WinWarbler 7.9.2

Overview 2
Prerequisites 3
Download and Installation 4
Configuration 5
General Settings 7
Display Settings 10
Push-to-talk (PTT) Settings 13
Soundcard Settings 15
Configuring Multiple Soundcards 16
Phone Settings 17
PSK Settings 18
Soundcard PSK Broadband Decode Settings 23
RTTY Settings 26
MMTTY Settings 33
External Modem Settings 35
External Modem Command Files 40
CW Settings 42
Log Settings 47
Contest Settings 49
Obtaining Position, Course, and Speed from a GPS Receiver 50
Logging 52
Macros 65
CW 79
CW Keystrokes 83
Phone 84
PSK31, PSK63, and PSK125 86
PSK Reception 88
PSK Transmission 92
PSK Broadband Decode 94
RTTY 97
Soundcard RTTY Reception 99
Soundcard RTTY Transmission 104
RTTY Reception Via External Modem 105
RTTY Transmission Via External Modem 107

Overview

WinWarbler helps you conduct QSOs in the CW, Phone, PSK31, PSK63, and RTTY operating modes. The topics below will introduce you to its capabilities in-depth; for a quick tour, you can review the PSK screen capture and RTTY screen capture. If you let the mouse cursor dwell over a control for a few seconds, WinWarbler will pop up an ***tooltip*** explaining that control's function; the display of tooltips can be disabled once you've become familiar with the program.

WinWarbler is free, and contains no advertising. Commercial use is expressly forbidden.

Prerequisites

To use WinWarbler, you need

- a PC running Windows 95, Windows 98, Windows 2000, Windows NT, Windows XP, Windows 7, or Windows 8
- a sound card
- an SVGA display or better
- a transceiver covering the frequencies of interest
- appropriate connections between your sound card and transceiver inputs and outputs

The VOX circuits of some transceivers can be configured to automatically trigger when WinWarbler transmits. Alternatively, you can connect a serial port to your transceiver's PTT input to automatically place your transceiver in transmit mode.

In RTTY mode, WinWarbler's 2-Tone and MMTTY engines can simultaneously decode two signals (e.g. a DX station and its pileup) or provide diversity decoding of a single signal. An external RTTY modem such as a KAM or PK232 can be used to provide additional diversity decoding. External modems like the SCS PTC family that support modes like Amtor and Pactor are also supported.

Download and Installation

Installing or Upgrading the DXLab Launcher
The **DXLab Launcher** automates the installation of new DXLab applications, including WinWarbler, and the upgrading of already-installed DXLab applications.

If you're an aspiring DXLab user who has **not installed any DXlab applications** on your PC, or if you're a long-time DXLab user who has **never installed the Launcher**, then installing the Launcher will make it easy to install new DXLab applications and keep them up to date as upgrades are released.

Step-by-step guides for installing the Launcher are available, both in HTML for browsing (http://www.dxlabsuite.com/dxlabwiki/InstallLauncher) and in PDF for printing (http://www.dxlabsuite.com/Download%20and%20Installation.pdf).

You can uninstall WinWarbler by running the Add/Remove Programs applet on the Windows control panel.

If you have questions or suggestions, please post them on the DXLab reflector at http://groups.yahoo.com/group/dxlab.

If you're not a member, you can sign up at http://www.dxlabsuite.com/reflector.htm.

Configuration

The first time you run WinWarbler, you will be asked to enter your callsign. Once this has been completed, WinWarbler is ready for basic PSK31. PSK63, and Soundcard RTTY operation. Basic controls -- such as those that start/stop transmission, enable/disable Automatic Frequency Control (AFC), enable/disable NET operation, or log a QSO -- are located on WinWarbler's main window.

Clicking the **Config** button on WinWarbler's main window displays a tabbed dialog box that provides additional control of WinWarbler's behavior and appearance.

Panels on the Configuration window's General tab let you

- specify your callsign
- enable automatic archiving of the information WinWarbler receives and transmits
- align WinWarbler's frequency readout with your transceiver's during RTTY operation
- display the Position and Vector Configuration window, from which you can
    - specify values for your current latitude, longitude, grid square, course, and speed
    - enable connection to a NMEA-compliant Global Positioning Satellites (GPS) receiver that automatically updates your current latitude, longitude, grid square, course, and speed, and determine the number of satellites contributing to the position computation
    - specify the serial port to which a GPS receiver is connected
- choose the browser that displays WinWarbler's online help

Panels on the Configuration window's Display tab enable you to

- select the colors and font styles of transmitted and received text displayed in each receive pane
- select the colors and font styles of text displayed in the transmit pane
- select the trace color used in spectrum, vector, and XY tuning displays

Panels on the Configuration window's Log tab enable you to specify the initialization and behavior of items used in logging.

Controls on the Configuration window's Contest tab enable you to configure WinWarbler's support for Contesting.

Panels on the Configuration window's Push-to-talk (PTT) tab let you determine whether and how WinWarbler directs your transceiver to switch between receive and transmit modes.

Panels on the Configuration window's PSK tab control reception and transmission in PSK31, PSK63, and PSK125; settings in this tab allow you to

- choose BPSK USB, BPSK LSB, QPSK USB, or QPSK LSB modulation
- set limits for search range and AFC tracking
- choose between waterfall and spectrum tuning displays
- set the squelch speed
- specify an optimal audio offset, permitting one-click QSY to place the currently-received signal in your transceiver's passband
- select the speed at which CW identification is sent
- compensate for a frequency offset between your transmitter and receiver
- compensate for error in your soundcard's clock rate

Panels on the Configuration window's Soundcard tab let you choose a soundcard for PSK operation if your PC has more than one, and provide a means to invoke the Windows multimedia mixer, whose controls governing the levels of signals received and transmitted via the selected soundcard

Panels on the Configurations window's Broadband Decode tab provide control over a mechanism that can simultaneously decode and monitor up to 47 PSK signals between 100 hz and 3500 hz.

Panels on the Configuration window's RTTY tab let you

- enable or disable Soundcard RTTY operation
- specify baud rate
- specify shift
- enable or disable Unshift On Space (USOS)
- enable or disable reverse RTTY
- specify whether your transmitter is using AFSK or FSK
- specify whether characters should be sent immediately after their entry, or only after a word has been entered
- choose between waterfall and spectrum tuning displays
- tune the RTTY engine's demodulator

Panels on the Configuration window's External Modem tab enable you to

- specify the specific RTTY modem in use and the serial port to which its connected
- enable or disable Soundcard RTTY operation
- specify baud rate
- specify shift
- enable or disable Unshift On Space (USOS)
- enable or disable reverse RTTY
- specify whether your transmitter is using AFSK or FSK

Panels on the Configuration window's CW tab enable you to

- specify the transceiver mode to be used when CW operation is selected
- compensate for a transceiver offset during CW operation
- specify whether characters should be displayed as they are transmitted
- specify the keyboard mode (auto start, auto stop, send each character or accumulate a word before sending)
- specify keying mode (transceiver control software, serial port modem control signal, PTT port modem control signal, external modem, WinKey)
- specify PTT parameters (enable/disable, lead time, lag time)
- specify CW weight
- specify WinKey parameters

Panels on the Configuration window's Phone tab enable you to

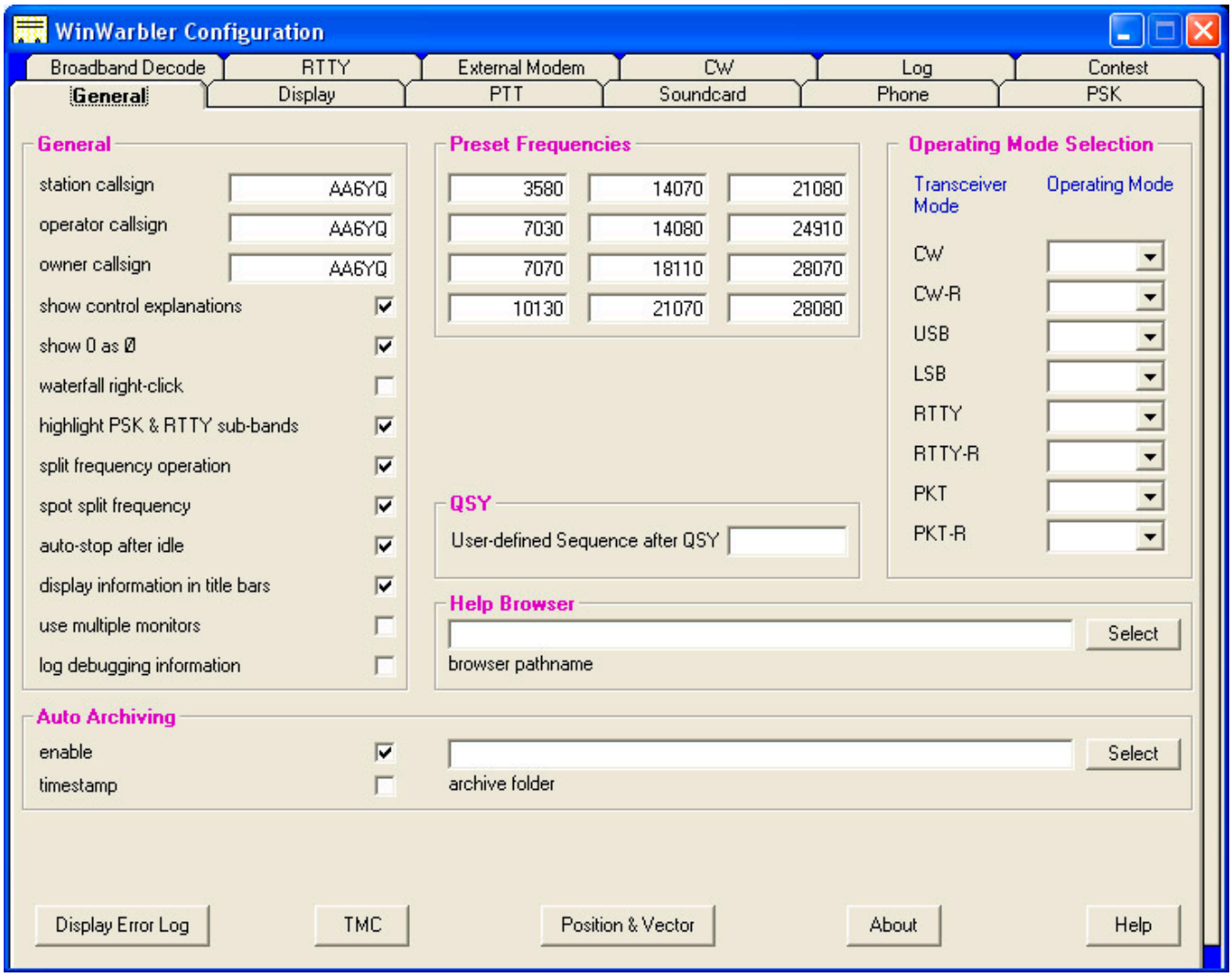
- specify the transceiver mode to be used when Phone operation is selected
- compensate for a transceiver offset during Phone operation
- specify whether PTT is enabled during Phone operation

External RTTY modem commands are specified in files located in WinWarbler's `Modems` subfolder. WinWarbler includes files for the KAM and PK232. You can modify these files, or create files for other RTTY modem models using a simple command syntax.

General Settings

The **General** tab of WinWarbler's Configuration window contains 6 panels, each containing a related group of settings that you can inspect and/or modify. This window also provides four buttons along its bottom border:

- Display Error Log - displays the file Errorlog.txt in WinWarbler's folder, which contains diagnostic and error recovery information
- Position and Vector - displays the Position and Vector Configuration window for use with a GPS receiver
- About - displays a window that shows the versions of PSKCORE and MMTTY currently in use
- Help - displays this online documentation



General Panel

station callsign	the callsign being used over the air • appears in the main window title bar • appears in the STATION_CALLSIGN field of each log record • can be inserted into macros via the <mycall> command
operator callsign	the operator's callsign • appears in the OPERATOR field of each log record • can be is inserted into macros via the <opcall> command
owner callsign	the station owner's callsign • appears in the OWNER_CALLSIGN field of each log record • can be is inserted into macros via the <ownercall> command
show control explanations	When checked, enables the display of explanatory information when the mouse cursor lingers over a textbox, button, checkbox, display pane, or setting.
show 0 as Ø	When checked, displays the character 0 (zero) as Ø in receive panes
waterfall right-click	• when unchecked, right-clicking in the waterfall sets the transmit frequency and CTRL-right clicking invokes the optimal offset function • when checked, right-clicking in the waterfall invokes the optimal offset function and CTRL-right clicking sets the transmit frequency
split frequency operation	if checked ,the XCVR Freq panel's TX frequency selector tracks Commander's transmit frequency; if unchecked, it tracks Commander's primary VFO.
spot split frequency	When checked, outgoing spot notes include the QSX frequency if the current RX and TX frequencies are separated by more than 300 Hz
auto-stop after idle	When checked while in PSK or RTTY mode, automatically terminates transmission after idle characters are sent for 15 consecutive seconds (not activated by tuning)
Display information in title bars	When checked, displays the UTC time in the Main window's title bar (uncheck when running on Vista)
use multiple monitors	When checked, windows that resided on a secondary monitor during the previous session will be restored to the same secondary monitor on startup; when not checked, all windows are restored to the primary monitor on startup
log debugging information	when checked, writes diagnostic information to the file errorlog.txt in WinWarbler's folder

Auto Archiving Panel

enable	when checked, information presented on each pane is continuously appended to a separate file located in the specified archive folder name
timestamp	when checked with automatic archiving enabled, records a timestamp in each active pane's archive file every 5 minutes
archive folder name	specifies the pathname of the folder into which archive files will be placed if auto archiving is enabled

Preset Frequencies Panel
This panel lets you specify up to 12 preset frequencies for selection via the QSO Info panel's Freq selector.

QSY Panel
This panel lets you specify the name of a User-defined Command Sequence in Commander to be executed after WinWarbler directs Commander to change the transceiver's frequency.

Operating Mode Selection Panel

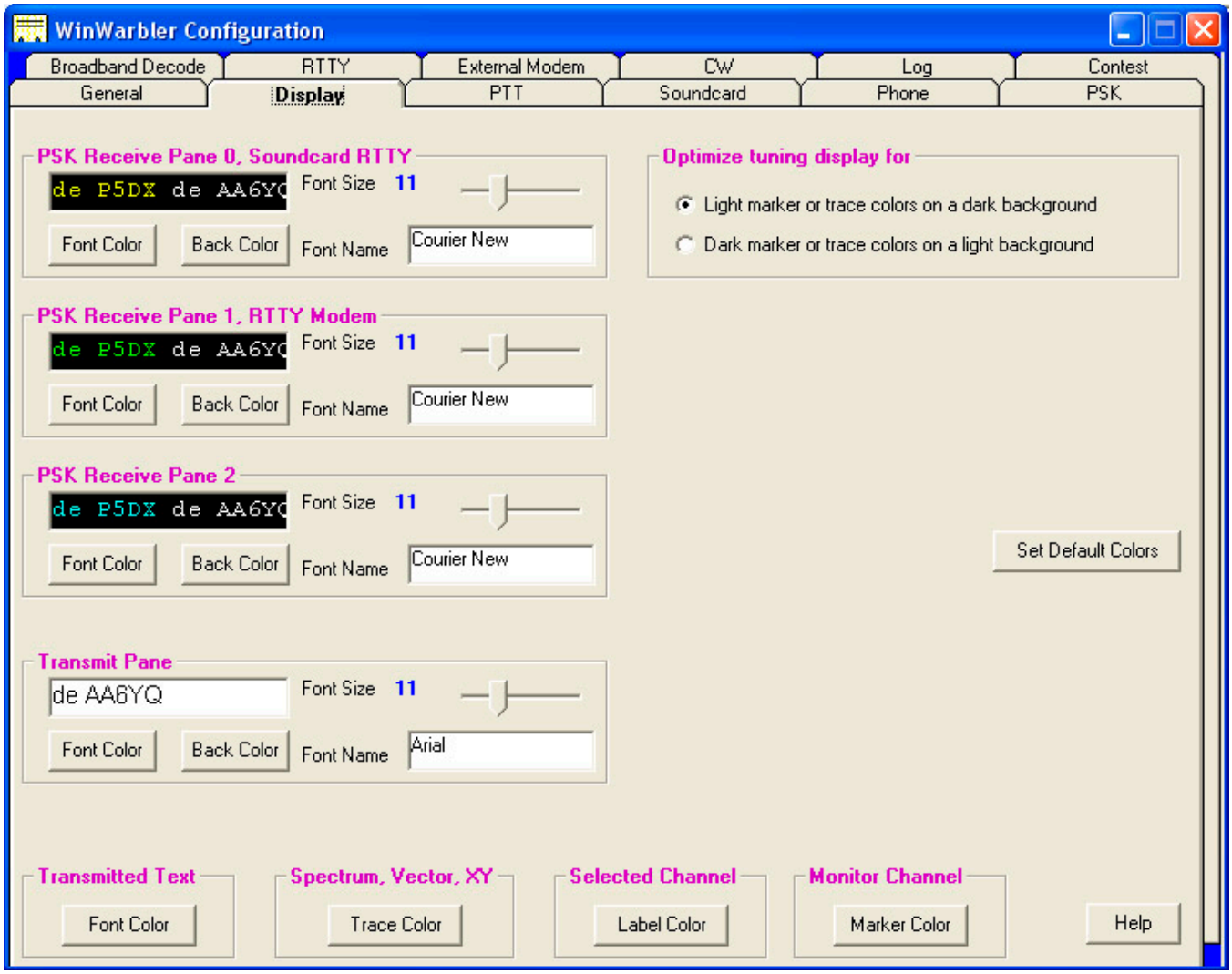
This panel provides the option of automatically changing Operating Mode when Commander reports a change in transceiver mode not initiated by WinWarbler. For example, you can specify that WinWarbler should switch to the RTTY operating mode if your transceiver is switched to RTTY. This panel provides a selector for each transceiver mode. If a selector's contents are empty, then there will be no change in Operating Mode when the transceiver is switched to the transceiver mode associated with that selector. If a selector's contents specify an operating mode, then when Commander reports that the transceiver has switched to the transceiver mode associated with that selector, the specified operating mode will be activated.

Help Browser Panel

browser pathname	if this setting is blank, WinWarbler displays online help using your PC's default HTML browser; if this setting contains the pathname of an HTML browser, WinWarbler displays online help using that browser.

Display Settings

The **Display** tab of WinWarbler's Configuration screen contains panels that control the appearance of received text, transmitted text, and the Spectrum, Vector, and XY displays.



Receive Pane Display Settings
The following settings are provided in panels for each of the three receive panes:

Font Color	clicking this button displays a color selector that lets you choose the color of the pane's **received** text; this same color is displayed on the identification panel to the left of each receive pane, and identifies the associated channel's waterfall trace
Back Color	clicking this button displays a color selector that lets you choose the color of the receive pane's background color
Font Name	displays the name of the font used to display text appearing in the receive pane; clicking this control displays a standard Windows font selector, allowing you to choose any available font, specify its point size, and specify whether it is to be rendered in bold and/or italics
Font Size	this slider displays and controls the point size of text appearing in the receive pane

Changing font characteristics can make a pane's existing text unreadable; thus such modifications should be avoided while in QSO.

The *Transmitted Text* setting controls the color of transmitted text in all three receive panes:

Font Color	clicking this button displays a color selector that lets you choose the color of **transmitted** text

When a receive channel is selected, the label to the left of its pane (on WinWarbler's main screen) is given a unique color; The Selected Channel setting specifies this color. Since each channel label appears over a panel whose color matches the font color of its associated receive pane, choose a color for the selected channel label that contrasts with all three receive pane font colors.

Label Color	clicking this button displays a color selector that lets you choose the color of the channel label for the currently-selected receive pane

The *Optimize tuning display for* panel determines whether Monitor Channel markers will be shown against a white background and tuning display trace borders will be rendered in black, or Monitor Channel markers will be shown against a black background and tuning display trace borders will be rendered in white. If you you select light receive pane font colors and dark receive pane background colors, then you should chose *Light marker or trace colors on a dark background* and select a light Monitor Channel marker color (e.g. white) . If you you select dark receive pane font colors and light receive pane background colors, then you should chose *Dark marker or trace colors on a light background* and select a dark Monitor Channel marker color (e.g. black) .

Changes made to the above settings are immediately applied, so you can assess your customization by direct observation. To reduce the need for flipping between windows on systems with smaller screen sizes, each panel contains a preview textbox illustrating the appearance of both received text (on the left) and transmitted text (on the right).

Transmit Pane Display Settings
The following settings are provided for the transmit pane:

Font Color	clicking this button displays a color selector that lets you choose the color of keyboard-generated or macro-generated text
Back Color	clicking this button displays a color selector that lets you choose the transmit pane's background color
Font Name	displays the name of the font used to display text appearing in the transmit pane; clicking this control displays a standard Windows font selector, allowing you to choose any available font, specify its point size, and specify whether it is to be rendered in bold and/or italics
Font Size	this slider displays and controls the point size of text appearing in the transmit pane; the transmit pane's height is automatically scaled to properly display the selected font size

Tuning Display Frequency Scale settings
The following settings are provided to control the rendering of frequencies in the tuning display's frequency scale:

Font Name	displays the name of the font used to display frequencies; clicking this control displays a standard Windows font selector, allowing you to choose any available font, specify its point size, and specify whether it is to be rendered in bold and/or italics
Font Size	this slider displays and controls the point size of frequencies
highlight PSK & RTTY sub-bands	when checked, highlights `PSK sub-bands` and `RTTY sub-bands` in the tuning display's frequency scale by coloring displayed frequencies and tick-marks
Sub-band Color	clicking this button displays a color selector that lets you choose the color of frequencies and tick-marks within `PSK sub-bands` and `RTTY sub-bands` to be used if the `highlight PSK & RTTY sub-bands` setting is enabled
Out-of-sub-band Color	clicking this button displays a color selector that lets you choose the color of frequencies and tick-marks that are not within `PSK sub-bands` and `RTTY sub-bands` to be used if the `highlight PSK & RTTY sub-bands` setting is enabled

Spectrum Display, Vector, and XY Display Settings

Trace Color	clicking this button displays a color selector that lets you choose the color of the trace used to render the spectrum display, vector, and XY display

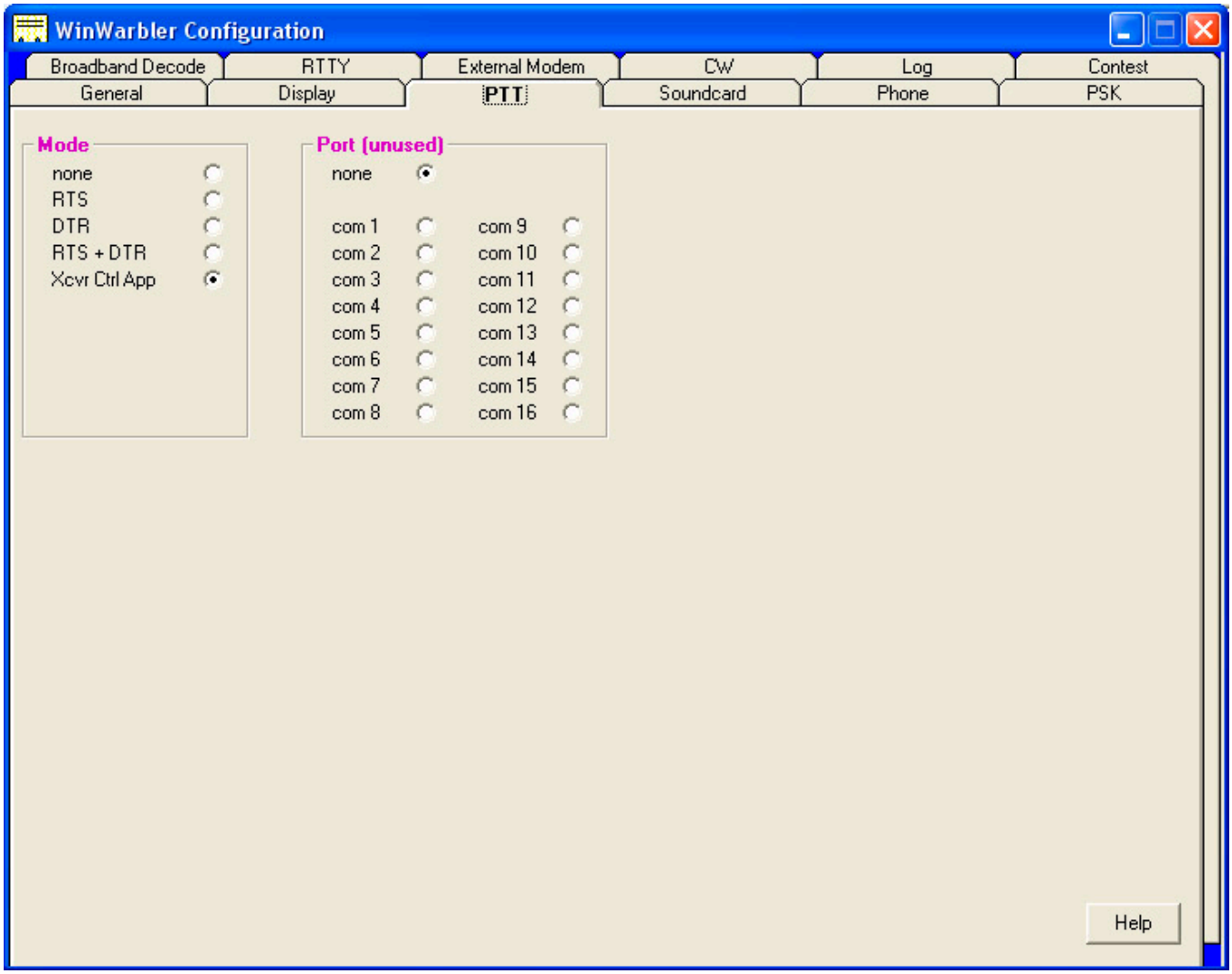
Monitor Channel settings

Marker Color	clicking this button displays a color selector that lets you choose the color of the markers used to designate the frequency of each locked `monitor channel`

Default Colors button
Clicking this button sets all colors to reasonable default values. If incoming text is not visible because font colors and background colors lack sufficient contrast, this function will rectify the situation.

Push-to-talk (PTT) Settings

The **PTT** tab of WinWarbler's Configuration screen contains two panels that indicate how the transceiver is to be switched between transmit and receive modes.



When Soundcard RTTY is active, the specified PTT port is used by the MMTTY engine for PTT (if the PTT Mode is set to RTS+DTR) and/or FSK (if the Soundcard RTTY modulation and transceiver mode panel is set to FSK (USB) or FSK (LSB).

PTT Mode panel

none	the transceiver must be manually switched between receive and transmit modes, or utilize VOX
RTS	the RequestToSend modem control signal is asserted on the PTT port when transmitting; this choice is not available when Soundcard RTTY is active.
DTR	the DataTerminalReady modem control signal is asserted on the PTT port when transmitting; this choice is not available when Soundcard RTTY is active.
RTS+DTR	both the RequestToSend and DataTerminalReady modem control signals are asserted on the PTT port when transmitting except when operating CW: • if CW keying is set to use the PTT port's RTS signal, then only DTR will be used for PTT during CW transmission • if CW keying is set to use the PTT port's DTR signal, then only RTS will be used for PTT during CW transmission
Xcvr Ctrl App	messages are sent to a transceiver control application (e.g. Commander) directing it to switch the transceiver between receive and transmit modes

PTT port panel

This panel's caption indicates how the selected port is being used:

none	the selected port is not being used
PTT	the select port's modem control signals are being used to effect transmit/receive switching
MMTTY FSK	the selected port's TxD signal is being used by the MMTTY engine to convey FSK data
MMTTY PTT & FSK	the select port's modem control signals are being used to effect transmit/receive switching, and its TxD signal is being used by the MMTTY engine to convey FSK data

The panel lets you select the serial port used for transmit/receive switching and/or Soundcard RTTY FSK:

none	no serial port is used for transmit/receive switching and/or Soundcard RTTY FSK
com1-16	asserts modem control signals on the selected PC serial communications port, as specified by the *PTT mode setting*; if Soundcard RTTY is enabled and FSK mode is selected, FSK data is conveyed via port 1's TxD pin

Soundcard Settings

The **Soundcard** tab of WinWarbler's Configuration window contains controls that let you

- select the soundcard devices to be used in
    - PSK & soundcard RTTY reception
        - the soundcard's left or right channel can be selected for soundcard RTTY reception
    - PSK and soundcard RTTY transmission
    - Phone transmission
- display the Windows multimedia mixer controls governing the levels of signals received and transmitted via the selected soundcard

For PSK and soundcard RTTY operation, the **Windows default soundcard** button chooses the soundcard device selected on the audio tab of the Windows Control Panels' Sounds and Audio Devices applet. . If you have more than one soundcard, you can choose the Windows default, or you can select a specific soundcard.

For Phone operation, select the soundcard device to be used by play or say macros; you can use the same soundcard for PSK, RTTY, and Phone transmission.

Buttons in the **Mixer adjustments** panel let you display the multimedia mixer controls governing the levels of signals received and transmitted via the selected soundcard devices.

Configuring Multiple Soundcards

Windows supports multiple soundcards, identifying them by product name in order from soundcard 0 to soundcard *N*. One of these soundcards devices -- the **preferred device** -- is used to play Windows sounds, such as those that can be played when open a folder with Windows Explorer, or when an error occurs. If your PC has two soundcards, or has integral soundcard functions on its motherboard and an add-on soundcard, you can

- designate one soundcard output device as the Windows **preferred device** for Windows sounds and SpotCollector's audible DX announcements
- designate the other soundcard output for PSK31, PSK63, AFSK RTTY via WinWarbler, and/or Phone transmission

Configuring your soundcards in this way will avoid inadvertent transmission of DX announcements and Windows sounds when you are operating PSK31, PSK63, AFSK RTTY, or Phone. To do so,

1. Decide which soundcard you want to use for SpotCollector's audible DX announcements and which card you will use with WinWarbler. If your PC's motherboard has integral soundcard functions on its the motherboard, this will likely already be configured as soundcard 0, and is a good candidate for playing Windows sounds and SpotCollector announcements.
2. Open the **Windows Control Panel**, run the **Sounds and Multimedia Properties** applet, and select its **Audio** tab
3. Note the order in which your soundcards are listed in the **Sound Playback** panel's **preferred device** selector; the first soundcard listed is soundcard 0, and the second is soundcard 1. If your two soundcards are identical, determine which is soundcard 0 and which is soundcard 1:
    - switch to the **Sounds and Multimedia Properties** applet's **Sounds** tab
    - select a Sound Event that shows a loudspeaker icon (e.g. "Critical Stop")
    - set the Sound Volume slider to 75%
    - with speakers connected to one of your soundcards, play the selected sound by clicking the button bearing a left-facing black triangle; if you hear nothing, connect the speakers to the other soundcard
    - the soundcard from which sound is heard when you play a Windows sound is the one designated as the preferred device on the **Audio** tab; if its the first soundcard in the **preferred device** selector's list, then its soundcard 0; if its the second soundcard in the selector's list, then its soundcard 1.
4. On the **Audio** tab**,** set *both* the **Sound Playback** and **Sound Recording** panels' **preferred device** selectors to the soundcard you have chosen to play Windows sounds and SpotCollector's audible DX announcements.
5. On the **Soundcard** tab of WinWarbler's **Configuration** window, select the soundcard device not specified in step 4 in both in the PSK & RTTY and Phone Transmission panels

SpotCollector plays its audible DX announcements on the **preferred device**, so no configuration of that application is required.

