MixW202 HELP CONTENTS TABLE

WELCOME AND INSTALLATION

Welcome
Installation
System Requeriments
Quick Start
Registration

SET UP AND CONFIGURATION

Configuration
Basic Set
PTT Circuit
TNC Set up
Interface Links
Configuring Macros
List of Macros
MixW Version History

OPERATION

General Operat. Procedures
HF Digital Modes Band Plan
- Amtor Frequency
- Pactor Frequency
- RTTY Frequency
- Packet Frequency
- FAX Receiving
- MFSK 16 Frequency
- Hell Frequency
- SSTV Frequency
- THROB Frequency
- MT63 Frequency

QSO Technique
Using MixW with DXAtlas
Using MixW with other pgm, DDE
Status Bar
Logging and QSLing
Contest Operation
File Menu Item
View Settings
Using Macros
Using a TNC

DIGITAL MODES

RTTY

- RTTY Intro and Theory
- RTTY Operation

PSK 31 and BPSK 31

- PSK 31 Intro and Theory
- PSK 31 Operation

MFSK

- MFSK Intro and Theory
- MFSK 16 Operation

PACTOR

- Pactor Introduction and Theory
- Pactor Operation

AMTOR

- Amtor Introduction and Theory
- Amtor Operation

PACKET

- BBS Commands
- TCP/IP over AX25
- HF Packet Introduction
- HF Packet Operation
- VHF/UHF Packet Introduction
- VHF/UHF Packet Operation
- DX Cluster

CW

- CW Introduction
- CW Operation

HELLSCHREIBER

- Hell Introduction and Theory
- Hell Operation

SSTV

- SSTV Introduction
- SSTV Operation

THROB

- Throb Introduction and Theory
- Throb Operation

FSK 31

- FSK 31 Theory and Operation

MT 63

- MT 63 Introduction and Theory
- MT 63 Operation

FAX

- FAX receiving

Welcome to MixW version 2.02

State of the art digital mode software by Nick Fedoseev, UT2UZ and Denis Nechitailov UU9JDR. Help files by Scott E. Thile, K4SET
The Demo version is good for 15 days, for registration information please see Registration

MixW stands for a Mixture of different modes. With this release of Version 2.02, MixW now fully supports CW, BPSK31, QPSK31, MFSK, RTTY, FSK31, Packet (HF and VHF), Pactor RX/TX (TX requires TNC), Amtor (Sitor) TX/RX (No TNC needed), Hellschreiber, FAX (RX only), SSTV, THROB, and MT63. Nick is constantly adding new modes and features to MixW, and strives to make it the best and most complete sound card digital mode program available. It now also includes support for multimode TNCs, for Pactor transmit, and for those preferring a hardware-based approach to the other digital modes. Even more modes can be accessed by configuring MixW to call other software packages from within MixW.

Other MixW features include a voice keyer for SSB, FM, and AM phone modes. Excellent logging, sked scheduling and reminding, and even auto CQing of scheduled events through the fully configurable MACROS. There is also a sophisticated contest mode facilitating competitive digital mode contest operation, and an export of the contest log to the newly required Cabrillo format. The log will also import and export CSV and ADIF files. MixW also has support for printing of custom QSL cards or labels. There is also built in DX Cluster support either via Packet Radio or the internet.

New! TCP/IP over AX.25 packet radio protocol is also supported now! Click TCP/IP for details.

MixW does not require a TNC to operate. The only requirement is that you have a computer running the Windows 9x, ME, NT, 2000, and XP operating system, and a compatible soundcard. Click here for the minimum system requirements. System Requirements

If you're experienced with other SoundCard Digital mode software, or upgrading from previous MixW releases, you may wish to start with the Quick Start to familiarize yourself with this exciting new release, and get on the air quickly.

If you are new to SoundCard Digital mode operation, you will need to connect your radio's transmit and receive audio to your computer soundcard via the mic or line input, and the speaker or headphone output. TX/RX switching can be handled either by using your radio's VOX circuit, or by building a simple PTT interface. This is covered in Basic Set Up

To configure MixW for your station and operating styles see Configuration

See Logging for additional information about MixW's new logging and QSL features and operation.
See DX Cluster for additional information about the DX Cluster features and operation.
See General Operation to learn to operate MixW.
See DX Atlas to learn to configure MixW and DXAtlas to work together.
Far additional information on using DDE to interface MixW with external programs see Using MixW with other programs, DDE

Click on the Index button to view the complete help file topic offerings, or the Contents Tab for the outline of the help files system. If you are having trouble finding help in a specific area, click on the Index Tab above, then click on the Find tab, this will compile a search system to be used with these Help Files.

The history and theory of many of MixW's modes is also available in these helpfiles.

For the latest MixW software and related information, visit the MixW websites at:
http://tav.kiev.ua/~nick/mixw2/

http://www.nvbb.net/~jaffejim/mixwpage.htm

To download the most current version of these helpfiles click here:
http://campus.murraystate.edu/staff/scott.thile/k4set/index.html

To view the history of development and features added to MixW2 and its various releases please see MixW History

For additional help and discussion on using MixW please subscribe to the MixW email reflector by following this link:
http://www.egroups.com/group/mixw/

While these help files attempt to provide background information on the various modes supported in MixW, there is a wealth of information on the WWW. For additional information on the various modes please visit the following sites:

For an excellent overview of all the HF Digital Modes visit the site of MixW Beta tester and help file contributor, Richard B. Griffen, NB6Z:
http://www.teleport.com/~nb6z/

PSK31, "The official homepage for PSK31":
http://aintel.bi.ehu.es/psk31.html

MFSK, **"The official MFSK website"** Murray Greenman, ZL1BPU.
http://www.qsl.net/zl1bpu/MFSK/

For all the "Fuzzy Modes", such as Hellschreiber (MT63 Is also covered at this site) visit the Murray Greenman. ZL1BPU main website at:
http://www.qsl.net/zl1bpu/

For THROB, vist the developers description, Lionel Sear G3PPT.
http://www.lsear.freeserve.co.uk/page3.html

RTTY, for an interesting look at the history of Radio Teletype please visit RTTY.com:
http://www.rtty.com/

MixW Version 2 Help files by Scott E Thile, K4SET
scott.thile@murraystate.edu
http://campus.murraystate.edu/staff/scott.thile/k4set/index.html

With Many thanks to the following help file contributors:

Denis Nechitailov, UU9JDR

Howard (Skip) Teller, KH6TY
http://members.home.com/hteller/digipan/

Richard B. Griffen, NB6Z:
http://www.teleport.com/~nb6z/

Jim Jaffe, WA2VOS:
http://www.nvbb.net/~jaffejim/mixwpage.htm

Finn Helmuth Pedersen, OZ6LI:
http://hjem.get2net.dk/helmuth/

While MixW is a commercial program, all of the contributors to the MixW help files are volunteers working to further the radio art.

The MixW help files are free, and it is our hope that our efforts here will help you to enjoy MixW and amateur radio's wonderful digital modes.

Every effort has been made to contact the writers of the material used from the WWW on the history and theory behind the various digital modes. It is our sincere wish to comply with the writer's wishes in using their excellent materials. Please contact Scott E. Thile, K4SET if you have any concerns about the use of material in these helpfiles.
scott.thile@murraystate.edu

Installation of MixW version 2.0

State of the art digital mode software by Nick Fedoseev, UT2UZ and Denis Nechitailov UU9JDR. Help files by Scott E. Thile, K4SET.

First, click on System Requirements to make sure your system will handle MixW version 2.0.

Installation

The current MixW install program is available at http://tav.kiev.ua/~nick/mixw2/

This is a self extracting installation file. You can choose a different directory to install MixW to, but I would suggest using the default directory of C:\Program Files\MixW\.

This will automatically install all the files MixW2 needs to run on your system. These will include the following files in the MixW directory:

- bands.ini (default band frequency information)
- contest.mc (contest Macros)
- Events.dat
- HAMCAL32.DLL
- MixW DDE test.doc (For the QSL Card feature)
- MixW QSL card test.doc (For the QSL Card feature)
- MixW2.exe (The main program files)
- MIXW2.FTS
- MIXW2.GID
- PACTOR-KAM.MC (Special Macro file for KAM modems to run Pactor TX)
- pfx.dat
- RACCD32A.DLL
- sstvhdr.bmp
- trace.log
- WebCL.dll

Besides having MixW2.exe and its related files in your folder/directory there are two other files that are automatically created by MixW which are MixW2.log, and cty.dat. The cty.dat file is part of the Antenna Heading system and MixW2.log is a file created by MixW, which is your logging system. Your MixW2.log file should be backed up often to protect your log information from a computer crash and loosing all those QSO records!

In order to use these helpfiles in from the MixW help menu, two additional files called MIXW2.hlp and MIXW2.cnt must be in your MixW directory. (These are included with the Zip file located at: http://campus.murraystate.edu/staff/scott.thile/k4set/index.html

The following files will be created in your MixW Directory:

- Mix(mode name).mc (All Mix*.mc files are macro files. MixW makes one for each mode that you have configured custom micros for. For instance "MixBPSK31.mc" or "MixRTTY.mc" are the custom Macro files for BPSK31 and RTTY.
- MIXW2.INI (the file that contains all your configuration information)
- MixContests.ini (contains all your contest configurations)
- MixMacors.ini (contains list of Macro files and default macros)

These files in the MixW directory contain all the data and information regarding your MixW setup configuration, macros, contests, and any other information concerning the assignment of the Function Keys. These files should be backed up in case you have a Computer Crash and have to re-install MixW again.

Next,, if you do not have a transceiver interfaced to your radio yet, go to Basic Set Up
To configure the MixW softare for your station go to Configuration
If your already set for digital mode sound card operation, go to Quick Start

MixW, Quick Start

A brief outline for configuring and operating version 2.0 for experienced users. See Basic Set Up if you have not set up your radio to computer interface yet. See Configuration for detailed instructions on configuring the software for your station.

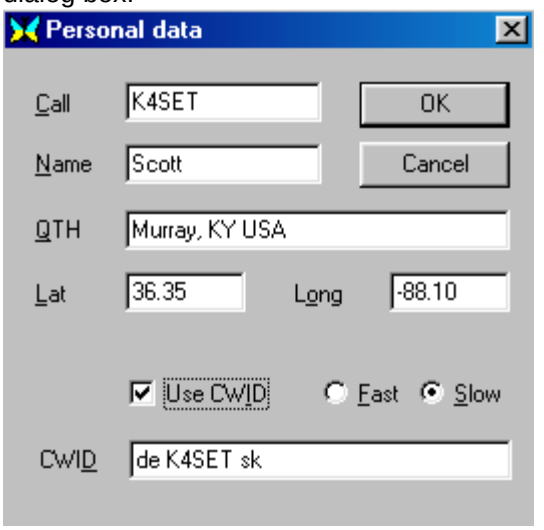
If your station is already interfaced and configured for SoundCard digital software, and you're already an experienced operator with the SoundCard digital modes, then here is all you need to do to get on the air with MixW Version 2.0:

- **Install the software**. Click Installation if you have yet to install the software.
- **Configure your Personal Data**
- **Configure your Transceiver CAT/PTT settings**
- **Commands for basic operation**
- **Configure your accessories** (Rotor and/or TNC) (Optional)
- **Configure your Macros** (Optional)

If you're migrating from MixW 1.xx or DigiPan

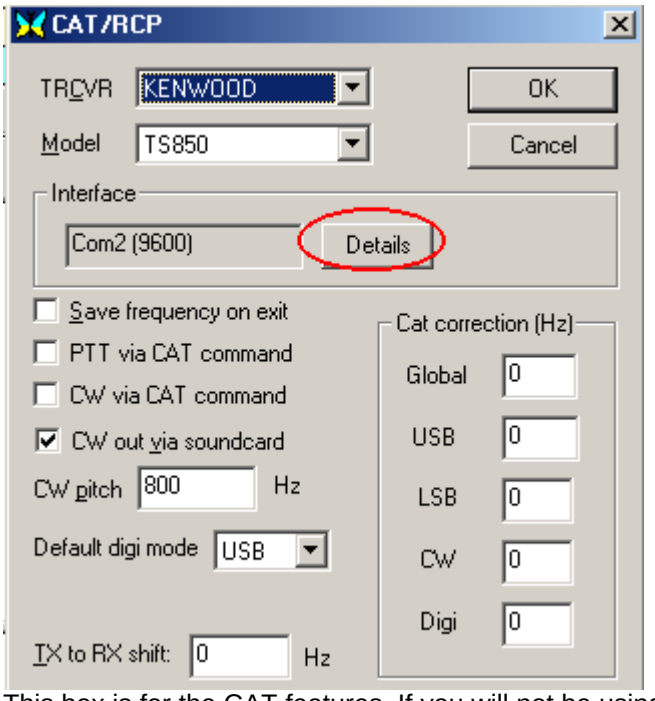
- Copy the MixW 1.xx registration file (if you have one) to the MixW2 folder.
- Enter your call into Personal Data dialog (use capital letters), and then restart MixW2 to let registration take effect.
- Export MixW1 or DigiPan log to an ADIF file.
- Import the ADIF file in MixW 2. (select File | Import from the main menu).

Configure your Personal Data: Select Configure | Personal Data. This will display the following dialog box:



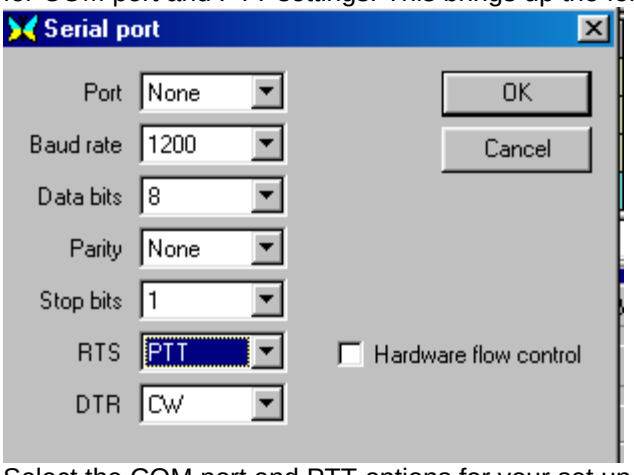
Enter your Station information and select your CD ID options, then click OK. (Your callsign should be in ALL CAPS).

Configure your Transceiver CAT/PTT settings: If you are using VOX to trigger TX/RX function, and you are not using CAT features you can ignore this dialogue box entirely. If you are triggering the TX/RX with a PTT circuit, or CAT control, you will need to configure that in order to key your transceiver. To do this, click Select Configure | TRCVR CAT/PTT. This will display the following dialog box:



This box is for the CAT features. If you will not be using the CAT function, set TRCVR to "None", ignore the rest of this box, and click on "Details" to configure your PTT and COM port options. If you will be using the CAT features, first select your transceiver make and model from the drop down menus. **(Note:** if your model is not listed, try a similar model of the same make. For instance, almost all CAT capable Kenwoods work with the TS-850 setting).

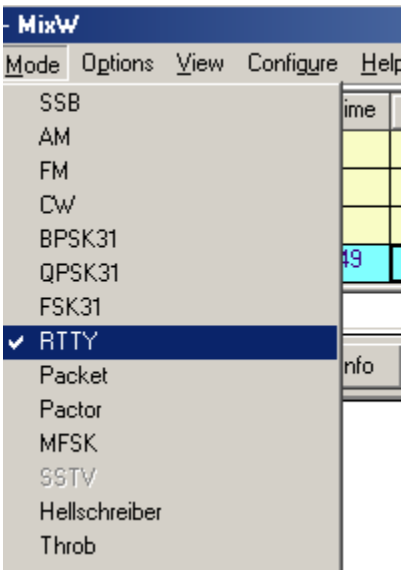
Next, check the features you want MixW to use CAT operation for, then click on the "Details" button for COM port and PTT settings. This brings up the following dialog box:



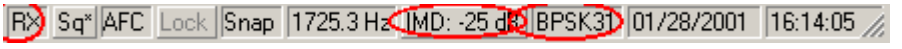
Select the COM port and PTT options for your set up and click OK, and then OK again. If you need more information on these settings see Configuration and/or Basic Set Up for interfacing information.

Commands for basic operation:
Mode selection

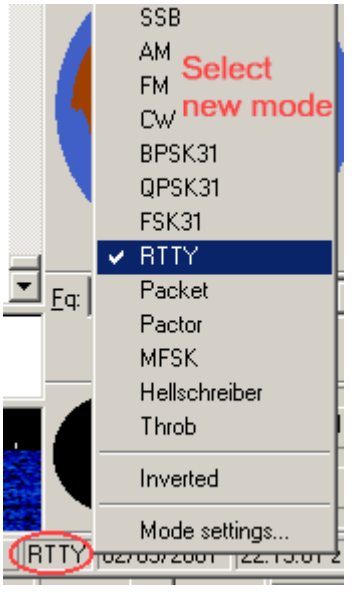
Select the mode you wish to operate by clicking Mode | <your choice of mode>:



Notice that the status bar will change according to the options and features specific to the mode you have selected, and the mode will be indicated in the mode box. For instance, IMD is only relevant in the PSK31 modes, while Connected or Disconnected is only relevant for Packet:



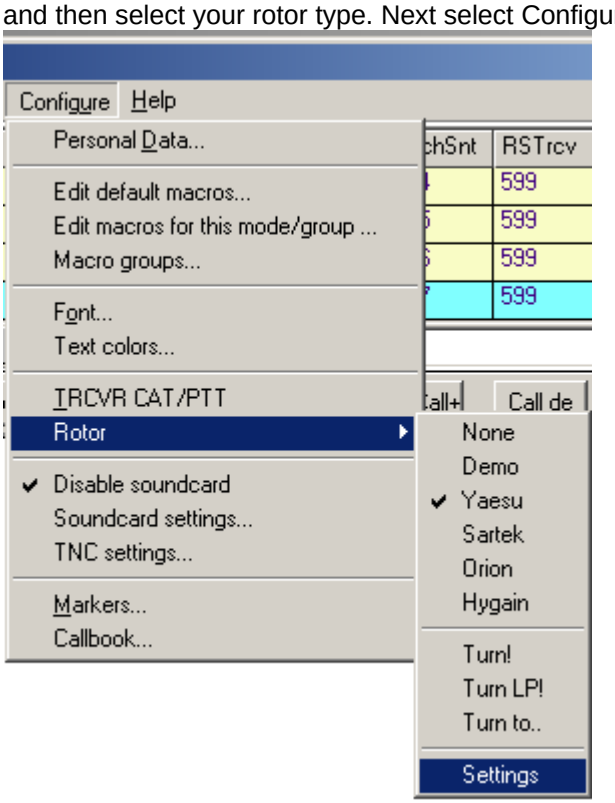
You can also switch modes my clicking on the mode box in the status bar and selecting the mode you wish to operate from the pop up menu:



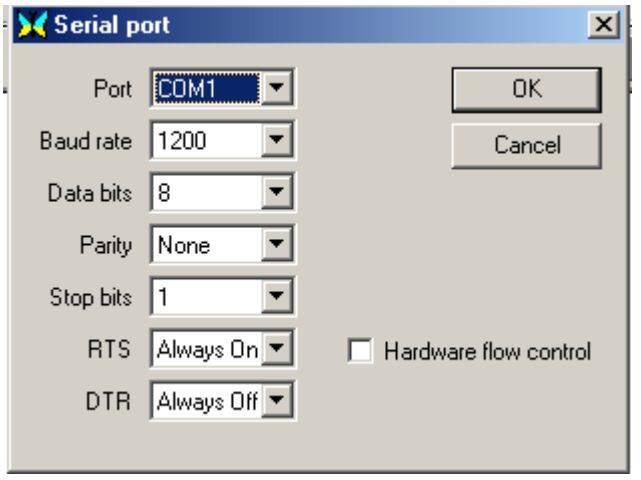
Switching between RX and TX: There are several ways to switch MixW between TX and RX. The Pause/Break key will toggle RX/TX.. You can also toggle TX/RX by clicking on the RX/TX box in the Status Bar, or by using the TX and RX buttons on the Macro Bar (depends on your Macro Settings see Configuring Macros for more information).

These basic commands will suffice to get you on the air with MixW's default settings in most of the modes, however, there are many user configurable settings to refine and improve your operation. To learn more about general operating settings and skills see General Operation. To learn more about settings for the specific modes offered in MixW version 2 click here: PSK31, RTTY, MFSK, Hellscreiber, Pactor, CW, HF Packet, VHF Packet, THROB

Optional Configure your accessories (Rotor): To configure your rotor select Configure | Rotor, and then select your rotor type. Next select Configure | Rotor | Settings:

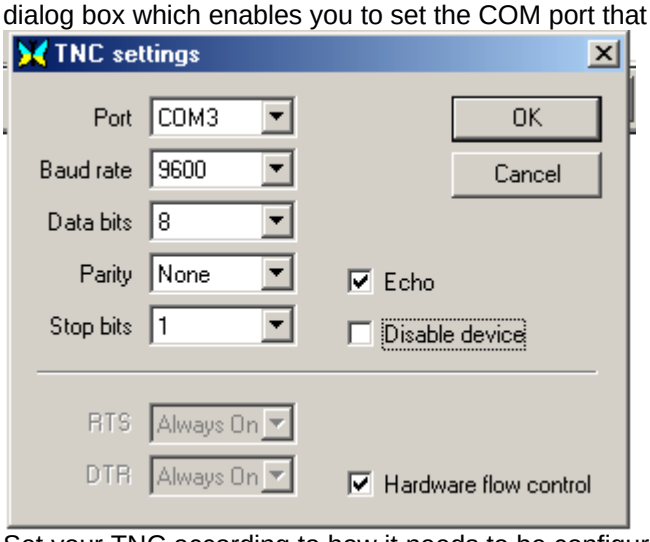


This will bring up the following dialog box to configure your rotor settings:



Set the COM port settings for your rotor and click OK. To operate the rotor click Configure | Rotor and then select Turn to rotate the antenna toward the station callsign location (appears on the world map) that is active in the <Call> box, select LP to set the antenna to work the Long Path for the callsign location that is active in the <Call> box, or select Turn to.... for a dialog box which enables you to set the heading in degrees.

Optional Configure your accessories (TNC): Select configure | TNC to bring up the following dialog box which enables you to set the COM port that your TNC is connected to:



Set your TNC according to how it needs to be configured and click OK. For additional information on TNC setup see TNC Configuration and operation.

Optional Configure your Macros. MixW version 2 is designed to enable extensive use of Macros to automate the operation of your equipment, software features, facilitate efficient contest exchanges, and to cut down on repetitive typing during casual QSOs. Separate Macros can be configured, optimized, and automatically loaded for each of the modes you operate. See Configuring Macros for how to optimize your Macros.

Optional Using the other features: MixW version 2 has extensive logging capabilities. See Logging. There is also a contest-logging mode, which can be combined with extensive use of

Macros for maximum competitive efficiency and enjoyment. See Contest Operation.

SYSTEM REQUIREMENTS

MixW version 2 requires a
Pentium 166MHz or faster PC
16 bit or better soundcard
64 MEG of Ram
A little free HD space.
Note: RAM is more important than CPU speed,
and the needs will depend on the operating mode.
For instance CW seems to benefit from more RAM.

Slower systems: MixW 2.0 has been run successfully with
a 486 DX 4 100 after the following changes are made to
reduce the use of system resources:

- Turn the tuning indicator off (View | Tuning Indicator) should be unchecked.
- Set spectrum speed to Slow (Configure | Soundcard settings).
- Set the sample rate to 8000 (Configure | Soundcard settings).
- Set DSP filter to none (Configure | Soundcard settings).
- Reduce the height of waterfall by dragging the top down.
- Turn off the average spectrum line (if using the spectrum mode) (View | Spectrum |Average Curve | None).

Registering the MixW Version 2.02 Demo

The MixW Version 2.02 demo is good for 15 Days before registration is required, there are no other restrictions: To register and pay online, please visit the following site:

http://tav.kiev.ua/~nick/mixw2/

For US Stations who wish to register by mail, simply send Check, Cash, or Money order in the amount of $50.00 to:
Jim Jaffe, WA2VOS (Make checks or Money Orders Payable to Jim Jaffe)
141-08 71 Road
Flushing, NY 11367-1945.
Jim will send you via EMAIL a special registration file which will both register and stop the timer in the downloaded program.

A CD can also be ordered for an additional fee of $15.00 plus $1.00 postage for
U.S. Stations. Overseas Stations can order a CD for an additional fee of $15.00 US funds plus $3.00 Postage

Overseas Stations should send $50.00 in US funds, either in Cash or International Money Order as indicated above. Foreign Checks and Credit Cards are not accepted.

A registration form can be downloaded by clicking here:
http://209.67.56.128/MIXWREG.pdf

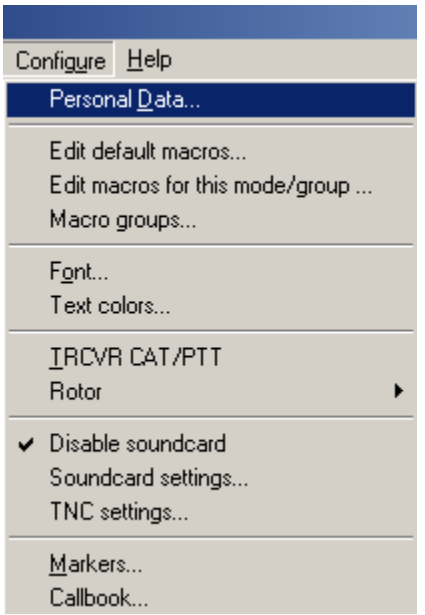
Dual registration: We will issue a dual registration to any registered user provided that the second call is either their own MARS call or another personal call issued by a foreign country or another member of the Immediate household living at the same address (confirmed by a callbook). The new mixwreg.dll file will cause the second call to appear in the peronal data by clicking the down arrow in the Personal data dialog box. To apply for dual registration please send an email to:

mailto:jaffejim@erols.com

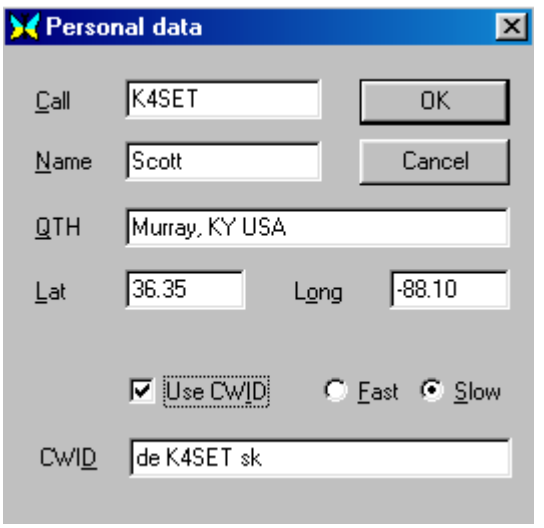
Registration questions can go to either:
mailto:jaffejim@erols.com
or
mailto:nf@tav.kiev.ua

Configuring the MixW software for your Station

Personal Data
Your first task is to tell MixW who you are, and where your QTH is. Click on Configure | Personal Data:



This brings up the following dialogue box:

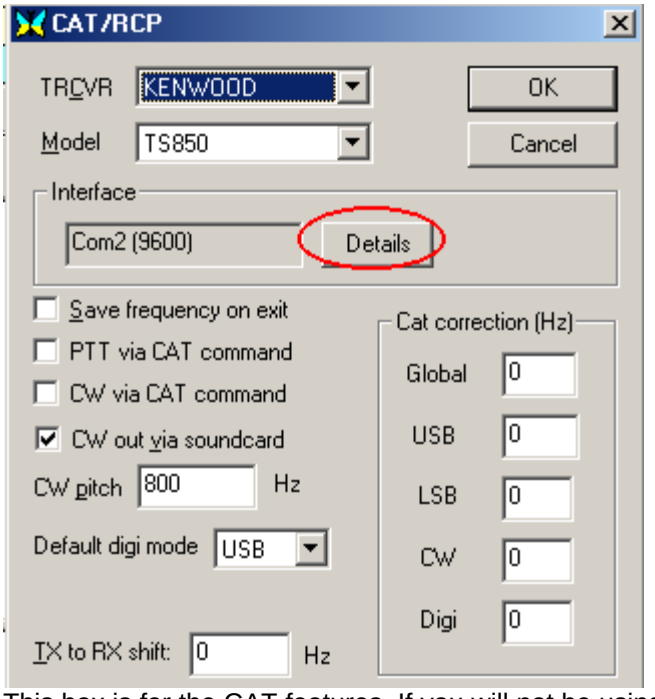


Fill in your station information, as indicated. (Use ALL CAPS for your callsign).
Note: In North and South America your longitude will be a negative (-) number.
If you want to be able to send a CW ID at the end of your transmissions, indicate that here in the checkbox along with the text to send. Adding the <CWID> function inserted in your sign-off Macro sends your CD ID string. When finished configuring here click the OK button. For more information on Macros click Configuring Macros

Note: You must at least enter your station call sign in order to transmit with MixW. If you are triggering TX/RX with VOX, or manually triggering RX/TX you can ignore the rest of this for the time being and get right on the air. Remember to come back though, as you will be missing many of MixW's advanced features.

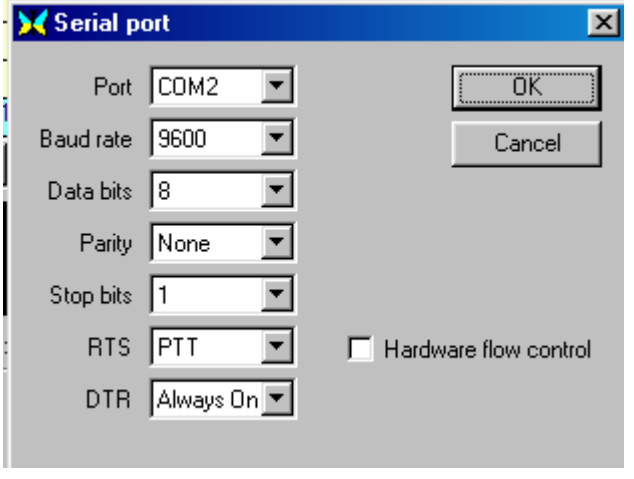
Configure your Transceiver CAT/PTT settings: If you are using VOX to trigger TX/RX function, and you are not using CAT features you can ignore this dialogue box entirely. If you are triggering the TX/RX with a PTT circuit, or CAT control, you will need to configure that in order to key your transceiver. To do this Select Configure | TRCVR CAT/PTT, which will display the following dialog

box:



This box is for the CAT features. If you will not be using the CAT function, set TRCVR to "None", ignore the rest of this box, and click on "Details" to configure your PTT and COM port options. If you will be using the CAT features, first select your transceiver make and model from the drop down menus. **(Note:** if your model is not listed, try a similar model of the same make. For instance, almost all CAT capable Kenwoods work with the TS-850 setting).

Next, check the features you want MixW to use CAT operation for, then click on the "Details" button for COM port and PTT settings. This brings up the following dialog box:



Port is where your PTT or CAT circuit is connected. The Baud Rate, Data Bits, Parity, and Stop Bits, are set to match your transceiver's CAT configuration. (Check your Transceiver's manual for these settings). If you are not using the CAT features with your transceiver you can ignore these settings.

The RTS and DTR pins of the selected COM port are where High/Low signals are delivered to key your PTT circuit, your CW circuit, or both. They can also be set to "always on" or "always off" to facilitate a combination of PTT keying via a PTT circuit in conjunction with using CAT for automatic rig QSY, frequency reporting, and other features.

RTS uses pin 4 for the DB-25 connectors, or pin 7 or the DB-9 connectors. DTR uses pin 20 of the DB-25, or pin 4 of the DB-9.

In my set up, I trigger PTT via DTR on COM2, and I set RTS to always on in order to maintain communications with my Transceiver's CAT features. This utilizes the same port for both PTT and CAT functions.

If you are triggering PTT by radio command (CAT) and do not need to key a separate PTT or CW circuit then you can simply click the Hardware flow control box and make sure your COM Port, Baud Rate, Data Bits, Parity, and Stop Bits match you transceiver's settings. RTS and DTR are not used. **Note:** The transceiver must support "hardware flow control" if this box is checked. If it does not support it, you will encounter several problems. If this is the case, simply uncheck the "hardware flow control" box, and instead set the DTR and RTS to "always on". Make sure you have enabled the PTT via CAT in the previous menu.

See PTT Circuit for how to build a PTT circuit, and a more through discussion of the DTR/RTS pin assignments. Or for additional information see Interface information on the WWW

When finished with your selections for the COM port, PTT, and CW keying options for your set up, click OK, and then OK again.

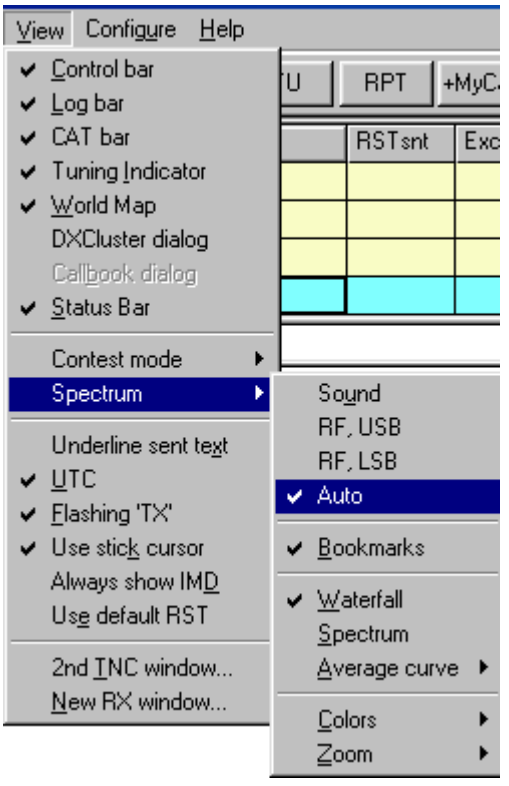
Configuring for LSB or USB operations: The MixW options for RF, USB/LSB should be configured to reflect your mode of operation by selecting View | Spectrum | RF, USB or RF, LSB or Auto, or Sound. These must be set correctly in order for the frequencies in the displays to represent your actual operating frequencies, and for MixW to automatically adjust the inversion settings based on your RF mode.

Inversion: Note: This feature works differently in MixW than most other SoundCard digital programs, so please read and understand the following information to avoid confusion while operating:

Modes that utilize the inversion feature are QPSK31, MFSK16, RTTY, AMTOR, Hellschreiber, THROB, and FAX. In MixW, "Inverted" means to invert the Mark and Space tones from the normal operating standards of the active mode. This feature can be used in cases where the station you are attempting to work is inverted.

To illustrate: When using a traditional hardware TNC, RTTY is almost always operated in the LSB mode, utilizing a 170 Hz shift between the MARK and SPACE tones, with the MARK tone being the higher in frequency. If MixW is set on "RF, LSB" it will set the Mark tone as the higher tone. However, if MixW is set on "RF, USB" then the Mark tone will be set to the lower tone. (You can think of this as an automatic inversion if you like). In other words, if MixW is configured correctly (it needs to know if you are using LSB or USB) then it will automatically adjust your Mark and Space tones for you. You would only use the "Inverted" feature to operate inverted from the standard practice of that mode of operation, regardless of whether you're using USB or LSB.

If you are configured to use the CAT features of MixW, the USB/LSB and frequency changes will all be done automatically for you by selecting View | Spectrum | Auto:



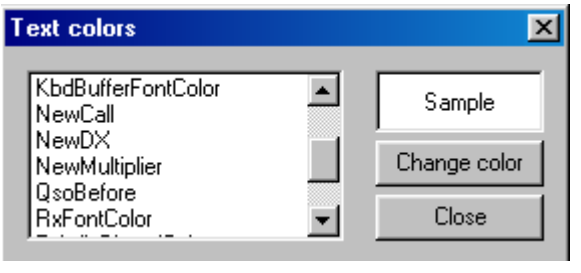
Now, MixW will automatically know if you are using USB or LSB, as well as your operating frequency by polling your transceiver via the CAT feature. Your MixW operating frequencies (in the spectrum display as well as the log and CAT bars) will also automatically represent the audio offset, which will be either plus or minus your transceiver's frequency, depending on if you're operating LSB or USB. If you are not using CAT to determine your mode and frequency, you can still set your RF, USB/LSB parameters manually from this menu. Your frequency will be accurately displayed as long as you manually set your frequency in MixW to match your transceiver's frequency. This can be done using the Alt-F key combination.

Selecting View | Spectrum | Sound will show the audio offset alone, without regard to the RF operating frequency. **Note:** The audio frequency can also be displayed while in the RF USB, RF LSB, and auto modes by simply placing the cursor above the spectrum display until you see the cursor turn into a hand and pressing the left mouse button.

MACRO Configuration
MixW has extensive Macro features for contesting as well as rag chewing.
See Configuring Macros for instruction on configuring and operating with Macros.

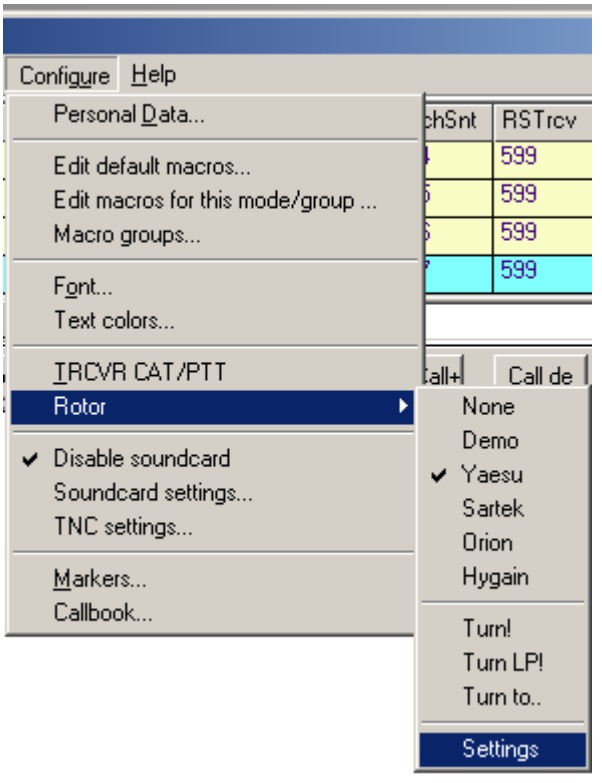
Font
Select Configure | Font. This will bring up the font select dialog box. Here you can select the font that will be used in your receive and transmit windows.

Text Colors
Select Configure | Text Colors. This will bring up the following dialog box:

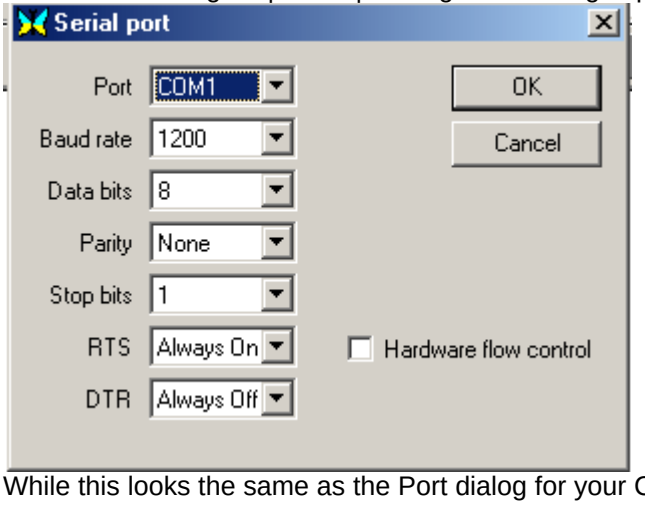


Here you can select the text colors for the various text types. This is an extremely handy way to customize your text to easily recognize call signs, new call signs, new DX,, customize contest mode colors such as new multiplier or QSO before, receive and transmit window background colors etc... The ability to customize your applications and operating preferences is an area in which MixW really shines.

Rotor Selection and Control
This section pertains to PC controllable Rotors.
Select Configure | Rotor | and then click on your Rotor brand.



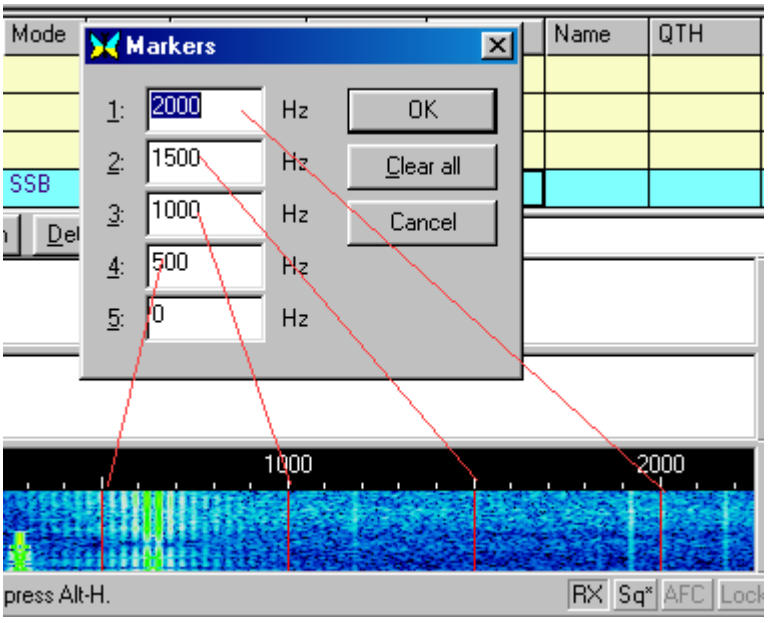
Next select Configure | Rotor | Settings. This brings up the following Port dialog:



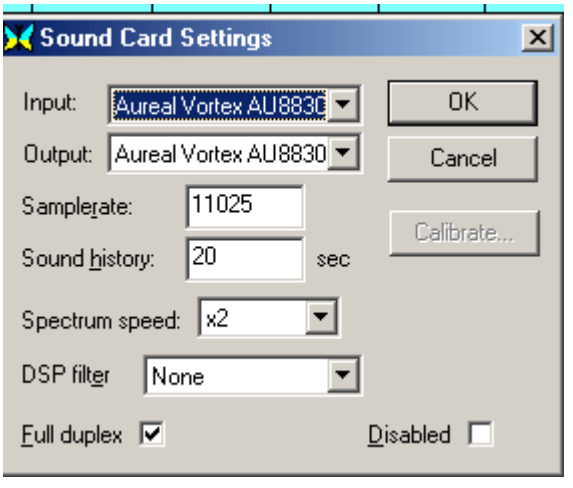
While this looks the same as the Port dialog for your CAT/PTT information it is for selecting your Rotor control information. Set these same features by consulting your rotors manual.

When you click OK to close this dialog a box will pop up to allow you to input an Azimuth setting. Type it in here and click OK. This can be changed later by selecting Configure | Rotor | Turn to... Your other options are Turn! (Turns the rotor toward the station in <call>), and TurnLP (Turns the rotor torward the long path direction of the station in <call>.

Waterfall Audio Frequency Markers
Markers can be set in up to 5 locations. This will place a thin red line running down the waterfall display at the desired location as follows:



Configuring the Sound Card
Open the soundcard settings dialog by selecting Mode | Soundcard settings. If you have multiple soundcards in your system, you select which one you want MixW to use for TX and RX functions. You can also set the sample rate, sound history, spectrum speed, as well as select a DSP filter, which can help your copy in certain conditions.



Sample rate: A value between 7000 Hz and 12000 Hz for a soundcard sample rate is displayed. MixW works best with the default sample rate of 11025 Hz, although other rates can be used to accommodate differences in soundcards. Generally, it is not necessary to modify the default value except in special circumstances.

Sound history: This selection presents an input box for entering the number of seconds of previous reception to be stored in MixW to be played back by holding down the Shift key while clicking on a signal. The signal will be played back at an accelerated rate.

Spectrum Speed: This setting alters the speed of your waterfall or spectrum display. A faster display will make tuning in signals easier and faster, but it also requires a faster computer and soundcard.

DSP Filter: The "DSP Filters" can not be used and should be set to NONE for operating the digital modes with the sound card. These settings are designed for general listening, or for phone operation. MixW offers three choices for DSP (Digital Signal Processing) filters. Pass through, notch, and anti-noise. These filters can enhance phone receive performance in certain operating conditions.

If you're migrating from MixW 1.xx or DigiPan

- Copy the MixW 1.xx registration file (if you have one) to the MixW2 folder.
- Enter your call into Personal Data dialog (use capital letters), then restart MixW2 to let registration take effect.
- Export MixW1 or DigiPan log to ADIF file
- Import ADIF file in MixW 2.

To further customize MixW**'s various features please see View**

MixW Basic Set Up

Note: It is VERY important that you have installed the latest Microsoft patches and upgrades to your version of Windows. Go to: http://www.microsoft.com/downloads/search.asp You may also benefit from downloading the most recent drivers for your SoundCard from its manufacturer's website.

Note: Be sure your computer time is set correctly. High accuracy (+-1 second) is needed for many of MixW's advanced features to operate correctly. Use wellknown freeware utilities like NetDate: http://oneguycoding.com/netdate/ or Automachron http://oneguycoding.com/automachron/ to be in sync with the whole world automatically. GPS or any other precise clock source may be used as well. Click onto desired frequency to move the TRCVR there.
Previous Fq and mode will be restored after closing the dialog.

Interfacing your Transceiver to your PC:
Interfacing your transceiver and PC to work with MixW can be handled many ways. A two-way audio path must be provided between the transceiver and the computer soundcard, and the transceiver needs to be switched between RX and TX. You can configure MixW to switch between TX and RX in four ways.

1. Operate a push-to-talk (PTT) switch via a voltage to the DTR or RTS pins of a com port, the same port can also be used for serial communication with the radio (CAT operation) if desired.
2. Use transmit and receive commands to the radio via the serial port through CAT, and without using the PTT circuit.
3. Use the VOX circuit in your radio to switch it into transmit when it hears the audio sent by the computer, and back to receive when the audio stops.
4. Operate the radio transmit/receive manually

Important Note: Your microphone must be disconnected from the radio (or otherwise switched out of the circuit) to avoid inadvertently transmitting voice signals in the digital bands. When using VOX, Non-MixW computer sounds (such as the Windows start up chime) can also trigger the VOX circuit and key the transceiver (you may have heard these unintentional transmissions before). These sounds will then be transmitted over the air! To avoid these illegal transmissions, it is important to disable all sounds in any applications running while using MixW, and be sure to have your rig off or disconnected from your computer when booting or re-booting.

Note: Many new and "high end" transceivers do not need a special interface to operate with the MixW. Most new rigs have input and output audio ports that are directly compatible with ports on a typical sound card. Also, the CAT feature on many new rigs will provide the T/R switching for the MixW. (For instance, the interface for the FT-920 is an audio in and audio out cable and a RS-232 cable. Proper levels are adjusted at the sound card mixer.)

The following simple set up has been used successfully at station K4SET.

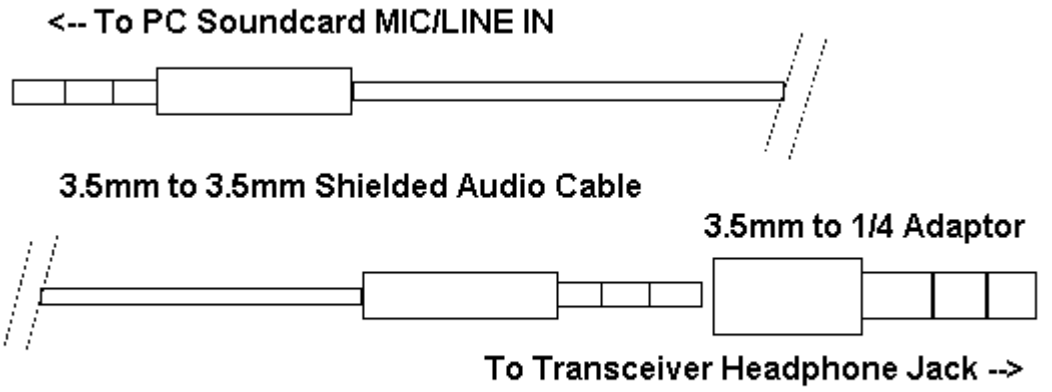
Using Vox: The first option outlined is the simplest way to get on the air. It still offers automatic switching between TX and RX. by using the rig's VOX circuit. This simple interface can be refined to match your station configuration and operating preferences.

To receive and decode digital mode signals, you need to connect your transceiver's receive audio to the PC soundcard line or mic input. To code, and transmit digital mode signals you need to connect your computer soundcard output audio (available at the speaker or headphone jack) to your transceiver's audio input. (via the mic audio pin or an accessory connector audio in pin). Check your transceiver manual for the pin assignments. If you don't have a manual, check the following link for pin assignment information: http://freeweb.pdq.net/medcalf/ztx/wire/

The simplest way to do this is to make up a cable using **shielded** audio cable to connect from your receiver's headphone jack (usually a 1/4" PHONO Jack) to your soundcard's line-in or mic-in jack

(most often a 3.5mm stereo "mini-phone" jack). **Note**: The soundcard's line-in jack is a better choice than the mic jack due to the signal levels involved, but either will work (some soundcards, like my laptop, only have a mic-in jack). You simply need to adjust the Windows Recording Volume for the correct input levels as described bellow.

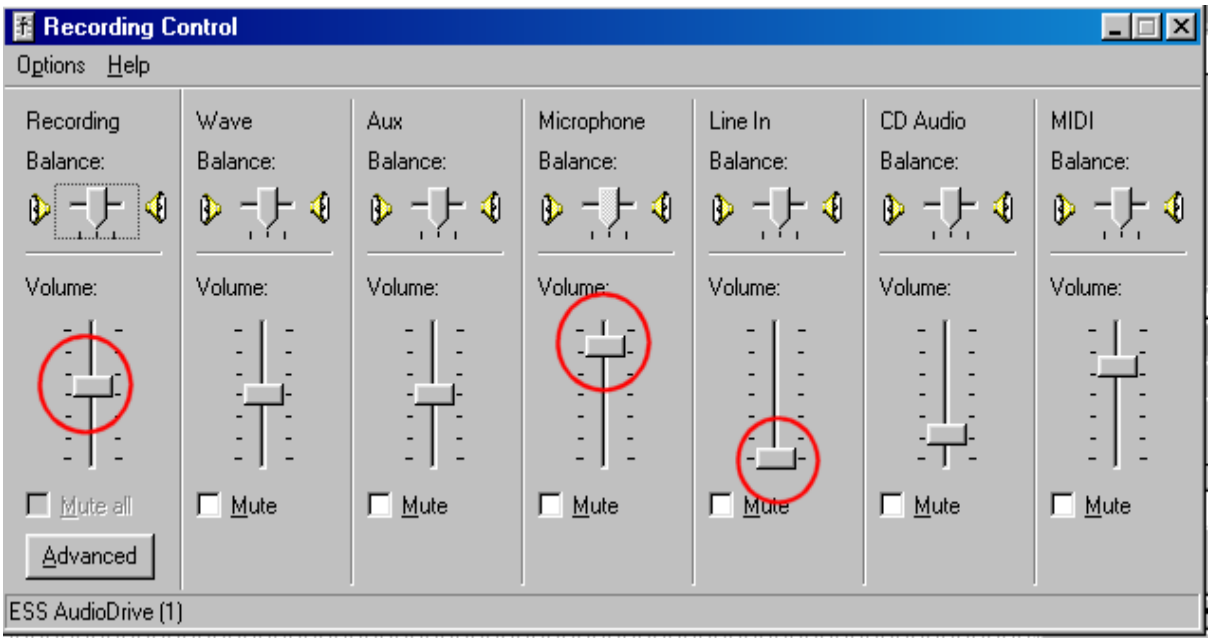
I made this cable by using a pre-made (Radio Shack, Cat.#: 42-2387) 3.5mm to 3.5mm stereo audio cable and a 3.5mm to 1/4" stereo adapter (Cat.#: 274-367) for the transceiver side. It looks something like this:



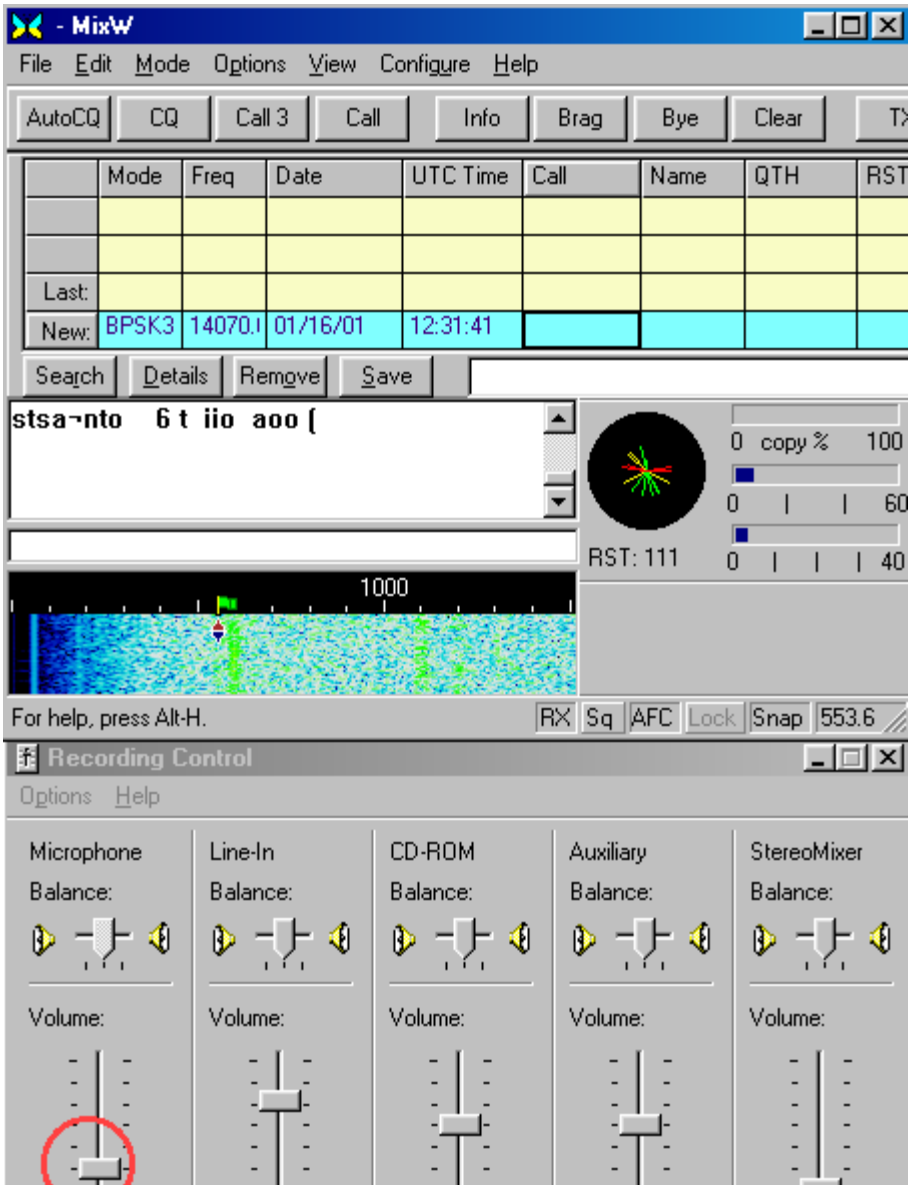
To see this cable and order on line at Radio Shack, click Cable The adaptor is also available by clicking Adapter.
With this simple cable (no soldering required) you're ready to try to receive digital mode signals with MixW, but first we need to set the recording level in windows to match the signal your feeding your sound card.

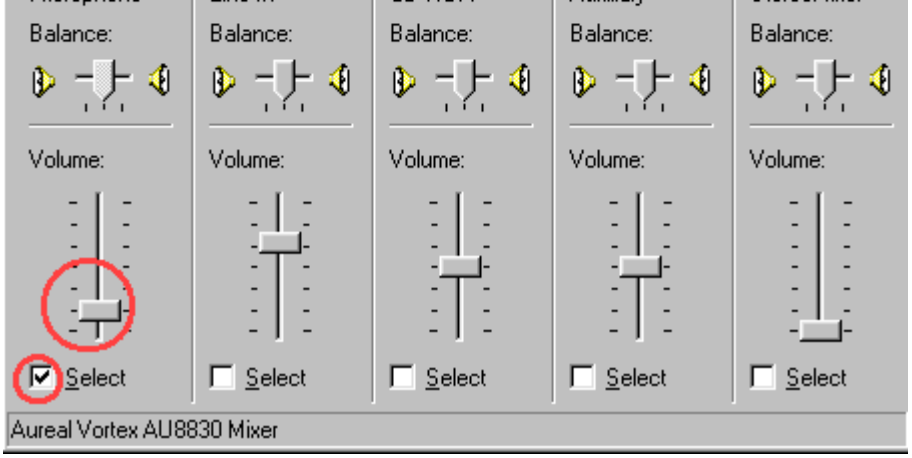
NOTE: In this set up, with the headphone jack in only part way, I've found that I can still monitor the transceiver audio through the speaker while also sending the audio to the soundcard. This is a great aid in tuning in signals by ear while also monitoring them on MixW's tuning display. You can also use the external speaker jack of your radio for this signal but this will cut off your rig's speaker so you won't be able to hear as you tune. (This jack may accept the 3.5mm plug directly, or it may require an adapter; check your manual).

Setting Audio Levels: (**Note:** The windows Volume and Recording control windows can now be launched from within MixW by selecting Configure | Input volume, or Configue | Output Volume). **It is extremely important to match your sound input and output levels**. This is done with the Volume and Recording controls in Windows 2000, 98, 95 and NT. Let's set the input volume first by selecting Configure | Input Volume, which brings up the following window:



For these adjustments you need to arrange your MixW window and your Recording mixer Window so that you can easily see both windows and switch between the two. Set your transceiver's audio (listening) volume to a comfortable listening level. You should be able to see both windows like this.





Depending on your set up, you will be adjusting the Mic or Line level input controls. Make sure that the select box is checked. The best way to set these levels is to roughly tune in digital mode activity with your transceiver, and then click on the area of the strongest activity as shown in the waterfall display (colorful lower segment of MixW's main operating window) to direct MixW's attention to that QSO. If MixW does not lock onto the signal right away you can then fine-tune it with your transceiver, or by clicking on the signal in the waterfall display again. MixW's AFC action should tune it in for you if it is activated.

Adjust the input level on the Mic or line inputs until the background noise shows a dark to light blue color, and the actual signals (or strong noise) are a light green color. Strong signals on the tuning display will be yellow or orange. It's very important not to overdrive your soundcard inputs. Overdriving these inputs will severely degrade your copy, and give you inaccurate IMD readings. Adjusting for the minimum record levels, while still providing a good display is the best starting point. It may be necessary to attenuate the signal between the transceiver and sound card, especially if you're using the Mic input of your soundcard, like I have to on my laptop. This can be done with a simple voltage divider circuit or Radio shack also sells a Attenuating Dubbing Cord Cat.#: 42-2152. Click Radio Shack to see this in your browser.

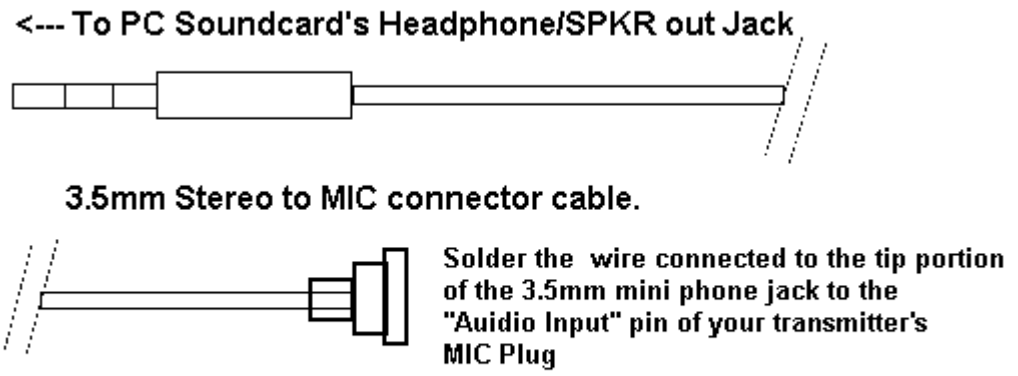
If you don't see any receive activity on MixW's displays at all, make sure that your Mic or line input control is not muted ("Mute" is a check box next to the slider in your record mixer) or that the input your using is selected. (These options will vary depending on your soundcard drivers). Also double-check all your connections. It's also possible you're overdriving your soundcard and will need to attenuate the input signal.

After these receive adjustments are optimized, go ahead and try to copy some QSOs by tuning them in using MixW's tuning indicator(s) as shown above and described in Quick Start

OK, you're back. Are you excited about MixW's potential? And I bet you can't wait to jump into the exciting world of the amateur digital modes? We still have a little work to do though, so hang in there.

To transmit digital signals, you need to connect the sound card output (often through an isolation transformer, or 100:1 attenuator) to the transmitter microphone or AFSK input.

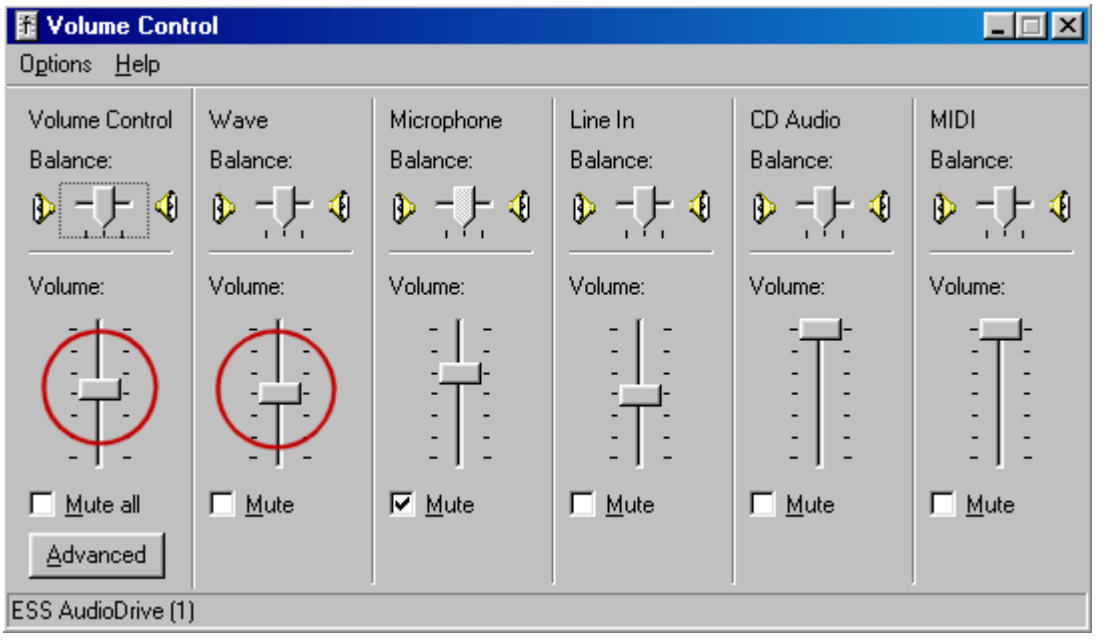
In my set up I've found that I don't need any attenuation or isolation and have had excellent results with this very simple interface solution, which uses VOX for keying the transmitter.
(Or you can manually engage and disengage the transmitter.)



