

STEREO *IMPACT*

IDPU Thermal Vac Test Procedure

IMPACT-IDPU_TvacProc_A.doc
Version A – 2004-Aug-24

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Date Run: _____

Document Revision Record

Rev.	Date	Description of Change	Approved By
A	2004-Aug-24	Preliminary Draft	-

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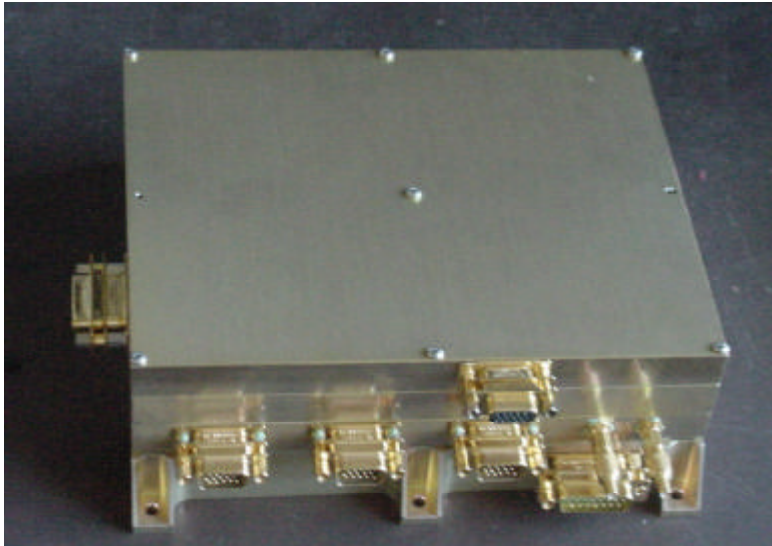
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1. Overview

1.1. Introduction

Instrument Data Processing Unit (IDPU) is a central part of the STEREO IMPACT instrument suite. It is the hub for IMPACT and PLASTIC instrument telemetry and is the single point of contact for the suite with the spacecraft command and telemetry system. It consists of a single box to be mounted inside the spacecraft, .

This document describes the Thermal Vacuum Test to be performed on the IDPU as part of the instrument acceptance testing as called out in reference 2. Note that no thermal balance test is called for.



FM1 IDPU

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.

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. 7381-9003 – STEREO Environmental Test Spec (on APL web site)
2. 7381-9012 – IMPACT ICD (on APL web site)
3. TestProcs/IMPACT-IDPU-CPT – IDPU Comprehensive Performance Test
4. ICD/IMPACTSerialInterfaceG (instrument interface spec)
5. ICD/IMPACT_CTM_O (command & telemetry database)
6. Plans/IMPACTContaminationControlPlan

