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by Larry D. Barr

I read a book last weekend. Now, this is certainly not out of the ordinary. I read a lot of books. Some of them, like Stephen King's *The Stand*, I read about once a year. And I've probably read almost everything Martin Caidin ever wrote four or five times. Or more. However, the book I read last weekend is certainly out of the ordinary.

It's called *Homebrew Wind Power – A HANDS-ON GUIDE TO HARNESSING THE WIND*. The book is written by Dan Bartmann and Dan Fink, a couple of guys who live (and create wind turbines) in a small off-grid community somewhere up in the north-west part of Colorado. A few years ago, when I was the editor of an online publication called *Energy Self Sufficiency Newsletter*, Dan Fink was one of our regular columnists, writing under the handle of "The Wind Bag". DanF, as he's also known, proved himself very adept at sharing his vast knowledge and his insights into the vagaries of the wind, and the various ways it can be captured and cajoled into sharing some of its energy (but never more than 59.26%) in the form of usable electricity.

The Two Dans have been working on this book for several years, and about two weeks ago I got an email from DanF asking me if I'd like an 'advance review copy' to look over and possibly share my reactions with y'all, the readers of Rebel Wolf Online. Of course I said "Yes" and the book arrived in a few days. As I removed the book from the bubblepack envelope, it was immediately apparent that this was a quality tome. It's 8" X 10", with a soft 12 point C1S cover (C1S is printer talk for Coated with plastic on 1 Side), and contains 320 pages of 100% post consumer waste recycled paper, a spectacular cover shot of a wind turbine flying in a Rocky Mountain sunset and more appendices than the Dionne quintuplets.

I don't necessarily consider myself a wind energy expert, even though I lived off-grid for about 19 months back in the '70s with a Wincharger 1222H as my main source of power. However, I'm pretty well versed in the overall discipline and so I wasn't sure just how much I'd learn from this volume. I learned a hell of a lot.

Mick Sagrillo's foreword, written in Mick's usual "if you didn't want the answer, why'd you ask the question?" style, will be a real eye-opener for the renewable energy newbie who thinks that wind power is a simple "plug and play" experience. Mick Sagrillo is one of the 'gods' of renewable energy and getting Mick to write the forward for your book is a lot like Enzo Ferrari looking at your home-built car and saying, "You done good, Kid."

The first four chapters, which cover wind energy theory, basic electricity and elementary magnetism are intended to bring the wind energy neophyte 'up to speed', and basically served only as a review for me. I've always been comfortable with the theories and math of

renewable energy. And ten years as a working electrician gave me a very solid grounding (sorry) in the electrical department.

When I got into Chapter 5, “Furling and Regulation” my wind turbine education truly began. You see, my little Wincharger didn't furl – it just had a couple of centrifugally activated flaps that came out when the wind speed got too high and slowed the rig down to a hopefully safe speed. Anything faster than that and I was supposed to be home and physically set the brake and secure it. Primitive yes, but it was a 1930s era design and it worked fine in the area I was living in at the time.

However, that's not the way it's done anymore and The Two Dans have designed and implemented a virtually fail-safe mechanism for the self-protection of their wind turbine design. In the interest of historical accuracy, I should mention here (as The Two Dans acknowledge repeatedly in the book) that the original axial-flux design didn't originate in the wilds of Colorado with DanB and DanF.

The credit for the original concept goes to Hugh Piggott, another of the gods of renewable energy. Hugh lives in Scoraig, Scotland, many kilometres beyond the reach of the grid and pioneered a radial-flux wind turbine design built from old truck brake drums., which was the first homebrew design to have a furling tail. Then, as the price of neodymium magnets came down, Hugh invented the axial-flux design. Remember that Hugh's initial challenge was two-fold. First, to electrify the little settlement of Scoraig. His second challenge was to devise a turbine that wouldn't self-destruct in the vicious winds coming off the North Sea at N 57° 55'.

Now, I've never been to Scoraig, Scotland. But my friend Ash lives at N 55° on the northern coast of Ireland, and we've clocked winds of better than 80 mph at his house. I don't imagine that things calm down any almost three degrees of latitude further north. So Hugh had his work cut out for him. And he met the challenge brilliantly. Before long, Hugh was traveling the world, giving hands-on workshops for building turbines and bringing electricity to places where it had never been before.

The Dans attended one of Hugh's workshops in the US and liked it so well they went back for more. After a couple more sessions under Hugh's tutelage, they got back to their shop in the wilds of the Rockies and started thinking and tinkering and making a few changes here and there. DanB came up with the idea of using Volvo disc brake rotors one cold, dark night and as the process continued, one change led to a couple more -- ad infinitum -- and the turbine that's detailed in the book is something like “iteration n+1” and generations removed from Hugh's original, primitive radial-flux wind generator.

