NexDome 2.2m Dome Rotation Kit

Installation and Operation Manual

The NexDome dome rotation kit provides motorized dome rotation. This also allows for rotation control by various software packages including ASCOM and TheSkyX.

To install the dome rotator, start by attaching the double-sided tape on the inside of the dome lip along the center of the track slot. Press firmly while unrolling the tape. Once the tape is in place, remove the protective strip from the outside (Fig 1).

Figure 1 Install the double-sided tape as in (A) and remove the protective cover strip (B).

Next, install the gear track by unrolling the track while simultaneously and firmly pressing it into place along the tape (Fig 2).

TIPS
- The provided double-sided tape works best with applying pressure over time.
- Clean the track slot and back of the track using household cleaner, such as Windex and make sure both surfaces are dry.
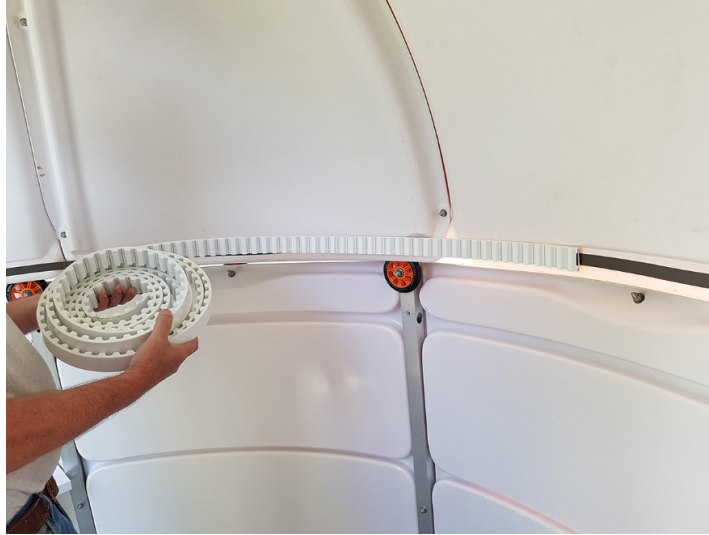
Figure 2: Install the gear track along the tape.

Mounting the motor unit will require drilling 3 holes in the wall brace. If you have a bay, pick a brace near the bay so that the USB control cable can reach the computer. Position the motor unit with the gear in the middle of track and mark the hole positions on the wall post. Drill the 516" bit. Mount the motor unit with the bolts provided (Fig 3).

Figure 3: Motor unit mounted.

If you do not plan on using software to control the dome rotation, you are done. The dome can be rotated with the toggle switch.

TIP
- Use the pressure knob on the motor bracket to adjust the distant between the gear and track if you find the teeth don't mesh tightly.

To use the motor with dome rotation software, we need to install the magnetic switch. Attach the switches to the brackets as shown in Fig 14. Locate an angled roller bolt near the control box. The "V" shaped bracket mounts on the wall and is for the switch, the "L" shaped bracket mounts on the dome for the magnet. The brackets can then be mounted to the corresponding bolts as in the figure. The dome mount does not have to line up with the magnetic switch at this time. It is important that the magnet and switch be perpendicular to the wall and with a 12" between them. The switch jack then plugs into the motor controller. The wire for the switch can be run under the wall lip and be held in place with tape.

You can test the placement of the magnet and switch with a voltmeter. Place the leads of the voltmeter on the jack terminals. Rotate the dome. The switch will close when the magnet gets close. If the switch doesn't close, the gap is too large and it will be necessary to put a spacer under the switch to move it up. A small piece of wood or plastic will work for this.

Figure 4: placement of the magnetic switch and magnet.

TIP
- It doesn't make any difference where the magnetic switch is located on the dome, but it is recommended to place the dome magnet on the south side of the dome when it is in parked position for domes installed in northern hemisphere, and placed on north side on domes in southern hemisphere.

