

# Quick-Start Guide to *WSJT-X 2.0*

Joe Taylor, K1JT  
November 26, 2018

**Overview:** This Guide is written for experienced users of *WSJT-X* v1.9. It will be superseded by the *WSJT-X 2.0 User Guide*, when that becomes available. Be sure to read this entire document before using *WSJT-X 2.0*.

**The latest release candidate is RC5.** Changes made since RC4 are summarized on page 6.

The most important new program features in v2.0 (relative to v.1.9.1) apply to operating modes FT8 and MSK144. These protocols now convey 77-bit information payloads, compared with the previous 75-bit (FT8) and 72-bit (MSK144) messages. Cyclic redundancy checks (CRCs) have been extended from 12 to 14 bits (FT8) and from 8 to 13 bits (MSK144). These changes enable new message formats for efficient, robust QSOs in North American VHF contests, European VHF contests, ARRL Field Day, and the ARRL RTTY Roundup. They also provide user-friendly support for nonstandard callsigns, smaller false decode rates, and many other benefits. Operating modes other than FT8 and MSK144 are unchanged from v1.9.1.

Starting with the fourth candidate release, *WSJT-X 2.0-rc4*, only the new 77-bit message protocols are supported for FT8 and MSK144. Henceforth all MSK144 activity should use the v2.0 protocol and revert to 6-meter working frequencies 50.360 (IARU Region 1) or 50.260 (Regions 2 and 3). The v2.0 protocol for FT8 is starting to be used in the conventional FT8 sub-bands, e.g. dial frequency 14.074 MHz on 20 meters. Inevitably this causes some confusion and cross-protocol interference: users of v1.9.1 and earlier are not able to decode transmissions from users of RC4 and later, and *vice-versa*. To minimize such confusion this we recommend using RC5 at audio Tx frequencies 2000 Hz and higher. As more users upgrade their software to RC5 or the GA release, activity with the v2.0 protocol can move downward in audio frequency. By December 10 or very soon afterward, everyone should upgrade to the full *WSJT-X 2.0* release.

## **To make FT8 QSOs with stations who use version 1.x software:**

- You must use *WSJT-X* v1.9.1 or earlier
- Operate in the standard FT8 sub-bands with audio **Tx Freq** < 2000 Hz.

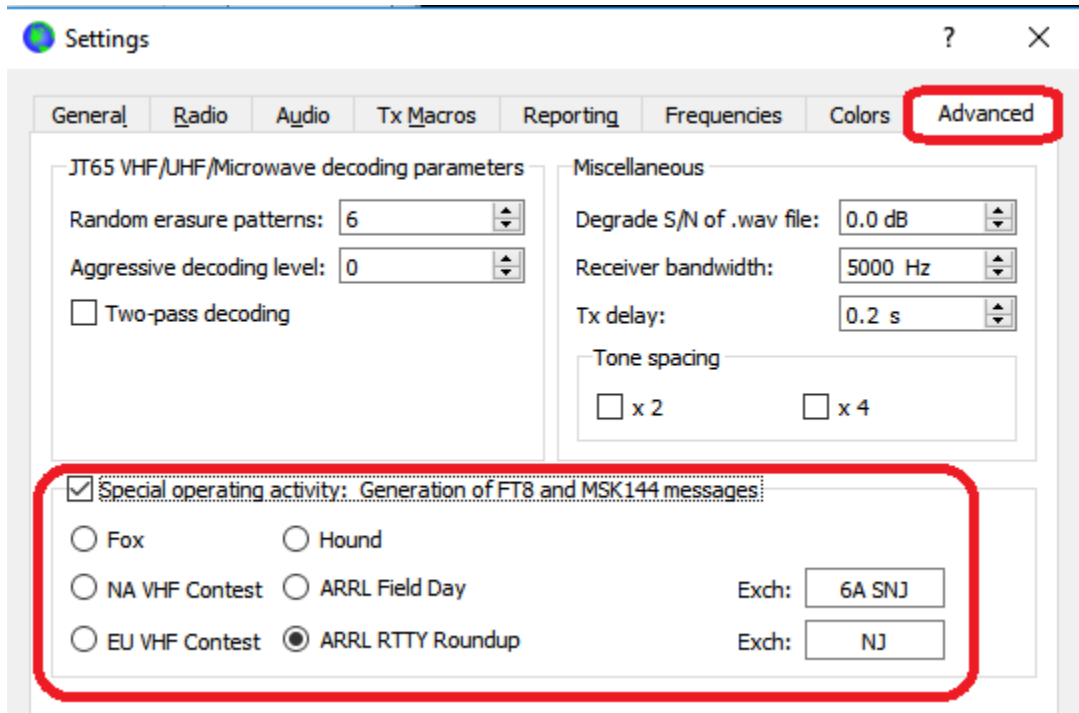
## **To make FT8 QSOs using *WSJT-X 2.0-rc5*:**

- Operate in the standard FT8 sub-bands with audio **Tx Freq** ≥ 2000 Hz.

