Telescopio Nazionale Galileo

HARPS-N Quick Start Guide

Draft Manual version 2.0.2
TNG-MAN-HAN-0001

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Change Record

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V2.0.1	14-02-2013		New Sequencer and AG
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Contents

1 System Overview

The following parts composes the HARPS-N instrument control software:

- The Front End and Calibration Unit control software (LCU)
- The telemetry system (part of the LCU)
- The exposure meter counter(part of the LCU)
- The Autoguider (AG)
- The Sequencer
- The New Short Time Scheduler (NSTS)
- The scientific camera software (UCAM)
- The Data Reduction Software (DRS) using the TRIGGER to automatically execute reduction

The parts of the control software reside in various computers and communicate one with the other according with the scheme in Figure 1

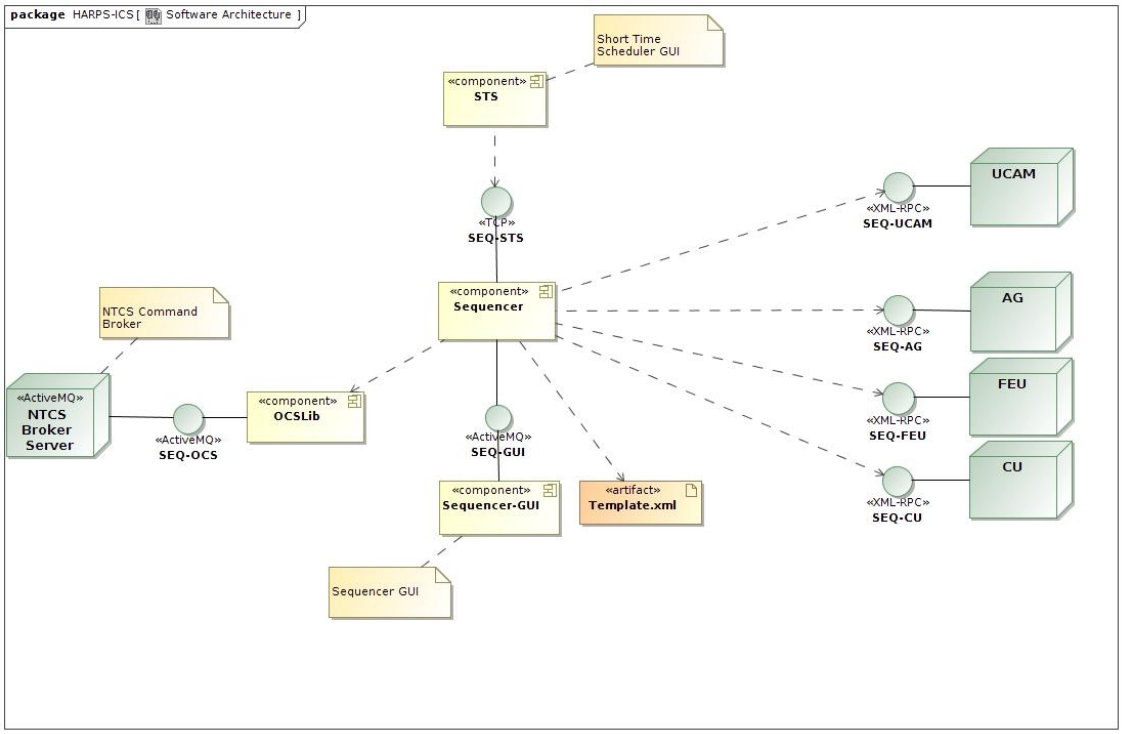


Figure 1 - The software architecture

Unit	Machine	IP	User
Front End Unit	harpsnlcu	161.72.92.20	harps
Autoguider	harpsnag	161.72.92.21	harps
Short Time Scheduler	brunello.tng.iac.es	161.72.44.35	guest
	barbera.tng.iac.es	161.72.53.4	guest
Sequencer	harps-ics.hn	161.72.92.10	hanmgr
Ucam	ucam.hn	161.72.92.32	ucam
Data Reduction Software	drs32.hn	161.72.92.15	harpn

Table 1 - Units addresses

2 Important points to be aware of

2.1 Life time of ThAr lamps

The ThAr lamps have two important roles in a HARPS-like spectrograph. The first, is to allow for precise wavelength calibration. The wavelength calibration sets the nightly 'zero point' of the instrument and is extremely important for the long-term radial-velocity repeatability. Therefore, always the same lamp should be used, which should live as long as possible. The second role is to track possible instrumental drifts. For this purpose, the 'simultaneous reference fiber' (fiber B or fiber 2) of HARPS is illuminated with the ThAr spectral reference, which is able to measure these drifts.

Given these two roles, we have foreseen in HARPS-N two different ThAr lamps:

A) **ThAr1** will be dedicated to the calibration. It is always used on fiber A and is switched ON only for calibration. The operational time must be as short as possible, typically of 10-15 minutes per day. **Immediately after ThAr calibration this lamp MUST be switched OFF.**
B) ThAr2 is always used on fiber B (sim. reference) for drift measurement. It is generally switched ON at the beginning of the night and switched OF at the end of the night by the 'End night' script. If not used for longer than an hour, it might be switched OFF during the night as well.

Important note: One should not forget to apply a warm-up time of **5-10 minutes after switching ON** again and before using it!

2.2 Observations without data reduction

The data reduction is an automatic but completely 'off line' process. The observations can be carried out without any loss of data or information even WITHOUT starting the DRS. For no reasons the observations should be halted because of the DRS not able to run or simply not running. The one note of caution is that no quality feed-back will be available from the DRS in these cases. The Observer should make sure that the instrument parameters are all ok and that a full calibration set has been carried out at the beginning or the end of the night.

2.3 Efficiency of the instrument

Efficiency of a spectrograph is a concern because it can strongly change with seeing, cloud conditions, calima, and air mass. The NSTS has some build-in functions to estimate the expected count rate and SNR as a function of seeing, airmass, stellar magnitude and exposure time. This function is called Exposure-Time Calculator.

At any time during the observations the Observer may want to compare the obtained values with the expected values. It is therefore recommended to compare the NSTS/ETC predictions with the measured values provided by the DRS. The can be found in the headers of the reduced *e2ds_A.fits files in the reduced file folder:
`drs32>/data/reduced/YYYY-MM-DD/` The keywords `HIERARCH TNG DRS SPE EXT SNXX`, where XX is the order number, provide the SNR per extracted pixel of the corresponding order, which can be directly compared with the ETC value.

A script is available in the directory `~harpn/scripts/get_mes` which will provide some general information on the scientific exposures, and in particular the SNR for the orders 1 (390nm), 46 (550 nm) and 68 (690 nm). The script can be called as follows:

```
cd
cd scripts
./get_mes 2012-06-23
```

Another mean to verify instantaneous efficiency is to observer the exposure meter counts in the HARPS-N Exposure Meter panel on the LCU machine. As a reference, the expected count rate is given, as well as the 'efficiency', which is nothing else that the measure/expected count rate.

The efficiency given by the ETC has been verified to be 'realistic'. In case of big discrepancies between measured and expected SNR, the problem may be due to:

- de-focus of the telescope or bad image quality -> ask the operator to do Shack-Hartmann and/or focus procedure
- Calima (nothing can help)
- Clouds (nothing can help)
- Wrong seeing estimation

In case that none of them apply, please contact as soon as possible the HARPS-N Instrument Scientist.

