

# Meade LX200 Classic ASCOM Driver

(13 April 2024)



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## **INTRODUCTION**

This ASCOM driver is dedicated for controlling the first breed of the Meade LX200s, affectionately known as the LX200 Classic telescopes, and will work for the following telescopes which have a firmware version of 3.30 or higher:

- 7" Meade LX200 Maksutov-Cassegrain F15
- 8" Meade LX200 Schmidt-Cassegrain F10
- 10" Meade LX200 Schmidt-Cassegrain F6.3
- 10" Meade LX200 Schmidt-Cassegrain F10
- 12" Meade LX200 Schmidt-Cassegrain F10
- 16" Meade LX200 Schmidt-Cassegrain F10

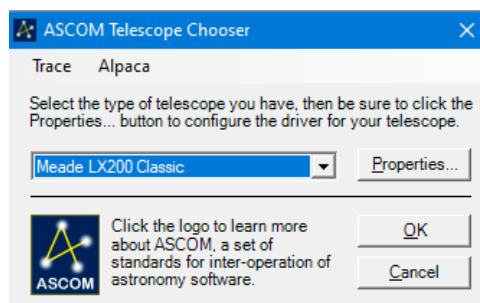
The driver assumes the telescope has been set-up to send and receive equatorial coordinates which means the telescope is set on either a polar aligned mount (POLAR) or a horizontal mount (ALTAZ).

Notable features of this driver is as follows:

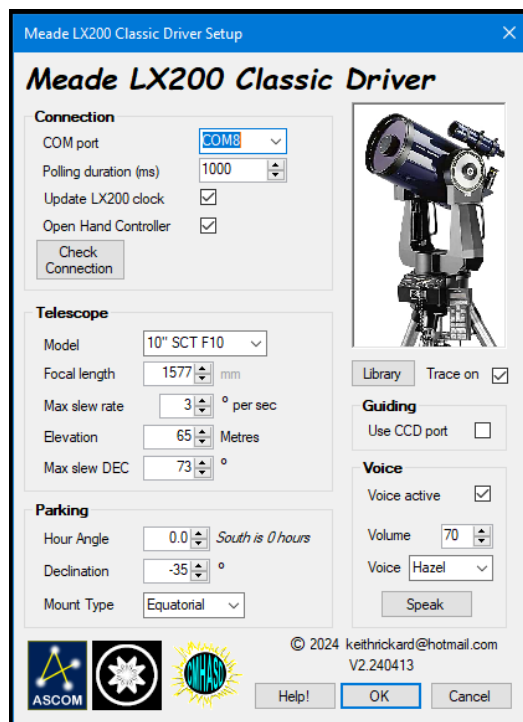
- Check connection with the telescope on the driver's setup window
- Telescope model selection – the driver knows the telescope's focal length, aperture area and aperture diameter.
- Focal reducer setting
- Optional automatic telescope clock update, including local sidereal time
- Optional mini hand controller with Meade focuser control
- Maximum Declination for slew – helps to prevent cameras from hitting the telescope's mount!
- Set maximum slew rate to save the LX200's motors
- Set observing site's elevation
- Parking the telescope with progress window
- Dual pulse guiding that can allow corrections to both telescope axes simultaneously
- Access to the LX200's native library of objects, including the sun, for slewing to them.
- Optional voice announcements when using the ASCOM driver
- 32 and 64-bit versions are available
- Multiple applications can access the LX200 simultaneously

## SETTING UP THE DRIVER

After downloading and installing the appropriate 32-bit or 64-bit driver, select the **Meade LX200 Classic** from the ASCOM driver chooser from your client application such as MaxIm DL or your favourite planetarium software:



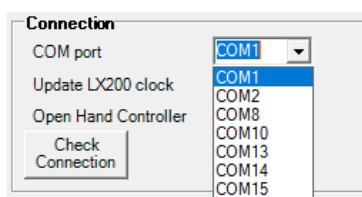
Click on the **Properties...** button to open the **Meade LX200 Classic Driver Setup** window:



Enter the settings on this window for your telescope set-up:

- **COM port**

Click on the down arrow to select the COM port which your telescope is connected to:



- **Polling Duration**

The driver asks for telescope's status every 1000ms (default). This prevents the telescope from being overwhelmed by those applications which interrogate the driver many times a second and allows others applications to have their chance to get access to the telescope. You can, if you wish, change the duration to a value between 100ms to 10000ms.

