Fort Bend Astronomy Club
P.O. Box 942
Stafford, TX 77497-0942

The FBAC Observer

Volume 19, Issue 7

July, 2005

The CCD Chronicles Part IV

Wes Whiddon

When I left you last month we were still talking about the importance of focusing. So, as a final shot, I'm going to give you another rule. CCD imaging rule #3: **Proper focus is the most important thing you can do.** Every photon counts and if they are scattered on the chip, detail will diminish or that dim variable star you're trying to image may be lost.

So, at long last, the scope is polar aligned, camera cooled, focus perfect. Now what? It's time to shoot something. Making the assumption that it's late fall or early winter when all the aforementioned happened, what's your target. What's big , bright, beautiful, and seems like a natural first object to image? Why M42, of course. Orion is easy to find so slew on over, set the camera software for 60 seconds, click on expose, and glue your eyeballs to the computer screen waiting anxiously for what has to be a perfect image. As the countdown timer approaches zero, you become a little breathless and your heart beats just a tad faster in anticipation. The exposure finishes and your very first image blossoms on the screen. You are stunned. The image is, well, indescribable. You've never seen anything quite like it. For a long, long moment you stare at what modern technology in all it's glory has wrought. And it's ugly as sin.

I'm willing to bet that half the beginning CCDers in this world start by shooting M42. I did and it was a big mistake. M42 is so bright that realizing a good first image is almost impossible. I'm not saying it can't be done. There's way too many fantastic pictures on the net and other places that belie that statement. What I'm saying is it's probably one of the hardest objects in the sky to properly image. The dynamic range of M42 is so large that it requires a lot of processing to overcome the blooming and image blowout, especially if your camera is non-antiblooming. So, here's rule #4: **In the beginning, pick medium brightness objects with less dynamic range.** You can use longer exposures and have more control. It's better to start with objects like globulars and low surface brightness nebulae such as M1. Obviously there's not a wealth of globulars to shoot in the winter but summertime constellations Scorpius and Sagittarius offer great beginning objects.

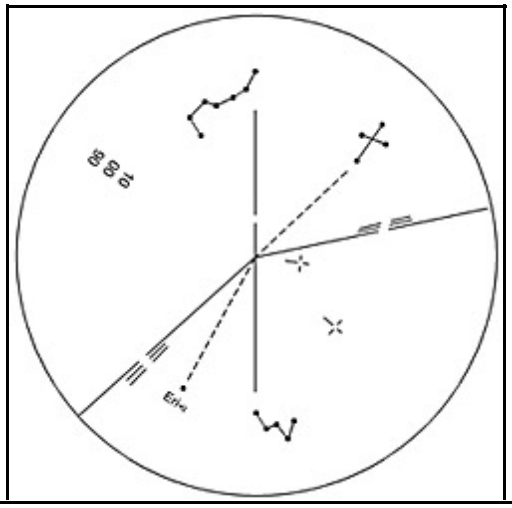
Oh by the way, I forgot something—a very important something: tracking. I may be stating the obvious but if your mount doesn't track the object of your desire, there's no way you'll wind up with a decent image. And the first step in getting your mount to track is polar alignment.

If you've spent any time standing around outside in the dark with other observers, a discussion of some kind involving the star Polaris is sure to pop up. Most beginning astronomers eventually find out where it is but sometimes not without difficulty. I can remember pointing out Polaris while volunteering at the George Observatory and hearing something like, "That's the north star? It can't be, I can barely see it." John Q. Public thinks it's a blazing beacon much on the level of Venus. And they're disappointed when it's not. But, laying all that aside, Polaris plays a mighty important part in CCD imaging. Without it, we'd spend a lot more time getting our scopes lined up with the Earth's axis and that's what polar alignment is all about.

There are many ways to polar align a scope. The easiest is to plop the mount down, drag out the trusty boy scout compass, figure out the difference between true and magnetic north (called variation and I'm not going to explain it here—go find it on the internet) and line the mount up on true north. Then you adjust the elevation of the mount toward Polaris using the latitude of your location. As an example, the latitude of the spot where I sit as I write this is 29 degrees, 34 minutes, 34 seconds. Most mounts have some kind of elevation setting circle that will get you in the ballpark. Easy enough, right? Wrong! This might work for visual (and I've done it many times) but it's useless for imaging. Rough alignment like that isn't worth a hill of beans. So what to do? Well, you need a handy-dandy gadget called a polar alignment scope.

