STAR STUFF

The Ford Amateur Astronomy Club Newsletter

August 11-12 Perseid Meteor Storm?

Volume 3 Number 8 August 1994

**ASTEROID OCCULTATION PRIMER**

Reprinted from Astronomy Network News
Issue #15, Spring 1994, Tom Gill, editor.

I saw this next piece in the HOUSTON ASTRONOMICAL SOCIETY's newsletter "Guide Star." While it is not attempting to be a complete "how-to," it is a great introduction to asteroid occultations. The brevity and clarity of the information may prompt members to rally behind the idea and give it a try, ideally as an "outing" or a group effort. And most clubs I talk to sure could use a little more of that!

How To Properly Observe and Time Asteroid Occultations
by Paul Maley

A most useful endeavor by amateur astronomers is to conduct observations of eclipses of stars by minor planets (asteroids). These are rare occurrences which are forecasted by the International Occultation Timing Association (IOTA) annually. Star finder charts are published monthly in Sky and Telescope magazine and give readers a warning of possible occultations that might be visible in the USA. Early in the year they publish a map of the more interesting events scheduled for the upcoming calendar year. An asteroid occultation involves the Earth, a star and an asteroid. All three line up geometrically and at the proper moment, the light of the star forms a shadow behind the asteroid which is cast onto the Earth's surface. Any observers lucky enough to be inside the shadow may witness the star drop in brightness to a level somewhat fainter then that of the asteroid itself. The star is called the "target star" and is typically 8th to 11th magnitude, thus requiring an 8-inch or larger telescope. Most importantly, the amateur astronomer using the telescope must be able to possess the proper equipment to make scientifically useful measurements and have the ability to "star hop" (or some other way) using star charts all the way to the spot in the sky where the target star resides.

Equipment Needed:

1. A telescope of at least 8 inches in aperture or one capable of showing a clear image of the target star along with at least several other nearby stars. The optimum eyepiece to use should have a field of view no larger than 0.25 degree (half a Moon diameter). One must have either a clock driven telescope or the skill to track the star by moving the telescope by hand so that during motion, the star never leaves the field of view.

2. A portable tape recorder with fresh batteries and tape rewound to the beginning.

3. A source of accurate time signals (easily obtained from a shortwave radio on the frequencies 5.0, 10.0 and 15.0 MHz, the three main frequencies for the National Time Signal broadcasting station WWV in Fort Collins, Colorado.) The radio should also have fresh batteries.

4. A star chart showing the target star with other reference stars.

5. If using a telescope with a corrector plate on the front in either a humid or cold climate, a hair dryer or some method to clear the plate of condensation.

Method:

1. If possible, locate the star on a night prior to the night of the occultation. It is NOT necessary to ever locate the asteroid at any time! Finding the star early is especially important if the sky is partly cloudy on the night of the occultation or if it is imbedded in a very crowded star field.

2. On the night of occultation, you will observe according to the following timeline. The letter "T" is used to indicate the time of predicted occultation.

T -30 minutes: Arrive at observation site and locate target star no later that this time. Depending on when you located star, the asteroid may be very close and will slowly merge with asteroid as time passes.

T -20 minutes: Conduct a test to determine if your voice and time signals record properly. Position recorder and short wave receiver in the locations they will be during observation. Turn on the radio and recorder, position your eye at the eyepiece and call out "D" and then after a few seconds, "R." Stop the recorder, rewind and replay tape to see if voice and time are recorded so both are clearly heard. If not, reposition everything and repeat the test until you can clearly distinguish your voice callouts and time tones.

T -4 minutes: Turn on short wave receiver and verify the best frequency for time signals.

T -3 minutes 15 seconds: Turn on the tape recorder.

T -3 minutes: Begin constant surveillance of the target star for the next 6 minutes. Monitor target and adjacent stars for atmospheric turbulence and verbally note any seeing, cloud problems, or distractions such as mosquitoes or tearing of the eyes. Otherwise, say nothing. As the asteroid passes in front of the target star, the occultation could last anywhere from a fraction of a second to the maximum number of seconds predicted. Be prepared to react. The occultation could occur any time in the 6 minute window of opportunity. Do not stop your observation for any reason until the end of the window is reached which you can tell by listening to the voice on WWV. If the star drops in brightness, call out "D" as quickly as possible, when the star regains its brightness, call out "R." After this comment briefly on whether the D and R were gradual or instantaneous. Also comment on stability of adjacent reference star images. MOST IMPORTANTLY, describe how fast you reacted to the event, that is, did you delay in calling out D or R by a 0.5 second or more. The best reaction time is about 0.3 seconds for experienced observers. (Ed note: you can test this for each observer before the event with a stopwatch, or you can devise a more sophisticated method.)

After you see the occultation, it still may not be over. Continue observing the star until the end of the 6 minute period. If you see any other occultations of that star, use the same procedure as above.

T +3 minutes: End observation. Turn off recorder and radio. Rewind tape back to determine if your callouts and time signals are clearly heard. Have your tape available to turn into the IOTA.

If your club has a coordinator, report your results to him or her as soon as possible. If you saw the star clearly but did not witness an occultation, this could be very important data. Report this. If you were clouded out, this also could be important and it too should be reported to the club coordinator.

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## PRESIDENT'S CORNER

The great New Mexico astronomical expedition is now history. Time was short for this issue of Star Stuff, so I'll provide a write-up on the trip for the September issue. For now, suffice it to say that it was a real nice vacation, but generally an astronomical fizzle. But I met some nice folks from the Clovis NM Astronomy Club, and I'll tell you all about it later...

On another subject, it has occurred to me that it's time to "launch" this club, kick it out of the nest, put its feet to the fire. We have only four more meetings this year (the November and December meetings are usually combined into one), then guess what: It's January and time once again for ELECTION OF OFFICERS!
Being president since the club was started has been an interesting and rewarding experience, but it's time to turn over the reins to new leadership. It's not too early for YOU to start thinking about what roll you will play in the future of your club. It's your ideas and innovations that will carry the club into a successful future. Nominate someone (perhaps yourself) right away! I expect to see campaign posters up by October!
Hope to see you soon!

*Greg Burnett*


# STAR STUFF

Monthly Publication of the
Ford Amateur Astronomy Club
Star Stuff Newsletter
P. O. Box 7527
Dearborn, Michigan 48121-7527


### 1994 CLUB OFFICERS

| | | |
|---|---|---|
| President: | Greg Burnett | 24-81941 |
| Vice President: | Brian Gossiaux | 39-03935 |
| Secretary: | John St. Peter | 535-2755 |
| Treasurer: | Al Czajkowski | 84-57886 |

### GENERAL MEETINGS

The Ford Amateur Astronomy Club holds regular general meetings open to the public on the fourth Thursday of the month at 5:00 pm. Meetings are held at the Ford Motor Credit Company (FMCC) building, northeast of the World Headquarters building in Dearborn, in conference room 1491, lower floor, East side of the building.

