Operator's Manual

Introduction

This manual describes the telescope control system (TCS) of the OAN/SPM 1.5-meter Johnson telescope for the OAN/SPM mountain staff. It covers safety precautions, the web interface, opening and closing the telescope, and shutting down the TCS to allow maintenance.

General Instructions

Operator

The 1.5-meter telescope will be operated each night by an operator designated by the Secretario Técnico of the OAN.

The operator should:

1. Start up the TCS in the afternoon prior to evening civil twilight.
2. Open at the start of evening civil twilight, if conditions permit.
3. Close at the end of morning civil twilight. (It is normally not necessary to shut down the TCS at the end of the night.)
4. Open and close during the night, as conditions permit and demand.
5. Report any problems using the normal channels.

The designated operator may carry out these tasks anywhere on the mountain (including at the 1.5-meter telescope dome, at the 2.1-meter telescope dome, or from the accommodation building).

[I NEED TO BE ADDED TO THE LIST OF RECIPIENTS OF NIGHTLY AND ENGINEERING REPORTS.]

Mountain Technical Staff

The mountain technical staff should:

1. Shut down the TCS prior to working in the dome.
2. Start up the TCS once they have finished working in the dome.
3. Inspect and report on the state of the telescope and instrument every TBD days.
4. Report any problems using the normal channels.

[WE NEED TO DEFINE THE INSPECTION.]

Safety

The 1.5-meter telescope is normally opened and closed remotely and operated robotically. Thus, the telescope, dome, and other mechanisms can move unexpectedly. This creates special dangers that are not present at the other telescopes at the OAN/SPM.

In addition to the usual safety precautions, these special precautions apply to the 1.5-meter telescope:

1. Use the webcams to check the state of the telescope and dome before and during opening and closing. Do not initialize, open, or close remotely:

(a) if the manual dome or hallways lights are switched on;

(b) if any of the doors to the dome or hallway are open;

(c) if you see other signs of people working in the dome or building;

(d) if the telescope is covered by a tarpaulin; or

(e) if there is an obstruction in the vicinity of the telescope.

When in doubt, do not open or close the telescope remotely. Visit the telescope and determine the situation.

2. In the web interface:

   (a) The "Emergency Stop" button is always enabled. This cuts power to the mount motors, the mount controller, dome controller, shutters/lights controller, secondary controller, and the dome fans.

   (b) Except while you are opening, closing, or shutting down the telescope, you should disable the other controls using the "Disable Controls" button except while opening, closing, or shutting down. This will help avoid unintentional movements.

4. If you are going to work in the dome:

   (a) shut down the TCS (see below);

   (b) switch on the manual dome and hallway lights; and

   (d) leave at least one of the doors to the dome or hallway open.

   The lights and open door signal to a remote operator not to open or close. When you are finished, switch the manual dome lights off and close all of the doors to the dome and hallway.

[WE NEED TO TURN THE EAST DOME WEBCAM SLIGHTLY SO THAT IT CAN SEE THE NORTHERN DOORS TO THE DOME.]

Weather

The dome and telescope must be closed:

1. if it is raining or snowing;
2. if the humidity is 90% or greater;
3. if the humidity is 85% or greater and rising;
4. if the wind average speed has been 45 km/h or greater at any moment in the previous 30 minutes; or
5. at the discretion of the operator.

The web interface states that domes "must be closed" if the current conditions from the OAN/SPM weather station indicate that any of the first four criteria are met. If none of them are met, it states that domes "may be open". However, the discretion of the operator takes precedence.

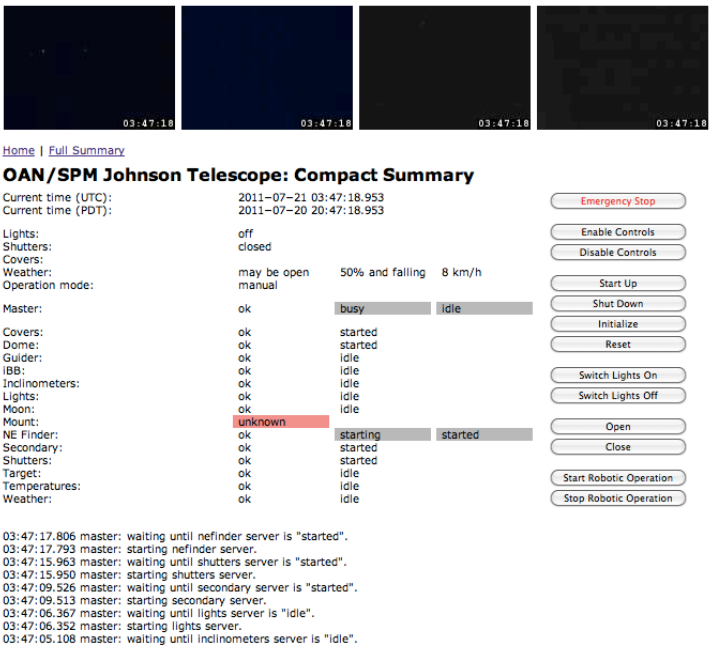
Web Interface

The TCS web interface is at:

http://ratir.astrossp.unam.mx/tcs/compact.html

The web interface can only be accessed from the OAN/SPM mountain network and furthermore requires a user name and password.

