

micro **KEYER**

microHAM

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release 2.0

Edited by Joe Subich, W4TV

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1. WARRANTY

microHAM warrants this product for 3 years and 30 day full money back less shipping. The product must not be modified in any way, except configuration, otherwise the warranty voids. The warranty does not cover damage caused by improper or abnormal use, failure to follow instructions, improper installation, lightning, or excessive voltage. The product will be either repaired or replaced, at our discretion. The only cost will be the cost of return shipping.

microHAM assumes no liability or responsibility for damages to other devices or injuries to persons, as a consequence of using our products.

If the terms of the above warranty are not acceptable, return the unit and all its associated documents, to microHAM or to your supplier for a full refund.

2. PACKING

The product includes micro KEYER™, USB cable, sound card cables (3), microHAM USB Device Router program on a CD-ROM.

If the shipment is incomplete, please contact us at the following address:

E-mail: support@microham.com

fax : +421 2 4594 5100

by Post: **microHAM s.r.o.**
Nadrazna 36
90028 Ivanka pri Dunaji
SLOVAKIA

3. IMPORTANT WARNINGS

NEVER FORGET !!!

If you plan to use micro KEYER with different transceivers, ALWAYS be sure the proper microphone is connected to the micro KEYER RJ45 jack BEFORE connecting the DB37 RADIO cable.

If you power micro KEYER from external power supply ALWAYS check polarity of the external 13.8 V supply.

If your radio includes upgradeable firmware, always perform any upgrade directly from an RS-232 (COM) port on the computer - NOT through microKeyer.

4. PARAMETERS

USB: USB 2.0 Full speed , USB 1.1 compatible

Power consumption: USB – less than 100mA; Transceiver side – less than 200mA at 13.8V (max. 16V)

Radio Port: RXD, TXD, (RTS, CTS) – 57,600 baud max.
Levels: TTL, inverted TTL, open collector bus, RS232

CW: open collector, max 30V/400mA

FSK: open collector, max 30V/400mA
Supports 5/6/7/8bit data length, 1/1.5/2 stop bit, up to 300 Bd

PTT1: open collector, max 30V/100mA

PTT2: open collector, max 30V/400mA

PA PTT: selectable by rear panel switch
Open collector, max. 48V/1.5A
Relay contact, max. 125VAC/2A 60VDC/2A

Foot Switch: active when closed to ground, max load: 5 mA

Radio AF OUT: 600 Ohm, max 1Vpp
3dB bandwidth: 0.2 - 6KHz typical
Insertion loss: 2-3dB typically

Computer LINE OUT: 600 Ohm, max 1Vpp
3dB bandwidth: 0.2 - 6KHz typical
Insertion loss: 9dB typically (additional 6dB attenuator is included for best IMD)

Computer MIC IN: signal and signal ground directly switchable to the MICROPHONE input (jumper selectable preamplifier for dynamic microphones)

Radio MIC IN: signal and signal ground directly switchable to the MICROPHONE input. All others wires are routed from RJ45 to the radio microphone input. Microphone works with all his functions as if were plugged straight to the radio.

Dimensions: **W** 175mm (6.89") x **H** 44mm (1.73") x **D** 85mm (3.35") **Weight:** 1100g (2.43lbs)

5. REQUIREMENTS

Minimum: 800MHz PC compatible computer with Win98SE, 48MB RAM, sound card, CD-ROM, USB1.1 port, transceiver

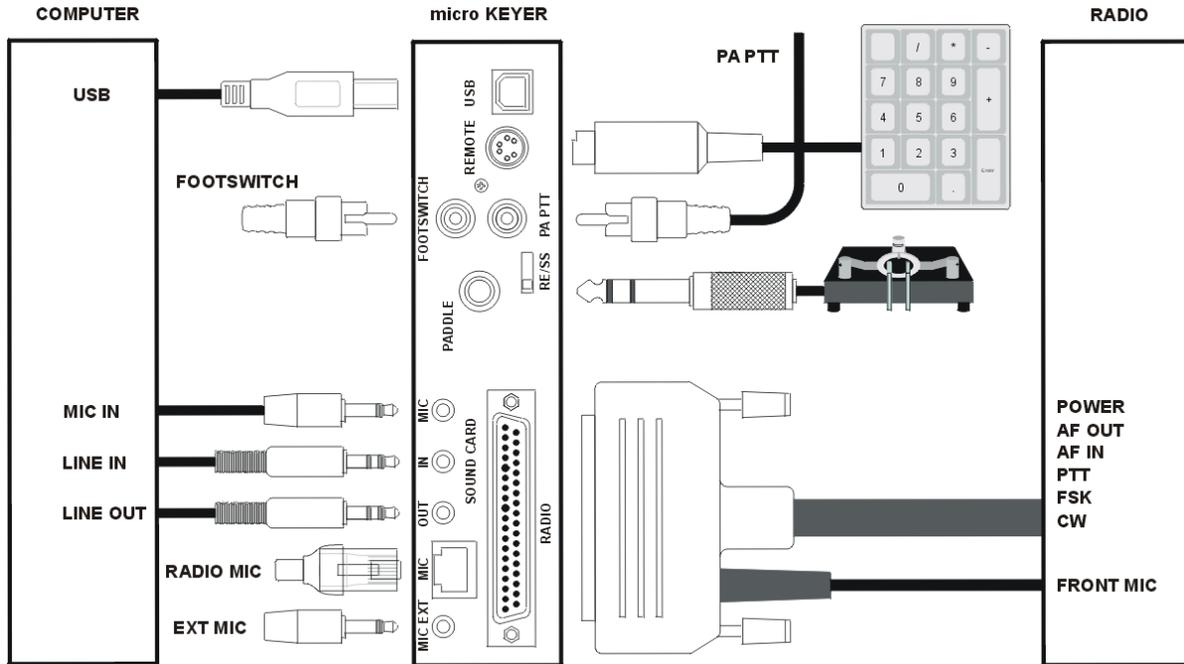
Recommended: 1.6GHz PC compatible computer with WinXP Home or higher, 256MB RAM, sound card, CD-ROM, USB2.0 port, transceiver with computer port, FSK port, CW paddle, PS/2 keypad, logger or control software

6. FEATURES AND FUNCTIONS

- ♦ **No COM nor LPT port necessary, just one USB port and sound card**
- ♦ **Complete "Computer <-> Radio" galvanic isolation**
 - bidirectional transformer isolation of sound card and radio
 - optical isolation of ALL digital signals -> Radio Control, CW, 2xPTT, FSK, PA from USB port
- ♦ **Compatible with all MS Windows based logging or control software**
 - the special microHAM "USB Device Router" program creates virtual COM ports which allow full functionality with your favorite logging program
 - customizable presets allow instantly changing micro KEYER parameters to match the program currently in use
- ♦ **Integrated computer control port for all radios CI-V, FIF-232, IF-232, RS-232**
 - fully supports Icom, Kenwood, Ten Tec, Yaesu and other radios
 - no separate level converter required
- ♦ **Integrated K1EL WinKey™ chip with extended capabilities for superior CW**
 - front panel speed knob
 - nine (9) user programmable memories
 - PS/2 keyboard/keypad support for direct CW sending
 - PS/2 keyboard/keypad support for instant CW message playback and function handling
 - PS/2 keyboard or keypad CW works without computer connection
 - precisely timed auto PTT
 - selectable side tone
 - all parameters are stored in nonvolatile memory and reloaded on power up
- ♦ **FSK keying output**
 - capable of sending 5/6/7/8 bits and 1/1.5/2 stop bits
 - support for PS/2 keyboard for direct RTTY transmission without computer connection
- ♦ **Unique Mic/Sound Card/Radio audio switching**
 - configurable audio priority microphone routing for SSB/Contest/SSTV
 - two audio outputs, one for radio front MIC IN and second for rear LINE IN
 - front panel audio level controls for setting both the computer and radio levels
- ♦ **Independent keying buffer for Power Amplifier**
 - extended range solid state output for modern PA or QSK
 - relay isolated output capable to key vintage PA with negative keying
- ♦ **Footswitch input with programmable functions**
 - programmable PTT assertion delay in 1ms steps
 - selectable muting of CW and/or FSK when footswitch is closed
- ♦ **Programmable second PTT output for extended keying capabilities**
 - PTT2 output for digital modes with "muted mic" function
- ♦ **Hot Switch protection with user defined timing**
 - T/R sequencer for PTT keying outputs
 - unique, hot switch protected FSK keying
- ♦ **Strong RFI immunity**
 - integrated chokes and filters for best RFI immunity
 - advanced shielding and circuit design for RFI product suppression
- ♦ **Connections:**
 - USB, Sound Card - 3 x 3.5mm (1/8"), Microphone - RJ45, Radio - DB37
 - Paddle - 1/4", PS/2 - MiniDIN6, Footswitch - RCA, Amplifier keying - RCA
- ♦ **Dual color LEDs for easy visual feedback of CW/FSK and PTT1/PTT2**
- ♦ **Metal/Aluminum case, powder coated and silk screened**
- ♦ **Free, time unlimited, firmware/software upgrades via Internet**

7. PRINCIPLES OF OPERATION

micro KEYER ("MK") is an all mode interface between computer and transceiver.



The computer is connected to MK using three (3) standard audio cables and one A-B USB cable. All these cables are included to the MK pack.

The transceiver and MK are connected by single radio cable terminated on one side by a DB37M and on the other side by the appropriate plugs for the specific transceiver model. The cable carries power for MK, audio, CAT control and keying. A separate cable from the DB37 connects to the transceiver's microphone jack.

