WARNING: THIS PROCEDURE CONTAINS HAZARDOUS OPERATIONS

HESSI Spacecraft BUS FUNCTIONAL

HSI_MIT_012F
2001-Jan-09
Dave Curtis

30 SW Safety Approval:_____ _____
Date

As Run on: _____ (Date/Time)
By _____ (Test Conductor)

Document Revision Record

Rev.	Date	Description of Change
D	2000-11-14	Mark RF sections Hazardous, indicate safety requirements
E	2000-12-29	• Page 15. Define clear area and change light to amber as part of the START OF HAZARDOUS OPERATIONS. • Page 15. Prior to step 3.7.1, add a WARNING that Antennas will be radiating and could result in personnel injury. • Page 18, Change light to Green and take down the clear area as part of the END OF HAZARDOUS OPERATIONS <u>30SWSES General Comments</u> Cover Page. Add 30 SW Safety approval signature block on cover page(EWR 127-1, Chapter 6, Appendix 6B, para. 6B2.2a.). 2.1 List/Identify any tools/equipment that may be required to run this procedure (EWR 127-1, Chapter 6, Appendix 6B, para. 6B.2.8). 2.2 List/Identify required personnel protective equipment(PPE) (EWR 127-1, Chapter 6, Appendix 6B, para. 6B.2.7). 2.3. Identify by function/title, the number of essential personnel required to accomplish hazardous steps (EWR 127-1, Chapter 6, Appendix 6B, para. 6B.2.9). 3.7. Specify the enforced safety clear zone(control area) (EWR 127-1, Chapter 6, Appendix 6B, para. 6B.2.14c.). 3.7. Add the appropriate emergency and backout steps per EWR 127-1, Chapter 6, Appendix 6B, para., 6B.2.15. <u>Specific Comments</u> 1.3 Pg 5 - Provide a brief description of the hazards involved in the tasks to be performed. Identify the facility (by building number) where this procedure will be performed.(EWR 127-1, Chapter 6, Appendix 6B, para., 6B.2.3). 3.7. Pg 15, sec 3.7 - Prior to the start of the hazardous steps, define the clear area, add steps to change the area warning light to amber, and make the appropriate PA announcement(EWr 127-1, Chapter 6, Appendix 6B, para. 6B.2.14b.). 3.7.3 Pg 18 - Add steps at the end of the hazardous operations to make the appropriate PA announcement, change the area warning light, and open the safety clear area.(EWr 127-1, Chapter 6, Appendix 6B, para. 6B2.14). 4. Pg 20 – If appropriate, add a step to remove the FEP or Transmit enable plug from the spacecraft.
F	2001-01-09	NASA SAFETY REVIEW COMMENTS Page 5 Add: Item 1.3 and State specific hazard personnel will be exposed to. Page 15 item 3.7 Insert: A crew briefing shall be made prior to start of hazardous ops. Page 15 item 3.7 Add/Insert: List or Number of Essential Personnel required to support the hazardous operation Page 15 Item 3.7 Add: Task leader verify all equipment needed to perform task is on hand. All personnel are trained and ready to proceed. Page 15 Item 3.7 Add: Establish a Safety Control area Page 15 item 3.7 Insert: Turn on flashing amber light

		(No P. A. in Bldg. 836 Lab 1) Page 15 item 3.7 Insert: In Bldg 836, Obtain NASA Safety concurrence to proceed with HAZARDOUS Operations Page 18 Add a step, Denoting completion of hazardous operation and (In Bldg 836) obtain NASA Safety concurrence to return area to normal operations, turn amber light off. (No P. A. in Bldg. 836 Lab 1) Page 21 Add: EMERGENCY Instructions (power down, etc.)

Western Range/NASA Safety:_____ _____
Date

Project Manager: _____ _____
Peter Harvey Date

System Engineer: _____ _____
David Curtis Date

QA: _____ _____
Ron Jackson Date

1. INTRODUCTION

1.1 Purpose

This document establishes the Functional Test Procedures for the HESSI Spacecraft Bus. The purpose of this procedure is to verify functional operation of the bus.

1.2 Scope

This procedure will be performed during integration testing of the spacecraft.

1.3 Description of Hazards Contained in this Procedure

Among other things, the Spacecraft Functional test verifies the RF capabilities of the HESSI spacecraft by transmitting on the forward and aft antennae. This procedure will be run in both buildings 836 and 1555. The power of this transmission is hazardous while very close to the patch antennae, so we install RF hats to both attenuate the signal and feed it into the spacecraft GSE.