2.4 Instrumental drifts

The data reduction software provides shortly after a thorium-calibration 'thoAB' exposure and a simultaneous-thorium 'tho_simult' exposure a measure of the instrumental drift (since the last calibration). If this drift happens to be higher than 2 m/s we strongly recommend to re-do a wavelength calibration.

In its initial phases the HARPS-N spectrograph is not (yet) installed in a precisely controlled thermal environment. Therefore we strongly recommend to monitor the instrumental drifts given by the DRS. In case of faint objects are observed in objAB mode (sky light on fiber B), at least one tho_simult observation on a bright target should be done every hour to monitor the drifts.

2.5 The 'End night'

It is extremely important to execute the 'End night' command from the Sequencer. This command will ensure that, among other, that:

- The dust cover is closed
- The AG is stopped
- The lamps are switched OFF

The Observer and the Operator must verify that at least these three tasks have been carried out correctly.

3 Start-up procedures

3.1 Telescope start-up procedure

Actor:	**Telescope Operator**
Reference start time:	**Nautical night start NN**
Procedure:	
NN-90 min.	**Telescope start-up**
NN-80 min.	**Start-up the instrument** Start-up LCU (4.2) Start-up AG (4.3)
NN-60 min.	**Open telescope dome**
NN-50 min.	**Configure instrument for HARPS-N** Set derotator to 'HARPS-N'
NN-30 min.	If the image quality is poor, do a Shack-Hartmann (usually, only to be done when starting a run) Must be followed by a focus procedure
NN-20 min.	Check telescope telemetry running

3.2 Instrument start-up procedure

Actor: **Support Astronomer**
Reference start time: **Nautical night start NN**
Procedure:

NN-90 min. **Instrument verification**

Verify that telemetry is running
Monitor specific HARPS-N sensors (see Figure 2):
(From the http://tngweb.tng.iac.es/harps webpage)

Head-heater temperature	: CEO2_HEADSEC_T ~ 20°
CCD temperature	: CD02_CCDSEC_T ~ 15°
Echelle temperature	: LC03_ECHONTOP_T ~ 17°
Detector-body temperature	: LC07_DECHDBODY_T ~ 19.7°
Enclosure T2 temperature	: LE03_AIRINT2_T:~ 15°
Enclosure T3 temperature	: LE04_AIRINT3_T:~ 17°
Pabry-Perot temperature	: CC02_FPSEC_T: ~ 22°
Vessel pressure	: RTP5_VESSEL_P < 10^{-1} mbar
Pabry-Perot pressure	: RTP6_FP_P < 10^{-4} mbar
Liquid Nitrogen level	: M38AI00_LN2LVL1_L > 10%
CCD head pressure	: RTP4_DETECTOR_P (disabled)

NN-80 min. **Start-up the instrument**

From HARPS-ICS Terminal: Start-up Sequencer (multimedia, p.12)
From **brunello**: Start-up NSTS
From UCAM Terminal: Start-up UCAM (wsastro)
From DRS32 Terminal: Start up TRIGGER/DRS (brunello/wsastro)

NN-70 min. **Initialize instrument**

From Sequencer: Press '**LCU Init**' button
From Sequencer: Press '**AG Init**' button
Verify on LCU and AG that init is executed
Verify in Sequencer that no errors are reported
On sequencer: press on **'Start ins'** button

NN-60 min. **Calibrate instrument (daily calibrations)**

From Sequencer: Set ThAr1 and ThAr2 lamps to 'ON'
In NSTS: Insert File->OB->Standard calibration
From Sequencer: Press Next OB to execute
On DRS: Verify that quality control passes
After calibration and from Sequencer: SWITCH OFF ThAr1 lamp

NN-20 min. **Start night:**

On sequencer: Press '**Start Tel**' button
On sequencer: press 'Open' button in Dust cover
On Sequencer: Verify that no errors are reported
Verify the status in the **'instrument status webpage' (**Figure 3**)**
On Harps detector rack verify the state of exposure meter (TBF)

NN-15 min. **Do through focus (optional)**

In NSTS: Insert FOCUS OB
From Sequencer: Execute NEXT OB
The system should have set automatically the correct focus