OPERATION

For Windows

Your NexDome rotation unit is already programmed with the latest firmware and it is ready to use but we recommend downloading the following software:

Arduino IDE software: https://www.arduino.cc/en/Main/Software
This software does two things for you. First, enables your computer to recognize the Arduino board and therefore connect to it. Secondly, makes it possible to upload NexDome software updates to the onboard firmware.

Download the program, open the NexDome.ino file and upload it to the controller using the provided USB cable. The unit doesn't need to be powered by the provided 12v power supply when uploading the driver.

Your dome control unit was shipped with the latest version of NexDome firmware, but if you need to update to the latest version for Windows, the link is available on the SUPPORT page at NexDome.com https://www.nexdome.com/support

Download the software that you need and read the included readme.txt files for valuable installation instructions.

TIP
- Use administrator level permissions on your computer when installing Arduino IDE

NOTE
- TheSkyX users need to upload the TheSkyXplugin to be able to operate the controller. This plugin works on MacOS, Windows, Linux Ubuntu and Raspberry PI.
- Linux users need to upload the Linux driver.
- You can find the latest version of these plugins and drivers on NexDome.com's SUPPORT page, here https://www.nexdome.com/support

Once installed, when you plug in the controller to the USB port, you should get a notification that the Arduino was recognized. Check which COM port was assigned to the controller by

checking the "COM and Serial Port" listings under the devices list for the computer. Arduino Leonardo should appear next to a COM number (Fig 5). You'll need this information for the setup process.
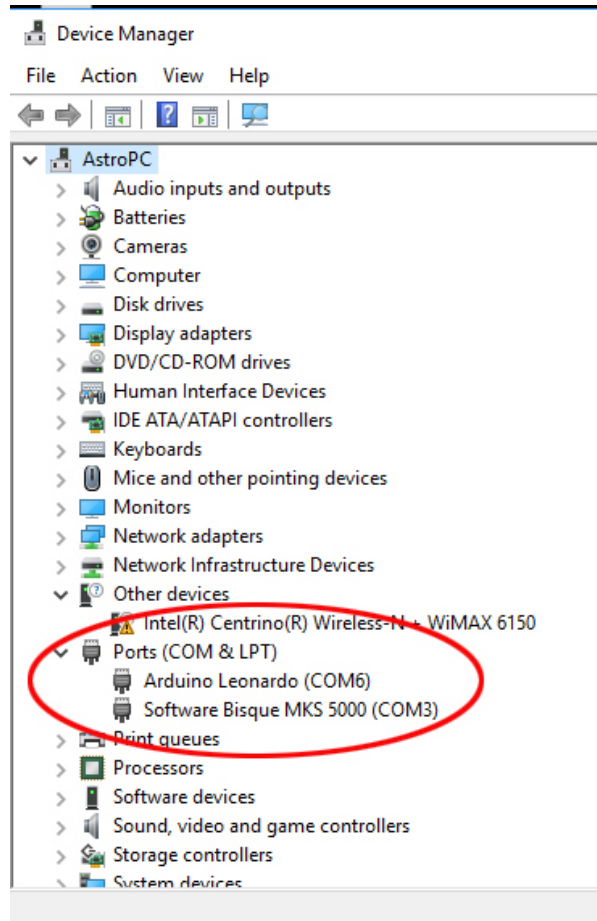

Figure 5: Port assignment for Arduino.

We will use the ASCOM POTH (Plain Old Telescope Handset) dome control freeware for these instructions. ASCOM POTH is a Windows based program. Other control software are setup in a similar manner.

You can download POTH from here http://www.ascom-standards.org/Downloads

There are two things that must be done before dome rotation will work correctly. The first is calibration. This tells the software how many steps of the motor are required to turn the dome 360 degrees. The second is "Homing". This tells the computer which direction the dome slit is facing.

