



**Imager Functional Tests Procedure**  
HSI-MI&T-IMGR-FT

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# HESSI Imager Functional Test Procedure

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## 1 Introduction

### 1.1 Purpose

The following paper describes a semi-automatic functional test of the IDPU and RAS and SAS Aspect Data Processor of the Imager on the HESSI spacecraft. The test assumes that the IDPU, IPC and PD will be mounted and tested together with the flight harness.

The purpose is to verify that the IDPU and the spacecraft communicate properly, that the SOH telemetry is properly displayed on the ITOS pages, and that the ITOS system can reliably send commands to the IDPU through the spacecraft. In addition, test data is sent from the IDPU through the SSR and transmitted through ITOS and routed to a display computer.

### 1.2 Outline

- Power on procedure
- Performs functional RAS thermal control tests
- RAS shutter functional test
- RAS and SAS are fully connected on the spacecraft.
- Parameter Files are loaded into the ADP.
- SAS and RAS background profiles are taken.
- SAS and RAS internal test modes are tested.
- RAS determination of stars is tested.
- RAS earthshine is tested..

### 1.3 Operator Information

Date and Time Run: \_\_\_\_\_  
Test Lead: David Curtis / Alex Zehnder  
Time Estimate: 4 hours

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## 1.4 Setup Requirements

Item	Setup	Result
1	IDPU, IPC, ADP	
2	RAS	
3	SAS	
4	RAS Baffle Covered with LED Cover	
5	LED Cover connected to GSE	
6	RAS cooling EGSE	

## 1.5 Safety Requirements

Item	Requirement	Result
1	HV Enable Plug Installed	n/a
2	Actuator Enable Plug Installed	

## **2 Test Procedure**

### **2.1 Power On/ Initialization**

<b>Step</b>	<b>Procedure</b>	<b>Result</b>
1.	<b>Power on and configure the spacecraft bus</b>	
1.1	Power On Spacecraft	
1.2	start ssr_on	
1.3	start sc_ssr_mkpart	
1.4	start inst_to_4mbps	
1.5	Set Spacecraft TAC Supply for 6A minimum	
2.	<b>Power On IDPU</b>	
2.1	Enter SC_IDPUON	
2.2	Page igseexec	
2.3	Verify that Reset Counter is Cleared, Mode=Normal	
2.4	Record Version	
2.5	Verify Executive Status Nominal	
2.6	page igseimgt	
2.7	cfomon ad590 (monior RAS temperature)	
2.8	Verify IDPUT between -30C and +40C. Record Temp.	
2.9	Verify IPCT between -30C and +40C. Record Temp.	
2.10	Verify PDT between -30C and +40C. Record Temp	
2.11	Verify IRAS1T between -30C and +18C Record Temp	
2.12	Verify IRAS2T between -30C and +18C Record Temp	
3	<b>Power On Switched 28 for Heaters</b>	
3.1	Start SC-IDPU_SPWRON to turn ON Switched Power	
4.	<b>Comments Problems</b>	

**2.2 RAS Thermal Control Test**

<b>Item</b>	<b>Description</b>	<b>Result</b>
1.	<b>Enable</b>	
	page igseimgt	
1.1	Record IRAS1T Temperature	
1.2	Record IRAS2T Temperature	
1.3	Verify Temperature using IRMAN	
1.4	/IDPUARM HTR	
1.5	Verify Heater Enable	
2.	<b>Test RAS Heaters</b>	
2.1	/IPWMMODE CP=0,RAS=ON,UGT=Off,LGT=Off	
2.2	Verify RAS Heater mode	
2.3	/IRASSETPT Value=18	
2.4	Verify RASPWR periodically record value	
2.5	Verify IRAS1T Climbs several degrees.	
2.6	Verify IRAS2T Climbs several degrees.	
2.7	/IPWMMODE CP=0,RAS=OFF,UGT=Off,LGT=Off	
2.8	Verify RAS Heater Disabled	
2.9	Verify RASHTRV is 0	

**2.3 RAS Shutter Test**

<b>Item</b>	<b>Description</b>	<b>Result</b>
1.	<b>Switch to Engineering Mode</b>	
	Page igseexec	
1.1	/IDPUENGIN to enable actuators	
2	<b>Verify Shutter Primary</b>	
	Page igseact	
2.1	Start IRAS_OPENSHUTTER	
2.2	Verify Actuator Voltage	
2.3	Verify Current Draw	
2.4	Verify Shutter Opened by Listening	
2.5	Reset Shutter Mechanism	
3.	<b>Verify Shutter Backup</b>	
3.1	Start IRAS_OPENSHUTTERB	
3.2	Verify Actuator Voltage on IACTV	
3.3	Verify Current Draw on LD_CURR	
3.4	Verify Shutter Opened by Listening	
3.5	LEAVE Shutter Mechanism OPEN	
4.	<b>Switch to Normal Mode</b>	
4.1	/IDPUNORMAL to return to normal mode.	

