A FRAC COMPREHENSIVE GUIDE TO OBSERVING

By Bill Warren

CHOOSING AN OBSERVING PROGRAM

1. What area of observing are you interested in?
2. If you're a beginner, do a beginner's program.

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WHEN YOU DECIDE WHICH PROGRAM YOU WANT TO DO:

1. Go to the A. L.'s site, click on Observing, then click on the program you want and read the rules and requirements for that program.
2. Organize your search.
    A. *Seasonal Star Charts* groups the constellations by the four Seasons, and shows them month-by-month. (I used *SSC* to divide the targets for each program into seasons by constellation.)
3. Those four lists showed me which objects would be up next time I went out to observe.

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PREPARING TO OBSERVE

Before Leaving Home:

1. Be like Santa Claus: make a list and check it twice.
    A. All of your observing gear.
    B. Comfort features (e.g., an extra sweater or jacket, a fold-up chair, bug spray, coffee, etc.).

Onsite:

1. Arrive early (before dark if possible).
    A. Telescopes and finderscopes are easier to collimate in the daylight.
    B. Telrads and Rigel Kwikfinders are easier to collimate when the Sun is down. (You can see the red circles better.)
2. When unpacking, lay out everything exactly where you want it. (Put it in the same place every time so you'll know where to look for it in the dark.)
3. If you have problem with collimation, ask for help.
4. Don't get bug spray on your eyelashes or your eyepieces or optics.

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SEARCH STRATEGIES

1. Before working on your list, find and observe the easiest object you know how to find. Success will give you confidence. (For me, it's always **M57 (Ring Nebula)** in the summer and **M42 (Orion Nebula)** in the winter.
2. When starting a program or observing session, look for the easiest objects on your list first.
    A. Easy objects are those lying near one or more bright stars.
        (That confines the area you'll be scanning.) The hardest objects to find are those out in the middle of nowhere.
3. Look for the westernmost objects. (They'll be gone first.)

4. Work your way through one constellation at a time. (The more you work in a constellation, the more familiar you'll become with it.)
5. Look for the same kind of object (e.g., globular clusters) so you can compare them.
6. Find objects at low power (e.g., 25mm, 26mm). Using lower magnifications than that (e.g., 32mm, 40mm) will make the objects so small that you may overlook them entirely. And even if you find them, they'll be so small that you won't get any detail.

    At high power, the field of view will be so small that you'll miss it.
7. Adjust the brightness of your Telrad as necessary to see the star you're looking for in it.
8. Develop a scanning technique that will cover every square inch of sky.
9. Get as close as possible to where you think the object is located before you start scanning.
    A. *Near a bright star* (e.g., **M4** near **Antares** in *Scorpius*).
    B. *Triangulation.* (Use two stars to form a triangle with where your chart shows the object is located.)
    C. *Degrees* (e.g., **Sue French's** articles telling you how to find things)*:*
        i. A Telrad's three red circles are $1/2^{o}$, 2^{o}**,** and 4^{o} in dia.
        ii. Rigel Kwikfinder's two circles are $1/2^{o}$ and 2^{o} in dia.
        iii. A pinky-width held against the sky is 1^{o}.
        iv. Three finger-widths is 5^{o}.
        v. A fist-width is 10^{o}.
        vi. A spread pinky-to-index finger width is 15^{o}; and
        vii. A spread thumb-to-pinky width is 20^{o}.
10. Scan slowly. (No faster than 2 seconds per field of view.)
11. Don't spend more than 5-6 minutes looking for an object. If you haven't found it by then, go on to the next object on your list. (You can always go back to it later.)
12. Wait until the sky gets really dark before you look for the smallest and faintest objects on your list.

    A. *How do you know which objects are small and faint if you've never seen them before?* (Your A. L. object list will have the size and brightness of each object.)

