

TSW SoftwareV6.3.1N for the Teensy 4.0 Raduino Adapter/Version 6 Raduino

From the Triumvirate Skonk Worx, www.w0eb.com

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TSW's Teensy4_V6.3.1L Splash Screen



Teensy 4 adapter mounted on a V6 uBITX running TSW's V6.3.1L software.

This software is available for download from www.w0eb.com in the “Files” section. It operates very similarly to the factory’s version V6.3.1 and this manual covers ONLY TSW’s changes to the original which has been enhanced to operate with a PJRC Teensy 4.0 MPU instead of the Arduino NANO.

Install Arduino IDE version 1.8.10. before doing anything else, go into the Libraries directory for the basic IDE and DELETE the LiquidCrystal directory completely.

Download and install the latest “TeensyDuino” software from PJRC so the Arduino IDE can compile for the Teensy 4.0.

Do NOT delete the LiquidCrystal directory under “Hardware – Teensy – Libraries” though as this is the one that is needed to compile the software.

There are many advantages to using a Teensy 4.0 in place of the original NANO. The T4 is MUCH faster – 600 MHz processor vs the NANO’s 16 Mhz, T4 has 512K+ of RAM, much larger Flash memory, larger EEPROM for storing variables & program constants to name just a few. Its clock oscillators operate on different frequencies which get rid of a bunch of “birdies” that plague the NANO MPU Raduino’s.

The only operational changes TSW made to the original software was to improve the CW keyer by using separate dot and dash wires and used the “Timer Interrupts” to allow other things to happen in the software while the key paddles are not pressed instead of having to constantly poll the inputs to see if a key press occurred. This way the keyer can operate much more efficiently and other processes don’t interfere with it.

You ONLY have to add another Key Paddle jack which will connect to pins on the Teensy4.0 to NANO adapter to be able to use the Iambic Keyer.

Hand key operation via the Microphone Jack's PTT connection remains the same and NO mods to the uBITX OR Raduino are needed for this.

The new paddle jack connects directly to the A8 and A9 input pads on the end of the adapter board by the Teensy's USB connector. A8 gets wired to the "TIP" connection of the new jack and becomes the Paddle DOT connection. A9 gets wired to the "Ring" connection and becomes the Paddle DASH connection. The jack's ground connection connects to the ground pin on that header.

NOTE: The hand key will still operate normally as long as you plug it into the microphone connector because, just like the Factory V6 uBITX (and Raduino), the PTT line is used for hand key operation, independent of the Iambic Keyer. The hand key must connect between the "RING" (PTT) and "SLEEVE" (Ground) connections of a 3.5mm stereo plug in order to be able to plug it into the Microphone Jack and use it for CW but NO mods have to be made to the uBITX or Raduino itself. You can also connect an external keyer in the same manner if you like.

TSW's keyer routine is "interrupt" driven and we've given the Hand Key priority in the interrupt hierarchy so if you key via Hand Key (or mic PTT button), until the uBITX returns to receive, the Paddles will be locked out.

How to wire the hand key properly is listed in the highlighted paragraph above. Please pay close attention to this and it will work great.

All Menu operations are now done by touching the buttons on the color touch screen either with your finger or a blunt plastic stylus.



Example: Rig set to LSB CW with RIT turned on. Encoder tunes only RX in this mode and TX stays fixed on the frequency shown below the main tuning window for VFO A.



Example showing rig in CW LSB (normal CW) mode.

Using the above screen as a guide, a touch on USB will switch the rig to Upper Sideband mode when in SSB and if CW was selected, (normal CW receive is on the lower sideband) USB will select the other side of the filter and can help remove or reduce adjacent frequency interference from another station.

Touching SPL will put the rig into SPLIT frequency operation where VFO A will be receive and VFO B will be the transmit frequency.

The buttons labeled 80, 40, 30, 20, 17, 15 and 10 when touched will switch the rig to a frequency within that band and a white underscore line will indicate the selected band (initially the QRP CW calling frequencies are defaulted). You can set your own frequency on each band by first selecting that band and either tuning to it with the encoder or using the Frq button to select the desired frequency on that band. Waiting 5 seconds before changing it again or changing to another band will save that frequency in the selected band button.



