

# Schulman Telescope Startup Procedure

Updated 8/4/2022 - Travis Deyoe

The order of operations below is designed for time efficiency. Missing a step could lead to frustration as some steps may feel “out of order” but are designed to reduce down time waiting for things to power on.

## Pre-Startup Checks

### Pull Off Tarps

The Telescope, Controller, and desk will always be tarped whenever the telescope is put into Lightning Shutdown. They will need to be removed before inspecting or moving the telescope.

Perform your best interpretive dance to appease the tarp gods. If that does not make the tarp fall off you must remove it manually. Folding it up and placing it to the right of the brown cabinet is a nice touch.

### Check Telescope Position

Verify the the telescope is not at any limits. If it is or looks “wrong” to you move it manual into a safe position before the next steps. This guarantees that it will be able to successful and safely home in a future step. It's recommended to place it either at [Zenith](#) or the [Park](#) position.

### Check Emergency Stops

If engaged, release any E-stops on the Hand Paddle, Telescope Controller, and the MaxDome Controller. They all appears as big red buttons that scream “PRESS ME IN CASE OF EMERGENCY”.



## Check the telescope Balance state

The telescope is in a balanced state when one of the following conditions are met:

- The camera is on with a single weight attached at the “top” of the backplate.
- The focuser is on with both eyepiece weights attached on either side of the focuser and there is no weight on the “top” of the telescope.

In either state an eyepiece should be in the 6” refractor and the mirror covers are open (this will be done later in the [this step](#). If neither of these are the state the telescope is in place it in one of the [Configurations](#) now or at the very least before [homing the telescope](#).

## Check RA Encoder Tape

Follow the RA [optical tape](#) along the big RA wheel and check for any smudges, bug guts, and so forth. The WEST [read head](#) is active while the east read head is not currently utilized so make sure through the entire motion of the telescope (in RA of course) that there is nothing blocking the reading of the tape on the west side and that there is nothing obstructing the read heads ability to “see” the optical tape.

Make certain both the [drive and idler bearings](#) are also free of anything that might be transferred to the optical tape. There is a bit of felt held in place there that *should* wipe off anything but its best to check still.

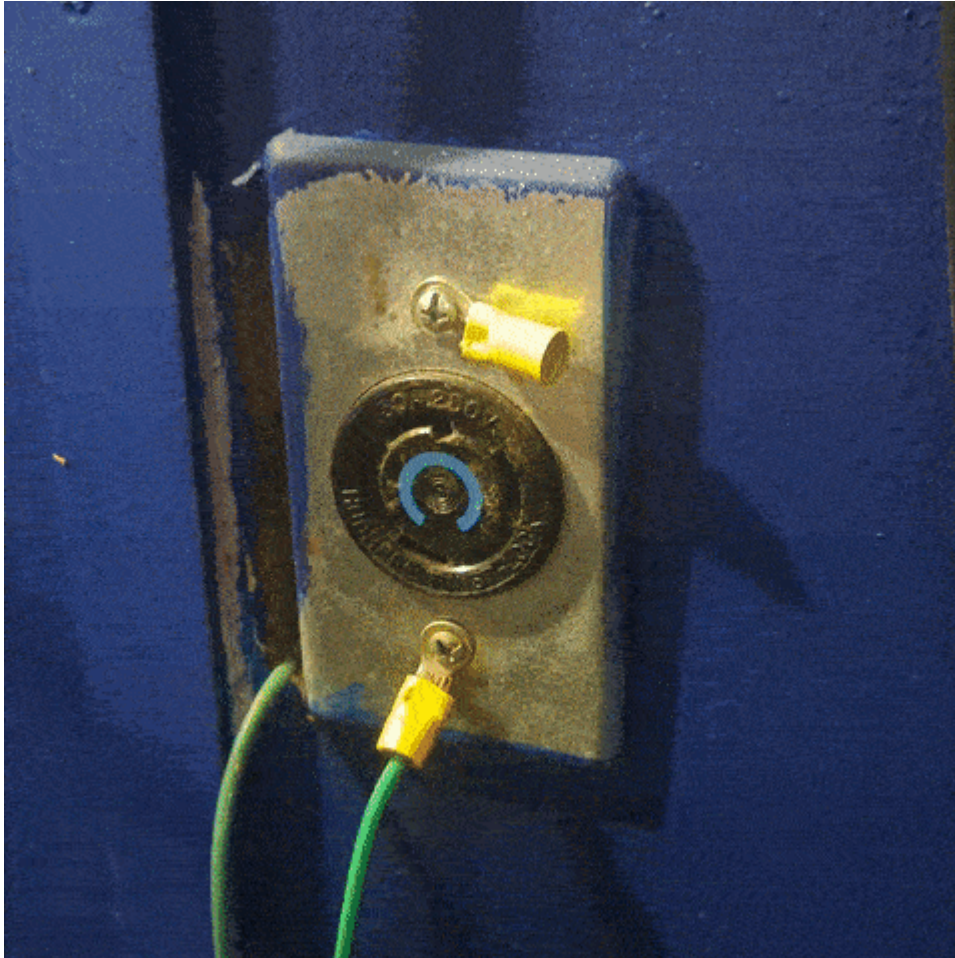
If anything is observed use a microfiber cloth or TEX wipe to wipe it away. 99% isopropyl alcohol may be utilized if necessary. Note that you should only wipe along the narrow length NOT along the circumference of the tape.

