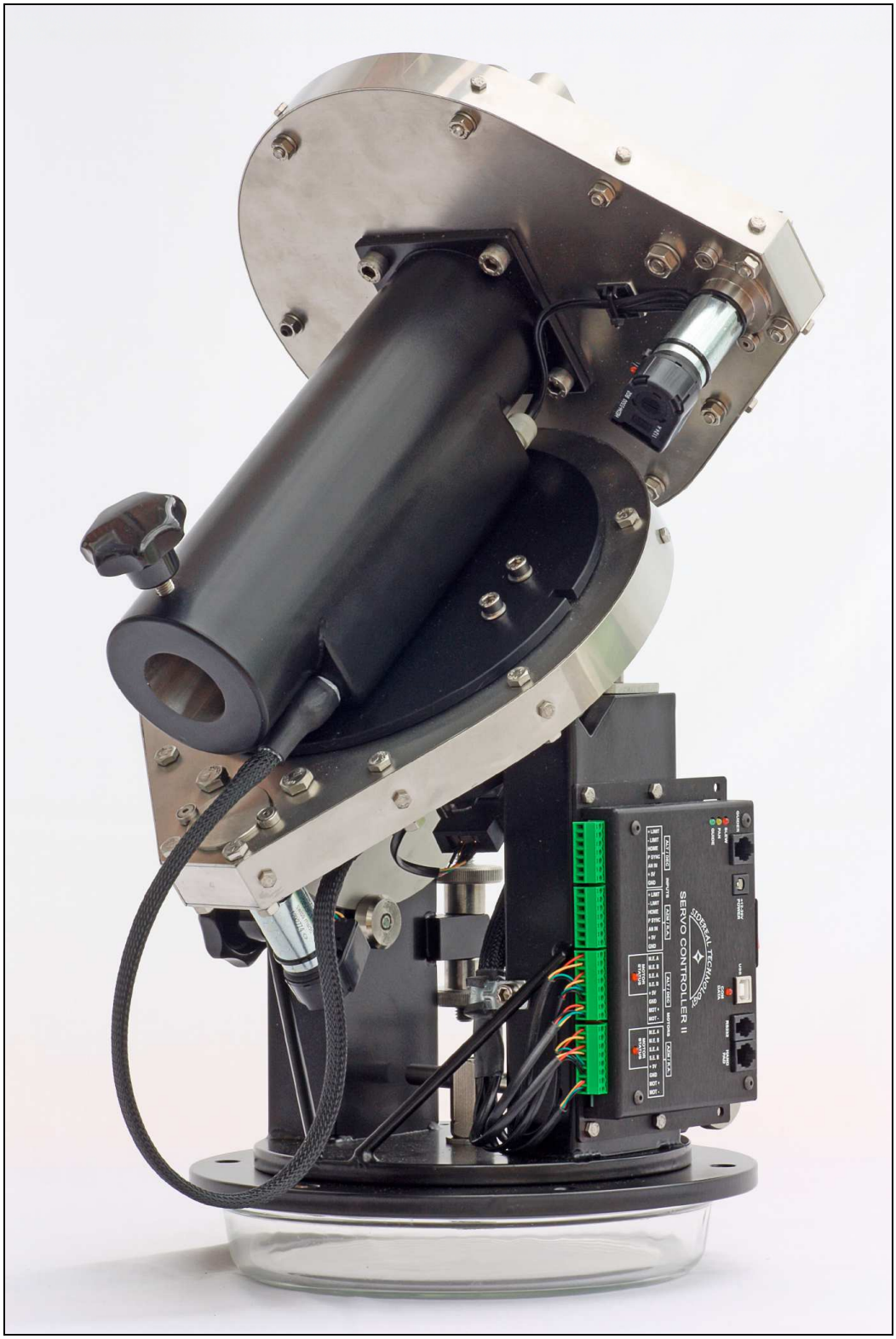
MESU 200 Mount

A Quick Guide to Installation

V1.0



August, 2014

Steve Richards

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1 FOREWORD

Congratulations on the purchase of your Mesu-Mount 200.

The Mesu-Mount 200 is an equatorial mount with some special features.

1. A backlash-free drive mechanism that is very stiff and tracks extreme smoothly and accurately. These properties are especially important for astrophotography but they are desirable for other applications as well.

2. A 90 degree rotatable altitude setting makes it possible to set the mount for any latitude on Earth.

3. Its very simple and rugged design enhances the reliability and the ease of use in darkness.

4. Its 27kg upper head has a huge carrying capacity so it will be possible to use heavy telescopes with this mount.

5. After passing the meridian it will still be possible to continue tracking an object for an additional 3 hours before a meridian flip has to be carried out.

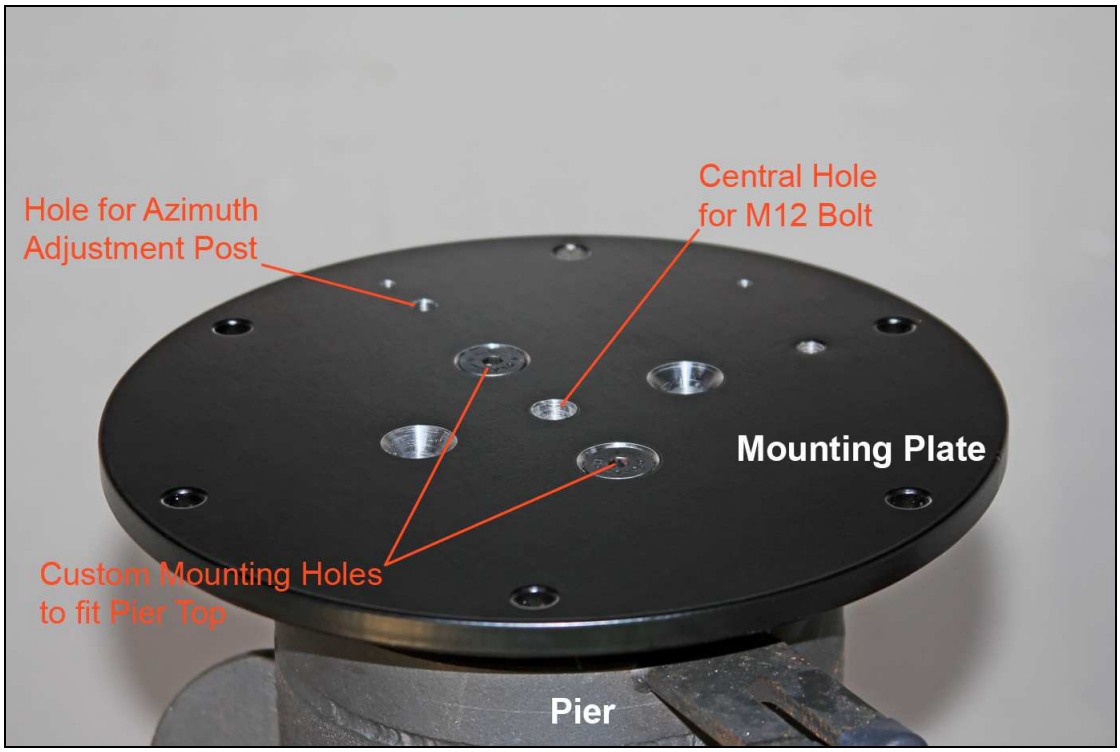
6. The SiTech Servo II controller included with the mount is an industry leading servo controlled system manufactured by Sidereal Technology.

In short, this is a purchase that you will enjoy for many years to come.

