

# MONSOON

# Operating Instructions For the WIYN Bench Spectrograph

## NOAO Document MNSN-AD-08-0010 Revision: 2.1

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Doc. File MNSN-AD-08-0010 R2.1.doc Doc. Number MNSN-AD-08-0010

## **Revision History**

Version	Version Date Approved Sections Af		Remarks
0	3/14/2008	All	Initial draft release - aro
1.0	(125/2000)	1 thm 6 and 0	New MOP interface, new power up and
1.0	0/23/2008	1 thru 6 and 9	power down procedures
		Various	Specify mouse buttons used when
			navigating MOP.
1.1	7/2/2008	4.0	Expand information on "Stop and readout
			image."
		6.1	Expand PAN reset instructions.
		3.1	Expand explanation of exposure
1.2	7/9/2008		configuration.
		5.0	Expand note on use of ximtool.
		As required	Replace MOP GUI throughout. New MOP
2.0	7/15/2008	-	has an entry for "propid."
		3.2	Define "propid"
2.1	9/22/2008	As required	Replace MOP GUI throughout.

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## **1.0 Introduction**

This document sets forth instructions for operating the MONSOON Observing Platform (MOP) as it applies to the WIYN Bench Spectrograph. Graphical User Interfaces (GUI) are represented throughout this manual and serve to clarify many of the operational features of the MOP.

## 2.0 Starting the System

Power on DHE, if not previously accomplished.

Log in as "observer."

#### 2.1 Start the Software

The Monsoon Observing Platform software has one major prerequisite. The data acquisition software on the Pixel Acquisition Node (PAN) machine must be up and running.

Start the Bench PAN software by left clicking on the Start benchPAN icon on the desktop.



The *Start benchPAN* terminal window will open along with *panCapture* and *panSaver* windows. These windows can be minimized to save desktop space. See Figure 1. The *panDaemon* and *panProcAlg* windows, which contain the interface and data preprocessing processes, are started minimized.



Start Bench PAN Figure 1

To start the MOP, left click the Start MOP icon on the desktop.



**<u>NOTE:</u>** If the PAN software is not running, a small dialog box will also appear indicating a problem. See Figure 2.

	PAN no	t active	X
Fai on Ple the	led to conn wiyn-bencl ase Restart h click OK	ect to PAN h PAN proce	1558.5
	No	ок	

PAN Not Active Figure 2

See Section 6.1, Troubleshooting, for PAN restart instructions.

Restart the PAN and left click OK. The window will no longer be displayed if PAN start was successful.

Four new windows will open:

- MONSOON Camera Control window
- MOP Debug Log Viewer
- A DS9 Image Viewer
- MOP Command Link Interface

"Initializing camera" appears briefly, as shown in Figure 3, then disappears leaving the monitor screen as depicted in Figure 4.



Initializing Camera Figure 3

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$\overline{\mathbf{v}}$		Мо	nsoon Cam	era Contro	l - bench		× 🗸 📈					AOImage	ds9					. = ×
File	Gain	Bin	PAN		Tool	s Help	File	Edit Fra	me Bin	Zoon	n Scale	Color	Region	WCS	Analysis			Help
Exp	Ex osure (in se ber of frame	<b>kp.type</b> econds) : es : 1	10.0 Ç	title observer propid	test (s) DW 0 CCD Temperatu Mode Summary	ire Attribute	File Value WCS Physica Image Frame1	al > > Zoon		000	Y	0.000			× tx			
	/data	a0/observ	/er/tests	[	GainRN-B	in Readtime	File	Edit	Fra	ne	Bin	Zoom	Sca	de	Color	Region	I	WCS
File	e name : jur	ık	3	3	0.0e/auu 4.3e 4	AD TUSEUS	about	open	save im	g sa	ave fits	save mp	eg he	eader	source	print	page	exit
Co	START : ( 10.0 Automatic o mments :	OBJECT × 1 display	Pa Stop read	and out	ume Abort			✓ {{s> p {socka	xSetAVP c	olBin=2	M( 2}}	OP debug l	og	to 2.0	m/1			
Gsc. Dss. Xte: Ccd. Namin Asg. Gwc. *****	Init Init s_Init s_Init ss[stinit ssTestInit Init Init Inis is the engineering anything her just leave i	######################################	M Ind line, int use only. I not exit th i conified s	op ended for lo not type nis xterm tate				{{s}         P           {{s}         P           {{s}         P           {{s}         CD_Seq           {{s}         P           {{s}         CD_Seq           {{s}         P           {{s}         Scoke           {{s}         Scoke	xSetAVP r ; got >0K; xSetAVP n ; got >0K; xSetMemCF; ; got >0K; xSetMemCF; ; got >0K; xSetAVP n ; got >0K; xSetAVP c ; got >0K; xSetAVP n ; got >0K; ; got >0K; ; start com	ppxSet ppxSet ppxSet ppxSet p2us.uc benchC0 ppxSet cbSeqEr ppxSet ouBin=3 ppxSet cbSeqEr ppxSet cbSeqEr ppxSet cbSeqEr ppxSet cbSeqEr ppxSet ppxSet	2}} Successive Success	cess. \\ nc cess. \\ nc encer_Ramp2 Downloaded od}} mpleted suc cess. \\ nc cess. \\ nc cess. \\ nc cess. \\ nc cess. \\ nc cess. \\ nc	wBin set bSeqEnab Us.ucd}} File /us ccessfull bSeqEnab olBin set bSeqEnab bSeqEnab cSeqEnab cSeqEnab	to 2.0 le set r/Monso y.<} le set to 4.0 to 3.0 le set le set	0003 to 0x000000 on/ofg/_ber to 0x000000 0003 to 0x000000 to 0x000000	)00<0,000> hchCCI/ben )01<1,000> )00<0,000> )01<1,000>	↔ chC	

