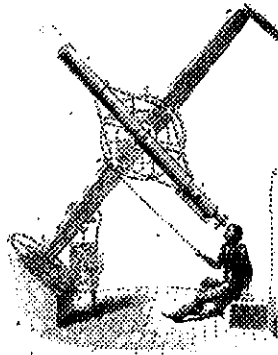


# the focal point

Monthly Notices of the Atlanta Astronomy Club, Inc.

Vol. VI No. 3

November, 1993



**Why is this telescope famous?  
See page 3**

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- *How to Pick the Best Slide Film. This Month's Astrophotography Installment from Alan Dyer.*
- *How to Ward off Dew, by Jason Ware.*
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**NEXT MEETING – NOVEMBER 19**

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# the focal point

Monthly Notices of the Atlanta Astronomy Club, Inc.

FROM:

**Leonard B. Abbey, Editor**

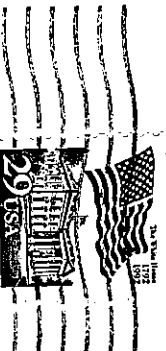
**1002 Citadel Drive**

**Atlanta, Georgia 30324**

The Atlanta Astronomy Club Inc., the South's largest and oldest astronomical society, meets at 8:00 p.m. on the third Friday of each month at Agnes Scott College's Bradley Observatory. Occasional meetings are held at other locations (check the hot line for details). Membership is open to all. Annual dues are \$20 (\$10 for students). Discounted subscriptions to *Astronomy* (\$18), and *Sky & Telescope* (\$20) magazines are available. Send dues to: Clay McHann, Treasurer, 3450 Jones Mill Rd., #708, Norcross, Ga. 30092

**Hot Line:** Timely information on the night sky and astronomy in the Atlanta area is available on a twenty-four hour basis on the Atlanta Astronomy Club hot line: 621-2661.

**BBS:** The Atlanta Astronomy Club operates a computer bulletin board at 455-3089. The BBS, which is free and open to the public, provides contact with both amateur and professional astronomers around the world.



**First Class**

W. Tom Buchanan  
105 Carriage Station Circle  
Roswell, GA 30075

9310

## ASTRONOMY IN THE COLD

by Jack Kramer, Libertyville, Illinois

Astronomy isn't a seasonal hobby, yet when the cold of winter strikes, the number of observers really falls off. But those who don't want to face the weather often miss some of the most beautiful skies of the year. The secret to coping with the cold lies in dressing appropriately. Even late fall and early spring observing requires some cold weather gear because when the temperature drops into the 30's, you'll really feel cold after a couple of hours if you're not dressed properly.

*The secret to coping with the cold lies in dressing appropriately.*

You've no doubt heard that the way to stay warm is to wear layers of clothing. But I've seen people come to an observing session wearing layers of clothing under their heavy jackets, only to be felled by the cold within an hour. The problem is that they've been done-in by the one part of their anatomy that isn't protected as well as the rest. So let's look at these weak links.

One item that should be a part of our cold weather uniform is what's generally referred-to as the "snowmobile suit"; it's really just an insulated coverall. It keeps your legs warm and because it's a one-piece garment, there are no cold drafts going up under your outer clothing. As an alternative to this, there are insulated bib overalls available in sporting goods stores. But it's best to forget about apparel intended for skiers. Ski apparel is fairly light in weight and intended for mobility. But observing is a sedentary activity. Without much muscle activity (other than your brain), you'll get cold in a hurry unless you're wearing heavier clothing. Even with a snowmobile suit, you'll still need some layering underneath, depending on how

cold it gets. The best rule of thumb is to wear more clothing than you think you'll need; you can always shed some item of apparel if you get too warm.

Your feet are one of the first things to feel the effects of the cold. Thermal socks and insulated hiking boots are a help, but the best protection is a pair of outdoorsmen's boots, often referred-to as "pack boots" or "sorrel boots". Typically they have leather uppers, rubber-covered lower portions, plus an inner heavy felt liner. These are the boots made famous by the L. L. Bean Company, but they're available at most sporting goods stores. These boots have two advantages - they keep your feet warm and dry. Others have also had good luck with the less costly footwear referred-to as "moon boots".

Now for the head. The best thing here is knit headwear that also covers your face and neck. This is one item of ski apparel that fits our needs. The best type has separate openings for your eyes and mouth. The type with a single opening for the eyes creates a unique problem; some of your warm breath comes up and out of the eye opening and will fog up your eyepiece as you're observing. If it's really cold, you'll also want to wear a hooded sweatshirt; that'll provide an extra measure of head protection. Some snowmobile suits also come with an attached hood, but some observers find these to be too stiff, plus the material makes an annoying "crinkly" sound with each movement.

Now let's talk about your hands. Heavy, insulated mittens will do the best job of keeping them warm. But they don't allow enough mobility to pick up eyepieces, flip through the pages of your chart, or tighten that setscrew. You'll find yourself constantly removing your mittens to perform these routine actions; each time you

