<table>
<thead>
<tr>
<th>Document Title</th>
<th>PDU CCA Test Procedure</th>
</tr>
</thead>
</table>

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## CHANGE HISTORY LOG

<table>
<thead>
<tr>
<th>Revision</th>
<th>Effective Date</th>
<th>Description of Changes</th>
</tr>
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<tbody>
<tr>
<td>01</td>
<td>09/29/2004</td>
<td>First Version</td>
</tr>
<tr>
<td>02</td>
<td>05/05/2005</td>
<td>Changes throughout the document</td>
</tr>
<tr>
<td>03</td>
<td>06/22/2005</td>
<td>Added step between step 16 and 17 to 5.2.4. Changed margin levels for voltage margining. Changed expected resistances and voltages in data sheets due to WO1155 and WO1230 and NC476</td>
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</table>
### Table of Contents

1. SCOPE ....................................................................................................................... 6
2. DEFINITIONS AND ACRONYMS ............................................................................................ 7
   2.1 Definitions ................................................................................................................ 7
   2.2 Acronyms ............................................................................................................. 8
3. REFERENCES .................................................................................................................. 9
   3.1 Applicable Documents ............................................................................................ 9
4. REQUIREMENTS ................................................................................................................ 10
   4.1 General .................................................................................................................. 10
      4.1.1 Specific Test Requirements ........................................................................... 11
   4.2 Test Personnel and Descriptions ............................................................................. 12
   4.3 Test Readiness Review (TRR) and Post Test Review (PTR) .................................. 12
   4.4 Environmental Conditions ..................................................................................... 13
   4.5 Contamination Control ........................................................................................... 13
   4.6 Handling and Transportation ................................................................................... 14
   4.7 ESD ........................................................................................................................ 14
   4.8 Mate/Demate Connectors ......................................................................................... 14
   4.9 Test Equipment ....................................................................................................... 14
   4.10 Test Data and Review ............................................................................................ 15
   4.11 Flight Hardware Log Book .................................................................................... 15
   4.12 Nonconforming Test Data, Equipment and Software .......................................... 15
   4.13 Redlining and Blacklining Documents .................................................................. 15
   4.14 Quality Assurance ............................................................................................... 16

Hard copies of this document are for REFERENCE ONLY and should not be considered the latest revision.
PDU CCA Test Procedure

4.14.1 Product Assurance Requirements ................................................................. 16

4.15 Warnings, Cautions, and Notes ........................................................................ 17

4.16 Testing Safety ..................................................................................................... 18

4.17 SLAC Safety, ES & H Manual ........................................................................... 18

5. TEST PROCEDURES ............................................................................................. 19

5.1 Test Procedure Instructions/Information ........................................................... 20

5.1.1 Test Prerequisites ............................................................................................. 20

5.1.2 Test Sequence .................................................................................................. 20

5.1.3 Test Equipment ............................................................................................... 21

5.1.4 Participant List ................................................................................................ 22

5.2 PDU CCA Test Procedures ................................................................................ 23

5.2.1 Pre-Operation Verifications ............................................................................ 24

5.2.2 Visual Inspection ............................................................................................. 26

5.2.3 Resistance Checks ......................................................................................... 26

5.2.4 Voltage Checks .............................................................................................. 31

5.2.5 Stray Voltage Test ......................................................................................... 40

5.2.6 Performance Test .......................................................................................... 40

APPENDIX A - (Test Data Sheets) ........................................................................... 41
List of Figures - LOF

Figure 1. Test Setup Part 1 ....................................................................................................21
Figure 2. R143 Probe Point ...................................................................................................27
Figure 3. C79 Probe Point .....................................................................................................28
Figure 4. R575 and R576 Probe Points .................................................................................29
Figure 5. LAT-DS-04309 Cable Drawing, Parts .................................................................31
Figure 6. Voltage Check Test Setup .....................................................................................32
Figure 7. Primary SIU switching ON both PDUs, via JL-3 ..................................................33
Figure 8. R576 and R579 Probe Points .................................................................................34
Figure 9. Primary SIU switching ON both PDUs, via JL-4 ..................................................35
Figure 10. R577 and R580 Probe Points ..............................................................................35
Figure 11. R143 Probe Points ..............................................................................................36
Figure 12. C79 and R40 Probe Points .................................................................................37
Figure 13. Primary SIU switching ON Prim PDU, via JL-4 ..................................................38
Figure 14. Primary SIU switching ON Rdnt PDU, via JL-4 ..................................................39
1. **SCOPE**

The Power Distribution Unit (PDU) accepts regulated 28VDC power from the spacecraft bus and switches this power to the GASU, the EPU, and the TEMs. The PDU also monitors LAT temperatures and voltages.

