STAR STUFF

The Newsletter of the Ford Amateur Astronomy Club

April 1999
Volume 8 Number

☆☆☆ GIANT ASTEROID WILL IMPACT EARTH !!!* ☆☆☆

IN THIS ISSUE...

*APRIL FOOL!

A giant asteroid will probably impact Earth eventually, but with any luck it won't happen in our lifetime. ☆

Znamya - Russian Space Mirror Experiment Fails

by Bob Lambeck

The 25-meter Znamya space mirror failed to deploy on the morning of February 4 when it became snagged on one of the antennae of its Progress M-40 carrier spacecraft. A second attempt to deploy the mirror on February 5 was also a failure and the mirror along with the Progress M-40 was ordered into Earth's atmosphere over the Pacific.

Znamya, the second in a series of space mirror experiments, was intended to illuminate a 5 to 7 kilometer diameter area on the Earth with a brightness of 5 to 10 full moons. If the initial deployment had been successful, North American sites to be illuminated included: Winnipeg, Manitoba, 5:54pm; Quebec City, Quebec, 6:56pm; Calgary, Alberta, 6:30pm; and Devil's Lake, North Dakota, 7:32pm (all times local). A replacement mirror is available but space on restocking flights to the Mir is not available.

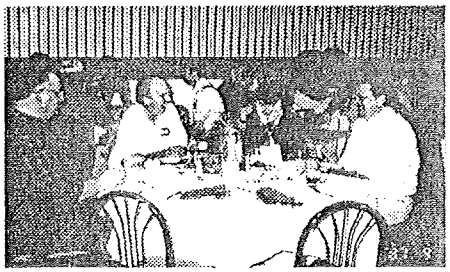
Znamya's sponsoring agency, the Space Regatta Consortium, has published an open letter to astronomers which appears to have done little to temper the controversy. The letter is generally well reasoned and informative; however, the final paragraph appears to have suffered fatally during translation to English: "We, as developers of large space-based structures, hope that in the future we will not only vex astronomers with our extremist experiments but we will also be able to provide scientists with unique tools for real exploration of the farthest corners of the Universe, as well as serve our civilization here on Earth in need and through the hard times."

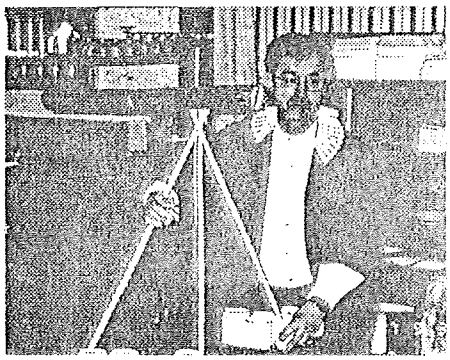
A sampling of opinions from the InterNet:

"This is one of those things where they spent so much effort seeing if they COULD that they didn't stop to think if they SHOULD." *Continued on page 2...*

ANNUAL HOLIDAY PARTY

photos by Al Bates ☆





STAR STUFF
is a monthly publication of the Ford Amateur Astronomy Club, an affiliate club of the Ford Employee Recreation Association.

STAR STUFF
P.O. Box 7527
Dearborn MI 48121-7527

Your submissions to STAR STUFF are welcome. Please write to the address above or contact the editor...

Greg Burnett
gburnett@ford.com
(313) 84-53586

Ford Amateur Astronomy Club

Officers:

President	Dan Kmiecik
Vice President	George Korody
Secretary	David Beard
Treasurer	Ray Fowler

General Meetings:
The Ford Amateur Astronomy Club holds regular general meetings on the fourth Thursday of each month (except the combined November/December meeting held the first Thursday of December) at 5:00 PM in conference room 1491 in the Ford Credit building in Dearborn, Michigan.

Observing:
The Ford Amateur Astronomy Club observes at Spring Mill Pond within the Island Lake State Recreation Area near Brighton, Michigan. The club maintains a permit for after-hours access. Weather permitting, the club observes on Friday nights, Saturday nights, and nights before holidays.

Hotline:
Observing schedules and additional club information is available by calling the Observing Hotline at (313) 390-5456.

Club Membership:
Membership in the Ford Amateur Astronomy Club is open to Ford employees and non-employees. Write or call for an application.