NN Start scientific observations

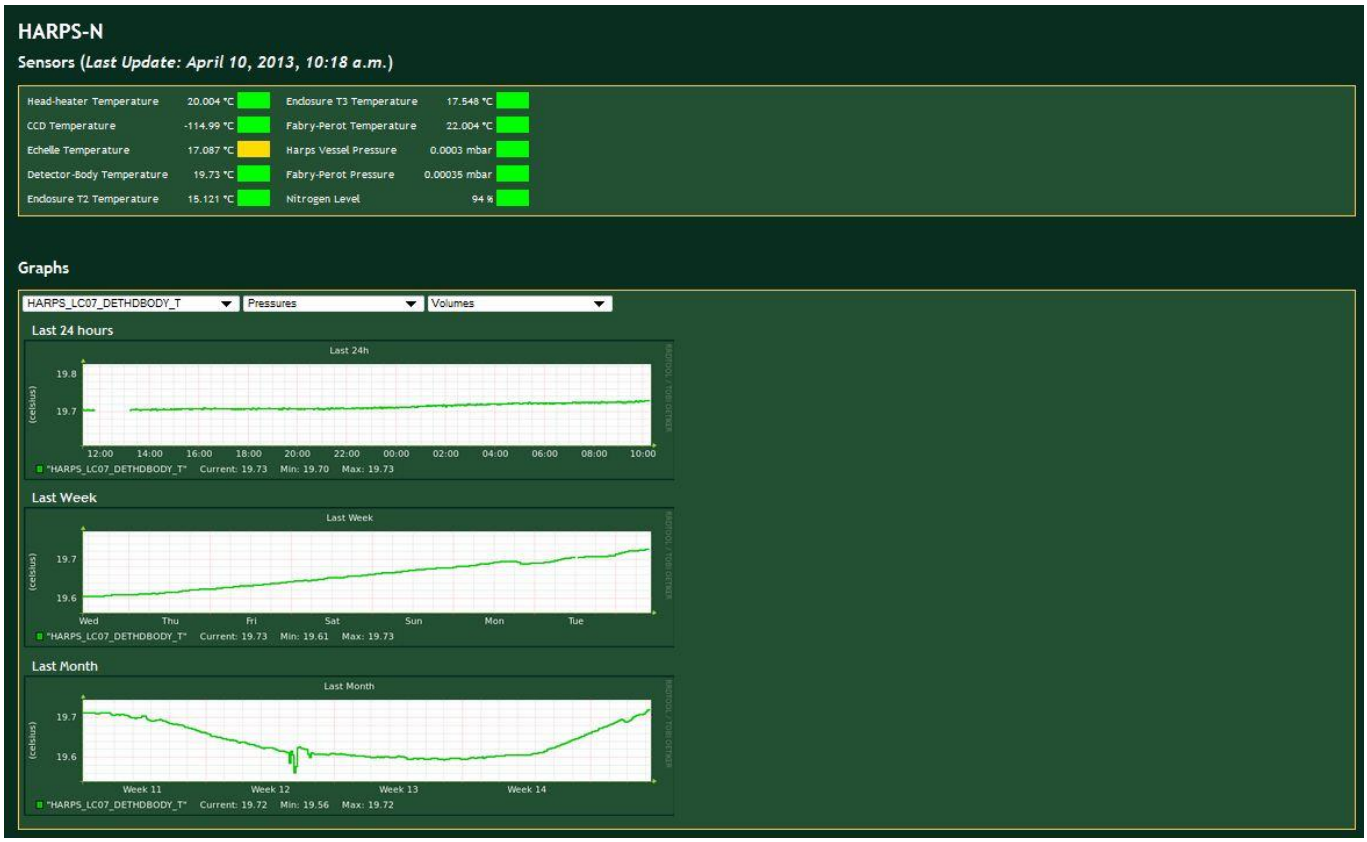


Figure 2 – HARPS-N sensors webpage

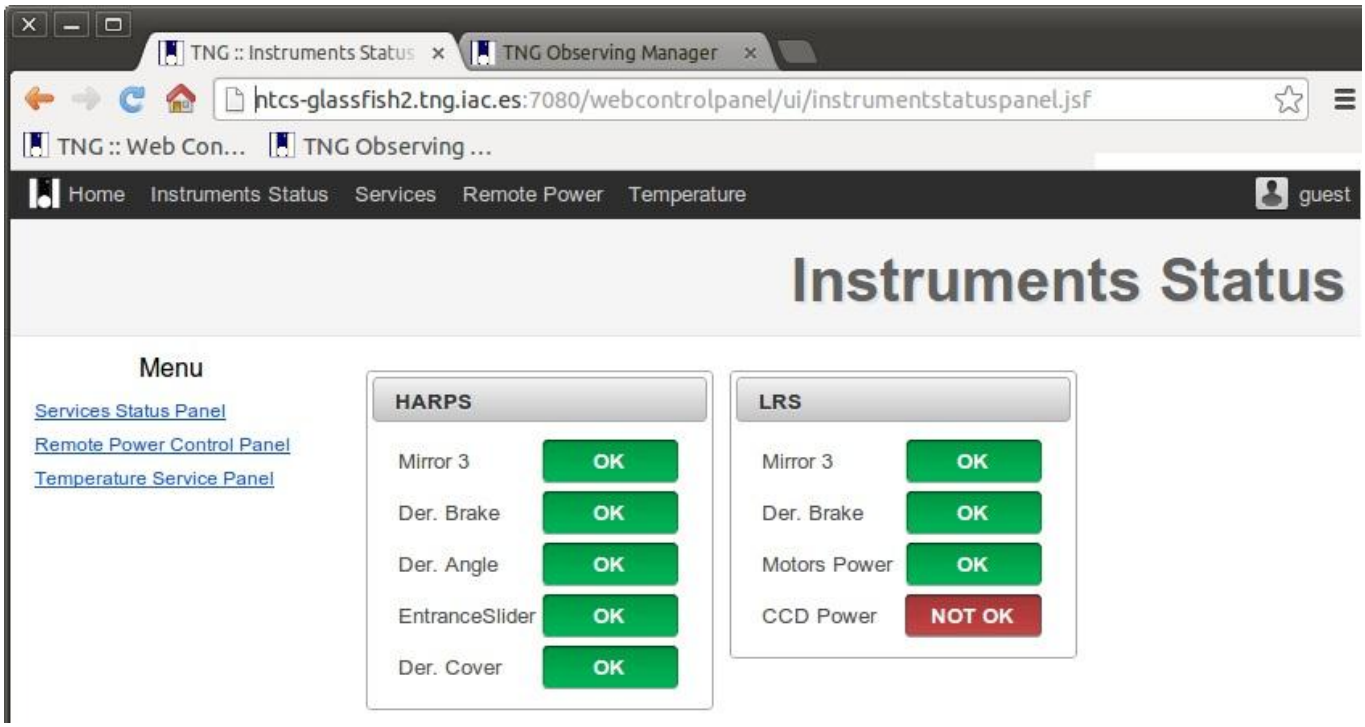


Figure 3 - Instrument Status webpage

4 How to start-up the various subsystems

4.1 The HARPS-N Workstation environment

The workstation environment in the control room is shown in Figure 4 . The workstation WSOPER is under the control of the Telescope Operator (TO), the Brunello and WSASTRO workstations are under the control of the Visitor Astronomer (VA) and finally the Multimedia workstation is shared between the TO and the VA.

Figure 4 - Control room workstations

4.2 The Front End and Calibration Unit (LCU) Start-up

The software used to operate with the FEU runs on a Windows PC that is located in Nasmyth B, in a rack close to the Calibration Unit. The user will interact with the FEU software by a remote connection from a linux machine.
In order to connect to FEU computer and start the LabView software, is necessary to open a remote desktop connection (from the **wsoper** workstation located in the control room):

a) Click on the HarpsNLCU icon (Figure 5) , or open a shell from any linux machine and type:
`rdesktop -T LCU 161.72.92.20 -g89%`
This will start the remote connection with the FEU PC.

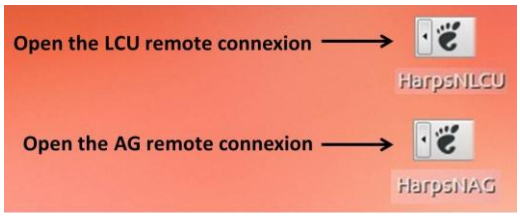


Figure 5 - WSOPER workstation desktop

b) Start the control software by clicking the icons corresponding to the control software in the following order (Figure 6):

1. syslogCollector
2. startLCUServer
3. simpleLCUClient
4. lcuDeviceTempMonitor

Figure 6 - FEU desktop screenshot

4.3 Autoguider (AG) Start-up

The software used to operate with the AG runs on a Windows PC that is located in Nasmyth B, in a rack close to the Calibration Unit. The user will interact with the FEU software by a remote connection from a linux machine.
In order to connect to AG computer and start the LabView software, is necessary to open a remote desktop connection (from the **wsoper** or **wsastro** workstation located in the control room):

c) Click on the HarpsNAG icon (Figure 5) , or open a shell from any linux machine and type:
`rdesktop -T AG 161.72.92.21 -g89%`
This will start the remote connection with the AG PC.

a) Start the control software by clicking the icons corresponding to the control software in the following order:

1. syslogCollector
2. startAGServer
3. startOffload
4. simpleAGClient
5. AG_DevMonitor

Figure 7 - AG desktop screenshot

4.4 Start up the Sequencer

From the **multimedia** workstation click on the **HARPS-ICS** icon.
Two programs make up the sequencer: the sequencer and the DS9. Both programs are hosted by a linux machine.

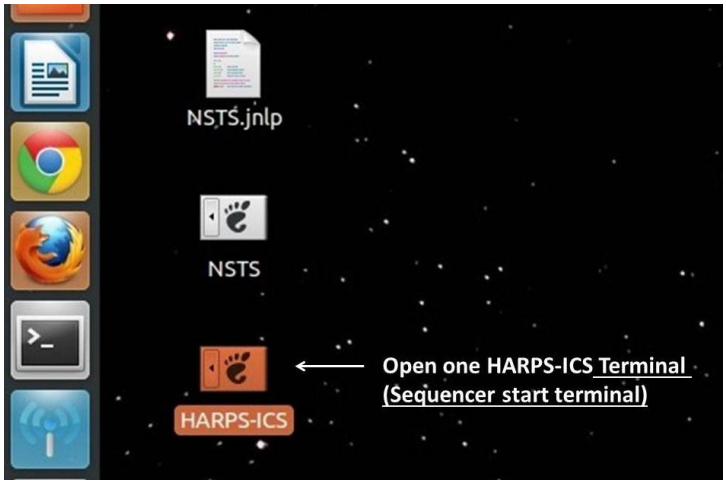


Figure 8 - Multimedia Workstation desktop

NOTE: verify that there aren't other sequencer running (see Figure 17)

These programs have to be executed from a terminal in the following way:

1. Open a HARPS-ICS terminals by clicking the HARPS-ICS icon in the **multimedia** workstation (or execute: ***ssh -X hanmgr@161.72.92.10*** `from a linux machine`)
2. Change to run directory in both terminals → `cd /home/hanmgr/run`
3. Run the sequencer in the first terminal → `./run_sequencer.csh`

The script opens the Sequencer GUI and a DS9 terminal.