Transmitting without the RF hats installed is **UNSAFE** to both personnel within a meter of the top and bottom of the spacecraft, and is possibly harmful to the transmitter itself due to reflections in the local environment.

2. SETUP

2.1 Tools Required

Equipment Item	Used for
Spacecraft GSE Racks Power Control PC Sun Workstations (2) Battery Air Conditioner	Turn On
Micrometer	IAD Motor Test
Fine Sun Sensor (FSS) Stimulator	FSS Test
Antenna Hats (4)	Telecommunications Test

2.2 Protective Equipment

None required.

2.3 Essential Personnel Required

Personnel who are authorized and able to run the hazardous tests in this procedure are as follows:

David Curtis (Systems Engineer), Peter Harvey (Project Manager), and Manfred Bester (Operations Scientist). Only one is needed to run the test.

2.4 Test Setup

The spacecraft shall be setup and powered on using the HSI_SPACECRAFT_ON (HSI_MIT_010) procedure with either the Flight Enable Plug (FEP) or Transmit Enable Plug (TEP) plug installed.

3. TEST PROCEDURE

3.1 IAD Motor 1 Test

a. Record the measured starting position of the yoke 1 (+X) above the spacecraft deck in the table below.
b. Record the IAD1 motor position from the PACI display page.
c. Enable IAD1 motor power by typing "/PCBSETSWITCH PCBIAD1, ON" from the ITOS STOL prompt.
d. Command the motor to move 32 steps, about 1/8 turn of the shaft, by typing "/PCBDRIVEIAD IAD1, STEPS=32, CLOCKWISE" from the ITOS STOL prompt.
e. Record the IAD1 motor position from the PACI display page
f. Command the motor another 352 steps for a total of 384 (0.1" of travel) by typing "/PCBDRIVEIAD IAD1, STEPS=352, CLOCKWISE" from the ITOS STOL prompt.
g. Record the new location measured from the spacecraft upper deck to the top of the yoke.
h. Record the IAD1 motor position from the PACI display page
i. Command the motor back 384 steps by typing "/PCBDRIVEIAD IAD1, STEPS=384, COUNTERCLOCK" from the ITOS STOL prompt.
j. Record the new location measured from the spacecraft upper deck to the top of the yoke.
k. Record the IAD1 motor position from the PACI display page
l. Disable power to the IAD1 motor by typing "PCBSETSWITCH PCBIAD1, OFF" from the ITOS STOL prompt.

