

AzCamTool User's Guide

Michael Lesser

University of Arizona Imaging Technology Laboratory

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INTRODUCTION

This User's Guide describes the basic operating concepts of *AzCamTool* when used as an observing tool for astronomical imaging. See the [AzCamTool Manual](#) for more detailed information of the workings of *AzCamTool*, including installation. All documentation for *AzCam* is available at the web site <http://www.itl.arizona.edu/azcam>. *AzCamTool* supports [Astronomical Research Cameras, Inc.](#) (ARC) camera controllers and ITL/Magellan Guider controllers with PCI data acquisition interfaces.

AzCamTool has been written by Michael Lesser. Support has been provided by the [University of Arizona](#) and the [National Science Foundation](#) grant AST-9876630. Please send questions, comments, suggestions, or bug reports to mlesser@as.arizona.edu.

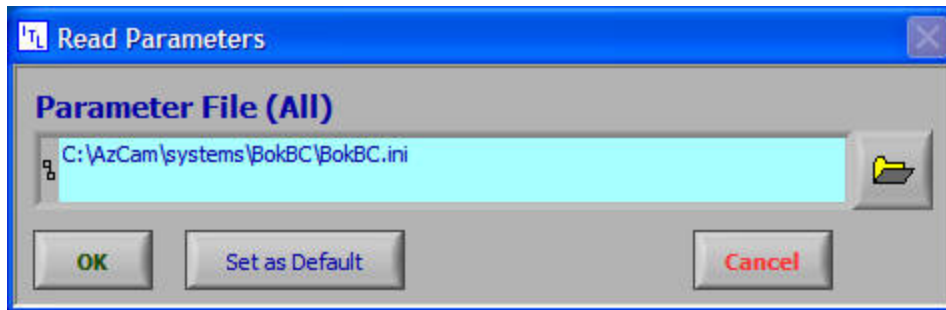
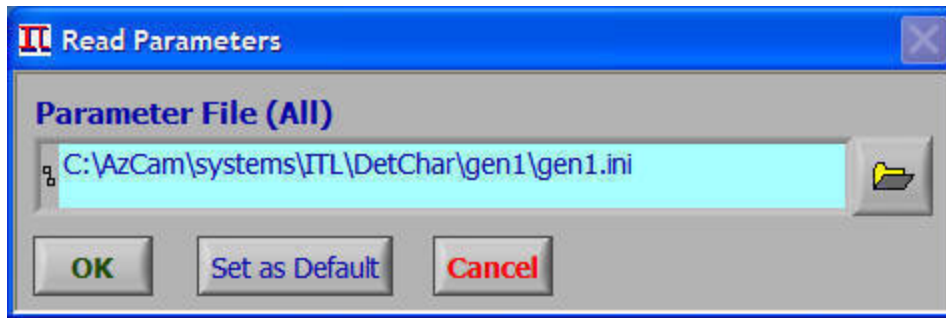
We use the forward slash "/" for filenames, which should be interpreted as reverse slashes "\" under Windows and forward slashes "/" under Linux. In most cases, forward slashes are operating system independent and are internally translated as needed.

The SYSTEM DIRECTORY refers to the directory from which the parameter file is loaded. Most scripts and auxiliary files are expected to be in this directory. An example is */home/primefocus/azcam/systems/90prime/*.

