

# NOVAC'S "BIG DAY"

The 2013 VAAS Annual Meeting & Star Gaze by David Werth

*"To observe and to help  
others to observe"*

NOVAC's motto was put into full effect on October 5, 2013, at C. M. Crockett Park when we took on the dual role of hosting the annual meeting of the Virginia Association of Astronomical Societies AND our own annual fall Star Gaze public event.

By my rough count, there were about 80 member telescopes set up on the field, running from the Obsession on Dob Hill down past Refractor Row all the way to BinocBurg. Aided by two late busloads of Prince William County high school students, there were nearly 500 members of the public there to share the skies with us. A Big Day indeed!

The day began early as we welcomed VAAS members from across the state to the annual meeting. NOVAC last hosted this event in 2007. It was a real pleasure to get to meet our peers from other clubs

and share our mutual interest together. The weather was kind as we had sun and clear skies all day and into the evening.

**Alan Goldberg** was our first presenter who spoke on color perception and meaning in astronomy. This was followed

by a round-table discussion on amateur astronomy by members of five different clubs and moderated by NOVAC president **Phil Wherry**.

**Jim Browder**, Richmond, **Steve Layman**, Charlottesville, **Jerry Hubbell**,



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## 2013 VAAS Annual Meeting & Star Gaze *Continued from p. 1*

Rappahannock, (our own) **Beth Tatum**, NOVAC and **John Goss**, the Astronomical League Vice President discussed topics such as:

- How is your club doing in its bid to attract new members?
- Are there particular demographics on which you're focusing particular attention?
- What are a few things your club does exceptionally well?
- If you could wave a wand and change anything about your club (or amateur astronomy generally), what would it be?
- Volunteerism is an oft-cited problem in clubs large and small. Any secrets you'd like to share about recruiting and developing great leadership talent?

All agreed that this was a very valuable exercise and that we all took home some new ideas to consider.

Capping the VAAS portion of the day, our Key Note speaker was **Sean O'Brien** who many members know as the host of the monthly astronomy night at Sky Meadows State Park. Sean shared some colorful observations on his long history as a planetarium educator.

With some safe solar viewing to bridge the gap, we moved on to our Star Gaze public event at 3 PM. **Chip Sufitici** got us



*NOVAC President, Phil Wherry, moderated a round-table discussion on amateur astronomy during the VAAS Annual Meeting.*

off to a great start with his presentation on radio astronomy and discovering solar flares from your own back yard. Chip's presentation was so popular that it was hard getting folks back in the tent for the next presentation as many folks had followed him out onto the field to see his rig in person.

Next up was our Key Note speaker from JHU/APL, **Mike Zimmerman** who gave an intriguing talk on NASA's DREAM Science Team and the space environment at the moon. Outside of basketball in the 1990's...who wouldn't want to be on the "DREAM Team"?

He was followed by NOVAC's own **Geoff Chester**, the public affairs officer at the Naval Observatory in Washington. Even though it is only a few miles from most of us, there is much to learn about its place in history. Geoff's excellent presentation really brought out the rich history at the USNO with added emphasis on the work being done there today. All in all, it was a great day of presentations and discussion. Following **Cal Powell's** one man planetarium tour of the real night sky, the big crowd got down to the real highlight which was enjoying the wonders of the universe, together... \*

### Event Speakers



Alan Goldberg



Sean O'Brien



Mike Zimmerman



Chip Sufitici

# NOVAC

The NOVAC Newsletter is the official publication of the Northern Virginia Astronomy Club and is published quarterly. The NOVAC Newsletter is available to members of NOVAC as a regular membership benefit.

## Membership

Membership in the Northern Virginia Astronomy Club is \$25.00 per year and is open to anyone interested in astronomy or the sciences. Additional memberships at the same address are \$5.00 per person. Membership in the Astronomical League is free with NOVAC membership and includes the *Reflector* magazine plus access to their Observing Awards.

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## Submissions to the newsletter

NOVAC members are invited to submit articles for publication in the NOVAC Newsletter. The editor reserves the right to edit all materials submitted. Send article submissions to the Editor, Chris Lee, at newsletters@novac.com.

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## A Conversation With... NOVAC Librarian John Deriso

By David Werth

*In what we hope will become a regular part of the NOVAC Newsletter, we will present question and answer interviews featuring some of our clubs' notable members who will share their thoughts on different aspects of our mutual interest in astronomy. Club member David Werth interviewed veteran observer John Deriso.*

*I can't think of anyone in NOVAC who is more involved in all aspects of the club—librarian, site coordinator, outreach participant and solar and night-sky observer—John does it all!*