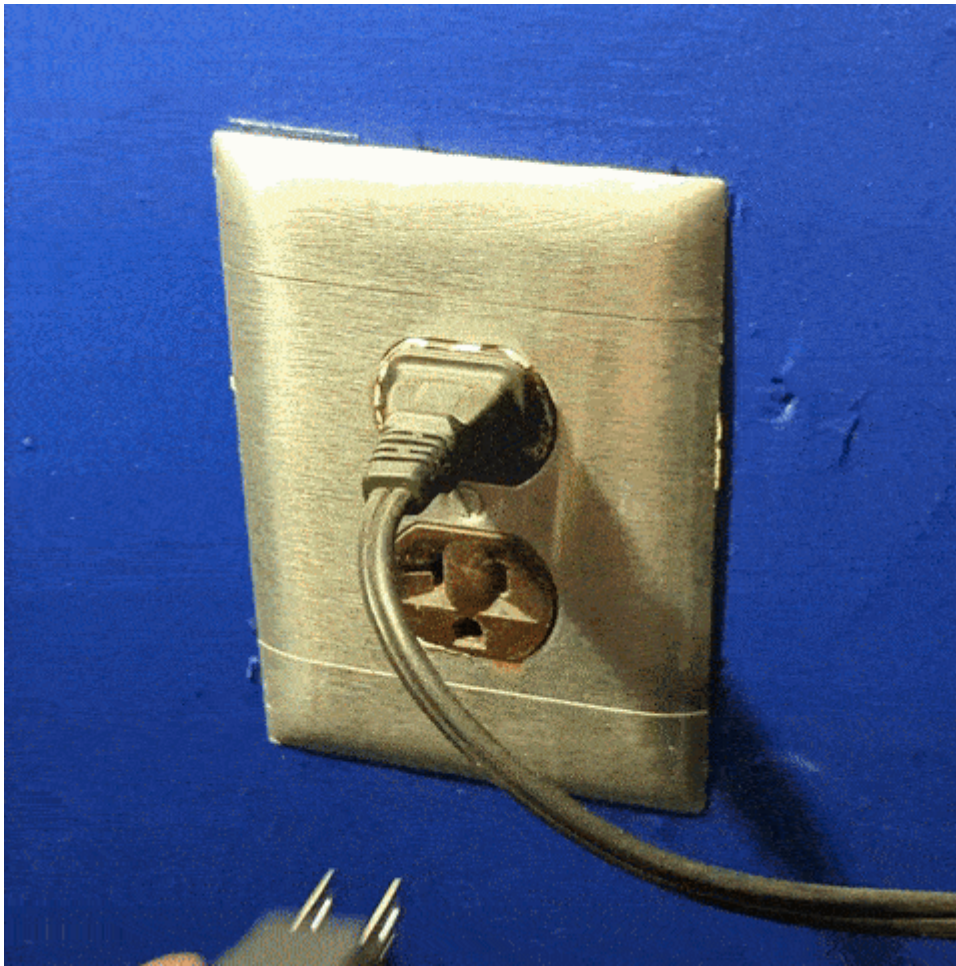
## Powering everything on

Now that you have inspected the telescope for safety it is now time to start turning things on.

### Power On UPS's

First plug in the Big and Small UPS's to the left of the desk. The BIG UPS should be twisted clockwise after insertion in order to secure it in the socket. The Big UPS powers the larger controller box on the wall above it while the Small UPS powers basically everything else.





Next you must turn on both UPS's. Press and hold the corresponding “on” button for at least a second until you hear a beep then let go. For the Big UPS this will take a few moments as it cycles through some littles (shown in full in the GIF below). The Small UPS will power on quicker.





Both UPSs will immediately supply power to their output plugs so no further button pressing is

necessary.

## Power On Controller and Desktop computer

The big gray box on the wall is the Controller. Turn it on by turning the large red switch on the bottom left of the Controller box to the right (clockwise). Assuming the UPS was powered on in the last step Fans and other noises will be heard as the system comes on.



