

# Autoguiding

This book details an approach to the problem of getting high-quality astronomical images under light-polluted conditions. The book is for amateur astronomers interested in CCD imaging, especially those who have to work under suburban conditions. It outlines the materials and equipment used for high-quality imaging. The many wonderful images produced allow the

reader to see the product of – initially – a fellow beginner's efforts. Respectable images are attainable with modest equipment. This book outlines a complete and thoroughly tested working program for every beginner to achieve high-quality digital imaging. There are many books covering different facets of astrophotography, but few of them contain all the necessary steps for beginners in one

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accessible place. Astrophotography is Easy! fills that void, serving as a guide to anybody interested in the subject but starting totally from scratch. Assuming no prior experience, the author runs through the basics for how to take astrophotos using just a camera—including cell phones and tablets—as well as a telescope and more sophisticated equipment. The book includes proven techniques, checklists,

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safety guidelines, troubleshooting tips, and more. Each chapter builds upon the last, allowing readers to master basic techniques before moving on to more challenging material. Also included is a comprehensive list of additional books and resources on a variety of topics so readers can continue expanding their skills. *Astrophotography Is Easy!* doesn't simply teach you the basic skills for becoming an astrophotographer: it

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provides you with the foundations you will need for a lifelong pursuit.

Arditti's approachable work covers all the details of design, siting and construction – once a basic type has been decided upon. It is written in a way that is equally applicable to the USA and UK (where there are slightly different building regulations) and deals with matters that are basic to building and commissioning any

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amateur observatory. Uniquely, David Arditti also considers the aesthetics of amateur observatories – fitting them in with family and neighbors, and maybe disguising them as more common garden buildings if necessary. Every amateur astronomer who wants a purpose-built observatory (and let's face it, which one of them doesn't?) will find this book invaluable. The Caldwell Objects and How to Observe Them The design, development,

installation and performance of a quadrant photosil autoguiding for the Cambridge Schmidt telescope

The 100 Best Astrophotography Targets

Astronomy Now

The Kast Double

Spectrograph

IAU Colloquium 136

*Choosing and Using the New CAT will supersede the author's successful Choosing and Using a Schmidt-Cassegrain Telescope, which has enjoyed enthusiastic*

*support from the amateur astronomy community for the past seven years. Since the first book was published, a lot has changed in the technology of amateur astronomy. The sophistication and variety of the telescopes available to amateurs has increased dramatically. Computerized SCTs, Maksutov-Cassegrains, and most recently Meade's new and acclaimed Ritchey-Chrétians have come to*

*dominate the market. That means that all amateurs considering the purchase of a new telescope (not only a SCT, and not just beginners) will benefit from this detailed guide. Choosing the right telescope for particular kinds of observation (or even for general work) is far from easy – but Rod Mollise gives invaluable advice and guidance. Any amateur astronomer who is interested in astrophotography,*

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*particularly if just getting started, needs to know what objects are best for imaging in each month of the year. These are not necessarily the same objects that are the most spectacular or intriguing visually. The camera reveals different things and has different requirements. What objects in the sky tonight are large enough, bright enough, and high enough to be photographed? This book reveals, for each month of the year, the*

*choicest celestial treasures within the reach of a commercial CCD camera. Helpful hints and advice on framing, exposures, and filters are included. Each deep sky object is explained in beautiful detail, so that observers will gain a richer understanding of these astronomical objects. This is not a book that dwells on the technology of CCD, Webcam, wet, or other types of astrophotography.*

*Neither is it a book about in-depth computer processing of the images (although this topic is included). Detailed discussions of these topics can be found in other publications. This book focuses on what northern latitude objects to image at any given time of the year to get the most spectacular results. The Compendium of Practical Astronomy is unique. The practical astronomer, whether student, novice or*

*accomplished amateur, will find this handbook the most comprehensive, up-to-date and detailed single guide to the subject available. It is based on Roth's celebrated German language handbook for amateur astronomers, which first appeared over 40 years ago.*

