



THE NEKAAL OBSERVER

July 2005 VOLUME 13, ISSUE 7

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(785) 449-2102 www.nekaal.org

The official newsletter of Farpoint Observatory and the Northeast Kansas Amateur Astronomers' League

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Your articles and other contributions to this newsletter are welcome and encouraged. Please get them to the editor at least 6 days prior to the next scheduled meeting.

Editor : Graham Bell
12229 Blazingstar Rd
Maple Hill, KS 66507
(785) 256-6281
gebell@mindspring.com



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FROM THE PRESIDENT: By Graham Bell

Tombaugh Vision: The modifications to place the camera inside the scope have been completed. Dan Tibbets has spent many hours baffling the telescope, and had great success. The Tombaugh is approaching the original expectations, but it isn't quite there yet. Our original expectations might have been a little excessive, but Gary and crew will, I am sure, keep tuning and tweaking. Gary's FastTrack article discusses this in detail.

E/PO Building: Mark Borton and John Raild, an engineer, have provided a preliminary design for the Kessler Observatory. I say preliminary, because a number of changes are needed. As currently designed, a pier mounted telescope set up to reach Polaris would not be able to reach Sagittarius, one of the best areas for public viewing.

Cosmos 1: At the Society for Astronomical Sciences conference last month, a NASA Branch chief proposed a pro-am collaboration to track the Cosmos 1 satellite. I have written a little article about that effort (page 6).

Rescheduled Cookout and Viewing Night: Somehow, we managed to let several years go by since our last cookout at Farpoint Observatory. It's a fun time to enjoy food and conversation with other NEKAALers, and meet their long-suffering family members. When darkness falls, we'll start the star party. Set up your own equipment or use one of the NEKAAL scopes – whatever way you choose to spend a night under the stars.

Find the details about this on page 2. Be sure to bring family, friends and potential astronomers to this event.

Astronomical League Conference: This conference is in Kansas City this year, so NEKAAL should be well represented. Please try to join those of us who have already signed up. Details are on page 3.

Minutes and Financial Report: The minutes can be found on the Yahoo Group members section. For those members getting the printed version of the *Observer*, minutes are inserted. I dropped the ball, and missed the financial report this month.

COSMOS 1 Update. As the *Observer* is going to press, it has been 24 hours since the launch of COSMOS 1. It is missing and its fate is unknown.

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FASTTRACKS: by *Garv Hua*

My apologies for the absence of this column in the Observer the past couple of months. I could tell you I was just so busy but that actually means I poorly managed my time. So without further excuses here is an update about FAST.

The telescope has been transformed to an instrument no longer capable of eyepiece viewing (again my apologies), but now that the CCD is mounted directly inside the optical tube assembly (OTA), the output images have dramatically improved. The optical aberrations have been greatly minimized by reducing from three to two mirrors. Although there seems to be some room for further aligning the optical axis, it is now much closer to being centered. Images are now much cleaner. Stars are much more pinpoint and the out of focus aberrations show very little elongation in either axis.

Dan Tibbets has been steadily improving the baffling system (quite literally out of common household items and Velcro). It is now practical to take very effective flat field images

even in twilight! Dan really deserves a lot of credit for bringing the Tombaugh closer to its ideal capability. He and I also re-worked the CCD-in-the-OTA modification of the Tomabugh to make it more feasible.

All that has been done with the Tombaugh showed a dramatic improvement in the image clarity and depth although we are still a bit shy of going as deep (read faint) as I believe it should. Currently the scope and camera combination working with the focal reducer provides stellar images to 19th magnitude in about one minute, 20.3 to 20.5 magnitude in about 4 to 6 minutes, but fails to record much over 21.0 magnitude in 10 to 20 minute integrations. This cap at the faint end may suggest localized light pollution levels have increased dramatically over the last few years or we still have more tweaking to do with baffling and optical alignment and even optical configuration (somehow shaping the CCD and its holder to block less of the light cone?).

I still believe the Tomabugh at Farpoint on a good night should reach

21st in 6 to 10 minutes and perhaps reach 22.0 V in long integrations (say 20 minutes or more). Dan and I both agree the changes recently made to the Tombaugh have dramatically improved the end results.

