

Using fldigi and the Digital Keyboard Modes

Amateur Radio “Digital Mode” Definition:

Amateur Radio communications that use computer software algorithms to encode information into binary “1’s” and “0’s” and then using various modulation techniques, transmit this information. Receiving stations then demodulate and decode the transmission to recover the original information.

“Keyboard to Keyboard” text modes are one example of digital modes.

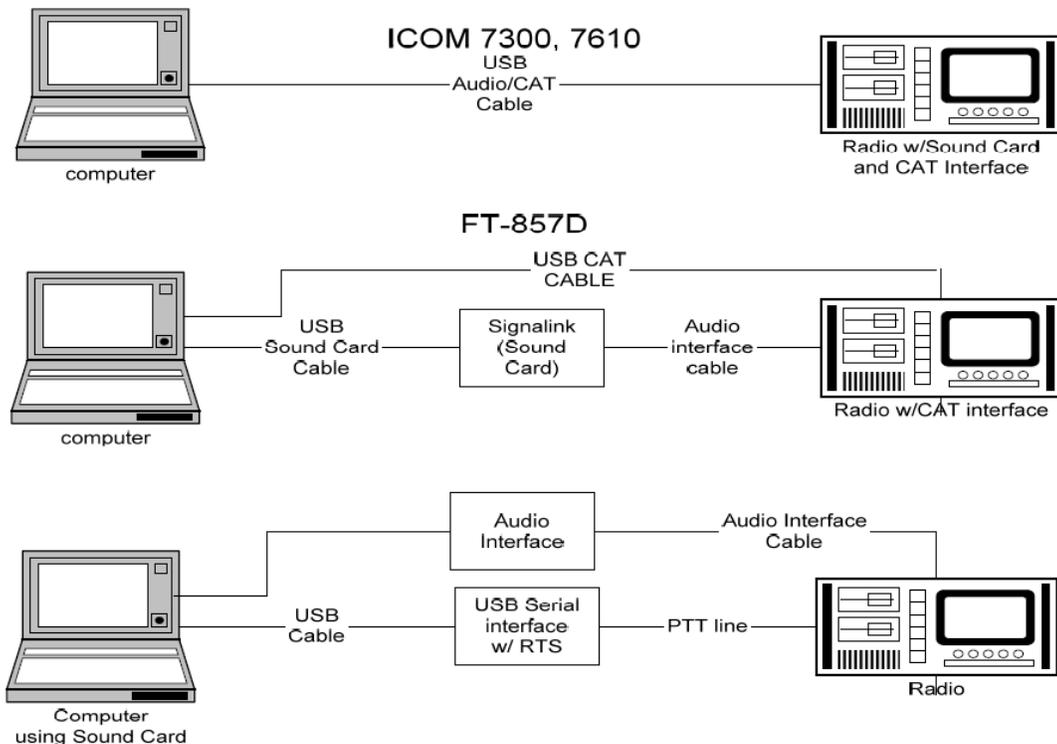
Some popular digital modes that are not keyboard modes:

- JT65, JT9, FT8, FT4 uses wsjt-x software and fixed exchange, time synchronized. Example FT8 every 15 secs, 12.6 sec on, 2.4 sec off. Easy to identify based on band plan frequency assignments. Example: 20 Meters, FT8 14.074MHz, 40 Meters, 7.074 MHz
- Winlink uses Winlink Express software and several support software modems (VARA, Packet, ARDOP) to transmit email.
- Echolink: A remote user using a smartphone/laptop can communicate over the internet to an Echolink VHF/UHF repeater or transceiver using Voice Over IP (VOIP) and Echolink software.
- Slow scan television for transmitted static picture data

Keyboard to Keyboard Modes

- Also referred to as “Conversational Digital Modes”
- Use a variety of modulation techniques to support real time text chat. One of the most complete software packages for these chat modes is called “fldigi”
- There are several other software packages worth looking into including VARAC and JSCALL
- Most of these modes used on HF transmit SSB (usually USB) where the baseband audio is modulated to transmit the data.