2. Testing Required

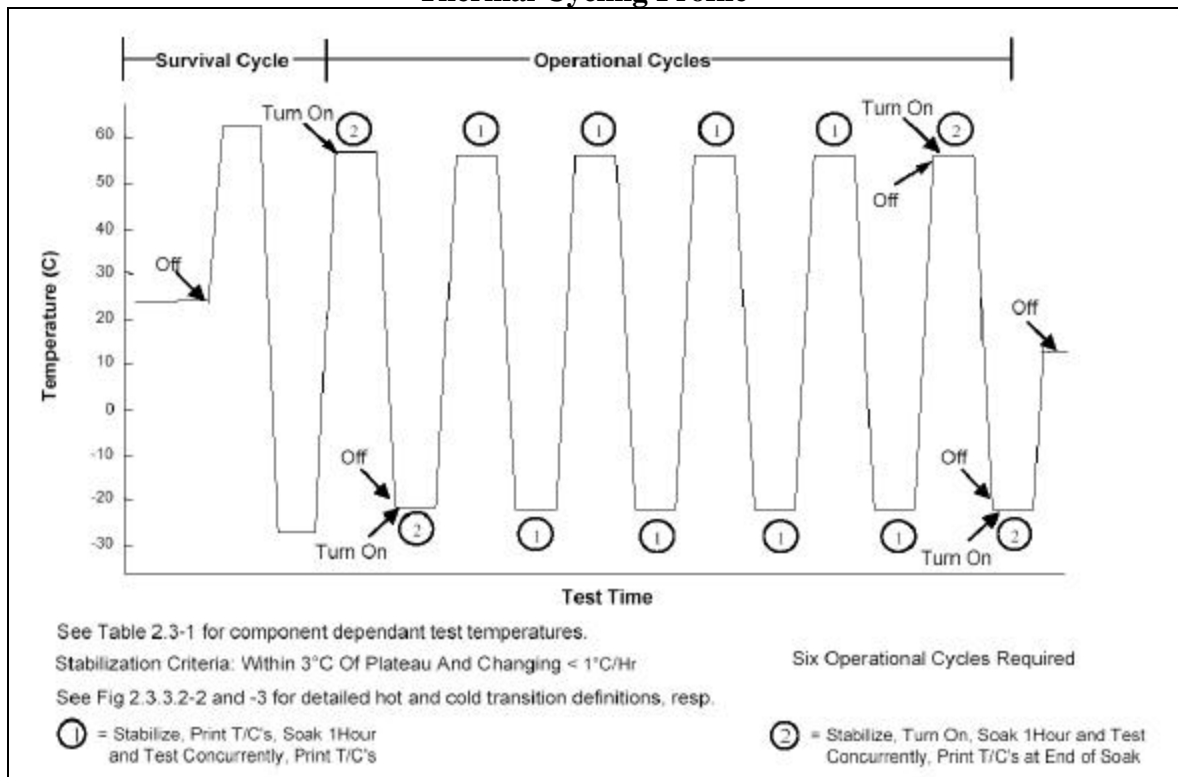
2.1. Thermal Cycling

Under vacuum the IDPU will be thermally cycled a total of seven times, including one non-op cycle from -28 to +60C, and 6 Operational cycles from -23 to +55C (as measured at the baseplate) as specified in reference 1 for conductively mounted units. At each extreme, the unit shall be thermally soaked as specified in reference 1, which states a soak is one (1) hour after baseplate/shroud thermocouples are within three (3) degrees of the setpoint with a slope of less than one (1) degree rise per hour. Transition rates between plateaus of 3 to 5C/minute shall be strived for.

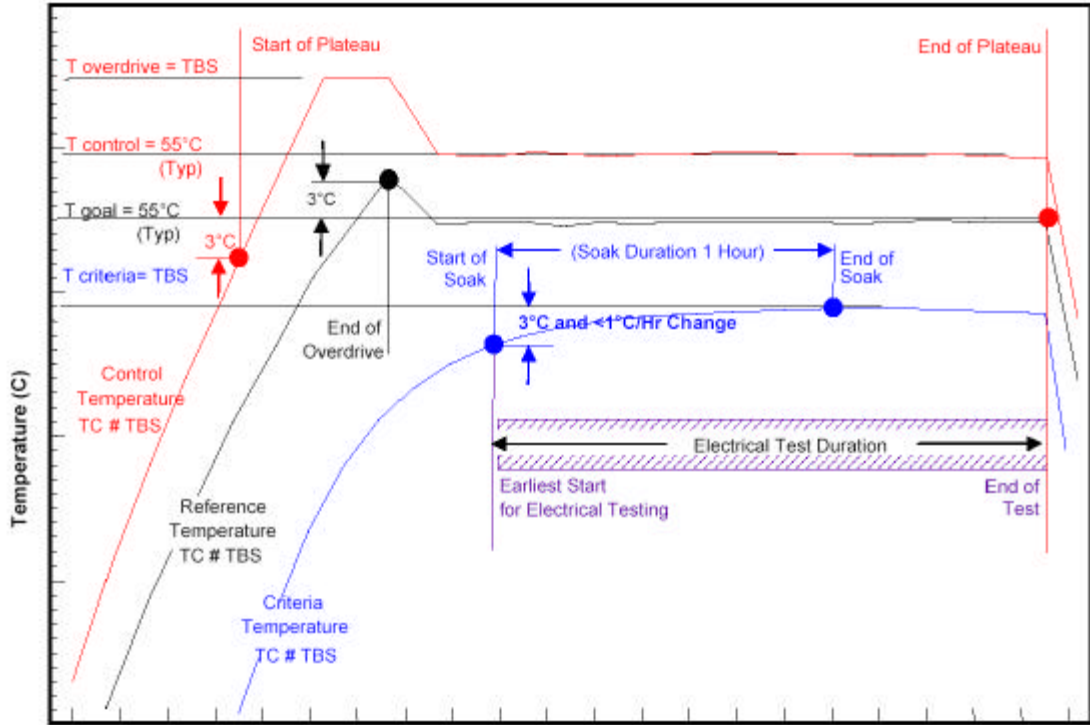
2.1.1. Functional Test

At each operational temperature plateau an IDPU CPT as called out in reference 3 will be performed. On the first and last operational cycles a cold-start will be demonstrated.

