

# Cheap Observer's Report

## Star Charts

By Alex McConahay

It's hard to get someplace without knowing where you are going. Road maps (and Garmins) help for driving a car on earth, and a good star map is essential for traversing the heavens. But atlases come in all shapes and sizes, and can be pricey. It is nice to know that the Cheap Observer has some alternatives.

Let's consider first what one is looking for in a star atlas. We will start with a good old paper and ink version. Next month we will consider computer versions.

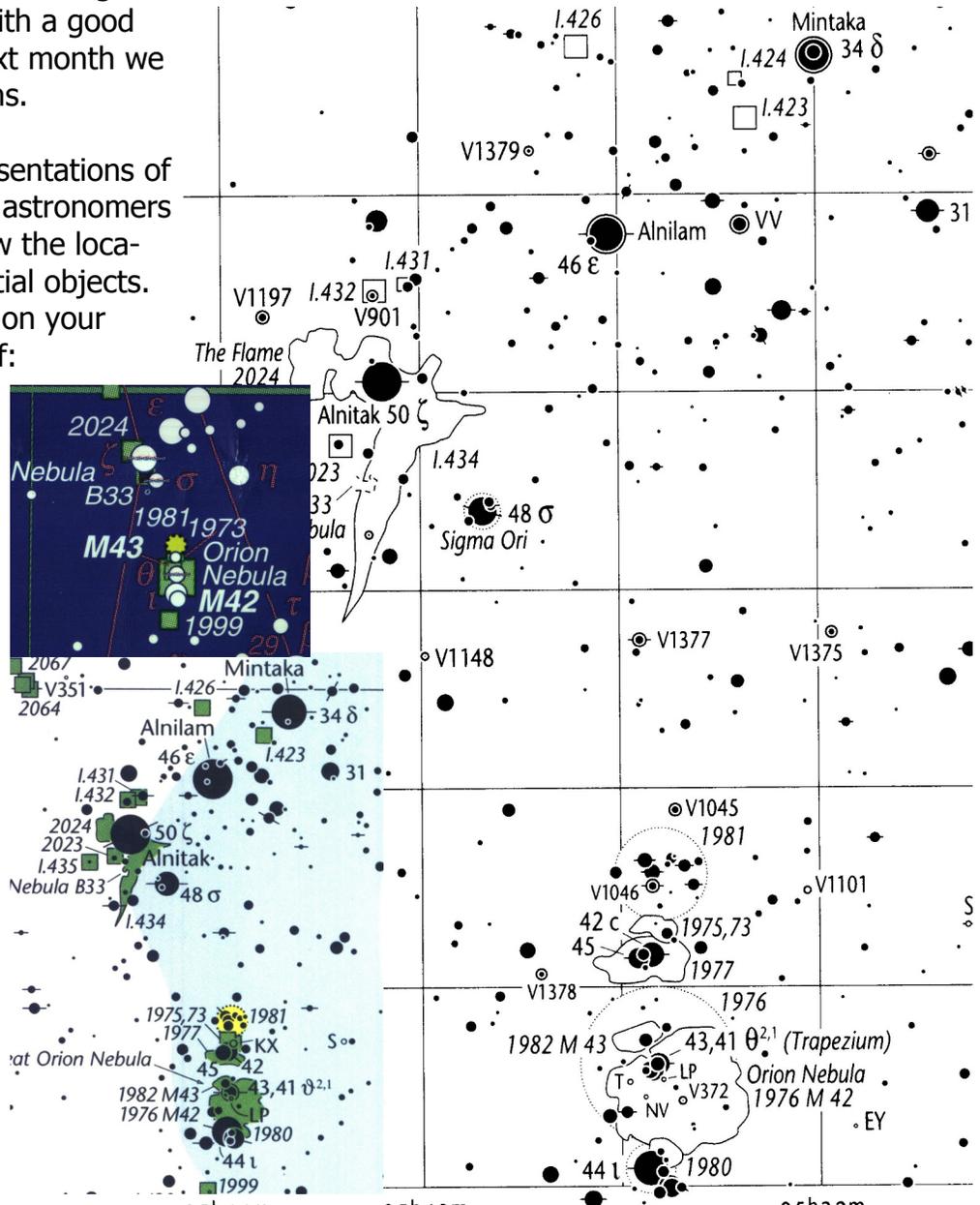
Charts are simply visual representations of the night sky. For some time, astronomers have been using them to show the locations of major stars and celestial objects. What is best for you depends on your tastes and needs. Ask yourself:

### What celestial objects am I looking for?

If you are a relative beginner, or looking for the most common of objects (like the Messiers and brighter NGC's), then nearly any atlas will do. But if you are looking for the faintest of the fuzzies, then you will need something that has those objects, and the relatively dim guide stars that will take you to them. And if you are looking for a special kind of feature (a quasar? Gravitational lensing?) make sure the atlas has those marked. Among other things, look for the number of objects the chart covers.

*Uranometria* has 280,035

Some of the differences between star maps are shown below. These images show how three atlases depict a region of Orion. Note how the Deep Sky Map (top left) has relatively few objects and it is hard to tell which label goes to which object. The Sky Atlas 2000 Deluxe (bottom left) has more detail and larger scale. The *Uranometria* 2000, (right) has more objects still and the largest scale. On the other hand, The Deep Sky Map fits on one 22 x 31 inch sheet, SA2000 is 26 large pages, and *Uranometria* is two thick volumes of 220 charts. Note how colors are used in the three. While attractive and useful during the day, they are not quite as useful at night under a dim red flashlight. (from <http://www.oreillynet.com/network/2005/07/18/staratlases.html>)



stars and 30,000 non-stellar objects. My Norton 2000 has 8700 stars and 600 non-stellar. Obviously, I will have more objects to find in the *Uranometria* (of course, see the next question as to whether this matters).

**What equipment will I be using? And what kind of skies?**

These questions relate to how dim you need the atlas to go. The least expensive atlases will commonly have stars to Mag 6 and show the brightest Messiers and NGC's. These are actually great for in-town, or for smaller telescopes. You do not need more detail because your telescope will not show any more than that anyway. If, however, you have a sixteen incher in dark skies, you need something that will take you much deeper.

