EOS AM PROJECT STATUS

FOR

MODIS SCIENCE TEAM MEETING

5/1/96

C. J. SCOLESE
NASA/GSFC
CODE 421

OVERVIEW

OVERVIEW

- SIGNIFICANT PROGRESS HAS BEEN MADE IN THE LAST 6 MONTHS
  - FLIGHT HARDWARE IS BEING PRODUCED
    - — FIRST CERES INSTRUMENT DELIVERED AND INSTALLED ON TRMM
    - — PRIMARY STRUCTURE FABRICATED AND STATIC TESTING COMPLETED
    - — MANY SPACECRAFT COMPONENTS ARE DELIVERED
- SIGNIFICANT ISSUES HAVE BEEN RESOLVED
  - LAUNCH VEHICLE SINE VIBRATION REQUIREMENTS RESOLVED
  - ASTER TIR AND MOPITT COOLER VIBRATION RESOLVED
  - LAUNCH SITE CAPABILITIES SUPPORT EOS AM REQUIREMENTS
  - MODIS VIBRATION AND MIRROR INTERACTION RESOLVED
  - MODIS PARTS PROBLEMS LARGELY RESOLVED
- MANY INTERFACE CONCERNS RETIRED
  - COMPLETED INSTRUMENT EM SIS TESTING TO VERIFY DESIGN COMPATIBILITY
- COMPLETED IAR AND PMC FOR EOS AM-1
  - INVOLVED IN POP PROCESS AND NEXT IAR
- PURSUING ACCELERATION OF SPACECRAFT DELIVERY

STATUS

- INSTRUMENT DEVELOPMENT
  - ASTER AND CERES IN EXCELLENT SHAPE
  - MODIS IN GOOD SHAPE -- EMPHASIS ON IMPROVING SCHEDULE
  - MOPITT SCHEDULE REMAINS AGGRESSIVE AND SPACECRAFT LEVEL TESTING ISSUE
  - MISR HAS SERIOUS SCHEDULE AND TECHNICAL CHALLENGE
- SPACECRAFT
  - PROGRESSING WELL; CONCERN IS WITH EPC POWER CONVERTER
    - — I&T SCHEDULE TASKS ARE BEING COMPRESSED
  - MANY BOXES AND SUBSYSTEMS ARE BEING DELIVERED
  - SUBCONTRACTED ITEMS GENERALLY IN GOOD SHAPE
    - — CONCERN REMAINS WITH SOLAR ARRAY
  - SPACECRAFT ACTIVITIES FOCUSING ON I&T
- OPERATIONS
  - STRONG EMPHASIS ON DEFINING OPERATIONAL SCENARIOS
  - OPERATIONS LEAD FROM CODE 500 TO BE NAMED SOON

STATUS (cont'd)

- SCIENCE / SOFTWARE
  - GOOD PROGRESS BEING MADE ACROSS THE BOARD
  - MAIN CONCERN IS IMPACT OF FEDERATION
    - — MAKING PROGRESS WITH HQ
  - SENIOR NASA MANAGEMENT CONCERN REGARDING MODIS PROCESSING REQUIREMENTS
  - GENERATION OF STANDARD GRIDDED PRODUCTS
- LAUNCH VEHICLE/LAUNCH SITE
  - EOS AM-1 ASSIGNED AC-141 AS OUR VEHICLE
    - — STILL WORKING TO OBTAIN ATLAS PECULIAR LOADS
  - ASTROTECH CHOSEN AS PROCESSING FACILITY
    - — NOT IDEAL BUT WORKABLE

CONCERNS

- FEDERATION OF THE DIS
- ADEQUACY OF SUPPORT FOR MODIS BEYOND AM-1 AND PM-1
- DEFINITION OF MODIS FOR THE AM-2 AND LATER ERA
- RELATIONSHIP OF MODIS TO NOAA MISSION

SCHEDULES

EOS AM-1 SPACECRAFT SUMMARY STATUS

Statused: 3/29/96

Legend

Potential Impact to Contract:

- "Red" — > 11 days Negative slack to critical path
- "Yellow" — 1 to 10 days of negative slack to critical path
- "Green" — Positive Slack (on/ahead of schedule)

Potential Impact to I&T:

- "Red" — > 11 days Negative slack to critical path (< 79 days slack remain)
- "Yellow" — 1 to 10 days of negative slack to critical path (79-89 days slack remain)
- "Green" — Positive Slack (on/ahead of schedule)

