A Small BCI Filter/Dummy Load for QRP Transceivers
by Jack Purdum, W8TEE

I had an article published in the March, 2016, issue of *QST* that discussed adding a VFO and LCD display to the Forty-9er rig which Doug and Wayne created years ago. Given where I live, the front end of the receiver was overwhelmed by a local broadcast radio station. I could still hear CW in the background, but after a few minutes, copying CW began to approach zero fun.

The BCI Filter

I followed the *QST* article with a BCI filter, which was published in the August issue of *CQ*. However, that filter was designed for a 100W transceiver, but I did hang it on the Forty-9er for a while. Still, the filter was almost as big as the transceiver, so I redid the filter specifically for the Forty-9er. The result is a much smaller (and less expensive) filter that easily fits within my Forty-9er case. (See Figure 1.)

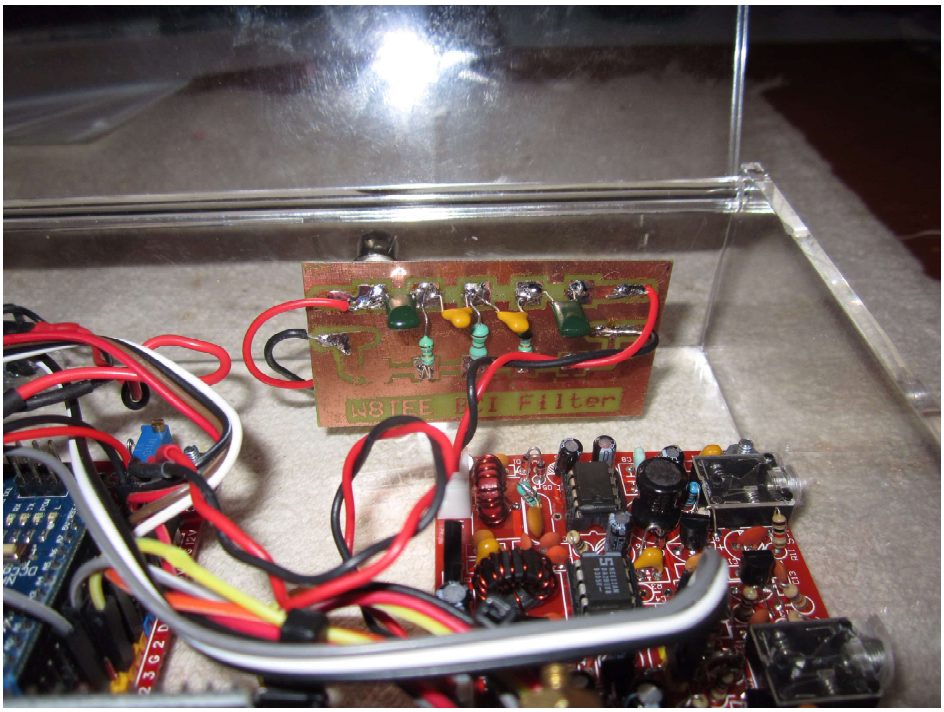


Figure 1. The BCI filter in my Forty-9er.

As you can see in Figure 1, I used Chuck Adam's (K7QO) Muppet construction method for building the filter. Figure 2 shows the schematic for the 7-pole Chebychev filter, originally designed by David Giddy, VK3IL. My version uses axial lead inductors instead of toroids. The values shown in Figure 2 are

back-of-the-napkin numbers in that a little (10%?) slop either way should still give good results. The parts for the filter, purchased mostly from online vendors, cost $0.35. After placing the filter in the rig, the local broadcast interference is totally gone.