The remaining connectors on the rear panel of the MK support optional accessories like footswitch, paddle, microphone, and keypad.

MK works with or without a computer. Switching between modes is fully automatic.

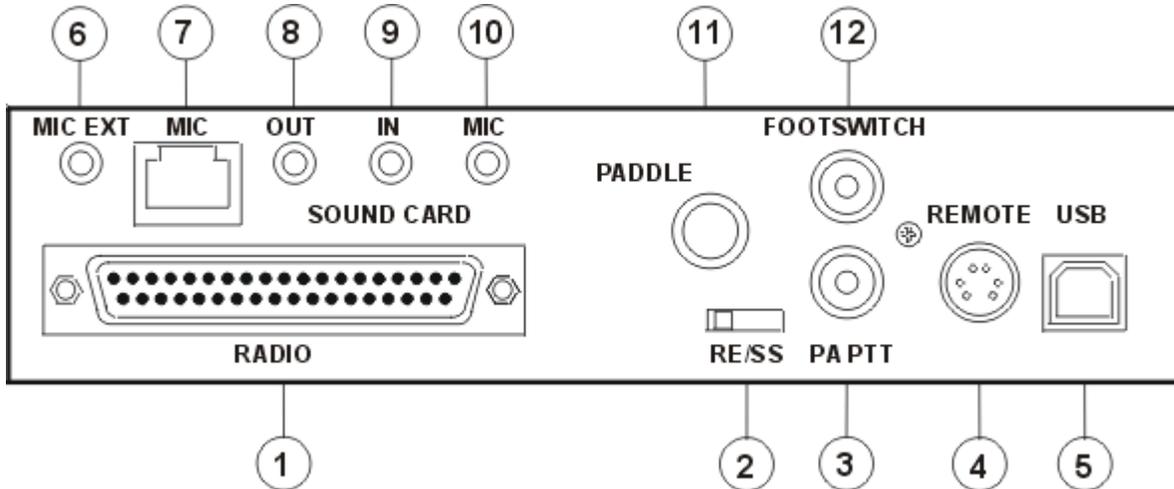
If a computer is not connected or not running MK uses customizable "power up" settings. In this mode MK functions as a CW memory keyer with a PS/2 keypad, drives all PTT outputs and provides a PTT sequencer controlled by the footswitch or microphone PTT. With an external PS/2 style keyboard MK also provides keyboard generated CW and RTTY.

If a Windows PC running the "microHAM USB Device Router" program is connected, MK also functions as a computer interface. It transfers all digital and analog signals generated by the computer logging program between the computer and transceiver. Software compatibility is insured by using virtual serial ports. Router continuously monitors these virtual ports, logs every event on them and transfers all these events via USB to the MK. MK processes this data and sends it to the physical ports of transceiver as CAT, CW, FSK, and PTT functions.

8. PANEL DESCRIPTION

All connectors for connecting the computer, radio and accessories are located on the rear panel.

8.1 REAR PANEL



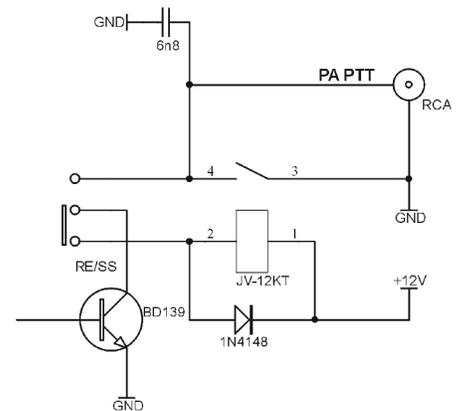
(1) – RADIO: DB37F connector for radio interconnection – a detailed description is in Appendix A

(2) – RE/SS: PA output mode switch for PA output.

RE - Relay contact

SS - Transistor collector

If the slide switch is in SS position, open collector of the switching transistor is wired to the PAPT output jack. The transistor can switch up to 48V/1.5A. This position is appropriate for all modern Power Amplifiers with electronic keying. Check manual of your PA if grounding of key input will switch PA to the TX state. Also check the power rating of this input to be sure it does not exceed transistor rating. Otherwise move slider switch to the RE position. This position connects the relay contact to the PA PTT RCA. Maximum rating for the relay is: 125VAC/2A or 60VDC/2A.



TIP: If you are not sure about keying voltage of your amplifier, use the RE position.

(3) - PA PTT: PTT output for Power Amplifier. Output depends on RE/SS switch position.

RCA jack

TIP - Signal

SHELL - GND

(4) – REMOTE: MiniDIN6 for PS/2 keyboard or PS/2 keypad.

This connector also provides an interface for a future SO2R Extension box.

(5) – USB: USB B connector for computer connection. Connect a standard USB A-B cable.

- (6) - MIC EXT:** 3.5mm (1/8") connector for external microphone input.
TIP - Microphone input
RING - NC
SHELL - Microphone Ground

Note: When using the 3.5mm connector, the RJ45 microphone input is muted, but all controls from the microphone connected to RJ45 (buttons, PTT) will work.

- (7) – MIC:** RJ45 jack for microphone.
If the original radio microphone uses a connector other than an RJ45 an adapter is provided in the cable set. All microphone controls are connected to the DB37 Radio connector (pins 12-15 and 30-33)

- (8) - LINE OUT:** 3.5mm (1/8") jack – connects to **sound card Line Out**
TIP - Signal
RING - NC
SHELL - Signal Ground

- (9) - LINE IN:** 3.5mm (1/8") jack – connects to **sound card Line In**
TIP - Signal
RING - NC
SHELL - Signal Ground

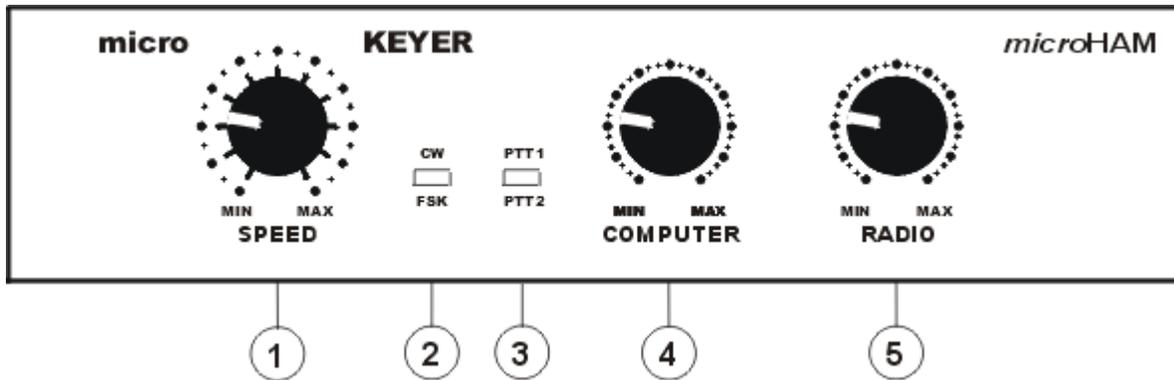
- (10) - MIC IN:** 3.5mm (1/8") jack – connects to **sound card Mic In**
TIP - Signal
SHELL - Signal Ground

- (11) – PADDLE:** 6.3mm (1/4") stereo female for paddle input.
TIP - DIT
RING - DAH
SHELL - GND

Note: The paddle sense can be reversed using Router settings

- (12) – FOOTSWITCH:** RCA foot switch input. Active when closed to ground.
TIP - Signal
SHELL - GND

8.2 FRONT PANEL



(1) – **SPEED:** CW Keyer Speed. Range (MIN, MAX) is defined by software

(2) - **CW/FSK LED**

RED color indicates when CW keying line is active
GREEN color indicates when FSK keying line is active

(3) - **PTT1/PTT2**

RED color indicates when PTT1 (front) is active
GREEN color indicates when PTT2 (rear) is active
YELLOW color indicates when both PTT1 + PTT2 are active

