

GRAVITY PROBE B
PROCEDURE FOR
BOX LEVEL / THERMAL VAC TESTING

ECU / PROTON DETECTOR
INTERFACE CHECKOUT

Procedure No. P0626 Rev. –
Test Case ID:

1/24/10

Prepared by: *D. Meriwether*

Approvals:

Program Responsibility	Signature	Date
D.Meriwether Test Author		
A. Ndili Proton Detector Manager		
B. Muhlfelder ECU Hardware Manager		
J. Thatcher ECU REE		
D. Seidl LMMS Quality Assurance		

NOTES:

Level of QA required during performance of this procedure:

 X LMMS QA Representative

 Government QA Representative

- Any red lines to the procedure shall require the approval and initial of the Test Author and LMMS QA prior to implementation.
- LMMS QA must be notified at least 24 hour before beginning this procedure.
- A Quality Assurance representative or their designated representative shall review any discrepancy noted during assembly or test.
- Upon completion of this procedure, Quality Assurance will certify his/her concurrence that the effort was preformed and accomplished in accordance with the prescribed instructions by signing and dating.

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Revision Record:

Rev	Rev Date	ECO #	Summary Description

Acronyms and Abbreviations:

Acronym / Abbreviation	Meaning
ECU Monitor Mnemonics	
BE _XXXXX_XXXXXX	Binary Word Monitor
CE _XXXXX_XXXXXX	Current Monitor
DE _XXXXX_XXXXXX	Digital Word Monitor
TE _XXXXX_XXXXXX	Temperature Monitor
TE_XXXXX_ XGT XXX	GRT type Thermometer
TE_XXXXX_ XPT XXX	PRT type Thermometer
TE_XXXXX_ XST XXX	SDT type Thermometer
TE_XXXXX_XXXXX D	Dewer located Thermometer
TE_XXXXX_XXXXX P	Probe located Thermometer
TE_XXXXX_XXXXX Q	Quartz Block located Thermometer
VE _XXXXX_XXXXXX	Voltage Monitor

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A **Scope**

This is a CSTOL procedure exercising the ECU Interface with the Proton Detector. Tested in this procedure are the ECU Proton Detector commands and their response. Proton Detector monitors are displayed and recorded both in a set of bridge files (pmon_br1 - 6) and as the value changes, the event_messages file.

B **Requirements Verification**

B.1 Requirements Cross Reference

B.2 Expected Data for verification per requirement:

Proton Detector monitors will be displayed and recorded both in a set of bridge files (pmon_br1 - 6) and upon monitor change, the event_messages file.

C **Configuration Requirements**

- The ECU Test set shall be connected to the ECU via a 1553 bus for data transmission and a timing signal supplied across a S16D connection.

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D Hardware Required

D.1 Flight hardware required

Description	Finite Lifetime Object	No. Req'd
Aft ECU		1

D.2 Commercial test equipment

Manufacturer	Model	Serial Number	Calibr. Exp. Date
SUN Workstation	Ultra 1 3D Creator		

D.3 Mechanical/Electrical Special test equipment

Description	Part No.	Rev. no.	Serial No.	Certification Date
Proton Detector, EU				

D.4 Tools

Description	No. Req'd
8 mm tape drive	1

D.5 Expendables

Description	Quantity
8 mm tape	1

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E Software Required

E.1 Flight Software

Flight Software Name	Version No.
MSS (Mission Support Software)	3.0.4S

E.2 CSTOL Scripts

CSTOL Script Name	Version No.
Ecu_test_set.prc	
Ecumisc_br.prc	V 1.1 : 01/15/99
f3040ecu32a.prc	
f3040ecu32a_r.prc	V 1.1 : 02/18/99
Load_br.prc	
Pmon_test.prc	V 1.1 : 10/29/99
Pmon_br1.prc	V 1.1 : 02/10/99
Pmon_br2.prc	V 1.1 : 02/11/99
Pmon_br3.prc	V 1.1 : 02/11/99
Pmon_br4.prc	V 1.1 : 02/11/99
Pmon_br5.prc	V 1.1 : 02/11/99
Pmon_br6.prc	V 1.1 : 02/11/99

E.3 SPC Scripts

SPC Script Name	Version No.
N/A	

E.4 Test Support Software

Test Software Name	Version No.
Oasis (Operating System Software)	V 2.4.4
Framex (front end software)	framexs

F Equipment Pretest Requirements

Equipment	Serial No.	Test Required	Proc. No.	Test Performed	
				Date	By

G Personnel Requirements

- As a general requirement, all operations involving flight equipment require at least two persons at all times.
- The ECU REE is John Thatcher <Phone 650-424-2317>. The ECU REE is responsible in general for the coordination of all ECU tests, and will therefore schedule appropriate times for the performance of this procedure.
- The LMMS Quality Assurance representative is Dave Seidl <Phone: 650-424-2704> or his appointed representative.
- The following personnel are qualified to perform this procedure using the ECU test set:

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- John Thatcher <Phone: 650-424-2317>.
- Byron Oh <Phone: 650-354-5446>
- Carlos Jeanpierre <Phone: 650-354-5766>
- Paul Meyer <Phone: 650-424-2239>
- Dave Meriwether <Beeper 650-317-7912>
- Thomas Wai <Phone 650-354-5644>

H **Safety Requirements**

- *Standard safety practices to ensure safety of personnel and prevent damage to equipment shall be observed during performance of this test.*
- *Ensure that power is removed from cable assemblies before connecting and disconnecting cable connections.*