### OBSERVING SITE

The Ford Amateur Astronomy Club has an established observing site, by permit, at the Spring Mill Pond area of the Island Lake Recreational Area in Brighton, Michigan located near the intersections of I-96 and US-23. Observing at this location is usually held on any clear weekend and holiday evenings or as specified in the observing hotline phone message.

### OBSERVING HOTLINE NUMBER (313) 390-5456

On Friday and Saturday nights, or nights before holidays, you can call the hotline numbers up to 2 hours before sunset to find out if we will be observing that night. Assume that any clear Friday or Saturday night is a candidate observing night unless something else is going on or if none of the club officers are able to make it.

### MEMBERSHIP AND DUES

Membership to the Ford Amateur Astronomy Club is open to both Ford and Non-Ford Motor Company employees. The general public is also welcome to join. The dues structure is as follows:

| | |
|---|---|
| Annual Individual/Family | $20.00 |
| Lifetime Membership | $100.00 |

Membership benefits include a subscription to the Star Stuff newsletter, discounts on subscriptions to Astronomy and/or Sky & Telescope magazine(s), after hour use of the observing site at Island Lake Recreational Area, and discounts at selected local area astronomical equipment retailers.

### NEWSLETTER STAFF

| | | |
|---|---|---|
| Editor: | Brian Gossiaux | 39-03935 |
| Contributing Editors: | Patti Smith<br>Greg Burnett | Doug Bock |

### NEWSLETTER SUBSCRIPTION

A yearly subscription at a rate of $12.00 is available to those who are not members of the Ford Amateur Astronomy Club. Subscriptions are free to any other Astronomy Clubs wishing to participate in a newsletter exchange.

## SKY & TELESCOPE NEWS BULLETINS

BETA PICTORIS's PLANET?

Two French astronomers have found strong circumstantial evidence that a planet orbits the star Beta Pictoris, 52 light-years away. Ever since 1984, when a disk of solid particles was found surrounding the star, researchers have suspected that planets might form there -- if they haven't already. But the star's brilliant glare has prevented observers from studying the innermost 100 a.u. of the disk, where planets would accrete. Now, thanks to a high-resolution image made at the infrared wavelength of 10 microns, it appears that the density of dust in the disk drops tenfold within 30 a.u. of the star. Although other explanations exist, the French team proposes that a planet of a few Earth masses orbits about 20 a.u. from the star and has swept the inner zone of the disk nearly free of dust. This distance is analogous to the orbit of Uranus in our own solar system.

PRIMORDIAL HELIUM

Astronomers using the refurbished Hubble Space Telescope have detected the signature of ionized helium in the spectrum of a high-redshift quasar in Cetus. The characteristic ultraviolet absorption appears to come from diffuse intergalactic matter immediately in front of the quasar at a redshift of 3.286. If so, it confirms the presence of abundant helium in the cosmos only 1 or 2 billion years after the Big Bang, matching the predictions of Big Bang nucleosynthesis. It also signals the first detection of the ionized intergalactic medium, the stuff astronomers believe eventually spawned the galaxies we see around us today. An international team led by the European Space Agency's Peter Jakobsen made the discovery using Hubble's Faint Object Camera and announced their results in the July 7th issue of the journal Nature.

ULYSSES UPDATE

The Ulysses spacecraft has now begun its landmark study of the sun's polar regions. The European/American spacecraft was deployed from the space shuttle Discovery in 1990, whirled around Jupiter in 1992, then gained enough momentum to fly out of the ecliptic and into an orbit that will loop around the sun's previously inaccessible polar regions. Data sent back from Ulysses will enable scientists to learn more about the sun's magnetic field, corona, and solar wind. Ulysses is now on the road toward the solar south pole.

COMET-CRASH UPDATE

The black spots on Jupiter caused by the impact of Comet Shoemaker-Levy 9 last week are persisting. And they *can* be seen in amateur telescopes if the sky is clear and steady. No one knows how long they'll last -- estimates range from a few more days to a year. Spot A has started breaking up and others are elongating in Jupiter's winds, making it hard to tell some of them apart. Some spots are much bigger, darker, and thus more visible than others. These include H, K, L, and the elongated complex G-D-S-R. Omitted here are B, P, and Q2, which have not been seen visually; also, F, T, and V are near E and too faint, and is N near Q.

JOVIAN METEORS?

Smaller debris that was in the comet's southwestern tail will keep plowing into Jupiter for weeks. As of today, it is hitting the *near* side in full view from Earth. Any good-size chunks might cause visible flares. The most pieces, and the largest ones, should come soonest. So keep Jupiter's celestial east limb under watch, and be ready to note the time to the second if you see a definite flare. Full comet-crash coverage will appear in future issues of SKY & TELESCOPE.

TRAFFIC JAM ON THE INFO HIGHWAY

By now you're probably aware that images of the comet crash were transmitted among scientists worldwide by the vast computer network known as the Internet. For example, a 60-centimeter telescope at the South Pole, the only site able to view Jupiter in darkness around the clock, relayed its images back to the University of Chicago using a satellite-assisted link to the Internet. But the system's real power was demonstrated by how often everyday computer users tapped into the huge cache of comet data. In the past two weeks Internet sites at the Space Telescope Science Institute, NASA's Goddard Space Flight Center, the Jet Propulsion Laboratory, and the European Southern Observatory in Germany have logged roughly *two million* images that were downloaded for private viewing.

COMET 1994m

With the Moon now waning, you might try looking for Comet Nakamura-Nishimura- Machholz, which is near 9th magnitude and approaching the bright stars of Cassiopeia. Here are equinox 2000 positions for 0 hours Universal Time:

| | R.A. (2000) | Decl. |
|---|---|---|
| July 30 | 2h 25m | +68.4d |
| Aug 1 | 2 12 | 67.9 |
| Aug 3 | 1 59 | 67.3 |

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## CORRECTION

In the July issue of Star Stuff the article "Computing Dobsonian Coordinates" contained a printing error. All the "degree" symbols, ° , somehow were printed as "1/2". If you can read around this error, the math is actually pretty straight-forward.

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## NOTES FROM THE EDITOR

Due to vacations and astronomical ventures of many contributing members of Star Stuff, this issue will be slightly on the lean side. I decided that you would prefer a more timely receipt of the newsletter with information that is time sensitive rather than wait another week just to have a more 'cosmetically correct' issue. The September issue will return to the regular size and promises to contain many of the familiar columns. Thank you for your understanding on this matter!