Phone Settings

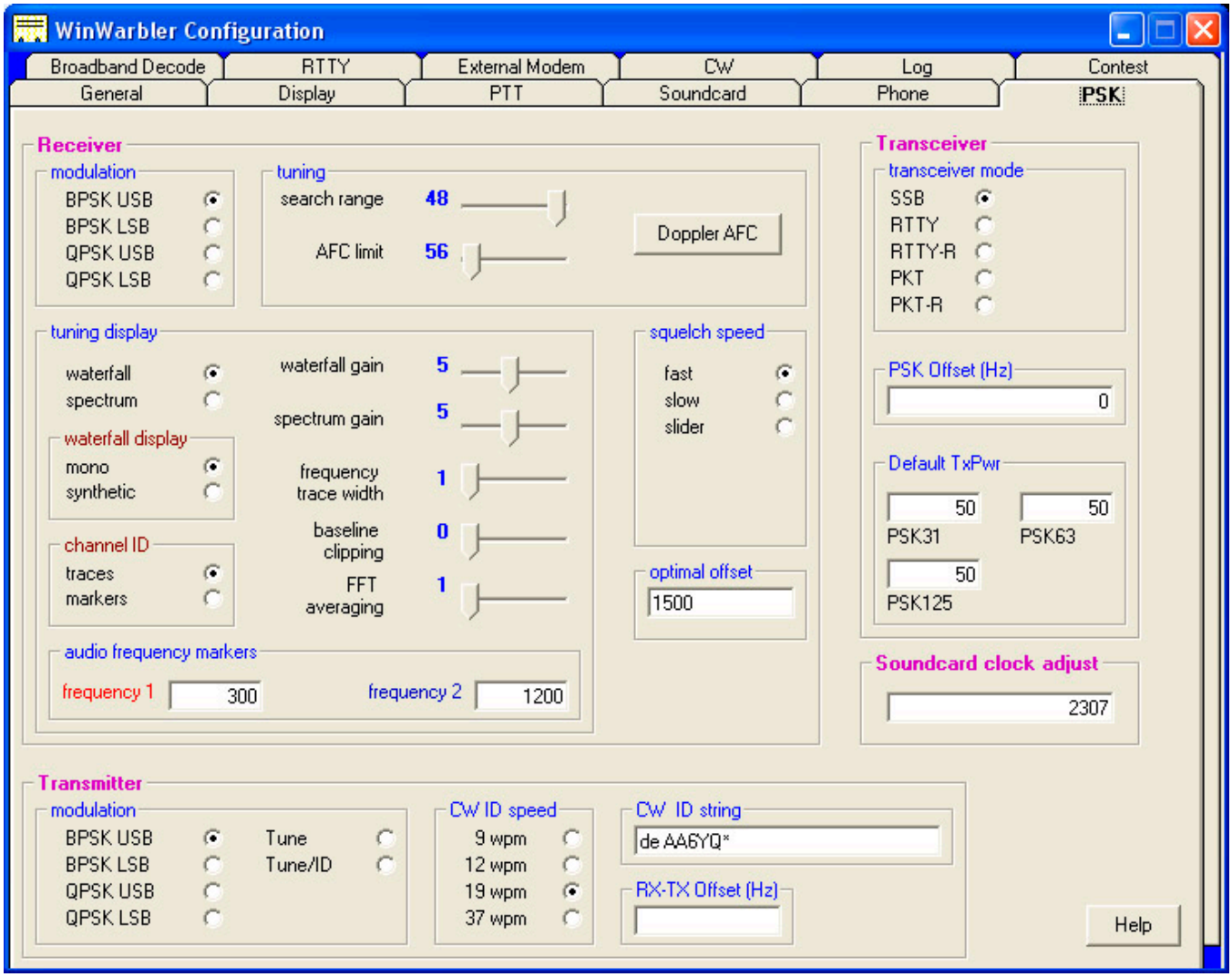
The **Phone** tab of WinWarbler's Configuration window provides a panel that controls voice keying operation in Phone modes:

Xcvr mode	specifies whether Commander (if running) should set the transceiver mode to AM, FM, or SSB when WinWarbler is placed in Phone mode; if SSB is selected, LSB will be used if the frequency is below 13 MHz, and USB will be used if the frequency is above 13 MHz.
Phone offset (hz)	specifies an offset in Hertz that aligns the displayed Phone receive frequency with a known Phone frequency; negative values are accepted. This can be used to compensate for an offset between your transceiver's VFO display and its actual frequency, ensuring that an accurate frequency will be logged with the QSO.
Default TxPwr	specifies the default power used to initialize the QSO Info panel's TX Pwr textbox when the **Enter** or **Tab** key is struck in the QSL Info panel's call textbox with the Main window's Mode panel set to Phone
assert PTT during Phone	when checked, assert PTT during SSB transmission; this option is disabled if the PTT mode panel is set to *none*
.wav file folder	pathname of the folder containing .wav files referenced in <play> macros

PSK Settings

The **PSK** tab of WinWarbler's Configuration window contains four panels that control PSK31, PSK63, and PSK125 mode operation.

- Receiver panel
- Transmitter panel
- Transceiver panel
- Soundcard clock adjust panel



The frequency scale above the tuning display is rendered in green for frequencies within PSK sub-bands, and in red for frequencies outside of PSK sub-bands; you can customize the definition of these sub-bands by copying and editing a file.

The **Receiver panel** contains 5 sub-panels, each containing a related group of settings that you can inspect and/or modify.

Modulation sub-panel

BPSK USB	specifies the BPSK PSK modulation mode for the transmitter and demodulation mode for all receive channels, and assumes the transceiver is set to upper sideband or RTTY-reversed
BPSK LSB	specifies the BPSK PSK modulation mode for the transmitter and demodulation mode for all receive channels, and assumes the transceiver is set to lower sideband or RTTY
QPSK USB	specifies the QPSK PSK31 modulation mode for the transmitter and demodulation mode for all receive channels, and assumes the transceiver is set to upper sideband or RTTY-reversed
QPSK LSB	specifies the BPSK PSK31 modulation mode for the transmitter and demodulation mode for all receive channels, and assumes the transceiver is set to lower sideband or RTTY

Squelch Speed sub-panel

fast	selects a fixed value for fast filtering
slow	selects a fixed value for slow filtering
slider	presents a slider control that allows precise operator selection • 10 is fastest • 200 is slowest

Tuning sub-panel

search range	specifies the search range above and below a newly-specified receive frequency in hertz • the receive frequency is centered on the first PSK signal located in this range • 0 disables searching
AFC limit	specifies the maximum track-able excursion from a PSK signal's center frequency in hertz • 0 disables AFC tracking • un-checking the *AFC enabled* checkbox in the Receive panel disables AFC tracking
Doppler AFC	clicking this button sets the AFC limit to 3000, which optimizes the AFC for tracking Doppler shifted signals; the label of the Receive panel's *AFC enabled* checkbox is rendered in red when the Doppler-tracking AFC is enabled

Tuning Display sub-panel

waterfall	selects a waterfall tuning display
spectrum	selects a spectrum tuning display
waterfall gain	determines the sensitivity of the waterfall display
spectrum gain	determines the sensitivity of the spectrum display
frequency trace width	determines the width in pixels of the tuning display traces that indicate each receive channel's frequency, and and the transmit frequency (if not locked to a receive channel)
baseline clipping	sets the baseline signal strength; signals weaker than the baseline are discarded, whereas signals stronger than the baseline are scaled to the waterfall and spectrum display ranges

FFT averaging	specifies the degree of averaging using during Fast Fourier Transform (FFT) processing • 1 = no averaging • 10 = maximum averaging
waterfall display	specified the colors used in the waterfall display • mono - monochrome • synthetic - false color, using a color lookup table devised by AE4JY
channel ID	determines how receive channel and transmit frequencies are indicated on the waterfall and spectrum displays • traces -via colored lines; in the waterfall display, the width of these lines is set by the frequency trace width slider • markers - via colored triangles above the tuning display; the width of these lines indicates the bandwidth of the current mode's signals
audio frequency markers	specifies the frequencies of tuning display markers when operating PSK frequency 1 — frequency (hz) of the red marker on the tuning display's frequency scale; double-clicking this setting clears it, suppressing display of the red marker frequency 2 — frequency (hz) of the blue marker on the tuning display's frequency scale; double-clicking this setting clears it, suppressing display of the blue marker

Optimal Offset sub-panel
The textbox in this panel allows you to specify the optimal receive offset frequency, in Hz., used by the Optimize Offset function. Values must lie in the range of 50 to 3500.

The **Transmitter panel** contains 5 sub-panels, each containing a related group of settings that you can inspect and/or modify.
Modulation sub-panel

BPSK USB	specifies the BPSK PSK modulation mode for the transmitter and demodulation mode for all receive channels, and assumes the transceiver is set to upper sideband or RTTY-reversed
BPSK LSB	specifies the BPSK PSK modulation mode for the transmitter and demodulation mode for all receive channels, and assumes the transceiver is set to lower sideband or RTTY
QPSK USB	specifies the QPSK PSK31 modulation mode for the transmitter and demodulation mode for all receive channels, and assumes the transceiver is set to upper sideband or RTTY-reversed
QPSK LSB	specifies the QPSK PSK31 modulation mode for the transmitter and demodulation mode for all receive channels, and assumes the transceiver is set to lower sideband or RTTY
Tune	transmit a steady carrier for tuning
Tune/ID	transmit a steady carrier for tuning and send a CW identification when transmission is complete

CW ID Speed sub-panel

9 wpm	if PSK31 mode, transmits the CW identification string at the rate of 9 words per minute; if in PSK63 mode, 19 words per minute
12 wpm	if PSK31 mode, transmits the CW identification string at the rate of 12 words per minute; if in PSK63 mode, 19 words per minute
19 wpm	transmits the CW identification string at the rate of 19 words per minute
37 wpm	transmits the CW identification string at the rate of 37 words per minute

RX-TX Offset sub-panel

This setting can be used to compensate for a frequency offset between transmitter and receiver. Specify your transmitter's offset in Hz. If your transmitter's frequency is 10hz higher than your receiver's frequency, enter 10; if it's 10 hz lower, enter -10).

CW ID String sub-panel

CW identification string	specifies the information sent in Morse code when the CWID button in the Transmit panel is clicked, or when the *transmission modulation* setting is Tune/ID • * (asterisk) generates the SK prosign • + (plus sign) generates the AR prosign • = (equal sign) generates the BT prosign

The **Transceiver panel**
The Transceiver Mode subpanel enables you to specify the mode to which the transceiver is set (if Commander is running) during PSK operation.

SSB	if the Transmitter Modulation is set to LSB, then set the transceiver to LSB; otherwise set the transmitter to USB
RTTY	set the transceiver to RTTY
RTTY-R	set the transceiver to RTTY-R
PKT	set the transceiver to PKT (present unless the primary transceiver supports Data modes)
PKT-R	set the transceiver to PKT-R (present unless the primary transceiver supports Data modes)
Data-L	set the transceiver to Data-L (present if the primary transceiver supports Data modes)
Data-U	set the transceiver to Data-U (present if the primary transceiver supports Data modes)

The PSK Offset subpanel lets you specify an offset (Hz) that aligns the displayed PSK receive frequency with a known PSK frequency; negative values are accepted. This can be used to compensate for an offset between your transceiver's VFO display and its actual frequency.

The Default TxPwr subpanel specifies the default power used to initialize the QSO Info panel's TX Pwr textbox when the **Enter** or **Tab** key is struck in the QSL Info panel's call textbox with the Main window's Mode panel set to PSK31, PSK63, or PSK125.

The **Soundcard clock adjust panel** enables you compensate for a soundcard clock frequency that's fast or slow by up to10,000 parts-per-million (PPM); a positive number makes the clock faster, and a negative number makes the clock slower. The free application MMSSTV includes an excellent soundcard calibration mechanism that displays your soundcard's error in PPM; be sure to configure MMSSTV for a clock frequency of 48 khz, which is what WinWarbler's PSK engine uses.

Defining custom PSK sub-bands

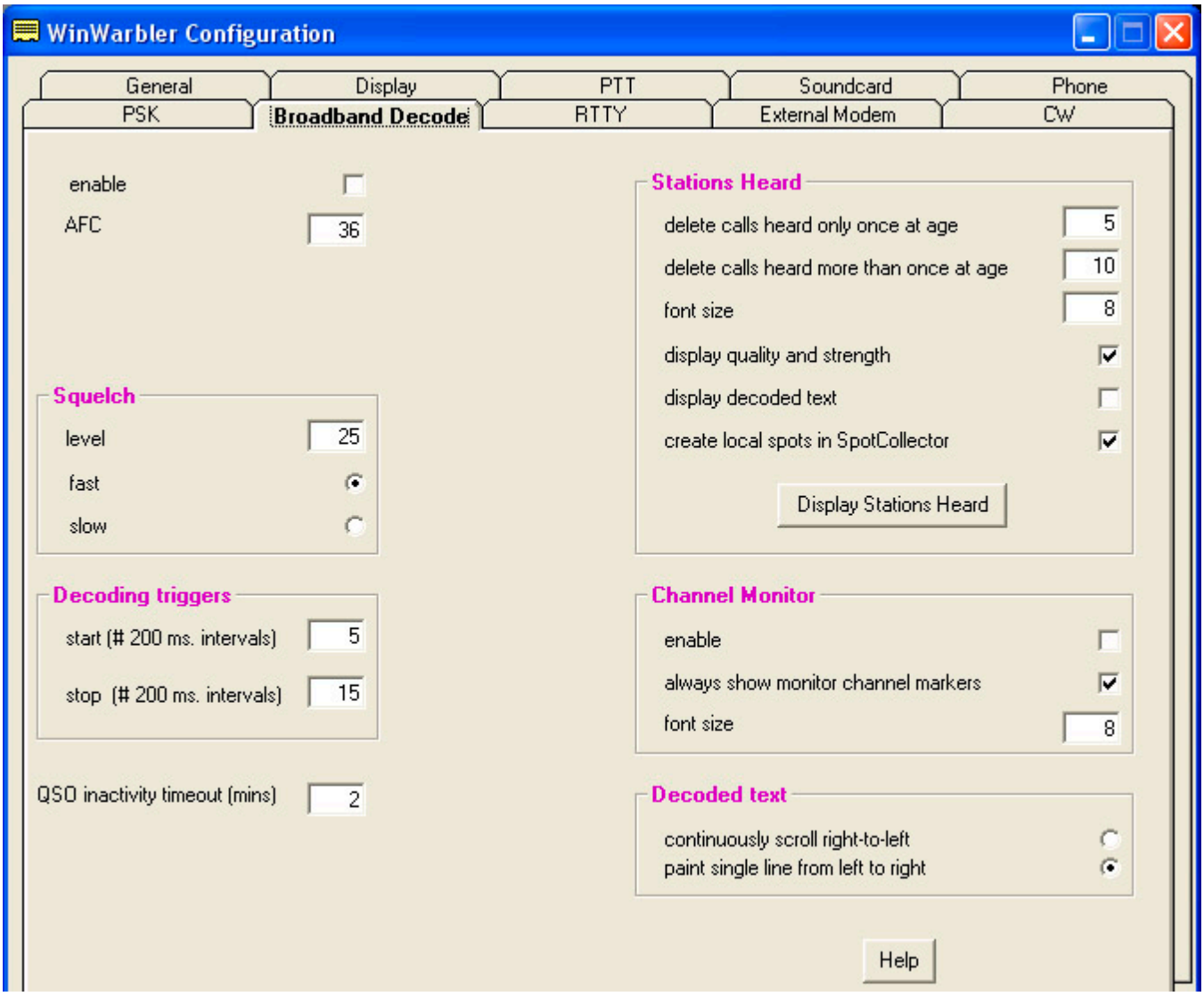
If sub-band highlighting is enabled, the frequency scale above the tuning display is rendered in green for frequencies within PSK sub-bands, and in red for frequencies outside of PSK sub-bands. By default, PSK sub-bands are defined by the contents of the file `DefaultPSKBands.txt` in WinWarbler's `Databases` folder. Each line in this file defines the PSK sub-band within a named band:

```
160M, 1.807,  1.811
80M,  3.580,  3.584
40M,  7.070,  7.074
30M, 10.140, 10.144
20M, 14.070, 14.074
17M, 18.100, 18.110
15M, 21.070, 21.074
12M, 24.920, 24.930
10M, 28.120, 28.124
```

To specify your own sub-bands, make a copy of `DefaultPSKBands.txt` in the `Databases` folder and name it `PSKBands.txt`. Edit the frequencies in `PSKBands.txt` as desired, and save your changes; you can also define sub-bands for the 6M and 2M bands. In the Main window's Mode panel, select a mode other than PSK31, PSK63, or PSK125, and then select PSK31, PSK63, or PSK125. the tuning display's frequency scale will be colored as specified by your custom sub-band definitions.

Soundcard PSK Broadband Decode Settings

The **PSK Broadband Decode** tab of WinWarbler's Configuration window provides control over a mechanism that can simultaneously decode and monitor up to 47 signals whose audio tones fall in the range of 100 Hz. to 3500 Hz.



When the **enable** box is checked, WinWarbler deploys 47 monitor channels across the audio band from 100 hertz to 3500 hertz; each monitor channel thus covers approximately 72 hertz of spectrum. Signals that meet the decoding criteria specified below can be optionally denoted by channel markers: triangles on a black bar or white bar above the tuning display as specified by the Optimize tuning display panel setting. Channel markers appear if the Channel Monitor is enabled or if the Channel Monitor's **always show monitor channel markers** box is checked. Decoded callsigns are displayed in the Stations Heard window.

When the **Channel Monitor** panel's **enable** box is checked, WinWarbler displays a Channel Monitor window that displays the following information for each monitor channel:

- frequency
- signal quality
- signal strength
- receiving_callsign
- transmitting_callsign
- decoded text (this text either scrolls left to right or is painted right to left as specified by the decoded text panel setting)

The **AFC** control specifies the maximum track-able excursion from a PSK signal's center frequency in hertz for each monitor channel. 0 disables AFC; the maximum value is 1000 hertz. Half the monitor channel range -- 36 hertz -- is a good starting value for this setting.

The **Squelch** panel provides controls that set the squelch level and speed for all monitor channels. If an incoming signal's quality is below that of the specified squelch level, characters are not decoded. The minimum value 0 disables all squelch action, whereas the maximum value of 99 disables all decoding. A squelch level of 25 with fast action is a reasonable initial setting.

The **Decoding Triggers** panel provides settings that determine whether a monitored channel is considered to be tracking a viable PSK signal. WinWarbler checks each monitor channel's signal quality every 200 ms and assigns it a *state*. Initially, each monitor channel's state is *unlocked*. If a monitor channel's signal quality exceeds the squelch level, a counter is incremented, and that monitor channel is considered to be *locking*; if the signal quality falls below the squelch level, the counter is zeroed, and the monitor channel is considered to be *unlocked*. If the counter reaches the value specified in the **Start** setting, the monitor channel is considered *locked*, which enables the subsequent extraction of callsign information from the decoded text. WinWarbler continues to sample a *locked* monitor channel's signal quality every 200 ms. If the signal quality falls below the squelch level, a counter is incremented and the monitor channels is considered to be *unlocking*. If the signal quality subsequently exceeds the squelch level, the counter is zeroed and the channel is again considered *locked*. If the counter reaches the value specified in the **Stop** setting, the monitor channel is considered *unlocked*, and callsign extraction is discontinued. Each monitor channel is managed individually through the four states: *unlocked*, *locking*, *locked*, and *unlocking*. The state of each monitor channel is indicated by the color of the font used to render its channel number in the Channel Monitor window:

State	**Channel # Font Color**
Unlocked	black
Locking	magenta
Locked	red
Unlocking	blue

The **QSO Inactivity Timeout** determines how long a monitor channel can remain *unlocked* before its captured callsign information is discarded. Since WinWarbler may only be monitoring one side of a QSO, 2 minutes is a reasonable value for this setting.

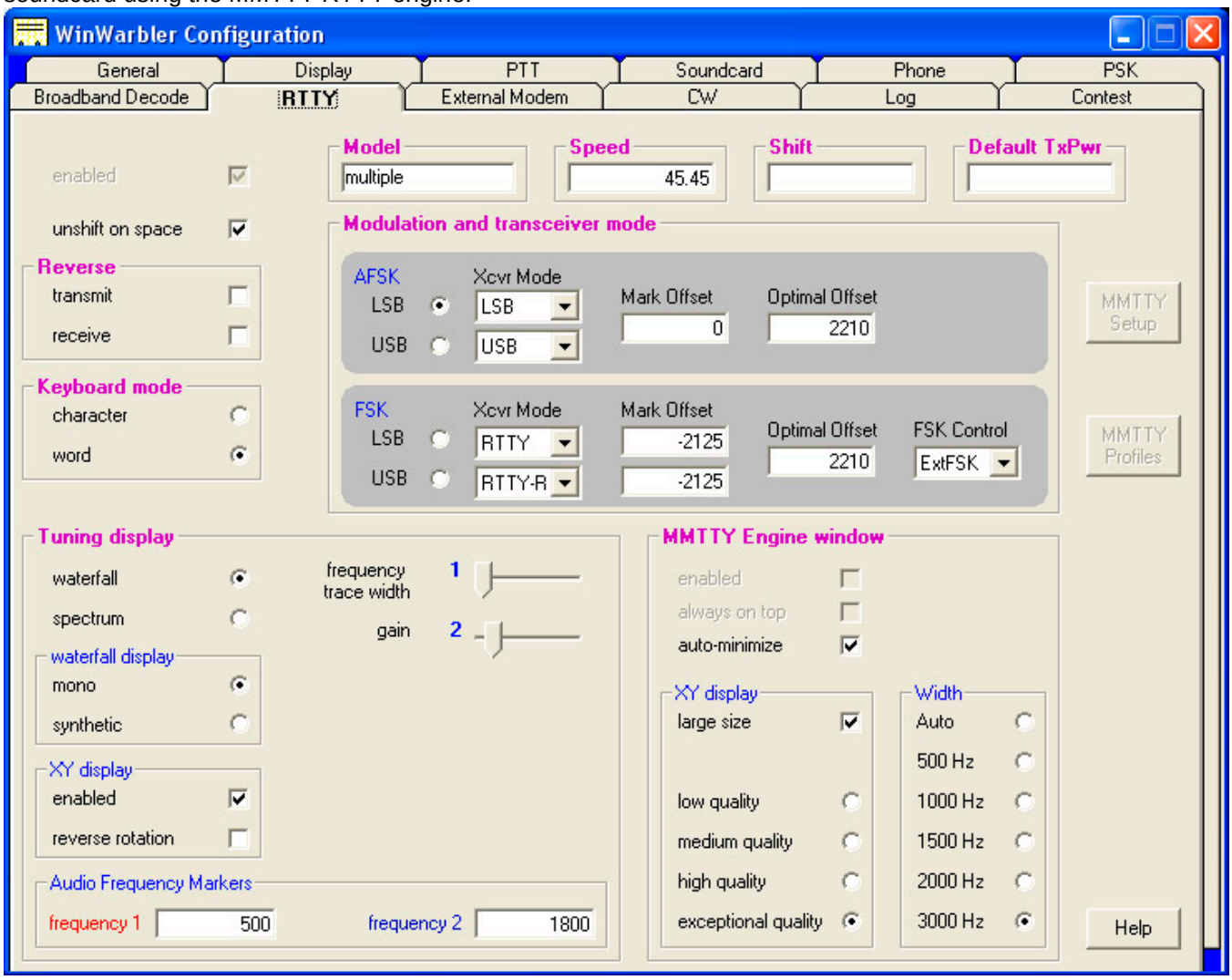
The Stations Heard panel provides setting that govern the list of transmitting stations displayed in the Stations Heard window:

Setting	Effect
delete calls heard only once at age	If a Station Heard list entry's transmitting callsign has been decoded only once, delete the entry after the specified number of minutes elapse without decoding the callsign again (default is 2 minutes)
delete calls heard more than once at age	If a Station Heard list entry's transmitting callsign has been decoded more than once, delete the entry after the specified number of minutes elapse without decoding the callsign again (default is 15 minutes)
font size	specified the font size used to display entries in the Stations Heard list
display DXCC prefix	when checked, DXView (if running) is used to determine the DXCC prefix of each station added to the Stations Heard list, and the Stations Heard list displays these DXCC prefixes
display quality and strength	when checked, each entry in the Station Heard list includes the signal quality and signal strength
display decoded text	when checked, each entry in the Station Heard list includes decoded text; this text either scrolls left to right or is painted right to left as specified by the decoded text panel setting
create local spots in SpotCollector	If checked, transmitting callsigns will be locally spotted in SpotCollector each time they are decoded after the first time they are decoded

The decoded text panel determines whether decoded displayed in Channel Monitor entries and Stations Heard entries scrolls continuously from left to right, or is painted right to left.

RTTY Settings

The RTTY tab provides settings that control operation when WinWarbler is sending and receiving RTTY via the soundcard using the MMTTY RTTY engine.



enabled	check to enable RTTY operation using the soundcard (this setting can only be changed when the main window's Mode panel is set to RTTY)
Model	displays the soundcard model name (read only)
Speed	specifies the RTTY baud rate (standard value is 45.45)
Default TxPwr	specifies the default power used to initialize the QSO Info panel's TX Pwr textbox when the **Enter** or **Tab** key is struck in the QSL Info panel's call textbox with the Main window's Mode panel set to RTTY
Shift	specifies the default RTTY shift in Hertz, which is set when starting soundcard RTTY operation or by clicking the Def button (standard value is 170)
unshift on space	check to return to letters mode after receiving a space character

Reverse panel

transmit	check to transmit reverse RTTY (ignored if modulation is FSK)
receive	check to receive reverse RTTY

Changes to either of the settings in this panel will update the reverse checkboxes in the Main window's Receive and Transmit panels.

Keyboard mode panel

character	check to transmit each character as it is entered
word	check to wait until a word has been entered to transmit it

Modulation and transceiver mode panel

Settings on the AFSK and FSK sub-panels determine which form of modulation, which sideband, which transceiver mode, what frequency compensation, and what optimal offset is used during Soundcard RTTY operations:

AFSK sub-panel

LSB	• configures WinWarbler for AFSK RTTY operation on the lower sideband • selects the specified transceiver mode (if Commander is running and soundcard RTTY is active, switches the transceiver to the specified mode) • directs the MMTTY engine to generate AFSK via the soundcard • sets the external modem's RTTY modulation setting to lower sideband (so that if simultaneous soundcard RTTY and external RTTY modem operation is utilized, both mechanisms use the same sideband) • transmit tones can be reversed
USB	• configures WinWarbler for AFSK RTTY operation on the upper sideband • selects the specified transceiver mode (if Commander is running and soundcard RTTY is active, switches the transceiver to the specified mode) • directs the MMTTY engine to generate AFSK via the soundcard • sets the external modem's RTTY modulation setting to upper sideband (so that if simultaneous soundcard RTTY and external RTTY modem operation is utilized, both mechanisms use the same sideband) • transmit tones can be reversed
Mark Offset	an offset (in Hertz) that aligns the displayed RTTY receive frequency with a known mark frequency when operating in AFSK mode; negative values are accepted. This can be used to compensate for an offset between your transceiver's VFO display and its actual frequency.
Optimal Offset	specifies the optimal receive offset frequency (in Hertz) • when you click the Def button, the Mark and Space frequencies are set based on the specified optimal offset • when you click the Opt button, the transceiver is QSY'd so that optimal receive offset falls midway between the mark and space frequencies

FSK sub-panel

LSB	• configures WinWarbler for FSK RTTY operation on the lower sideband • selects the specified transceiver mode (if Commander is running and soundcard RTTY is active, switches the transceiver to the specified mode) • directs the MMTTY engine to generate FSK via the port specified by the FSK Control • sets the external modem's RTTY modulation setting to lower sideband (so that if simultaneous soundcard RTTY and external RTTY modem operation is utilized, both mechanisms use the same sideband) • transmit tones cannot be reversed
USB	• configures WinWarbler for FSK RTTY operation on the upper sideband • selects the specified transceiver mode (if Commander is running and soundcard RTTY is active, switches the transceiver to the specified mode) • directs the MMTTY engine to generate FSK via the port specified by the FSK Control • sets the external modem's RTTY modulation setting to upper sideband (so that if simultaneous soundcard RTTY and external RTTY modem operation is utilized, both mechanisms use the same sideband) • transmit tones cannot be reversed
Mark Offset	offsets (in Hertz) that align the displayed RTTY receive frequency with a known mark frequency when operating in FSK LSB mode or FSK USB mode; negative values are accepted. These can be used to compensate for an offset between your transceiver's VFO display and its actual frequency. If your transceiver's VFO displays the RTTY mark frequency, then the correct value for this setting is -2125.
Optimal Offset	specifies the optimal receive offset frequency (in Hertz) • when you click the Def button, the Mark and Space frequencies are set based on the specified optimal offset • when you click the Opt button, the transceiver is QSY'd so that optimal receive offset falls midway between the mark and space frequencies
FSK Control	specifies the means by which FSK information is conveyed to the transceiver None — no FSK information is conveyed COM1-16 — FSK information is conveyed via the specified serial port's TxD pin (sets the PTT port to this serial port) EXTFSK — FSK and PTT information is conveyed via the EXTFSK application, which can utilize selected serial port or parallel port output pin (sets the PTT port to "None")

Tuning display panel

waterfall	selects a waterfall tuning display
spectrum	selects a spectrum tuning display
frequency trace width	determines the width in pixels of the tuning display traces that indicate transmit and receive frequencies
gain	determines the sensitivity of the waterfall and spectrum displays
waterfall display	specifies how signals in the waterfall tuning display are colored mono — specifies a monochrome waterfall tuning display synthetic — specifies a false color waterfall tuning display, using a color lookup table devised by AE4JY
XY display	enabled — enables the XY tuning display in the **RTTY receive** panel and enables the XY tuning display in the MMTTY Engine window reverse rotation — reverses the direction that the **RTTY receive** panel's XY tuning display's crossed ellipses rotate when you change frequency
audio frequency markers	frequency 1 — frequency (hz) of the red marker on the tuning display's frequency scale; double-clicking this setting clears it, suppressing display of the red marker frequency 2 — frequency (hz) of the blue marker on the tuning display's frequency scale; double-clicking this setting clears it, suppressing display of the blue marker

MMTTY Engine window

enabled	when checked, the **MMTTY Engine** window will appear on-screen when soundcard RTTY is active (can only be changed when soundcard RTTY is active)
always on top	when checked, the **MMTTY Engine** window will if enabled never be obscured by another window (can only be changed when soundcard RTTY is active)
auto-minimize	hen checked, the **MMTTY Engine** window will be minimized whenever WinWarbler's Main window is minimized, and if enabled will be restored whenever WinWarbler's Main window is restored
Width	specifies the frequency width of the MMTTY Engine window's spectrum and waterfall displays
XY display	selects a small or large XY display, and specifies the quality of this display (note: the Tuning display panel's XY displayed enabled box determines whether or not an XY display appears in the Main window's **RTTY Receive** panel and whether or not an XY display appears in the **MMTTY Engine** window)

MMTTY Engine Configuration

The RTTY and Soundcard tabs of WinWarbler's Configuration window provide control over the basic settings required to configure the MMTTY engine for RTTY operation. However, the MMTTY engine is controlled by settings that govern

- the pre-filter
  - bandpass filter shape
  - notch filter shape
  - Least Mean Squares (LMS) filter parameters
- the RTTY demodulator
  - IIR, FIR, or PLL discriminator selection and filter shape
  - Limit amplifier gain control and over-sampling
  - Smoothing filter IIR or FIR and filter shape
  - Automatic Frequency Control (AFC) parameters
  - Automatic Threshold Control (ATC) parameters
- the RTTY decoder
  - Baudot Codeset
  - baud rate, bit length, stop bits, parity
  - majority logic
- the RTTY modulator
  - diddle parameters
  - letters/figure shift parameters
  - band-pass and low-pass filter shape
- Sound Card Source
  - Mono - for use with monophonic soundcards
  - Right - demodulate information from the selected soundcard's right channel (transmit on both left and right channels)
  - Left - demodulate information from the selected soundcard's left channel (transmit on both left and right channels)
- Sound Loopback

Configuring these settings is accomplished by clicking the **MMTTY Setup** button on the Configuration window's **RTTY** tab, which displays MMTTY's 6-tab **Setup** window; the settings adjustable via these tabs are fully described in the MMTTY help file; some frequently-used settings are also described here. However, tweaking this many settings while trying to work BQ9P through the auroral flutter is clearly impractical, so MMTTY provides a Profile mechanism.

