FOREIGN TRIP REPORT

A1. SUMMARY :

Report date : 10th September 2001
Traveler : Rex Pearson [1]
Destination : Nauru Island, Republic of Nauru
Dates : 12th August 2001 to 25th August 2001

A2. PURPOSE

This trip was part of the DOE[1] ARM[2] Program's continuing efforts to establish several ARCS[3] sites in the Tropical Western Pacific (TWP) region. The first ARCS was installed on Manus Island in Papua New Guinea (PNG) in the summer of 1996 and the second ARCS was installed on the Island of Nauru in the Central Pacific in the fall of 1998.

This particular trip was for emergency maintenance on the Nauru site to attempt repair of the Brusag tracker and other maintenance activities.

A3. ABSTRACT

The Department of Energy's ARM program has begun phased operations of Cloud and Radiation Testbed facilities in the TWP. TWP science considerations require that several observation stations be sited across the Pacific Basin from Indonesia to east of the dateline. To meet these requirements the ARM program is developing ARCS, which will operate in a semi-autonomous mode for long periods in remote locations. We began operations of the first ARCS on the island of Manus in PNG in the fall of 1996 and installed the second ARCS for Nauru Island in the central area of the TWP in 1998. Regularly scheduled maintenance, improvement and calibration visits are required for both sites by ARM Operations. Teams made up of technical personnel from several national labs participate in those visits, known as RESETs.

This report outlines the emergency maintenance visit by Rex Pearson.
The description for each item is based on the daily activity at the site.

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[1] Technical Officer, Australian Bureau of Meteorology

B. REPORT

Activities on Nauru site 13th August to 24th August 2001

13th August (Monday)

- Assessed the condition of the existing Brusag tracker
  Power and external cabling appear to be intact and within normal limits.
  Cover for tracker was opened and water "poured" out of the tracker.
  The control PCB was removed and inspected, the lower half of the board is badly water damaged and corroded.
- Commenced testing of other control boards on site with existing tracker – nil functioned.

14th August (Tuesday)

- Commenced fault finding on the control PCB's from the Brusag tracker's.
- Requested a schematic of the control boards from B. Kornkie.
- Initial evaluation of Cimel to ascertain why the elevation section is not functioning correctly. The elevation drive belt is stretched and slipping.

15th August (Wednesday)

- Cimel adjustment completed and tracker aligned. Replacement belt needs to be ordered and replaced on Reset 14.
- Schematic diagrams for the Brusag arrived in electronic format. Fault finding commenced on the printed circuit boards.
- PCB number 1 repaired – datacomms to PCB not functioning due to faulty protection diodes (transorbs). Cut diodes from circuit and board now functions correctly.
- PCB number 2 repaired – datacomms to PCB not functioning due to lack of power to RS232/TTL integrated circuit. Found faulty transistor in inverter circuit, replaced and tested normal.
- One of the connection cables from the Brusag to the external connection box has an open circuit wire in the cable. The cable will need to be replaced.

16th August (Thursday)

- Commenced testing trackers with repaired control boards.
- Found parts of trackers functioned. One tracker was dismantled and the operation of the tracker was observed. The elevation motor was not turning, whereas the

azimuth motor functioned normally. The control leads were “swapped” and the functions stayed the same – confirming the control board was functioning and there was a problem in the elevation motor.

- On inspection the elevation motor was very tight to turn whereas the azimuth motor turned freely.
- Two “good” motors were obtained from the tests and one tracker assembled. Confirmation of operation was performed on the bench before assembling in the field.
- The good unit was placed in the skyrad stand and aligned. The unit was placed into operation at approximately 1500.
- As requested data from the tracker was FTP’ed to the ARM website from then until I left on the following Friday for verification. Files were uploaded every night at approx 1730 Nauru time. NO confirmation was received that the data was ok – so I had to assume that it was.

17th August (Friday)

- The third tracker (water logged one) was dismantled and checked for damage. The motors were ok but the unit would not align reliably. This was traced to the optical encoder disk moving on its mount. It appears that the disk is glued to the shaft with final adjustments made by a set screw arrangement. I was unable to repair this due to lack of suitable glues and an alignment procedure.
- To repair the trackers a set of new gaskets and motors will be required, together with a new control PCB.
- Checked operation of Brusag during the day – all normal, data FTP to ARM site at approx 1730.