# August 1994

| SUN | MON | TUE | WED | THUR | FRI | SAT |
|---|---|---|---|---|---|---|
| | 1 | 2 | 3<br>Mars 3° N. of Moon | 4 | 5 | 6 |
| 7<br>NEW MOON | 8 | 9 | 10<br>Venus 3° N. of Moon | 11<br>Ford Amateur Astronomy Club Perseid Party at Island Lake Rec. Area<br>Perseid meteors | 12<br>Moon at perigee<br>Mercury in superior conjunction<br>Perseid meteors | 13<br>Jupiter 2° N. of Moon<br>Perseid meteors |
| 14<br>FIRST QUARTER MOON | 15 | 16 | 17 | 18 | 19 | 20 |
| 21<br>FULL MOON | 22<br>Saturn 7° S. of Moon | 23 | 24<br>Venus at greatest eastern elongation (46°) | 25<br>The Ford Amateur Astronomy Club meeting . | 26 | 27<br>Moon at apogee |
| 28 | 29<br>LAST QUARTER MOON | 30 | 31<br>Mars 4° N. of Moon<br>Venus 0.7° S. of Spica | | | |

**NEXT MONTH**

**The Ford Amateur Astronomy Club general meeting is September 22nd!**
**Second Annual Island Lake Star Party, September 10th!**

**MEETING ANNOUNCEMENT -- August 25, 1994**

The Ford Amateur Astronomy Club holds regular general meetings on the fourth Thursday of each month. Our next meeting will be Thursday, August 25th, at 5:00 p.m.

The program for the meeting will be a presentation by John St. Peter on how astronomical distances are measured. This will be an update of an earlier presentation and will include many new developments and expanded information researched by John. Don't miss it!

The Ford Amateur Astronomy Club meets in the Ford Motor Credit Company (FMCC) **conference room 1491**, located on the lower floor on the east side of the building. FMCC is the low building immediately northeast of (but not attached to) Ford World Headquarters in Dearborn.
The FMCC building is secured with a card entry system. The easiest ways to enter the building for meetings is to park in the northeast lot (Employee Lot 7) and enter through the lower northeast door or the lower east door. At 5:00 p.m. no one seems to have much trouble getting in because many people are leaving around that time. At the east door you can dial 0911 on the security phone and say that you are here to attend a Ford club meeting, and security will admit you. You may, of course, find your way into the building any way you see fit, but I will post direction signs only between the lower northeast and lower east doors and the meeting room.
**IMPORTANT UPDATE about building access:** Controlled doors are presently being installed to secure access to the lower floor from the front (south) building door. If any folks have been entering there because there was no security, that will no longer be the case. Your best bet will be the lower northeast door; the receptionist will not let you in at the front door. Hope to see you at the meeting!

# OUR GANG

**FROM THE STARLOG OF JUDY DOELKER**

6-29-94 Curt Gowdy State Park, Cheyenne, Wyoming.

Hot here today, about 100 degrees, "but it's a DRY heat". After watching an afternoon thunderstorm over Cheyenne, I head west for Gowdy State Park, about 9,000 feet elevation. I've found a spot by the lake looking east with a hill to my back to break the wind (it's Wyoming, remember!). Venus and Jupiter pop in and out of the clouds. I have my C90 and I catch a few glimpses. I almost pack it up, but I have only a lonely hotel room to go back to and it's nice here by the lake, so I take a nap as the remaining sunset fades.

This IS a beautiful area and I'm glad I stayed. The clouds all go away. There are lots and lots of stars. I look at my Messier list and see I need to finish Ophiuchus. At 10:10 pm I spot M10 and M12. I've star hopped here. Then I hop over to M14. Looks a little fainter, but very nice. There's more I need in Ophiuchus, but Scorpio and Sagittarius call to me. First I look at a few now-called "regulars" - M4 and M7. Quite stunning, and nicer than when I saw them from Cayman. At 10:25 I find M6. It's easy to tell from the surrounding clusters because it's so bright. Sagittarius is only bout 10 degrees above the horizon but I see it's stars very clearly. I thought I saw some high clouds moving in but it was only the Milky Way growing brighter and brighter. I see lots of dark wisps going throughout - like one of Doug Bock's photos, but I'm seeing it directly - wonderful!

At 10:45 pm I locate M18 and M24. They're both in my eyepiece together. Five minutes later I locate M22. Next is M25 at 10:55 pm. These are all bright star clusters. I'm having quite a time! I have to locate them on my charts using the white trunk lights because I've forgotten my red lights in my suitcase back at the hotel. Then I have to get dark adapted again to search the sky for these little jewels. It's getting late now and I must work tomorrow but I cannot stop. At 11:00 I locate M54 in Sagittarius.

Before I leave I sit a while by the water, which is now very still, and find the teapot reflecting in the water. In fact, lots of stars are shining on the water, twinkling as the waves slowly rock. I will have to come back to this place.

6-30-94 Arapaho National Forest, Colorado.

I've driven here from Cheyenne today. Passing through Denver it was 96 degrees. On the way up the mountains I passed through an afternoon thunderstorm. There are quite a few clouds around, but as darkness falls they go away. I drive up US 6 to about 11,000 feet elevation. I'm still in the trees, but it gets colder as I go higher. Its pretty windy too, so I pull into the parking lot of Arapaho Basin Ski Area. It's pretty dark here and mostly out of the wind. The Milky Way is shining bright, just like in Wyoming last night. M3 is very bright. Ursa Major is positioned well above the trees and I think I will time-travel here on this very clear night. Those "hard to find" Messier objects may not be so hard to locate tonight.

At 10:20 I locate M97, the Own Nebula. I almost have to use averted vision, it's just a small smudge in my C90, but definitely there. As I cross over my target star to the other side I can barely make out a galaxy M108. I do have to use averted vision here, and have to move the field around a bit to see it at all. I look up the magnitude and find that it's only 10.1. Wow, and I found it in my C90! The Owl Nebula is only mag. 12, but it's easier to see. I wonder why - maybe more surface. These objects look like a mag. 9 would back at Island Lake.

At about 10:28 pm I locate M109. At mag. 9.8 it seems as hard to see as M108. Still, averted vision helps and I log in another Messier object. It's pretty cold here, about 50 degrees now, and I don't have a hat (poor planning) so I put a skirt over my head to preserve some heat. I'm glad no-one can see me here. I wish I had gloves. All the metal controls are very cold!

Other than M40 (where's that?) I've completed the Messier's in Ursa Major and it's on to Canes Venatici. I don't seem to have much trouble locating brighter stars to begin my star hopping and I like the upright view I get through my C90. It takes a little longer to find M106 at about 10:35 pm. I can feel the cold eating away at my patience.

I finally give in to the cold and wrap it up at about 11:00. Nine Messier object last night and four more tonight puts me at 57! Look out Patti! I'll see you next weekend. Maybe we'll make the certificate together.

