

THE ISAAC NEWTON GROUP OF TELESCOPES

INSTRUMENT CHANGE CHECKLIST

PRIME FOCUS IMAGING PLATFORM (PFIP) USING THE MOSAIC CAMERA WITH UDAS



Revision : 2.2

Description : CCD Wide Field Imaging

Location : WHT Prime Focus

Weight : 800 Kg

Preparation

Team required : 2 (1 mechanical, 1 electronics)

Approximate Time : ½ hour

This should be carried out at least a day before the change. If PFIP is *already* mounted on the PF turntable then there is no need to do this preparation work. It would certainly need to be done if the previous prime focus run was AUTOFIB as PFIP will need to be re-fitted to the PF turntable.

IMPORTANT : Make sure that the Mosaic camera (2EEV) is pumped and cooled down ready to be fitted the next day.

Tick each box when complete.

TICK BOX

1. Wheel the PF turntable into the test focal station and locate the PFIP unit. Remove the top dust cover.

2. Remove the filter wheel access cover (6 brass 'finger' bolts). Unplug the two cables and the pneumatic detent air pipe from the filter wheel unit mounted on an internal connector panel.

3. Remove the filter wheel unit by releasing the two clamps either side of the shoe plate and pull back the locking pin. Slide out the assembly taking care not to touch the filters.

4. Fit the 2 dowel pins (these should be taped together for safe keeping inside the PFIP housing when not in use) into the PF turntable face plate.

5. Using the small crane in the test focal station, with the PFIP suitably stropped and balanced. Lower it over the PF turntable and rotate the PFIP to align the indexing holes over the 2 dowel pins. *n.b.* The PFIP can only fit on in one position else the mounting bolt holes won't line up.

6. When PFIP is sitting squarely on the dowel pins, secure it to the PF turntable using eight M10 bolts

7. Check for free movement of the filter wheel detent pin

Before replacing the filter wheel unit, check that the detent pin moves freely.

Make sure that it does this.

8. Re-fit the filter wheel unit, pushing in the shoe plate until the locking pin clicks and apply the clamps. Plug the two cables and the detent air pipe back into their respective sockets and replace the filter wheel cover.

9. If the PF turntable was previously used with AUTOFIB, it will be necessary to re-position the LIFTING PLATE on the HANDLING TROLLEY to correct for the centre of gravity.

If the lifting plate is in the 'A' position (AUTOFIB) then remove the bolts and re-fit the lifting plate to the 'B' (PFIP) position.

11. Place PLC on the Telescope

12. Plug two Ethernet cables in the PLC (PLC Module Ethernet/IP and the module PROSOFT MVI-56-GEC). Also plug UPS mains to the PLC.

13. Check the PLC processor key must be in REMOTE.

14. Check If the power control is ON. See the WEB page <http://primepwrcontrol>

15. Switch ON the PLC and Check for any error LED indicator in the processor module.
For the errors codes see publication “Installation Instructions” 1756-IN101K-EN-P from:
<http://www.ing.iac.es/bscw/bscw.cgi>

16. TO check the communications, just try to ping the two Ethernet Interface or use the engineering interface (RSView32).
Ping 161.72.36.28
Ping 161.72.6.143

17. When the communication checks have finished, switch off PLC.

18. Plug the PFIP and ADC LEMO cables at the PLC panel. Also plug the alpha cable label ADC & PFIP SIGNALS.

19. Check if the air pipe is connected to the PFIP connector plate.

PREPARATION COMPLETE

Signature : _____ Date : _____

INSTRUMENT CHANGE PROCEDURE

WHT PRIME FOCUS IMAGING (PFIP)

Team required :

