JAN '70 ?

MESSIER CLUB OUTING

THE MESSIER CLUB will hold an outing on January 31st if it is clear at Stoney Creek. Messier Club Members are asked to please attend this outing. Sunset is at 5:36 P.m. So 5:30 will be the leaving time. Any interested individuals are welcome to come along. We should all meet between 5:00 and 5:30. Where we will meet will be discussed at the General meeting. Those needing further information CALL 778-5768. New members are welcome! Members should have following items listed below.

THINGS TO BRING

WATCH-IF YOU HAVE ONE
PENCIL AND SKETCH PAD
A LOG IF YOU HAVE ONE-IF NOT I WILL GIVE YOU ONE
AN ATLAS OR GOOD STARCHART
IF POSSIBLE BRING A SMALL TABLE
BRING A DIM LIGHT
BRING VERY WARM CLOTHES
BRING A TELESCOPE!

THINGS TO BE VIEWED

1ST-COMET 1969-G
2ND - M-77-MAG.9-SPIRAL GALAXY IN CETUS
3RD - M-1 -MAG.10-DIFFUSE NEBULA-TAURUS
4TH - M-35- MAG.6- OPEN CLUSTER-GEMINI
5TH -M-79-MAG.8 -GLOBULAR CLUSTER-LEPUS

THANK YOU,

FRANK McCULLOUGH

INTRODUCTION TO ASTROPHOTOGRAPHY

By
Larry F. Kalinowski

PART III – THE PRIME FOCUS METHOD

One of the most popular methods of through-the-telescope photography involves no camera lens or eyepiece. The camera body is fitted with a coupling device which slides into your eyepiece holder and your mirror or lens in the telescope forms an image directly on the film. If you have a single lens reflex body, you can see the image of your subject and how well it's focused on the round glass of the camera. Focusing is accomplished with your rack and pinion. If you don't have an SLR camera, you'll have to mount the camera on the scope without film in it. Remove the back and substitute a piece of ground glass or white paper in place of the film. When the camera is focused, the paper or ground glass is removed and the film is placed in the camera and closed. Care must be taken so that the camera body does not slip out of focus while loading the film. Bright objects, such as the sun or moon, will be easy to see on the paper when focusing. Stars will prove much more difficult because of so little light. If you don't have a shutter on your camera body, cover the telescope with a black piece of cardboard or a hat, so that the film won't get exposed while you're loading it. Use your finder to center the image on the film and expose by removing the hat or cardboard for the required length of time.

Why use the prime focus method? Well, there is more than one reason. This method produces the cleanest, sharpest image your camera and telescope combination can give, simply because you use the least amount of optics. The more lenses or mirrors you add to the system, the greater chance you have of deteriorating the final image.

Another reason is wide field. Perhaps as much as one and a half to two degrees wide in some cases, depending on your objective's focal length. For those two reasons alone, many amateurs prefer this method for lunar and solar photography. You can bet that, during the next total eclipse of the sun, many amateurs will be using this method or a slight modification of it.

How big will the image be on the film? A good rule to follow is find the focal length of your objective in inches and move the decimal two places to the left. This rule applies only to the sun and moon. If the focal length of your mirror is 50 inches, the image on the film will be .50 in wide. Actually it turns out to be a little less, but the difference is slight.

From part one and two we learned that three things must be known in order to take a picture: the speed of the film (A.S.A. rating), the F ratio of the system and the shutter speed or exposure time, if you prefer.

Since the focal length of our objective doesn't change when we use the prime focus system, the F ratio will be the same as it has always been since you made the telescope. Most amateurs build telescopes with a ratio of about F8 (Six inch mirror, forty-eight inch focal length).

The film speed can be found packed in the film box. Let's assume the A.S.A. rating is 32.

The exposure time, if it's a quarter moon, will be one tenth of a second. So the hat or the cardboard will have to be moved aside from the telescope for a tenth of a second.

How did I know what the exposure would be? Very simple: trial and error. Only certain types of light meters can measure the light coming from the moon. Since the average person can't afford to buy a light meter just for this purpose, the best thing to do is try a dozen different exposures on a roll of film and see which turns out to be the best.

ASTROPHOTOGRAPHY (cont'd)

Of course, you can profit from the mistakes of others, like myself, who have recorded all successful exposures and devised a method for calculating what the exposure should be for any combination of A.S.A. rating and F ratio. I'll be happy to share that information with you.

