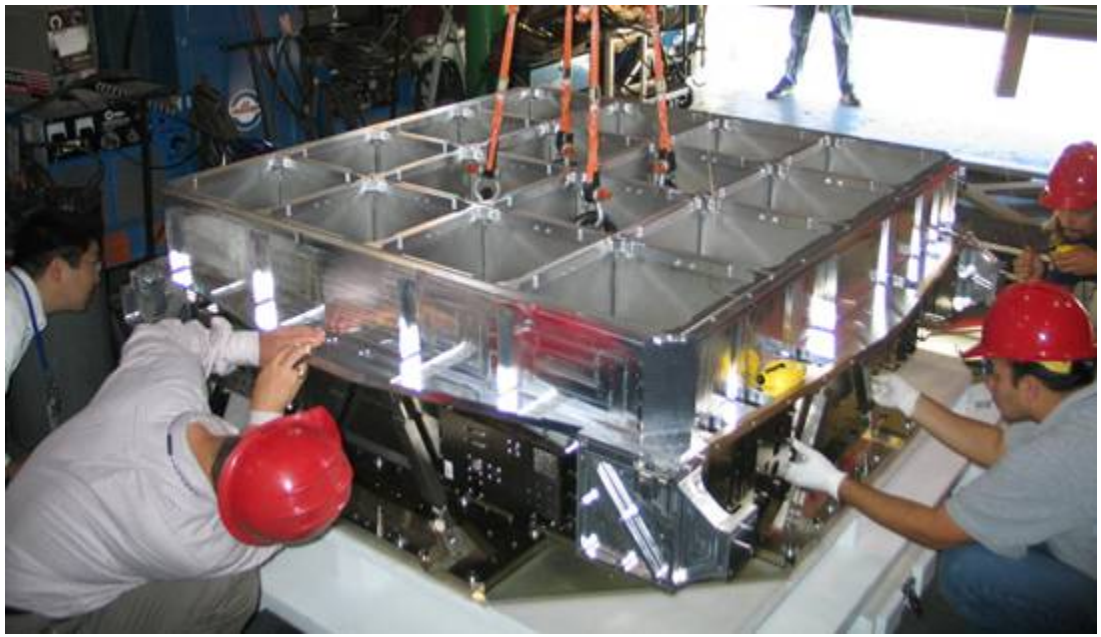
Mechanical Systems
Mechanical / Thermal Hardware
September 2005 Status

Marc Campell, Subsystem Manager

Grid Qual Static Load Test

- **Hardware**
  - **Grid Box #2 assembly is complete**
- **Pre-Test (SLAC activities)**
  - **Test Interface Plate (TIP) Assembly complete less strain gage application which will be done at NTS now**
  - **Used & returned Spectrum's Interface template**
  - **Shipped Grid Box Assy to NTS on 10/5**
  - **TRR held on 10/13**

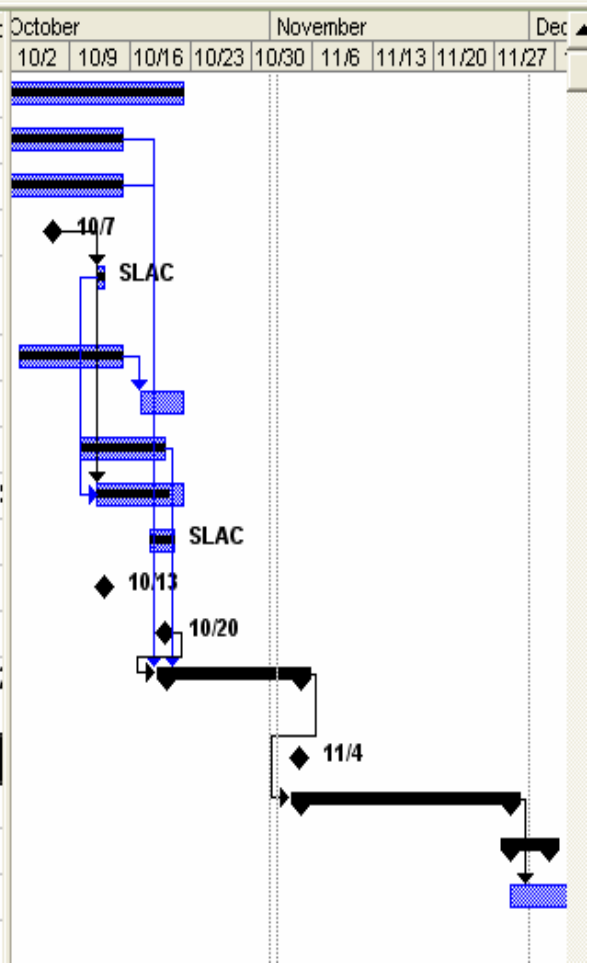


Grid Qual Static Load Test (cont)

