

# NGUI: The NEWFIRM Graphical User Interface

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**Abstract.** This document describes NGUI, the NEWFIRM graphical user interface, for generating observing scripts. It is assumed that the observer is familiar with the allowed NEWFIRM observing recipes.

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## 1. Installation

To run NGUI, you must have Tcl/tk installed on your system. The software has been tested under various flavors of Linux (CentOS 4, Fedora Core 5) and Mac OS X (10.4 Tiger, 10.5 Leopard). There is no Windows version.

To install the software, unpack the tarball into a known directory and edit the `ngui.cshrc` file to reflect the ‘home’ location. By default, NGUI\_HOME is `/home/ngui`:

```
% cd /home
```

```
% gzip -cd ngui.tgz | tar xvf -
```

To start the software, source the C-shell script:

```
% source $NGUI_HOME/etc/ngui.cshrc
```

```
% ngui &
```

To exit the software, select ‘Exit’ within the *File* menu and be prompted, or click on the × in the upper left/right hand corner of the application.

## 2. Start Me Up!

Set Project Parameter(s)	
Principal Investigator:	Phil Daly
PIs Email Address:	pnd@noao.edu
Actual Observer(s):	A N Other
AOs Email Address:	another@noao.edu
Observing Assistant:	Phil Daly
OAs Email Address:	pnd@noao.edu
Proposal Identifier:	2007A-007
Telescope System:	KPNO Mayall 4m
Save	

Figure 1.: NGUI Project Parameters Screen

When started, you will see the default project screen, shown in figure 1, and you should edit and save these values. These edits are saved in `~/ngui` for future reference. At the telescope, this file is sent to the KTM to put the appropriate observing staff keywords in the meta-data.

Once the project parameters have been saved, the main interface shown in figure 2 will appear. Note the color-coded command buttons to reflect differing functionality within the interface.

The interface is made up of 4 parts:

**Menu Bar** This consists of the *File* menu, shown in Figure 3, the *Options* menu (presently empty) and the *Help* menu (which provides the software revision number).

**Text Pane** The text pane reports various activity when generating scripts. Normally, these messages are informational but you will sometimes see a red ‘ERROR’ message appear—please take note and corrective action. For example, an incorrectly formatted *RA,Dec,Epoch* will result in an error (which in this case can be ignored!). The script will still be written but offending lines will be commented out.

**Output Modifiers** This line allows the user to enable or disable various outputs in the resulting scripts. When *enabled* these buttons:

- *ERROR Cmnds*: insert error checking into the output script so that the script aborts when something goes wrong. *NB: This is something you always want to do so disable it at your own risk.*
- *BIAS Cmnds*: insert commands to enable bias voltages. At present, it is *disabled* because you will bias the arrays manually whilst at the telescope. *NB: Do not enable this feature unless instructed to do so by a scientist/engineer.*
- *FILTER Cmnds*: insert filter commands into the output scripts. It is there for lab checking when the filter wheel may be physically out of action. *NB: This is something you always want to do so disable it at your own risk.*