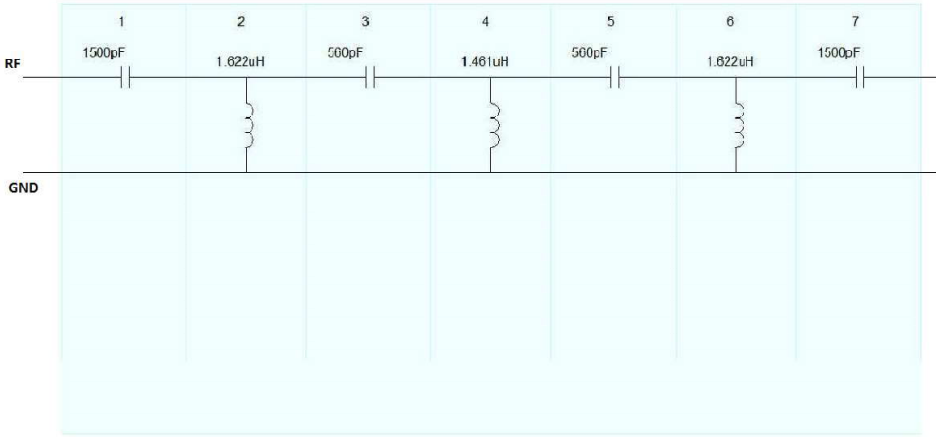


Figure 2. 7-pole Chebychev filter schematic

A plot of the filter's response curve, plotted using the Student Version of the Elsie filter program, can be seen in Figure 3. The broadcast station is down almost -80dB yet the insertion loss is only -.04dB for my frequencies of interest.

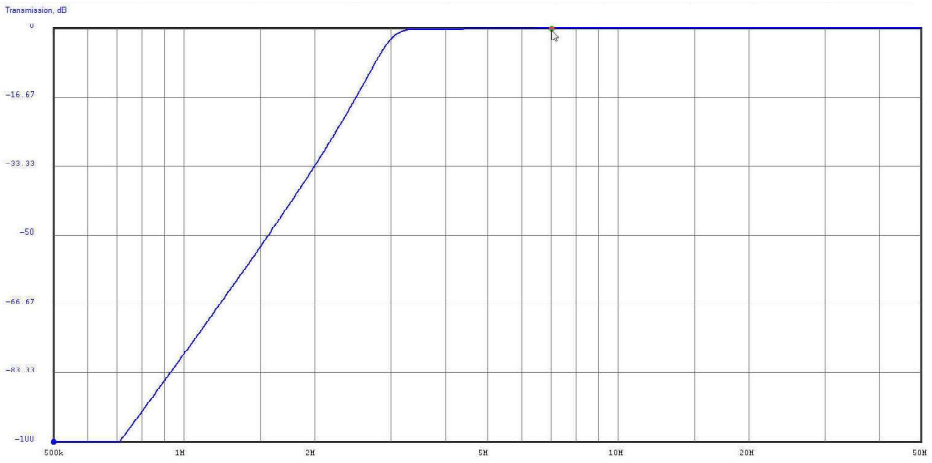


Figure 3. The attenuation versus frequency curve

The Dummy Load

The transfer image for the filter is shown in Figure 4. As you can see, the top part is the BCI filter toner image while the bottom part is for a dummy