**NOVAC:** John, how long have you been interested in astronomy and how did you come to join NOVAC?

**JOHN:** As a kid, I used Dad's binocs, laying on our front lawn in Connecticut and learning a few constellations. He subscribed to *Scientific American*; I read the articles on mirror-making and lusted over the Questar ads. In my mid-30s, camping in northern Arizona, there were so many stars I couldn't find the Big Dipper. In early '98, saw a Meade ETX-90 in a mall store window, reminiscent of the Questar. Read the manual, "I can do this." It was winter, Orion was up, saw the nebula and I was hooked. Read a little about Messier objects, so I figured I'd start with something easy, the first one, M1, right? Despair! Scope on car trunk, kneeling in snow at the edge of a sod farm. What's wrong? Knew exactly where to point. Not enough power? Bad eyes? Freezing, accidentally nudged the scope. Something REALLY faint moved. Bumped scope again, the faint thing moved again. IS THAT ALL THERE IS?? Upgraded to the go-to '90 on a store deal, and got a tripod so's I wouldn't kneel in snow anymore.

Heard of NOVAC somehow, joined in October '98 when meetings were in the Arlington Planetarium. Joined the ATM Special-Interest Group, made a 4-1/4 in. reflector, and a 10 in. Dob for another member.

**NOVAC:** How long have you been NOVAC's librarian and how did the club manage things before you took on that role?

**JOHN:** Stuck my hand up when Prez Tilly Smith asked for trustee volunteers, and did two 2-year terms. Back then, the Library was all in a 3-shelf 4 ft. x 3 ft. homemade plywood cabinet, maybe 50 books, and I think it was kept at the Planetarium. When we moved meetings to GMU, it was inconvenient to keep the cabinet there, so I volunteered to take it home and run the library from my house. Foolishly the Board gave me a budget and I began adding titles. In the years since then it's grown to more than 700 items—books, DVD's, star maps, etc. Three 6 ft. bookcases and the original cabinet. It was originally managed with library cards and a homebrew Excel spreadsheet, but that took many hours per week. Bought software to speed things. Now all items and borrowers are tracked with bar codes. Nirvana would be every borrower presenting their NOVAC card when checking out a title, but I still back up with the cards. That saved my bacon when the laptop crashed earlier this year.

**NOVAC:** What books or DVD's in the now vast club library impress you the most?

**JOHN:** I'm a fan of Fred Shaff's S&T column and books, like *Year of the Stars*. The Engineer in me likes techie stuff, particularly ATM 'cause I'm a tinkerer at heart. I like history, too. Ever read "The Perfect Machine", the story of the Hale 200-inch at Palomar? They did final figur-

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## A Conversation With...

# NOVAC Librarian John Deriso *Continued from p. 3*

ing polish touches with a thumb, come on! Some of the Great Courses DVD's are my ticket, like "Experiencing Hubble: Understanding the Greatest Images of the Universe." Good teaching.

**NOVAC:** Any new acquisitions you would like to recommend?

**JOHN:** Imaging has been a hot topic lately and I've tried to keep us current with titles that start at beginner level, through advanced image processing. I try to hit a balance between observing books, books for the newbie, kids' books, history, cosmology, DVD's like NOVA specials for cloudy nights.

**NOVAC:** You were the person who brought Meadowkirk in as a club observing site. Give us some background on how that came about

**JOHN:** So, I was standing at the book table one Sunday night, and a lady from Mfldkr (or so I thought) asked me if someone could help with their telescope. Me: "What kind?" Her: "Meade, I think." Me: "Well, I have a couple Meade scopes, I'll see." So I found Meadowkirk at Delta Farm Lane, met up with the lady—Shannon Pitre—who brought me to a 12 in. LX200GPS in a 10 ft. observatory. Me: "I think I might help, I have the same model."

**NOVAC:** I know you also refurbished the observatory on Meadowkirk's grounds...

**JOHN:** It was in sorry condition, no one on site knew how to even turn it on. The whole shebang was donated by the wife of a Pastor in his memory, Henry Coxe Brinton, who was also employed at NASA. Months later I had it running again, wasp nests cleaned out of the dome, Astroturf so's the eyepieces and Autostar controller wouldn't hit the concrete pad. I converted

it to ALT-AZ; trained a couple of MK's staff to turn it on. But no one knew the sky, and Shannon wanted to show MK visitors the stars. I headed up a couple outreaches with help from NOVAC members, including a night for Gulf War Vets with their families. It took some time, but the MK Board eventually reached confidence in NOVAC to sign an agreement to let us use their fields anytime.

**NOVAC:** What observing equipment do you use personally and what are your favorite objects to view?

**JOHN:** Rotator cuff surgery a couple years back has kept my 12 in. LX200GPS in the garage. Got a sweet deal on an 8 in. model that I now keep at my Jersey Shore house. Bought a second-hand ETX-125 that had been "used twice", mint condition...so it appeared perfect-looking optics. Turned out to have a wrecked plastic AZ gear train. Much internet digging and coaching, making parts, and months later, it turned out a fine machine. And I can carry it with one hand, it gets the most use.

