**Document Title**

ACD G3 Test Stand, GASU to ADC FREE Interface Test Procedure for GLAT0785/6 GASU
# CHANGE HISTORY LOG

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<tr>
<th>Revision</th>
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Hard copies of this document are for REFERENCE ONLY and should not be considered the latest revision.
1. **SCOPE**

This document provides the process for setup, safe to mate and instructions for the ACD G3 test stand -GASU to ACD. The ACD G3 test stand has been designed to be used with many different GASU to ACD test configurations. The test procedure within this document uses only one typical test configuration.

Note that this test-procedure for the GLAT0785/6 GASU (see serial ID bar-code on enclosure and cover).

This procedure is meant to be improved when feedback of the ACD system is received.
2. DEFINITIONS AND ACRONYMS

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

2.1 Acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Definition</th>
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<tbody>
<tr>
<td>ACD</td>
<td>Anti Coincidence Detector</td>
</tr>
<tr>
<td>EM</td>
<td>Engineering Model</td>
</tr>
<tr>
<td>FH</td>
<td>Flight Hardware</td>
</tr>
<tr>
<td>FREE</td>
<td>Front End Electronics</td>
</tr>
<tr>
<td>GLAST</td>
<td>Gamma Ray Large Area Space Telescope</td>
</tr>
<tr>
<td>GASU</td>
<td>Global Trigger ACD Signal Distribution Unit</td>
</tr>
<tr>
<td>LAT</td>
<td>Large Area Telescope</td>
</tr>
<tr>
<td>LVDS</td>
<td>Low Voltage Differential Signaling</td>
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</table>
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>
</tr>
</thead>
<tbody>
<tr>
<td>LAT-TD-03623</td>
<td>Final Acceptance Test for GLAT0885/6 G3 GASU</td>
</tr>
</tbody>
</table>
4. REQUIREMENTS

This section lists the requirements that shall be followed during this test procedure.

4.1 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.
5. **TEST PROCEDURE**

Note: The ACD G3 test stand has been designed to use many different GASU to ACD test configurations. The following procedure only uses one typical test configuration which is the testing of the primary and redundant interface of the GASU and one ACD FREE board.

Caution: only one of the 28V supplies shall be powered. Do not power both, primary and redundant 28-V supplies simultaneously.

5.1 **Test Equipment**

The list below indicates the equipment that is used as the ACD G3 Test Stand test setup:

<table>
<thead>
<tr>
<th>Type</th>
<th>Manufacturer/Model/ID Number</th>
<th>Version/Revision</th>
<th>Customer Provided</th>
</tr>
</thead>
<tbody>
<tr>
<td>VME Crate</td>
<td>Dawn VME Products 11-1011777-2119</td>
<td>VME64x (series 767)</td>
<td></td>
</tr>
<tr>
<td>VME SBC MVME2304 card</td>
<td>Motorola PN MVME2304-0123</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VME LCB Mezzanine card</td>
<td>LAT-TD-00860</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Software for the local PC</td>
<td>LATTE P03-00-00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(2) DC Power supplies</td>
<td>BK Precision MN1786A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>28 Volt supply cable</td>
<td>LAT-DS-03611</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LCB Transition board cable</td>
<td>LAT-DS-02104</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAT5 Ethernet cable</td>
<td>TRD855PL-50</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>RS-232 Cable</td>
<td>TDC003-7 (RECO98M connectors)</td>
<td></td>
<td>X</td>
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</table>
5.2 Test Setup

The Figure below shows the interconnections, cables and equipment for testing the interface between the GASU unit and one ACD FREE board.

Figure 1. Minimum Test setup Interconnection Diagram; Insert breakout box between GASU and BEA/FREE before connecting flight hardware.
CAUTION:  DO NOT turn ON BOTH power supplies. SEVERE DAMAGE to the GASU will result if they are USED together.

Note: Follow the appropriate ESD precautions while performing the processes in this document.

Note: Dust caps shall be used on all connectors when the connections are not mated. Insure that the dust caps are clean inside and outside.

Note: Use breakout boxes if required per the ACD procedure in addition to inspection of connectors/pins for safe to mate.

1) Verify that power is off for all equipment.

2) Visually inspect each connector/pins for condition, cleanliness, particulate contamination and alignment before mating.

3) Connect all the ACD G3 equipment and cables per the interconnect drawing, but without connecting the ACD FREE board.

Note: Verify the keying (if applicable) is the same for connectors to be mated.

