Payload and Components Real-time Automated Test System (PACRATS)

Data Acquisition of Leak Rate & Pressure Data Test Procedure

Flight Systems Integration and Test Branch

Systems Development, Integration & Test Division

Space Systems Department

Engineering Directorate

VERIFY THAT THIS IS THE CORRECT VERSION BEFORE USE.
### REVISION RECORD

<table>
<thead>
<tr>
<th>REVISION</th>
<th>DESCRIPTION</th>
<th>DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>Original Release</td>
<td>06/28/2011</td>
</tr>
</tbody>
</table>

VERIFY THAT THIS IS THE CORRECT VERSION BEFORE USE.
PACRATS MCTF
Approval Page

PREPARED BY:

Maegan L. Richart
M. L. Richart/ES61
Test Engineer
961-2416

DATE: 6/28/11

APPROVED BY:

Amy Cardno
A.N. Cardno/ES61
Lead Test Engineer
544-3039

DATE: 6/28/11

T. A. Phillips/ES61
Flight Systems Integration & Test Branch, Team Lead
544-1322

DATE: 6/28/11

L. B. Jeter
L. B. Jeter/ES61
Flight Systems Integration & Test Branch, Chief
544-7392

DATE: 6/28/11

Shirley R. Blair
S. R. Blair/QD11
Safety & Mission Assurance, Lead Quality Assurance
544-5607

DATE: 6-28-11

VERIFY THAT THIS IS THE CORRECT VERSION BEFORE USE.
TEST ARTICLE IDENTIFICATION

There are no test articles for this procedure. The system under test is the Payload and Components Real-Time Automated Test System (PACRATS) for the use of data-acquisition during leak-rate and pressure-data testing.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Revision Record</td>
<td>ii</td>
</tr>
<tr>
<td></td>
<td>Approval Page</td>
<td>iii</td>
</tr>
<tr>
<td></td>
<td>Test Article Identification</td>
<td>iv</td>
</tr>
<tr>
<td></td>
<td>Table of Contents</td>
<td>v</td>
</tr>
<tr>
<td>1.0</td>
<td>Introduction</td>
<td>1</td>
</tr>
<tr>
<td>1.1</td>
<td>Purpose</td>
<td>1</td>
</tr>
<tr>
<td>1.2</td>
<td>System Description</td>
<td>1</td>
</tr>
<tr>
<td>1.3</td>
<td>Test Program Classification</td>
<td>1</td>
</tr>
<tr>
<td>1.4</td>
<td>Responsibilities</td>
<td>1</td>
</tr>
<tr>
<td>1.5</td>
<td>List of Abbreviations</td>
<td>1</td>
</tr>
<tr>
<td>1.6</td>
<td>Applicable Documents</td>
<td>2</td>
</tr>
<tr>
<td>2.0</td>
<td>Safety / Quality Assurance Information</td>
<td>3</td>
</tr>
<tr>
<td>2.1</td>
<td>Risk Assessment Code</td>
<td>3</td>
</tr>
<tr>
<td>2.2</td>
<td>Job Hazard Analysis</td>
<td>3</td>
</tr>
<tr>
<td>2.3</td>
<td>Personnel Protective Equipment</td>
<td>3</td>
</tr>
<tr>
<td>2.4</td>
<td>Hardware Handling</td>
<td>3</td>
</tr>
<tr>
<td>2.5</td>
<td>Cleanliness Requirements</td>
<td>3</td>
</tr>
<tr>
<td>2.6</td>
<td>Electrostatic Discharge (ESD) Requirements</td>
<td>3</td>
</tr>
<tr>
<td>2.7</td>
<td>Grounding Requirements</td>
<td>3</td>
</tr>
<tr>
<td>2.8</td>
<td>Electrical Conventions</td>
<td>3</td>
</tr>
<tr>
<td>2.9</td>
<td>Emergency Telephone Numbers</td>
<td>4</td>
</tr>
<tr>
<td>2.10</td>
<td>Emergency Shutdown Procedures</td>
<td>4</td>
</tr>
<tr>
<td>2.11</td>
<td>Close Call / Mishap Reporting</td>
<td>4</td>
</tr>
<tr>
<td>2.12</td>
<td>Test Verifications</td>
<td>4</td>
</tr>
<tr>
<td>3.0</td>
<td>Pre-Test Preparation</td>
<td>5</td>
</tr>
<tr>
<td>3.1</td>
<td>Test Requirements</td>
<td>5</td>
</tr>
<tr>
<td>3.2</td>
<td>Test Readiness Review</td>
<td>5</td>
</tr>
<tr>
<td>3.3</td>
<td>Test Facility</td>
<td>5</td>
</tr>
<tr>
<td>3.4</td>
<td>Test Equipment / GSE</td>
<td>5</td>
</tr>
<tr>
<td>3.5</td>
<td>Pre-test Setup</td>
<td>6</td>
</tr>
<tr>
<td>4.0</td>
<td>Test Operations</td>
<td>7</td>
</tr>
<tr>
<td>4.1</td>
<td>Proof Test</td>
<td>7</td>
</tr>
<tr>
<td>4.2</td>
<td>Sniffer Probe Leak Test with Inficon</td>
<td>10</td>
</tr>
<tr>
<td>4.3</td>
<td>Sniffer Probe Leak Test with Varian</td>
<td>15</td>
</tr>
<tr>
<td>4.4</td>
<td>Test Documentation Update</td>
<td>19</td>
</tr>
</tbody>
</table>