**NOVAC:** Have you gotten into astrophotography yet?

**JOHN:** I had planned to start AP wide, bought rails and counterweights and a Stellarvue 80mm APO to ride on the 12 in. Meade. And the last Canon EOS 20Da at Ace Photo in Ashburn. Before long I had great shots of the moon and especially my neighbor's fence, trying different reducers.

**NOVAC:** I believe you have a Mallincam. Have you had a chance to use it yet?

**JOHN:** I saw Lyle Mars' Mallincam in operation with M27 and immediately went off on another tangent when a club member sold me his Mallincam XTREME.

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# EzCBP Equatorial Platform — It Really IS Easy!

Review by Michael Coren

*Disclaimer: I have no affiliation with TL Systems other than being a customer.*

*Disclaimer 2: There is a ton of useful information on the web about how equatorial platforms work, so I will not attempt to explain that here.*

## Introduction

A committed visual-only observer, I have been a happy dob user ever since I sold my equatorial GOTO rig in 2006. I love the simplicity of being able to simply put the scope down on the ground and start observing, and I find starhopping with a chart and finderscope to be extremely satisfying and relaxing. On a few occasions, however, I have thought it would be useful to have a tracking mount. Mostly, these have been when trying to observe with my kids, or at public outreach events. I had heard about equatorial platforms but never gave them much thought. A few months ago, however, I decided to look into purchasing or building one.

There are only a handful of options for buying a pre-made platform (I think I found three in the US, and one of those doesn't seem to be active lately), and lots of information on building your own. In addition to the CN forums, I saw many suggestions to check out the Yahoo! "eqplatforms" group. I signed up for this group and began going through its archives. There is definitely a lot of good information there, but it's organized chronologically and goes back more than ten years, and I felt that just browsing through it all could be a six month project on its own. With all due respect to the eqplatforms contributors (many of whom I recognized from CN), that is NOT how I wanted to spend my time.

From the research I did, I had two major concerns about building my own platform:

1. All of the designs I saw required the edge of either the curved or the flat surface of the bearing(s) to be cut at an accurate angle, generally the complement of your latitude. All I have are some basic hand tools I've bought over the years, no table saws or anything like that with a precisely adjustable tilt.
2. While there was plenty of information on platform designs, I found a lot less information about drive motors and electronics. There were some references to stepper motor controller boards available from regional electronic hobby suppliers around the world (or were available 5+ years ago), but I couldn't find any sort of "formula", if you will, for taking a common stepper motor with certain properties and driving it with an off-the-shelf controller board (although I did see a number of people adapting the Celestron AstroMaster/PowerSeeker drive module). A key component that also seemed missing from the discussions was the gearing. Was there an off-the-shelf gear module that would adapt the stepper motor to the necessary speed and torque? Or is this something I would have to design and assemble myself somehow (without access to a machine shop)? I didn't want to make the process designing and building a drive motor into a big project on its own.

In short, for my first attempt at constructing an equatorial platform, I was looking for something easy.

With these concerns in mind, I was pleased and intrigued to come across the EzCBP Cylindrical Bearing Platform kit from TL Systems (<http://home.netcom.com/~tssystem/cablet4.htm>). Some of what appealed to me about the EzCBP kit includes:

- Only one curved wood bearing surface to cut (promised to be "easy to cut and finish... using a standard hand jig saw and hand drill...")
- The angle of the curved bearing is set using hinges and turnbuckles. No need to cut an angled bearing edge
- Drive motor and controller included
- Reasonable price (regularly \$239, on sale at the time for 10% off, or \$215)

I searched through the CN archives and found a few mentions of EzCBP, most of which were positive. I only recall coming across two negative comments. One was an opinion that the components were not as "good" as what somebody would use himself, something which could realistically be said of nearly any mass-produced consumer product, telescope or otherwise. The other comment I saw was that \$239 seemed like a lot for a box of hardware and a set of plans. In my opinion, the value you're paying for with this kit isn't just the parts, but the time somebody took to figure out which parts you need, including drive motor, and to design a motor controller board and make a set of detailed plans to help you put it all together. The plans, about a dozen pages plus photographs and other information, show you exactly where to cut and where to drill and how to put it all together to

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## EzCBP Equatorial Platform — It Really IS Easy Continued from p. 5

make a working platform, in a reasonable amount of time, with a high likelihood of first time success.

I emailed TL Systems with some questions, and received prompt responses from Ted Lafleur, the "TL" in TL Systems, no doubt. After a brief exchange, I went ahead and purchased the kit with the unassembled drive controller (unlike woodworking, I've worked with electronics for many years so I'm not afraid of a little soldering). The kit is available with the drive controller pre-assembled, and there is also a dual-axis motor option, and digital setting circles available.

### Construction

The kit ships via USPS Priority Mail and includes just about everything you need except wood and tools. All of the hardware (hinges, screws, bolts, etc.) and drive motor and electronics are included. Also included are a set of detailed plans, but note that these are "plans" and not "instructions". They tell you how everything should be measured and cut and drilled and put together, but they don't give you a step-by-step sequence to follow. I cannot stress enough the importance of reading through the plans completely before starting construction, as there are important notes about some of the assemblies on different pages from the main page for those particular assemblies.