STARTUP

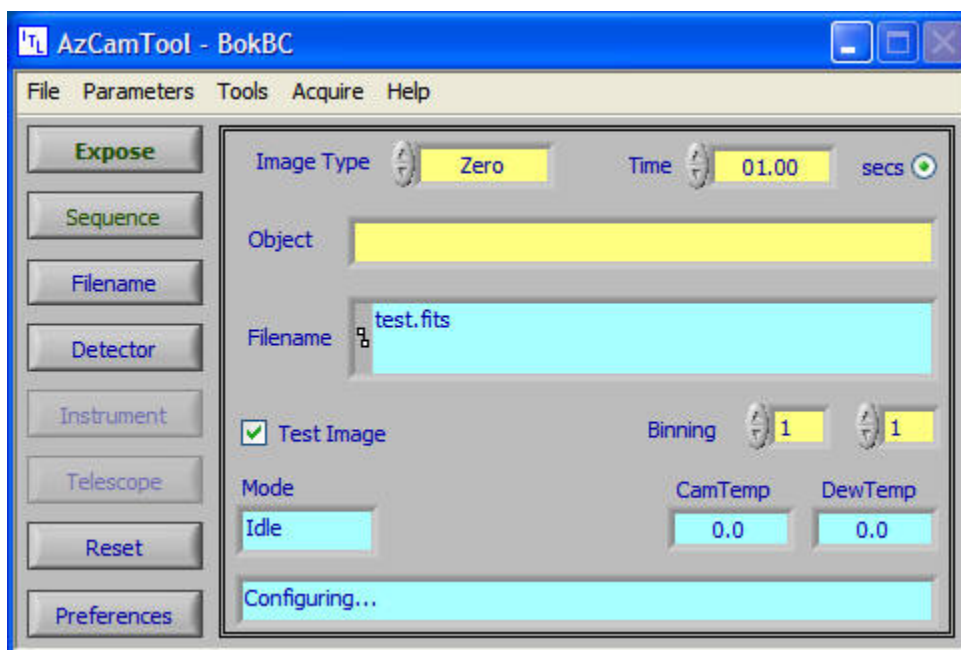
AzCamTool may be started from an icon/desktop shortcut, the Windows Start Menu (**Start®Programs®AzCam®AzCamTool®AzCamTool**), from Windows Explorer or from a command line (*/Program Files/AzCam/AzCamTool/AzCamTool.exe*). *AzCamServer* must be running on the server machine before starting *AzCamTool*. For some systems, a single icon may start *AzCamServer* and then *AzCamTool*.

If the *AzCamTool* command line (usually found in Properties for the icon) includes a **-parfile** parameter, then *AzCamTool* will start and try to connect immediately to *AzCamServer*. This is the normal mode for most telescope installations. If the command line is empty or contains a **-startfile** parameter, the *Read Parameters* window will open and the user may select a parameter file for a specific instrument using the browse button .



If *AzCamTool* cannot make a connection to *AzCamServer* without user intervention, the *Server Communications* window (and typically an error message) opens which allows selection of the server. If *AzCamServer* was not started, start it and then push the *Connect* button in the *Server Communications* window. If a connection is not made, the user may also push the *Demo Mode* button and *AzCamTool* will open in demo mode, in which no server is needed. In demo mode, *AzCamTool* operates as if a connection to a server is made and all actions have a successful return status. This is used for training. Running *AzCamTool* in Demo mode will not create images. Pressing *Quit* will close *AzCamTool* immediately.

MAIN WINDOW



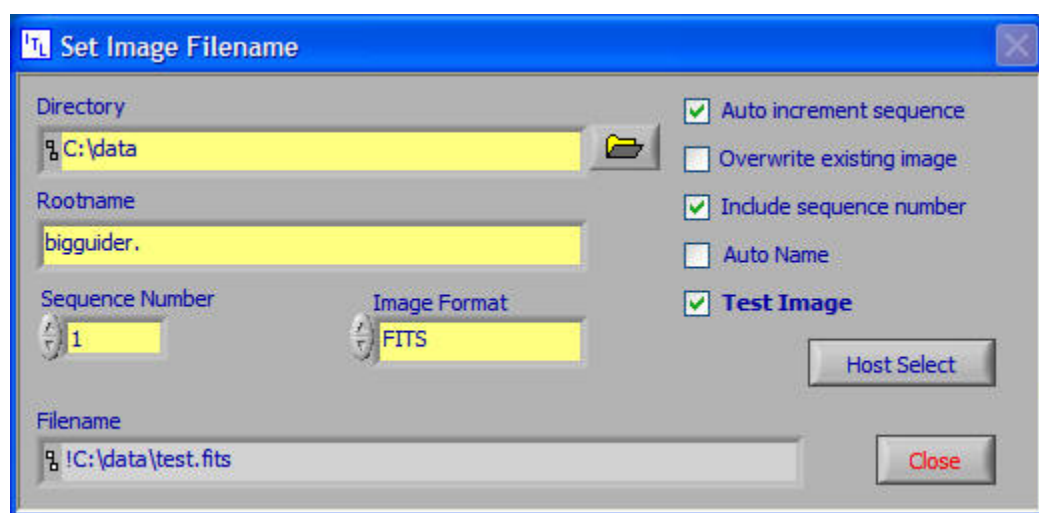
The main window of *AzCamTool* is shown above. Cyan colored fields are for display only and yellow fields are for data entry. The *Mode*, *CamTemp*, *DewTemp*, and *Progress* indicators are automatically updated.

