

STEREO IMPACT

PROBLEM REPORT

PR-1006

STE-U FM1 Miswire

2004-4-30

PR Numbers: 1xxx=UCB, 2xxx=Caltech/JPL, 3xxx=UMd, 4xxx=GSFC/SEP, 5xxx=GSFC/Mag,
6xxx=CESR, 7xxx=Keil, 8xxx=ESTEC, 9xxx=MPAe

Assembly : IMPACT Boom	SubAssembly : STE-U
Component/Part Number:	Serial Number: FM1
Originator: David Curtis	Organization: U.C.Berkeley
Phone : 510-642-5998	Email : dwc@ssl.berkeley.edu

Failure Occurred During (Check one)

Functional test Qualification test S/C Integration Launch operations

Environment when failure occurred:

Ambient Vibration Shock Acoustic
 Thermal Vacuum Thermal-Vacuum EMI/EMC

Problem Description

While installing STE-U into the thermal vac chamber the unit was powered on for ambient tests. After ~20 seconds it was clear that something was wrong; currents was ~20-30mA greater than usual on the 28V primary, and some housekeeping values were out of limits. Power was turned off while we diagnosed the problem.

Analyses Performed to Determine Cause

We determined that the cause of the problem was the thermal vac feed-through on the STE-U thermal vac harness between the STE-U preamp inside the chamber and the IDPU outside, and corrected that. The 25 pin D feed-through connector on the new thermal vac chamber is not 1-1. Instead it is wired pin 1 to pin 13 pin 2 to pin 2, (male inside, male outside), etc. - i.e. straight through. However, while the instrument currently works fine, some parts have been stressed (see below for more details)

Corrective Action/ Resolution

Rework Repair Use As Is Scrap

We have corrected the feed-through. We replaced 2 parts that were identified as stressed, the MAX987 comparator and the LT1353 opamp. The parts replaced will not be conformally coated after installation due to contamination concerns with the STE detector. The STE-U FM1 passed ambient temperature CPT and was able to successfully complete thermal vacuum testing.

Date Action Taken: 2004-05-05 Retest Results: Success

Corrective Action Required/Performed on other Units Serial Number(s): _____

Closure Approvals

Subsystem Lead: _____ Date: _____
IMPACT Project Manager: _____ Date: _____
IMPACT QA: _____ Date: _____
NASA IMPACT Instrument Manager: _____ Date: _____

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Analysis:

We determined the problem by buzzing-out the feed-through. It turns out the 25-pin D feed-through connector on the new thermal vac chamber is not 1-1. Instead it is wired pin 1 to pin 13, pin 2 to pin 12, etc - i.e. straight through. We made up an external connector to correct this problem and demonstrated that the instrument was working properly.

We did an analysis of what the reversed connector did to the circuits at both ends. Mostly it was safe, but in one case the output of a MAX987 comparator on the STE-U preamp board was connected to the -5V supply, exceeding the manufacturer's absolute maximum ratings (short to ground for no more than 10 seconds) and potentially causing latent damage to the part. The comparator is involved in the door position sense circuit. A second LT1353 opamp involved in the temperature sensing also had its output shorted. The datasheet claims it should be able to survive that indefinitely, provided the part does not over-heat. A bench test of an ETU in the same configuration indicates the part gets warm quickly, so we are concerned. The IDPU power converter may also have been stressed, but this was the ETU unit.

Repair:

We plan to break chamber after thermal balance completes to re-configure for cycling. At that time we propose to replace the comparator and the opamp and do a bench CPT before returning to thermal vac. We expect we can do that in 1 day. None of the parts being replaced is involved in the instrument calibration, so there is no need to re-calibrate. Nor should we have to repeat thermal balance, since the instrument is functioning properly and taking the typical currents at this time.

We will have to break through the conformal coating to replace the parts, and we propose not to recoat those parts as that will potentially contaminate the STE detector.

Email dated 1/21/2005

Date: Fri, 21 Jan 2005 16:02:22 -0800
To: "Lillian S. Reichenthal" <Lillian.S.Reichenthal@nasa.gov>
From: David Curtis <dwc@ssl.berkeley.edu>
Subject: Re: PFR1006

Lil:

Here is the PFR. I am not quite sure which harness is being referred to. The feed-through has no pig-tail, just a flange with a 25-pin D back-to-back connector embedded in it (male inside and out). The STE-U unit does have a pig-tail. Then there is a harness from the pig-tail connector to the feed-through on the chamber wall, and then another harness on the outside from the feed-through to the IDPU. No we do not have a serial number for this harness (not big believers in numbering things around here). It is known as the STE-U Thermal Vac Harness.

Dave

At 03:52 PM 1/21/2005, you wrote:

Dave,

This is an easy one. See questions below in blue. Send me the PFR and I will update.
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Change: From a repair to a rework.

Add after the first sentence under Analysis Performed to Determine Cause:

The 25 pin D feedthrough connector on the new thermal vac chamber is not 1-1. Instead it is wired pin 1 to pin 13, pin 2 to pin 2, etc. - i.e. straight through.

QUESTION: Was this harness a pigtail? If so, include that information in your documentation.

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Under Corrective Action/Resolution:

Remove: See below for more details.

Add after the second sentence: Replace parts will not be conformally coated after installation due to contamination concerns with the STE detector.

Is there a s/n associated with this harness?