## WHAT'S UP

Date	SUN				MOON				Age
	Rise	Azi	Set	Azi	Rise	Azi	Set	Azi	
11/15/93	7:10	111.9	17:34	247.9	9:00	116.4	19:21	243.7	2.5
11/16/93	7:11	112.2	17:34	247.6	9:58	115.8	20:23	245.0	3.6
11/17/93	7:12	112.5	17:33	247.3	10:48	113.4	21:25	248.0	4.6
11/18/93	7:12	112.8	17:32	247.0	11:32	109.8	22:27	252.1	5.6
11/19/93	7:13	113.1	17:32	246.7	12:09	105.2	23:25	257.0	6.6
11/20/93	7:14	113.3	17:32	246.4	12:43	100.3	-----	-----	7.5
11/21/93	7:15	113.6	17:31	246.2	13:13	94.9	0:22	262.3	8.4
11/22/93	7:16	113.9	17:31	245.9	13:43	89.6	1:17	267.7	9.3
11/23/93	7:17	114.1	17:30	245.6	14:12	84.2	2:11	273.2	10.2
11/24/93	7:18	114.4	17:30	245.4	14:42	79.2	3:05	278.5	11.1
11/25/93	7:19	114.6	17:30	245.2	15:14	74.5	3:59	283.3	12.0
11/26/93	7:20	114.9	17:29	244.9	15:48	70.4	4:53	287.8	12.9
11/27/93	7:21	115.1	17:29	244.7	16:27	67.1	5:49	291.6	13.8
11/28/93	7:22	115.3	17:29	244.5	17:10	64.8	6:44	294.4	14.7
11/29/93	7:23	115.5	17:29	244.3	17:59	63.8	7:39	295.9	15.6
11/30/93	7:23	115.7	17:29	244.1	18:53	64.3	8:31	296.1	16.6
12/1/93	7:24	115.9	17:29	243.9	19:50	66.3	9:20	294.7	17.6
12/2/93	7:25	116.1	17:28	243.7	20:51	69.6	10:05	291.9	18.6
12/3/93	7:26	116.3	17:28	243.5	21:53	74.2	10:46	288.0	19.6
12/4/93	7:27	116.5	17:28	243.4	22:57	79.6	11:25	282.9	20.6
12/5/93	7:28	116.6	17:28	243.2	-----	-----	12:01	277.1	21.7
12/6/93	7:29	116.8	17:28	243.1	0:01	85.9	12:36	271.0	22.7
12/7/93	7:29	116.9	17:29	242.9	1:05	92.3	13:12	264.6	23.8
12/8/93	7:30	117.1	17:29	242.8	2:11	98.7	13:50	258.6	24.9
12/9/93	7:31	117.2	17:29	242.7	3:18	104.7	14:30	252.9	26.0
12/10/93	7:32	117.3	17:29	242.6	4:27	109.8	15:15	248.3	27.1
12/11/93	7:32	117.4	17:29	242.5	5:35	113.7	16:06	245.1	28.2
12/12/93	7:33	117.5	17:29	242.4	6:41	115.9	17:02	243.7	29.3
12/13/93	7:34	117.6	17:30	242.3	7:42	116.3	18:03	244.2	0.9
12/14/93	7:34	117.7	17:30	242.2	8:36	114.8	19:06	246.4	1.9
12/15/93	7:35	117.7	17:30	242.1	9:23	111.7	20:09	250.0	2.9

### OFFICERS AND OTHER DIGNITARIES

President:	Steve Gilbreath	409-1915
First Vice-President:	Hal Crawford	242-9995
(Program)		
Second Vice-President:	Alex Langoussis	429-8384
(Observing)		
Recording Secretary:	Terry McHann	441-9097
Corresponding Secretary:	Leonard Abbey	634-1222
Treasurer:	Clay McHann	441-9097
BBS:	Doug Chesser	457-5743
Edibles:	Terry McHann	441-9097
Facilities	Leonard Abbey	634-1222
Light Pollution:	Tom Buchanan	587-0774
Membership:	Terry McHann	441-9097

## OBSERVATORY REPORT

by Alex Langoussis

Our next observing session at Villa Rica will take place Saturday evening, November 13th.

We will have as our special guests the folks from the Nature Company. They will be bringing telescopes from the store to learn their operation. This is a wonderful opportunity for members to be of help to those who are new to astronomy and telescopes.

PLEASE JOIN US! For more information, call Alex Langoussis, 429-8384.

Our Maksutov needs a finder. This exotic 8" catadioptric was our club's first telescope, and its finder was broken several years ago. If you have a suitable finder to donate, contact the Observing Chairman.

Looking ahead, don't forget the lunar eclipse the night of Nov. 28th. New moon in December falls on the 13th, with observing at Villa Rica on the 11th.

Members, don't forget that you may use the Villa Rica facilities at any time. If you have not yet been checked out to use the 20", give me a call to arrange a time. It's your scope, so come on out and use it!

## YOUR EXPIRATION DATE

Remember....the date of your last membership renewal appears at the upper right corner of your mailing label. Add one year to this date to get your expiration date. This date will be highlighted in color for those members who are past due.

## COMING ATTRACTIONS

In the near future, we look forward to hearing Dr. Doug Gies, of Georgia State University's Department of Physics and Astronomy. We hope to hear him discuss pulsating variables, a current field of interest.

Doug Chesser will demonstrate our club Electronic Bulletin Board (BBS) system, and will distribute free software for accessing it.

We also look forward to hearing Dr. Ron Tilford, noted Atlanta ophthalmologist, who will describe the effects of the eye's anatomy on what and how we see through telescopes.

Later in the year, Dr. Hal McAlister, director of the Center for High Resolution Astronomy (CHARA) at Georgia State University will speak.

We also hope to have Dr. Tom Van Flandern, a cosmologist who is noted for his new, and highly original, insights into the origin of the universe. We will have to catch Tom on his way through town, so this meeting may not be held on the usual

remove them, your hands are exposed to the cold and pretty soon your hands have become pretty cold. I once tried unlined lumberman's mittens which have a separate forefinger, along with them I wore liners for skier's gloves. The liners were the type with aluminum strands woven into the fabric to reflect heat back into your hands. I found that this arrangement still didn't provide enough tactile sense, and I ended up constantly taking off the mittens and picking things up wearing just the liners, then putting the mittens back on. Pretty soon, my hands got cold. The best solution I've found is well-insulated skiers' gloves that have a rough outside coating on the palms and undersides of the fingers. They keep your hands warm and allow enough tactile sense so that you can perform all but the most delicate manipulations without removing the gloves. That's the secret - minimize glove removal!