I General Instructions

- This procedure shall be conducted on a formal basis to its latest approved and released version.
- Tests will be conducted under the environmental conditions existing in the ECU Lab at LMMS, Bldg 250, Palo Alto.
- This procedure operates Flight Hardware. All use of software associated with this procedure must conform to the GP-B Configuration Control process.
- In order to expedite test operations, unless specifically noted, the sequence in which major sections or subsections are preformed may be altered at the discretion of the ECU REE or his representative.
- Upon completion of the test, all data on the ECU test set under the /opt/usr6/lab and sub-directories shall be archived onto an 8mm tape and transferred to the ECU data archive on the Payload Server.
- Upon confirmation that the ECU test set data has been successfully archived onto 8 mm tape, the data in the /opt/usr6/lab/bridge, /opt/usr6/lab/snaps, /opt/usr6/lab/messages and /opt/usr6/lab/oasis_raw_data directories may be deleted for space considerations.
- Test operators shall read this procedure in its entirety and resolve any apparent ambiguities prior to beginning this test.

J References and Applicable Documents

- Critical Design Review Supplement for the Proton Detector, April 7, 1997
- SCSE 16 / 9 Flight Software Design Specification, V. cj

Table 9.2.3.2-8 Proton Monitor Data,

- 9 Header Byte,
- 10 Channel Configuration and Time Resolution
- 11 Conversion Gain and Minimum Ionization
- 12 Suppression Threshold and Noise Cut Threshold
- 13 Hardware Configuration)

Table 9.2.3.3-3 Proton Monitor Commands

- SCIT-01 System Design, Verification, Integration & Test Plans
- SCSE 06 Command and Telemetry Handbook, App B sw_cmd 3.0.4

L Operations

1. ECU / ECU Test Set Initialization

- 1.1. Initiate Telemetry recording
- 1.2. Check for ECU format and change to if necessary.
- 1.3. Record ECU miscellaneous bridge file.
- 1.4. Check for SRE timing signal.
- 1.5. Wait for ECU power and turn on ECU processing, check for ECU Status monitor, and print on change.
- 1.6. Monitor Failure Status of Rollover Counter (BE_Failure_A/_B) and print on change.
- 1.7. Check Input / Output Mux addresses for proper range.
- 1.8. Check for 1553 Bus Send/Receive errors.
- 1.9. Bring up x-term window and monitor the event_messages file.
- 1.10. Confirm ECU is nominal and type GO to start Proton Detector test.

2. Proton Detector ECU Interface test

- 2.1. Display Proton Detector Science Frame (SCSE 16/9, table 9.2.3.2-8) telemetry monitors and print on change.
- 2.2. Type GO to Reload Proton Detector software with defaults
 - 2.2.1. Wait for correct command response.
- 2.3. Type GO to send a Self Test Request
 - 2.3.1. Wait for correct command response.
- 2.4. Type GO to send memory dump request
 - 2.4.1. Wait for correct command response.
- 2.5. Type GO to send Housekeeping request
 - 2.5.1. Wait for correct command response.
- 2.6. Type GO to Send Self Calibration Request
 - 2.6.1. Wait for correct command response.
- 2.7. Type GO to Enable Soft Error Correction
 - 2.7.1. Wait for correct command response.

2.8. Type GO to Disable Soft Error Correction

2.8.1. Wait for correct command response.

2.9. Type GO to Enable Dead Time Correction

2.9.1. Wait for correct command response.

2.10. Type GO to Disable Dead Time Correction

2.10.1. Wait for correct command response.

2.11. Type GO to Enable Electron Suppression

2.11.1. Wait for correct command response.

2.12. Type GO to Disable Electron Suppression

2.12.1. Wait for correct command response.

2.13. Type GO to Enable Maximum Criteria

2.13.1. Wait for correct command response.

2.14. Type GO to Disable Maximum Criteria

2.14.1. Wait for correct command response.

2.15. Type GO to Set Detector Channel Configuration

2.15.1. Set Bits 000 -> 111

2.15.2. Wait for correct command response.

2.16. Type GO to Set Time Resolution

2.16.1. Set Bits 000 -> 111

2.16.2. Wait for correct command response.

2.17. Type GO to Set Conversion Gain

2.17.1. Set Bits 000 -> 111

2.17.2. Wait for correct command response.

2.18. Type GO to Set Suppression Threshold

2.18.1. Set Bits 000 -> 111

2.18.2. Wait for correct command response.

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2.19. Type GO to Set Noise Threshold

2.19.1. Set Bits 000 -> 111

2.19.2. Wait for correct command response.

2.20. Type GO to Set Minimum Ionization Level

2.20.1. Set Bits 000 -> 111

2.20.2. Wait for correct command response.

2.21. Type Go to end Proton Detector test

3. Proton Detector Test Completion

3.1. End print on change of Proton Detector Science Frame telemetry monitors.

3.2. Remove Proton Detector monitor display

3.3. End Proton Detector bridge file recording

3.4. Turn off ECU processing

3.5. End print on change of Rollover Counter Failure status and ECU status.

3.6. Return to default 32K format.

3.7. End telemetry recording

Test completed.

Completed by: _____

Witnessed by: _____

Date: _____

Time: _____

Test Leader: _____

Date:

Time:

Quality Engineer:

Date:

Time: