X-57 Flight Systems Integration Path

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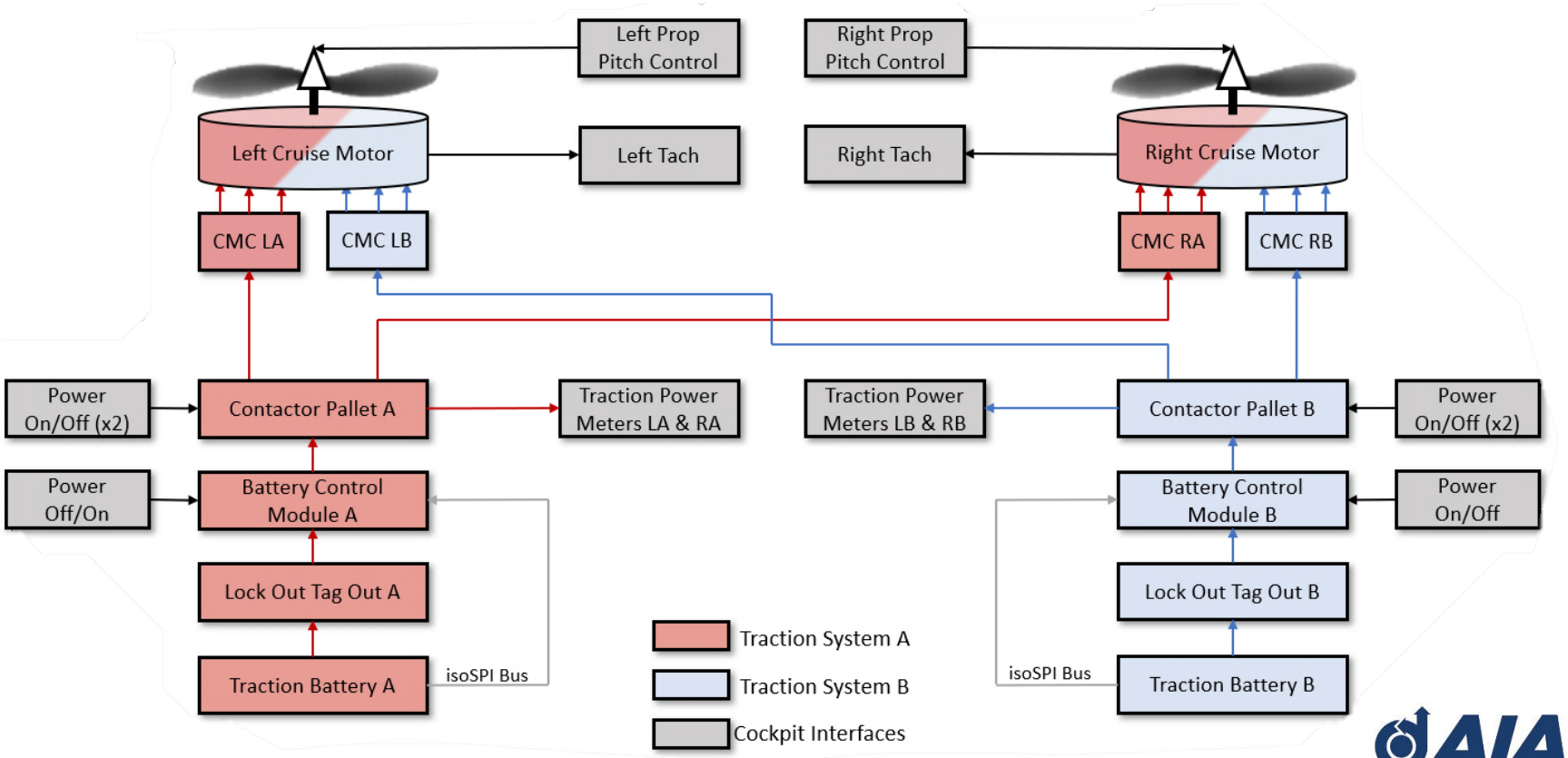
X-57 Overview



