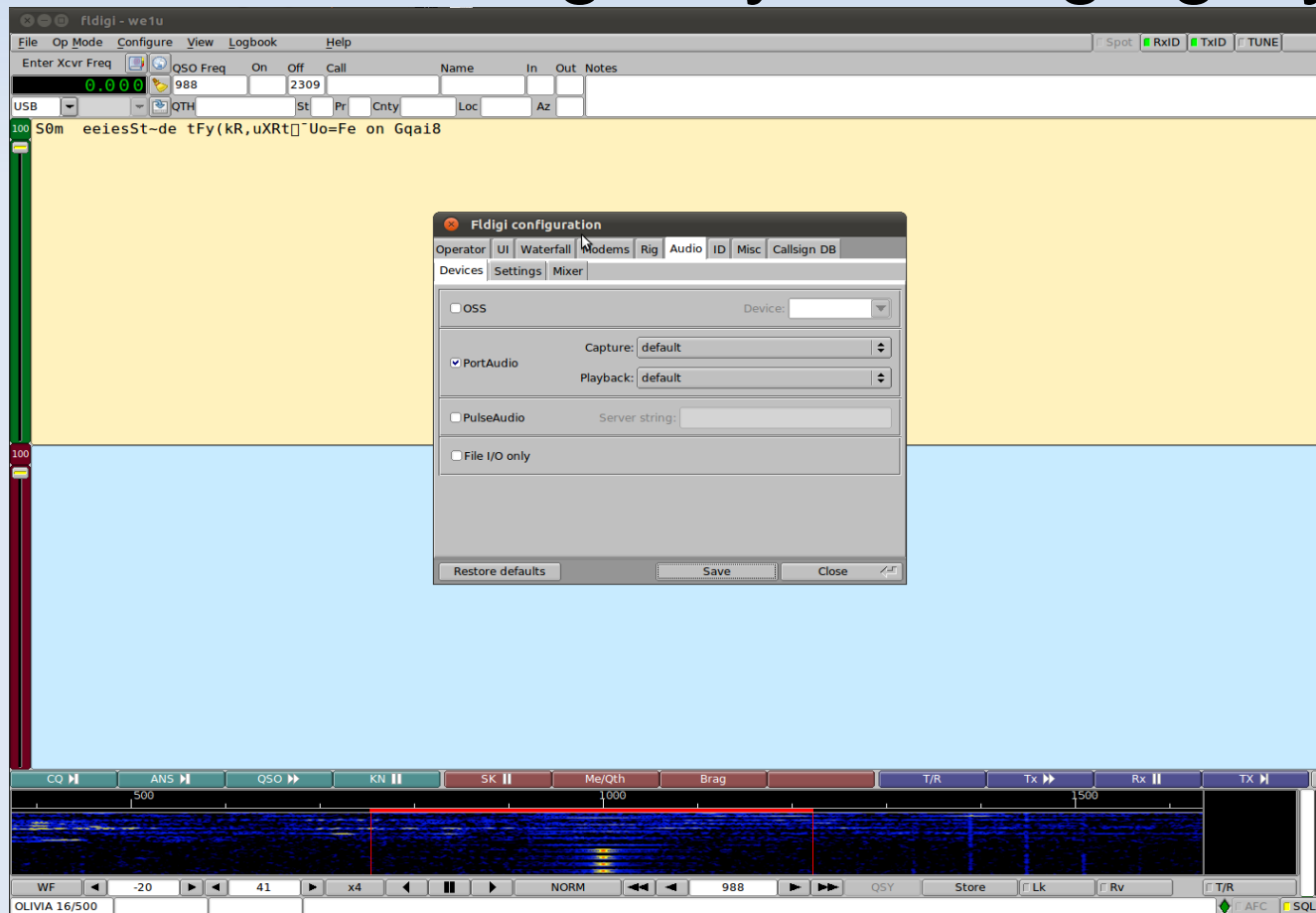


FLDigi NBEMS Suite

FLDigi for Narrow-Band Emergency Messaging System



Why NBEMS Communications?

- Voice communication is not always best
- Data communication is often needed:
 - Supply list, especially one with part numbers
 - Roster of Personnel
 - Telephone Directory for a incident
 - Images
 - Binary files

What do you need?

- Radio
- Laptop

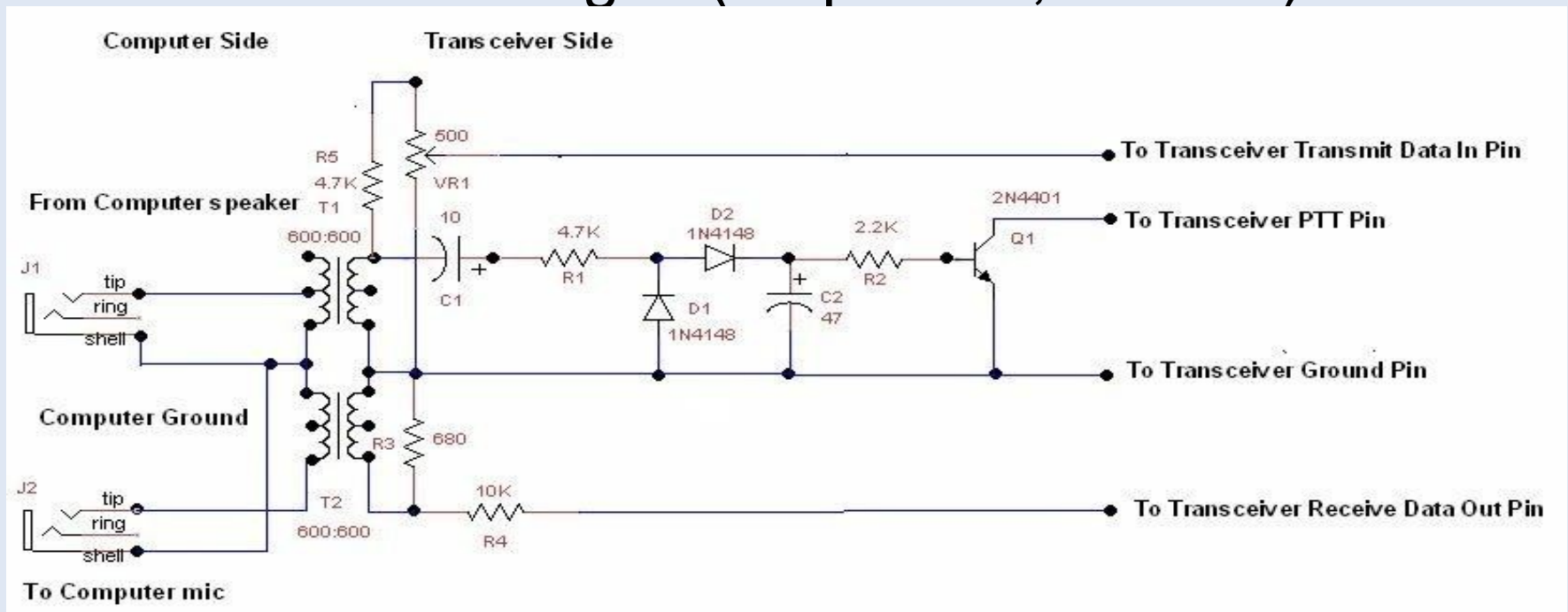
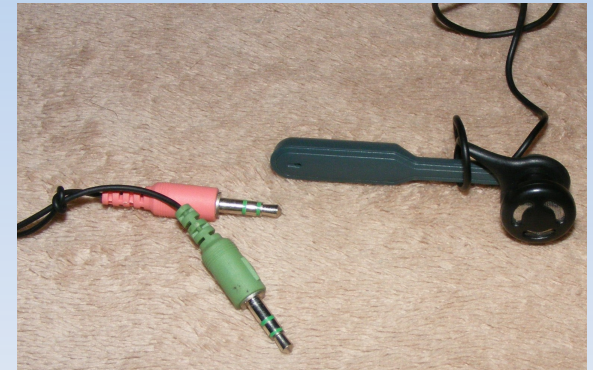


- Built-in speaker and microphone can be used
- Wireless mouse is recommended
 - Touchpads are RF sensitive



Useful Items

- External microphone is helpful
- Interface box
 - That isolates radio from computer
 - Generates PTT signal(Skip Teller, KH6TY)

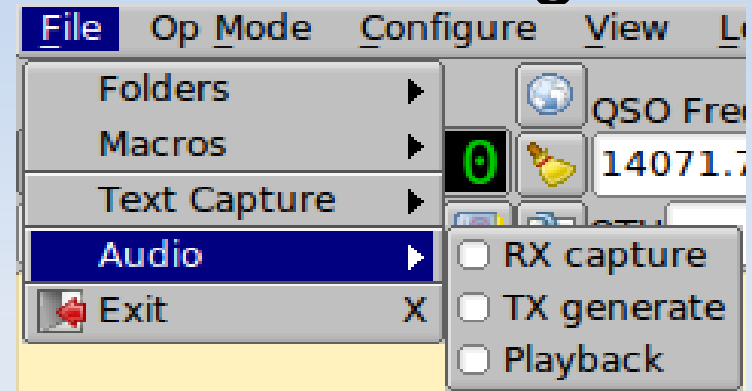


The FLDigi Suite

- fldigi
 - Digital sound card modem
- flwrap
 - Checksum verifier and (un)compressor
- flmsg
 - Form-based Message Generator

FLDigi -Digital Modem

- Uses sound card to encode and decode signal
- Record Audio to a “wav” file
 - Capture incoming audio
 - Save outgoing audio
 - Playback saved audio into decoder
- Control some Radios
- Save and Compile Log files



Rig Not Specified		QSO Freq	On	Off	Call	Name	In	Out	Comment
3580.000		3580.641	1833	1834	WA1DAP	Donald			
USB		QTH Winthrop	St	ME	Pr	Cnty	Loc FN44xh	Az 049	

Flmsg-Message Form Editor

Flmsg has common message forms templates

Incident Command System forms

Radiogram or just a blank page

FLMSG: 1.1.6
File Template Config Help filename: default.203
ICS Radiogram Generic Blank DnD
203 205 205a 206 213 214 216
Org List Agency Planning Logistics Ops A Ops B Ops C Ops D Admin

1. Incident Name
2. Date Prepared ...
3. Time Prepared ...
4. Oper' Period

Incident Command and Staff

Commander
Deputy
Safety Officer
Information Off'
Liaison Officer
Prepared By

FLMSG: 1.1.6
File Template Config Help filename: default.m2s
ICS Radiogram Generic Blank DnD
Message Records

SVC *NR *PREC HX_ *STN ORIG CK
 ROUTINE hx ck

PLACE OF ORIG TIME FILED *MON DY

*TO TEL:
OP NOTE:

TXT:

SIG: OP NOTE:

ARL MSG

FLMSG: 1.1.6
File Template Config Help filename: default.b2s
ICS Radiogram Generic Blank DnD

Blank page

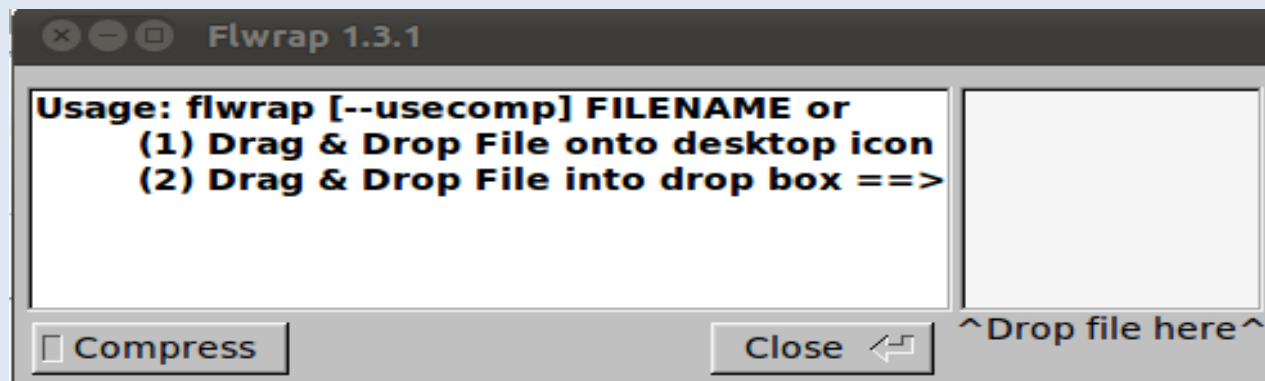
Flwrap-Outgoing Message Wrapper

Delineates Message with start/end text markers

- Binary files are first converted to a base-64
 - <http://en.wikipedia.org/wiki/Base-64>

Adds a checksum

Can compress a message



Flwrap output in fldigi



The screenshot shows a window titled "fldigi - we1u" with a menu bar containing "File", "Op Mode", "Configure", "View", "Logbook", and "Help". The main area has a yellow background and displays the following text in red:

```
eev eù u
....start
[WRAP:begin][WRAP:lf][WRAP:fn default.b2s]<flmsg>1.1.6
<blankform>
:mg:262 Flwrap wraps the outgoing message with text markers showing the start and end
Checksum is added to verify the message is accurate
Compression can be used to shorten a text message

The incoming message is uncompressed if needed and verified against the checksum.
[WRAP:chksum 565D][WRAP:end]
.....end
```

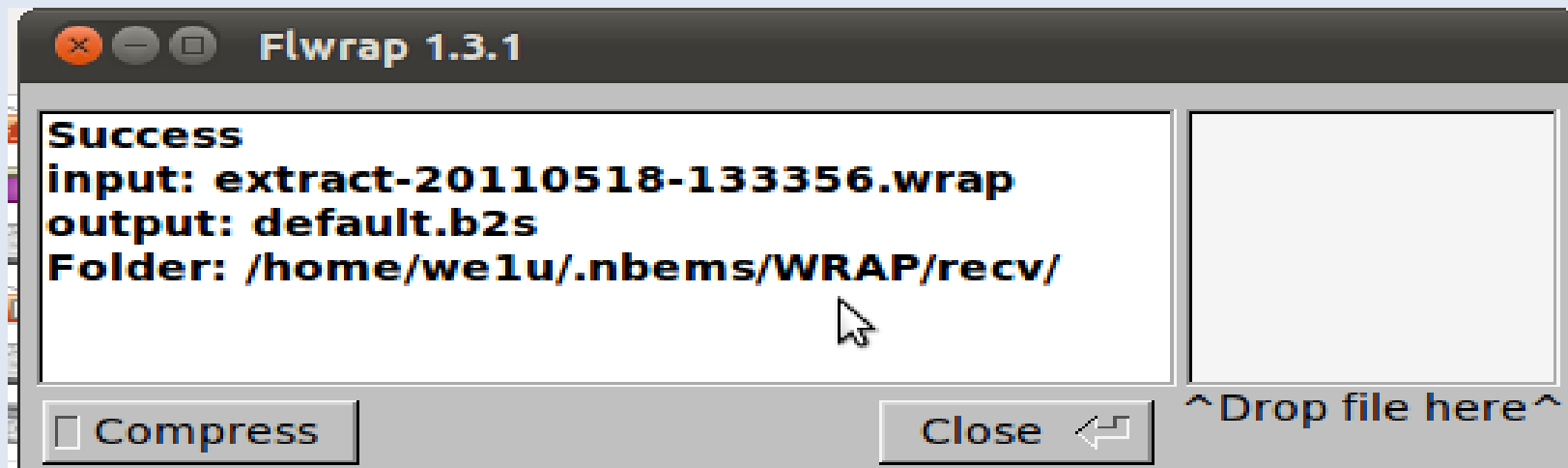
A mouse cursor is visible over the text. At the bottom left of the window, there is a light blue bar with the letter "I" on it.