    B. Size and brightness can be deceiving (e.g., **M33** and **M101** are listed as being bright, but they aren't. Their stated magnitude refers to what their total brightness would be if they were the size of a star – but they aren't. Both of them are very large, and their brightness is spread out over a very large area. That's why you need somebody to help you when you're getting started.)
13. Know what kind of object you're looking for before you look for it.
    A. *Is **M67** a galaxy, an open cluster or globular, or a nebula?* (It's an open cluster in *Cancer.*)
    B. Find a photo or drawing of it.
        i. Drawings are better than photos.
        ii. You can use my photos and descriptions of the Messiers.
        iii. For your own photos of the Messiers, you can buy a Messier Chart from *Sky & Telescope*, or go to the *Interactive NGC Catalog Online* for photos of the Messiers or any of the 7,800 NGC objects.
14. If you're having a hard time finding an object:
    A. Ask for help.
    B. Find something easier. Go back to a favorite.
    C. Look for another way to find it (e.g., by forming a different triangle with different stars).
    D. Use a different star chart or atlas. (That's why I prefer atlases to computer-generated charts.)

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OBSERVING TECHNIQUES

1. When you find an object:

A. Before observing it, note the way it drifts across your fov. That way, you'll know where to look for it if you lose it. Use high magnification to watch the object drift, then switch back to low power.

B. Take your time observing it. (The longer you look at it, the more detail you'll see.)

C. If the object is faint, use averted vision.

D. If it's very faint, try tapping the tube lightly. (Your eye will be attracted to the object's movement.)

E. Filters will bring out additional detail in nebulas, but not in open clusters, globulars or galaxies.

2. Use at least two eyepieces of widely different magnifications for every object you observe. One of them will give you a better view than the other.

A. Carry your eyepieces in a vest, jacket or your pants pocket.

(That will keep them warm, and will keep the dew off them.)

Don't use an accessory tray like some mounts and tripods have on them to store your eyepieces when not in use.

B. Re-center objects in your field of view before taking your eye away from the eyepiece.

3. Objects are brightest when viewed near the zenith.

4. **Recording your observations:**

A. Except for special programs like the Double Star, Sunspotters & Lunar, I recommend the Deep Sky Binocular observing form.

B. A hand-held pocket recorder is easier to use than writing down your observing notes (You don't have to turn on your red-beam light, and you don't have to take your eye away from the eyepiece).

C. You can also use a cell phone to dictate your notes or do a text message.

D. Record the time you found the object, and the seeing and transparency. (Most of the A. L. programs ask for all three – but not the Messier.)

E. **Transparency** (refers to how clear the sky is)**:** *What's the faintest star you can see naked-eye via averted vision?* (Find it in *Seasonal Star Charts* and it'll have the magnitude by the star.)

F. **Seeing:** *How steady is the atmosphere?* (Find a bright star, move it out of focus so it has a black circle at its center. Then watch how the edges of the star jitter and dance.)

I use the **Antoniadi Scale** to estimate seeing:

1= perfect steadiness, no quivering (excellent conditions);
2= slight quivering, mostly calm (very good);
3= some quivering, but with larger spikes (acceptable);
4= constant large and small quivers (observing difficult);
5= wildly gyrating spikes (observing useless).

If all that sounds complicated, just think of 1, 2, 3, 4 & 5 as corresponding to A, B, C, D & F grades in school. You're grading the quality of the atmosphere. I check the transparency and seeing just once a night, not for every object I find.

5. Record how you found the object, so you'll know how to find it next time you look for it.

6. The last thing to do before you leave the observing site is check the the ground around your 'scope and vehicle for stuff you might have dropped, and go over your checklist *one more time*.

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STAR CHARTS AND ATLASES

1. West is on the right side of the page.

2. The hardest objects to find are those located near the edges of the charts (e.g., **M75** in *Seasonal Star Charts)*.

3. **Characteristics of the Best Star Atlases:**

A. *Large charts* to give you a sense of where the object is in the sky;

B. Should have all of the stars down to mag. 5.5 or 6.0;

C. Pages should be water-resistant (e.g., *Seasonal Star Charts* or *DEEP MAP 600)*. Or, you can have them laminated or put them into protective sleeves.

4. The best beginner's star atlases: *SEASONAL STAR CHARTS; DEEP MAP 600; CAMBRIDGE STAR ATLAS; BRIGHT STAR ATLAS; and NORTON'S STAR ATLAS.*

5. For a great book that combines astronomy and observing Information with good star charts, there's **Terence Dickinson's** *NIGHT WATCH.* (Its weakness: It doesn't have many deep-sky objects.)