In my career—such as it is—as an observer, I've seen several different types of polar alignment scopes. For the sake of discussion, though, I will refer to the one that Losmandy supplies (as an option and for a magnificent fee I might add) with their G-11 mount. This particular device has two of the northern constellations, Ursa Major and Cassiopeia engraved and mounted in such a way that they show in the scope. It also has an LED lighting system that illuminates the engravings so they may be seen in darkness. For reference, there's a representation of what this looks like on the next page. The idea is, after your initial compass and rough latitude alignment, to site through the polar scope and align the mount perfectly with Polaris. But there's a problem. Polaris does not, I repeat does not represent true polar alignment. The north star currently sits about 1 degree from the true Earth axis. If you align on it, you will still have problems with tracking. (continued next page)

To overcome the Polaris alignment problem the Losmandy scope has settings for various epochs from 1990 to 2010. This is represented by the dashed lines on the lower left and slightly above center lines. For alignment, you look in the scope, rotate it until the engraved constellations line up the same as the ones in the sky (they are not visible in the finder scope) and place Polaris in the gap above the center of where the four solid lines intersect. Delta Ursa Minoris is then set inside the appropriate gap in the bottom left line (for epoch 2000 it would be the middle one), and 51 Persei is set inside the appropriate gap on the line running to the right and slightly up. All of this is done using the latitude and right ascension adjustment knobs. You are also required to simultaneously stand on your head and whistle Dixie.



View through a Losmandy polar alignment scope

Having done all of the above, you can, at last, feel assured that your mount will track perfectly giving you an opportunity to start imaging and walk away, perhaps to find a convenient loony bin that accepts the likes of us. Wrong! You are not finished. Polar alignment is not complete. Your alignment scope may be out of alignment. You are required to do more. You are now required to drift align.

Drift alignment is the ne plus extra of polar alignment. But many an observer has fallen on his sword while practicing this move. Bottom line is this: Drift alignment is for refining out the little errors that creep in. Alignment scope not perfect, mount not perfect, flexure between alignment scope and mount, etc. I'm not going to describe here a method for doing it. Again, if you want to find details, go to the internet.

So now that you're back from the internet with all the details and your scope is perfectly aligned, you can begin. OK, lets go. Set the software for a 3 minute exposure, click on expose, sit back and relax. It's nice to have nothing to do for a whole 3 minutes.

They say time flies when you're having fun. So three minutes pass in an instant and your new polar aligned twelve ways from Sunday image flashes on the screen. Arrrrgh. It can't be true. The stars are big fat oblongs. Nothing came out right. The image is ruined. And you're suffering from PERIODIC ERROR.

There's not a telescope mount in existence (at least one that you or I could afford) that does not suffer in some degree from periodic error. This is a tracking error caused by irregularities in the drive gears in right ascension. Gears are never perfectly machined thus the problem. If you look at periodic error over a long time, it looks much like a ragged sine wave. The ups and downs of the graph shown here to the right indicate the kind of movement typically seen.

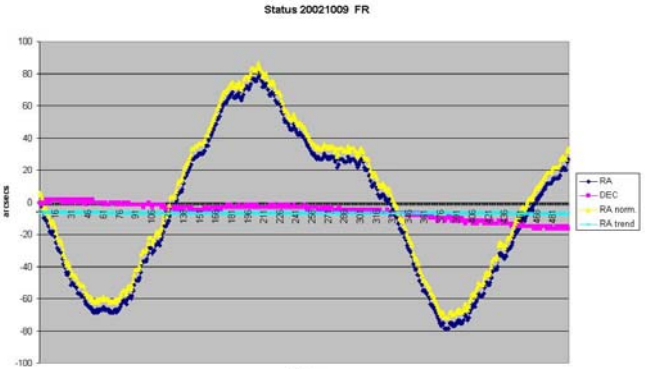
How do we over come that? Well, this kind of tracking error can usually be compensated for by the mount. Many mounts have a periodic error correction routine that you can run. The routine usually involves turning on the function and carefully guiding over the period of the mount. In the case of a Losmandy G-11 that period is 4 minutes. If the mount if carefully guided via either a camera guider or by eye, compensation will then be available for all future tracking sessions.