One of our club members is a physician with experience in cold weather survival in the military. He points out that once a part of your body gets cold, it becomes impossible to warm it up without increased levels of physical activity or getting warmth from somewhere else. If your feet or hands start getting cold, you can walk around or "twiddle" your fingers; the muscle activity generates heat to keep you going. You can also place your bare hands under your arms, but while doing so, keep your jacket as tightly closed as possible to minimize loss of body heat. Chemical hand warmer packets work well, too. Avoid alcoholic beverages, but do consume sufficient fluids — you'll get cold faster if you're "dry". The real trick is to not let any part of your body get cold in the first place. Good outerwear is not cheap, but the alternative is to declare a moratorium on serious observing between October and April.

## ADMIRAL SMYTH AND THE FIRST OBSERVER'S GUIDE

When telescopes first became available to amateur astronomers in the middle of the Eighteenth Century they were used primarily to view the Moon and bright planets. Planets were easy to locate, but nobody knew how to find dim nebulae and interesting double stars which were being discovered in increasing numbers. This situation was remedied with the publication of Smyth's *A Cycle of Celestial Objects* in 1844.

William Henry Smyth, an admiral in the British navy, was of American descent. After his retirement in 1825 Smyth erected an observatory in Bedford, England. The principal instrument was a 5.9" refractor by Tully which was carried on an equatorial mount similar to the ones later used on

the 28" refractor at Greenwich and the 100" Hooker telescope.

Smyth carefully recorded his observations with the 5.9" over the next two decades. When it was published, the *Celestial Cycle* (also known as the Bedford Catalog) was hailed for its completeness, accuracy, and for its delightful style. To this day Smyth's book is quoted by deep-sky writers. The *Celestial Cycle* was reprinted in 1881, and either edition is a rare prize for the astronomical book collector!

After Smyth's death, the telescope was sold to his friend, John Lee, who built an observatory for it. Its present whereabouts is unknown.

## SELECTING THE RIGHT SLIDE FILM

Alan Dyer, *Astronomy Magazine*

Remember when there was one type of Coke? Now there's Diet, Caffeine-free, Classic, and Cherry. The same explosion of choices has happened to film.

If you remember the days of one type of Coke, you may also remember the days of plain old High Speed Ektachrome. At one time it was the only slide film suitable for taking pictures of the stars. Now you can choose from eight high-speed films (at least in the North American market). And lots more slower-speed films.

The new films are coming so fast that selecting the best one may seem like a daunting task. Relax. We've attempted to sort it all out for you. We put two dozen of the latest slide films through their paces. The result is a set of recommendations that should net you the best astrophotos with the least amount of trial-and-error.

## WHY SLIDE FILMS?

All the films in this report are 35mm color slide films. These are the films whose names end with "chrome" - Kodachrome, Fujichrome, Agfachrome. 'Chrome films produce transparencies. In fact, the slide you get is the actual film you loaded into your camera, developed to produce a positive transparency you can view directly or insert into a projector.

We didn't look at color negative films, the films whose names end with "color." These are the films that produce color prints. Nor did we look at black-and-white films. We restricted this survey to color slide films for several reasons:

Black-and-white films are used by only a minority of astrophotographers these days, with Kodak's T-Max emulsions and Tech Pan 2415 being the favorites. The latter film simply has no rival when it comes to fine grain and resolution.

Similarly, there is little debate about the best color print films for astrophotography. Fuji's Super HG-400 seems to have claimed the throne as king. Its fine grain and excellent red and blue sensitivity make it a winner for deep-sky photography. For applications requiring slower-speed print films, Ektar 25 and 100 are favorites of

*ASTRONOMY magazine examines nearly two dozen slide films, helping you to match the right film to the right celestial subject.*

many astrophotographers, while Ektar 1000 and Konica SR-G3200 have proven their worth for situations requiring an ultra-high-speed film. These choices aren't written in stone — some astrophotographers have other favorites such as Kodacolor Gold 400 or Konica 400.

Finally, although print films outsell slide films by a wide margin for everyday shooting, slide films are probably the best films to use if you are starting out in astrophotography. You can see exactly how the photo turned out, without worrying about errors introduced by the print process. This makes it easier for you to evaluate and learn from your results. For example, automated print machines attempt to print every negative to the same density, making it hard to tell an underexposed frame from a correctly exposed frame in a set of prints.

## A BALANCING ACT

When selecting a film for any shooting situation, the first choice you need to make is not what brand but simply what speed film to use. A film's speed is given by its ISO number, a designation set by the

## AAC ACTIVITIES

## OCTOBER MEETING

The November meeting will be held at 8:00 p.m. on Friday, November 19, at Bradley Observatory. Our speaker will be Dave Riddle who will speak on *A Complete Guide to Star Parties*.

Time was when you could observe from your front yard. When Bradley Observatory was built it was possible for observers there to see down to at least magnitude 6.5 with the naked eye. But those days are gone forever. Serious deep sky observers must now travel to rural locations to see stars as faint as 5th magnitude. Even the skies at Villa Rica are beginning to brighten.

In recent years we have seen the development of "star parties" at very remote locations. These extended weekends are now coming to take the place of the regional conventions which were popular in the 50's, 60's, and 70's. They are not nearly as convenient as the old front yard telescope was, but to get a really good view of truly black skies it is worth the extra effort.

Dave Riddle has been to many star parties around the country. Each one has its own particular flavor, and he will describe his experiences, illustrated with slides, to us at the November meeting.

## OCCULTATION REMINDER

by Mike Kazmierczak, Atlanta

Here are the bright total occultations for the remainder of the year.