Flwrap-Incoming Message Unwrapper

Verifies Checksum

Recover Binary file from any base-64 text

Uncompress Message if needed



http://www.w1hkj.com/download.html

Download page - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://www.w1hkj.com/download.html

Download page: updated 17 April 2011

	Linux Binary	Windows Setup	OS X dmg	Puppy Pet (1)	Source	Help	Release Info
Fldigi / Flarq:	fldigi-3.21.9.bin README	fldigi-3.21.9	fldigi-3.21.9	fldigi-3.21 flarq-4.3	fldigi-3.21.9	Fldigi-Help Flarq-Help Fldigi pdf file Beginners Guide pdf file	Maint'
				pet libs	required for all fl__ applications		Legacy Source 3.20.11 to present
RigCat Xmls	xml archives	updated on 11 Apr 2011					
Flwrap:	flwrap-1.3.1.bin	flwrap-1.3.1	flwrap-1.3.1	flwrap	flwrap-1.3.1	Flwrap-Help	Maint'
Flmsg:	flmsg-1.1.6.bin	flmsg-1.1.6	flmsg-1.1.6	flmsg	flmsg-1.1.6	Flmsg-Help	Maint'
Flwkey:	flwkey-1.0.0.bin	flwkey-1.0.0	flwkey-1.0.0	flwkey	flwkey-1.0.0	Flwkey-Help	Initial
Flrig:	flrig-1.1.3.bin Supported rigs	flrig-1.1.3	flrig-1.1.3	flrig-1.1.3	flrig-1.1.3	flrig-help	Maint'

(1) Puppy / NBEMS [How-To-Install](#)

RPMS for Open Suse: [DL8FCL rpm's](#)

Debs for Ubuntu: <https://launchpad.net/~kamalmostafa/+archive/fldigi> [How To Install from Kamal's PPA](#)

Past versions of software [Berlios archives](#)

Wiki for fldigi/fldigi etc. [Wiki](#)

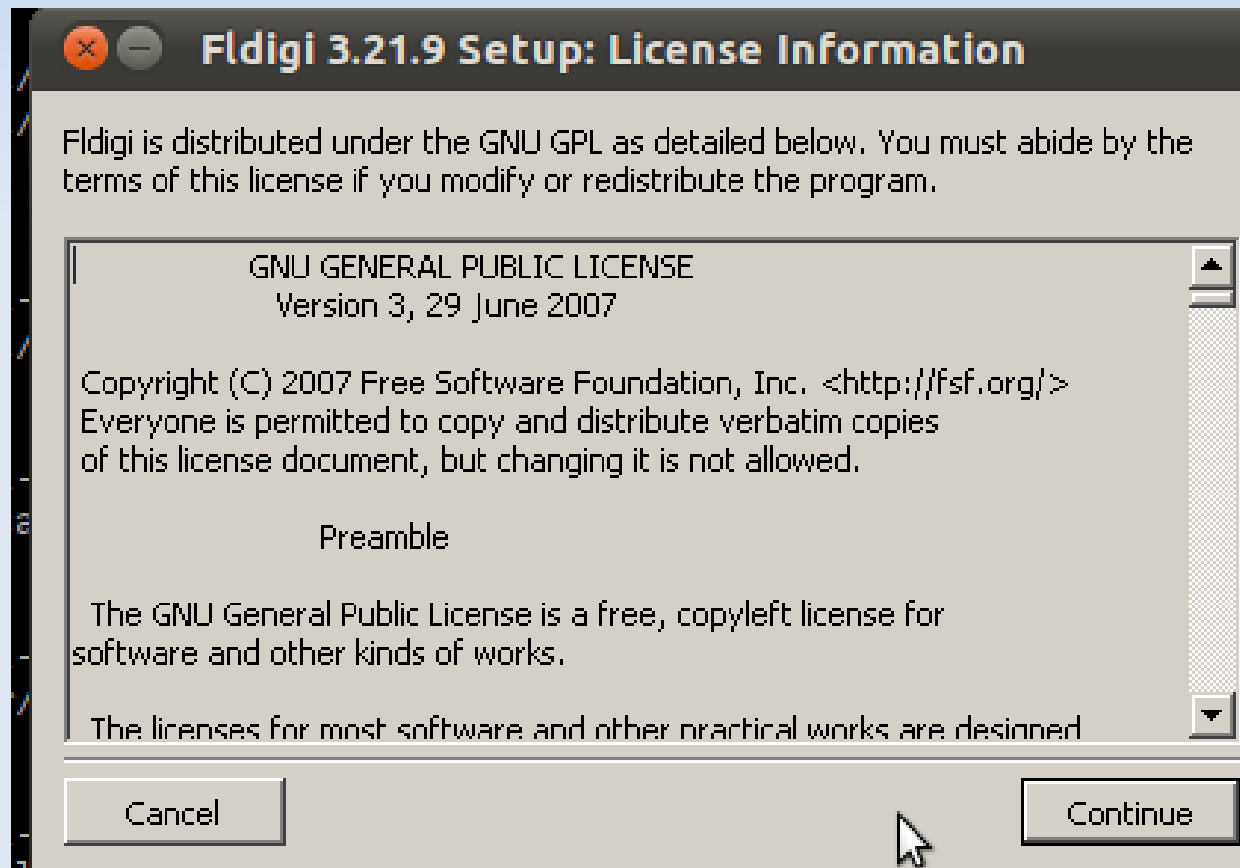
3 party software applications for use with fldigi/fldigi [3rd party software](#)

fldigi Windows Installation

- The three setup files install in the same steps:
 - fldigi-3.21.9_setup.exe
 - flmsg-1.1.6_setup.exe
 - flwrap-1.3.1_setup.exe
- The Default setting should be fine.
- Do the four steps for each program
 - Window Security may require you to verify additional steps
- Be aware the programs are being actively developed and updates are frequent