- 1 Electronics specialist
- 2 Mechanical specialists
- 1 Weightlifter

Nominal time : 6 hours

TOP END RING FLIP-OVER AND MOVING TO ACCESS PARK

- | | |
|---|--------------------------|
| 1. Make an entry in the log book:
INSTRUMENT CHANGE - Don't move the telescope | <input type="checkbox"/> |
| 2. Switch on the oil pumps and the main axis servo-amp breakers.
Make sure the telescope is at the zenith. | <input type="checkbox"/> |
| 3. Go to the Access Park station on the dome balcony and push the PRIME button on the FLIP RING control box. You need to keep this button pressed during the operation. Once the ring has flipped over, keep the button pushed to allow time for the ring clamps to re-engage (say a minute). There is NO visual indication implemented yet to indicate that the operation is completed. | <input type="checkbox"/> |
| 4. Push the AP2 button on the balcony LOCAL control box.
<i>Note You can speed up this operation by starting up the TCS, putting the telescope in computer mode and type: park ap1 This will bring the telescope down to about 19° elevation. When the telescope has stopped moving, go back to engineering mode and continue the access parking procedure from the dome balcony. Bring the telescope down further by pushing the AP2 (7° elevation) button.</i> | <input type="checkbox"/> |
| 5. When the telescope is at AP2, unbolt and open the sliding gates to their full extent. Remove the gate connecting bar, unbolt and lower the two hinged floor panels to release the safety switches. Push the AP3 button to bring the telescope tube horizontal to the dome balcony. | <input type="checkbox"/> |
| 6. When the telescope is at AP3, pull down the TIE BARS on each side of the top end ring and clamp the tube to the balcony fixing points | <input type="checkbox"/> |

REMOVING THE SECONDARY MIRROR

7. Remove the sky baffle tube by releasing the 4 clamps. Put the protective cover over the secondary mirror.

8. Disconnect the following cables below the secondary mirror cell :

- The 3 din plugs (7,8,9) for the LVDT's plugged into a grey box.
- The collimation drive plug (cable 39TKA12) on the mirror cell.

9. Using the 2.5 ton dome crane, raise the secondary mirror lifting frame out from the handling trolley on the ground floor and position it over the mirror cell's lifting frame mounting holes.

10. Bolt the lifting frame to the mirror cell using the bolts provided. These are identified with GREEN heads. Screw in the frame bolts, 4 at the top of the cell and 2 each side.

11. Tension the crane to take the weight of the mirror cell. When this is satisfactory, remove the 4 bolts securing the mirror cell to the central ring.

12. When the mirror cell is free, move it clear of the central ring and lower it back down into its handling trolley on the ground floor.

13. Un-hook the crane from the lifting frame and move the secondary mirror trolley clear. Move the prime focus turntable trolley below the crane and hook it up to the lifting frame.

FITTING THE PRIME FOCUS TURNTABLE

14. Lift the prime focus turntable up to the dome balcony and manipulate it CAREFULLY into the central ring using small adjustments to the crane and dome position.

15. When the bolt holes in the prime focus turntable are aligned, fit it to the central ring with 5 M10 bolts. (*but see note 17*)

16. When the PF turntable is secure, remove the 8 bolts (RED heads) to release the lifting frame. There are 4 bolts each side. Crane down the lifting frame to its trolley on the ground floor.

17. Remove the bolt from the right hand bracket holding the ADC LIMPIT CONTROL BOX to the PF turntable and swing the box down. This allows access to a mounting hole to enable the 5th mounting bolt to be fitted.

18. Fit the 5th M10 bolt and re-mount the ADC LIMPIT CONTROL BOX to the PF turntable.

CABLING UP THE PFTT (with ADC) AND PFIP

The 3 prime focus connector panels are mounted on the left hand side of the central ring.

19. PFIP LIMPIT CONNECTORS	
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TOP PF CONNECTOR PANEL	
20	PFIP MAINS SUPPLY
19	PFIP STATUS
18	PFIP L.V. SUPPLIES
17	Not used (PFIP RS-422 COMMS & ENCS)

20. PF TURNTABLE CONNECTORS	
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CENTRE PF CONNECTOR PANEL	
250	PFTT TACHO
249	PFTT MOTOR 2
1	PFTT MOTOR 1
2	PFTT ABS ENCODER
3	PFTT INC ENCODER
4	PFTT LIMITS

21. MISCELLANEOUS CONNECTORS	
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BOTTOM PF CONNECTOR PANEL	
31	Status/Control (Alpha Cable)
19	* VIDEO 1 S.H. TV video
18	* VIDEO 2 S.H. TV sync
9	MAINS SUPPLY
8	* S. H. L.V. SUPPLIES
6	AUTOGUIDER COMMS
Earth strap	To connector panel support
Air supply pipe	To air connector valve

