

# *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 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
- 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 call of 3583.500, and an off-frequency of 0158. Below the call log is a large yellow rectangular area for text entry. Underneath that is a light blue area for chat or messages. The bottom section features a frequency display with a waterfall plot. The frequency scale ranges from 3583.0 to 3585.0. The waterfall plot shows a blue background with a yellow vertical line indicating the current frequency. Below the waterfall plot is a control panel with various buttons and sliders, including '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*

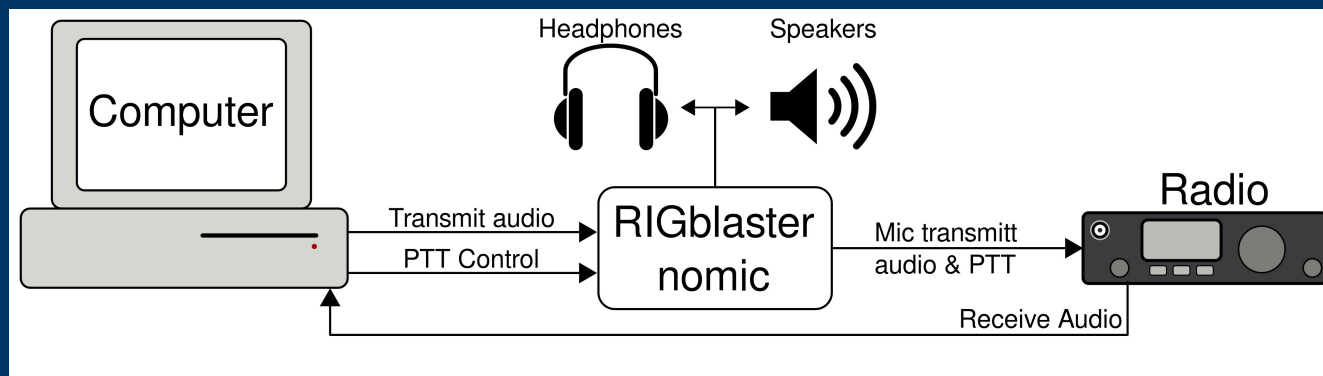
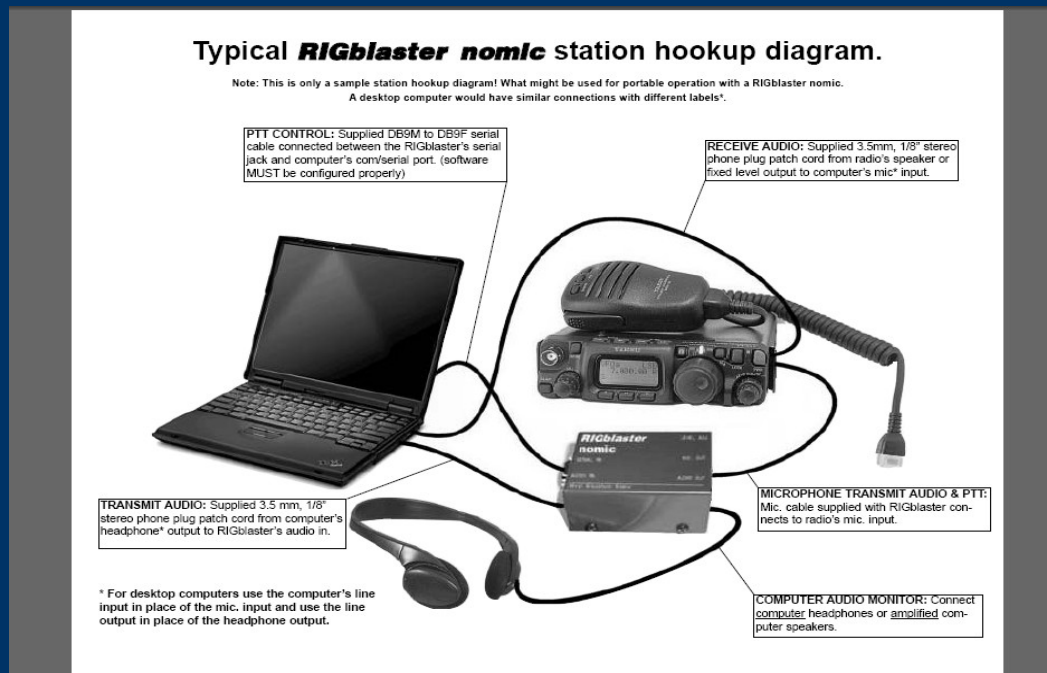
- Many ways to interface with computer.
- Rigblaster
- Signalink
- USB for newer HF radios.
- But, if necessary, hold radio mike up to computer speaker and...
- Hold radio speaker up to computer mike!
- In an emergency, don't really need hardwired interface.
- Disable all DSP “enhancement” programs on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