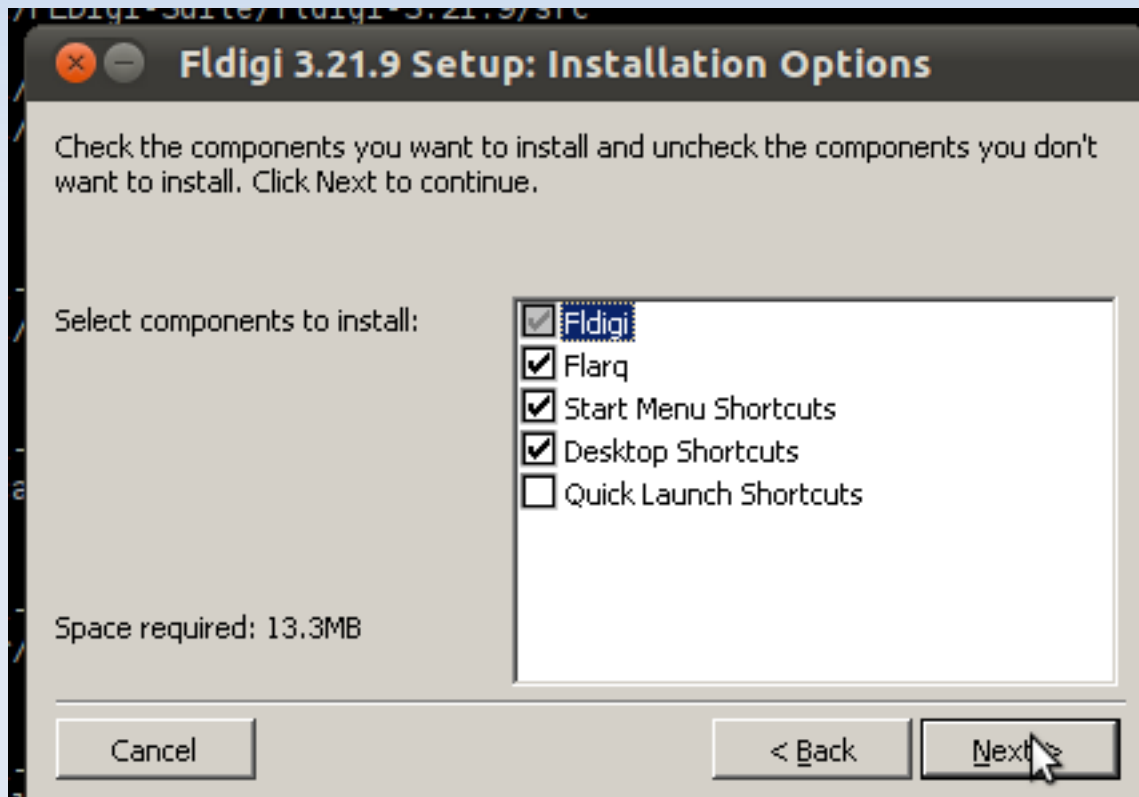
Setup Step 1-License Information

Click Continue Button



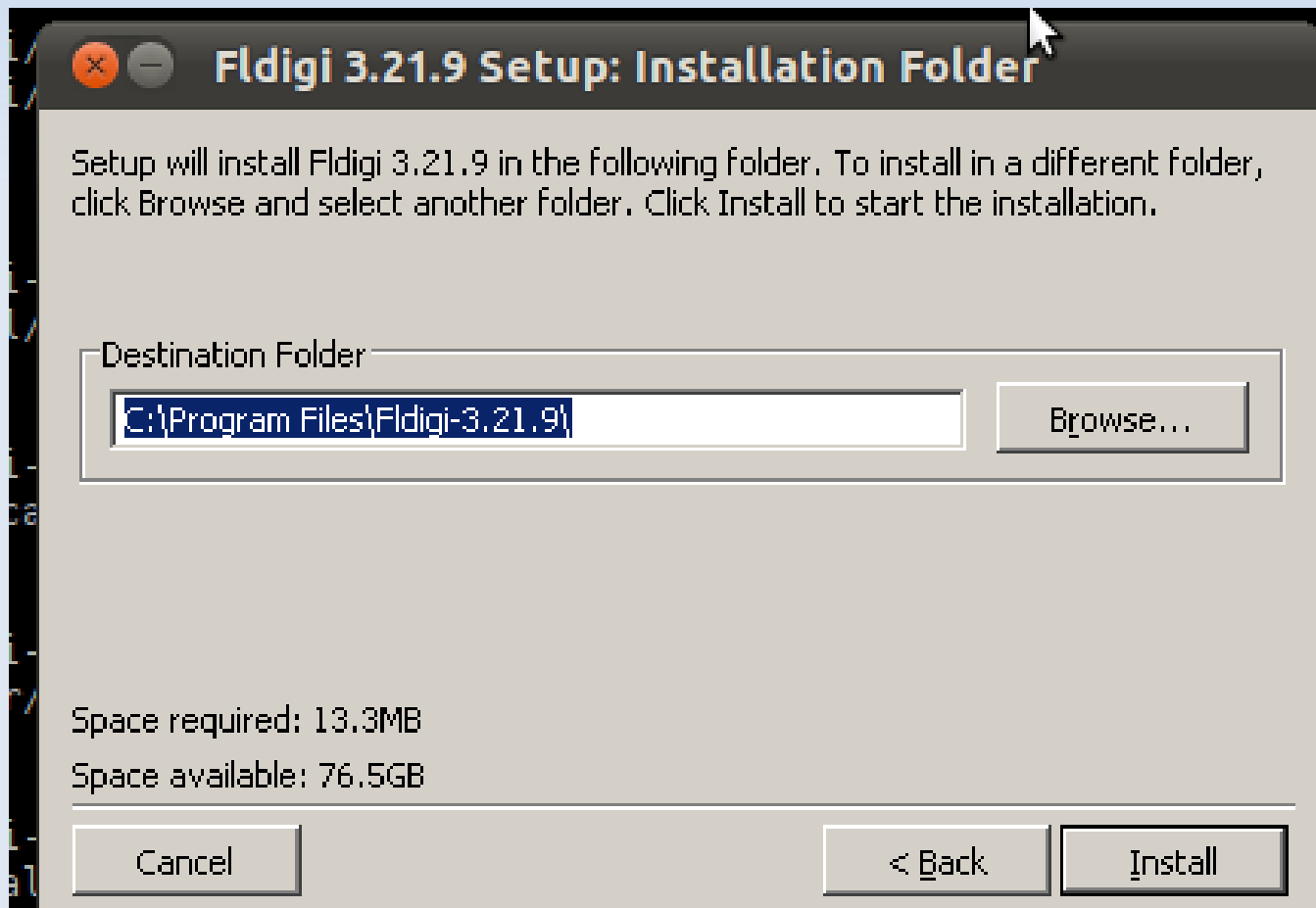
Step 2 Installation Options

Click “Next” Button



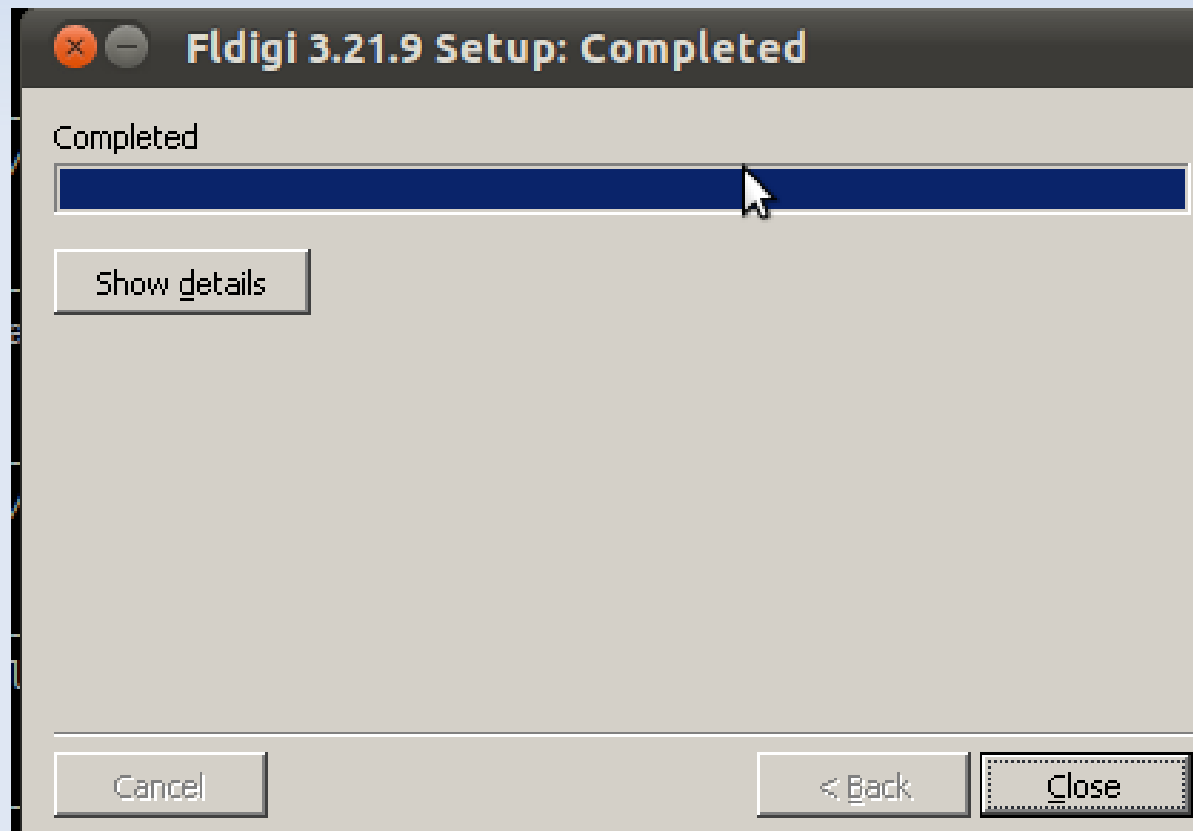
Step 3-Installation Folder

Click the “Install” Button



Step 4-Completed

Click “Close” Button



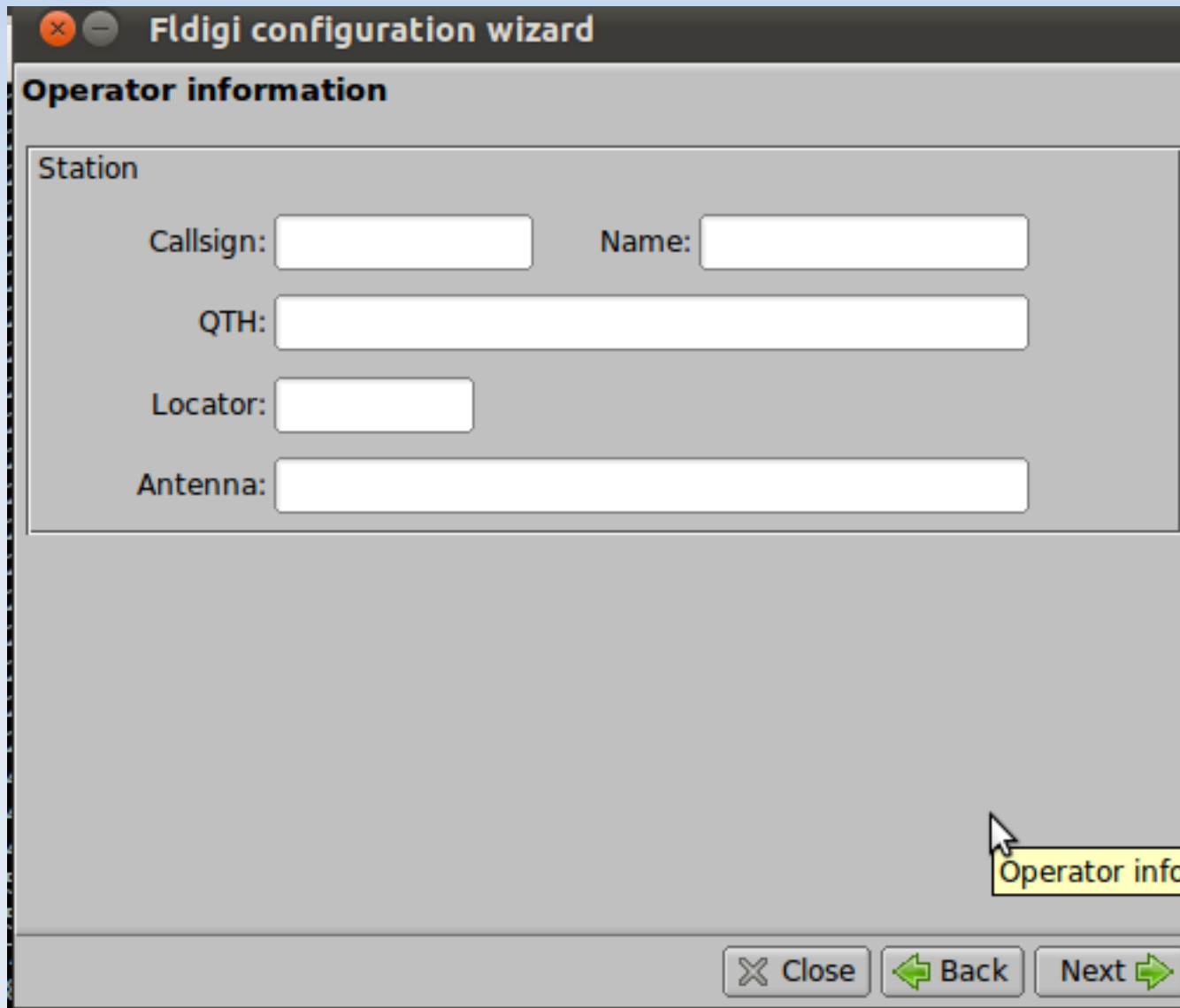
Fldigi -Configuraton Wizard Step 1

Click "Next" Button



Fldigi -Configuraton Wizard Step 2

Enter your information and Click “Next” Button



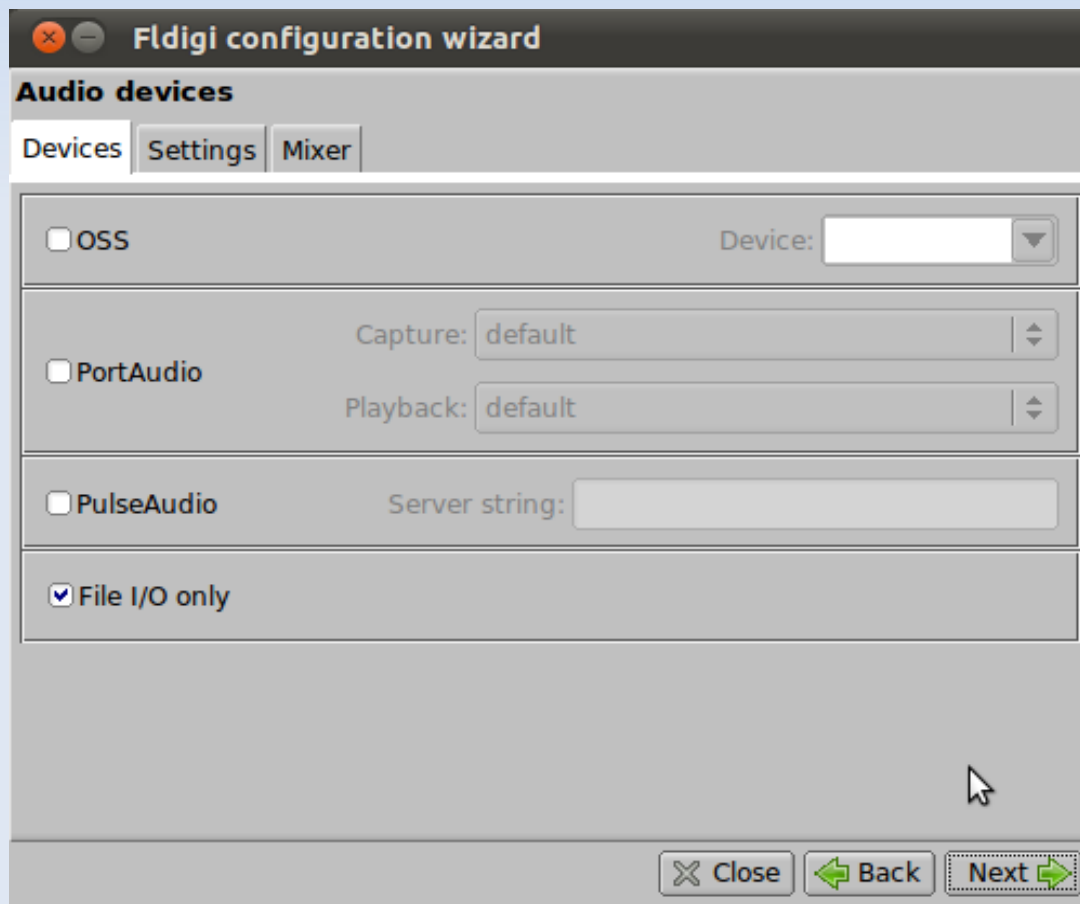
The screenshot shows a window titled "Fldigi configuration wizard" with a standard OS title bar (close, minimize, maximize buttons). The main content area is titled "Operator information" and contains a "Station" section with the following fields:

- Callsign:
- Name:
- QTH:
- Locator:
- Antenna:

At the bottom right of the window, there is a yellow tooltip that says "Operator infor" (partially visible). At the bottom of the window, there are three buttons: "Close" (with a close icon), "Back" (with a left arrow icon), and "Next" (with a right arrow icon). A mouse cursor is pointing at the "Next" button.

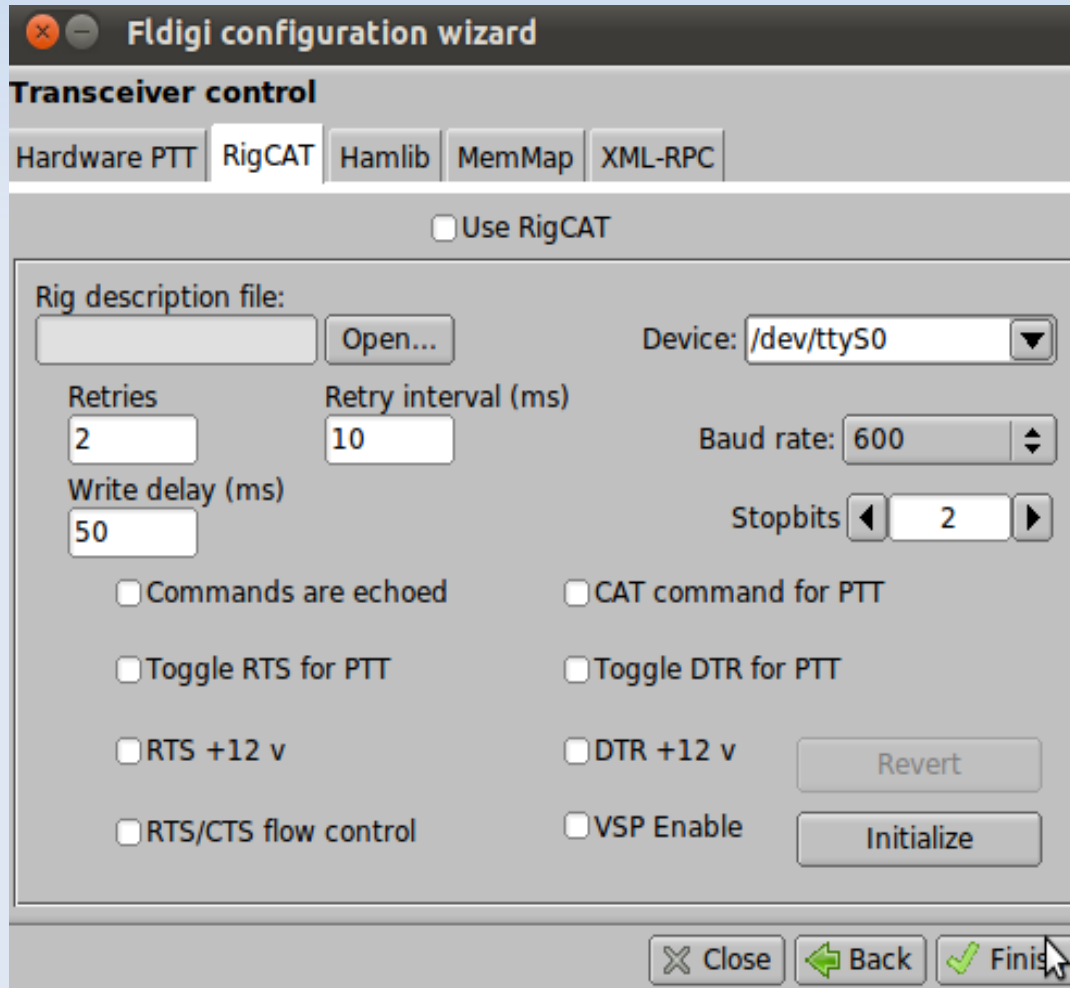
Fldigi -Configuraton Wizard Step 3

Select your Audio Devices and Click “Next” Button

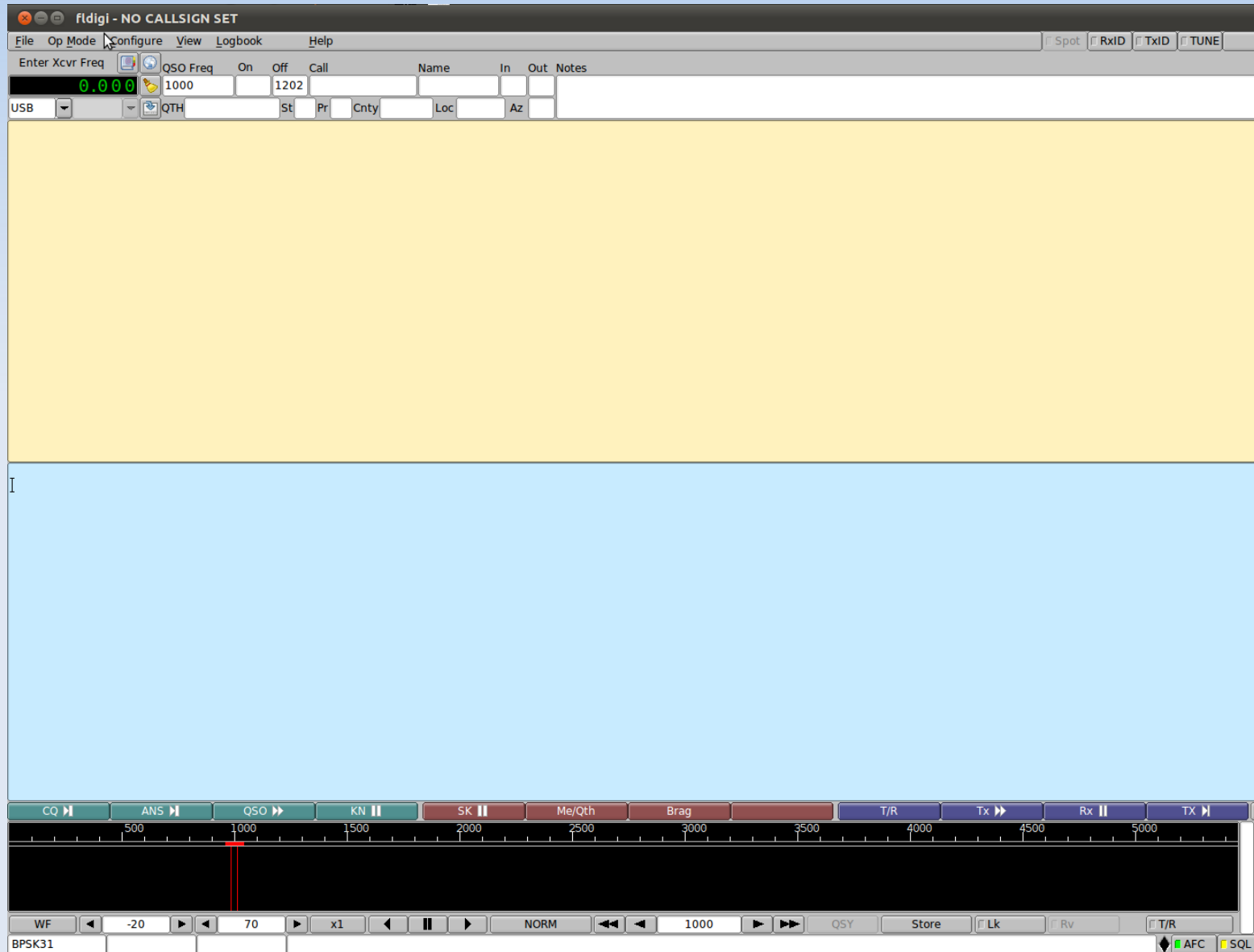


Fldigi -Configuraton Wizard Step 4

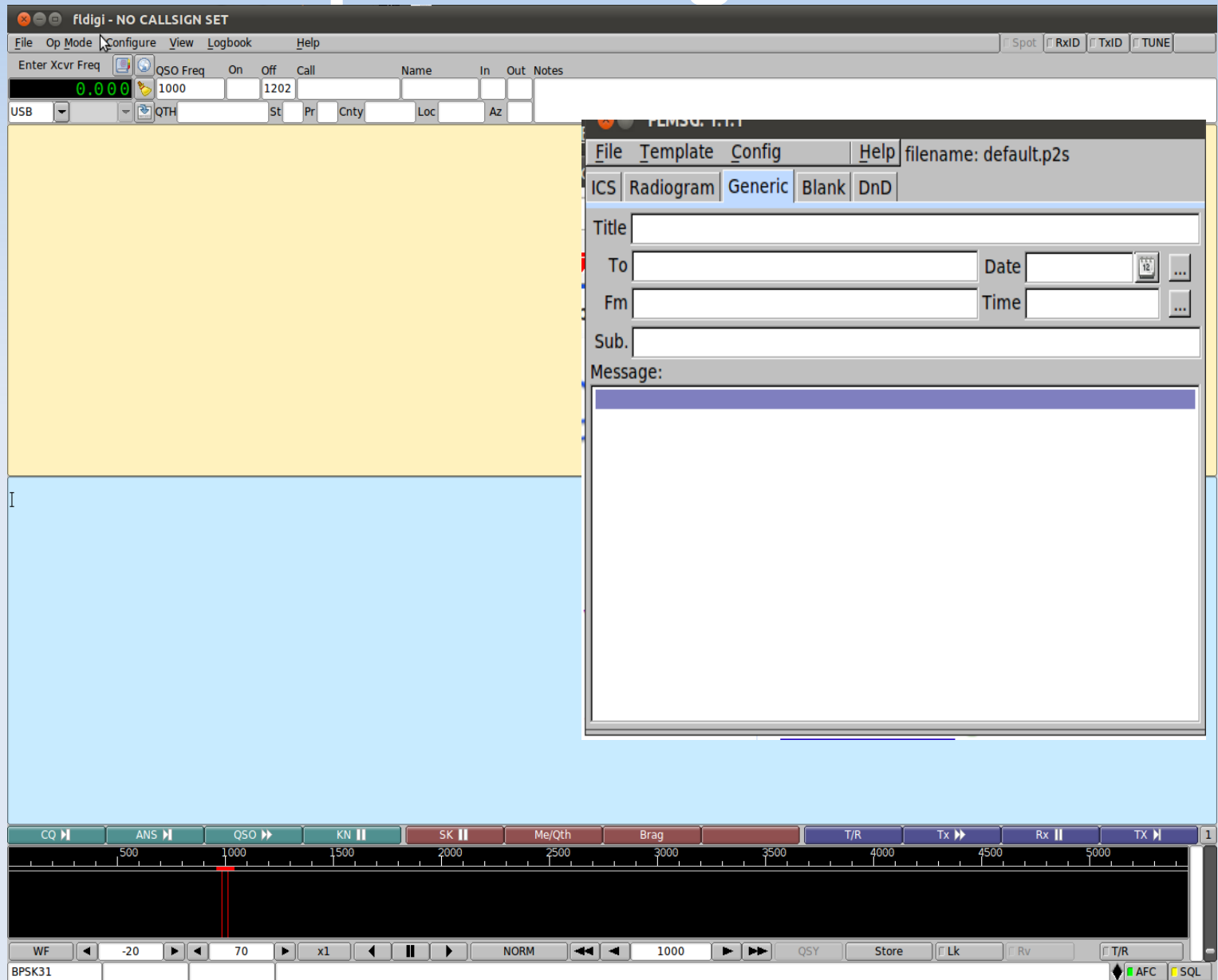
Leave this as is for now and Click “Finish” Button



