LAT PROJECT DOCUMENT CHANGE NOTICE (DCN)

DCN No. LAT-XR-06611-01

SHEET 1 **OF** 1

ORIGINATOR: Leonid Sapozhnikov	**PHONE:** 650-926-2002	**DATE:** 5/5/05
CHANGE TITLE: DCN for TEM/TPS Performance Test Procedure		**ORG.:**

DOCUMENT NUMBER	TITLE	NEW REV.
LAT-TD-04085	TEM/TPS Performance Test Procedure	04

CHANGE DESCRIPTION (FROM/TO):

Please see LAT-XR-06612-01 for changes to this document

REASON FOR CHANGE:

ACTION TAKEN: ☒ **Change(s) included in new release** ☐ **DCN attached to document(s), changes to be included in next revision**
☐ **Other (specify):**

DISPOSITION OF HARDWARE (IDENTIFY SERIAL NUMBERS):	**DCN DISTRIBUTION:**
☒ **No hardware affected (record change only)**	
☐ **List S/Ns which comply already:**	
☐ **List S/Ns to be reworked or scrapped:**	
☐ **List S/Ns to be built with this change:**	
☐ **List S/Ns to be retested per this change:**	
☐	

SAFETY, COST, SCHEDULE, REQUIREMENTS IMPACT? ☐ **YES** ☒ **NO**
If yes, CCB approval is required. Enter change request number:

APPROVALS	DATE	OTHER APPROVALS (specify):	DATE
ORIGINATOR: L. Sapozhnikov (signature on file)	5/5/05	Thermal- J. Goodman (signature on file)	5/6/05
ORG. MANAGER: G. Haller (signature on file)	5/5/05		
PSA- J. Cullinan (signature on file)	5/5/05		
Manufacturing- R. Patterson (signature on file)	5/5/05		
Elec.- D. Nelson (signature on file)	5/9/05		
DCC RELEASE: Natalie Cramar (signature on file)	5/9/05	Doc. Control Level: ☒ Subsystem ☐ LAT IPO ☐ GLAST Project	

	Document #	Date effective
	**LAT-TD-04085-04**	05/04/2005
	Author(s) L. Sapoznikov	Supersedes LAT-TD-04085-03
	Subsystem/Office Electronics & DAQ Subsystem	
Document Title **TEM/TPS Performance Test Procedure**		

Tower Electronics Module Assembly (TEM)/Tower Power Supply (TPS) Performance Test Procedure

CHANGE HISTORY LOG

Revision	Effective Date	Description of Changes
01	10/28/04	Initial version
02	01/06/05	Added line 12 and 13 to Para. 5.5.1 and the data sheets to reflect the changes. Updated Figures 20, 36, 44, to indicate that the TPS is a Unit Under Test; Changed EGSE equipment: TEMPROD version to V01-00-02 under Software for the local PC
03	02/14/05	Changed LATTE version to P04-07-02 and TEMPROD version to V02-03-01. In Temperature Test, updated screenshot of window and added step to record ambient temperature. In Functional Test, updated screenshots to show Misc and Thorough buttons. Replaced Basic Test in CAL Noise and TKR Noise Tests, with Functional Test. Added steps to check indicator lights before demating during the CAL Noise and TKR Noise Tests. Removed references to gGTIC; these steps are now contained in the code. Added Mate/Demate Log.
04	05/04/05	Added Thermal Vac section in which all the tests are run in one test.

Table of Contents -TOC

1. SCOPE

This document provides the process for setup and instructions for testing the Tower Electronics Module (TEM)/Tower Power Supply (TPS) and the Electrical Ground Support Equipment (EGSE) TEM Test Stand.

Note: This document shall be considered subordinate to any Assembly and Inspection Data Sheet (AIDS) that is used in conjunction with this testing process.

2. DEFINITIONS AND ACRONYMS

The following terms, abbreviations, and acronyms are used in this document:

2.1 Definitions

A, An	Analog
D, Dg	Digital
F	Functional
Hz	Hertz, unit of frequency
MHz	Megahertz
mV	millivolt, 10^{-3} Volt
Ω	ohm, unit of electrical resistance
s, sec	seconds
µ	10^{-6}
V	Volt
W	Watt

2.2 Acronyms

AIDS	Assembly and Inspection Data Sheet
BOB	Break-Out-Box
CAL	Calorimeter
CPT	Comprehensive Performance Test
EGSE	Electrical Ground Support Equipment
ETech	Electrical Technician Electrical Ground Support Equipment
GASU	Global trigger Anti-collision Spacecraft Unit
LPT	Limited Performance Test
MTech	Mechanical Technician
PTR	Post Test Review
QAE	Quality Assurance Engineer
TC	Test Conductor
TD	Test Director
TEM	Tower Electronics Module
TKR	Tracker
TPS	Tower Power Supply
TRR	Test Readiness Review
UUT	Unit Under Test

3. REFERENCES

The list below provides documents that are to be used as references for this procedure:

3.1 Applicable Documents

Document Number	Description
SPECIFICATIONS	
LAT-TD-00778	LAT Environmental Specification
PROCEDURES	
PLANS	
LAT-MD-00039	Performance Assurance Implementation Plan
LAT-MD-00078	GLAST LAT System Safety Program Plan
LAT-MD-00404	LAT Contamination Control Plan
LAT-MD-00408	LAT Program Instrument Performance Verification Plan
LAT-SS-00296	T & DF Test Plan
LAT-TD-00297	LAT Electronics Test Plan
DRAWINGS	
OTHER	
LAT-MD-00091	GLAST Quality Manual
LAT-MD-00471	Control of Nonconforming Product
LAT-MD-00472	Corrective and Preventative Action
LAT-MD-00473	Handling, Storage, Packing, Preservation and Delivery

4. REQUIREMENTS

This section lists the requirements that shall be followed during the TEM Qualification and Acceptance process.

4.1 General

The Performance Assurance Implementation Plan, LAT-MD-00039 shall be utilized to ensure that the products produced by the GLAST LAT project intended for design qualification, flight and critical ground support equipment usage meet the required levels of quality and functionality for their intended purposes.

This document shall follow the LAT Program Instrument Performance Verification Plan LAT-MD-00408 which details the LAT and its subsystem verification test flow.

The LAT T & DF Test Plan, LAT-TD-00296 shall be utilized to address the overall requirements at engineering model, qualification and production level phases. This document defines the time period from post circuit board fabrication until electronic box delivery to LAT Integration and Test.

Testing within this document shall conform to the requirements stated in LAT Performance and Operations Test Plan LAT-MD-02730 for all testing that relates to LAT I & T.

4.2 Test Personnel and Descriptions

Test personnel are described in GLAST LAT Integration and Test Subsystem Test Plan, LAT-MD-01376.

4.3 Test Readiness Review (TRR) and Post Test Review (PTR)

The TRR and PTR are organizational meetings that shall be held at the appropriate times to inform all parties about the testing that is to be accomplished and has been completed. The TRR and PTR meetings are defined in the GLAST LAT Integration and Test Subsystem Test Plan, LAT-MD-01376.

4.4 Environmental Conditions

Testing performed in accordance with this document shall conform to standard environmental test conditions unless specific test requirements within this document exist. Standard Environmental test conditions are as follows:

- Dynamic Mechanical Conditions: No load, at rest
- Temperature: 18.3 to 25.7°C
- Atmospheric Pressure: Uncontrolled local conditions
- Humidity: 30% to 50% RH for testing when the Calorimeter or Engineering Model (EM) Calorimeters are present. For all other testing 30% to 60% RH is required.

This document shall follow the LAT Environmental Specification, LAT-SS-00778 for all testing where non standard environments are required. The Environmental Specification defines the thermal, vibration and on-orbit exposure design and test environments for the LAT instrument and its subsystems.

4.5 Contamination Control

The Contamination Control Plan defines the overall contamination control requirements necessary to establish hardware cleanliness for the GLAST LAT program. When work is performed at SLAC follow LAT-MD-01386. When work is performed elsewhere follow LAT-MD-00404.

4.6 Handling and Transportation

This document shall follow the requirements found in the Handling, Storage, Package, Preservation and Delivery document, LAT-MD-00473. This document establishes handling, storage, packaging and transportation practices adequate to maintain the safety, reliability and quality of SLAC LAT flight hardware items and achieve their damage free delivery to the place and time of ultimate use.

4.7 ESD

The CAL, TKR, T & DF Contamination Control Plan and the LAT Contamination Control Plan define the ESD requirements for the GLAST LAT program. When work is performed at SLAC follow LAT-MD-01386. When work is performed elsewhere follow LAT-MD-00404

4.8 Mate/Demate Connectors

This document shall follow the requirements found in the Mate and Demate Workmanship Standard LAT-PS-04459. The mate/demate process shall be followed for each and every connector mate. This consists of a visual inspection of the interface, cleaning if required, and proper mating techniques.

4.9 Test Equipment

This document shall follow the requirements found in the LAT Program Instrument Performance Verification Plan, LAT-MD-00408, which defines calibration, accuracy, substitutions, etc. for the test equipment.

4.10 Test Data and Review

This document shall follow the requirements found in the LAT Program Instrument Performance Verification Plan, LAT-MD-00408, which defines the test data sheets and details the personnel that reviews test data. Test data shall be recorded on the data sheets that are found in Appendix A of this document. The data sheets and any supporting data shall use a cover sheet that is found in Appendix A of this document.

4.11 Flight Hardware Log Book

The LAT Program Instrument Performance Verification Plan, LAT-MD-00408 requires that a log of hardware installation, software installation, power ON and mates/demates to flight connectors shall be kept for each flight unit. The log book is part of the package that is deliverable to the customer.

4.12 Nonconforming Test Data, Equipment and Software

This document shall follow the requirements found in the Control of Nonconforming Product, LAT-MD-00471. This document establishes methods to identify and control nonconforming product developed by the LAT project team.

4.13 Redlines to Documents

The users of this document shall follow the requirements found in the Redline/Blackline Engineering Documents, LAT-MD-03474.

4.14 Crane Operations

Before a crane (or any lifting device) is used it should be verified that the proof loading is current and the expected load to be lifted does not exceed the load capacity of the device. The operator shall have a current certification for the operation.

There shall be three people present before, during and at the completion of all lifting operations. Each one of these people shall perform only one of the following three duties:

- Crane Operator – When the crane operator controls the crane no other duties shall be performed. At other times this person may help with the mechanical or electrical duties.
- Spotter – During the lifting operation this person guides the item that is to be moved up or down, checks clearances and the overall movement of all items. At other times this person may help with the mechanical or electrical duties.
- Safety Person (for crane operations only) – Before lifting the item, this person double checks all operations and the removal of bolts/hardware from the item to be moved. During crane operations this person is an observer of the operation and directs the overall lifting operation.

4.15 Quality Assurance

This document shall follow the requirements found in the Corrective and Preventative Action document, LAT-MD-00472 and the GLAST Quality Manual, LAT-MD-00091 and LAT Program Instrument Performance Verification Plan, LAT-MD-00408.

The Corrective and Preventative Action document establishes the method to be used to initiate, implement, evaluate and record corrective and preventive actions. The GLAST Quality Manual defines the methods implemented by the GLAST LAT project to ensure consistent quality of all processes for procurement, design, development and production of flight hardware, flight software, calibration and all associated ground support equipment interfacing with flight hardware and software. The LAT Program Instrument Performance Verification Plan defines test configuration, data sheets and review of test results.

4.15.1 Product Assurance Requirements

The Quality Assurance Engineer (QAE) shall witness the initial test setup and validation operations. In the event of a failure a Non Conformance Report (NCR) shall be written. The root cause and corrective action shall be identified and there shall be QAE approval before the operation is continued. Any deviation from this document requires approval from the QAE as well as the Test Conductor (TC).

4.16 Warnings, Cautions, and Notes

The following SAFETY ALERTS are intended to create awareness of the potential safety hazards and the steps that must be taken to avoid accidents. These same alerts are used throughout this document to identify specific hazards that may endanger personnel and/or equipment.

Identification of every conceivable hazardous situation is impossible. Therefore, all personnel have the responsibility to diligently exercise safe practices whenever exposed to this equipment.

WARNING: Indicates a potential hazardous situation which, if not avoided, could result in death or injury.

CAUTION: Indicates a potential hazardous situation which, if not avoided, could result in damage to equipment.

Note: Indicates a notification of information that is important, but not hazard related.

4.17 Safety

This document shall follow the requirements found in the GLAST LAT System Safety Program Plan, LAT-MD-00078. This document defines all phases of the LAT program including: design, development, fabrication, handling, transportation, storage, test, assembly and operation.

WARNING: When high voltages are present extreme care should be exercised.

5. PROCEDURE

This procedure is used for Performance Testing of the circuits of the TEM.

Unless otherwise noted use a DVM for all measurements.

Note: When performing measurements with a DMM connect the negative lead first.

5.1 Test Procedure Instructions/Information

This section provides the general instructions and information that are used and required to perform this procedure, including: test parameters, sequence, equipment and test participants.

5.1.1 Test Prerequisites

This section describes processes and procedures that must be completed prior to performing the tests in this document.

Before this test is run, the following tests must be completed:

- TEM Performance Test Procedure: LAT-TD-03415
- TPS Performance Test Procedure: LAT-TD-01652

5.1.2 Test Sequence

This section describes the requirements of the event sequence for performing this procedure. Tests are to be performed in the order listed in this document unless otherwise specified. It is permissible for Assembly Instruction Data Sheets (AIDS) to be used to change the order of tests or select a single test paragraph to be performed. In that case, the data sheet for the test performed will be included in the end item data package linked to the AIDS step that required it. Test sequencing can also be changed in a TRR and black lined into the test procedure.

5.1.3 Test Equipment

The test equipment listed below is necessary for the tests described in this procedure. If additional equipment is used, add it to the table below with the signature of the TC and QAE, proceed with the test.

5.1.3.1 EGSE

To record the test equipment, cables, connector savers and software:

1. Record the information for all equipment on the data sheet. See the list below for descriptions of the information to be recorded.

   - Description and Manufacturer
   - Model/LAT number
   - Serial/Revision number
   - Calibration due date (enter NA for non calibrated equipment)
   - Validation completion date for all EGSE

The list below indicates the equipment that is used to perform this procedure:

Test Equipment Description, Manufacturer	Model/LAT Number
VME Crate, Dawn VME Products	11-1011777-2119
VME, TST-STP Trans card	LAT-DS-00999
VME SBC MVME2304 card, Motorola	PN MVME2304-0123
VME LCB Mezzanine card	LAT-TD-00860
Software for the local PC	LATTE P04-07-02 Downloaded from www-glast.slac.stanford.edu/IntegrationTest/ONLINE/updates/
Software for the local PC	TEMPROD V02-03-01 Found in /nfs/slac/g/glast/online/cvsroot/temprod See TEMPROD/History for more information.
DC Power supply #1, BK Precision	BK 1697
DC Power supply #2, BK Precision	BK 1697
28 Volt supply cable	LAT-DS-03246
PS Control cable	LAT-DS-04831
TEM to GASU cable	LAT-DS-02106
LCB Transition board cable	LAT-DS-03247
TEM Test Board Assembly	LAT-DS-04465
TEM Test board cooling fan assembly	LAT-DS-03567
CAT5 Ethernet cable	TRD855PL-50

Test Equipment Description, Manufacturer	Model/LAT Number
RS-232 Cable	TDC003-7 (RECO98M connectors)
Ground jumper, Banana, Pomona	B-12-0
PS extension cable	LAT-DS-04629
Digital Multimeter, Fluke/Meterman	87-III/38XR
Connector Savers (28 pin), L Com	DGBH28MF
Connector Savers (51 pin), Glenair	MWDM2L-51USP1
Connector Savers (69 pin), SLAC	LAT-DS-04724
Connector Savers (78 pin), L Com	DGBH78MF
Breakout Box Assembly (BOB) (78 pin), SLAC	LAT-DS-03580
Breakout Cable (BOC), SLAC	LAT-DS-04273
Breakout Cable (BOC), SLAC	LAT-DS-04275
Load	LAT-DS-04822
Load	LAT-DS-04823
1 MHz Filter	LAT-DS-04767
Noise Measurement Adapter, 51-Pin, SLAC	LAT-DS-04821
Noise Measurement Adapter, 69-Pin, SLAC	LAT-DS-04820
True RMS Volt Meter, Agilent (HP)	3400A
Delay Line, Lemo To Bnc 4N, from SLAC Stores	STORES ID #078697

5.1.3.2 User Interfaces

This test uses GUIs that are based on the Run Control software that has been provided for GLAST by SLAC. Each of the GUIs is described when they are first used in the body of the test procedure.

5.1.4 Participant List

This section provides a data sheet to record test participants.

1. Record all test participants in the data sheet.

5.1.5 Unit Under Test (UUT)

The units under test are the TEM and TPS. The serial number for these units is the 4-digit part of the GLAT number, which is located on the bar code sticker on the unit. Record these numbers on the data sheet cover page and table headings, and enter them in the test application window when requested.

5.2 Pre-Operation Verifications

This section details the pre-operation verification checks before testing the UUT.

To perform the pre-operation verification checks:

CAUTION: Follow ESD processes during this checkout.

Note: Prior to the connection of any hardware to other electronics, verify that all power supplies, signal generators, VME racks, and any other test and measurement equipment are connected to the same AC ground. The simplest way to do this is to connect all AC-powered equipment to the same power strip. In cases where this is not practical (e.g., possibly a thermal-vacuum test), greater care must be taken to ensure there are no floating grounds since this would represent a hazard to the electronics.

Note: Leave all connector savers in place until the actual flight mate is to be made. The AIDS provides authorization to install and remove connector savers.

Note: All flight mates and demates must be completed and entered into the mate demate log before measurements are made or testing can start.

1. Notify QAE that testing is expected to start, so the QAE can arrange to be present for the setup and start of testing. Record per the data sheet.
2. Verify that the Test Readiness Review has concluded and all parties have signed the cover sheet. Record per the data sheet.
3. Record the serial numbers and locations per the data sheet. The serial number for the TEM and for the TPS is the 4-digit part of the GLAT number, which is located on the bar code sticker on the unit.
4. Turn off the LAT or EGSE power. Record in the data sheet.
5. Verify connector savers are on all flight hardware (install the connector savers per authorization from an AIDS if necessary). Record in the data sheet.
6. Verify that the test equipment and participant lists have been completed.

5.3 Test Descriptions

The tests that are run as part of this document are:

- Calibration Tests:
  - Calorimeter (CAL) – Calibrates the TEM measurement of the CAL HV current against an external measurement and logs the internal current measurement as a function of voltage.
  - Tracker (TKR) – Calibrates the TEM measurement of the TKR HV current against an external measurement and logs the internal current measurement as a function of voltage.
  - TEM/TPS – Calibrates the TEM measurement of the tower current against the power supply measurement.
- Main Tests
  - Test Setup for Main Tests – Opens Run Control. This is not a test of the TEM.
  - Monitor Margin and Bias Midrange – Sets the margin and bias voltages to the nominal (mid) range level and then checks the output reading.
  - Temperature Monitor – Checks the temperature readings.
  - Basic – Checks the basic TEM functions (none of the front end connections).
  - Front End – Checks the front end connections and the front end communication.
  - TEM FIFO – Tests the FIFOs on the TEM
- Functional Tests – Tests all the functional registers on the TEM individually.
- Noise Tests – Checks the noise requirements for CAL and TKR power.
  - CAL Noise Test
  - TKR Noise Test

5.4 Calibration Tests

5.4.1 CAL Calibration High Voltage Test Procedure

This section provides instructions to test the calibration of the CAL.

To setup and run the calibration test:

1. Verify that the power is off to power supply #1 and the VME Crate.

2. Connect all the equipment and cables per the interconnect drawing in the figure below.

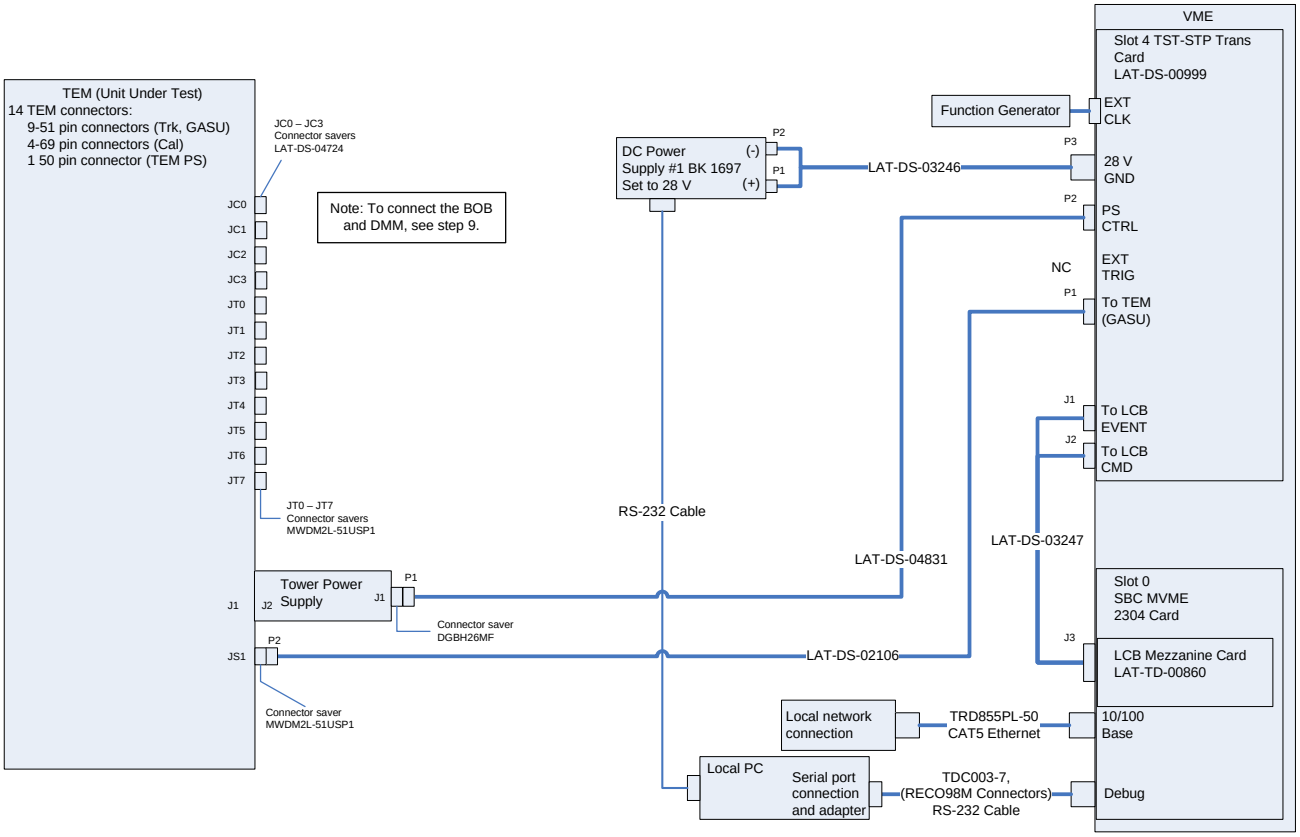


Figure 1. CAL Calibration Test setup Interconnection Diagram

3. Set the DMM to the auto-ranging setting. Record in the data sheet.

4. Measure DMM lead resistance by connecting the two leads together. Record in the data sheet.

5. Connect the BOB chassis to technical ground. Measure the resistance between the BOB chassis and technical ground. Record in the data sheet.

6. Ensure all shorting plugs are removed from the BOB. Record in the data sheet.

5.4.1 CAL Calibration High Voltage Test Procedure (continued)

7. Measure the resistance between the Unit Under Test (UUT) chassis and technical ground. Record in the data sheet.

8. Measure the resistance between the test equipment chassis and technical ground. Record in the data sheet.

9. Setup the BOB and configure the DMM per the figure below following this process:

   a) Connect P2 of the BOC (LAT-DS-04275) to J2 on the BOB (LAT-DS-03580).

   b) Connect P1 of the BOC to JC-0 on the TEM.

   c) Connect the load (LAT-DS-04822) to the black lead of the DMM and insert it into the red terminal of test point 69 on the BOB.

   d) Insert the red lead of the DMM into the red terminal of test point 68.

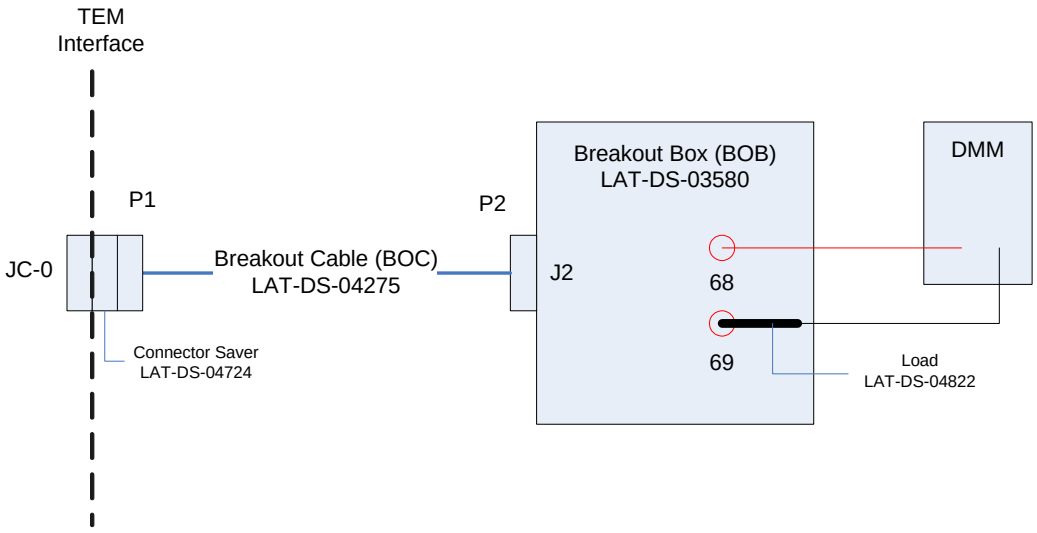


Figure 2. CAL Calibration Test DMM Setup

   e) Configure the DMM and test leads in current-measuring mode in the mA range.

   f) Record on the data sheet.

10. Set the function generator to 20 MHz square wave.

11. Turn on power supply #1 and apply 28.0 volts.

12. Open the “ttermpro” file located in the C:\Program Files\TeraTermProSSH\ directory and connect to the VME Crate using the serial port (COM3).

5.4.1 CAL Calibration High Voltage Test Procedure (continued)

13. Apply power to the VME Crate.
14. Wait for the boot to finish.
15. Open a Command Prompt window.
16. Change the directory to V:\GLAST\Electronics\Teststands\gitot.
17. Type in “runcontrol.bat” and enter.

5.4.1 CAL Calibration High Voltage Test Procedure (continued)

18. The “Run Control Main” window appears as shown below.

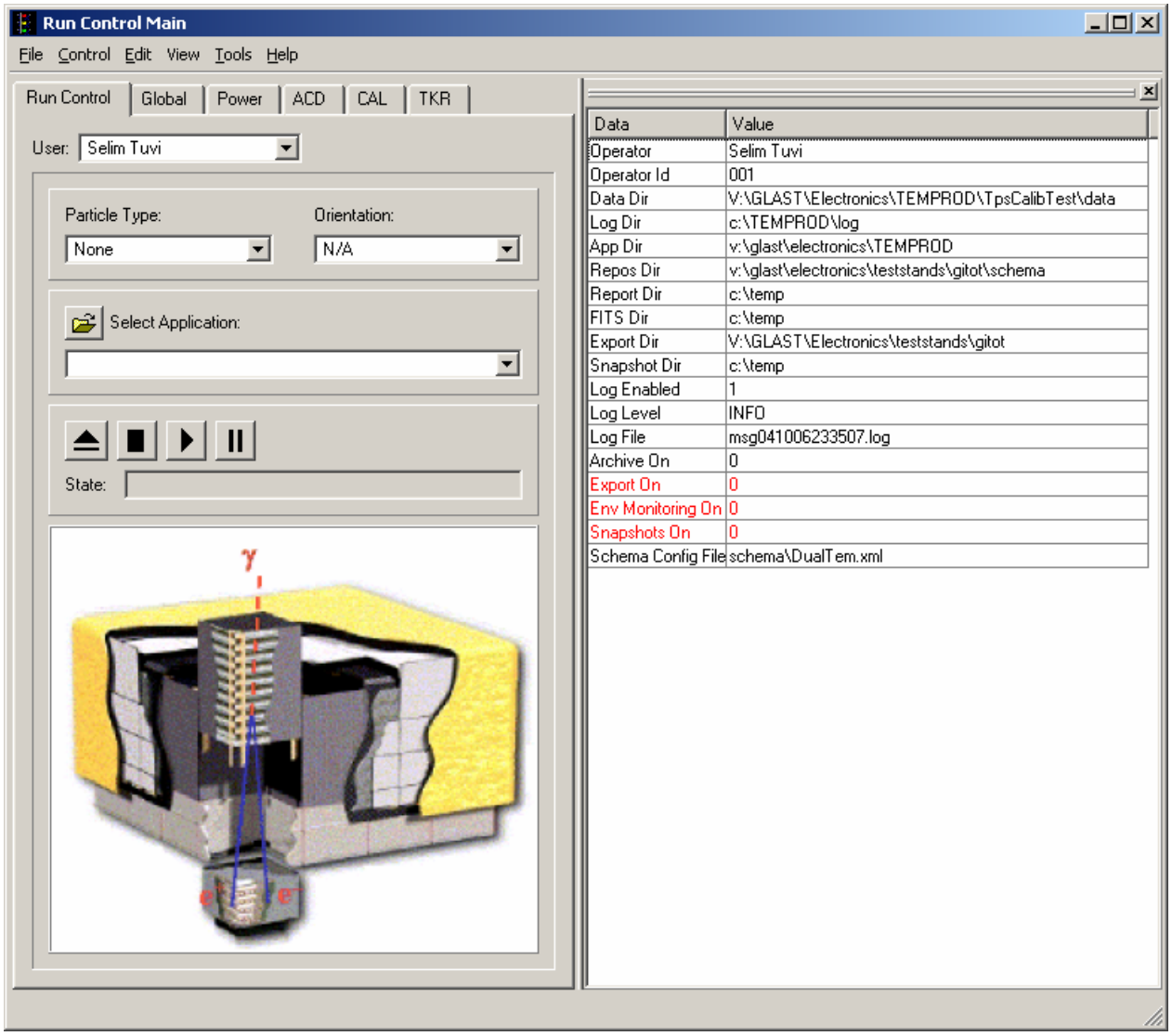


Figure 3. Run Control Main Window

Note: Do not change the options in this window.

19. At the “Run Control Main” window, click on the “Select Application” button. The “Select an application” window appears as shown below.