Many of the measurements in the plans are specified in units of 0.1 inches, but most of the rulers I have are graduated in 1/8 or 1/16 inch. For the most part, I just measured to the nearest 1/8 and cut as best as I could, knowing that my measuring and cutting accuracy is far worse than the difference between 1/10 and 1/8 of an inch.

I purchased my wood at Home Depot, where I got a four-foot length of red oak 1x4 for the curved sector and sector sup-

port boards, and a single 2 foot by 4 foot piece of 3/4 in. birch plywood "handy panel" to make both the top and bottom boards. The total cost for these two pieces was around \$32. The only other wood required is a few inches of 2x4 to support the south roller, and a few scraps of unspecified size to make feet. I also picked up a couple of cans of Minwax spray-on polyurethane wood finish.

The design of the platform avoids the need for angled bearing edges by attaching the curved sector (and its corresponding support board) with hinges and using turnbuckles to position and hold them in place. The advantage of this is that there is no need to cut any edges at precise angles. One drawback is that the sector mounted this way does not provide any bracing for the top board. The kit is advertised for a maximum weight of 150 lbs., although the web site says to contact TL Systems before ordering if your scope is more than 120 lbs. For 120 lbs., the recommended 3/4 in. birch plywood seems like it should be strong enough. TL Systems' web site shows a photo of a platform supporting a 14 in. sonotube dob, which is probably pushing the 120 lb. weight limit. I suspect it doesn't even feel my 60 lb. Orion XT10.

An important design parameter for any equatorial platform is the height of the rotation axis, which is directly related to the height of the center of gravity (CoG) of your scope. If the scope's CoG is higher than the rotation axis, the scope might not be stable and can tip as the platform reaches one extreme of its movement or the other. On the

other hand, if the scope's CoG is too far below the rotation axis, the drive motor has to work harder as the scope's weight shifts during tracking (one good analogy I read somewhere likened this to "driving the scope up hill"). In practice, you want the axis to be a little bit above the scope's CoG, but not too far. How's that for a precise specification!

When you order your kit, TL Systems will compute a bearing sector radius for you from your latitude and the height of your scope's CoG (actually they ask for the height of your altitude bearing, which is the most conservative approximation). The plans include a description of a graphical method to determine the bearing radius yourself, but like most graphical methods this relies on the accuracy of the drawing and measurements (using a protractor and, again, units of 1/10 in.). Personally, I prefer trigonometry, and once I understood the method I was able to mathematically reproduce the value Ted gave me from the data I had provided to him, as well as compute a somewhat lower axis once I determined how far below the altitude bearings my scope's center of gravity really was. It is not necessary to calculate sines and



*Pivoting jig for smoothing the circular bearing section using a hand drill and a grinding disc*

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## EzCBP Equatorial Platform — It Really IS Easy Continued from p. 6

cosines with, say, nine digits of precision. I found that a difference of 1/2 in. in CoG height only changed the sector radius by about the same amount, so in practice rounding to the nearest 1/4 or 1/2 inch is probably fine. Your mileage may vary, of course, depending on your latitude and the size of your dob. (I designed mine for 39°N, which is the approximate latitude of the Washington DC area).

The plans also include a description of how to build a pivoting jig for smoothing the circular bearing section using a hand drill and a grinding disc (the initial rough figure is cut using a jigsaw). I did this first, since I was most concerned about the circular bearing. Fortunately, it seemed to go smoothly, and in about two evenings I had a well-shaped circular bearing section.

For most of the construction I used my own hand tools. There are two holes on the sector support board which need to be drilled into the edge of the wood perpendicular to an angled surface, so for these I used a small drill press at my work, just to make sure the drill was really straight. For this step I also sandwiched the wood between two small scraps in a vice to reduce the likelihood of splitting.

Measuring and cutting the top and bottom boards was straightforward. I made a few changes to my platform from the supplied plans. First and most obvious is the shape. TL Systems' plans describe an almost square platform, but I made mine more of a "T" shape since less wood equals less weight, and because I don't like having square corners sticking out when I am walking

around my scope in the dark. I was also inspired by the many photos I found showing skillfully constructed platform shapes like this.

The second change I made was to add adjustable feet for help with leveling. Here again, my inspiration was the many pictures around the web showing adjustable feet using threaded rods. Mine turned out not to work very well, being somewhat wobbly and not having enough adjustment range for the slope of the field where I observe. I have some ideas for fixing them, but since this is a review of the EzCBP kit, I won't say any more about these feet because they were my own "embellishment" and not part of the kit plans.