load (DL). Strange, you say, to put a DL with

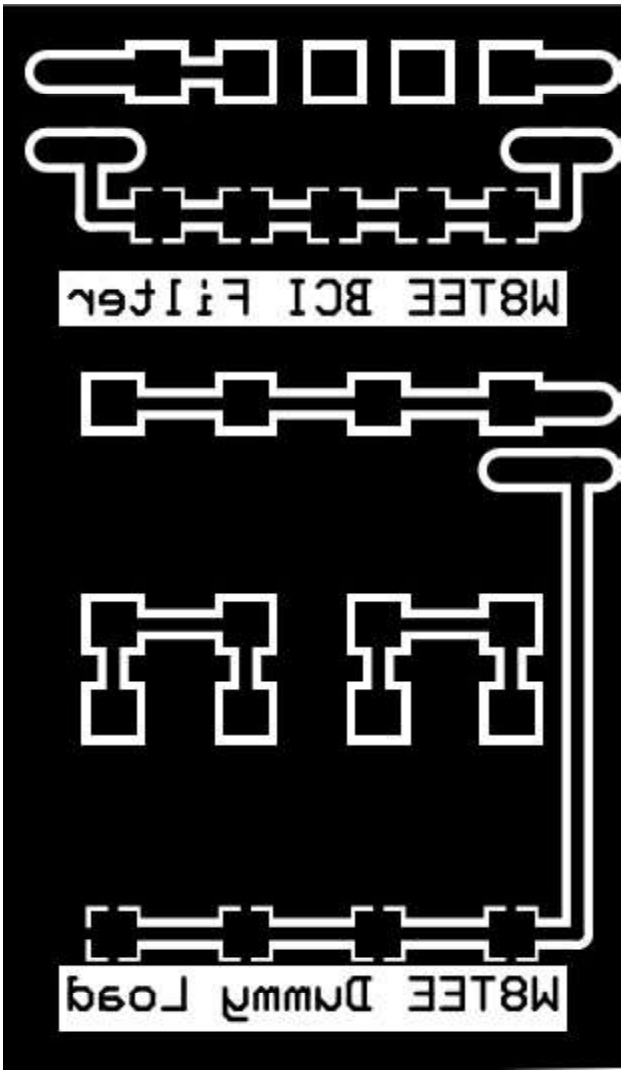


Figure 4. The toner image

and BCI filter. Well, not really. I wanted a dummy load that I could use with all of my QRP rigs, some of which can output up to 15W. This DL is built from eight 1000 ohm, 3W, 1% metal film resistors. Figure 5 shows an earlier version of the resistor pack. You can buy 20 of these online for about $3.00. If you look at the image and do the math, you can see that it provides a 50 ohm load with a max power load of 24W, although I would not push it to that power level.

I put both the BCI filter and the DL on the same board because it's

easier to do two circuits at one time than two individual circuits. Because I did the two circuits on a light-weight copper clad board, I just cut the two circuits apart with tin snips after the circuit was etched and filed the edges smooth. If you don't need the DL, just cut it off of the toner image.

Figure 5. The DL resistor pack

My guess is that most of you will want to place your own call on the board...piece of cake! Run PC Paint and then load the Figure 4 image. Now select the menu sequence *Home --> Rotate -->Flip Horizontal* which flips the lettering back to normal. Using the eraser on the Paint menu, erase my call, and then use the Text icon to write your own call. Once your satisfied with your edit, flip it again to get it back to the reverse image and save it. It's now ready for printing. If you don't have a laser printer, most office supply stores can do it for you. I'm assuming that you already know how to transfer the image either using heat or chemicals, and then etch and your done. If not, Chuck has a great Youtube video on how to build and etch a Muppet board.

BTW, Doug has already pointed out that some transceiver kits cost less than $5. Add the DL here to one of those rigs and you have a code practice

oscillator for less than you can buy one. If two of you sit in the same room, you can practice sending to each other almost anywhere and it's a good way to practice because it's more fun than just listening to your computer throw code at you. Enjoy!

Snort's Shorts
by Steve Smith, WB6TNL

Hello, I am Steve "Snort Rosin" Smith WB6TNL. This is the second edition of "Snort's Shorts" monthly column in QRPp. Each month I'll present project ideas, short reviews and submissions from NorCal QRP Club member contributors.

Last month, the column got out of control and ended up a full-blown construction article but that was OK for a first cut. This month I'll get down to what I originally envisioned and leave the construction projects for complete, multi-page articles.

Remember: This column is two-way; If you have a hint, review or project idea, please send it to me for inclusion in one of my columns. Photographs are welcome. Thanks!

This Month, our first **Snort's Shorts Hints** are a couple submitted by Doug Hendricks KI6DS, Editor and Publisher of QRPp:

Removing Enamel-Coated Magnet Wire Insulation

I use the following method to clean the insulation from magnet wire. First I wind the toroid and then I put each lead at 90° from the Toroid. I hold the toroid by one wire and I then take a BIC lighter and burn the insulation back to the toroid. I repeat on the other lead. Then I take one turn off each end and use a 3M scrubber pad to clean the burned insulation off the wire. I then put each turn back on, and now I am ready to solder the toroid on the board. The advantage of this method is that you do not have the problem of nicking the wire that you would with a knife or a scraper.

PCB Etching Speed-UP

When you are etching pcb's, the process will go faster if you agitate the etchant solution. I etch my boards in a Pyrex dish. I set the dish on a straight length of coat hanger wire. Then use my finger to gently rock the dish back and forth: Instant agitator.

Snort's Mini-Reviews

Harbor Freight Tools Headband Magnifier Mini-Review and Mod.