The purpose of this test procedure is to:

- Verify that the PDU CCA has been manufactured and assembled correctly
- Verify the functionality of the PDU
- Measure impedances and voltages that will be inaccessible after the box is sealed
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
- **P**: Performance
- **p-p**: peak-to-peak
- **s, sec**: seconds
- **V**: Volt
- **W**: Watt
2.2 Acronyms

AIDS  Assembly and Inspection Data Sheet
BOB   Break Out Box
BOC   Break Out Cable
CAL   Calorimeter
EGSE  Electrical Ground Support Equipment
EICIT Electrical Interface Continuity and Isolation Test (cold checks)
ETech Electrical Technician
EUT   Equipment Under Test
GASU  Global trigger Anti-collision Spacecraft Unit
GLAST Gamma Ray Large Area Space Telescope
LAT   Large Area Telescope
MTech Mechanical Technician
NG    No Good (test fails)
PTR   Post Test Review
STM   Safe To Mate
SVT   Stray Voltage Test (hot checks)
T&DF  Trigger and Data Flow
TC    Test Conductor
TEM   Tower Electronics Module
TKR   Tracker
TPS   Tower Power Supply
TRR   Test Readiness Review
QAE   Quality Assurance Engineer
PDU CCA Test Procedure

3. **REFERENCES**

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

### 3.1 Applicable Documents

<table>
<thead>
<tr>
<th>Document Number</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td><strong>SPECIFICATIONS</strong></td>
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</tr>
<tr>
<td>LAT-TD-00136R2</td>
<td>LAT Power Supplies Level IV Specification</td>
</tr>
<tr>
<td>LAT-TD-00778</td>
<td>LAT Environmental Specification</td>
</tr>
<tr>
<td>LAT-TD-01543</td>
<td>Specification and Programming ICD, PDU</td>
</tr>
<tr>
<td>LAT-TD-01743</td>
<td>Specification and Electrical ICD, PDU</td>
</tr>
<tr>
<td>LAT-TD-04096</td>
<td>Specification and Electrical ICD, PDU Test Box</td>
</tr>
<tr>
<td><strong>PROCEDURES</strong></td>
<td></td>
</tr>
<tr>
<td>LAT-TD-01744</td>
<td>Test Procedure, PDU</td>
</tr>
<tr>
<td>LAT-TD-04095</td>
<td>Test Procedure, PDU Test Stand Validation</td>
</tr>
<tr>
<td>LAT-TD-04332</td>
<td>Test Procedure, PDU EICIT</td>
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<tr>
<td>LAT-TD-04384</td>
<td>Test Procedure, PDU SVT</td>
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<tr>
<td><strong>PLANS</strong></td>
<td></td>
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<tr>
<td>LAT-MD-00039</td>
<td>Performance Assurance Implementation Plan</td>
</tr>
<tr>
<td>LAT-MD-00078</td>
<td>GLAST LAT System Safety Program Plan</td>
</tr>
<tr>
<td>LAT-MD-00228</td>
<td>CAL, TKR, and T&amp; DF Contamination Control Plan</td>
</tr>
<tr>
<td>LAT-MD-00404</td>
<td>LAT Contamination Control Plan</td>
</tr>
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<td>LAT-MD-00408</td>
<td>LAT Program Instrument Performance Verification Plan</td>
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<td>LAT-MD-01376</td>
<td>GLAST LAT Integration and Test Subsystem Test Plan</td>
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<tr>
<td>LAT-MD-02730</td>
<td>LAT Performance and Operations Test Plan</td>
</tr>
<tr>
<td><strong>OTHER</strong></td>
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<tr>
<td>LAT-DS-01696</td>
<td>Power Distribution Unit – Assembly</td>
</tr>
<tr>
<td>LAT-DS-02125</td>
<td>Power Distribution Unit – Circuit Card Assembly</td>
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<tr>
<td>LAT-DS-02127</td>
<td>Schematic Diagram, PDU CCA</td>
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<td>LAT-DS-02228</td>
<td>Schematic Diagram, PDU</td>
</tr>
<tr>
<td>LAT-MD-00091</td>
<td>GLAST Quality Manual</td>
</tr>
<tr>
<td>LAT-MD-00471</td>
<td>Control of Nonconforming Product</td>
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<tr>
<td>LAT-MD-00472</td>
<td>Corrective and Preventative Action</td>
</tr>
<tr>
<td>LAT-MD-00473</td>
<td>Handling, Storage, Packing, Preservation and Delivery</td>
</tr>
<tr>
<td>LAT-MD-03474</td>
<td>Redline/Blackline Engineering Documents</td>
</tr>
<tr>
<td>LAT-PS-04459</td>
<td>Mate and De-mate Workmanship Standards</td>
</tr>
<tr>
<td>LAT-TD-02304</td>
<td>Bill of Materials</td>
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4. **REQUIREMENTS**

