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QA procedures in Uppsala

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This document is an operator's guide for the QA procedures that are to be performed in Uppsala during the production of ATLAS/SCT detector modules.

Introduction

This document describes the practical procedures and the steps to be performed. It is complemented by two operator guides: Operator's Guide to Electrical Tests that is a detailed instruction for the measurements of the electrical performance of the modules and Metrology Manual that describes the details of the measurements of the mechanical precision of the module assembly.

Each step in this QA procedure corresponds to items on the ModuleTraveller and the HybridTraveller, where notes of the actions taken should be made.

1. Reception tests of hybrids

Procedure:

1. Reception of hybrids stuffed with AISICs from KEK. These are fully bonded and have already been subject to burn-in procedure of the AISICs mounted hybrid.
2. Register reception in the SCT DataBase.
3. Mount the hybrid on the hybrid test plate.
4. Visual inspection; check for visible damage, broken bonds or cracks in the pitch adapter.
5. Insert the test plate in the water cooled test-box and connect the cables to the DAQ system.
6. Turn on the cooling water and the nitrogen flow.

7. Start the C:\AtlasProduction\vi\ColdBoxMon.vi on the ATLAS DCS computer to monitor the test environment. Temperature and humidity log files are found in the folder C:\AtlasProduction\vi\logfiles\.
8. Wait for the temperature and humidity to stabilise.
9. Perform the electrical ConfirmationTest according to the instructions in The Operator's Guide to Electrical Tests.
10. Analyse the results and at failure enter the rework loop.
11. Switch the power off, turn off the nitrogen and the cooling water
12. Remove of the test plate from the cold box and dismount the hybrid from the test plate.
13. Visual inspection; check for visible damage and broken bonds.
14. Storage of hybrids in desiccated cabinet awaiting Hybrid to Baseboard Assembly.
15. Submit results and action to the SCT database (initially local storage of data).

2. Reception tests of sensor/baseboard assembly

Procedure:

1. Reception of sensor/baseboard assembly from University of Oslo.
2. Visual inspection; check for visible damage, dust and scratches.
3. Register reception in the SCT DataBase.
4. Store of the sensor/baseboard assembly in desiccated cabinet awaiting Initial Metrology.

3. Initial metrology

Procedure:

1. Mount the sensor/baseboard assembly in the metrology frame.
2. Perform the initial metrology according to the instructions in the Metrology Manual.
3. Analyse the results by the and at failure enter the rework loop.
4. Dismount the sensor/baseboard assembly from the metrology frame.
5. Store of the sensor/baseboard assembly in desiccated cabinet awaiting Hybrid to Baseboard Assembly.
6. Submit results and actions to the SCT database (initially local storage of data).

4. Hybrid to baseboard assembly

Procedure:

1. Check the status of the hybrid and sensor/baseboard assembly in the SCT DataBase
2. Visual inspection of the hybrid and the sensor/baseboard assembly.
3. Hybrid to baseboard assembly according to the Hybrid to Baseboard Assembly Manual.
4. Save glue sample, to cure with the assembled module.
5. Form the detector module in the SCT Data Base.
6. After curing, check quality of glue sample
7. Visual inspection of the completed assembly, especially the alignment of pitch adapter to the detectors and excess of glue around the feet of the carbon-carbon bridges.
8. Store the detector module in the desiccated cabinet awaiting Electrical Bonding.

5. Electrical bonding

Procedure:

1. Visual inspection of the module
2. Bond pitch adapter to detector and detector to detector according to the Bonding Documentation.
3. Check for touching bonds or deformed bond loops after the lower bond loops are done
4. Check for touching bonds or deformed bond loops after the higher bond loops are done
5. Check the bias and guard-ring bonds.
6. Register the bonding in the SCT DataBase
7. Storage of the detector module in the desiccated cabinet awaiting Detector I/V Measurement.

6. Detector I/V measurement

The procedures described in Section 6 to 10 can be performed in one sequence without ever disconnecting or touching the module. This sequence can be interrupted after any test item to be continued thereafter in Bergen, Oslo or Uppsala. NB: When shipping the module to Bergen or Oslo for further testing, verify that the Final Metrology has been done.

Procedure:

1. Mount the detector module in the Huber cooled test box.
2. Turn on the nitrogen flow.
3. Start the C:\AtlasProduction\vi\HuberControl.vi on the ATLAS DCS computer to control the environment temperature.
4. Load the temperature profile IVMeasurement.txt.

