Using the Skygazer's Almanac

Look at the front of your *Skygazer's Almanac*. You will notice that the dominant hourglass figure has days of the year running vertically and time of day running horizontally (actually, time of night from 5 pm to 7 am). Note the left and right <u>solid</u> borders of the hourglass are labeled sunset and sunrise, respectively. Hence, the hourglass shape is a simple consequence of longer nights in the winter and shorter nights in the summer. The shape is also a consequence of the observer's latitude (the farther north one goes, the thinner is the middle "waist" of the hourglass). In the case of the almanac that Astronomy 10 requires you to purchase, the almanac is drawn for 40 degrees north latitude, which is very close to that of Placer and Sacramento counties in California.

If you study the dotted grid that overlays the hourglass almanac, you will notice that one can determine "events" (to be defined below) to within a precision of 1 day (vertically) and to within 5 minutes (horizontally) for a given day.

Be careful about the days. A given day starts at midnight, runs to the right until it hits the sunrise border and then drops down a line as it comes in from the left sunset border and makes its way back to midnight (whereupon the next day starts). Also, be careful of the time. Time is measured in *local mean time*, which really means standard time on the meridian line of a given time zone. At 121° west longitude, Rocklin, California, is very close to the meridian line of the Pacific Time zone (located at 120° west longitude). Therefore, one can read the times directly off the almanac and not worry about being too far off from the time given on your watch (just be sure you understand that the almanac gives standard time and not daylight savings time). [For locations not near a time zone meridian or 40° north latitude, see "Time Corrections on the backside of the almanac.]

The next feature one notices about the almanac are the colored and white lines that mark "events". For the most part, these events are for the rising, transiting (when a celestial object crosses the meridian), and setting of the planets (colored lines and excluding Pluto) and stars (white lines). Other events are also displayed, but in a different manner. The rising and setting of the Moon, for instance, is shown by a Moon symbol that also shows the Moon's phase. Meteor showers are marked by a "radiant", a series on lines radiating out from a center point (e.g., the Leonids on November 17). Other event symbols are illustrated and defined at the very bottom of the almanac. [Important Note: Most of these symbols are relatively large for day/time determinations; consequently, use the center of these symbols to determine the dates and times associated with the symbolized event.]

The general procedure for using the almanac is as follows. First, choose an "evening" of interest, which will actually cover the late hours of one day and the early hours of the next. Second, starting from the hourglass sunset line on the left, progress horizontally to the right making a note of each event and its time of occurrence as you go (e.g., determined where a colored planet line crosses the horizontal day line that you are moving to the right on). When you reach the right hourglass sunrise line, you are done cataloging events for that "evening". Depending on your needs, you may want to catalog events on an adjoining "evening" as well. You are now ready to answer questions concerning this time-sequenced collection of data.

A typical problem to solve is the time of an event on a given day. The aforementioned procedure makes finding the solution quite straightforward since this information was cataloged for the day of interest.

A more difficult problem is determining some astronomical occurrence within a given time span during an "evening", say, for example, what events occur between sunset and the end of evening twilight (which is marked with a dashed line on the almanac). To solve these types of problems, first mark the beginning and ending points of the restricted time span within the events that you compiled for the entire evening (for the example just noted, we would mark the time of sunset and the time of end of evening twilight). Solving the problem then comes from asking logical questions based on the time-sequenced data.

Dealing with planet questions (e.g., what planets are in the sky during some time span) requires an understanding of the sequence of events that a planet experiences in the sky. The best way to look at this is to begin with the planet rising. After a planet rises, it will then transit (be halfway across the sky and on the meridian). Finally, the planet will set. So that is the sequence for a planet (and even the stars): rise, transit, set, rise, transit, set, etc., etc. A planet (or star) may not do all these events during an evening (since they may have occurred during the day, which is not illustrated on the almanac), but they will always follow the rise-transit-set sequence.

So to determine a planet's disposition during some time span, ask yourself what was the last thing it did before the span started, what is it doing during the time span, and what is the first thing it does after the time span. Not all of these determinations can be made for a given evening if the appropriate colored lines are not present, but usually a rise, transit, or a rise condition can be found which will then shed light on what the planet is doing during the time span of interest. For example, say we are interested in Mars during the time span between sunset and end of evening twilight and that there are no Mars lines crossing this time span on the almanac. However, the first thing Mars does after the time span is set. This must mean 1) Mars transited before the time span; and 2) Mars must therefore be in the sky during the time span of interest.