2Tone

enabled	when checked, the 2Tone RTTY demodulator will be activated and controllable via an on-screen window; the characters it decodes will appear in the receive pane whose channel label is 2

Setup	clicking this button will direct the 2Tone RTTY demodulator to display its Setup window
	• **Receive Settings**: select the soundcard whose audio conveys the RTTY to be decoded; you can if desired choose the same soundcard selected for PSK & RTTY Reception, enabling 2Tone to decode the same RTTY signal that the MMTTY engine is decoding
	• **Transmit Settings**: not used
	• **Soundcard Channel**: select **Left** if the selected soundcard's left channel conveys the RTTY to be decoded, or **right** if the selected soundcard's right channel conveys the RTTY to be decoded
	• **Set Mark and Space Tones**: specify the Mark and Space tone frequencies, or toggle between high and low tones using the **High** and Low **toggle** button
	• **Display width in Hz**: specify the width of the spectrum display in 2Tone's Main window
	• **Operating Mode**
	  o **Decode**: optimize 2Tone for normal or fluttered RTTY signals
	  o **TX**: not used
	• **Speed**: select the baud rate of RTTY signals being demodulated

Profiles

To simplify the task of managing many settings, MMTTY provides **profiles**; a profile is a named group of settings. You can save MMTTY's current settings to a profile, and later restore those settings by selecting that profile using the **Profile Selector** in the Main window's **RTTY receive** panel. You can define up to 16 profiles. To save MMTTY's current settings in a profile,

1. click the **MMTTY Profiles** button on the Config window's **RTTY** tab to display WinWarbler's **MMTTY Profile Editor** window
2. In the **MMTTY Profile Editor** window,
   a. decide which of the 16 profiles will be used to store the current settings
   b. specify that profile's **Name**
   c. click that profile's **Store** button

When WinWarbler starts up with its Operating Mode panel set to RTTY, or when the Operating Mode panel is changed to RTTY, the MMTTY's settings will be loaded from the profile specified in the **Profile Selector** in the Main window's **RTTY receive** panel unless the Profile Selector is set to
`<current settings>`
in which case MMTTY's settings will remain as they were during the last soundcard RTTY operating session. Profiles are stored in the file named `USERPARA.INI` that resides in your WinWarbler folder.

WinWarbler provides a `USERPARA.INI` in its Profiles folder that contains 8 predefined profiles:

- standard RTTY
- fluttered signals
- fluttered signals (FIR)
- 23hz RTTY
- multi-path
- hyper sensitive
- EU1SA
- AA6YQ-FIR-512

To gain access to the above profiles, copy `USERPARA.INI` from the `WinWarbler/Profile` sub-folder to the `WinWarbler` folder before starting WinWarbler.

Selecting a profile can change MMTTY's Unshift On Space, Reverse, and Keyboard Mode settings; you may need to modify these settings if they don't match your setup and/or preferences.

Note that controls in the **MMTTY Setup** dialog allow you to enable or disable Automatic Frequency Control and the Bandpass Filter. WinWarbler's AFC and BPF control boxes will not reflect changes made via the MMTTY Setup dialog until you click the MMTTY Setup dialog's OK button.

While the **MMTTY Setup** dialog provides control of settings otherwise not accessible from within WinWarbler, it also results in there being two different ways to specify some parameters, like the serial port used to control PTT. Making a change from either WinWarbler's Config window or MMTTY's Setup dialog will have the advertised effect, but its the WinWarbler settings that persist from one operating session to another.

- Parameters that can be set in a profile
- Setting used in available profiles

Defining Custom RTTY Sub-bands

If sub-band highlighting is enabled, the frequency scale above the tuning display is rendered in green for frequencies within RTTY sub-bands, and in red for frequencies outside of RTTY sub-bands. By default, RTTY sub-bands are defined by the contents of the file `DefaultRTTYBands.txt` in WinWarbler's `Databases` folder. Each line in this file defines the RTTY sub-band within a named band:

```
160M,  1.800,  2.000
80M,   3.500,  3.750
40M,   7.000,  7.150
30M,  10.100,  10.150
20M,  14.000,  14.150
17M,  18.068,  18.110
15M,  21.000,  21.200
12M,  24.890,  24.930
10M,  28.000,  28.300
6M,   50.100,  54.000
2M,  144.100,  148.000
```

To specify your own sub-bands, make a copy of `DefaultRTTYBands.txt` in the `Databases` folder and name it `RTTYBands.txt`. Edit the frequencies in `RTTYBands.txt` as desired, and save your changes; you can also define sub-bands for the 6M and 2M bands. In the Main window's Mode panel, select a mode other than RTTY, and then select RTTY. the tuning display's frequency scale will be colored as specified by your custom sub-band definitions.

MMTTY Settings

The RTTY and Soundcard tabs of WinWarbler's Configuration window provide control over the basic settings required to configure the MMTTY engine for RTTY operation. The MMTTY engine provides additional settings that govern

- the pre-filter
  - bandpass filter shape
  - notch filter shape
  - Least Mean Squares (LMS) filter parameters
- the RTTY demodulator
  - IIR, FIR, or PLL discriminator selection and filter shape
  - Limit amplifier gain control and over-sampling
  - Smoothing filter IIR or FIR and filter shape
  - Automatic Frequency Control (AFC) parameters
  - Automatic Threshold Control (ATC) parameters
- the RTTY decoder
  - Baudot Codeset
  - baud rate, bit length, stop bits, parity
  - majority logic
- the RTTY modulator
  - diddle parameters
  - letters/figure shift parameters
  - band-pass and low-pass filter shape
- Sound Card Source
  - Mono - for use with monophonic soundcards
  - Right - demodulate information from the `selected soundcard's` right channel (transmit on both left and right channels)
  - Left - demodulate information from the `selected soundcard's` left channel (transmit on both left and right channels)
- `Sound Loopback`

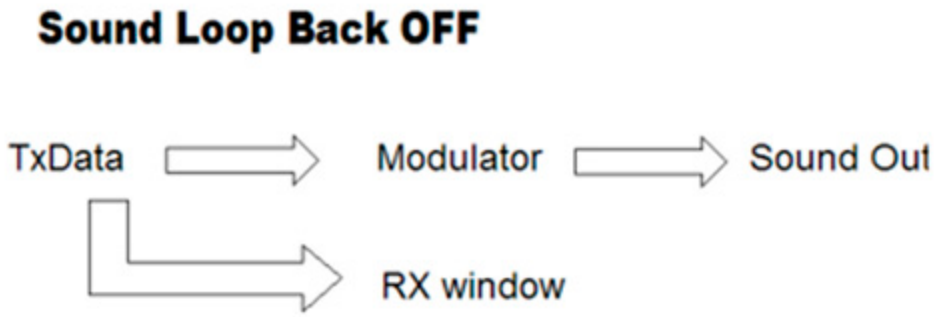
Configuring these settings is accomplished by clicking the **MMTTY Setup** button on the Configuration window's **RTTY** tab, which displays MMTTY's 6-tab **Setup** window; the settings adjustable via these tabs are fully described in the MMTTY help file; several of these settings are also described below.

To simplify the task of managing many settings, MMTTY provides **profiles**; a profile is a named group of settings. You can direct WinWarbler to save MMTTY's current settings to a profile, and later restore those settings by selecting that profile using the **Profile Selector** in the Main window's **RTTY receive** panel.

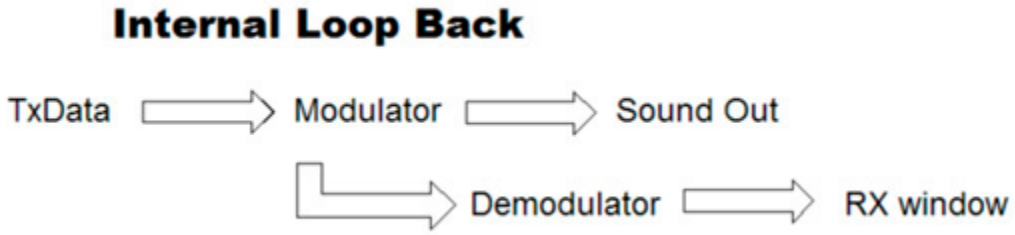
Sound Loopback
Full duplex soundcards can simultaneously generate and monitor AFSK. While you're transmitting RTTY, the **Sound loopback** panel on the **Setup** window's **Misc** tab lets you exploit this ability by

- displaying text decoded from your transmitted RTTY signal
- displaying text decoded from an independently received RTTY signal (e.g. during Satellite operation)

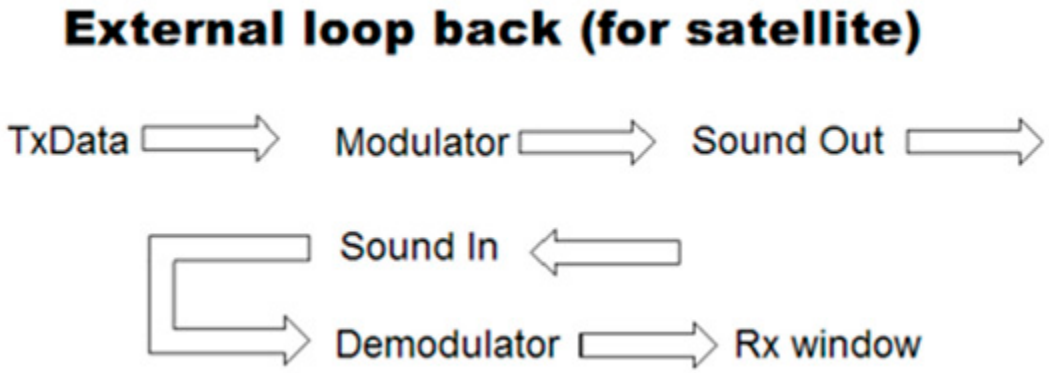
When the **Sound loopback** panel is set to **OFF**, MMTTY's demodulator is inactive. As characters are transmitted, they are displayed in **RTTY Receive** pane:



When the **Sound loopback** panel is set to **Int.**, the **RTTY Receive** pane displays transmitted characters decoded from your transmitted AFSK signal, providing confidence that the Modulator is working correctly:

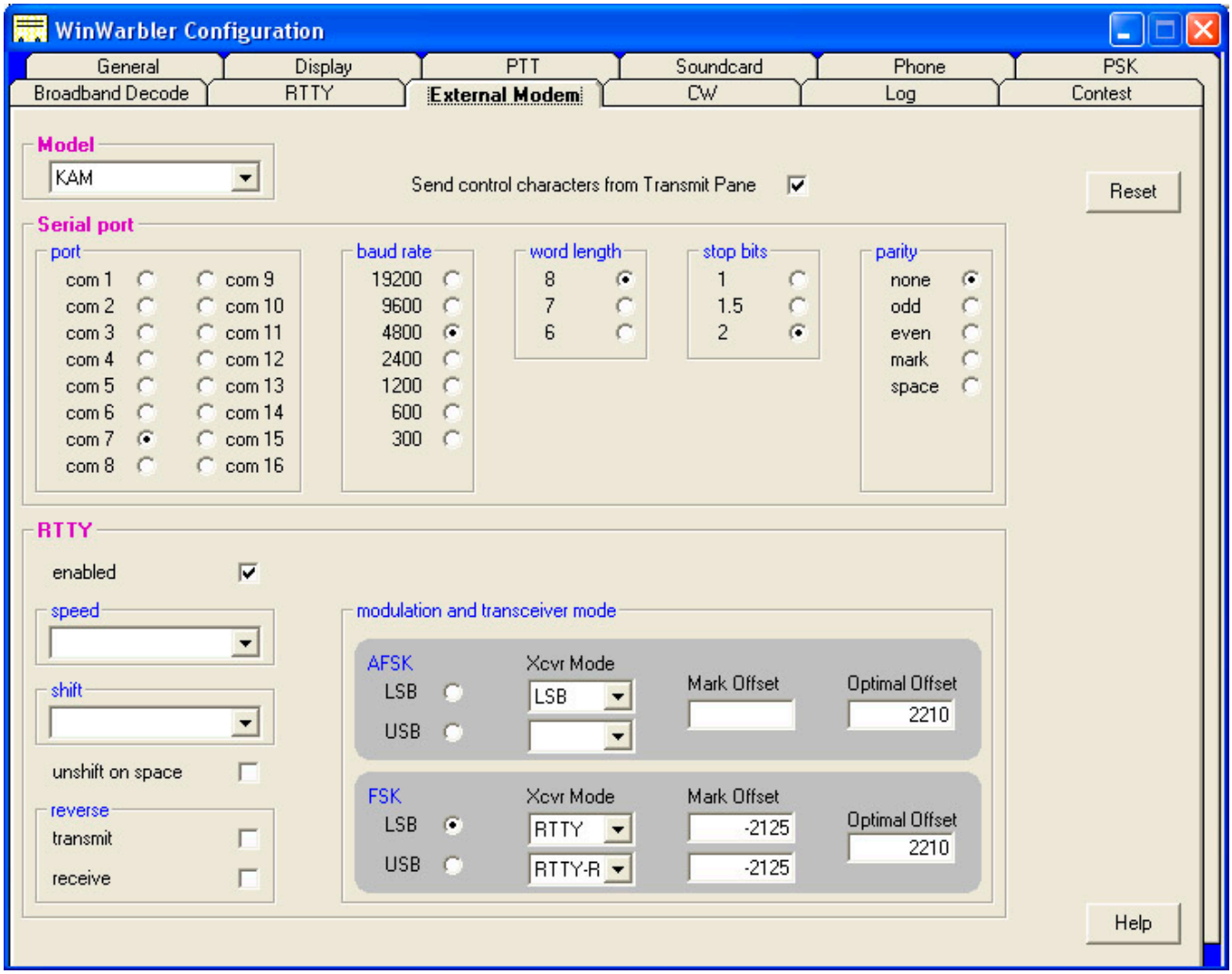


When the **Sound loopback** panel is set to **Ext. (SAT)**, the **RTTY Receive** pane displays characters decoded from whatever signal is connected to your soundcard input. This can be used, for example, to display the received "echo" from a satellite you're working:



External Modem Settings

The External Modem tab provides settings that control operation when WinWarbler is sending and receiving RTTY or CW via an external modem connected to your PC via a serial port.



The **model** selector lets you choose the external modem model from among those for which external modem command files are present in WinWarbler's Modems subfolder. WinWarbler includes files for the KAM, MFJ464, PK232, PK900, and PTCII, . You can modify these files, or create files for other modem models using a simple command syntax.

The **send control characters from Transmit Pane** box, when checked, routes control characters struck in the Transmit Pane other than CTRL-J, CTLR-Q, CTRL-R, CTRL-S, and CTRL-V to the external modem. This allows you to directly control the external modem -- setting parameters or switching to another mode -- but means that keyboard shortcuts used to navigate among QSO Info panel textboxes will not function in the Transmit Pane. If this box is checked while in CW mode with keying via the external modem, the Auto Start and Auto Stop settings are unchecked and disabled; this prevents keystrokes intended to control the external modem from initiating transmission.

Clicking the **reset button** sends an InitCmd to the external modem.

The **serial port panel** lets you specify and configure the serial port by which your external modem is connected.

The **RTTY panel** controls the RTTY operation of the external modem.

enabled	check to enable RTTY operation via an external modem
unshift on space	check if RTTY operation should return to letters mode after receiving a space character
speed	select the RTTY baud rate
shift	select the RTTY shift in Hertz
reverse sub-panel	specifies whether transmitted or received data is inverted transmit: check to transmit reverse RTTY (disabled if the active external modem command file does not specify a command to invert transmitted data) receive: check to receive reverse RTTY (disabled if the active external modem command file does not specify a command to invert received data) note: Changes to either of the settings in this panel will update the reverse checkboxes in the Main window's Receive and Transmit panels.
modulation and transceiver mode sub-panel	specifies the form of modulation, sideband, transceiver mode, frequency compensation, and optimal offset AFSK (LSB) • configures WinWarbler for AFSK RTTY operation on the lower sideband • elects the specified transceiver mode (if Commander is running and RTTY operation via the external modem is active, switches the transceiver to the specified mode) • configures soundcard RTTY for lower sideband (so that if simultaneous soundcard RTTY and external RTTY modem operation is utilized, both mechanisms use the same sideband) • specifies a Mark offset (in Hertz) that aligns the displayed RTTY receive frequency with a known mark frequency when operating in AFSK mode; negative values are accepted. This can be used to compensate for an offset between your transceiver's VFO display and its actual frequency. • specifies the optimal receive offset frequency (in Hertz) used by the Optimal Offset function when operating in AFSK mode; when the Optimal Offset function is invoked, the transceiver is QSY'd so that optimal receive offset falls midway between the mark and space frequencies

	AFSK (USB)	• configures WinWarbler for AFSK RTTY operation on the upper sideband • elects the specified transceiver mode (if Commander is running and RTTY operation via the external modem, switches the transceiver to the specified mode) • configures soundcard RTTY for upper sideband (so that if simultaneous soundcard RTTY and external RTTY modem operation is utilized, both mechanisms use the same sideband) • specifies a Mark offset (in Hertz) that aligns the displayed RTTY receive frequency with a known mark frequency when operating in AFSK mode; negative values are accepted. This can be used to compensate for an offset between your transceiver's VFO display and its actual frequency. • specifies the optimal receive offset frequency (in Hertz) used by the Optimal Offset function when operating in AFSK mode; when the Optimal Offset function is invoked, the transceiver is QSY'd so that optimal receive offset falls midway between the mark and space frequencies

	FSK (LSB)	• configures WinWarbler for FSK RTTY operation on the lower sideband • elects the specified transceiver mode (if Commander is running and RTTY operation via the external modem is active, switches the transceiver to the specified mode) • configures soundcard RTTY for lower sideband (so that if simultaneous soundcard RTTY and external RTTY modem operation is utilized, both mechanisms use the same sideband) • specifies a Mark offset (in Hertz) that aligns the displayed RTTY receive frequency with a known mark frequency when operating in FSK LSB mode; negative values are accepted. This can be used to compensate for an offset between your transceiver's VFO display and its actual frequency. • specifies the optimal receive offset frequency (in Hertz) used by the Optimal Offset function when operating in FSK mode; when the Optimal Offset function is invoked, the transceiver is QSY'd so that optimal receive offset falls midway between the mark and space frequencies

	FSK (USB)	• configures WinWarbler for FSK RTTY operation on the upper sideband • elects the specified transceiver mode (if Commander is running and RTTY operation via the external modem, switches the transceiver to the specified mode) • configures soundcard RTTY for upper sideband (so that if simultaneous soundcard RTTY and external RTTY modem operation is utilized, both mechanisms use the same sideband) • specifies a Mark offset (in Hertz) that aligns the displayed RTTY receive frequency with a known mark frequency when operating in FSK USB mode; negative values are accepted. This can be used to compensate for an offset between your transceiver's VFO display and its actual frequency. • specifies the optimal receive offset frequency (in Hertz) used by the Optimal Offset function when operating in FSK mode; when the Optimal Offset function is invoked, the transceiver is QSY'd so that optimal receive offset falls midway between the mark and space frequencies

External Modem Command Files

WinWarbler determines what commands to send to an external modem via command files present in the `Modems` subfolder. Each command file present in this folder is presented as a choice in the model panel on the Configuration window's External Modem tab. WinWarbler opens and reads a command file

- at startup
  - if RTTY mode is selected and the RTTY operation of this modem is enabled
  - if CW mode is selected and keying via the external modem is specified
- when the external modem is enabled for RTTY operation
- when a new external modem model is selected

By convention, a command file is named `model.txt`, where `model` represents the name of the modem -- e.g. `KAM.txt` or `PK232.txt`. Files in WinWarbler's `Modems` subfolder having an extension other than `.txt` will not appear as a choice in the model panel.

A command file contains one or more commands separated by newline characters; you can create or edit command files using a text editor like Notepad or EMACS; if you use an word processor like Microsoft Word, be sure to save as "text only with line breaks", or WinWarbler will be unable to parse the command file.
The basic command syntax is

```
CommandName = CommandString
```

`CommandString` is a sequence of ASCII characters sent to the RTTY modem to accomplish a function denoted by `CommandName`. To facilitate the inclusion of control characters, the sequence `<N>` within a CommandString, will be replaced by a single byte of value N; N must be 0 or greater, and 255 or smaller. <3>, for example, would be replaced by Ctrl-C.

The ***baud*** and ***shift*** commands include appended arguments.

```
baud45=<3>rbaud 45<13>
```

for example, specifies the command to set a PK232 to 45 baud, and

```
shift850=<3>X<3>mark 2125<13>space 2975<13>RTTY<13>
```

specifies the command to set a KAM to an 850 hz shift. Each ***baud*** command contained within a command file creates a choice in the speed panel on the Configuration window's External Modem tab, and each ***shift*** command creates a choice in the shift panel on the Configuration window's External Modem tab.

The ***cwwpm*** command also includes an appended 2-digit argument.

```
CWwpm05=<3>1
```

sets a KAM's CW speed to 5 words per minute; note that leading zero needed in order to meet the 2-digit requirement.

WinWarbler defines the following commands:

CommandName	Function
InitCmd	initialize the modem
TermCmd	place the modem in command mode and enable character echo
RTTYCmd	place the modem in RTTY mode (initial commands)
RTTYCmdDelay	if > 0, then send the RTTYDelayedCmd in specified number of milliseconds (max 5000)
RTTYDelayedCmd	secondary command required to place modem in RTTY mode after the specified delay (not executed if RTTYCmdDelay is 0 or unspecified)
XmitCmd	direct the modem to begin transmitting
RcvCmd	direct the modem to stop transmitting after all untransmitted characters have been sent

AbortCmd	direct the modem to stop transmitting immediately
CmdCmd	place the modem in command mode
IDCmd	direct the modem to transmit a station identification in CW
TXRevOnCmd	direct the modem to transmit in reverse RTTY
TXRevOffCmd	direct the modem to transmit in normal RTTY
RXRevOnCmd	direct the modem to receive in reverse RTTY
RXRevOffCmd	direct the modem to receive in normal RTTY
USOSOnCmd	direct the modem to enter Letters mode after receiving a space character
USOSOffCmd	direct the modem to not enter Letters mode after receiving a space character
baudN	direct the modem to set its transmission rate to N baud, where N is a RTTY baud rate supported by the modem,
shiftN	direct the modem to set its shift to N baud, where N is a RTTY shift supported by the modem
CWCmd	place the modem in CW mode (initial commands)
CWCmdDelay	if > 0, then send the CWDelayedCmd in specified number of milliseconds (max 5000)
CWDelayedCmd	secondary command required to place modem in CW mode after the specified delay (not executed if CWCmdDelay is 0 or unspecified)
CWLockCmd	direct the modem to lock the current CW speed
CWUnlockCmd	direct the modem to unlock the current CW speed
CWwpmN	direct the modem to set its transmission rate to N words per minute, where N is a 2-digit CW speed supported by the modem
CWInitialXmitCRLF	defines the number of CR-LF pairs that precede actual CW transmission (assumed to be 0 if command not present)
TypeAhead	• **N** if the modem ignores characters to be transmitted before the modem has been commanded to transmit • **Y** if the modem remembers characters to be transmitted before the modem has been commanded to transmit and automatically transmits them immediately after the modem has been commanded to transmit If no TypeAhead is specified, **Y** is assumed.

CW Settings

The **CW** tab of WinWarbler's Configuration window provides panels that controls the generation of CW. It contains general settings, and six panels: Keyboard mode, PTT, Keying, Weight, Cut numbers, and WinKey.

General settings

Xcvr mode	specifies whether Commander (if running) should set the transceiver mode to CW or CW-R when WinWarbler is placed in CW mode
CW offset (hz)	specifies an offset in Hertz that aligns the displayed CW receive frequency with a known CW frequency; negative values are accepted. This can be used to compensate for an offset between your transceiver's VFO display and its actual frequency, ensuring that an accurate frequency will be logged with the QSO.
Default TxPwr	specifies the default power used to initialize the QSO Info panel's TX Pwr textbox when the **Enter** or **Tab** key is struck in the QSL Info panel's call textbox with the Main window's Mode panel set to CW
don't change Xcvr sideband	if checked with Commander running, WinWarbler will not change the transceiver's mode from CW to CW-R or from CW-R to CW
display xmit/rcv characters	when checked, presents a receive pane in which characters are displayed as they are transmitted or received • CW reception requires an external modem such as a Kantronics KAM or Timewave PK232 • this setting can only be changed when WinWarbler is in CW mode

Keyboard mode panel

Settings on this panel specify when characters are transmitted if the CW Keying panel is set to serial port RTS, serial port DTR, WinKey, PTT port RTS, PTT port DTR, or parallel port.

auto start	when checked, automatically starts CW transmission when characters are entered into the Transmit pane by keystroke or macro Note: the auto start setting will be un-checked and disabled if the Send control characters from Transmit Pane setting is checked while in CW mode with keying via the external modem; this prevents keystrokes intended to control the external modem from initiating transmission.
auto stop	when checked, automatically stops CW transmission if there are no more characters to transmit Note: the auto stop setting will be un-checked and disabled if the Send control characters from Transmit Pane setting is checked while in CW mode with keying via the external modem; this prevents keystrokes intended to control the external modem from initiating transmission.
character	when selected, transmit each character as its entered in the transmit pane
word	when selected, wait to transmit until a word is entered, as signified by a space, punctuation, or pro-sign character

PTT panel
Settings on this panel specify whether and how PTT is asserted during CW transmission if the CW Keying panel is set to serial port RTS, serial port DTR, WinKey, PTT port RTS, PTT port DTR, or parallel port.

assert PTT during CW	when checked, assert PTT during CW transmission; this option is disabled if the PTT mode panel is set to *none*
PTT lead time (ms)	PTT lead time, in milliseconds; WinWarbler will wait for this amount of time after asserting PTT before transmitting CW (with WinKey, non-zero values will be rounded up to the next largest multiple of 10ms)
PTT lag time (ms)	PTT lag time, in milliseconds; WinWarbler will wait for this amount of time after transmitting CW before un-asserting PTT (with WinKey, non-zero values will be rounded up to the next largest multiple of 10ms)

If you have configured WinWarbler to generate CW via WinKey keyer and you plan to use paddles, set the **PTT lead time** and **PTT lag time** settings to 0 to ensure smooth operation.

Keying panel
Note that changing the CW keying while a CW transmission is in progress will abort that transmission.

serial port RTS	when selected, key the transceiver via the specified serial port's RTS modem control signal note: if the specified serial port is selected in the PTT port panel, and if the PTT port's RTS signal is available for CW keying, then PTT port (com n) RTS will automatically be selected; if the PTT port's RTS signal is not available for CW keying, then use of the PTT port for CW keying will be disallowed.
serial port DTR	when selected, key the transceiver via the specified serial port's DTR modem control signal note: if the specified serial port is selected in the PTT port panel, and if the PTT port's DTR signal is available for CW keying, then PTT port (com n) DTR will automatically be selected; if the PTT port's DTR signal is not available for CW keying, then use of the PTT port for CW keying will be disallowed.
WinKey	when selected, key the transceiver via a WinKey keyer connected to the specified serial port
serial port selector	serial port to be used for CW keying
PTT port (com n) RTS	when selected, key the transceiver via the PTT serial port's RTS modem control signal; this option is disabled if the PTT mode panel is set to *none*, *RTS*, or *Xcvr Ctrl SW*, or if the PTT port panel is set to *none*
PTT port (com n) DTR	when selected, key the transceiver via the PTT serial port's DTR modem control signal; this option is disabled if the PTT mode panel is set to *none*, *DTR*, or *Xcvr Ctrl SW*, or if the PTT port panel is set to *none*
parallel port	when selected, key the transceiver via the specified parallel port signal; while WinWarbler is in CW mode with parallel port keying enabled, the specified parallel port's strobe signal is asserted, placing a TTL 0 voltage on DB25 pin 1
parallel port selector	parallel port to be used for CW keying • **LPT1** is the port whose hexadecimal address is 378 • **LPT2** is the port whose hexadecimal address is 278 • **LPT3** is the port whose hexadecimal address is 3BC • **LPT4** is the port whose hexadecimal address is 2BC • **Custom** - lets you specify a **parallel port address** in the range of 0000 to FFF8.

