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GREGOR:
QUICK HELP OBSERVATION MANUAL

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Signatures & Approval

	Name	Signature	Date
Prepared by	O.Grassin - KIS Software engineer		2017-11-21
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Vers.	Date	Author	Description of Changes	Sect./Para.
1	2017-11-21	O.G.	Updates: Add images, updates & corrections	all
2	2018-04-02	O.G.	Updates: Add images & new information	1,2,5,6,9, 10,11,13,18

Table of Contents

1 Overview

Note: In case of problem/fault/issue during tuning/observation, please fill the "GREGOR – Ticket System" at https://helpdesk.tt.iac.es***!***

As last year, observations can be directed from GREGOR's 5th and 3rd floor from the so-called "flight simulators". The GREGOR Control System has been cleaned; The ICS tree has been reordered and interfaces in Labview 8.0 have been removed. The updated interfaces work with Labview 2015-64bits version. Please refer to the **addendum** at the end of the document. Read carefully, most of the advice written here will avoid or solve the common problems…

The current configuration of the GREGOR control is:

- ❖ GCS computer running all control command interfaces:
    - DCP server (Device Communication Protocol interface)
    - ICS (GREGOR Instrument Control System)
    - GTCS (GREGOR Telescope Control System)
    - Derotator (Beta, is current version for DCP commands)
    - Conductor
    - M2M3M5M6M7
    - M11M16F3 (AO bench)
    - SlitScanner
    - Calibration Unit (CalControl)
    - BBI (Broad-Band Imager)
    - IFU (Integral Field Unit) available since July
    - M4
    - BTF3 (Beam Tracker at F3)