DATE	T(UT)	PR	STAR	MAG	%MN	AL	SN	CA
OCT 21	01:01	D9	2734	5.4	36+	25		80N
OCT 27	07:05	D9	3501	4.8	91+	25		80N
NOV 3	11:57	R9	0847	2.9	86-	41	0	67N
NOV 4	09:46	R9	0995	4.1	79-	74		66N
NOV 20	02:58	D9	3093	4.5	40+	16		85N
NOV 23	03:04	M9	3453	4.9	69+	46		10S
NOV 29	05:29	D9	0633	5.4	33E	77		58U
NOV 29	06:04	R9	0633	5.4	0E	75		46U
DEC 4	09:50	R9	1341	4.3	74-	68		19N
DEC 19	01:35	D9	3287	5.8	32+	28		53S

**INTERVIEWS...****David Oesper Replies**

Up until the invention of the mechanical clock, each 24-hour day began at dawn, and hours were not divided into units smaller than the half and quarter hour. The hour didn't really become important until the introduction of the striking clock into European towns and villages in the 14th century. These clocks chimed out the time once every hour, 24 times each day. It was during this period that the beginning of the day was shifted from dawn to midnight, and the minute and second came into common use.

David Oesper, Ames Iowa  
fl.dao@isumvs.iastate.edu

**Comparison of Celestron & Vixen 80 mm Scopes**

First let me say that I did not have an opportunity to look through either scope, thereby missing the most important test.

I was in a telescope store yesterday where they had a Celestron First Scope 80 (FS-80) sitting next to a Vixen 80 mm. I was instantly taken by how identical the two units were. So identical that after 15 minutes the only differences I found were:

FS-80 has wooden tripod; Vixen has aluminum.

FS-80 is black; Vixen is white.

FS-80 has 1.25" eyepiece adapter;  
Vixen has .965" eyepiece adapter.

Everything else was identical, right down to the screws and parts. The alt-az

mounts were the same, all parts looked identical. The finders were the same, finder mounts the same. Both finders had fairly large aperture stops about halfway down the tubes. This is the exactly same design and size as found on the Orion Ultrascan 80. These are 6x30 finders with just a single bracket holder.

Primary Tubes were both 80 mm objectives, 910 mm focal length. I unscrewed the 1.25" eyepiece adapter from the Celestron and it perfectly fit into the Vixen. I then unscrewed the 80 mm objective lenses and interchanged them, again both were perfect fits.

If someone took the Vixen tube and mount controls, painted them the same colors as the FS-80 installed a 1.25" eyepiece adapter, and then placed it on a FS-80 wooden tripod, then there would have been no way to tell them apart (oops, you'll have to paint "Celestron" on the Vixen).

Typically the Vixen sells for about \$100 - \$150 less than the Celestron. They do come with different accessories, the Celestron coming with a 1.25" star diagonal and 18 mm orthoscopic eyepiece. The Vixen has a .965" star diagonal and 3 eyepieces, a 20 mm Kellner, 12 mm Huygenian, and 6 mm orthoscopic.

Dana Bunner, Madison Wisconsin  
bunner@vms.macc.wisc.edu

International Standards Organization. (This number used to be called the film's ASA rating.)

A slow film (ISO 25 to 64) is least sensitive to light and requires the longest exposure time. Films with ISO ratings of 100 to 200 are considered medium speed. For ordinary daylight photography, these are all-purpose films. Films with ISO ratings of 400 or more are very light-sensitive, making them ideal for low-light situations and an obvious choice for astronomical photography. In fact, the choice of a high-speed film seems so obvious you might wonder why it's worth considering any other type of film for astrophotography.

The reason is film grain. As you increase film speed, the size of the light-sensitive grains in the film also goes up. A grainy image doesn't appear as sharp, details are blurred, and the slide or negative won't withstand much enlargement.

All astrophoto subjects benefit from a fine-grained film. The Moon looks sharper, stars appear as nicely resolved points, and even amorphous objects such as auroral curtains and nebulae look smoother and more realistic.

Selecting the right film for the task basically means balancing two opposing requirements: film grain and exposure time.

Faster films record faint objects better, and require shorter exposure times. With shorter exposure times there is less opportunity for the image to blur due to turbulence in the atmosphere or errors in the tracking of the telescope. On the other hand, the details you arc after might be lost in the grain of a fast film.

For best results, you want to use the finest-grained film you can — which usually means the slowest speed film — and still record the subject. After all, the sharpest slide in the world isn't much good if it doesn't pick up the nebula or galaxy you're after.

If you are just starting to take pictures through your telescope you might be

surprised to see we've even considered films as slow as ISO 25. It's natural to assume all night-sky objects are faint and beyond the reach of such a slow film. But the Moon is bright and requires exposures of only a fraction of a second, even with an ISO 25 film. (See "Staging a Moon Shot, August 1992 ASTRONOMY.) Other subjects, such as auroral displays and the planets, are dimmer and do require a faster film, but an ISO 100 to 200 film is often all you need. Fast ISO 400 films or the ultra-fast ISO 1600 emulsions are best reserved for the truly faint targets such as nebulae and galaxies.

**GOING SLOW: ISO 25 to 64**

This class of film can produce slides you can blow up to 16 X 20 prints. The film grain is minimal and the sharpness high. These characteristics make a slow film your first choice for shots of the whole disk of the Moon through a telescope.

We examined seven films in this league. Where we could, we shot all the films as quickly as possible the same night to minimize variations from atmospheric conditions or the changing altitude of the Moon. We shot the Moon at several phases using this procedure to check the findings from one night against results from other nights. Exposures were around 1/4 second. In addition, all films for this survey were processed at the same Kodak lab.

For lunar photography, we were looking for several characteristics:

- Fine grain. The finer the better.
- Neutral color. The Moon should look gray or light brown and not blue, green, magenta, or some other off-color shade.
- Good contrast. Although the Moon is inherently a contrasty subject, a film with good contrast renders the detail along the terminator with better snap and apparent sharpness.

