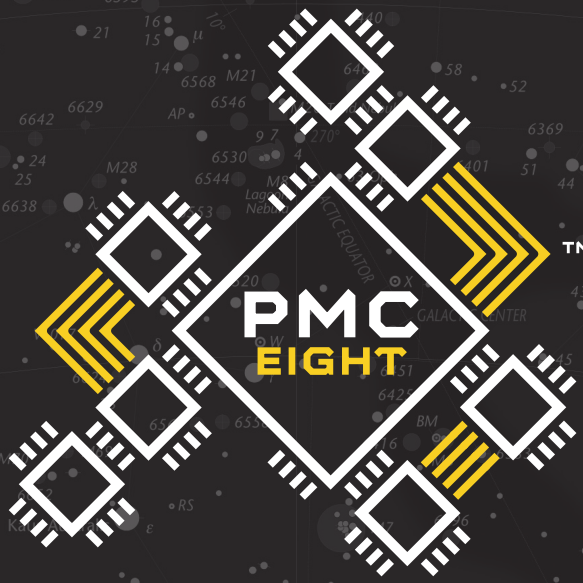


PRECISION MOTION CONTROLLER

Instruction Manual

EXPLORE SCIENTIFIC®

PMC EIGHT™

PRECISION MOTION CONTROLLER

WELCOME TO THE WORLD OF EXPLORATION.

www.explorescientific.com/pmc-eight

Table Of Contents

Welcome To The PMC-Eight™

With the PMC-Eight™ OpenGOTO system in your arsenal of astronomical tools flawlessly navigating the skies has never been easier. Designed to meet the versatile needs of astronomers of all levels, this advanced GOTO system is a clean slate approach to precision motion control technology that maximizes the potential of your optical equipment.

The robust electronics that power the PMC-Eight™ include eight CPUs that are independently dedicated to performing set functions. This devotion to task translates into a reliable system that responds rapidly and operates smoothly. The complexities of the electronics, which are conformal coated for protection against contaminants and harsh environments, are easily managed with our own intuitive ExploreStars app or through the ASCOM-powered planetarium software of your choosing.

Although the electronics of the PMC-Eight™ make it a clear standout for robotic telescope control, it is the open source coding that makes our system truly revolutionary. We feel that by making our software open source, we can discover exhilarating uses and encourage innovative thinking. We invite developers of all levels to become an active part of the OpenGOTO community by downloading our coding and exploring the PMC-Eight™'s unlimited possibilities.

Explore Scientific Guarantee

The regular guarantee period is 2 years and begins on the day of purchase. To benefit from an extended voluntary guarantee period as stated on the gift box, registration on our website is required.

- You can consult the full guarantee terms as well as information on extending the guarantee period and details of our services at www.bresser.de/warranty_terms.
- Would you like detailed instructions for this product in a particular language? Then visit our website via the link below (QR code) for available versions.

www.bresser.de/download/PMC-Eight

710456

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Please note that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures: --Reorient or relocate the receiving antenna. --Increase the separation between the equipment and receiver. --Connect the equipment into an outlet on a circuit different from that to which the receiver is connected. --Consult the dealer or an experienced radio/TV technician for help.

Art. No. 0456200

PMC-Eight™
with EXOS-2 GOTO Mount

Art. No. 0456000

PMC-Eight™
with LOSMANDY G-11
GOTO Mount

User supplied
Windows Tablet or PC

RISK of ELECTRIC SHOCK

Never bend, pinch or pull the power and connecting cables, extensions and adapters. Protect the cables from sharp edges and heat.
Before operating, check the device, cables and connections for damage. Never use a damaged unit or a unit with damaged power cables. Damaged parts must be exchanged immediately by an authorised service centre.

Only use the device in complete dry environment and do not touch it with wet or moist parts of your body.

Never use the device with defective or damaged components (e.g. housing, cable, etc.)

RISK of FIRE/EXPLOSION!

Do not expose the device to high temperatures. Use only the supplied power supply or the recommended batteries. Do not short-circuit the device or batteries or throw them into a fire! Excessive heat or improper handling could trigger a short circuit, a fire, or an explosion.

RISK of property damage!

Do not disassemble the device. In the event of a defect, please contact the Service Centre in your country.

Be sure to read about the correct operating voltage in the operating manual of your end device. No guarantee is provided for damages due to an incorrect voltage selection.

Protect the device from severe shocks!

RISK of DATA LOSS!

Do not interrupt the power supply or data transfer to your computer during the installation process. This could lead to data loss.

Do not interrupt an on-going data connection to a computer before all data has been transferred. This could lead to data loss for which the manufacturer is not liable.

PMC-Eight™ System Quick Start Guide

Although the PMC-Eight™ is a complex precision motion control system, it is simple to set up.

Step 1: Choose Your Platform

Before using the PMC-Eight™, you will need to select and load your operating program of choice to your device. Our intuitive ExploreStars app can be downloaded for free from the Windows App store. Once installed, you will simply download the object database from ***www.explorestars.com*** and you are ready to go. For those that already have a favorite third party planetarium program, the PMC-Eight™ has an ASCOM driver. For more information on the ExploreStars app or the ASCOM driver, please see the individual manuals. For video tutorials on installing the app and/or driver, visit ***www.explorescientific.com/pmc-eight/***

Step 2: Connect The PMC-Eight™

Before connecting the PMC-Eight™, you will need to balance your telescope.
Once that is completed, simply attach the PMC-Eight™ mounting bracket onto one of the legs of the tripod. Put the antenna into its port on the PMC-Eight™ box and attach the included DB9 motor cables. Slide the box onto the mounting bracket. Connect the other end of the DB9 motor cables to the stepper motors on the mount. Plug in the PMC-Eight™. Connect to the PMC-Eight™ wirelessly through your Windows device. For more information on connecting the PMC-Eight™, please see the full manual. For a video tutorial on the set-up process, visit
www.explorescientific.com/pmc-eight/

Step 3: Align Your Telescope

Before using the PMC-Eight™, you will need to align your telescope. You can do this using a traditional manual alignment process or by using the alignment procedure in the ExploreStars app.
It is important to remember that the better your alignment is, the better the system will perform.
For a video tutorial on the alignment process, visit
www.explorescientific.com/pmc-eight/

Step 4: Choose an object and start exploring!