FAST now has 1900 NEO observations on record with the Minor Planet Center. You can check out all of these observations including the residuals (used to track positional error comparing to observations by observatories), at <http://unicorn.eis.uva.es/cgi-bin/neodys/neoibo?sites:734;main>

We are using 2 megabyte images (Raw FITS images). We can no longer go months before needing to archive images and data. In one busy night we can now generate more than one CD's worth of data. FAST members would be wise to back up data soon after a single nights run if it used a lot of hard drive space. There is a stack of blank CD's in the top drawer of the file cabinet near the Dell computer. We may want to look at acquiring a DVD Recorder expressly for archiving data...



Farpoint Picnic & Star Party

Farpoint Observatory Grounds
July 15, 2005
6PM - ???

(Rain Date: June 11)

This is the new date, postponed from June 10. In case if inclement weather, the alternate date is July 16.



Check the NEKAAL MEMBERS YAHOO group or 1-785-449-2102 for last minute status.

We're grilling! Bring your friends and family to the cookout at Farpoint. Bring a lawn chair and enjoy food and conversation with other sky-minded folks, then stick around for some observing. Bring your **binoculars** and **telescopes** or use the club's. It's also Open House, so you can meet some of our neighbors.

**Burgers, Hot Dogs and Drinks donated by the Board.
BYOJF (Bring Your Own Junk Food)**

SKY HIGHLIGHTS: *by Janelle Burgardt*

Sky Highlights for July

NOTE: All times CDT

July 5	Earth at aphelion (farthest distance from the Sun)
July 6	New Moon
July 8	Mercury at greatest eastern elongation Mercury 2° SW of Venus, which is just below the crescent moon
July 14	First quarter moon
July 17	Occultation of Antares visible in far western and southern U.S. Mars at perihelion (closest point to the sun)
July 21	Full Moon. July's full moon is called the Buck, Hay or Thunder Moon
July 23	Saturn at conjunction
July 27	Last quarter moon

Planets

Mercury—Visible the first week of the month, it can be found 1-2° from brilliant Venus

Venus—Sets about 1½ hours after sunset. At magnitude -3.7, it serves as a locator for Mercury, and is only 1.1° from Regulus on the 23rd.

Mars— Rises in Pisces around 1a.m. Beginning at magnitude -0.1, it brightens throughout month to -0.5

Jupiter— At magnitude -2 in Virgo, Jupiter sets by 11 p.m. by end of month.

Saturn—Disappears behind the sun this month.

NOTE: Venus & Jupiter will be getting closer to each other over the next few months. They are 60° apart on July 6, closing to 45° separation by the 19th.

CONFERENCES & STAR PARTIES: *by Graham Bell*

Conferences:

AIcon Expo 2005 - See page 3

Star Parties

Texas Star Party

SW Region of the AL
<http://www.texasstarparty.org/>
 May 1-8, 2005, Fort Davis, Texas

Nebraska Star Party

Several Sponsors
<http://www.nebraskastarparty.org/>
 July 31 - Aug 5, 2005
 Valentine Nebraska

Ark-La-Tex Star Party

Red River Astronomy Club
<http://www.rrac.org/starparty/starparty.html>
 Sept. 1-5, 2005
 13 mi. W. of Nashville, Ark

Astronomical League Convention in Kansas City August 12 & 13

Don't forget the AL Annual Convention (ALCON 2005). Since it is in Kansas City this year is will be convenient. Several NEKAAL members have already signed up. Join us in KC for an interesting experience. For details see the May NEKAAAL Observer or check out the AL Web site at <http://www.astroleague.org>

AFFILIATED ORGANIZATIONS:



International Dark-Sky Association
 IDA
<http://www.darksky.org>



Astronomical League
<http://www.astroleague.org>

15 Events + 3 Pending

HERE ARE SOME PRICES FROM THE NEKAAL STORE:

<u>Periodicals</u>		<u>Merchandise</u>		Tote bags \$8.00
S&T \$32.95		hats \$8.00	marked down	Coffee Mugs \$10.00
Astronomy \$29.00		Tshirts \$8.00	marked down	Please contact Walter or Nancy Cole to acquire any of these items.
		Sweatshirt \$10.00	marked down	
		Name tags <i>free</i>		



Moving a Mountain of a Dish : by Patrick L. Barry

Your first reaction: "That's impossible!"

How on earth could someone simply *pick up* one of NASA's giant Deep Space Network (DSN) antennas—a colossal steel dish 12 stories high and 112 feet across that weighs more than 800,000 pounds—move it about 80 yards, and delicately set it down again?

Yet that's exactly what NASA engineers recently did.

One of the DSN dishes near Madrid, Spain, needed to be moved to a new pad. And it had to be done gingerly; the dish is a sensitive scientific instrument full of delicate electronics. Banging it around would not do.