*So You Want a Meade LX Telescope!*

*Ground-based Telescopes*

*An Introduction to*

*Observational*

*Astrophysics*

*The Total Skywatcher's*

Manual

Handbook of Practical  
Astronomy

Stellar Photometry:  
Current Techniques and  
Future Developments

**Features the Anglo-Australian  
Observatory (AAO), located in  
Epping, New South Wales,  
Australia. Posts contact information  
via mailing address. AAO is an  
astronomical research and  
instrumentation organization.**

**Highlights AAO images, AAO news,  
press releases, information on  
employment opportunities,  
instruments, and AAO databases.  
Links to other astronomical and  
astrophysical resources.**

**The observational component of  
astronomy is an exciting and vital**

***part of any astrophysics degree. With the advent of low-cost astronomical cameras and remote and robotic operation, more students than ever have the opportunity to observe and perform observatory research. This updated and fully corrected textbook provides a comprehensive overview of practical observing techniques for undergraduate astrophysics courses. The chapters introduce students to the basics of the field before delving into telescope types, the nature and operation of the astronomical camera, imaging techniques and reduction, photometry and spectrography, and solar and radio observations. The second edition covers the latest research on calibrating the telescope-camera-observatory***

***system. It contains revised information on all available astronomy equipment, including filters, webcams, sensors, and telescope designs. Also included is an entirely new chapter on exoplanet transit measurements.***

***The textbook's practical approach will guide readers from basic first-year techniques to those required for a final-year project.***

***Michael Swanson's online discussions with literally thousands of NexStar owners made it clear that there was a desperate need for a book such as this – one that provides a complete, detailed guide to buying, using and maintaining NexStar telescopes. Although this book is highly comprehensive, it is suitable for beginners – there is a chapter on "Astronomy Basics" –***

***and experts alike. Celestron's NexStar telescopes were introduced in 1999, beginning with their first computer controlled "go to" model, a 5-inch. More models appeared in quick succession, and Celestron's new range made it one of the two dominant manufacturers of affordable "go to" telescopes.***

***Getting the Most from Your Schmidt Cassegrain or Any Catadioptric Telescope***

***25-28 August, 2002, Waikoloa, Hawaii, USA***

***Choosing and Using a New CAT  
A Monthly Guide for CCD Imaging***

***with Amateur Telescopes***

***Imaging with SGP, PHD2, and Related Software***

***The Lick TV Autoguider***

***State-of-the-art and***

***future technology in stellar photometry in a comprehensive and timely review.***

***The Astrophotography Manual, Second Edition is for photographers ready to move beyond standard SLR cameras and editing software to create beautiful images of nebulas, galaxies, clusters, and the stars. Beginning with a brief astronomy primer, this book takes readers through the full astrophotography process, from choosing***

***and using equipment to image capture, calibration, and processing. This combination of technical background and hands-on approach brings the science down to earth, with practical methods to ensure success. This second edition now includes: Over 170 pages of new content within 22 new chapters, with 600 full-color illustrations. Covers a wide range of hardware, including mobile devices, remote control and new***

**technologies. Further insights into leading software, including automation, Sequence Generator Pro and PixInsight Ground-breaking practical chapters on hardware and software as well as alternative astrophotography pursuits**

**Today's photographic equipment allows amateurs to take pictures of the stars that far surpass images taken just a few decades ago by even the largest**

***observatories-and this book will teach you how. Author and world-renowned astrophotographer Thierry Legault teaches the art and techniques of astrophotography: from simple camera-on-tripod night-scene imaging of constellations, star trails, eclipses, artificial satellites, and polar auroras to more intensive astrophotography using specialized equipment for lunar, planetary, solar, and deep-sky imaging. Legault shares advice on***

***equipment and guides you through techniques to capture and process your images to achieve spectacular results. Astrophotography provides the most thorough treatment of the topic available. This large-format, richly illustrated book is intended for all sky enthusiasts-newcomers and veterans alike. Learn how to: Select the most useful equipment: cameras, adapters, filters, focal reducers/extenders, field***

**correctors, and guide telescopes Set up your camera (digital, video, or CCD) and your lens or telescope for optimal results Plan your observing sessions Mount the camera on your telescope and focus it for razor-sharp images Polar-align your equatorial mount and improve tracking for pin-point star images Make celestial time-lapse videos Calculate the shooting parameters: focal length and ratio, field of view, exposure time, etc.**