I made this interface with another Radio Shack 3.5mm to 3.5mm stereo, shielded audio cable. I cut off one of the 3.5mm plugs and soldered the wire connected to the tip of the remaining 3.5mm plug to the audio input pin of a Mic plug for my transceiver. The other two wires were cut short and taped.

With the above interface connected, and your transceiver's antenna jack connected to a dummy load we can now set the audio output level, of your PC soundcard to match your transceiver's input circuit.

Again, it is extremely important to match your sound input and output levels. To set the output level we bring up the Windows Volume control by selecting Configure | Output volume, which brings up the volume mixer window:



The rig set up. These audio output adjustments are best made with your transceiver connected to a **dummy load**. This eliminates QRM as well as wear and tear on your equipment. Set your transceiver MIC gain control slightly above its minimum setting and make sure your rig's VU meter (or indicator) is set to monitor "ALC". Your VOX threshold setting (if you're using VOX) should be adjusted as you normally have it for your other modes. Set the VOX delay to LONG to prevent the possibility of dropouts. And of course, VOX must on if you plan to trigger your TX/RX function with

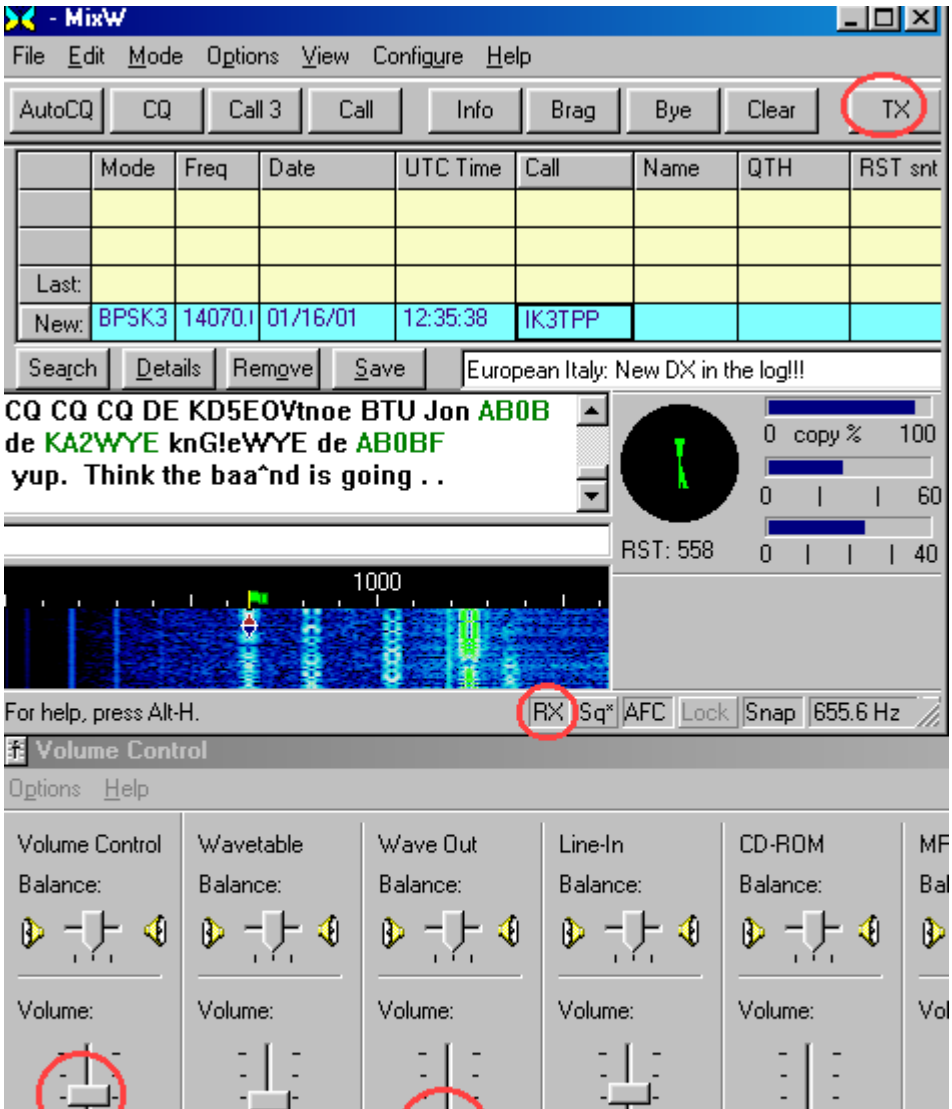
it. If you're not using VOX or an optional PTT circuit (more info on that below) you can do these tests by manually engaging transmit on the rig at the same time as you tell MixW to transmit.

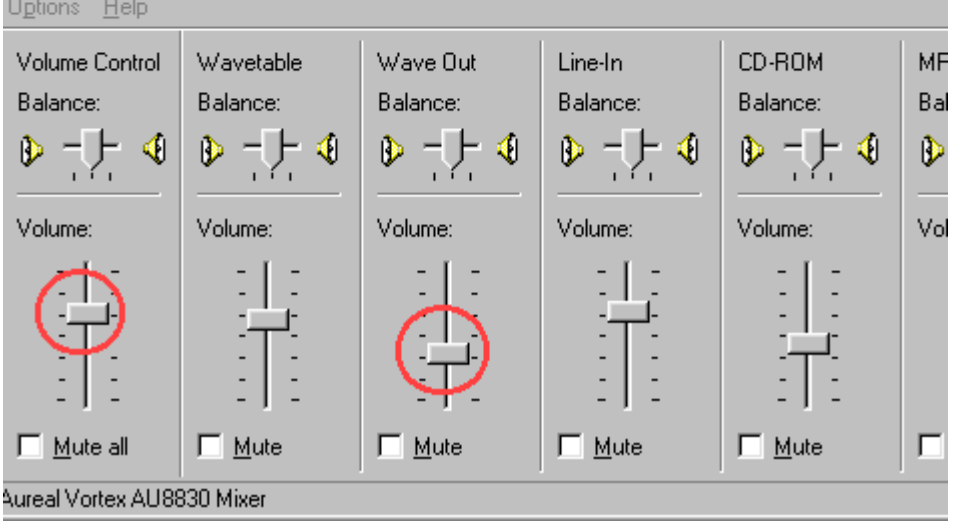
The PC set up. In order for MixW to enter the transmit mode you will need to have configured your personal data information. If you have done this yet, click on Configuration. The rest of the configuration information can be completed later if you wish.

It is again best to have MixW active in one window and the Volume Control mixer in a second window like we did before with the recording settings. For now slide the Windows Volume Control to a minimum (all the way down), and the Wave slider at just slightly above the minimum setting.

Note: To avoid possible feedback, mute the Line and Microphone sliders in the Volume Control panel. Checking the Mute check boxes does this. If these are not muted, it is possible for the receive audio to feed through to transmit audio and trip the VOX. Muting Line and Microphone (NOT VOLUME and WAVE! - you need this for the transmit audio) is also useful for feedback reduction even when using serial control for PTT.

First select the mode you expect to operate in the most by clicking Mode, and then selecting the mode of choice. Put MixW into transmit by clicking the TX button, or by clicking the RX in the status bar. The "RX" turns to "TX", and MixW will transmit in the digital mode you have selected from the mode menu. To toggle back to the receive mode, simply click the RX button, or click the "TX" box in the status bar. (You can also toggle between transmit and receive by depressing the Pause/Break key on your keyboard.) **Caution: Do not transmit for long periods while making these adjustments.** If you find that your adjustments take a while, let your rig rest in the receive mode for a while in between adjustment attempts. Here is what this set up should look like with both windows visible, note the outlined TX button (RX is right next to it and out of this picture) and the RX box (turns to TX while transmitting) in the status bar area in lower part of MixW's screen:





The adjustments. Slowly raise the Volume control fader on the mixer until your rig's VOX circuit engages and your rig starts transmitting. If VOX has not engaged by the time your Volume is set at mid way up the slider scale, then raise your rig's Mic gain slightly and try again. You must also watch the rig's ALC indicator. You want a minimum reading here, if any, indicating that you have just enough audio to drive your rig, and not so much that you run the risk of over driving your rig's Mic input. Over driving the Mic input circuit is a common cause of badly distorted and wide signals when using this type of soundcard set up, so be careful here. PSK31 is especially sensitive to these settings but all the digital modes will suffer.

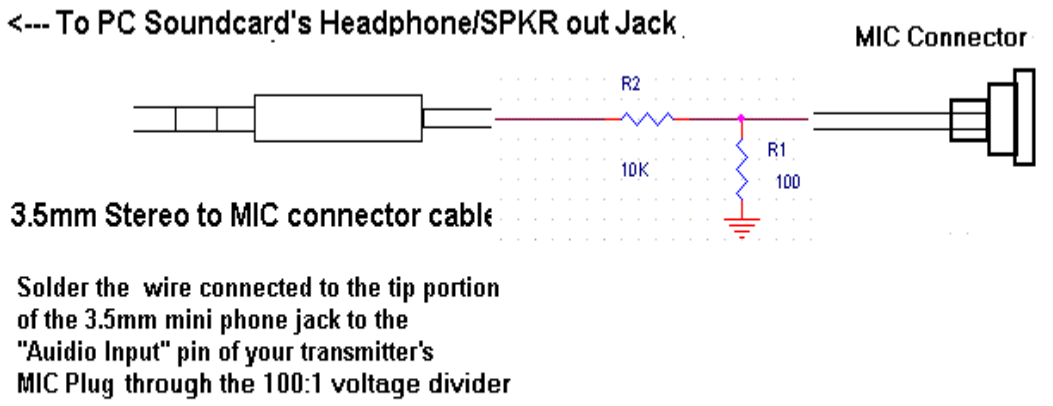
Note: Many operators have solved their distortion problems caused by the sound-board by adjusting the soundboard gain to where the ALC meter just starts to move upscale and them backing it off to zero. It is not necessary to see ALC meter movement!

If VOX does not seem to kick in at low enough audio level, you may want to set the levels by manually setting the rig into transmit, then set the levels to optimize your audio signal (again you should just see your ALC indicator moving, and then back it off to zero), then reset your VOX circuit to trip at that level of input.

The optimal setting when using the above interface, which again has no attenuation, will usually have your soundcard output (Volume and Wave Control settings) very low, and your Mic gain at a little lower than your norm for SSB operations. If you find that your unable to control the audio using these controls in reasonable ranges, you very likely need to add attenuation between the soundcard output and the rig's Mic input. You can also try using the audio input of your accessory jack (if you're rig is so equipped). This may avoid your Mic pre-amp circuit and be a better choice for signal matching, however this may also make it impossible to use your VOX circuit for engaging your transmit and receive modes.

Once you've optimized these settings make a note of the positions of your rig controls as well as the Windows Volume and Recording mixer positions.

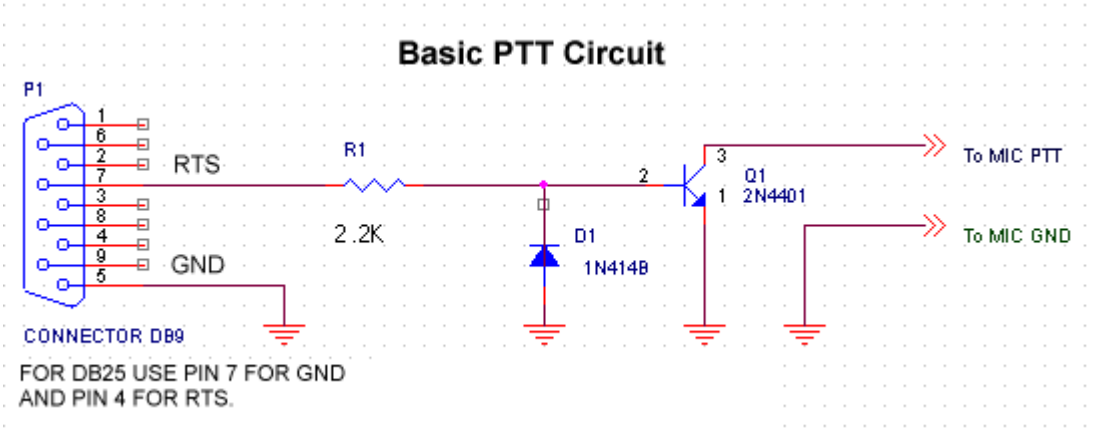
I found that with careful adjusting of these settings I was able to have excellent and consistent results with these simple interfaces. Some rigs tolerate more Mic input than others, so you may find that you get better performance from a more sophisticated interface with attenuation as shown here:



OK, that about covers the basic set up information. If you haven't yet configured MixW with your station information, that's your next step. Click Configuration. It's also a good idea to practice a few things while your rig is still connected to a dummy load. When you're finished configuring, and after a little practice go jump into some QSOs..... Make sure all your settings stay put and that you have good notes on all the levels. I recommend that you ask for honest signal reports as to audio quality. PSK31 is especially sensitive to these audio levels, and most operators are happy to help newbies get their stations optimized, and prevent UN-needed QRM from clogging up the digital mode bandwidth.

Additional TX/RX keying options.

PTT Circuit: To allow for automatic keying of the radio (PTT) on transmit, from the selected PC serial port, pin 20 (DTR) or pin 4 (RTS) of the DB25 is raised during transmission. A suitable transistor keying arrangement (such as the one shown here) must be installed between the PC and the radio PTT.



See PTT Circuit for more information on using PTT.
Or check the web for more Interface information.

Check these additional resources for more sophisticated Interface information

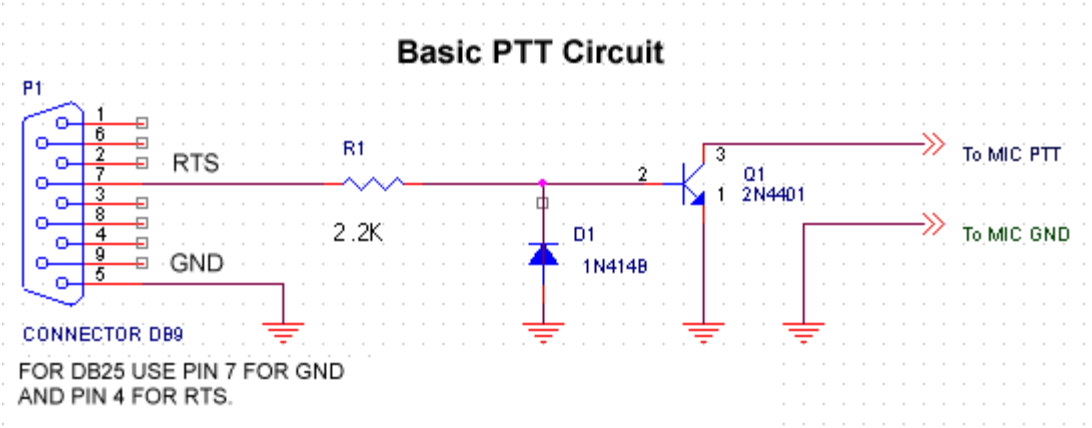
Configuring Push To Talk (PTT)

Basic Set Up if you need to interface your PC sound card to your transceiver.

MixW's PTT Options: You have three basic options for PTT transmitter keying:

- Keying of the radio PTT line from a dedicated serial port,
- Direct command to PTT on/off Via the PC - Radio command interface (Certain radios only).
- Sharing the PC-Radio command serial port with the PTT circuit.

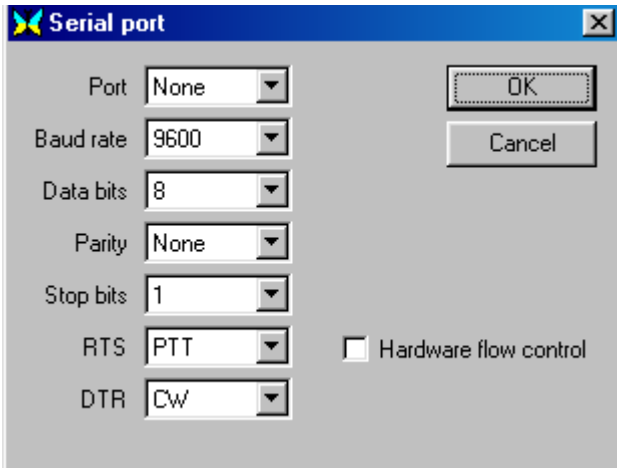
Keying of the radio PTT line: For serial port keying, the PTT signal is accomplished by high/low voltages on pin 20 or 4 of a DB25 connector or pins 7 and 4 of a DB9 connector. (These are the DTR and RTS lines). To key the radio PTT line from DTR or RTS a transistor interface circuit is required. This simple circuit will do the trick:



Click Here for a list of WWW links with additional PTT circuit and interface information, with more sophisticated approaches to this circuit including isolation of the PC and transceiver.

PTT options are set/selected from the "Configure" menu. Select Configure | TRCVR/CAT PTT then click on the "Details" button in the CAT/RCP window.

Which brings up the following dialog box:

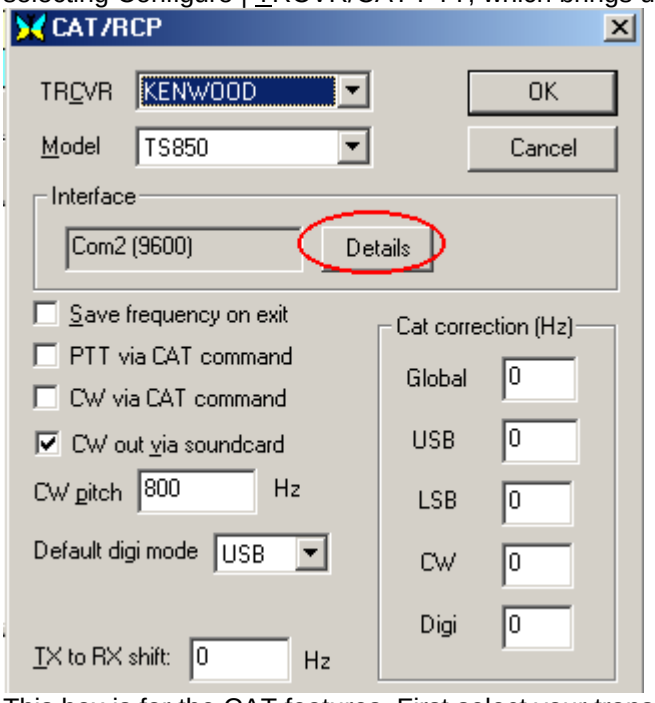


Under "Serial Port", select the Com port connected to your PTT interface.

Under "PTT Keying line", select "RTS" for pin 4(DB-25) or pin 7(DB-9), which is used by the circuit above. Select DTR for pin 20(DB-25) or 4(DB-9) operation, or select RTS and DTR will set both pins to go high for PTT.

Direct command to PTT on/off Via the PC - Radio command interface:

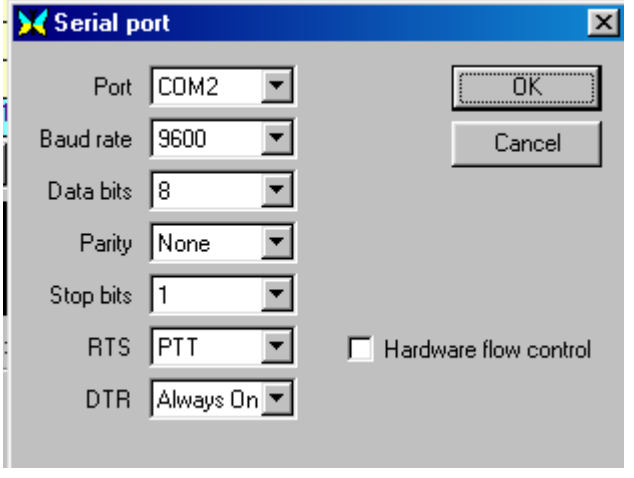
For direct radio command PTT keying on (certain models) of Kenwood. Yaesu, Icom, and TenTec radios, the built in capabilities of the radio serial interface are used. These are configured by selecting Configure | TRCVR/CAT PTT, which brings up the following dialog box:



This box is for the CAT features. First select your transceiver make and model from the drop down menus.

Note: if your model is not listed, try a similar model of the same make. For instance, almost all CAT capable Kenwoods work with the TS-850 setting.

Next, check the features you want MixW to use CAT operation for, and then click on the "Details" button for COM port and PTT settings. This brings up the following dialog box:



Port is where your PTT or CAT circuit is connected. The Baud Rate, Data Bits, Parity, and Stop Bits, are set to match your transceiver's CAT configuration. (Check your Transceiver's manual for these settings).

Fax Receiving

For information on HF FAX stations and some theory of operation visit:
http://www.hffax.de/HF_Fax/HF-Fax_Schedules/hffax_schedules.html

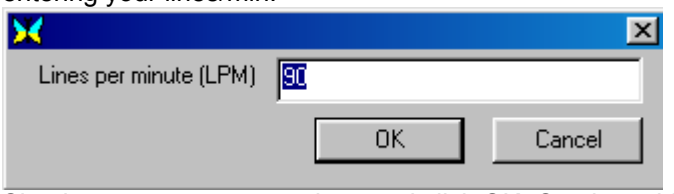
This version of MixW supports FAX receive only. The following procedures will help you get started receiving FAXes in MixW version 2.

Your transceiver should be set to USB and tuned to one of the frequencies of the FAX stations listed at the above website. You should also have the waterfall set to display audio frequencies by selecting View | Sound.

Toggle all the toolbars off by selecting View and then uncheck the various toolbars to get a larger viewing window for your incoming FAXes.

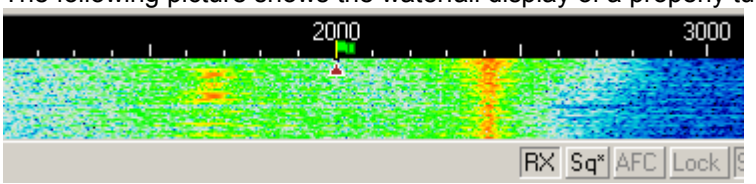
Tune the pilot carrier to 2400 Hz on the display and then put the FAX curser at 400 Hz below that. You are now spaced in the center between 1500 Hz and 2400 Hz for normal black and white RX. Move the curser down (closer to white) to get a lighter image or up for a darker image. Wait for the next image to start to get better centering of the image on the screen.

Most WX FAX stations are operating at 120 lines/min (Actually RPMs of the drum speed) however this number may need to be adjusted to compensate for your CPU clock. To adjust this speed, first you must be in the FAX mode by selecting Mode | FAX, or by clicking on the Mode box in the Status Bar and selecting FAX. Next select Mode | Mode settings to bring up the following dialog box for entering your lines/min:

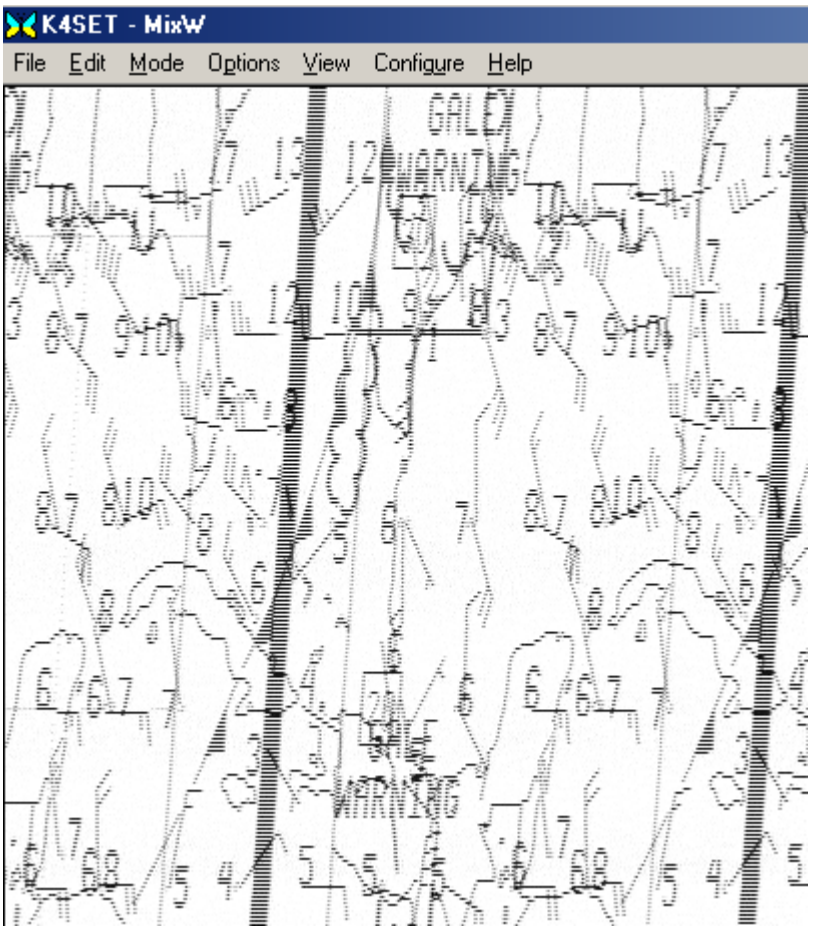


Simply enter your new settings and click OK. Continue this process of altering the LPM rate until you get the clearest images. Mine seems to produce the best results at an LPM of 80 lines/min.

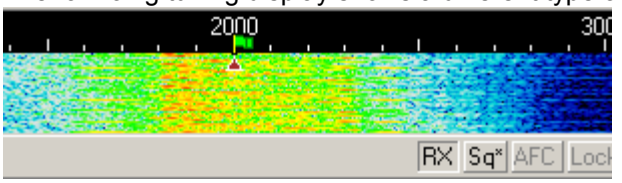
The following picture shows the waterfall display of a properly tuned WX FAX station:



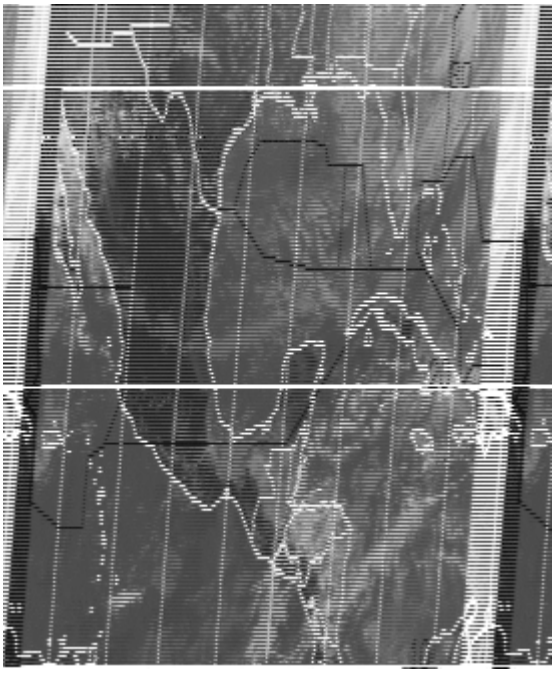
And this produced the following image:



The follwoing tuning display shows a different type of image:



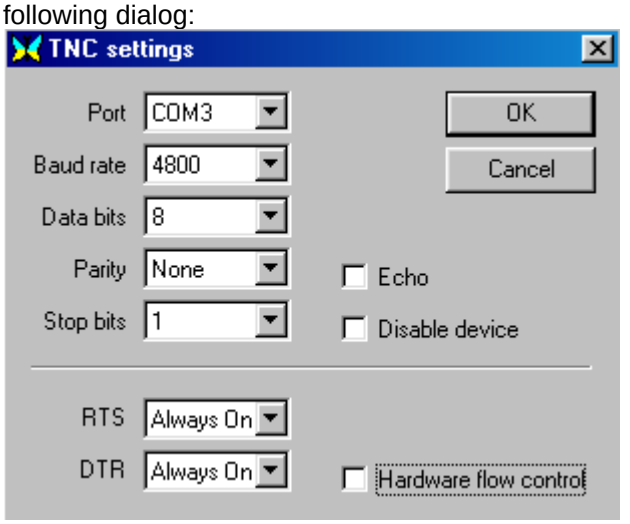
Notice that while the edges of this signal are less defined with lots of information between the 1500Hz and 2400Hz, they still fall between these ranges. This signal produced the following satellite image of the Gulf of Mexico:



Setup Instructions for TNC Operation, **RICHARD B. GRIFFIN, NB6Z**

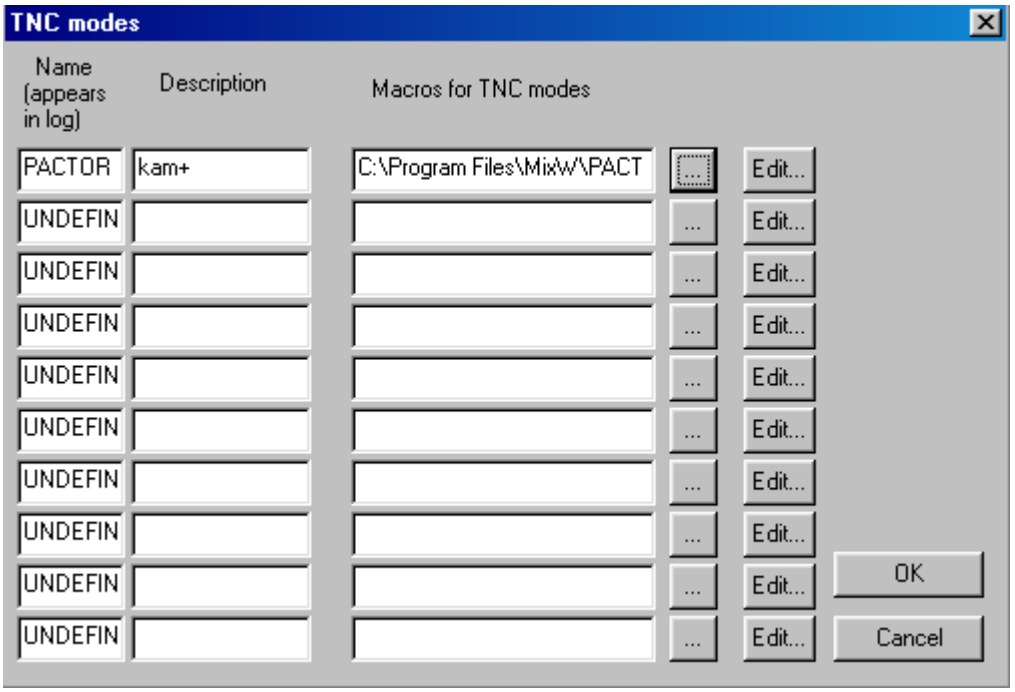
TNC operation is accomplished with MixW by providing a communications link between the PC running MixW and the TNC. The PC will act as a "terminal" to send commands to the TNC and display characters sent from the TNC. In this configuration the TNC will be operated in the "command" mode and not in the "host" mode, as would be done if a "host" program like XPWin or KaGold were being used. It will be necessary in command mode operation that the appropriate commands be used to correspond with the model of TNC being used. The command structure for your TNC should be available in the Operators Manuel provided from the TNC manufacturer.

Under the CONFIGURATION menu in the tool bar, you will find the TNC settings menu that you will use to setup communications to the TNC. Select Configuration | TNC Settings, which brings up the following dialog:

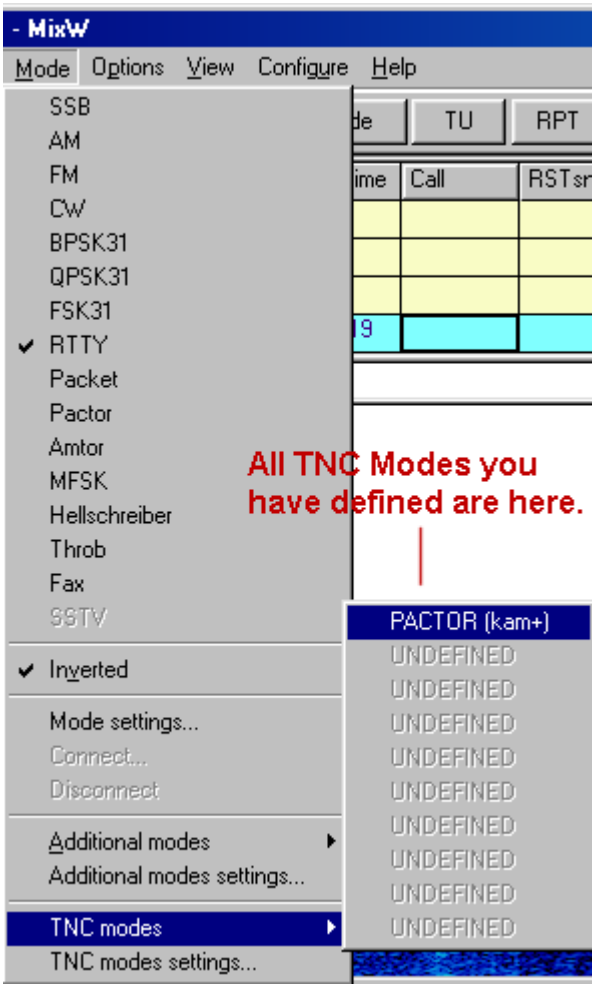


These settings will be the same as you were previously using with your TNC or you must refer to the TNC Operators Manuel for the comport setup information. You will have the option to "echo" back to your screen all commands if so desired. The recommendation is to leave ECHO unchecked.

A TNC macro file that you create with the extension ".mc" must be available on your PC. This file will be read by MixW to setup all command macros and to initialize the TNC for the specific mode chosen. This file is very important and you will want to customize and duplicate it for each of the TNC modes that you wish to operate. This file will contain strings of commands that are unique to the MixW program and to your model of TNC. The first four strings of commands will start the TNC in the appropriate mode and tell MixW how to control your TNC. The remaining strings will setup the macro buttons (keys) that appear on your screen to control the TNC operation and to send "brag" files. When the macro file is ready for use, you will go to the MODE menu in the tool bar and find the TNC modes setting menu. Select Mode | TNC mode settings, which will bring up the following dialog:



You will select the macro file and give it the name for the mode that it represents. This will be the mode name that appears in the log entry and in the TNC mode selection menu. To start a TNC session, you will go to the MODE menu in the tool bar and select the appropriate TNC mode as you have named it as follows:



To view, create or modify a macro file, use an ASCII editor like NOTEPAD. Use the file this way only with the MixW program not running. You can also create user selectable macros within the program by the normal manner of right clicking the chosen macro button and using the pop-up macro editor window. Use the macro editor to create buttons that will modify your TNC settings and to send short brag files. Edit the file this way when you are in the chosen TNC mode. The macro file will be updated when the program exits. See Configuring Macros for additional information.
NOTE: You can make macro buttons to change the TNC mode, but this method will cause the incorrect mode to be stored in the QSO log. You can create a macro button to start the TNC "command" mode (<CTRL-C>X for the KAM) and then type commands directly into the TX window and execute them by hitting the ENTER key.

A sample macro file for the KAM TNC called PACTOR-KAM.mc is provided with the MixW program. You may use this file to operate Pactor mode on a KAM TNC and duplicate/modify it for other KAM TNC modes like G-tor and Amtor. If you have another manufacturer's TNC, you should use this file as a template to create macro files with the commands specified by your TNC manufacturer.

The example shown below is from the PACTOR-KAM.mc file. It shows the four recommended strings needed to initialize the KAM TNC for Pactor operation. The commands in red are those specific to the KAM, found in the KAM Reference Manual. (These are the same commands used to operate the KAM with the Pacterm program that came with many of the original KAM units.)

```
[Macros]
nItems=21
Name0=OnStartMode
Label0=Start mode
Text0=<HIDETEXT><AUDIOFQ:2200><SHIFT:200><CR><LF><CTRL-C>X<CR><LF>PACTOR<CR><LF>
Name1=OnEndMode
Label1=End mode
Text1=<HIDETEXT><CTRL-C>X<CR><LF><SHOWTEXT>
Name2=TX
Label2=TX command
Text2=<HIDETEXT><CTRL-C>T<SHOWTEXT>
Name3=RX
Label3=RX command
Text3=<HIDETEXT><CTRL-C>E<SHOWTEXT>
```

These for string (three lines each) are used by MixW to:

1.) Start the TNC in Pactor mode.
2.) Put the TNC into the command mode for exit.
3.) Put the TNC into the TX mode.
4.) Put the TNC into the RX mode.

The other commands are specific to the MixW and are used to make operations look nicer on the screen. The "<AUDIOFQ:2200><SHIFT:200>" was used to position the MixW tuning curser on the waterfall, and can be changed to match your TNC programmed settings. The macro file size will grow as you add macro buttons and the "nItems=" will automatically update.

NOTE: To enhance the terminal operation of your TNC, you may wish to modify specific command settings, such as for line feeds and carriage returns, echo on/off...

Additional Interface Information on the Web:

The following sites are recommended for additional information on PTT, Optical Isolators, Filtering, and Attenuation Circuits. Depending on your station and operating habits, these optional circuits may enhance the overall performance of MixW on your equipment.

Plans

Understanding Soundcard Interfacing, by Ernie Mills, WM2U:
http://www.qsl.net/wm2u/interface.html

Bucks ComCo, Interface diagrams by radio:
http://www.packetradio.com/rascal.html

Kits for sale

BUX CommCo, Kits by K4ABT:
http://www.sedan.org/sedanmap.htm

LectroKit (very affordable kit)
http://sanduskyohio.com/lectrokit/misc.htm

Completely assembled and tested interfaces for sale:

For the DigPan Isolating interface:
http://members.home.net/hteller/digipan/

For the popular RigBlater interface:
http://www.westmountainradio.com/RIGblaster.htm

SignaLink Sound Card - Radio Interface by TigerTronics:
http://www.tigertronics.com/sl_main.htm

MFJ-1275 Soundcard-to-Rig Interface:
http://www.mfjenterprises.com/products.php?prodid=MFJ-1275

Note: Some new and "high end" transceivers do not need an "interface" to operate with the MixW. Most new rigs have input and output audio ports that are directly compatible with ports on a typical sound card. Also, the CAT feature on many new rigs will provide the T/R switching for the MixW. (For instance, the interface for the FT-920 is an audio in and audio out cable and a RS-232 cable. Proper levels are adjusted at the sound card mixer.)

Note: This is just a start on this resource page for interface information. K4SET.

Configuring and Using Macros

Current as of MixW version 2.02 (more are added all the time) Jump to the Macro lists for Text Macros, Text using Files, Program Control, Frequency Control, Auto CQ, Macros control Macros, Mode Settings, RTTY Specific, SSTV Specific, CW Specific, Rotor Control

Note: I am interested in expanding this area to include examples of Macros. If you have ideas for this area, or Macros you think others might benefit from, please email me at scott.thile@murraystate.edu.

Macro commands in MixW can be combined with each other, or combined with text, to control many functions of MixW, or your CAT equipped transceiver. They can be used to reduce the need for repetitive typing. Macro commands must be typed in all capital letters. Text can be typed as upper or lower case. Lower case characters will automatically be converted to uppercase when transmitted for modes like RTTY and AMTOR, which only support upper case.

MixW now supports different Macro groups for each mode of operation, which can be automatically loaded when you switch modes (called "local" macros). You can also have different sets of Macros in files, which can be configured for specific types of operation. For instance, you can configure one set for contesting, and another for rag chewing. These can be custom configured, saved, and then reloaded from the Macro Configuration Window. To optimize Macros for contest operation see Contest Operation

MixW Version 2's Macro system is extremely flexible and powerful, however it will take a little time to understand how to configure them to best match your operating styles. Macros can be added or edited three different ways:

- By simply right clicking on the Macro button
- By selecting Configure | Default Macros
- By Selecting Configure | Macros for the mode...

MixW 2 Macros explained by Denis Nechitailov, UU9JDR (with minor editing by K4SET)
MixW 2 is supplied with a default set of macros. These macros are loaded from the "MixMacros.mc" file, which is located in your MixW directory, when MixW 2 is launched. This is the Default set of Macros used for all modes, meaning they are used regardless of which mode you're operating, unless you have configured specific mode macros that replace them.

You can choose another file to be your default macro file by selecting Configure | Default macros, which will bring up the complete list of default macros. Here you can add, delete, or edit each macro. You can also save this macro list to another file, or you can load a different list from a different file, which will then become your default macros. If you right-click on a key in the control bar you can easily edit just the single corresponding macro, without having a big full list. Each macro has a label which appears on the corresponding button in the Control Bar, and a text which is placed in the TX window when you select that macro.

There are two general ways to use macros. The simple way uses a single set of macros at any given time. This set (or file) can be changed as outlined above, or it can also be changed on-the-fly using a macro. This is done by using the <MACRO:filename> macro. For example, you might like to configure another set of macros for a different language. For instance, your F5 key macro (using the default MixMacros.mc for the English language), might be the following:

Macro: F5
Label: Name
Text: My name is Eugene.

While in the Spanish version (MixMacrosSpanish.mc), your F5 key may look like this:

Macro: F5
Label: Nombre
Text: Mi nombre es Eugenio.

And so on.

We can configure MixW to quickly change between the English and Spanish macro sets by configuring a macro to change which macro file is active. This is achieved by doing the following:

While using the English MixMacros.mc, at any unused key location (e.g. Ctrl-Shift-F1, for instance), place the macro:

Macro: Ctrl-Shift-F1
Label: Spanish
Text: <MACROS:MixMacrosSpanish.mc>
And in Spanish set (e.g. MixMacrosSpanish.mc),
Macro: Ctrl-Shift-F1
Label: English
Text: <MACROS:MixMacros.mc>

Now if you press Ctrl-Shift-F1 when you are using the English set, the Spanish set will be loaded (and vice versa).

Of course, this single default set of macros is not right for ALL the modes you operate, or for ALL situations. Sometimes, even switching macros by using the <MACROS:filename> macro does solve the problem. So, in addition to using the simple macro mode (single set of macros) MixW 2 is capable of using a secondary system (called the local system), which can integrate mode or contest specific macros into your default macros. This can also be used to integrate macros specifically configured for hardware TNCs.

Why does one need to use local macros? For example, you would not want to have a macro with the text RYRYRYRYRYRYRY on the screen in SSB mode, even though this might be very helpful in the RTTY mode. You would also not want to have your recorded voice calling "CQ CQ etc.." in the PSK31 mode, while this could be helpful in the SSB or FM modes.

Using the local macro system, MixW2 can automatically switch to a set of macros that you have custom configured for a specific mode, or even a specific contest (using the MixW 2 Contest Mode). MixW 2 can also automatically load TNC command macros (for instance, to switch baudrate "on-the-fly", etc.) when you use hardware TNCs.

For example, if you may want to use a separate set of macros for BPSK31. To do this, select the BPSK31 mode from mode menu, then click Configure | Macros for this mode... Then, enter the name of the file you want to use for this mode (e.g. BPSK.mc). Now, whenever you switch to the BPSK31 mode, you will have these special BPSK macros on the screen.

Note: The "Merge macros" item from the "Configure" pull-down menu tells MixW how you want the local and default macros to be merged. If this is left unchecked, you will see only the mode/contest/TNC specific macros. If you check the "Merge macros" option, you will see your local macros merged with your default macros. The default and local macros are merged using a simple rule: If a macro (for example, for the F5 key) exists in the local set (BPSK.mc in this example) it will be used. If not, the F5 macro from default set will be used.

Merging macros is very useful when you want to add just a few macros to the default set. For example, if the F2 key from the default set contains
<TX>
CQ CQ CQ de <MYCALL> <MYCALL> <MYCALL>

You might like to define an F2 macro for the RTTY mode like this:
<TX>
RYRYRYRYRYRYRYRYRYRYRYRYRY
CQ CQ CQ de <MYCALL> <MYCALL> <MYCALL>

Most likely, the same local macro files can be used for the BPSK31, QPSK31, and the FSK31 modes. RTTY and AMTOR can also share the same local macro file, and the phone macros for SSB, AM and the FM modes can be shared as well.

You can edit these local macros through Configure | Macros for this mode (this will load the full list of macros). When you are using separate macros for each mode (or for a groups of modes), right-click on one of the keys on the Control Bar to edit this macro. This will show the same Edit user

macro dialog box, but now you can choose if you want this macro to be used for the current mode by selecting "For this mode", or it can be set to use it as a default macro for all modes by selecting "Default for all modes".

Suppose you don't have separate macros for RTTY yet, and you want to add RYRYRYRY for the RTTY mode only (as shown in the example above). Here is how to do that:

1. Switch to the RTTY mode (from Mode menu).
2. Go to Configure | Macros for this mode, and then enter name for the RTTY mode macro file (e.g. RTTY.mc). If there is no file by that name yet, when you press the Edit button at the Filename for RTTY macros dialog, you will be asked if you really want to make a new file. Say yes. At the RTTY macros dialog, you can add the F2 macro, but close the dialog and press OK on Filename for RTTY macros dialog.
3. If the "Merge macros" option from Configure menu is disabled, you will see the blank keys on the Control Bar (that is because you are using separate macros for RTTY, but no macros have been defined yet). Now, enable "Merge macros" from the Configure menu. Now the Control Bar shows the default macros.
4. Right-click the F2 key and select "For this mode" in the Edit user macro dialog box. Then add the "RYRYRYRYRYRYRYRY" line and press OK.

You now have RYRYRYRYRYRY line on the F2 key while using the RTTY mode, but not in any of the other modes.

To delete a local macro; the macro we just made for the RTTY mode for instance, open the Edit User Macro dialog for the F2 key while in the RTTY mode (it now indicates "For this mode"), and clear the macro with the Clear button. Press OK and now F2 macro with RYRYRYRY is deleted from RTTY set.

TNC Macros: When using TNC, the TNC's own file (it's name is entered into TNC Modes dialog from Mode | TNC modes settings menu) is used as a local macro file. Merge Macros can also be used if you want to merge TNC's macros with the default macros. For additional information on TNC operation see
TNC Configuration and operation.

Using macros with TNCs: TNC operations in MixW 2 are based on two general principles:

1. TNC works in terminal mode (not host mode).
2. TNC state (mode, baudrate, TX/RX state, etc.) is controlled by using macros.

Usually you will have different sets of macros for different modes on the same TNC, and there are several steps that should be done for each set. First, you must define the macros to initialize the TNC and place it into the mode you want to operate (and de-initialize it at the end of mode).These two macros are used for this purpose:

OnStartMode
OnEndMode

For example, to operate PACTOR using a KAM+ TNC, you may define them like this:

```
Macro: OnStartMode
Label: Start (or whatever you choose)
Text: <HIDETEXT><AUDIOFQ:2200>
<SHIFT:200> <CTRL-C>X
PACTOR
<SHOWTEXT>

Macro: OnEndMode
Label: End (label does not matter)
Text:
<HIDETEXT><CTRL-C>X
<SHOWTEXT>
```

The first macro sets the center audio frequency and shift to draw the cursor at Waterfall/Spectrum

window, then it sends "Ctrl-C" and "X" characters to TNC (to make sure it's placed into command mode), and then sends "PACTOR" command to place TNC into PACTOR mode. The second macro just places TNC into command mode. After defining OnStartMode and OnEndMode macros, re-define the TX and RX macros that are used to make TNC transmit or receive. For PACTOR using the KAM+, they may look like this:

Macro: TX
Label: tx (label does not matter)
Text: <HIDETEXT><CTRL-C>T<SHOWTEXT>

Macro: RX
Label: rx (label does not matter)
Text: <HIDETEXT><CTRL-C>E<SHOWTEXT>

The first macro sends "Ctrl-C" and "T" characters (to transmit), and the second one sends "Ctrl-C" and "R" to receive. And now if the <TX> or <RX> macros are used in any other macro, like F2 with "<TX>CQ CQ CQ...<RX>" text, then by pressing F2, the TNC will transmit "CQ CQ CQ..." and then go back to receive.

Other macros to connect, disconnect, etc. can also be defined using these methods.

Contest macros: You might like to have another set of macros (with short "CQ CQ TEST" serial numbers etc..) for contests. At the Contest Settings dialog (choose a contest from View | Contest mode | then highlight the contest and select the Edit button) then enter a name of the Macro file you want to use for this contest (and also check the Merge macros check-box).
Now, a combination of 3 sets of macros is used: macros for the specific mode, macros for the specific contest, and your default macros. Contest macros are only active when View - Contest mode - On menu is
checked. For more information on using MixW 2 for contesting see Contest Operation.

Configuring Additional Macro Keys: There are several keys which can be used for containing macros as well as the function keys, but they are not shown on the control bar, so these keys can only be edited through the full list (either the default list, the macros for this mode list, the TNC macros list, or the contest macros list).

At the Edit User Macro dialog, select (or enter) the hot key name in the Macro field. There are 5 additional keys that are supported now:

Ins
Gray+
Gray-
Gray*
Gray/

Please note that these names are case-sensitive.

The "OnStartMode" and "OnEndMode" macros are executed when you start or end a mode. For example, if you have the separate set of macros for SSB, you can define OnStartMode to turn on a Notch filter, and OnEndMode to turn it off. Now if you switch to SSB, the filter will be automatically turned on.

Calling a macro from a macro: It's also possible to call a macro from another macro. For example, if you have the following configured in the F2 key macro:

<TX>
CQ CQ CQ de <MYCALL> <MYCALL> <MYCALL>

You might like to use this same text for your Auto CQ. To do this, just place <F2> in the Auto CQ, instead of the Auto CQ text. Now AutoCQ will play the F2 text. You cannot call a macro from itself, however, if you try
you will be warned about this when you try to run it. Moreover, you may call a macro anything you want.
For example, you can define a macro like this:

Macro: POWER
Label: (Anything you choose, it will not appear anywhere).
Text: 40
(This will not be shown on the Control Bar because it is not assigned to a specific key)
Now, this is used with the other macro as follows:
Macro: F6
Label: Brag
Text: <CR>The power is <POWER> <POWER> watts.<CR>
This uses the value that is entered into the POWER macro, and inserts it into the text for the brag macro. To change the power macro on-the-fly, choose an unused key (e.g.Ctrl-Shift-F2) and fill it with <EDITMACRO:name> like this:
Macro: Ctrl-Shift-F2
Label: myPWR
Text: <EDITMACRO:POWER>
Then if you press Ctrl-Shift-F2, it will bring a dialog box with the value 40 in it. Replace the 40 with 20 (for instance) and press OK. Now your F6 key will yield the following:

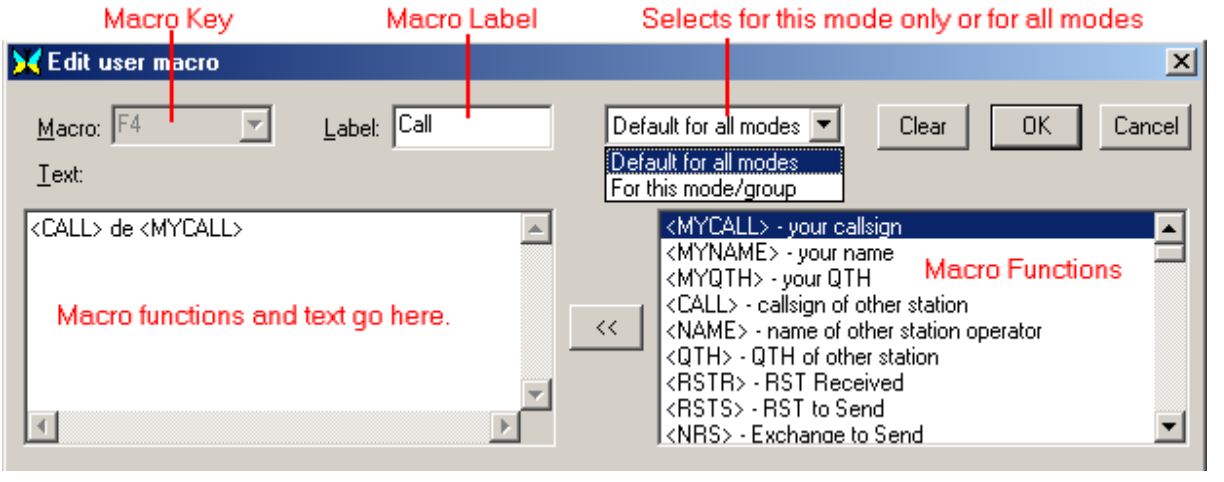
power is 20 watts

The following instructions were written before receiving Macro information from Denis Nechitailov, UU9JDR. I am leaving them here in case they prove useful.

Simplified Macro editing instructions with graphics:

Let's start with simply changing the first group of Macros (The F1 through F12 Macros are represented as clickable buttons just under MixW's main menus):

Depressing the F1 through F12 function keys will also activate the Macros. To change the F1 through F12 Macros, simply right click the buttons, which brings up the following dialog:



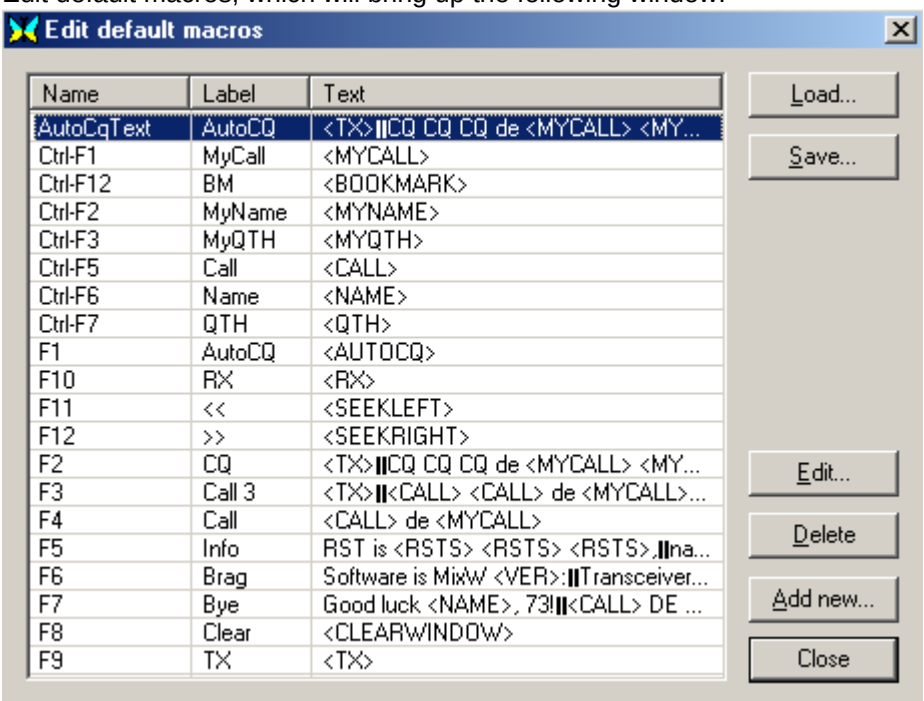
We can now edit this Macro's Label, as well as its text and functions. All edit functions are available from this edit window with the exception of the Key assignment (It is assumed you want this to be the key you right clicked on to bring up the window). As you can see, we have a convenient list of Macro functions and short explanations in the box on the right. Simply highlight the desired function and click the double arrow to move it into the desired location in the Macro text box. This simple example in Macro location F4 is named "Call". And will return the standard 1 X 1 call sequence. For this Macro to work, there needs to be an active callsign in the Call box of the New Log line. This can be entered by simply double clicking on the call sign of the received text of a station calling CQ. If no station is active in the <CALL> field, then a dialog box will pop-up when you attempt to activate

the Macro asking for the callsign you wish to insert here.

Control Macros can be modified to increase the automation of MixW. For example, the Call Macro above can automatically toggle MixW between transmit and receive modes by placing <TX> as the first command and placing <RX> as the last command, so Call would read, <TX><CALL> DE <MYCALL> K<RX>. In this example, pressing F4 would cause MixW to go into transmit mode, send the other station's call once, followed by DE, send your call once, followed by "K" and then automatically return to the receive mode. Selecting "This mode/group", will make this Macro available only for the currently selected mode or group. Selecting "Default for all modes", will make it available from all modes and groups.

Some Macros will be useful for all modes and operations. These should be set for "Default for all modes". Others are mode or operation specific and should be set for "This mode/group".

Clicking the Macro buttons in conjunction with the CTRL, Shift, or both CTRL-SHIFT keys can activate the other Macros. Notice that the Button Labels change to represent the labels you have selected for these sets of Macros when you press the CTRL and Shift keys. These Macros can also be edited by Right clicking while holding down the CTRL, Shift, or both CTRL-SHIFT keys and then clicking the buttons. All edit functions are available from the Right Click edit window with the exception of the Key assignment, which is grayed out. In order to be able to change the key assignment for an existing Macro we can call up a different Edit Window by clicking on Configure | Edit default macros, which will bring up the following window:



Double Clicking any of the Macro lines in this Window will bring up the Macro edit window. You can also Load and Save this list to a file for later recall. This gives you unlimited use of Macros for each mode as well as every type of operation. Each group has a potential for 48 separate Macros assigned to specific F-keys and buttons, and there are another 5 available under "other Macros" as well. MixW can also auto load separate Macros for the different digital modes. This makes the use of application specific Macros almost limitless.

Favorite Macros from the MixW version 2 beta test team, and others who have written in:

From Richard "Griff" Griffin, NB6Z
"SK"
<CALL> de <MYCALL> SK at <TIME><CWID><RXANDCLEAR><SAVEQSO>

"BTU"

BTU <NAME>... <CALL> DE <MYCALL> K <RXANDCLEAR>

"CALL"
<TX><CALL> <CALL> <CALL> de <MYCALL> <MYCALL> <MYCALL> K
<RXANDCLEAR>

"RST"
Thanks for report from <QTH>; you are <RSTS> <RSTS> here in
<MYQTH>.

From Nick Fedoseev, UT2UZ

Use <LOCKTX> in CQ macros:
<LOCKTX><TX>CQ CQ CQ de <MYCALL> <MYCALL>
<RX>
Use <UNLOCKTX> in Search/Pounce macros:
<UNLOCKTX><TX><CALL> <CALL> de <MYCALL> <MYCALL> <MYCALL> pse k <RX>

While calling DX in pileups I need to send my call several times (from
one to five times. I use following macro:
<MYCALL> <TX><RXE>
If I press according button four times, MixW transmits
"UT2UZ UT2UZ UT2UZ UT2UZ " and switches to RX.

From Dick Thompson, WB0DUL
Many time, we all type something like "Well Scott, the temp here is 60 degrees F and is supposed to stay that way for..." and so on.

I programmed my F12 key to display ºF when I hit it. So When I type in the number 60 (or whatever it may be, it looks like this:
Well, Scott, the temp here today is 60ºF and....

To do this, choose an empty macro. Put the cursor in the text box. Then, while holding down the Alt key, hit 0186 on the "keypad". The º will appear. Just type the F (or C for centigrade) after it, name the Macro Temp and save it. Just hit that key (in my case the F-12 key) when you want to insert ºF or ºC after a temperature.

This topic will be expanded with additional Macro examples.
If you have ideas for this area please email me with help and comments at scott.thile@murraystate.edu.

Complete List of Macros **See also** Link to topic Configuring Macros **for how to use the Macros.**

Current as of MixW version 2.02 (more are added all the time) Jump to Text Macros, Text using Files, Program Control, Frequency Control, Auto CQ, Macros control Macros, Mode Settings, RTTY Specific, SSTV Specific, CW Specific, Rotor Control

The following Macro commands are available in the current release:

Text Macros
<MYCALL> - Returns your callsign as configured in Personal Data
<MYNAME> - Returns your name as configured in Personal Data
<MYQTH> - Returns your QTH as configured in Personal Data
<CALL> - Returns the callsign of other station as in log
<NAME> - Returns the name of the other station as in log
<QTH> - Returns the QTH of the other station as in log
<NOTES> - Returns the Notes field as in the log.
<RSTR> - Returns received RST
<RSTS> - Returns sent RST
<NRS> - Exchange to send
<NRR> - Exchange received
<CWID> - Transmits CWID (as configured in Personal Data, see below)
<CR> - Sends Carriage Return symbol
<LF> - Sends Line Feed Symbol
<CRLF> - Sends both CR and LF symbols
<CTRL-x> - Sends Ctrl-A. Ctrl-Z symbol
<VER> - Inserts the MixW version number

Time related text Macros
<DATE> - Inserts the current date
<TIME> - Inserts the current time in UTC
<LOCALTIME> -Inserts the current local time
<STARTTIME>-Inserts the QSO start time
<FIXSTARTTIME> -sets the current time as the QSO start time
<CTIME>- time for the contest (HHMM format)

File Related text Macros
<FILE> - Inserts the contents of a file (selected by Send File Dialog box)
<FILE:filename> - Inserts the file indicated after the :
<TEXTFILE> - Insert text does (not convert Macros) opens dialog box to select the text file
<TEXTFILE:filename> - Inserts the indicated text file
<RANDOM:filenam> - Inserts random string from a file. Designed to simulate live typing.
<INIFILE:file,section,name> -returns data from ini-file. (See Below)

Condition Related text Macros
<GA> - returns GM, GA, or GE (based on the local time of the <CALL> station.
<GAL> -same as above but returns a long phrase (Good Morning, etc..)
<MODE> - prints the current mode
<MHZ> - prints the current frequency in MHz
<MHZn> - prints n digits after decimal point
<KHZ> - prints the current frequency in KHz
<KHZn> - prints n digits after decimal point

Program Control Macros
<TX> - Starts transmission
<RX> - Ends transmission

<TXTOGGLE> - Toggles between TX and RX
<RXANDCLEAR> - Switches to RX and clears transmit window.
<MODE:mode> - Sets new mode (for instance <MODE:RTTY> sets to RTTY
<MODEADD:mode> - Calls a defined additional mode outside of MixW.
<MODETNC:mode> - switches the TNC mode
<MODESETTINGS> - Brings up the mode settings dialog box for the active mode.
<CLEARTXWINDOW> - Clears TX Window
<CLEARRXWINDOW> - Clears RX Window
<SAVEQSO> - Saves the data in the new QSO line the LOG
<CLEARQSO> - erases the data in the new QSO line
<EXEC:command> - Runs the indicated command
<ASSCRIPT>script - runs the indicated script
<SHOW:name> - Toggles the indicated toolbar ON
<HIDE:name> - Toggles the indicated toolbar OFF
The following toolbars can be toggled with the SHOW and HIDE Macros:
CONTROLBAR, LOGBAR, CATBAR, TUNINBAR, WORLDMAP, STATUSBAR, DXCLUSTER, CALLBOOK, TNC.
<WAVE:filename> - Plays the indicated *.WAV file (For Voice Keyer function, see below)
<STARTRECORD> Starts a WAV file recording.
<STARTRECORD:filename> Starts a WAV file recording to the file name.
<STOPRECORD> Stops recording.
<FILTER:name> Turns on the DSP filter
Options for "name" include NONE, PASS, NOTCH, NOISE.
<REPLAY> - Replays sound history
<REPLAY:n> - Replays n seconds of the sound history
<SNAPNOW> - do snap now
<SEEKLEFT> - initiates the seek left command
<SEEKRIGHT> - initiates the seek right command
<INPUTVOLUME> - Set the soundcard input volume using the Windows Recording Control.
<OUTPUTVOLUME> - Set the soundcard output volume using the Windows Volume Control.
<TUNE> - send a tuning signal (ESC key aborts)
<STARTSCAN> - Starts the scan feature
<STOPSCAN> - Stops the scan feature
<LASTCALL> - grabs the last call received and puts it in the Call window (also in <CALL>)
<GRABCALL> - grabs calla received from a stack Call window (also in <CALL>)
<ESCAPE> - works the same as the ESC key, stops auto CQ, etc..
<WORDMODE:x> Toggles word mode on and off, x=1 for on, x=0 for off.