**FT8 DXpedition Mode:** We recommend that any serious use of **FT8 DXpedition mode** (“Fox and Hound” mode) should use *WSJT-X* v1.9.1 until December 10, 2018, and *WSJT-X 2.0* thereafter. This advice applies to both Fox and Hound stations.

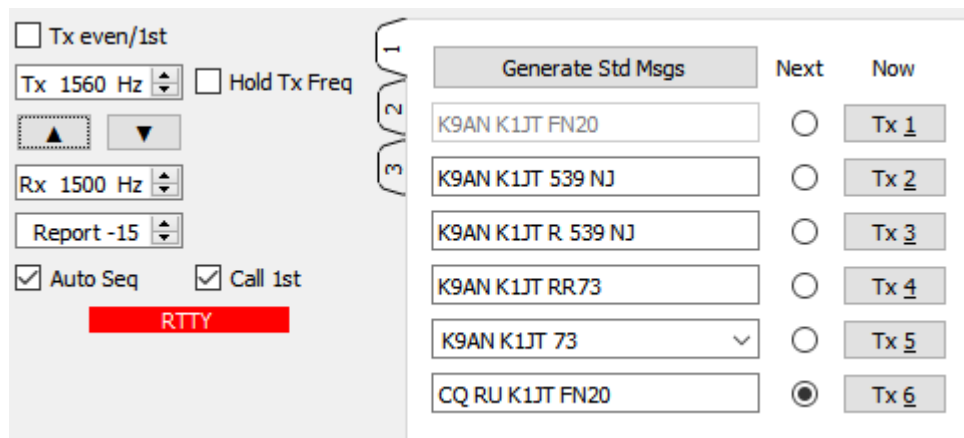
**Frequencies:** When choosing an operating frequency, remember that your on-the-air signal frequency is the sum of the dial (suppressed carrier) frequency and the audio tone frequencies.

**Special Operating Activities:** Generation of default messages for **Fox**, **Hound**, **NA VHF Contest**, **EU VHF Contest**, **ARRL Field Day**, and **ARRL RTTY Roundup** can be activated through selections on the **Settings | Advanced** tab:



Be sure to enter your relevant exchange information. For **ARRL Field Day**, enter your operating Class and ARRL/RAC section; for **ARRL RTTY Roundup**, enter your state or province. Use “DX” for section, state, or province if you are not in the US or Canada.

When one of the special operating activities has been selected a red-highlighted message appears on the *WSJT-X* main window, as shown here for RTTY Roundup:



Be aware that *WSJT-X 2.0* currently lacks many features found in mature contesting software: dupe checking, display of QSO rate, multipliers, cumulative score, etc. Such features will be added in due course, some of them based on using *WSJT-X 2.0* together with contesting software *N1MM+*.

*WSJT-X 2.0* supports a number of new formats for structured messages. Some examples of valid FT8 and MSK144 exchanges follow, grouped according to standard usage in minimal QSOs for the special operating activities:

#### **NA VHF Contest**

```
CQ TEST K1ABC/R FN42
  K1ABC/R W9XYZ EN37
W9XYZ K1ABC/R R FN42
  K1ABC/R W9XYZ RR73
```

#### **ARRL Field Day**

```
CQ FD K1ABC FN42
  K1ABC W9XYZ 6A WI
W9XYZ K1ABC R 2B EMA
  K1ABC W9XYZ RR73
```

#### **Compound or Nonstandard Callsigns**

```
CQ PJ4/K1ABC
  <PJ4/K1ABC> W9XYZ
W9XYZ <PJ4/K1ABC> +03
  <PJ4/K1ABC> W9XYZ R-08
<W9XYZ> PJ4/K1ABC RRR
  PJ4/K1ABC <W9XYZ> 73
```