As a point of interest, the telescope's status includes it's Right Ascension, Declination, Azimuth, Altitude, if it's parked, and if it's slewing.

- **Update LX200 clock**

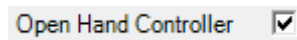
When your client application connects to the telescope with this driver, the onboard clock is updated using your PC's clock. LX200s are bad time keepers so it is good to update their clocks on connection.



If you don't want your LX200's clock update then un-tick the box.

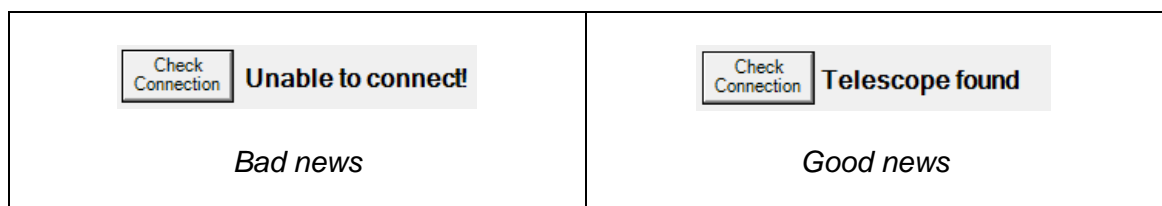
- **Open Hand Controller**

If you want to open a mini-version of the telescope's hand controller when your client application connects to the telescope. It will only appear if the telescope is not parked. More on the Hand Controller later in this document.



- **Check Connection**

After selecting the COM port that the telescope is connected to, clicking on this button will check that a connection can be made with the telescope (provided it is switched on!).



If you cannot connect, try a different COM port setting.

- **Model**

Select the option for the telescope model you will be connecting to by clicking on the down arrow:

- **Focal Length**

Selecting the telescope model populates this field with default focal length for that telescope. This can be modified with telescope's effective focal length if a focal reducer or a Barlow lens has been attached to the telescope. If needed, the client application will obtain this value.

For example, a 10" telescope's default focal length is 2500mm. Using a F6.3 focal reducer will produce an effective focal reducer of 1575 (2500mm x 0.63). For a 2x Barlow, this will be 5000.

**Note:**

A focal reducer may not necessarily reduce the focal length by its given value. Its distance from a mounted camera can affect this. If you are able to work out the effective focal reduction, e.g. by using plate solving software, then an appropriate value can be entered here.

- **Max Slew Rate**

When powering up the LX200, the maximum slew rate is automatically set to the highest speed. For the 7", 8" and 10" telescopes this is 8 degrees per second. For 12" and 16" telescopes it is 6 and 4 degrees per second respectively.

In order to save those ageing telescope motors; this driver will set the rate to 3 degrees per second. You can this value if you wish – 2 degrees per second is the slowest rate you can select.

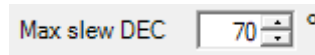
- **Elevation**

Enter the elevation of the telescope's observing site:

This is the height above sea level in metres. Some client applications make use of this information.

- **Max slew DEC**

This is the maximum declination the telescope is allowed to slew to. The driver will refuse to allow the telescope slew beyond this value. The main purpose for this is to prevent any equipment fixed to the rear cell of the telescope from colliding with the telescope's mount.

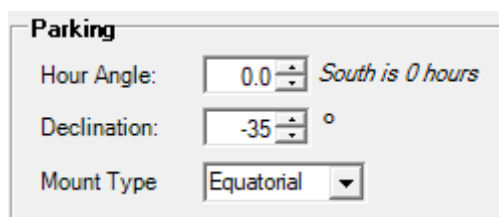
A control box with the label "Max slew DEC" on the left. To its right is a numeric input field containing the value "70". To the right of the input field is a small circular icon with a degree symbol (°).

Enter the maximum declination in degrees. For southern hemisphere users, ensure you enter a '-' sign in front of the value.

Some client applications may have a similar feature, in which case the driver is able to add an additional safety net.

