

SEP Integration and Test

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SEP Integration and Test Flow

- Four instruments tested separately to the extent possible
 - LET at Caltech/JPL
 - HET at GSFC
 - SIT at UMd/GSFC, includes acoustics and vibration
 - SEPT at Kiel, includes acoustics, vibration, and thermal vacuum
- SEP Central integrated & tested at Caltech
 - Low Voltage Power Supply from UCB
 - Detector bias supply from Space Instruments
 - Analog/post-reg board from Space Instruments
 - Logic board from Caltech
 - Mechanical parts from GSFC
- SEP Central simulator will be provided to GSFC to aide in HET & SIT testing
- ETU systems will be integrated & tested first at Caltech
- SEP Central/IDPU interface test at UCB and/or Caltech
- Integrate into SEP flight system at Caltech
- Test SEP at Caltech
- Accelerator test of LET, HET, and SEP Central
- Vibration, acoustics, and thermal vac at JPL for LET/HET/SEP Central
- Thermal vac for SIT at JPL
- EMI/EMC for all of SEP at UCB

End-to-End Test of LET & HET at a Heavy Ion Accelerator

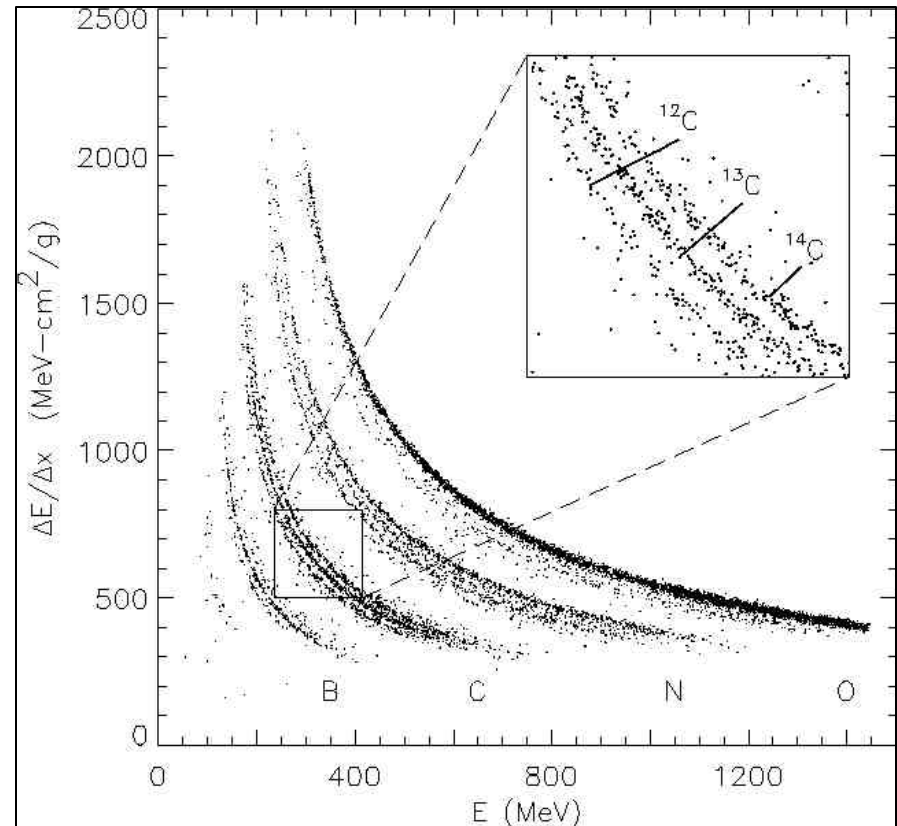
Equipment: LET, HET, SEP Central, GSE
Location: MSU/NSCL or LBL 88" Cyclotron
Beams: H, He, O, Si, Ar, Ni, etc. (and range of fragments)

Energies: ~2 to ~100 MeV/nuc

Intensities: ~1 to ~10⁵/s

Objectives:

- End-to-end functional test
- Verify species/energy algorithms
- Verify element, isotope resolution
- Verify event priority and formatting
- Check for unexpected anomalies