Start by opening the control software (Fig 6-7), and click on "setup". Next, click on "Dome" and then "Choose Dome". The ASCOM Dome Chooser window will open. Select NexDome from the dropdown list. Click on the "Properties" button and select the COM Port that was assigned to the Arduino controller, click "OK".
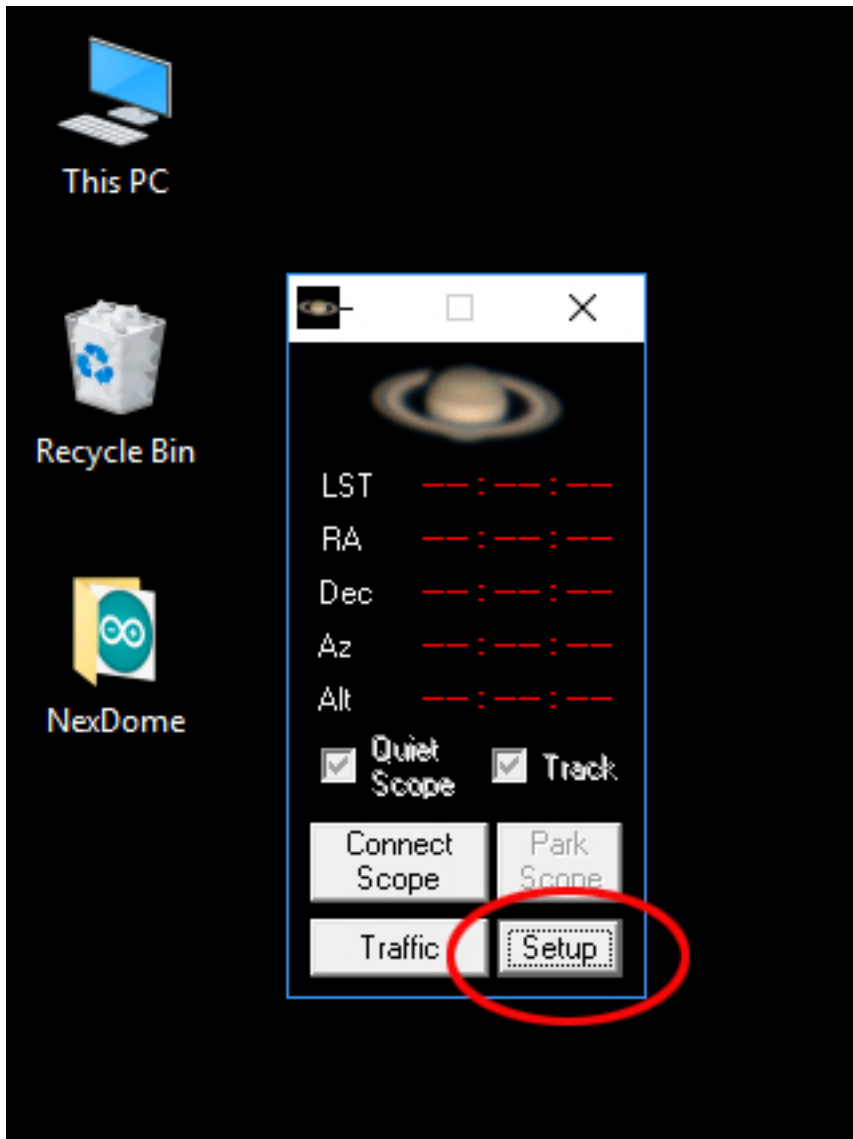

