

# Operations at the La Silla 2.2 metres telescope

Rodolfo Angeloni

Paul Eigenthaler

paul.eigenthaler@icloud.com

Angela Hempel

ang.hmpl@gmail.com

Sam Kim

skim@astro.puc.cl

Iván Lacerna

Régis Lachaume

lachaume@astro.puc.cl

Markus Rabus

Since 2013, the operations at the La Silla 2.2 metres telescope involve minimal support by ESO. This guide intends to familiarise observers with the operations.

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# Contents

<b>List of Figures .....</b>	<b>9</b>
<b>List of Tables .....</b>	<b>11</b>
<b>List of procedures .....</b>	<b>13</b>
<b>1      Introduction .....</b>	<b>17</b>
1.1    Control room	17
1.2    Overview of operations	17
1.3    Security	18
1.4    Telescope building	19
<b>2      Early afternoon: daily start-up .....</b>	<b>23</b>
2.1    Outline	23
2.2    WFI startup	29
2.3    TCS startup	30
2.4    FEROS startup	31
2.5    GROND and FEROS AG	32
2.6    FEROS DRS	32

<b>2.7 Additional material</b>	<b>32</b>
2.7.1 Harmless error messages .....	32
2.7.2 Display settings .....	32
<b>3 Afternoon: Day-time calibrations .....</b>	<b>35</b>
<b>3.1 WFI</b>	<b>35</b>
<b>3.2 FEROS</b>	<b>36</b>
<b>3.3 GROND</b>	<b>37</b>
<b>4 Sunset: Getting ready .....</b>	<b>39</b>
<b>4.1 Opening</b>	<b>39</b>
<b>4.2 Telescope readying</b>	<b>39</b>
<b>4.3 Making the instruments ready (at sunset)</b>	<b>40</b>
<b>4.4 Refining the night plan</b>	<b>41</b>
<b>5 Twilight: On-sky calibrations .....</b>	<b>43</b>
<b>5.1 Outline</b>	<b>43</b>
<b>5.2 WFI</b>	<b>44</b>
5.2.1 Sky flats .....	44
5.2.2 Pointing .....	45
5.2.3 Focus .....	46
5.2.4 Standard fields (quick tips) .....	48
<b>5.3 FEROS</b>	<b>49</b>
5.3.1 Focus .....	49
5.3.2 Focus and spectrophotometric standard .....	49
5.3.3 Radial velocity standards .....	50
<b>5.4 GROND</b>	<b>50</b>
5.4.1 Sky flats .....	50
5.4.2 Focus .....	51
5.4.3 Photometric standard fields .....	51
5.4.4 RRM online .....	51

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<b>6</b>	<b>Night: Observing .....</b>	<b>53</b>
<b>6.1</b>	<b>WFI</b>	<b>53</b>
6.1.1	Popup handling .....	53
6.1.2	Switching to WFI .....	53
6.1.3	Refining acquisition .....	54
6.1.4	Guiding .....	55
<b>6.2</b>	<b>FEROS</b>	<b>58</b>
6.2.1	Switching to FEROS .....	58
6.2.2	Guiding .....	60
<b>6.3</b>	<b>GROND</b>	<b>63</b>
6.3.1	Switching to GROND .....	63
6.3.2	React to an automatic trigger .....	64
6.3.3	Guiding .....	65
<b>6.4</b>	<b>All instruments</b>	<b>65</b>
6.4.1	Run an observing block .....	65
6.4.2	Skip the preset .....	66
<b>7</b>	<b>Morning: Closing &amp; Calibrations .....</b>	<b>67</b>
<b>7.1</b>	<b>Panels referred to</b>	<b>67</b>
<b>7.2</b>	<b>Telescope</b>	<b>67</b>
<b>7.3</b>	<b>Instruments</b>	<b>68</b>
<b>7.4</b>	<b>Dome</b>	<b>68</b>
<b>7.5</b>	<b>Tidying folders</b>	<b>68</b>
<b>7.6</b>	<b>Health checks &amp; internal calibrations</b>	<b>69</b>
<b>8</b>	<b>Managing observing blocks .....</b>	<b>71</b>
<b>8.1</b>	<b>Transferring OBs from one's laptop</b>	<b>71</b>
8.1.1	Standard way .....	71
8.1.2	Loading manually .....	71
<b>8.2</b>	<b>OT</b>	<b>72</b>
<b>9</b>	<b>Software maintenance .....</b>	<b>73</b>
<b>9.1</b>	<b>Monthly</b>	<b>73</b>

<b>9.2</b>	<b>Every six months</b>	<b>74</b>
<b>10</b>	<b>Troubleshooting</b>	<b>75</b>
<b>10.1</b>	<b>No flux or little flux</b>	<b>75</b>
<b>10.2</b>	<b>Autoguider camera fails</b>	<b>75</b>
10.2.1	GROND .....	76
10.2.2	FEROS .....	76
10.2.3	WFI .....	77
<b>10.3</b>	<b>OB doesn't work</b>	<b>78</b>
10.3.1	OB gives an error when started .....	78
10.3.2	OB stalls before starting to observe .....	78
10.3.3	Crash before an exposure .....	78
10.3.4	Crash during an exposure .....	80
10.3.5	Crash during telescope offset .....	80
10.3.6	Crash during a telescope focus offset .....	80
10.3.7	Crash at the beginning of sky flats .....	81
10.3.8	Crash during filtre change in WFI .....	81
<b>10.4</b>	<b>Focus issues</b>	<b>81</b>
10.4.1	GROND autoguider defocused .....	81
10.4.2	Defocused wih FEROS ACS .....	81
10.4.3	WFI focus sequence fails with a timeout .....	81
10.4.4	No focus offset when filtres are changed .....	82
<b>10.5</b>	<b>FEROS ADC</b>	<b>82</b>
10.5.1	ADC cannot be put off .....	82
10.5.2	Telescope focus is not corrected when ADC enters .....	82
<b>10.6</b>	<b>FEROS-DRS</b>	<b>83</b>
10.6.1	FEROS exposure number is close to 10000 .....	83
10.6.2	FEROS DRS fails .....	83
10.6.3	Problems to restart the FEROS-DRS and data subscriber .....	83
10.6.4	Data won't show up .....	84
<b>10.7</b>	<b>Startup issues</b>	<b>85</b>
10.7.1	FEROS .....	85
10.7.2	WFI .....	85
10.7.3	Hydraulics cannot be switched on/off .....	86

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<b>10.8 TCS issues</b>	<b>86</b>
10.8.1 Start-up fails with 12p2cam error . . . . .	86
10.8.2 Start-up fails with telescope not initialised . . . . .	86
10.8.3 Quick TCS restart . . . . .	87
10.8.4 No connection with VME . . . . .	87
10.8.5 TCS is OFF on an instrument . . . . .	87
10.8.6 Telescope doesn't take focus orders . . . . .	88
10.8.7 TCS Setup panel is stuck . . . . .	88
10.8.8 Main mirror cover cannot be moved . . . . .	88
10.8.9 Dome doesn't move . . . . .	88
10.8.10 Dome slit and telescope are not aligned . . . . .	89
<b>10.9 GROND issues</b>	<b>89</b>
10.9.1 GROND M3 is stuck . . . . .	89
10.9.2 GROND OB only crashes with TCS on . . . . .	89
10.9.3 GROND IR exposure won't start . . . . .	90
<b>10.10 Freezing issues</b>	<b>90</b>
10.10.1 Mouse pointer does not move . . . . .	90
<b>10.11 Pointing issues</b>	<b>90</b>
10.11.1 Pointing is incorrect . . . . .	90
10.11.2 Telescope is stuck at low elevation . . . . .	91
<b>10.12 Web pages</b>	<b>91</b>
10.12.1 2.2m Environmental Monitor stuck . . . . .	91
10.12.2 All sky camera . . . . .	92
<b>10.13 ESO database issues</b>	<b>92</b>
<b>11 Main systems</b> . . . . .	<b>101</b>
<b>11.1 Telescope control software</b>	<b>101</b>
11.1.1 Manual preset . . . . .	102
11.1.2 Manual offset . . . . .	102
11.1.3 Autoguider . . . . .	102
<b>11.2 WFI</b>	<b>103</b>
<b>11.3 FEROS</b>	<b>103</b>
<b>11.4 GROND</b>	<b>103</b>
<b>11.5 P2PP and OT</b>	<b>103</b>

<b>11.6 FEROS reduction software</b>	<b>103</b>
<b>11.7 Dome controls</b>	<b>103</b>
<b>11.8 Computers</b>	<b>103</b>
<b>Glossary .....</b>	<b>121</b>



## List of Figures

1.1	Layout of the telescope controls . . . . .	17
1.2	Time flow of afternoon and twilight observations . . . . .	18
1.3	Entering the old control room in the telescope building . . . . .	20
1.4	Entering the computer room in the telescope building . . . . .	20
1.5	Entering the dome . . . . .	21
2.1	Time-flow of afternoon operations . . . . .	24
2.2	Wide field imager restart . . . . .	29
2.3	Telescope control software restart . . . . .	30
2.4	Fibre-fed Extended Range Optical Spectrograph (FEROS) restart. . . . .	31
2.5	Switching between GROND and FEROS guide cameras . . . . .	32
2.6	FEROS data reduction software (DRS) Disk Monitor to check free disk space. . . . .	32
2.7	Changing the date of the FEROS DRS. . . . .	33
2.8	Harmless error message of the TCS during WFI restart . . . . .	33
2.9	Harmless alarm display on WFI during TCS restart . . . . .	33
2.10	Correct sky orientation of the GROND displays . . . . .	34
5.1	Main steps in the focus sequence of WFI . . . . .	47
6.1	Refining the WFI acquisition . . . . .	54
6.2	Guide with WFI . . . . .	56
6.3	Fast guiding acquistion with WFI . . . . .	57
6.4	Window to set FEROS fibre reference position . . . . .	60

10.1 Rack with FEROS AG LCU . . . . .	93
10.2 Command scanei to control environments . . . . .	94
10.3 FEROS data subscriber. . . . .	95
10.4 Telemetry window. . . . .	95
10.5 WFI electronics: power cycle button and boards . . . . .	96
10.6 When TCS restart fails to reboot the FEROS autoguider (AG) LCU . . . . .	96
10.7 VME rack in the computer room of the telescope building . . . . .	97
10.8 Controlling the hydraulics and mirror cover. . . . .	97
10.9 Local control of the dome . . . . .	98
10.10Writing the M3 position in the database . . . . .	98
10.11The GROND M3 mirror and main cover control box. . . . .	99
10.12The GROND IRACE box . . . . .	99
10.13The “joystick” can be used to manually point the telescope. . . . .	100
11.1 Main panel of the telescope control software . . . . .	101
11.2 Setup panel of the telescope control software . . . . .	102
11.3 WFI autoguider . . . . .	103
11.4 Status window of the telescope control software . . . . .	104
11.5 Auxiliary functions of the telescope control software . . . . .	106
11.6 WFI ICS Control . . . . .	106
11.7 WFI state manager . . . . .	107
11.8 WFI General State panel . . . . .	108
11.9 FEROS control panel . . . . .	109
11.10FEROS instrument control software panel . . . . .	110
11.11The main displays of Gamma-Ray Burst Optical/Near-Infrared Detector (GROND). . . . .	111
11.12Control panels for the detectors. . . . .	111
11.13Dome Auxiliary Functions. . . . .	112
11.14dome webcam . . . . .	113



## List of Tables

10.1 Pointing model parameters for each instrument, as of November 2015. . . . .	91
11.1 Main workstations and users . . . . .	105
11.2 Common passwords. . . . .	105
11.3 Some useful reboots . . . . .	105





## List of procedures

2.1	Telescope and instrument startup . . . . .	23
3.1	WFI dome flat-fields . . . . .	35
3.2	FEROS afternoon calibrations . . . . .	36
4.1	Dome opening and telescope readying . . . . .	39
4.2	Telescope readying . . . . .	39
4.3	Making instrument ready . . . . .	40
5.1	Taking sky flats with WFI . . . . .	44
5.2	Ensure that pointing is correct using FEROS . . . . .	45
5.3	WFI pointing . . . . .	45
5.4	Focusing with WFI . . . . .	46
5.5	WFI photometric standard fields . . . . .	48
5.6	FEROS focusing . . . . .	49
5.7	Focus and/or spectrophotometric standard . . . . .	49
5.8	FEROS radial velocity standards . . . . .	50
5.9	GROND evening flat fields . . . . .	50
5.10	GROND standard field observation . . . . .	51
5.11	GROND morning flat fields . . . . .	51
6.1	Switch to WFI observations . . . . .	53
6.2	Refine the acquisition of WFI . . . . .	55
6.3	Guide with WFI . . . . .	55
6.4	Restart guiding with WFI . . . . .	57
6.5	Switch to FEROS observation . . . . .	58
6.6	Guide a FEROS observation using reflection on the fibre head . . . . .	60

6.7	Guide a FEROS observation blindly using off-fibre reference . . . . .	61
6.8	Guide a FEROS observation with the WFI guide camera . . . . .	62
6.9	Switch to GROND observations . . . . .	63
6.10	React to an automatic trigger . . . . .	64
6.11	Guide with GROND . . . . .	65
6.12	Skip the preset . . . . .	66
7.1	Close the dome . . . . .	67
7.2	Put the instruments offline . . . . .	68
7.3	Tidy folders . . . . .	69
7.4	Launch morning health checks and internal calibrations . . . . .	69
8.1	Transfer OBs from one's computer to the telescope, using p2pp check-in . . . . .	71
8.2	Transfer OBs from one's computer to the telescope, using manual file transfer. . . . .	71
9.1	Monthly software maintenance . . . . .	73
9.2	Monthly software maintenance . . . . .	74
10.1	Investigate and fix the reason for the absence of flux in an instrument . . . . .	75
10.2	Observe when the autoguider fails . . . . .	75
10.3	Restart the GROND autoguider . . . . .	76
10.4	Restart the FEROS autoguider . . . . .	76
10.5	Fix WFI autoguider issues . . . . .	77
10.6	Fix OB start error . . . . .	78
10.7	Fix stalling of an OB . . . . .	78
10.8	Investigate and fix a crash occurring before the start of an optical exposure . . . . .	78
10.9	Fix a crash during an exposure . . . . .	80
10.10	Fix a WFI filtre change crash . . . . .	81
10.11	Fix the WFI focus sequence timeout . . . . .	81
10.12	Remove the ADC from the optical path of FEROS . . . . .	82
10.13	Fix the absence of focusing after FEROS ADC enters . . . . .	82
10.14	Reset the exposure number . . . . .	83
10.15	Fix a FEROS exposure number going above 10 000 . . . . .	83
10.16	Restart the FEROS data reduction software and data subscriber . . . . .	83
10.17	Restart the data handler. . . . .	84
10.18	Restart environment . . . . .	85
10.19	Activate FEROS or WFI telemetry . . . . .	85
10.20	Fix WFI init error . . . . .	85
10.21	Set the hydraulics for remote control . . . . .	86
10.22	Fix FEROS AG LCU during start-up . . . . .	86
10.23	Fix the telescope not initialized popup . . . . .	86

10.24Quick TCS restart . . . . .	87
10.25Solve the connection issue with the VME . . . . .	87
10.26Fix telescope focus issues . . . . .	88
10.27Unstuck the TCS Setup panel . . . . .	88
10.28Manually close the main mirror cover . . . . .	88
10.29Set the dome for remote control . . . . .	88
10.30Unlocking the grond M3 mirror . . . . .	89
10.31Fix GROND OB crash with TCS on . . . . .	89
10.32Deep reset of GROND IRACE (verify this!) . . . . .	90
10.33Recover the mouse pointer . . . . .	90
10.34Fix WFI pointing issues. . . . .	90
10.35Preset manually to zenith. . . . .	91
10.36Restart the 2.2m environmental monitor . . . . .	91
10.37Data do not appear in the database . . . . .	92





# 1 — Introduction

The operational scheme at the La Silla 2.2 metres telescope involves minimal support by ESO. This guide intends to familiarise observers with the operations.

## 1.1 Control room

First of all, the [control room](#), is located below the main ESO building, the one with the dining room. It is still shared with the two ESO telescopes, the NTT and the 3.6 m. If everything works without technical issue, you can do everything from there without any need to access the telescope building.

Figure. 1.1, p. 17 below shows the layout of the different components of the controls. Screens, keyboards, and mice are labeled to avoid confusion.

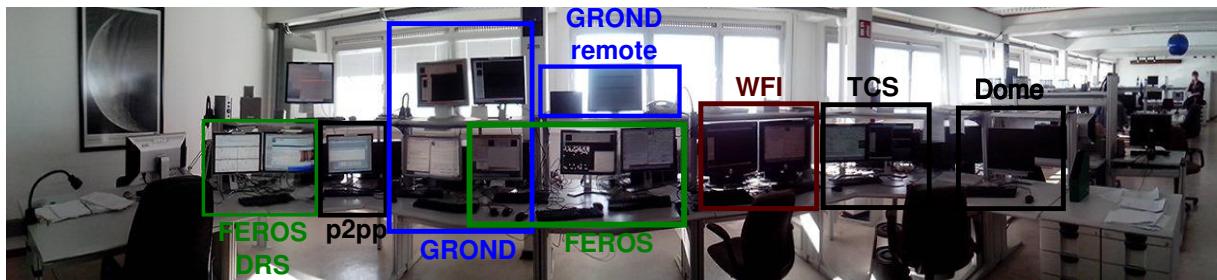


Figure 1.1: Layout of the telescope controls. From right to left: [Windows desktop](#) controlling and monitoring the [dome](#), [telescope control software](#), [WFI](#) controls, [FEROS](#) controls (bottom) and skype laptop connected to the [GROND](#) remote observers (top), [GROND](#) controls, machine where s are crafted and loaded by the visiting astronomer, and, finally, the [FEROS](#) [data reduction software](#).

## 1.2 Overview of operations

In most nights, a support astronomer is present in the afternoon and the first part of the night, freeing the [visitor](#) of the afternoon and evening twilight calibration duties. Sometimes visitors are asked to perform all duties alone. In that case, an experienced observer can start operations 2.5 hours before sunset to minimise

working time, while giving a small time buffer to solve the commonest technical issues. Inexperienced ones should plan to start earlier or accept possible downtime in the very beginning of the night. Figure 1.2, p. 18 shows a time-optimised chart of operations in the afternoon and both twilights.

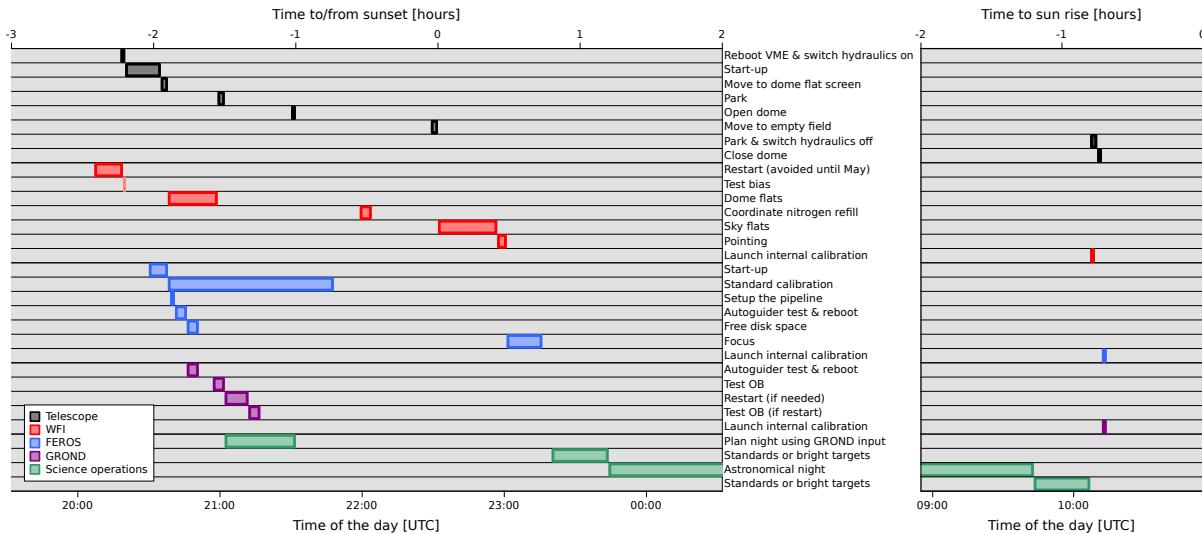


Figure 1.2: Time flow of operations in the afternoon and twilights. Afternoon setup and calibrations should be started at least 2.5 hours before sunset to leave a small buffer for technical issues. This example is giving for a late fall night (May 15th), with presence required for about 15 hours.

Support astronomers perform or help to perform observations in [service](#) mode for the follow-up of gamma-ray bursts and transients (15% of time as of 2019) and time-domain programmes (15% of time as of 2019). They ensure that [visitors](#) correctly share their time with these other programmes. In addition, during [Max-Planck Institut für Astronomie. \(MPIA\)](#) time, they also have they monitor the different MPIA programmes and ensure they are observed according to their priority and weather conditions. It includes real-time assessment and decisions, guided by the instructions of the different PIs, in particular during service mode. During [Max-Planck Institute for extraterrestrial Physics. \(MPE\)](#) and Chilean time, they are mostly supporting observations and are not expecting to take real-time decisions concerning these programmes. If service mode for MPE or Chile is offered, it is more similar to a “delegated visitor” mode where instructions by the PI are expected.

When no [service](#) astronomer is present (e.g. last part of the night), visiting astronomers will be asked to perform service observations for other groups, both for the follow-up of gamma-ray bursts and time-domain programmes. The number of allocated nights for [visitors](#) takes the average time loss into account, in case more down time, compensation will be considered in service mode. Since 2017, a long-term monitoring of quasi-stellar objects takes 1.5 to 2 hours daily, and targets of opportunity about 1 hour (15% long-term average). [MPIA](#) observers may be ask for additional [service](#) observations for the MPIA.

Chapters 2–6 can be seen as a step-by-step guide of the operations from the daily startup to the night time. Many of the steps need some knowledge of the [OB](#) management and of the [bob](#) interface, which are presented in Chapter 8. Chapter 9 details monthly preventive software maintenance. Chapter 10 lists fixes to common issues at the telescope. We present the software components more in detail in Chapter 11.

### 1.3 Security

The main guidelines to avoid bodily harm are:

- Don’t move the telescope or [dome](#) before checking no one is in the way. During the day, ESO

technicians may address some issues or refill the instrument with nitrogen. If you operate from the remote [control room](#), check the dome [dome webcam](#).

- If you need to go to the [dome](#), leave a conspicuous message in the [control room](#) and put the telescope in local control from the [computer room](#) of the telescope building.
- If you drive by night, go very slowly and defensively as you may not see a pedestrian or a dark donkey.
- If you walk, take the incoming traffic side and be very careful at night. Drivers don't use lights.

ESO has the duty to ensure telescope safety but you have to be proactive, too. In particular:

- If you are not able to close when you must (sunrise and inclement weather), you need to ask to the operators present at the NTT or the 3.6m. They have the duty to assist.
- The weather officer or the NTT operator will tell you when you need to close and when you may reopen, stick to it.
- If you have any doubts whether you may open in the afternoon, wait for the NTT to open or ask the ESO day-time operator.
- If the meteo monitor shows that the closing limits are reached (wind, humidity, clouds), close.
- If a sea of clouds below the observatory was present at sunset, be attentive as it is common for them to raise and increase humidity to 100% within minutes.

## 1.4 Telescope building

It is sometimes necessary to physically access the telescope building where there is an old control room (Fig. 1.3, p. 20), a [computer room](#) to physically access some relevant workstations (Fig. 1.4, p. 20), the FEROS room, and, obviously, the [dome](#) (Fig. 1.5, p. 21).

Some subsystems are controlled by machines gathered in big rack towers, these machines are called [LCU](#) or sometimes [VME](#). There are also workstations controlling coordinating with one or more LCUs, they look like a normal desktop computer tower usually with no screen or keyboard.

In the [dome](#) itself, many electronic boxes attached at the telescope (see Fig. 1.5, p. 21) may need a [power cycle](#), that is being switched off and on. It is also possible to locally take control of telescope, dome, and mirror motion.



Figure 1.3: Entering the old control room in the telescope building



Figure 1.4: Entering the [computer room](#) in the telescope building. In front slightly to the left is the **VME** rack.



Figure 1.5: Entering the **dome**, from left to right: the **ADAM** controls, a computer to use the **TCS**, the dome controls, the bottom of the telescope.





## 2 — Early afternoon: daily start-up

Start-up should take about one hour, but small technical issues can lengthen it significantly. Ideally, it should be done early enough in the afternoon (2–3 pm in Winter, 3–4 pm in Summer), so that [dome flat fields](#) can be done before the nitrogen of [wide-field imager \(WFI\)](#) is refilled. Also, complicated issues should be diagnosed early, so that you benefit from the day-time support from ESO engineers. Night time support is not provided except for emergencies.

For an experienced observer alone in Winter, a later start-up can be done by optimising and hoping for the best (see Fig. 2.1, p. 24), but the risk is to lack time to perform [dome flat fields](#) and/or losing the very beginning of the night to technical issues.

The [TCS](#) and the [WFI](#) are entangled. In particular, the [WFI instrument control software \(ICS\)](#) controls the [focus](#) and [pointing](#), and the [TCS](#) controls the [WFI AG](#). For this reason, the [WFI](#) should be rebooted before the [TCS](#). The other instruments, [GROND](#) and [FEROS](#), are more independent and need a later restart. Also, the [FEROS](#) and [GROND AG](#) should be checked and the [FEROS DRS](#) set to the right date.

### 2.1 Outline

To be on the safe side, the start-up sequence shall be performed in this order below. To gain a bit more time one can do [B1–B2](#) during [A1–A5](#) and [B5a–B7a](#) during [A8–A10](#). [FEROS](#), [GROND](#), the [autoguider](#) and the [data reduction software \(C, D, E, F1\)](#) can be handled in parallel as soon as the [TCS](#) is booted ([B7a](#)).

If under time pressure, you can also do some day-time calibrations in parallel. Figure. 2.1, p. 24 gives a time-optimised flow of the day-time start-up and calibrations, showing what can be done in parallel. It should be started latest 2.5 hours before sunset.

#### Procedure 2.1. Telescope and instrument startup

##### A. [WFI restart \(8 min, in case of problems, see Fig. 2.2, p. 29\)](#)

- A1. On the screen BOB Wide Field Imager, go to the StartUp [virtual desktop](#).
- A2. In a terminal, `osf2p2StartUp ini WFI F8`, where ini is your initials (Fig. 2.2(a), p. 29).
- A3. On the dialog, choose DAILY startup (Fig. 2.2(b), p. 29).
- A4. Click START on the appearing window (ESO220 WEEKLY FULL STARTUP, see Fig. 2.2(c), p. 29).

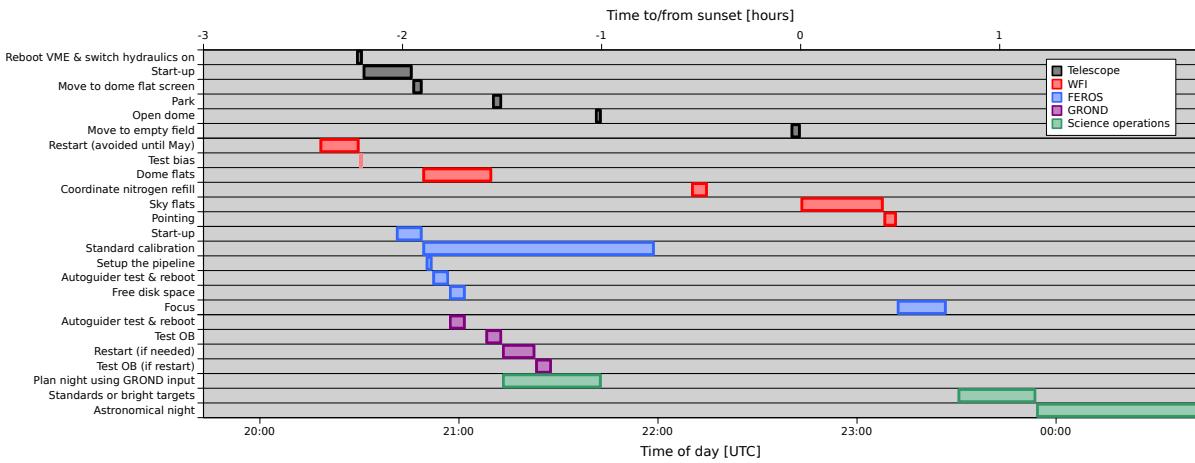


Figure 2.1: Operations time flow in the evening, doing start-up, calibrations, and tests in parallel. It should start latest 2.5 hours before sunset (see horizontal axis at the top). The time of the day, given in universal time on the bottom horizontal axis, corresponds to a date close to fall equinox (September 15th).

- A5. Wait until the start-up window says **SCRIPT finished** (about 11 minutes).
  - A black text window gives indication on the process (Fig. 2.2(d), p. 29)
- A6. Close the startup window (Fig. 2.2(c), p. 29)
- A7. Close the emerging PDF (Fig. 2.2(e), p. 29).
- A8. Rearrange windows to the corresponding **virtual desktops** (1 min, see Fig. 2.2(f), p. 29)
  - **rtd** goes to all **virtual desktops**, on the left screen.
  - other windows go to the **virtual desktop** bearing their name, on the right screen.
- A9. Wait for the filtre wheel to be set to a specific filtre (1–2 min)
  - a. Locate the **Filter** field on the **WFI General State** panel
  - b. If it stays in **MOVING** for more than 2 minutes or you skipped full restart, reset filtre wheel (Procedure 10.10, p. 81).
- A10. In **bob**, execute **testOB.oob** (1 min)
  - a. Import it with window menu **File**→**Load OBs**→**From file...**
  - b. Click the **Start** button.
- B. TCS restart (18 min, daily, see Fig. 2.3, p. 30)**
- B1. Switch hydraulics and drives on
  - a. Go to web browser on screen **Dome webcam & hydraulics** (Fig. 2.3(a), p. 30).
  - b. Find the **Dome Auxiliary Functions** (tab called **ADAM 6000...**)  
If it is not there, open it with the bookmark **Dome controls**.  
Use the good seeing password if necessary.
  - c. Click **HydOn**, then button **Hydr** goes green.
  - d. Click **DrivesOn**, then button **Drives** goes green.

It may be needed to click two or three times to get green buttons.
- B2. On the screen **Telescope Control Software**, go the the **StartUp virtual desktop**.
- B3. If Cannot read "@w2p2wfi..." pop-up can be seen on the **TCS** screen (Fig. 2.3(b), p. 30), click **OK**.
- B4. In a terminal type **lccBoot lte2p2** and wait for command to end (2 min, Fig. 2.3(c), p. 30)  
If none is there, you can open one with left-click mouse menu **TCS User**→**tcs xterm**.  
If an error message appears on the **WFI** screen, click **OK**.
- B5. Launch the start-up script
  - a. In the terminal type **osf2p2StartUp ini ALL F8**, with **ini** = your initials. (Fig. 2.3(d),

p. 30)

Make sure WFI is fully booted (A5) before going on with the TCS start-up.

- b. Click START on the appearing startup window titled ES0220 DAILY STARTUP (Fig. 2.3(e), p. 30)

#### B6. Be proactive to handle some appearing pop-ups (14 min)

- a. One asking to check hydraulics and telescope is parked among other things (Fig. 2.3(f), p. 30).

Take your time to check each point and then click OK

- b. One asking to switch on flat-field lamp (Fig. 2.3(g), p. 30)

Lamp should be on, check no one is in the dome, then click OK.

If it's off, on FAUX functions panel select 200V under FLAT FIELD LAMP

Then, telescope will do movement checks you can monitor on the webcam.

- c. One asks to check for CCD alarms to be enabled (Fig. 2.3(h), p. 30)

Go to the large, black text window where all numbers below the two A1 Enab should be ones.

- d. One asks to check that the flat-field lamp is off and telemetry active.

- (i) If flat-field lamp is on, turn it off unless you will do dome flat fields.

On FAUX functions panel select OFF under FLAT FIELD LAMP

- (ii) On the Telemetry panel, ensure that the FEROS telemetry module is active

If not, activate it on the FEROS screen using fcdTelemetry (see Procedure 10.19, p. 85)

- (iii) On the Telemetry panel, ensure that the WFI telemetry module is active

If not, activate it on the WFI screen using fcdTelemetry (see Procedure 10.19, p. 85)

- (iv) If a telemetry was restarted, panel must be closed and reopened (see Procedure 10.19, p. 85)

#### B7. Perform some post-start-up tidying

- a. Make sure the start-up window indicates SCRIPT finished.

- b. Close startup window.

- c. Close emerging PDF.

- d. Rearrange windows to the corresponding virtual desktops (1 min)

- **skycat** go to all virtual desktops, on the right screen.
  - Other windows go to the virtual desktop bearing their name, on the left screen.
  - Ignore window CSS ALARM DISPLAY (Fig. 2.9, p. 33) if it pops up on the WFI screen.

#### B8. Check and set up the WFI AG (1 min)

- a. Go to the TCS Control Panel

- b. Under AG Field Acquisition, click Retrieve Field

- c. Under Autoguider look that CCD Stat goes to Pending and integrating (10–15 s)

- d. Check that an image is read out on the **skycat** window (30 s)

- e. Select window menu View→Autoscale

- f. If steps B8c–B8d do not work, see Procedure 10.5, p. 77.

- g. On the **skycat** window, use window menu TCS→Pick Reference Star...

- h. On emerging window (title Pick Reference Star), click Cancel Operation

#### B9. Ensure that the pointing model is correct (1 min).

- a. Check that the sidereal time is correct.

Compare the TCS Control Panel and the wall clock

- b. Select WFI pointing model.

- (i) On the TCS Status Panel, use window menu Instrument selection→WFI

- (ii) On the emerging popup select Continue
- c. Check the **pointing model** parameters are non zero
  - (i) Locate the **TCS Setup Panel**
  - (ii) Look values of ID, IH, and CH under Pointing Model Data
  - d. If they are zero, fix the **pointing model**.
    - (i) Locate or open a tcs terminal
    - (ii) Type `~/bin/fixPointing.sh` and wait for command to return (15 s)
    - (iii) Redo steps **B9b–B9c**

### C. FEROS restart (daily, 8–9 min, see Fig. 2.4, p. 31).

Only start after **TCS** is back online and doing telescope movements (**B6b**).