Frequency Control Macros
<FQ:fq_in_kHz> - Sets the tranceiver frequency
<ZFQ:fq_in_kHz> - Sets the tranceiver zero-beat frequency
<AUDIOFQ:fq_in_Hz> - Sets the audio frequency
<JUMPTOTXFQ> - RX frequency jumps to TX frequency
<ALIGN:fq_in_Hz> aligns to the specified frequency
<SPZOOM:n> set spectrum or waterfall zoom (0.5, 1, 2, 3, or 4 are available)
<SPSHIFT:fq_in_Hz> sets the spetrum or waterfall shift.
<BOOKMARK> - Toggle the bookmark on/off
<BMERASE> -clears all marks on this frequency
<CATCMD:text_command> - sends the text to the transceiver.
<CATCMDHEX:hex_command> - sends the hex command to the transceiver.
(This can be in 0A 3F 56 08 or 0A3F5608 formats)
<CATWAIT:ms> - CAT delay in ms.
<CATCMDDDE:text_command> - sends text via DDE

<MEMW:n> and
<MEMR:n>
These macros are equivalent to Ctrl+n and Alt+n
and can be used to save and restore current frequency and mode.

Auto CQ Macros
<AUTOCQ> - Initiates the auto CQ routine as set under Options | AutoCQ (See below)
<ACQ> - Pause and restores AutoCQ mode.
<ASAUTOCQ> This assigns the current Macro as the AutoCQ text. (See below)
<ALARM:string> - Beeps when string is received

Macros that control Macros
<MACROS:filename> - load macros from file after this command, "filename" will be used as default macros
(instead of MixMacros.mc)
<MODEMACROS:filename> - load macros for this mode this command sets "filename" to store macros for this mode.
<EDITMACRO:name> - edit macro with specified name this command brings Edit User Macro dialog to edit macro that is called "name".
<ONQSOBEFORE:name> run this Macro if QSO before
<HIDETEXT> - Don't show Macro in text window
<SHOWTEXT> - Shows macro as usual
<QSOCMDDDE:command> -DDE command to external program.

Mode Settings Macros
<SQUELCH> - Toggles squelch.
<SQUELCHON> - Switches squelch on
<SQUELCHOFF> - Switches squelch off
<AFC> - Toggles AFC
<AFCON> - Switches AFC On
<AFCOFF> - Switches AFC Off
<SNAP> - Toggles Snap
<SNAPON> - Switches Snap On
<SNAPOFF> - Switches Snap Off
<INV> - Toggles inversion
<INVON> - Turns inversion on
<INVOFF> - Turns inversion off
<LOCKTX> - Lock TX Frequency
<UNLOCKTX> - Unlocks the TX Frequency
<LOCKTXTOGGLE> - Toggles the Frequency Lock
<THRESHOLD> - Displays the Squelch dialog box

RTTY Specific Mode Macros
<SHIFT:shift_n_Hz> - Sets the RTTY shift in Hz.
<BAUDRATE:baudrate> - Sets the baudrate for RTTY
<LETTERS> - fources letters
<NUMBERS> - fources numbers

SSTV Specific Mode Macros
<FONTSIZE:n> - Sets the font size
<FONTFACE:name> - Sets the font face to name
<FONTBOLD:n> - Sets the font boldness (n=0 for bold off, n=1 for bold on)
<FONTITALIC:n> - Sets the font italics (n=0 for italic off, n=1 for italic on)
<LOADPICTURE:filename> Loads the picture "filename" with a header
<LOADPICTUREONLY:filename> Loads the picture "filename" without a header
<PUTHEADER:filename> Places the specified header file

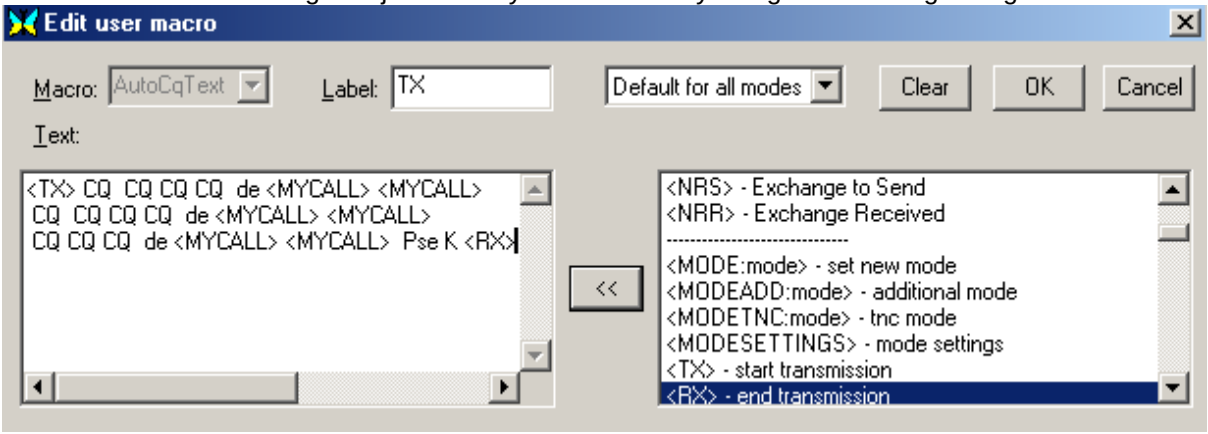
CW Specific Macros
<WPM:n> - sets the CW speed to n
<WPM:+n> - increases the CW speed by n
<WPM:-n> - decreases the CW speed by n
<WPM:RX> - Matches the TX speed to the RX speed

Rotor Control Macros
<ROTOR:SP> Turn rotor to the Short Path for the station in the <CALL> field.
<ROTOR:LP> Turn rotor to the Long Path for the station in the <CALL> field.
<ROTOR:n> Turn rotor to the specified azimuth using n

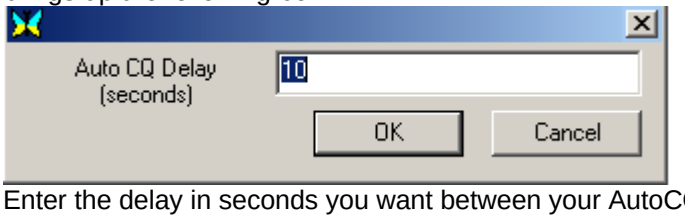
Further explanation on the use of some of MixW version 2's special Macro commands:

CWID: To add a CW ID to the default signoff macro you must first define it under Personal Data. Select Configure | Personal Data. This brings up the personal data window. Check the "use CWID" box and then enter your sign off CW ID text, then uncheck this box to avoid sending the CWID when you don't want too. Next add <CWID> to the end of the macro, such as, 73 <CALL> DE <MYCALL> SK<CWID>. Of course, <CWID> can also be assigned to a separate function key, as can <TIME> and <DATE>, but MixW's log also logs the time and date automatically. If you use CW ID, keep in mind that while it is executing, the other station is printing only garbage. For that reason, you might want to use CW ID only at the end of your signoff macro.

AutoCQ: Auto CQ is a very handy Macro that enables you to transmit a predetermined CQ sequence at regular intervals. It will stop automatically when a call sign is received (indicating that your CQ has been answered). AutoCQ must first be configure by selecting Options | Auto CQ | Text. It can then be configured just like any other Macro by using the following dialog box:



When you're done configuring this click OK to save it. Then select options | Auto CQ | Delay, which brings up the following box:



Enter the delay in seconds you want between your AutoCQ transmissions. Next simply assign <AUTOCQ> to one of your Macro Keys as any other Macro.

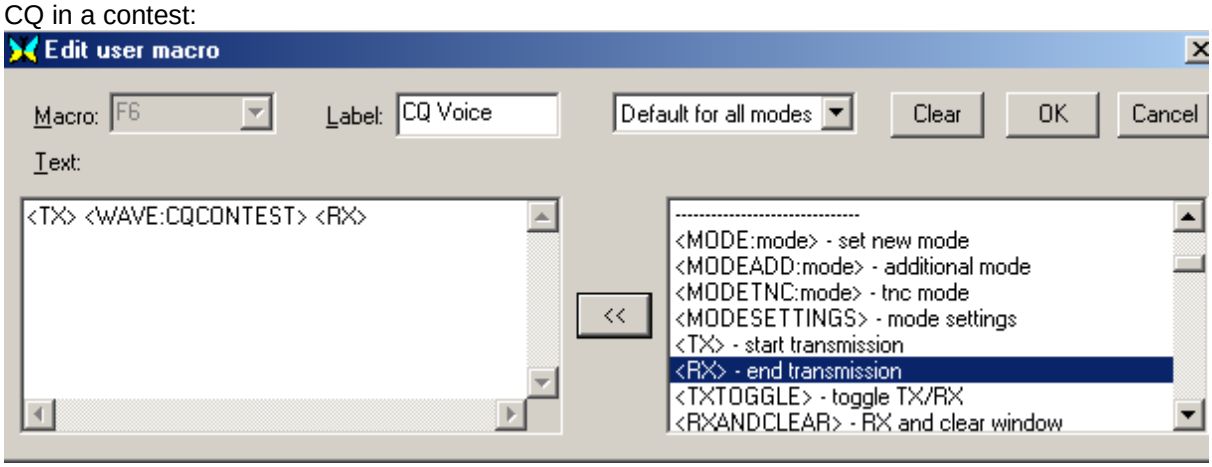
You can initiate AutoCQ in three ways: Click on the button you have assigned it to, depress the key you have assigned it to, or select Options | Auto CQ | Start. You will see the AutoCQ indication box appear above your cursor in the spectrum or waterfall display. AutoCQ will cycle until a call sign is received in the RX window, when it will automatically stop (MixW knows that your CQ has been answered!). You can manually stop AutoCQ by depressing the Escape Key, or by Selecting Options

| Auto CQ | Stop.

By selecting Options | Auto CQ | and Watch squelch, AutoCQ will then only operate when your RX is squelched, thereby avoiding accidentally transmitting over the top of an existing QSO.

<ASAUTOCQ> Using this Macro command at the beginning of any Macro string will define it as the new AutoCQ text and commence to AutoCQ with it when selected. This enables MixW to have multiple AutoCQ strings. For instance you could define one for a contest or special event station, and still leave your default AutoCQ text for your normal operations.

<WAVE:filename> - Plays the indicated *.WAV file. This is very handy to use as a voice Keyer for contesting or otherwise calling CQ or other automated voice responses. Simply record wave files using the Windows Sound Recorder (included with Windows 9x, ME and 2000) or another digital recording program and save them as .WAV files. Then you can configure your Macros to replay your voice as recorded all automatically. For instance the following Macro would be used for calling CQ in a contest:



Where CQCONTEST is the name of the pre-recorded .WAV file of my voice saying, "CQ Contest CQ Contest CQ Contest CQ Contest, this is K4SET calling CQ Contest". For this Macro to work, you should be in SSB, AM, or FM phone modes. Then by initiating this Macro (by clicking on the button or depressing the F6 key in this case) MixW will automatically key your transceiver, then play your recorded voice calling CQ through the soundcard to your transceiver's input audio, then it will switch back to receive while you just sit by and listen for answers. You can likewise pre-record any number of other transmissions including reports or QRZ type end of contact calls. This can really save you voice during a long contest or special even operation.

Note: <WAVE:filename> can also be used in conjunction with your <AUTOCQ> or <ASAUTOCQ> Macros to use the voice keyer to automatically call CQ.

<INIFILE:file,section,name> - insert a line from an ini-file.

Suppose I have a program that measures the temperature using a sensor outside of the house and periodically writes the value into d:\temp\sensor.ini file:

```
--- start of d:\temp\sensor.ini ---
[Sensor]
Temperature=xx
Humidity=yy
Illumination=zz
--- end of d:\temp\sensor.ini ---
```

Then I can make a macro:

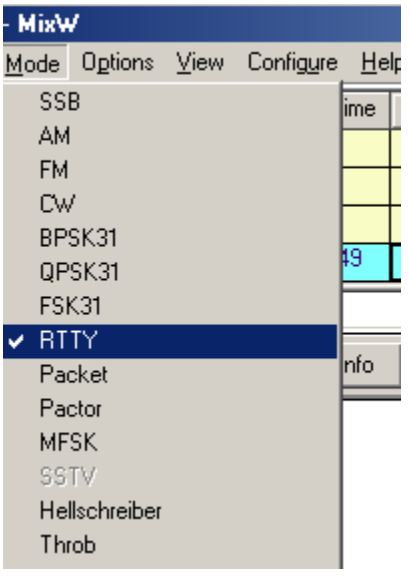
The current temperature in Kiev is
<INIFILE:d:\temp\sensor.ini,Sensor,Temperature> degrees centigrade.

MixW, General Operation

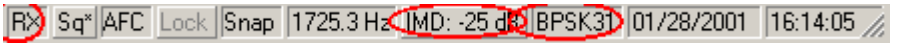
Read these general instructions first to get familiar with general MixW operations , then click on the specific mode(s) you intend to operate for mode specific instructions: PSK31, RTTY, MFSK, FAX, HF Packet, VHF Packet, Pactor, Hellschreiber, SSTV, Throb, FSK31,MT63.

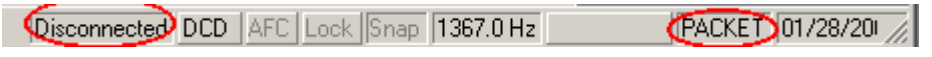
Mode selection

Select the mode you wish to operate by clicking Mode | <your choice of mode>:

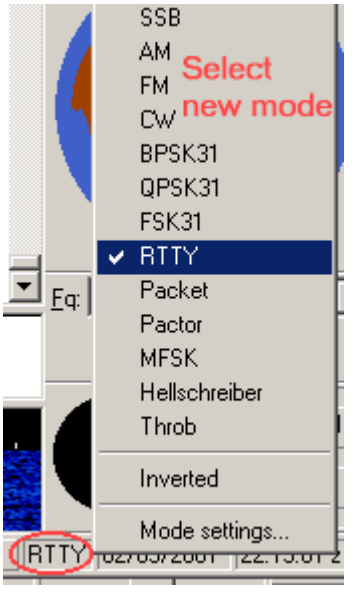


Notice that the status bar will change according to the options and features specific to the mode you have selected, and the mode will be indicated in the mode box. For instance, IMD is only relevant in the PSK31 modes, while Connected or Disconnected is only relevant for Packet:



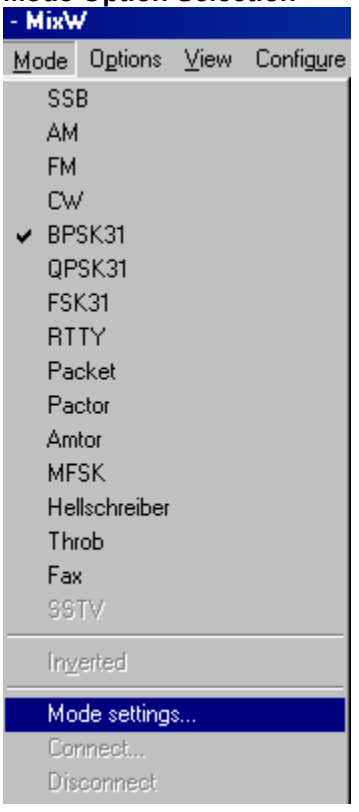


You can also switch modes my clicking on the mode box in the status bar and selecting the mode you wish to operate from the pop up menu:

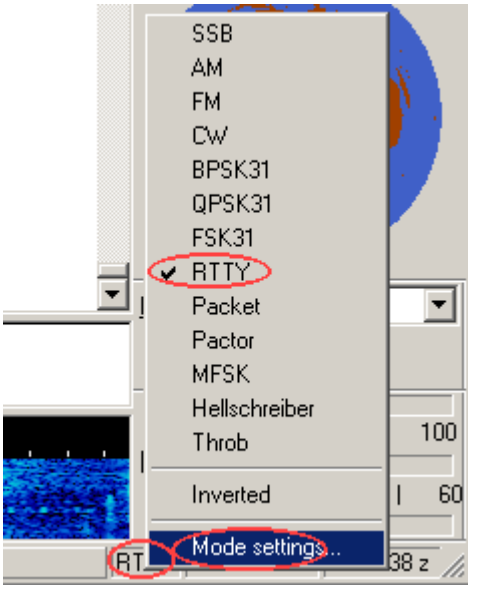


Make sure your transceiver is tuned to a frequency indicated in the digital mode Band Plan for the mode you have selected.

Mode Option Selection

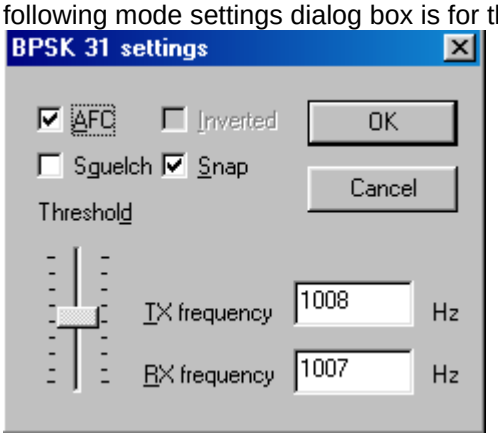


Individual settings for each of MixW's modes can also be preset by selecting Mode | <each mode> and then Mode | Mode Settings, which brings up the mode settings dialog box. See the individual topics for specific settings that are advantageous to each mode of operation. Clicking on the mode box in the status bar, and then selecting "mode settings" can also access the preset mode option dialog.



The preset mode option dialog can also be accessed with the MACRO <MODESETTINGS> from one of the F-key Macros. Many of these settings can also be toggled from Macros as well. See Configuring Macros for more information.

Your mode options will vary depending on the mode of operation. For instance in RTTY, you can set the shift, the baud rate, and inversion, which are not relevant options to the PSK31 modes. The following mode settings dialog box is for the options available in the BPSK31 mode:



AFC
When this is checked, MixW will keep a station accurately tuned. It is recommended that you keep AFC checked unless it prevents you from tuning to a desired station. Uncheck AFC if a nearby strong station makes it impossible to tune to a weaker station.

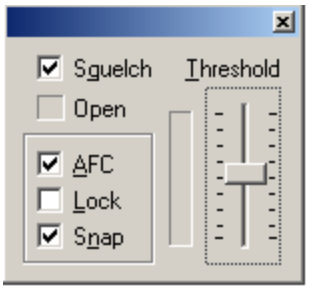
Lock
When Lock is selected, the TX frequency is fixed at the position of the active cursor, and the flag above the cursor changes to red. When LOCK is NOT selected, transmission will occur on the same frequency as receive, as indicated by the diamond or triangle cursor, and the flag above the cursor will be green. Lock allows you to transmit on one frequency and receive on another, which is very handy for working split, and also handy if you're working a station that is drifting in frequency. In this situation you can lock down the frequency, allowing their AFC action to find your constant TX frequency. Their AFC should be on and their Lock should be off so that they are transmitting on the same frequency they are receiving on. (Note: some other digital mode programs call this function "NET". When NET is on the TX/RX frequencies are the same, when off they can differ).

SNAP
When Snap is checked, MixW will automatically find the correct tuning point for a station. Uncheck Snap if a nearby strong station makes it impossible to tune to a weaker station.

Squelch
When this is checked, only signals above the Squelch threshold will be printed. This can be used to prevent random characters created by noise from being printed. Right clicking on the Spectrum Window will display a Squelch Threshold control.

When the screen-printing is "squelched", or not printing, because the signal is below the squelch threshold, the "Sq" on the status bar will turn red. If MixW appears to stop decoding, be sure the squelch threshold is not set too high. For reception of weak signals, it is usually best to turn the squelch completely off. This will result in "garbage" print some of the time, but whenever the signal becomes strong enough that copy is possible, the text will appear on the screen along with the garbage characters.

Squelch Threshold
Making this selection will display a level control for the Squelch threshold. The threshold can be adjusted as high as possible to prevent noise from printing as random characters but still allow print of a desired station. AFC, Lock, and Snap can also be switched in this display.



RX Selecting RX places MixW in the receive mode.
TX Selecting TX places MixW in the transmit mode.

RX and Transmit can also be toggled by using the pause/break key, or by clicking on the RX/TX box in the Status Bar, by using the TX and RX buttons, or by using the <TX> or <RX> Macros.

Sb off Sb OFF disables the soundcard and releases it for other programs. SB must be set to ON for MixW to operate.

Continuous Seek
When this is checked, Seek will continuously seek for a station until one is found and stops on that station. To stop Seek, just press any Seek button. If a station fades below the Seek threshold, Continuous Seek does not start seeking for another station. This is so you can stay on the station's frequency and continue to copy whatever you can, even though it is fading. To restart Continuous Seek, just press one of the Seek keys or buttons.

Arrows for Seek
When this is checked, the left and right arrow keys can be used for most comfortable operation of Seek, and F11 and F12 used for other one-finger macro keys, but the arrow keys are not then available for editing the RX and TX window. Uncheck Arrows for Seek to make the left and right arrow keys available for RX and TX window editing. In this case, you might want to re-assign F11 and F12 to Seek.

Start Scan
When selected, Scan will cause MixW to Seek out a station, stop on that station, record the time and tone frequency of the station, and print that station on the screen for a determined amount of time (dwell). After printing for the selected dwell time, MixW will proceed to the next detectable signal and repeat the process.

Stop Scan
Selecting this will stop the Scan process. Scan may also be stopped by selecting station or frequency with the mouse.

Start Scan and Stop Scan are controlled by macros, so <STARTSCAN> and <STOPSCAN> may be assigned to function keys as a convenience. See Configuring Macros for additional information.

Scan properties
Selecting this will bring up a dialog for setting the way Scan behaves, such as Only once, stopping Scan after encountering the first detectable signal, Dwell (staying to print) time in seconds, or Continue on squelch, scanning when the signal level falls below the squelch threshold, Checking Time Marks or Frequency Marks, tells MixW to display the time of the station print or the frequency of the station print, or both.

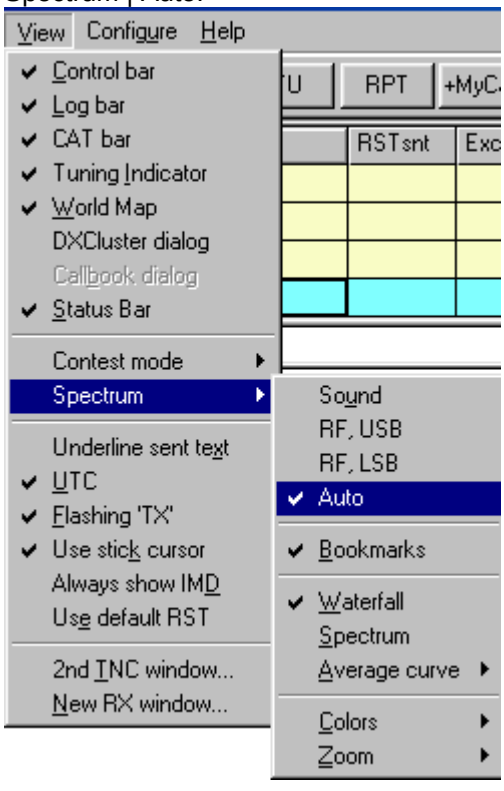
Inversion: Note: This feature works differently in MixW than most other SoundCard digital programs, so please read and understand the following information to avoid confusion while operating:

Modes that utilize the inversion feature are QPSK31, MFSK16, RTTY, AMTOR, Hellschreiber, THROB, and FAX. In MixW, "Inverted" means to invert the Mark and Space tones from the normal

operating standards of the active mode. This feature can be used in cases where the station you are attempting to work is inverted. The MixW options for RF, USB/LSB must be configured to reflect your mode of operation by selecting Configure | Spectrum | RF, USB or RF, LSB. These must be set correctly in order for the frequencies in the displays to represent your actual operating frequencies, and for MixW to automatically adjust the inversion settings based on your RF mode.

To illustrate: When using a traditional hardware TNC, RTTY is almost always operated in the LSB mode, utilizing a 170 Hz shift between the MARK and SPACE tones, with the MARK tone being the higher in frequency. If MixW is set on "RF, LSB" it will set the Mark tone as the higher tone. However, if MixW is set on "RF, USB" then the Mark tone will be set to the lower tone. (You can think of this as an automatic inversion if you like). In other words, if MixW is configured correctly (it needs to know if you are using LSB or USB) then it will automatically adjust your Mark and Space tones for you. You would only use the "Inverted" feature to operate inverted from the standard practice of that mode of operation, regardless of whether you're using USB or LSB.

If you are configured to use the CAT features of MixW, (see Configuration for more information) the USB/LSB and frequency changes will all be done automatically for you by selecting Configure | Spectrum | Auto:



Now, MixW will automatically know if you are using USB or LSB, as well as your operating frequency by polling your transceiver via the CAT feature. Your MixW operating frequencies (in the spectrum display as well as the log and CAT bars) will also automatically represent the audio offset, which will be either plus or minus your transceiver's frequency, depending on if you're operating LSB or USB. If you are not using CAT to determine your mode and frequency, you can still set your RF, USB/LSB parameters manually from this menu.

Receiving
While specific tuning instructions are somewhat mode specific and therefore covered in the individual mode operation topics, there are several procedures and techniques relevant in all modes.

To tune in signals left click the mouse pointer on the signals in the waterfall or spectrum display. You should start seeing text in your receive window. You can fine-tune the cursor location by holding down the control key and using the right and left arrows keys.

Stations may also be tuned in by assigning the <SEEKLEFT> and <SEEKRIGHT> macros to

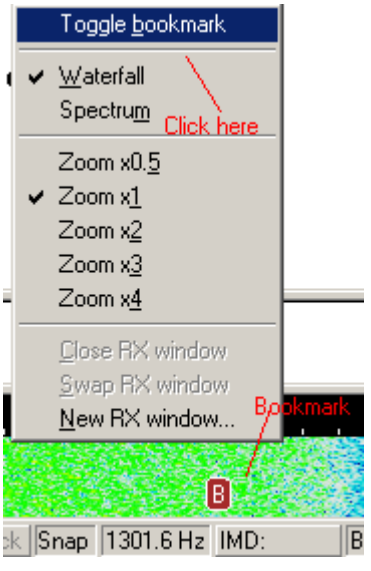
individual function keys, preferably single-finger keys. Pressing the key assigned to <SEEKRIGHT> will cause the cursor to jump to the next signal to the right of the current cursor position. Pressing the key assigned to <SEEKLEFT> will cause the cursor to jump to the next signal to the left of the current cursor position. Seek will send the cursor to any signal strong enough for Seek to detect, so if the cursor stops on what appears to be an empty frequency, it may have detected a noise pulse or spurious signal instead of a station. Just continue to press the Seek key repeatedly until the cursor stops on the desired station. If the cursor seems not to move, there may not be a detectable signal in the direction of Seek. It is important to always select the proper sideband in use, by selecting Configure | Spectrum | RF, USB or RF, LSB , in order to make Seek move in the proper direction. If Seek passes the station you want to tune, or tunes to one side of the station and not in the middle, just press the Seek button to pass the station and approach it from the other side. The default keys for Seek are F11 and F12, labeled << and >>.

When Options/Arrows for Seek is checked, the left and right arrow keys can be used for the Seek function, releasing F11 and F12 for other one-finger macro key configurations. However, if the left and right arrow keys are used for Seek, they are not available for editing the TX and RX windows. You need to decide if you prefer using the arrow keys for Seek, or for editing the TX and RX windows.

When Options/Continuous Seek is checked, Seek will search continuously for a signal and stop when it finds one. To manually stop Continuous Seek, just press any Seek key.

If MixW is tuned to a station, and Squelch is not set too high, and no characters are displaying on the screen, the cursor may have been left in the RX screen from a previous operation. Just press the Tab key to place the flashing text cursor in the TX window and characters should start displaying on the RX screen again.

A place-holder called a Bookmark is available on either the spectrum or waterfall spectrum displays. To place a bookmark at the cursor position, click the right mouse button and select "Toggle Bookmark" from the pop-up window. A lettered bookmark will appear at the diamond cursor position at the bottom of the Window. Pointing to any bookmark, clicking the right mouse button, and again clicking the "Toggle Bookmark," will remove a bookmark. To return to a book-marked frequency, point to the numbered bookmark and click the left mouse button to position the diamond cursor there, or click the right mouse button to position the triangle cursor there. You can also capture the station's call sign for that bookmark by double clicking the call in the receive window (the call will also be captured automatically is many cases). The station's call will now appear in the bookmark when tuned to that frequency.



When the Bookmark macro is assigned to a key, pressing that key will place a bookmark at the diamond-shaped cursor's position and if a bookmark is already placed there, it will remove the bookmark. MixW uses the name Mark for the bookmark key, as "Bookmark" is too long to fit on a

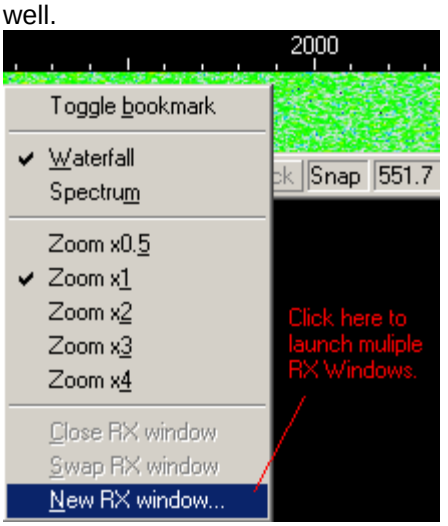
key label.

The bookmarks are numbered from A to Z in the same order they were created. One way bookmarks are helpful is to mark the location of a station that has not yet transmitted a callsign, while checking another station of possible interest, and being able to easily return to the first station of interest. Bookmarks are also helpful in marking where you have been transmitting and wish to attempt to QSY by transmitting on another frequency, but return to the original frequency in case the other station did not hear you on the second one. The usefulness of bookmarks is only limited by your imagination! Bookmarks only work with the diamond cursor.

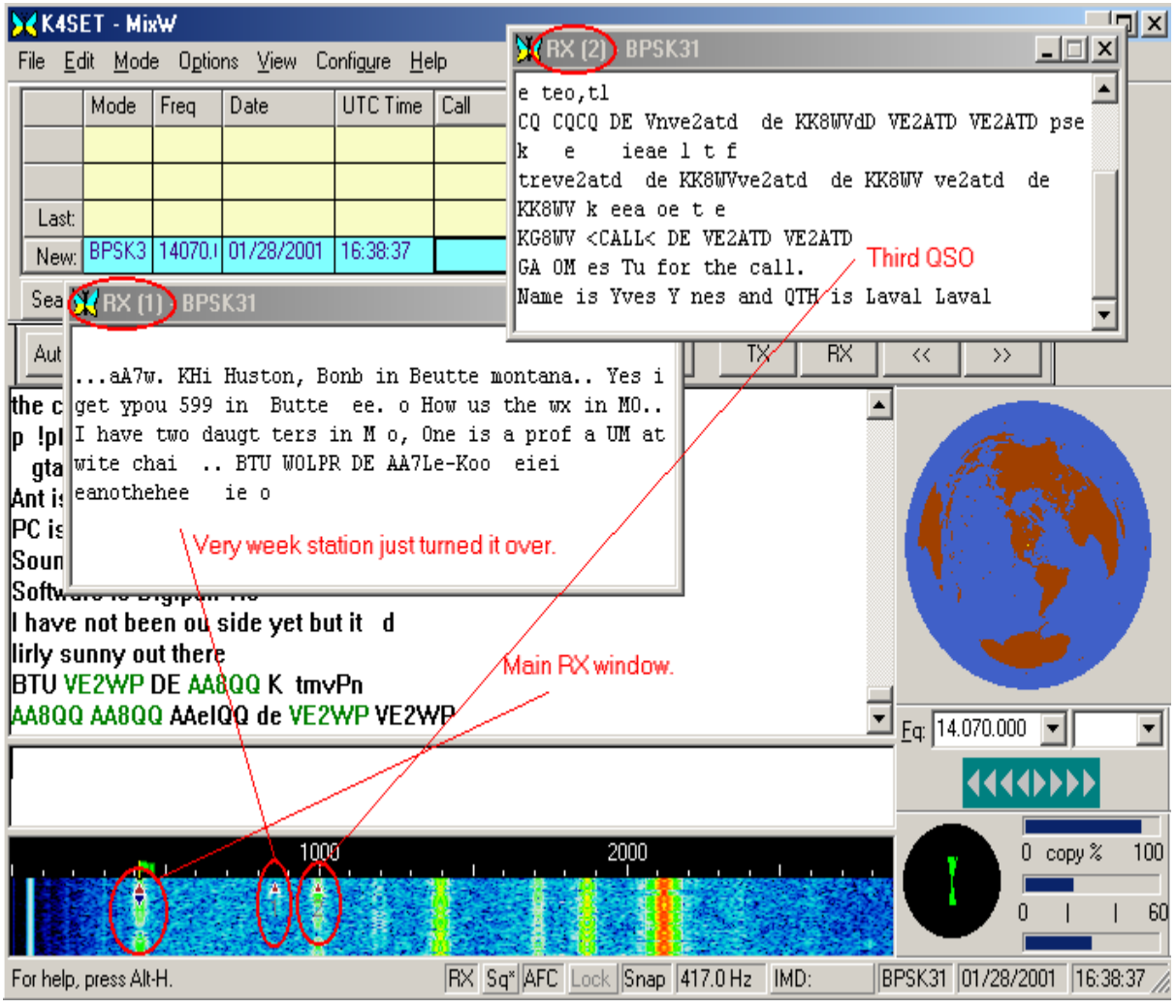
Text in the RX window can be deleted or Cleared by using the <CLEARWINDOW> macro, which is configured as one of your default macros (F8). Simply place the cursor in the RX window and then click on the Clear button (or press the F8 key).

Multiple Channel RX Operation

CTRL-clicking the right mouse button in the receive window will put MixW instantly into dual channel mode and open a second RX screen (called RX 1). If you are pointing at a signal when you right double-click, you will start copying that station in the RX 1 window immediately. Right clicking in waterfall or spectrum display, and selecting "New Receive Window" will also launch the second receive window, as well as a third, fourth, fifth etc... There are unlimited RX channels available for all modes except Hellschreiber. If there is sufficient interest, they will be added for Hellschreiber as well.



Here are three QSOs being copied simultaneously in the Main, RX 1, and RX2 windows. Note the cursor locations of each on the waterfall display:



The spectrum window cursor for RX 1, 2, 3 etc... is a triangle instead of a diamond and is tuned by pointing to the desired station or frequency and clicking the right mouse button instead of the left. Bookmarks are not supported for the triangle cursor unless the cursors are swapped, which will also swap the text from the Main Channel window to the Channel 1 window and vice versa. To avoid confusion, you should not swap cursors unless swapping is very desirable. The IMD readings and Bookmarks will only apply to the diamond cursor unless the cursors are swapped.

The active cursor for transmit is denoted by a green flag on the dial scale above the cursor. The transmit frequency may also be locked in place, and when locked the flag will change to red color, warning you to notice the actual transmit frequency.

When MixW is in muliple channel mode, it may be returned to single channel mode by simply closing the extra receive windows.

Transmitting

To transmit to a station, first tune it in. (see above) Type outgoing text in the Transmit Window, which is the smaller window between the Receive Window and the Spectrum Window. Press the TX/RX button (or one of the other TX/RX toggles) and the text in the Transmit Window will be transmitted. You can continue to type, and that text will also be transmitted. As it is being transmitted, text in the transmit Window will also appear in the Receive Window. To stop transmitting, press the T/R button again with the mouse. Pressing ESC will abort transmission and return MixW to receive mode, but the last several characters typed will not be transmitted. For this reason, the T/R button should be used to switch from transmit to receive.

When transmitting, the waterfall will freeze and remain frozen until returning to Receive. At that

time, MixW will display a thin green line to mark where the previous reception ended.

Text in the TX window may be edited before it is sent out with the standard Windows editing functions, except that insert is not supported. It is necessary to use the Backspace key and retype text that needs to be changed in the TX window. If the left and right arrow keys are used for the Seek function, those keys are not available for cursor movement in the TX and RX windows. To make them available, you must uncheck "Arrows for Seek" under the Options menu selection.

Text in the TX window can be deleted or Cleared by using the <CLEARWINDOW> macro, which is configured as one of your default macros (F8). Simply place the cursor in the TX window and then click on the Clear button (or press the F8 key).

Multiple Channel TX Operation
When additional RX windows are used, MixW is in multiple Channel mode. In this mode, pointing to a station and clicking the left mouse button will tune the Main RX Channel. Pointing to a station and clicking the right mouse button tunes the additional Channels (smaller RX windows). The Main Channel frequency will be shown by the diamond cursor and the additional Channel frequencies by the triangle cursor.

To avoid the possibility of transmitting to the wrong station, MixW supports only one transmit frequency,
But we can easily switch to any RX window by swapping it with the main channel. Operations with only one additional RX window are quite simple:

- Ctrl+Left mouse creates a secondary channel, or moves the existing channel to the pointed position.
- Press Ctrl+S or select Swap in the local menu (Right mouse click in the spectrum window).

For additional RX channels:
- Use the local menu to create a new RX channel, or switch to an existing channel.
- Press CTRL and move the mouse to the desired channel you wish to swap with. You will see a big white triangle on the bottom, which shows the closest RX channel.
- Press "S" keeping CTRL pressed to swap to that channel.

Lock can also be used to operate what is normally referred to as "Split frequency" operation, or transmitting on one frequency and listening on another. In order to set the transmit frequency, position the cursor to the frequency where you want to transmit and Lock it there. Then move to the frequency where you want to receive or where there is a station of interest. If you see a "pileup" and want to transmit to the side of the pileup, first place your transmit frequency to the side of the "pileup", lock it, and then tune to the station generating the "pileup". With a little experimentation or experience you may find Lock useful in other ways.

Another way to use the Lock feature is to set a bookmark on a station frequency that you wish to call off-frequency. Then move to the transmit frequency you want to use and Lock the transmit frequency there. Clicking on the Bookmark will easily return you to the station's frequency. However Bookmarks only function with the diamond cursor, or for the Main Channel, unless the cursors have been switched.

Digital Mode Band Plan **(Use with discretion).**

General HF Digital Band Plan

There is little consensus right now on which modes are acceptable in certain portions of the digital mode sub-bands. The influx of new digital modes and operators is not welcome by some. Please make every effort to avoid interference with other modes.

Suggested frequencies for each mode: PSK31, RTTY, MFSK, Packet, Pactor, THROB, Hellschreiber , SSTV, MT63

Standard Recommended HF Digital Operating Frequencies (MHz)

North and South America	**Europe/Africa**
3.590 RTTY DX	3.580-3.620
3.605-3.645	
7.040 RTTY DX	7.035-7.045
7.080-7.100*	
14.070-14.099.5	14.080-14.099.5
21.070-21.100	
21.080-21.120	
28.050-28.150	

* Digital operators should avoid interfering with hams outside the continental US who have phone privileges in this portion of 40 meters.

Recommended Novice/Technician Plus Digital Operating Frequencies (MHz)

28.100-28.150*

Suggested simplex packet-radio frequencies:

28.102.3

28.104.3

* Authorized power output 200-watts maximum for Novices/Technician Plus Licensees in the 10-meter Novice sub-band.

The following list from the AD4JE may prove helpful as well:

BANDPLAN Practical Information de AD4JE dated Jan 22, 2002

RTTY / Pactor: Radio Teletype. FSK signal. 5 Bit, 45.45 Baud. 60 WPM.
170 Hz - 850 Hz Shift. Duty cycle 100%

160m	1800 - 1840
80m	3580 - 3620
40m	7040 - 7100
30m	10130 - 10140
20m	14070 - 14100
17m	18100 - 18105
15m	21070 - 21100
12m	24920 - 24925
10m	28070 - 28150

PSK31: Phase Shift Keying. 31 Hz wide. 40-50 WPM. Duty cycle 80%

160m	1838
80m	3580
40m	7070, 7035
30m	10140
20m	14070
17m	18100
15m	21080
12m	24920
10m	28070, 28120

MFSK / Throb: Multi-tone Frequency Shift Keying using 8 or 16 tones.
About 42 WPM.

160M	1838
80M	3580
40m	7037
30m	10147
20m	14080
17m	18105
15m	21080
12m	24929
10m	28080

MT63:

160m	1822, 1838.15
80m	3580.15, 3590, 3635
40m	7035.15, 7037
30m	10140.15, 10145
20m	14106.3, 14109.3, 14114
17m	18105, 18100.15
15m	21130
12m	24925
10m	28130

HELLSCHREIBER:

160m	
80m	3575, 3580, 3559
40m	7030, 7035, 7037, 7040
30m	10135, 10137, 10145
20m	14063, 14064, 14070
17m	18100, 18105
15m	21070
12m	
10m	28063, 28070, 28100, 28110, 28120

SSTV:

160M	
80M	3730, 3845
40m	7171
30m	
20m	14227, 14230
17m	
15m	21340, 21335
12m	
10m	28675, 28680

FAX

160m	
80m	3730
40m	
30m	
20m	14227
17m	
15m	21335
12m	
10m	28675

PACKET:

160M	
80M	3620, 3620.9, 3623.9, 3627.9, 3635, 3638.9
40m	7068.9, 7070.9, 7071.9, 7072.9, 7073.9, 7076.9

30m	10124.9, 10125.9, 10126.9, 10133.9, 10136.9, 10140, 10150
20m	14062.9, 14072.9, 14073.9, 14074.9, 14075.9, 14076.9, 14095, 14099.5
17m	18101.9, 18105, 18107.9, 18110
15m	21072.9, 21100, 21110
12m	24925, 24930
10m	

Hellschreiber Frequencies

Band	Frequency	Comments
80M -	3.580 MHz	
20M -	14.063 MHz	
17M-	18.063 MHz	

From BANDPLAN Practical Information de AD4JE dated Jan 22, 2002:
HELLSCHREIBER:

160m	
80m	3575, 3580, 3559
40m	7030, 7035, 7037, 7040
30m	10135, 10137, 10145
20m	14063, 14064, 14070
17m	18100, 18105
15m	21070
12m	
10m	28063, 28070, 28100, 28110, 28120

If anyone knows other active Hellschreiber Frequencies please email them to me for inclusion here: scott.thile@murraystate.edu.

AMTOR Frequencies

This topic is still under developement. K4SET

If you know active Amtor Frequencies not included here, please email them to me for inclusion: scott.thile@murraystate.edu.

HF Packet Frequencies

Band	Frequencies	Comment
80M -	3.606, 3.630, and 3.642 MHz	
40M -	7.093 and 7.097 MHz	
30M -	10.145 MHz	
20M -	14.101 - 14.105 MHz	
15M -	21.099 - 21.105 MHz	
10M -	28.099 - 28.105 MHz	

VHF Packet Frequencies

Band	Frequencies	Comment
6M -	50.62 - 51.78 MHz	(51.70MHz calling Frequency)
2M -	145.010 MHz, 144.390 MHz for APRS.	
222MHz	223.52 - 223,64 MHz	

UHF Packet Frequencies

Band	Frequencies	Comment
440 MHz -	430.05 - 431.025 and 440.975 - 441.075 MHz	
Others	903 - 906 MHz, 915 - 918 MHz, 1248 - 1252 MHz 1296 and 1297 - 1300 MHz	

From BANDPLAN Practical Information de AD4JE dated Jan 22, 2002:
PACKET:

160M	
80M	3620, 3620.9, 3623.9, 3627.9, 3635, 3638.9
40m	7068.9, 7070.9, 7071.9, 7072.9, 7073.9, 7076.9
30m	10124.9, 10125.9, 10126.9, 10133.9, 10136.9, 10140, 10150
20m	14062.9, 14072.9, 14073.9, 14074.9, 14075.9, 14076.9, 14095, 14099.5
17m	18101.9, 18105, 18107.9, 18110
15m	21072.9, 21100, 21110
12m	24925, 24930
10m	

MFSK Frequencies

Band	Frequency	Comments
80M -	3.580 MHz	
40M -	7.080 MHz	
30M -	10.140 MHz	
20M -	14.080 MHz	<---- Most Activity here.
17M -	18.105 MHz	
10M -	28.130 MHz	

From BANDPLAN Practical Information de AD4JE dated Jan 22, 2002:
MFSK / Throb: Multi-tone Frequency Shift Keying using 8 or 16 tones.
About 42 WPM.

160M	1838
80M	3580
40m	7037
30m	10147
20m	14080
17m	18105
15m	21080
12m	24929
10m	28080

MT63 Frequencies

From BANDPLAN Practical Information de AD4JE dated Jan 22, 2002:
MT63:

160m	1822, 1838.15
80m	3580.15, 3590, 3635
40m	7035.15, 7037
30m	10140.15, 10145
20m	14106.3, 14109.3, 14114
17m	18105, 18100.15
15m	21130
12m	24925
10m	28130

If anyone knows of any active MT63 Frequencies please email them to me for inclusion here: scott.thile@murraystate.edu.

PSK31 Suggested Frequencies

Band	Frequency	Comments
160M	1838.150	
80M	3580.150	Increasing activity at night here now.
40M	7035.15	For regions 1 and 3
40M	7.071	(US)
40M	7080.15	For the rest of region 2
30M	10142.150	
20M	14070.150	**Almost always activity here.**
17M	18100.150	
15M	21080.150	(although most activity can be found 10 kHz lower)
12M	24920.150	
10M	28120.150	

From BANDPLAN Practical Information de AD4JE dated Jan 22, 2002:
PSK31: Phase Shift Keying. 31 Hz wide. 40-50 WPM. Duty cycle 80%

160m	1838
80m	3580
40m	7070, 7035
30m	10140
20m	14070
17m	18100
15m	21080
12m	24920
10m	28070, 28120

There is some controversy surrounding these frequencies at the present time. Please operate with caution, and be extremly courtious.

SSTV Suggested Frequencies

From BANDPLAN Practical Information de AD4JE dated Jan 22, 2002:

SSTV:

160M	
80M	3730, 3845
40m	7171
30m	
20m	14227, 14230
17m	
15m	21340, 21335
12m	
10m	28675, 28680

Throb Frequencies

From BANDPLAN Practical Information de AD4JE dated Jan 22, 2002:
MFSK / Throb: Multi-tone Frequency Shift Keying using 8 or 16 tones.
About 42 WPM.

160M	1838
80M	3580
40m	7037
30m	10147
20m	14080
17m	18105
15m	21080
12m	24929
10m	28080

If anyone knows of any active THROB Frequencies please email them to me for inclusion here: scott.thile@murraystate.edu.

RTTY Suggested Frequencies

Traditionally RTTY has been found accross the entire digital mode allocation in each band, however, as more modes are developed RTTY has been used less (except durring contests were it is still the digital mode of choice for many contesters). And the lower portions (about 3KHz) of each allocation has been occupied by PSK31, and now MSK16 operations just up from the PSKers (often around 10KHz up from the bottom of the band).

Note: During contests you will find RTTY activity throughout these allocations.

In general, when operating RTTY, look for activity in the middle of the digital mode allocations as follows:

Recommended HF Digital Operating Frequencies for RTTY (MHz)

North and South America	Europe/Africa
3.590 RTTY DX	3.580-3.620
3.605-3.645	
7.040 RTTY DX	7.035-7.045
7.080-7.100*	
14.070-14.099.5	14.080-14.099.5
21.070-21.100	
21.080-21.120	
28.050-28.150	

* Digital operators should avoid interfering with hams outside the continental US who have phone privileges in this portion of 40 meters.

Recommended Novice/Technician Plus Digital Operating Frequencies (MHz)

28.100-28.150*

Suggested simplex packet-radio frequencies:

28.102.3

28.104.3

* Authorized power output 200-watts maximum for Novices/Technician Plus Licensees in the 10-meter Novice subband.

From BANDPLAN Practical Information de AD4JE dated Jan 22, 2002:
RTTY / Pactor: Radio Teletype. FSK signal. 5 Bit, 45.45 Baud. 60 WPM.
170 Hz - 850 Hz Shift. Duty cycle 100%

160m	1800 - 1840
80m	3580 - 3620
40m	7040 - 7100
30m	10130 - 10140
20m	14070 - 14100
17m	18100 - 18105
15m	21070 - 21100
12m	24920 - 24925
10m	28070 - 28150

Pactor Frequencies (Mostly BBSs)

Band	Frequencies	Comment
40M =	7.060 - 7.080	
30M =	10.130 - 10.140	
20M =	14.060 - 14.080	
17M =	18.100 - 18.110	
15M =	21.060 - 21.080	
10M =	28.080 - 28.120	

From BANDPLAN Practical Information de AD4JE dated Jan 22, 2002:
RTTY / Pactor: Radio Teletype. FSK signal. 5 Bit, 45.45 Baud. 60 WPM.
170 Hz - 850 Hz Shift. Duty cycle 100%

160m	1800 - 1840
80m	3580 - 3620
40m	7040 - 7100
30m	10130 - 10140
20m	14070 - 14100
17m	18100 - 18105
15m	21070 - 21100
12m	24920 - 24925
10m	28070 - 28150

If you know active Pactor Frequencies not included here, please email them to me for inclusion here: scott.thile@murraystate.edu.

MixW version History

State of the art digital mode software by Nick Fedoseev, UT2UZ.

Version 2.02
IARU beacons dialog added (menu View > NCDXF/IARU Beacons)
Be sure your computer time is set correctly, high accuracy
(+-1 second) is desired. Use wellknown freeware utilities
like NetDate to be in sync with the whole world automatically.
GPS or any other precise clock source may be used as well.
Click onto desired frequency to move the TRCVR there.
Previous Fq and mode will be restored after closing the dialog.
TCP/IP connection via PACKET, as an alternative to SV2AGW PACKET
ENGINE and FLEXNET. Requires additional network driver
(download from http://tav.kiev.ua/~nick/TcpIp.html)

PACKET settings dialog:
- General tab:
- Separate callsign box for TCP/IP operation
- Parameters tab:
- 9600 baud (G3RUH-compatible) bit shapes (select one of 16)
- Beacon/monitor tab:
- Show content of IP/ARP packets
- Baudrate measurement (show baudrate of "I" packets)

Be sure your computer time is set correctly, high accuracy
(+-1 second) is desired. Use wellknown freeware utilities
like NetDate to be in sync with the whole world automatically.
GPS or any other precise clock source may be used as well.
Click onto desired frequency to move the TRCVR there.
Previous Fq and mode will be restored after closing the dialog.

The TRCVR/CAT dialog has an option "Show zero beat frequency"

Export: DxccPfx is added

Statistics: SSTV is no longer DIGITAL

Word mode added (menu View). To turn on or off this mode use new macros
<WORDMODE:ON> or <WORDMODE:OFF>

Capitals Only mode added. Use according macros <CAPITALSONLY:ON> or
<CAPITALSONLY:OFF> to switch the mode.

<MEMW:n> and <MEMR:n> macros are equivalent to Ctrl+n and Alt+n
and can be used to save and restore current frequency and mode.

Some fixes for YAESU CAT control

Elecraft K2 Support added (see Kenwood settings)

Callbook datapath adviser (for those who do not want to read FAQ :-)

CWID amplitude bug fixed (now it follows current mode setting)

SSTV:

- WWV mode can be used to calibrate the soundcard while receiving WWV

signals. Time marks are transmitted on 4996, 9996, 14996 KHz.
Tune TRCVR to 4994.100, 9994.100, 14994.100 (USB) accordingly since
Be patient if you do not hear anything. Time marks aren't transmitted
all the time, up to 5 min. pauses are expected.
- SSTV slant correction can be moved to soundcard samplerate
correction, to let other modes use that correction as well.
See button "Go" in SSTV mode settings dialog.
- Zoom window now is non-modal, so it can be placed anywhere to see
what's being received while preparing the TX picture.
- Up to 16 history bitmaps can be shown now (smaller size, of course)

MixW 2.01
New macro:

<INIFILE:file,section,name> - insert a line from an ini-file.

Suppose I have a program that measures the temperature using a sensor
outside of the house and periodically writes the value into d:\temp\sensor.ini file:

```
--- start of d:\temp\sensor.ini ---
[Sensor]
Temperature=xx
Humidity=yy
Illumination=zz
--- end of d:\temp\sensor.ini ---
```

Then I can make a macro:

The current temperature in Kiev is
<INIFILE:d:\temp\sensor.ini,Sensor,Temperature> degrees centigrade.

Export to CSV format

See the Search Results dialog.

Export to text format

Text format has been changed.

PTT & CAT dialog

"DIG" drop-down box sets DIG mode (Yaesu transeivers) to use LSB, USB, or
FM.

Search dialog

Added "QSL sent" and "QSL received" search options.
Print support is added.

Install

Icons are created on the desktop and in Start Menu.

Bugs

SSTV dialog remembers the last position

MixW 2 RELEASE
Added support for changing territorial characteristic and country for a call or group of calls, also giving them an area name.

In Edit QSO dialog (when editing a QSO details), click Change button. Enter a call or mask (wildcards '*' and '?' are allowed).
Give a name for this call area. Choose an existing country to add this area to. Fill other required fields.

These changes are stored in pfx.dat file in MixW directory.

Added restoration of an accidentally deleted QSO.

Click File - Restore removed QSO menu.

Added WW Locator, IOTA number, domain (state) and county settings.

See Configure - Personal data menu.

List of contests dialog has been moved to View - Contest mode menu.

Double-click sets the selected line active. To deactivate a contest, choose "No contest".

Added CQ zone, ITU zone, Domain or DXCC prefix auto suggestion. See the Contest Settings dialog.

Log Statistics dialog has been moved to View - Statistics - Brief log statistics menu.

Added statistics filters for displaying contest statistics on-the-fly.

In Contest Settings dialog, click the Statistics: [...] button and choose a statistics filter. Then, click View - Statistics - Show contest statistics menu to display the statistics window.

Contest filters are actually DLL files that are located in Plugins subdirectory in MixW directory. See the bottom of main MixW page for the list of available statistics DLLs.

To automatically generate Cabrillo contesting log for a given contest,

Run Search in Logfile dialog (File - Search in logfile menu). Uncheck all check-boxes except Contest. Choose a contest from the list. Click Display button. In the search results dialog, select the lines you want to export (right mouse click for additional options), then press To Cabrillo button.

After viewing the contest statistics, fill the required fields and press OK.

Added Quick Search dialog for searching for incomplete callsigns.

In View - Quick search menu, choose your preferred method of searching, then click Show dialog to display the Quick search dialog.

Enter a part of a call into the the new QSO cell of the Log Bar. Wildcards ('*' and '?') are allowed.

Red ticks indicate if we already had a QSO (dupe) with this station (according to the current contest settings).

Changed the order of columns in DXCluster dialog.

9600 baud packet (experimental). Use 22050 Hz soundcard samplerate for 9600 packet mode, and 11025 Hz for any other mode (see Configure - Soundcard settings menu.).

Added Freeze on mouse move feature (see Options menu), which will stop printing the received text for a couple of seconds when mouse cursor is moved over the RX window.

Added Use WAE option (see Configure menu), which allows using extended WAE country list

instead of DXCC list (just adds several countries).

Trial period date (for unregistered users) is 15 days after installing the program.

MixW 2 RC12
ROTOR support is extended with four buttons on the world map (visible only when any rotor is selected).
Macros added: <ROTOR:SP>, <ROTOR:LP>, <ROTOR:nnn>.

<OUTPUTVOLUME>,<INPUTVOLUME> macros added to call Windows Volume Control.

Some minor bugs are fixed.

MixW 2 RC11
Expiration date (for unregistered users) is October 1, 2001.

Fixed bug with FSK RTTY transmittion (COM port bug under Win98).

Added Snap for 22 Hz RTTY.

Added "Clear QSO data?" question when clearing QSO (hold Control key to bypass this message).

See StarOffice MixW DDE test.sdw file to see how to use DDE interface with Star Office.

MixW 2 RC10
Expiration date (for unregistered users) is September 1, 2001.

Tip of the Day window is added.
Please suggest new tips!
(You may also edit tips.txt file from MixW directory.)

See ExtProg.html to learn about interfacing MixW with other programs (short VB samples are included):

- Printing QSL cards;
- Passing QSO data to external loggers;
- Passing data to external maps;
- Switching/rotating antennas;
- Custom callbooks.

Contesting for Monkeys article tells about an example of using MixW in contests. See MonkeyOp.html.

New fields are added to the log file:

- Domain (state, etc.),
- IOTA,
- county,
- QSL manager.

Callbook fields can be viewed via DDE when Callbook dialog is open.
See MixW DDE test.doc file from MixW directory for details.

Two user-configured Log bar layouts are added.
See Configure > Log bar > Custom 1 & 2 menus. Resize Log bar columns by their gray headers.
Double-click on the border of a header to restore it's original size.

Contest mode: separate menu (View > Contest mode > Activate contest mode) is added to turn on/off contest mode.

- Domains, states, etc. (see Contest settings dialog) are now grabbed to Domain field or SerialNR (see "as Domain" and "as Number" switches);
- Contest time is now grabbed to Exchange Received field and added to the exchange number, like '001 1532' (001 is a number, 1532 is grabbed time).

In Search Results dialog, click Callbook button to open the Callbook dialog for a selected callsign.

Export to Cabrillo format file:
2 formats are now supported:
- rst + number,
- [number] + name + domain (NAQP contest etc.).

Export to text files:
New log fields are also added to export list. Using a text editor, exported TXT file can be converted and sent as a contest log.

Icom transceivers:
CWR, FSK and FSKR support added;

Configurable output amplitude for each mode. See Mode > Output amplitude for this mode menu.

MixW 2 RC9
Expiration date (for unregistered users) is August 1, 2001.

Three CW RX algorithms:
- Manual (by ear);
- Old MixW 1.45;
- MixW 2.0.

SSTV:
- Picture Preview in load picture dialog;
- TX load history tab.

Tune Transmitter menu item (under Options). See also <TUNE> macro.

New macros:
<WPM:nn> <WPM:+nn> <WPM:-nn> - for CW, absolute and relative speed change;
<WPM:RX> - make TX speed equal to RX;
<LOADPICTURE:filename> - loads SSTV picture. If a folder name is given instead of filename, RANDOM picture from that folder will be loaded;
<TUNE> - start tuning tone, ESC stops.
<STOP> and <ESCAPE> - equivalents of keyboard ESC key.

TEN-TEC Pegasus/Jupiter support (via external file, Pegasus control software is required):

In PTT&CAT dialog, select CAT=TEN-TEC, Model=Pegasus/Jupiter, Software path = directory of Pegasus software, like D:\PEGASUS .
In PTT&CAT Details sub-dialog, choose a port number for PTT control and DTR/RTS behaviour (baudrate etc. does not matter).
Run the software (BBTRX1.EXE).
Then MixW will read and write transceiver frequency and mode.

RTTY via transceiver FSK port:

Go to Configure > Secondary PTT/RTTY port menu.
Check "Use this port for RTTY output".
In Port Settings sub-menu, set up port number and RTS/DTR pins (other settings do not matter).
In PTT&CAT dialog (from Configure > TRCVR CAT/PTT menu), enter FSK center frequency (according to your transceiver type and settings).

In bands.ini file from MixW directory, add lines for each band you
want to use with hardware RTTY, like

20m RTTY FSK 14065 14112 14080

where
20m = band name,
RTTY = real mode,
FSK [or FSKR] = transceiver mode used to operate RTTY,
14066, 14112, and 14080 = start, end, and preferred frequencies.

(With such lines, MixW will switch rig to FSK [or FSKR] mode for RTTY by default.)

Then restart MixW to let it re-read bands.ini.
RTTY output will be sent to this COM port and to the soundcard in parallel.
MixW 2 RC8
Expiration date (for unregistered users) is July 14, 2001.
New soundcard module with much better RX stability in heavy multitasking environment.
Manual RX is supported for SSB and CW with usual highlighting, call grabbing etc. (For CW: go to Mode settings/Rx Algorithm/Manual)
Multiple call registration is available
Mode specific info is displayed in the status bar.
Some minor bugs fixed
MixW 2 RC7
Expiration date (for unregistered users) is July 1, 2001.
Added:
Added CWR and FSKR transceiver modes to drop-down mode menu.
Added <SPZOOM:n> (n=0.5,1,2,3 or 4) macro to set spectrum/waterfall zoom.
Spectrum/waterfall shift position is now saved (and restored :-).
Added <INV>, <INVON> and <INVOFF> macros to quickly change inversion.
8-bit encoding in MT63 mode is added (see MT63 settings dialog).
Contest Settings: added Check Dupes regardless of Band or Mode check-boxes.
<LASTCALL> macro (not in list), unlike <GRABCALL> captures last call
appeared on the RX screen.
CW weight correction (in 1ms intervals) to compensate CAT CW delay.
(+1 to add 1ms delay, -1 to subtract 1ms, and so on.) See CW settings
dialog.
Bugs fixed:
Auto Search Log name and QTH bug is fixed.
AFC in MFSK in full duplex mode stopped.
<ALIGN:nnn> on LSB bug is fixed.
Several contest bugs are fixed, but contest mode is to be re-written
MixW 2 RC6
Several bugs are fixed:
- RTTY 850 Hz shift must work now
- MT63 now allows not only 500 Hz start frequency
- DXCluster wrong mode selection bug
Right-click on RX window in RTTY mode to convert selected received text to upper/lower register
MixW 2 RC5
New DxCluster dialog (MSFlexGrid.ocx is no longer needed!)
SSTV ZOOM window
New macros added:
- <MODE> prints current mode
- <KHZ:n> Frequency in kHz with n digits after decimal point
- <KHZ> the same as above with n = 0
- <MHZ:n> Frequency in MHz with n digits after decimal point
- <MHZ> the same as above with n = 1
Some bugs fixed:
- WPX counting bug
- MT63 & RAC callbook incompatibility (!)

- PSK31 TX drift in fullduplex mode
Expiration date is set to June 30
MixW 2 RC4
MT63 mode.
(!) INI files are no longer stored in WINDOWS folder.
Move all MixW*.ini and all .mc files to MixW folder.
SSTV
Right click on history bitmap shows it full-sized (only if it was auto-saved)
R36 and R72 modes added.
Settings dialog is modified.
Video ID. See notes below.
MACROS for SSTV:
<FONTFACE:nnnn> selects given font. Example: <FONTFACE:Arial>.
<FONTCOLOR:n> selects the color from the list if the number is less than 14 or uses following formula for exact RGB color (Red+Green*256+Blue*65526) where Red, Green and Blue are clor components in range of 0..255. Example : <FONTCOLOR:4>
<FONTBOLD:n> Turns on/off BOLD effect. Example: <FONTBOLD:1>
<FONTITALIC:n> Turns on/off ITALIC effect. Example: <FONTITALIC:1>
<FONTSIZE:nn> Sets font size. example: <FONTSIZE:26>
CAT
Added Comport conflict extended diagostics.
FT817 support.
The number of ICOM models is extended to 33.
Possible custom CI-V address for ICOMs.
Search dialog (under glasses)
global optimization. Viewing the full log of ~26000 QSOs took ~3minutes in RC2. Now it takes only 11 seconds on my C366.

Video ID.
This is a new feature to transmit Video ID visible on the waterfall. See picture below. Simple editor is included. Since the power is divided by all points transmitted at the same time, do not make long horizontal lines. Try VID samples butterfly.bmp and mixw.bmp in the MixW directory.