5.4.1 CAL Calibration High Voltage Test Procedure (continued)

20. Select the directory
V:/GLAST/Electronics/TEMPROD/CalibHVTest/

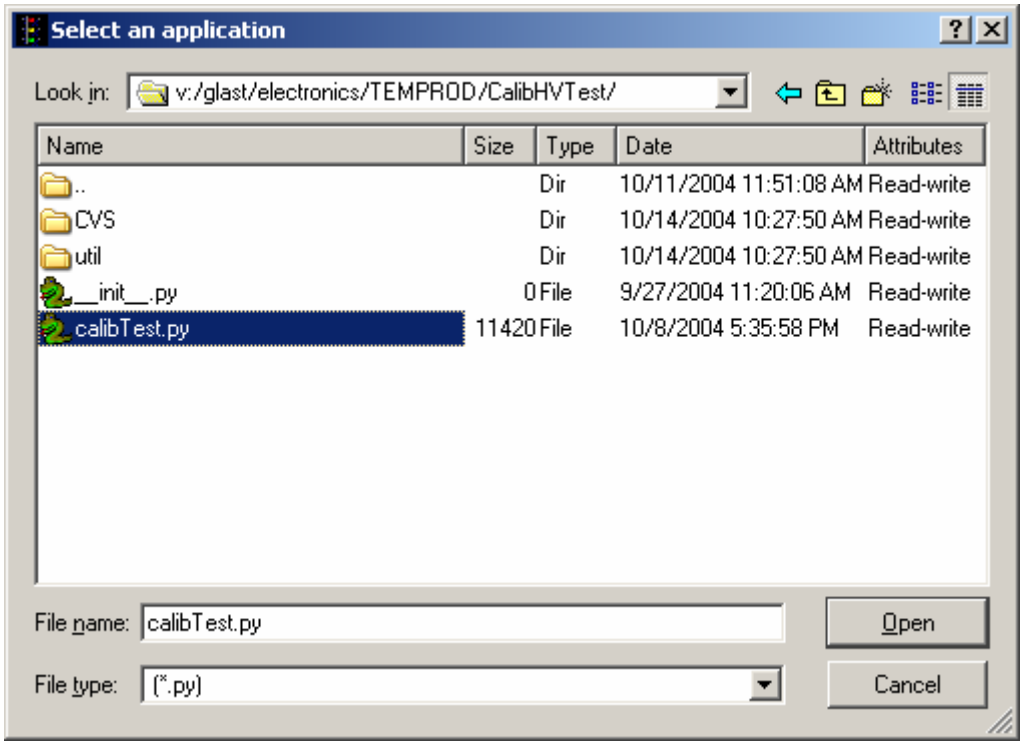


Figure 4. Select an Application Window

21. Select “calibTest.py”.

22. Click on the “Open” button to open the file.

23. At the “Run Control Main” window, click on the ► button.

5.4.1 CAL Calibration High Voltage Test Procedure (continued)

24. The “Calibration High Voltage Test Window” appears as shown below. The indicators following the ranges are clear before the test.

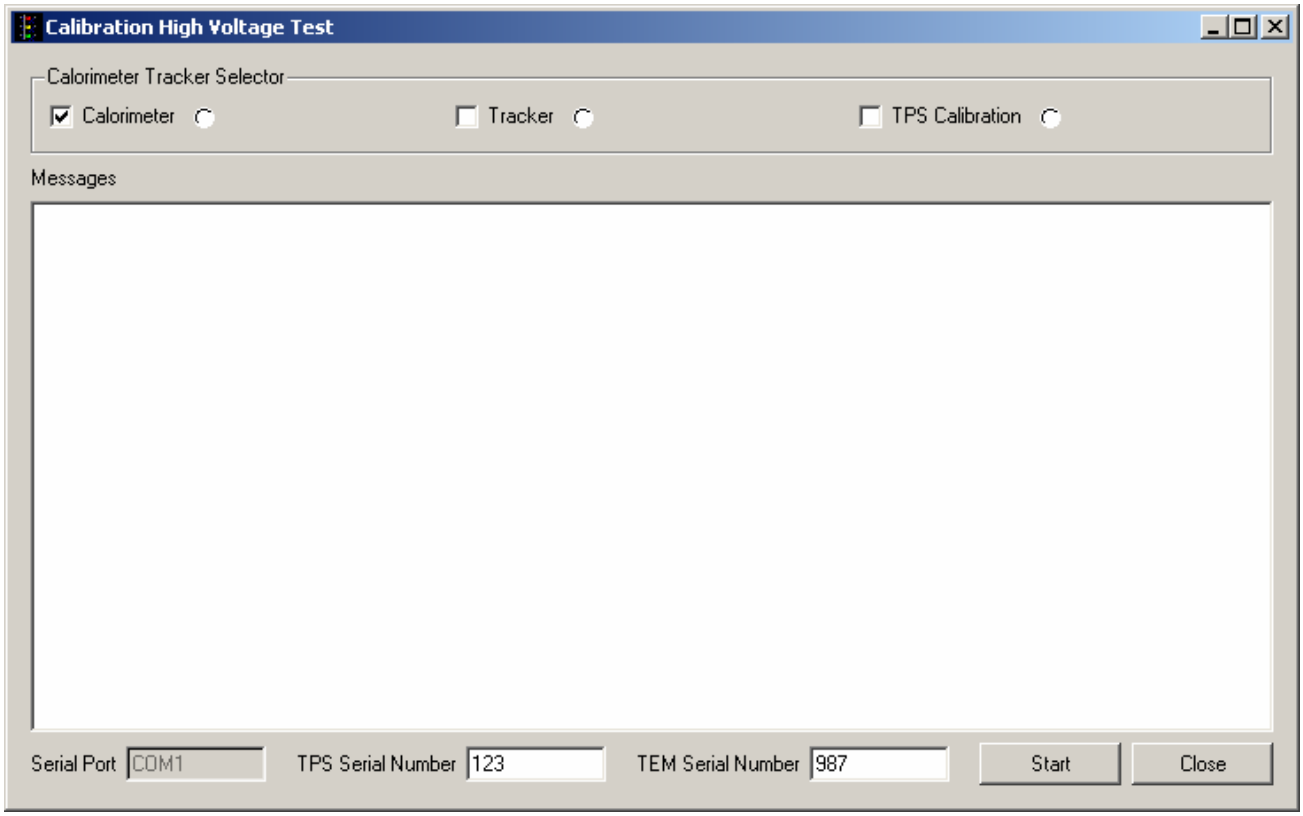


Figure 5. Calibration High Voltage Test Window—CAL Test

25. Select the Calorimeter box and clear the Tracker and TPS Calibration boxes.

26. Enter the TPS serial number in the window. The TPS serial number is the number on the bar code sticker on the TPS.

27. Enter the TEM serial number in the window. The TEM serial number is the number on the bar code sticker on the TEM.

5.4.1 CAL Calibration High Voltage Test Procedure (continued)

28. Click on the “Start” button. The “Current Value Window” appears.

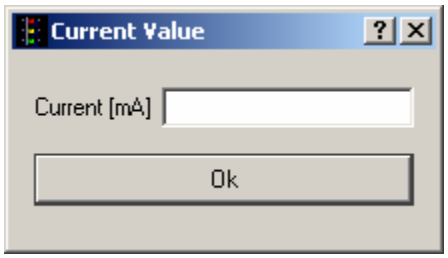


Figure 6. Current Value Window

29. Enter the DMM reading in the “Current Value Window” and click OK.

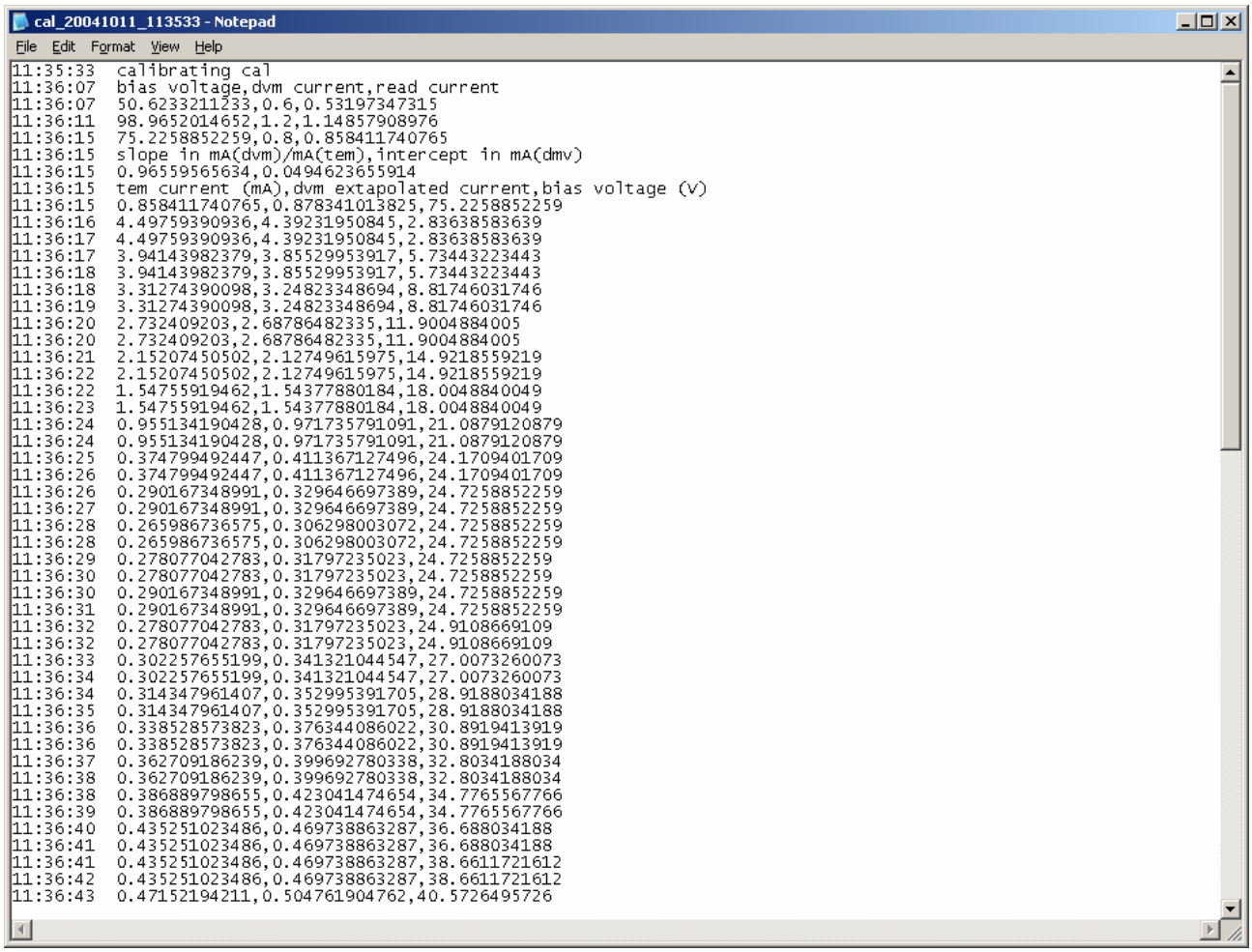
30. Repeat steps 28 and 29 two more times. (The “Current Value Window” appears three times in all.) If there are any errors, they will appear in the Messages box and in the log file.

Note: This test takes about a minute or less to run.

31. Verify that the indicator is green, indicating good data (a red light indicates failure of the test) and that no errors appear in the Messages box. **Record** verifications per the data sheet.

32. Open and print the log file (see the sample of the log file below) and attach it to the data cover sheet.

5.4.1 CAL Calibration High Voltage Test Procedure (continued)



cal_20041011_113533 - Notepad

File Edit Format View Help

```
11:35:33  calibrating cal
11:36:07  bias voltage,dvm current,read current
11:36:07  50.6233211233,0.6,0.53197347315
11:36:11  98.9652014652,1.2,1.14857908976
11:36:15  75.2258852259,0.8,0.858411740765
11:36:15  slope in mA(dvm)/mA(tem),intercept in mA(dmv)
11:36:15  0.96559565634,0.0494623655914
11:36:15  tem current (mA),dvm extapolated current,bias voltage (V)
11:36:15  0.858411740765,0.878341013825,75.2258852259
11:36:16  4.49759390936,4.39231950845,2.83638583639
11:36:17  4.49759390936,4.39231950845,2.83638583639
11:36:17  3.94143982379,3.85529953917,5.73443223443
11:36:18  3.94143982379,3.85529953917,5.73443223443
11:36:18  3.31274390098,3.24823348694,8.81746031746
11:36:19  3.31274390098,3.24823348694,8.81746031746
11:36:20  2.732409203,2.68786482335,11.9004884005
11:36:20  2.732409203,2.68786482335,11.9004884005
11:36:21  2.15207450502,2.12749615975,14.9218559219
11:36:22  2.15207450502,2.12749615975,14.9218559219
11:36:22  1.54755919462,1.54377880184,18.0048840049
11:36:23  1.54755919462,1.54377880184,18.0048840049
11:36:24  0.955134190428,0.971735791091,21.0879120879
11:36:24  0.955134190428,0.971735791091,21.0879120879
11:36:25  0.374799492447,0.411367127496,24.1709401709
11:36:26  0.374799492447,0.411367127496,24.1709401709
11:36:26  0.290167348991,0.329646697389,24.7258852259
11:36:27  0.290167348991,0.329646697389,24.7258852259
11:36:28  0.265986736575,0.306298003072,24.7258852259
11:36:28  0.265986736575,0.306298003072,24.7258852259
11:36:29  0.278077042783,0.31797235023,24.7258852259
11:36:30  0.278077042783,0.31797235023,24.7258852259
11:36:30  0.290167348991,0.329646697389,24.7258852259
11:36:31  0.290167348991,0.329646697389,24.7258852259
11:36:32  0.278077042783,0.31797235023,24.9108669109
11:36:32  0.278077042783,0.31797235023,24.9108669109
11:36:33  0.302257655199,0.341321044547,27.0073260073
11:36:34  0.302257655199,0.341321044547,27.0073260073
11:36:34  0.314347961407,0.352995391705,28.9188034188
11:36:35  0.314347961407,0.352995391705,28.9188034188
11:36:36  0.338528573823,0.376344086022,30.8919413919
11:36:36  0.338528573823,0.376344086022,30.8919413919
11:36:37  0.362709186239,0.399692780338,32.8034188034
11:36:38  0.362709186239,0.399692780338,32.8034188034
11:36:38  0.386889798655,0.423041474654,34.7765567766
11:36:39  0.386889798655,0.423041474654,34.7765567766
11:36:40  0.435251023486,0.469738863287,36.688034188
11:36:41  0.435251023486,0.469738863287,36.688034188
11:36:41  0.435251023486,0.469738863287,38.6611721612
11:36:42  0.435251023486,0.469738863287,38.6611721612
11:36:43  0.47152194211,0.504761904762,40.5726495726
```

Figure 7. Sample Log File

Note: The test log files are saved as C:/TEMPROD/log/CalibHVTest/cal_*date_time*.log. One file is created by running this test.

33. Click on the “Close” button to close the test environment.

34. Turn off power supply #1.

35. Turn off power to the VME Crate.

36. Demate the BOB from the TEM.

5.4.2 TRK Calibration High Voltage Test Procedure

This section provides instructions to test the calibration of the TKR.

WARNING: The TEM/TPS internally produces over 50 V at up to 10 mA. Do not manipulate the TEM/TPS during the test procedure. Do not disassemble until the power supplies have been turned off.

To setup and run the calibration test:

1. Verify that the power is off to power supply #1 and the VME Crate.
2. Connect all the equipment and cables per the interconnect drawing in the figure below.

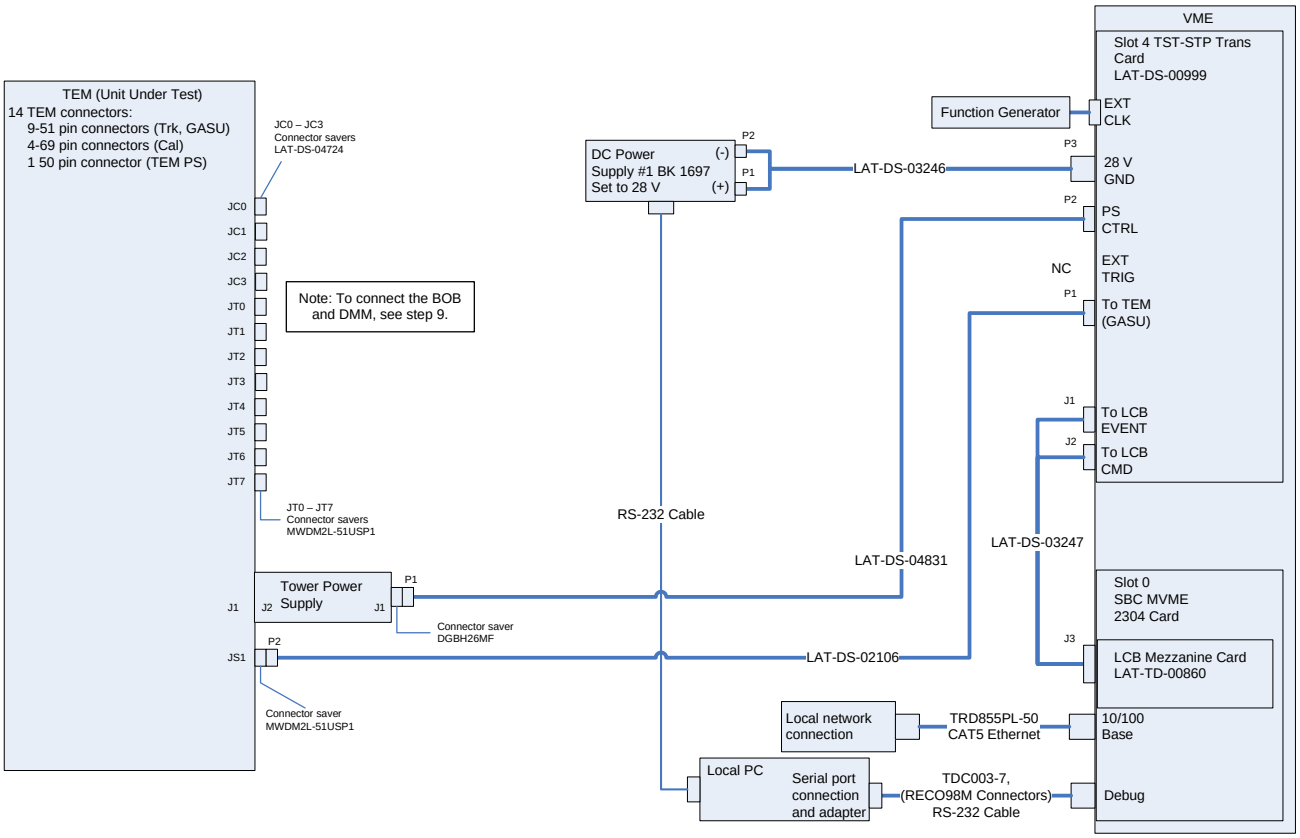


Figure 8. TKR Calibration Test setup Interconnection Diagram

3. Set the DMM to the auto-ranging setting. Record in the data sheet.
4. Measure DMM lead resistance by connecting the two leads together. Record in the data sheet.

5.4.2 TRK Calibration High Voltage Test Procedure (continued)

5. Connect the BOB chassis to technical ground. Measure the resistance between the BOB chassis and technical ground. Record in the data sheet.

6. Ensure all shorting plugs are removed from the BOB. Record in the data sheet.

7. Measure the resistance between the Unit Under Test (UUT) chassis and technical ground. Record in the data sheet.

8. Measure the resistance between the test equipment chassis and technical ground. Record in the data sheet.

9. Setup the BOB and configure the DMM per the figure below following this process:

   a) Connect P2 of the BOC (LAT-DS-04273) to J2 on the BOB (LAT-DS-03580).

   b) Connect P1 of the BOC to JT-0 on the TEM.

   c) Connect the load (LAT-DS-04823) to the black lead of the DMM and insert it into the red terminal of test point 40 on the BOB.

   d) Insert the red lead of the DMM into the red terminal of test point 37.

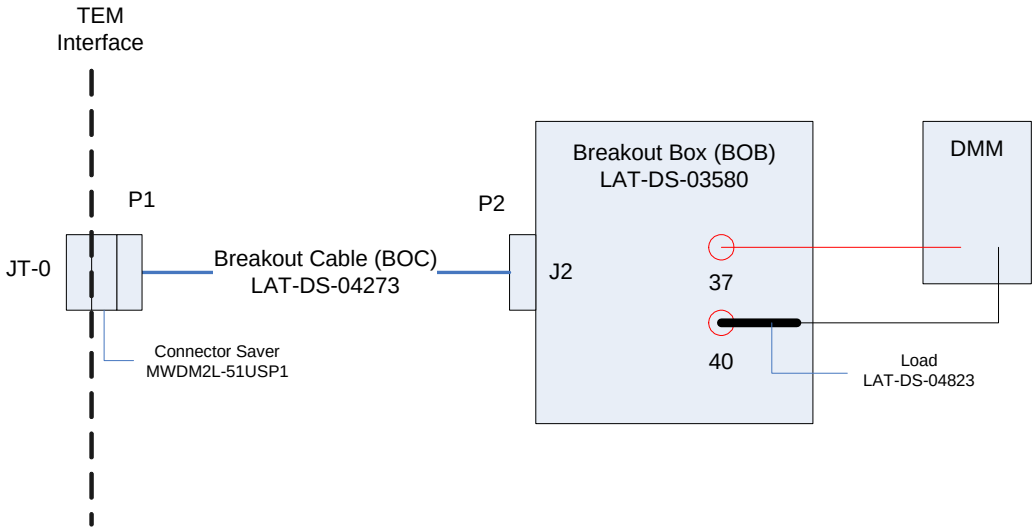


Figure 9. TRK Calibration Test DMM Setup

   e) Configure the DMM and test leads in current-measuring mode in the mA range.

   f) Record in the data sheet.

10. Set the function generator to 20 MHz square wave.

5.4.2 TRK Calibration High Voltage Test Procedure (continued)

11. Turn on power supply #1 and apply 28.0 volts.

12. Open the “ttermpro” file located in the C:\Program Files\TeraTermProSSH\ directory and connect to the VME Crate using the serial port (COM3).

13. Apply power to the VME Crate.

14. Wait for the boot to finish.

15. Open a Command Prompt window.

16. Change the directory to V:\GLAST\Electronics\Teststands\gitot.

17. Type in “runcontrol.bat” and enter.

5.4.2 TRK Calibration High Voltage Test Procedure (continued)

18. The “Run Control Main” window appears as shown below.

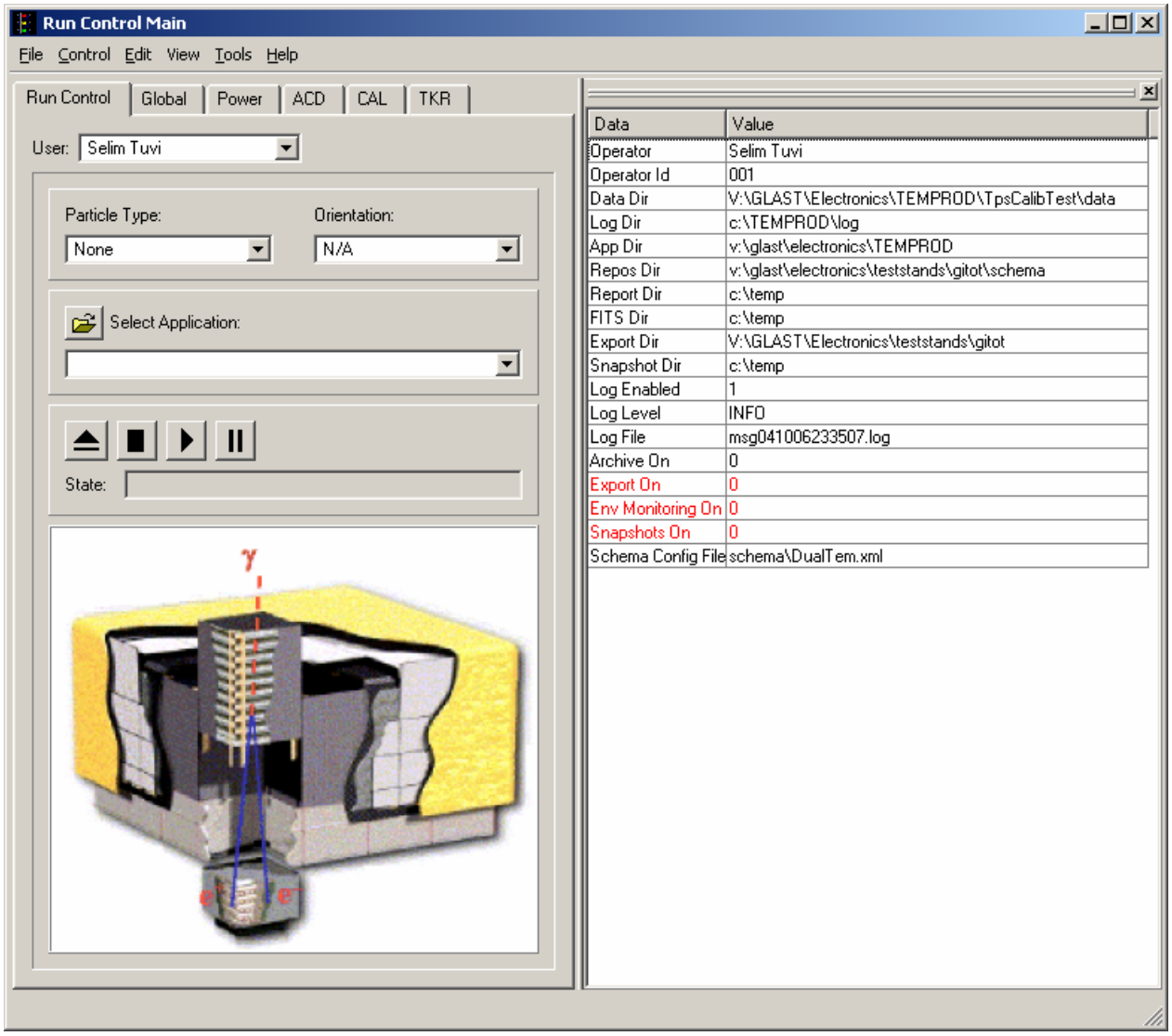


Figure 10. Run Control Main Window

Note: Do not change the options in this window.

19. At the “Run Control Main” window, click on the “Select Application” button. The “Select an application” window appears as shown below.

5.4.2 TRK Calibration High Voltage Test Procedure (continued)

20. Select the directory
V:/GLAST/Electronics/TEMPROD/CalibHVTest/

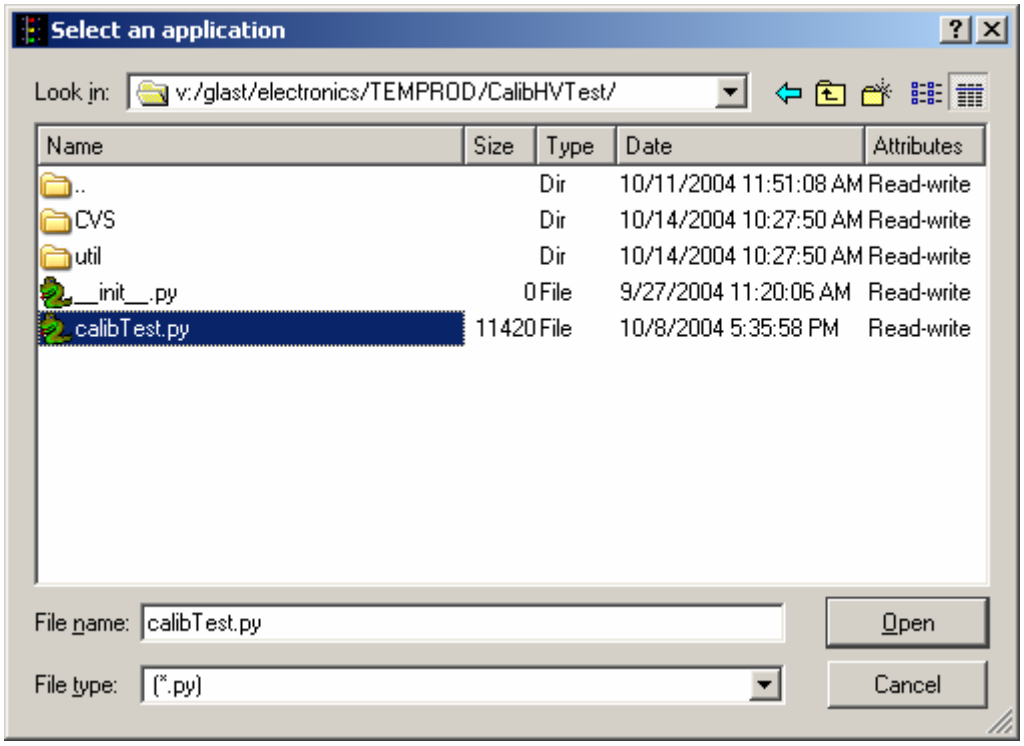


Figure 11. Select an Application Window

21. Select “calibTest.py”.

22. Click on the “Open” button to open the file.

23. At the “Run Control Main” window, click on the ► button.

5.4.2 TRK Calibration High Voltage Test Procedure (continued)

24. The “Calibration High Voltage Tests Window” appears as shown below. The indicators following the ranges are clear before the test.

