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## The Installation of a Digital Autoguider in Carnarvon in 2011 September

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# The Installation of a Digital Autoguider in Carnarvon in 2011 September

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## Abstract

We upgraded the autoguider and mount control system on this visit. We installed a digital autoguider: the mount controller.

## 1 Introduction

Brek Miller and Steven Hale visited Carnarvon from September 19 to October 3. We installed a new digital autoguider—our second mount controller—on this trip.

We also replaced the Peltiers in the aft port detector, removed all of the Mark V electronics from the rack, installed a new motorized network camera, upgraded the computer to Fedora 14, replaced the battery in the small UPS, and replaced the lock on the bunker door.

## 2 New Autoguider

We upgraded the autoguider and mount control system on this visit. The following items were changed:

1. Four modules in the main electronics crate were replaced by the mount controller [1]. These four modules are now no longer needed; they are the autoguider module, the RA and DEC stepper modules, and the mount encoder module.
2. The RA and DEC stepper motors were replaced.
3. The cabling to the motors, limit switches, and the autoguider telescopes was replaced.

The following items were not changed:

1. The autoguider telescopes,
2. The encoders,
3. The Potentiometer-Encoder-to-Serial Adaptor (PESA) [2], and
4. The mount limit switches.

**Motors** Installing the new stepper motors was the most difficult part of the replacement. The new motors were chosen so that they were physically similar in size to the stepper motors we use elsewhere. However the mount in Carnarvon is a smaller version of our normal mounts. The old Carnarvon motors are also somewhat smaller.

Fortunately we still have a copy of the small mount here in Birmingham. It used to be housed in the dogshed on the roof. Parts of it are now stored in the dome; parts of it are sitting on the roof outside the dome. We don't have any drawings of the old mount; so we should keep all of these pieces for reference.

Before sending the motors to Carnarvon, we tried them with the small mount in Birmingham. It was clear that the declination motor was way too large. Barry Jackson purchased a universal joint (RS 511-3785) and made some mounting brackets. We took all of this to Carnarvon: it fit! The declination motor works well.

We didn't think there would be any problem with the right ascension motor. But there was. The new stepper-motor mounting bracket touched the slew-motor bracket. Brek spent an hour filing the slew-motor bracket. It fits now.

**Heat shield** The right ascension worm wheel is covered by a heat shield. The grease lasts much longer when we keep the sun from shining on the gears all day. We needed to make a new heat shield because the old one wasn't large enough to fit over the new motor. We had the work done by Carnarvon Mechanical Services. They charged us \$30, which we thought was quite reasonable.

Carnarvon Mechanical Services used to be called Arkco Engineering and they used to be located on Robinson Street. They have changed their name and moved to a new location:

Carnarvon Mechanical Services  
92 Boundary Road  
Carnarvon, WA 6701

**Autoguider scans** We performed one autoguider scan. It looked exactly like the one we did [3] back in 2009 July. We believe we haven't changed the spectrometer or telescope alignment. Because we were running short of time, we didn't do any more autoguider scans.

### 3 Replaced Peltier

Steve replaced the Peltiers in the port aft detector, which had failed on 2011 March 2. The new Peltiers are more efficient at cooling the detector: they require less power than the other Peltiers. Perhaps the heatsink compound on the other detectors is getting old. Or perhaps Steve is getting better at installing Peltiers.

### 4 Mark V Retired

The original Carnarvon spectrometer, Mark V, hasn't collected useful data since 2009 August 5, just a couple of weeks after Brek and Ian put Jabba back on the mount [3]. We didn't have time to try to fix Mark V on this trip, and we needed to make some space in the rack for the new mount controller, so we removed all the Mark V electronics from the rack and we removed all the Mark V cabling from the bundle. The electronics have been stored in the bunker.

## 5 Computer

**Operating system update** We upgraded the computer from Fedora 10 to Fedora 14. It went smoothly.

**Faulty hard disk** We removed a faulty hard disk from the computer. Our computer contained three hard disks. Two were connected and participating in a RAID array. The third disk was in the computer but not connected. It was a newer disk installed by Brek [3] in 2009 July. It was meant to be used as a backup. It contained a snapshot of the system taken in 2009 July.