MOP Startup Figure 4

The MOP window can be minimized at this time but it is recommended that the *MOP debug log* window be left open to monitor the health of the software.

## 3.0 MOP GUI Interface

The *Monsoon Camera Control – bench* screen allows system configuration by means of pull-down menus across the top of the screen and several text entry areas. See Figure 5

le Gain Bin	PAN	Tools	Help
Exp. type	title observe	ttmmpp er(s)	
Exposure (in seconds) : 15. Number of frames : 1	.0 🜩 propid	T&E CCD Temperature Attu Mode Summary	
/data1/observer/jgte	sts/tmp	GainRN- Bin Readt 0.8e/adu 4.3e 2x2 34sec	ime :s
START : OBJECT 15.0 x 1	Pause Re	sume Abort	
Automatic display	Stop and readout		
Comments : 🔲 (auto-cle	ar)		
Comments : (auto-cle	ar)		



The pull-down menus are:

File

Exit

The File menu has only one option:

Exit – closes the MOP interface.

• Gain

Low 0.8e-/ADU
Med 0.4e-/ADU
High 0.2e-/ADU

The Gain menu provides three options:

Low 0.8e-/ADU – low conversion gain, 0.876 electrons per ADU.

Med 0.4e-/ADU – medium conversion gain, 0.438 electrons per ADU.

High 0.2e-/ADU – high conversion gain, 0.219 electrons per ADU.

NOTE: The coversion gainslisted are for the right amplifier of CCD STA1042-5644.

When a gain selection is made, the Mode Summary section of the window will display a brief message, "Reconfiguring readout mode", and then will display the new setting. See Figure 6. The conversion gain will affect read noise and readout time. These are displayed in the Mode Summary area of the Monsoon Camera Control screen. See Figure 7.







The Bin menu provides a selection of row/column binning options. Binning selection will affect the readout time and will be updated and displayed in the Mode Summary area of the *Monsoon Camera Control* screen. See Figure 7.

- 1x1 no binning
- 2x1 two-pixel binning for columns, no binning for rows
- 2x2 two-pixel binning for columns and rows
- 4x2 Four-pixel binning for columns, two-pixel binning for rows
- 4x3 Four-pixel binning for columns, three-pixel binning for rows

#### • PAN

#### Reset PAN

The PAN menu provides an option for resetting the PAN if an error occurs. See Section 6.1, Troubleshooting, for more information on resetting the PAN.

Tools

Engineering GUI
Debug Log
Reset MOP
Exit and shutdown PAN
Disconnect CCD Voltages
Reconnect CCD Voltages

The Tools menu provides these options:

Engineering GUI – for Engineering use only.

Debug log – launches a *MOP debug log* window. (automatic at startup)

Reset MOP - resets MOP to a default configuration.

Exit and shutdown PAN – closes the MOP interface and shuts down PAN operation.

Disconnect CCD voltages - disconnects the clock and bias signals from the CCD devices. This is used before powering down the DHE.

Reconnect CCD voltages - connects the clock and bias signals to the CCD devices. (automatic at start-up)

• Help

Users Guide Quick start

> Users Guide Quick Start

#### 3.1 Exposure Configuration

Controls are provided for image exposure time, number of frames to acquire and type of frame. Figure 8 shows the various options.



#### Exposure Configuration Figure 8

Left click on Exp type and the Exposure Type pull-down menu is displayed. Exposure Type should be selected first because the exposure time will automatically be entered based on information entered during the last exposure of the same type. Example: if "Object" is selected as the exposure type and the last time "Object" was used, exposure time was 22.0 seconds, then exposure time will remain at 22.0 seconds for this "Object" exposure until it is changed.

Exposure time may be changed during an exposure any time prior to readout. If exposure time is changed, click on the "Start" button again to update the system.

The number of frames may be changed during an exposure sequence. The system will use the new value after the end of the current exposure.

#### 3.2 User Data

The three items in this area of the MCC window are user editable. The default value for the title is set to the target name that was entered by the telescope operator. It will be entered into the image header as "OBJECT."

The default value for the observer is taken from the value entered during the "obsinit" setup procedure or the last values entered by the observer. It will be entered into the image header as "OBSERVER."

