

Trip Report for AERI Nauru Repair March 2002

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Purpose of Trip

The purpose of the trip to Nauru in March 2002 was to replace the existing AERI instrument (AERI-08) with a refurbished instrument (AERI-06). The repair trip was originally scheduled for October 2001 but was delayed due to government travel restrictions imposed at that time.

Personnel

Robert Knuteson of the University of Wisconsin-Madison Space Science and Engineering Center (SSEC)

John Glowacki of the Australian Bureau of Meteorology (BOM).

Travel Details

Robert Knuteson left Madison, Wisconsin on 28 February 2002, arriving on site 4 March 2002 at 9am Nauru local time (21:00 UTC 03 March 2002). John Glowack had already been on site for several days performing instrument maintenance and replacing the AERI hatch mechanism and controller. Robert Knuteson and John Glowacki worked on site together until noon on 8 March 2002 (00:00 UTC 08 March 2002) when they left together for the airport. Robert Knuteson arrived back in Madison, Wisconsin on 12 March 2002 after several days of personal leave.

Planned Activities

Planned Activities for UW Repair Visit to Nauru March 2002

R. Knuteson, UW-SSEC
27 February 2002

Objective 1: Characterize Previous AERI Unit

- Step 1: Inspect and note condition of existing AERI hardware.
- Step 2: Backup up software configuration.
- Step 3: Perform Intermediate Blackbody Test.
- Step 4: Attempt to collect clear sky data with balloon.
- Step 5: Perform electronics calibration check procedure.

Objective 2: Install Replacement AERI unit

Step 1: Open packing crates and inspect. Note humidity.
Step 2: Disconnect electronics rack.
Step 3: Follow setup procedure for replacement unit.
Step 4: Follow packing procedure for previous unit.
Step 5: Backup software configuration of electronics rack.
Step 6: Install configuration files
[ABCVALS.NUM, AESITTER.SCR, MIRROR.BEG, INST.ID, NLAPP.SIP, . . . ,
ZFLI.SIP]

Objective 3: Characterize Replacement AERI unit

Step 1: Perform FOV map.
Step 2: Perform Intermediate BB test.
Step 3: Collect clear sky data with balloon.
Step 4: Archive data to DAT tape.
Step 5: Archive final software configuration.

Objective 4: Check out Auto-hatch.

Step 1: Develop a procedure for testing auto-hatch.
Step 2: Check for hatch metadata in AERI data stream.
Step 3: Test autohatch.
Step 4: Observe hatch behavior in rain conditions.

Actual Activities

Before Knuteson (ROK) arrived on site

- Site operator found and corrected blackbody controller (BBC) setpoint temperature
- John Glowacki cleaned “rust” off of AERI rain sensor.
- SSEC had shipped three boxes containing the AERI-06 and test support equipment.
- ROK brought a replacement BBC with him to Nauru via checked luggage.

On-site: 03-08 March 2002 (Note all dates and times are in UTC)

03 March 2002

21:00 UTC Arrived on-site with John Glowack (BOM).
21:57 UTC Site operator replaced AERI DAT backup tape with blank tape.
Red Light Summary (upon arrival):
1. Outside Air Temp: -181K (failed)
2. LW Responsivity: 0.63
3. SW Responsivity: 5.91
22:38 UTC Installed new BBC (procedure recorded in logbook)
23:30 UTC Normal balloon launch (11:30 am local Nauru time)

04 March 2002

01:00 UTC Backup old software configuration to c:\config\backup
01:12 UTC Perform electronics calibration procedure (training for J. Glowacki)

03:40 UTC Found and fixed loose cable from SCE to computer. Data OK now.

05:00 UTC Left site for the night.

20:14 UTC Arrive on site with J. Glowacki.
Normal operation overnight.
Red Light Summary:

1. LW Responsivity (red)
2. SW Responsivity (red)
3. Outside air temperature (red - failed)
4. HBB controller temp (red – failed)

20:31 UTC Terminate data collection (AERI-08)
Manual backup of \config and \eleccal (AERI-08)
Set up for UW 3rd BB Test using s/n 30.

22:25 UTC Begin UW 3rd BB test on AERI-08

23:17 UTC Intermediate BB stable at 318.056K (apex). Excellent agreement with observed brightness temperature 318.0K ! Spectrally flat. This shows that AERI-08 remains in good calibration despite a dirty scene mirror and degraded entrance window.

23:29 UTC ! For unknown reason the Ambient side of the BBC began to heat uncontrollably.

23:55 UTC Shutdown and backup data from AERI-08.

05 March 2002

01:00 UTC Begin disassembly of AERI-08. Note only AERI sensor module is being replaced.
Note Stirling Cooler meter reads: 14822.17 hours.
Noticed that AERI-08 scene mirror and interferometer entrance window are badly degraded.

03:52 UTC Brought AERI-06 interferometer serial number MR-100 SZM433G1 June 1996.
Power to interferometer. Normal operation of MR-100 LEDs.

05:43 UTC Power to BBs. All connected except air handler.
Changing configuration files to convert from AERI-08 to AERI-06 using the same electronics rack computer.