18th August (Saturday)

- Completed tests on Trackers. It is possible to get the remaining trackers working on Nauru provided suitable replacement parts are provided. This may eliminate shipping to Darwin and the associated costs.
- Started work on SAM access problems in I van.
- GEC programmer not functioning. Batteries flat. Could not find charger. Flashed the batteries to get some charge into them and built a replacement charger from the “old” cellular phone charger. After several hours had sufficient charge in the batteries to operate the programmer.
- The analogue module in the I van that monitors the Clary UPS was not indicating any activity. Checked the unit for supply and any fuses.

All appeared normal. Removed unit and dismantled to check for any internal fuses or obvious damage. The power transformer was warm indication there was power getting to it. I did not proceed with further fault finding as I had no details of the unit.

- Replaced the analogue unit and reprogrammed. Indicator lights indicated the unit was functioning. Confirmed the operation via the SAM laptop and several hours later via the H&S display.
- Checked operation of Brusag during the day – NIP sun alignment slightly off (will adjust tomorrow), data FTP to ARM site at approx 1730.

19th August (Sunday)

- Checked alignment of the Brusag and made a slight correction to the NIP alignment to center the sun on the NIP. The radiometers were shading correctly.
- Transferred the WSI files to the NT computer as requested by W. Porch.
- Commenced fault finding on PowerTrac unit in I van. Replaced and reprogrammed the module. Confirmed operation on SAM and several hours later on the H&S display.
- Looked into alarm on SAM – “SAM access components power” but was unable to find what this meant. Have sent an e-mail to W. Kornke to see if we can find what this is for the RESET visit.
- Checked operation of Brusag during the day – all normal, data FTP to ARM site at approx 1730.

20th August (Monday)

- Kipp tracker did not arrive – changed return travel details until the following Friday.
- Replaced airconditioner in D van (AdAM side) as the one there was not functioning. The replacement was only slightly better but was providing some cool air. I suggest this needs to be replaced during the RESET14.
- SAM indicating high humidity readings in the U van work side. Checked against the Visala handheld unit and confirmed the readings

on SAM were correct. Suspect the dehumidifier is not functioning properly.
- Install the APC UPS in I van and connect to Ceil and MWR laptops and move the MWR electronics onto the UPS power.
- Move AERI computer onto the APC UPS supply.
- Checked operation of Brusag during the day – all normal, data FTP to ARM site at approx 1730.

21st August (Tuesday)

- Teleconference.
- High voltage readings were occurring on the SAM display for the mains grid. This was happening when on Genset. Reset the genset voltage to 240v/50Hz. The genset was producing 250/1 volts and 51Hz.
- FTP'ed WSI files to ARM site as requested after I was advised where to find the files on AdAM.
- Checked operation of Brusag during the day – all normal, data FTP to ARM site at approx 1730.

22nd August (Wednesday)

- Complete wiring for Kipp tracker, added cabling to get tracker onto the 110v APC UPS. Provided cabling to get the 110v to the cal skyrad stand.
- Checked operation of Brusag during the day – all normal, data FTP to ARM site at approx 1730.

23rd August (Thursday)

- Kipp tracker arrived !!!
- Assembled unit, assembled radiometers and placed NIP and suneye on the tracker. Installed the tracker on the calibration skyrad stand.
- Aligned tracker and placed into suntrack mode at 0100Z.
- Monitored Kipp and Brusag for accuracy.
- Visit to IES site with Andrew – pictures sent to Larry Jones.
- Checked operation of Brusag during the day – all normal, data FTP to ARM site at approx 1730. Have NOT heard if the data is ok – have to assume it is as nothing heard.

- Configuration changes to Brusag Tracker were minimal, I changed the offset values of the elevation by .2 degrees to compensate for the different back end of the tracker. (This is to adjust for the alignment/offset of the optical encoder)

24th August (Friday)

- General site check.
- Brusag and Kipp tracking normally.
- Return to Brisbane

C1. ITINERARY

Itinerary for Rex Pearson

From/To	Date	Purpose
Darwin/Brisbane	12th August 2001	Air travel to Nauru
Brisbane/Nauru	12th August 2001	Air travel to Nauru
Nauru	13th/24th August 2001	Nauru maintenance
Nauru/Brisbane	24th August 2001	Air travel to Darwin
Brisbane/Darwin	25th August 2001	Air travel to Darwin

C2. KEY CONTACTS

Nauruan Government:

- Andrew Kaiurea – Nauru IDI (Administrative contact)
- Henry Harris, On-site observer
- Nicolas Duruburia, On-site observer
- Franklin Teimitsi – Nauru IDI (Observer)

Australian Bureau of Meteorology:

- Colin Maxwell
- Troy Culgan
- John Glowacki
- Tony Baldwin
- Mat Gould