ARRL Periodicals Archive – Search Results

A membership benefit of ARRL and the ARRL Technical Information Service

ARRL Members: You may print a copy for personal use. Any other use of the information requires permission (see Copyright/Reprint Notice below).

Need a higher quality reprint or scan? Some of the scans contained within the periodical archive were produced with older imaging technology. If you require a higher quality reprint or scan, please contact the ARRL Technical Information Service for assistance. Photocopies are $3 for ARRL members, $5 for nonmembers. For members, TIS can send the photocopies immediately and include an invoice. Nonmembers must prepay. Details are available at www.arrl.org/tis or email photocopy@arrl.org.

QST on CD-ROM: Annual CD-ROMs are available for recent publication years. For details and ordering information, visit www.arrl.org/qst.

Non-Members: Get access to the ARRL Periodicals Archive when you join ARRL today at www.arrl.org/join. For a complete list of membership benefits, visit www.arrl.org/benefits.

Copyright/Reprint Notice

QST Issue: Jan 2004
Title: Home Brew
Author: John H. Dilks III, K2TQN

Click Here to Report a Problem with this File

Home Brew

I've always appreciated well-made homebrew equipment, probably because I had to build most of my early stations on used chassis from scrounged parts. No, my early stations were not well made. They were hastily thrown together monstrosities made from pieces of blue wire, old radio and TV parts, and became known as "rats-nests," as my mother called them. Mom was smart—she refused to dust anywhere near those "death-traps," another name she had for them. Somehow I learned and gradually became better at laying out the parts first, and I began to put some thought into safety.

It was after I went to work for Western Electric and the training I received there that I became obsessive about building well-thought-out projects, built on new chassis, with new parts. And now I began to use several different colors of hook-up wire to connect everything together, not just the single 18-gauge blue wire from the 500 foot roll someone had given me early on.

Today I get really excited when I find a great piece of homebrew gear. I appreciate the thought and care that was put into the project. This year, as the column starts its fifth year in *QST*, I will feature some nice projects every couple of months. If you have something in your collection you think would be of interest, please e-mail me and include one photo if you can. I'll get right back to you.

This month's project (see Figure 1) was built about 1935 by Wilson Smith, WB3ICR, from Nescopeck, Pennsylvania, when he was first getting interested in ham radio. Wilson is now a SK, but his work lives on. This was some project, much more than I would have tackled when I wanted to learn the code.

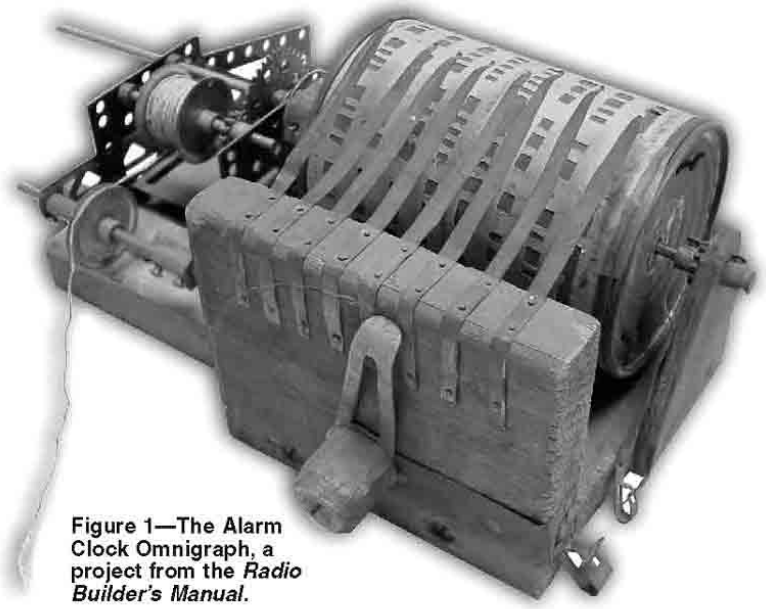

Figure 1—The Alarm Clock Omnigraph, a project from the *Radio Builder's Manual*.

