# Sutherland Health Check

Hale, Steven J.

# BiSON Birmingham Solar-Oscillations Network

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Steven J. Hale
*The University of Birmingham, Edgbaston, Birmingham B15 2TT*

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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**

A brief look at the current condition of Spectrometer F in Sutherland.

## 1 Previous Visits

The most recent trip to Sutherland was by Roger New in 2003 April [1]. The next trip is currently scheduled for 2006 April, which results in gap of three years.

That is a long time for a station to remain in operation without a visit from Birmingham. This is mainly due to the exceptional level of help we get from the on-site staff in Sutherland. Nevertheless it is likely that a lot of maintenance work is going to be required.

The main aim of Roger's trip was to install his Automatic Gain Control (AGC) circuit [2] to try and improve the Sutherland Auto-guider. This worked well and the AGC was left active on both RA and Dec. However, it later malfunctioned and the RA channel was switched back to 'Normal' in 2004 September by Johann Scholtz.

Roger experienced problems with the port detector temperature control. The detector would rise to ambient temperature during the morning and evening, but would be normal throughout the rest of the day. The problem was a broken conductor in the 25-way cable between controller and spectrometer, so Roger swapped to an unused conductor in the same cable. Later he replaced the whole cable with two 12-way cables in the hope that it would be more flexible.

He also cleaned the front red filter giving an increase of 10K counts on both channels, and fixed a wobbly polaroid mount.

# 2 Problems Experienced

In 2003 [3] October, after Roger's last visit, the shutter limit switch failed causing damage to the shutter track. These were replaced free of charge by Ash Dome. The next month the shutter started shadowing the instrument at noon, and so the shutter encoder was adjusted by Chantal Petersen.

In 2004 [4] September the RA AGC malfunctioned and the RA channel was switched back to 'Normal'. The Dec channel was left on automatic.

In 2005 [5] June the cloud-detector was tripping early, and so the threshold was adjusted to compensate. There were also many computer problems where the PC had to be rebooted.

# 3 Current Condition

## 3.1 Temperatures

*IF* The interference filter is currently running at 31 C and appears to be temperature controlled within half a degree.

*Ambient* The ambient temperature on 2006 March 8 varied between 20 C and 34 C. Obviously this varies throughout the year.

*Oven Bottom*
The oven bottom is constant at 114 C controlled within 0.1 C.

*Spectrometer*
On a relatively cool day the spectrometer temperature is maintained at around 20 C, but tracks the ambient temperature - cooler in the morning and afternoon, slightly hotter at midday. On a hot day the temperature is less well controlled, and varies between around 26 C and 30 C.

*Detectors* Temperature control is erratic. On cool days both detectors are stable at just above 20 C for the entire day. On hot days the detectors are running at maximum cooling power and cannot cope. This is due to the spectrometer temperature being inadequately controlled throughout the day.

*Tank* The water tank is a 1500 litre container with an immersion heater and a flow-through cooler. The heater is set to come on when the tank temperature falls below 18 C, and the cooler set to come on when the tank temperature rises above 22 C. On a relatively cool day, figure 1, the tank temperature remains stable at 24 C. On a hot day, figure 2, the flow-through cooler is on constantly and does not have enough power to control the tank temperature. Additional fans have been installed in an attempt to increase the efficiency of the cooler by improving the airflow, but this has proven to be ineffective. The tank-bottom temperature sensor appears to be dead.

