Chapter 6 ViewFits

6.1 Default Operation and Mouse Control

VF starts up with four display canvasses. You can choose which is active by clicking on the A, B, C, D buttons below the canvasses. The E frame is a large, separate, window. The color map is selected by the button on the lower right. By default the image will be autoscaled, however you can also fix the range using the commands in the lower part of the window. Holding and dragging the right mouse button will change the stretch of the display. If you see a black display when autoscaling try clicking on “fixed” then “auto” again. Moving the cursor over the images will result in the x and y and data value for the pixel being displayed at the top of the VF window. x values increase to the right, and y increases downwards. Unless the camera has been rotated at the telescope, North should be to the top and East to the left (to better than half a degree).

VF uses seven temporary data buffers for storing the image data. Each of the five canvasses is associate with a default buffer however each canvas can look at any buffer by selecting the appropriate buffer number in the “Buffer” option in the lower part of the window.

If you use the XUI observing window to take an “Object” frame this image will be written to data buffer B0 and displayed in the top left canvas, “A”. If a “Sky” frame is taken this will be written to buffer B1 and displayed in the lower left canvas, “B”. If “Obj - sky” is selected in the XUI then the difference of the object and sky frames will be written to buffer B2 and displayed in the “C” frame to the top right.

Holding down and dragging the middle mouse botton will draw a box on the image. You can then zoom in on this box (button in lower part of window) or get statistics for the box (see Section 6.4). Clicking with the left button will center any box on the cursor position.

6.2 Different Display Modes

As well as displaying images the “Display” button in the lower part of the window allows you to display the FITS header, merged columns or rows of the image (Spectra A, B), histograms, or linecuts through the image. More information on these modes is given in the VF manual at the summit and also in the CSHELL manual. Here we will only mention the commonly used NSFCAM modes: image, header and linecut.

Selecting “Header” as the display mode will present the FITS header for the currently active canvas. We suggest you put this display into the E canvas which enables you to see almost the entire header in one glance. Use the horizontal and vertical scroll bars to view the edges of the frame.

To perform a linecut through the image, display the image in one canvas, select another canvas and the “linecut” display option, and point that canvas to the appropriate buffer. Go back to the image display; draw a box around the region of interest by dragging on the middle mouse button; click with the left mouse button on the center of the box, and hit “l” (for linecut). Go back to the linecut canvas and select “Box” in the “Area” option and “Autoscale On”. You should get a meaningful display which you can then fine-tune by reselecting the x and y central values or the scale using the options in the lower part of the window. This is a useful method for measuring seeing or checking telescope focus.

6.3 Mathematical Operations

The “Math” button on the top of the VF window allows mathematical operations to be performed on the seven data buffers. You can also copy buffers, clear buffers, and rotate the images.

6.4 Stats Frame (and use for Shift & Add)

Clicking on the “Options” box at the top of the VF window presents you with a menu whose top option is “Stats Frame”. Select the appropriate canvas and statistics will be displayed for the entire frame as well as for the boxed area and specified sky area. Rudimentary photometry can be performed in this way.

This option is useful for observing in Shift and Add mode, as you can draw boxes and specify that those arrays define the data and guide subarrays (see Section 5.6).

6.5 Telescope Offsetting

Clicking on “Options” allows you to select “TCS coordinates”. This is a very useful way of offsetting the telescope. Ensure that the “Angle” and “Plate scale” values are correct for your chosen lens and orientation of NSFCAM (angle is the location of North measured clockwise from straight up on the VF display - it should be 0 unless you have requested that the camera be physically rotated at the telescope). Place the cursor on the current position of an object in the frame, click with the left button, and hit “f” (for “from”). The x and y values should be read into the TCS window. Move the cursor to the desired position, click and hit “t” (for “to”), or type in the desired x,y coordinates in the frame (for example 128, 128 to put an object in the center of the array). You can also indicate the from-to locations by holding down and dragging the middle mouse button while pressing the shift key. Click on the “calculate offset” button and if the values look reasonable and you are ready to move then click on the “offset” button.

6.6 Reading and Saving Images

The “File” button on the top of the VF window allows you to read in a previous image to a buffer and display it, and also allows you to save a buffer. The image that is saved may not have all the telescope information in the header however so this is not a good substitute for switching on “autosavexui”.

Chapter 7 Instrument Setup and Sensitivity

7.1 Start of Night: Dark Current Check

At the start of every night you should check that the array appears OK when blanked off. Blank off both the lens and the filter and take a 1 second integration, with 1 cycle and 1 coadd, for both object and sky, and display the difference. The mean counts in the differenced frame should be zero with $\sigma \sim 2$. The individual frames should have a mean of 6 to 12 DN.

If the dark current is high, check that the array has not warmed up - it should be below 35K, and preferably near 29.5K (with the current Lakeshore controller).

If the temperature is OK, but the dark current is too high, try recycling the power to the array and resetting the array voltages.

Report any problems to the operator.