FLDIGI Hardware Examples



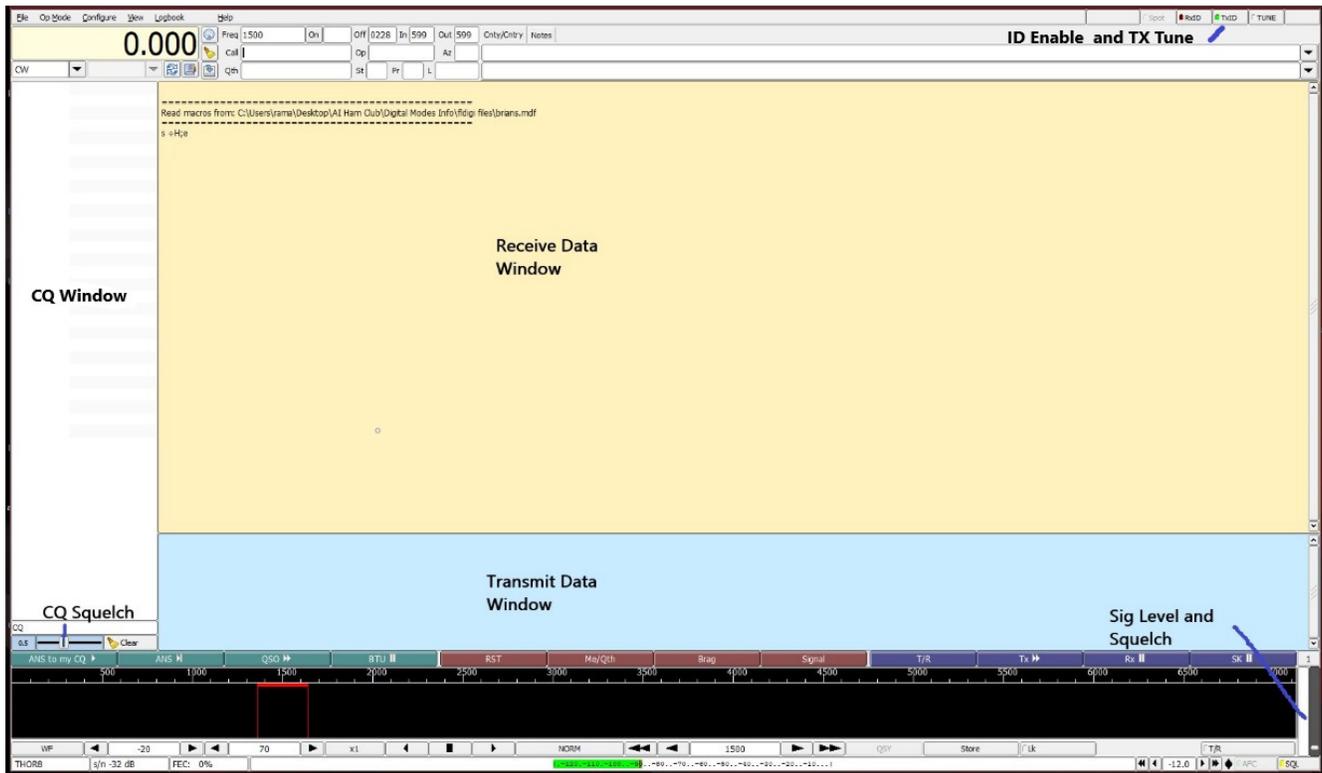
What is fldigi?

- Fast Light Digital modem application
- Free, open source application using a computer's sound card to perform communication over SSB with different digital modulation technics.
- Dave Freese, W1HKJ, developed the software along with other contributors.
- OS's supported: Windows, Linux and Apple
- Examples of digital modes supported: RTTY, PSK31, Olivia, Contestia, THOR, Held Feld, MFSK, MT63 and many more: See <http://www.w1hkj.com/>
https://www.sigidwiki.com/wiki/Signal_Identification_Guide
<http://wb8nut.com/digital/>
- The challenge when you hear a digital station is to determine what is the digital mode being used.
- fldigi Key feature: fldigi uses “**RSID**” to detect modulation type.

- What is RSID?

- **Reed Solomon Identifier** is a special transmission designed by Patrick Lindecker, F6CTE
- RSID supports the automatic identification of any digital transmission which has been assigned a unique code identifier.
- On reception of a RSID, two events occur: the mode used is detected and the central frequency of the RSID, which is also the central frequency of the identified mode, is determined with a precision of 2.7 Hz.
- The RSID signal to be sent at the beginning and the end of each transmission. The leading RSID is the normal position.
- During reception fldigi can decode RSID signals within the entire audio spectrum. It can also be configured to limit the reception to a narrow bandwidth centered on the current audio subcarrier.
- Detection occurs as a background process and does not interfere with the normal signal decoding.