Notice that in the previous paragraph I said, "camera guider". You may be aware that many CCD cameras have a method of guiding. The SBIG line of cameras from the ST-7 and higher all have a separate guiding chip. Some of the Starlight systems have self guiding functions using the imaging chip for both. At any rate, camera guiding is an essential requirement for exposures longer than 20 or 30 seconds.

Camera guiding comes in two flavors. Internal chip or external guider. There are benefits to each. With an internal chip, no guide scope is required. What the imaging chip sees, the guider also sees…to a degree. My experience with the ST-7 is that the guider chip is much less sensitive than the imager so guide stars are harder to find. And the guider chip is not aligned exactly the same as the imager so you can't expect to see stars in the same field. In fact, some software such as the Sky version 6 have field of view indicators that show both chips making it easier to find a good guide star.

External guiding has it's advantages, though. If you're imaging in a field with very dim stars using an external guide scope and camera give you the option of jiggering the scope around until you find a bright star to guide on. But another scope and camera complicate things considerably so, from my perspective, camera guiding is simplest and best.

Next month I'll have more on guiding. One thing I wish to point out (and I've said this before) is that I'm not an expert. There are many things I still need to work out for myself and I'm still on a learning curve. While writing these articles there are many details I will either miss or leave out. My purpose is not to give you a step by step manual for imaging, it is to show you some of the trials and tribulation that you can encounter while hopefully encouraging you to give it a try.



Periodic Guiding Error In A Telescope Mount

GOING DEEP

Keith Rivich

During the 1950's George Abell scoured the newly published Palomar Sky Survey plates looking for distant galaxy clusters. His criterion for a cluster was 30 or more galaxies with a clear detachment from the background, much like how a nearby open cluster appears through a telescope. In 1958 Abell published his list of 4037 clusters and a new amateur observing program was born! Some clusters are notoriously difficult to observe, like the Coma cluster, others are quite easy such as the Perseus cluster. Below is a sampling of some of the clusters that can be observed during the spring and early summer. Keep in mind that the magnitude given for the cluster is the magnitude of the 10th brightest member of the cluster, which means that there are 9 galaxies brighter then the magnitude given.

First up is **AGC 1367** in Leo. At magnitude 13.5 this is a very challenging cluster to observe. The brighter members can be viewed with a 10" scope under dark skies with 5 of the galaxies clustered in a ½ degree field. In a 20" or larger scope more then 20 galaxies can be made out. You can find AGC 1367 5.5º north and slightly west of Denebola in Leo's tail.

Now lets venture south to **AGC 1060** in Hydra. Centered 4º NNE from 4th magnitude Alpha Antlia 1060 is one of the easiest of the Abell clusters to observe. Containing 10 galaxies brighter then 12.7 magnitude this cluster is well within reach of an 8" scope under dark skies. From Late Arrival with my 12.5" I was able to make out all ten of the brightest galaxies!

Prowling around in Lynx you will find the easy find but hard to observe **AGC 779**. Located just 41' SSE of 3rd magnitude Alpha Lynx, AGC 779 host the relatively bright NGC 2832 at 11.9 magnitude. Large and round NGC 2832 is surrounded by a multitude of fainter galaxies that have a lumpy appearance in larger scopes.

With over 800 galaxies brighter then 16.5 magnitude the Coma Cluster, **AGC 1656**, is one of the richest to observe. Anchored by NGC 4889 and 4874 this cluster has something to offer for scopes of all sizes, though it is very rewarding for those willing to seek out a very dark observing sight. Save this one for TSP '06

Object	Type	RA, Dec	# Galaxies	Magnitude
AGC 1367	GC	11 44 30, 19 50 00	117	13.5
AGC 1060	GC	10 36 54, -27 31 00	50	12.7
AGC 779	GC	09 19 48, 33 46 00	32	13.8
AGC 1656	GC	12 59 48, 27 58 00	900+	13.5

FBAC Club Meeting
Friday, July 15, 2005
7:30 PM
First Colony Conference Center
3232 Austin Parkway
Sugar Land, TX

AQUILA The Eagle & SCUTUM The Shield

Aquila represents an eagle, the thunderbird of the Greeks. There are several explanations for this eagle in the sky. In Greek and Roman mythology, the eagle was the bird of Zeus, carrying the thunderbolts which the wrathful god hurled at his enemies.

