AERI and E-AERI Systems Reference Calibration Source using 3rd Blackbody Breakout Kit

Measurement made easy

The ABB Atmospheric Emitted Radiance Interferometer AERI™ provides thermodynamic profiling, trace gas detection, atmospheric aerosol detection and more.

Combined with its atmospheric profiling algorithms, the AERI gives and automated atmospheric sounding system capable of continuously generating humidity and temperature profiles every 8 minutes. No consumables or human interaction are needed. The AERI automatically measures the atmosphere radiance and determines the atmospheric humidity and temperature profiles from each radiance measurement.



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Section 1 About this Manual

Purpose of Document

This document describes the different steps to perform an AERI Reference Calibration with the 3rd Blackbody breakout kit. This is made to ensure that the AERI system is well calibrated.



All servicing of the equipment is to be performed by Qualified Service Personnel only.

Tools and Equipment Required

- AERI or E-AERI complete instrument
- AERI 3rd Blackbody (0022-17-1-00003-01)
- 3rd Blackbody Breakout Cable (0022-18-2-00011-01)
- Ambient BB Set Point Cable (0022-18-2-00003-61)
- Small Philips Screwdriver
- Small Flat Head Screwdriver
- Allen Key Driver Set

Definition of Icons

This publication includes Warning, Caution, and Information where appropriate to point out safety related or other important information. It also includes Tip to point out useful hints to the reader. The corresponding symbols should be interpreted as follows:



The laser warning icon indicates the presence of a hazard related to the presence of a laser.



Acronyms

BΒ

Blackbody

Section 2 Safety Summary

Warnings, Cautions and Notices

User must comply with all warnings, cautions and notices indicated in this manual. Failing to comply with any of the instructions, precautions or warnings contained in this manual is in direct violation of the standards of design, manufacture, and intended use of the equipment. Failure to comply with any of the warnings, cautions or notices can result in personal injuries and/or equipment damages. If you do not fully understand the information contained in this manual, please contact ABB. Refer to the back cover of this manual. ABB Inc. assumes no liability for the user's failure to comply with any of these safety requirements.

ESD Warnings

E S D

Electrostatic Sensitive Device

Perform maintenance procedures in an ESD protected environment.

Always use an ESD protection to perform maintenance procedures on the AERI system. If you are not familiar with ESD protection, or if ESD protection material is not available, contact ABB customer support. Refer to the back cover of this manual.

Electrical Warnings



Disconnect power or take precautions to insure that contact with energized parts is avoided when servicing.

Make sure the system is configured to use the available line voltage.

Ensure that the equipment and any devices or power cords connected to it are properly grounded.

The grounding pin of the power connector must be present at all times. If necessary, have a certified electrician install a grounded wall outlet.

Protective earthing connection (grounding) must be active at all times. The absence of grounding can lead to a potential shock hazard that could result in serious personnel injury. If an interruption of the protective earthing connection is suspected, ensure the equipment remains inoperative.

Always replace old fuses with new ones of the same type. If uncertain, contact ABB Inc. Damage may result if wrong fuses are used.

Use the equipment ONLY if a power outlet properly grounded is available.

Before using the equipment, make sure the appropriate line voltage is available.

Do not use repaired fuses and avoid any situations that could short circuit the fuse.

Use a power extension ONLY if it has proper conductive protection (grounding).

General Warnings

Do not apply power when connecting or disconnecting components. Connect all components BEFORE powering up the unit. Contact your local ABB support for information.



Do not attempt any adjustment, maintenance, or repair procedure to the equipment if immediate first aid is not accessible.

Do not, under any circumstances, remove the warning and caution labels. Information must be available at all times for the security of the user.

The blackbody control unit weighs 65 lb. When lifting bend your knees or ask for the help of a second person.



Do not operate the equipment in the presence of explosive or flammable products, condensing moisture and excessive dust.

Do not store the spectrometer in an environment with condensing moisture and excessive dust.

Read this manual thoroughly before installing this equipment. If you do not understand the content of this manual, contact ABB service personnel.

General Notices

Changing the computer or instrument IP address should be done by qualified personnel only.

All components, whether in transportation, operation or storage, must be in a non-corrosive environment.

Do not use the equipment if any signs of damages are present. Contact ABB service personnel.