7.2 Focus

The focus of the telescope is controlled from the operator's console so that the observer needs to request any focus changes (this will be changed in the future). The focus of the telescope gets more negative with decreasing temperature, and so has to be reduced during the night, usually stabilising by the early hours of the morning.

The NSFCAM plate scales have different focus positions. The values depend on the ambient temperature and can change by 20 units (0.20) but typical values (for the non-tiptilt top end) are:

TABLE 7.1: Typical Focus Positions

Pixel Scale:	0.055"	0.148"	0.300"
Focus:	-4.65	-4.85	-5.05

i.e. there is a 20 unit offset between the different lenses. No focus change is necessary when changing filters.

Currently the telescope is astigmatic, which, although undesirable, can be used as a guide for focussing. If an extended image is seen orientated like "/" (with north to the top and east to the left) then the focus should be made less negative. If an elongated image like "\" is seen then make the focus more negative.

To measure the width of the image use the linecut option in VF (Section 6.2).

7.3 Instrument Sensitivity

Updated sensitivity values will be provided shortly, but the values determined in 1994 and given in version 1.0 of the manual appear to be valid.

TABLE 7.2: Instrument Sensitivity Assuming a 2"x2" Image

Filter	Background per square arcsec with gain 10 electrons/ADU		3σ mag in 1 min on target and 1 min on sky
	e-/s	mag	
J	6.9×10^3	15.9	20.6
H	2.9×10^4	13.4	18.9
K′	1.2×10^4	14.0	18.9
K	$1.7.10^4$	13.7	18.8
L	1.8×10^7	4.9	14.0
L′	2.5×10^7	4.5	13.6
M′	1.5×10^8	0.3	10.7
M	5.3×10^8	-0.7	10.7

Other magnitudes or signal-to-noise values can be calculated assuming background limited performance:

S/N α signal x (sqrt time)

So that for example to increase signal-to-noise from 3σ to 30σ, the signal would have to be increased by a factor of 10, implying that the object would have to be 2.5 magnitudes brighter than the values given above, or the integration time would have to be increased by a factor of 100.

For the narrow band filters or CVFs S/N can be estimated using the above numbers and the difference in bandwidth (see Table 5.5). For example, the signal through the CVF is down by about a factor of 10 compared to the corresponding broadband filter and the noise is down by the square root of 10; therefore objects would have to be 1.25 magnitudes brighter than the values listed above for the same signal-to-noise.

Note that often systematic effects will limit the accuracy achieved. In particular sky variations will be the limiting factor unless you are careful to limit the exposure time for each image to less than the likely sky variation time. This translates into maximum integration times of about one or two minutes at JHK, and about 20 seconds at longer wavelengths. Keep your counts greater than ~100 to avoid being read noise limited. The minimum number of counts to be background limited is equal to the square of the read noise in electrons divided by the gain (see Section 4.3).

Integration times for standard stars are given in Section 9.2.

Chapter 8 Target Acquisition and Off-Axis Guiding

Targets are usually visually acquired using the on-axis TV. A mirror is put in and out of the beam by the operator. Targets need to be brighter than 17 in the red to be seen on the TV. After a large slew the operator may check pointing by going to a nearby bright star.

An offset guider is available for optically guiding during an integration. The guider has a field of view that is an annulus with an inner radius of 100" and an outer radius of 200". It can reach about V=12 in one second or V=14 in 5 seconds. The operator can search for a guide star but it would be more efficient if you want to operate in this mode to arrive at the telescope with a list of bright objects in this region around your target. You can use the xstarcat utility to find guide stars.

Chapter 9 Calibrations and Photometric Color Transformations

9.1 Non-Linearity

At the time of writing a non-linear correction has not been determined for NSFCAM - however a correction will be determined in the near future.

The array behaves in a similar manner to the CSHELL SBRC InSb array. The plots shown in the back of the CSHELL manual of counts versus integration time, as a function of bias voltage, can be used as a guide for the camera.

These relationships imply the following conservative upper limits to retain linearity in your data:

TABLE 9.1: Maximum Counts for Data Linearity

VDET	-3.4	-3.2	-2.9	-2.7
bias mV	300	500	800	1000
Counts should not exceed (excluding bad pixels)	2000	4000	8000	10000

Observations of photometric standards with a 300mV bias show that counts around the 2500 level result in a 5% non-linear effect.

9.2 Standard Stars

For JHK work the UKIRT Faint Standards list provides an excellent source of standard stars. This list is posted on paper in the control room and is also available to the operators and observers via the xstarcat utility. The natural system of NSFCAM is extremely similar to the UKIRT photometric system. The systems appear identical at H and K with a small difference at J described (provisionally) by the color relation:

$$(J\text{-}K)_{nsfcam} = 0.95\ (J\text{-}K)_{ukirt}$$

Using the UKIRT to CIT relationships from Krisciunas (private communication) this implies that the relationship between the NSFCAM natural system and the CIT system (as defined by the Elias standards) is:

$$K_{cit} = K_{nsfcam}$$
$$(H\text{-}K)_{cit} = 0.854(H\text{-}K)_{nsfcam}$$
$$(J\text{-}K)_{cit} = 0.974(J\text{-}K)_{nsfcam}$$