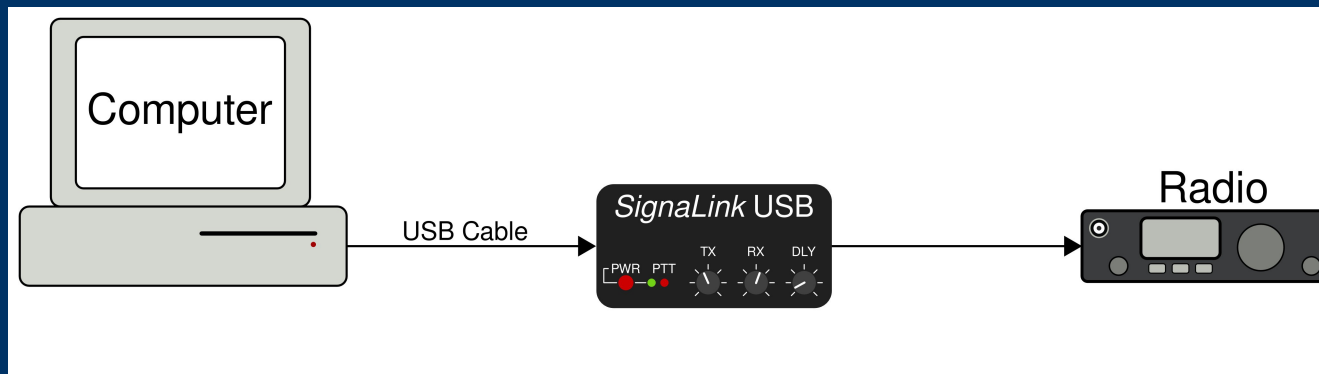
# Acoustic Interface

- 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



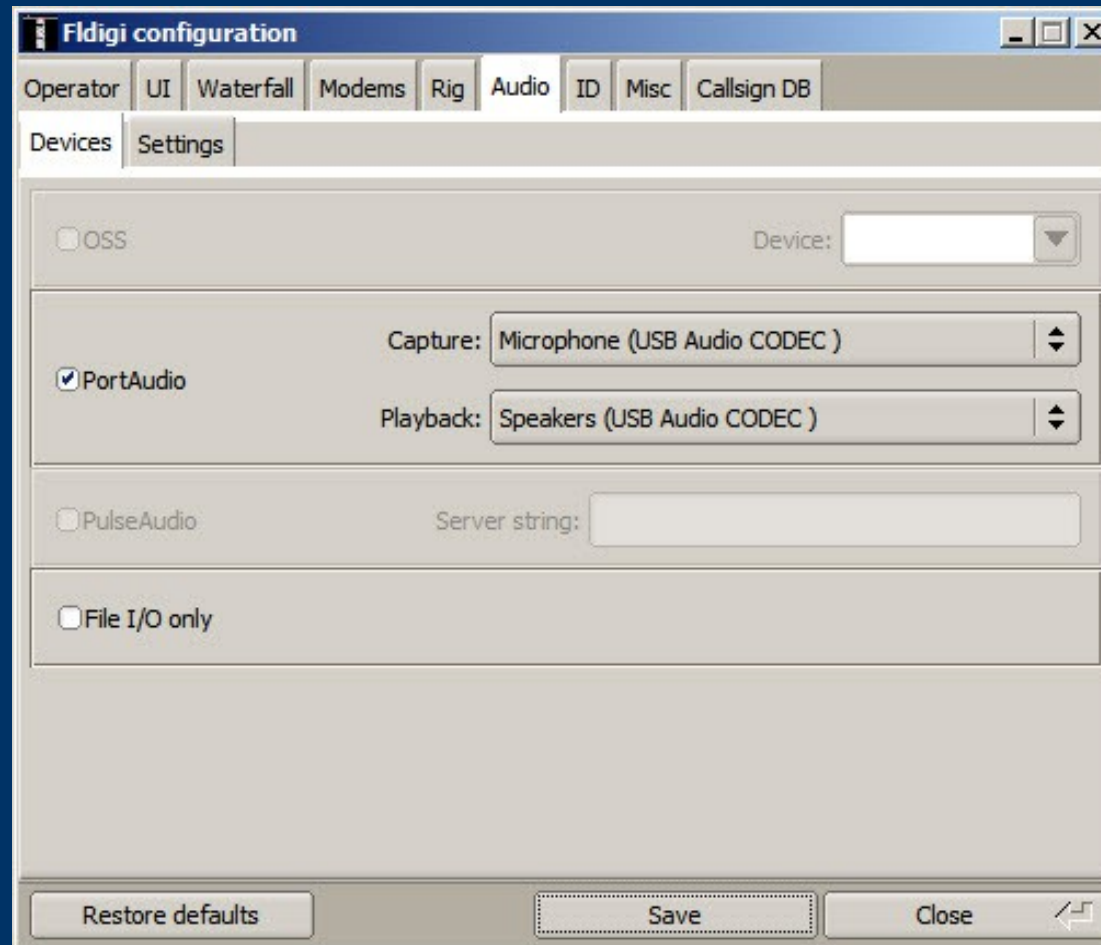
# Signalink USB



# *Signalink Configuration*

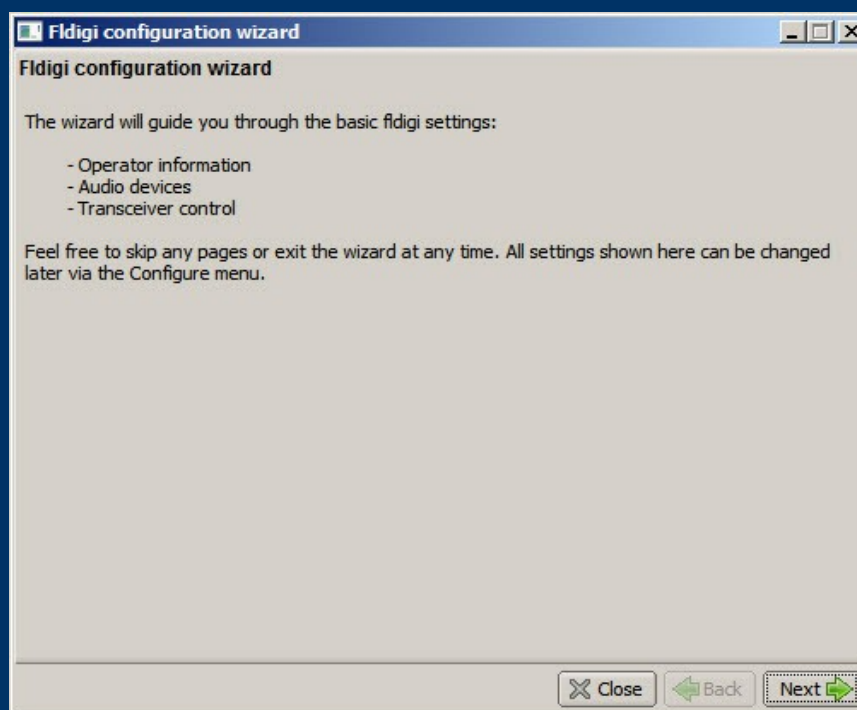
- Signalink is very easy to configure.
- Just connect to computer via USB.
- Configure Fldigi to use Signalink USB sound card.
- Generate just enough audio from computer to trigger Signalink vox.