Under time pressure, you can skip points **C1–C4**, accepting an increased risk of night-time issues.

C1. On the screen FEROS BOB, go the the StartUp **virtual desktop**.

C2. Launch the weekly full start-up script (2 min)

- a. In a terminal type `osf2p2StartUp ini` FEROS F8, where ini is your initials. (Fig. 2.4(a), p. 31)
  - If none is available, use left-click mouse menu FEROS User→feros xterm.
- b. Click FULL on popup Select StartUp Type (Fig. 2.4(b), p. 31)
- c. Click START on the start-up window ES0220 WEEKLY FULL STARTUP (Fig. 2.4(c), p. 31).
  - A black text window should appear and give indications on the progress. (Fig. 2.4(d), p. 31)
- d. Wait for the weekly full start-up to indicate finished and close it (2 min)
  - (i) Close ES0220 WEEKLY FULL STARTUP when it says SCRIPT finished
  - (ii) Close the emerging PDF

C3. Perform the instrument start-up (4 min)

- a. Locate the Instrument Startup window and click START (Fig. 2.4(e), p. 31).
- b. A large, grey window giving details on the process should open.
  - If a timeout error occurs, see Sect. 10.7.1, p. 85.
- c. Wait for the large, grey window to close itself (3 min)
- d. Put the instrument online (1 min)
  - (i) On FEROS General State panel, use window menu Instrument→ONLINE
  - (ii) Wait for State to indicate ONLINE

C4. Rearrange windows to the corresponding **virtual desktops** (1 min, see Fig. 2.4(f), p. 31)

- **rtd** goes to all **virtual desktops**, on the left screen.
- Other windows go to the **virtual desktop** bearing their names, on the right screen.
- There are two **rtds** and two **logMonitors**, you can close one of each.

C5. Perform a test **OB** with telescope communication (1–2 min)

- a. On FEROS General State panel, select window menu Telescope→ENABLE
- b. In **bob**, run `testOB.oob` (1–2 min)
  - (i) Fetch it with window menu File→Load OBs→From file...(/OBD/Templates/).
  - (ii) Click Start
  - (iii) Wait for the exposure to finish (takes about 1 min).
  - (iv) If points **C1–C4** were skipped, it will fail on the first attempt and proceed.
  - (v) Click OK on the error popups, one should say `error closing w2p2cam`
  - (vi) In **bob**, click on Reset status
  - (vii) Re-run it (point **C5bii**).
- c. FEROS General State panel, select window menu Telescope→IGNORE

### D. GROND restart (daily, 5–11 min)

D1. Go to screen GROND BOB.

D2. Locate or open a terminal with user `grondmgr`.

- You can use left-click mouse menu GROND user→grondmgr on `wgrond`
- D3. In the case of a power cut or issues with GROND, restart the instrument (5 min)
- Type `grinsStop`, wait for shutdown window to finish and disappear.
  - Type `grinsStart` and click Continue on the pop-up.
  - Wait for startup window to finish and disappear (a few minutes).  
If an error about “reply timed out” appears, then close the startup window and repeat from D3a.
  - Rearrange windows.
  - Use window menu Instrument→ONLINE in the GROND control panel (Fig. 11.11(b), p. 111).
- D4. Do some preventive reinitialisations (1.5 min)
- Close `bob`.
  - Launch `bob` from the terminal as user grondmgr (type `bob &`).
  - In the same terminal, execute `grondGRI`.
  - In the same terminal, execute `grondSHUTTER && grondFM` (might take 1 min).
- D5. From `bob`, execute the test OB `testOB.oob`, see Fig. 11.11(a), p. 111 (1 min)
- Ensure TCS is OFF (red button) by clicking TCS OFF.
  - Fetch OB with window menu File→Load OBs→From file...
  - Click Start.
- D6. Repeat the last step using communication with the TCS (2 min)
- Ensure TCS is ON (green button) by clicking TCS ON.
  - Fetch OB with window menu File→Load OBs→From file....
  - Click Start.
  - If you haven't done the full start-up, the first attempt should fail, you need to
    - Click OK on the error popups, one should say error closing `w2p2cam`
    - Wait for the exposure to finish
    - In `bob`, click on Reset status
    - Click on start again.
    - If error persists, close `bob` and open it again
  - Set telescope back to FEROS/WFI (0.5 min)  
In a terminal type, `grondM3 WFI && grondMC CLOSE && grondCS CLOSE`.
- D7. If a restart (point D3c) was done, set the image displays (1 min).
- Go to the GROND optical (FIERA) screen.
  - Find the `rtd` window (griz images).
  - Check that image is flipped along both axes and rotated (see Fig. 2.10(a), p. 34).
  - Go to the GROND infrared (IRACE) screen.
  - Find the `irtd` window (JHK images).
  - Check that images are received live.  
The left column should have a green button with text Stop (see Fig. 2.10(b), p. 34).  
If it is gray with text Start, click it so that it gets as described above.
  - Check that the image is horizontally flipped (see Fig. 2.10(b), p. 34).
  - Check that the image has positive pixel values  
Find menu option Negative real time image
- E. FEROS and GROND guide cameras setup (3–8 min)**
- Go to the Autoguider GROND & FEROS screen.
  - Rearrange windows to their corresponding virtual desktops (1 min)  
`Autoguiding` window should go to all virtual desktops.
  - Use numbers 6, 3, 0.02 below Autoguider control and click Apply.
  - Check the GROND autoguider (1–4 min)

- a. Go to **virtual desktop** GROND AG
- b. Select GROND below CCD change (see Fig. 2.5, p. 32)
- c. If necessary, use Start exposure to change CCD Status to Infinite loop
- d. Find window **Telescope R.T.D**
- e. Use window menu TCS→Attach camera
- f. A bias image should be seen within seconds
- g. If it fails in the previous steps, go to Procedure 10.3, p. 76 (3 min)
- h. Use window menu TCS→Pick Reference Star
  - i. On emerging window **Pick Reference Star**, click Cancel operation
- E5. Check the **FEROS** autoguider (1–4 min)
  - a. Go to **virtual desktop** FEROS AG
  - b. Select FEROS below CCD change (see Fig. 2.5, p. 32)
  - c. If necessary, use Start exposure to change CCD Status to Infinite loop
  - d. Find window **FEROS AG Real Time Display**
  - e. Click checkbox Camera on/off so that checkbox gets green
  - f. A bias image should be seen within seconds
  - g. Check that the image is horizontally flipped.
  - h. If it fails in the previous steps, go to Procedure 10.4, p. 76 (3 min)
    - i. Click Set Reference
    - j. On emerging window **Pick Reference Star**, click Cancel
- F. **FEROS data reduction software setup** (2–5 min)
  - F1. Change the date (1 min)
    - a. Go to the DRS:main **virtual desktop** of screen FEROS pipeline
    - b. Locate or open FEROS DRS window
      - It opens with left-click left-click mouse menu FEROS User→FEROS DRS
    - c. Stop the Reduce Queued Image Status
    - d. Stop the Midas Session Status
    - e. Change the date
    - f. Start the Midas Session Status
    - g. Start the Reduce Queued Image Status
  - F2. Free disk space (1–4 min)
    - a. Go to Visitor **virtual desktop** of screen FEROS pipeline
    - b. Use or open a terminal
    - c. If df -h /data indicates more than 80% disk usage, proceed
    - d. Delete the oldest nights in /data/raw, /data/reduced, and /data/reduced/FEROS
      - Leave at least the last three nights.
    - Example: rm -rf /data/reduced/2018-01-\* /data/reduced/FEROS/2018-01-\*
- G. **Afternoon calibrations can be done right after start-up** (see Chapter 3, p. 35)
  - **WFI dome flat fields** may be done in parallel starting from point B6b
  - **FEROS** standard calibration may be done in parallel starting from point D

## 2.2 WFI startup

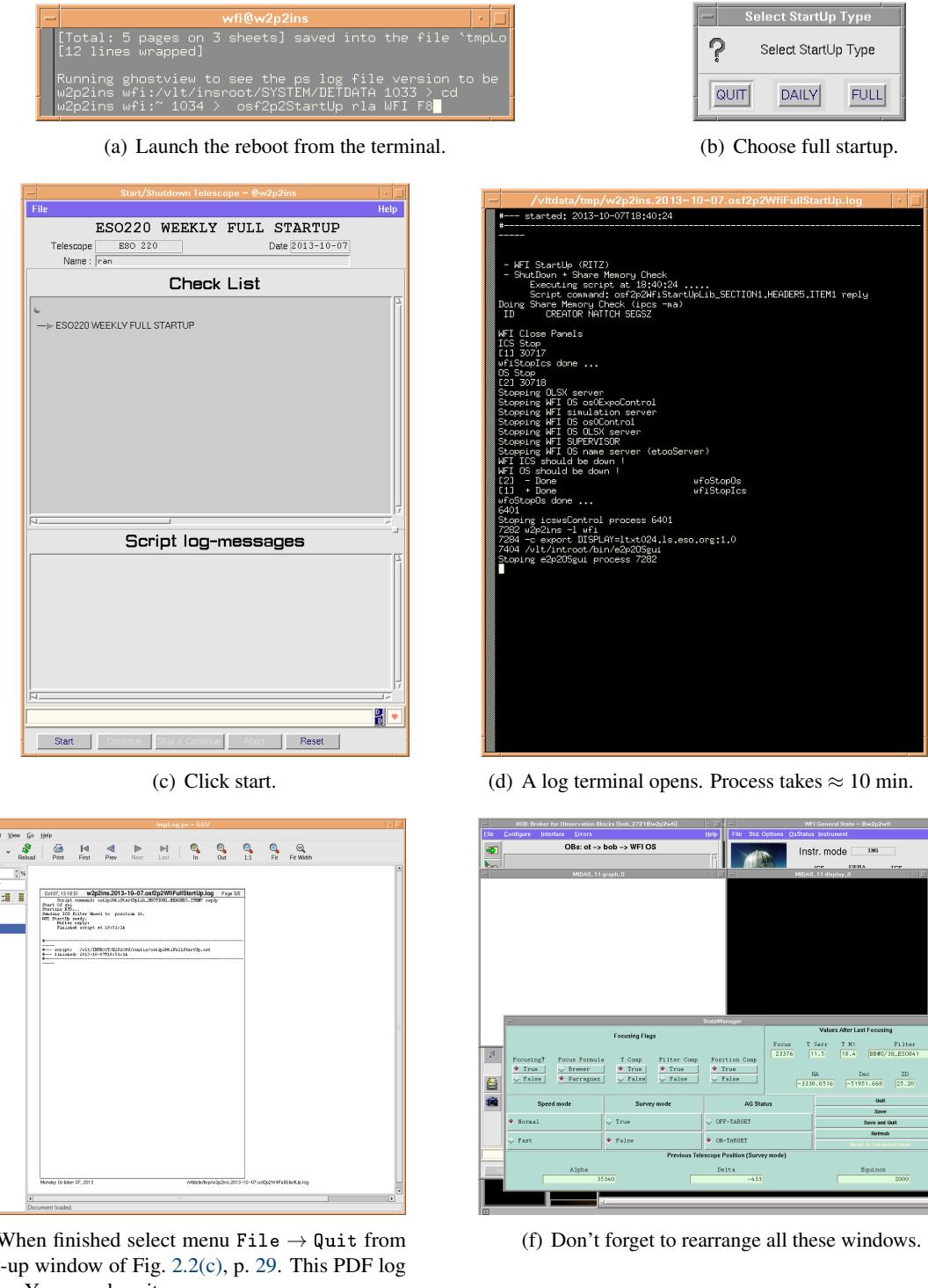
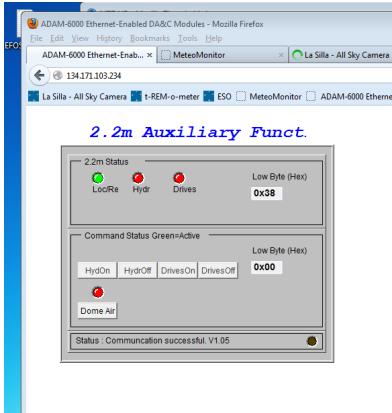


Figure 2.2: WFI restart. When done, don't forget to take a test bias.

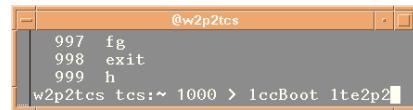
### 2.3 TCS startup



(a) Turn hydraulics and drives on, Windows desktop.



(b) On the TCS machine, give OK to this error.



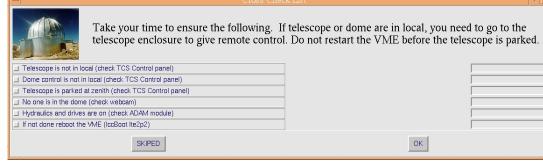
(c) Reboot `1te2p2` machine.



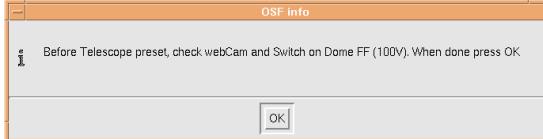
(d) Launch the reboot from the terminal.



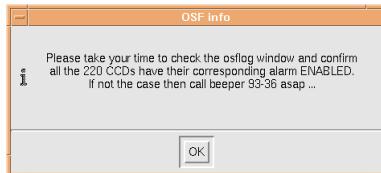
(e) Click start.



(f) Check elements then click OK to incoming pop-up.



(g) Check flat lamp is on or switch it on. After clicking OK, telescope should move.



(h) Check that CCD alarms are on in the black text window.



(i) Check flat field lamp is off, if not, turn it off

Figure 2.3: TCS restart. As for WFI there is a black terminal log (and process ends with a PDF log being popped up. Emergent windows should be rearranged to their respective virtual desktops. The `rtd` display should go to all desktops on the left screen, the other windows n the right screen.

## 2.4 FEROS startup

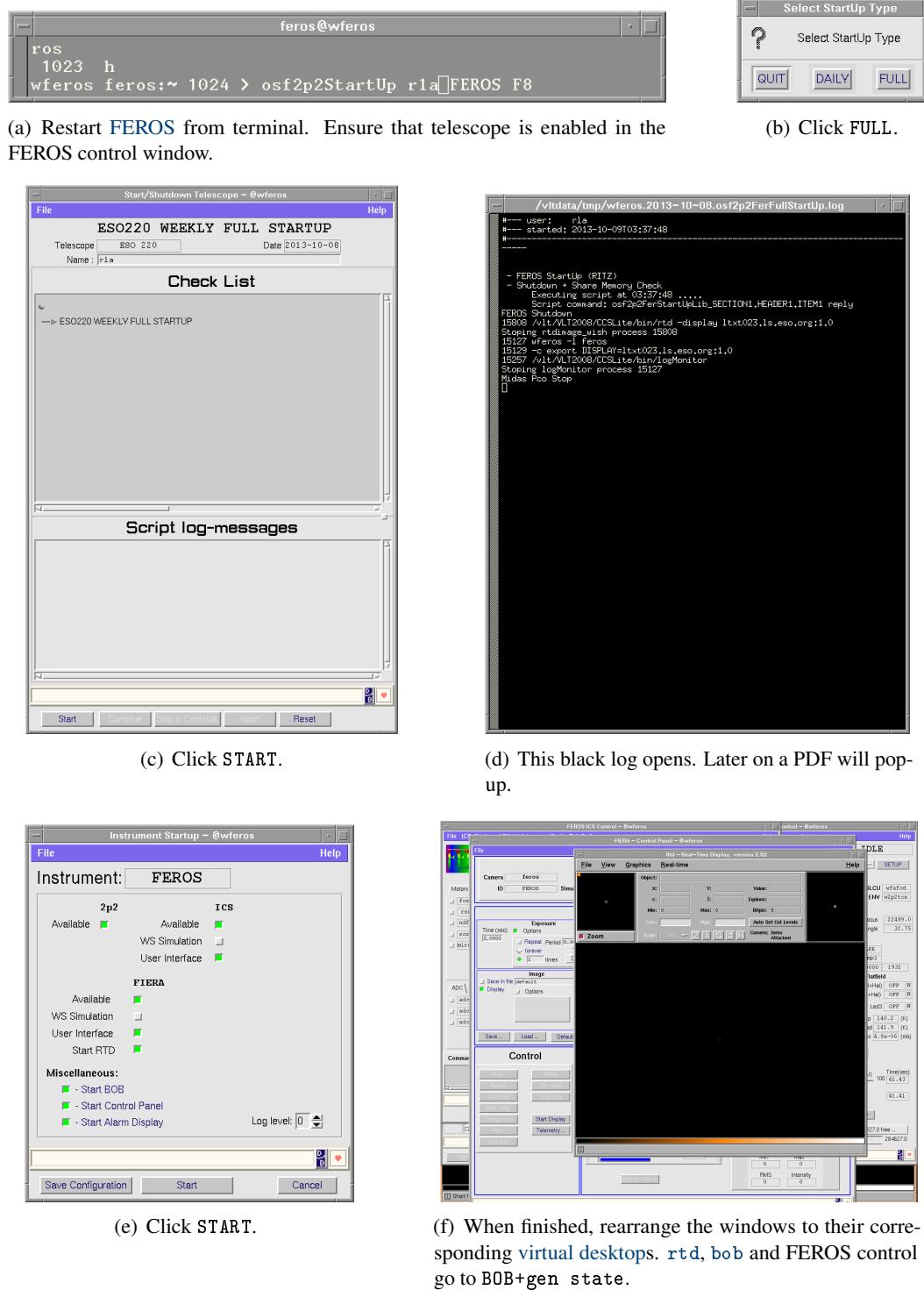


Figure 2.4: FEROS restart.

## 2.5 GROND and FEROS AG

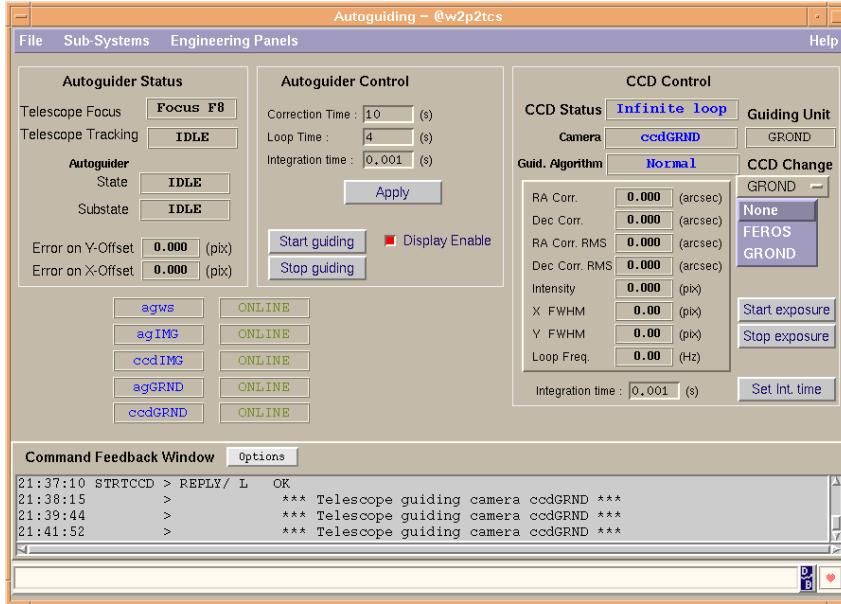


Figure 2.5: Switching between **GROND** and **FEROS** guide camera.

Check that the **GROND** and **FEROS** guide cameras work by switching between them on the **AG** window (see Fig. 2.5, p. 32). The switching should set the camera in CCD status Infinite loop. It may be necessary to click on Start exposure after switching to obtain this status. If status is Fail, the camera must be restarted (see Sect. 10.2, p. 75).

## 2.6 FEROS DRS



Figure 2.6: **FEROS DRS** Disk Monitor to check free disk space.

The **FEROS DRS** should be set to process the data of the current night. In the process the **MIDAS** session (with its characteristic blue window) is closed and reopened.

## 2.7 Additional material

### 2.7.1 Harmless error messages

### 2.7.2 Display settings

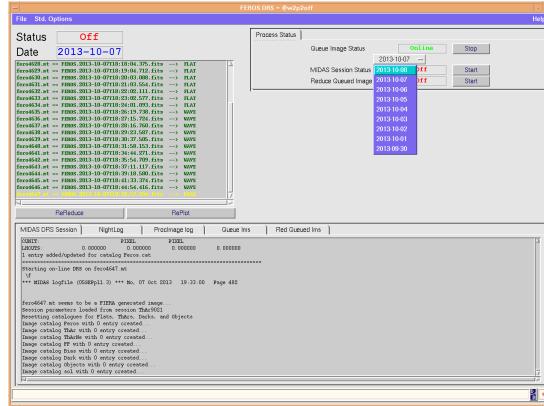


Figure 2.7: Changing the date of the FEROS DRS.

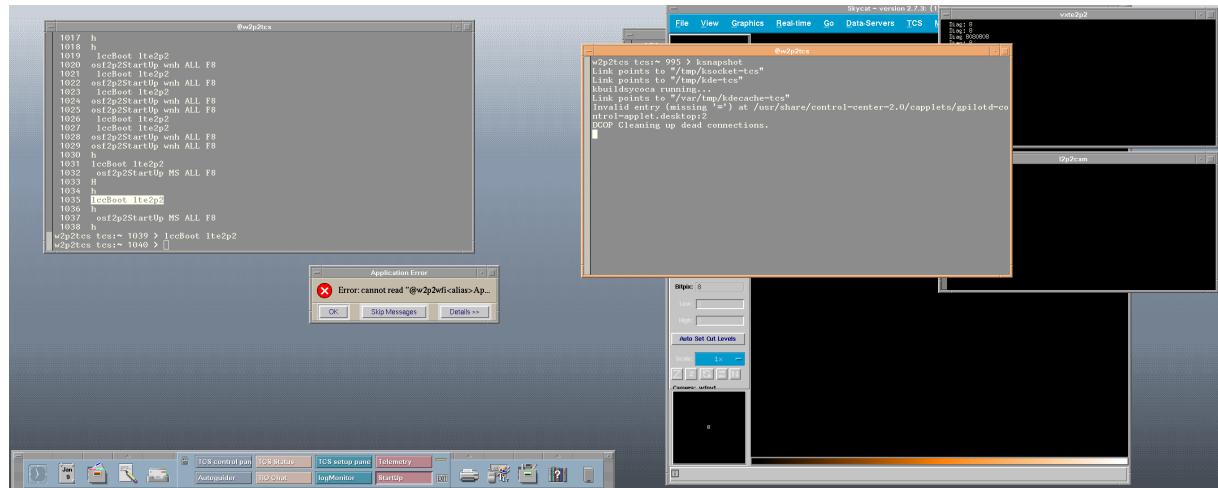


Figure 2.8: When restarting WFI, the TCS generally issues a harmless error message. Get over it and click OK.

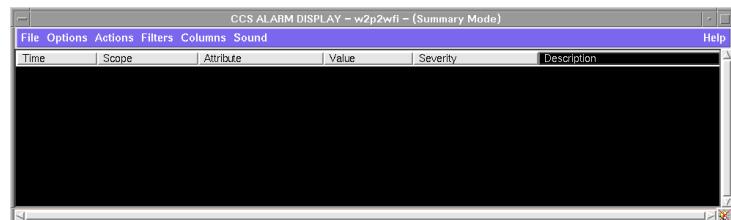


Figure 2.9: CSS ALARM DISPLAY will typically pop-up on the WFI screen with a line in red when the TCS is restarted. Get over it and hide the window.

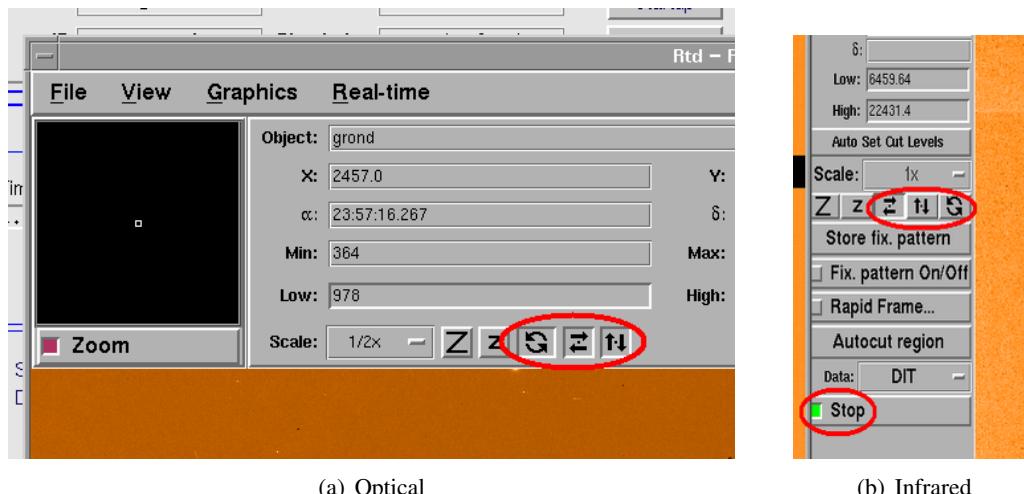


Figure 2.10: Correct sky orientation of the **GROND** displays. The infrared one is receiving data in real time (green checkbox).



## 3 — Afternoon: Day-time calibrations

The day-time observations use OBs either stored in bob or in a ot queue. Managing OBs with bob and ot is explained in more detail in Chapter 8, p. 71.

### 3.1 WFI

Internal calibrations and health checks are typically left running in the morning after the dome slit has been closed. See Sect. 7.6.

#### Procedure 3.1. WFI dome flat-fields

- A. Ensure that no one is in the dome nor will enter it before starting the dome flat fields.
- B. Prepare the telescope.
  - B1. If hydraulics is off, switch it on and wait for connection with VME
    - a. On the Dome Auxiliary Functions panel click Hydr On then Drives On.
    - b. On the TCS Control Panel, check if red message appears no connection.
    - c. If it is the case, wait for it to disappear (about 2 min)
  - B2. If hydraulics were off, initialise telescope
    - a. On the TCS Setup Panel, click Tel Init
    - b. Wait for the telescope status on the TCS control panel to go from WaitIni to Slew (2 min)
  - B3. Preset to flat-field screen
    - a. Go to the TCS Setup Panel (Fig. 11.2, p. 102) on screen Telescope Control Software.
    - b. Put Dome on automatic.
    - c. Preset the telescope to flat-field screen.  
Click FF Scr below Fixed Presets
    - d. Wait for the movement to complete (2 min) before starting the flat-field OB.  
On the TCS Control Panel (Fig. 11.1, p. 101) telescope status is Slew.
  - B4. Prepare shutters and mirrors
    - a. Click Open under the Main Mirror Cover.
    - b. Wait for opening to complete (2 min) before starting the flat-field OB
    - c. Open the WFI protective shutter.  
In the Auxiliary Functions (Fig. 11.5, p. 106), OPEN the WFI PROTECTIVE SHUTTER.

- d. Ensure the GROND **M3** mirror is on WFI
- e. Ensure the FEROS **mirr3** mirror is on FEROS

C. Prepare the flat-field **OB**

- C1. Go to **bob** on the screen **BOB Wide Field Imager**.
- C2. Fetch **bob** from file (window menu **File**→**Load OBs**→**From file...**) looking in sub-folder **DomeFlats**.

- If observing in UBVRI standard filters: **DomeFlatCalPlan\_new.oob** (25 min).
- During an observing period or a **visitor** run, a custom **OB** may be used  
For instance: **DomeFlatsP103.oob** or **DomeFlatsVisitorName.oob**
- To choose filters on the fly: **DomeFlatGeneric\_new.oob**.
- To test all filters: **DomeFlatAllSnapshot.oob** (1 flat per filter, 2 hrs 30 min).

C3. If choosing filters on the fly, customise the ob

- a. Open the **dome flat fields template**, left-clicking on the triangle of **WFI\_img\_cal\_DomeFlat\_new**
- b. Open the instrument section, left-click on the triangle of section **INS**
- c. Use window menu **Interface**→**Engineering**.
- d. Middle-click the filter name, fill in value, and type enter.  
Name is **ESONNN\_name/width** (NNN: number, name: filter name or wavelength)  
In **virtual desktop WFI ICS**, a filter list is found below **SETUP Instrument**
- e. Deactivate the filters you don't want.  
Right-click the triangles to get a thumb down

D. Execute **OB** (15–30 min usually).

E. If no other types of flats fields are done, park the telescope

- E1. Go to the **TCS Setup Panel** on screen **Telescope Control Software**.
- E2. Close to the **Main Mirror Cover**.
- E3. Set the **dome** in **Manual**.
- E4. Click **Zenith** below **Fixed Presets** (2 min)
- E5. Close the **WFI protective shutter**.

In the **Auxiliary Functions** (Fig. 11.5, p. 106), CLOSE the **WFI PROTECTIVE SHUTTER**.

F. If telescope will stay idle for hours, switch hydraulics off.

## 3.2 FEROS

A linearity check is left running in the morning (see Sect. 7.6). The standard **FEROS** calibration is generally done after startup. It is internal in a separate room, so it can be done while doing telescope movements, going to the **dome**, or even **WFI** or **FEROS** observations.

### Procedure 3.2. FEROS afternoon calibrations

- A. Go to screen **FEROS BOB**.
- B. Check that **FEROS** does not communicate with the telescope  
On the **FEROS General State** panel, use window menu **Telescope**→**Ignore**.
- C. Execute **StanCalNorm.oob** from **bob** ( $\approx 1$  h).
  - C1. Use window menu **File**→**Load OBs**→**From file....**
  - C2. Click **Start**.
- D. Check that the **DRS** has processed it. **While Fabry-Pérot stays installed, it will fail.**
  - D1. Find a white graphics with title **OBJ FIB GUESS**.
  - D2. The wavelength solution should have  $4 \times 10^{-3}$  Angstrom rms or less and look flat.
  - D3. If not, restart calibration if possible.

### 3.3 GROND

GROND calibrations are left running in the morning after the [dome](#) has been closed (see Sect. 7.6). Some observers may ask for GROND linearity calibration using [dome flat fields](#), providing the observing blocks and a detailed explanation.





## 4 — Sunset: Getting ready

### 4.1 Opening

Opening should take place about one or two hours before sunset if conditions allow it. In case of doubts, always ask to the day-time Telescope & Instrument Operator of ESO.

#### Procedure 4.1. Dome opening and telescope readying

- A. Check that the [dome slit](#) is oriented opposite to the Sun. It does not apply when opening at night.
  - A1. On the [rose diagram](#) of the [TCS Control Panel](#), it should be to the East
  - A2. If not, rotate manually in the [TCS Setup Panel](#)
- B. Open the [dome slit](#)
  - B1. Go to the [TCS](#) setup panel (Fig. 11.2, p. 102)
  - B2. Check that the value below Main Mirror Cover is closed.
  - B3. If not, click Close (2 min).
  - B4. In the [TCS](#) setup panel (Fig. 11.2, p. 102), below slit, click Open (1 min)
- C. Turn on the Dome Air in the [Dome Auxiliary Functions](#) ([Windows desktop](#), Fig. 11.13, p. 112).
- D. If opening during the night, you can directly prepare the telescope (Procedure 4.2, p. 39).

### 4.2 Telescope readying

A bit before sunset if doing [sky flat fields](#) or at sunset otherwise, you can ready the telescope and point to an empty field.

#### Procedure 4.2. Telescope readying

- A. Prepare the telescope
  - A1. If hydraulics is off, switch it on and wait for connection with [VME](#)
    - a. On the [Dome Auxiliary Functions](#) panel click Hydr On then Drives On.
    - b. On the [TCS Control Panel](#), check if red message appears no connection.
    - c. If it is the case, wait for it to disappear (about 2 min)
  - A2. If hydraulics were off, initialise telescope
    - a. On the [Telescope Setup](#) panel, click Tel Init
    - b. Wait for the telescope status of the [TCS Control Panel](#) to go from WaitIni to Slew (2 min)

- A3. Open the **main mirror cover**
  - a. Click **Open under the Main Mirror Cover**.
  - b. Wait for opening to complete (2 min) before starting the flat-field OB
- B. **Preset** to an empty field if doing **sky flat fields**, a test with GROND, or readying before sunset
  - B1. Go to the **TCS Control Panel** (Fig. 11.1, p. 101)
  - B2. Below Catalogue Handling click **Cat.** **Select**.
  - B3. Choose **Empty Fields 2011**
  - B4. Select field with Up and Dwn.  
Right ascension should be about 1 hour more than sidereal time at sunset.  
Consider field quality: excellent, good, OK, poor.
  - B5. Click **Preset**.
- C. Set the **dome** motion in automatic.  
On the **TCS** setup panel (Fig. 11.2, p. 102), below Dome, select the checkbox **Automatic**.

## 4.3 Making the instruments ready (at sunset)

### Procedure 4.3. Making instrument ready

- A. Activate the connection between instruments and telescopes
  - A1. On the **FEROS** control panel (Fig. 11.9, p. 109), use window menu **Telescope**→**Enable**.
  - A2. On the **GROND** control panel (Fig. 11.11(b), p. 111), click **TCS ON**.
  - A3. Refresh the **WFI** general state panel (Fig. 11.8, p. 108).
    - Use window menu **Std.** **Options**→**Refresh Database values**.
    - Check that TCS is **ONLINE**.
- B. Open the instrument covers
  - B1. In the **Auxiliary Functions** (Fig. 11.5, p. 106), open the **WFI protective shutter**.
  - B2. For **GROND** observations, in a terminal open the **main cover**, the **cold shutter**, and the optical ones through these commands
    - a. **grondMC OPEN**
    - b. **grondCS OPEN**
    - c. **grondSHUTTER**
- C. Check for mirrors
  - C1. Check **FEROS** mirror (**M3 Selected Mirror**) on the **FEROS** control panel (Fig. 11.9, p. 109).  
If necessary, set **mirr3** motor on the **FEROS ICS Control** (Fig. 11.10, p. 110)
    - to **WFI** for observations with **WFI** or **GROND**;
    - to **FEROS** for observations with **FEROS**.
 (Select the **mirr3** check box, select instrument, click **SETUP**, deselect checkbox.)
  - C2. Check **GROND M3** mirror on the **GROND** control (Fig. 11.11(b), p. 111).  
If necessary, type
    - **grondM3 WFI** for **FEROS** or **WFI** observations
    - **grondM3 GROND** for **GROND** observations.
- D. If no test **OB** with TCS on was done during the start-up, try to run a **GROND** test **OB** (**1min1TD\_test.obd**) on sky using **bob** (Fig. 11.11(a), p. 111).
  - D1. Fetch **OB** with window menu **File**→**Load OBs**→**From file....**
  - D2. Click **Start**.
  - D3. If an error occurs after the optical exposure has started
    - Click **OK** on the error popups
    - Wait for the exposure to finish
    - In **bob**, click on **Reset status**

- Click on start again.
  - If error persists, close `bob` and open it again
- D4. For other errors, do a `grondSHUTTER`, close `bob` and open it again.