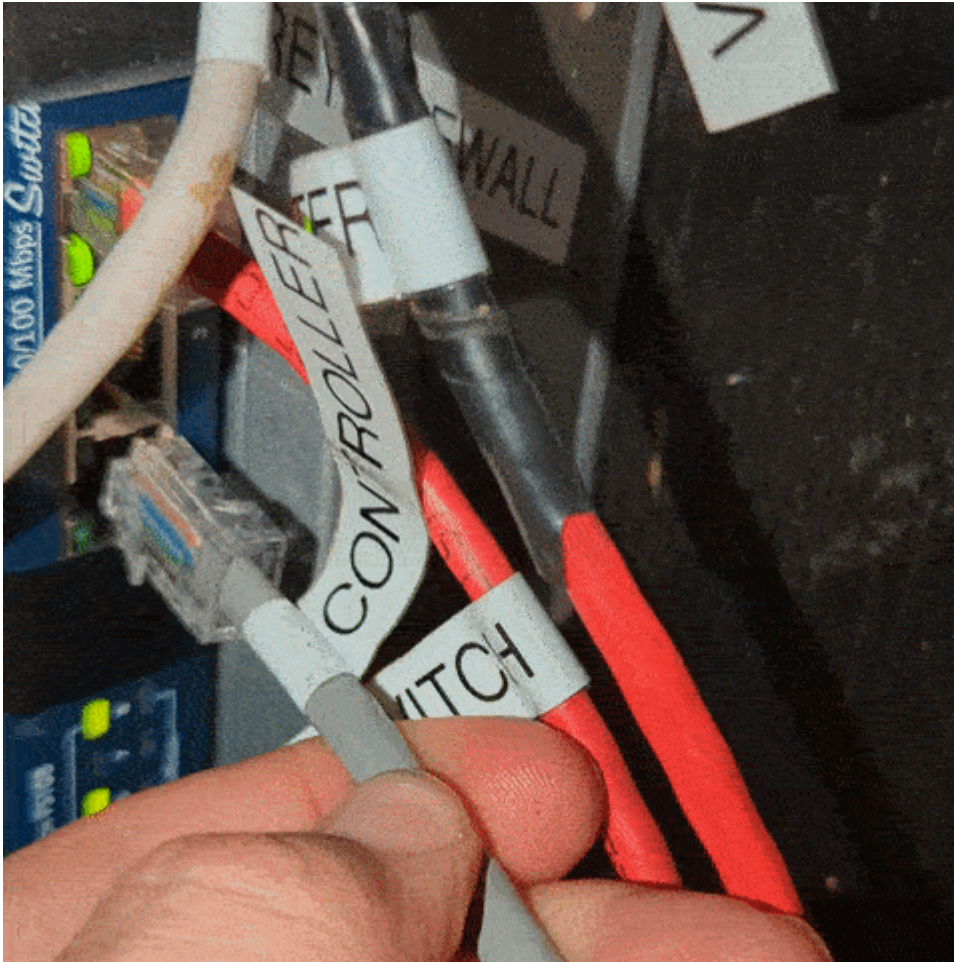
Now is also when you should turn on the Desktop computer. It is under the desk behind the little door on the left. The power button is the same color as the computer case so in a dimly lit room (like it most likely is now without the dome open) you may need a light to find it.

## Power on TIM Unit

The TIM unit is a small gray/black box on back of the telescope just below where the camera or eyepiece is installed. There is a standard power switch on the left side to turn it on.

## Check Controller Ethernet Cable

While the Controller and Desktop are powering on (the Controller takes about 15 years to do so) go into the warm room. Now go into the closet. There is a grey ethernet cable labelled "Controller". Plug this into the switch on the right wall and confirm there are the happy internet lights on the switch.



## Desktop Tasks

Procced back to the desktop computer which should be fully powered on. Login to the computer (standard SkyCenter password). The next few task will all be done on this computer.

### Open Mirror Covers

Open the [RCOS TIM software](#) from the desktop link or toolbar quick link.





Connect to the TIM unit and navigate to the “Primary Mirror Covers” tab.



Open the Mirror Covers:





If the mirror covers aren't opening correctly or the current stays high (over 1000milliamps) then there is a problem. Abort the opening (or closing) and follow [this procedure](#)

## Verify Mic and PubSub time

Launch VNC Viewer. It will appear on the middle right of the desktop (or just search it in the start menu). You will now want to remotely connect to the Mic and Pubsub computers that run the controller. This is what VNC Viewer does so just double click on the MIC and SUBSUB links in VNC Viewer and it will open a window of each.

**NOTE: At this time Pubsub is dumb and will display a “Logout” screen. Click that button and it will display an empty desktop. To find the actual desktop you will need to use the file manager in the Programs menu (top left of the screen)**

