

**ARM Nauru Research Station  
RESET Visit 12N Report**

*Visit Duration: 16 – 27 October 2000*

Denig District, Republic of Nauru

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## **A. INTRODUCTION**

The main goals of the TWP Operations RESET-12N Visit (non-routine) to ARCS-2 at Denig District, Republic of Nauru were the following: 1) Replace the MPL Laser Diode; and 2) Perform DC Power Upgrades. Details of the RESET visit planning are found in Attachment 3.

This Report is organized according to the planned tasks or work units performed during the RESET Visit. Within these work units the activities accomplished are arranged chronologically. Most of the information was put together by the RESET-12N members based on the actual visit, daily reports.

## **B. TWP OPERATIONS MANAGEMENT AND RESET VISITS**

Once an ARCS Site is established, TWP Operations maintains the site and performs data reporting. TWP Operations also coordinates equipment retrofits at the established sites, accomplished by local NWS site personnel, routine RESET visits, and non-routine RESET visits.

### **Routine RESET Visits**

Routine visits are scheduled on approximately six-month intervals and are focused mainly on routine maintenance, instrument calibration, instrument replacement, and training. A formal audit-in is performed upon arrival and audit-out before departure.

### **Non-routine RESET Visits**

Non-routine visits are intended for technical non-routine tasks such as emergency repairs, retrofits, and/or the addition of new instruments.

The work on a RESET visit is performed by the RESET 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 RESET 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.

### **RESET 12N Members**

- Bill Kornke
- Dennis Morrison
- Larry Yellowhorse
- Grant Jeffery
- Observers and the observers

## **C. TASKS PERFORMED**

### **1. Install Outfitter's Inmarsat B Unit**

**16 Oct**

- The sat-phone antenna has been installed on a dedicated mast (unistrut). Test calls were made to the States and the landline phone at the site. We cannot, however, dial to the sat-phone from the local site. The manual mentions that some locations require operator assistance. The important test, of course, will be from the States. I don't want to broadcast the number here but will forward it to L Jones, Cliff and Monty.

**17 Oct**

- Sat-Phone tests from the States and site-to-site were successful but some connection quality issues were raised. Per Eagan's suggestions we have changed port baud rate to 2400. The manual recommends 9600 baud even with the nominal 2400 phone-to-satellite bit rate. We will give it a try at any rate. We spent some time trying to fine tune the satellite signal but we are already at 480 out of 500 and probably can't get any better than that. (Kornke, Yellowhorse, Morrison)
- Contacted ARCS1 via Sat Phone for GOES troubleshooting. (Kornke)

**20 Oct**

- Started cleaning up the phone lines and the installation of the Outfitter and Phone Manager. (Kornke)
- Connected FAX machine to the Outfitter phone. You can test! I will forward the number via email to TWPPO. (Kornke)

**22 Oct**

- In response to Eagan's Sat Phone transmission quality issues, I have re-routed the antenna cable. (Kornke)

**25 Oct**

- Satellite phone antenna has only been slightly relocated due to a very short coax. We'll have one more day to find the best position so we'll need feedback. We've experimented here by dialing into ADaM –Sat phone to Courier to see for ourselves. What we've seen here is command entry with lost return.
- Second Nauru Inmarsat B card location unknown.

### **2. Install modem line surge arrestors**

**27Oct**

- Installed modem line surge arrestors.

### **3. Mount CD on ADaM for Eagan remote IOS and zenocom upgrade.**

**20 Oct**

- The (Zenocmm) CD is in the drive for adam and available for use. (Morrison)

**26Oct**

- Zenocom upgrades completed and CD-ROM disk taken to Manus. (Morrison)

### **4. Terminal Server Flash & RAM Memory upgrade**

**19 Oct**

- The terminal server upgrades are completed. (Morrison)

## **5. UPS change out**

### **18 Oct**

- The new I-Van UPS has been installed and powered up. Some balancing to the output circuits was done to minimize overloading. Circuits 1-3, each 15A, are dedicated to the orange plugs. Ckt 4 (20A) is also dedicated to the orange plugs, specifically the MMCR. Ckt 5 (20A) feeds the standard receptacles on the rear of the UPS unit. Ckt 6 feeds the three twist lock receptacles also on the rear of the US. Right now only the AERI PC and MMCR is on the UPS. We will not perform any tests until we resolve the ACCESS monitoring problems. (Kornke, Yellowhorse)