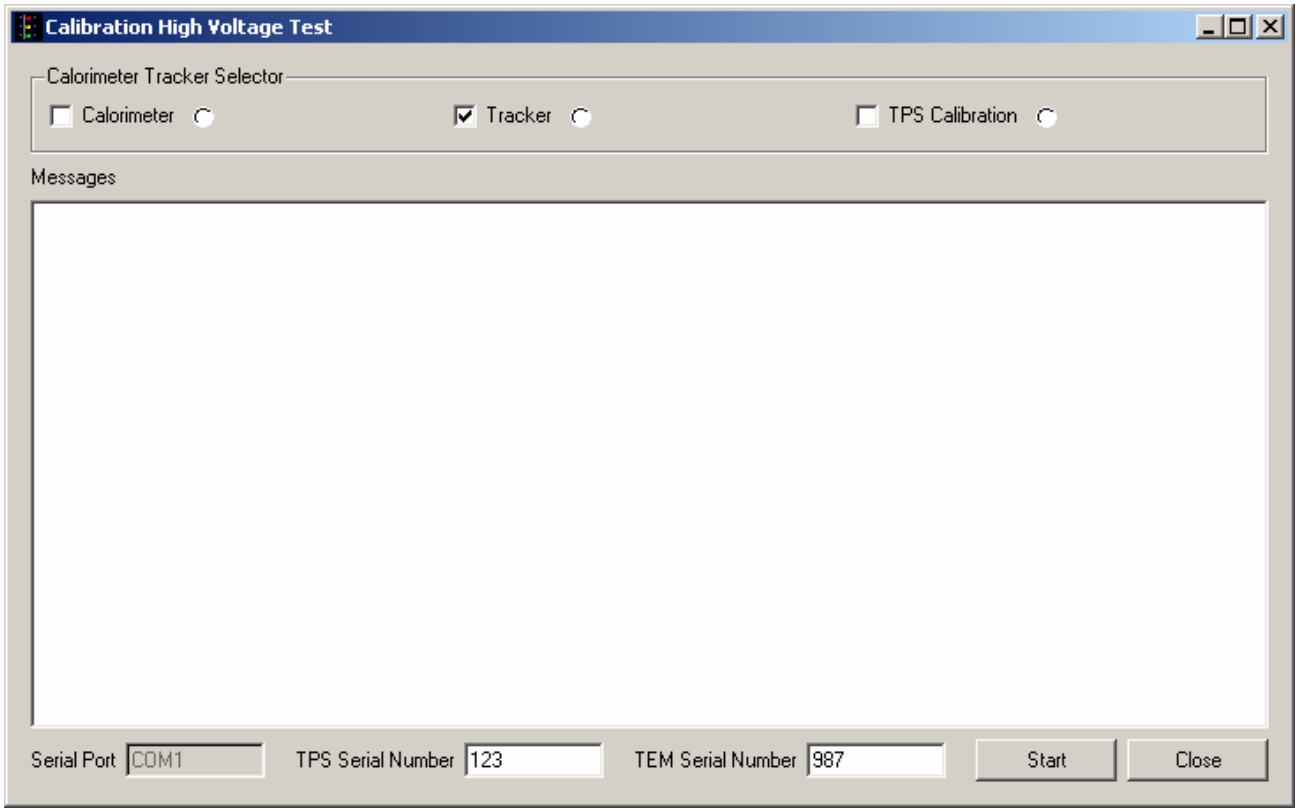


Figure 12. Calibration High Voltage Test Window—TRK Test

25. Select the Tracker box and clear the Calorimeter and TPS Calibration boxes.

26. Enter the TPS serial number in the window. The TPS serial number is the number on the bar code sticker on the TPS.

27. Enter the TEM serial number in the window. The TEM serial number is the number on the bar code sticker on the TEM.

5.4.2 TRK Calibration High Voltage Test Procedure (continued)

28. Click on the “Start” button. The “Current Value Window” appears.

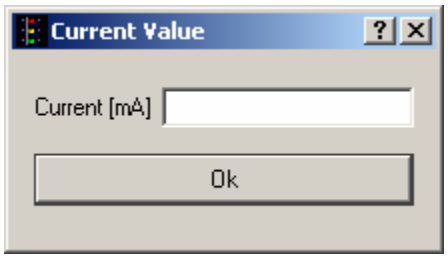


Figure 13. Current Value Window

29. Enter the DMM reading in the “Current Value Window” and click OK.

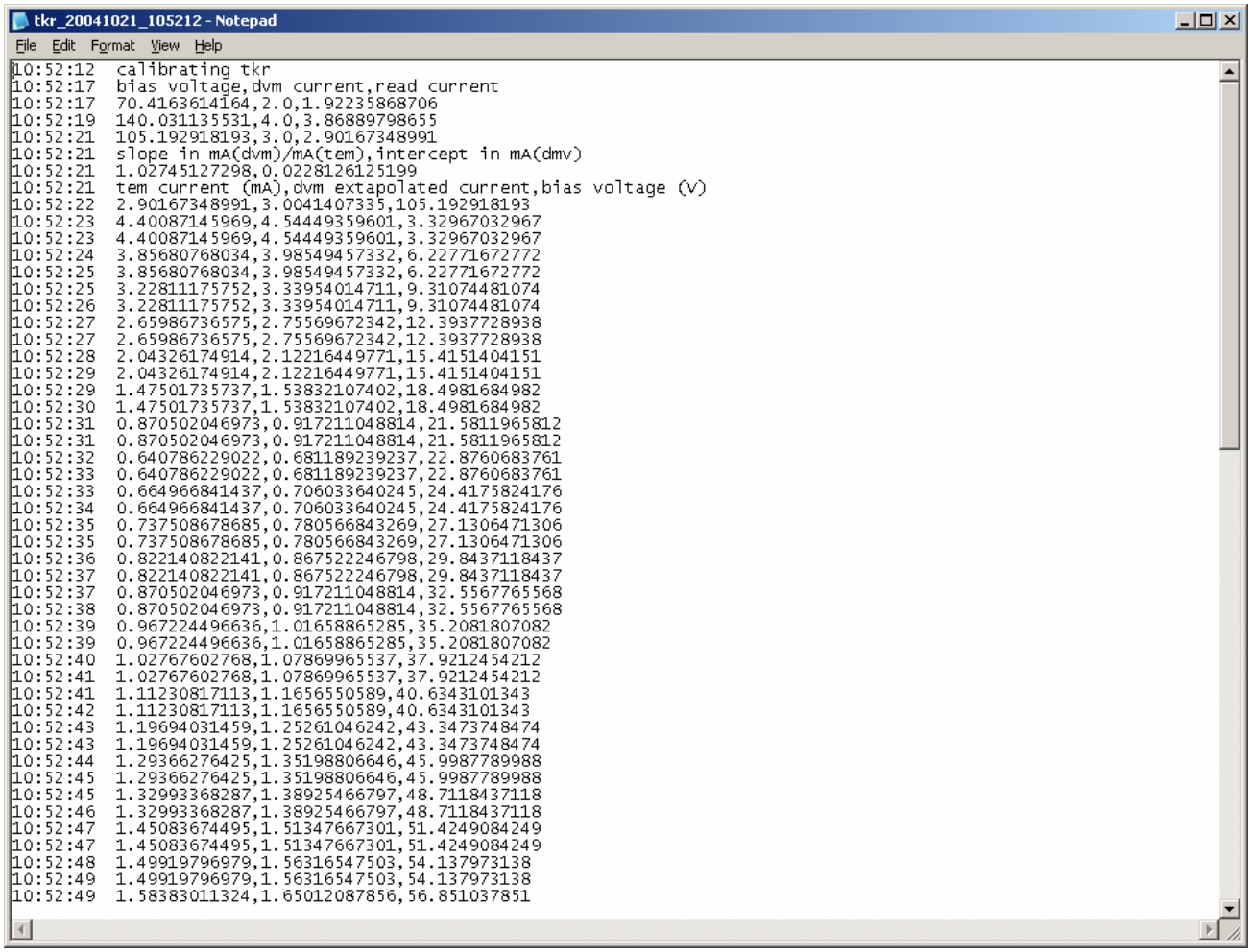
30. Repeat steps 28 and 29 two more times. (The “Current Value Window” appears three times in all.) If there are any errors, they will appear in the Messages box and in the log file.

Note: This test takes about a minute or less to run.

31. Verify that the indicator is green, indicating good data (a red light indicates failure of the test) and that no errors appear in the Messages box. **Record** verifications per the data sheet.

5.4.2 TRK Calibration High Voltage Test Procedure (continued)

32. Open and print the log file (see the sample of the log file below) and attach it to the data cover sheet.



tkr_20041021_105212 - Notepad

File Edit Format View Help

```
10:52:12  calibrating tkr
10:52:17  bias voltage,dvm current,read current
10:52:17  70.4163614164,2.0,1.92235868706
10:52:19  140.031135531,4.0,3.86889798655
10:52:21  105.192918193,3.0,2.90167348991
10:52:21  slope in mA(dvm)/mA(tem),intercept in mA(dmv)
10:52:21  1.02745127298,0.0228126125199
10:52:21  tem current (mA),dvm extapolated current,bias voltage (V)
10:52:22  2.90167348991,3.0041407335,105.192918193
10:52:23  4.40087145969,4.54449359601,3.32967032967
10:52:23  4.40087145969,4.54449359601,3.32967032967
10:52:24  3.85680768034,3.98549457332,6.22771672772
10:52:25  3.85680768034,3.98549457332,6.22771672772
10:52:25  3.22811175752,3.33954014711,9.31074481074
10:52:26  3.22811175752,3.33954014711,9.31074481074
10:52:27  2.65986736575,2.75569672342,12.3937728938
10:52:27  2.65986736575,2.75569672342,12.3937728938
10:52:28  2.04326174914,2.12216449771,15.4151404151
10:52:29  2.04326174914,2.12216449771,15.4151404151
10:52:29  1.47501735737,1.53832107402,18.4981684982
10:52:30  1.47501735737,1.53832107402,18.4981684982
10:52:31  0.870502046973,0.917211048814,21.5811965812
10:52:31  0.870502046973,0.917211048814,21.5811965812
10:52:32  0.640786229022,0.681189239237,22.8760683761
10:52:33  0.640786229022,0.681189239237,22.8760683761
10:52:33  0.664966841437,0.706033640245,24.4175824176
10:52:34  0.664966841437,0.706033640245,24.4175824176
10:52:35  0.737508678685,0.780566843269,27.1306471306
10:52:35  0.737508678685,0.780566843269,27.1306471306
10:52:36  0.822140822141,0.867522246798,29.8437118437
10:52:37  0.822140822141,0.867522246798,29.8437118437
10:52:37  0.870502046973,0.917211048814,32.5567765568
10:52:38  0.870502046973,0.917211048814,32.5567765568
10:52:39  0.967224496636,1.01658865285,35.2081807082
10:52:39  0.967224496636,1.01658865285,35.2081807082
10:52:40  1.02767602768,1.07869965537,37.9212454212
10:52:41  1.02767602768,1.07869965537,37.9212454212
10:52:41  1.11230817113,1.1656550589,40.6343101343
10:52:42  1.11230817113,1.1656550589,40.6343101343
10:52:43  1.19694031459,1.25261046242,43.3473748474
10:52:43  1.19694031459,1.25261046242,43.3473748474
10:52:44  1.29366276425,1.35198806646,45.9987789988
10:52:45  1.29366276425,1.35198806646,45.9987789988
10:52:45  1.32993368287,1.38925466797,48.7118437118
10:52:46  1.32993368287,1.38925466797,48.7118437118
10:52:47  1.45083674495,1.51347667301,51.4249084249
10:52:47  1.45083674495,1.51347667301,51.4249084249
10:52:48  1.49919796979,1.56316547503,54.137973138
10:52:49  1.49919796979,1.56316547503,54.137973138
10:52:49  1.58383011324,1.65012087856,56.851037851
```

Figure 14. Sample Log File

Note: The test log files are saved as C:/TEMPROD/log/CalibHVTest/tkr_*date_time*.log. One file is created by running this test.

5.4.2 TRK Calibration High Voltage Test Procedure (continued)

33. Click on the “Close” button to close the test environment.
34. Turn off power supply #1.
35. Turn off power to the VME Crate.
36. Demate the BOB from the TEM.

5.4.3 TPS Calibration Tower Current Test Procedure

This section provides instructions to test the calibration of the TPS.

To setup and run the calibration test:

1. Verify that the power is off to power supply #1 and the VME Crate.

2. Disconnect the Test Board Cooling Fan Assembly by demating the cable (LAT-DS-03567) from Power Supply #1. Record in the data sheet.

3. Connect all the equipment and cables per the interconnect drawing in the figure below.

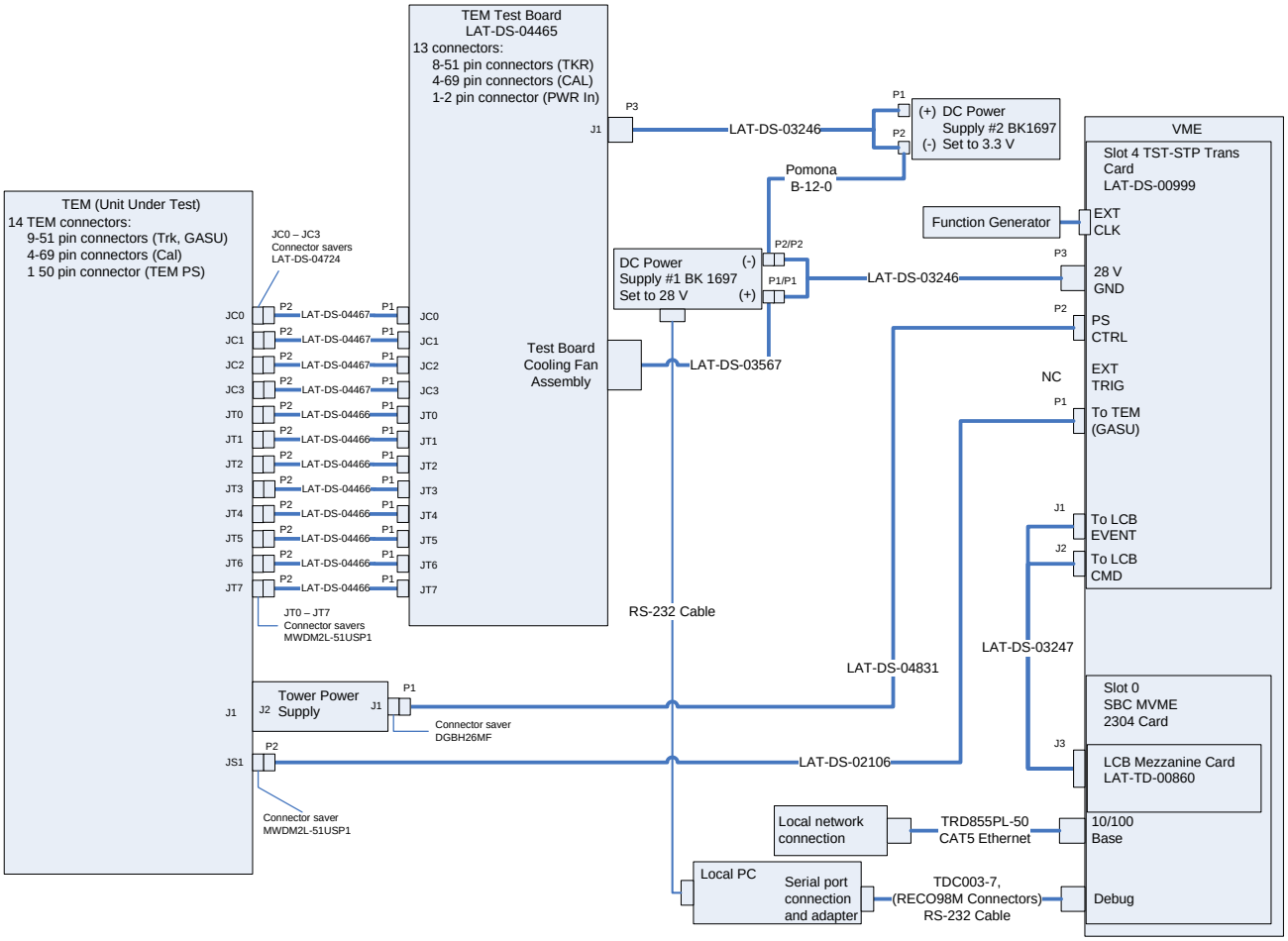


Figure 15. TPS Calibration Test setup Interconnection Diagram

4. Set the DMM to the auto-ranging setting. Record in the data sheet.

5.4.3 TPS Calibration Tower Current Test Procedure (continued)

5. Measure DMM lead resistance by connecting the two leads together. Record in the data sheet.

6. Measure the resistance between the Unit Under Test (UUT) chassis and technical ground. Record in the data sheet.

7. Measure the resistance between the test equipment chassis and technical ground. Record in the data sheet.

8. Set the function generator to 20 MHz square wave.

9. Turn on power supply #1 and apply 28.0 volts.

10. Open the “ttermpro” file located in the C:\Program Files\TeraTermProSSH\ directory and connect to the VME Crate using the serial port (COM3).

11. Apply power to the VME Crate.

12. Wait for the boot to finish.

13. Open a Command Prompt window.

14. Change the directory to V:\GLAST\Electronics\Teststands\gitot.

15. Type in “runcontrol.bat” and enter.

5.4.3 TPS Calibration Tower Current Test Procedure (continued)

16. The “Run Control Main” window appears as shown below.

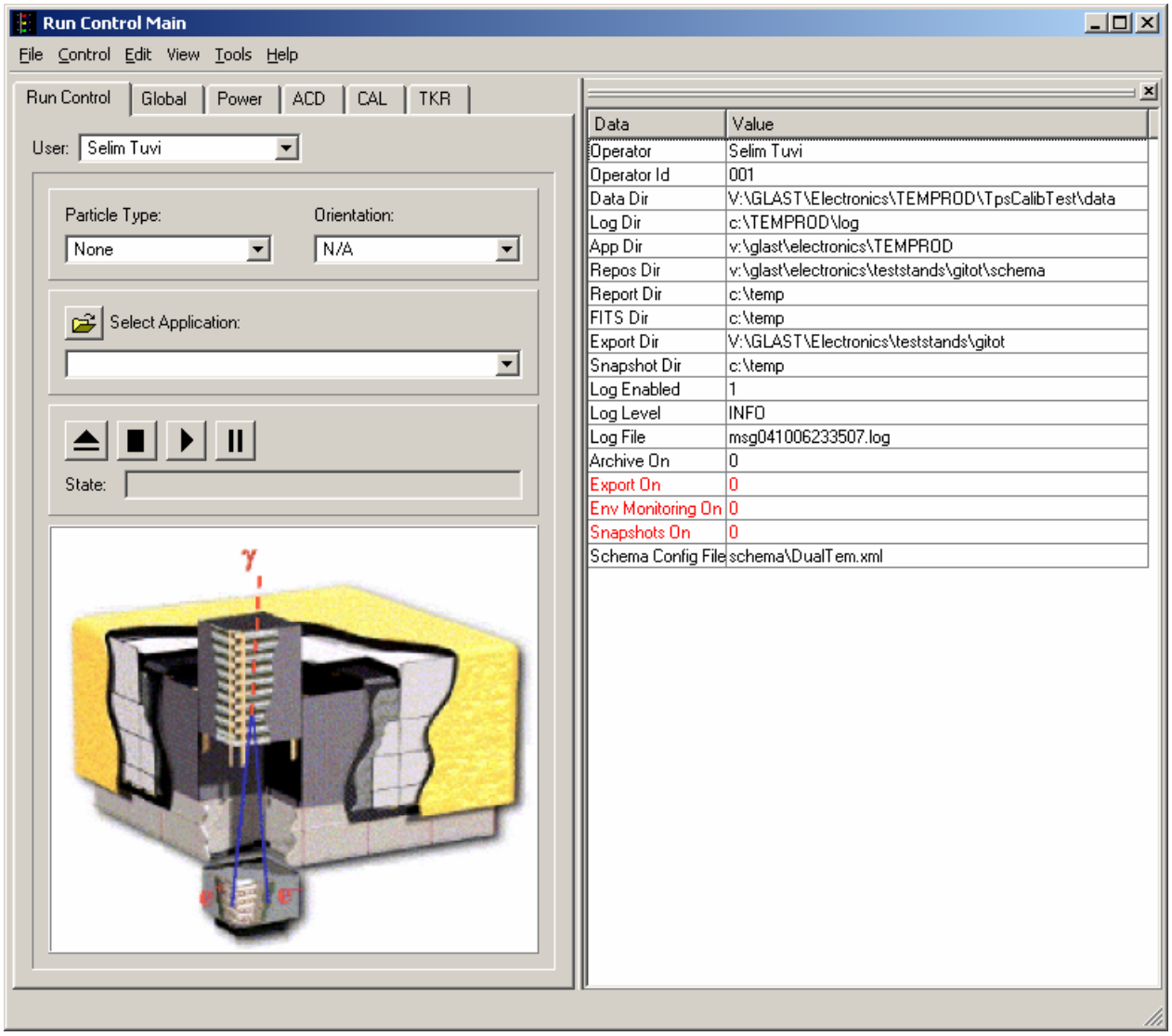


Figure 16. Run Control Main Window

Note: Do not change the options in this window.

17. At the “Run Control Main” window, click on the “Select Application” button. The “Select an application” window appears as shown below.

5.4.3 TPS Calibration Tower Current Test Procedure (continued)

18. Select the directory V:/GLAST/Electronics/TEMPROD/CalibHVTest/

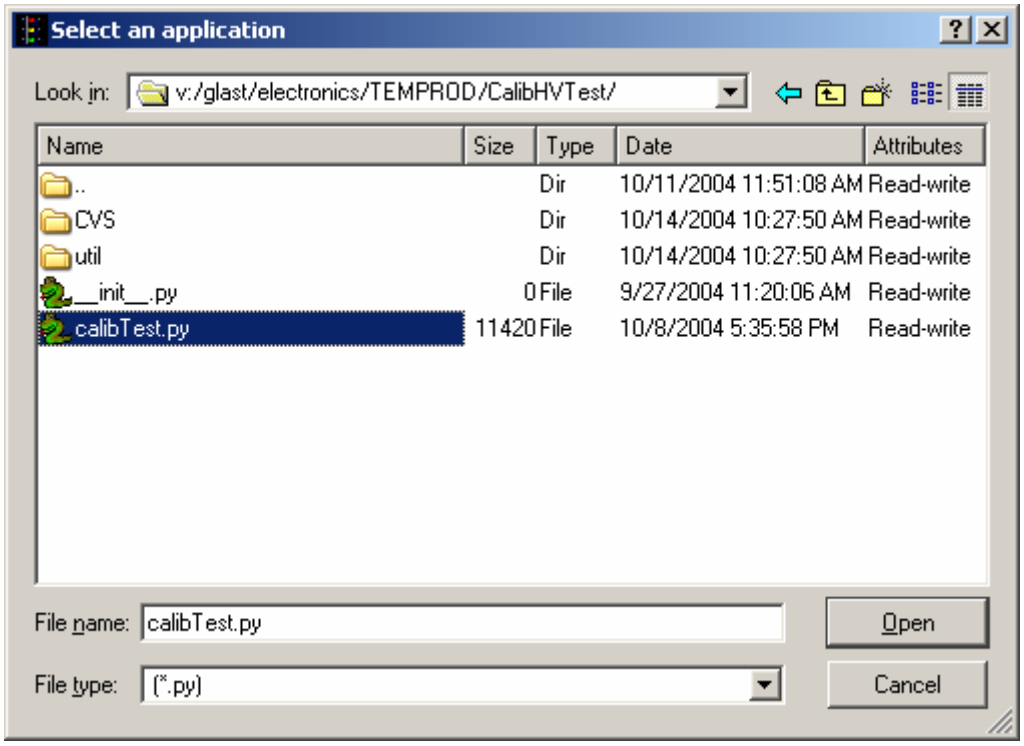


Figure 17. Select an Application Window

19. Select “calibTest.py”.

20. Click on the “Open” button to open the file.

21. At the “Run Control Main” window, click on the ► button.

5.4.3 TPS Calibration Tower Current Test Procedure (continued)

22. The "Calibration High Voltage Tests Window" appears as shown below. The indicators following the ranges are clear before the test.

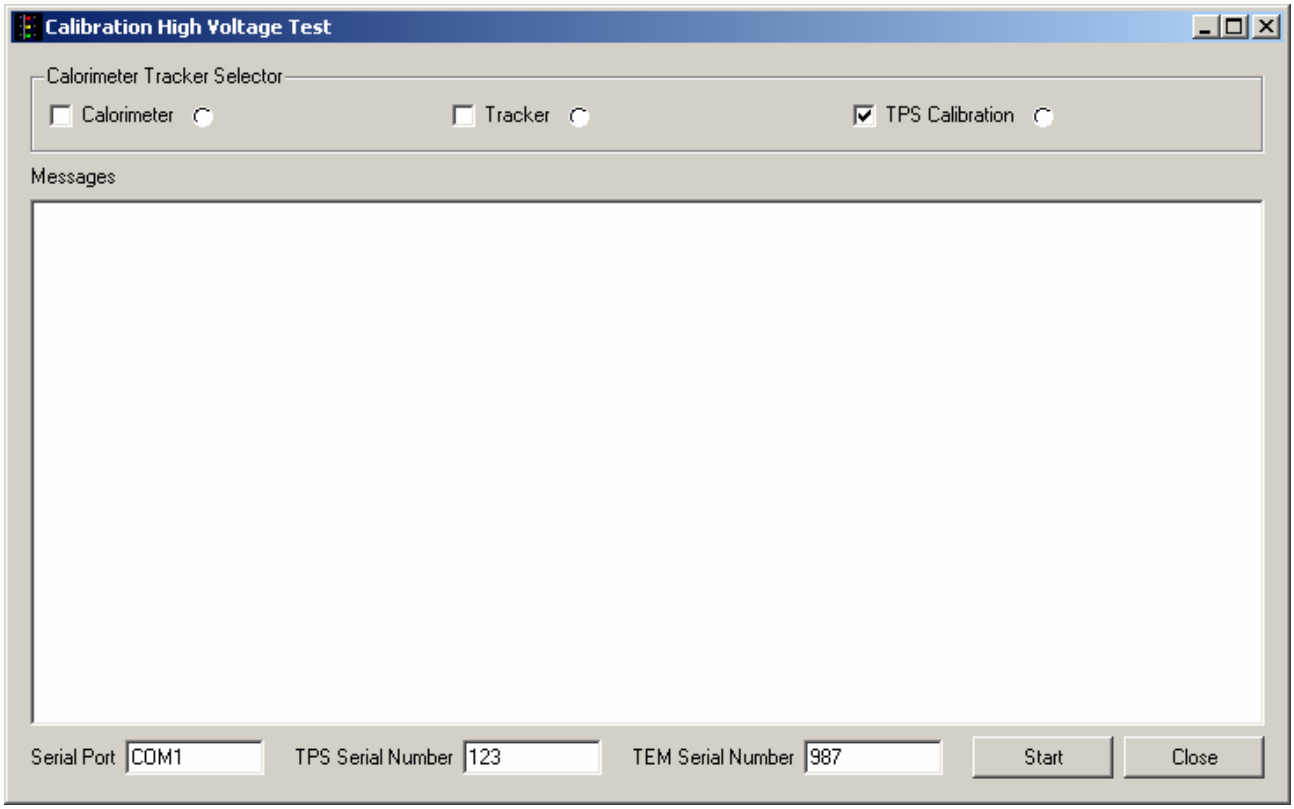


Figure 18. Calibration High Voltage Test Window—TPS Test

23. Select the TPS Calibration box and clear the Calorimeter and Tracker boxes.

24. Ensure that the Serial Port is correct. If not, enter the correct port in the "Calibration High Voltage Test Window."

25. Enter the TPS serial number in the window. The TPS serial number is the number on the bar code sticker on the TPS.

26. Enter the TEM serial number in the window. The TEM serial number is the number on the bar code sticker on the TEM.

27. Click on the "Start" button. If there are any errors, they will appear in the Messages box and in the log file.

Note: This test takes about 40 seconds to run.

5.4.3 TPS Calibration Tower Current Test Procedure (continued)

28. Verify that the indicator is green, indicating good data (a red light indicates failure of the test) and that no errors appear in the Messages box. **Record** verifications per the data sheet.

29. Open and print the log file (see the sample of the log file below) and attach it to the data cover sheet.

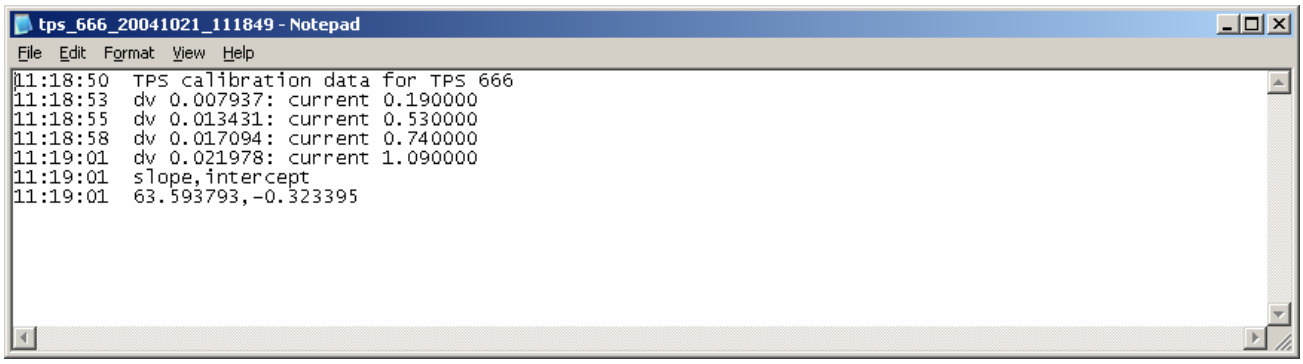


Figure 19. Sample Log File

Note: The test log files are saved as C:/TEMPROD/log/CalibHVTest/tps_*ID_date_time*.log. One file is created by running this test.

30. Click on the "Close" button to close the test environment.

31. Turn off power supply #1.

32. Turn off power to the VME Crate.

33. Reconnect the Test Board Cooling Fan Assembly by connecting the cable (LAT-DS-03567) to Power Supply #1.

5.5 Main Tests

5.5.1 Main Tests Setup Procedure

This section provides instructions to setup the TEM/TPS for the Main Tests.

To setup the TEM/TPS Main Tests:

34. Verify that the power is off to power supply #1 and the VME Crate.

35. Connect all the equipment and cables per the interconnect drawing in the figure below.

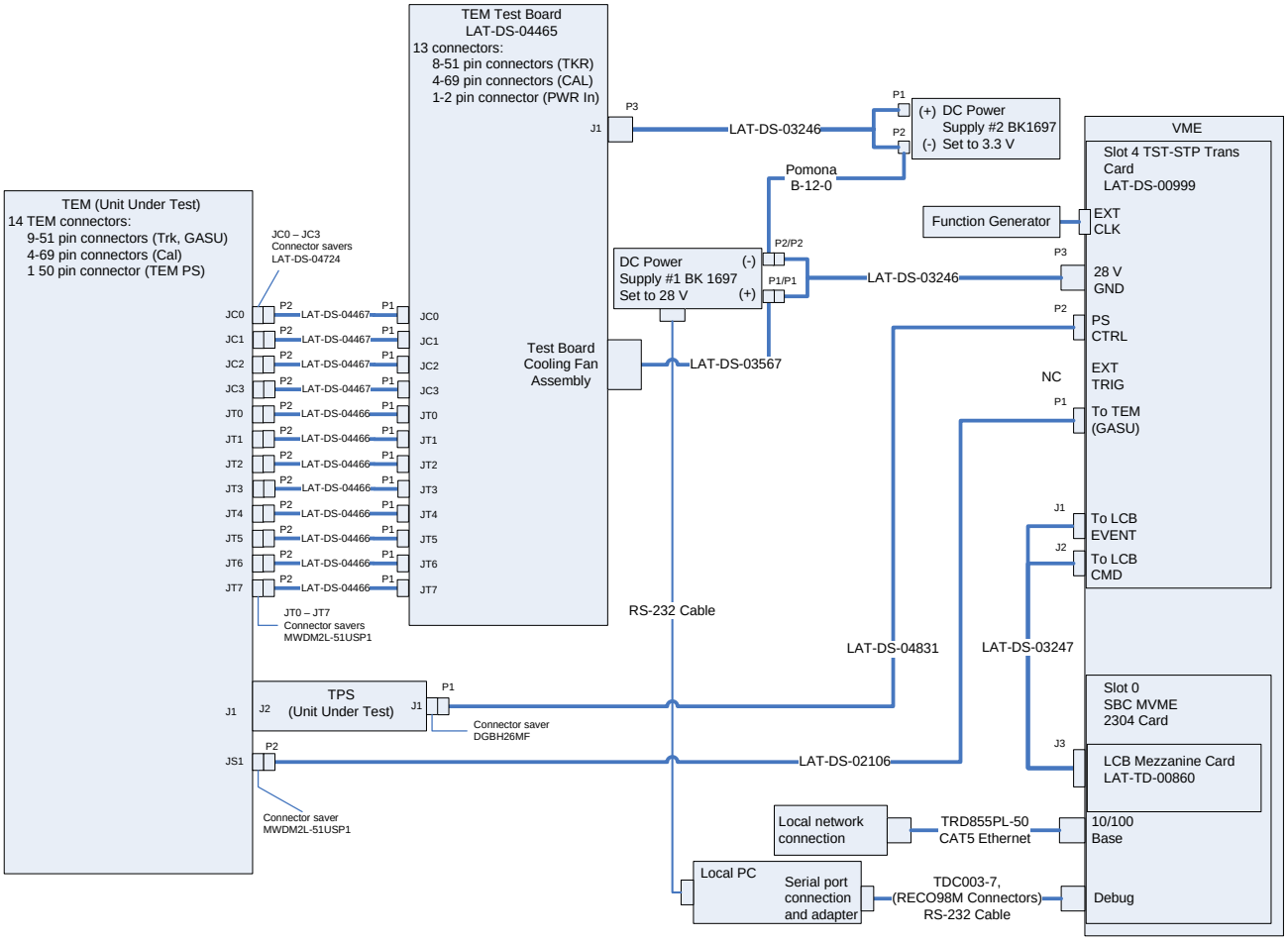


Figure 20. Monitor Margin and Bias Test setup Interconnection Diagram

36. Set the DMM to the auto-ranging setting. Record in the data sheet.

37. Measure DMM lead resistance by connecting the two leads together. Record in the data sheet.

5.5.1 Main Tests Setup Procedure (continued)

38. Measure the resistance between the UUT chassis and technical ground. Record in the data sheet.

39. Measure the resistance between the test equipment chassis and technical ground. Record in the data sheet.

40. Set the function generator to 20 MHz square wave.

41. Turn on power supply #1 and apply 28.0 volts.

42. Open the “ttermpro” file located in the C:\Program Files\TeraTermProSSH\ directory and connect to the crate using the serial port (COM3).

43. Apply power to the VME Crate.

44. Wait for the boot to finish.

45. Disconnect the fan. Record the current draw at external power supply #1 in the data sheet and verify that it is within the specified range.