Aquila is the eagle that snatched up the beautiful Trojan boy Ganymede, son of King Tros, to become the cup-bearer of the gods. Ganymede is represented by the neighboring constellation of Aquarius, and star charts show Aquila swooping down towards Aquarius. Germanicus Caesar said that the eagle is guarding the arrow of Eros (neighbor constellation Sagitta) which made Zeus love-struck.

The name of the constellation brightest star, Altair, comes from the Arabic *al-nasr al-ta'ir* , meaning 'flying eagle' or 'vulture'. Ptolemy called it Aetus, the eagle, the same name as the constellation. The German scholar Paul Kunitzsch notes that the Babylonians and Sumerians referred to Altair as the eagle star. Altair's neighboring stars Beta and Gamma Aquilae form the eagle's outstretched wings. These two stars have their own names, Alshain and Tarazed, which come from a Persian translation of an old Arabic word meaning 'the balance'.

Altair forms one corner of the Summer Triangle with the stars Vega and Deneb found in the constellations Lyra and Cygnus respectively.

The southern part of Aquila was subdivided by Ptolemy into a now-obsolete constellation called Antinous, visualized on some charts as being held in the eagle's claw.

Scutum is the fifth smallest constellation in the sky, introduced by the Polish astronomer Hohannes Hevelius in 1684 under the title Scutum Sobiescianim, Sobiesci's Shield, in honor or King John III Sobiesci of Poland. It is the only constellation introduced for political reasons that is still in use.

Scutum lies in a bright area of the Milky Way and is distinctive in its small size. The brightest stars of Scutum are of only fourth magnitude, and none are named. Scutum contains a celebrated cluster of stars called the Wild Duck cluster (M11) because its fan-shape resembles a flight of ducks. There is also, M26.

Information on objects in both constellations are combined here in one contention. For rich field telescopes and binoculars, Aquila and Scutum offer breathtaking views of the Milky Way. Both constellations have an abundance of open clusters and are laced with numerous dark regions. Aquila offers a host of planetary nebula, none of which are exceptionally bright. Scutum is a small constellation, but it certainly is not lacking in celestial objects. Its most impressive area is the Scutum Star Cloud which is a pure delight if one chooses to do nothing more than to just scan though the area. Within the star cloud itself is **M11**, the Wild Duck Cluster, one of the finest open clusters in the sky. It is so rich and compressed that is it is often mistaken as being a globular cluster.

Altair, the brightest star in Aquila, is one of our close neighbors in space being only 17 light years away.

Aquila has 278 non-stellar objects and Scutum has 102.

Leonard Pattillo, January, 2005

50th Anniversary Event
September 24, 2005

50 years ago in September the Houston Astronomical Society was formed. The Society has done many new things over the years. One of the major accomplishments since the founding of the Society was the building of our Columbus Observatory. The land surveying started in 1979, and in 1982 the current observatory building was dedicated. Three years later a time capsule was placed in the ground on the south side of the building.

On Saturday, September 24, we will have our annual picnic. At the picnic we will unearth and open the capsule. And to help celebrate our 50th anniversary we are inviting all the area clubs to attend our picnic. As usual, the HAS will supply the food for the picnic, including meats and sides, you bring the drinks. We will also have the observatory open for our visitors, a constellation tour at twilight, and the usual observing session when it gets dark. Bring your own telescope to test our night skies.

We will need an RSVP by September 10th if you are planning to attend. Watch for details in the coming months. Mark your calendar now for September 24.