LET Verification Matrix

			Verification Matrix for STEREO/IMPACT/SEP/LET																		Revision Date: 11/08/02			
																					Revision Number: 5			
Hardware Description			Tests																					
Level of Assembly	Item		Noise & Brkdown	Thermal vacuum	Alphas &/or particle accelerator	Elect. test, rm. Temp	Elect. Test, hot	Elect. Test, cold	Vibration, Sinusoidal	Vibration, Random	Shock	Acoustics	Pressure change	Voltage margins	Thermal cycle	Thermal balance	Life Test	EMC/EMI	Magnetics	Radiation	Leak	Bakeout	Contamination	Comments
C	Detectors, PT		X	X	X	X	X	X		X		X			X								X	Acoustics in BB with windows
C	Detectors, F		X	X	X	X	X	X		X					X									
C	Hybrids, PT					X	X	X												X				
C	Hybrids, F					X	X	X									X				X		X	Also standard class H tests
C	LET detector/MISC board, EM					X	X	X							X									
C	LET detector/MISC board, F					X																X	X	
C	Connectors, F																						X	
C	Windows, BB									X		X			X									Include L1 detectors for vib & acoustics
I	Instrument, F1			H	X	X	X	X	H	H	A	X	A	X		X	X	H	H			X	X	Protoflight levels for vib; full EMC at suite
I	Instrument, F2			H	X	X	X	X	H	H	A	X	A	X			X	H	H			X	X	Acceptance levels for vib; workmanship for EMC
Legend:																								
	Level of Assembly		Unit	Type										X =	Test required									
														A =	Analysis									
	C = Component		BB =	Breadboard										H =	test at a higher level of assembly									
	I = Instrument		EM =	Engineering Model																				
			PT =	Prototype																				
			PF =	Protoflight																				
			F =	Flight																				
			F1 =	Flight unit #1																				
			F2 =	Flight unit #2																				

HET Verification Matrix

				Verification Matrix for STEREO/IMPACT/SEP/HET																				Revision Date: 11/12/02	
																							Revision Number: 3		
Hardware Description				Tests																					
Level of Assembly	Item																						Comments		
		Noise & Bkdown	Thermal vacuum	Alphas &/or Accelerator	Elect. test, rm. Temp	Elect. Test, hot	Elect. Test, cold	Vibration, Sinusoidal	Vibration, Random	Shock	Acoustics	Pressure change	Voltage margins	Thermal cycle	Thermal balance	Life Test	EMC/EMI	Magnetics	Radiation	Leak	Bakeout	Contamination			
		X	X	X	X	X	X		X		X			X								X		Vibration at manufacturer	
		X	X	X	X	X	X		X				X											Vibration at manufacturer	
					X	X	X												X						
					X	X	X						X			X				X		X		Also standard class H tests	
					X	X	X						X												
					X	X	X						X							X	X				
																	X	X				X			
		I	Instrument F1		H	X	X	X	X	H	H	A		A	X		X	X	H	H				X	X
I	Instrument, F2		H	X	X	X	X	H	H	A		A	X			X	H	H			X	X	Acceptance Levels		
Legend:																									
	Level of Assembly	Unit Type			X = Test required																				
	C = Component	BB = Breadboard			A = Analysis																				
	I = Instrument	EM = Engineering Model			H = test at a higher level of assembly																				
		PT = Prototype																							
		F = Flight																							
		F1 = Flight unit #1																							
		F2 = Flight unit #2																							

SIT Verification Matrix

Verification Matrix for STEREO/IMPACT/SEP/SIT

Revision Date: 2002/11/8

Revision Number: 2

Hardware Description			Tests																			Comments
Level of Assembly	Item	Vacuum	Alphas	Elect. test, rm. Temp	Bench Calibration	Elect. Test, hot	Elect. Test, cold	Vibration, Sinusoidal	Vibration, Random	Self Shock	Acoustics	Thermal Vacuum	Voltage margins	Thermal cycle	Thermal balance	Life Test	EMC/EMI	Magnetics	Beam Calibration	Bakeout	Contamination	
C	Detectors, F		X									X										
C	Foils PT										X											
C	Telescope PF,F	X	X																		X	
C	Energy board, EM			X		X	X						X									X
C	Energy board, F			X																		X
C	TOF Board, EM			X		X	X						X									X
C	TOF Board, F			X																		X
C	HVPS EM			X		X	X						X									
C	HVPS F			X																	X	
I	Instrument W/O Telescope																			X		
I	Instrument, PF	X	X	X	X	X	X	X	X	X		X	X	X	X	X	H	X	X	X	X	Protoflight levels
I	Instrument, F	X	X	X	X	X	X	X	X	X		X	X	X		X	H	X	X	X	X	Acceptance levels

Legend:

Level of Assembly

Unit Type

X = Test required

A = Analysis

H = at a higher level

C = Component

BB Breadboard

EM Engineering Model

PT Prototype

PF Protoflight

F = Flight

I = Instrument

Verification Matrix for STEREO/IMPACT/SEPT

Revision Number 2

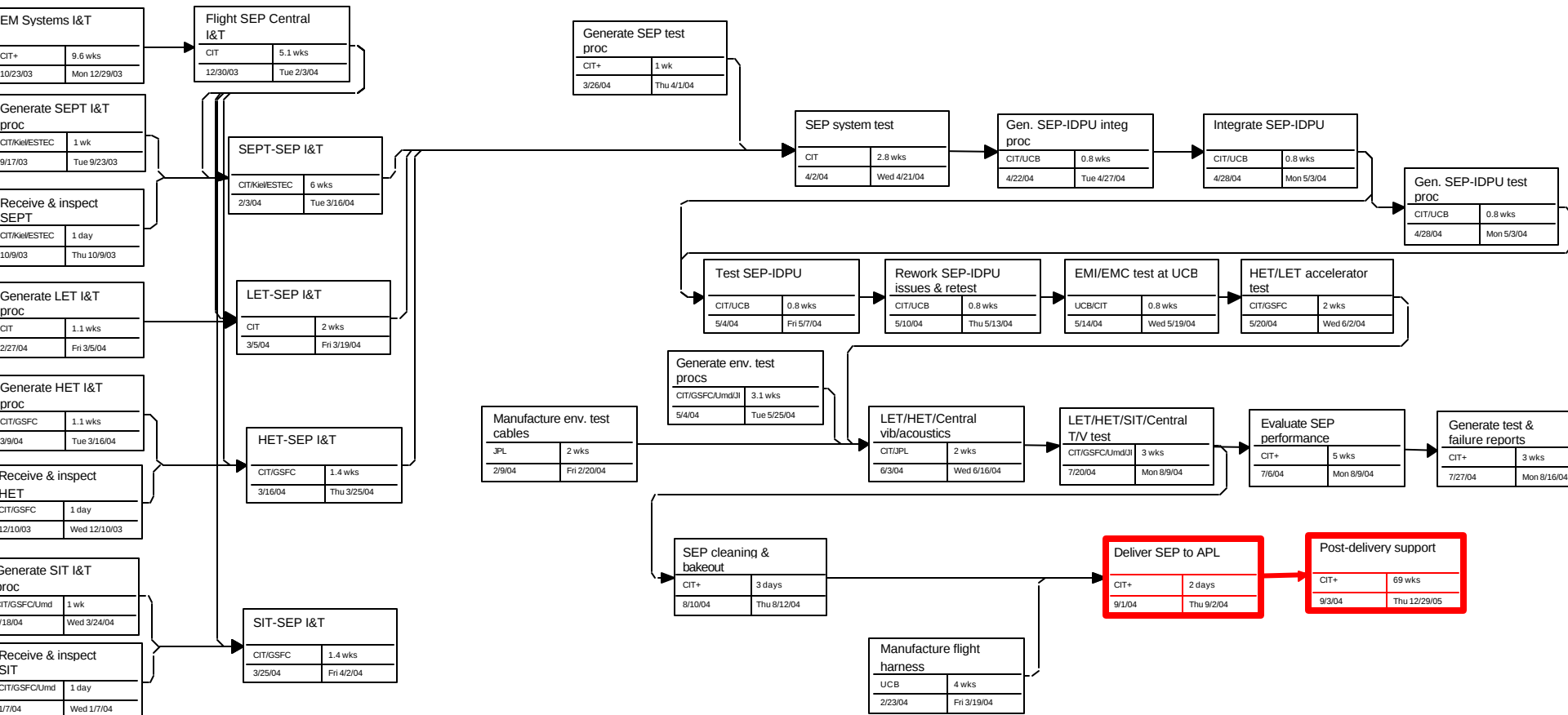
Revision Date 2002-11-7

Legend:
A=Analysis
X=Test
H=Test at a higher level

SEP Central Verification Matrix

				Verification Matrix for STEREO/IMPACT/SEP/SEP Central																Revision Date: 11/08/02	
																				Revision Number: 3	
Hardware Description				Tests																	
																</					