Annual Individual or Family	$ 20
Lifetime Membership	$100

Membership include a subscription to the STAR STUFF newsletter, discounts on ASTRONOMY and SKY & TELESCOPE magazines, after-hours access to the observing site, and discounts at selected area equipment retailers.

Znamya...from page 1...

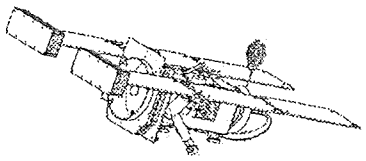
"Znamya is dead ... let's all look for the pretty fireball is it burns up in the atmosphere!! That's the only lighting of the night sky I wanna see. After reading the arrogant 'letter to astronomers' on the Regatta web site I have NO sympathy for these people whatsoever."

"The reactions on this newsgroup have revealed the narrow-mindedness of many contributors. It is one thing to oppose something and another to say that no right-minded person could possibly support it. Nobody should pooh-pooh Znamya until they have spent a winter in the Arctic. A month of solid darkness might make even the most avid astronomer yearn for a little light pollution." ☆

Stardust Mission Update

by Robert Salhaney

NASA's Stardust spacecraft had a successful launch atop a Delta II rocket from Cape Canaveral in Florida, on Sunday, February 7, 1999, at 4:04 p.m. EST. This is the first U.S. mission destined for a comet and the first-ever spacecraft sent to collect extraterrestrial material from outside the orbit of the Moon and return the sample back to Earth.



Stardust is on a path that will deliver it to Comet Wild-2 (pronounced "Vilt-2") on January 2, 2004. The spacecraft will gather particles of the nucleus of the comet. In addition the spacecraft will attempt to gather samples from a stream of interstellar dust that flows through the solar system. The particles will be captured in a glass foam called Aerogel. The samples will be enclosed in a clamshell-like capsule that will be dropped off for reentry in the Earth's atmosphere in January 2006. Equipped with parachutes, the capsule will float to a pre-selected spot in the Utah desert, where it will be picked-up and delivered to scientists for analysis. Additionally, photographs and dust analysis will be performed during the fly-by of the spacecraft.

The comet travels a path from just outside Jupiter's orbit to just inside the orbit of Mars. Due to the fact that Wild-2 originated from the Oort cloud, which extends beyond the orbit of Pluto, the Stardust mission will bring back matter from the deepest recesses of our solar system. The Stardust spacecraft will sweep through the comet's coma (the ball of gas surrounding the nucleus of the comet) at 136,000 miles per hour. NASA will use the Aerogel "catcher's mitt" to catch particles coming off of the comet.

The 'grains of sand" sized particles will hit the Aerogel with an extremely high velocity. The impact is so powerful that any other substance other than Aerogel would either vaporize the particles on impact or they would become so distorted that scientists would not be able to study them.

When the particles hit the Aerogel they will drill through the material, gradually slowing down, creating furrows that scientists will use to track the paths of the particles.

Aerogel is the lightest solid known; only three times the density of air. It can protect virtually anything from heat or cold. A block the size of a human weighs less than a pound yet could support a small car.

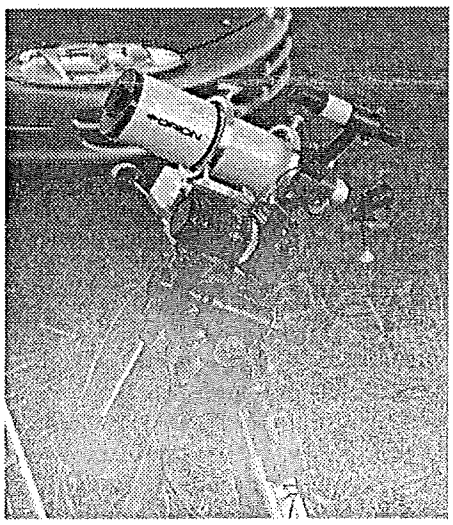
For more information check out the following websites:
http://stardust.jpl.nasa.gov/ or
http://science.nasa.gov/ ☆

A TRACKING MOUNT FOR ASTROPHOTOGRAPHY

by Clayton Kessler

As I was planning my recent vacation in Tucson, I realized that the ability to do some astrophotography while I was there was very important to me. Unfortunately I was flying, and luggage contraints precluded carrying my Meade 8" SCT. I spent a fair amount of time researching the portable alternatives.

