

## Library - Book Review

### **The New CCD Astronomy: How To Capture Stars With A CCD Camera In Your Own Backyard**

By Ron Wodaski

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Reviewed by: Brent Joyce

(Extracted From AAQ March 2003 Newsletter)

Astrophotography using film has recently been upstaged by the advent of the CCD Camera. Electronic imaging is becoming more popular, although to be successful a number of disciplines must be mastered.

Ron Wodaski starts by discussing the basic hardware required before realizing satisfactory images. A solid mount capable of at least 1 minute unguided integrations is considered a necessity.

Obtaining precise focus is essential to obtaining good CCD images. Novice CCD imagers often struggle to do this properly and can become disillusioned by the difficulty of the process. A number of aids are discussed which simplify the process. They include the use of "masks" to create duplicate images of the same object. It is then a matter of adjusting the focus control until the images are superimposed. Accurate focusing can also be achieved by adjusting the focus control until diffraction spike pairs merge. He makes the important point focusing is dependent on atmospheric conditions. I've experienced this myself, on some nights it is straightforward to obtain good focus. On other nights under similar conditions it seems almost impossible to obtain good focus. It all depends on the severity of air current motion in the atmosphere.

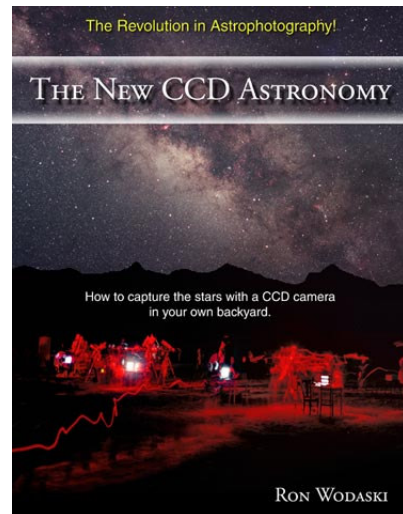
Setting up the telescope and mount is discussed next. In this section, achieving good collimation (Newtonian telescopes) and backlash adjustment are examined.

Following sections look at methods of optimizing signal to noise ratio. An optimal S/N ratio is critical if faint detail in an object, particularly nebula, is to be extracted. Summing of multiple short integration frames of the same object is a common technique. This can produce acceptable results although it is never as good as a single long integration of the same total duration.

The Losmandy G-11 mount is considered an entry-level mount for budget conscious CCD imagers. Paramount (by Software Bisque), Takahashi (EM-10 & NJP-160) and Astro-Physics mounts are also referred to as excellent mounts, although you'll need a deep pocket to afford these.

Short focal length telescopes, 400-800mm, make CCD imaging easier. The field of view is larger while tracking and focusing artifacts are not so obvious. Beyond 800mm, imaging becomes a little more technical; obtaining unguided integrations that don't suffer from tracking errors can be a real problem. A long focal length telescope such as the f10 Meade can be converted to a shorter focal length using a f5 or f6.3 focal reducer. The relative merits of refractors and reflectors as CCD imaging platforms are also discussed in some detail.

CCD cameras are made by a number of manufacturers including SBIG, Apogee, Starlight Express and Meade. You can also make your own as I have with the ubiquitous Cookbook CCD camera. The Cookbook camera is certainly the least



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expensive option. Of the commercially made cameras, Starlight Express are probably the cheapest.

Image reduction is discussed later in the book. Under this category, Wodaski includes dark/bias frame subtraction and flat fielding. Techniques he has personally developed are examined in plenty of detail.

Concluding sections look at image processing and color imaging. A large amount of information is presented although it is well explained and does not become too technical.

Throughout the book, Wodaski utilizes particular camera control software packages to demonstrate the various disciplines. Maxim DL and CCDSoft are extensively referred to throughout the book. This is fine if you already own this software, otherwise it can become tiresome to read through.

Wodaski has done well to bring together the large and complex nature of CCD imaging in one book. I recommend the book to novice and experienced CCD imagers.