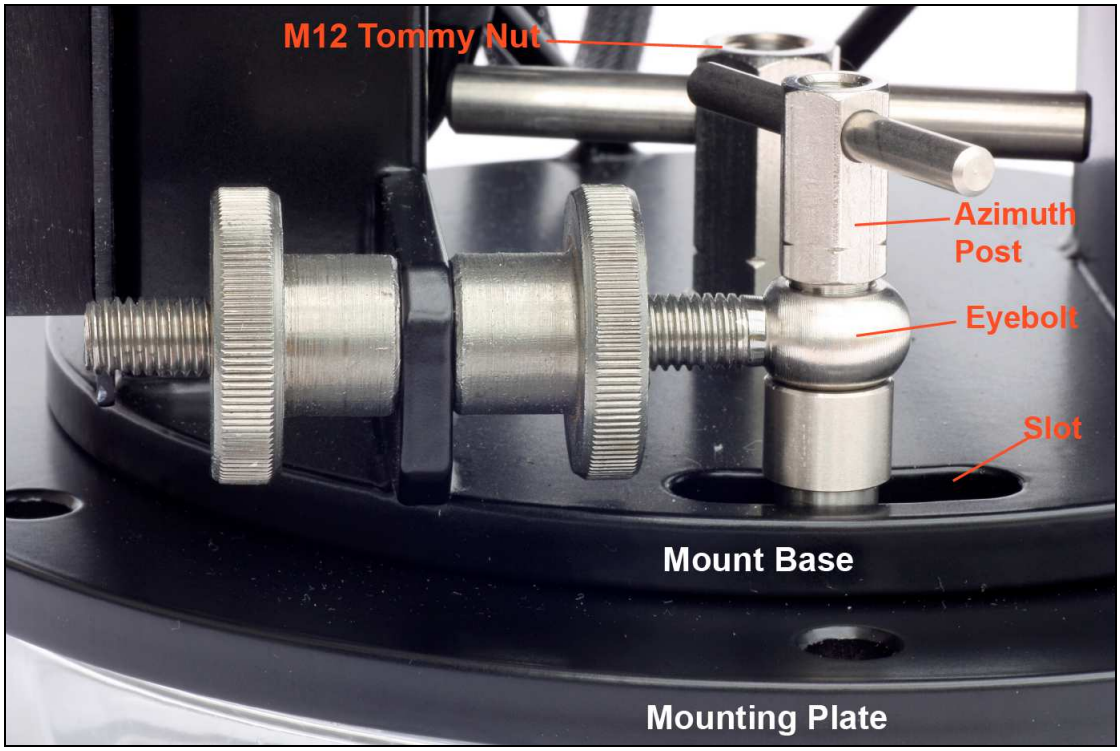
Lucas Mesu

2 MOUNTING

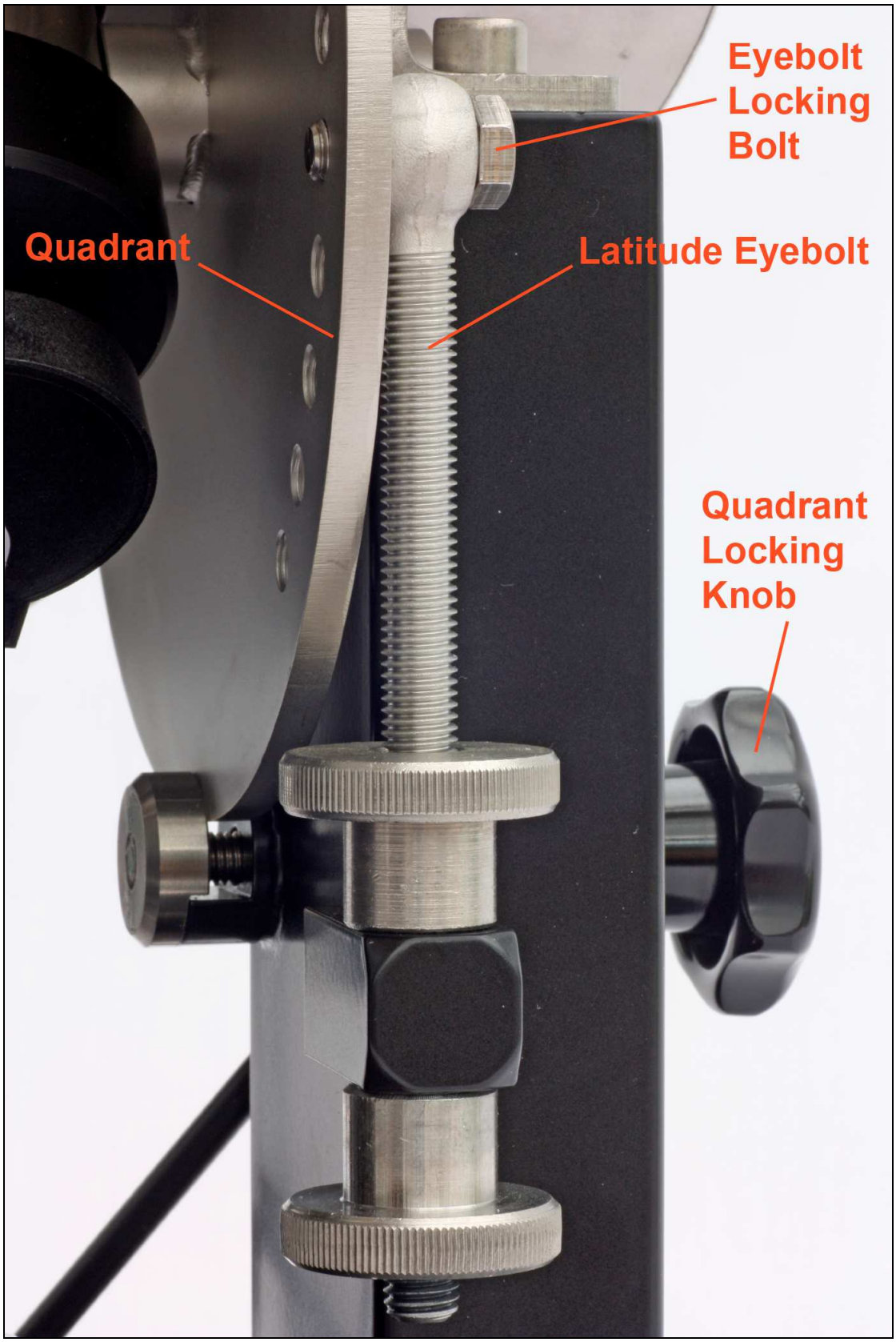
The Mesu 200 mount should be attached to a pier via the Mesu mounting plate. Ensure that the azimuth post hole is orientated to the South if you are located in the Northern Hemisphere or to the North if you are located in the Southern Hemisphere.



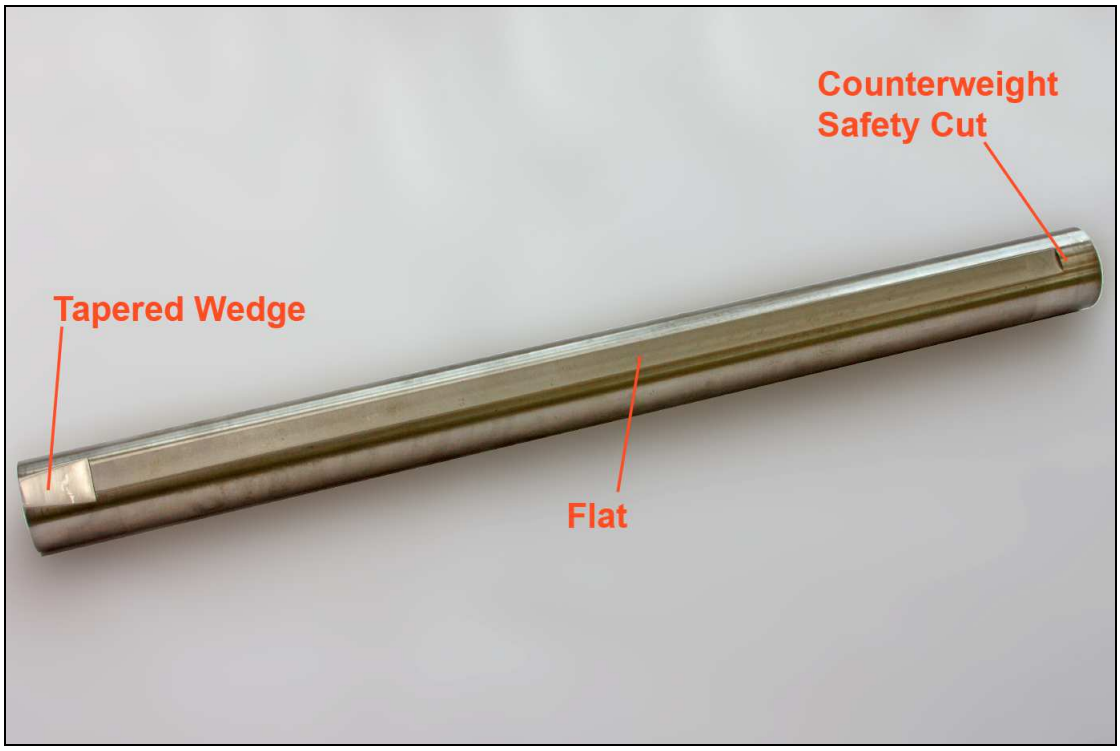
Carefully place the mount on top of the mounting plate and attach it using an M12 bolt, Tommy nut and a washer, through the hole in the centre of the mount's base. Align the centre of the slotted hole at the rear of the base over the azimuth hole in the mounting plate and insert the M8 azimuth post through the azimuth adjustment eyebolt and nip the two Tommy nuts.



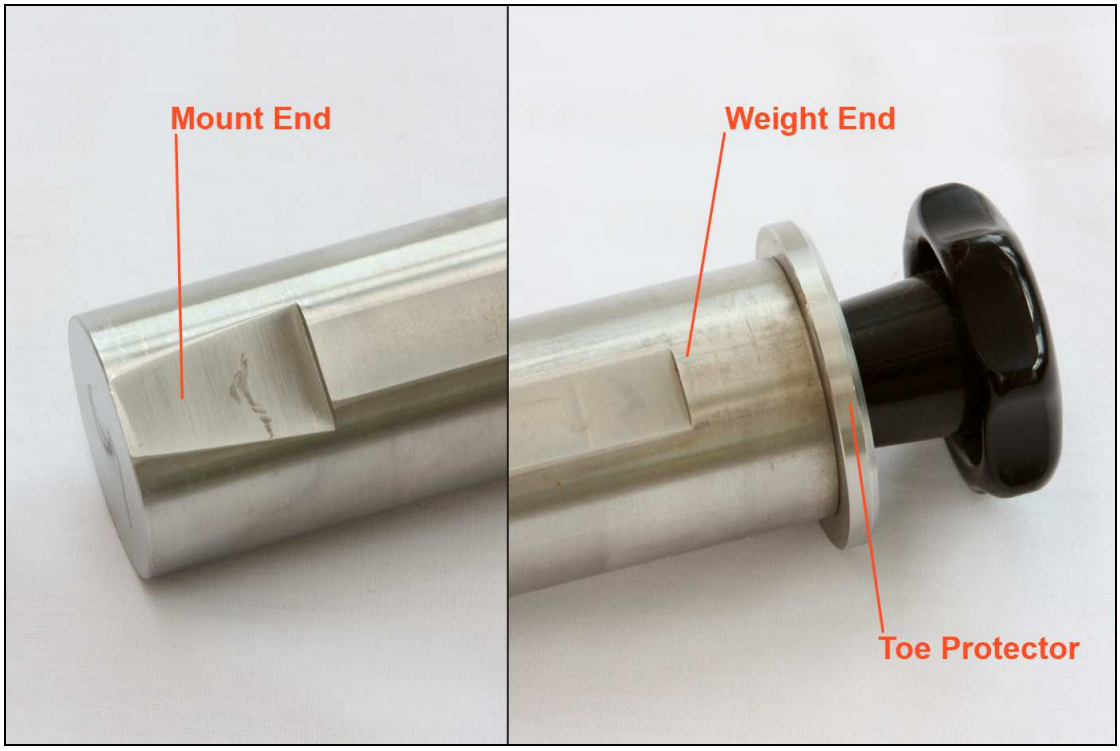
Roughly set the RA axis to your local latitude. The quadrant that sets the mount's polar axis has locating holes for the adjustment eyebolt, in increments of 10 degrees. Choose the hole closest to your latitude, release the locking knob on the side of the mount, undo the eyebolt retaining bolt and move the eyebolt to the chosen hole while carefully supporting the mount head to ensure that it doesn't fall. Final adjustment will be carried out later in chapter 7.



To complete the basic assembly of the mount, insert the tapered wedge-shaped cut-out end of the counterbalance bar into the declination housing and carefully tighten the locking knob ensuring that the bolt is aligned with the flat milled in the cut-out.