This section lists the requirements that shall be utilized during the PDU Qualification and Acceptance process testing and storage.

4.1 **General**

The Performance Assurance Implementation Plan, LAT-MD-00039 shall be utilized to verify 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.
4.1.1 Specific Test Requirements

The tests that verify PDU requirements in this document are listed in the following table. The full list of PDU requirements are listed in LAT-TD-01743.

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Source Document</th>
<th>Source Paragraph</th>
<th>Test Paragraph</th>
</tr>
</thead>
<tbody>
<tr>
<td>Each PDU provides 3.3V and 2.5V to its onboard circuitry</td>
<td>LAT-TD-01743</td>
<td>5.3.6</td>
<td>5.2.4</td>
</tr>
<tr>
<td>Each PDU correctly sequences turn-on for its 2.5V and 3.3V power buses</td>
<td>LAT-TD-01743</td>
<td>5.3.6</td>
<td>5.2.4</td>
</tr>
<tr>
<td>Each spacecraft feed select switch overcurrent protection circuit is loaded correctly</td>
<td>LAT-TD-01743</td>
<td>5.3.3</td>
<td>5.2.4</td>
</tr>
</tbody>
</table>
4.2 Test Personnel and Descriptions

Test personnel are described in GLAST LAT Integration and Test Subsystem Test Plan, LAT-MD-01376. The test team members are defined with the following responsibilities:

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.
PDU CCA Test Procedure

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 Redlining and Blacklining Documents

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

4.14.1 Product Assurance Requirements

The 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 TC.
4.15 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.
4.16 Testing 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.

4.17 SLAC Safety, ES & H Manual

This document shall follow the requirements found in the SLAC Environment, Safety, and Health Manual, SLAC-I-720-0A29Z-001. This document defines the SLAC policy to support environmental protection, health, and safety in the workplace.

**WARNING:** A hot work permit is required for work on or around open connectors/circuits having:

- Voltage greater than 50V (AC or DC)
- Current supply capability greater than 5mA
- Energy storage greater than 10 Joules (E=1/2CV²)
5. **TEST PROCEDURES**

The following statement is used for powered tests. If the power levels are above the safe working limits the proper WARNINGS and instructions must be written into the procedure.

**WARNING:** This document is written so that there is no exposed connectors/circuitry of more than the safe working limits as stated in the SLAC Environment, Safety, and Health Manual, SLAC-I-720-0A29Z-001.

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

Unless otherwise noted use a DMM 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 is 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 procedure, the following tests must be completed:

- LAT-TD-04332: PDU EICIT Procedure

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 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. Additionally, this procedure requires execution of all tests of LAT-TD-04384 and LAT-TD-01744. As such, the equipment list and test setups of LAT-TD-04384 and LAT-TD-01744 apply. If additional equipment is used, please add it to the table below with the signature of the TC and QAE, and proceed with the test.