7-23-94 Bugland, USA (Otherwise known as Island Lake, Spring Mill Pond).

Saturday night. I arrive at 8:15 p.m. Sun setting, about 78 degrees, little wind and clear skies. Soon John St. Peter and family show followed by Harry and Ada. We have lots of chatting while we all set up. Brian and kids arrive in an over-stuffed vehicle (the kids are real troopers!) All our sights are on Jupiter -- searching out the impact sites.

Now a FIRST!!! Yes, it's hard to believe, but Al Czajkowski and his wife Kathy arrive with telescope to boot! This is the first time since I've been a club member that I've seen the club Treasurer out observing. Kathy says it's been almost a year since she's been out. They picked a lovely night and I hope this evening is a spark for them to get out and observe with us more. Doug Bock shows up too and seems to have a great time "scope hopping". I think he likes this as much as "star hopping".

A few others show up too but I never do get around to their scopes. Of all the scopes, Brian's seemed to have the best view of Jupiter's new "black" spots. The elongated one tonight is really two sites close together. Brian's scope really resolved the two spots nicely along with the bands. I think we all would take that scope off his hands given the opportunity.

We have some great fun with the moon tonight. Kathy really likes the craters and Harry and Ada are real interested in the

variable polarizing filter. All view the "Once in a Blue Moon" with the filter on maximum - real pretty. Doug shows us eyepiece projection and creates a 6-7 inch moon on a white book cover using my 42mm eyepiece. All the features show up nicely -- pretty cool!

Two regulars, Greg and Patti, are no-shows tonight. Greg is recouping from his vacation drive and I don't know where Patti is, but we miss them both. I almost decided not to come out tonight because of the full moon. I figured I could see Jupiter just as well from my own backyard and the moon would outshine any other objects I might search for at Island Lake. But I'm glad I went because there is more to club observing than "seeing". We all had such a nice time -- lots of laughs. It was a relaxed atmosphere -- no real quiet, serious observing tonight. And that's great for a full moon. Just a good time to be with friends out at night, out of trouble, and out of donuts! Missed those too!

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**MEETING MINUTES - July 28th, 1994**

The meeting was held at the Ford Motor Credit Company, conference room 1491. There were 32(?) members and visitors present. The meeting was called to order by our club president, Greg Burnett, at 5:15pm.

Presidents Report: Greg provided information about the annual Astrofest '94 sponsored by the Chicago Astronomical Society, noting that it coincided with our own 2nd annual Star Party at Island Lake scheduled for Sept. 10, 1994. He also mentioned the annual SMURFS star party scheduled for August 4-7, 1994. Maps to the viewing site were provided for those interested in attending.

Vice Presidents Report: Brian Gossiaux announced that the FAAC had been accepted for membership in the Astronomical League.

Treasurers Report: Al Czajkowski related the Clubs financial status and the report was placed on record.

Main Presentations: The remainder of the meeting was taken up with a "de-briefing" on the Shoemaker-Levy 9 comet impact with the planet Jupiter. The multi-media presentation included images produced by the Hubble Space Telescope and images from various observatories throughout the world, downloaded from different sources on the Internet. David Lee provide a slide show of photographs he had taken of our planetary neighbors, including some excellent photos of Jupiter. Barry Craig showed us some video tapes of the comet impact that he had taken during the week long encounter with Jupiter. Charlie Hart provided us with some video tapes of the updates and news briefings that were shown on the NASA TV network during the week of cometary impacts. The meeting adjourned at 7:30pm.

*Right:* Image from the Hubble Space Telescope showing three of the many 'black spots' left by the impact of cometary fragments of Shoemaker-Levy 9.

# PERSEID STORM?

Some of you may recall that last year's Perseid Meteor Shower was hyped to be what astronomer's refer to as a 'storm'. This prediction was based on reasoning that the Earth's orbit was going to take it directly into the main stream of the debris remnant's from periodic comet Swift-Tuttle. Well apparently the predictions were off and there is a somewhat guarded guess that this year's shower will be the 'big event.' (See Sky&Telescope August '94, page 72 for more detail.)

This year the Ford Amateur Astronomy Club will be holding a 'Perseid Party' out at our Island Lake Recreation Area observing site on the night of Thursday, August 11th. You will need no special equipment to be able to observe this type of event. A lounge chair (preferably the reclining type), warm clothing and blanket, plus lots of mosquito repellant, and your own eyes are all that is required. Arrive at the site around dusk if possible so as not to miss a single streak across the sky.

Even if no storm occurs, the shower should still prove to be enjoyable with approximately 100 to 300 meteors an hour. As always, this event is based on the weather, so call the FAAC Hotline (313) 390-5456 prior to sunset for verification. Hope to see you at the Storm!

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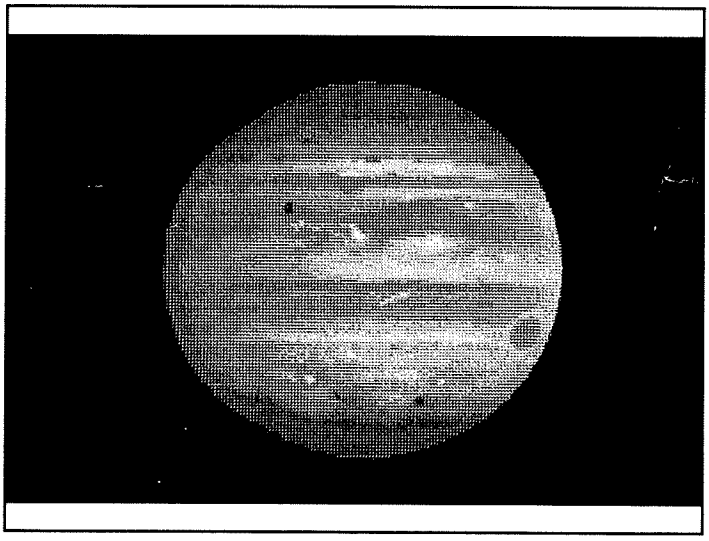
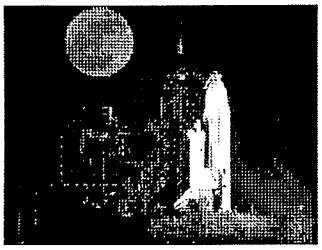


# ASTRONOMY WORKSHOP

**by Greg Burnett**



PROFS=GBURNETT
InterNet
USFMC6SH@IBMMAIL.COM

Well, there were no answers or questions submitted since last time, so instead, I have included selections from "Purchasing Amateur Telescopes FAQ" by Ronnie B. Kon (ronnie@cisco.com "FAQ" means Frequently Asked Questions). Thanks to Paul Mrozek for providing this material.