Open fldigi for the first time



Open flmsg too

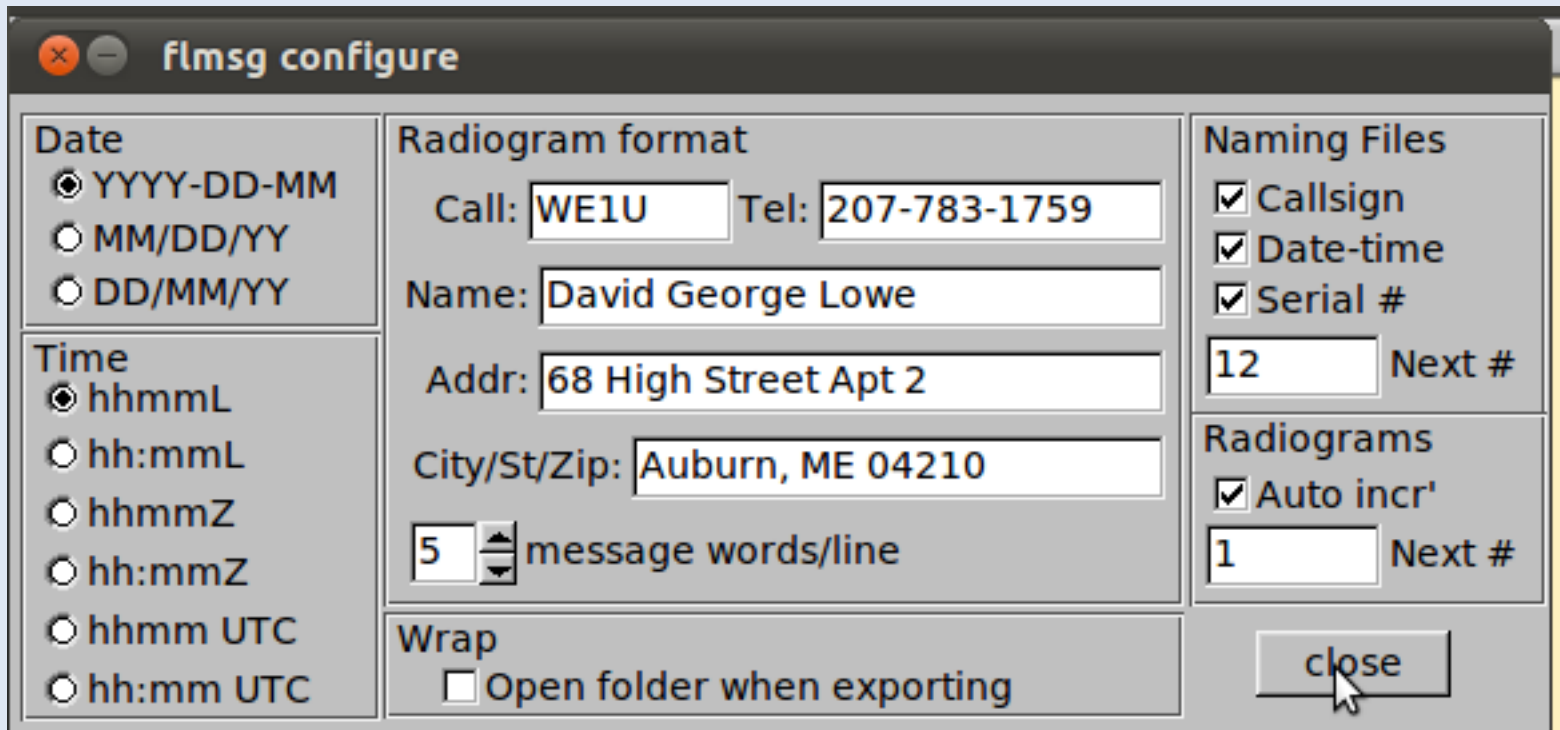


Config flmsg

Open flmg

Click on flmsg's "Config" Menu

Edit Settings and Click "close" Button

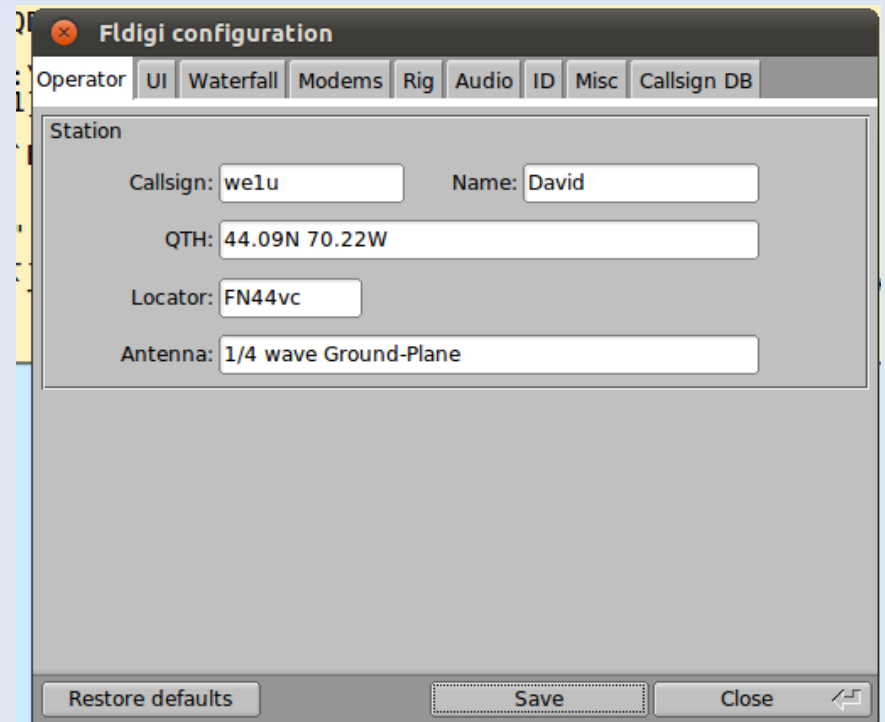


The screenshot shows a window titled "flmsg configure" with the following settings:

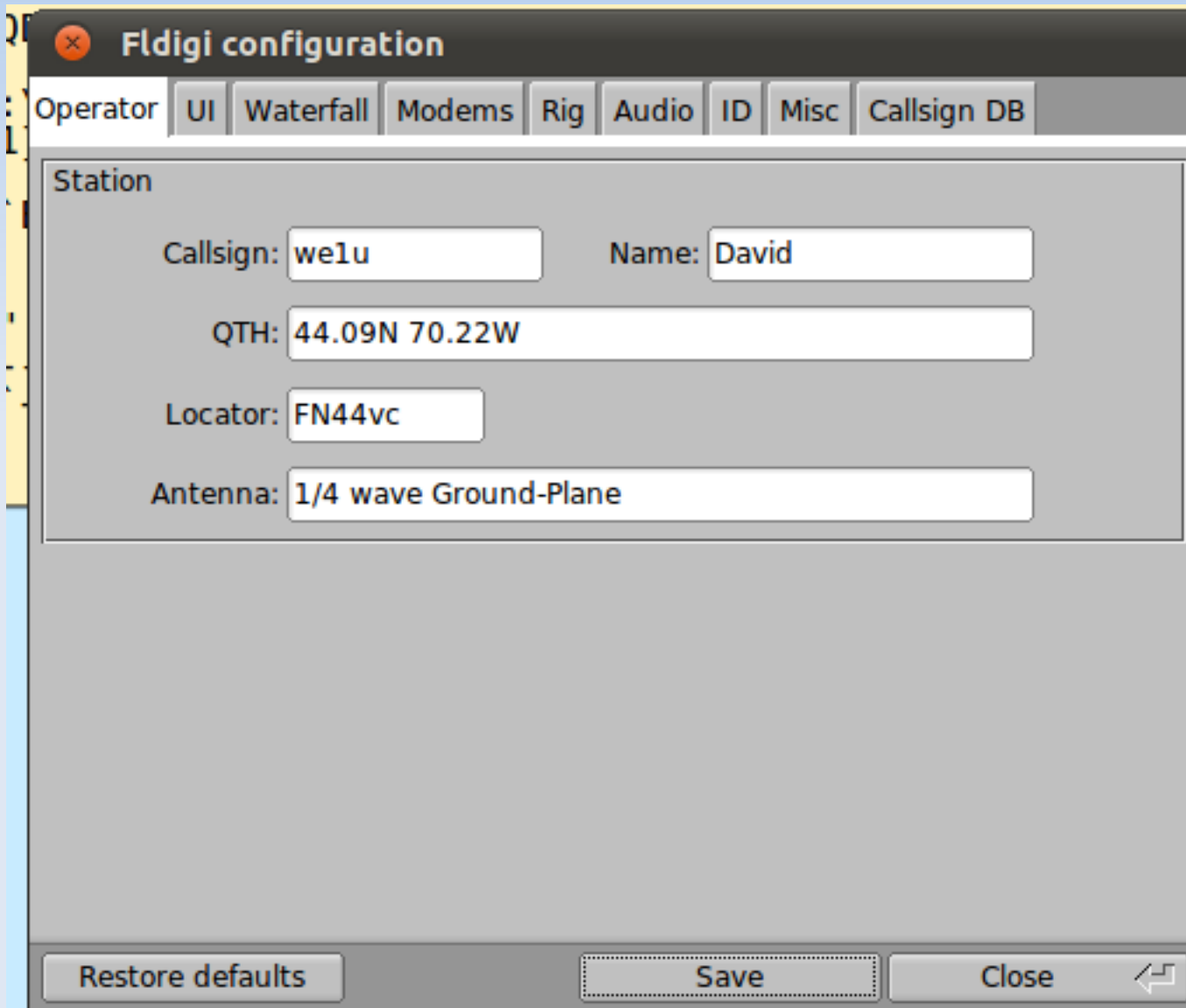
- Date:** YYYY-DD-MM, MM/DD/YY, DD/MM/YY
- Time:** hhmmL, hh:mmL, hhmmZ, hh:mmZ, hhmm UTC, hh:mm UTC
- Radiogram format:** Call: WE1U, Tel: 207-783-1759, Name: David George Lowe, Addr: 68 High Street Apt 2, City/St/Zip: Auburn, ME 04210, 5 message words/line
- Naming Files:** Callsign, Date-time, Serial #, 12 Next #
- Radiograms:** Auto incr', 1 Next #
- Wrap:** Open folder when exporting
- Buttons:** close

Closer look at Fldigi's Configure Menu and Dialogs

The “Configure” Menu items bring up a tabbed dialog except for the “Colors and Fonts” and “Notifications” items



Starting Point-Who are YOU?

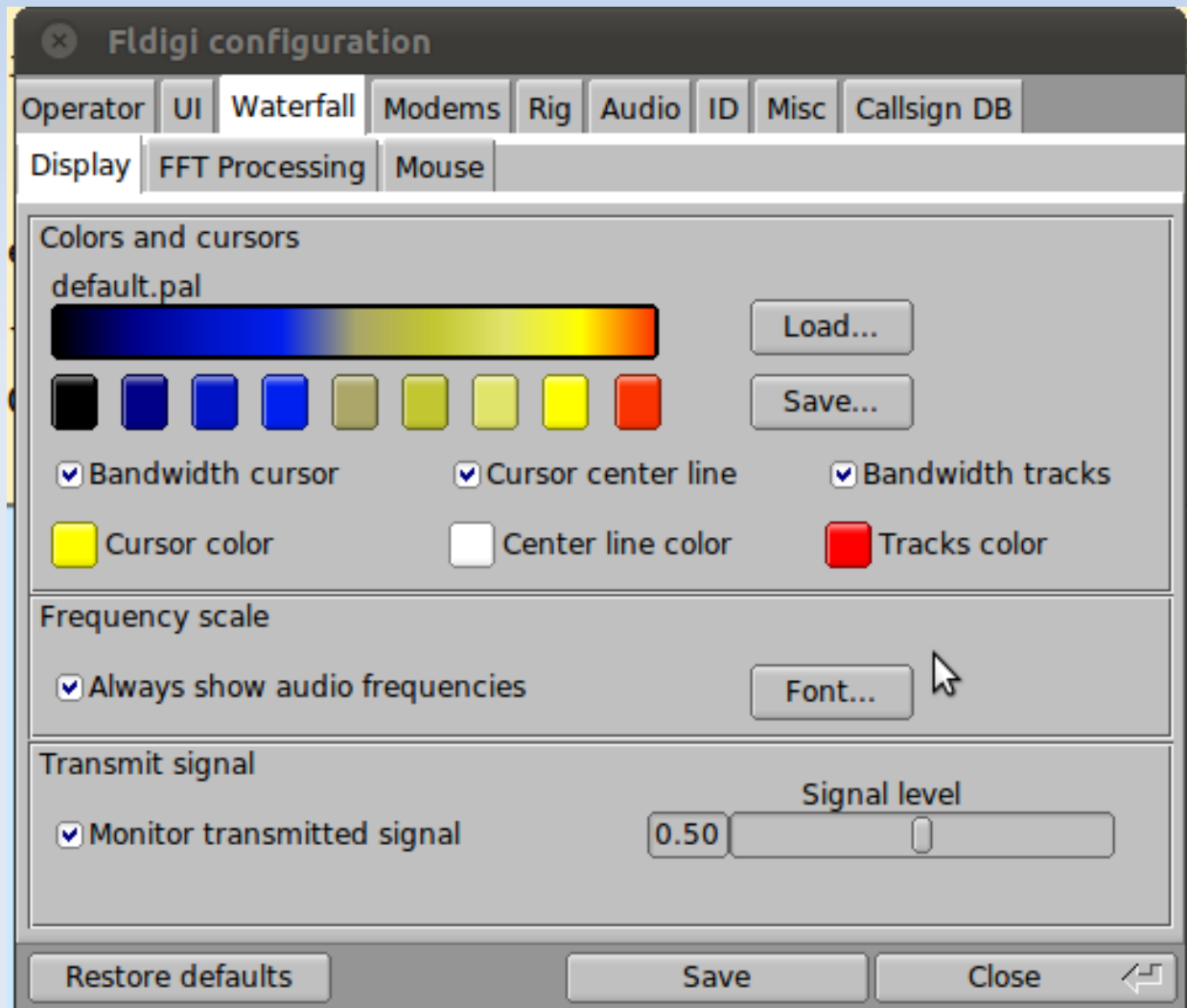


The image shows a screenshot of the 'Fldigi configuration' dialog box, specifically the 'Station' tab. The dialog box has a title bar with a close button and the text 'Fldigi configuration'. Below the title bar is a tabbed interface with the following tabs: 'Operator', 'UI', 'Waterfall', 'Modems', 'Rig', 'Audio', 'ID', 'Misc', and 'Callsign DB'. The 'Station' tab is selected and contains the following fields:

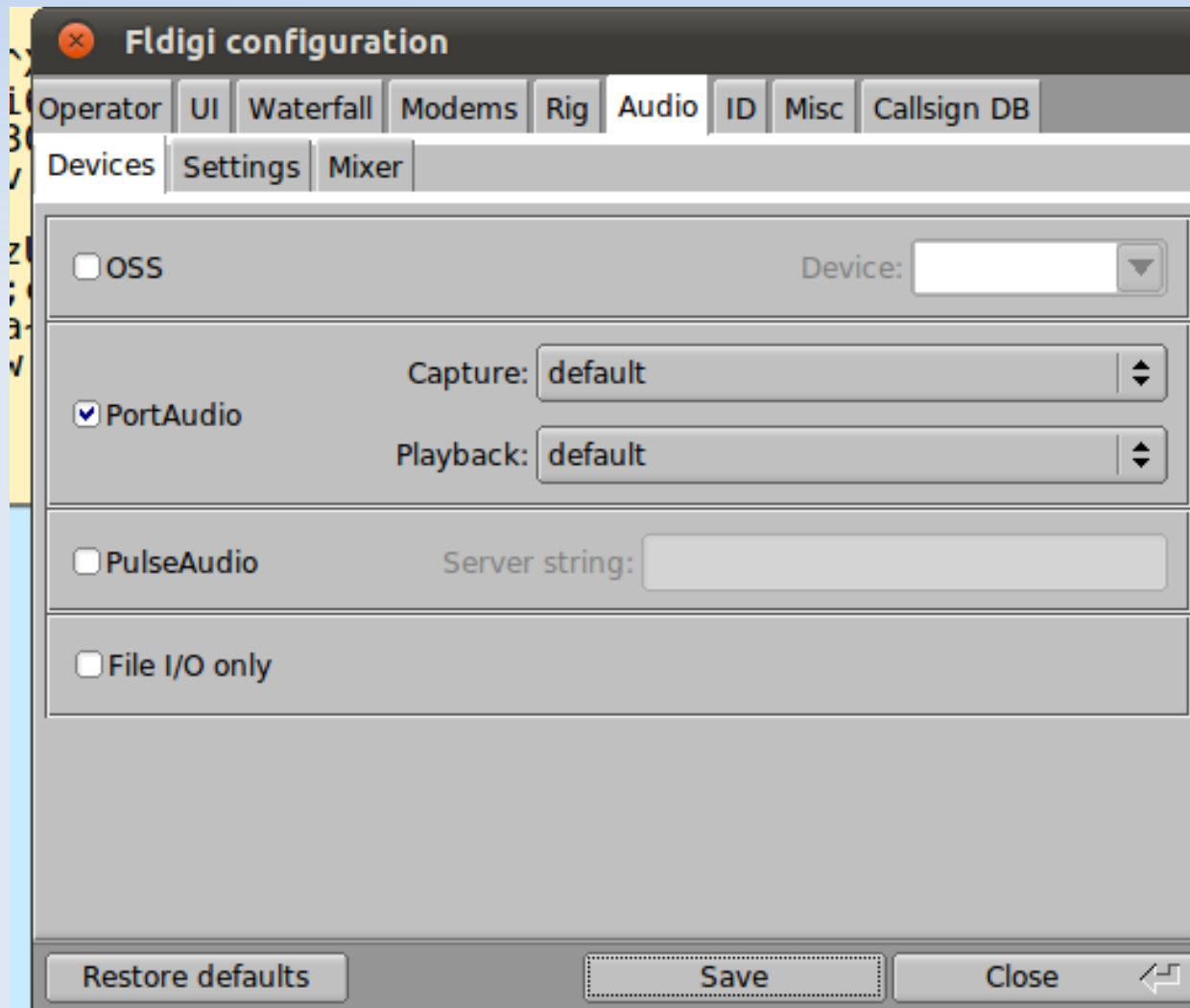
- Callsign:
- Name:
- QTH:
- Locator:
- Antenna:

At the bottom of the dialog box, there are three buttons: 'Restore defaults', 'Save', and 'Close'. The 'Save' button is highlighted with a dotted border.

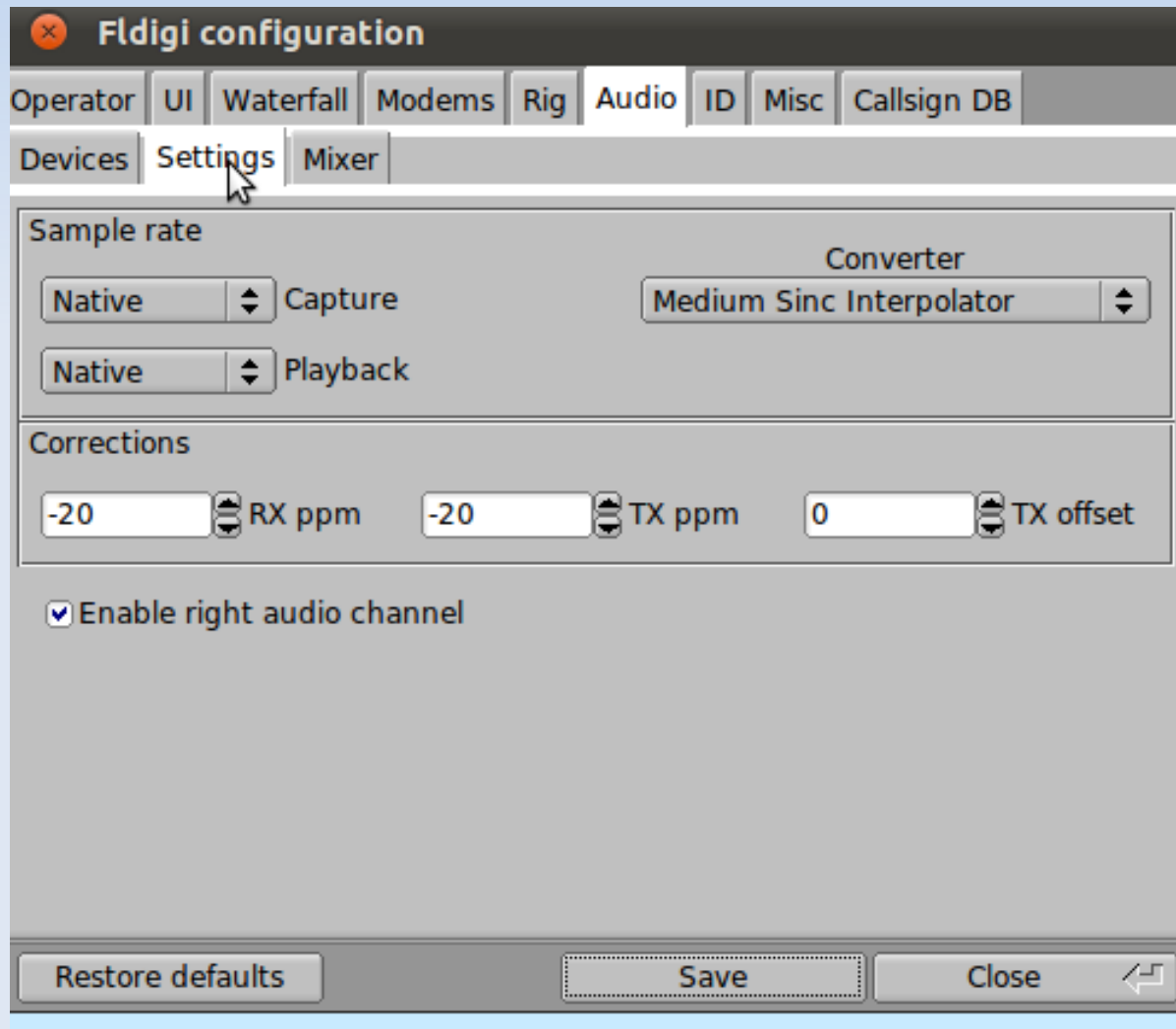
Waterfall > Display



Audio Devices



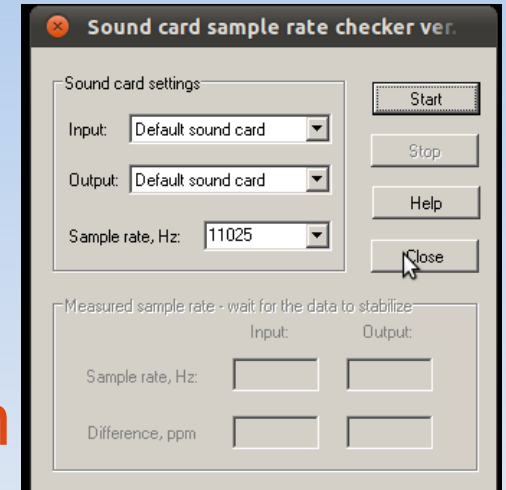
Audio > Settings



Audio Settings

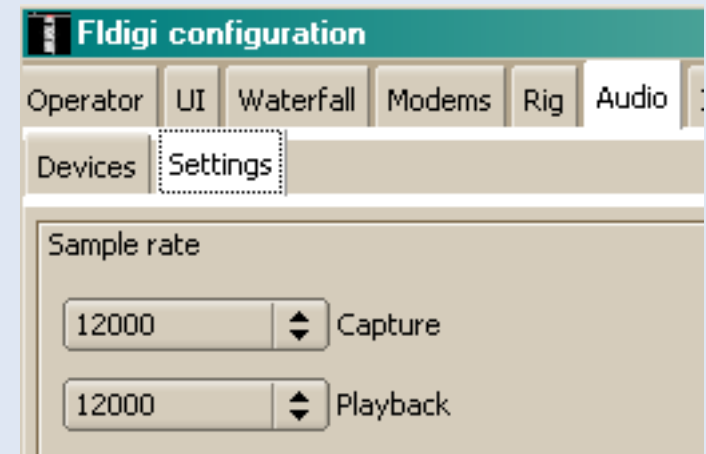
Check Sound Card with CheckSR

http://panbems.org/fldigi_calibration.htm

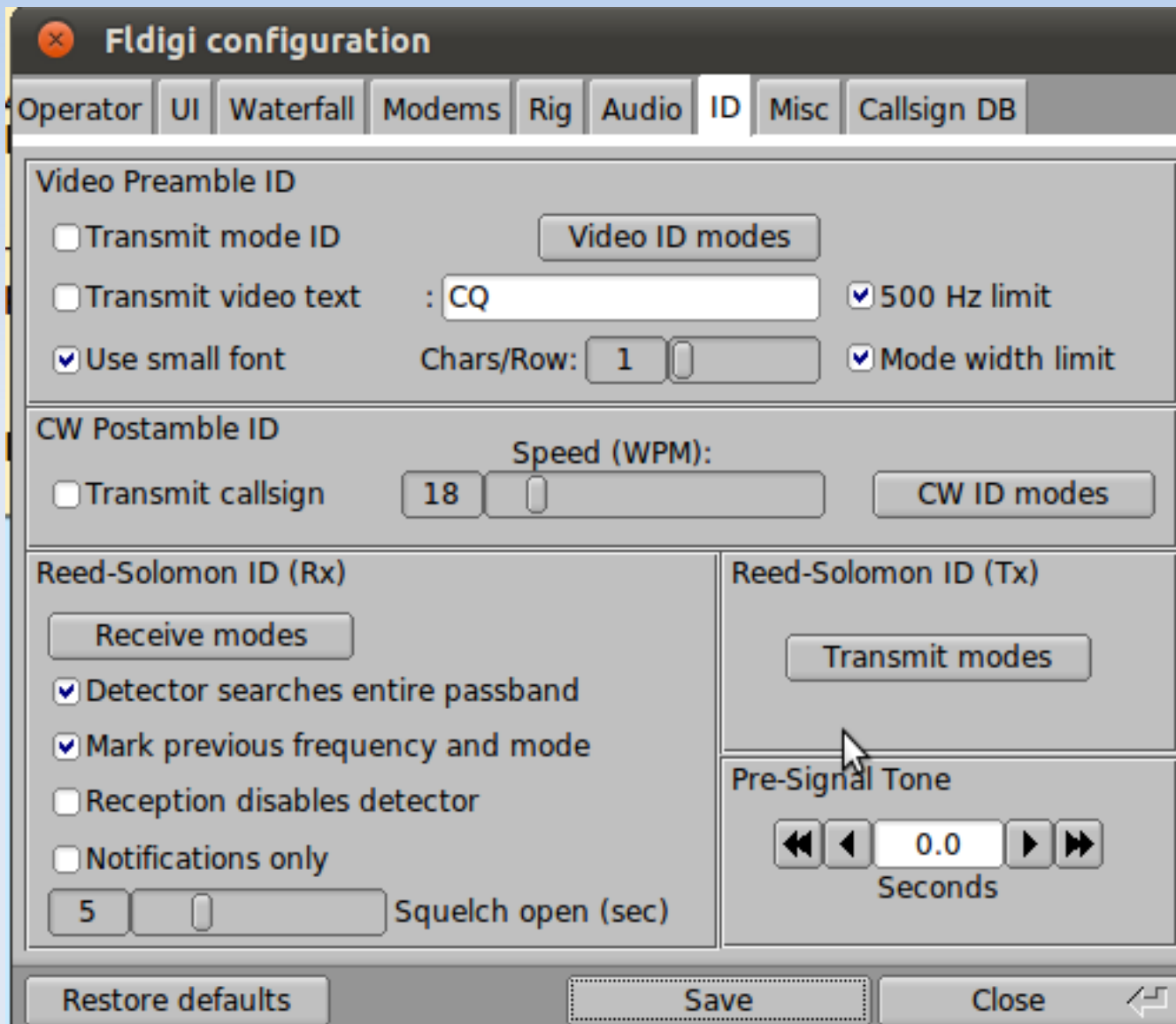


Some setups experience errors with the “Sample Rate” set to “Native” on the Settings Tab

