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WHT A&G System User Guide

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Chapter 1 Introduction

The purpose of this document is to provide a user guide to the acquisition and guidance software control system (A&G) which is hosted upon the W. H. T. instrument control system. It outlines the syntax and the semantics of the command line scripts which can be used to retrieve status or effect control over the mechanisms which constitute the A&G 4MS system. Furthermore it will outline how the A&G graphical user interface (GUI) can be used to control the 4MS system.

The intended target audience of this document is the *observer* who will use the system operationally and the *operations team engineers* who may perform maintenance with the system.

Chapter 2 Glossary

This section contains a *glossary* of the terms which are used throughout the document.

2.1 MIMIC

A **MIMIC** is *graphical* representation of a *system* which updates in realtime to continually reflect the current state of the underlying **hardware** system. There are many applications for such an tool at the observatory, much of the hardware deployed at the ING benefits from a graphical representation of it's state.

2.2 GUI

A *graphical user interface* will permit the user to control and monitor the status of the mechanisms which comprise the A&G 4MS system via a windows/graphical based application.

2.3 4MS

The mechanisms associated with the acquisition and guidance system are controlled by a 4MS embedded microprocessor system which is FORTH based. Communication between the high-level software control system and the embedded system is via a RS232 serial communications link.

2.4 Controls

In the context of a graphical user interface, a *control* is a *graphical device* upon the interface which can be used to *effect control* over some aspect of the acquisition and guidance 4MS system. Controls can take many different forms depending on it's intended function. Drop-down menus, dial controls and buttons are some of the controls which are used throughout the system.

Chapter 3 Command line scripts

This chapter outlines the various scripts which can be used from the command line of the instrument control system (normally the *whitics* machine) to control specific aspects of the acquisition and guidance 4MS -based system.

3.1 Error reports

Any errors which are encountered by the A&G system in response to a request from one of the command line scripts will be duly relayed back to the command line and the *talker* log.

On successful completion of a command line script, a status of 0 will be returned. Any other status value returned should be considered an *error* status.

Status information relating to the progress of commands will be sent to the *talker/syslog* so there is a permanent record of the actions which have been performed upon the A&G system.

3.2 The *agaux* command

This command can be used to instruct the A&G system to position the *small feed* mirror into the light path such that the light will be reflected to the *auxillary* port of the A&G system. Any other mirror in the A&G unit which was previously positioned within the optical path will be first removed from the light path.

Should the calibration lamps be illuminated when the command is invoked, the system will *automatically* switch off the lamps prior to positioning the mirror.

No action will be taken if the small feed mirror is *already* positioned within the optical path prior to the command being issued.

3.3 The *agcomp* command

This command can be used to instruct the A&G system to position the *acquisition and comparison* mirror into the light path such that the light from the sky will be reflected to the *acquisition system* and light from the *comparison system* will be reflected off the *backside* of the mirror into the instrument currently located at the cassegrain focal station (.i.e. ISIS). Any other mirror in the A&G unit which was previously positioned within the optical path will be first removed from the light path.

Should the calibration lamps be illuminated when the command is invoked, the system will *automatically* switch off the lamps prior to moving the mirror.

No action will be taken if the auxiliary mirror is *already* positioned within the optical path prior to the command being issued.

3.4 The *agdoor* command

This script will allow the user to *lock* and *unlock* the filter access door of the acquisition and guidance system.

The syntax of the command is as follows;

```
agdoor [open|0|unlock|unlocked|close|1|closed|locked]
```

3.5 The *agingrid* command

This command can be used to instruct the A&G system to position the INGRID flat into the light path. Given that INGRID is no longer available at the cassegrain focus, this script currently has no operational value.

Should the calibration lamps be illuminated when the command is invoked, the system will automatically switch off the lamps prior to moving the mirror.

Any other mirror in the A&G unit which was previously positioned within the optical path will be first removed from the light path.

3.6 The *aginit* command

This command will be used to initialise the mechanism specified on the command line. The time taken for this command to finish varies depending on the amount of time required to initialise that specific mechanism.

The syntax of the command is as follows :

```
aginit <mechanism name>
```

The list of valid *mechanisms* which can be initialised using this command is as follows;

Mechanism name	Purpose
ACQCOMP	The acquisition/comparison mirror
AUTOFILT	The autoguider filter
AUTOFOCUS	The autoguider focus
AUTORADIAL	The autoguider radial probe
AUTOTHETA	The autoguider theta probe
AUXFILTER	The AUX port filter
COMPFLTA	The comparison colour filter mechanism
COMPFLTB	The comparison neutral density filter mechanism
LARGEFEED	The INGRID flat mirror
MAINFILTC	Main colour filter
MAINFILTND	Main neutral density filter
SLITVIEW	The slit view mirror mechanism
SMALLFEED	The small feed mirror mechanism
TVFILT	The TV filter mechanism ¹
TVFOCUS	The TV focus mechanism
TVREDUCER	The TV focal reducer mechanism

Table 1A&G Mechanisms

¹ Currently not operational.