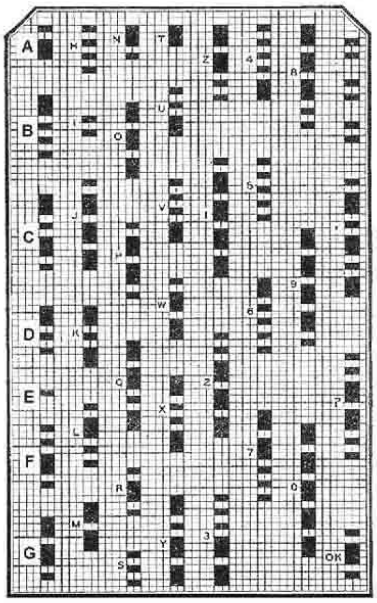

Figure 2—Sample paper code lesson.

Radio Builder's Manual

About 10 years ago I was given a great 1935 paperback book by a ham who was first licensed around the same time, John Roberts, N2DSX, now a SK. John was a young W9 from Michigan at the time. He entered WW II as a radioman in the Army. He told me it was his favorite book and he took it with him everywhere he went while he was in the service. I have enjoyed reading his book many times since then.

Consisting of 130 pages of radios and radio-related projects, it was titled *Radio Builder's Manual* and published in 1935 by Modern Mechanix Publishing Company. Aimed at the beginner, it had detailed physical drawings of the parts layout, with pictorial schematics and regular schematics. Projects ranged from simple to complex, from receivers and transmitters, from gadgets to Morse code keys and simple test equipment—everything a budding ham would need to get started and more.

It must have been the article "Alarm Clock Omnigraph—Teaches Code to Radio Fans" that I remembered. One day while looking on eBay, there it was—a project from the book, and no one was bidding on it. I entered a bid, and eventually won that auction.

The Omnigraph

The omnigraph was a device designed for sending precoded Morse code through a buzzer. One would listen to the letters while learning the code. There was a control of some sort, where the speed could be increased as you learned. And there was a way to change the order of letters to help eliminate anticipating the next letter being sent.

John Dilks, K2TQN ♦ 125 Warf Road, Egg Harbor Township, NJ 08234-8501 ♦ k2tqn@arrl.org

It's obvious that Wilson Smith had this book, because it is almost exactly like the article. Wilson must have spent hours cutting out the wood, tin and brass pieces, and putting them all together. It even has a universal joint between the motor device and the rotating drum, just like in the article. It must have taken him hours and hours to build, probably longer than it took to learn the code once it was running.

What convinced Wilson to build this and how does it work? It's interesting to read from the article:

> The principal features of the instrument can be seen in the accompanying drawings. The clock works rotate a tin can, which is connected to the minute hand shaft. A simple universal joint is used to couple the clock and can.
>
> In preparing the clock works for use on the Omnigraph the escapement mechanism must be removed and also the main spring. A small wooden spool is then mounted on the main spring shaft. The clock works is operated by a cord wound around this spool and force applied by means of a weight.
>
> The tin can drum is covered with a paper held in place by rubber bands, as illustrated in the figure. The dots and dashes are cut in this paper and a contact spring makes contact through the holes in the paper as the can is rotated, thus completing an electrical circuit and making the radio signals.

The one difference between Wilson's Omnigraph and the one in the article is that Wilson used Erector Set parts to build the clock works, rather than an old clock for the parts. The result is the same: The string is wound around the spool. A weight is attached to the end of the string, and the drum turns as the weight pulls the string on its way toward the floor. The speed is adjusted by the amount of weight applied.

The article continued and told how to make the paper code lessons by using graph paper and putting $^1/_8$ inch wide holes in the paper. Dots should be $^1/_{20}$ to $^1/_{16}$ inch long and dashes should be three times as long as a dot. Spaces between dot and dashes should be equal to one dot. The spaces between letters should equal four dots, and the space between words should equal eight dots. (See Figure 2, which has all the alphabet, numbers 0 through 9 and basic punctuation. Note the period at upper right is the old *di-dit di-dit di-dit*.)

The switch arm is interesting. It allows the operator to move between eight different rows of letters. The operator will not be able to guess the next letter by changing the switch at random while the can is turning. Also by turning the paper upside-down on the drum, it changes the row the letters are on. Other charts can be made for additional practice as the operator gains experience.

Figure 3 shows a detail drawing of all the various pieces. From this plan you could make one for yourself, if you wanted to. Also included is a schematic diagram to show how the unit was wired to a buzzer and batteries. The 0.002 µF condenser helps eliminate sparking. See Figure 4.

