



Whatcom Association of Celestial Observers

The Meade ETX Telescope

**A Tutorial for both Basic and
Advanced Setup**

Dedicated to making astronomy fun!

A Service Provided by the



The Meade ETX 90



The Meade ETX series is a sophisticated entry level telescope suitable for people that would like to view the night sky without spending a huge amount of money. They actually have many of the features found in more of the higher priced & more advanced telescopes available. The biggest difference is the size of the Optical Tube Assembly (OTA) and its ability of gather light from the darkness of the night sky. Although this telescope is deemed as an entry level scope it is still a precision instrument in its own right. It comes with an instruction manual that can be very frustrating to understand by a person just starting out. Once there is an understanding of what the manual is trying to convey, that knowledge is very useful to the person that is of a mind to upgrade their telescope system to a more powerful light gathering model

First Step

Make an honest attempt to read and understand the manual and have the scope and its various parts on hand while doing so. Don't be in a rush to set the scope up and expect to see "Hubble Space Telescope" images after your first observation session. The ETX is a long way away from the "Hubble". The ETX is great for viewing the moon and many of the various planets in our solar system. Most of the "Deep Sky Objects" such as Nebulas and distant Galaxies that might be nothing more than a smudge in the night sky when viewed with the naked eye, will be just a more defined smudge when viewed through the ETX. Reading the manual at least two to three times is a good idea.

Once becoming totally confused after reading the manual you will most likely just want to set the scope up and get with the program so let's do it.



The tripod should come with its own duffle bag and it can be a struggle to extract the tripod and later put it back in.



The Instruction manual is actually pretty clear on how to set the tripod up but there is one tip to keep in mind. Don't extend the legs all the way out, leave a little bit of length for leveling adjustment later. With the legs fully extended a person sometimes has to adjust two legs whereas if there was some length left, adjusting one leg would do the trick. Adjusting the height of the tripod is an exercise in "trial & error" and the correct height will only be settled on after several observation sessions and each adjustment messes with the level of the scope.



While setting up your tripod, line up the Latitude adjustment rod of tripod's mounting plate to the back and the forward leg to either "True North" or "Magnetic" North. This will come in handy when you have to align the telescope with a couple of "alignment stars" later. Also get the top mounting plate as level as possible by adjusting the length of the tripod's legs. A useful tool in performing these operations is one's cell phone using the compass function and a free "level app".

Another thing to note is that after mounting the telescope to the tripod as shown in the instruction manual, it might be necessary to lift the entire telescope/tripod assembly in order to get the telescope pointed in the direction of either "True North" or "Magnetic North" after setting the scope to its "Home Position". The operation of leveling the scope might have to be repeated and the adjustments should be very minor.

(There is no real Front or Back on the Telescope but on the bottom of the Telescope base there should three small rubber pads. Assemble the scope so the two pads are in the back with the single pad facing forward. The control panel at the base of the scope should be on the left side. Orienting the scope in this way will provide for full range of motion when the telescope "Slews" to a selected target in the Night Sky. This is called the default "Alt/Az" mount)

Mount the Telescope to the Tripod

The instruction manual shows in very good detail how to mount the scope to the tripod. For the most part there is no reason to concern yourself with what the latitude control arm and latch does. All you want to do is loosen the latch, raise the attached plate to expose the knobs of the telescope attachment screws. Follow the directions to get the scope securely fastened to the tripod mounting plate. Push the plate down all the way and tighten the latch. At this point, take the dust cover off the eye piece holder and replace it with an eye piece. Tighten the set screw to secure the eye piece in the holder.

Aligning the Finder Scope with the Optical Tube

This is an important step. Getting this done right will greatly increase one's chances for success when trying to locate something in the night sky. All of the next several set up operations should be done outside in the daylight hours. Pick something out in the distance no closer than 200 yards, preferably farther. Remove the dust cover from the front of the optical tube, loosen the horizontal latch at the base of the scope while loosening the vertical knob on the right fork of the scope. Loosen these to the point where scope can be easily turned side to side & up and down with a small amount of resistance.

Finder Scope Optical Tube Alignment (continued)



Some models of the ETX, depending on date of manufacture, have different Finder Scopes. Some have an electronic red dot and others might have a low power scope with crosshairs, mounted to the main telescope body.