- **Home position**

On the **Home position** section of the window, values are entered to determine the position of where the telescope is to point when it is parked.

A window titled "Parking" containing three controls. The first is "Hour Angle:" followed by a numeric input field with "0.0" and a text label "South is 0 hours". The second is "Declination:" followed by a numeric input field with "-35" and a degree symbol (°). The third is "Mount Type" followed by a dropdown menu currently showing "Equatorial".

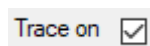
The **Hour Angle** has a value of 0 at due south (meridian) and increases in value as you rotate your equatorially mounted telescope on its RA axis westwards of south. 24 hours make up one complete rotation. When unparked, the driver sets the telescope's Right Ascension to local sidereal time less the value of the **Hour Angle**.

The **Declination** box is the telescope's declination when parked. When unparked, the telescope's Declination is set to this value.

The **Mount Type** box allows you to select if your telescope is equatorially mounted or on an Alt-Az mount. When unparking the telescope, the driver will set the LX200 to start in the correct mode.

- **Trace**

The driver makes good use ASCOM's trace feature and it is very useful for debugging why something has not worked.

A checkbox labeled "Trace on" which is checked, indicated by a small square with a checkmark inside.

The trace file is stored in the following folder on your PC:

*Documents\ASCOM\Logs YYYY-MM-DD\*

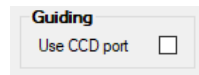
The suffix is today's date. The file is called:

*ASCOM.Meade LX200 Classic.HHMM.SSSSSS.txt*

The suffix is the time when driver was connected to the client application.

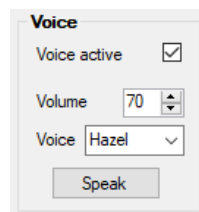
- **Guiding**

This feature is for the author's own guiding device which sits between the PC and the LX200 serial port. If you are wanting to use the driver for pulse guiding then please leave the 'Use CCD port' box unselected otherwise it will not work for you.



- **Voice**

This ASCOM driver can give you oral feedback of key information when you send instructions to the telescope provide the **Voice active** checked box



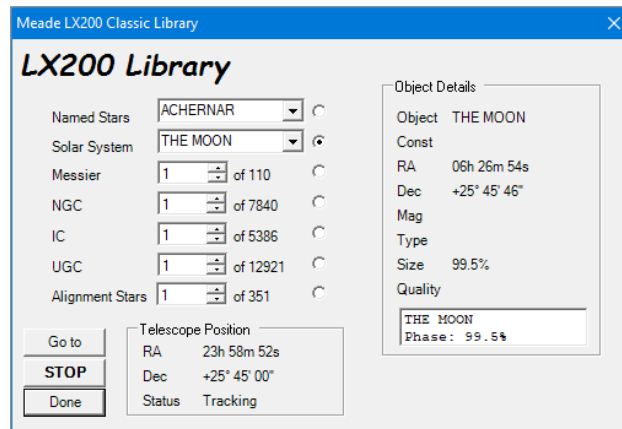
To activate the driver's voice, ensure the **Voice active** check box is ticked.

The voice's volume in the **Volume** box. Values of 0 (no sound) to 100 (loudest) are allowed. You may also choose which voice you wish to have speaking.

Click on the **Speak** button to hear a test sentence being spoken at the set volume.

## LIBRARY

Ensure the telescope scope's COM port is correctly set and the telescope is switched on and that the telescope is correctly aligned and not parked. On the driver setup window, click on the **Library** button to open the Library window:



Using the library is very simple. You can access the following objects in the LX200's library:

- 33 named stars
- The planets (including Pluto, excluding Earth!), the moon and the sun\*
- 110 Messier objects
- 7840 New General Catalogue (NGC) objects
- 5386 Index Catalogue (IC) objects
- 12921 Uppsala General Catalogue (UGC) objects
- 351 Alignment stars as listed in the LX200's manual

\*The sun isn't actually in the LX200's library. It has been added here by the driver.

**BE CAREFUL WHEN SLEWING TO THE SUN. THE AUTHOR ACCEPTS NO LIABILITY FOR HARM OR DAMAGE TO THE USER OR EQUIPMENT**

Choose the object you are interested. If the radio button next to it has been selected, the **Object Details** section will bring up information about the object. These details are downloaded from the LX200's onboard computer.

