



WHT-PFIP-12

# PFIP Controller

## Solaris Software User Guide

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## 1 INTRODUCTION

The control software for the prime focus instrument platform (PFIP) has been reengineered to function upon the UNIX operating system. Consequently *all* of the PFIP control applications which were previously hosted on the VAX computer system are now redundant. It was intended that *all* of the existing functionality of the *previous* VAX based system be transferred to the new Solaris based system. All control of the PFIP instrument therefore will now take place from the UNIX **whtics** console window on taurus.

This document outlines the new software which will be used to control the prime focus instrument platform and how the observer may utilise it for both observational and engineering purposes.

## 1.1 Definitions, acronyms and abbreviations

### 1.1.1 Instrument controller software

A *central software-based server task* which is hosted on the WHT ICS machine will be responsible for managing **all** of the communication along the serial line to the 4MS PFIP microprocessor. This is a pure Java application which permits client software such as the instrument control GUI to affect *control* on the 4MS system. It also provides the packet collection mechanism with the means to acquire PFIP related header information.

### 1.1.2 PFIP Control GUI

This is a *graphical user interface* (GUI) application which affords the user *complete* control over all aspects of the PFIP instrument control system.

### 1.1.3 Talker Log

An application which is used to monitor the messages which are produced by the software within the observing system by the observer.

### 1.1.4 Action

Any attempt by the Observer to control any aspect of the system will result in an *action* being started within the PFIP instrument controller task. Sometimes these actions will be quite simple such as moving the autoguider focus slide and other times, these will be complex *compound* actions such as the move of the main filter wheel which will result in not only the autoguider focus slide being changed but also the telescope focus as well.

### 1.1.5 PFIP Instrument Control Scripts

As with the VAX system, the new implementation of the control system contains a number of *scripts* which may be used by the Observer from the command line in place of using the control GUI. By and large the scripts are very similar to the existing scripts on the VAX system in an attempt to reduce the learning curve for new users of the revised system.

### 1.1.6 4MS Control Widget

A *mechanism control widget*. A standard set of widgets have been developed specifically to control 4MS mechanisms. The aim of this is to provide the Observer with a standard looking interface to all of the mechanisms irrespective of the 4MS instrument it is associated with.

### 1.1.7 Digi PortServer

A portserver permits RS232 based devices to be controlled over a standard local area network. Portservers are deployed in numerous stations around the W. H. T. and are used for conveying data backwards and forwards to network-aware applications such as the 4MS instrument controllers.

Each portserver can control up to 16 *individual* RS232 devices.

### 1.1.8 Parameter Noticeboard

The parameter noticeboard is a *status monitor application* which is hosted on the WHT ICS computer and contains a *complete mirror* of all the status information related to the PFIP instrument control

system. All third-party applications which require PFIP related status information will query this status monitor application in order to ascertain PFIP status. It will be the responsibility of the PFIP instrument control system to *ensure* that the status information which is contained in the parameter noticeboard is current.

## 2 PFIP User Guide

This chapter is intended for the end-users of the system such as the observers and engineers. It provides a guide to all of the applications which may be used to affect control over the PFIP 4MS system from both an operational and engineering perspective.

### 2.1 Starting The System

If the observing system has been configured accordingly, starting the PFIP instrument controller system will simply be a case of executing a **startobssys** command from the WHT ICS console window. This will start up all necessary software responsible for the control of the PFIP instrument.

A *trace* of the software as it starts will be entered into the standard UNIX *talker* log.

### 2.2 Stopping the System

If the observing system has been configured accordingly, stopping the PFIP instrument controller system will simply be a case of executing a **shutdownobssys** command from the WHT ICS console window. This will stop all software responsible for the control of the PFIP instrument.

A trace of the software as it terminates will be entered into the standard *talker* log.

### 2.3 Error Reporting

All *errors* and *warnings* produced by the system will be logged automatically in the UNIX *talker* log. Critical errors will be entered into the *talker* log as *alarms*. The user will be informed of *alarms* by the *talker* log by means of a flashing dialogue box accompanied by an audible alarm.

When the user attempts to perform an action on the PFIP system using the PFIP GUI and there is an *error*, the user will be informed by means of a *dialogue window*. Furthermore, if the action that the user requested was associated with a mechanism, the *mechanism control widget* which is associated with that mechanism will be highlighted with a *red* background. Should an error occur when the user attempts to perform an action, one should assume that the action did *not* complete and should therefore verify the state of the system before proceeding.

Should a *minor* error occur whilst the system is attempting to perform an action, an error will be entered into the *talker* log. Should the warning be associated with a *mechanism* within the instrument, any mechanism control widget associated with that *mechanism* will be highlighted with a *yellow* background. A *warning* implies that the demanded action completed successfully and is reported for informational purposes only.

### 2.4 The PFIP Control GUI

The purpose of this application is to provide a graphical representation of the current status of the PFIP instrument control system and also to allow the user to *move* any of the mechanisms associated with the instrument or customise the behaviour of the instrument controller task. Control is afforded through a number of *standard control widgets* which are present on the interface. These *controls* function in a *predictable* and *standard* manner in order to facilitate the familiarity with the operation of not only this control interface but also of the control interfaces which are to be developed for the other 4MS control systems.

