Schulman Telescope StartUp Procedure

Check Internet

Go to the warm room closet and check that all internet cables are plugged in. There is one CAT5 cable that goes to the main observatory computer and another that goes directly to the telescope controller. During lightning shutdown these cables are often unplugged. While in the closet check to see that the StarDot video server is healthy.

Power up the Main Observatory Computer and UPS's

Plug in and turn on the small UPS that delivers power to the main computer and telescope services (including the TIM unit via the remotely controlled power outlets). Login to the main Windows user account. This is currently labeled "Adam" and the password is the standard "I8...." Next plug in and turn on the larger telescope controller UPS. (Do not turn on the controller yet.)

Interpret the Telescope Orientation and Clear Manual E-stops

Check the Telescope Orientation and assess the condition of the telescope. If the current position does not "make sense," consider investigating further before proceeding. If engaged, release any E-stops on the hand paddle, telescope controller, and dome controller. Although it should be in operable state by default, also check the upper shutter E-stop plunger by visual inspection. If this is inadvertently left pushed in it must be released or software shutter errors will follow. The key should be turned to the "on" position.

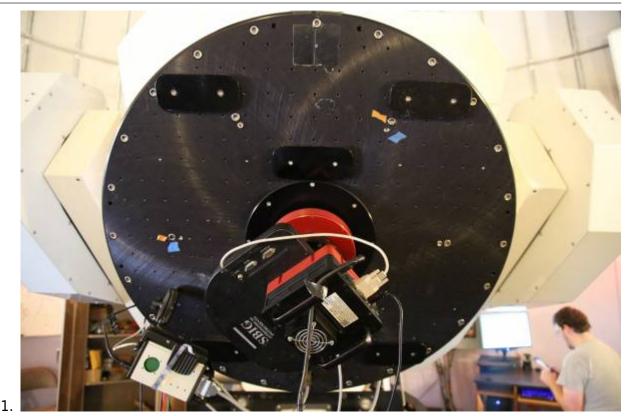
Check the RA Optical Tape and Read Heads

Before turning on the controller (or moving the telescope for normal operation) examine the RA axis optical tape for signs of water condensation or insect "residue." This must be cleaned before operation. Make certain both the drive and idler bearings are also free of anything that might be transferred to the optical tape. Look closely at the read heads and check to make certain they appear aligned without anything in the space between the read head and the tape. (Use a thin Tek wipe or something similar to clear the space and clean the window if necessary.)

Check the telescope Balance state

As of Fall 2016 the telescope is in a balanced state when the following conditions are met:

- 1. The CCD camera is attached to the back of the telescope. * (see note below)
- 2. There are no extra hardware or eyepieces attached to the telescope (e.g. No eyepieces should be installed in the refractor.)
- 3. The number of weights and configuration are as in the picture below:



4. **THE MIRROR COVERS ARE OPEN** This will be done shortly.

Note (Eyepieces)

The combination of the 31mm Nagler eyepiece and adapter at the back of the telescope is sufficiently close to "balanced" that it is OK to follow the startup process in this state. Being optimized for the CCD configuration permits better success at automation and recovery from errors.

Manually Point the Telescope to the Zenith

When on site for startup purposes it is OK to move the telescope against the Declination brake to point the telescope vertically (at the zenith on the meridian). This step is necessary as mountain operations currently (Fall 2016) requires the telescope be pointed "up" before opening the mirror covers. During a recovery event when the controller is one but the telescope needs to be re-homed, opening the mirror covers in other positions will still be OK. Even if the mirror covers do not fully deploy ("Mid Position")- the balanced state will be achieved and initializing the system can proceed. The mirror covers can then be closed and re-opened later.