At first, I thought I would build a classic "Barn Door" mount. I have seen these work very well with normal and wide angle lenses. Upon reflection I thought that a more sophisticated system would be more useful in the long run. There are several commercial camera tracking mounts available, and two had been reviewed in Sky and Telescope in the last year. More research!



The most highly regarded camera mount is the venerable Byers "Cam Track". This was apparently a very robust and accurate mount – and is no longer made. Judging by the cost of the "Cam track" on the used market, some of the components must be machined from solid gold! Lack of availability was the downfall for this mount. A search of Astromart showed many more requests to buy than offers to sell, and this is probably why the cost of the few available is so high!

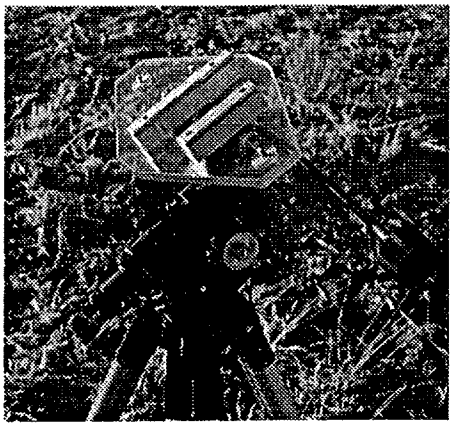
Pocono Mountain Optics sells a camera mount that they call the "Series II German Equatorial Mount". This mount was reviewed in the March 1998 issue of Sky and Telescope. I read the review several times and came to the conclusion that the reviewer thought it was "OK" at best. The mount sells for $309.00 and does not include any kind of tripod or declination controls. The mount could not be guided and would only support 1 camera with a limitation on the lens focal length. There were no polar alignment aids built into the mount so a good polar alignment was difficult to achieve. I see in the current ads that a quartz controlled drive is available – which brings the cost to $435.00. And a second camera adapter is available for an additional $24.95. The biggest problem with this is the lack of declination control and difficulty with polar alignment.

The next thing that came to mind is the Apogee Multi Purpose Fork Mount. This was reviewed in the January 1999 Sky and Telescope. This is a small equatorial fork mount with an RA drive and declination slow motion controls. This mount is large enough to accept a Celestron C90 or a Teleview Pronto. The mount comes with a light wooden tripod and a hole bored through the polar axis. This hole can be used to get a rough polar alignment and a drift alignment can finish the process. The RA drive includes a hand-box with variable drive rate controls and fast and slow buttons. This allows guiding in RA for astrophotos. Guide with what? The reviewer noticed that the polar bore hole was large enough for a 3/8" diameter screw. This allowed a camera tripod ball adapter to be bolted to the bottom of the RA shaft and a second camera to be mounted there. The reviewer mounted a C-90 to the fork mount and used it to guide photos of up to 25 minutes and up to 185mm focal length with a camera mounted to the ball head. The cost for this mount is $399.00 and I started to get very interested in it. The downfall on this mount is the tripod. A much heavier tripod would be needed to take accurate photos reliably.

As a result of my research, I felt that none of these mounts would satisfy my camera platform desires. I started a search for a used "Super Polaris" mount with RA and Dec motors. Unfortunately I was not able to find one in a timely manner that had a working drive system.

Time was beginning to get short and I had to make a decision. I had seen, in my cybertravels, numerous places that were selling a GEM mount made in Taiwan. This mount seemed to be everywhere from Orion Telescopes and Binoculars (the Skyview Deluxe mount) to the Europa Mount in Great Britain. Many small manufacturers were using this mount for 4", 6" and even 8" newtonians. I found, on the web, that Internet Telescope Exchange was offering their version of this GEM, the First Magnitude Model ITE EI01 Mount, with dual axis drives. I called Bill Burnett at ITE and discussed this mount with him. Unfortunately, the dual axis drives were not available, the drive manufacturer was located in the Florida Keys and heavily damaged by hurricane Georges. Bill did have a single axis drive available with a hand paddle for guiding. This I promptly ordered at a cost of $400.00.

A week later the drive hit my floor and I was very impressed when I unpacked it. The construction was robust and both RA and Dec seemed tight and precise. This mount is WAY beyond the normal, inexpensive, equatorial mount that comes with most mid priced scopes from Meade and Celestron. In size, the mount is slightly smaller than the venerable "Super Polaris" mount – maybe the size of the older Polaris. It includes worm gears on both axis and slow motion controls. A very nice feature is the polar alignment scope. The reticule shows Polaris with the proper offset and several of the stars surrounding the pole. The mount has fine adjustments in altitude and azimuth to ease the chore of polar alignment.