IAD Motor 1 Measurements

Steps	Distance (in.)	IAD1 Position
0		
32 CW		
352 CW		
384 CCW		

3.2 IAD Motor 2 Test

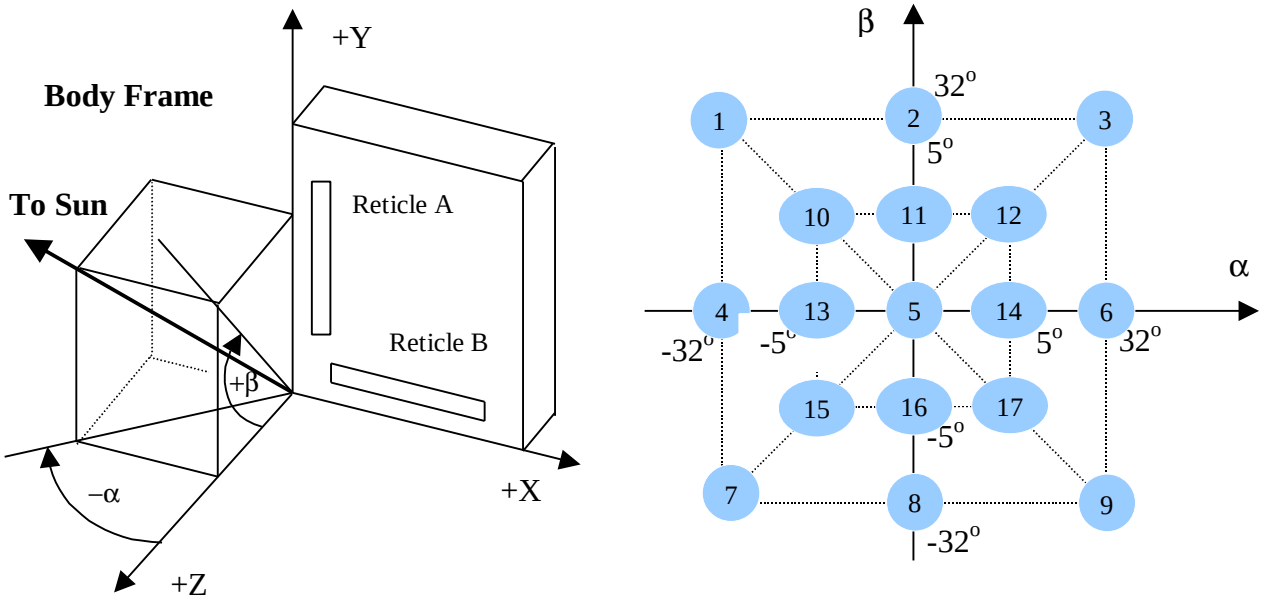
a. Record the measured starting position of the yoke 2 (+Y) above the spacecraft deck in the table below.
b. Record the IAD2 motor position from the PACI display page.
c. Enable IAD1 motor power by typing "/PCBSETSWITCH PCBIAD2, ON" from the ITOS STOL prompt.
d. Command the motor to move 32 steps, about 1/8 turn of the shaft, by typing "/PCBDRIVEIAD IAD2, STEPS=32, CLOCKWISE" from the ITOS STOL prompt.
e. Record the IAD2 motor position from the PACI display page
f. Command the motor another 352 steps for a total of 384 (0.1" of travel) by typing "/PCBDRIVEIAD IAD2, STEPS=352, CLOCKWISE" from the ITOS STOL prompt.
g. Record the new location measured from the spacecraft upper deck to the top of the yoke.
h. Record the IAD2 motor position from the PACI display page
i. Command the motor back 384 steps by typing "/PCBDRIVEIAD IAD2, STEPS=384, COUNTERCLOCK" from the ITOS STOL prompt.
j. Record the new location measured from the spacecraft upper deck to the top of the yoke.
k. Record the IAD2 motor position from the PACI display page
l. Disable power to the IAD2 motor by typing "PCBSETSWITCH PCBIAD2, OFF" from the ITOS STOL prompt.

IAD Motor 2 Measurements

Steps	Distance (in.)	IAD2 Position
0		
32 CW		
352 CW		
384 CCW		

3.3 Fine Sun Sensor Functional

a. Set FSE sensivity Control to “Stimulator”. Using the FSS stimulator, input the following FSS α and β angle coarse bits. Set the ATA bits for both alpha and beta of the stimulator to HIGH. For each entry in the table below, verify the FSS expected sun vector. Refer to the figure below. The FSS coordinates are the same as the spacecraft coordinates.



Fine Sun Sensor Phasing

No.	Stimulator Input		Angle (deg)	Expected			Measured (±0.02)		
	FSS α input	FSS β input	(α, β)	FSS X	FSS Y	FSS Z	FSS X	FSS Y	FSS Z
1	000001	100011	(-32, 32)	-0.47	0.47	0.75			
2	010000	100000	(0, 32)	0.00	0.53	0.85			
3	100011	100011	(32, 32)	0.47	0.47	0.75			
4	000000	010000	(-32, 0)	-0.53	0.00	0.85			
5	010000	010000	(0, 0)	0.00	0.00	1.00			
6	100000	010000	(32, 0)	0.53	0.00	0.85			
7	000001	000001	(-32, -32)	-0.47	-0.47	0.75			
8	010000	000000	(0, -32)	0.00	-0.53	0.85			
9	100011	000001	(32, -32)	0.47	-0.47	0.75			
10	010111	110110	(-5, 5)	-0.087	0.087	0.9924			
11	010000	110110	(0, 5)	0.00	0.087	0.9962			
12	110110	110110	(5, 5)	0.087	0.087	0.9924			
13	010111	010000	(-5, 0)	-0.087	0.00	0.9962			
14	110110	010000	(5, 0)	0.087	0.00	0.9962			
15	010111	010111	(-5, -5)	-0.087	-0.087	0.9924			
16	010000	010111	(0, -5)	0.00	-0.087	0.9962			
17	110110	010111	(5, -5)	0.087	-0.087	0.9924			

The FSS inputs are entered with the 6 right hand switches (after the ATA switch); the left hand switches shall be set to zero (down). α is the top row of switches.

