

DIGITAL MESSAGES via HAM RADIO

1.0 INTRODUCTION

There is a method of sending and receiving properly formatted Radiogram and other messages in digital mode using ordinary FM or USB radios – even VHF or UHF HTs. The method is quick and efficient using minimal air time and is error free in transmission and reception.

This method has been adopted by many emergency communications organizations (ARES, RACES, ACS, etc.) and has been adopted by the MARS for message traffic on both HF and VHF. The preferred transmission format for VHF FM is MT63-2000 long interleave. On HF, both stations would use MFSK32 or other modes but the principles are the same. Many other modes can be used depending on conditions.

This method does require a computer at both ends, even a laptop or notebook. A printer will enable the printing of the complete message in the recognized format.

In addition to Radiogram format, forms corresponding to those used in the National Incident Management System (NIMS) or Incident Command System (ICS) can be sent and received in the standard format. Also included are American Red Cross forms and even a spread sheet sent in comma separated value (csv) format readable in Excel, etc. There is provision for importing other message formats, even self programmed custom forms, but both stations must have the same version form installed on their computers.

This method uses software known as the Narrow Band Emergency Messaging Software or NBEMS. If you wish to find out more, just go to this web site <http://www.arri.org/nbems/>.

The software used is known as fldigi for the basic communications program and flmsg for the message form handling program.

You may wish to download both the FLMSG program and the associated (and required) FLDIGI program to one or more of your computers. Versions are available for Windows, MAC, and Linux systems, even computers and smart phones using the Android operating system. The price is very reasonable -- absolutely free.

You can go to: <http://w1hkj.com/FldigiHelp/index.html> and <http://www.w1hkj.com/flmsg-help/index.html> to get an overview of these programs via the user manuals for version 4 of these programs.

Version 4 of flmsg is significantly different from the previous versions as successive received files are listed on a pop-up list for later viewing and processing rather than overlapping successive windows which has been found to be difficult to manage. If you have been using earlier versions of the software, you are advised to upgrade to the latest version.

The links above generally are updated periodically to reflect the latest versions of fldigi and flmsg so you might want to update your memory about how to configure and operate these programs.

These instructions assume that you know how to create new folders (directories) on your computer and also know how to download new files from a source and how to copy or move files from one folder to another. These instructions also assume that you know how to extract files from a ZIP folder. If you don't know – ask!

2.0. DOWNLOAD OF SOFTWARE

These instructions are mainly for computers running Windows and particularly Windows 10 or 11. Earlier versions of Windows have a slightly different location to to install the programs. Depending on how your computer is organized, you may wish to download the files to a slightly different location. This document does **not** include instructions for computers running Linux, Android, or MAC OS. Apple iPhones or other iOS devices are not supported. Android device users may wish to install the AndFlmsg app on their devices.

Using the Windows File Explorer, create a new Downloads folder in a folder or directory you prefer. This should not be the Downloads folder found under the c:\users location but rather one you can manage. Go to your folder, right click on the mouse and create a new folder named NBEMS and go there. Create new folders named fldigi and flmsg respectively under this folder using the Right click procedure.

Using your internet browser, go to <http://www.w1hkj.com/> or alternately <https://sourceforge.net/projects/fldigi/>

Select fldigi then select the current version number Setup.exe file (for Windows) to download to your \Downloads\NBEMS\fldigi folder. If downloading for a MAC, select the appropriate DMG file for your computer. If you want to download a pdf version of an operating manual, you may also want to download the fldigi.help.pdf file to the same folder.

While still in the w1hkj or sourceforge web site, select flmsg then select the Setup.exe file (for Windows) to download to your \Downloads\NBEMS\flmsg folder. If downloading for a MAC, select the appropriate DMG file for your computer. If you want to download a pdf version of an operating manual, you may also want to download the fldigi.help.pdf file to the same folder.

You may wish to review the help.pdf files downloaded at any time but you can also read these files by clicking on the on-screen help command in the running programs.

CUSTOM Files

While many messages may be sent and received using standard forms such as the Radiogram, or Incident Command System (ICS) forms or even plain text, there will be times where some custom forms will be required. These may be specific to Mendocino County or perhaps some other forms including those derived from Winlink Express forms. For the form to be used, both the transmitting station and the receiving station must have the same custom form installed, including the version number.