Use the Finder Scope to aim the main Optical Tube at the intended target in the distance and then look through the Telescope Eye Piece. Most likely you are going to have to turn the focus knob on the scope in order to see anything at all. Also, when viewing through the eye piece, the image is backwards, so up is down, down is up, right is left and left is right. Make whatever adjustments are necessary to get the intended target in the viewing center of the Eye Piece. Take your time, this backwards way of looking at things is the same in most if not all telescopes available to the backyard astronomer. This image can be “corrected” if a person wants to spend some money and if something might actually be available to do so, just get use to it.

Once the target is centered in the main telescope, lock down both the horizontal and vertical adjustments. Now adjust the Finder Scope so its center of target matches that of the main Telescope. Now both the main scope and spotting scope should be aligned. In the future, the Finder Scope, with its wider field of view will greatly assist in the search and finding the selected targeted objects for night sky viewing.

Put the Telescope into its Home Position

With the alignment of the spotting scope and main Optical Tube complete, get the scope set up in its “Home Position” for the operation of “Training the Drive.”

Loosen the “horizontal” lever at the base of the scope and turn the scope counter clockwise until it comes to a stop. Now turn the scope clockwise until one of the fork mounts lines up with the power controls on the scope base. Lock down the horizontal lever. Replace the eye piece with the combination bubble level/compass that is included is the telescope package. If that is missing, put your cell phone on top of the eye piece holder and use the compass and level apps. If necessary lift the entire assembly to achieve “True or Magnetic North” alignment of the optical tube.



Loosen the vertical lock knob on the right fork of the telescope to adjust the optical tube with the use of the bubble level or cell phone app. You might have to adjust the tripod legs in order to center the bubble in the level. With some practice, this operation becomes much easier.

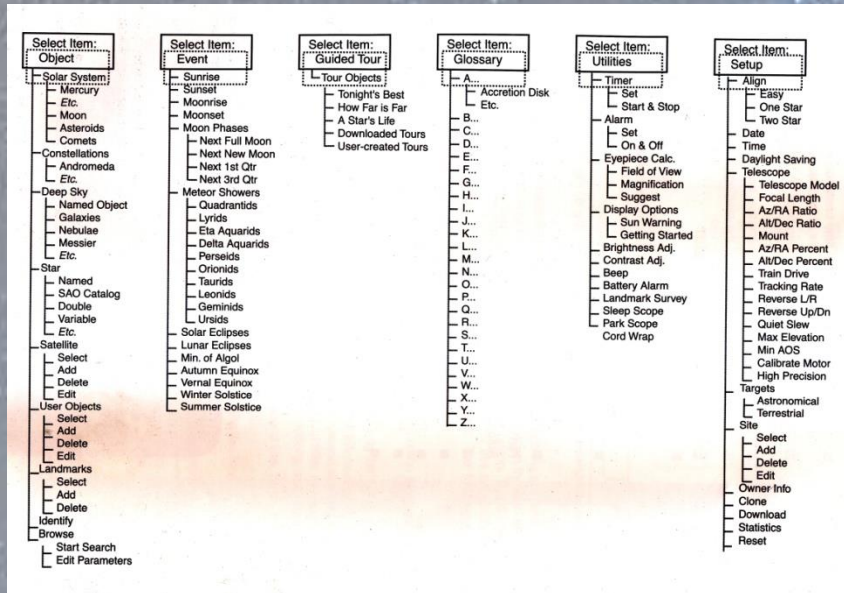
Training the Drive

It is assumed that batteries have been installed into the telescope or that the scope is being supplied with power from some source. If that is not the case, disassemble the scope from the tripod and install the batteries. After reassembly, don't worry about any alignment issues with the spotting scope, that is taken care of. The scope should still be pretty level, just do a quick check to confirm and move on.

In the back of the Instruction Manual is a section called "Training the Drive." You are going to power up the scope and use the "AudioStar Handset." (*The Instruction Manual might refer to the Handset as the "AutoStar Handset."* It is "Audio" because when you select an object a voice from the Handset will describe the object in detail.) Read the directions first before doing anything. Sometimes there is a thing where the "cart gets before the horse." If you read the directions first there is less of a chance of that happening.

What Training the Drive does is help with aiming issues so the scope returns accurately from one celestial object to another. The AudioStar Handset is a small computer that controls all the scope's movements. Pick something displayed on the handset menu, press the "GoTo" button and the scope moves to point directly to that object. A step in getting the scope to move and accurately settle in on the desired object is to "calibrate" it so all the movements are repeatable. That is what "Training the Drive" does. This only has to be done very infrequently or if there is a decided lack of accuracy in where the scope is pointing.