6. The best intermediate-level star atlas is *SKY ATLAS 2000.0.*

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RECORDING DEEP-SKY OBSERVATIONS

Introduction. These are guidelines, suggestions and options, not requirements for recording deep-sky observations. Study the printed materials of whatever A.L. observing program(s) you're pursuing for precise information regarding data to be collected.

How do you describe deep-sky objects? Most of them are small, faint and fuzzy, but you can't use those descriptions for everything you find. **Art Russell** devised a slightly different approach to the problem, i.e., *What should you look for when observing deep-sky objects? What makes one galaxy, nebula or cluster look different from another?*

These are the things that Art recommends including in an observing log:

A. Basic Data. This includes the date, location, observing instrument used, eyepieces (magnification), and filters, if any.

B. General Observing Conditions.

1. **Weather**. Except for things like noting the presence of ground fog, I don't bother with this.
2. **Transparency** (estimate the limits of visual magnitude directly overhead, whether naked-eye or telescopic); and
3. **Seeing**. (Test for atmospheric turbulence over your observing site by viewing the slightly out-of-focus image of a star or planet: "superb seeing" is evidenced by a dead calm inage, "good seeing" by a slow, rippling image, and "poor seeing" by a rapidly shimmering image. Rate your seeing on a scale from 1 [best] to 5 [worst].)

C. General Questions (respond only to those questions or statements which apply to the object being observed):

1. If you like, you can sketch the object. (It doesn't have to be an artistic masterpiece.)
2. How did you find the object? Was it easy or difficult to find? Were there any bright stars, double stars or other notable objects nearby?
3. How difficult or easy was the object to see once you found it? Did it require averted vision, or could you observe it directly?
4. Was there anything unusual or peculiar about the object?
5. How large was the object? (If possible, use arc-minutes and arc-seconds. Or you can compare it to other similar objects you've seen.)
6. What was its shape? If not round, (a) How was it oriented in the sky?, and (b) What, if any, earthly objects did its shape suggest?
7. Could you resolve individual stars? How many? *(Don't count them, just give a rough estimate.)*

8. What color was the object and/or individual stars within it? How bright was it? How bright were the individual stars?

9. Were some parts of the object brighter than other parts? How did the brightness change with distance from the center?

10. Were there any dark areas indicating the possible presence of a dark nebula? *(I don't bother with this.)*

11. What was the best magnification for observing the object?

D. Questions Specific to the Object Being Observed:

***Open Clusters.**

1. Was the cluster: poor with less than 50 stars?; moderately rich with 50-100 stars?; or rich with 100+ stars? (Don't attempt to count the stars, an estimate will do nicely.)

2. How bright was the cluster? If bright, was the brightness due to a few bright stars, or were all of the stars of roughly equal brightness or faintness?

3. Was the cluster detached from the surrounding starfield, or did you have trouble identifying which stars near the edges were part of the cluster?

4. Did the cluster or stars within it form a recognizable shape or pattern?

***Globular Clusters.**

1. Could you resolve individual stars within the cluster?

2. Was there a bright central core of unresolved stars? If so, how large was the core in relation to the rest of the cluster?

3. Were there any chains of stars?

***Bright Nebulae.**

1. Does a filter improve the contrast and/or expand the apparent size of the nebula?

2. Was there a star cluster associated with the nebula?

***Planetary Nebulae.**

1. What color and shape was it? (Usually, blue, green or gray, and round or oval).

2. Was the disk uniformly bright?

3. Was there a ring present? If so, what shape was it?

2. Could you see the central star?

***Galaxies.**

1. Was there a nucleus at or near the galaxy's center? If so, what was its size, shape and brightness?

2. Were there any bright areas outside the nucleus to suggest the presence of star clusters or nebulae?

3. Was the galaxy's surface (a) mottled?, or (b) smooth?

4. Were the edges of the galaxy (a) ragged? or (b) even? Were they (a) clearly defined?, or (b) vague? Were there any dust lanes? Spiral arms?