### 2.4.1 Starting the PFIP Control GUI

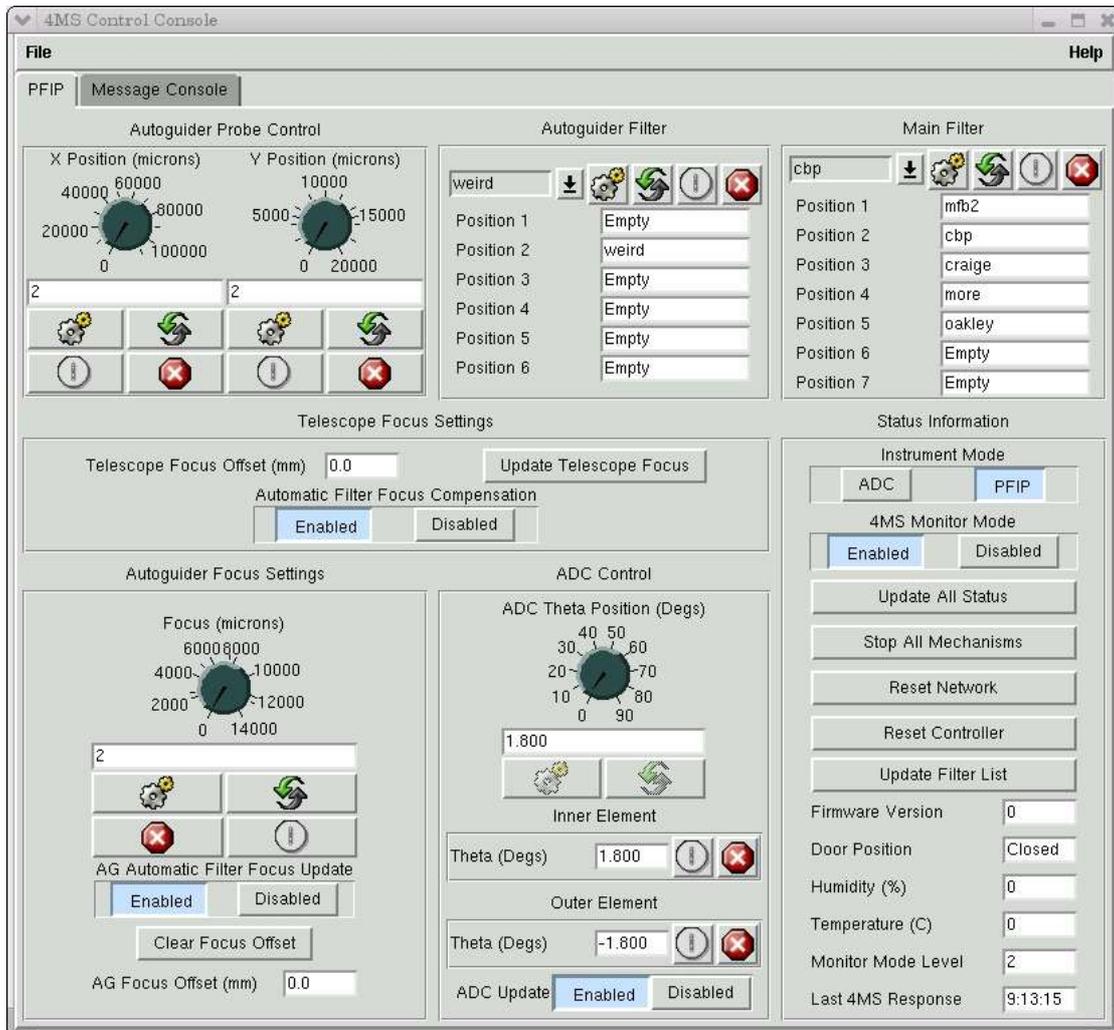
If the system is correctly configured for PFIP operation, the control GUI will be displayed automatically when the observing system is started. Should there be a need to start the control application independently it can be done using the following command from the WHT ICS console window.

```
4MSControl&
```

On initialisation, the application will attempt to ascertain the status of the PFIP instrument control system in order to present to the user an *accurate* representation of not only the 4MS system but also the instrument controller application. Any errors encountered on startup will be reported in the *talker* log. It is a prerequisite that in order for this application to start successfully that the software instrument controller system and the 4MS microprocessor are functioning correctly.

After a short delay, the following window will be displayed upon the WHT ICS console display. The control panel is broadly divided up into logical segments which control *discrete* parts of the PFIP system.

The following sections will detail each segment in more detail as well as outline common features prevalent throughout the interface.



The Main PFIP Control Panel

## 2.4.2 The Use of Icons

In order to reduce the amount of screen space used, *standard* graphical icons are used throughout the application. The semantics associated with each icon are intended to be *identical* irrespective of the instrument or mechanism that is being controlled. The intention is that once a user is familiar with one 4MS instrument control panel, he should be able to quickly establish how to operate the instrument control panel for a different instrument.

The semantics associated with each of the different icons which are used within the 4MS instrument control panels are outlined in the following subsections.

### 2.4.2.1 The Move Icon

The icon which contains a picture of *two gear wheels* is used to indicate that when this button is pressed, the associated mechanism will start *moving* to the user demanded position.



*The Move Icon*

Normally associated with this icon will be an *input field* into which the user will enter a *demand position* for a mechanism. Depending on its configuration, once a button containing this icon is pressed, *confirmation* from the user will be requested and subsequently the associated mechanism will start *moving* to the demanded position.

During the time that the mechanism is moving, the *move* button will remain insensitive to input from the user. Only once the mechanism has finished moving *or* it has returned an error state will the button once again be sensitive to user control.

Sometimes the associated mechanism may not actually be a physical mechanism inside of the instrument microprocessor was rather a pseudo mechanism contained within the instrument controller software.

### 2.4.2.2 The Initialisation Icon

The icon which contains a small circle with a vertical line represents a *power on button*. The semantics associated with such a button are as such. When pressed, the *mechanism* associated with the button will be sent an *initialisation* request. In the case of a *hardware* mechanism this will result in the mechanism attempting to *datum* itself. During the time that a mechanism is moving, the button will remain *insensitive* to Observer control. Once the mechanism has either completed moving or the mechanism returned an error, this button will once again be *sensitive* to Observer control.



*The Initialise Icon*

### 2.4.2.3 The Reset Icon

The icon which contains two small arrows arranged in a circular manner can be used to *reset* a value which was entered into a *demand position* field to the actual *current* position of the associated mechanism.



