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### QRV? Putting Together a Good Bench

Well, it's hamfest season again. Since I already have more ham gear than I'll ever reasonably use, and enough un-built kits to last for many a rainy day, I go to hamfests mostly to see my friends and to restock my junque box. Last year, for the first time, I went to FDIM and the granddaddy hamfest of them all, Dayton. Wow! FDIM was like a four-day long North Georgia QRP Club meeting and the Dayton boneyard was pure sensory overload!

The problem with shopping for stocking your workbench at a hamfest is remembering what it is that you need, especially if you're just getting started in construction. There's so much stuff and it is all so cool! So in this article, let's take a look at some of the basic things that you can do to put together a good construction workbench.

#### Locating Your Bench

Ideally, you should locate your bench where you can work for several hours at a time undisturbed, and if possible, where you can leave your project and return to it later. Your work area should be well lit. In my construction area, I have an overhead light on the ceiling, a fluorescent lamp mounted underneath a storage cabinet, and a swing-arm lamp with magnifying lens directly over the workarea. It's best to **not** locate your workbench in a carpeted area—you be totally amazed how carpet (even short pile) will consume any and all parts dropped on the floor. If you have no choice, try getting a large plastic floor mat from an office supply store.



KO4WX's construction workbench

My first bench was a piece of plywood over a couple of metal filing cabinets in the den (I learned about carpets and radio parts the hardway). When I moved into my present house, I custom built melamine counters and cabinets. What is important is to not use your great-great-grandfather's antique desk! Over time, you will drop tools, solder, chemicals and various and as sundry other things that will wreck a precious family heirloom.

#### Tools

Proper tools will make or break any construction project. However, you can get started with a basic set of common and easily available tools. A good soldering iron is a must. Weller makes the best, in my opinion. If you can afford it, get a variable heat iron, in the \$50 to \$100 range. It

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will pay off in the long run. If not, consider getting a couple of inexpensive 25-Watt and 40-Watt soldering irons, like the ones sold at Radio Shack. A heavy soldering gun is helpful for larger projects, metal work and making PC board cabinets, but isn't necessary right off the bat. Your best bet for solder is "44" rosin core. You can usually find it at hamfests for about \$5 a pound. Get lots—and get lots of solder wick too!



Neat trick for storing tools on your bench useful of all: the Dremel tool.

Here are some of the basic tools you need for most construction projects:

- Small needle nosed pliers
- Small diagonal pliers ("dikes")
- "X-acto" knife
- Small set of screwdrivers
- Decent VOM meter
- "Extra pair of hands"--very helpful
- Pair of scissors
- Tweezers
- 3/8 inch drill
- set of "allen" wrenches (hexagonal wrench)

With experience, you'll find all kinds of tools available for every kind of special need. Some of the more useful tools that I use all the time include a nibbling tool (to cut holes in thin metal), hog-shears (also called "tin snips"—useful for cutting PC board, brass, aluminum, etc.), and the most

## Parts

You can **never** have too many parts! Believe it or not, one of the best places to get parts is still your neighborhood Radio Shack store. Different stores carry different inventory, but almost all still carry some assortment of parts. I sometimes walk into a store just to see if they've got some old discontinued parts you'd never see in any other store. I've found some real gems at times!

While this isn't a plug for Radio Shack (and sadly, the RadioShack.com business is going out of business), one thing that you should definitely get to jump start your bench is one of their ¼ - Watt resistor assortments (RS271-312, \$9.99 or the smaller assortments, RS271-306, \$4.99 or RS271-308, \$3.99). Some of their capacitor assortments are good to prime a junque box as well.

Here's my recommendation for a good starter set of parts:

**Resistors** – ¼-Watt, 10%, 30 of each: 1K, 10K, 100K; 10 of each: 1, 10, 51, 100, 120, 150, 220, 330, 470, 560, 1.5K, 1.8K, 2.2K, 3.3K, 4.7K, 15K, 22K, 51K, 68K, 120K, 220K, 470K, 680K, 1M, 10M

**Variable Resistors** – 3 - 5 of each: 500, 1K, 10K, 50K, 100K

**Disk Capacitors** – (ideally NPO or COG if you can find them) 10 of each: 3 (or 3.3) pF, 7 (or 6.8pF), 10pF, 15pF, 33pF, 47pF, 68pF, 100pF, 120pF, 150pF, 220pF, 270pF, 330pF, 390pF, 470pF, 680pF, 910pF, 1200pF, 1800pF, 2200pF, 3300pF

**Bypass Capacitors** – 20 of each: .1uF, .01uF, .001uF

**Electrolytic Capacitors** – (16V or 25V) 1uF, 3.3uF, 4.7uF, 10uF, 22uF, 33uF, 47uF, 100uF, 220uF, 470uF

**Inductors** – 1.8uH, 2.7uH, 5.6uH (or 4.7uH or both), 10uH, 15uH, 22uH, 47uH, 100uH, 1mH, 2.5mH

**Toroids** – 10 of each (if you can): T-37-2, T-37-6, T-50-2, T-50-6, FT-37-43, FT-37-61, FT-50-43, FT-50-61

**Transistors** – 10 of each: 2N3904 (the cockroach of semiconductors), 2N2222/2N2222A, 2N4401, 2N3906, MPF102, 2N7000, 2N4416A; 5 of each 2N5179, 2N3866, 2N2907, 2N3053

**Diodes** – 10 of each: 1N34/1N34A, 1N914, 1N4148, 1N4001/1N4004

**Integrated Circuits** – 5 of each: 78L12, 78L08, 78L06, 78L05, LM386N, LM741; 3 of each LM747, NE602A (also called SA602AN) or NE612A (SA612AN)

**Crystals** – 3 – 5 of your favorite popular QRP frequencies (3.579, 3.686, 7.040, 10.106, 10.112, 14.060, etc.)

You may not be able to build that super-doooper all-band, all-mode rig with these parts, but you'll make a good start. Even if you only build kits, it is helpful having these parts on hand—I just hate it when I have to stop work on a project because I don't have any extra .01 uF capacitors on hand!

Some of the older “through-hole” parts are becoming harder and harder to find (I went crazy recently trying to find a CA3020A driver amp!)--many are being replaced by surface mount parts. You'll find that surface mount parts are a lot cheaper than the older parts we are used to working with, because they are easily manufactured by machines (this is one of the reasons that consumer electronics have gotten so cheap lately!). Be careful, because unless you are skilled in working with surface mount, it can be challenging and frustrating.

There is a great list of parts suppliers available on the QRP ARCI website. Some of my favorites are: Amidon, Inc.; Dan's Small Parts; Digikey, Corp; Kits and Parts; Far Circuits; Halted Electronics, International Crystal; Mouser Electronics, National Semiconductor and RF Parts. Most have their catalogs available on-line, and some you can even download. Many have direct ordering over the Internet, and usually ship within 24 hours if the parts are in stock. Depending on the project, you may have to shop at several suppliers to get all of the parts necessary for a specific project.

So next time you go to a hamfest (or, maybe I'll see you at FDIM!) you'll know better what to look for to look for to get that junque box stocked up! Then get that solder melting, build something and get QRV!

72 de Mike, KO4WX