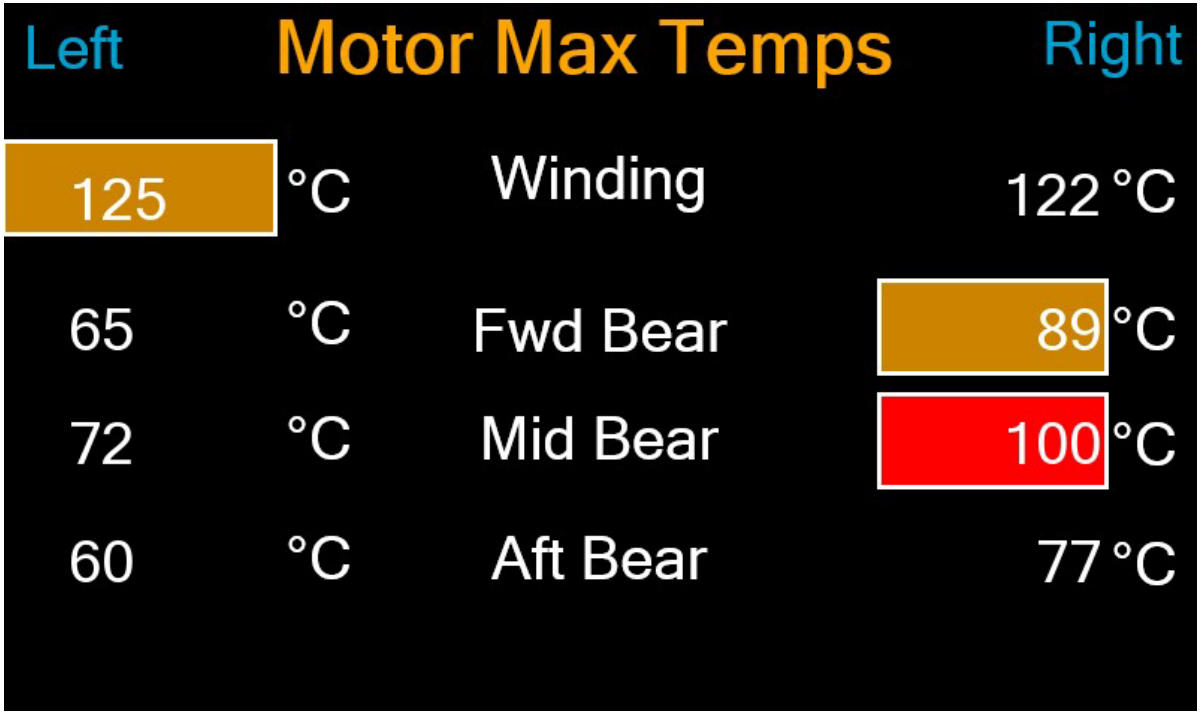
Red and Yellow Alerts



Page 2


Left
CMC Max Temps
Right
B 22 °C MOSFET 21 °C
A 36 °C FPGA A 33 °C
22 °C Driver Board B 23 °C
B 25 °C Vicor B 26 °C
A 25 °C CPU Board A 21 °C

Page 3


Left
Motor Max Temps
Right
125 °C
Winding
122 °C
65 °C
Fwd Bear
89 °C
72 °C
Mid Bear
100 °C
60 °C
Aft Bear
77 °C