Additional Support

If you have questions about operating the PMC-Eight™, please do not hesitate to contact our Customer Service Center under www.explorescientific.co.uk/en/contact

For Frequently Asked Questions, visit the Knowledge Base page at
www.explorescientific.com/knowledgebase

Welcome to the PMC-Eight™ System!

The PMC-Eight™ is a precision motion control system designed to flawlessly navigate the night sky and ensure you spend more time observing and imaging. Astronomical GOTO systems play an important role in the world of amateur astronomy. A GOTO mount works with a variety of software platforms to move an attached telescope to a specific celestial object that is chosen by the observer from a vast database of potential targets. Most serious GOTO systems offer single processors. The PMC-Eight™ is a revolution in precision motion control technology because it utilizes eight central processing units (CPUs) that are each independently tasked with performing dedicated functions. By delegating tasks among the processors, the system operates smoothly and functions at a high level of reliability and efficiency. As an added benefit, the electronics feature conformal coating that protects them from contamination by dust and other debris, moisture build-up, corrosion and harsh environments. Although the inner workings of the system are complex, it is easy to set up and use. This manual and the accompanying materials will guide you through basic assembly and operation procedures for the PMC-Eight™.

Contents

The PMC-Eight™ package contains the following:

- PMC-Eight™ System box
- AC power supply
- RJ-12 WiFi Channel Switch
- One set of motor cables (each with a male and a female connector)
- Mounting bracket with Velcro strap
- Antenna
- Set-up Manuals

Balancing The Telescope

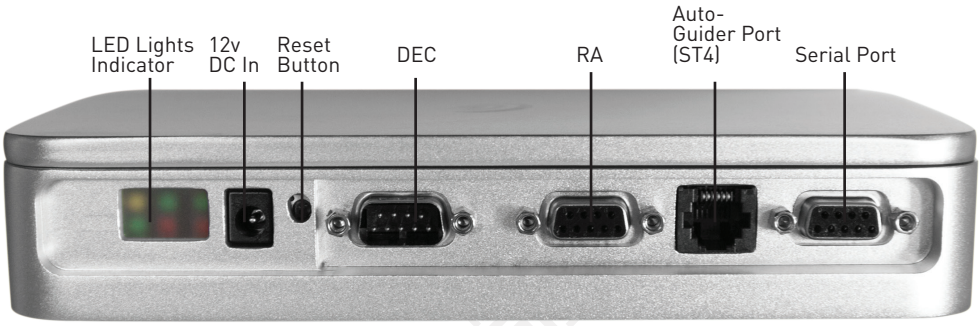
Before connecting the PMC-Eight™ System, you will need to set up your tripod, mount and telescope per the telescope's manual, and then balance the telescope. Balancing is essential because it stabilizes the scope and allows it to move smoothly.

CAUTION: It is vital that you hold the telescope with a tight grip when the locks are loosened because the weight of the telescope can cause it to really swing. Failure to maintain a firm grasp could easily and quickly result in damage to the telescope, other optical equipment, yourself or those around you.

To Balance The Telescope:

1. Start by firmly holding the telescope and loosening the Right Ascension (RA) lock. The telescope should now move freely about the RA axis.
2. While continuing to hold onto the telescope, rotate it so that the counterweight shaft is parallel to the ground. Unlock the counterweight lock knob and slide the counterweight along the counterweight shaft until the telescope remains in one position without drifting down in either direction.
3. Retighten the counterweight lock and then secure the RA lock.
4. With a firm grip on the telescope tube, undo the Declination (DEC) lock and loosen the cradle rings so that the optical tube slides easily back and forth in the cradle rings.
5. Move the main tube horizontally in the cradle rings until the telescope remains in one position without tending to drift down in either direction. Secure the DEC lock.
6. Loosen the RA and DEC locks and return the telescope to the PARKED position.

Connecting The PMC-Eight™ System
Once the telescope is balanced, it is time to connect the PMC-Eight™ box assembly to the mount and tripod set-up.



To Connect The PMC-Eight™ System:
1. Attach the mounting bracket onto one leg of the tripod, using the Velcro strap to firmly secure it.
2. Attach the antenna into its port on the front side of the PMC-Eight™ box, then attach the DB9 motor cables into the two middle connection points on the back of the box and tighten the screws on either side of the connectors to secure.
3. Slide the box onto the mounting bracket.
4. Connect the other end of the DB9 motor cables to the ports on the stepper motors by coupling male to female.
5. Plug the provided AC adapter power connector into its port on the back of the PMC-Eight™ box. Plug the adapter into an AC power outlet.
6. When the PMC-Eight™ is on, go to the network settings on your Windows device and connect to the mount's WiFi network — SSID: PMC-Eight-xx. The password will be "PMC-Eight".

NOTE: You will want to make sure you have installed your chosen operating software (ExploreStars app/ASCOM Driver) before connecting your device to the PMC-Eight™ "network." Once you are connected to PMC-Eight™ you will be unable to connect to other wireless sources, including your Internet connection".