Environmental Information

The EARI reference calibration source has required the extraction and use of natural resources for its production. Therefore, it system may contain hazardous substances that could impact health and environment. In order to avoid dissemination of these hazardous products into the environment and also to reduce the extraction and protect our natural resources, ABB inc. strongly recommends to return old units to your supplier in order to make sure materials used to produce the equipment are reused or recycled in a sound way.

Section 3 Hardware Configuration for the 3rdBB Breakout Kit

Ambient BB Set Point Cable

Prior to start this procedure, the AERI instrument shall be powered off.

In the calibration mode, wiring to the Ambient BB will be shared in between the Ambient BB and the 3rdBB. To perform this calibration mode, a new cable 0022-18-2-00003-61 that comes with the calibration kit needs to be installed. That new cable will allow to set the temperature of the 3rd BB when calibrating.

The following drawing shows the connections that have to be made with the new cable. The cable 0022-18-2-00003-62 is already existing in the system and comes from the Ambient BB controller. Inside the back end, on the left side there are 3 Agilent modules. The module in the middle should be L4452A. Locate this module and do the following:

- Pull out the cartridge where all cables are plugged.
- Remove the plastic cover to have access to its terminals.
- Plug the 3 ferrules of the cable 0022-18-2-00003-61 on channel 7 (shown in red in the following drawing).
- The 3 ferrules of new cable must be plugged on channel 7 as shown in red in the following drawings.

• The other side of 0022-18-2-00003-61 must then be plugged to the existing cable.



Figure 3-1: Cable connection

Ambient BB Power Cable

The wires that can supply the Ambient BB controllers may have been plugged to the ground to disable it (it is the case if both red wires of cable 0022-18-2-00003-63 are plugged to the ground (+24V RTN). This controller needs

to be supplied to perform the calibration so make sure that the red wires are connected to the +24V terminal located next to the radiometer (right side).



Figure 3-2: Ambient BB power cable connection



Figure 3-3: Ambient BB diagram

3rdBB Breakout Cable

The cable 0022-18-1-00003-66 normally plugged on the Ambient BB side must be unplugged. The breakout cable 0022-18-2-00011-01 needs to be plugged at the end of that unplugged cable like shown on the following drawing. The branch labelled Ambient BB on the breakout cable shall be plugged to the ambient BB and the other one on the 3rdBB.



Figure 3-4: Breakout cable diagram

Setup the 3rdBB

1. Remove the front-end enclosure

2. Remove the sky view plate on top the AERI front-end optics by unscrewing the 4 screws.



Figure 3-5: Remove sky view plate

3. Locate the 3rdBB and install in sky view :

• Remove the red protective aperture cover from the 3rdBB.



Figure 3-6: Remove red protective cover

• Install the 3rdBB on the sky view. Prior to tightening the 4 screws, ensure that the blackbody is aligned against the black buttons.



Figure 3-7: Install 3rd BB on sky view

- 4. Plug the branch of the breakout cable labelled "3rd Body" on the 3rdBB (this cable has been installed earlier in this procedure).
- 5. Turn on the AERI. Wait for temperature stabilization since the instrument has been turned off for a while during the setup. The interferometer temperature must be stable at about 35 °C and the 3rdBB stabilized at 45 °C. This will take about half a day if the spectrometer temperature starts from room temperature.

Section 4 Software Configuration for the 3rdBB kit

- 1. Stop the AERI Softwares by doing the following:
- Press ctrl-c in the black ingest window up to 3 times to stop ingest
- Close FTSW AERI
- 2. Manage the data directories:
- Rename c:\AEYYMMDD (today's date, if exists) to c:\AEYYMMDDA
- In a cygwin Window type:
 - cd /cygdrive/c
 - mv AEYYMMDD AEYYMMDDA
- Rename c:\ftp\AEYYMMDD (today's date, if exists) to c:\ftp\AEYYDDA
 - In a cygwin Window type:
 - cd /cygdrive/c/ftp
 - mv AEYYMMDD AEYYMMDDA
- Delete c:\E-AERI\Data\HouseKeeping.hk
 - In a cygwin Window type:
 - cd /cygdrive/c/E-AERI/Data
 - rm HouseKeeping.hk
- Remove all files from c:\temp
 - In a cygwin Window type:
 - cd /cygdrive/c/temp
 - rm *
- 3. Setup the Ingest Configuration Files:

Prior to perfoming this step, you must know the actual configuration mode. It should be Rapid Sample Mode (RS_3) or Slow Sample mode (has). If you are not sure, compare the file c:\config\mirror.beg with those one in c:\config\setup\RS_3 and c:\config\setup\has.