"It was a heck of a challenge," says Benjamin Saldua, the structural engineer at JPL who was in charge of the move. "But thanks to some very careful planning, we pulled it off without a problem!"

The Deep Space Network enables NASA to communicate with probes exploring the

solar system. Because Earth is constantly rotating, a single antenna on the ground can communicate with a probe for only part of the day, when the probe is overhead. By placing large dishes at three locations around the planet—Madrid, California, and Australia—NASA can maintain contact with spacecraft around the clock.

To move the Madrid dish, NASA called in a company from the Netherlands named Mammoet, which specializes in moving massive objects. (Mammoet is the Dutch word for "mammoth.")

On a clear day (bad weather might blow the dish over!), they began to slowly lift the dish. Hydraulic jacks at all four corners gradually raised the entire dish to a height of about 4.5 feet. Then Mammoet engineers positioned specialized crawlers under each corner. Each crawler looks like a mix between a flatbed trailer and a centipede: a flat, load-bearing surface supported by 24 wheels on 12 independently rotating axes, giving each crawler a maximum load of 194 tons!

One engineer took the master joystick and steered the whole package in its slow crawl to the new pad, never exceeding the glacial speed of 3 feet per minute. The four crawlers automatically stayed aligned with each other, and their independently suspended wheels compensated for unevenness in the ground.

Placement on the new pad had to be perfect, and the alignment was tested with a laser. To position the dish, believe it or not, Mammoet engineers simply followed a length of string tied to the pad's center pivot where the dish was gently lowered.

It worked. So much for "impossible."

Find out more about the DSN at <http://deepspace.jpl.nasa.gov/dsn/>. Kids can learn about the amazing DSN antennas and make their own "Super Sound Cone" at The Space Place, <http://spaceplace.nasa.gov/en/kids/tmodact.shtml>.



Giant Deep Space Network antenna in Madrid is moved using four 12-axle, 24-wheel crawlers.

MEMBERS SURVEY TO BE SENT SOON: by Bill Leifer

Don't you just hate those surveys that everyone sends to you? All you want to do is just purchase something or obtain a service and then be left the heck alone, but every business has to send you a survey asking a million questions about the service that was provided. Well, guess what? NEKAAL is going to send you all a survey. Please don't throw it away. Here's why:

The last two years have seen a lot of growth in membership and activity. The public outreach program under Janelle Burgardt has been extremely active. We have joined many affiliate organizations, such as International Dark Sky Association, Night Sky Network, Astro League, etc. Most of all, the board has been totally preoccupied obtaining the NASA grant, building and installing the Tombaugh Telescope, and training interested members in the skills needed to participate in NEO research with the new scope and provide data to NASA. We are also constructing a new observatory building at Farpoint to house the club 14" scope and other member's scopes recently displaced by the gigantic Tombaugh Telescope. All of this is very exciting, but the downside is that we have not been able to pursue the main agenda and original mission of NEKAAL, which is to

provide its members access to resources and events that involve learning about the sky, how to use telescopes, learn visual observing, and sharing and enjoying this limitless, fun, and inspiring activity with other members and with our own families.

This has to change, and the board members recognize that. Consequently, we are doing some things that will bring us back to the original mission of NEKAAL. This includes fairly regular picnics at the observatory, where we can get to know each other, followed by a star party after dark where we can share our knowledge, look through each other's scopes, learn how to use our own scopes, eat junk food together, etc.

We also need to learn some details about each other in order to involve members in those things which led us to join NEKAAL. We need to find out your current level of interest and experience in astronomy, since at least half of us are absolute rank amateurs with little or no prior astronomy courses or experience. We also need to find out what other skills or interests you have that can be enlisted to run this organization. We need to know who likes to write or edit and therefore be able to help with the newsletter or

submit articles. We need to know who is good with computers or networking. We need to know who is good at fixing things or doing construction or small projects. We need to know who likes to cook or organize events. Who has teaching experience or likes to help with kids? Any or all of these things are needed desperately. In a club like this, anyone expressing an interest or skill in any of these things will likely find themselves a board member or officer rather quickly. The survey will accomplish these things.

Last, the survey will include some questions that will help me write a feature article in each monthly newsletter that will be essentially a "Member of the Month" featuring one of our members. This may require me to call you on the phone, and a small picture of you or of you and your family would be included in this type of article. Of course we would not do this without your agreement.

