Title: ***The Radio Sky and How to Observe It***
Author: Jeff Lashley
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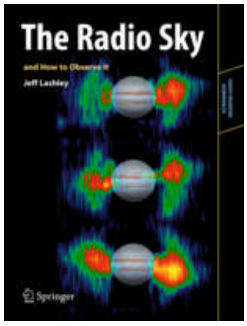

Readers of my previous reviews in this journal know by now that I am critical of many amateur radio astronomy books. ***The Radio Sky and How To Observe It*** appears to be better overall. It is reasonably priced and I think it does a reasonably good job of covering the basic aspects of amateur radio astronomy. The author is a technical support engineer at the National Space Centre, Leicestershire, UK. I was pleasantly surprised to find in the author's acknowledgements a list of individuals active in the British Astronomical Association – Radio Astronomy Group (BAA-RAG) and UK Radio Astronomy Association (UKRAA), most of whom I regularly correspond with. However, several of them told me they had not seen the book or had nothing to do with it.

The author says in the preface: "*This book does not assume you know anything about electronics. If you do, that's a bonus, and some parts of this book will not be new to you.... The emphasis throughout is about understanding how radio equipment works, what building blocks are needed, and about construction techniques....*" This extracted text is a good introduction to the three broad coverage areas that lie ahead, but the assumption that the reader does not need to know anything about electronics is a stretch:

- ☼ Non-mathematical discussion of astrophysics (chapters 1 – 4)
- ☼ Theory of radio design (chapters 5 – 8)
- ☼ Specific and detailed building projects (chapters 9 – 13)

The four chapters on astrophysics cover, in order, The Radio Sun, Jupiter, Meteors and Meteor Streams, and Beyond the Solar System. For the amateur radio astronomer, observations of the first three are comparatively easy because the amateur can successfully receive Sun and Jupiter emissions and ionized meteor trail reflections with modest investment and effort. As our observations move to objects farther away from the solar system things get more difficult and complex from a receiver and antenna perspective.

In chapter 4 there is a discussion of pulsars which covers several pages. The author says "*Pulsars can be observed by radio methods at frequencies of between 20 MHz and 10 GHz*" but, unfortunately, he does not tell us how in this or later chapters. It is not mentioned in the book that the proven successful observations in the high-frequency band (at 26 MHz) required extraordinarily large antenna systems and observation times and that the claims of pulsar detection at 20 MHz using simple receivers and antennas have not been independently verified.

The next four chapters are Antennae, Setting Up a Radio Astronomy Station, Radio Hardware Theory, and Introduction to RF Electronics. The antenna chapter covers the familiar antenna types, including the dipole, folded dipole, dual-dipole, Yagi, log periodic dipole array (LPDA or just LPA), parabolic dish reflectors and associated feed horns. One feed horn pictured, a "tin can feed horn," appears to be made from tin pipe taken from an air handling system. I was reminded of the garbage can cavity filters one of my college professors made (that was in the days when garbage cans were made from steel and could withstand collisions with cars driven by his students). There also is coverage on transmission lines and baluns (BALanced to UNbalanced transformers). I believe there is enough information in this chapter for the reader to put together their own antennas, especially if they have experience as an amateur radio operator or are a radio frequency (RF) hobbyist. The book has equations and if you plan to build your own antennas from it, you will need to do some simple algebra.

One radio project described is the Small Radio Telescope (SRT) designed by a group at MIT Haystack (http://www.haystack.mit.edu/edu/undergrad/srt/index.html). The SRT is commercially available as a kit for US$10,000, obviously beyond the reach of most amateur radio astronomers. As an aside I contacted this vendor to ask if the kit could be purchased without the dish since shipping that one item to Alaska would cost a fortune and I already have access to one. From the tone and content of the answer I received, it was obvious the vendor could use some customer service training. Other projects, one for each chapter, include a Very Low Frequency Solar Flare Monitor (in this case connecting a loop antenna to a PC soundcard), Jupiter Radio Telescope (based on the Radio Jove Receiver and antenna), and a Broad Band Solar Radio Telescope (using a television tuner front end, similar in concept to the CALLISTO receiver). There is no mention of the very popular SolarSID and SuperSID projects that are familiar to SARA members. The last chapter covers data logging and processing, but it is too short to be of much use.

I found many quality control problems in ***The Radio Sky***. Many are relatively minor, such as numerous typographical errors, but they add up and are annoying. Another complaint I have is the author discusses many technical terms without first defining them. As I read the book, I placed a sticky-note on each page where I noticed an unclear or poorly worded explanation or an illustration that did not match the associated text or caption. An example of the latter is shown right. The text for this drawing says "*...the angle of incidence for incoming radio waves is equal to the angle of reflection as it leaves.*" The drawing clearly shows different angles for the ray reflecting off the meteor trail. This is only one example, but it is typical. When I finished the book, I had used well over 50 sticky-notes, indicating that reviewers, if any, were in name only or were ignored and that the publisher did not ensure the book met what I consider to be minimum publication standards.

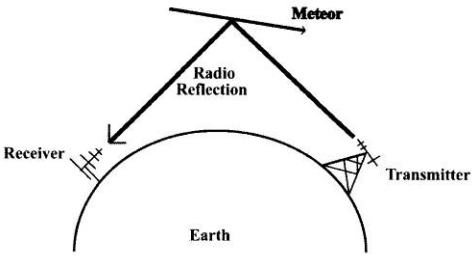

Fig. 3.1. Forword scattering of radio waves from meteor trails.

I also noticed some major problems. One is that there are no references, only a short bibliography at the book end, so it is difficult to verify something and to either learn more or expand on a given discussion or topic. The discussion in chapter 1 about the Sun is presented as if the solar emission mechanisms are accepted and known facts. It would have been better to clarify that not all investigators agree on the physics behind the way the Sun works and the details of its operation. Maybe as amateur radio astronomers we can overlook this and just concentrate on the projects described in the book.

In conclusion, despite its many shortcomings, this is one of the better books for amateur radio astronomers. It is up-to-date and describes many current practices and topics. On the negative side it suffers from poor editing and has many errors, but I do not view these as show-stoppers. If the author corrects these many shortcomings, the second edition should be a very good book indeed.

Reviewer - Whitham Reeve was born in Anchorage, Alaska and has lived there his entire life. He became interested in electronics in 1958 and worked in the airline industry in the 1960s and 1970s as an avionics technician, engineer and manager responsible for the design, installation and maintenance of aircraft electronic equipment and systems. For the next 38 years he worked as an engineer in the telecommunications and electric utility industries with the last 33 years as owner and operator of Reeve Engineers, an Anchorage-based consulting engineering firm. Mr. Reeve is a registered professional electrical engineer with BSEE and MEE degrees. He has written a number of books for practicing engineers and enjoys writing about technical subjects. Since 2008 he has been building a radio science observatory for studying electromagnetic phenomena associated with the Sun, Earth and other planets.