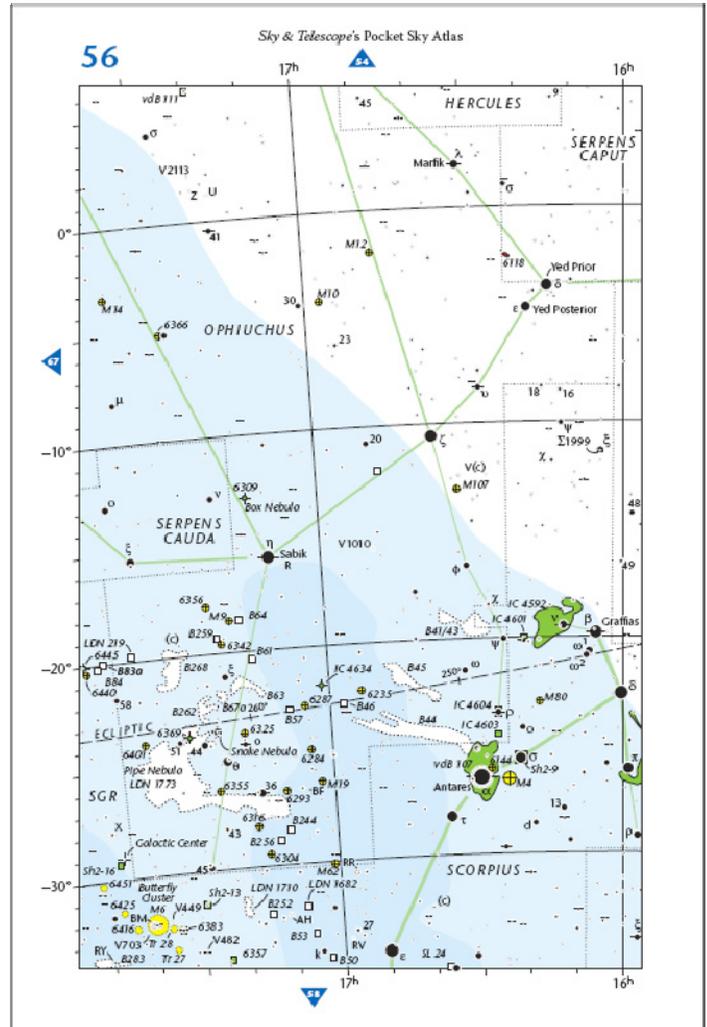
**What am I comfortable with?**

What one person likes may not work for another. Star atlases come in all shapes and sizes. Contrast a planisphere and *Uranometria*.

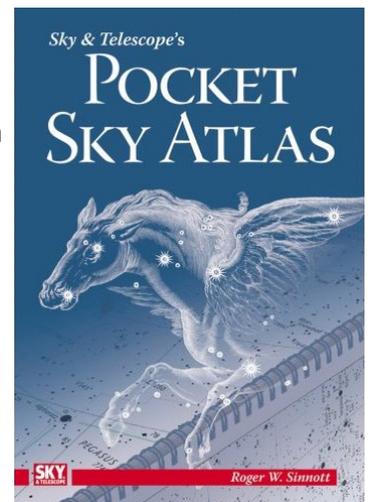
Technically, a planisphere is a star chart. It shows the entire northern (or southern) sky on a disk that can be rotated to show where the stars are in relation to the horizons. Of course, putting all that on one disk means you have to sacrifice the number and limiting magnitude of the objects. But it fits easily in your hand, can be held high, and is comfortable.

At the other extreme, *Uranometria* is two volumes containing 220 very dense charts spread across pages 12 by 8 1/2 inches. Big books. Heavy books. (And, truthfully, there are even larger and denser—more expensive—atlases.)

These extremes are not your only choices, though. In between are "Finder cards" or "Telrad Cards" that feature one object (like a Messier galaxy) on each card, along with the necessary guide stars, and often with Tel-rad circles showing you how to star hop. There are



A very popular option is the *Pocket Sky Atlas* for \$20 retail from Sky and Tel. It's scale is midway between the Orion Deep Sky Map and the Sky Atlas 2000 (see preceding page). The 80 color charts contain 30,796 stars to Mag 7.6, and 1500 deep sky objects to 12— pretty much anything one would be looking for from the city with a ten inch scope. It is small, convenient, fairly tough, and has the constellation stick figures. The charts are large enough to fit one or two constellations per page, more on the double wide spread across the spiral binding. This is still not enough to make me happy, but a good compromise of physical size, detail, field of view per chart, and convenience.



books like the Edmunds Mag 6 Sky Atlas, and Norton 2000 which have the whole sky in about 15 to 20 charts in one easily held book. The Pocket Sky Atlas uses more than 80 charts, each 5 by 8 inches. And the Sky Atlas 2000, comes in six different formats, all of which cover the sky in 26 oversized charts.

The key to this size and format question is—just what is one comfortable with? You will be carrying it around, lifting it over your head, taking up space on your observing table....and all that adds up. It is a physical thing.

**How much is on each chart?**

If you have only one, you need a Goldilocks sized atlas. Not too big, not too small, but just right. To use a star chart, you must be able to orient it. This means it must cover a wide enough area of the sky. Imagine trying to find Wall Street from an orbiting space station when all you have is a map of lower Manhattan. The map itself does not cover a large enough area to start your search. But it can't cover too much sky. If all you had in your space station was a globe, you would never be able to find Wall Street—there just is too much field of view, and not enough detail.