Steve Goldberg

FBAC Meeting Minutes June 17, 2005

- Meeting Started at 7:28 p.m.
- David Jenkins welcomed everyone and introduced the officers.
- The Novice program—Don D'Entremont on time
- Break at 7:57 p.m.
- Break ended at 8:21 p.m.
- Main Program was given by Dennis Borgman entitled Lunaticing (Observing the Moon). D. J. McCracken showed some images he took using a webcam.
- Vice President's Report—Don and D.J. have been doing the novice presentations this year off and on this year and offered his thanks. No real presentation for next month—any help would be appreciated.
- Secretary's Report—Tonight's minutes should be posted either when I get home or when I log onto my Internet account tomorrow morning. Please submit any corrections to me via NetSlyder.
- Steve Goldberg discussed Telescopes for Telethon—Cinemark Tinsletown (on Beltway 8), July 16th and August 13th Senior Road Tower group is matching contributions dollar for dollar. HAS will celebrate their anniversary at a picnic September 24th at their Columbus Observatory. All clubs are invited. More details later. Around 3:00 p.m. HAS will supply food and side orders, bring your own drinks.
- AOW Request for aid at a star party for the First Presbyterian Church of Sugar Land. No date set yet.
- Treasurer Report—not here tonight
- Nomination committee—Jack, Wes, and Dennis volunteered to serve.
- FBAC night at the George—June 26th at 8:00 p.m. Please sign up.
- A-team report—Hit a dry spell lately due to the professional searches. We have one long-range possibility. We have only 9 discoveries this year.
- Gamma Ray burst—We have a team for this as well. 3-4 nights a month
- East Dome Report
    - Replaced the top two rollers on the dome shutter with the help of Keith Rivich.
    - Had some problems with our Quadrant 1. Dennis made the repairs.
    - The Quadrant 4 has had major problems. We will be looking at this and possibly send it back.
    - The door prop has been repaired.
    - The dead bolt lock is working.
    - The East Dome has not been left in the best of shape lately. We have decided it is an issue of training. There will be an East Dome training session June 26th at the door.
    - We're having problems getting volunteers out at the East Dome. We need more volunteers out at the dome.
- Refreshments were volunteered for next month.
- Chili's Count
- Adjournment at 10:03 p.m.

—Jim Ellis, Secretary

WHAT'S HAPPENING IN JULY

Friday, July 1: Look for Luna hovering a few degrees above the Pleiades cluster in early morning.
Saturday, July 2: Venus and Mercury only 1 degree apart low in the evening sky during twilight. Mercury will begin to drop rapidly soon.
Sunday, July 3: Venus and Mercury are passing through the "Beehive Cluster" for the next few days.
Monday, July 4: Deep Impact collision with Comet Tempel 1.
Tuesday, July 5: Earth reaches aphelion at 12:00 midnight CDT. Aphelion is when Earth is farthest from the sun, about 94,512,000 miles, denying any idea that the sun is closest in summer.
Wednesday, July 6: New Moon at 7:02 a.m. CDT. Watch for a sliver tomorrow night early.
Thursday, July 7: Mars is passing through Pisces, a faint zodiac constellation. Look for the brightest object in the southeast about an hour before sunup. Pegasus rides the sky a couple of fist widths above Mars.
Friday, July 8: The Moon, Venus, and Mercury cavort low in the southwestern sky. Luna hovers directly above Venus with Mercury hanging a couple of degrees to the lower left. Mercury is at mag 0.5 and gaining while Venus shines at a brilliant –3.9
Saturday, July 9: A waxing Moon rests in Leo tonight. Mars sits 15 degrees away from Regulus and will be closing in coming weeks.
Sunday, July 10: See if you can find dim constellation Draco, the Dragon in the northern sky. Good luck in the light pollution.
Monday, July 11: Scorpius is high near the end of evening twilight. Antares crosses due south about 1 1/2 hours after sundown. This beautiful constellation is a favorite of many skywatchers.
Tuesday, July 12: Mercury slides beneath Venus in the next couple of nights. Regulus sits 12 degrees up and to the left of Venus.
Wednesday, July 13: Jupiter and Luna are 4 degrees apart tonight. See how soon after sunset (or before if you're sharp eyed) you can spot Jupiter.
Thursday, July 14: First quarter moon at 10:20 a.m. CDT.
Friday, July 15: Payday and **FBAC CLUB MEETING, 7:30 PM, FIRST COLONY CONFERENCE CENTER, 3232 AUSTIN PARKWAY, SUGARLAND, TX.**
Saturday, July 16: Spica is occulted tonight by the Moon. Watch for it. **TELESCOPES FOR TELETHON. 5-11 PM, TINSELTOWN THEATER, BELTWAY 8 AND WESTPARK.**
Sunday, July 17: Antares occulted tonight by the Moon. Travel to Mexico, Central America, northern South America, and maybe Houston to see it.
Monday, July 18: Venus and Regulus 5 degrees apart.
Tuesday, July 19: Luna in Sagittarius with the tip of the teapot spout only 7 degrees away from the Moon.
Wednesday, July 20: Moon approaching full tonight and rises close to sunset.
Thursday, July 21: Full Moon at 6:00 a.m. CDT. This Moon is sometimes called the Thunder Moon. Nine hours after it reaches full phase, Luna also reaches perigee and the second closest separation to Earth of the year. Watch out for high tides.
Friday, July 22: Venus passes Regulus within 1 degree.
Saturday, July 23: Mars continues to creep through Pisces, the Fish at the rate of 1/2 degree per day.
Sunday, July 24: Look south into the Sagittarius Spiral Arm of the Milky Way. Sadly, most of us won't see much because of light pollution.
Monday, July 25: Look toward the star Vega to see the direction our solar system travels in its orbit around the Milky Way. At an astounding speed of 500,000 miles per hour it still takes 200 million years to complete a circuit.
Tuesday, July 26: Mars continues to brighten and visits the almost last quarter Moon tonight.
Wednesday, July 27: Last quarter Moon at 10:10 p.m. CDT.
Thursday, July 28: Delta Aquarid meteor shower reaches peak tonight. Check it out but expect only an occasional shooter.
Friday, July 29: Get up early and check out the Moon in Taurus. Aldebaran sits 10 degrees below Luna.
Saturday, July 30: The beautiful star, Arcturus, is still visible in the west for a few hours after sunset.
Sunday, July 31: Arcturus was one of the first stars named and was originally used to identify the constellation it resides in. Arcturus is a giant orange star, cooler than our sun but considerably brighter because of its size.