**What is the single best piece of advice to give to someone thinking about buying a first telescope?**

Find a local astronomy club and attend a star party. *[Told ya!! - G.B.]* Find ways to look through telescopes of different quality and prices so you can determine what you want to buy. This FAQ can give you information, but cannot possibly compare to actually going out and looking for yourself. Besides, it's the last chance you'll get to look at the sky for free.

**What are some good introductions to Amateur Astronomy?**

In the US, there are two popular astronomy magazines: Sky and Telescope (S&T), and Astronomy. Of the two, S&T is more technical, while Astronomy has more things like "artist's conception of Jupiter-rise on Ganymede" which are very pretty. I consider S&T a necessity, but getting both is not a bad idea.

There are many good introductory books. I can recommend The Light-Hearted Astronomer by Ken Fulton as being an excellent introduction for the complete neophyte. The writing style is a little irritating, but it is full of practical information. It is more about observing than astronomy, though. It has advice like "if you are in bear country, make a lot of noise so the bears don't bother you."

P. Clay Sherrod's A Complete Guide to Amateur Astronomy, available through Sky Publishing Company, is a more technical introduction. Sidgewick's books are absolutely excellent books, probably the very best ever written on amateur astronomy. They are also probably over a beginner's head. Holding off on these for a while would not be a bad idea.

Nightwatch by Terence Dickinson is a good introductory book on Astronomy. Great section on purchasing a telescope. Star charts are so-so.

The Backyard Astronomer's Guide by Terence Dickinson and Alan Dyer. A comprehensive introduction to astronomy and the equipment amateurs like to use. Written by and for amateur astronomers.

**What will I be able to see?**

The best way to find out is to go observing with someone. Look for a local astronomy club (S&T lists them periodically). This is also a very good way to get a good price on a used telescope of proven quality.

In general, you will be able to see all planets except Pluto as disks. You will be able to see the bands and red spot on Jupiter and the rings around Saturn. You may be able to see the ice caps on Mars (although Mars is probably the most disappointing object in the Solar System). Venus and Mercury will show phases but not much else.

You will be able to see four of Jupiter's moons as points. Ditto Saturn's moon Titan. You will be able to see comets.

Do not expect your images to be anywhere as nice as the ones you see from the Voyager spacecraft [or the Hubble Space Telescope -G.B. ]. If a $2000 telescope could get these, nobody would have spent billions of dollars to send a spacecraft out there.

As far as "deep sky" objects, you will be able to see all the Messier objects in most any modern telescope. Galaxies will tend to look like bright blobs. Look a while longer and you may find some spiral arms or dust lanes (assuming it has them). Galaxies look nothing like their pictures--you will not see the arms anywhere near as clearly.

You will also find that the colors you see are considerably more muted than the pictures you see. This is because our retinas work by having two different types of light sensitive organs, rods and cones. Rods are very sensitive to dim light, relatively useless for color vision. Cones are the opposite. Thus when looking through a telescope you are using your rods, and you aren't seeing a lot of color.

Left over questions.....

**Q31. What is meant by an Astrometric night and a Photometric night, are they the same? What are the differences and what type of astronomy are they related to?**

**Q32. What is a good light-weight 35mm camera for taking pictures through a telescope?**

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**U of M RADIO TELESCOPE OPEN HOUSE**

Thanks to Steve Nagi for the following info.....

Recently I contacted U of M regarding an open house they have for their radio telescope (I think it is right off of N. Territorial Rd, you can see it from the road). They are having one this year on the 3rd Sunday of September from 2:00pm-4:30pm. Their number is 426-8441. If I can, I plan on attending that.

# STATISTICALLY SPEAKING....

Dearborn, MI

Latitude: 42°22'00" N Longitude: 83°17'00" W

Local Time = UT - 4.00 hours(EDT) Elevation: 180 meters

Times are in 24 hour format.
Abbreviations used in reports:

| | | | |
|---|---|---|---|
| FQ | First Quarter Moon | SR | Sunrise |
| FM | Full Moon | SS | Sunset |
| LQ | Last Quarter Moon | MR | Moon Rise |
| NM | New Moon | MS | Moon Set |
| UT | Universal Time | | |

August 1994

| Sunday | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday |
|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| | SR: 6:25 | SR: 6:26 | SR: 6:27 | SR: 6:29 | SR: 6:30 | SR: 6:31 |
| | SS: 20:53 | SS: 20:52 | SS: 20:50 | SS: 20:49 | SS: 20:48 | SS: 20:47 |
| | MR: 1:23 | MR: 2:05 | MR: 2:53 | MR: 3:48 | MR: 4:47 | MR: 5:50 |
| | MS: 16:20 | MS: 17:13 | MS: 18:01 | MS: 18:46 | MS: 19:27 | MS: 20:03 |
| 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| SR: 6:32 | SR: 6:33 | SR: 6:34 | SR: 6:35 | SR: 6:36 | SR: 6:37 | SR: 6:38 |
| SS: 20:45 | SS: 20:44 | SS: 20:43 | SS: 20:41 | SS: 20:40 | SS: 20:39 | SS: 20:37 |
| MR: 6:56 | MR: 8:04 | MR: 9:13 | MR: 10:23 | MR: 11:34 | MR: 12:45 | MR: 13:55 |
| MS: 20:37 | MS: 21:09 | MS: 21:41 | MS: 22:13 | MS: 22:47 | MS: 23:24 | MS: None |
| NM: 4:45 | | | | | | |
| 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| SR: 6:39 | SR: 6:40 | SR: 6:41 | SR: 6:42 | SR: 6:43 | SR: 6:44 | SR: 6:45 |
| SS: 20:36 | SS: 20:34 | SS: 20:33 | SS: 20:31 | SS: 20:30 | SS: 20:28 | SS: 20:27 |
| MR: 15:03 | MR: 16:07 | MR: 17:05 | MR: 17:55 | MR: 18:39 | MR: 19:16 | MR: 19:49 |
| MS: 0:06 | MS: 0:55 | MS: 1:49 | MS: 2:50 | MS: 3:55 | MS: 5:01 | MS: 6:08 |
| FQ: 1:58 | | | | | | |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 |
| SR: 6:46 | SR: 6:48 | SR: 6:49 | SR: 6:50 | SR: 6:51 | SR: 6:52 | SR: 6:53 |
| SS: 20:25 | SS: 20:24 | SS: 20:22 | SS: 20:21 | SS: 20:19 | SS: 20:17 | SS: 20:16 |
| MR: 20:19 | MR: 20:48 | MR: 21:15 | MR: 21:43 | MR: 22:13 | MR: 22:45 | MR: 23:20 |
| MS: 7:13 | MS: 8:16 | MS: 9:18 | MS: 10:19 | MS: 11:18 | MS: 12:17 | MS: 13:14 |
| FM: 2:47 | | | | | | |
| 28 | 29 | 30 | 31 | | | |
| SR: 6:54 | SR: 6:55 | SR: 6:56 | SR: 6:57 | | | |
| SS: 20:14 | SS: 20:12 | SS: 20:11 | SS: 20:09 | | | |
| MR: None | MR: 0:00 | MR: 0:46 | MR: 1:36 | | | |
| MS: 14:09 | MS: 15:02 | MS: 15:52 | MS: 16:38 | | | |
| | LQ: 2:42 | | | | | |