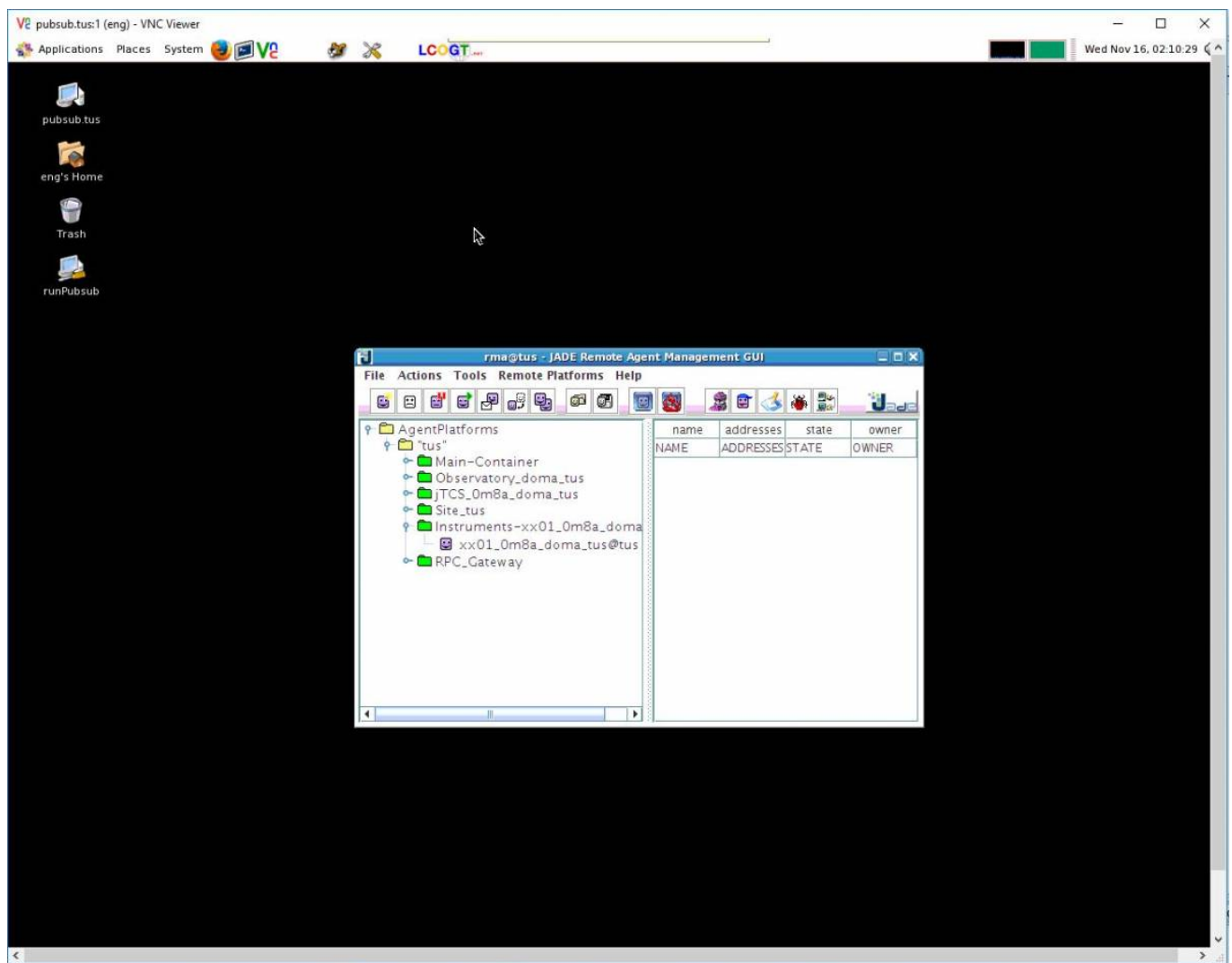
Make it so you can view the top right of both screens next to each other and confirm that the two computers times are within about 5 seconds of each other. If they are not you must perform the following task: [Sync Controller Times](#).

## Launch Pubsub software

Initially the desktop will be blank (black). Start PubSub processes by pressing the tool utility icon at the top of desktop. It is circled in the image below:



This will clear the database and give everything a clean start. Eventually (a few minutes) the “JADE” agent will load and the desktop will look like the below:



The small icons to the right of processes can be pressed to expand them and reveal the list as shown. Once the “Instruments-xx01\_0m8a\_doma” process is loaded under its section PubSub is ready to communicate with the telescope (and the user). The “RPC\_Gateway” process will not show up until communication to PubSub through the web browser commences. This is in the next step. It is OK to close the VNC window.

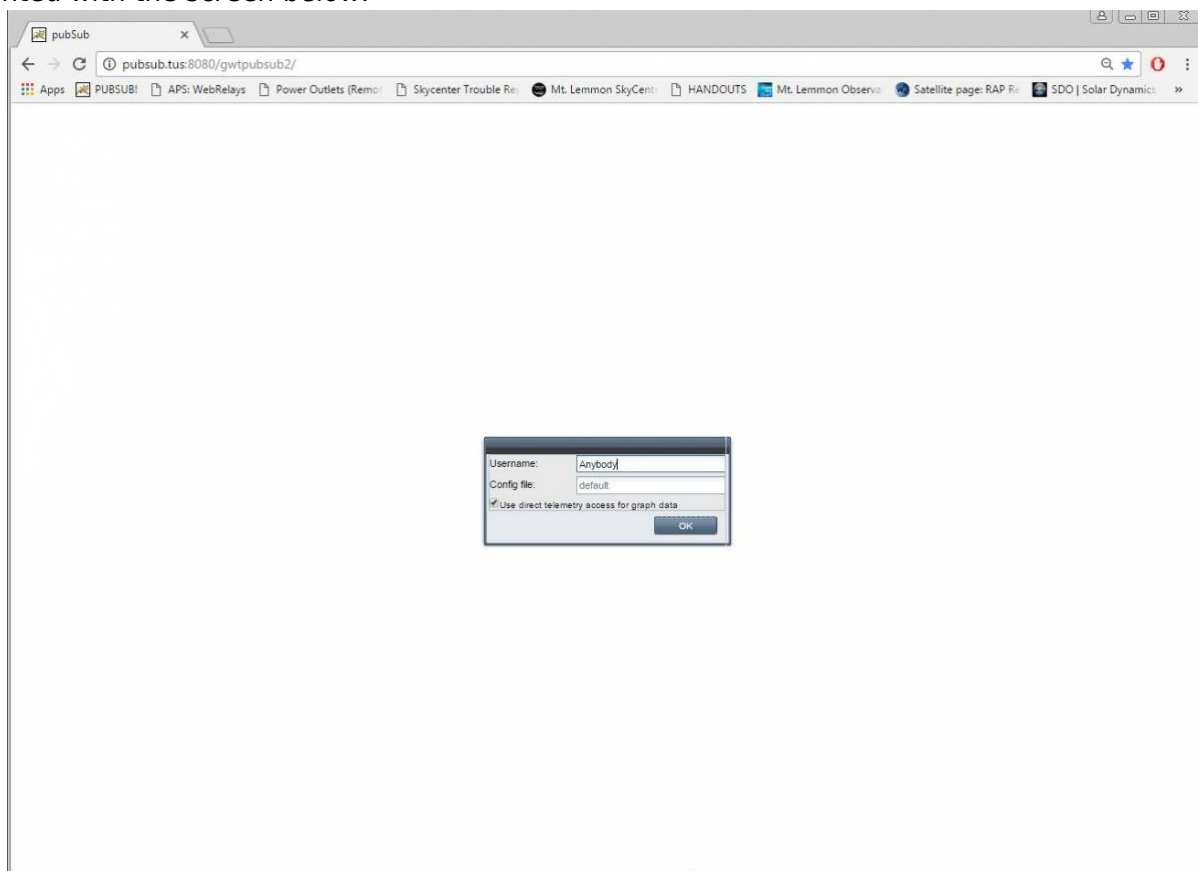
From Pubsubs Desktop folder double click on the “Clear and Restart Pubsub” program. This will open both a Terminal window and a GUI. The gui will slowly populate with a list of items. **Do not process until all those below show up**

