

# STEREO *IMPACT*

## IMPACT Boom Deployment Instrument Setup Procedure

IMPACT-BOOM-Deployment\_B.doc  
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Date Run: \_\_\_\_\_

Test Reference: \_\_\_\_\_

## Document Revision Record

Rev.	Date	Description of Change	Approved By
A	2005-Jun-27	Preliminary Draft	-
B	2006-Jul-20	Add MAG & SWEA post-deploy thermal, Remove SWEA door & HV ops.	-

## Distribution List

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## 1. Overview

### 1.1. *Introduction*

The STEREO IMPACT Boom is a deployable mechanism that holds the magnetometer, STE-U, and SWEA-STE-D instruments of the STEREO IMPACT instrument suite. The spacecraft actuates deployment of the boom. Mechanical constraints, setup, and operation for ground deployments are described in reference 1.

During deployment (both ground deployment and on-orbit) the boom suite instruments and IDPU shall be powered and configured to monitor the deployment. This document describes the instrument electrical setup required to put the instrument into the optimal state for monitoring the deployment.

### 1.2. *Document Conventions*

In this document, **TBD** (To Be Determined) means that no data currently exists. A value followed by **TBR** (To Be Resolved) means that this value is preliminary. In either case, the value is typically followed by a code such as UCB indicating who is responsible for providing the data, and a unique reference number.

Commands to be typed into the C&T GSE (stgsect) are indicated as follows: */SystemNOP*. After typing the command hit the Enter key to send.

### 1.3. *Applicable Documents*

The following documents are closely interrelated with this specification. All documents can be found on the Berkeley STEREO/IMPACT FTP site unless otherwise indicated:

<http://sprg.ssl.berkeley.edu/impact/dwc/>

1. **TBD** – Test Boom deployment mechanical setup
2. **TBD** – APL deployment procedure
3. TestProcs/IMPACT-BOOM-CPT – Boom Suite Comprehensive Performance Test

## 2. Setup

This procedure assumes the boom suite is integrated to the spacecraft.

### 2.1. Configuration

1. IDPU Serial number\_\_\_\_\_.  
Configuration issues:\_\_\_\_\_
2. PROM version number:\_\_\_\_\_
3. EEPROM code version number:\_\_\_\_\_
4. Command & Telemetry GSE connected to MOC via TCP/IP  
C&T GSE version date\_\_\_\_\_
- C&T Database version:\_\_\_\_\_, Date:\_\_\_\_\_
5. MAG Sensor (ETU, FM1, FM2, none):\_\_\_\_\_
6. STE-U Preamp/Sensor (ETU/FM1/FM2):\_\_\_\_\_
7. Boom harness (ETU/FM1/FM2)\_\_\_\_\_
8. SWEA/STE-D Sensor/simulator (ETU/FM1/FM2/Sim)\_\_\_\_\_
9. SWEA HV Enable Plug Type (Red/Green/None)\_\_\_\_\_

**NOTE: MCP HV should not be enabled except in vacuum.**

### 2.2. Startup GSE

1. Verify spacecraft is powered and functioning, and MOC is ready for POC to connect. Verify\_\_\_\_\_
2. Start up SSH and connect to the MOC
3. Power up C&T GSE PC and start C&T GSE software (stgsect).
4. Select the PROM display from the C&T GSE Display/Recall Display menu
5. Connect C&T GSE to MOC for telemetry – push the button next to the TLM display on the Received Data Panel:  
Verify the TLM light comes on:\_\_\_\_\_
6. Connect C&T GSE to MOC for commands – push the button next to the CMD display on the Received Data Panel:  
Verify the TLM light comes on:\_\_\_\_\_
7. On the C&T GSE push the Record button. Determine the name of the telemetry file (in the scgse\log directory)  
File Name:\_\_\_\_\_
8. Enable the stgsect Telemetry Server.
9. Startup the MAG, STE, and SWEA science displays. Connect each to the server. Verify the connect lights come on.  
Verify\_\_\_\_\_

### 3. Power-up Boom Suite

Record Start Time \_\_\_\_\_

1. From spacecraft housekeeping record the initial state of the IMPACT and PLASTIC instrument suite power:

IDPU Power (On/Off) \_\_\_\_\_  
 MAG Heater Power (On/Off) \_\_\_\_\_  
 SWEA/STE Power (On/Off) \_\_\_\_\_  
 SWEA/STE Survival Heater Power (On/Off) \_\_\_\_\_  
 SEP Power (On/Off) \_\_\_\_\_  
 SEP Survival Heater power (On/Off) \_\_\_\_\_  
 PLASTIC Power (On/Off) \_\_\_\_\_  
 PLASTIC Survival Heater Power (On/Off) \_\_\_\_\_  
 Boom Deployment Heater (On/Off) \_\_\_\_\_

#### 3.1. Power-up IDPU

DO NOT POWER ON THE IDPU OR MAG HEATER CIRCUIT  
WITHOUT THE MAG SENSOR CONNECTED.