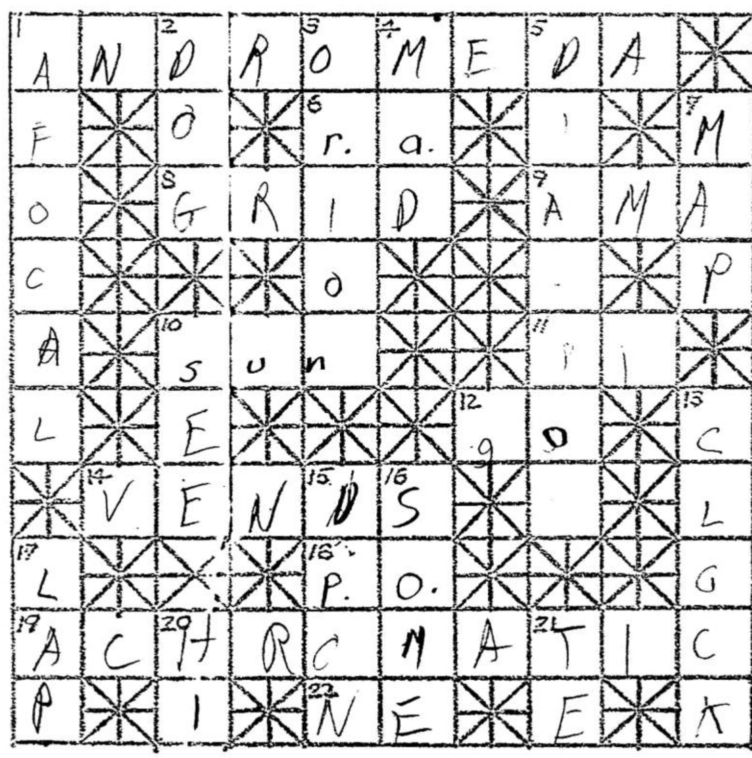
If you haven't realized it by now, the camera we've been using to take pictures with this method has neither a camera lens, a shutter, nor an adjustment for F ratios! In reality, this camera's function was only to hold the film in place and protect it from outside light.

Remember the example I used for taking pictures of the moon in the first article I wrote? It involved an Instamatic camera placed in front of your eyepiece. In the next issues, we'll take that method apart for close scrutiny when we discuss the afocal system of through-the –telescope photography.

ASTRONOMICAL CROSSWORD PUZZLE

ACROSS

1. Fall constellation.
6. Abreviation for right ascens on.
8. Used to determine size.
9. American Medical Association, abreviated.
10. Solar system center.
11. Greek letter.
12. Opposite of stop.
14. Inner planet.
18. Post Office, Abreviated.
19. Corrected for two colors.
22. Direction.



DOWN

1. Photographic method.
2. Sirius is sometimes called the _____ star.
3. Winter constellation.
4. A mixed up comic magazine
5. Secondary mirror.
7. To find an object you need a ________ .
10. To percieve.
13. A timing device.
15. Preposition.
16. When you have little you have ______.
17. Used to polish mirrors and lenses.
20. Exclamation.
21. Initials of an electrical wizard.

THE SPECIAL THEORY OF RELATIVITY – AN INTRODUCTION

PART 1

By Gene L. Francis

Since relativity plays such a large role in all areas of physics today, including astrophysics and cosmology, a study of its basic concepts should prove worthwhile to any interested individual. This series will concern itself with only the simpler Special Theory, which examines un-accelerated reference systems and problems related to their constant velocity, through the use basic algebra and a very small amount of calculus.

Equations and various statements used in these articles are not original, and are taken from Arthur Beiser's text, Concepts of Modern Physics.

This first article will cover the Michelson-Morley experiment, the results of which paved the way for the development of relativity theory.

The Michelson-Morley Experiment

With the development of the wave theory of light, it was assumed, and not at all illogically, that the light waves had to undulate in some sort of elastic medium, classed ether, similar to the way ripples on a lake move across its surface. Maxwell's development of the electromagnetic theory in 1864 and Hertz's experimental confirmation in 1887 deprived the medium of most of its properties, but the fundamental notions about it remained the same: that light propagates itself relative to some sort of universal reference frame. We will now consider what this ether concept implies and how to go about detecting its presence through the use of a simple analogy.

Figure 1 is a sketch of a river of width D having a velocity R. Two boats start out from the same point on one shore, boat A going to a point on the other shore directly opposite the starting place, and boat B going downstream a distance D and then returning to the starting point. Let us calculate the time required for each round trip:**

For boat A:

Since the current R will carry the boat downstream, the boat must have an upstream velocity vector component equal to –R (Figure 2). This leaves the component V' as the boat's net velocity. These rates are related as follows:

$$V^2 = V'^2 + R^2$$

Where V is the boat's true (still-water) velocity.

