

Introduction to NBEMS



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Why Digital EmComm?

- Think back to your last public service event, drill, or deployment.
- You probably passed a lot of traffic best suited for voice communications but...
- What if you had been asked to pass
 - Roster of evacuees
 - Required prescription medications
 - Directions to a disaster scene

Why Digital EmComm?

- The needs of our Served Agencies have changed.
- They still need voice communications but...
- There's an increasing need for data communications.
- We need to be able to provide more than just voice communications from a ham with an HT.

What is NBEMS?

- Narrow Band Emergency Messaging System
- Consists of four 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
- Can download from <http://www.w1hkj.com/>
- Runs on Windows, Linux, and Mac.
- Released under GNU Public License, so is completely FREE.

NBEMS philosophy

- Keep it cheap.
- Keep it simple.
- Use Open Source software.
- Don't depend upon infrastructure.
- Make it fun to use between drills and disasters.
- Any computer, any radio.

Fldigi

The screenshot displays the Fldigi software interface. At the top is a menu bar with options: File, Op Mode, Configure, View, Help, Spot, RxID, TxID, TUNE. Below the menu bar, the rig is identified as 'RigCAT - IC-7000'. A call log table is visible with the following columns: QSO Freq, On, Off, Call, Name, In, Out, Notes. The first entry shows a frequency of 3582.500 (highlighted in green), a QSO frequency of 3583.500, and an off-frequency of 0158. Below the table are fields for QTH, St, Pr, Cnty, Loc, and Az. A large light blue text input area is present below the call log. At the bottom, there is a frequency display showing 3583.0 to 3585.0 kHz, a waterfall plot, and a control panel with buttons for CQ, ANS, QSO, KN, SK, Me/Qth, Brag, PSK31, Tx, Rx, Olivia, MT63, WF, -20, 70, x1, NORM, 1000, QSY, Store, Lk, Rv, T/R, OLIVIA 8/500, AFC, and SQL.

| QSO Freq | On | Off | Call | Name | In | Out | Notes |
|----------|----|------|------|------|----|-----|-------|
| 3582.500 | | 0158 | | | | | |

How it works

- Fldigi uses your computer's sound card to generate and decode digital signals.
- Flmsg talks to Fldigi to send and receive messages.
- All work is done by your computer, don't need an external Terminal Node Controller (TNC).
- Audio from your computer speakers go into your radio's mike input for transmission.
- Audio from your radio goes into your computer's mike or line-in for decoding.
- Don't need an extremely powerful new computer, older machines work just fine.

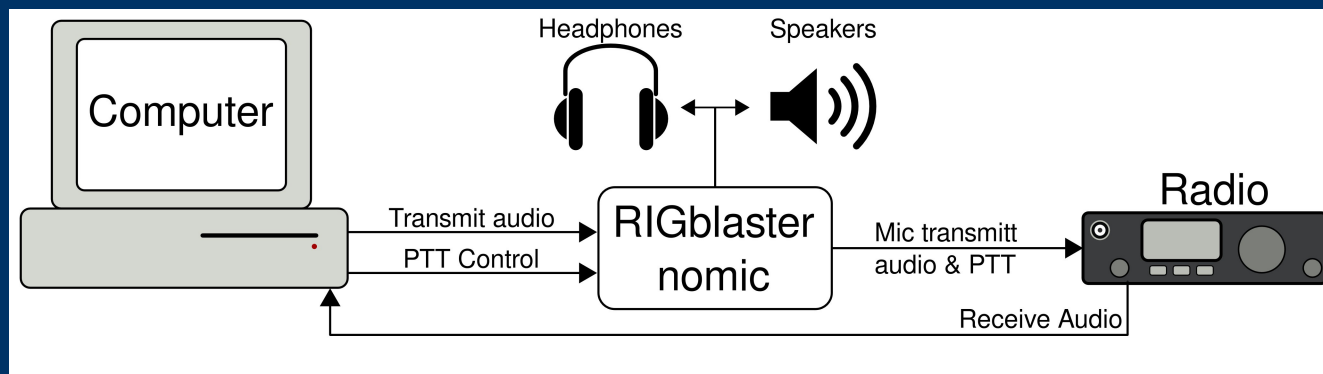
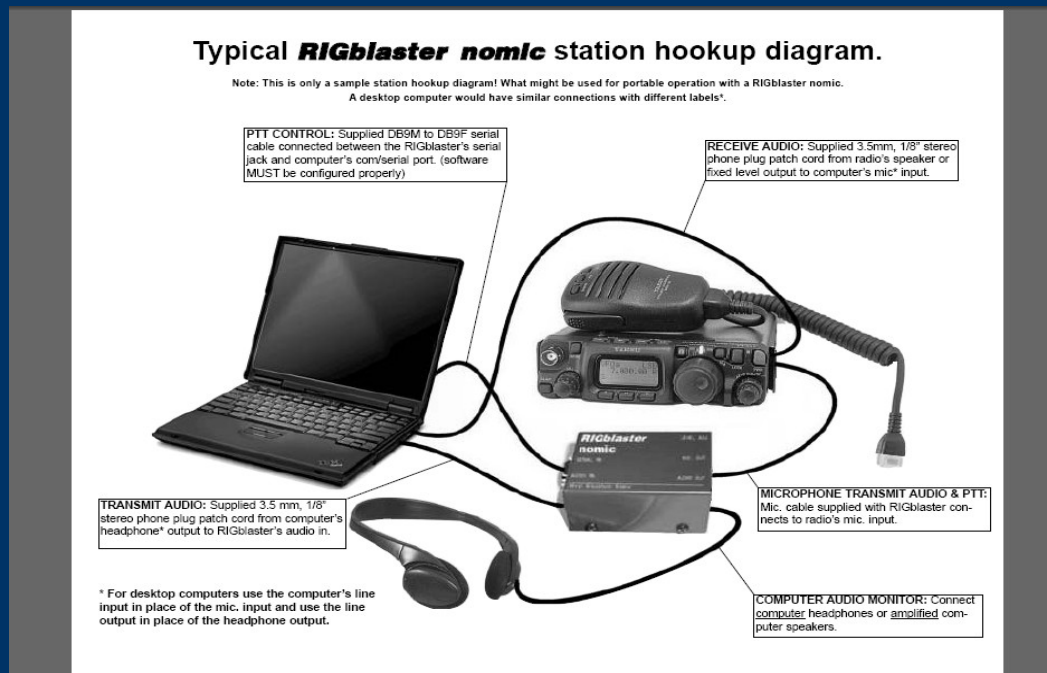
Interfacing with computer

- Many ways to interface with computer.
- Rigblaster
- Signalink
- USB for newer HF radios.
- But, if necessary, hold radio mike up to computer speaker and...
- Hold radio speaker up to computer mike!
- In an emergency, don't really need hardwired interface.
- Disable all DSP “enhancement” programs on mic.

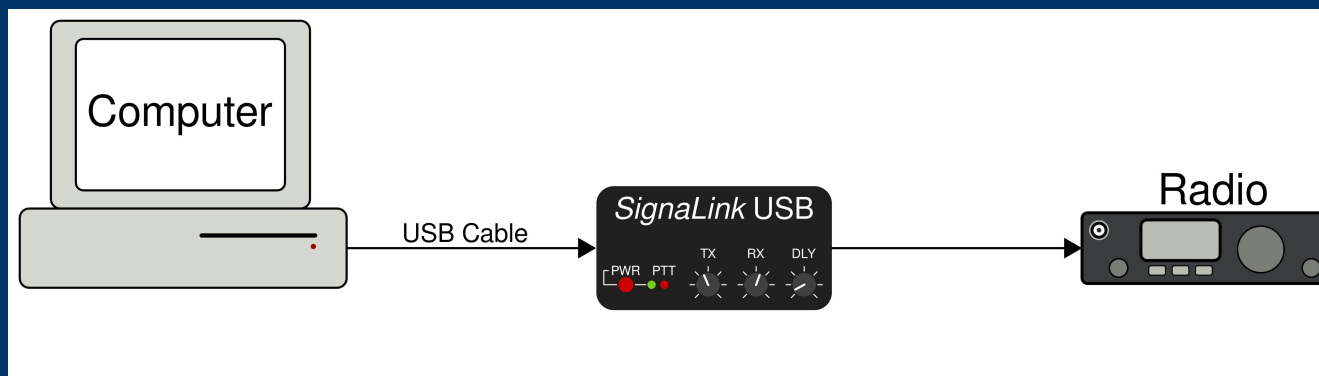
Acoustic Interface

- Easiest way to interface radio to computer is to...
- Hold radio mike up to computer speakers.
- Hold radio speaker up to computer mike.
- You do PTT manually.
- Works especially well with VHF/UHF FM.
- Real gamesaver during emergencies.
- Allows you to easily send data using any radio.
- Hams can participate who do not have a soundcard interface.
- MT63 is sufficiently robust to deal with background noise, even in a noisy EOC or field site.

Rigblaster nomic setup



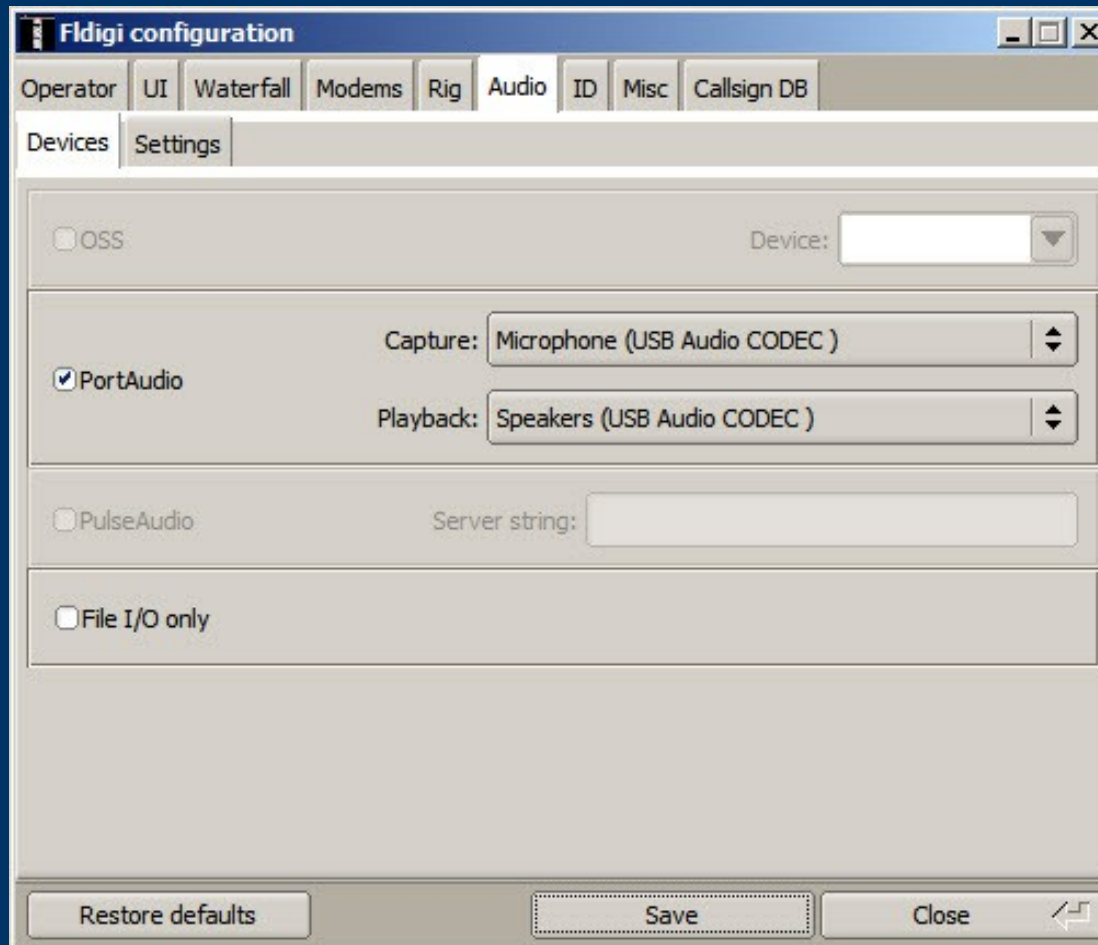
Signalink USB



Signalink Configuration

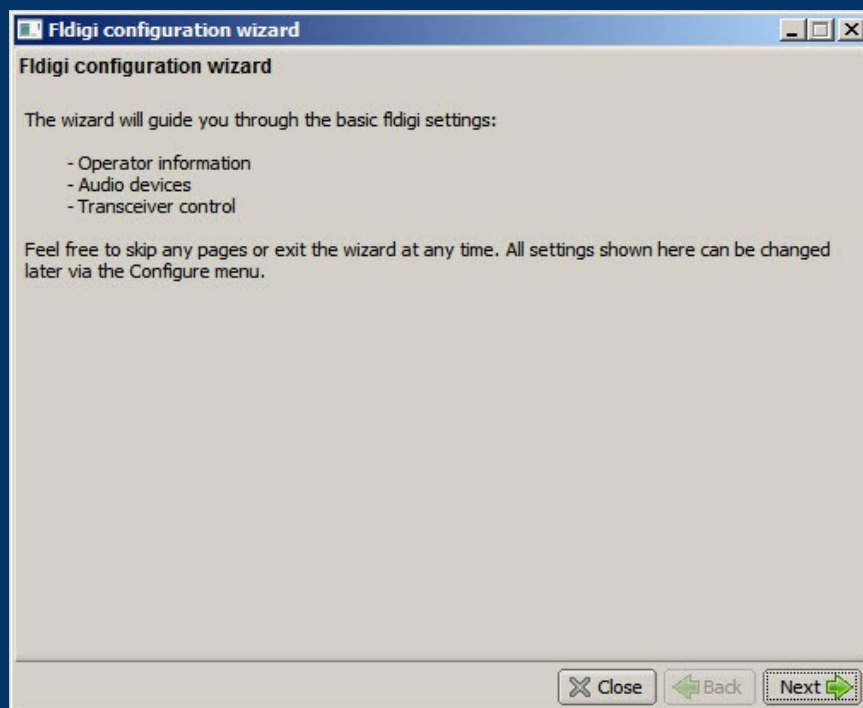
- Signalink is very easy to configure.
- Just connect to computer via USB.
- Configure Fldigi to use Signalink USB sound card.
- Generate just enough audio from computer to trigger Signalink vox.
- Use volume controls on Signalink and don't touch computer audio settings

Signalink Configuration



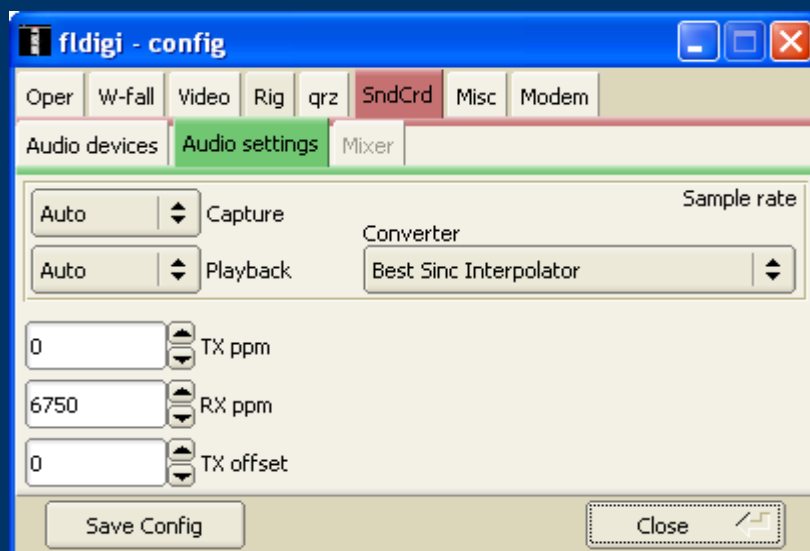
Configuring Fldigi

- First time through, wizard is run.
- Enter your personal info.
- Also configure soundcard, radio interface, and modems.



Soundcard Calibration

- If possible, calibrate your soundcard.
- Especially necessary for narrowband HF modes.
- Can use fldigi WWV mode or CheckSR.exe.



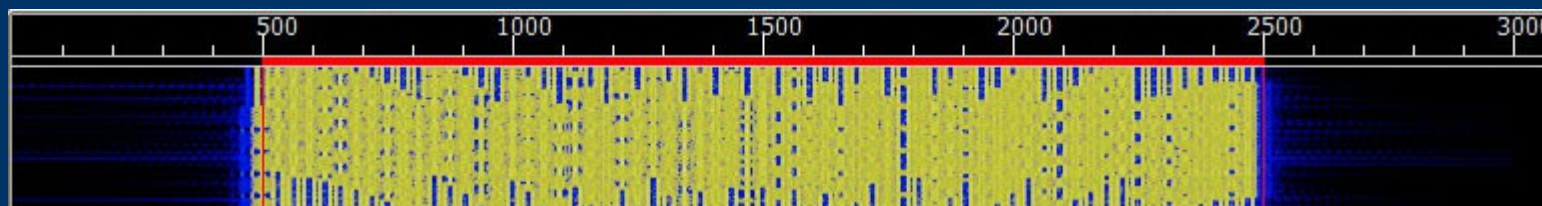
Modes

- Lots of modes, most popular ones are...
- MT63 (500, 1000, 2000)
- Olivia
- “R” PSK modes...fast with FEC
- Popular PSK31 OK for making non-emcomm contacts, but has no error correction.

MT63 – Most Versatile Mode

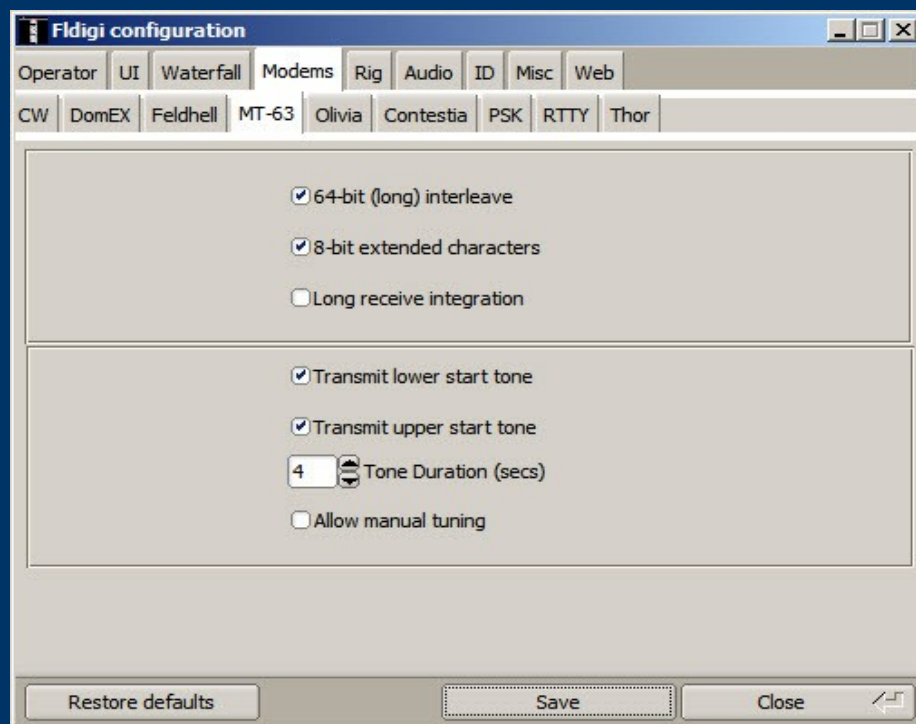
- MT63-2000 great choice for FM EmComm.
- Fast – less than 2 min to send 2kb text file.
- Data redundancy in time and in frequency.
- Used by MARS.
- Very resistant to noise – can lose up to 25% of signal and still copy.
- Works well with holding mike up to speaker.
- Used in WPA ARES SET and Red Cross drills.

MT63-2000 Waterfall



- 64 tones sent at same time.
- Signal width is 2000 Hz.
- Offset frequency is always fixed at 1500 Hz.
- Fixed low frequency eliminates tuning errors.
- Sounds like a giant buzzsaw.

Important MT63 configuration



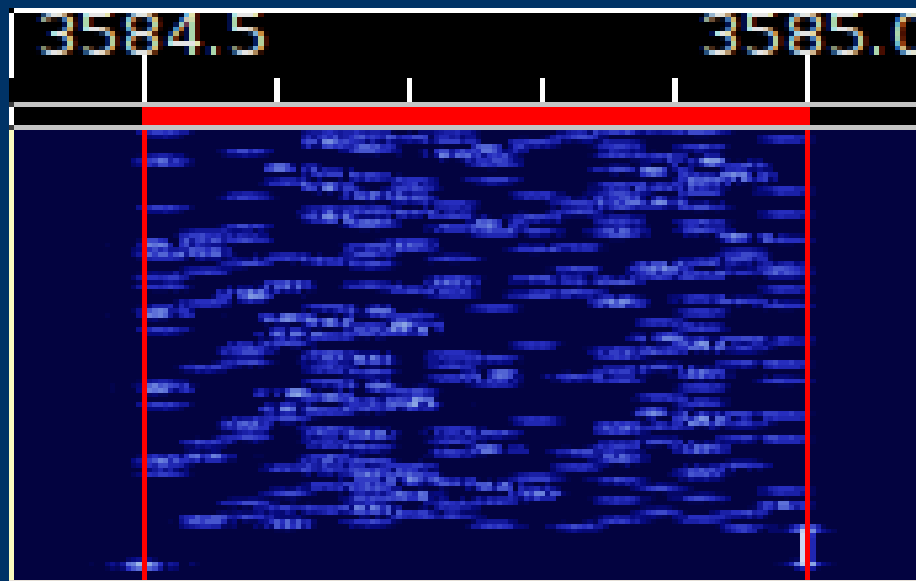
- Be sure to set 64 bit interleave and 8-bit char.
- Provides extra data redundancy.
- Both stations must have same interleave setting.
- Uncheck manual tuning for VHF/UHF.

HF modes

- Preferred HF mode is Olivia.
- Olivia is great for poor HF conditions.
- Will get through when no other mode will.
- Can make contacts below noise floor!
- Does not require precise tuning.
- We use 8/500 when possible – 8 tones in a 500 Hz bandwidth.
- When conditions are poor, we go to 16/500 – 16 tones in a 500 Hz bandwidth.
- 16/500 is slower, but will get through.
- Fine article in Dec 2008 QST by WB8ROL.

Olivia waterfall

- Screenshot of Olivia 16/500 signal in waterfall



- Unmistakable sound...like a flute!

HF Tips

- A few things to remember for HF operation.
- Always use upper sideband (USB), even on 40M and 80M.
- Don't overdrive your audio.
- Disable speech compressor, noise blanker, and all other audio processing.
- Adjust mike gain so that ALC just moves a little.
- Digital modes are 100% duty cycle so...
- 50 watts is plenty!
- RF kills touchpads...use an external mouse!
- Don't need high power for digital modes anyway.

Data Verification with Checksums

- Checksums allow you to be 100% sure your message was received accurately.
- Checksum is inserted into a file by Flmsg.
- Receiving station computes the checksum on the incoming file and...
- If the two checksums are identical, the file was received without error.
- Allows multiple stations to receive and confirm data 100%.
- Great for bulletins like situation updates, weather reports, road closures, lists of contact info.

Example

This is an example of a file with a checksum:

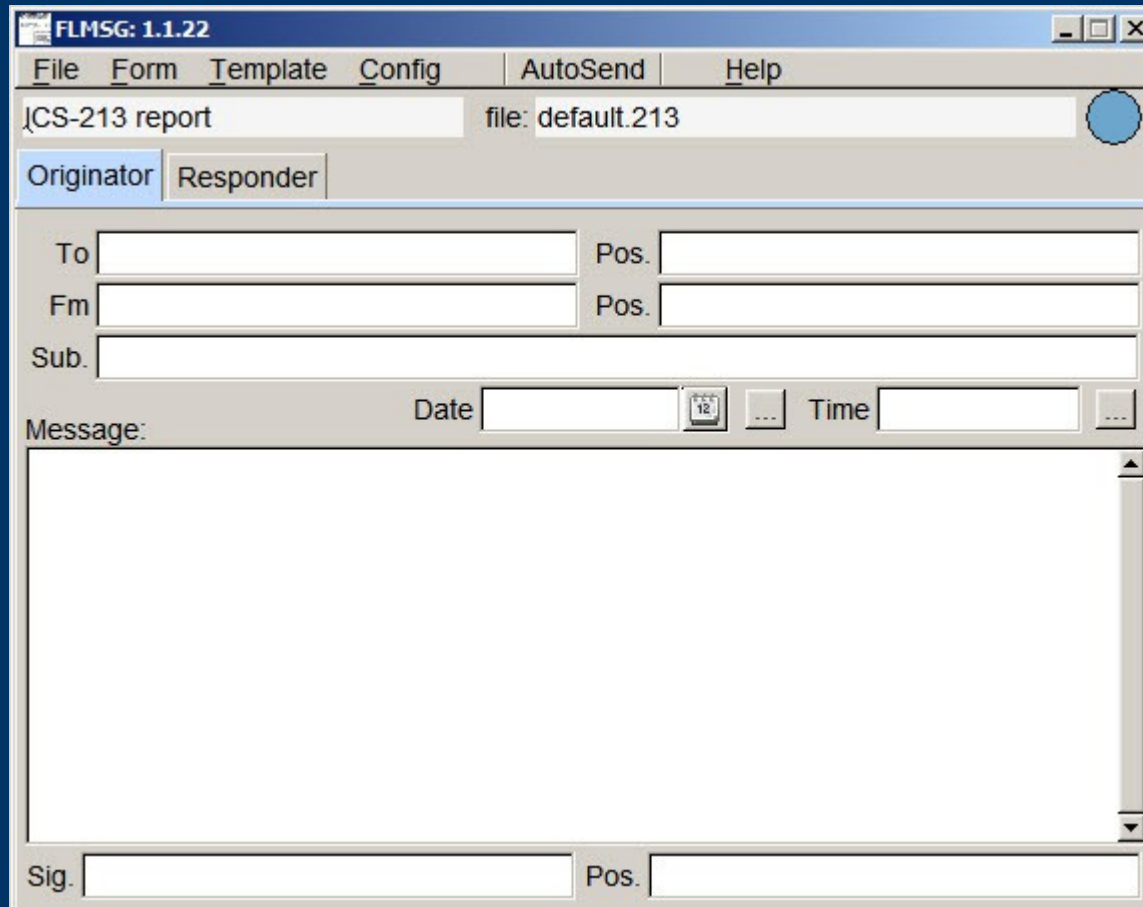
```
[WRAP:beg][WRAP:crlf][WRAP:fn example.txt]This is an example of a wrapped file.  
Here's what happens when we wrap something.[WRAP:chksum B71E][WRAP:end]
```

- Note the WRAP beg and end delimiters.
- Also note the checksum, it's B71E.
- Flmsg automatically generate checksums.
- Flmsg also computes checksums on incoming messages.

Flmsg – send/receive messages

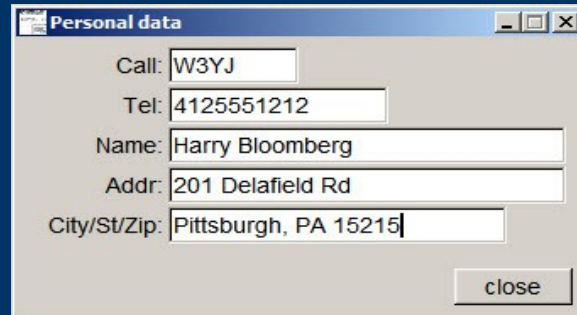
- Flmsg used to send formatted messages:
 - ICS forms like ICS-213
 - ARRL Radiograms
- Blank text
- Easy workflow for CSV spreadsheets.
- No need for use of text editor like Notepad.
- Starts transmission automatically.
- Eases importing and checksum verification of incoming message.
- Can have incoming messages automatically opened!

Flmsg screenshot



Flmsg - configuration

- Click on Config menu.



Personal data

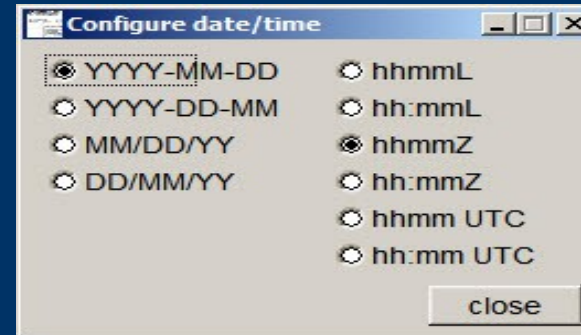
Call:

Tel:

Name:

Addr:

City/St/Zip:



Configure date/time

YYYY-MM-DD hhmmL

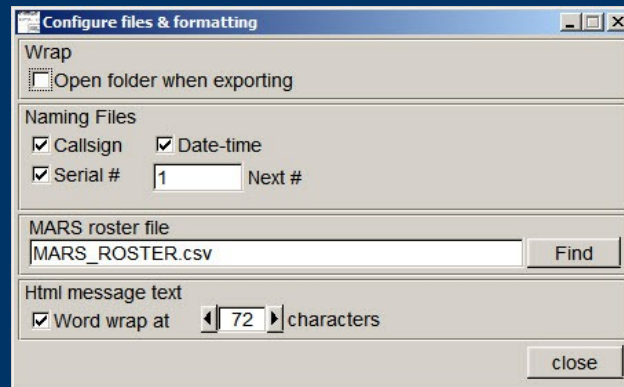
YYYY-DD-MM hh:mmL

MM/DD/YY hhmmZ

DD/MM/YY hh:mmZ

 hhmm UTC

 hh:mm UTC



Configure files & formatting

Wrap

Open folder when exporting

Naming Files

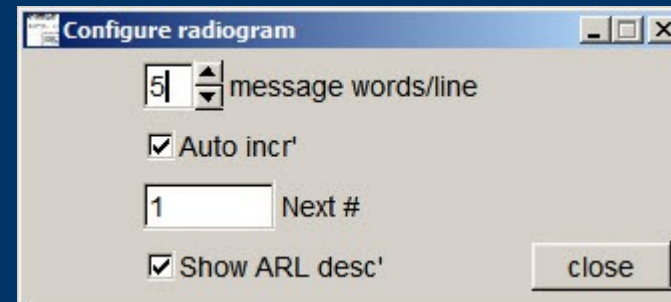
Callsign Date-time

Serial # Next #

MARS roster file

Html message text

Word wrap at characters



Configure radiogram

message words/line

Auto incr'

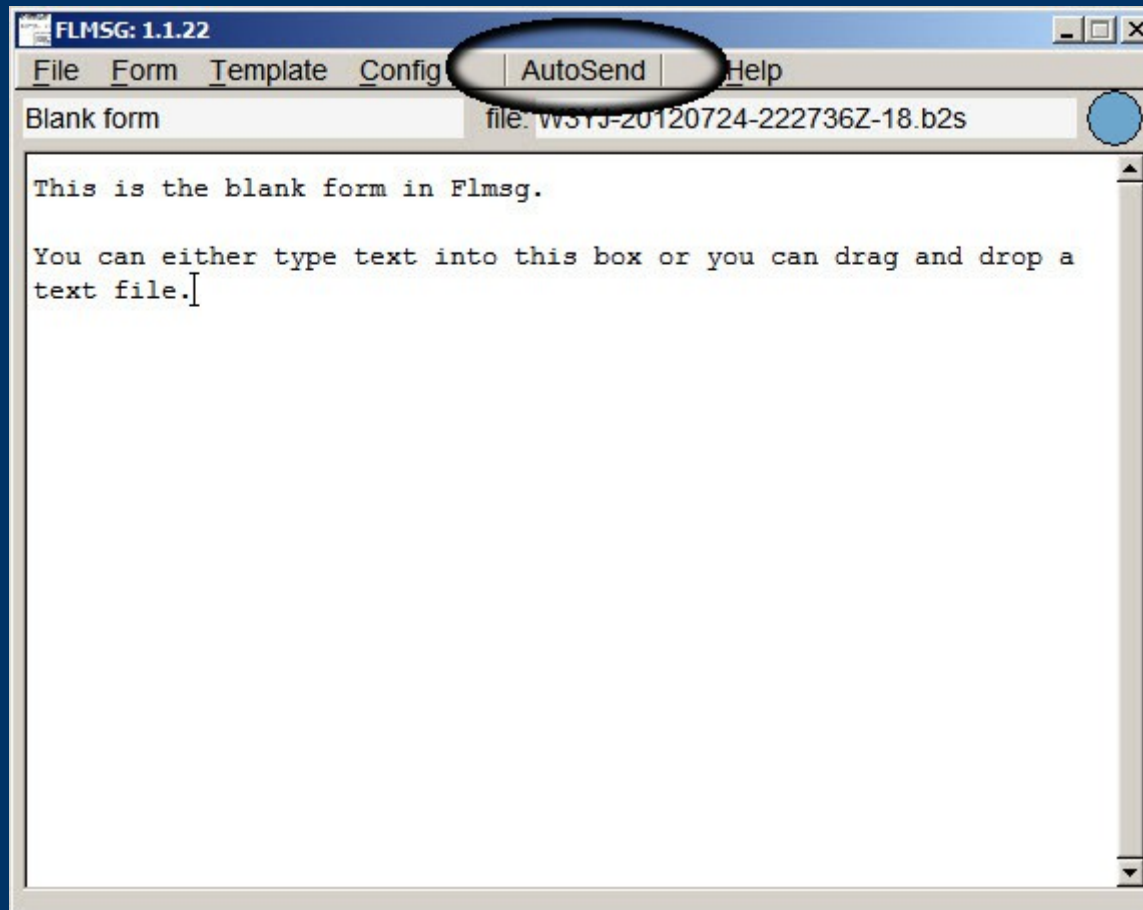
Next #

Show ARL desc'

Flmsg – Autosend workflow

- One click sending!
- Enter text directly into large empty box.
- Can also drag-and-drop text file into box.
- Push the AutoSend menu at top.
- Will be prompted to save file with automatically assigned unique filename.
- Flmsg will cause Fldigi to automatically send message.

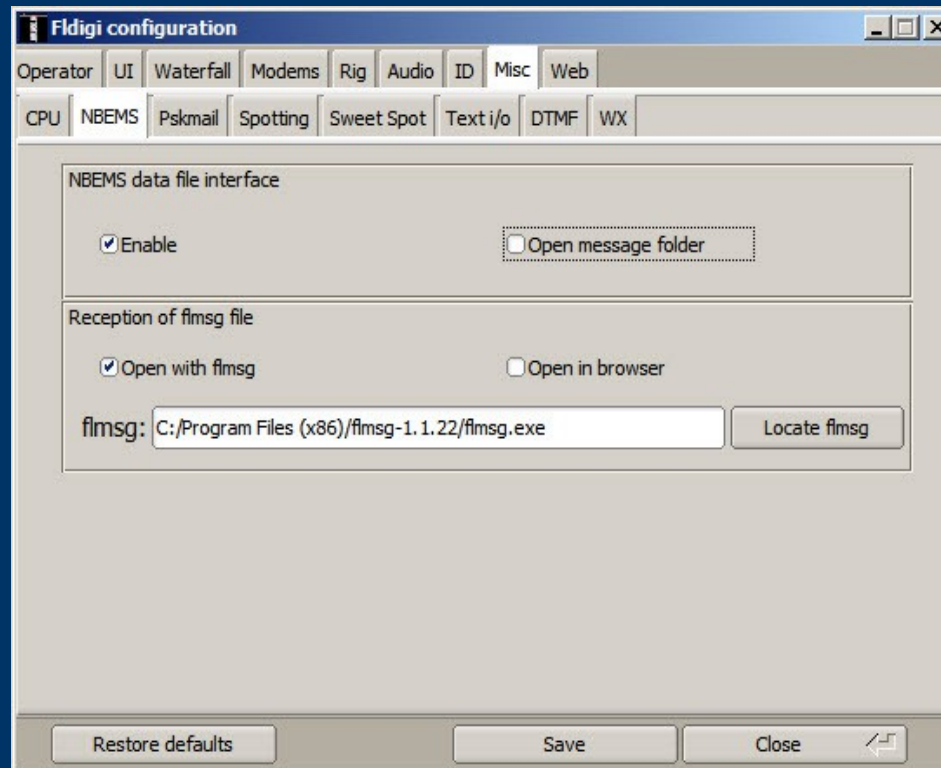
Flmsg – Autosend Blank Text



Flmsg Auto Display of Messages

- Incoming messages can be automatically opened in Flmsg.
- Can also auto open messages in browsers.
- Can walk away and come back to see messages displayed.
- Display in browser great for EOC or Served Agency facility.
- In Flmsg, Config->Misc, hit NBEMS tab.
- Check appropriate boxes.
- Must check box for Enable NBEMS data interface.
- Important: must enter complete path to flmsg.exe.

Configure Fldigi for Incoming Data



CSV Files for Spreadsheets

- Flmsg simplifies sending and receiving CSV files

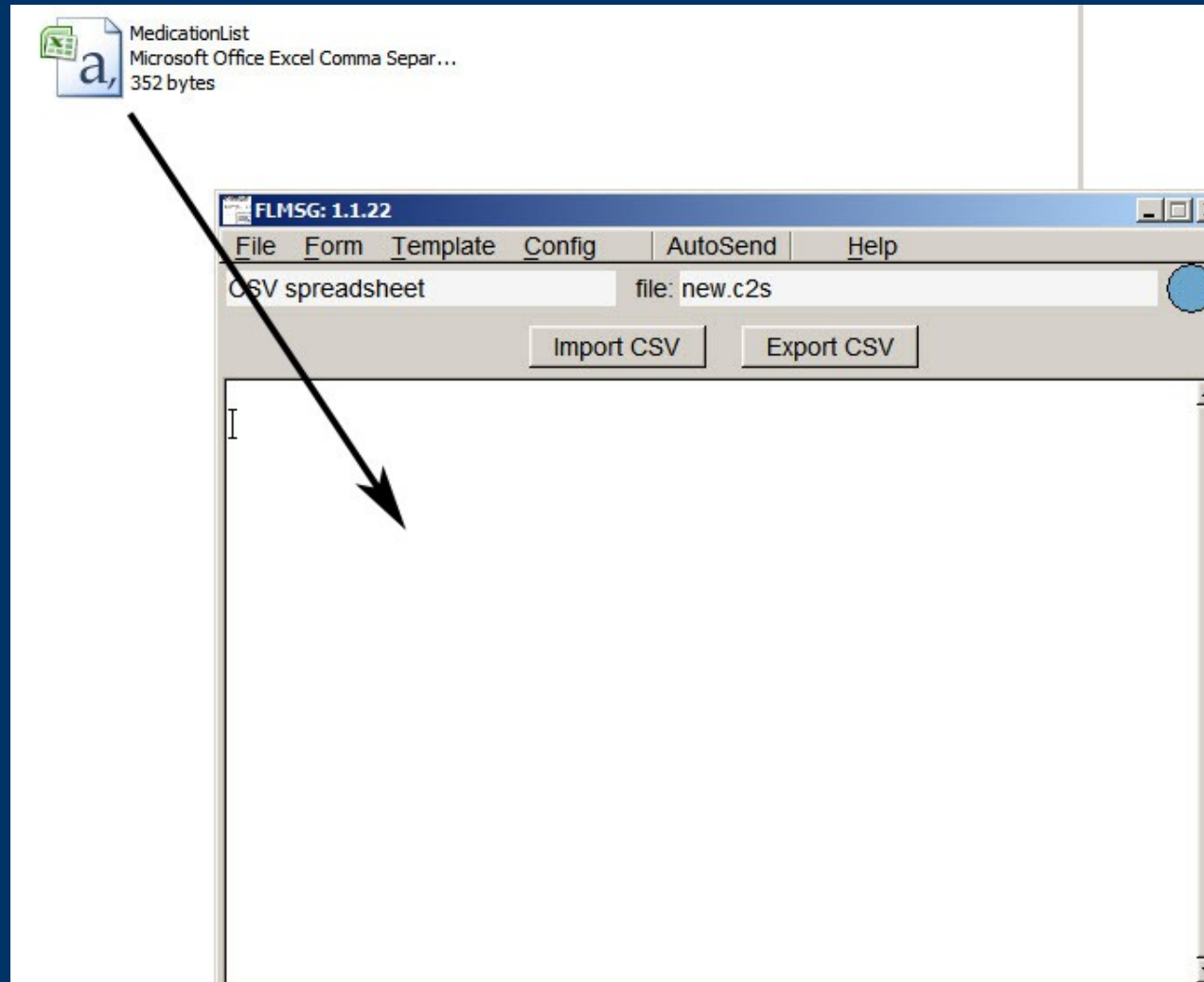
To Send:

- Form->CSV menu
- Drag-and-drop CSV file into the large text box.
- Push Auto Send.