The Full Bar



Close-up of bar ends

3 SOFTWARE INSTALLATION

DOWNLOADING THE REQUIRED SOFTWARE

Various pieces of software must be downloaded from the Sidereal Technology website at the following URL:- http://siderealtechnology.com/page9.html

1. MICROSOFT .NET FRAMEWORK 4

You must be running version 4 of the Dot Net framework. This framework provides a software environment that allows for a range of different program languages to operate together.

2. ASCOM PLATFORM V 6.1

The SiTech II controller is operated within the ASCOM platform (in version 6.1 at the time of writing this manual). More information about ASCOM can be found at http://ascom-standards.org

3. ASCOM VERSION OF SITECHEXE 0.90P

This software installs the following programs:-

a) *SiTechExe* The SiTech ServoII control software

b) *PlateSolve2* An excellent plate solving program

c) *CalPointsXP* An excellent sky modelling system

d) *Interop.MaxIm.dll* An interface to the popular image capture software MaxIm DL

e) *ServoConfig* The configuration management system for the SiTech ServoII software

4. CDM20830_SETUP

The USB driver for the USB to Serial chip virtual COM port for connecting the SiTech ServoII controller to your PC's USB port. You may well not need this driver as your operating system should identify the serial connection on the SiTech ServoII controller but it makes sense to have it to hand just in case.

5. SITECH V0.90 RELEASE NOTES PDF FILE

This document gives details of the latest software version with instructions on how to install the software components. The PDF file can be downloaded from the following URL:-

http://siderealtechnology.com/SiTechExeReleaseNotesVersion0.90.pdf

6. UCAC3PS zip file

This 411Mb file comprises The Third US Naval Observatory CCD Astrograph Catalog (UCAC3) which is required for use with the PlateSolve2 and CalPoints XP software above. This extensive data file can be downloaded from the following URL:-

http://old.planewave.com/files/software/platesolve/UCAC3PS.zip

7. OPERATIONSMANUAL1-1.PDF

The SiTech ServoII operation manual. This PDF file includes a huge amount of information about the SiTech.exe software but a lot of it is not relevant to the Mesu 200 mount. However, it is a very useful reference work that we will be pointing to from time to time where appropriate. The PDF file can be downloaded from the following URL:-

http://www.sitechservo.info/controller-manual/OperationsManual1-1.pdf?attredirects=0&d=1

8. QUICK START SITECH EQU OPERATIONS REV J.PDF

This is a quick start guide to the general use of an equatorial mount with the SiTech Servo II controller. Again, some of it is relevant and some of it can be ignored and in particular, ignore the information regarding the encoders as this information will already have been entered into the firmware at the Mesu-Optics factory. The PDF file can be downloaded from the following URL:-

http://www.sitechservo.info/controller-manual/Quick%20Start%20SiTech%20EQU%20Operations%20rev%20J.pdf?attredirects=0&d=1

9. CARTES DU CIEL

This software is a very competent planetarium program that can be used to locate a huge number of celestial objects then issue GoTo or Sync commands to your mount to make mount control intuitive and fun within a graphical user interface (GUI). The software can be downloaded from the following URL:-

http://sourceforge.net/projects/skychart

INSTALLING THE REQUIRED SOFTWARE

Only software items 1 to 3 inclusive must be installed to have the mount up and running, all the other items are optional although we would recommend downloading the Operations Manual (item 7) for reference.

It is very important that the software is installed in the following sequence.

1. MICROSOFT .NET FRAMEWORK 4

Install this software in accordance with the instructions on the Microsoft website.

2. ASCOM PLATFORM V 6.1

Install the ASCOM platform version 6.1 or higher in accordance with the instructions on the ASCOM website.

3. ASCOM VERSION OF SITECHEXE 0.90P

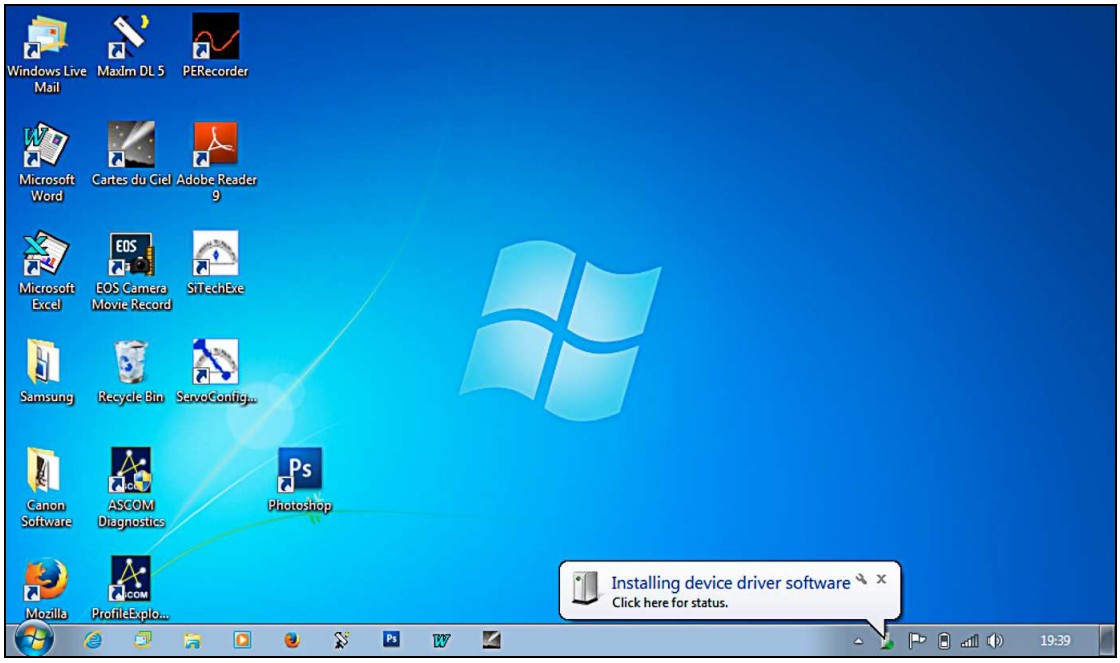
Double click on the executable file SiTechSetup090P.exe to automatically install all the controller software. SiTechExe.exe, PlateSolve2.exe, CalPointsXP.exe and Interop.MaxIm.dll will all be installed in the folder C:\Program Files\SiTech\SiTechExe for 32bit versions of Windows XP, Vista and W7 or C:\Program Files (x86)\SiTech\SiTechExe for 64bit versions. The configuration program ServoConfig.exe will be installed with all its resource files in the directory C:\ServoConfig for all software versions.

We recommend setting shortcuts on your desktop screen to both SiTechExe.exe and ServoConfig.exe.

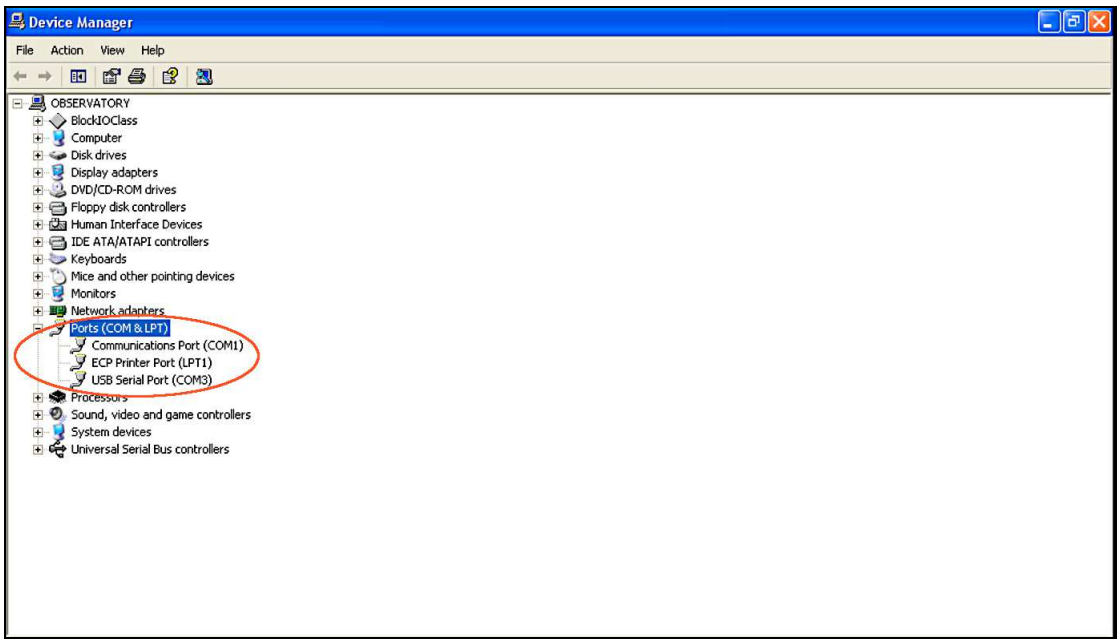
4 CONNECTING TO YOUR PC

Connect the mount to a regulated 13.8 volt supply via the '+12V – 28V POWER' socket on the front of the controller – the inner pin is the positive terminal. Connect the supplied hand-controller to the socket marked 'HAND PAD'.

Turn on your PC and when the operating system has finished loading, plug the USB cable into the USB socket on the controller and a spare USB 2.0 socket on your PC. Your operating system should identify the USB device and load the drivers for it. If the USB device is not recognised, run the device installer **CDM20830_Setup.exe**.



When the USB driver has completed installation, click on ***Start - Control Panel - Device Manager*** and examine the available ports by clicking on the '+' sign next to '***Ports (COM & LPT)***'. One of the ports will be labelled as a '***USB Serial Port (COM *)***', thus identifying the USB to Serial Port converter built into the SiTech ServoII. Make a note of the COM port number that has been assigned to it (COM3 in the example below) as you will need it for the next step.