Contractual

I&T Need

Science Algorithm

	1995 DEC	1996 JAN	1996 FEB	1996 MAR
INSTRUMENTS				
MODIS	(AEM Parts and Board Assy)		(Aft Optics Assy; SRCA Options)	(OBC Parts Proc; SDSM Assy; AOA)
ASTER	(TIR Scanner Delivery challenging)	(11/15 Instrument Delivery)		
CERES				
MOPITT	(Extended Calibration)	(Extended Calibration)	(Electronics Parts Delivery)	(Electronics Parts Delivery)
MISR				(System Electronics)
SPACECRAFT				
SPACECRAFT				
GROUND SUPPORT EQUIPMENT				
LAUNCH VEHICLE				
LAUNCH SITE				
GROUND SYSTEMS				

rl3/29/96

March 29, 1996

EOS AM-1 REVIEWS/MILESTONES (Calendar Year)

ACTIVITIES	1995 JUL	AUG	SEP	OCT	NOV	DEC	1996 JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
POWER ETM	▼ 7/7/95																	
MOPITT INSTRUMENT CDR	▼ 7/12/95																	
DAS XMITTER ETM		▼ 8/18/95																
MAGNETIC TORQUE ROD			▼ 9/15/95															
SUN SENSOR ASSEMBLY				▼ 10/13/95														
TAP TO STATIC LOAD TEST				▼ 11/1/95														
COMM,C&DH EM STRUCT				▼ 11/1/95														
EARTH SENSOR ASSEMBLY				▼ 11/9/95														
PWR EM STE					▼ 11/17/95													
DAS X-BAND ANTENNA ETM					▼ 11/29/95													
WORKHORSE HEX BATT					▼ 11/30/95													
KINEMATIC MOUNTS					▼ 12/1/95													
BDU FOR INSTRUMENT ETM						▼ 1/5/96												
DAS UPCONVERTER ETM						▼ 1/16/96												
S/C CONTROL COMPUTER						▼ 1/30/96												
DAS MODULATOR ETM							▼ 2/14/96											
KSA MODULATOR ETM							▼ 3/1/96											
COMM EM HARNESS										▽ 4/9/96								
SENSOR EM SHELL										▽ 4/12/96								
(S) LIFE TEST SAD ETM										▽ 4/15/96								
S/C CHECK-OUT STATION										▽ 4/17/96								
TAM (GFE)										▽ 4/17/96								
RWA EM HARNESS										▽ 4/19.96								
PWR EM HARNESS										▽ 4/22/96								
RWA's 1-4										▽ 4/22/96								
WORKHORSE PEM BATT										▽ 4/24/96								
CPHTS KINEMATIC MOUNTS										▽ 4/24/96								

TIME NOW

rls 4/9/96

EOS AM-1 REVIEWS/MILESTONES (Calendar Year)

ACTIVITIES	1995 JUL AUG SEP	1995 OCT NOV DEC	1996 JAN FEB MAR	1996 APR MAY JUN	1996 JUL AUG SEP	1996 OCT NOV DEC
CTIU ETM				∇ 4/25/96		
ACS II TO CPHTS				∇ 4/25/96		
POWER EM STRUCT				∇ 4/26/96		
GENERIC STE				∇ 4/28/96		
SENSOR EM HARNESS				∇ 4/29/96		
SOLAR ARRAY DRIVE ETM				∇ 4/30/96		
ATTITUDE CONTROL ELECT.				∇ 5/8/96 (On Hold)		
PROPULSION GSE				∇ 5/14/96		
S-BAND OMNI I/F UNIT				∇ 5/14/96		
PMEA				∇ 5/16/96		
RWA EM STRUCT				∇ 5/16/96		
INERTIAL REFERENCE UNIT				∇ 5/16/96		
STAR TRACKER				∇ 5/20/96		
DAS PANEL STRUCT				∇ 5/23/96		
DAS PANEL HARNESS				∇ 6/7/96		
REC EM STRUCT				∇ 6/10/96		
S/C CORE HARNESS				∇ 6/13/96		
S-BAND OMNI ANTENNA				∇ 6/14/96		
PRIMARY STRUCTURE				∇ 6/17/96		
BATTERY POWER CONDIT.					∇ 7/10/96	
SCIENCE FORMATTING EQUIP					∇ 7/10/96	
S-BAND XPONDER					∇ 7/15/96	
MASTER OSCILLATOR					∇ 7/19/96	
CTIU					∇ 7/23/96	
POWER SWITCHING UNIT					∇ 7/31/96	

TIME NOW

rls 4/9/96

March 29, 1996

EOS AM-1 REVIEWS/MILESTONES (Calendar Year)