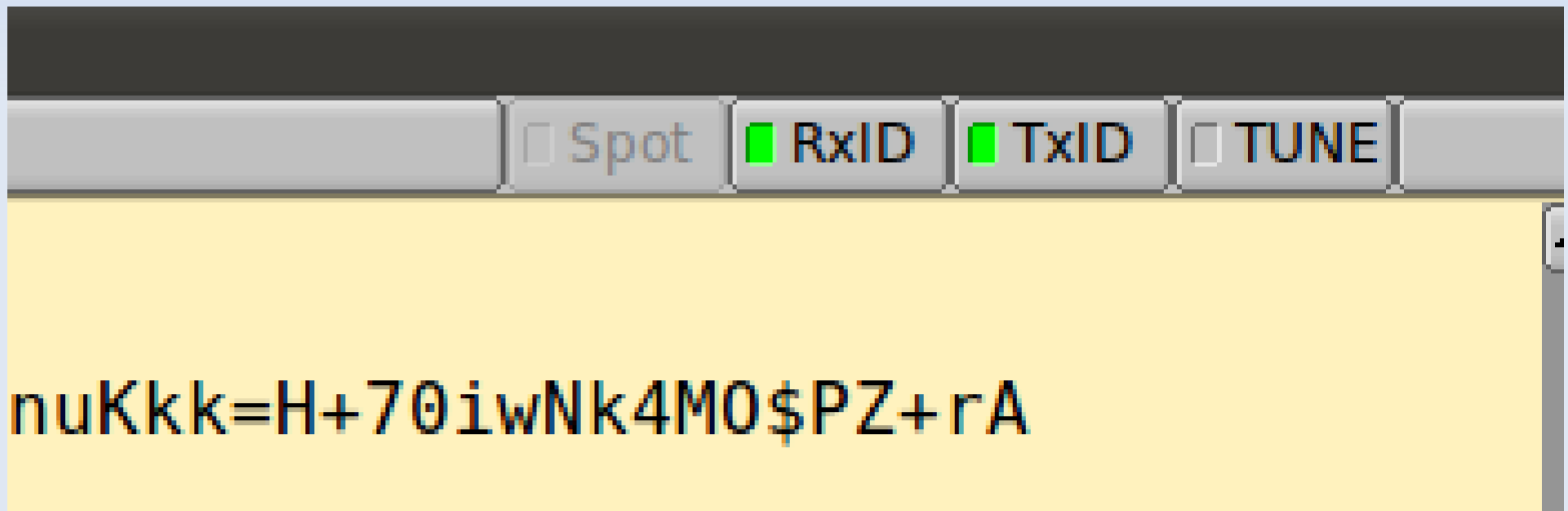
Try 12000 or 16000 avoid 11025



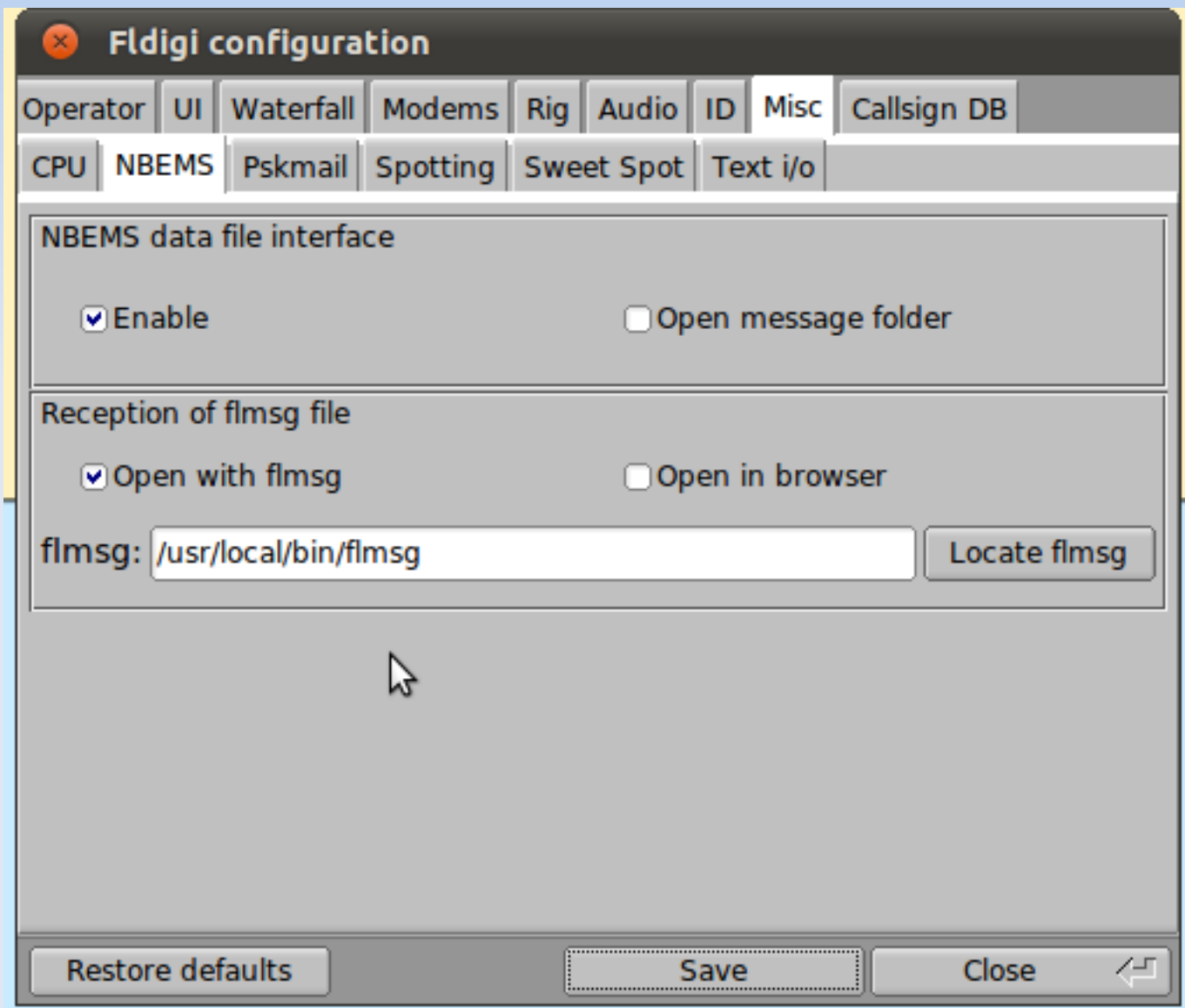
RxID and TxID



RxID & TxID on Title Bar






NBEMS Settings



Clean Display

View Logbook He

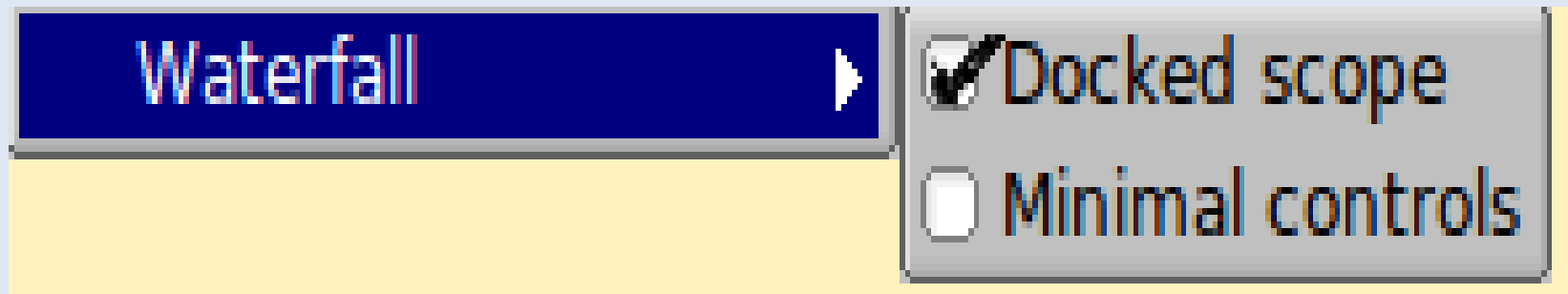
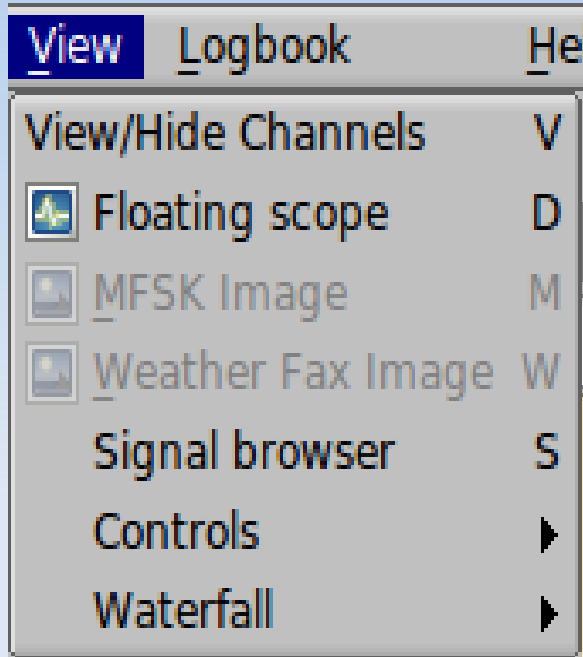
- View/Hide Channels V
-  Floating scope D
-  MFSK Image M
-  Weather Fax Image W
- Signal browser S
- Controls ▶
- Waterfall ▶

Controls ▶

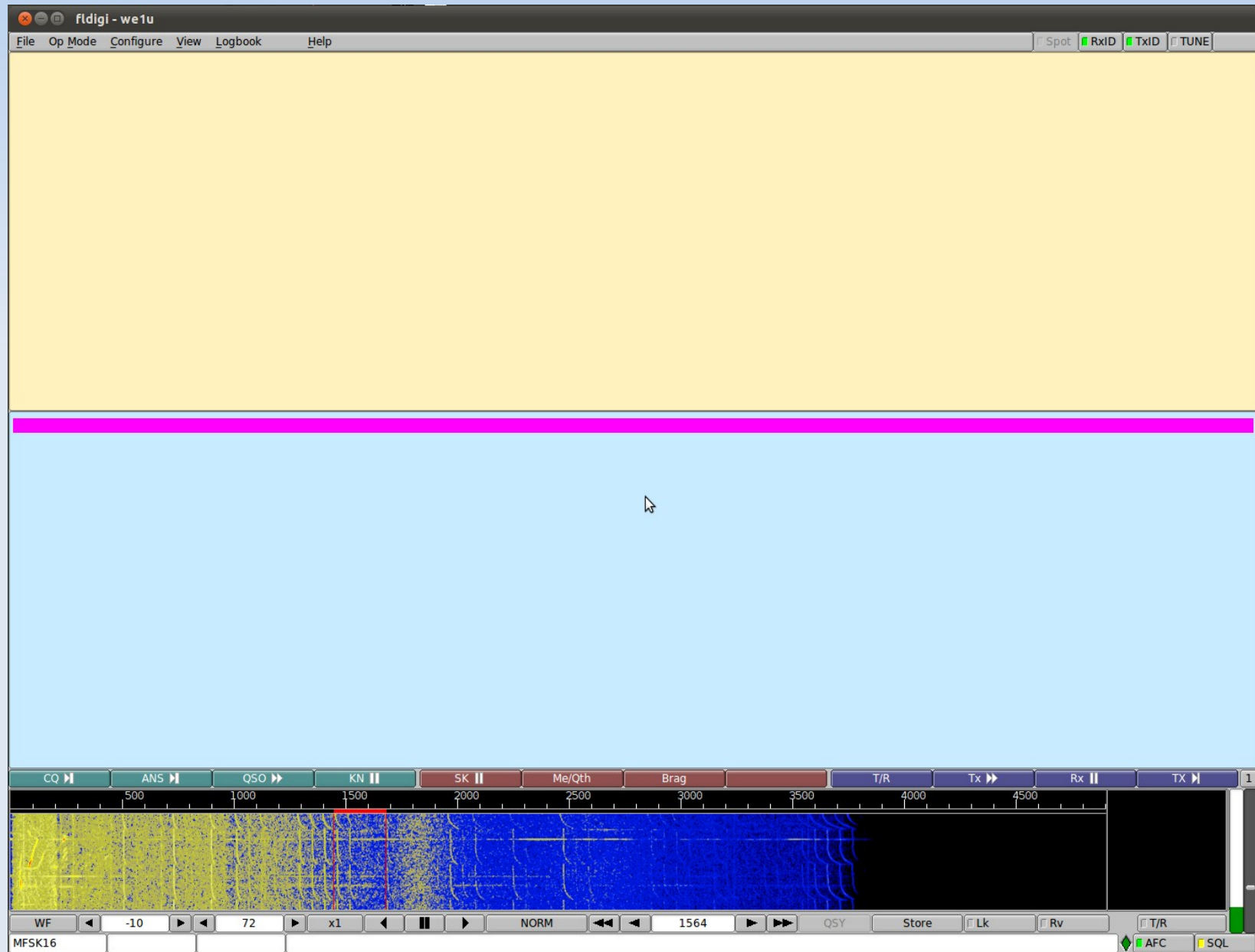
Waterfall ▶

- Full
- Rig control and logging
- Rig control and contest
- None
- Contest fields C