CamTemp typically refers to the detector temperature and *DewTemp* is the cooler (LN_2) temperature, but the actual sensors and their locations are system dependent.

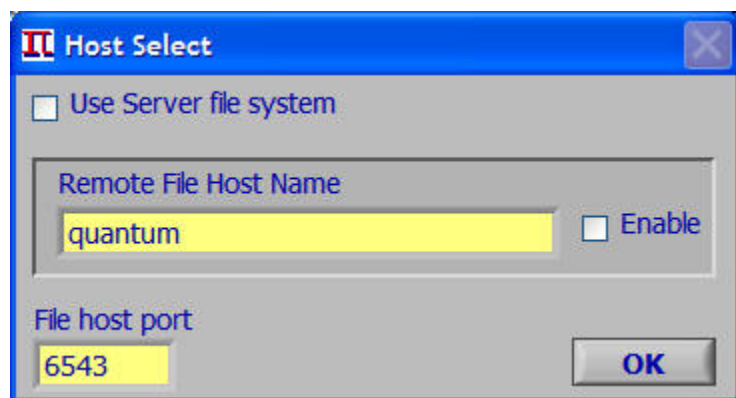
A typical image exposure is made by selecting the *Image Type*, setting the *Exposure* time, and pressing *Expose*. *Image Type* is used to set the image type in the image header, to enable comparison lamps for some systems, and to control the shutter during exposure.

Comparison lamps are selected from the *Image Type* control. The comp lamps are automatically turned on and off.

If *AutoTitle* is turned enabled (*Preferences*->*Image File*) then changing *ImageType* will also update the Title field to the *ImageType* string for non-object exposures, and to the last object title entered for object exposure types.



The *Filename* button opens the *Set Image Filename* window which is used to set the filename, directory, and sequence information. If *Test Image* is checked in *Set Image Filename* or the main window then the image is written to file name *test.fits*, overwriting any existing test image. The *Auto Name* option names the image file with *Rootname* and the *Image Type* of the exposure. Press *Host* to change the file host name (and port), the computer which receives the image data.

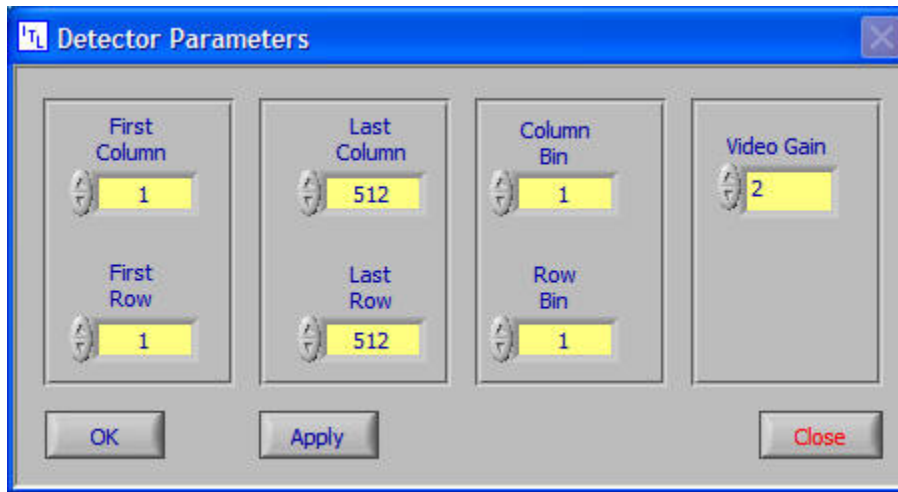


The *Sequence* button makes a series of exposures, all of the same *ImageType*. For a sequence, *Auto increment sequence* in *Set Image Filename* should usually be turned on to increment the image sequence