3.7 The *agmirror* command

This command can be used to position the specified mirror into the optical path. Any other mirror in the A&G unit which was previously positioned within the optical path will be first removed from the light path.

The syntax of the command is as follows:

```
agmirror <slitview|smallfeed|ingrid|largefeed|acqcomp|out>
```

INGRID or largefeed are synonyms and will result in the *large feed mirror* being positioned into the optical path.

Note that if the calibration lamps are currently illuminated, selecting any mirror *other* than the slitview mirror will result in the calibration lamps being switched off.

Due to a shortcoming in the low-level code in the 4MS system, mirrors are *removed* from the optical path by *initialising* them. This adds a slight overhead to the time taken in order to complete a mirror movement request. Superfluous mirror movements during operations should be avoided in order to minimise the amount of time lost.

Should the demanded mirror *already* be in the optical path, no action will be taken by this script.

3.8 The *agslit* command

This command can be used to instruct the A&G system to position the *slitview* mirror into the light path such that light from the *slit jaws* of ISIS will be reflected to the television camera in the A&G system. Any other mirror in the A&G unit which was previously positioned within the optical path will be first removed from the light path.

No action will be taken if the *slit view* mirror is already positioned within the optical path.

3.9 The *agvalues* command

This command can be used to display a *status summary* on the command line of all of the hardware mechanisms which comprise the acquisition and guidance system.

3.10 The *arcoff* command

This command can be used to simultaneously *switch off* the calibration lamps and position the *slit view* mirror into the optical path. Any other mirror in the A&G unit which was previously positioned within the optical path will be first removed from the light path.

3.11 The *autofilt* command

This command can be used to select a specified filter in the autoguider mechanism.

The syntax of the command is as follows:

```
autofilt <filter name| filter position>
```

The command takes a single argument which is either the *name* of a filter or the position number in the filter mechanism expressed as an integer. If the name of the filter is specified, it should correspond to the name of a filter which was defined as being in that mechanism in the filter management system.

In order for this command to function correctly, the astronomer should ensure that the filter management system has been correctly configured so it is aware of the names of the filters which are currently deployed within the autoguider filter mechanism.

3.12 The *autofocus* command

This command can be used to change the *focus* of the autoguider.

The syntax of the command is as follows :

```
autofocus <focus position 0-6000 microns>
```

3.13 The *autoradial* command

This command can be used to change the position of the autoguider *radial* mechanism.

The syntax of the command is as follows :

```
autoradial <0-40000 microns>
```

3.14 The *autotheta* command

This command can be used to change the position of the autoguider *theta* mechanism.

The syntax of the command is as follows :

```
autotheta <0-180000 millidegrees>
```

3.15 The *auxfilter* command

This command can be used to select the specified auxillary port filter.

The syntax of the command is as follows:

```
auxfilt <filter name| filter position>
```

The command takes a single argument which is either the *name* of the filter or the position of the filter in the filter mechanism. If the name of the filter is specified , it should correspond to the name of a filter which was defined as being in this mechanism in the filter management system.

In order for this command to function correctly, the astronomer should ensure that the filter management system has been correctly configured so it is aware of the names of the filters which are currently deployed within the auxillary port filter mechanism.

3.16 The *cagb* command

This command can be used to *start* or *stop* **all** of the processes which are responsible for the control of the A&G system.

Should there be a problem with the A&G software control system, it is possible to *restart* the A&G control system using this command as an *alternative* to restarting the entire observing system.

The syntax of the command is as follows :

```
cagb <stop|start>
```

3.17 The *cagb_cancel* command

This command can be used to cancel an *outstanding* action in the instrument controller task. This could be used for instance if the user has requested a move of a mechanism but it is taking too long to execute. It should be noted that **all** actions which are performed by the system have *timeouts* associated with them so eventually any requested action which does not complete of its own accord will eventually self cancel.

The syntax of the command is as follows :

```
cagb_cancel -m <mechanism name> -a <Type of action>
```

A full list of the valid mechanism names is provided in 3.6. The *type of action* specified to be cancelled can be one of *init*, *move* or *stop*.

3.18 The *cagb_init* command

This command can be used to request that the specified mechanism is *initialised* or *datumed*.

The syntax of the command is as follows :

```
cagb_init -m <mechanism name>
```

The time taken for this command to complete is dependent upon the nature of the mechanism.

Valid mechanisms which can be specified are outlined in the following table :

Mechanism Name	Description
ACQCOMP	The acquisition/comparison mirror
AUTOFILT	The autoguider filter
AUTOFOCUS	The autoguider focus
AUTORADIAL	The autoguider radial probe
AUTOTHETA	The autoguider theta probe
AUXFILTER	The AUX port filter
COMPFLTA	The comparison colour filter mechanism
COMPFLT B	The comparison neutral density filter
LARGEFEED	The INGRID flat mirror
MAINFILTC	Main colour filter
MAINFILTND	Main neutral density filter
SLITVIEW	The slit view mirror mechanism
SMALLFEED	The small feed mirror mechanism
TVFILT	The TV filter mechanism
TVFOCUS	The TV focus mechanism
TVREDUCER	The TV focal reducer mechanism

3.19 The *cagb_init_all* command

This command can be used to initialise **all** of the mechanisms found within the A&G system simultaneously.