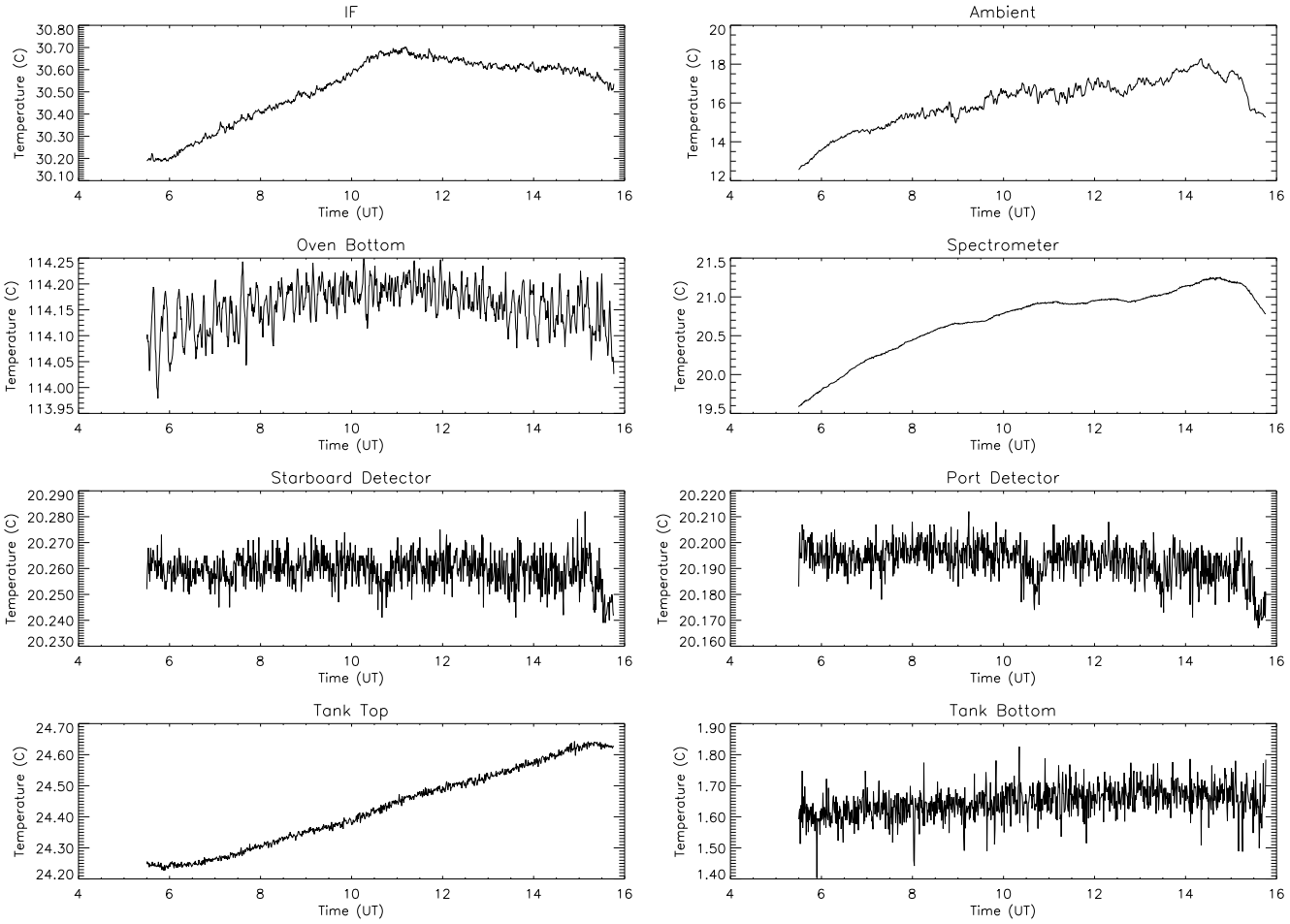


**Figure 1**: Temperature Monitor plots for Sutherland 2006 May 13 - Low Ambient Temperature.

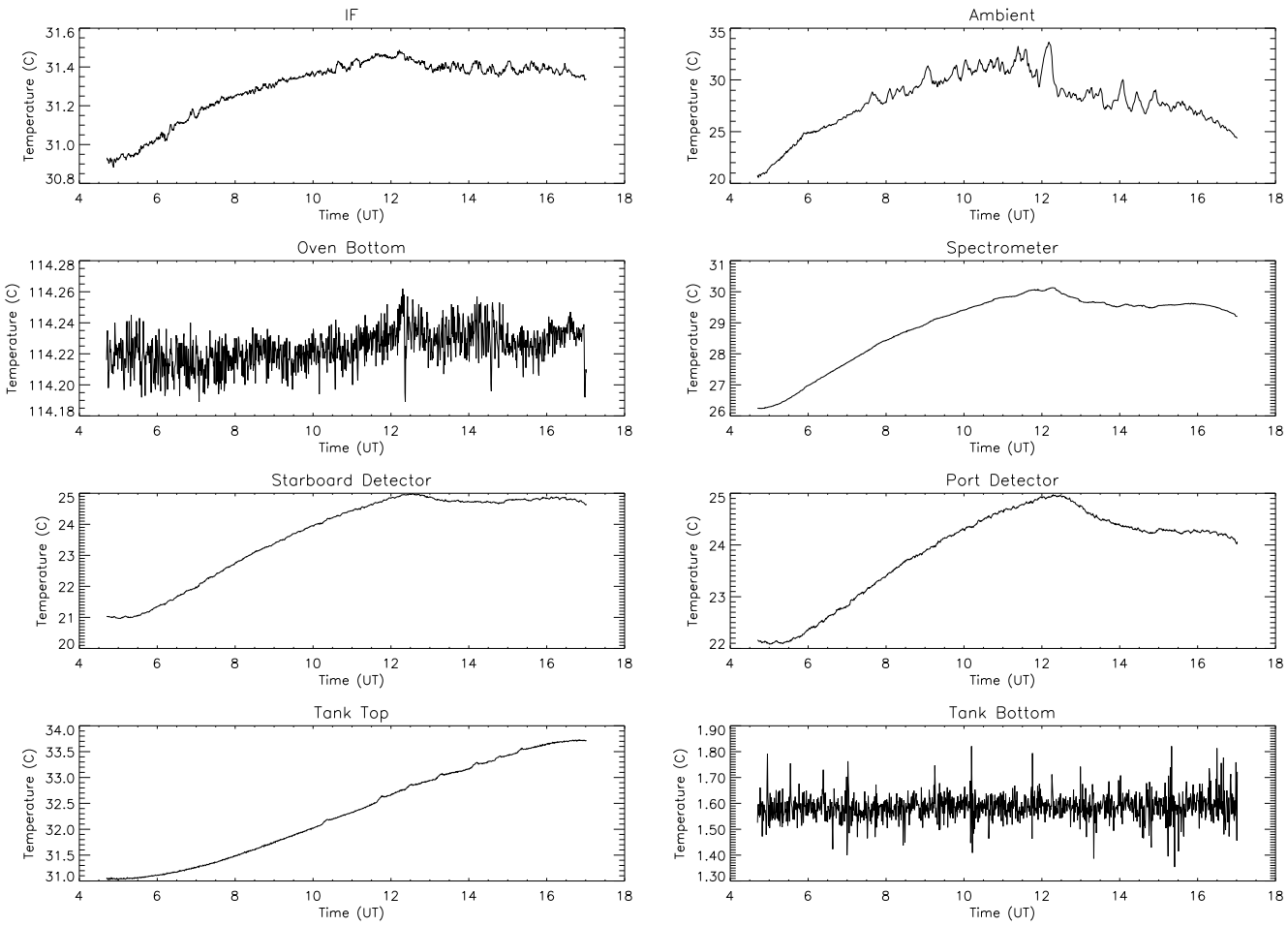


**Figure 2**: Temperature Monitor plots for Sutherland 2006 March 8 - High Ambient Temperature.

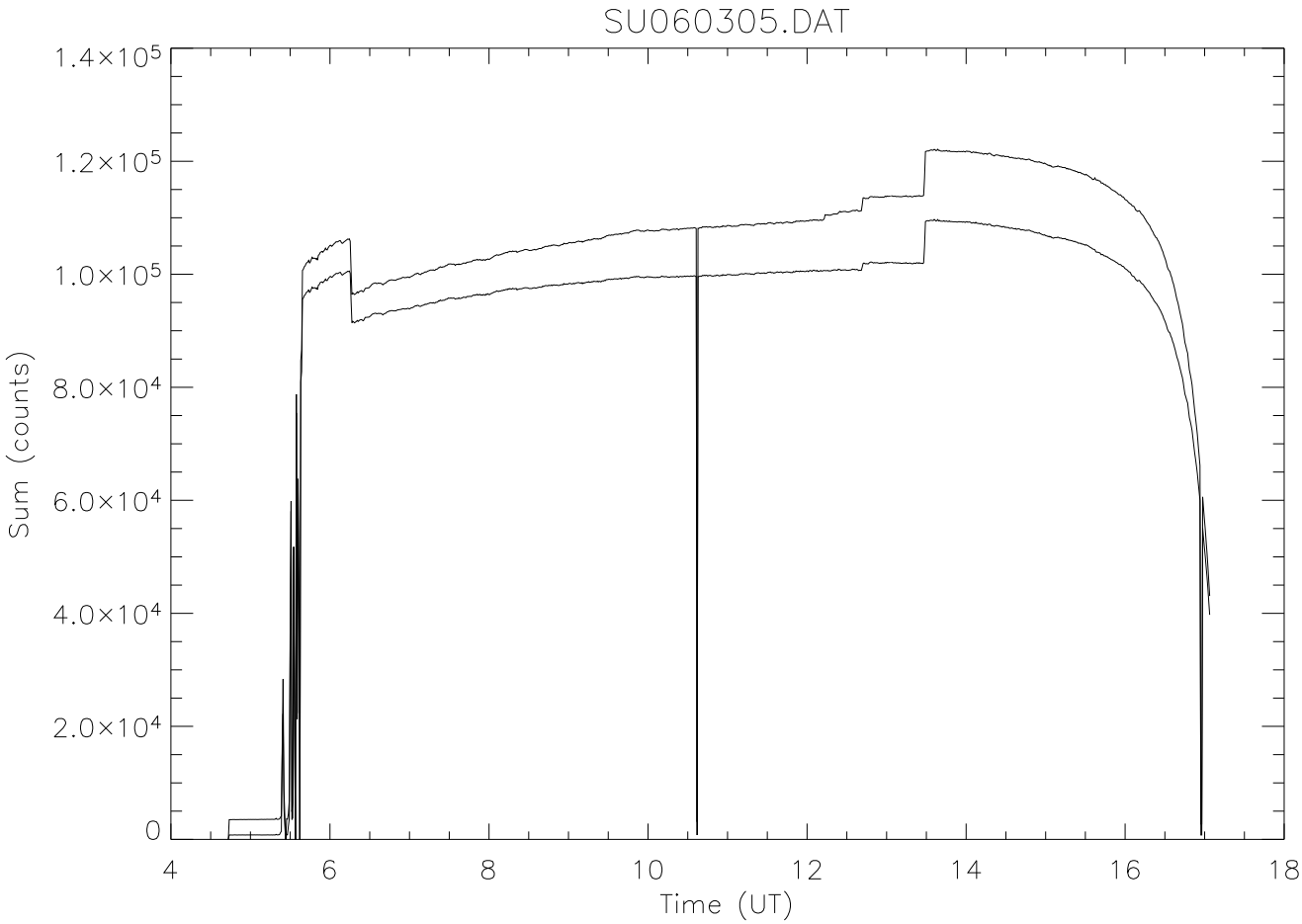


**Figure 3**: Steps in the Sum for Sutherland 2006 March 5.

## 3.2 Data Quality

Data from Spectrometer F in Sutherland appear to be good quality except for overall steps in intensity throughout the day, figure 3. Steps occur in both the morning and afternoon, but most frequently in the afternoon. The most common step occurs around 