(4) – **COMPUTER:** Adjusts level to the computer sound card LINE IN

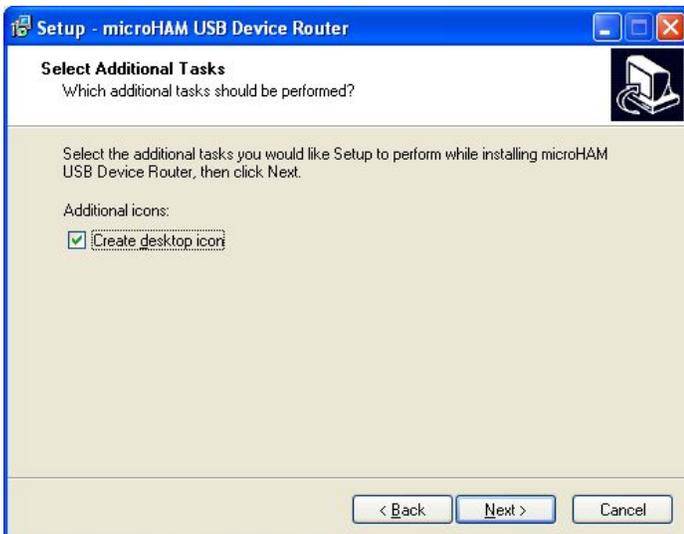
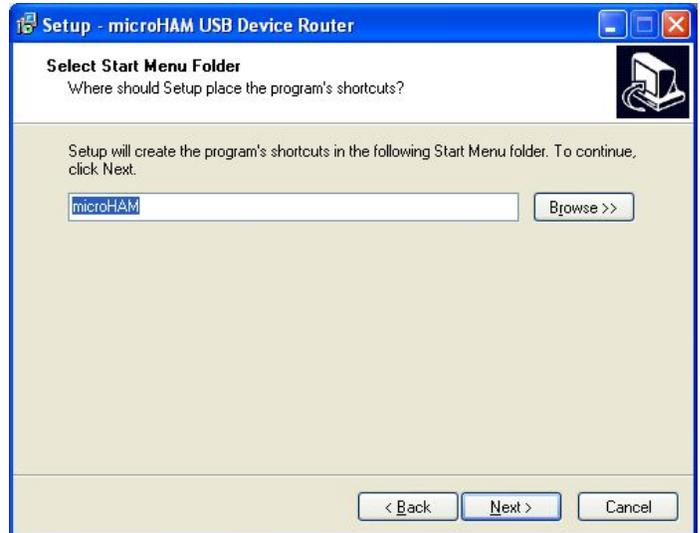
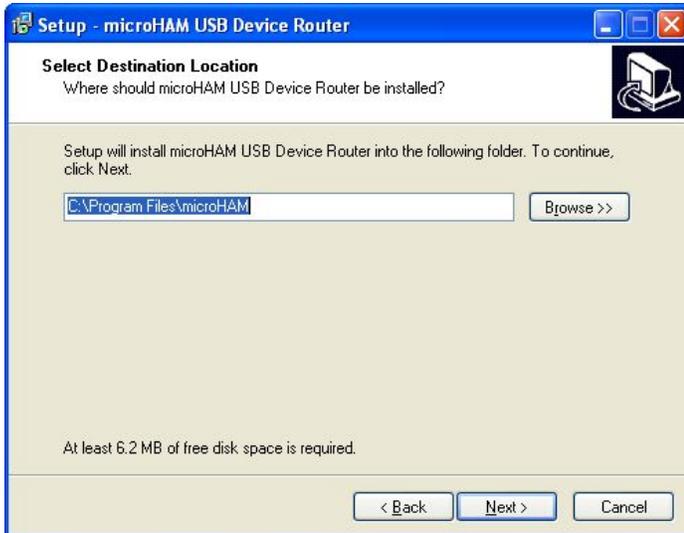
(5) – **RADIO:** Adjusts level to the transceiver AF IN and Microphone inputs

9. SOFTWARE INSTALLATION

Software installation is divided into the two parts. First part is installation of **USB Device Router** control program and second part is a **USB driver** installation.

9.1 USB DEVICE ROUTER

To install Router click on **Install USB Device Router** link on installation CD or launch downloaded installation package "urouter_release_xx_xx.exe" (xx_xx is version) to start the installation.

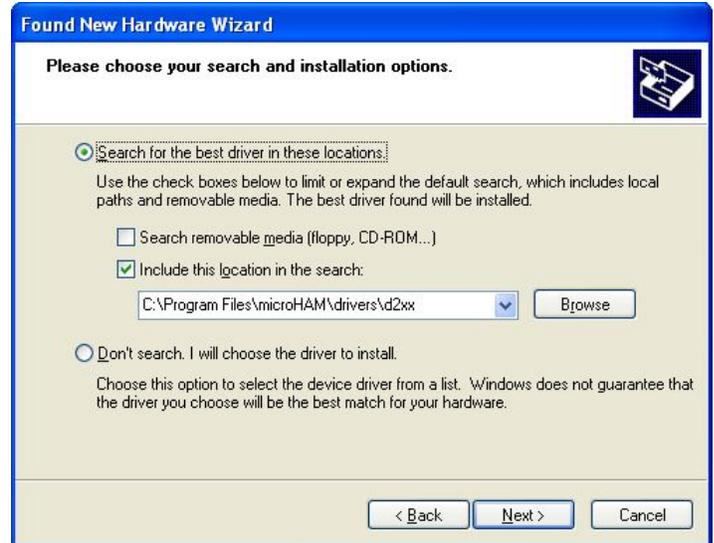


9.2 USB DRIVER

1. Connect the USB cable to the microKeyer USB jack (5), plug the other end of the USB cable into the computer USB port. Leave all other cables (including the DB-37) unconnected.
2. The automatic Wizard will appear, insert the installation CD into the CDROM drive and click next. If you have previously installed Router, you can click Install from specific location and use the path to the Router installation directory. The default path is: `C:\Program Files\microHAM\drivers\d2xx`
3. Wait until driver is copied. During installation on Windows XP a driver certification dialog will appear. Ignore this message and click "Continue Anyway".



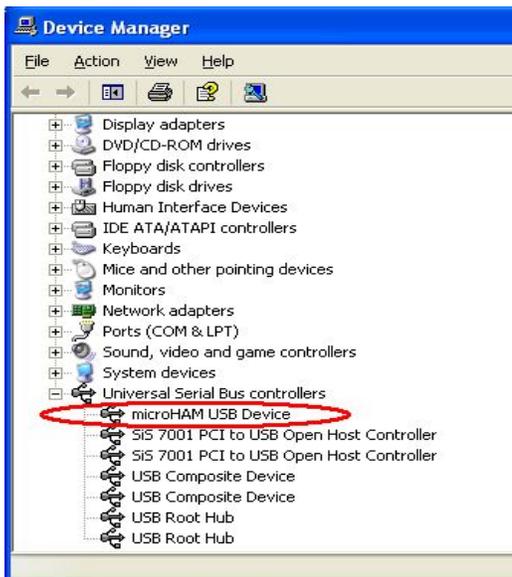
Driver installation from supplied CD



Driver installation from specific directory, after successful installation of USB Device Router



4. After successful USB driver installation you should see a MK driver in Windows Device Manager without any exclamation mark.



10. HARDWARE INSTALLATION

10.1 CONNECTING THE COMPUTER

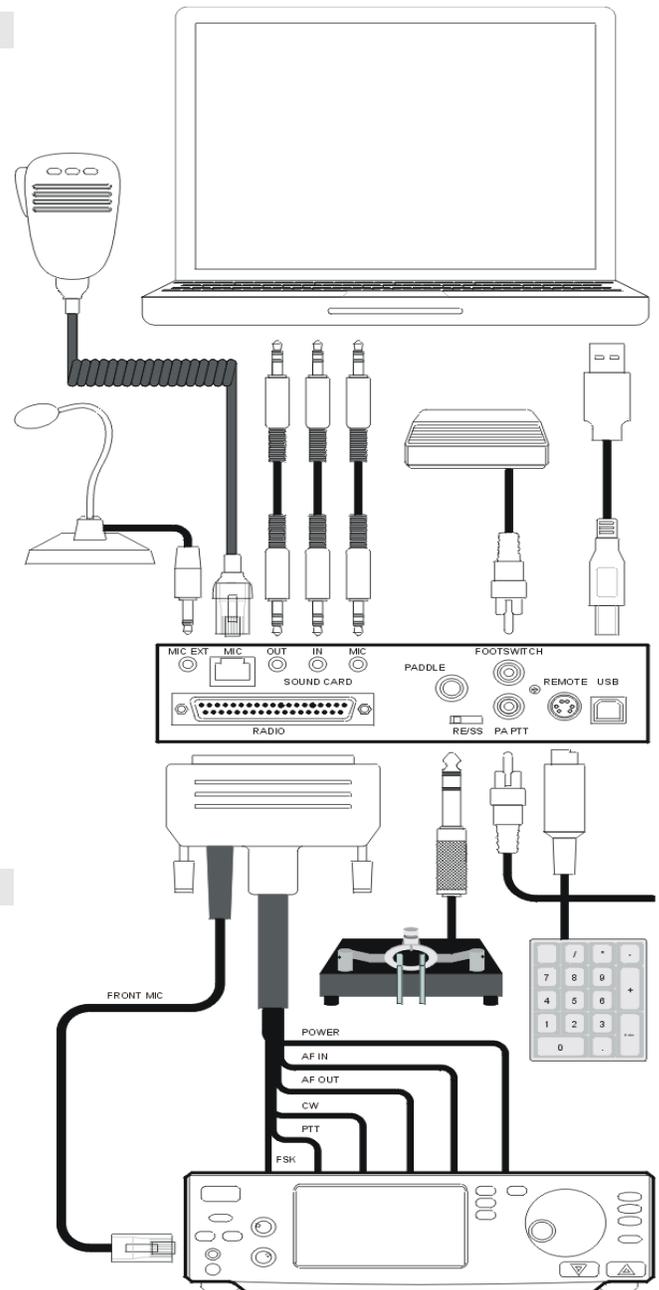
1. Plug provided audio cables to the sound card and to the micro KEYS rear panel jacks. There are three (3) identical cables.
 - A - Sound Card Line OUT to the MK rear panel Sound card OUT jack (8)
 - B - Sound Card Line IN to the MK rear panel Sound card IN jack (9)
 - C - Sound Card Line MIC IN to the MK rear panel Sound card MIC jack (10)

TIP: If your computer has only "Speaker/Phones" and "Microphone" jacks, connect MK OUT to "Speaker/Phones" and MK IN to "Microphone" jack.

10.2 CONNECTING THE TRANSCEIVER

1. Turn transceiver and transceiver power supply OFF
2. Plug radio cable DB37 connector to the MK DB37 jack
3. Plug ALL connectors from the cable set to the appropriate jacks at the rear panel of your transceiver. Each plug coming from radio cable is marked same as the matching jack on your transceiver
4. Plug microphone cable coming from the DB37 plug of the radio cable to the transceiver front panel microphone jack
5. Plug your original microphone to the MK RJ45 jack located at the MK rear panel
6. If radio cable ends with leads for external power, connect these leads to a 12-16V DC power supply. **Be sure to observe the proper polarity.**
7. Turn transceiver power supply and transceiver ON. If MK is powered from an external supply turn this supply on.