46. Reconnect the fan.

47. After the boot-up process for the VME has completed turn on power supply #2 and apply 3.3 volts.

48. Open a Command Prompt window.

49. Change the directory to V:\GLAST\Electronics\Teststands\gitot.

50. Type in “runcontrol.bat” and enter.

5.5.1 Main Tests Setup Procedure (continued)

51. The “Run Control Main” window appears as shown below.

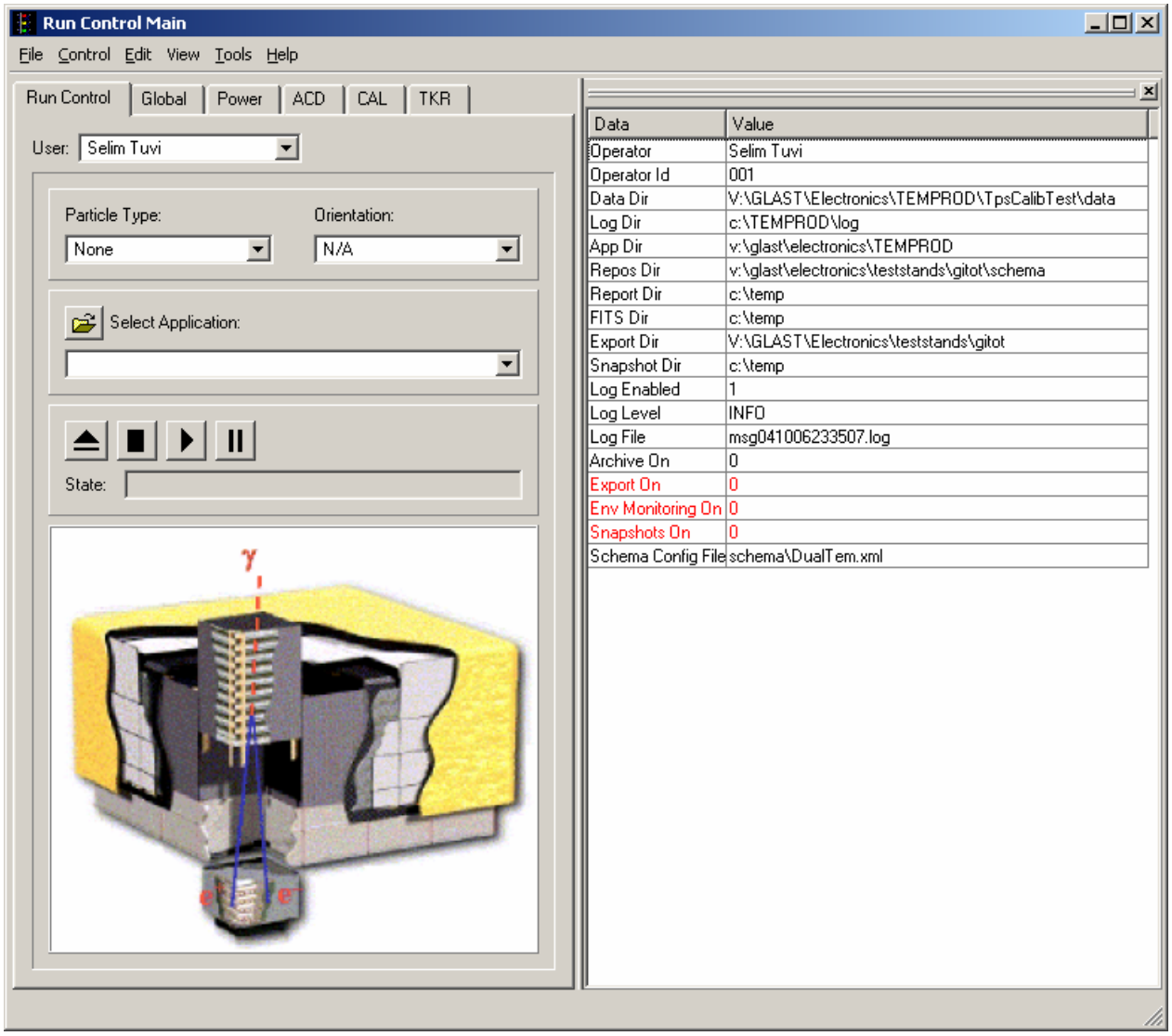


Figure 21. Run Control Main Window

Note: Do not change the options in this window.

5.5.2 Monitor Margin and Bias Test Procedure

This section provides instructions to test the TEM/TPS environmental monitor.

To run the TEM/TPS environmental monitor test:

1. At the “Run Control Main” window, click on the “Select Application” button. The “Select an application” window appears as shown below.

2. Select the directory V:/GLAST/Electronics/TEMPROD/EnvTest/

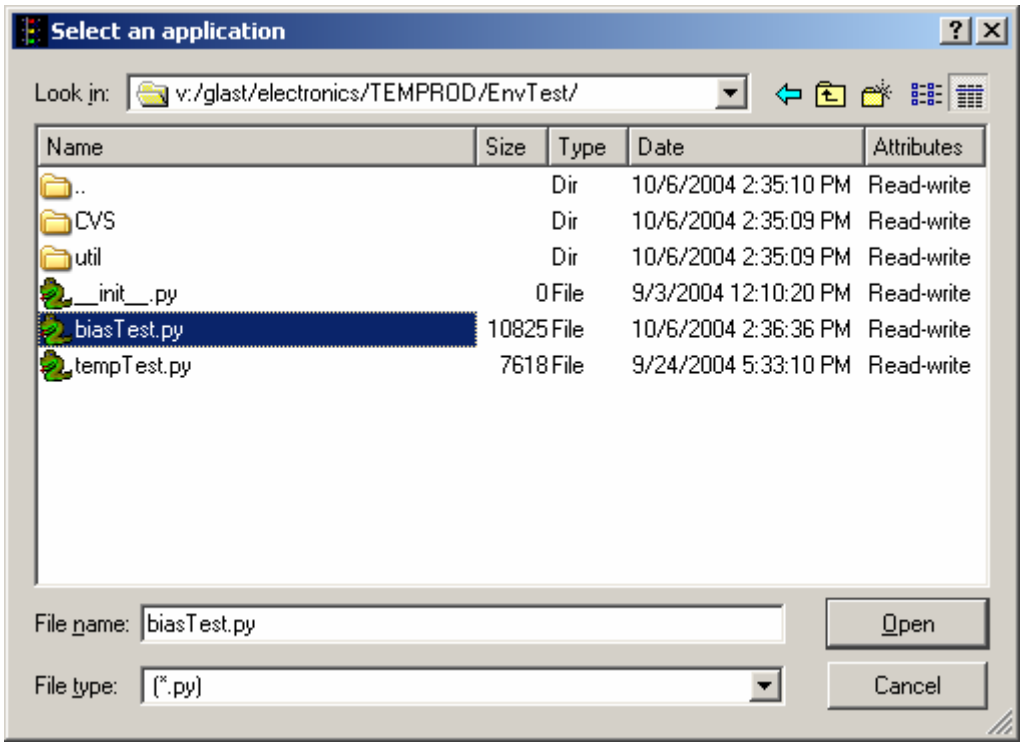


Figure 22. Select an Application Window

3. Select “biasTest.py”.

4. Click on the “Open” button to open the file.

5. At the “Run Control Main” window, click on the ► button.

5.5.2 Monitor Margin and Bias Test Procedure (continued)

6. The “Margin and Bias Tests Window” appears as shown below. The indicators following the ranges are clear before the test.

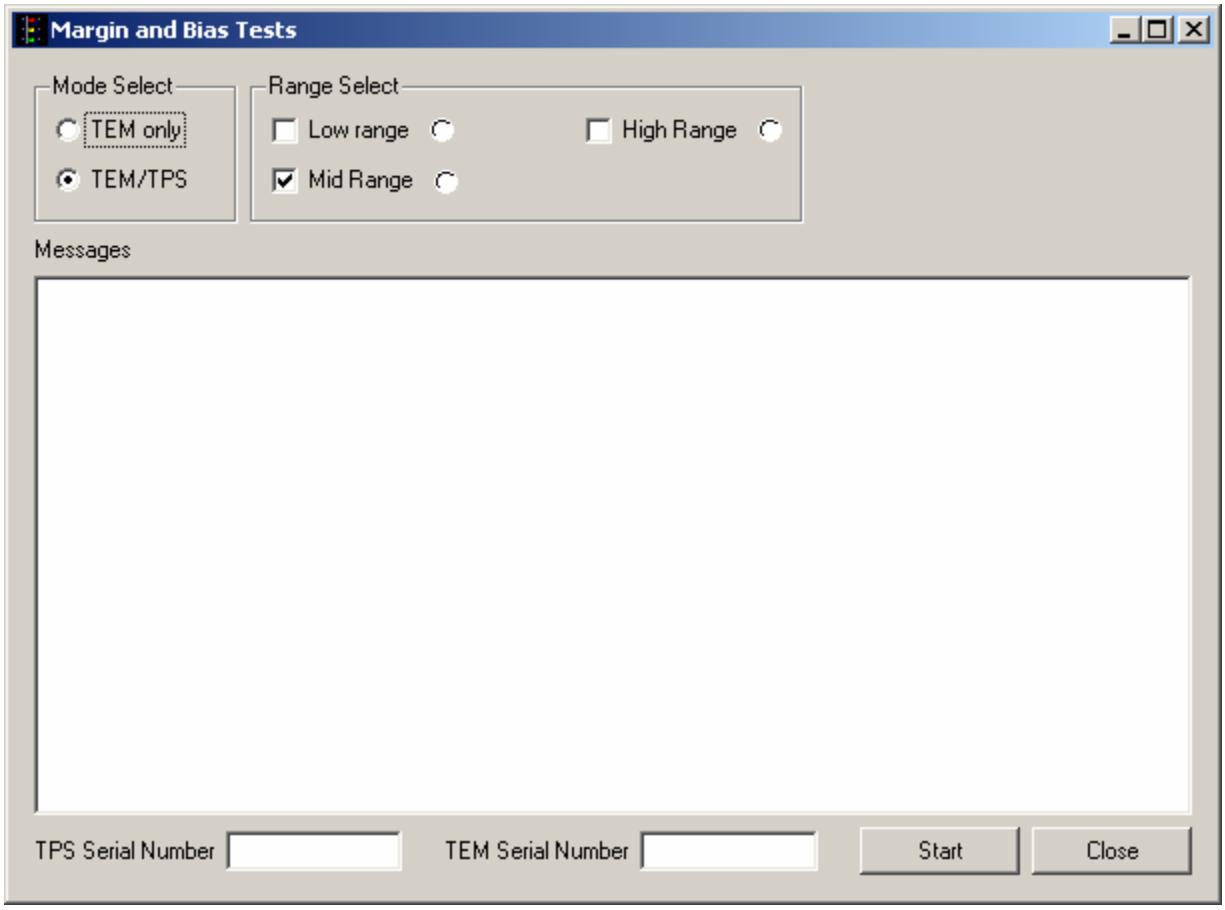


Figure 23. Margin and Bias Tests Window

7. Under Mode Select, select TEM/TPS. This selects Mid Range and clears Low Range and High Range.

8. Enter the TPS serial number. The TPS serial number is the number on the bar code sticker on the TPS.

9. Enter the TEM serial number. The TEM serial number is the number on the bar code sticker on the TEM.

10. Click on the “Start” button to run the test. If there are any errors, they will appear in the Messages box and in the log file.

Note: This test takes about 10 seconds to run.

5.5.2 Monitor Margin and Bias Test Procedure (continued)

11. Verify that the indicator is green in the Margin and Bias Tests Window, indicating good data (a red light indicates failure of the test) and that no errors appear in the Messages box. **Record** verifications per the data sheet.

12. Open and print the log file (see the sample of the log file below) and attach it to the data cover sheet.

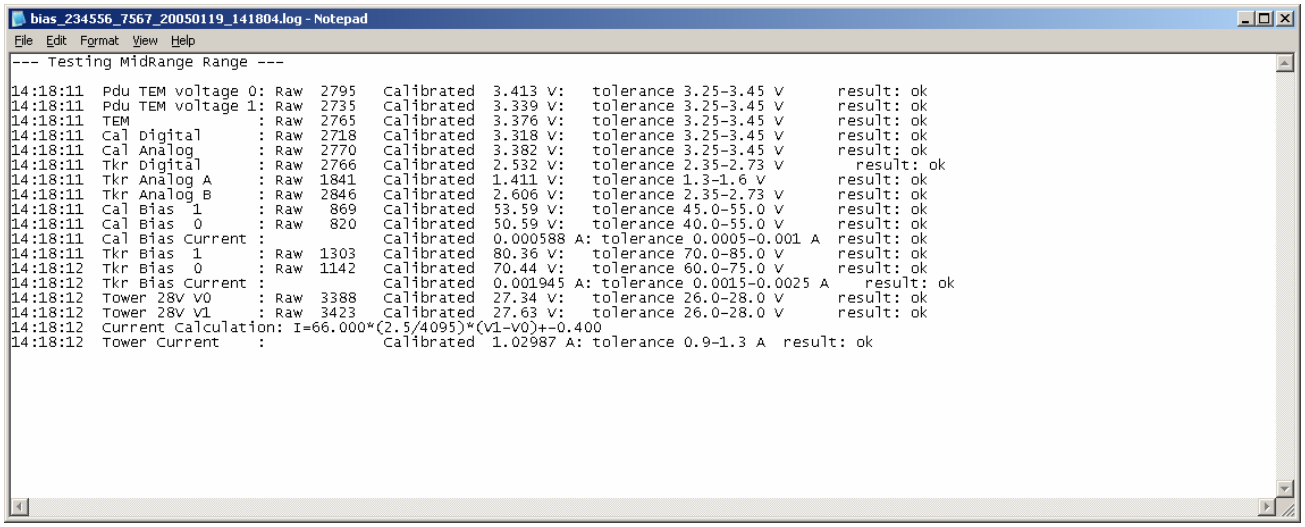


Figure 24. Sample Log File

Note: The test log files are saved as C:/TEMPROD/log/EnvTest/bias_*TPS#_TEM#_date_time*.log. One file is created by running this test.

13. Click on the “Close” button to close the test environment.

5.5.3 Temperature Monitor Test Procedure

This section provides instructions to test the TEM temperature monitors.

To setup and run the TEM temperature test:

14. At the “Run Control Main” window.

15. Click on the “Select Application” button. The “Select an application” window appears as shown below.

16. Select the directory V:/GLAST/Electronics/TEMPROD/EnvTest/

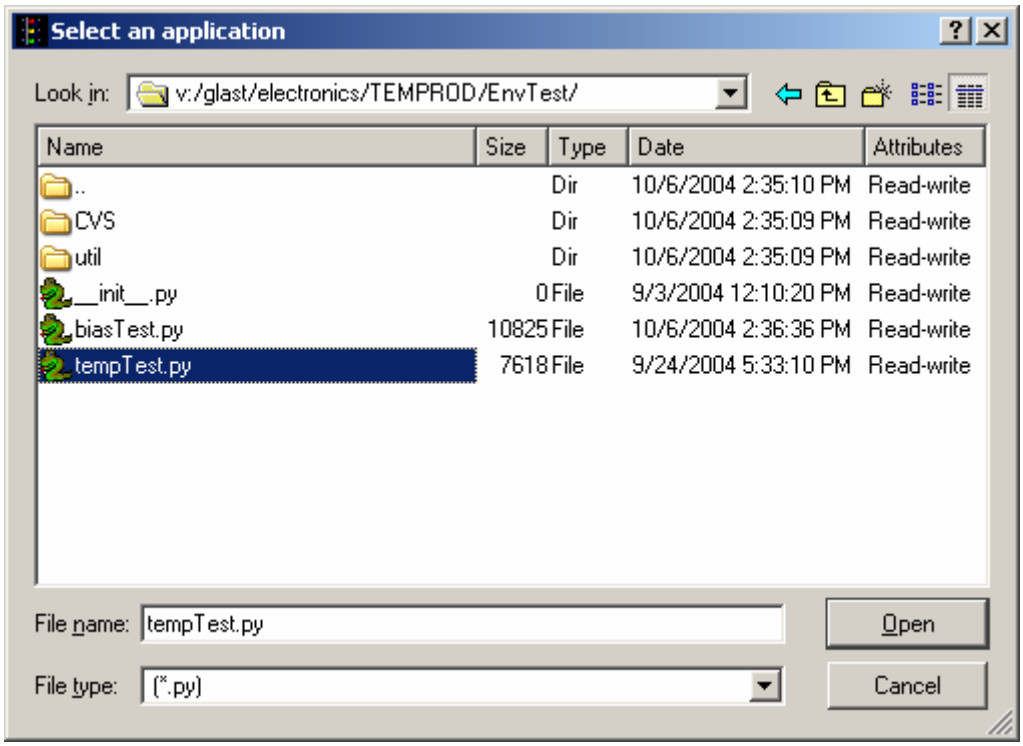


Figure 25. Select an Application Window

17. Select “tempTest.py”

18. Click on the “Open” button to open the file.

5.5.3 Temperature Monitor Test Procedure (continued)

19. At the “Run Control Main” window, click on the ► button.

20. The “Temperature Test” Window appears as shown below. The indicator is clear before the test.

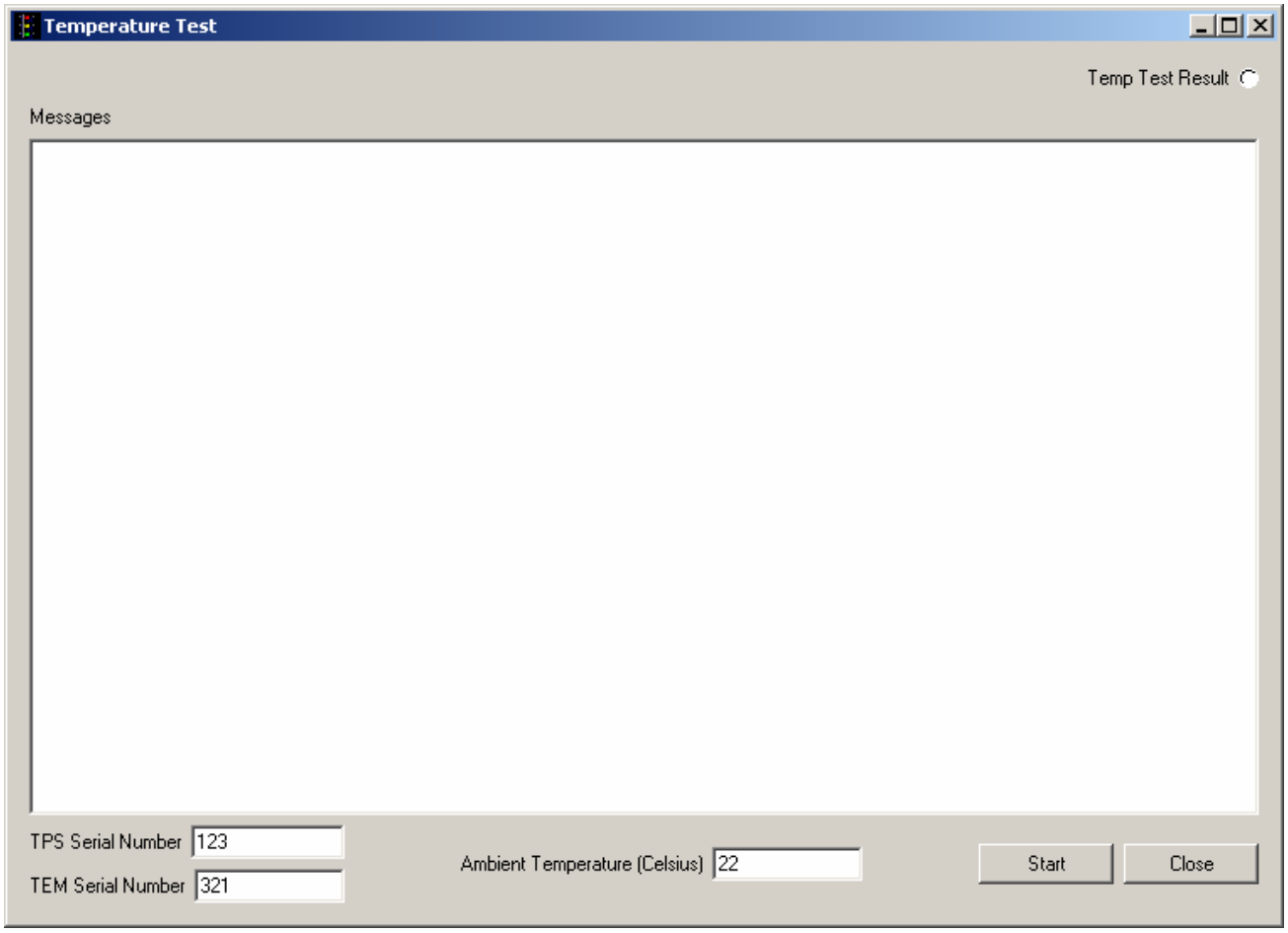


Figure 26. Temperature Test

21. Enter the TPS serial number. The TPS serial number is the number on the bar code sticker on the TPS.

22. Enter the TEM serial number. The TEM serial number is the number on the bar code sticker on the TEM.

23. Enter the ambient temperature in Celsius.

24. Click on the “Start” button, to run the test.

Note: This test takes a few seconds to run.

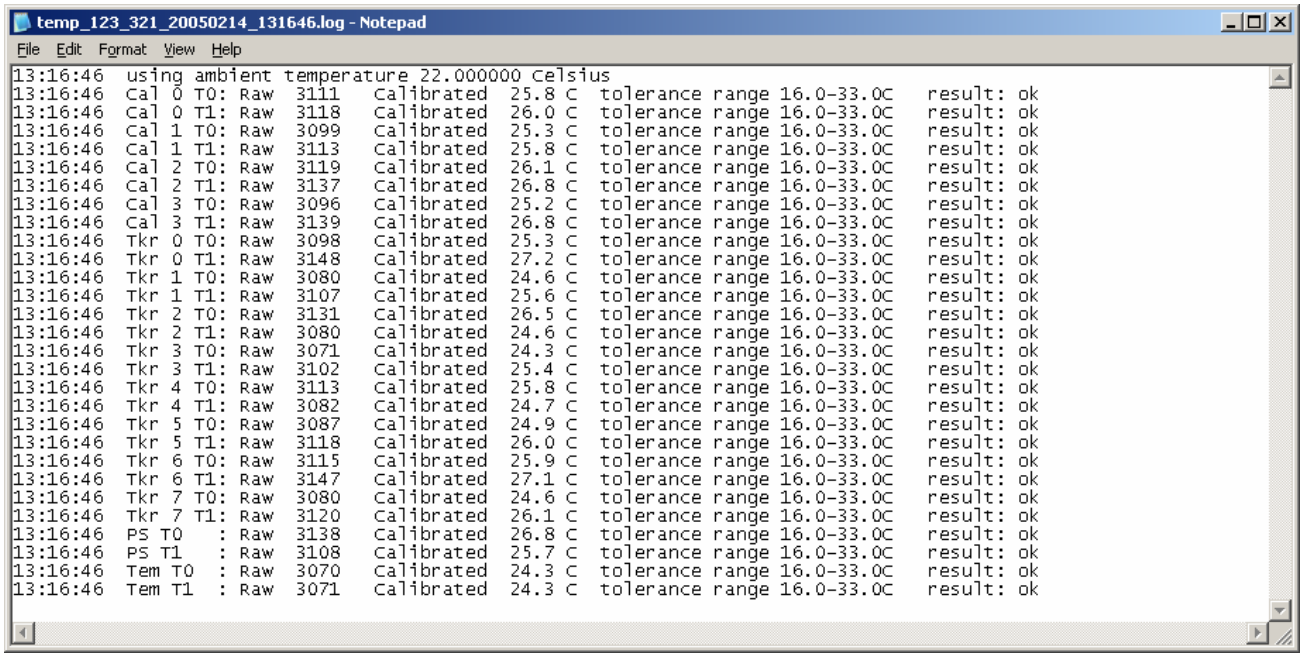
5.5.3 Temperature Monitor Test Procedure (continued)

25. Verify that the indicator is green, indicating good data (a red light indicates failure of the test) and that no errors appear in the Messages box. **Record** verifications per the data sheet.

26. Open and print the log file (see the sample log file below) and attach it to the data cover sheet.

Note: The test log files are saved as

C:/TEMPROD/log/EnvTest/temp_*TPS#_TEM#_date_time*.log.



temp_123_321_20050214_131646.log - Notepad

File Edit Format View Help

```
13:16:46  using ambient temperature 22.000000 Celsius
13:16:46  Cal 0 T0: Raw  3111   Calibrated  25.8 C  tolerance range 16.0-33.0C   result: ok
13:16:46  Cal 0 T1: Raw  3118   Calibrated  26.0 C  tolerance range 16.0-33.0C   result: ok
13:16:46  Cal 1 T0: Raw  3099   Calibrated  25.3 C  tolerance range 16.0-33.0C   result: ok
13:16:46  Cal 1 T1: Raw  3113   Calibrated  25.8 C  tolerance range 16.0-33.0C   result: ok
13:16:46  Cal 2 T0: Raw  3119   Calibrated  26.1 C  tolerance range 16.0-33.0C   result: ok
13:16:46  Cal 2 T1: Raw  3137   Calibrated  26.8 C  tolerance range 16.0-33.0C   result: ok
13:16:46  Cal 3 T0: Raw  3096   Calibrated  25.2 C  tolerance range 16.0-33.0C   result: ok
13:16:46  Cal 3 T1: Raw  3139   Calibrated  26.8 C  tolerance range 16.0-33.0C   result: ok
13:16:46  Tkr 0 T0: Raw  3098   Calibrated  25.3 C  tolerance range 16.0-33.0C   result: ok
13:16:46  Tkr 0 T1: Raw  3148   Calibrated  27.2 C  tolerance range 16.0-33.0C   result: ok
13:16:46  Tkr 1 T0: Raw  3080   Calibrated  24.6 C  tolerance range 16.0-33.0C   result: ok
13:16:46  Tkr 1 T1: Raw  3107   Calibrated  25.6 C  tolerance range 16.0-33.0C   result: ok
13:16:46  Tkr 2 T0: Raw  3131   Calibrated  26.5 C  tolerance range 16.0-33.0C   result: ok
13:16:46  Tkr 2 T1: Raw  3080   Calibrated  24.6 C  tolerance range 16.0-33.0C   result: ok
13:16:46  Tkr 3 T0: Raw  3071   Calibrated  24.3 C  tolerance range 16.0-33.0C   result: ok
13:16:46  Tkr 3 T1: Raw  3102   Calibrated  25.4 C  tolerance range 16.0-33.0C   result: ok
13:16:46  Tkr 4 T0: Raw  3113   Calibrated  25.8 C  tolerance range 16.0-33.0C   result: ok
13:16:46  Tkr 4 T1: Raw  3082   Calibrated  24.7 C  tolerance range 16.0-33.0C   result: ok
13:16:46  Tkr 5 T0: Raw  3087   Calibrated  24.9 C  tolerance range 16.0-33.0C   result: ok
13:16:46  Tkr 5 T1: Raw  3118   Calibrated  26.0 C  tolerance range 16.0-33.0C   result: ok
13:16:46  Tkr 6 T0: Raw  3115   Calibrated  25.9 C  tolerance range 16.0-33.0C   result: ok
13:16:46  Tkr 6 T1: Raw  3147   Calibrated  27.1 C  tolerance range 16.0-33.0C   result: ok
13:16:46  Tkr 7 T0: Raw  3080   Calibrated  24.6 C  tolerance range 16.0-33.0C   result: ok
13:16:46  Tkr 7 T1: Raw  3120   Calibrated  26.1 C  tolerance range 16.0-33.0C   result: ok
13:16:46  PS T0   : Raw  3138   Calibrated  26.8 C  tolerance range 16.0-33.0C   result: ok
13:16:46  PS T1   : Raw  3108   Calibrated  25.7 C  tolerance range 16.0-33.0C   result: ok
13:16:46  Tem T0  : Raw  3070   Calibrated  24.3 C  tolerance range 16.0-33.0C   result: ok
13:16:46  Tem T1  : Raw  3071   Calibrated  24.3 C  tolerance range 16.0-33.0C   result: ok
```

Figure 27. Sample Temperature Monitor Log File

27. Click on the “Exit” button to close the test environment.

5.5.4 Basic Test Procedure

This section provides instructions to test the basic functions of the TEM/TPS unit.

To setup and run the TEM/TPS basic test:

1. At the “Run Control Main” window, click on the “Select Application” button. The “Select an application” window appears as shown below.

2. Select the directory V:/GLAST/Electronics/TEMPROD/BasicTest/

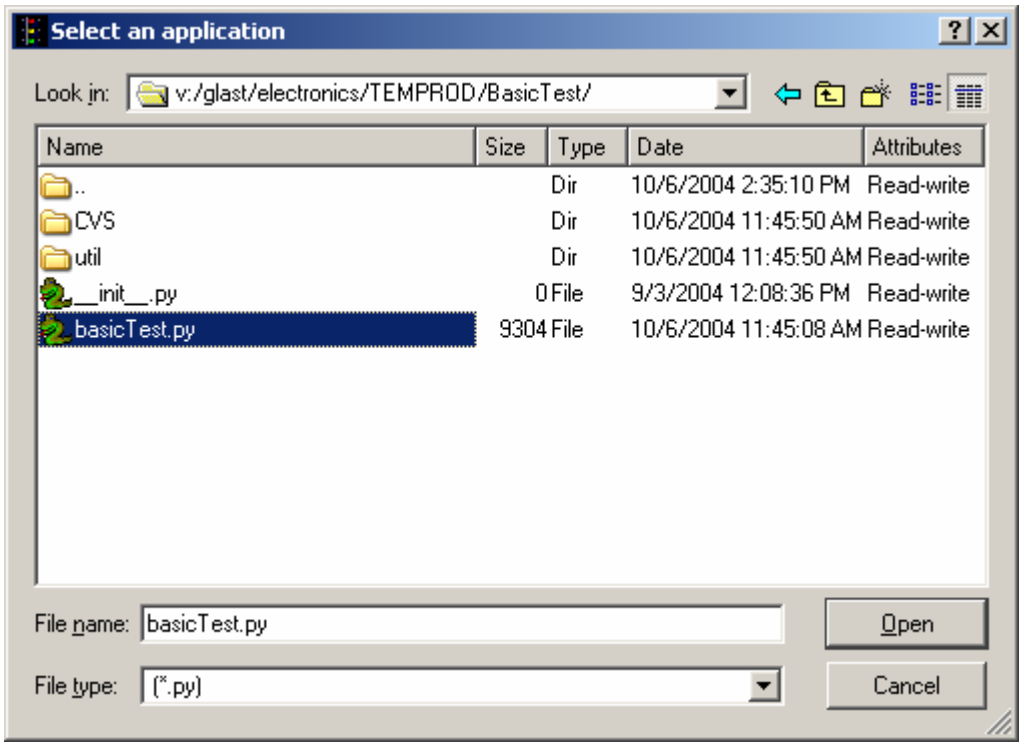


Figure 28. Select an Application Window

3. Select “basicTest.py”.

4. Click on the “Open” button to open the file.

5. At the “Run Control Main” window, click on the ► button.

5.5.4 Basic Test Procedure (continued)

6. The "TEM Basic Test" window appears as shown below. The indicators are clear before the test is run.

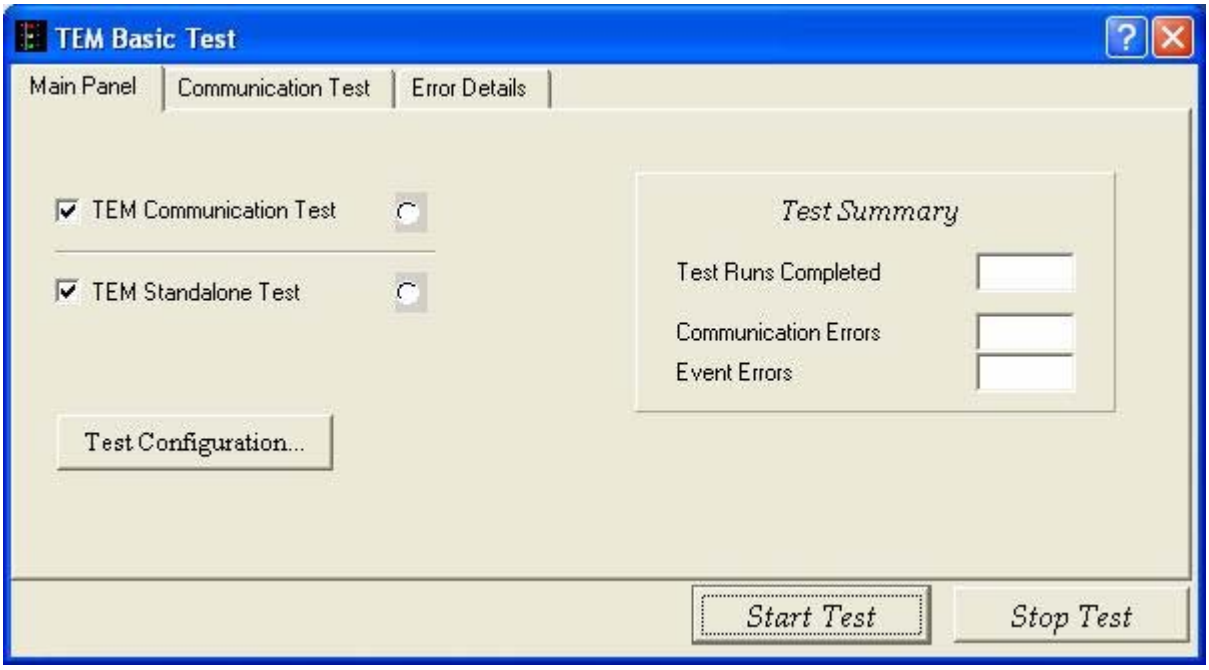


Figure 29. TEM Basic Test Window

Note: Do not change the default values and selections in this window; use them as they are.