5 SOFTWARE CONFIGURATION

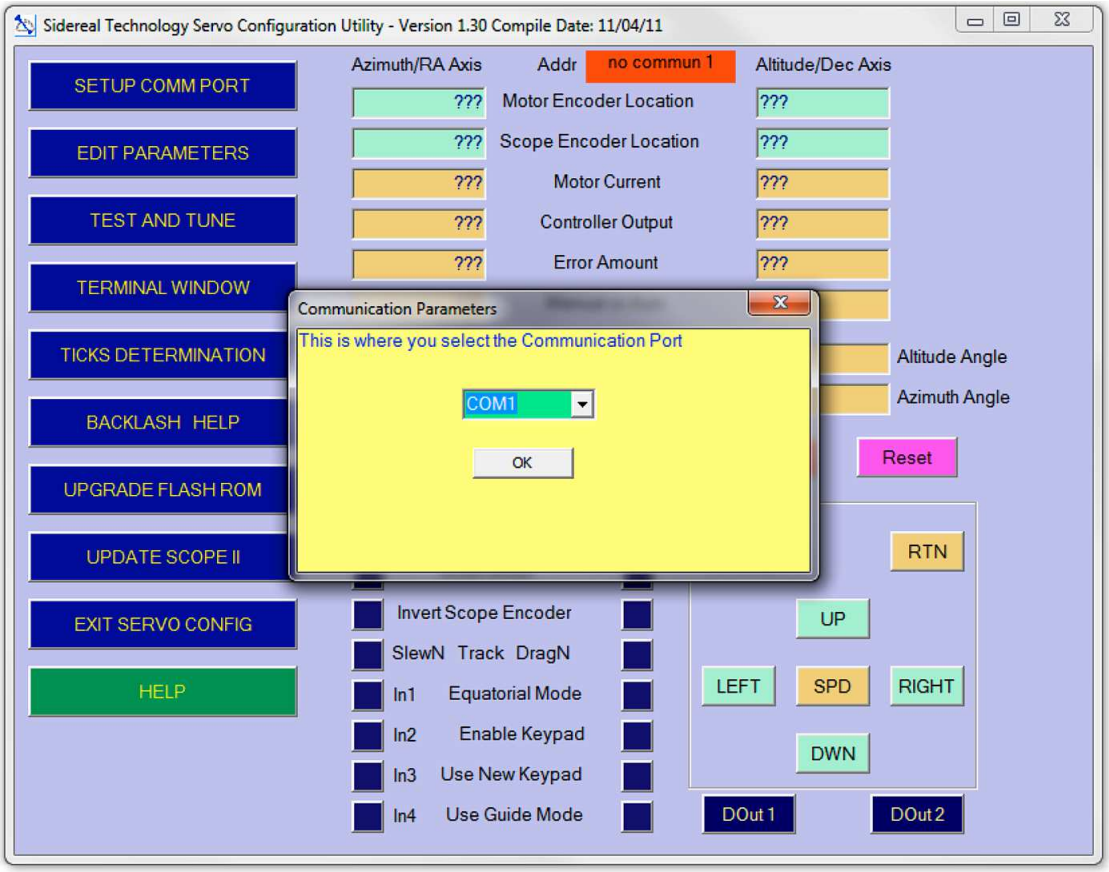
There are two sets of configuration files that need to be managed with this system. The SiTech ServoII controller is very versatile and can be used with a wide range of different mounts so it needs to know various attributes regarding the specific mount it is connected to.

The program ServoConfig manages this information and the data is stored in the SiTech ServoII contoller. Mesu-Optics have already inserted the required information into your controller at the factory but for your security, you should make a local copy on your PC's hard drive.

The second set of configuration data tells the controller how it should perform and this is managed within the program SiTechExe.

CONFIGURING SERVOCONFIG

Turn on the mount using the panel switch on the right hand side of the controller box and then double click on the shortcut to ServoConfig.exe. Click on the [**SETUP COMM PORT**] button and select the COM port number that you noted above.



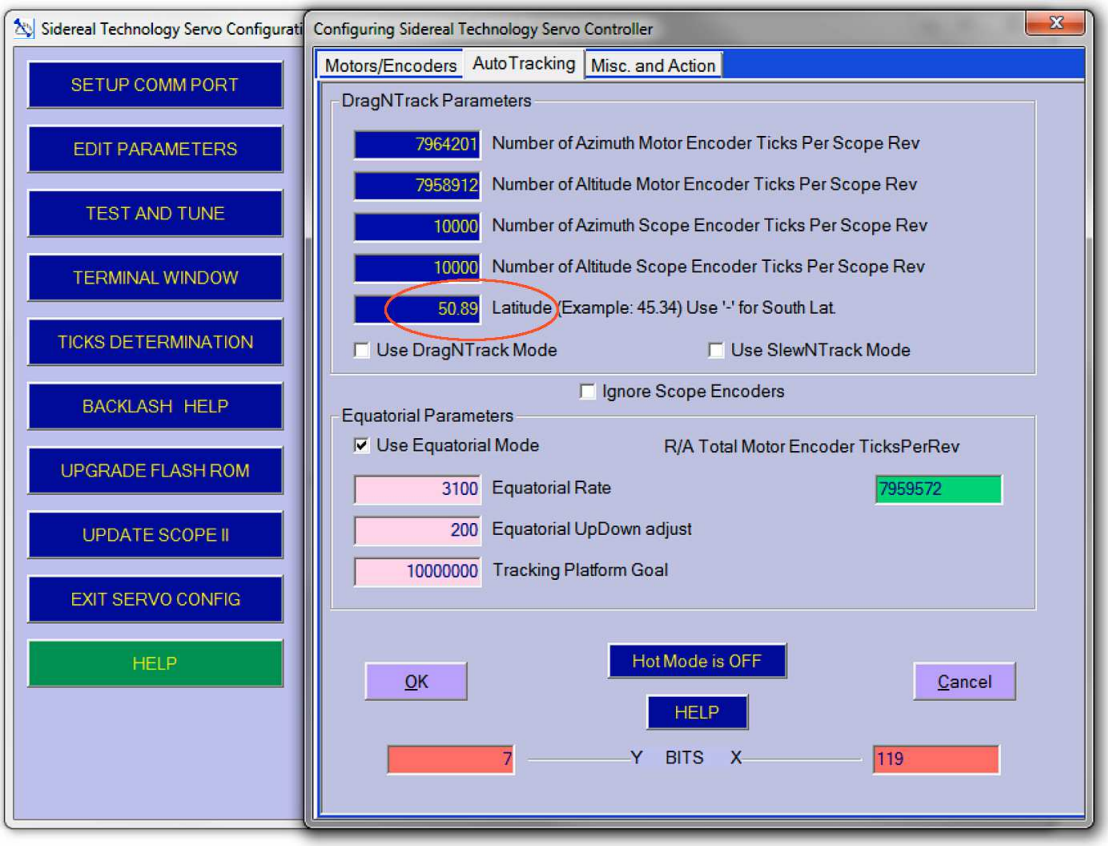
Setting the COM port in ServoConfig

Click on the [**EDIT PARAMETERS**] button and select the [**Get Data From Controller**] button to download the data from the controller into the configuration manager. Under no circumstances should you change any of the parameters under the ***Motors/Encoder*** tab as these have already been set up at the Mesu-Optics factory for your specific mount. Click on the ***Auto Tracking*** tab and enter your latitude in decimal degrees in the fifth box down as shown overleaf.

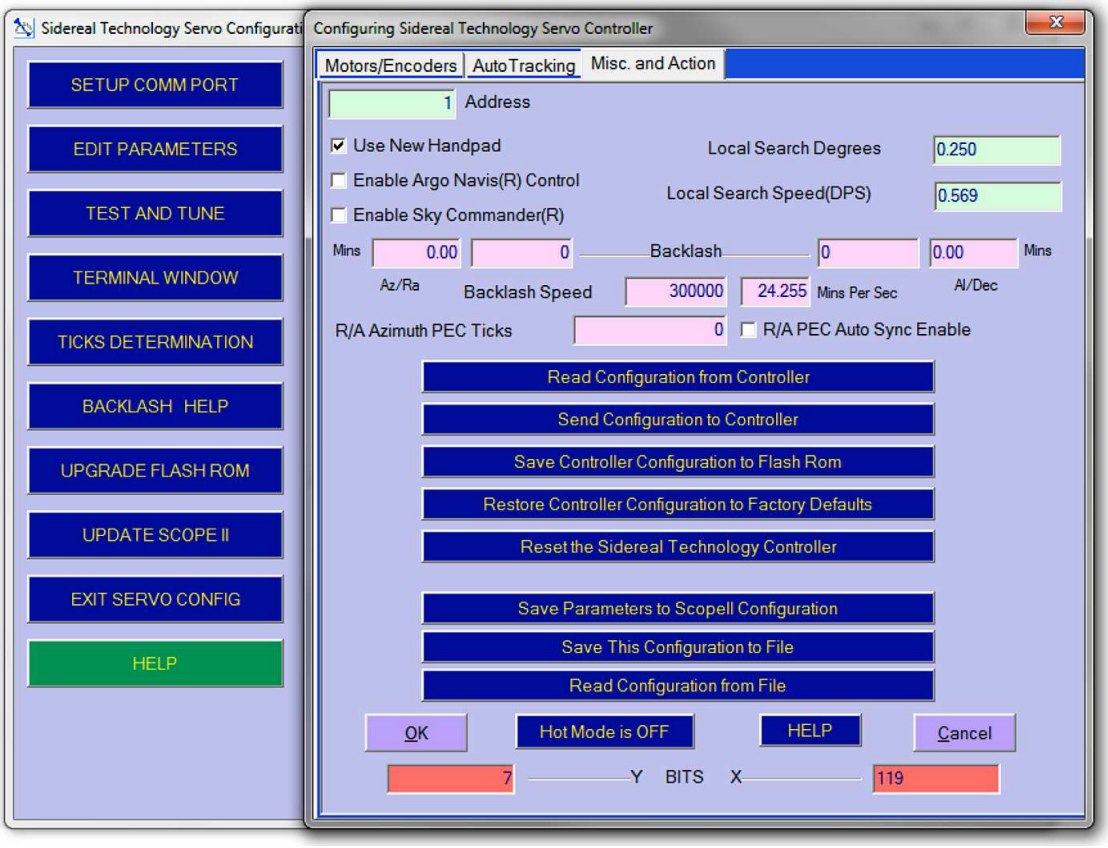
Now select the ***Misc. and Action*** tab and enable ***Use New Handpad*** by clicking in the box to its left. These are the only changes to this configuration data that you will be required to make so click on the [**Send Configuration to Controller**] button and then click on the [**Save Controller Configuration to Flash Rom**] button to update the SiTech Servo II controller. When this action is

completed, click on the [**Save This Configuration to File**] button to save a security copy of the data to your hard drive and choose a suitable filename like **Mesu_config_13-08-2014.car** (the '.car' file extension will automatically be appended to your chosen file name).

