# Desert Skies

### NORTHERN HEMISPHERE.





#### MEETINGS

GENERAL MEETING - FRIDAY, August 3, 7:30 P.M. at Steward Obs. lecture room.

Dave Harvey will give a talk on "Auto-Tracking of
Satellites" and Jim Scotti will present a History
of Orbital Mechanics.

FRIDAY, September 7, 7:30 P.M. at Steward Obs. lecture room.

Roger Angel will present a talk entitled "Mirrorspinning and Big Astronomy"

FRIDAY, October 5, 7:30 P.M. at Steward Obs. lecture room.
A talk on Astronomical Clocks will be given by
Ewen Whitaker.

STAR PARTY - SATURDAY, AUGUST 18 Star Party at Empire Ranch

COMPUTER GROUP - Call Saul Levy for information at 889-7753

EXECUTIVE MEETING - Thursday, August 9, 7:30 P.M. at Flandrau Planetarium.

#### TAAA EXECUTIVE

President Tim Hunter 299-2972 Vice-President Dean Ketelson 293-2855 Executive Sec. Dick West 1-762-5831 Sharon Niehaus 299-7328 Recording Sec. 296-4780 Treasurer Debbie Smith Member-at-Large 790-1452 Bob Goff Chief Observer Terri Lappin 790-5053 Membership coordinator Terri Lappin 790-5053 299-7328 Past President Duane Niehaus Desert Skies ed. Dolores Hill 325-9820 Rik Hill Assı. ed.

#### Desert Skies Publishing Guidelines

\*All articles, announcements, news etc. must be submitted by the 20th of the month. Materials received after that date will appear in the NEXT issue.

\*All submissions are retained by the editor unless prior arrangements are made.

\*Articles, artwork, and photos should be camera ready. Photos should be screened.

\*We will not publish slanderous or libelous material!

Send articles, announcements etc. to Desert Skies c/o Dolores Hill 4632 E. 14th St., Tucson, AZ 85711 (phone: 325-9820) OR Lunar & Planetary Lab. U of A (621-6951).

#### MEMBERSHIP IN THE TAAA

Individual Membership \$20,00 Family Membership \$25,00 Senior Citizen (over 60) \$18,00

Sky & Telescope subscription (optional) \$16.00

Rates for membership in the TAAA are given above. Members can subscribe to Sky & Telescope at the time of membership renewal, saving over 25% off the cost of a regular subscription. The subscription term must match your membership period. Send one check, made payable to Tucson Amateur Astronomy Association, to cover both membership and subscription to: TAAA, P.O.Box 41254, Tucson, AZ 85717. It is best to pay your dues 2-3 months before your membership actually expires.

#### 4 EASY STEPS TO MEMBERSHIP RENEWAL

- Pay your dues 2-3 months early. Your month of membership expiration is listed on your newsletter mailing label.
- a) Decide if you want Sky & Telescope, then add \$16 to your membership rate.
  - b) Include Sky & Telescope's renewal notice, if possible.
- 3. Write one check, payable to TAAA.
- 4. Send it to TAAA, P.O.Box 41254, Tucson, AZ 85717.

Call the Treasurer if you have any problems.

OPPOSITION OF SATURN PARTY - AUGUST 11

If you think that's late, think how late we are to celebrate Dean & Vicky Ketelsen's marriage! Bring your own food to BBQ to Bob and Val Goff's house at 5712 E. Cooper Aug. 11 at 6 P.M. (1block west of Park Mall and 2 blocks south of Broadway. Someone ought to bring a telescope too!



MIRRORS TESTED by Bob Goff.... call 790-1452.



FOR SALE: 91/2" Meade Fibrelite tube, 48" long, with endrings, brand new....\$95 Call Andrew Meyer 883-2193 (please not after 10 P.M.- leave a message on the machine)

FOR SALE: Celestron 5 tabletop reflector/stand, 25mm Kellner.....\$150, Yashica 35mm SLR camera/50mm lens.....\$150. Contact Patrick Craig at 750-8046.