I quickly built a dual camera platform out of some ½" Lexan that I had laying around. I designed this in the shape of an elongated diamond. I included a machined dovetail bar in the center to attach a guide scope. This gave me the ability to attach my Orion "Short Tube 80" or my C-90 as a guide scope. Two cameras can be attached, one on each end. Balance is achieved in the normal way with a GEM and the counter-weight supplied was equal to the task. I really wanted to try the system out before the Tucson trip, to have a chance to work out any bugs. Unfortunately, Michigan weather being what it is, there were no clear nights available for this.

This system is fairly compact but I did not want to carry this for the entire trip so I shipped the mount UPS to my folks' place in Tucson a week prior to my leaving. This worked very well as the mount arrived 5 minutes after I did and I saved my back to haul around golf clubs!

A couple of days after my arrival I gave the system "first light" at the TAAA Empire Ranch dark site 30 miles from Tucson. The results were pretty good. The polar alignment scope, and the alt / az fine adjustments, allowed me to get a decent polar alignment quickly – but I had trouble finding the additional stars shown in the reticule. This resulted in some declination drift visible in the guide scope. If I were not quite so lazy, I would have done a drift alignment – but I am much too lazy for that. The Declination drift showed up as guiding error in the 200mm shots and to a lesser extent in the 135mm shots. A good drift alignment would have minimized this. Even better would have been a declination motor. A simple bump to the dec. axis once in a while would have made the use of 300mm and 400mm lenses possible. RA guiding was great. The motor adjusted well and held speed nicely. The Orion Short Tube is a 400mm focal length scope and my 9mm guiding eyepiece gives a 44x magnification. I did not notice any great amount of periodic error in the drive gears with this magnification.

All in all I am very pleased with this setup. I do plan to add a declination motor, which will allow more accurate guiding. I used the mount on three different nights and took about 70 astrophotos with it using two cameras simultaneously. All but a few (kick the tripod dummy!) came out very well and this gives me a wealth of negatives to scan and print. This will make a nice addition to my astrophotography arsenal and I will get a lot of use from it! ☆

NOTHING BUT THE FAACs

by George Korody

Welcome to recent new Club Members:

David K. Churen
Kristen Golick
Jon Haynes
Kathleen Lengyel
Lynn Morgan
Mark Thrashes
Tom R. Tompkins

We all look forward to meeting you and sharing in your experiences while participating in Club activities.

John Paul St. Peter and his wife Barbara, who had been long time members of FAAC, announced the arrival of a new family member by the name of Spencer Duncan. Spencer Duncan who is the fourth child of John Paul and Barbara arrived at 7:32 P.M. on February 15 at a weight of 8 pounds 3.5 ounces and a length of 20.5". Everyone is doing fine. ☆

MEETING MINUTES - 3/25/99

by Dave Beard

The meeting was called to order by President Dan Kmiecik at 16:56pm 3/25/99. Members immediately invested themselves with pop and pizza provided by George Korody and Bob Fitzgerald. The attendance was 36 which included 3 new members. A friendly welcome was extended to the new members, and the usual round table discussions ensued. The amount of observing seems to be creeping up, due to the slightly improving weather, and several members discussed the good time they had at the Eastern Michigan University Fish Lake star party.

It was John Kmiecik's 13th birthday, and everyone wished him well. Ray Fowler gave the treasurer's report: currently $1571.65 in savings, $2013.83 in checking, and the scholarship fund was up to $941.89. There have been two applicants for the scholarship fund, and the scholarship committee will convene to discuss the applications.

Bob McFarland gave a report on the recent activities of the Great Lakes Amateur Astronomy Committee (G.L.A.A.C.). The committee met at Indian Springs Metropark, which is being considered as a possible observing site for the metro area clubs. Light pollution is minimal at the site. The rangers are a little nervous about dedicating resources, but a small group of astronomers will be invited out to the site soon to check out the situation at the parking lot there. The Kensington Metropark star party is scheduled for August 20th and 21st. Also learned at the G.L.A.A.C. meeting is that the Eastern Michigan University Astronomy Club is asking clubs for ideas for an upcoming symposium on astronomy that they will be organizing.

