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AN OBSERVING PROGRAM FOR THE SERIOUS AMATEUR

By: Mark McConnell

Up until a few years ago the asteroids were a commonly neglected group of celestial objects suitable for amateur observing and a steady program of observation was carried out only by professionals and a small group of unorganized amateurs. Now, through the efforts of Dr. J.U. Gunter and, more recently, by the A.L.P.O. Minor Planets Section, this has all changed. It is in conforming to this change that I have written this article as a basic guide to those wishing to make tracking the minor planets their main observing program, as I have done. (See footnote by Editor at the end of this article).

The equipment necessary depends largely on your interest; binoculars can be used for the brighter planets, but their accuracy is poor. I have found that a 15 cm (6-inch) telescope can be used to observe about 30 to 40 planets brighter than photographic magnitude 13.5 each night. Considering that a good rate of observations is about six planets per hour, a 15 cm (6-inch) telescope certainly is adequate for a detailed and extensive program. (By the way, the most I have observed in one night is 27 asteroids). Although opinions vary, I prefer an equatorial mount, as such a mount provides for easy movement in right ascension and declination; this will prove a great convenience in the long run.

Magnification is another point to consider. You will want a wide-field yet you don't want skylight to prevent you from seeing the fainter stars. Even though I started with a 40mm eyepiece giving a field slightly over one degree across, I later found that a 20mm eyepiece with only a half-degree field to be better. I recommend, however, that you should use the lower power, wide-field eyepiece until you are used to using the charts and moving around the sky and then move onto a higher power, if necessary.

Star charts are another very important consideration. One of Hans Vehrenberg's photographic atlases should be considered indispensable. His Photographic Star Atlas (Falkau Atlas) goes to about 13th photographic magnitude and is perfect for a 15 cm (6-inch) telescope. For larger telescopes, Vehrenberg's Atlas Stellarum goes down to about magnitude $14\frac{1}{2}$ at twice the scale of the Falkau Atlas.¹

Once a copy of the Ephemerides of the Minor Planets, the standard volume for both amateurs and professionals, has been obtained,² the paths of the selected planets can then be drawn on Xerox copies of the photographic charts. For locating the fields of the various charts an atlas such as Becvar's Atlas of the Heavens is quite useful.³

As you start observing you will soon find that quite often you will not be sure of a particular observation being accurate. There are reasons for this. For example, many of the brighter star images on the photographic charts are necessarily over-exposed causing many images to blend together. Thus it is hard to tell at times whether what you see through the telescope is a star or the planet for which you are looking. If this happens, just go back and check it again about two hours later. Unless the asteroid is in the process of reversing its direction (i.e., in

one of the bends in its retrograde loop) you should be able to detect its motion quite readily if it is fairly close to some reference stars.

The major problem with this and many other observing programs is moonlight. For about a week or so around full Moon observing all but the brightest planets is virtually impossible, at least with a 15 cm telescope. Since this will tend to break up a consistent series of observations, you should plan accordingly.

Once you have completed your observations of a planet during a particular opposition, a record of those observations should be sent to the Minor Planets Section Recorder, Prof. R.G. Hodgson, using appropriate forms. It may also be a good idea to keep your own records of all observations. Here is one way: On an unruled sheet of paper, type, for each observation, the date, time, telescope aperture, power used, and measured position. Then tape onto the sheet the tracking chart which you used. By storing such sheets in a spiral notebook you can readily keep track of all your observations in a convenient way.

Though such a program may not be as valuable to science as variable star observing, there are occasions where it may be extremely important, as in the case of a planet found to be off its ephemeris position. In the meantime it is a very self-satisfying experience as well as being very educational. And, who knows, maybe you will even run across a new comet or similar phenomena while searching for some minor planet. Good luck!

Footnotes

1. Vehrenberg's Photographic Star Atlas costs \$ 38.00 for edition A (black stars on white background) of the northern section, and \$ 53.00 for edition B (white stars on black background). Edition A is recommended for asteroids. Atlas Stellarum North is priced at \$ 103.00 and has black stars on white background. Both are available from Sky Publishing Corp., 49-50-51 Bay State Road, Cambridge, Massachusetts 02138, U.S.A.

2. The North American distributor for Ephemerides of Minor Planets is University of Cincinnati Observatory, Observatory Place, Cincinnati, Ohio, 45208, U.S.A. The price is \$ 1.50 postpaid. (Note copies for the year 1974 are no longer available; the volume for 1975 should now be available -- Editor)

3. Eecvar's Atlas of the Heavens, field edition (which is recommended) costs \$ 4.00 per set. The deluxe edition is priced at \$ 12.50. Both are available from Sky Publishing Corporation. (My only regret about the field edition is its omission of Flamsteed numbers, but its more compact format makes it easy to use -- Ed.)

Editor's Note: Mr. Mark McConnell thus far has been the most active observer in our A.L.P.O. Minor Planets Section, as a forthcoming report summarizing Section observations will make clear. He is an outstanding, mature observer in spite of being only 15 years old. He is now a junior class student at Horseheads Senior High School. Long interested in astronomy (which he plans to make his career), his 15 cm telescope is of his own making, and was completed in January 1972. With it he has observed all of the Messier objects, and approximately 100 different minor planets.

Mr. McConnell is evidence of what can be done with a 15 cm telescope in the minor planet field. Perhaps his example will encourage many others. Given the choice, of course, larger apertures are to be preferred since they permit observation of fainter planets (some of which may have special scientific interest), but larger apertures take longer to move from one part of the sky to another. The Editor doubts he could observe six planets an hour with his 41 cm (16-inch) f/7 Newtonian, especially if he had to keep adjusting ladders!