*The Reset Icon*

For example, should the Observer using the main filter wheel control widget select a *different* filter to the one that is *currently* selected in the main filter wheel and then subsequently decides that he no longer wants to move the filter to this selected position, by pressing the button containing the two arrows, the field containing the user demand position will be reset to the *actual* position of the mechanism thus nullifying his change.

### 2.4.2.4 The Stop Icon

The icon which contains a *red hexagon* with a cross within the centre can be used to *stop* the movement of the associated mechanism.



*The Stop Button*

This button can normally be pressed at any point whether the mechanism is either *moving* or is stopped.

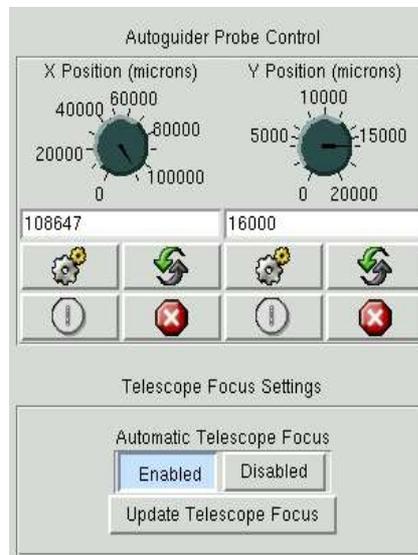
## 2.5 The PFIP Engineering Panel

The engineering panel is intended to be used by engineers of the ING and not by the visiting astronomers. The purpose of the panel is to give the engineer *complete* control over the instrument and as such offers features which the casual user should not use. The user can select the engineering panel by clicking on the tab labeled *PFIP* at the top of the control panel.

The following sections outline the various parts of the engineering panel and how they may be used.

### 2.5.1 The Autoguider Probe Control Panel

Located at the top left of the PFIP control panel is the *autoguider probe control panel*. The autoguider on PFIP comprises of *two* mechanisms which can be used to move the autoguider probes in both the X and Y directions. The control panel consists of *two* controls which allow the *independent* movement of each of these mechanisms. Using the dials, the user can either *turn* the dial to change the *demand position* of the mechanism to the desired value. Alternatively, the user may *modify* the value which is displayed within the input field. Once the demand position has been entered, the user can request the movement of the mechanism by pressing the *Move* icon. Should the system establish that the demand position has been specified incorrectly, the text associated with the demand position will turn *red* and no movement will be affected.



*The Autoguider Probe Control Panel*

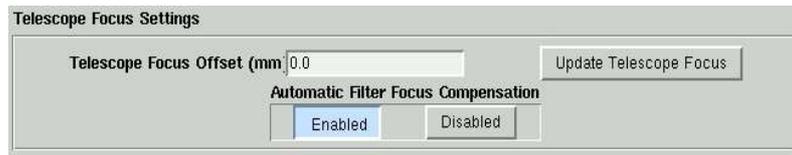
The mechanism position for *both* of the probes is displayed in *microns* and noticeably, there is greater movement available in the X probe mechanism than there is in the Y probe mechanism.

Both control widgets are *responsive* to movement of the *underlying* mechanisms and will update in realtime should the underlying mechanisms be moved.

The *autoguider probe* control widgets support all of the *standard* mechanism commands which are represented by the standard 4MS control icons as detailed in section 2.4.2.

### 2.5.2 The Automatic Telescope Focus Adjustment Panel

This panel allows the user to specify whether or not the instrument controller software will *automatically* perform adjustments of the telescope focus when the filter in the main filter ring is changed. This feature can either be *enabled* or *disabled* depending on whether or not automatic adjustments are to take place.



*The Automatic Telescope Focus Adjustment Panel*

The *amount* of adjustment which will be applied to the telescope focus is determined by the *focus offset* which is associated with the selected filter within the filter database. It is the responsibility of the support astronomer to ensure that the *focus offsets* which are associated with the filters which are located in the main filter ring are correctly specified in the filter database.

There is a button labeled *Update Telescope Focus* which when pressed will perform an *immediate focus adjustment* of the telescope in accordance with the *focus offset* associated with the current filter in the main filter ring. Normally the telescope focus update is only performed when the main filter is moved.

By default, when the system is started, automatic telescope focus adjustment is *enabled* by the system.

### 2.5.3 The ADC Control Panel

The PFIP instrument contains an *atmospheric dispersion corrector (ADC)* to compensate for the image distortion due to diffraction in a science image when the telescope is pointing *away* from the zenith position and subsequently through a greater air mass. The ADC consists of *two* independent optical elements which are controlled by discrete mechanisms which are known as the *inner element* and the *outer element* of the ADC. Each mechanism can be rotated in theta in the range  $-90^\circ$  to  $90^\circ$ .



*The ADC Control Panel*

During normal operations, the *positions* of the *inner* and *outer* elements of the ADC will be set *automatically* by the PFIP instrument control system which monitors the *zenith angle* of the telescope and adjusts the positions of the two elements of the ADC accordingly in order to remove image aberrations. This feature can be *enabled* or *disabled* by pressing one of the buttons labeled *Enable* or *Disable* associated with the control labeled *ADC Update*. By default, on startup, the system will assume *automatic* control of the positioning of the ADC.

Should the user want to move *either* of the ADC elements individually, he may do so using *either* of the mechanism control widgets which are located within the ADC control panel. It should be noted though that in order to do this successfully, the user should have *first* disabled automatic ADC updates.

Using the standard icons associated with each of the ADC mechanism control widgets, the user can *initialise*, *stop* and *move* each of the ADC elements independently.

### 2.5.4 The Status Information Panel

The status information panel is reserved for reporting status information relating to the *state* of the PFIP instrument controller system.