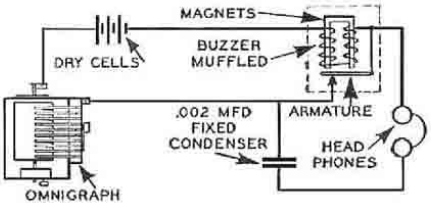

Figure 4—The schematic shows how it was wired to the batteries and buzzer.

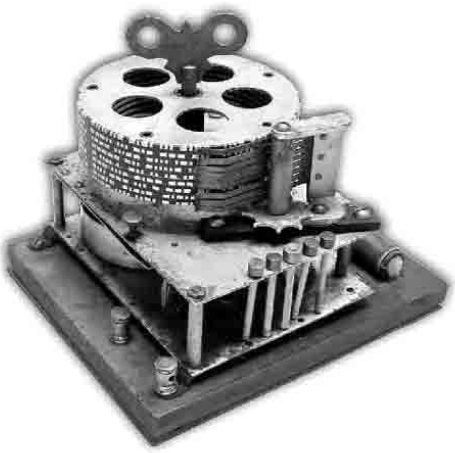

Figure 5—The Natrometer, a commercial version of the Omnigraph.

A Commercial Omnigraph

Omnigraphs could be purchased from several sources. The Capital Radio Institute offered one as part of their radio courses that is very similar in design to the one described above. They manufactured it under the name "Natrometer Corporation." It has a spring-wound motor, which will allow the encoded drum to turn for many revolutions. See Figure 5.

You can see in the photo that there is a drum with nine tracks of precoded letters and numbers. Also there are nine contact springs, which contact the drum one track at a time. The Natrometer had a set of pins that could be inserted into any of the five small holes near the top edge of the drum. When the pins would pass a small cog-gear under the drum, it would turn the gear and advance the vertical shaft, raising the old and lowering the next contact spring, to touch the drum on the next track. (Five pins are shown in their storage locations just below the vertical track-changing shaft.) If more than one pin was inserted into the drum, then the tracks would change more often making the next letter very hard to anticipate. Extra drums could be purchased and changed when needed.

My February 2002 column, "Learning the Code and Code Machines," shows still another Omnigraph, with a more elaborate method of changing tracks.

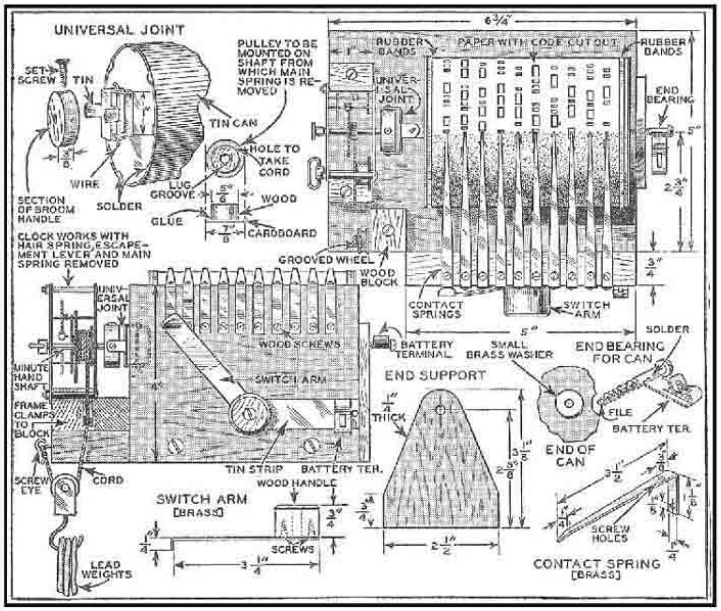

Figure 3—The various pieces making up the Omnigraph, from the *Radio Builder's Manual*.

Want to Build One?

For anyone wanting to build a tin can Omnigraph, I have scanned and placed the entire three page article on my Web page at **www.eht.com/oldradio/arrl/index.html**.

Thanks for your support the last four years; I really appreciate all the e-mail I receive. You give me great ideas for the column, and I read every message. Remember—if you have something in your collection you think would be of interest, please e-mail me and include one photo if you can.

Look for my hat at the hamfests, and say hello.—*K2TQN* QST