#### 4.4 Refining the night plan

On the GROND remote observer screen at the side of the small laptop, one of the GROND team members should have contacted you by slack to indicate their observing plan, if they have some monitoring to do. It generally consists of 1–3 targets to be observed within a time range, so that you try to accommodate with your own and/or other service observations. If it is detrimental to the other observations, there is sometimes some flexibility on which days they have their monitoring done, ask, but they have precedence. If slack is closed, open a browser with the following link: <https://slack.com/signin>. Sign in to workspace `grondobs.slack.com` and continue. Use the credentials given on the cover of the laptop, account `lasillaskype` with password `pwd*****`. Under channel `remote_observing` you can usually find the observing plan (late afternoon).





## 5 — Twilight: On-sky calibrations

### 5.1 Outline

#### A. Flat-fielding

- A1. [WFI sky flat fields](#) can be done from sunset to sun at  $-10$  degrees elevations depending on filtre.  
Standard filtres have that order: U, V, R, I, and B.  
Done daily if possible.
- A2. [GROND sky flat fields](#) are extensive and run from sun at  $-4$  to  $-9$  degrees elevation.  
To be started when 2s J-band exposures feature a relatively flat field with 20 000 counts.  
Done weekly.

#### B. Pointing & Focus

- B1. Pointing check should be performed daily. One basically points at a bright star and checks it falls where expected. You may use one of these methods:
  - with [WFI](#), using an [OB](#) from [bob](#).
  - with [FEROS](#), using a spectrophotometric standard or focus [OB](#).
- B2. Focus is best done daily. If conditions are stable, at the beginning of the night, but may be delayed in case of bad seeing, fast varying temperature, or late opening.
  - a. [FEROS focus](#) should be performed nightly using an [OB](#) from [bob](#)
  - b. [WFI focus](#) should be done closest to science observations.
  - c. [GROND focus](#) is usually not performed.

#### C. Standards

- C1. The [FEROS](#) standards are
  - a. Spectrophotometric standards included in the Focus+Standard [OBs](#).
  - b. Radial velocity standards by IAU and Soubiran, available from [bob](#)
- C2. [WFI](#) Landolt standard fields are available from [bob](#).
- C3. [GROND](#) SDSS standard fields are available from [bob](#).  
The [GROND](#) team usually explicitly asks for them.

## 5.2 WFI

### 5.2.1 Sky flats

**Sky flat fields** in most narrow-band filters and the darkest broad-band ones (*U & V*) should be started right at sunset or slightly before sunrise. The brightest broad band filters (*R, I, B*) can be obtained with the sun at  $-6$  to  $-9$  degrees approximately. It is possible to obtain the five standard filters in one twilight provided they are started at sunset or in the morning twilight when the sun is at  $-9$  degrees.

The procedure has been somehow modified (January 2014).

#### Procedure 5.1. Taking sky flats with WFI

- A. If not done, check that **dome** and **main mirror cover** are open (Procedure 4.1, p. 39).
- B. If not done, check **GROND M3** and **FEROS mirr3** mirrors (Procedure 4.3, p. 40, point C).
- C. If not done, check that the **WFI protective shutter** is open (Procedure 4.3, p. 40, point B).
- D. If not done, point the telescope to an empty field (Procedure 4.2, p. 39, point B).
  - D1. Go to TCS control panel the on screen Telescope Control Software.
  - D2. Below Catalogue handling click Cat . Select.
  - D3. Choose Empty Fields 2011
  - D4. Select field with Up and Dwn.  
Right ascension should be about 1 hour from sidereal time, opposite to the Sun.  
Consider field quality: excellent, good, OK, poor.
  - D5. Click Preset.
- E. Go to **bob** on screen BOB Wide Field Imager.
- F. Fetch **sky flat fields OB** from file (window menu File→Load OBs→From file...).  
(Go to folder .../TEMPLATES/OBD/SkyFlats/)

  - For standard filters use **SkyFlatsEveningCalPlan.oob**  
(**SkyFlatsMorningCalPlan.oob** in the morning)
  - Some other filters have their own flat **OBs** (e.g. **SkyFlatsI203**).
  - For a set of non standard filters use **SkyFlatsGeneric.oob**.

- G. If not doing the standard filters, customise **OB**.
  - G1. For non standard filters, edit the filter names.
    - a. Open the **sky flat fields template**, left-clicking on the triangle of **WFI\_img\_cal\_DomeFlat**
    - b. Open the instrument section, left-click on the triangle of section **INS**
    - c. Use window menu **Interface→Engineering**.
    - d. Middle-click the filter name, fill in value, and type enter.  
(In **virtual desktop ICS**, a filter list is found below **SETUP Instrument**)
  - G2. Deactivate unneeded **templates**.  
Right-click the triangles to get a thumb down.
- H. Execute **OB**
  - H1. Click **Start**.
  - H2. For each **template**
    - a. A test exposure is taken. (1 min)
    - b. A pop-up estimates the exposure time. (a few seconds)
    - c. If it is too late (too dim in the evening), the **template** will be skipped.
    - d. If it is too early (too bright in the evening), the **template** will restart from point H2a.

### 5.2.2 Pointing

#### Pointing with FEROS

If starting with FEROS, you can use the [focus](#) and/or [spectrophotometric standard star OB](#) to check pointing.

#### Procedure 5.2. Ensure that pointing is correct using FEROS

- A. Update the [pointing model](#) parameters
  - A1. Go to the [Telescope Control Software](#) workstation.
  - A2. Open or use a [UNIX terminal](#).
  - A3. Type `~/bin/fixPointing.sh`
- B. Change [pointing model](#) to FEROS.
  - B1. Go to the [TCS Status Panel](#) ([virtual desktop Status](#), see Fig. 11.4, p. 104).
  - B2. Use window menu [Instrument selection](#)→FEROS
- C. Check the sidereal time
  - C1. On the digital clock of the [control room](#), switch display to sidereal time.
  - C2. Go to the [TCS Control Panel](#) ([virtual desktop Control](#)).
  - C3. The sidereal time of the TCS Control Panel should lag by approximately 5 s.
- D. Point at a FEROS [focus/spectrophotometric standard](#) star. See Sect. 5.3.1, p. 49.

#### Pointing and autoguider test with WFI

If things go well, the bright star used for the [pointing](#) test should fall a few hundreds of pixels from the centre of the mosaic in the North-West direction (as of 2019).

#### Procedure 5.3. WFI pointing

- A. Switch the instrument to [WFI](#) on the [TCS](#) status panel.  
([Instrument Selection](#), Fig. 11.4, p. 104. Do it even if it already says [WFI](#)).
- B. If not done, check that dome and [main mirror](#) are open, and dome is in automatic.  
(Refer to Sect. 4.1, p. 39, points [B](#), [A3](#) and [C](#)).
- C. If not done, check [GROND M3](#) and [FEROS](#) [mirr3](#) mirrors (Sect. 4.3, p. 40, point [C](#)).
- D. If not done, check that the [WFI protective shutter](#) is open (Sect. 4.3, p. 40, point [B](#)).
- E. Go to [bob](#) on screen [BOB Wide Field Imager](#).
- F. Fetch [pointing OB](#) from file (window menu [File](#)→[Load OBs](#)→[From file...](#)).  
(Go to folder `.../TEMPLATES/OBD/Pointing/`
  - [OBs](#) are [Pointing-<ra>.obd](#), where [<ra>](#) is the right ascension.
  - Choose an OB with [<ra>](#) close to sidereal time.
- G. After the exposure is taken, accept “refine [acquisition](#)”.  
A small form asking for the star’s coordinates will appear.
- H. Use window menu [View](#)→[Pick Object](#) in the [rtb](#) to obtain the star’s pixel coordinates.
- I. Input the pixel coordinates.  
Copy them with the mouse from the [Pick Object](#) popup to the small form.
- J. After [offset](#) and [quit](#) a popup should have appeared.  
Click [OK](#) if satisfied with the offset values (in arcsec).
- K. If no star at all is seen, see Sect. 10.11.1, p. 90 to check that:
  - K1. You did not forget Points [A-D](#).
  - K2. The sidereal time of the [TCS](#) is correct within seconds.
  - K3. The pointing parameters of the [TCS](#) are correct.
  - K4. Check that the star does not fall into the gap between two CCDs. (Give coordinates falling in the gap to the pop-up, offset and reacquire.
  - K5. Once you have a star, as long as the offset is large, use [offset](#) and [reacquire](#)

- K6. If the correct pointing model is selected, that should not take more than 2-4 repeats (max 10 min).
- L. At that point, the pointing is done, and a small test of the autoguider is done.  
If it crashes, it has no impact on the pointing check. You can skip it if you do not intend to use the WFI autoguider.
- M. When asked, acquire a guide star on the TCS.  
On the TCS Control Panel, follow the steps of Sect. 6.1.4, p. 55  
If it is still too bright to click on a guide star, click on background.
- N. Click OK to the popup asking for guiding on the WFI workstation.
- O. Wait for a short exposure to read out (30 sec).

### 5.2.3 Focus

focus with WFI should be preferably done close in time and telescope position to the target's. It is not necessary to use the same filtre as the observation, but using the same one saves about 2 min. in particular if the observation uses a narrow band or a dimm filtre (*U*), for WFI knows the focus offsets between filtres. Using the same filtre saves about 2 min.

It is possible to skip the focus if an acquisition or test image shows sharp, round stars or if the seeing is too bad ( $\gtrsim 2$ ). It is advisable to (re)focus once conditions have stabilised, a few hours into the night, if on-chip seeing is critical.

#### Procedure 5.4. Focusing with WFI

This procedure lasts a bit less than 10 minutes.

- A. Prepare telescope and filtre for focusing (1–3 min)
- A1. If focusing in the same field and filtre as a target's, use the target OB's preset.
- Load OB for the target.
  - Thumb-down all templates except the acquisition.
  - If template contains an acquisition image, decrease exposure time to 10 s.
  - Start ob.
  - If it asks for autoguider, acquire it (Procedure 6.3, p. 55).
  - If it asks to refine acquisition after an image pops-up, skip it.
  - If an image pops-up and stars appear round and sharp enough for the science goal, you may skip the focusing altogether.
- A2. If focusing in another field and filtre, do it manually
- In the TCS Control Panel, enter the coordinates and click Preset
  - In the WFI ICS Control, choose the filtre and click ???
  - Wait for telescope and filtre movements to complete (2–3 min).
  - In the TCS Control Panel and skycat, acquire autoguider (Procedure 6.3, p. 55, 1 min)
- B. Start the focus OB (Fig. 5.1(a), p. 47) and perform AG acquisition if required (Fig. 5.1(b), p. 47)
- B1. In bob, use window menu File→Load OB→from file...
- B2. Double-click subfolder .../TEMPLATES/OBD/Focus
- B3. Choose ob, e.g. focusV.oob or focusCurrentFiltre.oob
- B4. Click OK
- B5. Click Start on the OB
- B6. If a pop-ups asks for AG, acquire it (Procedure 6.3, p. 55, 1 min)
- C. Monitor the progress of the focus sequence on bob and skycat (Fig. 5.1(c), p. 47, 6 min).
- Guide star will disappear and reappear between all subexposures.
  - If bob repeats a message about a focus order for more than 10-15 s, you will need to enter the

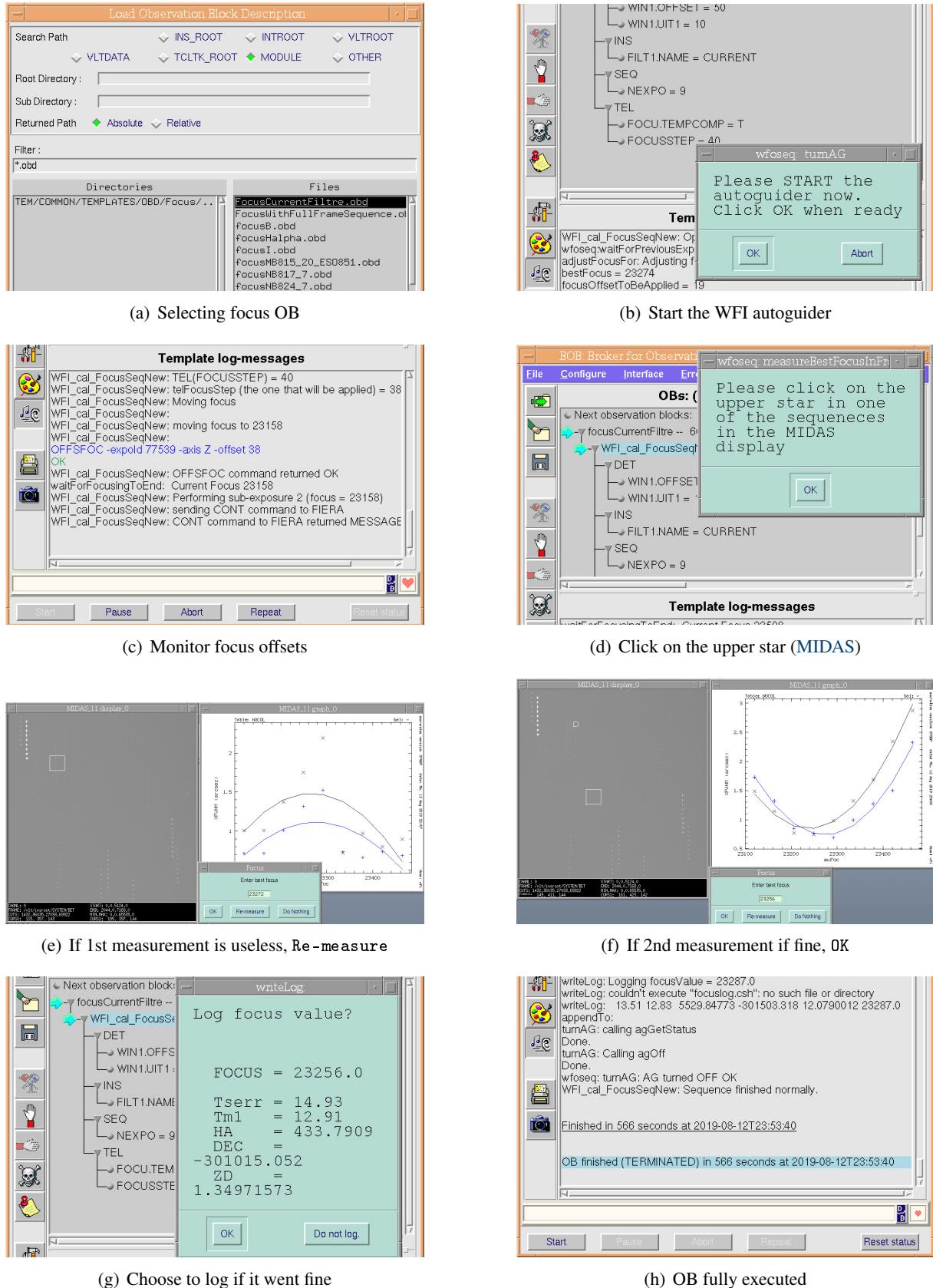


Figure 5.1: Main steps in the focus sequence of WFI.

target values in the [TCS Control Panel](#) for all subexposures starting from the one where problem appears (second one). Otherwise, the ob will crash. See Procedure [10.11](#), p. [81](#).

- D. Perform a dummy focus measurement (bug workaround)
  - D1. Click **OK** on the pop-up asking to pick a star in **MIDAS** window (Fig. [5.1\(d\)](#), p. [47](#))
  - D2. Go to [virtual desktop](#) **MIDAS** (Fig. [5.1\(e\)](#), p. [47](#))
  - D3. Locate a black **MIDAS** window intended for graphics
  - D4. Left-click, then right-click close to its centre
  - D5. On the pop-up asking for confirmation, click **Redo**
- E. Perform focus measurement (Fig. [5.1\(f\)](#), p. [47](#))
  - E1. Click **OK** on the pop-up asking to pick a star in **MIDAS** window
  - E2. Find a vertical star sequence that is relatively separated from other ones
  - E3. On the same black window, use arrow keys to dimension a box centred on the cursor, so that it encompasses a star of the sequence, but not two.
  - E4. Left-click, then right click the upper star of the sequence
  - E5. Look at the graphics displaying the FWHM fit as a function of focus offset
  - E6. Decide what to do (confirm exact labels...)
    - If the fit and optimum focus offset value are correct, click **OK**
    - If the fit is not correct but you can spot the best focus value, Enter **best focus** in the popup and click **OK**
    - If you are not sure, click **Re-mesure** and pick another star sequence
    - If it is clear that conditions have messed the focus, click **Do Nothing**.
  - E7. Wait for a pop-up to ask whether to log the value (Fig. [5.1\(g\)](#), p. [47](#), 20 s)
    - If you are happy with the focus, click **OK**
    - Otherwise, click **Do not log**
  - E8. Wait for OB to finish (Fig. [5.1\(h\)](#), p. [47](#), 10 s)

#### 5.2.4 Standard fields (quick tips)

##### Procedure 5.5. WFI photometric standard fields

- A. Go to screen **BOB Wide Field Imager**.
- B. If not done, switch the instrument to **WFI** on the **TCS** status panel (Fig. [11.4](#), p. [104](#)).
- C. Fetch **standard field OB** from list
  - C1. Use window menu **File**→**Load OBs**→**From file**....
  - C2. Go to folder **.../TEMPLATES/OBD/Standards/**.
  - C3. Select **OB**
    - If good image quality in **U** is needed, select **Standard-<RA>-<name>-UBVRI .obd**.
    - If not, select **Standard-noAG-<RA>-<name>-UBVRI .obd** (no guiding).
- D. Customize OB.
  - If non-standard filters are needed, edit filter names (Sect. [5.2.1](#), p. [44](#), item **G1**).
  - Deactivate unneeded **templates**.  
(Right-click the triangles to get a thumb down.)
- E. Execute **OB** (20 min).
  - E1. Click **Start**.
  - E2. For each filter
    - a. Guide if required by a pop-up and click **OK**.
    - b. A pop-up with number of dithers to skip must be answered (with value 0).  
If it doesn't appear it is hidden behind a window. If left unanswered, observation will just pause.

## 5.3 FEROS

You can choose **focus** only, or **focus** and **spectrophotometric standard**, which takes only 5 min more. A **radial velocity standard** can be taken any time needed (they take 5-10 minutes with overheads).

### 5.3.1 Focus

#### Procedure 5.6. FEROS focusing

- A. Check that dome and **main mirror** are open (Procedure 4.1, p. 39).
- B. Check **GROND M3** and **FEROS mirr3** mirrors (on **WFI** and **FEROS**, respectively. Sect. 4.3, p. 40, point C).
- C. Check that the **WFI protective shutter** is open (Sect. 4.3, p. 40, point B).
- D. Select instrument **feros** on the **TCS Status Panel** (screen Telescope Control Software).
- E. Got to **bob** on screen **FEROS OB** and fetch **focus OB**:
  - E1. Use window menu **File**→**Load OBs**→**From file...**
  - E2. Select directory **.../TEMPLATES/OBD/Focus/**.
  - E3. Select **Focus-<ra>....obd** with **<ra>** close to sidereal time.
- F. Click **Start**.
- G. Acquire object on fibre and guide (see Sect. 6.2.1, p. 58, point D, & Sect. 6.2.2, p. 60).
- H. Perform the **focus**
  - H1. On the **Autoguiding** window, select numbers 6, 3, 0.2.
  - H2. After about 30 s, click **OK** to pop-up asking to ensure loop time is more than 3.
  - H3. A pop-up asks and suggest a **focus** estimate
    - a. If number is in range 300–500, it should be fine, click **OK**.
    - b. If not, fill in last remembered value or, if you don't have any, 400, then click **OK**.
  - H4. Shortly after, a pop-up asks to select a star to **focus** on
    - a. A **MIDAS** image appears, left and right-click on a non-saturated source.
    - b. Click **OK** to pop-up
  - H5. After about 5–10 min a fit to **focus** is done and a pop-up asks whether it is correct
    - a. If it seems correct, click **OK**.
    - b. If it seems incorrect, but you can spot a good **focus** value by eye
      - Click **No**
      - Give guesstimate to new pop-up
    - c. If you have no clue, just abort.

### 5.3.2 Focus and spectrophotometric standard

You may deactivate the **focus** sequence by thumbing down the second **template** in **bob** (10 min without focus).

#### Procedure 5.7. Focus and/or spectrophotometric standard

- A. Perform steps of Sect. 5.3.1, p. 49 except that
  - **OB** directory is **.../TEMPLATES/OBD/Focus+Standard**
  - **OB** name is **Focus+Standard-<ra>....obd** with **<ra>** close to sidereal time.
- B. After **focus** is done, change integration time to 0.01 on the **Autoguiding** window.
- C. Two pop-ups will ask to wait for object to be centred on the fibre. Wait for it to occur and click **OK**.
- D. Wait for **spectrophotometric standard** template to integrate and read out (1 min)

### 5.3.3 Radial velocity standards

#### Procedure 5.8. FEROS radial velocity standards

- A. Got to `bob` on screen FEROS OB and fetch radial velocity standard OB:
  - A1. Use window menu File→Load OBs→From file....
  - A2. Select directory .../TEMPLATES/OBD/RVStandard.
  - A3. Select RVStandard...<ra>....obd with <ra> close to sidereal time.
- B. Proceed with guiding and answer popups, that's a normal observation (about 5 - 10 min).
  - B1. In the e2p2 RTD window, click Centering (below Image Control), then click on the object.
  - B2. In the Autoguiding window, set the integration time if necessary.
  - B3. OK on popups (FEROS OB) when the object is centred.

## 5.4 GROND

### 5.4.1 Sky flats

#### Evening flats

Before taking evening flat fields, check the relevant items of “no flux or little flux” in Sect. 10.1, p. 75. In particular the **main mirror** cover should be open and the dome set in automatic. The **sky flat fields** typically start when the sun is 4 degrees below the horizon. To be able to start on time, the following procedure should be started right at sunset.

#### Procedure 5.9. GROND evening flat fields

GROND flat field OB lasts about 30 min.

- A. If not done, check that dome and **main mirror** are open (Procedure 4.1, p. 39).
- B. If not done, point the telescope to an empty field (Procedure 4.2, p. 39, point B).
- C. If not done, set the dome in automatic.
- D. Go to GROND BOB screen.
- E. If not done in the evening, do some prophylaxis (Procedure 2.1, p. 23, points D4 and D6)
  - E1. Close `bob`.
  - E2. In the terminal, type `grondGRI`.
  - E3. In the terminal, type `grondSHUTTER && grondFM` (may last 1 min).
  - E4. From the terminal, launch a new `bob` with `bob &`.
  - E5. Execute a `1min1TD_test.obd` with TCS ON.
- F. Insert **M3** mirror and open shutters
  - F1. In the terminal, type `grondM3 GROND`.
  - F2. In the terminal, type `grondMC OPEN`.
  - F3. In the terminal, type `grondCS OPEN`.
- G. Get **sky flat fields** OB ready
 

In `bob`, fetch OB `GROND_img_cal_skyflats_ev`  
(use `Flats/` folder).
- H. Monitor the *J*-band counts.
  - H1. Go the the GROND infrared (IRACE) screen.
  - H2. Set the IR integration time to 2 s.
    - Find window Infrared Acquisition Module (see Fig. 11.12(b), p. 111).
    - Close to the INTEGRATION TIME, fill in value 2.
    - Press enter (Don't do Apply.)
  - H3. Draw cuts in the infrared image.
    - Go the the `irtd` window.

- Go to the *J*-band (right handside)
  - Use window menu **View**→**Cuts...**, then click **OK** on the pop-up.
  - Draw a diagonal on the image with the mouse.
- H4. Wait for the cuts to look flat and with about 20 000 counts. This should occur when the sun is about 4 degrees below the horizon.
- I. When counts are OK, on the GROND BOB screen, click **Start** in **bob**.

### Standards

#### Procedure 5.10. GROND standard field observation

The procedure lasts 7 min.

- A. Select an SDSS **standard field** close to the meridian  
In **bob** use window menu **File**→**Load OBs**→**From file...** and select one in sub-folder **Standards**
- B. Execute it by clicking **Start**
- C. You can ignore guiding and click **OK** if the ob asks for it

### Morning flats

Morning sky **flat fields** are trickier to get right. They should be started when the sun is at 9 degrees below horizon.

#### Procedure 5.11. GROND morning flat fields

- A. Point the telescope to an empty field as explained in Sect. 4.1, p. 39.
- B. Go to GROND BOB screen.
- C. Insert **M3** mirror and open shutters (if you were not already with **GROND**)
  - C1. In the terminal, type **grondM3 GROND**.
  - C2. In the terminal, type **grondMC OPEN**.
  - C3. In the terminal, type **grondCS OPEN**.
- D. Get **sky flat fields OB** ready  
In **bob**, fetch **OB GROND\_img\_cal\_skyflats\_mo**.  
(Use **Flats/** folder.)
- E. When sun is at 9 degrees below horizon, click **Start** on **bob**.

### 5.4.2 Focus

The **focus** of **GROND** is stable and managed periodically by the **MPE** team. Defocused observations can be obtained by specifying a **focus** offset in the **OB**.

The **AG** can also be focused separately from the instrument, in case of defocused observations (I don't remember how to open the new GUI though).

### 5.4.3 Photometric standard fields

There are **OBs** for Landolt and SDSS **standard fields** that can be fetched from file with **bob** (10 min).

### 5.4.4 RRM online

In the GROND **General State** panel (Fig. 11.11(b), p. 111), click **RRM ONLINE** at the end of the twilight (beginning of the night) to allow for remote observations with this instrument.





## 6 — Night: Observing

### 6.1 WFI

#### 6.1.1 Popup handling

`bob` will generally throw a few pop-ups during a typical observation. Failing to answer them, nothing will happen and time will be irremediably lost. These pop-ups may appear behind windows, so be proactive.

At the beginning of an observation, you may have have popups asking

- to refine acquisition (Sect. 6.1.3, p. 54), i.e. recentre the object of interest if the observer has specifically asked for a precise position of his target. Three successive popups will ask whether to recenter, enter the pixel coordinates of the object, and whether to offset and/or refine again.
- to acquire the guiding (Sect. 6.1.4, p. 55), which you will click once you have done it. Almost all science observations will ask for it.

During an observation, it can happen that guiding acquisition is asked for several time

- For an observation with large dithers (COMBINED.OFFSET is F) the guiding will be asked at the beginning of each exposure.
- For an observation with different filters, it will be asked for if at each filter change.

Error popups may also appear, see Chapter 10, p. 75.

#### 6.1.2 Switching to WFI

You may start an OB once point B has been done. This minimises overheads by parallelising `preset` and mirror movements. However, beware that some acquisition templates (movetopixel and movetogap) don't ask before taking the acquisition image, so you should be faster than preset.

##### Procedure 6.1. Switch to WFI observations

- A. Open the `WFI` protective shutter.
- B. Switch the pointing model to `WFI`.
  - B1. Go to screen Telescope Control Software.
  - B2. Go to the `TCS Status Panel` (`virtual desktop` Status, see Fig. 11.4, p. 104).
  - B3. Use window menu Instrument selection→`WFI`
- C. Check the `GROND M3` mirror.

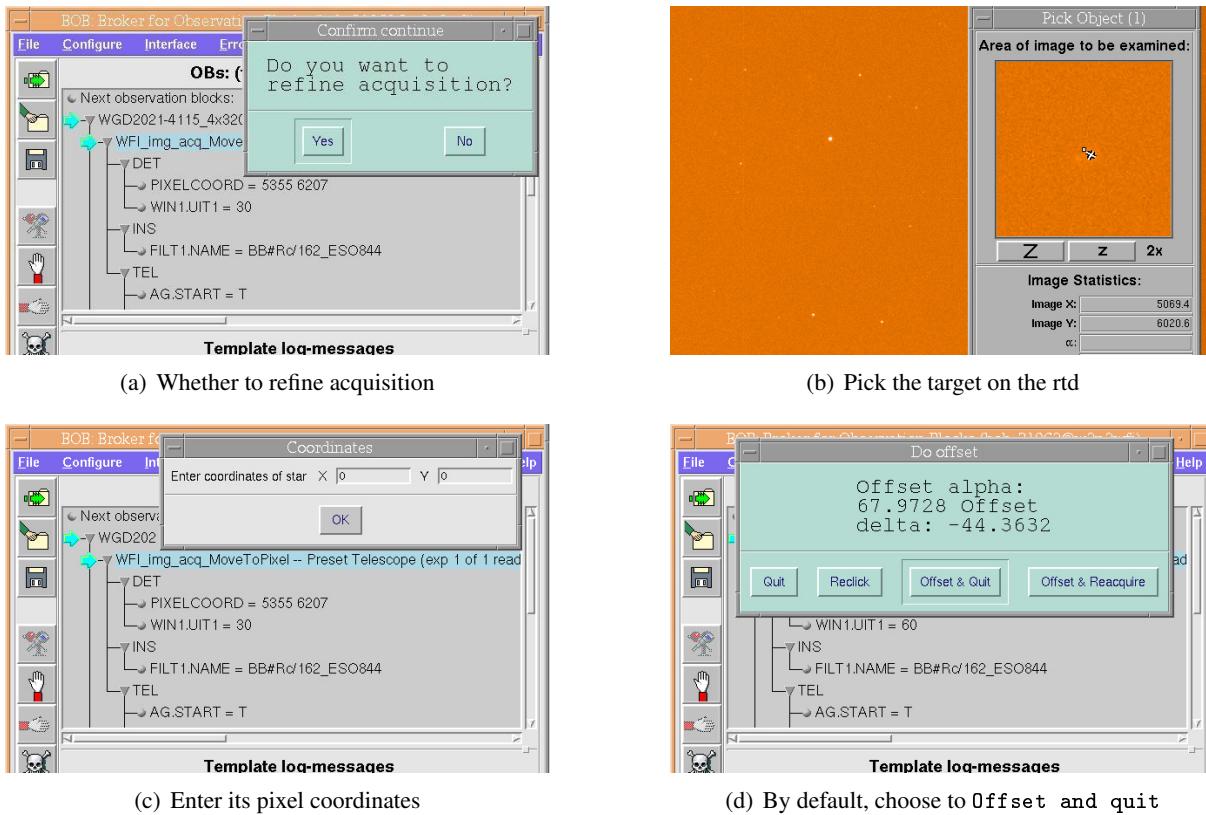


Figure 6.1: Refining the WFI acquisition for the `WFI_img_acq_MoveToPixel` template.

Go to screen GROND BOB.

C1. Ensure that the **M3** mirror is on **WFI**.

- Go to the GROND General State panel (virtual desktop BOB+gen state).
- Check the value of GROND M3.

C2. If it is on **GROND**, set it to **WFI**.

In a terminal, type `grondM3 WFI`.

Redo point C1 (value should be MOVING then WFI).

D. Check the **FEROS mirr3** mirror.

Go to screen FEROS BOB.

D1. Ensure that the mirror is on **WFI**

- Go to the FEROS General State panel (virtual desktop BOB+gen state).
- Check the value of M3 Selected Mirror.

D2. If it is on **FEROS**, set it to **WFI**.

- Go to the FEROS ICS Control panel (virtual desktop ICS).
- Select the `mirr3` checkbox (in green) under the Motors section.
- Select WFI on the same line.
- Click SETUP at the bottom of the panel.
- Deselect the `mirr3` checkbox.

### 6.1.3 Refining acquisition

It is possible to refine the **acquisition** with **WFI** if the **OB** has explicitly planned for it. Technically speaking, if the **template** is `WFI_img_acq_MoveToPixel` or `WFI_img_acq_MoveToGap`, the observer

will be asked whether to offset the telescope so that a given target falls on a specific pixel of the CCD matrix or a gap of between the CCDS.

Refining takes place after telescope [preset](#) and before acquisition of the [AG](#).

### Procedure 6.2. Refine the acquisition of WFI

- A. Wait for acquisition image
  - A1. Wait for the acquisition image to read out ( $\approx 1$  min)  
On screen WFI BOB, window [rtD](#) you can change the cuts of the image and the scale.
  - A2. Wait for a pop-up asking to refine acquisition (a few seconds)  
It may appear on any of the two screens.
- B. Accept or decline refining by answering the pop-up Confirm continue (Fig. 6.1(a), p. 54)
  - B1. With Yes, this procedure continues and a second pop-up appears.
  - B2. With No, this procedure ends and observation goes on without recentering.
- C. Pick target (Fig. 6.1(b), p. 54)
  - C1. Locate the target by means of a finding chart.  
Inspect the [rtD](#) window of screen WFI BOB
  - C2. Open the [Pick Object](#) window.  
On the [rtD](#), use window menu View→Pick Object
  - C3. Select the target.
    - a. Click on the target
    - b. Check the cross is centred on target in the [Pick Object](#) window
    - c. If it isn't zoom out z and Z to achieve centring of the cross
- D. Enter coordinates on pop-up Coordinates (Fig. 6.1(c), p. 54)
  - D1. On [Pick Object](#), copy the value of Image X
  - D2. On popup Coordinates, paste the value in X coordinate
  - D3. Do the same for Image Y
  - D4. Click OK on the popup Coordinates
- E. If a pop-up asks for the coordinates of the gap, attend it.  
It occurs for template WFI\_img\_acq\_MoveToGap. Its handling is similar to steps C–D.
- F. Examine the offset proposition on pop-up Do\_offset (Fig. 6.1(d), p. 54)  
Read the offset values (in arcseconds) and decide whether they make sens.
- G. Answer pop-up Do\_offset (Fig. 6.1(d), p. 54)
  - G1. Offset and quit: the recentering will be performed.  
This is the most common action.
  - G2. Offset and reacquire: the recentering will be performed, and procedure starts again from step A for an additional centring to increase precision.  
This is used when an accuracy of the order of a pixel is needed or it is important to ensure the target is in the gap.
  - G3. Quit: no offset will be performed and this procedure ends.  
Mostly used when the OB will be aborted.
  - G4. Reclick: no offset is performed and this procedure starts again from step C.  
Mostly used if an obvious clicking or copying error has been done in steps C–D.
- H. Wait for telescope offset (recentering) to complete ( $\approx 30$  s)  
After that, either AG acquisition will be asked or science observations will start.