Propid – proposal identification number assigned to the observation run by the observer. This number becomes part of the observation record. See Figure 9.

e Gain Bin	PAN	Tools	Help
	t	ttmmpp	
Exp. type		enver(s)	
Exposure (in seconds) : 1	5.0 🌲 p	oid T&E	
Number of frames : 1	▲ ▼	CCD Temperature	Attribu
		Mode Summary	User D
/data1/observer/jgt	æsts/tmp	GainRN- Bin 0.8e/adu 4.3e 2x2	Readtime 34secs
File name : jg	11		
START : OBJECT 15.0 x 1	Pause	Resume Abort	
Automatic display	Stop an readou		
Comments : 📃 (auto-c	lear)		

User Data Figure 9

#### **3.3 FITS Image Naming and Storage**

The user can select a directory in which to save data, a FITS file name prefix and a file number.

- The File name field on the *Monsoon Camera Control* window is used to select the name of the image FITS file. When naming the file, avoid spaces and punctuation as UNIX file naming conventions can be particular.
- The data directory button is used to change the directory where data is saved. Left click the button to display the *Choose Directory* window as shown in Figure 11.

[	Monsoon Camera Control - bench
ş	File     Gain     Bin     PAN     Tools     He       Exp. type     title     ttmmpp       Exposure (in seconds) : 15.0     observer(s)       Number of frames : 1     T
to ge tory.	//data1/observer/jgtests/tmp      GainRN- Bin Readtime         //data1/observer/jgtests/tmp       0.8e/adu 4.3e 2x2 34secs         File name : jg       14         START: OBJECT       15.0 x 1         Automatic display       Stop and readout         Comments :       (auto-clear)
e i	
uence hber	Selecting Image Name and Storage Location Figure 10

The current default directory for data storage is displayed on a button as shown in Figure 10. Left click the button to select a different storage location. See Figure 11.



• The auto-incrementing sequence number is automatically added to the image file name. In the example in Figure 10, the saved image file name would then be:

/data0/observer/tests/dw 007.fits

- **NOTE:** The sequence number may be located elsewhere in the file name and have a different format if required. Note that "C" language syntax format specifications will apply.
  - Example: A file name of "m101\_%5.5d\_narrowband3" entered in the Selction field would result in an image file name of:

M101\_00001\_narrowband3.fits

#### 3.4 Comments Area

General comments about an image may be entered into this area as shown in Figure 12. Avoid quotation marks, ampersands and other non-alphanumeric content as much as possible.

File	Gain Bin	PAN			Tools	Help	
	Exp. type	1	title	ttmmp	p		
Exposure Number o	Exposure (in seconds) : 15.0 🗘 Number of frames : 1 🚔				(S) T&E CCD Temperature Attribute		
File nan	/data1/observer/jgtest: File name : jg			GainRN- Bin Readtim 0.8e/adu 4.3e 2x2 34secs		leadtime  4 <mark>secs</mark>	
SI	ART : OBJECT 15.0 x 1	Pau	se Resi	ime	Abort		
📕 Auto	matic display	Stop read	and but				
Comme	nts : 🔲 (auto-	clear)					

Comments Area Figure 12

The contents of this area will be added to the image header as COMMENT keywords. The "autoclear" option is is the default and will clear the Comments Area after each new exposure.

**NOTE:** Comments may be added up to the time of readout.

**NOTE:** Maximum size of a comment is TBD

## 4.0 Observation Control

Once the observation and image parameters have been set and the desired readout mode configured, click the "Start" button in the *Monsoon Camera Control* window to initiate an exposure as shown in Figure 13. The "Start" button changes color and indicates that the software is "working."

	<ul> <li>Image: A start of the start of</li></ul>		Mon	soon Cam	Control - bench				
	File	Gain	Bin	PAN			Tools	Help	
					title	te	st		
		Exp.	= object			···			
	Expos	ure (in se	conds) :	10.0 🚔	opserv	er(s)D	W		
	Numbe	er of frame	° • 1		propia	U			
	(ACINIDO	a of frame.	s • ∣±	•		CCD	Temperature		
						Mode	e Summa <del>ry</del>		
"Start"		/data	0/observe	er/tests		Ga	inRN- Bin   Iadu 3 30 4v3	Readtime 29socs	
"working"	<b>File</b>	name : jun	k	3	13	0.20	auu J.Je 4xJ	235805	
		,							
		work	ing	Pa	<mark>ise</mark> r		Abort		
	F P	utomatic d	isplay	Stop	and lout				
	Com	ments :	👅 (auto-	clear)					
			-	-					
	1								
	<b>-</b>				<b>C</b>		_		
	Fra	ne #	1		Seco	nds:	/		
				Ex	posure S	Start			

Figure 13

The status of the exposure is displayed in the bottom of the *Monsoon Camera Control* window as shown in Figure 14.