Within two seconds the green FSK LED will blink once: this means that all MK parameters have been loaded from nonvolatile memory and MK is ready for operation.



10.3 CONNECTING ACCESSORIES

1. Plug a paddle to the PADDLE jack (11)

If the paddles are reversed you can correct it by settings in USB Device Router program described below.
2. Plug footswitch to the FOOTSWITCH jack (12)
3. Plug Power Amplifier keying line to the PAPT jack (3). Be sure that you have correctly set the RE/SS (2) slide switch described at page 7.
4. Plug PS/2 keyboard or PS/2 keypad to the REMOTE (4) jack.

11. SOFTWARE SETUP - USB DEVICE ROUTER

MicroHAM USB Device Router (Router) is a program providing *configuration tool for microHAM USB Devices (micro KEYER and USB Interfaces) and software interface* to another applications (loggers). The software interface is provided as *Virtual Serial Ports*.

To use the MK with any Windows based logging program (and configure it) it is necessary to have installed the USB driver and started the Router. With Router running, it is configured to match the requirements of the application software (logger, digital mode package, voice keyer, etc.).

11.1 MICRO KEYER STATUS



When the USB driver is installed correctly and the MK is powered from a radio or external 12V DC supply Router will show a device tab with a **GREEN** check beside the device name (micro Keyer).

Only when the check is green is the USB driver properly installed and Router communicating with micro Keyer. DO NOT proceed with the setup process until you have a green check.



When Router shows a **YELLOW** "X" instead of a green ✓, it means the Router sees the USB part of the micro KEYER (the USB driver is correctly installed) but is not communicating with MK.

This indicates MK is not receiving power from the radio or external supply.



When Router shows a **RED** "X" instead of a green ✓, it means the device is disconnected and Router does not see the USB part of the micro KEYER.

This happens when the USB cable is unplugged or the USB driver is not correctly installed.

12. INITIAL SETUP



Router must be used to configure microKEYER to function properly. The device configuration tabs (in the red rectangle) are used to setup each part of the MK.

12.1 TRANSCEIVER MODEL SETUP

First, it is necessary to select the radio model. Click the **Ports** tab and then the **Set** button. A new window titled “**micro Keyer. RADIO1**” will appear. Select your radio in the **Radio** combo box. Then select communication speed in the **Baud rate** combo box. Please note: Baud rate must match the requirements of your radio. All Icom and many TenTec radios require the appropriate **CI-V address** (use the information from **Setup hints** window). If everything is configured properly, your radio’s current operating frequency and mode should be displayed.

Configure your radio parameters as described in the **Setup hints** window. These parameters are different for each radio and can be set in radio menu. Check your transceiver manual for information on configuring your radio.

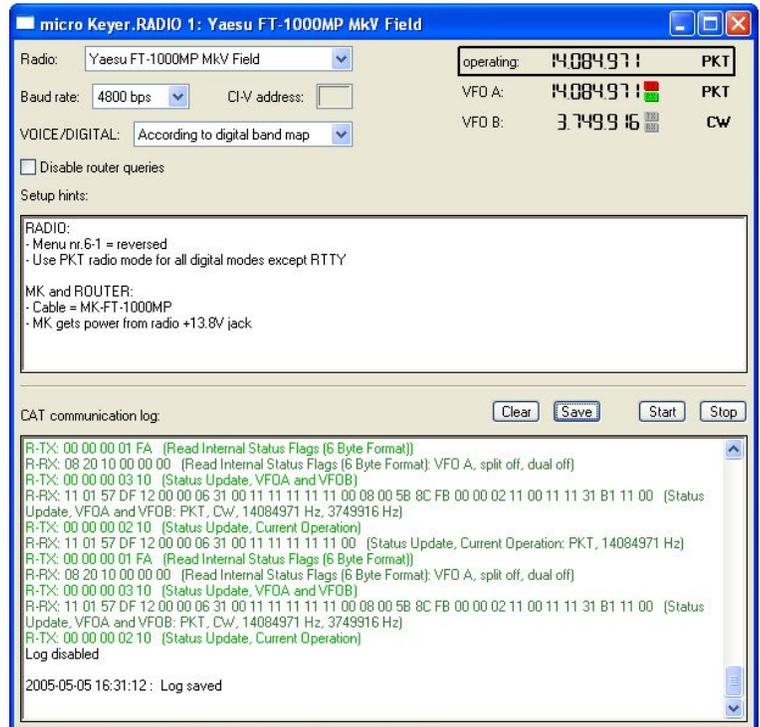
There is a special combo box called **VOICE/DIGITAL**. These settings are used for switching between VOICE and DIGITAL (AFSK) operation under special circumstances.

MK reads the frequency and mode of the radio from the serial port. Unfortunately, the protocol implementation in some radios does not detect digital mode operation using AFSK, PSK or other special modes not implemented in the radio. In those cases, digital operation must use voice modes (USB, LSB or FM). Even though this information is not available, Router can be configured to apply the digital mode configuration settings instead of the settings for voice mode under certain circumstances.

When Router detects USB, LSB or FM operation, the **VOICE/DIGITAL** combo box will control whether the Digital or Voice configuration will be applied:

- **Always VOICE:** VOICE settings will be used regardless of detected frequency.
- **Always DIGITAL:** DIGITAL settings will be used regardless of detected frequency.
- **According to Digital Band Map:** Router will automatically select DIGITAL settings when detecting a frequency inside the "Digital Modes" frequency boundaries. These boundaries can be fully customized in the Band Map by clicking: **Router | Options | Digital Band Map**.

Disable router queries – When this box checked, Router will not poll the radio for missing information about VFO's, operating frequencies and modes when that information is not available from monitoring the communication between logger and radio.



12.2 FUNCTION CHECK

Basic functionality can be checked with the **Test** buttons, located on **Ports** tab.

FSK - test button sends ten (10) RY characters at 45.45 5/N/1.5 to the MK FSK output. The green arrow in the Router should blink together with the green FSK led on MK front panel. When radio is in the RTTY mode and is manually keyed to transmit, characters will be transmitted.

2nd FSK - test button sends ten (10) RY characters at 45.45 5/N/1.5 to the MK FSK output. The green arrow in the Router should blink together with the green FSK led on MK front panel. When radio is in the RTTY mode and is manually keyed to transmit, characters will be transmitted.

CW - test button keys the MK CW output. The red arrow in the Router and the red CW LED on the MK front panel should light continuously. When radio is in the CW mode and is manually keyed (or break-in is enabled) a continuous CW carrier will be transmitted.

PTT - test button keys the MK PTT outputs. The PTT line that is keyed depends on the Serial port PTT settings on the **PTT/FSK** tab.

1. When CW, VOICE is chosen (PTT1 - hardwired to radio MIC jack) then red arrow in the Router and the red PTT1 led at a MK front panel should light continuously.
2. When FSK, DIGITAL is chosen (PTT2 - hardwired to radio rear jack) then the green arrow in the Router and the green PTT2 led at a MK front panel should light continuously.
3. When QSK CW, Voice VOX is chosen then no arrow nor PTT led should light. Note: relays inside the MK may still "tick" because of audio switching.

If the PA PTT box is checked then the PAPTT signal for Power Amplifier will be generated on the MK rear panel RCA jack.

WinKey - test button sends "TEST" at 1200 8/N/2 to the internal WinKey chip. As a result, morse "TEST" string will be played from WinKey at the speed set by the SPEED knob on the MK front panel. Both red and green arrows in the Router should light for a while (red longer) indicating data transfer to the WinKey (green) and receiving echo from the WinKey chip back (red).

Foot Switch - when the footswitch or hand mic PTT button is closed, the red arrow should light until the footswitch or hand mic PTT button is released.

12.3 POWER-UP SETTINGS

MK uses two types of settings - Power-up settings and the Router settings.

Normally when Router connects to MK, the last used settings by the Router are immediately restored to the MK. When Router not running (computer is turned off) the special MK internal power-up settings are applied.

To assure proper operation of micro KEYER when the computer is off, it is necessary to set and store (default) power-up settings to the MK non-volatile memory.

1. Click on **Audio** tab and select **FIXED** Audio switching and choose **CW (AAA)** audio routing. AAA routing assures that the microphone will be connected directly to the radio. AAA settings also assure quiet operation, only the PAPTT relay ticks.
2. Click on **CW/WinKey** tab and setup internal CW keyer by your requirements. For QSK operation uncheck **Generate PTT1** box. All settings are applied immediately after each parameter changes. A full description of WinKey parameters settings is described at WinKey manual available on author website <http://www.k1el.com> A short description of the important parameters may be found in Section 15.4.