Click on the [**EXIT SERVO CONFIG**] button to close the program because you cannot have both ServoConfig and SiTechExe running at the same time and that is where we're going next.



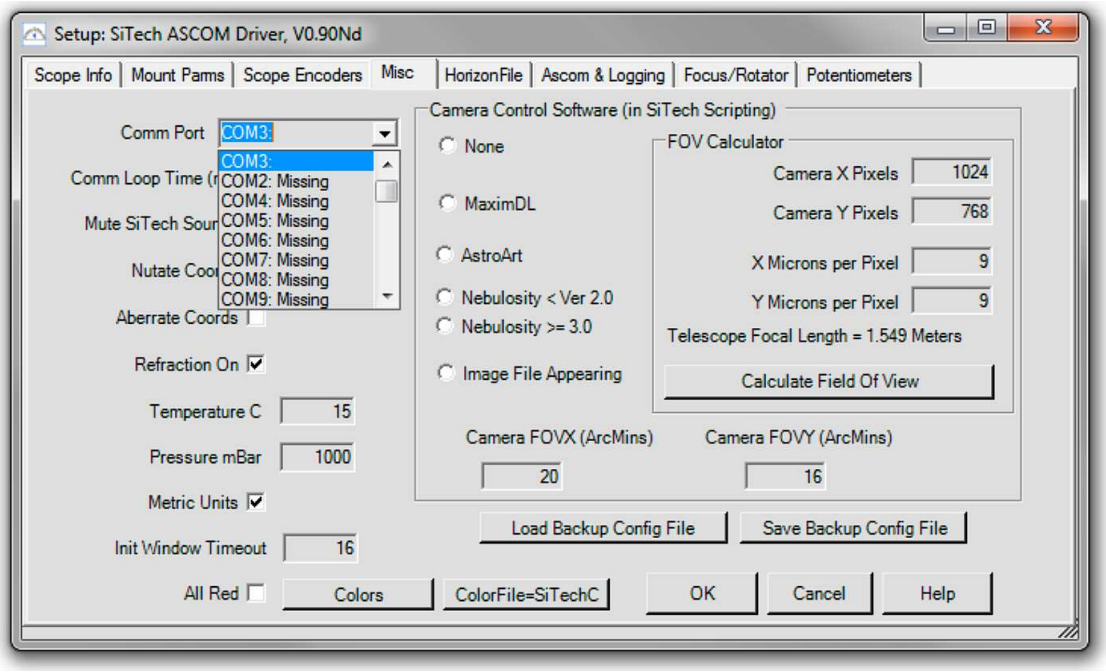
Setting Your Latitude in ServoConfig



Saving your updated your configuration files

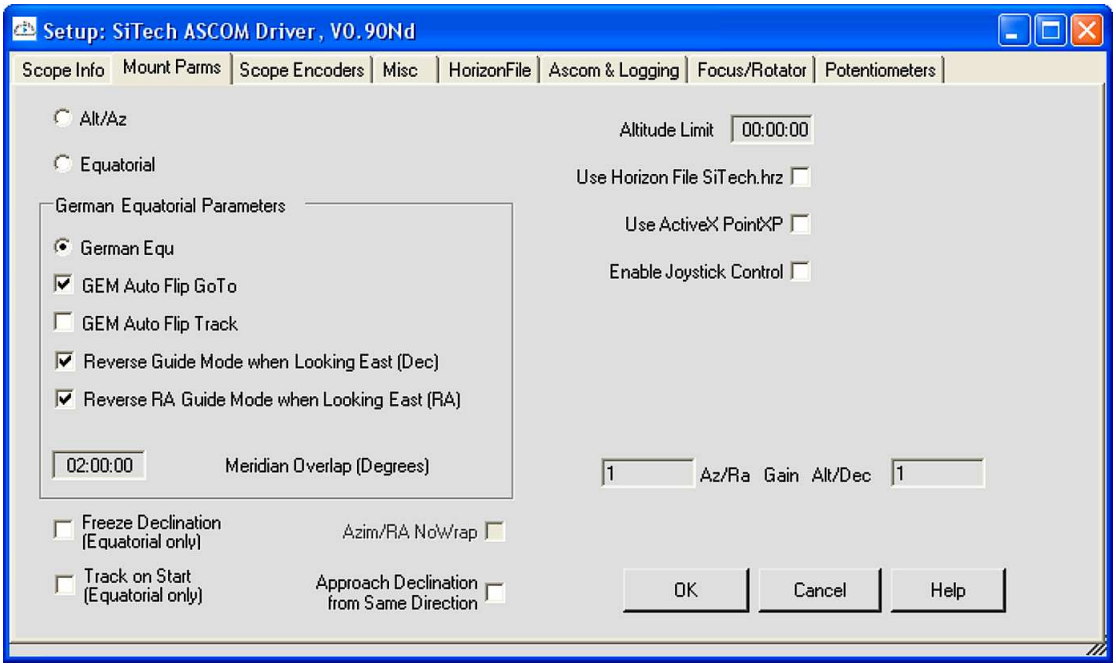
CONFIGURING SITECHEXE

Ensure that ServoConfig is not running and then double click on the shortcut to SiTechExe. You will note a '*Bad Scope Commun*' error message will appear which is to be expected at this stage. Select the ***Config*** tab and click on the [**Change Config!**] button to load the Setup panel for the SiTech ASCOM driver. Select the ***Misc*** tab and choose the COM port number that you noted above. You will now be able to communicate with the SiTech ServoII controller using the SiTechExe software and with other software via ASCOM.



Click on the ***Scope Info*** tab, give your mount a suitable name, enter your longitude and latitude in the relevant boxes using the 99:99:99 format, enter your height above sea level in the Elevation box and then add the optical information.

Click on the ***Mount Parms*** tab. The Mesu 200 mount is a German Equatorial Mount (GEM) so it is vital that the correct parameters are entered here to ensure predictable operation. The first two radio buttons (Alt/Az and Equatorial) should be deselected. In the 'German Equatorial Parameters' section, select <u>only</u> the following parameters by clicking on them:-



German Equ
GEM Auto Flip GoTo
Reverse Guide Mode when Looking East (Dec)
Reverse RA Guide Mode when Looking East (RA)

Deselect all the other tick boxes on this screen.

Note:
Later, you may start using a 'horizon map' to automate sky modelling and to warn you that chosen objects are below your local accessible horizon. If you do want to use a horizon map then tick the 'Use Horizon File Sitech.hrz' box.

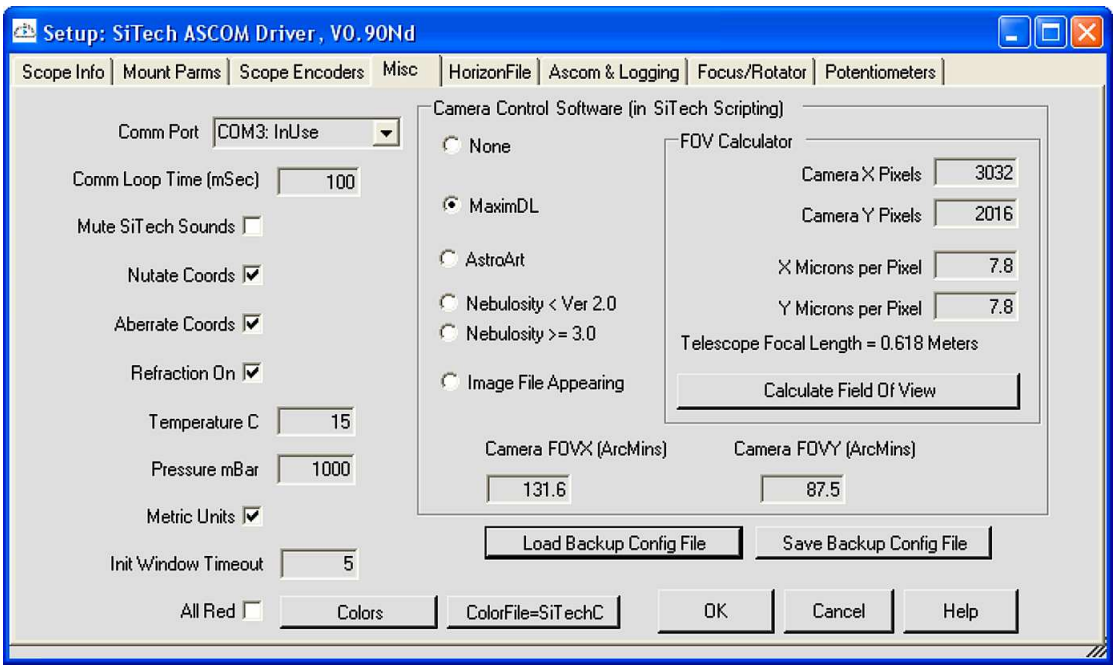
Click on the ***Scope Encoders*** tab. The Mesu 200 mount has two encoders on each axis, a motor encoder and a shaft encoder and these work in unison to ensure extremely accurate GoTos and tracking. It is recommended that you select 'Polite Mode' for both the RA and Dec axes and set a Supervisory Threshold of 10:00:00 degrees. In Polite Mode, both motor and shaft encoders are in operation for GoTo slews in excess of the supervisory threshold that you set, while slews of less than the supervisory threshold use only the much higher resolution motor encoders.

Return to the ***Misc*** tab and enable the following parameters by clicking on them:-

Nutate Coords
Aberrate Coords
Refraction On

In the 'Camera Control Software (in SiTech Scripting)' section enable relevant camera control software or select 'None' if your software isn't listed. If your software is listed, enter your camera's Pixel information in the FOV Calculator and click on the [**Calculate Field Of View**] button. This information is used when running a script to produce an automated sky model (see chapter 9 - Further Reading).

