

## ***Lockheed Martin Progress***

### ***X-LAT Plate Assy and Radiators***

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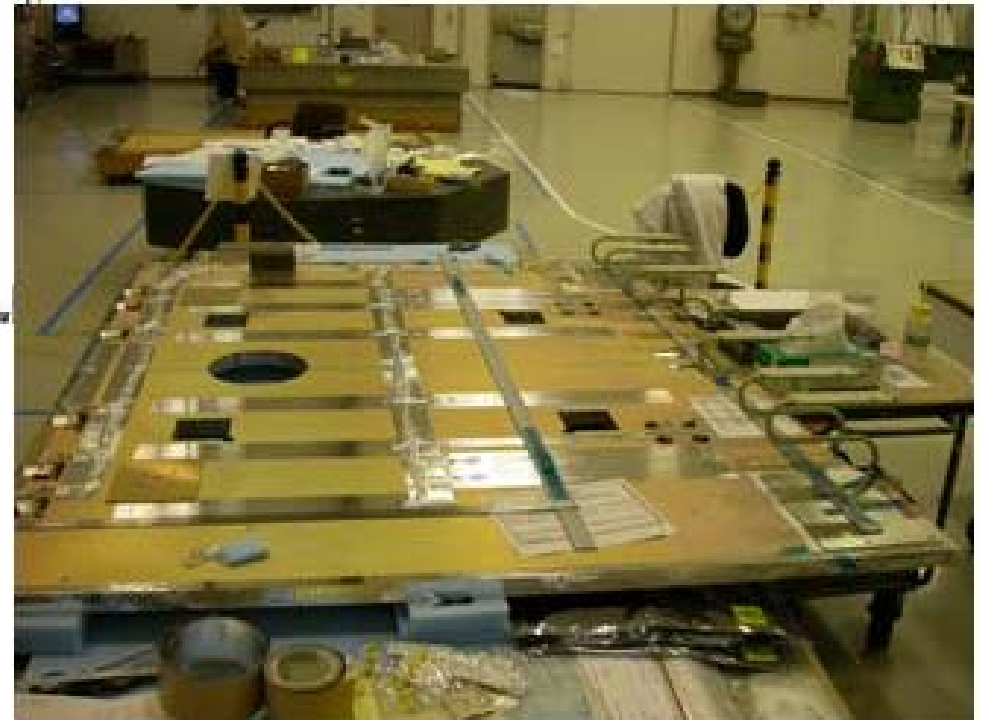
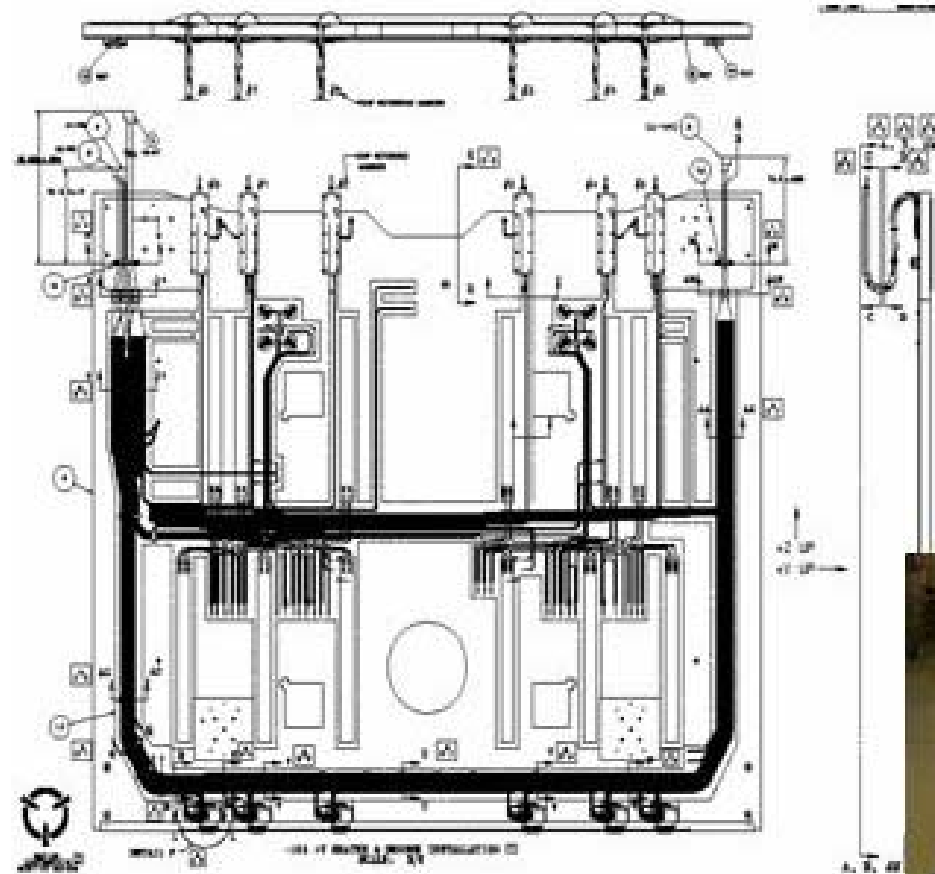
## Flight Hardware Status - Radiators

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- **+/-Y Radiator**
  - **Complete except for htr/instrumentation I&C**
  - **-Y Heater/Instrumentation I&C to complete this weekend after bake-out to cure adhesives; +Y completes mid next week**
- **Spare VCHP build holding at 87% completion**
  - **Will decide after acoustic and sine vibration testing as to whether it makes sense to complete the spares**



# Radiator Heater/Sensor Installation





## Flight Hardware DR Status - Radiators

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- **(200025024) Face sheet length discrepancy (.007" short maximum on a +/- .005" tolerance) that was uncovered during data review. UAI disposition. (Have all inputs to close this)**
- **DR R 72534 Heater wire Kapton defects**
  - **Q-note closed**