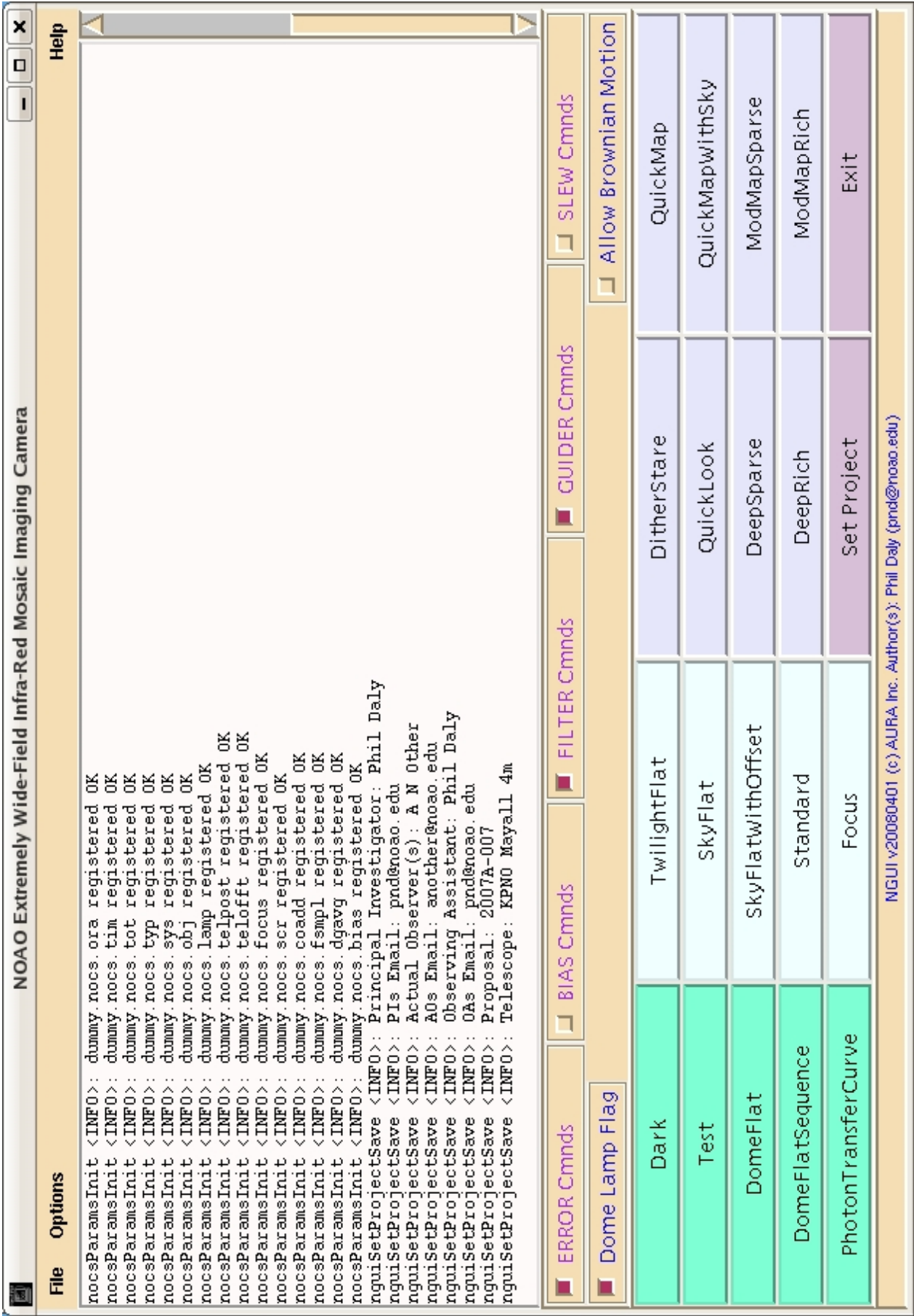


Figure 2.: NGUI Main Interface

DRAFT



Figure 3.: NGUI File Menu Screen

- *GUIDER Cmnds*: does nothing. The interaction between NGUI and guide star selection/operation is currently under review.
- *SLEW Cmnds*: insert telescope slew commands into the output files. At present, it is *disabled* because of safety issues. Even if enabled, these commands are *not* currently written to the script so make sure you bring your target lists with you!

Two other options also exist:

- *Dome Flat Lamp*: indicates the status of the dome flat lamp which is not under observatory software control (so this flag makes the FITS meta-data correct). When *enabled* the dome flat lamp is *assumed* to be on (and vice-versa). This flag is *not* used for a dome flat sequence.
- *Allow Brownian Motion*: for random dither or map patterns, this flag enables or disables the Brownian motion effect. If *enabled*, a series of  $n$  observations results in a random walk of  $\sqrt{n}$  positions away from the origin. If *disabled*—the default—the telescope offsets are randomly-centred around the nominal home position.

**Command Buttons** These buttons define the various observing recipes allowed by the NEWFIRM observation control system (see [1]).

### 3. A Tour Of The Widgets

Each command button produces a new top-level window that consists of only those widgets required to create the output script. There are 6 main areas (script, observation, monsoon, telescope, dither and map) as described below.

At the bottom of each window are command buttons:

- *OK*: grabs various widget parameters and creates the script in \$NGUI\_EXEC. The user is prompted if the filename already exists.
- *What's This*: a simple help file is displayed as an *aide memoire* for the given recipe.

- *Cancel*: dismisses the window with no action taken and no script generated.

### 3.1. SCRIPT CONFIGURATION

Figure 4.: NGUI Script Configuration Frame

**Object Name** a descriptive name meaningful to the observer which becomes the OBJECT FITS keyword.

**Script Name** the name by which the script is stored in the \$NGUIEXEC directory. Spaces are replaced by underscores.

### 3.2. OBSERVATION CONFIGURATION

Figure 5.: NGUI Observation Configuration Frame

**NumObs** The number of observations to take at each telescope pointing.

**SkyMod** The sky modulus is the number of modulo frames to skip when going to sky in the *QuickMapWithSky* and *ModMapRich* recipes. If set to 1, the script will take a sky frame after every object frame and if set to, say, 3 the sky frame becomes every third frame.