Notes

* *Only needed when the **Shack Hartmann** box is on prime.*

** *Now obsolete with UDAS, but connect it to keep cables tidy!*

22. FIBRE OPTIC CABLES



FIBRE OPTIC CABLES BOX		
1	1 st PAIR	SDSU (To DAS)
2	1 st PAIR	SDSU (From DAS)
3	2 nd PAIR	AUTOGUIDER
4	2 nd PAIR	

23. ADC LIMPIT CABLES
n.b. These are stowed cable-tied behind the bottom connector plate when not in use.



**Plug the 12 meters alpha cable from the PLC panel
 "ADC+PFIP SIGNALS" to the ADC & PFIP junction box,
 close to ADC LIMPIT.**



**Figure 1 (ADC & PFIP Junction Box near of ADC LIMPIT)
 Figure 2 (PLC connector Plate)
 Figure 3 (General Block Cable Diagram)**

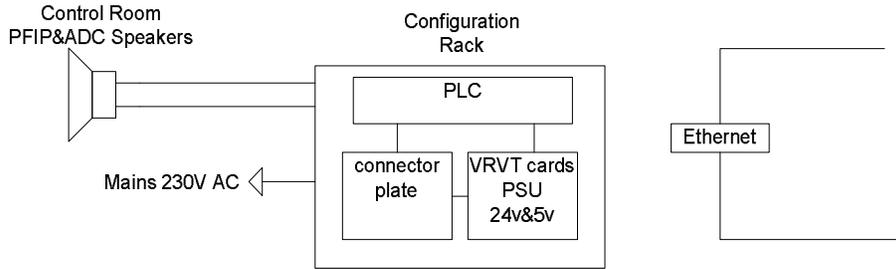
Figure 1 (ADC & PFIP Junction Box near of ADC LIMPIT)



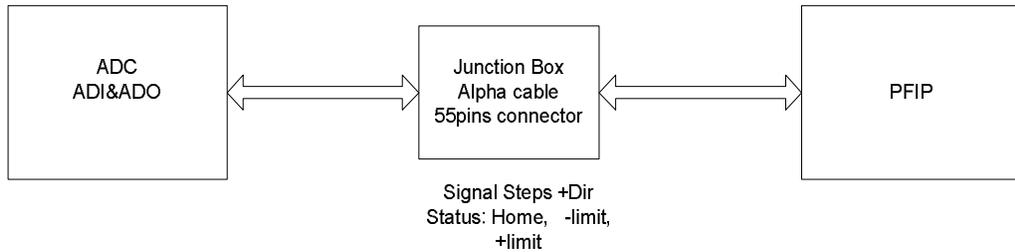
Figure 2 (PLC connector Plate)



Figure 3 “General Block Cables Schemes”



Lemo Existing cables
AC Mains



24. P.F. TURNTABLE ABS ENCODER

This cable is stored on the right hand side of the central ring. Untie it and plug it into the connector on the rear of the encoder.

25. IMPORTANT After checking that all the connections are correct, cable tie back the cable bundle going to the bottom connector plate. If this is not done, the cables may snag when the turntable rotates.

ROTATING THE PF TURNTABLE FOR MOUNTING THE CCD

26. IN THE CONTROL ROOM

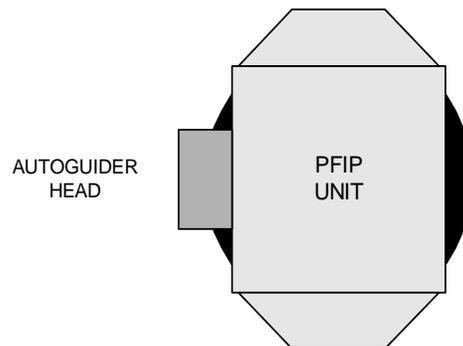
Switch on the breaker labelled PFTT at the bottom of the MARCONI servo rack.

27. AT ACCESS PARK

Push the buttons + and – on the PF turntable local control box and make sure the turntable can be rotated in both directions.

28. Move the PF turntable so that the autoguider head on PFIP is positioned to the left hand side of the rotator. See diagram below.