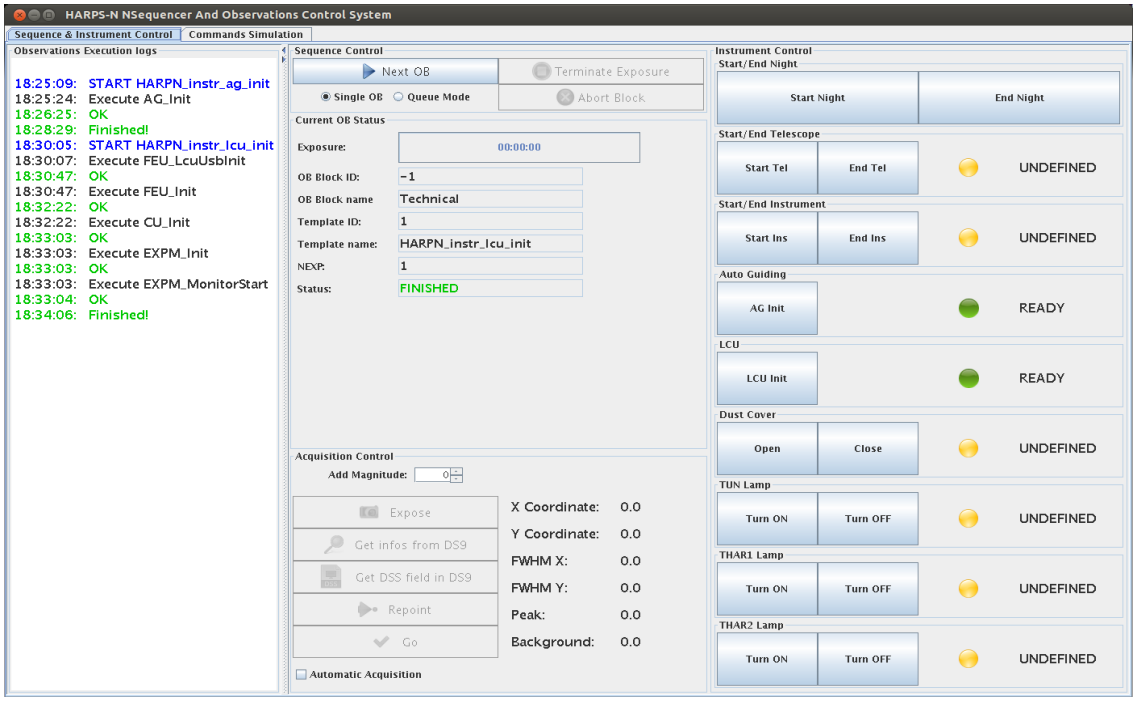


Figure 9 - Sequencer GUI

Note: The red log "Failed to fetch data from telemetry!" is not an error and can be ignored as error if appears during calibrations or in acquisition with exposure time less than 5 seconds.

Table 2- Acquisition Control panel

Add magnitude	Increases/decreases the value of the magnitude of the selected star
Expose	Takes a new image with the AG camera
Get info from DS9	Takes coordinates and FWHM from the point clicked in the DS9 image
Get DSS fields in DS9	Visualizes the compass in the DS9
Repoint	puts the point clicked in the DS9 image into the fiber position and acquire a new image
Go	put the point clicked in the DS9 image into the fiber position and start the autoguider
Automatic acquisition	Selects , puts in the fibre and start the acquisition of the brightest star of the field

4.4.1 Sequence Control buttons

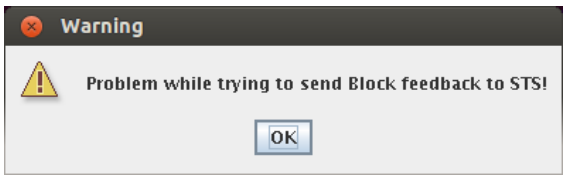
Next OB → executes the next block available of the NSTS
Single OB → if checked executes one block when the user click on **Next OB** button
Queve Mode → if checked executes a series of NSTS blocks (according with the NSTS rules) when the user clicks on **Next OB** button
Terminate exposure → ends the current exposure
Abort block → aborts the current block

4.4.2 Instrument control buttons

Start night button → executes the **Telescope Start night** and the **Instrument start night**
Start Tel button → executes the **Telescope Start night**
Start Ins button → executes the **Instrument start night**
Dust Cover buttons → **Open** and **Close** the dust cover
Note: The ***Start Night*** button includes the preparation to observation of the telescope and of the instrument.
With the new two buttons the user can do this operation separately by using the **Start Tel** and the **Start Ins** Buttons .

4.4.3 Other changes

The sequencer now has a feedback with the NSTS. If the NSTS is not in execution the sequencer visualizes a warning.