ACTIVITIES	1995 JUL	AUG	SEP	OCT	NOV	DEC	1996 JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
DAS XMITTER														▽ 8/6/96				
ARRAY DRIVE ELECTRONICS														▽ 8/6/96				
PYRO RELAY ASSY															▽ 8/16/96			
LSE PDR															▽ 8/20/96			
DAS UPCONVERTER															▽ 8/22/96			
POWER DISTRIB. UNIT															▽ 8/28/96			
SOLID STATE RECORDER ETM															▽ 9/1/96			
HIGH GAIN ANTENNA															▽ 9/17/96			
DAS MOD															▽ 9/23/96			
DAS X-BAND ANTENNA																▽ 10/10/96		
SEQUENTIAL SHUNT UNIT																▽ 10/10/96		
LSE CDR																	▽ 10/20/96	
HIGH GAIN ANTENNA BOOM																		▽ 11/15/96

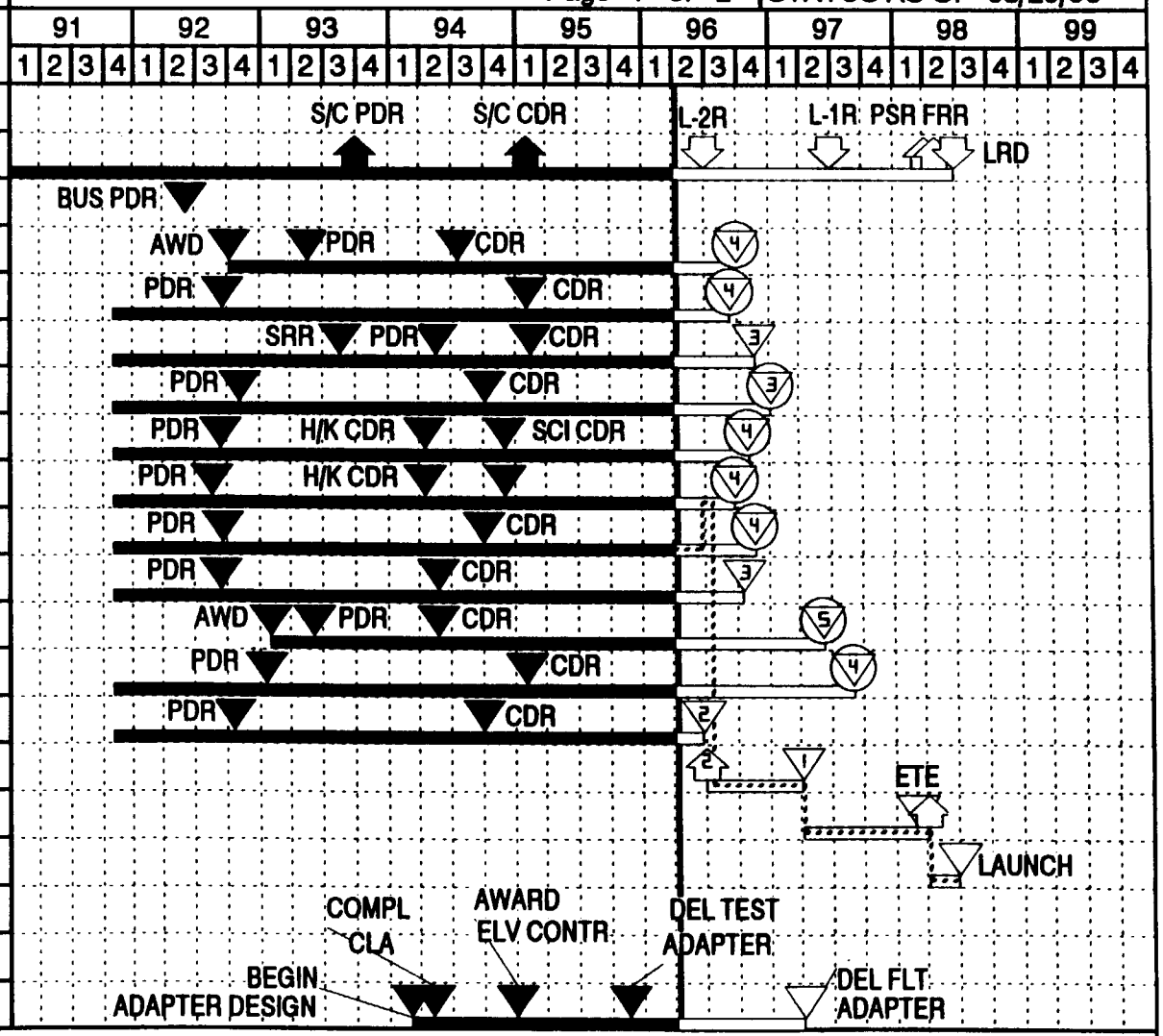
TIME NOW

rls 1/31/96

GODDARD SPACE FLIGHT CENTER
APPROVAL V. WEYERS
ACCOMP. C. SCOLESE

MASTER SCHEDULE
EOS AM-1 SPACECRAFT

ORIG. APPVL. 08/30/93
LAST CHANGE 03/29/96
STATUS AS OF 03/29/96



NOTE:

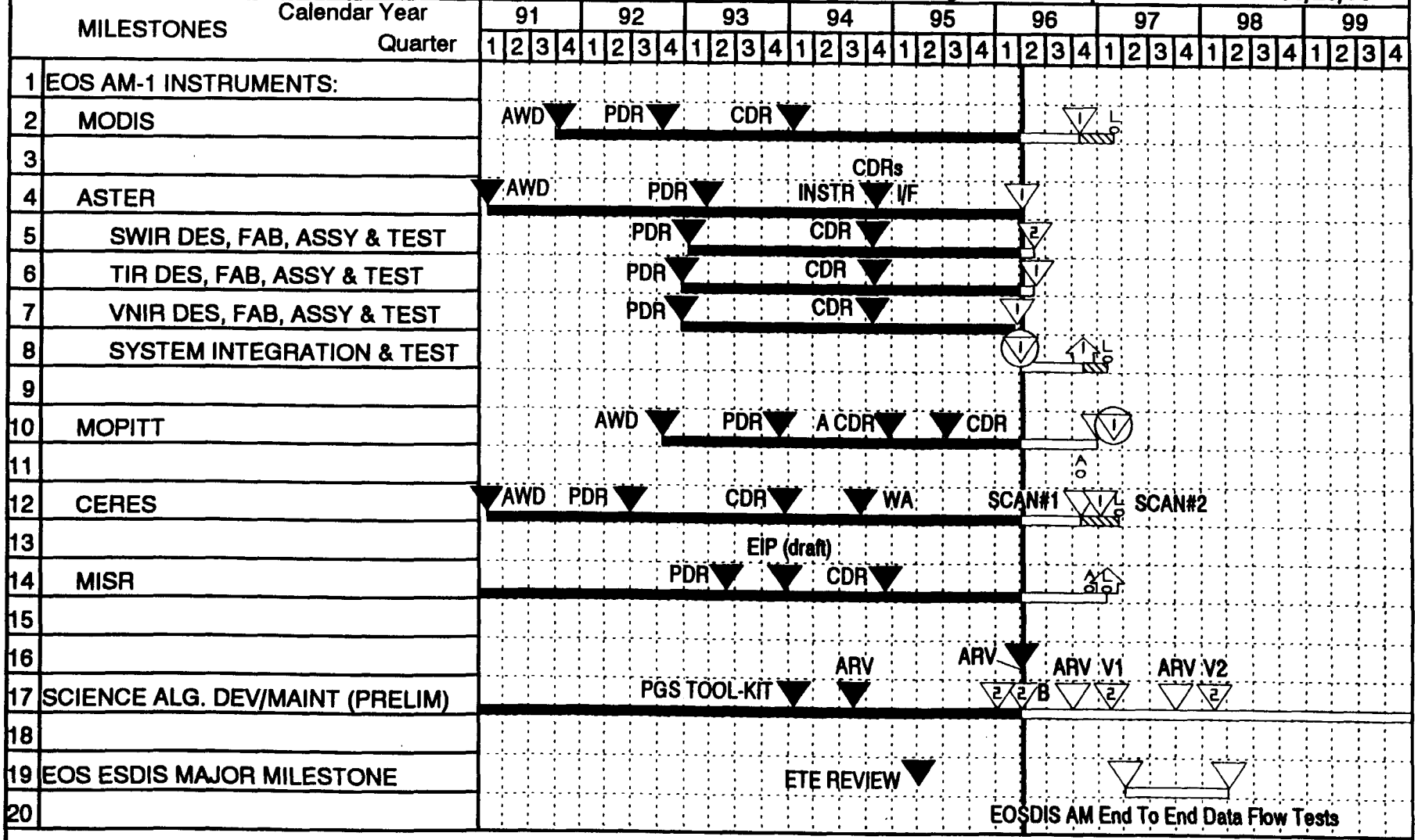
Critical Path changed from the Launch Vehicle (successfully delivered the Test Adapter) to the Electrical Power Subsystem (PDU & EPC).