Using using your internet browser, go to the www.mcarcs.org web site and select RESOURCES and then Operating Tips. Download all of the desired flmsg CUSTOM files in ZIP format to your \Downloads\NBEMS\flmsg folder on your computer.

Then click on the ZIP files and extract the resulting html files to the same folder.

3.0 INSTALLATION OF SOFTWARE

Using the Windows File Explorer, go to the \Downloads\NBEMS\fldigi folder that you created earlier and downloaded the setup.exe file to and double click on the fldigi setup.exe file. Allow the program to install into the default folder and file locations.

Your anti-virus program may declare this and the fldigi setup.exe files to be unsafe as they will write to your hard disk and they are not widely downloaded so you may have to temporarily disable your anti-virus software or declare these files to be OK and safe to run.

Go to the\Downloads\NBEMS\fldigi folder that you created earlier and double click on the fldigi setup.exe file. Allow the program to install into the default folder and file locations.

For Windows XP and Windows 7 computers the installation program will generally install a desktop shortcut icon. Windows 8, Windows 10, and Windows 11 computers may install an app tile or you may install a shortcut icon on the desktop page. The actual programs may be installed in the C:\Program Files or C:\Program Files (x86) folders depending on the operating system.

If you prefer the Desktop screen in Windows 8, 10, or 11 as compared to the Tile screen, using the Windows File Explorer to navigate to the program locations, then Right click on the fldigi.exe and the fldmsg.exe files and select Create Shortcut for each. You will probably be told that you cannot create a shortcut here and will be prompted to install it on the Desktop. From the Desktop screen you may click and drag to wherever you prefer the shortcuts on the screen.

Double click the tile or desktop shortcut icon and run fldigi. Resize the screen as necessary to partially fill the space and still leave room for the fldmsg window although these windows may overlap. I suggest that you have the fldigi window occupy the right half of the screen while still leaving room at the left half of the screen for fldmsg.

Double click the tile or desktop shortcut icon and run fldmsg. Resize the screen as necessary to occupy the lower and left half of the screen with a minimum overlap. Generally the message entry part of fldmsg will be smaller than the fldigi screen although this space may be expanded when editing or viewing the form. This may depend on your screen resolution.

You will find that the programs create "folders" for messages in the following locations in Windows:

XP and 2000: c:\Documents and settings\your user name\NBEMS.files\ICS\messages
Vista and Win 7 - 11: c:\users \your user name\ NBEMS.files\ICS\messages

Generally you can expect received messages to be saved to these locations. When you are saving messages that you compose, I highly recommend that you save your messages to the same location – sometimes this does not automatically happen. If so, just navigate to the \NBEMS.files\ICS\messges location using your mouse.

Installing CUSTOM Forms

Using File Explorer, copy the resulting html CUSTOM html format files in your \Downloads\NBEMS\fldmsg folder to "your user name\NBEMS.files\CUSTOM folder. I find that a second copy of File Explorer (called "This PC or Your PC or similar") to be a good tool to do this. From File Explorer, find This PC and click and drag the icon to a desired desktop location. This is in effect a dual view of the File Explorer that works really well to copy the html files to the CUSTOM folder. Just hold the Ctrl key down when dragging the files.

4.0 FLDIGI INITIAL SETUP AND CONFIGURATION

Refer to the fldigi help.pdf file if needed. These instructions apply to computers running Windows, MAC, or Linux. Android computers may be different.

- 1) In FLDIGI, Select OpMode – then slide down and select MT63, then MT63-2000L. This will be the default setting for VHF. Other modes may be selected for HF operations as per operator coordination. The Op Mode display on the lower left part of the window should show MT63-2KL

Verify that the waterfall display shows from 500 to 2500 Hz with the center frequency at 1500 Hz. You may have to drag the Red waterfall cursor line or use the arrows below the display to set the center to 1500 Hz.

- 2) Click on Configure, then select Config Dialog
You will be presented with a catalog of choices including Colors-fonts, Contests, IDs, Logging, Modem, Misc, Rig Control, Soundcard, UI, Waterfall, and Web. Most of these you can leave at their default values but you do need to fill in some data.

- a) Click the + sign in the box for IDs, click the following
CW: Uncheck Transmit callsign. This unnecessary. Digi RsID is OK
RsID Check “Searches passband” and Disable alert dialog” You may wish to click on both “Receive Modes” and Transmit modes” to verify that all possible modes are selected.