For most bench work, I use a headband magnifier sold by Harbor Freight Tools (and likely others) described in their catalog as a "Magnifier Head Strap With Lights Item#38896".

Fig. 1 Harbor Freight Headband Magnifier as modified

Fig. 2 Close up detail of light mounting method

It was quite reasonably priced and, considering the lenses are acrylic, has decent optics, several ranges of magnification and, except at the highest magnification, no noticeable distortion. This magnifyer features a fixed lens, a 'flip-up' lens and a swing-down single lens for extreme close-up work. Magnification levels are:

1.8X
2.3X
3.7X
4.8X

It has an adjustable, padded headband and will fit over regular or safety glasses. There are dual, built-in battery-powered lights, one on each side with independent power switches.

What is not very good about this magnifier is the built-in illumination. Each of the lights are powered by two AAA cells and use a tiny screw-base lamp with a magnifying lens built-in. Frankly, they're poorly built and lousy performers at best. I found them to be practically useless.

These days decent high-intensity flashlights using single "Cree" type LEDs are available for a couple of dollars or less per light. I bought two at an auto parts store for $2 ea., including batteries, and proceeded to graft them onto my magnifier. The existing lamp assemblies were easy to remove; they're attached by a couple of sheet metal screws. After removing the lamps, holes were bored in the headband fore and aft of the LED flashlights with a drill diameter sized to pass a large plastic wire tie routed through the headband and around the flashlight, securing it tightly. (See the photograph for details.)

The results are very good. Although it increase the weight of the magnifier, I don't notice it for the short period of time I usually wear it. Now there is plenty of light from the LED flashlights with one or both powered on. This works very well "in the field" where there may not be sufficient illumination from other sources.

Vellaman Tuning Tool Set

Velleman model #VTCSS ("High Frequency Adjuster Set 10 pcs.") Someone on QRP-L suggested these so I bought a set. $8 on eBay, shipped. Search term, "Velleman High Frequency Radio TV Alignment Trimmer Tool Set Kit Ham CB FM HiFi".

The set consists of 10 hard plastic tools, each ~4.5" (115mm) long overall with a ~1.875" (48mm) long grip.

2 ea. Hex, 2mm and 2.5mm
2 ea. Cross, 2.4mm and 3.0mm
2 ea. Square, 1.5mm and 2mm
4 ea. Flat, 1mm, 1.5mm, 2mm and 4mm

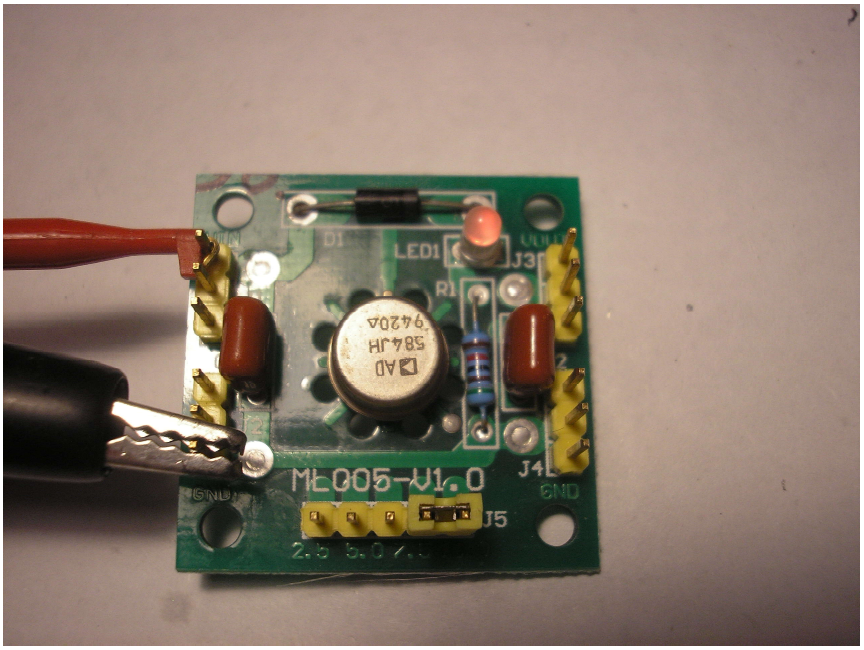
The cross shaped tips will fit some of the trimmer capacitors found in QRP radio kits.