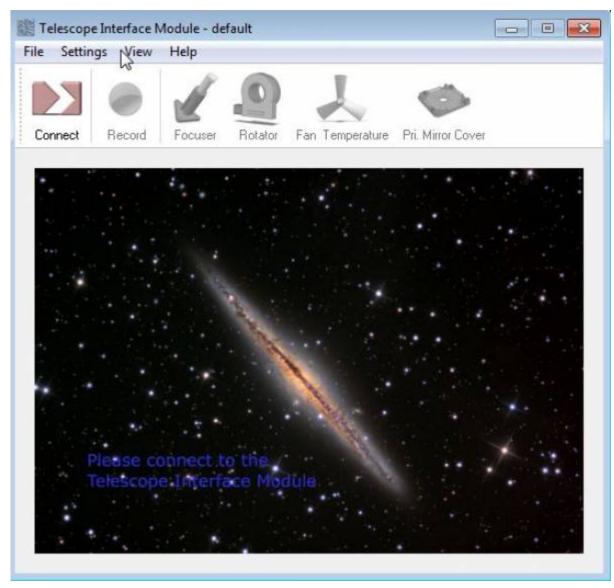
Turn on the TIM Unit, Connect, and Open Mirror Covers

The TIM Unit must be turned on in order to open the mirror covers. Before turning it on make certain all connections are firmly seated into the enclosure. Turn the unit on with the rocker style toggle switch.

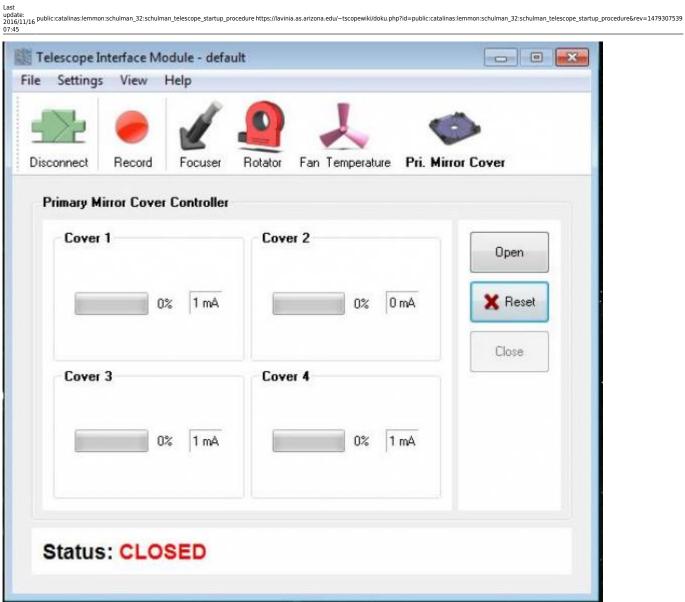
Next on the computer open the RCOS TIM software.

https://lavinia.as.arizona.edu/~tscopewiki/





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

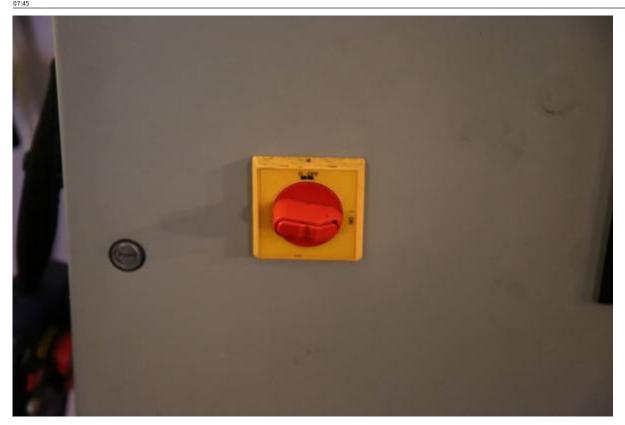


Open the Mirror Covers:

connect Record Focuser	Rotator Fan Temperature Pri. Min	por Cover
Primary Mirror Cover Controller		
Cover 1	Cover 2	Open
0% 1 mA	0% 1 mA	X Reset
Cover 3	Cover 4	Close
0% 0 mA	0% 1 mA	

Turn On Telescope Controller

Turn the red switch to the "on" position. Fans and other noises will be heard as the system comes on. Wait for 3 minutes for the Mic and PubSub internal computers to boot. Generally when the MIC completes booting the drives/servos are alive and holding the telescope (listen for them).