FLDIGI Main Screen

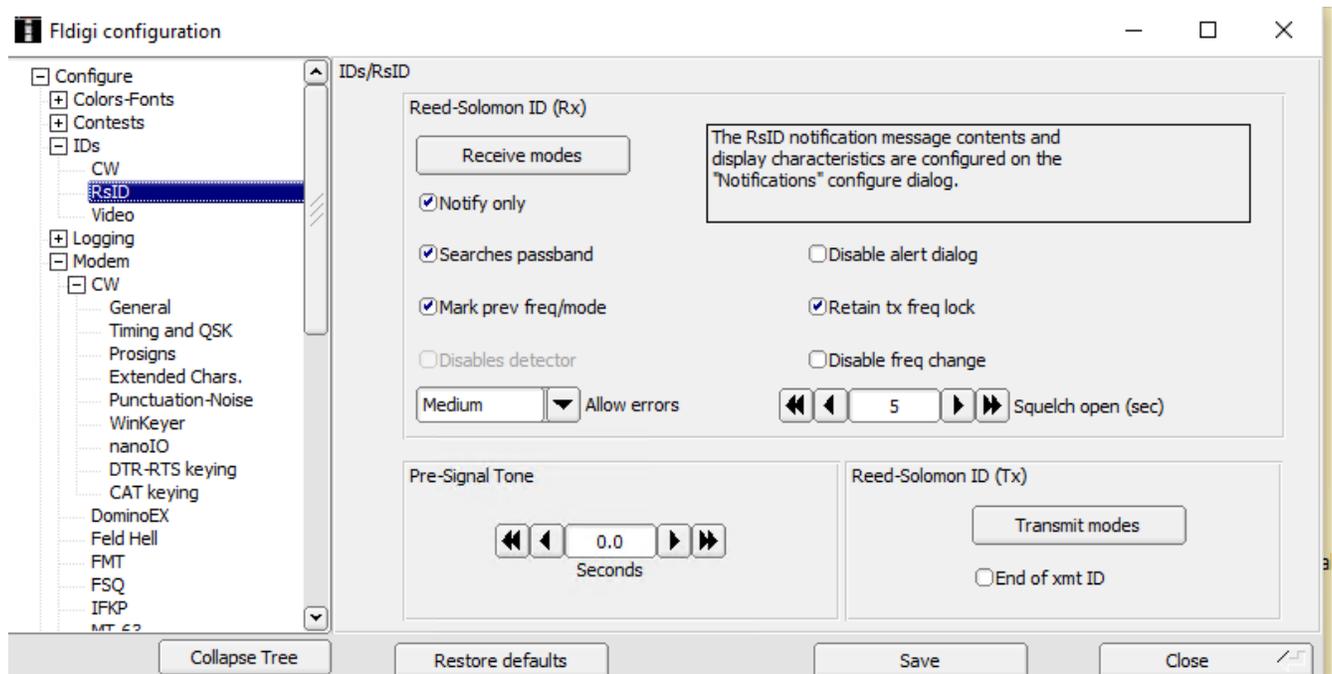
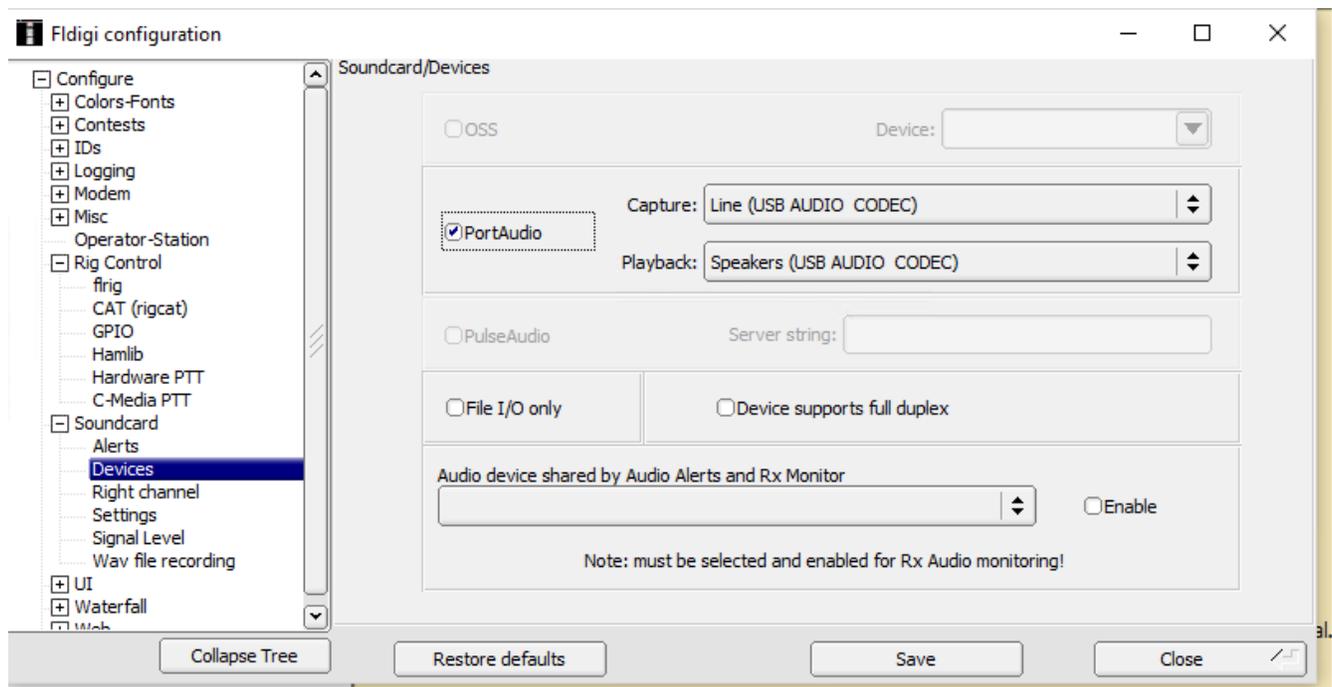