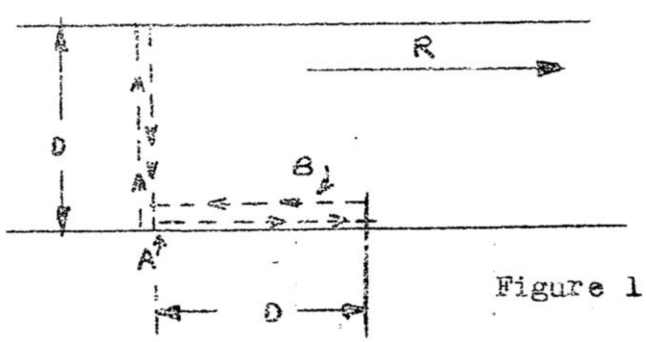


Figure 1

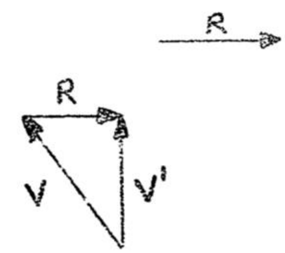


Figure 2

** Both boats have identical velocities.

The actual velocity with which the boat crosses the river, then, is:

$$V' = \sqrt{V^2 - R^2}$$
$$= V\sqrt{1 - R^2/V^2}$$

The time to cross the river is the distance divided by the speed V'. Since the trip back is identical and requires the same amount of time, the total time, t_A, is twice D/V', or:

$$t_A = \frac{2D/V}{\sqrt{1 - R^2/V^2}}$$

For boat B:

As it heads downstream, boat B's velocity relative to the shore is its own velocity plus the velocity R of the river, and it travels the distance D downstream in the time

$$\frac{D}{V+R}$$

On the return trip, B's velocity relative to the shore is its own, V, minus the velocity of the river. The time required to cover the distance D, then is:

$$\frac{D}{V-R}$$

The total time, t_B, is the sum of these two times:

$$t_B = \frac{D}{V+R} + \frac{D}{V-R}$$

Using a common denominator (V+R) (V-R) and rearranging:

$$t_B = \frac{D(V-R) + D(V+R)}{(V+R)(V-R)} = \frac{2DV}{V^2 - R^2} = \frac{2D/V}{1 - R^2/V^2}$$

Which is different than tA, the corresponding time for the other boat. The ratio of t_A and t_B is

$$\frac{t_A}{t_B} = \sqrt{1 - R^2/V^2}$$

The reasoning in this example can be transferred to the analogous problem of the passage of light waves through the ether. If there exists an ether pervading space, it would appear to an observer on the earth that the ether was streaming past him. Now, if two light waves are sent out over identical distances through the ether "current", the existence of the ether would introduce a time lag between the times required by both waves to cover their distances. Hence, A. A. Michelson and Morley attempted this experiment meant to verify what physicists had believed for years. What the results were threw physics into a quandary, and it was Einstein who finally made sense of the experiment's enigmatic results.

(Next month—The Michelson-Morley experimental results; Einstein's postulates).

IMPRESSIONS

By

D. T. Ther

MY THOUGHTS WHILE VIEWING THE MOON

I have been observing the moon through various telescopes for several years and have always enjoyed it. My impressions of what I see have definitely changed after man walked upon the lunar surface. Although I still find the moon to be an object worthy of observation, much of the interest and excitement in doing so disappeared the instant Apollo 18 landed on its surface.

My lunar observations began with the completion of my first telescope—the moon was the first object to be seen through it. Armed with a crude moon map, I had expected to see a lot of nothing and was only interested in testing the telescope. A few seconds at the eyepiece were enough to completely change my opinion of the moon as an object of observation. Although I knew nothing of the appearance or nature of the lunar surface features, I was immediately impressed by their complexity and variety. Craters, mountains, rays and snakelike rills all appeared in great numbers and gave the moon the appearance of a totally alien environment.

I often try to imagine how the early observers felt as they trained their newly-built telescopes upon the moon. For thousands of years men had gazed at the moon without really knowing what they were seeing until Galileo and others began using telescopes. The excitement and suspense must have been unbearable as they saw for the first time the true rugged nature of the moon.

Until recently, man's knowledge of the moon was limited to what is apparent telescopically. The moon was mapped and described over a hundred years ago leaving very little to be done in the area of observational discovery. Before the manned space programs, the professional scientist was quite unconcerned with the moon. Only amateur observers had devoted much time in this area and for aesthetic rather than scientific reasons.

I find lunar observing to be an excellent opportunity for aesthetic enjoyment. The over-all effect of the many irregular surface features is one of great beauty. Before the manned landings there was the stimulus of seeing a place completely remote from man's domain. With the landing of Apollo XI, the interest generated by the mysteries of the moon became greatly reduced. Though still unique, the moon has become a large piece of real estate which, like Antarctica or the Sahara Desert, is not extremely interesting. Rather than appreciating the moon's beauty or why a formation was named as it was, I now think of footprints and landing sites.

I don't believe the loss of the moon as an object of mystery is a tragedy that can outweigh the scientific gains involved in the lunar space programs. As man moves outward into the universe, he will always be able to look ahead and speculate as he once did upon the moon.