FOR SALE.....6" Parks Dobsonian telescopeincludes 25mm Kellner eyepiece, 6 x 30 finderscope, Novak curved spider...\$300

Astroscan 4", f/4 from Edmund Scientific/ 28mm RKE eyepiece\$100
50mm Parks Kellner eyepiece
2" Parks rack & pinion focuser. \$20
1.3" Diagonal holder (no mirror) & spider for 6" scope \$10
7" Parks Tube for 6" scope, 37" long

Call Jeff Bridges at 293-8976 if interested.

FOR SALE: Celestron 8" with 7 x 50 finder, several eyepieces, light pollution filter, sturdy tripod base - in excellent condition.....\$975/best offer. Call Len Schess 628-8700 (day) or 299-6460 (night).

WANTED: Need a ride to club star parties and meetings from 250 N. Arcadia Apt.710 (Lincoln Green Apts.) until Aug. 20 OR UA campus-Sierra Hall (Stadium) Call Patrick Craig at 750-8046 if you can help!

#### FOR SALE:

Heavy 8" diameter steel column on a triangular steel base with a rising heavy tube by rack & pinion. Min. height 5 ft. and max. height 7 ft. It was a NASA tooling stand... would be good for a large refractor etc. \$500. Will trade 3 1/2" Aiven Clark refractor on tripod mount for Mac II computer. Call Mr. Sevilli at 327-0665 (450 S. Rosemont Ave., Tucson 85711)

FOR SALE: Cave 6" F/4 Rich-Field Newtonian Reflector with 28mm eyepiece, personally refigured primary mirror, on Edmund Scientific equatorial mount with electric clock drive, 1" R.A. and Dec. shafts, \$350.

Call Duane Niehaus 299-7328

A donation of several Astronomy Magazines from between 1973 and 1988 have been donated by a former TAAA member. They will be available free for the taking at the August meeting.

#### OBSERVER'S REPORT

#### Star Party August 18 Empire Ranch

The August Star Party will be held on Saturday the 18th at Empire Ranch. If Saturday August 11th is clear it may be worth your while to head out to the Empire Ranch. We need to take advantage of all the clear evenings we can get during Tucson's monsoon season! Be aware that if it has rained recently there may be mud and mosquitoes to contend with.

I am not scheduling an official TAAA star party on the 11th because the moon will be up early and some members don't like scheduled star party taking place when the moon is expected up early. I have been trying to schedule alternate star party dates in the event that the regular star party is clouded out. No matter how you look at it one of the two star party dates is going to have some moon interference.

The summer monsoon season is a good time to get your telescope into shape. Clean your telescope mirrors carefully -- you usually won't hurt the glass but the aluminum coating is very easily If you don't know how to clean mirrors, read a good astronomy book or talk with another TAAA member about the correct Once cleaned, it will be necessary to align (or procedure. collimate) your optics. Again use a good astronomy book or ask a fellow member if you don't know how. Don't think that you will not need to align the mirrors if you leave the primary in the cell when you clean it. We've all tried that and it doesn't work. Learning how to align the optics is just as important as learning how to look throuh the telescope. It isn't difficult to align the optics although it can be a bit trying the first few times you do it. Do the final adjustments using an out of focus star. You will also need to realign your finder anytime you adjust the primary. If you own a refractor or Schmidt-Cass you may only need to clean the front objective. Follow directions for cleaning objective lenses-not mirrors. Check the alignment although many refractors do not have a way to adjust the cell. Do not remove the lens from the cell unless you really know what your doing.

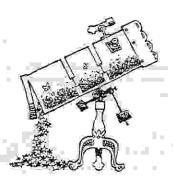
Don't forget your telescope mount! Clean and lubricate the appropriate parts and tighten loose screws and nuts. Make sure the

electrical components are in good condition.

This is also the time to make that nifty what-ja-ma-call-it that you keep thinking about. Maybe it is as complicated as an observing table to hold all your maps, eyepieces and coffee mug or as simple as a loop to be used with your star charts so you know how big one degree is or how big your binocular field of view is.

Monsoon season can be difficult for the dedicated observer if they only watch the clouds build up each evening so use this time

wisely!!





