

**ARM Nauru Research Station**  
**Site Visit 0309N Report**

Visit Duration: 15 September to 26 September 2003

Denig District, Republic of Nauru

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## **Introduction**

The main goals of the TWP Operations Site Visit 0308-N Visit to ARCS-2 at Nauru were the following: 1) Instrument change out, comparison and calibration 2) Repair MMCR 3) Install replacement CIMEL.

This report is organized according to the planned tasks or work units performed during the Site Visit. Within these work units the activities accomplished are arranged chronologically. Most of the information was put together by the Site Visit Team members based on the actual visit, daily reports.

### **A. TWP Operations Management and Site Visits**

Site Visits are scheduled on approximately four-month intervals and are focused mainly on routine maintenance, instrument calibration, instrument replacement, and training. Sometimes non-routine visits are needed for technical tasks such as emergency repairs, retrofits, and/or the addition of new instruments. A formal audit-out is performed before departure.

The work on the Site Visit is performed by the Site Visit team, but often in close coordination with the local on-site Observers. The team holds a daily, morning tasking meeting at the site using the proposed Site Visit tasking schedule. After each day's work, the team meets to summarize work activities and an assigned team member writes a "Daily Report" and e-mails the report to TWP personnel in the U.S. Because of time-zone differences, necessary calls to instrument mentors in the U.S. are done in the morning.

#### **Site Visit Members**

- Rex Pearson
- Troy Culgan

## B. Tasks Performed - Nauru

### 1. Review site safety practices with observers

15 Sept:

- Working on U Van fault gave a good example of safety – finding the circuit breaker cover missing – it was pointed out that this is a dangerous situation and should be reported if this is found. As the U Van 240 circuit breaker panel is something we have not worked on before I cannot say how long the cover has been missing.

### 2. Cal Kit box and equipment set up

25 Sept:

- Cal equipment stored in cal box where there is site spares

### 3. Cal Kit checklist review

### 4. Instrument calibration

15 Sept:

- Setup calibration equipment – to allow stabilization
- Ventilators placed on cal stand and fans wired up.

16 Sept:

- Electronic calibration of cal logger completed.
- Electronic calibration of Skyrad logger completed
- Electronic calibration of gndrad logger completed

17 Sept:

- Ceilometer checks completed

18 Sept:

- Ceilometer battery replaced

### 5. Instrument comparison

16 Sept:

- Checked current radiometer cal coefficients – sent to Porch for verification.
- Comparison radiometers placed on cal stand and connected to cal logger.
- Cal logger connected to network on ttySI7 port.

17 Sept:

- Barometer comparison completed – data sent to Porch
- Smet TRH comparison setup for tomorrow

18 Sept:

- Smet comparison completed.

19 Sept:

- Radiometer comparison continuing – data sent to Porch

19 Sept:

- IRT comparison with blackbody completed

20 Sept:

- Radiometer comparison continued – data sent to B. Porch

21 Sept:

- Radiometers swapped out, data sent to B. Porch
- Instrument change forms sent to B Porch.

22 Sept:

- Gndrad radiometers inverted into their correct position (i.e. facing downwards)

## 6. Calibrate WSI

22 Sept:

- WSI cal commenced. It was noticed the spectral density filter wheel was not turning, this has now been repaired. Fault was due to a sticky bearing on the lower end of the stepper motor drive shaft.

- WSI is covered as part of the cal process – the collection will not be reading correctly. WSI taken off line at 2230z today.

23 Sept:

- Commenced WSI calibration procedures.
- The install program did not automatically create the directory and install the files. I checked with Janet/Monique to see if it was ok to manually create the directories and install the files and was advised it was.
- When attempting to do the test calibration – the computer keeps crashing after the first part of the dome calibration – during the latter part of the dome cal there is an error message:

AT200 error unresponsive

Error in DSP\_IRQB

- Up until this point it (dark cal and first part of the dome cal) everything looked normal. If this can be passed on to MPL to see if they have any ideas and I will call them in the morning.
- The lamp power supply has also locked up. The LCD display was only showing 11/2 lines and the contrast was such that the display could not be read. The Start/stop switch didn't function – indicating the processor had probably locked up – this was after about an hour of testing. The unit was under a sun shade (tent type structure) sitting on a table on the WSI stand. The only way to turn off the unit was to remove mains power.