### **19 Oct**

- We switched off grid power to the site twice today to test the new UPS. Everything went smoothly and without incident. We plan on two or three site shutdowns every day while we're here. After reassembling the old UPS we noticed the 240V 30A circuit on the rear panel. The new replacement UPS is of a different output configuration and we were mistaken about the circuit breaker capacities we reported yesterday. For some strange reason this new one has three 120V 30A circuits. We will have to do some circuit breaker swaps with the old one. (Kornke, Yellowhorse)

### **20 Oct**

- All I-Van instruments are connected to the I-Van UPS. Extension cords from D-Van to I-Van removed. (Kornke)
- Old UPS crated and ready for shipment. Prop # WD27591 (Observers, Yellowhorse)
- I hate to be the bearer of bad news, but the newly installed I-Van UPS has failed to provide backup in much the same way as the other. The UPS failed when site power was switched off for a test; it also failed when site power was restored and the vans were being phased back on to grid power.... we propose trying the following test. We would like to move the UPS from phase c to phase b to get it away from the inductive loads of the air conditioners. Since c is the most heavily used phase and b is the least, this will not put the loads any more out of phase

### **21 Oct**

- I spent most of the day exhausting every conceivable diagnostic on the I-Van UPS. Dennis and Larry brainstormed with me but the problem is so far unidentifiable. I methodically checked loads, wiring, voltage levels, measured for current leakage, changed phases, isolated and eliminated all the variables I could think of. The UPS fails 100% of the time now, failing to support itself even in a no load situation. The problem is isolated at the I-Van, which means the GenSet transfer is out of the picture as a potential problem. It acts as if the batteries don't exist yet we measure a healthy 108VDC. I am going to contact Clary on Tuesday. Their 24-hour hotline is 8-5 PST. (Kornke)

### **23 Oct**

- We did another round of troubleshooting on the I-Van power system. No unknown circuits, ground loops, miswiring, polarity reverses found. Grant told me this problem has been around since the middle of '99. (Kornke)

### **24 Oct**

- The suggestions about the I-Van UPS problem have already been tried. I think we've already hosed the UPS so unless we can get back to square one (a fully

operational unit) we cannot sequence and repeat diagnostics. Also, unless my next contact with Clary reverses things, we will support the I-Van from the D-Van again if possible. I will calculate load requirements and capacities and run appropriate wiring—not Sandia. (Kornke)

#### **25 Oct**

- We're fairly confident that we have identified the UPS problem. Seems the past few replacements are an older model ('94). The isolation transformer puts out too much voltage for the inverter/control module (137VAC grid/142VAC GenSet) ; the tolerance is +10% at 120VAC. The very reliable D-Van UPS is a different model with two transformers, one we're certain is line conditioning. At any rate it puts out a rock solid 120VAC to the UPS inverter. We plan to verify this with Clary in the morning and inquire about an onsite upgrade. Unfortunately, we may have identified the problem but we won't be able to fix it this go 'round. We contacted Clary this morning but we had already done the diagnostics they suggested in addition to ripping into the control module guts. I have recorded S/N's and Yellowhorse took pictures of both units. (Kornke, Yellowhorse)

#### **26 Oct**

- It turned out the second xfrmr is a 240VAC output. We really couldn't trace the wiring that well because it's in a UPS that is actually working with only one side visible. Our only manuals are generic. The real problem was the isolation xfrmr that was tapped for 208VAC instead of 240VAC. I say let's cut our losses and dump this beast in the ocean. What I really mean is, it's time for a new and different unit, or another approach. It's sort of like when you try to fix your old car, you start with an O2 sensor, new plugs, then new injectors and so on. This unit is a '94 with only two years service; we could have almost installed another site for what we've put into it. I did talk with a Clary tech that said new batteries solve 90% of the problems even though they (batteries) pass inspection. He said a good quality battery would last 5 years. That's when I requested a tracer on the current battery bank's age. I'm disappointed that things didn't work out but I was able to support the I-Van instruments from the D-Van UPS. Instead of extension cord, I ran THHN 12 AWG in flex conduit from the D-Van UPS circuits to the I-Van wire track. This allows I-Van instruments to plug into the van wiring also proving there is nothing wrong with the I-Van wiring because it works fine. The D-Van UPS supported the load through extensive testing. D-Van UPS average load is now 60% with a peak of 80%. I also left the I-Van UPS running with no load. I provided for a contingency by wiring the rear outlets so that the observers could pull the flex conduit from the D-Van and replug into the I-Van UPS. Everything is electrically safe. (Kornke, Yellowhorse)
- I-Van is now running off D-Van with a new hardwired line.

