Flex Radio Remote Keying Without Latency

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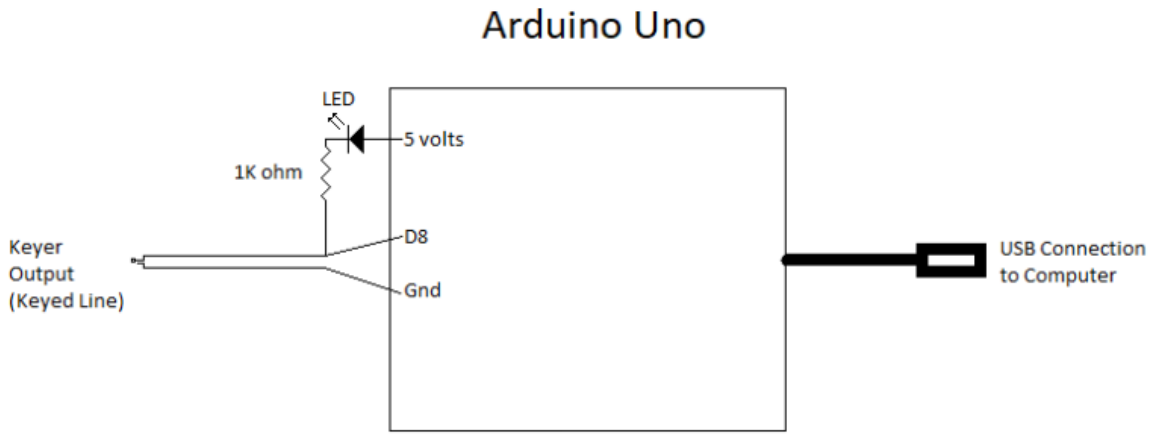
I have successfully used the Remote Keyer Interface for Flex Radio transceivers. However, all remote keying schemes suffer from latency issues. There is a delay between when the key is closed and the transmitter is actually keyed. There is also a delay when the key is opened and the transmitter stops sending. That delay is due to latency, the time that it takes a keying signal to be transmitted over the internet. At 30 words per minute a “dit” is 40 ms long. In my remote installation, the latency varies between 50 and 100 ms. The variation in the latency causes the “dits” and “dahs” to be somewhat variable in length. At 20 wpm the variation is hardly noticeable. At 30 wpm it is noticeable and can become troublesome at 40 or 50 wpm.

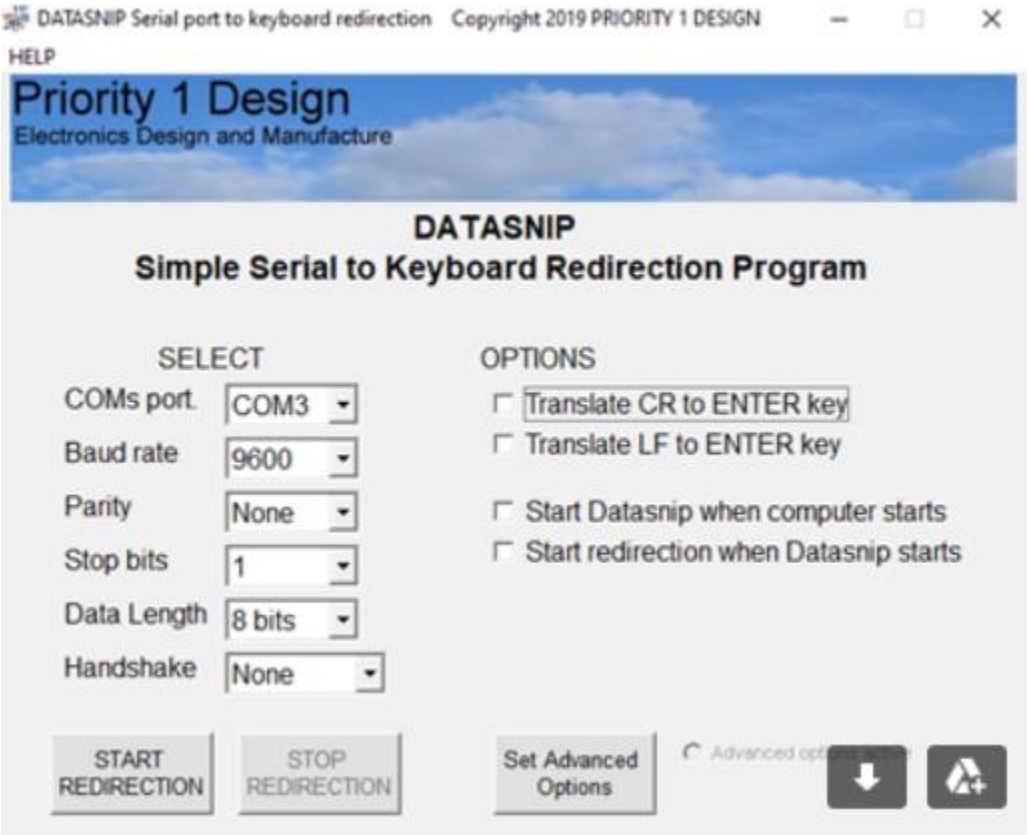
I have developed a way to use a keyer to remotely send CW with a Flex radio without latency. It uses a simple circuit based on an Arduino Uno and a program on the computer which maps ASCII code coming in a COM port to the keyboard queue. The Arduino is programed with code similar to that developed by Budd Churchward, WB7FHC. However, the code has been trimmed down to eliminate unnecessary functions resulting in a much higher speed capability for the device. The circuit looks like this:



The keyer must have a sidetone generator. You can no longer use the sidetone generated by the Flex Radio transceiver because what is being sent by the radio is not in sync with what is being keyed into the device. A straight key or a bug can be used with the device, but a sidetone circuit must also be included so that the operator can hear what is being fed into the device.

There are two programs that you will need on your PC before starting. Both can easily be removed after you are finished by going to the control panel > programs and features > uninstall.

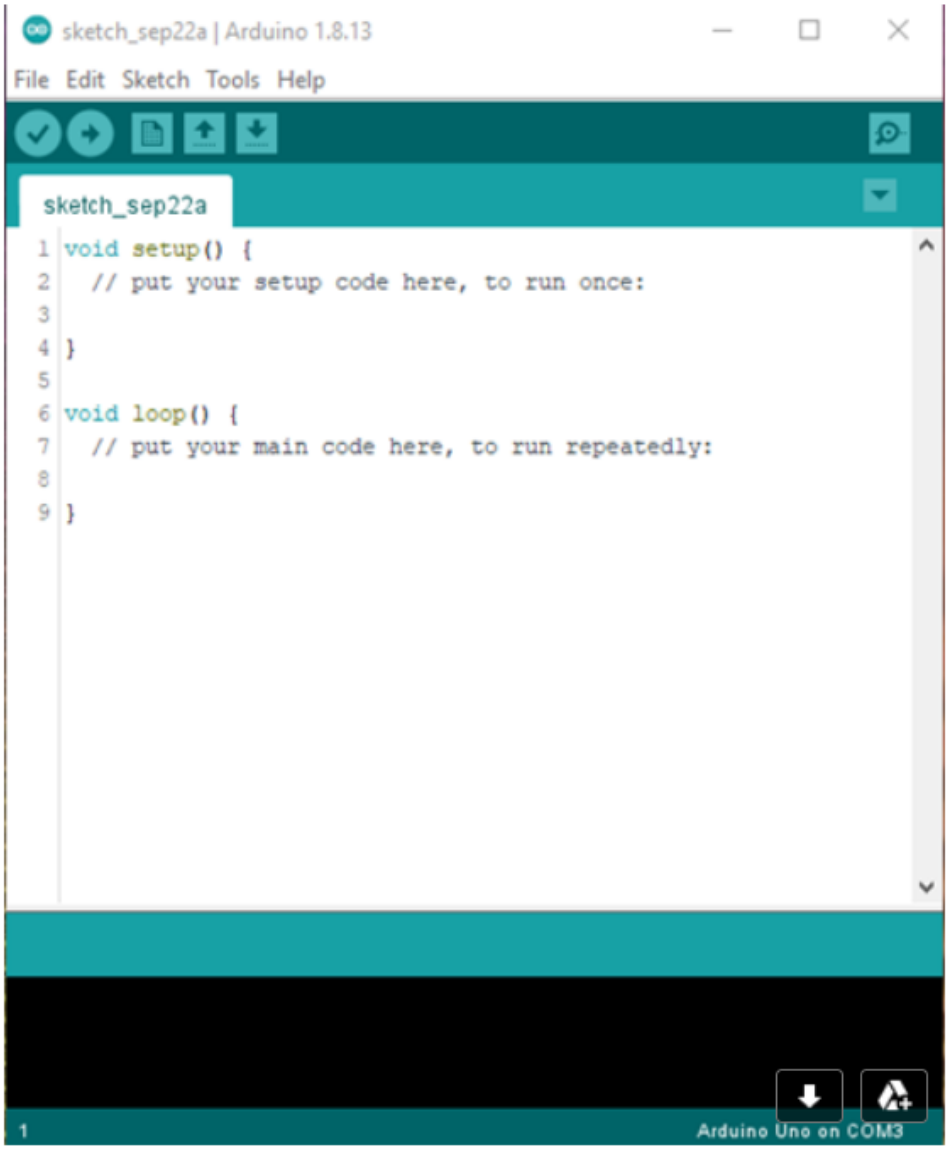
Using your browser, navigate to priority1design.au/datasnip.html > Download Datasnip Now. This will put the datasnip.zip folder in your downloads folder. You can leave it there or move it to another convenient place. Then, extract all from that folder. A new folder labeled "datasnip" will be created and the datasnip program will be in that folder. Create a shortcut out on the desktop for the program. When you run Datasnip you will get a screen that looks like:



You will have to set the COM port using the drop down. But, at this point, you don't know which one to use. The other settings shown above should be correct. Later, when you are ready, you can start Datasnip, set the COM port, and "start redirection". DO NOT click on the little minus sign in the upper righthand corner. If you do, the control screen goes away and you can't stop the redirection without rebooting the PC. Just leave the Datasnip screen somewhere convenient on the display and "stop redirection" when you are finished. You can then exit (X) out of the program.

Next install the Arduino IDE. To do that, navigate to Arduino.cc > Software > downloads > Download Arduino IDE 1.8.13 for your system > just download (no voluntary contribution). The file will appear in your downloads and you can click on it to install the IDE (integrated development environment). You will get an icon on the desktop:

When you start it, you will get:



But, yours will not show the COM port.

You will also need a C++ sketch program for the Arduino Uno which can be downloaded at this site. The Arduino must be programed with the code named:

CW_Decoder_Stripped.ino.

It will operate at speeds well above 50 wpm and includes the prosigns used by the Flex Radio CWX program. Create a folder called “Arduino”. Inside that folder create another folder called “CW_Decoder_Stripped”. Place the sketch CW_Decoder_Stripped.ino into this folder.

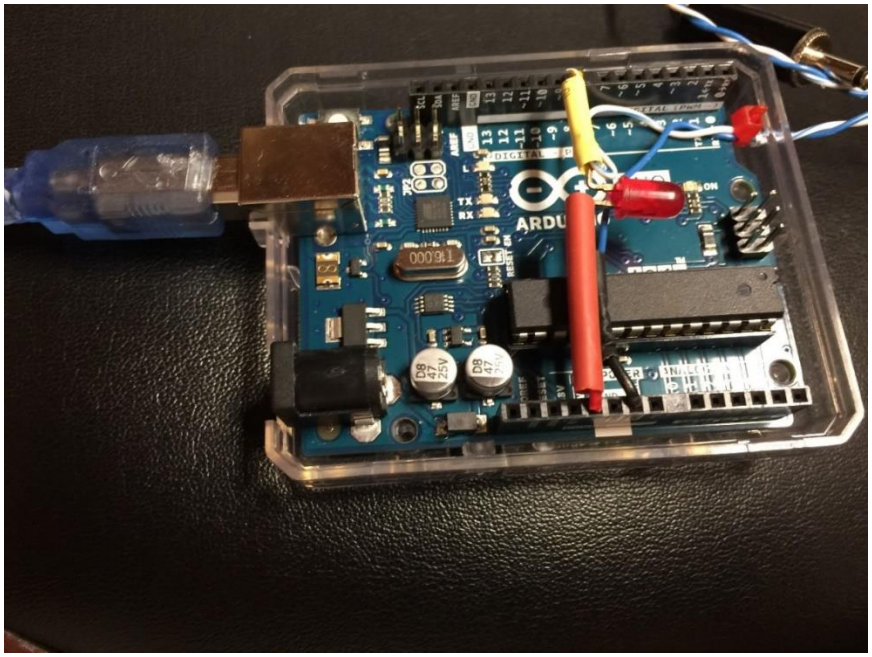
Start the Arduino IDE program. Click on “file” and open the CW_Decoder_Stripped sketch. Plug the Arduino into a USB port on your PC. Then, click on the "tools" at the top. Go down to "port:" and select the port that the Arduino is connected to. In the IDE click on the check mark at the upper lefthand corner. The program should compile without errors. Then, click on the arrow pointing to the right in the upper lefthand corner to load the sketch into the Arduino.