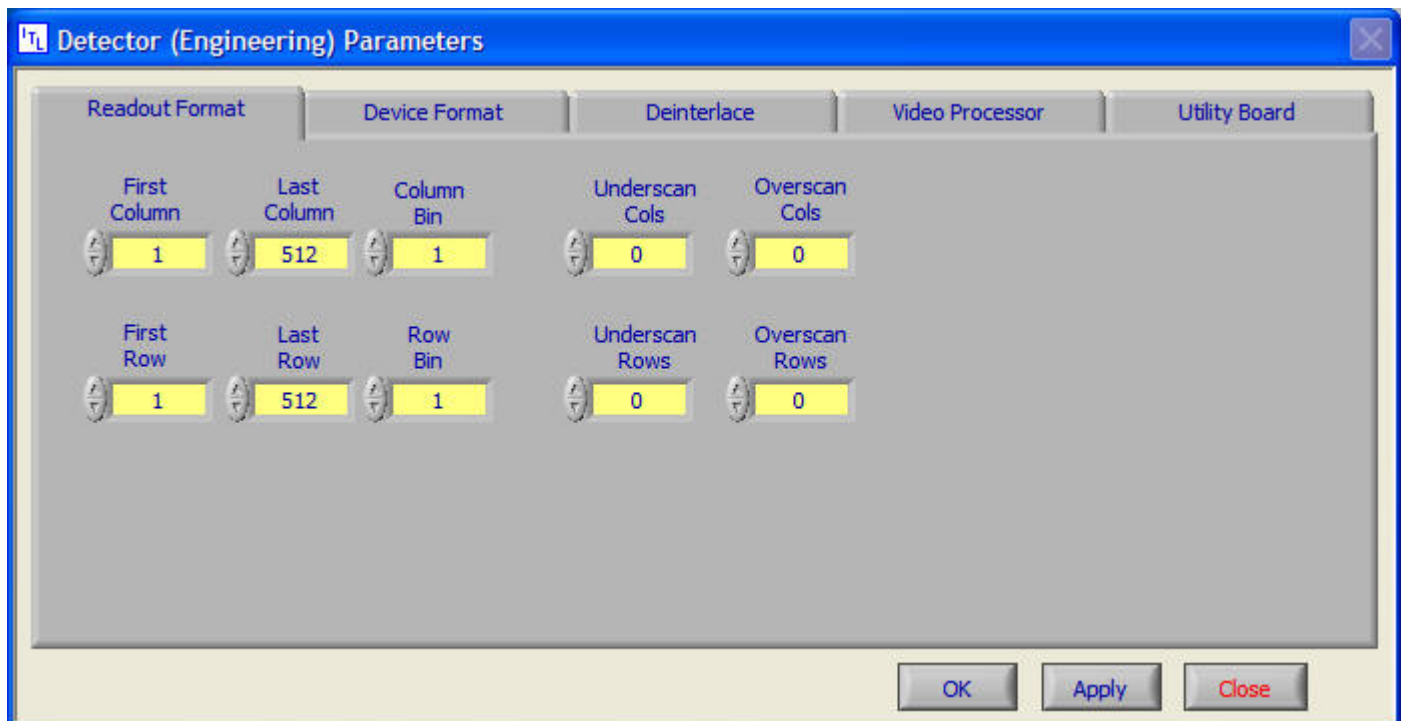
number by one after each exposure. For Comparison exposures, opening the Sequence window turns on the selected comp lamp and closing the window turns off the same lamp.

When the system power is turned off, the camera must always be reset using the *Reset* button once power is turned back on. If problems occur, resetting the controller is often a reasonable fix. Exactly what happens during reset depends on both the system configuration and software parameters such as reset scripts and modes (engineering or user).

DETECTOR PARAMETERS

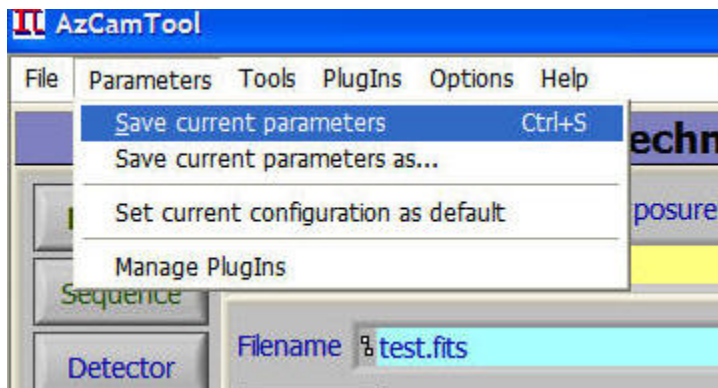


Pressing the *Detector* button opens the *Detector Parameters* window shown above in normal (user) mode and the window shown below in Engineering mode. Typically only the binning and region of interest (ROI) is changed, but many other parameters may also be set in this window. The binning may also be changed on the main window directly.