- ❖ Flight Stations can run:
    - Remote panel of interfaces started on GCS computer
    - TeamViewer sessions, Remmina remote desktop and TigerVNC
    - FireFox browser (webcams, etc.)
    - Instrument applications
    - Terminal windows and other tools…
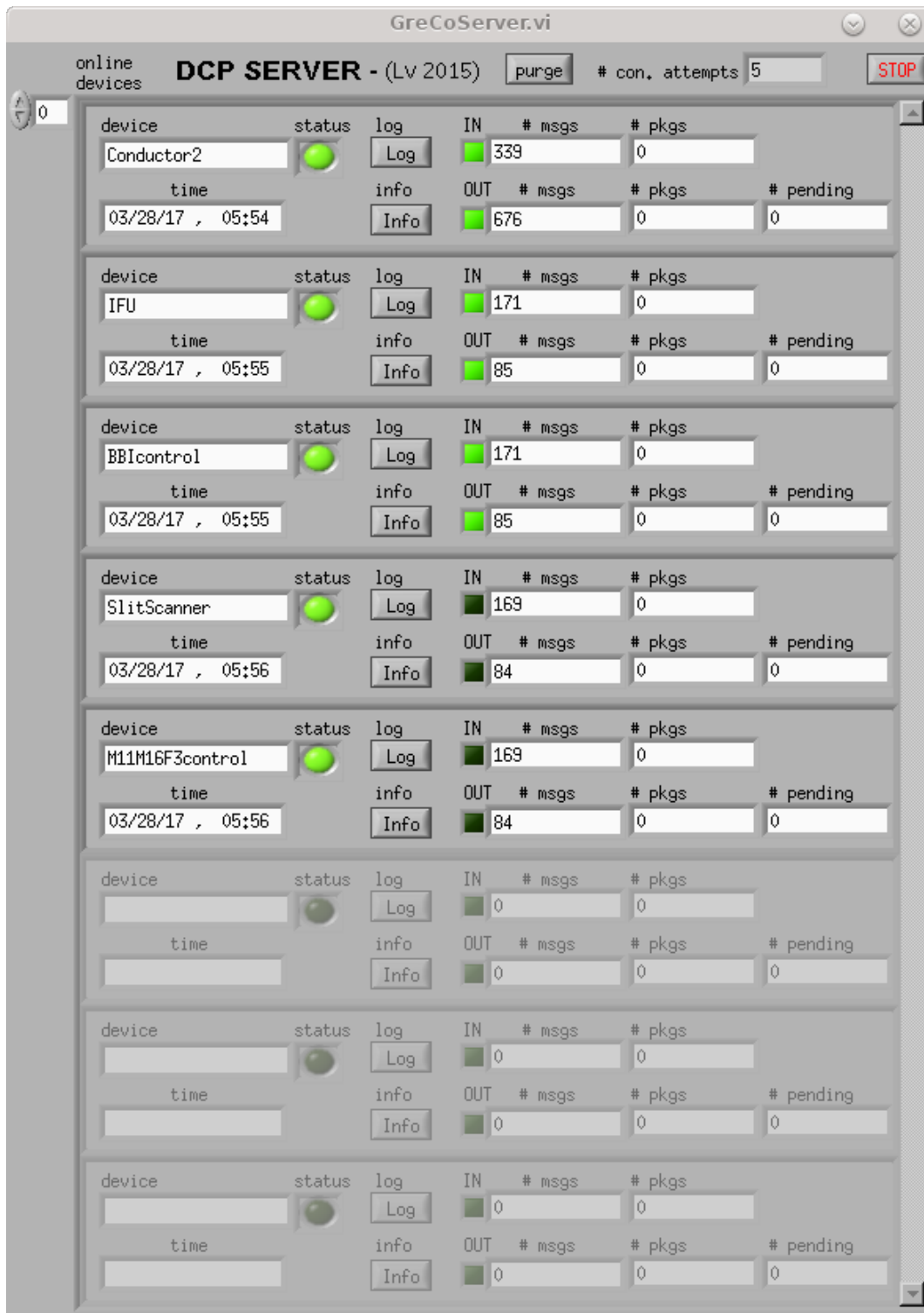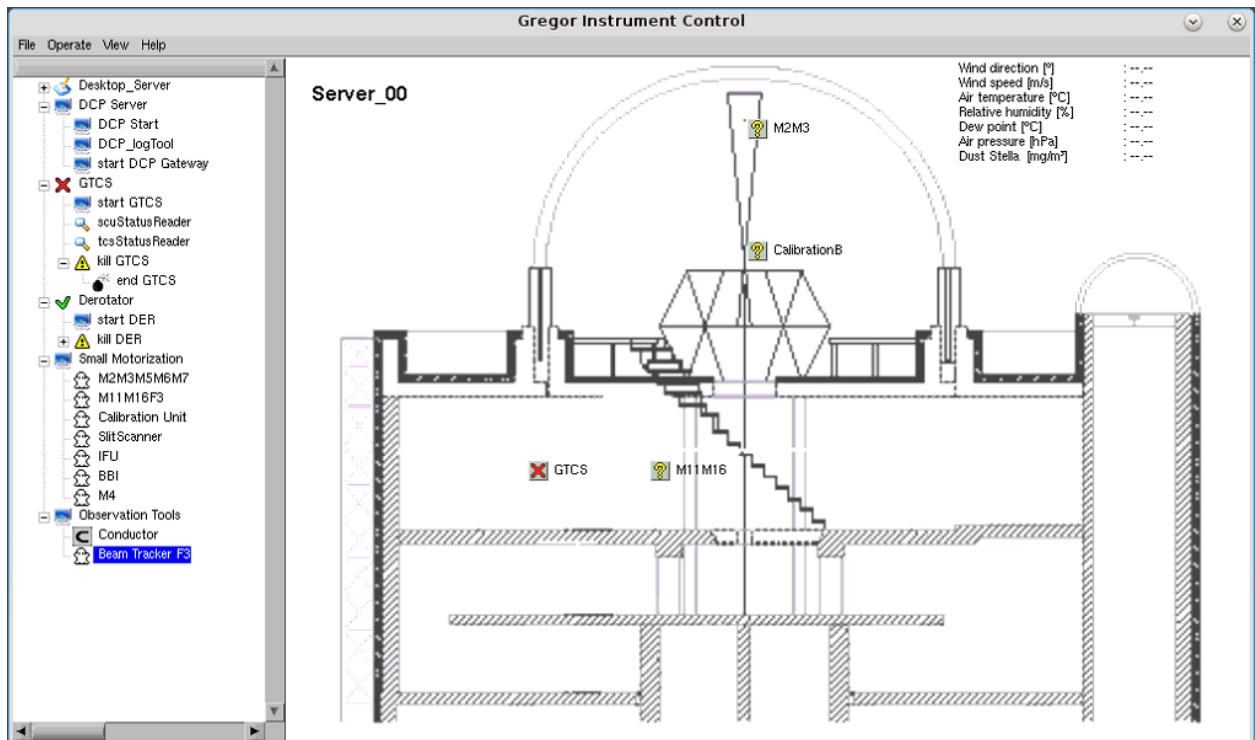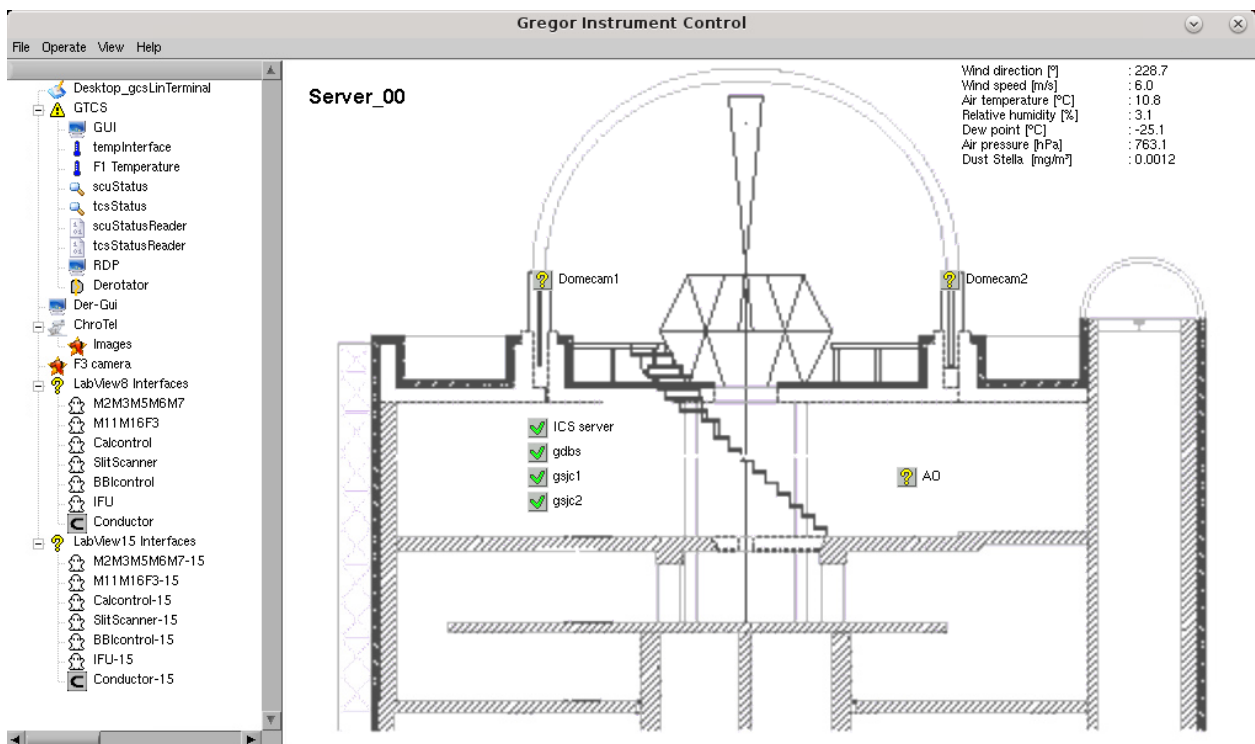
DCP Server Labview 15 version:

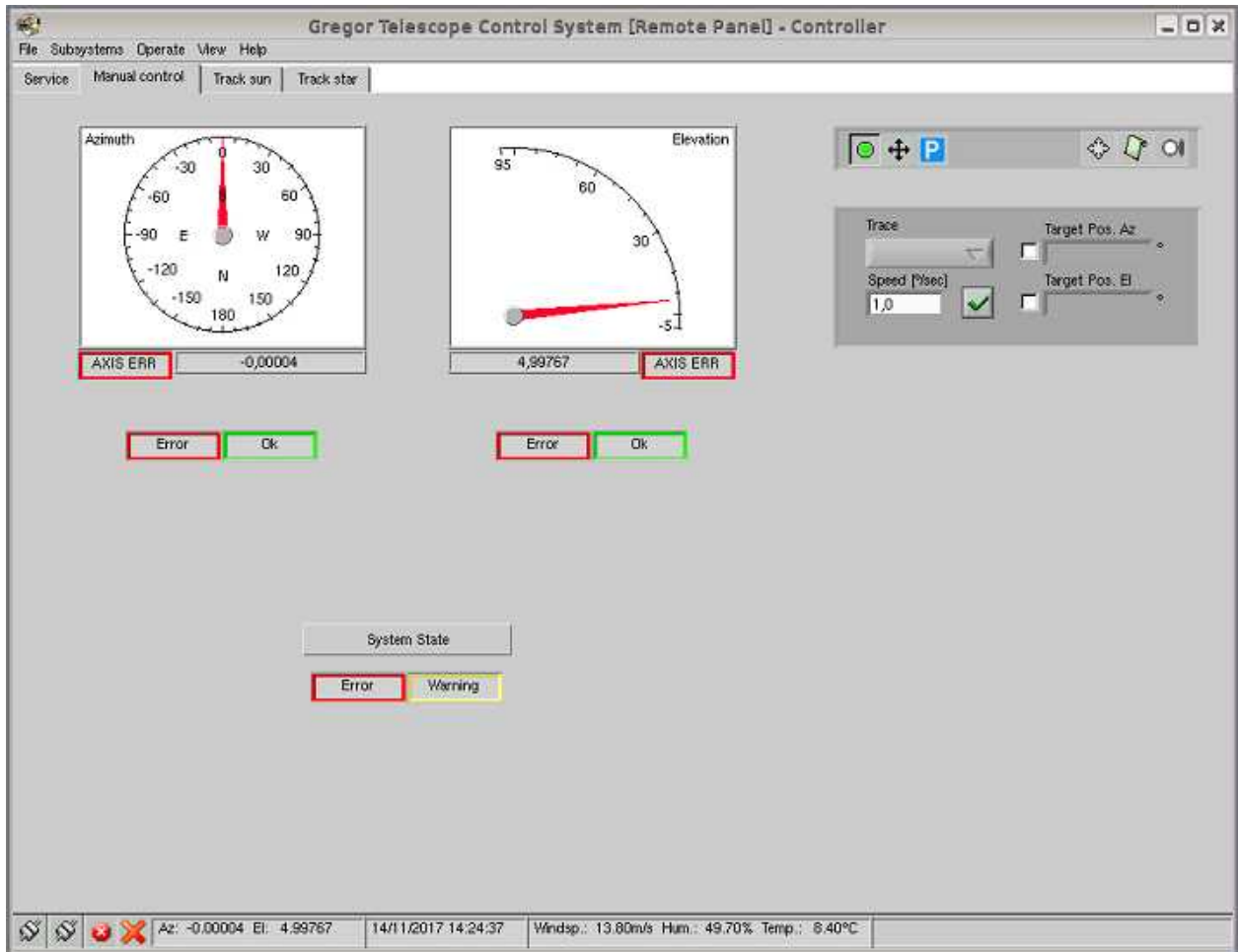**Figure 1: DCP server, which runs on the GCS computer in the back of the 5th floor.**

ICS (GREGOR Instrument Control System) @ GCS computer:

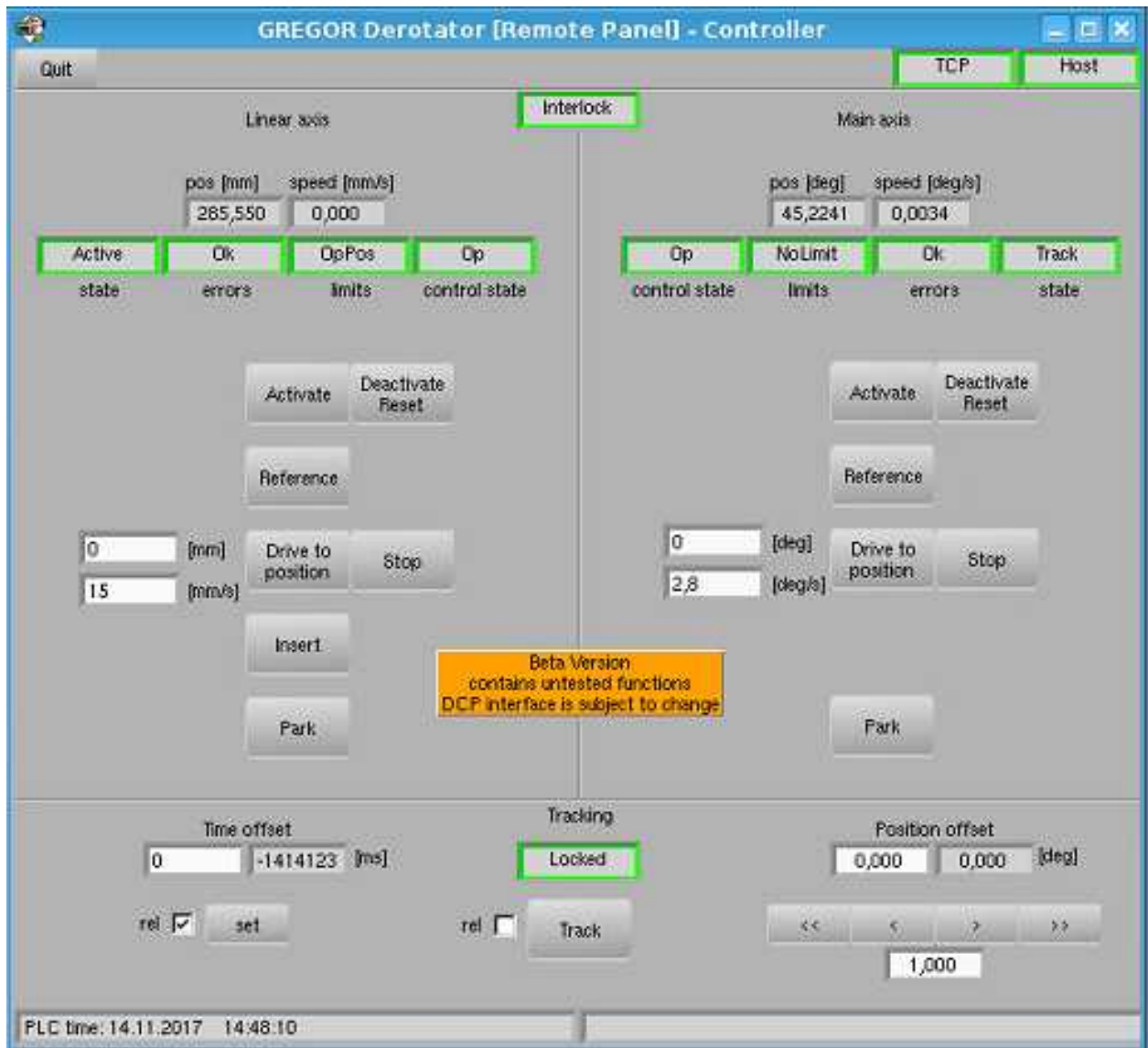# ICS (GREGOR Instrument Control System) @ Flight Stations:

GTCS

Derotator

Conductor

M2M3M5M6M7

M11M16F3

SlitScanner

Calibration Unit
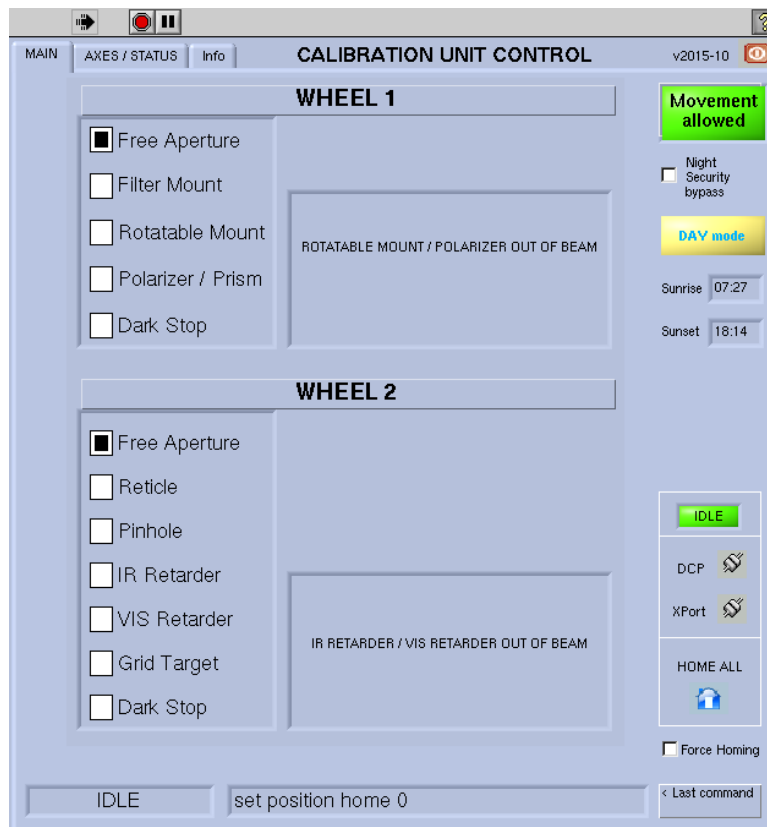
BBI (Broad-Band Imager)
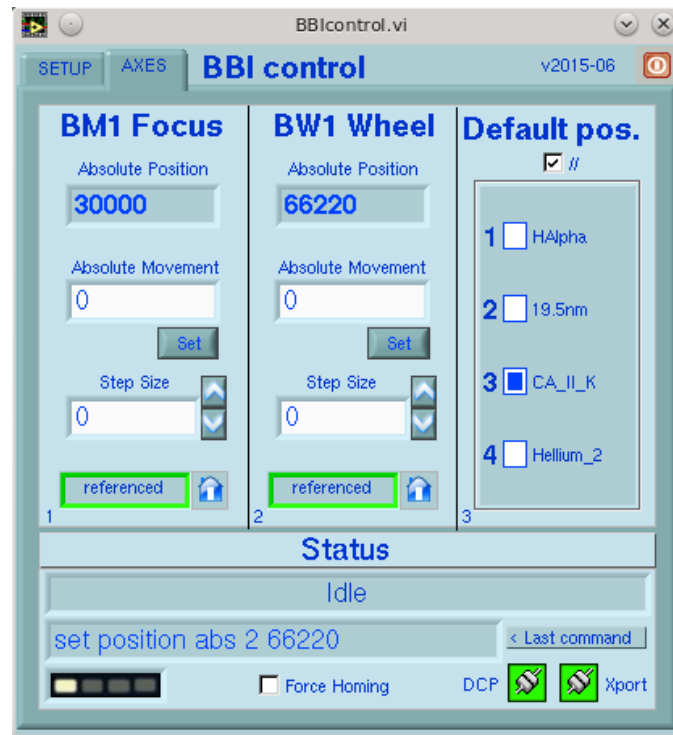
IFU (Integral Field Unit)
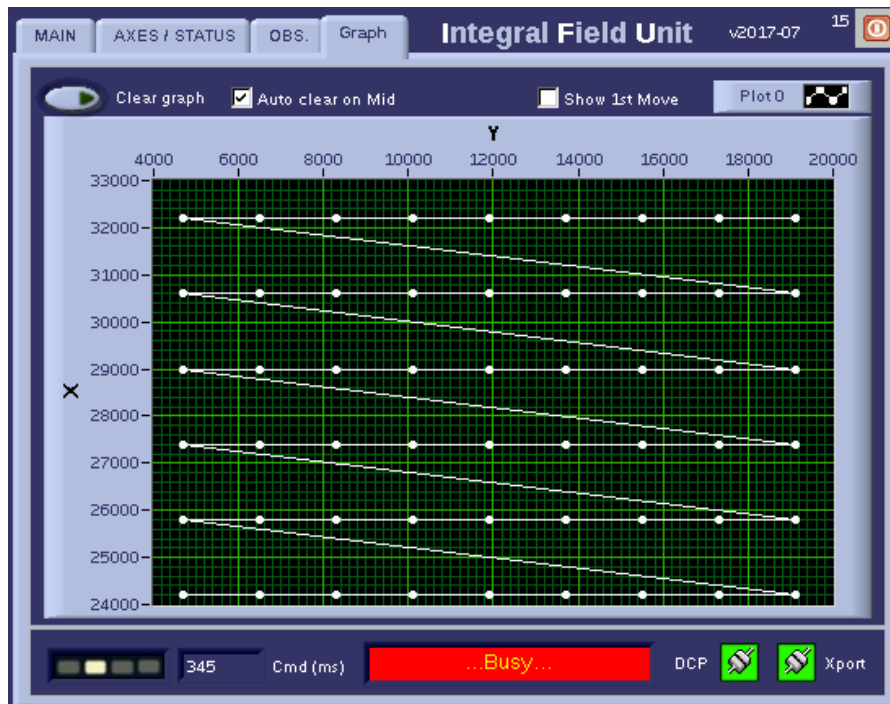
BTF3 – Beam Tracker at F3
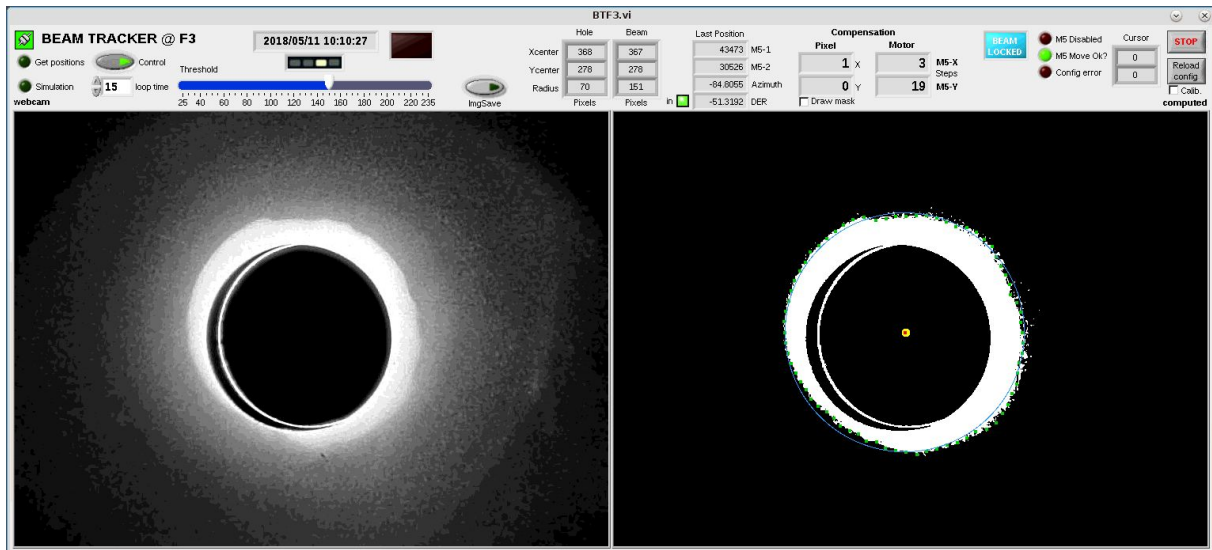
M4