To put this another way—we all know that two

bright stars can be found from the easily recognized curve of the Big Dipper's handle: "Arc to Arcturus, and Spike to Spica." Well, if these things are not on the same page of the star atlas, it is not nearly so obvious.

I find it difficult to relate some charts (e.g., Uranometria and the very popular (and inexpensive) *Pocket Sky Atlas*) to their position in the sky. There just is not enough sky on each chart to place it easily in the sky.

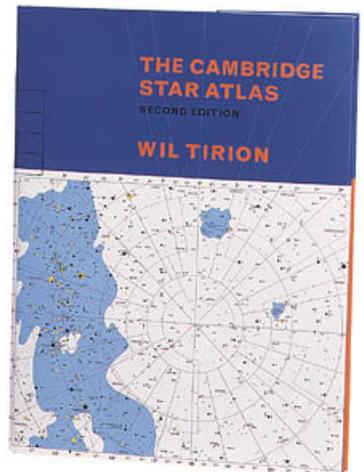
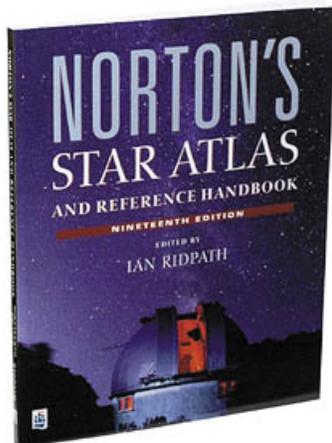
Most "star charts" approach this problem by having large finder charts in the front of the collection that direct the user to the more detailed charts within. But this means you have to use two different charts—not necessarily easy.

A related issue is chart edge overlap. I find it hard to find some objects because they are on the edge of one chart with no guide stars nearby. The next chart over has lots of guide stars, but not the object I am seeking. The nebulae in southern Ophiuchus, for examples would be easier to find if Sagittarius (right over the border) was in fact on that chart. With more overlap, this is not as big a problem.

**Colors, Lamination, and Such?**

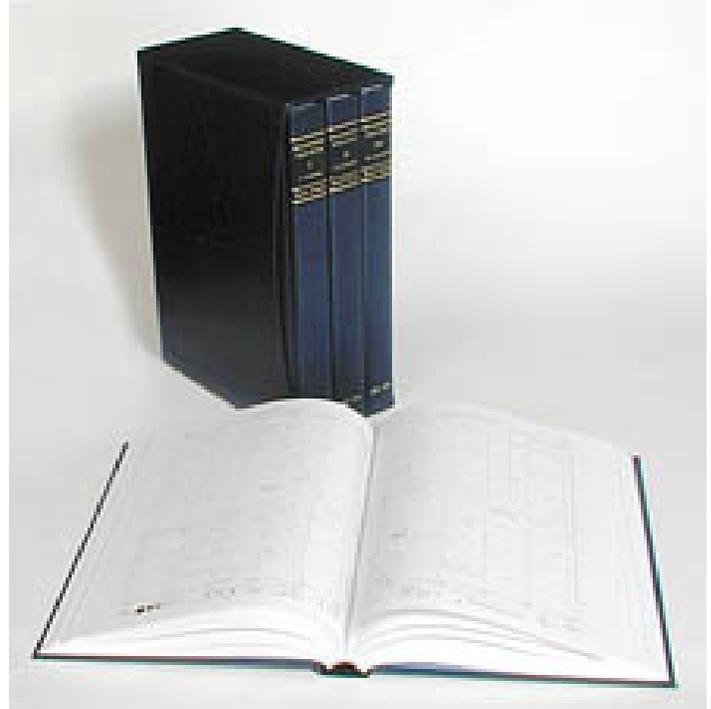
This is where things can become expensive and

**Mag 6 sky atlases are also very handy. They are by nature, limited to relatively few objects, with less detail than their more expensive brothers. However, they are not particularly good values. Although they can be had for as little as \$10 (Bright Star Atlas), the extra \$25 you spend on a full fledged SA 2000 is well worth your while. Nortons is more a reference book than a star atlas, but is \$49 retail. It does, however, have lots of very good reference and it is fun to use a book that has been used by fellow amateurs for 100 years and twenty some editions.**



beautiful. Some of them matter, but others are not worth the expense.