- **Test (NTS activity)**
  - Received large baseplate
  - Checked out all of the load frame configurations
  - Erected tent over our test area
  - Started programming data acquisition channels
  - Setting up for proof test of the load frame for Load Case 1 (highest loads)
  - Installation of Grid & Flexure Strain Gages is 85% complete
  - Overtime has been authorized to maintain schedule

Grid Qual Static Load Test Schedule

	Task Name	Duration	Start	Finish	Prec
1	Fixture Fabrication	30 days	Mon 9/12/05	Fri 10/21/05	
2	Hydraulic Actuator Preparation	20 days	Mon 9/19/05	Fri 10/14/05	
3	Instrumentation Preparation	20 days	Mon 9/19/05	Fri 10/14/05	
4	Test Article Delivery	0 days	Fri 10/7/05	Fri 10/7/05	
5	Receiving inspection & start SG installation	1 day	Wed 10/12/05	Wed 10/12/05	4
6	Generate Test Procedure	10 days	Mon 10/3/05	Fri 10/14/05	
7	Approve/Update Test Procedure	5 days	Mon 10/17/05	Fri 10/21/05	6
8	B1 Building Test Area Preparation	8 days	Mon 10/10/05	Wed 10/19/05	
9	Strain Gauge Installation	8 days	Wed 10/12/05	Fri 10/21/05	4,5
10	Ship Grid Tilt Table to NTS	3 days	Tue 10/18/05	Thu 10/20/05	
11	TRR Via Telephone	0 days	Thu 10/13/05	Thu 10/13/05	
12	Test Fixture Delivery	0 days	Thu 10/20/05	Thu 10/20/05	
13	**Fixture/Actuator/Instrumentation Integration**	**11.25 days**	**Thu 10/20/05**	**Fri 11/4/05**	**12,**
29	Conduct delta TRR	0 days	Fri 11/4/05	Fri 11/4/05	28
30	**Test Conduct**	**14.5 day...**	**Fri 11/4/05**	**Mon 11/28/05**	**13**
66	**Shipping preps**	**4.25 days**	**Mon 11/28/05**	**Fri 12/2/05**	
76	Test Report	10 days	Mon 11/28/05	Mon 12/12/05	30



Drawing Release Plan

- 70 of 73 (96%) drawings released
  - 3 MLI drawings (in check)
- Known drawing revisions

Concerns

Lockheed Martin – open items

- **The following work is still being performed at LM at no cost to SLAC:**
- **A second interim paperwork sell was held to close out open paper except for the items below.**
  - **3rd & final sell is pending**
- **X-LAT plate lifting fixture has been reworked (welds repaired) and is in inspection. It will be proof loaded on Monday, inspected and shipped to SLAC on Wed. 11/2. (Complete)**
- **Radiator flight MLI blankets are complete. Paperwork is being closed and these will ship to SLAC on Wed. 11/2.**
- **Radiator 2 pt lift sling in proof test. ECD for ship to SLAC is also 11/2.**

Lockheed Martin – financial

- **LM has billed through July and only $185k remains on contract value for Aug. & Sept. activities including T/Vac testing**

Open Flight Design Issues

- **Radiator integration sequence**
  - **Coupon testing of repeated make & break of joint has been tested. Results were inconclusive due to test facility problems.**
  - **Test will be repeated at NTS**
  - **Disassembly facilitated by use of mold release agent**
- **Radiator vibration requirements**
  - **Sine vibration testing will not be performed at LM**
    - **Test options under investigation**

MECH Qualification Program

Qual Test	Status	ECD
Grid-Top Flange Heat Pipe bond process qual	Complete. Report released	Comp
Grid Box Assy Static Load test	Planning in work. Perform on Grid #2	Nov 05
X-LAT Plate Thermal Vac test	Complete less MRB on final results	Comp
Radiator Variable Conductance Heat Pipe new extrusion	Passed burst test, heat capacity test after charging	Comp
Radiator Acoustic	at LMMS	Comp
Radiator Thermal Vacuum	at LMMS	Comp
TCS-Radiator Thermal Balance	at LMMS	Comp
Radiator Sine Vibration	Test alternatives in work	
Radiator Heat Pipe Thermal Joint	Continue coupon tests at NTS	Dec 05