Status Information	
<b>Instrument Mode</b>	
ADC	PFIP
<b>4MS Monitor Mode</b>	
Enabled	Disabled
Update All Status	
Stop All Mechanisms	
Reset Network	
Reset Controller	
Refresh Filter List	
<b>Firmware Version</b>	0
<b>Door Position</b>	Closed
<b>Humidity (%)</b>	0
<b>Temperature (C)</b>	0
<b>Monitor Mode Level</b>	2
<b>Last 4MS Response</b>	11:16:30

*The Status Information Panel*

#### 2.5.4.1 Setting the PFIP Instrument Mode

PFIP can be operated in one of two modes. In **PFIP mode** the Observer may interact with any of the mechanisms which are present within the instrument. In **ADC Mode**, the Observer may utilise *only* the ADC mechanisms and any attempt to move *any* of the other mechanisms will result in an error being returned.

The current mode that the instrument is operating in is displayed by the status widget labeled **Instrument Mode**. By clicking on either of the buttons labeled *PFIP* or *ADC*, the Observer can request that the 4MS change the mode that it is operating in.

#### **2.5.4.2 Refreshing the Filter List**

Following an update of the details of the filters in the filter database by the support astronomer, the observer can press the button labeled *Refresh Filter List* in order to synchronise the filters displayed in the *main filter* and *autoguider filter wheel* control widgets with those of the filter database.

#### **2.5.4.3 Setting The Monitor Mode of the 4MS**

The 4MS microprocessor system communicates its status to the outside world by means of *status messages* which are sent from its RS232 serial communications port. In turn these are themselves interpreted by the instrument control software. The *number* and *type* of status messages which are returned by the microprocessor system is determined by the *level* of the monitor mode which the system finds itself in.

The control widget labeled **Monitor Mode** allows the engineer to *enable* and *disable* monitor mode on the 4MS system. When *monitor mode* is enabled, the 4MS will deliver a *stream* of status messages when a mechanism has been requested to move.

It is important that if the engineer or observer wants *real-time* updates of the mechanism positions on the 4MS Control Panel as the mechanisms move, the engineer should ensure that *monitor mode* remains *enabled* at all times.

#### **2.5.4.4 The Humidity Status**

There exists a sensor inside of the PFIP 4MS system which reads the *relative humidity* and returns the reading as a *percentage*. This is displayed in the status field labeled *humidity*.

#### **2.5.4.5 The Firmware Version**

The status field labeled *firmware version* is used to display the version number of the Forth code which is currently running within the 4MS microprocessor system.

#### **2.5.4.6 The Door Position**

In order to access the *main filter wheel* to change the filters, there is a *hatch* on the instrument which may be opened by the Observer. When this door is *open*, the 4MS system will *interlock* the movement of the main filter wheel in order to prevent damage to the instrument. This status field will read either *open* or *closed* depending on the *state* of the main filter wheel hatch.

#### **2.5.4.7 The Temperature Reading Label**

Within the instrument is a thermocouple which reads the ambient temperature surrounding the instrument. This is displayed within the status field labeled *Temperature* and it is expressed in *centigrade*.

#### **2.5.4.8 Monitor Mode Status Label**

The status field labeled *monitor mode* represents the current *status* mode of the 4MS system. This value can be set to one of *0, 1* or *2* with the higher numbers representing an increased number of status messages returned by the 4MS module when the mechanisms associated with the instrument are moved.

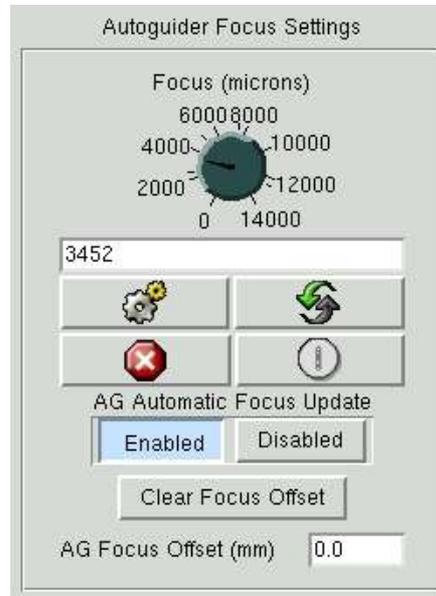
#### **2.5.4.9 Last 4MS Response Label**

Once a minute, the instrument controller task will attempt to communicate with the 4MS system in order to establish whether or not the microprocessor system is still responding. This status label contains the time of the *last successful handshake* with the 4MS microprocessor system. Should the time

contained within this label differ *significantly* from the current time, it is a sure indication that either hardware communications or the microprocessor system has failed in some way. Normally it will be the responsibility of an engineer to resolve such a problem.

### 2.5.5 The Autoguider Focus Settings

The control panel labeled *Autoguider Focus Settings* permits the Observer to modify the *position* of the autoguider focus slide.



*The Autoguider Focus Control Panel*

#### 2.5.5.1 Setting the Position of the Autoguider Focus Slide

The position of the *autoguider focus slide* is displayed in units of *microns* and may have a position within the range 0 to 14,000. It is possible to change the position of the *focus slide* by either entering the desired position within the text entry field or by turning the dial until the desired position is reached. By pressing on the *move icon*, the 4MS microprocessor will be instructed to move the mechanism.

The *autoguider focus slide* control widget supports *all* of the standard mechanism commands which are represented by the standard 4MS control panel icons as detailed in section 2.4.2.

#### 2.5.5.2 Enabling Automatic Readjustment of the Autoguider Focus Slide

When the main filter wheel is moved through the high-level software, *automatic focus adjustment* is performed on the *autoguider focus slide* to take into account that as part of the move of the main filter wheel, the *telescope focus* is also changed to account for the optical characteristics of the newly selected filter. This has implications for the focus of the autoguider. In order to compensate for this, as part of the move of the main filter wheel, in addition to modifying the telescope focus, the *focus of the autoguider* is modified also by an *equal an opposite amount* to compensate.