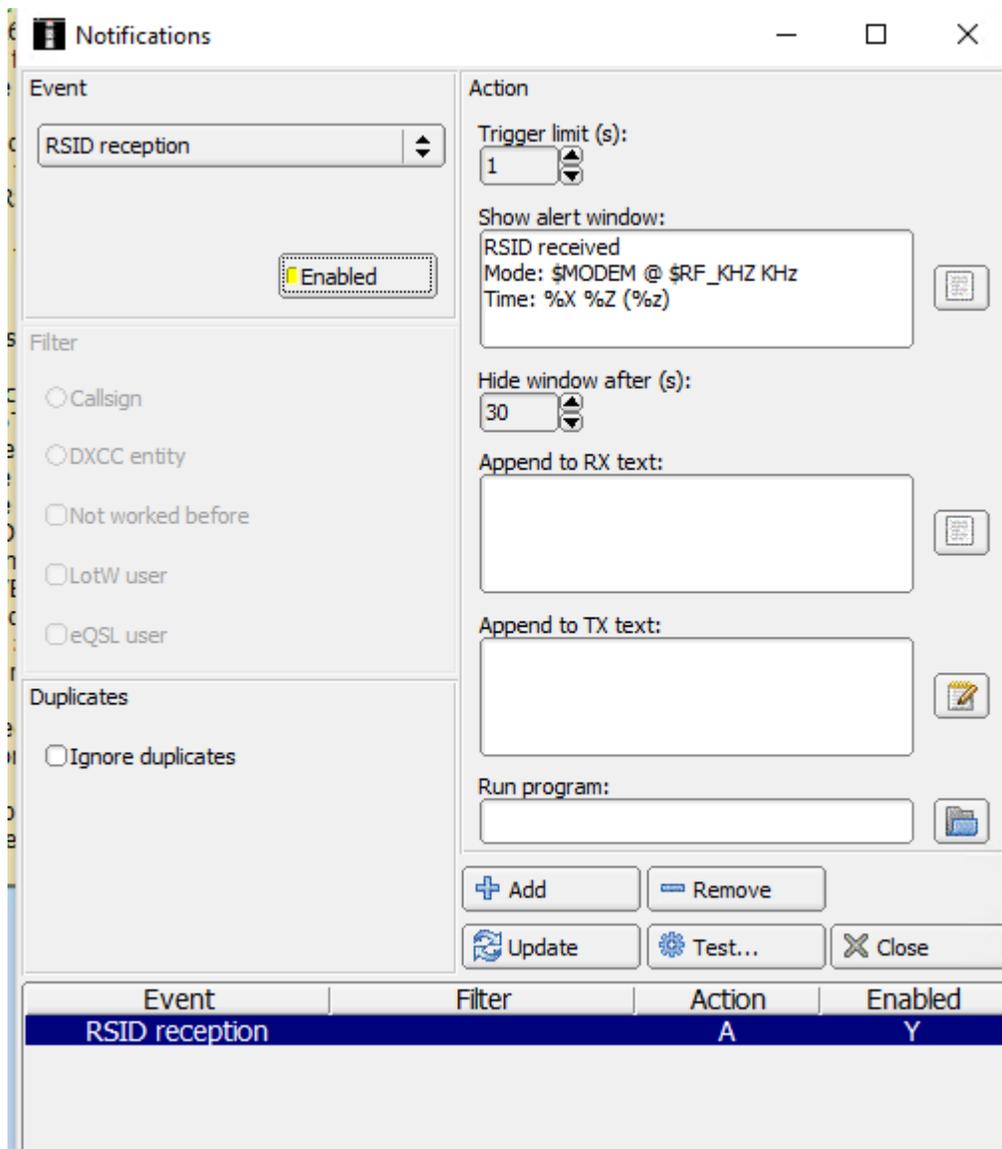
Main screen with RFID Notification

The screenshot displays the fldigi software interface. At the top left, the frequency is set to 14070.000. A notification window titled "RFID received" is open, showing the following details:

- RFID received
- Mode: OLVA-4(125 @ 14071.117 KHz)
- Time: 6:32:50 PM Pacific Standard Time (Pacific Standard Time)

The notification window includes buttons for "Go to 1117 Hz" and "Close". The main interface features a large yellow text area with garbled characters, a blue spectrum display at the bottom, and various control buttons such as "ANS to my CQ", "ANS M", "QSO", "BTU", "RST", "Me/Qth", "Brag", "Signal", "T/R", "Tx", "Rx", and "SK". The interface also includes a menu bar (File, Op Mode, Configure, View, Log) and a toolbar with buttons for "Spot", "RFID", "TXID", and "TUNE".



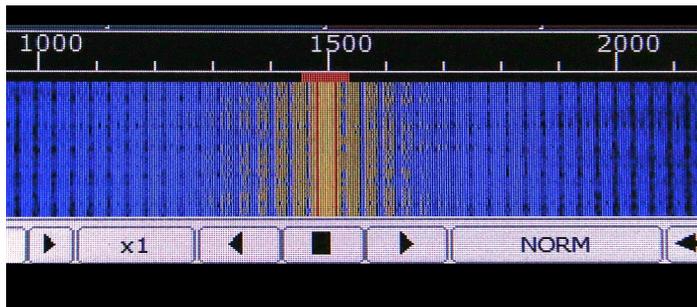


--->Play: fldigi Psk31 receive example

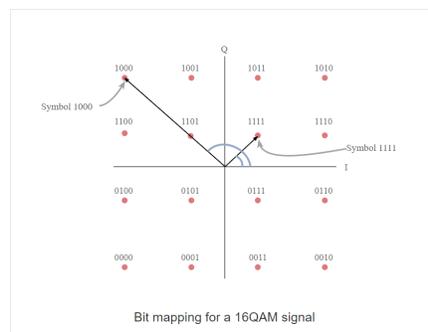
Transmitting Digital Data

- Its important to make sure the baseband audio level going to your rig is set correctly.
- If the input level is too high the rigs ALC (Automatic Level Control) will distort the audio input signal going to your rig.
- Depending on the modulation method used, this can result in spectral splatter, causing QRM to adjacent channels. PSK31 is an example of a modulation that uses pulse shaping to keep the signal within a narrow band (31 Hz). Olivia is another example of pulse shaping used to limit bandwidth.

Example of input audio distortion impacts to PSK31 signal:



Amplitude distortion can also impact communication reliability. Modulation methods that use signal amplitude as part of the symbol decoding can be impacted when output is non-linear: Example: VARA which uses 32 bit QAM (Quadrature Amplitude Modulation) for higher data rate communication.



- Audio level signal distortion has less impact on constant envelope types of modulation. These include FSK(Frequency Shift Keying) and MSK(Minimum Shift Keying) family of modulations.
- Still, it is good practice not to overdrive your audio into your rig and operate at a high level of ALC, independent of what modulation scheme your using.

Method to check audio level to transmitter:

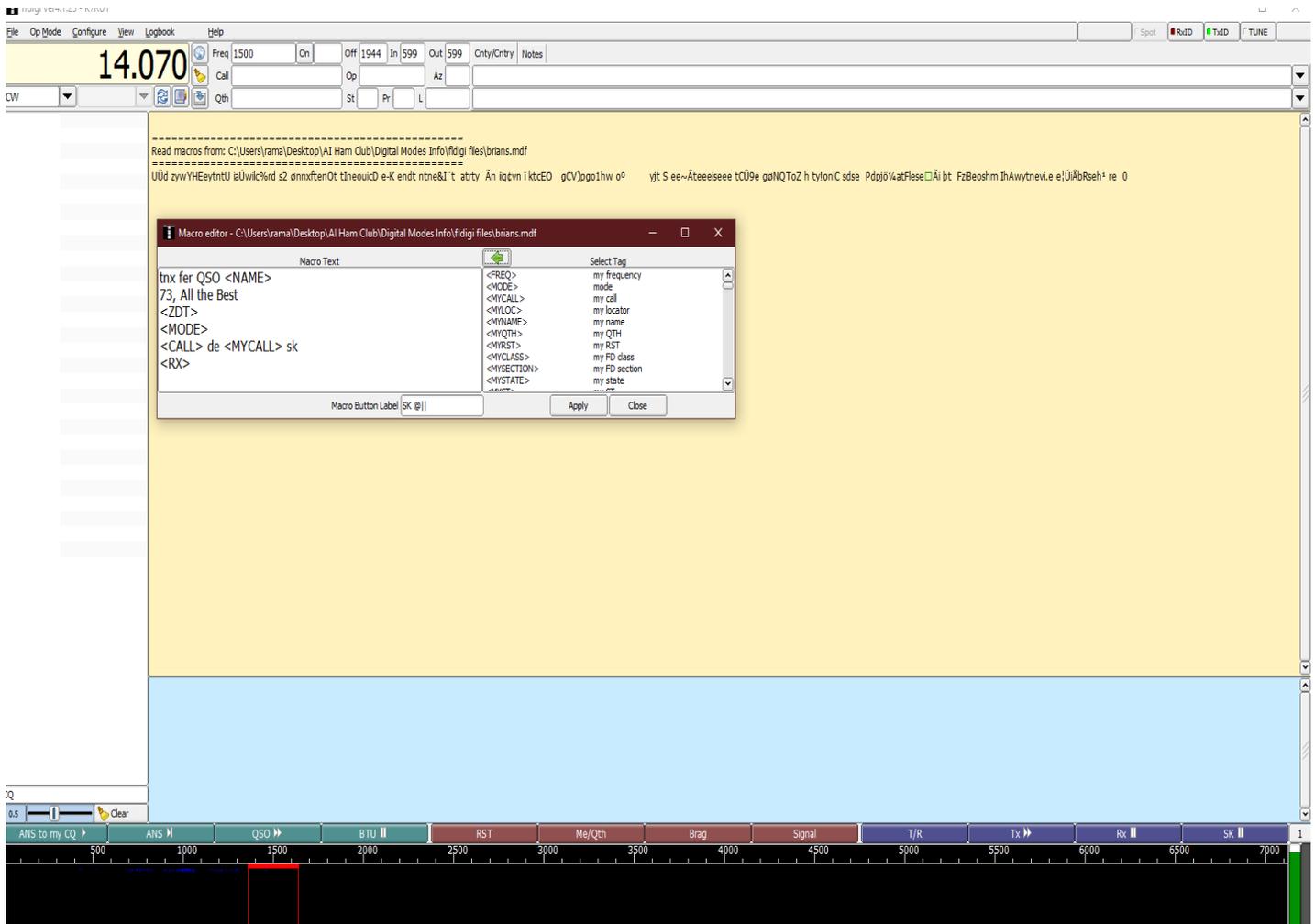
1. Switch to antenna dummy load.
2. Lower TX power, select transmit band and frequency.
3. Monitor ALC on your rig and power output.
4. Lower your audio output level to some minimum value
4. From fldigi, click the tune.
5. Gradually increase audio output level, watching power output increase
6. Initially, ALC should be a zero or minimum. Increase power until you just see the ALC begin to register. On my IC-718 that would be 1 bar on the ALC display.
7. Continue to increase and watch power meter until power output barely hits a maximum. Then reduce audio output and watch power output drop below this maximum point.
8. Check ALC reading. On my IC-718, I reduce output until ALC is below 30% max scale. I find that operating ALC 0- 30% max scale provides good results.
9. The IC-718 recommends staying below 50% scale for ALC using any modulation. Check your rig's manual for recommended ALC operation.