Legend: ▽ - Supporting ⇩ - HQTR Controlled L - Latest Comp. Date ⊘ - Changed Rebaseline Date 11/30/93
Slack ---------- Critical Path P -Program Master Milestones A - Mgt. Assessed Comp. Date

GODDARD SPACE FLIGHT CENTER
APPROVAL V. WEYERS
ACCOMP. C. SCOLESE

MASTER SCHEDULE
EOS AM-1 SPACECRAFT

ORIG. APPVL. 08/30/93
LAST CHANGE 03/29/96
STATUS AS OF 03/29/96



NOTE:

ARV - Algorithm Quarterly Review

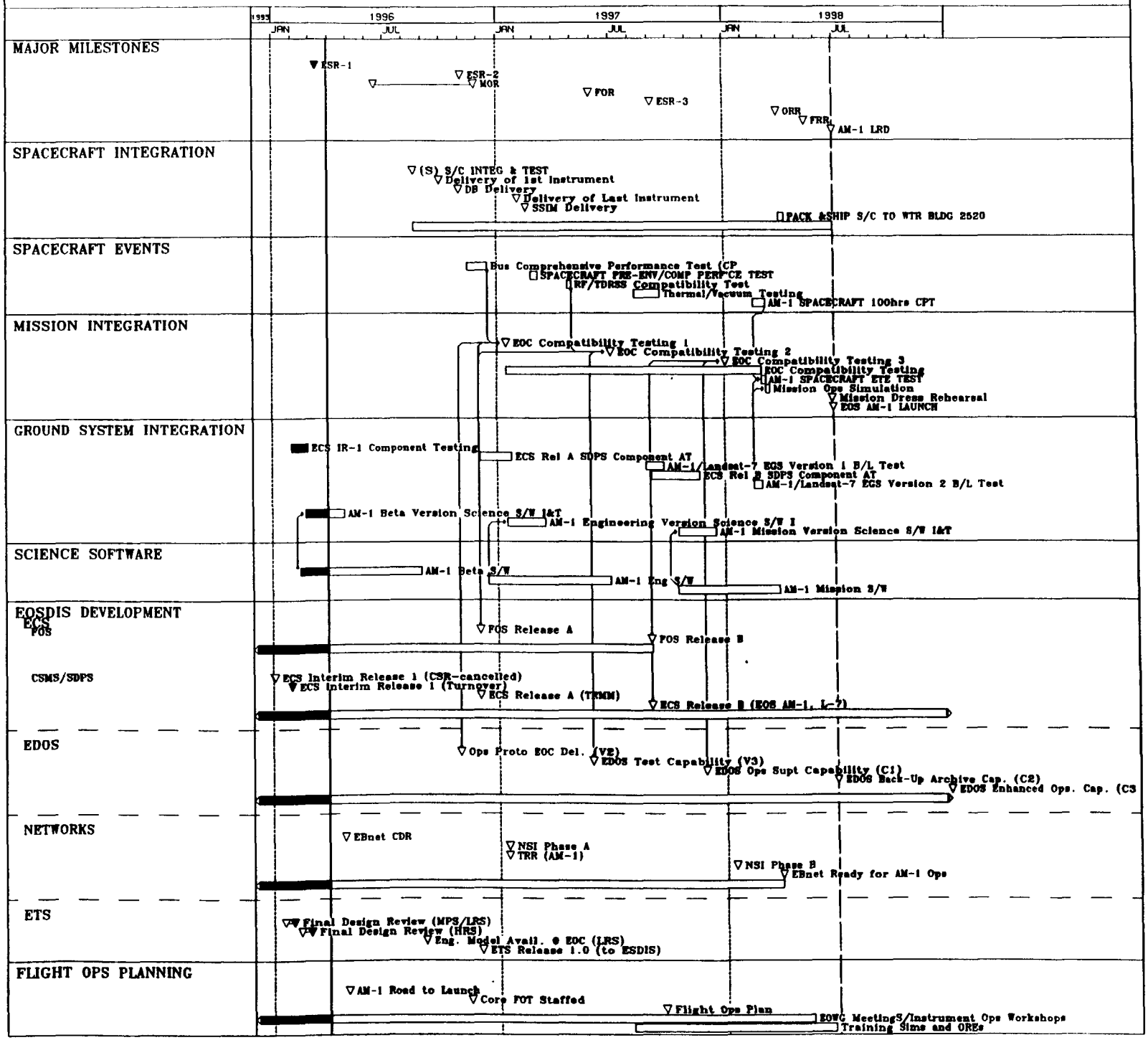
Legend: ▽ - Supporting ⇩ - HQTR Controlled L - Latest Comp. Date ⊘ - Changed Rebaseline Date: 11/30/93
Slack ..... Critical Path ⇧ -Program Master Milestones ^ - Mgt. Assessed Comp. Date