1. If IDPU is powered up already, skip to step 3.  
 Already On? (Y/N): \_\_\_\_\_
2. Request that the spacecraft operator power-on the power service to the IDPU.  
 If the supply current limit is reached, power off the supply immediately.
3. Record the bus voltage and IDPU current from spacecraft housekeeping:  
 Bus Supply Voltage \_\_\_\_\_ V  
 IDPU Supply current \_\_\_\_\_ mA
4. Verify C&T GSE is getting telemetry. On IDPU SOH panel, UTC time should correspond to spacecraft time (typically set to UTC), and should be incrementing every two seconds.  
 Verify C&T GSE getting telemetry \_\_\_\_\_
5. After 10 seconds ISoftwareVersion should change to correspond to the EEPROM software version number. Verify no errors are reported and the version changes  
 Record value of ISoftwareVersion \_\_\_\_\_  
 Record value of IERRORCount \_\_\_\_\_  
 Record value of IBootSelect \_\_\_\_\_  
 Verify that MAG and STE-U InterfaceActive bits are set \_\_\_\_\_

### 3.2. **Power-up SWEA**

1. Record the SWEA enable connector used in SWEA-J2.

SWEA Enable \_\_\_\_\_

**DO NOT POWER ON SWEA WITH THE MCP HV ENABLED (Green-tag enable in place) EXCEPT IN VACUUM,  $P < 1E-5$  TORR. POWERING ON WITH THE ENABLE PLUG IN, WHILE STILL PROTECTED BY THE ENABLE COMMAND, IS RISKY.**

2. If SWEA is powered up already, skip to step 4.

Already On? (Y/N): \_\_\_\_\_

3. Request that the spacecraft operator power-on the power service to the SWEA. If the supply current limit is reached, power off the supply immediately.

4. Record SWEA supply current from spacecraft housekeeping:

SWEA Supply current \_\_\_\_\_ mA

5. Verify that on the C&T GSE ISCStatus display the SWEA Power display shows On (1), and on the Interface Active display, SWEAInterface shows active (1).

Verify \_\_\_\_\_

6. Verify state of SWEA Survival Heater via spacecraft telemetry (nominally should be Off)

On/Off \_\_\_\_\_

7. Record SWEA temperature

ISWEADACTemp \_\_\_\_\_ C

8. Record the state of the SWEA cover from instrument housekeeping. It should be Open (if not, see section 5.1 to open, but not during ground tests)

SWEACovStat \_\_\_\_\_

9. Record the state of the SWEA HV from spacecraft housekeeping.

NRHVENB \_\_\_\_\_

MCPHVENB \_\_\_\_\_

ISWEAMCP \_\_\_\_\_

10. If the HV is not enabled or the MCP HV is below 2500V use section 5.2 and 5.3 to power-up high voltage (but not for ground tests)

### 3.3. **Power-up MAG Heater**

1. If MAG Heater is powered up already, skip to step 3.  
Already On? (Y/N): \_\_\_\_\_
2. Request that the spacecraft operator power-on the power service to the MAG Heater. If the supply current limit is reached, power off the supply immediately.
3. Record the MAG Heater supply current from spacecraft housekeeping.  
Mag Heater Supply current \_\_\_\_\_ mA
4. Record the MAG temperature on the C&T GSE:  
IMAGTemp \_\_\_\_\_ C
5. Record the telemetry MAG heater current (note that this is not expected to be an accurate measure of the actual current, but should correspond to the measurement made above to ~20%). The MAG heater will not come on above 10C, but will take a ~5mA standby current.  
IMAGHeater \_\_\_\_\_ mA



### 3.4. ***Power-up the Boom Deployment Heater***

The boom deployment heater should be powered up no later than 30 minutes before deployment (this time is not important for ground tests, but the heater circuit should be on to simulate flight conditions at the time of deployment). The heater should maintain the boom actuator at no less than 0C (as indicated by the boom temperature in spacecraft telemetry). The boom has been deployed in boom thermal vac testing with the actuator at -33C and +40C.

