# Using a Software Defined Receiver with WSJT-X

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My homebrew Software Defined Receiver (SDR) works great using the I/Q processing capabilities of WSPR 2.12 or Linux WSPR 4. However, I wanted to use it with WSJT-X which currently does not provide for I/Q processing. Following a bit of research into the ARRL publication Experimental Methods in RF Design, I developed the following circuit to build an analog signal processor.
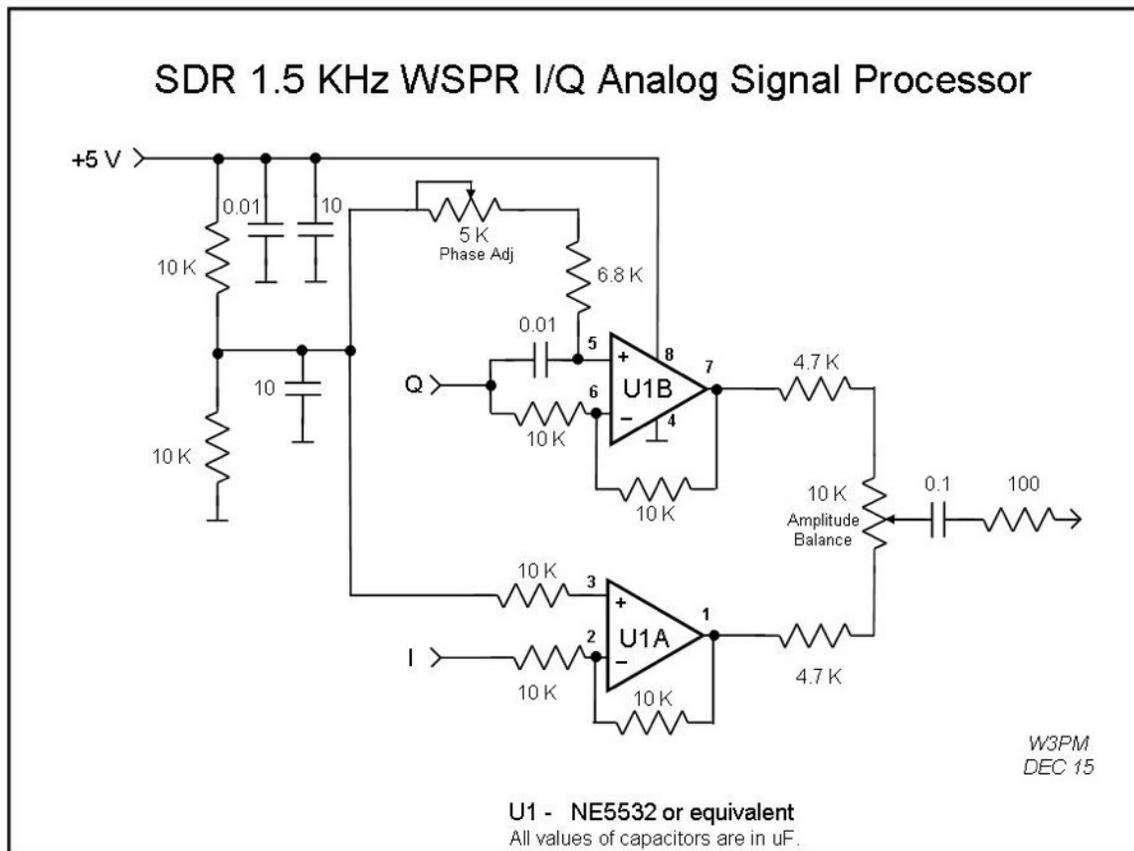
The circuit uses two all-pass networks. One network (U1B) produces a 90 degree phase shift over a narrow bandwidth centered on 1500 Hz. This equates to the center of the 200 Hz audio WSPR window from 1400 – 1600 Hz. Excellent opposite sideband rejection is realized using this simple narrow bandwidth circuit. With careful adjustment of the Phase Adjust and Amplitude Balance potentiometers I was able to obtain over 50 dB opposite sideband rejection.

Adjustment:

Preset the potentiometer/resistor combination connected to pin 5 of U1B to approximately 10.6 K ohms. When the capacitive reactance of the 0.01 uF capacitor at 1500 Hz (10.6K) is equal to the 10.6 K potentiometer/resistor combination a 90 degree phase shift is realized through the network.

Adjust the 10K Amplitude Balance potentiometer to mid-range.

Connect the I and Q inputs to the SDR I and Q output signals. Connect the output at the 100 ohm resistor to the PC soundcard audio line input.

The SDR must be set to the WSPR dial frequency. Ensure the SDR control program sets the SDR frequency to the dial frequency, and not to an offset frequency. For example, when using CAT for a SoftRock SDR receiver in WSPR 2.12 the frequency is set 12000 Hz below the dial frequency.

Set the receiver to the WSPR dial frequency e.g. 3.5926 MHz. Using a signal generator or other signal source inject a moderately strong signal (approximately -60 dBm) at 3.5941 MHz (3.5926 MHz + 1500 Hz). Using the WSJT-X waterfall display, you should now see a signal at 1500 Hz. Note the amplitude of this signal. Set the signal generator to 3.5911 MHz (3.5926 MHz – 1500 Hz). You should now see a weaker signal at 1500 Hz. If the signal is stronger than the 3.5941 MHz signal reverse the I and Q connections. Carefully adjust both the Phase and Audio Balance potentiometers to null the 3.5911 MHz signal. The network is now ready to put into service.

I may be contacted at w3pm at amsat dot org for any questions or comments.