#### **Details Concerning the New Message Formats**

1. CQ messages may contain an optional second word with up to four letters — “CQ TEST”, “CQ FD”, etc. — followed by a standard callsign and 4-character grid locator, or a nonstandard callsign and no locator. In MSK144 mode a second word with three decimal digits, as in “CQ 285 K1ABC FN42”, is permissible and has the automatic-QSY implication described in the present (v1.9.1) *WSJT-X User Guide*.
2. As in *WSJT-X* v1.x and in modes other than FT8 and MSK144, the most common standard messages contain two callsigns and a grid locator, signal report, RRR, RR73, or 73. An optional “R” (for acknowledgment) may appear before the locator or signal report. In *WSJT-X 2.0* either or both of the callsigns may be appended by /R (indicating Rover status) or /P (portable).

#### **EU VHF Contest**

```
CQ TEST G4ABC/P
  G4ABC/P PA9XYZ JO22
PA9XYZ 570123 IO91NP
  G4ABC/P R 580071 JO22DB
PA9XYZ G4ABC/P RR73
```

#### **ARRL RTTY Roundup**

```
CQ RU K1ABC FN42
  K1ABC W9XYZ 579 WI
W9XYZ K1ABC R 589 MA
  K1ABC W9XYZ RR73
  K1ABC G3AAA 559 0013
TU; G3AAA K1ABC R 569 MA
  K1ABC G3AAA RR73
```

#### **FT8 DXpedition Mode**

```
CQ KH1/KH7Z
  KH7Z K1ABC FN42
  KH7Z W9XYZ EN37
K1ABC KH7Z -13
  KH7Z K1ABC R-11
K1ABC RR73; W9XYZ <KH1/KH7Z> -17
  KH7Z W9XYZ R-16
```

...

- The third message shown above in the **EU VHF Contest** group includes a 6-digit integer and a 6-character grid locator. The example number conveys a signal report “57” and a QSO serial number “0123”. Signal reports range from 52 to 59; they are generated automatically based on received signal-to-noise ratio using, a 6 dB per S-unit scale starting at –24 dB. Serial numbers may range from 0001 to 4095.

| S/N (dB)   | RST |
|------------|-----|
| ≤ –19      | 529 |
| –18 to –13 | 539 |
| –12 to –7  | 549 |
| –6 to –1   | 559 |
| 0 to 5     | 569 |
| 6 to 11    | 579 |
| 12 to 17   | 589 |
| ≥ 18       | 599 |

- The **ARRL Field Day** exchange includes number of transmitters (1-32), operating class (A-F), and ARRL/RAC Section. DX stations send “DX” for section.
- The RTTY Roundup exchange includes a 3-digit signal report in RST format (529 through 599) followed by US state, Canadian province, or QSO serial number for non-US/Canadian stations. Serial numbers may range from 0001 to 7999. As illustrated in one example shown above, for the **ARRL RTTY Roundup** messages in this format may be preceded by “TU;” — thereby thanking a previous QSO partner while simultaneously responding to another caller. A user-convenience feature for using this message type is planned for a future revision.
- Compound and nonstandard callsigns such as PJ4/K1ABC or YW18FIFA are automatically recognized and handled using special message formats. One such callsign and one standard callsign may appear in most messages, provided that one of them is enclosed in <...> angle brackets. If the message includes a grid locator or numerical signal report, the brackets must enclose the compound or nonstandard callsign; otherwise the brackets may be around either call. Angle brackets imply that the enclosed callsign is not transmitted in full, but rather as a hash code with a smaller number of bits. Receiving stations will display the full nonstandard callsign provided that it has been received in full in the recent past. These restrictions are honored automatically by the algorithm that generates default messages for minimal QSOs. For FT8 and MSK144 there is no longer a distinction between “Type 1” and “Type 2” compound callsigns; all nonstandard calls are treated identically. Except for the special cases involving /P or /R, *WSJT-X 2.0* offers no support for two nonstandard callsigns to work each other.

7. Standard messages in the **NA VHF Contest** format are the same as those required for the Makrothen RTTY Contest. Thus, if the Makrothen sponsors decide to offer an FT8 contest the necessary support is already provided.

**Comparison with WSJT-X v1.9.1:** Earlier versions of *WSJT-X* could lead to confusion when one station enabled **NA VHF Contest** mode and the QSO partner did not. Grid locators might then be displayed as that of the antipode location on Earth and signal reports might be received when not expected, confusing the auto-sequencing logic. Other problems existed for those using /R (rover) callsigns. None of these problems is present in *WSJT-X 2.0*. When a casual operator happens upon a station transmitting messages in **NA VHF Contest** format, the QSO will proceed without complication: all messages will be decoded and sequenced correctly with no special user action. You will no longer see odd grid locators from the antipodes, and you may append the /R suffix to any standard callsign.