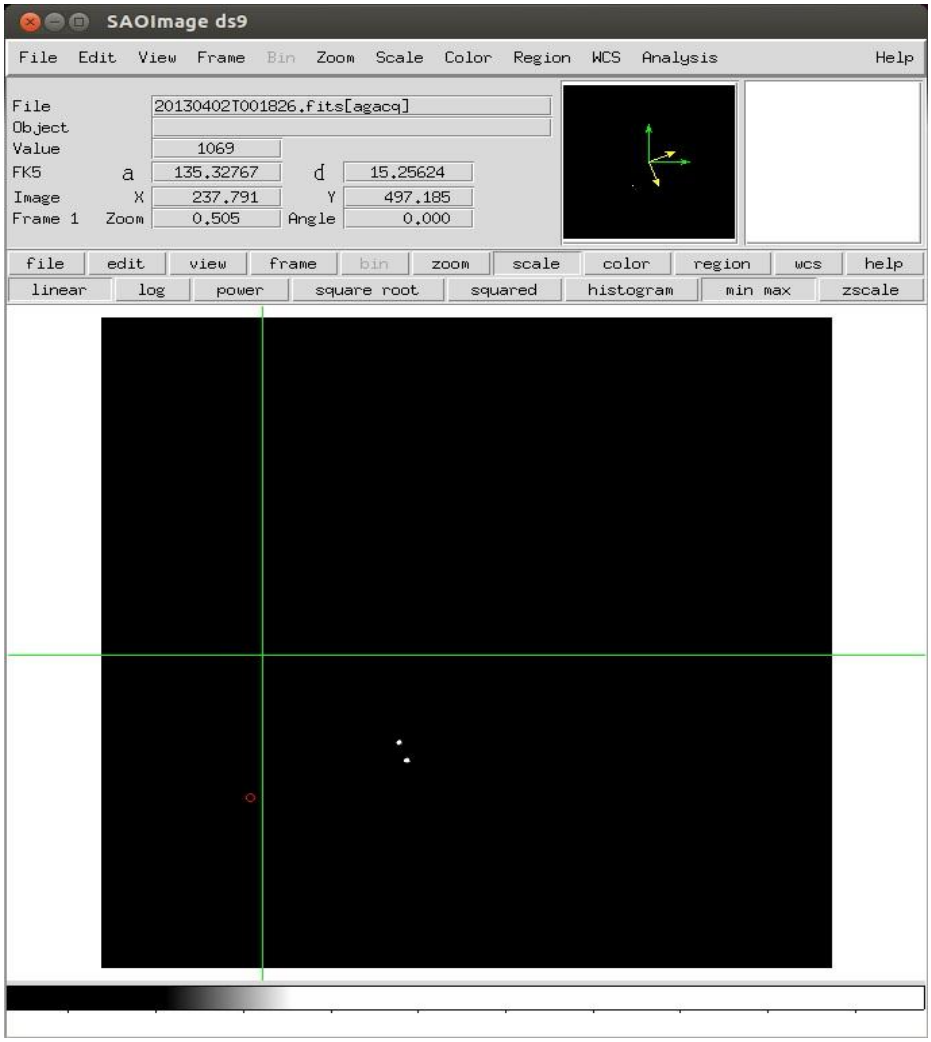


Figure 10 - The DS9 GUI with the star into the fiber

4.5 Start up the New Short Time Scheduler (NSTS)

From the **brunello** workstation click on the **HARPS Short Time Scheduler** icon.

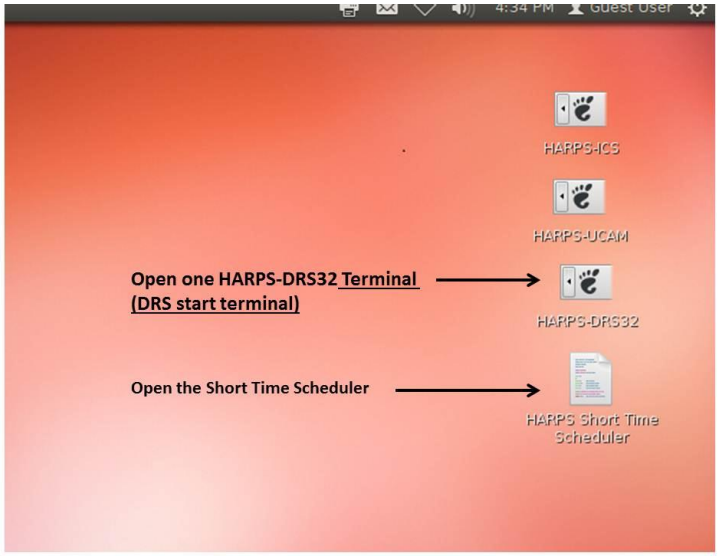


Figure 11 – brunello workstation desktop

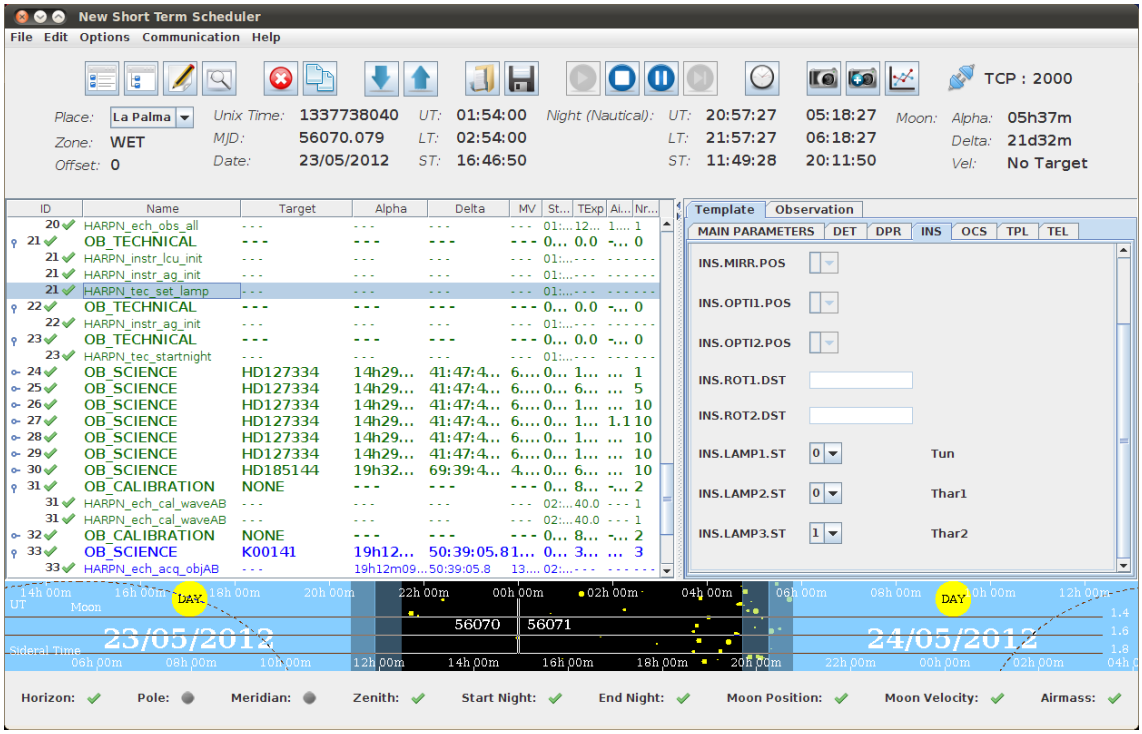


Figure 12 - Short Time Scheduler GUI

4.6 Start up the scientific camera (UCAM)

A linux machine hosts the software of the scientific camera.
Open a HARPS-UCAM terminals by clicking the HARPS-UCAM icon in the **wsastro** workstation (or execute: ssh –X ucam@ucam.hn from a linux machine)

1. Start the UCAM software with the command → *goucam*

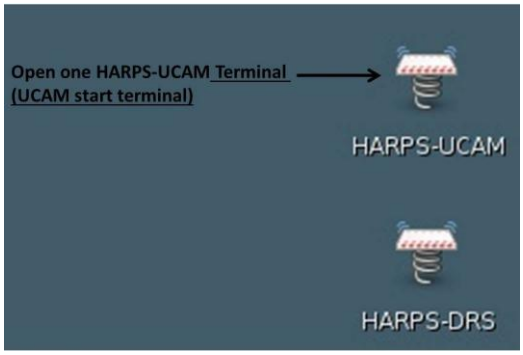


Figure 13 - Wsastro workstation desktop

The command opens three terminals and starts the DS9 GUI and the UCAM GUI. Once UCAM has been launched, the camera must be initialized and enabled.