## **GSE being developed - Radiators**

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- **Shaker interface plate for Sine Vibration Test**
- **Four point lift sling for radiators needed for vib tests**
- **Two point lift sling for radiators for acoustic test**
- **Acoustic test Support Fixture**
- **Radiator TV fixtures/interface simulators**
- **Electrical GSE cabling (from radiators through feed-through ports to SLAC GSE) and feed-through plate**
- **Radiator shipping containers**
  - **Order on hold until requirements are verified**



# **GLAST Vibration/Acoustic Test Planning**

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## **• Acoustic Test**

- **Acoustic test fixture design and build complete**
- **“Two point” lift sling**
  - **Drawings done – in house build**
  - **Radiator accelerometer/strain gage installation done except for the ones on the reservoirs**
- **Acoustic test facility recovering from a hardware failure; drive amplifier tuning in progress**
  - **Shaping run to be completed last week**

## **• Sine vibration test still follows acoustic test due to delay in shaker availability**

- **Vibration Shaker IIF Plate**
  - **In-house build – complete**
- **“Four Point” lift sling**
  - **Drawings done – in house build**

## **• TRR held**

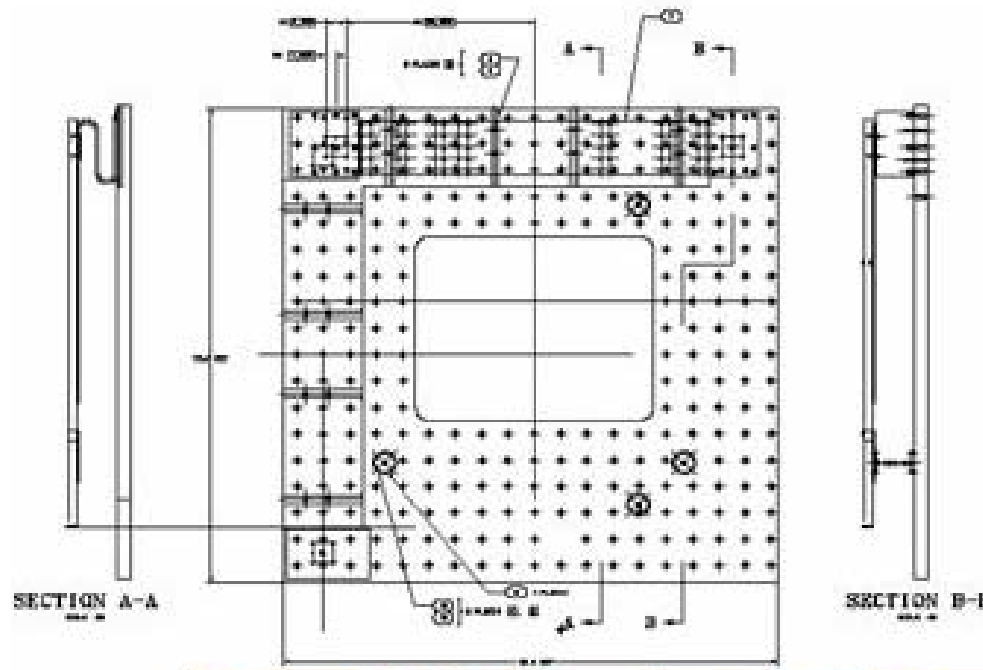
- **Delta TRR to be held this week to address facility and flight hardware readiness**

## **• Test Plan and Test Procedure covering both tests updated to reflect TRR inputs**

***GSE, Facility and Plans are ready to proceed with the acoustic testing***



# Sine Vibration Shaker I/F Plate



build complete



## **B/156 Shaker for Sine Vibration Testing**



**Single 45,000 lbf Ling Shaker  
64 Channel Vibration Control  
512 Channel data Acquisition**



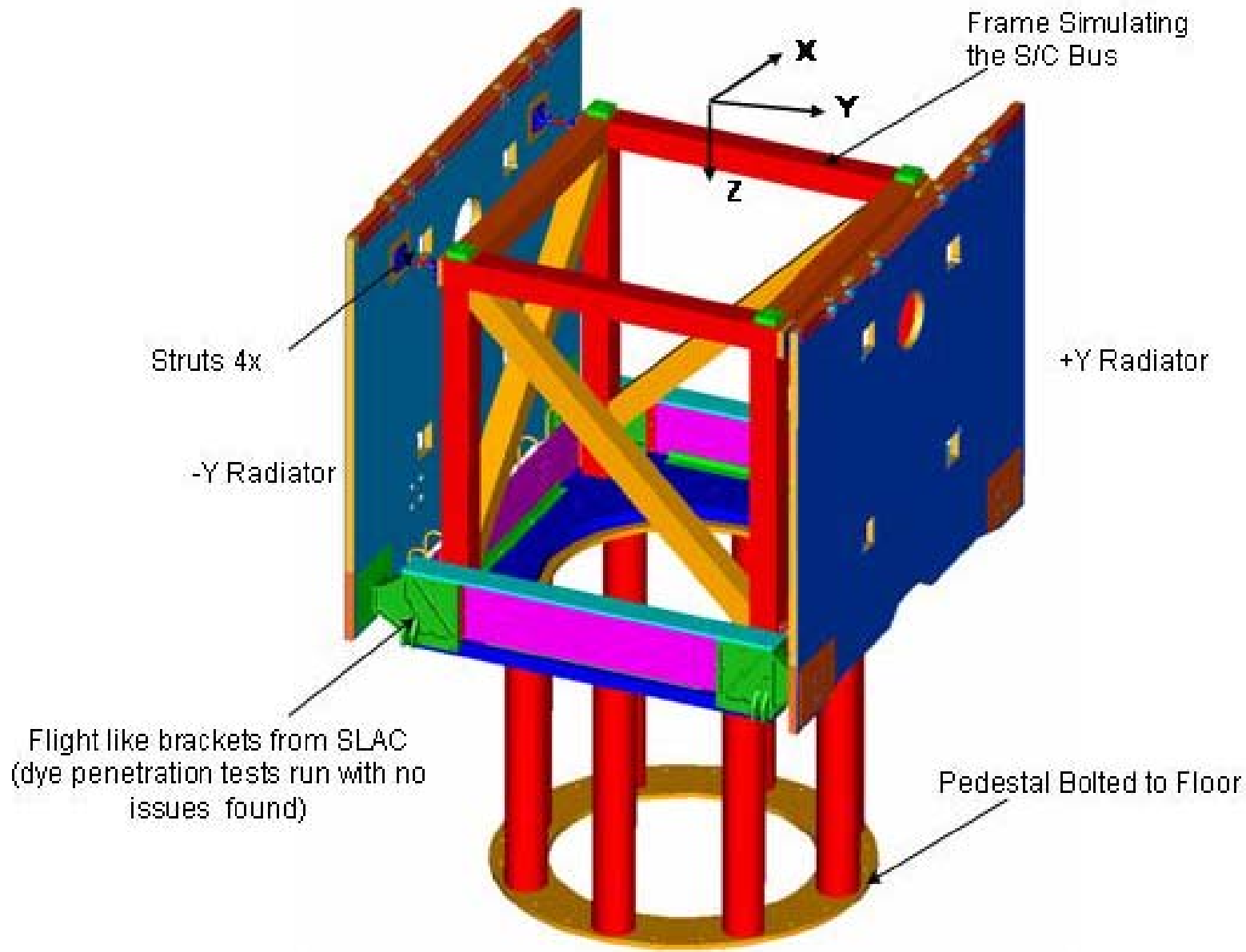
***Sine Vibration Test will  
still follow acoustic test***

