

# PC Guider Documentation v 3.2

Under construction. Last updated May 18, 2000 by rcantarutti

## Hardware Setup

The CTIO PC Guider software supports two different hardware setups and its configurable by editing a single configuration file. One setup is intended for using the camera in the Mosaic-II 8Kx8K imager environment. The other one is the more general purpose setup for CTIO digital cameras.

### Mosaic-II 8Kx8K Imager Environment

In this environment the standard RS-170 analog signal from the ICCD cameras is put into the IC-CMP frame grabber to be acquired. The PC guider then calculates the error correction and sends the correction to the TCS using either the network or a dedicated RS-232 line.

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#### Contents:

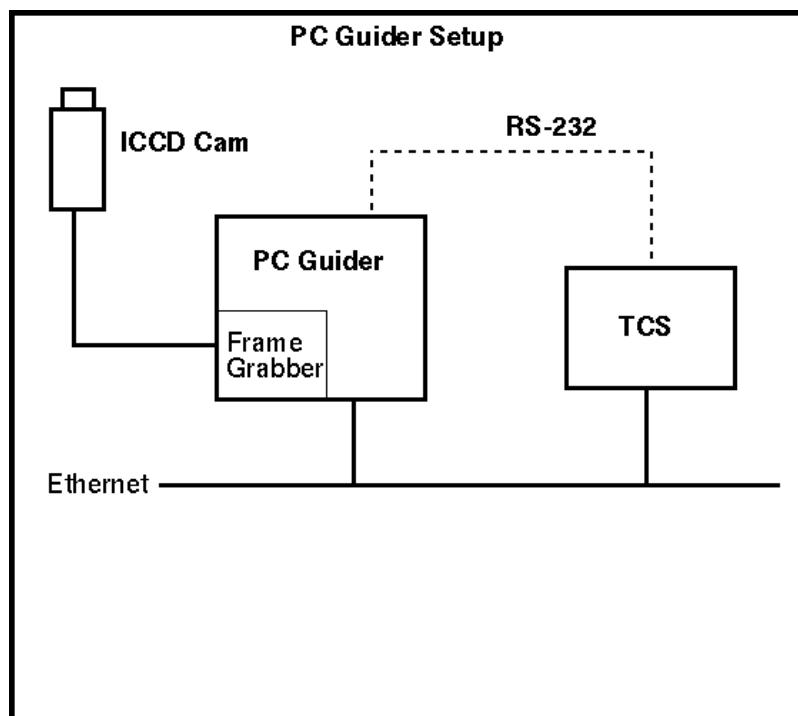
[Mosaic-II 8Kx8K Imager Environment](#)

[CTIO Digital Camera Environment](#)

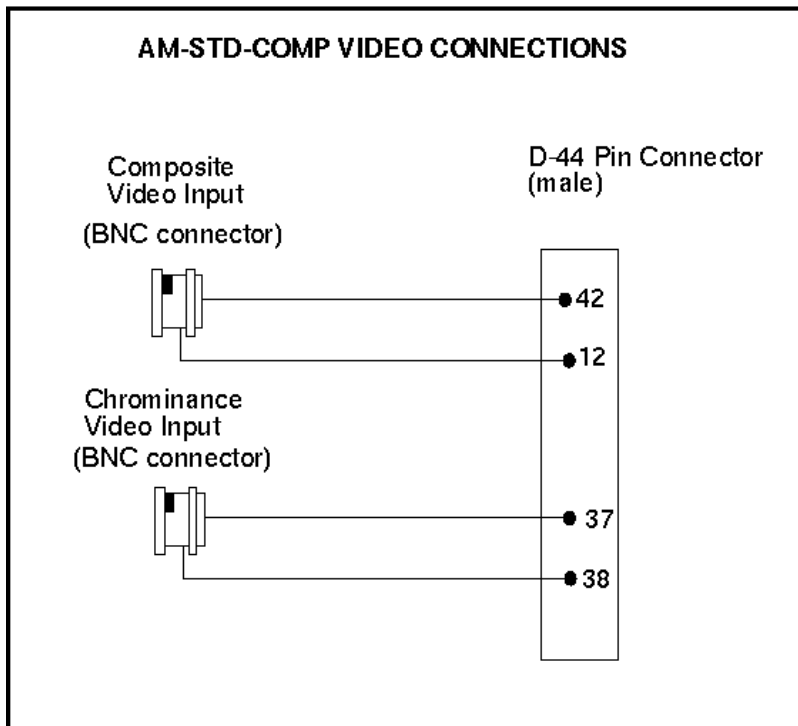
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The schematics below shows the cable connector between the ICCD camera.



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## CTIO Digital Camera Environment

In this environment the digital signal coming from the camera head is fed into the comex board for serial to parallel format conversion. The resulting 12 bit word is then acquired by the IC-DIG frame grabber. The PC guider then calculates the error correction and sends the correction to the TCS using either the network or a dedicated RS-232 line.

## Installing the IC-PCI frame grabber

The IC-PCI board is a standard PCI board, so installation is quick and simple. No jumper configurations have to be made and the board can be installed right out of the box. After you install the board you will have to save some upper memory for the frame grabber. There's no way at present time under Linux 2.0.X to dynamically allocate a block of linear memory during runtime.

To save this memory you will have to edit the `/etc/lilo.conf` file to look like the following example:

```
boot=/dev/sda
map=/boot/map
install=/boot/boot.b
prompt
timeout=50
image=/boot/vmlinuz
label=linux
    root=/dev/sda2
    append="mem=60M"
    read-only
```

In the example above the line 'append="mem=60M' tell the kernel that only 60 megabytes are available out of the total amount of memory. If the total memory is 64 Mb then only 4 Mb will be saved for the frame grabber.

Then as root execute the "lilo" command and reboot.