Radiator Sine Vibe Test Approach

Requirement

2. The primary objective of the high-level sine vibration test is to exercise the radiator interfaces to 1.25 x CLA.
The dynamic response of the radiator in its test configuration should be verified in the pretest analysis. If the provided sine vibration input spectrum does not produce adequate reaction forces, the vibration spectrum in the low frequency band should be increased to compensate.

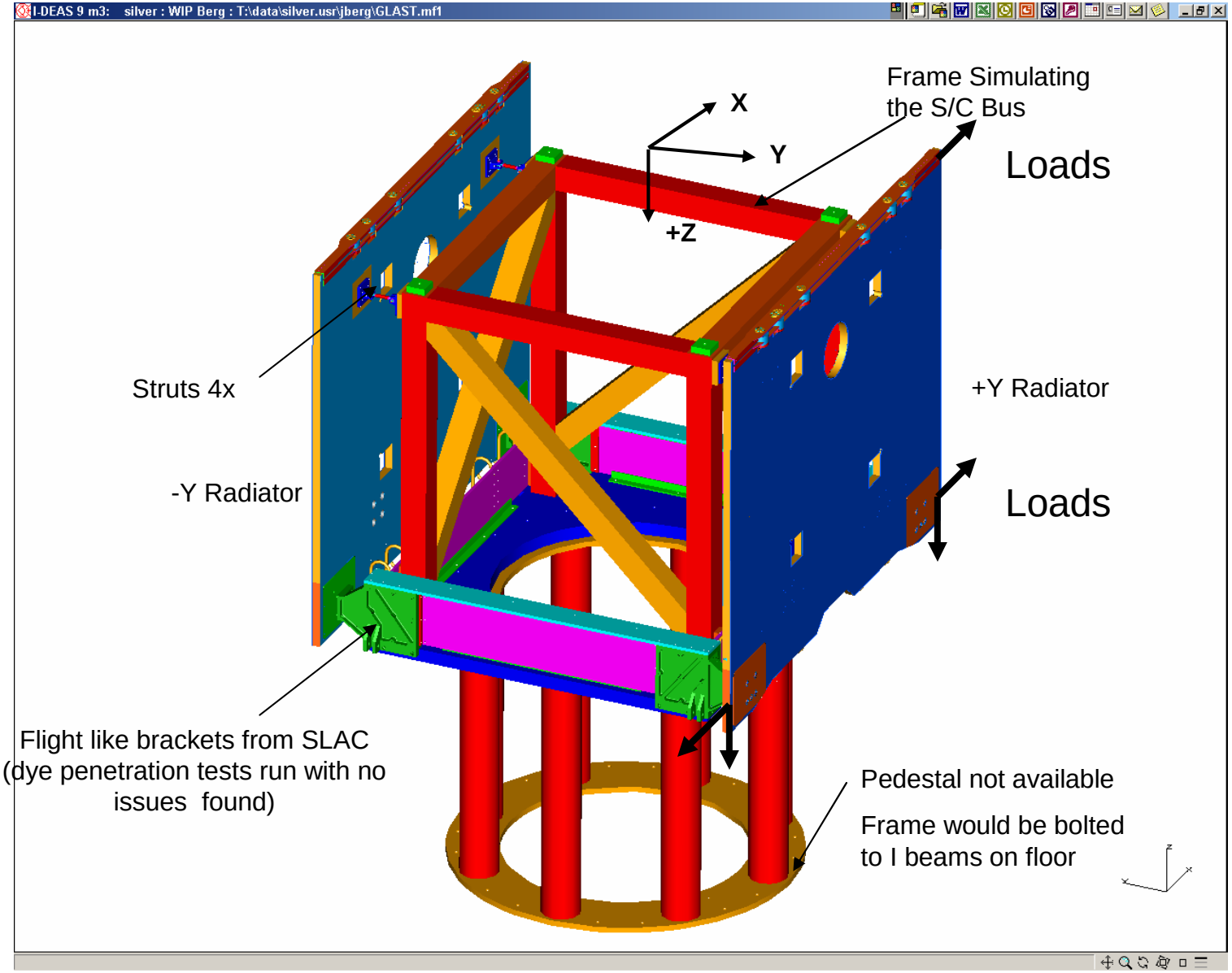
Approach

- **Analysis shows that the interface loads normal to the panel (Y-axis) were enveloped by the Acoustic test**
- **Acoustic test had a flight-like Radiator Mount Brackets**
- **Propose performing static load test to address the in-plane (X and Z axis) loading requirement**