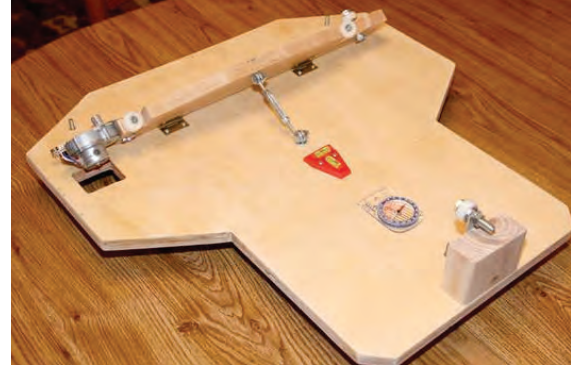
See photos, at right on this page.

Overall the kit parts and plans were sufficient for the job. There were a couple of minor snafus, but no show-stoppers, and Ted was very prompt in responding to emails with answers to questions and clarifications. I think the worst problem I had was that the threaded mounting stalks on the turnbuckles were exactly as long as the thickness of the oak 1x4 I had used for my circular bearing sector and support board, so I had to drill and cut away some of the wood around the mounting holes in order to get the nuts to thread on.

The final weight of my assembled platform, without scope, is 14 lbs.

### Motor Controller Assembly

The drive motor is provided as a single assembly connected to a metal mounting plate with pre-drilled holes for attachment to the bearing support board. A DB-9 plug



*Here is the completed bottom board, seen from the south end. The two-axis level and compass were not part of the EzCBP kit. I added these to help with leveling and alignment. I also made a cutout in the bottom board that I thought would be needed to prevent interference with the drive motor, although once I had assembled everything it looked like it wasn't necessary for my latitude after all.*



*Here is the bottom of the top board, seen from the north end. The metal plate on the south end contacts the roller that can be seen at the south end of the bottom board.*



*And here is the complete platform (other than the drive control box). I decided to replace my scope's ground board with the platform by installing a 3/8 in. bolt and tee nut and three Teflon pads as shown.*

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## EzCBP Equatorial Platform — It Really IS Easy Continued from p. 7



*Close up of the drive motor mounted on the bearing support board.*

is also attached to the mounting plate for connecting to the controller. The kit comes with a 6-foot DB-9 cable for connecting the motor to the controller.

Since I purchased the unassembled motor controller, I received a plastic enclosure containing a pre-assembled and tested circuit board with a standard 5.5 mm outer diameter/2.1 mm inner diameter DC power receptacle and DB-9 socket (for the motor interface) attached. Also included are pre-cut wires with the ends stripped (my kit was short two wires), a potentiometer for adjusting the tracking speed, two switches, and labels for the switches and potentiometer on the enclosure. Note that the two switches look identical but they're not; one is a three-position switch for on/off and tracking direction, the other is a momentary action switch for east/west movement (more on that later).

Assembling the electronics took less than two hours in all. About half of this time was measuring, drilling, and cutting the plastic enclosure for the potentiometer, two switches, DB-9 connector, and power input connector. The other half was soldering the wires, about 15 wires with a total of about 20 connection

points. A wiring diagram is included with the kit plans, and I recommend using a highlighter to mark the connections as you solder them. Be sure to double-check all of your connections against the wiring diagram again when you are finished, before applying power!

The plans require the wire carrying 12V from the power input connector to go to one of the switches, but my kit came with that wire slipped into one of the wire clips on the circuit board. My guess is that this is the way

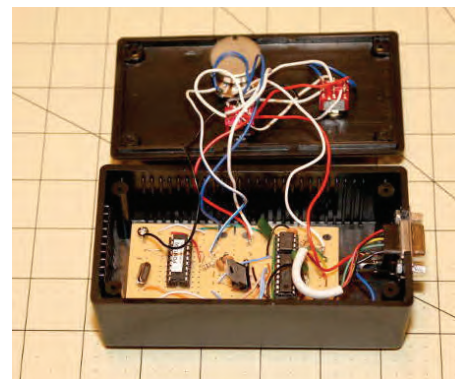
the board is tested before it is shipped. The clip just held the wire by friction, so it was easy enough to slip it out and solder it to the switch where it belonged.

The plans also suggest the use of silicone adhesive to secure the assembled circuit board into the plastic enclosure when soldering is completed. Since the circuit board has mounting holes at all four corners, I used a couple of 10mm standoffs from Radio Shack which I had left over from a previous project.

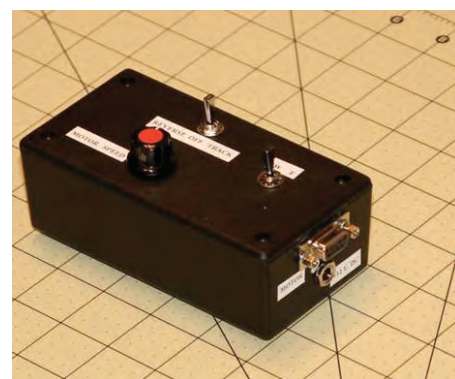
The assembled motor control box has two switches and a potentiometer. The potentiometer is used to adjust the tracking speed, and has a wide adjustment range. The wide adjustment range is necessary since the kit has to accommodate scopes of different sizes and latitudes, both of which affect the cylindrical bearing radius/circumference, and therefore the motor speed that is needed to track properly.