NOTE: The back of the PMC-Eight™ box also has an additional serial DB9 port for possible firmware upgrades and a RJ-12 jack for to connect an auto-guider.

Changing The WiFi Channel
In most instances, the pre-set WiFi channel should work perfectly well when operating the PMC-Eight™ wirelessly. However, if you are in an area where a lot of wireless activity is occurring, you may need to switch the pre-set WiFi channel.

To Change The WiFi Channel:
1. Use a pen or a paperclip to push the reset button that is inset on the back of the PMC-Eight™ box near the connection lights. After releasing the reset button, you will notice that the lights will cycle through several red and green flashes, until the top right green light begins to flash in a steady pattern.
2. Once this green light is flashing steadily, put the included phone-style RJ-12 jack into the appropriate port on the back of the box. Once the yellow light flashes once, the channel is reset.
3. If the new channel still does not meet your needs, perform the procedure again until you reach a satisfactory channel.

Additional Support
If you have questions about setting up or operating the PMC-Eight™ system, a selection of video tutorials are available at ***www.explorescientific.com/pmc-eight/***

For Frequently Asked Questions, visit the Knowledge Base page at
www.explorescientificusa.com/knowledgebase

Welcome to ExploreStars!

Designed specifically for the PMC-Eight™, the intuitive ExploreStars app will streamline your observing experience by making it easy to align your equipment, navigate the stars and learn specifics about tens of thousands of celestial objects. It also leaves room for manual operation.

Installing The ExploreStars APP

The free ExploreStars application can be downloaded from the Windows app store onto your Windows device. Once you install ExploreStars, you will need to download the object database that provides the content for the application. To do this, go to ***www.explorestars.com*** and follow the instructions on the website to download the extensive object database.

Operating The ExploreStars APP

When you first open ExploreStars, you will need to make sure your location (latitude and longitude), date/time and other vital information are correct.

1. Go to the menu in the upper left corner of the screen, open Settings and select Preferences. If the latitude and longitude coordinates or the date/time for your current location are not correct, update the information in the appropriate boxes.
2. You will then need to select your mount — Losmandy G-11 or Exos II — in order to ensure that the step counts for both Right Ascension and Declination are correct.

Once these preferences are set, exit to the home screen. On the right, you will see the manual control buttons that are used to select speed and motion direction. The top menu bar will have your object catalogs. The bottom menu bar will have alignment options.

Alignment

After confirming your preferences, you will need to perform an alignment to ensure that the telescope, the PMC-Eight™ system and the sky are in sync. The ExploreStars application has three options for aligning your system — **2 Star Alignment, 3 Star Alignment and Alignment Tour**. To start the alignment process, press or click on the "Reset Alignment" button in the lower right corner of the home screen and then select your preferred alignment option from the list in the bottom left.

To Perform A 2 Star Alignment:

1. Select the 2 Star Alignment option from the bottom menu bar. The app will pull up a suggested target that should be the first visible alignment star closest to the western horizon. If this star is not visible, select "Try Next Star," and the program will bring up another choice.
2. Once it pulls up a star that is visible from your location, select "Align to this Star." This will bring up the alignment screen.
3. At this point, you will need to center the target star in your eyepiece. Using the buttons on the right side of the screen, you can move the telescope up, down, left and right. The numbers are used to determine motor speed with 0 being the slowest and 9 being the fastest. During this centering process, you should probably make bigger adjustments using a speed in the 3 to 5 range and then fine tune using the 1 or 2 speeds. The higher speeds (6-9) are for larger movements, so they will not be useful during this part of the alignment process.
4. Once you have centered the selected star in the eyepiece, press or click on "Sync," which is located under the number 7.
5. After you have synced to this star, the display will show you the next available star and you can begin the same process with the second star. Based on your first selection, the program will select the next star beginning on the eastern horizon. If this selection is not visible, select "Try Next Star" until you arrive at a target that will work.

NOTE: The 3 Star Alignment and Alignment Tour Options Follow The Same Process Only With An Extra Star To Align To.

Point Mode and Track Mode
There is an advanced feature in the ExploreStars application that ensures accurate tracking rates are maintained when a proper physical polar alignment is not obtained and you are performing the 2 or 3 Star Alignment procedure. There are two tracking modes available called Track mode and Point mode.

When slewing to an object after a 2 or 3 Star Alignment, the system goes into Point mode, which directs the mount to continually "Point" to the object based on the real-time calculated motor position using the 2 or 3 star pointing correction.

The behavior of the mount in this mode is such that the tracking rate not only on the RA axis but also the DEC axis is adjusted dynamically and is updated five times per second to maintain the object in the center of the field.

When slewing the mount manually with the keypad buttons, the system reverts to "Track" mode, which sets the RA axis rate to the predetermined set tracking rate value. All of these functions result in excellent object tracking for both visual observing and astrophotography.

The Point mode is indicated on the ExploreStars display as a "triangle P" symbol 

, and the Track mode is indicated by the "square Tr" symbol 

. So even if you are not physically polar aligned, you can still rely on the tracking rates to be accurate when doing astrophotography. There are limitations to the length of exposure with regard to field rotation based on the focal length and image scale of your equipment.

CAUTION: When using the AUTO-GUIDING port with the ExploreStars application, the controller SHOULD BE PLACED IN "TRACK MODE".

Finding Objects
The ExploreStars app makes it easy to navigate the night sky by organizing its massive database of celestial objects into catalogs — Messier Objects, Solar System Objects and Alignment Stars.
To find celestial objects from the provided catalogs:

1. Select one of the categories on the top menu bar, and you will be presented with a variety of targets.
2. Choose an object, and the application will pull up an image of the object and detailed information about it.
3. If the object is currently above the horizon at your location, a "Slew to Object" button will appear beneath the image.