PARAMETER FILES

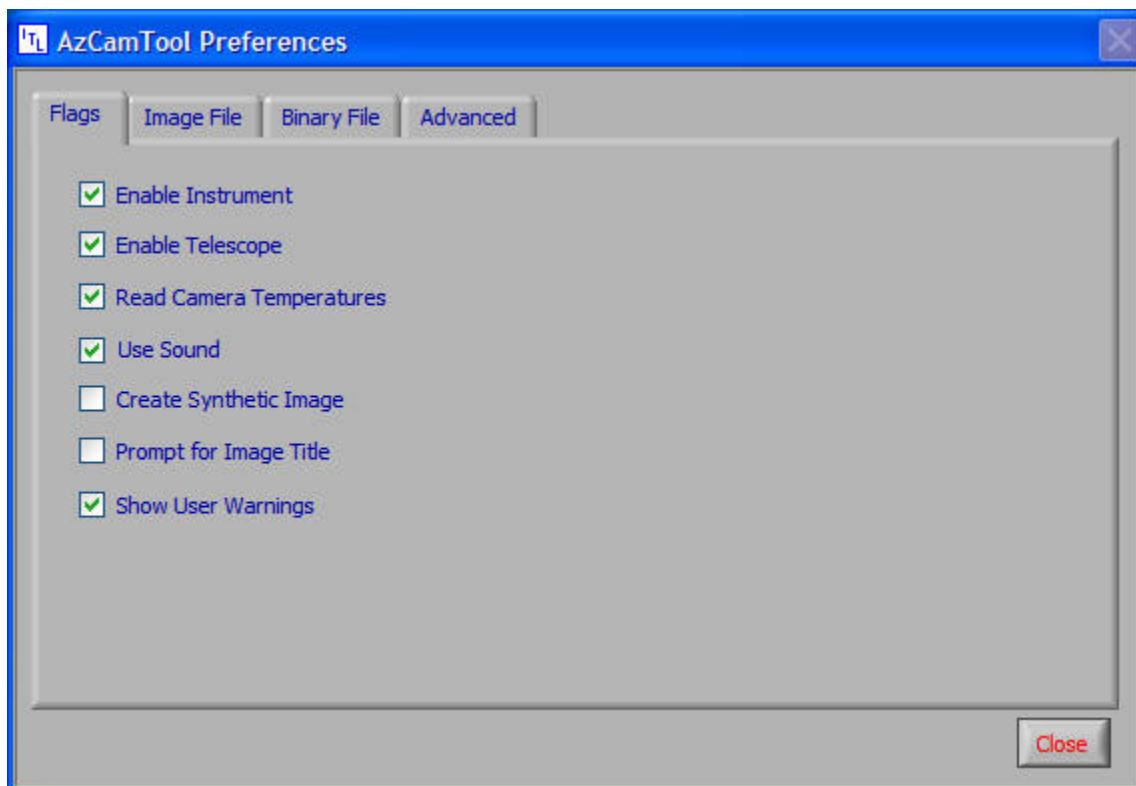
AzCamTool uses parameter files to save configuration information. You must manually save parameters in order for them to be loaded when you next start *AzCamTool*. Select *Parameters*®*Save current parameters* from the menu to save current parameters to the current parameter file.



ACQUIRE MENU

The acquire menu is customized specifically for each system. In general, it opens windows which perform special acquisition sequences such as focus, multiple exposures of different types (possibly changing instrument parameters for each exposure), and detector checkout such as linearity and photon transfer.