5. Start the C:\AtlasProduction\vi\ColdBoxMon.vi to monitor the test environment. Temperature and humidity log files are found in the folder C:\AtlasProduction\vi\logfiles\.
6. Connect the Stanford/Keithley I/V set-up according to the posted scheme. Make sure that the DAQ system is not connected to the module.
7. Wait for the temperature and the humidity to stabilise.
8. Start the C:\AtlasProduction\vi\IVMeasurement.vi on the ATLAS DCS computer.
9. Configure the scan 0 to 500 volts in steps of 10 V, 10 seconds rest between each step via the LabView interface.
10. Store the data in the on the ATLAS server (assuming the measurement has the label <Label>) as /SQ/<SerialNumber>/IV/<Date>_<Label>_IV.txt.
11. To convert the data to SCTDAQ/SCTDB compatible format, start SCT-DAQ and run the macro ProcessIV.cpp. This has to be run in the SCT-DAQ environment to have access to the relevant variables.
12. Submit the results to the SCT DataBase (initially local storage).
13. Verify that leakage current corresponds to the sum of the four detector currents, as registered in the SCT DataBase. Possibility to enter the rework loop.
14. Store the detector module in the desiccated cabinet awaiting Electrical Confirmation Test.

7. Electrical confirmation test

Procedure:

1. If not already done, repeat the steps 1-5 from section 6. In this case load temperature profile Constant14.txt.
2. Connect the cables to the DAQ system.
3. Wait for the temperature and the humidity to stabilise.
4. Perform the electrical ConfirmationTest according to the instructions in the Operator's Guide to Electrical Tests.
5. Analyse the result and at failure enter the rework loop.
6. Results and actions submitted to SCT database (initially local storage of data).
7. Remove the detector module from the cold box, or possibility to continue directly to Thermal Cycling.
8. Visual inspection, check for visible damage and broken bonds.
9. Store the detector module in desiccated cabinet awaiting Thermal Cycling or shipment to Oslo or Bergen.

8. Thermal cycling

Procedure:

1. If not already done, repeat the steps 1-5 from section 6. In this case load temperature profile TemperatureCycle.txt.
2. Make sure that the power (low and high voltage) is off.
3. Run the TemperatureCycle profile on the LabView interface.
4. When the temperature has stabilised after the cycling, perform the electrical ConfirmationTest according to the instructions in the Operator's Guide to Electrical Tests.
5. Analyse the result and at failure enter the rework loop.
6. Submit results and action to the SCT database (initially local storage of data).
7. Remove the detector module from the cold box, or possibility to continue directly to Long-term Stability Test.
8. Visual inspection, check for visible damage and broken bonds.
9. Store the detector module in desiccated cabinet awaiting Long-term Stability Test or shipment to Oslo or Bergen.

9. Long-term stability test

Procedure:

1. If not already done, repeat the steps 1-3 from section 7. In this case load temperature profile LongTerm.txt.
2. Run the ModuleLTT according to the Operator's Guide to Electrical Tests.
3. After the test has finished, analyse the result and at failure enter the rework loop.
4. Submit results and action to the SCT database (initially local storage of data).
5. Remove the detector module from the cold box, or possibility to continue directly to Final Electrical Characterisation.
6. Visual inspection, check for visible damage and broken bonds.
7. Storage of detector module in desiccated cabinet awaiting Final Electrical Characterisation or shipment to Oslo or Bergen.

10. Final electrical characterisation

Procedure:

1. If not already done, repeat the steps 1-3 from section 7. In this case load temperature profile OperatingTemp.txt.
2. Run the CharacterisationTest according to the Operator's Guide to Electrical Tests.
3. After the test has finished, analyse the result and at failure enter the rework loop.
4. Submit results and action to the SCT database (initially local storage of data).
5. Remove the detector module from the cold box

6. Visual inspection, check for visible damage and broken bonds.
7. Store the detector module in desiccated cabinet awaiting Final Metrology.

11. Final metrology

Procedure:

1. Mount the sensor/baseboard assembly in the metrology frame.
2. Perform the final metrology according to the instructions in the Metrology Manual.
3. Analyse the results and at failure enter the rework loop.
4. Dismount the sensor/baseboard assembly from the metrology frame.
5. Store of the sensor/baseboard assembly in desiccated cabinet awaiting Shipment to Oxford.
6. Submit results and actions to the SCT database (initially local storage of data).

12. Shipment to Oxford

Procedure:

1. Visual inspection; check for visible damage, dust and scratches.
2. Check that the module is fastened with three screws.
3. Verify that all required entries are registered in the SCT DataBase and that it passed all corresponding tests.
4. Pack the module for shipment and send it.
5. Register the shipment in the SCT DataBase.

13. Shipment to Oslo or Bergen

Procedure:

1. Visual inspection; check for visible damage, dust and scratches.
2. Check that the module is fastened with three screws.
3. Verify that all applicable entries are registered in the SCT DataBase and that it passed all corresponding tests. Especially, verify that the Final Metrology has been done.
4. Pack the module for shipment and send it.
5. Register the shipment in the SCT DataBase.