- Wide exposure latitude. Slide films usually have a much narrower exposure latitude than print films — they under or overexpose easily, leaving little margin of error. A film with a wide exposure latitude makes it easier to get the exposure right and records detail better across the lunar disk with its large range of brightness. Unfortunately, a wide exposure latitude usually comes at the expense of contrast.

Of the films we examined, Fuji's professional ISO 50 film called Velvia was by far the winner for film grain. This is a remarkable film, exceeding even the classic Kodachrome 25 for lack of grain. The test shots showed a little less contrast than competitor films, but not markedly so. The Moon turned out fairly neutral in color, with just a shade of a brown tint.

On the other hand, Kodachrome 25 has a unique advantage: it is so slow that exposures for the Moon through a telescope are often over 1/4 second. This is long enough that you can use a black card over the front of the telescope as the shutter. This avoids the vibration induced by the camera's own shutter, giving you sharper shots. Kodachrome 25 also had the most neutral coloration; it gave a slate gray Moon with a only touch of cyan.

Another excellent film for lunar shots proved to be Ektachrome 64X, one of the new "X" series of emulsions from Kodak that feature high-resolution due to special tabular-shaped film grains, dubbed "T-grains."

Agfachrome RS 50 Plus exhibited very fine grain, good contrast, and a wide exposure latitude. On frames taken on several nights it showed a brownish tint similar to Fujichrome 50 - in all, a very good film for lunar shots.

However, here's a caveat on lunar colors. The results we found may not match

what you get in your own lunar shots. When the Moon is low or when the atmosphere is hazy, you'll get a yellower or browner Moon. Films can also change color with age. Kodachrome, for example, starts out with a cyan cast when it is fresh, and gradually shifts to magenta as it ages.

Several films are available in "professional" versions, manufactured with tighter tolerances on film speed and color balance. In camera stores, these rolls are kept refrigerated to minimize color shifts from the aging process. Use the professional emulsions if you want more consistent colors from roll to roll.

### PICKING UP THE PACE:

#### ISO 100 to 200

Close-up shots of the Moon through a telescope require a technique called eye-piece projection. The result is a highly magnified view of the Moon but also a dimmer view. To keep exposures to a reasonable length (under 2 seconds), you need to move to a film in the medium speed class.

We shot a series of lunar close-ups with eight films in this speed range, again firing off all shots in one night. (We used the 8-inch Schmidt-Cassegrain telescope with a 20 mm eyepiece in the standard tele-extender adapter. Exposures were about 1 second.) Some light haze intervened at times resulting in a few frames that were underexposed, but the basic characteristics of the films still shone through.

The most neutral coloration came from the Agfachrome CT200, with Fujichrome 100, Ektachrome 100X and Ektachrome 200 all very good. All the ISO 100 films exhibited very fine grain, with Ektachrome 100X having a slight edge. As expected the ISO 200 films were a little grainier, with Kodachrome 200 offering the finest grain of the 200-speed group.

We also checked these films for their suitability for starfield shots. If you use an f/2.8 or faster lens piggybacked on a motor-driven telescope, a 10- to 30-minute

point of sticking to the pressure plate in the back of the camera! This problem is especially noticeable with Kodak 2415 black and white film.

A solution to this problem was presented to our club by James Bryan of Georgetown, Texas in a talk on his search for novae in M31. He suggested using dry nitrogen which is bled into the telescope with a thin hose. My friend David Lee and I took this idea and adapted it to an off-axis guider used with a Schmidt-Cassegrain. Using airbrush hoses and fittings, available at most hobby stores, we found a way to introduce a steady stream of dry nitrogen into the off-axis guider. This creates a positive pressure inside the telescope and camera and forces out the moisture saturated air.

Toting around a supply of nitrogen may at first sound like an onerous task. However, small tanks which contain enough gas to last several evenings can be easily purchased from welding supply stores. A

larger tank can be rented for refilling the small tank. Nitrogen is cheap. A large tank, enough for several months of use sells for under \$10. The rental fee on the tank is under \$5 per month. Be sure you have a professional at the welding supply give you the proper fittings for refilling the small tank. You will be working with pressures close to 3000 psi, and using improper fittings can be disastrous. You will want to get some sort of needle valve to finely control the amount of gas running through the system. I have found a flow rate of about 50 ml per minute to work with my telescope, this can be measured by inverting a cup with a known volume in a tub of water and then noting the amount of time it takes to fill while holding the hose underneath.

Astrophotography under adverse conditions is challenging, but not impossible. Those who live in areas with damp climates, and cannot travel to a dryer area, may benefit from these techniques.

## OVERHEARD ON THE INTERNET

### Whence came Midnight?

As a planetarian I am expected to know the answers to some unusual questions. Although I am familiar with some of the astronomical origins of modern conventions, the following question from a patron has me baffled.

"Who determined that Midnight would be the division between days and when was it instituted?"

Now, the Babylonians can be blamed for a lot...the twenty-four hour day, the division of circles into 360 degrees...but their days began at sunrise according to

my references. After twelve hour clocks were invented, they were set by the sun's arrival at the meridian, and prior to noon became ante-meridian (a.m.) while after noon was known as post-meridian (p.m.).

Does anyone know how midnight gained its current status??

Any replies would be enlightening and appreciated.

Alan Davenport, University of Maine  
aland@maine.maine.edu

## Dew-Proof Astrophotography by Jason Ware, Dallas

Success in astrophotography requires a combination of the proper equipment and a suitable environment. I do most of my deep sky photography from a forty acre dark-sky observing site in southern Oklahoma owned by the Texas Astronomical Society of Dallas. Although the site is quite dark, it is often plagued by heavy dew, or in the winter, frost.