5.1.3.1 EGSE

The figure below illustrates the test setup for the first part of this test. The second part of this test follows LAT-TD-04384 and LAT-TD-01744.

![Test Setup Part 1](image)

Figure 1. Test Setup Part 1

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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 (Data Logger and cards, etc)
- Serial/Revision number (for equipment, files and software)
- Calibration due date (enter NA for non calibrated equipment)
- Validation completion date for all EGSE

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

<table>
<thead>
<tr>
<th>Test Equipment Description, Manufacturer</th>
<th>Model/LAT Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital Multimeter, Fluke/Meterman</td>
<td>* 87-III/38XR</td>
</tr>
<tr>
<td>Digital Oscilloscope, Tektronix</td>
<td>TDS 2024</td>
</tr>
<tr>
<td>1200W Variable DC Power Supply, Xantrex Technology</td>
<td>XFR35-35</td>
</tr>
<tr>
<td>DC Power Supply, BK Precision</td>
<td>1786A</td>
</tr>
<tr>
<td>PDU Test Cable – Power, SLAC</td>
<td>LAT-DS-04309</td>
</tr>
<tr>
<td>PDU Test Box, SLAC</td>
<td>LAT-DS-03400</td>
</tr>
<tr>
<td>PDU GASU Test cable, SLAC</td>
<td>LAT-DS-05550</td>
</tr>
</tbody>
</table>

* Do not substitute other DMM's
CAUTION: Fluke 87-III and Fluke 87-V are not the same, Fluke 87-V is not allowed.

5.1.4 Participant List

This section provides a data sheet to record test participants.

1) Record all test participants in the data sheet.
5.2 PDU CCA Test Procedures

The EUT is the partially assembled PDU Box (LAT-DS-01696). This is a pre-conformal coat, pre-final assembly test. The main purpose of this test is to execute all the performance testing that will be done on the final sealed box (except thermal/vac, vibration, and EMI/EMC) to validate the correctness of the box assembly thus far. This test also includes tests that can only be done before the box is sealed. The EUT serial number is the 4-digit part of the GLATxxxx barcode number affixed to the PDU chassis. Record this number on the test data sheets as required and enter them in the Run Control Main application window when asked.
5.2.1 Pre-Operation Verifications

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

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, it shall be verified that all power supplies, signal generators, VME racks, and any other test and measurement equipment shall be 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 verify 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.

4) Turn OFF the power on the LAT, or the EGSE. Record in the data sheet.

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

6) Measure DMM lead resistance by connecting the two leads together. Record in the data sheet.
7) Measure the resistance between the EUT 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) Verify that the test equipment and participant lists have been completed.
5.2.2 Visual Inspection

Inspect workmanship of primary and redundant PDU CCAs. Refer to LAT-DS-02125 and LAT-DS-01696 for assembly details.

1) Check for bent or missing pins, missing or loose screws or jackposts, and miscellaneous debris. Record per the data sheet.

2) Inspect the solder work of all solder terminals. Record per the data sheet.

3) Check that all components are loaded or omitted based on the BOM, LAT-TD-02304. Record per the data sheet.

5.2.3 Resistance Checks

This section verifies that the expected resistances are present at various locations on the CCAs.

1) The PDU Box is open and disconnected from everything.

2) With a multi-meter on the Primary PDU board, measure the resistance between solder terminal MP47 (red lead) and the chassis (black lead) and record per the data sheet.

Note: The same measurements are also performed on the Redudant PDU board.

3) Measure the resistance between board ground (red lead) and the chassis (black lead) and record per the data sheet. Board ground is any of the copper rings along the perimeter of the board.

4) Measure the resistance between solder terminal MP56 (red lead) and the chassis (black lead) and record per the data sheet.
5) Measure the resistance between R143 at the point shown below (red lead) and the chassis (black lead) and record per the data sheet.

Figure 2. R143 Probe Point
PDU CCA Test Procedure

6) Measure the resistance between C79 at the point shown below (red lead) and the chassis (black lead) and record per the data sheet.