PFIP ORIENTATION FOR FITTING THE CCD MOUNTING PLATE



Note. Before the CCD mounting plate can be fitted, the SDSU controller will need to be mounted. See the following pages written by Simon Tulloch.

MOUNTING THE MOSAIC CAMERA AT PFIP

PFIP can be dismantled into two assemblies : Part A, the main assembly containing corrector and filter wheel and Part B, the camera assembly constituting the shutter plate, CCD cryostat mounting plate and the two 19" controller racks. Part A can be mounted directly to the telescope, however, part B requires some pre-assembly prior to mounting.



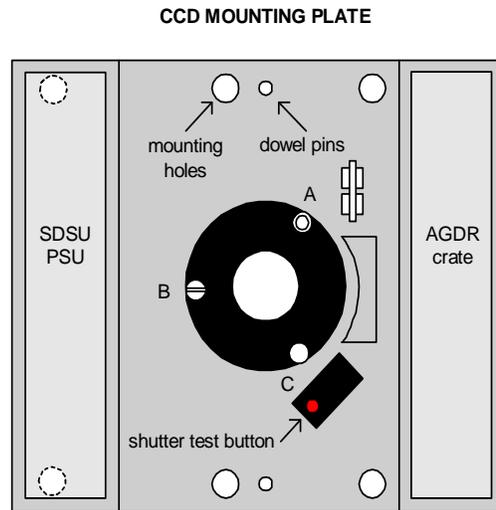
Part A



Part B

The science CCD SDSU controller is mounted on a plate that extends between the 19" racks. The autoguider controller needs to be mounted on a second plate on the opposite side of the racks.

Once the controllers are mounted, part B can be attached to the rest of PFIP on the telescope. At this stage 2-3 people will be needed for the lift, there are no suitable crane lifting points. Lift the CCD mounting plate into position and loosely fit the 6 bolts. Before the bolts are tightened, fit the 2 dowel pins into position. See diagram below.

