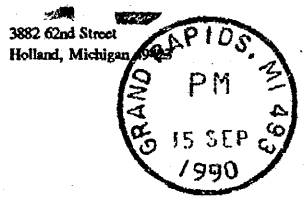
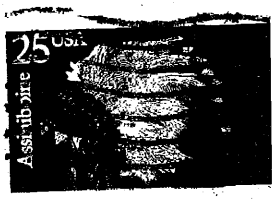
URANOGRAPHOS

Newsletter for the
Shoreline Amateur Astronomical Association

President- Robert Wade, D.Phil. **Vice President**- Peter Burkey **Secretary**- Michael Coté **Treasurer**- Mark Logsdc

Robert Wade, Editor *September 199*





September Meeting

The September meeting of the Shoreline Amateur Astronomical Association will be held on September 20th, beginning promptly at **7:30** PM in the West Ottawa Middle School Planetarium in Holland, Michigan. The agenda will be as follows:

7:30 - 7:40 The September Night Sky Tour.

7:40 - 8:45 *Transparency and Seeing: Meteorology for the Common Astronomer.* WOOD radio meteorologist Peter Chan will be here to tell us everything we need to know about how atmospheric conditions affect our observing. Anyone wishing to dine with the speaker before the meeting should contact Bob Wade at 396-3614 by 9-19-90.

September Board Meeting Minutes

The meeting was called to order at 6:30 pm on September 12th with Bob, Pete, Sandy, and Mark in attendance.

Old Business: Astronomy Day 1991 was discussed. Westshore Mall has gone through two marketing directors in six months and is not now accepting requests for mall space. So..., we shelved hopes for a booth and party there in favor of a star party elsewhere, possibly with John Dobson attending as he will be in the area then. We also discussed some kind of school programs to interest students in astronomy. To be continued. Mark reported our status with the Astronomica League is again sound - everyone should be getting *Th Reflector* quarterly, with the next issue due out in November The need for a membership packet was reiterated. Any idea out there?

New Business: Mark noted a few irregularities with ou *Astronomy* subscriptions. If you have your own long tern subscription and want to convert to a club subscription contact Mark and be sure to give him your subscriptior number. Dues are payable to the publisher by October 3, sc if you wish to continue receiving the magazine you shoulc come prepared to renew your membership early. We alsc obtained copies of the constitution of several other astronomical societies to compare with our own. Study will continue, with the Board recommending some changes in the nea future. Don't forget the September star party at Mark's home

on either 21 or 22, weather permitting. Treasurer's Report: $296.00.

Submitted by Mark Logsdon

Photographing the Earth's Nearest Neighbor--the MOON

by Tom Martinez
Astronomical Society of Kansas City

Have you ever wanted to take pictures of that gorgeous Full Moon, just rising over the horizon? Or possibly a beautiful thin crescent Moon sitting next to a bright planet such as Venus? How about taking a close up of the Moon's features, using either a telephoto or a telescope? These kind of pictures are fairly easy to do. Some require only a minimal amount of equipment, while others take quite a bit to set up.

Assuming you have never taken a picture of the Moon, or have tried and failed, here are some procedures that you can try the next time the Moon beckons your camera out of its bag.

First, we need to establish the kind of camera you need. Most 35mm cameras are capable of doing everything described here. As long as you can set the shutter speed manually you should be okay. If you camera is totally automatic exposure you may be out of luck. The problem with an automatic camera is that its metering system is always trying to make every picture into a normal daylight exposure. Darkness around the Moon fools the meter, and you will never get a good shot.

Okay, lets start with a common mistake. You see that fat Moon high in the sky, so you set up your camera on your tripod and click of a few shots, exposing for a few seconds to possibly up to few minutes (after all, you think, its dark outside and you are sure you need long exposures). After having the pictures processed you find that what you have is a featureless blob surrounded by darkness. What happened to the bright and dark features you could see even without optical aid. Well, I think you will understand what happened when you realize that sunlight falls on the Moon just as much as it does on the Earth, therefore, to shoot detail on the Moon, daylight exposures are what is needed.

USING WIDE ANGLE, NORMAL & SMALL TELEPHOTO LENSES--The Moon can be shot with just about any kind of lens you can think of, but you have to realize they all will show the Moon differently. Lets take the normal lens that usually comes with your 35mm camera, a 50mm lens, and show you another fact-- image size. The size of the image of the Moon on film depends on the focal length of the lens, as expressed by the formula:

FORMULA 1

Image Size (on film) = Focal Length/110

where the focal length is expressed in the same units as th
>image size (normally millimeters).