On a recent observing and photography trip the sky above was very clear, however the ground was covered with a blanket of fog several feet deep! Conditions such as this can kill all astrophotography efforts unless proper precautions are taken to ensure that the telescope and film remain dry.

My photography setup consists of an 8-inch Meade f10 Schmidt-Cassegrain telescope. Guiding is usually done by a Santa Barbara Instruments ST-4 Autoguider. Photography under conditions of heavy moisture has presented me with several problems which I have overcome. These tips are offered to observers in similar climates.

### KEEP THE CORRECTOR DRY

Schmidt-Cassegrains are known for the tendency of their corrector plates to fog. This thin piece of glass quickly radiates its heat and will usually begin to fog before other nearby objects show any sign of a problem. Several companies make resistively heated dew caps or heat strips designed to replace the heat lost by radiation. I use an Orion 12 volt Dew Zapper. Unfortunately, it will not quite keep the corrector clear of moisture on the dampest of nights. I have solved the problem by adding an Orion FlexiShield dew cap, which is placed over the Dew Zapper. This further insulates the Zapper and has the added advantage of shading the telescope from stray light, which can reduce contrast or fog the film.

Dennis di Cicco, Associate Editor of *Sky & Telescope* magazine has been successful in preventing dew formation by lightly blowing a hair dryer over the corrector plate during an exposure. Care must be taken when using this method because image degradation, while not enough to ruin the photo can cause loss of the guide star, especially when using an autoguider.

### EYEBPIECE "ANTI-FOG"

Astrophotographers who have worked on a humid or cold night know that bringing the eye close to the guiding eyepiece can cause it to fog, causing the guide star to be impossible to see. I have a similar problem with the SBIG ST-4 autoguider. The autoguider uses a CCD imaging camera which replaces the guiding eyepiece and "watches" the guide star electronically. In order to improve sensitivity and reduce thermal noise, the CCD is cooled by a thermo-electric cooler. Although the CCD itself is protected from moisture by an optical window, the window can sometimes form dew which causes loss of the guide star. I have solved this problem by adding about 1 1/2 watts of heat to the CCD draw tube. This was done with two 210 ohm resistors connected in parallel to a 12 volt supply. I have used this same setup on a guiding eyepiece and it works quite well.

### NO MORE SOGGY FILM

A subject which has received little attention in the amateur community is that of keeping the film dry while in the field. Hypersensitization works by removing moisture and oxygen from the film, thus slowing the chemical reactions which produce reciprocity failure. In many cases the film is then returned to a damp environment at the telescope, which actually reverses the effect of hypering. In extreme cases I have seen the film fog and even swell to the

exposure with a film in this class can yield excellent results. (We used a 50 mm f2 lens and 6-minute exposures, shorter than what you would normally use but it allowed us to shoot all the films during as short a time as possible.)

The ISO 100 film that recorded the most stars was Fujichrome 100. No other ISO 100 film came close. However, it yielded green skies and did not record red nebulosity very well.

We used Kodak's Ektachrome 100 Plus, a film designed to yield high color saturation in daylight shots on the Moon and on starfields. In these situations it gave results similar to Ektachrome 64X.

In the ISO 200 film camp, Ektachrome 200 showed comparable recording power to Fuji 100 but yielded a more natural cyan sky and picked up more red nebulosity. Agfachrome 200 also picked up faint stars well, but not red nebulosity. Kodachrome 200 was not as sensitive as its ISO 200 competitors but did yield good contrast and picked up some red nebulosity. For piggyback photography Kodachrome 200 definitely requires long exposures.

### LIFE IN THE FAST LANE:

#### ISO 400 and Beyond

For the high-speed films we concentrated on deep-sky applications. We shot the North America Nebula region with a 180 mm f2.8 lens using 6-minute exposures. We also took 30- and 60-second exposures with a 50 mm f2 lens. None of the films were hypersensitized; all were shot straight out of the box.

We were looking for:

- Fine grain. Always an advantage.
- Good sensitivity over long exposures. Most films aren't designed for exposures longer

than 10 seconds. Some fast films lose their sensitivity during exposures lasting minutes.

- Good red sensitivity. Many nebulae emit red light so good sensitivity in the red end of the spectrum is a plus for deep-sky shots.
- Neutral skies. Over long exposures, the color balance of many films can shift to an overall red, green, or blue cast.

The winner here was ScotchChrome 400, a little-known and hard-to-find film from 3M. [Call 3M at (800) 695-FILM for the dealer nearest you. Outside the United States the film is called ScotchChrome 800/3200P.] Its ability to pick up faint stars and red nebulosity was astonishing. It picked up the North America Nebula in only 60 seconds, a feat unmatched by its ISO 400 competitors and even the ISO 800 Fuji and Ektachrome films.

Some of the films in this league are formulated for "push-processing." This is a service available at extra cost from most processors that effectively boosts the speed of the film. We processed rolls of ScotchChrome at ISO 400 and at ISO 800 (pushed "one f/stop"). When processed at ISO 800, ScotchChrome's recording power surpassed all other films, including the ISO 1000 films. A 3-minute exposure showed as much faint nebulosity as a 6-minute exposure at ISO 400, with minimal increase in film grain. In fact, when pushed to ISO 800 it was easy to overexpose this film, resulting in frames washed out by sky fog. ScotchChrome can also be pushed to ISO 1600. The graininess becomes coarse, but its sensitivity is unmatched, making it a prime choice for constellation shots using a fixed camera and exposures under 30 seconds (to prevent star trailing).