The Scope is Ready for Viewing...but



The scope is ready for viewing the night sky, sort of. As it stands, if the telescope is currently in a good position to view the night sky, so have at it by pushing the buttons on the handset in manual mode to aim the scope at the Moon. Be aware that the scope won't follow the Moon if the "Tracking" isn't on.

Turning on the Telescope Tracking involves trying to navigate through the AudioStar Menu tree. Do yourself a favor and run off a copy of the menu tree in the instruction manual. Have it laminated or at least put in a protective plastic sleeve. This is great thing to have on hand and an easy reference in order to quickly find the menu item that will get you where you want to go.

If the scope is really going to show you the night sky it has to be first aligned with a couple of prominent guide stars. With the telescope system properly set up the AudioStar Handset is going to want to go through that alignment process. **Read about it, it is important.**

Using The Technology Available

With the advent of cell phones, iPads, tablets and other handheld computers, backyard astronomers have some powerful tools available to assist in the process of first identifying what is viewable and where in the night sky it is located. During the Star Alignment process, the AudioStar Handset is going to pick a couple of different stars that you as the observer have to get centered in the field of view. The stars are going to be referred to by name and that should be a clue as to the significance of those stars.

Well fear not, the techno geeks of the universe are here and they heard your anguished cries for help. Apps such as “Star Chart”, “Night Sky Lite”, “SkyPortal”, “Sky Walk 2” and many more are available for both the iOS and Android platforms. Some of the best ones are free and most of them are very reasonably priced.

Just open an app, point the camera of the phone to the night sky and the phone’s screen is filled with information as to what is currently visible and by zooming in, the constellations with their major stars are drawn out and named. Comparing the image on the phone screen to the real night sky can greatly assist you in getting your telescope aimed at the correct star.



First Time Viewing the Night Sky

By this time you are itching to get going and don't let anything stop you, but just a couple more things for consideration. Have you read the menu tree of the AudioStar Handset? If you haven't made a copy of that menu tree you better have the instruction manual readily available, you're going to need it. There is options on top of options available on the AudioStar Handset that you as the telescope operator have to choose from and one of the first things to do is provide the handset with the time, date and zip code. This will be important because AudioStar needs this information to tell you what is available for viewing. It can be rather frustrating to try and figure all this stuff out, in the dark when you really don't have a plan.

Start off with the MOON. It's big, it's easy to find and most of the time it is so bright a lunar filter should be screwed into to bottom of the eye piece to knock the brightness level down a few notches. There plenty to see on the moon and the best time to view the moon is when it isn't completely full. There is a lot of detail on the "Terminator Line" between light & dark and many astronomers favor this. Also, there is this thing called "Beginner's Luck" where you might see something on the moon's surface that many astronomers never see. A couple of those special things are the "Lunar X & the Lunar V." There is a couple of major named craters on the moon's surface that when the light strikes them at a certain angle a lighted "X" and a "V" are clearly visible. You never know, sometimes it's better to be lucky than good.

First Time Viewing Tips

Don't try and take it all in at once, the universe has been around for awhile and by all accounts, it is predicted to be around for a while longer. To that end, a couple of convenient tools to have are a 2-Sided Planisphere, a Headlamp, and a walking stick.



A Planisphere is a tool that will show you, the observer, to see what is available for viewing at your location when adjusted for the correct day and time of the year. It's a handheld device and will be found in many a backyard astronomer's tool kit. The headlight is great to have strapped to your head and can be switched to a red light so as not to ruin your light vision

The Planisphere can be ordered online and sometimes comes as an add-on with certain astronomy books and instructional videos. The headlamps are available at Costco and other retailers and the 3/pack shown was less than \$20. You can get a good "hiking or walking" stick at an outdoors shop. At times when looking through the eye piece you have to steady yourself and you reach out and touch the scope. This causes vibration and the object you trying to observe bounces all over the viewing area. A good stick or cane to lean on will take care of that.

You've Seen The Moon, Now What?



The orbiting mud ball that we inhabit, is the “Third Rock From The Sun” called planet “Earth.” There are several more planets in the solar system that are easily visible using the ETX telescope. The AudioStar handset will have them on the menu as long as you programmed in the proper information on start up.

Saturn is one of those planets where every person that has viewed it through a telescope will remember when and where they were when they did it.