![C79 Probe Point Diagram]

Figure 3. C79 Probe Point
7) Measure the resistance (primary overcurrent holdoff resistance) between R575 at the point shown below (red lead) and R576 at the point shown below (black lead) and record per the data sheet.

Figure 4. R575 and R576 Probe Points
8) Measure the resistance (redundant overcurrent holdoff resistance) between R578 at the point shown below (red lead) and R577 at the point shown below (black lead) and record per the data sheet.

9) Repeat steps 2) through 8) for the Redundant PDU board measurements, record per the data sheet.
5.2.4 Voltage Checks

This section verifies that the expected voltages are present at various locations on the CCAs.

1) Configure the LAT-DS-04309 cable.

This test procedure requires one LAT-DS-04309 cable and uses the ring lug option of this cable. Refer to the cable drawing LAT-DS-04309 and the Figure below for the following steps:

a) Mate Cable LAT-DS-04309 Part A to Part BD and record per the data sheet.

Figure 5. LAT-DS-04309 Cable Drawing, Parts
2) Turn ON the Xantrex power supply and set for 28V, 30A.

3) Turn OFF the Xantrex power supply.

4) Turn ON the BK Precision power supply and set for 2.0V, 3.0A.

5) Turn OFF the BK Precision power supply.

6) Configure the PDU Test Setup as shown below. On the LAT-DS-04309 cable, the red wired lugs connect to the positive terminal of the Xantrex and the black wired lugs connect to the negative terminal of the Xantrex. Record per the data sheet.

[Diagram of voltage check test setup]

7) At LAT-DS-03400 front panel, verify that DIP switches SW5 and SW6 are all in the OFF (up) position for all switches.
8) Turn ON the Xantrex power supply.

9) Turn ON the BK Precision power supply.

10) Perform this step on both Prim and Rdnt PDU. Measure the voltage between MP56 (red lead) and the chassis (black lead). Record per the data sheet.

11) At LAT-DS-03400 front panel, set DIP switch SW6 as shown in the Figure below. This sets the primary SIU (JL-5) to turn ON both PDUs with power from JL-3.

---

**Figure 7.** Primary SIU switching ON both PDUs, via JL-3
12) Perform this step on both Prim and Rdnt PDU. Measure the voltages at the points indicated below. Record per the data sheet.

Figure 8. R576 and R579 Probe Points

13) At LAT-DS-03400 front panel, set DIP switch SW6 all in the OFF (up) position for all switches.

14) Turn OFF the Xantrex power supply.


16) Mate LAT-DS-04309 J66 to PDU JL4. Record mate.

17) Turn ON the Xantrex power supply.
PDU CCA Test Procedure

18) At LAT-DS-03400 front panel, set DIP switch SW6 as shown in the Figure below. This sets the primary SIU (JL-5) to turn ON both PDUs with power from JL-4.

![Figure 9. Primary SIU switching ON both PDUs, via JL-4](image)

19) Perform this step on both Prim and Rdnt PDU. Measure the voltages at the points indicated below. Record per the data sheet.

![Figure 10. R577 and R580 Probe Points](image)
20) Perform this step on both Prim and Rdnt PDU. Measure the voltage between R143 (red lead) as indicated below, and the chassis (black lead). Record per the data sheet.

![R143 Probe Points](image)

21) Set the BK Precision power supply to 3.8V.

22) Perform this step on both Prim and Rdnt PDU. Measure the voltage between R143 (red lead) as indicated in figure, and the chassis (black lead). Record per the data sheet.

23) Set the BK Precision power supply to 0.4V.

24) Perform this step on both Prim and Rdnt PDU. Measure the voltage between R143 (red lead) as indicated in figure, and the chassis (black lead). Record per the data sheet.

25) Set DIP switch SW6 conditions to the OFF (up) position for all switches.

26) Turn OFF all power supplies.

PDU CCA Test Procedure

28) In the remaining steps of this section, use the TDS2024 oscilloscope to measure voltage and time.

29) Setup the scope for two channels, about 1V per div and 1mSec per div, trigger on rising edge of one of the channels at 1V.