3.4 Coarse Sun Sensor Phasing

a. Using the GSE CSS simulators, command the following CSS channels and verify the measured CSS sun vector with the expected CSS sun vector. Refer to Figure 4-2 below. Table 4-11 lists the following CSS naming conventions:

Table 4-11. CSS Naming Conventions

No.	Physical CSS	CSS Name	PACI Channel
1	+X, upper	CX11	TPACSSCH1
2	+X, lower	CX10	TPACSSCH2
3	+Y, upper	CY11	TPACSSCH3
4	+Y, lower	CY10	TPACSSCH4
5	-X, upper	CX01	TPACSSCH5
6	-X, lower	CX00	TPACSSCH6
7	-Y, upper	CY01	TPACSSCH7
8	-Y, lower	CY00	TPACSSCH8

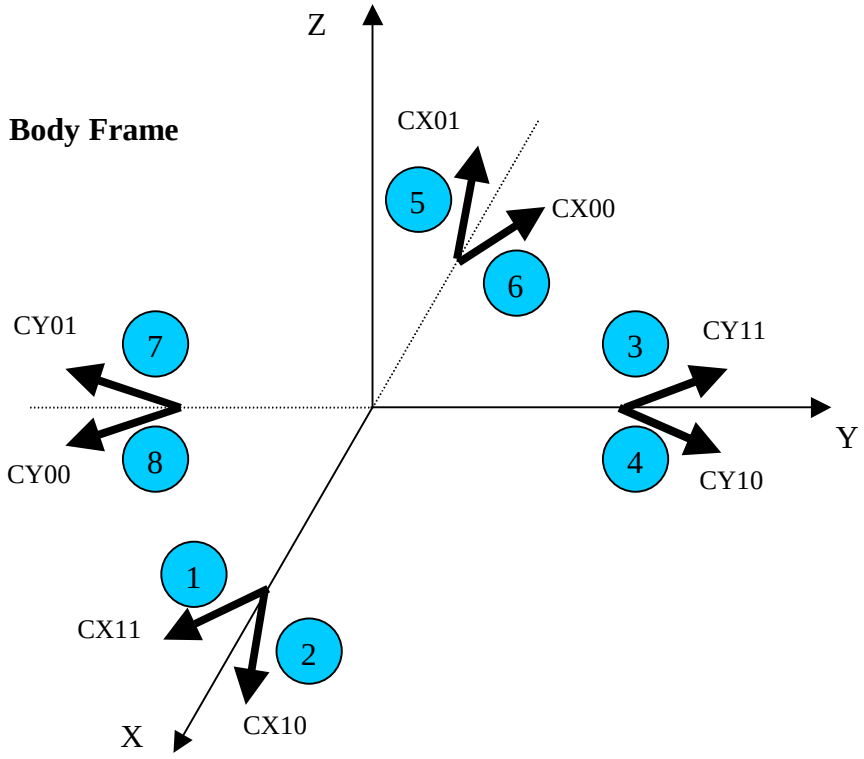


Figure 4-2. Coarse Sun Sensor Phasing

b. Command the following CSS channels one at a time and verify the measured CSS sun vector with the expected CSS sun vector in Table 4-12. For each channel specified, set the GSE input −1300 µA.

Table 4-12. CSS Phasing, one channel at a time

No.	CSS Channel	CSS Input Current (μA)	Expected Sun Vector			Measured Sun Vector (±0.01)		
			CSS X	CSS Y	CSS Z	CSS X	CSS Y	CSS Z
1	CX11	-1300	0.8660	0.00	0.50			
2	CX10	-1300	0.7660	0.00	-0.6428			
3	CY11	-1300	0.00	0.8660	0.50			
4	CY10	-1300	0.00	0.7660	-0.6428			
5	CX01	-1300	-0.8660	0.00	0.50			
6	CX00	-1300	-0.7660	0.00	-0.6428			
7	CY01	-1300	0.00	-0.8660	0.50			
8	CY00	-1300	0.00	-0.7660	-0.6428			

TC	

3.5 Torque Rod Compensation Matrix

a. From ITOS, start the torque rod compensation matrix test procedure by typing, “start tqrod_comp” from the ITOS STOL prompt. Verify that the magnetic filed responds to each torque bar.