#### 6.1.4 Guiding

### Procedure 6.3. Guide with WFI

A graphical outline of the procedure is given in Fig. 6.2, p. 56 in the case no differential guiding (for solar

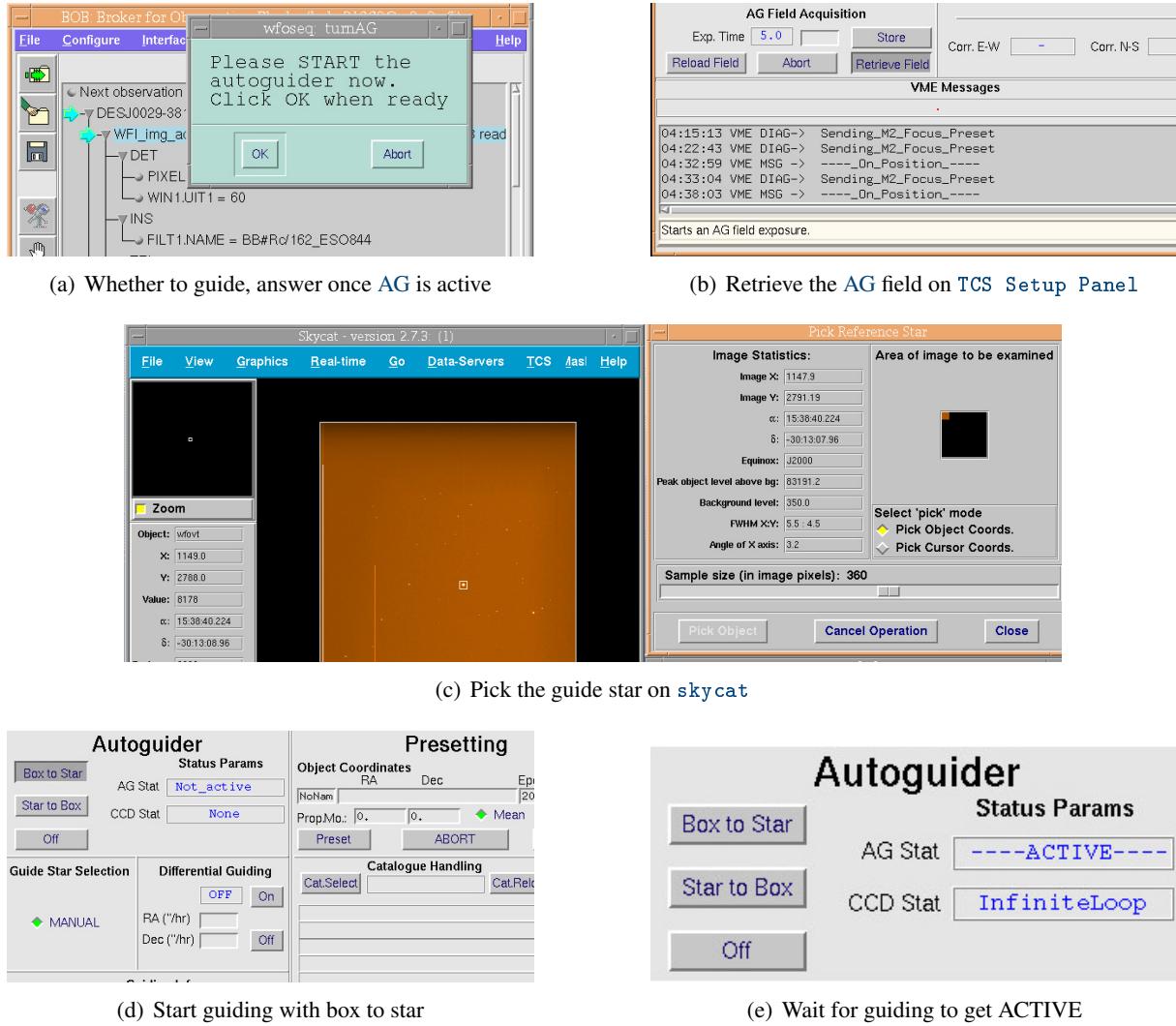


Figure 6.2: Setting the WFI AG for targets outside the solar system

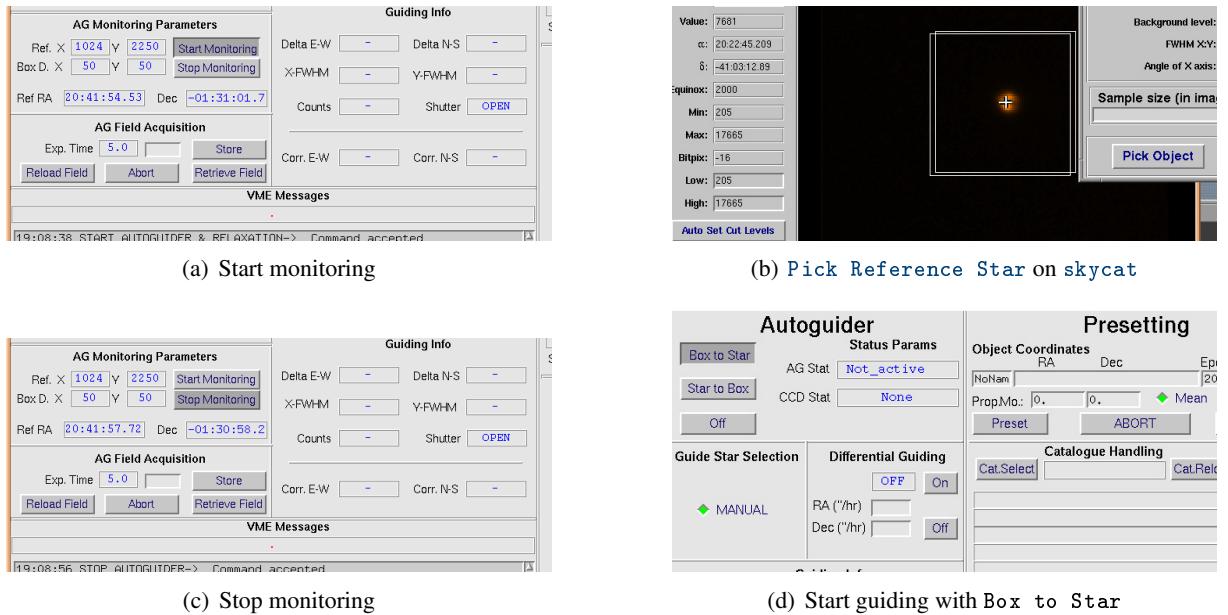


Figure 6.3: Fast guiding acquistion with WFI

system bodies) is needed.

- A. On the TCS workstation, acquire the guide field (Fig. 6.2(b), p. 56)
  - A1. Go to screen Telescope Control Software.
  - A2. Locate the TCS Control Panel (Fig. 11.1, p. 101).
  - A3. Click Retrieve Field below AG Field Acquisition.
- B. For solar system objects, set-up the differential guiding n
  - B1. Locate the Differential guiding section on the TCS Control Panel (Fig. 11.1, p. 101)
  - B2. Enter the target's proper motion in arcseconds per hour
  - B3. Click ON
- C. On the autoguider windows (Fig. 11.3, p. 103), choose the guide star (Fig. 6.2(c), p. 56)
  - C1. Wait ( $\approx 30$  s) for skycat to read out the guide field.
  - C2. On the same window, click Auto Set Cut Levels.
  - C3. Open the Pick Reference Star window if necessary.  
In skycat chose window menu TCS→Pick Reference Star.
  - C4. Pick the reference star  
On the Pick Reference Star window click Pick  
On the skycat window, click a bright star not too close to the border.
- D. On the TCS Control Panel (Fig. 11.1, p. 101) start the guiding
  - D1. Activate the guiding (Fig. 6.2(d), p. 56)  
Click Box to Star below Autoguider.
  - D2. Wait for guiding to start (Fig. 6.2(e), p. 56)  
In a few seconds ACTIVE should appear in AG Stat.
- E. Proceed with the observation, typically by clicking on pop-up asking for guiding (Fig. 6.2(a), p. 56)

After a filtre change or when running several observing blocks on the same field, it is possible to reacquire guiding within a few seconds instead of the full procedure (1 min). It is not possible to do it after a focus sequence.

#### Procedure 6.4. Restart guiding with WFI

A graphical outline of the procedure is given in Fig. 6.3, p. 57. Stopping monitoring and picking reference star can be performed in any order.

- A. On the TCS machine, go to screen Telescope Control Software.
- B. On the TCS Control Panel (Fig. 11.1, p. 101)
  - B1. Click Start monitoring (Fig. 6.3(a), p. 57)
  - B2. Click Stop monitoring (Fig. 6.3(c), p. 57)
- C. Select the star on the autoguider windows (Fig. 11.3, p. 103)
  - C1. Click Pick object in the Pick Reference Star window.
  - C2. Click on the star in the skycat window (Fig. 6.3(b), p. 57).
- D. On the TCS Control Panel (Fig. 11.1, p. 101) start the guiding
  - D1. Activate the guiding (Fig. 6.3(d), p. 57)  
Click Box to Star below Autoguider.
  - D2. Wait for guiding to start (Fig. 6.2(e), p. 56)  
In a few seconds ACTIVE should appear in AG Stat.
- E. Proceed with the observation, typically by clicking on pop-up asking for guiding (Fig. 6.2(a), p. 56).

## 6.2 FEROS

### 6.2.1 Switching to FEROS

You can start an OB once point B has been done. This minimises overheads by parallelising preset, mirror movements, and AG settings

#### Procedure 6.5. Switch to FEROS observation

- A. Switch the pointing model to FEROS.
  - A1. Go to screen Telescope Control Software.
  - A2. Go to the TCS Status Panel (virtual desktop Status, see Fig. 11.4, p. 104).
  - A3. Use window menu Instrument selection→FEROS
- B. Ensure the FEROS mirr3 mirror is on FEROS.
  - B1. Go to the FEROS General State panel on virtual desktop BOB+gen state on screen FEROS BOB.
  - B2. If the value of M3 Selected Mirror is WFI, set it to FEROS
    - a. Go to the FEROS ICS Control panel (virtual desktop ICS).
    - b. Select the `mirr3` checkbox (in green) under the Motors section.
    - c. Select FEROS on the same line.
    - d. Click SETUP at the bottom of the panel.
    - e. Deselect the `mirr3` checkbox.
- C. Ensure the GROND M3 mirror is on WFI.
  - C1. Go to the GROND general state panel on virtual desktop bob+gen space of screen GROND BOB
  - C2. If the value GROND M3 is GROND send it to WFI.  
In a terminal, type `grondM3 WFI`.
  - C3. Check that value GROND M3 goes to MOVING then WFI (2 min)
- D. Set up the autoguider
  - D1. Go to the FEROS virtual desktop of screen Autoguider GROND & FEROS
  - D2. Set up the autoguiding properties. (See Fig. 2.5, p. 32)
    - a. Go to window Autoguider  
If necessary open with left-click mouse menu CAM user→Autoguider.
    - b. Change the guiding unit to FEROS

- Select FEROS under Guiding unit in the CCD Control area.
- c. Select autoguiding loop times.  
Under Autoguider control fill in the numbers from top to bottom
    - For **focus**: 6, 3, 0.02
    - For science targets adapt last number to magnitude (0.001–2.999).
  - d. Restart exposure so that guider takes new values into account.
    - If CCD Status is Infinite loop, click Stop exposure
    - Wait a few seconds for it to change to Inactive (check the exact word)
    - Click Start exposure.
- D3. Set up the autoguider real time image.
- a. Go window **FEROS AG Real Time Display**.  
If necessary open with left-click mouse menu CAM user→E2P2...
  - b. Activate the guide camera image flow if necessary.  
If checkbox Camera On/Off is not green, click on it.
  - c. Ensure autoguider refreshes image  
On the Autoguider control the checkbox Display Enable should be red
  - d. Ensure the image is horizontally flipped.  
Right of scale the button ↔ should be pressed.
- D4. Set the fibre reference position if GROND was used
- a. Open or activate window **Pick Reference Star** (Fig. 6.4, p. 60).  
Click Set Reference on window **FEROS AG Real Time Display**.
  - b. Ensure the reference is set on the cursor's clicking position.  
On window **Pick Reference Star**, select checkbox Pick Cursor.
  - c. Back on window **FEROS AG Real Time Display**, click on fibre position.  
Coordinates are x=822 and y=516, zooming to 3 or 4× helps to click accurately.  
A box centred on the pixel should appear.
- E. Start the observation.
- E1. Go the the bob+gen state **virtual desktop** of screen FEROS BOB
  - E2. In bob, fetch **OB** and click Start

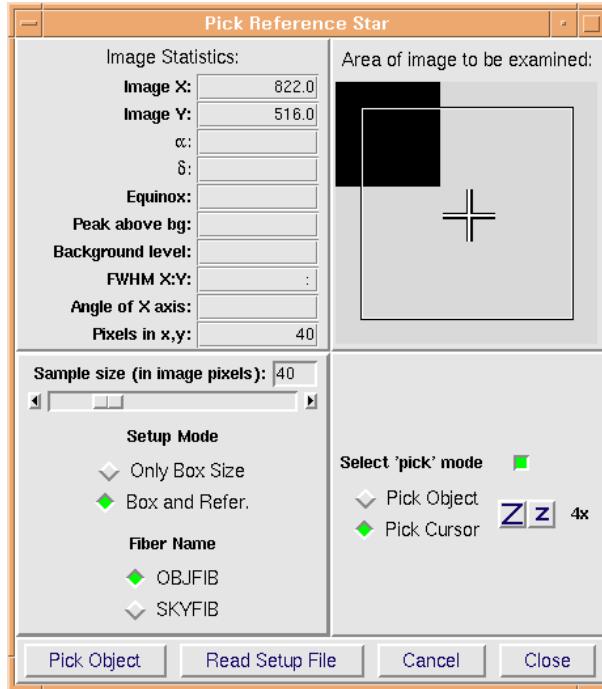


Figure 6.4: Window to set FEROS fibre reference position [Pick Reference Star](#). Select checkbox Pick Cursor.

## 6.2.2 Guiding

### On fibre

The fastest way to guide with FEROS is using the reflection on the fibre head. It is not adequate for faint stars (try to get  $\approx 4\text{--}5000$  counts) or with bad weather.

#### Procedure 6.6. Guide a FEROS observation using reflection on the fibre head

- A. Check that [WFI AG](#) is off.

  - A1. Go to the Control [virtual desktop](#) of screen Telescope Control Software
  - A2. On the [TCS Control Panel](#), below Autoguider, check that Ag Stat is Not\_active
  - A3. If active, click OFF

- B. Centre the target onto the fibre.

  - B1. Go to screen Autoguider GROND & FEROS, [virtual desktop](#) FEROS
  - B2. In window [FEROS AG Real Time Display](#), change scale back to full field (1/2)
  - B3. Change cuts (Autoset Cut Levels)
  - B4. Click Centering below Image Control
  - B5. Click on the target.
  - B6. Wait for target to be centred (5–10 s).

- C. Adapt guiding integration time to the stellar brightness
  - C1. In [Autoguiding](#) window, fill values
    - a. Correction Time (usually 6)
    - b. Loop Time (usually 3, must be  $\leq$  Correction Time)
    - c. Integration time (depends on star, must be  $<$  Loop Time)
  - C2. Click Apply
- D. Click Start guiding.
- E. Ensure that brightness is sufficient for guiding
  - E1. In window [FEROS AG Real Time Display](#), check that the counts on the doughnut around

- the fibre are above 4 000 to 5 000
- E2. In **Autoguiding** window, adapt **Integration time**
  - E3. Click **Set Int. time**.
  - E4. If you need an integration time larger than **Loop time**,
    - a. Click **Stop guiding**
    - b. Perform point **C** again with larger values (e.g. 8, 8, 7.99)
    - c. Click **Start guiding**
  - F. If running the **acquisition** of an **OB**
    - F1. Wait for star to be well-centred on the fibre (5–30 s).
    - F2. Go to screen **FEROS BOB, virtual desktop bob+gen. state**
    - F3. Click **OK** to the pop-up asking for guiding.

It is possible to guide blindly using another star of the field in the fibre head viewer. It is not recommended and should be used as a last resort.

### Off fibre

#### Procedure 6.7. Guide a FEROS observation blindly using off-fibre reference

- A. Check that **WFI AG** is off.
  - A1. Go to the **Control virtual desktop** of screen **Telescope Control Software**
  - A2. On the **TCS Control Panel**, below **Autoguider**, check that **Ag Stat** is **Not\_active**
  - A3. If active, click **OFF**
- B. Centre the target precisely onto the fibre.
  - B1. Go to screen **Autoguider GROND & FEROS, virtual desktop FEROS**
  - B2. In window **FEROS AG Real Time Display**, change scale back to full field (1/2)
  - B3. Change cuts (**Autoset Cut Levels**)
  - B4. Click **Centering** below **Image Control**
  - B5. Click on the target.
  - B6. Wait for target to be centred (5–10 s).
  - B7. Repeat if necessary to achieve close to perfect centering.
- C. Adapt guiding integration time to the off-fibre guide star brightness
  - C1. In **Autoguiding** window, fill values
    - a. Correction Time to 6
    - b. Loop Time to 3
    - c. Integration time to a value <**Loop Time**>
  - C2. Click **Apply**
- D. Select the guide star
  - D1. Click **Set reference**
  - D2. In window **Pick Reference Star**, under **Select 'pick'** mode select **Pick Object**
  - D3. In window **FEROS AG Real Time Display**, click on star
- E. Click **Start guiding**.
- F. Ensure that brightness is sufficient for guiding
  - F1. In window **FEROS AG Real Time Display**, check that the counts on the star are above 4 000 to 5 000
  - F2. In **Autoguiding** window, adapt **Integration time**
  - F3. Click **Set Int. time**.
- G. If running the **acquisition** of an **OB**
  - G1. Wait for star to be well-centred on the fibre (5–30 s).
  - G2. Go to screen **FEROS BOB, virtual desktop bob+gen. state**
  - G3. Click **OK** to the pop-up asking for guiding.

H. When the **OB** is finished, set the reference back to fibre (see point **D4** of Procedure **6.5**, p. **58**).

### Using the WFI autoguider

This is the preferred method for faint targets. When the FEROS atmospheric diffraction corrector (ADC) is used the WFI guide field is extremely defocused and this guiding method may be unstable. In case of clouds, guiding will do a random walk...

#### Procedure 6.8. Guide a FEROS observation with the WFI guide camera

- A. Check that **WFI AG** is off.
  - A1. Go to the Control **virtual desktop** of screen Telescope Control Software
  - A2. On the **TCS Control Panel**, below Autoguider, check that Ag Stat is Not\_active
  - A3. If active, click OFF
- B. Adapt guiding integration time to quick visual monitoring
  - B1. In **Autoguiding** window, fill values to allow a quick visual monitoring, yet bright enough to see target:
    - a. Correction Time to 1–3
    - b. Loop Time to 1–3
    - c. Integration time to 0.99–2.99
  - B2. Click **Apply**
- C. Change **WFI** filtre to limit the defocus in the **WFI AG**
  - C1. Go to the workstation **WFI BOB, virtual desktop ICS**.
  - C2. In panel **WFI ICS Control**, select filtre under **SETUP Instrument**.
    - If **FEROS ADC** is used, select Cousins *I*.
    - Other wise, use standard *R*.
  - C3. In the same panel, click apply.
  - C4. Wait for filtre change ( $\approx$  1–2 min), to start step **F**
    - On the panel, field **Filtre Name** will first display **Moving**.
    - When the right filtre name appears, proceed
- D. Centre the target onto the fibre.
  - D1. Go to screen **Autoguider GROND & FEROS, virtual desktop FEROS**
  - D2. In window **FEROS AG Real Time Display**, change scale back to full field (1/2)
  - D3. Change cuts (Autoset Cut Levels)
  - D4. Click **Centering** below **Image Control**
  - D5. Click on the target.
  - D6. Wait for target to be centred (5–10 s).
  - D7. Zoom in to check centring (scale  $\sim$  5)
  - D8. If not using the **ADC**, repeat centring until you achieve close to perfect centering.
- E. If executing an **OB** with the **ADC**
  - E1. Go to screen **FEROS BOB, virtual desktop bob+gen. state**
  - E2. Click **OK** on the first pop-up asking for guiding
  - E3. Wait for the first exposure to start
  - E4. In **FEROS General State**, click **PAUSE**
- F. Proceed with guiding as for a **WFI OB** (Procedure **6.3**, p. **55**).
- G. Recentre the target on the fibre
  - G1. Go to the workstation **Telescope Control Software**.
  - G2. On the **TCS Main Panel** find the virtual racket.
  - G3. Select **Offset** and tick checkbox **Combined Offsets**.
  - G4. Enter offset values for both axes (0.3) and click **Store**.
  - G5. While monitoring the **FEROS AG Real Time Display** on screen **Autoguider GROND &**

- FEROS, use arrows to centre the target  
 A full fibre width is 5 arrow clicks.  
 Keep in mind the centring will have a delay of 10–15 s.
- H. Attend the OB on screen FEROS BOB, **virtual desktop** bob+gen. state
    - H1. If using the ADC, click CONT in the FEROS General State
    - H2. Click OK on any pop-up asking for centring on the fibre
  - I. When the OB is finished, turn off the WFI autoguider
    - I1. Go to the Control **virtual desktop** of screen Telescope Control Software
    - I2. On the TCS Control Panel, below Autoguider, click OFF
    - I3. Check that Ag Stat turns to Not\_active

## 6.3 GROND

### 6.3.1 Switching to GROND

You can start an OB once point A has been done. This minimises overheads by parallelising **preset**, mirror movements, and autoguiding configuration. If the Moon is between the first target and the current position or you are on a bright star, you should manually preset with the **main cover** closed to avoid blinding the IR detector.

#### Procedure 6.9. Switch to GROND observations

- A. Ensure the **GROND main cover** is closed to avoid **pointing** at a bright target with open shutters  
 Your FEROS targets may be very bright or you might slew over the moon in your first GROND observation.
  - A1. Go to screen GROND BOB.
  - A2. In a terminal, type **grondMC CLOSE**.
  - A3. Wait for cover to close (10-15 s) on panel **GROND General State**  
 Due to a bug, it will say Moving, Open, then Closed
- B. There is no need to switch the **pointing model** to **GROND**  
 GROND does it automatically, but you can do it to be consistent with FEROS and WFI.
- C. To gain time, ensure the **GROND M3** mirror is on **GROND**
  - C1. Go to window **GROND General State** on screen GROND BOB
  - C2. If **M3** says WFI, send it to GROND.  
 In a terminal, type **grondM3 GROND** and wait for it to go from MOVING to GROND
- D. Check that **WFI AG** is off
  - D1. Go to the Control **virtual desktop** of screen Telescope Control Software
  - D2. On the **TCS Control Panel**, below Autoguider, check that Ag Stat is Not\_active
  - D3. If active, click OFF
- E. Set up the autoguider
  - E1. Go to the **GROND virtual desktop** of screen Autoguider GROND & FEROS
  - E2. Set up the autoguiding properties. (See Fig. 2.5, p. 32)
    - a. Go to window Autoguider,  
 If necessary open it with left-click mouse menu CAM user→Autoguider.
    - b. Change the guiding unit to **GROND**  
 Select GROND under Guiding unit in the CCD Control area.
    - c. Select autoguiding loop times.  
 Under Autoguider control fill in the numbers from top to bottom  
 8, 4, 1 is usually fine, then 1 can be increased or decreased (0.001–3.999) depending on guide star.
    - d. Restart exposure so that guider takes new values into account.

- If CCD Status is Infinite loop, click Stop exposure
  - Wait a few seconds for it to change to Inactive (check the exact word)
  - Click Start exposure.
- E3. Set up the autoguider real time image.
- a. Go window Telescope R.T.D.  
If necessary open it with window menu CAM User→Autoguider RTD Grond
  - b. Activate the guide camera image flow if necessary.  
Use window menu TCS→Attach camera.
  - c. Ensure autoguider refreshes image  
On the Autoguider control the checkbox Display Enable should be red
- E4. Ensure the reference picking window **Pick Reference Star** is open  
If necessary open it from **rtd** with window menu TCS→**Pick Reference Star**
- F. Start the observation
- F1. Go the the bob+gen state **virtual desktop** of screen FEROS BOB
  - F2. In bob, fetch **OB** and click **Start**
  - F3. Wait for **preset** to near or reach target  
Look on the Rose Diagram of the **TCS Setup Panel** on the TCS screen.
  - F4. Open the **main cover**
    - a. Go to screen **GROND BOB**.
    - b. In a terminal, type **grondMC OPEN**.
    - c. Wait for cover to close (10-15 s) by checking value on panel **GROND General State**  
Due to a bug, it will say Moving, Closed, then open Open.
  - F5. Acquire guide star is needed or asked

### 6.3.2 React to an automatic trigger

When the **RRM** of **GROND** is activated, it is possible that the detection of a transient by a satellite sends an automatic notice that will result in GROND taking command of the telescope.

#### Procedure 6.10. React to an automatic trigger

- A. Check that your exposure is being read out automatically, if not, do it manually
  - (**FEROS**) click END on **FEROS General State**
  - (**WFI**) click END on **WFI General State** panel.  
If WFI wasn't read out and **preset** is started, frame is lost.
- B. Click **OK** on the trigger to start **preset**.  
Preset will be automatic after 30 seconds.
- C. Set up the autoguider (unless you were observing with GROND).  
Go to the screen **Autoguider GROND & FEROS**
- D. Switch off the **WFI** autoguider if needed
  - D1. Set up the autoguiding properties. (See Fig. 2.5, p. 32)
    - a. Go to window **Autoguider**, open it if necessary.  
To open: left-click on the background, choose **Autoguider** from menu **CAM user**.
    - b. Change the guiding unit to **GROND**  
Select **GROND** under **Guiding unit** in the **CCD Control** area.
    - c. Select autoguiding loop times.  
Under **Autoguider control** fill in the numbers from top to bottom  
8, 4, 1 is usually fine, then 1 can be increased if necessary.
    - d. You may need to **Start exposure**.
  - D2. Set up the autoguider real time image.
    - a. Go window **Telescope R.T.D.**, open it if necessary.

- To open: left-click the screen background, choose Autoguider RTD Grond from menu CAM user.
- b. Activate the guide camera image flow if necessary.  
Use window window menu TCS→Attach camera.
- D3. Ensure the reference picking window is open
- a. Look for window: [Pick Reference Star](#)  
To open: from rtd window use window menu TCS→[Pick Reference Star](#)
- E. Start the guiding (Sect. 6.3.3, p. 65 below).

### 6.3.3 Guiding

#### Procedure 6.11. Guide with GROND

- A. Prepare the guiding field
  - A1. Go to [Telescope R.T.D](#) on screen Autoguider GROND & FEROS, [virtual desktop](#) GROND AG
  - A2. Set the scale to 1/2
  - A3. Set cuts ([Autoset Cut Levels](#))
- B. Adapt guiding integration time to the guide star brightness
  - B1. In [Autoguiding](#) window, fill values
    - a. Correction Time (usually 8)
    - b. Loop Time (usually 4, must be  $\leq$  Correction Time)
    - c. Integration time (depends on star, must be  $<$  Loop Time)
  - B2. Click Apply
- C. Acquire a guide star
  - C1. On the [Pick Reference Star](#) window, click Pick Object  
(It can be open from the [Telescope R.T.D](#), using window menu TCS→[Pick Reference Star](#))
  - C2. Click on a star at least 100 pixels off any border
  - C3. On the [Autoguiding](#) window, click Start guiding.
- D. Ensure that brightness is sufficient for guiding
  - D1. In window [Telescope R.T.D](#) check that counts are  $\gtrsim 4000$ .
  - D2. In [Autoguiding](#) window, adapt Integration time
  - D3. Click Set Int. time.
  - D4. If you need an integration time larger than Loop time,
    - a. Click Stop guiding
    - b. Perform point B again with larger values (e.g. 8, 8, 7.99)
    - c. Click Start guiding
- E. If running the [acquisition](#) of an OB
  - E1. Go to screen GROND, first [virtual desktop](#)
  - E2. Click OK if there is a pop-up asking for guiding.

## 6.4 All instruments

### 6.4.1 Run an observing block

There are three ways to run an OB: use a [template](#) in [bob](#) and modify it on the fly; call it from [p2pp](#); call it from the [ot](#) execution sequence. The last method allows to automatically fetch and run OBs in a sequence, without lost time, but popups must be attended, of course.

### 6.4.2 Skip the preset

If the telescope is already on the right target, you can skip the [preset](#) when starting an [OB](#). For observations requiring guiding, you should make sure that it is already on or acquire it right after the first exposure begins. On [WFI](#), it should be avoided if the observing [template](#) sets RETURN to F (false) and [pointing](#) position is important.

#### Procedure 6.12. Skip the preset

- A. Generic method
  - A1. In [bob](#), open the acquisition [template](#)  
Use left click on the triangle.
  - A2. Edit the PRESET field to F  
You need to set bob to “engineering” mode.  
Middle click on the value, it should be T by default.
  - A3. Start the guiding if needed  
For [WFI](#), see quick guiding Procedure 6.4, p. 58
  - A4. Start the [OB](#).
- B. Standard observation with FEROS or GROND
  - B1. In [bob](#), deactivate the [acquisition template](#)  
Use right click on the triangle.
  - B2. Ensure guiding is working if needed
  - B3. Start the OB.



## 7 — Morning: Closing & Calibrations

### 7.1 Panels referred to

When closing, you may need panels that are not automatically opened at startup. Here is how to find and open them.

- A. On the [TCS](#) screen, ensure that the [Auxiliary Functions](#) (Fig. 11.5, p. 106) is open.  
If not, left-click on an empty region and select window menu TCS User→Panels→ux Functions.
- B. On the [Windows desktop](#), ensure mozilla shows the [dome webcam](#) (Fig. 11.14, p. 113).  
The tab named TRENDNET... can be opened with bookmark Dome Webcam.
- C. On the [Windows desktop](#), ensure mozilla has a tab with [Dome Auxiliary Functions](#).  
Tab tab named ADAM 6000... can be opened with bookmark Dome Controls (Fig. 11.13, p. 112).

### 7.2 Telescope

To put the telescope to a safe parking position one has to follow steps in a definite order, in particular, it is best to close the [main mirror cover](#) before anything else. (Except in an emergency closing of the dome.)

#### Procedure 7.1. Close the dome.

- A. Close the [main mirror cover](#).  
In the [TCS Setup Panel](#) (Fig. 11.2, p. 102), click Close below Main Mirror Cover.
- B. Wait  $\approx 2$  min until it says closed.  
In the same panel, it should state Closed below Main Mirror Cover.
- C. Park the telescope.  
In the same panel, click Zenith under Fixed preset.
- D. Wait for preset to complete.  
In the [TCS Control Panel](#), the telescope should be at the zenith in the [rose diagram](#).
- E. Put the dome in manual.  
In the [TCS Setup Panel](#), click the Manual checkbox under Dome.
- F. Close the [dome slit](#).  
In the same panel, click Close under Slit.
- G. Switch on the light in the dome (Fig. 11.14, p. 113).  
In the [Auxiliary Functions](#) (Fig. 11.5, p. 106), select 200V under Flat Field Lamp.

H. Check the dome slit is closed and telescope at zenith

Use the [dome webcam](#) (Fig. 11.14, p. 113) on the mozilla tab TRENDNET on the [Windows desktop](#).

I. Switch off the light in the dome.

In the [Auxiliary Functions](#), select OFF under Flat Field Lamp

If the panel is frozen, you can execute commands from a terminal, in directory bin: closemirror, presetzenith, closeslit, domemanual. Or you can try to revive the panel (See Procedure 10.27, p. 88).

If nothing works, you must ask for support from an ESO [telescope and instrument operator \(TIO\)](#). ESO is still responsible for the safety of the facilities.

### 7.3 Instruments

One should close the [protective shutter](#) of [WFI](#) and [main cover](#) of [GROND](#), cut the communication between instruments and [TCS](#), and ensure mirrors let light directly to [WFI](#) for [dome flat fields](#).

#### Procedure 7.2. Put the instruments offline

A. Close the [WFI protective shutter](#).

Check on the [WFI General State](#) panel in the [WFI monitor](#) (Fig. 11.8, p. 108) that [Protective Shutter State](#) is CLOSED.

If not, go to [Auxiliary Functions](#) (Fig. 11.5, p. 106) and CLOSE the [WFI Protective Shutter](#).

B. Deactivate [FEROS](#) communication.

In the [FEROS control panel](#) (Fig. 11.9, p. 109) select from window menu [Telescope](#)→[IGNORE](#).

C. Deactivate [GROND](#) communication.

In the [GROND General State](#) panel (Fig. 11.11(b), p. 111), click [RRM STANDBY](#) and [TCS OFF](#)

D. With [GROND](#), close the [cold shutter](#) and [main cover](#).

In a terminal, type [grondCS CLOSE](#) and [grondMC CLOSE](#).

E. Ensure [FEROS](#) [mirr3](#) mirror is not in the way.

In panel [FEROS General State](#) (Fig. 11.9, p. 109), [M3 Selection Mirror](#) should state [WFI](#)

If not, int the [FEROS ICS Control](#) control panel (Fig. 11.10, p. 110), check the [mirr3](#) box, select [WFI](#), click [SETUP](#).

F. Ensure [GROND M3](#) mirror is not in the way.

In panel [GROND General State](#) (Fig. 11.11(b), p. 111), [GROND M3](#) should state [WFI](#).

If not, type [grondM3 WFI](#) in a terminal.