By default, the behaviour described above is *enabled* when the instrument controller system is started. It is possible to *disable* and *enable* this behaviour through the PFIP control panel using the control widget labeled **AG Automatic Focus Update**. By setting this value to *enabled*, automatic adjustment of the autoguider focus *will be* performed when the main filter wheel is moved. Conversely, when set to *disabled*, automatic adjustment of the autoguider focus *will not be* performed when the main filter wheel is moved.

### 2.5.5.3 Clearing the Focus Offset

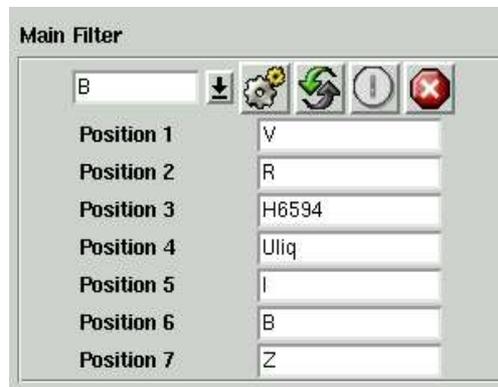
In order that the instrument controller can modify the *autoguider focus offset* correctly after the move of the main filter wheel, it **must** always remember the *previous offset* that was applied to the autoguider focus slide. Should there be a case where the instrument controller system applies an *incorrect focus offset* to the autoguider focus after the move of the main filter wheel, it is possible to *zero set* the focus offset by pressing the button labeled *Clear Focus Offset*.

### 2.5.5.4 Current Autoguider Focus Offset

The *current* autoguider focus offset which has been applied to the *autoguider focus slide* as a result of movements of the main filter wheel is displayed in the status field labeled *AG Focus Offset* and is expressed in units of *millimetres*.

### 2.5.6 Moving the Main Filter Wheel

At the top of the PFIP control panel is a control widget labeled *Main Filter*. This control permits the Observer to *change* the currently selected filter in the main filter wheel.



*The Main Filter Wheel Control Panel*

It should be noted that this control is for moving the main filter wheel *alone*. Moving the main filter wheel using this control widget will *not* result in the telescope focus being adjusted nor the autoguider focus being adjusted. The observer is expected to use the main filter wheel control on the *observer panel* in order to control the main filter wheel.

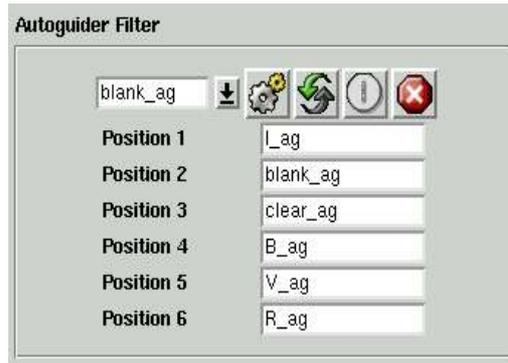
The *filter database* is used by the PFIP instrument controller system in order to establish the *filter identifiers* of the filters which are currently deployed within the main filter wheel. Therefore, the user is presented with the *names* of the filters in the main filter wheel rather than simply a series of numbers corresponding to the positions in the filter ring.

Under the *main filter wheel* control widget is a list of all of the positions in the main filter wheel with the names of the filters which are currently residing in the filter holders.

The *main filter* control widget supports *all* of the standard mechanism commands which are represented by the standard 4MS control panel icons as detailed in section 2.4.2.

### 2.5.7 Changing the Autoguider Filter

At the top of the PFIP control panel, is a control widget labeled *Autoguider Filter*. Through the use of this widget, the Observer may *change* the filter in the autoguider which is currently in the light path.



*The Autoguider Control Panel*

The PFIP instrument controller *interrogates* the *filter database* in order to establish the *filter identifiers* of the filters which are currently deployed in the autoguider filter ring. Therefore it is possible for the *Observer* to select the *name* of the filter that he wants in the light path rather than having to specify the position in the filter ring of the autoguider.

Underneath the control which will be used to select the autoguider filter is a list of *all* of the positions in the autoguider filter ring and the names of the filters which are currently residing within them. This data has its origins in the *filter management system*.

The *autoguider filter* control widget supports all of the *standard* mechanism commands which are represented by the standard 4MS control panel icons as detailed in section 2.4.2.

## 2.6 The Observer Control Panel

The Observer Control Panel is intended to be used by a visiting Observer to control the PFIP instrument. It permits the control of a *subset* of the features of the prime focus instrument platform and provides a *status summary* of pertinent information relating to the instrument's readiness for observing.

The observer panel can be selected by clicking upon the tab labeled *PFIP Observer* which is located at the top of the display. The following sections outline the various parts of the observer panel and what they represent.

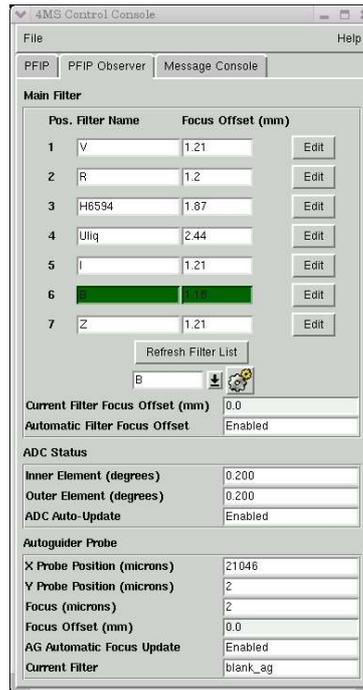


Illustration 1 The Observer Panel

### 2.6.1 The Main Filter Wheel Control Panel

Located at the head of the display is a panel which can be used to control the main filter and its associated behaviour.