SEP Integration and Test Flow Chart



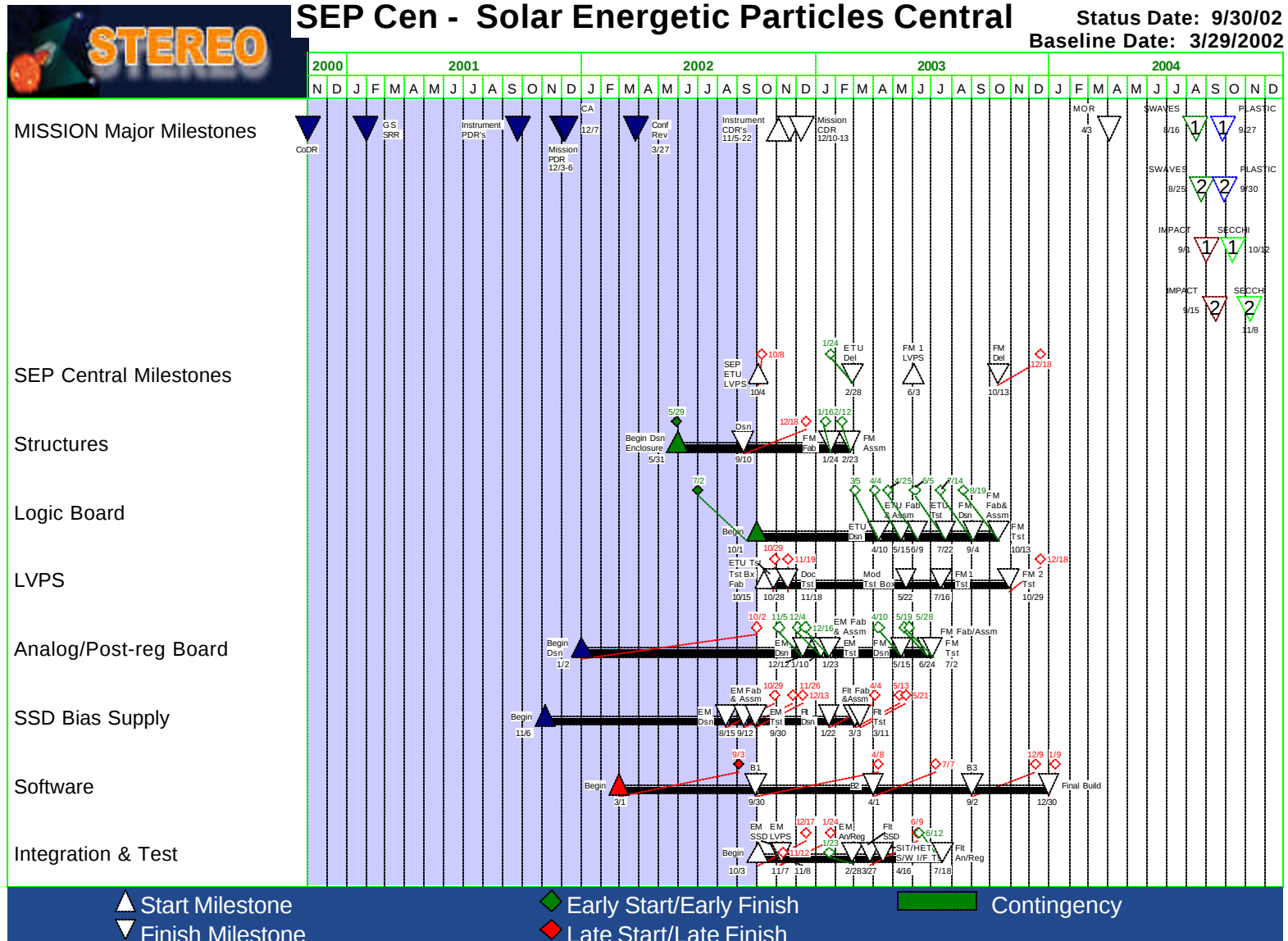
Critical Design Review

2002 November 20,21,22



STEREO IMPACT

Critical Design Review
2002 November 20,21,22



Critical Design Review

2002 November 20,21,22



Schedule Comment

- **Insufficient slack in “Ready to Deliver to JHU/APL” milestone**
- **Caltech schedule shows 50 days of slack but Project integrated schedule shows only about 15 days of slack**
- **First block on SEP I&T Flowchart, “EM Systems I&T”, is showing a 5-month slip, moves flight work out (but not by 5 months)**
- **Actions taken to recover that slip are shown on next slide**
- **Conclude that we can meet original 5/12/03 date to start EM Systems I&T**
- **Need to review, edit, and re-baseline Project integrated schedule**

Schedule Comment (continued)