- **Protoqual sine sweeps to be run on both radiator panels**
- **Low level runs used to establish and prove notching**
- **Low level run repeated after protoqual run**





# Acoustic Test Configuration





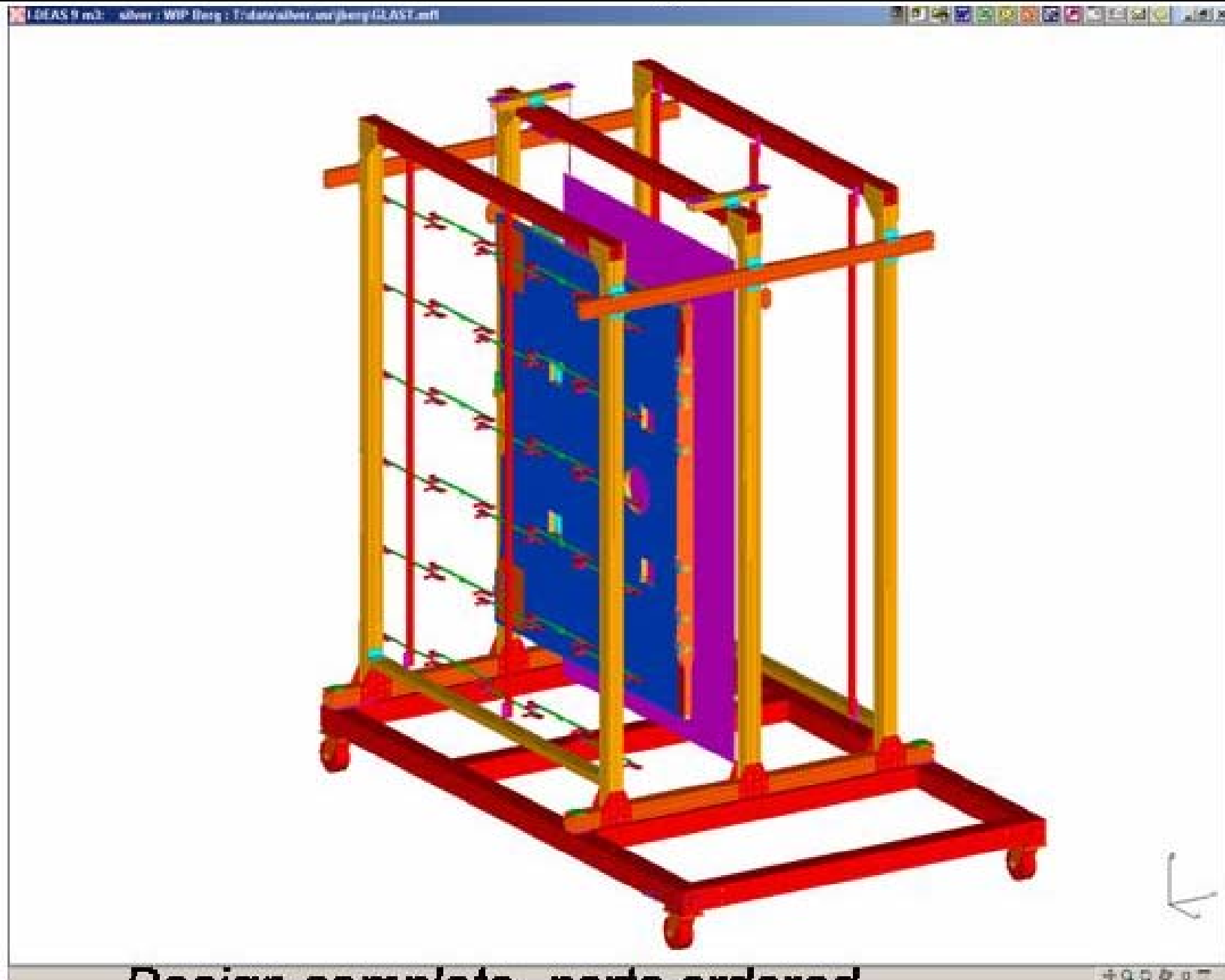
# GLAST Radiator Panel TV Testing

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- **Test Planning on-going for SEP III Chamber**
  - **Test plan has been completed**
- **GSE design completed**
  - **SLAC will provide rack for thermal control/power for flight heaters....has PDU emulator and flight thermal control software in flight processor emulator**
  - **LM will provide thermal simulators and MGSE and EGSE cabling to SLAC rack and facility control I/F**