b. Rename the output file "tqrod.comp.plt" in hessiops /usr/tmp to "trqrod_comp_YYMMDD.plt" (e.g. trqrod_comp_000311.plt). Verify that the report file says "PASSED" _____OK

c. Record filename here

_____

3.6 Telecommunications Test

a. Verify that the antenna hats (all 4) are installed on the spacecraft antennas and properly cabled to the GSE RF Rack

b. Start the following ITOS script to plot RF Uplink telemetry

"start PLOT_RF_UPLINK"

c. Configure the RF uplink from the PC GSE as follows

1. If not started, bring up the "RF Control" window
2. Configure the PC GSE RF switch for the Forward Receive antenna.
   - On the RF Control window, click on the "Forward" button at least 2 times to FWD.

d. Configure the HP-E4422B S-band Signal Generator in the RF rack as follows (may be stored as configuration #1):

3. Set the HP-E4422B to "LOCAL" (hit LOCAL key)
4. Set the center frequency to 2039.645833 MHz.
5. Set the output power to –37 dBm.
6. Set the Frequency Modulation (FM) Deviation to 240 kHz and Phase Modulation (PM) deviation to 3.1 rad.
7. Set the FM Source to EXT2 DC
8. Set the PM source to EXT1 AC
9. Set Mod on/off = ON
10. Disable PM and enable FM.

e. Configure the HP-33120A Sweep Generator as follows

1. Set waveform to triangle wave.
2. Adjust output level to 1.0 V peak-to-peak.
3. Set the frequency to 0.133 Hz.
4. On the PC GSE "I&T Diagnostic" Window, select Uplink Path = Transponder
5. Verify that the Avtec PTP is configured per the Spacecraft Power-On procedure
6. Give ITOS a "resync" command

3.6.1 Forward Receive Functional Test

3.6.1.1 Forward Receive Carrier Acquisition

a. Enable the S-band signal generator RF output (Push RF On button).

b. Observe from telemetry the time difference between the point at which sweep generator is enabled (indicated by the loop stress) and the time at which carrier lock is indicated. Record this value. It should not be greater than 30 seconds.

Time to lock carrier: _____ Sec (<30 seconds)

c. Continue to monitor telemetry for 30 seconds and ensure that the command receiver continues to track the swept Continuous Wave (CW) signal.

TC Verify _____

d. Disable the S-band signal generator RF output and ensure that the command receiver indicates an unlocked condition in telemetry.

TC Verify _____

3.6.1.2 Forward Receive Command Acquisition and Tracking

a. Enable the S-band signal generator RF output. Enable Modulation.

b. With the command receiver locked, disable the uplink sweep by disabling the FM input on the sweep generator. This must be done when the sweep is near the nominal frequency (close to zero loop stress) or the command reciever will lose lock. Verify that the command receiver remains locked.

TC Verify _____

c. Enable the PM input to the signal generator.

d. Monitor telemetry and ensure that sub-carrier lock is achieved.
Sub-carrier Lock Status = Locked

TC Verify _____

e. Continue to monitor the carrier and sub-carrier lock status and ensure that both indicate a lock condition for 30 seconds.

TC Verify _____

f. Send "cmdblasthcd" proceedure to uplink 64 commands. Verify that Command Count increases to 64, and the Code Block Error counter is zero

TC Received _____ Code Block Errors_____

TC Verify _____

g. Using the front panel increment button on the RF signal generator, sweep the modulated uplink up to 2039.795833 MHz (+150kHz) in steps of 1KHz. Verify that the carrier and sub-carrier remain locked.

TC Verify _____

h. Send "cmdblasthcd" procedure to uplink 64 commands. Verify that Command Count increases to 64, and the Code Block Error counter is zero

TC Received _____ Code Block Errors_____

TC Verify _____

i. Using the front panel decrement button on the RF signal generator, sweep the modulated uplink up to 2039.49833 MHz (-150kHz) in steps of 1KHz. Verify that the carrier and sub-carrier remain locked.

TC Verify _____

j. Send "cmdblasthcd" proceedure to uplink 64 commands. Verify that Command Count increases to 64, and the Code Block Error counter is zero

TC Received _____ Code Block Errors_____

TC Verify _____

k. Using the front panel increment button on the RF signal generator, sweep the modulated uplink back to the nominal value 2039.645833 MHz in steps of 1KHz. Verify that the carrier and sub-carrier remain locked.