**Combine multiples exposures to reveal faint galaxies, nebulae details, elusive planetary structures, and tiny lunar craters Adjust contrast, brightness, light curves, and colors Postprocess your images to fix defects such as vignetting, dust shadows, hot pixels, uneven background, and noise Identify problems with your images and improve your results**  
**21-24 June, 2004,  
Glasgow, Scotland,  
United Kingdom  
Astronomical Equipment**

**for Amateurs**

**The CCD Cassegrain**

**Spectrograph at the**

**Shane Reflector**

**How to Use the Star Book**

**TEN and the Original Star**

**Book**

**Photography with the**

**AAT**

**Solid State Sensor Arrays**

**and CCD Cameras**

*This book is for anyone who owns, or is thinking of owning, a Vixen Star Book Ten telescope mount or its predecessor. A revolution in amateur astronomy has occurred in the past decade with the*

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wide availability of high tech, computer-driven, Go-To telescopes. Vixen Optics is leading the way by offering the Star Book Ten system, with its unique star map graphics software. The Star Book Ten is the latest version of computer telescope control using star map graphics as a user interface, first introduced in the original Star Book first offered in 2003. The increasingly complicated nature of this software means that learning to optimize this program is not

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straightforward, and yet the resulting views when all features are correctly deployed can be phenomenal. After a short history of computerized Go-To telescopes for the consumer amateur astronomer market, Chen offers a treasury of technical information. His advice, tips, and solutions aid the user in getting the most out of the Star Book Ten system in observing sessions. An important 1990 history of the Anglo-Australian Telescope, which provides facilities for research in

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*optical astronomy for scientists from Britain and Australia.*

*Amateur astronomy has changed beyond recognition in less than two decades. The reason is, of course, technology. Affordable high-quality telescopes, computer-controlled 'go to' mountings, autoguiders, CCD cameras, video, and (as always) computers and the Internet, are just a few of the advances that have revolutionized astronomy for the twenty-first century. Martin Mobberley first looks at the basics*

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*before going into an in-depth study of what's available commercially. He then moves on to the revolutionary possibilities that are open to amateurs, from imaging, through spectroscopy and photometry, to patrolling for near-earth objects - the search for comets and asteroids that may come close to, or even hit, the earth. The New Amateur Astronomer is a road map of the new astronomy, equally suitable for newcomers who want an introduction, or old hands*

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who need to keep abreast of innovations. From the reviews: "This is one of several dozen books in Patrick Moore's "Practical Astronomy" series. Amid this large family, Mobberley finds his niche: the beginning high-tech amateur. The book's first half discusses equipment: computer-driven telescopes, CCD cameras, imaging processing software, etc. This market is changing every bit as rapidly as the computer world, so these details will be current for only a year or two. The rest of

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*the book offers an overview of scientific projects that serious amateurs are carrying out these days. Throughout, basic formulas and technical terms are provided as needed, without formal derivations. An appendix with useful references and Web sites is also included. Readers will need more than this book if they are considering a plunge into high-tech amateur astronomy, but it certainly will whet their appetites. Mobberley's most valuable advice will*

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save the book's owner many times its cover price: buy a quality telescope from a reputable dealer and install it in a simple shelter so it can be used with as little set-up time as possible. A poor purchase choice and the hassle of setting up are why most fancy telescopes gather dust in their owners' dens. *Summing Up: Highly recommended. General readers; lower- and upper-division undergraduates.*" ( T. D. Oswalt, CHOICE, March 2005)

The ShortTube 80 Telescope

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*Astrophotography is Easy!*  
*Anglo-Australian*  
*Observatory*  
*A Practical and Scientific*  
*Approach to Deep Sky*  
*Imaging*  
*An Autoguiders for the 0.6m*  
*Perkin Research Telescope*  
*Exoplanet Observing for*  
*Amateurs*

**Star charts, step-by-step projects, photos, and more: “The Total Skywatcher’s Manual is a fun book, but more importantly, it’s a useful book.” —Sky & Telescope** With fully illustrated star charts, gorgeous astrophotography, and step-by-step project instruction, this is the only guide you need to

