# YouKits®

# Youkits TJ5A SSB CW HF TRANSCEIVER

# Quick Guide to Alignment of TJ5A

Before calibrating BFO or DDS, please warm up both the frequency counter and TJ5A for 20 minutes for more accurate result.

**1. BFO Calibration**

Before calibrating the BFO, first set RIT to the middle position. Follow the following steps.

1) Set PWR knob to the lowest level.

2) Use a digital multi-meter to measure the voltage between the center pin of CN5 and GND (the screws on the four corners can be regarded as GND).
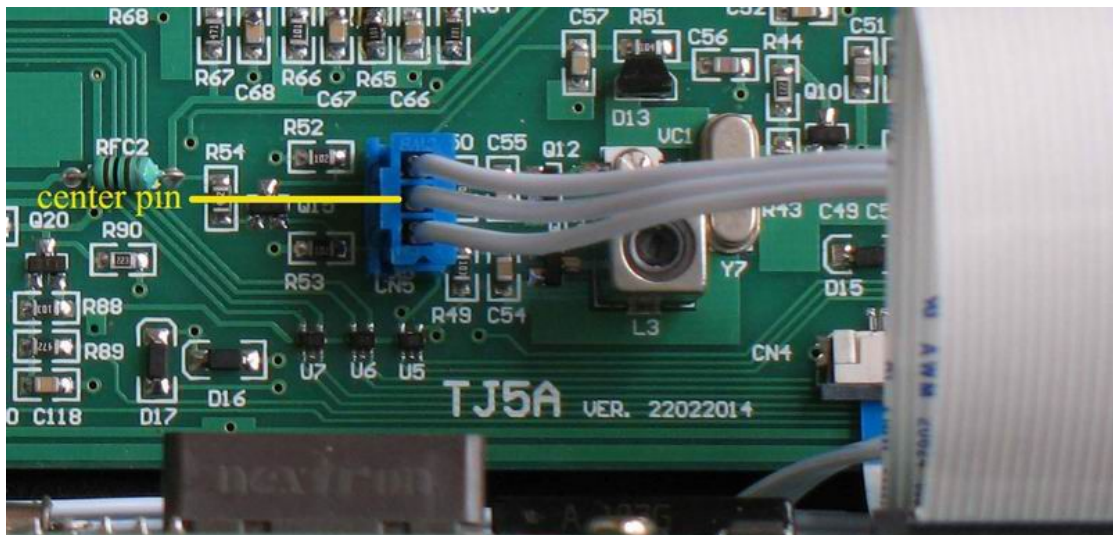


3) Press PTT, and observe the reading. Take down the reading. Now release PTT, and observe the reading. Rotate RIT knob until the reading is the same as the reading taken while PTT is pressed. This is the middle position of RIT.

Now, you can calibrate BFO.

Connect the frequency meter to TP2. Set MOD to LSB first. Observe the reading. It is around 8.998400MHz. If it is to far from this frequency, trim L3 to calibrate. Set MOD to USB, the reading is around 9.000500MHz, i.e. 2.1 kHz apart from LSB. If it is far from this frequency, trim VC1 to calibrate. Now go back to LSB and observe the reading. If the reading is affected by USB calibration, trim L3 again. BFO calibration is completed.
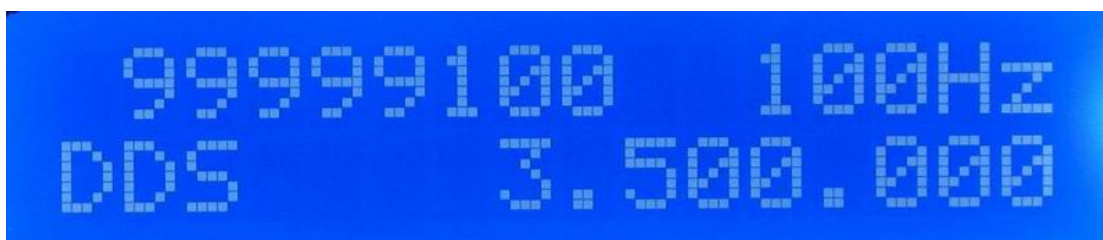
The BFO frequency should be input into MCU which automatically alters the DDS data to develop a correct and accurate LO signal.