<table>
<tr><td>parallel port signal selector</td><td>determines which parallel port signal is used to convey CW keying
databit 0 (DB25 pin 2)
databit 1 (DB25 pin 3)
databit 2 (DB25 pin 4)
databit 3 (DB25 pin 5)
databit 4 (DB25 pin 6)
databit 5 (DB25 pin 7)
databit 6 (DB25 pin 8)
databit 7 (DB25 pin 9)
initialize printer (DB25 pin 16) - not available if the parallel port Radio selection & PTT setting is enabled
select input 0 (DB25 pin 17) - not available if the parallel port Radio selection & PTT setting is enabled</td></tr>
<tr><td>parallel port Radio selection & PTT</td><td>when enabled with the parallel port setting enabled,
if Commander is running, the currently-selected radio is encoded on parallel port pins 16 and 14:<table><tr><th>Radio</th><th>Pin 15</th><th>pin 14</th></tr><tr><td>1</td><td>0</td><td>0</td></tr><tr><td>2</td><td>0</td><td>1</td></tr><tr><td>3</td><td>1</td><td>0</td></tr><tr><td>4</td><td>1</td><td>1</td></tr></table>
if Commander is running, parallel port pin 17 is asserted when WinWarbler is transmitting
Note that pins 14, 15, and 17 will be set as described above in every operating mode, not just CW.</td></tr>
<tr><td>external modem</td><td>when selected, key the transceiver via the an external modem
disables all settings on the CW keyboard mode, CW weight, and CW PTT panels (as these functions are controlled by the external modem)
to display characters decoded by the external modem, check the display xmt/rcv characters box</td></tr>
<tr><td>Xcvr Ctrl App</td><td>when selected, generate CW by sending text to Commander which is then conveyed to the transceiver via CAT command ; this option is only enabled if Commander's active transceiver is capable of this function.</td></tr>
</table>

Weight panel

Settings on this panel specify the relative time-weighting of transmitted CW elements if the CW Keying panel is set to serial port RTS, serial port DTR, WinKey, PTT port RTS, PTT port DTR, or parallel port.

dot	time units per CW dot
dash	time units per CW dash
element space	time units per CW element space (not adjustable if keying via WinKey)
character space	time units per CW character space (not adjustable if keying via WinKey)
word space	time units per CW word space (can only be set to 6 or 7 if keying via WinKey)

Cut Numbers Panel

use cut #s in macros	when checked in CW mode, sends T or O for the digit zero and N for the digit nine in the results of RSTsent, RSTrcvd, transmit_power, rx_serial_number, and tx_serial_number macros
send T for 0	when selected with use cut #s in macros enabled, sends T for the digit zero
send O for 0	when selected with use cut #s in macros enabled, sends O for the digit zero

WinKey panel

Settings on this panel control the operation of a WinKey keyer; this panel's caption indicates WinKey's firmware version.

speed potentiometer	• establishes the range of speeds that can be set by the speed potentiometer, in words per minute • specifies the standard 3-wire potentiometer connection, or the optional 2-wire potentiometer connection
timing	• if the *Farnsworth speed* setting is greater than the current CW transmission speed, then Farnsworth spacing is used at the Farnsworth speed; setting the Farnsworth speed to 0 precludes Farnsworth spacing at any transmission speed • the *dot/dash ratio* setting sets the ratio between dot and dash durations, by the formula Dot/Dash = 3 x (N/50) where the setting N must be in the range of 33 (producing a 2:1 ratio) to 66 (producing a 4:1 ratio) • the *first extension* setting increases the duration a transmission's first dot or dash by the specified number of milliseconds to a maximum of 250; this can be used to compensate for a transceiver's slow break-in response • the *compensation setting* increases the duration of all dots and dashes in a transmission by the specified number of milliseconds to a maximum of 250, reducing the duration of spaces to maintain the specified speed; this can be used to compensate for the shortening of transmitted CW elements by a transceiver's QSK circuit
sidetone	• *enabled* box o when checked, a WinKey version 1's pin 5 is configured for sidetone output at the specified audio frequency o when checked, a WinKey version 2's pin 8 is configured for sidetone output at the specified audio frequency o when using a WinKey version 1, enabling PTT during CW disables this option, as WinKey pin 5 is used to generate PTT • *paddle-only* box, if checked, generates a sidetone at the specified audio frequency in response to paddle entry, but not in response to CW generated by WinWarbler o this option is disabled when using a WinKey version 1 o this option is enabled unless the sidetone sub-panel's *enabled* box is checked

paddle	• *iambic A*, if selected, sends alternating dots and dashes when both paddles are pressed (Curtis-style) • *iambic B*, if selected, sends alternating dots and dashes when both paddles are pressed, and sends an extra alternate dot or dash when the paddles are released (Accu-keyer style) • *ultimatic*, if selected, sends a continuous stream of whichever paddle was last pressed when both paddles are pressed • *bug/straight*, if selected, sends dots when the dot paddle is pressed, but sends a single dash when the dash paddle is pressed; to use a straight key, connect it to the dash paddle input • *swap*, if enabled, configures the right paddle to generate dots and the left paddle to generate dashes • *autospace*, if enabled, interprets a pause of more than one dot time as a letter space, and generates the full letter space timing; additional dots or dashes entered during this interval will be buffered and sent once the letter space has been completed • *echo back*, if enabled, decodes CW generated via the paddles for display in WinWarbler's receive pane (if enabled) • the *switchpoint delay* setting determines when a new paddle press will be accepted after sensing the current one; the default value of 50 corresponds to 1 dot time, and is adjustable as a percent of dot duration by the formula Delay = (N x DotDuration)/50 where the setting N must be in the range of 10 to 90 • the *ultimatic priority* setting determines dit/dah priority when *ultimatic* is selected o norm: normal ultimatic operation o dah: will send dahs when both paddles are pressed o dit: will send dits when both paddles are pressed • the *hang time dits* setting specifies how many dit times are added to a wordspace time before ending paddle insertion
output port	• checking the 1 box enables the port 1 Key and PTT outputs • checking the 2 box enables the port 2 Key and PTT outputs • when run with Winkey version 1, this panel is disabled

Log Settings

QSO Info Panel

automatic lookup	when checked, DXKeeper, is directed to produce a filtered display showing previous QSOs with that callsign and perform a callbook lookup (if enabled on the Callbook tab of DXKeeper's Configuration window) when • Double-clicking on a received callsign • striking the enter key in the *callsign* textbox
log Special Callsign Tags	when checked, Special Callsign Tags reported by DXView and SpotCollector will be appended to the QSO Info panel's Comment textbox
automatic propagation forecast	when checked with DXView and PropView running, capturing a callsign or performing a Lookup directs PropView to generate a propagation forecast for the station's location using the TX frequency
local spot on callsign acquisition	when checked with SpotCollector running, generate a local spot when a callsign is acquired
clear QSO Info on callsign capture	if checked, items in the QSO Info panel will be cleared when a new callsign is entered, or when the Enter or Tab keys are struck while focus resides in the callsign item
set QSO Start when RST received	when checked, the QSO will be deemed to have started and its Start Time will be captured when the rst R textbox is modified
initialize RST items to default	when checked, when you strike Enter or double-click in the Call textbox or when you double-click on a callsign in a receive pane, the rst S and rst R textboxes will, if empty, be set to the specified default value; if no default value is specified, these items will be set to 599 (or 59 if the Mode is Phone)
preset QSL checkbox	when checked, the QSL box is initialized to *checked*
preset Buro checkbox	when checked, the Buro box is initialized to *checked*
prompt on QSO Info overwrite	when checked, if an action -- e.g. double-clicking on a SpotCollector spot database entry -- would overwrite unsaved QSO Info panel data from a QSO that has started, WinWarbler will display a dialog box allowing the user to allow or disallow the overwrite
create mobile myQTHID	when checked with a valid grid square in the Position and Vector Configuration window's Position panel, log each QSO's myQTHID as Mobile_<mygrid>; for example, if the current grid square were FN42hj, QSOs would be logged with a myQTHID of **Mobile_FN42hj**
refuse to log if invalid callsigns	when checked, callsigns that doesn't contain at least one number and one label are flagged as invalid when logging is attempted
refuse to log if missing DXCC	when checked, prevents the logging of QSOs for which no DXCC item has been selected unless the callsign is a mobile or begins with an exclamation point
refuse to log if nonstandard RST	when checked, prevents the logging of QSOs with an RST Sent or RST Rcvd item whose first character isn't a digit between 0 and 5 or whose second character isn't a digit between 0 and 9
upload to eQSL.cc when logging	when checked, clicking the **Log** button in the Main window's **QSO Info** panel automatically uploads the QSO to eQSL.cc

use Spotcollector's callsign colors	when checked with `SpotCollector` installed, • Spot Database font colors are used to convey "need" in the **QSO Info** panel's **call** textbox • Spot Database background colors are used to convey participation in LotW and Authenticity Guaranteed membership in eQSL.cc
Select Font	when clicked, enables selection of the font, font size, and font italics used in the Main window's **QSO Info** panel; a bold font cannot be selected.

Minilog Panel

pathname	specifies the pathname of the file that serves as the `Minilog` ; this pathname can only be modified by clicking the **Select** button and using the **Save As** window to select an existing file or create a new file
Display	clicking this button displays the contents of the `Minilog` file
Clear	clicking this button deletes the `Minilog` file

Default Settings Panel

QSL msg	default QSL message used to initialize the `QSO Info` panel's `QSL msg` textbox when the **Enter** or **Tab** key is struck in the QSL Info panel's `call` textbox
Spot notes	default `outgoing spot` notes
Default sent & rcvd	if `enabled`, the specified default value is used to initialize the `rst S` and `rst R` textboxes; if the specified value contains a slash, the number before the slash is used if the current mode is phone, and the number after the slash is used if the current mode is CW, RTTY, or PSK) if enabled with no default value specified, the rst S and rst R textboxes are initialized to 599 if the current mode is CW, RTTY, or PSK or 59 if the current mode is phone
Path	default antenna path (**S**hort-path, **L**ong-path, **G**rey-line, or **O**ther)
User-defined Items	when clicked, directs `DXKeeper` to display its Configuration window's `User Items` tab so that the caption, style, alignment, and default value of each of the `QSO Info` panel's `User-defined items` can be specified; this button is only present if DXKeeper is running.

Item focus after callsign entry Panel

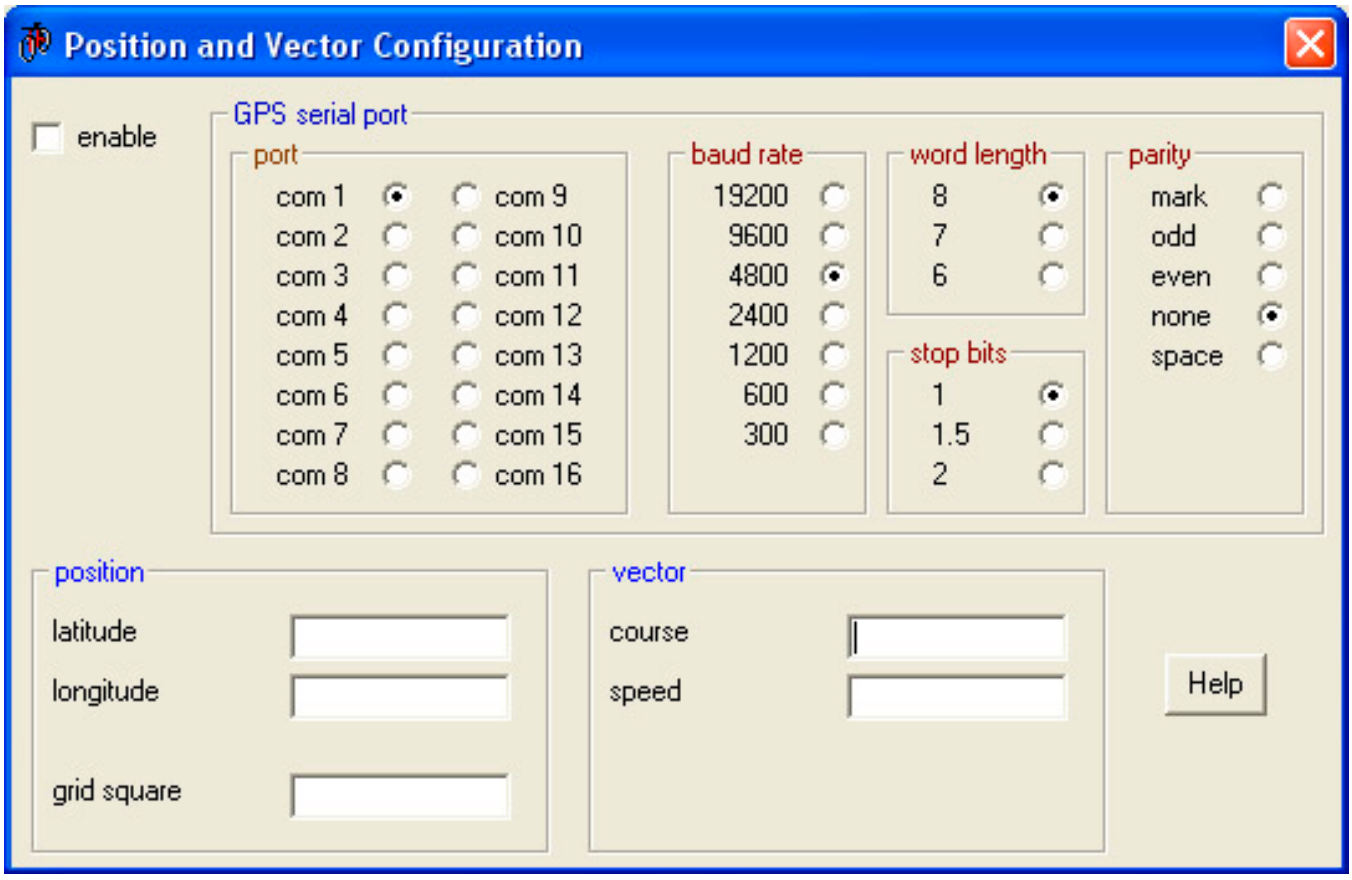
Transmit pane	after entering a callsign and striking the *Enter* or *Tab* keys with `Contest mode` disabled, cursor focus moves to the Transmit pane
RST Sent item	after entering a callsign and striking the *Enter* or *Tab* keys with `Contest mode` disabled, cursor focus moves to the QSO Info panel's `RST Sent` item

Contest Settings

contest mode	when checked, WinWarbler • moves the cursor focus to the RX# textbox after you strike Enter in the QSO Info panel's call textbox • records *59/599* in the rst S and rst R items of each log record • when you double-click on a sequence of digits in a receive pane, copies that sequence into the RX# textbox • when you double-click on a word in a receive pane while simultaneously depressing the **ALT** and **CTRL** keys, copies that word to the RX# textbox • when you selecting a group of contiguous words in a receive pane while simultaneously depressing the **ALT** and **CTRL** keys, copies those words to the RX# textbox • if the increment TX# setting is enabled, increments the contents of the TX# setting when the Log button is clicked, or when the <advance_tx_serial_number> macro substitution command is executed • if DXKeeper is running and configured to perform previous QSO lookups, flags duplicate QSOs with the word **Dup!** to the left of the QSO Info panel's call textbox • moves the cursor focus to the QSO Info panel's call textbox after any action that clears the QSO Info panel • displays the word "Contest" followed by the default contest name in the Main window's title bar; if no default contest name is specified, displays "Contest: ?" Notes: 1. when you first start a contest, be sure to initialize TX#; clicking the Reset TX Serial# button will set TX# to 1 2. you can also enable or disable contest mode via the Test box in the Main window's QSO Info panel
increment TX#	when checked, the transmit serial number is incremented (if its numeric) after each QSO is logged
place focus in RX# on DX Spot activation	when checked, places focus in the QSO Info panel's RX# item when a DX spot is activated in SpotCollector, DXView, or Commander
don't log contest, TX#, or RX# if contest mode is disabled	when checked while not it contest mode, disable the Contest selector and the TX#, and RX# textboxes in the QSO Info panel, and logs the ADIF Contest, STX, and SRX items as empty strings
contest ID	if contest mode is checked, the contents of this default contest ID setting are used to initialize the QSO Info panel's Contest textbox when the **Enter** or **Tab** key is struck in the QSL Info panel's call textbox
TX#	the transmit serial number that will be logged with the next QSO (need not be numeric)
X	clicking this button sets TX# to 1

Obtaining Position, Course, and Speed from a GPS Receiver

The Position & Vector Configuration window specifies information that can be transmitted by associated macros, and optionally enables this information to be updated by a NMEA-compliant Global Positioning Satellites (GPS) receiver.This window can be displayed by clicking the **Position & Vector** button at the bottom of the Configuration window's General tab.



Checking the **Enable GPS** box enables a NMEA-compliant GPS receiver to update the latitude, longitude, grid square, course, and speed text boxes via the serial port specified in the GPS Serial Port panel, When this box is checked, the number of GPS satellites contributing to the current location computation is displayed to its right.

The GPS serial port panel lets you specify the serial port to which a NMEA-compliant GPS receiver is connected, and specify this serial port's baud rate, word length, stop bits, and parity.

The DX Units panel specifies whether distances are specified in miles or kilometers, and whether speeds are displayed in miles-per-hour or kilometers-per-hour.

If the **Enable GPS** box is checked, values in the Position panel and Vector panel are updated as NMEA messages arrive from the GPS receiver.

Position panel

latitude	your current latitude in DD MM' N/S format ;striking the enter key updates the grid square setting; after making a change, strike the **Enter** key to update the grid square.
longitude	your current longitude in DDD MM' E/W format ;striking the enter key updates the grid square setting; after making a change, strike the **Enter** key to update the grid square.
grid square	your current maidenhead grid square; striking the enter key updates the latitude and longitude; after making a change, strike the **Enter** key to update the latitude and longitude.

Vector panel

course	your current course
speed	your current speed in `miles-per-hour or kilometers-per-hour`

If the **Enable GPS** box is not checked and DXKeeper is running, the Position panel's latitude, longitude, and grid square items are set from those specified in the default QTH ID on the Log tab of DXKeeper's Configuration window. If no default myQTHID is specified, then the Position panel's latitude, longitude, and grid square items are set from QTH latitude and QTH longitude specified on the Defaults tab of DXKeeper's Configuration window.

If the Create Mobile myQTHID option is enabled, each logged QSO's myQTHID will be set to Mobile_<mygrid>; for example, if the current grid square were FN42hj, QSOs would be logged with a myQTHID of **Mobile_FN42hj**

Logging

WinWarbler can log QSOs as ADIF records in a text file, referred to as the Minilog; you can select the file to be used for this purpose. WinWarbler can also log QSOs in real time to DXKeeper, a full-functioned logging program that records and manages QSOs, tracks progress towards DXing objectives, prints QSL cards and QSL labels, and synchronizes with both eQSL.cc and the ARRL's Logbook of the World (LotW).

At the top of its Main window, WinWarbler's **QSO Info** panel provides textboxes and selectors in which to collect the information to be logged. After capturing a callsign with DXKeeper running, this panel also displays the number of logged QSOs with that callsign, and the details of the most recent QSO with that callsign. You can expand or contract the height of the QSO Info panel to display more information by clicking the  button in the panel's upper right corner. When all information is visible in the QSO panel, the surface of this button changes to  ; clicking the button in this state reduces the height of the QSO Info panel to its minimum, and changes the button surface back to .

The transceiver's Receive and Transmit frequencies are displayed in the **Xcvr Freq** panel's **RX** textbox and **TX** selector, respectively; these frequencies are combined with audio offsets to compute the actual receive and transmit frequencies displayed in each mode's **Receive** and **Transmit** panels, and logged with QSOs. If Commander is running, these frequencies are updated automatically; if not, you must set them manually.

Some information can be directly captured from decoded data by double-clicking on received words in a PSK receive pane or RTTY receive pane. Double-clicking a received callsign, for example, will place that callsign in the QSO Info panel's Call textbox, and initialize many items:

- if clear QSO Info on callsign capture is enabled, all QSO info panel textboxes except the **callsign** textbox will be cleared
- the TX Pwr textbox is set from the default value specified in the Configuration window's PSK tab, RTTY tab, CW tab, or Phone tab
- the QSL Msg textbox is set from its default value specified in the Log panel on the Configuration window's Log tab
- if Contest Mode is enabled
    - the Contest selector is set to the contest named in the Configuration window's Contesting panel
    - the rst S and rst R textboxes are set to 59 or 599 as a function of the current mode
- if Contest Mode is disabled
    - the Contest selector and the TX#, and RX# text boxes are disabled if the Don't log contest, TX#, or RX# if contest mode is disabled option is enabled
    - if the **Log** button is clicked, values for Contest, TX#, and RX# will not be recorded with the QSO
- if initialize RST items to 59/599 is enabled, the rst S and rst R textboxes are set to 59 or 599 as a function of the current mode
- if DXKeeper is running and Automatic Lookup is enabled, then
    - DXKeeper will display all previous QSOs with the callsign, perform a callbook lookup (if installed and enabled), and perform a DXCC database lookup
    - information logged in previous QSOs, found in the selected callbook, or found in the DXCC database is used to set the DXCC selector, to set the Grid, Via, QTH, IOTA, CQ, ITU, State, County, and Province textboxes, and to record the Country Code and Continent
    - the Call textbox's caption will indicate the number of previous QSOs with this callsign
    - details of the most recent QSO with this station are displayed in the expanded QSO info panel
- if the log currently open in DXKeeper specifies User-defined items that are to be initialized with default values, the QSO Info panel's User-defined items will be so initialized
- if DXKeeper is not running but DXView is running, then DXView will perform a DXCC database lookup to set the DXCC selector, to set the IOTA, CQ, ITU, and State textboxes if they can be unambiguously determined from the callsign, and to record the Country Code and Continent

- if DXView is running
    - DXView's **Info** and **World Map** windows will display the callsign's location
    - the station's local time will be displayed in the QSO info panel's upper-right corner
    - the Az box and Path selector will be updated from DXView's most recent antenna heading
    - directs PropView to generate a propagation forecast for the station's location using the TX frequency
- if DXView is not running, Path will be set to the default Path
- if Pathfinder is running, it is directed to perform a QSL route search for the callsign
- if SpotCollector is running, its **Outgoing spot** panel will be populated with the callsign (in case you wait to spot the callsign until after your log it)

Manually keying a callsign into the Call textbox and then striking the **Enter** or **Tab** keys will also perform the above actions; if the *Ctrl* key is depressed while striking the **Enter** key, all QSO info panel textboxes except the **callsign** textbox will be cleared.

If DXKeeper is running, a **?** button will be present to the right of the Call textbox's caption. Clicking this **?** button invokes the **Lookup** operation, which performs several actions referencing the station whose callsign is shown in the Call textbox:

- directs DXKeeper to filter its Log Page Display to show previous QSOs with the station
- directs DXKeeper to perform a callbook lookup (if enabled)
- populates the QSO info panel textboxes with DXCC, Grid, Via, QTH, IOTA, CQ, ITU, State, County, Province, Continent and Country Code information obtained from previous QSOs, found in the selected callbook, or found in the DXCC database
- if log Special Callsign Tags is enabled, appends Special Callsign Tags reported by DXView to the QSO info panel's Comment textbox
- display's the station's local time in the QSO info panel's upper-right corner
- if Contest Mode is disabled, updates the **Prev QSOs** box to display the number of previous QSOs with the callsign specified in the Call textbox, and displays the word **Dup!** if one or more of these previous QSOs were made in the current mode in the current band
- if Contest Mode is enabled, updates the **Prev QSOs** box to display the number of previous QSOs with the callsign specified in the Call textbox in the current contest, and displays the word **Dup!** if one or more of these previous contest QSOs were made in the current mode in the current band
- uses the Call textbox's font color to indicate progress towards the award objectives specified in DXKeeper
    - Red: Unworked entity, entity-band, or entity mode
    - Blue: Worked but unconfirmed entity, entity-band, or entity mode
    - Black: Confirmed entity, entity-band, and entity mode
    - if the use SpotCollector's callsign colors option is enabled, the colors specified in the **Spot Database** sub-tab on the **Display Fonts** tab of SpotCollector's Configuration window will be used instead of the above colors unless a background color specified in SpotCollector is too dark.
- displays details of the most recent QSO with the station in the expanded QSO info panel
- directs Pathfinder to perform a QSL route search for the station
- if DXView and PropView are both running and automatic propagation forecasting is enabled, directs PropView to generate a propagation forecast for the station's location using the TX frequency

If WinWarbler can determine from DXView or DXKeeper that the station whose callsign is shown in the Call textbox is known to participate in ARRL's Logbook of the World (LotW) or is an Authenticity Guaranteed (AG) member of eQSL.cc, the Call textbox's background color is set to

- yellow if the station is known to participate in LotW but is not an AG member of eQSL.cc
- pink if the station is an AG member of eQSL.cc but is not known to participate in LotW
- light blue if the station is both known to participate in LotW and is an AG member of eQSL.cc

If SpotCollector is running, the background colors indicating LotW participation and AG membership are those specified on the **Spot Database Display** tab of SpotCollector's Configuration window - unless they are too dark.

Double-clicking the Comment textbox will display WinWarbler's **Comment Editor** window, which makes it easy to capture and/or edit lengthy notes. Anything you type in the Comment Editor window will be placed in the **Comment** textbox (though it may not all be visible), and vice versa.

Double-clicking a textbox's caption will direct DXKeeper (if running) to filter its log page display to show only QSOs that match the textbox's value, and underline that caption for 1 second. For example, double-click the word *QTH* in the QSO Info panel when the **QTH** textbox contains Miami will direct DXKeeper to filter its log page display to show only QSOs whose QTH is Miami.

You can enable or disable Contest Mode via the Configuration window's Contest tab or via the Test box on the last row of the Main window's fully-expanded QSO info panel.

To indicate that a QSO has started, click the QSO info panel's Begin button; the start time will appear in the panel caption. If set QSO start when RST received is enabled, entering a received signal report in the rst R textbox will automatically start the QSO, whether this is done manually, by double-clicking on a received signal report, or because Contest Mode or initialize RST items to 59/599 are enabled. Executing a macro containing the <RSTsent> or <TX_serial_number> command will also start a QSO. To update the QSO's start time, click the Begin button again.

To indicate that a QSO has ended, click the QSO info panel's End button; the end time will appear in the panel caption.

Double-clicking or striking the *Enter* key in the Grid textbox directs DXView to display the specified gridsquare's location. Depressing the *Ctrl* key while double-clicking the Grid textbox directs DXView to display the specified gridsquare's location and rotate the antenna to the short-path heading; depressing the *Alt* key while double-clicking the Grid textbox directs DXView to display the specified gridsquare's location and rotate the antenna to the long-path heading.

Clicking the **Log** button also ends the QSO, and checks the information contained in QSO info panel's textboxes and selectors. Errors or omissions are flagged by flashing the offending item's caption in red font; the flag invalid callsigns and require DXCC options are considered when identifying errors and omissions. If no errors or omissions are found, the information to be logged is recorded in the minilog and sent to DXKeeper, if running. If Contest Mode is disabled and the don't log contest, TX#, or RX# if contest mode setting is disabled, values from the Contest selector and the TX#, and RX# textboxes are not recorded with the QSO. Depressing the *Ctrl* key while clicking the Log button directs DXKeeper to immediately upload the information to eQSL.cc ; alternatively, checking the upload to eQSL.cc when logging box directs DXKeeper to upload each QSO as it is logged. To prepare for the next QSO, WinWarbler then clears all QSO info items except Freq and, if Contest Mode is enabled, TX#. You can clear the QSO info items without logging a QSO by clicking the **X** button in the QSO info panel's upper right corner.

Callsigns not containing at least one letter and one number are considered invalid unless flag invalid callsigns is disabled.

When operating PSK31 or PSK63, WinWarbler provides three receive panes, each capable of decoding an independent PSK signal. WinWarbler therefore independently records QSO information for each receive pane. The QSO info panel shows the information associated with the currently active receive pane, and the active receive pane is identified by number in the QSO info panel's caption. Making another receive pane active causes the QSO info panel to display information for the QSO being decoded in the newly-activated receive pane. This allows you to accumulate information captured from multiple signals, separately retaining each signal's information until a QSO is completed and logged.

When operating RTTY with both soundcard RTTY and an external modem both enabled, WinWarbler provides two receive panes, each capable of decoding an independent RTTY signal. By tuning both receive panes to the same signal, you can employ ***diversity decoding*** to more reliably capture information under difficult conditions. WinWarbler can thus be configured in two ways:

1. Independently record QSO information from the soundcard RTTY and external modem receive panes. In this case, the QSO info panel shows the information associated with the currently active receive pane and the active receive pane is identified by number in the QSO info panel's caption. Making the other receive pane active causes the QSO info panel to display information for the QSO being decoded in the newly-activated receive pane. This allows you to accumulate information captured from two different RTTY signals, separately retaining each signal's information until a QSO is completed and logged.
2. Merge QSO information from the soundcard RTTY and external modem receive panes, in which case the QSO info panel shows information captured from either receive pane. With both panes tuned to the same RTTY signal, this enables you capture information from whichever pane provides the best copy on a word-by-word basis.

The choice between these two configurations is governed by the RTTY Transmit panel's QSO Selector, which only appears when operating RTTY with both soundcard RTTY and an external modem both enabled. When the QSO Selector is set to **S** or **X**, QSO information captured from the two receive panes is merged; otherwise, QSO information is maintained independently for each receive pane.

To allow operation without removing one's hands from the keyboard, WinWarbler provides keyboard shortcuts for navigating among QSO info items and the Transmit Pane, and for invoking functions like starting or logging a QSO.

Macros can be invoked from QSO info text boxes and selectors by striking the appropriate Function key. Macro substitution commands are available for many QSO info items.

If DXKeeper is running, changes to items in WinWarbler's QSO info panel are immediately reflected in DXKeeper's Capture window; this allows you to begin logging a QSO in WinWarbler and complete it in DXKeeper's Capture window, should you desire to do so. However, changes to items in DXKeeper's Capture window are not reflected in WinWarbler's QSO info panel. If Contest Mode is enabled, logging a QSO via DXKeeper's Capture window will increment the Capture window's TX# textbox, but will not increment WinWarbler's TX# textbox; thus when switching from "logging from DXKeeper" to "logging from WinWarbler" in the middle of a contest, you must manually update WinWarbler's TX# textbox at the time you switch.

The Minilog

The Minilog is a text file whose simple name is the operator's callsign (with any forward slashes or back slashes replaced by hyphens) and whose suffix is `.adi`; the Minilog resides in the folder whose pathname is specified in the Minilog panel's pathname textbox.

Every time you log a QSO, an ADIF record is appended to the Minilog's contents, whether or not DXKeeper is running. You can load the information contained in a Minilog into any logging application capable of importing standard ADIF. After importing the Minilog's contents into a logging application, you may wish to clear the contents of the Minilog; you can do so by clicking the Clear button on the Config window's Log tab.
If you will be importing the Minilog into the logging program DXbase, select export for DXbase in the Minilog panel on the Log tab of the Configuration window; this ensures that frequencies are represented in a format acceptable to DXbase.

User-defined Items

By fully expanding the QSO Info panel, you can log up to 8 user-defined items with each QSO. DXKeeper provides the ability to specify a caption, style, alignment, and default value for each user-defined item; you can choose from among 11 styles, including a list style that lets you choose from among a pre-specified set of values. If DXKeeper is not running, WinWarbler's QSO Info panel displays these 8 items with the names user-defined 0 through user-defined 7, and accepts all alphanumeric characters. If DXKeeper is running, the QSO Info panel displays the these 8 items with the captions specified on the User Items tab of DXKeeper's Configuration window, and enforces the constraints imposed by each item's style. configurable

Capturing Information from Decoded Data

To facilitate logging, WinWarbler provides several mechanisms for copying information from decoded data into textboxes in the QSO info panel.