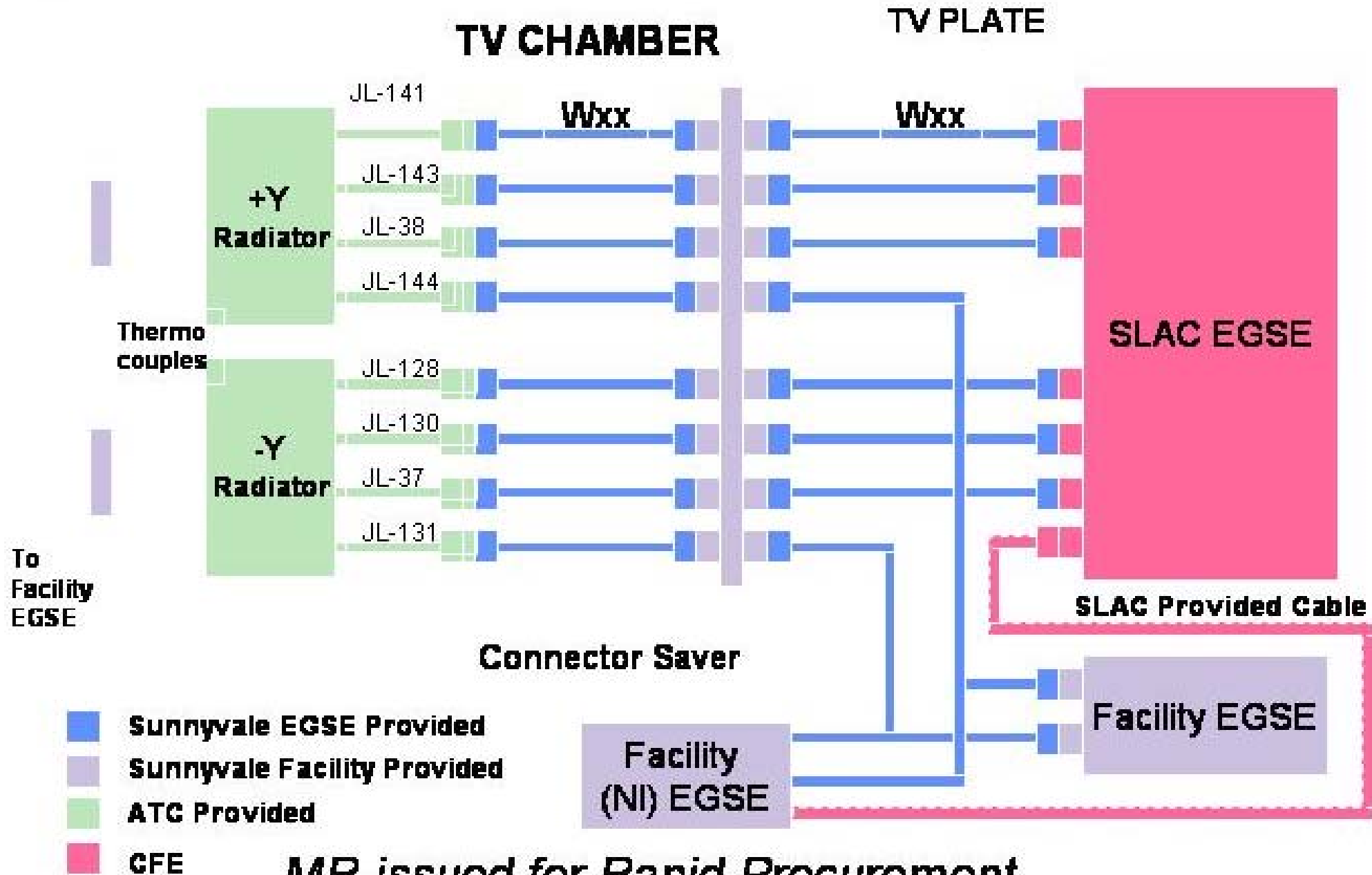
# Radiator TV Fixture Concept



*Design complete, parts ordered*



# GLAST Radiator Thermal Vacuum Configuration



MR issued for Rapid Procurement





# Flight Hardware Status – X-LAT

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- **X-LAT**
  - **Complete**
  - **Pre-ship review package being prepared**