Jupiter is the big bully of the solar system and many times it's moons can be visible with just the use of binoculars. With a decent telescope, Jupiter becomes even more impressive.

Mars, is the so called “Red Planet.” Take a look at it, you got to, you might even be the first person to see the invading space force headed in our direction.

Other planets might also be visible depending on the time of year.

You Saw What You Saw But It Might Not Be What You Expected Or Wanted

You took a look through your scope and you didn't see images reminiscent of those taken by some of the Deep Space Telescopes that are currently orbiting our planet Earth. Would you care to think of the amount of money that was invested in those telescopes and what it cost to build some of the earth bound telescopes housed in observatories peppered about the globe? Put that into perspective when figuring in the cost of the telescope you are currently viewing with and the images obtained.

Sometimes conditions in the atmosphere surrounding our planet fuzz out an image and nothing viewed through the eye piece is wire sharp. That is why you should view things for a period of time because conditions are constantly changing and from one minute to the next can be quite dramatic. A good rule of thumb is when the stars aren't "twinkling" that is the best time to observe because the atmosphere is clear and not bouncing the light around.

Don't get discouraged, it takes a few times to get that "ah-ha" moment and many times you just don't know what you are looking at or if the scope is actually pointed in the right place. A little research can go a long ways and maybe it might be a wise idea to "buddy up" with somebody that does know what they are doing. Ya gotta do what ya gotta do to smooth out the learning curve. Besides, the instruction book says you can always get a bigger and more powerful scope if you're not satisfied with the results from the ETX.

Couple Things You Might Have Done That You Don't Want To Do Again

- You shortened the length of the tripod legs so you could see through the eye piece when the telescope was completely horizontal. Then when the scope “slewed” around (*that is fancy astronomer telescope talk to say the scope was moving side to side and up/down*) the eye piece was so low you had to stoop down in order to look through it. That is part of the figuring out how to set up your own scope to fit you.
- Hopefully you didn't rest anything in the space between the mounting forks underneath the telescope's Optical Tube. That space is a **“Do Not Enter, No Trespassing Zone.”** You might have noticed that when the scope as aimed at something nearly straight up in the sky there is hardly any clearance between the scope and the bottom of the mount. There is a clear potential to cause damage to the Slewing & Motor gears if things get jammed in that space.
- Did you put your hand on the scope or tripod when looking through the Eye Piece? Notice all the vibration and that the subject matter of your viewing interest was bouncing all over the place? You have to keep your hands off the equipment if you want a steady image. The only time you want to be looking through the Eye Piece and touching the scope is when you are adjusting the focus knob.

Astronomy Terms To Learn In Order To Talk Like You Actually Know Something

- Slew:** This is what the scope is doing when it moves up/down and side to side.
- Alt/Az Mount:** Short for Altitude / Azimuth. Altitude pretty means what it suggests, how high in degrees the scope is pointed in the sky. Azimuth refers to the degree the scope is pointed from side to side. By default the mounting system on the tripod is an Alt/Az mount but it can be set to be an
- Equatorial Mount:** There is really no reason to use this feature unless you plan on hanging a camera off the back of the scope. The tripod will be oriented so the Latitude adjustment bar is facing to the front. The tripod base has to be raised and set to match the Global Latitude of the Telescope's current location. Then a "Polar Alignment" must be used when setting up the scope for viewing. That is another can of worms best explained in the back of the Instruction Manual. If you want to set your scope as such, then you must have advanced knowledge and most likely know what you are doing. With a raised Equatorial mount, the scope will now have enough room to Slew up & down without binding up between the mounting forks.
- Polar Alignment:** The scope is aligned so the North Star is positioned in the center of the scope when viewing through the Eye Piece. That will be the scope's home position.
- 2 Star Alignment:** The AudioStar Handset Computer picks two stars that have to be image centered and then it is calibrated or "Aligned." From there, AudioStar knows where everything is in the night sky and can "GoTo" it with a fair degree of accuracy.