- Right-clicking in a receive display pane in which one or more contiguous characters have been selected produces a window with buttons that let you choose a destination textbox in the QSO info panel into which those characters are copied.
- Selecting one or more contiguous characters in a receive display pane
    - while not depressing the *Alt* key, copies those characters to the Windows Clipboard
    - while depressing the *Alt* key,
        - if the selected characters are a valid gridsquare, copies those characters to the Grid textbox
        - if the selected characters are a URL, directs the selected browser to navigate to that URL
        - otherwise, copies the selected characters to the QTH textbox
    - while depressing the *Alt* and *Ctrl* keys with Contest Mode disabled, copies those characters to the Comment textbox
    - while depressing the *Alt* and *Ctrl* keys with Contest Mode enabled, copies those characters to the RX# textbox
- Double-clicking on a word in a receive pane with neither *Alt* nor *Ctrl* depressed copies that word to the appropriate QSO info textbox:
    - if the word contains both letters and digits, it is assumed to be the station's callsign and placed in the call textbox; the following actions are taken:
        - the TX Pwr and QSL Msg textboxes are set from their default values in the Configuration window's Log tab's Default Settings panel
        - if Contest Mode is enabled
            a. the Contest selector is set to the contest ID named in the Configuration window's Contest tab
            b. the rst S and rst R textboxes are set to 59 or 599 as a function of the current mode
        - if initialize RST items to 59/599 is enabled, the rst S and rst R textboxes are set to 59 or 599 as a function of the current mode
        - if DXKeeper is running and Automatic Lookup is enabled, then
            a. DXKeeper will display all previous QSOs with the callsign, perform a callbook lookup (if installed and enabled), and perform a DXCC database lookup
            b. information logged in previous QSOs, found in the selected callbook, or found in the DXCC database is used to set the DXCC selector, to set the Grid, Via, QTH, IOTA, CQ, ITU, State, County, and Province textboxes, and to record the Country Code and Continent
            c. the Call textbox's caption will indicate the number of previous QSOs with this callsign
            d. details of the most recent QSO with this station are displayed in the expanded QSO info panel
        - if DXKeeper is not running but DXView is running, then DXView will perform a DXCC database lookup to set the DXCC selector, to set the IOTA, CQ, ITU, and State textboxes if they can be unambiguously determined from the callsign, and to record the Country Code and Continent
        - if DXView is running, it will display the location of that callsign
        - if Pathfinder is running, it is directed to perform a QSL route search for the callsign
        - if SpotCollector is running, its **Outgoing spot** panel will be populated with the callsign (in case you wait to spot the callsign until after your log it)
    - if the word contains only letters, it is assumed to be the operator's name and placed in the name textbox
    - if not in Contest Mode and the word contains two or three digits, it is assumed to be a signal report. If the word is in received text, it is placed in the rst R textbox; ff the word is in transmitted text, it is placed in the rst S textbox
    - if in Contest Mode and the word contains only digits, it is assumed to be a serial number and is placed in the RX# textbox

- Double-clicking a word in a receive pane while depressing the *Alt* key copies that word to the QTH textbox ***unless*** the word is a valid 4-character or 6-character Maidenhead gridsquare identifier, in which case it is placed in the Grid textbox and DXView, if running, is directed to display that grid square's location. If the DXCC selector is set to *K*, *KH6*, or *KH7* and the word is a valid US State abbreviation, then the State selector will be set accordingly; similarly, if the DXCC selector is set to *VE* and the word is a valid Canadian Province abbreviation, then the Province selector will be set.
- Double-clicking a word in a receive pane while depressing the *Ctrl* key copies that word to the Via textbox.
- Double-clicking a word in a receive pane while simultaneously depressing the *Alt* and *Ctrl* keys
    - with Contest Mode is disabled, appends that word to the Comment textbox
    - with Contest Mode is enabled, copies that word to the RX# textbox

Summary of QSO info destinations when double-clicking a decoded word in a receive pane

contains letters	**contains numbers**	**valid grid**	**valid URL**	***Alt* depressed**	***Ctrl* depressed**	**contest mode**	**text**	**destination QSO info textbox**
no	yes			no	no	disabled	received	rst R
no	yes			no	no	disabled	transmitted	rst S
no	yes			no	no	enabled		RX#
yes	no			no	no			name
yes	yes			no	no			call
		no	no	yes	no			QTH, State, Province
		no	yes	yes	no			(navigates browser to URL)
		yes		yes	no			Grid
				no	yes			Via
				yes	yes	disabled		Comment
				yes	yes	enabled		RX#

If, when you click the **Log** button, one or more **QSO info** panel textboxes contain invalid information, their labels will blink in red font until you correct their contents and again click the **Log** button; callsigns not containing at least one letter and one number are considered invalid unless the flag invalid callsigns box is unchecked. Log entries are appended to a file that WinWarbler creates in its application folder; this file's simple name is your callsign, and its file extension is .ADI -- e.g. `AA6YQ.ADI`.

If you are using a ADIF-compatible logging application other than DXKeeper, you can import the log entries in this file into your logging program; this can be done while WinWarbler is running. After successfully importing these entries, click the **Clear** button in the **Minilog** panel on the Log tab of WinWarbler's Configuration window to delete all log entries from WinWarbler's log file.

Information Logged

The following table lists all information logged with a QSO, macro substitution commands and ADIF tags for each**.** The QSO info panel column indicates whether the item is always visible in the QSO info panel, only visible when the QSO info panel is expanded, or never visible:

Item	Contents	Notes	QSO info panel	Macro Substitution Command	ADIF tag
	geomagnetic A-index from SpotCollector, if running		no		A_INDEX
ARRL	ARRL Section		yes		ARRL_SECT
Az	antenna azimuth		if expanded		ANT_AZ
Path	antenna path (**S**hort-path, **L**ong-path, **G**rey-line, or **O**ther)		if expanded		ANT_PATH
Band	band associated with QSO frequency		no		Band
Buro	check to indicate that a QSL should be sent via the QSL Bureau		yes		QSL_SENT_VIA
Call	callsign	1,2	yes	<callsign>	CALL
Comment	miscellaneous comments Special Callsign Tags	6, 14	if expanded 6		COMMENT
CQ	CQ zone		yes		CQZ
Contest	contest name		if expanded	<contest_id>	CONTEST_ID
Continent	continent designator		yes		CONT
Country code	numeric DXCC entity identifier	9	no		DXCCID
County	US county	3	yes		CNTY
Distance	distance from your location to the station's location via the antenna path		no		DISTANCE

DOK	the station's DARC DOK (only visible for stations in Germany)		yes		APP_DXKEEPER_DOK
DXCC	DXCC entity prefix	4	yes		APP_DXKeeper_DXCCPREFIX
End time	QSO end time		no		TIME_OFF
eQSL	check to indicate that the call is an Authenticity Guaranteed member of eQSL.cc		if expanded		APP_DXKeeper_EQSL_MEMBER
Grid	Maidenhead grid square	10	yes	<grid>	GRIDSQUARE
IOTA	IOTA tag		if expanded		IOTA
ITU	ITU zone		yes		ITUZ
K	geomagnetic K-index from SpotCollector, if running		no		K_INDEX
Latitude	the station's latitude		no		LAT
Longitude	the station's longitude		no		LON
LotW	check to indicate that the call is known to participate in the ARRL's Logbook of the World		if expanded		APP_DXKeeper_LotW_MEMBER
Mode	PSK31, PSK63, RTTY, CW, SSB, AM, or FM	8	no		MODE
My Grid	your Maidenhead grid square		no	<mygrid>	MY_GRIDSQUARE
My Latitude	your latitude		no	<mylatitude>	MY_LAT
My Longitude	your longitude		no	<mylongitude>	MY_LON
Name	operator name		yes	<name>	NAME
Operator	*operator* callsign		no	<mycall>	OPERATOR

Pri Sub	primary administrative subdivision		yes		STATE
Province	Canadian province (abbreviation)	7	yes		VE_PROV
Pwr	transmitter power		if expanded	<transmit_power>	TX_POWER
QSL	check to indicate that a QSL card or label should be sent		yes		QSL_SENT
QSL msg	message to be printed on an outgoing QSL card or label	6	if expanded 6		QSLMSG
QTH	location		yes	<QTH>	QTH
Receive Freq	receive frequency	5	12		FREQ_RX
Region	the station's Region as defined by CQ for its Marathon award and DARC for its WAE award (only visible in the Awards panel for stations in Austria, Italy, Scotland, Svalbard, and Turkey)		yes		APP_DXKEEPER_REGION
rst S	outgoing signal report	15	yes	<RSTsent>	RST_SENT
rst R	received signal report	15	yes	<RSTreceived>	RST_RCVD
RX#	received contest exchange		if expanded	<rx_serial_number>	SRX
	solar flux from SpotCollector, if running		no		SFI
Sec Sub	secondary administrative subdivision		yes		CNTY
Start date	QSO start date		no		QSO_DATE

Start time	QSO start time		no		TIME_ON
State	US state	3	yes		STATE
Transmit Freq	transmit frequency	11	13		FREQ
TX#	transmitted contest exchange		if expanded	<tx_serial_number>	STX
User-defined 0	configurable		if expanded		APP_DXKeeper_User_Defined_0
User-defined 1	configurable		if expanded		APP_DXKeeper_User_Defined_1
User-defined 2	configurable		if expanded		APP_DXKeeper_User_Defined_2
User-defined 3	configurable		if expanded		APP_DXKeeper_User_Defined_3
User-defined 4	configurable		if expanded		APP_DXKeeper_User_Defined_4
User-defined 5	configurable		if expanded		APP_DXKeeper_User_Defined_5
User-defined 6	configurable		if expanded		APP_DXKeeper_User_Defined_6
User-defined 7	configurable		if expanded		APP_DXKeeper_User_Defined_7
Via	QSL Manager's callsign		yes	<via>	QSL_VIA

Notes:

1. striking the *Enter* or *Tab* keys after keying in a callsign is equivalent to clicking the ? button - the **Lookup** operation is invoked
2. if the callsign begins with an exclamation point or ends with an /am or /mm suffix, WinWarbler will not check it for validity and DXKeeper will ignore it from an awards tracking perspective
3. the **State** and **Country** items will appear when the **DXCC** selector is set to K, KH6, or KL7
4. letting the mouse cursor hover over the contents of the **DXCC** selector will display an explanatory popup bearing the full name of the selected DXCC entity
5. WinWarbler logs the actual receive frequency -- the transceiver receive frequency modified by specified offsets in CW, Phone, and FSK RTTY modes, and modified by the audio offsets in PSK and AFSK RTTY modes
6. the **Comment** and **QSL msg** items share space; to toggle between them, click the ~ button to the right of the currently-visible item
7. the **Province** item appears when the **DXCC** selector is set to VE
8. the **Mode** is primarily determined by the Main window's Mode panel; if Phone is selected, the Mode is determined by the Phone Xcvr Mode setting
9. the proper **Country Code** is automatically set whenever a DXCC entity prefix is selected
10. striking the *Enter* or *Tab* keys after typing a grid square into the **Grid** item directs DXView, if running, to display the location of that grid square
11. if the transceiver is operating split, WinWarbler logs the actual transmit frequency -- the transceiver transmit frequency modified by specified offsets in CW Phone and FSK RTTY mode, and modified by the audio offsets in PSK and AFSK RTTY modes
12. the receive frequency is taken from the frequency displayed in the Main window's Receive panel for the currently active mode

13. the transmit frequency is taken from the frequency displayed in the Main window's Transmit panel for the currently active mode
14. double-clicking in the **Comment** textbox displays the Comment Editor window
15. typing Ctrl-1 through Ctrl-9 with the cursor in the rst R or rst S textboxes will set the signal report to 51 through 59 if the Main window's **Operating Mode** panel is set to phone, or to 519 through 599 if the **Operating Mode** panel is not set to phone

DXCC Entity Prefixes
The QSO info panel's DXCC selector contains an entry for each current DXCC entity. If DXKeeper is running and Automatic Lookup is enabled or if DXView is running, then entering or capturing a callsign will trigger a DXCC database lookup that sets the DXCC selector to the DXCC prefix associated with the callsign's DXCC entity; otherwise, the user must manually set the DXCC selector to the appropriate DXCC prefix.
On startup, the DXCC selector is populated with prefixes obtained from the file `DXCC.txt`. If DXView is installed, WinWarbler will preferentially reference the file `DXCC.txt` found in DXView's `Databases` folder, as this file will be maintained automatically by future versions of DXView. If DXView is not installed, or if its `Databases` folder does not contain a `DXCC.txt` file, then WinWarbler populates its DXCC selector with prefixes from the file `DXCC.txt` in its own `Databases` folder. When DXCC entities are added or deleted, the file `DXCC.txt` being used by WinWarbler should be updated accordingly.

Generating DX Spots
If SpotCollector is running and configured to generate outgoing cluster spots, clicking the QSO info panel's Spot button will generate an outgoing spot for the station designated by the call textbox on the current receive frequency. You can specify default spot notes; if no default spot notes are specified, the outgoing spot note will indicate the QSO's mode. If the Transmit and Receive panel's frequencies are different and the spot split frequency option is enabled, the difference will be included in the spot notes as a split if

- the operating mode is CW, RTTY, or Phone and the split is greater than 300 Hz
- the operating mode is PSK31 and the split is greater than 31 Hz
- the operating mode is PSK63 and the split is greater than 63 Hz
- the operating mode is PSK125 and the split is greater than 125 Hz

If the QSO frequency is 50 mHz or higher

- if the **QSO Info** panel's grid box contains a valid grid square, it will be included in the spot notes
- if the Position and Vector Configuration window's position panel specifies a grid square, or if DXKeeper is running and specifies the operator's grid square, it will be included in the spot notes; a grid square specified on the Position and Vector Configuration window takes precedence over the operator's grid square specified by DXKeeper.

If you want SpotCollector to generate a local spot rather than one sent to all clusters, depress the *Alt* key or the *Shift* key while clicking the Spot button.

Depressing the *Ctrl* key while clicking the Spot button will display WinWarbler's **Outgoing Spot** window, which enables you to specify spot notes, as well as generate a cluster or local spot.

- the spot notes you specify in the **Outgoing Spot** window take precedence over any default spot notes you've specified
- the **Outgoing Spot** window displays in bold blue font the complete spot notes that will be conveyed when you click its **Cluster** or **Local** button: operating mode, text you've specified, split, and grid square

You can configure WinWarbler to automatically generate a local spot when a callsign is acquired.
If the Spot button is disabled ("grayed out"), then either SpotCollector is not running, or its running but not configured to generate outgoing cluster spots

Keyboard Shortcuts

To allow operation without removing one's hands from the keyboard, WinWarbler provides keyboard shortcuts for navigating among the QSO Info items, Xcvr Freq items, and the Transmit Pane, and for initiating actions. Keyboard shortcuts can be used whenever the mouse cursor resides in a QSO Info item or the Transmit pane.

Destination	CTRL shortcut	ALT shortcut
Call textbox	C	C
CQ textbox		X
Contest selector		T
County textbox		O
DXCC selector		D
Xcvr Freq TX selector	X	F
Xcvr Freq RX textbox		M
Grid textbox	G	G
IOTA textbox		I
ITU textbox		Y
Name textbox	N	N
Comment textbox	D	E
QSL Msg textbox	F	H
QTH textbox	Q	Q
rst R textbox	R	R
rst S textbox	S	S
RX# textbox	Z	Z
State selector		A
Transmit Pane	T	/
TX# textbox		W
TX Pwr textbox		K
Via textbox		V

Action	CTRL shortcut	ALT shortcut
Select all characters in textbox	A	
Clear QSO Info panel	W	
Log QSO	L	J, L
Start QSO		B
Toggle QSL checkbox		U

Action	shortcut
Set PSK transmit frequency to that of active PSK receive pane	F1
Start transmission in the current operating mode	F2, Insert
Send CW ID at end of PSK transmission	F3
Stop transmission when all characters have been transmitted	F4
Stop transmission immediately	Esc, End

Typing Ctrl-1 through Ctrl-9 with the cursor in the rst R or rst S textboxes will set the signal report to 51 through 59 if the Main window's **Operating Mode** panel is set to phone, or to 519 through 599 if the **Operating Mode** panel is not set to phone.

Macros

WinWarbler's two banks of sixteen macros allow you to transmit information with a single mouse click or keystroke. To invoke a macro in the first bank, click on its button, or strike its associated function key (F5 through F12, and Shift-F5 through Shift-F12). To invoke a macro in the second bank, depress and hold the ALT key to display the second bank, and then click the appropriate macro button, or strike its associated function key. Checking the ALT checkbox, located between the 4th and 5th macro buttons, displays the second bank of macros until you uncheck it. You can also switch macro banks using the <macrobank *n*> command described below.

Using the repeat command described below, a macro can be repeated multiple times with a single mouse click or keystroke, separated by "listening intervals" of specified duration.

WinWarbler also provides

- a CW startup macro that can be executed whenever you switch to CW mode
- a Phone startup macro that can be executed whenever you switch to Phone mode
- a PSK startup macro that can be executed whenever you switch to PSK31, PSK63, or PSK125 mode
- a RTTY startup macro that can be executed whenever you switch to RTTY mode

These dedicated macros can be used to set transceiver parameters, select a macro bank, and/or load a macro bank from a file containing macros appropriate for the mode. They are defined in the lower portion of WinWarbler's macro definition window, described below.

With WinWarbler's Main window active, allowing the mouse cursor to linger over a Macro button for a few seconds will display an explanatory popup showing what would be sent if the associated macro were invoked; substitution commands will be replaced by the substitution text unless that that substitution text is empty, in which case the name of the command enclosed in angle brackets will be displayed. An explanatory popup window will not appear if the show control explanations setting is disabled, or if the macro's **Explain** box is unchecked in the macro definition window

Macro Definition Window
To modify a macro, depress the Ctrl key while clicking on the macro's associated button or striking its associated function key. WinWarbler will display its macro definition window, which displays two components for each macro: *title*, and *contents*. The *title* is used to label the macro buttons on WinWarbler's main window. The *contents* determine what is transmitted when the macro is invoked.

To include a single ampersand in a macro's title, insert a pair of back-to-back ampersands, e.g. R&&B.

To prevent a popup explanation from appearing when the mouse cursor hovers over a macro's button with the Main window active, uncheck its **Explain** box.

To select the font used to label a macro button, click the **Font** button.

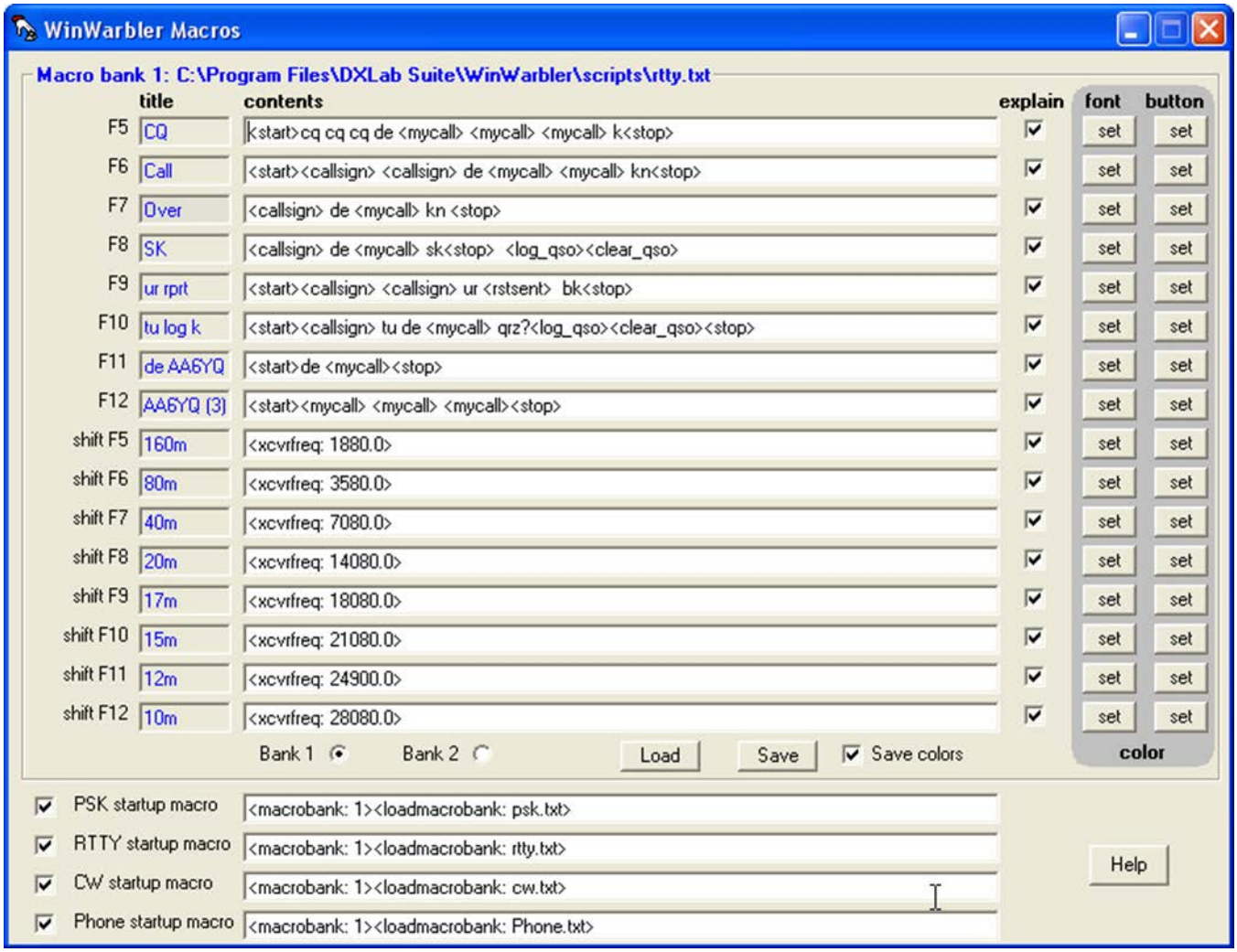
To set the color of the font used to label a macro button, click the appropriate **Set** button in the *Font Color* column, and choose the desired color from the color selection window. If you depress the CTRL key while clicking a **Set** button, the macro button's font color will be set to black.

To set the color of a macro button's face, click the appropriate **Set** button in the *Button Color* column, and choose the desired color from the color selection window. If you depress the CTRL key while clicking a **Set** button, the macro button's button face color will be set to the standard button face color in the current Windows color scheme.

For macros whose length exceeds that of the macro definition window display, double-clicking in the *contents* field will invoke a resizable editing dialog.

You can save a macro bank's sixteen macros to a file by clicking the *Save* button and selecting a destination pathname; if the *Save colors* box is checked, then font and button colors for each of the macro bank's sixteen macros will also be saved in the file.

You can load a macro bank's sixteen macros from a file by clicking the bank's *Load* button and selecting a source pathname; if the file contains font and button colors, then the font and button colors of each of the macro bank's sixteen macros will be set to the save colors. The last filename pathname associated with a macro bank is displayed in the Macro Bank panel's caption; if a macro is subsequently modified, this will be noted in the panel's caption. The simple name of the file is displayed in the Main window's Macro panel caption. If you use a text editor to modify the contents of a file into which macros have been saved, do not insert line breaks, as this will prevent WinWarbler from properly loading the file; to insert a line break in a macro use the <enter> substitution command described below.



The PSK startup, RTTY startup, Phone, and CW startup macros are defined in the lower portion of WinWarbler's macro definition window; there's a checkbox associated with each startup macro that determines whether the macro's commands are executed when a switch to its mode occurs.

To insert a line break in a macro, use the <enter> substitution command described below.

Macro Commands

In a macro's *contents*, any information not surrounded by a pair of angle brackets is transmitted verbatim in every mode except phone. Valid commands begin and end with an angle bracket; WinWarbler processes such commands in a macro's *contents* by replacing them as enumerated in the following **Substitution** table, or by executing an action specified in one of the following **Action** tables:

Command	**Substitution**
<n>	the character whose ASCII code is n (for 0 <= n < 255); control characters other than <17>, <18>, and <19> will be conveyed to the external modem if in CW mode with keying via the external modem, or if in RTTY mode with the external modem's receive pane active
<antpath>	**Antenna Path** / **Substitution** (blank) / unknown S / short path L / longpath G / grayline O / indirect path
<band>	the band associated with the current transmit frequency
<callsign>	contents of the call textbox
<contest_id>	the contents of the contest textbox
<cwid>	transmit the CW identification string when transmission is complete
<date>	the current UTC date
<dx>	If a location in specified in the Position panel on the Position and Vector Configuration window and the Main window's QSO Info panel specifies a Grid item and a Path item of either **S** or **L**, the computed distance and distance unit, e.g. 5035 mi If these prerequisites are not satisfies, the word unknown
<enter>	the character whose ASCII code is 13 - use this to insert a line break in a macro
<file: *filename*>	the contents of the designated file ; *filename* should begin with a drive letter and include all intervening directories (if the file does not terminate with a newline character, one is appended)
<fileraw: *filename*>	the contents of the designated file ; *filename* should begin with a drive letter and include all intervening directories
<greeting>	if DXView is running and if capturing a station's callsign or performing a lookup operation has updated the QSO Info panel to display the station's local time in its upper-right corner, then • if the local time is between 0:00Z and11:59Z, the string Good morning • if the local time is between 12:00Z and 17:59Z, the string Good afternoon • if the local time is between 18:00Z and 23:59Z, the string Good evening if DXView is not running, or if the local time cannot be determined for the captured station's callsign, the string Good day

<greeting_abbrev>	if DXView is running and if capturing a station's callsign or performing a lookup operation has updated the QSO Info panel to display the station's local time in its upper-right corner, then • if the local time is between 0:00Z and11:59Z, the string GM • if the local time is between 12:00Z and 17:59Z, the string GA • if the local time is between 18:00Z and 23:59Z, the string GE if DXView is not running, or if the local time cannot be determined for the captured station's callsign, the string GD
<grid>	contents of the grid textbox
<lastqso>	if DXKeeper is running and a previous QSO lookup is successful, the string The last of our X QSOs was at HH:MM UTC of YYYY-MM-DD on FF.FFF MHz in {Mode}. where X is the number of previous QSOs with the current station, HH:MM, YYYY-MM-DD, FF.FFF. and {Mode} are taken from the most recent previous QSO. If a QSL for this most recent previous QSO has been received, the string Thanks for QSL! is appended. If the previous QSO lookup is unsuccessful, the string This is the first time we've worked. is appended.
<lastqsocount>	if DXKeeper is running and a previous QSO lookup is successful, the number of previous QSOs with the station; otherwise, nothing
<lastqsodate>	if DXKeeper is running and a previous QSO lookup is successful, the UTC date of the most recent QSO with the station in YYYY-MM-DD format; otherwise, nothing
<lastqsotime>	if DXKeeper is running and a previous QSO lookup is successful, the UTC time of the most recent QSO with the station in HH:MM format; otherwise, nothing
<lastqsofreq>	if DXKeeper is running and a previous QSO lookup is successful, the frequency in MHz on which the most recent QSO with the station was conducted; otherwise, nothing
<lastqsoband>	if DXKeeper is running and a previous QSO lookup is successful, the band on which the most recent QSO with the station was conducted; otherwise, nothing
<lastqsomode>	if DXKeeper is running and a previous QSO lookup is successful, the mode in which the most recent QSO with the station was conducted; otherwise, nothing
<lastqsostatus>	if DXKeeper is running and a previous QSO lookup is successful, confirmed if the most recent QSO's QSL_Rcvd item is 'Y' or 'V', otherwise unconfirmed .
<mode>	the current mode (PSK31 or QPSK31 or PSK63 or QPSK63 or PSK125 or QPSK125 or RTTY or CW or SSB or AM or FM)
<mycall>	the station callsign
<mycourse>	the contents of the course textbox in the Position and Vector Configuration window
<mygrid>	the contents of the grid square textbox in the Position and Vector Configuration window

<mylatitude>	the contents of the latitude textbox in the Position and Vector Configuration window
<mylongitude>	the contents of the longitude textbox in the Position and Vector Configuration window
<myspeed>	the contents of the speed textbox in the Position and Vector Configuration window
<name>	contents of the name textbox; if the name textbox is empty, returns *om*
<newline>	the character whose ASCII code is 10
<peakIMD>	contents of the peak IMD textbox ; if the peak IMD textbox is empty, returns *not measured*
<prev_callsign>	contents of the call textbox when the previous QSO was logged
<prev_tx_serial_number>	the contents of the TX# textbox minus 1, zero-filled to 3 digits if increment TX# is enabled; if in CW mode and use cut #s in macros is checked, substitute T for 0 and N for 9
<prisub>	the contents of the Pri sub (or State or Province) text box
<secsub>	the contents of the Sec sub (or County) text box
<QSOBeginUTC>	QSO begin time for the current receive pane in the format hhmm
<QTH>	contents of the QTH textbox
<qsonumber>	if DXKeeper is running and a previous QSO lookup is successful, the number of previous QSOs with the current station
<revision>	WinWarbler's revision level
<RSTsent>	contents of the rst S textbox (if non-empty) or the contents of the Default sent & received textbox (if the rst S textbox is empty); if in CW mode and use cut #s in macros is checked, substitute T for 0 and N for 9
<RSTreceived>	contents of the rst R textbox; if in CW mode and use cut #s in macros is checked, substitute T for 0 and N for 9
<rx_freq>	the current RF reception frequency (if RTTY, mark frequency)
<rx_serial_number>	the contents of the RX# textbox, zero-filled to 3 digits if increment TX# is enabled; if in CW mode and use cut #s in macros is checked, substitute T for 0 and N for 9
<opcall>	the operator's callsign
<ownercall>	the station owner's callsign
<transmit_power>	the contents of the TX Pwr textbox; if in CW mode and use cut #s in macros is checked, substitute T for 0 and N for 9
<tx_freq>	the current RF transmission frequency (if RTTY, mark frequency)
<tx_serial_number>	the contents of the TX# textbox, zero-filled to 3 digits if increment TX# is enabled; if in CW mode and use cut #s in macros is checked, substitute T for 0 and N for 9
<UTC>	the current UTC time in the format hh:mm
<UTChour>	the current UTC hour in the format hh

<UTCminute>	the current UTC minute in the format mm
<Via>	contents of the Via textbox

Command	Action
<advance_tx_serial_number>	increment the contents of the TX# setting if the increment TX# setting is enabled
<afc: *n*>	if *n* =0 then disable Automatic Frequency Control; if *n* =1 then enable afc (changes afc for current mode -- PSK or RTTY)
<archivetimestamp>	if automatic archiving is enabled, writes a timestamp into the current pane's archive file
<beginqso>	indicates that the QSO in the Main window's ***QSO info*** panel has started
<clear_qso>	clear the *callsign*, name, *QTH*, *RST sent*, *RST rcvd*, and *rx serial#* textboxes in the ***QSO info*** panel
<clear_receive_pane>	clears the current receive pane
<clear_receive_pane: n>	if n is 0, 1, or 2, clears the specified receive pane if its visible
<clear_transmit_pane>	clears the transmit pane and any not-yet-transmitted data
<comment: *text*>	no effect; *text* can be used to document the macro
<cwspeed: n>	adjusts the CW speed in words per minute • <cwspeed: 20> sets the CW speed to 20 words per minute • <cwspeed: +5> increases the CW speed by 5 words per minute • <cwspeed: - 3> decreases the CW speed by 3 words per minute • <cwspeed: pot> if the Keying Mode is set to Winkey, sets the CW speed to that specified by the WinKey speed potentiometer Note: if transmission has been initiated, this command takes effect after transmission of the preceding character *except* when transmitting CW via the External Modem, in which case the command takes effect when its executed; if transmission has not been initiated, the command takes effect when encountered
<endqso>	indicates that the QSO in the Main window's ***QSO info*** panel has ended
<focus: item>	moves the mouse cursor to the designated user interface item: • <focus: call> moves the mouse cursor to the QSO Info panel's Call textbox • <focus: rst_sent> moves the mouse cursor to the QSO Info panel's rst S textbox • <focus: rst_rcvd> moves the mouse cursor to the QSO Info panel's rst R textbox • <focus: transmit_pane> moves the mouse cursor to the Main window's **Transmit Pane**

`<log_qso>`	Before executing a macro containing this command, WinWarbler checks for errors or omissions, considering the flag invalid callsigns and require DXCC settings. If no errors or omissions are found, WinWarbler creates a new log record from the information contained in the ***QSO info*** panel, records it in the Minilog, and directs DXKeeper (if running) to log it . If errors or omissions are found, they are flagged by flashing the offending item's caption in red font, and none of the macro is executed.
`<log_eqsl_qso>`	Before executing a macro containing this command, WinWarbler checks for errors or omissions, considering the flag invalid callsigns and require DXCC settings. If errors or omissions are found, they are flagged by flashing the offending item's caption in red font, and none of the macro is executed. If no errors or omissions are found, WinWarbler creates a new log record from the information contained in the ***QSO info*** panel, records it in the Minilog, and directs DXKeeper (if running) to both log the QSO and immediately upload it to eQSL.cc • if the upload succeeds, DXKeeper records a 'Y' in the QSO's *QSL_sent* field and the current UTC date in its *date_sent* field • if the upload fails, the QSO is logged, but the *QSL_sent* and *date_sent* fields remain empty • successful uploading requires that you have registered with eQSL.cc and have specified your username and password on the *eQSL* tab of DXKeeper's DXKeeper's window.

