HESSI IDPU
COMPREHENSIVE PERFORMANCE TEST

HSI_IDPU_CPT_D

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1. INTRODUCTION

1.1 Purpose

This document establishes the HESSI IDPU Comprehensive Performance Test to be performed at the stand-alone IDPU. This is a limited version to be run with simulators in the place of the Imager and Spectrometer.

1.2 Scope

This procedure will be performed to verify IDPU functionality during or following exposure of the IDPU to qualification or transportation environments.

2. SETUP

a. Connect the IDPU, IPC, CPC together with the ETU harness (IDPU-J2, IPC-J2, IPC-J3, CPC-J2)
b. Connect the Particle Detector to the IDPU using the ETU harness (IDPU-J5 to PD-J1)
c. Connect the Particle Detector to the IPC bias supply with an ETU reynolds HV cable (PD-J2 to IPC-J6)
d. Connect the 9 High Voltage supplies (IPC-HV1 to IPC-HV9) to the HV Load GSE box via ETU Reynolds HV cables.
e. Connect the IDPU Detector inputs (IDPU-J11-J19) to the Spectrometer load simulator, with signal inputs to a Berkeley Nucleonics PB-4 Pulser.
f. Connect the Power Controller outputs (IDPU-J3 and IDPU-J4) to the Spectrometer/Imager load simulator ("Iggy box").
g. Connect the ADP signals (IDPU-J7 and IDPU-J8) to the RAS/SAS simulators with the test harness.
h. Connect the CPC power output (CPC-J3) to the cryocooler load simulator (white box connected to large resistors).
i. Connect the IDPU signal harness (IDPU-J1) to the GSE cart (silver box).
j. Connect the IPC power input (IPC-J1) to the GSE cart (switch box, OUT2)
k. Connect the CPC power input (CPC-J1) to the GSE cart (switch box, OUT1)
l. Connect the PMT-RAS LED to the SR pulse generator via the Heathkit resistance box.
m. Power on the GSE cart and boot up the computers
n. Switch on the GSE interface box (silver box)
o. Bring up the GSE programs, scgse5o and ssrk. On ssrk, set the buffer size to 64K and the packet size to packets, and push AcquireRT. On scgse display POWER.srd
p. Install the HV and Actuator enable plugs in the IPC
q. Power up the Spectrometer/Imager load simulator box. Set switch to COLD.

3. POWER-UP PROCEEDURE

a. Record the temperatures on the scgse received data display: IDPU °C_____
IPC °C_____
CPC °C_____

b. Start SC_IDPUON. Verify instrument current <0.6A HP#1 Current _____
c. Start SC_CPCON. Verify CPC current < 0.15A HP #2 Current_____
d. Start IDPU_INIT. Verify instrument mode = NORMAL, Errors=0,Voltages nominal _____OK
e. Turn on the Imager

1. Display IMGR.srd
2. Start the IMGR_ON procedure. Verify that 5 IADP_PWR fields on the SOH ADP page are all "ON" (11111) and Imager voltages are nominal (+5, +12, +14 all +/-0.3V) except P5D2V _____OK
3. Send "/IADPMODE 15" to clear any ADP errors. Verify that the 4 ADP_STATUS fields on the SOH ADP page read "OK" _____OK
4. Load the default parameter file: start "v4s0r0_003". Verify all 4 IADP_STATUS values on the SOH ADP page are "OK" (0) _____OK
5. Send /IADPRUN. Verify all 4 IADP_STATUS values on the SOH ADP page are "OK" (0), Simulator LEDs flash, and IADP_RASFRMS and IADP_SASFRMS on the SOH_IADP_MD display count _____OK
6. Start the IADP_TM_ON procedure. Verify RAS and SAS image telemetry on the SSRGSE _____OK
7. Verify instrument current <1.0A HP#1 Current _____

f. Turn on the Spectrometer Interface

1. Display POWER.srd
2. Start the IDIB_ON procedure. Verify that the voltages (+12, +5, -5, -12) for all 9 DIBs are nominal (+/-0.3V) _____OK
3. Start the IDIB_TM_ON procedure. Verify Monitor Rates packets appear on the SSRGSE every 10 seconds _____OK
4. Verify instrument current <1.9A HP#1 Current _____