More Terms

- Magnitude:** This is a term to describe the brightness of a star or object in the night sky. The smaller the number the brighter the object is. Some guy in the far flung distant past coined the term and the differences from one number to the next. The system has undergone some changes but it is still in use. It is something interesting to look up if one wants to know some background on some of the founding principles of Astronomy.
- Focal Length:** Generally expressed, focal length is the distance (given in millimeters) between the telescope's primary lens or mirror and the point where the light rays come together in focus. Why is this important? Focal length is the major determining factor of any given telescope's magnifying power.
- Objective Lens Size:** In a telescope the objective is the lens at the front end of a refractor or the image-forming primary mirror of a reflecting or catadioptric telescope. A telescope's light-gathering power and angular resolution are both directly related to the diameter (or "aperture") of its objective lens or mirror.
- Telescope F-Stop:** The f-stop, f-number, is the lens speed of the telescope. It is the result of dividing the focal length of the lens with the aperture of the eyepiece. The wider the aperture, the more light it lets through, and the lower the f-stop number. A telescope with a short f ratio (usually f4 or f5) is considered a rich field telescope and is suited for viewing the skies in wide views such as constellations, nebulae, clusters and other rich, scattered items. A telescope with a medium f ratio (usually f6 to f8) is considered a good all purpose telescope f ratio.

Going Over
To The
DARKSIDE

Times Are A Changin' And Not Everybody Is On Board With That

As the years pass by, improvements are made to just about everything because of newer technologies that are developed and found useful in different fields of study and in everyday life. Some of these technologies are welcomed with open arms, whereas sometimes there is old traditional ways of doing things that people will hang on to, no matter what.



Some traditional astronomers feel that a person isn't really a true practitioner of the art of Astronomy and observing the night sky until you can name and locate many if not all of the classical constellations along with naming the major stars that make up those constellations. Some purists feel that a true observer is one who has their eye glued to the eye piece of the telescope and anything else is "fake astronomy" practiced by individuals that are too lazy to follow the true path. With the technological merging of electronics, computers, optics, and cameras, the door for the field of Astronomy has opened for people to get right in without going through a long protracted apprenticeship.

There Is Still A Need To Know The Basics

Knowing some of the basics of Astronomy is a good thing but it is something a person can pick up as need be. Sometimes it is a simple thing of “Why do they call it that?” when someone encounters something in the night sky. Then and there a short and to the point history lesson might be in order so a person might have an appreciation of where the field of Astronomy came from and the names of some of the major players along the way. It is easy to take for granted something we can freely do today that would get you burned alive at the stake several hundred years ago.

There is the basics of past history, there is the basics of the science involved and there is the basics of what was the equipment of the past and the journey from the past to the present. But another argument can be made that things are advancing so rapidly that new cutting edge technology has a very limited life span before something else pops up over the horizon. It used to take hundreds of years for the things to change and now it occurs almost daily. So a person better jump aboard or get left behind.

To that end, ETX is now going to undergo some advanced set up.

Lazy Telescope Astronomy 101



The photo on the left shows a Meade ETX 90 that has been outfitted with a Meade LPI-G Advanced Color camera. (*Lunar Planetary Imager and Gilder*) The camera is connected to a Laptop Computer which is running Meade's "Sky Capture" software. There is many more similar software packages on the market that might be superior and the job of these software packages is to get what the telescope is currently viewing in real time onto the computer screen.

A further connection is Meade's STELLA WiFi adapter which is hardwired into the AudioStar Handset. A handheld tablet computer is wirelessly connected to the Stella Adapter which controls the movements of the telescope and much more.

Connection Pattern Between Telescope, AudioStar, and Stella



The photo on the left shows some details of what the connection pattern between the telescope, AudioStar Handset and the Stella WiFi adapter would look like. The AudioStar Handset is connected to the telescope base as normal. There is also a secondary connection using the Meade #505 Cable Set going from the handset to the Stella.

There is a newer updated version of the #505 Cable Set available online which comprises of a 4 pin plug on one end that connects into the Handset and a USB style plug that connects into the Stella.

To the right of the Stella is battery pack that can be plugged into the Stella to augment it's internal battery power source. Above the battery pack is the 9 pin serial port adapter and cable that is supplied by Meade and is their version of the #505 Cable Set.

The Stella WiFi Adapter Interface



Stella sets up a WiFi network which can be connected to a handheld device such as a computer tablet. A special StellaAccess application has to be downloaded and the application is available on both Apple's iOS and Android platforms. Once the app is downloaded and opened, one has to set it up, meaning telling the app such things as what telescope is actually going to be used.

The set up is very intuitive and shouldn't be any trouble. Stella shows what is available for viewing depending on what direction the device is pointed. The device then has to be connected to the Stella WiFi network but before connecting the device to the Stella, make sure the telescope is set up, aligned and ready for viewing. Once that is done, touch the on screen "CONNECT" button and Stella takes over from the AudioStar Handset. Every function and control available on the handset is available on Stella with its easy to view GUI (*Graphical User Interface*).