Docked Scope



End up like this



Setup Test

Set fldigi to “CW” mode

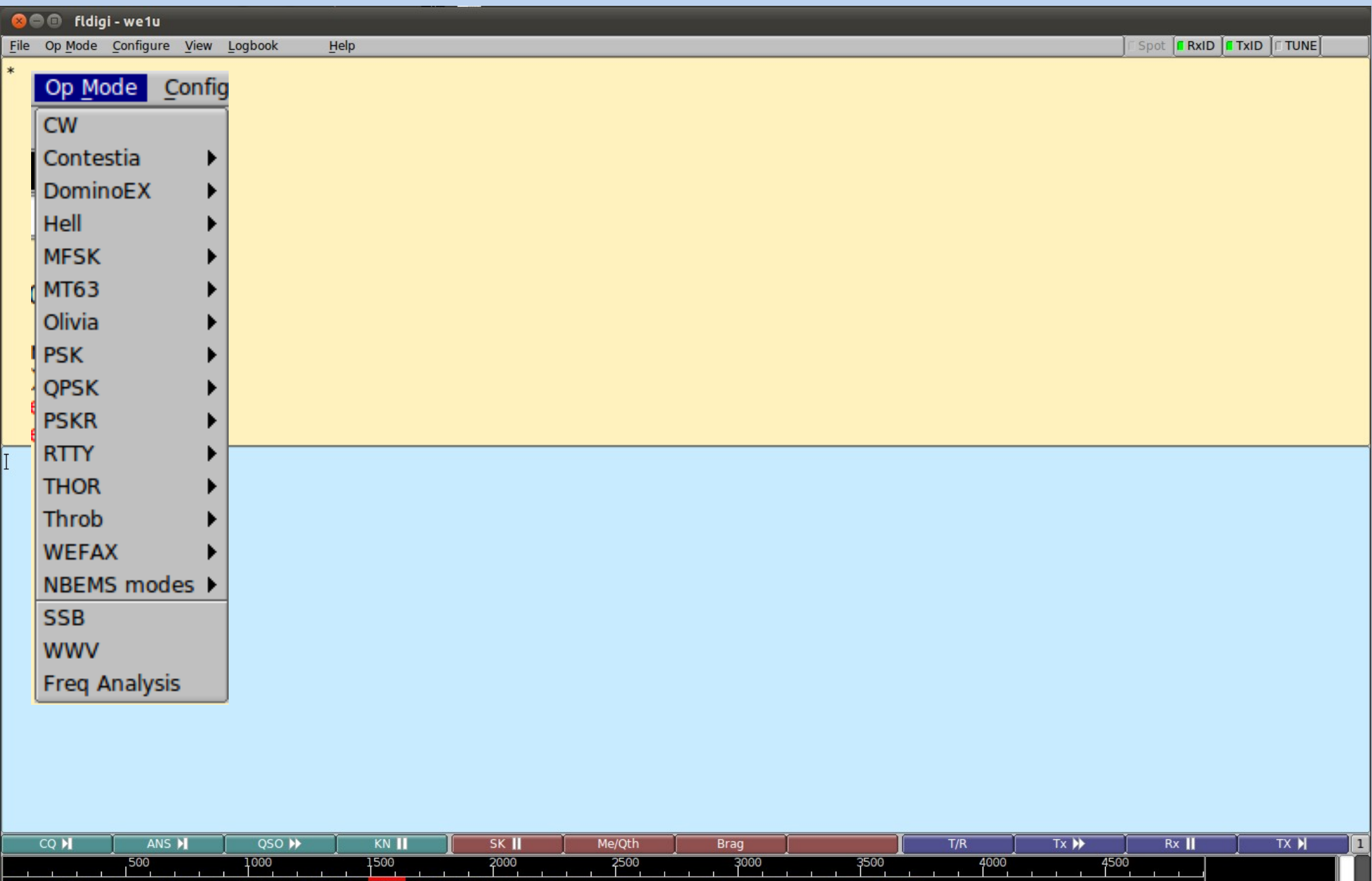
Use the “CQ” macro

Adjust Mixer for Audio Volume Level

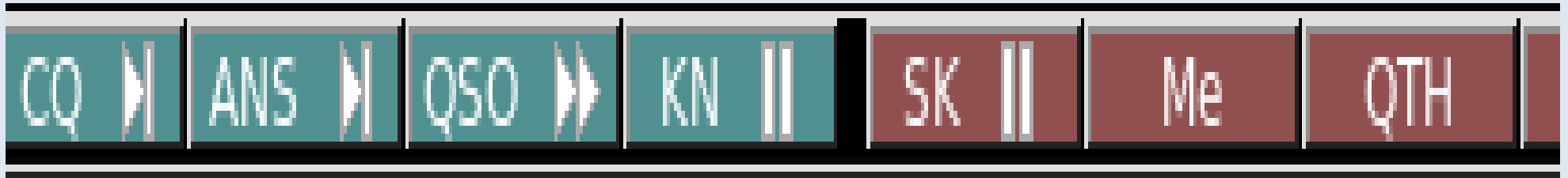
Calibrate Soundcard

Correcting Sample Rate

Set Op Mode to CW



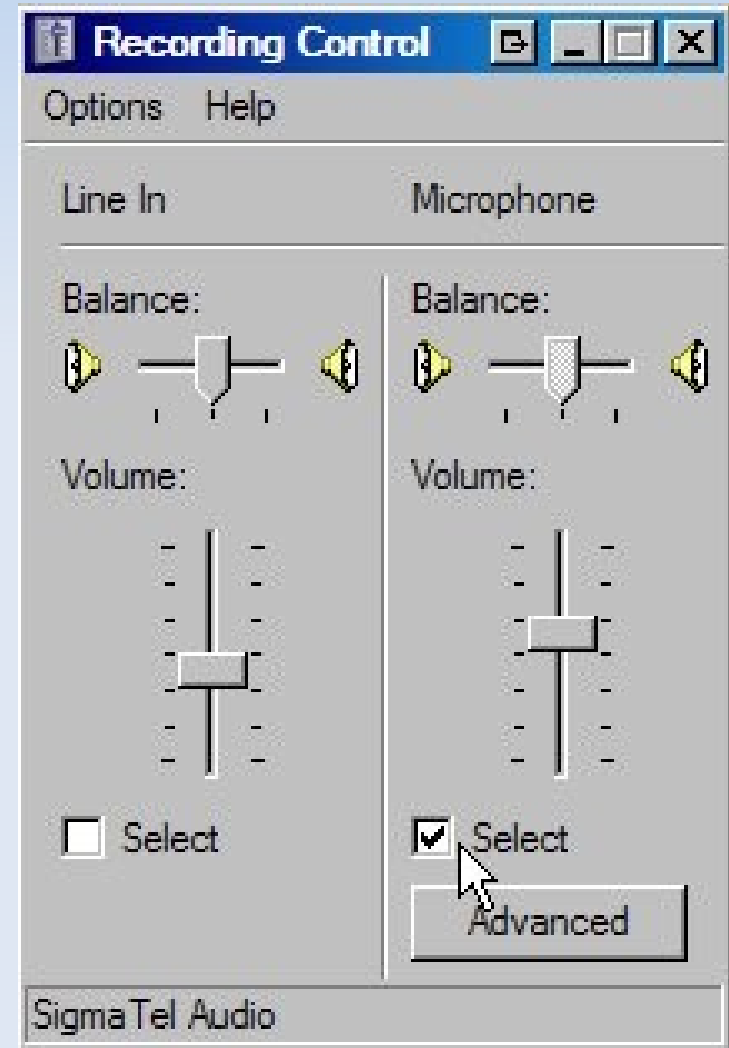
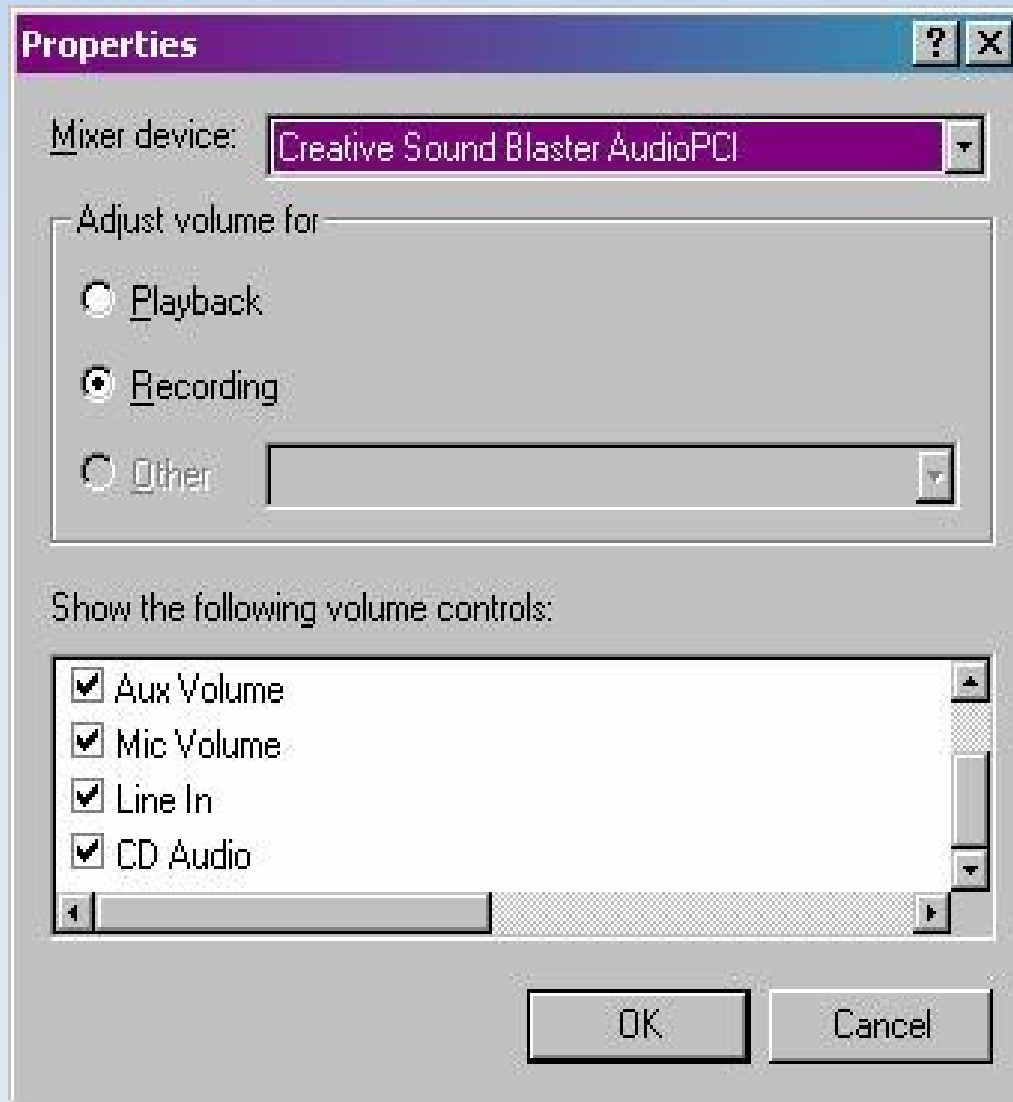
Click the “CQ” Button



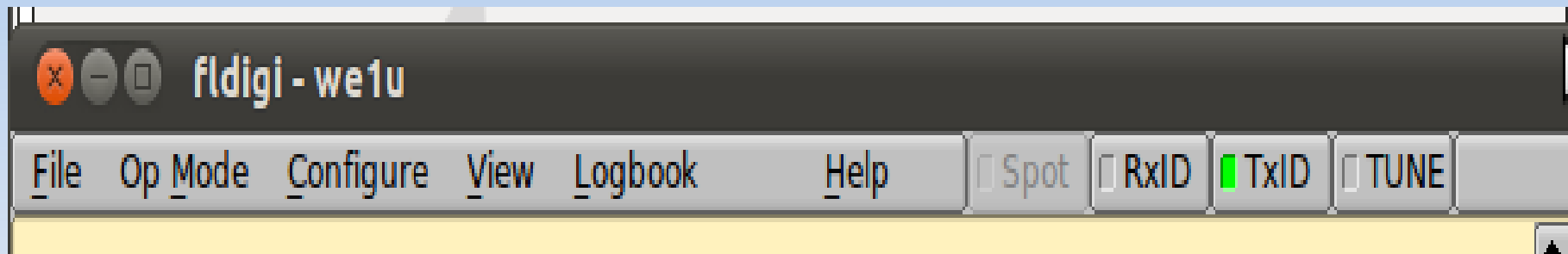
Right-click on Speaker for Volume Control options... aka the Mixer



Audio Levels



“TUNE” to help set Audio Levels

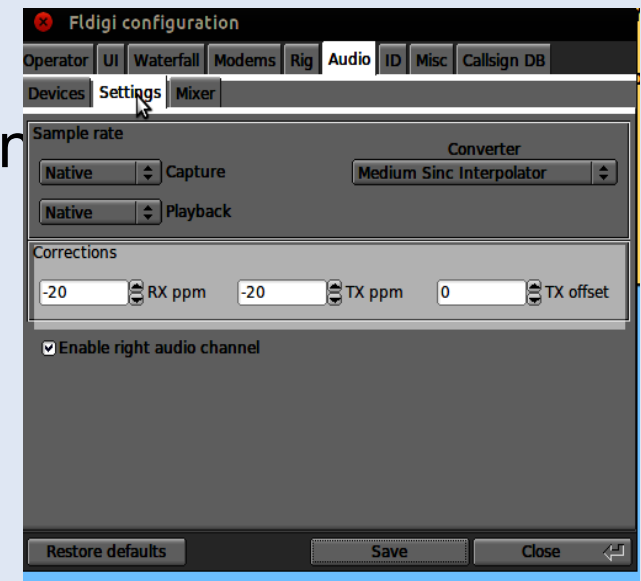


- “Tune” Button upper right corner
 - Generates a continuous single frequency audio signal at the exact frequency to which the waterfall cursor has been set.
 - Peak amplitude of this signal is the peak amplitude of every modem signal generated by fldigi.

Not all Sound Cards are Equal

Adjust(Correcting) sound cards using:

- Time Standard Station in AM, no DSP etc
 - WWV 5, 10 ,15, 20MHz or
 - CHU 3.330, 7.850, and 14.670MHz
- Adjust Corrections in Audio > Settings tab
 - Using the WWV Mode or
 - MMSSTV Calibration Function



MMSSTV Soundcard Calibration

WE1U (WE1U.MDT) - MMSSTV Ver 1.13A

File Edit View Option Profiles Program RadioCommand Help

Sync RX History TX Template

TX Mode

- Auto
- Robot 36
- Robot 72
- AVT 90
- Scottie 1
- Scottie 2
- ScottieDX
- Martin 1
- Martin 2

1000

Log

Call _____ His 595 My _____

Name _____ Qth _____

Note _____

RxID _____ TxID _____

List 14.230

1/17

Setup MMSSTV

RX TX Misc

Sound Card

In Default

Out Default

FIFO

RX 12 TX 8

Priority

Normal Highest

Higher Critical

Source

Mono Right

Left Critical

Clock

11024.15 Hz Adj

Tx offset 0.00 Hz

WaterFall

L [] H []

History max

256

JPEG

Quality 80 %

Save window location

Always use DIB

System Font

Window Times

Jap

FFT

Background [Orange]

Signals [Yellow]

Trails [Blue]

Sync marker [Green]

Freq marker [Yellow]

Priority of MMSSTV

Normal Higher

Calibrating the Sound Card with a Time Standard Broadcast Station

1) Receive standard radio wave (e.g., WWV, BPM).

2) Tune into the tick sound.

3) Continue listening to the sound for a while. You have a vertical line.

4) Click the lower point of the line.

5) Click the upper point of the line.

You could use F4 for exact timing. OK Left button, Cancel Right button Clock=11025.17

Clock 11024.15 -76 ppm Tone 1000 AGC Gain [] OK Cancel

Installing MMSSTV

Download MMSSTV from:

<http://hamsoft.ca/pages/mmsstv.php>

Run the install program

Default setting are a safe bet

Clock Adjust function

Under “Option” Menu select “Setup MMSSTV”