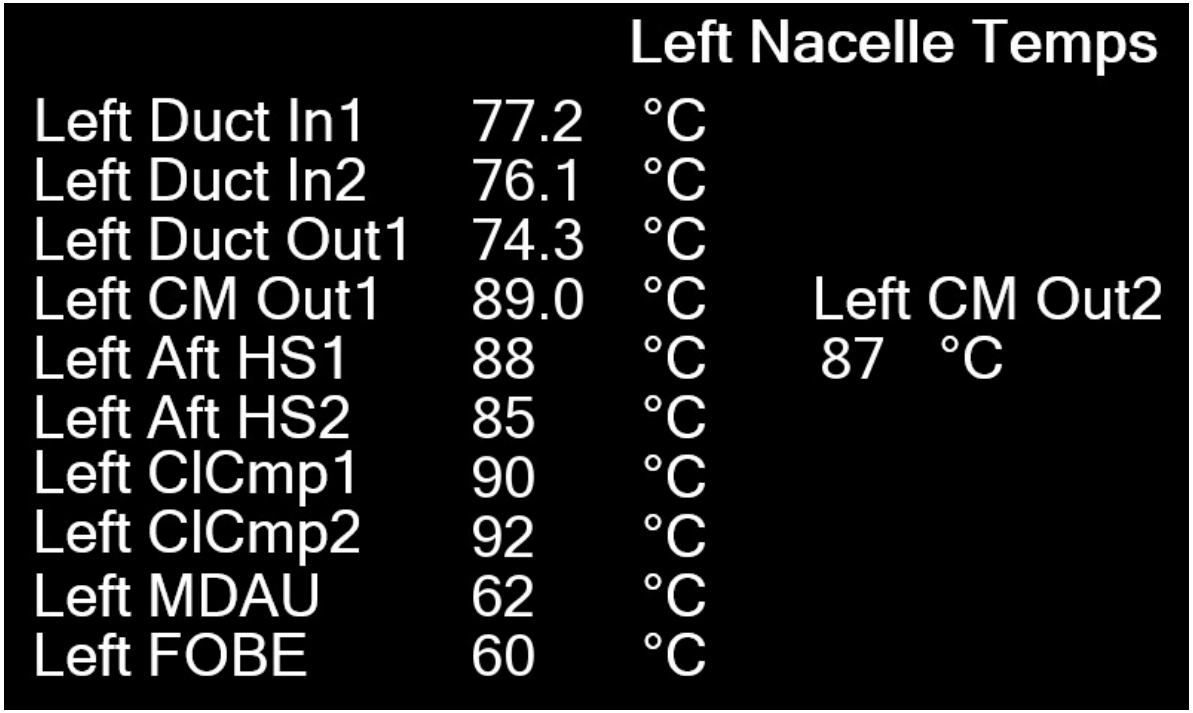
Page 4


MFD Software Version: 12.5.22
ACL Software Version: 2.4
15.0 deg Pitch 15.0 deg

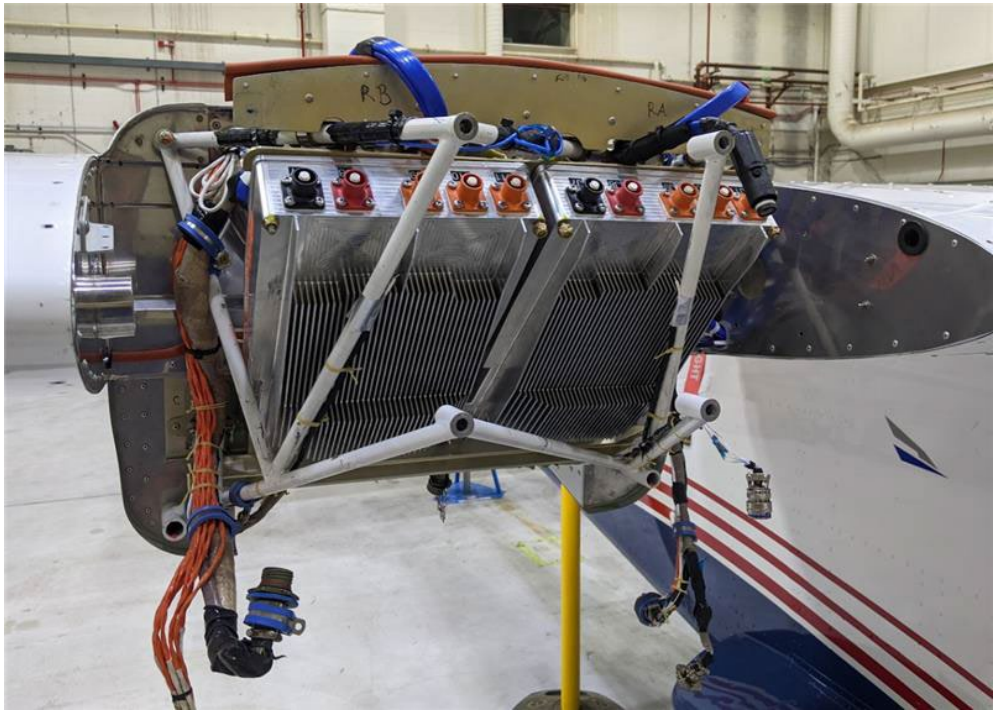
Page 5

Left MW			Right MW	
A1	125.0	deg C	122.0	A1
B1	118.0	deg C	115.0	B1
C1	110.2	deg C	116.4	C1
A2	120.0	deg C	120.0	A2
B2	119.3	deg C	113.0	B2
C2	112.0	deg C	118.2	C2