TC Verify _____

3.6.1.3 Forward Receive Signal Fade

a. Decrease the RF signal generator output power level until the receiver lock telemetry indicates unlocked status. Record the power level where the receiver loses lock. (Typically about -69 dBm)

RECEIVER LOSES LOCK POWER LEVEL _____ DBm

b. Increase the RF signal generator output +10dB above recorded setting. If system does not relock, repeat step 3.6.1.2.b.

c. Send "cmdblasthcd" proceedure to uplink 64 commands. Verify that Command Count increases to 64, and the Code Block Error counter is zero

TC Received _____ Code Block Errors_____

TC Verify _____

d. Return the RF signal generator output to -37dB

3.6.2 Aft Receive Functional Test

3.6.2.1 Aft Receive Carrier Acquisition

a. Disable the RF signal generator (Push the RF On button).

b. Configure the PC GSE RF switch for the Aft Receive antenna.
   - On the RF Control window, click on the "Aft" button

c. Enable the S-band signal generator RF output (Push RF On button).

3.6.2.2 Aft Receive Command Acquisition

a. Enable the S-band signal generator RF output. Enable Modulation.

b. With the command receiver locked, disable the uplink sweep by disabling the FM input on the sweep generator. This must be done when the sweep is near the nominal frequency (close to zero loop stress) or the command reciever will lose lock. Verify that the command receiver remains locked.

TC Verify _____

c. Enable the PM input to the signal generator.

d. Monitor telemetry and ensure that sub-carrier lock is achieved.
Sub-carrier Lock Status = Locked

TC Verify _____

3.6.2.3 Aft Receive Signal Fade

a. Decrease the RF signal generator output power level until the receiver lock telemetry indicates unlocked status. Record the power level where the receiver loses lock. (Typically about -69 dBm)

RECEIVER LOSES LOCK POWER LEVEL _____ DBm

b. Increase the RF signal generator output +10dB above recorded setting. If system does not relock, repeat step 3.6.1.2.b.

c. Send "cmdblasthcd" procedure to uplink 64 commands. Verify that Command Count increases to 64, and the Code Block Error counter is zero

TC Received _____ Code Block Errors_____

TC Verify _____

3.7 Transmitter Performance Testing

The test engineer will hold a crew briefing to outline the transmitter performance test

Verify that one of the following is running the procedure:

David Curtis (Systems Engineer),Peter Harvey (Project Manager), and Manfred Bester (Operations Scientist).

The test engineer will verify that all equipment needed to perform the task is on hand and that all personnel involved are trained and ready to proceed.

VERIFY	

Verify that the antenna hats (all 4) are installed on the spacecraft antennas and properly cabled to the GSE RF Rack prior to proceeding

VERIFY	

Verify that the FEP or Transmit enable plug is installed in the spacecraft

VERIFY	

Define a 1 meter clear area around the forward and aft ends of the HESSI spacecraft.

VERIFY	

Locate the red Emergency Power Off button on the spacecraft GSE rack. In the event of an emergency in the execution of this procedure, the operator may hit this button without fear of damage to the spacecraft.

VERIFY	

In Bldg 836, Obtain NASA Safety concurrence to proceed with HAZARDOUS Operations

VERIFY	

Change warning light to amber and announce over the Public Address system that there will be RF transmitted near the spacecraft which could result in personnel injury.

VERIFY	

START OF HAZARDOUS OPERATIONS

3.7.1 Downlink Test Setup

a. Configure the S-band Downconverter in the PC GSE RF Control task as follows:
   1. LNA path selected.
   2. S-band frequency range (2200-2300 MHz).
   3. Internal TCXO.
   4. Center Frequency 2215 MHz.
   5. Toggle "Input 1" (Forward Transmit Antenna) to Input 2 and back to Input 1. Listen for the relay to click in the RF rack.
   6. Push "Program" Button ON. Wait 1 Second. Push "Program" Off.

b. Configure the RF power meter. Connect the power meter probe to the FWD GSE TLM RCVR port on the RF rack.

c. Send the ITOS command "/dlsetrate rate125kbps" to change the downlink rate to 125kbps

d. On page CIB_HCD_CMDS, Push downlink rate = high.

TC Verify _____

3.7.2 Forward Transmit Functional Test

a. Command the RF switch to the forward pushing the "FWD" button on the PCB ITOS page. Verify that the Antenna telemetry on the "PACI" ITOS page indicates FWD

TC Verify _____

b. Enable transmitter RF output power by pushing the "TRANSMIT Ebl" button closely followed by the "TRANSMIT On" button on the PCB ITOS page. Verify that the transmitter status readback indicates "On".