The first of the two switches is a three-position switch labeled "TRACK", "OFF", and "REVERSE". This switch turns the motor on and off and controls the direction of tracking.

The second switch is a three-position momentary contact switch labeled "E" and "W". This switch operates when pushed from the center into either the E or W position, and returns to the center position when released. The idea behind this switch is that it is used for slewing around a large object such as the moon, although in practice I'm not sure I understand its use. With tracking on, pushing this switch to the E position causes the platform to move in the reverse direction at the sidereal rate, effectively moving the view east at 2x the sidereal rate. Pushing this switch to the W position has no effect when tracking is on, but with tracking off it causes the platform to momentarily move in the westward direction at the current tracking rate. In order to "gain" on an object moving to the west, you also



*Assembled and soldered motor control electronics*



*Completed motor control box*

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## EzCBP Equatorial Platform — It Really IS Easy Continued from p. 8



*All together and ready for first light!*

need to turn up the tracking speed using the potentiometer dial.

The motor and controller are powered from 12V DC. The kit comes with a compact AC adapter, but if you want to power it from a field battery you'll need to make

your own cable with a 5.5mm OD/2.1mm ID plug (Radio Shack calls this "size M").

### First Light

My platform had its "first light" on a mid-August evening, less than four weeks after I received the EzCBP kit. I wasn't able to level the bottom board very well on the gentle slope of the field where I was observing, but the platform itself performed great. Saturn was low in Virgo in the southwest, so after leveling and polar aligning the platform as best as I could, I centered Saturn at 300x--definitely too much power for the conditions that night--and adjusted the tracking speed on the controller box until it seemed to be tracking well. I let this go for about 20 minutes, and although there was considerable drift in the north-south direction (due to the inaccurate polar alignment resulting from my leveling difficulties), the east-west tracking was pretty good. I only did this for about 20 minutes because I didn't want to lose good observing time, but it could have easily gone for longer.

After this, I only stayed out for about an hour before heading home (it was a week night, after all). During this time I had to reset the platform once. This was easy and involved lifting the top board slightly

off the drive motor (but keeping the other rollers engaged) and pulling it back to the other end of its travel range. I also learned a very important lesson: Check the platform tracking position and reset it, if necessary, before beginning your starhopping so that, once you finally find your target, you have more than a couple of minutes of viewing time before the platform runs out of range and has to be reset again!

### Conclusion

All in all I have to say the EzCBP lives up to its name. With only a few basic hand tools and very little woodworking experience, I was able to construct a working platform over the course of a few evenings and weekends. The total elapsed time from receiving my kit to first light was less than four weeks. I would say that the estimate of 8-12 hours of total working time (including drive controller assembly) given at the EzCBP web site is accurate. The price is reasonable, and the seller is a good guy who usually responds to emails the same day. \*

EzCBP web site: <http://home.netcom.com/~t1system/cablet4.htm>

## Upcoming NOVAC Meetings

**January 12, 2014**

Sten Odenwald  
Mind, Space and Cosmos:  
Exploring the mystery of space and  
how we think about it

**February 9**

Duncan Lorimer  
Fast Radio Bursts

**March 9**

Timothy Livengood  
Mars: A World Where Air Goes to  
Sleep at Night

Monthly meetings are normally held at 7 p.m. on the second Sunday of each month in Room 163 of the Research Building on the campus of George Mason University. More info at [www.NOVAC.com](http://www.NOVAC.com).

# The most volcanically active place is out-of-this-world!

By Dr. Ethan Siegel



Volcanoes are some of the most powerful and destructive natural phenomena, yet they're a vital part of shaping the planetary landscape of worlds small and large. Here on Earth, the largest of the rocky bodies in our Solar System, there's a tremendous source of heat coming from our planet's interior, from a mix of gravitational contraction and heavy, radioactive elements decaying. Our planet consistently outputs a tremendous amount of energy from this process, nearly three times the global power production from all sources of fuel. Because the surface-area-to-mass ratio of our planet (like all large rocky worlds) is small, that energy has a hard time escaping, building-up and releasing sporadically in catastrophic events: volcanoes and earthquakes!

Yet volcanoes occur on worlds that you might never expect, like the tiny moon Io, orbiting Jupiter. With just 1.5% the mass of Earth despite being more than one quarter of the Earth's diameter, Io seems like an unlikely candidate for volcanoes, as 4.5 billion years is more than enough time for it to have cooled and become stable. Yet Io is anything but stable, as an abundance of volcanic eruptions were predicted before we ever got a chance to view it up close. When the Voyager 1 spacecraft visited, it found no impact craters on Io, but instead hundreds of volcanic calderas, including actual eruptions with plumes 300 kilometers high! Subsequently, Voyager 2, Galileo, and a myriad of telescope observations found that these eruptions change rapidly on Io's surface.