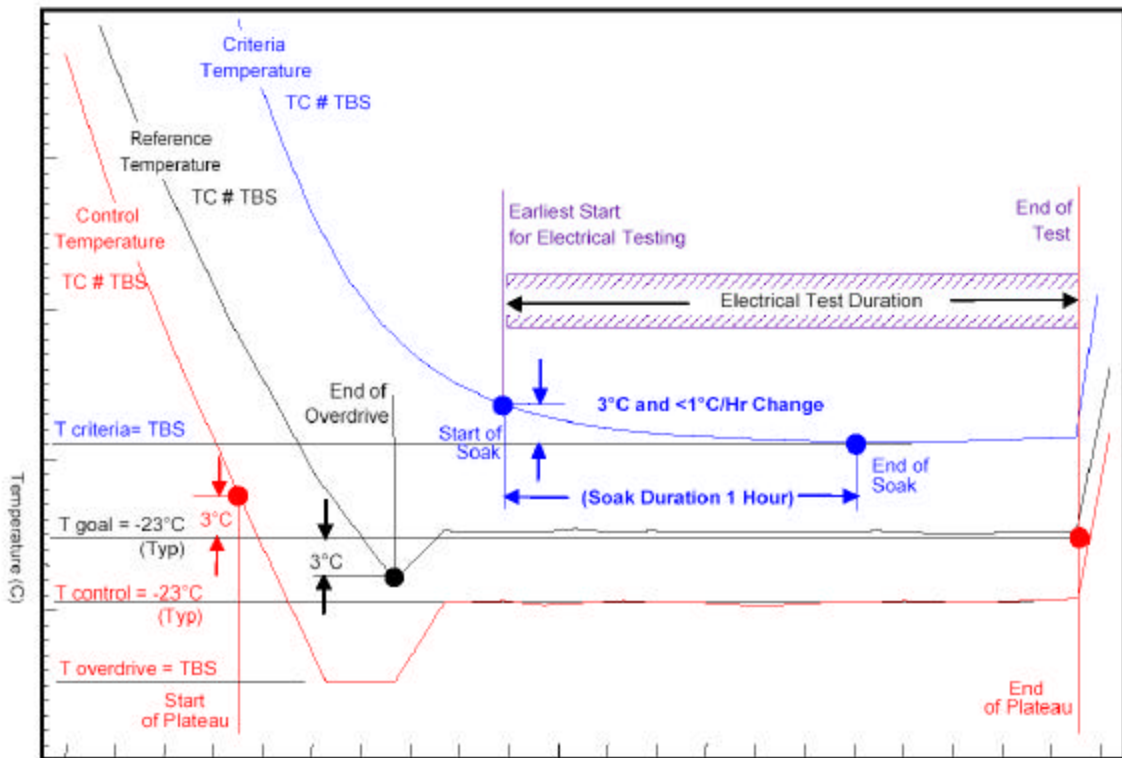
Thermal Cycling Profile



Transition to Hot Soak



Transition to Cold Soak



2.2. *Thermal Bakeout*

The IDPU will be baked out under vacuum for a minimum of 8 and a maximum of 48 hours at a minimum temperature of 60 degrees C. This bakeout shall be monitored by TQCM at a temperature of **TBD** degrees C for a period of 8 hours with a goal of reaching a TQCM measurement of no more than **TBD** Hz/hr rise from the TQCM, excluding background chamber rate. This bakeout will be appended to the end of thermal cycling. In addition, the first hot soak (survival) may be extended to add some bakeout prior to the start of cycling.

3. Chamber Setup

The IDPU shall be mounted directly to the chamber baseplate. The IDPU shall be in flight configuration (the IDPU has no thermal blankets), and no thermal isolation or gasketing material between the IDPU and baseplate.

In addition to chamber monitors on the baseplate and shroud(s), the IDPU shall have at least 2 TCs mounted to the exterior; one at the mounting foot of the instrument, and the other at the top of the instrument near a corner.

In addition to the exterior test TCs, the unit has one internal thermistor attached to the STE-U interface board near the center of the unit. The reading from this thermistor is only accessible through the instrument telemetry stream when it is powered on.