Set Pre-Signal Tone” to 2.0 seconds to activate the repeaters.

Do not select End of xmit ID

Video: Uncheck everything if checked This just takes more time on start of message and does not provide any more information that the transmitted RsID.ID

- b) Click Misc, Operator- Station Enter your Call sign, name, location, etc. Click Save and Close

- c) Click the + sign for Misc: then click NBEMS interface: Check NBEMS Data File interface “Enable” and open message folder, Reception of flmsg files “Open with flmsg.” While in Config/Misc/NBEMS, locate the flmsg.exe file. It will normally be found at: Windows XP, 2000, Vista, and Windows 7 32 bit:

C:\Program Files\“flmsg version no.”\flmsg.exe

Windows 64 bit, including Windows 8,10, and 11 64 bit:

C:\Program Files (x86)\“flmsg version no.”\flmsg.exe

Note: if you replace this version of flmsg with a later version, you **must** browse to the new version location at that time to reconfigure fldigi to work with flmsg.

- d) Click the + sign in the box for Soundcard. Click Devices
Enable your fldigi sound card by selecting Port Audio. When starting the fldigi program the default audio sources should have been selected. If you have an external sound card installed using an USB connection, the default configuration should show USB Audio CODEC. If you are using the computer's internal speaker and microphone that should have been selected. If you are using external cables connected to the Line in and Line out connectors these should be selected.

You may ignore the other options at this time. Click on Save, then Close

4.1 FLMSG Initial Configuration

In the FLMSG Window, Select Config, then

- a) Under Personal data enter: your Call sign, telephone number (including Area code), your Name, Street Address, City, State, and ZIP code, your email address.
- b) Under Date/Time select: YYYY-MM-DD and hhmmL. (for US domestic use)
- c) Under Files: Check Callsign, Select Local time, L, check Serial #
- d) Under Radiogram: Select 10 words per line, Check Auto incr, check Show ARL
- e) Under ARQ: Accept the defaults for Addr, Port, Retries, and Block Size, Check all the ID/RxID boxes and both the modem boxes
- f) Under UI: Check the User interface = Expert

5.0 ANALOG INTERFACE TO TRANSCEIVER AND COMPUTER

This would be an alternate as compared with the speaker/microphone method that minimizes acoustical interference on both receive and transmit but may not be practical for all stations. All setup and configuration parameters are the same as the speaker and microphone procedure except for the following connection and level considerations:

Rig Blaster is a proprietary name for one brand of interface device. Some hams may prefer another computer to radio interconnection device. In most cases a home brew substitute can be constructed at a considerable cost saving. Wherever "Interface Device" is used in this document, substitute your preferred device.

Suitable connectors must be used for connection both to the computer and to the radio. Transformer isolation between ports may be helpful in reducing ground loops. Transformers suitable for this use may be salvaged from a phone line modem or a desktop computer modem board. Here are some tips particularly for an analog interface.:

Computer connection is best done to the Line Input and Line Output connections. These will probably not be available on a laptop. Many desk computers omit these as well. Line input and line output nominal level is about 1V P-P for best performance. Line input impedance is usually about 600 Ω . Line output impedance is usually designed to feed a 600 Ω load but may be of considerably lower impedance. Line inputs and outputs are usually stereo – you will connect to only one channel, right or left your choice.

Headphone output is usually in the range of 2 to 3 V P-P at max volume. This level must be attenuated considerably to be compatible with the microphone input to computers and radios. Headphone outputs may be of low impedance but are often designed to drive 300 Ω headsets. Some may work with ear phones with an impedance as low as 30 Ω . Your Interface Device may have a considerably higher input impedance. Headphone outputs are usually stereo – you will connect to only one channel, right or left your choice.

Microphone input impedance on both computers and radios is usually in the range of around 10k Ω and at a level of 40 to 100 mV P-P. You will need to connect to only the active input and block any DC signal in the input with a capacitor in your Interface Device..

Many desk top computer microphone inputs accept the audio on the ring of an 1/8 inch (3.5 mm) diameter phone jack connector and provide the DC power on the tip. Some reverse this. Many laptop computers reverse this. Some may have both audio input and DC power for a microphone output on the same connection. Some computers have a single connector that can assigned to be headphone or speaker output or microphone input under software control. Radios may be of any configuration and with many different types of connectors. Every situation is different.