## Flight Hardware DR Status – X-LAT

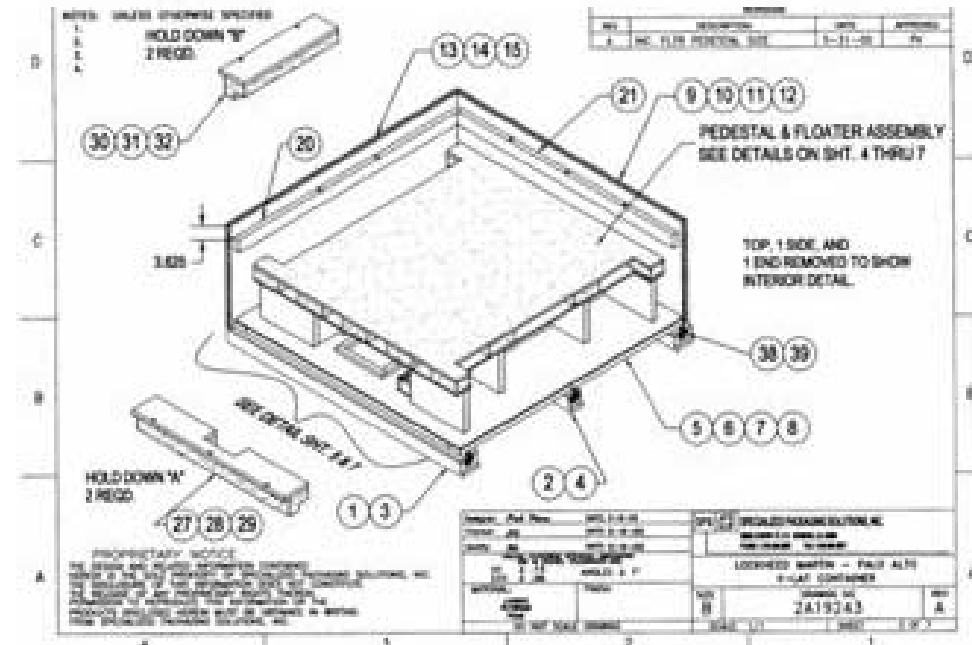
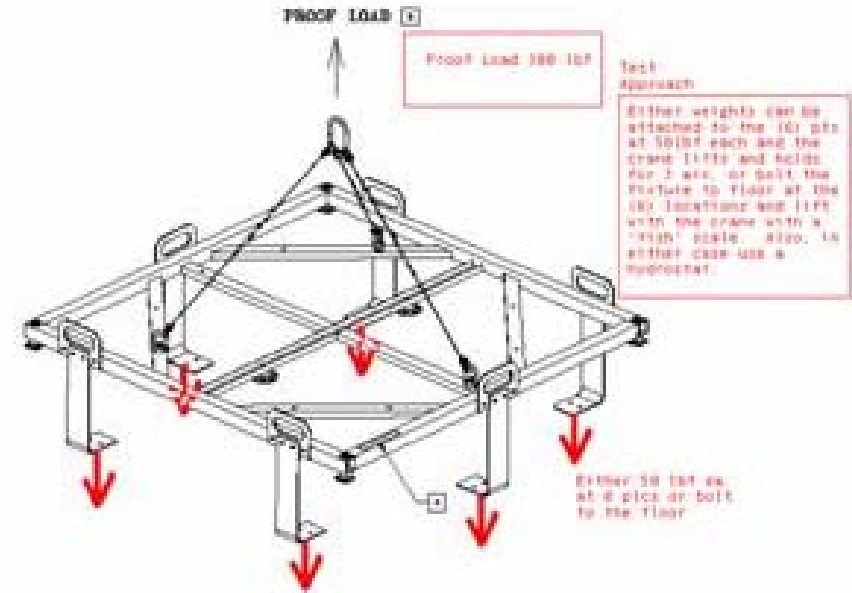
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- (200024815) Q-note closure on use of assembly fixture as inspection tool in work...customer program office agreement documented
- (200024529) Q-note on disbonds at ends of heat-pipe flanges... analysis completed (no impact), SLAC MRB held will close pending ultrasound results/delta MRB.
- (200025152) Discolored Electroless Nickel Plating...Reworked, in audit



# GSE being developed – X-LAT

- **Lift sling/strong back**
  - **Proof loading and delivery this week**
  
- **X-LAT shipping container**
  - **Container completed**







# GLAST X-LAT Thermal/Ultrasound Testing

- **X-Lat Test Planning**
  - Reduced X-Lat testing to thermal cycling for workmanship only
  - "Mission Success" IRR (4/21) recommended using ultra-sound and 12 temperature cycles (allows detection of "kissing bond" type failures)
- Temp Cycling testing completed
- Ultra sound NDI testing before and after temp cycling completed
  - No significant change seen
- Mass & Cg measured
- MRB closeout still needed





# GLAST Risk Assessment Summary

Risk	Impact	Type of Risk (T/S/C)	Likelihood	Consequence	Mitigation Action	Status/ECD
Use of "Search" chamber for thermal testing	Console "red tag" status may not be resolved in time to support test. Chamber configuration not ideal for test requirements.	T, S & C	high	failure to meet delivery date	Have requested use of the SEP III chamber	SEP III chamber scheduled, planning and GSE approach being updated for test in SEP III
Failure to get agreement on reducing X-Lat testing to thermal cycling for workmanship	A full TV test with more extensive GSE would be needed if agreement is not reached	T, S & C	medium	will lengthen TV test and increase test complexity	get customer and mission success Dk to proceed	"Mission Success" review 4/21/05 recommended ultrasound NDI. Customer ok received for ambient pressure temp cycling
Fit Instrumentation/water installation may drive schedule	could impact start of acoustic test	S&C	high	could force delay of rest of test program	have added more people resources; trying to work around EPDM issues	steady progress is being made



# Summary Schedule – X-LAT

ID	Task Name	Duration	Start	Finish	Qtr 4, 2004			Qtr 1, 2005			Qtr 2, 2005					
					Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun			
1	X-LAT Plate Fab	132 days	Fri 10/1/04	Mon 4/4/05	[Gantt bar from Oct 1 to Apr 4]											
2	Receive X-LAT Plate from APEX	86 days	Fri 10/1/04	Fri 1/28/05	[Gantt bar from Oct 1 to Jan 28]											
3	Bond Heat pipes	32 days	Mon 1/31/05	Tue 3/15/05	[Gantt bar from Jan 31 to Mar 15]											
4	Bond cooling tube	3 days	Wed 3/16/05	Fri 3/18/05	[Gantt bar from Mar 16 to Mar 18]											
5	Inspect, Close-out Paper	11 days	Mon 3/21/05	Mon 4/4/05	[Gantt bar from Mar 21 to Apr 4]											
6	X-LAT Plate Complete	0 days	Mon 4/4/05	Mon 4/4/05	[Point marker at Apr 4]											
7	X-LAT Thermal Cycling test	74 days?	Tue 3/15/05	Fri 6/24/05	[Gantt bar from Mar 15 to Jun 24]											
8	Thermographic Imaging proof test review	7 days?	Wed 4/13/05	Thu 4/21/05	[Gantt bar from Apr 13 to Apr 21]											
9	Preparation (Procedure development/review)	41 days	Tue 3/15/05	Tue 5/10/05	[Gantt bar from Mar 15 to May 10]											
10	Pretest Ultrasound (Sample & Fix X-LAT)	8 days?	Fri 5/13/05	Tue 5/24/05	[Gantt bar from May 13 to May 24]											
11	Test Readiness Review	0 days	Wed 5/25/05	Wed 5/25/05	[Point marker at May 25]											
12	Thermal Cycling Testing/Post Test Ultrasound	8 days	Wed 6/1/05	Fri 6/10/05	[Gantt bar from Jun 1 to Jun 10]											
13	X-LAT Test Report/paper closeout	10 days	Mon 6/13/05	Fri 6/24/05	[Gantt bar from Jun 13 to Jun 24]											
14	X-LAT Lift sling for -Z lift/stronback	54 days	Mon 4/18/05	Thu 6/30/05	[Gantt bar from Apr 18 to Jun 30]											
15	design	30 days	Mon 4/18/05	Sun 5/29/05	[Gantt bar from Apr 18 to May 29]											
16	build	24 days	Mon 5/30/05	Thu 6/30/05	[Gantt bar from May 30 to Jun 30]											
17	Shipping container	39 days	Mon 4/25/05	Thu 6/16/05	[Gantt bar from Apr 25 to Jun 16]											
18	Design	16 days	Mon 4/25/05	Mon 5/16/05	[Gantt bar from Apr 25 to May 16]											
19	Build	6 days	Thu 6/9/05	Thu 6/16/05	[Gantt bar from Jun 9 to Jun 16]											
20	X-LAT MRB (Disbonds, TBD)	0 days	Thu 6/30/05	Thu 6/30/05	[Point marker at Jun 30]											
21	Combined Cert/Pre ship review (TBD)	0 days	Wed 7/6/05	Wed 7/6/05	[Point marker at Jul 6]											
22	Deliver X-LAT Plate Assy & Existing Spare CCHP	0 days	Mon 7/11/05	Mon 7/11/05	[Point marker at Jul 11]											



