

I know what you're thinking. "Not another digital keyer article!" Well, there's where you're right - in part. Mostly, this is about some new technology that may prove useful to you in your next project, and it uses an update to a classic keyer as the vehicle to demonstrate that technology. If you're as comfortable with a soldering iron in your hand as you are a mic, or a key, then give this "keyer article" a chance before searching for the latest DXpedition or contest piece.

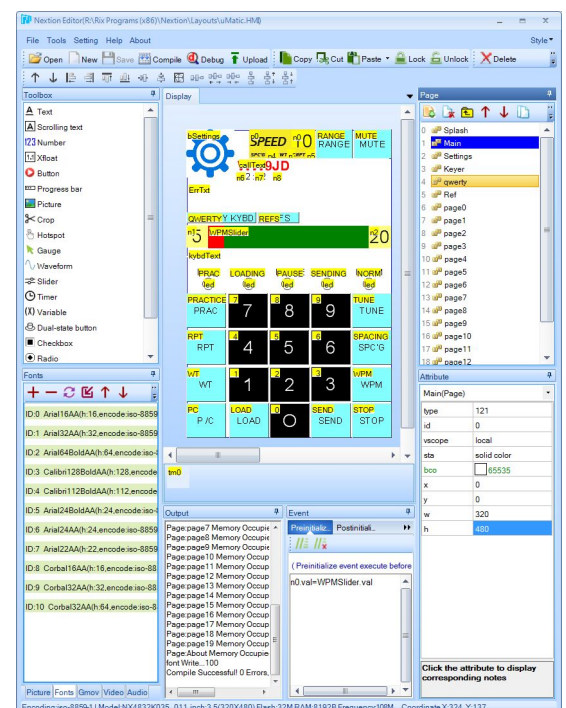
Kit building is probably my favorite Ham Radio activity. I think I'm happiest with a soldering iron in my hand. In 1984 I went to the Heathkit store in Indianapolis and purchased the μ Matic Memory Keyer SA - 5010. Among its features was a "huge" 240 character/command memory. Its main flaw was capacitive "touch" paddles that worked well for only a few Hams. It included a Molex connector to use with external paddles, which I modified to use an 1/8" stereo jack. I also added a 1/8" mono jack for a straight key, and a relay circuit to mute the speaker. For quite awhile I've been wanting to update the keyer with a touch-sensitive LCD panel, but I didn't want to go through the programming nightmare that creating the user interface (UI) would require.

I recently found the Nextion Enhanced 3.5" HMI Touch Display LCD Module. It claimed to connect to Arduino or Raspberry Pi with just a pair of serial wires, and provide a UI design environment that was independent from the Main program code. While working with the display to move my keyer closer to reality, I realized that this display was ideal for lots of software-defined radio projects. It seems to me that one of the limiting factors in projects today is the need for space for controls. Using keyers for an example, many of them have only a few memories due to the need to include a push-button for each memory. The Nextion display can have as many as 256 controls on each screen, and as many as 256 screens. If your project can ultimately be controlled by an Arduino or RPi, then it doesn't need to have a large enclosure just for buttons, dials, and displays.

I was hoping to modify one of the excellent Arduino-based keyers that are already free to use or modify, but my programming skills were not up to the task. I proudly call myself a ham (radio operator), and equally proudly lay claim to being a hacker (programmer). I just couldn't figure out how to modify an existing keyer to perform the functions of the μ Matic using the Nextion display. I did end up using some existing code, and I gave credit for that work in the comments.

The Nextion Display (Nextion Enhanced 3.5" HMI Touch Display LCD Module NX4832K035) has its own Development Environment. Here, you create the different screens (Pages) you want to use, and populate them with controls. The display has the ability to move between the different Pages on its own, or the Pages can be selected under Arduino sketch control. If the Send Component ID box is checked for a particular control's action (i.e. Touch Press or Touch Release), then your sketch will be able to make use of that event to perform some program action (function - in a sketch).

The pages don't have to all be about controls. In this project, I've created a page to enable several Pages for reference information. Right now, there's just a Q-Signals, US Call Areas Map, and some Pages with keyer instructions that are used. I included



additional buttons and blank pages so that others will have an easy time adding their own information.

// Some extra (edited out) paragraphs that might be useful - depending on how this draft is ultimately used

Since one of my goals was a smaller and lighter device than the original, I had planned to use an Arduino Nano board. It didn't take long for my sketch (Arduino program) to exceed its memory limits because of the number of global variables needed to use the Nextion display. The Nextion also required a serial connection. Arduino Nano only has one hardware serial connection, so I would have to disconnect the display every time I wanted to upload a new sketch. I was also never successful in getting the software serial option working. In my search for a new board, I acquired an Artemis Nano from SparkFun, and a Mega Mini from RobotDyn.

The Artemis Nano has a lot of potential. I'm sure that a version of this keyer will ultimately run on it, but this technology is too new for use in this project. Most Arduino sketches are portable between the different development boards, but the Artemis Nano currently requires too many modifications to run. Instead, I settled on the RobotDyn Mega 2560 PRO (Embed) CH340G/ATmega2560-16AU. While it's more than twice the size of the Nano, it has 4 hardware serial ports and enough memory to run the sketch (and enough left over for future modifications).