



**Cherry Valley Public Library**  
(815) 332-5161  
*And the Binocular Program of*  
**The Rockford Amateur Astronomers**



***Vortex Crossfire 8 x 42 Binoculars***

**INSTRUCTION MANUAL**

**WARNING:** *Never look directly at the sun through your binoculars — even for an instant — as permanent eye damage could result. Do not point the binoculars at the sun, as parts will melt! Children should use these binoculars only with adult supervision.*

## ROCKFORD AMATEUR ASTRONOMERS

**Rockford Amateur Astronomers** is a non-profit educational organization established in 1958. The club is dedicated to sharing our love of astronomy and advancing science education. RAA is the largest amateur astronomy club in the Rockford Region. They hold public “star parties”, demonstrations, presentations, and discussions, all free of charge. Learn more about RAA at [RockfordAmateurAstronomers.com](http://RockfordAmateurAstronomers.com)



## SINNISSIPPI AUDUBON

**Sinnissippi Audubon** – The Sinnissippi Chapter of the National Audubon Society was founded in the 1970’s and is committed to wildlife preservation in the Rockford region. Visit our website to learn more.

[Sinnissippiaudubon.org](http://Sinnissippiaudubon.org)



Sinnissippi Audubon

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## TELESCOPE AND BINOCULAR CHECKOUT PROGRAM

**Telescope Program:** The New Hampshire Astronomical Society ([nhastro.com](http://nhastro.com)) started placing telescopes and educational materials in selected libraries in 2008. The goal of the program was to foster scientific literacy, stimulate an interest in astronomy, and provide people who have never looked through a telescope the chance to experience the excitement that comes from discovery. The program has been widely successful, expanding throughout the USA and even internationally. The program was introduced to Rockford at the Cherry Valley Public Library. Other regional libraries are being added.



**Binocular Program:** Binoculars are now being added to the program. The dual use potential of daytime for nature and nighttime for astronomy provides an attractive new checkout item for library patrons..



## **BINOCULAR OVERVIEW**

The binoculars used for the library checkout program were carefully selected based on several objectives. We wanted the binoculars to be:

- Versatile, for viewing the night sky (astronomy) and nature (birds, etc.)
- Light weight, for ease of handling by ages 10 or older without a tripod
- Waterproof, with anti-reflective lens coatings to increase light transmission
- Large enough in objective lens size to gather sufficient light for viewing the night sky and provide a bright view in the daytime (42 mm diameter is good)
- Just right in magnification to enable steady viewing by hand (8X is good)
- Able to obtain focus down to less than ten feet for close-up views of nature (e.g., insects and flowers).
- Affordable, with an unlimited, unconditional lifetime warranty

The Vortex Crossfire 8 x 42 binoculars are fully multi-coated, weigh only 23.5 ounces, and can focus down to 7.5 feet.

## BINOCULAR OPERATION AND CARE

### Caution

Binoculars are not intended for looking at the sun or other intense light sources. Such viewing could damage the retina and cornea of your eyes—even to the point of causing blindness.



## **Adjust the eyecups**

Enjoy comfortable viewing even if you wear eyeglasses. Simply twist the eyecups up or down to see the full field of view. Keep the eyecups fully extended (twist up) if you aren't wearing eyeglasses or sunglasses, and twist them down if you are.



## Adjust the interpupillary distance

The interpupillary distance (IPD) is the distance between the centers of your left and right pupils. Your binocular also has an IPD. To see a single image free of shading, rotate your binocular until its IPD aligns with your eyes so that you see a single clear circle with no shadows.



The IPD of a binocular is the distance between the center of the left and right ocular lens.



Rotate the binocular barrels inward or outward to align the ocular lenses with your eyes.



## **Adjust the binoculars' focus mechanism for your own eyes**

IMPORTANT: For clear views, use the center focus and then the diopter to adjust for vision differences in each eye. Choose an object that is at medium distance (20-30 yards) from you and perform this two-step process:

**Adjust the center focus for your left eye.** Close your right eye or cover the right objective lens with your hand. Look at the object with your left eye and rotate the center focus knob back and forth until the image is in focus as sharply as possible. Note: Keep the center focus knob in this position as you do the next step.





**Adjust the diopter for your right eye.** Close your left eye or cover the left objective lens with your hand and rotate the ring on the right eyepiece until the same object is again in perfect focus. Now check the +/- setting on the diopter ring and be sure to remember it, so you can go back to it if someone changes the setting. From now on, you only need to use the center knob to focus your binocular. If your vision changes, you may need to repeat this process.

## **Accessories**

Use the provided eyepiece rain guard and tethered objective lens covers to protect lenses when you are not using your binocular. Between viewing sessions, safely store your binocular in the case. Note: If the optics are exposed to moisture, keep the covers off and allow the optics to dry out completely before putting them in the case for storage.

### **Neck strap**

A binocular strap is attached to the binocular for ease of use. Please do not thread any metal rings directly onto the strap attachment loop.

### **LENS CARE**

Please do not use facial tissue, heavy cotton, or flannel cloth on the lenses because these materials can scratch the lens surface. If your lens is dirty, please return the binoculars to your library who will have them cleaned by knowledgeable personnel.