# Summary Schedule - Radiators

ID	Task Name	Duration	Start	Finish	Qtr 1, 2005			Qtr 2, 2005			Qtr 3, 2005		
					Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
23	+Y Radiator	40 days	Thu 1/20/05	Wed 3/16/05	[Bar]								
24	Structure fab complete	40 days	Thu 1/20/05	Wed 3/16/05	[Bar]								
28	Build & Install Instrumentation & Verify (Htrs, Thermostats...)	55 days?	Tue 4/19/05	Mon 7/4/05				[Bar]					
29	parts kitting	25 days?	Tue 4/19/05	Mon 5/23/05				[Bar]					
30	install & cure	30 days?	Tue 5/24/05	Mon 7/4/05				[Bar]					
31	+Y radiator ready for acoustic/vib test	0 days	Tue 7/5/05	Tue 7/5/05							7/5		
32	-Y radiator	40 days	Wed 2/2/05	Tue 3/29/05	[Bar]								
33	Structure Fab Complete	40 days	Wed 2/2/05	Tue 3/29/05	[Bar]								
37	Build & Install Instrumentation & Verify	57 days?	Tue 4/19/05	Wed 7/6/05				[Bar]					
38	parts kitting	25 days?	Tue 4/19/05	Mon 5/23/05				[Bar]					
39	install & cure	32 days?	Tue 5/24/05	Wed 7/6/05				[Bar]					
40	-Y Radiator ready for acoustic/vib test	0 days	Thu 7/7/05	Thu 7/7/05							7/7		
41	Vibe/ Acoustic test	89 days?	Wed 3/16/05	Mon 7/18/05				[Bar]					
42	Vibe Interface Plate GSE	44 days?	Wed 3/16/05	Mon 5/16/05				[Bar]					
43	Plate design	23 days?	Wed 3/16/05	Fri 4/15/05				[Bar]					
44	Material acquisition	6 days?	Mon 4/11/05	Mon 4/18/05				[Bar]					
45	Plate build	20 days	Tue 4/19/05	Mon 5/16/05				[Bar]					
46	Acoustic test support fixture	34 days?	Fri 4/1/05	Wed 5/18/05				[Bar]					
47	fixture design	12 days?	Fri 4/1/05	Mon 4/18/05				[Bar]					
48	fixture build	22 days?	Tue 4/19/05	Wed 5/18/05				[Bar]					
49	Vibe/ Acoustic Test Plans/ Preps/ Ops	59 days	Wed 3/30/05	Mon 6/20/05				[Bar]					
50	Acoustic/sine vib Instr Install (accels/strain gages)	33 days?	Wed 5/11/05	Fri 6/24/05				[Bar]					
51	Radiator Two point lift sling (existing spreader, new brackets to	59 days	Fri 4/1/05	Wed 6/22/05				[Bar]					
54	Thermal isolator procurement (12, in receipting 6/14)	34 days	Tue 4/26/05	Tue 6/14/05				[Bar]					
55	Acoustic Test Readiness Review (delta TRR 6/23)	0 days	Tue 6/14/05	Tue 6/14/05							6/14		
56	Acoustic cell shaping	1 day?	Wed 6/22/05	Wed 6/22/05							6/22		
57	Acoustic Test	3 days	Thu 7/7/05	Mon 7/11/05							7/11		
58	Permission To Break Configuration Review	0 days	Mon 7/11/05	Mon 7/11/05							7/11		
59	Four point lift sling/frame (not deliverable)	53 days?	Tue 4/19/05	Thu 6/30/05				[Bar]					
60	design	9 days?	Tue 4/19/05	Fri 4/29/05				[Bar]					
61	build	21 days	Tue 6/2/05	Tue 6/30/05				[Bar]					
62	Sine Vib Test Readiness Review (delta TRR 6/23)	0 days	Tue 6/14/05	Tue 6/14/05							6/14		
63	Sine Vibration Testing	5 days	Tue 7/12/05	Mon 7/18/05							7/18		
64	Permission To Break Configuration Review	0 days	Mon 7/18/05	Mon 7/18/05							7/18		