For security, click on the [**Save Backup Config File**] button to save this configuration data to your hard drive and choose a suitable filename like **Mesu_config_13-08-2014.cfg** (the '.cfg' file extension will automatically be appended to your chosen file name).



This and the work already carried out by Mesu-Optics concludes the basic software configuration and your mount is now ready to be set up for an observing or imaging session.

6 BALANCING THE MOUNT

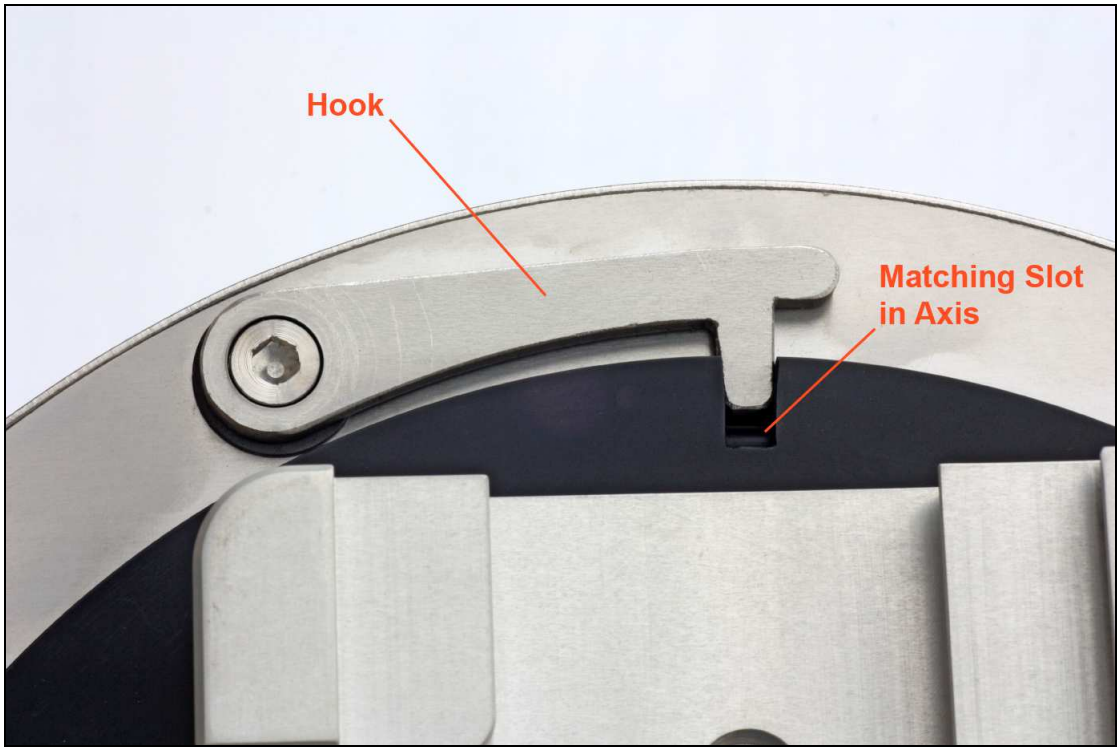
Just like any equatorial mount, the Mesu 200 mount must be carefully balanced to ensure accurate GoTos, tracking and the minimum of stress being placed on any of the components.

Counterbalance weights are not supplied as standard with the mount but these are available from your retailer. The Geoptik chrome plated steel counterweights in 10Kg and 5Kg versions are highly recommended and compatible with the Mesu 200's 40mm counterweight bar.

As a basic guide, you will require counterbalance weights of a similar weight to that of the telescope and other equipment you intend mounting. **Please note that the counterbalance bar and counterbalance weights are very heavy so must be handled and installed with extreme care to avoid any accidents – Mesu-Optics will not accept any liability in the event of any accident involving the installation and use of the counterbalance bar and/or weights.**

Turn off the mount and check that the counterbalance bar has been correctly installed as described in chapter 2 – Mounting. Rotate the mount around the RA axis until the counterbalance bar is pointing downwards and then adjust the RA axis carefully until you can engage the hook that retains the RA axis in a locked position. Install the counterweight(s) one at a time by slipping them over the counterbalance bar and securing them firmly with the locking bolt aligned with the flat machined in the length of the counterbalance bar. Securely attach the 'toe protector' to the end of the counterbalance bar.

Rotate the Dec axis until it is in a suitable orientation to install your telescope and then adjust the Dec axis carefully until you can engage the hook in one the nearest slots that retain the Dec axis in a locked position.



Install the dovetail bar attached to your telescope to the saddle clamp on the top of the Dec axis and tighten the saddle clamp firmly. Attach your ancillary equipment to the telescope (star diagonal/eyepiece or camera/autoguider) in accordance with the manufacturer's instructions.

While holding firmly onto the telescope, release the Dec hook gently and check for rotation of the Dec axis. Rotate the Dec axis until the telescope is horizontal. Loosen the saddle clamp a little and slide the telescope in the saddle clamp horizontally until it is perfectly balanced in the Dec axis and then re-tighten the saddle clamp – you can feel when the balance is correct by gently rocking the Dec axis backwards and forwards.

While holding firmly onto the telescope, release the RA hook gently and check for rotation of the RA axis. Rotate the RA axis until it is horizontal and adjust the position of the counterbalance weight(s) until the RA axis is perfectly balanced – you can feel when the balance is correct by gently rocking the RA axis backwards and forwards.

Make a final check that the saddle clamp, counterbalance bar and counterbalance weights are all securely locked in position.

Equatorial mounts with conventional worm and gear drives require the ‘rising’ side of the RA axis to be heavier to counteract backlash when autoguiding. Because the Mesu 200 mount has zero backlash, it will not be necessary to bias the balance of the mount when autoguiding.

7 POLAR ALIGNMENT

In common with all equatorial mounts, you must ensure that the mount is accurately Polar Aligned. The most accurate method for doing this is to carry out a ***drift alignment*** - a Google search will find numerous resources describing how to do a drift alignment. However, the SiTech ServoII system can help you to achieve a very good Polar Alignment with software assistance.

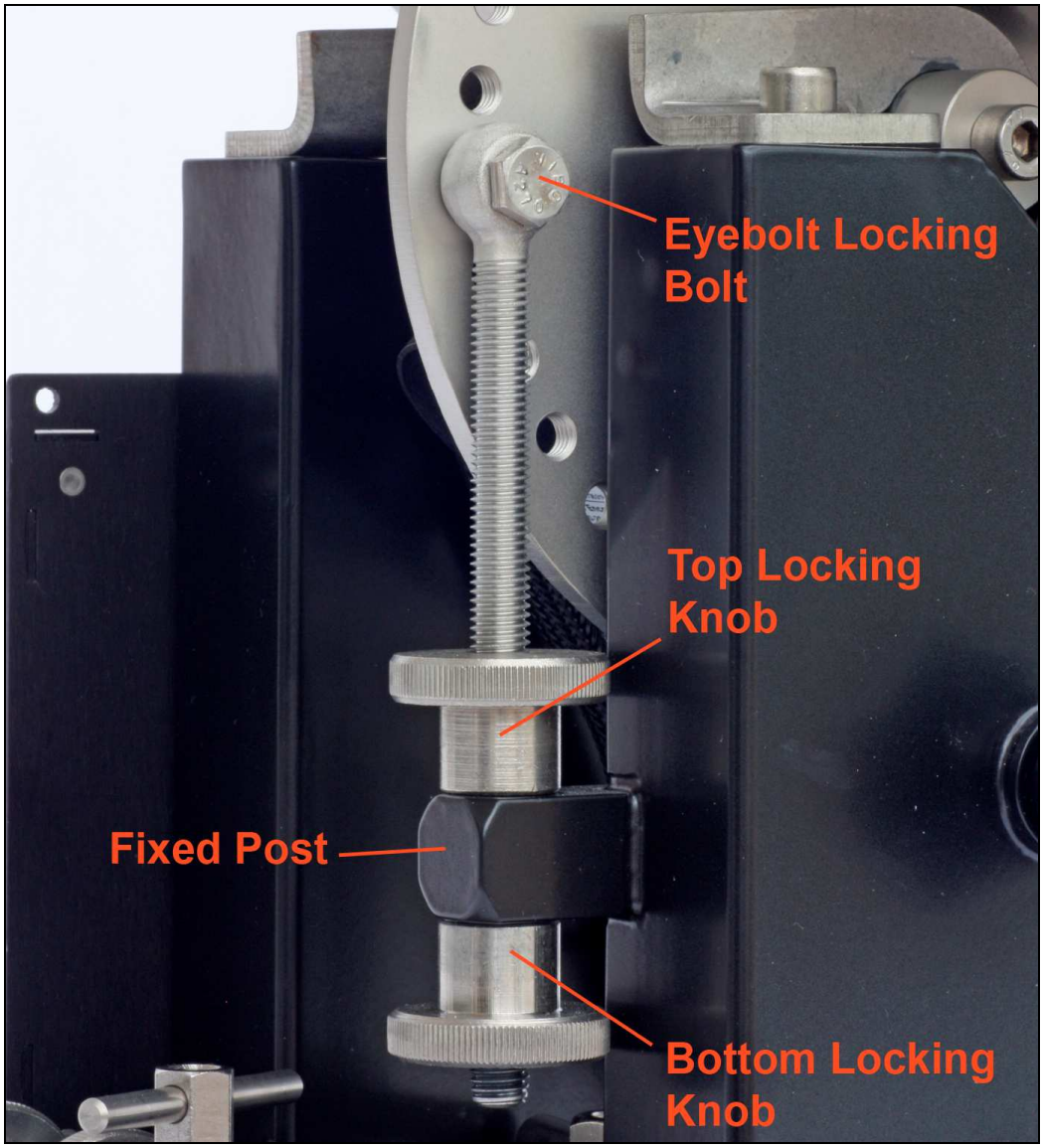
Full details on how to do this can be found on page 90, section 5.2.1 ***Polar Align*** in the **Operationsmanual1-1.pdf manual** downloaded in chapter 3. You will be required to download and install the **UCAC3PS zip file** also discussed in chapter 3, to carry out this software assisted procedure but this data file will have other uses as well.