`<loadmacrobank: filename>`	loads the currently selected macro bank with macros defined in the specified filename located in WinWarbler's `scripts` folder. If WinWarbler is installed in the folder
	`c:\program files\winwarbler`
	then the command
	`<loadmacrobank: cw.txt>`
	will load the current macro bank with macros defined in the file
	`c:\program files\winwarbler\scripts\cw.txt`
	notes:
	1. if no macro bank has been selected by a preceding <macrobank: n>, then macro bank 1 will be loaded
	2. if the specified file was saved with font and button colors, the current macro bank's font and button colors will be set to the colors specified in the file

`<loadfullmacrobank: pathname>`	loads the currently selected macro bank with macros defined in the specified pathname. For example, `<loadfullmacrobank: c:\radio\macros\WinWarbler\cw.txt>` notes: 1. if no macro bank has been selected by a preceding <macrobank: n>, then macro bank 1 will be loaded 2. if the specified file was saved with font and button colors, the current macro bank's font and button colors will be set to the colors specified in the file

<lookup>	DXKeeper (if running) is directed to do the following with the station whose callsign is shown in the Call textbox: • produce a filtered display showing previous QSOs • perform a callbook lookup • record DXCC, Grid, Via, QTH, IOTA, CQ, ITU, State, County, Province, Continent and Country Code information obtained from previous QSOs, found in the selected callbook, or found in the DXCC database • update the Call textbox's caption to indicate the number of previous QSOs -- unless WinWarbler's Contest Mode is enabled and the current QSO duplicates the callsign, band, and mode of a previous QSO, in which case the Call textbox's caption will indicate **Dup!** • display details of the most recent QSO with this station in the expanded QSO info panel If DXKeeper isn't running, DXView (if running) is directed to display the location of the station whose callsign is shown in the Call textbox, and Pathfinder (if running) is directed to perform a QSL route search for that callsign.
<macrobank: n>	selects and displays macro bank *n* (*n* must be 1 or 2)
<modulation: cw>	Send and receive CW
<modulation: bpsk lsb>	Send and receive PSK31 with BPSK modulation using lower sideband
<modulation: bpsk usb>	Send and receive PSK31 with BPSK modulation using upper sideband
<modulation: qpsk lsb>	Send and receive PSK31 QPSK modulation using lower sideband
<modulation: qpsk usb>	Send and receive PSK31 QPSK modulation using upper sideband
<modulation: bpsk63 lsb>	Send and receive PSK63 with BPSK modulation using lower sideband
<modulation: bpsk63 usb>	Send and receive PSK63 with BPSK modulation using upper sideband
<modulation: qpsk63 lsb>	Send and receive PSK63 with QPSK modulation using lower sideband
<modulation: qpsk63 usb>	Send and receive PSK63 with QPSK modulation using upper sideband
<modulation: bpsk125 lsb>	Send and receive PSK125 with BPSK modulation using lower sideband
<modulation: bpsk125 usb>	Send and receive PSK125 with BPSK modulation using upper sideband
<modulation: qpsk125 lsb>	Send and receive PSK125 with QPSK modulation using lower sideband
<modulation: qpsk125 usb>	Send and receive PSK125 with QPSK modulation using upper sideband
<modulation: phone>	Send and receive Phone
<modulation: rtty>	Send and receive RTTY
<net: *n*>	if *n* =0 then disable net; if *n* =1 then enable net (changes net for current mode -- PSK or RTTY)

<play: *filename*>	if WinWarbler is in Phone mode, plays the designated .wav file in the .wav file folder via the soundcard
<rcvchannel: *n*>	set the current channel to *n* (*n* must be 0, 1, or 2)
<rcvchannel: *n hz*>	set channel *n* receiver audio frequency to *hz* without changing current channel (*n* must be 0, 1, or 2 and *hz* must be in the range of 50 to 3500)
<repeat: *r, t*>	if this command appears first in a macro, the remainder of the macro is repeated *r* times separated by "listening intervals" of *t* seconds; when a macro beginning with command is executed, a small **Repeating Macro** window will appear that shows the number of repetitions remaining and provides a Cancel button to prematurely terminate remaining repetitions. This command cannot be used when the Main window's **Operating Mode** panel is set to **CW** and the CW Keying panel is set to Xcvr Ctrl SW. For example, the macro <repeat: 3, 5><start>cq test de <mycall> k<stop> will call "CQ test" 3 times, with 5 second listening intervals in between • the <repeat: *r t*> must precede all other characters in the macro; otherwise, the <repeat: *r t*> command will be ignored • the macro must contain exactly one <start> command, and one <stop> command that follows the <start> command; otherwise, the macro will not be executed • an *r* larger than 25 is treated as 25 • a *t* larger than 30 is treated as 30 • the following actions will prematurely terminate any remaining macro repetitions: a. clicking Cancel in the **Repeating Macro** window b. striking the escape key c. striking any function key d. clicking any macro button e. clicking any start, stop, or abort button f. changing WinWarbler's Mode panel selection
<rotatesp>	directs DXView to rotate to its short path heading
<rotatelp>	directs DXView to rotate to its long path heading
<say: *message*>	if WinWarbler is in Phone mode, speaks the message via the soundcard (requires appropriate .wav files to be present in WinWarbler's Phone folder as described below)
<saycallsign>	if WinWarbler is in Phone mode, speaks the contents of the QSO Info panel's Call textbox via the soundcard (requires appropriate .wav files to be present in WinWarbler's Phone folder as described below)

<saycallsignphonetics>	if WinWarbler is in Phone mode, speaks the contents of the QSO Info panel's Call textbox phonetically via the soundcard (requires appropriate .wav files to be present in WinWarbler's Phone folder as described below)
<saytransmitpane>	if WinWarbler is in Phone mode, speaks the contents of the Main window's transmit pane via the soundcard (requires appropriate .wav files to be present in WinWarbler's Phone folder as described below)
<saytransmitpanephonetics>	if WinWarbler is in Phone mode, speaks the contents of the Main window's transmit pane phonetically via the soundcard (requires appropriate .wav files to be present in WinWarbler's Phone folder as described below)
<saytxserial>	if WinWarbler is in Phone mode, speaks the QSO Info panel's TX# textbox (requires appropriate .wav files to be present in WinWarbler's Phone folder as described below)
<scrttybaud: *n*>	set the soundcard RTTY baud rate to *n*
<scrrtyshift: *n*>	set the soundcard RTTY shift to *n* (hertz)
<setstationcall: *callsign*>	sets the "station callsign" on the Config window's General tab
<spot_cluster>	if the QSO Info panel's Call textbox is specified and SpotCollector is running, generates a cluster spot for the current receive frequency for the current mode • if the current mode is CW, PSK31, PSK63, PSK125, or RTTY, the spot notes will include the current mode • if the current mode is PHONE, the spot notes will include the mode specified in the "Xcvr Mode" selector on the Configuration window's Phone tab • if default spot notes are specified, they will be included in the spot notes • if the current receive and transmit frequencies are different, the split will be included in the spot notes
<spot_local>	if the QSO Info panel's Call textbox is specified and SpotCollector is running, generates a local spot for the current receive frequency for the current mode • if the current mode is CW, PSK31, PSK63, PSK125, or RTTY, the spot notes will include the current mode • if the current mode is PHONE, the spot notes will include the mode specified in the "Xcvr Mode" selector on the Configuration window's Phone tab • if default spot notes are specified, they will be included in the spot notes • if the current receive and transmit frequencies are different, the split will be included in the spot notes
<start>	begin transmission
<stop>	stop transmission when all to-be-transmitted information has been sent
<txaudiofreq: *hz*>	set the transmitter audio frequency to *hz* (*net* must be disabled and *hz* must be in the range of 50 to 3500)

<tune: on>	if the current mode is CW, RTTY, or PSK and the Transmit panel's Tune box is enabled, check the Tune box and begin transmission
<tune: off>	if the current mode is CW, RTTY, or PSK and the Transmit panel's Tune box is enabled, uncheck the Tune box and end transmission
<tune: toggle>	if the current mode is CW, RTTY, or PSK and the Transmit panel's Tune box is enabled and unchecked, check the Tune box and begin transmission; if theTransmit panel's Tune box is enabled and checked, uncheck the Tune box and end transmission
<winkeyoutport: p, status>	set the specified WinKey output port *p* to the specified status of *enabled* or *disabled*
<xmrttybaud: *n*>	if *n* is a supported baud rate, set the external modem RTTY baud rate to *n*
<xmrrtyshift: *n*>	if *n* is a supported shift, set the external modem RTTY shift to *n* hertz

The <say: *message*>, <saycallsign>, and <saytxserial> commands require that you populate WinWarbler's Phone folder with the following files:

- A.wav, B.wav, ... Z.wav - each containing a recording of the spoken letter
- 0.wav, 1.wav, ... 9.wav - each containing a recording of the spoken number
- slash.wav - containing a recording of the word *slash* or *stroke*

The <saycallsignphonetics> and <saytransmitpanephonetics> commands requires that you populate WinWarbler's Phone folder with the files A_phonetic.wav, B_phonetic.wav, ... Z_phonetic.wav - each containing a recording of the spoken letter's phonetic (e.g. *Alpha, Bravo, ...Zulu*).

The <saytransmitpanephonetics> command may also require that you populate WinWarbler's Phone folder with the file space.wav , which is played when a space character is encountered.

Unless you're using VOX to initiate transmission, commands like <play: filename> and <say: message> should be preceded by a <start> and followed by a <stop>, e.g.

```
<start><play: cq.wav><stop>
```

If Commander is running, the following action commands can be used to control an attached transceiver; if Commander is not running, these commands have no effect:

Command	Action
<autoarchive: on>	enables auto archiving
<autoarchive: off>	disables auto archiving
<optoffset>	If a PSK mode is active, direct Commander to QSY the transceiver to shift the currently received PSK signal to the optimal PSK offset for the current channel. If RTTY mode is active, direct Commander to QSY the transceiver to shift the currently received RTTY signal to the optimal RTTY offset.
<optoffsetdisableafc>	If RTTY mode is active, direct Commander to QSY the transceiver to shift the currently received RTTY signal to the optimal RTTY offset and disable Automatic Frequency Control.
<prixcvr: *n*>	directs Commander to select primary radio *n*, where *n* is a number between 1 and 4
<setxcvrsequencename: *sequence,name*>	If *sequence* is an integer, sets the *name* of the specified User-defined Command Sequence, where 0 corresponds to the F5 sequence, 1 corresponds to the F6 sequence, etc. and 8 corresponds to the SH-F5 sequence, 9 corresponds to the SH-F6 sequence, 16 corresponds to the ALT-F5 sequence, 24 corresponds to the ALT-SH-F5 sequence, etc.
<setxcvrsequenceledcolor: *sequence, color*>	If *sequence* is an integer, sets the *color* of the specified User-defined Command Sequence's LED, where 0 corresponds to the F5 sequence, 1 corresponds to the F6 sequence, etc. and 8 corresponds to the SH-F5 sequence, 9 corresponds to the SH-F6 sequence, 16 corresponds to the ALT-F5 sequence, 24 corresponds to the ALT-SH-F5 sequence, etc.
<tunefreq: RX>	With a PSK mode active, directs Commander to select the transceiver's RX VFO, and configures WinWarbler's tuning display to show the RX VFO frequency when receiving in a PSK mode. With RTTY mode active, directs Commander to select the transceiver's RX VFO, and configures WinWarbler's tuning display to show the RX VFO frequency when receiving in RTTY mode.
<tunefreq: TX>	With the transceiver in split and dual receive with a PSK mode active, directs Commander to select the transceiver's TX VFO, and configures WinWarbler's tuning display to show the TX VFO frequency when receiving in a PSK mode. With the transceiver in split and dual receive with RTTY mode active, directs Commander to select the transceiver's TX VFO, and configures WinWarbler's tuning display to show the TX VFO frequency when receiving in RTTY mode.
<tunefreq: TX_IND>	With the transceiver in split and with a PSK mode active, directs Commander to select the transceiver's TX VFO, and configures WinWarbler's tuning display to show the TX VFO frequency when receiving in a PSK mode. With the transceiver in split and with RTTY mode active, directs Commander to select the transceiver's TX VFO, and configures WinWarbler's tuning display to show the TX VFO frequency when receiving in RTTY mode.

<xcvra=b>	Direct Commander to set the transceiver's VFO B frequency to its VFO A frequency
<xcvraxb>	Direct Commander to swap the frequencies in VFOs A and B
<xcvrcommand: *hexcmd*>	Direct Commander to send *hexcmd* to the transceiver; *hexcmd* can be specified either with 2 hexadecimal digits per byte or as an ascii command preceded by an apostrophe: <xcvrcommand: FEFE6AE014010255FD> <xcvrcommand: 'FR1;>
<delayedxcvrcommand: *hexcmd, interval*>	Direct Commander to send *hexcmd* to the transceiver after a delay of *interval* milliseconds ; *hexcmd* can be specified either with 2 hexadecimal digits per byte or as an ascii command preceded by an apostrophe: <delayedxcvrcommand: FEFE6AE014010255FD> <delayedxcvrcommand: 'FR1;>
<xcvrfreq: *kilohertz*>	Direct Commander to set the transceiver's frequency to *kilohertz*
<xcvrmode: usb>	Direct Commander to place the transceiver in USB mode
<xcvrmode: lsb>	Direct Commander to place the transceiver in LSB mode
<xcvrmode: am>	Direct Commander to place the transceiver in AM mode
<xcvrmode: cw>	Direct Commander to place the transceiver in CW mode
<xcvrmode: cw-r>	Direct Commander to place the transceiver in reverse CW mode
<xcvrmode: rtty>	Direct Commander to place the transceiver in RTTY mode
<xcvrmode: rtty-r>	Direct Commander to place the transceiver in reversed RTTY mode
<xcvrmode: fm>	Direct Commander to place the transceiver in FM mode
<xcvrmode: wbfm>	Direct Commander to place the transceiver in wideband FM mode
<xcvrmode: data-l>	Direct Commander to place the transceiver in Data-L (packet in Yaesu transceivers)
<xcvrmode: data-u>	Direct Commander to place the transceiver in Data-U (reversed packet in Yaesu transceivers)
<xcvrmode: pkt>	Direct Commander to place the transceiver in packet mode (Data-L in Elecraft and Icom transceivers)
<xcvrmode: pkt-r>	Direct Commander to place the transceiver in reversed packet mode (Data-U in Elecraft and Icom transceivers)
<xcvrqsy: *hertz*>	Directs Commander to change the transceiver's frequency by the specified value in *hertz* (which can be a negative number) to the nearest 10 hertz
<xcvrsequence: *sequence*>	If *sequence* is an integer, execute Commander's corresponding User-defined Command Sequence where 0 corresponds to the F5 sequence, 1 corresponds to the F6 sequence, etc. and 8 corresponds to the SH-F5 sequence, 9 corresponds to the SH-F6 sequence, 16 corresponds to the ALT-F5 sequence, 24 corresponds to the ALT-SH-F5 sequence, etc. If *sequence* is a name, execute the User-defined Command Sequence whose name is *sequence .*

<xcvrslider: *slider,value*>	if *slider* and *value* are both integers, directs Commander to set the specified Command-generating Slider to the specified numeric value; *slider 0* corresponds to user-defined slider #1, *slider 1* corresponds to user-defined slider #2, etc.
<xcvrsplit: on>	Direct Commander to place the transceiver into split frequency operation
<xcvrsplit: off>	Direct Commander to place the transceiver into simplex operation
<xcvrxmitoffset: *hertz*>	If the transceiver's split frequency operation is enabled, direct Commander to set the transceiver's transmit frequency to its current receive frequency plus the offset specified in *hertz* (which can be a negative number)

For applications using frequencies outside of the amateur radio bands, there exists a version of WinWarbler that allows you to schedule the execution of macro sequences, where a macro sequence specifies the execution of one, two, or three macros. Each of the macros within a sequence can be repeated up to three times, and the entire sequence can be repeated up to three times at specified intervals. If you have need for this functionality, contact AA6YQ at aa6yq@ambersoft.com .

CW

To begin CW operation, click the **CW** button in the **Operating Mode** panel located on the right side of WinWarbler's main window. You can specify a set of commands to be executed whenever WinWarbler switches to the CW operating mode by setting up a CW startup macro.

Setting up for CW operation
To setup for CW transmission, you must first specify the means by which WinWarbler will key your transceiver. Your choices are

- a serial port modem control signal
- a parallel port data signal
- a WinKey external keyer connected to a serial port
- an external modem such as a Kantronics KAM or Timewave PK232 connected to a serial port
- a transceiver controlled by Commander with the ability to transmit CW via CAT commands (e.g. a Kenwood T-2000, TS-870, TS-570, or TS-480, or an Elecraft K2 or K3).

You can use an external interface between a serial port's modem control signals -- either RTS (request to send) or DTR (data terminal ready); this external interface must be designed to key your transceiver when presented with an asserted RS-232 modem control signal (nominally +12 VDC), and unkey your transceiver when presented with an un-asserted RS-232 modem control signal (nominally -12 VDC). Alternatively, you can use an appropriately-designed external interface between a specified parallel port data bit and your transceiver; a PC parallel port uses TTL output levels. Configure WinWarbler to key your transceiver via the appropriate signal and port using the settings on the CW keying panel.

If your transceiver operates QSK, then a keying interface as described above will be sufficient. If your transceiver (or linear amplifier) does not support QSK, you can configure WinWarbler to place assert PTT (which places your transceiver into *transmit mode*) before sending CW and not de-assert PTT (which places your transceiver into *receive mode*) until after CW transmission is complete. If you wish to do this, use the PTT panel settings on the CW tab of WinWarbler's Configuration window; you can also enable or disable PTT during CW via the PTT checkbox on the Main window's CW Transmit panel. The means by which PTT is conveyed to your transceiver are common to all WinWarbler modes, and are specified on the Configuration window's PTT tab.

If you configure the PTT tab's mode panel to assert PTT via the PTT serial port -- either via RTS, DTR, or RTS + DTR in combination -- then you can optionally key your transceiver through the PTT port modem control signal that is not being used for PTT, thereby saving the need for a second serial port. For example, if you set the PTT mode panel to specify that the PTT port's DTR signal conveys PTT, then you can set the CW keying panel to key your transceiver via the PTT port's RTS signal; if you specify that the PTT port's RTS signal conveys PTT, then you can set the CW keying panel to key your transceiver via the PTT port's DTR signal.

If you set the PTT mode to *RTS + DTR*, as is required for soundcard RTTY operation, and you specify that CW keying be accomplished using the PTT port RTS signal, then during CW operation WinWarbler will use the PTT port's DTR signal for PTT; conversely, if you set the PTT mode to *RTS + DTR* and you specify that CW keying be accomplished using PTT port's DTR signal, then during CW operation WinWarbler will use the PTT port's RTS signal for PTT.

With the CW Keying panel set to serial port RTS, serial port DTR, PTT port RTS, PTT port DTR, or parallel port, WinWarbler generates the timing of the signals used to key your transceiver, and (optionally) switch it between transmitting and receiving via a PTT signal. If you have a WinKey or an external modem capable of CW generation, such as a Kantronics KAM or Timewave PK232, you can set the CW Keying panel to WinKey or external modem respectively. In these configurations, characters to be transmitted are conveyed to the keyer or external modem, which generates both the keying and PTT signals for your transceiver. External modems are typically capable of decoding as well as generating CW; to view decoded characters, check the display xmt/rcv characters box.

If you have configured WinWarbler to generate CW via a WinKey keyer but your WinKey is not responding - perhaps because it is powered down - the CW button caption in the Main window's Mode panel will be rendered in red; if your WinKey is responding properly, this button's caption will be rendered in black font.

If you're using a parallel port to transmit CW,

- select the parallel port to be used
- select the parallel port signal to be used

If you're using an external modem to transmit and/or receive CW,

- select the external modem model
- configure the external modem's serial port
- set the CW keying panel to external modem
- check the display xmt/rcv characters box

If Commander is controlling a transceiver capable of CW transmission via CAT commands, the CW keying panel's Xcvr Ctrl App option will be enabled for you to select.

Operating in CW

To transmit in CW,

- set the CW transmit panel's WPM (words per minute) setting to the desired speed; you can also use a a WinKey's speed control.
- start transmission by clicking the Main window's transmit panel's **Start** button (or striking the **F2** or **Insert** keys)
- enter characters you wish to transmit into the **Transmit Pane**; you can transmit upper-case characters, numbers, punctuation, and pro-signs
- click the transmit panel's **Stop** button (or strike **F4** or **Ctrl-Enter**) to indicate that transmission should stop after all characters have been transmitted; you can do this as soon as transmission has begun

You can immediately terminate a CW transmission by clicking the **Abort** button (or striking the **Esc** or **End** key) - unless the CW keying panel is set to Xcvr Ctrl SW. In the latter case, a CW transmission initiated by WinWarbler can be immediately terminated by tapping the dot or dash paddle of a CW key connected to the transceiver.

Clicking the right mouse button on the transmit display pane produces a pop-up menu with two commands:

- **Paste (insert Clipboard into Transmit Pane)** inserts the contents of the Windows clipboard into the **Transmit Pane**
- **Transmit file** presents a Windows file selector with which to choose a file to be transmitted, starts transmission, and then transmits the contents of the selected file click the **Abort** button to terminate this operation before it is complete.

Striking **Ctrl-V** in the **Transmit Pane** also initiates the **Paste (insert Clipboard into Transmit Pane)** operation.

If you check the CW transmit panel's Tune box with the CW Keying panel set to anything but external modem, then clicking the Start button will immediately key your transceiver until you click the **Stop** or **Abort** buttons.

To see characters as they are transmitted, check the display xmt/rcv characters box.

You can adjust CW transmission speed by depressing the **ALT** key while striking the keyboard arrow OR page up/down keys, as well as by clicking on the Transmit panel's WPM controls:

Key	Action
ALT - Left Arrow	decrease WPM by 1
ALT - Right Arrow	increase WPM by 1
PageUp	decrease WPM by 2
PageDown	increase WPM by 2
ALT - Down Arrow or CTRL-ALT-Left Arrow or CTRL-PageUp	decrease WPM by 5
ALT - Up Arrow or CTRL-ALT-Right Arrow or CTRL-PageDown	increase WPM by 5

If you have configured WinWarbler to generate CW via an external modem, WinWarbler will set the modem to transmit at the specified CW transmission speed rounded to the nearest multiple of 5 WPM.

If you have configured WinWarbler to generate CW via WinKey keyer, you can adjust the CW transmission speed using your WinKey's potentiometer by checking the **WinKey Speed** box in the Main window's CW transmit panel. You can specify the range in words per minute covered by this potentiometer, its connection scheme (standard 3-wire, or optional 2-wire), and a Farnsworth rate. Adjusting the CW transmission speed by clicking on the CW transmit panel's **WPM** controls or by striking the keyboard arrow keys will uncheck the **WinKey Speed** box, causing subsequent changes to WinKey's potentiometer to have no effect on CW transmission speed until the **WinKey Speed** box is again checked. If no potentiometer is connected to your WinKey keyer, uncheck the **WinKey Speed** box; otherwise, transmission speed will be held to zero words per minute.

If you have configured WinWarbler to generate CW via WinKey keyer and you plan to use paddles, set the PTT lead time and PTT lag time settings to ensure smooth operation.

Most of the substitution commands available for inclusion in macros can be used when operating with CW. A <cwspeed> macro makes it possible to set or adjust CW transmission speed from within a macro.

All of WinWarbler's logging facilities can be used with CW, including automatic interoperation with DXKeeper if its running.

Transceiver Control
WinWarbler automatically interoperates with Commander, an transceiver control program for Alinco, Elecraft, Flexradio, Icom, Kachina, Kenwood, TenTec, and Yaesu radios. If WinWarbler and Commander are running simultaneously, WinWarbler's **xcvr freq** selector will automatically track your transceiver's frequency as you QSY; it does not matter in what order the two programs are started.

- If you modify the contents of the **xcvr freq** selector and then strike the http://www.dxlabsuite.com/winwarbler/Help/SoundcardRTTYTransmission.htm key, WinWarbler will direct Commander to QSY your transceiver to the specified frequency
- If you open the **xcvr freq** selector, you can choose a preset frequency; doing so places the transceiver in simplex mode (as opposed to split frequency operation), selects its primary VFO, and sets that FRO to the preset frequency

Additional CW options
Some transceivers let the user operate CW on either the upper or lower sideband. If you are running Commander, you can specify that your transceiver be placed in either CW or CW-R mode when WinWarbler's Mode panel is set to CW via the Xcvr mode setting.

If your transceiver's frequency readout does display the actual transmitted frequency and your are running Commander, the CW offset setting can be used to display the correct frequency in the Main window's CW Receive panel, ensuring that an accurate frequency will be logged with the QSO.

After you initiate CW transmission by clicking the Transmit panel's Start button, WinWarbler will transmit the Morse code for each character as you enter it into the transmit pane; this is referred to as character mode. Alternatively, you can select word mode, in which WinWarbler waits to transmit a word until you strike a **Space**, **Enter**, **Period**, **Comma**, **Exclamation**, **Semicolon**, **Colon**, **QuestionMark**, **Minus**, **Plus**, **Slash**, **Ampersand**, **LeftSquareBracket**, **RightSquareBracket**, **Equal**, **Asterisk**, or **Accent** key; these keys are collectively referred to as **trigger keys**.

If you prefer to have CW transmission start as soon as you enter a character in the transmit pane, check the auto start box; this eliminates the need to first click the **Start** button in the Main window's Transmit Panel, or strike the **F2** or **ESC** keys.

If you prefer to have CW transmission stop when there are no more characters to transmit, check the auto stop box; this eliminates the need to click the **Stop** button in the Main window's Transmit Panel, or strike the **F4** key. If you have selected both word mode and auto stop, CW transmission will not stop if a partial word is waiting to be transmitted; you must enter one of the trigger keys to begin transmission of the waiting characters, after which CW transmission will automatically stop.

By default, WinWarbler uses the standard weighting for CW element types, as suggested by the ARRL Handbook:

Element	**Meaning**	**Default time units**
dot	duration of a dot	1
dash	duration of a dash	3
element space	duration of the space between elements (dots and dashes)	1
character space	duration of the space between characters	3
word space	duration of the space between words	7

If you wish, you can adjust the weighting of transmitted CW using the weight panel settings; note that WinWarbler will maintain the specified transmission speed as you make these changes. If you have configured WinWarbler to generate CW via WinKey keyer, inserting the vertical bar character **|** will transmit insert a one-half dit-time delay.

CW Keystrokes

Letter	CW
A	.-
B	-...
C	-.-.
D	-..
E	.
F	..-.
G	--.
H	....
I	..
J	.---
K	-.-
L	.-..
M	--
N	-.
O	---
P	.--.
Q	--.-
R	.-.
S	...
T	-
U	..-
V	...-
W	.--
X	-..-
Y	-.--
Z	--..

Number	CW
1	.----
2	..---
3	...--
4	....-
5	.....
6	-....
7	--...
8	---..
9	----.
0	-----

Character	CW	Notes
.	.-.-.-	
,	--..--	
?	..--..	
/	-..-.	
+	.-.-.	pro-sign: AR
\	.-.-.	pro-sign: AR
*	...-.-	pro-sign: SK
]	...-.-	pro-sign: SK
=	-...-	pro-sign: BT
;	-.-.-.	
:	---...	
'	.----.	
"	.-..-.	
-	-....-	
_	..--.-	
$	...-..-	
(	-.--.	pro-sign: KN
)	-.--.-	
&	.-...	pro-sign: AS
[	.-...	pro-sign: AS
!	...-.	
%	-.-.-	
@	.--.-.	
#	.-.-..	
^	-.-	pro-sign: K
`	....	error

Phone

To begin Phone operation, click the **Phone** button in the **Operating Mode** panel located on the right side of WinWarbler's main window. You can specify a set of commands to be executed whenever WinWarbler switches to Phone mode by setting up a Phone startup macro.

Setting up for Phone operation
If you'll be switching your transceiver between Receive and Transmit either manually or via its VOX circuit, then uncheck the Phone panel's Assert PTT during Phone box. If the Assert PTT during Phone box is checked, WinWarbler will PTT your transceiver as specified settings on the PTT tab's mode panel and PTT serial port panel.

Specify the Phone mode -- AM, FM, or SSB -- in the Phone panel's Xcvr Mode selector. If you switch to Phone mode with Commander running, WinWarbler will direct Commander to place your transceiver in the designated mode. If you choose SSB, then LSB will be used if the transceiver frequency is below 10 MHz, and USB will be used if the transceiver's frequency is above 10 MHz.

If you'll be using any of the *play* or *say* macros described below, select the soundcard to be used.

Operating in Phone
To transmit in Phone,

- start transmission by clicking the Main window's transmit panel's **Start** button (or striking the **F2** or **Insert** keys)
- speak, or invoke macros containing commands that generate speech
- click the transmit panel's **Stop** button (or strike **F4** or **Ctrl-Enter**) when complete

You can immediately terminate a Phone transmission by clicking the **Abort** button (or striking the **Esc** or **End** key).

Text generated by macros is ignored in Phone mode. The following commands generate speech via the sound card when executed with WinWarbler in Phone mode:

- <play: *filename*> -- plays the designated .wav file in the specified .wav file folder
- <say: *message*> -- speaks the message
- <saycallsign> -- speaks the contents of the QSO Info panel's Call textbox
- <saycallsignPhonetics> -- speaks the contents of the QSO Info panel's Call textbox phonetically
- <saytxserial> -- speaks the Contesting panel's TX#

The <say: *message*>, saycallsign>, and <saytxserial> commands require that you populate WinWarbler's `Phone` folder with the following files:

- `A.wav, B.wav, ... Z.wav` - each containing a recording of the spoken letter
- `0.wav, 1.wav, ... 9.wav` - each containing a recording of the spoken number
- `slash.wav` - containing a recording of the word *slash* or *stroke*

The <saycallsignphonetics> command requires that you populate WinWarbler's `Phone` folder with the files `A_phonetic.wav, B_phonetic.wav, ... Z_phonetic.wav` - each containing a recording of the spoken letter's phonetic (e.g. *Alpha, Bravo, ...Zulu*).