My opinion: Overall, a nice set for the money.

Precision DC Voltage Reference

From eBay; search term, “AD584 4-Channel 2.5V/5V/7.5V/10V High Precision Voltage Reference Module“. I purchased one for $3.39, shipped. That is less than the cost of the I.C. alone. It employs an Analog Devices AD584JH, 8-pin TO5 device:

<http://www.analog.com/media/en/technical-documentation/data-sheets/AD584.pdf>.



Precision DC Voltage Reference

Input: 12-15 Volts D.C.
Outputs: VDC
2.5 (+/- 7.5mV)
5.0 (+/- 15mV)
7.5 (+/- 20mV)
10.0 (+/- 30mV)
Dimensions: 1.25 X 1.25”

It has a reverse-polarity protection diode and an LED power indicator. A SIP header with Berg connector selects one of 4 output voltages.

My opinion: This gadget is quite useful for checking the accuracy of DMMs, especially the inexpensive red Harbor Freight “freebie” meters. By using this reference along with a precision resistor, DC current accuracy can also be checked.

Soldering Iron Tip Thermometer

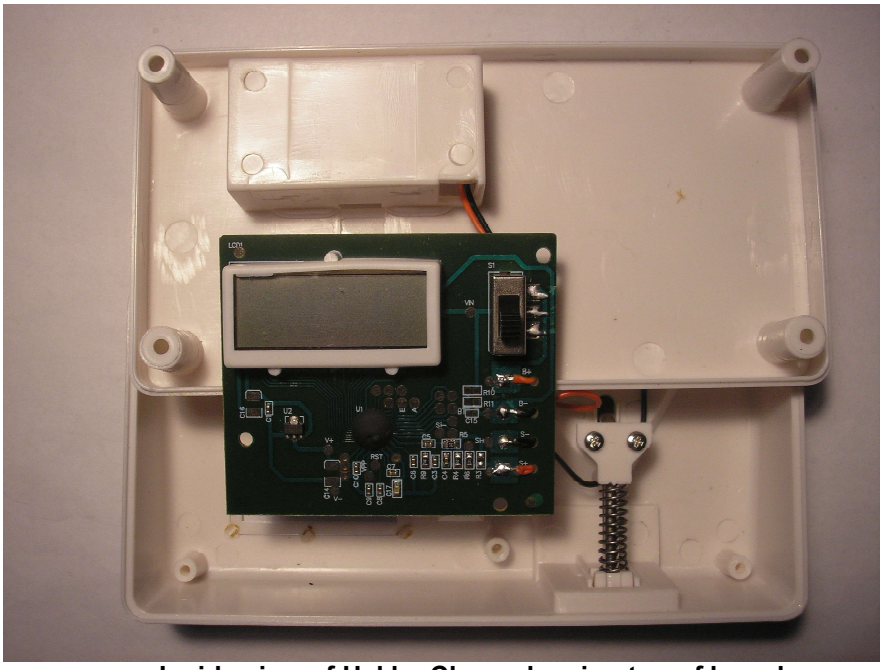
Purchased at auction on eBay; search term, “New HAKKO 191 Electric soldering iron Thermometer temperature tester”. PLEASE NOTE: This is NOT a genuine HAKKO device. It is a “clone” of an out-of-production HAKKO Model 191. I won this at auction and paid $5.24, shipping included.