This method of transmitting a picture visible on the waterfall was first suggested by Roland Zurmely (PY4ZBZ), roland.zurmely@mrnet.com.br (http://www.qsl.net/py4zbz).
MixW 2 RC2
SSTV mode
SSTV is accessible from menus
History tab is added
CAT changes
IC 756 PRO has been added to the list
FT 847 PTT bug fixed
ICOM PTT via CAT COMMAND implemented
MACROS <CATCMD:asciicmd> and <CATCMDHEX:hex bytes> are added. Example of usage: <CATCMD:FE FE 56 E0 1C 00 01 FD>. This let you send any CAT command to the TRCVR.
Log bar
Lookup call button (Alt+K) has been added
New macros
<SELCALL>, <SELNAME>, <SELQTH>, <SELRSTR>, <SELRSTS>, <SELNRR>, <SELNRS> mean the same as <CALL>, <NAME> etc but for selected line in the log bar.
<CATCMD:asciicmd> and <CATCMDHEX:hex bytes> (see CAT changes)
MixW2 and SSTV
MixW2 does not compete with MMSSTV, ChromaPIX and other SSTV programs. It does not have extended service like templates or diagonal texts with gradient fill. It allows you to make occasional QSOs. It has the ability of manual correction of phase and slant. It lets you quickly type and place the text over transmitted image. Macros can be used for frequently typed words. Simple it is a tool for experimenters and for those who want to save the time.

Picture received from 9H4CM.
SSTV features implemented at the moment:

Load TX file
Save RX or TX file
Load TX picture from the clipboard
Load picture from the RX screen
Text font, size and color selection
Hold CTRL to change the text color while placing
Hold SHIFT to change the size while placing
Slant correction
[\],[\\],[//],[/] buttons
Draw a line over the LEFT border of received picture
tip: Move picture right, then draw a line
Auto Slant (on the end of picture)
Phase correction
[COLOR], [<<], [<], [>], [>>] buttons
Single click on the LEFT received border of the picture
tip: Move picture right, then click on the border
Shift+Slant saves current slant correction and current value will
be used while transmitting next pictures as well as Slant button
will restore it in RX mode.
[<<], [<], [>], [>>] buttons in combination with Shift and Ctrl
move picture up or down
Right click on the top of picture moves it up making an attempt to
resync. This is useful in case wrong or manual start, somebody has
started transmitting over existing SSTV flow...
History small bitmaps (1/3 of actual size) can be easily inserted to TX screen. Move it to desired place like usual drag'n drop: push left mouse button (TX picture appears), move to desired place then release.
Single step Undo is available to restore the TX picture after wrong placement.
Note: Placing text and history bitmaps is possible during transmit
In case of troubles with dropping receive or transmit,
following hints may help. Play with following lines in the mixw2.ini:
Section
[Device 0 Setup]
m_iBufRxNum=48
m_iBufRxSize=256
m_iBufTxNum=48
m_iBufTxSize=256

declares 48 buffers, 256 bytes each to use for sound operations. If we use sound card at 11025 sps, total length equals to 48*256/11025 ~ 1.1 sec. I.e. a little more that a second is reserved for unexpected Windows delays. We can increase the time by enlarging buffer sizes or increasing the number of buffers.

- Changing the task priority. Look for following section in the
MixW2.ini:
[Priority]
MainThread=0
Class=32

These values are by default, defining standard priority.
Try Class=128 (HIGH PRIORITY) or Class=256 (REALTIME PRIORITY)

This will definitely help in multitasking environment, and let you work with other programs at the same time, but it may hang slow PC. Also you may play with increasing the main thread priority:
MainThread=1
or
MainThread=2
or
MainThread=15

I set Class=128 and MainThread=2 on my C366 under W2000 and both SSTV TX and RX work great while I am opening PhotoShop, compiling projects etc.

Also you may play with following numbers in [SSTV] section of MixW2.ini:
FilterLength=4
The value may be inreased. I use the value of 64 on my C366. This value defines the number of taps used for the
FIR filter (actually the number of taps is FilterLength*2+1).

Dec=5
Decimation rate. May be decreased to 4 or 3.
I do not recommend to set it less than 3.
MixW 2 RC1 (first public release candidate)
After the long work we decided to make it public in order to get more opinions, feedbacks and bug reports before the final release of 2.0.
MixW2 RC1 supports SSB, AM, FM, CW, BPSK31, QPSK31, FSK31, RTTY, Packet, Pactor (RX only), AMTOR (FEC), MFSK, Hellschreiber, Throb, Fax (RX only), SSTV.
This version has time limit (expiration date is May 31th, 2001, for unregistered users only) as we do not want it to be distributed widely. No other restrictions for unregistered users. The program seems to be stable and more than 30 users have been using it quite a long time. But each program has at least one bug :-) We will replace RC version with final release as soon as we find it bug-free enough.

Digital Modes, A QSO Technique primer. **Some of this material is from Steven R. Hurst, KA7NOC from his website at http://www.magiclink.com/web/shurst/Page2.html**

The best way to learn the ropes is to monitor several QSOs in the modes you intend to operate, but this should help you get up to speed as well.

Before transmitting in any mode, it is good practice to ask if the frequency is in use. You do this by sending: "QRL? de (Your Call)" , then listening for a "YES" or "Y" or "TU" or "C".

Procedure for calling "CQ":

- "CQ CQ CQ DE (Your call) (Your call) (Your call) K"
- Then LISTEN..... if you don't hear anyone answering your call try again.
- "CQ CQ CQ DE (Your call) (Your call) (Your call) K"
- Again, LISTEN..... You might also observe around your transmit freq. to see if anyone is calling you that you may not have seen. Lets assume someone is calling you. This is what they may say:
- "KB1XXX KB1XXX DE WA9ZZZ WA9ZZZ K"
- It is now up to you to establish communication. Example:
- "WA9ZZZ WA9ZZZ DE KB1XXX , TNX fer the call OM es GA (or GE). Ur RST RST is (give signal report). My name is (Send your name twice). My QTH is (Send your location twice). So hw cpy OM ? BK T U . WA9ZZZ DE KB1XXX KN"
- Then the other station will tell you if he/she copied all of what you sent or if you need to repeat anything. They might send all of their information as you did during this time.

This is just one example of how to make your first contact. You will of course find what you like and what is comfortable for you. Just try to remember to keep your CQ calls short, no one likes to sit for five minutes seeing an endless stream of "CQ CQ CQ..." . They may get tired and move on , and you will therefore miss the QSO.

After all of the standard information is passed and copied, you can move on to other topics. What do you talk about on digital modes? Try to make it interesting for the other station. You might tell them your age, how long you've been licensed, what you do for a living, or what grade you're in and what you like to study the most. It's just like talking with someone on the phone (well almost, digital radio is much more fun!). Are you familiar with the "hamspeak" being used?

- CQ is a general call for any station to answer you. You are "seeking" any station to call you.
- DE means "FROM" or "THIS IS". From the French , DE means FROM.
- K means "OVER" .
- TNX means "THANKS". You could also use "TKS" for the same meaning.
- FER means "FOR". Easier to send an E than an O I guess !
- OM is "Old Man" . Hams call each other Old Man no matter how old you really are ! Helpful hint: NEVER call a female ham an "Old Lady" !
- YL is "Young Lady".
- ES means "AND". Again, easier to send ES than AND.
- GM / GA / GE / GN. Good Morning, Good Afternoon, Good Evening and Good Night.
- Ur means "Your".
- RST is "Readability", "Strength" and "Tone". This is the way signal reports are given using CW. I'll be setting up a page explaining how to give meaningful signal reports soon.
- HW means "HOW".
- CPY means "COPY".
- BK means "BACK".
- T U means "To YOU". (This can also mean "Thank You" in some cases)
- KN means "Over, only the station I'm working respond".
- WX means "Weather".
- HR means "Here"

Short list of popular Q-Signals

- QRM means "Interference"
- QRZ? means "Who is calling me"

- QRN means "Static"
- QSL means "I copy or understand"
- QSL? means "Do you copy"
- QTH is your location.

Complete list of AMATEUR RADIO "Q-SIGNALS"

QNA Answer in prearranged order.
QNC All net stations copy.
QND Net is directed.
QNE Entire net stand by.
QNF Net is free.
QNG Take over as net control station.
QNI Net stations report in.
QNM You are QRMing the net.
QNN Net control station is [call sign].
QNO Station is leaving the net.
QNP Unable to copy you.
QNS Following stations are in the net.
QNT I request permission to leave the net.
QNU The net has traffic for you.
QNX You are excused from the net
QNY Shift to another frequency.
QNZ Zero beat your signal with mine.
QRG Will you tell me my exact frequency?
QRH Does my frequency vary?
QRJ Are you receiving me badly?
QRK What is the intelligibility of my signals?
QRL Are you busy?
QRM Is my transmission being interfered with?
QRN Are you troubled by static?
QRO Shall I increase power?
QRP Shall I decrease power?
QRQ Shall I send faster?
QRS Shall I send more slowly?
QRT Shall I stop sending?
QRU Have you anything for me?
QRV Are you ready?
QRX When will you call me again?
QRY What is my turn?
QRZ Who is calling me?
QSA What is the strength of my signals?
QSB Are my signals fading?
QSD Is my keying defective?
QSG Shall I send messages?
QSK Can you hear between your signals?
QSL Can you acknowledge receipt?
QSM Shall I repeat the last message?
QSN Did you hear me?
QSO Can you communicate with me?
QSP Will you relay?
QST General call preceding a message.
QSU Shall I send or reply on this frequency?
QSW Will you send on this frequency?
QSX Will you listen?
QSY Shall I change frequency?
QSZ Shall I send each word more than once?
QTA Shall I cancel message?
QTB Do you agree with my counting of words?
QTC How many messages have you to send?

QTH What is your location?
QTR What is the correct time?

I hope that this helps to familiarize you with the procedures of making a digital mode contact. Don't be shy or afraid to get on the air and make that first contact! It really is a thrill to see someone sending your callsign back to you after you have called or answered a CQ.

Help for installing "Automatic cooperation between MixW and DxAtlas programmes" **By Finn Helmuth Pedersen, OZ6LI,** http://hjem.get2net.dk/helmuth/

You will need do make a few preparations in order for MixW and DxAtlas to work together :

Go to the MixW site to get the latest MixW version (2.01 or 2.02): http://tav.kiev.ua/~nick/mixw2/
Then download the DxAtlas from www.dxatlas.com

Now follow this sequence:
1) After downloading the files, install in the usual/suggested MixW and DXAtlas directories.

2) Go back to the MixW site and proceed further down the page to find the headline ARTICLES with the sub issue INTERFACING MIXW WITH OTHER PROGRAMS. Click on that one and find USING DDE INTERFACE. Then find USING DDE INTERFACE TO PASS DATA TO EXTERNAL MAPS. Locate the line "Download Visual Basic source code and Exe file: Mix2DxAtlas1.zip" and click it. After download unpack this DDE zip file into your MixW directory. This file can also be downloaded by clicking here:
http://tav.kiev.ua/~nick/mixw2/Mix2DxAtlas1.zip.

3) Third step is to create a Macro within MixW:
Load MixW and create e new Macro, e.g. with the name of "ATLAS".

This macro will need the following content:
<EXEC:C:\Programmer\Afreet\DX Atlas\DXAtlas.exe>
<EXEC:C:\Programmer\MixW\Mix2DxAtlas.exe>

The first line is to initially activate the DxAtlas program from within MixW. The second line awakes the DDE data transfer program Mix2DxAtlas.
Of course the path names will depend of your actual paths.

Now you are ready to utilize the benefits of the great Digital program (MixW2) in "tandem" with the great DX Atlas program.

1) Load MixW as usual.
2) Click on your newly created macro button "ATLAS".
3) The DxAtlas is now loading, as well as the DDE routine Mix2DxAtlas.exe
4) After some seconds a smaller DxAtlas window pops up in the upper left corner.
5) Enlarge the atlas to the whole screen.
6) To get the Mix screen back, click the Mix Butterfly at the very bottom. Click a couple of times to watch MixW and DxAtlas screens toggling.

Daily work with DxAtlas and MixW:
Use MixW as usual. Select a station in the waterfall and click on the callsign in the RX window. As soon as you click the call, data will automatically be transferred to the DxAtlas. To actually see the result of this transaction, toggle the screens by clicking the Mix Butterfly at the bottom of the screen. Now you will see the "DX" station placed correctly on the world map.

Of course the station is placed in the middle of a Prefix area. But if you, for instance, copy your Callbook CD to your hard disk, latitude and longitude data for the station in question (if present in callbook) will be transferred to DxAtlas as well. The station will then be placed right on spot in the map.

Far additional information on using DDE to interface MixW with external programs see Using MixW with other programs, DDE

Interfacing MixW with other programs **Using the DDE interface, By Denis Nechitailov UU9JDR**

MixW provides DDE interface to pass data to another program. See the MixW DDE test.doc file from MixW directory for the list of available items to transfer.

Using DDE for printing QSL cards.
See MixW QSL card test.doc file from MixW directory. This file shows a sample QSL card. Names, QTHs and other data are automatically updated in Microsoft Word document when you change them in MixW. Normally, current QSO is shown. To print a previous QSO, select it from the list in Search Results dialog.

Download the Microsoft Word DDE test file:
http://tav.kiev.ua/~nick/mixw2/MixW%20DDE%20test.doc

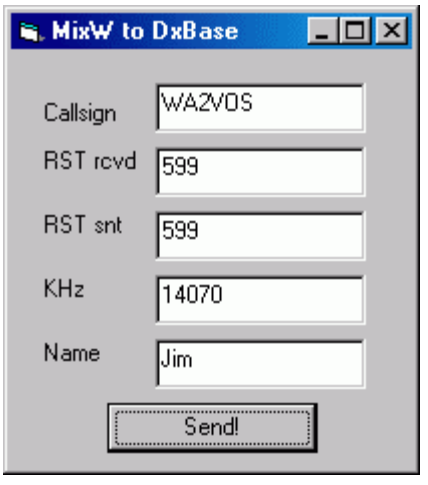
and the MixW DDE test.doc and sample QSL card:
http://tav.kiev.ua/~nick/mixw2/MixW%20QSL%20card%20test.doc

Download Sun Star Office notes:
http://tav.kiev.ua/~nick/mixw2/StarOffice%20MixW%20DDE%20test.sdw

Using DDE to pass QSO data to external loggers.
Here is a sample application to pass data to DXBase 2002 software (www.dxbase.com) http://www.dxbase.com.

Download Visual Basic source code and EXE file:
http://tav.kiev.ua/~nick/mixw2/Mix2DxBase4.zip.

(All Visual Basic EXE files require Visual Basic 6 DLLs to be present in your system.)



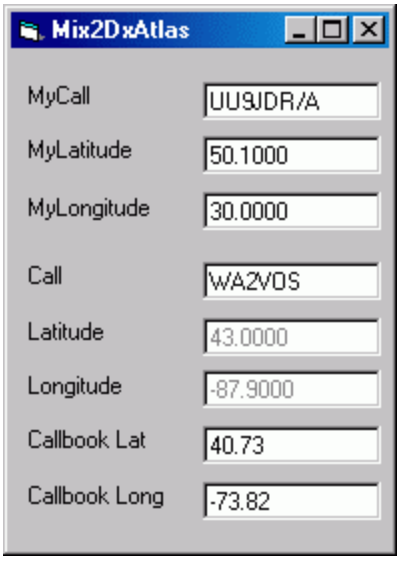
Click Send! button to send data to DXBase.

Or, create keyboard macro (for example, for F2 key):
Macro: F2

Label: Save
Text: <QSOCMDDDE:WRITE><QSOCMDDDE:>
Then use F2 to get the same result.
MixW also automatically generates <QSOCMDDDE:Send> when you press Save QSO button, and <QSOCMDDDE:Remove> when you press Remove QSO button.

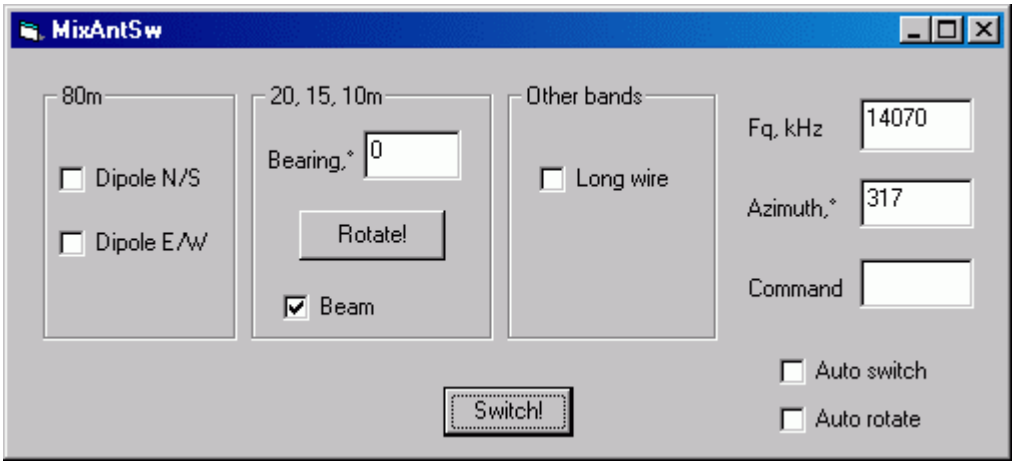
Using DDE to pass data to external maps.
Here is a sample application to pass data to DX Atlas software (www.dxatlas.com).
http://www.dxatlas.com/.

Download Visual Basic source code and EXE file:
http://tav.kiev.ua/~nick/mixw2/Mix2DxAtlas1.zip.



This sample program plots your own and other operator's position on the map. If you are using a callbook and it conains other operator's coordinates, they will be used instead of approximate ones calculated from his callsign.

Using DDE to switch/rotate antennas.
Download Visual Basic source code and EXE file:
http://tav.kiev.ua/~nick/mixw2/MixAntSw1.zip.



Suppose you have two perpendicular dipoles for 80m (North/South and East/West), a multiband beam for 20,15, and 10m and a long wire antenna for other bands.

This program demonstrates the possibility of automatic switching between all your three antennas

and rotating the beam.

Click Switch! button to switch the antennas depending on the current frequency (80m dipoles also depend on the azimuth).

Click Rotate! to rotate the beam to the other station direction.

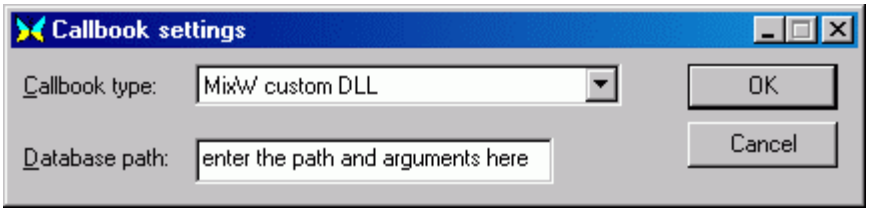
To initiate switching and rotating from MixW window, create two keyboard macros (e.g. F3 and F4):

Macro: F3
Label: Switch
Text: <CATCMDDDE:SWITCH><CATCMDDDE:>
Macro: F4
Label: Rotate
Text: <CATCMDDDE:ROTATE><CATCMDDDE:>

Now F3 will switch antennas, and F4 will rotate the beam.
Check "Auto switch" and "Auto rotate" to start switching and rotating immediately when the frequency or direction changes.

Custom Callbooks
Using external DLL driver, it's now possible to use callbooks not directly supported by MixW.

Writing callbook drivers in C language.
Download C++ source code and DLL file:
http://tav.kiev.ua/~nick/mixw2/MixCallBook1.zip.



Place MixCallBook.dll file to MixW directory. Then open Callbook Settings dialog and select "MixW custom DLL" as callbook type. Enter the database path and other data passed to the DLL (not needed in this sample).

This sample DLL does not contain an actual database and returns data only for UU9JDR (yes, megalomania). But it could be easily extended to support a real database file. See included C++ files for details.

Writing callbook drivers in Visual Basic.
Using a "bridge" DLL written in C language, it's possible to use Visual Basic ActiveX DLL as a callbook driver.

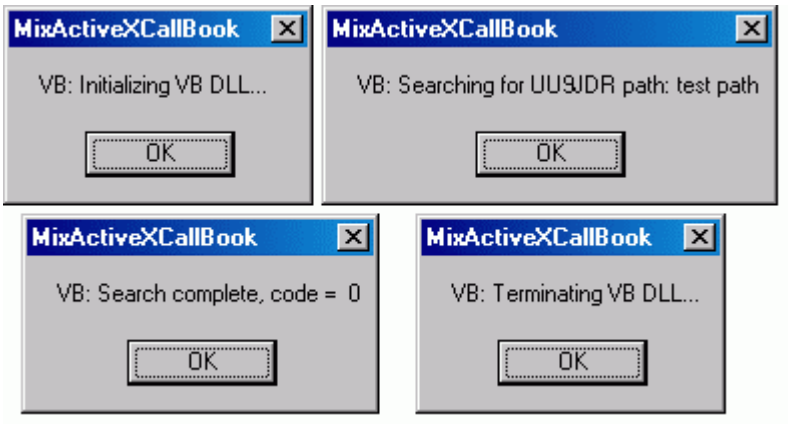
Download C++ and Visual Basic source code and DLLs:
http://tav.kiev.ua/~nick/mixw2/MixActiveXCb1.zip.

Copy both DLLS (MixActiveXCallBook.dll and MixCallBook.dll) from the ZIP file to the MixW directory, then register ActiveX DLL by typing

regsvr32 MixActiveXCallBook.dll

Now choose the "MixW custom DLL" as Callbook type in Callbook Settings dialog to activate the "bridge" DLL.

This sample Visual Basic ActiveX DLL opens MsgBox windows in response to initializing DLL, it's deinitializing, and callsign lookups.



It also returns data in response to searching for UU9JDR.

You do not need to modify the MixActiveXCallBook.dll written in C language. Add your code to three Visual Basic functions to support your callbook database, it's easy:

```
Private Sub Class_Initialize()
' Add your initializing code here
...
End Sub
Private Sub Class_Terminate()
' Add your terminating code here
...
End Sub

Public Function LookupCall(Path As String, Callsign As String, ByRef Info As String) As Long
' Add your lookup code here
...
End Sub
```

See sample Visual Basic project from VB directory of the ZIP file for details.

Searching at WWW callbook sites.
Howard, KH6TY suggested running Internet Explorer to open search page for current callsign.

Download the Visual Basic source code and EXE file:
http://tav.kiev.ua/~nick/mixw2/MixWebLookup2.zip.
.

This sample program automatically opens different callbook pages depending on the country of

callsign owner.

For Canadian calls, it opens the search page at www.rac.ca.
For Russian calls, www.octavia.com.
For any other calls, www.qrz.com.
To start search, enter a call into Call field in MixW, then click Search button in this program. To start search from MixW window, create the keyboard macro (e.g. F4):

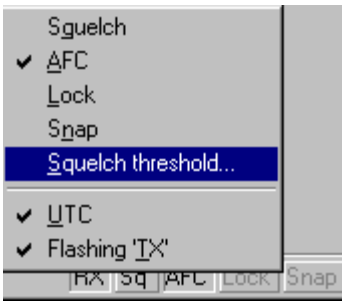
Macro: F4
Label: Search
Text: <QSOCMDDDE:LOOKUP><QSOCMDDDE:>
This program does not parse the page and does not fill Name or QTH fields. It only shows the whole page in it's window.

The Status Bar

The Status Bar is located at the bottom of the MixW screen. The information that appears on the Status Bar in part depends on the mode selected. For instance, IMD is only relevant in the PSK31 modes, while Connected or Disconnected is only relevant for Packet:

TX/RX: The left most box indicates either TX or RX depending on if MixW is in transmit or receive modes, and transmit and receive can be toggled by clicking on this indicator box.

Squelch (Sq) can be also be toggled on or off by clicking on the Sq box, and the threshold can be set by right clicking on the Status Bar and selecting "Squelch Threshold" from the Pop Up menu. as follows:



Clicking on Squelch Threshold pops up the following box:

As well as setting the Squelch threshold, AFC and Snap functions can also be set from this pop up box, and clicking in the status bar locations for each can also toggle these.

AFC, Lock, and Snap: These can also be toggled for the modes they are available for by clicking on their boxes in the Status Bar.

Frequency: The current audio operating frequency is indicated in Hz. This represents the offset from your transceivers frequency.

IMD: Clicking on the IMD box will freeze the IMD at the last observed value. Clicking on it again will activate the IMD reading again. If MixW appears to stop decoding, be sure the squelch threshold is not set too high. For reception of weak signals, it is usually best to turn the squelch completely off. This will result in "garbage" print some of the time, but whenever the signal becomes strong enough that copy is possible, the text will appear on the screen along with the garbage characters.

IMD is a measure, in dB, of the level of the first pair of unwanted sidebands (at +/-46Hz from the center-frequency) compared to the main pair of wanted sidebands (at +/-15Hz). The readout is accurate only when the signal is idling, and at that time, the emission is actually the same two-tone signal that is used for checking the quality of SSB transmitters, and the IMD dB figure is the same as the third-order intermodulation performance figure given for SSB transmitters.

IMD readings are only accurate, and only display when the station is idling, and there is not another

station very close in frequency, and when the S/N ratio of the received station is about 20 dB or greater. Typical IMD readings are -25 dB to -30 dB for a well-adjusted transceiver, and readings of -20 dB or worse indicate that the transceiver's extra sidebands can cause QRM to adjacent stations.

To record an IMD reading during idling, click the IMD window on the status bar, and the last IMD reading measured will be displayed.

Mode: The current operating mode is indicated in the box next to the IMD reading.

Date: The current date is displayed.

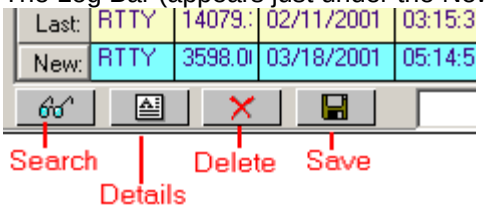
Time: The current time is displayed. By right clicking the status bar, you can select to display UTC or Local time.

MixW, Logging features and operation

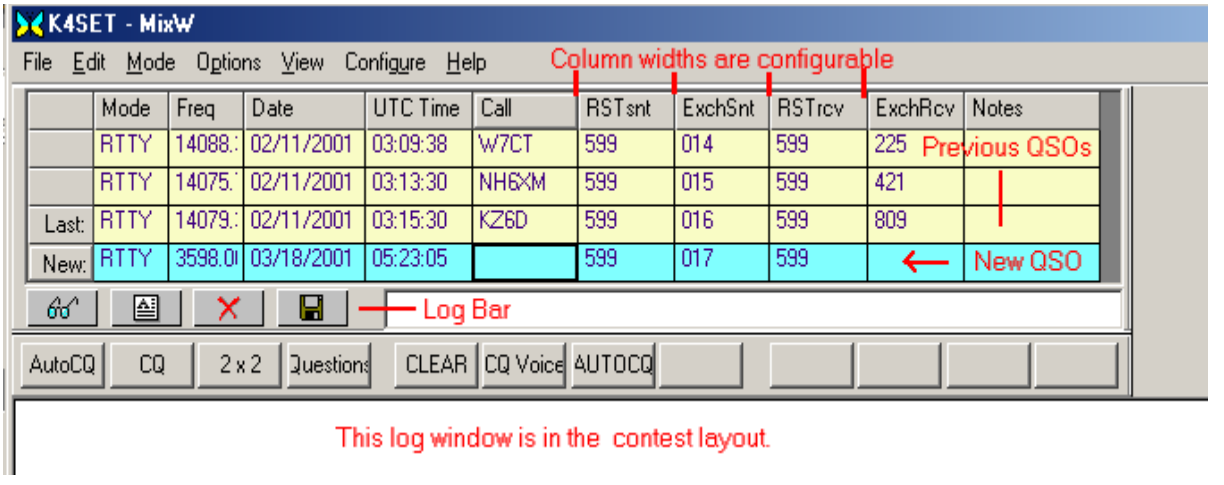
MixW's Logging features makes it easy to keep track of all your QSOs. The contest mode will track your contest progress complete with multipliers while automatically checking for DUPs and auto-increment serial numbers for exchanges. The normal mode can track your regular ragchewing and award hunting contacts.

You can easily switch between contest, normal, and custom log modes by selecting View | Log bar | | and selecting a Contest layout or Normal Layout, or Custom layout 1 or 2. To configure contest mode operation see Contes Operation

The Log Bar (appears just under the New QSO line) controls several log functions.



Search allows you to search the log for a callsign. Details will bring up the full log information for the selected QSO. Delete will delete the selected QSO, and Save will save the New QSO line to the Log:



The widths of the Log columns are configurable. Simply place your cursor between two columns in gray (title area), then clicking and dragging to the desired width.

To move from one log field to another, place your cursor in the desired field and left click the mouse.

A Call can be typed into the Call window or pointed to on the RX screen with the mouse, and double-clicked with the left mouse button. The call will be automatically copied in the Call window of the New QSO line.

For Roundtable operation, a second, third, etc. call may be appended to the Call window by highlighting the call and selecting "Add call" from the right-click menu. If this is done, all buttons using the <CALL> macro will also use the additional calls.

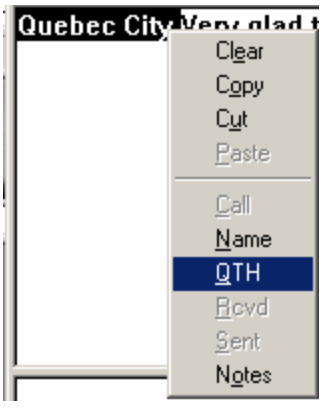
A Name can be typed into the Name window or pointed to on the screen with the mouse, and double-clicked with the left mouse button. This will copy that name into the Name window.

An RST may be entered into the Rec'd box by double-clicking on any three-number "word" on the RX screen.

Holding the CTRL key and double-clicking on a word will append that word to the QTH box. By holding down Shift and double-clicking each word of a QTH in turn, a multi-word QTH can be entered into the log without typing.

All boxes can also be filled in by highlighting the information on the screen, holding down the left mouse button, "dragging" the information into the desired box, and releasing the mouse button.

A box may also be filled in by highlighting the information, pressing the right mouse button, and copying and pasting the information into the desired box, or choosing a location from the displayed menu as shown here:



When the desired windows are filled in, pressing the Save icon button will save the information into the log, Pressing the Search icon button will search and display all log entries for any call desired, with the default call being the one currently displayed in the Call window. You can search the log for any character or string of characters, by typing in a string to be found and pressing the Search button on the search dialog and you can also display the entire contents of the log by pressing the "Display Whole Log" button.

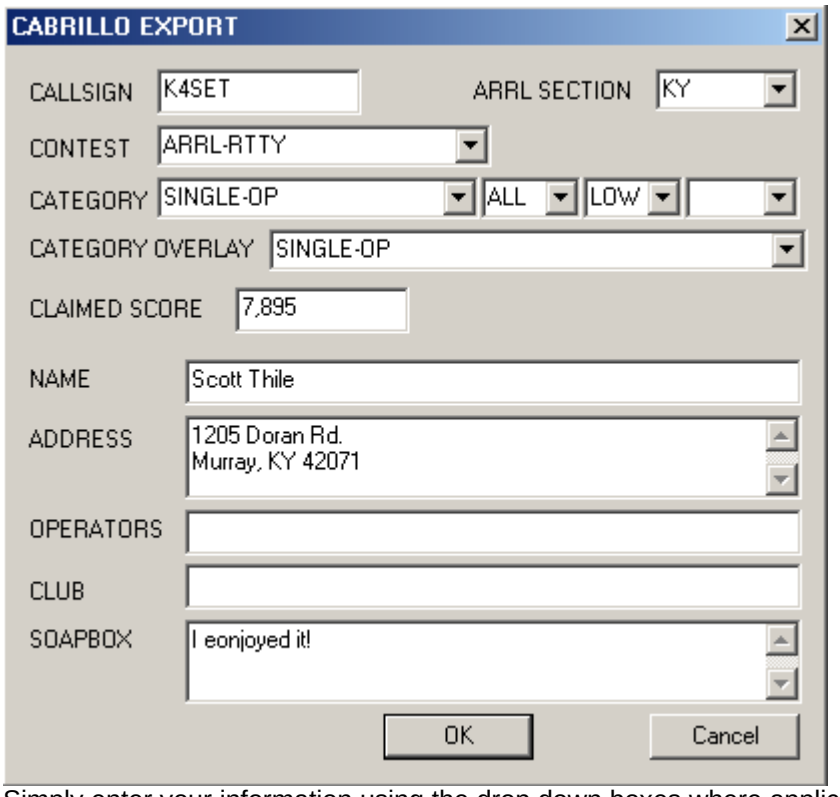
You can also use the <SAVEQSO> macro at the end of your sign off macro to automatically save the QSO to your log. See Configuring Macros for additional information.

Note: If you select a new callsign in the RX window before you have saved your QSO information, your "New" QSO line will be cleared and the new call inserted. To avoid the possibility of accidentally loosing a QSO this way, UNcheck "Clear QSO on new call" under the Options menu, then a new call will not clear the unsaved QSO. You can also restore and accidentally cleared or deleted QSO by selecting File | Restore removed QSO.

Printing and Exporting your log file.
To print the log, or a portion of the log, display the whole log by clicking on Search, then selecting Whole Log. Highlight the entries you wish to print and press the "To Text" button to export to a text file. Enter a file name and save the file. This file may then be viewed or printed by any word processor program, or if saved with an extension of .txt, by Notepad. To export to another Logging program repeat the print procedure but select the to ADIF button for exporting to the ADIF format, which is supported by most full featured logging programs. You can also export to the Cabrillo format, which is now required when submitting electronic logs for most contests.

Note: To export multiple QSOs, highlight ALL the QSOs you want to export at once, then export them. You can highlight multiple QSOs that are grouped together using Shift-mouse click. You can highlight multiple QSOs that are not all grouped together by using CTRL-mouse click. (These are the standard windows commands for selecting files etc..)

To export, first select all the QSOs you wish to export and click on the format you wish to export too. When exporting to ADIF you will be prompted for the filename you wish to export to. When exporting to Cabrillo format for contest entry you will be prompted for the information to be included in your Cabrillo summary statement as follows:



Simply enter your information using the drop down boxes where applicable. Your claimed score will be calculated for you based on your log information, but you should check this to make sure that the data are correct. When you're done here click OK and the Cabrillo Log will be saved. For more information on optimizing your contest log settings and Macros for contesting see Contes Operation

Note: Now you can also export to the CSV format and the Text formats. The text format has been changed. See the Search Results dialog.

Using the MixW program to create a QSL card to print or to email.
The MixW program provides a dynamic data exchange (DDE) link for use by other Windows programs such as MS Word and Excel. The data that is available can be used to create a QSL card by inserting DDE fields into a document that will be viewed as a QSL card in the final form. To learn more about DDE fields, go to the HELP files in your application that supports Windows DDE fields. The chart below shows the DDE code fields that are supported by MixW:

Entity	Server name	Topic	Item	Current state
Your call	MixW Info	MyCall	K4SET	
Your name	MixW Info	MyName	Scott	
Your QTH	MixW Info	MyQth	Murray, KY	
Program name	MixW Info	Program	MixW	
MixW version	MixW Info	Version	2.0 beta 21	
QSO date	MixW QSO	Date	28-Jan-2001	
QSO time	MixW QSO	Time	20:57	
Frequency, MHz	MixW QSO	Mhz	14.1	
Mode	MixW QSO	Mode	BPSK31	
Call	MixW QSO	Call	W8HAT	
Name	MixW QSO	Name	RICHARD	
QTH	MixW QSO	Qth	STEVENSVILLE MI	
RST sent	MixW QSO	RstSnt	589	
RST received	MixW QSO	RstRcv	589	
Notes	MixW QSO	Notes	Likes to fish	
QSO is unsaved	MixW QSO	Changed	NO	
QSO freq.	MixW QSO	Khz	14070	
Zero beat freq, kHz	MixW CAT	Khz	14070.000	

PTT state	MixW	CAT	PTT	OFF

To use these field codes in a QSL or for making mailing labels, you enter the field code in the document where you want it to appear. In MS Word 2000 you can add a DDE field by using Ctrl-F9, then fill in the field code. To view the results in the final form, use Alt-F9.
From the chart above, you would create "your call" with the following string of field code:
{DDEAuto "MixW" "Info" "MyCall" * MERGEFORMAT}. (The items in bold are from the above chart.) With some imagination, you can create your own QSL form or modify the form provided.

The following describes how to create a QSL card with MixW V2.X using the MS Word 2000 form provided with the program:

Step 1. Open the log entry that you wish to use for the QSL card. Either select the log entry from the MixW log window or use the Search feature to find it and then open it in the Edit QSO window.

Step 2. Make sure all the desired log entry fields for the QSL are entered into the log. Leave the log entry open while completing the remaining steps.

Step 3. Call up the QSL feature (to be decided) or find the appropriate .doc file in the MixW folder and open it in the MS Word program.

Step 4. Use the MS Word print function and your color printer to create a hard copy of the QSL card.

The following will describe how to create a graphical file of the QSL to attach to an email:

Step 1. Repeat steps 1, 2 and 3 above for creating the QSL card in MS Word.

Step 2. Select (highlight) the entire QSL card by Edit > Select All, from the tool bar.

Step 3. Copy the QSL card by Edit > Copy, from the tool bar.

Step 4. Open your favorite graphics editor (like Paint Shop Pro) and then Paste the QSL card into the editor by Edit > Paste as New Image. (Note, Paint shop Pro 4.0 is still available as shareware from the Internet.)

Step 5. Save the QSL card as a .gif file by File > Save as > CompuServe GIF file. Save it to a directory where you can retrieve it later as an attachment file to your out-going email.

Far additional information on using DDE to interface MixW with external programs see Using MixW with other programs, DDE

MixW Contest Operations

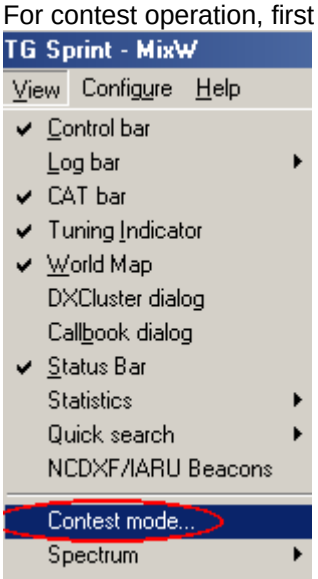
MixW version 2 offers extensive support for contest operation, including special Macros, as well as special logging features. It can be configured for specific contests, and these settings can be stored for future use.

The full list of configured contests is shown in the List of Contests dialog from the View | Contest Mode. This brings up the List of Contests menu. You may edit, delete, or add new contest settings from this dialog. The "Select" button sets the active contest from the list of contests. Specific DLL files for many contests are also available from Nick's website. When downloaded and installed in the Plugins subdirectory, these DLLs will keep track of your statistics for that contest, as well as enable MixW to automatically calculate your scores for inclusion in your electronic log submission.

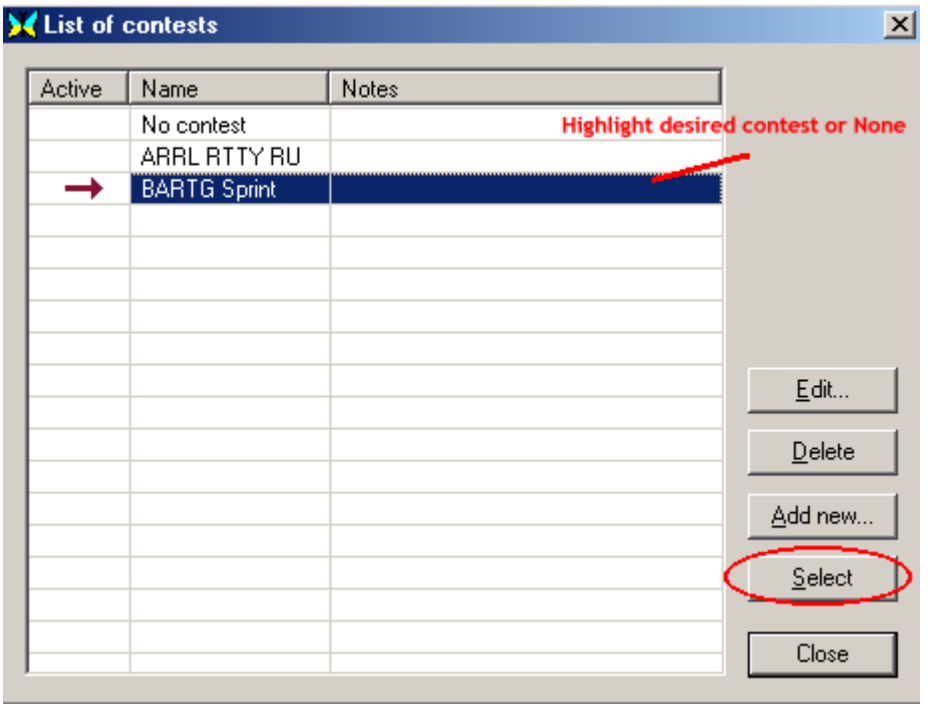
The contest mode is turned on or off from the View | Contest Mode menu. While In the contest mode, the Log Bar can be set to display exchange numbers instead of the name and QTH fields. To do this select View | Log bar | Contest layout.

The contest mode also allows you to check for previous QSOs made during the current contest only.

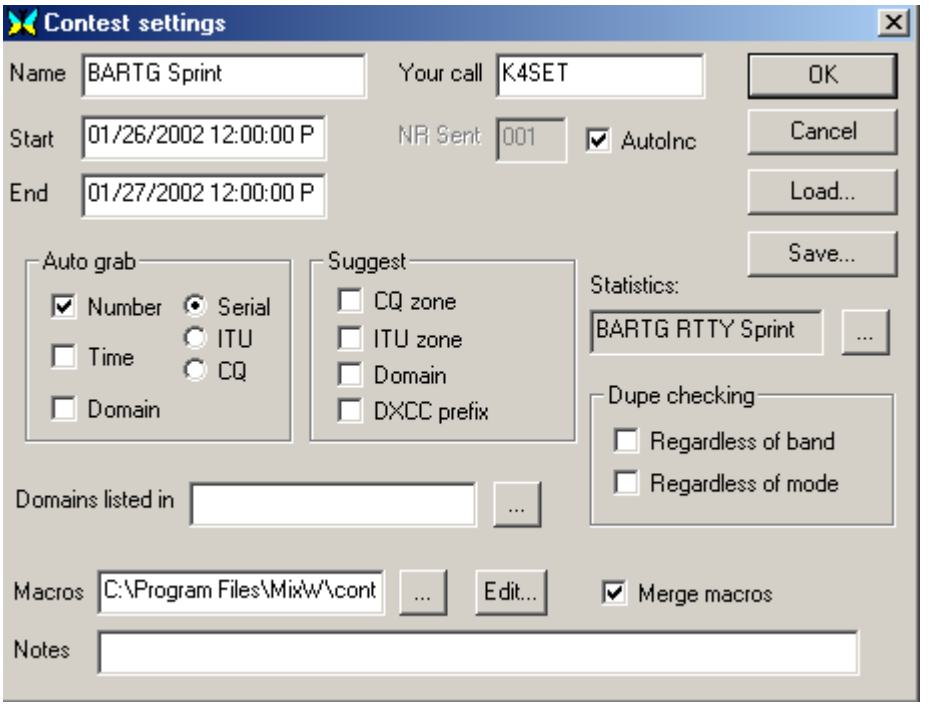
Configuring MixW's contest mode.
For contest operation, first switch to the contest mode by selecting View | Contest Mode:



This will bring up the following contest selection dialog:



Select the active contest by highlighting it and pressing the Select button. From here you can also add a new contest, edit an existing contest, or change the active contest. (Selecting none returns MixW to the regular "non-contest" mode) To edit a contest, simply highlight it and select edit. To add a contest, simply click on the add button. Either of these options will bring up the following edit contest dialog box:



Here you can configure the logging features to suite the times and rules of the specific contest you are operating, and these settings can be saved and recalled for the next time you operate this contest (or a similar one).

Name - This is the name of contest, which appears at the top of MixW window when the contest mode is active.
Your call - specify the call sign you want to use in this contest. All QSOs during the contest will be logged with this call.
NRS is the report you send. If it is a serial number, enter the number you want MixW to start with, and check the AutoInc box if you want MixW to automatically increment these numbers in your Macros and log.
Note: I found I had to check the AutoInc box, and then enter the first number manually in log bar to get this feature to work. If this specific contest requires a different type report, that can either be entered here, and simply leave AutoInc unchecked, or that can be added as text in your contest Macros.
Start is the start time of the contest.
End is the end time of the contest.

Note: Keeping track of the start and stop times enables MixW to know which QSOs count in the scoring and dupe checking.

If **AutoInc** is on, MixW automatically increments the number in the ExchSnt field of the previous QSO. If the previous QSOs has no number (such as at the very beginning of the contest) the number 001 is used.

If **AutoInc** is off, the **ExchSnt** field is just copied from the previous QSO. (The **NR sent** field from the Contest Settings dialog box is used at the beginning of the contest.)

The ExchSnt for the current QSO can be changed by typing another text in the pop up box that is displayed during the QSO.
.
Auto Grab - this feature allows auto-grabbing of serial numbers, time (such as for the BARTG contest) and states/counties/cantons/etc. from received data.

When the Auto Grab Serial number box is checked, MixW looks for strings that are likely to be a serial number and places them in the ExchRcv (exchange received) field of for the current QSO.

When the Auto Grab Time box is checked, MixW looks for time stamps like 2317 or 23:17 or 2317z or 23:17z, and places them in the Notes field. (This only works if the time does is not much different from the local computer's GMT time.)

When the other Auto Grab boxes are checked, MixW looks for a limited set of strings, which coincide with that type of data. Domains can also be checked and a .dom file (located in the Plugins directory) can be specified to determine where to place the data received. For instance:

A RUSSIAN.DOM file contains a list of Russian oblasts to grab automatically:

```
------------- start of file -------------
Ab = AB
Ad = AD
Al = AL
.....
(102 lines with oblast definitions)
------------- end of file -------------
```

Now both the received serial number and a grabbed domain are put to ExchRcv field of the log file.

DOM files use a simple data format compatible with N6TR software:

Each line consists of the left part, equal sign, and the right part. Lines without equal signs are ignored as comments.

The Left part is a domain name,

The Right part is a list of words to grab.

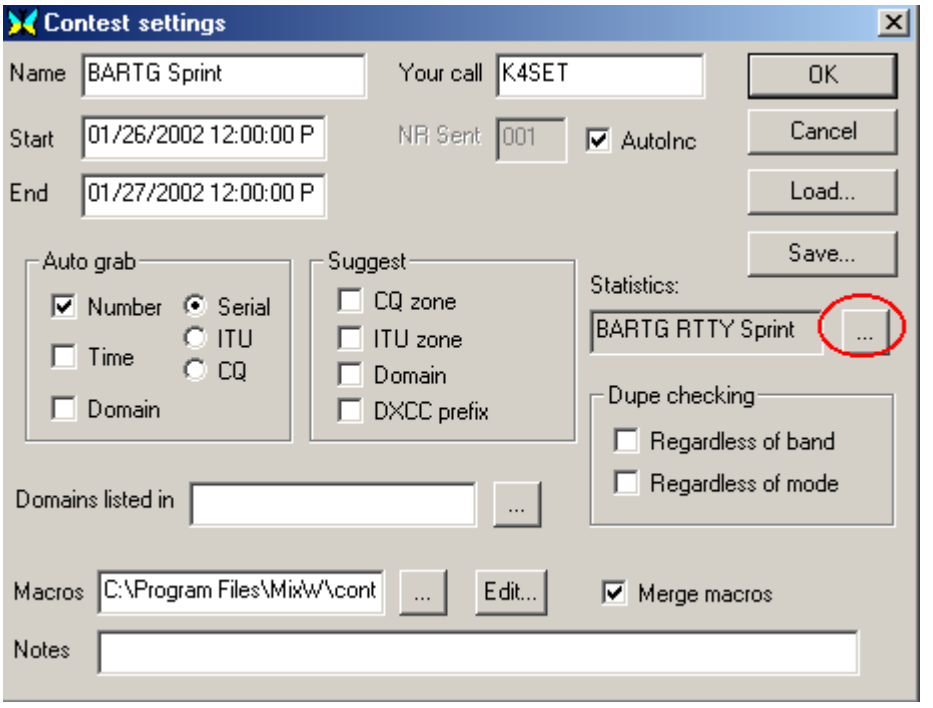
Samples:
Ab = AB
Cd = EF, GH
Ij = JKL, MNO, PQ, R

A DOM file can be specified for each contest with domains that you expect to encounter in that contest.

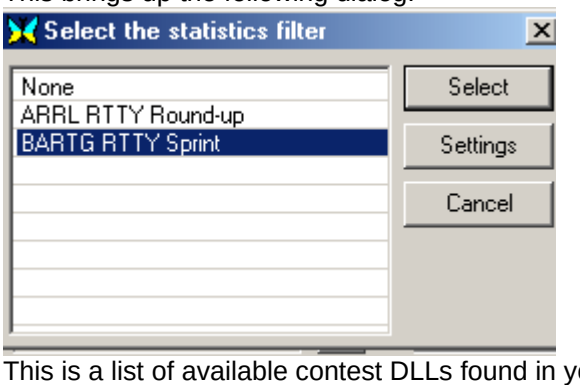
Statistics
First you must download the specific contest DLLs available from the following sites:
Nick's Site:
http://tav.kiev.ua/~nick/mixw2/
Scroll down to the Contest area of Nick's page, which currently lists the following DLLs (They are added before most major contests)
CQ WW contest statistics DLL:
http://ham.kiev.ua/~nick/mixw2/StatsCQWW.dll
TARA RTTY sprint contest statistics DLL
http://ham.kiev.ua/~nick/mixw2/StatsTaraRttySprint1.zip
ARRL RTTY Round-Up Contest statistics DLL
http://ham.kiev.ua/~nick/mixw2/StatsRttyRoundup1.zip
BARTG RTTY Sprint Contest statistics DLL
http://tav.kiev.ua/~nick/mixw2/StatsBartgRttySprint1.zip

Jim Jaffe also maintains a collection of contest DLLs, which can be downloaded by clicking here::
http://209.67.56.128/contestdll.zip

Once downloaded these files should be unziped into the Plugins directory, which is in the MixW folder. Next they are selected in the Contest dialog by clicking on the Statistics browse button:



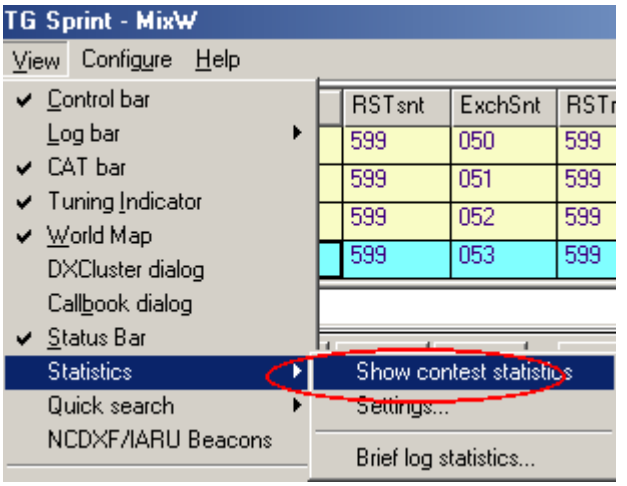
This brings up the following dialog:



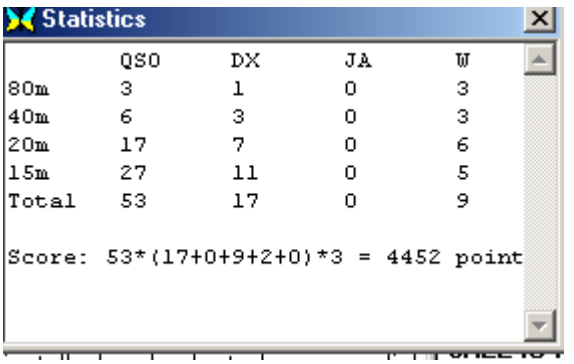
This is a list of available contest DLLs found in your Plugin directory. Simply highlight the desired contest DLL you wish to use for this contest and press the Select button. Some contests also offer settings options, which can be accessed from this menu as well.

With these DLLs installed and selected you can click View | Statistics - Show contest statistics as

follows:



This will allow you to see your statistics as you work the contest in the following box:



It's fun to watch your progress here as you work the contest. You can also view the Brief Log Statistics box for a more detailed view of your progress by selecting View | Statistics | Brief log statistics, which will display the following view of your progress:

Viewer

Print

Statistics for K4SET, contest: BARTG Sprint

Callsigns:

Band	Total	CW	SSB	DIGI	RTTY	PSK31	SSTV	WPX
80m	3	0	0	3	3	0	0	3
40m	6	0	0	6	6	0	0	6
20m	17	0	0	17	17	0	0	17
15m	27	0	0	27	27	0	0	24
Total	49	0	0	49	49	0	0	42

DXCC WKD/CFM:

Band	Total	CW	SSB	DIGI	RTTY	PSK31	SSTV
80m	1	0	0	1	1	0	0
40m	3	0	0	3	3	0	0
20m	7	0	0	7	7	0	0
15m	11	0	0	11	11	0	0
Total	17	0	0	17	17	0	0

Configuring the contest Macros

Macros - This is the name of file containing the individual keyboard macros for this contest (or blank space if no individual macros are used).

Merge Macros - if this check box is unchecked, macros from the specified file will be directly assigned to the Control Bar keys. If it is checked, the macros from the file will be merged with the macros for the current mode and/or the default MixW macros.

Notes This can contain any useful information describing this contest.

There are several special keyboard macros, which can be used in the contest mode:

<NRS> - sent exchange number
<NRR> - received exchange number
<CTIME> - contest time (BARTG contest) like "2317" (hours and minutes)
<ONQSOBEFORE:macro> - if we had QSO before, run specified macro.

Here are some example contest Macros, which will prove very helpful while using the contest mode:

If a station calls you that you have worked before in this contest (a dupe), this macro tells him you have worked before, and then clears the QSO information from the log.

Macro: F9
Label: QSOb4
Text: QSO before!<CLEARQSO><RXANDCLEAR>

Now, when you press F9, the other station sees the message "QSO before", and then the new QSO data is erased.

<ONQSOBEFORE:macro> can also be used (for example, inside the macro that answers someone's CQ) to automate the process:

Without automation:

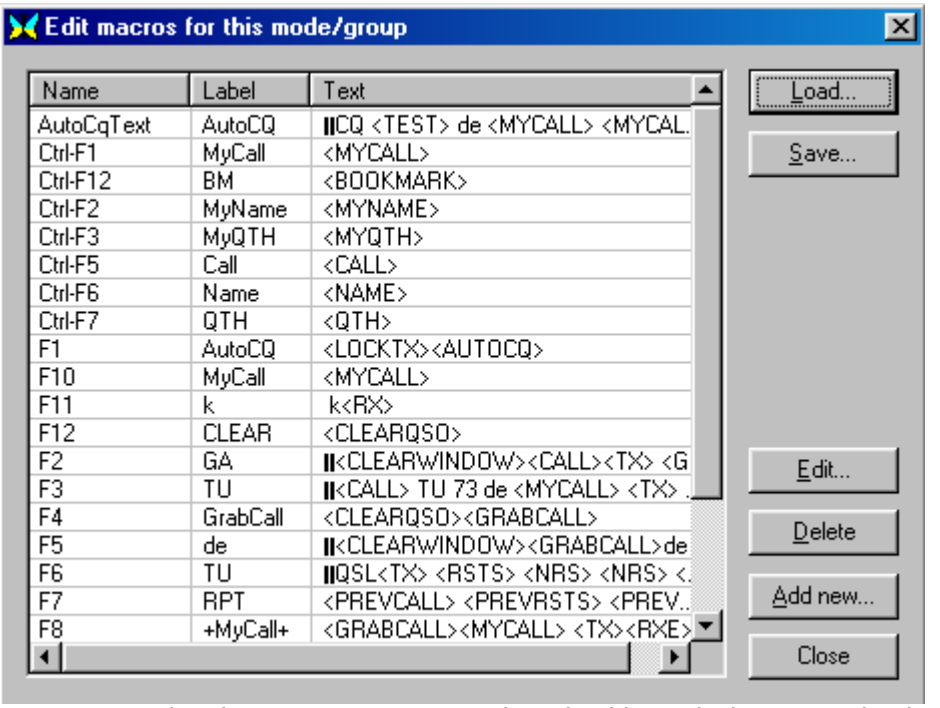
Macro: F5
Label: Answer
Text: <TX><CALL> de <MYCALL> 599 <NRS> <NRS> <RXANDCLEAR>
He sees " AB1CDE de UU9JDR 599 001 001 ".

With automation:

Macro: F5
Label: Answer
Text: <TX><CALL> de <MYCALL> <ONQSOBEFORE:F9> 599 <NRS> <NRS> <RXANDCLEAR>

In this case if you have not worked the station before they will see the above text. But if you have worked them before they will see " AB1CDE de UU9JDR QSO before! " and nothing more, because F9 macro with <RXANDCLEAR> at it's end and the "599 001 001" will not be sent.

We can configure Macros for a specific contest, but first we need to save the existing Macros to avoid loosing them and regretting it latter (ask me how I know about this!). Next, click on Save, and save the existing group as Basic. (You can skip this step if you have already saved the basic Macros). Now, let's load the generic contest Macros that come with MixW by selecting Configure | Edit Macros for this mode/group. This brings up the Edit Macro dialog box. Now we can load the default contest Macros that come with MixW by clicking on the Load button, then select the file "contest.mc". This will load the default Macros for contesting:



Now we can alter the Macros as we want them for this particular contest by double clicking on line (Macro) in this window, then edit them using the Edit Macro Window. For more information on editing Macros see Configuring Macros

As an example of contest specific Macros here is a suggested set of Macros for the CCCC contest.

Set one is for calling CQ in a contest:
CQ: (To call CQ in the CCC contest)
<CLEAR><TX>CQ CQ CCC Test
CQ CQ Test de <MYCALL> <MYCALL> k<CR><LF><RX>

AutoCQ: (Assigns AutoCQ to the above Macro for this contest)
<ASAUTOCQ><CLEAR><TX>CQ CQ CCC Test
CQ CQ Test de <MYCALL> <MYCALL> k<CR><LF><RX>

QRZ: (To ask for another call when you haven't copied the station calling)
<CLEAR><TX>QRZ? AGN Pse de <MYCALL> k<CR><LF><RX>

ANSWER: (To answer a call with your report)
<TX><CALL> de <MYCALL> Hello, ur <RSTS>-<NRS>-<NRS> k<CR><LF><RX>

REPEAT: (To repeat your report)
<TX><CALL> Agn ur <RSTS>-<NRS>-<NRS> k<CR><LF><RX>

CFM: (Confirms and calls QRZ and saves the QSO to the log)
<TX><CALL> QSL 73 de <MYCALL> QRZ? k <CR><LF><SAVEQSO><RX>

NOCFM: (To ask for your report again)
<TX><CALL> PSE AGN UR REPORT de <MYCALL> k <CR><LF><RX>

These two Macros are for answering in a contest:
CALL S/P: (To call the station currently in <CALL>)
<TX><CALL> de <MYCALL> <MYCALL> k <CR><LF><RX>

CFM S/P: (To confirm, give your report, and save the QSO)
<TX><CALL> de <MYCALL> TNX, QSL, ur <RSTS>-<NRS>-<NRS> 73 de <MYCALL> k <CR><LF><SAVEQSO><RX>

Note: Replace <RSTS> with 599 if you do not want to see the prompt for your report for each QSO, and would prefer to always use 599.

These can be altered to work in almost any contest. When your finished editing your Macros for this contest, consider saving these to a new Macro file so you can use them next time by clicking on Save, and then calling something related to this contest.

MixW, File Menu Items

The following selections are available from the file menu:
Print (CTRL-P) Prints the contents of the Receive window to the printer.

Print Preview: Displays an image of the printed page.

Print Setup: Displays a dialog for setting printer parameters.

Send File: Transmits the contents of a specified text file. This must be text only! Be sure to always "close" your file. The easiest way to insure this, if you create your text file in Notepad, is to always end the file by pressing the Enter key before saving it.

Run Script:

Search in log file (ALT-R): Searches for a specified text string in the log file.

QSO details (ALT-D): Displays a dialog of the current Log bar QSO details.

Remove QSO (Alt-O): Deletes the selected QSO.

Restore removed QSO Selecting will restore the last deleted QSO.

Save QSO data (Alt-A): Saves the contents of the Log bar.

Lookup call (Alt-K): Looks up the active call in the log.

Import ADIF: Imports a log from a different program in ADIF format.

Export ADIF: Exports a log in ADIF format.

Merge: Will merge two MixW2 logs together.

RX Log file: Opens or closes a file to save the receive window data.

Sound: You can save the last twenty seconds of audio to a wave file. This is useful in cases were you want to demonstrate certain audio characteristics. Files can be saved, and later played back for reception and display.

Exit: Exits MixW

Close RX log file: closes the active receiving log file.

Save last 20 seconds: saves the last 20 seconds of incoming audio for Sound History playback.

Import: Imports a log file in ADIF format into MixW.

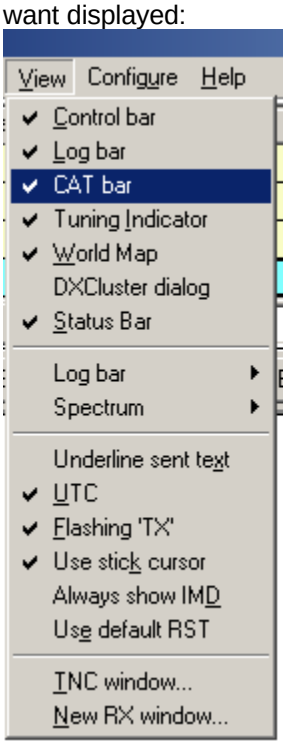
Export: Exports the MixW log file in ADIF format.

Merge: Merges a log file in ADIF format into the MixW log.

Exit: Quits MixW

MixW View menu, configuring your screen.

View is where you select which of MixW's various control windows and operating aids are displayed on the screen, and in several cases, how they are displayed. Simply select (check) the ones you want displayed:



Control Bar
When checked, the Control Bar will be displayed. The Control Bar may be moved and repositioned (docked) by pointing to an empty area of the bar, holding the left mouse button down, moving the outline of the bar until it changes shape, and then releasing the mouse button. The usual alternate docking location for the Control Bar is just underneath the Spectrum Window.

Log Bar
Gives access to several settings for contest logging, and log text colors.

CAT Bar
When checked, the CAT Bar will be displayed to aid in software control of your transceiver. (You must have the CAT operation configured and your transceiver interfaced to the PC for this feature to work. See Configuration for additional information.

Tuning Indicator
When checked, a phase display of the received signal will be displayed. This will display as multicolored radial lines, like spokes of a wheel, when MixW is not tuned to any signal. A diamond or a triangle near the display indicates the cursor signal that is being displayed. When tuned to a BPSK signal, there will be only two vertical, or nearly vertical, spokes displayed. When tuned to a QPSK signal, there will be two vertical spokes and two horizontal spokes forming a cross, and when tuned to a FSK31 signal, two horizontal spokes will be displayed.