g. Power on the Particle Detector and PMT

1. Enable the PMT High Voltage by sending "/IDPUARM 9". Verify that PMT_HV status reads "Enabled" _____OK

2. Start "IHV_ON" procedure. Verify that IDPU_28HV on the SOH Voltages page reads 28V +/- 0.5V IDPU_28HV_____

3. Turn on the PMT: Start "IPMT_ON". Verify that IPMT_HVDAC on the SOH PMT page starts to increment once a second _____OK

4. Record the Particle Detector temperature IPDT (bias will not be applied if IPDT>25C) IPDT_____

5. With PD bias off, record the PD rates

   IPDCTRA_____ IPDCTRB_____

6. Turn on the particle detector using the IPD_ON procedure. Verify that the IPDHVDAC value on the SOH Particle Detector page starts to increment once a second. _____OK

7. Wait for IPDHVDAC and IPMT_HVDAC to reach their final values. (IPDHVDAC = 122, IPMT_HVDAC = 130) _____OK

8. Verify instrument current <2.0A HP#1 Current _____

4. TEST PROCEDURE

4.1 PMT Test

a. Display PMT.srd
b. Send /IDPUDUMPTBLB
c. With the Stanford Research waveform generator (SR) connected to the RAS PMT dust cover power off , read the PMT count rate off the SOH Memory Dump page, value #1 (should be <5) Value: _____
d. Turn on Set the SR. Verify the following settings (should be recalled on power-up):
    1. Amplitude = 5Vpp
    2. Offset = 2.5Vpp
    3. Modulation=Off
    4. Waveform = ARB
    5. Frequency = 1099.9Hz
e. Set the Heathkit resistance box connected to the SR to 100Kohms (HI range).
f. Record the PMT count rate, value #1 in the Memory Dump page. Should be 61-6f hex. Value: _____
g. Set the SR to Square waveform, Frequency=100Hz (should change frequency automatically when you change waveform select).
h. Record the PMT count rate, value #1 in the Memory Dump page. Should be about 71 hex. Value: _____
i. Set the resistance box to 470K
j. Record the PMT count rate, value #1 in the Memory Dump page. Should be about 47 hex. Value: _____
k. Set the resistance divider back to 100K
l. Set the SR back to ARB waveform

4.2 Particle Detector Test

a. Display PD.srd
b. Verify nominal PD settings on Particle Detector display: IPDTHRESH=6, IPDHVDAC=122 _____OK
c. Send "/IPDTHRESH 2". Record PD rates
IPDCTRA_____ IPDCTRB_____
d. Send "/IPDTHRESH 4". Record PD rates
IPDCTRA_____ IPDCTRB_____
e. Send "/IPDTHRESH 6". Record PD rates
IPDCTRA_____ IPDCTRB_____

4.3 HV Test

a. Display SPEC.srd
b. Verify Spectrometer HV outputs on SPEC HV display=0 _____OK
c. If HV28 is not on, type "/IDPUARM 1". Verify SPHV is Enabled, and IDPU_28HV is 28V. _____OK
d. Type "IHV_RAMP3700", then send "/IHVPERIOD 1". Wait for DAC values of 190 _____OK
e. Record voltages at BOB Pins 1-9 .v.pin 15 below. Verify appx 3700mV _____OK

HV Outputs

1	2	3	4	5	6	7	8	9

4.4 Cryocooler Test

a. Verify that the CPC Status on the SOH Spectrometer Power page is "TRIPPED"
TC Verify:_____

b. Start the script "ICRYO_ON". Verify that CPC Status is now "OK"
TC Verify:_____

c. Send the command "/ICRYOMAIN 150". Record the value of HP#2 Peak Current
HP#2 Max Current:_____

d. On the Cryocooler load simulator, verify that the main current waveform is a smooth sinusoid at about 60Hz
TC Verify:_____