### **6. Drawing book checking, red-marking**

#### **23 Oct**

- Site document verification has been started (all).

#### **24 Oct**

- Site document verification is ongoing (all).

#### **25 Oct**

- Site document verification is ongoing (all).

## **26 Oct**

- Site document verification has been started (all).

## **7. MPL change-out – hand-carry documents**

### **16 Oct**

- Dennis tackled the MPL but is running into discrepancies with cables and interfaces. He plans to make some calls first thing tomorrow.

### **17 Oct**

- Dennis got in touch with Conner on the MPL. After sitting power levels with the handheld and aligning, the MPL seems to be working. We notice it is now green on the GOES but data quality should be checked.

### **20 Oct**

- Dennis got the MPL reporting again after ingest problems. (Morrison)

### **23 Oct**

- AERI and MPL data has been ftp'd to Flynn. Morrison said he will email the path, personally, to Flynn. (Morrison)

## **8. Laptop replacement (new BBSS, GOES, and Spare), CPCC upgrades**

### **17 Oct**

- Morrison has started CPCC on the SAM/GOES laptop.

### **18 Oct**

- Morrison completed installation of the replacement BBSS laptop. Ghost imaging went well.
- Not so lucky with the SAM/GOES laptop. Seems we have no messages to transmit. You may have seen some "blue" on the H&S. We are now back to the original laptop until we get some advice. (Morrison)

### **19 Oct**

- Old GOES laptop hard drive installed in replacement laptop. Everything looks OK.

### **26 Oct**

- CPCC installed on Ceilometer and MWR laptops. (Morrison)
- Spare laptop upgraded. (Morrison)

## **9. Observer training: a) Newer sondes will have humidity sensor cap that needs to be removed when used; b) Clean rad domes at 10am daily; c) Outfitter's Inmarsat B use; d) Digital camera use; e) CD Procedure access; and f) He Cylinder handling**

### **19 Oct**

- Larry worked with the observer on the new digital cameras.

### **22 Oct**

- Nick has taken possession of the Digital camera. I've instructed him to send some pictures to TWPPPO. (Kornke)

### **23 Oct**

- The LCD image on the new digital camera is broken. I'll have to bring the camera back. (Kornke)
- Performed sonde cap removal training.



- Instructed Observers to perform radiometer dome cleaning at 10:00am local time daily.
- Trained the Observers on the new Inmarsat B operations.
- Reviewed CD ROM access with Observers.

#### **26Oct**

- Jeffery went over the recommended Helium Cylinder handling procedures with the Observers.

### **10.H2 Generator maintenance: tri-annually(BOM)**

#### **26Oct**

- H2 generator repair and maintenance. (Jeffery)
- Sensor cell changeout for H2 generator –completed. (Jeffery)

### **11.Fix SMET anemometer cable connection.**

#### **19 Oct**

- The anemometer cable modification completed. (Kornke)

### **12.Redo phone system as per US standards**

#### **20 Oct**

- Started cleaning up the phone lines and the installation of the Outfitter and Phone Manager. (Kornke)

#### **26Oct**

- Phone system rework partially complete. (Kornke)

### **13.Check MFRSR Cable connection to head, reconnect**

#### **26Oct**

- Check done and looks fine – verified earlier Observer check.

### **14.Replace D-Van Bard AC Unit parts.**

#### **13Oct**

- Local Air Con folks performed routine maintenance.