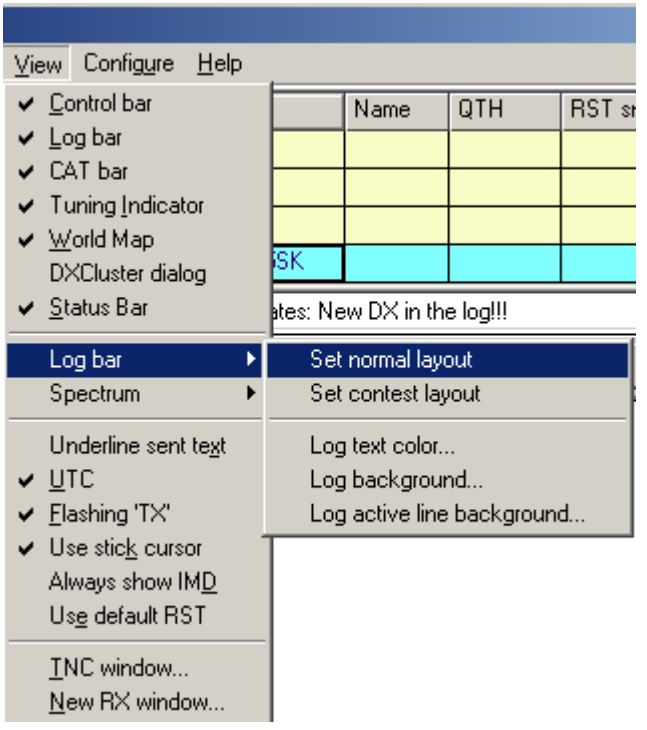
World Map
When checked the World Map will be displayed. Your station location will be indicated by a yellow dot in the location you configured under personal Data and a line will appear indicating the location of the incoming call signs. If you have configured MixW to use CAT Rotor control, the heading of your antenna will also be displayed, and it will move with your bearing when operated through MixW.

DX Cluster

When checked the DX cluster window will be displayed. This can be configured for packet or internet DX information (Please see DX Cluster for more information.

Callbook dialog
Note: For this option to work, a callbook must first be configured by selecting Configure | Callbook, and then selecting your callbook type and its path settings.

Status Bar
When checked, the Status Bar will be displayed. **Note:** Right clicking in the status bar will bring up additional display options. (Please see Status Bar for additional information).



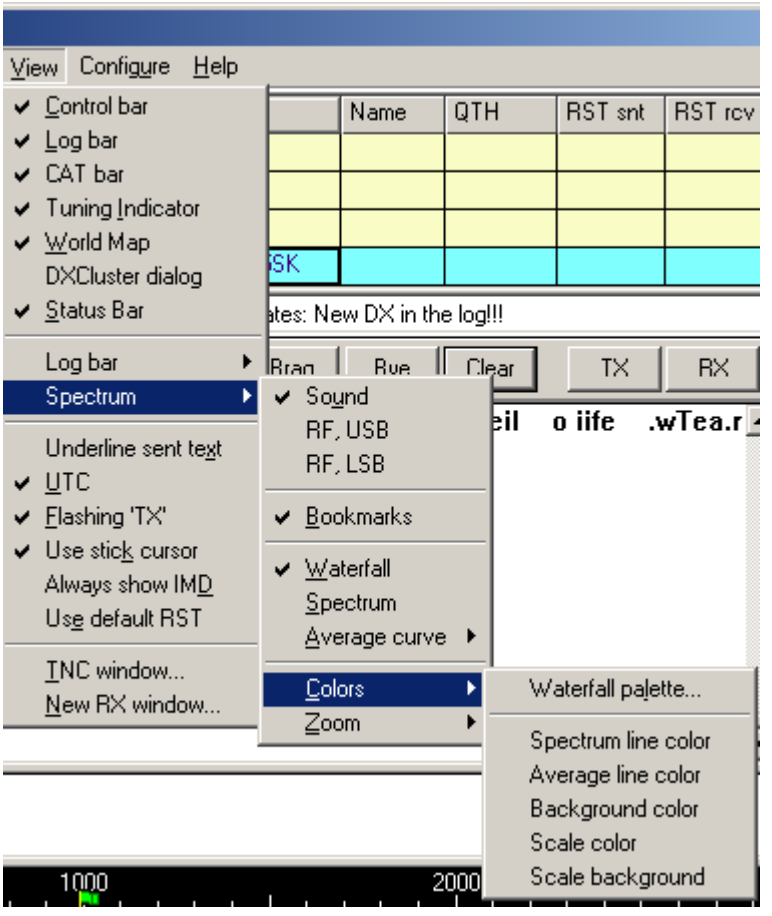
Statistics
Statistics give you display options for your contest statistics while in the MixW contest mode. (Please see Contest Operation for more information.

Quick search
The Quick Search dialog is for searching for incomplete callsigns.
Select View | Quick search | Show dialog. Next select your preferred method of searching from the options by selecting View | Quick search | <preferred method>. Now with the Quick search dialog selected you can enter part of a call sign into the new QSO cell of the Log Bar. Wildcards ('*' and '?') are allowed. Red ticks will indicate if you have already had a QSO (indicating a dupe) with this station (this will be according to the current contest settings).

NCDXF/IARU Beacons
Selecting this will bring up a dialog for you to automatically QSY your rig to the various beacons. The options reflect the active beacons based on Zulu time. Clicking on one of the active beacons will QSY your rig to that beacon's frequency, and set the mode to CW for decoding it.
Note: Your computer time must be set extremely accurately to use this feature, otherwise the list will not be in sync with the beacon timing. Also you must have the CAT feature properly configured to automatically QSY the rig. (Please see Configuration for additional information on using CAT).

Contest mode
Selecting this will bring up the contest mode dialog box for selecting, editing or adding contest settings. (Please see Contest Operation for more information.

Spectrum
Here you can change between the Waterfall or Spectrum displays as well change the colors, zoom, and RF markers. These can also be changed by Right Clicking in the waterfall or spectrum display windows.



Note: you can also change the speed of this display in the sound card settings dialog box. Select Mode | Sound Card settings. The faster speeds require faster computers. See Configuration

Displaying spectrum frequencies and Configuring for LSB or USB operations: The MixW options for RF, USB/LSB should be configured to reflect your mode of operation by selecting View | Spectrum | RF, USB or RF, LSB or Auto, or Sound. These must be set correctly in order for the frequencies in the displays to represent your actual operating frequencies, and for MixW to automatically adjust the inversion settings based on your RF mode.

Underline sent text
When checked, the text in the TX window will be underlined as it is transmitted. Transmitted text will also be echoed to the RX screen in a user-assigned color as configured under Configure | TX font color. The Underlining of sent text can be an aid to editing of the text that still remains in the buffer.

Word mode
Note: Selecting word mode prevents text from going to the transmit buffer until an entire word is typed in the TX window. This can be handy as it allows for editing a word in modes that do not support the backspace key, such as the RTTY and AMTOR modes.
Note: Word mode is only available when using the Underline sent text option as described above. Also, when using word mode, several Macros will require a space to be present after the Macro command itself in order for it to be sent to the TX buffer properly.

CAPITALS ONLY

Selecting CAPITALS ONLY will automatically convert any lower case characters entered in the TX window to upper case when sent to the TX buffer. This is handy for the RTTY and AMTOR modes, which only support upper case characters.

UTC
When checked, the time displayed on the right end of the status bar will be in Universal Coordinated Time, and when unchecked, will be in local time. If the clock of the host computer is set to UTC instead of local time, the Time Zone setting under Windows needs to be set to GMT and adjustment for "daylight savings changes" disabled.

Flashing 'TX'
When checked, the 'TX' indicator for transmit will be displayed on the status bar and will blink on and off. When unchecked, the 'TX' indicator will still be displayed, but will not blink.

Use Stick Cursor
Selecting this will turn the mouse pointer to a thin stick while in the waterfall display. This can facilitate placing the tuning diamond in the middle of a signal.

Show hairlines
Selecting Show Hairlines causes hairline tails to extend down from the tuning indicators (from the top to the bottom of the waterfall display). These can be an aid to tuning certain signals.

Always show IMD
Selecting this will display the IMD reading whenever receiving a PSK31signal instead of just during the idle tones. However, the idle tones are the best time to determine the station's IMD.

Use Default RST
Selecting this will send the default RST when the RST Macro is used, instead of asking for your RST report.

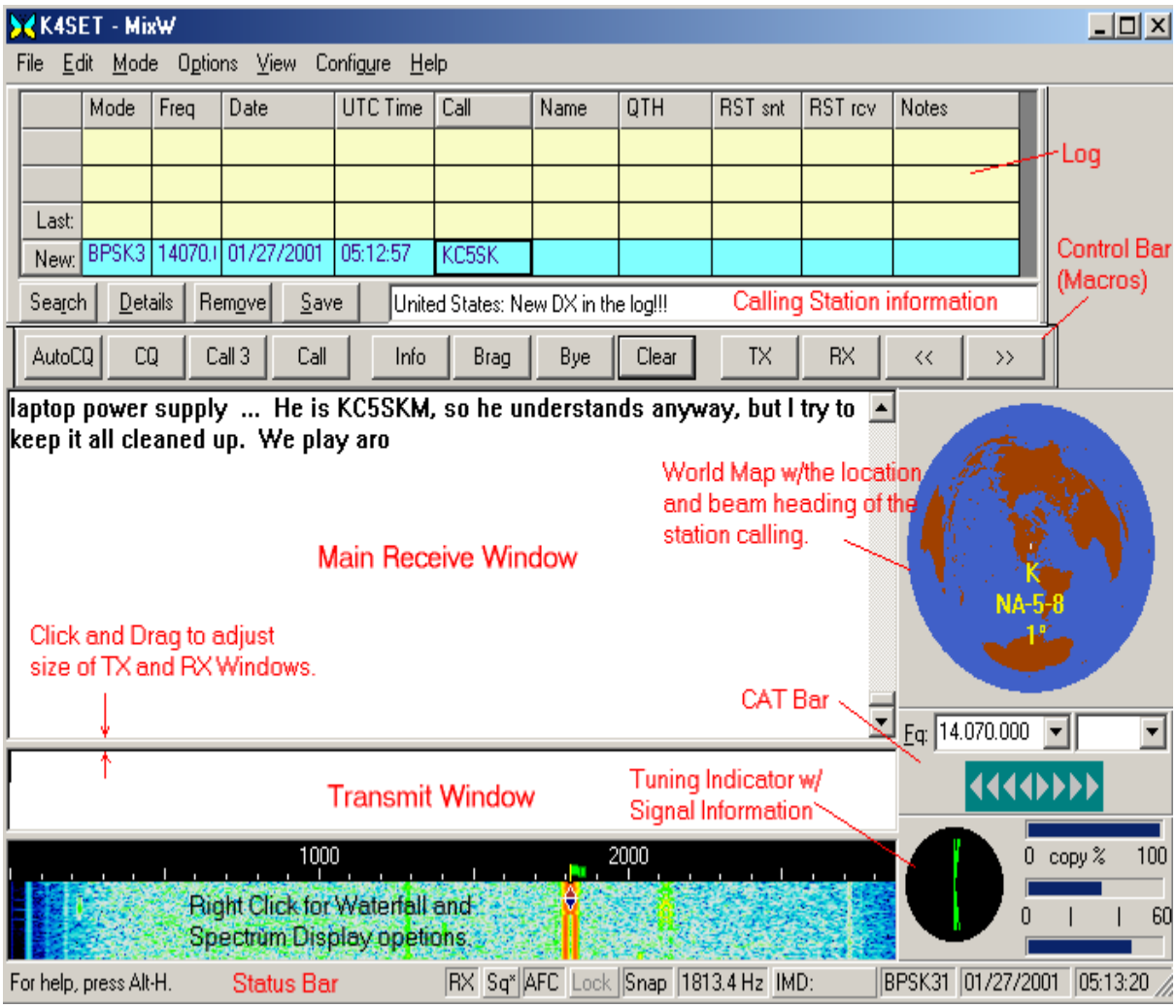
2nd TNC window
Selecting this option displays a 2nd TNC window. (Please see TNC Configuration and operation for additional information on using TNCs with MixW).

New RX window
Selecting this option opens a new RX window tuned to the same frequency as is currently active in the waterfall display.

Positioning and Sizing Windows
Pointing to a vacant space on the Control Bar, Log Bar, Tuning Indicator, or World Map and holding the left mouse button down while moving the mouse makes it possible to reposition and dock any of these features. An outline of the feature will appear when the mouse is first moved, and when that outline shrinks, it indicates a position where the feature may be docked by releasing the mouse button. The docked position of the feature will be remembered from session to session.

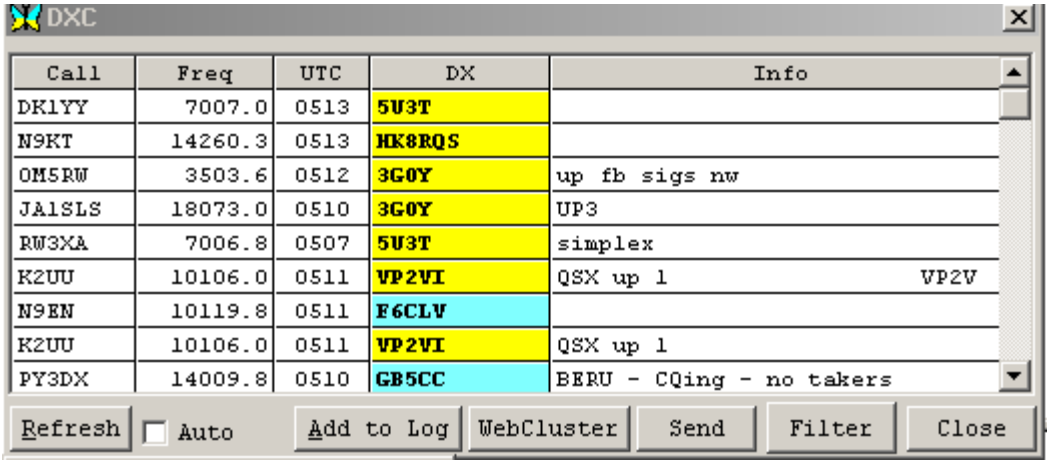
Pointing to a window separator will cause the mouse cursor to change to a small pair of parallel lines, and pressing the left mouse button and keeping it pressed will make it possible to resize the Spectrum, TX or RX windows. Releasing the mouse button will leave the window in the resized position. For single channel operation, there is a double separator between the TX window and the RX window. It is necessary to move the lower separator to resize the TX window, and not the upper one.

The following screen indicates one approach to screen layout using the various MixW displays:

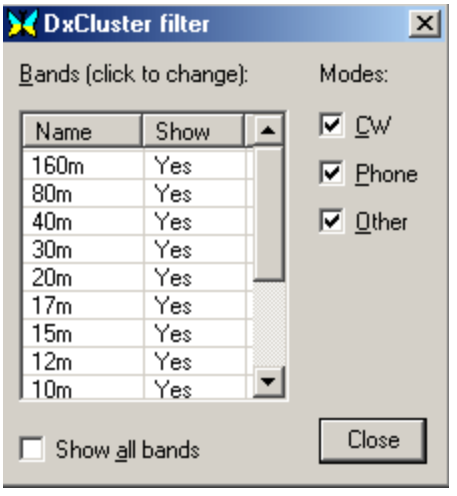

K4SET - MixW
File Edit Mode Options View Configure Help
Mode Freq Date UTC Time Call Name QTH RST snt RST rcv Notes
Last:
New: BPSK3 14070.1 01/27/2001 05:12:57 KC5SK
Log
Control Bar (Macros)
Search Details Remove Save
United States: New DX in the log!!!
Calling Station information
AutoCQ CQ Call 3 Call Info Brag Bye Clear TX RX << >>
laptop power supply ... He is KC5SKM, so he understands anyway, but I try to keep it all cleaned up. We play aro
World Map w/the location and beam heading of the station calling.
Main Receive Window
K
NA-5-8
1°
Click and Drag to adjust size of TX and RX Windows.
CAT Bar
Fq: 14.070.000
Transmit Window
Tuning Indicator w/ Signal Information
1000
2000
Right Click for Waterfall and Spectrum Display options
0 copy % 100
0 60
For help, press Alt-H.
Status Bar
RX Sq* AFC Lock Snap 1813.4 Hz IMD: BPSK31 01/27/2001 05:13:20

DX Cluster configuration and operation

MixW has a built in DX Cluster window, which can obtain data from either a Packet or internet DX Cluster. To activate this window select View | DXCluster dialog. This brings up the following window:

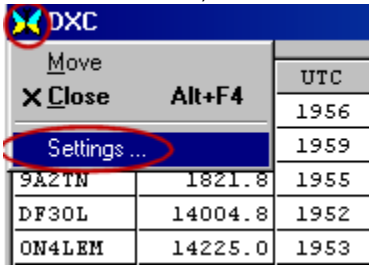


Clicking on Filter allows you to set just those stations your interested in as follows:

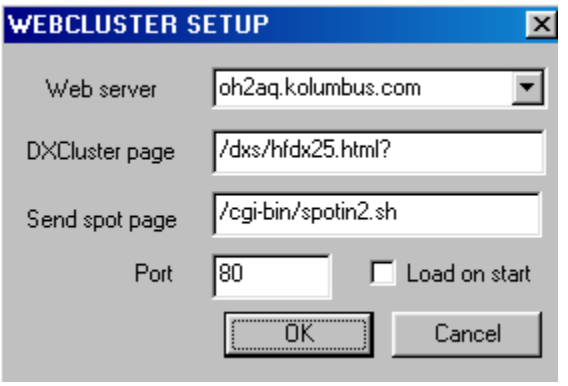


Packet based DXCluster: For the Packet DXCLuster to work you must have a packet TNC connected and configured. (This is doen by selecting Configure | TNC settings. see Configuration for more information). You can also write a script file to connect to your TNC to the packet DXCLuster of your choice. See TNC Configuration and operation for more information.

Internet based DXCluster, "WebCluster": Click on WebCluster to set the DXCLuster feature to use an internet based "WebCluster". The default WebCluster works well, but MixW can be configured to use any WebCluster of your choice. Simply click on the Butterfly (upper left corner of the DXC window, and then select settings as shown here:



This brings up the following dialog where your WebCluster choices can be configured:



MixW will automatically connect to the WebCluster if you check the "Load on start" box. Enter your other WebCluster information and click "OK" to save your settings.

The following colors indicate the status of each DX entry when compared against your Log:

Plain text/no color	This country worked on this band/mode (not needed)
Yellow Background	New Country for any band/mode (needed)
Blue Background	New DX on Band, New DX on Mode (needed)
Red letters in italics	QSO with this callsign before.

Configuring and Using Macros

Current as of MixW version 2.02 (more are added all the time) Jump to the Macro lists for Text Macros, Text using Files, Program Control, Frequency Control, Auto CQ, Macros control Macros, Mode Settings, RTTY Specific, SSTV Specific, CW Specific, Rotor Control

Note: I am interested in expanding this area to include examples of Macros. If you have ideas for this area, or Macros you think others might benefit from, please email me at scott.thile@murraystate.edu.

Macro commands in MixW can be combined with each other, or combined with text, to control many functions of MixW, or your CAT equipped transceiver. They can be used to reduce the need for repetitive typing. Macro commands must be typed in all capital letters. Text can be typed as upper or lower case. Lower case characters will automatically be converted to uppercase when transmitted for modes like RTTY and AMTOR, which only support upper case.

MixW now supports different Macro groups for each mode of operation, which can be automatically loaded when you switch modes (called "local" macros). You can also have different sets of Macros in files, which can be configured for specific types of operation. For instance, you can configure one set for contesting, and another for rag chewing. These can be custom configured, saved, and then reloaded from the Macro Configuration Window. To optimize Macros for contest operation see Contest Operation

MixW Version 2's Macro system is extremely flexible and powerful, however it will take a little time to understand how to configure them to best match your operating styles. Macros can be added or edited three different ways:

- By simply right clicking on the Macro button
- By selecting Configure | Default Macros
- By Selecting Configure | Macros for the mode...

MixW 2 Macros explained by Denis Nechitailov, UU9JDR (with minor editing by K4SET)
MixW 2 is supplied with a default set of macros. These macros are loaded from the "MixMacros.mc" file, which is located in your MixW directory, when MixW 2 is launched. This is the Default set of Macros used for all modes, meaning they are used regardless of which mode you're operating, unless you have configured specific mode macros that replace them.

You can choose another file to be your default macro file by selecting Configure | Default macros, which will bring up the complete list of default macros. Here you can add, delete, or edit each macro. You can also save this macro list to another file, or you can load a different list from a different file, which will then become your default macros. If you right-click on a key in the control bar you can easily edit just the single corresponding macro, without having a big full list. Each macro has a label which appears on the corresponding button in the Control Bar, and a text which is placed in the TX window when you select that macro.

There are two general ways to use macros. The simple way uses a single set of macros at any given time. This set (or file) can be changed as outlined above, or it can also be changed on-the-fly using a macro. This is done by using the <MACRO:filename> macro. For example, you might like to configure another set of macros for a different language. For instance, your F5 key macro (using the default MixMacros.mc for the English language), might be the following:

Macro: F5
Label: Name
Text: My name is Eugene.

While in the Spanish version (MixMacrosSpanish.mc), your F5 key may look like this:

Macro: F5
Label: Nombre
Text: Mi nombre es Eugenio.

And so on.

We can configure MixW to quickly change between the English and Spanish macro sets by configuring a macro to change which macro file is active. This is achieved by doing the following:

While using the English MixMacros.mc, at any unused key location (e.g. Ctrl-Shift-F1, for instance), place the macro:

Macro: Ctrl-Shift-F1
Label: Spanish
Text: <MACROS:MixMacrosSpanish.mc>
And in Spanish set (e.g. MixMacrosSpanish.mc),
Macro: Ctrl-Shift-F1
Label: English
Text: <MACROS:MixMacros.mc>

Now if you press Ctrl-Shift-F1 when you are using the English set, the Spanish set will be loaded (and vice versa).

Of course, this single default set of macros is not right for ALL the modes you operate, or for ALL situations. Sometimes, even switching macros by using the <MACROS:filename> macro does solve the problem. So, in addition to using the simple macro mode (single set of macros) MixW 2 is capable of using a secondary system (called the local system), which can integrate mode or contest specific macros into your default macros. This can also be used to integrate macros specifically configured for hardware TNCs.

Why does one need to use local macros? For example, you would not want to have a macro with the text RYRYRYRYRYRYRY on the screen in SSB mode, even though this might be very helpful in the RTTY mode. You would also not want to have your recorded voice calling "CQ CQ etc.." in the PSK31 mode, while this could be helpful in the SSB or FM modes.

Using the local macro system, MixW2 can automatically switch to a set of macros that you have custom configured for a specific mode, or even a specific contest (using the MixW 2 Contest Mode). MixW 2 can also automatically load TNC command macros (for instance, to switch baudrate "on-the-fly", etc.) when you use hardware TNCs.

For example, if you may want to use a separate set of macros for BPSK31. To do this, select the BPSK31 mode from mode menu, then click Configure | Macros for this mode... Then, enter the name of the file you want to use for this mode (e.g. BPSK.mc). Now, whenever you switch to the BPSK31 mode, you will have these special BPSK macros on the screen.

Note: The "Merge macros" item from the "Configure" pull-down menu tells MixW how you want the local and default macros to be merged. If this is left unchecked, you will see only the mode/contest/TNC specific macros. If you check the "Merge macros" option, you will see your local macros merged with your default macros. The default and local macros are merged using a simple rule: If a macro (for example, for the F5 key) exists in the local set (BPSK.mc in this example) it will be used. If not, the F5 macro from default set will be used.

Merging macros is very useful when you want to add just a few macros to the default set. For example, if the F2 key from the default set contains
<TX>
CQ CQ CQ de <MYCALL> <MYCALL> <MYCALL>

You might like to define an F2 macro for the RTTY mode like this:
<TX>
RYRYRYRYRYRYRYRYRYRYRYRYRY
CQ CQ CQ de <MYCALL> <MYCALL> <MYCALL>

Most likely, the same local macro files can be used for the BPSK31, QPSK31, and the FSK31 modes. RTTY and AMTOR can also share the same local macro file, and the phone macros for SSB, AM and the FM modes can be shared as well.

You can edit these local macros through Configure | Macros for this mode (this will load the full list of macros). When you are using separate macros for each mode (or for a groups of modes), right-click on one of the keys on the Control Bar to edit this macro. This will show the same Edit user

macro dialog box, but now you can choose if you want this macro to be used for the current mode by selecting "For this mode", or it can be set to use it as a default macro for all modes by selecting "Default for all modes".

Suppose you don't have separate macros for RTTY yet, and you want to add RYRYRYRY for the RTTY mode only (as shown in the example above). Here is how to do that:

1. Switch to the RTTY mode (from Mode menu).
2. Go to Configure | Macros for this mode, and then enter name for the RTTY mode macro file (e.g. RTTY.mc). If there is no file by that name yet, when you press the Edit button at the Filename for RTTY macros dialog, you will be asked if you really want to make a new file. Say yes. At the RTTY macros dialog, you can add the F2 macro, but close the dialog and press OK on Filename for RTTY macros dialog.
3. If the "Merge macros" option from Configure menu is disabled, you will see the blank keys on the Control Bar (that is because you are using separate macros for RTTY, but no macros have been defined yet). Now, enable "Merge macros" from the Configure menu. Now the Control Bar shows the default macros.
4. Right-click the F2 key and select "For this mode" in the Edit user macro dialog box. Then add the "RYRYRYRYRYRYRYRY" line and press OK.

You now have RYRYRYRYRYRY line on the F2 key while using the RTTY mode, but not in any of the other modes.

To delete a local macro; the macro we just made for the RTTY mode for instance, open the Edit User Macro dialog for the F2 key while in the RTTY mode (it now indicates "For this mode"), and clear the macro with the Clear button. Press OK and now F2 macro with RYRYRYRY is deleted from RTTY set.

TNC Macros: When using TNC, the TNC's own file (it's name is entered into TNC Modes dialog from Mode | TNC modes settings menu) is used as a local macro file. Merge Macros can also be used if you want to merge TNC's macros with the default macros. For additional information on TNC operation see
TNC Configuration and operation.

Using macros with TNCs: TNC operations in MixW 2 are based on two general principles:

1. TNC works in terminal mode (not host mode).
2. TNC state (mode, baudrate, TX/RX state, etc.) is controlled by using macros.

Usually you will have different sets of macros for different modes on the same TNC, and there are several steps that should be done for each set. First, you must define the macros to initialize the TNC and place it into the mode you want to operate (and de-initialize it at the end of mode).These two macros are used for this purpose:

OnStartMode
OnEndMode

For example, to operate PACTOR using a KAM+ TNC, you may define them like this:

```
Macro: OnStartMode
Label: Start (or whatever you choose)
Text: <HIDETEXT><AUDIOFQ:2200>
<SHIFT:200> <CTRL-C>X
PACTOR
<SHOWTEXT>

Macro: OnEndMode
Label: End (label does not matter)
Text:
<HIDETEXT><CTRL-C>X
<SHOWTEXT>
```

The first macro sets the center audio frequency and shift to draw the cursor at Waterfall/Spectrum

window, then it sends "Ctrl-C" and "X" characters to TNC (to make sure it's placed into command mode), and then sends "PACTOR" command to place TNC into PACTOR mode. The second macro just places TNC into command mode. After defining OnStartMode and OnEndMode macros, re-define the TX and RX macros that are used to make TNC transmit or receive. For PACTOR using the KAM+, they may look like this:

Macro: TX
Label: tx (label does not matter)
Text: <HIDETEXT><CTRL-C>T<SHOWTEXT>

Macro: RX
Label: rx (label does not matter)
Text: <HIDETEXT><CTRL-C>E<SHOWTEXT>

The first macro sends "Ctrl-C" and "T" characters (to transmit), and the second one sends "Ctrl-C" and "R" to receive. And now if the <TX> or <RX> macros are used in any other macro, like F2 with "<TX>CQ CQ CQ...<RX>" text, then by pressing F2, the TNC will transmit "CQ CQ CQ..." and then go back to receive.

Other macros to connect, disconnect, etc. can also be defined using these methods.

Contest macros: You might like to have another set of macros (with short "CQ CQ TEST" serial numbers etc..) for contests. At the Contest Settings dialog (choose a contest from View | Contest mode | then highlight the contest and select the Edit button) then enter a name of the Macro file you want to use for this contest (and also check the Merge macros check-box).
Now, a combination of 3 sets of macros is used: macros for the specific mode, macros for the specific contest, and your default macros. Contest macros are only active when View - Contest mode - On menu is
checked. For more information on using MixW 2 for contesting see Contest Operation.

Configuring Additional Macro Keys: There are several keys which can be used for containing macros as well as the function keys, but they are not shown on the control bar, so these keys can only be edited through the full list (either the default list, the macros for this mode list, the TNC macros list, or the contest macros list).

At the Edit User Macro dialog, select (or enter) the hot key name in the Macro field. There are 5 additional keys that are supported now:

Ins
Gray+
Gray-
Gray*
Gray/

Please note that these names are case-sensitive.

The "OnStartMode" and "OnEndMode" macros are executed when you start or end a mode. For example, if you have the separate set of macros for SSB, you can define OnStartMode to turn on a Notch filter, and OnEndMode to turn it off. Now if you switch to SSB, the filter will be automatically turned on.

Calling a macro from a macro: It's also possible to call a macro from another macro. For example, if you have the following configured in the F2 key macro:

<TX>
CQ CQ CQ de <MYCALL> <MYCALL> <MYCALL>

You might like to use this same text for your Auto CQ. To do this, just place <F2> in the Auto CQ, instead of the Auto CQ text. Now AutoCQ will play the F2 text. You cannot call a macro from itself, however, if you try
you will be warned about this when you try to run it. Moreover, you may call a macro anything you want.
For example, you can define a macro like this:

Macro: POWER
Label: (Anything you choose, it will not appear anywhere).
Text: 40
(This will not be shown on the Control Bar because it is not assigned to a specific key)
Now, this is used with the other macro as follows:
Macro: F6
Label: Brag
Text: <CR>The power is <POWER> <POWER> watts.<CR>
This uses the value that is entered into the POWER macro, and inserts it into the text for the brag macro. To change the power macro on-the-fly, choose an unused key (e.g.Ctrl-Shift-F2) and fill it with <EDITMACRO:name> like this:
Macro: Ctrl-Shift-F2
Label: myPWR
Text: <EDITMACRO:POWER>
Then if you press Ctrl-Shift-F2, it will bring a dialog box with the value 40 in it. Replace the 40 with 20 (for instance) and press OK. Now your F6 key will yield the following:

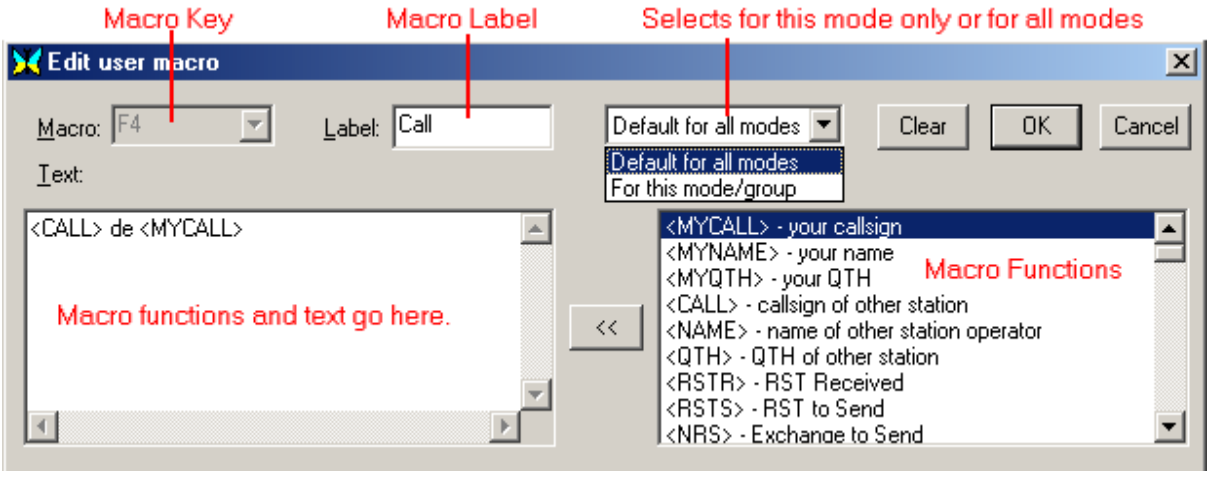
power is 20 watts

The following instructions were written before receiving Macro information from Denis Nechitailov, UU9JDR. I am leaving them here in case they prove useful.

Simplified Macro editing instructions with graphics:

Let's start with simply changing the first group of Macros (The F1 through F12 Macros are represented as clickable buttons just under MixW's main menus):

Depressing the F1 through F12 function keys will also activate the Macros. To change the F1 through F12 Macros, simply right click the buttons, which brings up the following dialog:



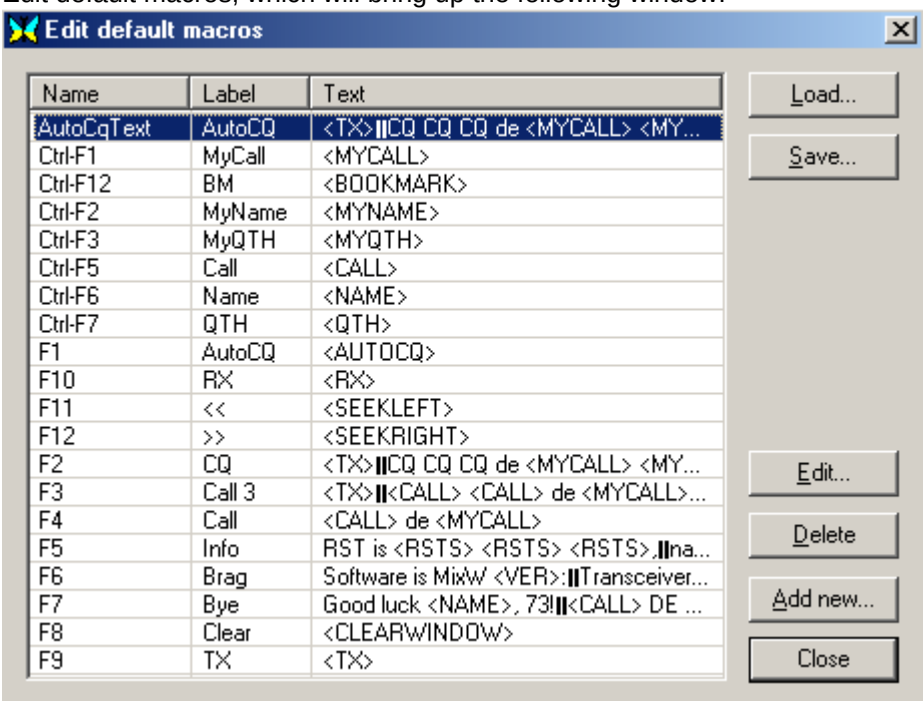
We can now edit this Macro's Label, as well as its text and functions. All edit functions are available from this edit window with the exception of the Key assignment (It is assumed you want this to be the key you right clicked on to bring up the window). As you can see, we have a convenient list of Macro functions and short explanations in the box on the right. Simply highlight the desired function and click the double arrow to move it into the desired location in the Macro text box. This simple example in Macro location F4 is named "Call". And will return the standard 1 X 1 call sequence. For this Macro to work, there needs to be an active callsign in the Call box of the New Log line. This can be entered by simply double clicking on the call sign of the received text of a station calling CQ. If no station is active in the <CALL> field, then a dialog box will pop-up when you attempt to activate

the Macro asking for the callsign you wish to insert here.

Control Macros can be modified to increase the automation of MixW. For example, the Call Macro above can automatically toggle MixW between transmit and receive modes by placing <TX> as the first command and placing <RX> as the last command, so Call would read, <TX><CALL> DE <MYCALL> K<RX>. In this example, pressing F4 would cause MixW to go into transmit mode, send the other station's call once, followed by DE, send your call once, followed by "K" and then automatically return to the receive mode. Selecting "This mode/group", will make this Macro available only for the currently selected mode or group. Selecting "Default for all modes", will make it available from all modes and groups.

Some Macros will be useful for all modes and operations. These should be set for "Default for all modes". Others are mode or operation specific and should be set for "This mode/group".

Clicking the Macro buttons in conjunction with the CTRL, Shift, or both CTRL-SHIFT keys can activate the other Macros. Notice that the Button Labels change to represent the labels you have selected for these sets of Macros when you press the CTRL and Shift keys. These Macros can also be edited by Right clicking while holding down the CTRL, Shift, or both CTRL-SHIFT keys and then clicking the buttons. All edit functions are available from the Right Click edit window with the exception of the Key assignment, which is grayed out. In order to be able to change the key assignment for an existing Macro we can call up a different Edit Window by clicking on Configure | Edit default macros, which will bring up the following window:



Double Clicking any of the Macro lines in this Window will bring up the Macro edit window. You can also Load and Save this list to a file for later recall. This gives you unlimited use of Macros for each mode as well as every type of operation. Each group has a potential for 48 separate Macros assigned to specific F-keys and buttons, and there are another 5 available under "other Macros" as well. MixW can also auto load separate Macros for the different digital modes. This makes the use of application specific Macros almost limitless.

Favorite Macros from the MixW version 2 beta test team, and others who have written in:

From Richard "Griff" Griffin, NB6Z
"SK"
<CALL> de <MYCALL> SK at <TIME><CWID><RXANDCLEAR><SAVEQSO>

"BTU"

BTU <NAME>... <CALL> DE <MYCALL> K <RXANDCLEAR>

"CALL"
<TX><CALL> <CALL> <CALL> de <MYCALL> <MYCALL> <MYCALL> K
<RXANDCLEAR>

"RST"
Thanks for report from <QTH>; you are <RSTS> <RSTS> here in
<MYQTH>.

From Nick Fedoseev, UT2UZ

Use <LOCKTX> in CQ macros:
<LOCKTX><TX>CQ CQ CQ de <MYCALL> <MYCALL>
<RX>
Use <UNLOCKTX> in Search/Pounce macros:
<UNLOCKTX><TX><CALL> <CALL> de <MYCALL> <MYCALL> <MYCALL> pse k <RX>

While calling DX in pileups I need to send my call several times (from
one to five times. I use following macro:
<MYCALL> <TX><RXE>
If I press according button four times, MixW transmits
"UT2UZ UT2UZ UT2UZ UT2UZ " and switches to RX.

From Dick Thompson, WB0DUL
Many time, we all type something like "Well Scott, the temp here is 60 degrees F and is supposed to stay that way for..." and so on.

I programmed my F12 key to display ºF when I hit it. So When I type in the number 60 (or whatever it may be, it looks like this:
Well, Scott, the temp here today is 60ºF and....

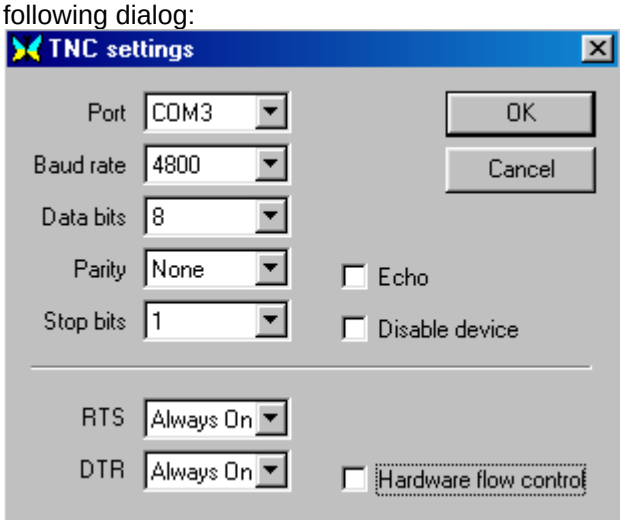
To do this, choose an empty macro. Put the cursor in the text box. Then, while holding down the Alt key, hit 0186 on the "keypad". The º will appear. Just type the F (or C for centigrade) after it, name the Macro Temp and save it. Just hit that key (in my case the F-12 key) when you want to insert ºF or ºC after a temperature.

This topic will be expanded with additional Macro examples.
If you have ideas for this area please email me with help and comments at scott.thile@murraystate.edu.

Setup Instructions for TNC Operation, **RICHARD B. GRIFFIN, NB6Z**

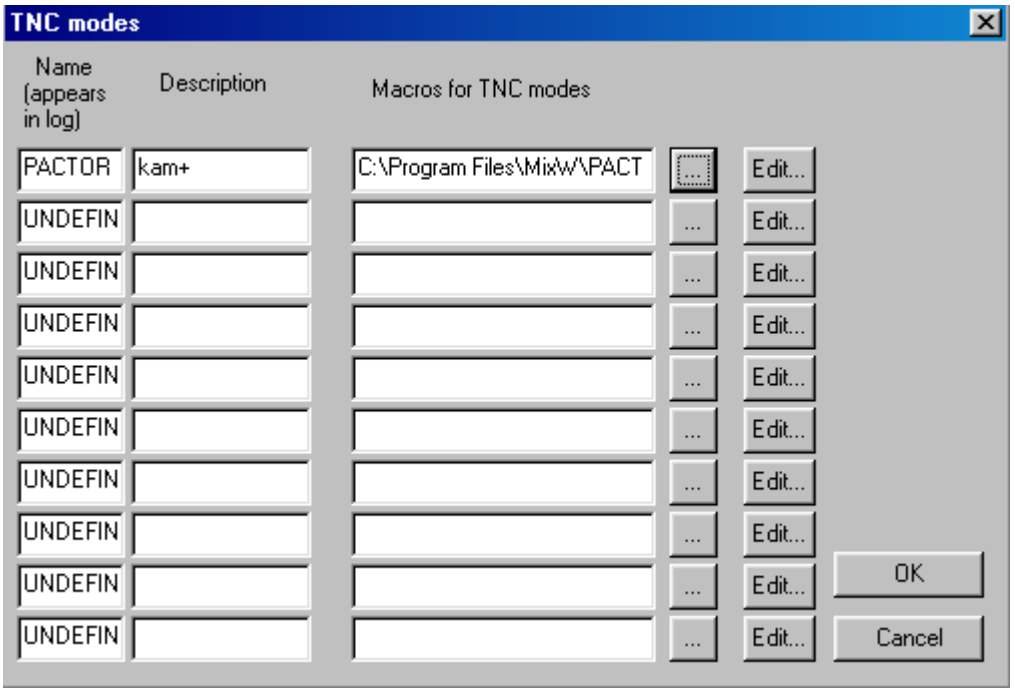
TNC operation is accomplished with MixW by providing a communications link between the PC running MixW and the TNC. The PC will act as a "terminal" to send commands to the TNC and display characters sent from the TNC. In this configuration the TNC will be operated in the "command" mode and not in the "host" mode, as would be done if a "host" program like XPWin or KaGold were being used. It will be necessary in command mode operation that the appropriate commands be used to correspond with the model of TNC being used. The command structure for your TNC should be available in the Operators Manuel provided from the TNC manufacturer.

Under the CONFIGURATION menu in the tool bar, you will find the TNC settings menu that you will use to setup communications to the TNC. Select Configuration | TNC Settings, which brings up the following dialog:

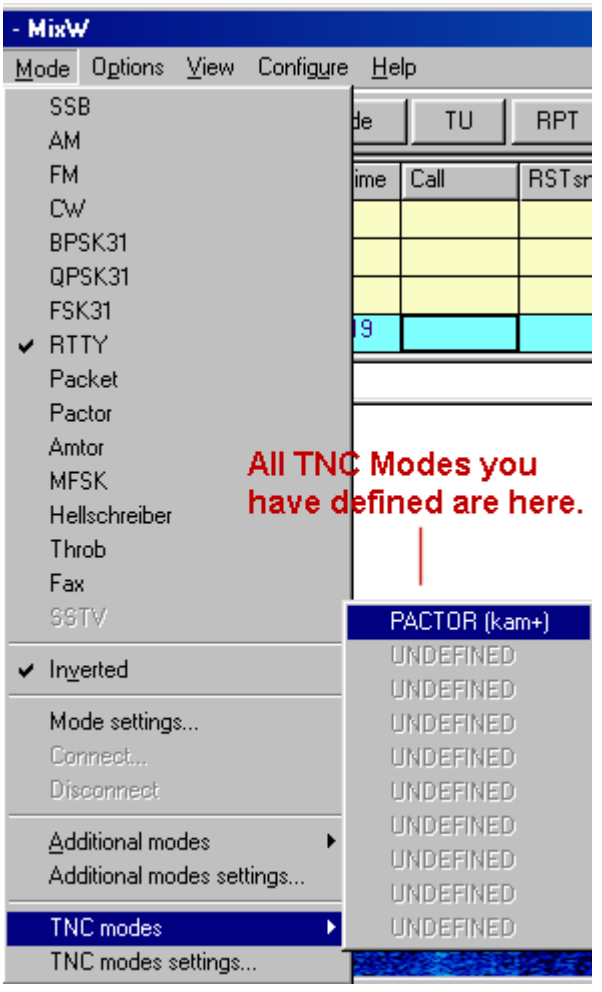


These settings will be the same as you were previously using with your TNC or you must refer to the TNC Operators Manuel for the comport setup information. You will have the option to "echo" back to your screen all commands if so desired. The recommendation is to leave ECHO unchecked.

A TNC macro file that you create with the extension ".mc" must be available on your PC. This file will be read by MixW to setup all command macros and to initialize the TNC for the specific mode chosen. This file is very important and you will want to customize and duplicate it for each of the TNC modes that you wish to operate. This file will contain strings of commands that are unique to the MixW program and to your model of TNC. The first four strings of commands will start the TNC in the appropriate mode and tell MixW how to control your TNC. The remaining strings will setup the macro buttons (keys) that appear on your screen to control the TNC operation and to send "brag" files. When the macro file is ready for use, you will go to the MODE menu in the tool bar and find the TNC modes setting menu. Select Mode | TNC mode settings, which will bring up the following dialog:



You will select the macro file and give it the name for the mode that it represents. This will be the mode name that appears in the log entry and in the TNC mode selection menu. To start a TNC session, you will go to the MODE menu in the tool bar and select the appropriate TNC mode as you have named it as follows:



To view, create or modify a macro file, use an ASCII editor like NOTEPAD. Use the file this way only with the MixW program not running. You can also create user selectable macros within the program by the normal manner of right clicking the chosen macro button and using the pop-up macro editor window. Use the macro editor to create buttons that will modify your TNC settings and to send short brag files. Edit the file this way when you are in the chosen TNC mode. The macro file will be updated when the program exits. See Configuring Macros for additional information.
NOTE: You can make macro buttons to change the TNC mode, but this method will cause the incorrect mode to be stored in the QSO log. You can create a macro button to start the TNC "command" mode (<CTRL-C>X for the KAM) and then type commands directly into the TX window and execute them by hitting the ENTER key.

A sample macro file for the KAM TNC called PACTOR-KAM.mc is provided with the MixW program. You may use this file to operate Pactor mode on a KAM TNC and duplicate/modify it for other KAM TNC modes like G-tor and Amtor. If you have another manufacturer's TNC, you should use this file as a template to create macro files with the commands specified by your TNC manufacturer.

The example shown below is from the PACTOR-KAM.mc file. It shows the four recommended strings needed to initialize the KAM TNC for Pactor operation. The commands in red are those specific to the KAM, found in the KAM Reference Manual. (These are the same commands used to operate the KAM with the Pacterm program that came with many of the original KAM units.)

```
[Macros]
nItems=21
Name0=OnStartMode
Label0=Start mode
Text0=<HIDETEXT><AUDIOFQ:2200><SHIFT:200><CR><LF><CTRL-C>X<CR><LF>PACTOR<CR><LF>
Name1=OnEndMode
Label1=End mode
Text1=<HIDETEXT><CTRL-C>X<CR><LF><SHOWTEXT>
Name2=TX
Label2=TX command
Text2=<HIDETEXT><CTRL-C>T<SHOWTEXT>
Name3=RX
Label3=RX command
Text3=<HIDETEXT><CTRL-C>E<SHOWTEXT>
```

These for string (three lines each) are used by MixW to:

1.) Start the TNC in Pactor mode.
2.) Put the TNC into the command mode for exit.
3.) Put the TNC into the TX mode.
4.) Put the TNC into the RX mode.

The other commands are specific to the MixW and are used to make operations look nicer on the screen. The "<AUDIOFQ:2200><SHIFT:200>" was used to position the MixW tuning curser on the waterfall, and can be changed to match your TNC programmed settings. The macro file size will grow as you add macro buttons and the "nItems=" will automatically update.

NOTE: To enhance the terminal operation of your TNC, you may wish to modify specific command settings, such as for line feeds and carriage returns, echo on/off...

RTTY, **from the website of RICHARD B. GRIFFIN, NB6Z, used by permission:**
http://www.teleport.com/~nb6z/

RTTY or RadioTeletype is a direct machine-to-machine communications mode using the Baudot (or Murray) code.
This mode became popular with many amateurs when surplus TTY machines became available at a reasonable cost after World War II. These mechanical monsters provided a keyboard for Input and a paper roll for printed Output. They were also useful to help hold the house down in times of hurricane winds - they must weigh a ton. Video displays were still too exotic and expensive in those days. It was not until the mid 1970s that we began to see the Video Display come into more widespread use. (By the way, have you ever wondered why early Program Languages like BASIC use the command PRINT to display their output?)

When transmitting Morse Code, the transmitter is switched on and off to make the dits and dahs. When sending Teletype however the transmitter runs continuously, sending either of two frequencies conventionally known as Mark and Space (a reference to paper tape reception of telegraphy). The early pioneers found on-off keying was not all that successful for Teletype signals because of interference from static.

They experimented with FSK, or Frequency Shift Keying and found it performed much better. With FSK, the transmitter is shifted up in frequency every time a Mark is to be sent, reverting to the lower frequency for a Space. The amount of the shift is usually 170 Hz for Amateur Radio use although many commercial Teletype signals use other shifts, notably 425 Hz and 850 Hz.
Many systems use AFSK or Audio Frequency Shift Keying. When this is sent, the transmitting station generates the Mark and Space audio tones and feeds them into the transmitter's microphone input. The result at the receiving end is that the same audio tones are heard and processed, whether the transmitting station used FSK or AFSK.

When listening to a teletype signal off air, you will soon get to recognize the familiar warble of Mark and Space tones.
In the amateur shack the TTY machine is usually connected to an HF receiver or transceiver which the operator tunes so that the received audio is just the right pitch or audio frequency to trigger the demodulator's Mark and Space resonators.

If the receiver is slightly off the correct frequency the tones vary and the text becomes garbled or even lost altogether. To help the other station tune the receiver correctly, a RTTY operator can send a string of alternate R and Y characters RYRYRYRYRY. This pattern is chosen as it produces the most frequent and almost symmetrical alternation of Mark and Space tones, giving the receiving operator the best chance to tune the receiver before the "real" message starts. However, even if the signal is accurately tuned, the information can become garbled or completely lost due to interference, fading, or noise. Often, it is possible to make sense of the message even with parts missing, but RTTY is by NO means an error free mode!

I should point out that similar problems exist for other modes including Packet. While information can still fail to get through on the more sophisticated modes the Error Detecting capability of some, especially Packet and PACTOR, ensure that the operator will receive either accurate information or nothing at all. Usually, where "nothing at all" is received, the information will automatically be retransmitted when the radio is retuned, or the interference stops, (etc) and nothing is lost.

The Baudot code is a 5 bit code and those of you who are familiar with Binary Notation will know that the maximum number of values we can have with 5 bits is 32. That means that each unit of transmission, one keystroke if you like, can contain any one of 32 possible values. If you look up a table of Baudot codes you will see there are 32 values listed, one code for each letter of the alphabet plus a few other codes for other things such as a space and a Carriage Return. But, what if we want to send a number such as "9" or a question mark? These are not mentioned in that table because all 32 codes are already used.

The solution is rather similar to the Typewriter or Computer Keyboard where we have the Shift key

to get various additional codes from the keyboard. Most keys will produce a different result if we hold down the Shift key as we type. Well, one of those original 32 codes is a special code known as FIGS (for Figures Shift). The convention is that when we want to send a number or some other special character such as a punctuation mark, we can do that by firstly transmitting a FIGS code.

Then instead of using that original table of 32 codes, we have a second table of codes to use, and that second table includes all ten numeric digits and various punctuation marks. Provided both sides of the conversation observe the convention, the sender can send a FIGS and start using the second table; the receiver will see the FIGS code and it too will interpret all data that follows from the second table.

With just 5 bits of data we then have almost 64 different codes we can send and receive. (I say almost because there is some duplication in the two tables, including a space and a Carriage Return but that is not important here). Even that many codes is not enough to handle all 26 letters of the alphabet in both UPPER and lower case, so RTTY systems always operate in upper case only.

If we wanted to type a big number (say "13579") we don't have to send FIGS before every digit. We send that code only once and the receiver then will take EVERYTHING we type from now as if it belongs in the second table. When we want to revert to the normal alphabetic table of codes we can send another special code, this one called LTRS (for Letters Shift). Then everything goes back to normal, using the original alphabetic table of codes.

Normally we don't have to concern ourselves with these FIGS and LTRS codes. Our computing equipment will take care of those things for us. We just type away and rely on the system to generate and send those codes when necessary.

As I mentioned earlier, it is quite possible to lose bits here and there when receiving a RTTY signal, whether it be because of fading, interference, frequency drift, or whatever. One of the big problems with lost data is the possible loss of a FIGS or LTRS code! Say we had sent "13579" and then typed "HAPPY BIRTHDAY". Our equipment would have sent a LTRS code before the first "H" but what if the receiver did not copy the LTRS code we sent? Can you imagine what happens? As far as the receiver is concerned we are still sending numbers or other codes from the numeric table! So our "HAPPY BIRTHDAY" is going to come out looking something like "#-006 ?845#$-6". And EVERYTHING we type from then on is going to look just as strange until we happen to send another LTRS code later. It is for this reason that many systems include an option to "Un-shift on space". If you have a multi mode TNC capable of handling RTTY, you will probably have this option in your TNC. If that option is ON then your receiving system will imply a LTRS code every time it receives a space. So if you seem to be copying lots of funny numbers from a strong, well tuned signal, try setting that option ON.

We can overcome some of these problems by using ASCII instead of using the Baudot code. With ASCII we can have 128 different codes so we do not need the FIGS/LTRS codes. All Personal Computers use ASCII as their native "language" so it would be a reasonable thing to use. Although not part of the defined ASCII standard, it has become an almost de-facto standard in the computer world that an additional 128 characters are available, often called Extended ASCII. But, despite these benefits, Baudot continues to rule the airwaves for Amateur and Commercial Teletype transmissions.

Today, RTTY is still a popular mode especially on the HF bands, and the advent of the "Glass Terminal", firstly the Dumb Terminal and now the Personal Computer, has brought this mode to even more operators the world over. Many specialized RTTY systems were developed for the Amateur enthusiasts but have been superseded now by the Personal Computer with one of the Multi Mode TNCs, which handle RTTY, and many other modes besides.

The latest Computerized RTTY equipment generally allows us to use the mode better, quieter, more efficiently, using less power and occupying less space than the old TTY machines, but the limitations of the mode remain.

MixW, RTTY Operation

If you have not already done so, read the General Operations Topic For suggested RTTY frequencies click RTTY Frequencies

Transceiver Settings

Fine Tuning: If your transceiver is equipped with a "FINE" tuning feature, always use that for RTTY tuning once you have found RTTY activity, however, most of your adjustments can be made in software, and not with the transceiver's VFO if you prefer. In the PSK31 modes almost all tuning is done in software. For RTTY, I prefer to tune with the VFO. Some older rigs are really not stable enough for PSK31 operation and will drift considerably off frequency, but because of the wider bandwidth, they are fine for RTTY. (TIP, when starting your QSO make note of the Starting Frequency, this way you can see how badly the other station is drifting and observe the stability of both rigs) Note: when dragging the Mouse pointer into the Spectrum window the cursor changes from the typical arrow shaped pointer to a checkered thin line if that option is selected in View | Use stick cursor.

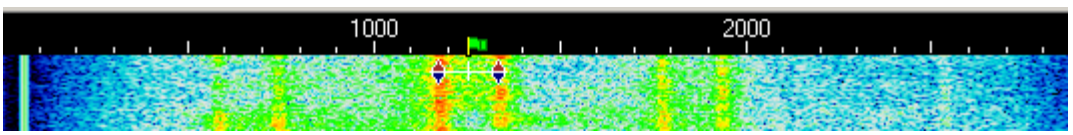
Processor: Depends on the operating conditions. It can aid in the printability of your signal in certain conditions, but start with it **off as a general rule**.

Pre-Amp: This can be on or off depending on the operating conditions. It can help when working weaker stations in certain situations, but can also make things worse if there are strong adjacent signals.

LSB: Almost all RTTY operators use LSB transmissions and a 170Hz shift between the MARK and SPACE signals, with the MARK signal being the higher in frequency. **Note:** While using the CAT features, MixW automatically adjusts the Mark and Space tones depending on which sideband you are operating on. If you are not using CAT, MixW needs to know which sideband your operating on to set the Mark and Space correctly. (See the discussion bellow under inversion).

VOX: Depends on how your switching between RX and TX., See Basic Set Up

Filtering: Optimum filtering depends on your transceiver's SSB filtering options and it's IF rejection characteristics. Wide filtering will enable you to work the largest spectrum with out retuning your transceiver, but can also cause problems when there are strong adjacent signals. A narrow (RTTY or FSK) filter may help significantly with some radios and situations. However, many transceivers do not have narrow filtering options while operating in SSB modes. Consult your manual and experiment for the optimum configuration for your setup and conditions. The following waterfall display shows MixW's panoramic display advantages of using a wide filer setting on the transceiver:

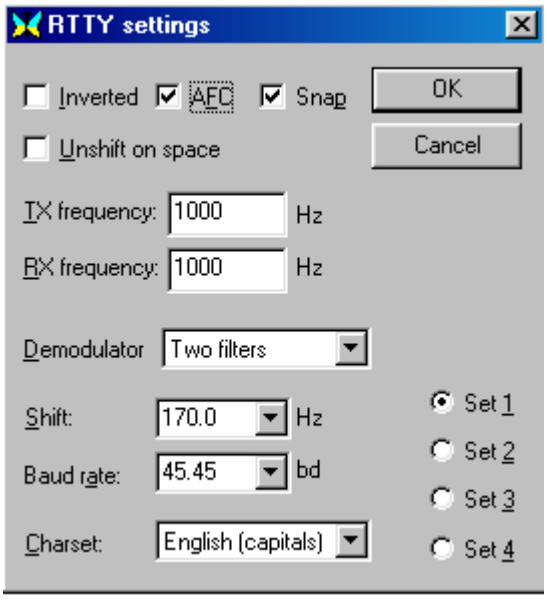


Here there are 3 different RTTY QSOs we could copy with the simple click of the mouse in roughly 3 KHz of spectrum. The strong one in the middle is currently selected and will provide the best print. The others may be to week to copy 100 percent.

Power: This of course depends on conditions. RTTY uses a much wider bandwidth than the PSK31 modes, and so it will require higher power to deliver the same overall signal to the receiving station. High power operation is not shunned in RTTY operation like it is with PSK31 modes. Never use more power than you need to for any given situation, however.

MixW Settings

Mode will be set to RTTY of course. Click on the mode box in the status bar and select RTTY. Next bring up the "Mode Settings". This can be done one of several ways, see General Operation, but the easiest is to click on the mode box in the status bar and select "Mode Settings". This brings up the following dialog box:



The TX and RX frequencies are set to wherever your cursor is in the spectrum window. I recommend this be around 1000 - 1500 Hz, which keeps your transceiver operating close to the center of its pass band. Shift is selectable (if you don't see what you want in the drop down box, any number can be typed in). Most RTTY uses a shift of 170 Hz, however try setting this to 182 Hz. I find this often improves the copy for most signals. Baud rate is also configurable. Most of the time this will be 45.45 Baud, but the other options are nice to have as well. You will sometimes find stations operating different shifts and baud rates. The Character set can also be configured for the language you will be using. The Mark and Space tones can be inverted by checking the "Inverted" box. Up to four different sets of parameters can be configured for RTTY operation by selecting the different "Set" radio buttons (set 1 - 4). It is then possible to designate different operating parameters for each set, such as shift, baud rate, character set etc., which will then be remember for that set. These can then be easily recalled by simply selecting the different radio buttons.

AFC can be **on** to assist in tuning the RTTY signals. After tuning, I generally click AFC Off unless I need to track a drifting station, or I am in a NET were I need to copy several stations that may be slightly off frequency from one another. RTTY tuning is not near as critical as PSK31 tuning, so AFC is more of an option than a necessity.
Lock should be **off** so you will be transmitting on the same frequency you're receiving on. The exception here would be if you're working a station that is drifting and want that station to find your more stable frequency each time.
Inverted when clicked will invert the positions of the MARK and SPACE frequencies. If you appear to be tuned into a strong signal and are only copying garbage, try clicking **Mode | Inverted, or clicking the box in the RTTY settings.** You will often find the station start to print 100 percent as a result.

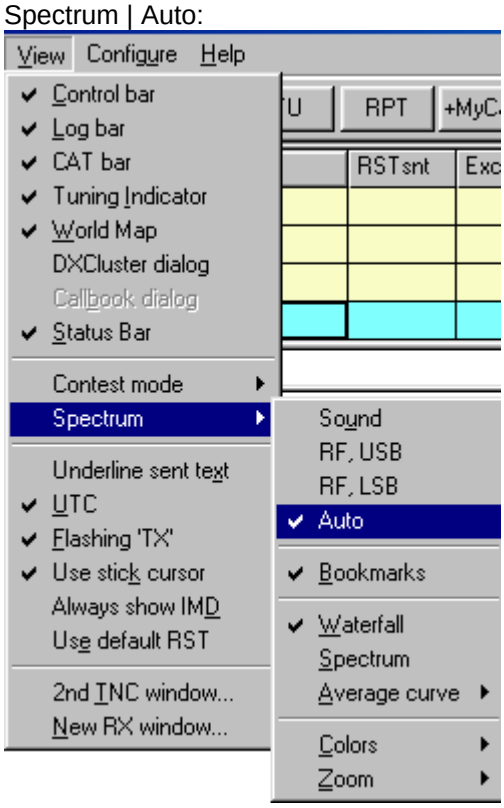
Inversion: Note: This feature works differently in MixW than most other SoundCard digital programs, so please read and understand the following information to avoid confusion while operating:

In MixW, "Inverted" means to invert the Mark and Space tones from the normal operating standards of the active mode. This feature can be used in cases where the station you are attempting to work is inverted. The MixW options for RF, USB/LSB must be configured to reflect your mode of operation by selecting Configure | Spectrum | RF, USB or RF, LSB. These must be set correctly in order for the frequencies in the displays to represent your actual operating frequencies, and for

MixW to automatically adjust the inversion settings based on your RF mode.