- Main-Container
- Observatory\_doma\_tus
- Site\_tus
- JTCS\_0m8a\_doma\_tus
- Instruments-xx01\_0m8a\_doma
- (RPC\_Gateway) ← only shows once connected (via [this step](#)) to the controller, will not show initially

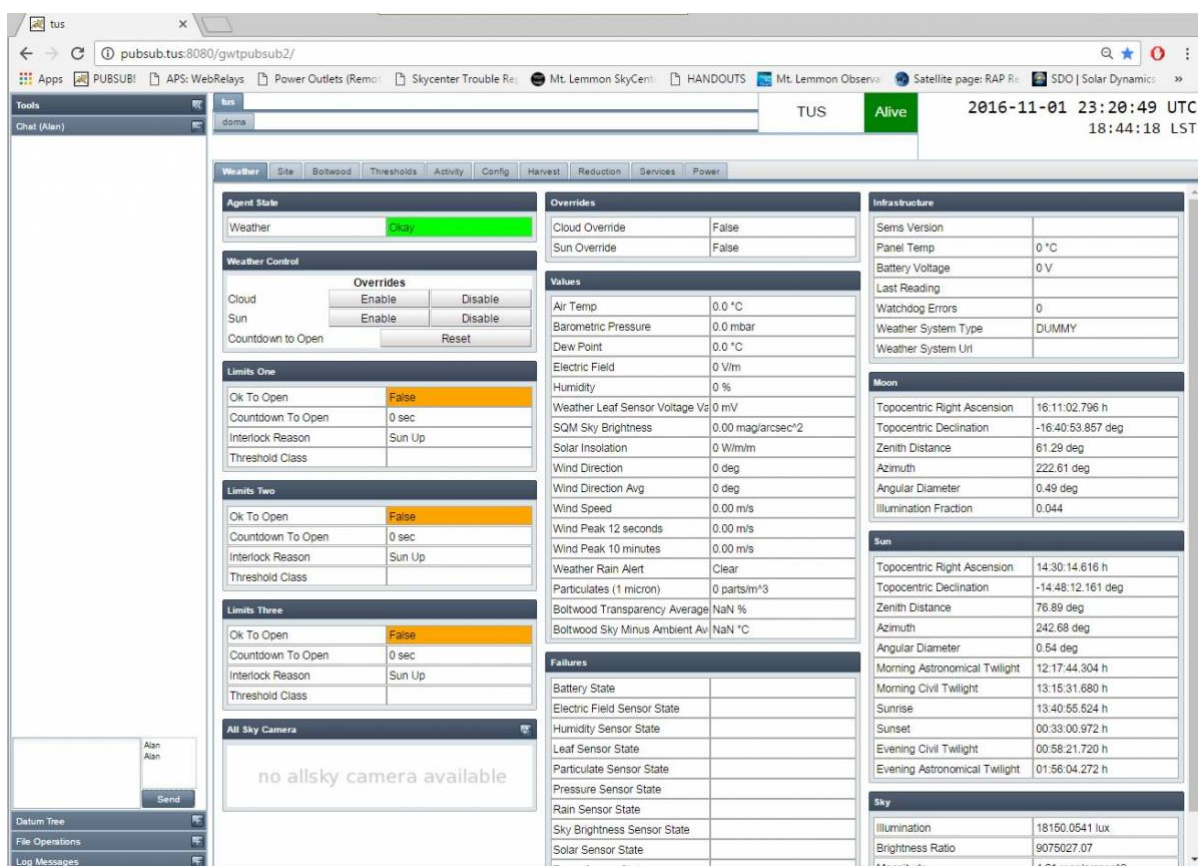
## Access the LCOGT (PubSub) GUI

Now that the system is up and running with drives, servos, and PubSub- access the LCOGT GUI:

1. Open the [Chrome Browser](#) and click the quick link labeled PubSub (leftmost icon). You will be presented with the screen below:

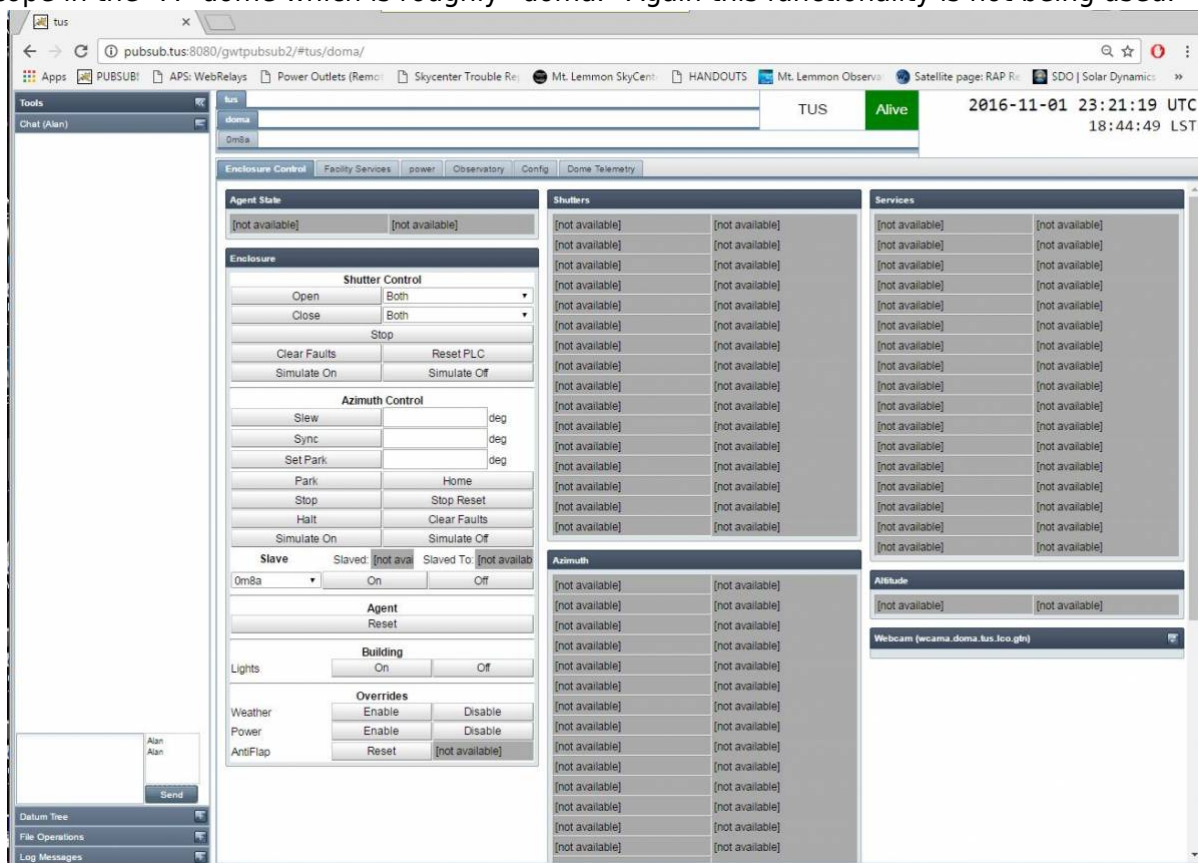


1. The log on name is unimportant. However *default* is required for the Config File field.
3. Press the "OK" button to continue.
2. Wait for PubSub to send all of the data to the browser. It will take 2-4 minutes. If you simply have a blank/white screen → going back to PubSub through VNC may be necessary to make certain it is setup correctly.
3. Once the GUI comes up you will be presented with the Site heads up information. Note the small tab is labeled "tus." This stands for "Tucson." None of the capabilities on this screen are currently in use.



1.

4. Click on the tab beneath "tus" to expose the information under the "doma" tab. The LCOGT software can be used to control multiple telescopes at a site. Our single site has a single telescope in the "A" dome which is roughly "doma." Again this functionality is not being used.



1.