President Dan solicited the membership for a volunteer (or volunteers) for the Program Chairperson. The duties are simply to come up with presentations or informative astronomy related demonstrations for the membership

meetings. The duties can be shared by more than one person, so if you have any ideas, please contact one of the club officers!

The members present discussed the upcoming Astronomy Day involvement. Nothing has been set in stone as of yet, but pairing up with one of the astronomy retailers for a display and throwing a picnic were discussed. A couple of retailers will be contacted as this subject receives more attention.

George Korody mentioned that the permit has been renewed for the Island Lake observing site, as well as the permit for our annual star party in September. The date for this year's event is September 18th. Mark your calendars! Also, the lock situation for the front gate at the park was discussed. The park rangers are in favor of a keyed lock due to the availability of more robust locks in this style, but the topic is still under discussion.
An item on new business was introduced by Ray Fowler. The proposal was that new member memberships be raised to $25, past due memberships (the cutoff being January 31st of the membership year) be $25, and members who sign up after June 30th, be charged $12. After some discussion, the motion was seconded, votes were taken, and the proposal passed with a 100% yea vote.

Member Clay Kessler then introduced the topic of the evening, a talk about his visit to the University of Arizona Mirror Laboratory, followed with an excellent video about activities at the lab. ☆

FROM THE EDITOR
by Greg Burnett

Another jam-packed issue of STAR STUFF! Thanks to everyone who contributed...keep those articles coming.

We need some "letter to the editor." I will appreciate your comments on the newsletter content and format.

Hope to see you soon! - G.B. ☆

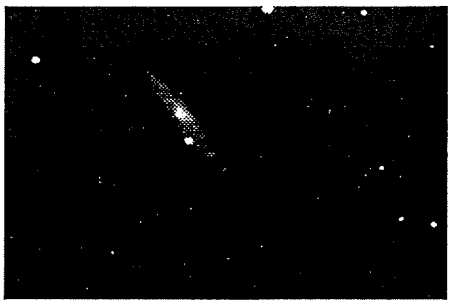
INSTRUCTIONS TO AUTHORS

STAR STUFF wants your articles, announcements, letters, etc. MS-Word format is preferred, but the editor will work with anything you submit.

Pretty simple instructions, huh? Submit your contributions today!! The deadline to be included in a particular issue is the Monday following the general meeting, but pay that no mind, just send your stuff along whenever! ☆

SUPERNOVA
by George Korody

Frequently now, supernovas are being found in other galaxies. Last spring (March) I heard of one in magnitude 11.9 galaxy NGC 3877 so I went to that location and took the attached CCD picture of the galaxy and the supernova, which itself was 12th magnitude, about as bright as the entire remainder of the galaxy. My pic is attached. The supernova is just below the bright center of the galaxy.



Because of such bright supernovas I am concerned that if Betelguese goes supernova (or has already) we might be in real danger of some significant gamma, X-ray, or other rays doing real damage, because of it's close proximity to us. Maybe we won't have to concern ourselves about Y2K problems after all!
:-) or is it :-(☆

HEARD ON THE NET
by Bob Lambeck

From the sci.astro.amateur newsgroup...

A 7 yr old's first Deepspace Night
I thought some of you might enjoy it. My daughter wanted to go out and use her telescope (Celestron 60mm Deluxe) last night (3/5/99) and it was a crystal clear evening. Of course she wanted to see some planets, but it was after 9PM and there were none available.

We started with the "fleaides" (which I of course corrected). A very nice view through the little 60mm at 22X (32mm Plossl). She of course exclaimed how "pretty" they were. I took the opportunity to explain what made this an "open cluster" vs. just a bunch of stars in view.

Moved on to M36, which to my surprise looked quite good in her little scope at both 22X and 111X (6.3mm Plossl). She thoroughly enjoyed the view, but I'm not sure that I got across the point that this was an Open Cluster just like the Pleiades. Plenty of individual stars visible at 111X.

I moved around the yard to find a spot to get a glimpse of M42 (where "stars are born"). We had a nice view at 111X, and I was treated to another gasp. My favorite question of the night came from this one: "You mean that's where stars come from?"