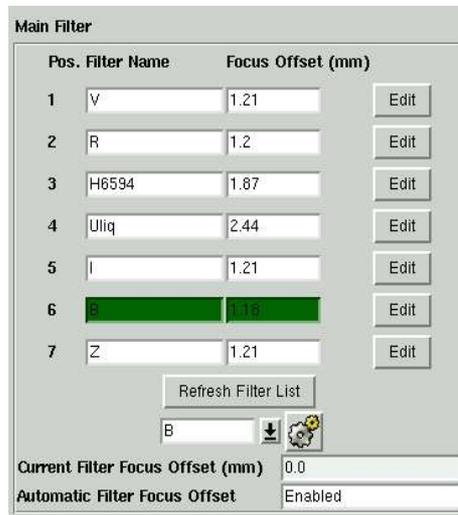


Illustration 2 Main Filter Wheel

The details of the filters in *each* of the seven positions in the main filter wheel are displayed. The source of the filter data is the *filter database* so whenever there is a need to modify the names of the filters in the main filter wheel, the support astronomer *must* refer to the filter database in order to change the filter configuration.

Associated with *each* of the filter positions is a *focus offset*. The *focus offset* is defined in *millimetres* and is the *focus offset* which will be applied to the telescope when *that* filter is selected. It is possible to *modify* the focus offset associated with a filter by pressing on the corresponding button labeled *Edit*. In turn a dialogue window will be presented to the user into which he can enter the details of a *new* focus offset. This new focus offset will also be stored in the filter database.

The Observer can change the currently selected filter in the main filter wheel by selecting a *filter* in the drop-down menu found below filter list and then clicking on the *move* button.

The procedure for changing the filter in the main filter wheel is a *compound* action which consists of a number of discrete operations. In the first instance, the instrument controller system will request the PFIP 4MS system to *move* the main filter wheel to the *demanded* position. Following this, the instrument controller task will then interrogate the *filter database* in order to ascertain the associated *focus offset* for this filter. This *focus offset* will then be applied to the telescope *delta* focus (this is displayed as DFOCUS on the TCS info display). The process of *changing* the focus of the telescope however will result in the *focus* of the autoguider being changed also. Therefore, it is then necessary to *modify* the focus offset of the autoguider as well by an equal and opposite amount to what was applied to the focus of the telescope. The action takes a small amount of time to complete and *whilst* the action is in progress the drop-down menu which can be used to select filters will remain *insensitive* to user interaction.

The button labeled *Refresh Filter List* should be used *after* the details of the filters in the main filter wheel have been updated in the filter database. This will result in the details of the filters in the main filter control panel being updated.

In the box labeled *Current Filter Offset* is an indication of the last filter focus offset which was applied to the telescope focus.

In the box labeled *Automatic Filter Focus Offset* is an indication as to whether the telescope will be automatically refocused when the filter in the main filter wheel is changed. If this is disabled for any reason it will be highlighted with a red background. Automatic filter focus compensation of the telescope can be re-enabled in the engineering panel.

## 2.6.2 The ADC Status Panel

The status panel labeled *ADC Status* displays the current position of the *two elements* of the ADC which are expressed as an angle *theta* in units of degrees.

ADC Status	
Inner Element (degrees)	0.200
Outer Element (degrees)	0.200
ADC Auto-Update	Enabled

Illustration 3 ADC Display Panel

The status labeled *ADC Auto-Update* indicates to the Observer whether or not automatic ADC compensation is enabled. If this is *not* enabled it will be highlighted with a **red** background. During normal operations the ADC compensation should be *enabled* and this can be accomplished from the engineering panel.

## 2.6.3 The Autoguider Status Panel

The status panel labeled *Autoguider Status* is used to provide status information relating to the autoguider unit which can be found in PFIP.

Autoguider Probe	
X Probe Position (microns)	21046
Y Probe Position (microns)	2
Focus (microns)	2
Focus Offset (mm)	0.0
AG Automatic Focus Update	Enabled
Current Filter	blank_ag

Illustration 4 Autoguider Status Panel

The *current positions* of the autoguider X and Y probes are displayed at the head of the status panel and are expressed in units of *microns*.

The current *focus* of the autoguider is displayed in the status window labeled *Focus* and is expressed in units of *microns*.

The current *focus offset* of the autoguider is displayed in the status window labeled *Focus Offset*. This represents the *focus offset* in *mm* which has been applied to compensate for the telescope focus shift which has been applied to *compensate* for the *filter* currently in the main filter wheel.

In the status window labeled *AG Automatic Focus Update* is displayed whether or not the autoguider focus will automatically be updated to compensate for the change in focus of the telescope when the filter in main filter wheel is changed. When this is *disabled*, the background will be highlighted in **red**. To *re-enable* automatic refocus of the autoguider *when* the main filter wheel is changed, the user should use the engineering panel.

In the status window labeled *Current Filter* is displayed the name of the filter which is currently selected in the autoguider. The details of *which* filters are located in the autoguider filter wheel are to be found in the filter database.

## 2.6.4 The Message Console

The message console will be used to display to the user a *trace* of the behaviour of the GUI control application. It serves no other purpose but to inform the user of significant events that have occurred during the use of the application.

## 2.7 PFIP Observer Control Scripts

In addition to the PFIP control GUI, there exists a set of *scripts* which may be used to control most aspects of the PFIP system. These command line scripts themselves may be *incorporated* by observers into their own observing sequence scripts. The new scripts are intended to *replicate* the functionality that was provided as part of the script suite on the old VAX -based system.

The following sections outlined the purpose of each of the scripts and also how they may be used.

### 2.7.1 Prerequisites for Running the Scripts

Before the Observer can use *any* of the following scripts, it should be verified that the instrument controller task and the PFIP 4MS controller are both functioning correctly and that communications between the two systems are normal.

### 2.7.2 pfip\_begin

The purpose of this script is to *extract* the current status of the PFIP 4MS controller and update any client applications which may be dependent on this status information. It is intended that this script be run **immediately** after the instrument controller task has been started to ensure that an *accurate* status image is available and that the system is ready for use by the Observer.

