

WinKeyer 3.1.0 Firmware Release

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Steven T. Elliott

Version 3.1 is a major upgrade in functionality for WinKeyer keyers. Besides many bug fixes, several new features have been added. The most notable is the ability to generate an accurately timed RTTY serial transmit stream. RTTY can be generated in host mode and also standalone mode. This is especially useful for dealing with transceivers that only provide RTTY receive capability. With WK 3.1 you can generate RTTY without a PC.

RTTY Feature Set

Winkeyer supports standard 5 level Baudot transmission. Four operating speeds are supported, 45.45, 50, 75, and 100 baud with either 1.5 or 2 stop bits. Automatic Diddle generation can be included as well as automatic end of line carriage return/Line feed. Finally UOS transmit is also supported.

RTTY Host Mode

The software API is described in Appendix A. It is fairly easy to add RTTY capability to an existing application that supports WK since all of the basic interface procedures are the same. That includes buffer full handshaking, pause, immediate abort, and translation from ASCII to Baudot with automatic FIGS/LTRS generation.

RTTY Standalone Mode

The user issues special paddle commands to initiate RTTY mode and also to control Rx/Tx switch over. Since WK can keep track of line length and can automatically word wrap at the end of a line, it makes it easy to send CW strings. There are special Morse commands to start and stop an RTTY transmission, as well as insert an CRLF, or send an RY test string. In addition all of WK's standard message slots are available for RTTY as well as the User callsign slot. Since WK has two separate user setups, one setup could be used for regular CW while the other can be used for RTTY. That means you can switch back and forth very easily.

WK3 RTTY standalone commands

ADMIN Commands: Press CMD button, wait for R, enter X followed by one of these commands:

Y – RTTY Mode toggle, WK responds with A when RTTY is enabled and an N when turned off.

K – Reverse toggle, this reverses the sense of mark and space. WK responds with an A when reverse is turned on and an N when turned off

L – Diddle toggle, WK responds with an A when enabled and an N when off.

Z – FSK MAP toggle. WK uses PTT and KEY to transmit RTTY. When in transmit mode, PTT is used to key the transceiver and KEY is the FSK output. When FSKMAP is enabled the function of KEY and PTT

is reversed; KEY keys the transceiver and PTT is the FSK output.

Procedure commands, when WK is in RTTY mode these commands can be entered at any time, no pushbutton press is required.

AA (di-dah-di-dah) toggles WK3 into and out of RTTY transmit mode. When in transmit mode is enabled the transceiver is keyed and FSK is asserted as specified by the Revers and FSKMAP settings. If Diddle is enabled it will start when RTTY is enabled and stay on until RTTY is turned off.

MM (dah-dah-dah-dah) Tells WK to generate a CRLF sequence.

MN (dah-dah-dah-dit) Tells WK to generate an RY string for testing. A CRLF is generated followed by a line full of repeating RYRYRY patterns.

WK will send messages in RTTY format when RTTY is enabled. When a message is sent in RTTY mode, WK will automatically go into RTTY transmit mode before the message is sent and leave RTTY mode after the message is sent. The special RTTY codes, MM and MN can be inserted into messages if desired. AA can't be entered since it is used to end message entry.

A message can be aborted by pressing the paddles.

Note that the RTTY settings can be retained by using the save command.

Using WK3demo in RTTY mode

RTTY transmit can be sent using WK3tools 5.0. Note that there is a new section in the setup dialog box where RTTY can be enabled and configured. Simply set the parameters that you want and if RTTY is enabled, WK3demo will send Baudot FSK in response to letters entered in the Tx window. If RYMON is enabled letters will be echoed as they are sent. You must start every exchange with a left bracket [and end it with a right bracket]. For example [CQ CQ CQ DE K1EL K1EL K] For best results enter a value of at least 40 into both LeadIn and Tail settings. This allows the receiver to cleanly handle a RTTY transmission. In default mode, PTT is FSK output while KEY is used to key your transceiver. This can be swapped by setting FSKMAP. The sense of Mark and Space can be reversed with the REVERSE setting.