5. Finally click on the "0m8a" tab to expose the controls for the Schulman Telescope. This tab roughly translates to 0.8m a (or first 0.8m telescope).



pubsub.tus:8080/gwtpubsub2/#tus/doma/0m8a/

Apps PUBSUB! APS: WebRelays Power Outlets (Remo) Skycenter Trouble Re Mt. Lemmon SkyCent HANDOUTS Mt. Lemmon Observ Satellite page: RAP R SDO | Solar Dynamics

Tools Chat (Alan)

TUS **Alive** 2016-11-01 23:21:41 UTC 18:45:10 LST

State Observation Script Sequencer Source Tracking Axes Guide Instrument Ins View Spectrograph Calibrate Focus Optical Tube Telescope Services 1 Telescope Services 2

### Tracking

Disable Roll Disable Pitch Enable Rotator  
Stop Tracking Loop

Rotator Mode  
SKY Set

### Other States

Astrometric Kernel State	Stopped
Astrometric	Okay
[not available]	[not available]
Container State	Okay
Agent Count	10

### State

Astrometric	Okay
[not available]	[not available]
Mount	Okay
Mount State	Okay
Config	Okay
InstrumentSelector	Okay
Monitor	Okay
[not available]	[not available]
Paddle	Okay
SdbAgent	Okay
[not available]	[not available]
[not available]	[not available]
TestAgent	Okay
[not available]	[not available]

### Instrument State

xx01	Okay
Agent Alive Time	67344 s
Repository Revision	6a5404e

### Description

Mount Type 1

### Current Message Queue Size

Astrometric	0
[not available]	[not available]
Axes	0
Config	0
InstrumentSelector	0
Monitor	0
[not available]	[not available]
Paddle	0
SdbAgent	0
[not available]	[not available]
[not available]	[not available]
[not available]	[not available]

### Software Revision

Astrometric	3b4d9fe
[not available]	[not available]
Axes	3b4d9fe
Config	3b4d9fe
InstrumentSelector	3b4d9fe
Monitor	3b4d9fe
[not available]	[not available]
Paddle	3b4d9fe
SdbAgent	3b4d9fe
[not available]	[not available]
[not available]	[not available]
[not available]	[not available]

### Behaviours

Astrometric	133
[not available]	[not available]
Axes	93
Config	18
InstrumentSelector	22
Monitor	9
[not available]	[not available]
Paddle	31
SdbAgent	10
[not available]	[not available]
[not available]	[not available]
[not available]	[not available]

### Software Repository Path

Astrometric	issue-5613-2
[not available]	[not available]
Axes	issue-5613-2
Config	issue-5613-2
InstrumentSelector	issue-5613-2
Monitor	issue-5613-2
[not available]	[not available]
Paddle	issue-5613-2
SdbAgent	issue-5613-2
[not available]	[not available]
[not available]	[not available]
[not available]	[not available]

Datum Tree File Operations Log Messages

Alan Alan Send

6. Take note of the color of the fields in the column on the left in the above image. They should all be green when the telescope is ready to be used. The “astrometric kernal” can be “yellow” when the drives are not tracking. If the telescope is tracking, this will also be green. If you come to this tab/screen quickly after rebooting PubSub, you may see fields such as “Mount State” indicate “initializing.” This is OK provided that the agent does eventually initialize the drives and the field goes to green after a minute or two.

## Homing the Schulman Telescope

The telescope must be homed before it can be operated.

1. Go to the *Axes* tab. Note that the axes are **Unhomed**.

The screenshot shows the 'Axes' tab of the Telescope Control Interface (TCI). The 'Agent State' section at the top indicates the 'Mount' is 'Okay'. Below this, the 'Axes Command' section is divided into three columns: 'Roll', 'Pitch', and 'Rotator'. Each column has a status indicator (Standby/Unhomed), position/velocity controls, and a list of buttons including Slew, Halt, Home, Park, Unwrap, Stop, Stop Reset, Enable, Disable, Goto Pos L1, Goto Neg L1, Recover L2, and Fault Reset. A large 'HOME' button is visible at the bottom of the interface.

- 1.
2. Press the large *HOME* button (circled below) to move both axes simultaneously to the home position. See [Telescope Orientation](#) for the correct position.

The screenshot shows a software interface for controlling axes. At the top, there are tabs: State, Observation Script, Sequencer, Source, Tracking, **Axes**, Guide, and Instrument. Below the tabs, the 'Agent State' section shows 'Mount' and a green 'Okay' button. The 'Axes Command' section is divided into 'Agent Enable' and 'Agent Disable' columns. Under 'Agent Enable', there are three columns: Roll, Pitch, and Rotator. Each column has a status field (Standby, Homing, etc.), a position/velocity selector (Pos/Vel), a numerical input field (0.0), and a unit (deg). Below these are buttons for Slew, Halt, Home, Park, Unwrap, Stop, Stop Reset, Enable, Disable, Goto Pos L1, Goto Neg L1, Recover L2, and Fault Reset. The 'Home' button for the Pitch axis is circled in red. At the bottom, there are additional buttons: Slew, Halt, Park, Home, and Stop.

1.

3. Once homed successfully the state field will briefly go to "stopped" and then finally "L1 Positive Limit" in both axes:

The screenshot shows the 'Axes' tab of a telescope control interface. At the top, there are tabs for 'State', 'Observation Script', 'Sequencer', 'Source', 'Tracking', 'Axes' (selected), 'Guide', and 'Instrument'. Below these, the 'Agent State' section shows 'Mount' with a green 'Okay' status. The 'Axes Command' section is divided into 'Agent Enable' and 'Agent Disable' tabs. Under 'Agent Enable', there are three columns: 'Roll', 'Pitch', and 'Rotator'. Each column has a status indicator (e.g., 'Okay' for Roll and Pitch, 'Off' for Rotator), a position/velocity selector (Pos/Vel), a numerical input field (0.0), a unit (deg), and a list of control buttons (Slew, Halt, Home, Park, Unwrap, Stop, Stop Reset, Enable, Disable, Goto Pos L1, Goto Neg L1, Recover L2, Fault Reset). The 'Rotator' column also has a 'UNKNOWN' status indicator.