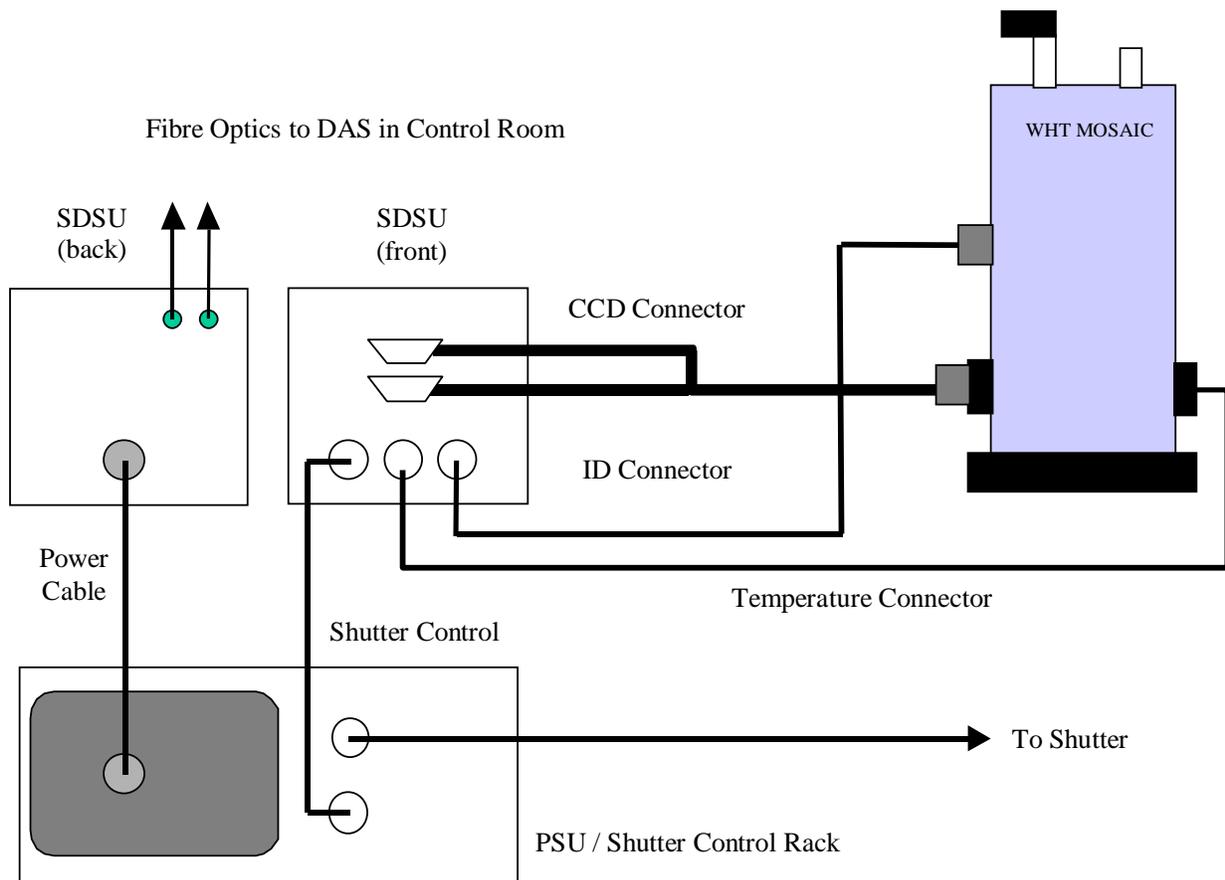


There is a red shutter test button on the plate, this should be operated a few times to ensure that the shutter opens and closes fully.

There is a 19" rack unit that contains a shutter control card and a PSU for the SDSU controller. This has a number of connectors that should be cabled up prior to mounting the rack, since once mounted the cables will be inaccessible. The cabling is illustrated in the diagram below.



PSU/Shutter control rack



The autoguider CCD controller power supply can then be mounted in the other 19" rack. The Camera cryostat window should then be blown clean of dust and the camera mounted onto part **B**.

IMPORTANT Before mounting the cryostat, back off the micrometers. Fit the cryostat and adjust the capstans to the previous settings which should have been recorded in the PFIP folder and on this check list

29. CAPSTAN SETTINGS (please record these)

A=

B=

C=

D=

Some further cables must now be attached to the SDSU controller. These are :

- The bifurcated CCD cable to the cryostat
- The two fibre optic cables
- The CCD ID connector
- The CCD temperature connector.

All are labelled and there should be no confusion as to which cable goes where. The connections to the camera cryostat are shown in the photos below :