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## Installing the IC-PCI drivers

Copy the icpci.tar.gz file to the /usr/src directory on your machine and follow the instructions in the README file in the icpci directory to compile and install the driver. The driver module will be copied to the /lib/modules/`uname -r`/misc directory.

NOTE: The RedHat Linux distribution add to the kernel version number a release number. If using that distribution the "make install" command will create a new directory named /lib/modules/2.0.36/misc" and will install the drivers there. Move manually the drivers to the "/lib/modules/preferred/misc/ directory.

Then you will have to edit you /etc/rc.d/rc.local file and add a line like the following.

```
insmod icpci base=60 size=4
```

The line above will load the module at boot time allowing you to get the frame grabber ready to go after the machine comes alive. Reboot the machine to take the changes.

When more than one IC-PCI board is installed the driver will assign a board number to each one. The number the driver gave to each board must be determined by trial an error (aghhh!). The board number defines what especial character file correspond to each board. For example, if an installed IC-DIG board receives number 1 then its associated fille will be /dev/ic1idl under BMA mode. If the number is 3 then the file will be /dev/ic3idl.

Keep that in mind when programming with this drivers.

## The comex device driver

If you are using the IC-PCI board in its IC-DIG encaranation, then you will have to additionally install the comex device drivers. The Comex device transform the serial stream from the camera head into parallel words to the IC-DIG board.

Copy the comex-1.0.0.tar.gz file to the /usr/src directory on your machine. Then type make all to compile and install the driver modules. Finally add a sentence like the following to you rc.local startup scripts:

```
/usr/src/comex-1.0.0/comex_load
```

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# Guider Software

## Installing The PC Guider Software

A good policy is to create an account for the PC Guider application. Copy the tar file that currently leaves at ftp.ctio.edu:/pub/rolo called

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2. [Getting things running](#)

tvguider.3.2.tar.gz to the home directory of the PC guider account. To 3. [The PC Guider Control Program](#)

```
% tar xvzf tvguider.3.2.tar.gz
```

You will need to add to your PATH variable the current path of the application: /home/pcguider/tvguider/bin. Copy the tvguirc file in the /home/pcguider/tvguider/bin directory to the home directory as [.tvguirc](#). For example to install the tvguirc file in your home directory:

```
% cd /home/pcguider/tvguider/bin
% cp tvguirc ~/.tvguirc
```

You will need to install ximtool for Linux as well. Ximtool for Linux can be obtained from iraf ftp site as part of the [X11 Iraf package](#) [1]. Version 3.2 of the PC Guider software support X11 Iraf version 1.2. You must be aware that the X Server on top of which you run ximtool must be set to 8 bits per pixel otherwise ximtool won't work. You can use xdpinfo to check that out.

Another thing to install/create are the fifos for ximtool. To create those special files you have to be super user. For example to create the fifos "imt1i" and "imt1o":

```
% cd /dev
% su
% mkfifo imt1i
% mkfifo imt1o
% chmod a+w imt1i
% chmod a+w imt1o
```

You will also have to create the **imtoolrc** file to define the frame buffer configuration table and copy the file to /usr/local/lib ( or wherever you install ximtool). For example to define five frame buffers **imtoolrc** should look like:

---

```
1 2 96 81
2 2 400 288
3 2 512 512
4 2 640 480 # NTSC
               640x480 square
               pixel
5 1 1024 1024
```

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## Getting things running

Login to the pcguider account and start X (if it's not running already). Then you will have to start ximtool, since it's going to be used to display the camera images. At that time you can specified some command line options that will minimize the color conflicts. Once ximtool is running you can

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type "tvguictio" at a shell prompt to start the PC guider. For example to start ximtool minimizing color conflicts and the tvguider:

```
% ximtool -basePixel 196 -cmapInitialize true -maxColors 64 &  
% tvguictio
```

There is a script available that do the above for you, called "pcguider". For example to start the guider application type:

```
% pcguider
```

The scripts opens ximtool and then wait five seconds (too long?) to start the PC Guider application program.

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## The PC Guider Control Program

The PC Guider program is actually two programs running together: The PC Guider Control Program and the [PC Guider GUI](#). The PC Guider Control Program source code leaves at directory src/main/ of the PC Guider software directory tree. The structure of the PC Guider software directory tree is as follows:

- tvguider
  - bin
  - config
  - doc
    - applixware
  - lib
    - bitmaps
    - tvgui
  - man
    - mann
  - share
    - include
    - lib
      - blt2.3
      - tcl7.6
      - tk4.2
  - src
    - demos
      - am-dig
      - am-std
      - animate
      - cdl
      - comex+ximtool
      - cursor