**navigate the night (and day) sky. Learn about the phases of the moon, how to conduct your own deep-sky observations, how the universe is expanding, our search for life on other planets, meteors vs. meteorites, sunspots and solar flares, best eclipse-viewing techniques—everything you need to know to appreciate the wonder of our universe. The Total Skywatcher's Manual will help stargazers, comet-spotters, and planet-seekers: Choose the best telescope Identify constellations and objects in the night sky Search for extraterrestrial phenomena Plan star parties Capture beautiful**

**space imagery and much more**  
For well over a century, the **Astronomical Society of the Pacific** has provided resources, tools, and information to astronomy enthusiasts, including amateur astronomers, families, and science educators. Now they draw on their wide-ranging expertise to guide you through the skies.

**Welcome to the first comprehensive guide to one of the world's most popular telescopes: the ShortTube 80 refractor. With its ultra-portability, versatility, and relatively low cost, this telescope continues to delight generations of stargazers.**

**Starting in the field under a dark sky, the author walks the reader through a typical evening of stargazing, where the ShortTube 80 brings many astronomical treasures into focus. From there, he provides an in-depth account of the optical properties of the ShortTube 80 refractor and the accessories and mounting arrangements that maximize its potential both as a spotting 'scope by day and an astronomical 'scope by night. The main text discusses how the versatile ShortTube 80 can be used to study deep sky objects, the Sun, the Moon, bright planets and even high-resolution projects, where the instrument's**

**features can be optimized for the observation of tight double and multiple stars. It explores how the ShortTube 80 can image targets using camera phones, DSLRs and dedicated astronomical CCD imagers. Packed with practical advice gained from years of firsthand stargazing experience, this book demonstrates exactly why ShortTube 80 has remained a firm favorite among amateur astronomers for over three decades, and why it is likely to remain popular for many years to come.**

**Do you struggle to take great photos of fireworks or the stars and night sky? Written by Multi**

**Award Winning Australian Photographer, Trainer and Best Selling Author Steve Rutherford. This book, The Beginners Guide to Night Photography is one of the best selling "Beginners Guide to Photography" book series and is an easy to understand practical guide to night photography. In the latest book "The Beginners Guide to Night Photography" another book in the best selling "Beginners Guide to Photography" book series. You'll discover the secrets the pro's use to get amazing photos of star trails, planets and even deep space! Here is what is covered in this complete**

**beginners guide to  
Photographing the Night Sky by  
Award Winning Professional  
Photographer and Best Selling  
Author Steve Rutherford. The  
SECRET TECHNIQUES pro  
photographers use every day  
FREE Access to BONUS VIDEO  
TRAINING to learn photo editing  
like a pro Beginners buying  
guide to telescopes and how to  
use them with cameras. Dozens  
of astrophotography techniques,  
tips and tricks. Equipment  
needed to capture star field  
planetary and celestial objects.  
Specialised telescopic  
equipment studies. All the  
resources to find processing  
software for astrophotography.**

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**Over 200 pages of hands on easy to follow instruction The equipment that takes your shots from boring to amazing How to save time and money using the right photography tools How to turn your photography passion and creativity into a BIG \$ income You will discover the many secrets that I, and other pro photographers, use to capture stunning award winning photos, with sharper focus, more color, more detail and less time wasting, trying every setting to "hope for a good shot". Set out into an easy to follow, page by page guide, join me indoors, outdoors and at night on all aspects of photography and how**

**to take control of your DSLR Camera, and master striking photos, with every shoot. The Beginners Guide to Night Photography, is clearly written, easy-to-understand guide will be an indispensable resource whenever you pick up the camera for your next night photography shoot. You'll also get FREE access to Video Training at - <https://www.photocheats.com>. Also FREE Access to One Shot Magazine at - <http://www.oneshotmagazine.com>. It is packed full of tips and tricks to improve your photography. Just follow the links to both Photo Cheats and One Shot Magazine in the**

