A check on Carnarvon in 2014 November following NBN construction

Hale, Steven J.

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Steven J. Hale

The University of Birmingham, Edgbaston, Birmingham B15 2TT

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High-Resolution Optical-Spectroscopy Group

School of Physics and Astronomy
The University of Birmingham
Edgbaston, Birmingham B15 2TT, United Kingdom
Telephone: +44-121-414-4551 FAX: +44-121-414-1438

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Abstract

The site was checked for damage following the adjacent NBN construction. Everything was cleaned and tidied. The forward detector Peltiers were replaced. The water tank was refilled and the cooling-loop repaired.

1 Introduction

Steven Hale visited Carnarvon from November 6 to November 17.

2 NBN Co

Following the site visit in 2013 September [1], the dome was shutdown and powered off during construction work by NBN Co.

The dome was shutdown on 2013 September 15. It was covered up in an attempt to prevent the majority of the dust and dirt during the NBN ground-works from entering the dome. Once the ground-works were completed on 2013 November 12, the dome was uncovered and operations restarted.

Construction continued for a further 12 months and has now been completed. This site visit was scheduled to check on the state of the site, and make sure everything is operating correctly.

When the dome is on the east limit, the sun is now shadowed by the new NBN antennas. We will probably lose an hour or so of data in the morning for a few days around the summer solstice. It could have been a lot worse.

The floors of both the lower and upper levels of the dome were covered in red sand. It would have been considerably worse if we had not covered up the dome during the initial ground-works. The sand was swept up and removed. There doesn't appear to be any other damage following the work.

The front filters were cleaned on both Jabba and the autoguider. The counts from Jabba increased by almost 42 %. They were very dirty.

3 Water Pump

Upon arrival, the water pump was found to not be running, and one of the hoses was detached from the car-radiator cooling system.

The pump has a built-in float switch. The pump was deactivated because the water level had become too low. Presumably all the water was pumped out when the hose became detached from the radiator. However, there is no visible evidence of any leak or flood. The pump rate is quite slow, and so the water must have had time to drain or evaporate without building up. We are lucky that nothing has been damaged.

There are two big water bottles in the dome. These were used to refill the tank, driving to and from the apartment to collect more water. It took six full bottles over two trips to bring the tank back up to a suitable level for the pump to run.

The hose was reattached to the radiator and the pump allowed to run. All the hose connections were checked and the clips tightened. The system seems be be running fine. The hoses were adjusted slightly to move the flow-meter into a vertical position so that it could operate correctly and be read. The pump was running at 0.6 l/m which is a little slow. The thin hoses that go up to the dome can not handle much pressure before stretching and ballooning, but the pump should be running faster than that.

The system was left to run, and after 24 hours the flow rate had increased to better than 2 l/m, which is the maximum that the flow meter can indicate. This increase happened presumably after the system had had enough time to remove all the air from the pipes.

4 Replaced Peltiers

The Peltiers in the aft port detector were replaced on the last trip [1]. Since then, the cooling on both forward detectors had failed. The Peltiers in both the forward detectors were replaced on this visit.

The Peltiers in the detectors in Jabba do not seem to last very long. We had thought the problem was with the installation. When screwing the photo-diode down onto the Peltiers it is very easy to apply too much pressure and damage the Peltiers. The damage is either catastrophic and instant, or slight and causes delayed premature failure.

However, during this repair the bad Peltiers were visibly corroded, similar to when the aft Peltiers were replaced on the last visit. Maybe it is just the salty coastal air in Carnarvon that causes the failures, and we will just have to budget to replace them regularly.

We currently have only two spare Peltiers remaining.

During the re-installation of the forward-port detector, one of the bracket screws was lost. This should be replaced at the next available opportunity. In the mean time, the missing screw causes no detrimental effects.

Even with the new Peltiers installed, they were struggling to hold the detectors at 20 C. The set-point was increased to 22 C and still requiring over 30 % power to maintain the temperature. This was because the water cooling loop was not operational and the spectrometer was becoming

too hot. The Peltiers can not operate correctly if there is nothing removing the heat from the hot side of the detector. Once the water loop was reactivated and the spectrometer actively cooled, the detector temperature control returned to a normal power level.