We connected this third disk to the computer and disconnected one of the other two. This was to update the backup snapshot. However, after a few days of use, the hard disk became unstable and crashed periodically. We returned it to Birmingham.

Brek tried testing the disk in Birmingham; but by this point, the drive's condition had deteriorated and it wasn't recognized by the BIOS in any of the computers in Birmingham. Brek returned it to Seagate and a replacement has been received. The replacement has been tested and will be sent back to Carnarvon.

**Fan replacement** We replaced the 120-mm case fan in the computer. We bought a cheap 120-mm fan in Carnarvon. But we will send out a higher-quality Akasa fan so that we have a spare in Carnarvon. The 80-mm fan in the power supply was making a funny sound; so we replaced that too. That power supply was bought new [3] in 2009 July.

**Near motherboard disaster** Near the end of the trip, the computer started to crash periodically. We took the computer apart and tried disconnecting and connecting all the hardware. We began to suspect a problem with the motherboard.

Eventually we got the computer to a state where the BIOS wouldn't POST<sup>1</sup>. Nothing appeared on the monitor and the speaker beeped in a way that indicated an error. This suggested a problem with the graphics card. We examined the motherboard carefully. The graphics card's AGP slot looked like some of the contacts were dirty. The whole case was filled with red sandy dirt. It looked like something had got into the slot.

We purchased some canned air from a shop in town. That didn't work.

We bought some Servisol electrical clean and lube from Electronics Plus. It is basically a contact cleaner. We removed the motherboard and even removed the CPU from the motherboard. We cleaned everything, paying particular attention to the AGP slot. The new cleaner worked. But it leaves a film. We cleaned that with methylated spirits. We put the computer back together and it works!

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<sup>1</sup>POST stands for Power On Self Test.

**DSL troubles** Near the end of the trip, we began to have trouble with the DSL internet connection. The modem was disconnecting and reconnecting periodically. It was doing this more than once an hour. Sometimes it happened every few minutes. The DSL modem gets assigned a new IP address every time this happens; so this has a serious impact on connectivity from Birmingham.

We called BigPond and reported the problem, somehow managing to get past all the questions about which version of Windows we have and what firewall we use.

The next day, BigPond notified us that they detected a fault on the line. We left Carnarvon before any repairs were done. The line is now working; but Les Schultz tells us that no engineer visited the dome. We speculate that the problem was in a junction box between the dome and the exchange—possibly near the roadhouse at the junction on the highway. That junction was under several feet of water during the floods in 2010 December.

## 6 Network Camera

We replaced the network camera with a new one. The old camera was an expensive one from Axis. The new one is a cheap Foscam copy. Its image quality is not as good as that of the Axis camera. But it does have two advantages: it has a two-axis motorized mount and it has IR LEDs so that it can see the mount at night.

Two of our Axis cameras have failed (Sutherland [4], Las Campanas [5]). In both cases, water had got into the cameras because they are mounted too close to the window.

Since we bought those Axis cameras, the prices have gone up dramatically. So this time we chose cheaper cameras and we have decided to mount them near the base of the dome and at a greater distance from the shutter. We hope this will keep the water out.

## 7 UPS

We tested the UPSs near the end of the visit. The big one worked; the little one didn't. The big one powers the dome. The little one powers the computer. It was bought new [6] in 2002 November. We suspected that the battery was bad. Nine years is pretty long for UPS batteries. We needed a new 12-V 13-A hr battery.

Les Schultz took us on a long tour around Carnarvon looking for batteries. We finally ordered one for \$98.50 from Craig's Marine. It arrived the next day.

By the way, the big UPS is older. One of its batteries was replaced in 2002 November when the little UPS was purchased.

## 8 Bunker Door Lock

We replaced the lock on the bunker door.

When we first tried to enter the bunker, we found that we couldn't turn the key in the lock. It felt old and rusty. So we turned harder. That broke the lock. Now the key turned the whole way around (and around and around) without doing anything.

We went to Mitre 10 and bought a replacement lock. When we fitted the new lock, we needed to put a aluminium plate behind it. The new lock was smaller and it didn't completely cover the unnecessarily large hole in the door that was cut when the original lock was fitted.

Les Schultz made extra copies of the keys for us.

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