She then wanted to see "a pair of stars" so I pointed "the little scope that could" at Mizar/Alcor. I showed her the view at 22X, just 2 stars in view, I then pushed the power up to 70X, and the double split nicely. I got a nice surprised "wow" for that one. Of course, once again I took the opportunity to explain the difference (in 7 yr old terms) between a binary star system and a visual double. She got a real kick out of the fact that "one star spins around the other."

The attention span was waning at this point, but I wanted to give her a glimpse at a couple of galaxies. I managed to get

M81 and M82 at 22X, but they were very faint fuzzies, I may have lost her on these. She was getting cold, and was letting me know :).

For those of you fortunate enough to have children, I urge you to share this wonderful hobby with them. Nothing comes close in this life to seeing a small child's face light up (especially when it's your own). It was cold, windy, but the smile on her face lasted all night (as did mine).

Kevin Daly
Mattatuck Astronomical Society ☆

AURORA ALERTS

by Chuck Boren

I wanted to explain a couple of terms used in this months report so that you can better understand what some of them mean. First is Proton Enhancements. This is not so much a term as it is a description of a type of solar activity. The SEC describes a Proton Enhancement as solar activity levels with at least one high energy event (Class X Flares). Remember that the solar wind is made up of Protons and Electrons and the amount and speed at which these particles are ejected determines what they can do when they are trapped in the Earth_s magnetosphere.

An electron flux is the rate of flow of a physical quantity of electrons through a reference surface usually one centimeter square. The rate of electron flow is voltage, which brings us to MeV or million electronvolt. When the solar wind is really whipping around, voltages can get very extreme and that_s when an aurora can form. An aurora needs allot of electricity at very high pressures (voltages) to ionize the gases found in the highest part of our atmosphere and cause them to glow.

The following is part of a report published by the Space Environment center that tries to forecast solar activity for the next 27 days (one solar rotation).

FORECAST OF SOLAR AND GEOMAGNETIC ACTIVITY
24 MARCH - 19 APRIL 1999

SOLAR ACTIVITY IS EXPECTED TO BE LOW TO MODERATE. ISOLATED M-CLASS FLARES MAY OCCUR DURING 28 MARCH - 03 APRIL WITH THE RETURN OF OLD REGION 8485.

NO SIGNIFICANT PROTON ENHANCEMENTS ARE EXPECTED AT GEO-SYNCHRONOUS ALTITUDE.

THE GREATER THAN 2 MEV ELECTRON FLUX AT GEOSYNCHRONOUS ALTITUDE IS EXPECTED TO BE AT NORMAL TO MODERATE LEVELS DURING MOST OF THE PERIOD. HOWEVER, FLUXES MAY REACH HIGH LEVELS DURING 29 MARCH - 04 APRIL.

GEOMAGNETIC FIELD ACTIVITY MAY INCREASE TO UNSETTLED TO ACTIVE LEVELS AROUND 26 MARCH IN RESPONSE TO A RECENT CME OCCURRENCE. ACTIVE LEVELS ARE ALSO EXPECTED DURING 28 MARCH - 03 APRIL DUE TO RECURRENT CORONAL HOLE EFFECTS. ☆

NEXT GENERAL MEETING

The next meeting of the Ford Amateur Astronomy Club will be held on Thursday, April 22, at 5:00PM in conference room 1491 in the Ford Credit building in Dearborn.

The program for the meeting has not yet been determined, but as always, pizza and pop will be provided.

The Ford Credit building is the low building immediately northeast of (but not attached to) Ford World Headquarters. The building is secured with a card entry system. The easiest way to enter for meetings is to park in the lot east of the building and enter thru the lower east or lower northeast doors. At 5:00p no one seems to have much trouble entering, because many people are leaving about that time. At the lower east door you can dial 911 on the security phone and say you are there to attend a Ford club meeting, and security will admit you. The meeting room is on the lower floor, on the east side of the building, about mid-way along the north-south corridor. Usually, signs will be posted to direct you to the room. ☆

EMAIL ADDRESSES

If you have an email address but are not receiving meeting announcements via email, notify the club president (manager of the email distribution list) of your address. Also be sure to advise the club of any changes in your address. ☆

MAGAZINE DISCOUNTS

Do not send money to FAAC for SKY & TELESCOPE or ASTRONOMY magazine subscriptions. We now have a form that you send in with your subscription directly to the publisher to receive a $10 discount. Pick up a form at the next meeting, or contact a club officer. ☆