3.20 The *cagb_lamps* command

This command can be used to either illuminate the calibration lamps or to switch them off.

The syntax of the command is as follows :

```
cagb_lamps <lamp name>
```

The *lamp name* specified can be one of the following :

<i>Lamp name</i>	<i>Description</i>
tun	The <i>tungsten</i> lamp is illuminated. The acquisition and comparison mirror is placed into the optical path.
cune	The <i>copper-neon</i> lamp is illuminated. The acquisition and comparison mirror is placed into the optical path.
cuar	The <i>copper-argon</i> lamp is illuminated. The acquisition and comparison mirror is placed into the optical path.
off	All of the lamps are switched off.
arcoff	All of the lamps are switched off and the slit view mirror is placed into the optical path.

Due to a hardware problem in the low-level embedded microprocessor system, sometimes it will be necessary to repeat the command up to **two or three times** before the lamps will be illuminated.

3.21 The *cagb_move* command

This command can be used to instruct a specified mechanism to move to a *demand* position.

The syntax of the command is as follows :

```
cagb_move -m <mechanism name> <demand position>
```

A list of the valid mechanisms and their legal demand positions is detailed in the following table :

Mechanism	Description	Valid Positions
ACCESSDOOR	The A&G access door	lock unlock
ACQCOMP	The acquisition and comparison mirror	in out

Mechanism	Description	Valid Positions
AUTOFILT	The autoguider filter	The numerical position in the filter mechanism or the <i>name</i> of the filter in the filter mechanism as specified by the filter management system.
AUTOFOCUS	The autoguider focus	Integer value in the range 0-8000 expressed in microns.
AUTORADIAL	The autoguider radial probe	Integer value in the range 0-40000 expressed in microns.
AUTOTHETA	The autoguider theta probe.	Integer value in the range 0-180000 expressed in millidegrees.
AUXFILTER	The AUX port filter.	The numerical position in the filter mechanism or the <i>name</i> of the filter in the filter mechanism as specified by the filter management system.
COMPFLTA	The comparison colour filter mechanism	The numerical position in the filter mechanism or the <i>name</i> of the filter in the filter mechanism as specified by the filter management system.
COMPFLTB	The comparison neutral density filter mechanism	The numerical position in the filter mechanism or the <i>name</i> of the filter in the filter mechanism as specified by the filter management system.
COMPLAMPS	The comparison lamps	A combination of one or more of the following values : cune, tun, cune, cuar or off Should more than one of the values be used, each value must be separated by the + character <i>e.g cune+tun</i>
LARGEFEED	The INGRID flat mirror	in out
MAINFILTC	Main colour filter	The numerical position in the filter mechanism or the <i>name</i> of the filter in the filter mechanism as specified by the filter management system.
MAINFILTND	Main neutral density filter	The numerical position in the filter mechanism or the <i>name</i> of the filter in the filter mechanism as specified by the filter management system.
SLITVIEW	The slit view mirror mechanism	in out
SMALLFEED	The small feed mirror mechanism	in out
TVFILT	The TV filter mechanism	This mechanism is currently <i>disabled</i> and not available to be used.

Mechanism	Description	Valid Positions
TVFOCUS	The TV focus mechanism	An integer value in the range 0-17500 microns .
TVREDUCER	The TV focal reducer mechanism	0,1,2 or clear, slit, direct.
MONITOR	The state of the monitor mode	on off

Table 2 Moveable Mechanisms

3.22 The *cagb_stop* command

This command can be used to request that a hardware mechanism which is currently moving to be stopped. Caution should be used when using this command. Some of the mechanisms in the A&G box use encoders and the action of stopping the mechanism whilst it is in movement can result in the position of the mechanism being lost and the subsequent initialisation of the mechanism being required.

The syntax of the command is as follows :

```
cagb_stop -m <mechanism name>
```

The mechanism name can be any of the mechanisms which are outlined in the table in section 3.21.

3.23 The *cagb_update* command

The purpose of this command is to request the 4MS embedded microprocessor system to return the *current* status of the specified mechanism. Normally this is not required because the embedded microprocessor system should normally be in *monitor mode* and as such, any changes in a hardware mechanism position will *automatically* be reported.

The syntax of the command is as follows :

```
cagb_update -m <mechanism name>
```

The mechanism specified can be any one of the mechanisms which are outlined in the table in section 3.21.

3.24 The *cagb_update_all* command

This command performs a similar function to that of the *cagb_update* command (see 3.23) the difference being that it requests a simultaneous status update for **all** of the mechanisms which are associated with the A&G unit.

3.25 The *compfilta* command

This command can be used to select a specified filter in the comparison filter A mechanism.

The syntax of the command is as follows:

```
compfilta <filter name| filter position>
```

The command takes a single argument which is either the *name* of the filter or the *position* of the filter in the filter mechanism expressed as an integer. If the name of the filter is specified , it should correspond to the name of a filter which was defined as being in this mechanism in the filter management system.

