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	Quality Assurance Procedure for Verifying Individual High Voltage Standoff		
ATLAS project document no. ATL-IT-QP-0034	Date last modified. 21 May 2001	Approval status Full Production	

1 Scope

1.1 Scope

This procedure establishes requirements for inspection of the module assembly's straw high-voltage capability prior to straw gluing and module assembly wire-stringing.

1.2 Applicability

1.2.1 Applicability

This procedure applies to the process of verifying the individual high voltage standoff by the Indiana and Duke Production Facilities.

1.2.2 Relation to Other ATLAS Project Requirements

The quality assurance procedure described by this specification is in addition to other tests and inspections required for module assembly. Module assembly may continue only after acceptable results from this procedure.

2 Applicable Documents

2.1 Document List

The following documents of the issue in effect on the effective date of this specification form a part of this specification to the extent specified herein.

2.1.1 ATL-IT-EY-0004, ATLAS - Indiana Environmental, Health, and Safety Plan

2.2 Amendments and Revisions

Whenever this procedure is amended or revised subsequent to its effective date, the Revised Version will be placed in the Engineering Data Management System, the Production DataBase displays, and released

to the technicians. The Production Engineers will coordinate release to the technicians.


3 Requirements

3.1 Background

High voltage plates distribute high voltage from the fuse box to the straw cathodes. The high voltage is negative. A Kapton flex circuit on the high voltage plates, which plugs into the fuse box, carries the high voltage on copper traces embedded in the Kapton - first to a resistor and then from the resistor to a feed-through pad. A thick plate with a collar that mates to the tension plate and the shell carries the mounting holes for mounting the high voltage module in the detector and for supporting and spacing the straws. A thin plate on the side of the high voltage plate opposite the Kapton flex circuit connects each group of eight or seven straws to a feed-through hole. A pin socket conducts the high voltage through the feed-through hole from the Kapton to the straws.

Insertion of straws into the modules through radiator material, dividers, and the high voltage plates can damage straw reinforcing fiber bundles. Stray fiber bundles in a position near the shell or an adjacent high voltage group can cause a high voltage breakdown. This test will identify damaged straws and allow straw replacement or fiber bundle repair before the straws are glued into place.

Before straw gluing, test all high voltage groups for isolation between groups and for isolation between the shell and the group. The Kapton HV strips shall be connected to a high voltage test fixture. The circuits will be tested by sequentially raising each trace and each corresponding group of straws to 2.7 kV while holding all the other traces at

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ground. Accept straw groups when the number of breakdowns is limited and finally holds voltage for at least 15 seconds. Others will be returned for rework.

Use a Bertran high voltage power supply with an A/D board resolution of $2.44\text{mV} = 244\text{nA}$. The noise level from the power supply is $\sim 1\text{-}2\text{mV}$ after reducing ripple with a 0.47sec time constant (47nF and 10Mohm). The program running the device averages 10 samples of current for data input. The present limit of measurement accuracy is 100nA .

Appendix A provides a checklist to be used by Technicians performing this procedure.

4 Preparation for Delivery

4.1.1 Storage, Packing, and Shipping Requirements

There are no storage, packing, and shipping requirements applicable to this procedure.

5 Environment, Health, and Safety (EH&S)

5.1.1 EH&S Invoked

This test requires use of high voltage equipment and test methods. Technicians performing this test must follow the ATLAS U.S. EH&S procedures for high voltage testing as described by reference 2.1.1 above.