The set-point was returned to 20 C and the Peltiers now need to be driven at only 5 % power, which is a typical value.

5 Alignment

The initial autoguider micrometer settings were 5.0 mm in RA and 1.25 mm in Declination, determined on the site visit in 2011 September [2]. A scan was performed in RA with the cell ovens hot. The results are shown in figures 1 and 2. The best alignment was determined to be at 5.0 mm in agreement with the initial setting. It would appear that no movement has taken place during the NBN works and so no further scans were performed.

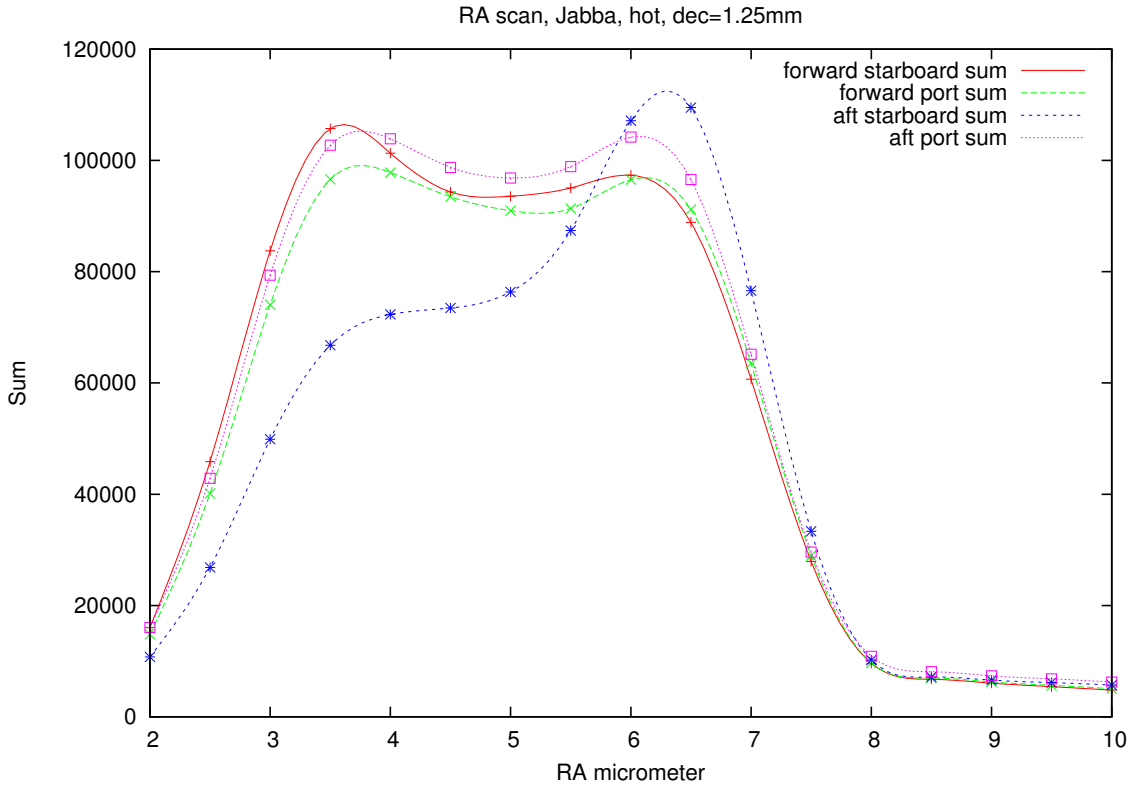

Figure 1: RA Hot Sum

6 Mount controller

The new mount controller was installed during the site visit in 2011 September [2]. Since then, it has operated very reliably.

During this visit, the mount got stuck on one occasion whilst slewing back to the sunrise position overnight. The motors could be heard to be "chopping" even when running on the standard 5 V setting. This means that the current limit is set too low - the current should not need to be "chopped" when running on 5 V.