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Figure 14

- During an exposure, the Observe area changes to enable the Pause, Abort and Stop functions.
- The exposure status area appears after an exposure is started and displays the frame number and exposure countdown timer. If multiple frames were requested, the "Frame#" field will increment as each frame is completed.
- The currently exposing image can be aborted by clicking on the "Abort" button. A confirmation window will be displayed. Select "No" or "Yes". See Figure 18. If the image is one of a sequence, then the entire sequence will be cancelled.

There are other usable options in the observe area. They are:

Pause – closes shutter and suspends exposure countdown. The exposure status area indicates "Hold." See Figure 15. When "Pause" is selected to stop an exposure for a short time, a confirmation window opens and the operator must select either "No" or "Yes" to confirm that a pause of exposure is required. See Figure 16.

Resume - reopens shutter and restarts countdown timer.

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Stop and readout image – closes shutter and reads out image. A confirmation window opens and the operator must select either "No" or "Yes" to confirm that the should be stopped and the image read out. See Figure 17. The shutter will close approximately two seconds after the button is pushed.



When "Pause" is selected to stop an exposure for a short time, a confirmation window opens and the operator must select either No or Yes to confirm that a pause of exposure is required. See Figure 16. When the operator is ready for the exposure to resume, left click the "Resume" button.

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Stop Confirmation Figure 17



Abort Confirmation Figure 18

Once an exposure is completed and the shutter closes, it will take approximately the readtime listed in the Mode Summary Area to read out the image depending on the observation parameters. The approximate remaining time is displayed in the image readout countdown timer as shown in Figure 19.

<b>v</b>		Mon	soon Cam	era Control	- benc	h		×
File Expose Number File	Gain Exp sure (in se er of frame /data name : jur word Automatic o nments :	Bin . = object econds) : es : 1 a0/observe hk king display (auto-	PAN 10.0 ‡ sr/tests 7 Stop read	title observer( propid	test (s) DW (0) CCD Te Mode S Gain- 0.2e/ad	Tools mperature Summary RN- Bin Re lu 3.3e 4x3 29	Help Attribute sadtime Isecs	Approximat Readtime
Frai	me #	1		Second	ls :	Read - I	DHE 26	Image Readout Countdowr Timer

Image Readout Status Figure 19

When the readout is complete, the image data is transferred via ethernet to the MOP computer. This may take a few seconds. See Figure 20.

✓ More	nsoon Cam	nera Contro	ol - ben	ch	= = ×
File Gain Bin	PAN			Tools	Help
		title	tes	t	
Exp. = object	;				
Exposure (in seconds) :	10.0 🚔	observe	r(s) D9		
Number of frames + 1	·	propia	U		
Hamber of Traines + 1	•		CCD <sup>-</sup>	Femperature	
			Mode	Summary	
/data0/observ	er/tests		Gai	n	Readtime
File name : junk	3	35	0.Zen	au 5.5e 4x5	Zaseus
			r		
working	Pa	use Res	sume		
Automatic display	Stor	Lond			
	read				
Comments : 🔳 (auto	-clear)				
Frame # 1		Secon	ds :	Read	· Net

Data Transfer Figure 20

After an exposure is completed and the image data is transferred to the MOP computer, the exposure status area of the *Monsoon Camera Control* window will display a "Disk IO" message. If an image with the same file name and sequence number exists in the curret directory, a "File exists" pop-up window will be displayed. See Figure 21. The image file name exists on the MOP computer so the options are:

Yes – overwrite the existing file and replace it with the new image.

No – a save as option is provided to rename the new image.

<b>•</b>		Mor	isoon Can	nera Cont	rol - ben	ch	= = ×
File	Gain	Bin	PAN			Tools	Help
				title	tes	t	
	Exp	). = object		ohoom		-	
E	xposure (in s	econds) :	10.0 🚔	- Upserv	er(s)Dy		
N	lumber of fram	es + 1	, 	propia	U		
		cs •  1	•		CCD .	<b>Femperature</b>	
					Mode	Summary	
	/dat	a0/observ	er/tests		Gai	n	Readtime 29cocc
ī	File name : ju	nk		37	0.201	auu 5.56 485	238663
	,						
	wor	king	Pa	use R	esume		
	Automatic	display	Stor	and	,		
		• •	rea	dout			
	Comments :	🔳 (auto	-clear)				
Г							
L.							
F	rame #	1		Seco	nds :	DisklO	

➤ File	exists		×
The i /hon alrea	file name ne/monsc ady exists	d oon/test_001 5, Overwrite	.fits e it ?
[	No	Yes	



## 5.0 Data Display

If the "automatic display" option is selected in the MOP window, then each frame is automatically displayed in the DS9 image display window as shown in Figure 22.

NOTE:

This data may be displayed in a ximtool/VNC window depending on the observer's choice. If ximtool is preferred then the DS9 window must be closed.