7. Click on the "Start Test" button.

Note: This test takes about one minute to run. You can click on the "Communication Test" button to view the results as the test is running.

8. Verify that all the indicators are green, indicating good data (a red light indicates failure of the test) and that the value for Communication Errors and Event Errors is "0". **Record** verifications per the data sheet.

9. Open and print the log file for the test and attach it to the data cover sheet.

Note: The test log files are saved as C:/TEMPROD/log/BasicTest/basic_*date_time*.log.

10. Click on the "Exit" button to close the test environment.

5.5.5 Front End Test Procedure

This section provides instructions to test the TEM without the CAL or TKR front-end electronics.

To setup and run the TEM Front End test.

1. At the “Run Control Main” window, click on the “Select Application” button. The “Select an application” window appears as shown below.

2. Select the directory V:/GLAST/Electronics/TEMPROD/TemFeTest/

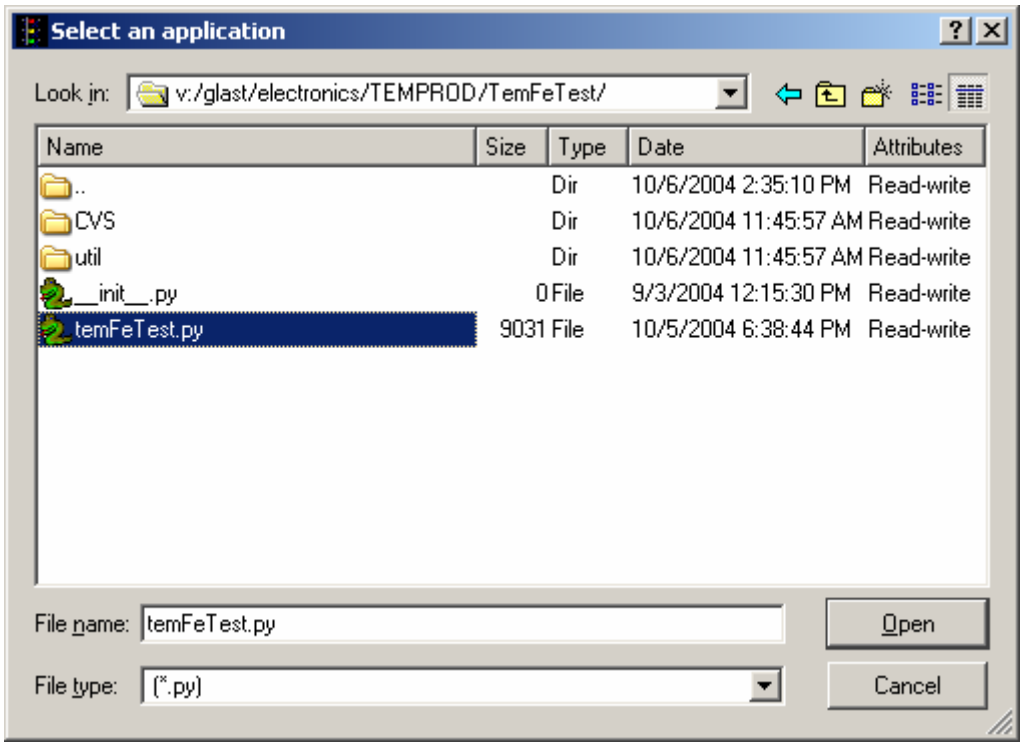


Figure 30. Select an Application Window

3. Select “temFeTest.py”.

4. Click on the “Open” button to open the file.

5. At the “Run Control Main” window, click on the ► button.

5.5.5 Front End Test Procedure (continued)

6. The "TEM – FE Connectivity Test" window appears as shown below. The indicators are clear before the test.

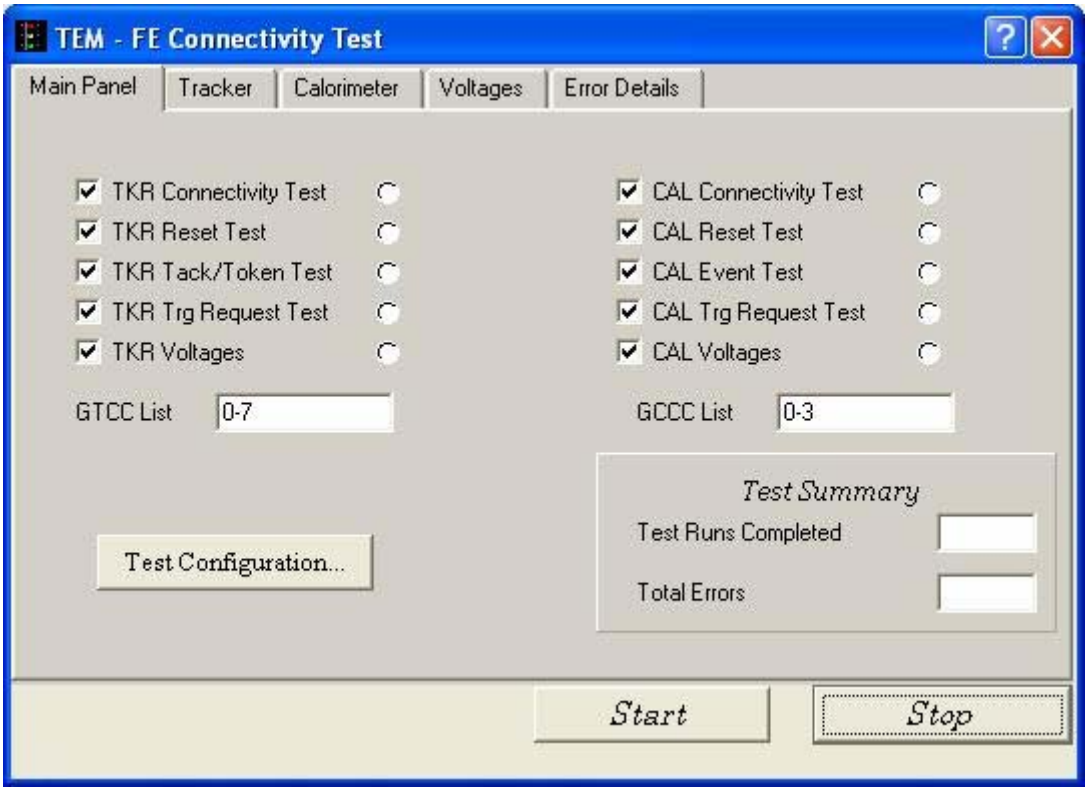


Figure 31. TEM – FE Connectivity Test Window

Note: Do not change the default values and selections in this window; use them as they are.

7. Click on the "Start" button, to run the test.

Note: This test takes about one minute to run.

8. Verify that all the indicators are green, indicating good data (a red light indicates failure of the test) and that the value for Total Errors is "0". **Record** verifications per the data sheet.

9. Open and print the log file for the test and attach it to the data cover sheet.

Note: The test file is saved as C:/TEMPROD/Log/TemFeTest/temFe_*date_time*.log. One log file is created for this test.

10. Click on the "Exit" button to exit from the test environment.

5.5.6 TEM FIFO Test Procedure

This section provides instructions to test the FIFOs on the TEM.

To setup and run the TEM FIFO monitor test:

1. At the “Run Control Main” window, click on the “Select Application” button. The “Select an application” window appears as shown below.

2. Select the directory V:/GLAST/Electronics/TEMPROD/FifoTest/

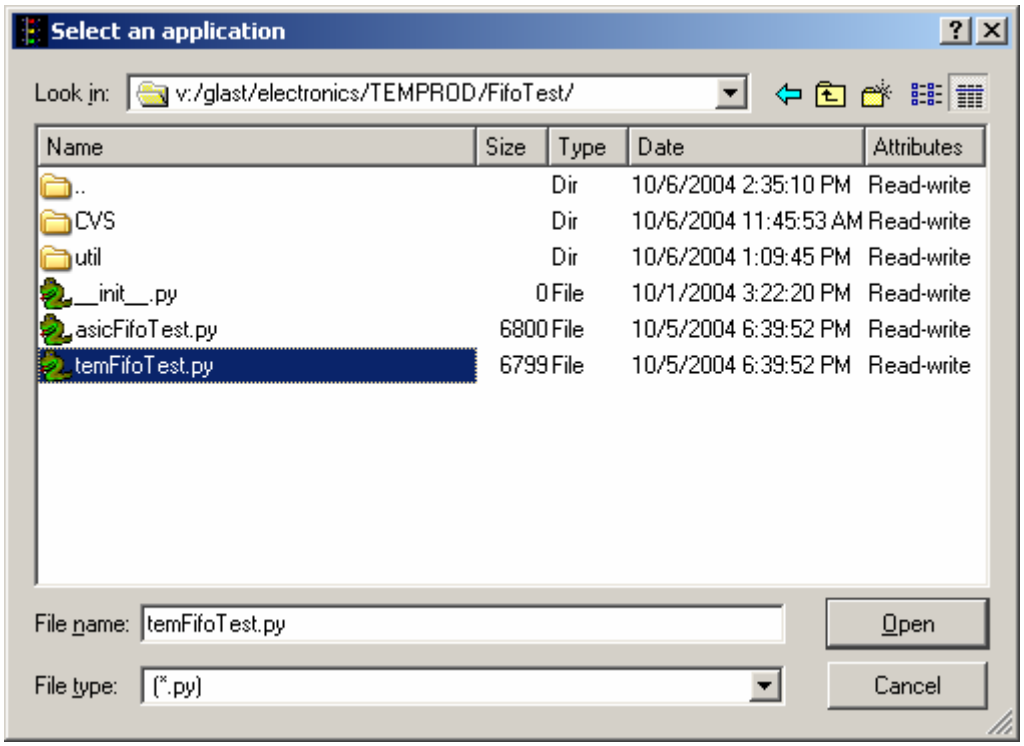


Figure 32. Select an Application Window

3. Select “temFifoTest.py”.

4. Click on the “Open” button to open the file.

5. At the “Run Control Main” window, click on the ► button.

5.5.6 TEM FIFO Test Procedure (continued)

6. The “TEM FIFO Test” window appears as shown below. The indicators are clear before the test.

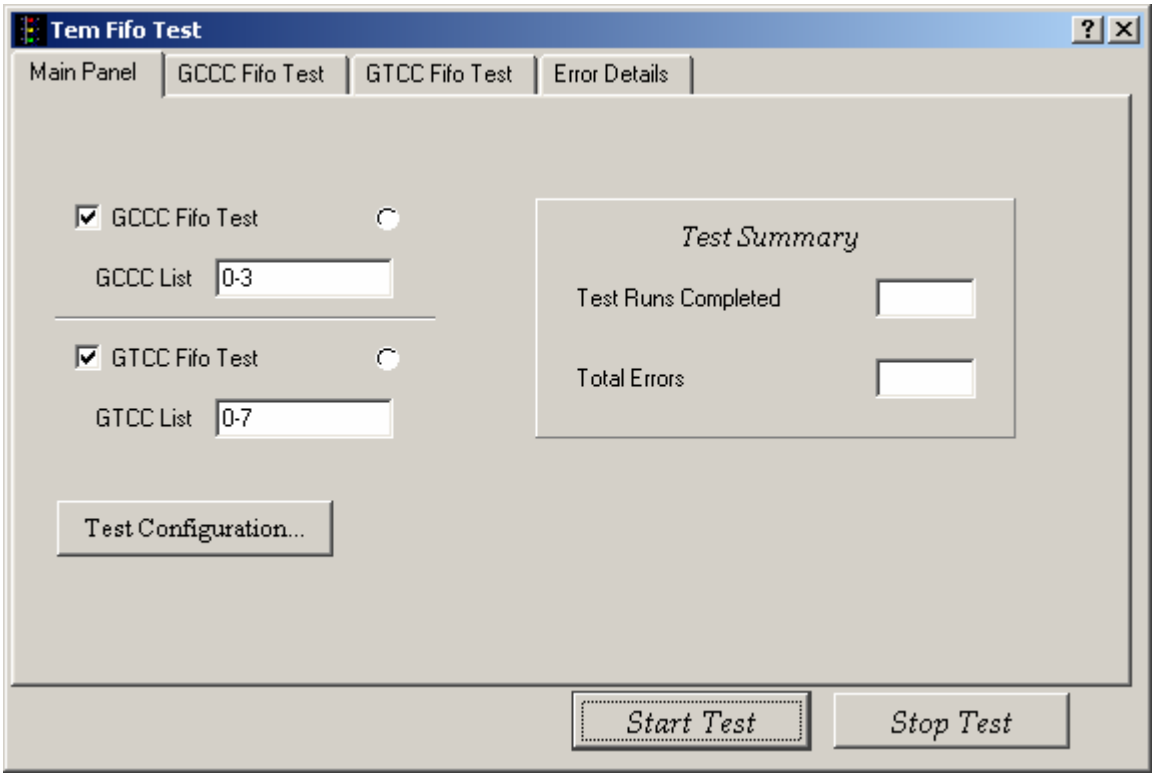


Figure 33. TEM FIFO Test Window Selections

Note: Do not change the default values and selections in this window; use them as they are.

7. Click on the “Start” button, to run the test.

Note: This test takes a few minutes to run.

8. Verify that all the indicators are green, indicating good data (a red light indicates failure of the test) and that the value for Total Errors is “0”. **Record** verifications per the data sheet.

9. Open and print the log file and attach it to the data cover sheet.

Note: The test log files are saved as C:/TEMPROD/log/FifoTest/fifo_date_time.log.

10. Click on the “Exit” button to exit from the test environment.

5.6 Functional Test Procedure

This section provides instructions to test all the function registers on the TEM individually.

To setup and run the TEM environmental monitor test:

1. At the “Run Control Main” window, click on the “Select Application” button. The “Select an application” window appears as shown below.

2. Select the directory V:/GLAST/Electronics/TEMPROD/FuncTest/

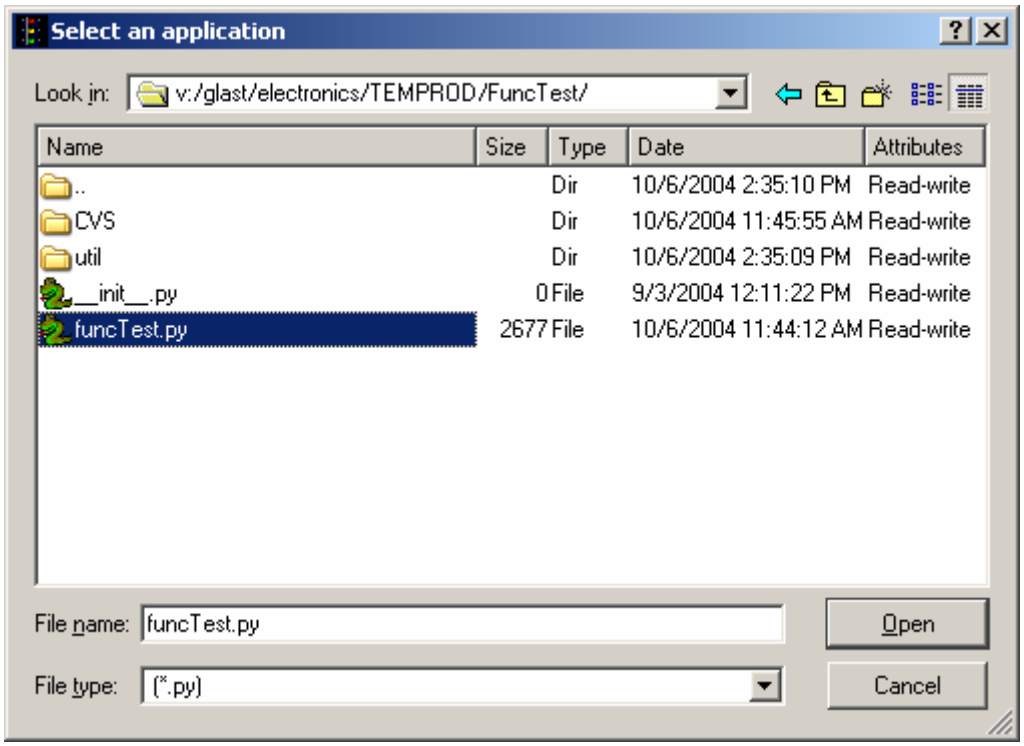


Figure 34. Select an Application Window

3. Select “funcTest.py”.

4. Click on the “Open” button to open the file.

5. At the “Run Control Main” window, click on the ► button.

5.6 Functional Test Procedure (continued)

6. The “TEM Functional Tests” window appears as shown below. The indicators are clear before the test.

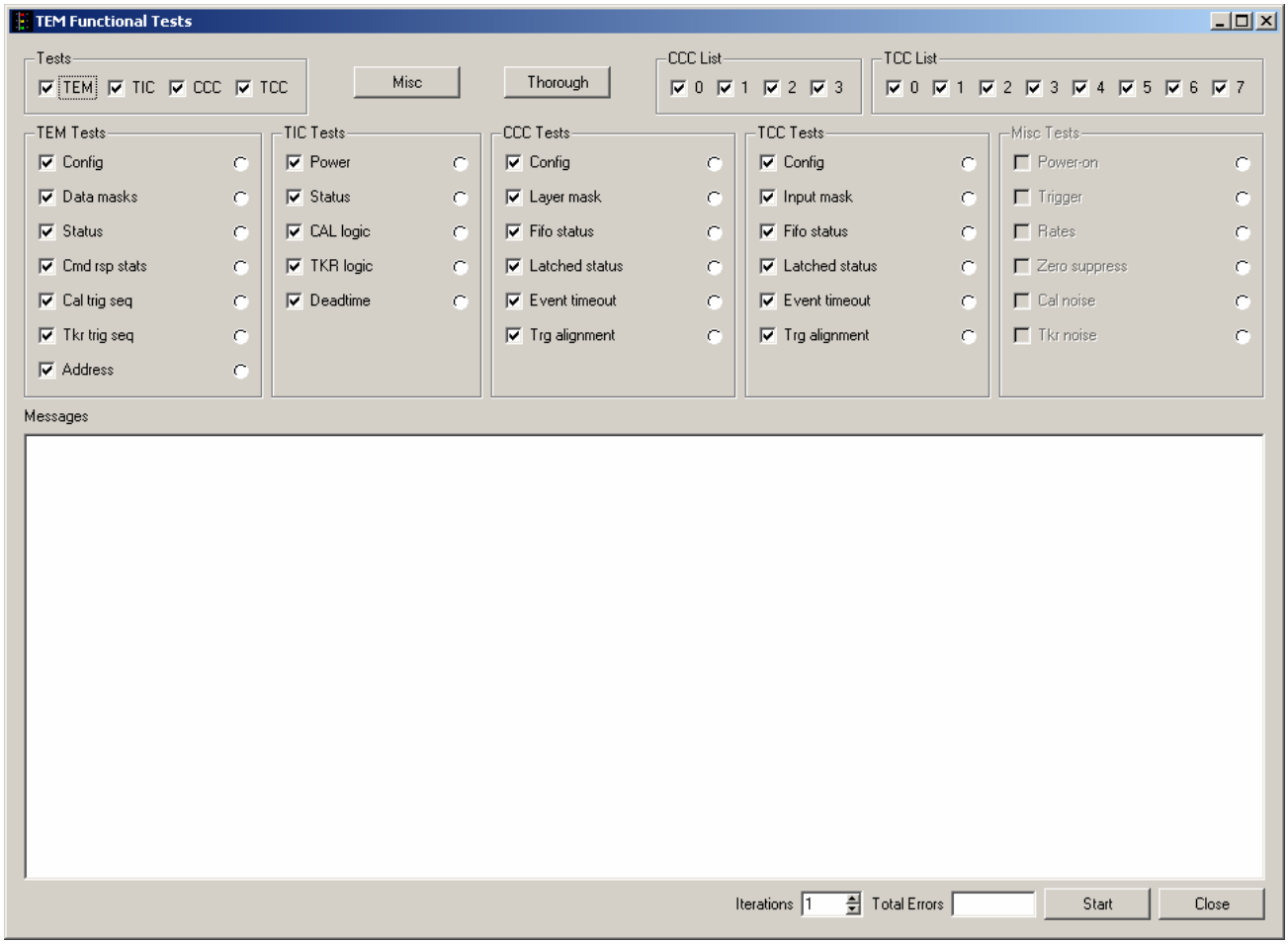


Figure 35. Functional Tests Window

Note: Do not change the default values and selections in this window; use them as they are.

7. Click on the “Start” button, to run the test.

Note: This test takes 25 minutes to run.

8. Verify that all the indicators are green, indicating good data (a red light indicates failure of the test) and that no errors appear in the Messages box. **Record** verifications per the data sheet.

5.6 Functional Test Procedure (continued)

9. Click on the “Close” button to exit from the test environment.

10. Open and print the log file and attach it to the data cover sheet.

Note: The test log files are saved as C:/TEMPROD/log/FuncTest/func_*date_time*.log.

11. Turn off power supply #1 and 2.

12. Turn off power to the VME Crate.

5.7 Noise Tests

5.7.1 Noise Test Prerequisite

Before this test is run, the RMS meter must be turned on and run for at least 20 minutes.

5.7.2 CAL Noise Test Procedure

This section provides instructions to test the noise on the CAL.

To setup and run the noise test:

1. Verify that the power is off power supply #1 and 2 and the VME Crate.

2. Connect all the equipment and cables per the interconnect drawing in the figure below.

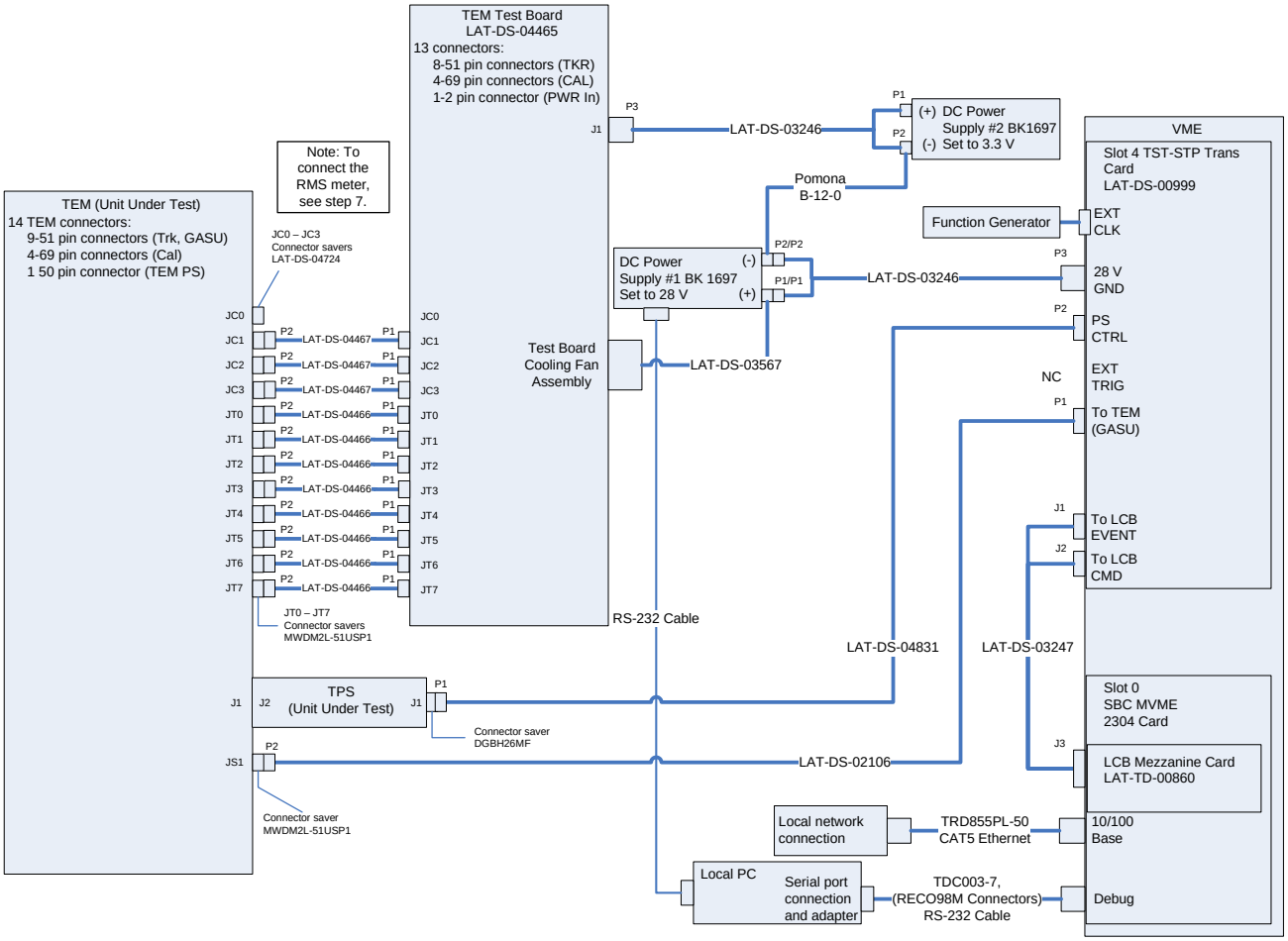


Figure 36. CAL Noise Bias Voltage (HV) Test Setup Interconnection Diagram

5.7.2 CAL Noise Test Procedure (continued)

3. Set the DMM to the auto-ranging setting. Record in the data sheet.

4. Measure DMM lead resistance by connecting the two leads together. Record in the data sheet.

5. Measure the resistance between the UUT chassis and technical ground. Record in the data sheet.

6. Measure the resistance between the test equipment chassis and technical ground. Record in the data sheet.

7. Connect JC-0 to the RMS meter as shown in the figure below following this process:

   a) Connect the 1 MHz filter (LAT-DS-04767) to J4 of the adaptor (LAT-DS-04820) using a Lemo cable.

   b) Connect the 1 MHz filter to the RMS meter.

   c) Connect J1 of the adaptor (LAT-DS-04820) to the connector saver on JC-0 on the TEM.

   d) Record in the data sheet.

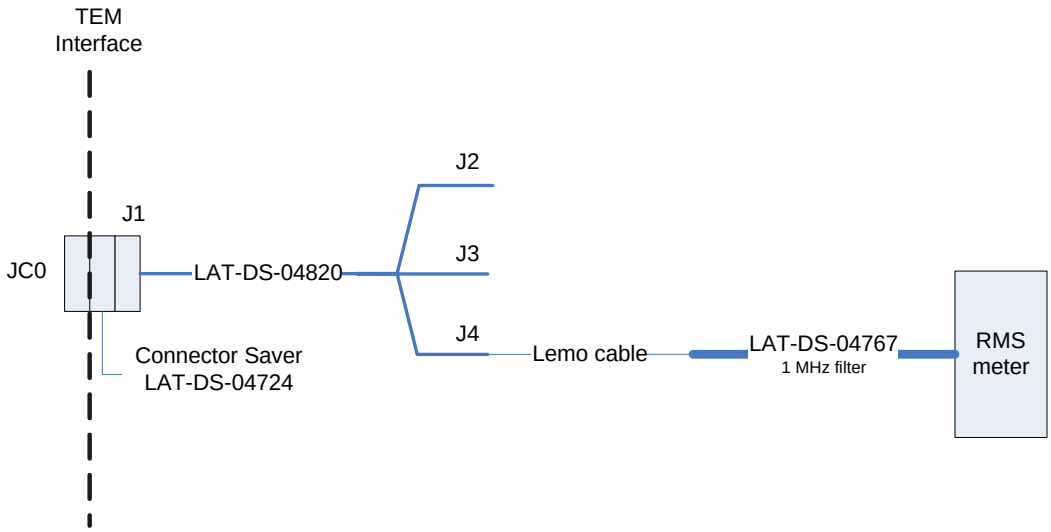


Figure 37. CAL Noise Test Setup—Bias Voltage (HV)

8. Ensure that the RMS meter has been running for 20 minutes.

9. Set the RMS meter to the 1 mV range.

10. Set the function generator to 20 MHz square wave.

5.7.2 CAL Noise Test Procedure (continued)

11. Turn on power supply #1 and apply 28.0 volts.

12. Open the “ttermpro” file located in the C:\Program Files\TeraTermProSSH\ directory and connect to the VME Crate using the serial port (COM3).

13. Apply power to the VME Crate.

14. Wait for the boot to finish.

15. Open a Command Prompt window.

16. Change the directory to the following:

    V:\GLAST\Electronics\Teststands\gitot

17. Type in “runcontrol.bat” and enter.

5.7.2 CAL Noise Test Procedure (continued)

18. The “Run Control Main” window appears as shown below.

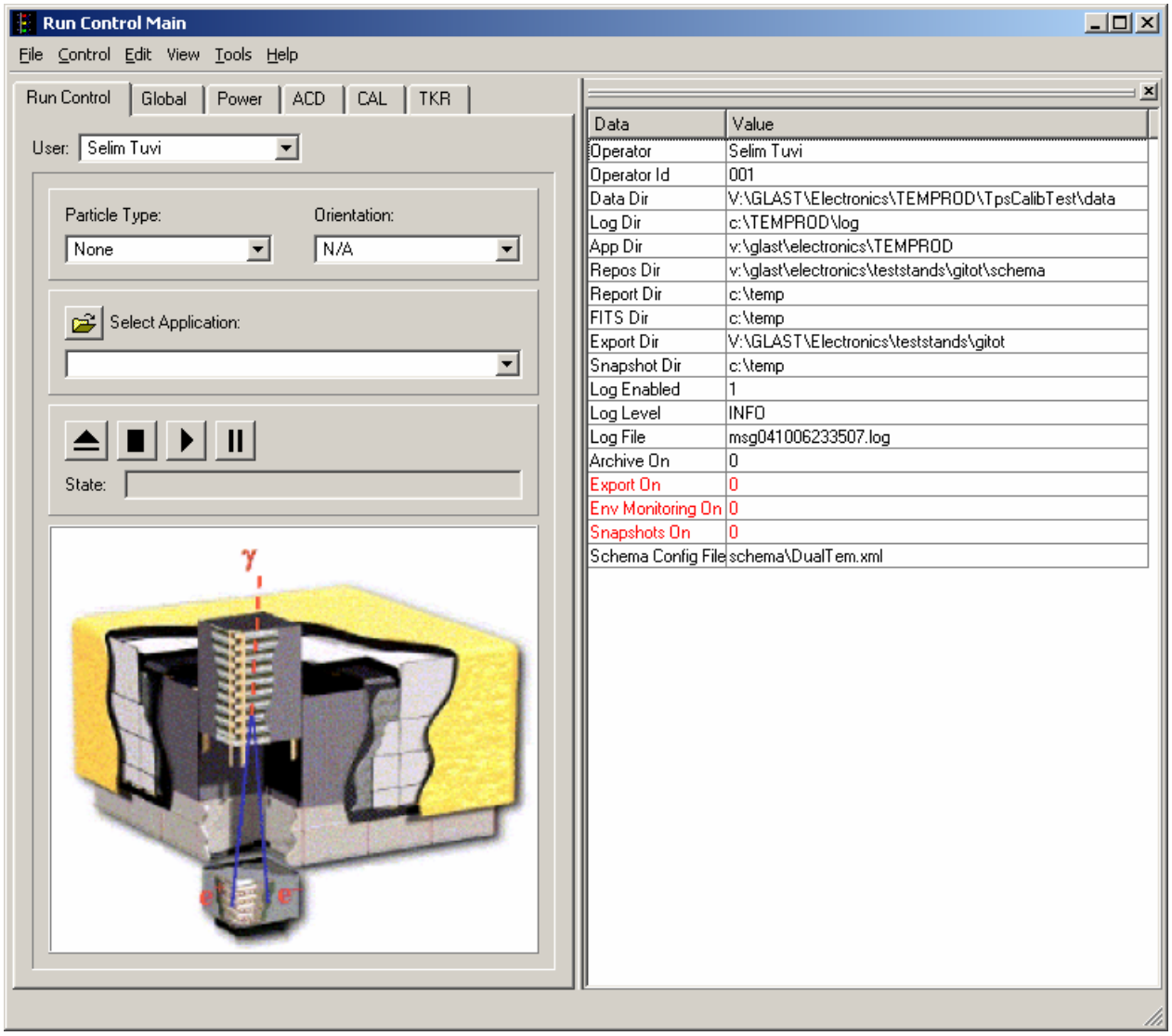


Figure 38. Run Control Main Window

Note: Do not change the options in this window.