When a casual operator receives a message addressed to him/herself in the special **EU VHF Contest** format, *WSJT-X 2.0* recognizes the need to enable these messages and makes the necessary change automatically. Casual operators who decode a contest-type message formatted for **ARRL Field Day** or **ARRL RTTY Roundup** will be prompted to check the relevant box so that they can transmit the required exchanges.

**Other program enhancements:** *WSJT-X 2.0* has several other new features and capabilities. The WSPR decoder has better sensitivity by about 1 dB. Color highlighting of decoded messages provides worked-before status for callsigns, grid locators, DXCC entities, continents, CQ Zones, ITU zones on a “by band” and “by mode” basis, and for stations that have uploaded their logs to Logbook of the World (LoTW) within a specified time interval. The necessary information from LoTW is automatically downloaded from the ARRL web site.

**LoTW Download Errors:** If you are using Windows and experience LoTW download errors, go here <https://slproweb.com/products/Win32OpenSSL.html> and download the OpenSSL installer, specifically the “Win32 OpenSSL v1.0.2p Light” version. Note that this is the correct version even if you are running 64-bit Windows. The direct download link is [https://slproweb.com/download/Win32OpenSSL\\_Light-1\\_0\\_2p.exe](https://slproweb.com/download/Win32OpenSSL_Light-1_0_2p.exe). Run the installer with all default options and accept the option to install into the Windows system directory. If you cannot install the OpenSSL libraries or do not have an Internet connection on the computer used to run *WSJT-X 2.0*, you can download the LoTW file manually. Go to <https://lotw.arrl.org/lotw-user-activity.csv> in a web browser, download the file, then move it to the *WSJT-X* log files directory. This directory can be opened by selecting **File | Open log directory**.

**Color highlighting:** If you intend to alternate between *WSJT-X* v1.9.1 or earlier and *WSJT-X 2.0*, for example to be able to make old-style FT8 QSOs, any customizations of decode highlighting will be lost when switching between versions. This behavior is not a defect but a consequence of the mechanism used to seamlessly carry forward configuration settings during upgrades. Click **Reset Highlighting** on the **Settings |**

**Colors** tab to repopulate the v2.0 default colors. You may find it best to delay color customizations for a few weeks, until nearly everyone is using *WSJT-X 2.0*.

**Release schedule:** RC5 is scheduled for release on November 26, 2018. The General Availability (GA) release of *WSJT-X 2.0* is scheduled for December 10. All v2.0 beta releases will cease to function by December 31, 2018.

**Instructions for Beta-testers:** If you are an experienced user of *WSJT-X* v1.9.1, have read the Release Notes and the present document carefully, and find any unexpected behavior in RC5, please send a detailed report to the WSJT Developers email list, [wsjt-devel@lists.sourceforge.net](mailto:wsjt-devel@lists.sourceforge.net). You must be a subscriber to post messages there. To register go to <https://sourceforge.net/projects/wsjt/lists/wsjt-devel>. Please consult the archives first, to make sure that your report will not be redundant. An excellent archival search feature is available here: [https://sourceforge.net/p/wsjt/mailman/search/?mail\\_list=wsjt-devel](https://sourceforge.net/p/wsjt/mailman/search/?mail_list=wsjt-devel).

**Release candidate RC5:** Several bug fixes and new features appear in release candidate 5. Here's a brief summary list:

1. Make the "Auto Seq" checkbox sticky, again
2. Remove the 5-minute mouse timer
3. Correct the "worked before" logic for color highlighting
4. Add "No own call decodes" checkbox in WSPR mode
5. Display and log UTC (not local time) in contest operations
6. Validate contest QSO details before allowing logging
7. Force Aqua theme on macOS to avoid issues with Mojave dark theme
8. Move Fox log Reset action to Fox log window context menu
9. Improve layout of Working Frequencies and Station Information tables
10. Allow deletes and editing in Fox and Contest log windows
11. Add Tool Tips for Fox and Contest log windows
12. Fix a bug causing false AP decodes in JT65 VHF+ operation
13. Fix a bug that could switch unexpectedly from JT65 to JT9 mode