**VERIFY THAT THIS IS THE CORRECT VERSION BEFORE USE.**
TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.0</td>
<td>Post Test Verification</td>
<td>20</td>
</tr>
<tr>
<td>6.0</td>
<td>Figures</td>
<td></td>
</tr>
<tr>
<td>6.1</td>
<td>Proof Test Setup</td>
<td>21</td>
</tr>
<tr>
<td>6.2</td>
<td>Sniffer Probe Leak Test with Inficon Setup</td>
<td>22</td>
</tr>
<tr>
<td>6.3</td>
<td>Sniffer Probe Leak Test with Varian Setup</td>
<td>23</td>
</tr>
<tr>
<td>7.0</td>
<td>Tables</td>
<td></td>
</tr>
<tr>
<td>7.1</td>
<td>Proof Test Table</td>
<td>24</td>
</tr>
<tr>
<td>7.2</td>
<td>Sniffer Probe Leak Test with Inficon Table</td>
<td>24</td>
</tr>
<tr>
<td>7.3</td>
<td>Sniffer Probe Leak Test with Varian Table</td>
<td>25</td>
</tr>
<tr>
<td>8.0</td>
<td>Appendices—TRI Information</td>
<td></td>
</tr>
<tr>
<td>8.1</td>
<td>Proof Test Inspection</td>
<td>26</td>
</tr>
<tr>
<td>8.2</td>
<td>Sniffer Probe Leak Test with Inficon Inspection</td>
<td>27</td>
</tr>
<tr>
<td>8.3</td>
<td>Sniffer Probe Leak Test with Varian Inspection</td>
<td>28</td>
</tr>
<tr>
<td>9.0</td>
<td>Emergency Page</td>
<td></td>
</tr>
<tr>
<td>9.1</td>
<td>Emergency Shut Down Procedure</td>
<td>29</td>
</tr>
</tbody>
</table>

VERIFY THAT THIS IS THE CORRECT VERSION BEFORE USE.
1.0 Introduction

1.1 Purpose

The purpose of this activity is to provide the Mechanical Components Test Facility (MCTF) with the capability to obtain electronic leak test and proof pressure data. Payload and Components Real-time Automated Test System (PACRATS) data acquisition software will be utilized to display real-time data. It will record leak rates and pressure/vacuum level(s) simultaneously. This added functionality will provide electronic leak test and pressure data at specified sampling frequencies. Electronically stored data will provide ES61 with increased data security, analysis, and accuracy. The tasks performed in this procedure are to verify PACRATS only, and are not intended to provide verifications for MCTF equipment.

1.2 System Description

An in-house Personal Computer—based data acquisition software system (PACRATS) developed by NASA Engineers will be utilized to interface with MCTF hardware to collect, display, and record real-time serial data.

1.3 Test Program Classification

This activity is a Non-Mission Critical and Non-Safety Critical Program.

1.4 Responsibilities

ES61 and ES63 will be responsible for overall test management and will develop the test plan, procedure, and a final test report. ES61/MCTF engineers will be responsible for operation of MCTF devices interfacing to PACRATS.

1.5 List of Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBL</td>
<td>Cable</td>
</tr>
<tr>
<td>CCW</td>
<td>Counter Clockwise</td>
</tr>
<tr>
<td>COM</td>
<td>Communications</td>
</tr>
<tr>
<td>ESD</td>
<td>Electrostatic Discharge</td>
</tr>
<tr>
<td>GHe</td>
<td>Gaseous Helium</td>
</tr>
<tr>
<td>GN2</td>
<td>Gaseous Nitrogen</td>
</tr>
<tr>
<td>GSE</td>
<td>Ground Support Equipment</td>
</tr>
<tr>
<td>JHA</td>
<td>Job Hazard Analysis</td>
</tr>
<tr>
<td>MCTF</td>
<td>Mechanical Components Test Facility</td>
</tr>
<tr>
<td>MSFC</td>
<td>Marshall Space Flight Center</td>
</tr>
<tr>
<td>OWI</td>
<td>Organizational Work Instruction</td>
</tr>
<tr>
<td>PACRATS</td>
<td>Payload and Components Real-time Automated Test System</td>
</tr>
<tr>
<td>PPE</td>
<td>Personal Protective Equipment</td>
</tr>
</tbody>
</table>