NOTE: If the object is not above the horizon in your area, this "Slew to Object" button will not appear.

When you press that button, the mount slews to the target and the home screen display will appear with a map showing a blinking red dot representing the location of the chosen object. Buttons below this location display allow you to move to either the previous object or the next object in this particular series with a simple push of a button.

You Can Also Choose The Take A Tour Option To Explore The Night Sky. To Do This:
1. Select "Take Tour," and you will be presented with a list of constellations to tour.
2. Once you select one, the display will show the sky map of the object closest to the western horizon that is visible in the constellation.
3. To move the telescope to the object, select "Go To Target." If you would like more details about this

object, select "Target Info" in the bottom right corner. To exit the tour, simply press App Bar.

Coordinate Input:
To move to specific coordinates, select "Coordinate Input" from the bottom menu options. This will bring you to the coordinate entry screen where you can enter either RA/DEC or ALT/AZ information in either decimal or hms format. Once you submit your information, the destination of the telescope will be displayed on the screen as it slews.

Load Extra Stars:
To access extra libraries of celestial objects, select the "Load Extra Stars" option. To access objects in these libraries, do a keyword search for an object using the built-in Windows search feature. Once a list of objects related to your search pops up, you can select one and it will take you to the target's information page. If the object is above the horizon, the "Slew to Object" button will appear on that page.

Manual Operation
The telescope can be moved manually using the control pad on the right side of the application's home screen. The numbers represent the speed at which the mount will move with 0 being the slowest and 9 being the fastest. In general, each speed is twice as fast as the previous one. Once you select a speed, use the up, down, left, right navigation buttons to move the telescope to your desired position. You can also control the mount manually using the "compass" image on the left side of the home screen. Press the Explore Scientific logo in the center of the compass and drag it in the direction that you would like the telescope to move. As you move the dot, a number will appear in the middle that shows the speed at which you are moving the mount. The further from the original location that you move the dot, the faster the scope will travel in that direction.

Other Features:
Park the mount: This option will send the mount back to its original position pointing at the north celestial pole (NCP) or very close to the star Polaris.

Reset Alignment: Anytime you relocate the telescope/mount, you will want to go through the alignment process again. This option clears the current alignment settings.

Reset Comm Link: This option will reset the communications link between the PMC-Eight™ system and your Windows device should it become interrupted.

NOTE: This only works if the yellow "communications active" LED is flashing on the PMC-Eight controller. Otherwise, you will need to physically reposition your mount to the "Park" position, power down the PMC-Eight and power it back up. You will need to re-establish communications again by reconnecting to the SSID in network settings.

Also, if you need to stop the mount's motion quickly, you can press this button. It will stop the mount without losing your alignment settings.

Sync on Target: If you find the target is not well centered in the eyepiece after executing a go-to command (due to misalignments, poor leveling, improper time output or errors in site location), center the object. Then press the Sync on Target button. This feature in essence synchronizes the telescope to a particular area of the sky. The next object will be better centered provided it is not to far away from the target you synced on.

ASCOM Driver

Although Explore Scientific has developed its own app — ExploreStars — to operate the PMC-Eight™, we recognize that the astronomy community is a diverse one. That is why we also offer an ASCOM driver so users may employ the ASCOM-powered planetarium software of their choosing to run the PMC-Eight™.

With this driver, the PMC-Eight™ is compatible with a wide range of guidance software programs built around the industry standard ASCOM interface.

Installing The ASCOM Driver

To install the ASCOM driver for the PMC-Eight™, please follow this procedure:

1. Go to the ASCOM standards website **(www.ASCOM-Standards.org)** and download the latest ASCOM platform using the download link provided at the upper right hand corner of the page.
2. Run the platform setup program, and follow the instructions in the program.
3. After the completion of the platform installation, locate the icon on your desktop or in your programs list for the ASCOM Diagnostics and start the program.

NOTE: The following step will run for a few minutes and test all the platform drivers and programs to ensure the proper operation of the platform.

4. Press the Run Diagnostics button to verify that the platform has been installed correctly.
5. On completion of the test, verify that there are zero fails.

NOTE: Steps 6, 7, and 8 direct you to use the ASCOM-Standards.org website to get to the Explore Scientific PMC-Eight™ ASCOM Driver download. You can also download the Explore Scientific PMC-Eight™ ASCOM Driver by going directly to the webpage at ***www.explorescientific.com/pmc-eight***

6. On the ASCOM-Standards.org website, using the menu on the upper left corner of the page, navigate to the Downloads page.
7. Using the menu on the upper left corner of the page, select Telescope/Mount Driver Downloads
8. Scroll down the Telescope/Mount Driver page and locate the Explore Scientific PMC-Eight™ Section. Press the Visit Site button to go to the Explore Scientific PMC-Eight™ webpage.
9. On the PMC-Eight™ ASCOM Driver webpage, hit the ASCOM driver download link and download the setup program.
10. Run the PMC-Eight™ ASCOM Driver setup program, and follow the directions in the program.
11. After installing the PMC-Eight™ ASCOM Driver, restart your computer system.
12. Connect your mount's motors to the PMC-Eight™ System and power up the PMC-Eight™ controller.

NOTE: If you desire to test your PMC-Eight™ System using the ASCOM driver, then perform steps 13-30.