- **Black on White:** Most observers seem to prefer the black stars and objects on white paper. They seem to be easier to read, even though the white on black is more like the sky. White on black is supposed to help night adaptation, and combat glare, but if that were true, I would see a more white on black charts on the observing field. I don't.
- **Color:** Some of the prettiest and most informative of the charts use various colors on white to emphasize the different objects, outline the Milky Way, and in other ways inform the user. These colors look nice while planning an evening observing, but they lose their utility under a dim red flashlight. As long as the chartmaker does not use red on white, you should be fine. But you should not pay a premium for color in an observing atlas.
- **Lamination and Writable Surfaces:** This can really boost the cost of an atlas. It helps to use a dry-erase marker to highlight your objects before you go out to observe. And some people take notes right on their atlas, transcribe them when they get home, and then wipe off their notes. Laminated surfaces tend to be tougher than regular paper, resist dirt and dew, and so forth. Lamination costs about \$2.00 to \$4.00 per sheet, though, and a factory laminated edition of Sky Atlas 2000 is double the price.
- **Binding:** Some atlases come in book form, others in individual sheets. Still others are available in both. Individual sheets are easier to move around and hold up over your head while matching them to the stars. However, they tend to magically disorganize themselves and are never where they belong. Even when you put them away right,



**Not for Cheap Observers:** This \$400 Millennium Star Atlas contains 1,058,000 stars to Mag 11 and 10,000 non stellar objects spread across 1548 charts in three volumes. It was so very exclusive that they no longer produce it.

they seem to jump around (like the cords from your imaging rig!!!). Books are heavier and more delicate. If you go the book route, make sure the binding is substantial, since this book will be out on dewy observing tables, tossed into the bottom of the equipment locker, and such! If you go the individual sheet route, or even with the bound editions of larger charts, invest in something to carry the whole thing. (I used an artist portfolio for mine.)

- **Durability:** This takes in a range of attributes, including some of those mentioned above, but also the type and thickness of the paper, coatings to resist dew and dirt, solidity of the cover, and so forth. These atlases should last a very, very, long time.
- **Size:** Smaller atlases are obviously easier to carry around and lift over your head. But

they are, well, smaller. Any detail they have must either be more densely packed (tiny print), spread around more individual charts (smaller field of view per chart), or omitted (not as many objects).

- **Legends and "next chart" notes:** I prefer a star atlas that has its legend on each chart. If I have forgotten the symbol of a Globular Cluster, as opposed to a Galaxy, or how big a black circle a Mag 1 star is, I want to be able to see it right on the page, not to go elsewhere to look for a legend. I also like knowing the chart number for the next piece of sky when I come to the edge of a chart.