To illustrate: When using a traditional hardware TNC, RTTY is almost always operated in the LSB mode, utilizing a 170 Hz shift between the MARK and SPACE tones, with the MARK tone being the higher in frequency. If MixW is set on "RF, LSB" it will set the Mark tone as the higher tone. However, if MixW is set on "RF, USB" then the Mark tone will be set to the lower tone. (You can think of this as an automatic inversion if you like). In other words, if MixW is configured correctly (it needs to know if you are using LSB or USB) then it will automatically adjust your Mark and Space tones for you. You would only use the "Inverted" feature to operate inverted from the standard practice of that mode of operation, regardless of whether you're using USB or LSB.

If you are configured to use the CAT features of MixW, (see Configuration for more information) the USB/LSB and frequency changes will all be done automatically for you by selecting Configure | Spectrum | Auto:



Now, MixW will automatically know if you are using USB or LSB, as well as your operating frequency by polling your transceiver via the CAT feature. Your MixW operating frequencies (in the spectrum display as well as the log and CAT bars) will also automatically represent the audio offset, which will be either plus or minus your transceiver's frequency, depending on if you're operating LSB or USB. If you are not using CAT to determine your mode and frequency, you can still set your RF, USB/LSB parameters manually from this menu.

Squelch and Threshold can be used and adjusted to suite your operating preferences.

Receiving RTTY

RTTY signals display as two parallel lines usually 170HZ apart (roughly four times wider than PSK31 tracks), and resembling wide railroad tracks in the Spectrum Window. Tune in a RTTY signal by pointing right in the center of the two tracks with the mouse and clicking the left mouse button. The text being sent by the station will then appear in the Receive Window. The RTTY tuning indicator is comprised of two diamonds, which are linked together with a bar and separated by the

shift width you have selected in options dialog. The diamonds will move together to track and tune RTTY QSOs.

When working RTTY, especially during contest operation, I prefer to leave the tuning indicators in a position at roughly 1500 Hz (or centered in my Spectrum window) and then use the transceiver VFO set on "Fine" to tune in the RTTY signals. I find that I can tune more quickly this way, and also keep the QSO centered more effectively in my transceiver's pass band. RTTY is much easier to tune than most of the other digital modes.

Transmitting RTTY
To transmit to a station, first tune it in as indicated above. Type your outgoing text in the Transmit Window, which is the smaller window between the Receive Window and the Spectrum Window. Press the T/R button (or the Pause/Break key, or click on the TX/RX box in the status bar), and the text in the Transmit Window will be transmitted. You can continue to type, and that text will also be transmitted. As it is being transmitted, text in the transmit Window will also appear in the Receive Window. To stop transmitting, press the T/R button (or one of the other toggles) again. Pressing ESC will abort transmission and return MixW to receive mode, but the last several characters typed will not be transmitted. For this reason, the T/R button (or one of the other toggles) should be used to switch from transmit to receive.

Note: RTTY utilizes a limited character set, using UPPER CASE LETTERS ONLY. MixW will automatically convert lower case letters to upper case. You will also notice that not all punctuation marks are supported, although most of them are. The following characters are supported: - ( ) $! " / : ? .

When transmitting, the waterfall will freeze and remain frozen until returning to Receive.

The standard operating mode for RTTY utilizes a 170 Hz shift between the MARK and SPACE tones, with the MARK tone being the higher in frequency.

When you are transmitting, and not typing or sending text, the Transmit Volume should be increased until the RF output power of the transceiver just stops increasing, and then reduced until the power falls to half of the amount when it just stopped increasing. This should result in maximum undistorted output power under RTTY operation. However, some transceivers cannot handle the full duty cycle of RTTY without overheating. In this case, quickly reduce the power until the transceiver is running at the recommended power output for continuous-duty operation.

What is PSK31?, **There is little doubt about the mode's appeal. A very brief and inadequate introduction, Scott E. Thile, K4SET.**

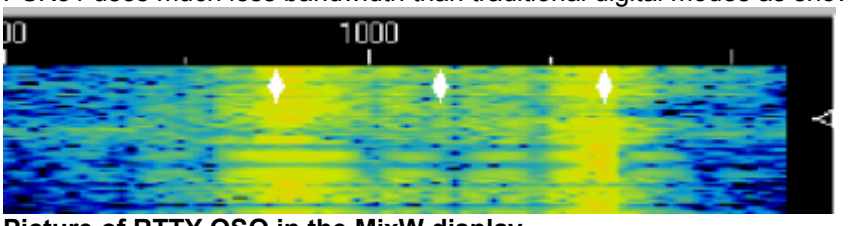
PSK31 is based on an idea by SP9VRC and developed by Peter Martinez, G3PLX, who also developed AMTOR. Based on RTTY, PSK is used for live keyboard-to-keyboard QSOs at 50 WPM (31 Baud) and uses "Phase Shift Keying" to signal mark and space values, instead of changing the frequency like RTTY (FSK).

DSP is used to change the phase by 180 degrees when a switch from mark to space is needed. DSP analysis by the program instantly detects this "Phase Shift".

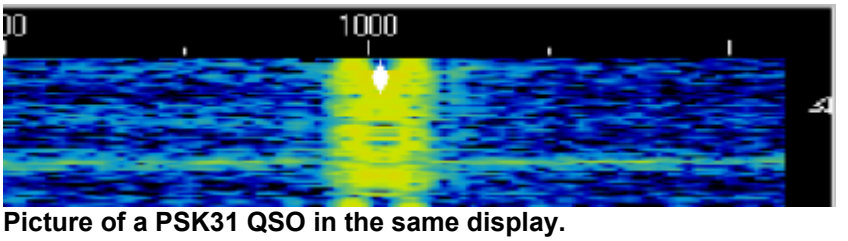
PSK works in a very narrow bandwidth, which sharply reduces noise and QRM. This narrow signal also makes it and excellent QRP (low power) mode, with between 5 and 10 watts producing excellent inter-continental paths.

The front-end DSP filter and pulse shaping keep the waveform compact, approximately 40 Hz at -3dB and 80 Hz at -40 dB. Pulse shaping uses a raised cosine to ramp amplitude during phase transitions and leaves the amplitude at full value during no phase reversals.

PSK31 uses much less bandwidth than traditional digital modes as shown here:



Picture of RTTY QSO in the MixW display.



Picture of a PSK31 QSO in the same display.

PSK31's two modes: BPSK and QPSK
In the QPSK mode, instead of just keying by phase reversals, or 180-degree phase-shifts, an additional pair of 90 and 270-degree phase-shifts are possible.

If you think of BPSK as reversing the polarity of the signal, then QPSK can be thought of as two BPSK signals on the same frequency, but 90 degrees out of phase with each other, and with only half the power in each.

The extra speed in QPSK is used for error correction. This works well under most conditions. Certain noisy conditions, and weaker signals, can benefit from the full power (single signal) of the QPSK mode.

Visit the PSK31 Official Home Page at:
http://aintel.bi.ehu.es/psk31.html

Note: Because this is commercial software, Peter Martenez, G3PLX's Introduction and Theory of PSK31 cannot be included as part of these help files, but these really should be reviewed for a better understanding of PSK and its development. Peter Martenez's outline and theory of PSK31 can be viewed on the website of MixW beta tester and help file contributor, RICHARD B. GRIFFIN, NB6Z at the following link:
http://www.teleport.com/~nb6z/psk31.htm

MixW has full BPSK31 and QPSK31 capabilities, but Nick did not use the G3PLX source code to implement it. By using his own source code, Nick is in keeping with Peter's guidelines for the use PSK31 in commercial software.

The MixW version 2 team is very grateful to Peter for PSK31, a great gift to the radio art.

MixW, PSK31 Operations **(Includes BPSK and QPSK)**

If you have not already done so, read the General Operations Topic For suggested PSK31 frequencies click PSK31 Frequencies

PSK31 Basics

Due to its limited bandwidth, PSK31 is perhaps the most critical mode for proper soundcard to radio configuration. Overdriving your transceiver audio input will cause over modulation, creating multiple side bands and interfering with adjacent QSOs. See Basic Set Up for additional information.

Transceiver Settings

Fine Tuning: If your transceiver is equipped with a "FINE" tuning feature, always use that for PSK31 tuning, but you will find that most of your adjustments are made in software, and not with the transceiver's VFO. Some older rigs are really not stable enough for PSK31 operation and will drift considerably off frequency. There's really nothing you can do about this except manually track the drift, but you will notice that you're missing a great deal of the incoming text, and the Frequency Box (located in the Status Bar) shows that AFC us changing the receive frequency constantly. (TIP, when starting your QSO make note of the Starting Frequency, this way you can see how badly the other station is drifting and observe the stability of both rigs)

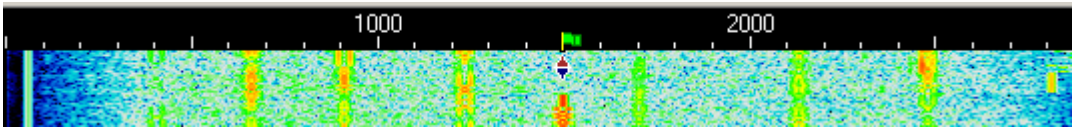
Processor: Off. Your processor should not be used in PSK31 operation.

Pre-Amp: This can be on or off depending on the operating conditions. It can help when working weaker stations in certain situations, but can also make things worse if there are strong adjacent signals.

USB: Although it is possible to work stations using LSB, USB is the convention for PSK31 operation in all bands.

VOX: Depends on how your switching between RX and TX., See Basic Set Up

Filtering: Optimum filtering depends on your transceiver's SSB filtering options and its IF rejection characteristics. Wide filtering will enable you to work the largest spectrum with out retuning your transceiver, but can also cause problems when there are strong adjacent signals. A narrow (CW or FSK) filter may help significantly with some radios and situations. However, many transceivers do not have narrow filtering options while operating in SSB modes. Consult your manual and experiment for the optimum configuration for your setup and conditions. The following waterfall display shows MixW's panoramic display advantages of using a wide filer setting on the transceiver:



Here there are 8 different QPSK31 QSOs we could copy with the simple click of the mouse in roughly 3 KHz of spectrum. You can even see the bottom of an MFSK QSO in the far right hand side of the display.

Power: Because of the narrow bandwidth, PSK31 transmit power can and should be kept to a minimum. PSK31 is an excellent mode for QRP operations. It is possible to work intercontinental DX with one watt. High power operation is considered very poor practice in the PSK31 modes.

MixW Settings

Mode will be set to either BPSK31 or QPSK31. Most PSK31 operations are **BPSK31** unless conditions will benefit from the limited error correction offered in the QPSK31 mode. See PSK31 Intro and Theory for additional information.

AFC should be **on** to assist in tracking PSK31 signals. The one exception is when a strong adjacent signal pulls you off of a weaker station you are working.

Lock should be **off** so you will be transmitting on the same frequency you're receiving on. The exception here would be if you're working a station that is drifting and want that station to always tune to your more stable "locked" transmit frequency.

Squelch and Threshold can be used and adjusted to suite your operating preferences.

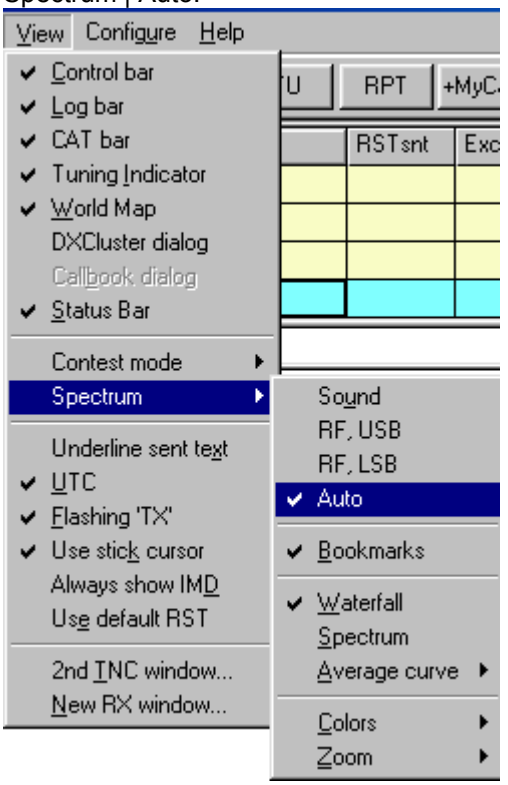
Inverted is grayed out for BPKS31 operation, and is never used. It can be used while operating in the QPSK31 modes however. If you are having difficulty copying a QPSK31 station that you seem to be correctly tuned in to, try clicking Mode | Inverted and see if you start to print them.

Inversion: Inversion is not used for BPSK31, but it can be for QPSK31. Note: This feature works differently in MixW than most other SoundCard digital programs, so please read and understand the following information to avoid confusion while operating:

In MixW, "Inverted" means to invert the Mark and Space tones from the normal operating standards of the active mode. This feature can be used in cases where the station you are attempting to work is inverted. The MixW options for RF, USB/LSB must be configured to reflect your mode of operation by selecting Configure | Spectrum | RF, USB or RF, LSB. These must be set correctly in order for the frequencies in the displays to represent your actual operating frequencies, and for MixW to automatically adjust the inversion settings based on your RF mode.

To illustrate: When using a traditional hardware TNC, RTTY is almost always operated in the LSB mode, utilizing a 170 Hz shift between the MARK and SPACE tones, with the MARK tone being the higher in frequency. If MixW is set on "RF, LSB" it will set the Mark tone as the higher tone. However, if MixW is set on "RF, USB" then the Mark tone will be set to the lower tone. (You can think of this as an automatic inversion if you like). In other words, if MixW is configured correctly (it needs to know if you are using LSB or USB) then it will automatically adjust your Mark and Space tones for you. You would only use the "Inverted" feature to operate inverted from the standard practice of that mode of operation, regardless of whether you're using USB or LSB.

If you are configured to use the CAT features of MixW, (see Configuration for more information) the USB/LSB and frequency changes will all be done automatically for you by selecting Configure | Spectrum | Auto:

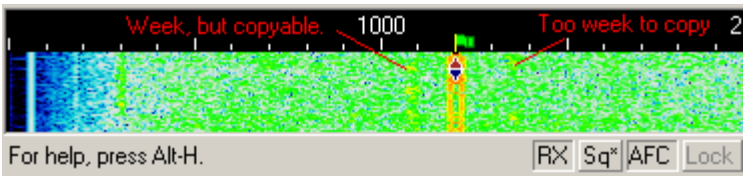


Now, MixW will automatically know if you are using USB or LSB, as well as your operating frequency by polling your transceiver via the CAT feature. Your MixW operating frequencies (in the spectrum display as well as the log and CAT bars) will also automatically represent the audio offset, which will be either plus or minus your transceiver's frequency, depending on if you're operating LSB or USB. If you are not using CAT to determine your mode and frequency, you can still set your RF, USB/LSB parameters manually from this menu.

Receiving PSK31

PSK31 signals display as two parallel lines, resembling railroad tracks, in the Spectrum Window. Tune in a PSK31 signal by pointing to it with the mouse and clicking the left mouse button. The

text being sent by the station will then appear in the Receive Window. **Note:** The mouse pointer will change from the typical arrow shaped pointer to a checkered thin line when you drag it into the waterfall display if that option is selected (This is done be selecting View | Use stick cursor).



In this screen capture of a portion of the Spectrum Window of an actual MixW screen, the bright orange stripe with the diamond-shaped cursor in the middle is a strong PSK31 station, the one to the left is a weak PSK31 station (yellowish streaks), but would likely still print readable copy, and the very faint signal to the right is a PSK31 station that is too weak to copy enough to sustain a QSO.

PSK31 is less than 40Hz in bandwidth, so it is virtually impossible to manually tune to the correct frequency with the transceiver's VFO, or even to manually touch up the tuning because the increments are so small. However, if your Rig is equipped with "FINE" tuning, Always use that when you're in the BPSK31 and QPSK31 modes.

Thankfully MixW pretty much does the tuning for you. In the picture above, the diamond-shaped cursor has been placed in the middle of the strong signal by pointing to the signal and clicking the left mouse button. Text starts to print in the receive window, and the diamond indicates that this is the station that is currently being received.

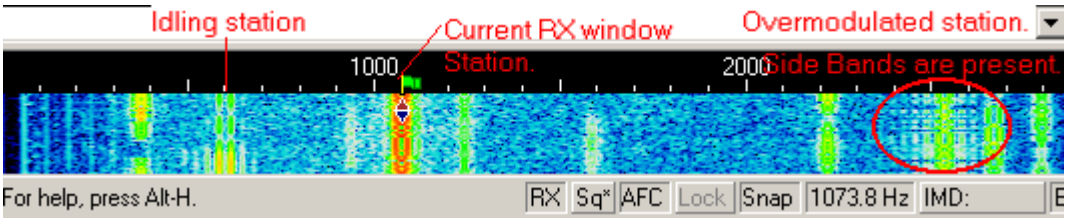
Transmitting PSK31
To transmit to a station, first tune it in as indicated above. Type outgoing text in the Transmit Window, which is the smaller window between the Receive Window and the Spectrum Window. Press the T/R button (or the Pause/Break key, or click on the TX/RX box in the status bar), and the text in the Transmit Window will be transmitted. You can continue to type, and that text will also be transmitted. As it is being transmitted, text in the transmit Window will also appear in the Receive Window. To stop transmitting, press the T/R button (or one of the other toggles) again. Pressing ESC will abort transmission and return MixW to receive mode, but the last several characters typed will not be transmitted. For this reason, the T/R button (or one of the other toggles) should be used to switch from transmit to receive. This process can also be automated with the use of MixW's sophisticated Macros, see Configuring Macros for additional information.

Note: PSK31 utilizes the full ascii character set, so use upper and lower case instead of all caps, and whatever punctuation you want. Callsigns are either upper and lower case, or ALL CAPS. Both ways seem acceptable, but I prefer all caps for callsigns.

When transmitting, the waterfall will freeze and remain frozen until returning to Receive.

The standard operating mode for PSK31 is called BPSK, and is sideband-insensitive, but under difficult operating conditions, communication may be improved by switching to QPSK mode. When using QPSK mode, both stations must use the same sideband.

When you are transmitting, and not typing or sending text, the Transmit Volume should be increased until the RF output power of the transceiver just stops increasing, and then reduced until the power falls to half of the amount when it just stopped increasing. This should result in maximum undistorted output power under PSK31 operation. However, some transceivers cannot handle the duty cycle of PSK31 without overheating. In this case, quickly reduce the power until the transceiver is running at the recommended power output for continuous-duty operation.



This screen capture of a MixW screen shows several PSK31 stations. The station to the left of our QSO is idling (not typing) and the two desired sidebands of the PSK31 signal can clearly be seen as parallel lines. Also visible are two more, fainter parallel lines on each side of the solid parallel lines at the bottom of this signal, which are unwanted sidebands, produced by slightly overdriving the transceiver. It looks as if this station is "setting" the soundcard output level. It was too strong at first and produced the unwanted side bands, and it looks about right where they ended up at the top of the display. The signal marked and circled as "over modulated station" also has the wide unwanted sidebands. Notice how close the sidebands are to interfering with the QSO directly to the right of them.

The transceiver should always be operated at a very linear power output, resulting in IMD readings of -25 dB or less, if possible, and producing no visible unwanted sidebands. IMD readings of greater than -25 dB, such as -20 dB, usually result from the transceiver being operated in a non-linear fashion, and can often be improved by merely reducing the audio drive to the transceiver from the soundcard audio output. See Basic Set Up for more information on setting the soundcard levels.

Text in the TX window may be edited before it is sent out with the standard Windows editing functions, except that insert is not supported. It is necessary to use the Backspace key and retype text that needs to be changed in the TX window. If the left and right arrow keys are used for the Seek function, those keys are not available for cursor movement in the TX and RX windows. To make them available, you must uncheck "Arrows for Seek" under the Options menu selection.

Multiple Channel Operation as well as other techniques are covered in General Operation.

MFSK16. An MFSK DX Mode. by Murray Greenman, ZL1BPU

A new weak signal DX mode for Radio Amateurs, employing M-ary FSK, phase continuous tones and convolutional coded FEC.

Introduction

The Professionals

Professional communications engineers are always interested in sending information faster and more reliably than was previously possible, if necessary by using complex technology, greater bandwidth or higher power to achieve this. In addition, commercial and military users for whom this equipment is designed, are generally interested in short distance communications with high reliability and relatively high signal strengths. These types of communications are also generally bi-directional (full duplex) or unidirectional (simplex or broadcast) rather than one way at a time (half duplex).

The Amateurs

Although some Amateur Radio applications have similar goals, especially on VHF, most Amateur Radio HF, MF and LF data communication has limited bandwidth available, and usually involves half duplex operation, while the available transmitter power is definitely limited, both by legislation and by cost. Fortunately, Amateurs have lesser expectations of reliability, and can always postpone operation until conditions improve, or simply talk to someone else! Amateur Radio operators also have an almost unique interest in real-time communications, now abandoned by almost all other HF services in favor of automated message techniques.

Radio Amateurs wishing to transmit data or text rather than voice (digital modes) are often interested in very robust transmissions over very long distances, such as from one side of the world to the other. Bandwidth needs to be kept to a minimum, since all the Amateurs in the world share the same limited space, and power requirements should be modest. Fortunately transmission speeds can often also be modest, which is helpful since speed can be traded off for improved reliability, lower power, or narrower bandwidth. This concept is the logical concept of early work in communications theory by Claude Shannon (1947). DX Conversation Modes

Thus there is always an interest in improving the communication performance of low power long distance links, typically casual person-to-person conversations where each person takes a turn to type on the keyboard and transmit what he types, while the others receive and print what is sent. Radio Teletype (RTTY) was used in this way for many years. Hellschreiber has recently been revived for the same purpose, and has proved to be very effective. New techniques such as PSK31 by Peter G3PLX have extended the performance of narrow-band links considerably.

The recent trend in these new modes has been to use differential PSK (DPSK) transmissions, since DPSK offers very high sensitivity and rejection of noise. Such modes are therefore ideal for low power. However, the biggest problems facing very long distance (DX) communication on HF are generally selective fading and ionospheric modulation of the signal, rather than sensitivity, and the PSK modes do not handle these problems very well.

The MFSK Option

Few Amateurs have even heard of MFSK, while some that have might be dismissive of MFSK as being "old fashioned". As has been clearly demonstrated by the recent successful revival and acceptance of Hellschreiber, old ideas combined with modern techniques such as DSP can be very effective. In the past, MFSK was used successfully by the British Foreign Office, the Belgian and French military and others, using such systems as Piccolo and Coquelet.

Such systems were designed for high communications reliability in the days of electromechanical equipment. These old MFSK systems provided very good performance for the time - robust, sensitive and reliable, with good results in fading and poor ionospheric conditions without requiring error correction. There are some modern military systems of a broadly similar nature used for similar reasons.

The opportunity has now arrived to modernize the MFSK technique, creating a new high performance yet inexpensive mode that will benefit from the advantages of MFSK, plus the simplicity of the PC and sound card, and the advantages of many associated DSP techniques, since PCs are now fast enough to perform this type of processing.

MFSK Overview for Beginners
MFSK is a technique for transmitting digital data using multiple tones, extending the RTTY two-tone technique to many tones, usually, but not always, one tone at a time.

MFSK means Multi - Frequency Shift Keying, and should not be confused with MSK (Minimum Shift Keying). There are a number of different techniques, using concurrent (or parallel) tones, sequential (one after another) tones, and combinations of tones. MT-Hell can be either concurrent or sequential, DTMF tones used for telephone signaling are concurrent tone pairs, while Piccolo and Coquelet, although using tone pairs, are decidedly sequential.

MFSK transmissions have a unique sound, almost musical, which is why Piccolo and Coquelet received their names (Coquelet means rooster).

MFSK uses relatively narrow tone spacing, so remarkable data rates are achieved for a given bandwidth - 64 bps in a signal bandwidth of 316 Hz is typical. The following picture is a spectrogram of an MFSK16 signal (16 carriers) with a spacing of 15.625 Hz and operating at 15.625 baud. The transmission operates at 62.5 bps (about 80 words per minute!) and occupies about 316 Hz of bandwidth. The two black horizontal lines in the picture are at 1000 Hz and 1300 Hz, and the horizontal scale is about 20 seconds. This short transmission contains about 120 letters. MFSK16 is always operated with FEC, so the text throughput is actually only about 42 WPM (31.25 bps).

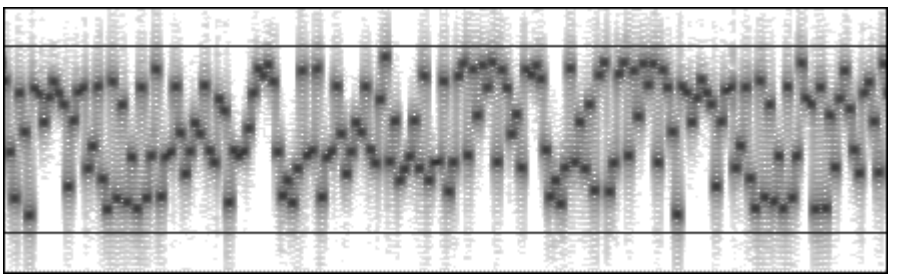


Fig. 1. Spectrogram of an MFSK16 Signal

Advantages
MFSK has several performance advantages:
- High rejection of pulse and broadband noise due to narrow receiver bandwidth per tone
- Low baud rate for sensitivity and multi-path rejection - data bit rate higher than symbol baud rate
- Constant transmitter power
- Tolerance of ionospheric effects such as doppler, fading and multi-path

Most important of all, with an MFSK system, the error rate improves as the number of tones is increased, so with as many as 32 tones the performance is unrivalled. With PSK systems the opposite is true.

Disadvantages
Let's be fair - there are disadvantages to MFSK! The main disadvantages are related to the narrow spacing and narrow bandwidth of the individual tone detectors - drift can be a problem and accurate tuning is essential. Good tuning indicators and AFC are necessary at the slower speeds. It is important that the radio transceiver be very stable, and also that it has very small frequency offset between transmit and receive (preferably less than 5 Hz).

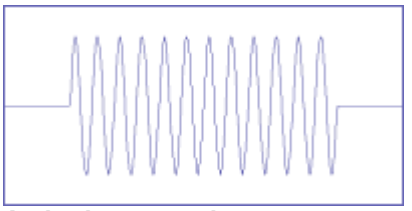
MFSK also uses more bandwidth for a given text speed than a 2FSK or PSK system, but by the same token it is therefore more robust.

How it Works
MFSK is a system where individual pulses of different radio frequencies carry information, and the data carried depends on the frequency of the pulse. This is the same as FSK, for example radio teletype (RTTY), but rather than two different frequencies, many more are used - from six to 64, for example. MFSK16 uses 16 tones. Each tone transmitted is just like a Morse code dot, but they follow

each other without pause, on slightly different frequencies.

MFSK systems generally use non-coherent detection, and space the many tones as closely as possible, to restrict the transmitted bandwidth. The transmitted tones must be spaced at a separation equivalent to the baud rate, or a multiple of the baud rate - the rate at which the "dots" are sent, otherwise it is difficult to separate one tone from another. This allows the signaling to be orthogonal, as will be explained over the next few paragraphs. For example, the tone carriers can be spaced by 20 Hz when keyed at 20 baud.

MFSK signals are traditionally "hard keyed", i.e. each tone starts and stops suddenly, as in the following example.



A single tone pulse

This gives the signal its characteristic frequency domain sin(x)/x shape, just the same as a Morse Code (CW) dot:

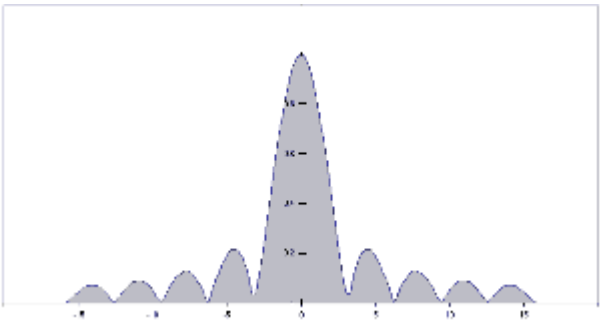


Fig. 2. The frequency domain response of a hard keyed single tone.

The shape of the transmitted signal has a main peak, with nulls spaced either side of the carrier frequency . The first nulls occur at the carrier frequency ± the baud rate. The humps and nulls are clearly visible on either side in Fig. 2. If you look carefully at the spectrogram in Fig. 1, you will see these side-lobes as gray streaks above and below the individual dots. The big hump in the center of Fig. 2 is the wanted signal, and it is these that cause the black dots in Fig. 1.

Of course the dots or tone bursts are not isolated, but preceded and followed immediately by other dots at the same or different close frequencies. Imagine then that we need to superimpose the sin(x)/x shape of each one to see what happens. We can arrange the spacing of the tones to achieve the best results.

Fig. 3 shows seven of these hard keyed tones superimposed, so that the nulls of each carrier coincide with the peak of the next, to minimize cross-talk between channels in the receiver and therefore allow orthogonal signaling. This occurs when the baud rate and tone spacing are numerically the same, or at multiples of the baud rate. Fig. 3 is a spreadsheet simulation, where the spacing is X=pi radians, and would be identical to the result of seven tones transmitted in turn at the baud rate.

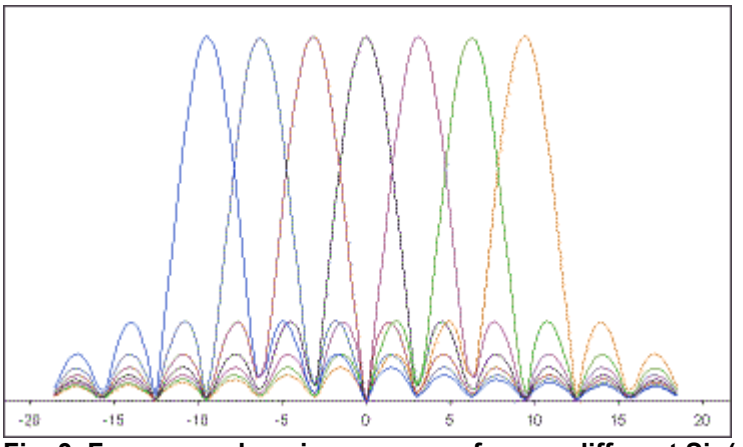


Fig. 3. Frequency domain response of seven different Sin(x)/x tones
The vertical scale in this graph is linear, 0 - 1, and the horizontal scale is in radians, from -20 to +20, or about ±12 Hz. The baud rate is assumed to be 1 Hz.

When the transmission consists of multiple tones spaced as described, the signal broadens out across the peak, but retains the characteristic shape, as illustrated above. When random data is transmitted, the broad peak "fills out", but the side lobes remain obvious. The following image shows the spectrum of a real 8FSK signal transmitting at 31.25 baud with a tone spacing of 31.25 Hz. The vertical axis in this image is logarithmic, so the side lobes are more obvious than in the simulations above. Note that the side-lobes are spaced 31.25 Hz because of the 31.25 Hz baud rate.

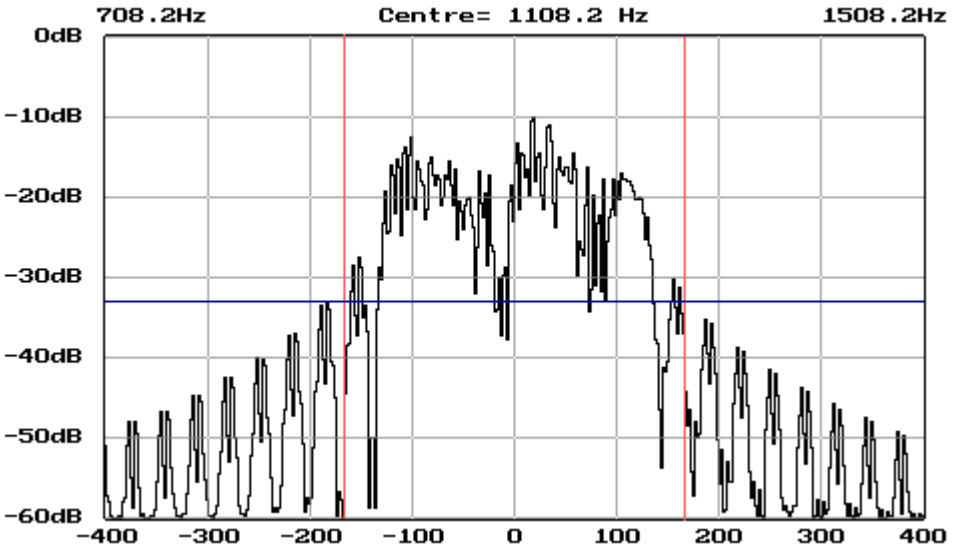
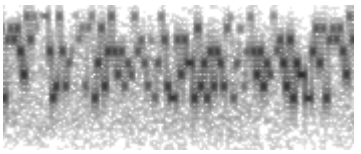


Fig. 4. The spectrum of a real MFSK transmitter
The spectrogram was taken with 0dB set at the level of a single constant tone. A standard method of calculating the necessary bandwidth of radio transmissions is laid out by the CCIR, and for the above transmission is 331.25 Hz (±166 Hz). Looking at the spectrum, the signal is well below -30dB from the single tone carrier at this bandwidth (indicated by the vertical red lines), easily exceeding the CCIR definition of 0.5% of the total transmitter power (about -20dB). The performance (indicated by the horizontal blue line) is this good because with modern DSP technology the signal measured above transmitted phase-synchronous tones (CPFSK). It so happens that this occurs naturally and easily using DSP when the duration of each tone (the symbol period) is the reciprocal of the tone spacing.

Here's another spectrogram, this time of an eight tone MFSK transmission, received over 18,000 km on 18 MHz. Note the characteristic appearance!



An 8-tone MFSK signal at 18,000 km range

Convolutional Coding
Forward Error Correction is achieved by sending twice as much data as without coding, but is done in such a way that more than twice the advantage is achieved. In addition, the improvement in copy achieved is greater than the loss in performance by having to use twice the bandwidth to send the data! This is called the coding gain.

The coding of the data for FEC is very simple, but the decoding is more than a beginner can be expected to understand.

Interleaving
One of the problems with FEC coding is that it works best if all the errors are spread out evenly. Unfortunately interference (especially static and splatter) is burst noise, and tends to take out data several bits at a time, which makes life very difficult for the Viterbi decoder. To avoid this problem, we muddle up the order of the transmitted bits using an Interleaver. Then, when bursts destroy adjacent bits, the process of de-interleaving spreads the errors out, easing the job of the decoder.

Bits and Bauds
One of the most confusing things about MFSK is that the signaling rate is not the same as the data rate, because each tone carries more than one data bit. To explain this, we'll define all the terms used and show how they inter-relate.

Symbol Rate
The basic element of transmission in any data mode is the Symbol. In most modes, each symbol implies a "0" or "1", but in MFSK systems, each symbol carries information according to how many tones there are - three bits of information for 8 tones, four bits for 16 tones, and so on. Each MFSK tone burst is one symbol. The symbol rate is always measured in baud (symbols/second), the reciprocal of the duration of the symbol.

Channel Data Rate
The data carried by the MFSK tones is inevitably coded in some way so that the "raw data" rate may not be the same as the user input or output data rate. However, the Channel Data Rate is always the number of bits per symbol x the Symbol Rate. The channel data rate is measured in bits/second (bps). For example, for a 10 baud 8FSK mode (8 tone FSK) there are three data bits per symbol, so the raw Channel Data Rate is 3 bits x 10 baud = 30 bps.

User Data Rate
Very often data is coded using an FEC system designed to reduce errors that occur due to the transmission path. For MFSK systems the most appropriate type of FEC is the sequential type, where every user data bit is represented in the transmission by two or more coded data bits. This ratio is the Coding Rate of the coder. For example, if there are two coded bits for every one data bit, the Coding Rate = 1/2. Thus the User Data Rate is the Channel Data Rate x Coding Rate.

Alphabet Coding
There are many ways to encode the alphabet from the keyboard for transmission. Perhaps the most common now is ASCII (ITA-5), but ITA-2 (as used by teleprinters) is common. MFSK16, like PSK31, is based on a Varicode, which, unlike most such alphabets, assigns a different number of bits to different characters, so that more frequently used characters have fewer bits and are therefore sent faster.

The number of bits per alphabet character therefore depends on the character frequency, just like Morse. For example:

Character	Varicode
space	100
a	101100

e	1100
E	111011100
Z	101010110100

Thus, the alphabet coding performance depends on the chosen code, and with a Varicode, even on the text sent:

Alphabet	Bits/Char
ITA-5 ASCII	10
ITA-2	7.5
Varicode	~ 7-8

The strength of the varicode is that the alphabet is essentially infinitely expandable. For example, all the European accented characters are defined, and others have been added for control purposes, that are outside the character set. The MFSK16 varicode is not the same as the PSK31 varicode, although the technique is similar.

Another important advantage of using a varicode is that the stream of data can be much more quickly re-synchronized in case of errors, than is possible with other systems, and so a minimum of data is lost.

Text Throughput

The user is most interested in the actual usable text throughput, which is specified in characters per second (CPS) or words per minute (WPM). Both depend on the alphabet used, and the number of words per minute depends on the average word size. In English this is taken for convenience to be five letters plus a letter space. So we can say that:

Text Throughput (CPS) = User Data Rate / Alphabet Bits per Character

Text Throughput (WPM) = CPS x 60 / letters per word

Worked Example

Say we are using an MFSK system with 16 tones (16FSK), operating at 15.625 baud with FEC Rate = 1/2, and an ASCII alphabet using 10 bits/character. Then:

Symbol Rate	= 15.625 baud		
Channel Data Rate	= 15.625 x log216 = 15.625 x 4	= 62.5 bps	
User Data Rate	= 62.5 x 1/2 (FEC RATE)	= 31.25 bps	
Text Throughput (CPS)	= 31.25 / 10 CPS		= 3.125 CPS
Text Throughput (WPM)	= 31.25 x 60 / (10 x 6)		= 31.25 WPM

This will take place in a bandwidth little more than 16 x 15.625 = 250 Hz.

Comparisons

Amateur Radio RTTY operating at 45.45 baud achieves 60 WPM with no error correction, and requires about 300 Hz bandwidth. 300 baud packet is error corrected, but is unsuited by its design to HF conditions, and rarely delivers better than 30 WPM, and often much less. Packet requires 1 kHz bandwidth. PSK31 operates at 31.25 baud, and in QPSK mode gives error corrected text at 31.25 WPM approximately. It has the narrowest bandwidth, less than 100 Hz.

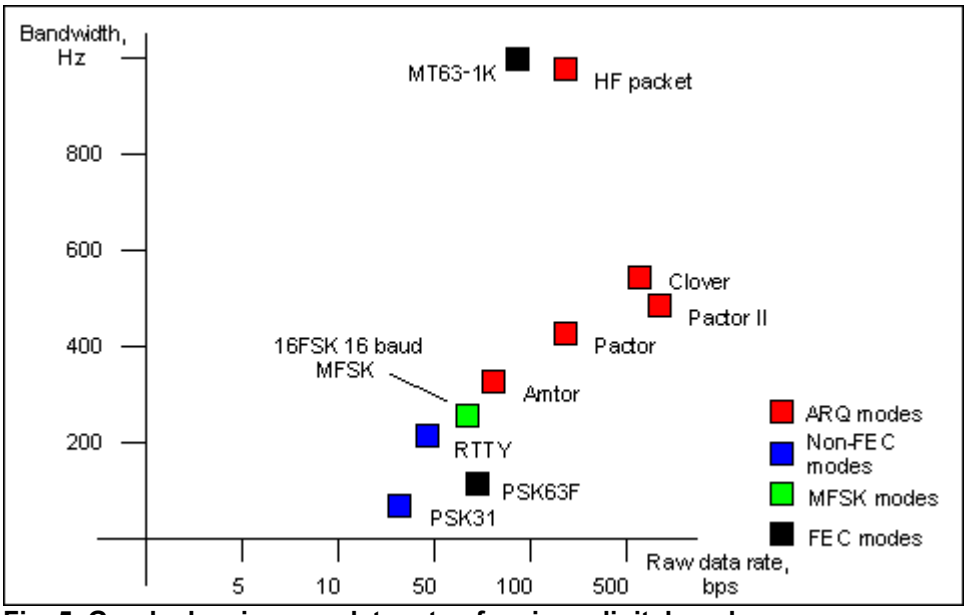


Fig. 5. Graph showing raw data rate of various digital modes versus approximate bandwidth.

In terms of performance, of the examples given, only MFSK16 and PSK31 are considered practical for DX QSOs. PSK31 often performs poorly on long path, and provides no improvement when the FEC is used, so is usually used without it. MFSK is virtually as sensitive as PSK31 in practice and is unaffected by Doppler. It is also less affected by interference, and offers effective FEC. These results are supported by ionospheric simulation tests.

MFSK16

The first serious Amateur Radio MFSK modes are now in use - MFSK16. Using test software,, initial QSOs were held 18 June 2000. The first QSO was from ZL1BPU - IZ8BLY on 18.105 MHz, then ZL1AN - ZL1BPU on 3.560 MHz. During the initial tests, rates from 7.8 to 31.25 baud were tested, with from 8 to 32 tones! The MFSK16 specification proved to be the best performing compromise. Here's what you can expect using this mode:

- On 17m, long path signals are normally weak and fading, but good hour-long contacts can be made on a regular basis, with 25W transmitter power and dipole antennas.
- On 20m conditions are much more unstable, although signals are stronger and the band open for longer. Copy is good on long path using 25W. Nets are quite feasible.
- 80m at night is very noisy, with very bad multi-path. Copy is close to 100% on 500mW transmitter power across town, or 10 - 25W between New Zealand and Australia (3000 km), something not generally possible with any other digital mode.

The software is being continually upgraded as a result of feedback from expert testers. These tests build up operating experience and provide feedback to software designers on how best to control and operate the MFSK16 mode.

Ionospheric simulation tests by Johan KC7WW on his sophisticated equipment have shown excellent results. Further tests will determine which combination of parameters should be offered in later release versions, for example special modes for weak signal or LF, maybe even modes optimised for MF and HF.

The new MFSK16 mode includes continuous phase tones and many other improvements, especially to the receiver. The mode is loosely based on Piccolo, but differs in a few important ways:

- The transmitted data is bit oriented, rather than character oriented.1
- The fundamental signal is a single symbol, not a symbol pair.
- Error reduction coding is built in.
- Tone spacing and baud rates are divisions of 125.2
- The transmitted tones are phase synchronous CPFSK.
- No symbol phase or other AM information is transmitted.3

1. The system can therefore potentially transmit text and binary files, any alphabet including varicodes, and can use error coding.
2. The tones and baud rates (15.625 Hz, 31.25 Hz etc) are chosen to allow straightforward PC sound card sampling at 8 kHz sample rate.
3. This means the transmitter need not be linear. Using the receiver FFT, the transmitted carrier phase can be extracted, and from it the symbol phase is deduced. This technique is very fast and reliable.

Of course MFSK16 is computer oriented, rather than an electromechanical system, so will be easy and inexpensive to install, and easy to operate, with no performance compromises.

- Accurate tuning for transceive operation using "point and click" techniques
- Convolutional coded FEC (Forward Error Correction) with interleaver for error reduction
- FFT (Fast Fourier Transform) symbol filtering and detection
- Symbol sync recovery by measuring transitions or carrier phase in the symbol detector FFT
- Two signaling speeds with differing numbers of tones (but the same bandwidth) to suit conditions

The MFSK Varicode is slightly more efficient than others, since smaller codes are available. This in turn is because the combinations "000", "0000" etc do not need to be reserved for idle and can be used inside character bit streams. Only the combination "001" is forbidden, as this signals the end of one character and the start of the next. The speed on plain language text is almost 20% faster than using the G3PLX varicode. The average number of bits per character for plain text has been measured at 7.44, giving MFSK16 a text throughput of 42 WPM at 31.25 baud user data rate.

Note: Murray has an excellent website with much more information on MFSK16 and other related modes. This is an excellent resource for anyone interested in learning more about this fascinating new mode:
MFSK, **"The official MFSK website"** Murray Greenman, ZL1BPU.
http://www.qsl.net/zl1bpu/MFSK/

MixW, MFSK16 Operation.

If you have not already done so, read the General Operations Topic For suggested MFSK frequencies click MFSK Frequencies

MFSK16 uses approximately the same bandwidth as 170Hz shift RTTY and so our MFSK16 transceiver settings can be roughly the same as those used for standard shift RTTY.

Transceiver Settings

Fine Tuning: If your transceiver is equipped with a "FINE" tuning feature, always use that for digital mode tuning once you have found the general area of the signals, however, most of your adjustments can be made in software, and not with the transceiver's VFO if you prefer. Some older rigs are really not stable enough for MFSK operation and will drift considerably off frequency. (TIP, when starting your QSO make note of the Starting Frequency, this way you can see how badly the other station is drifting and observe the stability of both rigs) Note: when dragging the Mouse pointer into the Spectrum window the cursor changes from the typical arrow shaped pointer to a checkered thin line if that option is selected in View | Use stick cursor.

Processor: off as a general rule.

Pre-Amp: This can be on or off depending on the operating conditions. It can help when working weaker stations in certain situations, but can also make things worse if there are strong adjacent signals.

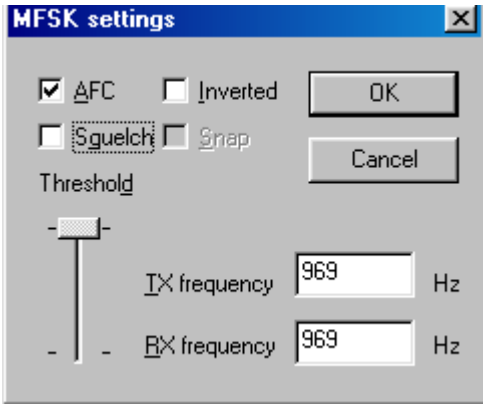
USB: You can invert the MFSK tones in software and work LSB.

VOX: Depends on how your switching between RX and TX, See Basic Set Up

Filtering: Optimum filtering depends on your transceiver's SSB filtering options and it's IF rejection characteristics. Wide filtering will enable you to work the largest spectrum with out retuning your transceiver, but can also cause problems when there are strong adjacent signals. A narrow (RTTY or FSK) filter may help significantly with some radios and situations. However, many transceivers do not have narrow filtering options while operating in SSB modes. Consult your manual and experiment for the optimum configuration for your setup and conditions. The following waterfall display shows MixW's panoramic display advantages of using a wide filer setting on the transceiver:

MixW Settings

Mode will be set to MFSK of course. Click on the mode box in the status bar and select MFSK. Next bring up the "Mode Settings". This can be done one of several ways, see General Operation , but the easiest is to click on the mode box in the status bar and select "Mode Settings". This brings up the following dialog box:



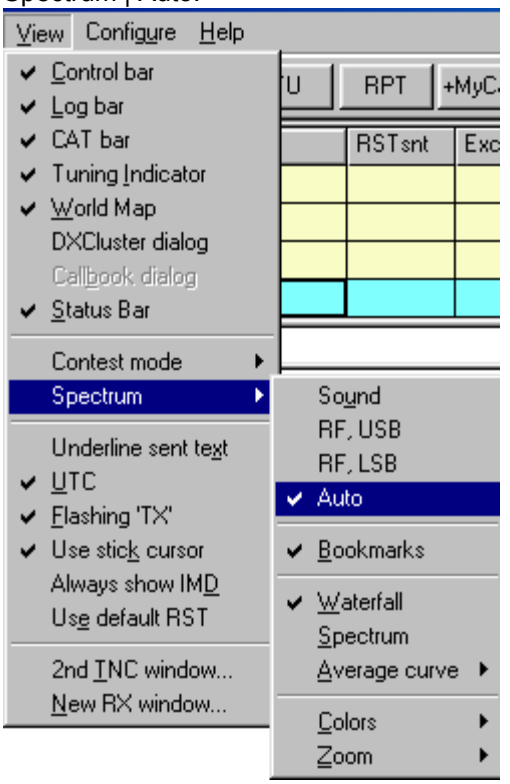
The TX and RX frequencies are set to wherever your cursor is in the spectrum window. I recommend this be around 1500 Hz, which keeps your transceiver operating close to the center of its pass band. Your other options are AFC, which should always be set to ON for MFSK operation due to the critical nature of MFSK tuning. Squelch and the Squelch threshold can be adjusted to limit garbage characters, but you can also miss characters by using squelch as well. The MFSK tones can also be inverted by checking the Inverted box.

Inversion: Note: This feature works differently in MixW than most other SoundCard digital programs, so please read and understand the following information to avoid confusion while operating:

In MixW, "Inverted" means to invert the Mark and Space tones from the normal operating standards of the active mode. This feature can be used in cases where the station you are attempting to work is inverted. The MixW options for RF, USB/LSB must be configured to reflect your mode of operation by selecting Configure | Spectrum | RF, USB or RF, LSB. These must be set correctly in order for the frequencies in the displays to represent your actual operating frequencies, and for MixW to automatically adjust the inversion settings based on your RF mode.

To illustrate: When using a traditional hardware TNC, RTTY is almost always operated in the LSB mode, utilizing a 170 Hz shift between the MARK and SPACE tones, with the MARK tone being the higher in frequency. If MixW is set on "RF, LSB" it will set the Mark tone as the higher tone. However, if MixW is set on "RF, USB" then the Mark tone will be set to the lower tone. (You can think of this as an automatic inversion if you like). In other words, if MixW is configured correctly (it needs to know if you are using LSB or USB) then it will automatically adjust your Mark and Space tones for you. You would only use the "Inverted" feature to operate inverted from the standard practice of that mode of operation, regardless of whether you're using USB or LSB.

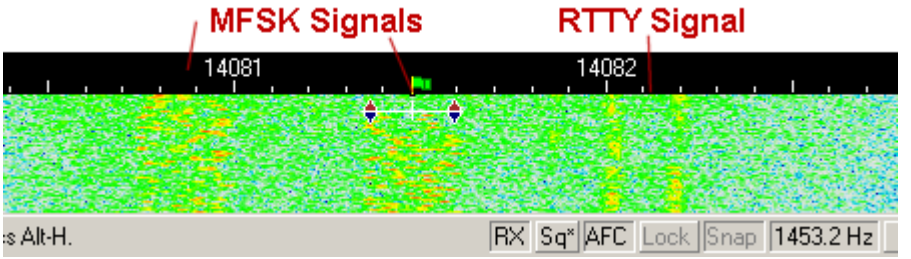
If you are configured to use the CAT features of MixW, (see Configuration for more information) the USB/LSB and frequency changes will all be done automatically for you by selecting Configure | Spectrum | Auto:



Now, MixW will automatically know if you are using USB or LSB, as well as your operating frequency by polling your transceiver via the CAT feature. Your MixW operating frequencies (in the spectrum display as well as the log and CAT bars) will also automatically represent the audio offset, which will be either plus or minus your transceiver's frequency, depending on if you're operating LSB or USB. If you are not using CAT to determine your mode and frequency, you can still set your RF, USB/LSB parameters manually from this menu.

Tuning MFSK

The bulk of MFSK activity is at 14.080 MHz. You can easily recognize the sound of MFSK once you have heard it. It sounds a lot like RTTY, only with multiple, rather musical tones. The following tuning display shows the distinctive waterfall pattern of MFSK16:



As you can see, the multiple MFSK tones are dispersed throughout the bandwidth of the signal while the two distinct Mark and Space tones of the RTTY signal are at the edges of the bandwidth. You can also see that MFSK16 uses just slightly more bandwidth than the standard 170Hz RTTY signal. To tune an MFSK signal, click the cursor in the middle, then adjust it to either side by using the CTRL- Arrow keys until you start receiving text in the RX window, and the AFC locks onto the signal. You may find that it takes a little longer to tune MFSK than RTTY or even PSK. You will also notice that the RX text will come in batches instead of a steady stream.

Transmit: To switch between transmit and Receive simply press the Pause/Break key, click on the TX/RX box in the status bar, or select Options | RX, or Options | TX from the menu bar. For additional information on general operating procedures see General Operation.

As with most of the other digital modes, It is possible to open multiple RX windows and switch the active window (the one you will be sending to) between them. For this and other general operation techniques see General Operation.

PACTOR - Short system description **from the website of RICHARD B. GRIFFIN, NB6Z, used by permission:** http://www.teleport.com/~nb6z/

I. Introduction

PACTOR (PT), specially designed for operation in noisy and fluctuating channels, is an improved half-duplex synchronous ARQ system combining the reliability of PR with the fixed AMTOR time frame.

Principal design considerations

PACTOR comprises all important AMTOR or PR (2-way) characteristics:

- fixed timing structure and full synchronism to ensure maximum speed
- fast and reliable changeover / break-in
- required bandwidth less than 600 Hz
- 100% ASCII compatible (true binary data transmission)
- extremely low probability of undetected errors (16 bit CRC)
- independent of shift polarities
- no multi-user overhead in a narrow-band channel
- inexpensive hardware (Z80 single-board)
- high operational comfort (built-in message storage system, etc.)
- listen-mode (monitor)
- FEC-mode (CQ-transmissions etc.)

As a novelty in Amateur RTTY, some additional powerful features have been realized:

- optimal coherent mode, i. e. system clocks locked to frequency standards (e.g. DCF77, TV deflection signals and other high precision broadcasts)
- online data compression (Huffman coding)
- automatic speed change (100/200 baud) without loss of synchronization
- fully acknowledged link termination (no QRT-timeout required)
- memory ARQ (even noisy packets can be restored)

II. System Details

1. Timing

The basic PT transmission frame is very similar to AMTOR; blocks (packets) containing data information are acknowledged by short control signals (CS) sent out by the receiving station.

Shift levels are toggled with every cycle in order to support memory ARQ (see below). Since the shift polarity is clearly definined at synchronization time, any conventions concerning 'mark/space' become obsolete.

- cycle duration : 1.25 sec
- packets : 0.96 sec = 192 (96) bits at 200 (100) baud
- control signals: 0.12 sec = 12 bits, each 10 msec long
- CS-receive gap : 0.29 sec

Change of transmission speed only alters the internal packet structure; all other timing parameters remain constant.

2. Packets

General packet structure:

/header/..20 (8) data bytes at 200 (100) baud../status/CRC/CRC/

header : This byte enables fast synchronization and delivers auxiliary information (memory ARQ, listen mode)

data : arbitrary binary information

status : system control byte (2 bit packet number, tx-mode, break-in request, QRT)

CRC : 16 bit cyclic redundancy check based on CCITT polynomial X^16+x^12+x^5+1, calculated over the entire packet (except header)

3. Control signals (CS)

Four CS are used. As a compromise between reliability and fast detection, a CS length of 12 bit was chosen.

CS1: 4D5 CS2: AB2 CS3: 34B CS4: D2C (all hex numbers, LSB right)

The mutual Hamming distance is 8 bit, thus minimizing the chance of receiving a false CS. CS1/2

and CS3/4 form symmetrical pairs (bitreverse patterns). CS1..3 have the same function as their AMTOR counterparts; CS4 serves as the speedchange control. In contrast to AMTOR, CS3 is transmitted as head portion of a special changeover packet (see below).

The calling station ('master') sends special synchronization packets: /head (100 bd)/..address (8 bytes, 100 bd)../..address (8bytes, 100 bd) Normally, the receiver only uses the 100-baud-section to achieve a fast synchronization. The 200-baud-section supplies additional information about the channel quality: if it is received correctly, the first CS will be CS4, otherwise CS1 is sent. After in turn having synchronized a CS4 or CS1, the master will continue with sending normal data packets at 200 or 100 baud, respectively. The first transmitted characters contain the 'system level number' (PACTOR software-version), followed by the master address (callsign).

5. Changing the transmission direction

Similar to AMTOR, the receiving station (RX) can change the transmission direction whenever it has received a valid packet. For this purpose a special changeover-packet is transmitted, starting at the CS time frame. The transmitting station (TX) will switch to RX mode immediately after it has received the CS3 which forms the first section of the changeover- packet. It then reads in the rest of that packet and transmits a CS (CS1 and CS3 = acknowledge, CS2 = reject) timed at the last three bytes of the former packet frame.To force a break in, the TX sets the BK-status-bit (this corresponds to AMTOR '+ ?').

6. Speedchange

Speeddown only being useful in poor conditions or at low data input rates (e. g. manual typing), both directions are treated unsymmetrically.

i) Speeddown

The RX may request speeddown after any incorrectly received packet by sending CS4, which immediately forces the TX to build up 100-baud-packets (any unconfirmed 200 baud information is repeated at low speed).

ii) Speedup

Any valid packet may be confirmed with CS4, forcing a TX speedup. In case the following high-speed-packet is not acknowledged after a number of tries, the TX will automatically perform a speeddown. (For more details, refer to 'PT-Handbook' by WAA Research Group).

7. Termination of a PACTOR contact

Cutting an ARQ link inevitably leads to the problem that information has to be transmitted without final acknowledgement (Second WAA theorem). PT applies special QRT packets, providing an expensive but rather effective solution. These packets contain an active QRT status bit and he RX address in byte-reverse order (low speed pattern). If this address is found during the standby synchronization procedure, the RX responds with a single transmission of the final CS (The timing relations before stby are stored). This method will always guarantee a well-defined QRT.

8. Data Compression

Character frequency analysis of typical english or german texts shows that the average amount of information per character does not exceed 4 bits. For that reason, ASCII text transmissions often carry a redundancy of 50%, which could be avoided by using a vriable length code matched to the character distribution.The most popular example of such a code is the Morse code; PACTOR data compression mode applies Huffman coding with nearly optimum efficiency, yielding up to 100% speed gain. Every packet contains a compressed data string; character code lengths vary from 2 to 15 bits.

9. Memory ARQ

In conventional ARQ systems the TX has to repeat a packet until it has been received completely error-free. It is evident that the probability of receiving a complete packet dramatically decreases with lower S/N ratio. The only way to maintain the contact in that case is to shorten packet length and/or to apply error correcting codes which in turn will greatly reduce maximum traffic speed when conditions are good. The method chosen by WAA Research Group is to sum up corresponding bit samples of subsequent packets and to test if the mean value (reduced to a 0/1-decision) passes the CRC. To keep quantizing errors small, the samples are taken from the FSK-demodulator low-pass-filter output by means of an 8-bit AD-converter. Assuming white Gaussian noise, this accumulation method - also known as 'memory ARQ' - will obviously converge even at a WA4EGT, QRA WA2MFY/SYS1: low

S/N ratio. Furthermore, since shift levels are toggled with every transmission, constant interfering signals within the receiver passband will not affect the resulting mean value. To prevent accumulation of old request packets, the header is inverted with every new information packet, thus serving as a RQ indicator (similarity test).

10. Listen Mode (Monitor)
This mode resembles Packet Radio monitoring: the receiver scans for valid packets which are detected by CRC match. This 'brute force' method was chosen in order to ensue maximum flexibility, although it consumes a considerable amount of the available CPU capacity.

11. FEC Transmissions
CQ and bulletin transmissions are supported by means of a special non- protocol mode. Packets are transmitted with one or more repetitions; the CS receive gap is omitted. Since the listen mode does not require synchronization, the transmitting station possesses great freedom of selecting packet repetition rateand speed.

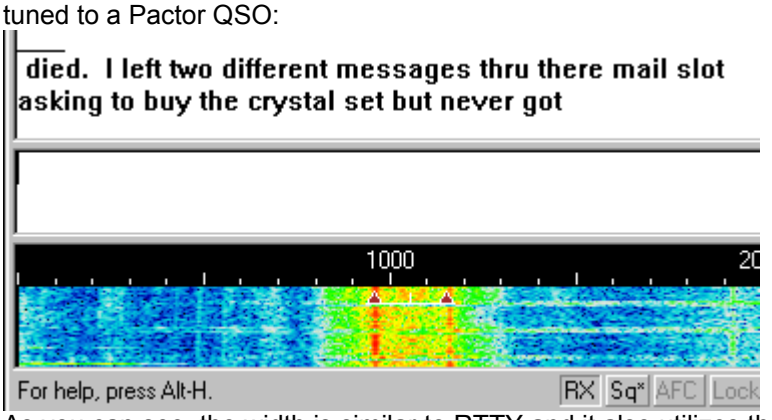
12. Practical Aspects
The first PACTOR programs were running on 'breadboarded' Z80 singleboard- computers. These early experiments led to the development of a stand-alone 'PACTOR- Controller' with built-in modem and tuning-display.The conven- tional operating modes BAUDOT and AMTOR were added in order to maintain compatibility and - what might be more interesting - to allow easy comparisons. Assuming typical conditions, PACTOR traffic can be expected to run 4 times faster than over a AMTOR link.

MixW, Pactor Operation

If you have not already done so, read the General Operations Topic For suggested Pactor frequencies click Pactor Frequencies

This release of MixW version 2 supports Pactor receive via the same soundcard interface used for the other digital modes. However, you will not be able to transmit Pactor without using a hardware TNC, which which has been properly configured in MixW. See TNC Configuration and operation for additional information.

To receive Pactor without a TNC, simply set the mode for Pactor by selecting Mode | Pactor from the main menu, or by clicking on the Mode box in the Status Bar and selecting Pactor. Pactor sounds like chirping bursts of packet like transmissions. The following picture shows the waterfall-tuning window tuned to a Pactor QSO:



As you can see, the width is similar to RTTY and it also utilizes the same two-diamond-with-a-bar indicator that RTTY, MFSK, and packet uses.

Amtor Introduction and Theory **BY TONY LONSDALE, VK2DHU**

AMTOR is a specialized form of RTTY. The term is an acronym for AMateur Teleprinting Over Radio and is derived from the commercial SITOR system (Simplex Telex Over radio) developed primarily for Maritime use in the 1970s.

In the late 1970's, Peter Martinez, G3PLX, made several changes to the SITOR protocol, which rendered it suitable for amateur radio use, and called it AMTOR.

AMTOR improves on RTTY by incorporating a simple Error Detection technique. The system remains relatively uncomplicated but AMTOR performs well even in poor HF conditions. While there can still be many errors in AMTOR data, the Error Detection helps a lot and the result is quite tolerable for normal text mode conversations because of the high redundancy in plain language text. While this is certainly much better than RTTY, for more critical data such as program code, or even some technical information messages, NO errors can be tolerated.

There are two modes used in Amtor: ARQ and FEC.
MixW currently supports the FEC mode only.

ARQ: This mode is a little different in that it is a Synchronous protocol, which means both stations are synchronized to each other's signals.

In ARQ mode (Automatic Repeat Query), sometimes called Mode A, data is sent in groups of 3 characters. Although each character is only 5 bits (same as for RTTY), two additional control bits make it up to 7 bits per "character" and they are set so there are always 4 marks and three spaces in every transmitted character. If the receiving station gets some other combination it knows an error has occurred. The 40 percent overhead is considered worthwhile to get some error detection. This technique can identify a lot of errors that might occur but is not as thorough as the methods used in PACTOR and Packet, which we look at later.

The receiver responds to each 3-character group by sending either an ACK (ACKnowledge) code (if OK) or a NAK (Negative AcKnowledge). Each time the transmitting station gets a NAK, that 3-character group is sent again.
If you listen around on the HF bands in the recognized Data Segments of the bands, you might hear a chirp-chirp sound that identifies an ARQ transmission. Even when there is no data actually being transmitted, the transmitting station continues to send idle "chirps" to maintain the link.

Your AMTOR equipment probably supports a Listen Mode too and that allows you to monitor another ARQ session even though you are not participating in the session with the usual acknowledgements. Of course that means you don't get the opportunity to say "NAK" if you don't copy something properly!