1. If Boom Deployment Heater is powered up already, skip to step 3.  
Already On? (Y/N): \_\_\_\_\_
2. Request that the spacecraft operator power-on the boom deployment heater service. If the supply current limit is reached, power off the supply immediately.
3. Record the Boom Deployment Heater supply current from spacecraft housekeeping.  
Boom Deployment Heater Supply current \_\_\_\_\_ mA
4. Record the Boom Temperature from spacecraft housekeeping:  
Boom Temperature \_\_\_\_\_ C
5. Record the STE-U preamp temperature from spacecraft housekeeping  
STE-U preamp Temp \_\_\_\_\_ C
6. Record the STE-U detector temperature from instrument housekeeping  
ISTEUTemp \_\_\_\_\_ C

## 4. Configure for Deployment

Configure the instruments to collect best time resolution data during the deployment. SEP science telemetry is disabled to allow more telemetry for the boom instruments, but SEP housekeeping and beacon telemetry continue. MAG data is set to maximum time resolution, while the burst system is used to record SWEA distribution data with maximum time resolution.

1. Turn off SEP science telemetry. Send command */SEPDisableTlm*. Verify SEPTlm bit in ItelemEnables SOH is off (0) Verify\_\_\_\_\_
2. Set Burst playback rate to 120bps. Send command */SetBurstRate 120*.
3. Set housekeeping packet rate to 4 seconds. Send command */SetHKPRate 4*. Verify housekeeping packets coming every 4 seconds. Verify\_\_\_\_\_
4. Set the MAG sample rate to 32 per second. Send the command */SetMAGRate 1*. Verify MAG packets coming every 1-2 seconds. Verify\_\_\_\_\_
5. Verify the telemetry rate is ~3200bps on the IMPACT GSE  
IMPACTBitRate\_\_\_\_\_ bps

### 4.1. 60 Seconds Before Deployment

Final setup to record burst data. Note that if deployment gets delayed by more than 5 minutes, repeat step 1.

1. Force a burst trigger. Send the command */RestartBurst*. Verify IBurstSavePage changes to 128. Verify\_\_\_\_\_
2. Record the following pre-deployment spacecraft housekeeping temperatures:
  - Boom Temperature\_\_\_\_\_ C
  - STE-U preamp Temp\_\_\_\_\_ C
  - SWEA Temp\_\_\_\_\_ C
3. Record the following instrument housekeeping temperatures:
  - IMAGTemp\_\_\_\_\_ C
  - ISTEUTemp\_\_\_\_\_ C
  - ISTEDTemp\_\_\_\_\_ C
  - ISWEADACTemp\_\_\_\_\_ C
  - ISWEAMCPTemp\_\_\_\_\_ C
  - ISTEUDACTemp\_\_\_\_\_ C

## 5. Post Deployment

### 5.1. 60 Seconds After Deployment

Set up to playback burst recording of deployment quickly. At this rate the burst should play back in 15 minutes (if burst started at Deployment-60 seconds)

1. Set the MAG sample rate to 8 per second. Send the command */SetMAGRate 4*.  
Verify MAG packets coming every 5-6 seconds. Verify\_\_\_\_\_
2. Set Burst playback rate to 1370bps. Send command */SetBurstRate 1370*.
3. Verify the telemetry rate is ~3200bps on the IMPACT GSE  
IMPACTBitRate\_\_\_\_\_bps

### 5.2. Power-off the Boom Deployment Heater

1. Request that the spacecraft operator power-off the boom deployment heater service.
2. Record the Boom Deployment Heater supply current from spacecraft housekeeping.  
Boom Deployment Heater Supply current \_\_\_\_\_mA
3. Record the Boom Temperature from spacecraft housekeeping:  
Boom Temperature \_\_\_\_\_C

### 5.3. Return to Normal Telemetry

After burst playback is complete (nominally 15 minutes after deployment), return the IMPACT suite to normal telemetry.

1. Set housekeeping packet rate to 60 seconds. Send command */SetHKPRate 60*.  
Verify housekeeping packets coming every 60 seconds. Verify\_\_\_\_\_
2. Set Burst playback rate to 536bps. Send command */SetBurstRate 536*.
3. Turn on SEP science telemetry. Send command */SEPEnableTlm*. Verify SEPTlm bit in ItelemEnables SOH is on (1) Verify\_\_\_\_\_
4. Verify the telemetry rate is ~3200bps on the IMPACT GSE (1900bps if SEP is Off)  
IMPACTBitRate\_\_\_\_\_bps
5. Record the following pre-deployment spacecraft housekeeping temperatures:  
Boom Temperature\_\_\_\_\_C  
STE-U preamp Temp\_\_\_\_\_C  
SWEA Temp\_\_\_\_\_C
6. Record the following instrument housekeeping temperatures:  
IMAGTemp\_\_\_\_\_C  
ISTEUTemp\_\_\_\_\_C  
ISTEDTemp\_\_\_\_\_C  
ISWEADACTemp\_\_\_\_\_C  
ISWEAMCPTemp\_\_\_\_\_C  
ISTEUDACTemp\_\_\_\_\_C