—Many thanks and an FBAC tip of the scope to Adler Planetarium and Thomas G. Ferguson.

Fort Bend Astronomy Club
P.O. Box 942
Stafford, TX 77497-0942

Dedicated to the acquisition and dissemination of information pertaining to the science of astronomy

We're On The Web
Http://www.fbac.org

You are invited to submit your opinions for inclusion on this page. Please be thoughtful and respectful of others in your comments. Rants will not be published. All articles should be 450 words or less and are subject to editing for clarity and length before publication. Please submit in Word format to: stargazer411@earthlink.net

The Fort Bend Astronomy Club meets on the third Friday of every month except for those months when special meetings are called. The next regular meeting will be at 7:30 PM on July 15, 2005 at the First Colony Conference Center, 3232 Austin Parkway, Sugar Land, TX. Dues are $30/year for the first member, $5 per additional household member. Student dues are $15/year.

The **Houston Astronomical Society** meets the first Friday of the month in room 117 of the University of Houston Research Building. The novice program begins at 7:00 PM and main meeting at 8:00 PM.

For the **Johnson Space Center Club**, refer to the JSCAS web site for meeting times and sites. There is a link on the FBAC web site.

North Houston Astronomy Club meets on the 4th Friday of the month at Kingwood College. The meeting starts at 6:45 PM, main meeting at 7:30 PM.

This month marks the 5th year (I think—somebody might correct me on this) that we have participated in Telescopes For Telethon. From my perspective, this is one of the most important events of the year for our club. It not only gives us a chance to do something for kids and adults suffering from debilitating muscular diseases but it shows off the science and hobby of astronomy to the public.

I have been fortunate enough to have been there for most of the days we set up our telescopes at Tinsel Town Theater. I still remember our first attempt and the timidity I felt about approaching people and, in a way, begging for money. I think a lot of us felt the same way considering how much money we collected that first year. But when it was over and we did it a second time, I summoned all my collective willpower, put aside my shyness, and decided what the heck, when I ask for money, all they can do is say no. Now when I go out and set up my scope, I'm willing to try just about anything short of tripping, to drag a dollar out of people. I've been known to chase them down the sidewalk.

And so it is now time for us to do it again. It's my hope that, if you are able bodied and can stand the heat, you will be there on July 16 to help collect for Jerry's Kids. Steve and Amelia are counting on you. Don't disappoint. Please come and help FBAC with this most important project.

Thanks.

Wes Whiddon

FORT BEND ASTRONOMY CLUB
P.O. BOX 942
STAFFORD, TX 77497-0942

A NON-PROFIT ORGANIZATION DEDICATED TO ASTRONOMY BY TEACHING, SHARING, AND OBSERVING