VERIFY THAT THIS IS THE CORRECT VERSION BEFORE USE.
1.6 Applicable Documents

ES61-JHA-003  Electrical/Mechanical Operations Job Hazard Analysis
ES61-JHA-011  Leak Detection Job Hazard Analysis
ES61-JHA-012  Pressurization Job Hazard Analysis
ES61-JHA-014  Small hand Tools Job Hazard Analysis
ES61-OWI-001  Systems Testing
ES61-OWI-004  Mechanical Components Test Facility (MCTF) Test Operations
MPR 1280.4    MSFC Corrective Action System
MPR 8715.1    Marshall Safety, Health, and Environmental (SHE) Program
MPR 8730.1    Inspection and Testing
MPR 8730.3    Control of Nonconforming Product
MPR 8730.5    Control of Inspection, Measuring, and Test Equipment
MWI 8715.15   Ground Operations Safety Assessment Program
ES61-PLAN -SSITF-302  Safety Assessment Plan
SN-C-0005    NASA Specification Contamination Control Requirements for Space Shuttle Program

VERIFY THAT THIS IS THE CORRECT VERSION BEFORE USE.
2.0 Safety / Quality Assurance Information

2.1 Risk Assessment Code

A safety assessment of the operations in this procedure was performed in accordance with MWI 8715.15, Ground Operations Safety Assessment Program, and is documented in ES61-PLAN-SSITF-302, Safety Assessment Plan. The electrical/mechanical test operations specified in this procedure are categorized as a Risk Acceptance Code 3E. Based upon an assessment of the complexity and risk to the hardware, this procedure can be performed by one individual after test setup verification by a second person.

2.2 Job Hazard Analysis


2.3 Personnel Protective Equipment

No Personnel Protective Equipment (PPE) is required.

2.4 Hardware Handling

No planned moves are to be performed during the execution of this procedure.

2.5 Cleanliness Requirements

MCTF hardware will be maintained per SN-C-0005 Level 300A.

2.6 Electrostatic Discharge (ESD) Requirements

Wrist straps will not be required for any cable connections. All cables used within this procedure are commercial grade.

2.7 Grounding Requirements

There are no specified grounding requirements.

2.8 Electrical Conventions

No test lead connections will be made as part of this procedure.
2.9 Emergency Telephone Numbers

The emergency telephone numbers are listed on the last page of the test procedure in section 9.0.

2.10 Emergency Shutdown Procedure

In case of an emergency, perform the emergency shutdown procedure located on the last page of the test procedure in section 9.0.

2.11 Close Call/Mishap Reporting

The test engineer is responsible for immediately notifying their supervisor for all ES61 mishaps and close calls. An initial estimate of the mishap severity based on injuries and cost shall be done by the responsible supervisor to determine the mishap type and notifications required in accordance with MWI 8621.1, Close Call and Mishap Reporting and Investigation Program.

All onsite mishaps and close calls shall be reported to the Industrial Safety Office within 4 hours of occurrence or awareness by calling (256) 544-4357, Option “0” (NASA Information Support Center) or the MSFC Industrial Safety Hotline at (256) 544-4357, Option “2”, or by electronic submittal from the MSFC SHE Page, under the “Report a Mishap” block to generate a NASA Initial Safety Incident Report, also known as a Flash or Quick Incident Report.

2.12 Test Verification

The Safety and Mission Assurance Directorate will monitor and verify all tests and inspections per MPR 8730.1. If a nonconformance or unsatisfactory condition is obtained during test operations, the Guidelines of MPR 8730.3, Control of Nonconforming Product, and MPR 1280.4, MSFC Corrective Action System will be followed to troubleshoot and document the corrective action.
3.0 Pre-Test Preparation

3.1 Test Requirements

The purpose of this procedure is to verify the operation of the PACRATS software only. MCTF hardware will be utilized to support this activity. However, no flight hardware will be required to perform operations within this procedure.

3.2 Test Readiness Review

According to ES61-PLN-PACRATS-MCTF-001, a Test Readiness Review (TRR) is not required. A Test Readiness Inspection (TRI) shall be performed following test setup and prior to the start of test operations for each test configuration. TRI will consist of personnel directly involved with the test. A TRI Checklist is in Appendix 8.0 which shall be filled out by the Test Conductor and signed by all test participants.

3.3 Test Facility

Mechanical Components Test Facility (MCTF) located in building 4493.

3.4 Test Equipment/GSE

All test equipment utilized in the performance of this test procedure shall be inspected for damage, and where appropriate, shall be verified to be operational and in current calibration.

