A Naked-eye Guide to the Night Sky
How to Read a Star Chart

No one needs instructions on how to look at the stars. You wait until dark, you head outside, and you look up. Pretty simple. But if you want to *learn* the stars – if you want to know their names and come to recognize the figures they form, month after month and season after season – you might turn to a star chart for guidance.

A star chart is a lot like any other map you might have seen: It shows where things are located, identifies features by name, and lays out a picture of familiar or prominent landmarks. But a map of the sky differs in many ways from a map of the ground, and you might find it useful to get your bearings before you head out to acquaint yourself with the stars.

First, it helps to imagine the sky as a dome, arching overhead. When rendered on paper, the dome flattens into a circle, like the one seen in **Figure 1**. The outer edge of the circle represents the horizon. It's marked with the compass directions, but notice that they're arranged differently than the way we usually see them. This is because a map of the sky looks ***upward***, the reverse of ***downward***, and it throws the placement of compass directions a little helter-skelter. Don't worry if this is confusing – it will all become clear when you get outside to use a chart.

Everything *inside* the horizon circle is the sky – again, imagined as a dome, and flattened on paper. At the center of the chart you'll often find a symbol marking "zenith", the point in the sky directly overhead. The word zenith comes from an Arabic expression meaning "the way or path of the head".

Finally, know that a chart is not complete – it shows just a few of the brightest stars in the sky for a given time of year. To include *everything* that's visible in the night sky would be impossible!

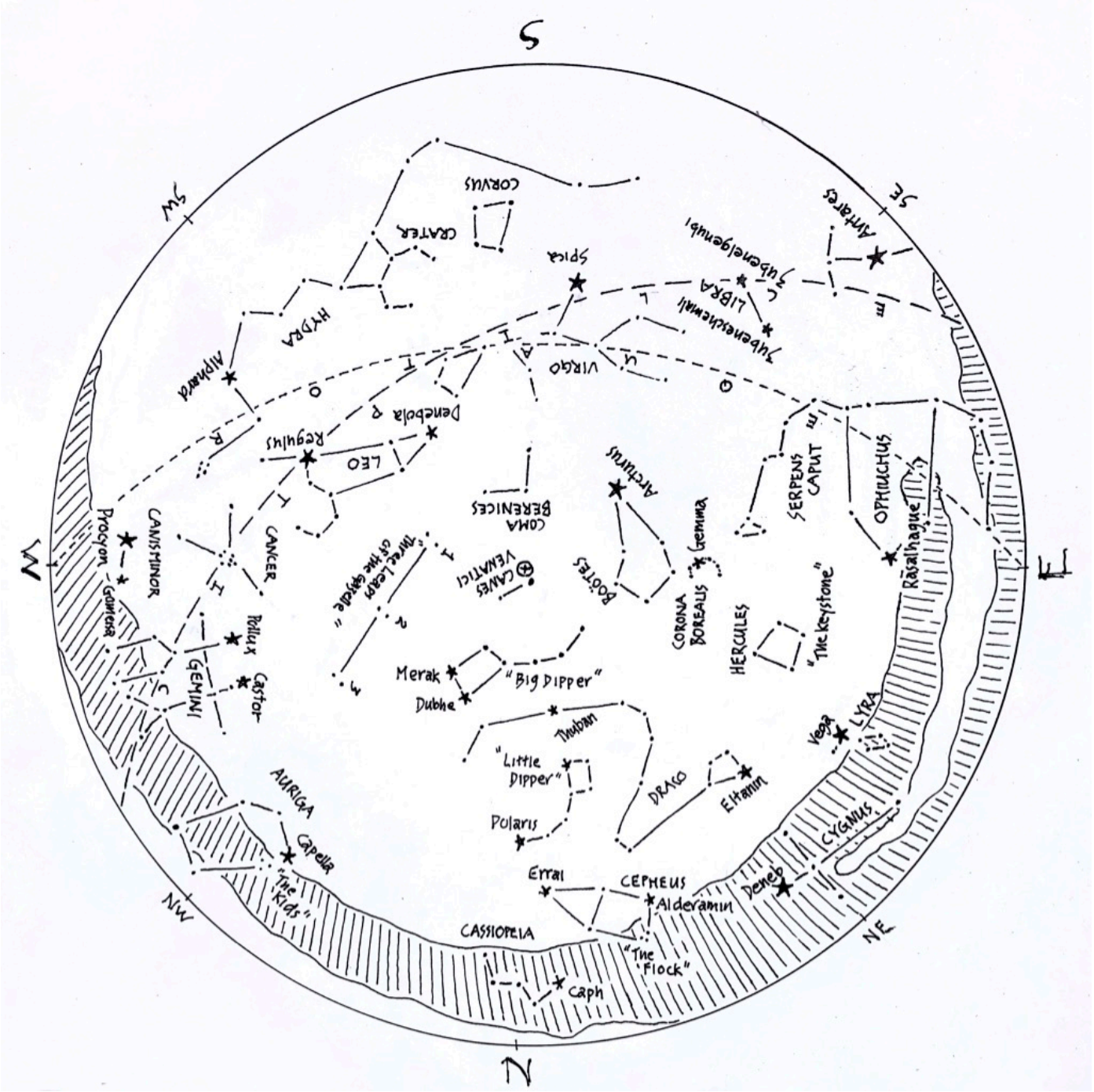

Figure 1: A sample star chart.

Drawn for the skies at around 9:30 pm. in mid-May,
Compass directions are listed around the horizon ring.
At the center of the chart, a (+) symbol inside a tiny circle of its own marks
zenith, the point in the sky directly overhead.