We would recommend that you also read page 51, section 4.7 ***Init Point Window*** of the **Operationsmanual1-1.pdf manual** to familiarise yourself with the meaning of the terms ***Offset Init*** and ***Calstar Init***.

For casual observing, the optional external polar scope supplied by Mesu-Optics can also be used to achieve a very basic Polar Alignment.

Adjusting the mount in elevation

The mount's altitude has already been set to within 5 degrees of your latitude during the mounting stage in chapter 2 but final much more accurate adjustment must now be carried out to correct any error revealed by the Polar Alignment method you have used.



Start by unlocking the quadrant locking knob and slackening the eyebolt locking bolt slightly.

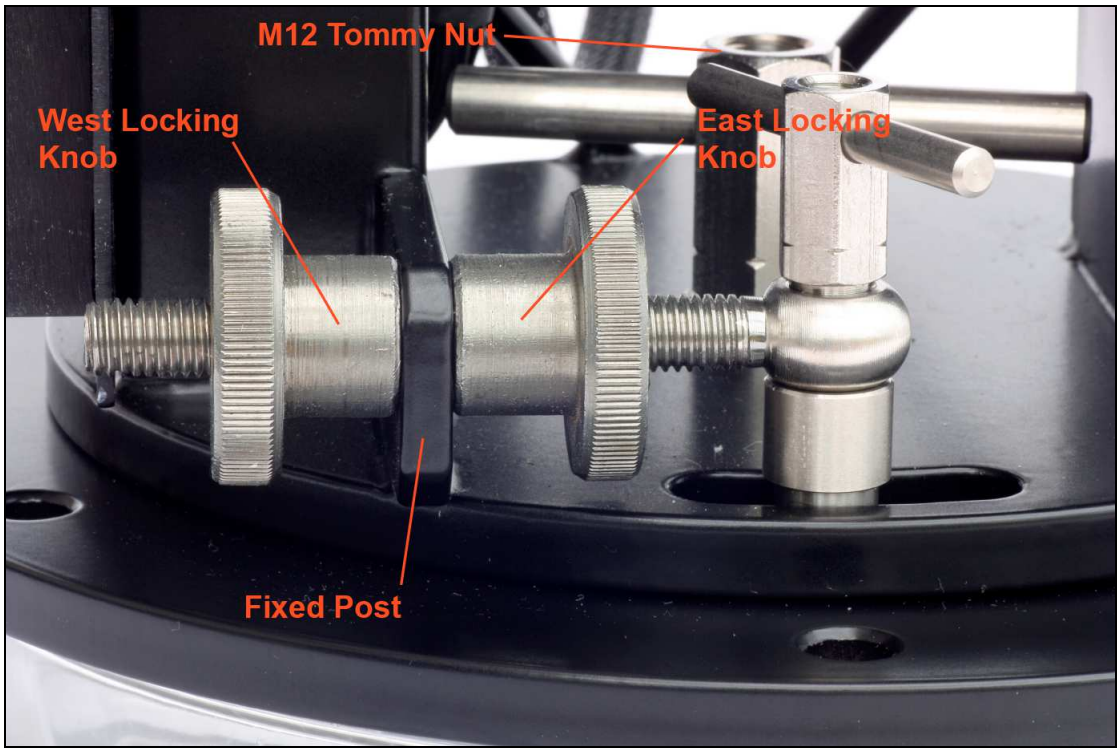
To decrease the elevation, unscrew the bottom locking knob and tighten the top locking knob against the fixed post at the same time.

To increase the elevation, unscrew the top locking knob and tighten the bottom locking knob against the fixed post at the same time.

When the elevation is correct, lock the quadrant locking knob and tighten the eyebolt locking bolt then nip the top and bottom locking knobs against the fixed post.

Adjusting the mount in azimuth

The mount's azimuth has already been set to approximately North during the mounting stage in chapter 2 but final much more accurate adjustment must now be carried out to correct any error revealed by the Polar Alignment method you have used. Start by slackening the M12 Tommy nut a little to allow the base of the mount to rotate on the mounting plate.



To correct for the mount pointing too far to the East, unscrew the East locking knob and tighten the West locking knob at the same time.

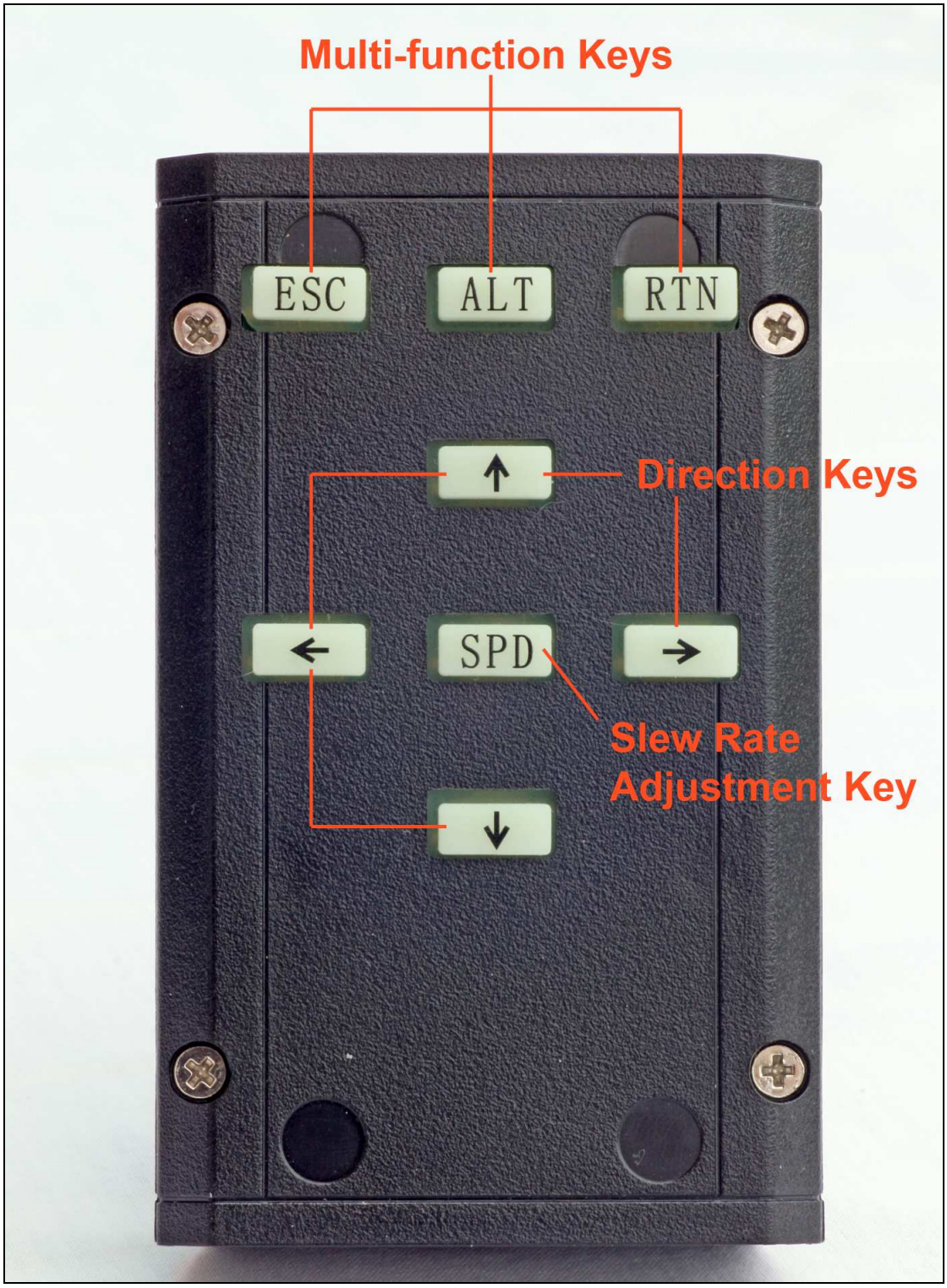
To correct for the mount pointing too far to the West, unscrew the West locking knob and tighten the East locking knob at the same time.

When the azimuth is correct, lock the Tommy nut then nip the East and West locking knobs against the fixed post.

8 MOUNT CONTROL

Operating the mount without a PC

The Mesu 200 mount ships with a basic hand controller allowing adjustment of the mount's pointing and slew speed. The mount can be configured to start moving at sidereal rate as soon as it is turned on. The direction keys can then be pressed to slew the telescope manually at high speed to the object you wish to observe and then fine adjustments can be made by pressing the centre key once to slow down to '***scan***' speed and a second time to reduce to '***guide***' speed. Pressing the centre button again will return you to full slew speed.



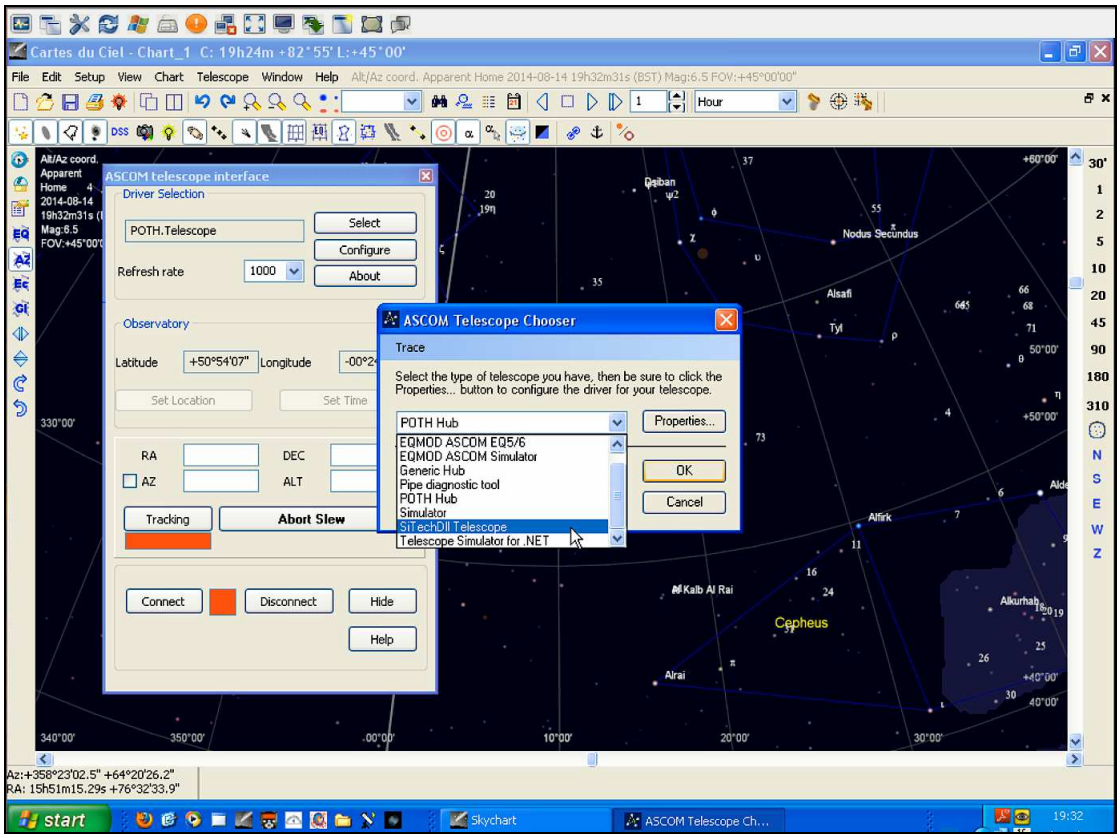
Operating the mount using a PC and Planetarium software

Operating the Mesu 200 mount using your PC and suitable software will release the full potential of the mount and reveal its many advanced features.

