

## The TC330\_TOOL User Guide.

### Introductions

The tc330\_tool is a GUI which allows communication to a RPC server running the tc330.rpc. The tc330.rpc provide a connection to the LakeShore model 330 Temperature Controller.

The Spex LittleDog computer has 2 TC330 temperature controller connected via its serial port. You can used the tc330\_tool to:

- Communicate directly to the tc330 temperature controller.
- Acquire and optional save data query from the tc330. Data queries include temperature, set points, heater output.
- Graph and monitor up to 50 data points on screen.
- Do this from a remote site.

### Starting Application

These tools are installed on the IRTF bigdog and guidedog computers. To start the program, just type the command 'tc330\_tool'. To export the display to another X server, don't forget xhost (for displaying remote clients) and setting you DISPLAY environment.

Here is an example for remotely displaying to myhost:

```
myhost% xhost +
myhost% rlogin bigdog
bigdog% setenv DISPLAY myhost:0.0
bigdog% tc330_tool
```

The following should appear on your screen.



Figure 1 – tc330\_tool

## Display formats

There are 4 status display formats: Status, Data Graphs, Data Table, and Help Screen. Use the tabs under the status display to select the format.

The **Status** format displays the current sample values using a text format:

- The Control Data and Sample Data are displayed in the units selected for the temperature controller (default is Kelvin).
- The heater section displays the heater settings.

The **Data Graphs** format displays the 2 data channels and the heater output of the temperature controller using a graphical form.

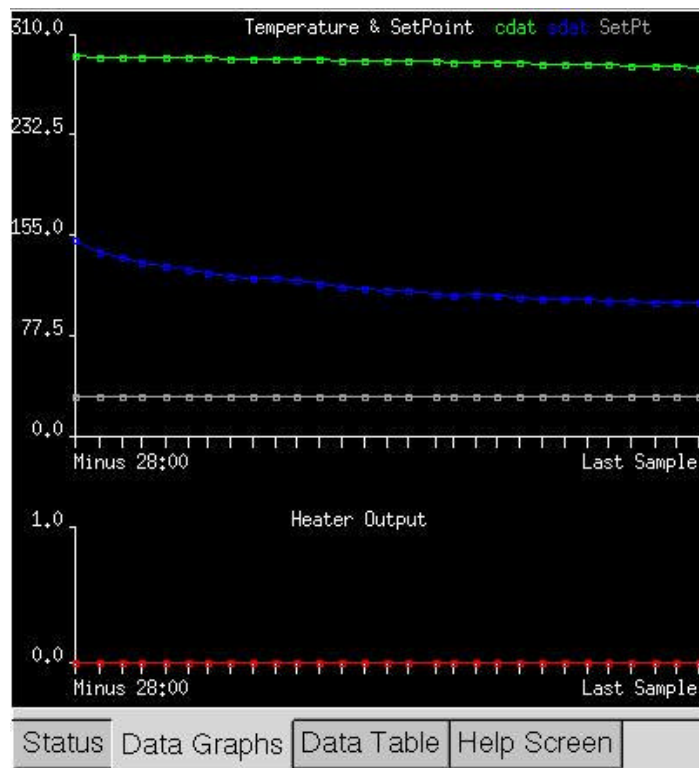


Figure 2 – Data Graphs

The green values in the top graph are the control channel values.

The blue values in the top graph are the sample channel values.

The gray line in the top graph is the set point.

The red values in the bottom graph are the heater output values.

The **Data Table** format is a tabular form of the data displayed graphically in View 2. This is the form the of the data the are written to the log file if that option is selected.

The **Help Screen** give a brief summary of the application as well as some frequently used temperature controller commands.

## Parameters Window

The parameters window provides widgets to modify the analog and digital outputs. Also some application related widget are available.