Photometric zeropoints for NSFCAM (i.e. the magnitude that is added to the instrumental magnitude to obtain true magnitude) are typically:

TABLE 9.2: Photometric Zeropoints

Filter:	J		H		K		L'
Plate Scale:	0.30"	0.15"	0.30"	0.15"	0.30"	0.15"	0.15"
zeropoint (mag)	22.54	22.44	22.06	21.94	21.43	21.32	20.0

These values are for an airmass of 1.0 and were measured over the time period December 1994 to November 1995. They are a measure of instrument throughput and should not vary by more than about 0.10mag from the above values. Atmospheric extinction is typically in the range 0.05 to 0.20 magnitudes per airmass at JHKL'. When reducing your data don't forget to divide your FITS images by the number of coadds and NDR (DIVISOR parameter value in the header); this is done automatically in VF.

The "stnd" XUI macro (see chapter 10) is often used to obtain 5 images of the standard with the star in different regions of the array. These frames can then be median filtered together to give a sky frame.

Typical integration times for observing a standard are:

TABLE 9.3: Integration Times for Standard Stars

Plate Scale	Stellar Mag	Filter	Int. Time, sec	Coadds	Cycles	NDR	Images	Total Time, s
0.15"	6	L'	0.076	50	1	1	5	19
	7	J, H, K, L'	0.08	50	1	1	5	20
	9	J, H, K	0.3	15	1	1	5	22.5
	9	L'	0.1	50	1	1	5	25
	11	J, H, K	1	10	1	8	5	50
	13	J, H, K	2.5	10	1	8	5	125

For JHK work point sources should be fainter than 7th magnitude. For L,L' work point sources should be fainter than around 5th. For work in the M band however 3rd magnitude objects are better, and you will have to work at the smallest plate scale or possibly through narrow filters or with a polarizer to reduce the background. The minimum integration time can be reduced slightly by using subarrays (see Section 4.4).

The maximum time between successive images, i.e. the number of coadds, should be constrained by sky variability. At JHK sitting on one position for a minute or two should be OK, but in the thermal regime shorter observations are recommended, such as 200 coadds at 0.08seconds.

9.3 Flat Fields

At J,H,K good flats can be obtained either from the dome or from the sky. Night to night variations at the level of 2% have been seen so taking flats each night is recommended (this situation may have been improved with the new array temperature controller). All the lights should be on in the dome and the telescope pointed at the usual flat position (which is not the white spot). Taking two sets of data with the lights on, where one set has half the integration time of the other, and subtracting the results, works well.

In the thermal regime dome flats require a long integration to get sufficient counts and usually sky flats are used, or flat fielding is not done and the object and calibrator are placed in the same region of the array.

The array is flat to about 7%. The figure below shows the usual structure that is seen: a gradient across the array with the right brighter than the left, and what Mark Shure refers to as the Starship Enterprise pattern in the center. If you do not see this kind of pattern then it is possible that there is a problem with the array and you should report this to the operator and your support astronomer.

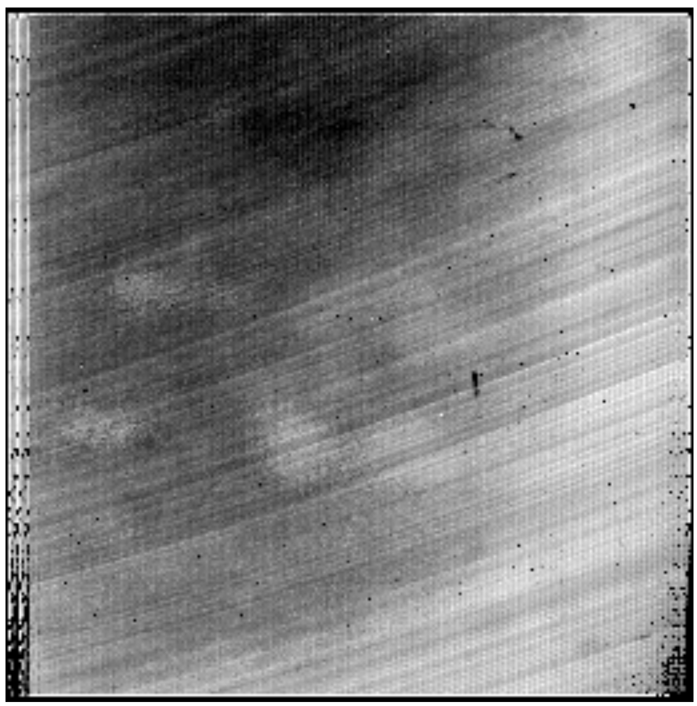

FIGURE 9.1: Example of K-band Flat-field Image

Chapter 10 XUI Macros

Macros are simple ascii files which give the camera a string of commands (e.g. change filter, take exposure, etc) or which send the telescope commands for offsetting (e.g. to create a mosaic of images over the sky).