1330 UT and results in a change of several thousand counts. Steps occur coincidently in all detectors and a small effect can be seen on the ratio. The first large step occured on 2005 December 6.

*STARBOARD*
: The starboard detector sum is usually around 110000 counts at noon, and the ratio currently around 200000 counts.

*PORT*
: The port detector sum is usually around 120000 counts at noon, and the ratio currently around 180000 counts.

*TRANSMISSION*
: Transmitted sum is around 135000 counts.

# References


[1] Roger New. Work carried out at Sutherland in 2003 April. *BISON Technical Report Series,* Number 212, High-Resolution Optical-Spectroscopy Group, Birmingham, United Kingdom, October 2003.

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[3] Brek A. Miller. BiSON operations log for 2003. *BISON Technical Report Series,* Number 230, High-Resolution Optical-Spectroscopy Group, Birmingham, United Kingdom, April 2004.

[4] Brek A. Miller. BiSON operations log for 2004. *BISON Technical Report Series,* Number 248, High-Resolution Optical-Spectroscopy Group, Birmingham, United Kingdom, March 2005.

[5] Brek A. Miller. BiSON operations log for 2005. *BISON Technical Report Series,* Number 263, High-Resolution Optical-Spectroscopy Group, Birmingham, United Kingdom, February 2006.