Connect to the PubSub Machine using VNC

Open VNC and type the address to PubSub shown below:

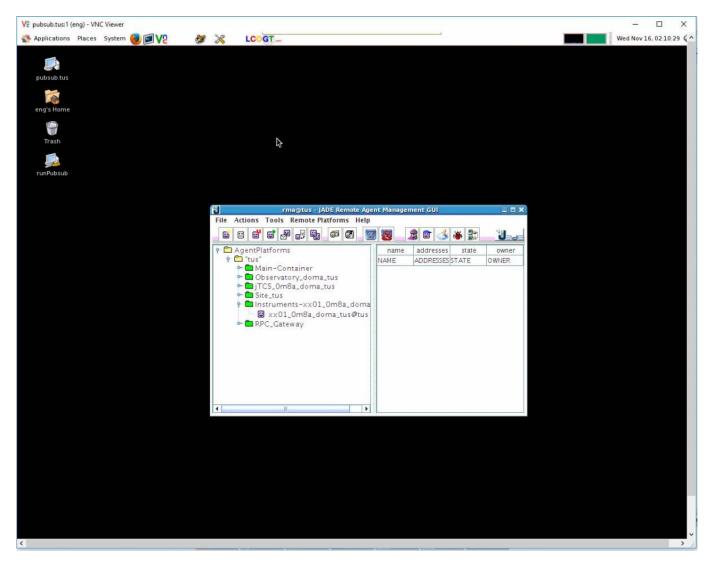
V2 VNC Viewer		-	
VNC® Vie	wer		V 2
VNC Server:	lune.as.arizona.edu:4260		~
Encryption:	Let VNC Server choose		~
About	Options	I	Connect

(It is assumed the user has the password.)

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:

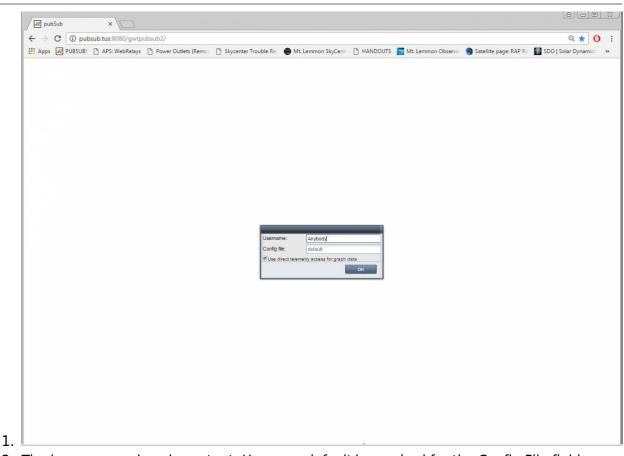


The small icons to the right of processes can be pressed to expand them and reveal the list as shown. Once the "Instruments-xx01_0m8a_doma" process is loaded under its section PubSub is ready to communicate with the telescope (and the user). The "RPC_Gateway" process will not show up until communication to PubSub through the web browser commences. This is in the next step. It is OK to close the VNC window.

Access the LCOGT 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:



The log on name is unimportant. However *default* is required for the Config File field.
 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 \rightarrow 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.