### 7.4 Dome

Turn off ventilation and hydraulics using the [Dome Auxiliary Functions](#) ([Windows desktop](#), Fig. 11.13, p. 112). If it is required, use the good seeing password.

A. Turn off the dome ventilation.

Click [Dome Air](#) if the button just above it is green.

B. Turn off the hydraulics.

Click [HydrOff](#). The button above [Hydr](#) should go red.

### 7.5 Tidying folders

Scripts move the data of the previous nights are to a sub-directory directory and and remove old ones (already in the ESO archive) if disk space is needed. It can be done any time (night, day) on a daily basis

for WFI and FEROS. The GROND team manages the data.

#### Procedure 7.3. Tidy folders

- A. On the **WFI** screen, type `~/bin/sciopsTidyMess.sh` in a terminal (wfi xterm).
- B. On the **FEROS** screen, type `~/bin/sciopsTidyMess.sh` in a terminal.

## 7.6 Health checks & internal calibrations

Launch health checks and internal calibrations.

#### Procedure 7.4. Launch morning health checks and internal calibrations

- A. Run **FEROS** linearity check.  
In **bob**, load and run the daily linearity **OB** using Fetch an OB from file.  
Name is `linearity-#-weekday` where `weekday` is that at the start of the night.
- B. Run the **WFI** health check, biases, and dark.  
In **bob**, load and run the daily calibration OB using Fetch an OB from file.  
Name is `WFI_cal_#-weekday` where `weekday` is that at the start of the night.
- C. Run **GROND** calibrations.  
In **GROND bob**, load and run `GROND_cal.oob` using Fetch an OB from file  
`(.../TEMPLATES/OBD/)`.





## 8 — Managing observing blocks

### 8.1 Transferring OBs from one's laptop

#### 8.1.1 Standard way

##### Procedure 8.1. Transfer OBs from one's computer to the telescope, using p2pp check-in

- On your laptop's [p2pp](#) select all your [OBs](#).
- Use window menu [File](#)→[Check\\_in](#)
- Use window menu [Readme](#)→[CheckIn](#) [Readme](#) if necessary
- If using [ot](#) (advised)
  - From main [ot](#) window, use window menu [Queues](#)→[Repository Browser](#)
  - Select [OB](#) name checkbox in the Repository Browser window
  - Empty all fields and enter your [p2pp](#) username
  - Click [Query](#)
  - Select all the [OBs](#) you need with the mouse (they should have status [Defined](#))
  - Select [Mark Status](#) and chose ([V](#)erified)
  - Select the same [OBs](#) again
  - Append to queue, typically [MPIA-YYYY-MM](#) (named by year and month)
  - Find the window corresponding to this queue and use window menu [Queue](#)→[Save](#)
- If using [p2pp](#)
  - TBW

#### 8.1.2 Loading manually

If this fails, for instance for [OBs](#) longer than one hour, you should ssh them from your laptop and load them manually into the dhs computer.

##### Procedure 8.2. Transfer OBs from one's computer to the telescope, using manual file transfer.

- Check that your laptop accept ssh connections.
- Connect it to the cable network.
- Find your laptop's IP address. With linux or mac, [/sbin/ifconfig](#) or [ifconfig](#) should give it.
- On the [p2pp](#) machine create a directory let's say [/yourusername/OBs](#)
- On the same machine, type [scp -r yourlogin@youripaddress:pathtoOBs /yourusername/OBs](#)

and type your password.

- Open [p2pp](#) with your credentials
- Select your program ID on the left column
- Use window menu **File**→**Import**

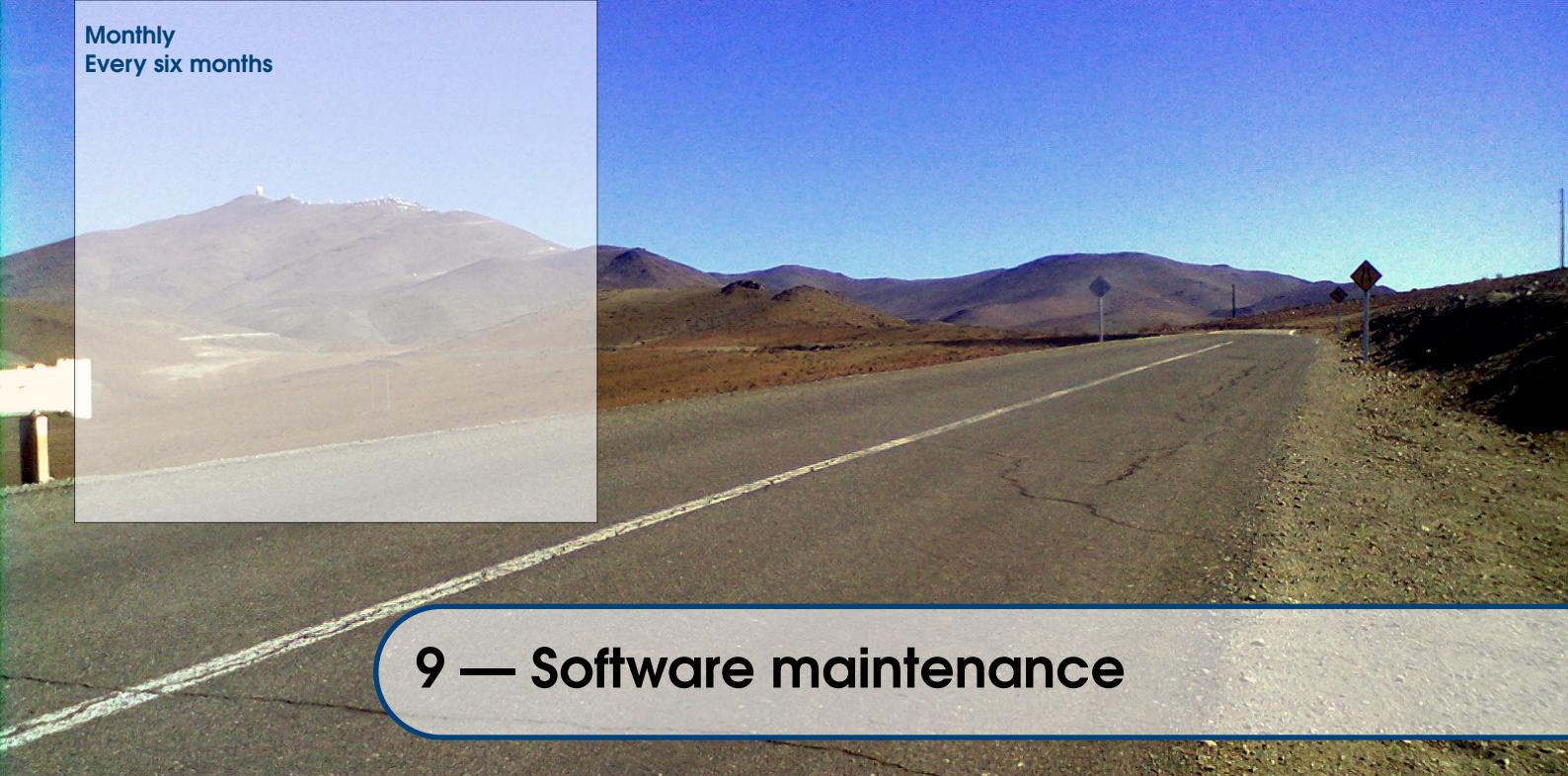
Note: if you cannot activate ssh services on your laptop, use a USB stick and someone else's computer. Alternatively, send an e-mail you will open on the p2pp machine (not advised).

## 8.2 OT

On the [p2pp](#) machine, there is a [virtual desktop](#) to use [OBs](#) from the observing tool ([ot](#)). In the Repository Browser of the [ot](#), find your OB using fields such as instrument, period, ID, username, position, etc. Click on the OB and then on a tab called Execution Sequence that it is in the same panel.

There should be an open window which is called Execution Sequence. The selected [OB](#) will be listed there, maybe with a list of others. Use the buttons move up (or move down) to move the OB you want to run next to the top of the list since it has to be the first one.

Then, go to [bob](#) and use the window menu **Configure**→**Environment**. In the Process tab change [p2pp](#) by [ot](#). Now you can fetch the [OB](#) from [ot](#).



## 9 — Software maintenance

### 9.1 Monthly

About once a month a software maintenance should be done for prophylaxis.

#### Procedure 9.1. Monthly software maintenance

- A. Stop some processes and applications (2 min)
  - A1. On the p2pp/ot screen, exit applications
    - a. Locate the main **ot** window with the execution sequence and exit it.
    - b. Locate any open **p2pp** window and exit it
  - A2. On the pipeline screen, stop pipeline processes
    - a. Open or locate a terminal
    - b. Type **doControl stop**
    - c. Type **stopRBS**
  - A3. On the FEROS DRS screen, stop data processes following the first two points of Procedure [10.16](#), p. [83](#)
    - a. Stop and close the **data subscriber** and the **FEROS DRS** panel (point **A**)
    - b. Kill processes and remove lock files (point **B**)
- B. Exit all sessions except **GROND** (1 min)
  - B1. On the **TCS** screen, exit the X environment
  - B2. On the **WFI** screen, exit the X environment
  - B3. On the **FEROS** screen, exit the X environment
  - B4. On the **GROND** and **FEROS AG** screen, exit the X environment
  - B5. On the **GROND** screen, exit the X environment
  - B6. On the p2pp/ot screen, exit the X environment
  - B7. On the pipeline workstation, exit the X environment
  - B8. On the **FEROS DRS** workstation, exit the X environment
- C. Power cycle all black Dell boxes except **GROND**'s (2 min)
- D. Log into all sessions (2 min)
  - D1. On the **TCS** screen, login as **tcs**
  - D2. On the **WFI** screen, login as **wfi**
  - D3. On the **FEROS** screen, login as **feros**
  - D4. On the **FEROS** and **GROND AG** screen, login as **cam**

- D5. On the GROND screen, login as grond
- D6. On the p2pp/ot workstation, login as dhs
- D7. On the pipeline workstation, login as pipeline
- D8. On the FEROS DRS workstation, login as astro
- E. Reboot workstations (except GROND)
  - E1. On the TCS screen, open a tcs terminal and type reboot
  - E2. On the WFI screen, open a wfi terminal and type reboot
  - E3. On the FEROS screen, open a feros terminal and type reboot
  - E4. On the FEROS DRS screen, open a terminal type reboot as root
  - E5. On the pipeline screen, open a terminal type reboot as root
  - E6. On the p2pp/ot screen, open a terminal type reboot as root
- F. Wait for the reboots to complete (20–30 min). You can check with any of the following:
  - The terminal disappears when clicked on
  - From a grond terminal, type ping <machine>.
    - <machine> can be w2p2tcs, w2p2ping (WFI), wferos, w2p2dhs (OT/p2pp), w2p2p1 (pipeline), w2p2off (FEROS DRS).
    - Reboot is not done if No route to host is answered.
    - When ping starts sending internet speed stats reboot is almost complete (less than one minute left).
- G. Restart some processes and applications
  - G1. On the p2pp/ot screen, open ot
  - G2. On the pipeline workstation
    - a. Open a terminal
    - b. Type dhsSubscribeControl start pipeline -backsince <date> pick <date> a few days ago
    - c. Type doControl start wfi,feros
    - d. Type startRBS pipeline.config
  - G3. On the FEROS DRS workstation, follow the last point of Procedure 10.16, p. 83 in order to
    - a. Open and configure data subscriber (point C1)
    - b. Open the FEROS DRS panel (point C2)
- H. Perform a full TCS restart

## 9.2 Every six months

Every six months a weekly software maintenance has an additional step with the reboot of the user workstation.

### Procedure 9.2. Monthly software maintenance

- A. Stop processes and exit sessions (steps A–B of Procedure 9.1, p. 73)
- B. Have a reboot of the user workstation done (15 min?)
- B1. Contact IT at Paranal (Josefina Urrutia)
- B2. Coordinate a reboot of user workstation uws2p2
- B3. Wait for their confirmation that it is done
- C. Power cycle dell boxes, log into sessions, reboot workstations, restart processes, and start-up TCS (steps C–H)

No flux or little flux  
Autoguider camera fails  
OB doesn't work  
Focus issues  
FEROS ADC  
FEROS-DRS  
Startup issues  
TCS issues  
GROND issues  
Freezing issues  
Pointing issues  
Web pages  
ESO database issues



## 10 — Troubleshooting

### 10.1 No flux or little flux

#### Procedure 10.1. Investigate and fix the reason for the absence of flux in an instrument

. Ensure that

- the dome slit is OPEN ([TCS](#) setup, Fig. 11.2, p. 102).
- the dome is on automatic ([TCS](#) setup, Fig. 11.2, p. 102) and the slit is aligned ([TCS](#), Fig. 11.1, p. 101).
- the Main Mirror Cover is OPEN ([TCS](#) setup, Fig. 11.2, p. 102).
- the `mirr3` mirror is on [WFI](#) or [FEROS](#) ([FEROS ICS](#), Fig. 11.10, p. 110) if observing with [WFI](#) or [FEROS](#). If necessary, click its checkbox and SETUP.
- the `M3` mirror is on [GROND](#) if observing with [GROND](#) and on [WFI](#) otherwise ([GROND](#) control, 11.11(b)). Use `grondM3` [WFI](#) or `grondM3` [GROND](#) in the terminal if necessary.
- ([WFI](#)) the protective shutter is OPEN ([Auxiliary Functions on the TCS machine](#), 11.5).
- ([GROND](#)) the main cover and cold shutter are OPEN ([GROND](#) control, Fig. 11.11(b), p. 111). Use `grondMC` OPEN and `grondCS` OPEN in the terminal if necessary.
- ([GROND](#)) If images look like biases, restart [FIERA](#).

On the [FIERA](#) Control Panel do Shutdown / Startup.

### 10.2 Autoguider camera fails

The [GROND](#) and [FEROS](#) autoguider use the same system on screen Autoguider GROND & FEROS, between the GROND and FEROS screens. [WFI](#) has its own system on screen Telescope Control Software.

It is possible to go on observing with GROND and FEROS while restarting the autoguider ([Technical CCD](#)), provided that the modules are deactivated on the [TCS](#). However, you need to reactivate them to do the last step of restarting the autoguider (`glse2p2StartTCCDs`).

#### Procedure 10.2. Observe when the autoguider fails

- A. On screen Telescope Control Software go to Status [virtual desktop](#)
- B. On the [TCS Status Panel](#) locate the modules section (Fig. 11.4, p. 104)

- C. Check ignore for the corresponding modules
  - For **GROND**, `ag_ccdGRND` and `ccdGRND`
  - For **FEROS**, `ag_ccdGRND` and `ccdGRND`
- D. Remember to uncheck them for `e2p2StartTCCDs` to work!

## 10.2.1 GROND

If you want to observe while fixing the issue you need to deactivate the modules in the **TCS**, see Procedure 10.2, p. 75. You will need to uncheck them just before starting the guider software with `e2p2StartTCCDs`.

### Procedure 10.3. Restart the GROND autoguider

- A. If in a hurry try the quick restart (1–2 min)
  - A1. On screen Autoguider GROND & FEROS, find or open a terminal.
  - A2. Stop the GROND **Technical CCD**  
Type `e2p2StopTCCDs gag` and wait for command to finish
  - A3. Start the GROND **Technical CCD**  
Type `e2p2StartTCCDs gag` and wait for command to finish
- B. If you have time or A does not solve the issue, go for the full restart (3–4 min)
  - B1. On screen Autoguider GROND & FEROS, find or open a terminal.
  - B2. Type `lccBoot 12p2agr`
  - B3. Wait for the command to finish (1–2 min)
  - B4. Type `scanei` to open the scanei GUI
    - a. Check that `l2p2agr` is ENABLED
    - b. If not, enable `l2p2agr` (see Fig. 10.2, p. 94)
    - c. Close the GUI
  - B5. Start the **Technical CCD** with command `e2p2StartTCCDs gag`

## 10.2.2 FEROS

If you want to observe while fixing the issue you need to deactivate the modules in the **TCS**, see Procedure 10.2, p. 75. You will need to uncheck them before starting the guider (Technical CCD) with `e2p2StartTCCDs` (step A4).

### Procedure 10.4. Restart the FEROS autoguider

- A. Restart the **AG** software (1–2 min).
  - A1. On screen Autoguider GROND & FEROS, find or open a terminal.
  - A2. Stop the FEROS **Technical CCD** with command `e2p2StopTCCDs fag` and wait for command to finish
  - A3. Start the FEROS **Technical CCD** with command `e2p2StartTCCDs fag`
  - A4. Wait for about 1–2 min for the command to exit successfully.
- B. If the problem persists or an error pops up in step A4, reboot the **AG LCU** (3–4 min)
  - B1. Type `lccBoot 12p2cam` and wait for command to finish (2 min)
  - B2. Type `scanei` to open the scanei GUI
    - a. Check that `l2p2cam` is ENABLED
    - b. If not enable `l2p2cam` (see Fig. 10.2, p. 94)
    - c. Close the GUI
  - B3. Perform steps A1, A3, A4.
- C. If the problem persists, step B1 does not terminate with minutes, or an error pops up at some point in step B, perform a hardware reset of the FEROS AG **LCU** (15 min)

- C1. Go to the FEROS room located in the telescope enclosure.
- C2. Locate the big blue rack tower (Fig. 10.1(a), p. 93).
- C3. On the lower racks, near to l2p2cam label, push a small RST button (Fig. 10.1(b), p. 93).
- C4. Perform steps A1, A3, A4.
- D. If this does not solve the issue, power cycle the LCU (15 min)
  - D1. Go to the FEROS room located in the telescope enclosure.
  - D2. On the back of the rack tower, unplug and replug the lower rack (Fig. 10.1(c), p. 93).
  - D3. Perform steps A1, A3, A4.

### 10.2.3 WFI

Failure of the **WFI** autoguider will generally be silent. It will just do nothing when asked to retrieve field or start monitoring.

If the quick 30 seconds fix does not work, it is not possible to observe with WFI during the 15–35 minute-long fix, but it should be possible to go on with GROND or FEROS with no guarantee though—the **TCS** has the bad habit of communicating with the WFI computers for **focus**.

#### Procedure 10.5. Fix WFI autoguider issues

Try in this order

- A. On the **telescope control software** screen, restart the **autoguider** (30 s)
  - A1. Use left-click menu **Stop Autoguider**
  - A2. Use left-click menu **Start Auoguider**

If window closes quickly (less than 10 s), it is a failure and the next step should be done.
- B. Restart the **WFI Technical CCD**.  
 This should be done if **Retrieve Field** gives the error **Error opening RPC connection** or if point A does not solve the issue.
  - B1. On the **WFI** screen, locate or open a terminal.
  - B2. Stop the **WFI Technical CCD** with command **wfinsStopTCCDS** and wait for it to finish
  - B3. Start the **WFI Technical CCD** with command **wfinsStartTCCDS** and wait for it to complete (2 min)
  - B4. Perform the AG restart of point A
- C. If an autoguider process is suspended, restart the **TCS**
  - C1. In a terminal, type **i**
  - C2. If there is an AG-related suspended process, proceed as follow
  - C3. Deactivate the connection between **FEROS** and **TCS**
    - On the **FEROS** screen (Fig. 1.1, p. 17), locate the **FEROS** control panel (Fig. 11.9, p. 109)
    - Select window menu **Telescope**→**IGNORE**
  - C4. Perform a full restart the **TCS** including **VME** reboot (Procedure 2.1, p. 23)
  - C5. Reactivate the connection between **FEROS** and **TCS**
    - On the **FEROS** screen (Fig. 1.1, p. 17), locate the **FEROS** control panel (Fig. 11.9, p. 109)
    - Select window menu **Telescope**→**ENABLE**
- D. Reboot the **WFI** SPARC station and dependencies (15–35 min).
  - From a terminal type **rlogin wffcd -l fcdrun**
  - Once logged in, type **reboot**
  - Wait for reboot to complete (a few minutes)  
 In a terminal type **ping wffcd** and wait until it shows packets.
  - Reboot **WFI** computer (a few minutes)  
 On screen **Wide Field Imager**, type **reboot** in a terminal.
  - Do the **WFI** weekly startup (10 min)

- Restart the TCS or just autoguider (see point 1 A), not sure here if TCS restart is needed.

## 10.3 OB doesn't work

### 10.3.1 OB gives an error when started

If an OB issues an error within seconds of being started.

#### Procedure 10.6. Fix OB start error

- If OB was already executed or aborted, click Reset status.
- Check that the object is observable (above 20 degrees).
- If telescope preset is needed, check that the communication with the TCS is on
  - (*FEROS*) Use window menu Telescope→Enable.
  - (*GROND*) Click TCS ON.
- If telescope preset is not needed (e.g. calibrations), deactivate it in
  - (*FEROS, GROND*) Right-click the triangle of the acquisition template. (A thumb down should appear. If you get a stop, go on clicking.)
  - (*WFI*) Set PRESET.NEW to F in the acquisition template.  
(This needs window menu Interface→Engineering.)

### 10.3.2 OB stalls before starting to observe

It may happen that an OB stalls, that means, nothing is happening. No error is reported but the telescope does not move, no integration seems to take place and the bob windows has stopped to give information about what is going on.

#### Procedure 10.7. Fix stalling of an OB

- (*WFI, FEROS*) Try to find a hidden pop-up asking for interaction (behind a window).
- (*WFI*) If OB stalls when focus order is sent by bob, set it manually.  
In the TCS screen, enter focus value in the TCS Control Panel (Fig. 11.1, p. 101).  
Note: A permanent fix is to restart the TCS (see Sect. 10.8.3, p. 87).
- (*GROND*) If IR exposure does not start after the optical one has, reset the IR flip mirror.  
In a terminal, type grondFM

### 10.3.3 Crash before an exposure

Here are possible fixes, from shortest to longest. Try each one in this order, until problem is fixed.

#### Procedure 10.8. Investigate and fix a crash occurring before the start of an optical exposure

- Close bob and launch a new one.
- FEROS**
  - Restart FIERA  
On the FIERA Control Panel do Shutdown / Startup.
  - Restart the instrument with telescope enabled  
(In particular if the second exposure of the night fails.)
    - On the FEROS General State panel, use window menu Telescope→enabled.
    - Do the full start-up procedure.
- GROND**
  - If error closing w2p2cam environment
    - If a FIERA exposure is running in GROND General State, click End or let it finish.
    - Type grondSHUTTER in a terminal.

- C2. If the error mentions **IRACE**
  - a. Go to monitor GROND IRACE.
  - b. Locate the Infrared Acquisition Module (Fig. 11.12(b), p. 111)
  - c. Click Reset on the lower left part of the panel
  - d. Select from window menu Online→Online
  - e. If it fails, you may need ≈ 40 min to deep restart (Procedure 10.32, p. 90) IRACE.
- C3. Ensure only one **bob** is running
  - a. Find all **bobs** (`ps aux | grep bob`)
  - b. kill them
  - c. launch a new **bob**.
- C4. (**GROND**) Restart **FIERA** (see B1).
- C5. (**GROND**) Restart **GROND**.
  - a. Type `grinsStop`
  - b. Type `grinsStart`
  - c. In GROND General State panel, put instrument ONLINE.
- C6. (**GROND**) Reboot **GROND**.
- C7. (**GROND**) If the GROND control has many TCS-related fields with gray background or the error says something about the FITS keyword TELESCOP, a last resort reboot of GROND may be needed. **BUT** in case of the first scenario, take a separate exposure with **FIERA** (in the control panel) first and check if these fields turn back to their usual color.

#### D. **WFI**

- D1. Abort a possible running exposure manually, in particular if **bob** issues the error message “Cannot start exposure before the last one has read out” or some equivalent message (10 sec)
  - a. On the **WFI ICS Control** (Fig. 11.6, p. 106) click Abort Exp./Seq.
  - b. The GUI should display the text ABORT > INVOKED
  - c. Wait for a few seconds for the answer ABORT > REPLY/ L OK.
  - d. If it works, problem is solved, if not go to next point.
- D2. Do a DAILY startup of **WFI** (5 min).
- D3. Do a full restart of **FIERA** and **WFI** (10-15 min).
  - a. Go to a wfi terminal or open it from menu wfi xterm.
  - b. Shut down the instrument.  
Type `wfinsShutDown`
  - c. Check that the environment are enabled.
    - (i) Type `scanei &`
    - (ii) Go to the opening GUI titled CSS Scan System.
    - (iii) Check that `wwffcd` and `w2p2tcs` are ENABLED
    - (iv) If either environment is DISABLED, proceed with these points
    - (v) Click on DISABLED
    - (vi) In emerging GUI, click Enable just below Environment.
    - (vii) Close it with window menu File→Quit.
    - (viii) Close CSS Scan System with window menu File→Quit.
  - d. Restart the CCD managing components
    - (i) Stop **Technical CCD** by typing `wfinsStopTCCDS`
    - (ii) Stop **Science CDD** by typing `wfinsStopTCCDS`
    - (iii) Start SCCDs by typing `wfinsStartSCCDS`
    - (iv) Start TCCDs by typing `wfinsStartTCCDS`
  - e. Restart the instrument.  
Type `wfinsStartUp`.
  - f. Restart the **AG**

- (i) Go to screen Telescope Control Software.
  - (ii) Left-click on an empty space to open the menu TCS User.
  - (iii) Use window menu TCS User→Stop autoguider.
  - (iv) Use window menu TCS User→Start autoguider.
  - g. Open missing windows on screens Wide Field Imager.
    - (i) **bob** with left-click mouse menu WFI User→WFI→BOB (WFI).
    - (ii) **rtd** with left-click mouse menu WFI User→WFI→WFI RTD.
  - h. Take a test bias.
- D4. Restart the instrument. You will need to restart the autoguider on the **TCS** machine.

#### 10.3.4 Crash during an exposure

##### Procedure 10.9. Fix a crash during an exposure

###### A. FEROS

- A1. **OB** crashes with “error closing cam environment” while an exposure (usually the first of the night) is running
- a. Let the current exposure finish and read out, it will be fine.
  - b. In the meantime, close and relaunch **bob**.

###### B. WFI

- B1. **WFI stalls** just before the read out of an exposure.  
Abort it manually, if unsuccessful restart **FIERA** (follow point D in Sect. 10.3.3, p. 78)

###### C. GROND

- C1. **OB** crashes with “error closing cam environment” while an optical exposure is running
- a. End the optical exposure (if it’s a long one)  
On the grond control panel, click END.
  - b. Wait for exposure to read out
  - c. Restart the **OB** without presetting  
(In **bob** deactivate preset and reset status.)
- C2. **OB stalls** or crashes during an exposure
- a. In a terminal, execute **grondFM** to reset the **flip mirror**. If issue is not fixed, proceed.
  - b. Close and/or kill all **bob** instances  
Find them by typing **ps aux | grep bob** in a terminal).  
Kill them with **kill -9 <pid>** where **<pid>** is the job number.
  - c. Launch **bob**  
Type **bob &** in a terminal.
  - d. In the same terminal, execute **grondGRI** and **grondSHUTTER**
  - e. Wait for **grondSHUTTER** command to end (10 s to 1 min).

#### 10.3.5 Crash during telescope offset

Here are possible fixes, from shortest to longest. Try each one in this order, until problem is fixed.

- Close **bob** and launch a new one. (Works with **WFI**).
- Restart the **TCS** (see Sect. 10.8.3, p. 87).

#### 10.3.6 Crash during a telescope focus offset

If a timeout error occurs relating to **FOCOFF** or some message about **focus** that cannot be done:

- (**GROND**) Disable and enable **w2p2tcs** in **scanei**.
- (**WFI**) See Sect. 10.4.3, p. 81.

### 10.3.7 Crash at the beginning of sky flats

If the [OB](#) crashes before the pop-up asking for manual preset, it means bob must be killed and the [sky flat fields](#) OB restarted.

### 10.3.8 Crash during filtre change in WFI

#### Procedure 10.10. Fix a WFI filtre change crash

If the [OB](#) crashes at the moment to change the filtre using [WFI](#) and the [Filter Name](#) status is Moving on the [WFI General State](#) panel (Fig. 11.8, p. 108)

- A. On the [WFI ICS Control](#) (Fig. 11.6, p. 106), select the filtre on the Filter option below Setup Instrument.
- B. Click on the Apply button.
- C. Wait for filtre Filter Name to change from Moving to selected filtre (up to 2 min)
- D. In case of error: “icswsERR\_MOVE\_FILTER : Error during movement of filtre. ErrNo:7 ErrString: NO DETECTION”, reset the filtre controller
  - D1. On the [Auxiliary Functions](#) (Fig. 11.5, p. 106) in the [TCS](#), click on the RESET button below WFI FILTER CONTROLLER.
  - D2. Repeat steps A–C.

## 10.4 Focus issues

### 10.4.1 GROND autoguider defocused

If the [GROND AG](#) is highly defocused:

- When switching from [WFI](#) or [FEROS](#), [focus](#) fixes itself after the observing [template](#) starts.
- If the problem persists, FOC.OFFSET in the [OB](#) allows a manual workaround.

### 10.4.2 Defocused wih FEROS ACS

See Sect. 10.5.2, p. 82.

### 10.4.3 WFI focus sequence fails with a timeout

The [WFI focus](#) sequence may fail to communicate the focus offsets to the telescope. In that case, [bob](#) will display several lines of focus orders ending with a timeout message. Then an error pop-up will appears.

#### Procedure 10.11. Fix the WFI focus sequence timeout

- A. Quick workaround
  - A1. Start a focus OB or restart the crashed one.
  - A2. When the focus sequence starts, repeat the following
    - a. Wait for the previous subexposure to finish  
There is no readout, so messages in [bob](#) should be monitored
    - b. Identify the focus offset required for the new subexposure  
The lower part of [bob](#) will give several lines with current value -> target value, one every few seconds.
    - c. Manually preset the focus to the target value  
In the [TCS Control Panel](#), below M2 Focus, enter the target value and click Preset to.

- A3. Once exposure is read out, proceed as usual (Procedure 5.4, p. 46)
- A4. Science observations will not be impacted.
- B. Clean fix (30 min)
  - B1. Do a full restart of [WFI](#) (10 min)
  - B2. Do a full restart of the [TCS](#) (20 min).
- C. When the problem becomes recurrent, the [WFI](#) workstation should be rebooted.

#### 10.4.4 No focus offset when filters are changed

The [focus](#) sequence is run for a specific filter, when changing filters during an [OB](#), the TCS should apply a focus offset, which should be seen in the [TCS Control Panel](#), M2 Focus. If no offset is applied, check if in the [WFI State Manager](#), the Focusing flag should be True. The ESO people were not really clear on that.

### 10.5 FEROS ADC

#### 10.5.1 ADC cannot be put off

At the start of an observation there is a message that the [ADC](#) cannot be put off. This happens after an observation using the [ADC](#). On the [FEROS ICS Control](#) panel (Fig. 11.10, p. 110) the line adca of the adc field contains ERROR in red.

#### Procedure 10.12. Remove the ADC from the optical path of FEROS

- . Try in order the following items.
  - Manually put it off from the [FEROS ICS Control](#) panel (Fig. 11.10, p. 110)
    - Select the checkbox of adca
    - Select OFF from the menu of adca
    - Click SETUP on the bottom of the panel.
    - Wait for ERROR to be replaced by OFF
  - If it fails with a timeout error, restart the devices on the [ICS Control](#) panel
    - Use window menu Device→Select all devices, then
    - Use window menu Device→OFF
    - Use window menu Device→ONLINE
    - Wait for about one minute for STATE to be ONLINE
  - If in the last step there is an error that one of the devices that cannot be set ONLINE
    - Use menu window menu LCU→Reboot LCU1
    - Use window menu Device→Select all devices
    - Use window menu Device→ONLINE
    - Wait for about one minute for STATE to be ONLINE
  - If problem occurs repeatedly, FEROS needs a restart, and problem should be reported. Risk of the ADC getting physically stuck, needing intervention on the instrument.

#### 10.5.2 Telescope focus is not corrected when ADC enters

Try in order the items of the following procedure.

#### Procedure 10.13. Fix the absence of focusing after FEROS ADC enters

- If no red messages appear below [VME](#) messages, manually preset to the theoretical [focus](#) displayed on the [TCS Control Panel](#)

- If repeated red messages concerning M2 preset appear below **VME** messages on the **TCS Control Panel** (Fig. 11.1, p. 101), break the infinite set-focus loop
  - Under M2 Focus on the same panel, click Set >
  - Click Apply
  - Maybe play around more **presetting** M2 manually until red messages disappear
  - Re-execute the **FEROS OB** from preset.
- If the red messages don't disappear, restart the **TCS** (Sect. 10.8.3, p. 87).

## 10.6 FEROS-DRS

### 10.6.1 FEROS exposure number is close to 10 000

If it goes past 10 000, the reduction software will fail. It is very easy to fix before it has reached the limit.

#### Procedure 10.14. Reset the exposure number

- A. Close the **FEROS DRS**.
- B. Open file /data/reduced/FEROS/.feroNNNN and replace number by 0000.
- C. Open the DRS again.

If the exposure number has reached the limit, the observations for that night will not be reduced, unless the following procedure is performed.

#### Procedure 10.15. Fix a FEROS exposure number going above 10 000

- A. Stop **data subscriber** and **DRS** (point A of Procedure 10.16, p. 83).
- B. Kill processes and tidy lock files (point B of Procedure 10.16, p. 83).
- C. Remove the night directory of the reduced data  
In a terminal, type `rm -rf /data/reduced/FEROS/yyyy-mm-dd`, where the date is yyyy-mm-dd
- D. Change the **FEROS** exposure number (Procedure 10.14, p. 83)
- E. Restart the **data subscriber** (point C1 of Procedure 10.16, p. 83).
- F. Restart the **DRS** (point C2 of Procedure 10.16, p. 83).

### 10.6.2 FEROS DRS fails

Check that

- A full standard calibration has been done  
It should be on the same day with the same setup (binning and readout speed).
- The exposure number is smaller than 10 000.  
In a terminal, write `cat /data/reduced/FEROS/.feroNNNN`.  
If number is above 10 000, go to Procedure 10.15, p. 83.

### 10.6.3 Problems to restart the FEROS-DRS and data subscriber

If you cannot start the **FEROS DRS** this might be for the following reason: when rebooting `w2p2off` without bringing down the pipeline before, a hidden lock file may survive. If all other attempts have failed to start the DRS, follow these steps.