To do so, go in the UCAM GUI and

1) Click on **reset** button
2) Click on the ***initialise*** button
3) Click on the ***enable*** button
4) Click in the ***refresh*** button
5) In the *camera applications* panel choose *ccd231_read_2ch_app.xml* and click on the ***select*** button
6) In the *application parameter* panel put the value ***1*** *in :*
    a. *4-EL_GAIN*
    b. *5-SPEED*
7) click on the ***Execute*** button to verify the image acquisition

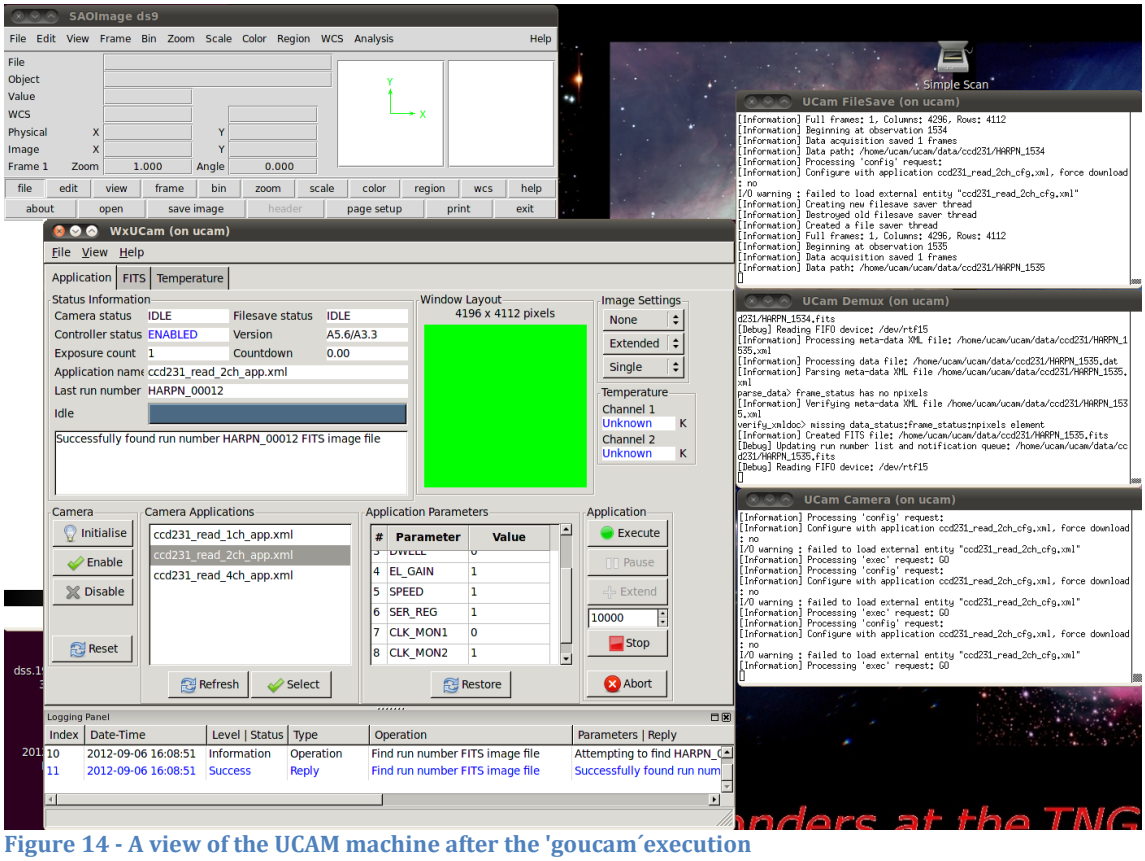


Figure 14 - A view of the UCAM machine after the 'goucam´execution

4.7 Start up the data reduction online software (DRS)

The DRS is an ensemble of recipes to reduce various frame type produced by HARPS-N. To each observation template, a specific reduction recipe has been associated, which will reduce the so recorded raw frames and produce second-level data products.

The automatic execution of the DRS and the association between template and recipe is carried out by the Trigger. In order to execute the trigger, one has to proceed as follows:

1) Open a HARPS-DRS terminals by clicking the HARPS-DRS icon in the **brunello** workstation, Figure 11 (or execute: ssh –Y harpn@drs32.hn from a linux machine)
2) Run the trigger and DS9 → **./start_DRS.csh**

The trigger will show any new raw frame arriving in the *current* night directory and automatically execute the corresponding recipe.
(the trigger can be started without ds9 → `trig.csh online`)

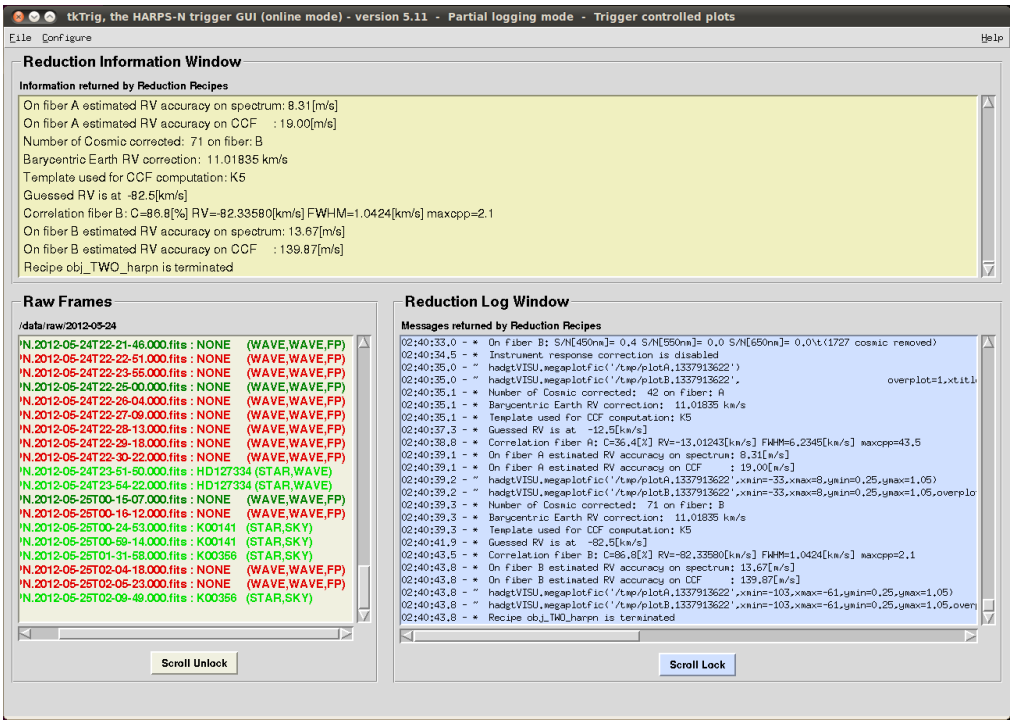


Figure 15 - Data Reduction Software

Important note: The data reduction is an automatic but completely 'off line' process. The observations can be carried out without any loss of data or information even WITHOUT starting the DRS. For no reasons the observations should be halted because of the DRS not able to run or simply not running. The one note of caution is that no quality feed-back will be available from the DRS in these cases. The Observer should make sure that the instrument parameters are all ok and that a full calibration set has been carried out at the beginning or the end of the night.

In case the Observer would like to reduce another night that the current one, he/she may launch the trigger in the 'offline' mode by typing: `trig.csh 'online YYYY-MM-DD'`. If the night had already been reduced, but the Observer would like to re-reduce it, then he/she will first have to remove the file `YYYY-MM-DD.r` in the folder `/data/msg/`.

4.8 Start up the data reduction offline software (OFFDRS)

In case the Observer would like to analyse the results of the pipeline, he/she may launch the DRS offline by typing the command: ***offdrs.csh*** and selecting the night and the reduced data from the user interface.