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Fools 🛛 🕅	tus doma				TUS	Alive 2016-1	11-01 23:20:4 18:44:1
	Weather Site Boltwoo	d Thresholds	Activity Config	Harvest Reduction Services	Power		
	Agent State			Overrides		Infrastructure	
	Weather	Okay		Cloud Override	False	Sems Version	
	Landard			Sun Override	False	Panel Temp	0 °C
	Weather Control	_	_		1	Battery Voltage	ov
		Overrides		Values		Last Reading	
	Cloud	Enable	Disable	Air Temp	0.0 °C	Watchdog Errors	0
	Sun	Enable	Disable	Barometric Pressure	0.0 mbar	Weather System Type	DUMMY
	Countdown to Open		Reset	Dew Point	0.0 *C	Weather System Url	
	Limits One			Electric Field	0 V/m		
		-		Humidity	0 %	Moon	
	Ok To Open	Faise		Weather Leaf Sensor Voltag	e Valo mV	Topocentric Right Ascension	16:11:02.796 h
	Countdown To Open	0 sec	0	SQM Sky Brightness	0.00 mag/arcsec*2	Topocentric Declination	-16:40:53.857 deg
	Interlock Reason	Sun Up		Solar Insolation	0 W/m/m	Zenith Distance	61.29 deg
	Threshold Class			Wind Direction	0 deg	Azimuth	222.61 deg
	Limits Two			Wind Direction Avg	0 deg	Angular Diameter	0.49 deg
	Ok To Open	False		Wind Speed	0.00 m/s	Illumination Fraction	0.044
	Countdown To Open	0 sec		Wind Peak 12 seconds	0.00 m/s		
	Interlock Reason	Sun Up	0	Wind Peak 10 minutes	0.00 m/s	Sun	
	Threshold Class	Sun Op	1	Weather Rain Alert	Clear	Topocentric Right Ascension	14:30:14.616 h
	Theshold Glass			Particulates (1 micron)	0 parts/m^3	Topocentric Declination	-14:48:12.161 deg
	Limits Three			Boltwood Transparency Ave	rage NaN %	Zenith Distance	76.89 deg
	Ok To Open	False		Boltwood Sky Minus Ambien	t Av NaN *C	Azimuth	242.68 deg
	Countdown To Open	0 sec				Angular Diameter	0.54 deg
	Interlock Reason	Sun Up	8	Failures		Morning Astronomical Twlight	12:17:44.304 h
	Threshold Class	Jourop		Battery State		Morning Civil Twilight	13:15:31.680 h
				Electric Field Sensor State		Sunrise	13:40:55.524 h
	All Sky Camera			Humidity Sensor State		Sunset	00:33:00.972 h
Alan				Leaf Sensor State		Evening Civil Twilight	00:58:21.720 h
	no allsky	camera :		Particulate Sensor State		Evening Astronomical Twilight	01:56:04.272 h
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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.

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Chat (Alan)	doma			103	Auve	18:44:49
	Om8a					
	Enclosure Control Fability S	ervices power Observatory Cor	nfig Dome Telemetry			
	Agent State		Shutters		Services	
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		· Managara (1998)	[not available]	[not available]	[not available]	[not available]
	Enclosure		[not available]	[not available]	[not available]	[not available]
		tter Control	[not available]	[not available]	[not available]	[not available]
	Open	Both •	[not available]	[not available]	[not available]	[not available]
	Close	Both •	(not available)	[not available]	[not available]	[not available]
		Stop	[not available]	(not available)	[not available]	[not available]
	Clear Faults Simulate On	Reset PLC Simulate Off	(not available)	(not available)	[not available]	[not available]
	Sinuae On	Simulate Oil	[not available]	[not available]	[not available]	[not available]
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	Slew	deg	[not available]	[not available]	[not available]	[not available]
	Sync	deg	[not available]	[not available]	[not available]	[not available]
	Set Park	deg	[not available]	[not available]	[not available]	[not available]
	Park	Home	[not available]	[not available]	[not available]	[not available]
	Stop	Stop Reset	[not available]	[not available]	[not available]	[not available]
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		d: [not avai Slaved To: [not availab	Azimuth		[not available]	[not available]
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File Operations			[not available]	[not available]		
Log Messages	T		[not available]	[not available]		

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).