#### Procedure 10.16. Restart the FEROS data reduction software and data subscriber

- A. Stop **data subscriber** and **DRS** at the **DRS** computer (Fig. 10.3(a), p. 95).
  - A1. Stop and close the **data subscriber**  
If window is frozen, you can use `xkill` from a terminal.

- A2. Stop and close the [DRS](#) panel  
If window is frozen, you can use `xkill` from a terminal.
- B. Kill processes and tidy lock files
  - B1. Type `killall -9 ferosReduceQueuedIms`  
It either returns no process killed or nothing.
  - B2. Type `rm -f /data/reduced/.ferosQueueIms/.ferosReduceQueuedIms*.pid`  
It is either silent or gives error no file removed
  - B3. Type `killall -9 ferosQueueIms`  
It either returns no process killed or nothing.
  - B4. Type `rm -f /data/reduced/.ferosQueueIms/.ferosQueueIms*.pid`  
It is either silent or gives error no file removed
- C. Restart the [data subscriber](#) and [DRS](#)
  - C1. Left click start [data subscriber](#) and configure it (Fig. 10.3(b), p. 95).
    - a. Program ID: service
    - b. Observer Name: service
    - c. Rename to Keyword: Name on INS ws
  - C2. Left click start FEROS DRS, start from top to bottom
    - a. Start Queue Image Status
    - b. Start [MIDAS](#) Session Status
    - c. Start Reduced Queued Image

Similarly, when rebooting the [w2p2off](#) with active [data subscriber](#), the watch-dog log file may survive.

Do:

- Start `cd $ DHS_LOG` (which corresponds currently to `/data/msg`)
- Remove the PID files therein

#### 10.6.4 Data won't show up

If data taken with FEROS do not show up in the ESO archive and/or in the FEROS DRS, you will need to restart processes on the data handling machine [w2p2p1](#) (username pipeline).

##### Procedure 10.17. Restart the data handler.

- A. Go to screen [w2p2p1 Pipeline](#)
- B. In a terminal you will need to type some of the following
  - B1. `dhsSubscribeControl start pipeline -backsince <date>`  
where `<date>` in the format YYYY-MM-DD is where you want to start again.
  - B2. (needed?) `pipelineControl stop`
  - B3. (needed?) `pipelineControl start`
  - B4. (needed?) `stopRBS`
  - B5. (needed?) `startRBS pipeline.config`
  - B6. `doControl stop`
  - B7. `doControl start wfi,feros`

## 10.7 Startup issues

### 10.7.1 FEROS

- There is an error about process feoControl stating “accepted PING but did not reply properly within 10000 msec”.  
Restart environment using Procedure 10.18, p. 85.
- There is a problem with the FEROS telemetry at TCS (window should show some graphs, Fig. 10.4(a), p. 95).  
Activate the telemetry using Procedure 10.19, p. 85

#### Procedure 10.18. Restart environment

- Type vccEnvStop -e \$RTAPENV
- Type vccEnvStart -e \$RTAPENV
- Redo the full startup procedure

#### Procedure 10.19. Activate FEROS or WFI telemetry

The **telemetry** module is activated following these steps:

- Go to FEROS or WFI screen
- Open or locate a terminal and type `fcdTelemetry &`
- On the emerging FIERA - Telemetry GUI, press Start
- Close the GUI
- Go to TCS screen
- Close the ESO 220 General Telemetry Panel
- Open or locate a terminal and type `sciops2p2Telemetry &`

### 10.7.2 WFI

The commonest issues are:

- **TCS** is OFF after startup on the **General State** Panel  
This is harmless. Use window menu Gen. Options→Refresh Database Events.
- **WFI** startup stops with an error during **WFI Init/Online**  
It most likely requires a **power cycle** of the **WFI** electronics, see below.

#### Procedure 10.20. Fix WFI init error

- Determine whether WFI passes the hardware self-test
  - Locate or open a `logMonitor`
  - If it was not active, choose to inspect the last 500 lines
  - Find red error “Failed to dispatch command for camera LOADED OK”.
  - Lines below and above contain “C40 ping failed” and “Could not download **FIERA config**”
  - You can also check directly whether WFI passes the self-test  
In a terminal, type `rsh -l fcdrun wfffcd "export DISPLAY=$DISPLAY; fcdtestseq"`
- Reboot the **FIERA** workstation
  - In a terminal, type `rsh -l fcdrun wfffcd reboot`
  - Wait for 1–2 minutes for it to get back online  
You may check in a terminal using `ping wfffcd`
- If **WFI** doesn’t pass the self-test, **power cycle** the WFI electronics
  - Go to the telescope floor
  - Locate the WFI power unit close to the FIERA electronics (Fig. 10.5, p. 96)
  - Switch it off

- C4. Wait for 30 seconds.  
(On a 2nd or 3rd attempt, you may try to unplug/replug the electronics boards if you dare.)
- C5. Switch it on.
- D. If WFI passes the self-test, do a restart of the **FIERA**
  - D1. In a terminal, type `fcdCtrl`
  - D2. On the emerging GUI, click Shutdown
  - D3. On the emerging GUI, click Startup
  - D4. Wait for **FIERA** to restart (1 min ?)
- E. Do a full WFI restart (see Proc. 2.1 point A and Fig. 2.2, p. 29)
- F. You may have to redo steps B–E until WFI can finish the full restart.

### 10.7.3 Hydraulics cannot be switched on/off

If you see that the Loc/Re button is red on the 2.2m Auxiliary Funct on the Windows computer, it means that the hydraulics system is for local control in the dome.

You need to go to the dome.

#### Procedure 10.21. Set the hydraulics for remote control

- A. Go to the dome.
- B. Locate the gray 1.5-metre-high **ADAM** rack (Fig. 1.5, p. 21).
- C. Locate the switch for ADAM Remote / Local (Fig. 10.8, p. 97, lower left).
- D. Put it towards ADAM Remote.

## 10.8 TCS issues

### 10.8.1 Start-up fails with `12p2cam` error

If the start-up stops with error could not send command "PING" to `12p2cam/lccServer`, you probably need to hard reboot the **FEROS AG LCU** in the dome, but try a software reboot first to save time.

#### Procedure 10.22. Fix FEROS AG LCU during start-up

- A. Try a software restart of the **FEROS AG LCU** (likely to fail).
  - A1. On the **TCS** screen, find or open a terminal
  - A2. Type `rsh 12p2cam reboot`  
If it gives an error, proceed to step B
  - A3. Wait for 1–2 min for the reboot to complete
  - A4. Check that the LCU is up using `ping 12p2cam`
  - A5. Press **CONTINUE** in the Start/Shutdown panel  
If it gives the same error popup, proceed to step B.
- B. Go to the dome and try, in that order (see Procedure 10.4, p. 76).
  - B1. A hard reset of the **LCU**
  - B2. A **power cycle** of the **LCU**

### 10.8.2 Start-up fails with telescope not initialised

If the start-up stops with `telescope not initialised`, you probably forgot to switch the hydraulics and/or drives on or the telescope was not parked at zenith.

#### Procedure 10.23. Fix the telescope not initialized popup

- A. Ensure hydraulics and drive are on

- A1. Locate the **Dome Auxiliary Functions** tab on screen Dome webcam & hydraulics.
- A2. Check that the Hydr and Drives buttons are green.
- A3. If not, switch the hydraulics and drives on (step **B1** in Procedure 2.1, p. 23).
- B. Manually initialise the telescope
  - B1. In a terminal type `~/bin/telinit`
  - B2. If an error reads "cannot initialise the telescope at more than 45 degrees from zenith"
    - a. Go to the dome and manually park it (Procedure 10.35, p. 91).
    - b. Repeat step **B1**
  - B3. Wait for 2–3 min for initialisation to complete.
- C. On the error popup, press SKIPIT

### 10.8.3 Quick TCS restart

Many **TCS** issues are solved by a fast restart, with a time loss of  $\approx 10$  min. Before, it is important move the telescope to zenith since one cannot initialize it later if the telescope is at  $\leq 45$  degrees above the horizon.

#### Procedure 10.24. Quick TCS restart

- **preset** to zenith
  - On the **TCS** setup panel (Fig. 11.2, p. 102), click Zenith under Fixed Presets.
  - Alternatively, if panel is frozen, type `~/bin/presetzenith` in a terminal.
- Execute the fast restart.  
Type `e2p2NewStartUp` and wait for it to complete.
- Initialise the telescope  
On the **TCS** setup panel (Fig. 11.2, p. 102) press Initialize under Telescope.

### 10.8.4 No connection with VME

If the **TCS Control Panel** indicates "No connection" in red, just below VME messages, it means that the **TCS** workstation has lost connection to the **VME** (telescope **LCU**). You can try the following:

#### Procedure 10.25. Solve the connection issue with the VME

- A. If you just switched hydraulics on, wait for a few minutes to see if connection is back.
- B. Do a remote reboot of the **VME**.  
Type `lccBoot lte2p2` in a terminal.
- C. Do a manual reboot of the **VME** in the dome.
  - C1. Go to the **computer room** of the telescope enclosure.
  - C2. Locate the **VME** (Fig. 1.4, p. 20) in front of the entrance, slightly to the left.
  - C3. Press the small red/pinkish button (Fig. 10.7(b), p. 97).
  - C4. Locate the **VME** monitor, behind you if you face the **VME**.
  - C5. Wait for boot sequence to finish with "end of boot script" (Fig. 10.7(c), p. 97)

A quick restart the **TCS** (Sect. 10.8.3, p. 87) is generally needed right after a reboot of the **VME**.

### 10.8.5 TCS is OFF on an instrument

The **General State** Panel of an instrument the TCS is in the state **OFF**. You should check the corresponding modules on the **TCS Status Panel**. If red, try to bring them **ONLINE**.

### 10.8.6 Telescope doesn't take focus orders

#### Procedure 10.26. Fix telescope focus issues

- (*WFI*) OB stalls when focus order is sent by [bob](#).  
Set it manually from the [TCS Control Panel](#) (Fig. 11.1, p. 101)
- (*FEROS*) Focus is not corrected after insertion of the ADC.  
See Sect. 10.5.2, p. 82.
- Focus cannot be set from the [TCS Control Panel](#).  
Restart the [TCS](#), see Sect. 10.8.3, p. 87.

### 10.8.7 TCS Setup panel is stuck

If you need to close when the panel is stuck, a few command lines are available in `/home/tcs/bin`: `closemirror`, `closeslit`, `presetzenith`, `domemanual`.

#### Procedure 10.27. Unstuck the TCS Setup panel

- A. In a terminal type `killall rs232`  
If “no process killed” appears, this procedure will not be useful.
- B. If the panel gets stuck again quickly (10–20 s), a restart of the TCS usually fixes the issue.

### 10.8.8 Main mirror cover cannot be moved

If the Main Mirror Cover state in the [TCS Setup Panel](#) says LOCAL you need to go to the dome, close it, and set it to remote control.

If the Main Mirror Cover state in the [TCS Setup Panel](#) stays in MOVING whatever order you send, you need to go to the dome, set it for local control, close it, and set it to remote control.

#### Procedure 10.28. Manually close the main mirror cover

The [main mirror](#) cover is closed following these steps:

- A. Go to the [dome](#)
- B. Locate the gray 1.5-metre-high [ADAM](#) control box (Fig. 1.5, p. 21).
- C. Locate the Main Mirror Cover controls (Fig. 10.8, p. 97, upper right)
- D. If the mirror was MOVING, press the yellow Local/Remote button.
- E. Press the red Mirror Close button.
- F. If any noise is heard, wait for the cover to be closed.
- G. Press the yellow Local/Remote button.

### 10.8.9 Dome doesn't move

If the Dome Status is Local on the [TCS Control Panel](#), it means that the dome is for local control from the dome.

You need to go to the [dome](#).

#### Procedure 10.29. Set the dome for remote control

- A. Go to the dome.
- B. Locate the dome controls (Fig. 1.5, p. 21), placed on the wall opposite to the entrance.
- C. On the dome controls (Fig. 10.9, p. 98) turn the leftmost button from local to remote

### 10.8.10 Dome slit and telescope are not aligned

For small zenithal angles there is an apparent misalignment between [dome slit](#) and telescope orientation as shown on the [rose diagram](#) on the [TCS](#) control panel. It is a normal setting since the telescope is not exactly at the centre of the [dome](#). If you need to avoid the wind you need to orient the [dome](#) manually but be weary of vignetting.

## 10.9 GROND issues

### 10.9.1 GROND M3 is stuck

If [GROND M3](#) mirror cannot be moved with the [grondM3](#) command try in order the items of the procedure below.

#### Procedure 10.30. Unlocking the grond M3 mirror

- Switch back-and-forth using [grondM3](#) WFI and [grondM3](#) GROND.
- Write the mirror position in the database (Fig. 10.10, p. 98)
  - A. In a terminal type `ccsei`
  - B. Click on CCS database monitor
  - C. Look down `Appl_data,GROND,ICS,DEVICES,M3→`.
  - D. Select checkbox Enable Editing
  - E. set `newPos` value to 2 for GROND position or 0 for WFI.
  - F. Check on GROND control that mirror indeed moves.
  - G. Close the GUI.
- Reset the mirror from the dome.
  - A. In the [dome](#), locate the [M3/MC](#) box below the [main mirror](#) (Fig. 1.5, p. 21).
  - B. On the box (Fig. 10.11, p. 99), press the [grondM3](#) WFI button.

### 10.9.2 GROND OB only crashes with TCS on

It sometimes happen that [GROND](#) works well when TCS is OFF (testOB works) but fails when it is ON (testOB fails with a weird TELESCOP keyword error). It can be a very tricky problem, many times solved by a simple restart, but sometimes very persistent.

#### Procedure 10.31. Fix GROND OB crash with TCS on

- A. Restart [GROND](#)  
Use [grinsStop](#), [grinsStart](#), and prophylaxy ([grondSHUTTER](#), etc.)
- B. If the last point doesn't fix the issue, do a full reboot of GROND and TCS
  - B1. Stop the instrument ([grinsStop](#))
  - B2. Reboot the [wgrond](#) workstation
  - B3. Do a full [TCS](#) restart
  - B4. Start the instrument ([grinsStart](#), etc.)
  - B5. Start the logging of the telemetry
- C. If the last point doesn't work, replace the reboot by a last resort reboot
- D. You may need to repeat the steps a few times until it works or you are bussed to a mental institution.

### 10.9.3 GROND IR exposure won't start

An [OB](#) starts with the optical exposure but nothing happens in the infrared and the [OB stalls](#). If [grondFM](#) doesn't solve the issue, this may need a full reset of the [IRACE](#) (IR electronics).

#### Procedure 10.32. Deep reset of GROND IRACE (verify this!)

- A. In a GROND terminal, do `grinsStop` as user `grondmgr`.
- B. Go to the [computer room](#) of the telescope building.
- C. Locate the [IRACE](#) workstation (Fig. 1.4, p. 20) and shut it down.
- D. Go to the dome
- E. Locate the power switch of the [IRACE](#) box (Fig. 10.12, p. 99) below the [main mirror](#).
- F. Switch it off for 10 seconds then on again.
- G. Go back to the [computer room](#) and start the [IRACE](#) workstation.
- H. Go back to the [control room](#) and reboot the GROND workstation.
- I. Do `~/bin/lastResortBeforeReboot.sh` as user `grondmgr`
- J. Reboot GROND workstation.
- K. Do `~/bin/lastResortAfterReboot.sh` as user `grondmgr`
- L. Put the instrument [ONLINE](#) in the GROND panel
- M. Do `grondSHUTTER && grondFM`
- N. close and open bob

## 10.10 Freezing issues

### 10.10.1 Mouse pointer does not move

This is common on the [WFI](#) screens.

#### Procedure 10.33. Recover the mouse pointer

- A. Power cycle the black Intel box connected to the failing screen.  
Press power button for 5 s, wait 5–10 s, switch it on, wait for start-up (1–2 min)
- B. Log in  
For WFI, user `wfi` (other logins in Table 11.1).
- C. Open the panels from a terminal.  
For WFI, type `~/bin/openPanels.sh`.

## 10.11 Pointing issues

### 10.11.1 Pointing is incorrect

After doing the [pointing](#) with [WFI](#) the target is not close to the central position (4150,3950). Also, it can happen during an observation with any instrument during the night that the object is not centred where it should.

#### Procedure 10.34. Fix WFI pointing issues.

- A. If not done, check the right instrument is selected on the [TCS Status Panel](#) (Fig. 11.4, p. 104).
- B. Check if the current [pointing model](#) parameters in Table 10.1 for [WFI](#) are selected on the [TCS Setup Panel](#) (blue numbers in the bottom right-hand panel of Fig. 11.2, p. 102). Typically the first three values ID, IH, CH are 0 because of a database issue.

In a hurry:

- Reset the database values  
In a terminal type `~/bin/fixPointing.sh`

Table 10.1: Pointing model parameters for each instrument, as of November 2015.

Parameter	FEROS	GROND	WFI
ID	-183.81	-230.04	-157.69
IH	72.92	-20.23	94.11
CH	136.07	28.89	31.41
NP		17.13	
ME		-113.61	
MA		2.22	
FO		91.83	
TX		-26.92	
HCEC		-18.57	
HCES		-22.55	

(Note: it can be done manually using `ccseiDb`)

- Select the instrument again

Otherwise, a quick TCS restart will generally solve the issue.

- C. Check that the Sidereal time on the [TCS Control Panel](#) is fine.

It should be withing seconds of the actual one. You can get it from the digital clock in the [control room](#) using a switch on its right.

If not, you need to go to the telescope building and reboot the [VME](#).

- D. Otherwise, it might be a problem with the [TCS](#).

Try a quick [TCS](#) restart (Sect. 10.8.3, p. 87).

## 10.11.2 Telescope is stuck at low elevation

If telescope goes out of safe zone, reaching 20 degrees elevation, a too high hour angle, it will be stuck (by software). It also occurs if a restart or a reboot of the [VME](#) is done when the telescope points lower than 45 degrees.

In that case, the telescope should be parked to zenith manually.

### Procedure 10.35. Preset manually to zenith.

- Go to the [computer room](#) in the telescope enclosure.
- Locate the [VME](#) rack (Fig. 1.4, p. 20).
- On the [VME](#), set the switch away from d (Fig. 10.7(a), p. 97).
- Go to the [dome](#) and find the joystick (Fig. 10.13, p. 100).
- Using the controls put the telescope approximately to zenith.
- Go to the [computer room](#) in the telescope enclosure.
- On the [VME](#) rack, set the switch to d.
- Go to the [control room](#) below the dining room.
- Initialise the telescope

Click Initialize below Telescope in TCS Setup Panel

## 10.12 Web pages

### 10.12.1 2.2m Environmental Monitor stuck

If the 2.2m Environmental Monitor is stuck.

### Procedure 10.36. Restart the 2.2m environmental monitor

- Go to screen Telescope Control Software.

- B. In a terminal, execute command `e2p2StartEnvMon`
- C. After a few minutes refresh <http://www.ls.eso.org/lasilla/sciops/2p2/EnvMon>.

### 10.12.2 All sky camera

If the all sky camera **LASCAM** is stuck

- A. Use the Danish 1.54m camera at <http://allsky-dk154.asu.cas.cz/>
- B. Ask an ESO **TIO** to restart **LASCAM**

## 10.13 ESO database issues

### Procedure 10.37. Data do not appear in the database

- A. Wait for one or two days after the data is taken because there may be a lag
- B. If all observations including the calibrations do not show up, you can restart the data handler  
See Procedure 10.17, p. 84
- C. If only a particular set of observations loaded directly from bob are impacted, check that the PID is correct
  - C1. Open the **OBs** (usually in OBD directory on bob machine)
  - C2. Check that the ESO PID has a valid format.
    - Science OBs must start with a leading zero for science PIDs, e.g. 0103.A-9001(A)
    - Calibration OBs should not have a leading zero, e.g 60.A-0040(Z)
  - C3. Check that the ESO PID has been assigned
    - a. Open the ESO Observing Schedule Query Form  
[http://archive.eso.org/wdb/wdb/eso/sched\\_rep\\_arc/form](http://archive.eso.org/wdb/wdb/eso/sched_rep_arc/form)
    - b. Fill telescope (La Silla -- 2.2 m) and period
    - c. Click Search
  - C4. If not assigned or invalid format, contact User Support Department at ESO to fix it.
- D. Data taken as TEST (daily checks) do not appear in the archive.



Figure 10.1: Rack with the FEROS AG LCU.

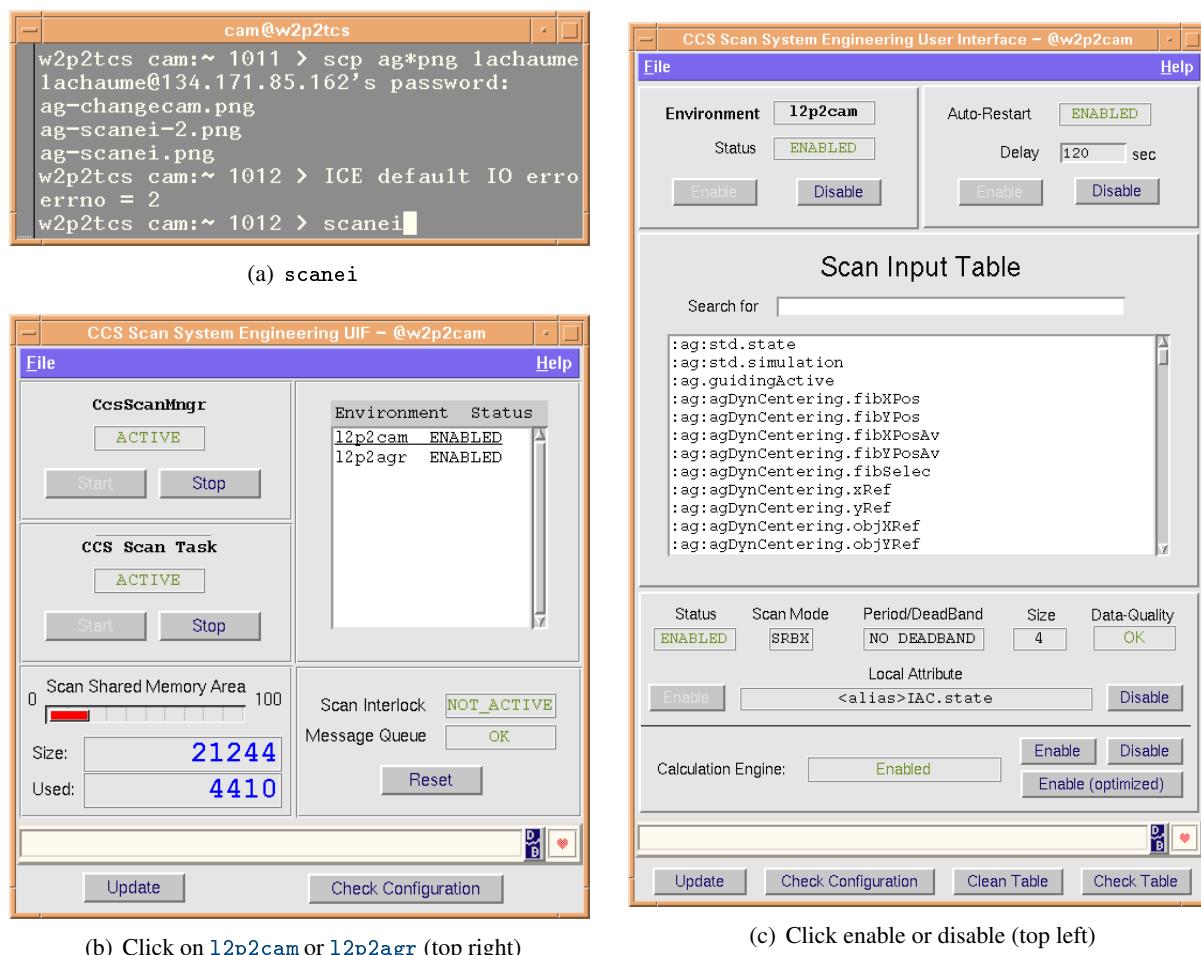


Figure 10.2: scanei on the FEROS and GROND AG machine.

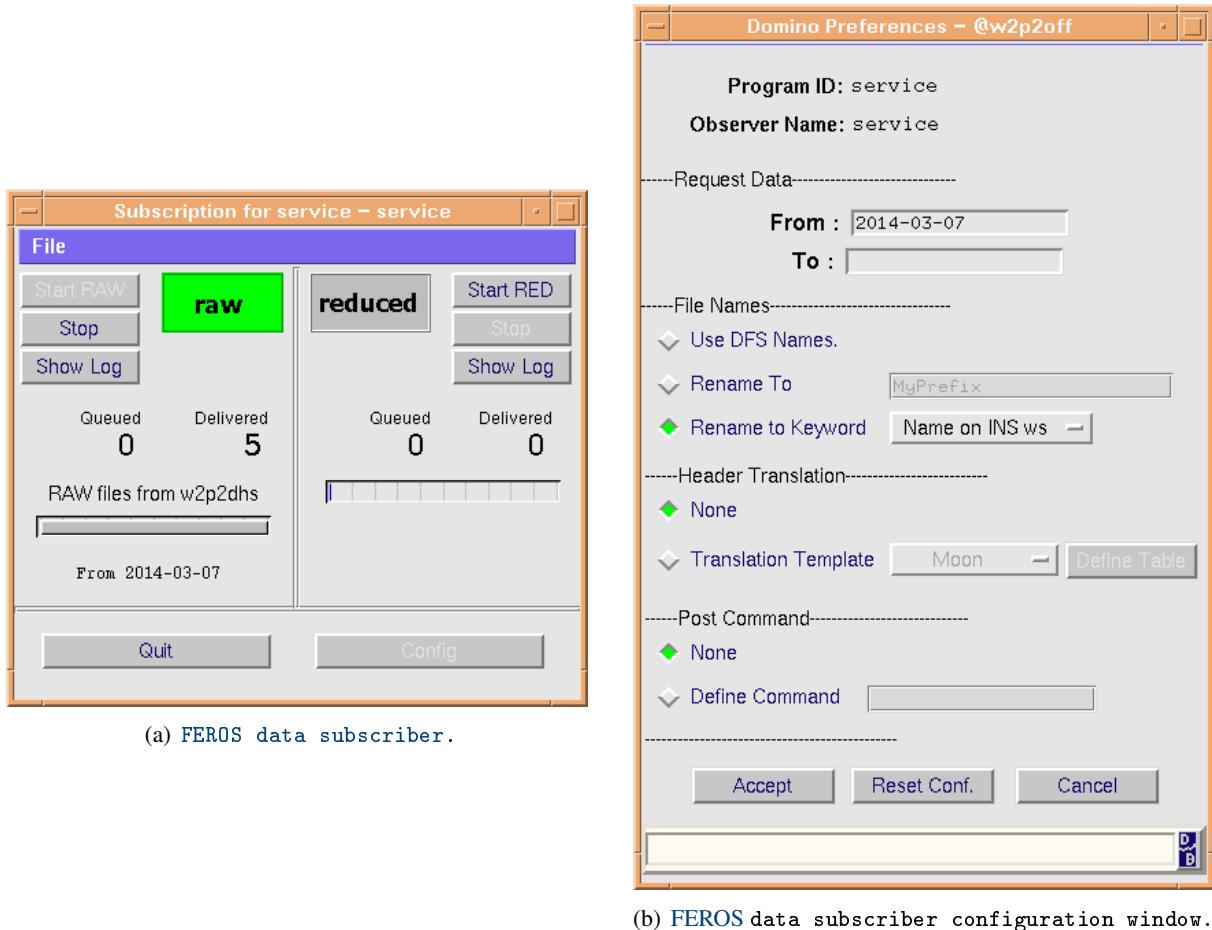


Figure 10.3: FEROS data subscriber.

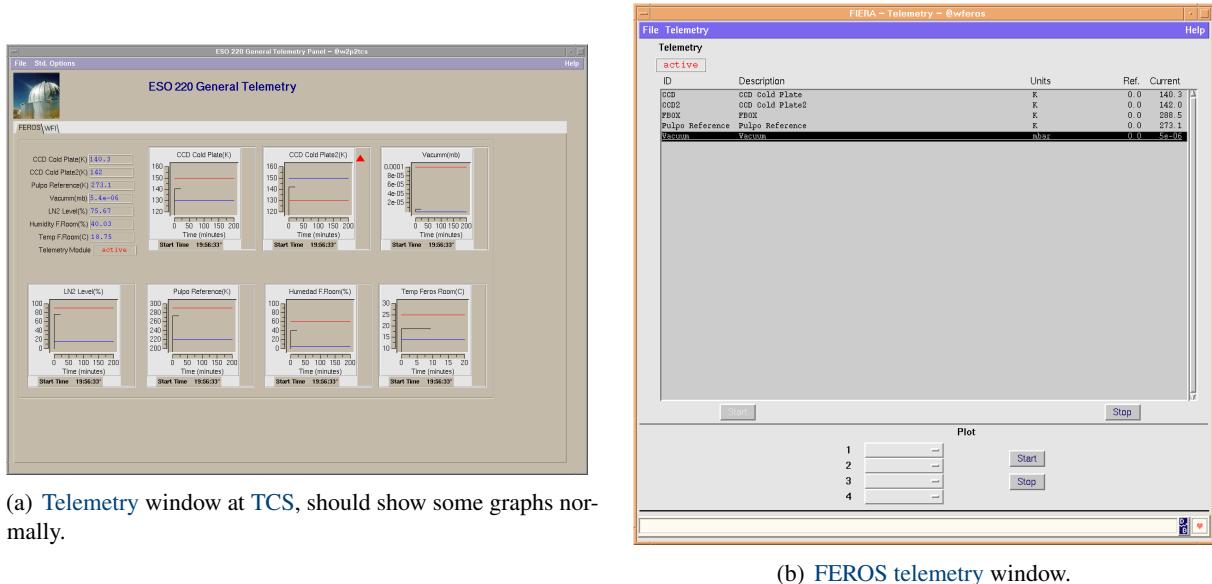


Figure 10.4: Telemetry window.



Figure 10.5: **WFI** electronics. The box on the right controls the power and can be used to power cycle. The box on the left contains the electronics boards that one may need to unplug and replug.

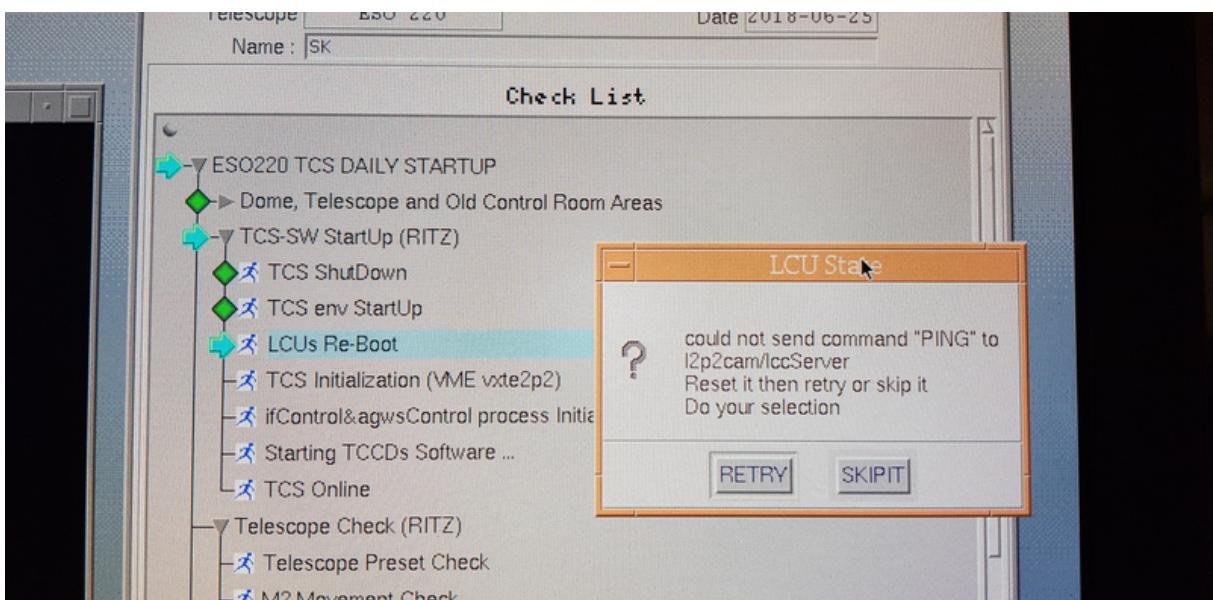


Figure 10.6: When TCS restart fails to reboot the **FEROS AG LCU**

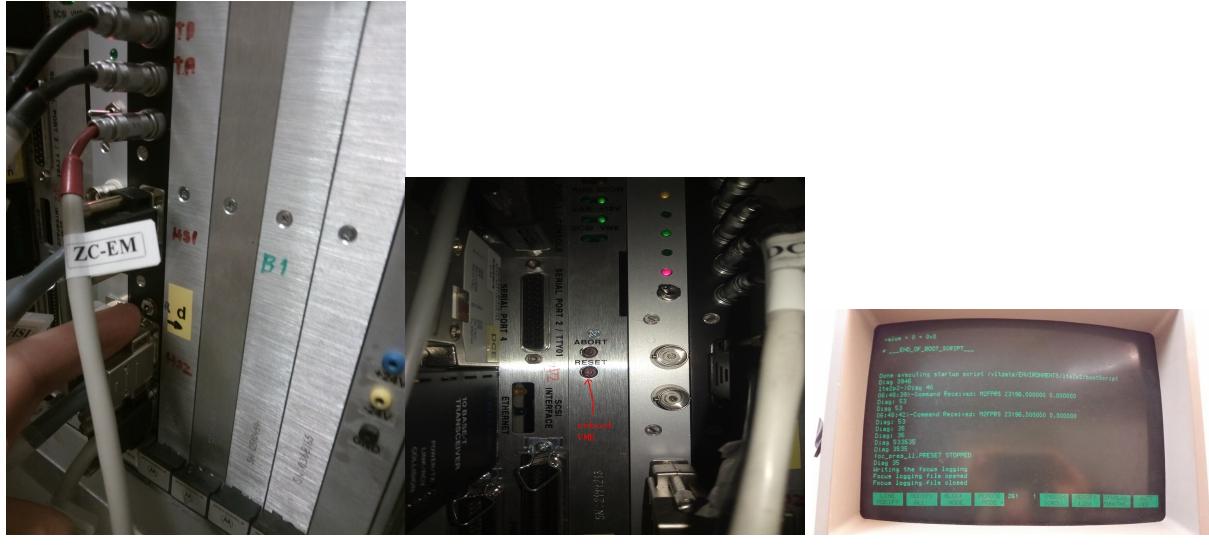


Figure 10.7: **VME** rack in the **computer room** of the telescope building *Left:* to manually point the telescope to zenith, you need to switch away from the yellow 'd' label. *Centre:* To hard reboot the VME, press the small red/pinkish reset button. *Right:* the VME monitor with the “end of boot script” after a reboot.