There are several macros in the directory /home/nsfcam/macro/camxui which is accessible from Herschel, Planck or Wien. These are readable and executable from the guest accounts. A few macros will also have been automatically copied into a /macro directory in your guest account. The "stnd" macros are useful for observing standard stars - five exposures will be taken with the standard in different regions of the array so that the frames can be median filtered together to obtain a sky frame. To customize the existing nsfcam macros copy the macro to your guest account, edit the macro and save the file there; we do not want a proliferation of guest-owned files in the nsfcam macro account. If you think you will need to use the macro on future runs save it to your home institution.

Selecting "options" at the top of the XUI Observing window, followed by "execute Do files" will allow you to execute or edit existing macros. The pathname will default to /home/nsfcam/macro/camxui; enter your own directory path if you have created your own macros. Once a macro is executing do not close the "execute Do files" window as the only way to stop a macro is by using the "cancel" button in this window.

As an example, here is the macro "stnd10" which takes 5 images using the selected integration time/coadd/cycle, offsetting the telescope by 10" between exposures and waiting for 2 seconds after moving the telescope:

```
Obsmode 0
autosavexui on
tcs ABEAM
tcs 1   0.0   0.0 -1 C.SCN
echo P#1
go
tcs 1   -10.0 -10.0 1 C.SCN
wait 2
echo P#2
go
tcs 1  -10.0  10.0  1 C.SCN
wait 2
echo P#3
go
tcs 1   10.0  10.0  1 C.SCN
wait 2
echo P#4
go
tcs 1 10.0   -10.0  1 C.SCN
wait 2
echo P#5
go
tcs 1  0.0    0.0  1 C.SCN
echo Done.
```

Chapter 11 Known Limitations and Common Problems

Dichroic errors sometimes occur on startup - type “ditinit” on the XUI command line.

The **filter and cvf wheels** may show a status of “error” or may be incorrectly positioned causing vignetting - type “filterinit” on the XUI command line.

The **lens turrets** may get into an error state - type “leninit” on the XUI command line.

If there are **continuous go task errors** check that the array power is on.

If the camera appears to **hang up when trying to take “sky” frame** - check that the telescope control system is powered up.

If there is **no image in VF** - set xuihostname to the appropriate machine using the xui command line.

If you see **no image** - check that one of the following is not in the way: the on-axis mirror, the camera window or telescope mirror covers, or clouds.

If **no object is visible and there are lots of bad pixels** - reset the array voltages.

If the image shows a **checkerboard effect** you are probably saturating, reduce the integration time or reset voltages.

If there is a **high dark current or a large number of bad pixels** - check the array temperature, reset if necessary by typing “tcls setp 29.5” on the XUI command line.

If there is **rapid heating of the array** - recycle the preamp power and check that the three red lights on the power supply box at the telescope are on (at the south position facing the control room); check that the temperature controller is still plugged in at the telescope; check that the outer cold box is OK.

If the **cold box is warming up** - check closed cycle cooler, check liquid nitrogen, tweak ccc pressure if necessary (see Section 14.5).

The data transmitting network is limited in speed so that if you do **a large number of cycles with very short integrations using smaller than the full array, it can hang the system**. The only recovery is to restart the IC.

Intermittent go task errors at short integrations are sometimes caused by a slow network, it can help to reduce the number of non-destructive reads using the Setup window.

If the **image number is increasing** although autosavexui is off then autosaveic is on, turn it off.

There is a **shift and add bug** - guide array x1,y1 cannot be identically equal to the data array x1,y1.

Images through **the cvf can show ghosts** - multiple reflections produce an image rotated 180 degrees about the frame center, so place extended objects on one side of the array.

If **Planck is sick** the camera can be run from Herschel, just type “xuihostname herschel” on the xui command line.

The message **“Panic error”** appears - don’t panic! Click on “OK” and continue. Usually this is a non-serious error condition due to a communication hiccup (although if you were saving data you may have lost one image).

Chapter 12 End of Night Procedures

At the end of the night you must blank off both lens and filter. It is possible for stray light to damage the array.

Quit the XUI and VF processes using the “quit” buttons on the windows.

Log off of the workstation.

Have the operator cover the camera window and top off the outer can with liquid nitrogen.

Chapter 13 Dictionary of Commands

Array - Set the size and location of sub-arrays. These sub-arrays determine where the SBRC Array will be readout for a GO.

Prompt	'Array' prompt on the observing parameter's Obs page.
Range	inx - determines which array is affected
	0 = Guide/Speckle Array.
	1 - 3 = Data arrays 1 through 3
	x y wid hgt - The (x,y) location of the upper left corner and its width and height is specified. Please note that these values <u>must be multiples of 8</u>.
Initial	All subarray are defines as full arrays (0 0 256 256).
Syntax	ARRAY inx x y wid hgt

AutoSaveIC - Determines whether the data is saved by the IC program on NSFPC.