2 Flight Stations at GREGOR

There are 7 PC running Linux CentOS 7 operating system for this purpose.

Description:

- On the 5th floor, 3 PC called FSG50.tt.iac.es (2 monitors), FSG51.tt.iac.es (2 monitors).

- On the 3rd floor, 4 PC called FSG30.tt.iac.es (2 monitors), FSG31.tt.iac.es (4 monitors), Finland.tt.ic.es (2 monitors), Denmark (1 monitor)

The user can start all needed interfaces from the ICS (GREGOR Instrument Control System); an icon of the ICS interface is available on the desktop.

Also TeamViewer Remote Desktop launch panels are started automatically at login. They can be minimized to the task bar if not used.

The login to the Flight Stations at startup is automatic. In case of restart, just wait for the configuration of the desktop to finish.

3 Remote panel

Most of the GREGOR control command applications are now running on the GCS computer. This means that the use of these applications from the observing computers (Flight Stations) has to be through the "Remote Panel" Labview feature.

For this purpose, the user can start the interface from the ICS menu, by clicking the icon in the list on the left side, after verifying that **no other instance of the program is already running** on the desktop or task bar.
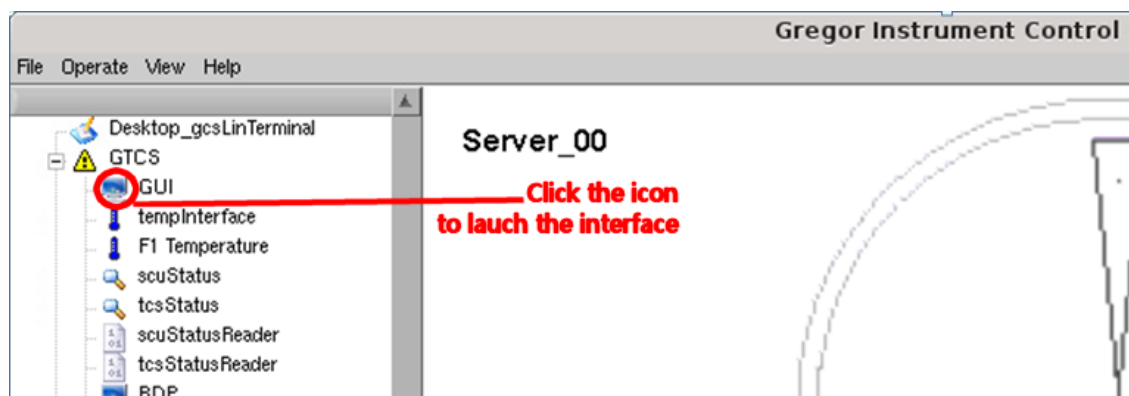
Closing the remote panel interface is done by only clicking the top-right cross button. This does not close the main interface that is still running on the GCS computer. Don't use the inner "stop" button, which is to be used for the main interface (normally grayed out, see image below). In case of shutting down the main interface from the remote one, the user will need to restart it on the GCS computer from the ICS interface.
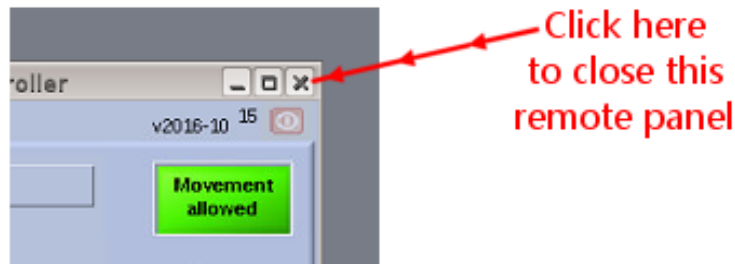
To take control of a remote panel, just right click over some unused place of the interface and a menu will appear with the following options:

- Request Control of VI
- Release Control of VI
- Show Last Message

Just select the appropriate option. Other options are also possible on the main interface (on the GSC computer):

Remote Server Panel >>

- Regain Control
    - o Unlock Control
    - o Lock Control
- Switch Controller
- Show Last Message

When server side interface regains control, the other remote panels connected to it cannot connect, until server panel unlocks the control.