Clicking on **Go to** will slew the telescope to the selected object provided it is unparked. If there is any issue with slewing then this will be shown in the **Object Details** section's readout box.

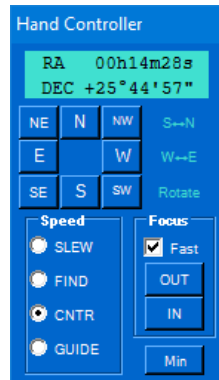
The **Telescope Position** section shows where the LX200 is currently pointing and whether it is tracking or parked.

Clicking the **STOP** button will abort the slew to the chosen object. Clicking on **Done** will close the **LX200 Library** window.

## HAND CONTROLLER

The hand controller is a useful gadget and provides some of the features on an actual LX200 hand controller. It appears when:

- its check box on the driver setup window has been checked
- the client application is connected to the telescope through the ASCOM driver
- the telescope is unparked



- **Read Out**

The hand controller's read out shows the RA and declination of where the telescope is pointing and will update automatically. However, pressing the empty space inside the directional arrows will force the read out to be updated. "PARKED" will show on both lines when the telescope is parked.

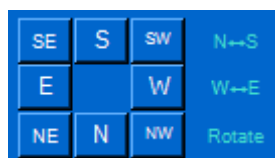
- **Directional buttons**

Pressing any of these buttons will slew the telescope at one of the chosen rates in the **Speed** section of the controller.

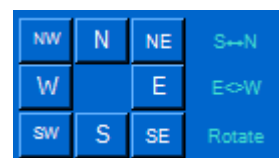


To make it convenient, the orientation of the buttons can be rearranged to match the attached camera's view.

Clicking on the **S↔N** button will flip the buttons vertically. Click on the **W↔E** button will flip the buttons horizontally. Clicking on these again will flip them back.



*After clicking on **S↔N***



*After clicking on **W↔E***

Clicking on **Rotate** will rotate these buttons about the centre, one button at a time.



- **Speed**

The regular LX200 speeds available change the rate of slewing when pressing the directional buttons.



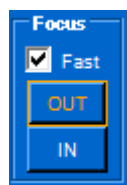
**SLEW** moves at the telescope's maximum slew rate as set on the driver's setup window (default is 3 degrees per second).

Rates per second are as follow:

<b>FIND</b>	2 degrees
<b>CNTR</b>	480 arcsecs (16" LX200 is 240 arcsecs)
<b>GUIDE</b>	30 arcsecs

- **Focus**

If you have a Meade Focuser attached which turns the LX200's focuser knob to achieve focus, and it is plugged into the **Focuser** socket on the LX200's control panel then you can control it by pressing the **IN** and **OUT** buttons on the controller. **IN** pulls the LX200's primary mirror towards the rear cell of the telescope while **OUT** pushes it away.



Pressing one of these buttons will make the button's text turn orange. This provides you with a reminder of which button was last pressed.

The **Fast** check box, when checked, will turn the focuser's motor at its fastest speed. Unchecked means the motor will turn at its slowest.

- **Min**

The Hand Controller gadget will always appear on top of everything on the PC's screen. Clicking on the **Min** button will minimise it.

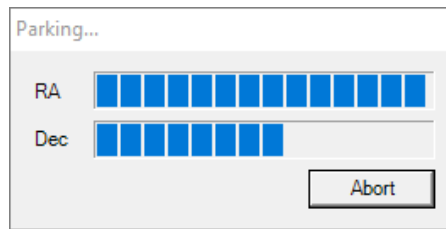


It can be restored by clicking on its button on the Windows taskbar.

## **PARKING**

Parking is a most useful feature for an accurately polar-aligned telescopes housed in an observatory, as it allows the user to avoid having to realign their telescope upon starting an observing session. Telescopes with an accurately levelled Alt-Az mount will work too with this feature.

While parking a window will pop-up and allow the user to see the progress and abort it if required.