]			and the second		S/	Olmag	je ds9			-	
File	Edit	Vie	w Fi	rame	Bin Zoe	om Sca	ale Color	Regi	lon WCS	Analysis	Help
lle			a0001	.fits							
bject			ThAra	az 0, 1 -	22				 Y		
/alu <del>e</del>									1		
vcs									×		
hysica	al	X			Y						
mage	_	X			Y			1	<sup>1</sup>		
rame	1 20	om	1	.000	Ang	0.0			_	1	
File	Ed	Int	Viev	W F	rame	Bin	Zoom	Scale	Color	Region	WCS
near	kg	sq	uared	sqrt	hist equ	minma	x 99.5%	99%	98% 95%	90% zsca	le use
••••				••••	• • • • •	•••••	• • • • • • • • •	••••	•••••		
					•••••	•••••	••••••		••••		
••••											
					•••••	*****	*******	++++	++++++ +1		
			• • • • •	****							
				* * * *					*****		
			*****	****	* *** *	•••••	• • • • • • • •	••••	***** **		
									10111		
									1111111		111
••••	••••		••••		• • • • •					• • • • • • • • • •	••••
	31 1										8 11.

DS9 Image Display Window Figure 22

To examine the image header, select "Display FITS Header" from the DS9 window File menu. A second window will open to display the data. See Figure 23.

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	a0001.fits	_ <b> </b>
File Edit		
SIMPLE = BITPIX = NAXIS = NAXIS1 = NAXIS2 = EXTEND = BSCALE = BZERO = ORIGIN = DATE = OBJECT = OBSERVAT= OBSERVAT= OBSERVER= EXPTIME = DARKTIME = IMAGETYP= TELESCOD	T / Fits standard 16 / Bits per pixel 2 / Number of axes 1033 / Axis length 2048 / Axis length F / File may contain extensions 1.000000E0 / REAL = TAPE*BSCALE + BZERO 3.276800E4 / 'NOAO-IRAF FITS Image Kernel July 1999' / FITS file originator '2008-02-20T19:34:16' / Date FITS file was generated '12:32:12 (20/02/2008)' / Time of last modification 'ThAr az 0, f -22' / Name of the object observed 'WIYN ' / observatory 'A Geller ' / observers 200. / actual integration time, seconds 200. / total elapsed time, seconds 'comp ' / object, flat, bias, etc.	
COMMENT DATE-OBS= UT = JD = INITTIME= PREPTIME= OBSTIME = READTIME = COMMENT	<pre>'2008-02-20 ' / Y2K compliant (yyyy-mm-ddThh:mm:ss) '19:28:51.241 ' / universal time (start of exposure) '2454517.31170416 ' / julian date of observation 0.169 / software/hardware initialization (sec) 8.373 / CCD preparation time (sec) 201.667 / active observing time (sec) 121.629 / CCD readout time (sec) 331.841 / total time spent in task (sec)</pre>	
DETECTOR= PREFLASH= GAIN = DWELL = RDNOISE = CAMTEMP = DEWTEMP = BIASSEC = TRIMSEC = DATASEC = CCDSEC = ORIGSEC =	<pre>'t2ka ' / detector name 0 / preflash time, seconds 2.1 / gain, electrons per adu 5 / sample integration time, microseconds 4. / read noise, electrons -99 / camera temperature, Celsius -192 / dewar temperature, Celsius -192 / dewar temperature, Celsius '[1004:1033,1:2048]' / overscan portion of frame '[1:999,1:2048] ' / region to be extracted '[1:1001,1:2048] ' / image portion of frame '[550:1550,1:2048] ' / orientation to full frame '[1:2048,1:2048] ' / original size full frame</pre>	

#### FITS Header Display Figure 23

On-line help for DS9 is available at:

http://hea-www.harvard.edu/RD/ds9/ref/index.html

## 6.0 The MOP Debug Log Viewer

This window displays the latest debug message from the MOP and interactions with the PAN computer. The full log is available at:

```
/tmp/mop-debug.log
```

It is a simple ASCII file as shown in Figure 24. Refer to Sections 6.2, 6.3 and 6.4 for MOP Debug file variations.

```
MOP debua loa
                                                                                                   - O X
{exp =961, pixelsDone = 0}
{waiting 961 -1}
{exp =960, pixelsDone = 0}
{waiting 960 -1}
{exp =959, pixelsDone = 0}
{waiting 959 -13
{waiting 959 -13
{waiting 958, pixelsDone = 03
{waiting 958 -13
{exp =957, pixelsDone = 03
{waiting 957 -13

{exp =956, pixelsDone = 1}
Ewaiting 956 53
{Reading out...}
{Progress was : NReads = 55 }
{Fri Mar 14 12:22:35 MST 2008 Fri Mar 14 12:22:38 MST 2008}
{socket got >asyncMsg: OK: ppxStartExp: Exposure is done ID=2454540.473268<}</pre>
{No value for TARGRA3
{No value for TARGDEC3
{No value for ROTANGLE}
{No value for ROTOFF}
{No value for ROTANGLE3
{No value for ROTOFF}
{Output data directory set to /data2}
П
```

#### Typical MOP Debug Log Figure 24

This window should be monitored for error messages. If error messages are displayed, refer to Section 6.1, Troubleshooting.