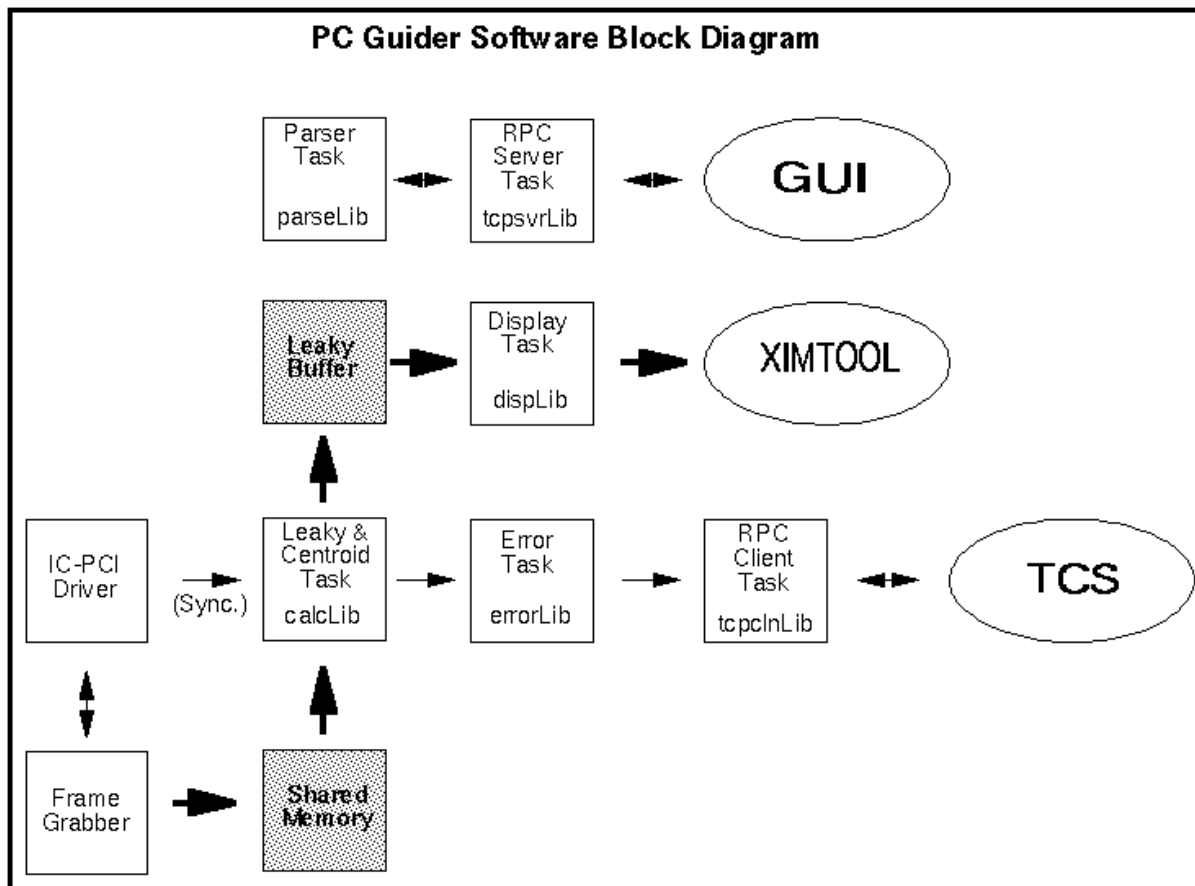
- serial
- tv+ximtool
  - am-dig
  - am-std
- gwish
- main

The PC Guider Control Program is a multithreaded application that runs under a vanilla Red Hat Linux distribution. It continuously acquires images to calculate an offset error between the center of a guide box and the guide star inside of it, and then send the error vector to the TCS program to apply the correction. Please see the [Hardware Setup](#) <sup>[2]</sup> section for specific information of the different working environments.

Once started the Guider Control Program accepts RPC connections from clients to receive commands and change its behavior. The main client of the control program is the guider GUI itself. The control program services the commands and sends the answers to the command generator. Through this mechanism you can turn the guider on/off, change the size of the guiding box, switch from panoramic to roi mode, etc.

The PC Guider Control Program also opens a fifo connection to the ximtool display server program. The control program uses ximtool to display the images captured by the [IC-PCI frame grabber](#). <sup>[3]</sup>

Finally the control program opens an RPC (or serial if selected) connection to the TCS to send the offset errors.



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## Command Interface

## aoi [pan|gen|full|histogram|statistics|leaky|base|offset|size|xtrim|ytrim]

**aoi pan** - switch to panoramic mode. What this command actually does depends on what type of camera is in use (see configuration files later on this chapter). Under the ICCD camera setup (IC-CMP) the frame grabber will be configured to acquire the whole frame. Under the CCDTV camera setup (IC-DIG) the camera head will be set to work under panoramic mode (i.e read the whole CCD) and the frame grabber will be configured to acquire the number of pixels in a complete CCD readout.

**aoi gen** - switch to general roi mode. What this command actually does depends on what type of camera is in use (see configuration files later on this chapter). Under the ICCD camera setup (IC-CMP) the frame grabber will be configured to crop the incoming frame to the size and position of the subraster box (yellow box in the ximtool display). Under the CCDTV camera setup (IC-DIG) the camera head will be set to work under general roi mode (i.e. read a roi) and the frame grabber will be configured to acquire the number of pixels in the region of interest.

**aoi full** - switch to general roi full line submode. What this command actually does depends on what type of camera is in use (see configuration files later on this chapter). Under the ICCD camera setup (IC-CMP) the frame grabber will be configured to crop the incoming frame to the height and y position of the subraster box (yellow box in the ximtool display) keeping the width equal to the frame width. Under the CCDTV camera setup (IC-DIG) the camera head will be set to work under general roi full line submode and the frame grabber will be configured to acquire the number of pixels in the region of interest.

**aoi histogram** - return a string containing four values. The first value is the minimum pixel value of the frame or ROI. The second is the maximum pixel value of the frame or ROI. The third is the average pixel value in the frame or ROI. The last one is the standar deviation of the pixel values.

**aoi statistics** - return a string containing the min, max, mean and standard deviation within the the data section of the image, that is, the image without the trim section defined by **xtrim** and **ytrim** (supported under CCDTV camera mode).

**aoi leaky factor**- set the leaky memory constant. The leaky memory makes an average of the history of the image by making an average between the current frame and the previous one:

$$I'(k) = \frac{I(k) + C * I'(k-1)}{(C + 1)}$$

**aoi base x y** - set the x and y coordinates of the subraster box.

**aoi offset dx dy** - offset the sibraster box coordinates by the specified amount of pixels.

**aoi size sz** - set the size of the subraster box.

**aoi xtrim value**- set the amount of columns to discard from the incoming image to value.

**aoi ytrim value**- set the amount of lines to discard from the incoming image to value.

## camera [1|2]

**camera 1** - selects the first camera scale and rotation parameters. These parameters are specified in the .conf file for each particular camera.