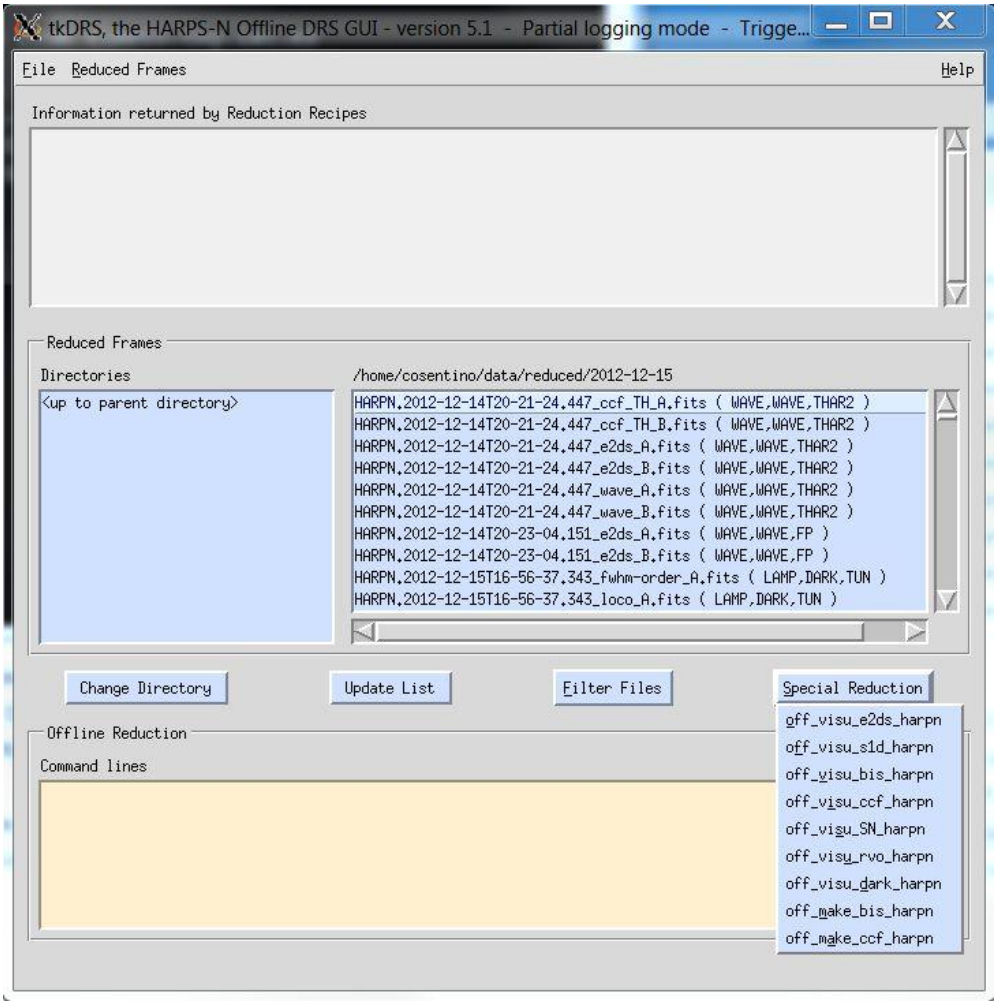


Figure 16 - Offdrs User interface

5 How to shut-down HARPS-N (end of observations)

5.1 How to shut-down the subsystems

1. From the sequencer do an “END NIGHT” and wait until the processes ended
2. Close the NSTS
3. Close the Sequencer GUI, the DS9 and the remote connections to harps-ics.hn
4. Close the DRS, the DS9 and the remote connection to drs32.hn
5. Close the UCAM software (the ds9, the gui and the tree terminals) and close the remote connection to ucam.hn
6. Close all the AG processes
7. Close all the LCU processes.
8. Power off the Dolores electronics (in needed)

6 Troubleshooting (to be upgraded)

In the following we will describe a series of known bugs and problems and how to solve them. This chapter will evolve very rapidly due to the on-going software upgrades.

There is no light of the guiding camera after acquisition

- Have you changed the cuts and moved the image around in the DS9?
- Has there been any error in the Sequencer or elsewhere, which prevented the acquisition to be carried out?
- Has the telescope received and executed the pointing command and respective coordinates?
- Is the telescope dome open and the telescope started?
- Is the telescope configured for HARPS-N (ask the telescope operator):
    - M2 position for HARPS-N nominal focus
    - M3 position on Nasmyth B
    - M4 position 'ADC' for HARPS-N
    - Derotator position set for HARPS-N and stable!
- Has the L1-lens cover on the derotator been opened?
- Is the 'cal mirror' out of the beam ('NONE' position)? Check on LCU Device Monitor and whether there have been errors in the Sequencer. If necessary, move it 'manually' from the LCU Simple_client panel on the LCU machine

The Sequencer is behaving in a strange way

It might happen that two OB are taken at the same time from the NSTS or that an OB starts by reporting 'OB Ended'. In this case there are probably two Sequencer processes running simultaneously.

NOTE: the state of sequencer is shown in the ***TNG Observing Manager*** webpage:

http://ntcs-glassfish1.tng.iac.es:7080/ntcs-ocsservice/manager/ui/observingmanager.jsf

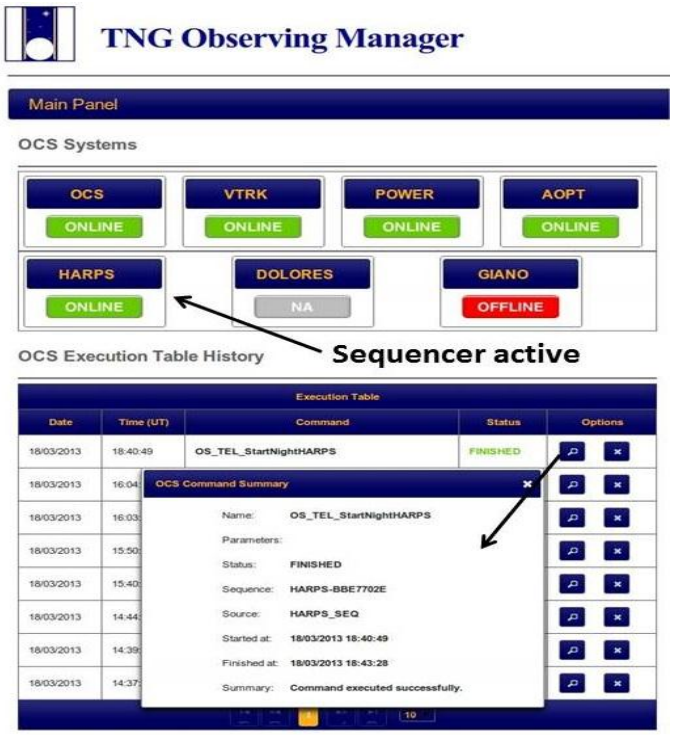


Figure 17 - TNG Observing Manager

In this case one has to make sure that only one Sequencer is running:

- Kill the Sequencer GUI
- In the same terminal type `ps –ef | grep Sequencer` to make sure that no such process is running. If so, `kill -9 nnnn` the corresponding process. Re-start the sequencer.

Other Sequencer errors

1. **Error** : The OB ends with *error status 1*
   Solution: → close and restart the sequencer and the sequencer GUI

2. **Error**: The OB ends/frozen immediately after
   ****** NEXT OBSERVATION ******
   Solution: → close and restart the NSTS (save the list before)

3. **Problem**: The sequencer is frozen and you want to stop it
   Solution: see *7.2 Sequencer errors*

4. **Problem**: The sequencer terminate the exposure with an ABORT

Solution: see UCAM errors (7.3)

The AutoGuider image remains stuck

It is very important that the star is always centered on the fiber hole at any time during the exposure. Because of unknown reasons, the guiding image may, very rarely, stop to be updated. It is then very important that the AG is stopped and started as quick as possible. To do so:

- Move to the AG machine and open/put in foreground the 'simple_Client' window to control the AG.
- Select the 'command' tab
- Choose the command 'AG_StopGuide.vi' and push the 'Press to Start' button.
- Choose the command 'AG_StartGuide.vi' and push the 'Press to Start' button.
- If not starting, repeat the procedure a couple of times.