Planet View Info Report for 8/ 1/1994 to 8/31/1994

Mercury

| Date | Rise | Set | RA | Dec | Elongation | Ill Fr | DIST(AU) |
|---|---|---|---|---|---|---|---|
| 8/ 1/1994 | 5:20 | 20:18 | 7h50m43s | 21°37'22" | 12°57'38" | 0.837 | 1.19688 |
| 8/ 8/1994 | 6:03 | 20:39 | 8h50m18s | 19°16'35" | 5°43'55" | 0.974 | 1.30935 |
| 8/15/1994 | 6:51 | 20:50 | 9h47m49s | 15°10'01" | 2°43'44" | 0.995 | 1.35771 |
| 8/22/1994 | 7:34 | 20:53 | 10h39m06s | 10°06'55" | 8°57'44" | 0.957 | 1.35535 |
| 8/29/1994 | 8:11 | 20:49 | 11h24m15s | 4°46'23" | 14°30'00" | 0.902 | 1.32013 |

Venus

| Date | Rise | Set | RA | Dec | Elongation | Ill Fr | DIST(AU) |
|---|---|---|---|---|---|---|---|
| 8/ 1/1994 | 10:17 | 22:42 | 11h34m33s | 3°02'33" | 44°25'24" | 0.602 | 0.87307 |
| 8/ 8/1994 | 10:29 | 22:28 | 12h01m02s | -0°26'13" | 45°10'31" | 0.571 | 0.81757 |
| 8/15/1994 | 10:39 | 22:14 | 12h26m42s | -3°54'04" | 45°43'14" | 0.538 | 0.76178 |
| 8/22/1994 | 10:49 | 21:58 | 12h51m30s | -7°17'24" | 46°00'36" | 0.502 | 0.70595 |
| 8/29/1994 | 10:57 | 21:42 | 13h15m21s | -10°32'44" | 45°58'42" | 0.465 | 0.65043 |

Mars

| Date | Rise | Set | RA | Dec | Elongation | Ill Fr | DIST(AU) |
|---|---|---|---|---|---|---|---|
| 8/ 1/1994 | 2:35 | 17:44 | 5h14m14s | 22°58'56" | 49°03'23" | 0.926 | 1.91706 |
| 8/ 8/1994 | 2:26 | 17:38 | 5h34m39s | 23°22'09" | 51°03'21" | 0.923 | 1.88597 |
| 8/15/1994 | 2:17 | 17:32 | 5h54m51s | 23°35'35" | 53°08'15" | 0.919 | 1.85291 |
| 8/22/1994 | 2:09 | 17:25 | 6h14m47s | 23°39'34" | 55°18'13" | 0.915 | 1.81788 |
| 8/29/1994 | 2:02 | 17:16 | 6h34m24s | 23°34'32" | 57°33'40" | 0.912 | 1.78080 |

Jupiter

| Date | Rise | Set | RA | Dec | Elongation | Ill Fr | DIST(AU) |
|---|---|---|---|---|---|---|---|
| 8/ 1/1994 | 13:53 | 0:28 | 14h16m08s | -12°30'56" | 87°26'59" | 0.991 | 5.36102 |
| 8/ 8/1994 | 13:29 | 0:02 | 14h18m38s | -12°45'28" | 81°24'11" | 0.991 | 5.46818 |
| 8/15/1994 | 13:05 | 23:32 | 14h21m36s | -13°02'07" | 75°27'38" | 0.992 | 5.57359 |
| 8/22/1994 | 12:42 | 23:07 | 14h25m00s | -13°20'39" | 69°36'46" | 0.992 | 5.67608 |
| 8/29/1994 | 12:20 | 22:42 | 14h28m48s | -13°40'48" | 63°50'43" | 0.993 | 5.77468 |

Saturn

| Date | Rise | Set | RA | Dec | Elongation | Ill Fr | DIST(AU) |
|---|---|---|---|---|---|---|---|
| 8/ 1/1994 | 22:15 | 9:15 | 22h52m30s | -9°13'47" | 147°34'15" | 0.999 | 8.88283 |
| 8/ 8/1994 | 21:46 | 8:45 | 22h50m56s | -9°24'38" | 154°41'09" | 1.000 | 8.82646 |
| 8/15/1994 | 21:18 | 8:15 | 22h49m11s | -9°36'20" | 161°50'41" | 1.000 | 8.78328 |
| 8/22/1994 | 20:49 | 7:45 | 22h47m18s | -9°48'34" | 169°00'33" | 1.000 | 8.75402 |
| 8/29/1994 | 20:20 | 7:15 | 22h45m21s | -10°01'03" | 175°57'03" | 1.000 | 8.73915 |

Uranus

| Date | Rise | Set | RA | Dec | Elongation | Ill Fr | DIST(AU) |
|---|---|---|---|---|---|---|---|
| 8/ 1/1994 | 19:57 | 5:15 | 19h43m01s | -21°51'52" | 165°13'50" | 1.000 | 18.68530 |
| 8/ 8/1994 | 19:28 | 4:46 | 19h41m54s | -21°54'34" | 158°16'03" | 1.000 | 18.72403 |
| 8/15/1994 | 19:00 | 4:17 | 19h40m52s | -21°57'02" | 151°18'24" | 1.000 | 18.77622 |
| 8/22/1994 | 18:32 | 3:49 | 19h39m55s | -21°59'13" | 144°21'14" | 1.000 | 18.84104 |
| 8/29/1994 | 18:04 | 3:20 | 19h39m05s | -22°01'07" | 137°24'29" | 1.000 | 18.91752 |

Neptune

| Date | Rise | Set | RA | Dec | Elongation | Ill Fr | DIST(AU) |
|---|---|---|---|---|---|---|---|
| 8/ 1/1994 | 19:43 | 5:08 | 19h32m34s | -21°06'37" | 162°57'19" | 1.000 | 29.20459 |
| 8/ 8/1994 | 19:15 | 4:39 | 19h31m50s | -21°08'22" | 156°04'49" | 1.000 | 29.24658 |
| 8/15/1994 | 18:47 | 4:11 | 19h31m09s | -21°10'01" | 149°12'07" | 1.000 | 29.30173 |
| 8/22/1994 | 18:19 | 3:43 | 19h30m31s | -21°11'33" | 142°19'27" | 1.000 | 29.36917 |
| 8/29/1994 | 17:51 | 3:15 | 19h29m58s | -21°12'54" | 135°26'39" | 1.000 | 29.44793 |

