Mechanical Systems
Mechanical / Thermal Hardware
December 2004 Status

Marc Campell, Subsystem Manager

Accomplishments

- **Accomplishments during December.**
  - **Missing feature was added to grid – this allowed temperature sensor wiring in the X axis purge grooves to pass under the Y axis heat pipes (more later).**
  - **The 5th Top Flange Heat Pipes was bonded into Grid.**
  - **Lockheed progress reported earlier.**

3 Month Milestones Jan - Mar

Milestone Description	Original Date	Current Date	Major Reqmnts to Achieve Milestone	*Notes*
Complete Grid Box Base Assy ops	07/22/04	02/04/05	bake-out	*2/4/2005*
			bond temperature sensors	*2/4/2005*
Grid Heat Pipe bond process Qual	02/24/04	11/15/04	write test report	*ECD 12/10/2004*
Design Heatrer Control Box	08/19/04	11/12/04	release drawings	*complete*
Fabricate Heater Control Box	10/28/04		procurement cycle	*in process. Stay clear issue being worked*
Test Heater Control Box	12/13/04	02/18/05		
Order TCS electronics components	01/30/04	12/17/04	release drawings of using assemblies	*activity started*
Order TCS flight hardware	12/19/03	12/30/04	LM procured TCS components	*all parts on hand*
Heaters, thermostats & thermistors			Grid thermostats	*Qual test complete report in review at GSFC*
Receive Grid #2, EMI skirts, details	11/15/04	04/02/05	EMI skirts & details	*complete*
			Grid final machining & inspection	*ECD 3/2/05*
			Grid plating	*reqmt deleted*
			grid box machining & hardware installation	*ECD 3/30/05*
Grid #2 Static Load Qual Test	12/16/04	05/02/05	Load case analysis	*prelim eval complete*
			in-house vs out-house analysis	*ECD 2/17*
			SOW, RFP & vendor selection	*Feb*
			MGSE & test fixture design	*Mar*
			MGSE & test fixture fab	*Mar*
			Test Readiness Review	*Apr*
Receive X-LAT plate	12/09/04	03/31/05	Complete X-LAT heat pipe fab	*Complete*
			Complete X-LAT plate assy	*Feb*
			Complete Thermal Vac testing	*Mar*

Drawing Release Plan

- 57 of 81 (70%) drawings released
  - 18 MLI drawings have been added to MECH drawing list
  - 4 unreleased parts not needed until I&T operations
    - In check
- Known drawing revisions
  - Feb – 2 planned
    - X-LAT (ready for release) & Radiator IDD's
      - Investigating potential interference between X-LAT cooling tube exit point and proposed Spacecraft MLI attachment