So, when you get this survey in the next several weeks, please take it seriously. Try to answer the questions, embellish on anything you want on an extra piece of paper, and mail it back to me.

FACILITY REPORT: by Bill Leifer

The Sprint phone and message machine are now functioning and replace the old number. The new number is 785-449-2102. The greeting and prompts are a little hard to hear, and we will try to record it a little louder. Nevertheless, it works well, and we have a back up dial up connection for internet, if the wireless connection goes down.

June Supplies and Maintenance were performed. There were no issues. More shear pins for the roof motor are needed. The old aluminum step ladder used for visual observing and other tasks is defunct, and a newer more "funct" one will have to be purchased.

Although the bee sting allergy emergency kit will work well for some time, it has "expired", and Dr. Jerry Majers will be obtaining a new kit. Regardless, we are prepared for an active bee and wasp season.

Some birds nests were cleaned out of the roof track mechanism. This happens every Spring, and it causes resistance against the rollers and broken shear pins.

Gary Hug installed a new cutoff switch for the southernmost excursion of the roof mechanism. So now, if the motor is left on while retracting the roof, it will shut off automatically.

Kevin Dobbs was able to purchase the floor model of a Brother MFC 9700 All-In-One Laser Printer-Scanner-Copier-Fax at a huge discount. Bill and Graham chipped in to donate this to the observatory. The toner cartridges for this excellent device cost \$72, but yield 6000 pages, which should be good for at least four years per cartridge at our level of use. The scanner and copier will be very useful for Public Outreach demos and teaching.

There has been almost continuous

activity improving the alignment and baffling of the Tombaugh telescope, and its optics and stray light elimination have markedly improved. This will continue to gradually improve with further adjustments over time, a process that is typical of all new research grade telescopes. A huge thank you to Dan Tibbetts who has worked on the baffling, and principal investigator Gary Hug, who has reconfigured the camera position and solved most of the alignment problems and also worked on the baffling. The Tombaugh is now up and running and producing excellent images, without astigmatism, reaching magnitude 21. The eventual goal is to reach magnitudes between 21.5 and 22 under dark skies for NEO work.

The first draft of plans for the Kessler Building is complete, and a meeting is scheduled at the office of the engineer on June 25.

COSMOS 1 - A SOLAR SAIL AND AN OPPORTUNITY: By Graham Bell

At the recent SAS conference Mark Whorton, NASA Branch Chief, presented a paper on the Solar Sail. By the time you read this, the test sail (Cosmos 1) will have been launched (June 21). On June 25 at approximately 8:35 pm CDT, the solar sail panels are scheduled to be deployed. I'd guess that NASA TV will cover it live, but my NASA TV guesses don't have a particularly good record. It wasn't on their schedule as of June 21.

Cosmos 1 is not a typical NASA undertaking. In fact, NASA plays a minor role in this endeavor, though they do, as usual, take more than their share of the credit. The Planetary Society has funded most of this \$4.03 million project, with assistance from the Russians. The spacecraft is being launched from a Russian nuclear submarine in the Barents Sea.

A solar sail operates with only sunlight as a propellant. The photons striking the sail transfer momentum to the sail. The force applied is the product of the photon's mass and its velocity. While the velocity is quite huge, not even E-Bay is selling photons with any appreciable mass. The objective, of course, is to use this solar energy to accelerate the sail. The acceleration is inversely proportional to the mass of the sail for any given thrust. The goal then is to maximize thrust while minimizing the mass of the sail.

The thrust resulting from the photon impact is not the only force acting upon the sail. There are varying gravitational influences. NASA wants to

acquire astrometric measurements of the sail's positions during the week or so of operational analysis. While they have a good idea of the thrust to be expected (0.0296 Newtons for a 40 x 40 meter square sail at 1 au from the sun), they need to better quantify the other forces.

They are asking for a collaboration between amateur and professional astronomers to acquire and submit the astrometric measurements.

The test sail is considerably smaller than the proposed size of 40 meter by 40 meter square sail to be used for the intermediate analysis, or the 80 Meter square sail planned for the final version. This newly launched sail is a 20 meter square one. Don't, however, let the smaller size fool you into thinking that the sail will be dim and hard to see. It is going to be bright... about mag. -1 to -2 (yes minus 2). That will complicate astrometry, as the object will be significantly brighter than the field stars for most positions. To further complicate the astrometry, this guy will be clipping






along at 3.5 arcmin per second. Yes Min per second, as compared with a typical NEO whose speed is measured in arcsec per minute. At this speed the satellite will cover about 17.5 degrees of sky in 30 seconds. It will cover 17.5 arc min (better than half a field of view with the Tombaugh) in 1/2 second!!!