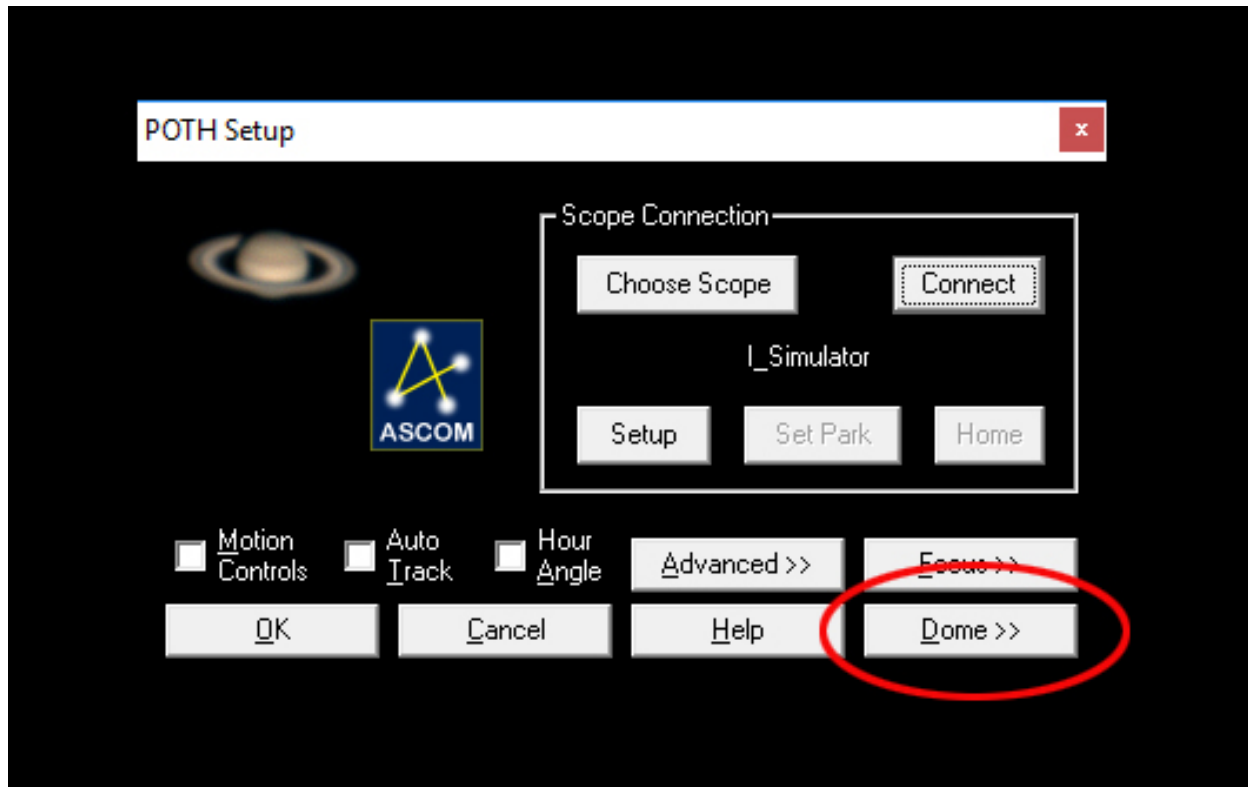Figure 6: POTH Scope and Dome control hub window.

Figure 7: Connect to dome.