**book or Like us over at <https://www.facebook.com/OneShotMagazine> Please also come back and leave a review we would love to know what you thought of this book. Don't forget to check out the other books in the "Beginners Guide to Photography" book series. Written with all levels in mind, there is instruction for beginners, as well as many advanced techniques and tips. I have also included "live website links" throughout, as well as easy to find "quick tip" sections. The "Beginners Guide to Photography" book series breaks techniques down into specific categories so you can**

**perfect these techniques. Please see the other books in the series for more in depth tutorials on a large range of photography styles. Please also come back and leave a review we would love to know what you thought of this book. Don't forget to check out the other books in the "The Beginners Guide to Photography" best selling photography book series. \*\*\*\*\* 5 STAR REVIEWS for this book series so far \*\*\*\*\* "Explanatory, easy descriptions involved material" "Loved it has helped me in numerous ways. Have used it as a reference constantly. One of my photos has gone viral since using the**

**hints and tips in the book. Small adjustments make huge differences." - Mike Roche. "Has absolutely everything" "Do not miss out on this book. As the title says it has absolutely everything and I particularly like the boxes with advice to shoot particular subjects. It doesn't matter whether you are just starting out or experienced with a camera, it has something for everyone. Highly recommended!" - Paul B "Well worth the money" "Great book that starts from the very basics, explains everything to do with modern cameras, their use, settings and techniques under different settings and**

**circumstances." - Qball "A great read" "Getting back into photography after a 6 yr break - born and raised on a film SLR, this book helped me remember things and to better adapt to a digital SLR - whether you're novice or experienced, you will get a lot out of this book...." -**

**Brian I love this book and hope to capture few good images as a result of this." - Jatinkumar.**

**The Vixen Star Book User Guide  
Using Sequence Generator Pro  
and Friends**

**A User's Guide**

**24-26 May 2006, Orlando, Florida,  
USA**

**Explore the Sky: 298 Tips, Tricks,  
& Skills**

**31 January-2 February, 1996, San Jose, California**

*For all but the simplest star-trail pictures, photographing the night sky involves machinery to track the stars, and the task becomes even more complicated when photographing very small or very faint objects that require high magnification or very long exposure times. Astrophotography for Amateurs presents equipment and techniques, features practical hints and tips from the experts, including coverage of traditional "wet" photography, CCD imaging, and computerized image enhancement. There are sections on photographing different classes of astronomical object from the moon to faint nebulae, as well as a detailed look at the*

*equipment needed.*

*When Mike Inglis, who consults for Springer, first asked me to write a Caldwell book in their “and How to Observe Them” series I admit I did need some time to think the suggestion over. I am a fan of Patrick’s Caldwell catalog as are most of the amateur astronomers I know, but could a new book be justified when the massive, comprehensive, and wrist-spraining Caldwell tome by Stephen O’Meara covers the subject fully anyway? That other book was researched and written over a 5-year period in the pre-9/11 world from 1996 to 2001, and its 484 pages of descriptive text and background data are a joy to peruse, as are Stephen’s impressive sketches. OK, the book is far too heavy for the*

*binding and after a few trips outside half the pages in my copy fell out, but apart from that it is an excellent book and surely impossible to improve upon, or even equal, especially in a smaller format book with only half the pages available; at least, that was my initial impression when I mulled over writing another Caldwell book. However, I changed my mind, because a number of events of astronomical significance have occurred in the last 10 years. First and foremost backyard imaging of deep sky objects, especially color imaging, has come on in leaps and bounds in the twenty-first century. In the last few years, digital SLR cameras have taken the astrophotography world by storm. It is now easier to photograph the stars*

*than ever before! They are compact and portable, flexible to adapt with different lenses and for telescope use, and above all DSLR cameras are easy and enjoyable to use. In this concise guide, experienced astrophotography expert Michael Covington outlines the simple, enduring basics that will enable you to get started, and help you get the most from your equipment. He covers a wide selection of equipment, simple and advanced projects, technical considerations and image processing techniques. Unlike other astrophotography books, this one focuses specifically on DSLR cameras, not astronomical CCDs, non-DSLR digital cameras, or film. This guide is ideal for astrophotographers who wish to develop their skills using DSLR*