Where does the energy for all this come from? From the combined tidal forces exerted by Jupiter and the outer Jovian

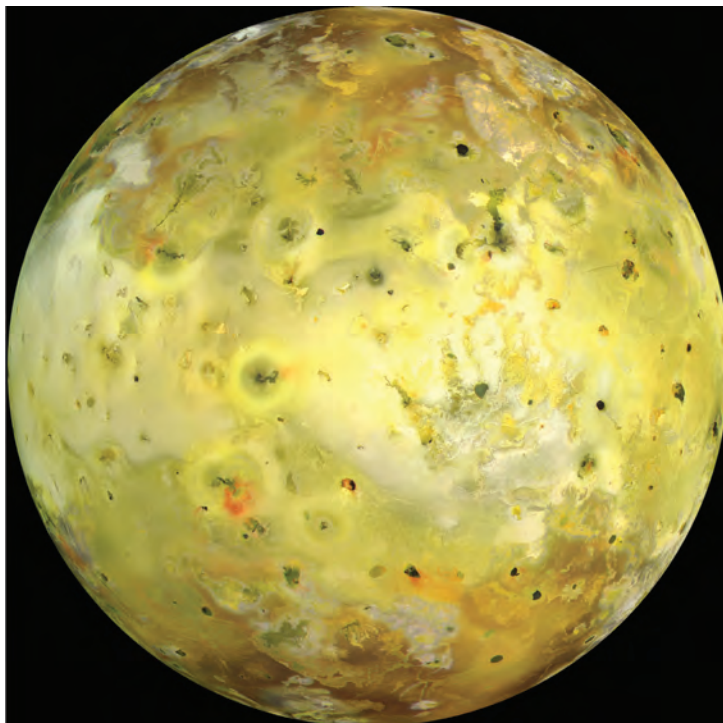
moons. On Earth, the gravity from the Sun and Moon causes the ocean tides to raise-and-lower by one-to-two meters, on average, far too small to cause any heating. Io has no oceans, yet the tidal forces acting on it cause the world itself to stretch and bend by an astonishing 100 meters at a time! This causes not only cracking and fissures, but also heats up the interior of the planet, the same way that rapidly bending a piece of metal back-and-forth causes it to heat up internally. When a path to the surface opens up, that internal heat escapes through quiescent lava flows and catastrophic volcanic eruptions! The hottest spots on Io's surface reach 1,200 °C (2,000 °F); compared to the average surface temperature of 110 Kelvin (-163 °C / -261 °F), Io is home to the most extreme temperature

differences from location-to-location outside of the Sun.

Just by orbiting where it does, Io gets distorted, heats up, and erupts, making it the most volcanically active world in the entire Solar System! Other moons around gas giants have spectacular eruptions, too (like Enceladus around Saturn), but no world has its surface shaped by volcanic activity quite like Jupiter's innermost moon, Io!

Learn more about Galileo's mission to Jupiter: <http://solarsystem.nasa.gov/galileo/>.

Kids can explore the many volcanoes of our solar system using the Space Place's Space Volcano Explorer: <http://space-place.nasa.gov/volcanoes>. \*



Io. Image credit: NASA / JPL-Caltech, via the Galileo spacecraft.

*Blast from the past*—This article originally appeared in the Jan/Feb 1997 issue of the NOVAC Newsletter.

## What's Up? Comet Hale-Bopp

by Al and Lynn Schumann

We figured it was high time we took a good long look at what should be the next great comet of the 1990s. So, a few other folks from the Skywatchers Club joined us on the Colonial Parkway near Williamsburg for a night of observing. Sky conditions could not have been better. We did not have the usual hazy skies you would expect in late summer - it was really clear. Also, the Moon was only a few days old, so it was out of the way before it even got dark. All year long Comet Hale-Bopp had been weaving its way through the southern Milky Way. It had departed Sagittarius and was in Scutum during our observing session. Because of its position, finding the comet was no trick at all. We just made our way along the Milky Way for the spout of the teapot and followed the fuzzes from the Lagoon and Trifid Nebulae on up to M-16. Hale-Bopp was the next fuzzy blob to the north. It was not yet a naked eye object. The comet seemed to be just about as bright as M-16, which put it around magnitude 6 to 6.5, an easy binocular object. It was a pretty sight in the 13 inch telescope. It showed a very bright



*Hale-Bopp: The Great Comet of 1997* FROM NASA.GOV. COPYRIGHT: JERRY LODRIGUSS

coma, slight flattened at one end, and it had just the suggestion of a tail at the other end. One fellow thought the comet resembled Hyakutake in early March just before the tail of that comet exploded into prominence. One thing is for sure, the expectations for greatness seem to be holding up. Hale-Bopp is already an

impressive comet, and it still has a long way to go before it makes its closest approach in April of '97. If you missed the chance to observe and get some good pictures of Comet Hyakutake, you've got a shot at enjoying another dandy spectacle. Hale-Bopp looks like it's going to be a blockbuster. ★

### A Conversation With...NOVAC Librarian John Deriso *Continued from p. 4*

I had it on the 12 in. a couple times before my shoulder conked out, but its main use has been on the 8 in. in New Jersey. What a rush, I tell you, M57 in living color and the central star!