So, with a 50mm lens, the image of the Moon on the film wil
be 50/110 = .45, or about 1/2 millimeter in diameter. Now
when you see that the width on a frame of 35mm film i
24mm, the .5mm Moon image is very small indeed. Even i
you enlarge the image 15X (about the equivalent of a 16X2
inch print from a 35mm negative) the image size on the prir
is only 1/4 inch in diameter. If you want to see detail on th
Moon, the image size of the Moon needs to be increased.

Table 1 shows size of the Moon image using various foc
lengths and the size of the Moon when enlarged 15 times:

TABLE 1

Focal Length	Image Size	15X Enlargement	
mm	mm	mm	inches
28	0.25	3.8	1/8
50	0.45	6.8	1/4
100	0.91	14	1/2
200	1.8	27	1
300	2.7	41	1 5/8
400	3.6	54	2 1/8
500	4.5	68	2 5/8
600	5.4	81	3 1/8
800	7.3	109	4 1/4
1000	9.1	136	5 3/8
1500	13.6	205	8
2000	18.2	273	10 3/4

As you can see, if you want detail to show up on yo
photograph of the Moon, you will need at least a 300mm
400mm lens, preferably longer. But, lets see what you can
with smaller focal length lenses.

A normal, wide angle, and small telephoto lens pretty mu
establishes that the pictures you shoot of the Moon will ha
to include foreground objects to make a pleasing pictu
Look for trees, houses, city-scapes, mountains, etc. Fo
ground objects are dark in this kind of scenes, so exposu
have to be longer than you would normally shoot the Moon
itself. This will wash out any detail on the Moon, but t
image is so tiny anyway, it doesn't matter. What you a
after is a night scene showing the Moon as either a min
detail, or showing its passage near bright stars or planets.

For Moon landscapes, it is best to use fast film, at least I
100, but preferably ISO 200 or 400. You really don't ne
faster film than this, besides, faster film means a grai
looking image. Exposures will depend on the focal length
your lens.

Here are some starting exposures:

TABLE 2

Focal Length	Exposure
28mm	10 - 30 seconds
50mm	14 seconds
100mm	7 seconds
200mm	4 seconds

As you can see, the longer focal length exposure are shorter. If you shoot exposures longer than this, the Moon and stars will start to trail on the picture because of the Earth's rotation. The higher magnification will emphasize it even more.

Always use a tripod, or some way of holding you camera steady (a pillow on top of a fence post). Use a cable release to prevent camera vibration. Stop down the camera lens at least 2 stops from wide open. Using most lenses wide open will give you gull wing images of stars and street lights around the edges of the picture. Stopping down will diminish this. Take off any filter you may have on the lens (bright objects like the Moon and street lights will show ghost images, even if you don't see them in the viewfinder.

The best time to shoot a night landscape is either shortly after sunset, or before sunrise. During twilight, the sky turns a royal blue that is emphasized by film, and there is enough sky glow to show trees or buildings silhouetted against the horizon.

Look for situations where is the Moon is a thin crescent next to some bright planets or stars. You can check out the SKYWATCH feature here on the Astronomy Features section for up-coming events. That usually places the Moon near the horizon. That's not to say that full Moon shots are not bad, but thin crescents, with some earth shine on the dark side of the Moon is always a beautiful sight.

USING LONG TELEPHOTOS & TELESCOPES--As you can see in Table 2, the longer the focal length is, the shorter your exposures must be to keep the Moon from blurring on the picture due to the Earth's movement. But, remember that the Moon is basically a daylight object, and short exposures are required. Table 3 details the exposures to use depending on the speed of the film and the f/ratio on your lens or telescope:

TABLE 3 -- LUNAR EXPOSURES

F/RATIO	ISO	FULL	GIBBOUS	QUARTER	CRESCENT	THIN
5.6	25	1/125	1/60	1/30	1/15	1/8
5.6	64	1/250	1/125	1/60	1/30	1/15
5.6	100	1/500	1/250	1/125	1/60	1/30
5.6	200	1/1000	1/500	1/250	1/125	1/60
11	25	1/30	1/15	1/8	1/4	1/2
11	64	1/60	1/30	1/15	1/8	1/4
11	100	1/125	1/60	1/30	1/15	1/8
11	200	1/250	1/125	1/60	1/30	1/15