ADVERTISEMENTS

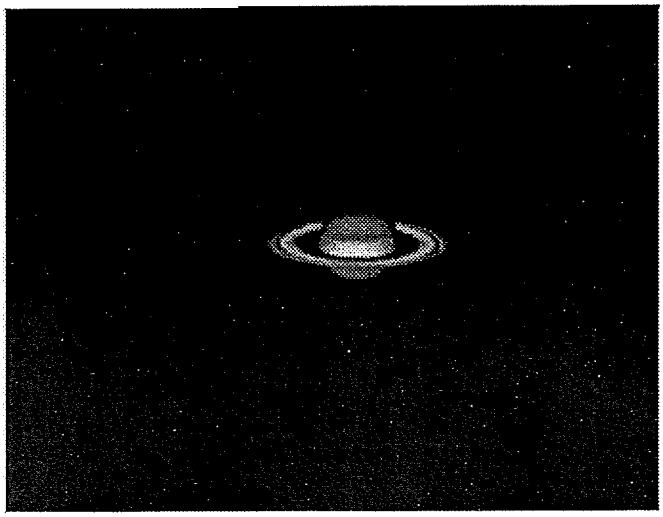
Misc. Telescope Accessories for Sale

2 Bausch & Lomb Wedge for 8000 and 6000 Scope
3 B & L Polar Alignment Kit #63-1067
1 B & L 8X50 Finder Scope
1 B & L Drive Corrector #63-1030
1 B & L Tripod Wedge for 4000 Scope #63-1061
1 B & L Lens Shade
1 B & L Off Axis Guider #63-1033
2 B & L Paraxial Mount #63-1029
3 B & L Camera Mount #63-1049
1 B & L RFT Adapter Assembly #63-1020
2 B & L Paraxial Camera Mount for 4000 Scope #63-1068
1 Meade #582 Sun Shade
4 Meade 2 Inch Prime Focus Adapter
1 Meade #788 Electric Motor Drive (MTS)
4 Meade #109 Setting Circle Set with Pointers (MTS)
2 Celestron Series 5 Filter Set (one set missing red filter)
1 Celestron Pulse Motor Drive (for old C5)

For further information contact...
Jerry Sadowski at Adray Photo
20219 Carlysle
Dearborn, MI 48124
313 274-9500 ☆

1999 Ford Amateur Astronomy Club Calendar

Apr 15-18	NCO Wilderness Spring Star Party – Boon, MI (West of Cadillac)
Apr 17	Lake Hudson Dark Sky Stargaze
Apr 22	FAAC General Membership Meeting
May 15	Lake Hudson Dark Sky Stargaze and Potluck Picnic With Jackson Club
May 22	Astronomy Day 1999
May 27	FAAC General Membership Meeting
Jun 11-13	16th Annual NCO Summer Solstice Star Party
Jun 12	Lake Hudson Dark Sky Stargaze
Jun 24	FAAC General Membership Meeting
Jul 10	Lake Hudson Dark Sky Stargaze
Jul 22	FAAC General Membership Meeting
Aug 12-15	SMURFS Star Party
Aug 14	Lake Hudson Second Annual Public Stargaze
Aug 20-21	Kensington GLAAC Star Party
Aug 26	FAAC General Membership Meeting
Sep 11	NCO Planning Meeting @ 4:00 PM Followed by Autumnal Equinox Star Party
Sep 11	Lake Hudson Dark Sky Stargaze
Sep 18	Seventh Annual Island Lake Star Party
Sep 23	FAAC General Membership Meeting
Oct 6-10	NCO Wilderness Fall Star Party – Boon, MI (West of Cadillac)
Oct 9	Lake Hudson Dark Sky Stargaze
Oct 28	FAAC General Membership Meeting
Nov 6	Lake Hudson Dark Sky Stargaze
Dec 2	FAAC Joint November/December General Membership Meeting
Dec 11	Lake Hudson Dark Sky Stargaze



Saturn
pic by George Korody

Ford Amateur Astronomy Club
STAR STUFF Newsletter
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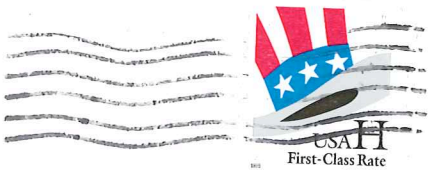

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