Static Load Test Proposal

- Radiators would be mounted to flight like interfaces on the Acoustic test fixture
- Load fixtures would mount to handling inserts on the X sides of the panel
- Panel is sequentially loaded in +X, -X, +Z and –Z directions (or pull at –Z corner to produce shear load and moment at RMB interface) TBR
- X loads are approximately 200 lbs
- Z loads are approximately 200 lbs
- Handling insert coupons were tested in shear and B basis capability is 800 lbs TBR (just need to verify)

Static Load Test Test Configuration



Test Approach (Cont)

Requirement 1

1. **The Radiators shall be capable of full operational performance after exposure to the sinusoidal vibrations loads due to the launch environment shown in Table 11a. This is specified in the IRD requirement, which reiterates Goddard Space Flight Center (GSFC) policy that sine vibration testing is performed only up to 50 Hz. Notching of the test levels shown is allowed to avoid over-testing of the structures.**

Approach

- **Waiver would be required for this requirement**

Test Approach (Cont)

Requirement

3. **In order to address any vulnerability to the MECO high frequency (110 Hz – 120 Hz) event, the LAT and all subsystems will conduct a low-level sine sweep test to identify all resonant frequencies up to 200 Hz. This low-level sine sweep spectrum for the LAT and all subsystems is shown in Table 11b.**

Approach

- **Analyzing Acoustic test data including tap testing to determine if modes can be identified.**
  - **Preliminary check looks promising**
  - **Also need damping (Q) factor**
- **If modes were not identified then need to investigate test approach**
  - **Modify tap test?**
  - **Modal test?**
  - **Note Radiators are not installed during LAT level vibration testing**
- **Waiver required to explain how the data was arrived at if not by sine sweep?**

Next Steps

- Agree on test approach
  - Received comments back on chart package
  - Set up telecon to discuss open issues
- Arthur Scholz will detail out Static Load Test implementation
- Conduct TRR
- Process required waivers

Cost/Schedule Reports for 4.1.8 Mechanical Systems Presentation September 2005 Month End