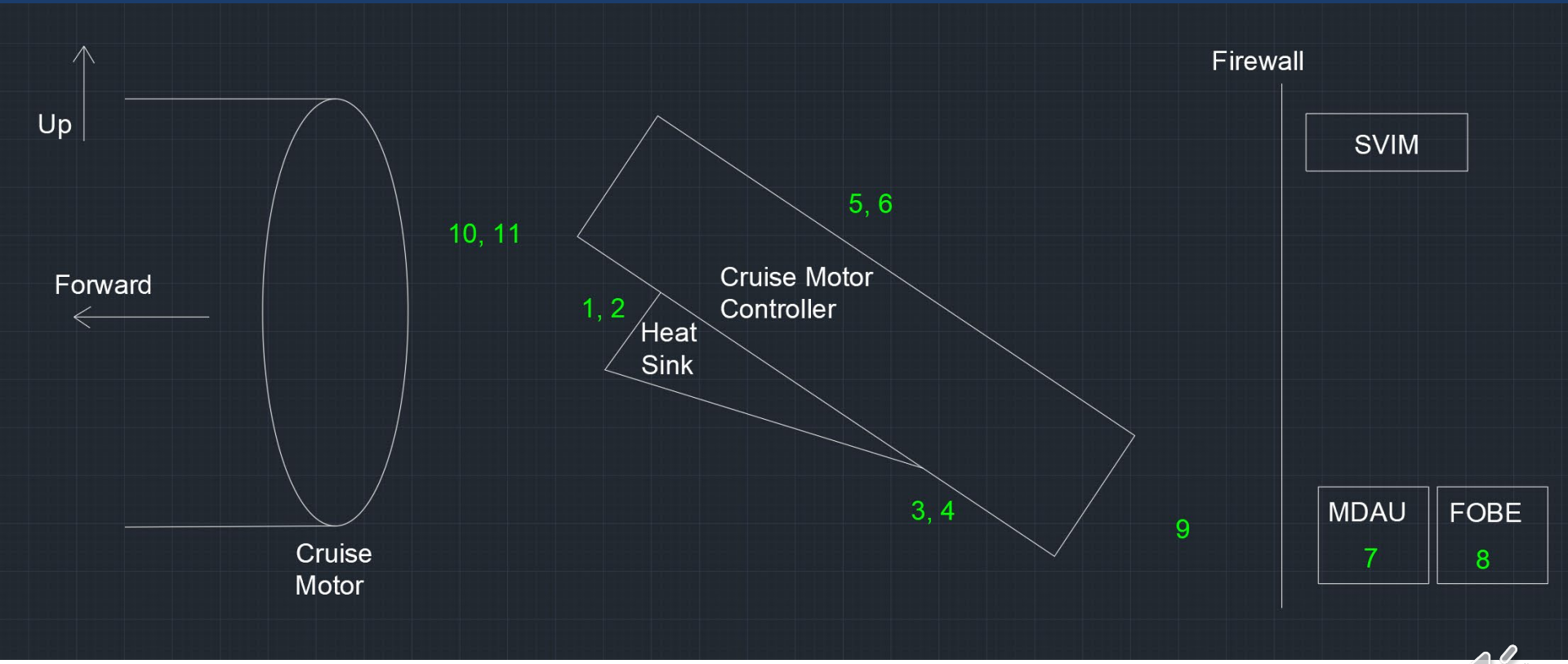
Page 6


Left Nacelle Temps
Left Duct In1 77.2 °C
Left Duct In2 76.1 °C
Left Duct Out1 74.3 °C
Left CM Out1 89.0 °C
Left CM Out2
87 °C
Left Aft HS1 88 °C
Left Aft HS2 85 °C
Left ClCmp1 90 °C
Left ClCmp2 92 °C
Left MDAU 62 °C
Left FOBE 60 °C