Some radios have a Data connector on them which looks like a PS/2 mouse connector – a Mini-DIN 6 pin female. These are usually found on dual-band (or more) VHF and some HF to VHF/UHF radios. The audio levels on this connector are usually in about the 300 mV P-P range although you may wish to attenuate the level to the transmitter to minimize distortion in both VHF FM and HF USB modes. Alinco transceivers often have a DE-9S connector for this connection.

Some hams have modified their radios to bring out TX and RX audio signals plus PTT to a convenient connector for them. Some have done this for APRS or Packet use and can use the same connection for these signals. Use an appropriate connector and cable to your Interface Device. The TX audio level to the radio is critical. Too high and the peaks will be clipped with a loss of data. Some repeaters will refuse to carry this data if at too high a modulation level and will drop out due to excess modulation level. Too high a level may also cause signal distortion which often causes the incoming signal to the receiving computer to display a string of @@@@.

Too low a TX audio level and the output at the other end will be too low for reliable reception. This is a particular problem when the received signal is noisy and the noise overcomes the tones.

Normal audio may sound lower than voice level (but like noise). Technically the peak deviation should be about 3 kHz or less on FM but most will not have deviation monitors available so some experimentation may be required. Even low modulation levels of less than 1 kHz have been observed to work with a clean signal into the repeater or receiver.

On HF, you will want the sound level to produce a transmitter power output at 25% of the maximum rated output or even less. Ensure that any speech compressor is turned off and that any Automatic Level Control does not operate.

In all cases with an analog interface device, you will have to make connection to the transceiver PTT line. The radio Data and/or Microphone connectors have this available. You can activate this with a manually operated switch or, with an audio detected Data Operated Transmit (DOX) circuit, or with suitable configured rig control software via a computer controlled signal from a RS-232 COM port usually using the RTS signal and a suitable level converter. Computers with only USB communications ports will have to have some kind of level and signal converter. Good luck, not all USB to RS-232 converters will work as you expect. Converters using the FTDI chips have been found to be the most successful.

When receiving from the radio, adjust the computer audio input in the same manner as with the speaker/microphone method by observing the waterfall display on FLDIGI.

Adjust the audio output to the radio in the same manner as with the speaker/microphone method being sure not to have too high a level.

Once you set up your Interface Device and cables and have all the signal levels adjusted to be appropriate for your equipment, you can send and receive data just the same way as in the speaker and microphone method except you will not hear the loud sounds from your computer and your microphone will not be picking up background noises.

If your transceiver has the Data interface and you are using it, you may adjust the speaker volume level without affecting the level to the Interface Device.

6.0 DIGITAL INTERFACE VIA USB CONNECTION TO COMPUTER

This method has been found to be the most reliable method of connection and eliminates a lot of session-to-session level setting of audio levels, etc. This method uses a dedicated sound card within the interface device replacing the sound card within the computer and with a USB digital interface to the computer.. At this time I have identified five commercial products that use this method. The first one is the Signalink USB device by Tigertronics, the second one is the DRA (Digital Radio Adapter) by Masters Communications, the third one is the Microham USB Interface II or USB Interface III, the fourth one is the RigBlaster Advantage, and the fifth one is the Navigator by Timewave. I have experience with the Signalink device but none with the other devices.

Some radios may have an internal sound card with a USB interface to connect to the computer

The audio connection between the device and the transceiver is the same as with the previous analog interface method unless the transceiver has an USB audio interface. The preferred method is via an internal connection to audio signals that are not subject to volume control such as the Data connector found on many radios – particularly dual band VHF/UHF radios or HF-VHF/UHF radios. A user modification that brings out these signal to a convenient external connector for radios that do not have these connectors is also useful. Connections to speaker audio and microphone input lines are also possible but these will be found difficult to adjust correctly and still maintain normal voice operations.

Signalink USB Device

Here is a link to the instructions for setting up and using this device

<http://www.tigertronics.com/files/slusbman.pdf>

Digital Radio Adapter by Masters Communications

Here is a link to the various DRA devices

<https://masterscommunications.com/products/radio-adapter/dra/dra-description.html>

These devices are basically similar different mainly in the cables used for connection to the radio. Both units use a USB Type B connector for connection to the computer. The radio connector to the radio from the Signalink USB device is an RJ-45 similar to a wired Ethernet cable connector while the DRAs offer a variety of connectors depending on model number. In either case a cable to the radio must be procured or made depending on the connector on the radio. The Signalink device has an internal plug-in wiring adapter to accommodate different radio connections.