5.7.2 CAL Noise Test Procedure (continued)

19. At the “Run Control Main” window, click on the “Select Application” button. The “Select an application” window appears as shown below.

20. Select the directory
V:/GLAST/Electronics/TEMPROD/FuncTest/

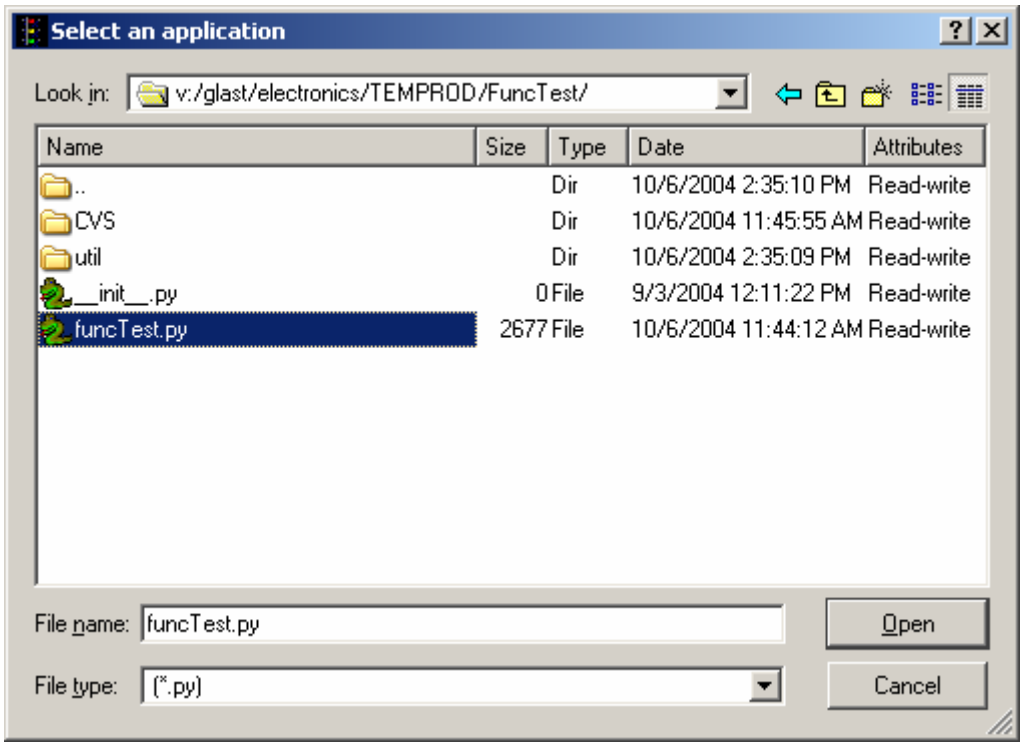


Figure 39. Select an Application Window

21. Select “funcTest.py”.

22. Click on the “Open” button to open the file.

23. At the “Run Control Main” window, click on the ► button.

5.7.2 CAL Noise Test Procedure (continued)

24. The “TEM Functional Tests” window appears as shown below. The indicators are clear before the test is run.

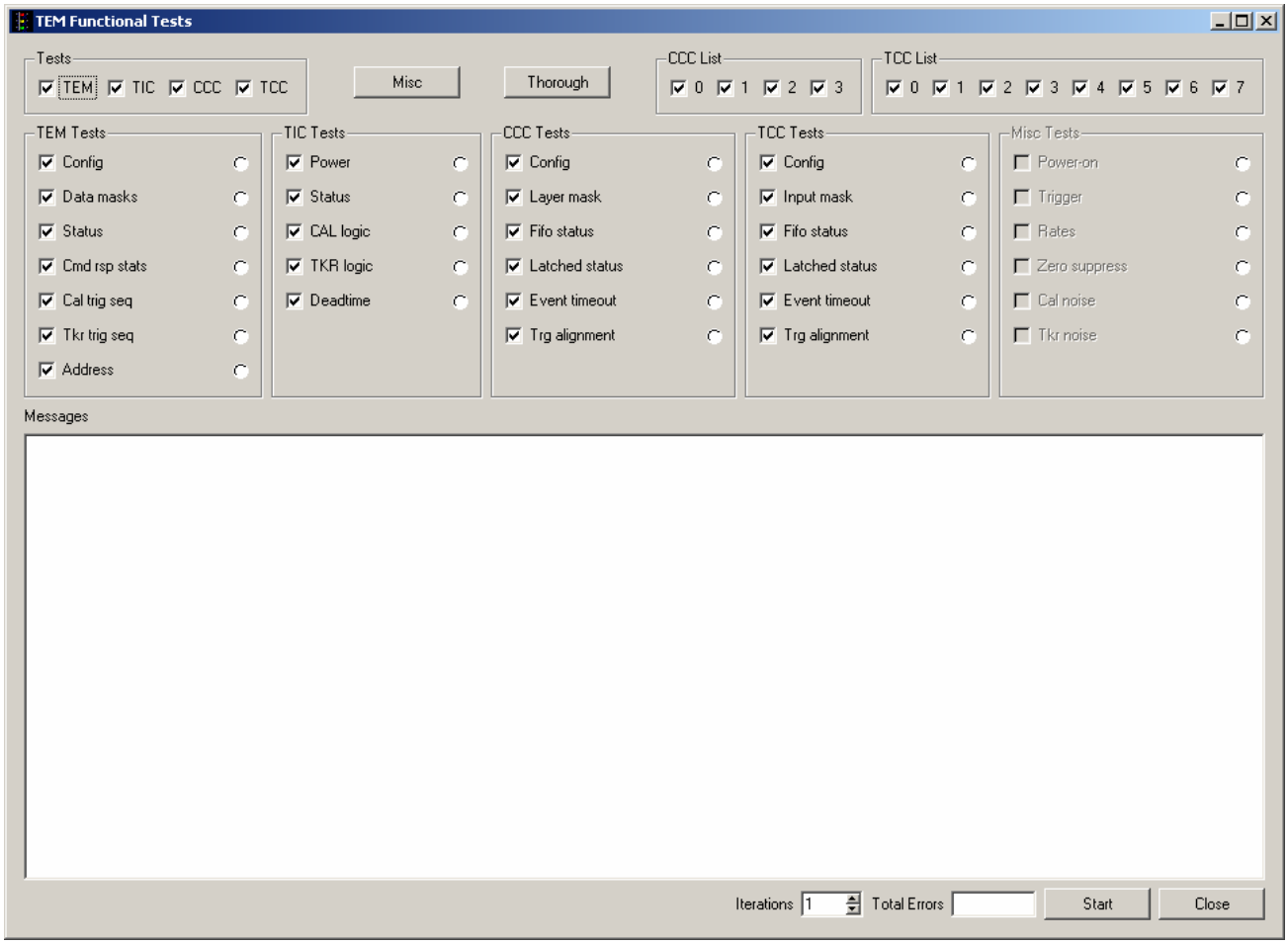


Figure 40. TEM Functional Tests Window

25. Under Tests, clear TEM, TIC, CCC, and TCC.

26. Click the “Misc” button.

27. Under Misc Tests, select Cal noise.

5.7.2 CAL Noise Test Procedure (continued)

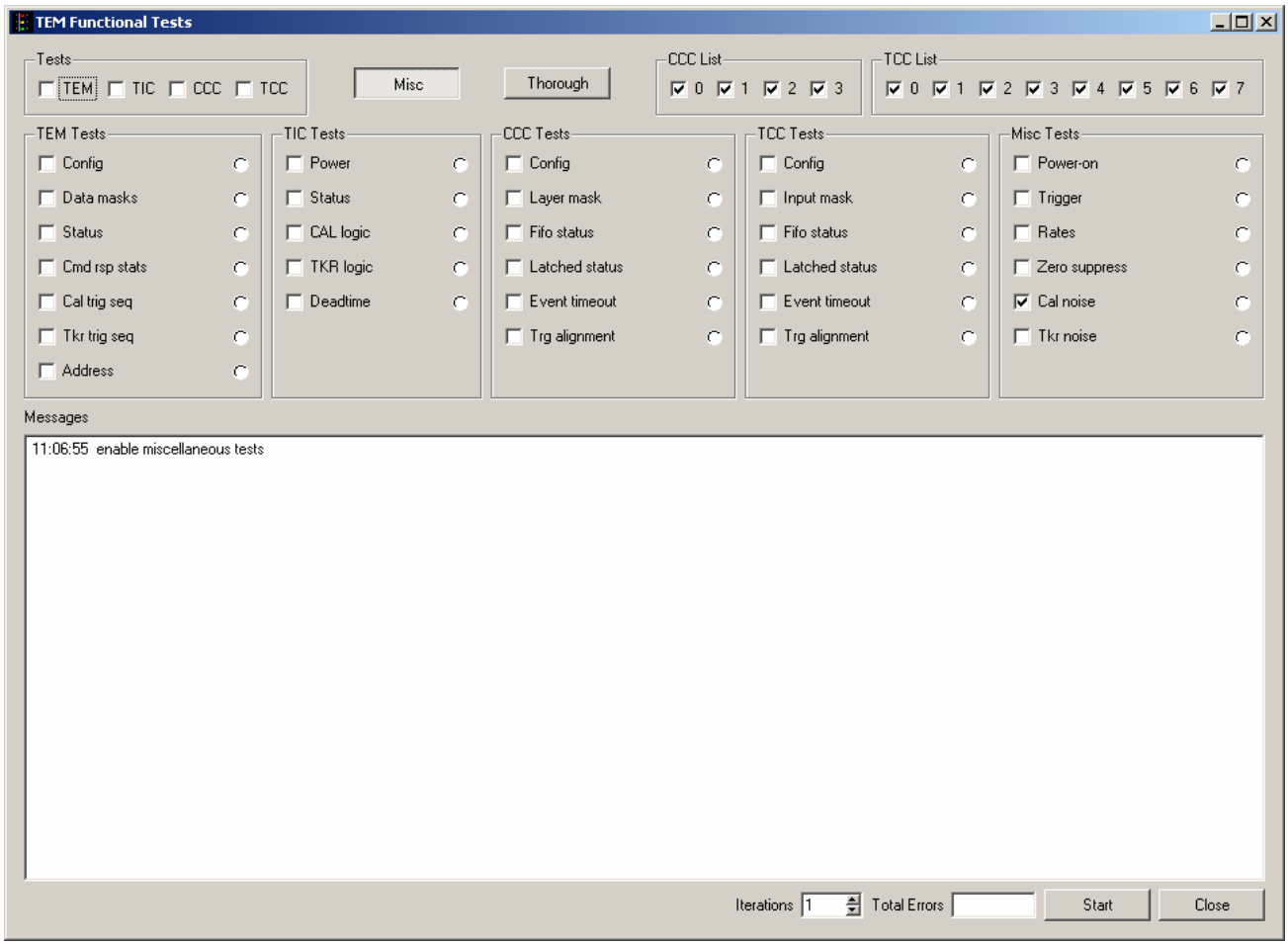


Figure 41. TEM Functional Tests Window for CAL Noise Test

28. Click on the “Start” button.

29. While the test is running and after the RMS meter reading has settled, read RMS meter. Record the reading on the data sheet. This is the CAL bias (HV) noise test.

30. Click the “Stop” button to turn off the CAL bias. Record in the data sheet.

31. Verify that the indicator light next to Cal noise turns green. Record in the data sheet.

32. Demate the Lemo cable from J4 of the adaptor.

5.7.2 CAL Noise Test Procedure (continued)

33. Connect the Lemo cable to J2 of the adaptor (LAT-DS-04820) as shown in the figure below and record in data sheet.

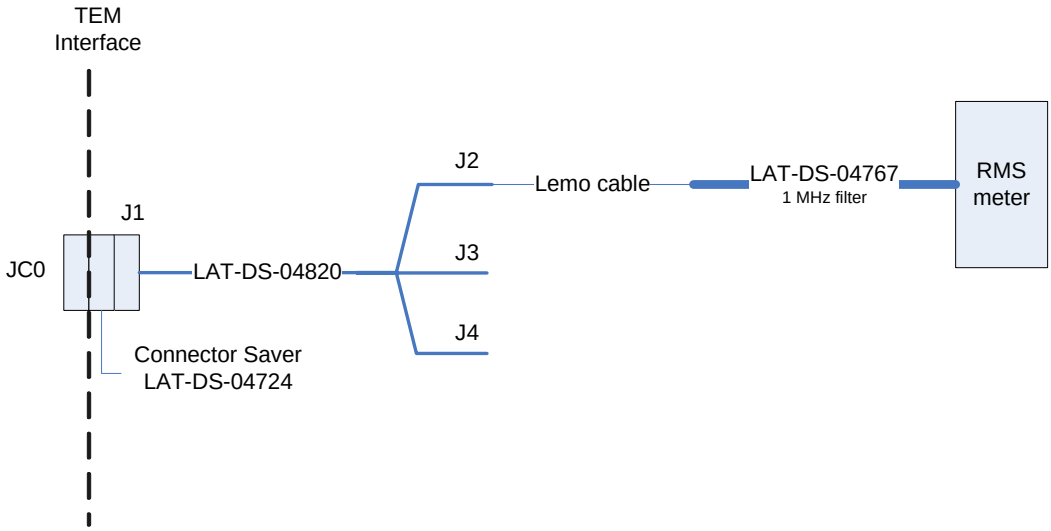


Figure 42. CAL Noise Test Setup—3.3 Analog Voltage

34. Click the “Start” button in the TEM Functional Tests window.

35. After the RMS meter reading has settled, read the RMS meter. Record the reading on the data sheet. This is the CAL 3.3 analog voltage noise test.

36. Click the “Stop” button to turn off the CAL bias. Record in the data sheet.

37. Verify that the indicator light next to Cal noise turns green. Record in the data sheet.

38. Demate the Lemo cable from J2 of the adaptor (LAT-DS-04820).

5.7.2 CAL Noise Test Procedure (continued)

39. Connect the Lemo cable to J3 of the adaptor (LAT-DS-04820) as shown in the figure below.

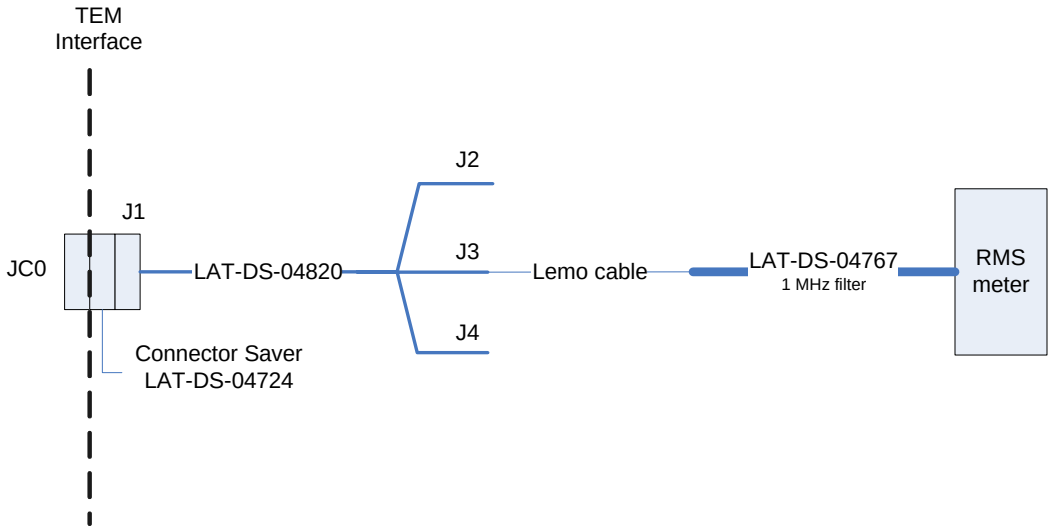


Figure 43. CAL Noise Test Setup—3.3 Digital Voltage

40. Click on the "Start" button in the TEM Functional Tests window.

41. After the RMS meter reading has settled, read the RMS meter. Record the reading on the data sheet. This is the CAL 3.3 digital voltage noise test.

42. Click on the "Stop" button to stop the test.

43. Verify that the indicator is green, indicating good data (a red light indicates failure of the test) and that the value for Total Errors is "0". **Record** verifications per the data sheet.

44. Click the "Close" button to close the test.

45. Open and print the log file for the test and attach it to the data cover sheet.

Note: The test log files are saved as C:/TEMPROD/log/FuncTest/basic_*date_time*.log.

46. Turn off power supply #1.

47. Turn off power to the VME Crate.

48. Demate the Lemo cable from J3 of the adaptor.

5.7.3 TKR Noise Test Procedure

This section provides instructions to test the noise on the TKR.

WARNING: The TEM/TPS internally produces over 50 V at up to 10 mA. Do not manipulate the TEM/TPS or TEM Tester Board during the test procedure. Do not disassemble until the power supplies have been turned off.

To setup and run the noise test:

1. Verify that the power is off power supply #1 and 2 and the VME Crate.

2. Connect all the equipment and cables per the interconnect drawing in the figure below.

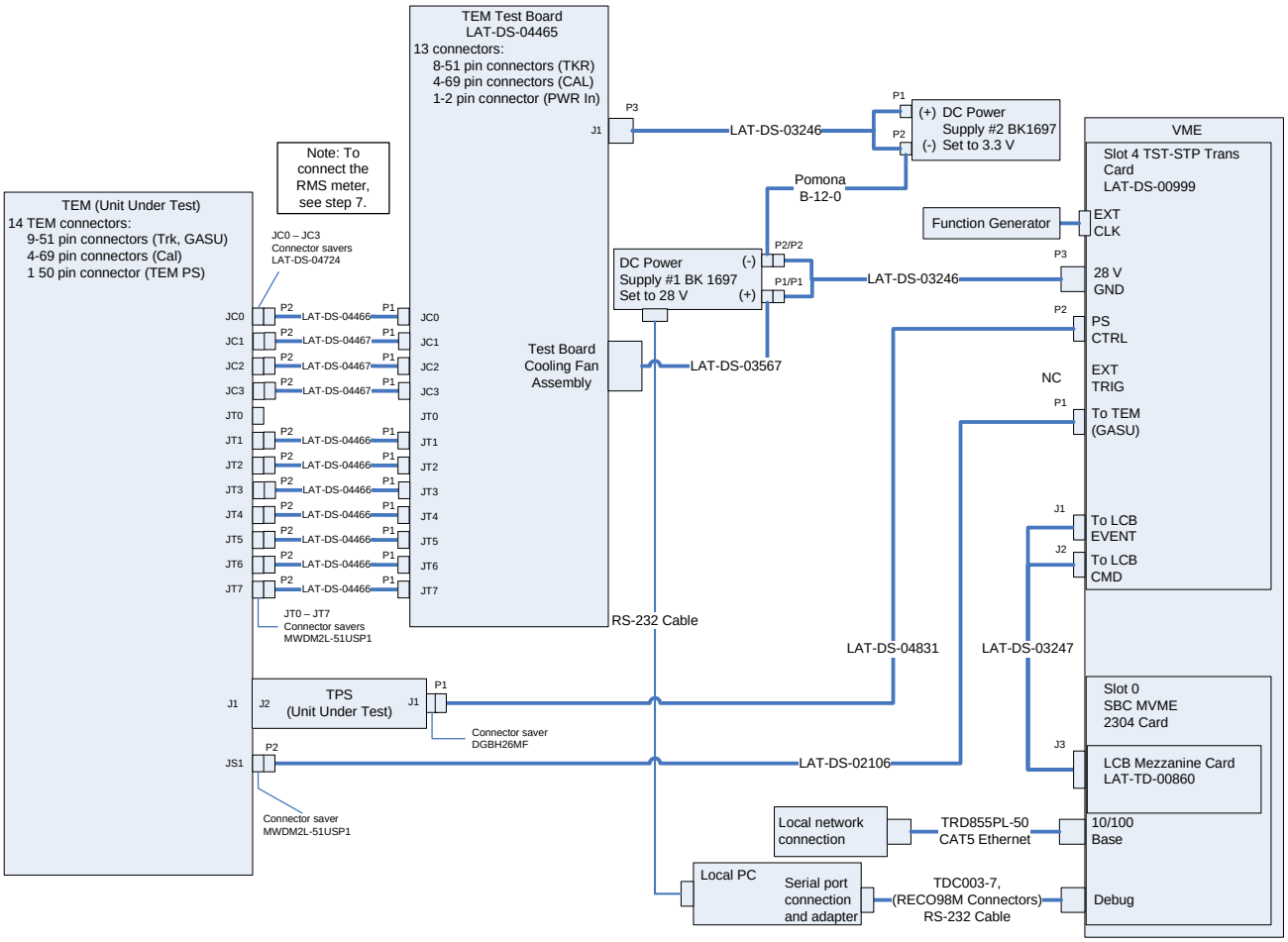


Figure 44. TKR Noise Bias Voltage (HV) Test setup Interconnection Diagram

3. Set the DMM to the auto-ranging setting. Record in the data sheet.

5.7.3 TKR Noise Test Procedure (continued)

4. Measure DMM lead resistance by connecting the two leads together. Record in the data sheet.

5. Measure the resistance between the UUT chassis and technical ground. Record in the data sheet.

6. Measure the resistance between the test equipment chassis and technical ground. Record in the data sheet.

7. Connect JT-0 to the RMS meter as shown in the figure below following this process:

   a) Connect the 1 MHz filter (LAT-DS-04767) to J5 of the adaptor (LAT-DS-04821) using a Lemo cable.

   b) Connect the 1 MHz filter to the RMS meter.

   c) Connect J1 of the adaptor (LAT-DS-04821) to the connector saver on JT-0 on the TEM.

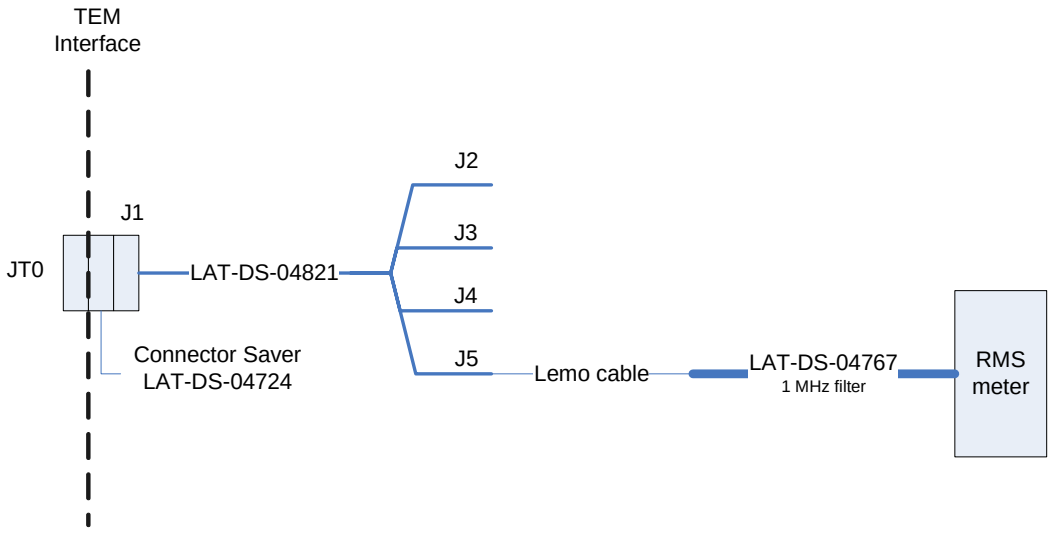


Figure 45. TKR Noise Test Setup—Bias Voltage (HV)

8. Ensure that the RMS meter has been running for 20 minutes.

9. Set the RMS meter to the 1 mV range.

10. Set the function generator to 20 MHz square wave.

11. Turn on power supply #1 and apply 28.0 volts.

12. Open the “ttermpro” file located in the C:\Program Files\TeraTermProSSH\ directory and connect to the VME Crate using the serial port (COM3).

5.7.3 TKR Noise Test Procedure (continued)

13. Apply power to the VME Crate.
14. Wait for the boot to finish.
15. After the boot-up process for the VME has completed, turn on power supply #2 and apply 3.3 volts.
16. Open a Command Prompt window.
17. Change the directory to the following:

    V:\GLAST\Electronics\Teststands\gitot.

18. Type in “runcontrol.bat” and enter.

5.7.3 TKR Noise Test Procedure (continued)

19. The “Run Control Main” window appears as shown below.

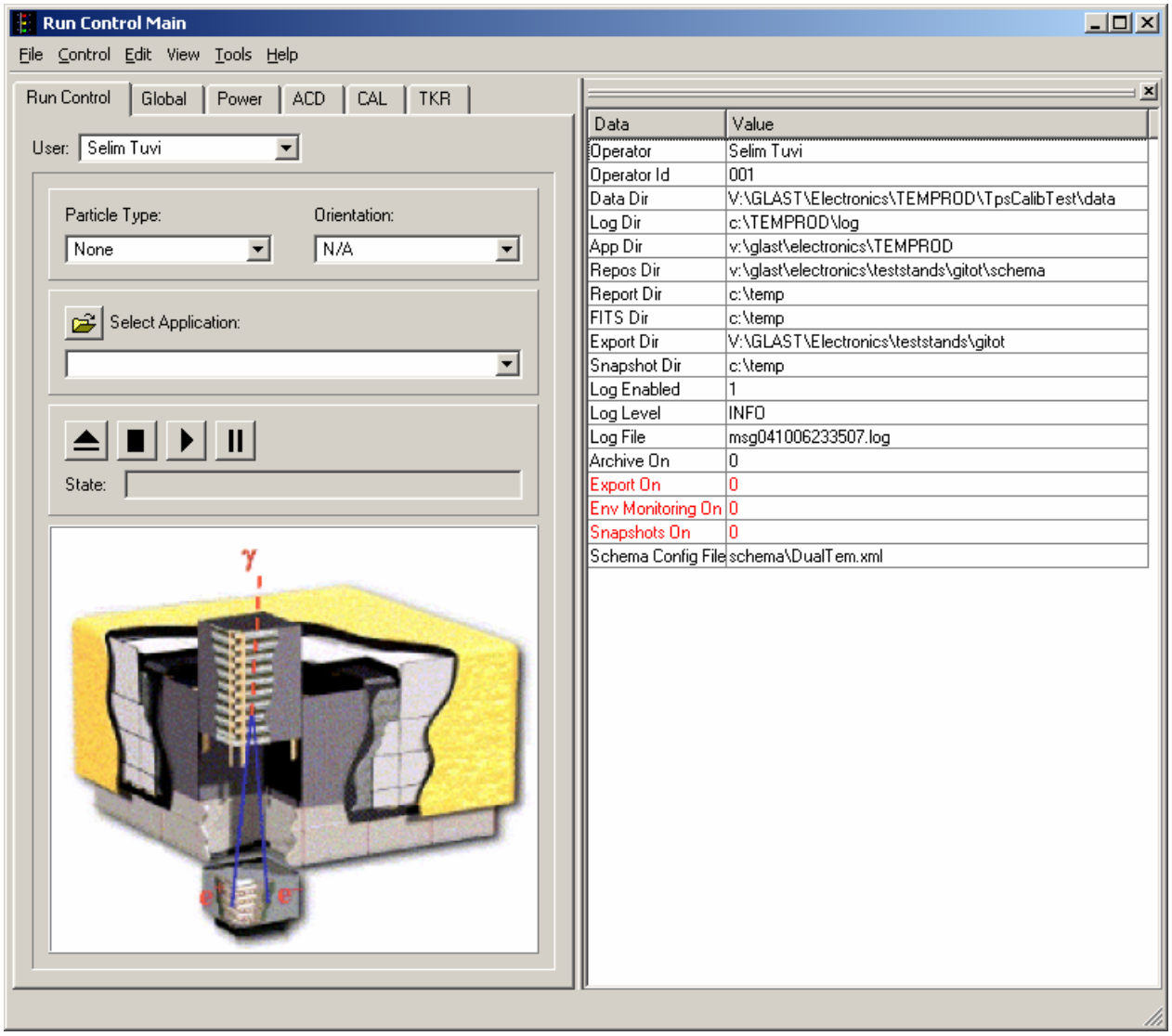


Figure 46. Run Control Main Window

Note: Do not change the options in this window.

5.7.3 TKR Noise Test Procedure (continued)

20. At the “Run Control Main” window, click on the “Select Application” button. The “Select an application” window appears as shown below.