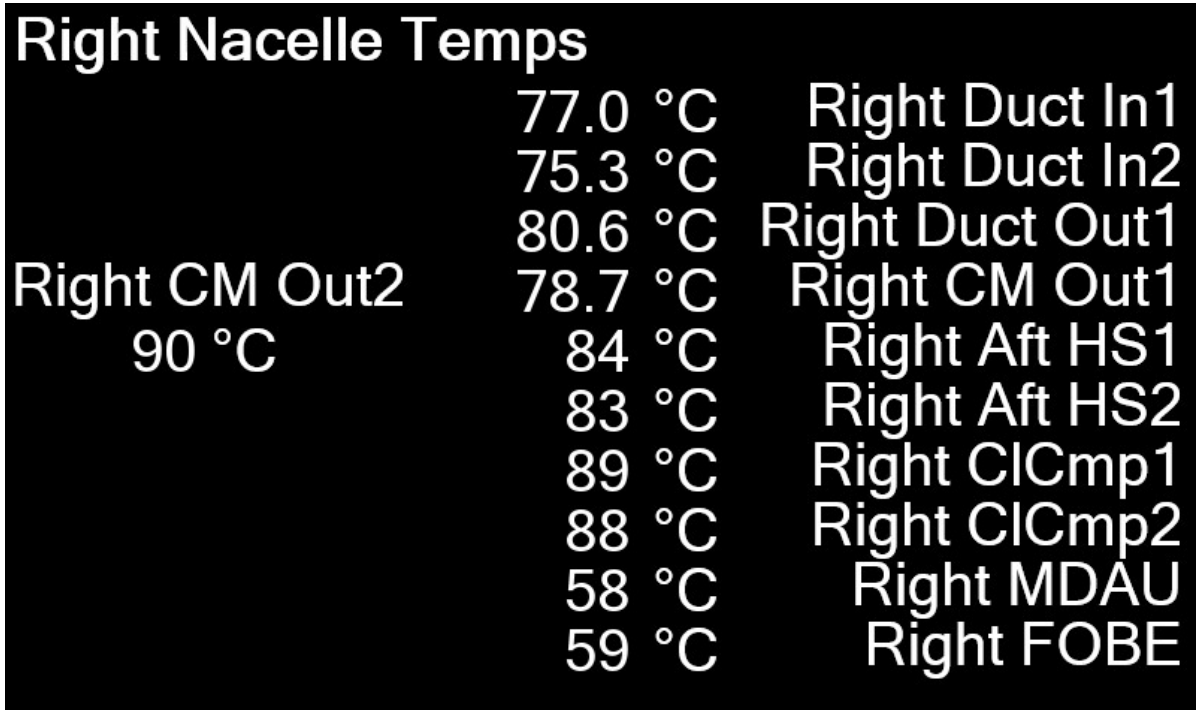
Cruise Nacelle



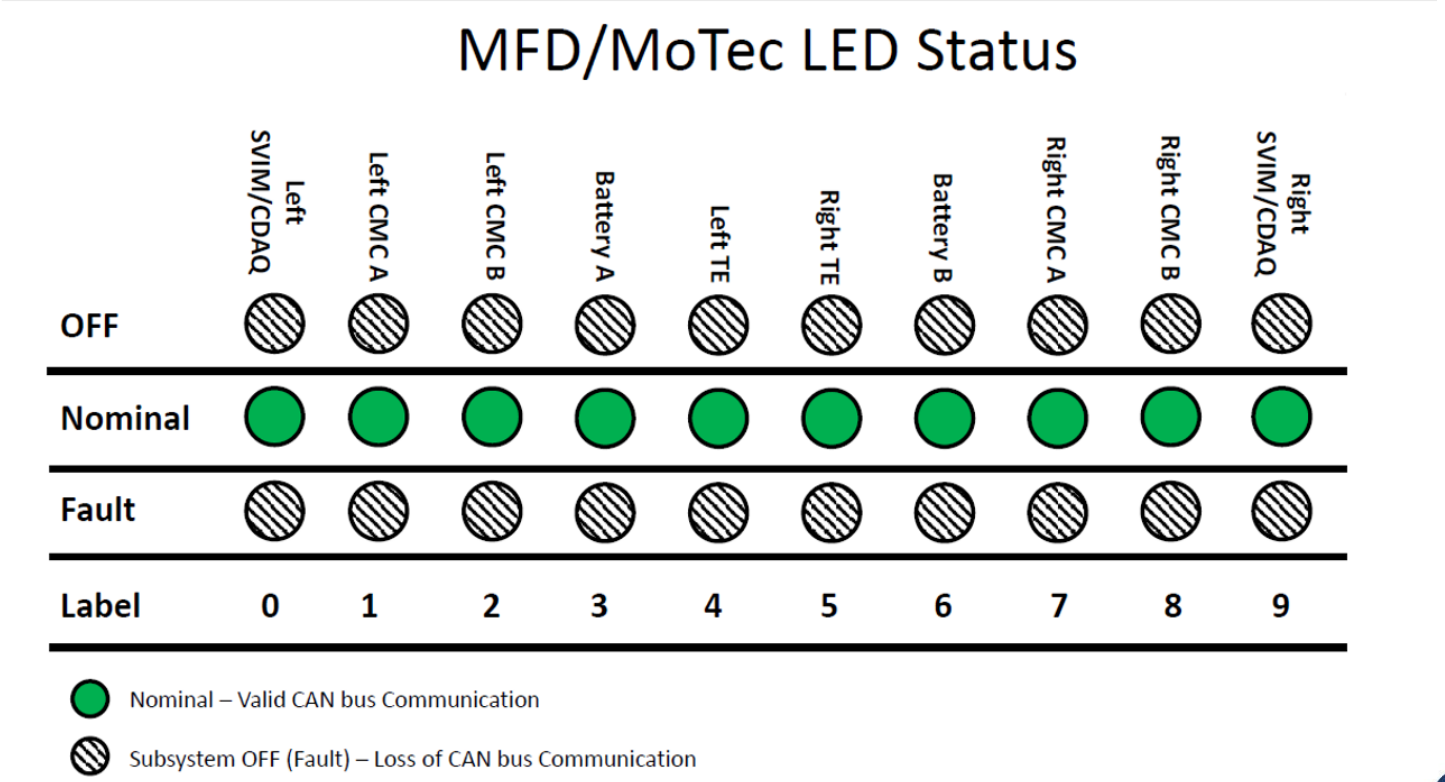
Nacelle Block Diagram



Page 7


Right Nacelle Temps
77.0 °C
Right Duct In1
75.3 °C
Right Duct In2
80.6 °C
Right Duct Out1
Right CM Out2
78.7 °C
Right CM Out1
90 °C
84 °C
Right Aft HS1
83 °C
Right Aft HS2
89 °C
Right CICmp1
88 °C
Right CICmp2
58 °C
Right MDAU
59 °C
Right FOBE