**camera 1** - selects the second camera scale and rotation parameters. These parameters are specified in the .conf file for each particular camera.

**comex [status|sync|reset|camera]**

**comex status**

**comex sync** - synchronize the camera head parameters with the device driver parameters.

**comex reset** - initialize all the camera head parameters to their default values.

**comex camera [abort|bin|dx|dy|e|g|i|mode|o|orig|resume]**

**comex camera abort** - any integration is forced to done.

**comex camera bin** -

**comex camera dx** -

**comex camera dy**

**comex camera e [on|off]** - enable/disable internal erase to precede exposure of CCD to light.

**comex camera g [2|4|6|8|10|15|20]** - set the gain of the stage that precedes the A/D converter input.

**comex camera i [0s-255s|0ms-1023ms]** - set the time interval that the CCD integrates on light.

**comex camera mode**

**comex camera o**

**comex camera orig**

**comex camera resume** - no integration is forced to done

**display [aoi|box|efactor|mark|olut|refer0|sigma]**

**display aoi [pos|show]**

**display aoi pos x y**

**display aoi show [0|1]**

**display box [pos|show]**

**display box pos x y**

**display box show [0|1]**

**display ref0 [pos|show]**

**display ref0 pos x y**

**display ref0 show [0|1]**



**display efactor *factor***

**display mark**

**display olut [sigma|exp|off]** - select the current output look up table. When **off** is selected, the output look up table does a linear reduction of the source image resolution to 8 bits (actually 0 - 200 due to ximtool constraints). When **exp** is selected, the output look up table does an exponential reduction of the source image to 8 bits making possible to stretch the dynamic range of the lower pixel values. When **sigma** is selected, display concentrates on information around the mean value in a range starting one standard deviation below the mean value and extending three standard deviation units above the mean value.

**display refer0 [pos|show]**

**display refer0 pos x y**  
**display refer0 show [0|1]**

**display sigma *mean stdev***

**echo**

**erro [rate]**

**erro rate *value***

**faults**

**guider [algorithm|box|calc|center|off|offset|on|ref]**

**guider algorithm [0|1|2]**  
**guider box [pos|size]**

**guider box pos x y**  
**guider box size side**

**guider calc**  
**guider center**  
**guider off**  
**guider offset dx dy [box|ref]**  
**guider on**  
**guider ref [pos]**

**id** - return the current version of the software.

**infog**

**set [kq|ksh]**

**quit** - exit the PC Guider Control Program.

## **Offset Error Algorithms**

Not available yet!

## Image Display

Before sending each image to ximtool, the control program draws , and applies if selected.

Ximtool doesn't support image display of color depths bigger than 8 bpp. In addition to that Ximtool reserves colors beyond level 200 for application specific colors (markers, dialog windows, etc.). That makes necessary to scale the image to fit those restrictions. Although the server can be programmed to do the scaling just before displaying the image, the current version of the software takes care of that before sending the image to ximtool.

The image is scaled to fit the ximtool number of colors restriction, the box markers representing the guide box, subraster box and reference box are drawn and the dynamic range enhancements are applied if selected.

To stretch the dynamic range of the displayed images look up tables are created and then applied to the acquired images. Right now two enhancement algorithms are available. The first algorithm does an exponential reduction of the acquired image to 8 bits making possible to stretch the dynamic range of the lower pixel values. To accomplish this task the output lookup table is created using the following formula.

$$I' = A * (1 - \exp(-I / (A * K))), \quad 0 < K < 1$$

The value of A depends on the current depth of the image. 12 bit images will use a value of 4096 and 8 bits images a value of 256. The value of K is a positive value between 0 and 1 that determines how much stretching will be applied to the image. The default value for K is 0.25. The **display efactor** command let the user change this value.

The second algorithm periodically update the output lookup table according to the mean and standard deviation values of the acquired image. The algorithm concentrates on information around the mean value in a range starting one standard deviation below the mean value and extending three standard deviation units above the mean value. All the data below the lower boundary is mapped to zero (black) and data above the upper boundary is mapped to 200 (white, under ximtool specification). The region between boundaries is divided in steps of  $(200/4\sigma)$ . The following table shows the calculated step values for various values of sigma:

---

Standard Deviation	Step Value
1	50 (i.e. 200/1x4)
2	25
3	16 (~16.667)
4	12
5	10
6	8
7	7
8	6
9-10	5
11-12	4