**WHICH FILM TO USE?**

**SLOW-SPEED FILMS**

Daytime phenomena (rainbows, haloes, etc.)  
 Constellations, star trails, aurora

Fixed Camera:

Piggybacked On Driven Platform

Constellations and starfields

not recommended

Through The Telescope

Moon (whole disk)  
 Sun (whole disk)  
 Solar eclipses  
 Lunar eclipses (partial phases)

Fuji Velvia or Kodachrome 25  
 Fuji Velvia or Kodachrome 25  
 Fuji Velvia or Kodachrome 64  
 Any slow-speed film will work well

**MEDIUM-SPEED FILMS**

Constellations  
 Star trails, bright aurorae

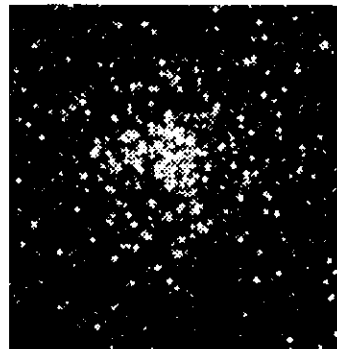
Fixed Camera

Piggybacked On Driven Platform

Constellations, starfields, bright comets

not recommended  
 Any of the ISO 200 films

Ektachrome 200



M37 in Auriga

65, 67 Tau These two stars are seen as a wide double star in the viewfinder, but the telescopic view holds a surprise. The two wide stars have two fainter stars directly between them! A very nice view.

**Auriga**

M36 A very nice open cluster, 20-25' in diameter, composed of relatively bright stars. In excess of 100 stars are seen, in

this rather concentrated cluster. Easily seen in the viewfinder, and very pretty.

M37 This is probably the most populous of the Messier objects in this constellation. I estimate there to be over 150 stars in this impressive, tightly concentrated star cluster. It is about 20-25' in diameter, and is dominated by a bright orange tinted star at its center.

M38 Easily seen in the finder, this cluster is about 25' in diameter, composed of over 100 stars of moderate brightness. Easily fitting in the field of view of a low power eyepiece is a companion cluster just south of M38. This is NGC 1907, which is seen as 10-12 stars against a hazy background.

ADS 4000 A nice double star, presenting a pretty yellow-white primary and a fainter blue secondary.

ADS 5188 This is a beautiful triple star composed of a yellowish star with two blue companions forming an equilateral triangle with it. Very impressive!

**BBS REPORT**

by Doug Chesser

This was a good month. We continue to break the system's existing message volume records, making the AAC BBS one of the largest message-based systems in the Atlanta area. I do think, however, the system growth has peaked and should begin leveling off. There is not much else left to add to the system. Internet access and the ListServer link are our high points.

The real need is for more activity from club members. This information source is a valuable tool for your astronomical efforts. I hope that those of you who are interested in gaining access to this resource will attend the December meeting at which a detailed discussion on how the club's BBS can help you will be given.

Total Users (last 90 days):	293
Total Files available for download:	150
Total Messages in the System:	13,842
Average Messages Per Day:	723
AAC Members With BBS Accounts:	29



# CONSTELLATIONS OF THE MONTH

## Taurus and Auriga

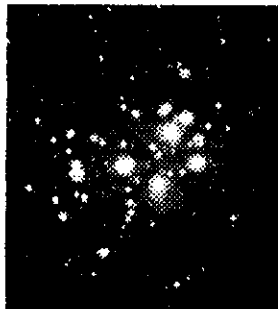
by Rick Raasch, Dallas

The constellations of Taurus and Auriga lie along the winter Milky Way, and therefore contain many objects (primarily open clusters) of interest to the amateur astronomer. Some are large enough to be seen easily with the naked eye, while others need moderate telescopic apertures to appreciate. There's something for everybody!

### Taurus

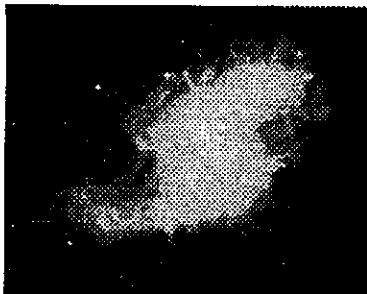
**The Hyades** This distinctive star cluster marks the head of Taurus the Bull. It is one of the closest open clusters, and therefore is large, bright, and easily seen. Binoculars or a rich field telescopes show many bright stars, including the brightest star in Taurus (Aldebaran), which not a true cluster member, but rather a foreground star.

**The Pleiades** This is another classic open cluster. Easily visible to the naked



M45 The Pleiades

eye, it yields a beautiful sight in binoculars. It is dipper-shaped, and about 5-7 stars can be seen with the naked eye. The slightest magnification shows about 100 stars in a compact area. Larger instruments show the fine nebulosity surrounding the brighter stars which is often seen in photographs.



M1 The Crab Nebula

**M1 The Crab Nebula** is a supernova remnant and shows a flame-shaped nebulosity which is about 5' by 3' in extent. It is brighter in the center, and has ragged or fuzzy edges which suggest its name. This is the object which started Charles Messier logging non-cometary objects.

**NGC 1514** A large, almost 2' in diameter, planetary nebula with a rather bright central star. This object exhibits the "blinking" effect rather well. That is, direct vision shows only the star well, but averted vision causes the fainter nebulosity to pop into view. Switching between the two causes the star to "blink" on and off.

**NGC 1807/1817** These two open clusters fit in the same field of view in a low power eyepiece, offering a very pleasing deep sky double. 1807 is about 8' in diameter with about 20 stars in a box or X-shape. 1817 is slightly larger, about 10' in diameter, and composed of about 75 relatively faint stars in a compact grouping reminiscent of NGC 7789 in Cassiopeia. This is a fine sight.