Example of the display after the Frq button has been touched.

Using the Frq button is really simple. For example to set 7.030 as the desired 40 meter frequency, you would first select the band button “40” and then touch Frq which will bring up the above menu. On this menu you would touch 7, 0, 3 and 0 in that order and then touch the on screen OK button. This will save that frequency to the 40 meter band button. Works the same way for all bands and if you are trying to do a quick QSY within a band, the Frq button will most likely be quicker than tuning with the encoder, especially for a long QSY to SSB from CW or vice versa. The other buttons on the Frq display are <- which is the digit erase button to wipe out a wrong number press one at a time. The Can button is “CANCEL” and will drop out of this menu back to the main screen without making any changes.



The SET menu.

In this menu you have 6 selections and an Exit selection. The first 4 selections operate on this screen for changes to CW Speed, Sidetone Frequency, CW delay (between TX/RX) and paddle swap for the keyer. The other two, CAL Freq and CAL BFO each take you to a special sub-

menu that allow you to either exit without changing anything by tapping a blank area of the screen, RESET to factory default or, using the encoder knob, change the value of the selected item for calibration purposes. Exit will take you back to the main screen either immediately or after using one of the selections.

CW WPM: Click on this and the speed value is highlighted. Use the encoder knob to set your speed and click on it again – the new value will be saved and you can then click on the Red highlighted EXIT bar to return to the main screen.

Tone: This item works is for setting the sidetone frequency to your comfortable listening frequency. Default is 800 Hz. It works exactly like the CW WPM selection.



Set Menu included again to help readability of instructions.

CW Delay" Sets the number of milliseconds after the last paddle or hand key press before the uBITX switches from Transmit back to Receive. Menu item works the same as the previous 2.

Set Paddle: IAMBIC or IAMBIC REV. This gives you the option of reversing your dot/dash paddle levers (REV is for Left Handers that have their paddles wired backward from the conventional TIP=DOT RING=DASH setup.) Click on the item and the on-screen value is swapped to its opposite (Normal or Reverse).

CAL Freq: Before entering this menu make sure the rig is connected to an antenna and can actually hear WWV or other 10.000 MHz standard signal, or an accurate signal generator outputting on exactly 10.000 MHz. Once in the sub-menu, you use the encoder to tune to zero-beat the tone. Pressing the encoder button or touching the screen background will save this calibration and you shouldn't have to do it again for a long time. If you accidentally enter this submenu, just touch the screen to exit without changing things. If you need to start from scratch after once calibrating the rig, there is a red RESET button which will erase the saved calibration info and reset to the factory default. If you hit this button, you WILL have to recalibrate the master oscillator frequency before the RX/TX frequency will be accurate again.

CAL BFO is for setting the BFO frequency to the right point on the crystal filter's passband. If this isn't set right, USB and LSB may be reversed due to the way the rigs mixers are set up. IF you can't hear RX noise or you hear very high pitched noise when you first turn a new rig on, the first thing you want to do is CAL the BFO. A good starting frequency number that should work for most all V6 uBITX radios is 11.055.0. You will be able to

tune for the loudest noise (which puts the BFO in the center of the filter) and then you should tune it to a frequency lower than that of the loudest signal to the point where the amplitude of the noise just starts to drop. This should put you pretty close to the right point. If you have access to Farhan's BFO Tuning Aid program, use that, but if not, the above method will work just fine.

When finished with any item in the Set menu and not intending to use another, touch the Exit bar and you will be back at the main screen again.

During testing, it was noted that the annoying "Tuning Clicks" and many of the internal "Birdies" that had been associated with using a NANO for the main processor were either gone completely or reduced to a level where any atmospheric noise in the receiver covered them to the point they were not noticeable. This is one of the really nice advantages of using the Teensy 4.0 as the MPU instead of the factory supplied NANO.

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