The script can be started from the Observer console window on the **whtics** machine by executing the following command from the command line.

```
pfip_begin
```

The command takes no arguments.

Normally this script will be run automatically when the observing system is started and configured for PFIP operation.

### 2.7.3 pfip\_set

This script can be used to *set* the *state* of some of the observer controllable variables which influence the behaviour of the system. The script is invoked as following;

```
pfip_set -m <state variable> <demand value>
```

The state variable specified can be one of the following;

#### 2.7.3.1 ADC

This allows the observer to enable and disable the automatic updating of the ADC position. The demand value can be either *enable* or *disable*.

#### 2.7.3.2 GDFOC

This allows the observer to define whether or not automatic autoguider focus compensation will be performed when the main filter wheel is moved. The demand value can be either *enable* or *disable*.

#### 2.7.3.3 FILTFOCUS

This allows the observer to define whether or not automatic telescope refocussing will be performed when the main filter wheel is moved. The demand value can be either *enable* or *disable*.

### 2.7.4pfip\_status

This command can be used from the command line to display a summary display of the status of the instrument. The command takes no arguments.

### 2.7.5pfip\_init

The purpose of this script is to permit the Observer to **initialise** (or datum) *any* of the mechanisms located on the PFIP instrument. Normally mechanisms on the PFIP do *not* need to be initialised but should there be a need to, this script may be used.

The script can be started from the Observer console window on the **whtics** machine by executing the following command from the command line.

```
pfip_init -m <mechanism name>
```

On successful completion of the action, the script will return *0* otherwise the script will return *1*. Any error messages produced by the script will be sent to the *talker* log.

The *mechanism name* specified can be any of the following:

- ADI  
Corresponds to the inner element of atmospheric distortion corrector.
- ADO  
Corresponds to the outer element of atmospheric distortion corrector.
- FILTER  
Corresponds to the main filter wheel.
- AUTOFILT  
Corresponds to the autoguider filter mechanism.
- GDX  
Corresponds to the autoguider X probe.
- GDY  
Corresponds to the autoguider Y probe.
- GDFOC  
Corresponds to the autoguider focus slide.
- ALL  
This requests that *each* mechanism is initialised *sequentially*. This action will take a long time to complete. It should be noted that if the PFIP instrument is in ADC mode, **only** the ADC elements will be initialised.

### 2.7.6pfip\_init\_all

This script can be used to initialise **all** mechanisms on the PFIP instrument *simultaneously*.

The script can be started from the Observer console window on the **whtics** machine by executing the following command from the command line.

```
pfip_init_all
```

The script takes no command line arguments.

### 2.7.7 pfip\_update

This script can be used to *request* the PFIP 4MS system to return *up-to-date* status information for the mechanism that is specified.

The script can be started from the standard Observer console window on the **whitics** machine by executing the following command from the command line.

```
pfip_update -m <mechanism name>
```

On successful completion of the action, the script will return *0* otherwise the script will return *1*. Any error messages produced by the script will be sent to the *talker* log.

The *mechanism name* specified can be any one of the following mechanisms:

- ADI  
Corresponds to the inner element of atmospheric distortion corrector
- ADO  
Corresponds to the outer element of atmospheric distortion corrector
- Filter  
Corresponds to the main filter wheel
- AUTOFILT  
Corresponds to the autoguider filter mechanism.
- GDX  
Corresponds to the autoguider X probe.
- GDY  
Corresponds to the autoguider Y probe.
- GDFOC  
Corresponds to the autoguider focus slide.
- All  
This requests that status information for *every* mechanism should be retrieved from the 4MS microcontroller.
- Mode  
Corresponds to the PFIP mode.
- Summary  
This requests an instrument summary from the 4MS controller.
- Monitor  
This requests the current monitor mode from the 4MS controller.
- Env  
This requests the current *environmental measurements* from the 4MS microprocessor such as the temperature and humidity to be updated.
- Door  
This requests the *current state* of the *main filter wheel hatch* be updated.

Any application which is *dependent* on status information from the PFIP instrument controller will be *updated* with new status information once the above command has been executed.

### 2.7.8pfip\_move

This script can be used to request the PFIP 4MS system to *move* either a mechanism or *change* the *behaviour* of the instrument controller task in some way.

The script can be started from the standard Observer console window on the **whtics** machine by executing the following command from the command line.

```
pfip_move -m <mechanism name> <mechanism position>
```

An example of its use follows:

```
pfip_move -m ADO 45.4
```

On successful completion of the action, the script will return *0* otherwise the script will return *1*. Any error messages produced by the script will be sent to the *talker* log.

The *mechanism name* specified can be *one* of the following mechanisms.

#### 2.7.8.1ADI

Specifying ADI as the mechanism argument permits the movement of the *inner element* of the atmospheric distortion corrector. A further single argument is expected which is the *rotation angle* expressed in *degrees* as a *real* number between -90.0 and 90.0

#### 2.7.8.2ADO

Specifying ADO as the mechanism argument permits the movement of the *outer element* of the atmospheric distortion corrector. A further single argument is expected which is the *rotation angle* expressed in *degrees* as a real number between -90 and 90.

#### 2.7.8.3Filter

By specifying *filter* as the mechanism, the Observer can perform a *movement* of the main filter wheel. A single additional argument is expected which is *either* the position in the filter ring to be selected (an integer between 1-7) or alternatively, a *standard* ING filter identifier. If the latter is specified, the Observer must *ensure* that the filter has been *defined* in the filter database as being positioned in the PFIP main filter wheel.

Following the movement of the main filter wheel, the telescope focus and the autoguider focus will be modified accordingly to take into account the optical characteristics of the new filter.

#### 2.7.8.4GDX

By specifying *GDX* as the mechanism, the observer can perform a *movement* of the *X* probe of the autoguider. A single demand position is expected which should be expressed as an integer in units of *microns* and be in the range of 0 to 110000.