An image of the web interface is shown below.



The most important elements of the interface are:

- Images from the four webcams at the telescope at the top of the page.
- A status display in the middle left.
- A log at the bottom.
- Controls in the middle right.

Webcams

The webcam images refresh about once per second. The leftmost three images are of the dome and the rightmost image is of the hallway between the dome, the control room, and the machine room.

The webcams are mainly used to check that it is safe to open or close.

Status Display

The upper part of the status display shows:

- The UTC time.
- The civil time (PST or PDT).
- The state of the lights: on or off.
- The state of the shutters: open, closed, or intermediate.
- The state of the covers: open or closed.
- The weather: whether the dome can be opened (according to the rules for opening), the relative humidity, and the wind speed.

- The operation mode: manual or robotic.

The lower part of the status display shows the state of the software servers. There are four columns, showing:

- the server name;
- the server status;
- the server current activity; and
- the server requested activity if this is different from the current activity.

The most important server is the master server. This coordinates the activities of all of the other servers. The other servers are typically associated with a single hardware or conceptual component.

The status is typically one of:

- ok

  The server is working normally and is ready to respond to requests.

- starting

  The server is starting and is not yet ready to respond to requests. If a server remains starting for more than a few seconds, this normally indicates a hardware or network problem.

- stale

  The server has not been able to communicate with its corresponding hardware within a reasonable time. This state usually indicates a hardware or network problem.

- unknown

  This means that the state of the server is not known because communication failed. This state usually indicates that the server is not running.

In the image of the web interface above, the status of most of the servers is "ok", but the status of the mount server is "unknown" because that server is not running.

The server activity describes what it is doing. Examples are "started", "idle", "busy", "moving", "tracking", and "exposing". When a server accepts a request, it typically sets is activity to something like "busy" or "moving" and is requested activity to something like "idle" or "tracking". When it completes the request, the activity changes to be the same as the requested activity.

When an error occurs, the server activity is "error".

In the image of the web interface above, the activities and requested activities of most of the servers is "idle" or "started". Because these are the same, the requested activity is not shown. The exceptions are the NE finder, which has an activity of "starting" and a requested activity of "started" and the master server, which has an activity of "busy" and a requested activity of "idle". Once the NE finder has finished starting, its activity will change to "started". Once the master server has finished its current request, its activity will change to "idle".

Log

The log shows the actions of the master server, which mainly consist of requests to other servers. The log fills from the top down.

Every minute, a mark is written to the log to give a visual indication of the passage of time.

Controls

The controls are:

- Emergency Stop

  This button cuts power to the mount motors, the mount controller, dome controller, shutters/lights controller, secondary controller, and the dome fans. It then stops robotic operation.

  This button is always enabled, so be careful. If you accidentally perform an emergency stop, the easiest way to recover is to follow the instructions for opening below.

- Enable Controls and Disable Controls

  These buttons enable and disable all of the controls, except "Enable Controls" and "Emergency Stop" which are always enabled.

- Start Up

  This button starts up the TCS. This reboots the controllers and starts the servers. It does not initialize the controllers. Starting up does not move any mechanism.

- Shut Down

  This button shuts down the TCS. It stops all of the servers except the master server and switches off the finders, the finder USB extender REX, the mount motors, the mount controller, and the dome fans.

- Initialize

  This button initializes all of the controllers and servers. The TCS must have been started up previously. Initializing will move mechanisms.

- Reset

  This button stops any ongoing request and clears any error activity.

- Switch Lights On and Off

  These buttons switch the lights on and off. The TCS must have been started previously.

- Open

  This button opens the dome. The TCS must have been initialized previously.

- Close

  This button closes the dome. The TCS must have been initialized previously.

- Start and Stop Robotic Operation

  These buttons start and stop robotic operation. During robotic operation, none of the controls work except "Emergency Stop" and "Stop Robotic Operation".

Procedures

Starting Up

1. Open the web page:

http://ratir.astrossp.unam.mx/tcs/compact.html

2. Use the webcams to check that it is safe to proceed.

   If the webcams show that the lights are on in the dome or hallway or one of the doors to the dome or hallway is open, someone if probably working in the building. If this is the case, do not continue until you have visited the telescope and verified that it is safe to do so.

3. Enable the controls using the "Enable Controls" button.

4. Start up the TCS using the "Start Up" button.

   This will reboot the controllers and start or restart the servers. It will not move any mechanism.

   Starting up takes about 4 minutes. While the TCS is starting up, the master server activity will be "startingup". Once the TCS has finished starting up, all of the servers should have a status of "ok" and an activity of "idle" or "started".