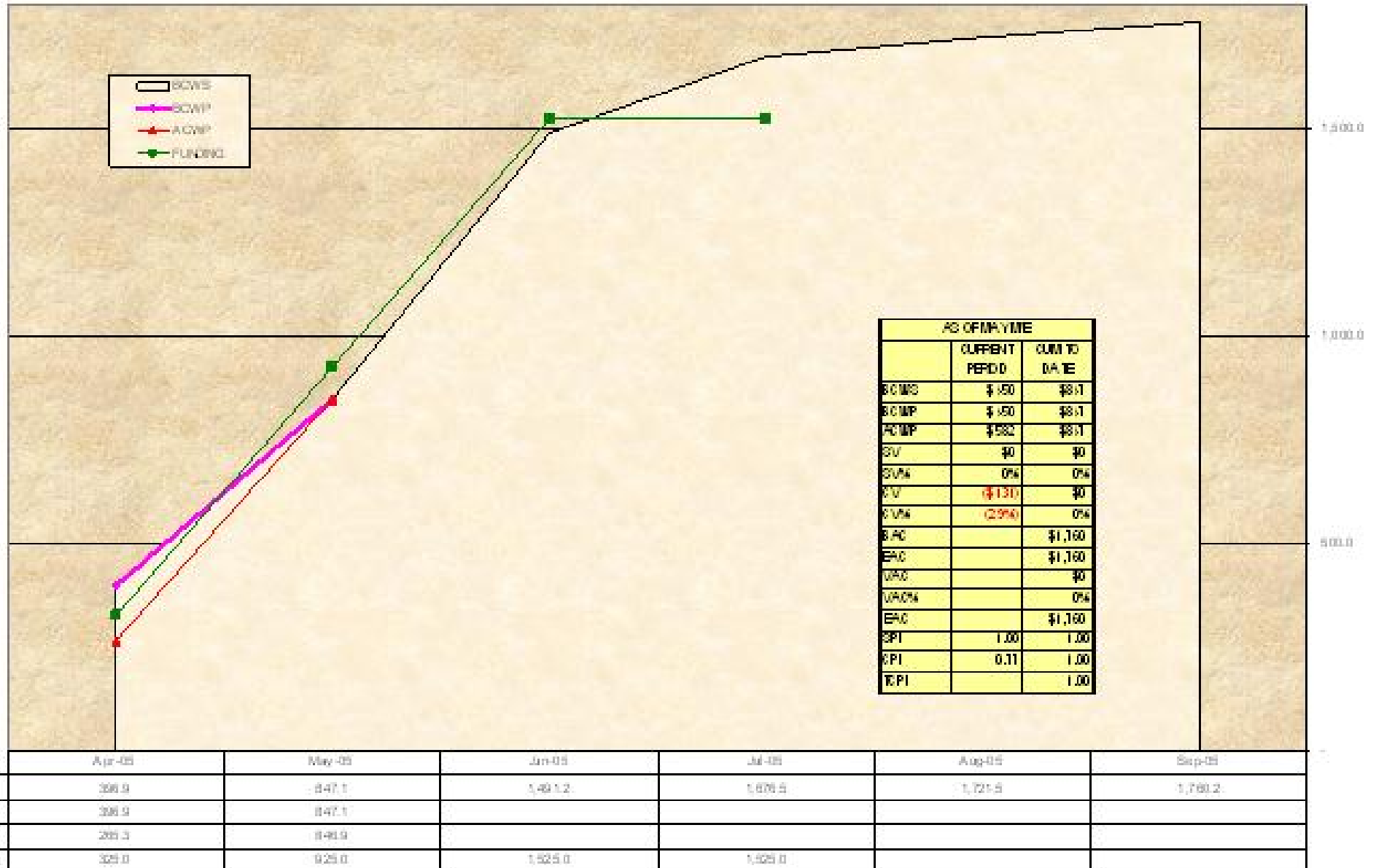


# Summary Schedule - Radiators (Cont)

ID	Task Name	Duration	Start	Finish	Qtr 2, 2005			Qtr 3, 2005			Qtr 4, 2005	
					Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
65	Thermal blanket procurement	59 days?	Mon 4/25/05	Thu 7/14/05	[Gantt bar]							
66	blanket design	15 days?	Mon 4/25/05	Fri 5/13/05	[Gantt bar]							
67	blanket build (2 sets)	44 days?	Mon 5/16/05	Thu 7/14/05	[Gantt bar]							
68	Install MLI/FOSR +/- Y radiators	5 days	Tue 7/19/05	Mon 7/25/05								
69	Radiator Thermal Vac/Thermal Balance test	102 days?	Fri 4/1/05	Mon 8/22/05	[Gantt bar]							
70	Test Planning	75 days?	Fri 4/1/05	Thu 7/14/05	[Gantt bar]							
71	Radiator SLAC GSE I/F Cabling	66 days?	Mon 4/11/05	Mon 7/11/05	[Gantt bar]							
72	Cabling Design	45 days?	Mon 4/11/05	Fri 6/10/05	[Gantt bar]							
73	Cabling build (MR placed 6/17/rapid procurement)	21 days?	Mon 6/13/05	Mon 7/11/05								
74	Feed thru plate design	8 days?	Mon 4/11/05	Wed 4/20/05	[Gantt bar]							
75	Feed thru plate build	18 days?	Thu 4/21/05	Mon 5/16/05	[Gantt bar]							
76	SLAC GSE I/F	5 days?	Tue 7/12/05	Mon 7/18/05								
77	Thermal Simulators/Mechanical GSE	51 days?	Fri 5/6/05	Fri 7/15/05	[Gantt bar]							
78	Design	30 days?	Fri 5/6/05	Thu 6/16/05	[Gantt bar]							
79	Build (MR ordered 6/24)	16 days	Fri 6/24/05	Fri 7/15/05								
80	Radiator T-Vac Preps at SEP III	5 days	Mon 7/18/05	Fri 7/22/05								
81	Install radiators & verify instrumentation hookup	2 days	Mon 7/25/05	Tue 7/26/05								
82	Radiator Thermal Vac Test Readiness Review	0 days	Tue 7/26/05	Tue 7/26/05								
83	Radiator T-VAC Testing	8 days	Thu 7/28/05	Mon 8/8/05								
84	Permission To Break Configuration Review	0 days	Mon 8/8/05	Mon 8/8/05								
85	T-VAC Write-up/ paper closeout	10 days	Tue 8/9/05	Mon 8/22/05								
86	Radiator shipping containers (temp on hold for spec clarification)	60 days	Wed 4/27/05	Tue 7/19/05	[Gantt bar]							
89	Combined Pre-ship/Cert Review	5 days	Mon 8/8/05	Fri 8/12/05								
90	Deliver Radiators	0 days	Mon 8/22/05	Mon 8/22/05								
91	Replacement Heatpipes (on hold until sine vib completion)	61 days?	Fri 4/1/05	Fri 6/24/05	[Gantt bar]							