- Use volume controls on Signalink and don't touch computer audio settings

# Signalink Configuration



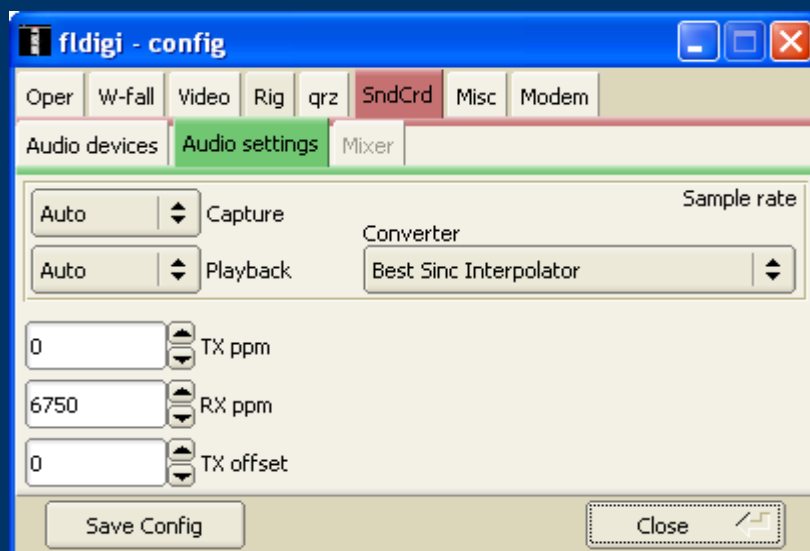
# Configuring Fldigi

- 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

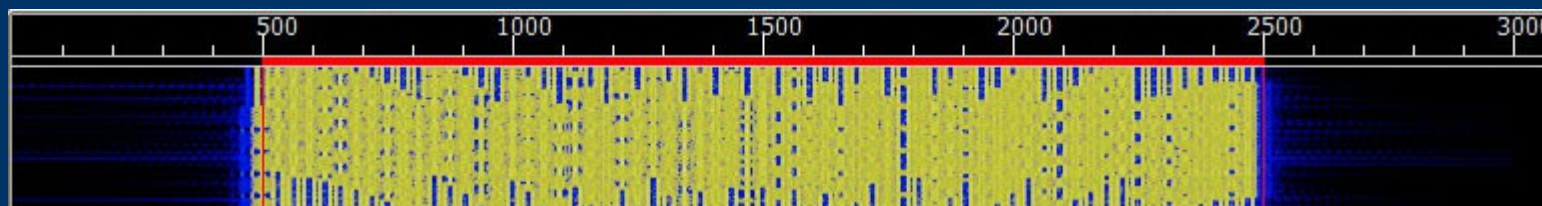
- Lots of modes, most popular ones are...
- MT63 (500, 1000, 2000)
- Olivia
- “R” PSK modes...fast with FEC
- Popular PSK31 OK for making non-emcomm contacts, but has no error correction.