Chapter 6 of the book, “Shop Safety” is an absolute must-read chapter. I don't care how long you've had a shop, worked in a shop or if you're a rank newbie at building anything. Read

this chapter. Then go back and read it again. It will keep you, and those who help you, from getting hurt. As you build your wind turbine, you'll be working with all kinds of things that can hurt you badly. The magnets used in the turbine are among the strongest, most powerful magnets this side of the Large Hadron Collider and if you let your hand get in between the two magnet rotors, the resulting collision will turn your fingers to Alpo. So pay attention.

The chapter is broken down into sections regarding the safety procedures for each step of the build and each fabrication process you'll be using. One of the good points that's made in the metalworking section is to treat every piece of metal that's been cut, welded or ground, as if it's hot. Mighty fine advice. However, I'd recommend that you also do what we always do in my shop. Once you're done grinding, welding or cutting on a piece, just take your soapstone marker and write "HOT" on the piece in big letters. It might have cooled off by the time your co-worker goes to pick it up, but it's much better to treat a cold piece of metal like it's hot than the other way around.

Chapters 7 through 18 take you step by step and piece by piece through the entire process of building your own axial-flux wind generator. Each chapter, each step, each process is illustrated with photos of the components. As you learn what to do and how to do it, you also learn what not to do. The Two Dans also do a wonderful job of explaining *why* you're doing it that way.

Knowing *why* you're doing something is vital in a process of this nature, because it gives you a solid foundation in the subject and prepares you for the sometimes not-so-simple task of living with and maintaining the wind monster you've created. Even if you're consumed with an almost overwhelming haste to get the rig in the air, don't skip over the 'why' parts of the book. You'll need them later.

Chapter 19 is titled "Failures and Prevention". It's a machine. It can fail. There are a lot of things that can go wrong with any complex mechanism. This chapter details what to watch for – those little signals a machine gives to let you know that all is not well. The proper maintenance methods are described and, again, illustrated with myriad photos. There's a very informative section with pictures of machines that have failed, along with a bit of failure analysis so you know why it happened and how to avoid that failure mode with your machine. The chapter concludes with a section on Troubleshooting. You built it, so nobody knows that machine better than you do. You're also the one that's going to be repairing it if something goes wrong. Nobody's better qualified.

If you're not satisfied with the 10 foot turbine described in the building process in the book, Chapter 20 "Scaling it Up and Down" may be for you. It describes a 17' unit and also a downsized 7' turbine. These two units are not as far along in the development process as the 10 footer that we build in this book. The guys have built and flown a few of them, but they

don't have near the hours in the air that the 10 footer does. I'd recommend building the 10 foot turbine first and getting some first-hand experience before setting off into less-charted waters. However, there is some advanced theory in that chapter that will certainly improve your technical understanding of the subject whether you build a larger or smaller unit or not.

Of the remaining two chapters of the book, one is devoted to sources of information, supplies, components, kits, towers, web resources and just about anything else that's wind energy related. Chapter 22 is the Glossary wherein you can find definitions for most every wind related term from "AC" to "Zymurgy". The latter being one of my favorites.

Six appendices round out the book and contain information on tap drill sizes, wire gage, those sometimes pesky metric to English conversions, tools, wind data and other just generally useful brain fodder. I was gratified to see in the production credits that the book was almost entirely produced using free, open-source software. I believe that open-source software will be the force of the future and the fact that a book of this quality can be produced using OSS is proof that the free software movement is coming of age.

Dan Bartmann and Dan Fink have done a magnificent job in the writing and production of *Homebrew Wind Power*. They've created a book, written with a vast amount of knowledge and experience in the subject, loaded it with photographs that clearly show the processes involved and enabled any wind energy amateur to successfully build his or her first wind turbine and enjoy the rewards of living off-grid. The writing style vividly demonstrates that The Two Dans enjoy what they do and while they take the subject of wind energy very seriously, they never take themselves too seriously. They have fun building wind turbines and it shows in the book.

Do I have any grumbles about the book? Just one. I live on a 70' X 100' lot in the city and I don't have room to fly one of these turbines even if I built one. I'd need a tower bigger than the lot to get above the trees. So, here's a book that's got me all fired up to build a wind turbine and I've got no place to fly it. What a book! I heartily recommend it.

Keep an eye on www.otherpower.com so you can be one of the first to get the book when it's printed and released.

By the way, you'll love the "Dog Haiku".

Peace,
ldb