We recommend that you download and install the planetarium software, Cartes du Ciel (item 9 on page 7) as this software is proven to work very well with the SiTech ServoII controller and Mesu 200 mount.

Full instructions are available with the Cartes du Ciel software regarding how to configure the software for your location so we will concentrate on getting it working with the Mesu 200 mount.

Start by associating the planetarium software with the SiTechEXE ASCOM driver. Select ***Telescope – Telescope Settings***, click on the ***Telescope*** tab and choose 'ASCOM' then click on the [**APPLY**] button followed by the [**OK**] button. Select ***Telescope – Control Panel*** then click on the [**Select**] button to enter the ASCOM chooser dialogue. Select 'SiTechDII Telescope' and click on the [**OK**] button.

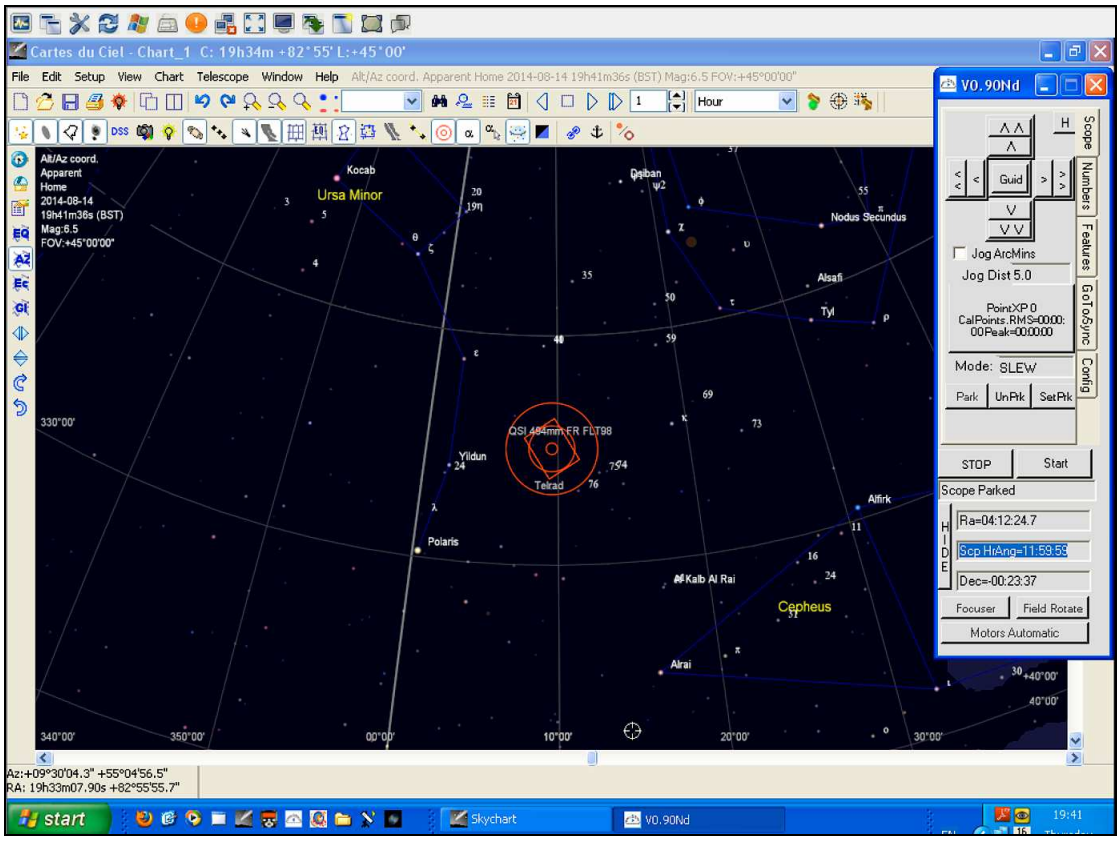


Turn on the Mesu 200 mount then click on the [**Connect**] button and the SiTechEXE virtual hand controller will appear (see overleaf). Click on the [**UnPrk**] button (ignore any error message about not being parked) followed by clicking on the [**Start**] button. The mount will start tracking at sidereal rate.

Manually slew the telescope to point at a known object in the sky using the hand controller supplied with the Mesu 200 mount and centre the object in your eyepiece. Locate the object in Cartes du Ciel and then right click on the object to bring up an option menu. Click on 'Telescope' then click on 'Sync' to synchronise the mount with the planetarium software and the actual sky.

You can now choose other objects from Cartes du Ciel, right click on them, select 'Telescope' then click on 'Slew' to command the telescope to 'GoTo' each one.

At the end of the session, manually move the mount to a convenient 'Park' position (usually with the counterbalance bar pointing downwards and the telescope pointing North) and click on the [**STOP**] button to stop the mount from tracking. Now, click on the [**SetPrk**] button, followed by the [**Park**] button to set the Park position and Park the mount (see overleaf). Finally, open the telescope control panel from Cartes du Ciel again, click on the [**Disconnect**] button, close down SiTechEXE and turn off the Mesu 200 mount.



Cartes du Ciel with the SiTech Virtual Handcontroller

Congratulations, you have now completed your first observing session!

9 FURTHER READING

This short manual is purely aimed at getting you up and running quickly without you having to wade through the huge SiTech ServoII operation manual which contains a wealth of information but much of it doesn't pertain to the Mesu 200 mount. However, there are some sections that we would recommend you should read to get the most out of the enormously rich feature set of the Mesu 200/SiTech ServoII combination.

More information about the SiTechEXE software

The SiTechEXE controller is much more than just a virtual handcontroller – it has a comprehensive set of features. We thoroughly recommend that you read the introduction to the SiTechEXE controller software in its entirety by reading section 4 starting on page 35 of the operation manual.

Parking and UnParking the Mount

Parking and unparking the mount are very important functions for starting and ending an observing session. See page 40 section 4.3.4 of the operation manual.

Sky Modelling

Sky modelling takes the normal 1, 2 or 3 star alignment of most GoTo mounts to a new level allowing numerous points all over the sky to be mapped using 'CalStar Inits'.

There are two types of 'Sync' procedures that your mount can perform - 'Offset Inits' and 'CalStar Inits'. Offset Inits are transient and CalStar Inits are semi-permanent. Think of CalStar Inits as being a set of corrections for mount pointing placed strategically all over the sky so that the mount makes specific corrections to its pointing when it is in each region covered by a CalStar Init. These CalStar Init corrections define the overall map of the sky. An Offset Init tells the mount where on that overall map the telescope is currently pointing.

With that in mind, turn to page 74 of the operation manual. It would also make sense to build a 'Horizon File' as described on page 82.

Autoguiding

The Mesu 200 mount is the perfect mount for long-exposure deep sky imaging but even with its incredibly low periodic error (4 arcseconds peak to peak), autoguiding should still be used to ensure the best quality images. Although there is an industry standard ST4 port built into the SiTech ServoII controller, we would recommend that you use pulse-guiding. See section 6 on page 108 of the operation manual.

Other Planetarium Software

Although we have used and tested Cartes du Ciel with the Mesu 200 mount ourselves, there are, of course, other software options. See Appendix B on page 158 for more information.

Troubleshooting

A useful troubleshooting section is included in the manual. See Appendix F on page 182.

Cue Cards

A Cue Card is a shorthand version of a checklist and you will find a set of these in the manual. See Appendix H on page 195.

Platesolving

Included in the SiTech suite of software and used during an automatic sky modelling scripted run, is an excellent standalone platesolving program called PlateSolveXP. See Appendix I on page 206 for more information.

Yahoo Mesu 200 User Group

There is an active user group supporting the Mesu 200 and we would encourage you to join in.

https://groups.yahoo.com/neo/groups/Mesu_Mount_200/info

Yahoo SiTech Servo User Group

There is an active user group supporting the SiTech ServoII Controller and we would encourage you to join in.

https://groups.yahoo.com/neo/groups/SiTechservo/info

10 MOUNT SPECIFICATION

Drive system	Friction wheels driven by Servo motors
Gear ratio	1 to 2000
Payload	Up to 100kg
Meridian flip required	Yes
Backlash	No
Latitude range	0 - 90 degrees
Pointing accuracy	< 2.5arcminutes
Guide accuracy	0.1arcseconds with autoguiding
Periodic error	4arcseconds peak-to-peak
GOTO speed	6 - 8 degrees/sec.
Mount control	SiTech Controller (needs a PC running SiTech Software)
Guiding protocol	ST4 port and Pulse-Guiding
Power consumption	Average is 400mA (when the mount guides for 90% of the time)
Diameter counterweight bar	40mm

Please note that due to our policy of continuous development, some of the items shown in the photographs in this manual may not exactly match the appearance of your own mount.

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