**Filter** The desired filter. In some cases various filters may be disabled. Note that the *DomeFlatSequence* recipe is different and is explained in § 3.7.

### 3.3. MONSOON CONFIGURATION

Figure 6.: NGUI Monsoon Configuration Frame

**intTime(sec)** the requested integration time per observation, or per coadd if coadds>1.

**coadds** the requested number of coadds per observation within the MONSOON system.

**bias(mV)** the requested bias voltage. NEWFIRM is currently configured for 400mV bias only so the other options should be ignored. This item is ignored if 'ERROR Cmnds' is disabled.

**fSamples** the requested number of Fowler samples.

**digAves** the requested number of digital averages. Note that the *DomeFlatSequence* recipe is different and is explained in § 3.7.

TELESCOPE CONFIGURATION									
POSITION:	Zenith	O-Sun	DFS	CoOrd	RA: HH-MM-SS.SS	Dec: DD-MM-SS.S	Epoch: 2008		
OFFSET:	RA ("): 45	Dec ("): 45	FOCUS:		Start Focus ( $\mu$ m): 10500	Step Size ( $\mu$ m): 10	# Focus Steps: 2		

Figure 7.: NGUI Telescope Configuration Frame

### 3.4. TELESCOPE CONFIGURATION

**POSITION**<sup>1</sup> the telescope position which can be one of several alternates:

- *Zenith*: move the telescope to zenith;
- *O-Sun*: move the telescope to the lowest elevation opposite the Solar position (usually the sunset point);
- *DFS*: move the telescope to the dome flat screen (*a.k.a.* the great, white spot);
- *CoOrd*: if selected the RA, Dec, Epoch entry widgets become enabled and the user may enter appropriate parameters. If the co-ordinates do not parse correctly, and ERROR is issued to the text pane.
- *RA*: if enabled the RA for the requested object.
- *Dec*: if enabled the Dec for the requested object.
- *Epoch*: if enabled the Epoch for the requested object.

**OFFSET** the offsets for sky frames in various recipes:

- *RA(")*: relative offset for RA in seconds of arc;
- *Dec(")*: relative offset for Dec in seconds of arc;

to sky.

**FOCUS** the parameters associated with executing a *Focus* script (only):

- *Start Focus ( $\mu$ m)*: start focus position.
- *Step Size ( $\mu$ m)*: the step size to increment/decrement between focus observations.
- *# Focus Steps*: the number of focus positions to take.

### 3.5. DITHER CONFIGURATION

DITHER CONFIGURATION									
RA("): 45	Dec("): 45	Iterations: 1	Settle(sec): 3	GEOMETRY:	5PX	4Q	Random	RAxDec	From File

Figure 8.: NGUI Dither Configuration Frame

**RA(")** the RA steps size, if appropriate, in arcseconds for the given pattern. For the random pattern, the upper/lower bounds of the walk, in RA, are set to +/- RA size;

**Dec(")** the Dec steps size, if appropriate, in arcseconds for the given pattern. For the random pattern, the upper/lower bounds of the walk, in Dec, are set to +/- Dec size;

<sup>1</sup>Note: for safety reasons, telescope slews are *disabled* so these buttons, in effect, do nothing!



**Iterations** the number of times the pattern should be executed.

**Settle(sec)** the number of seconds to allow for telescope settling after an offset when guiding—can be set to 0.

**GEOMETRY:** the dither geometry as follows:

- **5PX:** positions are SE, NE, NW, SW and home in diamond pattern with data taken at every pointing.
- **4Q:** positions are the centres of each array (quadrant);
- **Random:** positions are generated by the Tcl/tk *rand()* function within the RA, Dec bounds specified and allowing (or not) for Brownian motion. If selected, a new widget appears—labelled ‘# Random Steps’—allowing the user to specify the total number of pointings.
- **RAxDec:** an RA x Dec grid of positions generated so that the object is *always* centred in the grid. If selected, 2 new widgets appear—labelled ‘# RA Steps’ and ‘# Dec Steps’ respectively—allowing the user to specify the exact grid pattern required.
- **From File:** pops-in another widget allowing the user to specify a file containing RA, Dec offsets in arcseconds, 1 pair per line, separated by whitespace. If selected, a new widget appears—labelled ‘Filename’—allowing the user to specify the full path to the offset file.

NB: All patterns return to the ‘local’ field center when done.

### 3.6. MAP CONFIGURATION



Figure 9.: NGUI Map Configuration Frame

**RA(°)** the RA steps size, if appropriate, in arcseconds for the given pattern. For the random pattern, the upper/lower bounds of the walk, in RA, are set to +/- RA size;

**Dec(°)** the Dec steps size, if appropriate, in arcseconds for the given pattern. For the random pattern, the upper/lower bounds of the walk, in Dec, are set to +/- Dec size;

**Iterations** the number of times the pattern should be executed.

**Guider Wait?** a true or false flag which, if true, *pauses* the script whilst a new guide star is selected. The script only continues when the observer responds to the prompt.