# *MT63 – Most Versatile Mode*

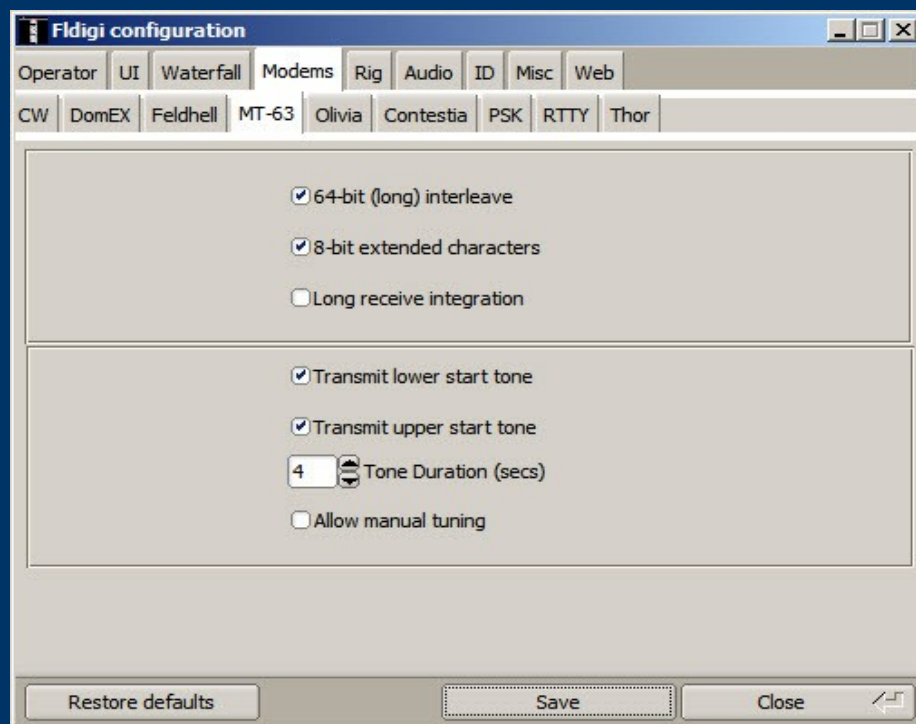
- MT63-2000 great choice for FM EmComm.
- Fast – less than 2 min to send 2kb text file.
- Data redundancy in time and in frequency.
- Used by MARS.
- Very resistant to noise – can lose up to 25% of signal and still copy.
- Works well with holding mike up to speaker.
- Used in WPA ARES SET and Red Cross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



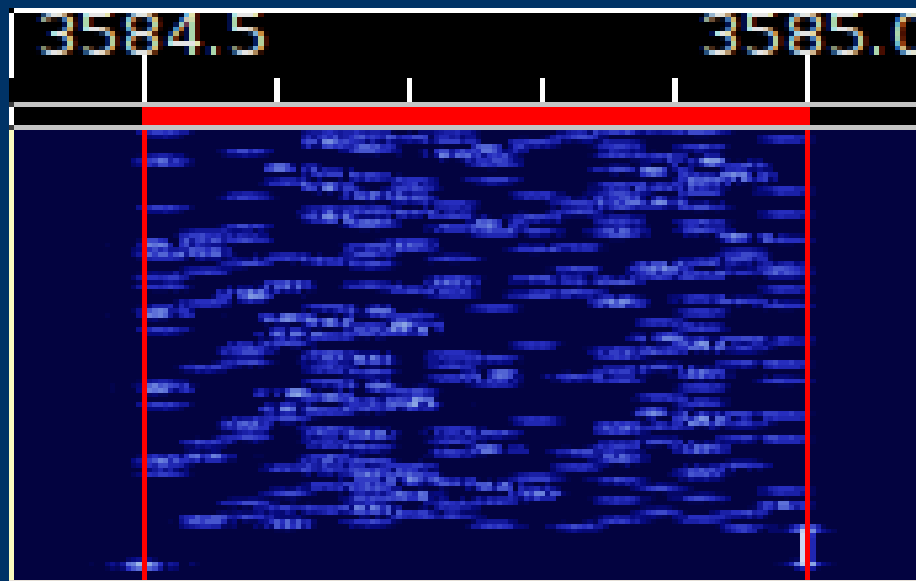
- Be sure to set 64 bit interleave and 8-bit char.
- Provides extra data redundancy.
- Both stations must have same interleave setting.
- Uncheck manual tuning for VHF/UHF.