CCD connector and ID connector

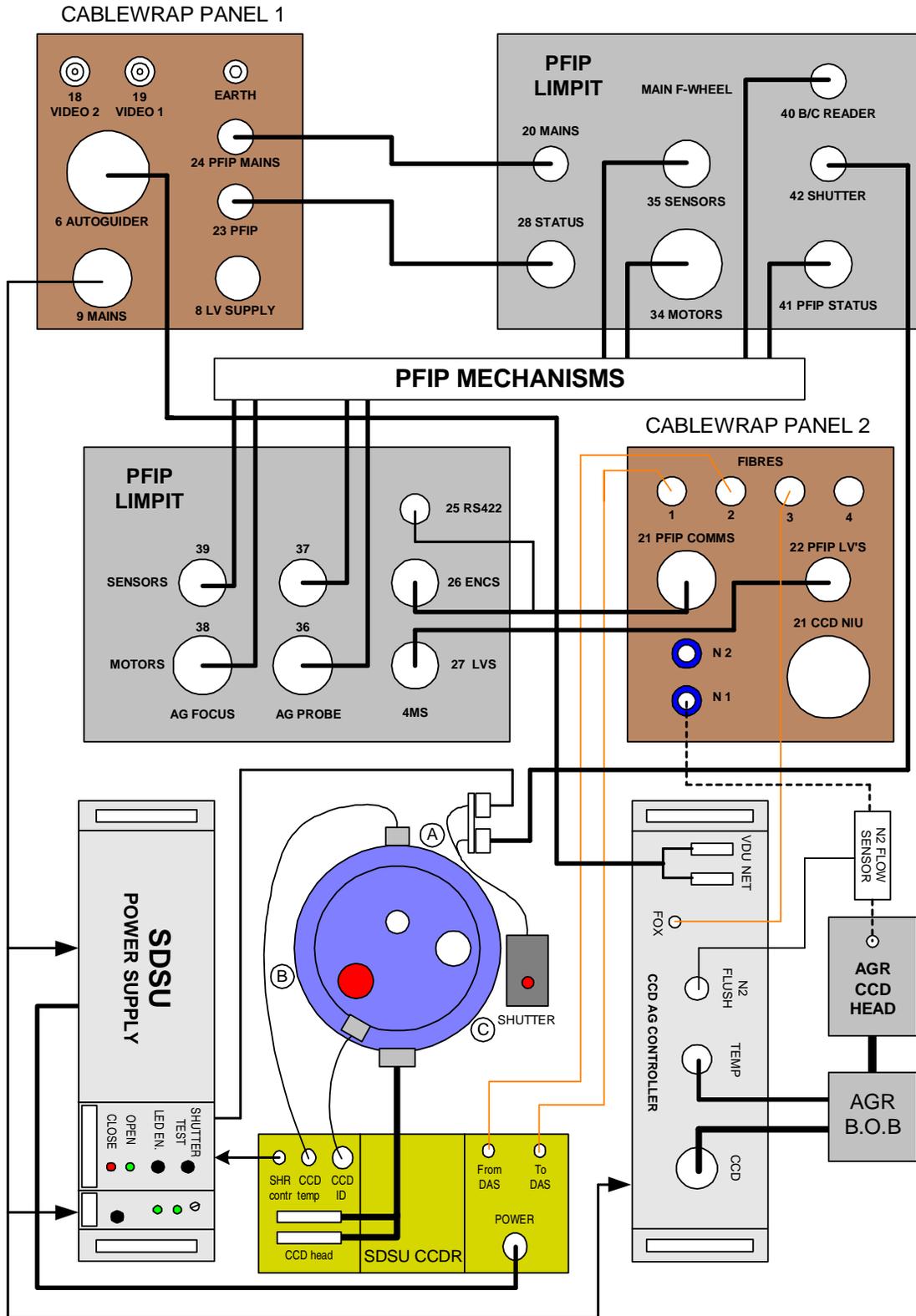


Temperature Connector

When attaching the bifurcated CCD cable to the camera make sure the controller is powered off and make sure you are grounded either through a wrist-strap or by holding the metal of PFIP. Unlike the Dutch CCD controllers, where a pre-amp remained permanently connected to the cryostat, the new system requires complete disconnection of the cryostat and the consequent temporary exposure of CCD signal pins in the open connector. One must be very careful not to touch these pins and to cap the connector with a shorting plug, when not in use. Once all cables are in place, the two power switches on the back of the PSU/Shutter Control rack can be switched on.

The fibre optics, one to receive commands from the Sparc, the other to send data should be connected to fibre ports 1 and 2. These are labelled , as are the ports on the back of the controller and in the control room.

PFIP, CCD AND AUTOGUIDER INTER-CONNECTIONS ejm 12/2/01 V1.0



FINAL CABLING UP

Note

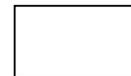
The swan neck and engineering cables are no longer required as broken cables in the cablewrap have been replaced.

30. The drawing on page 14 shows the remaining cabling needed between PFIP and the SDSU and autoguider controllers. This is self explanatory



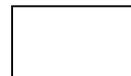
31. RACK MAINS SUPPLIES

Connect the dual mains lead to socket 9 on the PF turntable cable wrap connector panel and plug these into the mains sockets at the rear of the SDSU PSU and autoguider racks. Note that a mains supply is also required for the shutter PSU.