LED Indicators

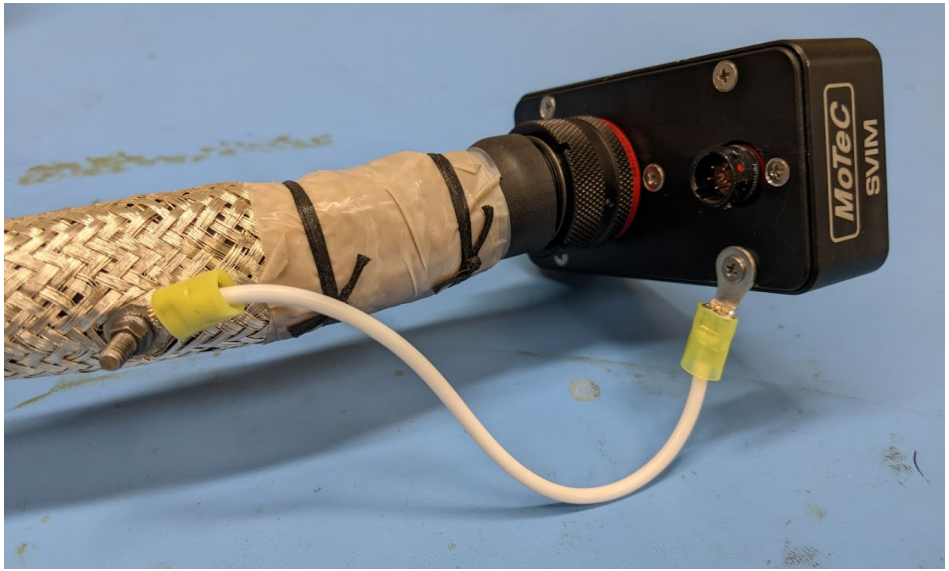


Challenges

- Electromagnetic Interference (EMI)
- Software Version Tracking

Harnesses and EMI Mitigation

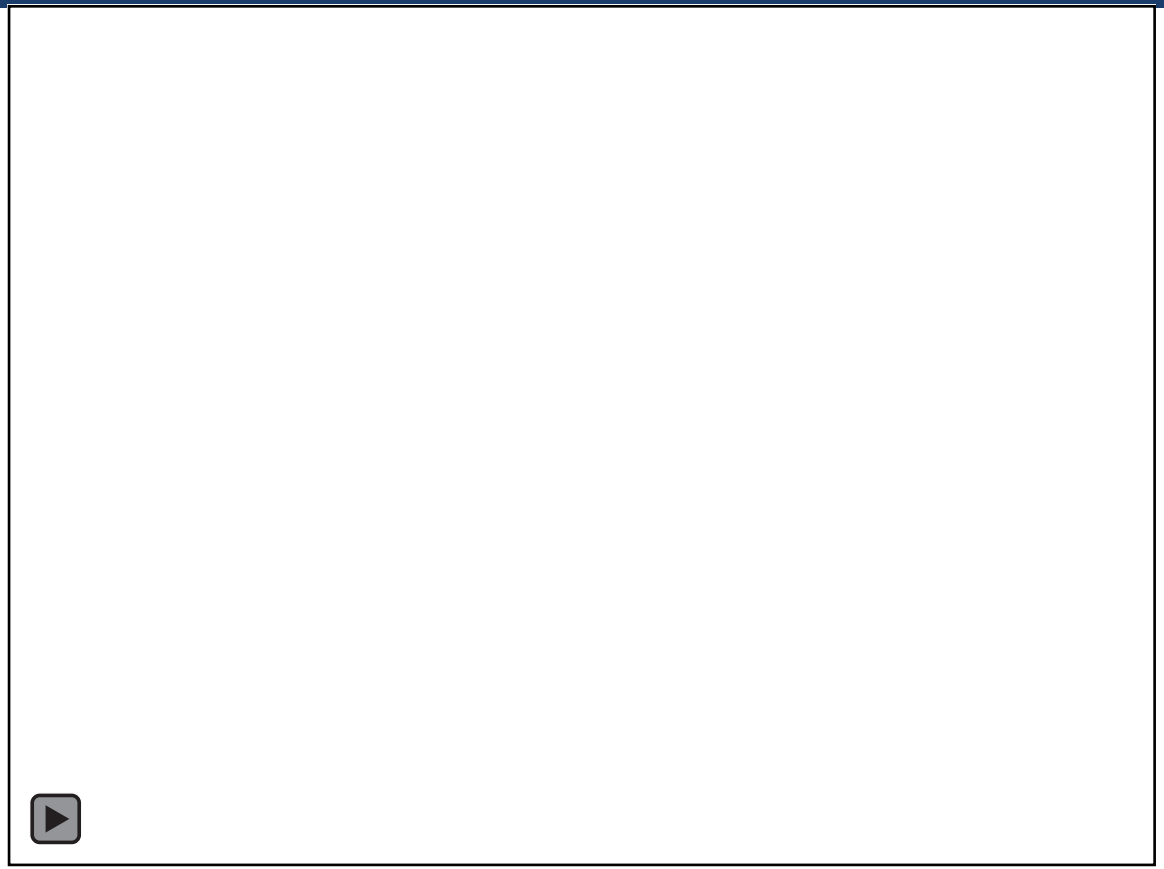
Lab



Aircraft



EMI

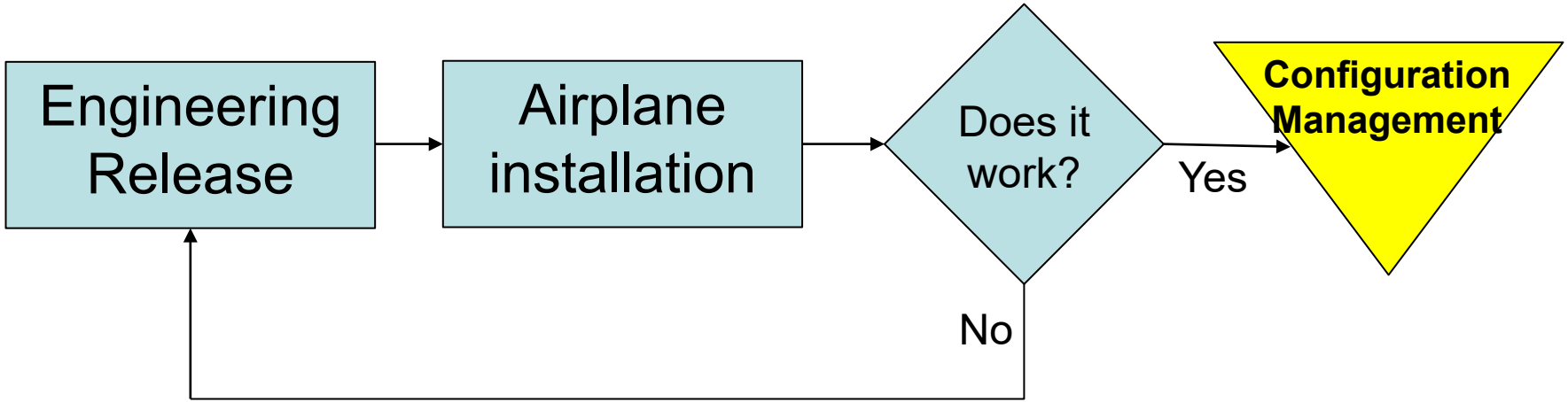


Software Version Control

Ideal process



Software Version Control (cont.)



Conclusion

- Supplement to safety critical data
- Primarily monitors temperatures
- Susceptible to EMI
- Iron Bird strongly recommended

Questions?



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