Last update: 2016/11/16 public:catalinas:lemmon:schulman_32:schulman_telescope_startup_procedure https://lavinia.as.arizona.edu/~tscopewiki/doku.php?id=public:catalinas:lemmon:schulman_32:schulman_telescope_startup_procedure&rev=1479307539 2016/12/16

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		SKY *	Set	[not available]	[not available]	InstrumentSelector	22
		Other States		Axes	0	Monitor	9
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		[not available]	(not available)	Monitor	0	SdbAgent	10
		Container State	Okay	[not available]	[not available]	[not available]	[not available]
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		Monitor	Okay	Axes	3b4d9fe	Monitor	issue-5613-2
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Datum Tree	5	Agent Alive Time	67344 s				
File Operations	F	Repository Revision	6a54d4e				

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.

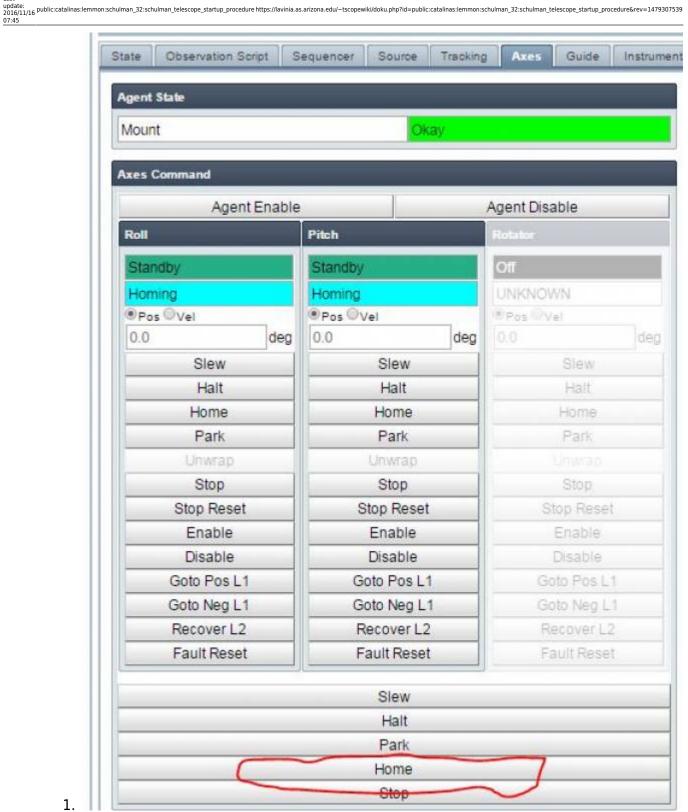
Homing the Schulman Telescope

The telescope must be homed before it can be operated.

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

tate Observation Script Sagent State	Sequencer Source	Trackin	g Axes	Guide	Instru			
Mount		kay	uncered @ 20	151116	0.0.50			
Axes Command			uspenu @ zv	10-11-10	96196			
Agent Enable	e		Agent Disab	le				
Roll	Pitch		Rotator					
Standby	Standby		OIT					
Unhomed	Unhomed		UNKNOWN	i.				
Pos OVel	● Pos © Vel		(Pos Ovel					
0.0 deg	0.0	deg	0.0		deg			
Slew	Slew			Slew				
Halt	Halt	Halt						
Home	Home	Home						
Park	Park	Park						
Unwrap	Unwrap	0						
Stop	Stop	Stop						
Stop Reset	Stop Res	Stop Reset			Stop Reset			
Enable	Enable		Enable					
Disable	Disable		Di	sable				
Goto Pos L1	Goto Pos	.1	Goto	Pos L1				
Goto Neg L1	Goto Neg	_1	Goto	Neg L1				
Recover L2	Recover L	2	Rec	over L2				
Fault Reset	Fault Res	et	Fau	it Reset				
	Slew		8 m -		_			
	Halt							
	Park							
	Home							
	Stop							

2. Press the large HOME button (circled below) to move both axes simultaneously to the home position. See Telescope Orientation for the correct position.