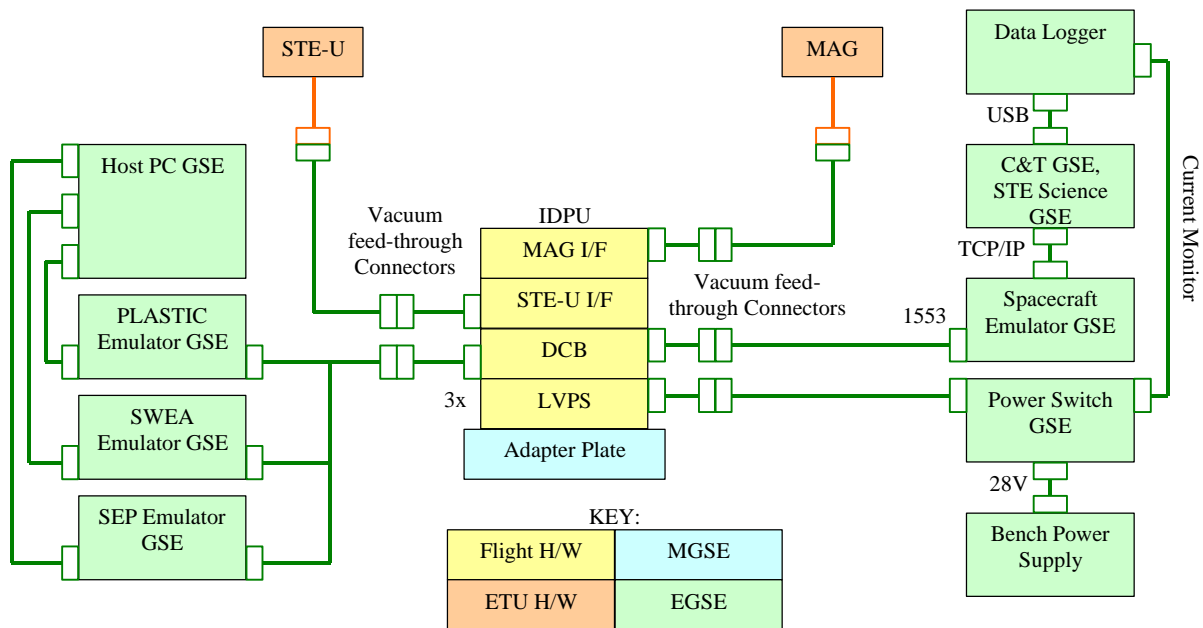
All TCs and thermistors shall be monitored and recorded continuously throughout the test (the internal thermistor shall be recorded whenever the instrument power is on).

During all soaks the baseplate and shrouds shall be run at the desired target temperature ('Control Temperature'). The 'Reference Temperature' shall be the TC at the foot of the IDPU and the 'Criteria Temperature' shall be the TC attached to the top of the IDPU. The target criteria temperature is the same as the control temperature for the non-op cycles. For operational cycles it is expected to run warmer by ~10C.

4. Electrical Configuration

The normal bench equipment and instrument ETUs or simulators shall be used to perform the IDPU CPT tests. This equipment will be outside the tank, connected to the IDPU via feed-throughs, as shown below. Test equipment and software shall be under configuration control, and revision numbers recorded in the IDPU CPT documentation.

The IDPU Flight Software shall include the final build of the PROM software and at a minimum build 2.5 of the instrument (EEPROM) software. Build 2.5 is adequate to verify all hardware and instrument functions but is missing some automation and telemetry products; Build 3 is the final version with all features. The version of flight software used shall have completed acceptance testing and be under configuration control.



IDPU Thermal Vacuum Setup

5. Contamination Control

5.1. *General Guidelines*

Flight hardware will be assembled clean prior to arrival at test facility. For the majority of the testing, the UUT shall be maintained in a Class 10,000 Clean Room or better. For short periods (loading/unloading into chamber, short transitions) the UUT may be exposed to Class 100,000 Environment.

5.2. *TQCM Monitoring*

During all testing, a minimum of one TQCM shall be provided by the Facility to constantly monitor NVR in the system. The TQCM shall be run at -20°C .

5.3. *Certification of Empty Tank Prior to Testing*

Prior to the start of testing, the tank shall be cleaned by the facility and certified via TQCM means to verify cleanliness. The Level of Cleanliness shall be less than **TBD** Hz/Hour with the TQCM at -20°C and the chamber at bakeout conditions. All MGSE and harnessing in the chamber with the IDPU shall be baked out prior to use.