6 References **ATLITB1_0010, Module 1 High Voltage Thick Plate**


6.1 **ATLITB2_0010, Module 2 High Voltage Thick Plate**

6.2 **ATLITB3_0010, Module 3 High Voltage Thick Plate**

6.3 **ATLITB1_0001, Type 1 Isometric Assembly Diagram (Exploded)**

6.4 **ATLITB2_0001, Type 2 Isometric Assembly Diagram (Exploded)**

6.5 **ATLITB3_0002, Type 3 Isometric Assembly Diagram (Exploded)**

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Appendix A

Table Name: *tblChecklistVerifyIndivHVStandoff*

Step *Check List Steps*

- 1 Scan the "Quality Assurance Procedure for Verifying Individual HV Standoff" Product ID Barcode.
- 2 Attach the set of cables for the type of module to be tested to the resistor cards on the top of the relay box. Each cable has a label specifying its position and orientation. Enter "Done".
- 3 Review this checklist and the instruction booklet on the HV tester. Logon to computer and double click on hvtest.exe. Set the sequence file name in the LabView panel to short side acute corner upper right. Enter "Done".
- 4 Turn on the control box (green lighted switch) and the Bertran HV supply side B. Also set the trip reset on the Bertan to automatic reset. Enter "Done".
- 5 First, test the continuity of the cables by putting thin copper sheets in the contact area of the "fuse box" connectors. Set the HV to 400 volts and the trip limit to 1. Enter "Done".
- 6 Run the program by clicking on the arrow in the upper left corner of the screen. There should be a trip on every step. If not, there is a bad contact that needs to be fixed. Enter "Done".
- 7 Exchange the copper sheets for kapton sheets in the "Fuse box" connectors. Set the voltage at 3000V and the trip limit to 5 and run the HV test program. There should be no trips at any step. Enter "Done".
- 8 Move the HV tester to the back end of the module so that the cables reach

the kapton strip leads. Connect cables to the strip leads. Kapton strip lead connector 1 is on the side with the short side acute corner. Enter "Done".

9 The fuse box connectors are marked "inside" and "outside" referring to the part of the module it faces. Put the plate with spring loaded grounding pins against the HV plate at the back end. Enter "Done".

10 Run the HV test with 400 volts and trip limit of 1. A trip is expected at every step. If there is no trip, a discontinuity is indicated on that pad and must be investigated. Enter "Done".

11 Disconnect the HV cables from the Kapton strips. Remove the grounding plate. Enter "Done".


12 Move the HV tester to the front end of the module so that the cables reach the kapton strip leads. Connect the cables to the kapton strip leads and put the grounding plate for the front against the HV Plate. Enter "Done"

13 Set the sequence file name to short side acute corner upper left. Run the HV test program with the same settings as before. Note any pad that does not give a trip and rework the connection later. Enter "Done".

14 Place Copper tape between the shell and the assembly frame, and visually insure that all straws are protruding through the HV plate. Enter "Done"

15 When all pads test ok, remove the grounding plate. Change voltage setting to 2800V, number of trips to 5, and time to 15 seconds. Run the HV test program again. Trips will occur but should not exceed 5. Enter "Done".

16 Turn off the Bertran supply and the

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control box. Disconnect the HV cables from the kapton strips. Exit the HV Test program. Enter "Done".

17 Review test data in C:\User\Hvtest\Data to. Create new folder in "\Data" with naming convention of module number, test, and date. Sort data by date modified. Highlight data identified by Log file name and save in file. Enter "Done"

18 Record all pad numbers in the log book that have an "F" or "T" designator. Enter "Done".

19 Turn on Bertran supply and control box. Select "Repeat One" on control panel. Enter pad number and run. it may be necessary to rerun more than once. Retest questionable pads and record failures in the logbook. Enter "Done"

20 If tripping persists, see if a discharge can be seen. A small spark where the bad straw rests on the HV plate identifies a bad straw, even if the discharge is inside the module. Enter "Done".


21 Run the program completely through for all the straws. Contact supervisor. Enter "Done".

22 Turn off the Bertan supply and the control box. Disconnect the HV cables from the kapton strips. Exit the HV Test

Program. Enter "Done".

23 Enter "Save" to save data and exit form or enter "Cancel" to exit form without saving this screen.

Approvals			
Name	Signature	Revision	Date
J.Callahan		B	
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C. Wang		B	

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