(a) Heise Meter

Manufacturer_________________ Model_________________

Cal ID__________________ Cal Due Date__________________

(b) INFICON

Manufacturer_________________ Model_________________

(c) Varian

Manufacturer_________________ Model_________________

(d) Pressure gauge (or transducer) PG1:

Cal ID._________________ Cal. Due Date_______ Range _______

VERIFY THAT THIS IS THE CORRECT VERSION BEFORE USE.
(e) Pressure gauge (or transducer) PG2:

Cal ID. ____________ Cal. Due Date _______ Range _______

(f) PC Name

NEMS # ________________ OS Version ____________________

(g) PACRATS Version ________________________________

(h) Filter

(i) Hand Valve(s)

(j) Vent Valve

(k) Various hoses and fittings

(l) Gaseous Nitrogen (GN2) per MIL-PRF-27401

(m) Gaseous Helium (GHe) per MIL-PRF-27407 Grade A except neon

(n) Regulator

(o) Relief Valve

(p) Sniffer Probe

(q) Vacuum Chamber

(r) Cables
   i. CBL Type 001 (2)
   ii. CBL Type 002
   iii. Com 4
   iv. Com 5

3.5 Pre-test Setup

Pretest setups for the varying configurations of the three unique tests are provided in the respective test operations sections.
4.0. **Test Operations**

4.1 **Proof Test**

Reference Section 6.0 Figure 6.1 for the test setup. The steps can be performed out of sequence at the discretion of the test conductor.

4.1.1 □ Setup the MCTF and PACRATS hardware per Section 6.1.

4.1.2 □ 2nd Person Verification _____________________________ (Print Name)

___________________________ (Sign Name)

4.1.3 □ Power on the Heise meter.

4.1.4 □ Press Setup.

4.1.5 □ Use the arrows to select “RS232.”

4.1.6 □ Select “Enable.”

4.1.7 □ Set the baud rate to “9600.”

4.1.8 □ Use the arrows to select the “Remote” mode.

4.1.9 □ Select “Terminal Mode.”

4.1.10 □ Select “CrLF” for the End of Message.

4.1.11 □ Verify/set regulator to full CCW (closed).

4.1.12 □ Verify/close HV1, HV2 and vent valve.

4.1.13 □ Verify PG1 and PG2 are reading atmospheric pressure.

4.1.14 □ Once the test set up is configured per Section 6.1, connect the setup to the dummy test article.

4.1.15 □ Conduct TRI. Complete the TRI Checklist in Appendix 8.0 Section 8.1 and the test participants shall sign and date.

4.1.16 □ Photograph the test setup and attach a copy to this procedure.

4.1.17 □ Power ON the PACRATS Computer and run the PACRATS application.

**VERIFY THAT THIS IS THE CORRECT VERSION BEFORE USE.**
4.1.18 □ Record PACRATS Version by selecting Help/About PACRATS.
   PACRATS Version ___________________________

4.1.19 □ Load the PACRATS test file heise.tst by selecting File/Start Test and double
   click test file to be loaded.
   Record Test File Name ___________________________

4.1.20 □ Verify data is being received on the PACRATS workstation.

4.1.21 □ Start PACRATS data recording by selecting File/Set Record On.
   Record Data File Name ___________________________

4.1.22 □ Verify Heise PG1 and PG2 are reading atmospheric and record in Section 7.0
   Table 7.1.

4.1.23 □ Verify PACRATS PG1 and PG2 are reading atmospheric and record in Section 7.0
   Table 7.1.

4.1.24 □ Open BV1.

4.1.25 □ Set the pressure on PG1 to 5.0 +/- 1.0 psig by adjusting the regulator.

4.1.26 □ Open HV1 and pressurize up to HV2.

4.1.27 □ Open HV2 and pressurize the dummy test article.

4.1.28 □ Record the pressures of Heise PG1 and PG2 and PACRATS PG1 and PG2 in
   Section 7.0 Table 7.1.

4.1.29 □ Verify PACRATS by adjusting the regulator to change the pressure multiple times
   and record values from the Heise meter and PACRATS in Section 7.0
   Table 7.1 after each change of pressure.

4.1.30 □ Close BV1.

4.1.31 □ Open the vent valve and vent until Heise PG1/PG2 and PACRATS PG1/PG2 read
   atmospheric pressure.

4.1.32 □ Record the final pressures in Section 7.0 Table 7.1.

4.1.33 □ Close HV1, HV2, and the vent valve.

4.1.34 □ Set the regulator to full CCW (closed).

8

VERIFY THAT THIS IS THE CORRECT VERSION BEFORE USE.
4.1.35  □  Stop PACRATS data recording by selecting File/Set Record Off.

4.1.36  □  Close the PACRATS workspace by selecting File/Closed Workspace.

4.1.37  □  Stop the PACRATS test file by selecting File/Stop Test.

4.1.38  □  Save data to .CSV file by selecting Data/Convert.

4.1.39  □  Select the correct file using Year/Month/Day/Time.HDR.

4.1.40  □  Open selected file.

4.1.41  □  Select the measurements tab in the Data Convert window.

4.1.42  □  Move measurements by selecting Heise 1 and Heise 2, and use the arrow to transfer to the right side.

4.1.43  □  Select Ok.

4.1.44  □  Select “No” on the Convert More Data to File window.