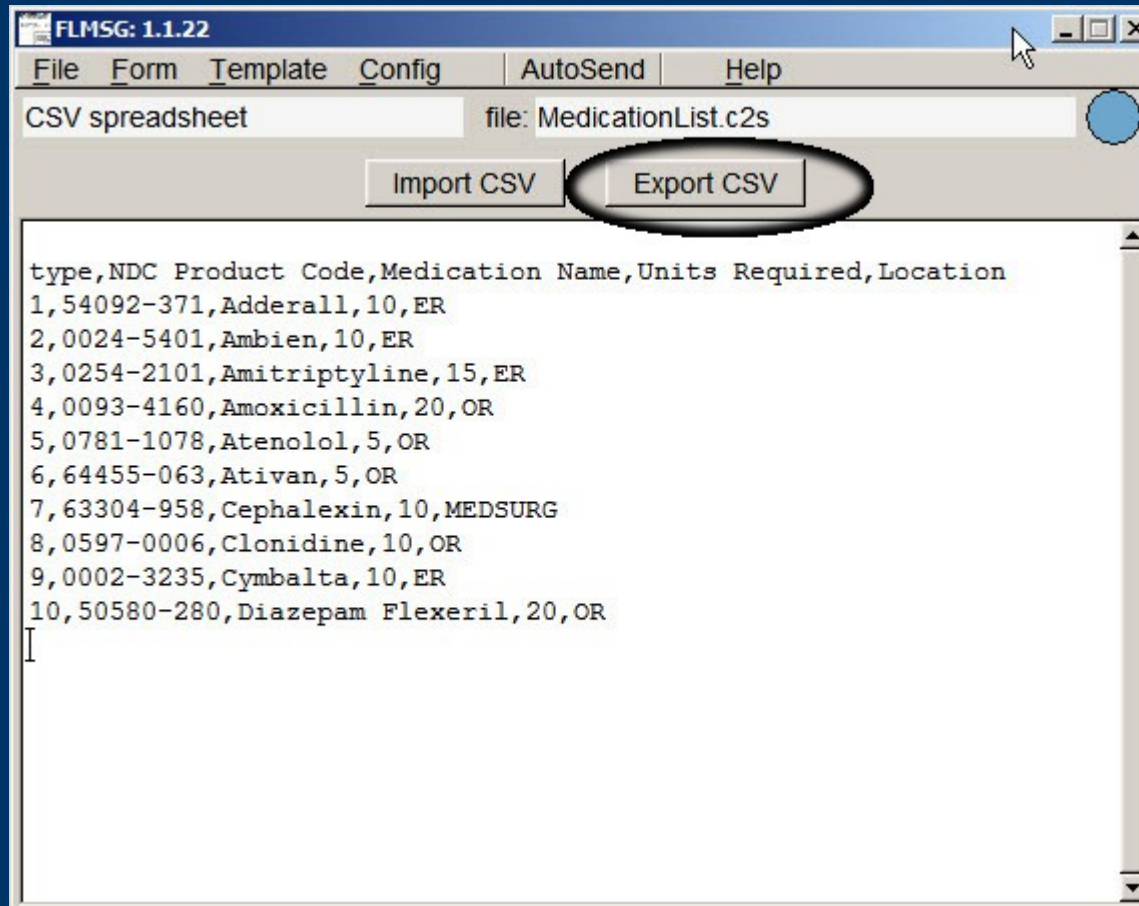
To Receive:

- Incoming CSV file will auto open in Flmsg.
- Push Export CSV button.
- Save to Desktop or USB drive.

Drag-and-Drop to Import CSV File



Extract Incoming CSV File



Data Guidelines for Emcomm

- We send only text files, no binary files.
- We do not send Word Documents, save as text.
- Excel spreadsheets must be exported as CSV.
- We do not send images.
- Limit file size to 3KB to avoid repeater timeouts.
- Meet with Served Agency beforehand to set expectations.
- Encourage Served Agency to give us data electronically.
- Remember, we have limited bandwidth.

Next steps

- Our strength is the ability to turn fun amateur activities into powerful emcomm tools.
- So, download NBEMS, and make lots of contacts!
- If you're ready for your daily hamming, you're more prepared for emergency than you think.
- Be active, and on the day you're needed, you'll feel right at home.

Resources

- Western PA ARES Website:
<http://wpaares.org>
- Docs available as well as membership sign up page
- wpaares-digital Yahoo group
- ARRL's HF Digital Handbook



Resources

- W1HJK (author of fldgi)
<http://www.w1hkj.com/>
- MT63 Wikipedia page
<http://en.wikipedia.org/wiki/MT63>
- August 2009 QST
- June 2010 QST

Advanced NBEMS

- Data compression with Flwrap
- ICS forms and ARRL Radiogram with Flmsg
- Use of Flarq
- Transmitting large data files
- Throughput benchmarking
- RSID
- New high-speed PSK “R” modes with FEC
- Alternate workflows for Power Users

Acknowledgments

We'd like to thank the following:

- W1HKJ, Dave Freese, lead NBEMS developer
- KH6TY, Howard Teller, NBEMS developer
- W3HRK (sk), Dr. G. Alec Stewart, University of Pittsburgh
- NA0B, Dr. Juan Manfredi, University of Pittsburgh
- KB3JXG, James Farringer, Superintendent of Police, O'Hara Twp, PA

Current and former ARRL Leadership:

- N3LLR, Bill Edgar, Atlantic Division Director
- N3MSE, John Rodgers, Western PA SM
- AB3ER, Larry Keller, Western PA SEC
- N3SPW, John Szwarc, former Western PA SEC