## A WORD ABOUT LIGHT POLLUTION

Light pollution is too much artificial light in the sky at night. Have you driven up to a city at night and seen the dome of light over the city? Look up at the street light near your home. Does the light come straight down to the ground or does it light up 360 degrees around the light? If you are looking at a dark-sky-friendly street light from the side or above, you shouldn't be able to see the bulb.

### **How does light pollution affect the planet?**

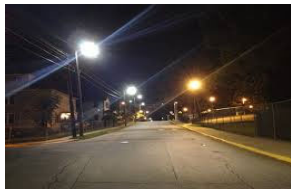
Light pollution has been found to contribute to sleeping disorders of humans, cause harm to wildlife, contribute to unsafe lighting -- and it is a waste of energy. Sometimes there is so much light at night it can be distracting. Brightly lit signs and flashing lights can break your concentration especially while driving. Scientific discovery, art, literature, astronomy, navigation, exploration, philosophy, and even human curiosity itself would be diminished without our view of the stars. Where would we be if we could no longer gaze upward in reverent wonder at the mysterious worlds beyond our own?

*For more information contact International Dark Sky Association at [darksky.org](http://darksky.org)*

### **Solutions for Light Pollution: What can you do?**

There are many existing solutions to light pollution that are simple, cost-effective, and instantaneous! Here are a few solutions:

- Use light only when and where it's needed, turn off lights when they are not needed, and create a curfew for lights-out.
- Use only as much light as needed. Over-lighting reduces the eye's ability to see outside of the lit area. In addition, excess light can produce glare, which also reduces visibility.
- Shine lights down, not up. Select new fixtures that are fully shielded; retrofit or replace poor quality fixtures.
- Use efficient light sources for outdoor lighting around homes and businesses.



On the left the picture shows how lights used today contribute to light pollution. On the right, light is directed down with much less light pollution. *For more information,<sup>13</sup> contact the International Dark Sky Association at [darksky.org](http://darksky.org)*

## USING THE BINOCULARS – NIGHT SKY

### What to Expect

Depending upon what is in the sky; Planets will look small, but you might be able to see the Moons of Jupiter. Craters on the Moon will be clear and numerous, the waxing and waning of Venus should be visible, and many bright deep-sky objects will fill the eyepiece. Don't expect to see color as you do in NASA photos as our eyes are not sensitive enough to see color in deep-sky objects, except in a few of the brightest ones. Remember that you are seeing these objects using your own eyes! Each session with your binoculars will be a learning experience. Each time you work with the binoculars, it will get easier to use, and stellar objects will become easier to find.

### Objects to Observe

The Moon is one of the easiest and most interesting targets to view with your binoculars. Lunar craters, “seas”, and even mountain ranges can all be clearly seen from a distance of 238,000 miles away! With its ever-changing phases, you'll get a new view of the Moon

every night it's up. Make sure to observe the Moon when it is well above the horizon to get the sharpest images. The best time to observe is during a partial phase, that is, when the Moon is not full. During partial phases, shadows are cast on the surface, revealing more detail, especially right along the border between the dark and light portions of the disk (called the "terminator").

The Planets do not stay at "fixed" locations like the stars do. To find them you should refer to the Sky Calendar ([telescope.com](http://telescope.com)), or to charts published monthly in *Astronomy*, *Sky & Telescope*, or other astronomy magazines and web sites. Venus, Jupiter, and Saturn are the brightest objects in the sky after the Sun and the Moon.

Stars: Even powerful telescopes cannot magnify a star to appear as more than a point of light. You can, however, enjoy the different colors of the stars. Look at the middle star in the handle of the Big Dipper, Mizar. It is really two stars very close together. Binoculars will also make visible stars that you cannot see with the naked eye.

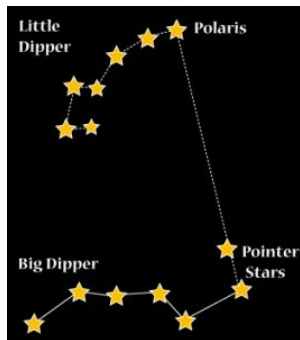
Constellations: The wide-field view of the sky provided by binoculars makes them a better choice than telescopes for viewing constellations. Constellations change by season, so refer to the "The Night Sky" pocket guide included with your binoculars to see what is

available during your viewing period. Constellations are also a good reference point to find deep sky objects. Check with your library for books on constellations and deep sky objects.

**Star Hopping:** This term describes how one uses a star chart to find objects too dim to see without a telescope. You likely already know how to do this, if you can find the North Star by following the “pointer stars” of the Big Dipper.

**Deep-Sky Objects:** Under dark skies, you can see lots of fascinating deep-sky objects, including nebulae, star clusters, and a variety of different types of galaxies.

Most deep-sky objects are very faint, so it is important that you find an observing site well away from light pollution. Take plenty of time to let your eyes adjust to the darkness.