A paper on suggested astrometric methods can be found in the email from Mark Whorton in the MPML Yahoo group.



Solar sail deployed in the vacuum test chamber at NPO Lovochkin. Credit: © Louis Friedman and the Planetary Society

July 2005

Sun	Mon	Tue	Wed	Thu	Fri	Sat
					1	2
3	4  Deep Impact*	5	6 New 	7	8	9
10 Board Meeting	11	12	13	14 1st Qtr 	15	16
17	18	19	20	21 Full NEKAAL Meeting 	22	23
24	25	26	27 Last Qtr 	28 ← Delta Aquarid Meteors →	29	30
31	* Deep Impact will be covered on NASA TV. Impact scheduled for 1:52 am EDT (0:52 CDT). See http://www.nasa.gov/multimedia/nasatv/MM_NTV_Breaking.html for NASA TV Schedule.					

2005 NEKAAL MEMBERSHIP FORM

Please check appropriate membership type:

- Individual \$30 Family \$35
 Student \$10 for first year, \$15 each succeeding yr

Name:

Address:

City State: Zip:

Phone Numbers:

E-mail:

Mail form and check to NEKAAL
 PO BOX 951, TOPEKA, KS 66601

FARPOINT CONTRIBUTERS

Help us improve and maintain Farpoint Observatory. A \$50 donation (membership dues not included) gets your name on a plaque on Farpoint's *Wall of Fame*.

- I am including an extra \$10 for a one year subscription to the Observer

Contributer Name:

Address:

City: State: Zip:

Name on Plaque:

- Donation is for Farpoint operating fund
 General fund Telescope
 Education/Outreach

Mail form and check to NEKAAL
 PO BOX 951, TOPEKA, KS 66601

Meeting Schedule

NEKAAL meets monthly on the fourth Thursday, January through October, at Washburn's Stoffer Hall. The meetings are at 7:30 pm.

Guests are always welcome to join us for the General Meetings and/or observing at Farpoint.

July General Meeting

Thursday, July 22, 2005, 7:30 pm

Speaker: **Russell Valentine - Colorado Star Party**

Will **You** volunteer ... call 256-6281

Who to contact:

<u>Meetings, Speakers:</u>	Graham Bell
<u>Farpoint Functions, Scheduling:</u>	Janelle Burgardt
<u>Farpoint Maintenance:</u>	Bill Leifer
<u>Special Presentations, Groups:</u>	Janelle Burgardt
<u>Dues, Donations, Merchandise:</u>	Walter or Nancy Cole
<u>FAST:</u>	Gary Hug or Graham Bell
<u>Web Content</u>	Janelle Burgardt
<u>Observer Articles</u>	Graham Bell
<u>Other Web Issues:</u>	Russell Valentine
<u>General Questions:</u>	Any board member

Graham Bell	256-6281	gebell@mindspring.com
Janelle Burgardt	266-5624	sky_liebe@yahoo.com
Walter Cole	266-4911	w.i.cole@worldnet.att.net
Kevin Dobbs		
Gary Hug	836-7828	frogstar@intergate.com
Bill Leifer	478-4249	williamleifer@usa.net
Jerry Majers	862-8869	jmajers@cox.net
Debbie Roberts		
Patsy Rush		
Dan Tibbets		Ddftp@aol.com
Russell Valentine	862-5046	russ@coldstonelabs.org

These numbers and email addresses are not to be shared with others. They are to be used by members only!

"The REAL MEETING" Gathering



Please join us for post-meeting eats at Perkins Restaurant, 1720 SW Wana-maker. Some members refer to this as "the real meeting" which follows our general meeting each month.

Open House Dates for 2005

February 11	7:30	August 12	9:00
March 18	7:30	September 10	8:30
April 15	8:30	October 8	8:00
May 13	9:00	November 5	7:30
June 10	9:30		
July 15	9:30		

Club Observing Dates for 2005

January 7-8	July 8-9
February 4-5	August 5-6
March 11-12	September 2-3
April 8-9	Sept 30- Oct 1
May 6-7	October 28-29
June 3-4	December 2-3

Farpoint Observatory

W. Long. 96°00'08.6" Elevation = 406 m
N. Lat. 38°53'24.9" = 1320 Ft.



The NEKAAL OBSERVER

NEKAAL

PO BOX 951

TOPEKA, KS 66601

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