Prompt	N/A
Range	Off - Data is not saved by the IC.
	On - The IC program on the PC saves the data.
Initial	Off
Syntax	AutoSaveIC { off | on }

AutoSaveXUI - Determines whether the data is saved by the XUI program on the SUN workstation.

Prompt	'AutosaveXUI' on the observing parameter's Obs page.
Range	Off - Data is not saved by the XUI.
	On - The XUI program on the SUN saves the data.
Initial	Off
Syntax	AutoSaveXUI { off | on }

CamMode - Specifies the observing mode in the GO sequence.

Prompt	'Mode' on the observing parameter's Obs page.
Range	Basic- Acquires single images with just the basic options.
	Guide- This mode is planned but not currently available.
	Speckle - This mode features real-time shift and add of images.
	Movie - Allow continuous data acquisition.
	SIM- Simulation mode. Allows the software to be used without the actual camera hardware.
Initial	Basic
Syntax	CAMMODE { basic | Guide | Speckle | Movie | sim }

CBMode - The CB or ClockBuffer Mode selects the type of readout scheme used by NSFCAM. Currently this is restricted to ARC_D.

Prompt	'CBMode' on the setup parameter's Obs page.
Range	ARC_S - Array Reset Clocking, Single sample.
	ARC_D - Array Reset Clocking, Double sample.
	PRC - Pixel Reset Clocking.
	CDS - Correlated Double Sampling (not yet functional).
Initial	ARC_D
Syntax	CBMODE { ARC_S | ARC_D | PRC | CDS }

ChgClkBias -.Changes the bias voltage to the clock/bias DAC. This is an engineering command.

Prompt	'ChgClkBias' button on the Observing Parameter's Engineering page.
Range	Board 1 to 4.
	DAC 1 to 16.
	Volts: -10 to 10.
Initial	N/A
Syntax	CHGCLKBIAS board dac volt

CoAdd - The number of integrations summed together per beam or chop position in a GO.

Prompt	'Coadd' on the observing parameter's Obs page.
Range	1 to 32000
Initial	1
Syntax	COADD num

Color - Indicate to the IC program whether the console supports color for text output. The character attributes for color or monochrome are selected based on this parameter.

Prompt	None
Range	OFF or ON.
Initial	OFF
Syntax	COLOR { off | on }

Comment - Specifies a string to be placed in the fits header of the saved file as a comment.

Prompt	'Comment' on the observing parameter's Obs page.
Range	Any string up to 40 characters.
Initial	Undefined.
Syntax	COMMENT string

Cycles - Cycles is a repeat factor in a GO sequence under basic mode. For the ObsMode Noise Image, Cycles indicates how many frames will be used to calculate the noise.

Prompt	'Cycles' on the observing parameter's Obs page.
Range	1 to 1000.
Initial	1
Syntax	CYCLES num

CVFwlen - When a CVF filter is selected, this parameter specifies the wavelength for the CVF filter.

Prompt	'CVFWLen' on the Filter Wheel Dialog Box.
Range	1.10 to 5.6
Initial	2.20
Syntax	CVFWLEN num

Die - This command stops the execution of the IC program. This command can only be executed from the IC program.

Syntax	DIE

Display - This command selects the various screen layouts on the IC program. This command can only be executed form the IC program.

Prompt	XUI_PROMPTS
Range	0 - Displays the most common observing parameters.
	1 - Display the descriptive text parameters.
	2 - Display the engineering parameters.
Initial	0
Syntax	DISPLAY num

Dit - Selects the dichroic wheel position. The selection is indicated by the index value.

Prompt	Click on the Dit Icon on the observing parameters window.
Range	0 = Open
	1 = Visual/IR dichroic in
	2 = COCO lens
	3 = COCO lens
Initial	0 or Open
Syntax	DIT { 0 | 1 | 2 | 3 }

DitInit - The command to initialize the dichroic wheel.

Syntax	DITINIT

DitPos - Allows you to position the dichroic wheel to any step position.

Range	1 to 5000
Syntax	DITPOS step

DoFastMode - Select the fast or slow clocking mode by setting Fastmode on or off. This is an engineering command.

Prompt	'DoFastMode' on the observing parameter's Eng page.	
Range	Off	- Slow clocking mode.
	On	- Fast clocking mode.
Initial	Off	
Syntax	DOFASTMODE { off | on }	

DoFile - This command starts execution of a macro file.

Prompt	See Execute Command File in the XUI chapters.
Syntax	DOFILE filename

DoFileMask - This command sets the pattern string used in creating the file list on the Edit and Executed File window in the XUI program. This command can only be executed from the XUI program.

Prompt	'DoFileMask' on the Execute Do Files window.
Range	Any string.
Initial	*

Syntax	DOFILEMASK string

DoPath - This path identifies the subdirectory where the XUI program will search for DO or macro files. The $HOME and $DATE macros are supported. This command can only be executed from the XUI program.

Prompt	'DoPath' on the Execute Do Files window.
Range	Any legal UNIX subdirectory
Initial	$HOME/macro/camxui
Syntax	DOPATH string

DSPResetMSec - Specifies the amount of time in millisecond between array reset. Array resets are performed during idle periods.