EM Systems I&T task							
Project integrated schedule date: 10/23/03 - 12/29/03							
Desired date (original schedule) : 5/12/03 - 7/18/03							
Status of predecessors to EM Systems I&T							
Item	Description	Integrated schedule end date	Actual expected end date	Comment			
1	Rework/Haywire/Trim SEP Central Logic board	4/25/03	3/4/03				
2	Receive LET S/W Build 2	5/5/03	4/1/03				
3	GSE H/W Test	7/30/03	2/1/03				
4	Write User's Guide (GSE)	10/23/03	5/1/03				
5	Finalize design & complete release 1 (GSE)	10/23/03	5/31/03	not all elements required to begin I&T			
6	LET tel EM integration/documentation	4/28/03		now same as item 7			
7	Deliver LET ETU to CIT	6/25/03	2/1/03	in reality this is Det/MISC EM board			
8	SEP Central Build 2	7/7/03	5/1/03				
Following tasks should be predecessors but currently are not							
9	Test HET prototype board	4/16/03	4/16/03				
10	Test SIT ETU board	12/11/02	<5/12/03				
11	SEPT I/F test with SEP DPU	6/16/03	6/16/03	can arrive in middle of I&T window			
12	LVPS EM board to Caltech	1/9/03	1/30/03				
13	Analog/Post reg EM board	1/16/03	5/1/03				
14	Bias supply EM board	1/24/03	5/1/03				

SEP Intergroup Deliverables List

file intergroup_deliverables.xls			Version 5				
created =	6/13/2002	now =	11/14/2002 11:34				
SEP.IMPACT Intergroup Deliverables List: (mostly derived from Project integrated 9-30-02 schedule)							
					Version 5		
					11/13/2002		
Item	From	To	What	When			
1	Caltech	UCB	Flight harness specs and connectors	1/1/2004			
2	Caltech	GSFC	Proto detectors L2, L3, H1, H2, H3	11/15/02-1/1/03			
3	Caltech	GSFC	Flight detectors	7/1/03-9/1/03			
4	Caltech	GSFC	Caltech PHASIC design document	12/1/2002			
5	Caltech	GSFC	PHASIC chip test fixture	6/12/2002			
6	Caltech	GSFC	Proto EE parts	2/1/2003			
7	Caltech	GSFC	Flight EE parts	6/1/2003			
8	Caltech	GSFC	SEP Central Simulator	6/1/2003			
9	Caltech	UCB	Unit for EMC/EMI tests (flight unit #1)	5/18/2004			
10	Caltech	GSFC	ETU hybrid	1/31/2003			
11	Caltech	GSFC	Flight hybrids	3/25/2003			
12	GSFC	Caltech	LET mechanical mock-up parts	3/1/2003			
13	GSFC	Caltech	LET mechanical flight parts	9/1/2003			
14	GSFC	Caltech	SEP Central mechanical flight parts	6/1/2003			
15	GSFC	Caltech	HET ETU board	4/17/2003			
16	UMd/GSFC	Caltech	SIT ETU board	5/12/2003			
17	GSFC	Caltech	HET Flight units	12/9/2003			
18	GSFC	Caltech	SIT Flight units	1/6/2004			
19	GSFC	Caltech	Tested L2, L3 detectors (protos)	4/1/2003			
20	GSFC	Caltech	Tested L2, L3 detectors (flight)	9/17/2003			
21	Kiel/GSFC	Caltech	SEPT ETU	6/15/2003			
22	Kiel/GSFC	Caltech	SEPT Flight units	10/9/2003			
23	UCB	Caltech	LVPS ETU	1/30/2003			
24	UCB	Caltech	LVPS Flight unit #1	6/3/2003			
25	UCB	Caltech	LVPS Flight unit #2	12/3/2003			
26	UCB	Caltech	IDPU simulator	12/15/2002			
27	Caltech	Caltech	LET-SEP_Central ICD	11/15/2002			
28	Caltech	GSFC	HET-SEP_Central ICD	11/15/2002			
29	Caltech	Kiel/ESTEC	SEPT-SEP_Central ICD	11/15/2002			
30	Caltech	GSFC/UMd	SIT-SEP_Central ICD	11/15/2002			
31	UCB	Caltech	IDPU-SEP_Central ICD	6/19/2002	IMPACTSerialInterface_F.pdf		
32	Caltech	GSFC	Hybrid test fixture	1/31/2003			
33	Space Inst.	Caltech	Bias supply ETU	1/24/2003			
34	Space Inst.	Caltech	Bias supply flight units	1/24/2003			
35	Space Inst.	Caltech	Analog/post-reg ETU	1/16/2003			
36	Space Inst.	Caltech	Analog/post-reg flight units	1/24/2003			