4 Remote desktop

TeamViewer: Connection to a remote computer can be made simply clicking the desired item/computer on the list window. Be patient, this could take a few seconds…

Other remote desktop clients, such as Remmina Remote Desktop and TigerVNC have been removed (2017/05/04).

To start the AO GUI on a FSG, there is an icon (either GFPIGRIS or BBI).

5 F3 beam

The telescope beam wobbles slowly during the day because of a non-perfect telescope alignment. A webcam is attached in the AO bench to monitor F3. Its IP address is 192.168.90.139, and it is accessible on the flight stations by web browser. There is an entry in the ICS menu to launch a viewer of the webcam. This F3 view is useful to re-center the beam using M5 from the motorization interface; increments of 50 or 100 work well.
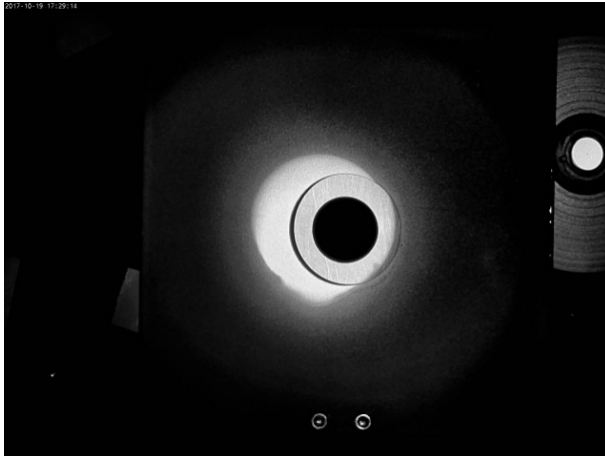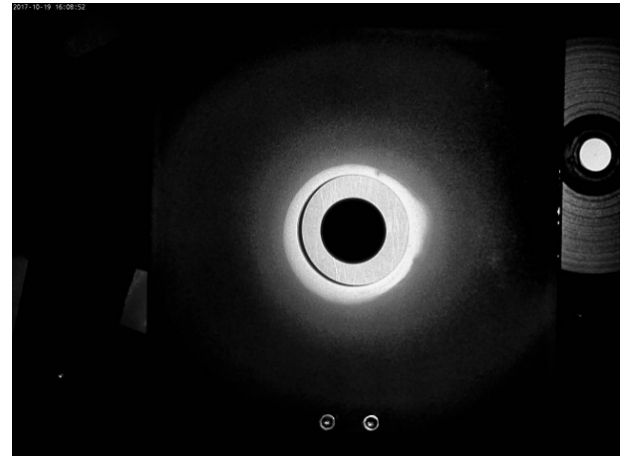

<table>
<tr><td>Not aligned</td><td>Aligned (+/-)</td></tr>
</table>

The new BTF3 interface (Beam Tracker at F3) has been added this year on GCS to automate the process. To switch it on/off use the "control" button in the GUI (no other settings required). When the beam centering is on, the beam should slowly move to the center of the hole until it is in the "locked" position (status will light up in GUI). BTF3 automatically takes into account whether the Derotator is inserted or out of the beam. When the beam position cannot be interpreted, a "Beam Error" indicator turns red. In the right picture of the interface (computed), the yellow dot corresponds to the hole center and the red dot to the calculated beam center. M5 motorization displacements are calculated as a function of the Azimuth position and Derotator if inserted. The loop time is currently set to 15 s but can be adjusted.

The interface is also controlled by DCP commands:

BTF3 set nop   >>>   Communication test. "0 FIN" is OK.

BTF3 get status   >>>   to get interface status.

Returns "0 a b c", where:

- a = (0/1) is the "tracking control" status   (OFF/ON)
- b = (0/1) is the "Locked" status   (OFF/ON)
- c = (0/1) is the "Beam error" status   (No error/Error)

BTF3 set soft ctrl a   >>>   to stop/start the BTF3 tracking.
Where a = 0/off/1/on

BTF3 set soft looptime t   >>>   to set the loop time delay in tracking. Where: $15 \leq t \leq 180$

BTF3 get position hole   >>>   Position of the hole (x y in pixels).

BTF3 get position beam   >>>   Position of the beam (x y in pixels).

BTF3 commands respect the DCP protocol - Parameters are not case sensitive.

6 Derotator

For observations requiring the Derotator, be sure to use the "beta" version of the interface running on the GCS computer, as it provides DCP commands for reading positions. The GRIS software needs this version in order to store positions with observation data, otherwise no polarimetric calibrations are possible. An orange message box at the interface front panel shows this information. The Derotator is also accessible through remote panels on the the flight stations. Do not forget to deactivate the linear axis to prevent warnings in answer messages of DCP position requests.
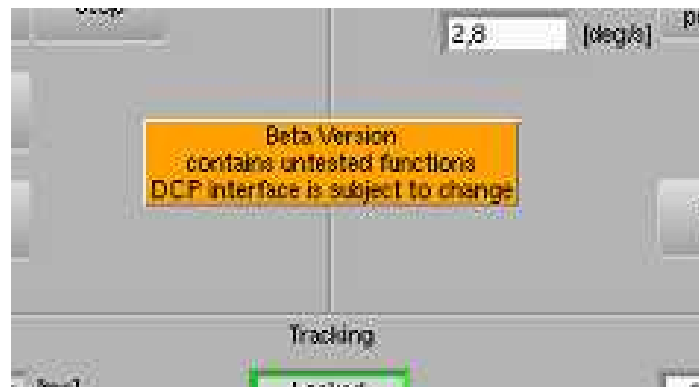
If the Derotator axes need to be referenced, for example after a power shut down of the system, the first axis to initialize is the linear axis, on the left side, clicking the "Deactivate/Reset" button, then the "Activate" one and finally "Reference". Wait until finished. Use "Insert" to place the Derotator into the beam. Then on the right side, initialize the rotation axis similarly. After initialization, an offset can be applied to the rotation axis, manually for static use or for tracking. Note: This offset is not aligned to any solar axis and is completely arbitrary with respect to the Sun. This is an open task for 2018.