**2.4 Startup Procedure of ADP**

<b>Item</b>	<b>Description</b>	<b>Result</b>
1	<b>ADP Startup Procedure</b>	
1.1	<b>Execute POWER ON procedure (section 2.1)</b>	
1.1	<b>page iadpdigital (displays ADP SOH)</b>	
1.2	page sssystem	
1.3	START v6s0r0_002 (SAS/RAS images high rate)	
1.4	<b>Verify that at 4MBPS else send procedure inst_to_4mbps</b>	

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1.5	/iadprun (Starts ADP with parameter file),	
1.6	Check on iadpdigital page that SAS and RAS SOH change	
1.7	wait 5 min before rating data, check iadpdigital page for data flow	
1.8	Record IRAS1T Temperature	C
1.9	Record IRAS2T Temperature	

### 2.5 General Procedure to Acquire Data from ADP

This procedure must be executed for each of the functional test listed below. be sure, that ADP and RAS were at least 5 minuets running, record temperature at 1.6/7 above

Item	Description	Result
1	<b>General Data Acquisition Procedure</b>	
1.1	start <a href="#">Parameter file procedure</a> Parameter files are uploaded and stored in sunny:/psi/IandT/CmdFiles <ul style="list-style-type: none"> <li>• Parameter files (detailed description see document HSI-MI&amp;T-IMGR-FTD), a short list follows</li> <li>• Low Rate Background/ Sensitivity tests: <b>v6s0r0_001</b> (images of SAS/RAS)</li> <li>• High Rate Background/ Sensitivity tests: <b>v6s0r0_002</b> (images of SAS/RAS)</li> <li>• Offset determination: <b>v6s3r6_001</b> (offset images of SAS/RAS)</li> <li>• Low Rate internal LED tests: <b>v6s4r4_001</b> (images of SAS/RAS)</li> <li>• High Rate internal LED tests: <b>v6s4r4_002</b> (images of SAS/RAS)</li> <li>• Event mode with Earth shine: <b>v6s0r0es_001</b> (turn on RAS GSE! ) (No SAS, RAS event/images)</li> <li>• Event mode with Earth shine: <b>v6s0r0es_001</b> (turn on RAS GSE! ) (SAS images and RAS event/images)</li> <li>• Communication test modes: <b>v6s6r7_001</b></li> </ul>	
1.2	start imgr_ssr_data to collect and store SSR data <ul style="list-style-type: none"> <li>• Set run time to at least 60 sec</li> <li>• After ADP stops play back file to HESSI SSR GSE for each ADP Image for visual inspection (2.4) or dump it to file</li> <li>• Note: The procedure restarts the RAS after stopping immediately</li> <li>• Note: Procedure will wait for confirmation to playback captured data. Confirm at 2.7</li> </ul>	
1.3	RECORD acquired Data: on SSRGSE, do the following <ul style="list-style-type: none"> <li>• SSRJ (if program is not already started)</li> <li>• Select &gt;512K buffer</li> <li>• TCP Client OPEN</li> <li>• Press [Save to File] ON</li> </ul>	
1.4	On SSRGSE, Press [Save to File] OFF	
1.5	Record saved filename :	
2	<b>Transfer data via FTP and rep</b>	
2.0	FTP data to sunny:/tmp/psi On sunbeam as hessiops type cd /tmp/psi ftp -n itos1 FTP> user hessisc password: hessisc FTP> cd /home/hessisc/ssr FTP> bin FTP> get <data>.ssr	

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	FTP>bye	
2.1	Transfer Data Files from sunbeam to sunny on sunbeam as hessiops: cd /tmp/psi rcp <data>.ssr sunny: /tmp/psi	
3	<b>Visual Inspection of data</b>	
3.1	Visual inspection on of Data: on SSRGSE do the following: <ul style="list-style-type: none"> <li>• Change dir to itos1:hessisc/ssr</li> <li>• SSRJ</li> <li>• Select ADP Image ON</li> <li>• TCP Client OPEN</li> <li>• Aquire ONE TIME</li> <li>• Save to File OFF</li> <li>• Select &gt;125K buffer</li> <li>• Select SAS0, or SAS1, or SAS2, or RAS Images for visual inspection</li> <li>• Print Plot of SAS0, or SAS1, or SAS2, or RAS Data</li> </ul>	