Level 3 Milestone Count
Level 3 Milestone List
Milestone Variance Explanation

- **None**

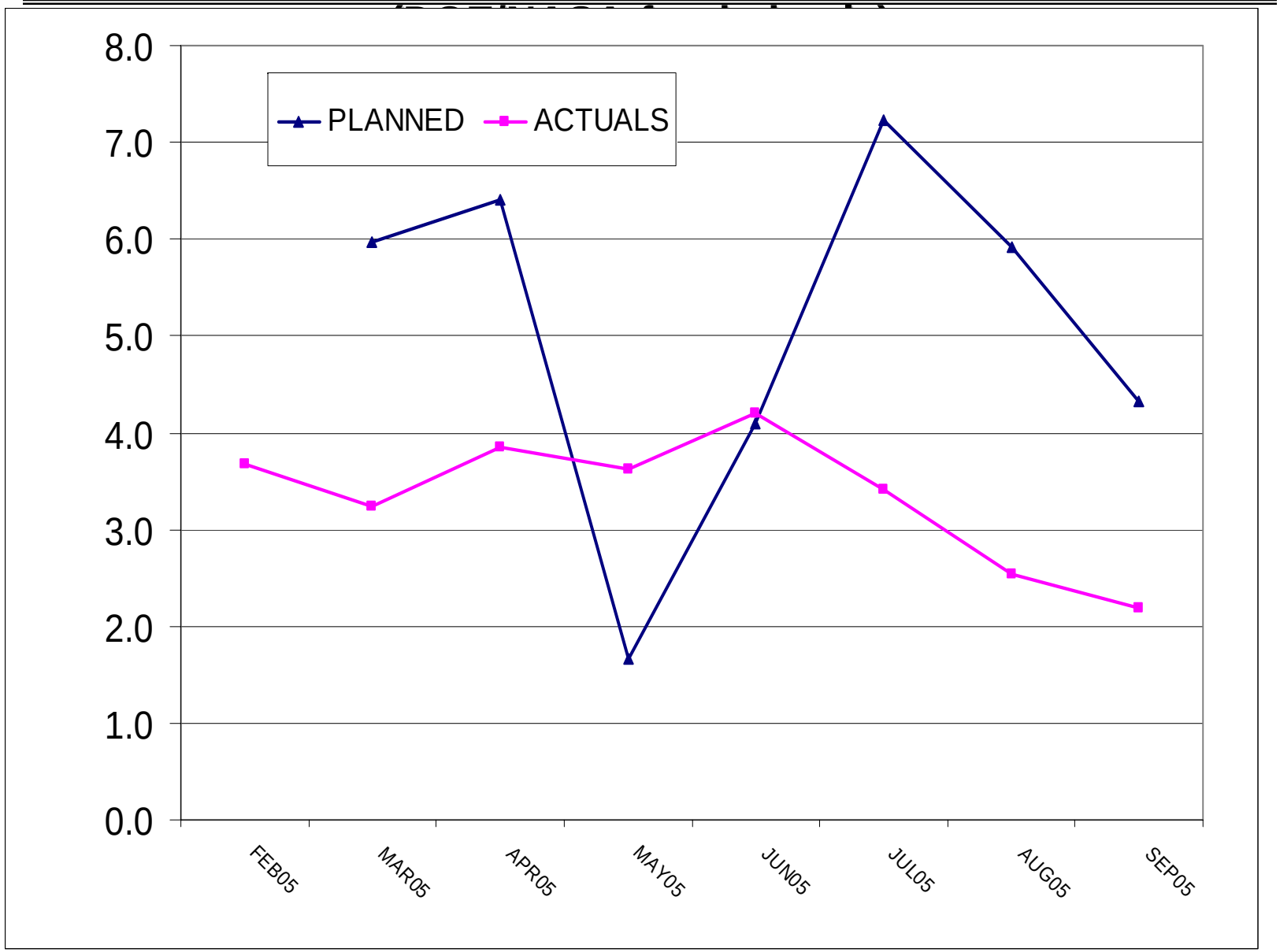
Cost Report

Reporting Category	Cost Incurred/Hours Worked				Estimated Cost/Hours to Complete			Estimated Final Cost/Hours		Unfilled Orders Outstanding
	During Month		Cum. to Date		Detail		Balance of Contract	Contractor Estimate	Contract Value	
	Actual	Planned	Actual	Planned	OCT05					
4.1.8 MECHANICAL SYSTEMS										
4.1.8.1 MANAGEMENT	563	77	4,969	3,871			-1,098	3,871	3,871	0
4.1.8.2 RELIABILITY & QUALITY ASSURANCE	0	0	399	393			-6	393	393	0
4.1.8.3 MECHANICAL SYSTEM DEVELOPMENT	0	0	1,088	1,088			0	1,088	1,088	0
4.1.8.4 THERMAL SYSTEMS DEVELOPMENT (LM)	0	0	1,043	1,043			0	1,043	1,043	0
4.1.8.5 THERMAL CONTROL SYSTEM (SLAC)	38	79	798	929			131	929	929	60
4.1.8.6 RADS, HEAT PIPES, THERM TEST, X-LAT (LM)	0	594	7,498	8,391			894	8,391	8,391	0
4.1.8.7 GRID	0	0	656	640			-16	640	640	0
4.1.8.8 FABRICATION, ASSEMBLY, AND TEST	15	3	669	947			278	947	947	16
4.1.8.9 LAT I&T SUPPORT	0	1	0	104			104	104	104	0
4.1.8.A MISSION I&T SUPPORT	0	0	0	0			0	0	0	0
CAPW[3]Totals:	615	755	17,119	17,406			287	17,406	17,406	76

Cost Variance Explanation

- **Why overrun/underrun?**
  - **LM has overrun their contract**
- **What will be done to correct?**
  - **Additional $540K funding approved**

FTE Report


8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
PLANNED
ACTUALS
FEB05
MAR05
APR05
MAY05
JUN05
JUL05
AUG05
SEP05

FTE Variance Explanation

- **Why overrun/underrun?**
  - **Underrun due to Grid Static Load Test and Heater Control Box fab being late**
- **What is the impact?**
  - **No LAT impact from SLT**
  - **Heater control boxes being tracked by ELEC**