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

Mount			Oka	IV.					
Axes Command	nt Enable	N	1		Agent D	isable			
Roll		Pitch			Rotator				
Okay	1	Okay			Off	_	-		
Halted L1 Positive	Limit		L1 Positive L	insit	UNKN	OWAL			
Pos Vel	- Latint	Pos 0	and the second	arm	Pos (
0.0	deg	0.0		deg	0.0		de		
Slew		-	Slew			Slew			
Halt				Halt			Halt		
Home		Home			Home				
Park			Park Pa			Park	Park		
Unwrap		Unwrap							
Stop		Stop			Stop				
Stop Rese	et		Stop Reset Stop			Stop Reset			
Enable		Enable			Enable				
Disable		Disable			Disable				
Goto Pos l	.1	(Goto Pos L1			Goto Pos L1			
Goto Neg L	.1		Goto Neg L1			Gata Neg L1			
Recover L	2		Recover L2	-		Recover L2			
Fault Rese	et		Fault Reset			Fault Reset			
	-		Slew						
			Halt						
			Park						
			Home						

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.

1.

← → C (i) pubsub.tus:80	80/gwtpubsub2/#tus/doma/0m	8a/Source						Q & (
Apps R PUBSUB! APS: W	ebRelays P Power Outlets (Remo	Ph Skycenter Trouble Re:	Mt. Lemmon SkyCent	HANDOUTS 🗖 N	At. Lemmon Obs	erva 🧑 Satellite page: RAP R	SDO	I Solar Dynamics
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	C. Santani		and the second se			Humidity:		%
	Point		Known objects:	•	Go	Temperature:		°C
	Point/Next St	art End	Source Name: nor	e i	Fetch Clear	Apply	/ Override	
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	Source		Hour Angle: 0		h	Tracking		
		1	Declination: 32		deg	Disable Roll Disa	ble Pitch	Enable Rotato
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	Limit Expected	Horizon Limit	Clear local offsets	o will it be r		Refraction		
	Limit Time Left	3.65 h	Go	Moon	Flat	Manual Override	False	
	Moon Zenith Distance	61.89 deg	Stop	Unwap Roll	Unwrap Rot	Air Temperature Value	0 °C	
	Sun Zenith Distance	77.69 deg	Time			Barometric Pressure Value	0 mbar	
				l.		Humidity Value	0 %	
	Telescope		Local Apparent Sidereal Time			Wavelength	0.6000 u	
	Tracking In Tolerance	Out Of Tolerance	Modified Julian Day	57693.9759 M	JD	Guiding Wavelength	NaN um	<i>1</i> 6
	Air Mass	2.3429	Julian Epoch	2016.8363 yr		Pointing Control		
	Altitude	25.15 deg	TAI Minus UTC TT Minus TAI	36 s 32.1840 s		M1 and M2 Alignment	-	
	Azimuth	179.23 deg	UT1 Minus UTC	-0.3238 s		Collimation	False	Enable
	Hour Angle	-00:03:18.493 h	OTT MINUS OTC	-0.3236.5		Roller Encoders	False	Enable
	Zenith Distance	64.8 deg	Orbital Element			Encoder Non-Linearity	False	Enable
	Sun Separation	132.20 deg	Source Orbital Element Sche	me				
Alan	Moon Separation	47.44 deg	Source Orbital Element Argu			Pointing Corrections		
	Space Motion		Source Orbital Element Daily			Polar Motion X	0.1892 a	
Send		144	Source Orbital Element Ecce	and the second		Polar Motion Y	0.2811 a	ircsec
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File Operations T	Source Proper Motion Epoch	NaN yr	Source Orbital Element Long	1		Collimation Correction Roll	0 arcsec	

6. Please see the Using the LCOGT GUI and Moving the Telescope section for more information.