### 3 Functional Tests

#### 3.1 RAS and SAS Dark Level/Sensitivity test

Item	Description	Result
0	<b>Ensure that RAS was &gt;5 min powered ON to stabilize in temperature , RAS must be cooled with air cooler to about 17C</b>	
1	<b>Background and Noise Measurement of SAS and RAS (low rate)</b>	
1.1	Record IRAS1T Temperature	C
1.2	Record IRAS2T Temperature	C
1.3	Turn OFF all S/C stimuli	
1.4	Run General Procedure 2.5 with PF: v6s0r0_001 (low rate) Run Time 60sec	
1.5	record file name:	
2	<b>Background and Noise Measurement of SAS and RAS (high rate)</b>	
2.1	Record IRAS1T Temperature	C
2.2	Record IRAS2T Temperature	C
2.3	Turn OFF all S/C stimuli	
2.4	Run General Procedure 2.5 with PF: v6s0r0_002 (high rate) Run time 30sec	
2.5	record file name:	
3	<b>Switch on S/C subsystems 1</b>	
3.1	Record IRAS1T Temperature	C
3.2	Record IRAS2T Temperature	C
3.3	Turn ON S/C function (TBD):	
3.4	Run General Procedure 2.5 with PF:v6s0r0_002 (high rate) Run time 30sec	
3.5	record file name:	

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4	<b>Switch on S/C subsystems 2</b>	
4.1	Record IRAS1T Temperature	C
4.2	Record IRAS2T Temperature	C
4.3	Turn ON S/C function:	
4.4	Run General Procedure 2.5 with PF: v6s0r0_002 (high rate)	
4.5	record file name:	
4	<b>Switch on S/C subsystems 3</b>	
5.1	Record IRAS1T Temperature	C
5.2	Record IRAS2T Temperature	C
5.3	Turn ON S/C function:	
5.4	Run General Procedure 2.5 with PF: v6s0r0_002 (high rate)	
5.5	record file name:	

### 3.2 RAS and SAS Offset Level Mode

Item	Description	Result
0	<b>Ensure that RAS was &gt;5 min powered ON to stabilize in temperature , RAS must be cooled with air cooler to about 17C</b>	
1.1	Record IRAS1T Temperature	C
1.2	Record IRAS2T Temperature	C
1.3	Turn OFF all stimulus	
1.4	Run General Procedure 2.4 with PF: v6s3r6_001	
1.5	record file name:	

### 3.3 RAS and SAS Internal LED Test

Item	Description	Result
0	<b>Ensure that RAS was &gt;5 min powered ON to stabilize in temperature , RAS must be cooled with air cooler to about 17C</b>	
1.1	Record IRAS1T Temperature	C
1.2	Record IRAS2T Temperature	C
1.3	Turn OFF all stimulus	
1.4	Run General Procedure 2.4 with PF: v6s4r4_001	
1.5	record file name:	

### 3.4 RAS and SAS Communication Test

Item	Description	Result
0	<b>Ensure that RAS was &gt;5 min powered ON to stabilize in temperature , RAS must be cooled with air cooler to about 17C</b>	
1.3	Turn OFF S/C all stimulus	
1.4	Run General Procedure 2.4 with PF: v6s6r7_001	



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1.5	record file name:	
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### 3.5 SAS Limb and RAS Star Test with Earth Shine

Item	Description	Result
0	Ensure that RAS was >5 min powered ON to stabilize in temperature , RAS must be cooled with air cooler to about 17C	
1.1	Record IRAS1T Temperature	C
1.2	Record IRAS2T Temperature	C
1.3	Turn ON RAS stimulus <ul style="list-style-type: none"> <li>• Connect Laser Banana Plugs in Laser GSE (Color)</li> <li>• Connect Lemo cable to Earth Shine GESE</li> <li>• Set Switches of Laser GSE to Rate=0.1, delta t to 20msec</li> <li>• Switch on Laser GSE (up= Battery, down External max=4.5V)</li> <li>• Switch on left and middle switch of Earth shine GSE</li> </ul>	
1.4	Run General Procedure 2.4 with PF: v6s0r0ES_002	
1.5	record file name:	
2.0	<b>Turn of LASER GSE (or change batteries every day)</b>	

## 4 Turn OFF

Item	Description	Result
1	<b>Instrument OFF</b>	
1.1	Start IMGR_OFF	
1.2	Start SC_IDPUOFF	
2	<b>Spacecraft OFF</b>	
2.1	SSR OFF	
2.2	S/C Power OFF	
3.0	<b>IMPORTANT: after scientists have retrieved *.ssr files from the /tmp/psi delete those files from /tmp/psi on both sunbeam and sunny</b>	

**Procedure Complete**

Date/Time: \_\_\_\_\_

## 5 Problems / Notes

System	Description of Problem