In order for this command to function correctly, the astronomer should ensure that the filter management system has been correctly configured so it is aware of the names of the filters which are currently deployed within the comparison filter A mechanism.

3.26 The *compfiltb* command

This command can be used to select a specified filter in the comparison filter B mechanism.

The syntax of the command is as follows:

```
compfiltb <filter name| filter position>
```

The command takes a single argument which is either the *name* of the filter or the *position* of the filter in the filter mechanism expressed as an integer. If the name of the filter is specified , it should correspond to the name of a filter which was defined as being in this mechanism in the filter management system.

In order for this command to function correctly, the astronomer should ensure that the filter management system has been correctly configured so it is aware of the names of the filters which are currently deployed within the comparison filter B mechanism.

3.27 The *complamps* command

This command can be used to control the illumination of the comparison lamps. It can also be used to report the current status of the comparison lamp system.

The syntax of the command is as follows :

```
complamps show|<lamps>
```

The user can specify one or more of the following lamp values :

- Off
- D
- FeNe
- FeAr
- ThAr
- AlMgCa
- NaK
- CuNe
- CuAr
- W

Should the user wish to have two or more lamps illuminated, he should concatenate the lamps he wishes to illuminate using the + character e.g. CuNe+W.

The lamps can be switched off by specifying *Off* for the lamp value.

It is possible to display the current status of the calibration lamps system by specifying *show* as the command line argument. This will result in a list of the currently illuminated lamps being displayed on the command line console.

3.28 The *compmirror* command

This command can be used to position the *acquisition and comparison* mirror into the optical path. The command takes a single argument which can either be *in* or *out*. When *in* is specified as the argument, the *acquisition and comparison mirror* will be positioned in the optical path. When *out* is specified as the argument, the *slitview* mirror will be positioned in the optical path.

Any other mirror in the A&G unit which was previously positioned within the optical path will be first removed from the light path.

3.29 The *compnd* command

This command will be used to set the strength of the neutral density capability in the comparison unit. The command takes a single argument which is a real number in the range of 0.0 to 5.0 which expresses the desired *strength* of the neutral density setting. The system will then position the two neutral density mechanisms in the comparison unit such that the *cumulative* neutral density of the two ND filters is as close an approximation to the user defined neutral density demand setting as possible.

3.30 The *cuaron* command

This is a convenience command which can be used to illuminate the *cuar* lamps. The command takes no arguments.

3.31 The *cune* command

This is a convenience command which can be used to illuminate the *cune* lamps in the calibration unit. The command takes no arguments.

3.32 The *prag* command

The *prag* command can be used to simultaneously set the position of the autoguider *theta* and *radial* mechanisms. The command accepts two arguments. The first is the *demanded* position of the *radial* mechanism expressed in microns and the second is the *demanded* position of the *theta* mechanism in millidegrees.

After the command has completed, the *telescope control system* will be informed of the new positions of the autoguider probe.

3.33 The *settv* command

This can be used to set up the *mirror* and the *TV focal reducer* mechanisms simultaneously. The command takes two arguments which are as follows :

1. The *focal reducer* demand position which should be either 5 or 12. The input value will be used to determine the position of the TV focal reducer.
2. The mode which should be either *slit* or *direct*. Depending on which is selected, the *slit view* mirror or the *acquisition mirror* will be placed into the optical path.

3.34 The *tvdirect5* command

This is a convenience command which can be used to set the position of the TV focal reducer to 5" and to position the *acquisition and comparison* mirror into the optical path. The command does not take any arguments.

3.35 The *tvdirect12* command

This is a convenience command which can be used to set the position of the TV focal reducer to 12" and to position the *acquisition and comparison* mirror into the optical path. The command does not take any arguments.

3.36 The *tvfocus* command

The *tvfocus* command can be used to set the focus of the television in the acquisition unit. The command accepts a single argument which is an integer value specified in *microns* and should be in the range *0-16000*.

3.37 The *tvscale* command

The *tvscale* command can be used to set the position of the *TV focal reducer* to the demanded position. The command accepts a single argument which can either be 5 or 12 depending on the desired setting of the mechanism.

3.38 The *tvslit5* command

This is a convenience function which can be used to position the *slit view mirror* into the optical train and to position the TV focal reducer mechanism to 5".

Any other mirror in the A&G unit which was previously positioned within the optical path will be first removed from the light path.

3.39 The *tvslit12* command

This is a convenience function which can be used to position the *slit view mirror* into the optical train and to position the TV focal reducer mechanism to 12".

Any other mirror in the A&G unit which was previously positioned within the optical path will be first removed from the light path.

3.40 The *mainfilta* command

This command can be used to select a specified filter in the mainfilter A mechanism.

The syntax of the command is as follows:

```
mainfilta <filter name| filter position>
```

The command takes a single argument which is either the *name* of the filter or the *position* of the filter in the filter mechanism expressed as an integer. If the name of the filter is specified, it should correspond to the name of a filter which was defined as being in this mechanism in the filter management system.