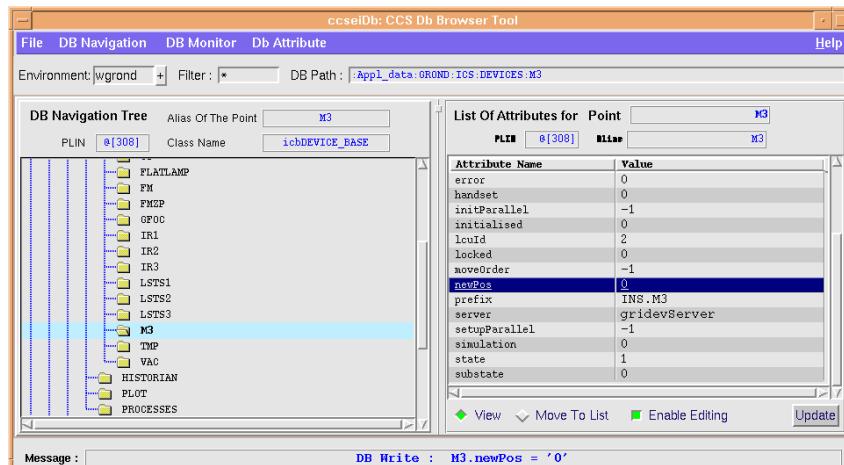
Figure 10.8: Controlling the hydraulics and mirror cover.



Figure 10.9: Local control of the dome. Local or remote control is set with the leftmost button. Other two buttons on the same row set the direction and speed of rotation in the local control mode. Just below, a start and stop button are used to initiate and finalise rotation.



(a) ccsei window.



(b) M3 in the database

Figure 10.10: Writing the M3 position in the database



Figure 10.11: The GROND **M3** mirror and **main cover** control box.

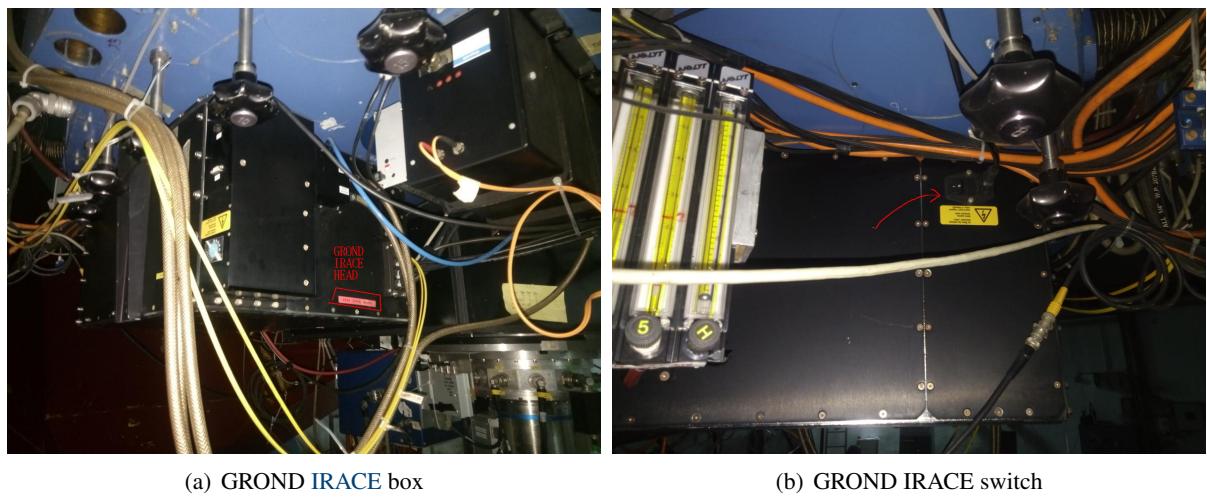
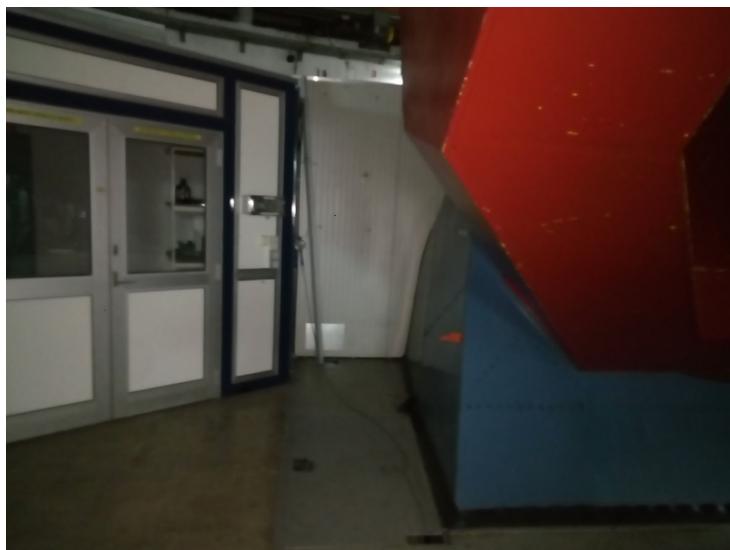


Figure 10.12: The GROND infrared electronics (**IRACE**) box below the **main mirror** of the telescope. In order to **power cycle**, use the power switch located towards the pier.

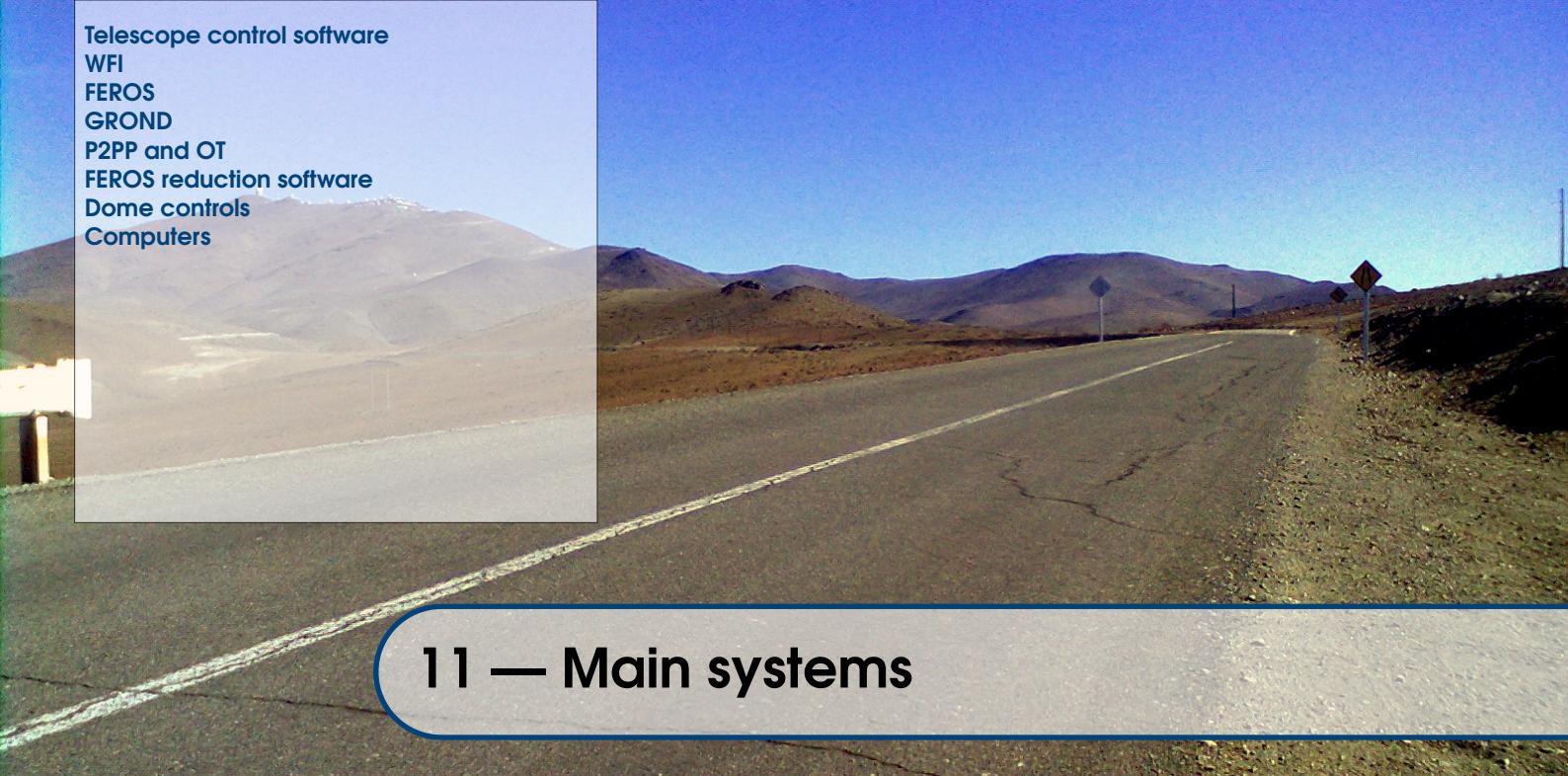


(a) Location of the joystick



(b) Joystick

Figure 10.13: The “joystick” can be used to manually point the telescope.



## 11 — Main systems

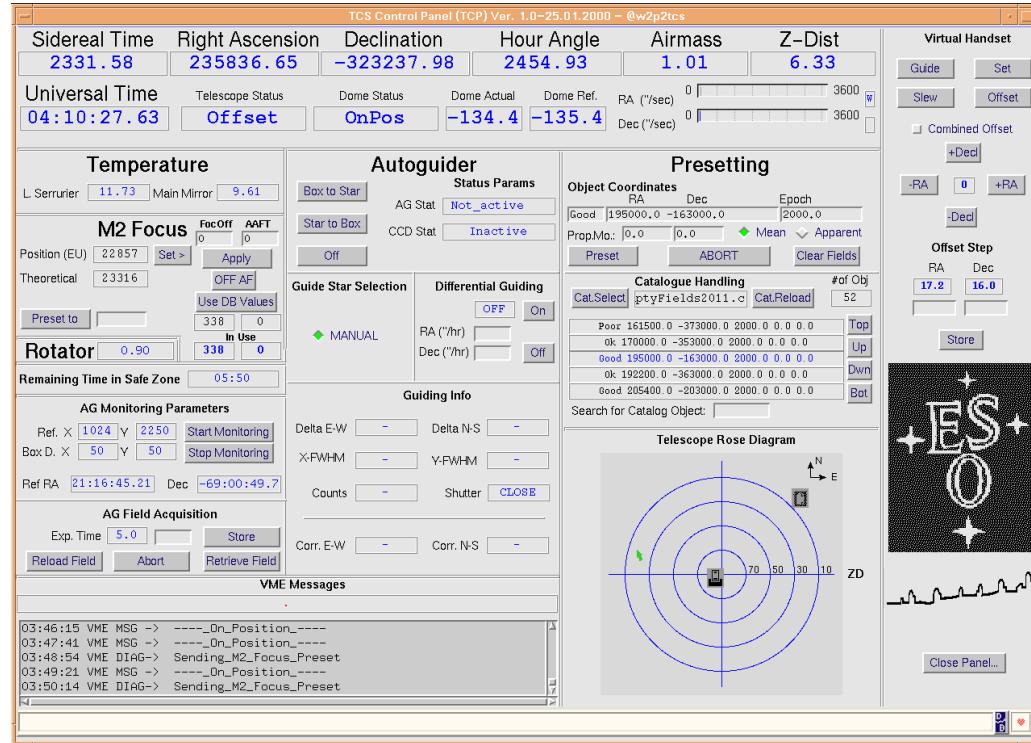


Figure 11.1: The **TCS Control Panel** allows to perform guiding with **WFI** and to manually preset or offset.

### 11.1 Telescope control software

The main panel of the **TCS** (Fig. 11.1, p. 101), called **TCS Control Panel**, gives a summary of **focus**, **guiding**, and **pointing**. The **rose diagram** gives telescope position, **dome slit** orientation (symbol just outside the outermost circle), Moon position (yellow circle), and some other info (green arrow). Telescope status and **dome** status indicate whether telescope is **presetting**, **slewing**, **guiding**, or **offsetting**. The panel

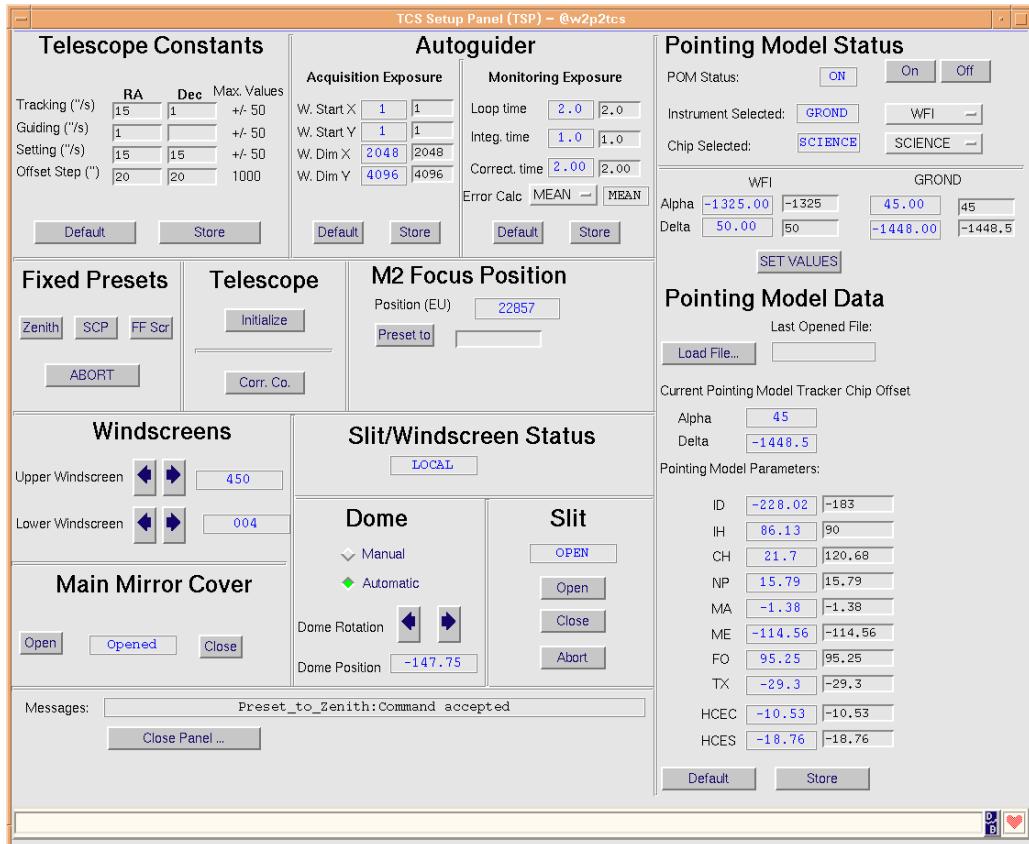


Figure 11.2: The **TCS** setup panel allows to open and close the **dome**, main mirror cover and setup the dome rotation. Additionally, fixed presets to zenith and flat screen can be sent.

also allows some interaction. The **TCS** setup panel (Fig. 11.2, p. 102) allows more interaction, in particular concerning closing and opening.

### 11.1.1 Manual preset

The **presetting** area of the main **TCS** panel (Fig. 11.1, p. 101) allows manual preset, which is used for flat fields and **WFI focus**. Catalogues can be loaded with **CalSelect**, in particular **EmptyFields** for flat fielding. The item of the catalogues is selected with Top, Up, Dwn, Bot before **Preset** is clicked.

### 11.1.2 Manual offset

The virtual handset area of the main **TCS** panel (Fig. 11.1, p. 101) allows to give an offset which is used when looking for a guide star on **GROND** or centring a target on the **FEROS** fibre when guiding with the **WFI AG**. An offset is done by clicking **Offset** and selecting **combined offset** (useful when guiding). Offset steps are input with **Store**, then the racquet in the centre ( $-RA$ ,  $+RA$ ,  $-Decl$ ,  $+Decl$ ) can be used.

### 11.1.3 Autoguider

The **AG** in the **TCS** can be used for **WFI** and **FEROS** observations.

The **AG** Field Acquisition and Autoguider areas of the main **TCS** control panel (Fig. 11.1, p. 101) give control over **WFI AG**. The buttons of interest are **Retrieve field** (to probe the **AG** field, displayed in Fig. 11.3, p. 103), **Box to star** (to start the guiding when a guide star has been picked) and **Off** (to turn

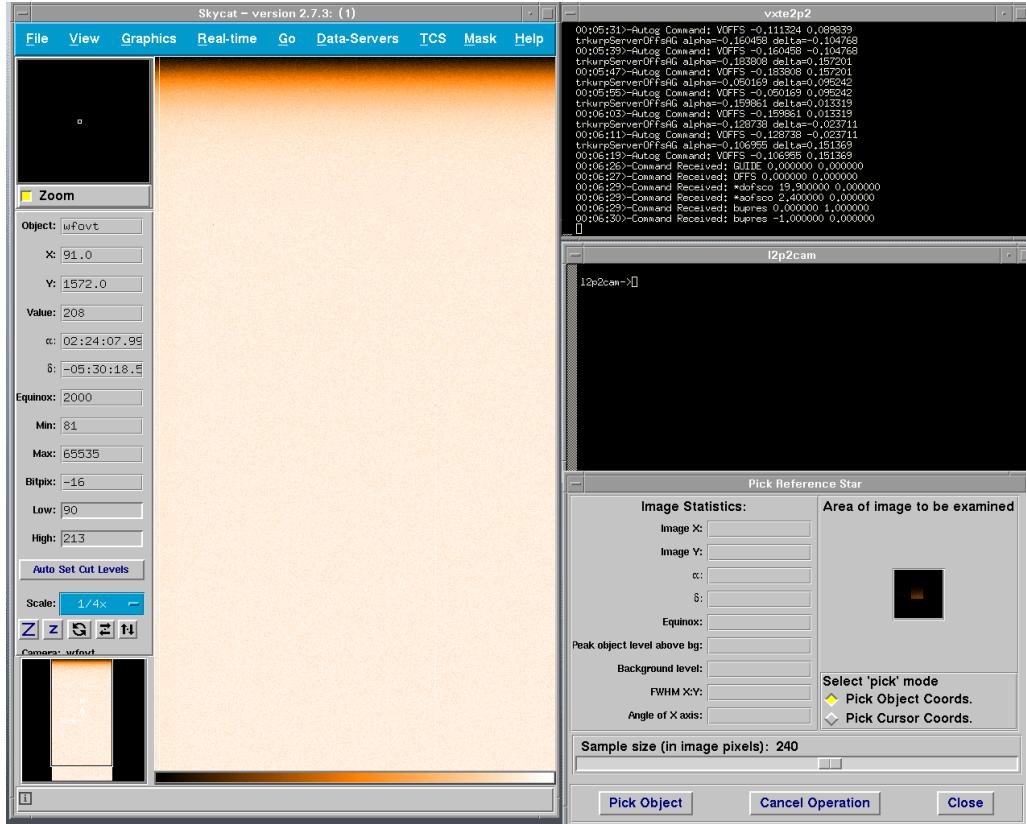


Figure 11.3: The **AG** field is displayed on the **TCS rtd** (left) where the reference star can be picked (using lower right window).

off the **AG**). Tuning of the **AG** (e.g. integration time) can be done on the Autoguider area of the **TCS** setup panel (Fig. 11.2, p. 102).

Note that guiding must be set **Off** at the end of a **FEROS** observation using the **WFI AG**. The buttons **Stop Monitoring** and **Start Monitoring** are useful after a change of filters on the same field, for they avoid a **Retrieve Field**.

Differential guiding can be set, but a particular care should be paid to units (here arcsec/hour).

## 11.2 WFI

### 11.3 FEROS

### 11.4 GROND

### 11.5 P2PP and OT

### 11.6 FEROS reduction software

### 11.7 Dome controls

### 11.8 Computers

Most components of the telescope can be accessed from any screen by using a graphical login: **tcs**, **cam** (guiders), **wfi**, **feros**, **dhs** (OBs), **astro** (pipelines), **grond**. They are detailed in Fig. 11.1, p. 105 and



Figure 11.4: The TCS Status Panel is mostly used to switch the pointing model between instruments.

generally have the famous good seeing password. These machines need a reboot from time to time, using reboot as the normal user.

For some tidying tasks or reboots, you need to root password (hint: pirate).

Other components may need reboots, they are given in Table 11.3.

Table 11.1: Computers one can use a graphical login for, from any screen, to get access to instruments and controls. The password is the “good seeing” one shared by most La Silla computers. The screen they are normally shown on and the relevant unix users are also given.

Computer	Login	User	Monitor(s)	Description
<a href="#">w2p2tcs</a>	tcs	tcs	Telescope Control Software	<b>TCS</b>
	cam	cam	Autoguider GROND & FEROS	Autoguiders
<a href="#">w2p2ing</a>	wfi	wfi	Wide Field Imager BOB	WFI user
		wfimgr	—	manager account
<a href="#">wferos</a>	feros	feros	FEROS BOB	basic user
		ferosmgr	—	manager account
<a href="#">w2p2dhs</a>	dhs	service	p2p2 & ot	<a href="#">service</a> observations (ot)
		visitor	p2pp & ot	<a href="#">visitors</a> (p2pp)
<a href="#">w2p2off</a>	astro	astro	FEROS pipeline	data & pipelines
<a href="#">w2p2pl</a>	pipeline	pipeline	w2p2pl pipeline	WFI/FEROS data handling
<a href="#">wgrond</a>	grond	grond	GROND BOB / <a href="#">FIERA</a> / <a href="#">IRACE</a>	basic user
		grondmgr	—	startup, <a href="#">bob</a> , commands

Table 11.2: Common passwords.

Component	User name	Password hint
Graphical interface user	tcs, cam, feros, wfi, grond, dhs, pipeline	.5a...
Other users	<a href="#">visitor</a> , <a href="#">service</a>	.5a...
Instrument manager	ferosmgr, grondmgr, wfimgr	pin2...
Workstation administrator	root	2be1...
Remedy tickets	2p2	.5a...
Observing tool	0	OHS4good
Dome auxiliary functions		.5a...
p2pp for <a href="#">MPIA</a>	MPGUtility, MPGDDT	MPG@...

Table 11.3: Reboots you may (will) have to do besides those of the aforementioned computers.

Component	Reboot command	Alternative reboots
<b>TCS LCU/VME</b>	<a href="#">lccBoot lte2p2</a>	rsh vxte2p2 reboot Reset button, <a href="#">VME</a> rack, <a href="#">computer room</a> at telescope*
<b>WFI FIERA</b>	<a href="#">lccBoot wfffcd*</a>	rsh -l fcdrun wfffcd reboot
<b>FEROS LCU</b>	<a href="#">lccBoot lfeics1</a>	FEROS <a href="#">ICS Control</a> , window menu LCU→Reboot rsh -l fcdrun lfeics1 reboot
<b>FEROS AG</b>	<a href="#">lccBoot w2p2cam</a>	rsh <a href="#">12p2cam</a> reboot Reset button, rack, FEROS room at telescope* Unplug rack, FEROS room at telescope*
<b>FEROS FIERA</b>	<a href="#">lccBoot wfefcd*</a>	rsh -l fcdrun wfefcd reboot
<b>GROND FIERA</b>		rsh root@ <a href="#">wgrccd</a> reboot Power switch, FIERA WS, <a href="#">computer room</a> at telescope*
<b>GROND IRACE</b>		rsh root@ <a href="#">wgrdcs</a> reboot Power switch, IRACE WS, computer room at telescope*
<b>GROND AG</b>	<a href="#">lccBoot w2p2cam</a>	rsh <a href="#">12p2agr</a> reboot
<b>User WS</b>	call at Paranal 5959 to reboot <a href="#">uws2p2</a> , first close all terminals	

\* Untested. \* Manual reboot needed if soft fails.

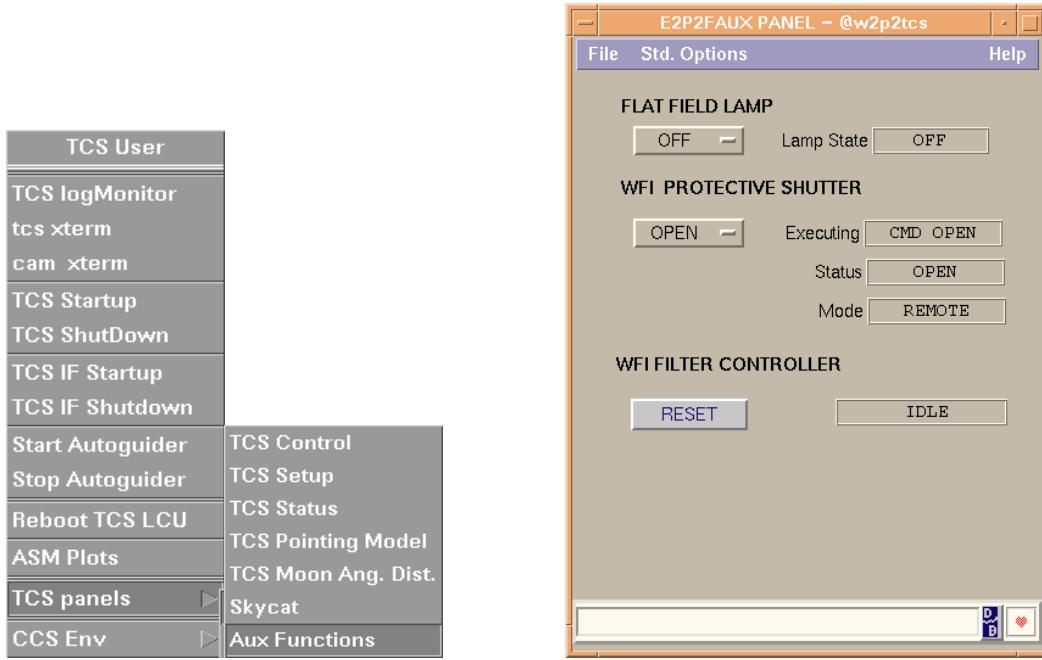


Figure 11.5: The [Auxiliary Functions](#) panel (right) is opened using the menu on the TCS machine (left). It is mostly used to switch the flat field lamp on and off, and to open or close the [WFI protective shutter](#).

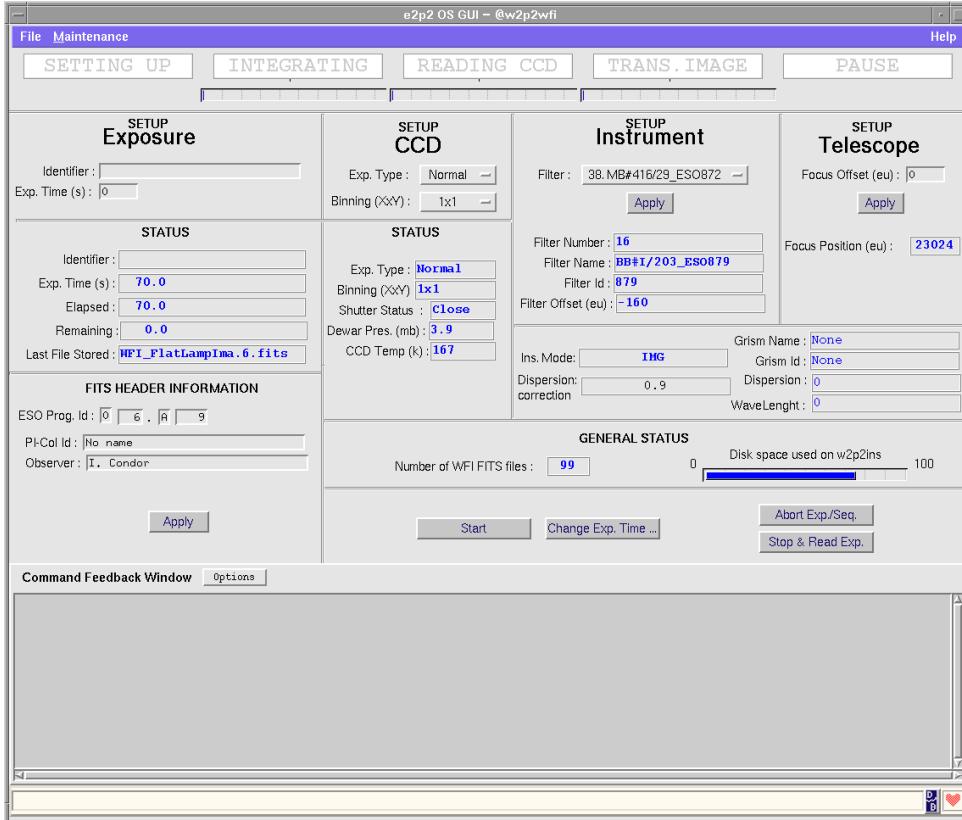


Figure 11.6: The [WFI ICS Control](#) can be used to change filters manually or take/abort CCD exposures.

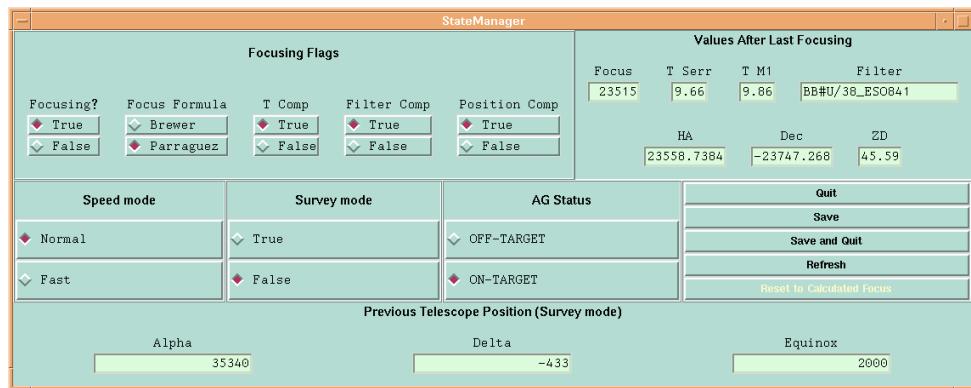


Figure 11.7: The **WFI State Manager** holds information on telescope **focus**, also used for **FEROS**. It can be used for quick-and-dirty focusing.

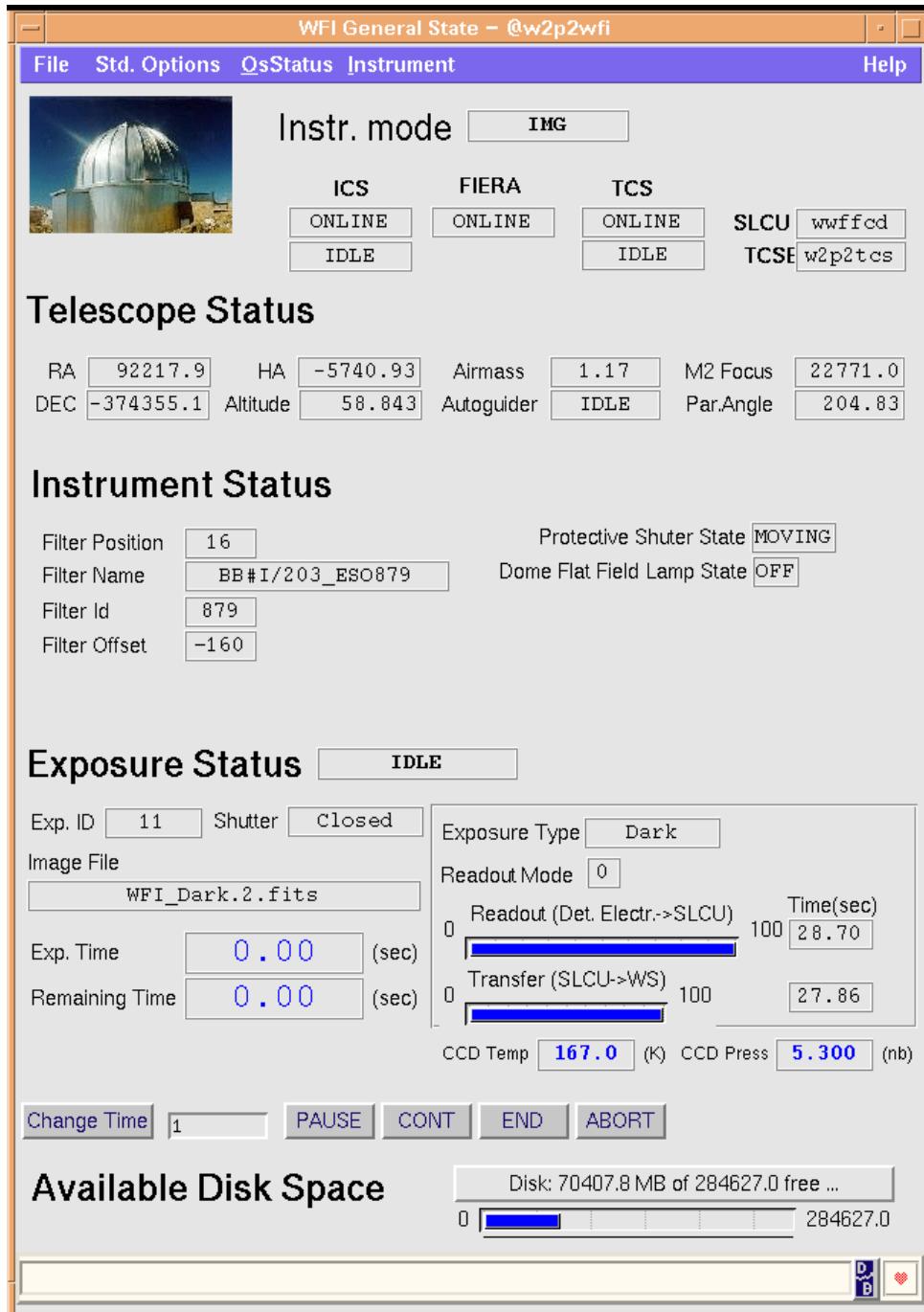


Figure 11.8: The **WFI** general state panel gives information about exposure, filters, and connection to **TCS**.