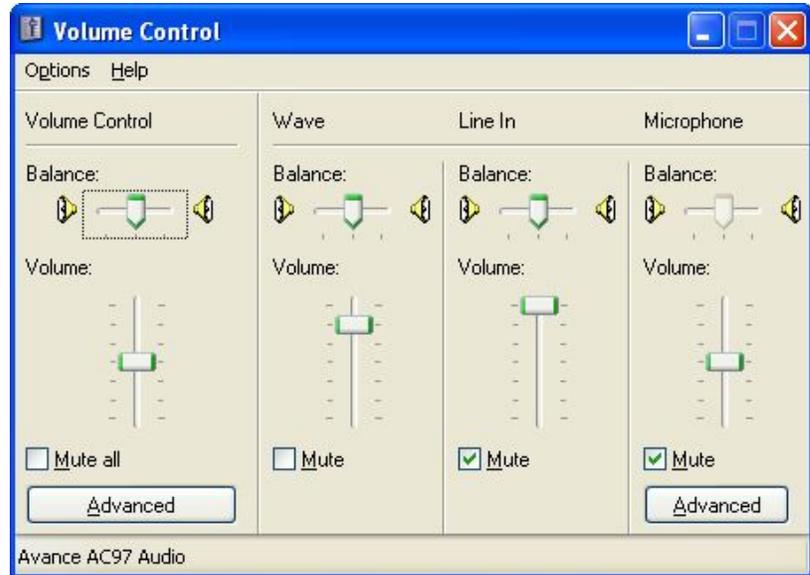
When finished, click on menu item **Device | Store as Power-up Settings**.

12.4 COMPUTER SOUND CARD SETUP

Sound card configuration depends on the capability of your application software. Some software can directly drive the sound mixer controls and settings. Several can also control the sound card differently based on the current operating mode.

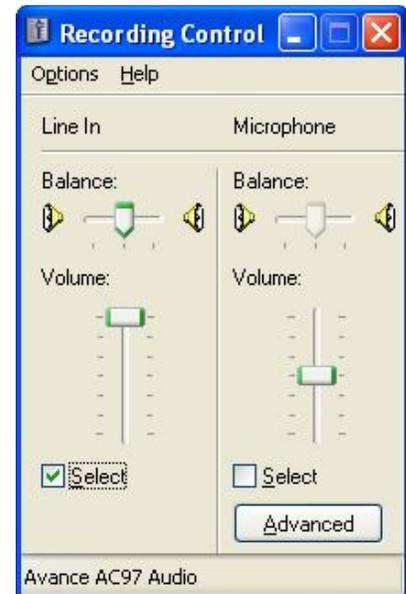
Transmit Levels

1. Push **TX Levels** button at the Router Audio tab, choose **Options | Properties** in Mixer and select Sound Card used by micro KEYER
2. Check "Volume Control, Wave, Line In and Microphone".
3. Move Volume slider to one between one quarter and half and Wave to about 90%.
4. Be sure that these two controls are not muted.
5. Be sure that the Line In and Microphone controls are muted. Under special circumstance is required to not mute "Microphone" control. When is described later in this section.



Receive Levels

1. Push **RX Levels** button at the Router at Audio tab. Choose **Options | Properties** in Mixer and select Sound Card used by micro KEYER
2. Check "Line In" and "Microphone"
3. Move Line In slider to max and Microphone slider to about 50%.
4. Select Line In
5. If your soundcard supports advanced controls, turn them on.
6. Check if you have turned off "Boost 20dB" function for microphone. Under special circumstance "Boost 20dB" function need to be on. When is described later in this section.



TIP: If your computer sound card does not have a line input, ignore Line In settings and use the Mic input instead.

TIP: The TX Level and RX Level buttons invoke the mixer for the Windows Default sound card. If you have more than one sound card be sure to use the Options | Properties | Mixer Device dialog in the Volume Control or Recording Control window to select the proper card.

12.5 MICROPHONE

Inside the MK on the left side of the top PCB there are two jumpers for selection of integrated preamplifier. This preamplifier is inserted between microphone attached to the RJ45 MIC jack or EXT MIC jack and the computer MIC IN input. Turn this preamplifier ON for Heil, Kenwood and Yaesu dynamic microphones. Keep preamp OFF (bypass) for electret microphones like those used with Icom radios. The preamplifier is bypassed when MK is shipped from the factory.

Dynamic microphones (Heil, Kenwood, Yaesu)

The sound card microphone input is usually not sensitive enough for low level dynamic microphones. A special function of some sound cards called "Boost 20dB" can improve situation in many but not all cases. If the signal level is not sufficient with 'Boost 20dB' enabled, the integrated microphone preamplifier should be turned on.

To enable pre-amplifier move **two** internal jumpers to the side positions marked as **(2-2)** on board. The preamplifier is powered from the bias voltage presented at the microphone jack of the sound card.

Please note: the preamplifier is between the microphone and the SOUND CARD microphone jack, not between the microphone and the transceiver Mic jack.

TIP: When microphone preamp is enabled, sound card "Boost 20dB" function must be turned OFF !

Electret microphones (Icom)

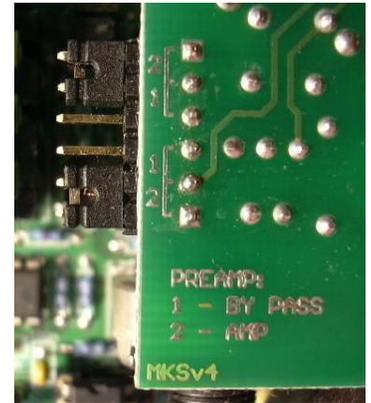
The sound card microphone input works very well with electret microphones and also provides bias voltage required for powering electret element. Turning on the internal MK preamplifier is useless and prevents powering the element from the computer. To disable pre-amplifier move **two** internal jumpers to the central position marked as **(1-1)**. By default factory settings, this preamplifier is bypassed.

Electret microphone and Radio with dynamic microphone input or Dynamic microphone and Radio with electret microphone input.

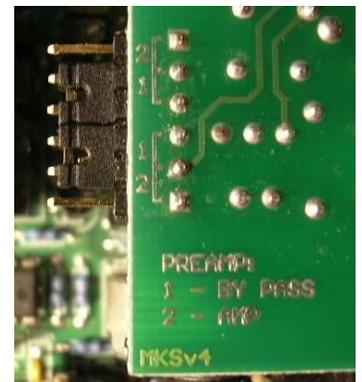
Even though these configurations will not work if the microphone is directly plugged to the radio, MK can enable these configurations in conjunction with a duplex sound card.

The microphone should be plugged to the EXT MIC jack and preamp should be off for electret microphones or on for dynamic microphones. Router audio settings must be **CCC** and the Microphone control on sound card mixer playback setting (TX levels) should not be muted.

Please note, enabling microphone in the "playback" mixer is good only for this special circumstance and only for VOICE modes. It also allows additional computer voice processing before microphone audio reaches the radio. For digital mode operation the microphone must be muted in the playback settings! This setup works only when the computer is turned on and Router running.



Preamplifier ON



Preamplifier OFF

12.6 MK AND TRANSCEIVER DRIVING LEVELS

There are two knobs on the MK front panel for adjusting audio levels.

The one marked **COMPUTER** adjusts the level of audio signal level from the radio to the computer **LINE IN** input. The one marked **RADIO** provides adjustment of the audio signal level from the sound card to the transceiver **AF IN** or **MIC** jack.

Because transceiver AF IN and MIC IN inputs for some radios require different levels, the additional attenuation for MIC IN is set with the **trimmer** accessed through the small hole located at the right side of the MK. The additional attenuation is applied only when audio routing **C** is selected in the Router - **Audio** tab.

Several tips from Geoff Anderson, G3NPA:

TIP: If you have achieved the correct settings for the transmit levels, you will see that changing from the PSK tuning tone to typing text, will make the transmitter power swing from 50% (no typing) to 100% (typing or tuning-tone) as observed on an rms or average reading meter. This change in power is correct. If you do NOT see this 50% change (or greater), then you are probably overdriving the radio. Please note that some radios have inbuilt power meters which give a PEAK reading and therefore the change in level discussed above will not be observed.

TIP: Although it is a common belief to the contrary, it is in fact quite alright to let the transmitter ALC line operate on PSK31. The ALC line will control the drive level without clipping in the same way that it does on voice operation.

TIP: It is advisable NOT to have the software sliders for the tx audio at max - indeed less than half is better. The reason for this is that some soundcards generate a considerable amount of distortion in themselves - and this can be reduced by simply reducing the output level. Also, make sure that any "effects" that the soundcard is capable of producing (like echo) are turned OFF

TIP: Don't fall into the trap of thinking that because the transmit signal on the waterfall looks good that your actual signal is ok. All the waterfall is showing during transmit is the local audio and NOT the resultant transmitted signal.

13. INTERGRATION WITH LOGGING AND CONTROL PROGRAMS

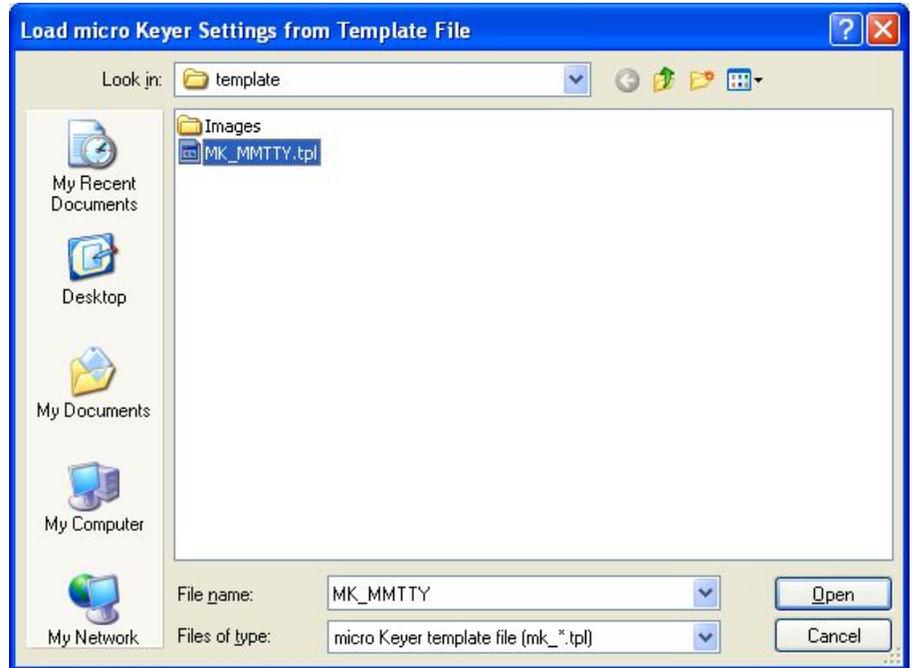
There are two methods of Router integration with logging programs. Automatic by using **templates** and **manual**.