911002MMLS

GODDARD SPACE FLIGHT CENTER
CODE 505
ESDIS PROJECT

EOS AM-1 MISSION INTEGRATION SCHEDULE

ORIG. APPVL. 02/17/95
LAST CHANGE 04/01/96
STATUS AS OF 03/31/96



EOS AM SPACECRAFT WEIGHT SUMMARY

DESCRIPTION	ALLOCATION (POUNDS)	ESTIMATE (POUNDS)	BUS/INST. CONTINGENCY (POUNDS)
INSTRUMENTS:			
ASTER	992.3	915.3	77.0
CERES	198.5	208.5	-10.0
MISR	346.2	330.6	15.6
MODIS	604.2	493.0	111.2
MOPITT	425.6	409.3	16.3
INSTRUMENT TOTALS	2566.8	2356.7	210.1
SPACECRAFT BUS:			
STRUCTURE & MECHANISM	3435.0	3247.6	187.4
THERMAL	425.0	397.7	27.3
ELEC. ACCOMMODATION	650.0	634.1	15.9
GN & C	385.0	344.5	40.5
POWER	1340.0	1319.3	20.7
C&DH	815.0	752.0	63.0
COMMUNICATIONS	450.0	407.3	42.7
PROPULSION	130.0	121.5	8.5
SPACECRAFT BUS TOTALS	7630.0	7224.0	406.0
DRY SPACECRAFT TOTALS:	10196.8	9580.7	616.1
PLA	350.0		
LAUNCH VEHICLE (stays with L/V after separation)		165.0	
SPACECRAFT (stays with S/C after separation)		54.0	
PROPELLANT	570.0	530.0	
TOTAL	11116.8	10329.7	
LV LIFT	11450.0	11450.0	
MARGIN	333.2	1120.3	

EOS AM POWER SUMMARY

DESCRIPTION	ONE-ORBIT ALLOCATION (watts)	ONE-ORBIT ESTIMATE (watts)	BUS/INST. CONTINGENCY (watts)
INSTRUMENTS:			
ASTER	525.0	430.0	95.0
CERES	110.0	110.0	0
MISR	80.0	75.0	5.0
MODIS	225.0	127.0	98.0
MOPITT	265.0	248.0	17.0
INSTRUMENT TOTALS	1205.0	990.0	215.0
SPACECRAFT BUS:			
STRUCTURE & MECHANISM	0	0	0
THERMAL	130.0	87.2	42.8
ELEC. ACCOMMODATION	3.0	0.9	2.1
GN & C	200.0	193.9	6.1
POWER	160.0	181.7	-21.7
C&DH	415.0	397.3	17.7
COMMUNICATIONS	385.0	326.6	58.4
PROPULSION	2.0	0.5	1.5
SPACECRAFT BUS TOTALS	1295.0	1188.1	106.9
SPACECRAFT TOTALS	2500.0	2178.1	321.9
CAPABILITY	2530.0	2530.0	
MARGIN	30.0	351.9	

TOP TEN ISSUES

TOP TEN ISSUES

PSR #	ISSUE (DATE LISTED)	ACTIONEE	DUE DATE	STATUS AS OF: 4/22/96	CLOSURE PLAN
1.	TRW solar array cell delamination - 35 build lots (~7000 cells) exhibited 0% delaminations. 17,500 cells in question - 11 build 2 lots (~3000 cells) exhibited 2-5% delamination - 9 build 2 lots (~2000 cells) exhibited >5% delamination - 20 build 2 lots not tested - 16 build 2 lots not delivered	TRW/MMAS R. Ho, D. Keys & J. Mannion	Option Selection Meeting - 4/18/96	• Q-board #1 module B intermittent traced to cell / interconnects. • Q-board #2 proceeding with build 1 cells. • Tecstar (ASEC) cell delivery to TRW stands at 37,580, 8,820 cells remain to be delivered. • 5,680 flight cells (30 submodules) completed backside sub-module processing with a 6.3% rejectable crack rate. • Contract signed to include cell delamination fix with cost sharing. - S/A delivery 3/1/97 • Negotiations underway to improve replacement cell delivery dates. • Alternative array options reviewed at GSFC on 3/13/96, downselect scheduled for 4/18/96. • Tiger team effort completed, performing screening of suspect cells. • Tecstar turned-on to provide 6,400 cells by 10/96. Acceleration options being examined. Availability of first build 3 cells by mid-May.	• Establish alternatives using TRW array assuming all build 2 cells are bad. - Closed • Utilize build 3 cells after Tecstar provides corrective measures. • Begin 5,400 cell replacement - 2/21/96. - Closed • Develop screening method (completed) and retest build 2 to determine if acceptable. - Closed • Segregate on solar array if acceptable. - Closed 4/18/96 • Evaluate silicon cells. - Closed 4/18/96 • Evaluate alternate arrays. Close 3/1/96 (closed) - No acceptable (cost, schedule, and technical) solution identified. - Initiate Build 4 cell production.