TC Verify _____

c. Record the power meter reading (nominally -68dBm)

FORWARD TRANSMIT POWER LEVEL : _____ DBm

d. Command the transmitter RF output off by pushing the TRANSMIT Off button on the PCB ITOS page. Verify that the transmitter status readback indicates "Off".

TC Verify _____

e. Disconnect the RF power meter probe and re-connect the receiver input cable to the FWD GSE TLM RCVR port on the RF rack.

TC Verify _____

f. Enable transmitter RF output power by pushing the "TRANSMIT Ebl" button closely followed by the "TRANSMIT On" button on the PCB ITOS page. Verify that the transmitter status readback indicates "On".

TC Verify _____

g. Set the BitSync in the signal rack to 125kbps RF using a preset file. Verify that the bitsync locks and ITOS continues to receive telemetry.

TC Verify _____

h. Monitor the telemetry receiver status and ensure it remains locked for a period of 2 minutes.

TC Verify _____

i. Monitor the Reed-Solomon decoder status and ensure no errors occurred within the 2-minute period.

TC Verify _____

j. Send the ITOS command "/dlsetrate rate4mbps" to change the downlink rate to 4mbps. Verify that ITOS telemetry is discontinued, and the BitSync on the signal rack loses lock

TC Verify _____

k. Set the BitSync for 4Mbps RF (use a preset file). Verify that the BitSync locks and ITOS receives telemetry again.

l. Monitor the Reed-Solomon decoder status and ensure no errors occurred within the 2-minute period.

TC Verify _____

m. Send the ITOS command "/dlsetrate rate125kbps" to change the downlink rate to 125kbps. Verify that ITOS telemetry is discontinued, and the BitSync on the signal rack loses lock

TC Verify _____

n. Set the BitSync for 125kbps HL (use a preset file). Verify that the BitSync locks and ITOS receives telemetry again.

TC Verify _____

o. Turn off the RF transmitter by pushing the "TRANSMIT OFF" button on the ITOS PCB page.

3.7.3 Aft Transmit Functional Test

a. Command the RF switch to the aft pushing the "AFT" button on the PCB ITOS page. Verify that the Antenna telemetry on the "PACI" ITOS page indicates AFT

TC Verify _____

b. Configure the S-band Downconverter in the PC GSE RF Control task for "Input Select" = "Source 2" (Aft). Listen for the relay to click in the RF rack.

TC Verify _____

c. Connect the power meter probe to the AFT GSE TLM RCVR port on the RF rack.

TC Verify _____

d. Enable transmitter RF output power by pushing the "TRANSMIT Ebl" button closely followed by the "TRANSMIT On" button on the PCB ITOS page. Verify that the transmitter status readback indicates "On".

TC Verify _____

e. Record the power meter reading (nominally -68dBm)

AFT TRANSMIT POWER LEVEL : _____ DBm

f. Command the transmitter RF output off by pushing the TRANSMIT Off button on the PCB ITOS page. Verify that the transmitter status readback indicates "Off".

TC Verify _____

g. Disconnect the RF power meter probe and re-connect the receiver input cable to the AFT GSE TLM RCVR port on the RF rack.

TC Verify _____

h. Enable transmitter RF output power by pushing the "TRANSMIT Ebl" button closely followed by the "TRANSMIT On" button on the PCB ITOS page. Verify that the transmitter status readback indicates "On".

TC Verify _____

i. Set the BitSync in the signal rack to 125kbps RF using a preset file. Verify that the bitsync locks and ITOS continues to receive telemetry.

TC Verify _____

j. Monitor the telemetry receiver status and ensure it remains locked for a period of 2 minutes.

TC Verify _____

k. Monitor the Reed-Solomon decoder status and ensure no errors occurred within the 2-minute period.

TC Verify _____

l. Send the ITOS command "/dlsetrate rate4mbps" to change the downlink rate to 4mbps. Verify that ITOS telemetry is discontinued, and the BitSync on the signal rack loses lock

TC Verify _____

m. Set the BitSync for 4Mbps RF (use a preset file). Verify that the BitSync locks and ITOS receives telemetry again.

n. Monitor the Reed-Solomon decoder status and ensure no errors occurred within the 2-minute period.