Instrument axis failing
It may happen, that one of the instrument functions fails and the error leads to a stop of the exposure. In this case the Sequencer will report an error of the corresponding axis, e.g. during setting the 'lamp selector', It might be sufficient, in this case, to simply duplicate the exposure in the NSTS and start it again. If the Sequencer is not ready, it might be necessary to 'Abort' the exposure first.

In case the system continues delivering failures of the function while configuring the instrument, the corresponding function must be re-initialized. Although a little bit longer, this is best done by re-initializing the LCU and/or the AG. To know which one needs re-initialization, one may verify in the LCU and in the AG device monitors if/which function is in 'failed' status or on which syslogCollector an error is reported. Do then a initialization of the corresponding system.

Alternatively, and in order to be sure that all the steps are carried out in the correct sequence, proceed as follows from the Sequencer:

1. Press 'End Ins' (~15 sec.)
2. Press 'LCU init' (~3 min.)
3. Press 'AG init' {~1 min.)
4. Press ' Start night' (~15 sec.)

Attention: The 'Init LCU' and the 'End night' commands will switch OFF the ThAr lamps. If one of the lamps is needed for calibration and/or simultaneous reference, the corresponding lamp must be switched ON again. A warm-up time of 5-10 minutes should be observed.

The Trigger/DRS remains stuck or crashed on a specific exposure
In case of DRS/trigger crashes, look into the terminal window to see if there is any python error message. Most of the time it is necessary to exit and restart the trigger.

If the problem persists (stops always on the same exposure) proceed as follows:

- On the drs32.hn machine, edit the file "`/data/msg/<night>.r`"
- Add a line indicating the exact name of the RAW frame the DRS has to skip. Follow the format of the previous line considering that only the file name column is needed. In general you may add/remove frames that you want to skip or re-reduce, respectively.
- Save the file and re-start the Trigger.

If the DRS shows the error message "CalibDB locked. Waiting...", delete the file "/data/calibDB/lock_calibDB".

7 Re-starting specific components in case of troubles

7.1 FEU and Autoguide errors

The errors that may happen on the LCU and AG systems are:

- Init error
- Positioning error
- Service doesn´t start (ADC start, autoguide offload, etc)
- etc

In these cases, act as follows

1. The first attempt to fix the error with an init of the system from the Sequencer or the engineering interface (simpleClient).
2. If this solution doesn't solve the problem, close all the Labview tasks and restarts them as indicated in the start-up procedure. If this solution doesn't solves the problem call the instrument scientist.

7.2 Sequencer errors

7.2.1 The sequencer remains frozen

When a sequencer remains frozen or doesn´t get the next block from the STS, the procedure to restart depends on the last operation executed and not terminated.

Case 1: The sequencer is crashing during a UCAM acquisition,

1. Close the sequencer GUI
2. Close all the windows of the UCAM software (only if the acquisition system is blocked)
3. Start the UCAM software (if it was closed before)
4. Start the sequencer GUI

Case 2: The sequencer is crashing during other conditions (telescope slew, repoint, init, etc) the procedure is the following:

1. Close the sequencer GUI
2. Start the sequencer GUI

7.2.2 The DS9 unexpectedly closes

When the DS9 unexpectedly closes the procedure to restart is the following:

1. Close the sequencer
2. Start the sequencer again

7.3 UCAM errors

7.3.1 The sequencer ABORT the Exposure

When the sequencer terminates the exposure with an 'ABORTED'

Example: Sequencer: Fri Nov 23 03:59:03 UTC 2012 /ObsBlockStatus/ABORTED
/ObsBlockStatus/ABORTED
Terminating Exposure...

Or the exposure ands after about 20 seconds

The solution is to restart the UCAM from the UCAM-GUI (Figure 14) as following:

1) Click on **reset** button
2) Click on the ***initialise*** button
3) Click on the ***enable*** button
4) Click in the ***refresh*** button
5) In the *camera applications* panel choose *ccd231_read_2ch_app.xml* and click on the ***select*** button (if not selected)
6) In the *application parameter* panel put the value ***1*** *(if not selected) in :*
    a. *4-EL_GAIN*
    b. *5-SPEED*
7) click on the ***Execute*** button to verify the image acquisition

7.3.2 The sequencer get stuck during exposure

If the exposure counter in the sequencer GUI exceeds the expected time (Exptime + 40 seconds) this means that the UCAM got stuck.

The solution is:

a) Restart the Sequencer and the sequencer GUI
b) restart the UCAM from the UCAM-GUI (Figure 14) as following:

1) Click on **reset** button
2) Click on the ***initialise*** button
3) Click on the ***enable*** button
4) Click in the ***refresh*** button
5) In the *camera applications* panel choose *ccd231_read_2ch_app.xml* and click on the ***select*** button (if not selected)
6) In the *application parameter* panel put the value ***1*** *(if not selected) in :*
    a. *4-EL_GAIN*
    b. *5-SPEED*

click on the ***Execute*** button to verify the image acquisition

Appendix A - Useful Harps-N webpages

HARPS-N TNG webpage	http://www.tng.iac.es/instruments/harps/
TNG Observing Manager	http://ntcs-glassfish1.tng.iac.es:7080/ntcs-ocsservice/manager/ui/observingmanager.jsf
HARPS-N Sensors	http://tngweb.tng.iac.es/harps/

Appendix B - Actions of multi task commands

Telescope start night:

- Open the HARPSN derotator cover
- Power on the Dolores electronics
- Initialize the Dolores movements
- Move the 'entrance slider' (M4) to the HARPS position
- Power on the M3 control
- Move M3 to Nasmyth-B (the TO had to set the telescope in Nasmyth-B mode)
- Power off the M3 control

Telescope end night:

- Close the HARPSN derotator cover

Instrument start night (HARPN_tec_startharps):

- FE_adczero
- FE_startadc
- FE_gettelemetry
- VC_startexp
- VC_useshutter

Instrument end night(HARPN_tec_startharps):

- AG_stopguide
- FE_stopgettelemetry
- FE_stopadc
- VC_stopexp

LCU init:

- Execute USB init
- Execute FEU init
- Execute CU init
- Execute EXPM init
- Execute EXPM monitor start

Appendix C

List of acronyms

ADC	Atmospheric Dispersion Compensator
AG	Auto-Guider
CCD	Charge Coupled Device
CCF	Cross Correlation Function
CFC	Continuous Flow Cryostat
CU	Calibration Unit
DFS	Data Flow System
DRS	Data Reduction Software
E2DS	Extracted 2-Dimensional Spectrum
ETC	Exposure Time Calculator
FEU	Front End Unit
FITS	Flexible Image Transport System
FWHM	*Full Width at Half Maximum*
HARPS-N	High Accuracy Radial velocity Planet Searcher in the North hemisphere
ND	Neutral Density
NSTS	New Short Time Scheduler
OB	Observing Block
RV	Radial Velocity
SA	Support Astronomer
SNR	Signal to Noise Ratio
TBC	To Be Confirmed
TBD	To Be defined
TBF	To be fixex
ThAr	Thorium Argon
TNG	Telescopio Nazionale Galileo
TO	Telescope Operator
VA	Visiting Astronomer