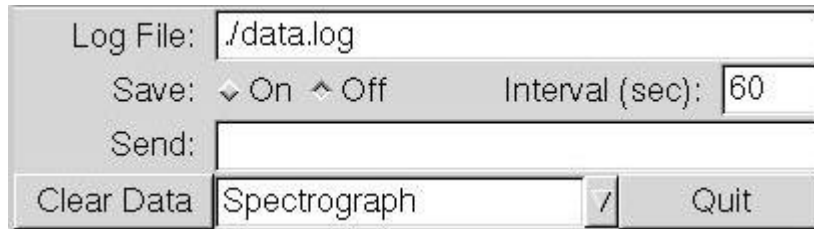


Figure 3 – Parameters Window

The **Log File:** entry issues the File command that sets the name of the file to which the data is to be written.

The **Save** toggle buttons issue the Save command that controls whether the data is appended to the file named above.

The **Interval (sec):** entry issues the Interval command to control the sample period.

The **Send:** entry issues the Send command to send a command directly to the temperature controller.

The **Clear Data** button issues the ClearData command to clear all data samples from the data table and graphs.

The **Controller** menu issues the controller command to switch between the spectrograph and the guider.

The **Quit** button exits the applications.

## Feedback Area

The feedback widget is a text window used to display the commands and return codes processed by the program. Also any user message are printed in this area.

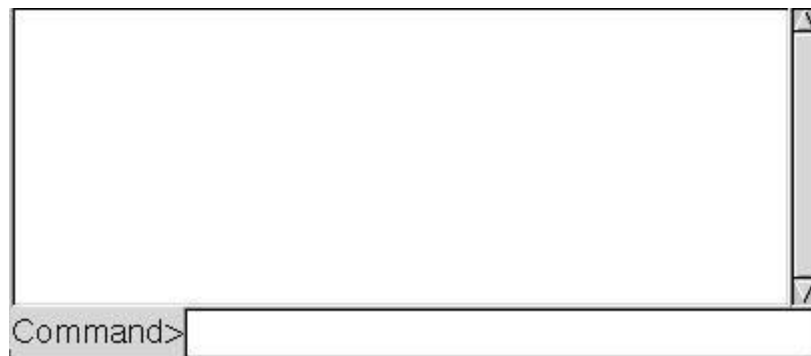


Figure 4 – Feedback Area

The **Command** entry widget allows you to type in any valid tc330 command.

## Dealing with the data log.

When Save is set to ON, the application will write it sample to a file name data.log. This section documents the data format, and gives some advice on dealing with this data. Here is a sample of the logged data. The column headings are not included in the actual data set, but are present here for documentation purposes.

```
Sample_Time      Cntl_Sen  Sam_Sen   SetPt    Heat  Rng
07/15/99 10:37:00 B 292.10  A 134.09  30.00  0.0  0
07/15/99 10:38:06 B 291.90  A 130.55  30.00  0.0  0
07/15/99 10:39:07 B 291.60  A 127.51  30.00  0.0  0
```

Sample\_Time – Time stamp of this sample.  
Cntl\_Sen – The control channel and its temperature value.  
Sam\_Sen – The sample channel and its temperature value.  
SetPt – The temperature set point.  
Heat – Heater output.  
Rng – Heater range.

In order to graph the data, it may be convenient to convert the time stamp to a elapsed time. A small utility exist that converts the time stamp from the mm/dd/yy hh:mm:ss to elapsed hours x.xxx format. This utility is called date2ehour. To run, type **date2ehour** at the command line. The new data file will have an .e file extension. Here is an example:

```
% date2hour data.log
% cat data.e
0.000 B 292.10 A 134.09 30.00 0.0 0
0.018 B 291.90 A 130.55 30.00 0.0 0
0.035 B 291.60 A 127.51 30.00 0.0 0
0.050 B 291.40 A 125.16 30.00 0.0 0
```

Finally, I'll give an example to graph this data using gunplot:

```
%gunplot
gunplot> plot 'data.e' using 1:3 with lines,
           'data.e' using 1:4 with lines,
           'data.e' using 1:6 with lines
```

These commands produce the following graph:

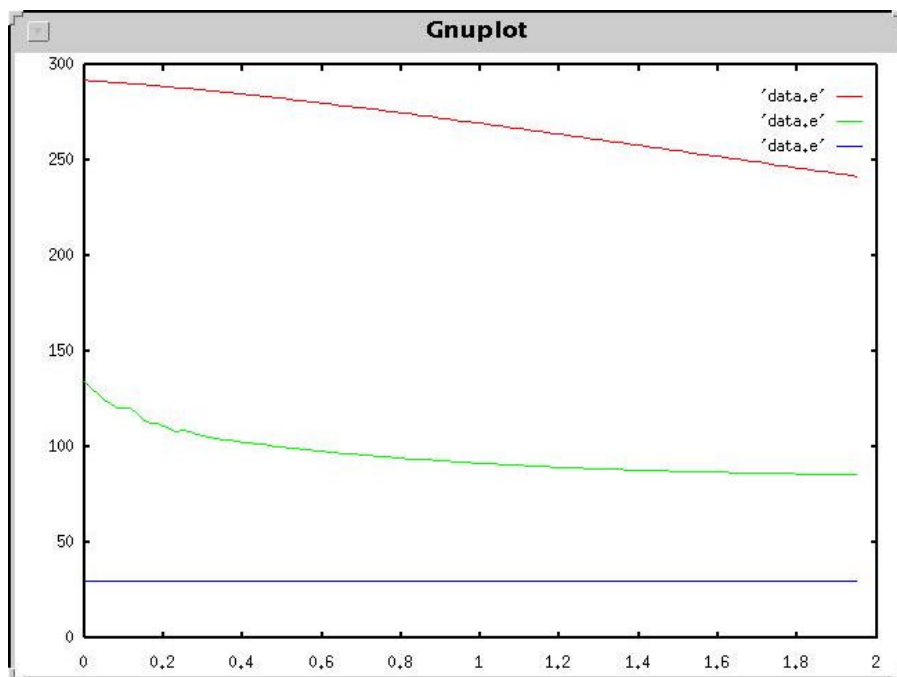


Figure 5 – gnuplot example.

## Command Syntax

This section describes the command set of the tc330\_tool application.

**AutoScale** – Scale the graphs.

Prompt N/A

Range

on – The graphs are scaled to include the smallest possible area while keeping the data visible.

off – The graphs are not scaled.

Initial on

Syntax `AutoScale { on | off }`

**ClearData** – Clear all data from the screen.

Prompt Clear Data button

Range N/A

Initial N/A

Syntax `ClearData`

**Controller** – Select a controller.

Prompt Controller pull down menu

Range

Spectrograph – Use the temperature controller attached to the spectrograph.

Guider – Use the temperature controller attached to the guider.

Initial Spectrograph

Syntax `Controller instrument`

**File** – Sets the name of the file to which the data is written.

Prompt File

Range N/A

Initial `./data.log`

Syntax `File path/filename`

**Interval** – Specifies the sampling interval in seconds.

Prompt `Interval(sec)`

Range 20 to 3,600 sec.

Initial 60

Syntax `Interval sec`

**Range** – Sets the min and max values for the graph

Prompt N/A  
Range min = 0 to max = 500  
Initial min = 0, max = 310  
Syntax Range *min max*

**Quit** – Exits the application.

Prompt Quit button  
Syntax Quit

**Save** – When ON, the sampled data is written to a text file. Each sample is append to the file data.log using the following format:

Prompt Save toggle buttons.  
Range  
Off – Data not saved.  
on – Save data to text file.  
Initial off  
Syntax Save { *off | on* }

**Send** – Sends a command string to the TC330. Any replies are printed in the feedback text widget.

Prompt Send  
Range Any valid TC330 command.  
Syntax Send *string*

**View** – Sets the format for the status display

Prompt Tab widget under status window.  
Range The index can be 0 to 3.  
0 – Status  
1 – Data Graphs  
2 – Data Table  
3 – Help Screen  
Syntax View *index*

## Development

This application was developed for the NASA IRTF (<http://irtf.ifa.hawaii.edu>) for the Spex project (<http://irtf.ifa.hawaii.edu/spex>).

Written by Tony Denault ([denault@irtf.ifa.hawaii.edu](mailto:denault@irtf.ifa.hawaii.edu)) and K. M. Hawarden-Ogata.