In order for this command to function correctly, the astronomer should ensure that the filter management system has been correctly configured so it is aware of the names of the filters which are currently deployed within the main filter A mechanism.

3.41 The mainfiltb command

This command can be used to select a specified filter in the main filter B mechanism.

The syntax of the command is as follows:

```
mainfiltb <filter name| filter position>
```

The command takes a single argument which is either the *name* of the filter or the *position* of the filter in the filter mechanism expressed as an integer. If the name of the filter is specified, it should correspond to the name of a filter which was defined as being in this mechanism in the filter management system.

In order for this command to function correctly, the astronomer should ensure that the filter management system has been correctly configured so it is aware of the names of the filters which are currently deployed within the main filter B mechanism.

Chapter 4 A&G GUI Control Application

In addition to being controlled through the WHT ICS command line, the A&G instrument may also be controlled by means of a graphical user interface (GUI).

The following sections outline the facilities provided by the GUI control application in order to control the A&G instrument.

4.1 Starting the GUI

Normally, as part of the start-up sequence of the observing system, the control GUI for the A&G instrument will be started automatically with the proviso that the A&G has been configured into the observing system.

Should the user need to start the application *manually*, it can be accomplished using the following command from the WHT OCS command line *after* the observing system has been started.

```
4MSControl -panels "CAGB" &
```

4.2 Colour Coding

When a *status value* associated with a mechanism is in an *error* state, the text associated with the status item will be highlighted in **red**.




When a mechanism is *moving*, the control associated with that mechanism will be *insensitive* to user interaction and any status text associated with it will be coloured **blue**.


Should there be an outstanding *warning* associated with a mechanism, any status text field associated with that mechanism will be highlighted with a **yellow** background.

4.3 Icons

A number of icons buttons are used throughout the GUI in order to perform specific tasks. Care has been exercised to ensure that the *meanings* of each of the icons is *consistent* across not just the control panels which are used to operate the A&G instrument, but also the rest of the other WHT instruments.

A summary of the icons which are used within the application follows.

<i>Icon</i>	<i>Semantics</i>
	This icon signifies that when this button is pressed, the associated mechanism will be <i>initialised</i> .
	This icon signifies that when this button is pressed, the associated mechanism will <i>move</i> to the demanded position.
	This icon signifies that when this button is pressed, the displayed position of the associated mechanism will be updated to that of the <i>current</i> mechanism position and as such, will override any <i>demand</i> position which may have been entered by the user.

<i>Icon</i>	<i>Semantics</i>
	This icon signifies that when this button is pressed, the associated mechanism will be <i>stopped</i> should it be moving.

4.4 The A&G Engineering Display

The intended purpose of the A&G engineering display is to provide the operations team members with extensive control over *all* of the mechanisms which comprise the A&G instrument. It is not intended that the observer will use this panel during operations.

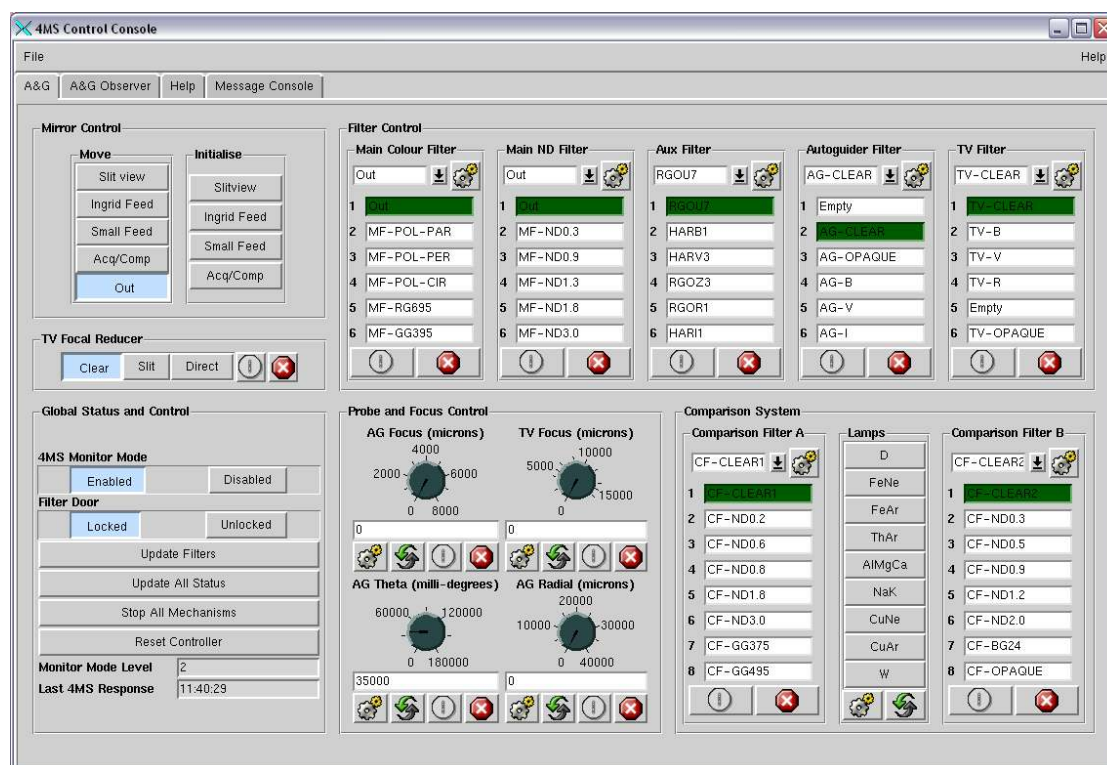


Illustration 14MSControl CAGB Engineering Panel

The panel is divided into groupings of logically related sections. The following chapters outline each of the sections