Keep in mind that the planet you're standing on is moving – it spins on its axis once per day, and orbits the Sun once per year. Both of these motions determine what stars will be visible at a particular hour for a given night. The star chart shown above is drawn for the skies of mid-May, about two hours after sunset. If you were to use it at a time or date very different than that, the chart would be less accurate, and you'd have a harder time matching it to the sky overhead.

To read a star chart, it's held in hand like a steering wheel. The chart is rotated so that the direction you're facing is at the bottom of the chart. Held in this way, the curve at the bottom of the chart represents the horizon, and everything in the *lower half* of the chart depicts the sky in front of you. Remember that the center of the map represents the point in the sky directly overhead – as you hold the map like a steering wheel, everything in the *upper half* is actually found in the sky behind you. If you want to look at those objects in the sky, you need to *face* that direction and rotate the map so that the new direction of sight is at the bottom of the map. As before, everything in the lower half of the map will match what you see in the sky ahead of you.

By turning your body to face different directions, and by turning the star chart to match your view, you can relate what's on the map to what's visible in every quarter the sky. The detail in **Figure 2**, below, shows the May star chart oriented to view the southern sky.

If you prefer to lie down to look at the stars, a star chart works in this case as well. Simply lay on the ground with your head pointing north, looking upward at the sky. Hold the map above you, again like a steering wheel, so that the northern mark on the horizon ring is pointing toward the north as well. In this orientation, the cardinal compass directions on the map will match those on the horizon around you, and stars on the map will match what you see in the sky. Of course, you may need to move the map aside a bit to see the stars hiding behind (above???) it.

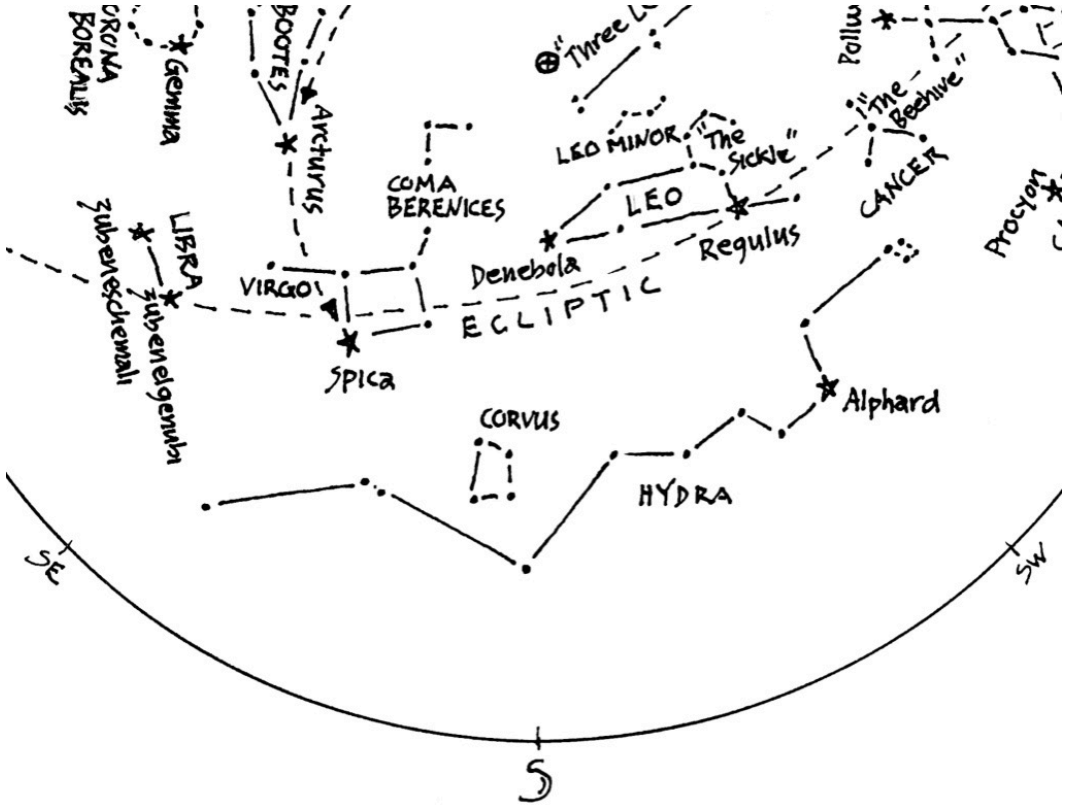

Figure 2: Detail from the chart in Figure 1

Star chart oriented to view the southern sky. South horizon is at the bottom of the chart. Zenith, the point directly overhead, is marked with (+). Stars and figures in the lower portion of the chart match those visible in the southern sky.

Last, a note about lighting. Many stars are dim and difficult to see, even under the best conditions and darkest skies. As you look at the night sky, your eyes will adapt to the dark, opening slowly to admit more light. But if you illuminate the map to read it in the dark, your eyes may respond by closing down again and becoming less sensitive. For this reason, a red-filtered flashlight is recommended for reading a star chart in the dark. Red lighting does not affect our eyes the way that bright white lighting does, and so a red light will allow you to read a star chart without the risk of closing your eyes off to the dimmer stars in the sky.

You might already have a headlamp with a red bulb option, and that will work just fine. Otherwise, you can easily modify an ordinary flashlight to be red-filtered: Just cover the lens of the flashlight with masking tape, and color the tape with a red marker. A Sharpie works great. So does a red crayon. It may take a few layers of tape and marker to get the light to quiet down sufficiently. You'll want enough light to read your star chart in the dark, but not so much that it blinds your eyes to the stars. It may take some experimenting to find what works best.

Equipped with a map of the sky and your red-filtered light, you're ready to become better acquainted with the stars overhead. And as you greet them by name, and trace with your fingers the figures and shapes they form, the skies overhead will draw ever closer as a part of the place you call home.