13-16	3
17-25	2
>=26	1

**Example 1:** mean = 8, standard deviation = 1

---

IN	OUT
7	0
8	50
9	100
10	150
11	200

**Example 2:** mean = 8, standard deviation = 3

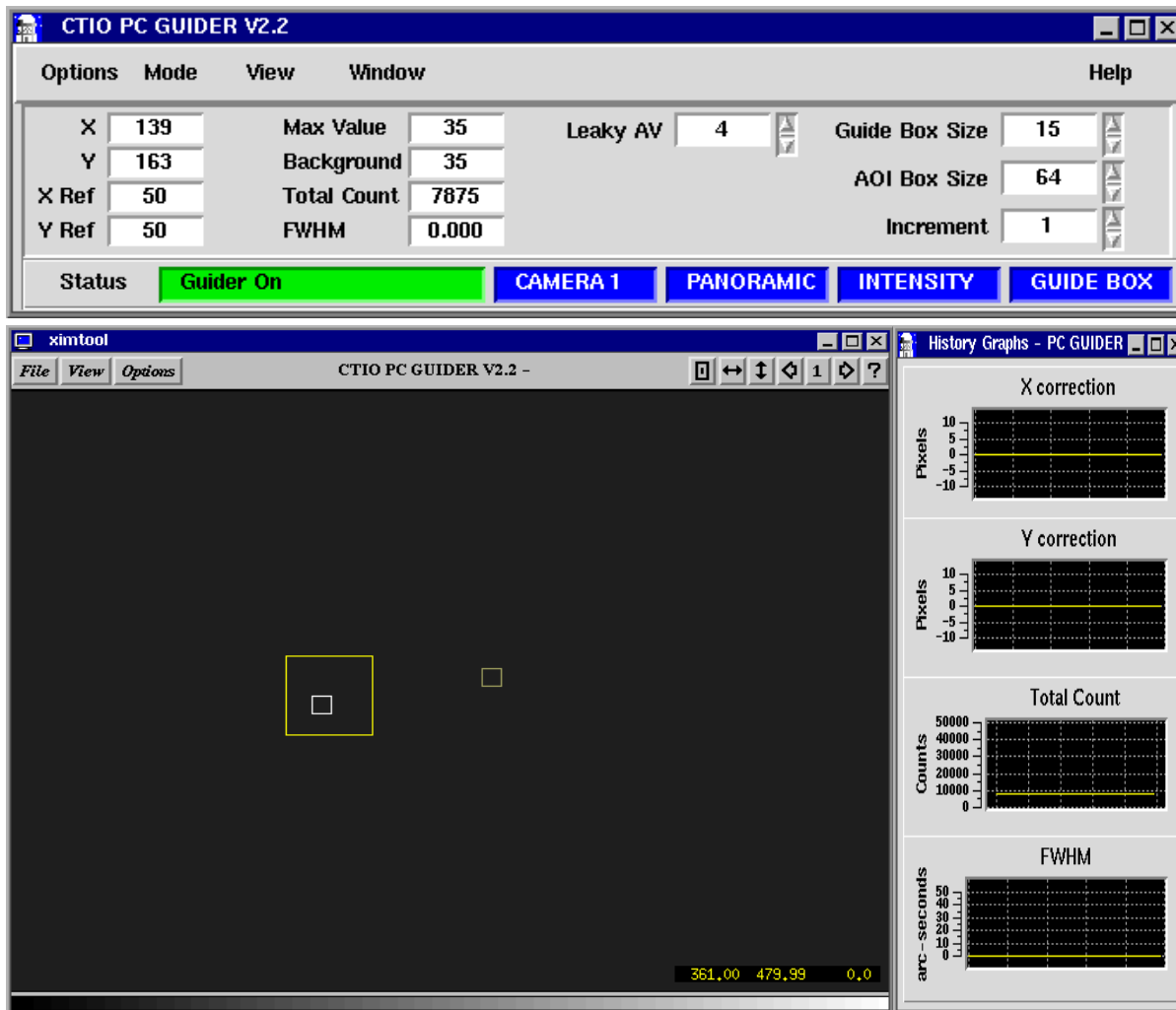
---

IN	OUT
5	0
6	16
7	32
8	48
9	64
10	80
11	96
12	112
13	128
14	144
15	160
16	176
17	192

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## The PC Guider GUI

The PC Guider GUI source code leaves at directory lib/tvgui/ of the [PC Guider software directory](#).  
tree.



The PC guider GUI consist of one main window from which the most common operations (e.g. turning the guider on) are initiated, a history graphs window, and the display server window. Eventually some other auxiliary windows can be popped up as well.

The GUI allows to send commands and retrieve status from the PC Guider Control Program. Its menu bar gives the user menu options to set thing like the current state of the guider or changing to different operations modes. It also has several boxes that show up to date information about the value of some important variables and parameters; four graphic plots show the history of the x-y corrections as well as the number of counts and FWHM in the guiding box defined area. A status bar at the bottom of the window indicates what's the state of the guider program (on/calc/off) and the operation mode.

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## Menu Bar

### Options Menu

The Options menu let the user set the operation mode of the guider to one of **Guider On**, **Guider Off** or **Calculate Only**. Under **Guider On** operation mode the application will start calculating and sending corrections to the TCS. Under **Calculate Only** mode the error correction will be calculated but not sent to the TCS. Under **Guider Off** mode neither error correction calculations nor error correction transfers will be made. The currently selected mode is displayed at the status bar.

Guider On	<F3>
Calculate Only	<F2>
Guider Off	<F1>
Move Box To Object	<F4>
Camera 1	
Camera 2	
Quit	Ctrl+q

The **Move Box To Object** option let the user use the mouse to move the guide box to a given position over the image. When selected the mouse cursor will change and the ximtool window will automatically gain the focus for the user to put the cursor over a guide star. By typing C the guide box will be centered over the selected object.

This menu also let the user choose between active cameras. Each active camera define a different set of scale and rotations factors. This is useful if more than one camera is in use at the same time. To make the TCS aware of the right camera the user selects **Camera 1** or **Camera 2** to automatically change the scale and rotation factors in the TCS. The scale and rotation factors for each camera are specified in the `.conf` file by setting variables CAM1\_HFACTOR, CAM1\_DFACTOR, CAM1\_RANGLE, CAM2\_HFACTOR, CAM2\_DFACTOR and CAM2\_RANGLE. The currently selected camera is displayed at the status bar.

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## Mode Menu

The mode menu offers to the user a set of operation modes for the guider, such as the size of the acquired region, the current centroiding method or which box is the to be moved with the arrows keys. A description for each of the selections for this menu option follows.

Panoramic Mode	<F5>
General ROI Mode	<F6>
Full Line Mode	<F7>
Intensity Centroid	
Shectman Centroid	
Quadrant Centroid	
Guide Box	
Subraster Box	
Reference Box	
<input type="checkbox"/> Gear Ref Box to Guide Box	

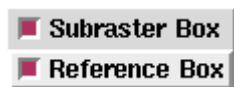
When using **Panoramic Mode** the whole image will be acquired and transferred to memory. Those operations slow down the transfer rates and the speed of the calculations resulting in a slower rate of corrections to the TCS. Ideally this mode shouldn't be used for guiding but the **General ROI Mode**. When using **General ROI Mode** only a user defined region of pixels will be acquired and transferred to memory. This mode dramatically speed things up and allows a 10 Hz rate of corrections to the TCS. The **Full Line Mode** acquires a line the same width as the image and the same height of the General ROI Mode. The currently selected mode is displayed at the status bar. The associated line command is `aoi [pan|gen|full]`.