Next, click the "Connect" button and a new control window will open (Fig 8). Press the home button and the dome should start to rotate. It will stop when the magnetic switch and magnet align. Note the real life azimuth position of the dome slit (not what's on the screen) and enter this value in "Home azimuth" field.
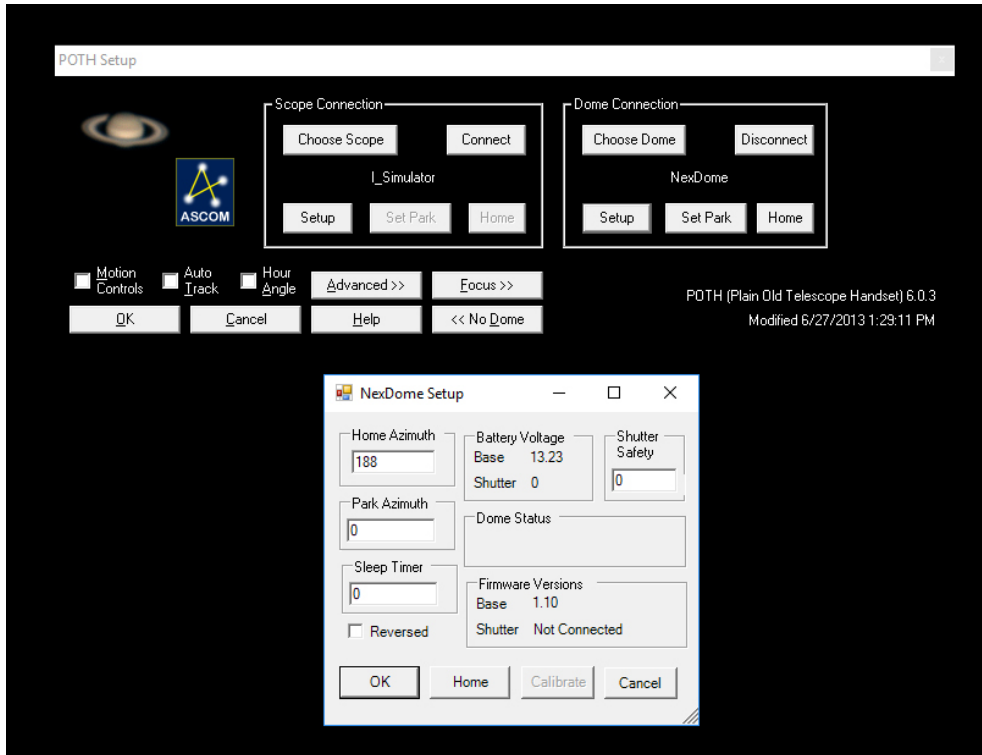
Figure 8: Dome Setup

If this is the first time you've run the software, the dome will need to be calibrated too. Make sure you are not connected to a telescope and that the track and slave boxes are not selected (if they are, the calibration will fail). First, home the dome. When that is done, the calibrate button will be available, press the "calibrate" button. The dome should rotate and then stop when it reaches the switch. This data is stored in the control box and is used to compute the number steps the drive makes to move the dome a specified number of degrees.

The last thing that is required in setup is to tell the computer where the scope is in relation to the dome slit. This geometry is used to compute the position of the scope and slit relative to each other.