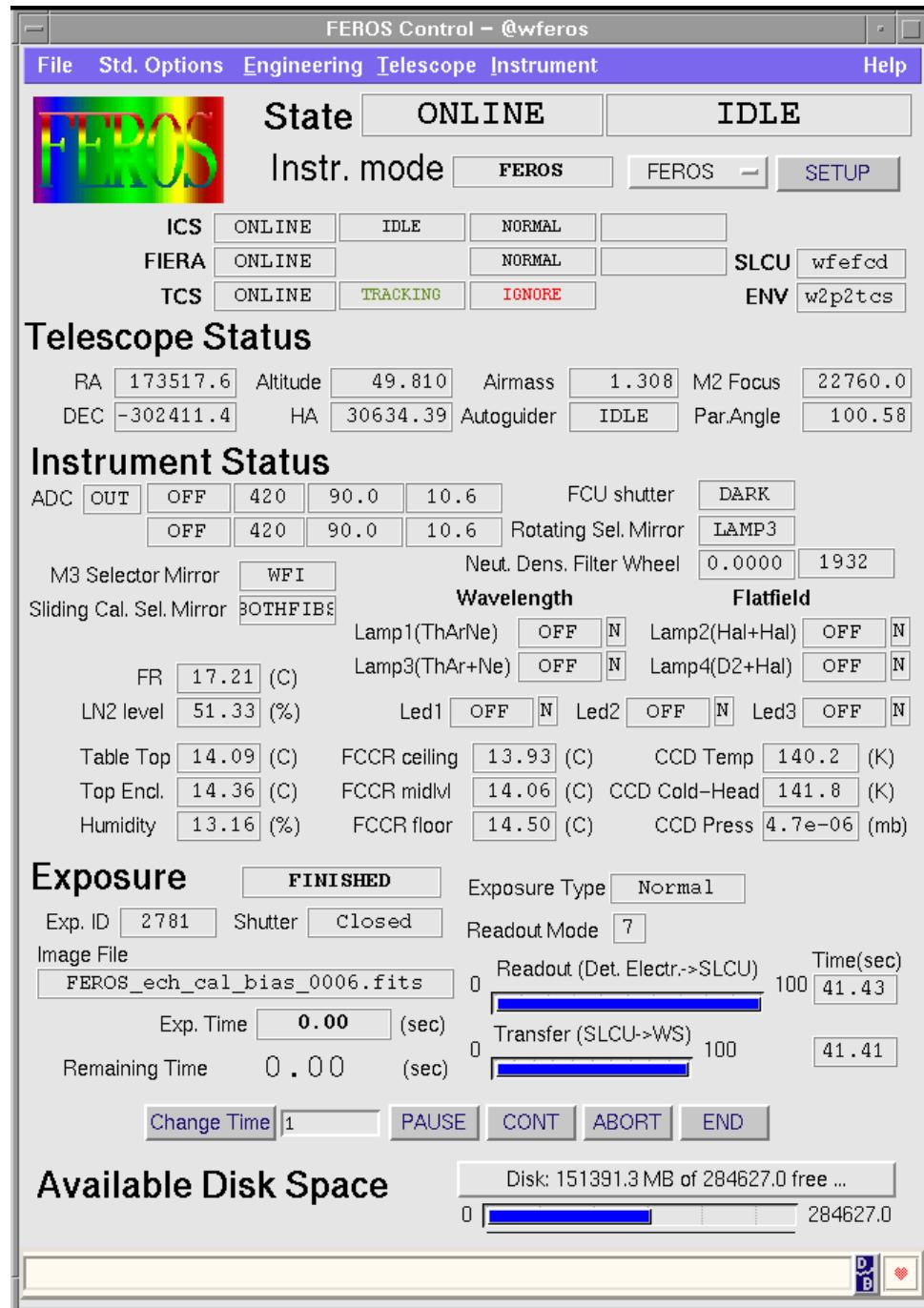


Figure 11.9: The **FEROS** control panel gives information about exposure, settings, lamps, and connection to **TCS**. Exposure times can be switched.

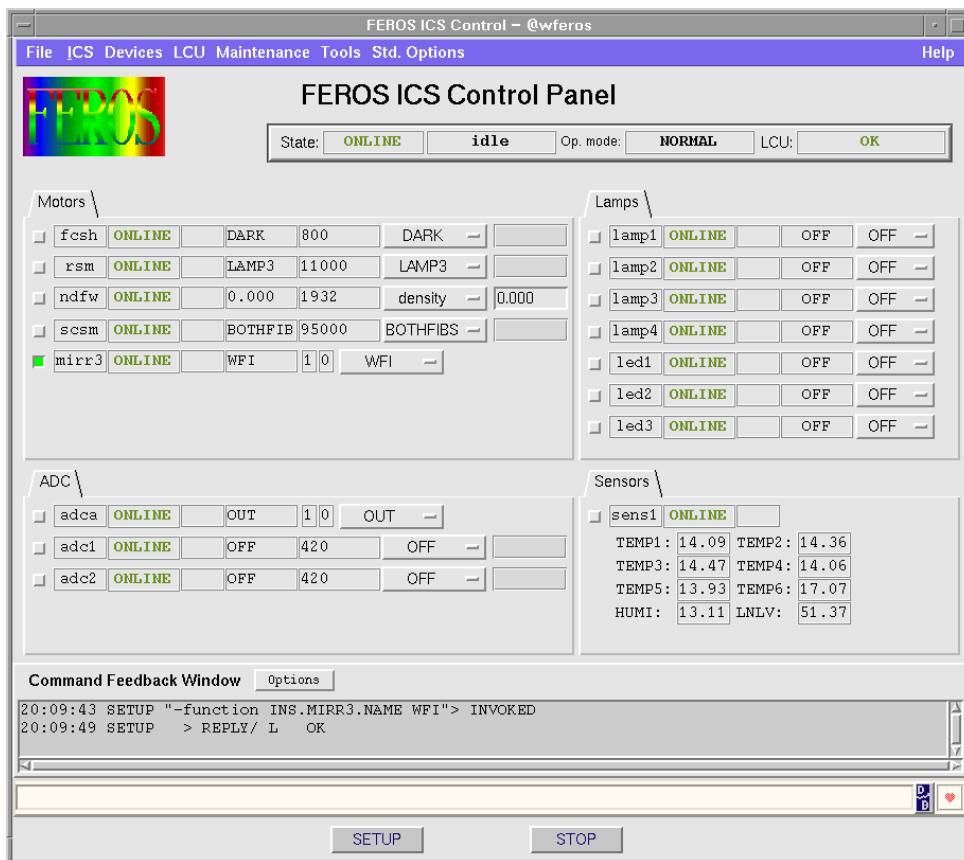


Figure 11.10: The **FEROS ICS Control** panel is mainly used to change the mirror **mirr3** from and back to **WFI**, but it gives wide access to the **instrument control software**.

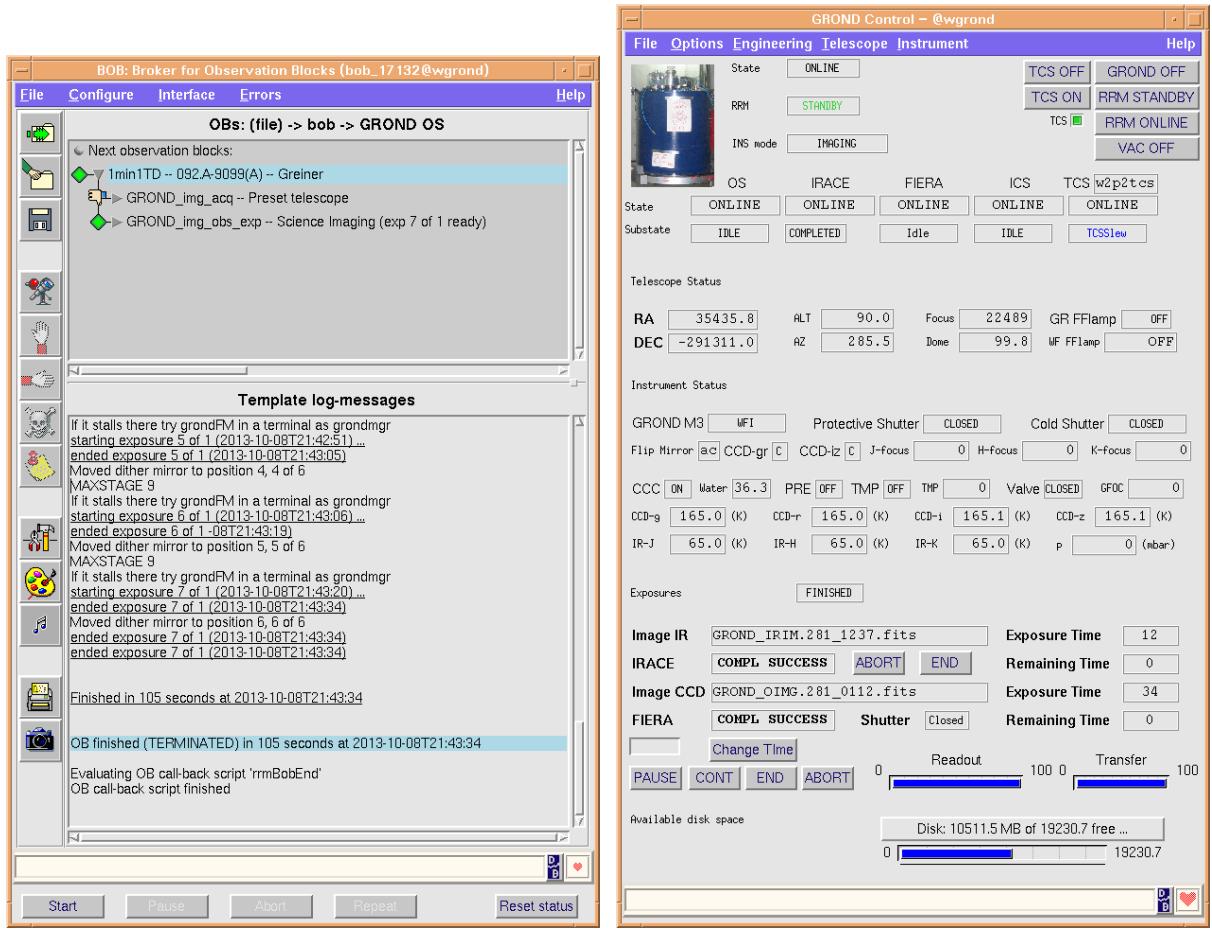


Figure 11.11: The main displays of GROND.

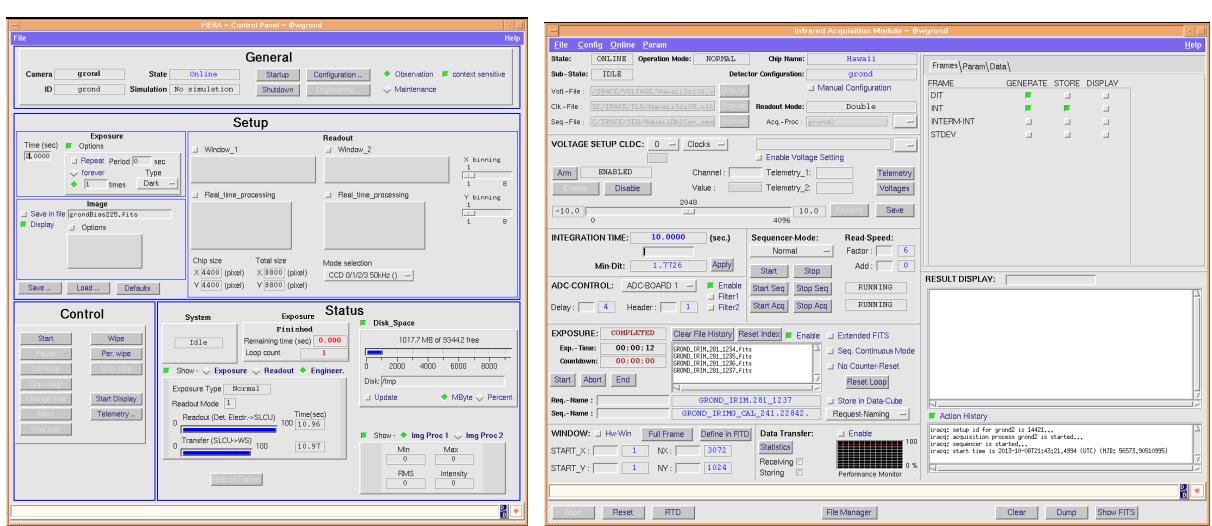


Figure 11.12: Control panels for the detectors.

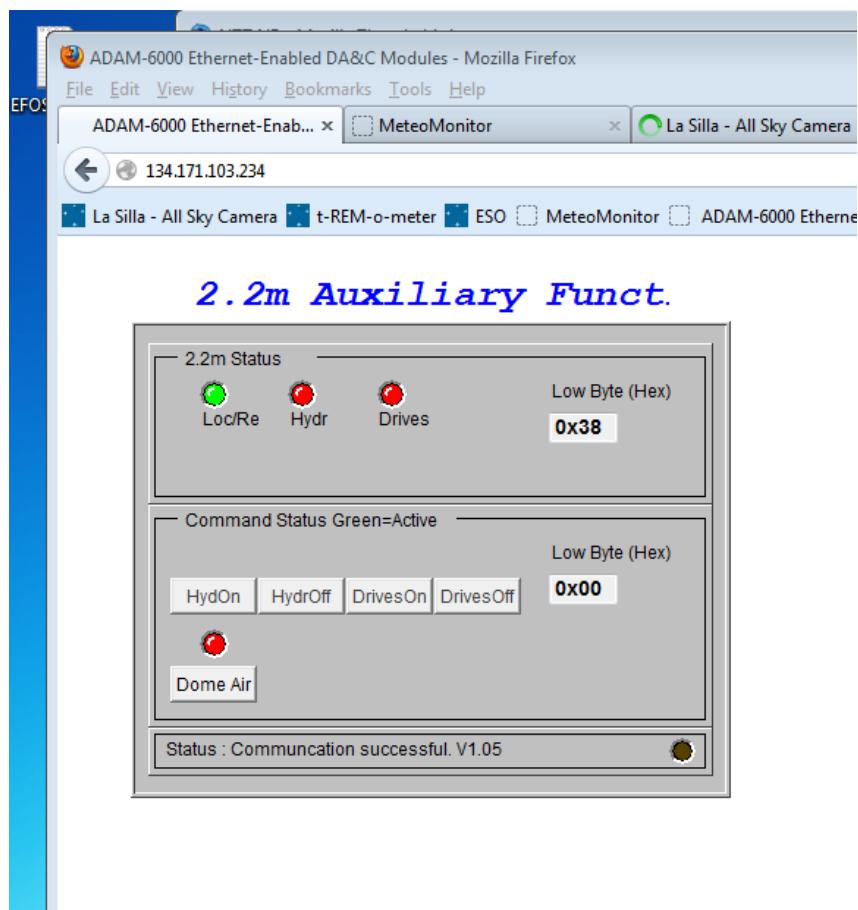


Figure 11.13: Dome Auxiliary Functions.

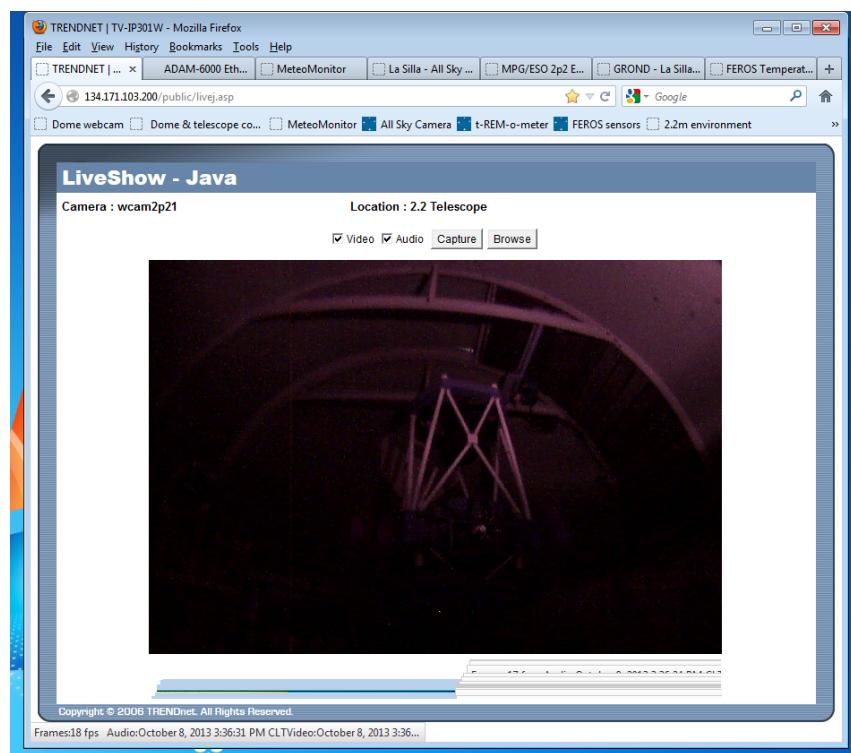


Figure 11.14: dome webcam





## Glossary

**acquisition**

Part of an observing block that prepares the telescope (preset) and instrument (filtre change, mirror setups, etc.) for an observation. [45](#), [46](#), [53–55](#), [60](#), [64](#), [65](#), [80](#)

**ADAM**

Telescope hydraulics and mirror cover control system. [21](#), [89](#), [92](#)

**ADC**

atmospheric diffraction corrector [61](#), [62](#), [84](#)

**AG**

autoguider [10](#), [23](#), [25](#), [32](#), [46](#), [51](#), [55–57](#), [59–62](#), [73](#), [76–79](#), [81](#), [83](#), [89](#), [90](#), [102](#), [103](#), [115](#), [116](#), [118](#), [119](#)

**Autoguiding**

Window controlling the settings of the autoguider of FEROS and GROND [27](#), [49](#), [50](#), [59–61](#), [64](#)

**Auxiliary Functions**

Panel with cryptic title E2P2FAUX PANEL (Fig. 11.5, p. 106) controlling WFI shutter and flat-field lamp. [35](#), [36](#), [40](#), [67](#), [68](#), [75](#), [83](#), [106](#)

**bob**

broker for observing blocks, the application that reads s and sends commands to the telescope and instrument so that observation is performed. The bob panel is usually placed in the first virtual desktop bob+gen. state [18](#), [24](#), [26](#), [27](#), [31](#), [35](#), [36](#), [40](#), [43–46](#), [49–51](#), [53](#), [64](#), [65](#), [69](#), [72](#), [80–83](#), [92](#), [105](#), [111](#)

**cold shutter**

Shutter of the infrared arm of GROND. It stays continuously open during and between observations. It will be closed during calibrations. Not to be confused with the main cover (protective shutter) or the shutters of the optical CCDs. [40](#), [68](#), [75](#)

**computer room**

Computer room located in the first floor of the telescope building. (There is also a site-wide computer room below the main control room, but we don't have access to it, so it will not be mentioned in this manual.) [19](#), [20](#), [91](#), [95–97](#), [105](#)

**control room**

Control room, located in the New Operation Building below the main building that contains the hotel and dining room. (There is also an old, partly functional, control room on the first floor of the telescope building, but otherwise specified, this manual refers to the main control room.) 17, 19, 45, 96–98

**data subscriber**

Software that fetches the FEROS data for reduction. 10, 73, 74, 85–87

**dome**

Part of the telescope building on the second floor containing the observing floor, telescope, and enclosure. It can also refer to the moving part of the enclosure. 17, 19, 21, 25, 35–37, 40, 44, 92–95, 97, 101, 102

**Dome Auxiliary Functions**

ADAM 6000 tab of mozilla on the Windows desktop that contains hydraulics and ventilation control of the dome. 10, 24, 35, 39, 67, 68, 90, 112

**dome flat fields**

Flat fields acquired on the flat field screen on the dome, using a lamp for illumination. 23, 25, 28, 35–37, 68

**dome slit**

Dome slit, through which it is observed when open 35, 39, 67, 68, 75, 94, 101

**dome webcam**

View into the dome given by the TRENDNET tab of mozilla on the Windows desktop. 10, 19, 67, 68, 113

**DRS**

data reduction software 9, 17, 23, 32, 33, 36, 73, 74, 85, 86, 118, 120

**FEROS AG Real Time Display**

Window with the mage of the FEROS autoguider camera 27, 58–61

**e2p2StartTCCDs**

Command to start the Technical CCDs (guiding cameras) of GROND and FEROS 78

**e2p2StopTCCDs**

Command to stop the Technical CCDs (guiding cameras) of GROND and FEROS 78

**fcdTelemetry**

Command to open the telemetry panel of GROND or WFI, used to activate telemetry if necessary. 25, 88

**FEROS**

Fibre-fed Extended Range Optical Spectrograph 9, 10, 17, 23, 25, 27, 28, 31–33, 36, 40, 43–45, 49, 54, 57–59, 61, 63, 68, 69, 73–80, 82, 83, 85, 87–90, 92, 102, 103, 107, 109, 115–118, 120

**FEROS ICS Control**

FEROS instrument control software panel 40, 68, 84, 110

**FIERA**

Electronics systems controlling the optical detectors 75, 80–82, 89, 105, 112, 120, 121

**flip mirror**

Flip mirror, mirror in the infrared arm of GROND that enables fast dithering while optical is exposing. See grondFM 80, 82

**focus**

Telescope focusing uses the secondary mirror. GROND focus is usually not touched. WFI and FEROS focus need regular (about daily) focus sequences to be performed. 23, 43, 45–49, 51, 57, 58, 79, 80, 82–84, 92, 101, 102, 107

**General State**

The General State panel of each instrument displays its status (integrations going on, basic telemetry, shutters, etc.). It is usually placed in the first virtual desktop bob+gen. state 10, 24, 26, 36, 51, 54, 57, 61–63, 68, 80, 81, 83, 88, 92

**grinsStart**

Command used to start the GROND instrument 26, 81, 95

**grinsStop**

Command used to stop the GROND instrument 26, 81, 95

**GROND**

Gamma-Ray Burst Optical/Near-Infrared Detector 10, 17, 23, 26, 27, 32, 34, 40, 43–45, 49–51, 53, 54, 57, 62, 63, 68, 69, 73, 75, 77, 80–83, 94, 95, 102, 111, 112, 115–117, 119, 121

**grondCS**

Command controlling the shutter of the infrared arm of GROND 27, 40, 50, 51, 68, 75

**grondFM**

Command that controls the infrared flip mirror of GROND 27, 50, 80

**grondGRI**

Command to reinitialise the event server of GROND 26, 50, 82

**grondM3**

GROND M3 mirror and command controlling it 27, 40, 50, 51, 54, 57, 62, 68, 75, 94, 95

**grondMC**

Command controlling the main cover (a.k.a. protective cover or main shutter) of GROND 27, 40, 50, 51, 62, 63, 68, 75

**grondSHUTTER**

Command that resets the shutters of the optical CCDs of GROND 27, 40, 41, 50, 80, 82, 95

**ICS**

instrument control software 23, 75, 94, 110, 116, 120

**ICS Control**

The ICS Control panel of an instrument allows to modify its state (mirrors, shutters, exposures).

It is usually placed in the virtual desktop ICS 54, 57, 84, 105

**IRACE**

Electronics systems controlling the infrared detectors. 80, 81, 95, 96, 105, 112

**irtd**

infrared real time display, an imaging application used to display the *J, H, K* bands of GROND. 27, 50

**l2p2agr**

LCU controlling the GROND autoguider 77, 78, 105

**l2p2cam**

LCU controlling the FEROS autoguider 7, 76–78, 89, 90, 105

**LASCAM**

La Silla all-sky camera 98

**lccBoot**

Command to reboot a workstation or a logical control unit (LCU/VME) 24, 78, 91, 105

**LCU**

Logical control unit, machine in a rack that controls an instrument or telescope subsystem. 10, 19, 76, 78, 84, 89–91, 105, 120

**lfeiccs1**

LCU of the FEROS instrument control software 105

**lte2p2**

LCU of the telescope control software 24, 30, 91, 105

**M3**

Tertiary mirror. There are two tertiary mirrors, one for **GROND** (trumps FEROS and WFI) and one for **FEROS** (trumps WFI). **WFI** is at the secondary focus and gets the light if, and only if, neither of the tertiaries is inserted in the optical path. 10, 35, 40, 44, 45, 49–51, 53, 54, 57, 62, 68, 75, 94, 95

**main cover**

Refers to the protective shutter of GROND 10, 40, 62, 63, 68, 75, 95

**main mirror**

Primary mirror of the telescope. It has a cover that needs to be open for observing and but should be closed when dome slit is being opened or closed. 39, 44, 45, 49, 50, 67, 92, 94, 96

**MIDAS**

The infamous reduction software, used mostly for side calculations (flux level, focus) and **data reduction software** 32, 47–49, 86

**mirr3**

FEROS M3 mirror 36, 40, 44, 45, 49, 54, 57, 68, 75, 110

**MPE**

Max-Planck Institute for extraterrestrial Physics. 18, 51

**MPIA**

Max-Planck Institut für Astronomie. 18, 105, 120

**OB**

observing block, a file containing the information needed to instruct the telescope to perform an observation 17, 18, 26, 27, 35, 36, 40, 43–46, 48–51, 53, 55, 57, 58, 60–65, 69, 71, 72, 80, 82–85, 92, 95, 99, 111, 115, 118, 120

**osf2p2StartUp**

Command used to do a start-up of the **telescope control software** and the instruments **WFI & FEROS**. 23, 24, 26

**ot**

observing tool, the application that can be used to manage the **OB**s for **service** observations 35, 64, 71–74

**p2pp**

phase 2 preparation tool, the application used by **visitors** and PIs to create their observing blocks and execute them on the mountain. 17, 64, 71–74

**Pick Object**

Graphical user interface that allows the observer to pick a star in an image to measure its size (e.g. seeing determination) and pixel position (e.g. refining acquisition). Also a menu option to open such a window. 45, 55

**Pick Reference Star**

Graphical user interface that allows the observer to pick a guide star on the WFI and GROND **autoguiders**, and a fibre reference pixel for FEROS. Also a menu option to open such a window. 25, 27, 28, 56–60, 63, 64

**pointing**

Pointing refers to the part of preset consisting of moving the telescope to the target. It may also refer to a check of the pointing accuracy. 23, 45, 46, 62, 65, 97, 101

**pointing model**

Set of parameters controlling the pointing of the telescope. 11, 25, 45, 53, 57, 62, 97, 104

**power cycle**

Action consisting of switching off an electronic device, waiting for a few seconds, and switching it back on. 10, 19, 73, 76, 78, 88–90, 96

**preset**

Telescope movements (right ascension, declination, and secondary mirror focusing) needed to point at a new source. It is also used as a verb to refer to the action of ordering the telescope to move. 35, 40, 53, 55, 57, 62–64, 82, 85, 91, 102

**protective shutter**

Protective shutter of WFI, that remains open during the night. Not to be confused with the shutter of the optical CCDs that open for integration only. (For GROND it is generally called main cover, see grondMC) 35, 36, 40, 44, 45, 49, 53, 68, 75, 106

**radial velocity standard**

A star with a stable radial velocity used to calibrate or check the calibration of FEROS. 43, 48, 49  
**rose diagram**

Diagram of the telescope position, slit orientation, and Moon displayed on the TCS Control Panel. 39, 67, 94, 101

**RRM**

rapid response mode, the system that allows GROND to swiftly and automatically take command of the telescope to start observing when a satellite detects a possible transient. 51, 63, 68

**rtd**

real time display, an imaging application used to display the optical CCD images of WFI, FEROS, and GROND. 24, 26, 27, 30, 31, 45, 55, 63, 64, 82, 103

**SCCD**

Science CDD 81, 120

**service**

Service observing, service mode, or queue observing is when an observer does observations for different programmes, according to weather conditions and priorities. 18, 41, 105, 118, 120

**sky flat fields**

Flat fields acquired on the twilight sky. 39, 40, 43, 44, 50, 51, 83

**skycat**

Imaging application developed at ESO that can be seen as a simplified ds9. 25, 46, 56, 57

**spectrophotometric standard**

A star with a stable and well-known flux energy distribution used to determine the transmission of FEROS + telescope + atmosphere. 43, 45, 48, 49

**stall**

Stalling refers to stopping doing anything without an error being displayed or reaching complete state. As it is silent, it is easy to lose time for a stalled OB... 80, 82, 92, 95

**standard field**

A field containing various standard stars with well known magnitudes. It is used to calibrate the flux response of WFI (Landolt fields) and GROND (Landolt and SDSS fields). 43, 48, 51

**State Manager**

WFI GUI giving the status of the telescope focus used by WFI and FEROS. 84, 107

**TCCD**

Technical CCD 75, 78, 79, 81, 116, 120, 121

**TCS**

telescope control software 17, 21, 23–25, 27, 30, 33, 39, 40, 45, 46, 48, 50, 56, 57, 67, 68, 73–75, 78–80, 82–85, 88, 89, 91, 92, 94, 95, 97, 101–103, 105, 108, 109, 118

**TCS Control Panel**

Graphical user interface showing the state of the telescope and WFI autoguider. Normally placed on the Control virtual desktop of the Telescope Control Software screen. [25](#), [35](#), [39](#), [40](#), [45](#), [46](#), [56](#), [57](#), [59–62](#), [67](#), [80](#), [83](#), [84](#), [91](#), [92](#), [97](#), [101](#), [119](#)

**TCS Setup Panel**

Graphical user interface allowing to modify the state of the telescope (opening/closing) and WFI autoguiding (parameters). Normally place on the Setup virtual desktop of the Telescope Control Software screen. [25](#), [35](#), [36](#), [39](#), [56](#), [63](#), [67](#), [92](#), [98](#)

**TCS Status Panel**

Graphical user interface showing the state of the telescope modules and pointing model. Normally placed on the Status virtual desktop of the Telescope Control Software screen. [25](#), [45](#), [49](#), [53](#), [57](#), [75](#), [92](#), [97](#), [104](#)

**telemetry**

Telemetry panels indicate the state of WFI and GROND detectors, in particular vacuum and temperature. A text-based telemetry module (logging) for GROND is to be manually started at reboot. [10](#), [25](#), [87](#), [88](#), [116](#)

**Telescope R.T.D**

Window displaying the image of the GROND autoguider [27](#), [64](#)

**template**

Atomic part of an , with a single function, such as the acquisition or a set of integrations with a single instrument configuration (filtre, readout mode). [36](#), [44](#), [48](#), [49](#), [53–55](#), [64](#), [65](#), [80](#), [83](#)

**TIO**

telescope and instrument operator [68](#), [98](#)

**uws2p2**

User workstation of the 2.2m metre telescope. All workstation are virtually run on it. [74](#), [105](#)

**virtual desktop**

A virtual desktop, or desktop, is a working environment showing on the screen of the linux/unix workstations. It is possible to switch between them on the same machine, achieving the same result as having more screens. [23–28](#), [30](#), [31](#), [36](#), [44](#), [45](#), [48](#), [53](#), [54](#), [57–64](#), [72](#), [75](#)

**visitor**

Visitors, i.e. astronomers observing in visitor mode, mostly observe their own programme independently of weather constraints and other programmes' priorities. During **MPIA** there is no “pure” visitor, as some programmes should be observed in **service** year round. [17](#), [18](#), [36](#), [105](#), [118](#)

**VME**

virtual machine environment, used metonymously to describe the controlling the telescope. (VME describes the operating system running on logical control units, but this manual will not use this definition.) [19](#), [20](#), [35](#), [39](#), [79](#), [84](#), [91](#), [92](#), [97](#), [98](#), [105](#)

**w2p2cam**

Environment corresponding to LCU l2p2agr controlling the GROND autoguider [105](#)

**w2p2cam**

Environment corresponding to LCU l2p2cam controlling the FEROS autoguider [26](#), [27](#), [80](#), [105](#)

**w2p2dhs**

Workstation controlling the s [74](#), [105](#)

**w2p2ing**

Workstation of WFI [74](#), [105](#)

**w2p2off**

Workstation controlling the FEROS data reduction software [74](#), [85](#), [86](#), [105](#)

**w2p2pl**

Workstation controlling the communication with the ESO database 74, 86, 105

**w2p2tcs**

Workstation of the Telescope Control software 74, 81, 82, 105

**wfefcd**

Workstation controlling the **FEROS** detector electronics (**FIERA**) 105

**wferos**

Workstation of FEROS 74, 105

**WFI**

wide-field imager 17, 23–25, 28–30, 33, 35, 36, 40, 43, 45–49, 53, 54, 57, 59–63, 65, 68, 69, 73–75, 79–84, 88, 89, 92, 96, 97, 101–103, 106–108, 110, 117, 118, 120, 121

**WFI ICS Control**

**WFI instrument control software panel** 46, 61, 81, 83, 107

**wfinsStartSCCDS**

Command to start the WFI Science CDDs (main array) software 81

**wfinsStartTCCDS**

Command to start the WFI Technical CCD (TCCD)s (guide camera) software 79, 81

**wfinsStopTCCDS**

Command to stop the WFI Science CDDs (main array) software 81

**wfinsStopSCCDS**

Command to stop the WFI TCCDs (guide camera) software 79, 81

**wgrccd**

Workstation controlling the **GROND** optical detector electronics (**FIERA**) 105

**wgrond**

Workstation of GROND 26, 95, 105

**Windows desktop**

Rightmost computer in the control room that controls the dome. 17, 30, 39, 67, 68, 116

**wwffcd**

Workstation controlling the **WFI** detector electronics (**FIERA**) 79, 81, 89, 105