The Mode Menu also let the user choose among three different offset error algorithms. The **Intensity Centroid** calculates the offset error as the center of mass of the area defined by the guide box. The **Shectman Centroid** determines the position of the star in the guide box and returns the offset error as the pixel distance between the box center and the guide star. Finally the **Quadrant Centroid** divides the guide box in four and calculates the offset error like the average of the four regions. The currently selected algorithm is displayed at the status bar. The associated line command is **guider algorithm**.

The user select which box is the one to move with the arrow keys by choosing **Guide Box**, **Subrastrer Box** or **Reference Box**. It is possible to move the boxes with a key combination also. Pressing the arrows keys while holding the shift key pressed will move the subrastrer box. Pressing the arrows keys while holding the control key pressed will move the reference box instead. The currently selected box is displayed at the status bar.

Finally it is possible to move both the guide box and reference box at the same time by gearing them with the **Gear Ref Box to Guide Box** option.

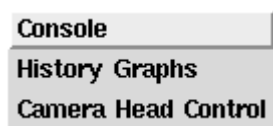
## View Menu



The View Menu let the user show or hide the subrastrer box and/or the auxiliary reference box.

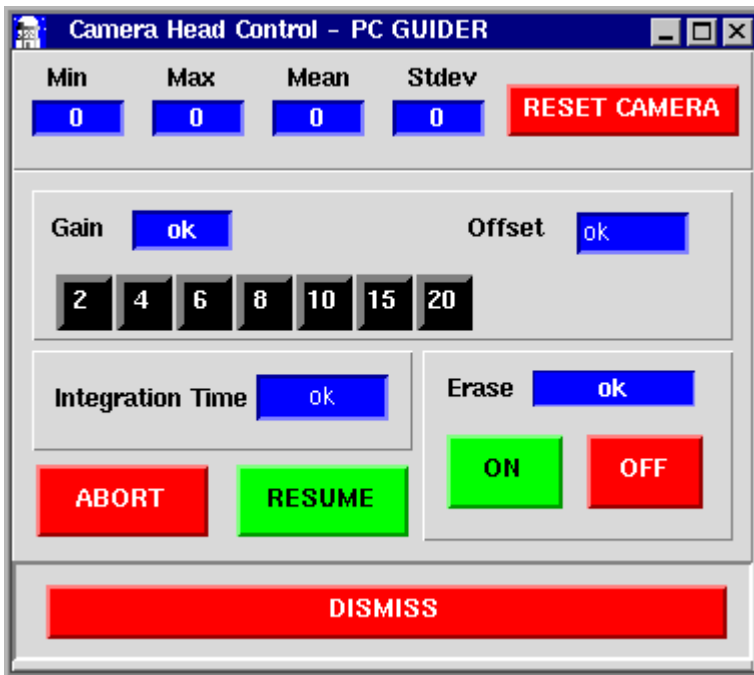
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## Window Menu



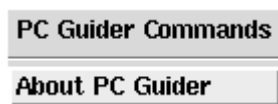
The Window Menu let the user pop up three auxiliary windows. The **Console** window let the user send command to the PC Guider Control Program. The **History Graphs** present the offset errors history plus the number of counts and the FWHM value inside the guide box.

The **Camera Head Control** window is the user interface to the CTIO CCDTV camera head. This tool let the user control parameters like camera gain and offset factors, integration time, etc. See the CCDTV camera documentation for more details about the camera.



The associated line commands are the **comex camera** commands family.

## Help Menu

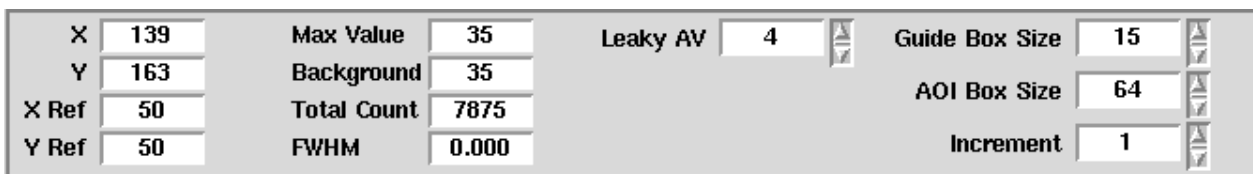


The Help Menu pop up an xterm window showing a Unix style man page with the commands available from the console.

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## Status Panel

The status panel present various status variables and gives control over some of them.



The **X** and **Y** entries present the current guide box position over the image in pixel coordinates. The guide box is the white box marker in the ximtool display area. The guide box can be moved around using the arrow keys while selected as the active marker box (see [Mode Menu](#)). The associated line command is **guider offset**.

The **X Ref** and **Y Ref** entries present the current reference box position over the image in pixel coordinates. The reference box is the green box marker in the ximtool display area. The reference box can be moved around using the arrow keys while selected as the active marker box (see [Mode Menu](#)) or by using the arrow keys while holding pressed the Control Key. The associated line command is **display ref0 pos**.

The **Max Value** entry present the maximum number of counts per pixel in the guide box area. The **Background** entry presents the average background value in the guide box area. The **Total Count** entry presents the total number of counts in the guide box area. The **FWHM** entry presents the full width high maximum value for the guide star inside the guide box. The background, total number of counts and fwhm values vary according to the selected algorithm (see [Mode Menu](#)).