30) Perform this step on the Prim PDU. Connect the ground clips of the scope probes to the chassis and with one channel probe C79 as shown below and with the second channel probe R40 as shown below.

![Figure 12. C79 and R40 Probe Points](image)

31) Turn ON the Xantrex power supply.
32) At LAT-DS-03400 front panel, set DIP switch SW6 as shown in the Figure below. This sets the primary SIU (JL-5) to turn ON the Prim PDU with power from JL-4.

![Figure 13. Primary SIU switching ON Prim PDU, via JL-4](image)

33) Measure the final voltage level of the two waveforms as captured by the scope and record on the data sheet.

34) Measure the time between the two rising edges of the two waveforms as captured by the scope. Take the time measurement at the points where the two waveforms have risen to 50% of their final level. Record per the data sheet.

35) Set DIP switch SW6 conditions to the OFF (up) position for all switches.

36) Turn OFF the Xantrex power supply.

37) Perform this step on the Rdnt PDU. Connect the ground clips of the scope probes to the chassis and with one channel probe C79 as shown above and with the second channel probe R40 as shown above.

38) Turn ON the Xantrex power supply.
39) At LAT-DS-03400 front panel, set DIP switch SW6 as shown in the Figure below. This sets the primary SIU (JL-5) to turn ON the Rdnt PDU with power from JL-4.

![Diagram of DIP switch settings](image)

Figure 14. Primary SIU switching ON Rdnt PDU, via JL-4

40) Measure the final voltage level of the two waveforms as captured by the scope and record per the data sheet.

41) Measure the time between the two rising edges of the two waveforms as captured by the scope. Take the time measurement at the points where the two waveforms have risen to 50% of their final level. Record per the data sheet.

42) Set DIP switch SW6 conditions to the OFF (up) position for all switches.

43) Turn OFF the Xantrex power supply.
5.2.5 Stray Voltage Test

Execute LAT-TD-04384 in its entirety and attach its data sheets to this procedure’s data sheets.

1) Perform LAT-TD-04384. Record per the data sheet and attach the data to this data package.

5.2.6 Performance Test

Execute LAT-TD-01744 in its entirety and attach its data sheets to this procedure’s data sheets.

1) Perform LAT-TD-01744. Record per the data sheet and attach the data to this data package.
APPENDIX A - (Test Data Sheets)
### TEST DATA SHEET

<table>
<thead>
<tr>
<th>Para./Step</th>
<th>Test Equipment Description, Manufacturer</th>
<th>Model/LAT Number</th>
<th>Serial/Rev. Number</th>
<th>*Cal./Val. Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1.3.1 - 1</td>
<td>Record Model/LAT number, Serial/Revision number, Calibration due dates and Validation date for all equipment used in this procedure:</td>
<td>** Digital Multi Meter, Fluke/Meterman</td>
<td>87-III/38XR</td>
<td></td>
</tr>
<tr>
<td></td>
<td>** Digital Oscilloscope, Tektronix</td>
<td>1200W Variable DC Power Supply, Xantrex Technology</td>
<td>TDS 2024</td>
<td>XFR35-35</td>
</tr>
<tr>
<td></td>
<td>DC Power Supply, BK Precision</td>
<td>PDU Test Cable – Power, SLAC</td>
<td>1786A</td>
<td>LAT-DS-04309</td>
</tr>
<tr>
<td></td>
<td>PDU Test Box, SLAC</td>
<td>PDU GASU Test cable, SLAC</td>
<td>LAT-DS-03400</td>
<td>LAT-DS-05550</td>
</tr>
</tbody>
</table>

* This column is for recording the calibration due date for a given piece of equipment or the date that EGSE was validated.