#### 6.1 Troubleshooting

In the MOP debug Log represented in Figure 25, there are some error messages to consider. If messages like these appear, pull down the PAN menu in the Monsoon Camera Control (MCC) window and select the Reset PAN option. After resetting the Pan, the MOP Debug Log window should appear as in Figure 25. There should be one or more "ppxAsyncResp" messages displayed and all should indicate "success" as shown in Figure 25. If the reset is not successful, repeat the reset process. If repeated resets of the PAN do not result in a successful restart, contact MTN support for additional assistance.

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MOP debug log  $\square \times$ end failed.\\ dheHdwrSend: DHE cmd echo mismatch word 0: sent-0x80010115, rcvd-0 ×4001fffc<3 {{s> ppxSetAVP mcbSeqEnable=1}} {socket got >ERROR: dheHdwrSend: DHE cmd echo mismatch word 0: sent-0x4001fffc, rcvd-0x80808080<} {{s> ppxSetAVP colBin=2}} {socket got >OK: ppxSetAVP: Success. \\ colBin set to 2.000<3</pre> {{s> ppxSetAVP rowBin=2}} {socket got ><}</pre> {socket got >OK: ppxSetAVP: Success, \\ rowBin set to 2,000<}</pre> {{s> ppxSetAVP mcbSeqEnable=0}} {socket got ><3</pre> {socket got >/// Socket got >// ERROR: writeValue: address send failed.\\ dheHdwrSend: DHE cmd echo mismatch word 0: sent-0x8001fffc, rcvd-0x80011000// Isocket got >ERROR: dheHdwrDownLoad: Failed at word 0. \\ dheHdwrSend: DHE cmd e Icho mismatch word 0: sent-0x80011000, rcvd-0x1008ffff [{{s> ppxSetMode benchCCD\_Ramp.mod}} {socket got >ERROR: \_ppxRestoreAttList: Failed. line 7. \\ writeValue: data send failed. \\ dheHdwrSend: DHE sent Async Message a<0x0495>-v<0xe495><3</pre> Ц [{{s> ppxSetAVP mcbSeqEnable=1}} {socket got >ERRØR: writeValue: data send failed. \\ dheHdwrSend: DHE sent Async Message a<0x0000>-v<0x0000><3 11 10

Error Messages MOP Debug Log with Errors Figure 25



#### 6.2 Typical Startup Log

**NOTE:** This message set is not visible in the window but is in the log itself.

The normal set of messages when the MOP is started is:

```
{{connected to bench-pan-dtn at port 5142}}
{{s> ppxReset}}
{socket got >OK: ppxReset: Link Reset and Clear Success.<}</pre>
{{s> ppxAsyncResp}}
{socket got >OK: ppxAsyncResp: Success.<}</pre>
{{s> ppxSetMode monsoon.ini}}
{socket got >OK: ppxSetMode: Completed successfully.<}</pre>
{{s> ppxSetMode benchCCD DefaultSetup 5644.mod}}
{socket got >OK: ppxSetMode: Completed successfully.<}</pre>
{{s> ppxSetMemCfg
/usr/Monsoon/cfg/ benchCCD/benchCCD Sequencer Ramp2us.ucd}}
{socket got >OK: ppxSetMemCfg: Downloaded File
/usr/Monsoon/cfg/ benchCCD/benchCD Sequencer Ramp2us.ucd.<}</pre>
{{s> ppxSetAVP mcbSeqEnable=1}}
{socket got >OK: ppxSetAVP: Success. \\ mcbSeqEnable set to
0x0000001<1.000000><}
{{s> ppxGetAVP dwnLdFname}}
{socket got ><}</pre>
{socket got >OK: ppxGetAVP: Success. \\
dwnLdFname=benchCCD Sequencer Ramp2us.ucd<}</pre>
{{s> ppxGetAVP expEndTime}}
{socket got >OK: ppxGetAVP: Success. \\ expEndTime=0.000<}</pre>
{{s> ppxGetAVP expFdir}}
{socket got >OK: ppxGetAVP: Success. \\
expFdir=/usr/Monsoon/cfg/_benchCCD<}
{{s> ppxGetAVP expID}}
{socket got >OK: ppxGetAVP: Success. \\ expID=<}</pre>
{{s> ppxGetAVP expStrtTime}}
{socket got >OK: ppxGetAVP: Success. \\ expStrtTime=0.000<}</pre>
{{s> ppxGetAVP imageCols}}
{socket got >OK: ppxGetAVP: Success. \\ imageCols=0.000<}</pre>
{{s> ppxGetAVP imageCount}}
{socket got >OK: ppxGetAVP: Success. \\ imageCount=0.000<}</pre>
{{s> ppxGetAVP imageDir}}
{socket got >OK: ppxGetAVP: Success. \\ imageDir=/data<}</pre>
{{s> ppxGetAVP imageFile}}
{socket got >OK: ppxGetAVP: Success. \\ imageFile=mmmdd<}</pre>
{{s> ppxGetAVP imageRows}}
{socket got >OK: ppxGetAVP: Success. \\ imageRows=0.000<}</pre>
{{s> ppxGetAVP intTime}}
{socket got >OK: ppxGetAVP: Success. \\ intTime=0.000<}</pre>
{{s> ppxGetAVP mosaicCols}}
{socket got >OK: ppxGetAVP: Success. \\ mosaicCols=1.000<}</pre>
{{s> ppxGetAVP mosaicRows}}
```