e. On the Cryocooler load simulator, record the RMS current and voltage (should be about 9V/9A)
Cryomain RMS Volts:_____ V
Cryomain RMS Current:_____A

f. Send the command "/ICRYOPHASE 32". Verify that ICRYOPHASE on the SOH Spectrometer Power page reads 32
TC Verify:_____

g. Send the command "/ICRYOBAL 100". Verify that ICRYOBAL on the SOH Spectrometer Power page reads 100
TC Verify:_____

h. On the Cryocooler load simulator, verify that the balance current waveform is a smooth sinusoid at about 60Hz
TC Verify:_____

i. On the Cryocooler load simulator, record the RMS voltage
CryoBalance RMS Volts:_____ V

j. Send the command "/ICRYOBAL 0". Verify that ICRYOBAL on the SOH Spectrometer Power page reads 0
TC Verify:_____

k. Send the command "/ICRYOMAIN 0". Record the value of HP#2 Current
HP#2 Current:_____

4.5 Cold Plate Heater

a. Set the HP current limit up: "Set HPA1=6"

b. Record the following values from the SOH Spec power page:

ICP1T_____
ICP2T_____
ICT1T_____
ICT2T_____
ITST_____

c. Start the procedure "ISPEC_CPHTR_ON". Record the following values off the SOH Spec Power page:

ICPPWR_____
IDPU_P100V_____
ICPHTR1_____
ICPHTR2_____
ICPHTR3_____
HP#1 Current_____

d. Verify that the CP heater LEDs come on on the load simulator GSE
TC Verify_____

e. Start the procedure "ISPEC_CPHTR_OFF". Verify that IDPU_P100V is set to zero volts (+/- 5V). TC Verify_____

f. Send the command "/IDPUNORMAL". Verify that the IDPU_MODE on the SOH Executive page reads "NORMAL" TC Verify:_____

4.6 Detector Interface

a. Connect the BN pulser to the Spectrometer Event Simulator input. Set amplitude to 900 00 x 1000 attenuation (all attenuator switches up), positive pulse, about 270Hz, 0.2us rise time, 200us fall time, square-top pulse with maximum width adjustment.

b. On SSRGSE, select the "Spectra" and "Monitor rates" displays. Arrange the displays on the screen to show all three plots. On the Spectra display select detector 1, Log counts.

c. Verify that all 9 detectors are making events at about the same rate (about 272 counts) on front and rear fast and slow counters. Verify that all 9 detectors have 99% live time front and rear: TC Verify:_____

d. Verify on the Spectra plot that there are events in a single bin for front and rear (FWHM about 1 for Front, about 3 for rear). Record the central bin number in the table below.

e. Select the next detector on the Spectra display and repeat step d for each detector.

Gain Table

Bin	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Front									
Rear									

f. Decrease the amplitude of the BN pulser until the Slow rates in each detector are decreased by 50%. Record the pulser amplitude for each segment in the table below

Slow Threshold Table

Ampl	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Front									
Rear									

g. Set the BN pulser to about 120 00 x 10 (only the last attenuation switch up). For each detector rear segment, adjust the pulser amplitude until the counts are half in the low gain and half in the high gain spectra on the SSR GSE. Record the amplitude setting below.

Crossover Pulser Amplitude

Ampl.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Rear									

4.7 Spectrometer Attenuator Actuators

a. Display ATTEN.srd

b. Set to engineering mode. Send the command "/IDPUENGIN". Verify that the IDPU_MODE on the SOH Executive page shows "Engineering"
TC Verify:_____

c. Set the Load Simulator GSE switches to LOCKED, Valve CLOSED, IN1, OUT2, status=RELAXED. Verify that this status is reflected in the SOH display. TC Verify:_____

d. Toggle the status switches on the load simulator GSE to TENSE. Verify that this is reflected on the SOH display. Then toggle the switches back to RELAXED. TC Verify_____

e. Start the procedure "iatt_lockdown". Verify that the LOCKDOWN LED lights.TC Verify:____

f. Toggle the LOCKDOWN status switch on the load simulator GSE to UNLOCKED. Verify that the shutter LOCK status reads "UNLOCKED"
TC Verify:_____