Depending on your setup, audio levels can be adjusted using:

- A. Adjusting output from PC using speaker adjustment from OS(60%)
- B. If you have a signal link, the TX control adjustment(50%)
- C. Your rigs microphone gain, usually contained as a menu item(25%)

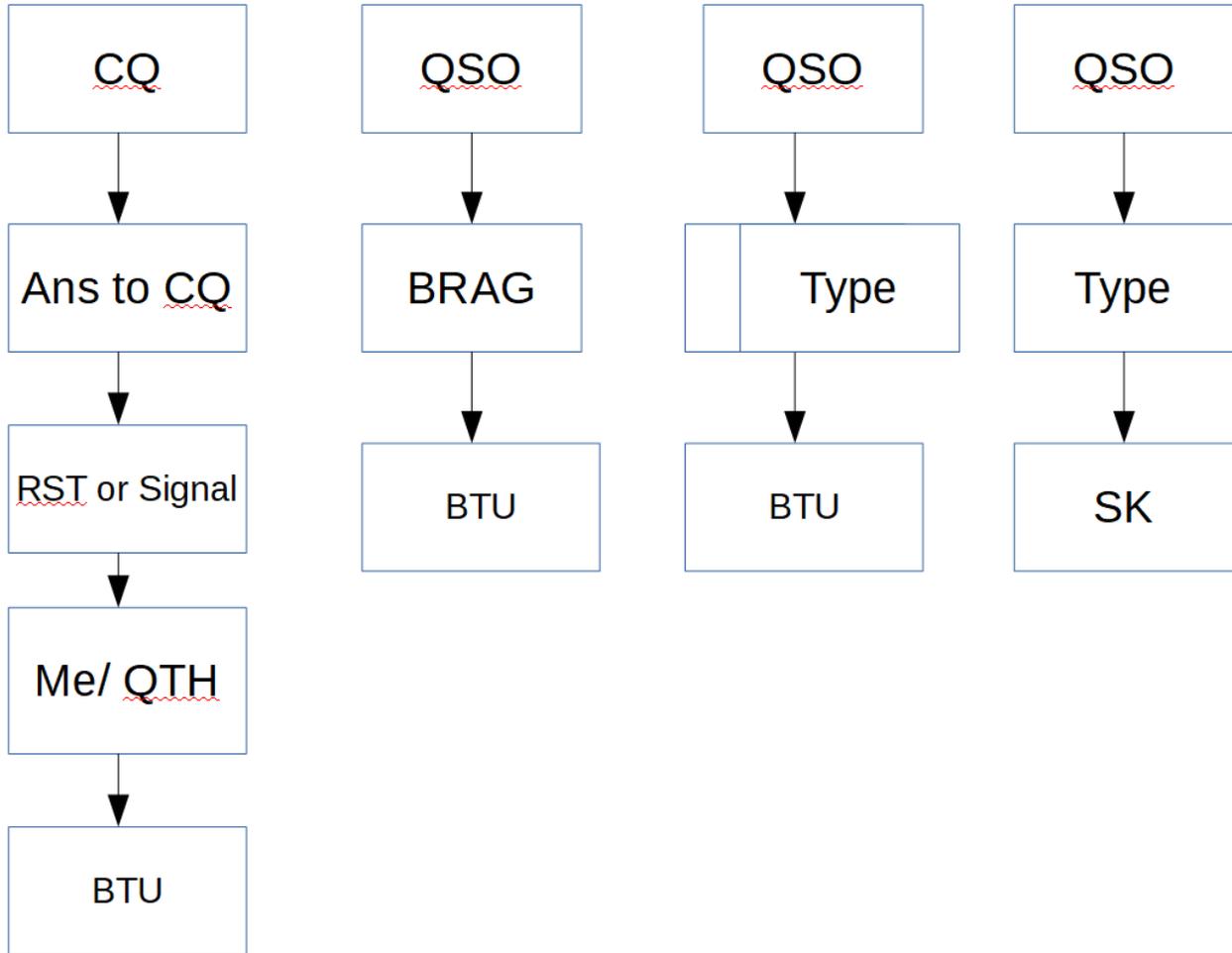
User Defined Macro's

- fldigi allows user to setup text macros for sending common messages, ie, "CQ", Signal report, Station location, etc.
- Simplifies Chat Mode Text
- Allows user to customize their frequently used strings
- Use combination of Macros and free text typing during a QSO
- Right click on macro button to program function