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Test Plan Approach

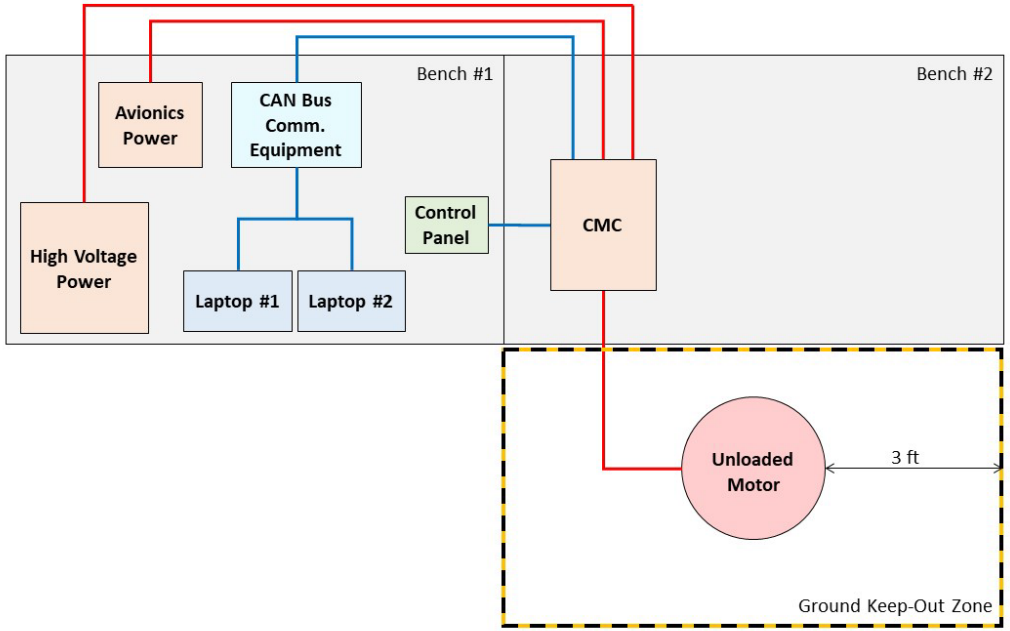
- Only X-57 specific elements to be tested in system level test points
- Assumed all components during V&V testing are in flight configuration
- Any configuration changes performed after formal system V&V testing could require retesting of specific test points or entire procedures

Software Testing Tools

- Developed GUIs for insight into system without cockpit displays

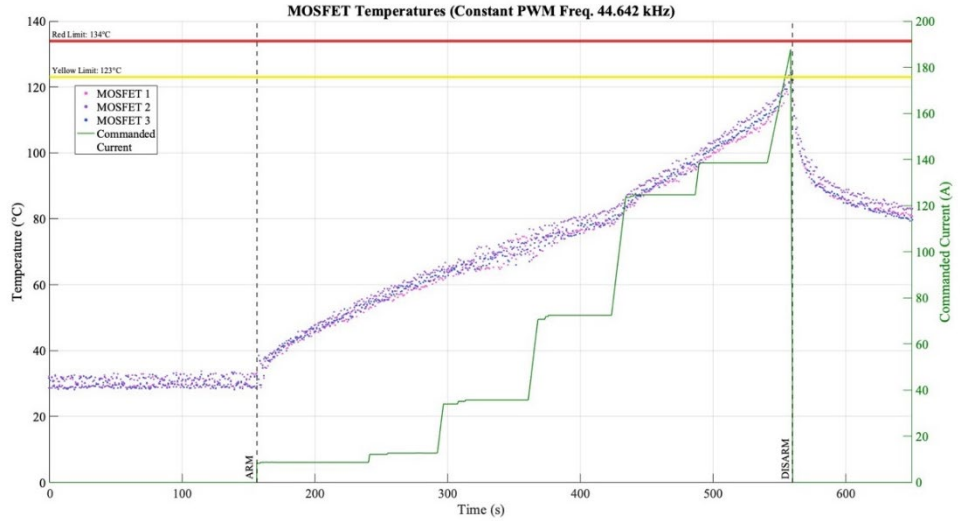
Cruise Motor Controller Software Testing

- Initial software testing performed in System Integration Lab (SIL)
- Checkouts of basic software functionality prior to aircraft testing
- Differences expected between SIL and AC