Follow the devices instructions for configuring the normal computer sounds and using the external USB device for the digital communications sounds. For most Windows operating systems prior to Windows 11, this will be following some variation on the Programs/Accessories/Entertainment/ Volume Control/Properties path to select the Mixer Device to be the USB Audio CODEC.

On the fldigi Configure/Audio/Devices screen set the PortAudio to be the USB Audio CODEC device. Be sure to save the configuration.

The Signalink instructions will tell you to set the Wave level to approximately mid-scale. I have found that this will not necessarily trigger the PTT function reliability in all modes. I suggest that you set the Wave level to be a lot higher – possible even to the maximum. Again this is prior to Windows 11.

As with the other interface methods, the TX audio level to the radio is critical. Too high and the peaks will be clipped with a loss of data. Some repeaters will refuse to carry this data if at too high a modulation level and will drop out due to excess modulation level. Too high a level may also cause signal distortion which often causes the incoming signal to the computer to display a string of @@@@.

Too low a TX audio level and the output at the other end will be too low for reliable reception. This is a particular problem when the received signal is noisy and the noise overcomes the tones.

Normal audio may sound lower than voice level (but like noise). Technically the peak deviation should be about 3 kHz or less on FM but most will not have deviation monitors available so some experimentation may be required. Even low modulation levels of less than 1 kHz have been observed to work with a clean signal into the repeater or receiver.

On HF, you will want the sound level to produce a transmitter power output at 25% of the maximum rated output or even less. Ensure that any speech compressor is turned off and that any Automatic Level Control does not operate.

In many cases with the levels as set in accordance with the instructions, this will result in an audio level too high, unless the TX control on the device is set to very close to the minimum setting. In that case an attenuator circuit consisting of two resistors (one in series, one in shunt) between the MIC input to the interface jumper connector and the audio output on the interface jumper connector will be required.

Connection to the radio microphone circuit will require a higher value of the series resistor resulting in a lower audio level to the TX level adjustment.

It is important to save all configuration changes and to ensure that the device is connected to the computer USB port when the computer is started. If it is not connected, you will likely find it necessary to set the Mixer Device to USB Audio CODEC again.

7.0 RECEIVE AND TRANSMIT AUDIO LEVELS

This is probably the most critical adjustment that will allow the system to work under many conditions. The problem is that every computer and every operating system has a different way of adjusting computer input and output audio signal levels.

The TX audio level to the radio is critical. Too high and the peaks will be clipped with a loss of data. Some FM repeaters will refuse to carry this data if at too high a modulation level and will drop out. Too high a level may also cause the HF transceiver to operate at a high power level which causes signal distortion which often causes the incoming signal to the receiver to be in error.

Too low a TX audio level and the output at the other end will be too low for reliable reception. This is a particular problem when the received signal is noisy and the noise overcomes the tones.

Fortunately the result we are looking for can be achieved in various ways. Tigertronics / Signalink has provided guidance for computers running variations of Windows but that guidance would also apply to DAT devices from Masters Communications or those transceivers that have an internal sound card with a USB interface.

https://tigertronics.com/sl_suprt.htm#Windows_11_Information

Be aware that this is a multipage document that involves multi-page scrolling and also has some other documents within it that you may wish to download separately.

In this all-purpose Signalink configuration document, Windows 11 is the first one listed but you can scroll down to find equivalent guide for Windows 10, Vista, 7-8, and 2000/ME/XP and a second copy of the Windows 11 guide.

Tigertronics also has a Frequently Asked Questions site about their products.

<https://tigertronics.com/slusbfaq.htm>

Masterscommunications has a simplified instruction site which may be found useful.

<https://www.masterscommunications.com/products/radio-adapter/faq/setting-audio-levels.html>

Editors note: I found it necessary when I changed to a Windows 11 computer to install Jumper 1 on my old (prior to 2018) Signalink USB device (the one with the through hole parts) to increase the PTT sensitivity and Jumper 2 to increase the received signal to the computer. That might not be necessary with the newer models with the surface mount components including the transformers.