The **Leaky AV** entry let the user set the leaky memory constant. The leaky memory integrates the acquired images by making an average between the current frame and the previous one according to the following formula. The associated line command is **aoi leaky**.

$$I'(k) = \frac{I(k) + C \cdot I'(k-1)}{(C + 1)}$$

The **Guide Box Size** and the **AOI Box Size** entries let the user change the size of the guide box and the subraster box. The size of the guide box can also be changed by using the **+** and **-** keys. The associated line commands are **guider box size** and **aoi size**.

Finally the **Increment** entry let the user change the size of the step to move the box markers over the image.

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## Status Bar

The status bar presents information about currently selected modes. The information includes operation mode, selected camera, acquisition mode, offset error algorithm and active box marker.



## Configuration Files

Two files exist to configure the PC Guider software: **tvguirc** and a guider camera specific **.conf** file. **tvguirc** defines a set of environment variables that the PC Guider Control Program and the PC Guider GUI Program share. The **.conf** files define guider camera specific parameters like the type of acquisition module to use with the camera, the frame format, etc.

### tvguirc

This file is basically a C-Shell script that defines a set of environment variables. The following example is a typical **tvguirc** file. It defines the place where the **tvguider** program leaves, the host name of the TCS machine (**ctiox0**), the name of the machine in which the PC Guider Control Program runs (**ctiox2**), the **ximtool** communication channels and the **.conf** file to use for the current guider setup (**mosaic**).

```
-----  
#  
#  
# .tvguirc  
#  
# Environment variables for the PC Guider Program  
#  
#***** Check these out and set them as you wish *****  
  
setenv GUIDEHOME /home/pcguider/tvguider2.2
```



```

setenv TCL_LIBRARY $GUIDEHOME/share/lib/tcl7.6
setenv TK_LIBRARY $GUIDEHOME/share/lib/tk4.2
setenv BLT_LIBRARY $GUIDEHOME/share/lib/blt2.3

# Host name of the TCS RPC server machine.
setenv TCP_NAME ctiox0

# Host name of the PC Guider RPC server machine.
setenv GUIDE_TCP_NAME ctiox2

# Ximtool fifos
setenv IMTDEV1 "fifo:/dev/imt1i:/dev/imt1o"
setenv IMTDEV2 "inet:5137"

# This tell the program where to find the binaries and configurations file.
setenv GUIDEBIN $GUIDEHOME/bin

# This is the configuration file directory
setenv CONF_DIR $GUIDEHOME/config

# This is the name of the configuration file
setenv CONF_FILE mosaic.conf

# make sure that guidebin is in the search path
set path = ( $GUIDEBIN $path )

# make sure we have the right man path
if ($?MANPATH) then
setenv MANPATH {$MANPATH}:$GUIDEHOME/man
else
setenv MANPATH {/usr/man}:$GUIDEHOME/man
endif

```

-----

The file is expected to live in the home directory. User should modify the contents of this file to reflect its own environment.

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## **.conf Files**

The .conf files define specific parameters for each guider setup. There's one configuration file for each setup. Right now only two of these files are available: mosaic.conf and guider4m.conf. These files define parameters like what type of acquisition module should be used with the camera, what's the board number of the acquisition module if more than one is installed, the type of CCD if using a CCD TV camera, the type of video format if using an analog camera, the frame format, the color depth, the camera scale, the transfer rate of the offset errors and the type of comm link to send the offset errors. Following is an example of the configuration file for the Mosaic Imager Environment.

```

-----
##
## Mosaic Guider Camera configuration file v3.0
##

```

# The board number the driver chose (might be other than zero if more  
# than one frame grabber is installed)

BOARD: 0

# The TV Guider software supports the IC-AMDG and IC-AMCMP  
# frame grabbers.

# IC-AMCMP = 1

# IC-AMDG = 2

MODULE: 1

# This keyword gets used when the IC-AMDG is specified

# CCD02 = 2

# CCD39 = 39

# None = 0

CCD: 0

# If using IC-AMCMP NTSC 640x480 is the only supported video format.

# NTSC = 1

# PAL = 2

FORMAT: 1

# Image dimensions

# Be very careful specifying the width and height values when  
# using the IC-AMDG module. Use the following values:

# ICCD : 640x480 pixels

# CCD02: 400x290 pixels ---> 400x288

# CCD39: 100x82 pixels ---> 96x81

WIDTH: 640

HEIGHT: 480

# Version 2.0 now supports 8 and 12 bits images

DEPTH: 8

# This are the rotation and scale for the two different cameras

# that the software support

CAM1\_HFACTOR: 0.326

CAM1\_DFACTOR: -0.326

CAM1\_RANGLE: 0.0

CAM2\_HFACTOR: 0.326

CAM2\_DFACTOR: -0.326

CAM2\_RANGLE: 0.0

# This is the transfer rate for error corrections to the TCS

# in Hz

RATE: 0.5

# This is the type of communication link in use

# 0 RPC over the network

# 1 RS-232

COMM\_LINK: 1

# This is the tty serial device in use. Gets used only when RS232  
# is specified.

# /dev/ttyS0 port A

```
# /dev/ttyS1 port B
TTY_S_PORT: /dev/ttyS0
```

---

New files can be created and copied to the tvguider/config/

directory. Then to actually use the file the `_tvguirc` file has to be modified to set the `CONF_FILE` variable to the new configuration file.

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# Troubleshooting

## TCS Link Broken?

A failure in the network connection to the TCS can cause an error in the RPC connection to the TCS. To solve this problem exit the application and start over again. If the problem persists check the following things:

1. Check the network connection (try doing a ping from the pc guider to the 4m TCS machine `ctiox0`)
2. Try the TCP GUI to see if you can still send commands to the TCS.
3. If nothing of the above works try rebooting the TCS computer.