# 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!

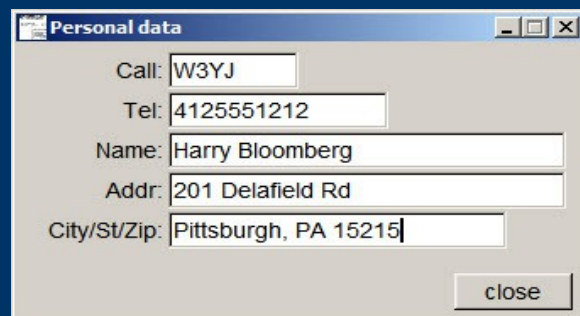
# Flmsg screenshot

The screenshot shows the FLMSG: 1.1.25 application window. The title bar reads "FLMSG: 1.1.25". The menu bar includes "File", "Form", "Template", "Config", "AutoSend", and "Help". The main window contains the following fields and controls:

- Text field: "ICS-213 report" (with "file: new.213" to its right)
- Buttons: "Originator" (selected) and "Responder"
- Form fields: "To" and "Pos." (two input boxes), "Fm" and "Pos." (two input boxes), "Sub." (one input box)
- Date and Time: "Date" (input box with calendar icon) and "Time" (input box with clock icon)
- Message: A large text area labeled "Message:" with a vertical scrollbar on the right.
- Signature: "Sig." (input box) and "Pos." (input box)
- Bottom controls:  "Comp", a dropdown menu showing "base64", a dropdown menu showing "MT63-2K", and two empty input boxes.

# Flmsg - configuration

- Click on Config menu.



Personal data

Call: W3YJ

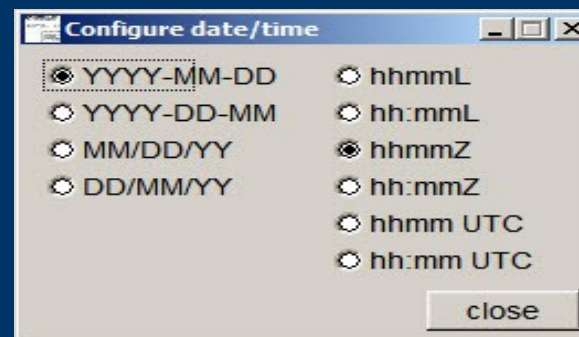
Tel: 4125551212

Name: Harry Bloomberg

Addr: 201 Delafield Rd

City/St/Zip: Pittsburgh, PA 15215

close



Configure date/time

YYYY-MM-DD     hhmmL

YYYY-DD-MM     hh:mmL

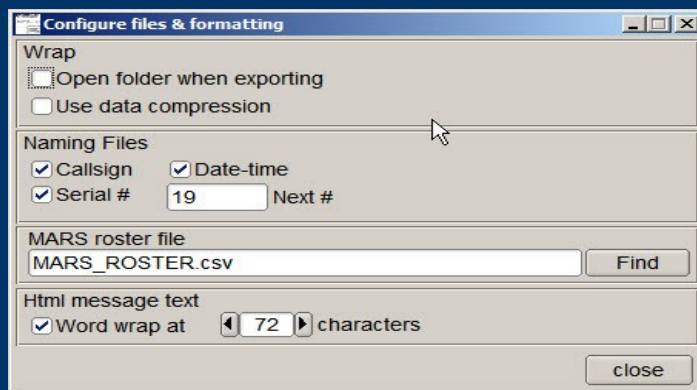
MM/DD/YY     hhmmZ

DD/MM/YY     hh:mmZ

    hhmm UTC

    hh:mm UTC

close



Configure files & formatting

Wrap

Open folder when exporting

Use data compression

Naming Files

Callsign     Date-time

Serial #    19    Next #

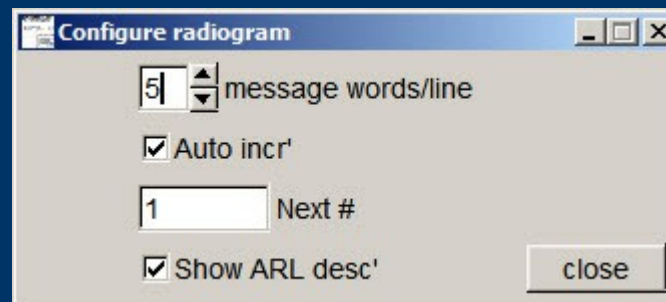
MARS roster file

MARS\_ROSTER.csv    Find

Html message text

Word wrap at    72    characters

close



Configure radiogram

5 message words/line

Auto incr'

1 Next #

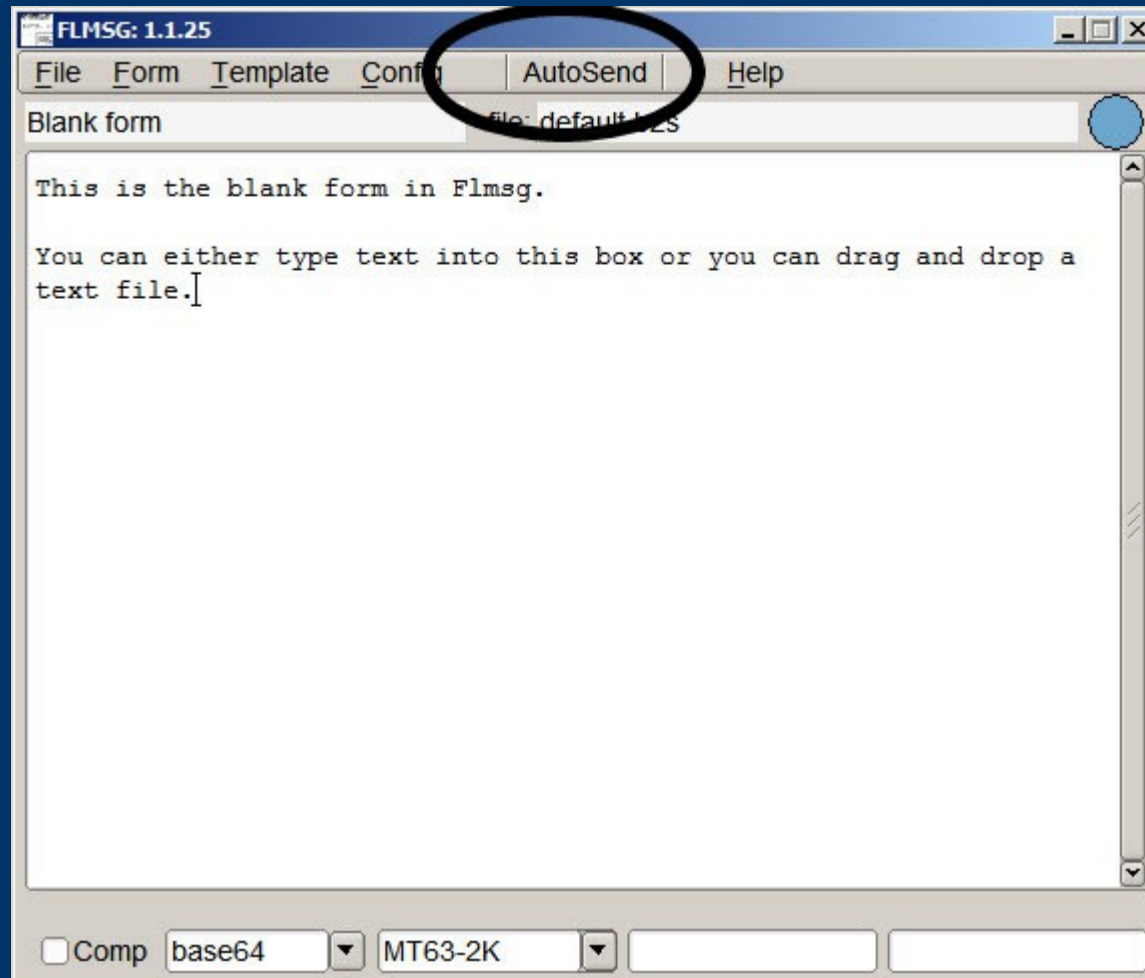
Show ARL desc'

close

# *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.

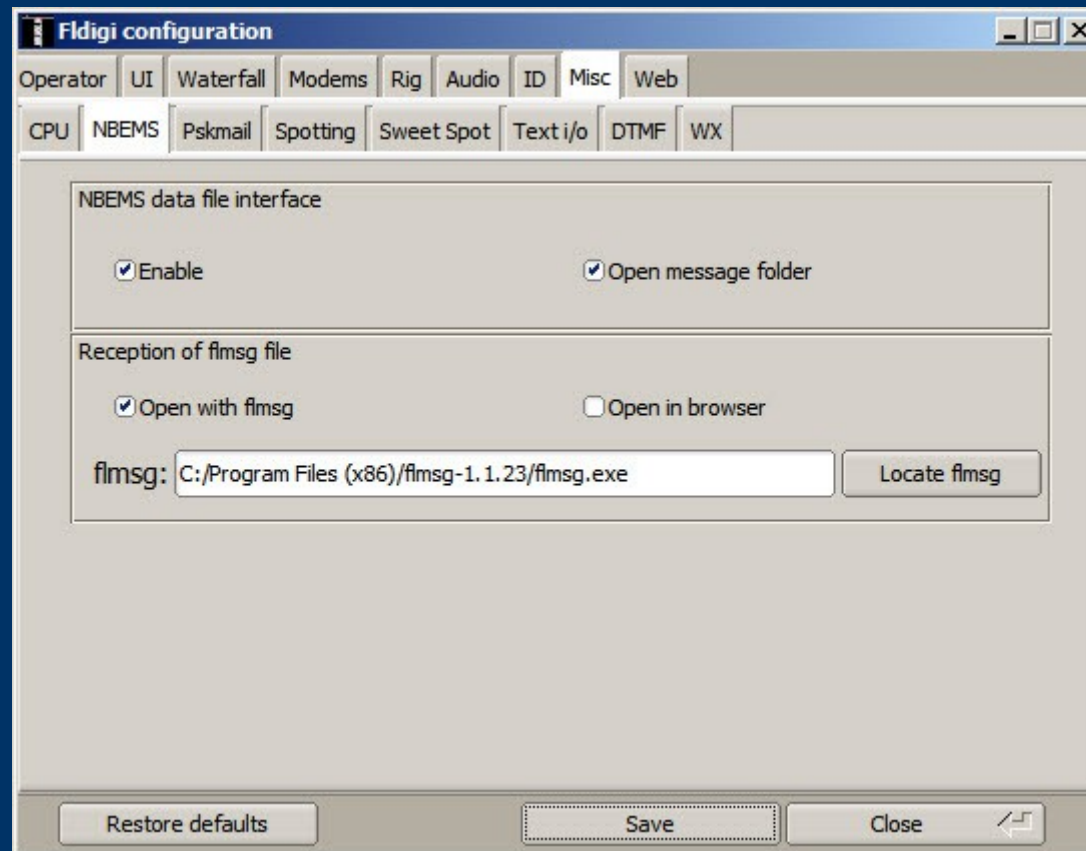
# Flmsg – Autosend Blank Text



# *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 Comma Separated Value (CSV) spreadsheets

## To Send:

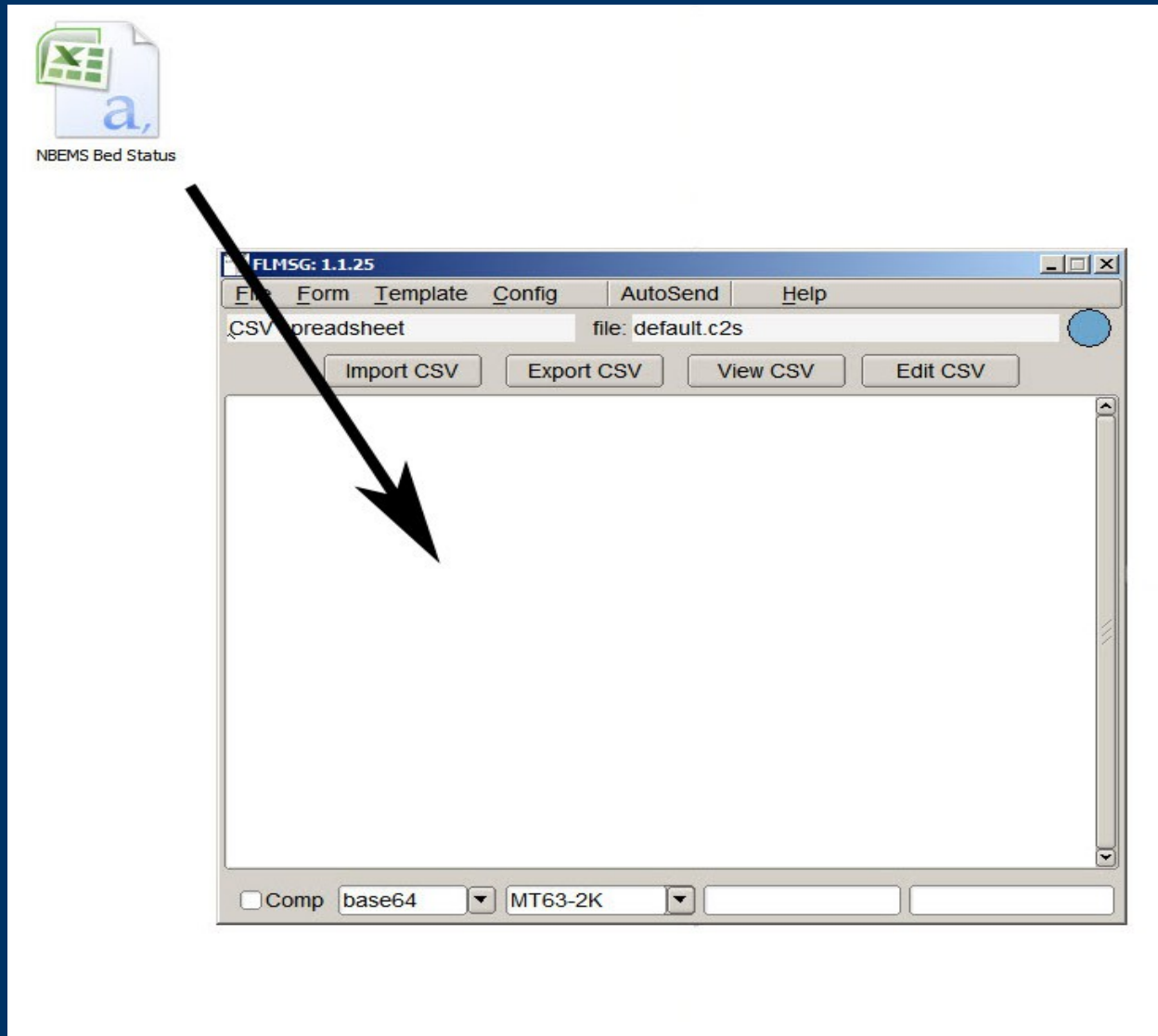
- Form->CSV menu
- Drag-and-drop CSV file into the large text box.
- Push Auto Send.