- Lil

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1. STEREO IMPACT STE-U Thermal Vac Harness

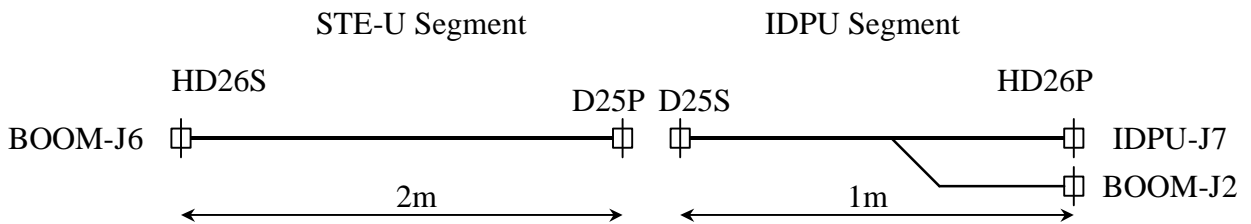
D.W.Curtis Rev B, 2004-3-24

The STE-U thermal vac harness brings the signals from the STE-U instrument through the wall of the vacuum chamber to the external test equipment (or IDPU). It can also be used for IDPU thermal vac tests, when the IDPU is in the vacuum chamber and STE-U (or a simulator) is outside.

The harness consists of two parts; one designed to go from STE-U to the chamber wall (STE-U segment), and a second part to go from the chamber wall to the IDPU (IDPU segment). The chamber wall has a 25 pin D feed-through connector on it (male side out). STE-U has a male 26-pin high density D connector on it, and the IDPU has a female connector of the same kind. Connector savers will be used on the flight hardware so that high rel connectors are not required.

When this harness is used with the STE-U by itself (connected to STE-U P1 instead of BOOM-J6), the spacecraft-monitored STE-U temp sensor is included. Those signals are routed on the IDPU end to BOOM-J2, which is the connector that the temp sensor is routed to inside the boom.

Wire should be PTFE stranded wire, coax should be RG178. Wires and connectors should be cleaned before assembly (Alcohol wipe), and should be assembled clean using gloves. After assembly, bag harness.



1.1 STE-U segment

Pin	Signal	Destination	Harness
1	OUTPUT1	D25P pin 1	Coax w/2
2	OUTPUT RET	D25P pin 2	Coax Shield w/1
3	OUTPUT2	D25P pin 3	Coax w/4
4	OUTPUT RET	D25P pin 4	Coax Shield w/3
5	OUTPUT3	D25P pin 5	Coax w/6
6	OUTPUT RET	D25P pin 6	Coax Shield w/5
7	OUTPUT4	D25P pin 7	Coax w/8
8	OUTPUT RET	D25P pin 8	Coax Shield w/7
9	Spare		
10	Test RET	D25P pin 9	Coax Shield w/11
11	Test	D25P pin 10	Coax w/10
12	Ground	D25P pin 14	#26 TT w/13,14
13	+5V	D25P pin 15	#26 TT w/12,14
14	-5V	D25P pin 16	#26 TT w/12,13

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15	Bias	D25P pin 17	#26
16	-12V	D25P pin 18	#26
17	Cover2	D25P pin 12	#26
18	Cover1	D25P pin 13	#26
19	Door Close Act.	D25P pin 20	#26 TT w/20,21
20	Door Open Act.	D25P pin 21	#26 TT w/19,21
21	Door Act. RET	D25P pin 22	#26 TT w/19,20
22	S/C Temp Sensor	D25P pin 11	#26 TP w/23
23	S/C Temp Sensor RET	D25P pin 19	#26 TP w/22
24	STE Temp	D25P pin 23	#26 TP w/25
25	STE Temp RET	D25P pin 24	#26 TP w/24
26	Chassis	D25P pin 25	#26

1.2 IDPU segment

Pin	Signal	Destination	Harness
1	OUTPUT1	D25S pin 1	Coax w/2
2	OUTPUT RET	D25S pin 2	Coax Shield w/1
3	OUTPUT2	D25S pin 3	Coax w/4
4	OUTPUT RET	D25S pin 4	Coax Shield w/3
5	OUTPUT3	D25S pin 5	Coax w/6
6	OUTPUT RET	D25S pin 6	Coax Shield w/5
7	OUTPUT4	D25S pin 7	Coax w/8
8	OUTPUT RET	D25S pin 8	Coax Shield w/7
9	Spare		
10	Test RET	D25S pin 9	Coax Shield w/11
11	Test	D25S pin 10	Coax w/10
12	Ground	D25S pin 14	#26 TT w/13,14
13	+5V	D25S pin 15	#26 TT w/12,14
14	-5V	D25S pin 16	#26 TT w/12,13
15	Bias	D25S pin 17	#26
16	-12V	D25S pin 18	#26
17	Cover2	D25S pin 12	#26
18	Cover1	D25S pin 13	#26
19	Door Close Act.	D25S pin 20	#26 TT w/20,21
20	Door Open Act.	D25S pin 21	#26 TT w/19,21
21	Door Act. RET	D25S pin 22	#26 TT w/19,20
22	Spare		
23	Spare		
24	STE Temp	D25S pin 23	#26 TP w/25
25	STE Temp RET	D25S pin 24	#26 TP w/24
26	Chassis	D25S pin 25	#26

1.3 BOOM-J2 connector, D9S

Pin	Signal	Destination	Harness
1			
2			
3	STE-U Temp Sensor	D25S pin 11	#26 TP w/8
4			

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5			
6			
7			
8	STE-U Temp Sensor RET	D25S pin 19	#26 TP w/3
9			