Tracking time offset: always check the "rel" box and click the "set" button before Derotator tracking. Then track with the central "track" button.

Refreshing the time reference is the right thing to do and should have very small effects on the position the derotator goes to. The time synchronisation between the gcs and the derotator hardware is monitored and if they are off by more than 20 s you get an axis error. Normally

they should synchronize automatically but there is a bug, therefore this needs to be done manually.

The position deviation depends on the tracking settings. Besides the "Track" button there is a check mark "rel" for "Relative tracking". If it is checked the derotator calculates the offset to the base trajectory and starts tracking at the current position. It keeps the current orientation of the image. The right, grey indicator "Position offset" tells you which offset it calculated.

If "rel" is unchecked it uses the offset shown in the right grey indicator "Position offset". Depending on the offset defined the derotator would rotate to a different position first and start tracking there. To change the offset, the user can enter it in the white field "Position offset", and it should show up afterwards in the grey field. This means if you find a good offset setting today and start tracking with "rel" unchecked tomorrow and the same offset in the grey field, then you should get the same image orientation tomorrow as well, independent at which time you observe.

The derotator software always calculates the same track to follow. It only varies due to the changing position of the Sun from day to day. If the offset is 0 the derotator will follow this track. But of course the observer maybe wants to have a certain orientation of the image, therefore the user can enter an offset in the gui. If he runs it with an offset other than 0, it is added to the original track, if user set it to 0 again, it is back on the original track. So normally when the user starts the next day with the same offset he should get the same orientation, as the basic track takes the changed position of the Sun into account.

When you read the position through DCP with "get pos" then you get the encoder position of the rotation axis, whatever offset is set. So the offset is already included in that position.

Trick: To avoid complete rotation in referencing the rotation axis, the Derotator can be moved manually rotating it counterclockwise looking from the top, about 30º of the reference position. Be sure the rotation axis is deactivated before rotating manually; the device rotates with minimal effort …never force!

Please ask an experienced person for a demonstration for the first time.

To shut down the power of the system, please refer to the Power Operation document, which must remain near the Derotator electric cabinet, in front of the GREST telescope cabinets.

7 Conductor

Documentation for use and script edition can be found on the blog.tt.iac.es web page, menu: *Telescopes/GREGOR/Operating_&_Control_System/Conductor*.

In case of problem or error during the script execution, please use the "Save report" button, to keep the sequence results and inform the responsible for post analysis. The filename is generated automatically, so the user just has to confirm to save into the "Reports" folder of "ConductorData" on GCS computer.

The useful scripts for observation are:

FindSunCenter.script

To get the offset of the Sun center: They are stored into the GREGOR data base and used for accurate target tracking. The TTL (time to live) of these value is 1 hour.

Please, follow the instructions described in the script comments before starting.

PointWithCoordinates.script

For accurate target tracking, the script calculates the rotation transformation for telescope coordinates. The sequencer may pause, if the TTL of Sun center coordinate expired (just warning); the user can continue the sequence by clicking the "Start/Play" button and may expect loss of accuracy. Also, a record of the pointing coordinates is saved to a report file (HelioproPointing.log) into the "/opt/ConductorData/Logs/" folder on GCS computer.

A version of both previous scripts working without GDBS is also available in case of GREGOR database issue, where center coordinates are saved internally. Please, don't mix the script versions.

Other scripts for tracing and debugging:

GetAllMotorsPositions.script

Retrieve all positions from the small motorization drivers to a report file. The user has to click the "Save Report" button to keep the result in a file, for knowledge of the motorization configuration like a configuration snapshot, or after a setup.

Communication-Test_All-interfaces.script

Verify DCP communication with all the interfaces.

8 SlitScanner

New function has been added to the SlitScanner motorization: Motorization can be disabled making a "Smart Referencing". Click the "Home" button of each motor and the "Driver disabled" LED will light up. It is useful to stop the motorization control loop during long periods or after observation to avoid power consumption, heating, etc. The motorization will be automatically enabled at the first command.
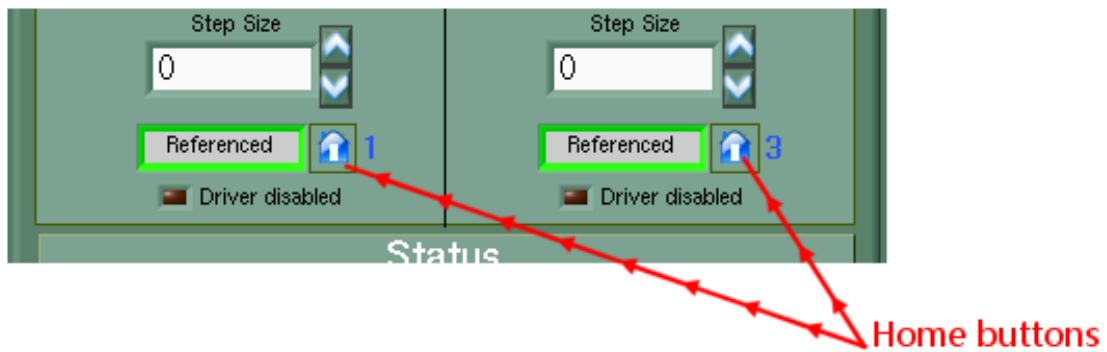
9 M4 interface

The M4 motorization control has been implemented into the system. It is used only for telescope alignment purposes and should not be used during observation. Please, ask Olivier or Thomas before any operation of this device.

10 M11M16F3 interface

The F3 wheel control panel has been changed for a more intuitive display, to easily select the wheel position:
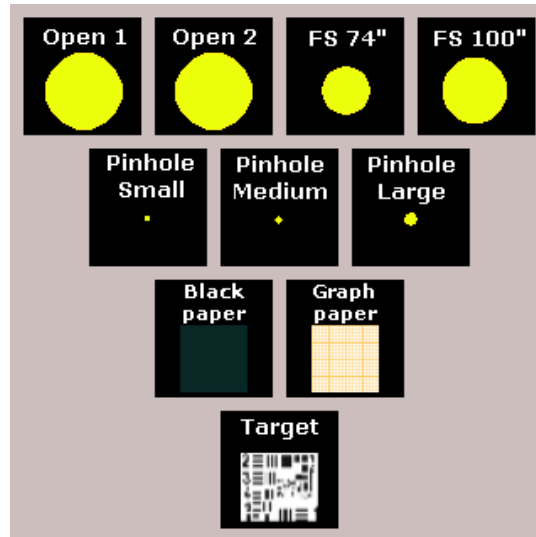
Just click on the selected position. Frame color meaning:

- **Blue**   > pointed.
- **Orange**   > moving…
- **Green**   > on position.