4.1.45  □  Exit the PACRATS application by selecting File/Exit.

4.1.46  □  Archive the PACRATS test data files, message log and photographs and record location:

    //Australia/PACRATS_MCTF/______________________________

4.1.47  □  Turn off hardware if applicable.

4.1.48  □  Disconnect the test setup as required.
4.2 Sniffer Probe Leak Test with Inficon

Reference Section 6.0 Figure 6.2 for the test setup. The steps can be performed out of sequence at the discretion of the test conductor.

4.2.1 ☐ Setup the MCTF and PACRATS hardware per Section 6.2.

4.2.2 ☐ 2nd Person Verification ________________________________ (Print Name)

______________________________ (Sign Name)

4.2.3 ☐ Power on the Heise meter.

4.2.4 ☐ Press Setup.

4.2.5 ☐ Use the arrows to select “RS232.”

4.2.6 ☐ Select “Enable.”

4.2.7 ☐ Set the baud rate to “9600.”

4.2.8 ☐ Use the arrows to select the “Remote” mode.

4.2.9 ☐ Select “Terminal Mode.”

4.2.10 ☐ Select “CrLF” for the End of Message.

4.2.11 ☐ Power up the Inficon, and let it warm up for 20-30 minutes.

4.2.12 ☐ While the device is warming, put the device in “All Interfaces Mode” by performing the next twelve steps.

4.2.13 ☐ Select “Menu”.

4.2.14 ☐ Select “Settings”.

4.2.15 ☐ Select “Interfaces”.

4.2.16 ☐ Select “Control Location”.

4.2.17 ☐ Select “All”.

4.2.18 ☐ Select “OK”.

4.2.19 ☐ Press the “Back” button to return to the Settings Menu.

VERIFY THAT THIS IS THE CORRECT VERSION BEFORE USE.
4.2.20  □ Select “Interfaces”.
4.2.21  □ Select “RS232 Protocol”.
4.2.22  □ Select “ASCII”.
4.2.23  □ Select “OK”.
4.2.24  □ Press the “Back” button twice to return to the Main Menu.
4.2.25  □ Select “Mode”.
4.2.26  □ Select “Sniff”.
4.2.27  □ Select “OK”.
4.2.28  □ Press the “Back” button.
4.2.29  □ Connect the Sniffer Probe to the Inficon.
4.2.30  □ Select “Start” button on Inficon.
4.2.31  □ Verify/set regulator to full CCW (closed).
4.2.32  □ Verify/close HV1, HV2 and vent valve.
4.2.33  □ Verify PG1 and PG2 are reading atmospheric pressure.
4.2.34  □ Once the test set up is configured per Section 6.2, connect the setup to the dummy test article.
4.2.35  □ Conduct TRI. Complete the TRI Checklist in Appendix 8.0 Section 8.2 and the test participants shall sign and date.
4.2.36  □ Photograph the test setup and attach a copy to this procedure.
4.2.37  □ Power ON the PACRATS Computer and run the PACRATS application.
4.2.38  □ Record PACRATS Version by selecting Help/About PACRATS.
   PACRATS Version__________________________
4.2.39  □ Load the PACRATS test file Inficon-Heise.tst by selecting File/Start Test and double click test file to be loaded.
   Record Test File Name__________________________

VERIFY THAT THIS IS THE CORRECT VERSION BEFORE USE.
4.2.40  □ Verify data is being received on the PACRATS workstation.

4.2.41  □ Start PACRATS data recording by selecting File/Set Record On.

        Record Data File Name ________________________________

4.2.42  □ Verify Heise PG1 and PG2 are reading atmospheric and record in Section 7.0 Table 7.2.

4.5.43  □ Verify the Inficon Leak Rate and Record in Section 7.0 Table 7.2.

4.2.44  □ Verify PACRATS PG1 and PG2 are reading atmospheric; verify the Leak Rate SCCS GHe and record all values in Section 7.0 Table 7.2.

4.2.45  □ Open BV1.

4.2.46  □ Set the pressure on PG1 to 5.0 +/- 1.0 psig by adjusting the regulator.

4.2.47  □ Open HV1 and pressurize up to HV2.

4.2.48  □ Open HV2 and pressurize the dummy test article.

4.2.49  □ Close HV2.

4.2.50  □ Open vent and allow Test Article to vent until PG2 reads atmospheric.

4.2.51  □ Close vent.

4.2.52  □ Open HV2 and pressurize Test Article as read on PG2.

4.2.53  □ Close HV2.

4.2.54  □ Open vent and allow Test Article to vent until PG2 reads atmospheric.

4.2.55  □ Close vent.

4.2.56  □ Open HV2 and pressurize until PG2 reads 5.0 +/- 1.0 psig.

4.2.57  □ Maintain pressure for dwell for 30 minute minimum.

        Start______________________    Stop______________________

4.2.58  □ Using a sniffer probe, test all separable joints for leakage.