06:20 UTC Set up for UW 3rd BB test on AERI-06.
MCT Gain D; INSB Gain D; F.S. 6.4 mm

07:06 UTC Turned off ABB controller because it was heating uncontrollably.
Left site for the night. Note: forgot to copy new files into \config!

20:00 UTC Return to site
Nominal operation overnight in UW 3rd BB test configuration (3rd BB at ambient).
Agreement at ambient is within 0.1 C.
* Edited AESITTER.SCR to make all yellow ranges equal to red ranges.
This will make realtime and Health and Status “sit” files consistent.
Set LW and SW responsivity ranges to be red at 10% below current value.

22:00 UTC Noticed that “ABBMaxTempDiff” is reporting an incorrect value (0.9 C) instead of the actual value of 0.03 C. Removed this item from the AESITTER display until this issue is resolved.

22:05 UTC Removed BBC s/n 14 (the one brought by ROK as luggage) and removed the fixed resistor. J. Glowacki installed the fixed resistor into BBC s/n 03 (original unit).

23:00 UTC Reinstalled s/n 03.
Begin UW 3rd BB test with Ambient controller set to 962.

06 March 2002

00:48 UTC NBBapexTemp = 317.77K; B.T. at 1000 cm-1 = 317.74K +- 0.05K.
AERI-06 PASSED !!!

00:52 UTC Terminate UW 3rd BB test and archive to PSS DAT tape.

01:22 UTC Switched to "op" configuration for normal sky viewing.

03:45 UTC ROK and J. Glowacki performed Field of View mapping for HBB, ABB, and SKY views.

03:50 UTC Aligned AERI-06 under hatch opening.

04:14 UTC Begin data collection

05:00 UTC Everything looks good. Left site for the night.

20:15 UTC Return to site.

AERI operating normally. All green lights except Hatch indicator is not valid.

20:22 UTC Began to diagnose hatch controller logic. J. Glowacki measured pin out voltages.

Sent fax to Connor Flynn requesting circuit diagram of hatch controller.

22:00 UTC Reviewed AERI-MADS system in the "I" van. Changed configuration from "AERI-08" to "AERI-06". Checked that NEW_R_DAY works correctly.

00:54 UTC Observed that sun sensor properly "safes" mirror during solar noon (about 01:00-02:00 UTC).

07 March 2002

01:00 UTC Performed tape backups of all test data and system software. Inserted new tape.

Added an icon "RT" to the OS/2 launchpad to run "hresview | more" in a window.

04:47 UTC Briefly shutdown system to save desktop settings. (Not on backup tape!)

22:45 UTC Attempted repair of Hatch Controller indicator.

"J3" was wired to UPS plug instead of AERI SCE J8 plug.

J. Glowacki set jumpers so that "1" is true on hatchClosedDetect and hatchOpenDetect.

23:10 UT ROK changed "aerihk.cfg" from HatchPolarity=low to HatchPolarity=high. Copied this file to floppy disk but **not** to PSS tape!!!
Left for airport.

Summary

The AERI Nauru repair visit was very successful. A brief summary is provided below:

- R. Knuteson (UW-SSEC) arrives on site Monday 04 March 2002.
- J. Glowacki (BOM) has new hatch installed and has cleaned AERI rain sensor (rusty residue).
- AERI-08 system is functional but with some red lights.
- Ran UW calibration test on AERI-08 before removal. Passed.
- Removed AERI-08 and installed AERI-06
- Installed a fixed resistor in the blackbody controller (BBC s/n 03) to avoid problems with the manual set point switch. Both accidental bumping and contamination over time.
- Performed alignment check (FOV mapping) on AERI-06.
- Performed UW calibration test on AERI-06. Passed.
- Modified Max/Min software limits on the operator display to make the health and status information (GOES uplink) consistent with the operator display. Only Green (OK) and Red (problem) lights will appear.
- Packed AERI-08 for shipment to USA. Bagged interferometer and filled with dry nitrogen.
- Modified hatch controller to fix wiring problem with sensor indicator.
- R. Knuteson and J. Glowacki depart site on Friday 08 March 2002.

UW Recommendations

The following actions are recommended by R. Knuteson (UW-SSEC) in order to avoid the problems encountered during the past 18 months of operation at Nauru. In general, the same routine maintenance provided at the SGP and NSA sites need to be incorporated into procedures of the site operators and the reset teams. These are my suggestions on how to implement these procedures and are of course subject to revision by those more familiar with site operations.

1. The hatch and AERI rain sensors (2 sensors) require routine (daily or weekly) cleaning by site operators by rinsing with clean water. This will prevent dust and salt deposits from accumulating on the sensors and degrading their performance. J. Glowacki (BOM) should write up a procedure for this as soon as possible. Note that a permanent ladder (or stairs) needs to be built for the "A" van in order to accomplish this task safely since the rain sensors are near the hatch opening.
2. The AERI scene mirror requires routine cleaning and/or replacement. Recommend that each reset team (about every 3 months) inspect the AERI scene mirror and either clean or replace the mirror depending it's condition. Photograph and document condition.
3. The AERI interferometer entrance window should be inspected by each reset team during mirror cleaning. Do not touch or attempt to clean. Photograph and document condition.
4. General cleaning of exterior surfaces and replacement of AERI air handler and van blower filters at each reset.

End of Trip Report