** Do not substitute other DMM's

CAUTION: Fluke 87-III and Fluke 87-V are not the same, Fluke 87-V is not allowed.
<table>
<thead>
<tr>
<th>Para/Step</th>
<th>Title</th>
<th>Print Name</th>
<th>Signature</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1</td>
<td><strong>Record names of all personnel that take part in the test/operation:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Para./Step</td>
<td>Description</td>
<td>Limits</td>
<td>Unit</td>
</tr>
<tr>
<td>-----------</td>
<td>--------------------------------------------------</td>
<td>--------</td>
<td>------</td>
</tr>
<tr>
<td>5.2.1</td>
<td>Pre-Operation Verifications</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-1</td>
<td>Notify QAE.</td>
<td>OK</td>
<td>OK/NG</td>
</tr>
<tr>
<td>-2</td>
<td>Test Readiness Review is done.</td>
<td>OK</td>
<td>OK/NG</td>
</tr>
<tr>
<td>-3</td>
<td>Record the EUT equipment:</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>CCA Prim Part number</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>CCA Prim LAT Bay location</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>CCA Prim Serial number</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>CCA Rdnt Part number</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>CCA Rdnt LAT Bay location</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>CCA Rdnt Serial number</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>-4</td>
<td>LAT or EGSE power is OFF.</td>
<td>OFF</td>
<td>ON/OFF</td>
</tr>
<tr>
<td>-5</td>
<td>Set DMM to autoranging for resistance.</td>
<td>OK</td>
<td>OK/NG</td>
</tr>
<tr>
<td>-6</td>
<td>Measure DMM lead resistance.</td>
<td>&lt; 2.0</td>
<td>Ω</td>
</tr>
<tr>
<td>-7</td>
<td>Measure EUT to ground.</td>
<td>&lt; 2.0</td>
<td>Ω</td>
</tr>
<tr>
<td>-8</td>
<td>Measure equipment to ground.</td>
<td>&lt; 2.0</td>
<td>Ω</td>
</tr>
<tr>
<td>-9</td>
<td>The test equipment and participant lists</td>
<td>OK</td>
<td>OK/NG</td>
</tr>
<tr>
<td></td>
<td>have been completed.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# TEST DATA SHEET

<table>
<thead>
<tr>
<th>PARA./STEP</th>
<th>DESCRIPTION</th>
<th>LIMITS</th>
<th>UNIT</th>
<th>DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1</td>
<td>Inspected pins, jackposts and assembly for debris.</td>
<td>OK</td>
<td>OK/NG</td>
<td></td>
</tr>
<tr>
<td>-2</td>
<td>Inspected solder work and terminals.</td>
<td>OK</td>
<td>OK/NG</td>
<td></td>
</tr>
<tr>
<td>-3</td>
<td>Inspected per LAT-TD-02304.</td>
<td>OK</td>
<td>OK/NG</td>
<td></td>
</tr>
<tr>
<td>Para./Step</td>
<td>Description</td>
<td>Limits</td>
<td>Unit</td>
<td>Data</td>
</tr>
<tr>
<td>------------</td>
<td>------------------------------------</td>
<td>---------</td>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td>-2</td>
<td>MP47 (+) and chassis (-)</td>
<td>45 – 55</td>
<td>Ω</td>
<td></td>
</tr>
<tr>
<td>-3</td>
<td>Board ground (+) and chassis (-)</td>
<td>&lt; 1.0</td>
<td>Ω</td>
<td></td>
</tr>
<tr>
<td>-4</td>
<td>MP56 (+) and chassis (-)</td>
<td>&gt; 5k</td>
<td>Ω</td>
<td></td>
</tr>
<tr>
<td>-5</td>
<td>R143 (+) and chassis (-)</td>
<td>130 – 400</td>
<td>Ω</td>
<td></td>
</tr>
<tr>
<td>-6</td>
<td>C79 (+) and chassis (-)</td>
<td>1k – 2k</td>
<td>Ω</td>
<td></td>
</tr>
<tr>
<td>-7</td>
<td>R575 (+) and R576 (-)</td>
<td>330k – 370k</td>
<td>Ω</td>
<td></td>
</tr>
<tr>
<td>-8</td>
<td>R578 (+) and R577 (-)</td>
<td>330k – 370k</td>
<td>Ω</td>
<td></td>
</tr>
</tbody>
</table>
## TEST DATA SHEET