4.4.1 The Global Status & Control Section

From the *Global Status & Control* panel the user can *review* and *control* the global level commands and status associated with the A&G instrument.



Illustration 2 Global Status and Control Panel

4.4.1.1 The 4MS Monitor Mode Control

The user can *enable* or *disable* monitor mode within the 4MS mode. The normal mode of operation for the 4MS A&G module is monitor mode *enabled*. With monitor mode enabled, the 4MS embedded microprocessor system will *continually* report movements of mechanisms and thus allows the high-level software to *track* the movements of the underlying mechanisms in the instrument.

The current *monitor mode* value is displayed in a status label at the bottom of the panel above. The highest level of monitor mode is *two* and the lowest is *zero*.

4.4.1.2 The A&G Filter Door Control

The *filter door* control allows the user to *lock* and *unlock* the filter access door located on the side of the A&G instrument.

4.4.1.3 The Update Filters Control

The source of the *filter names* which are contained within the filter mechanism graphical controls are located in the filter management system. Should the observer *change* a filter which is located in one of the mechanisms in the A&G system through the filter management system, by pressing this button, the GUI will *refresh the names of the filters* which are presented in the filter controls on the control panel such that they are synchronised with those in the filter management system.

4.4.1.4 The Update All Status Control

By pressing this button, the engineer can instruct the 4MS A&G embedded system to return the details of **all** of the status associated with all of the A&G mechanisms and subsequently update *all of the displayed status* in the A&G related control panels.

4.4.1.5 The Stop All Mechanisms Control

By pressing the *Stop All Mechanisms*, the engineer can instruct the 4MS microprocessor control system to **stop all** mechanisms which are currently moving.

This command should be used with caution as certain mechanisms can lose their position as a result of this command and will subsequently need to be reinitialised.

4.4.1.6 The *Reset Controller Control*

By pressing this button the engineer can instruct the 4MS embedded microprocessor control system to *reset* itself.

4.4.1.7 The *Last 4MS Response Status Label*

The A&G software instrument controller system attempts to *handshake* with the 4MS embedded microprocessor system on a regular basis. In the status field labelled *Last 4MS Response* is the time of the *last successful handshake* between the software controller and the embedded microprocessor.

4.4.2 The *Comparison System Control Panel*

The engineer can use this panel to control the mechanisms which are associated with the comparison subsystem in the A&G system.

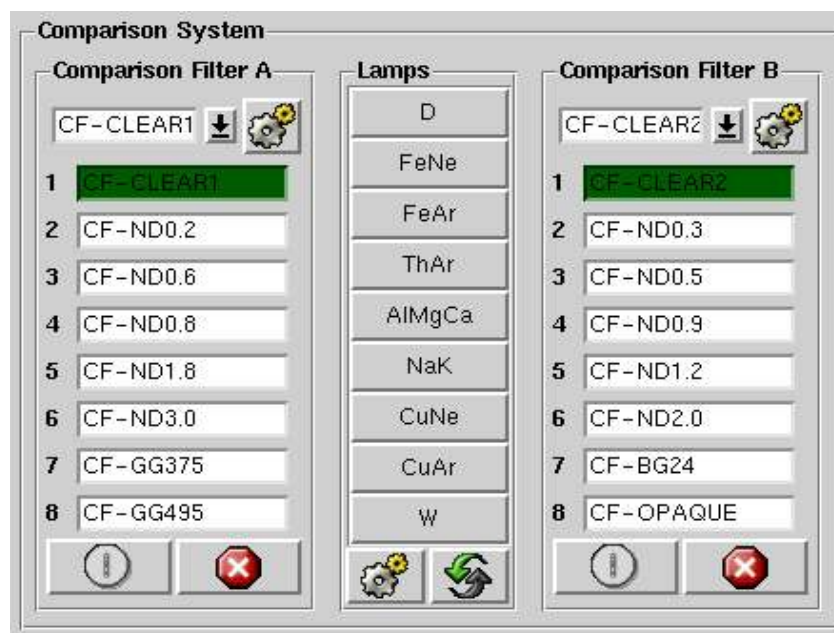



Illustration 3 Comparison System Control Panel

4.4.2.1 The *Comparison Filter A & B Controls*

Through the comparison filter controls, the user can change the current filter in both the comparison filter A & B mechanisms. The behaviour of both of the controls is identical.