13.1 INTEGRATION USING TEMPLATES

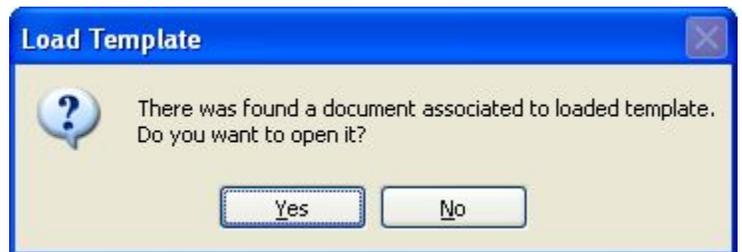
Templates assure the easiest way to integrate Router and the MK with your favorite software. A template is a special file containing all Router settings. With the template file is an HTML help file. This help file contains screen shots and instructions for setting up the application.

Router is configured automatically, but the application must be configured manually by instructions in the associated template help file.

Basic templates for many popular applications are included with the Router. Updated templates can be obtained from microHAM [downloads page](#)



To load template click on menu item **Device | Load Template**. Once you are sure that the settings works as should and you not need to customize anything, save settings to the **Preset**. Presets will allow you to easy and fast changing between Router settings for different loggers. More about Presets you can read at the Presets chapter 14.2.



13.2 MANUAL INTERGRATION

Correct manual setup requires knowing how a particular application manages the peripherals (Radio, CW, PTT, FSK, Sound Card) and knowledge of Router and micro KEYER operation.

MK and Router operation and the definition of each setting is described in the following chapters.

14. USB DEVICE ROUTER - GENERAL SETTINGS

General Router settings can be invoked by clicking on Router main menu.

14.1 ROUTER MENU

Restore Router Settings: used to restore settings from urs file previously created by the backup command below. This action will delete all current settings of the Router including presets, use it carefully ! A urs file can be used only on the system which generated the file (the file contains the unit serial number) on computer with same port assignments.

Backup Router Settings: Should be used to create backup urs file. This file contains Router settings for all Devices including Presets.

Options | General - Load Router on Start-up: When is checked Router will be automatically loaded after each computer reboot.

Options | General - Start Router Minimized: When is checked Router is started minimized.

Options | Digital Band Map: Customizable band boundaries for the digital modes used for automatically selecting VOICE/DIGITAL settings as described in Chapter 12.1

Minimize: Clicking this will minimize Router window to system tray at the bottom right corner of the desktop.

TIP: When Router is minimized you can restore it by double-clicking on the Router tray icon.

Exit: Clicking on this item will terminate Router.

Note: when Router is terminated application software cannot communicate with MK and the radio.

14.2 PRESET MENU

The requirements of each application (logging, control and digital mode programs) are different and each program handles radio control, CW / PTT keying, and the sound card for automated voice operation or digital modes its own way. It is difficult to find one universal setting for all applications – what works for one may not work properly with another. To get maximum performance from MK, the settings for each application should be customized.

For easy switching between different settings, router has built-in configurable **Presets**. Different MK settings can be stored to these presets and recalled almost instantly simply by clicking on the preset button.

Each preset contains the settings for all devices connected and controlled by Router. For example, if Router controls two MK's and two USB Interfaces, each preset remembers settings for all four devices including the assignment of COM ports and the contents of their sub tabs except contents of the Messages tab.

There are several ways to apply a preset once it is created:

1. Click on menu item **Preset** and select the desired preset from the pull-down menu.
2. Click on a preset button. To have buttons visible in Router, **Preset | Show Buttons** must be checked. When the settings from a preset are applied a green light located in the preset button is lit. This green light lit **ONLY** when all settings in Router are same as were stored in preset. If some parameter is changed, light is turned off, indicating that the current settings are not same as stored in the preset.



3. By right clicking on the system tray icon when the Router is minimized.

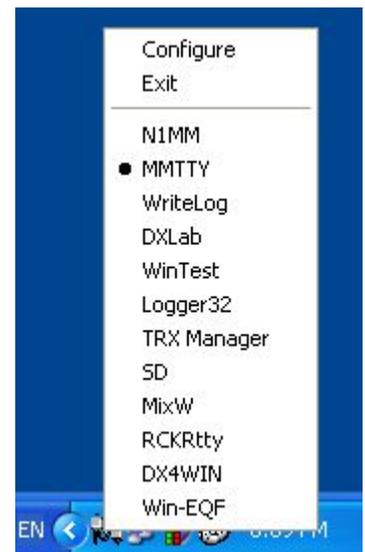
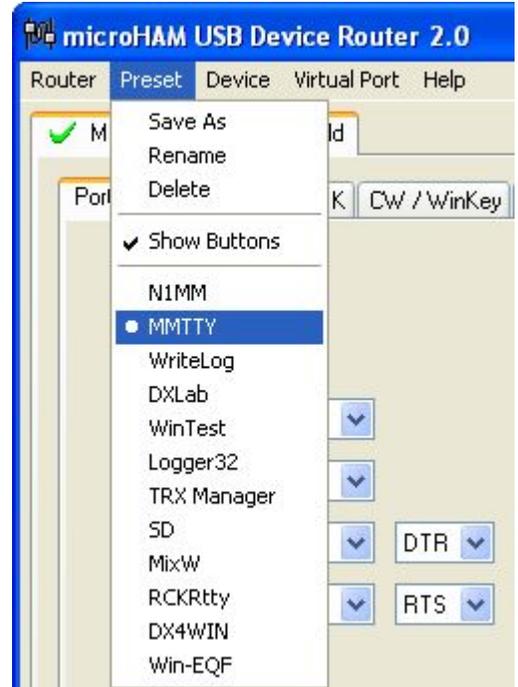
All presets and the current router configuration is stored to the registry when Router is closed and recalled when Router is loaded.

Save as - Saves the current Router settings to a preset for future use.

Rename - Allows renaming of an existing preset.

Delete - Delete chosen preset.

Show buttons - When is checked Router shows preset buttons at the bottom of the window.



14.3 DEVICE MENU

Router can control several devices. This allows configuring the settings for all connected devices at one time by using the Presets described in 14.2

Each device has its own tab (page) in the main Router notebook. The content of a device tab depends on device type. Adding a device is automatic the first time Router detects a supported device (USB driver). Once detected, a device remains in Router even though device is disconnected. Each device is identified by product identification number and a unique serial string.

Rename – Creates a custom device name. This is useful if two or more devices are connected to the Router. For example two micro Keyers and USB Interface can be renamed to more identifiable names as shown here..



Delete - Removes a device from the Router. Only disconnected devices with a **RED "X"** on device tab can be removed. To disconnect MK from the Router, unplug the USB cable from the computer or MK.

Load Template – Menu item for automatically configuring Router from a template (*.tpl file). When clicked, Router opens a standard File Load dialog window and the desired template can be chosen. Router loads templates from the template directory, by default located at: *C:\Program Files\microHAM\template*. When Router loads a template, it looks for an *html* file with the same name as the template in the same directory. If such file is found it is displayed. If Router fails to find an *html* file, it will look for a *txt* file with the same file name as template in same directory. If such file is found it is displayed.

Save Template - Menu item for saving current Router settings to template file. After click Router opens standard File Save dialog window. Router saves template to the template directory, by default located at: *C:\Program Files\microHAM\template*. An explanation text *txt* or *html* file can be added to the saved template manually. The explanation file must have the same name as a template file and must be located in the same directory.

Templates are a powerful tool for quickly configuring Router to work with a particular application or another purposes. Template files are interchangeable between different computers and transceivers and can be well used to clone setups when using the same logger in multi computer stations or for sharing custom setups between users.

Store as Power-up settings – Will store the current settings of the Audio, PTT/FSK, and the WinKey tab to the MK internal non-volatile EEPROM memory. If micro Keyer is powered-up without connection to computer it will use the settings stored in EEPROM. If an operating MK is connected to a computer (or Router loaded on the computer), the power-up settings will be overridden by the Router settings but the default settings are retained in EEPROM.

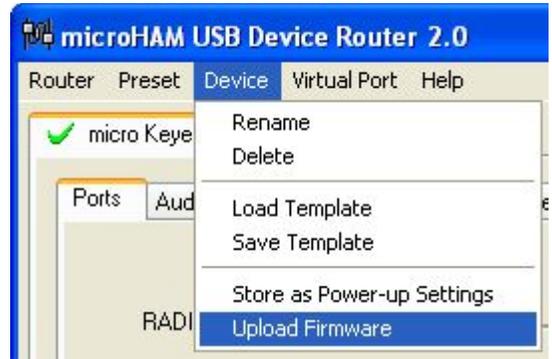
Suggested power-up settings are described in Section 12.3.