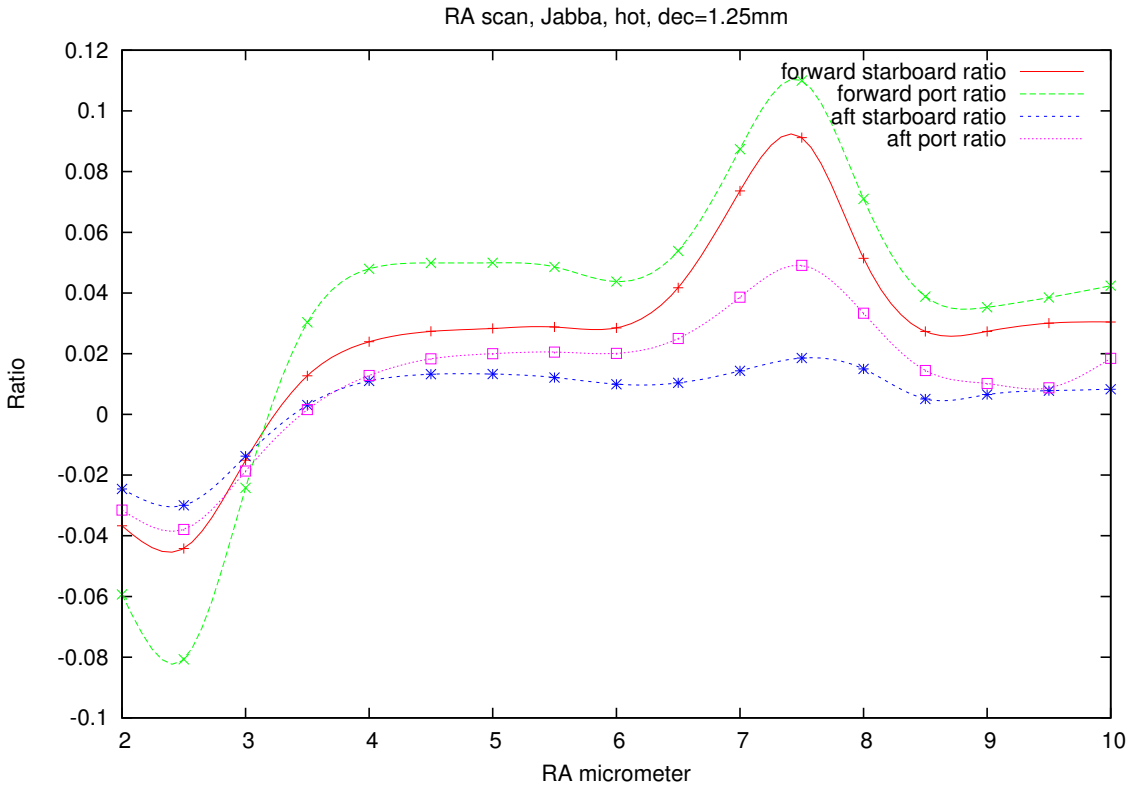

Figure 2: RA Hot Ratio

The current limit was checked and found to be set to 0.7 A which is the correct limit for each motor coil. However, we run the stepper motors in "parallel" configuration rather than "serial". This means that the drive current is split between two coils, making the correct current limit 1.4 A - half goes to each coil.

The drive current was increased to 1.2 A, which still gives a little headroom below the motor specification. The motors now sound much better during operation, and the mount has not got stuck since.

This same fix had to be applied in Las Campanas in 2014 June [3]. It is expected that all four mount controllers will need the current limit to be corrected.

References

[1] Steven J. Hale. Replacement of counters, temperature monitor, and peltiers in Carnarvon in 2013 September. *BISON Technical Report Series,* Number 361, High-Resolution Optical-Spectroscopy Group, Birmingham, United Kingdom, September 2013.

[2] Steven J. Hale and Brek A. Miller. The installation of a digital autoguider in Carnarvon in 2011 September. *BISON Technical Report Series,* Number 348, High-Resolution Optical-Spectroscopy Group, Birmingham, United Kingdom, January 2012.

[3] Steven J. Hale. Blind and mount controller repairs in Las Campanas in 2014 June. *BISON Technical Report Series,* Number 366, High-Resolution Optical-Spectroscopy Group, Birmingham, United Kingdom, July 2014.