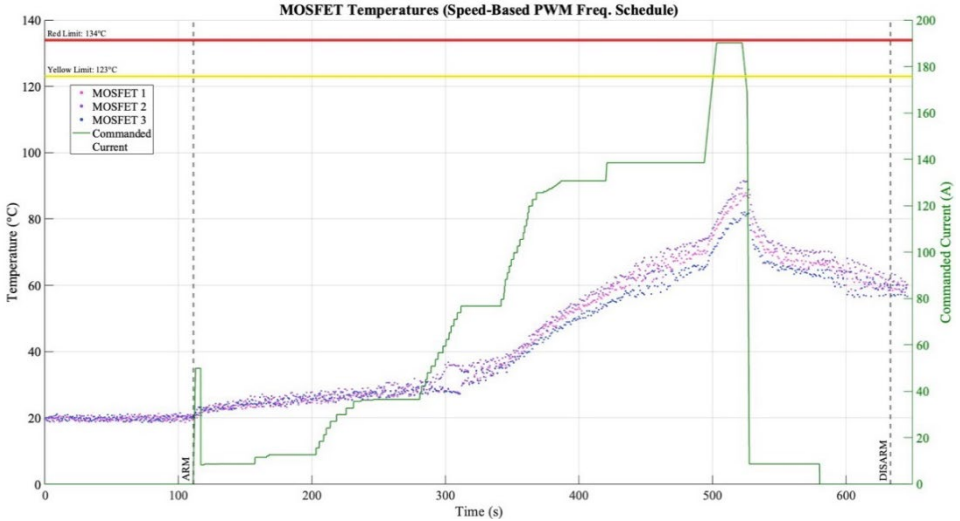


On-Aircraft Software Troubleshooting

- MOSFETs overheating during testing extended test days



Constant Frequency



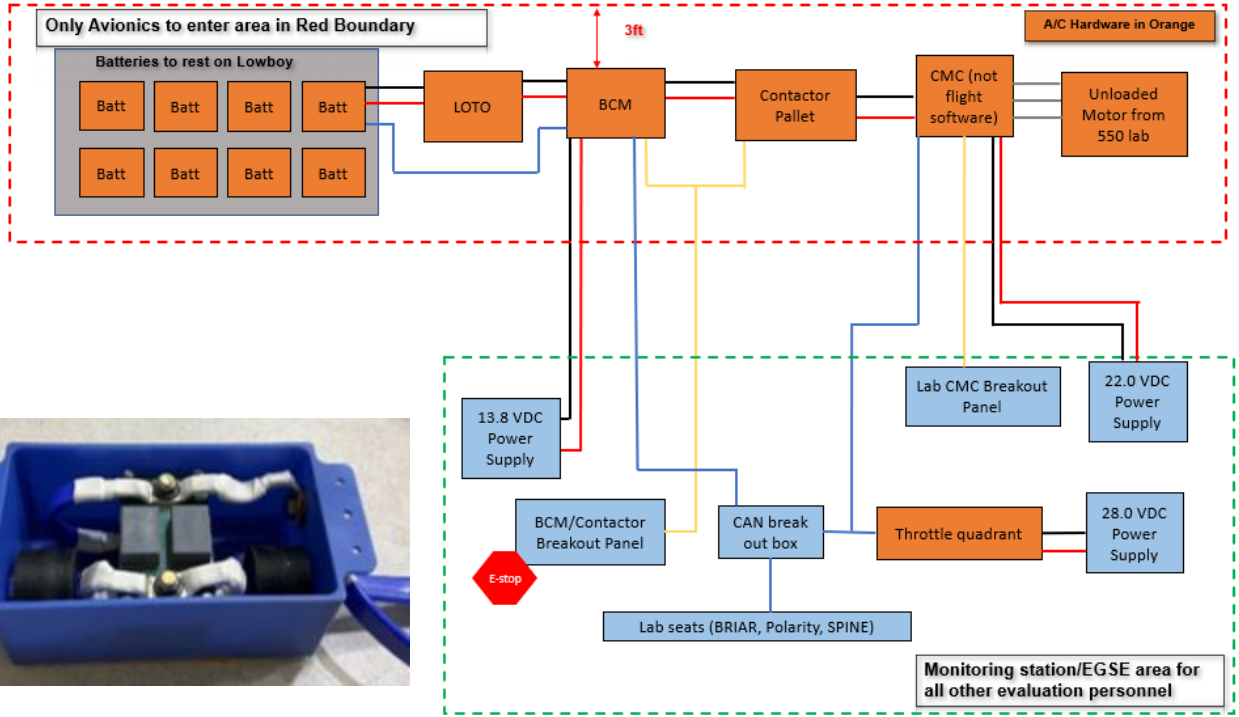
Speed-based Schedule

Aircraft Systems Testing

- Build up approach
- Initial testing with batteries off-aircraft
- Problems encountered with data dropouts
- Troubleshooting on aircraft

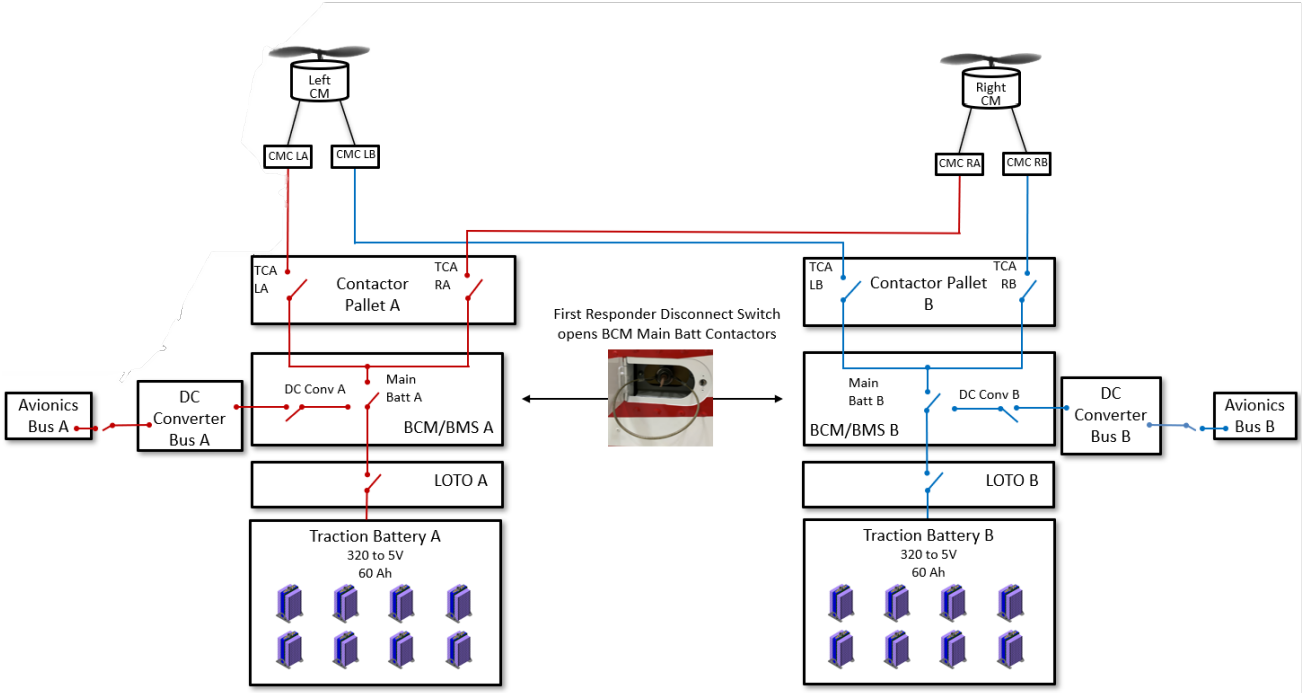
Hardware-in-the-Loop (HIL) Testing

- Faster for troubleshooting even with limited hardware
- Mitigated EMI with GRC PI filter design



Battery Testing

- Charging
- Discharging
- Balancing
- Health and Status Checks
- First Responder Disconnect



Conclusion

- Engineering and spare units are crucial for developmental aircraft and projects
- Early development of ground support equipment and tools is crucial to success
- Off-aircraft test setups (SIL and HIL) allow for faster testing but HW and SW can operate differently once in the integrated system
- Iron birds are critical during the development phase of a project to understand the integrated system

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