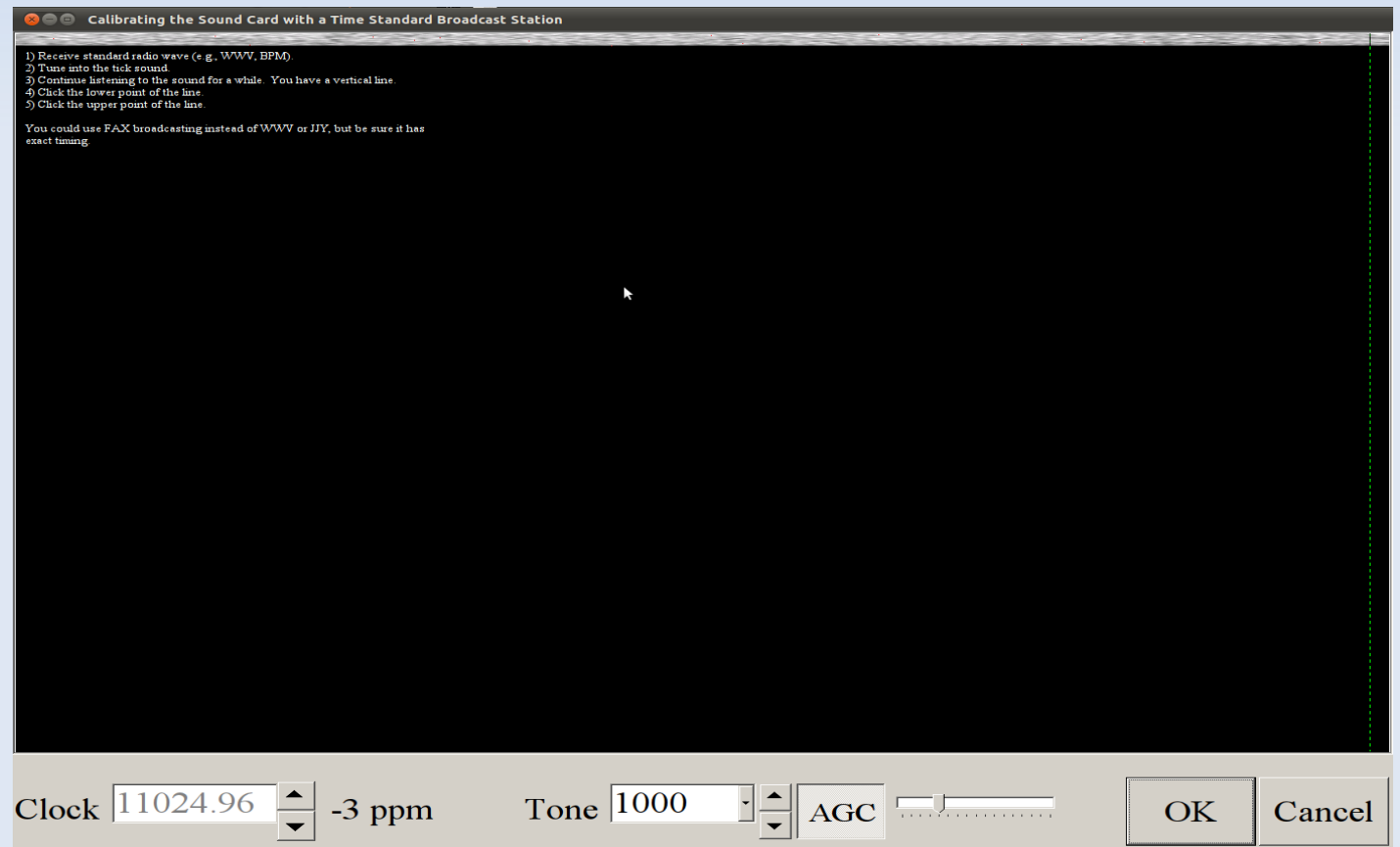
Click the “Misc” tab

Press the “Adj” button in Clock section



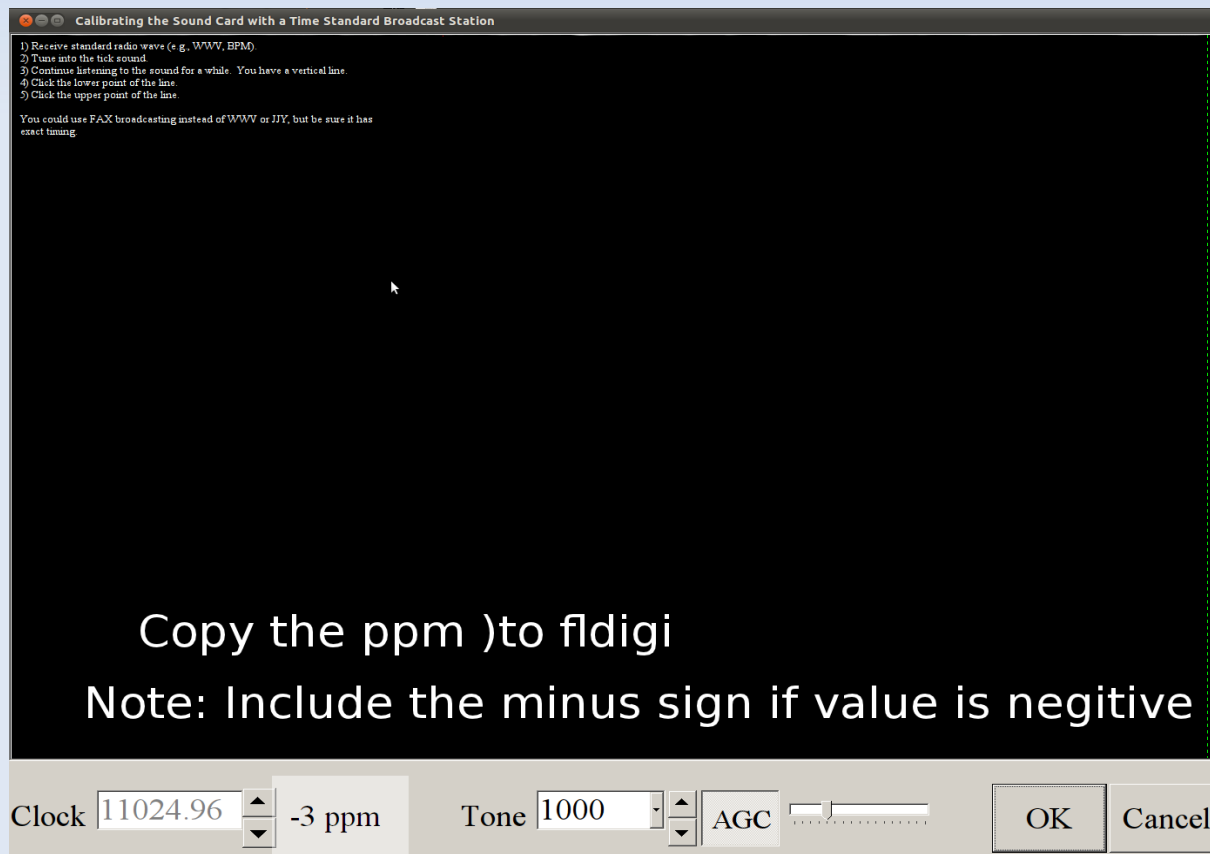
MMSSTV Calibration Screen

Maximize the Calibration Screen and Follow the Instructions



Copy the ppm for fldigi

Reopen the Calibration Function and copy the ppm from the bottom left to fldigi



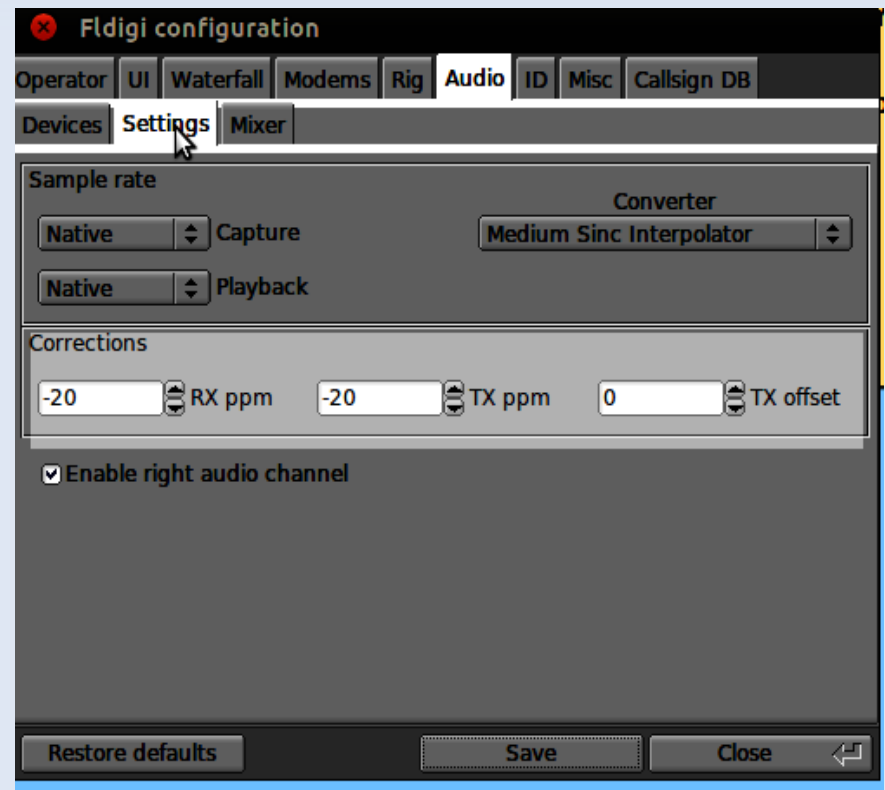
Enter ppm Value in Audio > Settings

Enter ppm into the Corrections Section

In both Rx ppm and

Tx ppm boxes

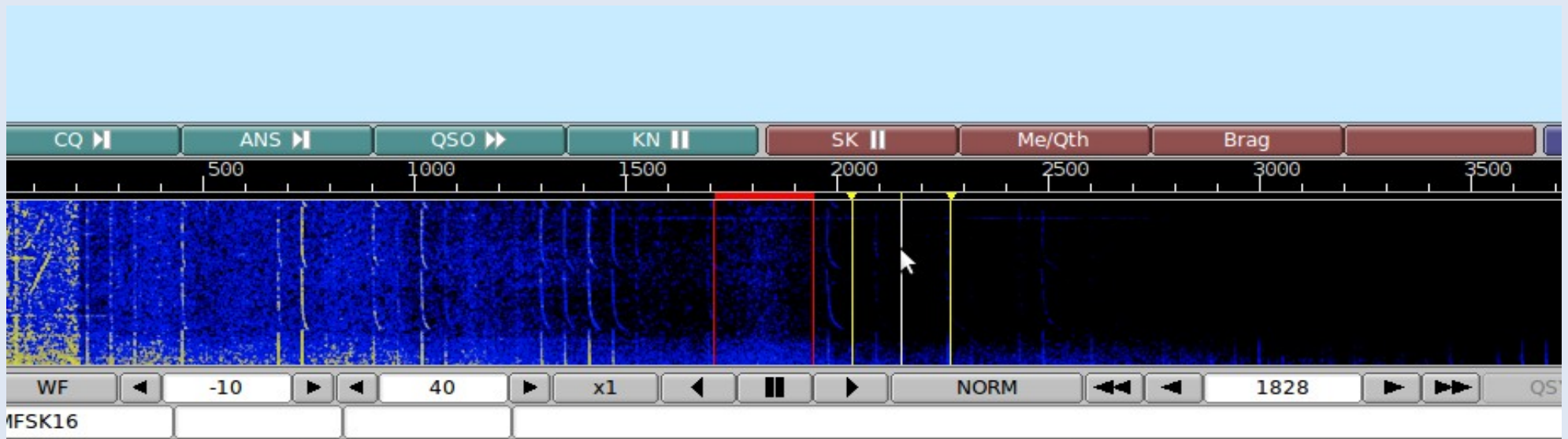
And click on the “Save” button



Waterfall Center Point

Fldigi decodes at the Waterfall's Center Point, in the center of the red outline area (bandwidth)

The Waterfall's Cursor, the three yellow lines to right, can move it by clicking anywhere in Waterfall Display.



Now for a trick

Open flmsg (Radiogram Icon)

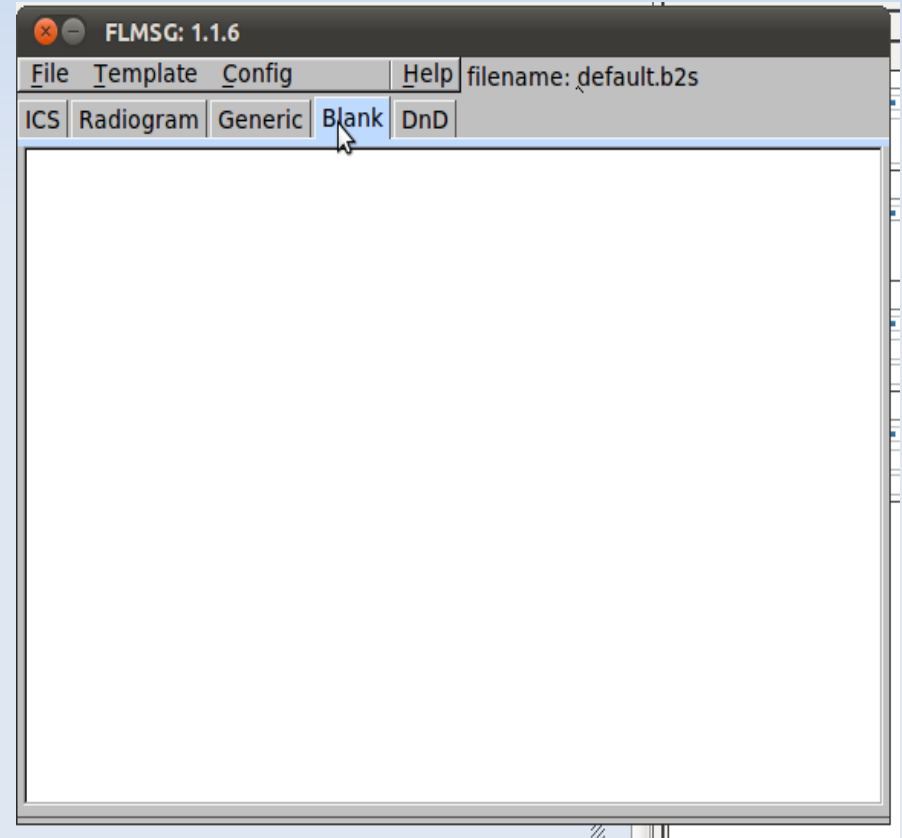
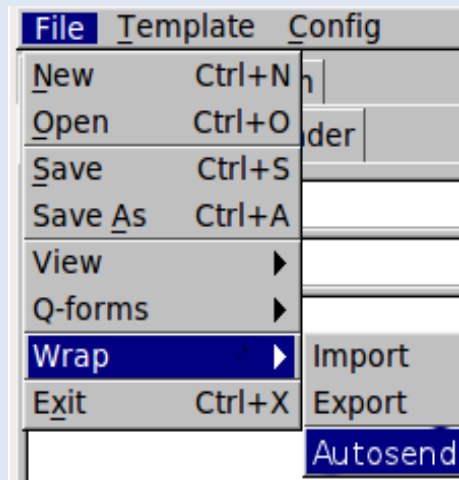


Select Blank form tab

Write a note

Then

- Autosend
- Save the form file



Message automation

The screenshot shows the fldigi software interface with a message automation script being executed. The main window displays the following text:

```
100 [WRAP:beg][WRAP:Lf][WRAP:fn WE1U-1.b2s]<flmsg>1.1.6
<blankform>
:mg:261 Open FLDigi
Enter "MT63-2000" Op-Mode
Open Flmsg
Enter message in FLmsg:

Maine ARES Statewide Frequencies
80m 3950kHz
40m 7262kHz
2m 146.520MHz
440 446.000MHz

File > Wrap > Autosend
Message Message is sent to FLDigi via FLwrap for checksum
FLdigi transmits

[WRAP:chksum 8F91][WRAP:end]
.....end
```

A smaller window titled 'FLMSG: 1.1.6' is open, showing the same script content:

```
FLMSG: 1.1.6 filename: WE1U-1.b2s
File Template Config Help
ICS Radiogram Generic Blank DnD

Open FLDigi
Enter "MT63-2000" Op-Mode
Open Flmsg
Enter message in FLmsg:

Maine ARES Statewide Frequencies
80m 3950kHz
40m 7262kHz
2m 146.520MHz
440 446.000MHz

File > Wrap > Autosend
Message Message is sent to FLDigi via FLwrap for checksum
FLdigi transmits
```

The bottom of the screenshot shows the software's control panel with various buttons and a frequency display.

MT63-2000

- Orthogonal Frequency Division Multiplexed
- 64 parallel carriers
- Differential BPSK modulated
- Tolerant of tuning
- This mode requires a very linear transmitter.
- Over-driving leads to excessive bandwidth and poorer reception.
 - <http://www.w1hkj.com/FldigiHelp-3.21/MT63.html>

Olivia

- Forward Error Correction
- Robust mode with low error rates
- The penalty can be an annoyingly slow transfer
- The default calling mode is 32-1000
 - 31.25 baud 1000Hz Bandwidth 24WPM

Contestia

- Derived from Olivia that is not quite as robust
- About twice as fast as Olivia
- Performs very well under weak signal conditions
- Handles QRM, QRN, and QSB very well also
- It decodes below the noise level
- Smaller 6-bit Character Set-Upper Case Only
- Most common modes: 250/8, 500/16, and 1000/32

Multi-frequency shift keyed (MFSK)

- A single carrier of constant amplitude is stepped in a constant phase manner. As a result, **no unwanted sidebands are generated**, and no special amplifier linearity requirements are necessary.
- The tones selected are set by the transmitted (4 or 5 bit) bit pattern and a gray-code table.
- Forward Error Correction, so it is very robust
- Tuning must be very accurate.

MFSK-16 Pictures

- Grayscale(B/W) and 24-bit color
- Double and Quadruple Speed is available
- $\text{Time(sec)} = W * H / 1000$ for grayscale
 - $320 \times 240 = 77$ seconds
- $\text{Time(sec)} = W * H * 3 / 1000$ for color
 - $240 \times 180 = 130$ seconds



Interfaces

- Soundcard Interface
 - Acoustical mike to speaker
 - <http://www.kc2rlm.info/soundcardpacket/index.html>
 - <http://sites.google.com/site/kh6tyinterface/>
 - <http://www.qsl.net/wm2u/interface.html>
- Rig Control
 - <http://www.iv3sbe.webfundis.net/html/Cat.htm>
 - http://www.qsl.net/4s7ab/MixW_ptt.htm

Resources

- FLDigi home page

- <http://www.w1jkj.com/>

- Western Pennsylvania NBEMS

- <http://panbems.org/>

- ARRL Digital Mode Page

- <http://www.arrl.org/digital-data-modes>

- MMSSTV

- <http://hamsoft.ca/pages/mmsstv.php>

Remember

RF can cause problems with touchpads

Try a cordless mouse

Use USB on all HF Bands

The Audio + USB = correct signal

Do Not overdrive transmitter

Explore and Have Fun