TOP TEN ISSUES (cont'd)

PSR #	ISSUE (DATE LISTED)	ACTIONEE	DUE DATE	STATUS AS OF: 4/22/96	CLOSURE PLAN
2.	MISR System Electronics (4/15/96) - Basic problem is differences between the digital electronics FPGA program simulations and the in-circuit timing performance. - Several 1750A data interface and chip set configurational idiosyncrasies.	T. Anderson		• JPL has formed a tiger team (3 members) from Division 34. • All FPGA Designs reviewed to assess scope of problem and order of attack. • MISR will continue to develop the EM electronics functionality to provide a rudimentary capability to substitute for the flight design during PFM integration. • MISR is conducting dedicated on-site field trips to Honeywell's facility to diagnose and resolve MISR 1750A computer high rate data interfacing problems. • Tiger team has noticed that much of the FPGA subprogrammings are common among the individual FPGAs and hence repairs are transferable among FPGAs. • MISR is initially focusing on key Master Time I/F and camera head support electronics FPGAs to guage scope of recovery effort. • Initial cuts at master recovery schedules are being generated and are being put on-line for remote access and review.	• Form dedicated tiger team - Completed. • Conduct initial assessment of FPGA designs to determine scope of rework - Complete (5 - 6 month effort). • Develop master plan and schedule - In Process (Due 4/24/96).

TOP TEN ISSUES (cont'd)

PSR #	ISSUE (DATE LISTED)	ACTIONEE	DUE DATE	STATUS AS OF: 4/22/96	CLOSURE PLAN
3.	MOPITT Schedule Performance (2/9/96)	J. Gervin & T. Anderson	Interim Milestone - Optics delivered to Cincinnati Electronics - 4/30/96	• FM delivery to LMAS in February 1997 following calibration. • Critical path is through detector cold optics at Cincinnati Electronics. • Have encountered a Harris parts delivery problem due to miscommunication by parts distributor. Alternate sources being located. • Held Quarterly Review on 2/27/96 and raised concern over revised MOPITT schedule. • Challenged CSA to rework schedule to deliver on time and with some schedule reserve.	• Have requested more schedule detail. - Completed • Will review schedule at Quarterly. - Completed • GSFC has identified sources for 17 of 19 Harris parts. - Still working to identify alternate sources for remaining parts. - Delivery dates from Harris for remaining parts have been incorporated into reworked schedule. • CSA presented Reworked Schedule to Project on 4/19/96. • Reevaluate after delivery of DOO to Cincinnati Electronics (4/26/96).
4.	EPC Schedule Problems (2/9/96)	D. Keys		• AFM to deliver 6 flight boards by 2/1/96 not met. - Five EPC's delivered (CTIU #1, PDU #1 and ACE #1 & #2, BDU). - Failed Vishay Resistor escaped inspection. Repaired. • Improved handling and inspection of Chip Resistors now in place, concern with rework handling under investigation.. • 22 EPCs in manufacturing or test (out of 52). BDU/HCE EPCs required ECN to meet stability rqmts now in rework. • Concern exists over LMAS ability to reduce EPC rework backlog in Mfg.	• Using transformers pre-QCI; data not expected until mid-5/96. • Substituting magnesium covers damaged in vendor fire with aluminum for first set. • Investigating supplementing staff on-site. • Tiger team formed to work EPC issues and improve schedule.