Other Changes for Version 3.1

K1EL WK Applications

There are two new app releases to support WK 3.1. RTTY setup has been added to the WK3tools standalone utility. WK3tools is required for upgrading existing WK3 keyers to version 3.1.

WK3demo has also been upgraded to support RTTY mode. You can enter messages and configure host mode RTTY transmit operation with WK3demo.

Sidetone Volume Command

A somewhat limited volume control has been added to WK3. As it turns out is not very useful in this release, it is only when the level is set to either 1 or 2 that the level actually decreases noticeably.

First Extent Command

This command was removed from Version 3.0 but has been reinstated for Version 3.1

Serial Number Changes

The serial number can be preserved in Version 3.1. What ever it is set to will be written to EEPROM when a save command is issued. Serial numbers up to 50,000 are now allowed.

Report Revision Standalone Command

A new extended command was added that reports the keyer major and minor version. Enter X Q and WK will report the major and minor revisions in Morse.

Many Bug fixes

A large number of small bugs were fixed in version 3.1. For example, all illegal paddle input is now flagged and reported. In version 3.0 there were cases where a bad command entry could cause a watchdog timeout.

WK API changes

Besides the new RTTY commands several new commands were added to load and unload the RTTY, Volume and X2MODE values.

Appendix A - WKUSB API Extension - FSK/RTTY Mode - revision 0.3

Introduction

Due to the true multi-threaded nature of K1EL WinKeyer task management, it was easy to implement an accurate and stable Baudot UART as part of the standard WinKeyer command set. UART timing is unaffected by the reception of commands, text, or other asynchronous events.

FSK/RTTY is modal in operation; an admin command with two parameter bytes initiate the mode. While enabled, incoming text is sent in Baudot coding. Mark is equivalent to key up and space is key down. PTT is issued in the normal WK way.

Baudot strings are delimited by square brackets. A starting [starts RTTY transmission and a trailing] ends it. PTT leading and trailing delays are specified with the existing WK PTT lead-in and tail delay commands. Baudot text is sent in the format specified by the RTTY/FSK command parameter bytes. PTT is asserted on leading [and held till the trailing]. Any subsequent text will be ignored. The forward slash character \ (0x5c) will abort RTTY transmission immediately. The right brace } will force a CRLF sequence: CR CR LF LTRS. The left brace will initiate an RYRYRY test pattern that runs for a line of 45 characters and then stops.

All ASCII characters which map to Baudot characters are accepted and printed. The only non-printing Baudot characters accepted are the brackets [], slash \, left brace {, and right brace }. All WK commands can be issued but most will be ignored. Those acted upon as shown below, with WK3 Datasheet page references:

Output port toggle (Set PinCfg, pg. 9) FSK/RTTY mode must be off when changing ports
CW mode changes are ignored (letterspace, weighting, compensation, dit/dah ratio; pgs. 6-8)
Key immediate, used for tuning (pg. 10)
Set Pause State (pg. 8)
Clear Tx buffer (pg. 10)
Set PTT Lead/Tail (pg. 7) Sets the FSK delay before and after transmitter keying

Baudot mode can be changed dynamically by reissuing the FSK/RTTY admin command with a different parameter byte.

Detailed Command Description

FSK/RTTY mode is only available in WK version 3 and future WK versions. To allow an easier transition, it is not necessary to set WK3 mode (Admin command 0x14)

Note that many advanced WK features are accessible in WK3 mode; refer to the X1MODE and X2MODE registers on WK3 Datasheet pg. 5 for further details.