Pluto

| Date | Rise | Set | RA | Dec | Elongation | Ill Fr | DIST(AU) |
|---|---|---|---|---|---|---|---|
| 8/ 1/1994 | 14:55 | 2:23 | 15h45m07s | -5°28'52" | 106°14'06" | 1.000 | 29.49107 |
| 8/ 8/1994 | 14:27 | 1:55 | 15h45m02s | -5°32'26" | 99°44'20" | 1.000 | 29.60351 |
| 8/15/1994 | 14:00 | 1:27 | 15h45m04s | -5°36'25" | 93°14'41" | 1.000 | 29.71835 |
| 8/22/1994 | 13:33 | 0:59 | 15h45m12s | -5°40'45" | 86°45'29" | 1.000 | 29.83395 |
| 8/29/1994 | 13:06 | 0:32 | 15h45m26s | -5°45'23" | 80°16'41" | 1.000 | 29.94882 |

Planet Apsides Report for 1994

Mercury
8/ 2/1994 Perihelion Distance from Sun: 0.31 AU

Planet Conjunction/Opposition Report for 8/ 1/1994 to 8/31/1994

Mercury

| Date | Hour | Event |
|---|---|---|
| 8/12/1994 | 21 | Superior Conjunction |

Moon Apsides Report for 8/ 1/1994 to 8/31/1994

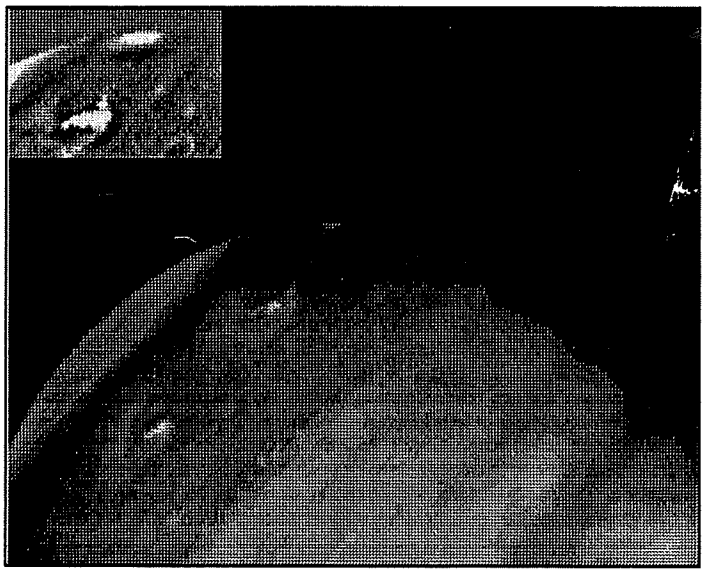
| Date | Hour | Apsis | Distance (km) | Diameter |
|---|---|---|---|---|
| 8/12/1994 | 19 | Perigee | 369474 | 0.5390° |
| 8/27/1994 | 14 | Apogee | 404351 | 0.4925° |

Meteor Showers Report for 8/ 1/1994 to 8/31/1994

| Date | Meteor Shower | ZHR | RA | DEC | Illum. Frac. | Longitude |
|---|---|---|---|---|---|---|
| 8/ 1/1994 | alpha-Capricornids | 5 | 20h36m | -10° | 0.29 | 130° |
| 8/ 6/1994 | iota-Aquarids | 8 | 22h10m | -15° | 0.01 | 134° |
| 8/12/1994 | Perseids | 75 | 3h04m | 58° | 0.34 | 140° |
| 8/20/1994 | alpha-Cygnids | 5 | 21h00m | 48° | 1.00 | 148° |

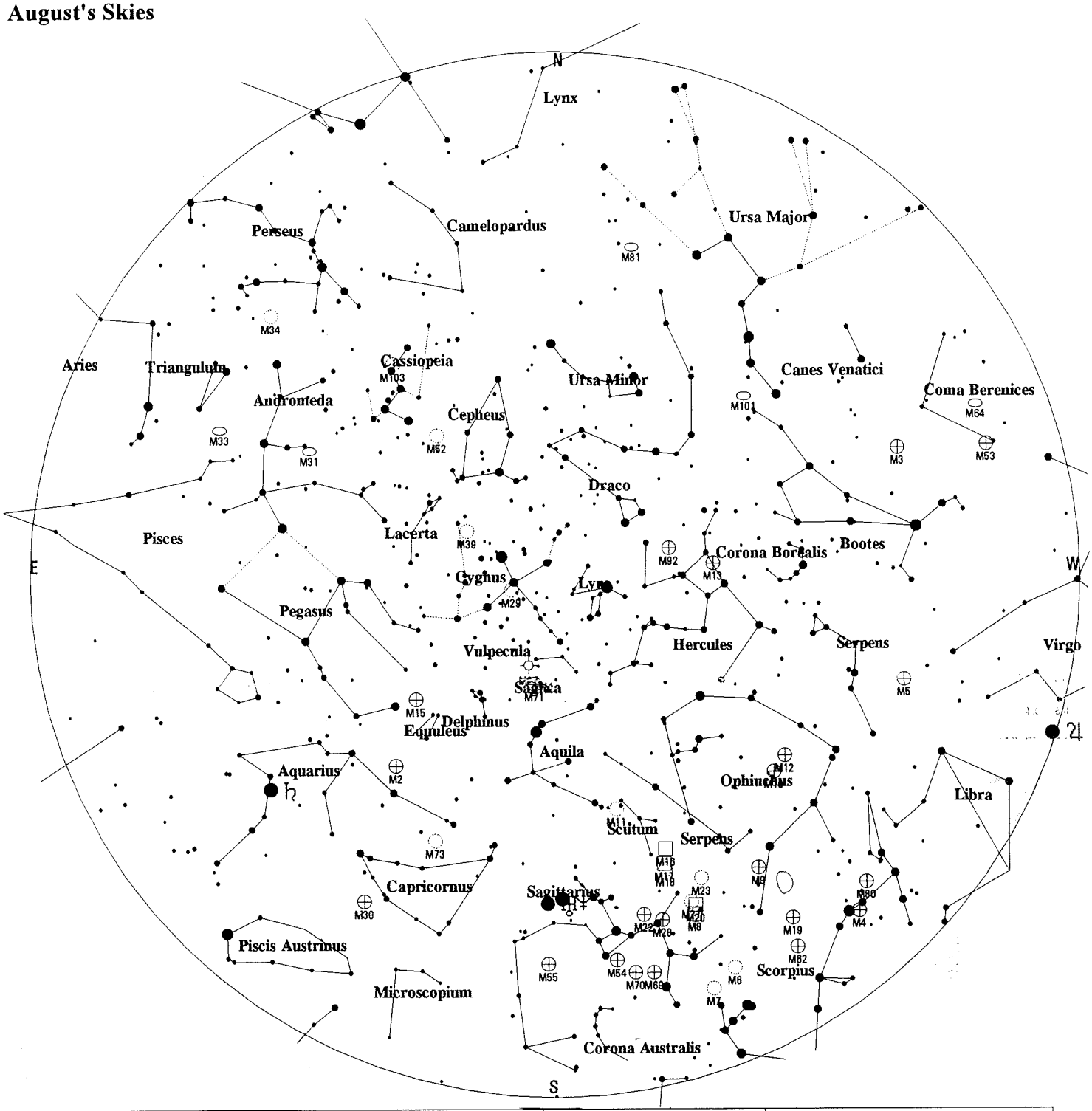
Twilight Report for 8/ 1/1994 to 8/31/1994