PREFERENCES

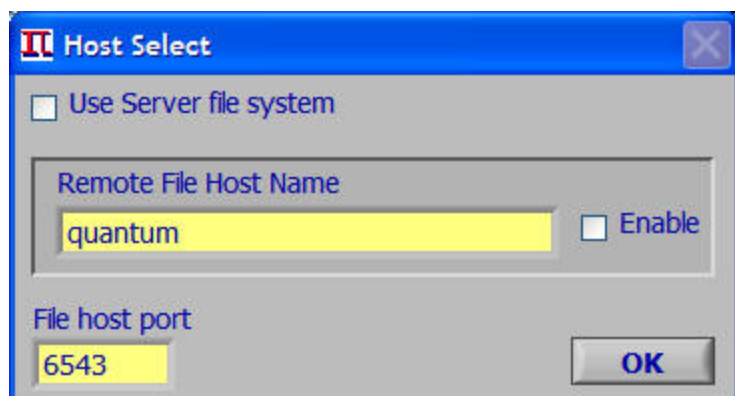


Many options can be set in *Preferences*, activated from the main window. The *Read Camera Temperatures*

must be checked for automatic temperature update on the main window. *Enable Instrument* and *Enable Telescope* must be checked for communication with instruments and telescope, such as for header keywords, focusing, lamp control, etc. *Deinterlace during readout* is applicable to some multi-amplifier systems and will speed up the readout process by beginning to deinterlace the image data before readout is complete. An image file template containing image header information may be specified and edited from the **Image File** tab. Keywords in this file are written to the image file exactly as found in the file.

IMAGE WRITING

Image files are only written to disk if the *Save Image* checkmark is on in *Preferences@Image File*. The start-up default is to save all images.



There are three methods of sending image data to a disk file. These are determined by *Host* window accessed from the *Filename* window.

- ∅ If *Enable* next to *Remote File Host Name* is not selected, then the filename is considered to be valid on the local client; that is the machine which is running *AzCamTool*. The image data is sent to the client where a file writing application reads the image and writes it to disk.
- ∅ If *Enable* next to *Remote File Host Name* is selected, the filename is considered to be valid on some other machine, specified by the *Remote File Host Name* option. Data is sent from the server to the file host machine, where a file writing application must be running. One such file writing application is *dataserver*, used at Steward telescopes.
- ∅ If *Use Server file system* is selected, the filename is considered to be valid on the **server** machine.

FITS files from multi-amplifier detectors or mosaics are written in Multi-Extension FITS (MEF) format. Single amplifier data is normally written as normal or non-extended FITS files. The data writing mode is selected in the *Filename* window by the *Image Format* parameter.

Multiple amplifier modes in general do not support regions of interest (ROI's), although first and last rows other than the full detector often are acceptable.