5. Switch on the lights using the "Switch On Lights" button.

6. Use the webcams to check that it is safe to proceed.

   Make sure there are no impediments to moving the telescope, dome, and other mechanisms. For example, make sure that there are no obstructions in the vicinity of the telescope and that it is not covered with a tarpaulin.

   If there are impediments and you decide to continue opening, you should visit the telescope and remove the impediment. If you decide not to continue opening, switch off the lights using the "Switch Off Lights" button and disable the controls using the "Disable Controls" button.

7. Initialize the TCS using the "Initialize" button.

   This may move the telescope, dome, shutters, covers, and other mechanisms.

   Initializing takes about TBD minutes. While the TCS is initializing, the master server activity will be "initializing". Once the TCS has finished initializing, all of the servers should have a status of "ok" and an activity of "idle".

8. If you wish to open immediately, proceed to step 6 of the "Opening" procedure. If not, continue with the remaining steps of this procedure.

9. Switch the lights off using the "Switch Lights Off" button.

10. Start robotic operation using the "Start Robotic Operation" button.

11. Disable the controls using the "Disable Controls" button.

Opening

1. Open the web page:

   http://ratir.astrossp.unam.mx/tcs/compact.html

2. Use the webcams to check that it is safe to proceed.

   If the webcams show that the lights are on in the dome or hallway or one of the doors to the dome or hallway is open, someone if probably working in the building. If this is the case, do not continue until you have visited the telescope and verified that it is safe to do

so.

3. Enable the controls using the "Enable Controls" button.
4. Switch on the lights using the "Switch On Lights" button.
5. Use the webcams to check that it is safe to proceed.

   Make sure there are no impediments to moving the telescope, dome, and other mechanisms. For example, make sure that there are no obstructions in the vicinity of the telescope and that it is not covered with a tarpaulin.

   If there are impediments and you decide to continue opening, you should visit the telescope and remove the impediment. If you decide not to continue opening, switch off the lights using the "Switch Off Lights" button and disable the controls using the "Disable Controls" button.
6. Open using the "Open" button.

   Opening takes about TBD minutes. While the TCS is opening, the master server activity will be "opening". Once the TCS has finished opening, all of the servers should have a status of "ok" and an activity of "idle".
7. Use the webcams to check that the telescope opened correctly.

   You should see that the telescope covers and the dome shutter are open.
8. Switch the lights off using the "Switch Lights Off" button.
9. Start robotic operation using the "Start Robotic Operation" button.
10. Disable the controls using the "Disable Controls" button.

Closing

1. Open the web page:

   http://ratir.astrossp.unam.mx/tcs/compact.html
2. Use the webcams to check that it is safe to proceed.

   If the webcams show that the lights are on in the dome or hallway or one of the doors to the dome or hallway is open, someone if probably working in the building. If this is the case, do not continue until you have visited the telescope and verified that it is safe to do so.
3. Enable the controls using the "Enable Controls" button.
4. Stop robotic operation using the "Stop Robotic Operation" button.
5. Switch on the lights using the "Switch On Lights" button.
6. Use the webcams to check that it is safe to proceed.

   Make sure there are no impediments to moving the telescope, dome, and other mechanisms before continuing. For example, make sure that there are no obstructions in the vicinity of the telescope. If there are impediments, you should visit the telescope and remove the impediment.
7. Close using the "Close" button.

Closing takes about TBD minutes. While the TCS is closing, the master server activity will be "closing". Once the TCS has finished closing, all of the servers should have a status of "ok" and an activity of "idle".

8. Use the webcams to check that the telescope closed correctly.

   You should see that the telescope covers and the dome shutter is closed.

9. Switch the lights off using the "Switch Lights Off" button.

10. Disable the controls using the "Disable Controls" button.

Shutting Down

1. Open the web page:

   http://ratir.astrossp.unam.mx/tcs/compact.html

2. Enable the controls using the "Enable Controls" button.

3. Stop robotic operation using the "Stop Robotic Operation" button.

4. Shut down the TCS using the "Shut Down" button.

5. Disable the controls using the "Disable Controls" button.

6. If you are going to work in the dome, switch on the manual dome and hallway lights, and leave at least one of the doors to the dome or hallway open. Once you have finished, switch off the lights, close the doors, and start up the TCS.

Errors

There are three kinds of error:

1. The TCS can reject a request. For example, the TCS will reject requests to open without having switched on the lights. These are signaled by a standard browser dialog box.

   To proceed after this sort of error, simply dismiss the dialog box.

2. During an activity, a TCS server can detect an error. In this case, the activity of the server becomes "error".

   To proceed after this sort of error, you should first reset the TCS using the "Reset" button. If the error persists, you may have to start up the TCS using the "Start Up" button.

3. A TCS server can crash. In this case, the status of the server becomes "unknown". Note that when the server is stopped for other reasons (e.g., the TCS is shut down), its status also becomes "unknown".

   To proceed after this sort of error, you start up the TCS using the "Start Up" button.

The second and third kinds of error should certainly be reported by the usual channels.

Attachments