5.3 Test Setup Verification

Prior to running the GASU to ACD safe to mate test procedure, all test equipment, connections, controls and units under test shall be validated. To validate the ACD G3 test stand setup, perform the following test.
CAUTION: DO NOT turn ON BOTH power supplies. SEVERE DAMAGE to the GASU will result if they are USED together.

1) Apply power to the VME Crate.

2) Turn ON primary power supply and set to 28.0 volts.

3) Verify nominal voltage is 28.0V and the current is nominal 0.35 A plus/minus 50 mA.

4) Run the applicable primary side AEM setup scripts to verify the test setup is functional.

Note: Write/read GASU AEM registers and ACD voltage levels.

5) Turn OFF primary power supply.

CAUTION: DO NOT turn ON BOTH power supplies. SEVERE DAMAGE to the GASU will result if they are USED together.

6) Turn ON redundant power supply and set to 28.0 volts.

7) Verify nominal voltage is 28.0V and the current is 0.35 A plus/minus 50 mA.

8) Run the applicable redundant side ACD setup scripts to verify the test setup is functional.

Note: Write/read GASU registers and ACD voltage levels. For voltage levels check values in “Final test of G3 GLAT0785/6”

9) Turn OFF redundant power supply.

5.4 GASU to ACD Safe to Mate Test

This section provides instructions to test the primary and redundant interface between the GASU and one ACD FREE board.

Follow safe-to-mate procedures by the ACD sub-system before connecting EGSE to ACD flight hardware. The following steps are suggested before connecting flight hardware.

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Electrical Interface Continuity and Isolation Test (non-powered test, verifies continuity and isolation of power & signals)

Interface Verification Test (powered, test each side of the break-out box without jumper, then test again with jumper)

5.4.1 Engineering Model (EM) ACD FREE Board Test

1) Connect the Engineering Model (EM) ACD FREE board per the interconnect drawing. Insert breakout box between GASU and BEA/FREE. Breakout box is not shown in the figure. Inspect connectors before mating. Note that the specific connector of the 12 possible connections for prime and 12 for redundant GASU side to be used is dependant on the specific G3 test-stand. Consult the connector ID’s specified in “Final test of G3 GLAT0785/6”.

CAUTION: DO NOT turn ON BOTH power supplies. SEVERE DAMAGE to the GASU will result if they are USED together.

2) Perform continuity & isolation test if connecting the hardware the first time

3) Turn ON primary power supply.

4) Perform interface verification test if connecting the hardware for the first time. Verify with break-out box and connections open that GASU side signals adhere to ICD. (Note that LVDS signals are not LVDS level in absence of remote terminations). Especially verify that EM ACD FREE board power (3.3V and 28V) are not shorted to ground. R must be > 500 ohm.

CAUTION: G3 GLAT0785 may be damaged if FREE card power is shorted to ground. Future G3 test-stands will have that caution removed.

5) Connect power/ground. Verify levels and then connect remaining signals. Measure that each level is per ICD. (Part of interface verification test).
6) Run all applicable primary side ACD acceptance test scripts that are used for the Flight Hardware (FH) ACD. Including but not limited to register write/read tests, trigger tests, event data tests, voltage/current/temperature monitoring tests.

7) Turn OFF primary power supply.

CAUTION: DO NOT turn ON BOTH power supplies. SEVERE DAMAGE to the GASU will result if they are USED together.

8) Turn ON redundant power supply.

9) Run all applicable redundant side ACD acceptance test scripts that are used for the Flight Hardware ACD.

10) Turn OFF redundant power supply.

11) Disconnect the ACD EM FREE board.

5.4.2 Flight Hardware (FH) ACD FREE Board Test

1) Again, use GASU to BEA/FREE break-out box. Use ACD break-out box procedure where applicable. Connect FH ACD FREE board and GASU with breakout box connections open. Perform continuity & isolation test per ACD procedure. Especially verify that 3.3V and 28V FREE power is not shorted to ground. (Must be > 1kohm). See caution in previous section.

2) Turn ON primary power supply.

3) Part of interface verification test. (Verify levels on both breakout box sides to ICD. Connect GASU to FREE signals and verify levels to ICD.)

4) Run all applicable primary side ACD acceptance test scripts that are used for the FH ACD.

5) Turn OFF primary power supply.

CAUTION: DO NOT turn ON BOTH power supplies. SEVERE DAMAGE to the GASU will result if they are USED together.

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6) Turn ON redundant power supply.

7) Repeat steps performed on primary side test.

8) Turn OFF redundant power supply.

9) Disconnect the FH ACD FREE board.