13. After your system restarts, bring up your network settings and find the PMC-Eight™ SSID, i.e., "PMC-EIGHT-XX" where XX is a two character alpha-numeric such as "C5"

NOTE: Your device may ask for a network password when connecting to the PMC-Eight SSID. The default password is "PMC-Eight".

14. Connect to the PMC-Eight™ network. Note that the connection will show LIMITED since it is a local AD HOC network connection to the PMC-Eight™ controller.
15. Locate the icon on your desktop or in your programs list for the ASCOM Diagnostics and start the program.

16. On the diagnostic programs' top menu find "Choose Device" and "Choose and Connect to Device".
17. This will bring up the programs window. Find and push the "Choose" button.
18. The ASCOM Chooser window will display. Find and select "ES_PMC8.Telescope" in the drop-down list. (Figure 1.)
19. Push the "Properties" button and display the PMC-Eight™ ASCOM Driver Configuration window. (Figure 2.)

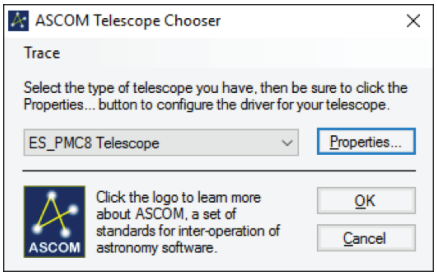


Figure 1. ASCOM Telescope Chooser window.

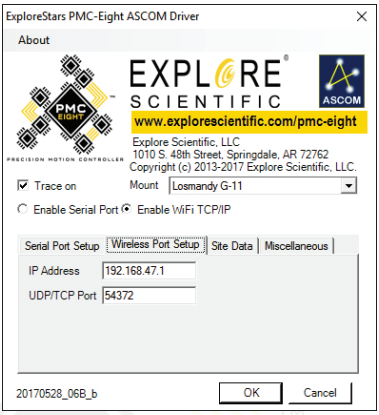


Figure 2. Explore Scientific PMC-Eight™ ASCOM configuration window.

20. Select the mount type in the drop-down list.
21. Choose Enable WiFi TCP/IP radio button.
22. The default values for the "Wireless Port Setup" are correct for this installation.
23. Update the "Site Data" for your location.
24. Press the OK button when done.
25. Hit OK on the ASCOM Telescope Chooser window.
26. On the "Device Connection Tester" window, press the "Connect" button and see that the program connects to the PMC-Eight™.
27. On the "Device Connection Tester" window, press the "Get Profile" button and see that the program displays the various ASCOM parameters from the PMC-Eight™.
28. You should see something similar to the following:

Create — *Creating device*
Connected — *Connecting to device*

Name — *Explore Scientific PMC-Eight ASCOM Driver*
Description — *ES_PMC8 Telescope*
DriverInfo — *Explore Scientific PMC-Eight Mount Controller ASCOM Driver.*
Developed by GRHubbell. Contact Explore Scientific at www.explorescientificusa.com . Version: 6.0
DriverVersion — *6.0*
InterfaceVersion — *3*
RA, Dec — *22:13:05.927 90:00:00.000*
Latitude, Longitude — *36:10:50.268 -94:11:18.168*
Tracking — *False*

Connected — *Disconnecting from device*
Dispose — *Disposing of device*
Dispose — *Completed disposal*

ReleaseComObject	*Releasing COM instance*
GC Collect	*Starting garbage collection*
GC Collect	*Completed garbage collection*

29. Close the "Device Connection Tester" window
30. Exit the ASCOM Diagnostics program.
31. Reset your network settings to your normal SSID if you are not going to use the PMC-Eight™ any further, otherwise, start up your ASCOM planetarium client or other type of ASCOM client and connect to the PMC-Eight™ using the ASCOM chooser available in that client.

Additional Support
If you have questions about installing the ASCOM driver for the PMC-Eight™, please do not hesitate to contact our Customer Service Center under www.explorescientifi.co.uk/contact.

For Frequently Asked Questions, visit the Knowledge Base page at
www.explorescientificusa.com/knowledgebase

Join the OpenGOTO community!

One of the most revolutionary aspects of the PMC-Eight™ OpenGOTO system is undoubtedly its open source software. With our precision motion control system, you can create a unique observing experience and find your own inspiration in motion.

The PMC-Eight™ was specifically designed to allow you to create your own vision about how to use the system. We put an emphasis on accessibility so you can unleash the full potential of this extraordinary system. The result is complete access to the coding that drives the PMC-Eight™ OpenGOTO.

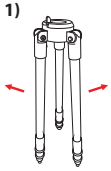
The software developer's kit provides you the building blocks you need to discover new ways to customize our powerful system to better serve your individual needs. Programmers can use their unique skills to manipulate the PMC-Eight™'s robust electronics, which include a two-channel multi-processor micro-controller with eight central processing units that operate independently of one another. Additional features include a 64 Kbyte EEPROM non-volatile Memory bank used to store parameters; a wireless Ethernet 10/100 with full IP function that permits operation from anywhere using a browser, ASCOM or application over the web or serial port; and non-volatile memory used to store various parameters. The electronics also includes an auto-guider port (ST4 contact input).

At ***www.explorescientific.com/pmc-eight/*** innovative thinkers interested in customizing the PMC-Eight™ can find the SDK and access the OpenGOTO community where they can interact with other programmers through an established forum.

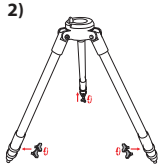
We encourage you to make this system your own, and we cannot wait to experience the results of your efforts!