#### **26Oct**

- Local Air Con folks replace D-Van AC parts after the RESET mayhem. (Nick)
- Bard AC filter change –completed. (Yellowhorse)

### **15.Check SAM E & I Van power/env sensors or genius blocks-see H&S as they now read zero**

#### **18 Oct**

- The relays that switch power to the I-Van and E-Van ACCESS I/O and PowerTrac boxes aren't energized and we can't seem to find any gui buttons or whatever for the Dig Out control. We'll call tomorrow. (Kornke, Yellowhorse)

#### **19 Oct**

- We asserted the SAM power digital outputs even though the relays they controlled are bypassed and the power is hard-wired. This will eliminate false status on the SAMS. (Kornke, Yellowhorse)

## **16. CIMEL troubleshooting**

**20 Oct**

- Dennis used a spare met tower (SPARCE) battery box to power the CIMEL. It is now working. Someone needs to check data quality. (Morrison)

**21 Oct**

- Dennis found the CIMEL battery he used from the SPARSE met would not hold a charge. All wet cell batteries on the site are marginal, one will be left on charge all night to see if it recovers, but if not, Dennis will buy one locally. (Morrison)

## **17. Mark anemometer alignment clearly on stand**

**19 Oct**

- The anemometer cable modification and index alignment is completed. (Kornke)

## **18. Ship back equipment (File server backup disc, old laptops, redmarked drawing books, etc.) and handcarry spare ADaM backup tape blanks to Manus.**

**20 Oct**

- Old UPS crated and ready for shipment. Prop # WD27591 (Observers, Yellowhorse)

## **19. Audit out**

**27 Oct**

- Audit out completed by Yellowhorse and Observers.

## **20. WSI outside box corroded AC unit replacement**

**22 Oct**

- WSI AC unit changed out. The occulter was calibrated. ARC drive looks clean. (Morrison, Yellowhorse)
- Old AC unit still working and left on island in case it is needed.

## **21. Install florescent light bulbs in existing sockets**

**17 Oct**

- All the energy saving light bulbs have been installed. (Yellowhorse)

## **22. Commission building stairs on spare Skyrad stand**

**23 Oct**

- Stair handrails are being added to the existing Skystand stair. (Yellowhorse)
- Metal stairs attached to the Calibration Skystand.

## **23. Throw away all Observer, Troubleshooting and RESET Manuals**

- Not done – do this on SET-4.

## **(Routine Maintenance tasks)**

### **24. Test generator 12v batteries with Hydrometer (Yellowhorse)**

**20 Oct**

- The GenSet starter batteries have been topped off and Specific Gravity checked. There were no bad cells but a few measured in the “fair” range; just barely outside “good”. (Yellowhorse)

**25. Check diesel fuel level gage.**

**26 Oct**

- Diesel fuel level gage working fine. (Yellowhorse)

**26. Change out sensor cell in Gas Analyzer for H2 Generator (BOM).**

**26 Oct**

- Sensor cell changeout for H2 generator –completed. (Grant)

**27. Change out velcro strap sonde retainer (BOM).**

- Not done.

**28. Change out Netrad Domes**

- Done - Duburiya says Observers do this monthly.

**29. Replace all smoke alarm batteries and CO units.**

**20 Oct**

- The new CO/Smoke detectors (battery powered) installed to replace the existing CO detectors in all the vans. Also put new batteries in the existing smoke detectors. (Yellowhorse)

**26 Oct**

- Smoke alarm test completed and successful. Existing smoke alarms “in-line” and NOT in bypass mode. (Yellowhorse)

**30. Oil Coolant pump on WSI**

**26 Oct**

- WSI pump bearings inspected and coolant pump oiled. (Morrison)

**31. Replace metal screen filters in WSI Blue Box**

**26 Oct**

- WSI metal screen filters –changed. (Morrison)

**32. Apply silicon to hinge parts of Tracker Shading Arm**

**25 Oct**

- Brusag Tracker pivot points-lubed. (Kornke)

**33. MMCR maintenance list(on CD of RESET Manual) plus power up(after UPS changeout) and verify reporting**

**18 Oct**

- The MMCR has been rebooted, a fault light on the TWT remains but the observers say it eventually goes out. I am also seeing some FTP errors on the DMS computer. Since it is late here we'll have to wait for status. It would be good if someone could dial in and look at the MMCR health logfiles it would help. (Konrke)

**19 Oct**

- The MMCR has been rebooted several times today after disk cleanup. It is still giving us trouble and the fault light persists. There is still a question of the 100% full /home

on the DMS. We need some input. I am also seeing some FTP errors on the DMS computer. (Morrison, Kornke)