TOP TEN ISSUES (cont'd)

PSR #	ISSUE (DATE LISTED)	ACTIONEE	DUE DATE	STATUS AS OF: 4/22/96	CLOSURE PLAN
5.	I & T Schedule (2/9/96)	R. Ho	New schedule 4/15/96. Monitor progress until 9/30/96.	• Flight components delivery slips are pushing out I&T activities. • Assessing schedule work arounds and increased test efficiency. • Evaluating reducing EMI testing and thermal cycling for second units. • New I&T schedule established. • Accelerating delivery of critical components.	• Reviewing acceleration of component builds, in-house and subcontracts. • Scrubbing module I&T flow to determine work-arounds to contain impacts. • Ensure critical milestone are met. • 2 equipment module I&T completion by 9/30/96.
6.	LMMS VF Closure (2/9/96)	R. Ho	Assess after forward pricing rates proposed - 4/30/96	• LMMS submitted consolidation cost / savings proposal to DPRO • LMMS negotiating a cost containment plan with DPRO. • Current projection indicates minimal rate impacts to the AM Program.	• Track impact of new rates and closures. • Analyze long-term trends on hours.
7.	MODIS Schedule Contingency Eroding (2/9/96)	K. Anderson & D. Weber	New schedule by mid-April	• Schedule presently shows delivery to LMAS in December 1996. Leaves very little schedule margin to LMAS need date.	• Will reevaluate test program to see if schedule can be compressed, aim to reduce program by 2 months.

TOP TEN ISSUES (cont'd)

PSR #	ISSUE (DATE LISTED)	ACTIONEE	DUE DATE	STATUS AS OF: 4/22/96	CLOSURE PLAN
8.	Readiness of Flight OPS Team for S/C Operations (3/14/96)	MOM, F. Bordi, and E. Chang	5/15/96	• Draft "Roadmap-to-Launch" plan reviewed with ESDIS on 3/1/96. • On 3/14/96 reviewed plan with LMAS and LORAL.	• Complete plan by 4/30/96. • Obtain concurrence by Chris Scolese and Dale Harris by 5/15/96.
9.	Sine Vib-Spacecraft Level • LaRC insisting on sine vibration testing between 50 - 100 Hz	T. Venator	Next Mtg - 4/3/96	• GSFC position paper presented at 4/3 meeting. • Revised EM equipment g-levels provided to LaRC.	• Resolution should be by next EOS-AM Executive Council. • Closed • LaRC and GSFC independent analysis validated EOS program. LaRC revising analysis results summary to reflect this.

TOP TEN ISSUES (cont'd)

PSR #	ISSUE (DATE LISTED)	ACTIONEE	DUE DATE	STATUS AS OF: 4/22/96	CLOSURE PLAN
10.	MODIS Instrument GSE test and analysis software schedule risk (3/14/96)	K. Anderson	5/1/96	• Most CDRLs received and responded to. Many comments noted. • TAC documents not yet submitted. Due at end of March. • Significant amount of work required to qualify software. • Have prioritized documentation required for SWAR.	• 3 GSFC personnel supporting SBRS to aid incorporating / resolving comments. • Will accept submittal of SECRs to resolve comments and not require complete document rewrites at this time to save turn-around time (approx. 4 weeks). • Comments on test procedures provided informally as generated to expedite turn-around time. • SBRS believes they are on track for May 1, 1996 GSE SWAR.

SUMMARY

SUMMARY

- SIGNIFICANT PROGRESS IS BEING MADE
  - STRONG DEDICATED WORKFORCE IS HALLMARK OF THE EOS AM-1 TEAM
  - MAINTAINING TECHNICAL FOCUS
  - DEDICATED TO DELIVERING A QUALITY MISSION
- MANY CHALLENGES REMAIN
  - SCHEDULES ARE ERODING AND MUST BE RECOVERED
  - CONSIDERABLE CHALLENGES REMAIN FOR MISR AND THE SOLAR ARRAY
  - IMPACTS OF DOWNSIZING, CONSOLIDATIONS, AND FEDERAL BUDGET UNCERTAINTIES ARE AFFECTING US ALL
    - — STILL NO BUDGET FOR FY96
    - — NASA AND INDUSTRY PERSONNEL REDUCTIONS AND FACILITY CLOSURES ARE DEMORALIZING THE WORK FORCE
    - — PROGRAMMATIC PROSPECTS FOR FY97 APPEAR BLEAK
- CONCENTRATION OVER THE NEXT 18 MONTHS
  - IMPROVE SCHEDULE AND COST PERFORMANCE
  - REMAIN FOCUSED ON TASKS WE CAN CONTROL
  - COMPROMISES MUST BE MADE
  - LAUNCH ACCELERATION WILL BE PURSUED