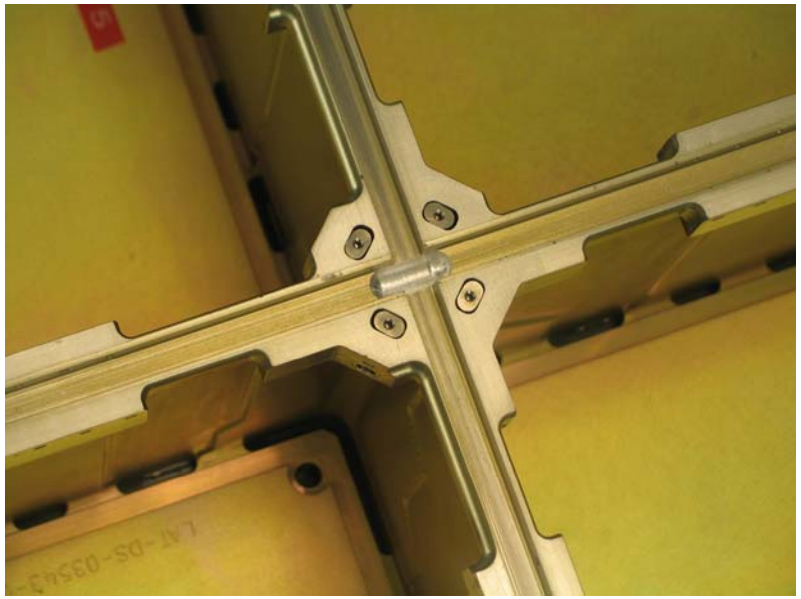
Concerns

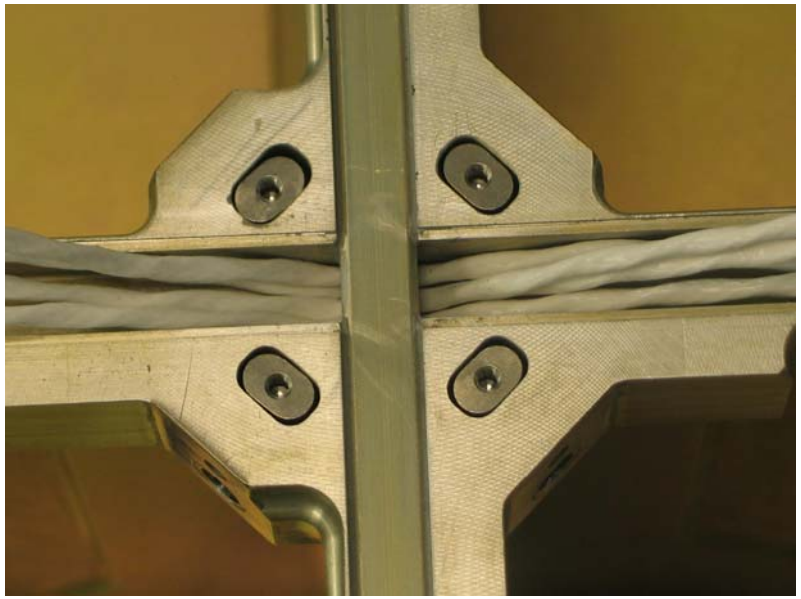
- **Lockheed Martin - X-LAT plate & Radiator delivery schedule**
  - **See LM presentation**

Concerns (cont)

- **Grid to I&T delivery date – schedule continues to compress.**
  - 2 big delays in delivery to I&T
  - Requirement to bake out adhesive used to bond heat pipes in order to meet outgassing requirements
    - Oven identified for this work in Oct
    - After SLAC injury incident, internal review revealed multiple deficiencies that had to be corrected before oven could be used. Still not online.
    - Developed work around plan to address these issues.
    - Plan to demonstrate ability to control grid temperatures on grid mass simulator (alum plates)
  - Rework of Grid for missing feature
    - Tooling developed and fabricated
    - Rework technique demonstrated on 1 x 4 Grid

Grid Rework Completed





Open Flight Design Issues

- **Requirements for Grid survival heaters & thermostats being revised to raise minimum Tracker temperatures**
  - **MRB has approved modification to these parts**
  - **Existing Qual is valid for new thermostats with higher set point and slightly higher current for 30,000 cycles**
  - **New thermostat has a much higher duty cycle in Safe mode. Is 30,000 cycles satisfactory?**
- **TCS validation vs. LM modified Radiator Thermal Vacuum & Balance plans**
  - **TCS test requirements being developed with Tom McCarthy**
  - **~3 additional TCS cases proposed**
  - **Cost & schedule impacts will be evaluated**
  - **TCS risk assessment and Qual test plan requested by GSFC**
- **Define GBA Static Load test requirements & plans**
  - **Detailed load cases & STE being developed**
    - **Stress has performed another iteration on the load cases**
    - **Loads have gone down and many cases are now Qual by analysis and other test cases will be combined**

Open Flight Design Issues (cont)

- Radiator integration sequence
  - Coupon testing of repeated make & break of joint in process
  - Disassembly facilitated by use of mold release agent
- X-LAT MLI blanket billowing does not violate stay clear (Closed)
- Radiator MLI blanket and wiring violates stay clear
  - S/C to LAT MLI design options in work with Spectrum Astro
    - Working group meeting held in Jan
- Radiator vibration requirements
  - Current proposal is pre & post low level sine sweep, sine vibe and Acoustic testing
  - Working with GSFC & LM to minimize & finalize requirements
  - Preliminary design of vibration test fixture complete.
  - Design concepts for Acoustic test fixture are next
  - Effort on hold

MECH Qualification Program

Qual Test	Status	ECD
Grid-Top Flange Heat Pipe bond process qual	Complete report in work.	Dec 04
Grid Box Assy Static Load test	Planning in work. Perform on Grid #2	Mar 05
X-LAT Plate Thermal Vac test	at LMMS	Mar 05
Radiator Variable Conductance Heat Pipe new extrusion	Passed burst test, heat capacity test after charging	Comp
Radiator Acoustic	at LMMS	TBD*
Radiator Thermal Vacuum	at LMMS	TBD*
TCS-Radiator Thermal Balance	Scope is changing. Need to define requirements	TBD*
* LM test program on hold pending funding resolution		

PMCS

- Mech Sys (SLAC only) cum schedule variance -$727K
  - Driven by late receipt of Grid #2, TCS hardware and Static Load Test did not start.
  - Will decrease each month as these are worked off

- Mech Sys (LM only) current cost variance -$317K, and
- Mech Sys (LM only) cum cost variance -$1,246K
  - LM is behind schedule and not on their headcount profile
  - LM has provided a spending profile for Jan – Mar to take them up to $7.5M
  - Investigating other testing options for Radiator and X-LAT plate

Program Threats

- Top threats to maintaining schedule
  - Grid Box is a pathfinder for Flight hardware operations in B33
  - Highly compressed, success oriented schedule
  - LM X-LAT & Radiator delivery have no float and LM manufacturing is not maintaining their schedule
- Top threats to staying within cost
  - LM staying on schedule
  - LM maintaining headcount profile, esp. planned roll-off
  - SLAC staying on schedule
  - Interdependencies with DAQ for fab, assy & test of TCS