11 Known problems

Common problems, which are not solved:

GTCS:

After going to tracking, the GTCS interface can freeze (white panel sometimes) and the M1 shutter closes. The way to go back to a working state is to close first the GTCS remote panels (Guider remote panel too) on the flight stations, then go to the GCS computer on the 5th floor or use TeamViewer, go to the ICS left side menu and select the "kill GTCS/end GTCS" option. The interface has to be restarted again, answering "no" to "initialization". The user has to click on activate, deactivate, activate button to clear possible errors then can start the cooling. The cooling may not start at the first time, and the user has to retry until the cross disappears from the activated button. Always wait for the "hourglass" cursor to disappear before beginning a new action… Also check the M1 cover opening, which may have had a failure…

M11M16F3 interface:

Sporadically, the F3 wheel position selection does not work on the "Main" panel of the M11M16F3 interface. To solve this, go to the "Axes/Status" panel and move the F3 wheel with the Step Up or Down button of 50 counts, then go back to the Main panel to select the desired wheel position. (This issue may have disappeared because of modifications.)

DCP server:

If it has to be restarted, be sure that only one instance of the interface is running on the GCS computer, checking applications on desktop and in the taskbar and closing all other instances of "GreCoServer.vi". Wait for about 3 minutes before restarting the DCP server from the ICS menu, because the DCP communication port 2001 has to be automatically closed by the operating system (CLOSE_WAIT).

In the case of a client program crash or bad disconnect from the DCP server, the green On/Off led corresponding to client on the front panel of the DCP server may remain "On". In this case, the client will not be able to register again to the DCP server. Just click on the green "On" led to set it "Off" and the client can then register correctly.
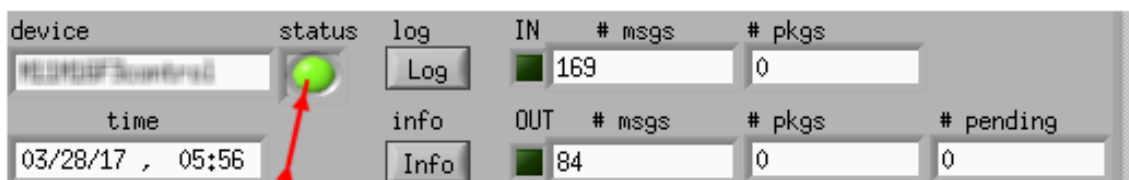

Thomas Hederer solved a serious network problem caused by the VPN server, resulting in remote panel, clients, and instrument computer sporadic disconnections. (2017/05/04)

12 Tips and tricks

Starting Telescope (Dome opened): No "Remote" option at SCU

Potential problem: The SCU telescope control program, normally in "**Host**" mode for tracking, is in "**LCP**" mode (local control panel) and there is no "**Remote**" option at the bottom of the screen instead of "**Local Control**". The trick is to shortly close the dome and reopen it to get an error, push to clear the red "Interlock" error button on the GREST cabinet and "Remote" should appear on the screen.
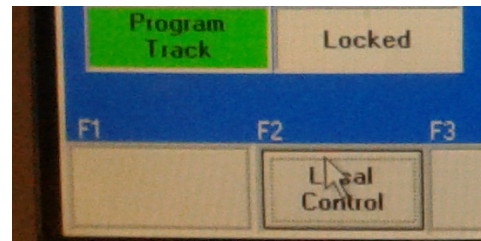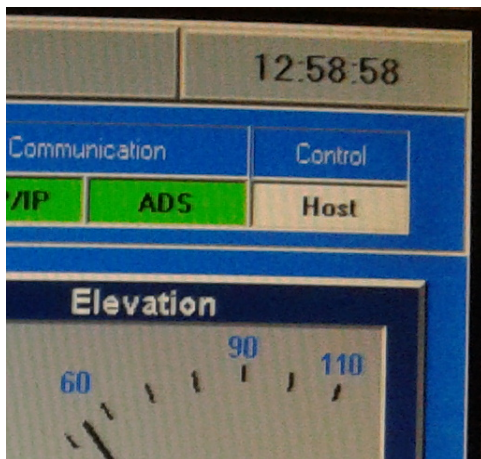
No tracking possible after referencing

After referencing the telescope, an error remains on the GTCS that is blocking the tracking, saying "**wrong mode...**". The trick is to restart the GTCS on the GCS computer, but in the beginning answer "**Yes**" to "**Initialize?**", then the error is cleared and tracking possible, or if it is already running, go to the GTCS menu "operate" and select "initialize telescope".

13 Addendum

In case of issues with GUIs, the user can try to close the interface and the potential dialog box related to it on the Flight Station. After verifying that no other instance of the interface is running on desktop, task bar, etc., the user can try to re-launch the interface from the ICS menu. If the interface does not start, the problem can come from the executable on the GCS computer.

As a second step, the user has to close the faulty interface on the GCS computer desktop, and restart it from the ICS menu in the same way as on the Flight Station, then restart it on the F.S.

All this can be done also through the TeamViewer remote desktop application connecting to "gcs.tt.iac.es". Do not forget to close the TeamViewer connection after use.

At this point, if the problem remains, the user has to inform the technical team.

BTF3: Documentation is currently in progress, and issues during real observations have to be reported to debug or enhance this system.

M4: As of now, the cabling is still visible, in the lower spider bar of the Calibration Unit in front of M1. Please verify before telescope movement (parking to tracking) that the CoSM black cable is not in danger.

Telescope/Dome operations: When opening and closing the dome, the operator has to remain at the dome level to verify the correct telescope position, that no tools or object remain around or over the moving parts or prevent movements.

Always verify the spider before opening the M1 cover (symmetric spiders shadow). A bad shadow means a bad telescope reference, leading to burning telescope parts…

If something is missing or can be useful for the next observers/users, please contact me to implement the information:

Olivier Grassin – grassin@leibniz-kis.de

(EOF)