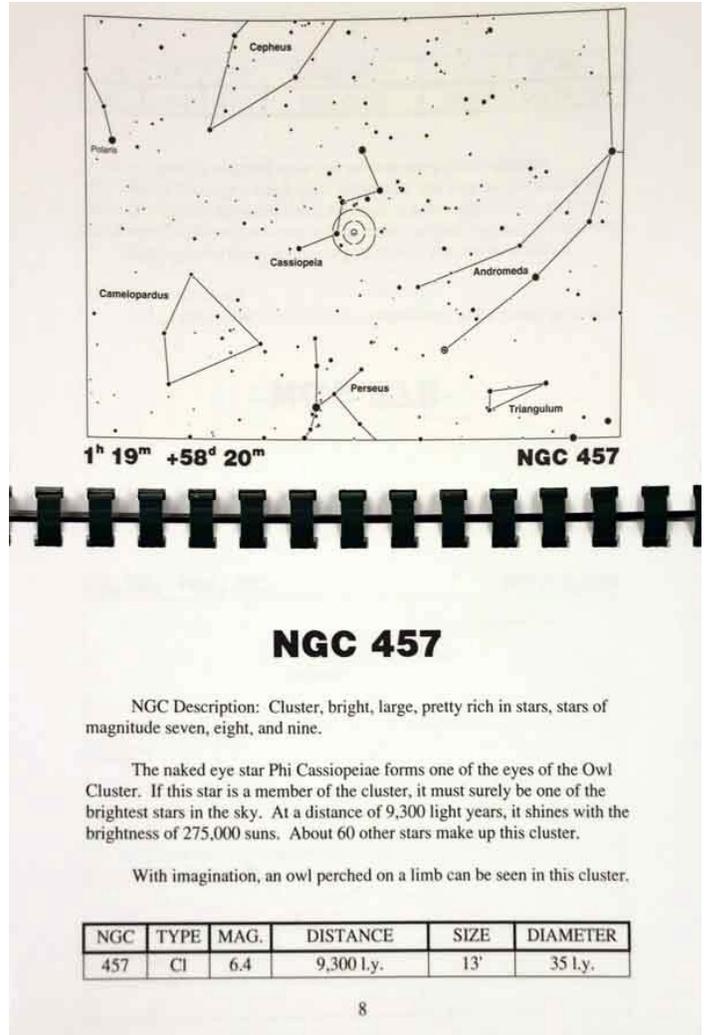
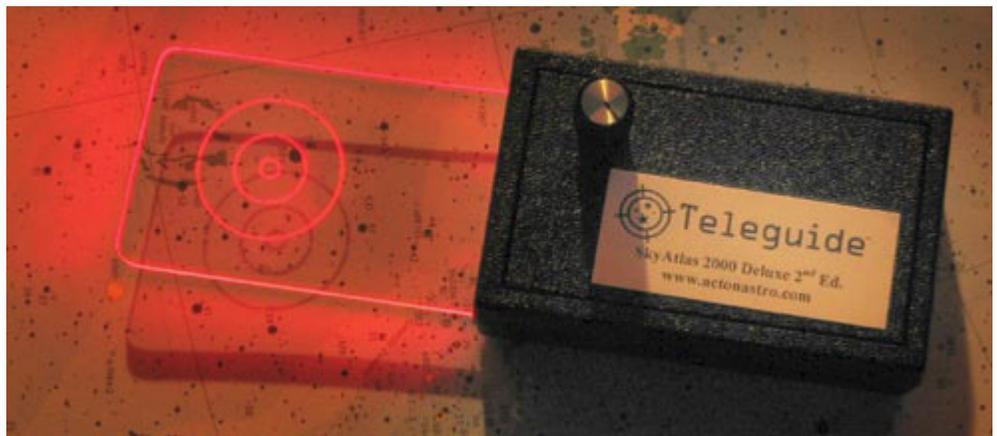
**Other Considerations?**

There are other things to think about when you get along in the hobby:

- Accuracy (how precisely the objects are plotted—there are errors ),
- Projection (wrapping a spherical sky onto a flat paper),
- Epoch (the date at which the charts are accurate considering that everything moves),
- And less well known catalogs (Catalogues are lists of specific types of objects. For instance, Arp peculiar galaxies, or Radio Sources have their own catalogues. )

In fact for simple starhopping, these things probably do not enter into consideration. However, some things add to the value of a

**The TeleGuide (right) is handy-dandy for star-hoppers. It has a reticle scaled to the SA2000 star chart showing .5, 2, and 4 degrees on the chart—same as the Telrad. It shows how many Telrad fields you need to move your scope from the corresponding guide star in the sky. Cheap Observers can do the same thing by printing appropriately sized circles on transparent overhead film**