The user selects the *demand filter* using the drop-down menus and then instructs the instrument to select that filter by pressing the *move*² button.

2  The move button

4.4.2.2 The Calibration Lamp Control Panel

The *calibration lamp control panel* will allow the engineer to illuminate one or more of the lamps which are housed within the calibration system within the A&G box. In order to select a lamp for illumination, the user must ensure that the buttons associated with the lamps he wants illuminated are depressed. The user may select one or more lamps for illumination.

In order to instruct the instrument controller to illuminate the selected lamps, the user should press the *move* button.

4.4.3 The Mirror Control Panel

The *mirror control panel* will allow the engineer to position any of the mirrors which are housed within the A&G instrument into the optical path. In addition, it will also allow the user to initialise any of the mirrors.

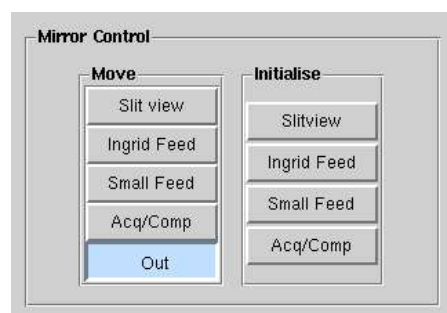


Illustration 4 Mirror Control Panel

In order to select a new mirror for insertion into the optical path, the engineer should press the button labelled with the *name of the mirror* of interest. After doing so he will be prompted with a *confirmation dialog* to ensure that this is actually what was intended.

Likewise, should the engineer want to initialise any of the mirrors, he must click on the corresponding button in the *Initialise* panel in order to effect the datum.

4.4.4 The Probe and Focus Control Panel

The engineer will use this panel in order to control the mechanisms associated with the autoguider probe position, the television focus position and the autoguider focus position.

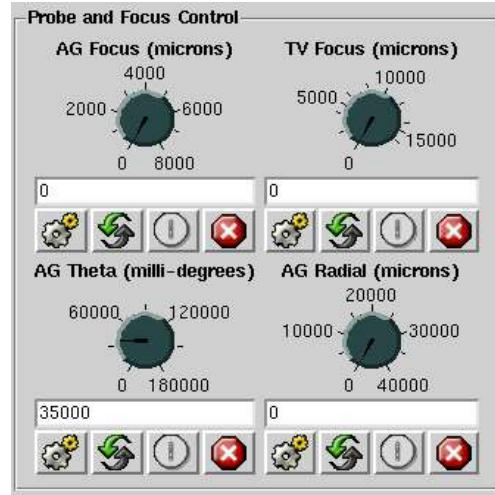


Illustration 5 Probe and Focus Control

4.4.4.1 The Autoguider Focus Control

The *autoguider focus control* can be used to adjust the *focus* of the autoguider unit within the instrument. The user can enter the demand position in two ways. The demand position can be entered into the text field associated with the control or it can be selected by turning the dial control until the desired demand position is reached.

In order to effect the move of the mechanism, the user should press the *move* button.

The *focus position* of the autoguider is specified in *microns* and should be in the range of 0 to 8000.

4.4.4.2 The Autoguider Theta Control

The *autoguider theta control* can be used to control the position of the autoguider theta mechanism. The *demand* position of the mechanism can be selected using either the *text field* or the *dial control* which can be turned until the desired demand position is reached. In order to effect the move of the mechanism to the demand position, the user should press the *move* button.

The range of values which can be entered for this mechanism are from 0 to 180,000 and is expressed in *millidegrees*.

4.4.4.3 The Autoguider Radial Control

The *autoguider radial control* can be used to adjust the *radial position* of the autoguider probe within the instrument. The user can enter the demand position in one of two ways. The *demand position* can be entered into the text field associated with the control or it can be selected by turning the dial control until the desired demand position is reached.

In order to effect the move of the mechanism, the user should press the *move* button.

The *radial position* of the autoguider probe is specified in *microns* and should be in the range of 0 to 40000.

4.4.4.4 The TV Focus Control

The *TV focus control* can be used to adjust the *focus* of the TV unit within the instrument. The user can enter the demand position in one of two ways. The demand position can be

entered into the text field associated with the control or it can be selected by turning the dial control until the desired demand position is reached.

In order to effect the move of the mechanism, the user should press the *move* button.

The focus position of the TV is specified in *microns* and is in the range of 0 to 16000.

4.4.5 The Filter Control Panel

The A&G instrument contains a number of filters which can be used to modify the physical characteristics of the light entering various components of the system. There are filters associated with the autoguider, the calibration system, the TV system, the auxiliary port and the main cassegrain science port.

Each of the filters can be controlled from the filter control panel. The behaviour of each of the filter controls is identical. The user selects the desired filter from the drop-down menu and then presses the *move* button in order to effect the filter movement.

Currently the TV filter control is **permanently disabled** as the underlying hardware is disconnected from it's control electronics.

