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QRV? Building Your Cub-40

Seems like I always find myself on the way home from some place really cool, right at the publication deadline for the next QQ. Well, Bush House and Germany were really something, as I write this issue's column, I'm on my way home from Four Days In May at the Dayton Hamvention. WOW! Ham radio is a great hobby, but having now been to my first FDIM, I know that I'm not the only one who feels that QRP is a true passion! I'm hooked on FDIM!

There's just nothing like sitting down and chatting with the guy that dug you out of the mud one night and gave you that 229—the one you happy danced over because you were running a handful of milliwatts in your first Spartan Sprint. And you can't pay enough money for the opportunity to sit down with the developer of your favorite piece of equipment and ask him what was going on in his mind when he came up with his design.

If you haven't been to FDIM, go! Pencil in next year's event on your calendar (May 16-19, 2002), grab a buddy—or a bunch of buddies—and go. I promise you, you won't regret it. Oh, and by the way, even if you're having too much fun at FDIM, don't forget to go to the Hamvention as well—there's nothing like it anywhere!

Assembling Your Cub-40

The MFJ Cub *Construction Manual* is very well written, and the assembly instructions are very straight forward. First you “stuff” (homebrewer's term for placing components in their proper positions on the PC board) and solder all of the Cub's generic parts. A number of the parts in the Cub circuit are the same, regardless of band, so you install these first.

The manual gives you a step-by-step guide and a suggested order in which to install the components. Until you have experience building kits, it's probably a good idea to follow this order, and to use a pencil or pen to mark the checkbox provided after installing each component (it's not a bad idea to do this, even if you have a lot of experience with kit building—sometimes you can get into real trouble, especially as projects get more complex and/or more compact).

When I install a component, I find that it helps to first place the component leads into the proper holes, then take a finger and hold the component in place while I flip the board over and using my long-nosed pliers, pull the leads snug at a slight angle so that they stay in place while soldering. It is very important, however, to just pull the leads snug. Don't

yank them or pull them too hard, as it is easy to damage a component—and that would put a serious dent in your kit building fun. Once you solder the component in place, use diagonal pliers and snip the extra lead (I guess I should suggest here that you wear proper eye protection as you are soldering and snipping the leads). Hold the lead with two fingers you cut it so that the lead won't go flying into your eyes or elsewhere—a stray lead can wreck havoc in your shack (remember they DO conduct electricity and the always seem to land in the worst places like your keyboard or inside a very expensive piece of equipment!).



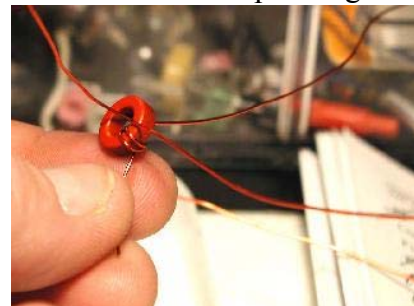
Remember from the last column that the point behind soldering is to make a good mechanical as well as a good electrical connection. Take care that you do not create any *solder bridges*--too much solder, or touching more than one pad with the iron or the solder while soldering can also cause a solder bridge.

After installing all of the generic Cub components, you install the frequency specific parts onto the PC board. These components are all capacitors, inductors and crystals. Two of the inductors are “toroidal inductors” or “toroids” for short. A toroid is a coil wound on a donut shaped piece of powdered iron or iron ferrite, called the “core”. Winding toroids seems to be the single-most scariest aspect of radio construction for most hams—but winding toroids is EASY! And maybe I'm a sicko, but I actually enjoy winding toroids!

Everyone has their own way of winding toroids. Wind enough and you will eventually “find your groove.” Here's my technique that seems to work pretty well—I warn you that I'm right handed, so you may have to adapt this technique if you are left handed. The first thing you do is cut a length of enameled wire the proper length for the band you are building your Cub for (12 inches in the Cub-40). At about inch or so from one end, form a small “U” shape by bending the end of the wire back over itself, approximately as wide as the toroid core is deep.

Take the core in your left hand and the wire in your right and pass the short end of the “U” through the hole in the core, *from the top* (that is, the red or yellow side of the core as you look down on it, through the hole), so that the short end of the wire is pointing back at you. What you now have is *1 turn*.

Take the long end of the wire and bend it downward, continuing the loop that you have started from the bottom. Thread the long end of the wire through the hole again, *from the bottom* (that is the dark gray or black side of the core away from you looking down on the core as above). You now have *2 turns*.



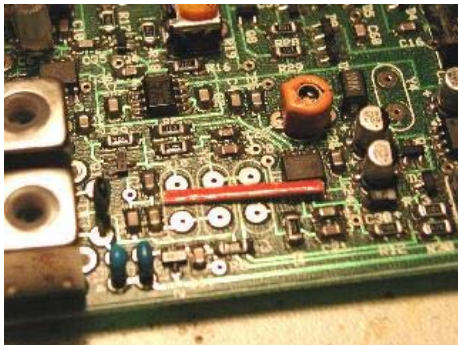
There seems to be a lot of confusion about “what is a turn?” It’s pretty simple: each time the wire passes through the center of the core, you count one turn). For the Cub-40, thread the wire through the core 18 times (including the first two that you’ve just completed).

As you make each turn, pull the wire snug and tight, but don’t break the wire by pulling it too tightly. When you’re done making your 18 turns, smooth out the turns around the core as shown in the manual, to make a nice, neat toroidal inductor. Your finished toroid should look something like this picture.



You have to remove the enamel coating from the two leads before installing onto the PC board. The easiest way is to *carefully* scrape the enamel off with a hobby knife (Xacto knife). You have to do this VERY carefully, because the slightest nick in the wire could cause it to break at the worst time later on (like when you’re the only guy in your club who hasn’t worked the fox). An alternative way (and one I’ve personally been using a lot more lately) is to carefully burn off the enamel using your soldering iron and a blob of solder. It’s a little trickier, but results in a much better connection and potentially more stable circuit.

Once you’re installed the two toroids, and have soldered them in place, you’re ready to install the crystals. The manual cautions to leave an air-gap between the base of the crystal and the PC board. There’s an easy way to do this. Cut a small piece of thin cardboard, about one-eighth to one-quarter of an inch wide and about an inch and a half



long. Place the cardboard strip between the two holes where the crystal leads go and install the crystal (tugging the leads snug on the other side with your long-nosed pliers). Once you’ve soldered the crystal in place, you can slip the cardboard out (you may need to tug it a little with your needle-nosed pliers). For the crystals in the crystal filter, Y1, Y2 and Y3, place the cardboard so that it fits in between all three pairs of holes, and install all three crystals before removing the cardboard.

After you’ve installed all of the crystals, you’ve completed the basic assembly of your Cub-40 (MFJ-9340). Next time, we’ll test out your completed board, align it, and hook it up to an antenna. Then your Cub will be QRV!

72 de Mike, KO4WX