Prompt	'DSP Reset Msec' on the observing parameter's Eng page.
Range	500 to 10000 milliseconds
Initial	1000
Syntax	DSPRESECMSEC num

DTime - Specifies the dead time after a beam switch in seconds.

Prompt	'Beamswitch DTime' on the observing parameter's Setup page.
Range	0 to 10 seconds.
Initial	2
Syntax	DTIME sec

EPassWord - The Epassword command allows you to enter a password. After entering the password successfully, any restrictive parameters (ie engineering) can be modified. Issuing the command with an invalid password will cause those parameters to be restricted.

Prompt	'epassword' on the observing parameter's Eng page.
Range	Any string
Syntax	EPASSWORD string

Filename - The filename's prefix is used to create filenames when saving data to disk. New filenames are constructed by concatenating Filename with the Image Number, then adding a file extension. For example, if Filename is '01jan' and image number is 45, the data file saved could be '01jan045.a'.

Prompt	'Filename' on the observing parameter's Obs frame.
Range	A string of 8 characters
Initial	The current date in the form DDMMM
Syntax	FILENAME string

Filter - Select a filter combination using the 2 filter wheels. The selection are indicated by the index values.

Prompt	Click on the FIlter Icon on the observing parameters window to bring up the Filter Wheel Dialog Box.
Range	CVFinx - Select the filter for the CVF wheel. The list of filters is given in Section x.x.
	Filterinx - Select the filter for the Filter wheel. The list of filters is given in section x.x.
	CVFWlen - This optional parameter specifies the CVF wavelength if a CVF is selected.
Initial	Blank Blank 2.20
Syntax	FILTER cvfinx filterinx (cvfwlen)

FilterInit - The command to initialize the both filters wheels.

Syntax	FILTERINIT

FIlterPos - Allows you to position the filter wheels to any step position.

Range	1 to 40000 for the CVF wheel
	1 to 7200 for the Filter wheel.
Syntax	FILTERPOS { CVF | FLT } step

FullFrame - Takes a single 256x256 image to be displayed in the Object buffer of VF. This image is intended to be used to set up your sub-array in Speckle and Guide camera modes .

Prompt	"Take FullFrame" button on the Observing Parameter's Obs page.
Syntax	FULLFRAME

fpcal - Calculate the sum of the five subarrays defined by fpsetbox (intended for Fabry Perot users).

Range	OFF or ON
Initial	OFF
Syntax	FPCAL { off | on }

fpsetbox - define 5 subarrays (intended for Fabry Perot users).

Range	inx - Identifies which subarray dimension is affected. Specify a value from 1 to 5.

	x y wid hgt - The (x,y) location of the upper left corner and its width and height is specified
Syntax	FPSETBOX inx x y wid hgt

Go - Performs a GO, which is a set of integrations. The GO command can take an optional parameter which determines the type extension for filenames in basic mode. Each CamMode describe the sequence of events which occurs during a GO. Please read the section description of CamModes for a more complete description.

Syntax	GO [{ obs | dark | flat | comp }]

GoInit - Initializies the go task in the IC program. The go task is responsible for controlling the DSPs and Array's electronics.

Syntax	GOINIT

GoReset - Places the DSP in a reset operation mode. The go task's state will be changed to ERROR.

Syntax	GORESET

GPSTime - The GPSTime parameter indicates which time source CAMIC uses: either the internal PC clock or the GPS clock board.

Range	OFF - GPS off uses the internal PC clock.
	ON - Use the GPS clock board.
Syntax	GPSTIME { off | on }

ICHostName - The XUI program uses this hostname when initiating network communication to the IC program. This command can only be executed from the XUI program.

Range	Enter the hostname of the IC computer
Initial	nsfpc
Syntax	ICHOSTNAME name

ICPath - The path identifies the subdirectory the IC program uses when writing data files. This command will create new subdirectories if path doesn't exist. Supports the $DATE and $HOME macros.

Range	Any legal Unix subdirectory. 80 chars max.
Initial	$HOME/data/$DATE
Syntax	ICpath string

ImageNumber - An ID number used to create the filename. See Filename for an example.

Prompt	'Next Image Number' on the observing parameters Obs page.
Range	1 to 9999
Initial	1
Syntax	IMAGENUMBER num

isready - When all hardware (array, len, filter, dit, pplate) is in an OK state, this command return 'NO ERROR', otherwise it returns 'ERROR NOT READY'. This command gives you a way to test if the camera is ready. Useful for macro files.

Syntax	ISREADY

Itime - The amount of time the array is exposed between readouts, or the time interval for 1 Coadd. The minimum value is determined by the readout rate.

Prompt	'Itime' on the observing parameter's Obs page.
Range	0.1 to 3600.0 seconds
Initial	1
Syntax	ITIME sec

Len - Changes the plate scale by moving the len turret to one of the len assembly. The selections are indicated by the index values.