**20 Oct**

- The MMCR looks OK on the GOES but the power fault light still occasionally comes on. Widener cleaned up /home. (Morrison)

**34. AERI maintenance list(on CD of RESET Manual) plus AERI mirror cleaning and diagnostics troubleshooting – see Flynn list.**

**21 Oct**

- The AERI mirror has been cleaned. No obstructions in the blackbody apertures were found. (Yellowhorse)

**23 Oct**

- AERI and MPL data has been ftp'd to Flynn. Morrison said he will email the path, personally, to Flynn. (Morrison)

**35. BBSS Troubleshooting**

**21 Oct**

- Some bad files have shown up on the BBSS ingest. Dennis is running diagnostics.

**22 Oct**

- Communication between BBSS laptop and DigiCora was OK. There are current files in the ingest, some bad. GOES is still showing “red” after ADaM reboot. This has occurred right after the new laptop replacement although the problem seems to be DigiCora related.
- Morrison is wrestling with the DigiCora comm problem. (Morrison)

**25 Oct**

- Morrison and Yellowhorse have been tackling the BBSS problem. They have reinstalled the original laptop. (Morrison, Yellowhorse)

**26 Oct**

- The BBSS problem is fixed. DigiCora data files are being sent, intact, to ADaM. Seems it was a terminal server problem. (Morrison)

**36. SAM/GOES DC Power UPS**

**22 Oct**

- A system check was done on the D-Van battery backup for the SAMS/GOES. It appears the PV controller failed to shutoff the charge at the setpoint and the battery was overcharged. I removed the outside battery cover; the battery was very hot. The batteries have expanded and are cracked. I did a check on each cell and found them to be OK. I have recalibrated the PV controller and lowered the DC power supply voltage output in case the controller is broken. I'll have to keep an eye on it for a few days. (Kornke)

**23 Oct**

- PV charger for GOES/SAMS backup is not working. If this is removed, we will be left with one level of backup- the D-Van UPS, which shouldn't be a problem. (Kornke)

**24 Oct**

- The PV system is by-passed. The SAMS runs from the D-Van UPS CKT-4, the 12VDC (fused) for the GOES comes from the power supply which is connected also to CKT-4. (Kornke, Yellowhorse)
- Repaired loose and shorted powers supply banana jacks on the GOES xmitter. This needs to be replaced with a circular connector. (Kornke)
- Due to the PV work, GOES lost it's time. The transmission time was corrected; Dennis found a manual onsite. We couldn't find it on the CD. (Morrison)

**37. Other****20 Oct**

- Filled paper trays on ADaM printer. Ran print command; did a few screendumps. Let's not forget this as a diagnostic tool even though connections are improving. (Kornke)

**22 Oct**

- Ceilometer network cable was inadvertently pulled out during our I-Van UPS troubleshooting. (Morrison)

**Future RESET tasks:**

- Work I-Van UPS problem(now D-Van seems to have same problem). Possible redesign of system. Need to replace batteries every 3 years. They tested fine but they are 5 years old. UPS manufacturer says installing fresh batteries (regardless of test results) has solved this UPS problem on other units. After installing new batteries, test it, then rewire I Van to be independent (possibly not – set up redundant system between I and D Vans.) Batteries could be changed out by Grant Jeffery of the BOM if necessary.
- Check SAM/GOES connection due to recent problems immediately after power outages. Possibly not plugged into the orange UPS sockets. Kornke rewired the GOES/SAM UPS backup. Possibly add battery/charger in line to replace failed one Kornke removed.
- Throw away paper manuals after verifying Observers can access procedures via CD ROM.
- Review with Nicholas what the alarm was during the D-Van battery bubble over – evidently it did not shut the Van down. If it was the new battery powered alarms it should have been a voice and not a buzz.

**Items to be Purchased:**

- Replacement UPS batteries.
- Replacement UPS and battery for GOES/SAM backup – Kornke
- Replacement spare BARD A/C unit “relay” P/N 3100-150-107/8401-007. Coil – 24V AC.
- Replacement spare BARD A/C unit “circuit breaker” 45amp, 2 pole, 120/240V, type 00V – HACR.(Yellowhorse for details)