EXOS II GT w/PMC-Eight™ System Mount Set Up

1)



2)



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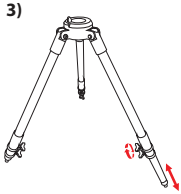

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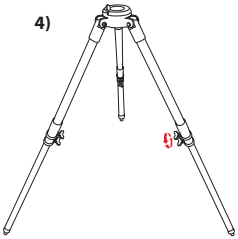

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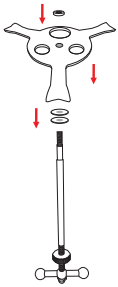

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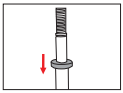

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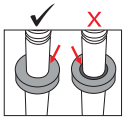
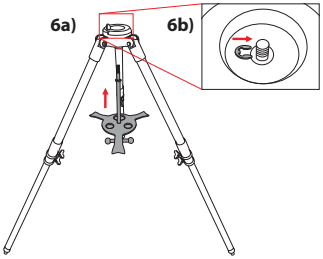


6a) 6b)



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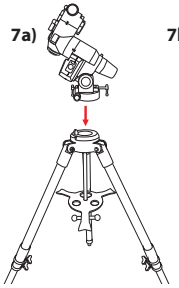

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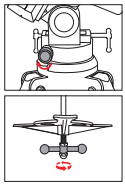

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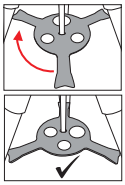

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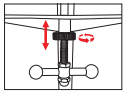

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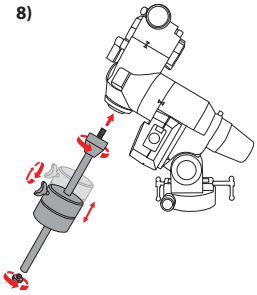

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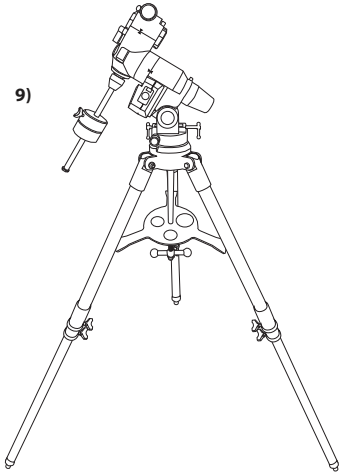


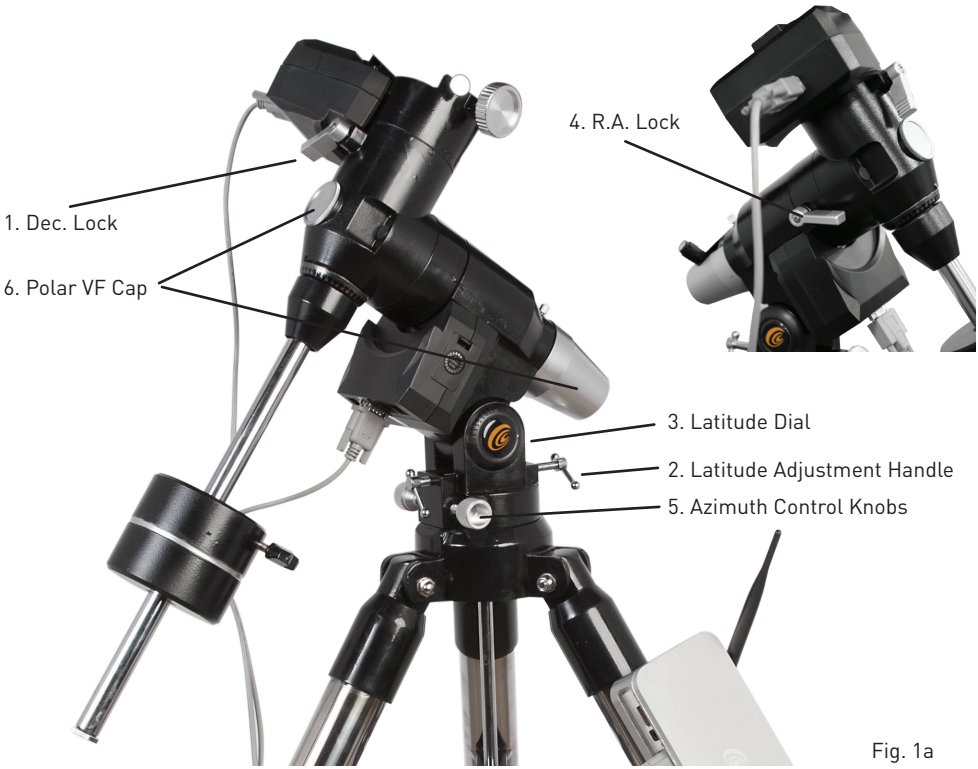


Fig. 1a

Setting the Polar Home Position

1. Level the mount by adjusting the length of the three tripod legs. Use the included bubble level to assist in this leveling.
2. Unlock the R.A. Lock (4, Fig. 1a) Rotate the Optical Tube Assembly until the counterweight shaft is pointing straight down over the mount.
3. If you have not already done so, lift the telescope assembly and turn it so that the tripod leg beneath the counterweight rod faces approximately North (South in the Southern Hemisphere). Release the Dec. lock (1, Fig. 1a) of the tripod, so that the optical tube may be rotated. Rotate the optical tube until it points North (or South in the Southern Hemisphere). Then re-tighten the lock. Locate Polaris, the North Star, if necessary, to use as an accurate reference for due North (or Octantis in the Southern Hemisphere).
4. If you have not already done so, determine the latitude of your observing location. Visit the LATITUDE AND LONGITUDE TOOL at ***explorescientific.com/latitude_longitude*** to find latitudes of any place on Earth. Once you have found your observing location, use the Latitude Adjustment Handle (2, Fig. 1a) to tilt the telescope mount so that the pointer indicates the correct latitude of your viewing location on the latitude dial (3, Fig. 1a).
5. If steps 1 through 4 above were performed with reasonable accuracy, your telescope is now sufficiently well-aligned to Polaris, the North Star, for you to begin making observations. Once the mount has been placed in the polar home position as described above, the latitude angle need not be adjusted again, unless you move to a different geographical location (i.e., a different latitude) or if you are making a more precise polar alignment.