21. Select the directory V:/GLAST/Electronics/TEMPROD/FuncTest/

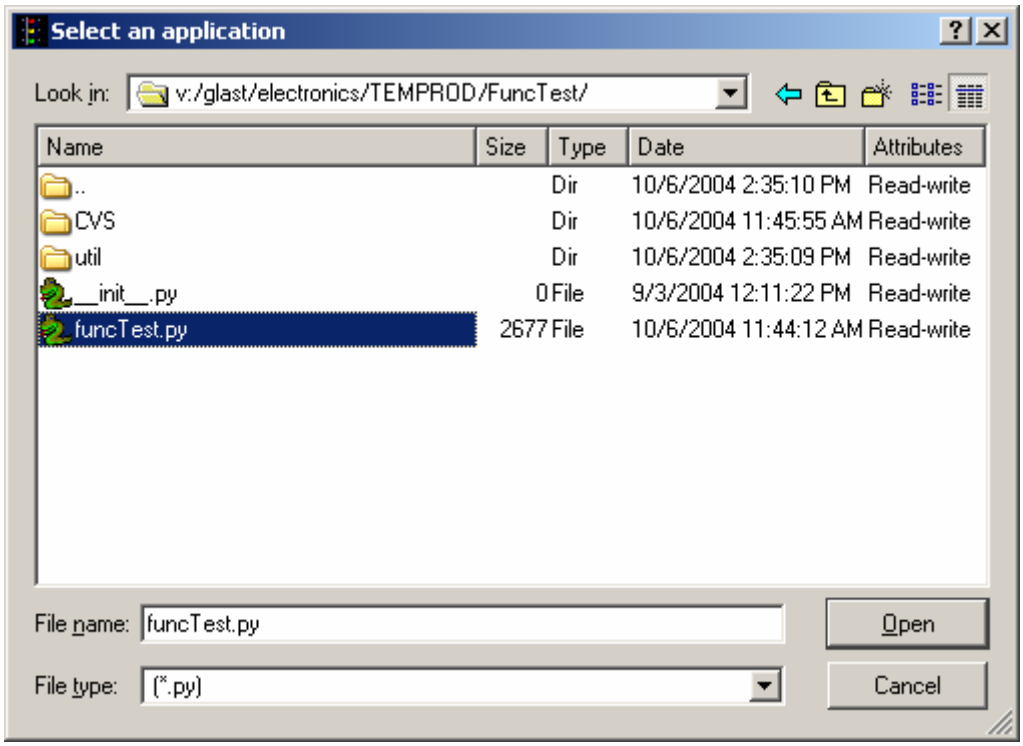


Figure 47. Select an Application Window

22. Select “funcTest.py”.

23. Click on the “Open” button to open the file.

24. At the “Run Control Main” window, click on the ► button.

5.7.3 TKR Noise Test Procedure (continued)

25. The “TEM Functional Tests” window appears as shown below. The indicators are clear before the test is run.

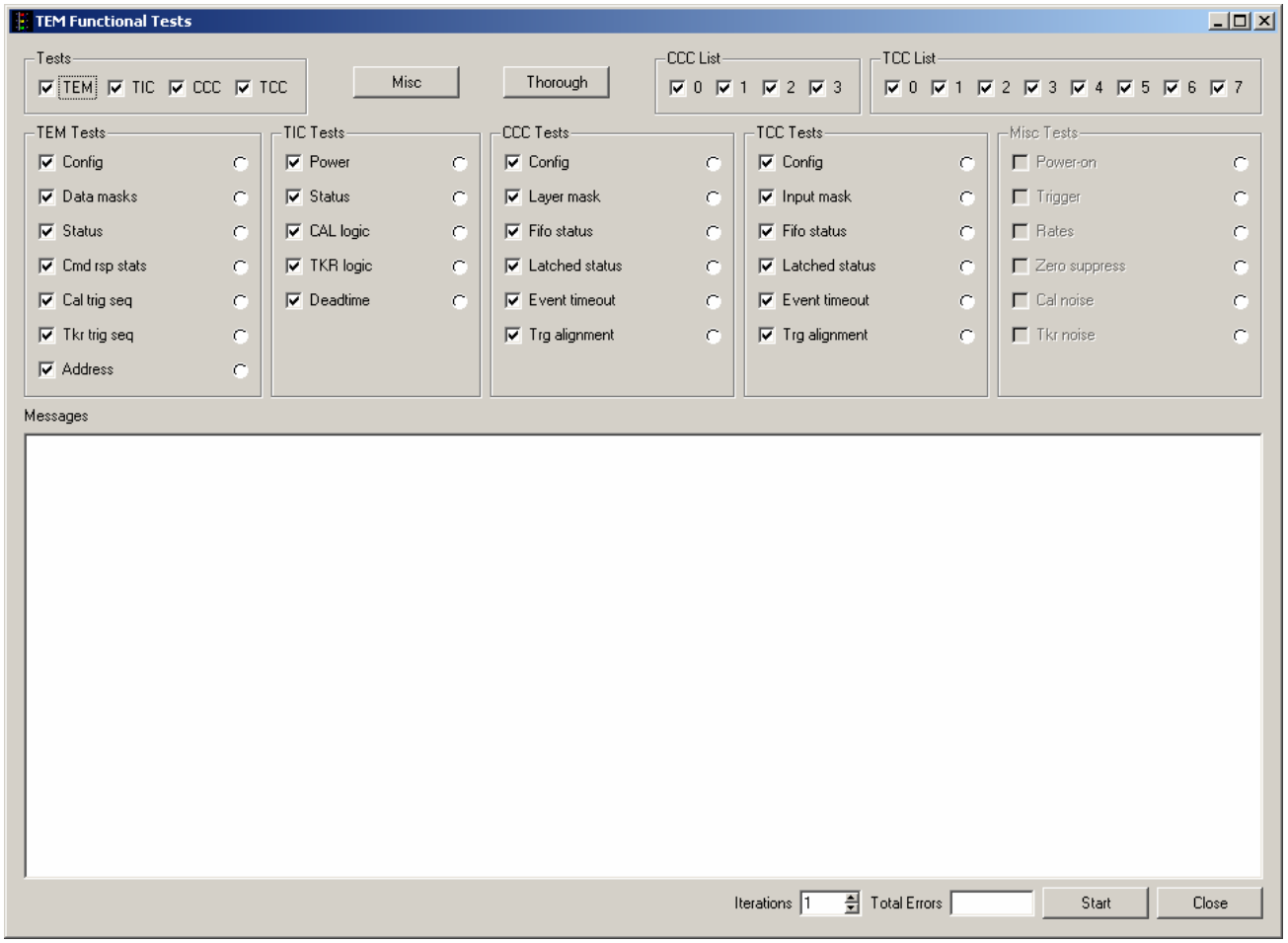


Figure 48. TEM Functional Tests Window

26. Under Tests, clear TEM, TIC, CCC, and TCC.

27. Click the “Misc” button.

28. Under Misc Tests, select Tkr noise.

5.7.3 TKR Noise Test Procedure (continued)

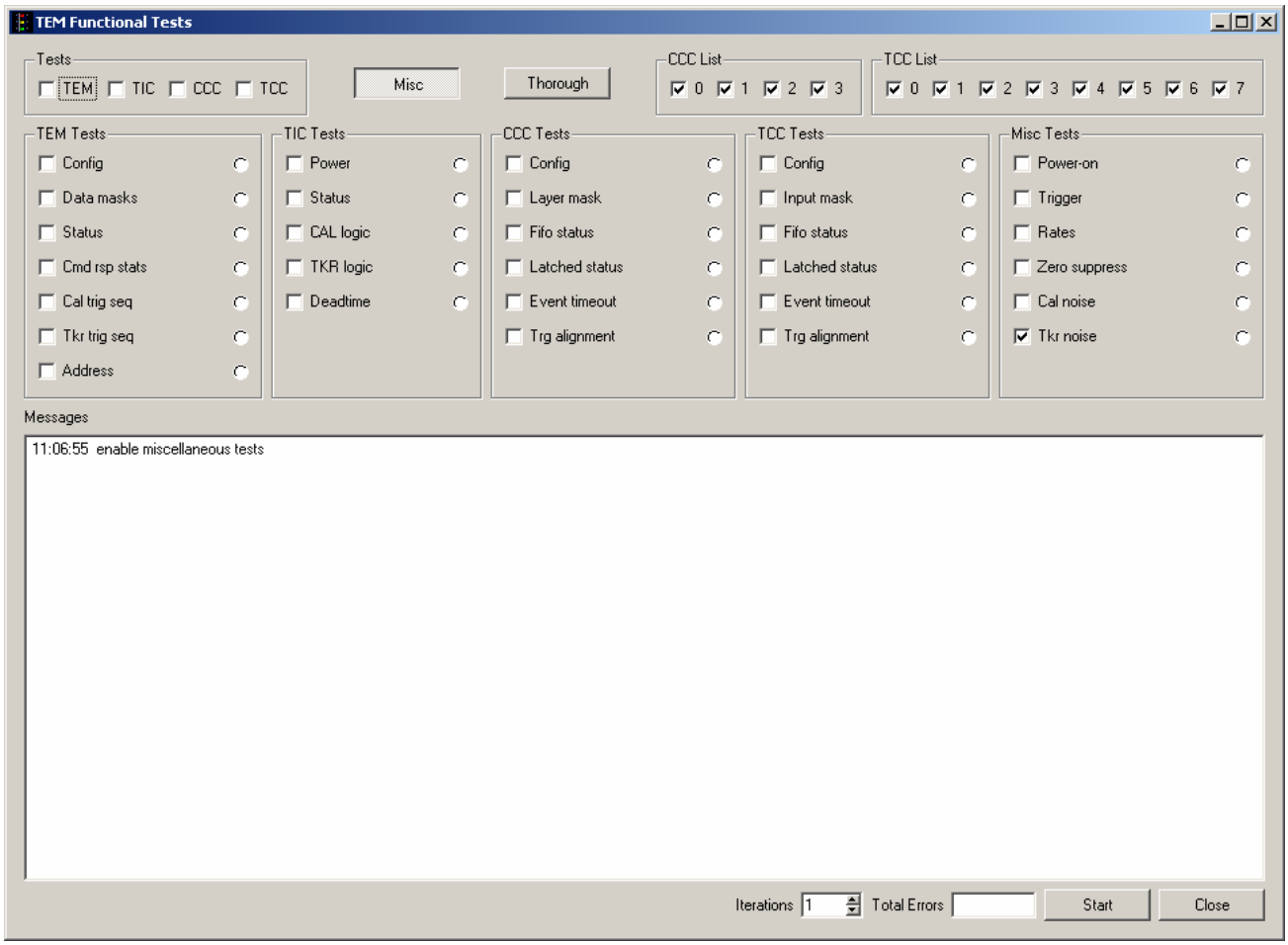


Figure 49. TEM Functional Tests Window for TKR Noise Test

29. Click on the “Start” button.

30. While the test is running and after the RMS meter reading has settled, read RMS meter. Record the reading on the data sheet.

31. Click the Stop button to turn off the TKR bias. Record in the data sheet.

32. Verify that the indicator light next to Tkr noise turns green. Record in the data sheet.

33. Demate the Lemo cable from J5 of the adaptor.

5.7.3 TKR Noise Test Procedure (continued)

34. Connect the Lemo cable to J2 of the adaptor (LAT-DS-04821) as shown in the figure below.

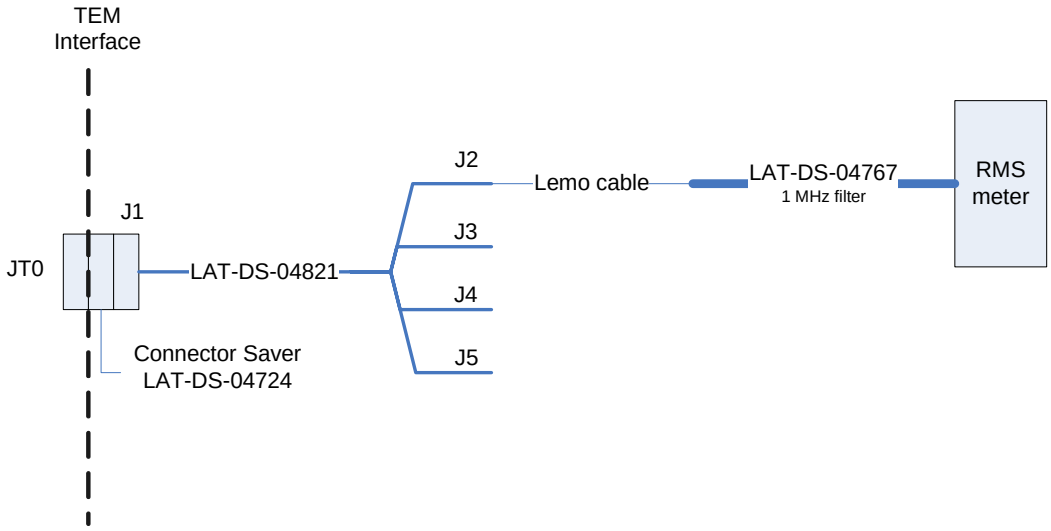


Figure 50. TKR Noise Test Setup—2.5 Analog Voltage

35. Click the “Start” button in the TEM Functional Tests window.

36. While the test is running, read the RMS meter. Record the reading on the data sheet. This is the TKR 2.5 analog voltage noise test.

37. Click the “Stop” button to turn off the TKR bias. Record in the data sheet.

38. Verify that the indicator light next to Tkr noise turns green. Record in the data sheet.

39. Demate the Lemo cable from J2 of the adaptor.

5.7.3 TKR Noise Test Procedure (continued)

40. Connect the Lemo cable to J3 of the adaptor (LAT-DS-04821) as shown in the figure below.

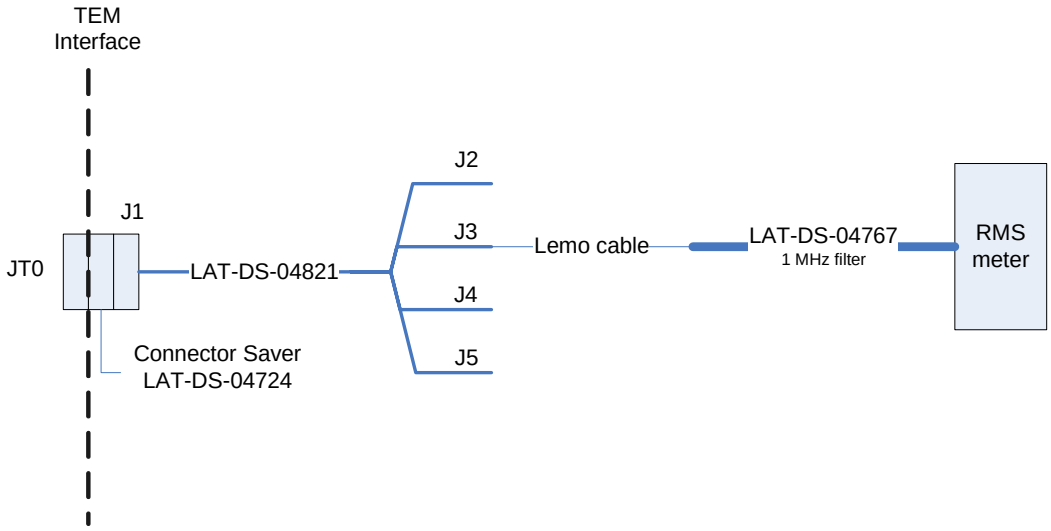


Figure 51. TKR Noise Test Setup—1.5 Analog Voltage

41. Click on the “Start” button in the TEM Functional Tests window.

42. After the RMS meter reading has settled, read the RMS meter. Record the reading on the data sheet. This is the TKR 1.5 analog voltage noise test.

43. Click the “Stop” button to turn off the Tkr bias. Record in the data sheet.

44. Verify that the indicator light next to Tkr noise turns green. Record in the data sheet.

45. Demate the Lemo cable from J3 of the adaptor.

5.7.3 TKR Noise Test Procedure (continued)

46. Connect the Lemo cable to J4 of the adaptor (LAT-DS-04821) as shown in the figure below.

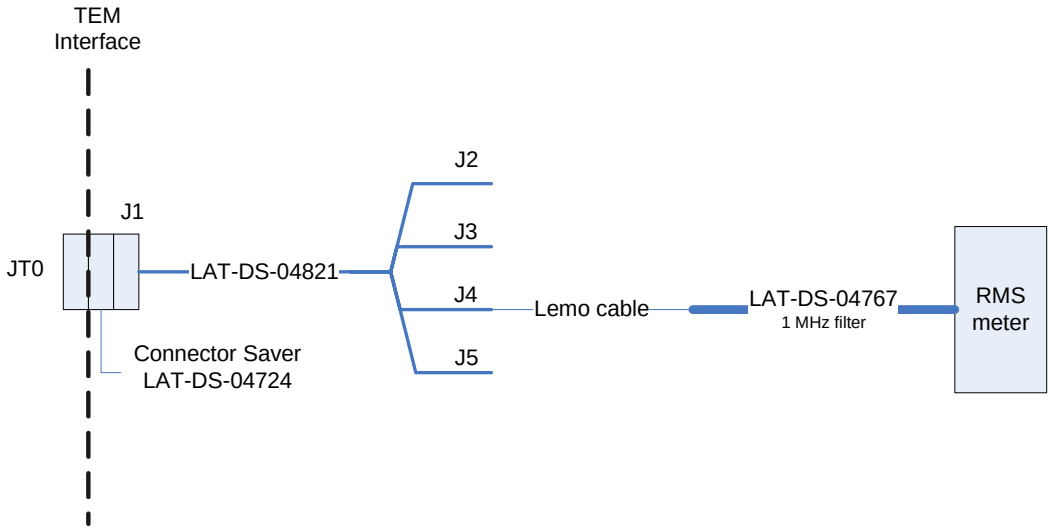


Figure 52. TKR Noise Test Setup—2.5 Digital Voltage

47. Click on the "Start" button in the TEM Functional Tests window.

48. After the RMS meter reading has settled, read the RMS meter. Record the reading on the data sheet. This is the TKR 2.5 digital voltage noise.

49. Click on the "Stop" button to stop the test.

50. Verify that the indicator is green, indicating good data (a red light indicates failure of the test) and that the value for Total Errors is "0". **Record** verifications per the data sheet.

51. Click the "Close" button to close the test environment.

52. Open and print the log file for the test and attach it to the data cover sheet.

Note: The test log files are saved as C:/TEMPROD/log/FuncTest/basic_*date_time*.log.

53. Turn off power supply #1.

54. Turn off power to the VME Crate.

55. Demate the Lemo cable from J4 of the adaptor.

5.8 Thermal Vac Test

The Thermal Vac Test runs the following tests together:

- Main Tests
  - Monitor Margin and Bias Midrange – Sets the margin and bias voltages to the nominal (mid) range level and then checks the output reading.
  - Temperature Monitor – Checks the temperature readings.
  - Basic – Checks the basic TEM functions (none of the front end connections).
  - Front End – Checks the front end connections and the front end communication.
  - TEM FIFO – Tests the FIFOs on the TEM
- Functional Tests – Tests all the functional registers on the TEM individually.

5.8.1 Thermal Vac Test Setup Procedure

This section provides instructions to setup the TEM/TPS for the Thermal Vac Test.

To setup the TEM/TPS Main Tests:

1. Verify that the power is off to power supply #1 and the VME Crate.
2. Connect all the equipment and cables per the interconnect drawing in the figure below.

5.8.1: Thermal Vac Test Setup Procedure (continued)

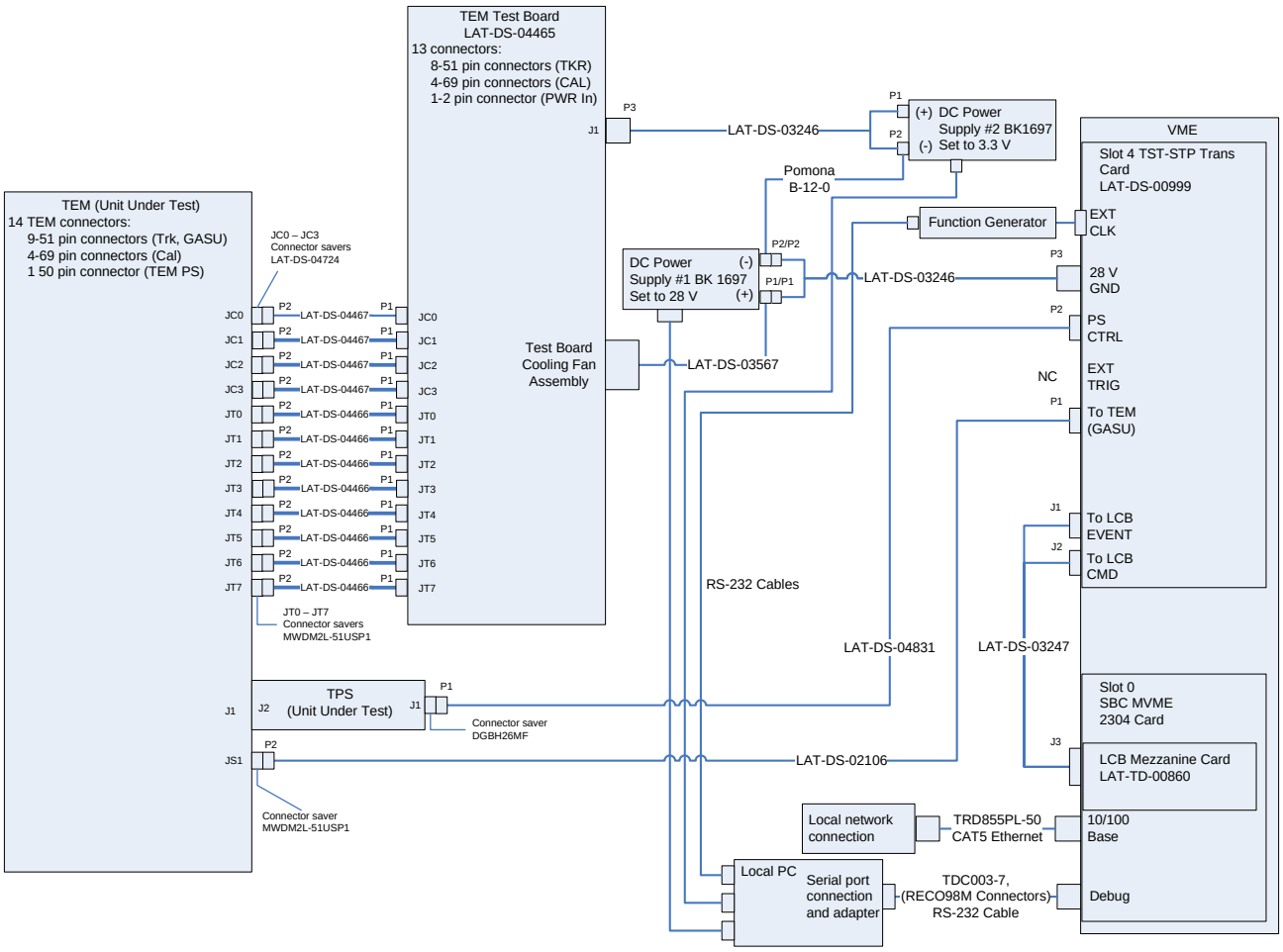


Figure 53. Monitor Margin and Bias Test setup Interconnection Diagram

3. Set the DMM to the auto-ranging setting. Record in the data sheet.

4. Measure DMM lead resistance by connecting the two leads together. Record in the data sheet.

5.8.1: Thermal Vac Test Setup Procedure (continued)

5. Measure the resistance between the UUT chassis and technical ground. Record in the data sheet.

6. Measure the resistance between the test equipment chassis and technical ground. Record in the data sheet.

7. Set the function generator to 20 MHz square wave.

8. Turn on power supply #1 and apply 28.0 volts.

9. Open the “ttermpro” file located in the C:\Program Files\TeraTermProSSH\ directory and connect to the crate using the serial port (COM3).

10. Apply power to the VME Crate.

11. Wait for the boot to finish.

12. Disconnect the fan. Record the current draw at external power supply #1 in the data sheet and verify that it is within the specified range.

13. Reconnect the fan.

14. After the boot-up process for the VME has completed turn on power supply #2 and apply 3.3 volts.

15. Open a Command Prompt window.

16. Change the directory to V:\GLAST\Electronics\Teststands\gitot.

17. Type in “runcontrol.bat” and enter.

5.8.1: Thermal Vac Test Setup Procedure (continued)

18. The “Run Control Main” window appears as shown below.

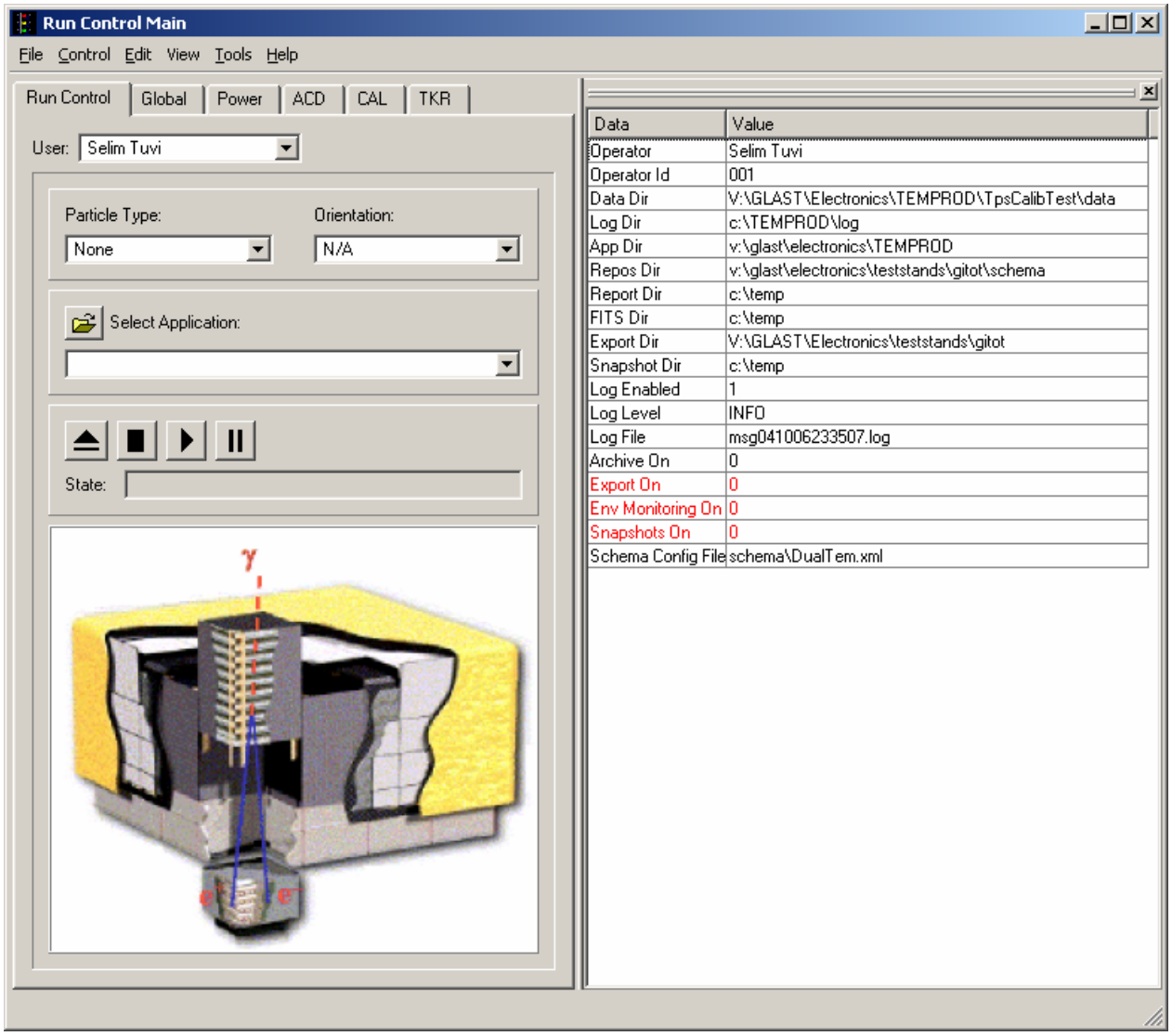


Figure 54. Run Control Main Window

Note: Do not change the options in this window.

5.8.1: Thermal Vac Test Setup Procedure (continued)

19. At the “Run Control Main” window, click on the “Select Application” button. The “Select an application” window appears as shown below.

20. Select the directory
V:/GLAST/Electronics/TEMPROD/

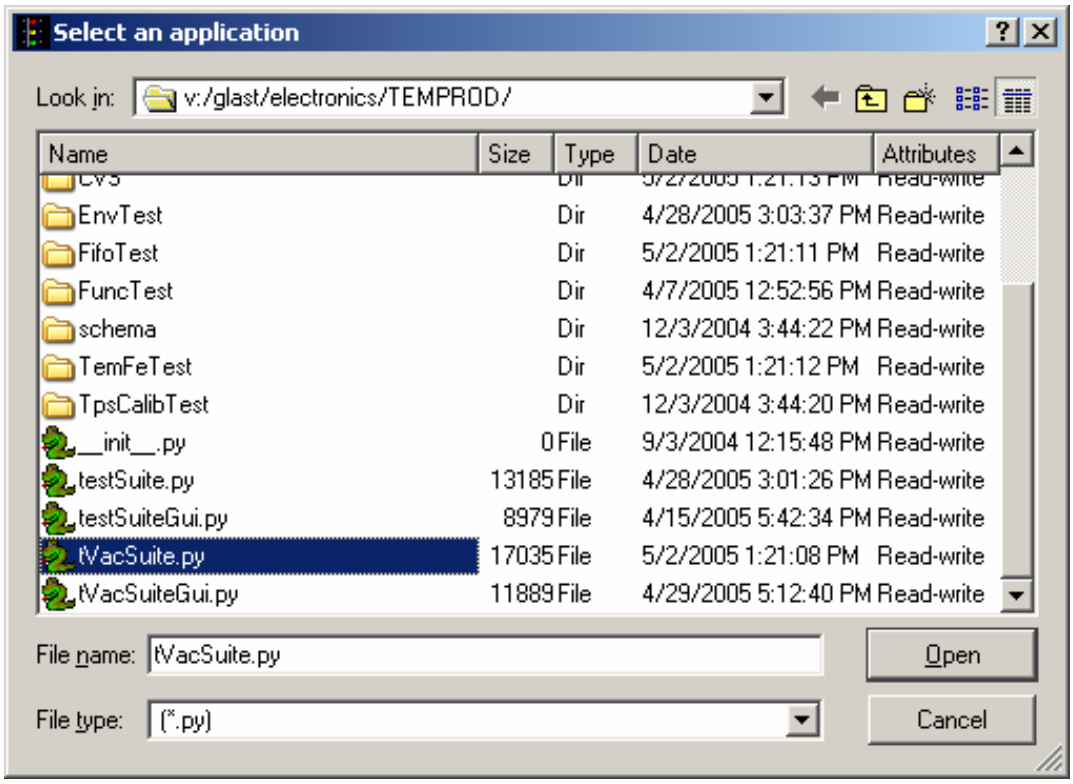


Figure 55. Select an Application Window

21. Select “tVacSuite.py”.

22. Click on the “Open” button to open the file.

5.8.1: Thermal Vac Test Setup Procedure (continued)

23. The “Thermal Vac Test Suite Window” appears as shown below. The indicators following the tests are clear before the test.

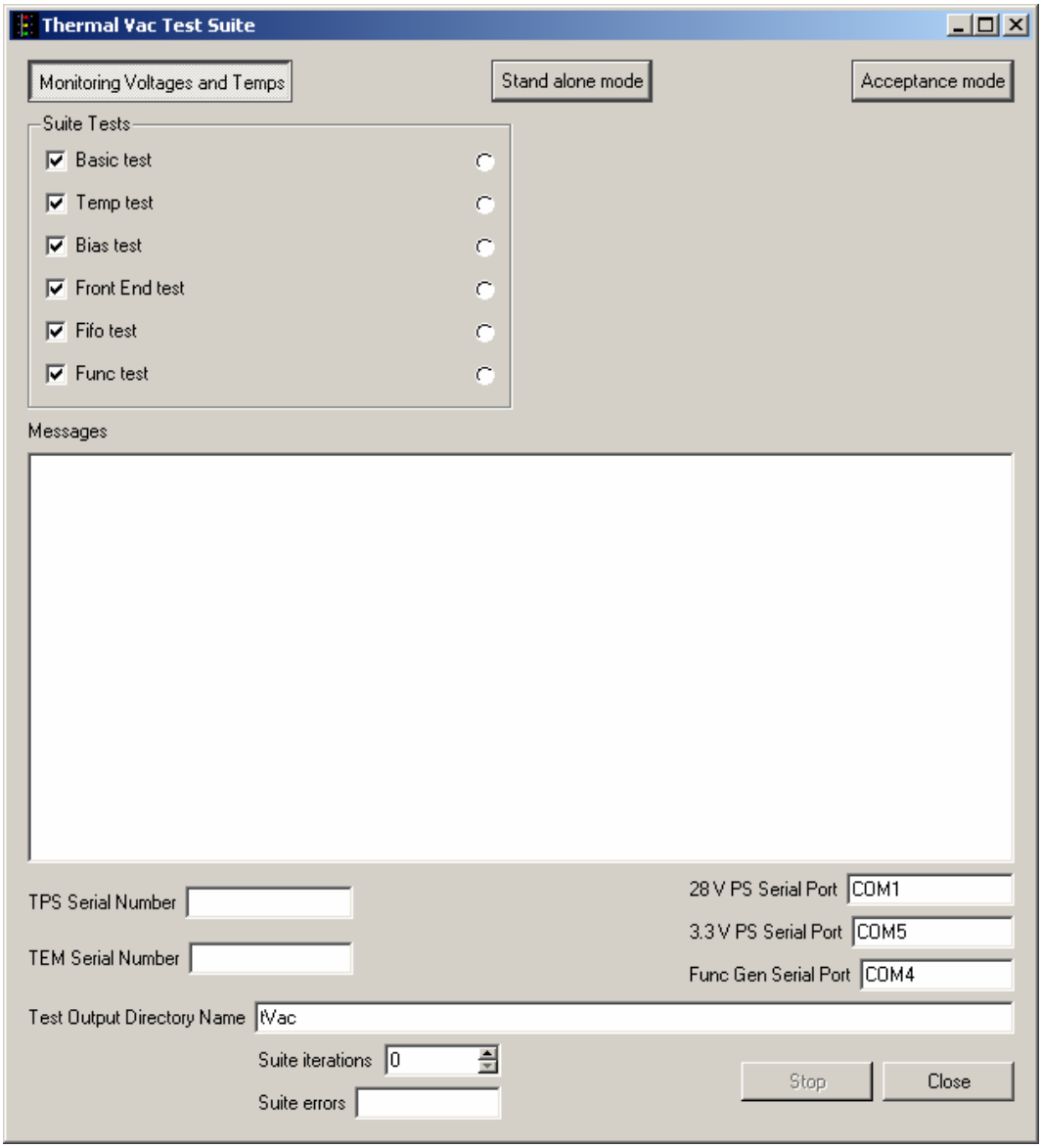


Figure 56. Thermal Vac Test Suite Window

24. Enter the TPS serial number. The TPS serial number is the number on the bar code sticker on the TPS.

25. Enter the TEM serial number. The TEM serial number is the number on the bar code sticker on the TEM.

5.8.1: Thermal Vac Test Setup Procedure (continued)

26. To save the test output in a directory other than the default (C:/TEMPROD/log/tVac/), enter the directory name in the Test Output Directory Name box.