With the Arduino plugged into the USB port and into the keyer, tap the paddles and see if the LED inside the box lights. Start at 15 to 20 wpm. But, the speed can be cranked up slowly from there. If the LED is lighting, the keyer information is reaching the Arduino. If not, that will have to be fixed before going any further. With the LED working, and the IDE running, click on the little circle in the upper right corner of the IDE screen. That will start the "serial monitor". Now when you key in a character with the paddles, it should appear on the serial monitor screen. You may need to send a few V's to get the program to sync with the keying.

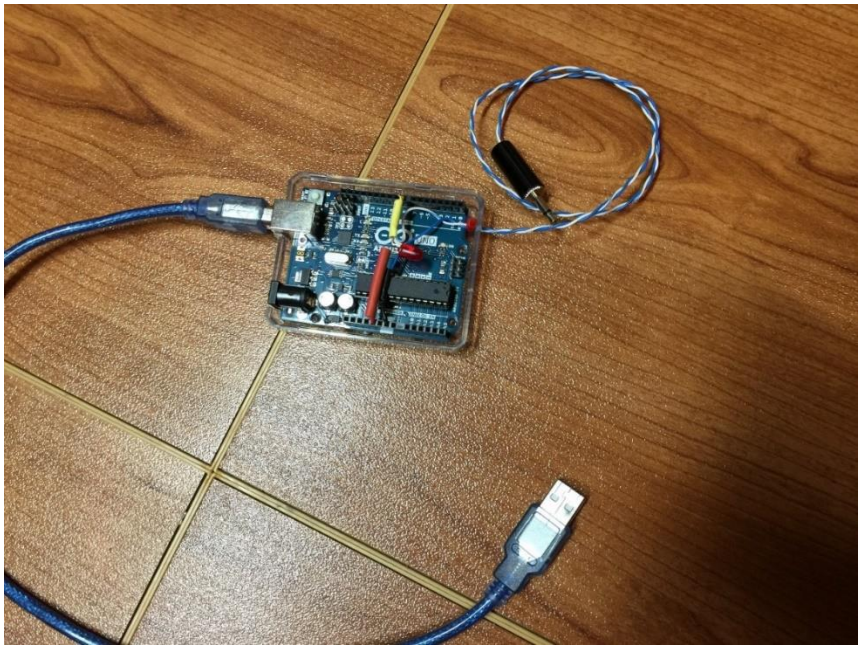
Exit from the IDE program. Datasnap will not work with the IDE using the COM port. Start the Datasnap program and tell it the COM port that the IDE was using and start the data redirection. Start Notepad or any word processing program. Again, test to see if keyed in characters appear in the document as if they were being typed on the keyboard. If so, you are ready to try it with the Flex program and your rig.

Start the Flex Radio Smart SDR program and start CWX. Set the CW speed on the Flex a little slower than the keyer speed so that you can begin to fill the type ahead buffer. Click on the “live” button and put the cursor in the CWX data entry box. Typing on the keyboard or sending CW with the keyer should now put characters into the CWX type ahead buffer. Your CW keying will be sent from the transmitter exactly as you key it in with the keyer and without any latency. Of course, you can also enter data by typing on the keyboard. So for example, the “backspace” key can be used to erase data that was mis-entered.

Here is what my Arduino Uno circuit looks like:



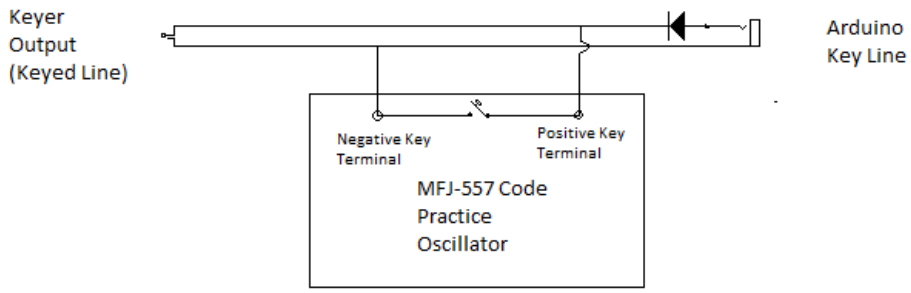
With the connecting wires, it looks like:



The Arduino Uno and the other components are mounted in a Plexiglas box purchased from Amazon.com:

“SB Uno R3 Case Enclosure New Transparent Clear Computer Box Compatible with Arduino UNO R3”. The cost is less than $5.

A simple way to add a side tone to your key or bug is with a circuit like:



A bug or a straight key can be connected to the terminals on the MFJ-557 Morse code practice oscillator and it will generate a tone as the keying is entered. Of course, a keyer is not required if you are using a bug or a key.