TC Verify _____

o. Send the ITOS command "/dlsetrate rate125kbps" to change the downlink rate to 125kmbps. Verify that ITOS telemetry is discontinued, and the BitSync on the signal rack loses lock

TC Verify _____

p. Set the BitSync for 125kbps Hard Line (use a preset file). Verify that the BitSync locks and ITOS receives telemetry again (via the TAC).

TC Verify _____

q. Turn off the RF transmitter by pushing the "TRANSMIT OFF" button on the ITOS PCB page

TC Verify _____

r. In Bldg 836, obtain NASA Safety concurrence to return area to normal operations

TC Verify _____

s. Remove the 1 meter clear area markers around the HESSI spacecraft

TC Verify _____

t. Change warning light to green and announce over the Public Address system that the RF transmission test is complete

TC Verify _____

END OF HAZARDOUS OPERATIONS

3.7.4 HDC Transmit Antenna Select Control Test

a. Display the Hardware Decoded Commands (HDC) ITOS Page "CIB_HDC_CMDS"
b. Verify that the Transmit Antenna status on the PACI page indicates AFT antenna selected

TC Verify _____

c. On the "cib_hcd_cmds" ITOS page push the AFT transmit button to send the HCD command to switch to Aft antenna. Verify that the telemetry point on the HCD page and the PACI pages both indicate that the AFT antenna is selected.

TC Verify _____

d. On the "cib_hcd_cmds" ITOS page push the FWD transmit button to send the HCD command to switch to Forward antenna. Verify that the telemetry point on the HCD page and the PACI pages both indicate that the FWD antenna is selected.

TC Verify _____

3.7.5 Power ON Solar Array Simulator

a. On the PC "Power Supply" display, set SAS Supply to 50V, 17A, ON. TC verify _____
b. Push "Press to Apply" for the SAS control TC verify _____
c. On the PC I&T Diagnostic display, select "cmd_all". TC verify _____
d. Set Current to 1.0 Amps per string. Push "Enable All" TC verify _____
e. On the PC "Power Supply" display, Push "Output" button to turn OFF. TC verify _____
f. On the PC "Power Supply" display, Push "Press to Apply". TC verify _____
g. Verify TAC Current goes to Zero TC verify _____
h. Verify SAS Current is non zero on the SAS display TC verify _____
i. Verify PACI battery current is positive (battery is being charged) TC verify _____

3.7.6 Establish GSE Connection

a. Run the TCP_COMM.vi (I&T File Open, then ***RUN***) TC verify _____
b. Type “start connect_to_power_rack_gse” from the ITOS STOL prompt. TC verify _____
c. Wait for the TCP/IP connection status indicator to turn “green”. TC verify _____

3.7.7 Mission Mode Relay Test

a. Type “start test_ccb_mission_mode” from the ITOS STOL prompt. TC verify _____
b. Wait for the test to complete and then review the data. Passed _____
c. Type "start sc_mm_nom" to set back to mission mode. TC verify _____

3.7.8 Solar Array Switch Test

a. Type “start test_ccb_sa_switches” from the ITOS STOL prompt. TC verify _____
b. When prompted to set RTDs to 2000, press OK to continue. TC verify _____
c. Wait for the test to complete and then review the data. Passed _____
d. Re-enable the SAS supplies at 1 amp/string on the PC GSE TC verify _____

3.7.9 Battery Temp Select Test

a. Type “start test_ccb_temp_select” from the ITOS STOL prompt. TC verify _____
b. Wait for the test to complete and then review the data. Passed _____

3.7.10 Battery Voltage Test

a. Measure and record the Battery voltage telemetry as measured by the CCB.
Battery Voltage_____
b. Measure and record the Battery Half voltage telemetry as measured by the CCB.
Battery Half Voltage_____
c. Measure and record the bus voltage using the Power PC . Bus Voltage_____

3.7.11 VT Select Telemetry Test

a. Type “start test_ccb_vtcurve_tlm” from the ITOS STOL prompt. TC verify _____
b. Wait for the test to complete and then review the data. Passed _____

4. TEST COMPLETION

The spacecraft shall be powered off using the HSI_SPACECRAFT_OFF (HSI_MIT_011) procedure and the FEP or TEP plug removed.

TC	

A. EMERGENCY INSTRUCTIONS

TO POWER DOWN SPACECRAFT: HIT THE RED "OFF" BUTTON ON THE SPACECRAFT GSE RACK.