FEC: In FEC mode (Forward Error Correcting), sometimes called Mode B, the sending station sends each character twice so this mode provides a means of transmitting to several stations at once. The receiving station does not acknowledge the data received. If a receiving station matches both instances of a character, that character will be printed, otherwise some error symbol is printed. This mode does not provide for the receiver to ask for the missing data to be retransmitted. An FEC transmission sounds more like a Baudot RTTY signal.

The two stations need to keep in phase with each other so each FEC transmission is started with several sets of "phasing pairs" and these are sent at regular intervals even while there is no data being transmitted.

FEC Mode is still better than ordinary RTTY but its error detection is not as reliable as that in the ARQ Mode.

AMTOR systems are still limited to the technology of the 60s with limitations such as the character set and the maximum transmission rate (100 baud) geared to the mechanical teleprinter. The Error Detection technique provides improved accuracy over the "vanilla" RTTY mode, but is still not entirely reliable. It is perhaps better termed Error Reduction than Error Detection and has limited application for critical data.

AMTOR Opertaion

Mix

If you have not already done so, read the General Operations Topic For suggested AMTOR frequencies click Amtor Frequencies

Amtor settings are much like those used for RTTY operation.

Transceiver Settings

Fine Tuning: If your transceiver is equipped with a "FINE" tuning feature, always use that for AMTOR tuning once you have found AMTOR activity, however, most of your adjustments can be made in software, and not with the transceiver's VFO if you prefer. In the PSK31 modes alomost all tuning is done in software. For AMTOR, I prefer to tune with the VFO. Some older rigs are really not stable enough for PSK31 operation and will drift considerably off frequency, but because of the wider bandwidth, they are fine for AMTOR. (TIP, when starting your QSO make note of the Starting Frequency, this way you can see how badly the other station is drifting and observe the stability of both rigs) Note: when dragging the Mouse pointer into the Spectrum window the cursor changes from the typical arrow shaped pointer to a checkered thin line if that option is selected in View | Use stick cursor.

Processor: Depends on the operating conditions. It can aid in the printability of your signal in certain conditions, but start with it **off as a general rule**.

Pre-Amp: This can be on or off depending on the operating conditions. It can help when working weaker stations in certain situations, but can also make things worse if there are strong adjacent signals.

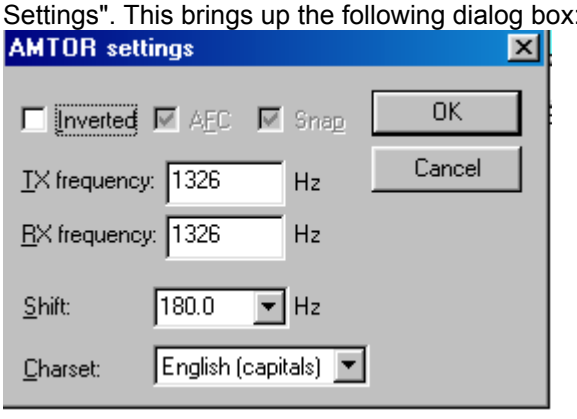
LSB: Almost all AMTOR operators use LSB transmissions and a 170Hz shift between the MARK and SPACE signals, with the MARK signal being the higher in frequency.

VOX: Depends on how your switching between RX and TX., See Basic Set Up

Filtering: Optimum filtering depends on your transceiver's SSB filtering options and it's IF rejection characteristics. Wide filtering will enable you to work the largest spectrum with out retuning your transceiver, but can also cause problems when there are strong adjacent signals. A narrow (RTTY or FSK) filter may help significantly with some radios and situations. However, many transceivers do not have narrow filtering options while operating in SSB modes. Consult your manual and experiment for the optimum configuration for your setup and conditions.

MixW Settings

Mode will be set to AMTOR of course. Click on the mode box in the status bar and select AMTOR. Next bring up the "Mode Settings". This can be done one of several ways, see General Operation, but the easiest is to click on the mode box in the status bar and select "Mode Settings". This brings up the following dialog box:



The TX and RX frequencies are set to wherever your cursor is in the spectrum window. I recommend this be around 1500 Hz, which keeps your transceiver operating close to the center of its pass band. Shift is selectable (if you don't see what you want in the drop down box, any number can be typed in). Most AMTOR uses a shift of 170 Hz You can also set the Character set for the language you will be using. You can also invert the Mark and Space signals by checking the "Inverted" box.

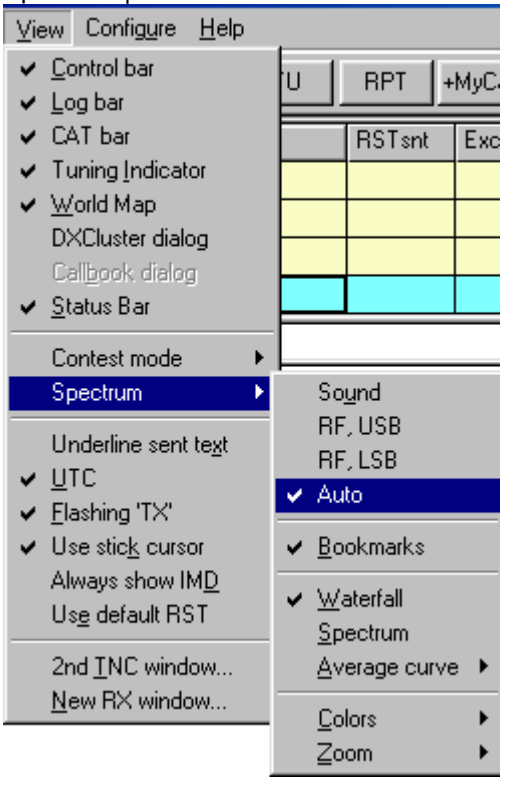
AFC can be **on** to assist in tuning the AMTOR signals. After tuning, I generally click AFC Off unless I need to track a drifting station, or I am in a NET were I need to copy several stations that may be slightly off frequency from one another. AMTOR tuning is not near as critical as PSK31 tuning, so AFC is more of an option than a necessity.
Lock should be **off** so you will be transmitting on the same frequency you're receiving on. The exception here would be if you're working a station that is drifting and want that station to find your more stable frequency each time.
Inverted: when clicked will invert the positions of the MARK and SPACE frequencies. If you appear to be tuned into a strong signal and are only copying garbage, try clicking **Mode | Inverted, or clicking the box in the AMTOR settings.** You will often find the station start to print 100 percent as a result.

Inversion: Note: This feature works differently in MixW than most other SoundCard digital programs, so please read and understand the following information to avoid confusion while operating:

In MixW, "Inverted" means to invert the Mark and Space tones from the normal operating standards of the active mode. This feature can be used in cases where the station you are attempting to work is inverted. The MixW options for RF, USB/LSB must be configured to reflect your mode of operation by selecting Configure | Spectrum | RF, USB or RF, LSB. These must be set correctly in order for the frequencies in the displays to represent your actual operating frequencies, and for MixW to automatically adjust the inversion settings based on your RF mode.

To illustrate: When using a traditional hardware TNC, RTTY is almost always operated in the LSB mode, utilizing a 170 Hz shift between the MARK and SPACE tones, with the MARK tone being the higher in frequency. If MixW is set on "RF, LSB" it will set the Mark tone as the higher tone. However, if MixW is set on "RF, USB" then the Mark tone will be set to the lower tone. (You can think of this as an automatic inversion if you like). In other words, if MixW is configured correctly (it needs to know if you are using LSB or USB) then it will automatically adjust your Mark and Space tones for you. You would only use the "Inverted" feature to operate inverted from the standard practice of that mode of operation, regardless of whether you're using USB or LSB.

If you are configured to use the CAT features of MixW, (see Configuration for more information) the USB/LSB and frequency changes will all be done automatically for you by selecting Configure | Spectrum | Auto:

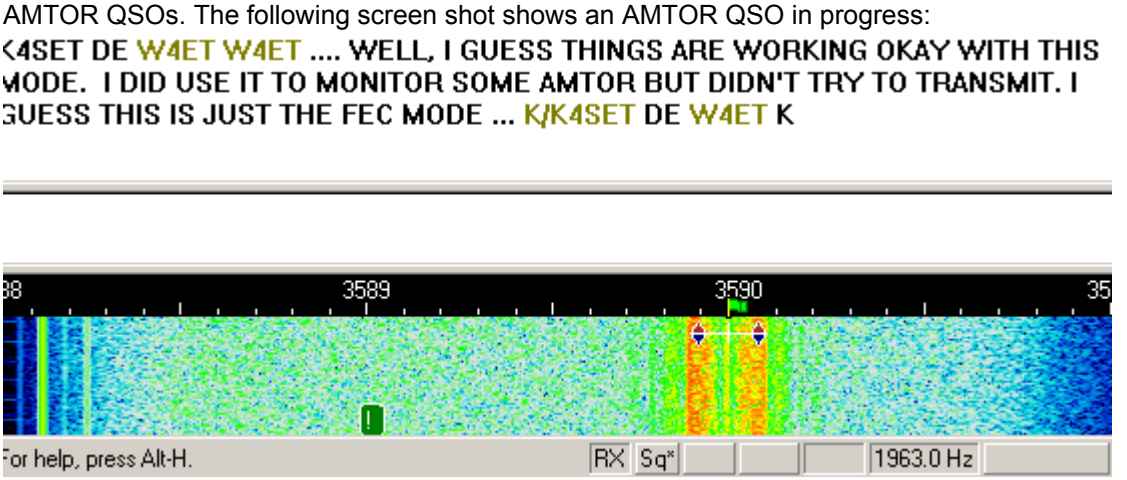


Now, MixW will automatically know if you are using USB or LSB, as well as your operating frequency by polling your transceiver via the CAT feature. Your MixW operating frequencies (in the spectrum display as well as the log and CAT bars) will also automatically represent the audio offset, which will be either plus or minus your transceiver's frequency, depending on if you're operating LSB or USB. If you are not using CAT to determine your mode and frequency, you can still set your RF, USB/LSB parameters manually from this menu.

Squelch and Threshold are not currently options for AMTOR.

Receiving AMTOR

AMTOR signals display as two parallel lines usually 170HZ apart (roughly four times wider than PSK31 tracks), and resembling wide railroad tracks in the Spectrum Window. Tune in a AMTOR signal by pointing right in the center of the two tracks with the mouse and clicking the left mouse button. The text being sent by the station will then appear in the Receive Window. The AMTOR tuning indicator is comprised of two diamonds, which are linked together with a bar and separated by the shift width you have selected in options dialog. The diamonds will move together to track and tune AMTOR QSOs. The following screen shot shows an AMTOR QSO in progress:



I prefer to leave the tuning indicators in a position at roughly 1500 Hz (or centered in my Spectrum window) and then use the transceiver VFO set on "Fine" to tune in the AMTOR signals.

Transmitting AMTOR

To transmit to a station, first tune it in as indicated above. Type outgoing text in the Transmit Window, which is the smaller window between the Receive Window and the Spectrum Window. Press the T/R button (or the Pause/Break key, or click on the TX/RX box in the status bar), and the text in the Transmit Window will be transmitted. You can continue to type, and that text will also be transmitted. As it is being transmitted, text in the transmit Window will also appear in the Receive Window. To stop transmitting, press the T/R button (or one of the other toggles) again. Pressing ESC will abort transmission and return MixW to receive mode, but the last several characters typed will not be transmitted. For this reason, the T/R button (or one of the other toggles) should be used to switch from transmit to receive.

Note: AMTOR, like RTTY, utilizes a limited character set, using UPPER CASE LETTERS ONLY. MixW will automatically convert lower case letters to upper case. You will also notice that not all punctuation marks are supported, although most of them are. The following characters are supported: - ( ) $! " / : ? .

When transmitting, the waterfall will freeze and remain frozen until returning to Receive.

The standard operating mode for AMTOR utilizes a 170 Hz shif between the MARK and SPACE tones, with the MARK tone being the higher in frequency.

When you are transmitting, and not typing or sending text, the Transmit Volume should be increased until the RF output power of the transceiver just stops increasing, and then reduced until the power falls to half of the amount when it just stopped increasing. This should result in maximum undistorted output power under AMTOR operation. However, some transceivers cannot handle the full duty cycle of AMTOR without overheating. In this case, quickly reduce the power until the transceiver is running

at the recommended power output for continuous-duty operation.

MSYS PACKET BBS COMMAND SUMMARY ... Version 1.18 (The first letter alone will invoke most major commands: example, B = Bye)

Note: The MSYS commands are used on many other PBBSs as well.

A Commands
Abort.....Stop current action

B Commands
Bye.....Disconnect

C Commands
Conference.....Multi-user/DX Node

D Commands
Download.....Download from FILES

G Commands
Grep.....String search file

H Commands
Help.....Help

I Commands
Information.....PBBS hardware
Info.....Basic Information
ID.....Port definitions

J Commands
Just Heard.....Log
JB.....BBS Stations
JD.....Digipeaters
JG.....Gateways
JK.....K and KA nodes
JM.....MSYS PBBSs
JN.....Net/Rom
JT.....TCP/IP protocol

K Commands
Kill.....Kill a message
KM.....Kill mine
KT.....Kill traffic
K-Nodes.....K-Node output

L Commands
List.....Message headers
L x.....List category x
LC.....List categories
LM.....List mine
LN.....List not read
LT.....List traffic
LL.....List last message
LL #.....List last #
LO #.....List older #=yymmdd
LU.....List unread to you
LY.....List read to you
LW.....List weather
L?.....List ? forward
L<< x.....List fm x=callsign
L>> x.....List to x=callsign
L@ PBBS.....Messages to PBBS

L #.....List since #
LL #.....List last #
L # #.....List from # to #
L"x".....List with x=string
L'x'.....List with x=sTrInG
L$.....List bulletins

M Commands
Message.....Message of the day

N Commands
The N commands are used while to give the BBS your information, either the first time you log on, or if you need to edit your information:
Name.....First name
NH.....Home board
NQ.....QTH=City,
NZ.....Zip code

P Commands
Path.....Path to a user
PF.....Path to a PBBS
PC.....Request a callsign

R Commands
Read.....Read a message
R x.....Read all category x
R@ xxxx.....Read all at xxxx BBS
R> xxxx.....Read all to xxxx
R< xxxx.....Read all from xxxx
RM.....Read Mine
RE.....Read for export
RH.....Read with headers
RN.....Read only text
RP.....W/O mark as read
REPly #.....Reply auto title
REP # .....Reply to given message number. If you put a period after the number, a title will automatically be generated. Same as SR command.
The following variations of the R command read messages:
R # # ..... Reads the given message numbers Ex: R 12734 11521 27185
RM .....Reads your messages (Read Mine)
R .....category Reads the messages in a given category ("TO" field). Ex: R SALE
R> .....callsign Reads msgs with given "TO" field
R< .....callsign Reads msgs from given callsign
R@ .....callsign Reads msgs with given @BBS Ex: R@ ARRL
RH # # .....Like R but displays all the R: lines as well (Read Headers)
RP # # .....Like R but doesn't mark msgs as read (Read Preview)
RN # # .....Like R but gives msg text only (Read Noheaders)
RE # # .....Reads the given message numbers in export form (Read Export)
REM .....Reads all messages to you in export form (Read Export Mine)
#RS .....Reads all messages to SYSOP (Read Sysop)
#RES.....Reads all messages to SYSOP in export form (Read Export Sysop)
#R* .....Reads held messages showing text
#R+ .....Reads held messages showing why held verbosely
#R- .....Like R+ but very concise
Typically, after a screefull of lines is displayed on your terminal, you will be asked:
More? [Y]es, No or Continuous
Press just return for next screenfull, N to quit reading this message or category), or C to display all the rest without pausing. The number of lines per screen is set by the X command.

> REQDIR

To list files in subdirectory XXX, put /XXX in the title of a msg to REQDIR.
For information on how to request a file, send a msg to REQFIL and put
REQFIL.HLP in the title.

> REQFIL

To request a file, send a private message to REQFIL at this BBS. Put in the
title the name of the file you want. If the file is in a subdirectory,
include the name(s) of the subdirectories. Examples:
SP REQFIL @ WA8BXN
REQFIL.HLP

S Commands

The S command is used to send messages. It several formats:
SP call @ bbscall.haddr Send a private msg Ex: SP K8EIW @ WB8BII.OH.USA.NA
ST zipcode @ NTSst Send traffic msg Ex: ST 44070 @ NTSOH
SB category @ route Send a bulletin Ex: SB NEED @ ALLOH
SR msg# Send reply Ex: SR 12723 or SR 12723.
In SB if call is a user of this system you can omit the @ bbscall.haddr
In ST, NTSst means to replace st with the state its going to: OH for Ohio, etc.
In SR, if you put a period after the msg #, a title will automatically be made
by preceeding the original title with RE:
IMPORTANT: SR tries its best to determine where the reply should go, but
it is not always perfect! The same applies to the REP command.
Never uses SSID's in callsigns (ex: don't use WA8BXN-2, just use WA8BXN)
Hierarchical addresses are of the form state.country.continent. Other parts
may be used by a particular BBS, if you know them, use them.
When sending personal messages to a distant bbs, it is a good idea to put
the destination city and state in the title.
When you are done typing your message, end it with either ^Z (Control-Z) or
Putting * at the beginning of a line makes it a comment.
It also suppresses the next command prompt (but the system will
be waiting for another command). * is useful to answer the SYSOP if you
get a MESSAGE FROM SYSOP ...

Send.....Send a message
^A.....Abort message
CC.....Carbon copy
SP.....Send personal
ST.....Send traffic

T Commands

The T cmd is used to connect to the sysop's keyboard. This if the sysop is present you may enter into a direct conversation. If there is no response from the sysop in 60 seconds you will be returned to the BBS. TCP/IP Telnet users note: Server 87 connects directly to the keyboard without going through the bbs.

U commands

The U cmd lists the current users of MSYS and what they are doing. The UP command may be used to upload ASCII files. You must be authorized by the SYSOP to upload files. After you use the UP command you will be asked the file name to upload. Follow the prompts given by the command.

V Commands

The V command gives the version of this software.
Version.....Version

W Commands

The What command lists the available files for downloading. The format: W - Lists all files with sizes.
A directory name may be specified to list files names in directories that appear in the list.
What.....Download list
W x.....What in x=subdir

X Commands
The X command can be used to set a variety of options. If no argument is given, X simply toggles and displays the new Expert status. If a number is given after X, this is the number of lines to display for a command before asking More? To continue displaying the current message when More? is sent press return. To abort the message, type N and then return. This facility has been added to prevent a long message from scrolling off your screen faster than you can read it. Experiment with different values until you find one that pleases you. To not use this facility, set the number of lines to zero.
Examples:
X.....Toggle expert
X 20 (pause after every 20 lines) X 0 (don't pause ever)
XF Set "fast" mode: BBS will put more than one line per packet
XS Set "slow" mode: BBS will put only one line per packet.
Note: If you have very good path to bbs, use XF. If you have a poor
path to bbs, use XS since short packets make it through easier.
XC..... toggles the automatic display of msg catagories when you connect to the
bbs and are using non-expert mode.
XR toggles the automatic asking if you want to reply to a msg after you read
it. Can be useful if you get a lot of personal mail.
XU toggles the automatic display of Unread mail when you connect.
X #.....Lines per page

Y Commands
Yapp.....Down and uploads
YW.....YAPP Directory
YD.....Download a file
YU.....Upload a file
YW .....Lists available files for YAPP Download
YD filename Downloads specified file using YAPP protocol
YU filename Uploads specified filename using YAPP protocol

*.....Comment to sysop

^ZH.....Conference help
^ZQ or /ex.....Return to PBBS
^ZU.....List users
^ZA #.....Invite user on #

^Z gets you this file, as you may already know!
SP REQFIL @ WA8BXN
XXX\NEWFILE.DAT
^Z
would get you file NEWFILE.DAT from directory XXX.
SP REQFIL @ WA8BXN
STUFF.BAS @ K8EIW
^Z
would send the file STUFF.BAS back to you at BBS K8EIW, instead of the one
from which you sent the message.
NOTE: YOU CAN REQUEST ONLY ONE FILE PER MESSAGE TO THE SERVER!

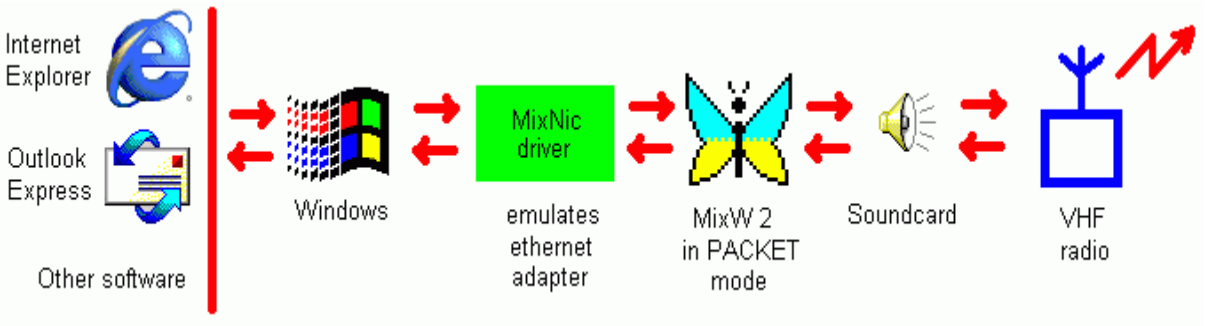
NETWORK NODE COMMANDS
BBS.....Connect to the PBBS
Bye.....Disconnect
Connect CALL...Connect to call
C# CALL...C on port # to call
Help.....Help
Nodes.....Nodes heard
Justheard.....Limited output JH
Nodes CALL..Info on node
Ports.....Port information

Routes.....Direct connect nodes
Route CALL..Other node
State Talk.....Page Sysop
Users.....Users/nodes

MixW now supports TCP/IP over AX.25

State of the art digital mode software by Nick Fedoseev, UT2UZ.

MixW 2 now supports TCP/IP over AX.25 (datagram mode). This means that you can use standard Windows' software to communicate with other TCP/IP systems (UNIX/Linux, AGW Packet Engine, Flexnet, MixW 2) over a VHF radio channel.



Download the virtual network adapter driver for Windows 98/ME/2000/XP from Nicks website by clicking here:
http://ham.kiev.ua/~nick/mixw2/MixNic6.zip

Or, for early Windows 98 versions:
http://ham.kiev.ua/~nick/mixw2/MixNic6Old.zip

Unzip the files to a separate folder and see the ReadMe.txt file for installation instructions.

These drivers have been tested with Windows 98 SE 4.10.2183A, Windows 2000 5.00.2195 SP2, Windows XP 5.1.2600.

MixW, HF Packet Introduction

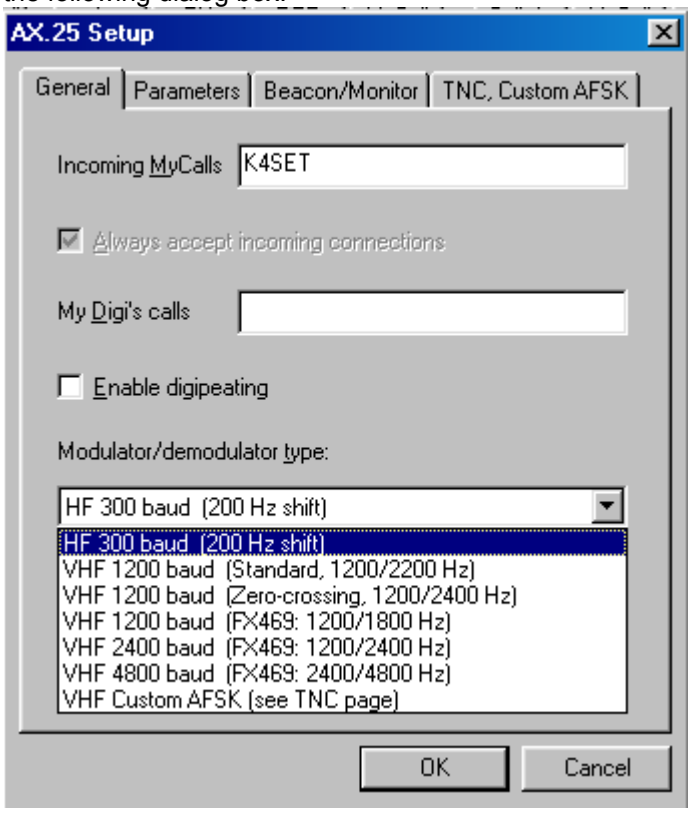
This topic is still under development, K4SET.

MixW, HF Packet Operation

If you have not already done so, read the General Operations Topic For suggested Packet frequencies click Packet Frequencies

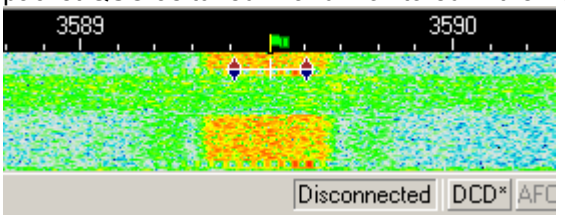
MixW has many options for Packet operation including both HF and VHF configurations. For VHF packet information see VHF Packet Operation.
MixW offers many user settable timing parameters, as well as the ability to send beacons, and act as a digipeater.

Switch to the Packet mode by selecting Mode | Packet, or by clicking on the Mode box in the Status bar and selecting Packet. Next, open the settings dialog box by selecting Mode | Mode settings, or by clicking on the Mode box in the Status Bar and selecting Mode settings from the list. This will bring up the following dialog box:



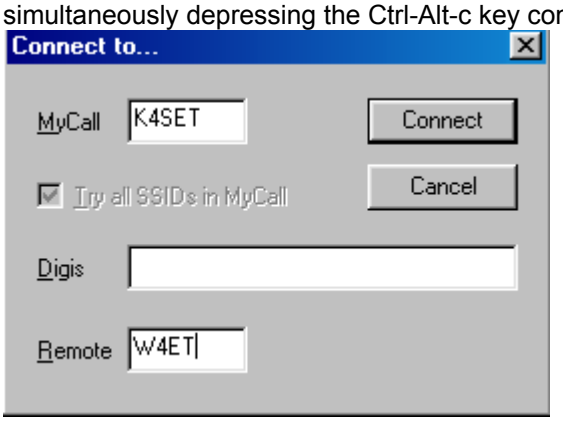
Enter your callsign and select "HF" for the mode you wish to operate. All HF packet operations are using 300 Baud at the present time, as conditions on HF do not support the higher baud rates. If you wish to act as a digipeater, enter your digipeater call sign here and check the box to enable digipeating. **Note**: This is more common for VHF packet. The Parameters, Beacon/Monitor, and TNC tabs can be ignored for the present. However, you can customize your packet timing parameters in order to facilitate connecting to certain BBSs or other unique situations by clicking on the Parameters Tab. The default settings here seem to work best for my operations. The Beacon/Monitor tab can be used to set your beacon text and parameters, and the TNC window can be used if you have a hardware TNC and want to use it instead of your soundcard for packet operation.

Next you need to find a packet station or PBBS to connect too. The following screen shot shows a packet QSO as tuned in and monitored in the waterfall display:



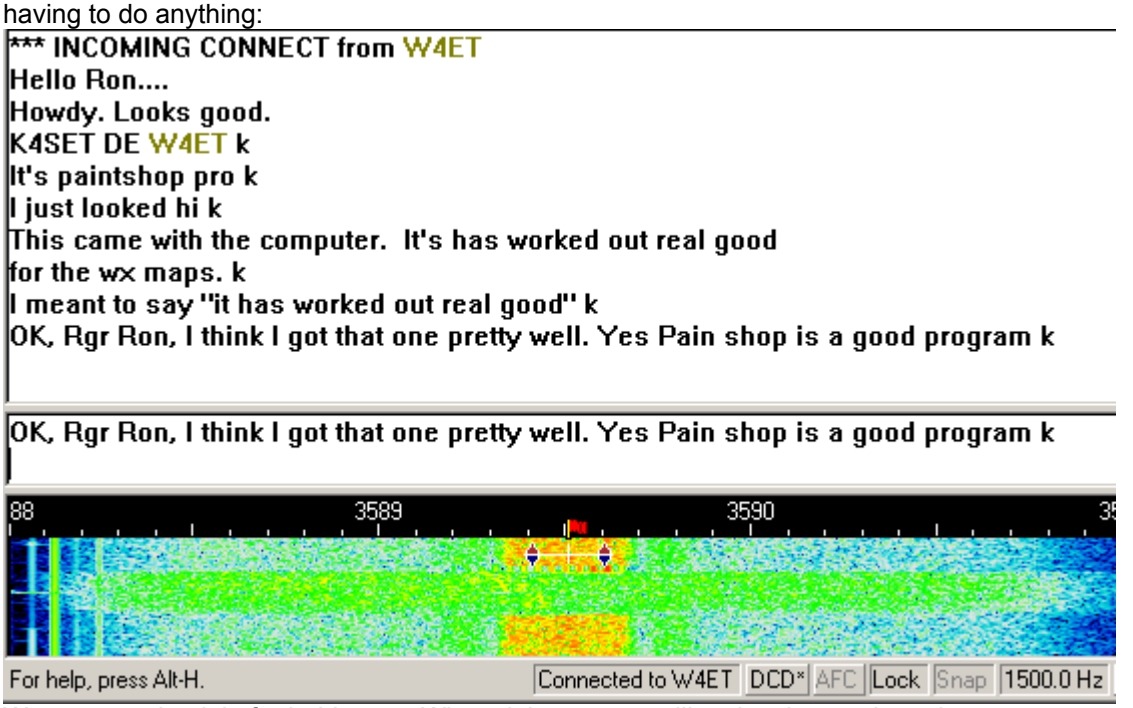
Tune a Packet signal by pointing right in the center of the signal with the mouse and clicking the left mouse button. You may need to fine tune by using the Alt-arrow keys. The text being sent by the station will then appear in the Receive Window. The Packet tuning indicator is comprised of two diamonds, which are linked together with a bar. The diamonds will move together to track and tune Packet connections.

Unlike unconnected protocols like RTTY, PSK, and MFSK, once you have tuned in and monitored packet activity you must first connect to the station or PBBS you have received in order to have a QSO or PBBS session. To do this, open the connect dialog box by selecting Mode | Connect, which will bring up the following dialog box: (**Note**: You can also bring up the connect dialog by simultaneously depressing the Ctrl-Alt-c key combination.)



Enter your callsign in the MyCall box and the callsign of the station or PBBS you wish to connect to in the Remote box. If you are planning to connect through a Digipeater path, enter that in the Digis box. Note: Digis are more common on VHF packet than HF. Next, click on the connect button and MixW will initiate a connection with the remote station.

As you can see in the following screenshot, we have now connected directly to Ron, W4ET. (Actually, in this case Ron imitated the connection, and my station automatically connected to him without me having to do anything:



We can type back in forth this way. When doing so you will notice that each station must acknowledge accurately receiving the other station's packets (this happens automatically through the software) so you will notice short bursts of activity while each station responds. During poor band or path conditions it may take several attempts before each station accurately receives the other's packets.

When you are finished with the QSO, or PBBS session, you must disconnect from the remote station by selecting Mode | Disconnect, which will send the disconnect string to the remote station and end your connection and QSO. Note: If you are connected to a PBBS, you should first log off the BBS with the Bye command, then if you remain connected you can initiate the disconnect command, but the BBS will most likely initiate the disconnect process.

For a typical list of PBBS commands see PBBS Commands

MixW, VHF/UHF Packet Introduction, **Adapted from material originally published in Packet Radio: What? Why? How? / Articles and Information on General Packet Radio Topics, TAPR, Publication #95-1. 1995. 130 pages.**

History of VHF/UHF Packet

Packet radio has been around since the mid-1960's, but was first seen on the amateur VHF bands in 1978 through research done in Montreal, Canada in 1978, the first transmission occurring on May 31st. This was followed by the Vancouver Amateur Digital Communication Group (VADCG) development of a Terminal Node Controller (TNC), also known as the VADCG board, in 1980. This was then followed by TAPR, the Tucson Amateur Packet Radio, with the creation of the TNC-1 in 1982 and then the TNC-2 in '84-'85. Over ten years ago, the packet radio revolution ignited when TAPR sold over a thousand TNC-2 kits. The TNC-2 was what was needed to make this mode take off.
There could be another packet radio revolution fueled by MixW, and the other new software that utilizes the soundcard based TNC approach.

With MixW, most amateurs already have what they need to be active with packet. All you need now is some kind of 2M radio, and a reasonably fast computer with a 16 bit or better soundcard. But first, why should you be interested in Packet Radio:

What can I do?

Like any mode in the amateur service, packet provides a group of amateurs with a way of having fun and meeting one of our primary aims, "improving the radio art". But what can you do?

PBBS systems: Most cities have one or more packet Bulletin Board System, or PBBS for short. Many of these are operating on 145.01 MHz in the US. PBBSs do two main things: send and receive personal messages for their local users (like yourself) and send and receive messages or bulletins intended for people locally or around the world. Since the PBBS is part of a national system of other PBBSs, it has the ability to pass information or messages to any other PBBS in the US or the world. The second thing that BBSs do is pass local and national bulletins, which are messages intended to be read by everyone. In this way, amateurs can read the latest messages about the ARRL, AMSAT, TAPR, propagation, DX, and other bulletins on varied topics. Message passing is the primary purpose of a PBBS system, but PBBSs can also support callbook programs, help references, Internet access, and more. For a list of typical PBBS commands see PBBS Commands

Keyboard-to-Keyboard: Like the other amateur modes in MixW, packet radio can be used to talk to other amateurs directly. Amateurs can talk to each other simultaneously using their keyboards when they can directly communicate with each other. With the use of networks, amateurs can talk at a distance beyond the reach of their own stations by using the network. Keyboard-to-keyboard communications is one of the least frequent methods of packet communications, because amateurs are rarely on packet at the same time. Many packet operators send electronic mail using either personal mailboxes or a local PBBS. In this way, messages are read when the amateur is on the air.

DX Packet Cluster: Many cities have DX spotting nodes or networks. HF operators connect to their local DX Packet Cluster in order to receive reports on the latest DX. This type of packet came about from those interested in 'chasing' DX. Many amateurs like to frequent the HF bands looking for rare international operators to contact. A DX Cluster allows many HF operators to be connected over packet radio at the same time while operating HF and hunting for DX. When someone finds a DX station, they send a packet message to the DX Cluster, which then sends the information to all other packet operators using the DX Cluster. In this way, you have several stations monitoring the band, looking for DX. Often an amateur will 'spot' (hear) a DX station and then distribute the DX report almost instantly. DX Clusters allow everyone to operate many harder to find DX stations in one evening than was possible operating alone.

RACES/ARES/NTS and Emergency Communications: Packet radio is being used in many emergency services. Whether packet is used to pass a message accurately and in large quantities or to handle messages passed by the National Traffic System, it can provide an important function like

any other amateur mode when used correctly. A new application called APRS combines GPS (Global Positioning Satellites) with packet radio to allow a master station to plot on their computer the location of all other stations in the field. The purpose is to coordinate the exact position of weather spotters or searchers, without having to waste radio time informing the control station of their locations. Recently, amateurs in Oklahoma have been distributing Doppler Radar images via the packet network. The small weather image file takes but a few minutes to retrieve and display. This helps those amateurs outside of the local ATV coverage to get an accurate weather picture from the Doppler Radar.

Networking: The man packet networking scheme we have is using Digipeaters. Digipeaters work much like a voice repeater works. Digipeaters simply look at a packet, and if its call was in the digipeater field, resend the packet. Digipeaters allow the extension of range of a transmitter by retransmitting any packets addressed to the digipeater.

An average packet station talks in a radius of about 10-30 miles. Packet Networks allow amateurs to widen the area of communications past their line of sight, by having a series of packet stations linked by radio, which can be used to get their packet messages to where ever the network goes. Much like the telephone system, networks provide long distance service outside the local area.
2
Satellite Communications: Many of the amateur radio satellites in orbit contain computer systems that provide packet capability. Most packet satellites provide BBS-like functions for messages to be passed to anywhere in the world within 24 hours. Several contain CCD cameras, which allow amateurs to download images of the earth and some allow users to retrieve data from the onboard experiments. Most satellites use AX.25 with special software developed for satellite communications. DOVE, Digital Orbit Voice Encoder, can be received with any normal VHF/FM 2-meter packet station, but most of the packet satellites use SSB and require more complex equipment in order to operate them.

References:
Finke, C. R. (Ed.) (1992, February 15). TPRS Quarterly Report. Texas Packet Radio Society, Inc.
Jones, G., G. Knezek, M. Hata. (1992). Packet Radio Prospects for Educational Data Communications. Proceedings of the Ninth International Conference on Technology in Education, 1, 218-219. Paris, France.
Lucas, Larry, Greg Jones, David Moore. (1992) An Educator's Alternative to Costly Telecommunications. Texas Center for Educational Technology, University of North Texas.

For additional information on SoundCard Packet, visit my website on the topic:
http://campus.murraystate.edu/staff/scott.thile/k4set/packet/index.htm

For more information on Packet visit TAPR, the Tucson Amateur Packet Radio

MixW, VHF Packet Operation

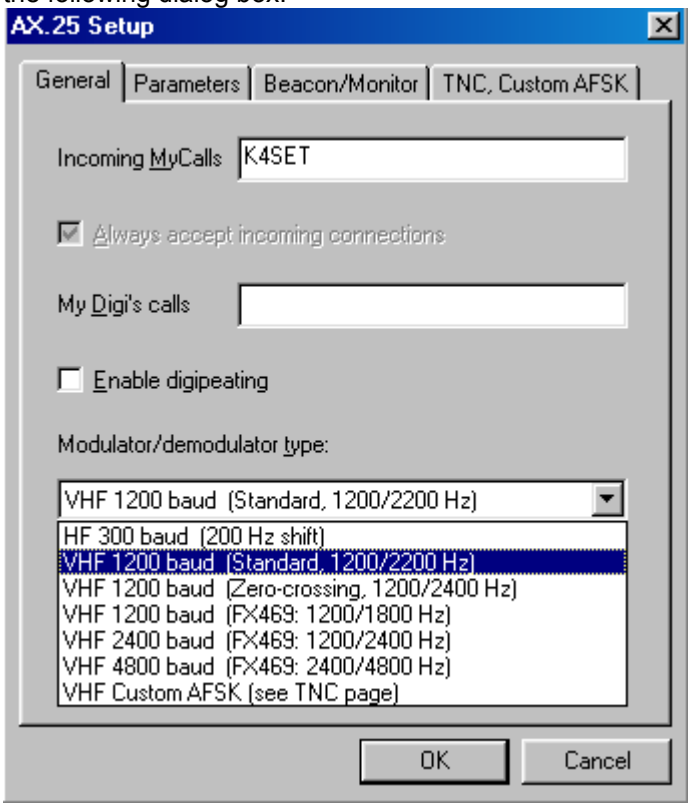
If you have not already done so, read the General Operations Topic For suggested Packet frequencies click Packet Frequencies

MixW has many options for Packet operation including both HF and VHF configurations. For HF packet information see HF Packet Operation.

New! TCP/IP over AX.25 packet radio protocol is also supported now! Click TCP/IP for details.

MixW offers many user settable timing parameters, as well as the ability to send beacons, and act as a digipeater.

Switch to the Packet mode by selecting Mode | Packet, or by clicking on the Mode box in the Status bar and selecting Packet. Next, open the settings dialog box by selecting Mode | Mode settings, or by clicking on the Mode box in the Status Bar and selecting Mode settings from the list. This will bring up the following dialog box:



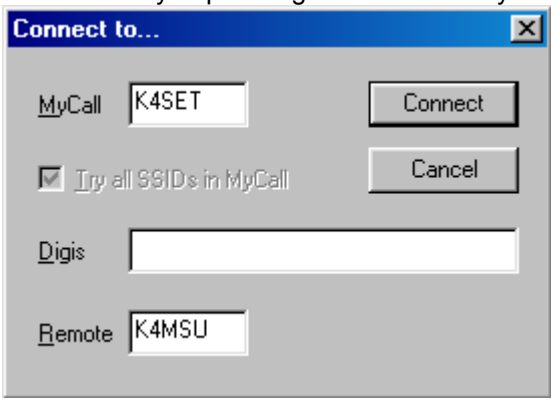
Enter your callsign, and to start with select the VHF 1200 baud Standard (or the settings you wish to operate). Most VHF packet operations in my area are using 1200 Baud standard shift at the present time, as conditions and equipment do not support the higher baud rates. If you want MixW to also act as a digipeater, enter your digipeater call sign here, and check the box to enable digipeating. The "use PSK" and the "OEM" checkboxes should be left unchecked for most operations. The Parameters, Beacon/Monitor, and TNC tabs can be ignored for the present. However, you can customize your packet timing parameters in order to facilitate connecting to certain BBSs or other unique situations by clicking on the Parameters Tab. The default settings here seem to work best for my operations. The Beacon/Monitor tab can be used to set your beacon text and parameters, and the TNC window can be used if you have a hardware TNC and want to use it instead of your soundcard for packet operation.

Next you need to find a packet station or PBBS to connect too. Unlike HF packet, VHF tuning is almost automatic, so long as you're using a standard VHF/UHF FM radio. Simply tune your radio to the packet frequency your interested in. (In my area virtually all packet is on 145.01MHz FM simplex.) You will notice that you cannot tune MixW by clicking in the Spectrum or Waterfall displays like you do for the other modes, or even for HF Packet. This is because MixW assumes you are tuned right

on frequency (due to the nature of VHF/UHF FM operations) and will be using the standard audio tones for the packet mode you have selected.

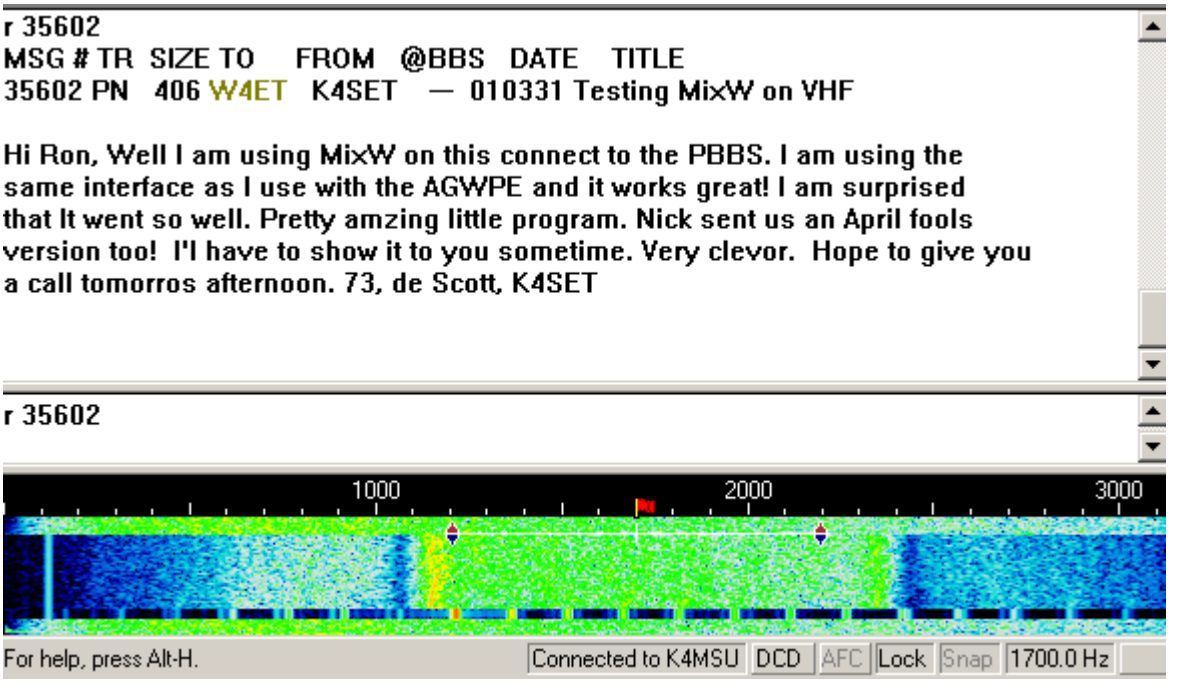
After first monitoring the frequency to determine that the station or PBBS you want to connect to is on the frequency, you then initiate the connect command.

Unlike unconnected protocols like RTTY, PSK, and MFSK, once you have tuned in and monitored packet activity you must first connect to the station or PBBS you have received, in order to have a QSO or PBBS session. To do this, open the connect dialog box by selecting Mode | Connect, which will bring up the following dialog box: (**Note**: You can also bring up the connect dialog by simultaniously depressing the Ctrl-Alt-c key combination.)



Enter your callsign in the MyCall box and the callsign of the station or PBBS you wish to connect to in the Remote box. If you are planning to connect through a Digipeater path, enter that in the Digis box. Next, click on the connect button and MixW will initiate a connection with the remote station.

As you can see in the following screenshot, we have connected directly to the K4MSU PBBS (our radio club operates this PBBS on 145.01MHz in Murray, KY) and I have written a message to my friend Ron, W4ET, who is also a user of this PBBS. What you are seeing here is the message I sent previously sent back to us by my use of the R <message #> command to read back the message.



When operating packet you will notice that each station must acknowledge accurately receiving the other station's packets (this happens automatically through the software), which results in short bursts of activity while each station responds. During poor band or path conditions it may take several

attempts before each station accurately receives the other's packets.

When you are finished with the QSO, or PBBS session, you must disconnect from the remote station by selecting Mode | Disconnect, which will send the disconnect string to the remote station and end your connection and QSO. **Note:** If you are connected to a PBBS, you should first log off the BBS with the Bye command, then if you remain connected you can initiate the disconnect command, but the BBS will most likely initiate the disconnect process.

For a list of typical PBBS commands see PBBS Commands

CW Introduction, **Some of this material is from Steven R. Hurst, KA7NOC from his website at http://www.magiclink.com/web/shurst/Page2.html**

What does CW mean?
CW stands for "continuous wave", most hams refer to Morse code when they talk about "CW". So what does CW have to do with Morse code? Morse is the code used via the CW medium, or "mode", of communication. Morse code can be created by means of a flashlight, signal flags, mirrors, even a stick hit against a water pipe can be used to communicate with Morse code, or any code for that matter! Telegraph operators used Morse code over the telegraph wires back in the 1800's to send messages. These messages were known as "telegrams". People of that time relied on the telegraph operators to pass information over great distances. Telegraph operators also checked the current weather conditions across the country, making sure that the trains ran on schedule . So , it's no surprise that when radio came along at the turn of the century, Morse code became the standard in communication , as many telegraph office's went "wireless". As the art of radio progressed, most ships became equipped with transmitters and receivers. These ship-to-shore operators used Morse code as their only means to communicate with other ships and land stations. The R.M.S Titanic used Morse code to send its ill-fated distress signal " C Q D ". Of course the amateur's were using Morse code all along. They used homemade,"spark gap", transmitters to send their messages around the globe. These primitive transmitters took up enormous amounts (by today's standard) of radio spectrum!

Ok, so what is Morse code?
Morse code is named after its inventor Samuel F.B. Morse, 1791-1872. Morse invented the code (and the electromagnetic telegraph) in 1836. The code consists of a series of dots and dashes. Each letter of the alphabet and numbers 0 through 9 have individual combinations assigned to them. For example, the letter "E", is a single ".", or "dit". Making it the easiest letter to learn! The letter "O" is "- - -", or "dah dah dah", another fairly easy one to learn. Most are not that easy but with practice and determination, it can be done. Some people can copy code at speeds of up to 70 words per minute! Of course that is more the exception than the rule, most ham's copy code in the 10 to 30 words per minute range. Once you get over the learning curve, Morse code becomes a second language; you begin to hear "words", not just each individual letter. You begin to recognize the rhythm of the words so you can easily pick them out and follow along with the conversation.

MixW
Of course, with MixW you don't need to worry about code proficiency, or do you? Actually, you should if you want to be a good CW operator, even with the help of MixW. MixW will copy computer-generated code nearly without error. It will also copy code sent well with an Iambic paddle and electronic keyer, so long as the timing is good. It can also accommodate certain small variations. It is even possible to copy code sent with a straight key if the operator has a very "Good fist". MixW can accurately copy the results in these cases; however, there are many CW signals on the air that are simply not printable by computer. The timing is just not consistent enough for MixW to understand. In these situations being able to copy the code by ear will help supplement the code that MixW copies for you.

MixW, CW Configuration and Operation

If you have not already done so, read the General Operations Topic

CW decoding operation is currently being revised and improved for future releases of MixW version 2.x, but it works quite well in this release .

Configuration

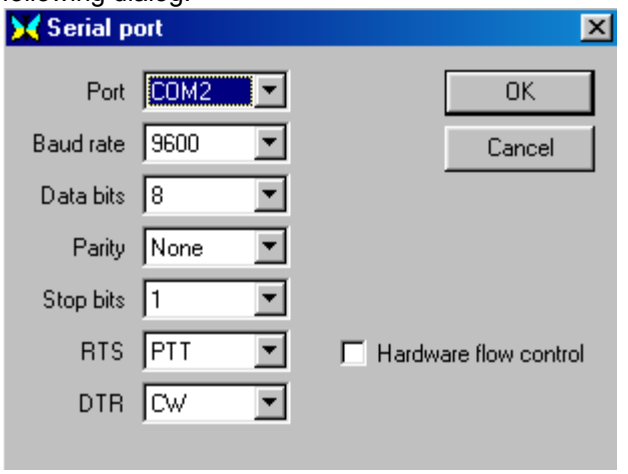
Receiving and decoding CW is handled the same as the other soundcard digital modes (through the audio input to your computer soundcard) transmitting CW, however, is a different story. There are four different methods for transmitting CW with MixW.

- Via the soundcard (while the transceiver is in SSB mode)
- Via a keying signal to your transceiver, which is similar to the way MixW handles the PTT signal for the other modes (your transceiver is in the CW mode)
- Via CAT command to your transceiver (your transceiver is in the CW mode).
- Via a dedicated hardware multimode TNC in the CW mode (for both decoding and encoding of CW via the TNC).

In addition, MixW will allow you to connect a key or keyer to your computer Joy Stick Port for input of CW with the key or keyer instead of with the keyboard.

SoundCard approach: The soundcard approach to CW operation is the simplest to implement, but there are limitations to this method. In this approach, your transceiver is in SSB mode (either USB or LSB will work). This means, however, that you can only use the filters available to you in the SSB modes (some rigs only have narrow filtering options available while in the CW mode). It also means that you're not truly transmitting CW, but SSB, with the SSB audio being a tone switched on or off in Morse Code, so in the purist sense, you are not operating CW at all but SSB. Still, it does work very well this way. To configure MixW to use the SoundCard approach is very simple because it is the same basic setup as your other digital modes. Your rig is keyed either with VOX, PTT, or CAT, just as it is for PSK31 or any other mode.

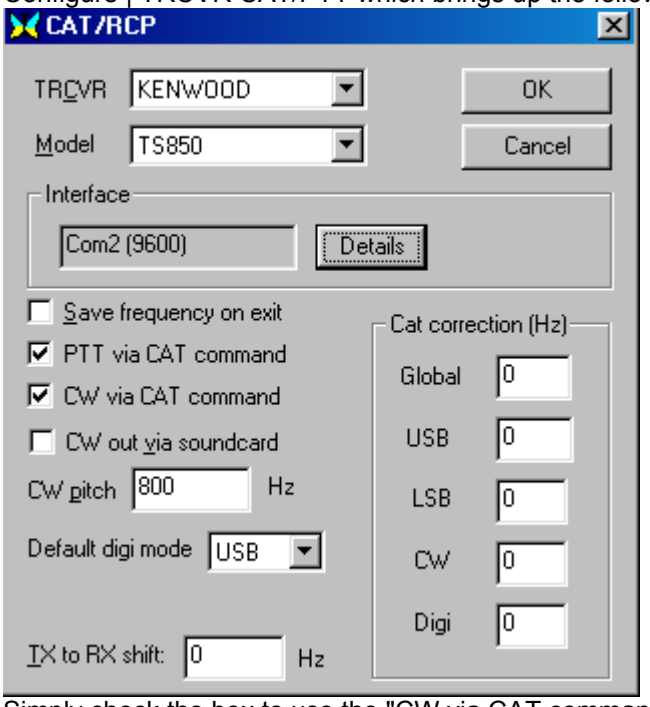
Direct CW keying: In this method MixW directly keys your transceiver via a connection between your computer's COM port and your transceiver's key input (a PTT type circuit is used for this connection). This works similar to connecting any external keyer to your transceiver, the only difference is that MixW (and your computer) are acting as the external keyer. In this case your transceiver is operated in the CW mode, and you truly are sending CW. You then have full advantages of your transceiver's CW filters etc. For this method you need to make up an interface that will connect either RTS or DTR (this can be shared with your PTT circuit, in which case it would which ever pin is not in use by PTT) of your computer COM port to the keyer input of your transceiver (see PTT Circuit for more information). For this implementation you must also configure your CAT/PTT settings accordingly by selecting Configure | TRCVR CAT/PTT, and then clicking on the Details button. This brings up the following dialog:



Set your COM port and CW keying options according to your setup and click OK, and then OK again.

CAT operation: If you are already triggering PTTor via the CAT control options of MixW, this may be your best option for keying CW keying as well. To implement direct CAT operation for CW select

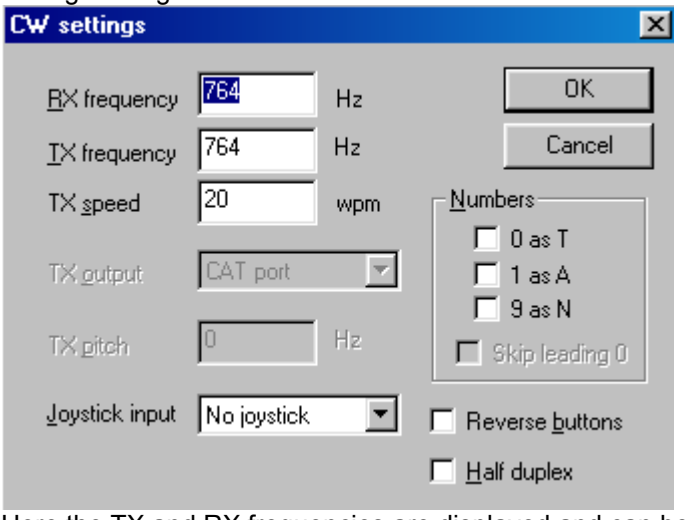
Configure | TRCVR CAT/PTT which brings up the following dialog:



Simply check the box to use the "CW via CAT command" option, and make sure your Com port and rig settings are correct. You can also adjust for correction in your frequency reading for the CW mode by using the "Cat correcting in Hz" box for CW. For more information on these settings see Configuration. Now when you set MixW for the CW mode, it will automatically switch your rig to the CW mode and trigger CW keying through CAT as well as adjust your frequency standard according to these settings.

CW via a Hardware TNC:
See TNC Configuration and operation for to use MixW with a hardware TNC for CW operations.

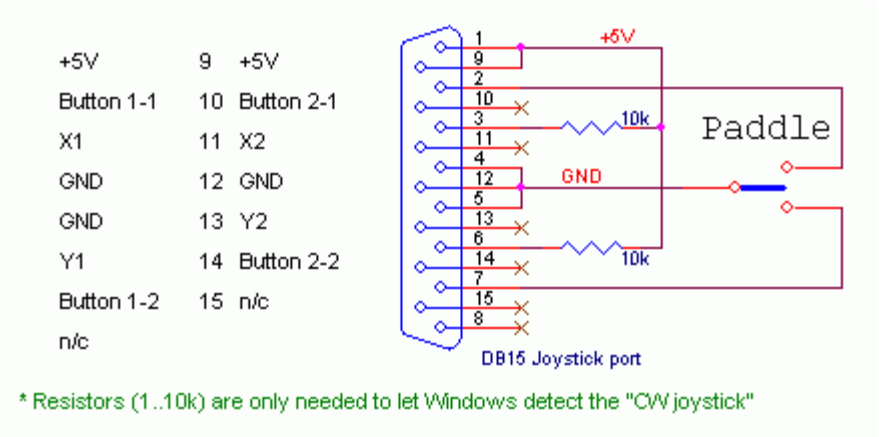
Operating CW
First, switch to the CW mode by selecting Mode | CW, or by clicking on the mode box in the Status Bar and selecting CW. Next set your CW settings by selecting Mode | Mode settings, or by clicking on the Mode box on the Status bar and selecting Mode settings. This will bring up the following CW settings dialog box:



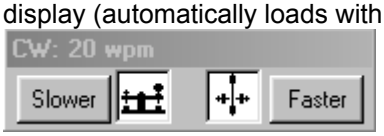
Here the TX and RX frequencies are displayed and can be changed, although it is much easier to change them by clinking in the spectrum/waterfall window.

MixW is capable of using a Joy Stick port for CW key or keyer input. Set which Joy Stick Port (if any) your key is connected to if you would like to use for this feature. A key is not required however, and

MixW can easily use your normal keyboard input, as well as Keyer input.
The following is how to wire the optional key to the joystick port:

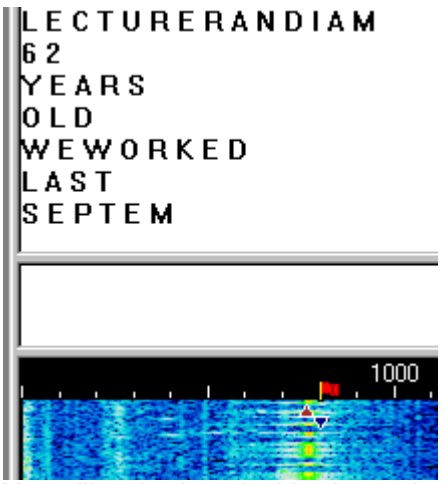


You can also tell MixW to convert your 0, 1, and 9s to letters as indicated by checking these boxes.
You can also set the sending speed, although this is more easily adjusted by clicking in the speed display (automatically loads with the CW mode) as follows:



Note: The speed adjustment is for sending speed only. MixW automatically detects the RX speed and adjusts accordingly, but it will send at whatever speed is indicated on the CW speed box.

Receive: To receive CW make sure you're tuned to one of the CW sub-bands and listen for CW signals, while watching the spetrum/waterfall display. Simply click on one of the signals as indicated here in the waterfall display, and you should start seeing text appear in the RX window:



You will notice here in this picture that while the letters are being decoded accurately, the timing of the characters being sent is such there are spaces between each one. It is important to note that accurate CW decoding, whether by hardware or software TNCs, is difficult to achieve due to the lack of timing standards with CW operations. Computer generated CW is the easiest to decode accurately in software, but even this is a challenge (as you can see above) because timing parameters vary between the different software packages and user settings. You will notice quite a few missed characters while trying to decode some hand sent CW, especially from a straight key. However, I have noticed that with practice, it is possible to send code with a keyer in such a way as to enable MixW to decode it perfectly every time. (It is a challenge though; believe me!)

Transmit: To switch between transmit and Receive simply press the Pause/Break key, click on the TX/RX box in the status bar, or select Options | RX, or Options | TX from the menu bar. For additional information on general operating procedures see General Operation.

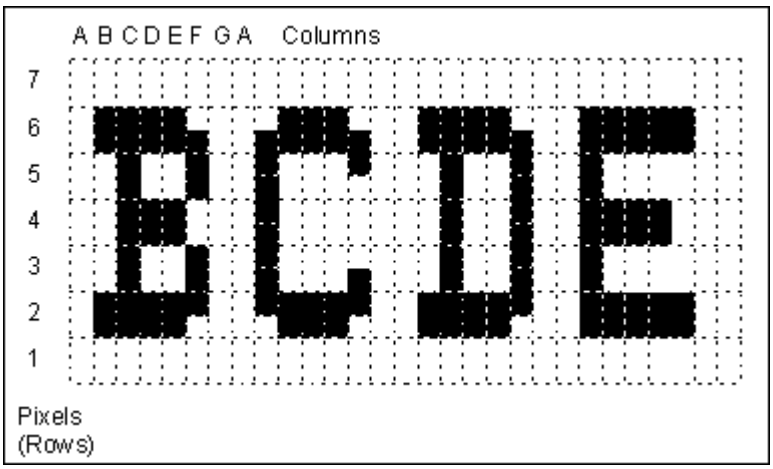
As with most of the other digital modes, It is possible to open multiple RX windows and switch the active window (the one you will be sending code to) between them. For this and other general operation techniques see General Operation.

Note: The CW implementation in MixW version 2 is still under development in this release. Please look for improvements in RX performance in future releases.

Feld-Hell, An Introduction by Murray Greenman, ZL1BPU

Hellschreiber was patented in 1929, and is still in use today using the original format. Hellschreiber was the first successful direct printing text transmission system, and was very popular at a time when teleprinters were complex and expensive (the Hell receiving mechanism had only two moving parts). At first the Hellschreiber was mostly used for landline press services, which continued well into the 1980s. A military version was used by the German Condor Legion during the Spanish Civil War (1933). During WWII, Hellschreiber was widely used for field portable military communications, for which it proved to be very suitable because the equipment was simple and robust. Today we use the term "Feld-Hell", or "Field Hell" for this system, to help differentiate it from the slightly different landline press systems.

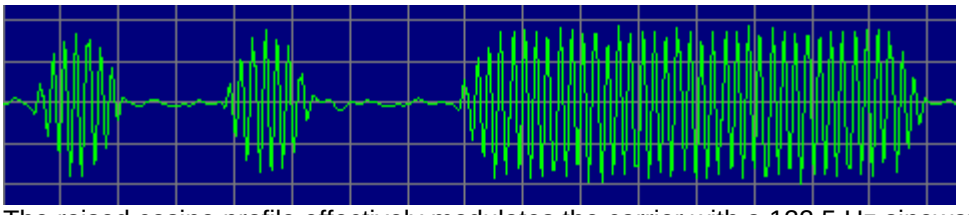
Each character of a Feld-Hell transmission is portrayed as a series of dots, in a matrix, just like the printing of a dot-matrix printer. The dots are sent one at a time, rather like Morse code. Feld-Hell transmits in the following order - up each column from bottom to top, then up each successive column from left to right. The following picture shows a fragment of text "BCDE", depicting the order in which the dot elements are printed. Each of the dotted rectangles represents a potential dot location, and is identified by a locating letter/number. The transmit order therefore is A1, A2, A3... A7, B1, B2... etc.



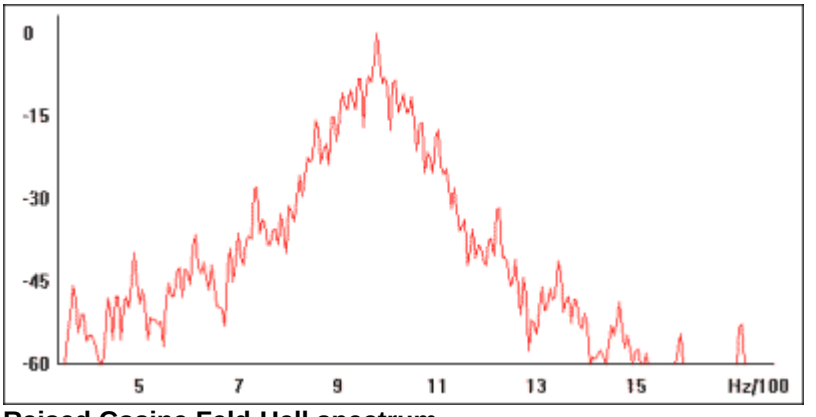
In this picture, the dotted rectangles depict individual dot locations in the matrix. There are blank, untransmitted picture elements (pixels) at the top and bottom of each character, and between characters. These are depicted as empty white rectangles. The transmitted (key down) pixels are shown black. Looking at the above diagram, it is easy to see that the transmitter duty cycle is quite low (about 22%). Another way of saying this is that the peak-to-average ratio is very high, which is important for good readability in noise.
150 characters are transmitted every minute. Each character takes 400ms. Since there are 49 pixels per character, each pixel is 8.163ms long. The effective baud rate is 1/8.163 ms = 122.5 baud, and the throughput is 2.5 characters/sec, or about 25 WPM.
The original Feld-Hell equipment, and the best software implementations, transmits two pixels (each half height, or half the duration) for every pixel shown in the diagram, thus improving the vertical resolution. If you look carefully at the above diagram, you can see how this comes about without increasing the signal bandwidth. Rudolf Hell designed the font so that a single half-height pixel is never transmitted. For example, the right side of the "B" has enhanced resolution achieved by slipping the timing of the full-height pixels by half the height of one pixel. Three half-height pixels are transmitted without a break, so the bandwidth is not increased.

Another important reason for the restricted bandwidth design, while providing well-defined characters, was that this technique ensured that pulses to the radio transmitter were never less than 8ms. Shorter (half-pixel) pulses could be severely distorted by the slow rise-time of the transmitter, and as a result, cause excessive bandwidth or fail to energise the mechanical print hammer in the receiver.
Another important technique, which limits the bandwidth of Feld-Hell transmissions, is the use of carefully shaped dots, using a raised cosine profile. If the signal is hard keyed, the 122.5 Hz keying

sidebands caused will spread out for some 500 Hz either side of the carrier. The picture below shows a raised cosine signal from a real transmission, two pixel-pairs, and a group of pixels. Note the shape of the dots, and that each dot is identical. Without the shaping, which confines the bandwidth to about 245 Hz, the signal would be very wide.

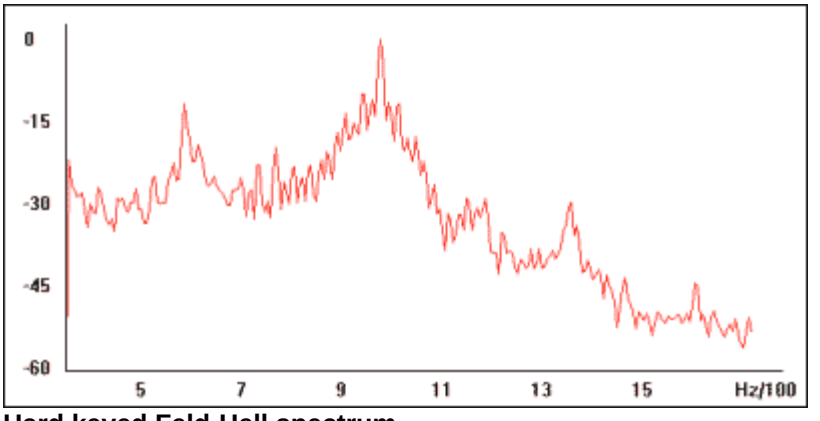


The raised cosine profile effectively modulates the carrier with a 122.5 Hz sinewave during the dots, and the result is a 100% modulated carrier, i.e. with one pair of sidebands spaced 122.5 hz either side of the carrier, rather than a wider pulse modulated signal.



Raised Cosine Feld-Hell spectrum

The spectrum of the real Feld-Hell signal above looks rather wide, but remember that the vertical scale is logarithmic. Note that the keying sidebands drop off quickly. Compare this with the next picture, which shows hard keyed Feld-Hell. The difference is obvious! The strong component at around 600 Hz is typical of wider systems - the LA0BX software can be distinguished by this transmission "feature".



Hard keyed Feld-Hell spectrum

Many software Feld-Hell systems can also transmit each column twice, for double width characters, which give better readability under poor conditions.

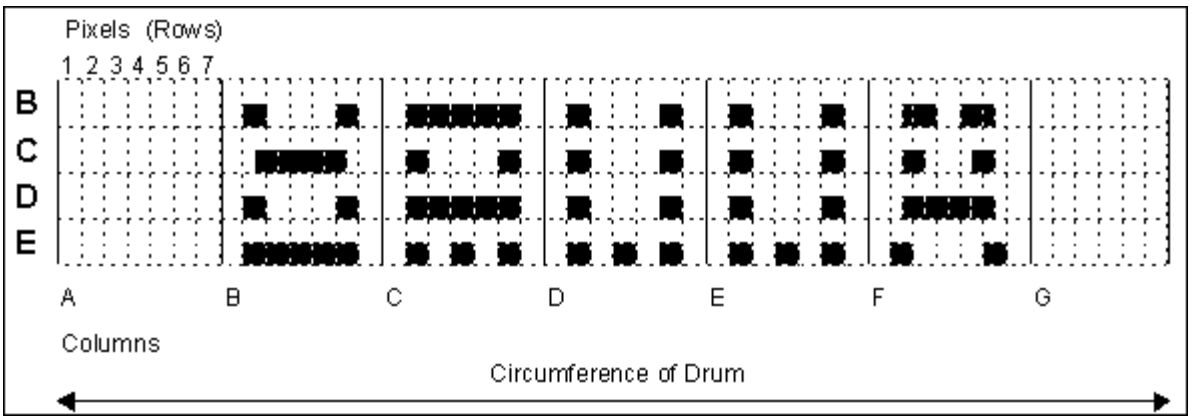
Double-width characters

The receiving system is compatible with the half-pixel and double column variations without any changes. Many other adaptations are possible while retaining receiver compatibility, for example transmitting small pictures, or foreign language fonts. The number of pixels per column and number of columns per character can also be altered - so long as there are exactly 17.5 columns per

second, and the bandwidth is controlled, it will make no difference to the receiver.

In the original Feld-Hell machine, the characters were generated in an interesting way. A drum contained one ring of brass contacts for each character provided on the keyboard. When a key was pressed, the drum rotated once, and in the process transmitted via a contact the dots required for that character. A mechanical interlock prevented keys being pressed simultaneously, and at the same time ensured that each new character started at the correct time to preserve the phase of the transmission. Using the keyboard was a challenge, because each new key needed to be pressed lightly during transmission of the previous character, to "lock in" the character at the correct time. Otherwise a space would be transmitted between characters.

Since only one ring of dots was used per character, and the drum was rotated once per character, rather than once per column, the character matrix was rearranged in a line around the circumference of the drum. Compare the drawing below with the one above:

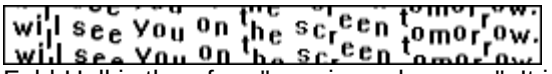


In this drawing, the pixels are labeled the same as the previous drawing, but note that each character starts at the left, and each column of pixels follows the previous column, labeled A, B, C.. etc at the bottom of the drawing. Now imagine the full character set added above and below the four characters shown, the black pixels representing the brass contacts, then wrapping the drawing around a vertical cylinder.

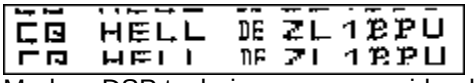
The output of the wartime Feld-Hell machine was a 900 Hz keyed audio tone, sent on a telephone line or to a transmitter modulator, for example an MCW transmitter. It was possible in some models to separate the keying contacts for direct keying of a CW transmitter. Feld-Hell is therefore amplitude keyed, just like Morse, as CW or MCW. Each pixel of a dot matrix character is sent in a fixed pattern as a CW dots. Where there is no black dot, nothing is sent. Feld-Hell is in reality a simple facsimile mode. The early press system, F-Hell was identical except that it ran at 245 baud (5 characters/sec). An asynchronous variant, GL-Hell, (used by land-line machines) utilised a fixed start block of pixels at the left of each character, which provided character based synchronism, but this method has no advantage to Amateurs. An excellent article describing the traditional mechanical method of transmitting and receiving Feld-Hell appeared in Ham Radio Magazine, December 1979. An article which describes the Hell font and includes other useful information was printed in Radcomm, April 1981. The actual machine described by the late G5XB in that article is now in the possession of Ian G4AKD. The Siemens A2 war-time machine is also described in detail on the Feld-Hell History page.

For a summary of the different Hell formats, see the Hell Formats Page

Feld-Hell characters are sent as a series of dots at 122.5 pixels/sec, using a CW transmitter, or these days, by sending tones to an SSB transmitter. Black dots are represented by a CW dot (key down), and white spaces by a space as long as one dot (key up). The timing requirements are quite precise, like FAX, but Rudolf Hell developed a simple but clever technique, which involves printing the text twice, which can negate the effects of phase and small timing errors, thus avoiding the need for true synchronism. At the top of this page is an example showing the two printed lines one above the other. The following example shows extreme timing errors, but the text is still readable. This error is actually caused by a soundcard buffering problem.



Feld-Hell is therefore "quasi-synchronous". It is important to realize that the text is printed twice, but not transmitted twice. The font was designed so that the top and bottom of the font can match to create readable text, no matter what phase relationship exists between transmitting and receiving equipment. In the next example the phase is out such that the two printed lines appear as one good line and two partial lines:



Modern DSP techniques can considerably improve the performance of Feld-Hell reception and transmission, reducing the transmitted bandwidth and providing impressive receive sensitivity. Several quite different types of software for Feld-Hell are provided on this site, and in most cases the hardware requirements are very simple - either a "Hamcomm" type interface or a sound card. Although not originally conceived in this way, Feld-Hell can benefit substantially from the use of DSP, specifically digital filtering, detection, averaging and analog to digital conversion techniques.

To illustrate these advantages, the picture below was received by ZL2AKM from OH/DK4ZC (about 20,000 km), recorded on audio tape and played back to the LA0BX software, which has digital filtering, but no DSP or analog demodulation, and, like the original Feld-Hell, lacks an analogue (grey scale) display process:


With better processing, analog detection, A-D conversion and use of a gray scale display, the SAME snippet of audio - thanks to ZL2AKM's signal processing experience - can be processed to look like this:

The improvement in copy is obvious - this is because presenting exactly what is received, without any decision making, allows the eye and brain, not the computer, to decide what dots are present, and when they are present. The eye and brain have superior powers of pattern recognition and context based interpretation that no computer can match. Most of the software on this site has this capability.

PERFORMANCE

Feld Hell performs very well where the path has reasonable stability (little fading) and where the signal level is equal to the average noise or better. If gray-scale reception is used (see above), performance at low signal to noise is much better. Feld-Hell is reasonably immune to interference, but can be badly affected by on-frequency carriers or Morse.


Perhaps the most annoying effect is that of timing variations due to fading. As the ionospheric path changes, the path distance can change by several thousand kilometres, resulting in a variation of dot arrival time by as much as 20 ms. The example on the left shows two successive words of a single transmission, transmitted over short and long path, achieved by an instantaneous switching of antennas between words. The path length difference, about 6000 km, is illustrated in the upward vertical movement of all the pixels in the second word by about 20 ms.


Since each column of dots occupies only 57 ms, these mis-placed dots can make the text unreadable. When the path is very unstable, for example when there are multiple paths, the signal from each path interacts differently at the receiver, and can vary from one character to the next. As a result the text can be rendered completely unreadable. In the next example on the left, observe the letters "ONG" in the word "LONG". This distortion is solely due to changes in the arrival time on a dot-by-dot basis. The letter "A" in "PATH" is partly missing due to a different effect - a short very deep fade in the signal, taking it well below the noise floor. These problems are typical of

lower HF frequencies.

The next example is very typical of 80m during the evening - on a 300km path, there is 16ms delay between the ground wave and (weaker) sky wave signal. Just where has ZL1AF's signal been to accumulate a delay equivalent to 4800 km?

The final example shows an example of short path and long path HF reception at the same time. Look closely at the letter "R" of "TURNED". Notice that two images of the letter are shown, displaced vertically by about 10ms. This example is of OH/DK4ZC copied by VK2DSG on 20m.

Notice also the fading in this last example - the "H" and "M" are weak, while the "B" is strong, and the background noise remains reasonably constant. This implies that the signal was close to the noise floor, or the AGC action would have reduced the noise. In all these examples the receiving software does of course use gray-scale display.

For the History of Hellschreiber visit:
http://www.qsl.net/zl1bpu/FUZZY/History/feldhell.html

For Additional Formats visit:
http://www.qsl.net/zl1bpu/FUZZY/modes.html

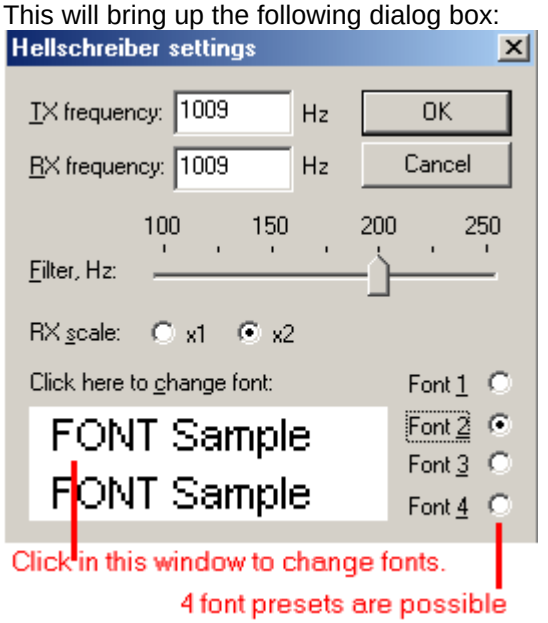
For more information on all the "Fuzzy" modes visit Murray Greenman, ZL1BPU's main website, with links to all the above and much more at:
http://www.qsl.net/zl1bpu/

MixW, Hellschreiber Operation **If you have not already done so, read the General Operations Topic For suggested Hellschreiber frequencies click Hellschreiber Frequencies**

Hellschreiber is a unique mode. Some would argue that is is not a digital mode at all. Still for our purposes, because we are certainly using digital techniques to operate Hellschreiber, we will call it a digital mode. It has more of a clicking, or chirping sound than the other, more recent digital modes. Receiving Hellschreiber text is more like receiving a FAX image. The characters you receive and transmit are actually pictures of characters. See Hellschreiber Intro for additional information on this fascinating mode.

Hellschreiber is another narrow band mode, like PSK31, and will benefit from the same transceiver settings. To review these settings please go to PSK31 Operation

First switch to the Hellschreiber mode by selecting Mode | Hellschreiber, or by clicking on the Mode box in the Status Bar and selecting Hellschreiber. Next bring up the mode settings by selecting Mode | Mode settings, or by clicking on the mode box in the Status Bar and selecting Mode settings. This will bring up the following dialog box:



The TX and RX frequencies are set to wherever your cursor is in the spectrum window. I recommend this be around 1500 Hz, which keeps your transceiver operating close to the center of its pass band.

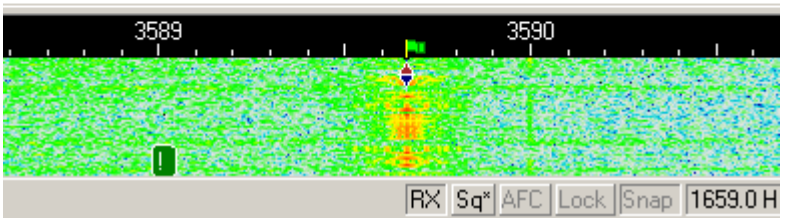
Filter: You have a selectable software DSP filter width of between 100 and 250Hz. Varying this setting may improve your reception during differing conditions. i have found a setting of 200Hz seems to work well overall.

RX scale: The RX scale option will enable you to set the RX text size in your RX window x2 may help you decipher hard to read characters, but you will not be able to see near as much text on each screen. Use x1 unless your having trouble seeing the text at this resolution.

Font Selection; You can pre-select up to 4 different fonts by clicking the button next to each font # and then clicking in the font sample window. Remember that this is the font you are transmitting, not receiving. You will receive the font selected by the sending station.

These are your only options for Hellschreiber at the present time.

Here is a screen shot of a Hellschreiber QSO between Ron, W4ET and me:



As you can see Hellschreiber uses the single diamond indicator like PSK31 uses, and the bandwidth is similar to that of PSK as well. Received text appears in double or tripple lines.
You can see more text on your screen by removing the log and other tool bars from the display. To do this click View, and then uncheck those toolbars you wish to remove. The log toolbar takes up the most room, so consider unchecking that one first.

Receiving Hellschreiber
Tune in a Hellschreiber signal by pointing right in the center of the signal with the mouse and clicking the left mouse button. The text being sent by the station will then appear in the Receive Window.

Transmitting Hellschreiber
To transmit to a station, first tune it in as indicated above. Type outgoing text in the Transmit Window, which is the smaller window between the Receive Window and the Spectrum Window. Press the T/R button (or the Pause/Break key, or click on the TX/RX box in the status bar), and the text in the Transmit Window will be transmitted. You can continue to type, and that text will also be transmitted. As it is being transmitted, text in the transmit Window will also appear in the Receive Window. To stop transmitting, press the T/R button (or one of the other toggles) again. Pressing ESC will abort transmission and return MixW to receive mode, but the last several characters typed will not be transmitted. For this reason, the T/R button (or one of the other toggles) should be used to switch from transmit to receive.

Note: This topic will be further developed, as more is understood about operating Hellschreiber.

An SSTV Introduction, by **Chuck Schied, JR, W3OHV**

SSTV is facsimile. And facsimile is a method of producing a picture a line-at-a-time. Newspapers and the wire press (e.g., AP, Reuters, UP) use facsimile for photos and text via wire and radio. Facsimile uses a line scanning system. The more lines, hence more time taken to send them, creates sharper better-defined images. Line scanning is a very old concept. It is used in infrared mapping and military reconnaissance. Artists have used the concept to copy graphic images freehand. Ham Radio Video is a compromise system that runs fast enough to produce attractive -- sometimes very beautiful -- pictures.

Slow Scan pictures used in amateur radio can be sent in a variety of time formats. Simple black-and-white photos of low resolution can be sent in 8 1/2 seconds. Good quality pictures in B/W or Color can be sent in one to three minutes. Excellent pictures in Color can be sent in about four minutes. Standard resolution of a picture today is a 640 width x 480 height pixels with 24-Bit color. 24-Bit color (also known as Truecolor) is able to reproduce up 17 million different hues. These are minute variations of eight basic colors like red, yellow, green, blue, white, black, magenta, and cyan. In short today's Slow Scan pictures using formats like Scottie #1 or Martin #1 are quite stunning! There are fifty or more formats created by many different programmers.

So now, you should be confused! Yes, Slow Scan is actually faster than facsimile but slower than standard Television! You can use the longer formats like Scottie DX or WRASSE 180 (4-5 minutes) and receive beautiful pictures even in poor receiving conditions. By now, you probably have heard SSTV on 14.230-233 MHz or 7173 MHz. You can learn a lot by listening. Don't invest in Slow Scan until you have learned something about it from people who know what they are talking about. Newcomers have many erroneous ideas about the Mode and will be poor tutors. Old-timers who own ROBOTS are of little help if they have not become expert users of PCs and use the SSTV PC Programs routinely.

An amateur by the name of Copthorne MacDonald (1960s) originally developed what is today erroneously called SSTV. The name Slow Scan really is related to regular Television.

In summary, Amateur TV is called Fast Scan since it is virtually real-time. But regular TV requires a great deal of bandwidth because moving pictures require many frames per second. Slow Scan, using an audio spectrum of 1200Hz to 2300Hz width can send high-resolution color pictures around the world almost instantly. In conclusion, let's call it Slow Scan Video, instead! It aint TV, Pilgrims!

WHERE SLOW SCAN VIDEO IS TODAY
About 1992-93, as the Personal Computer began to appear in ham shacks, Slow Scan was no longer an expensive, experimentalist, elitist activity. Prior to that time an expensive converter built by ROBOT RESEARCH Company was the only way to receive and send Slow Scan. After several years of PC programs, written by radio amateurs who were also involved in programming, the mode leaped forward in popularity as Microsoft Windows and INTEL opened up new and better PC performance, especially in CPU speed and better color and sharper resolution.

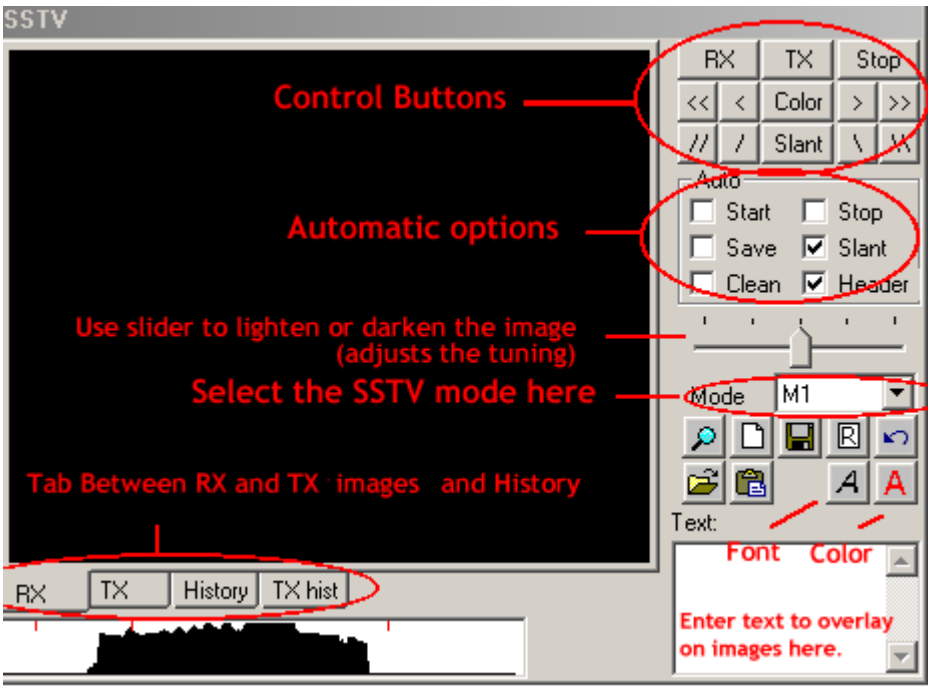
This introduction by Chuck was obtained from the following URL:
http://www.baldeaglejournal.com/sstv01.htm

For additional SSTV information vist the following website:http://www.kiva.net/~djones/

SSTV Operation

MixW2 and SSTV
Nick does not intend that MixW2 will compete with MMSSTV, ChromaPIX and other dedicated SSTV programs. It does not have extended services like templates or diagonal texts with gradient fill, however it does allow you to make occasional QSOs. It has the ability to manually correct for phase and slant. It lets you quickly type and place text over transmitted images. Macros can be used for frequently typed words. This mode in MixW is intended as a tool for experimenters, and for those who want to save time by not having to switch to a different program for SSTV operations..

Selecting SSTV from the mode menu or the status bar brings up the following window:



The control buttons are used as follows:

RX starts the receive image function using the mode selected.
TX will start the transmission of the image loaded into the TX window using the mode selected.
Stop will stop the RX or TX functions.
COLOR and horizontal location can be adjusted using the [<<], [<], [>], [>>] and the Color buttons.
Slant is adjusted using the [\],[\\],[//],[/] and Slant buttons.

You can also select which automatic options you want by using the Auto check boxes.

The RX, TX, History, and TX hist Tabs are used to select what is displayed in the image window.

To Load a TX image click the open folder icon (the size is 320x256x24) and select the image from your files.

To Save a RX image click the disk icon and select the location and name of the file to save the image to.

To Load a picture from the clipboard, click the clipboard icon.

Text can be placed on the TX screen by:

Selecting the text color and font using the indicated icons, then entering the text in the text window. Push the left mouse button in the TX window and move the text to where you want to place it, then release the mouse. The text can be placed during transmission.

The following screen shows a .BMP file that has been edited with text using the above procedure:

RX slant/phase correction:

Draw a line over the border of the picture. A left mouse click on the border corrects the phase only; the slant will not be changed. A right click can be used to move the picture up. The slant and phase can be corrected during receive.

Holding the Shift+slant keys saves the current slant correction, and this value will be used while transmitting or receiving the next pictures.

Modes

All five SSTV modes (Martin1/2, Scottie1/2/DX) are available for both TX and RX.

Header

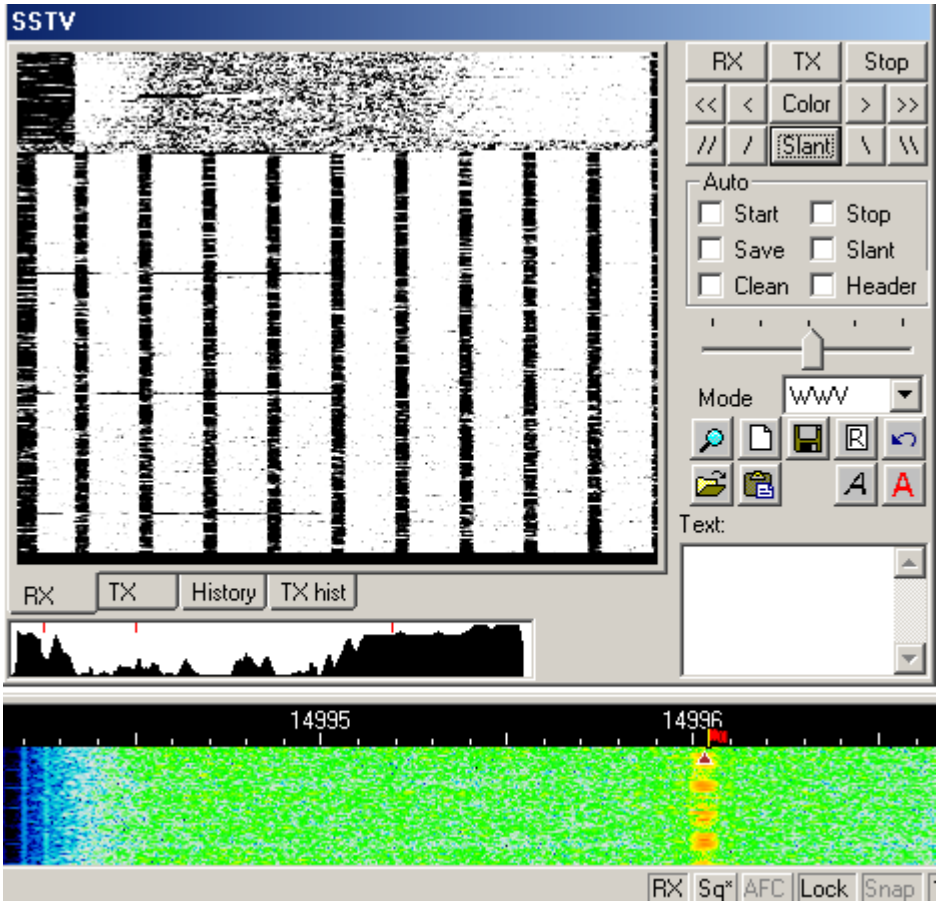
By default MixW uses sstvhdr.bmp as a header. Edit this file if desired to change the header, or select another file by holding the Ctrl key and clicking the Load icon. Hold shift during the load or clipboard operations to eliminate header. Just remove sstvhdr.bmp if you do not want any header.

SSTV Calibration using WWV

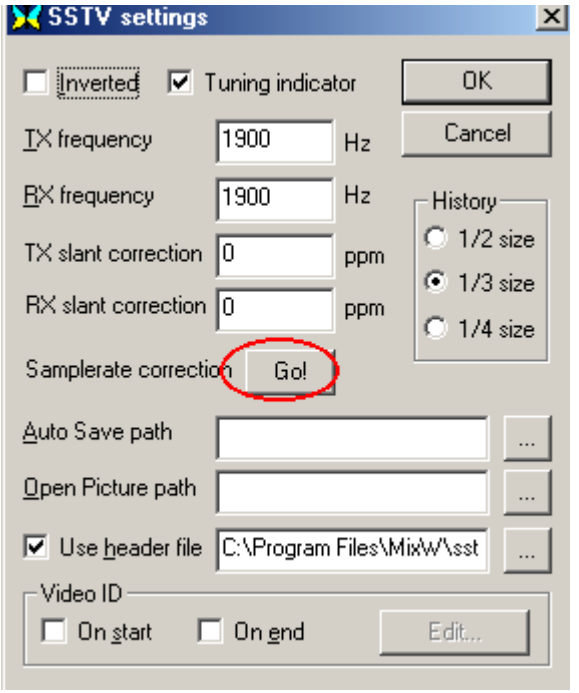
The WWV mode can be used to calibrate the soundcard while receiving WWV signals. Time marks are transmitted on 4996, 9996, 14996 KHz. Tune your TRCVR to 4994.100, 9994.100, 14994.100 (USB). Be patient if you do not hear anything as Timing marks are not transmitted all the time, Sometime there are 5 minutes pauses between these transmissions. When the WWV signals are tuned:

Select the WWV mode from the dropdown mode menu
Tune your receiver so the tuning indicator is on the signal as indicated in the waterfall display.
Click on the RX button
You will see black and white box patterns
Adjust the slant until the edges are straight

The image will depend on the timing intervals, but the edges should be straight in any case. This should look something like this:



This SSTV slant correction can also be moved to the soundcard sample rate correction to let other modes use that correction as well. To do this select the SSTV settings dialog from the Mode Menu, or the mode box on the status bar, and click on the "Go" button:



SSTV Settings

You can also select other SSTV options from above dialog.

The Tuning indicator check box indicates if you want to see the SSTV tuning display at the bottom of the SSTV window or not.

The TX and RX frequency settings locates your tuning indicator on the waterfall display and your radios pass band (these cannot be moved with a mouse click on the waterfall display like most of MixW's other modes allow) but must be set here.

T**X and RX slant correction** are best left to the WWV calibration process, which automatically enter the correction here.

The GO button sends these numbers to the soundcard sample rate correction settings as well.

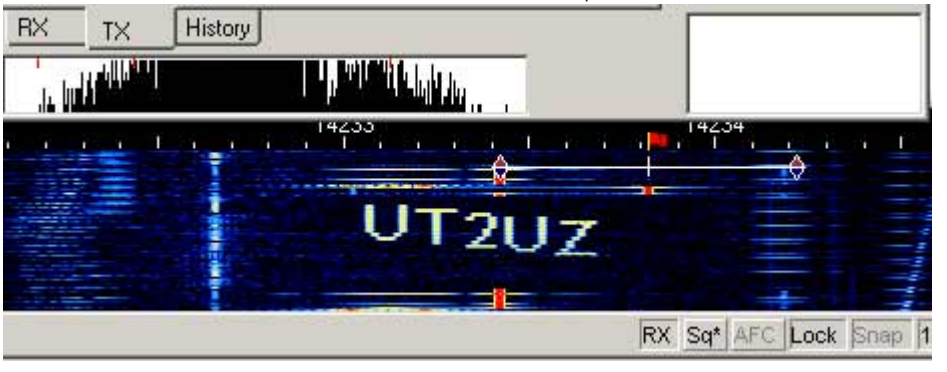
Selecting the history size determines how many images can fit in your History Tabs.

Setting the Auto Save and Open Picture paths will make saving and loading images much faster and more convenient.

Check the use header box if you want a header added to each TX image, and select the image you want to ad.

Video ID

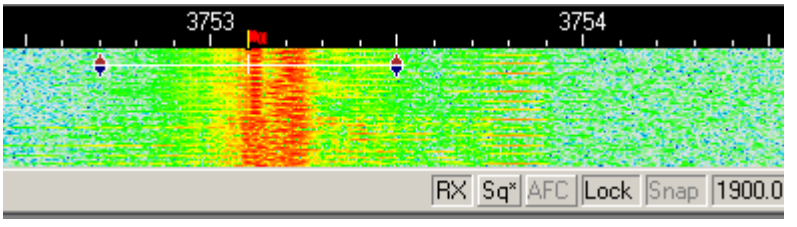
This is a new feature used to transmit a Video ID, which is visible on the waterfall display as follows:



A simple editor is included. Since the power is divided by all points and transmitted at the same time, do not make long horizontal lines. Try the VID samples butterfly.bmp and mixw.bmp, which are located in the MixW directory, or make your own. Select when to transmit your video (start, end, or both) and than click the Edit button, which will bring up the following dialog:

I made this VID by first loading the butterfly.bmp, and then clicking on the pixels to add my callsign to it. I then saved this to a new file and selected it as my VID.

Here is a tuned SSTV signal in the Waterfall display:



This yielded the following image from my friend Ron, W4ET:

Troubleshooting SSTV

In case of trouble with dropping receive or transmit, the following hints may help.

Play with following lines in the mixw2.ini:

- Section

[Device 0 Setup]
m_iBufRxNum=48
m_iBufRxSize=256
m_iBufTxNum=48
m_iBufTxSize=256

declares 48 buffers, 256 bytes each to use for sound operations. If we use sound card at 11025 sps, total length equals to 48*256/11025 ~ 1.1 sec. I.e. a little less that a second is reserved for unexpected Windows delays. We can increase the time by enlarging buffer sizes or increasing the number of buffers. Increasing the buffer size in parallel with decreasing the number of buffers may reduce system load a little:

m_iBufRxNum=24
m_iBufRxSize=512
m_iBufTxNum=24
m_iBufTxSize=512

- Changing the task priority. Look for following section in the MixW2.ini:

[Priority]
MainThread=0
Class=32

These values are by default, defining standard priority.
Try
Class=128 (HIGH PRIORITY)
or
Class=256 (REALTIME PRIORITY)

This will definitely help in multitasking environment, and let you work with other programs at the same time, but it may hang slow PC.
Also you may play with increasing the main thread priority:
MainThread=1
or
MainThread=2

or
MainThread=15
I could set
Class=256 (REALTIME PRIORITY) and MainThread=15 on my C366 under
W2000 and both SSTV TX and RX worked great while I was opening PhotoShop,
compiled next update etc.
Also you may play with following numbers in [SSTV] section of MixW2.ini
FilterLength=4 May be increased. I use the value of 64 on my C366.
This value defines the number of taps used for the
FOR filter (actually the number of taps is FilterLength*2+1).
Dec=5 Decimation rate. May be decreased to 4 or 3.
I do not recommend to set it less than 3.

THROB **a brief description from the website of RICHARD B. GRIFFIN, NB6Z, used by permission:** http://www.teleport.com/~nb6z/

THROB is yet another new DSP sound card mode that attempts to use Fast Fourier Transform technology (as used by waterfall displays) to decode a 5-tone signal. The THROB program is an attempt to push DSP into the area where other methods fail because of sensitivity or propagation difficulties and at the same time, work at a reasonable speed. The text speed is slower than other modes but the author (G3PPT) has been improving his MFSK (Multiple Frequency Shift Keying) program. Check his web site for the latest developments.

The rest of this page contains excerpts from the author of the THROB program, G3PPT, from his website at: http://www.lsear.freeserve.co.uk/page3.html.

THROB, An experimental program using 9 tones and FFT detection
The Fast Fourier Transform Waterfall Display allows the display of signals that can barely be heard and this prompts ideas for harnessing the FFT waterfall display for communication purposes. An obvious example is slow CW whereby the dots and dashes are decoded visually, another is multi-tone Hell whereby different tones make up the dot matrix of characters and are sent simultaneously (MT Hell), or sequentially (SMT Hell). The author has developed a program called SLOWFELD, (available elsewhere on this site), which is essentially very slow speed Hellschreiber whereby the intensity of selected FFT bins is plotted. This is very effective but very slow at 2 chars/minute and like all the Hell methods, suffers from the disadvantage that the whole character has to be sent as a "picture" and there is no ciphering advantage of 'E' over 'Z' for instance.

The amateur fraternity has an enormous choice of methods for two-way QSO's taking place under normal conditions such as PSK31 and Hellschreiber and their developments. The THROB program is an attempt to push DSP into the area where other methods fail because of sensitivity or propagation difficulties and at the same time work at a reasonable speed.

At the outset, please be aware that this is at an early state of development and may change a great deal, or come to nothing at all.

The program uses a Pentium based PC equipped with Windows95 and a soundcard. The soundcard runs at 8000Hz and uses data blocks of 2048, 4096 or 8192 16 bit samples. for the three speeds of 4, 2 and 1 baud respectively. Pairs or single tones out of a palette of 9 in a 72 or 144Hz bandwidth are sent and received sequentially, each tone being 2048, 4096 or 8192 samples long and shaped as a semi raised cosine "throb" in that the leading and trailing quarters of the block are raised cosine shaped. The permutations of single and pairs of tones out of a palette of 9 allow for a rudimentary character set to be sent in a single pulse. For reception, the 72 or 144Hz band pass (obtained via FFT and reverse FFT filtering) is positioned centrally over the signal, and then the presence and position of the tones is our unit of coding. Synchronization of the reception process to the incoming "throbs" is used, and can now be set automatically.

The program is a development of a previous version, which used 5 tones in a 40Hz bandwidth with the characters being coded into the permutations of three successive tones. This was slow at 7 words per minute and also sideband sensitive, however it did prove that amateurs had equipment and were able to use it to tune within 3 or 4 Hz and, with the aid of AFC, to hold it. The latest version of the program has three speeds: 1, 2 and 4 baud, allowing for a data rate of 10, 20 and 40 wpm respectively, and is not sideband sensitive in that both LSB and USB possibilities are decoded and displayed separately with the nonsense version being ignored.

Auto synchronization has now been added whereby the program looks for two consecutive minima in the received signal intensity, the correct time apart and then sets the commencement of sampling at the first one.

AFC is available wich can cope with a drift of 1Hz in 5 seconds or so.

There are still possibilities for improvement and fine-tuning of the program.

Lastly, since this work started it has become part of a general move towards trying MFSK modes on the amateur bands, MFSK having been neglected in the past. Murray, ZL1BPU has formulated a tentative specification for an amateur form of Piccolo and Nino, IZ8BLY with Murray has made enormous advances in this direction with a program called STREAM which is now available with several modes. Nino has been able to incorporate error correction into his program. I cannot do this with my current number of tones.

One way or another, this looks to be an interesting area of development that should ultimately yield benefit to the radio amateur.

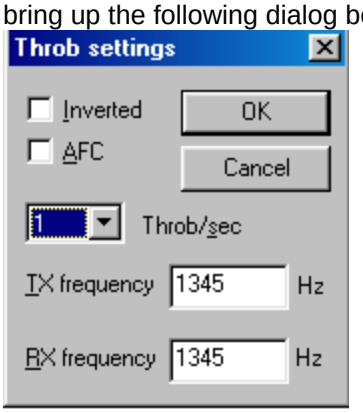
MixW, THROB Operation

If you have not already done so, read the General Operations Topic For suggested THROB frequencies click THROB Frequencies

THROB is a narrow band mode, although not as narrow as PSK31. Your transceiver's set up should be essentially the same as used for PSK31. See PSK31 Operation to review those recommendations.

Perhaps the first thing you will notice when tuning in THROB signals is the distinctive throbbing nature of the sound. If you succeed in tuning a signal in (I have worked THROB only by setting a schedule up with a my friend Ron, W4ET, as there is very little activity on this mode here in the US) you will also notice that is is extremely slow as compared with most of the other digital modes.

First switch to the THROB mode by selecting Mode | THROB, or by clicking on the Mode box in the Status Bar and selecting THROB. Next bring up the mode settings by selecting Mode | Mode settings, or by clicking on the mode box in the Status Bar and selecting Mode settings. This will bring up the following dialog box:

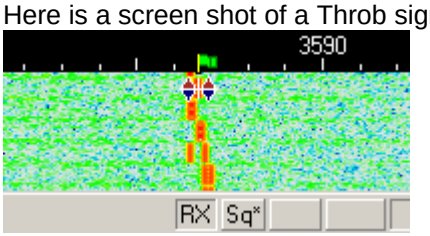


The TX and RX frequencies are set to wherever your cursor is in the spectrum window. I recommend this be around 1500 Hz, which keeps your transceiver operating close to the center of its pass band. THROB rate is selectable (if you don't see what you want in the drop down box, any number can be typed in). I have only used the default value of 1 THROB/sec,

AFC can be **on** to assist in tuning the THROB signals.
Inverted when clicked will invert the positions of the frequencies. This can be used if your operating on the opposite sideband from the station you are trying to copy. If you appear to be tuned into a strong signal and are only copying garbage, try clicking **Mode | Inverted, or clicking the box in the Throb settings.** You may find the station start to print 100 percent as a result.

These are your only options for Throb at the present time.

Here is a screen shot of a Throb signal on the waterfall display:



As you can see Throb uses the two diamonds with a bar between like RTTY, AMTOR, Packet, PACTOR, and MFSK. You will also notice that they are substantially closer together than any of these other modes.

Receiving Throb
Tune in a Throb signal by pointing right in the center of the tracks with the mouse and clicking the

left mouse button. The text being sent by the station will then appear in the Receive Window. The diamonds will move together to track and tune Throb QSOs.

Transmitting Throb

To transmit to a station, first tune it in as indicated above. Type outgoing text in the Transmit Window, which is the smaller window between the Receive Window and the Spectrum Window. Press the T/R button (or the Pause/Break key, or clich on the TX/RX box in the status bar), and the text in the Transmit Window will be transmitted. You can continue to type, and that text will also be transmitted. As it is being transmitted, text in the transmit Window will also appear in the Receive Window. To stop transmitting, press the T/R button (or one of the other toggles) again. Pressing ESC will abort transmission and return MixW to receive mode, but the last several characters typed will not be transmitted. For this reason, the T/R button (or one of the other toggles) should be used to switch from transmit to receive.

Note: This topic will be further developed, as more is understood about operating Throb.

FSK31 Theory and Operation

The main difference between FSK31 and PSK31 is that FSK31 represents a 90/270 degrees phase shift (DBPSK) instead of the 0/180 pair used in the original BPSK31 by G3PLX.

FSK31 is not near as vulnerable to over modulation as PSK31. FSK31 is Nick's solution to cleaning up the QRM caused by careless over modulation of PSK31 signals. Here is a comparison of PSK31and FSK31 (referred to here as PSK31-90/270) using a spectrum bandwidth at the -40 db level:

Clean signal:

	PSK31	PSK31-90/270
Idle	31	31
Random	80	60

Light distortion:

	PSK31	PSK31-90/270
Idle	220	124
Random	220	93

Heavy distortion:

	PSK31	PSK31-90/270
Idle	500+	160
Random	500+	93

Random = random sequence of characters.

In terms of operating FSK31, it is virtually the same as operating PSK31. For more information see PSK31 Operation

MT63 Introduction by Murray Greenman, ZL1BPU

MT63 is a DSP based advanced HF mode for Amateur Radio, intended to provide high performance keyboard - to - keyboard conversational operation on HF bands under poor conditions. MT63 utilizes a number of revolutionary ideas, and is technically very complex. MT63 is no more difficult to operate than RTTY, and can be easy to tune. It also provides much better performance on HF than most other modes. The specialty of MT63 is its performance when conditions are both weak and unstable.

Simple Description
By encoding the data to transmit (what you type on the keyboard) in a complex way, using 64 different modulated tones, the MT63 developer Pawel Jalocha SP9VRC has been able to include a large amount of extra data in the transmission of each character, so that the receiving equipment can work out, without any doubt, which character was sent, even if 25% of the character is obliterated. This technique is called Forward Error Correction. Other modes use FEC (for example AMTOR mode B uses a simple FEC technique), but MT63 has other advantages. Unlike most HF modes where a character can be lost or changed into something else by a single noise burst, MT63 is inherently very robust, because each character is spread over many tones (to avoid interference such as other radio transmissions) and over several seconds (to avoid bursts of noise, such as lightning). On each tone, the transmission data rate is also fairly slow, which suits the nature of ionospheric disturbances. Despite the low data rate, good text speed is maintained because the text is sent on many tones at once. The system runs at several different speeds, which can be chosen to suit conditions, but 100 WPM, much faster than you can type, is typical.

MT63 sounds unusual, (it sounds like a roaring noise) but the performance is spectacular. There is no connection process, as in AMTOR, Packet or PACTOR. Some users maintain that under poor propagation conditions (excessive fading) MT63 works better than either PACTOR II or Clover. Under good conditions the performance advantages are less obvious. The convenience advantages remain, no matter how good the signal - the mode is suited to nets and random QSOs, as no link need be established. MT63 is also far more immune to interference and deliberate jamming than any of the more conventional modes. Changeover from transmit to receive and vice-versa is slower than most modes.

There are disadvantages to MT63. First, the mode is broad (see below) and quite aggressive, i.e. it causes interference to other modes, but itself is little affected by other modes. Also, because of the delay through the error correction and interleaving processes, it is not possible have quick turnaround "slick" QSOs. In other words, operation is clumsy.

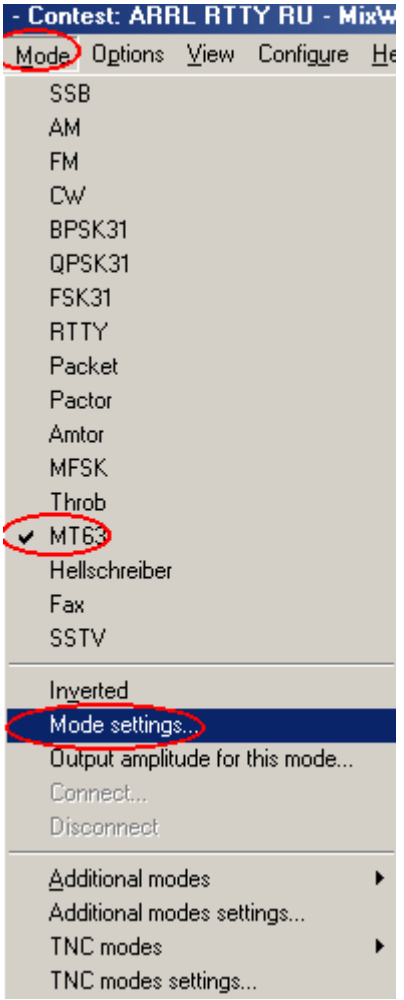
About Wide Modes
Modes like MT63 are quite different from the traditional Amateur digital modes, in fact even other new digital modes. MT63 is both wideband and relatively slow, gaining performance enhancement by spreading the signal in time and space, although it is not a "spread spectrum" mode. There is some controversy surrounding indiscriminate use of modes such as MT63, because they appear to generate wider signals for a given data rate than other modes. Choose you operating times and frequencies with care! (In other words, 20 meters when the band is open and crowded is not appropriate).

Note: Murray has an excellent website with much more information on MT63 and other related modes. This is an excellent resource for anyone interested in learning more about this fascinating new mode:
http://www.qsl.net/zl1bpu/MT63/MT63.html

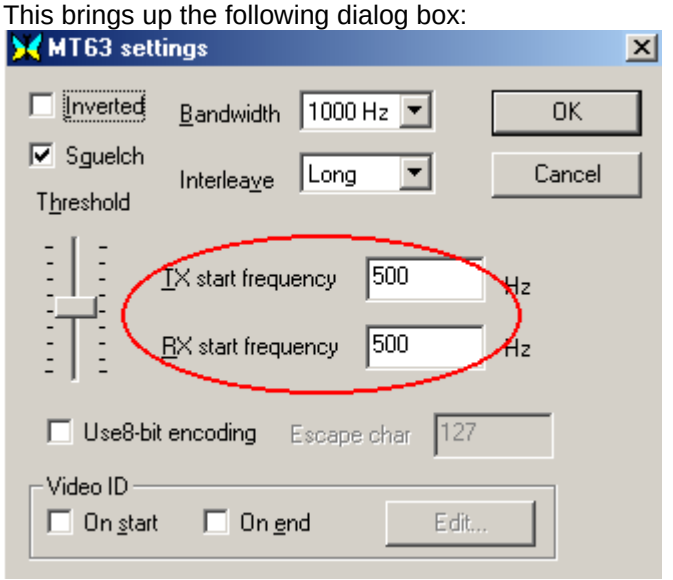
MixW, MT63 Operation.

If you have not already done so, read the General Operations Topic For suggested MT63 frequencies click MT63 Frequencies

In the PSK31 modes almost all tuning is done in software. **For MT63, you must tune with your transceiver's VFO**. The tuning indicators cannot be changed with the mouse like the other modes, however their location can be changed by selecting Mode | Mode Settings, while in the MT63 Mode:



This brings up the following dialog box:



The TX and RX start frequencies determines the location of your tuning indicators on the waterfall display. These should be the same unless your intention is to operate "split", or your transceiver's TX and RX frequencies are out of alignment with each other and you want to compensate for that here.

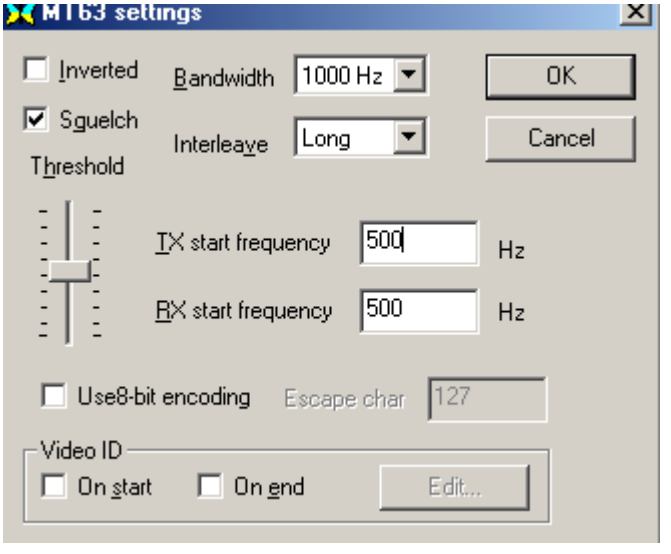
Transceiver Settings

Fine Tuning: If your transceiver is equipped with a "FINE" tuning feature, always use that for MT63 tuning once you have found MT63 activity. Some older rigs are really not stable enough for PSK31 operation and will drift considerably off frequency, but because of the wider bandwidth, they are often fine for MT63.
Processor: Depends on the operating conditions. It can aid in the printability of your signal in certain conditions, but start with it **off as a general rule**.
Pre-Amp: This can be on or off depending on the operating conditions. It can help when working weaker stations in certain situations, but can also make things worse if there are strong adjacent signals.
USB: Almost all MT63 operators use USB transmissions. **Note:** While using the CAT features, MixW automatically adjusts tones depending on which sideband you are operating on. If you are not using CAT, MixW needs to know which sideband your operating on to set the inversion correctly. (See the discussion bellow under inversion).
VOX: Depends on how your switching between RX and TX., See Basic Set Up
Filtering: Optimum filtering depends on your transceiver's SSB filtering options and it's IF rejection characteristics, however MT63 is generally 1000Hz wide (MixW allows 500Hz and 2000Hz MT63 as well). This is much wider than the other digital modes, with the exception of FAX and SSTV. In general your SSB phone filtering will be the best choice for MT63 operations.

Power: This of course depends on conditions. MT63 uses a much wider bandwidth than the PSK31 modes, and so it will require higher power to deliver the same overall signal to the receiving station. High power operation is not shunned in MT63 operation like it is with PSK31 modes. Never use more power than you need to for any given situation, however.

MixW Settings

Mode will be set to MT63 of course. Click on the mode box in the status bar and select MT63. Next bring up the "Mode Settings". This can be done one of several ways, see General Operation, but the easiest is to click on the mode box in the status bar and select "Mode Settings". This brings up the following dialog box:



As mentioned above, the TX and RX start frequencies can be set to wherever you want your cursor in the spectrum window. I recommend this be between 500Hz - 1500 Hz, which keeps your transceiver operating close to the center of its pass band.

Bandwidth: Bandwidth is selectable as well. Most MT63 uses a bandwidth of 1000Hz.

Squelch and Threshold can be used and adjusted to suite your operating preferences.

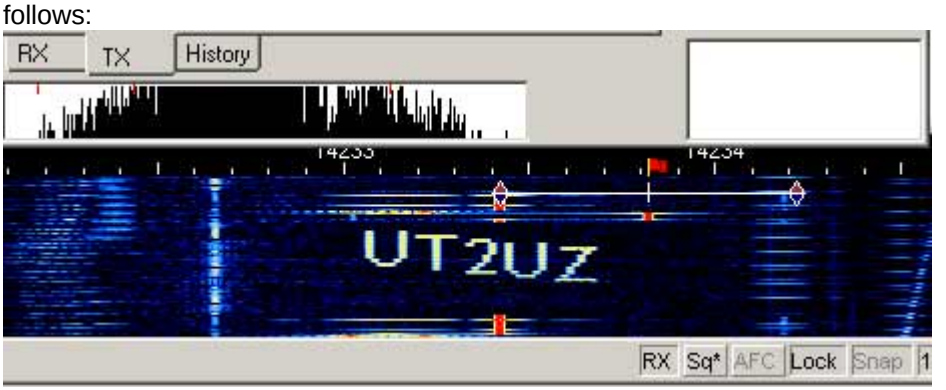
Interleave: Interleave must be adjusted according to bandwidth: try the following:

Bandwidth	Audio Range	Interleave/char
500 Hz	500 - 1000 Hz	Long
1000 Hz	500 - 1500 Hz	Short
2000 Hz	500 - 2500 Hz	Very Short

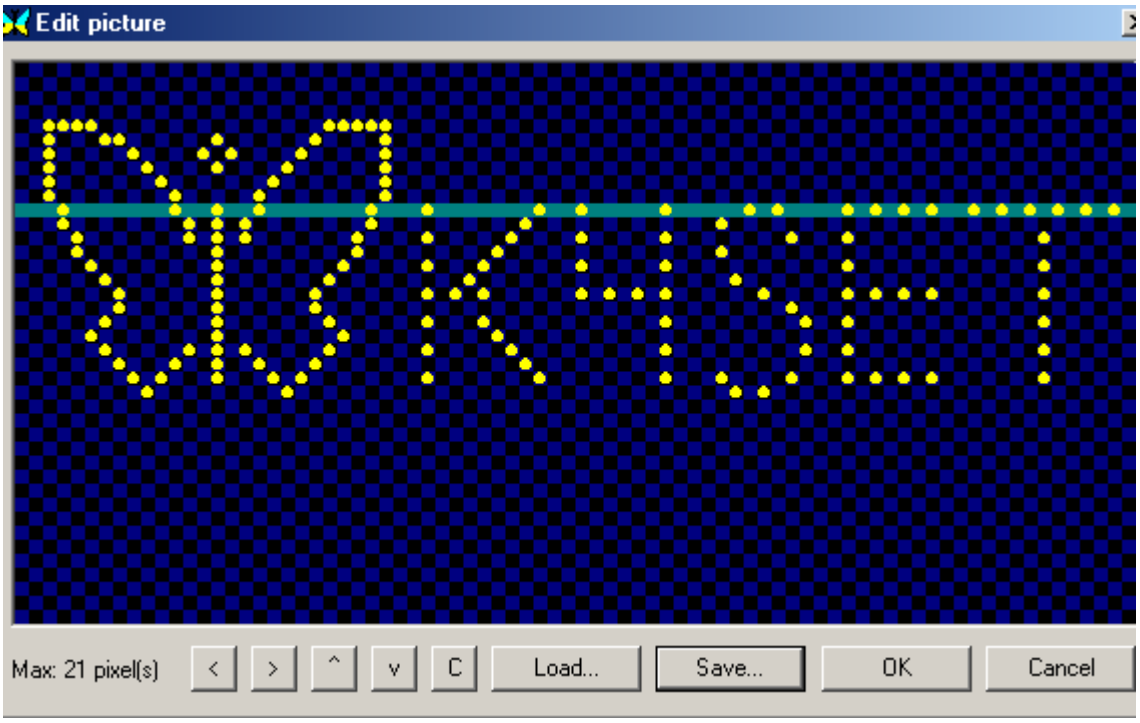
Use 8-bit encoding and Escape Char: Original MT63 supports only 7-bit encoding, which does not allow the use of international characters. 8 bit encoding allows an extension to MT63 protocol where each extended character (with code > 127) is represented as two 7-bit characters: the escape symbol and symbol code minus 128. To allow these charectors check the 8-bit encoding and set the Escape Charector to 127 (the defaulte value).

Video ID and options

This is a new feature used to transmit a Video ID, which is visible on the waterfall display as follows:



A simple editor is included. Since the power is divided by all points and transmitted at the same time, do not make long horizontal lines. Try the VID samples butterfly.bmp and mixw.bmp, which are located in the MixW directory, or make your own. Select when to transmit your video (start, end, or both) and than click the Edit button, which will bring up the following dialog:



I made this VID by first loading the butterfly.bmp, and then clicking on the pixels to add my callsign to it. I then saved this to a new file and selected it as my VID.

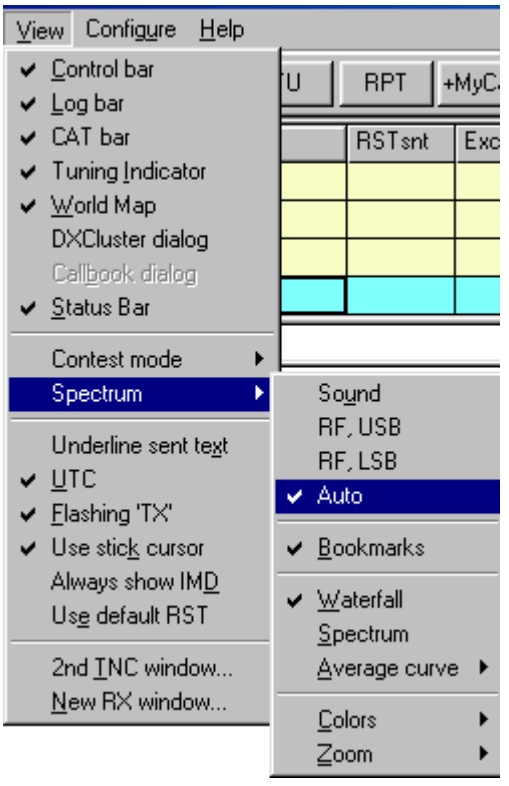
Inverted when clicked will invert the tones to match a station. If you appear to be tuned into a strong MT63 signal, which is tuned within your cursors, and are only copying garbage, try clicking **Mode | Inverted, or clicking the box in the MT63 settings.** You will often find the station start to print 100 percent as a result.

Inversion: **Note:** This feature works differently in MixW than most other SoundCard digital programs, so please read and understand the following information to avoid confusion while operating:

In MixW, "Inverted" means to invert the Mark and Space tones from the normal operating standards of the active mode. This feature can be used in cases where the station you are attempting to work is inverted. The MixW options for RF, USB/LSB must be configured to reflect your mode of operation by selecting Configure | Spectrum | RF, USB or RF, LSB. These must be set correctly in order for the frequencies in the displays to represent your actual operating frequencies, and for MixW to automatically adjust the inversion settings based on your RF mode.

To illustrate: When using a traditional hardware TNC, RTTY is almost always operated in the LSB mode, utilizing a 170 Hz shift between the MARK and SPACE tones, with the MARK tone being the higher in frequency. If MixW is set on "RF, LSB" it will set the Mark tone as the higher tone. However, if MixW is set on "RF, USB" then the Mark tone will be set to the lower tone. (You can think of this as an automatic inversion if you like). In other words, if MixW is configured correctly (it needs to know if you are using LSB or USB) then it will automatically adjust your Mark and Space tones for you. You would only use the "Inverted" feature to operate inverted from the standard practice of that mode of operation, regardless of whether you're using USB or LSB.

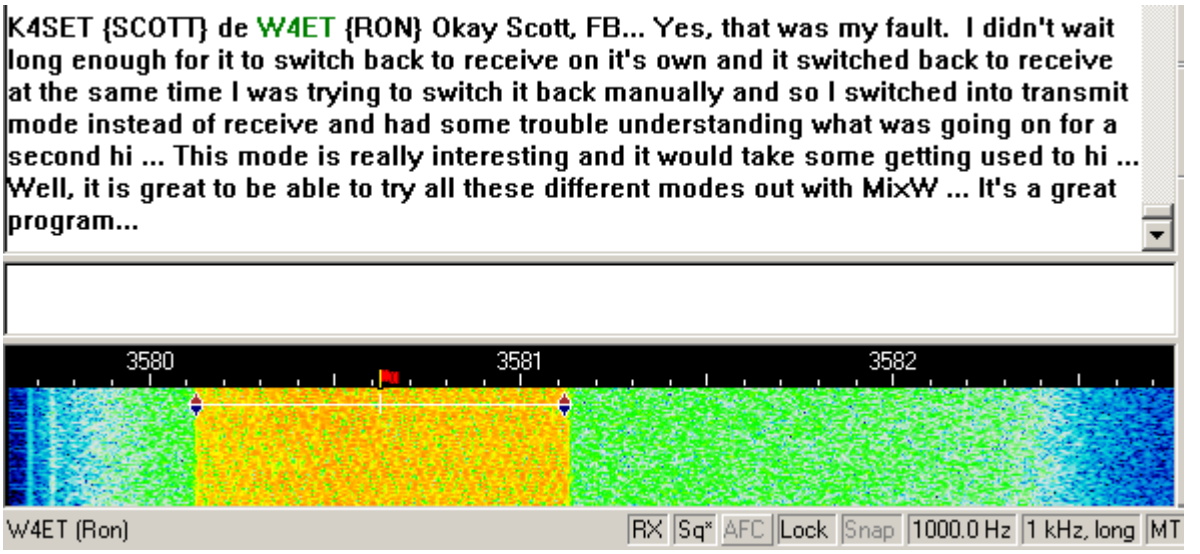
If you are configured to use the CAT features of MixW, (see Configuration for more information) the USB/LSB and frequency changes will all be done automatically for you by selecting Configure | Spectrum | Auto:



Now, MixW will automatically know if you are using USB or LSB, as well as your operating frequency by polling your transceiver via the CAT feature. Your MixW operating frequencies (in the spectrum display as well as the log and CAT bars) will also automatically represent the audio offset, which will be either plus or minus your transceiver's frequency, depending on if you're operating LSB or USB. If you are not using CAT to determine your mode and frequency, you can still set your RF, USB/LSB parameters manually from this menu.

Receiving MT63

Tune your transceiver's VFO until the MT63 signal appears within the tuning indicators as shown here:



Text should decode and appear in the RX window. If the MT63 signals you're attempting to tune are too wide or too narrow to line up with your tuning cursors, you may need to change your bandwidth setting as described above.

Transmitting MT63

To transmit to a station, first tune it in as indicated above. Type your outgoing text in the Transmit Window, which is the smaller window between the Receive Window and the Spectrum Window. Press the T/R button (or the Pause/Break key, or click on the TX/RX box in the status bar), and the text in the Transmit Window will be transmitted. You can continue to type, and that text will also be transmitted. As it is being transmitted, text in the transmit Window will also appear in the Receive Window. To stop transmitting, press the T/R button (or one of the other toggles) again. Pressing ESC will abort transmission and return MixW to receive mode, but the last several characters typed will not be transmitted. For this reason, the T/R button (or one of the other toggles) should be used to switch from transmit to receive.

When transmitting, the waterfall will freeze and remain frozen until returning to Receive.

When you are transmitting, and not typing or sending text, the Transmit Volume should be increased until the RF output power of the transceiver just stops increasing, and then reduced until the power falls to half of the amount when it just stopped increasing. This should result in maximum undistorted output power under MT63 operation. However, some transceivers cannot handle the full duty cycle of MT63 without overheating. In this case, quickly reduce the power until the transceiver is running at the recommended power output for continuous-duty operation.