- In a cygwin Window type:
 - change_config_to 3body_breakout

This script does the following:

- Changes mirror schedules
- Changes weighting of the 3 thermistor values that are inside each blackbody
- 4. Setup the FTSW AERI Configuration File:

The FTSW AERI configuration file needs to be modified temporarily for the additional BB to be recognized.

- Make sure all software are closed.
- Open the file c:\E-AERI\FTSW_AERI.config with Notepad.
 - Set calibKitY.connected = true



The default temperature of the additional BB is set to 45°C (1.363V). To change the BB temperature, set calibKitY.DAC2 voltage to the required temperature (Refer to the AA004389-01 AERI and E-AERI Systems Installation and User Manual for the corresponding table)

- Save the file
- Start FTSW_EAERI_GUI.bat from the desktop, be careful not to start the Acquisition Sequencer (Ingest) software.
 - The software detects a modification in the configuration file and displays the following window. Click OK to start FTSW AERI in calibration mode.



Figure 4-8: FTSW AERI dialog box

- Insert the USB stick that was delivered with the Reference calibration source and browse to it.



The USB key contains the coefficient file associated with the supplied BB. If multiple BBs are purchased, the USB key will contain the coefficient files for them. Each coefficient file name contains the serial number of the corresponding BB.

- Choose the file that corresponds to the installed BB and click **Open**.

Instrument Control (FTSW) will start. Verify if the information related to ref1is displayed.





- When validated, close FTSW AERI.

Running 3rdBB Test

• Just start Ingest software as usual and let it runs for at least 1.5 hours.



It will take a few minutes for the reference BB to warm up and to stabilize at the set temperature. The data collected during the stabilization process should be discarded from the calibration data.

• When terminated, data collected will have to be sent to mentor for analysis in following section.

Return to Normal Software Configuration and Send Data Collected

- 1. Stop the AERI Softwares by doing the following:
- · Press ctrl-c in the black ingest window up to 3 times to stop ingest
- Close FTSW AERI
- 2. Manage the data directories:
- Rename c:\AEYYMMDD to c:\AEYYMMDD-3body
 - In a cygwin Window type:
 - cd /cygdrive/c
 - mv AEYYMMDD AEYYMMDD-3body
- Rename c:\ftp\AEYYMMDD to c:\ftp\AEYYDD-3body
 - In a cygwin Window type:
 - cd /cygdrive/c/ftp
 - mv AEYYMMDD AEYYMMDD-3body
- Delete c:\E-AERI\Data\HouseKeeping.hk
 - In a cygwin Window type:
 - cd /cygdrive/c/E-AERI/Data
 - rm HouseKeeping.hk
- Remove all files from c:\temp
 - In a cygwin Window type:
 - cd /cygdrive/c/temp
 - rm *
- 3. Setup the Ingest Configuration Files:

This step depends on the previous configuration mode.

- If it was Rapid Sample mode (RS_3), do the following:
 - In a cygwin Window type:
 - change_config_to RS_3
- If it was Standard Sample mode (has), do the following instead:
 - In a cygwin Window type:
 - change_config_to has
- 4. Setup the FTSW AERI Configuration File:
- Open the file c:\E-AERI\FTSW_AERI.config with Notepad.
 - Set calibKitY.connected = false
 - Save the file
- 5. Send contents of c:\ftp\AEYYMMDD-3body to mentor for analysis.
- Mentor may be able to download it remotely if the data is on a network accessible by him.

Uninstalling Hardware

- 1. Turn the AERI system Off.
- 2. Remove the 3rdBB breakout cable.
- 3. Plug back the Ambient BB cable on it.
- 4. Remove the 3rdBB from the sky view and shut its opening with the red protective aperture cover.



Figure 4-10: Install protective cover



Make sure no dirt, dust or water enters the AERI system aperture to prevent any contamination on the mirror. Should any contaminant enter the aperture refer to AA004389-01 AERI and E-AERI Systems Installation and User Manual, section 7, Cleaning procedures.

5. Re-install the sky view plate on top the AERI front-end optics.



Figure 4-11: Unscrew sky view plate

6. Unplug the cable that supplies power to the Ambient BB Controller.



Figure 4-12: Disconnect power cable

- 7. Re-install the front-end enclosure.
- 8. Now the AERI can be powered up and ingest.bat run in standard mode.

Contact us

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