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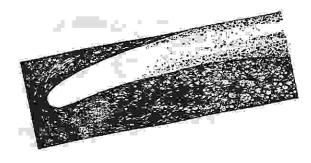
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AUG 9	22 48.6	24 1	1.580	0.696	134.3	27.3	211.6	5.2
AUG 12	22 20.3	20 24	1.591	0.595	143.0	23.5	199.7	4.7
AUG 17	21 43.5	14 49	1.483	0.511	151.8	18.8	178.0	4.3
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SEP 18	16 20.2	-35 40	1,129	0.851	74.4	59.0	104.0	4.2
SEP 22	16 4.1	-36 53	1,092	0.952	67.8	58.3	108.2	4.3
SEP 26	15 50.9	-37 47	1,059	1.052	62.0	56.7	112.3	4.4

#### COMET LEVY EPHEMERIS

This ephemeris is based on orbital elements from TAU circular 5030. These elements are preliminary meaning that the orbit of the comet has not been precisely determined and so the positions may not be accurate--possibly off by a degree or so. Coordinates are given for 0400 UT or 9pm local (Tucson) time. Values of R, Delta, Elongation, Phase, and PA are related to the comet's position and orientation in space. The last column gives the estimated magnitude of Comet Levy.

Each evening the comet will appear southwest of the position of the night before and by the end of September should be low on the horizon at sunset. A planesphere can be used in conjunction with this star chart to determine it the comet will be visible at a particular date and time. Around August 18/19 Comet Levy will be close to M15 in Pegasus, giving wide field astrophotographers a chance for a nice photograph.

Ephemeris calculated by Gary Rosenbaum using David Chandler's program Deep Space 3D.





#### Here's your chance

#### to order some good books

#### and save some money too!

Sky Publishing, who brings us Sky & Telescope each month, also makes astronomy books available at a reasonable discount to TAAA members. An order will be placed at the end of August so look over this list and order something. I need payment in advance, costs listed include shipping charges. Make checks payable to TAAA and send to our PO Box. There are other books available and I will bring the complete catalog to the August 3rd meeting or call me at 790-5053 if you want to place an order. The deadline for placing an order is August 31st.

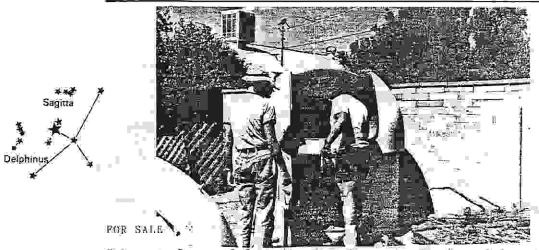
# Title/Author/soft or hard bound

Price

Uranometria 2000.0, two volume set)/hard \$36.			
Norton's 2000.0 Star Atlas/Editor: Ian Ridpath/hard			
The Deep Space Field Plan/John Vickers/paper			. 20.10
USGS Mars Map			
The Amateur Astronomers Handbook/James Muirden/soft			8.85
The Amateur Astronomers Handbook/James Muirden/soft 3 Set Burnham's Celestial Handbook/soft, (Vol. I, II,	. &	III	33.00
Astronomy with Binoculars/James Muirden/soft			6.40
Messier Album/Mallas & Kreimer/hard			. 12.05
Starlight Nights/Leslie Peltier/soft	•		. 7.25
The Cluody Night Book/George Mumford/soft			
Russell W. Porter/Berton Willard/bard		• •	. 12.05
Spherical Astronomy/R.M. Green/soft			. 27.55
Sky & Telescope Index, Volumes 1-70/soft			
Sky & Telescope Volume Binder (fits S&T after 1985)			

The savings are about \$2 or \$3 but in some cases, like Norton's Star Atlas, it is a lot more. Call me for prices on the Webb Society Handbooks, and other books on astrophotography, optics and astronomical computing. The S&T Index is also available on diskete.

Terri Lappin



Telescope Dame: 5 feet diameter dome, stands about 8 feet high. Photographs of this dome will be brought to the August 3rd meeting. There are two electrical outlets and two light fixtures in the wall. The door is about 2 feet high and 2 feet wide. The still is about 3 lect wide. The shruter is removed from the shelter for observing. Call Bob Goff if you want to see this dome, 790-1452. This dome, was donated to the TAAA by the Smithsonian Whipple Observatory. We are usking \$500 for it.