**NOVAC:** What is left in your "Bucket List" for astronomy? What haven't you done that you would really like to if you could?

**John:** It seems that I gravitate toward helping people, whether it's showing how to run an Autostar, or locating an M-object, or just giving Mom and Dad and the kids a quick look at Jupiter, Saturn, or a bright globular. I have my hands in so many things I'll probably never be an expert in anything. Someday,

hopefully in the not too distant future, I'll quit groveling at the Altar of Commerce and then it's off permanently to my NJ Shore house. A good night there is as dark as Crockett. Mid-afternoon naps are great! ★

## “To observe, and to help others observe”

NOVAC is a non-profit, all-volunteer organization chartered to advance amateur astronomy in Northern Virginia. Member benefits:

### Access to dark sky observing sites

NOVAC maintains agreements that provide club members with year-round access to observing sites away from city lights. [www.novac.com/wp/observing/](http://www.novac.com/wp/observing/)

### Monthly meetings

Monthly meetings are normally held at 7 p.m. on the second Sunday of each month in Room 163 of the Research Building on the campus of George Mason University. Each meeting features a lecture on an interesting topic by a local expert. See the meeting web page or future newsletters for a schedule of speakers.

[www.novac.com/wp/outreach/meetings/](http://www.novac.com/wp/outreach/meetings/)

### Quarterly newsletter

The NOVAC newsletter provides information specifically for NOVAC members, as well as general interest articles on such topics as observing reports, equipment reviews, upcoming events, amateur telescope making (ATM) projects, and more.

[www.novac.com/wp/members/newsletter/](http://www.novac.com/wp/members/newsletter/)

### High-quality telescopes to borrow

NOVAC members may borrow one of the club's several loaner telescopes at no charge. Members may choose from among three 6 in. reflectors, two 10 in. f/6 reflectors, an 8 in. SCT, and a hydrogen-alpha solar scope. Binoculars are also available for loan.

[www.novac.com/wp/members/loaner-scope/](http://www.novac.com/wp/members/loaner-scope/)

### Club website

Up to date information about club events and activities is maintained on the club website at [www.novac.com](http://www.novac.com).

### Large club library

NOVAC maintains a well stocked library from which members may borrow by contacting John Deriso ([librarian@novac.com](mailto:librarian@novac.com)). A full list of titles is available on the club website.

[www.novac.com/wp/members/library](http://www.novac.com/wp/members/library)

### Private email listserv

Members keep up with current club information by subscribing to the NOVAC email list, without fear of flame wars or spam emails.

### Public outreach opportunities

Several times each year volunteers from NOVAC present astronomy programs to schools, churches, Scout troops and other public groups. Contact [outreach@novac.com](mailto:outreach@novac.com) or fill out the outreach form on the NOVAC website to request a program or help in supporting an event.

[www.novac.com/wp/outreach/outreach-form/](http://www.novac.com/wp/outreach/outreach-form/)

### Membership in the Astronomical League

Through NOVAC's membership in the Astronomical League (AL), NOVAC members gain access to the AL's newsletter, services and observing programs. [www.astroleague.org](http://www.astroleague.org)

### Discounts on astronomy magazines

Subscriptions to *Sky & Telescope* and *Astronomy* magazines are offered to club members at a considerable discount. Contact Kent Allingham: [membership@novac.com](mailto:membership@novac.com)

### Mentor Program

Young or old, new or experienced, this program is for everybody. If you would like to meet with a mentor, think you would like to be a mentor, or have any questions about the program, contact: [mentor@novac.com](mailto:mentor@novac.com).

See your Membership Guide for more details about member benefits.

<http://www.novac.com/wp/members/>

## Notice

Due to the cancelation of the December NOVAC meeting because of inclement weather, club elections will be held at the January meeting, 01/12/2014.

## 2014 Astronomy Events

### March 27th – 30th 2014

Staunton River Star Party

### April 12th – 13th, 2014

Northeast Astronomy Forum & Telescope Show

### May 10, 2014

NOVAC Astronomy Day

### August 22 – 26, 2014

Almost Heaven Star Party

### June 26 – 19, 2014

Cherry Springs Star Party

### July 25th – 28th, 2014

Green Bank Starquest

### Sept. 27, 2014

NOVAC Star Gaze

### October 20 – 26, 2014

Staunton River Star Party

Find more info at  
[www.NOVAC.com](http://www.NOVAC.com)