<table>
<thead>
<tr>
<th>Para./Step</th>
<th>Description</th>
<th>Limits</th>
<th>Unit</th>
<th>Data</th>
</tr>
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<tbody>
<tr>
<td>1 - a</td>
<td>Record the mate of A to BD.</td>
<td>OK</td>
<td>OK/NG</td>
<td>NA</td>
</tr>
<tr>
<td>-6</td>
<td>Mate LAT-DS-04309-03 J66 to PDU JL3.</td>
<td>OK</td>
<td>OK/NG</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>Mate LAT-DS-03400 JL5 to PDU JL5.</td>
<td>OK</td>
<td>OK/NG</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>Mate LAT-DS-05550 J78P to PDU JL8.</td>
<td>OK</td>
<td>OK/NG</td>
<td>NA</td>
</tr>
<tr>
<td>-10</td>
<td>MP56 (+) and chassis (-)</td>
<td>0.8 - 1.2</td>
<td>Volts</td>
<td>NA</td>
</tr>
<tr>
<td>-12</td>
<td>R576 (+) and R576 (-)</td>
<td>&lt; 0.3</td>
<td>Volts</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>R579 (+) and R579 (-)</td>
<td>&lt; 0.3</td>
<td>Volts</td>
<td>NA</td>
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<tr>
<td>-15</td>
<td>Demate LAT-DS-04309-03 J66 from PDU JL3.</td>
<td>OK</td>
<td>OK/NG</td>
<td>NA</td>
</tr>
<tr>
<td>-16</td>
<td>Mate LAT-DS-04309-03 J66 to PDU JL4.</td>
<td>OK</td>
<td>OK/NG</td>
<td>NA</td>
</tr>
<tr>
<td>-19</td>
<td>R577 (+) and R577 (-)</td>
<td>&lt; 0.3</td>
<td>Volts</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>R580 (+) and R580 (-)</td>
<td>&lt; 0.3</td>
<td>Volts</td>
<td>NA</td>
</tr>
<tr>
<td>-20</td>
<td>R143 (+) and chassis (-)</td>
<td>3.2 - 3.4</td>
<td>Volts</td>
<td>NA</td>
</tr>
<tr>
<td>-22</td>
<td>R143 (+) and chassis (-)</td>
<td>3.0 - 3.1</td>
<td>Volts</td>
<td>NA</td>
</tr>
<tr>
<td>-24</td>
<td>R143 (+) and chassis (-)</td>
<td>3.5 - 3.6</td>
<td>Volts</td>
<td>NA</td>
</tr>
<tr>
<td>-27</td>
<td>Demate LAT-DS-05550 J78P from PDU JL8.</td>
<td>OK</td>
<td>OK/NG</td>
<td>NA</td>
</tr>
<tr>
<td>-33</td>
<td>Channel 1 (C79)</td>
<td>2.45-2.55</td>
<td>Volts</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>Channel 2 (R40)</td>
<td>3.25-3.35</td>
<td>Volts</td>
<td>NA</td>
</tr>
<tr>
<td>-34</td>
<td>Rising time between C79 and R40</td>
<td>2m - 3m</td>
<td>Sec.</td>
<td>NA</td>
</tr>
<tr>
<td>-40</td>
<td>Channel 1 (C79)</td>
<td>2.45-2.55</td>
<td>Volts</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>Channel 2 (R40)</td>
<td>3.25-3.35</td>
<td>Volts</td>
<td>NA</td>
</tr>
<tr>
<td>-41</td>
<td>Rising time between C79 and R40</td>
<td>2m - 3m</td>
<td>Sec.</td>
<td>NA</td>
</tr>
<tr>
<td>Para./Step</td>
<td>Description</td>
<td>Limits</td>
<td>Unit</td>
<td>Data</td>
</tr>
<tr>
<td>------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>--------</td>
<td>-------</td>
<td>------</td>
</tr>
<tr>
<td>NA</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.2.5 - 1</td>
<td>LAT-TD-04384 completed and attach data to this package.</td>
<td>OK</td>
<td>OK/NG</td>
<td></td>
</tr>
<tr>
<td>5.2.6 - 1</td>
<td>LAT-TD-01744 completed and attach data to this package.</td>
<td>OK</td>
<td>OK/NG</td>
<td></td>
</tr>
</tbody>
</table>