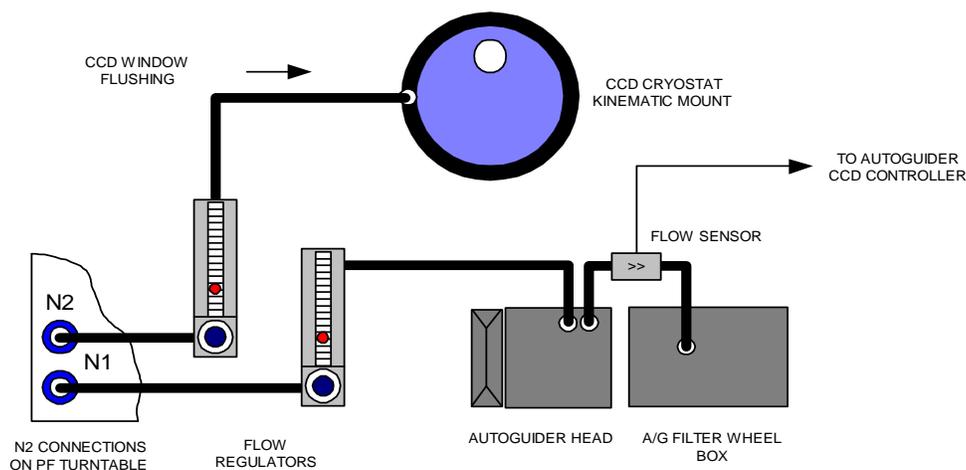


32. N² or DRY AIR SUPPLY

Connect up the autoguider and CCD dry air flushing pipes as shown in the diagram below. Make sure the flow sensor in the autoguider air line is fitted correctly with the >> in the direction of the flow. The gas vents from the filter wheel box.



DRY AIR CONNECTIONS FOR PFIP



34. FIBRE OPTIC CABLES IN THE CONTROL ROOM

The fibre optic cables from *lacerta* need to connect to the Prime focus TO and FROM SDSU fibre optic cables on the FO distribution tray in the end blue rack.

n.b. These will be found probably connected to either the UES or GHRIL fibre optic ports.

35. Re-check all connections for the CCD and autoguider controllers. When satisfied all is ok, switch on the crates. Make sure there is sufficient air flow to the autoguider head. This must be at least 5 Litres/minute.

WHT CONTROL ROOM ACTIVITIES

Note

The WHT observing system is running in Taurus.

PFIP Engineering Checks

36. ENGINEERING DISPLAY

Check that PFIP is communicating with the engineering PC.
To run the engineering terminal, use the RSview32 from PC PLC at the control room.



Check the ADC and PFIP mechanism with the Engineering Interface “RSview32”, The **Engineering** Interface is running in a SCADA software called **RSView32** and is possible to running it from the **PLC PC at WHT control room.**

Log ON to: PLCPC1 (this computer)

Username: whtobs

Password: The General WHT password

5a. Select the icon RSView32 Runtime called “Shortcut to eng_pifip_adc”:



If you have any problem to run this Shortcut, just reset the computer.

5.b Press Run Project. (Figure 4)

Figure 4

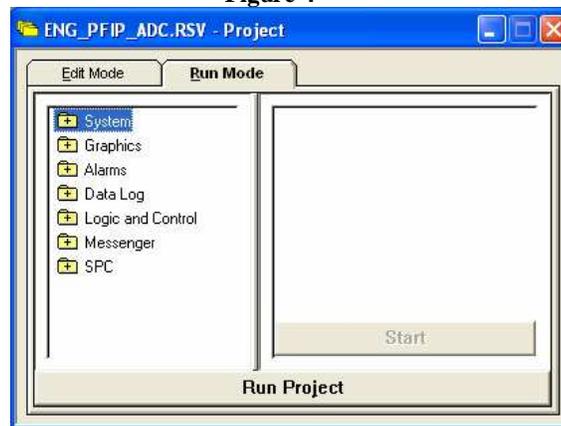


Figure 6 "Select Axis Control"



The first time, that the PLC is switch on we have to do the following TEST:

1. Find Home of all mechanisms
2. Move APY to 2000
3. Move APY to 15000
4. Move MFW to 4
5. Move MFW to 2
6. Move APX to 70000
7. Move APX to 40000
8. Move AFS to 5000
9. Move AFS to 11000
10. Move AFW to 3
11. Move AFW to 5
12. Move ADI to +300
13. Move ADI to -300
14. Move ADO to -300
15. Move ADO to 300

Engineering Interface Information:

Button EXIT; Exit from the Engineering Interface.

Button Stepper; Open window information about the stepper module, only for PLC engineering purposes.