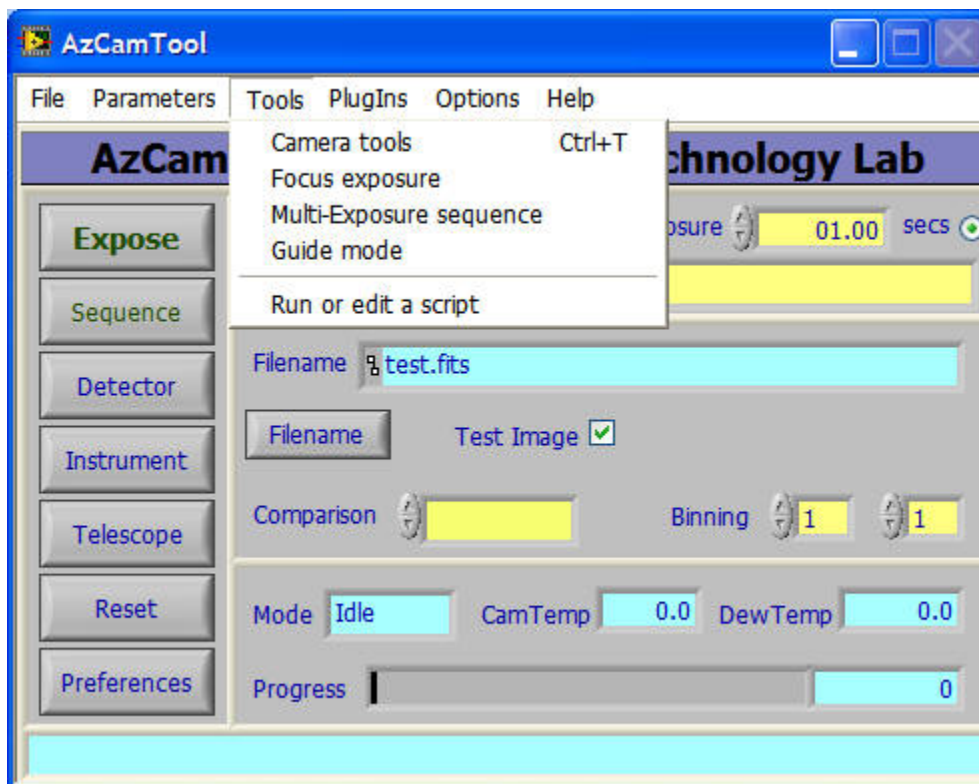
HELP

Help for specific controls in *AzCamTool* is on-line. Under the *Help* menu, the *Show Help Tips* and *Show Context Help* may be turned on (checked) or off. The Context Help is a separate window with more detailed help while the Help Tips are one line explanations of control functions.

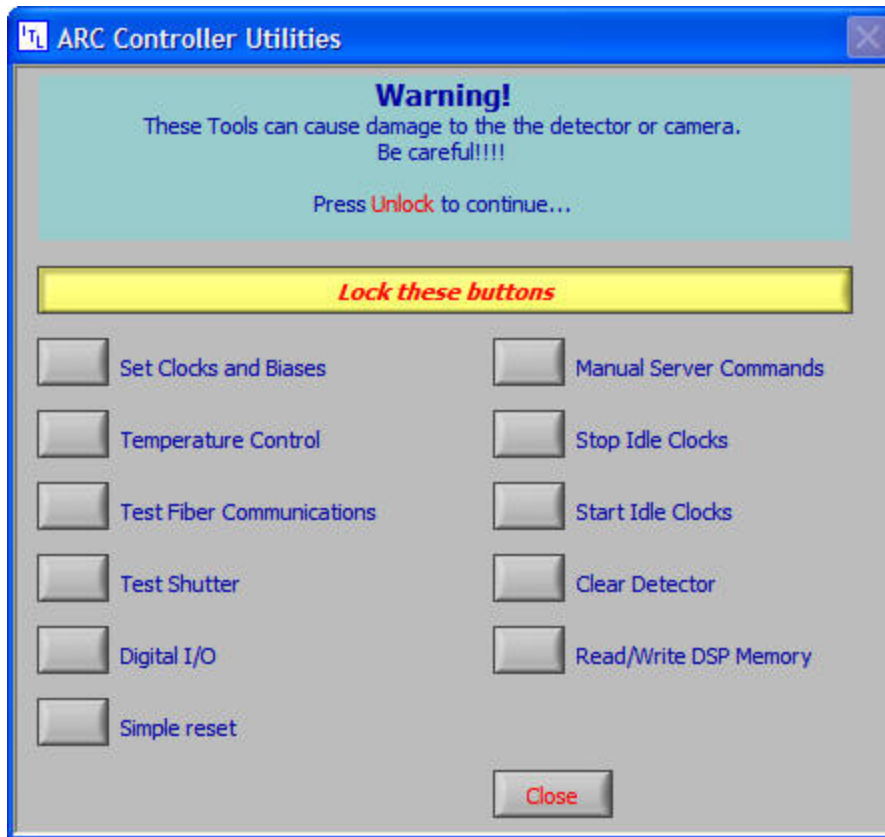
DISPLAY

Image display is performed only through an image file server program such as *dataserver* or one of the *AzCam* file servers. *AzCamTool* does not directly support a display tool because it does not receive image data.

TOOLS



The *Tools* menu provides special purpose camera functions. The *Focus Exposure* function creates a focus exposure which shifts the CCD between multiple exposures, interacting with instruments or telescopes as needed. *Guide Mode* controls the guide exposure mode which is optimized for the highest speed image acquisition and data transfer. *Run or edit a script* starts the script control function for text-based scripting.



ARC controller tools contain camera test and debug functions intended for laboratory or telescope checkout. You must press the **Unlock** button to activate the buttons, as an acknowledgment that your actions here may be dangerous. A few which might prove useful at the telescope are: *Test Shutter* exercises the camera shutter, *Test Fiber Communications* exercises the camera fiber communications, and *Temperature Control* manipulates the detector temperature servo and other sensors. Be careful running the tools as damage can occur with improper use!