VERIFY THAT THIS IS THE CORRECT VERSION BEFORE USE.
4.2.59  Verify that the PACRATS and Inficon data are the same and record maximum leakage from both in Section 7.0 Table 7.2.

4.2.60  Record the pressures of Heise PG1 and PG2, Inficon Leak Rate, and PACRATS PG1, PG2, and Leak Rate in Section 7.0 Table 7.2.

4.2.61  Verify PACRATS by adjusting the regulator to change the pressure multiple times and record the values from the Heise meter, Inficon, and PACRATS in Section 7.0 Table 7.2 after each change of pressure.

4.2.62  Close BV1.

4.2.63  Open the vent valve and vent until Heise PG1/PG2 and PACRATS PG1/PG2 read atmospheric pressure.

4.2.64  Record the final pressures in Section 7.0 Table 7.2.

4.2.65  Close HV1, HV2, and the vent valve.

4.2.66  Set the regulator to full CCW (closed).

4.2.67  Stop PACRATS data recording by selecting File/Set Record Off.

4.2.68  Close the PACRATS workspace by selecting File/Close Workspace.

4.2.69  Stop the PACRATS test file by selecting File/Stop Test.

4.2.70  Save data to .CSV file by selecting Data/Convert.

4.2.71  Select the correct file using Year/Month/Day/Time.HDR.

4.2.72  Open selected file.

4.2.73  Select the measurements tab in the Data Convert window.

4.2.74  Move measurements by selecting Heise 1, Heise 2, and Leak Rate, then use the arrow to transfer to the right side.

4.2.75  Select Ok.

4.2.76  Select “No” on the Convert More Data to File window.

4.2.77  Exit the PACRATS application by selecting File/Exit.

VERIFY THAT THIS IS THE CORRECT VERSION BEFORE USE.
4.2.78  □ Archive the PACRATS test data files, message log and photographs and record location:

//Australia/PACRATS_MCTF/

4.2.79  □ Turn off hardware if applicable.

4.2.80  □ Disconnect the test setup as required.
4.3 Sniffer Probe Leak Test with Varian

Reference Section 6.0 Figure 6.3 for the test setup. The steps can be performed out of sequence at the discretion of the test conductor.

4.3.1 Create setup the MCTF and PACRATS hardware per Section 6.3.

4.3.2 2nd Person Verification ____________________________ (Print Name)

__________________________ (Sign Name)

4.3.3 Power on the Heise meter.

4.3.4 Press Setup.

4.3.5 Use the arrows to select “RS232.”

4.3.6 Select “Enable.”

4.3.7 Set the baud rate to “9600.”

4.3.8 Use the arrows to select the “Remote” mode.

4.3.9 Select “Terminal Mode.”

4.3.10 Select “CrLF” for the End of Message.

4.3.11 Power up the varian, and let it warm up for 20-30 minutes.

4.3.12 Connect the Sniffer Probe to the Varian.

4.3.13 Press the Start/Test button on the Varian.

4.3.14 Verify/set regulator to full CCW (closed).

4.3.15 Verify/close HV1, HV2 and vent valve.

4.3.16 Verify PG1 and PG2 are reading atmospheric pressure.

4.3.17 Once the test set up is configured per Section 6.3, connect the setup to the dummy test article.

4.3.18 Conduct TRI. Complete the TRI Checklist in Appendix 8.0 Section 8.3 and the test participants shall sign and date.

VERIFY THAT THIS IS THE CORRECT VERSION BEFORE USE.
4.3.19 □ Photograph the test setup and attach a copy to this procedure.

4.3.20 □ Power ON the PACRATS Computer and run the PACRATS application.

4.3.21 □ Record PACRATS Version by selecting Help/About PACRATS.
   PACRATS Version ____________________________

4.3.22 □ Load the PACRATS test file Varian-Heise.tst by selecting File/Start Test and double left click test file to be loaded.
   Record Test File Name ____________________________

4.3.23 □ Verify data is being received on the PACRATS workstation.

4.3.24 □ Start PACRATS data recording by selecting File/Set Record On.
   Record Data File Name ____________________________

4.3.25 □ Verify Heise PG1 and PG2 are reading atmospheric and record in Section 7.0 Table 7.3.

4.3.26 □ Verify the Varian Leak Rate and Record in Section 7.0 Table 7.3.

4.3.27 □ Verify PACRATS PG1 and PG2 are reading atmospheric; verify the Leak Rate SCCS GHe and record all values in Section 7.0 Table 7.3.

4.3.28 □ Open BV1.

4.3.29 □ Set the pressure on PG1 to 5.0 +/- 1.0 psig by adjusting the regulator.

4.3.30 □ Open HV1 and pressurize up to HV2.

4.3.31 □ Open HV2 and pressurize the dummy test article.

4.3.32 □ Close HV2.

4.3.33 □ Open vent and allow Test Article to vent until PG2 reads atmospheric.

4.3.34 □ Close vent.