When using this driver, it is advisable to leave the telescope powered on when parked. To prevent the telescope from tracking and slewing when parked, it is put into **LAND** mode. If you switch off the telescope, the accuracy of the Right Ascension value will be lost when you power it up again. During its initialisation procedure, the LX200 turns the RA motor drive to find the magnet on its worm gear so that it knows its position. The amount of turning is quite random and will affect the accuracy of the unparking process. The error may be as much as 2 degrees.

During unparking, the telescope will have its clock (if selected) and local sidereal time updated using the PC's clock. It is essential to that you have entered the correct longitude value on the LX200 otherwise local sidereal time will be calculated wrongly. The LX200 is put into **POLAR** mode (or **ALTAZ** if selected as the mount type on the setup window) to start it tracking. Provided you have not moved the telescope away from its parked position then it will be pointing to the correct part of the sky according to RA and declination coordinates set during this unparking process.

**Note:**

The 16" LX200 has its own special commands for parking. This driver does not take advantage of this as the author has not had the opportunity to test his code on a 16" LX200. In the meantime, the above process as described should work.

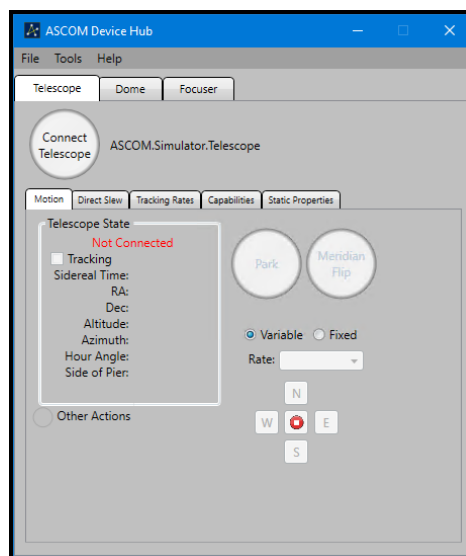
## **MULTIPLE APPLICATIONS**

The driver can allow any applications to use it in order for them to control the telescope. This could be controller software such as MaxIm DL or N.I.N.A., guiding software such as PHD2, and planetarium software such as SkyMap Pro, Cartes du Ciel, TheSky, etc. A maximum of three applications might be a sensible limit.

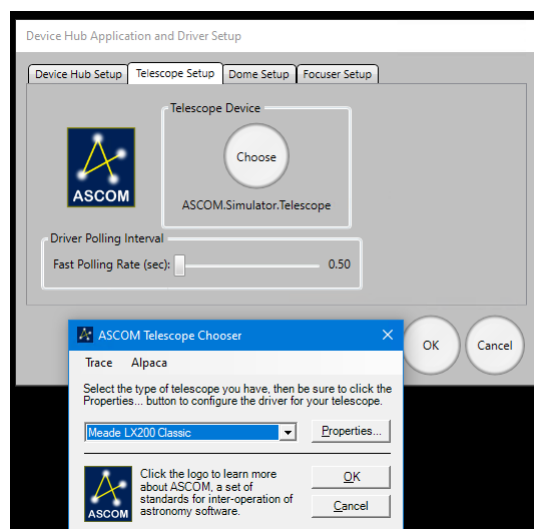
### **Using ASCOM Device Hub**

If you are finding that your setup is struggling with controlling the telescope using the driver then you may need to increase the Polling Duration on the driver setup screen (see above). Another way of having many applications using the driver is to use the ASCOM Device Hub which is include with the suite of files that come with the ASCOM platform package.

- To use the ASCOM Device Hub, first open it:



- Goto Tools / Setup / Choose and select the Meade LX200 Classic driver:



- I suggest a Driver Polling Interval of 0.50 sec. Increase this if you are having connection issues but 0.5 sec seems to works well.

- Click **OK** but don't connect to the telescope in this application. Just simply close.
- Open your application and when setting up the telescope control section, select the ASCOM driver called 'Device Hub Telescope'. Use the same driver for you other applications.
- You may find if you use guiding software like PHD2 or MaxIm DL's guiding tab, it would probably best to use the Meade LX200 Classic driver alongside the Device Hub Telescope driver as I believe there could be a delay of up to 0.5 seconds (or whatever you set the Device Hub's polling rate) before the guide pulse is sent.