Connecting the Camera and the Computer

Ok, Stella, the Telescope and a Tablet are connected but that is only half of it. Basically you would still have to drop in an eye piece and peer through that into the heavens above. You are trying get away from that so you can park your ass in a chair, kick back and view things on a High Definition screen. That is easy to do and a real joy once everything is set up.



This is a Meade LPI-G Color Advanced camera. On the top there is two ports, one for the included cable if the camera is to be used as a “guider” and the other port for the included USB3.0 cable. Put one end of the USB cable into the camera and the other into the USB port on a computer. From there, drop the camera into the Telescope’s Eye Piece Holder. Fire up whatever imaging software is on the computer and there should be a “preview” pane in the software window showing what the camera is currently viewing.

Camera to Computer Continued

Different Astro-Imaging Software packages are going to have different features or they are going to be doing the same thing but referring to it by a different name. Either way the image on the screen is “live” and can be manipulated by changing the brightness, contrast, color depth and maybe one of the most useful, rotating the image so everything is right side up. This might be a big help when slewing around in the sky and trying to precisely center an object in the viewing screen. Software packages are up to one’s personal taste, either go with what Meade gives you or go get something else.

Providing Power To The System

Providing power to run all the equipment is something that should be thought of. Some things that will come into play will be how long is the “observing” or “imaging” session going to last? Things that might have their own built in battery power supply are smaller Telescopes such as the Meade ETX, the STELLA WiFi Adapter, Laptop Computer, and Handheld Tablet. Some things are powered by their connections to other devices such as the Meade LPI-G camera but larger cameras will need their own power supply. Of course where the Telescope System is set up is a major factor. If the system is set up near a source of household current where extension cords can be strung out to provide power, great, you don’t have to worry about internal battery power running low.

Powering The System



If power can't be provided easily through an extension cord then other sources have to come into play. An easy fix is a portable generator. There is a massive amount of generator options to choose from and for the most part it needs to be portable, quiet, and provide the power needed. Figuring out the power requirements is just a simple exercise in math. Portability is up to the judgment of the person that has to pack the thing around but noise level can be something that others will most likely have a strong opinion about.

What is quiet to you might be a “Battle Heavy Metal Acid Rock Bands” or a

low flying squadron of 747's to someone else. In this day and age of people that make a sport out of complaining about something, best check ahead of time as to what the rules might be if any before taking a long trip to some star gazing venue that is not in your immediate backyard. Make sure to use a Surge Protector or UPS (Uninterruptable Power Supply) between the generator and your system. Generator power can be “dirty” and a Surge protector or UPS unit will clean that up.



Another option is a large DC Power Cell hooked up to an Inverter that converts DC power to AC power. You have to figure out how many total watts in power your system will need.

Add in an additional amount for a very comfortable buffer and go find an Inverter along with some Heavy Gauge Power Cables that meets or better yet, exceeds those requirements. Remember you are still using a “battery” and they have a limited run time of power.

More Ginger Bread Stuff



Ever had the feeling that someone is looking over your shoulder and you would like to shake them off? Or maybe you might have something really interesting on the computer screen but there just isn't enough room for everyone to view it all at once. One solution is to add a secondary monitor and that takes care of the person perched on your shoulder like a "pirate's parrot". For bigger crowds there is affordable technology existing that can link up the laptop with a projector unit that can broadcast an image in real time of what is on the computer to a large portable "Silver Screen". This would work great in the field if one is doing an Astronomy Workshop for kids or other interested parties that might want to know what is available to view in the local night sky.

There isn't too much more a person can add to the system without it becoming a hassle to break the system out, set it up and then pack it away after an observing session. Sometimes after adding all the accessories in order to achieve what one might feel is the ultimate telescope system, a person can find themselves really wishing for simpler times. There is a limitation as to how far a person can go and that is up to the individual. There is big market for "gently" used telescopes and related astronomy gear.

Other Sources Of Information

This is the end of the presentation and it is hoped that most if not all the questions involving the set up of the Meade ETX series of telescopes have been answered. This presentation is not meant to be the definitive first and last word on the subject. The Internet channel “YouTube” has a bunch of videos from both Meade and other owner’s of the ETX Telescope that are sharing their tips and tricks to get the system up and operational. Just “Google It.”

Clear Skies and Happy Observing!