Upload Firmware – The operation of MK is controlled by an internal program stored as *firmware* in the microcontroller. Thanks to the FLASH core technology of the internal microcontroller, changing firmware is

as easy as installing new version of the computer software. You will not need to have any special hardware or software. Firmware updates can be downloaded from our website and uploaded to MK from from the Router.

MK firmware can be upgraded using menu command **Device | Upload Firmware**.

The firmware version is checked automatically by the Router at MK power up and if a newer version has been saved in the default directory, typically *C:\Program Files\microHAM\firmware*, Router will update MK automatically.



14.4 VIRTUAL PORT MENU

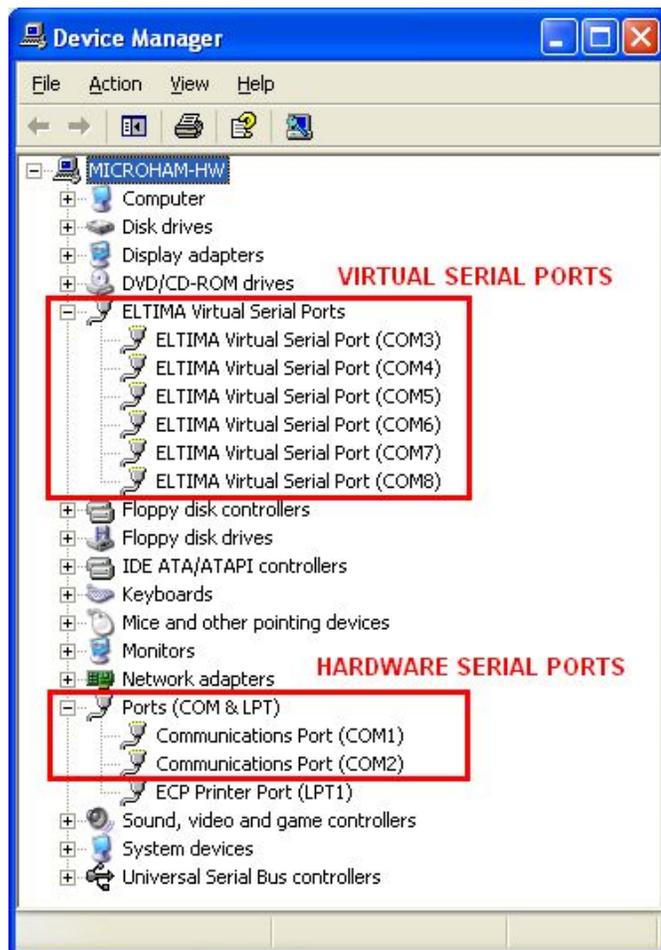
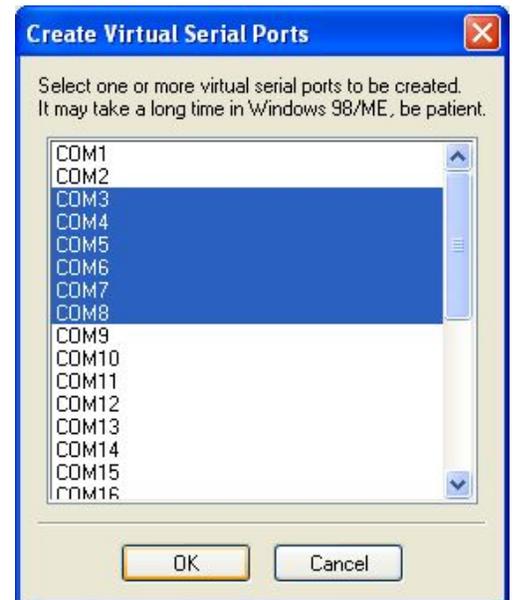
It is necessary to create several virtual serial ports (COM ports) because this is the only way an application (logging, control or digital mode programs) can access microHAM devices. By using templates, the necessary virtual ports are created automatically. However, virtual ports can be created manually as well.

Create - Creates virtual COM ports. It is possible to select more ports at once by holding *Ctrl* key on keyboard and clicking on COM port numbers. Creating of virtual port may take a long time (several tens of seconds) on Windows 98/ME, be patient.

Delete - Deletes any single virtual port.

Delete All - Deletes all previously created virtual ports.

Do not delete a virtual port until all applications using that port have been closed.



TIP: In order to avoid conflicts, do not use the number of COM ports that are already defined in Windows (hardware COM port or virtual COM port from another USB -> serial adapter).

Successfully created Virtual Serial Ports can be reviewed in Device Manager, under the ELTIMA folder. In Win98SE the ports are under the PORTS folder with "Null" copy.

Properly working ports should not display an exclamation mark (!).

14.5 HELP MENU

micro KEYER manual - Link to this document

microHAM Home Page - Link to our website

microHAM Downloads page - Link to our download page where updates for our products may be obtained.

Show Tooltips - When is checked, small, single line help is displayed below the mouse cursor after a second.

About - Shows full Router version

15. DEVICE CONFIGURATION TABS

There are five (5) tabs for configuring MK. Each tab is dedicated for setup of particular part of the MK. Any change to the first four (4) tabs are applied immediately to MK. Changes in Messages are NOT applied automatically. To store them use buttons **Store** or **Store All**.

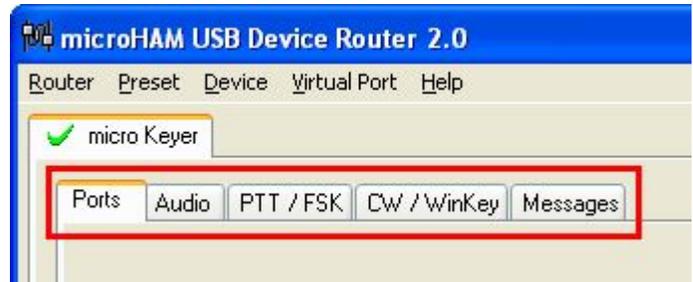
Ports - used to assign virtual ports to the MK channels used by applications.

Audio - used to configure audio routing based on operator preference, application sound card handling and operating mode.

PTT/FSK - used to configure T/R keying, keying sequencer and FSK functions

CW/WinKey - used to configure the internal CW keyer, PTT from the CW keyer, and side tone.

Messages - configuring tab for MK internal CW memories maintenance.



15.1 PORTS

Once virtual ports are created they must be associated with a specific device channel (e.g. Control, FSK or PTT). These assignments should correspond to settings of the application software and must be configured first in Router then in the application (e.g., logging program, MMTTY, STREAM, etc.).

Proper configuration of the COM ports assignments in this tab is most important for intergration with loggers. Read following informations carefully.

MK has seven channels with online indication of the state and settings applied by the host application

- serial channel for Radio **Control** (uses serial data signals RX and TX of virtual COM port)
- serial channel for **FSK** (uses serial TX signal of virtual COM port)
- serial channel for 2nd **FSK** (uses serial TX signal of virtual COM port)
- serial channel for **WinKey** (uses serial data signals RX and TX of virtual COM port)
- **CW** channel (uses DTR or RTS signal of virtual COM port)
- **PTT** channel (uses DTR or RTS signal of virtual COM port)
- **Foot Switch** channel (uses one of CTS, DCD, DSR or RING signal of virtual COM port)

General note: Do not assign virtual ports to the channels which are not used by the application. It is unnecessary and only consumes resources. For example, MMTTY does not support WinKey or FootSwitch interrupt. Virtual ports on these channels are useless.

The WinKey, footswitch and FSK ports of the MK always works with attached accessories (paddles, keypad, footswitch) whether a virtual port has been assigned or not. Assigning a virtual port to those channels is necessary only for controlling the functions from a host application.

Note: Data transfer is intentionally suppressed for one second after opening a COM port or changing parameters. This is because several loggers improperly initialize ports which causes short keying pulses during initialization.

15.1.1 CONTROL CHANNEL

The control channel is used by the host application to control transceiver frequency, mode, T/R switching and many other parameters. The application communicates with the radio using a serial protocol. Most modern radios implement some form of serial control but almost every radio implementation is different. The amount of radio control depends on the particular application and radio.

TIP: The COM port number assigned in Router MUST match the port number assigned in the host application. First configure the virtual COM ports in Router then configure the application.

When COM port is assigned in the Router but not in the application (or no application is running) Router states channel as **closed**.

When an application opens the COM port assigned for control (usually at start-up), Router states channel as



open and displays settings used by the application. Router displays baud rate, data bits, parity and number of stop bits. For example, 4800 8N2 means: 4800 baud, 8 bits data length, parity = none, and two stop bits.

TIP: If the application permits, always configure the Radio Control port to use two stop bits. Communication is then a little bit slower (9%) but more reliable. Some radios require two stop bits by default.

Data flowing through the Control channel are indicated by two arrows. A green arrow indicates data flow from the host application to the radio and a red arrow indicates data flow from the radio to the application.

TIP: If the application provides for PTT (T/R) keying by serial control (CAT) turn this function OFF. If PTT by software is ON, MK cannot properly handle T/R sequencing and cannot protect your external devices as Power Amplifier or Antenna Switches from hot switching. There is a dedicated T/R switching channel for this purpose called PTT.

The virtual COM port assigned in the Router for radio Control channel can be shared with CW, PTT and/or Foot Switch channel (channels can use same virtual COM port), but such sharing is not recommended unless specifically supported by the application. Many applications do not know how to share the radio port with other functions and use the control lines (RTS, CTS, DTR, DTS) for handshaking or apply a fixed level.