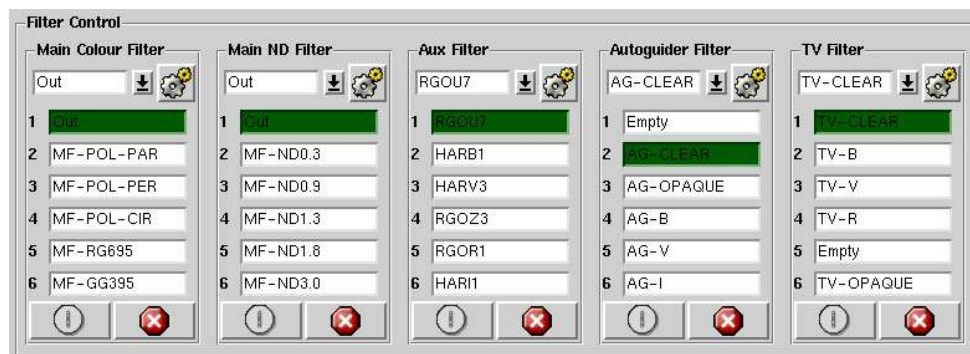


Illustration 6 Filter Control Panel

4.4.6 The TV Focal Reducer Control

This control panel can be used to adjust the position of the TV focal reducer. The user can select one of the positions *Clear*, *Slit* or *Direct*. A confirmation dialogue will be presented to the user prior to the mechanism being moved which he must acknowledge before the mechanism will be moved.

4.5 The A&G Observer Control Panel

The observer control panel was designed to be used by the observer and contains controls which are orientated towards *night-time operations* rather than engineering operations. Therefore the observer control panel offers a *subset* of the mechanism controls which are otherwise available on the engineering panel.

The following sections outline the functionality of the various controls which are present within the observer control panel.

4.5.1 The ND Setting Control

This control allows the user to specify a *demand neutral density setting* between zero and five. The user may specify the demand value either by turning the associated dial control or by entering the neutral density setting manually through the text field.

To affect the new neutral density setting, the user should press the *move* icon. The instrument controller will then attempt to select neutral density filters in the comparison system neutral density filter mechanisms such that the combined effect of *both* of the filters amounts to as close as possible, the neutral density setting demanded by the user.

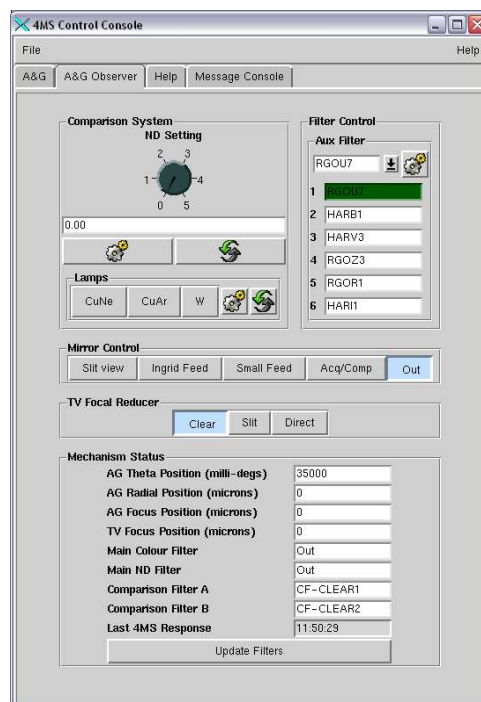


Illustration 7 The A&G Observer Control Panel

4.5.2 The AUX Filter Control

The *AUX Filter* control allows the user to select which filter is currently selected in the auxiliary filter mechanism. The user should select the *demand filter* from the drop-down menu and then press the *move* icon to effect the move.

4.5.3 The *Lamps Control*

The *lamps control* allows the user to illuminate any combination of the *three* currently operational lamps in the calibration system. The user can select the lamps that he wants illuminating by depressing the button with the corresponding lamp name. In order to effect the change, the user should press the *move* icon.

Due to a hardware problem in the low-level embedded microprocessor system, sometimes it will be necessary to repeat this process up to **two or three times** before the lamps will be illuminated.

4.5.4 The *Mirror Control*

Using the *mirror control*, the observer can specify *which* of the mirrors is to be positioned in the optical path. In order to position a mirror into the path of the beam, the user should press the button which is labelled with the desired mirror name. A confirmation window will be presented to the user prior to moving the mirror to ensure that this was the intention.

4.5.5 The *TV Focal Reducer Control*

The *TV focal reducer control* allows the user to specify the demanded position of the TV focal reducer mechanism. A confirmation window will be presented to the user subsequently prior to moving the mechanism just to ensure that this is exactly what was intended.

4.5.6 The *Mechanism Status Panel*

The purpose of the *mechanism status panel* is to display a status summary which is relevant to the observer and night-time operations. This status information is updated in real time as the underlying status values change in the instrument controller.

The colour coding of the status values displayed in this status panel adhere to the standards outlined in section 4.2

4.5.7 The *Update Filter Button*

This button is used to synchronise the filters listed in the filter controls on the observer panel with those which are held in the filter management system. This should be done *after* the observer has changed **any** of the filters in the filter management system which are associated any of the filter mechanisms which can be controlled through the observer panel.