The measurements needed are taken from the center of the dome and reflect the telescope rotational axis (Fig 9) offset North (considered positive), South (considered negative), East (positive), West (negative) and if the rotation point is above (up, positive) or below (down, negative) the rotational base of the dome. You will also need to know the dome radius. Note, in POTH, the offsets are measured in millimeters and the dome radius in meters.
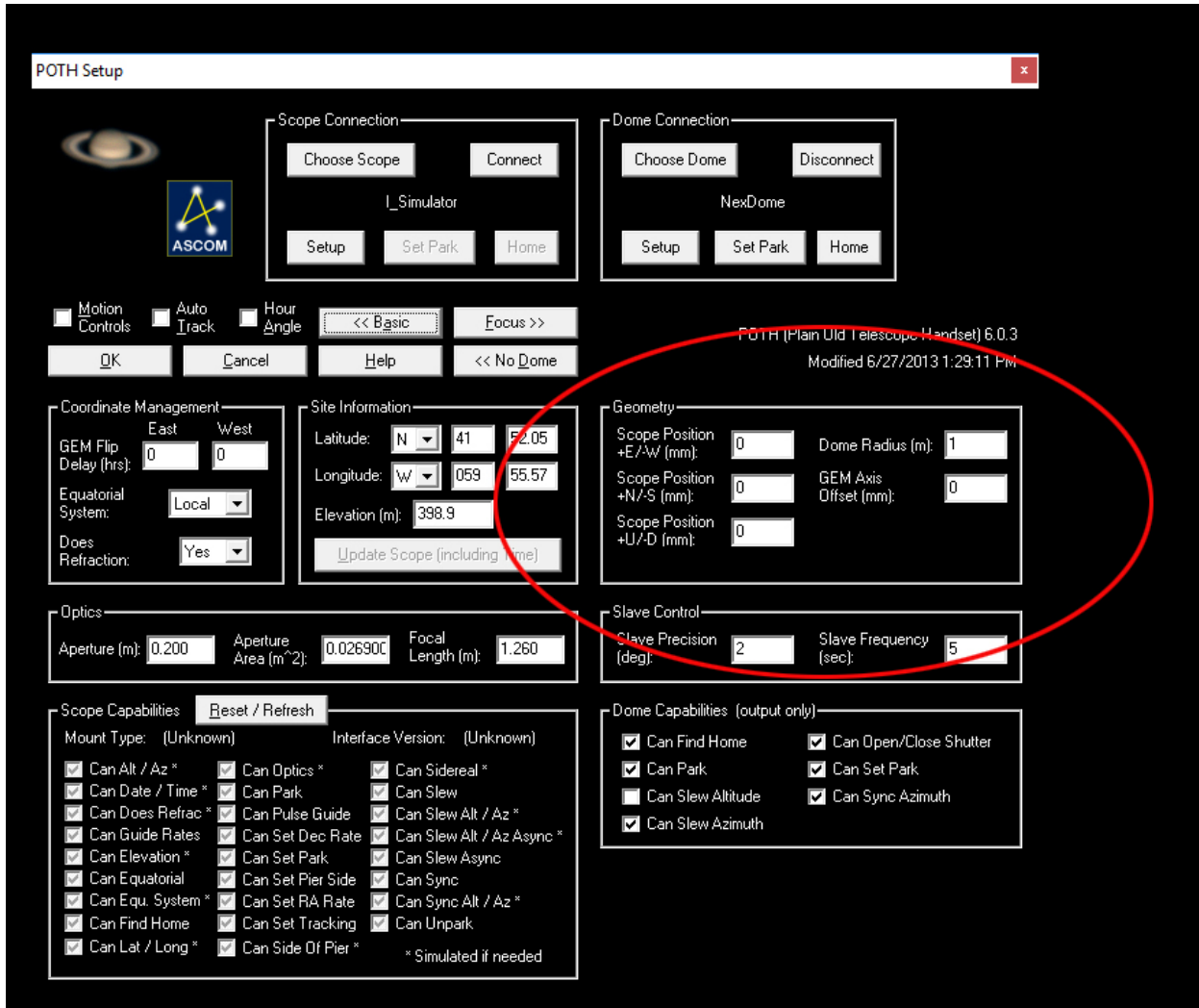
Figure 9: Telescope geometry measurements.