{socket got >OK: ppxGetAVP: Success. \\ mosaicRows=1.000<}</pre> {{s> ppxGetAVP numOutputs}} {socket got >OK: ppxGetAVP: Success. \\ numOutputs=1.000<}</pre> {{s> ppxGetAVP outputCfg}} {socket got >OK: ppxGetAVP: Success. \\ outputCfg=0.000<}</pre> {{s> ppxGetAVP processMode}} {socket got >OK: ppxGetAVP: Success. \\ processMode=0.000<}</pre> {{s> ppxGetAVP pxlCols}} {socket got >OK: ppxGetAVP: Success. \\ pxlCols=2600.000<}</pre> {{s> ppxGetAVP pxlRows}} {socket got >OK: ppxGetAVP: Success. \\ pxlRows=4000.000<}</pre> {{s> ppxGetAVP pxlsPerImage}} {socket got >OK: ppxGetAVP: Success. \\ pxlsPerImage=0.000<}</pre> {{s> ppxGetAVP shutterState}} {socket got >OK: ppxGetAVP: Success. \\ shutterState=0.000<}</pre> {{s> ppxGetAVP xPostScan}} {socket got >OK: ppxGetAVP: Success. \\ xPostScan=50.000<}</pre> {{s> ppxGetAVP yPostScan}} {socket got >OK: ppxGetAVP: Success. \\ yPostScan=0.000<}</pre> {{s> ppxSetAVP colBin=2}} {socket got >OK: ppxSetAVP: Success. \\ colBin set to 2.000<}</pre> {{s> ppxSetAVP rowBin=2}} {socket got ><}</pre> {socket got >OK: ppxSetAVP: Success. \\ rowBin set to 2.000<}</pre> {{s> ppxSetAVP mcbSeqEnable=0}} {{s> ppxSetAVP mcbSeqEnable=0}} {socket got ><}</pre> {socket got >OK: ppxSetAVP: Success. \\ mcbSeqEnable set to 0x0000000<0.000000><} {{s> ppxSetMemCfg benchCCD\_Sequencer\_Ramp2us.ucd}} {socket got ><}</pre> {socket got >OK: ppxSetMemCfg: Downloaded File /usr/Monsoon/cfg/ benchCCD/benchC CD Sequencer Ramp2us.ucd.<} {{s> ppxSetMode benchCCD Ramp.mod}} {socket got >OK: ppxSetMode: Completed successfully.<}</pre> {{s> ppxSetAVP mcbSeqEnable=1}} {socket got >OK: ppxSetAVP: Success. \\ mcbSeqEnable set to 0x0000001<1.000000><}

#### 6.3 Changing Readout Mode

The typical set of messages while the readout mode is being changed is:

```
{{s> ppxSetAVP colBin=2}}
{socket got >OK: ppxSetAVP: Success. \\ colBin set to 2.000<}
{{s> ppxSetAVP rowBin=2}}
{socket got ><}
{socket got >OK: ppxSetAVP: Success. \\ rowBin set to 2.000<}
{{s> ppxSetAVP imageFile=testxxx}}
{socket got ><}</pre>
```

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```
{socket got >OK: ppxSetAVP: Success. \\ imageFile set to >testxxx<<}
{{s> ppxSetAVP intTime=2.0}}
{socket got ><}
{socket got >OK: ppxSetAVP: Success. \\ intTime set to 2.000<}</pre>
```

#### 6.4 **During an Exposure**

The typical set of messages during an exposure is:

```
{exposing (obstobuffer)}
{socket got ><}
{socket got >OK: ppxStartExp: Exposure start signal given.<}
{exp =1000, pixelsDone = 0}
{waiting 1000 1}
{exp =999, pixelsDone = 0}
{waiting 999 1}
.....(several waiting messages will be displayed)
{socket got >asyncMsg: OK: ppxStartExp: Exposure is done
ID=2454516.398611<}
{Reading out...}
{Progress was : NReads = 55 }
{Tue Feb 19 09:34:46 MST 2008 Tue Feb 19 09:34:48 MST 2008}</pre>
```

## 7.0 Environment Variables

The MOP sends commands to the PAN and reads back status values using a standard (unix) socket. The IP hostname of the PAN computer is managed by the environment variable PAN\_HOST (default is benchpan).

The socket number for the PAN commanding is managed by the environment variable PAN\_DAEMONPORT (default is 5142).

The name of the Monsoon CCD configuration in use is managed by the environment variable PAN\_DETECTOR.

The socket number for image data transfer is managed by the environment variable PAN\_IMGPORT (default is 7001).

## 8.0 Header Configuration

The telemetry contents of the image headers is ocntrolled by two ASCII format files that are located in:

/usr/local/gui/tclsrc/scripts/monsoon

The first file is "headers.conf" which contains one header definition per instrument. Each definition is simply a list of telemetry items (MPG router, or MOP metadata) and the order with the they are to appear.

The second file is "telemwiyn. conf" which contains one section per telemetry stream. Each item in the stream is listed with the corresponding FITS keyword information, in the format:

```
Stream tcs.target
state COORDS coordinate system
Stream tcs.time
UT1 MJDHDR Mean Julian Date
```

The first item is the MPG router item name, the second is the FITS keyword, and the rest of the line is the FITS comment.

For example, if a new temperature sensor were added to the bench and it is desired to have it value added to the headers:

- make sure the value is available to the MPG router
- edit the headers.conf file to add it (eg bsa.main.newtemp)
- add a line to the telemwiyn.conf (eg in the bsa.main section)
- restart the MOP so it rereads the header definitions

So, if we added the line:

bsa.main.newtemp

to the "wiyn-bench" header definititon in "headers.conf" and:

```
newtemp BTEMPXY Temperature of xy stage motor
```

to the "stream bsa.main" section in "telem-wiyn.conf", then the FITS header record:

```
BTEMPXY = '32.4 '/Temperature of xy stage motor
```

would automatically be added to the image headers.

## 9.0 Shutting Down – Normal Operation

To shut down the software, pull down the File menu on the *Monsoon Camera Control* window and select:

**Exit** – closes the MOP interface. This action will leave the PAN software and detector running in its current state, which is "idle."

#### 9.1 Power Off System – Lightning or Maintenance Shutdown

Pull down the Tools menu on the Monsoon Camera Control window and select:

- **Disconnect CCD voltages** and then:
- Exit and shutdown PAN closes the MOP interface and shuts down PAN operation.

After disconnecting CCD voltages, it is safe to power off the DHE by switching off the power supply (switch on back of rack.)

Power down computers as required.

## Appendix MONSOON Observing Platform Bench Customizations

## Introduction

The Monsoon Observing Platform (MOP) is designed to be easily configurable and extendable to support new instruments and requirements. It achieves this by being written mostly in the tcl/tk scripting language and making use of "C" only where necessary.

The standard MOP package provides a simple API for adding instrument-specific procedures. These procedures are dynamically loaded at runtime.

Customization files are located in:

/usr/local/gui/tclsrc/scripts/monsoon

directory and are named according to the instrument name per MONSOON. For example, the WIYN bench ccd monsoon configuration is "benchCCD" so the tcl customization files would be called benchCCD\_Specific\_Setup.tcl and benchCCD\_plugins.tcl.

## The benchCCD\_Specific\_Setup.tcl File

This file usually contains a single procedure called:

```
detectorSpecificSetup
```

which takes no arguments. This procedure is called after the standard MONSOON initializations have been performed by the MOP during startup.

It will normally be used to load a specific .mod mode file.

## The benchCCD\_plugins.tcl File

This file contains two types of customizations.

First, it implements some of the standard MOP plugin API routines.

Second, it customizes the appearance of the gui and adds the readout mode configuration functionality.

## **Standard MOP API Routines**

These routines have predefined names and interfaces so the default MOP code can call them if they are provided.

benchCCDpanShutdown { } - executes the shutdown mode on the PAN

getInstrumentName { } - returns the name of the instrument

getFilterList { } - NOT USED, the bench gui manages filters

getCCDTemperature { args } - returns current CCD temperature

headerComments { fid } - add user comments to the header

when this routine is called the fid argument holds the handle of the open FITS header, it writes new keywords to this file using the "\$fid put keyword fitsheaderrecorddata" syntax. It should NOT close the file.

headerGeometry { fid } - add detector geometry to the header

when this routine is called the fid argument holds the handle of the open FITS header, it writes new keywords to this file using the "\$fid put keyword fitsheaderrecorddata" syntax. It should NOT close the file.

headerStandard { fid } – add default fields to the header

when this routine is called the fid argument holds the handle of the open FITS header, it writes new keywords to this file using the "\$fid put keyword fitsheaderrecorddata" syntax. It should NOT close the file.

setSetpoint { op val } – requests a new ccd setpoint temperature

setFilter { instr name } – NOT USED, the bench gui manages filters

showCCDTemp { } - simple ascii display of ccd temperature

## **Custom Routines**

These routines provide functionality specific to the particular instrument and as such are unlikely to be shared between MOP instances. Their naming convention is selected by the programmer.

benchTelemetry { } - force update of bench MPG telemetry

defaultReadoutMode { } – set the default mode on startup

instrumentMenus { } - adds bench-specific menus for Gain and Bin

setReadoutMode { op newbin } - change the bench ccd readout mode

The supported values for "op" are the gain selections "low", "med" and "high" and "rebin". If "rebin" is specified then the additional "newbin" argument must be supplied and have one the following values "1x1 1x2 2x2 4x2 4x3"

showro { } - cli debug to show readout mode variables

updateTitle { } - auto update title field from tcs.target.name telemetry