**52 (φ) Tau A** very pretty double star which shows a yellow-white primary and a fainter blue companion.

		HIGH-SPEED FILMS	
Through The Telescope	Lunar close-ups, planets	Agfachrome 200 or Ektachrome 200	ScotchChrome 400 pushed to 1600
Fixed Camera	Lunar eclipses	Kodachrome 200	Ektachrome 400HC or 400X
	Deep-sky objects	not recommended	Fujichrome P1600D but any high-speed film will work well
Piggybacked On Driven Platform	Constellations		ScotchChrome 400
	Star trails		
Through The Telescope	Most aurorae		Lunar eclipses
	Constellations and starfields		ScotchChrome 400
	Lunar eclipses		Ektachrome 400X
	ScotchChrome 400		ScotchChrome 400 (pushed to 800)
	Lunar close-ups, planets		Ektachrome 400HC or 400X
	Nebulous deep-sky objects		or Fujichrome P1600D
	Star clusters		

3M also makes ScotchChrome 1000. It exhibited excellent recording power, but not the superb red sensitivity of its slower speed cousin. It also proved to be very coarse-grained. Agfachrome 1000 had better red sensitivity than Scotch 1000 but was also very grainy and did not resolve stars as well as other films. Fujichrome P1600D and Ektachrome 800/1600P are both "pushable" films. We had them processed to ISO 800. The Fujichrome recorded more stars than the Ektachrome but neither exhibited recording power as good as Scotch 400.

One disadvantage to ScotchChrome 400 is that it is not quite as sharp as any of the Ektachromes or Fujichromes nor as fine-grained as any of the other 400-speed films. As a result, tight groupings of stars are not resolved as well. If you are shooting open or globular star clusters,

Ektachrome 400HC, Ektachrome 400X, or Fujichrome P1600D appear to be high-resolution choices.

We also shot frames on all the films using a broadband nebula filter, a Lumicon

Deep-Sky™ filter. How well each film recorded nebulosity through such a filter appeared dependent on the film's red sensitivity. ScotchChrome 400, 1000, and Agfachrome 1000 recorded the faintest stars and most nebulosity in filtered shots, with Scotch 1000 giving the most neutral sky color.

Each film category had some outstanding choices: Velvia in slow speed films, Agfachrome CT200 and Ektachrome 200 in the medium speed class, and ScotchChrome 400 in the high-speed group. However, every film had positive characteristics that can be exploited for some celestial subject. Experimenting with new films as they come out is part of the adventure of astrophotography.

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## Hot as Hell?

The temperature of Heaven can be rather accurately computed. Our authority is Isaiah 30:26, "Moreover, the light of the Moon shall be as the light of the Sun and the light of the Sun shall be sevenfold, as the light of seven days." Thus Heaven receives from the Moon as much radiation as we do from the Sun, and in addition  $7^7$  (49) times as much as the Earth does from the Sun, or 50 times in all.

The light we receive from the Moon is one 1/10,000 of the light we receive from the Sun, so we can ignore that. The radiation falling on Heaven will heat it to the point where the heat lost by radiation is just equal to the heat received by radiation, i.e., Heaven loses 50 times as much heat as the Earth by radiation. Using the Stefan-Boltzmann law for radiation,  $(H/E)^4 = 50$ , where E is the absolute temperature of the earth (-300K), gives H as 798K (525C).

The exact temperature of Hell cannot be computed...However, Revelations 21:8 says "But the fearful, and unbelieving...shall have their part in the lake which burneth with fire and brimstone." A lake of molten brimstone means that its temperature must be at or below the boiling point, 444.6C. We have, then, that Heaven, at 525C is hotter than Hell at 445C.

(From "Applied Optics" vol. 11, A14, 1972)

## Grazing Occultation Highlights

by Mike Kazmierczak, Atlanta

The end of the 1993 provides astronomers with a wealth of grazing occultation opportunities in this part of the United States. Starting in November there are no fewer than five grazes observable with moderate size telescopes within a 100-mile radius of Atlanta. Included in this group are two grazing occultations during the November 29 lunar eclipse! Sit right back and I'll tell you more about them.

The first graze is in my backyard once again. I will be setting up in the Conyers area to get this event. Its profile is pretty rugged and the star is a triple star. The magnitudes are 6.3, 8.0, and 8.3. That means a lot of fades and perhaps some step events.

The second graze is the brightest of the bunch. In fact, several observers are driving up from central Florida for this one. This is also a double star with two components of 5.7 magnitude. This profile looks like a buzzsaw, so combined with the star's duplicity, the events should be more than you can imagine.

On Monday morning, November 29th, most astronomers will be observing this

excellent lunar eclipse. The two grazes that occur are described on page 74 of the January *Sky & Telescope*. They are ZC 633 and X 5694. The two paths intersect near Tupelo, Mississippi. Depending on the weather, I am planning to travel to this intersection point to set up to observe two grazes and the totality between them. Of course, one can time total occultations during totality! The locations listed in the table are the closest points for each graze. If the weather isn't too bad, I'll go to Dalton, or stay at home for the other graze. If it is clear, these events should be exciting. The profiles are mostly smooth, but one can never tell how many events one can get.

Finishing off the year is the graze near Thomaston. This is another double star with two equal components of 6.5 magnitude. Another fine graze to observe.

If I have enticed you to observe these grazes, please give me a call at 404-760-8502 and I will be more than glad to tell you all about graze occultations.

### UPCOMING GRAZE OCCULTATIONS - 1993

DATE	MAG	TIME	%SUN	CA	LOCATION (VICINITY)
11/9	6.0	3:09A	27-	3S	CONYERS
11/22	4.9	10:03P	69+	12S	LAWRENCEVILLE/ SNELLVILLE
11/29	5.4	12:46A	87E	51U	SOUTH OF DALTON
11/29	7.1	2:14A	77E	62U	CONYERS
12/4	5.7	3:16A	74-	6S	THOMASTON