24 Sept:

- Continued WSI calibration procedure.
- Had continued lockup problems with the lamp power supply and had to turn it off, wait for it to cool down then restart the test. This happened about 5 times during the day making progress slow.
- We have reached step 11 – absolute calibration.

25 Sept:

- WSI calibration completed.
- Data ftp'ed from WSI computer and burnt onto CD
- WSI calibration equipment packed and ready for shipment

## 7. Change out CIMEL

17 Sept:

- Attempted to change the Cimel without success. There appears to be a problem in setting the password – the system never goes to the password screen but starts rotating the Cimel in a continuous circle.
- Email sent to Reass for forwarding on to mentor.

26 Sept:

- Cleaned solder joints on button connector and cleaned contacts of the connector. Was able to program the Cimel.
- Set time, aligned and checked sun calibration, put into run mode

## 8. Gndrad IRT – troubleshoot problem as per Morris instructions.

21 Sept:

- Whilst downloading gndrad data we noticed noise on the data line.
- The outside end fibre modem was changed and this solved the problem.
- We don't know if this has any relationship to the IRT problem.

22 Sept:

- No further problems noticed with gndrad data – can Vic Morris check to confirm data

24 Sept:

- Data confirmed as normal

## 9. MWR heater – replaces as per Morris Instructions and return old unit to SGP.

18 Sept:

- MWR heater assembly changed – Config updated

## 10. Perform MMCR checks as per Widener instructions

15 Sept:

- Commenced work on circulator temp monitoring fault.
- Checked the signal conditioning modules - these were ok.
- Replaced the RTD sensors and fault rectified, the health message is now showing correct circulator temperatures.
- Commenced work on missing 12 volt power supply monitoring functions.

16 Sept:

- Replaced mux – nill effect on 12 volt readings.
- Replaced ADC – nill effect on readings.
- Checking wiring to J1/J3 connector from Lemo connectors on Radar and DMS computers.
- Wiring on J3 connector is incorrect – changed wiring to match handbook data and both 12 volts supplies now reading correctly.

17 Sept:

- Attempted to get the MMCR to self calibrate – unsuccessfully. Have advised Kevin Widener and awaiting any ideas.

19 Sept:

- Kevin Widener is investigating methods to solve the problem.

20 Sept:

- MMCR Mux and ADC units restored to original units and monitoring panel reinstalled in back of the rack.

## 11. Review correct Sonde launch procedures using Velcro strap.

18 Sept:

- Discussed the use of the Velcro strap and unwind mechanism.  
Nic has taken on board the use of the strap and will ensure it is used for all launches. The Velcro strap was replaced.

19 Sept:

- Observed today's launch using the correct procedure and flight went as it should.

12. Train observers on TSI mirror cleaning w/ wax as per Morris instructions

19 Sept:

- Checked procedure used by observers.
- An instruction will be written up and sent to TWP office

13. Investigate AERI hot blackbody problem as reported by Demergian.

15 Sept:

- Reset HBB controller thumbwheel switches to 984 and the temperature of the HBB dropped to 333k. Advised Ralph/Jack so they can check further to confirm all is ok.

21 Sept:

- HBB temperature back to 337k. Performed connector checks as per request from Ralph/Jack. Temperature is back to 333k after checks completed. Email sent to mentors advising checks are completed.

22 Sept:

- HBB temperatures check this morning/afternoon and were normal.

24 Sept:

- Mentors confirmed all looks ok with the HBB temperature now

14. Establish means to get raw sonde file to Mather as done on Manus.

25 Sept:

- Asked observers to email raw file to Jim Mather – will try test tomorrow

15. Install smoke Alarms in Y, X, and AERI vans.

19 Sept:

- Alarms fitted in the 3 vans and tested

16. Desiccant - change out in all instruments to Envirogel

17 Sept:

- Desiccant changed out in all instruments

17. Outfitters phone -revise restricted dialing to include Nauru House

15 Sept:

- Additional dial restriction numbers added to phonebook as per Cheryl Straub request

18. Outfitters phone- Check Sat Fax operation

16 Sept:

- Checked fax machine/sat-phone – no obvious signs of problems, turned off auto-receive and back on again. Test fax from Apple and Reass received ok.