1.

4. Now go to the *Source* tab and move the telescope out of the limits to a valid sky position. If the telescope is not going to be used immediately typically the telescope is sent to the park position. Remember to stop the tracking loop if observing is not going to start. The zenith position is inputted in the picture below.



The screenshot displays the LCOGT GUI interface. At the top, a status bar shows 'TUS' as 'Alive' and the date/time '2016-11-01 23:25:14 UTC' and '18:48:46 LST'. The main interface is divided into several panels:

- Agent State:** Shows 'Astrometric' as 'Okay'.
- Point:** Includes buttons for 'Point/Next', 'Start', 'End', 'Skip', 'Store', 'Clear', and 'Goto nearest pointing star'. A checkbox for 'Clear local offsets' is checked.
- Source:** A table listing source parameters:

Name	
Right Ascension Source	NaN h
Declination Source	NaN deg
Coordinate System	
Equinox Source	NaN yr
Limit Expected	Horizon Limit
Limit Time Left	3.65 h
Moon Zenith Distance	61.89 deg
Sun Zenith Distance	77.69 deg
- Telescope:** A table listing telescope parameters:

Parameter	Value
Tracking In Tolerance	Out Of Tolerance
Air Mass	2.3429
Altitude	25.15 deg
Azimuth	179.23 deg
Hour Angle	-00:03:18.493 h
Zenith Distance	64.8 deg
Sun Separation	132.20 deg
Moon Separation	47.44 deg
- Space Motion:** A table listing space motion parameters:

Parameter	Value
Source Space Motion Enabled	false
Source Parallax	NaN arcsec
Source Proper Motion Epoch	NaN yr
Source Proper Motion Right Asc	NaN arcsec/yr
- Source Selection:** Includes 'Astrometric Kernel State' (Stopped), 'Known objects' (Go), 'Source Name' (none), 'Fetch', 'Clear', 'Coordinate System' (APPARENT\_HA), 'Hour Angle' (0 h), 'Declination' (32 deg), 'Space Motion', 'Orbital Elements', 'Where is it?', 'When?', 'Where will it be?', 'Clear local offsets', 'Go', 'Moon', 'Flat', 'Stop', 'Unwrap Roll', 'Unwrap Rot'.
- Time:** A table listing time parameters:

Parameter	Value
Local Apparent Sidereal Time	18:48:46.944 h
Modified Julian Day	57693.9759 MJD
Julian Epoch	2016.8363 yr
TAI Minus UTC	36 s
TT Minus TAI	32.1840 s
UT1 Minus UTC	-0.3238 s
- Orbital Element:** A table listing orbital element parameters:

Parameter	Value
Source Orbital Element Scheme	
Source Orbital Element Argumer	NaN deg
Source Orbital Element Daily Mo	NaN deg
Source Orbital Element Eccentric	NaN
Source Orbital Element Epoch O	NaN MJD
Source Orbital Element Epoch O	NaN MJD
Source Orbital Element Epoch O	NaN MJD
Source Orbital Element Longitud	NaN deg
- Refraction:** Includes 'Pressure' (mbar), 'Humidity' (%), 'Temperature' (°C), 'Apply Override', 'Clear Override'.
- Tracking:** Includes 'Disable Roll', 'Disable Pitch', 'Enable Rotator', 'Stop Tracking Loop'.
- Rotator Mode:** Includes 'Rotator Mode' (SKY) and 'Set'.
- Refraction (Manual Override):** A table listing manual override parameters:

Parameter	Value
Manual Override	False
Air Temperature Value	0 °C
Barometric Pressure Value	0 mbar
Humidity Value	0 %
Wavelength	0.6000 um
Guiding Wavelength	NaN um
- Pointing Control:** Includes 'M1 and M2 Alignment' (False), 'Collimation' (False), 'Roller Encoders' (False), 'Encoder Non-Linearity' (False), 'Enable' buttons.
- Pointing Corrections:** A table listing pointing correction parameters:

Parameter	Value
Polar Motion X	0.1892 arcsec
Polar Motion Y	0.2811 arcsec
Collimation Correction Enabled	False
Collimation Correction Pitch	0 arcsec
Collimation Correction Roll	0 arcsec

5.

6. Please see the Using the [LCOGT GUI](#) and [Moving the Telescope](#) section for more information.

From:  
<https://lavinia.as.arizona.edu/~tscopewiki/> - MOON

Permanent link:  
[https://lavinia.as.arizona.edu/~tscopewiki/doku.php?id=public:catalinas:lemmon:schulman\\_32:startup\\_procedure&rev=1659643763](https://lavinia.as.arizona.edu/~tscopewiki/doku.php?id=public:catalinas:lemmon:schulman_32:startup_procedure&rev=1659643763)

Last update: 2022/08/04 13:09