## 2. MCU Setting-up

You can find the setup button behind the DDS to Main Board ribbon.

Backup the setup data of the factory on a piece of paper, in case you need go back to the factory setup.

Press SETUP, DDS clock information is displayed:



"99999100" indicates the exact DDS clock frequency (This value can be different since the tolerance of every 100MHz clock crystal differs slightly). "3.500.000" indicates DDS is working at the lowest band now.  DDS clock is set in the factory which does not require alteration in normal cases. However, if your rig's frequency is not very accurate after years of operation or because of a very different surrounding working condition, you may need to calibrate the DDS clock value. Calibration will be discussed later.

Press SETUP again, IF data is displayed:



IF is set to "-1600" (9.000000 – 8.998400 = 1600Hz) in the factory. However, this value might be "-1650" because of the different group of crystals are used for the IF filter. The value "-1600" indicating the BFO LSB frequency is 8.99840MHz, while "-1650" indicating the BFO LSB is 8.998350MHz.

IF data can be altered by rotating the TUNE knob. Press MEM button to save the alteration. Alteration of IF is not necessary unless the BFO frequency has been changed.

Press SETUP again, USB compensation data is displayed:

USB Compensation is set to "2100" in the factory, this value indicating USB BFO frequency is 2.1 kHz apart from LSB BFO frequency. Some rig is set to 2400. However, some users got the signal report from QSOs that "USB favors the high (audio) frequency". If your rig is set to 2400, and you got the report, you can change this value to 2100 so that USB "favors the low frequency audio TX spectrum response." First select 100Hz step; then rotate TUNE knob counter-clockwise to reduce the value to 2100. **Press MEM button to save this new value**. You have to trim BFO USB frequency to suit this change. If the factory-set value is 2400, USB BFO frequency should be 2.4 kHz apart from LSB frequency. If LSB is 8.998400 MHz, then USB must be 9.000800. Take 300Hz down by trimming VC1, i.e. TP2 reading is 9.000500 MHz.

Press SETUP again, SETUP exits.

How to calibrate DDS clock? First, set IF to default value.
Press SETUP.



Press SETUP again.



Rotate TUNE knob until "0" appears. This is the default value, 9.000000 MHz. Press MEM button to save.

Press SETUP, and USB compensation appears.



Press SETUP to exit.

Now, we can calibrate the DDS clock. Let us enter the DDS interface again.
Press SETUP to enter DDS clock:



Connect the frequency counter to TP1 on the main board. The reading is 12.500000 MHz, or 12.499999 MHz (3.500000 + 9.000000 =12.500000). If the frequency is different, please calibrate by rotating TUNE knob while observing the frequency counter, until the reading reaches 12.500000 or 12.499999. For example, if the reading is 12.499990 (10 Hz lower), rotate TUNE knob counter-clockwise in 10 Hz step until the reading is 12.500000 or 12.499999. If the reading is 12.499890 (110 Hz lower), rotate TUNE knob counter-clockwise in 100 Hz step first and then 10 Hz step until the reading is 12.500000 or 12.499999. You can use 10 Hz step at the beginning. However 100 Hz step can save some time.

If the reading is 12.500003 (3 Hz higher), rotate TUNE knob clockwise in 10 Hz step until the reading is 12.500000 or 12.499999.

Press MEM button to save. Never forget this step.

Press SETUP to enter IF data:



Rotate TUNE knob until "-1600" displays. Press MEM button to save.

Press SETUP to enter USB compensation. No alteration in this step. Press SETUP to exit.

DDS calibration is completed.

Why take the trouble to change IFS value to "0" before calibrating DDS? Can we calibrate DDS with IFS "-1600"? The answer is "Yes". But the reading from the frequency counter is not 12.500000 MHz, but 12500000-1600=12498400, i.e. 12.498400MHz. It is1.6 kHz lower than 12.500000 MHz, not very as convenient for us as to read 12.500000MHz

**Important:** DDS calibration should be carried out after the required warming-up period of the frequency counter and TJ5A. Leave the frequency counter and TJ5A running for 20 minutes before calibrating DDS. A high quality, accurate frequency counter should be used to ensure the accurate DDS output frequency.

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