Once all the measurements are entered, home the dome one more time, then press ok. You will be returned to the control window. The position of the dome should reflect the home values you entered earlier. If not, go back and enter the real life azimuth value again in the "home azimuth" box (Fig 18). Also, sync the dome to this value on the main control screen (Fig 10). You can now move the dome to any azimuth by entering the value and pressing the "GoTo" button (Fig 20).
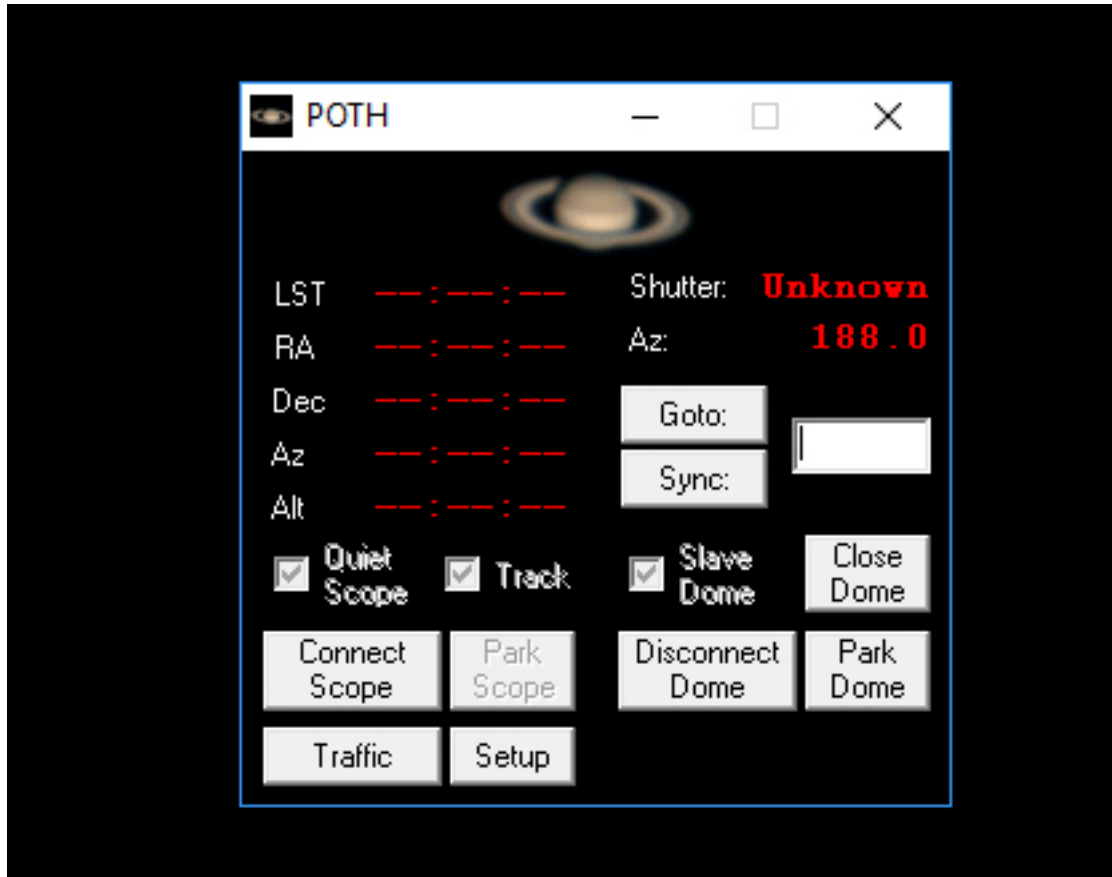
Figure 10: Dome and telescope control interface.

If you notice that the dome goes to a position that is 180° off (in other words, you enter a GoTo azimuth value of 90 and the dome rotates to 270), go back into the setup window and check the "reversed" box (Fig 18).

If you have a mount capable of being controlled by ASCOM and it is connected, the scope position will be listed here as well. Move the shutter to the azimuth the scope is set to, enter this value in the window and press "Sync". The scope and dome are now linked and will move together if the "track" and "slave dome" boxes are checked. Note, because the telescope is offset from the rotational axis and the dome axis, there may be times when the dome slit and scope pointing don't align. If you find this to be the case after a few slews, try adjusting the GEM axis offset value either higher or lower until the scope points through the slit.

Setup and use of other software, such as TheSkyX, will follow the same basic protocol.

Updating the firmware

The rotator ships with the latest version of the firmware already installed. If newer versions become available, you can easily update your unit using the Arduino IDE software that you have already installed. The new firmware will be available through a link on the SUPPORT webpage (https://www.nexdome.com/support). Download the NexDome.ino file (https://github.com/grozzie2/NexDome/tree/master/arduino/NexDome) and open it using the Arduino IDE software. To upload it to the controller, simply press the button on the toolbar (fig 11). The file will be compiled and uploaded to the controller. Remember to have the USB cable plugged in, the power cord does not need to be attached for firmware upgrades.

Figure 11:Firmware upload to Arduino. Simply press the upload button after opening the file with the software.