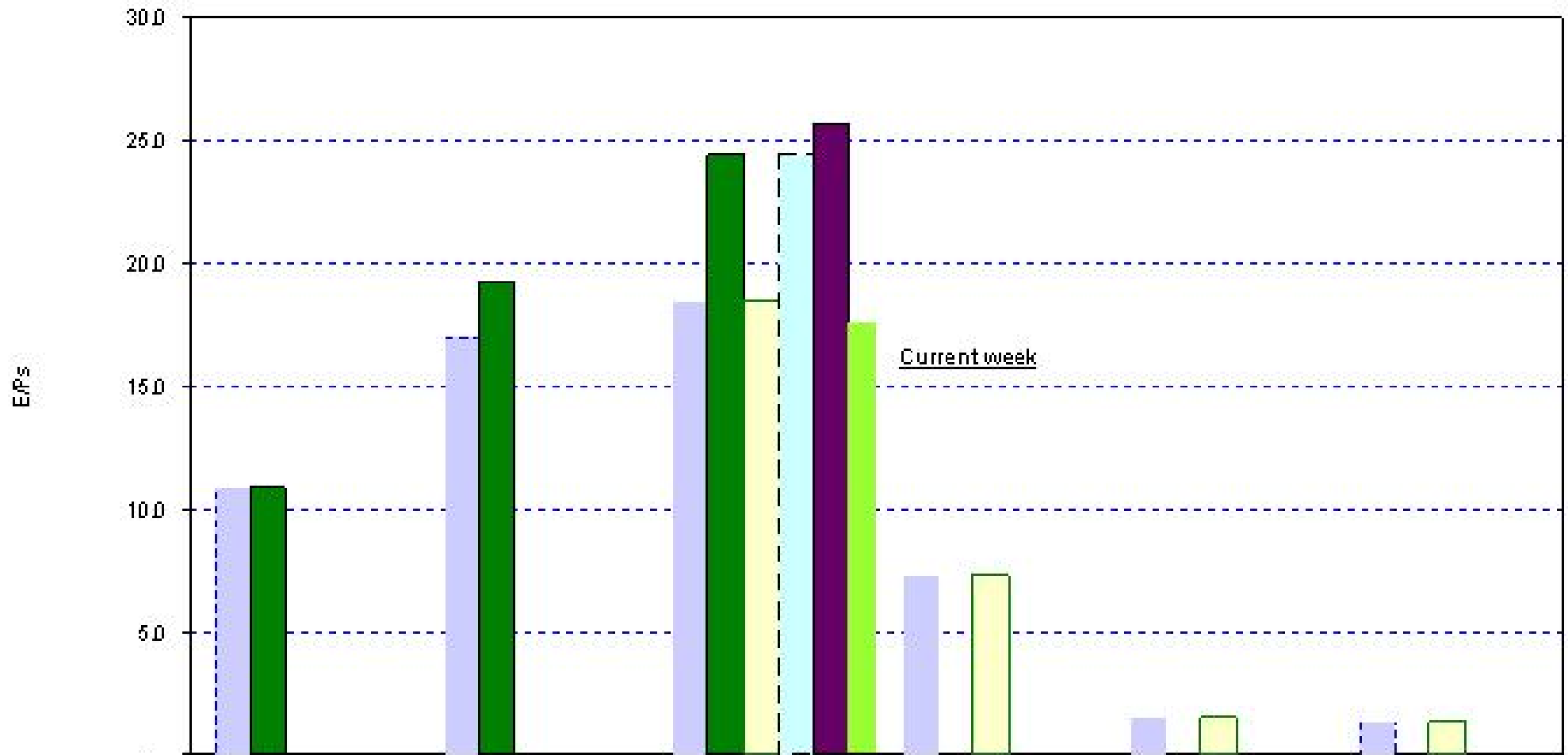


# GLAST Program Financials





# GLAST EP



	Apr-05	May-05	Jun-05	Jul-05	Aug-05	Sep-05
UM Budget EP	10.9	17.0	18.5	7.3	1.5	1.3
UM Actual EP	10.9	19.3	24.4			
UM ETC			18.5	7.3	1.5	1.3
UM MTD			24.4			
UM Current/Week			25.7			



## **Plan Forward-Financials**

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- **Executing per new LOE contract as of April 1 for radiator heater/instrumentation installation, GSE build and environmental testing**
  - **Contract through end FY 05**
  - **Staying within predicted spending profile so far through May...but trends due to Radiator flight instrumentation/hr I&C costs are a concern**
  - **People profile prediction updated to reflect schedule and material cost shifts....will continue to do that as GSE mtl \$ savings allow**





# Summary

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- **Radiator Instrumentation/Heater I&C still has the prestigious critical path spot!**
  - **But facility problems are a close second**
- **Still have shaker availability problem**
  - **Running acoustic test still best bet to minimize schedule hit**
  - **But TVAC completion slipped into first week of August**
- **X-LAT temperature cycling/ultrasound testing completed**
- **GSE now being designed and built almost in parallel.**
  - **Shaker I/F plate – ready**
  - **Radiator two/four point lift in-house builds**
  - **Acoustic test fixture - ready**
  - **Radiator TV test fixture design completed**
  - **TV EGSE cable design completed - MR issued**
  - **X-LAT container received, Radiator container orders on hold**