Prompt	Click on the Len Icon on the observing parameters window to bring up the Len menu.
Range	0 - 6. The list of lenses is given in Section x.x..
Initial	Blank
Syntax	LEN inx.

LenInit - The command to initialize the len turret.

Syntax	LENINIT

LenPos - Allows you to position the len turret 5000 to any step position.

Range	1 to 5000
Syntax	LENPOS step

MBoffset - Sets the Movie Burst Offset value. This value is subtracted from the pixel value in movie burst mode to allow the data values to be within the range of a 16-bit integer.

Range	0 to 100,000

Syntax MBOFFSET num

MovieBurst - The parameter used by the movie burst mode, indicates the number of image to be taken during a movie burst integration.

Range	0 to 600000 (But really limited by DSP memory).
Syntax	MOVIEBURST num.

MovieDisplay - A command to indicate how often frames are displayed on VF in movie mode. For example, if MovieDisplay equals 10, then every 10th frame is displayed. If autosavexui is on then these frames will be saved.

Prompt	'Display every' prompt on the observing's parameter's Obs page.
Range	1 to 100000
Initial	1
Syntax	MOVIEDISPLAY num

NDR - This parameter identifies the number of samples or times the array is readout to obtain the image for 1 coadd. Note that increasing the number of samples will lower your noise; the maximum number of reads possible (up to 8) in the requested integration time will be used. Prompt 'NDR' on the Setup page on the parameter window.

Range	1 to 16.
Initial	8
Syntax	NDR num

NumArray - Specifies the number of sub-arrays on the SBRC array to be used during a integration.

Prompt	'Numarray' on the observing parameter's Obs page.
Range	The range depends on the CamMode.
	Basic Mode allows 1 to 3 subarrays.
	Speckle mode allows 1 subarray.
	Movie mode allows 1 to 3 subarrays.
Initial	1
Syntax	NUMARRAY num

Object Name - This information identifies the object you are observing and is placed in the fits header.

Prompt	'Object' on the observing parameter's Obs page.
Range	Any string up to 40 characters.
Initial	'Name of Object'
Syntax	OBJECT string

Observer - This information identifies the observers and is placed in the fits header.

Prompt	'Observer' on the observing parameter's Obs page.
Range	Any string up to 40 characters.
Initial	'Your name'
Syntax	OBSERVER string

ObsMode - Determines the beam switch pattern for 1 cycle in Basic Mode.

Prompt	'Obs Mode' on the observing parameter's Obs page.
Range	0 - Obj(A) integrates at the present beam position. This data is treated as an 'object' frame.
	1 - Sky (B) integrates at the nod offset beam position. This data is treated as a 'sky' frame.
	3 - Pair (AB). In this mode, a pair of frames are taken. First the telescope is position at the A beam and a 'object' frame is taken. Then the telescope is positioned at the B beam and a 'sky' frame is taken.
	4 - Noise Image. This is a special mode used to produce noise images. For each cycle a image is readout. Using these images, the standard deviation of each pixel is calculated. A frame is produced where each pixel position contains the standard deviation of that pixel position. These value are multiplied by 100 to preserve decimal information.
Initial	0
Syntax	OBSMODE num

PPlate - Positions the polarizer plate to a specific angle. Real numbers are accepted.

Prompt	Click on the PPlate Icon on the observing parameters window to bring up the menu.
Range	0 to 359 degrees.
Initial	0
Syntax	PPLATE degrees

PPlateInit - The command to initialize the polarizer plate. After initialization the wave plate is set out and the polarizer plate is set to 0 degrees.

Syntax	PPLATEINIT

PPlatePos - Allows you to position the Polarizer Plate to any step position.

Range	1 to 5000
Syntax	PPLATEPOS step

PVoltage - Sets the user programmable voltage's VDDUC and VDET on the clock bias board.

Prompt	The observing parameter's Setup page contains prompts for set the voltages. First input the appropriate values in VDDUC and VDET. Then select the 'Set Programmable Voltages' with the mouse to send these values.
Range	VDDUC range is -3.75 to -2.505 volts.
	VDET range is -3.75 to -2.505 volts.
	In addition, vdet >= vdduc and (vdet-vdduc)<=1.5 volts.
Initial	Undefined. You must initialize the voltage as part of your startup procedures.
Syntax	PVOLTAGE vdduc vdet

PWindow - The PWindow variable indicates which parameter page should be displayed in the Observing Parameters frame.

Prompt	Set of Blue colored button in the upper-right corner of the Observing Parameter frame.
Range	1 - Obs. Displays most commonly changed Observing parameters.
	2 - Setup. Displays the setup parameters. These parameters should be examine at the start of you observing session.
	3 - Eng. Displays the engineering parameters. These are restricted parameters mostly dealing with the array electronics.
Initial	0
Syntax	PWINDOW { 0 | 1 | 2 }

SABinLen - For Shift&Add mode, this command identifies the width of a bin in terms of counts.

Prompt	'SABinLen' prompt on the Observing Parameters Obs page. You must be in Speckle mode.
Range	1 to 256000.
Initial	1000
Syntax	SABINLEN num

SAMethod - In Shift&Add mode, this command identifies the algorithm used to determine the offset for the shift and add.