RTTY/FSK Control Admin Command: 0x13

This is a four byte command with the following syntax:

0x00 0x13 <command parameter byte1> <command parameter byte2>

Command parameter byte1 definition:

- Bit 7: RTTY/FSK: RTTY/FSK Enabled when = 1
- Bit 6: DIDDLE: Diddle enabled when = 1
- Bit 5: FSKMAP: Assign FSK to PTT when 0, assign FSK to KEY when 1
- Bit 4: AUTOCRLF: Auto CRLF enabled when = 1 (word wrap at 40)
- Bit 3: RYMON: RTTY Tx Monitor enabled when = 1
- Bit 2: REVERSE: Mark/Space Reversed when = 1
- Bit 1:0 11: Set 100 Baud
 - 10: Set 75 Baud
 - 01: Set 50 Baud
 - 00: Set 45.45 Baud

The default setting is all bits = 0

When RTTY/FSK is enabled, the Key output will be set to mark in accordance with the Reverse bit. Letters/strings are sent in Baudot if they are encased in brackets. For example: [CQ CQ DE K1EL] will result in the following sequence:

```
Assert PTT
Wait for currently set Lead In Time (see WKUSB PTT Lead-In Command)
Send CQ CQ DE K1EL in Baudot over the active FSK output port
Wait for currently selected Tail Time (see WKUSB PTT Tail command)
Deassert PTT
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Letters/strings which are not encased in brackets will be ignored.

DIDDLE

If the Diddle bit is set then a constant stream of blanks will be sent as soon as a leading bracket [is encountered and will stay active until the trailing bracket] is encountered. In conversational applications, a user will initiate a stream by starting with a leading bracket. They can then type at leisure knowing that diddle will fill the empty space.

FSKMAP

This bit specifies which WK output pin is used for FSK. The default, FSKMAP=0, sets the PTT output to be FSK and the KEY output to transmitter key. This is the way most transceivers work and allows a user to run CW or RTTY without changing cables. When FSKMAP=1, the output is flipped, KEY output is FSK and PTT keys the transmitter. On some older radios, PTT is used to key the radio and KEY provides the FSK signalling. LeadIn and tail delay is applied the same way no matter which way FSKMAP is set.

AUTO LF/CR

When enabled, WK counts the printable characters in a line and after 40 characters, an automatic CR/LF sequence will be inserted after the next space. The character counter is reset after CR/LF. This is a very valuable feature for conversational RTTY. The operator can simply type and not have to worry about running over at the end of a line.

RTTY TX Monitor

Like normal WK CW mode, the user has the option to echo RTTY text back to the host after each letter has been sent. This is useful for setting up a monitor window that is used to keep track of transmission progress. Since the RTTY monitor is a separate control bit in the RTTY control byte, either RTTY, CW, or both can be echoed.

Command parameter byte2 definition:

Bit 7: Reserved, please set to zero

Bit 6: Reserved, please set to zero

Bit 5: RYIGNORE: 0 = ignore non-Baudot ASCII, 1=print ? For non-Baudot ASCII

Bit 4: Reserved: please set to zero

Bit 3: RYSTOP: Set 2 stop bits when = 0, set 1.5 stop bits when = 1

Bit 2: DIDLCHAR: Diddle will send Blank when = 0 and LTRS when = 1

Bit 1: Reserved, please set to zero

Bit 0: USOS: Enable USOS mode when = 1

The default setting is all bits = 0

RYIGNORE

To maintain compatibility with other RTTY transmit hardware, the user has the option to completely ignore ASCII characters which do not map to Baudot characters or print a ?.

RYSTOP

Setting this bit to 0 will select 2 stop bits between characters which is the default. A setting of 1 will select 1.5 stop bits.

DIDLCHAR:

Baudot blank (0x00) is normally sent during diddle. If desired, the LTRS (0x1F) character can be sent instead if this bit is set to a 1.

USOS (Transmit UOS):

To improve transmit integrity at the expense of extra FIGS characters, USOS mode will send two FIGS characters whenever a figures character follows a space. This reinforces the operation of UOS at the receiver which forces a letters transition after every space. USOS is enabled when this bit is 1.

Additional Notes:

In normal mode (Not Reverse), Mark is signalled when KEY OUT is OFF and Space is signalled when KEY OUT is ON.

Advantages of WKUSB RTTY

Optically isolated, solid state relay outputs

Single RTTY setup command

Two separate keying output pairs

RFI resistant metal enclosure

Tested to meet FCC and CE regulations

CW and RTTY are both included in base firmware

State of the art SMT fabrication