27. Click the Acceptance Mode button.

28. At the "Run Control Main" window, click on the Run ► button.

    The suite of tests runs once.

    The GUIs from the tests in the suite appear while each test is running.

    If the test fails while it is running, a red message box appears. Any errors appear in the Messages box and in the log file. The number of errors is listed in the Suite Errors box.

29. Verify that the Suite Errors box is empty, indicating a passed test. (Any number of errors in the box indicates failure of the test). **Record** the verification on the data sheet.

30. Open and print the log file (see the sample of the log file below) and attach it to the data cover sheet.

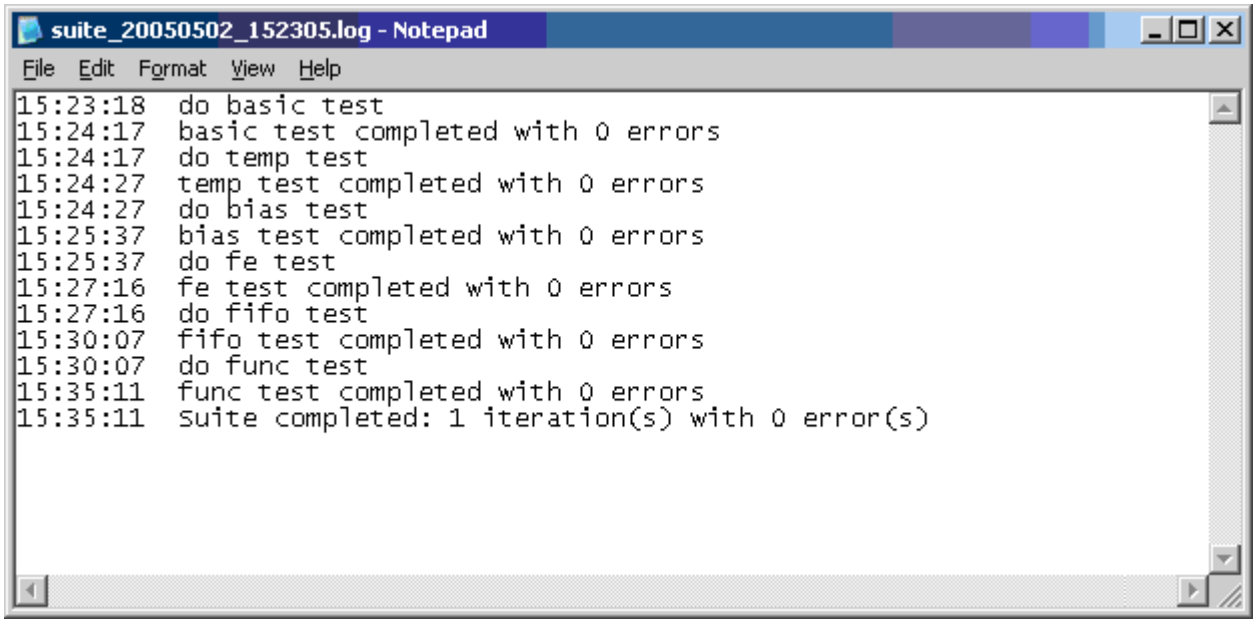


Figure 57. Sample Log File

Note: The test log files are saved as

C:/TEMPROD/log/*TestOutputDirectory*/SuiteTest/suite_*date_time*.log.

The default Test Output Directory is tVac.

31. Click on the "Close" button to close the test environment.

5.8.2 Thermal Vac Test Procedure

This section provides instructions to test the TEM/TPS.

To run the TEM/TPS tests:

1. At the “Run Control Main” window, click on the “Select Application” button. The “Select an application” window appears as shown below.

2. Select the directory
V:/GLAST/Electronics/TEMPROD/

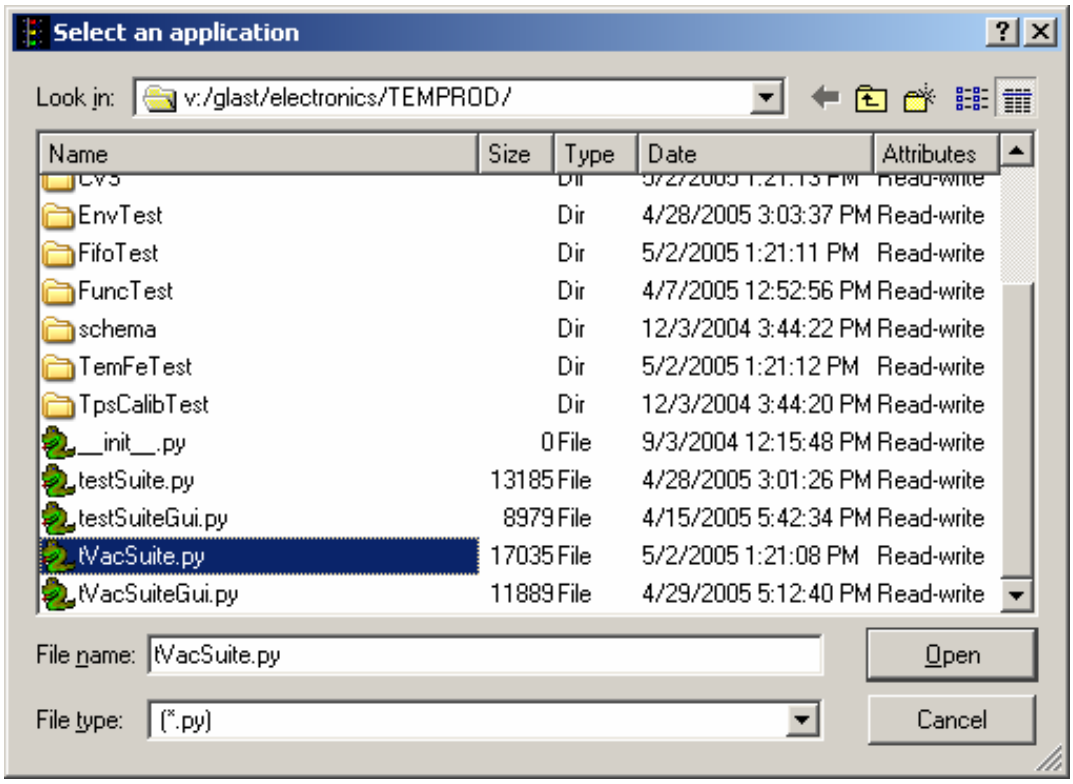


Figure 58. Select an Application Window

3. Select “tVacSuite.py”.

4. Click on the “Open” button to open the file.

5.8.2: Thermal Vac Test Procedure (continued)

5. The “Thermal Vac Test Suite Window” appears as shown below. The indicators following the tests are clear before the test.

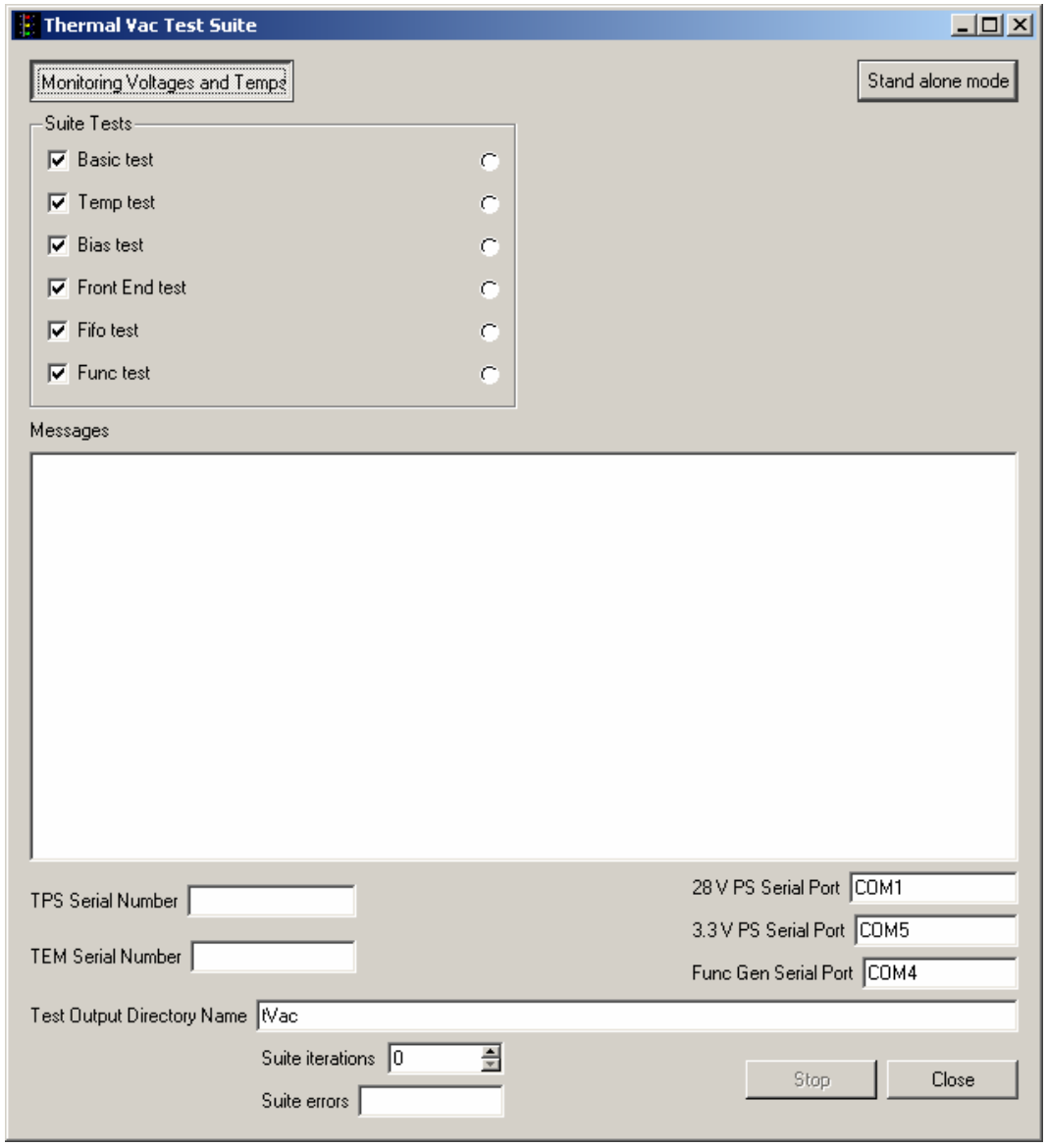


Figure 59. Thermal Vac Test Suite Window

6. Enter the TPS serial number. The TPS serial number is the number on the bar code sticker on the TPS.

7. Enter the TEM serial number. The TEM serial number is the number on the bar code sticker on the TEM.

5.8.2: Thermal Vac Test Procedure (continued)

8. To save the test output in a directory other than the default (C:/TEMPROD/log/tVac/), enter the directory name in the Test Output Directory Name box.

9. At the "Run Control Main" window, click on the Run ► button.

   The GUIs from the tests in the suite appear while each test is running.

   If the test fails while it is running, a red message box appears. Any errors will appear in the Messages box and in the log file.

10. At the completion of the Thermal Vac test, in the Thermal Vac Test Suite window, click the Stop button.

11. Verify that the Suite Errors box is empty, indicating a passed test. (Any number of errors in the box indicates failure of the test). **Record** the verification on the data sheet.

12. Open and print the log file (see the sample of the log file below) and attach it to the data cover sheet.

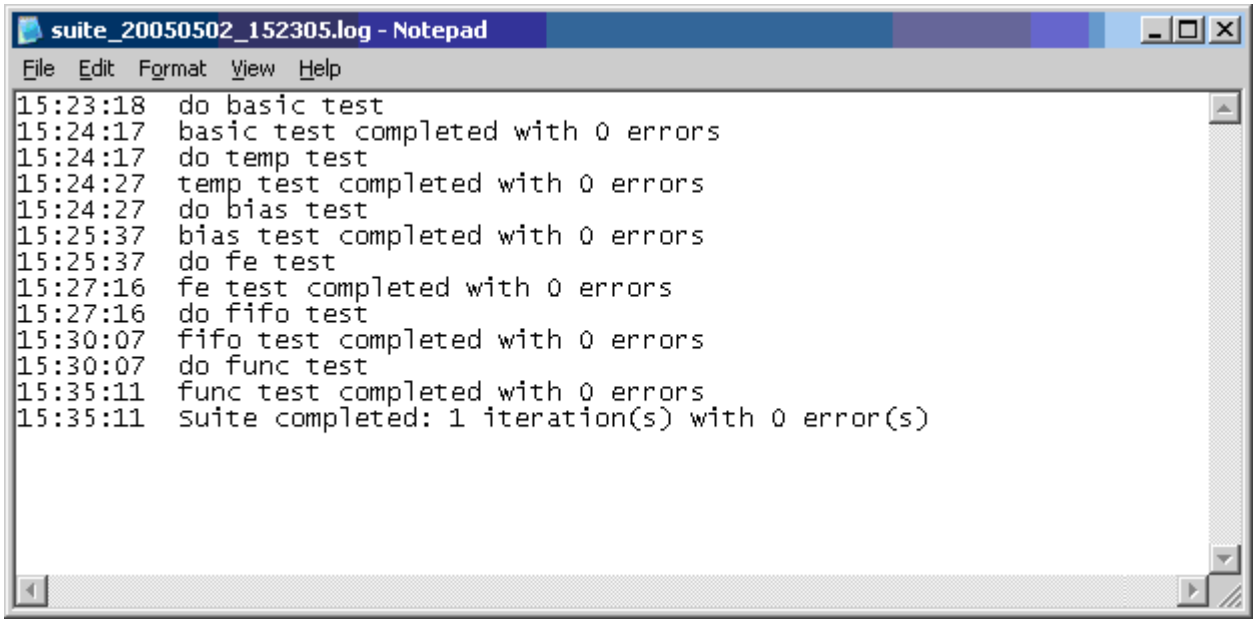


Figure 60. Sample Log File

Note: The test log files are saved as

C:/TEMPROD/log/*TestOutputDirectory*/SuiteTest/suite_*date_time*.log.

The default Test Output Directory is tVac.

13. Click on the "Close" button to close the test environment.

Appendix A (Data Sheets and Covers)

COVER SHEET

Program: GLAST

Procedure Number: LAT-TD-04085

Procedure Title: TEM/TPS Performance Test Procedure

Paragraph Number: _____

Paragraph Title: _____

Unit S/N: _____

TEST READINESS REVIEW COMPLETED AND APPROVED BY THE FOLLOWING:

Test Director: _____ Date: _____

Quality Assurance: _____ Date: _____

Test Conductor: _____ Date: _____

REVIEWED AND APPROVED BY THE FOLLOWING:

Test Director: _____ Date: _____

Quality Assurance: _____ Date: _____

Test Conductor: _____ Date: _____

TEST DATA SHEET		Unit S/N:		Date/Temperature:
Title: 5.1.3 Test Equipment		Operator:		QA:
Para./ Step	Test Equipment Description, Manufacturer	Model/LAT Number	Serial/Rev. Number	*Cal./Val. Date
5.1.3.1 - 1	**Record Model/LAT number, Serial/Revision number, Calibration due dates and Validation date for all equipment used in this procedure:**			
	VME Crate, Dawn VME Products	11-1011777-2119 VME64x (series 767)		
	VME, TST-STP Trans card	LAT-DS-00999		
	VME SBC MVME2304 card, Motorola	PN MVME2304-0123		
	VME LCB Mezzanine card	LAT-TD-00860		
	Software for the local PC	LATTE P04-07-02 Downloaded from www-glast.slac.stanford.edu/IntegrationTest/ONLINE/updates/		
	Software for the local PC	TEMPROD V02-03-01 Found in /nfs/slac/g/glast/online/cvsroot/temprod See TEMPROD/History for more information.		
	DC Power supply #1, BK Precision	BK 1697		
	DC Power supply #2, BK Precision	BK 1697		
	28 Volt supply cable	LAT-DS-03246		
	PS Control cable	LAT-DS-04831		
	TEM to GASU cable	LAT-DS-02106		
	LCB Transition board cable	LAT-DS-03247		
	TEM Test Board Assembly	LAT-DS-04465		
	TEM Test board cooling fan assembly	LAT-DS-03567		
	CAT5 Ethernet cable	TRD855PL-50		
	RS-232 Cable	TDC003-7 (RECO98M connectors)		
	Ground jumper, Banana, Pomona	B-12-0		

TEST DATA SHEET	Unit S/N:	Date/Temperature:
Title: 5.1.3 Test Equipment	Operator:	QA:

Para./ Step	Test Equipment Description, Manufacturer	Model/LAT Number	Serial/Rev. Number	*Cal./Val. Date
5.1.3.1 - 1	**Record Model/LAT number, Serial/Revision number, Calibration due dates and Validation date for all equipment used in this procedure:**			
	PS extension cable	LAT-DS-04629		
	Digital Multimeter, Fluke/Meterman	87-III/38XR		
	Connector Savers (28 pin), L Com	DGBH28MF		
	Connector Savers (51 pin), Glenair	MWDM2L-51USP1		
	Connector Savers (69 pin), SLAC	LAT-DS-04724		
	Connector Savers (78 pin), L Com	DGBH78MF		
	Breakout Box Assembly (BOB) (78 pin), SLAC	LAT-DS-03580		
	Breakout Cable (BOC), SLAC	LAT-DS-04273		
	Breakout Cable (BOC), SLAC	LAT-DS-04275		
	Load	LAT-DS-04822		
	Load	LAT-DS-04823		
	1 MHz Filter	LAT-DS-04767		
	Noise Measurement Adapter, 51-Pin, SLAC	LAT-DS-04821		
	Noise Measurement Adapter, 69-Pin, SLAC	LAT-DS-04820		
	True RMS Volt Meter, Agilent (HP)	3400A		
	Delay Line, Lemo To Bnc 4N, from SLAC Stores	STORES ID #078697		

* This column is used to enter the date that equipment is validated, when validated equipment is recorded in this data sheet.

TEST DATA SHEET	Unit S/N:	Date/Temperature:
Title: 5.1.4 Participant List	Operator:	QA:

Para./ Step	Title	Print Name	Signature
5.1.4 - 1	**Record names of all personnel that take part in the test/operation:**		

TEST DATA SHEET	Unit S/N:	Date:
Title: 5.2 Pre-Operation Verifications	Operator:	QA:

Step	Description	Requirement	Units	Data
5.2	Pre-Operation Verifications			
-1	Notify QAE.	OK	OK/NG	
-2	Test Readiness Review is done.	OK	OK/NG	
-3	Record the UUT equipment:			
	TEM Part number	NA	NA	LAT-DS-01481
	TEM Serial number	NA	NA	
	TEM LAT Bay location	NA	NA	
	TPS Part number	NA	NA	LAT-DS-01482
	TPS Serial number	NA	NA	
	TPS LAT Bay location	NA	NA	
-4	Ensure that the LAT or EGSE power is off.	OFF	ON/OFF	
-5	All connector savers are installed on the flight connections.	OK	OK/NG	
-6	The test equipment and participant lists have been completed.	OK	OK/NG	

TEST DATA SHEET	Unit S/N:	Date/Temperature:
Paragraph: 5.4 Calibration Tests	Operator:	QA:

Step	Description	Requirement	Units	Data
5.4.1	Test: CAL Calibration High Voltage Test Procedure			
-1	Verify that the power is off to power supply #1 and the VME Crate.	OK	OK/NG	
-3	Set DMM to autoranging for resistance.	OK	OK/NG	
-4	Measure DMM lead resistance.	< 2.0	Ω	
-5	Measure BOB to ground.	< 2.0	Ω	
-6	Remove all shorting plugs from BOBs.	OK	OK/NG	
-7	Measure UUT to ground.	< 2.0	Ω	
-8	Measure equipment to ground.	< 2.0	Ω	
-9	Connect BOB and configure DMM.	OK	OK/NG	
-31	Verify the test passed by green indicator and no errors in the Messages box.	OK	OK/NG	
-32	Attach printout of the test log file to this data package.	OK	OK/NG	

TEST DATA SHEET	Unit S/N:	Date/Temperature:
Paragraph: 5.4 Calibration Tests	Operator:	QA:

Step	Description	Requirement	Units	Data
5.4.2	Test: TRK Calibration High Voltage Test Procedure			
-1	Verify that the power is off to power supply #1 and the VME Crate.	OK	OK/NG	
-3	Set DMM to autoranging for resistance.	OK	OK/NG	
-4	Measure DMM lead resistance.	< 2.0	Ω	
-5	Measure BOB to ground.	< 2.0	Ω	
-6	Remove all shorting plugs from BOBs.	OK	OK/NG	
-7	Measure UUT to ground.	< 2.0	Ω	
-8	Measure equipment to ground.	< 2.0	Ω	
-9	Connect BOB and configure DMM.	OK	OK/NG	
-31	Verify the test passed by green indicator and no errors in the Messages box.	OK	OK/NG	
-32	Attach printout of the test log file to this data package.	OK	OK/NG	
-				
-				
-				
-				

TEST DATA SHEET	Unit S/N:	Date/Temperature:
Paragraph: 5.4 Calibration Tests	Operator:	QA:

Step	Description	Requirement	Units	Data
5.4.3	Test: TPS Calibration Tower Current Test Procedure			
-1	Verify that the power is off to power supply #1 and the VME Crate.	OK	OK/NG	
-2	Disconnect the Test Board Cooling Fan.	OK	OK/NG	
-4	Set DMM to autoranging for resistance.	OK	OK/NG	
-5	Measure DMM lead resistance.	< 2.0	Ω	
-6	Measure UUT to ground.	< 2.0	Ω	
-7	Measure equipment to ground.	< 2.0	Ω	
-28	Verify the test passed by green indicator and no errors in the Messages box.	OK	OK/NG	
-29	Attach printout of the test log file to this data package.	OK	OK/NG	

TEST DATA SHEET	Unit S/N:	Date:
Title: 5.5 Main Tests	Operator:	QA:

Step	Description	Requirement	Units	Data
5.5.1	Main Tests Setup Procedure			
-34	Verify that the power is off to power supply #1 and the VME Crate.	OK	OK/NG	
-36	Set DMM to autoranging for resistance.	OK	OK/NG	
-37	Measure DMM lead resistance.	< 2.0	Ω	
-38	Measure UUT to ground.	< 2.0	Ω	
-39	Measure equipment to ground.	< 2.0	Ω	
-12	Record the current draw at the external power supply #1.	0.100 - 0.130	Amps	

TEST DATA SHEET	Unit S/N:	Date/Temperature:
Paragraph: 5.5 Main Tests	Operator:	QA:

Step	Description	Requirement	Units	Data
5.5.2	Monitor Margin and Bias Test Procedure			
-11	Verify the test passed by green indicator and no errors in the Messages box on the Margin and Bias Test window.	OK	OK/NG	
-12	Attach printout of the Monitor Margin and Bias Test log file to this data package.	OK	OK/NG	
5.5.3	Temperature Monitor Test			
-25	Verify the test passed by green indicator and no errors in the Messages box on the Temperature Tests window.	OK	OK/NG	
-26	Attach printout of the Temperature Monitor Test log file to this data package.	OK	OK/NG	
5.5.4	Basic Test			
-8	Verify all tests passed by green indicators and “0” for Communication Errors and Event Errors on the Main Panel tab.	OK	OK/NG	
-9	Attach printout of the Basic Test log file to this data package.	OK	OK/NG	
5.5.5	Front End Test			
-8	Verify all tests passed by green indicators and “0” for Total Errors on the Main Panel tab.	OK	OK/NG	
-9	Attach printout of the Front End Test log file to this data package.	OK	OK/NG	
5.5.6	FIFO Test			
-8	Verify all tests passed by green indicators and “0” for Total Errors on the FIFO Test window.	OK	OK/NG	
-9	Attach printout of the FIFO Test log file to this data package.	OK	OK/NG	

TEST DATA SHEET	Unit S/N:	Date/Temperature:
Paragraph: 5.6 Functional Test Procedure	Operator:	QA:

Step	Description	Requirement	Units	Data
5.6	Functional Test			
-8	Verify all tests passed by green indicators and no errors in the Messages box on the Functional Tests window.	OK	OK/NG	
-10	Attach printout of the Functional Test log file to this data package.	OK	OK/NG	

TEST DATA SHEET	Unit S/N:	Date:
Title: 5.7 Noise Tests	Operator:	QA:

Step	Description	Requirement	Units	Data
5.7.2	CAL Noise Test Procedure			
-1	Verify that the power is off to power supply #1 and 2 and the VME Crate.	OK	OK/NG	
-3	Set DMM to autoranging for resistance.	OK	OK/NG	
-4	Measure DMM lead resistance.	< 2.0	Ω	
-5	Measure UUT to ground.	< 2.0	Ω	
-6	Measure equipment to ground.	< 2.0	Ω	
-7	Connect J4 of the adaptor.	OK	OK/NG	
-8	RMS meter has been running 20 minutes.	OK	OK/NG	
-9	Set the RMS meter to the 1 mV range.	OK	OK/NG	
-29	Record the CAL bias (HV) noise.	<500µ	Volts	
-30	Turn off the CAL bias.	OK	OK/NG	
-31	Confirm that the light turns green.	OK	OK/NG	
-33	Connect J2 of the adaptor.	OK	OK/NG	
-35	Record the CAL 3.3 analog voltage noise.	<150µ	Volts	
-36	Turn off the CAL bias.	OK	OK/NG	
-37	Confirm that the light turns green.	OK	OK/NG	
-39	Connect J3 of the adaptor.	OK	OK/NG	
-41	Record the CAL 3.3 digital voltage noise.	<200µ	Volts	
-43	Verify the test passed by green indicator and no errors in the Total Errors box on the Functional Tests window.	OK	OK/NG	
-45	Attach printout of the test log file to this data package.	OK	OK/NG	

TEST DATA SHEET	Unit S/N:	Date:
Title: 5.7 Noise Tests	Operator:	QA:

Step	Description	Requirement	Units	Data
5.7.3	TKR Noise Test Procedure			
-1	Verify that the power is off to power supply #1 and 2 and the VME Crate.	OK	OK/NG	
-3	Set DMM to autoranging for resistance.	OK	OK/NG	
-4	Measure DMM lead resistance.	< 2.0	Ω	
-5	Measure UUT to ground.	< 2.0	Ω	
-6	Measure equipment to ground.	< 2.0	Ω	
-7	Connect J5 of the adaptor.	OK	OK/NG	
-8	Ensure that the RMS meter has been running 20 minutes.	OK	OK/NG	
-9	Set the RMS meter to the 1 mV range.	OK	OK/NG	
-30	Record the TKR Bias (HV) noise.	<500µ	Volts	
-31	Turn off the TKR bias.	OK	OK/NG	
-32	Confirm that the indicator light next to Cal noise turns green.	OK	OK/NG	
-34	Connect J2 of the adaptor.	OK	OK/NG	
-36	Record the TKR 2.5 analog voltage noise.	<150µ	Volts	
-37	Turn off the TKR bias.	OK	OK/NG	
-38	Confirm that the indicator light next to Cal noise turns green.	OK	OK/NG	
-40	Connect J3 of the adaptor to the RMS meter.	OK	OK/NG	
-42	Record the TKR 1.5 analog voltage noise.	<150µ	Volts	
-43	Turn off the TKR bias.	OK	OK/NG	
-44	Confirm that the indicator light next to Cal noise turns green.	OK	OK/NG	
-46	Connect J4 of the adaptor.	OK	OK/NG	
-48	Record the TKR 2.5 digital voltage noise.	<150µ	Volts	
-50	Verify the test passed by green indicator and no errors in the Total Errors box on the Functional Tests window.	OK	OK/NG	

TEST DATA SHEET	Unit S/N:	Date:
Title: 5.7 Noise Tests	Operator:	QA:

Step	Description	Requirement	Units	Data
5.7.3	TKR Noise Test Procedure			
-52	Attach printout of the Functional Test log file to this data package.	OK	OK/NG	

TEST DATA SHEET	Unit S/N:	Date:
Title: 5.8 Thermal Vac Test	Operator:	QA:

Step	Description	Requirement	Units	Data
5.8.1	Thermal Vac Test Setup Procedure			
-1	Verify that the power is off to power supply #1 and the VME Crate.	OK	OK/NG	
-3	Set DMM to autoranging for resistance.	OK	OK/NG	
-4	Measure DMM lead resistance.	< 2.0	Ω	
-5	Measure UUT to ground.	< 2.0	Ω	
-6	Measure equipment to ground.	< 2.0	Ω	
-12	Record the current draw at the external power supply #1.	0.100 - 0.130	Amps	
-29	Verify that the Suite Errors box is empty, indicating a passed test.	OK	OK/NG	
-30	Attach printout of the Thermal Vac Test log file to this data package.	OK	OK/NG	

TEST DATA SHEET	Unit S/N:	Date:
Title: 5.8 Thermal Vac Test	Operator:	QA:

Step	Description	Requirement	Units	Data
5.8.2	Thermal Vac Test Procedure			
-11	Verify that the Suite Errors box is empty, indicating a passed test.	OK	OK/NG	
-12	Attach printout of the Thermal Vac Test log file to this data package.	OK	OK/NG	

Appendix B Connector Mate/Demate Log

CONNECTOR MATE / DEMATE

UNIT DESCRIPTION: _____

Connector(s)	Authorized by	Date	Mate or De-mate	Flight or Test	Verify Power Off	Pre-mate Inspect		ESD Bleed and Connector Mate		Final Inspect Fasteners Torqued, Witness Stripe applied	
Connector Reference Designator	Procedure & para or NCR	M/D/Y	M or D	F or T	Emp. ID#	*Emp. ID#	QA	* Emp ID#	QA	* Emp. ID#	QA

*****Personnel that is Mate/Demate certified.

Connector /Bracket R/D:

Note: This Mate/Demate log is a Microsoft Excel file embedded in the Microsoft Word version of this document. The file can be copied and pasted into a folder and then opened as an Excel worksheet.