| Date | Sun | | Astronomical | | Nautical | | Civil | |
|---|---|---|---|---|---|---|---|---|
| | Rise | Set | Begin | End | Begin | End | Begin | End |
| 8/ 1/1994 | 6:25 | 20:53 | 4:25 | 22:53 | 5:09 | 22:09 | 5:49 | 21:29 |
| 8/ 8/1994 | 6:33 | 20:44 | 4:37 | 22:40 | 5:19 | 21:58 | 5:57 | 21:20 |
| 8/15/1994 | 6:40 | 20:34 | 4:48 | 22:26 | 5:28 | 21:46 | 6:05 | 21:09 |
| 8/22/1994 | 6:48 | 20:24 | 4:59 | 22:12 | 5:37 | 21:34 | 6:13 | 20:58 |
| 8/29/1994 | 6:55 | 20:12 | 5:10 | 21:58 | 5:46 | 21:21 | 6:21 | 20:46 |



Close-up of the Q2 fragment impact site. -Hubble Space Telescope

## August's Skies

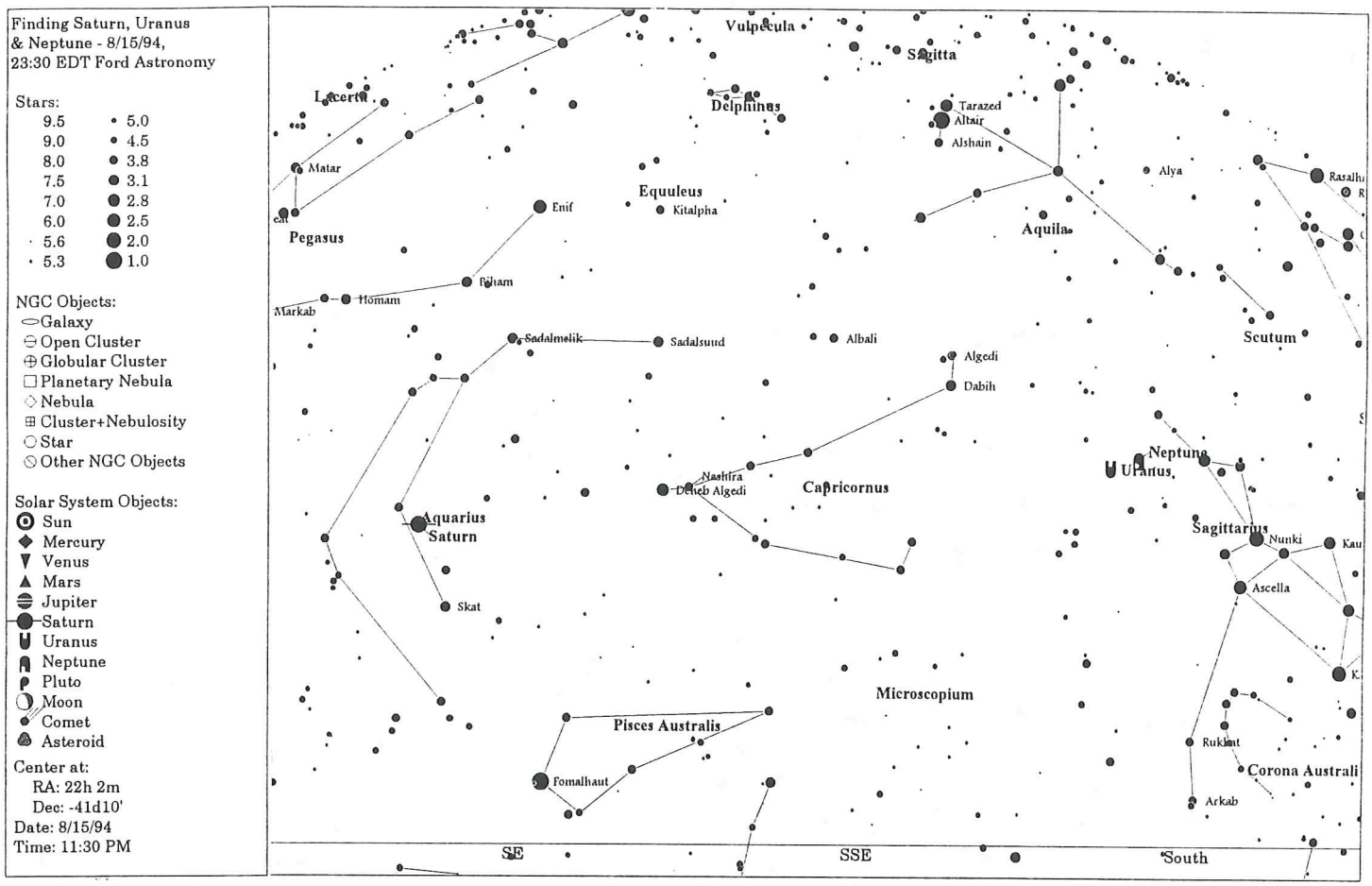



| STARS | SOLAR SYSTEM | | | NOTES |
|---|---|---|---|---|
| • <1 • 3.5 | ☿ Mercury | ♅ Uranus | ⬭ Galaxy | |
| • 1.5 • 4 | ♀ Venus | ♆ Neptune | ⊕ Globular Cluster | |
| • 2 • 4.5 | ♂ Jupiter | ♇ Pluto | ◌ Open Cluster | |
| • 2.5 • >5 | ♃ Saturn | ☄ Comet | ⌖ Planetary Nebula | |
| • 3 | | | □ Diffuse Nebula | |
| | | | ○ Other Object | |

Local Time: 23:30:00 15-Aug-1994
Location: 42° 22' 0" N 83° 17' 0" W

UTC: 03:29:59 16-Aug-1994
Centre Az: 180.0° Alt: 90.0° Field: 180.0°

Sidereal Time: 19:34:04
Julian Day: 2449580.6458

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