8.0 OPERATIONS

This discussion assumes that all the configuration and adjustments have been made previously and both the fldigi and flmsg windows are visible.

RECEIVE

Receive the message watching the “waterfall” and the incoming text in the upper fldigi window. If the transmitting station sends an RsID signal and your software is set to receive an RsID signal, the mode should automatically change even if not previously set.

Note: Observe the Green bar signal meter at the lower right of the FLDIGI screen. With no signal the squelch bar should be above the noise level. A normal signal level should place the top of the Green bar above the squelch bar. The squelch control is active when the SQL light is Yellow and changes to Green with a signal. If the SQL button has no color, random characters should appear in the upper window. Click on the SQL button to activate the signal squelch if required.

The message ends with “.....end” and the cessation of transmission. If configured properly with flmsg versions of 4.0 or greater, the file name assigned by the sender should be posted in the pop-up Rcvd Msgs files window.

If the message was not received correctly, inform the net control operator of your observations relating to signal strength and noise, audio level, and waterfall characteristics.

View, Print and or Email

In the pop-up window of Rcvd Msgs, select the File, then View. This should open the file in the flmsg default window.

To get a full page view, from the File menu in flmsg, select “View Html delivery”. The file should open in your preferred browser.

Size the page as required, preview any print operations if desired, and send to your selected printer. You may print it as a pdf document and paste the pdf file into the email program of your choice.

TRANSMIT

In the FLMSG window, select the form that you wish to transmit. Click on New. or Open an old file. Fill in the blanks using normal procedures. If the form has a date and/or time field, fill in that data or click on the entry prompt.

The procedure is slightly different using a CUSTOM form. If you select a Custom form, you will get a form with the data blank. Select Edit Form and proceed to fill in the data items requested. Then click on the Submit Form button at the bottom of the screen, which will show you the data items filled in. Then click on the X at the top right corner of the screen which will show you the items to be transmitted without the form showing..

For all forms including standard and CUSTOM forms. click on Save As and navigate to the ... \NBEMS.files\ICS\messages folder as found in section 2.0 of this document. Save the message with the call sign and date and time code as previously configured. I suggest editing the file name with a brief subject just after the call sign so that you or others can recognize it later.

When ready, using the microphone/speaker method of connection, position the radio microphone near the computer speaker, then Press the PTT bar to transmit to initiate transmission and immediately click the Autosend command.

If using an external analog or digital interface, obviously you would not use the microphone unless your analog interface does not have a Digital Operated Transmit (DOX) capability. In that case, the transmit function will be activated with a push-to-transmit function on the microphone or by means of a separate switch.

Keep transmitting until the message is completely sent and “end” appears. Observe the Transmit waterfall display while transmitting.

When the transmission sound (and waterfall) ends, release the PTT bar, if used. Some analog interface devices with a DOX circuit and certainly all digital interface devices will release the transmit function with the end of the audio signal. .

The receiving station may report on your signal strength and noise level, audio level, or waterfall characteristics if there is a problem. Adjust as required.

INTERFACE DEVICES

Here are links to some commercial USB connected Interface Devices:

DRA devices

<https://masterscommunications.com/products/radio-adapter/dra/dra-description.html>

Signal Link

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

Reviewed in QST April 2008, Page 73

Rig-Blaster

<http://www.westmountainradio.com/rigblaster.php>

Reviewed in QST February 2011, Page 40

MicroHam

<http://microham-usa.com/store/product-list.php?pg1-cid2.html>

Timewave

<http://www.timewave.com/support/Navigator/index.html>

Here are some references to hardwired interface devices:

For QST magazine reviews by manufacturers, start here:

<http://www.arrl.org/reviews-listed-by-manufacturer#S>

Here is a build-it-yourself kit for an analog interface device

Easy Digi by KF5INZ found on Ebay.com

Here are some home brew interface articles

QST March 2011, Page 34 "Digital VOX Sound Card Interface"

Consult QST May 2011, Page 51 for a correction.

QST July 2010, Page 37 "Classic Sound Card Interface".

A complete unit that uses a serial port to command the transceiver into transmit mode.

QST June 2009, Page 30. "A Sound Card Interface for FM Transceivers"

A simple TX only adapter with DOX.

John, W6FQX