*cameras and as a friendly  
introduction to amateur astronomers  
or photographers curious about  
photographing the night sky.  
Beginners Guide to Night Photography  
Instrument Design and Performance  
for Optical/infrared Ground-based  
Telescopes  
The NexStar User's Guide  
Basics for Beginners  
Telescope Control Systems  
Nickel Telescope User's Manual*

Proceedings of SPIE present the original research papers presented at SPIE conferences and other high-quality conferences in the broad-ranging fields of optics and photonics. These books provide prompt access to the latest innovations in research and technology in their respective fields. Proceedings of

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SPIE are among the most cited references in patent literature.

Computers and Astronomy Perhaps every generation of astronomers believes that their telescopes are the best that have ever been. They are surely all correct!

The great leap of our time is that computer-designed and machined parts have led to more accurately made components that give the astronomer ever better views. The manual skills of the craftsman mirror grinder have been transformed into the new-age skills of the programmer and the machine maker.

(The new products did not end the work of craftsman telescope makers, though.

Many highly skilled amateur/professional opticians continued to produce good-quality mirrors that are still seen today. ) Amateur-priced

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telescopes are now capable of highly accurate tracking and computer control that were once only the province of professionals. This has greatly increased the possibilities of serious astronomy projects for which tailor-made software has been developed. Add a CCD camera to these improved telescopes (see Chap. 3), and you bring a whole new dimension to your astronomy (see Fig. 1.1). Look Before You Leap! But first, a word of caution. Unless you are already familiar with astronomy and basic telescopes, it is not wise to start spending large amounts of money on a well-featured telescope. Such an instrument might otherwise be subsequently abandoned due to a perceived overcomplexity coupled with a waning interest.

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For many astronomers, the holy grail of observation is to discover a comet, not least because comets always bear the name of their discoverer! *Hunting and Imaging Comets* was written for comet hunters and digital imagers who want to discover, rediscover, monitor, and make pictures of comets using astronomical CCD cameras and DSLRs. The old days of the purely visual comet hunter are pretty much over, but this is not to say that amateurs have lost interest in finding comets. The book also covers the discovery of comet fragments in the SOHO image data, CCD monitoring of older comets prone to violent outbursts, the imaging of new NEOs (Near Earth Objects) that have quite often been revealed as comets - not asteroids - by amateur astronomers, and the finding of

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recent comets impacting Jupiter.

The Creation of the Anglo-Australian  
Observatory

Hunting and Imaging Comets

Astrophotography

National Optical Astronomy

Observatories Newsletter

Advanced Software and Control for  
Astronomy

How to Select and Use the LX200 and  
Other High-End Models

This guide provides useful insight for first-time telescope buyers as well as experienced amateurs. It examines the advantages and disadvantages of different types of telescopes, mountings, and accessories—ranging from refractors and reflectors to computer

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controlled drives and CCD cameras. The author also covers observation techniques, photographic equipment, astronomical software, as well as equipment care and maintenance.

This guide is specifically aimed at those who are using—or want to use—Sequence Generator Pro. SGP is a “session management” software package that controls the telescope, mount, camera, and ancillary equipment to target and secure images during a night of imaging astronomical objects. The book begins with a special tutorial to get up and running with SGP.

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With a comprehensive reference section, it takes the user in detail through the various aspects of user and equipment profiles, equipment definitions, the sequencer, and other essential elements of SGP. Finally, it focuses on how to get the most out of the ancillary programs—target databases, autoguiders, plate solvers, planetarium software, and other applications. Oftentimes, technical guides can end up being far denser than the processes they intend to explain. Many of the insights provided by SGP expert Alex McConahay are beyond what can be found in

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the official program  
documentation. In this book,  
the reader will find in-  
depth, yet straightforward  
practical advice on how to  
automate nightly  
astroimaging sessions with  
Sequence Generator Pro.  
Guiding Light in the Shadow  
of Distant Worlds  
Practical Astrophotography  
The New Amateur Astronomer  
Lick Observatory Bulletins  
CCD Astrophotography: High-  
Quality Imaging from the  
Suburbs  
Digital SLR Astrophotography