Hakko Clone Soldering Tip Thermometer

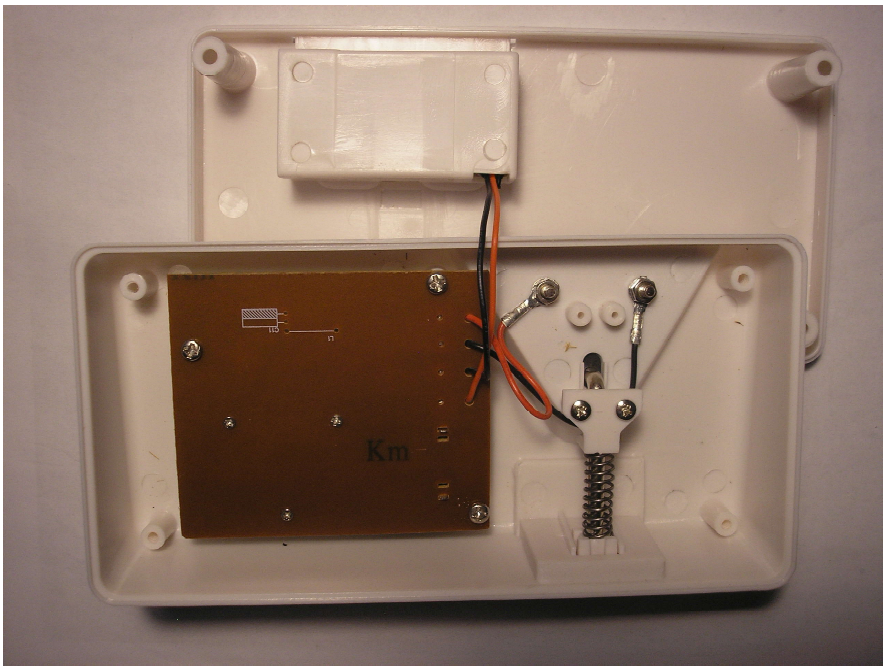
Several months ago, I purchased a HAKKO FX-888D on sale at Fry's Electronics. The 888D is a very popular soldering station with hams and hobbyists alike. After initial use, I found that I needed to set the indicated temperature on the 888's display to almost 900 degrees F to get it to solder reasonably. I knew there must be a calibration problem but I had no means of confirming that; I don't own a DMM with a thermocouple accessory. I tried using a 'pistol' type, non-contact IR thermometer but that did not register the tip temperature. So I went looking for a device specifically designed for the job. I found genuine HAKKO FG-101 thermometers for thousands of dollars and genuine HAKKO FG-100 units for hundreds; considerably more than I spent for my 888D. Then I discovered the model 191 on eBay. Prices were almost unbelievably low and immediately suspected they were copies. I was willing to risk 10 Dollars or less, made a bid on an auction and won. Frankly, I didn't expect to receive something useful.

In week or so, the device arrived. It looked good, if not a bit 'plasticky' (no surprise there). Included was what appeared to be a package of 5 brand new OEM HAKKO thermocouples. There were no instructions but operation is fairly intuitive and very similar to the HAKKO FG units for which instructions are available on the 'net. I attached a thermocouple, popped in a 9-Volt battery, flipped the switch to on, the LCD display 'lit up' and immediately indicated the room temperature in Celsius (could not find a cheap unit that reads in F).

I have several soldering stations but figured the one having the best probability of being accurate was my old Weller WTCP. The WTCP is not electronically regulated; it achieves temperature regulation with calibrated tips and a magneto-electric system. The tip in my Weller was marked '7' for 700 degrees F. I let it warm up for a few minutes, applied a blob of solder to the tip and touched that to the thermocouple on the 191. The LCD reading increased and after 20 seconds or so, stabilized at 371C, almost exactly 700 F! I then



Inside view of Hakko Clone showing top of board



Inside view of Hakko Clone showing bottom of board

checked the rest of my electronically regulated stations and except for one, they were all reasonably close to the marked temperatures.

Conclusion: Amazing performance for such an inexpensive unit. Although construction is a bit flimsy, with care the until should function reliably for a long time.

That's it for this time. Remember if you have a tip that the world can use, be sure to send it to me. It doesn't have to be fancy. Send me an email and we will discuss how to send it to sigcom@juno.com. 72, Snort.

Buildi A Vertial Delta Loop Antenna
by Ned Tully, AC6YY

I have always enjoyed nature, hiking and camping along with ham radio. I own several QRP rigs, commercial as well as homebrew, but as all hams know the key element for a successful communication is an efficient antenna. HF beams, quads or any other directional antennas are not very practical for portable operation. Random wire, all flavors of dipoles and vertical antennas are simple antennas used by hams in the field. If conditions are right all these antennas work well and personally I have been having excellent experience with them especially near salty water"

Even these simple antennas can produce satisfactory and rewarding results, I have always wanted to have the edge over them when trying to break a pile up or to work a DX station.