#### PRISMS, GRATINGS, AND SPECTROSCOPES by Richard E. Hill

Amateur solar astronomers, while doing excellent observations in white light and H-alpha, have for a long time largely neglected spectroscopy. The reason for this is unclear since the equipment involved is neither complicated nor expensive. Perhaps the reason lies in a lack of understanding about the dispersing elements in the heart of the spectroscope/graph.

The basic principles behind a spectroscope are not difficult to understand. (From here on I will refer only to spectroscopes since any resourceful amateur could easily figure out how to attach a camera to the instrument thus making it a spectrograph. The basics of the dispersing instruments are the same.) Light enters the spectroscope through a slit, set a couple of thousandths to as much as a hundredth of an inch wide. This light can come from a telescope or in the case of a solar instrument can come directly in from the sun. If the instrument is to be used without a collimator the slit should be distant from the dispersing element, perhaps about three feet, with a series of baffles along the tube or shaft. From the slit the light has to be collimated, either mechanically as described in the previous sentence, or optically. The job of the collimator is to make the diverging beam of light coming from the slit, a non-diverging, or parallel beam that will then be dispersed. Next the light is dispersed by either a prism or grating (described below) and passed along to a reimaging device called a telescope, but not necessarily in the sense that we are accustomed to. Behind this the film or plate will be positioned in a spectrograph. It's as simple as that, described in one paragraph!

Prisms are the simplest dispersing element available to the amateur astronomer and amateur telescope maker (ATM). These are easily found at swap meets and amateur conventions. Armed with nothing more than the prism from an old pair of binoculars one can build an instrument capable of showing the main Fraunhofer Lines in the solar spectrum. I have purchased surplus prisms with 2 inch square faces for only a couple of dollars! They did have some edge chips or cosmetic defects but were perfectly usable for a simple spectroscope.

While many may argue that these would not be "research quality" instruments, I would remind them that with an object as dynamic as the sun the value of the observation often lies with those prepared to make the most of serendipity, not necessarily the best equipped!

Gratings, both reflective and transmissive, are another type of dispersing element. They produce a spectrum by exploiting the wave nature of light. Their surfaces are covered with very straight, parallel grooves only a few microns deep and set at a precise pitch. There are thousands of these grooves on the grating, usually around 15,000/inch. When light strikes these grooves it is diffracted by different amounts and at different angles, depending on the wavelength involved, such that spectra are formed. In a reflection grating, a white light image is also formed at normal reflection angles (where the angle of incidence = the angle of reflection). In the transmission grating such an image can simply be seen through the grating.

Gratings are a little harder to acquire than prisms. There are some surplus dealers that occasionally make small ones available (one or two inches square) at very reasonable prices, often about 1 to 10% of original value!

Gratings differ from prisms in some very important respects. A single grating will form a series of spectra to either side of the normal or white light image, whereas the prism forms only one spectrum. (Please note here, a single one is a spectrum, while many are spectra.) The grating spectra closest to the normal image have the lowest dispersion. A bit further away is another spectrum of greater dispersion, and a bit further on still is yet another of even greater dispersion and so on. These different spectra are called orders. First order is closest to the white light or zero order image. Unfortunately, the orders higher than first overlap each other to some degree. So while one can obtain greater dispersion in the higher orders the price paid is that filters must be used to sort out the overlap. These multiple spectra from one input of light means grating spectra are fainter than prism spectra. This is often expressed as prisms being more "light efficient". Grating efficiency is improved by blazing. This is a process whereby the groves are cut as a specific pitch throwing more light into a particular order. This helps but little and prisms are still far more efficient. Fortunately, in solar astronomy this is only of minor concern since we usually have plenty of light, unless very high dispersion work is being done.

Another difference between gratings and prisms is in the scale of dispersion. Gratings provide a linear scale where the distance at the focal plane (in inches or millimeters) between equal intervals (in Angstroms) will be the same across the spectrum. That is, if 100 Angstroms (A) around H-alpha (red) is 1cm in length, then 100 A at the H or K line (blue) will also be 1cm. With prisms the scale is logarithmic, being more compressed in the red and less towards the blue.

A third major difference is that reflection gratings, being reflective, are not wavelength limited in their use, whereas prisms, being refractive, cannot work in the ultraviolet (UV) unless they are made of special glass. Even then they are only able to work in the near UV.