Finding the Polar Star (for Northern Hemisphere only)

Star hopping is a technique used by amateur astronomers to navigate the night sky. By using easily recognizable constellations and asterisms as a guide, an observer can locate stars and other objects. Polaris, which is commonly referred to as The North Star, can be located quickly using star hopping. Polaris is far from the brightest star in our night sky, but for centuries it has served as a navigational beacon representing true north because it lies extremely close to the north celestial pole. Although it has not always held this lofty position, Polaris' current reign has lasted for centuries and will continue for centuries to come.

Follow these steps to locate Polaris using the star hopping method:

1. Locate the Big Dipper asterism in the Ursa Major constellation. The popular pattern is defined by seven stars. The two stars on the front edge of the Big Dipper's "bowl" are Merak and Dubhe.
2. Draw an imaginary line from the bottom star (Merak) on this front edge through the top star (Dubhe) on the front edge. Follow the line to the first bright star you see. That should be Polaris (Fig. 2a).
3. To verify your finding, locate the Little Dipper asterism. Polaris is the anchor star at the end of the Little Dipper's (in Ursa Minor) "handle."

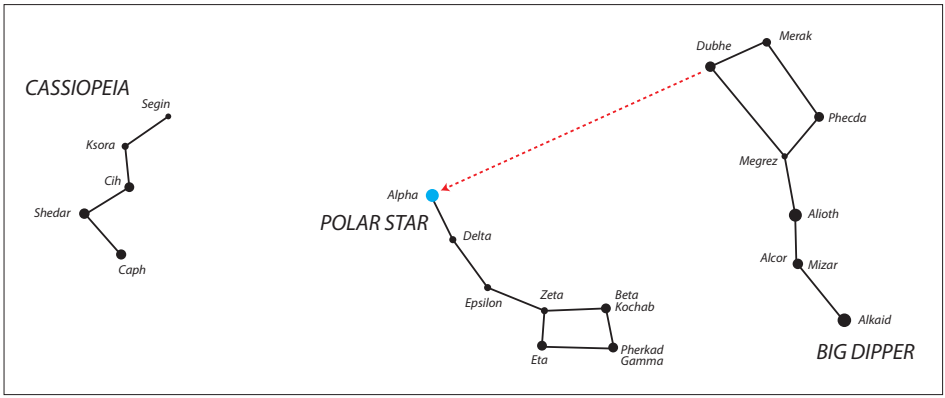


Fig. 2a

Using the Optional Polar Alignment Viewfinder (for Northern Hemisphere only)

1. Use a compass to find north. Physically position the mount so that the front leg is aimed toward Polaris. Once this is done, level the mount.
2. Remove the caps covering both ends of the polar alignment viewfinder (6, Fig. 1a). Loosen the Dec. lock (1, Fig. 1a) and rotate the telescope declination so that nothing is obstructing your view through the Polar Alignment Viewfinder. (Note that the telescope will be perpendicular to the polar axis during this exercise.) Retighten the Dec. lock.
3. Loosen the R.A. lock (4, Fig. 1a). While looking through the Polar Alignment Viewfinder, rotate the right ascension until Polaris and the four stars that are etched on the reticle are roughly aligned with the markings (Fig. 3b). Tighten the R.A. lock.
4. While looking through the Polar Alignment Viewfinder, use the azimuth control knobs (5, Fig. 1a) and latitude adjustment handles (2, Fig. 1a) to fine tune the alignment of Polaris and the four stars with the markings on the reticle (Fig. 3b). This can be a long process, and you may have to adjust the right ascension again. In the end, it is unlikely that all five stars will be precisely aligned with the markings, but it is important to get each one as close as possible.
5. Once you are satisfied with your alignment, loosen the Dec. lock and rotate the telescope to 90° North so that is once again facing in the same direction as the Polar Alignment Viewfinder. Replace the caps covering both ends of the Polar Alignment Viewfinder.

Polar Viewfinder Reticle (for Northern Hemisphere Only)

Southern Hemisphere users will need a crosshair reticle eyepiece. Available at astronomy shops.

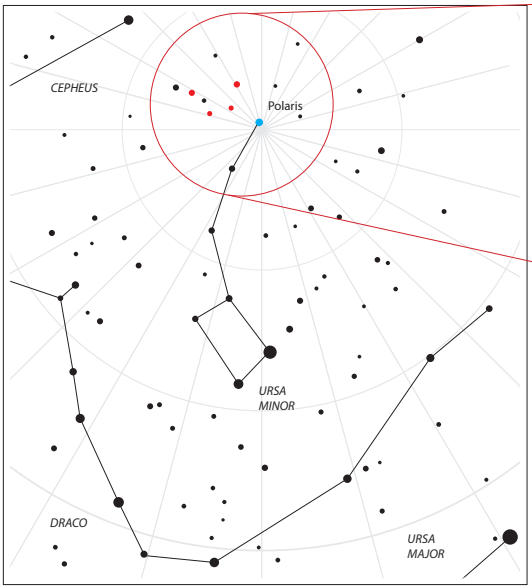


Fig. 3a

Polaris
The Four Stars

Not Aligned

Fig. 3b

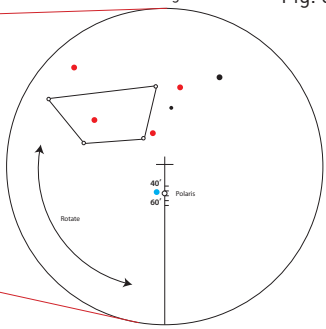
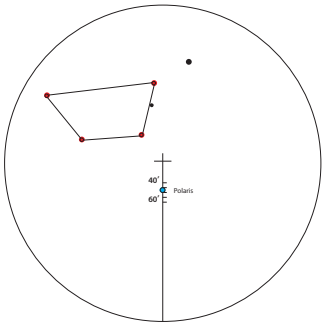


Image on polar viewfinder will be inverted.