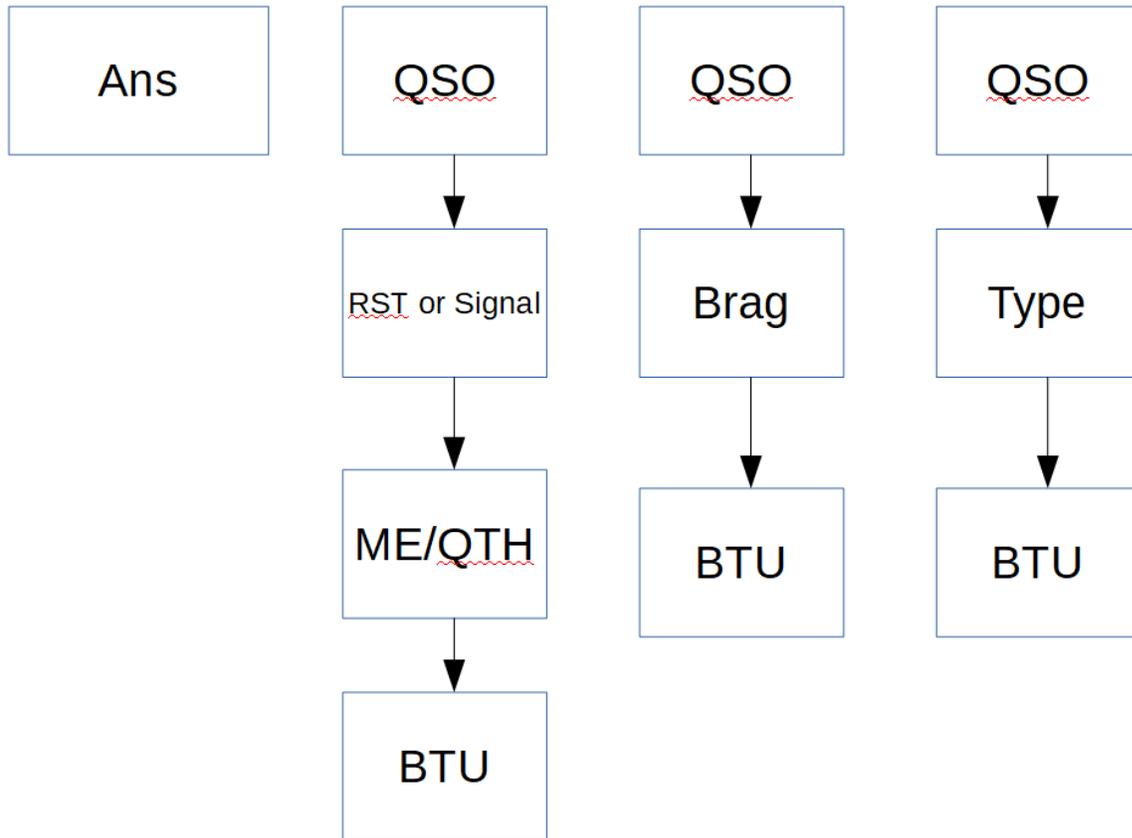


QSO Exchange Sequence Using Macros

Send CQ Macro Flow: fldigi



Answer CQ Macro Flow: fldigi



--->*Play Olivia QSO example*

Common digital mode frequencies based on mode/band plans

Dial Freq	PSK31	RTTY	FT8	FT4	JSCALL	Olivia (8/250)	Olivia(16/1000)	VARA
160m	1.838		1.84		1.842	1.8254		
80m	3.58	3.59	3.573	3.575	3.578	3.5814		
40m	7.04	7.043	7.074	7.047,50	7.078	7.0714		7.105
30m	10.141	10.143	10.136	10.14	10.13	10.1414		
20m	14.07	14.083	14.074	14.08	14.078	14.0714	14.106	14.105
17m	18.103	18.106	18.1	18.104	18.104	18.1014		
15m	21.07	21.08	21.074	21.14	21.078	21.0714		21.105
12m	24.92	24.925	24.915	24.919	24.922	24.9214		
	28.070							
10m	28.120	28.08	28.074	28.18	28.078	28.1214		28.105
6m	50.305	50.6	50.313	50.318	50.318			

Program Key

fldigi Wsjt-x VARAC JSCALL

Websites

<https://www.bandplans.com/>

Click on Band link and look at listing below

<http://www.w1hkj.com/>

fldigi user manual: <http://www.w1hkj.com/FldigiHelp/index.html>

fldigi and NBEMS

- Emcomm: Supports NBEMS, Narrow Band Emergency Messaging System
- Consists of several programs:
 - Fldigi – Fast Light Digital modem application
 - Flarq – Fast Light Automatic Repeat Request
 - Flwrap – embed a checksum in a file
 - Flmsg – ICS forms, Radiogram, text, CSV
 - Flamp – Amateur Multicast Protocol
- Flmsg supports the FEMA and ICS templates for emergency communications
- Pierce County ARES phased out the use of fldigi and the NBEMS about 3 years ago and now only supports Winlink for EMCOMM messaging