## Can't start the program?

Check if a lock file exists. The pc guider program creates a lock file called `/tmp/tvguider.lck`. Remove that file and try again. Don't forget to close `ximtool` too. If you are not sure use the `"ps ax"` command to see if `ximtool` is still running. Here's an example of the pc guider processes :

```
% ps ax
```

```
PID TTY STAT TIME COMMAND
```

```
.
.
.
1660 p0 S 6:09 ximtool -xrm Pixel 196 -xrm Initialize true -xrm olors 64
1670 p0 R 7:00 /home/pcguider/tvguider/bin/tvguider
1671 p0 S 0:00 /home/pcguider/tvguider/bin/gwish /home/pcguider/tvguider/bi
1672 p0 S 0:00 /home/pcguider/tvguider/bin/tvguider
1673 p0 S 0:00 /home/pcguider/tvguider/bin/tvguider
1674 p0 S 0:00 /home/pcguider/tvguider/bin/tvguider
1675 p0 S 0:00 /home/pcguider/tvguider/bin/tvguider
1676 p0 S 1:47 /home/pcguider/tvguider/bin/tvguider
1677 p0 S 0:00 /home/pcguider/tvguider/bin/tvguider
.
.
.
```

If you want to be sure kill all the processes above by hand and start over again.

## Error messages?

Here's a list of the error messages you can get from the TV Guider program and why they were generated:

**ERROR: can't set grab acquisition mode.**  
**ERROR: unable to initialize library packages**

These two messages usually go together. Check that you specified the right `.conf` file for your guider camera in the `.tvguirc` [4] file and that you have the right type of module at the `.conf` file. If the message appears when the application is starting, check that the data signal from the camera is reaching the frame grabber. When using the CCD TV this message will typically appear if the camera is off or unplugged.

**ERROR: can't open comex device**  
**ERROR: unable to initialize library packages**

Check that the comex driver module is loaded. To get a list of the loaded modules type:  
`% /sbin/lsmmod`

Your list should look something like this:

Module	Pages	Used by
comex	2	0
icpci	20	0

**ERROR: Attempt to load a null system param file**  
**ERROR: unable to initialize library packages**

You probably don't have the environment of your account set. The PC Guider software needs some environment variables to be set in order to search for its configuration files. Check that the `.tvguirc` [4] lives in your home directory and that its sourced when you enter you account. You may want to add a line like the following to your  `".login"`  file:

```
source ~/.tvguirc
```

The file `.tvguirc` [4] is a cshell script so it won't run under born again shell (bash) or any other shell without support for cshell type commands.

**ERROR: can't set camera configuration**  
**ERROR: can't get image width.**

The specified acquisition module doesn't match the acquisition module in the installed IC-PCI board. Check you specified the right `.conf` [5] file for your guider camera in file `.tvguirc` [4] and that you have the right acquisition module in the `.conf` [5] file.

**ERROR: can't open primary connection to image server**  
**ERROR: unable to initialize library packages**

Check that Ximtool is up and running. If that is the case check that the I/O fifos exist and have the right read/write permissions.

**ERROR: siocln\_init: can't open /dev/ttyS0 device**  
**ERROR: unable to initialize library packages**

If you get this message the program wasn't able to open the serial communication port. Check that the serial device name in your `.conf` [5] file matches the one on your system. Also check that it has the right read/write permissions.

**host machine: RPC: Port mapper failure - RPC: Unable to send  
WARNING: rpc: can't open "host machine"**

The GUI wasn't able to open an RPC connection to the application program. Check that the host machine name in your `.tvguirc` [4] file match the machine name in which the PC Guider program is running. Check also that the network interface is working correctly (a ping to the host machine will do). Quit all the windows and restart.

**host machine: RPC: Remote system error - Connection refused  
WARNING: rpc: can't open "host machine"**

The GUI wasn't able to open an RPC connection to the application program. This message usually appears when the application program is not running at the moment the GUI came up. Check for other error messages like warnings about lock files, etc.

**ERROR: can't open icpci ident ioctl device.  
ERROR: unable to initialize library packages**

The program wasn't able to open the frame grabber device driver. This may happen if the application finished uncleanly. You will have to uninstall the driver and install it again. If you have modified the `rc.local` file to load the drivers automatically the easiest way to go is reboot the machine. Otherwise you will have to do it manually (see installing the icpci drivers above).

## Appendix

### A1. Determining the scale and the rotation angle.

The guider sends corrections to the TCS through the `gg` command. The units for those corrections are pixels. The TCS scales and rotates those pixel values using the scale and rotation factors introduced by the user.

Scale and rotation factors have to be determined empirically at the telescope. Typically, you'll select a star, place the guide box on it and then take note of the pixel coordinates of the box. Then you'll do an arc-second offset with the telescope and then you'll put the guiding box back on the star, taking note of the new position. The scale of the telescope will be one divided by the distance between the first and last position of the guiding box.

### A.2 Demo software

The software sources include a set of demo programs useful for diagnostic. The README files included with each program describe how to compile and run the programs. Following is the demo programs directory tree.

- cdl
  - acq+ximtool
  - animate
  - comex+ximtool
  - cursor

- patterns
- ic-pci
  - am-dig
  - am-std
- serial

**Source URL (modified on 05/10/2011 - 14:58):** <http://www.ctio.noao.edu/noao/content/PC-Guider-Documentation-v-32>

#### **Links**

[1] <http://iraf.noao.edu/>

[2] <http://www.ctio.noao.edu/noao/content/hardware-setup>

[3] <http://www.ctio.noao.edu/noao/content/hardware-setup#ic-pci-frame-grabber>

[4] <http://www.ctio.noao.edu/noao/content/guider-software#tvguirc>

[5] <http://www.ctio.noao.edu/noao/content/guider-software#.conf-files>