Aligned



Precision Polar Alignment - The Drift Method

Using this method, azimuth and altitude are adjusted separately until the effects of star drift are eliminated. This method is good for Northern and Southern Hemisphere users.

• Azimuth adjustment

Select a star on the celestial equator and meridian (i.e., Hour Angle = 0° and Dec. = 0°).

- If, over time, the star drifts S in the eyepiece then the southern end of the polar axis is pointing East of the Celestial Pole.
- If the star drifts N then the southern end of the polar axis is pointing West of the Celestial Pole.

• Altitude adjustment

Select a star in the East (and/or in the West) low on the horizon and in the southern hemisphere of the Dec. = 0°.

- If the star in the East drifts N the elevation is too low.
- If the star drifts S the elevation is too high.

For more information on Polar Alignment on the Southern Hemisphere, visit Astronomical Society of South Australia website at ***www.assa.org.au/resources/equipment-reviews/polar-alignment/***

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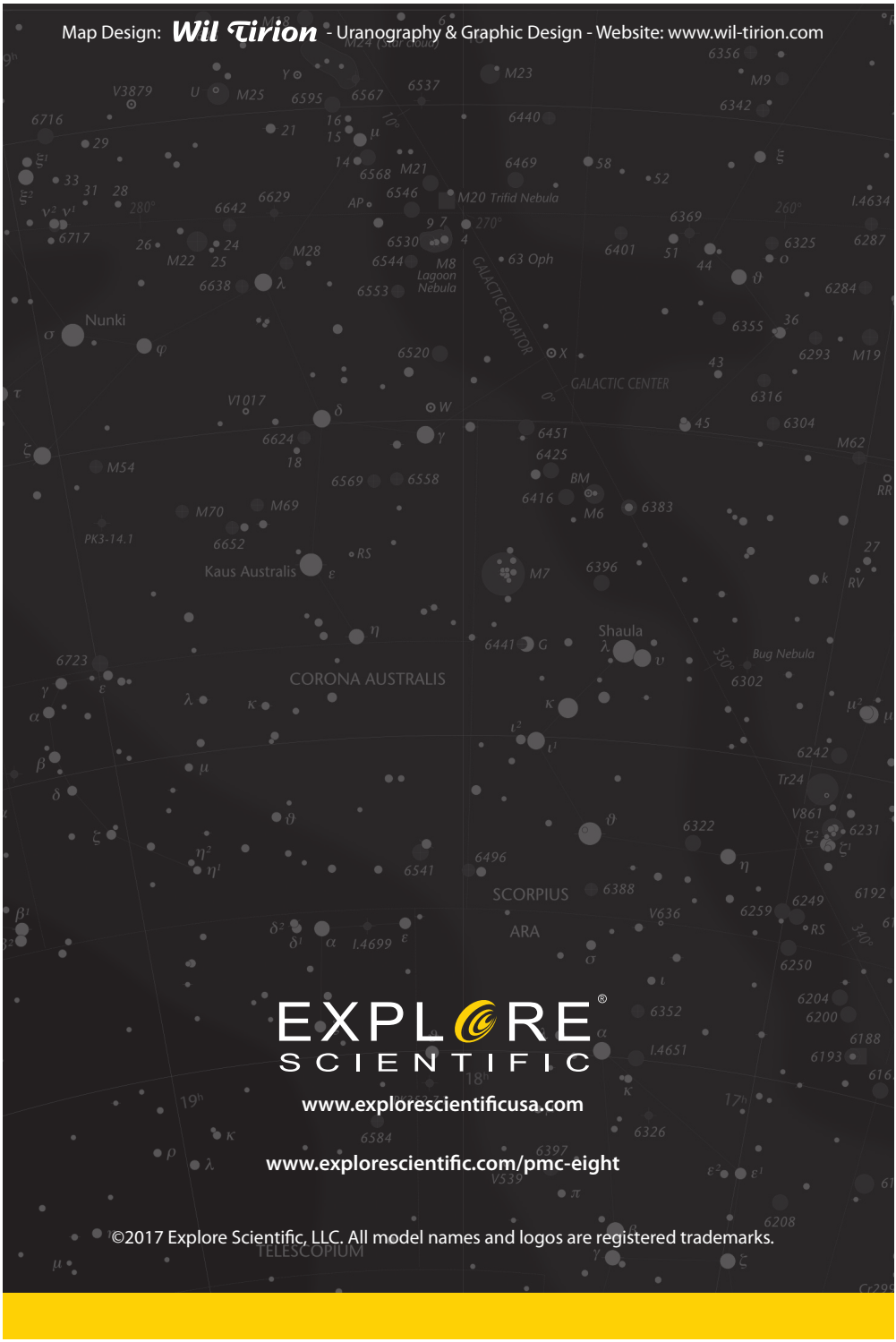

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