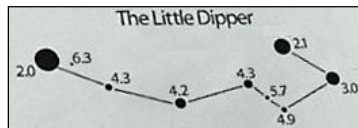
Do not expect these subjects to appear like the photographs you see in books and magazines; many will look like dim gray smudges. As you become more experienced and your observing skills get sharper, you will be able to ferret out more and more subtle details and structure. Star Clusters are particularly pretty, usually bright and easy to see. Note that some objects are very faint, and will take a while to find and see. A few are very dim, but may seem to appear like magic when you look at them “out of the corner of your eye”. This is called “Averted Vision” and works well when looking at very dim objects.

## When to go observing

“Seeing” and Transparency: Atmospheric conditions vary significantly from night to night. “Seeing” refers to the steadiness of the Earth’s atmosphere at a given time. In conditions of poor seeing, atmospheric turbulence causes objects viewed through the telescope to “boil”.

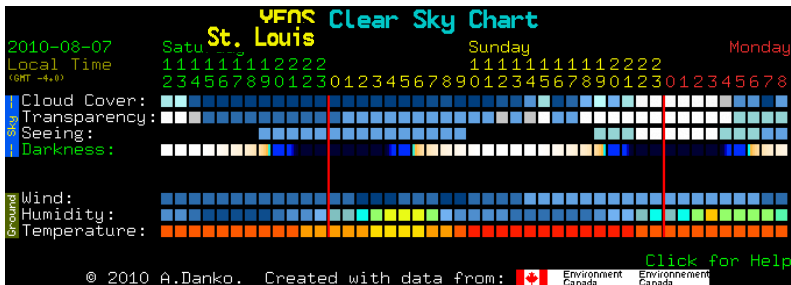
In conditions of good seeing, star twinkling is minimal and images appear steady in the eyepiece. Seeing is best overhead, worst at the horizon. Good “transparency” is especially important for observing faint objects. Transparency is judged by the magnitude of the faintest stars you can see with the unaided eye (Mag.1 is very bright, 2 is dimmer, and so on... 4th magnitude or fainter is desirable).

Looking at the Little Dipper will show you how good the viewing is. If you can see all the stars, you are doing pretty well. Be sure to wait until your eyes adapt to the dark.



**One more time, and with Feeling! WARNING:** *Never look directly at the Sun through your binoculars — even for an instant — or permanent eye damage could result. Do not point the binoculars at the Sun, as parts will melt! Children should use these binoculars only with adult supervision*

If you go to [cleardarksky.com/csk](http://cleardarksky.com/csk) you will find “Weather and Clear Sky Chart” links by State. The chart is a time line for weather. If you click on the chart, you will link to a detailed explanation. You will also find links to other charts. Pick the closest one to you for local weather conditions. For example, let’s use the St Louis chart: The first 4 rows are the most important: Is it cloudy? How clear is the sky? What is the “Seeing”, and finally, how dark is it? The deeper blue the squares are, the better. In the chart below, Saturday night looks very good, while Sunday night will be cloudy.



## USING THE BINOCULARS – BIRDS

- 1) **Strap on:** Be sure to keep the binocular strap around your neck at all times.
- 2) **Two hands on binoculars:** You can't get a clear steady view holding them with one hand, so use both hands, with one finger positioned to change focus rapidly.
- 3) **Eyes first, then binoculars:** Look for movement that will tell you where a bird is, then (without looking away) raise your binoculars to the spot. You will soon get the knack of doing this, although some birds are always too quick and get away.
- 4) **Scanning:** In open areas you may want to ignore rule 3, use your binoculars to scan a lake or a field or a treeline in the distance, and locate birds that way.
- 5) **Watch while you can:** If you do get a good look at a bird, don't jump immediately to your field guide or phone app. Study it carefully while you can, noting its shape, size, colors, patterns, and behavior. Then consult the field guide afterwards.
- 6) **Don't be discouraged:** Birding takes practice and experience. Keep at it and build up your knowledge one species at a time. Some species are easy to identify; others are not.

## RESOURCES ON BIRDS

For all sorts of general information on birds of the Rockford area, visit [815outside.com/birding/](http://815outside.com/birding/)

For local information, including a calendar of birding field trips that are open to the public, visit the Sinnissippi Audubon Society at [www.sinnissippiaudubon.org](http://www.sinnissippiaudubon.org).

As a basic complete field guide, suitable both for beginners and for permanent use, try *Birds of North America*, by Kenn Kaufman (a Kaufman Focus Guide, Houghton Mifflin) or *A Field Guide to Birds of Eastern and Central North America* by Roger Tory Peterson (be sure to get the 6th edition, Houghton Mifflin, 2010). Other excellent books, as you learn more, are the *Sibley Field Guide to Birds (East)* by David Sibley, and the *National Geographic Society Field Guide to the Birds of North America* (7th edition) by Jon Dunn and Jonathan Alderfer.

# Need more help?

## Connect to the Library Telescope Resource Center



### Quick Start Resources:

- How to use the binoculars
- Introduction to astronomy
- Educator resources
- Sky Map/Other resources
- More about the program

**[www.librarytelescope.org/get-started](http://www.librarytelescope.org/get-started)**