Prompt	'SAMethod' on the Observing Parameter Obs page.
Range	Peak - The peak pixel value determines the offsets.
	Centroid - A centroiding algorithm is used to determine the offsets
Initial	Peak
Syntax	SAMETHOD { PEAK | CENTROID }

SAPeak - For Speckle mode, the data is accumulated in 7 bins. The SAPeak value identifies the midpoint or count value for bin number 3.

Prompt	'SAPeak' on the Observing parameter's Obs page.
Range	1 to 2147483647.
Initial	38000
Syntax	SAPEAK num

SetMotorRdy - This command sets the status for all the motorized items (filter, dit, len, pplate) to the READY state. This command is intended for engineering purposes only. Since all item must in in a ready state before a GO is accepted, this command clears any ERROR condition due to mechanical failures. Do not attempt to move any motors which has been set ready using this command. This is an engineering or restricted command.

Syntax	SETMOTORDY

ShiftAdd - In Speckle mode, this parameter identifies the number of shifts and add frame to be taken.

Prompt	'ShiftAdd' on the Observing parameter's Obs page.
Range	1 to 10000.
Initial	10
Syntax	SHIFTADD num

SkyAvg - In Shift&Add mode, this parameter indicate the number of images to be averaged during the TakeSky procedure.

Prompt	SkyAvg on the obs page on the parameter window.
Range	1 to 200

Syntax	SKYAVG num

SlowCnt - When DoFastMode is OFF, the SlowCnt variable specifies the numbers of NOP's or delays in the DSP clocking algorithm. This effectively slows down the clocking pattern which lowers the readout rate and read noise. This is an engineering or restricted command.

Prompt	'SlowCnt' on the Observing Parameter's Eng page.
Range	1 to 100.
Initial	1
Syntax	SLOWCNT num

Stop - During an integration or GO cycle, the stop command is used to abort the acquisition.

Prompt	'Stop' button on the XUI's command frame.
Syntax	STOP

SubAB - After an image is taken and sent to VF, the XUI will command VF to display the object - sky frame if the SubAB switch is ON.

Prompt	'Objeck-Sky' check box on the Observing parameter's Obs page.
Range	OFF or ON.
Initial	OFF
Syntax	SUBAB { off | on }

TakeSky - For Shift&Add2 camera mode, this command takes and loads a sky image into the DSP. This is the sky image used for real-time sky subtraction. The image is also displayed on the VF's sky canvas.

Prompt	'Take Sky' button on the obs page of the parameter window.
Syntax	TAKESKY

TCLS - Sends a command to the Lakeshore Temperature Controller. Any string after the TCLS is send to the temperature controller. Please refer to the temperature controller's manual for the correct syntax of commands.

Range	Any legal controller command
Syntax	TCLS string

TCS - Using this command you may send a string to the Telescope Control System (TCS). This string is assumed to be a correct TCS command with a 40 character maximum limit.

Range	Any legal TCS command.
Syntax	TCS string

TCSHostName - Identifies the computer host accepting TCS commands.

Range	The current TCS host is 'planck'
Initial	'planck'
Syntax	TCSHOSTNAME name

TCSI - Sends a command to the Scientific Instrument's Temperature Controller. Any string after the TCSI is send to the temperature controller. Please refer to the temperature controller's manual for the correct syntax of commands.

Range	Any legal controller command
Syntax	TCSI string

TempRecord - TempRecord specifies the time interval in seconds for recording temperature data to disk. The temperature information is appended to the file 'temper.log' on nsfpc.

Prompt	'TempRecord' on the Observing parameter's Eng page.
Range	15 to 200000.
Initial	200000
Syntax	TEMPRECORD sec

VF - Commands VF from the XUI program. This command can only be executed from the XUI program.

Range	Any legal VF command. See the Command Dictionary for the VF program for syntax.
Syntax	VF command

Wait - Sets the acquire or Go task busy for a time interval specified seconds.

Range	0.1 to 60.0 seconds
Initial	N/A
Syntax	WAIT sec

WPAssy - A command to move the wave plate out or in.

Prompt	Click on the pplate Icon on the observing parameters window to bring up the pplate menu.
Range	OUT or IN

Initial	OUT
Syntax	WPAssy { out | in }

XUIHostName - The IC program uses this hostname when initiating network communication to the XUI program.

Range	Enter the hostname of the workstation running the XUI interface.
Initial	Planck
Syntax	XUIHOSTNAME name

XUIPath - This path identifies the subdirectory the XUI programs uses when reading and writing data file.

Prompt	'XUIPath' on the Observing Parameter's Obs page.
Range	Any legal UNIX subdirectory
Initial	/scr/s4/DDMMM. Where DDMMM is the current date. For example, /scr/s1/01jan.
Syntax	XUIPATH string

Command - DescribeCommand.

Prompt	XUIPROMPTS
Range	describeParameters.
Initial	N/A
Syntax	SYNTAX