All of WinWarbler's logging facilities can be used with Phone, including automatic interoperation with DXKeeper if its running.

Transceiver Control
WinWarbler automatically interoperates with Commander, an transceiver control program for Alinco, Elecraft, Flexradio, Icom, Kachina, Kenwood, TenTec, and Yaesu radios. If WinWarbler and Commander are running simultaneously, WinWarbler's **xcvr freq** selector will automatically track your transceiver's frequency as you QSY; it does not matter in what order the two programs are started.

- If you modify the contents of the **xcvr freq** selector and then strike the Enter key, WinWarbler will direct Commander to QSY your transceiver to the specified frequency
- If you open the **xcvr freq** selector, you can choose a preset frequency; doing so places the transceiver in simplex mode (as opposed to split frequency operation), selects its primary VFO, and sets that FRO to the preset frequency

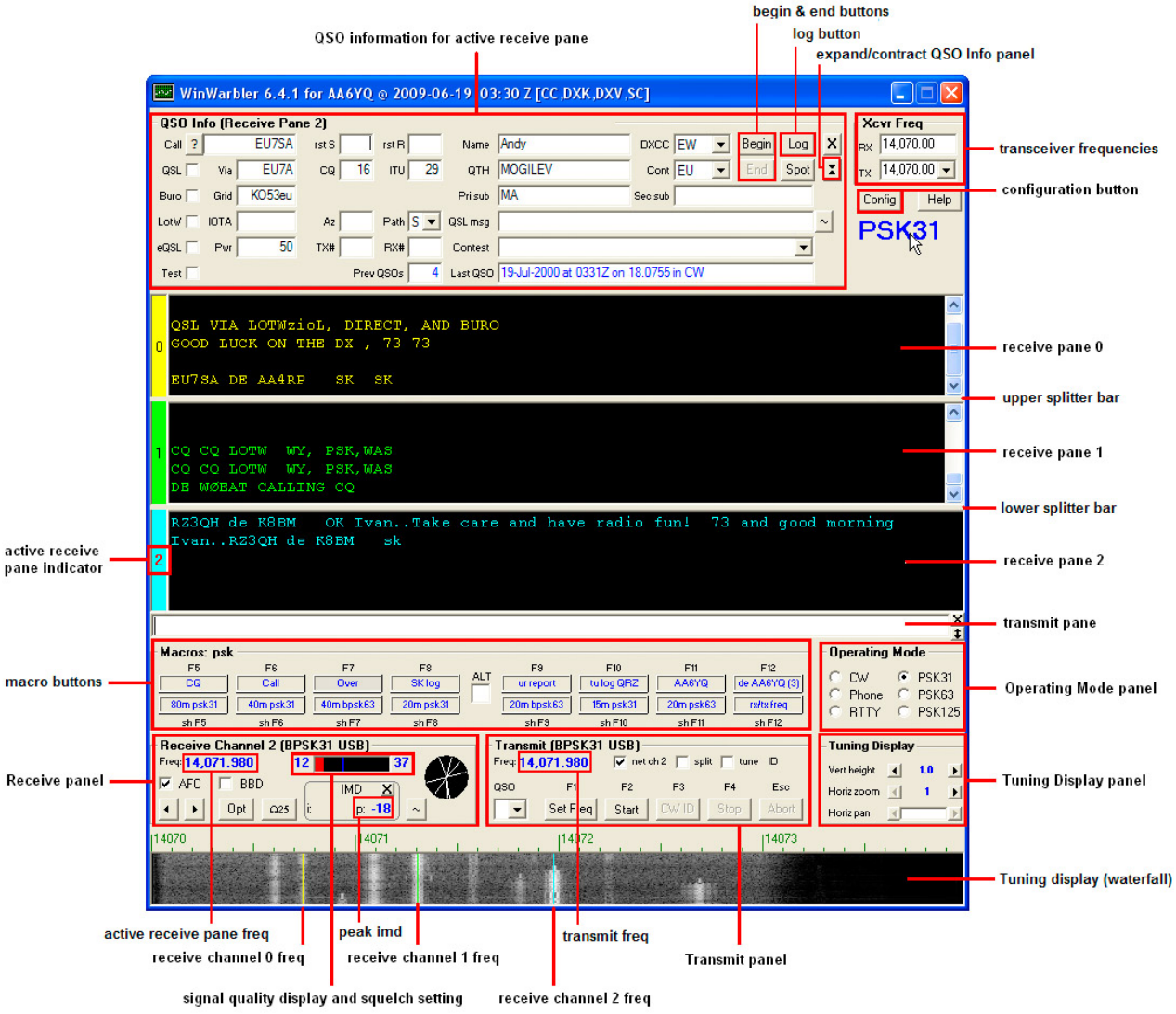
Additional Phone options
If your transceiver's frequency readout does display the actual transmitted frequency and you are running Commander, the Phone offset setting can be used to display the correct frequency in the Main window's Phone Receive panel, ensuring that an accurate frequency will be logged with the QSO.

PSK31, PSK63, and PSK125

Using your soundcard's analog-to-digital and digital-to-analog conversion capabilities, WinWarbler allows you to conduct QSOs using the PSK31 operating mode developed by Peter Martinez, G3PLX, the double-speed PSK63 variant, and the quad-speed PSK125 variant. Using AE4JY's PSKCORE engine, WinWarbler can simultaneously decode PSK transmissions on three separate frequencies; each decoded transmission is displayed in its own receive pane. WinWarbler graphically presents a 4 kHz spectrum, allowing you to choose frequencies by simply pointing and clicking with your PC's mouse.

To begin PSK operation at the desired speed, click the **PSK31**, **PSK63**, or **PSK125** button in the **Operating Mode** panel located on the right side of WinWarbler's main window. You can specify a set of commands to be executed whenever WinWarbler switches to PSK31, PSK63, or PSK125 mode by setting up a PSK startup macro.

- Annotated screen capture (page 81)
- Reception (page 82)
    - Tuning
    - Viewing
    - Transceiver Control
    - Optimizing the Audio Frequency Offset
- Transmission (page 86)
- Logging (page 47)
- Macros (page 59)


begin & end buttons
log button
expand/contract QSO Info panel
QSO information for active receive pane
WinWarbler 6.4.1 for AA6YQ @ 2009-06-19 03:30 Z [CC,DXK,DXV,SC]
QSO Info (Receive Pane 2)
Xcvr Freq
transceiver frequencies
configuration button
PSK31
receive pane 0
upper splitter bar
receive pane 1
lower splitter bar
receive pane 2
active receive pane indicator
transmit pane
macro buttons
Operating Mode panel
Receive panel
Tuning Display panel
Tuning display (waterfall)
active receive pane freq
receive channel 0 freq
peak imd
receive channel 1 freq
transmit freq
Transmit panel
signal quality display and squelch setting
receive channel 2 freq

PSK Reception

WinWarbler simultaneously demodulates and displays PSK31, PSK63, or PSK125 transmissions on three separate frequencies. It provides three receive channels, each with its own display pane; channel numbers are displayed to the left of each display pane. The *receive modulation* setting controls PSK31 and PSK63 demodulation for all three receive channels. Choose PSK31, PSK63, or PSK125 operation by clicking the appropriate button on the Main window's Mode panel.

WinWarbler's PSK Broadband Decode function monitors signals in the PSK band whose audio tones lie in the range from 100 Hz. to 3500 Hz., decoding up to 47 such signals simultaneously and extracting callsigns to display a Stations Heard list. To enable this function, check the PSK Receive panel's BBD box; to display the Stations Heard window, double-click this box's BBD label, or click the Display Stations Heard button on the Config window's Broadband Decoding tab.

Tuning
The tuning display at the bottom of WinWarbler's main window provides a visual indication of PSK activity across a 4 kHz frequency range; the bottom of this range is set by the contents of the **xcvr freq** selector (in kHz), located in the **QSO information** panel. Note that your transceiver's bandwidth and filter settings may attenuate signals in parts of this range. You can select a *waterfall* or *spectrum* display, using settings in the Tuning Display sub-panel; the *FFT averaging* setting controls the computations driving either display. A waterfall display can be presented in *monochrome*, or *synthetic color* using a color lookup table devised by AE4JY; *waterfall gain* and baseline clipping settings allow you to further control this form of tuning display. The *spectrum* display's trace color is set by the trace color setting, and its background color is fixed at black. You can set the spectrum display's gain independently from that of the waterfall display.

If sub-band highlighting is enabled, the frequency scale above the tuning display is rendered in green for frequencies within PSK sub-bands, and in red for frequencies outside of PSK sub-bands; you can customize the definition of these sub-bands.
The tuning display shows the current frequency of each receive channel:

- receive channel 0's frequency appears as a yellow trace
- receive channel 1's frequency appears as a green trace
- receive channel 2's frequency appears as a blue trace

You can change the colors of these traces via WinWarbler's display settings. You can control the width of these traces via the *frequency trace width* setting. Instead of traces, you can choose to be shown each channel's current frequency with colored triangular markers hovering above the tuning display.

If two receive channels are set to the same frequency, only one trace will be visible in the tuning display. If the transmit panel's net control is not checked, WinWarbler's transmit frequency will appear in the tuning display as a red trace.

To change a receive channel's frequency, first select that channel by clicking anywhere in its display pane - the channel label to the left of the display pane will turn red, and the receive panel will indicate the selected channel. Click in the tuning display to set the selected channel frequency, which will appear in the receive panel; frequencies in the lower 100 Hz or upper 500 Hz of this range cannot be selected. If there's a nearby signal, as defined by the *search range* setting, WinWarbler will set the selected channel frequency to this signal's center frequency. The *AFC (Automatic Frequency Control) limit* setting controls WinWarbler's ability to track a signal whose frequency is changing; you can enable or disable AFC via the **AFC** checkbox. A Doppler-tracking AFC algorithm can be selected by clicking the Doppler AFC button; when this Doppler-tracking AFC is selected, the **AFC** checkbox's label is rendered in red. You can switch Doppler-tracking on and off by clicking on the **AFC** checkbox's label.

You can both select a receive channel and set it's frequency simultaneously with a single gesture:

- to select channel 0, depress the **Ctrl** key while clicking in the tuning display
- to select channel 1, depress the **Shift** key while clicking in the tuning display
- to select channel 2, simultaneously depress the **Ctrl** and **Shift** keys while clicking in the tuning display

The two buttons in the Receive panel's lower left corner allow you change the current channel's receive frequency to the next lower frequency or next higher frequency signal respectively. These functions are not selective as to modulation -- they locate the next signal of any kind, including transient signals. With the mouse cursor in the transmit pane or in the QSO Info panel, depressing the *Alt* key while striking the **Down Arrow** or **Up Arrow** keys activates the next lower frequency signal or next higher frequency signal functions respectively.

The **Tuning Display** panel provides controls that let you increase the vertical height of the tuning display, and zoom on the horizontal (frequency) axis. You can only increase the tuning display's vertical height if doing so would not make WinWarbler's window height larger than your monitor can display. Changes you make in the tuning displays' vertical height while in PSK mode do not affect its vertical height while in RTTY mode, and vice versa. When the tuning display horizontal zoom is greater than one, the horizontal pan control lets you select the magnified frequency segment to be viewed.

The signal quality indicator in the receive panel displays the quality of the signal being received by the selected channel; this is a measure of the signal's phase noise, not its amplitude. Each receive channel maintains its own **squelch threshold** setting, which is established by clicking within the signal quality indicator while that channel is selected; responsiveness of the squelch for all three channels is controlled by a single *squelch speed* setting. When the current channel's signal quality is below it's squelch threshold, the indicator is red; when signal quality is above the squelch threshold, the indicator is yellow, green, or blue as a function of the current channel.

When the signal quality is above the squelch threshold, the signal strength indicator in the receive panel's lower-right corner provides a measure of relative signal strength, ranging from 0 to 99.

The **IMD** (intermodulation distortion) panel displays both the instantaneous IMD and the maximum observed (peak) IMD; the peak IMD can be referenced by the <peakIMD> macro substitution command. The peak IMD is cleared

- when you select a new frequency by clicking in the waterfall display
- when you select a new frequency by selecting the next lower or next higher frequency signal
- when you change receive channels
- when you click its associated reset button, whose caption bears the letter **X**.

The circular vector display in the receive panel displays the phase changes of the signal being received by the selected channel, in degrees; a 0-degree phase change is represented by a vector pointing "north", a 90-degree phase change by a vector pointing "east", a 180-degree phase change by a vector pointing "south", and a 270-degree phase change by a vector pointing "west". Properly-tuned BPSK signals should show only 0-degree and 180-degree phase changes; properly-tuned QPSK signals should show only 0-degree, 90-degree, 180-degree, and 270-degree phase changes. The vector display's trace color is set by the trace color setting; its background color is fixed at black.

Viewing

Information decoded from a receive channel's frequency is sequentially appended to its receive pane. Each receive pane has a vertical scrollbar along its right side, allowing you to view information which has scrolled off the pane. The only limit to each receive pane's information retention is the amount of free space on the disk drive hosting WinWarbler. You can change the font name, style, size, and color used to display this information via WinWarbler's display settings.

The three receive panes are separated by two "splitter" bars. You can move a splitter bar by placing the mouse cursor overtop it; when the mouse cursor changes to a double-headed arrow, use the left mouse button to drag the splitter to its desired location, reallocating available screen space between the adjacent receive panes. If the splitter bars are set so that a channel has no visible receive pane, then no trace or marker for that channel will be shown on the tuning display.

- Depressing the **Ctrl** key while clicking the color-coded panel to the left of a receive pane selects and enlarges that pane and hides the others
- Depressing the **Ctrl** key while clicking the color-coded panel to the left of an enlarged receive pane restores the receive panes to their previous state
- Depressing the **Alt** and **Ctrl** keys while clicking the color-coded panel to the left of an enlarged receive pane divides the available space equally among the previous visible receive panes
- Clicking the right mouse button over a receive pane produces a pop-up menu that includes an **Equalize all receive panes** entry; selecting this entry equally divides the available space among the three receive panes

To freely scroll a receive pane, you must first suspend the pane's display of incoming information; do so by clicking on the color-coded panel to the left of the pane you wish to scroll. A pane's channel number blinks while it is suspended. To resume the display of incoming information -- including that which arrived while the display was suspended, click on the color-coded panel to the left of the pane. You can suspend a pane for up to an hour without loss of incoming information.

To copy text from a receive pane to the Windows clipboard, use the standard Windows left-click and drag gesture. This gesture automatically suspends the pane. Click on the color-coded panel to the left of the pane to resume the pane's display of incoming information.

To facilitate logging, double-clicking on a word in a receive pane copies that word to the appropriate QSO Info panel item.

The contents of the QSO Info panel items are maintained separately for each receive channel; whenever you switch channels, these items are updated to reflect whatever information you have captured from that channel. This makes it easy to incrementally capture information as you monitor several QSOs.

Clicking the right mouse button over a receive pane produces a pop-up menu with four commands:

- **Save receive pane to file** copies the contents of that pane to a file you select via a standard Windows file selector
- **View pane archive** displays the contents of the pane's `archive file`, if it exists
- **Equalize all receive panes** divides the available space equally among the three receive panes
- **Clear receive pane** deletes the contents of that pane.
- **Clear all panes** deletes the contents of all receive panes.

Checking the Receive panel's **BBD** box enables Broadband Decoding. In this mode, WinWarbler deploys 47 monitor channels across the audio band from 100 hertz to 3500 hertz, each configured to search for PSK31, PSK63, or PSK125 signals within its 72 hertz range. Callsigns are automatically extracted from QSOs detected by these monitor channels.

To replay the last 25 seconds of received audio, click the receive panel's **Ω25** button. This feature is primarily used after repositioning a receive channel frequency, allowing you to decode a previously-missed transmission.

Under abnormal conditions, loss of incoming data can occur; this condition is signified by the appearance of a red vertical status bar in the receive panel; resting the mouse cursor over the status bar will cause an explanatory "tooltip" message to appear. The red vertical status bar will be automatically hidden after 10 seconds.

Transceiver Control
WinWarbler automatically interoperates with Commander, an transceiver control program for Alinco, Elecraft, Flexradio, Icom, Kachina, Kenwood, TenTec, and Yaesu radios. If WinWarbler and Commander are running simultaneously, the **TX** selector in WinWarbler's **Xcvr Freq** panel will automatically track your transceiver's frequency as you QSY; it does not matter in what order the two programs are started.

- If you modify the contents of the **Xcvr Freq** panel's **TX** selector and then strike the *Enter* key, WinWarbler will direct Commander to QSY your transceiver to the specified frequency
- If you open the **Xcvr Freq** panel's **TX** selector, you can choose a preset frequency; doing so places the transceiver in simplex mode (as opposed to split frequency operation), selects its primary VFO, and sets that VFO to the preset frequency

Optimizing the Audio Offset Frequency
The frequency shown in the **Receive** panel is the sum of two components: your transceiver frequency, and an audio offset frequency in the range of 50 to 3500 Hz. Your transceiver's filters may make it difficult to receive and/or transmit signals that fall near the lower or upper ends of its audio passband. If Commander is running, clicking the **Opt** button directs it to change your transceiver's frequency so that the audio offset frequency of current receive channel moves to the value specified in the optimal offset sub-panel of the **Receiver** panel on the Configuration window's PSK tab. Since the transceiver frequency and audio offset frequency are simultaneously adjusted, you can use this function during reception and lose no more than a character or two. The audio offset frequencies of the other two receive channels and the monitor channels (if broadband decoding is enabled) are appropriately adjusted to compensate for the change in transceiver frequency. You can also activate this function by depressing the **Ctrl** key while right-clicking in the *waterfall* or *spectrum* display; if the waterfall right-click box is checked, you can activate this function by right-clicking in the *waterfall* or *spectrum* display without depressing the **Ctrl** key.

Depressing the **Ctrl** key while clicking the **Opt** button will also disable AFC for the current receive channel.

The **Opt** button is disabled if Commander is not running; it is also disabled during transmission.

PSK Transmission

Transmission frequency can be set to the frequency of the selected receive channel by clicking the **Set Freq** button in the transmit panel, or by striking the **F1** key. Checking the **net** setting in the Transmit panel causes transmission frequency to automatically follow the selected receive channel's frequency. If **net** is unchecked, the transmission frequency appears as a red trace in the waterfall display. If the waterfall right-click box is unchecked, right-clicking in the tuning display unchecks the **net** setting and sets the transmission frequency; if the waterfall right-click box is checked, you must depress the CTRL key while right-clicking in the tuning display to set the transmission frequency. The transmission frequency is continuously displayed in the transmit panel.

If **net** is checked, you can optionally designate one of the the three receive channels as the **QSO channel.** If you've specified a QSO channel, then no matter which receive channel is active when you take an action that initiates transmission, WinWarbler will activate the QSO channel prior to transmitting. Thus you can be copying your QSO partner with one receive channel while using (and thus activating) another receive channel to locate your next QSO. When you transmit in response, WinWarbler will automatically activate the QSO channel, assuring that your response is transmitted on the correct frequency. Clicking in a receive pane while depressing the CTRL key designates the associated channel as the QSO channel. The QSO channel selector is located in the lower-left corner of the Main window's PSK Receive panel. If **net** is checked and no QSO channel is designated, then transmission occurs on the frequency of the currently active receive channel.

If Commander is running, checking the Transmit panel's **split** box and **net** box will place the transceiver in split mode, and when transmitting set the transceiver's VFO B so that transmission occurs on the optimal audio offset specified in the optimal offset sub-panel of the Receiver panel on the Config screen's PSK tab. This technique is helpful when using Broadband Decoding, as it allows transmission on the optimal offset without changing the receive frequency.

Information to be transmitted is entered into the **Transmit Pane** by direct keystroke; to clear information entered into the **Transmit Pane**, click the X button on the transmit pane's right margin. To increase the number of text lines visible in the transmit pane, click the resize button on the **Transmit Pane's** right margin. Sixteen macro buttons provide an alternative means of supplying information to be transmitted; macros can automatically transmit your callsign, the callsign, name, and QTH of the station with whom you are in QSO, incoming and outgoing signal reports, the peak IMD reading, the current UTC time or date, and the contents of files.

To initiate transmission using the PSK modulation specified by the *transmit modulation* setting, click the **Start** button in the transmit panel, or strike the **F2** key, or strike the **Insert** key; the **Start** button is immediately disabled, and remains so until transmission terminates. Initiating transmission enables the transmit panel's **CW ID**, **Stop**, and **Abort** buttons. As information is transmitted, its displayed in the currently selected receive pane using a white font to differentiate it from received information.

To force CW identification to be sent when transmission is terminated, click the **CW ID** button in the transmit panel, or strike the **F3** key; the **CW ID** button is immediately disabled, and remains so until transmission terminates. The identification information sent in morse code is specified by the *CW identification string* setting; the rate at which this information is sent is controlled by the *CW identification speed* setting.

To automatically terminate transmission after all information to be transmitted has been sent, click the **Stop** button in the transmit panel, or strike the **F4** key, or strike the **Enter** key while depressing the **Ctrl** key. You can do this as soon as transmission has begun.

To immediately terminate transmission, click the **Abort** button in the transmit panel, or strike the **Esc** or **End** key. Any un-transmitted information is discarded.

To facilitate tuning, you can set *transmit modulation* to tune by checking the **tune** checkbox in the transmit panel. Un-checking the **tune** checkbox returns *transmit modulation* to its previous value.

If the auto-stop after idle box is checked, transmission is terminated after idle characters are sent for 15 consecutive seconds; tuning does not activate this mechanism.

Clicking the right mouse button on the transmit display pane produces a pop-up menu with two commands:

- **Paste (insert Clipboard into Transmit Pane)** inserts the contents of the Windows clipboard into the **Transmit Pane**
- **Transmit file** presents a Windows file selector with which to choose a file to be transmitted, starts transmission, and then transmits the contents of the selected file click the **Abort** button to terminate this operation before it is complete.

Striking **Ctrl-V** in the **Transmit Pane** also initiates the **Paste (insert Clipboard into Transmit Pane)** operation.

To facilitate compliance with station identification requirements, WinWarbler keeps track of how much time has passed since you last identified on each channel for which a QSO is in progress. A channel is deemed to be "in QSO" from the point in time at which you start it until you end it. If 5 minutes elapses without your transmitting an identification, a small black square containing the channel number in yellow appears in the transmit panel's ID reminder; if 10 minutes elapses without your transmitting an identification, the channel number's color changes from yellow to red. Transmitting your call -- by keying it into the transmit pane, by pasting it into the transmit pane, or by invoking a macro -- resets the current channel's timer and removes any visible reminder.

PSK Broadband Decode

WinWarbler can deploy 47 monitor channels across the audio band from 100 hertz to 3500 hertz, each configured to search for PSK31, PSK63, or PSK125 signals within its 72 hertz range. If the Main window's **Mode** is set to PSK31, then the monitor channels search for PSK31 signals; if the Main window's **Mode** is set to PSK63 or PSK125, then the monitor channels search for PSK63 or PSK125 signals respectively. When a monitor channel's signal quality exceeds the specified squelch level for a specified number of samples, that monitor channel is considered *locked*. WinWarbler decodes and records the signals of all *locked* channels, extracting callsign data, and optionally denoting the locations of these *locked* channels above the waterfall display with **channel markers**: solid triangles whose color is adjustable. Channel markers appear if the Channel Monitor window is enabled or if the Channel Monitor's always show monitor channel markers box is checked.

Allowing the mouse cursor to hover over a channel marker results in a popup display of the callsign data extracted from the associated monitor channel, in the form `receiving_callsign de transmitting_callsign`. If either the receiving or transmitting callsign has not yet been captured, a ? appears in its place; if neither callsign has been captured, the popup display shows a single ?. Clicking on a channel marker sets a receive pane to the monitor channel's frequency and initializes it with the captured text and extracted transmitting callsign. The receive pane chosen is specified by **QSO** control on the Main window's Receive panel or, if the **QSO** control does not specify a receive pane, the currently active receive pane is used.

When Broadband Decoding is enabled, WinWarbler displays the resizable Stations Heard window. Transmitting callsigns extracted from *locked* channels are listed in this window; each entry on this list contains the following information:

- transmitting callsign
- DXCC prefix if the display DXCC prefix box is checked and DXView is running
- frequency
- signal quality (0-99, average over last 1 second) if the display quality and strength box is checked
- relative signal strength (0-99, average over last 5 seconds) if the display quality and strength box is checked
- age (time in minutes since the callsign was last decoded)
- count (# times the transmitting callsign was decoded, including in transmissions by the station's QSO partner)
- QSO partner (may also show CQ or QRZ?)
- decoded text (this text either scrolls left to right or is painted right to left as specified by the decoded text panel setting)

Whereas the signal quality is a measure of the signal's phase noise, the signal strength is a measure of its audio amplitude compared to other signals; due to automatic gain control action in your receiver, this may not accurately represent the amplitude of the received RF.

If the transmitting callsign or QSO partner in a Stations Heard entry matches the callsign in the **Search** textbox at the top of the Stations Heard window, then that entry will be preceded by a red asterisk. If the display decoded text option is enabled, a box labeled **DS** will be present to the right of the Search textbox; if this box is checked, the entry will be preceded by a red asterisk if the contents of the search textbox (which could contain a location or grid square, not just a callsign) are found in the entry's decoded data. Otherwise, if the QSO partner in an entry matches your callsign, then that entry will be preceded by a green asterisk; this alerts you to calling stations anywhere across the band.

Entries in the Stations Heard window can be sorted by any column - click on the column header to sort in ascending order; click again to sort in descending order. Clicking on an entry in the Stations Heard list selects that entry. Right-clicking an entry in the Stations Heard list selects that entry and displays a menu that lets you, delete the currently-selected entry, delete the entire Stations Heard list, and enable/disable the Channel Monitor. You can also delete the currently-selected entry by striking the Delete key.

Double-clicking on a list entry in the Stations Heard window sets a receive pane to that entry's frequency and initializes the pane with the captured transmitting callsign and recorded text, if any. The receive pane is specified by **QSO** control on the Main window's Receive panel or, if the **QSO** control does not specify a receive pane, the currently active receive pane is used. Depressing the **Shift** key while double-clicking a list entry in the Stations Heard window also sets the transmit frequency to that entry's frequency.

If Commander is running, checking the Transmit panel's split box will place the transceiver in split mode, and when transmitting set the transceiver's VFO B so that transmission occurs on the optimal audio offset specified in the optimal offset sub-panel of the Receiver panel on the Config screen's PSK tab. This technique is helpful when using Broadband Decoding as it allows transmission on the optimal offset without changing the receive frequency.

WinWarbler can be configured to send decoded transmitting callsigns to SpotCollector as local spots; the mode (PSK31, PSK63, or PSK125) and relative signal strength are included in the spot notes.

If Commander is running, clicking the Stations Heard window's **Opt** button will direct Commander to optimize your transceiver's frequency so that the audio offset frequency of current receive channel moves to the value specified in the optimal offset sub-panel of the Receiver panel on the Config screen's PSK tab. However, the resulting change in receive frequency will shift the locations of PSK signals within the transceiver's bandpass; it takes time for the Broadband Decoding mechanism to re-acquire these signals. An alternative approach is to check the split box on the Main window's Transmit panel. This will place the transceiver in split mode, and when transmitting set the transceiver's VFO B so that transmission occurs on the optimal audio offset specified in the optimal offset sub-panel of the Receiver panel on the Config screen's PSK tab -- without changing the receive frequency.

If you minimize or close the Stations Heard window, you can direct WinWarbler to display it by

- double-clicking the BBD label in the Main window's PSK Receive panel
- clicking the Display Stations Heard button on the Config window's Broadband Decoding tab

WinWarbler can optionally display the resizable Channel Monitor window, which displays the following information for each monitor channel:

- frequency
- signal quality (0-99, average over last 1 second)
- relative signal strength (0-99, average over last 5 seconds)
- receiving_callsign
- transmitting_callsign
- decoded text (this text either scrolls left to right or is painted right to left as specified by the decoded text panel setting)

The state of each monitor channel - *unlocked, locking, locked, and unlocking* - is indicated by the color of the font used to render its channel number in the Channel Monitor window.

Entries in the Channel Monitor window can be sorted by any column - click on the column header to sort in ascending order; click again to sort in descending order. Right-clicking the Stations Heard list displays a menu that lets you reset the list.

Double-clicking on a monitor channel entry in the Channel Monitor window sets a receive pane to that channel's frequency and initializes the pane with the captured transmitting _callsign and recorded text, if any. The receive pane is specified by **QSO** control on the Main window's Receive panel or, if the **QSO** control does not specify a receive pane, the currently active receive pane is used. Depressing the **Shift** key while double-clicking a list entry in the Channel Monitor window also sets the transmit frequency to that entry's frequency

To enable broadband decoding, check the BBD box on the Main window's Receive panel or the Enabled box on the Config window's PSK Broadband Decode tab. To display the Channel Monitor window, check the Display Channel Monitor box on the Config window's PSK Broadband Decode or check the Stations Heard window's Channel Monitor box.

The Config window's PSK Broadband Decode tab also provides

- AFC and Squelch controls that adjust the parameters for all monitor channels
- Decoding Triggers that govern each monitor channel's transition through a defined set of states
- QSO Timeout setting that determines when a QSO is considered to have vanished
- Controls that determine when to delete inactive entries in the Station Heard window
- the ability to enable or disable the generation of local spots in SpotCollector

RTTY

WinWarbler provides two independent means of sending and receiving RTTY signals:

- using your soundcard's analog-to-digital and digital-to-analog conversion capabilities, referred to as **soundcard RTTY**
- using an external modem, such as a `Kantronics KAM` or `Timewave PK232`

To begin RTTY operation, click the **RTTY** button in the **Operating Mode** panel located on the right side of WinWarbler's main window. You can specify a set of commands to be executed whenever WinWarbler switches to the RTTY operating mode by setting up a RTTY startup macro

When first installed, soundcard RTTY is enabled and RTTY via external modem is disabled. When you click the RTTY button (in the main window's Mode panel), you'll see a single receive pane and a single transmit pane; the channel label to the left of the receive pane is **S** (for **S**oundcard RTTY). WinWarbler uses JE3HHT's MMTTY engine; an icon representing this application will appear in your Windows task bar while soundcard RTTY is in progress; note that the MMTTY engine can take much longer to start and stop if a virus scanner is running on your PC. Once MMTTY is running, WinWarbler graphically presents a 4 kHz waterfall display, allowing you to specify your mark frequency by simply pointing and clicking with your PC's mouse.

With soundcard RTTY enabled, you can optionally enable G3YYD's 2Tone RTTY demodulator to decode RTTY in parallel with the MMTTY engine. 2Tone displays an independent Main window with a spectrum display and yellow Mark/Space indicators; the characters it decodes appear in a receive pane on WinWarbler's Main window with a channel label of **2** (for **2**Tone). 2Tone's Main window also provides a button that toggles between wide and narrow filtering, a button that toggles between optimization for normal and fluttered signals, and a menu that lets you enable or disable squelch, and displays a Settings window that selects the soundcard and soundcard channel to be used, operating mode, and RTTY baud rate.

WinWarbler's RTTY settings default to support soundcard RTTY operation immediately after installation, but you can optimize them to improve performance in specific conditions -- including by adjusting the MMTTY engine's demodulation parameters.

If you have an external modem connected to your PC via a serial port, you can enable a second receive pane -- its channel label is **X** (for e**X**ternal modem).