**GEOMETRY:** the dither geometry as follows:

- **5PX:** positions are SE, NE, NW, SW and home in diamond pattern with data taken at every pointing.
- **4Q:** positions are the centres of each array (quadrant);
- **Random:** positions are generated by the Tcl/tk *rand()* function within the RA, Dec bounds specified and allowing (or not) for Brownian motion. If selected, a new widget appears—labelled ‘# Random Steps’—allowing the user to specify the total number of pointings.

- *RAxDec*: an RA x Dec grid of positions generated so that the object is *always* centred in the grid. If selected, 2 new widgets appear—labelled ‘# RA Steps’ and ‘# Dec Steps’ respectively—allowing the user to specify the exact grid pattern required.
- *From File*: pops-in another widget allowing the user to specify a file containing RA, Dec offsets in arcseconds, 1 pair per line, separated by whitespace. If selected, a new widgets appear—labelled ‘Filename’—allowing the user to specify the full path to the offset file.

NB: All patterns return to the ‘local’ field center when done.

### 3.7. Dome Flat Sequence

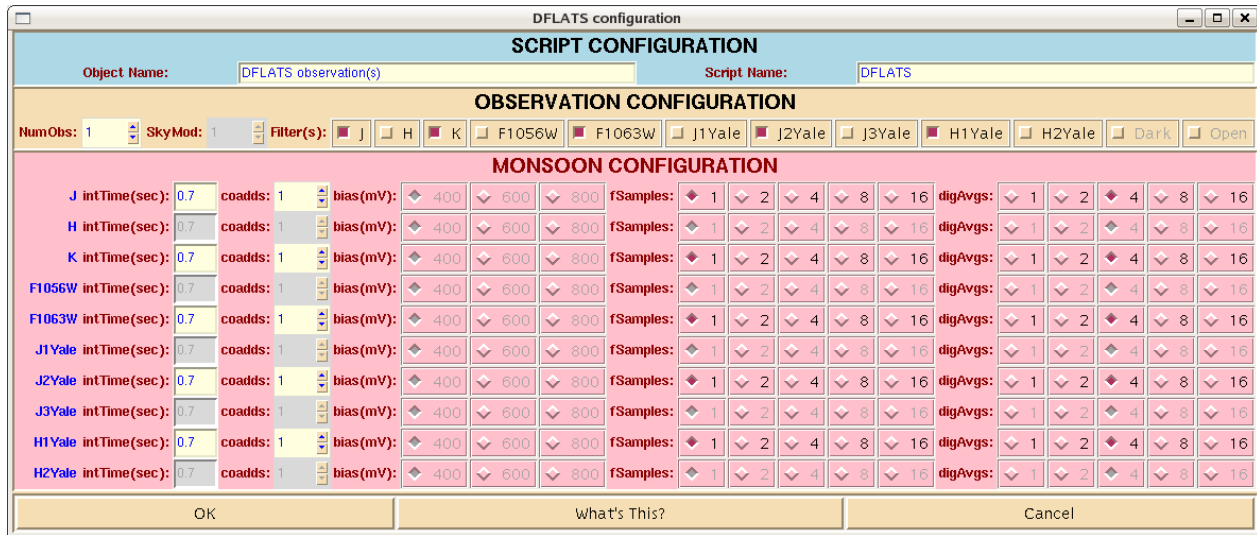


Figure 10.: NGUI DomeFlatSequence Recipe Window

The *DomeFlatSequence* recipe window is shown in the figure and differs because the filter selection contains checkboxes and not radiobuttons. The difference is that radiobuttons are mutually exclusive (*i.e.*, you can only choose 1 at a time) whereas checkboxes allow multiple selections. When checked, the corresponding Monsoon configuration widget for that filter is enabled and a script is created that sequences through the filters in a known order. In the example figure, dome flats would be taken in the following filters: J, K, F1063W, J2Yale and H1Yale.

NB: the dome flat sequence script is *highly* interactive requiring adjusting the dome flat lamp at various points during the execution of the script. When at the telescope, do *not* leave the script running and walk away!

## 4. Document Revision History

19 December 2007, PND: Original version. 01 April 2008, PND: Conforms to new NGUI after observer feedback.

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**References**

1. Daly, P. N. 2004, 'NEWFIRM Observation Recipe Book', SDN9006, NEWFIRM Project, NOAO.