19. COM line – install spare Skyrad/calibration line

16 Sept:

- Com line connected to Skyrad stand and to data system on - ttySI7
- Confirmed communications to cal logger.
- Fibre jumper box record updated.

20. Report progress of Storage shed construction.

15 Sept:

- Diesel storage shed roof and wall framing completed, requires outer mesh and gates to be fitted.

25 Sept:

- No further work on storage shed

21. Train observers to use address book with Outlook Express e-mail program.

22. Verify correct hardware and cabling is onsite of future installation of Brusag tracker.

25 Sept:

- All Brusag hardware appears to be here but will need a mounting plate and instrument mounting plate (I think there is one in Darwin)

23. Tidy site prior to departure.

26 Sept:

- General tidy up of site

24. Check U Van Mains failures

15 Sept:

- Checked U Van for cause of U Van work side mains power failing.
- The circuit breaker was not tripping, but the action of switching off the circuit and restoring it reapplied mains to the van. The problem turned out to be the under/over voltage detection circuit – this was tripping due to a high mains voltage - 427 volts per phase whereas the nominal voltage is 415 volts. Reset the trip point slightly higher and problem has not reoccurred.
- I showed the observers how to switch on the voltage detector bypass switch incase of future problems.

25 Sept:

- Cover located and installed in distribution box

25. Replace WSI white box filter assembly

19 Sept:

- Removed corroded outer cover.
- Cleaned corrosion on main cabinet frame and coated to prevent further degradation, installed new frame and filter

26. Check A/C unit in Z Van

20 Sept:

- A/C unit in Z van checked – power supply normal to unit.
- Replaced batteries in remote control and checked remote control on the Y van A/C unit – it functioned.
- Switched A/C unit to manual operation and A/C started to function.
- Fault is in the receiver unit (in the A/C) for remote control operation.
- This will not stop the A/C from functioning just does not allow the remote control to be used.

27. Pickup equipment for shipment

22 Sept:

- Commenced packing up MMCR equipment to be sent to Darwin.
- Commenced packing up radiometers for shipment.
- Commenced packing cal equipment to send to Manus

25 Sept:

- WSI cal equipment packed for shipping

28. MPL sun shade not operating properly

25 Sept

- Noticed MPL sunshade is not operating properly.
- Contacted Conner Flynn who is trying to obtain some information and send over before we leave.

26 Sept:

- Additional work done on the mpl shutter, there was a burnt out relay on the motor control. The motors seem to be overheating and going out on some sort of thermal overload. No ready fix seems apparent.

- We came up with the idea of and discussed with Conner:
  1. Observers will manually raise the shutter of a night time and turn off the compressors allowing them to cool down
  2. Of a day time they will set the shutter to normal and turn on the compressors – hopefully this will allow the system to function but will at least collect more data then is currently happening.
  3. We will ship the sunshade from Darwin to Nauru where the observers can install it in the Nauru system
  4. Conner Flynn will ship the replacement sunshade to Darwin for use when Darwin gets an MPL

## 29. Electrolyser basic maintenance

25 Sept:

- Troy completed basic maintenance on the electrolyser – no problems were apparent. Spares list will be checked tomorrow in preparation for the full maintenance in November

## C. Future Tasks

1. DS – APC UPS soft shutdown software installation.
2. K&Z trackers – automate time setting of solar tracker (ECR 00320)?
3. Set up spare Brusag tracker on Cal stand.

## D. Shipping

1. After Nauru Cal visit ship WSI Calibrator to Darwin.
2. Send removed MWR heater/blower assembly to SGP for upgrade.
3. Ship MPL Sunshade from Darwin to Nauru.
4. Send Radiometers to SGP for Calibration.
5. Send Cal equipment to Manus.
6. Send MMCR equipment back to Darwin.
7. Ship Brusag mounting plates to Darwin.

## **E. Requirements**

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Internal covers for 240 volt switchboard.

Manufacturer Square D – model NH29TS – type 1 series E1

Photos attached to show what is required. This will need to be ordered in the US as Square D is not common in Australia.

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Require 2 additional fire extinguishers to replace rusted out units.

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Require replacement 3 phase monitor module for U van

Manufacturer – Time Mark

Model EX269 – 3P over/under power monitor

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