With both soundcard and external modem receive panes active, you can decode the same signal simultaneously (diversity decoding), or simultaneously monitor nearby signals -- such as a DX station and her pileup. Clicking the soundcard RTTY or external modem receive pane *selects* it; the currently selected pane is distinguished by a red channel label on its left-hand border. The Transmit panel's **QSO selector** lets you specify whether transmission is accomplished via soundcard RTTY or via the external modem:

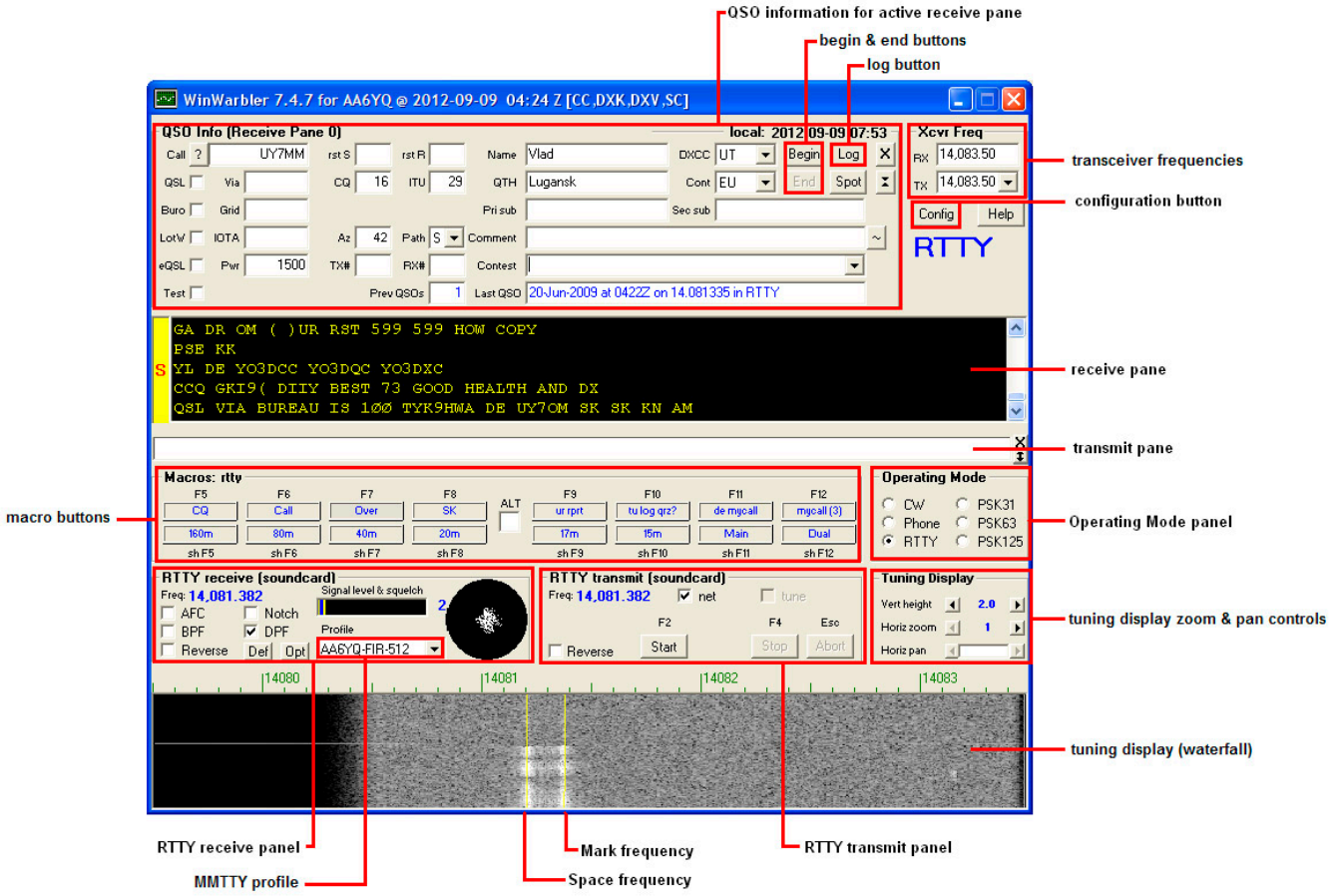
QSO Selector	**Transmission**
	via selected pane
S	via soundcard RTTY
X	via external modem

With the **QSO Selector** set to **S** or **X**, the QSO Info panel merges the information captured from the soundcard RTTY and external modem receive panes; otherwise, the information captured from each pane is separately maintained.

Since 2Tone is not used for transmission, its receive pane cannot be selected

If Commander is running, selecting a receive pane will place your transceiver in the appropriate mode, as specified by soundcard and external modem configuration settings.

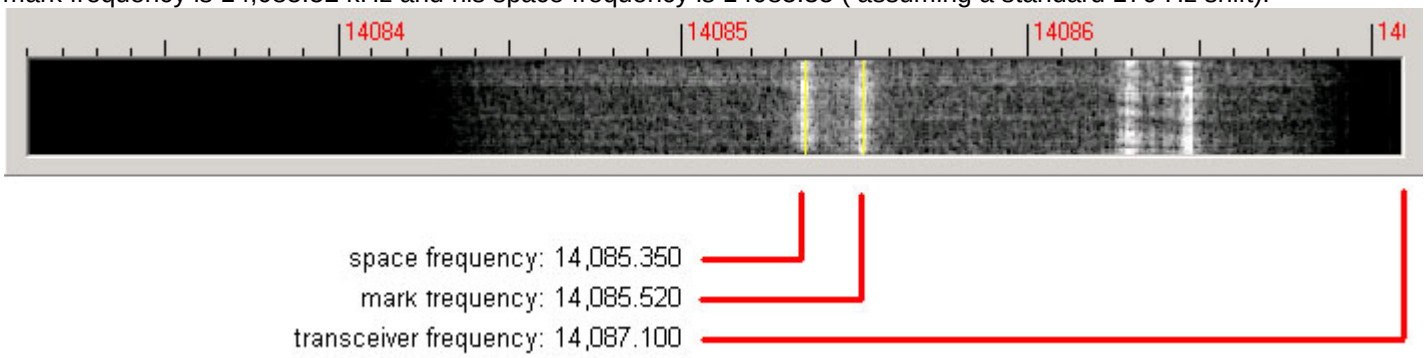
- Annotated main window capture (below)
- Reception via soundcard (page 98)
  - Tuning
  - Viewing
  - Transceiver Control
  - Optimizing the Audio Frequency Offset
- Transmission via soundcard (page 102)
- Reception via external modem (page 103)
- Transmission via external modem (page 105)
- Logging (page 52)
- Macros (page 65)



Soundcard RTTY Reception

Tuning

A RTTY signal involves two frequencies, referred to as *mark* and *space*; the sequence of 1s and 0s representing a character are conveyed by appropriately switching an RF carrier between these two frequencies. The switching occurs rapidly enough that, when seen on a PC-generated audio spectrum display, a RTTY signal appears as two peaks and on a waterfall display as two lines. Mark is the higher of the two frequencies, and space is the lower of the two; most amateur RTTY uses a *shift* - the frequency difference between the mark and space frequencies -- of 170 Hz. Thus when viewing a RTTY signal on a spectrum or waterfall display whose frequency (RF) increases from left to right, the left-most peak or line represents the signal's space frequency, and the right-most frequency or line represents its mark frequency. To avoid confusion, RTTY operators refer to a station's mark frequency when making schedules or reporting QSOs. So when P51DX is spotted on 14,085.52, it means that his mark frequency is 14,085.52 kHz and his space frequency is 14085.35 (assuming a standard 170 Hz shift):



The tuning display at the bottom of WinWarbler's main window provides a visual indication of RTTY activity across a 2.9 kHz frequency range; the top of this range is set by the contents of the **Xcvr Freq** panel's **TX** selector (in kHz), located in the **QSO information** panel. Note that your transceiver's bandwidth and filter settings may attenuate signals in parts of this range. You can select a *waterfall* or *spectrum* display, using settings in the Tuning Display sub-panel. A waterfall display can be presented in *monochrome*, or *synthetic color* using a color lookup table devised by AE4JY; a *gain* setting allows you to further control this form of tuning display. The *spectrum* display's trace color is set by the trace color setting; its background color is fixed at black.

If sub-band highlighting is enabled, the frequency scale above the tuning display is rendered in green for frequencies within RTTY sub-bands, and in red for frequencies outside of RTTY sub-bands; you can customize the definition of these sub-bands.

The tuning display shows the mark and space frequencies as yellow traces. You can change the colors of these traces via WinWarbler's display settings. You can control the width of these traces via the *frequency trace width setting*. If the transmit panel's *net* control is not checked, WinWarbler's transmit mark and space frequencies will appear in the tuning display as a red traces. Decoding and transmission are only possible if the mark and space tones are greater than 100 Hz, and less than 3000 Hz; if you select mark and space frequencies outside this range, the traces will be shown as dotted rather than solid lines.

The Tuning Display panel provides controls that let you increase the vertical height of the tuning display, and zoom on the horizontal (frequency) axis. You can only increase the tuning display's vertical height if doing so would not make WinWarbler's window height larger than your monitor can display. Changes you make in the tuning displays' vertical height while in RTTY mode do not affect its vertical height while in PSK mode, and vice versa. When the tuning display horizontal zoom is greater than one, the horizontal pan control lets you select the magnified frequency segment to be viewed.

To change soundcard RTTY frequency, click in the tuning display to choose a new mark frequency; the frequency you select will appear in the receive panel. If there's a nearby signal and the Automatic Frequency Control box (**AFC**) is checked, WinWarbler will adjust its frequency to track that signal. If you are simultaneously receiving RTTY via both soundcard and external modem, you must first select the soundcard RTTY receive pane before clicking on a new mark frequency. Do so by clicking the mouse anywhere within the soundcard RTTY receive pane -- its channel label will turn red to indicate this selection.

WinWarbler's RTTY engines decode RTTY by processing the audio output of a transceiver configured to demodulate a single-sideband signal. The resulting audio contains two ***tones***, one generated when the mark frequency is being received, and the other generated when the space frequency is received. The frequency of these audio tones depends on the difference between the transceiver frequency and the mark and space frequencies, and on the sideband the transceiver is demodulating. In the example above, configuring a transceiver to demodulate lower sideband (LSB) and tuning it to 14,087.100 would generate a ***mark tone*** of 1580 Hz, and a ***space tone*** of 1750 Hz.

WinWarbler can be configured to transmit RTTY using one of two techniques: AFSK, or FSK. The AFSK technique generates audio mark and space tones, which a transceiver modulates to generate a single-sideband signal. The FSK technique generates a serial port signal (TxD, RTS, or DTR) that switches between *on* and *off* ; this signal drives an external level translator connected to the transceiver's **FSK input**, causing the transceiver to switch between mark and space frequencies. Not all transceivers provide an FSK input, but any transceiver supporting single sideband operation can be used to transmit RTTY using AFSK. Transceivers that can transmit using FSK typically do so when their mode is set to **RTTY**; when set to this mode, they typically receive in LSB. Some transceivers provide a **RTTY-R** (RTTY-reversed) mode, in which they receive in USB.

Since transmitting in AFSK requires only an appropriate connection between PC soundcard output and transceiver audio input, mirroring the connection between transceiver audio output and PC soundcard input used for RTTY decoding, one might wonder why FSK transmission with its requirement for external circuitry is utilized. There are two reasons:

- some operators believe that RTTY signals generated by switching the transceiver between two frequencies are "cleaner" than RTTY signals generated by modulating audio tones because they aren't susceptible to improperly matched and isolated audio interfaces, improperly adjusted audio levels, improperly adjusted transmitter ALC, or soundcard imperfections
- some transceivers provide filters optimized for receiving RTTY, and only make these filters accessible when their RTTY mode is enabled, thereby forcing the use of FSK when transmitting

Received mark tone and space tone audio frequencies are a function of transceiver frequency. In the above example, the mark and space tones are 1580 Hz and 1750 Hz respectively. However, increasing the transceiver frequency from 14,087.100 to 14,087.500 would increase the mark and space tones to 1980 Hz and 2150 Hz respectively. WinWarbler's MMTTY and 2Tone engines can decode RTTY signals anywhere in the receiver passband. Both provide **Automatic Frequency Control (AFC)**, which "locks on" to a selected RTTY signal without requiring precise transceiver tuning; MMTTY's AFC can be enabled or disabled, whereas 2Tone's AFC is always enabled. While AFC is useful when first acquiring a RTTY signal, MMTTY's AFC should be disabled after that's been accomplished; otherwise, it may "lock on" to a stronger nearby signal mid-QSO.

When tuning a RTTY signal, there are several considerations:

- the typical receiver passband is 300 Hz to 3000 Hz; mark and space tones that aren't within this passband can't be decoded
- some receivers provide RTTY-optimized filters that operate on a limited range of audio frequencies
- the typical transmitter passband is also 300 Hz to 3000 Hz; when using AFSK, transmitting mark and space tones lower than 1500 Hz places second harmonics within the transmitter's passband, potentially generating QRM

Thus most operators prefer to tune RTTY signals so that their mark and space tones center on a particular audio frequency, referred to as the **Optimal Offset**. Some prefer 1500 Hz, while others choose an Optimal Offset centered on their transceiver's RTTY-optimized filter. WinWarbler lets you specify an AFSK Optimal Offset for use when transmitting via AFSK, and an FSK Optimal Offset for use when transmitting via FSK. Clicking the **Def** button in the Main window's RTTY Receive panel sets the mark and space frequencies to default values determined by the AFSK Optimal Offset or FSK Optimal Offset and the Shift settings:

Transmission Technique	Mark Frequency	Space Frequency
AFSK	carrier + `AFSK Optimal Offset` + (`Shift`/2)	carrier + `AFSK Optimal Offset` - (`Shift`/2)
FSK	carrier + `FSK Optimal Offset` + (`Shift`/2)	carrier + `FSK Optimal Offset` - (`Shift`/2)

Depressing the **Ctrl** key while clicking the **Def** button sets the mark and space frequencies to the above default values and disables **AFC**.

The signal quality indicator in the Receive panel displays the quality of the signal being received by the selected channel. You can adjust the **squelch threshold** setting by clicking within the signal quality indicator.

The receive panel's XY display plots the mark and space frequencies as ovals; when these two ovals are at right angles, the signal is properly tuned. if you find the waterfall or spectrum scope sufficient for tuning, you can disable the XY display and reduce the load on your PC.

You can optionally display the resizable, always-on-top **MMTTY Engine** window, which includes spectrum and waterfall views, and an XY display of adjustable size and quality.

To optimize reception, you can

- enable MMTTY's Bandpass Filter by checking the **BPF** box; the shape of this filter can be controlled via the `MMTTY Setup dialog`.
- enable MMTTY's Notch Filter by checking the **Notch** box and place it by clicking in the spectrum or waterfall display while depressing the **Alt** key; the shape of this filter can be controlled via the `MMTTY Setup dialog`.
- enable MMTTY's Dual Peak Filter by checking the **DPF** box
    - this box will only be present if MMTTY version 1.68 or later is running
    - unlike the Bandpass and Notch filters, enabling the Dual Peak Filter will have no visible impact on the tuning display

If the station you're monitoring is transmitting reversed tones, check the Receive panel's reverse box; to transmit reversed tones. Modifying this checkbox automatically updates the receive setting in the Reverse panel on the Config window's RTTY tab.

MMTTY demodulation and decoding

You can configure the many settings governing MMTTY demodulation and decoding. You can also load a named group of settings via the **Profile Selector** in the Main window's RTTY Receive panel. Selecting a profile can change MMTTY's Unshift On Space, Reverse, and Keyboard Mode settings; you may need to modify these settings if they don't match your setup and/or preferences.

2Tone demodulation and decoding

With soundcard RTTY enabled, you can optionally enable G3YYD's 2Tone RTTY demodulator to decode RTTY in parallel with the MMTTY engine. 2Tone displays an independent Main window with a spectrum display and yellow Mark/Space indicators. 2Tone's Main window also provides a button that toggles between wide and narrow filtering, a button that toggles between optimization for normal and fluttered signals, and a menu that lets you enable or disable squelch, and displays a Settings window that selects the soundcard and soundcard channel to be used, operating mode, and RTTY baud rate.

Viewing
Information decoded from the receive frequency by the MMTTY demodulator is sequentially appended to the soundcard RTTY display pane, designated by a channel label of **S** along its left margin. Information decoded from the receive frequency by the 2Tone demodulator is sequentially appended to the 2Tone display pane, designated by a channel label of **2** along its left margin. These display panes have a vertical scrollbar along their right sides, allowing you to view information which has scrolled off the pane. The only limit to each display pane's information retention is the amount of free space on the disk drive hosting WinWarbler. You can change the font name, style, size, and color used to display this information via WinWarbler's display settings.

If you are simultaneously receiving RTTY via soundcard, 2Tone, and/or external modem, their receive panes are separated by one or two "splitter" bars; by dragging a bar up or down with the left mouse button, you can reallocate available screen space among the receive panes. Clicking the right mouse button over a receive pane produces a pop-up menu that includes an **Equalize all receive panes** entry; selecting this entry equally divides the available space among the active receive panes.

Because RTTY uses the LTRS character to switch from sending characters in the *figures* set to characters in the *letters* set, and the FIGS character to switch from sending characters in the *letters* set to characters in the *figures* set, a garbled LTRS or FIGS character can result in the misinterpretation of the subsequent word. To compensate for this, clicking on a received word while depressing the **Ctrl** key will replace the each character in that word with its analog in the opposite set, and toggle the character's underlining in the Receive Pane. If you receive a garbled word, try **Ctrl**-clicking it; if that doesn't make it intelligible, **Ctrl**-click it again to return it to its original state.

- The *figures* character Bel (the analog of S in the *letters* set) is rendered as ~.
- For this purpose, a word is considered to be a sequence of characters delimited by a space or newline character; each Receive pane acts as if it begins and ends with a newline character.

To freely scroll a receive pane, you must first suspend the pane's display of incoming information; do so by clicking on the color-coded panel to the left of the pane you wish to scroll. A pane's channel label blinks while it is suspended. To resume the display of incoming information -- including that which arrived while the display was suspended, click on the color-coded panel to the left of the pane. You can suspend a pane for up to an hour without loss of incoming information.

To copy text from a receive pane to the Windows clipboard, use the standard Windows left-click and drag gesture. This gesture automatically suspends the pane. Click on the color-coded panel to the left of the pane to resume the pane's display of incoming information.

To facilitate logging, double-clicking on a word in a receive pane copies that word to the appropriate QSO Info panel item.

The contents of the QSO Info panel items are maintained separately for each receive channel; whenever you switch channels, these items are updated to reflect whatever information you have captured from that channel. This makes it easy to incrementally capture information as you monitor several QSOs.
Clicking the right mouse button over a receive pane produces a pop-up menu with four commands:

- **Save receive pane to file** copies the contents of that pane to a file you select via a standard Windows file selector
- **View pane archive** displays the contents of the pane's archive file, if it exists
- **Equalize all receive panes** divides the available space equally between the soundcard RTTY receive pane and the external modem RTTY receive pane if both soundcard RTTY and external modem RTTY are enabled
- **Clear receive pane** deletes the contents of that pane.
- **Clear all panes** deletes the contents of all receive panes

Transceiver Control
WinWarbler automatically interoperates with Commander, an transceiver control program for Alinco, Elecraft, Flexradio, Icom, Kachina, Kenwood, TenTec, and Yaesu radios. If WinWarbler and Commander are running simultaneously, the **TX** selector in WinWarbler's **Xcvr Freq** panel will automatically track your transceiver's frequency as you QSY; it does not matter in what order the two programs are started.

- If you modify the contents of the **Xcvr Freq** panel's **TX** selector and then strike the **Enter** key, WinWarbler will direct Commander to QSY your transceiver to the specified frequency
- If you open the **Xcvr Freq** panel's **TX** selector, you can choose a preset frequency; doing so places the transceiver in simplex mode (as opposed to split frequency operation), selects its primary VFO, and sets that VFO to the preset frequency

Optimizing the Audio Offset Frequency
The mark frequency shown in the **RTTY Receive** panel is the sum of two components: your transceiver frequency, and an audio offset frequency in the range of 0 to 4000 Hz. Your transceiver's filters may make it difficult to receive and/or transmit signals that fall near the lower or upper ends of its audio passband. Furthermore, transmitting with a low audio offset -- say 1 kHz -- can generate harmonics that fall within your transmitter's passband and therefore produce QRM up the band. If Commander is running, clicking the **Opt** button directs it to change your transceiver's frequency so that the midpoint between the current mark and space tones falls on the specified Optimal Offset. Since the transceiver frequency and audio offset frequency are simultaneously adjusted, you can use this function during reception and lose no more than a character or two. If you depress the **Ctrl** key while clicking the **Opt** button, AFC will be disabled; this eliminates the possibility of your receive audio offset frequency changing as a result of AFC action after your transceiver QSYs.

The **Opt** function provides an alternative to precisely tuning your transceiver to center a RTTY signal's mark and space tones on the specified Optimal Offset, using the XY display for assistance. You can instead

1. enable AFC
2. left-click on the desired RTTY signal's mark frequency in the tuning display
3. depress the **Ctrl** key while clicking the **Opt** button to disable AFC and QSY your transceiver to center the RTTY signal's mark and space tones on the specified Optimal Offset

When you switch from receiving to transmitting, you transmitted mark and space tones will be centered on the specified Optimal Offset.

You can also activate this function by right-clicking in the *waterfall* or *spectrum* display while depressing the *Ctrl* key; if the waterfall right-click box is checked, you can activate this function by right-clicking in the *waterfall* or *spectrum* display without depressing the *Ctrl* key. Right-clicking in the *waterfall* or *spectrum* display while depressing the *Alt* key invokes the **Opt** function and disables AFC.

The **Opt** button is disabled if Commander is not running; it is also disabled during transmission.

Soundcard RTTY Transmission

If the waterfall right-click box is unchecked, right-clicking in the tuning display unchecks the **net** setting and sets the transmission frequency; if the waterfall right-click box is checked, you must depress the **Ctrl** key while right-clicking in the tuning display to set the transmission frequency. Checking the **net** box causes transmission frequency to automatically follow the selected receive channel's frequency; the **net** box will automatically be unchecked and disabled if operating in FSK. The transmission frequency is continuously displayed in the transmit panel.

Information to be transmitted is entered into the **Transmit Pane** by direct keystroke; to clear information entered into the transmit pane, click the X button on the transmit pane's right margin. To increase the number of text lines visible in the transmit pane, click the resize button on the transmit pane's right margin. Sixteen macro buttons provide an alternative means of supplying information to be transmitted; macros can automatically transmit your callsign, the callsign, name, and QTH of the station with whom you are in QSO, incoming and outgoing signal reports, the current UTC time or date, and the contents of files.

To initiate transmission, click the **Start** button in the transmit panel, or strike the **F2** key, or strike the **Insert** key; the **Start** button is immediately disabled, and remains so until transmission terminates. Initiating transmission enables the transmit panel's **Stop**, and **Abort** buttons. As information is transmitted, its displayed in the currently selected receive pane using a white font to differentiate it from received information. If you are simultaneously receiving RTTY via both soundcard and external modem and wish to transmit via the soundcard, you must select the soundcard RTTY receive pane before initiating transmission; do so by clicking the mouse anywhere within the soundcard RTTY receive pane -- its channel label will turn red to indicate this selection.

If you check the RTTY transmit panel's Tune box with modulation set to FSK, then clicking the **Start** button will immediately direct your transceiver to transmit a RTTY mark tone until you click the **Stop** or **Abort** buttons.

If the auto-stop after idle box is checked, transmission is terminated after idle characters are sent for 15 consecutive seconds; tuning does not activate this mechanism.

To terminate transmission when all information to be transmitted has been sent, click the **Stop** button in the transmit panel, or strike the **F4** key, or strike the **Enter** key while depressing the **Ctrl** key.

To immediately terminate transmission, click the **Abort** button in the transmit panel, or strike the **Esc** or **End** key. Any un-transmitted information is discarded.

Clicking the right mouse button on the transmit display pane produces a pop-up menu with two commands:

- **Paste (insert Clipboard into Transmit Pane)** inserts the contents of the Windows clipboard into the **Transmit Pane**
- **Transmit file** presents a Windows file selector with which to choose a file to be transmitted, starts transmission, and then transmits the contents of the selected file click the **Abort** button to terminate this operation before it is complete.

Striking **Ctrl-V** in the **Transmit Pane** also initiates the **Paste (insert Clipboard into Transmit Pane)** operation.

If you are using AFSK, you can transmit reversed tones by checking the Transmit panel's reverse box. Modifying this checkbox automatically updates the transmit setting in the Reverse panel on the Config window's RTTY tab.

RTTY Reception Via External Modem

Tuning
Soundcard RTTY makes an excellent tuning indicator for your external modem; simply enable it, and refer to the soundcard RTTY tuning section.

Viewing
Information decoded by your external modem is sequentially appended to the soundcard RTTY receive pane. The receive pane has a vertical scrollbar along its right side, allowing you to view information which has scrolled off the pane. The only limit to each receive pane's information retention is the amount of free space on the disk drive hosting WinWarbler. You can change the font name, style, size, and color used to display this information via WinWarbler's display settings.

If you are simultaneously receiving RTTY via both soundcard and external modem, their receive panes are separated by a "splitter" bar. You can move this splitter bar by placing the mouse cursor overtop it; when the mouse cursor changes to a double-headed arrow, use the left mouse button to drag the splitter to its desired location, reallocating available screen space between the adjacent receive panes. Clicking the right mouse button over a receive pane produces a pop-up menu that includes an **Equalize all receive panes** entry; selecting this entry equally divides the available space between the soundcard RTTY receive pane and the external modem receive pane.

Because RTTY uses the LTRS character to switch from sending characters in the *figures* set to characters in the *letters* set, and the FIGS character to switch from sending characters in the *letters* set to characters in the *figures* set, a garbled LTRS or FIGS character can result in the misinterpretation of the subsequent word. To compensate for this, clicking on a received word while depressing the **Ctrl** key will replace the each character in that word with its analog in the opposite set, and toggle the character's underlining in the Receive Pane. If you receive a garbled word, try **Ctrl**-clicking it; if that doesn't make it intelligible, **Ctrl**-click it again to return it to its original state.

- The *figures* character Bel (the analog of S in the *letters* set) is rendered as ~.
- For this purpose, a word is considered to be a sequence of characters delimited by a space or newline character; each Receive pane acts as if it begins and ends with a newline character.

If the station you're monitoring is transmitting reversed tones, check the Receive panel's reverse box; this automatically updates the receive setting in the Reverse sub-panel on the Config window's RTTY tab.

To freely scroll a receive pane, you must first suspend the pane's display of incoming information; do so by clicking on the color-coded panel to the left of the pane you wish to scroll. A pane's channel label blinks while it is suspended. To resume the display of incoming information -- including that which arrived while the display was suspended, click on the color-coded panel to the left of the pane. You can suspend a pane for up to an hour without loss of incoming information.

To copy text from a receive display pane to the Windows clipboard, use the standard Windows left-click and drag gesture. This gesture automatically suspends the pane. Click on the color-coded panel to the left of the pane to resume the pane's display of incoming information.

To facilitate logging, double-clicking on a word in a receive pane copies that word to the appropriate QSO Info panel item.

The contents of the QSO Info panel items are maintained separately for each receive channel; whenever you switch channels, these items are updated to reflect whatever information you have captured from that channel. This makes it easy to incrementally capture information as you monitor several QSOs.

Clicking the right mouse button over a receive pane produces a pop-up menu with four commands:

- **Save receive pane to file** copies the contents of that pane to a file you select via a standard Windows file selector
- **View pane archive** displays the contents of the pane's archive file, if it exists
- **Equalize all receive panes** divides the available space equally between the soundcard RTTY receive pane and the external modem RTTY receive pane if both soundcard RTTY and external modem RTTY are enabled
- **Clear receive pane** deletes the contents of that pane.

Transceiver Control

WinWarbler automatically interoperates with Commander, an transceiver control program for Alinco, Elecraft, Flexradio, Icom, Kachina, Kenwood, TenTec, and Yaesu radios. If WinWarbler and Commander are running simultaneously, WinWarbler's *xcvr freq* selector will automatically track your transceiver's frequency as you QSY; it does not matter in what order the two programs are started.

- If you modify the contents of the *xcvr freq* selector and then strike the Enter key, WinWarbler will direct Commander to QSY your transceiver to the specified frequency
- If you open the *xcvr freq* selector, you can choose a preset frequency; doing so places the transceiver in simplex mode (as opposed to split frequency operation), selects its primary VFO, and sets that FRO to the preset frequency

RTTY Transmission Via External Modem

Information to be transmitted is entered into the **Transmit Pane** by direct keystroke; to clear information entered into the **Transmit Pane**, click the X button on the transmit pane's right margin. To increase the number of text lines visible in the transmit pane, click the resize button on the transmit pane's right margin. Sixteen macro buttons provide an alternative means of supplying information to be transmitted; macros can automatically transmit your callsign, the callsign, name, and QTH of the station with whom you are in QSO, incoming and outgoing signal reports, the current UTC time or date, and the contents of files.

To initiate transmission, click the **Start** button in the transmit panel, or strike the **F2** key, or strike the **Insert** key; the **Start** button is immediately disabled, and remains so until transmission terminates. Initiating transmission enables the transmit panel's **CW ID** , **Stop**, and **Abort** buttons. As information is transmitted, its displayed in the currently selected receive pane using a white font to differentiate it from received information. If you are simultaneously receiving RTTY via both soundcard and external modem and wish to transmit via the external modem, you must select the external modem receive pane before initiating transmission; do so by clicking the mouse anywhere within the soundcard RTTY receive pane -- its channel label will turn red to indicate this selection.

If you check the RTTY transmit panel's **Tune** box with modulation set to FSK, then clicking the **Start** button will immediately direct your transceiver to transmit a RTTY mark tone until you click the **Stop** or **Abort** buttons.

If the auto-stop after idle box is checked, transmission is terminated after idle characters are sent for 15 consecutive seconds; tuning does not activate this mechanism.

To force CW identification to be sent when transmission is terminated, click the **CW ID** button in the transmit panel, or strike the **F3** key; the **CW ID** button is immediately disabled, and remains so until transmission terminates.

To automatically terminate transmission after all information to be transmitted has been sent, click the **Stop** button in the transmit panel, or strike the **F4** key, or strike the **Enter** key while depressing the **Ctrl** key. You can do this as soon as transmission has begun.

To immediately terminate transmission, click the **Abort** button in the transmit panel, or strike the **Esc** or **End** key. Any un-transmitted information is discarded.
Clicking the right mouse button on the transmit display pane produces a pop-up menu with two commands:

- **Paste (insert Clipboard into Transmit Pane)** inserts the contents of the Windows clipboard into the **Transmit Pane**
- **Transmit file** presents a Windows file selector with which to choose a file to be transmitted, starts transmission, and then transmits the contents of the selected file click the **Abort** button to terminate this operation before it is complete.

Striking **Ctrl-V** in the **Transmit Pane** also initiates the **Paste (insert Clipboard into Transmit Pane)** operation.
To transmit reversed tones, check the Transmit panel's reverse box; this automatically updates the transmit setting in the Reverse sub-panel on the Config window's RTTY tab.