4.3.35 □ Open HV2 and pressurize Test Article as read on PG2.

4.3.36 □ Close HV2.

4.3.37 □ Open vent and allow Test Article to vent until PG2 reads atmospheric.

16

VERIFY THAT THIS IS THE CORRECT VERSION BEFORE USE.
4.3.38  □ Close vent.

4.3.39  □ Open HV2 and pressurize until PG2 reads 5.0 +/- 1.0 psig.

4.3.40  □ Maintain pressure for dwell for 30 minute minimum.

Start_________________________  Stop_________________________

4.3.41  □ Using a sniffer probe, test all separable joints for leakage.

4.3.42  □ Verify that the PACRATS and Varian data are the same and record maximum leakage from both in Section 7.0 Table 7.3.

4.3.43  □ Record the pressures of Heise PG1 and PG2, Varian Leak Rate, and PACRATS PG1 and PG2, and Leak Rate in Section 7.0 Table 7.3.

4.3.44  □ Verify PACRATS by adjusting the regulator to change the pressure multiple times and record the values from the Heise meter, Varian, and PACRATS in Section 7.0 Table 7.3 after each change of pressure.

4.3.45  □ Close BV1.

4.3.46  □ Open the vent valve and vent until Heise PG1/PG2 and PACRATS PG1/PG2 read atmospheric pressure.

4.3.47  □ Record the final pressures in Section 7.0 Table 7.3.

4.3.48  □ Close HV1, HV2, and the vent valve.

4.3.49  □ Set the regulator to full CCW (closed).

4.3.50  □ Stop PACRATS data recording by selecting File/Set Record Off.

4.3.51  □ Close the PACRATS workspace by selecting File/Close Workspace.

4.3.52  □ Stop the PACRATS test file by selecting File/Stop Test.

4.3.53  □ Save data to .CSV file by selecting Data.Convert.

4.3.54  □ Select the correct file using Year/Month/Day/Time.HDR.

4.3.55  □ Open selected file.

4.3.56  □ Select the measurements tab in the Data Convert window.

VERIFY THAT THIS IS THE CORRECT VERSION BEFORE USE.
4.3.57  □ Move measurements by selecting Heise 1 and Heise 2, and use the arrow to transfer to the right side.

4.3.58  □ Select Ok.

4.3.59  □ Select “No” on the Convert More Data to File window.

4.3.60  □ Exit the PACRATS application by selecting File/Exit.

4.3.61  □ Archive the PACRATS test data files, message log and photographs and record location:

//Australia/PACRATS_MCTF/

4.3.62  □ Turn off hardware if applicable.

4.3.63  □ Disconnect the test setup as required.

VERIFY THAT THIS IS THE CORRECT VERSION BEFORE USE.
4.4 Documentation Update – This section is for ES61 purposes only.

4.4.1 □ Enter calibration data into MCTF Calibration Logbook.

4.4.1 □ Log all data in the ES61 database.

VERIFY THAT THIS IS THE CORRECT VERSION BEFORE USE.
5.0 Post Test Verification

The test operations specified in this document have been satisfactorily completed.

______________________________________
Systems Test Engineer                     Date

______________________________________
S&MA Monitor                               Date
6.0 Figures

6.1 Proof Test

VERIFY THAT THIS IS THE CORRECT VERSION BEFORE USE.
6.2 Sniffer Probe Leak Test with Inficon

VERIFY THAT THIS IS THE CORRECT VERSION BEFORE USE.
6.3 Sniffer Probe Leak Test with Varian

VERIFY THAT THIS IS THE CORRECT VERSION BEFORE USE.
7.0 Tables

7.1 Proof Test Table

<table>
<thead>
<tr>
<th>Heise Pressure Meter</th>
<th>PACRATS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PG1</td>
</tr>
<tr>
<td>Value 1</td>
<td></td>
</tr>
<tr>
<td>Value 2</td>
<td></td>
</tr>
<tr>
<td>Value 3</td>
<td></td>
</tr>
<tr>
<td>Value 4</td>
<td></td>
</tr>
<tr>
<td>Value 5</td>
<td></td>
</tr>
<tr>
<td>Value 6</td>
<td></td>
</tr>
<tr>
<td>Value 7</td>
<td></td>
</tr>
<tr>
<td>Value 8</td>
<td></td>
</tr>
<tr>
<td>Value 9</td>
<td></td>
</tr>
<tr>
<td>Value 10</td>
<td></td>
</tr>
</tbody>
</table>

7.2 Sniffer Probe Leak Test with Inficon Table

<table>
<thead>
<tr>
<th>Heise Pressure Meter</th>
<th>Inficon</th>
<th>PACRATS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PG1</td>
<td>PG2</td>
</tr>
<tr>
<td>Value 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Value 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Value 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Value 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Value 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Value 6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Value 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Value 8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Value 9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Value 10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 7.3 Sniffer Probe Leak Test with Varian Table