I've decided to use Delta loop antennas for my portable operation. A Delta loop compared to an inverted Vee dipole, or dipole, lowers *effective height* of the antenna considerably and the advantage of that with a single apex point, the delta loop requires only one tall support. The feed point, where the heavy coaxial line connects, or ladder line can be placed at or near the delta loop antenna bottom. The single tall support and low feed line connection point makes delta loop construction and installation exceptionally simple and fast.

To support the antenna I use three types of fiberglass pushup masts: The MFJ-1910 Telescoping Fiberglass Mast is 33 feet tall, yet collapses to a mere 3.8 feet and weighs only 3.3 pounds.

MFJ-1910
http://www.mfjenterprises.com/Product.php?productid=MFJ-1910

Jackite 31 ft telescopic fiberglass pole.
http://www.jackite.com/product_info.php?cPath=41_44&products_id=133

Spiderbeam HD 12m fiberglass pole.

http://www.spiderbeam.us/
product_info.php?info=p3_Spiderbeam%20HD%2012m%20fiberglass%20pole.html

Optional: make three guy lines if you want to guy the mast. I use a ground stake over which I slide the mast onto the ground stake. It is a good idea to use a 1 foot length of pvc pipe that will fit inside the bottom of your pole and over the stake to protect the fiberglass pole.

How to construct a Delta loop antenna:

Tools needed:

1. Wire cutter
2. Wire crimper
3. Measuring tape
4. Screwdriver set
5. Soldering iron and solder.
6. Heat gun

Material needed:

1. Wire: I use 16 or 18 gauge wire. I bought an inexpensive spool of wire at Weird Stuff Warehouse in Sunyvale.
2. Antenna insulators: You need two antenna insulators. You can use any standard antenna insulators or make your own. I made mine from PVC Pipes (Plastic).
3. One piece of center insulator for the feed line. I made one from plexiglass.
4. Two wire ring terminals.
5. Two screws, two washers, two split lock washers and two wing nuts.
6. Shrink tube
7. Two 50 foot pieces of rope for antenna support. Any thin rope is ok. I use 3/16" rope.

Steps:

The standard full-wave loop formula is 1005 divided by frequency (MHz). So, if we want to determine the length of a full wave loop on say 20 meter CW, we would use 1005 divided by 14.050 = 71.53, feet.

1. Calculate the wire length. 1005/14.050 = 71.53.
2. Measure and cut the wire.
3. Stretch the delta out in a triangle on the ground and mark the wire at the 1/3 and 2/3 lengths.

4. Install two antenna insulators. One on the 1/3 and the second on the 2/3 lengths (apex). Depending on your insulator you can use superglue and 22-gauge aluminum wire to fasten the isulator in the place. I simply made an overhand knot. The knot through the insulator does not affect the antenna performance.

5. Use the wire crimper to strip two wire ends by squeezing the handles about ¼" from the end of the wire or the desired length, using the correct notch on the tool, and then twisting it slightly, the insulation will be cut free.

6. Put two one-inch pieces of shrink tube on the wire.

7. Install and crimp the two wire ring terminals.

8. Solder the terminals.

9. Slide the shrink tube over the terminals all the way to the rings and use the heat gun to shrink them.

10. Make a plexiglass center piece by cutting plexiglass. Make it 2 1/2 inches long and 1 1/2 inches wide. The size of the center piece is not critical, just big enogh to accommodate the width of the ladder line. Drill two holes on both ends and a third hole in the middle to provide an attachment point for the pole.

How I set up and use the loop:

1. I drive the stake into the ground and put a piece of PVC pipe over it to protect the inside of the fiberglass mast from being damaged.

2. I lay the loop on the ground and connect the center piece with the loop and then the ladder line.

3. I extend the mast and attache the apex to the top. Tie the rope to the both side of the loop and anchor the rope with the tent stakes in the same line with the center stake.

4. I raise the mast and put it over the stake.

5. I adjust the base of the loop by stretching the ropes to get the it as close as posible to delta shape.

6. Connect balanced line tuner or a 4 to 1 balun to the ladder line.

7. Connect the radio and enjoy DXing.