So gratings are usually preferred since: one can select dispersions (depending on light available and desired resolution), the measurement of spectral features (being linear) is straightforward, and one can work across the whole spectrum from the infrared (IR) to the far UV.

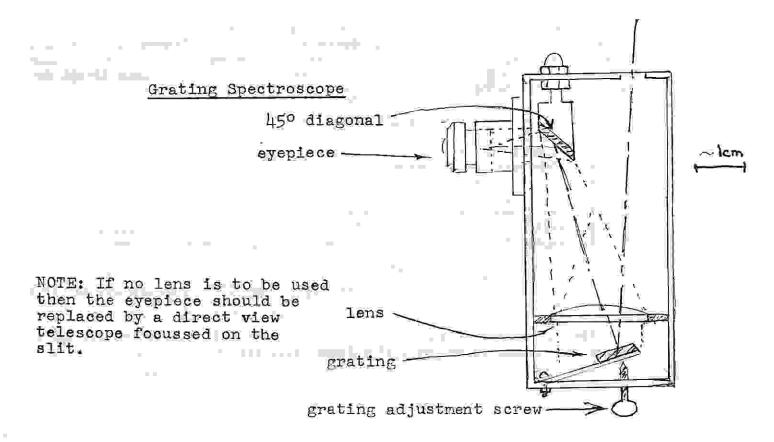
#### Instrumentation

By far the most simple spectroscope to build is the Littrow Design. It involves one slit, a long focus lens, a small telescope capable of focusing at only a few feet, and a plane grating. In a box about 20% longer than the focal length of the lens place the slit at one end, mount the grating in an adjustable mount in the other end. Next to the slit place an observation port in which you can place the telescope. Near the grating place the lens in a mount that can be moved up and down the tube a bit. Both the incoming and return light beam must pass through this lens so it should be about 50% bigger than the diagonal of the lens. Place the lens as close as possible to the grating as possible. If you can look through the lens while shining a bright light through the slit, the light should appear to flood the lens when it is in the correct position. The grating placed behind this will likewise be flooded with light.

Now look through the telescope. Adjust the grating so you are seeing a white light or zero order image of the illuminated slit. (It should not be illuminated with sunlight as even this would be too bright!) Focus the telescope so the image is sharp and clear. Now you can adjust the grating to observe the spectrum and explore. See references at the back of this book for guides as to what you are seeing and what you can do with this spectroscope.

To make this a spectrograph you need only mount a camera body behind the telescope, focus and photograph. It will take some experimentation, playing with slit width and exposure time to get it right.

parallel light from telescope or from sky





#### STEWARD OBSERVATORY TUCSON, ARIZONA 85721

TELEPHONE: (602) 621-2288 TELEX: 467175 TELEFAX: (602) 621-1532

TO:

Tucson Astronomical Community

D. McCarthy, K. Dow, T. Henry, D. Kirkpatrick

U of A Astronomy Camps

DATE: July 18, 1990

The University of Arizona Astronomy Camp has just completed its third year of activities. This June we enrolled 36 teenagers from 15 states for two week long "camps". Last April twenty adults from 9 states and Canada attended an extended weekend camp. More adult camps are planned for this Fall. Our programs are fast becoming more popular and nationally known. We are able to provide a very unique, hands-on educational experience utilizing the extensive resources of the local astronomical community.

In addition to improving the research activities and lectures offered at these camps, we are also trying to build a library of astronomical books and materials available to the attendees. We are looking for donations of such items which you may no longer need or have duplicates of. Such things may include the following:

- textbooks, lab manuals
- 2. educational or popular books
- 3. 35 mm slide sets
- 4. computers and software
- 5. movies (16mm or VHS)
- star charts, photos 6.
- 7. lab & demonstration equipment
- 8. audio-visual equipment (VCR, slide proj., screen, overhead proj.)
- 9. research equipment (optics, receivers, photometers, 35 mm cameras, CCD's).

Donations may be left in Steward Observatory room 260. Arrangements for pick up can be made by calling me at 621-4079.

For information on our future activities for both adults and teenagers, please call either me or the U of A Alumni Association (621-9024).

# Stellar Vision &

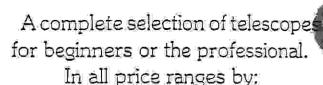
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