Here is an important formula that you should keep in mi while shooting with long telephotos and telescopes:

FORMULA 2

700/fl = LONGEST EXPOSURE FOR NO STAR TRAIL

where fl is equal to the focal length of lens

Now you know why the exposures were chosen for the vario focal lengths in Table 2. If you are using a telescope with focal length of 1000mm, the longest exposure to assure r movement of the Moon is about .7 second, or on a came shutter speed, about 1 second. So as long as you keep yo exposures faster than the formula states the movement of t Earth will be no factor, however, another factor is just important, and that is movement by vibration. A lo telephoto requires a sturdy tripod, and a cable release so th the camera is not shaken during the exposure.

PHOTOGRAPHING The MOON and PLANETS

by Pete Warren

In a recent article, I discussed piggyback astrophotography, great way to capture on film the colorful expanse of the nig sky. What about photographing subjects much closer to ou planet, such as the major planets and our Moon? Th piggyback method produces small images of these objects, s small that they appear merely as dots on film. To captur lunar and planetary detail, two methods can be used: eyepiec projection and first focus.

Briefly, eyepiece projection uses a telescope/eyepiece combina tion. For example, with a Schmidt-Cassegrain telescop (SCT), the eyepiece is inserted and secured in the telescop visual back, a tele-extender (adapter extension tube) is secure over the eyepiece to the visual back, and a camera (withou lens) is attached to the tele- extender with a T-ring adapter This method can be used to photograph the changing phase of Venus and Mercury, the churning atmosphere of Jupiter the rings of Saturn, and small lunar craters.

First focus uses a telescope without an eyepiece. Using th SCT as an example, the visual back is removed and replace with a T- adapter. The camera (without lens) is secured to th T-adapter with a T-ring. This method affords whole-disl photos of the Moon, as well as Jupiter and its four majo moons.

What type of telescope should you use? Any quality scop with a sturdy mount can be used. A motor drive system i recommended, but isn't necessary for exposures under on second and with focal ratios of f/50 or less. Good pola alignment is essential, but isn't as critical as it is for th piggyback method. Because exposure times are short, guidin the telescope during exposure isn't required. Quality eyepiec

es should be used, such as orthoscopic and Plossl designs. (One word of caution: ensure the eyepiece is secured well in the visual back! A loose eyepiece can slip and break the camera mirror.)

What type of camera should you use? A 35mm single lens reflex model seems to be the standard. It should be light-weight, allow interchanging of focusing screens, have an exposure meter shutoff switch, and a manually retractable mirror. For accurate focusing, use a clear ground glass focusing screen. The ability to retract the mirror prior to exposure eliminates "mirror slap", the vibration caused by the mirror retracting during shutter opening. Use a good cable release to operate the shutter. If available, use a viewfinder magnifier for critical, low light focusing.

What type of film should you use? For lunar photography, ISO 64 to 400 works well. For planetary work, I recommend ISO 200 to 400. Using films of higher speed may save a little exposure time, but produce a noticeable granularity on the negative.

Okay, everything is set. Your telescope is polar aligned, the drive system is engaged and tracking well, the camera is loaded with film and is securely mounted to the scope, and the atmosphere is steady. Now what?

1) Advance the film.
2) Center the subject in the camera viewfinder.
3) Focus the subject carefully.
4) Ensure the subject stays centered in the viewfinder for a few seconds. This will tell you whether or not the scope is correctly aligned to the pole and the right ascension motor is tracking correctly.
5) Check the shutter speed setting.
6) Retract the camera mirror.
7) Wait a few seconds for all vibration to cease.
8) Depress the shutter cable release. For exposures over one second, use a stop watch to time the exposures.
9) Record the data (e.g., exposure length) for future reference.
10) Repeat the above steps with the shutter speed one setting lower and one setting higher. This is known as "bracketing".

A recommended exposure length is usually for ideal conditions, which are elusive. Bracketing your shots will ensure your exposures are "in the ballpark". For exposures over one second, bracket your exposures by one second on either side. The name of the game is experiment.

Don't be surprised or dismayed if only one or two good photos are obtained from each of your first few rolls of film. By learning from your mistakes, the quantity of the quality will increase, as will your enjoyment from this form of astro-photography. Remember - patience and practice.