g. Start the procedure "iatt_out1". Verify that the OUT1 LED lights on the load simulator GSE. Then move the status switch to OUT1. Verify that the SHUTTER1 status reads "OUT" TC Verify:_____

h. Start the procedure "iatt_in1". Verify that the IN1 LED lights on the load simulator GSE. Then move the status switch to IN1. Verify that the SHUTTER1 status reads "IN" TC Verify:_____

i. Start the procedure "iatt_unstick1". Verify that the UNSTICK1 LED lights on the load simulator GSE TC Verify:_____

j. Start the procedure "iatt_in2". Verify that the IN2 LED lights on the load simulator GSE. Then move the status switch to IN2. Verify that the SHUTTER2 status reads "IN" TC Verify:_____

k. Start the procedure "iatt_out2". Verify that the OUT2 LED lights on the load simulator GSE. Then move the status switch to OUT2. Verify that the SHUTTER2 status reads "OUT" TC Verify:_____

l. Start the procedure "iatt_unstick2". Verify that the UNSTICK2 LED lights on the load simulator GSE TC Verify:_____

m. Start the procedure "ispec_valve". Verify that the valve LED on the load simulator GSE lights. TC Verify:_____

n. Toggle the status switch for the valve to OPEN. Verify that the switch status on the display reads OPEN. TC Verify:_____

o. Start the procedure "ispec_valveb". Verify that the backup valve LED on the load simulator GSE lights. TC Verify:_____

4.8 RAS Shutter

a. If not engineering mode, send the command "/IDPUENGIN". Verify that the IDPU_MODE on the SOH Executive page shows "Engineering"
TC Verify:_____

b. Start the procedure "iras_openshutter". In the course of the procedure, the monitor the following:
- On the Actuator page, IDPU_ACTV goes to ≈10V. IDPU_ACTV:_____
- HP#2 Current goes to ≈1A HP#2 Current:_____
- RAS shutter LED on load simulator lights Engineer Verify:_____

c. Start the procedure "iras_openshutterb". In the course of the procedure, the monitor the following:
- On the Actuator page, IDPU_ACTV goes to ≈10V. IDPU_ACTV:_____
- HP#2 Current goes to ≈1A HP#2 Current:_____
- RAS backup shutter LED on load simulator lights Engineer Verify:_____

d. Send the command "/IDPUNORMAL". Verify that the IDPU_MODE on the SOH Executive page reads "NORMAL" TC Verify:_____

4.9 Imager Functional

a. Verify nominal Imager telemetry on each of the 4 Image mode telemetry displays (SAS1, SAS2, SAS2, RAS) _____OK

b. Stop the ADP by sending "/IADPSTOP". Verify LEDs on simulators stop flashing. _____OK

c. Push the "Save to File" button on SSRJ.

d. Re-start the ADP by sending "/IADPRUN". Verify LEDs on simulators start flashing again. _____OK

e. Wait 60 seconds, then send stop recording by pushing the "Save to File" button again _____OK

f. On SSRJ, push the Replay File button and select the most recent file (just collected). File Name:_____

g. Verify the data in the file contains PF data and nominal images. _____OK

4.10 Imager Heaters

a. Display Thermal/.srd TC Verify_____

b. Start "IMGR_TEST_HTRS". Verify:

- UGTPWM =Primary
- LGTPWM = Primary
- IRASPWM = Enabled TC Verify_____

c. Verify that, after a few minutes, the IRASHTRV, IUGTHTRPV, and ILGTHTRPV read 28V periodically TC Verify_____

d. Verify that the primary UGT and LGT, and the RAS heater LEDs are flashing on the load simulator GSE. TC Verify_____

e. The command script will automatically shift to the backup heaters. Verify:

- UGTPWM =Backup
- LGTPWM = Backup
- IRASPWM = Enabled TC Verify_____

f. Verify that the backup UGT and LGT, and the RAS heater LEDs are flashing on the load simulator GSE. TC Verify_____

g. The system will automatically turn off the heaters. Verify that UGT, LGT, and RAS heater LEDs stop flashing. TC Verify_____