Depending on the current position of the autoguider probe, this action may take a little while to complete.

### 2.7.8.5 GDY

By specifying *GDY* as the mechanism, the observer can perform a movement of the *Y* probe of the autoguider. A single demand position is expected which should be expressed as an integer in units of *microns* and be in the range of 0 to 20000.

Depending on the current position of the autoguider probe, this action may take a little while to complete.

### 2.7.8.6 GDFOC

By specifying *GDFOCPOS* as the mechanism, the observer can perform a *movement* of the autoguider focus slide. A single demand position is expected which should be expressed as an *integer* in units of *microns* and be in the range of 0 to 2000.

### 2.7.8.7 Autofilt

By specifying *AUTOFILT* as the mechanism, the observer can perform a *movement* of the autoguider filter wheel. A *single* additional argument is expected which is to be *either* the position in the filter ring to be selected (1-6) or alternatively, a *standard* ING filter identifier. If the latter is specified, the Observer must *ensure* that the filter has been defined in the filter database as being positioned in the PFIP autoguider filter wheel.

## 2.7.9 The *agfocus* script

The *agfocus* script can be used to set the focus of the autoguider focus slide from the command line. The syntax of the command is as follows;

```
agfocus <focus position in microns>
```

The specified position should be specified in microns and be in the range 0-14000.

## 2.7.10 The *pfilter* script

This script can be used to conveniently change the filter in the main filter wheel and have the telescope and autoguider focus adjusted according to the filter offset associated with the selected filter.

The syntax of the command is as follows;

```
pfilter <filtername or filter position>
```

e.g. `pfilter 1` or `pfilter V`

If the *filter position* is specified it should be defined as an integer in the range 1-7. If the *filter name* is specified it should be entered *exactly* as entered in the filter database and displayed in the filter status display in the 4MSControl GUI application.

## 2.7.11 The *agprobe* script

This script can be used to set the position of both the X and Y autoguider probe simultaneously. This could be conveniently used by the telescope operator to set the position of the autoguider probes after reading the position of a guide star from the guide star catalogue. The TO should need to do nothing more than start a terminal on the whtics machine as `whtobs` and then execute the `obsys` script. The script should then be in the path.

The syntax of the command is as follows;

```
agprobe <X probe position> <Y probe position>
```

The value specified for the X position should be in the range 1-110000 and the value of the Y position should be in the range 1-20000. All units are expressed in microns.

### 2.7.12 pfp\_cancel

Each time an request is made of the instrument control system by the observer, an *action* will be started inside of the instrument controller. Some of these action may terminate quickly, others such as the compound action responsible for setting the main filter wheel, refocussing the telescope and the autoguider can take up to a minute to complete. Should in the unlikely situation that the observer attempt to instruct the instrument controller to do something via either the 4MS control GUI or a command line script and the *action* does not complete, it is possible to **cancel** the action in the instrument controller using the **pfp\_cancel** script.

Normally it should suffice to attempt to cancel *all* subactions in the controller using the **ALL** option. With expert knowledge of the system this is the advised course to take when it is necessary to cancel an outstanding action which appears to have hung.

The script is invoked using the following syntax

```
pfp_cancel -m <mechanism name> -a <action>
```

Mechanism can be one of the following

- ADI  
ADC Inner Element.
- ADO  
ADC Outer Element
- ADC  
Set both ADC elements
- FILTER  
Main Filter
- AUTOFILT  
Autoguider filter
- GDX  
Autoguider X Probe
- GDY  
Autoguider Y Probe
- SETGDFOC  
Enable automatic autoguider focus
- GDFOC  
Set autoguider focus position
- SETFOCUS  
Enable/disable or set automatic telescope refocus
- MODE  
PFIP mode

- ALL  
Cancel all outstanding subactions in the controller. Without expert knowledge of the system, the user should simply use this option.

Actions can be one of the following *if* specified

- MOVE  
Requests that an action which resulted in a mechanism moving be cancelled.
- STOP  
Requests that an action which requested that a mechanism stop be cancelled
- INIT  
Requests that an action which requested that a mechanism initialise be cancelled

### 2.7.13pfip\_stop

The purpose of this script is to allow the Observer to *stop* any of the mechanisms located on the PFIP instrument which may be moving. Should the mechanism specified *not* be moving, an error will be returned to that effect.

The script can be started from the Observer console window on the **whtics** machine by executing the following command from the command line.

```
pfip_stop -m <mechanism name>
```

On successful completion of the action, the script will return *0* otherwise the script will return *1*. Any error messages produced by the script will be sent to the talker log.

The *mechanism name* specified can be any one of the following mechanisms:

- ADI  
Corresponds to the *inner* element of atmospheric distortion corrector.
- ADO  
Corresponds to the *outer* element of atmospheric distortion corrector.
- FILTER  
Corresponds to the main filter wheel.
- AUTOFILT  
Corresponds to the autoguider filter mechanism.
- GDX  
Corresponds to the autoguider X probe.
- GDY  
Corresponds to the autoguider Y probe.
- GDFOC  
Corresponds to the autoguider focus slide.
- ALL  
This requests that *any* hardware mechanism controlled by the 4MS microprocessor which is currently *moving* should be stopped immediately.

## 2.8Changing filters

As part of the setup of the prime focus instrument platform, the Observer may need to change the *filters* which are located within the main filter wheel. After the *physical* change of the filters, it will then be the *responsibility* of the support astronomer to *update* the filter database to accurately record which filters are located within the main filter wheel. This is a most important step as the instrument controller system *utilises* the filter database in order to establish the filter identifiers associated with the positions within the filter ring on the main filter wheel. These identifiers are subsequently written into the image headers. Furthermore, the filter database is also used to establish the focus offsets associated with the filters which have been selected in the main filter ring.

A full description of the use of the filter database is outside of the scope of this document and is instead detailed in the document WHT-FILTDB-2 *A User Guide to the Filter Management System*.