## To Receive:

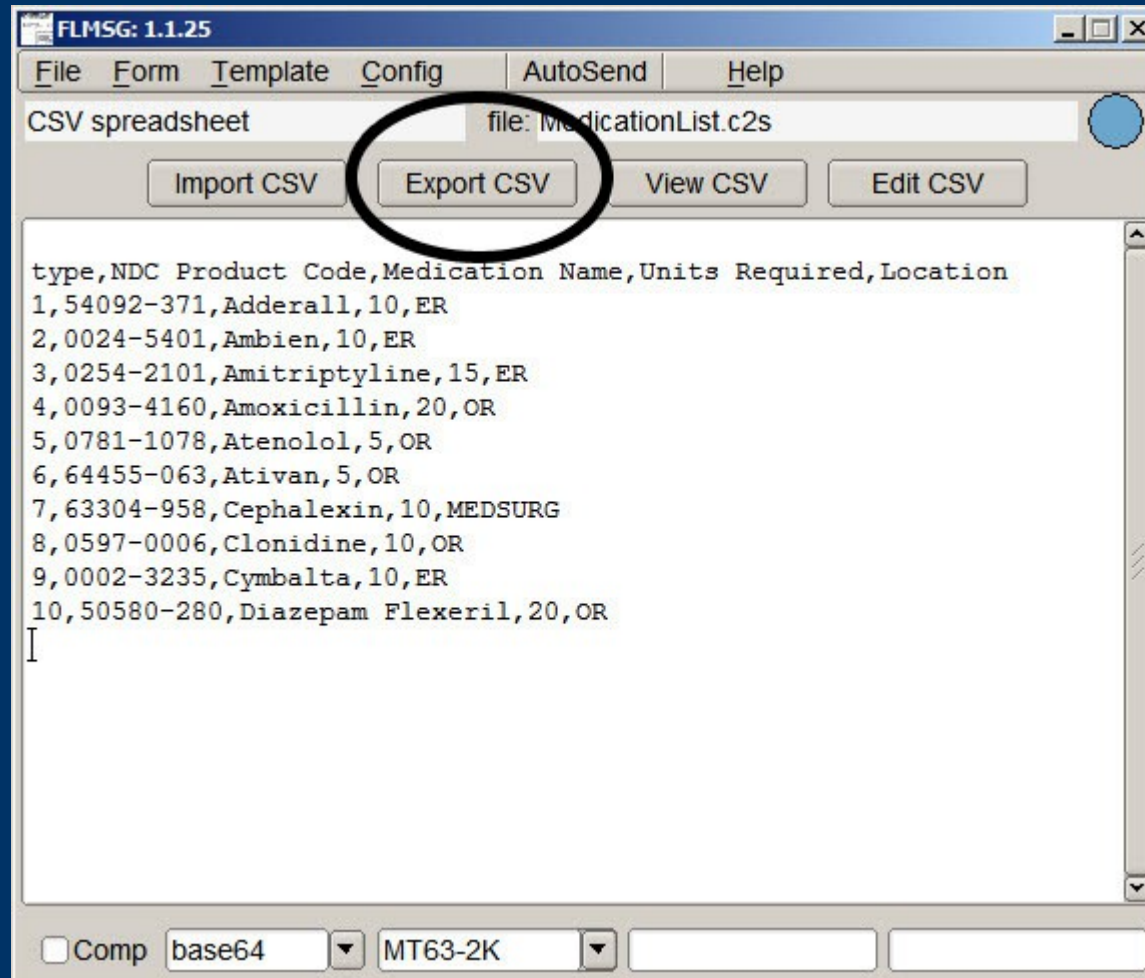
- Incoming CSV file will auto open in Flmsg.
- Push Export CSV button.
- Save to Desktop or USB drive.



# Drag-and-Drop to Import CSV File



# Extract Incoming CSV File



# *Data Guidelines for Emcomm*

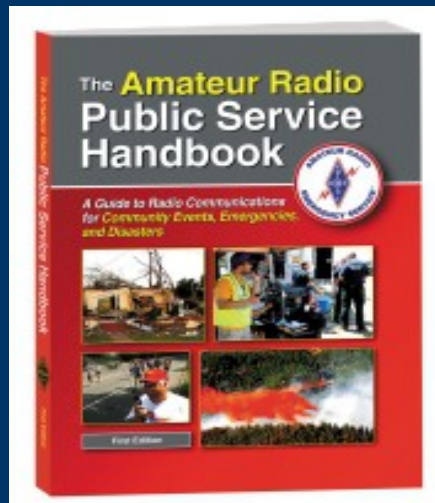
- We send only text files, no binary files.
- We do not send Word Documents, save as text.
- Excel spreadsheets must be exported as CSV.
- We do not send images.
- Limit file size to 3KB to avoid repeater timeouts.
- **CRITICAL:** Meet with Served Agency beforehand to set expectations.
- Encourage Served 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 for WPA hams only
- NBEMSham Yahoo group
- ARRL's Public Service 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
- ARRL NBEMS page  
<http://www.arrl.org/nbems>

# Acknowledgments

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- N3MSE, John Rodgers, Western PA SM
- AB3ER, Larry Keller, Western PA SEC
- N3SPW, John Szwarc, former Western PA SEC