**Star Cards (above):** These are a bit different in concept. Instead of covering the whole sky, they focus on a particular catalog (like the Messiers, or the Caldwell's) using a small set of cards, sometimes spiral bound. They run about \$15 to \$20 a set. Some have space for comments, and other information. They are available, among other places at <http://www.sky-spot.com/charts.htm>

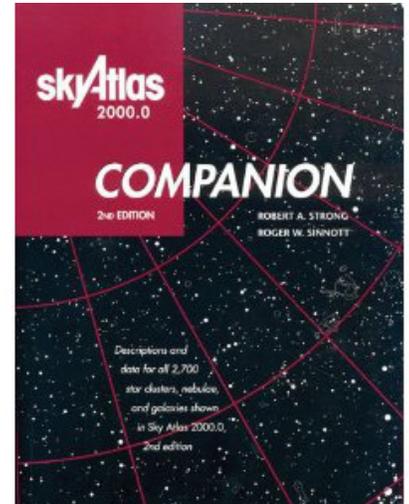
simple star chart.

- **Tel-rad compatibility:** By this I mean accessories like tel-rad finder circles and other devices already made up that you can use with your charts. Various transparent overlays are made to work with the Sky Atlas 2000, for instance. I like my TeleGuide (see box on previous page). It is nice for measuring how far to move a scope while starhopping. You can make your own, but it can be nice to have them available.
- **Companion Book:** Many atlases have lists that highlight the objects on the various pages. Some of the more popular go so far as to have special Observer's Guides describing most of the objects in the charts.
- **Overlays and special charts:** Many atlases have special charts for the Virgo Cluster, the Pleiades, M42, and such particularly dense areas. Some also have clear acetate overlays that help measure angular displacement between various objects.

Usually at this point, I make a suggestion for the cheap observer. But in star charts, I simply do not know of a paper and ink product that delivers more value than the Sky Atlas 2000. It retails at the S&T website from \$35 to \$120, depending on edition. But Amazon (and other places online) offer it for as little as \$23.

SA 2000 has 26 oversize charts, with 81,000 stars down to magnitude 8.5, and another 2700 deep sky objects. It comes in six editions. Desk and field editions are monochrome, *desk* with black objects on white background, and *field* the converse. They are on oversized (18 x 14 inch) heavy paper for \$35 (unlaminated single sheets) or \$69 (laminated spiral bound). The *Deluxe* editions feature color to highlight objects and are 21 x 16 inches. They are \$69 (unlaminated single sheets) or \$120 (laminated

**Need more Info? Various sky atlases have companion books like this \$30 volume for SA2000. It can tell you how far away an object is, how many stars are in a globular, angular dimensions, exact coordinates, and things that can be hard to deduce from a simple chart symbol. Having said that, I find I do not often use my Companion. Whatever I am looking for is already described in other documentation that lead me to look for the object in the first place. For instance, if I am doing the Herschel 400, my O'Meara H400 book probably has a better description than the rather dry compendium of facts in the "Companion" volume.**



spiral bound). These are suggested prices. Sky and Tel runs sales (the Deluxe laminated bound is going for \$99 as I write this) and other net-sellers have them for as much as one third off.

The SA 2000 I have been using for eleven years is a desk unlaminated version (the \$35 model). I drew constellation lines in a fine tip felt marker, and then laminated the pages back to back myself. Finally, I bound them together at the top with packing tape. I also made a list of the Messier objects and laminated that onto the cover pages so I can always find those objects pretty quickly. This edition comes without the "See Chart #???" on the edges of the charts, so I added them. Altogether, I have been very happy through the years with my trusty friend.

But, WAIT.....there's more. Although I have spent the whole six pages talking about ink and paper star atlases, it is possible that you do not need to buy anything at all to guide you through the heavens. Next month, I will tell you what I know about planetarium programs for the computer. You do have some (free) options.