<table>
<thead>
<tr>
<th></th>
<th>Heise Pressure Meter</th>
<th>Varian</th>
<th>PACRATS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PG1</td>
<td>PG2</td>
<td>PG1</td>
</tr>
<tr>
<td>Value 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Value 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Value 3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Value 4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Value 5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Value 6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Value 7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Value 8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Value 9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Value 10</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Submittal Date: June 28, 2011

VERIFY THAT THIS IS THE CORRECT VERSION BEFORE USE.
8.0 **Appendices – TRI Information**

8.1 **Proof Test Inspection**

Test Readiness Inspection Checklist:

- Test Readiness Review has been previously held.
- All test requirements have been properly incorporated into the test procedure.
- The test article configuration has been documented and is sufficient to meet the test requirements.
- The test setup is in accordance with the test procedure and is sufficient to meet test requirements and protect the test article, facility, and personnel from injury or damage.
- Facility and test equipment certifications/calibrations are current and adequate to meet the test requirements.
- Data collection, storage, reduction, and reporting provisions are in place to meet test requirements.
- All required PPE is in place.
- Emergency shutdown procedures are reviewed, documented, posted as appropriated, and understood by all test participants.
- Personnel staffing plans to cover the test are in place and understood by test participants and that all required personnel certifications are current.

_________________________________________  
Test Conductor  
Date  

_________________________________________  
Test Operator  
Date  

_________________________________________  
Test Operator  
Date  

_________________________________________  
Test Operator  
Date  

_________________________________________  
Quality Specialist  
Date  

VERIFY THAT THIS IS THE CORRECT VERSION BEFORE USE.
8.2 Sniffer Probe Leak Test with Inficon Inspection

Test Readiness Inspection Checklist:

☐ Test Readiness Review has been previously held.
☐ All test requirements have been properly incorporated into the test procedure.
☐ The test article configuration has been documented and is sufficient to meet the test requirements.
☐ The test setup is in accordance with the test procedure and is sufficient to meet test requirements and protect the test article, facility, and personnel from injury or damage.
☐ Facility and test equipment certifications/calibrations are current and adequate to meet the test requirements.
☐ Data collection, storage, reduction, and reporting provisions are in place to meet test requirements.
☐ All required PPE is in place.
☐ Emergency shutdown procedures are reviewed, documented, posted as appropriate, and understood by all test participants.
☐ Personnel staffing plans to cover the test are in place and understood by test participants and that all required personnel certifications are current.

_________________________________________  __________________________
Test Conductor                               Date

_________________________________________  __________________________
Test Operator                                 Date

_________________________________________  __________________________
Test Operator                                 Date

_________________________________________  __________________________
Test Operator                                 Date

_________________________________________  __________________________
Quality Specialist                            Date

-27-

VERIFY THAT THIS IS THE CORRECT VERSION BEFORE USE.
8.3 **Sniffer Probe Leak Test with Varian Inspection**

Test Readiness Inspection Checklist:

- Test Readiness Review has been previously held.
- All test requirements have been properly incorporated into the test procedure.
- The test article configuration has been documented and is sufficient to meet the test requirements.
- The test setup is in accordance with the test procedure and is sufficient to meet test requirements and protect the test article, facility, and personnel from injury or damage.
- Facility and test equipment certifications/calibrations are current and adequate to meet the test requirements.
- Data collection, storage, reduction, and reporting provisions are in place to meet test requirements.
- All required PPE is in place.
- Emergency shutdown procedures are reviewed, documented, posted as appropriated, and understood by all test participants.
- Personnel staffing plans to cover the test are in place and understood by test participants and that all required personnel certifications are current.

---

Test Conductor

Date

Test Operator

Date

Test Operator

Date

Test Operator

Date

Quality Specialist

Date

-28-

VERIFY THAT THIS IS THE CORRECT VERSION BEFORE USE.
9.0 **Emergency Page**

In the event of severe weather during test operations, perform the emergency shutdown procedure and proceed immediately to proper shelter.

If properly notified of a planned drill, testing may continue during a planned drill. However, if the fire alarm sounds, and it cannot be verified that a fire drill is taking place, perform the emergency shutdown procedure and evacuate the building.

The emergency telephone numbers are below.

<table>
<thead>
<tr>
<th>Service</th>
<th>Phone Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fire/Ambulance</td>
<td>911</td>
</tr>
<tr>
<td>Security</td>
<td>4-4357</td>
</tr>
<tr>
<td>Industrial Safety Hotline</td>
<td>4-0046</td>
</tr>
<tr>
<td>Facilities</td>
<td>4-3919</td>
</tr>
<tr>
<td>ES61 Branch Chief</td>
<td>4-7392</td>
</tr>
</tbody>
</table>

9.1 **Emergency Shutdown Procedure**

9.1.1 ☐ Close BV1.

9.1.2 ☐ Open vent valve and vent the assembly until PG1 and PG2 read atmospheric pressure.