When operating a rockbound transmitter such as my 10W one-valve 80m CW transmitter (pictured right), you will

I already had a crystal for 3.560 MHz, the international QRP calling frequency, and wanted one for 3.558 MHz the FISTS club calling frequency. An advantage of having two nearby frequencies is that if you're listening on 3.560 MHz without the CW filter, you can hear CQ's below you on 3.558. But, you can't buy a 3.558 MHz crystal anywhere, so you have to either have one made to order, or make one yourself as follows.

Before that though, what about ceramic resonators? They are stable (though not AS stable as a quartz crystal) and they can be pulled over a much greater range. A 3.79 MHz ceramic resonator certainly covers the band of interest. So I tried one in my one valve transmitter, but the results weren't good. Basically the power dissipated in the crystal or ceramic resonator is quite high because it's a valve circuit, and the crystal gets quite hot. Unfortunately when using a resonator the heat results in a degree of frequency drift which is unacceptable, leading to severe "chirp". On key down, you can hear the transmitted note drop by many hundreds of Hertz in the first second or so of keydown.

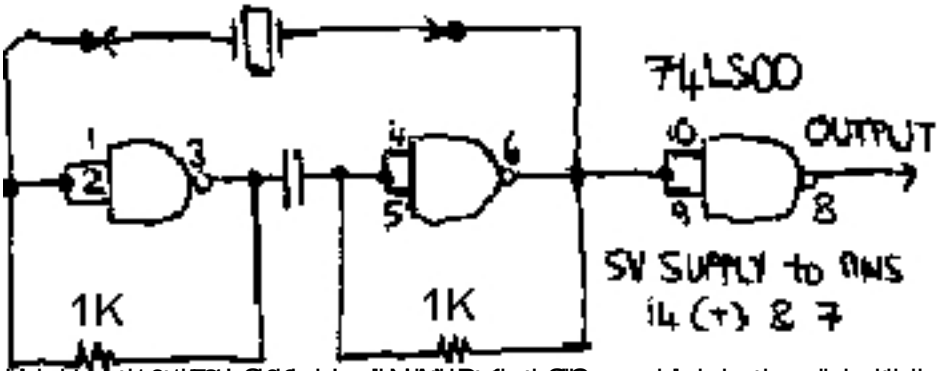
This idea for choosing your own crystal frequency comes from an article 'Penning Down' Crystals by Richard Wells G0RXH, published in SPRAT #99. In the article Richard recommends selecting a crystal frequency above the frequency of interest, and removing the case of the crystal and drawing on the surface with an indelible ink marker pen to lower the frequency.

{gallery}penning/qst{/gallery} The idea isn't new though! Long ago radio amateurs used to apply graphi

There are two types of crystal casing: resistance welded, and soldered. The soldered ones can simply be unsoldered, whereas

"Electron" PA2BE is a article by Ron Brink PA2BE (in Dutch magazine "Electron

Here's a 7010kHz crystal I made for my one valve CW transmitter . The crystal was in a standard HC49 case which wa



Success story from Mike N5JKY

Mike wrote me a nice email on 24-Jan-10 about the success he'd had with penning. He used a Dremel with fine cutting wheel. Clearly, a much better method than my wire cutters!
Pre-requisites: 1) a Dremel with fine cutting wheel 2) The skill to wield it... I had neither, when I did my penning, hihi. Or now, for that matter. Anyway, Mike writes:

"Thanks for reminding me about this technique... I put into practice this morning with success. The straight key century club (skcc) has been running special event stations (K3Y) in all of the US call districts this month, and a challenge went out to see who could use the lowest power to contact these stations. Fun. A year or so ago I built a Small Wonder Labs HiMite for 20 M. These were similar to the well-know Rockmites but featured a limited tuning range where the crystal could be pulled a few kHz. I had

crystals for both 14.058 and 14.060 MHz installed with a switch to toggle between the two. There was, as you might guess, considerable overlap in frequency between them. Anyway, I decided to fire up the HiMite this morning in hopes of snagging another K3Y using a milliwatt rig. I could hear K3Y stations, but they were all too low in frequency for me to work them. Hmmm... what to do.

"I decided to try penning an extra 14.060 crystal I had using a fine-point Sharpie pen. Since the example of removing the case on your website pretty much necessitated making a new case, I wondered if an alternate method could be done that would be speedier (these K3Y stations are on for just two hour stints). So, I figured out how to remove the case so that it could be re-used. I took my Dremel with the fine cutting wheel and carefully cut around the base of the crystal so the case could be removed intact. I then put a small dot of ink on the crystal, and checked its frequency: it had dropped about 5 kHz. Great! I put the case back on the crystal and carefully soldered it back to the base. When this crystal was mounted in the HiMite, I found that I was exactly in the right range to work K3Y/8 from West Virginia (Dave W3NP). When he finished working a station I sent my call and he replied with a 549... not bad for 500 mW! Next time you are in the mode to pen a crystal you might give this method a try. I think that it only took me 20 minutes start to finish. Of course, I was not aiming for a specific frequency just a general range so precision in penning was not required.

..."Actually, there was a detail I left out. When I began cutting, my skill, let's say, was not as good as when I finished. So, there was somewhat of a gap left on that side of the crystal can when I replaced the cover. I took a leftover piece of a resistor lead and laid it over that area and soldered it down. With it in place, I was able to completely reseal the can. One warning, use only the necessary amount of solder for the job; too much, and solder could get into the can and short the internal leads.

"The penned xtal works great. Here is the comparison of the unaltered 14.058 one and the penned one in my Himite:

"14.058 - tuning range: 14.0559 to 14.0579; power out: 368 mW to 401 mW Penned xtal - tuning range: 14.0532 to 14.0553; power out: 368 mW to 401 mW."