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.
FASTTracks: by Gary Hug

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 Tomabugh 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/neoi%20sites: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°
are 1.1° from Regulus on the 23rd.

CONFERENCES & STAR PARTIES: by Graham Bell

Conferences:
AlCon 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 NEKAAL 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

Night Sky Network
"Astronomy clubs bringing the wonders of the universe to the public"

15 Events + 3 Pending

HERE ARE SOME PRICES FROM THE NEKAAL STORE:

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<th>Product</th>
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Please contact Walter or Nancy Cole to acquire any of these items.
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!

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.”

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 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 understandable. Try to answer the questions, embellish on anything you want.

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 Tomahau 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.
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
**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 CONTRIBUTORS**

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:

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

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Jerry Majers 862-8869 jmajers@cox.net
Debbie Roberts
Patsy Rush Ddtfp@aol.com
Dan Tibbets
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 NEKAAL OBSERVER

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PO BOX 951
TOPEKA, KS 66601

ADDRESS SERVICE REQUESTED