Bringing Up the Observing System and TCS

37. Bring UP the TCS and then the observing system remember to configure the "configure file", with the right instrument.
If you have problems, how to start the observing system follow the link:
The PFIP User Guide
http://www.ing.iac.es/Astronomy/instruments/pfip/pfip_cookbook.html

38. Using the observer commands or the MIMIC move all the mechanism.
Information about how to use the observer commands, follow the link:

Solaris PFIP Control Software User Guide

<http://www.ing.iac.es/~docs/wht/pfip/wht-pfip-12/wht-pfip-12.pdf>

39. Check for un-initialised PFIP mechanisms

Ensure that the PFIP mimic shows the mechanisms are healthy (*green* status). If any mechanisms show *red* status then re-initialise them. Commands are :

- pfip_init -m ADO atmospheric dispersion corrector
- pfip_init -m ADI atmospheric dispersion corrector
- pfip_init -m APX autoguider X
- pfip_init -m APY autoguider Y
- pfip_init -m AFS autoguider focus
- pfip_init -m AFW autoguider filter wheel
- pfip_init -m MFW main CCD filter wheel

40. Checking out PFIP from ICS

On the ICS terminal, enter the following commands to test the autoguider probe movement, focus and the main filter wheel:

- agprobe 50000 15000 range X value = 0 to 110000 Y value = 0 to 20000
- agfocus 7400 range is 0 to 14100 microns
- pfilter 3 range is 1 to 7
- pfip_set -m ADC enable

By default when the system is started ADC correction is enabled.

Moving the telescope under computer control and changing the ELEVATION values will test the ADC. The upper and lower elements will adjust accordingly to compensate for air mass.

Note

Two small loudspeakers are positioned on the engineering console. There is one for PFIP the other for the ADC. Microphones mounted in the instrument pick up the sounds of moving mechanisms, so giving further confidence that all is well (or not).

It should also be noted that often a mechanism will change to **RED** on the ICL mimic and error messages saying that a *mechanism has un-expectedly moved*. This only happens with the LINEAR ENCODED mechanisms. These being the autoguider X and Y motions or the autoguider focus.

THIS IS NOT A REAL FAULT

It has been a 'feature' of the instrument since day one! It is caused by small variations to encoder values down at the millivolt level due to temperature changes of the LVDT's or perhaps noise generation from these devices. Simply moving (or initialising) the mechanism will clear the error. If an un-expected move really did occur, you would hear this over the loudspeakers.

41. Testing the Prime Focus Autoguider

- Enter FIELD to take an exposure. Make sure the display reads out.
- With low lights in the dome (just the mount lights are sufficient), enter: TV ON to make the autoguider continuously update. Check the mechanical Focus.
- Move the filters to position 1 (to 6) to test they are moving correctly and that the light level changes on the autoguider display as various filters are selected.

42. Take a test image with the 2EEV mosaic camera

- To take an image, enter at the SYS> prompt : bias pfip
- Wait until the CCD status monitor indicates that the CCD has been READ OUT and is idling. Make sure the image gets written (with TCS header information) to the Observing Log.
- To display the image, login as *whtguest* on the WHT Data Reduction SPARC (*lupus*).
- Open the programs menu by clicking on the background and start `xgterm` and `ximtool`
- In the `xgterm`, start an IRAF session using the command: `cl`
- Within IRAF, change to the `/obsdata` directory where the images are being stored. Note, a new 'date' directory is generated at 12:00 hrs daily.

e.g. `cd /obsdata/whtb/20010208`

Each image pair is contained in a single FITS file. To display the image from chip one, enter at the IRAF prompt:

```
display rxxxxxx[1] 1 fill+
```

To display the image from chip two

```
display rxxxxxx[2] 2 fill+
```

Where rxxxxxx = next sequential image number.

Both images can be displayed side by side by then selecting the 'tile frame' option on the ximtool menu GUI.

43. Examining the bias frame

- At the IRAF prompt, enter : imexam

Move the mouse into the area of the displayed frame and left click. Move the mouse around the image area, typing "m". This will produce statistics for a box containing 25 pixels centred on the mouse cursor.

Information on the expected bias levels of the two chips can be found at :
http://vela.ing.iac.es/Engineering/detectors/ultra_2eev.htm

To exit imexam, leave the mouse cursor over the image area and type "q".

INSTRUMENT CHANGED COMPLETED

CHANGE COMPLETE

Signature :

Date :

HAND-OVER TO SUPPORT ASTRONOMER

SET-UP COMPLETE

Signature :

Date :