To let the Router do automatic switching of various functions (Audio routing and PTT switching) based on frequency and mode, Router must know what radio model is connected to the MK. To configure radio click **Set** button as follows instructions from section 12.1.

At the bottom of the **Radio** window is a monitor of serial communication. This can be used by experienced users who know how to read protocol commands. The monitor uses colors to indicate who invokes communication. Black queries (TX) and grey radio responses (RX) are from the logger, green from/to Router. Green packets are not routed to the virtual serial port.

Router monitors the communication when the host application performs control and polls the radio periodically for all necessary information (VFO frequencies and mode). Because all applications do not poll the radio periodically or completely, Router must enter to this communication to update its internal state. When doing this, to avoid confusing the application, queries from the application are buffered and sent to the radio after Router receives a response to its latest query.

Because USB and virtual ports send data grouped in frames with a delay between frames, Router indicates frames by three dots (...). When a packet ends with three dots it means that the packet continues in next frame.

15.1.2 FSK CHANNEL

The FSK channel is used by the application program to send FSK keying signal. FSK is used primarily for RTTY. It is very important to understand the difference between FSK and AFSK.

FSK is a digital keying signal from the computer serial port (or external modem). This signal is used in the transceiver to generate a frequency shift. FSK must be supported by the transceiver (this mode is commonly labeled RTTY or FSK).

AFSK is a analog signal generated by the computer sound card (or external modem) used in the transceiver modulation circuits for operating digital modes as RTTY, PSK31, AMTOR etc. Computer sound card generated AFSK or PSK does not require special transceiver support and can be used in the LSB, USB or FM mode of the transceiver. Some radios have dedicated modes for AFSK (generally labeled PKT or DATA) with special features.

It is very important to properly adjust the audio drive level of an AFSK system so as to not overdrive the first transmit audio amplifier stage in the transceiver and produce a wide, distorted signal, full of intermodulation products. It is important to appreciate that distortion generated at this point due to overdrive CANNOT be reduced or eliminated by the reduction of the microphone gain control – it is the signal level that must be adjusted to be about the same as would be expected from a microphone. The microphone gain control then becomes a form of transmit power control.

An initial indication of proper audio drive level can be seen on the ALC meter of the radio. Provided that there is NO audio processing in circuit and that the microphone gain control is in its normal operating position, then, if the ALC does not show or just starts to indicate during transmission, the signal is likely to be clean. It is also important is to turn off the microphone compressor, ANY transmit audio equalizer, AND transmit DSP when AFSK is used. DO NOT use any form of digital modulation (sometimes called "Transmit DSP") with AFSK or PSK. Some transceiver bypass these circuits automatically when signal is routed to the rear audio jack instead of the microphone jack, but some do not (for example, the TS-850). MK always automatically routes AFSK signals to the rear transceiver jack for digital modes.

Edited by Geoff Anderson, G3NPA

Whenever possible, if your transceiver supports FSK, use FSK for RTTY. It's a only sure way to get a clean RTTY signal no matter the gain setting and compressor (processor) setting on your radio.

When a COM port is assigned to the FSK channel in Router but not in the application program (or no application is running), Router shows the channel as **closed**.

When an application opens the COM port (usually at start-up), Router shows channel as **open** and displays settings used to configure COM port. Router displays baud rate, data bits, parity and number of stop bits. For example, 45 5N1.5 means: 45 Baud, 5 data bits, parity = none, 1.5 stop bits.

TIP: If you see a baud rate other than 45 baud, the application is not configured correctly for normal RTTY operation.

The virtual COM port assigned in the Router for radio FSK channel can be shared with assignment for PTT (required in basic MMTTY settings). Do not share assigned COM port number with channels other than PTT.

FSK data flowing thru the channel are indicated by green arrow. To test basic functionality of the FSK way from the computer to the radio click on **Test** button when channel is unassigned or closed. More details about functionality check are described in chapter 12.2



15.1.3 SECOND FSK CHANNEL

This second FSK channel works in same principle as normal FSK channel. Channel is enabled and usefull only for radios with two receivers such as FT-1000xxx, Orion or IC-7800. Audio output from the second receiver should be connected to the right channel of the sound card (or second sound card, don't forget to isolation) and FSK port of the second instance of the RTTY program (for example MMTTY) should be chained with this 2nd FSK port. Rules and displayed port settings are same as for normal FSK port with one exception. **The RTS signal generated on the Second FSK port is automatically used as a PTT keying signal.**

15.1.4 CW CHANNEL

By thier very nature USB ports are not well suitable to transfer real time events required for CW keying on virtual serial COM ports control signals (DTR or RTS). There are also latencies caused by computer CPU load, internal Windows messages processing and data flow from another peripherals using USB ports. Transmitted characters can often be garbled. To minimize these unwanted OS effects Router uses a specially developed oversampling and prediction alorythm to assure as smooth transfer of control signals events over USB port as possible. Thanks to this principle, CW keying in the Router is in most cases usable up to 50 WPM if the application generates keying signals accurately and does not consume 100% of CPU time at the highest priority class.

Fortunately, most loggers now support an external keyer - WinKey. This keyer is integrated inside the MK, is absolutely immune to all unwanted effects of the computer, and always generates a perfect and accurate CW signal. Whenever possible, if your application supports it use WinKey for CW generation instead of the serial port CW channel. It is the sure way to get a perfectly timed CW signal regardless of load on your computer or USB port.

Router allows assigning a virtual serial port for the CW channel and supports selecting of two available output control lines, DTR or RTS.

TIP: More applications use DTR line for CW than RTS.

When a COM port is assigned in the Router but not in the application (or the application is not running), Router shows the channel as **closed**.

When an application opens the COM port (usually at start-up), Router shows the channel as **open**.

Activity and state of the CW channel is indicated by red arrow. If port is opened, it does not mean that it is properly configured for CW keying. The Red arrow will light in rythm of the transmitted CW characters when port is properly configured in the application.



TIP: If your application supports CW keying on serial port as well as by WinKey, choose WinKey. Do not use serial CW and WinKey together, you will confuse most applications.

To test basic functionality of the CW from the computer to the radio click on **Test** button when the channel is unassigned or closed. More details about functionality check are described in chapter 12.2.

15.1.5 PTT CHANNEL

The PTT channel is used for T/R switching of the transceiver and Power Amplifier. An internal T/R sequencer assures 100% protection against hot switching of the PA when the PTT channel is used for T/R switching. More information about T/R switching, MK PTT outputs and the sequencer is provided in chapter 15.3

Router allows assigning a virtual serial port to the PTT channel and supports PTT via DTR or RTS.

TIP: More applications use RTS for PTT than DTR.

When a COM port is assigned in the Router but not in the application (or the application is not running), Router shows the channel as **closed**.

When an application opens the COM port (usually at start-up), Router shows the channel as **open**.

Activity and the state of PTT channel is indicated by arrow. If port is opened, it does not mean that is properly configured for PTT keying. The arrow will light continuously during the entire transmission when port is properly configured. The color of the arrow (red or green) will on which PTT output of MK is being used. Operation of the PTT outputs is described in chapter 15.3

TIP: Always use serial PTT instead of the radio command PTT or VOX. It is the only sure way to protect an attached Power Amplifier and other accessory equipment against hot switching.

To test basic functionality of the PTT, click on the **Test** button when channel is unassigned or closed. More details about functionality check are described in chapter 12.2



15.1.6 WINKEY CHANNEL

WinKey is a unique external CW processor developed by Steve Elliot, K1EL. This CW processor supports paddle input like any other electronic keyer, offers many configuration options, and in addition converts data from the computer in ACSII (text) format to Morse characters. This unique property assures always perfect CW output from the computer regardless of OS load. More detailed instruction for configuring WinKey is contained in chapter 15.4.

When a COM port is assigned to WinKey in Router but not in the application program (or no application is running), Router shows the channel as **closed**.

When an application opens the COM port (usually at start-up), Router shows channel as **open** and displays settings used to configure COM port. Router displays baud rate, data bits, parity and number of stop bits. For example, 1200 8N2 means: 1200 Baud, 8 data bits, parity = none, 2 stop bits.

Data flowing through the channel are indicated by two arrows. The green arrow indicates data flow from the application to WinKey and the red arrow indicates data flow from WinKey to the host application.



TIP: Do not share the virtual port assigned for WinKey with any other channel. Applications Programs supporting WinKey always set RTS and DTR control lines high because it is required by the stand alone WinKey kit.

The correct COM port settings for WinKey in application programs are 1200 baud, 8 bit, No parity and 2 Stop Bits. Router manages the virtual COM port settings for WinKey and always sends characters to the WinKey at the correct speed using correct parameters even when the application is not configured correctly.

Important note: When a host application (logger) opens the port assigned in the Router for WinKey it takes control of all WinKey functions. The host application sends its own configuration to the WinKey when it initializes. When WinKey is controlled by a host application, Router cannot access WinKey to reset the parameters as defined on the WinKey tab because it might confuse the host application. When under application control, WinKey performs as directed by the application. If you would like WinKey to operate with the same parameters in stand-alone mode and under application control, you should use the same parameters in the application and Router or do not check **Overwrite host settings** box on the WinKey tab.

To test basic functionality of the WinKey, click on **Test** button when the channel is unassigned or closed. More details about functionality check are described in chapter 12.2

15.1.7 FOOT SWITCH CHANNEL

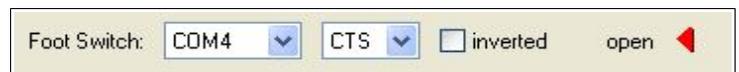
Even though many current applications do not support readback of foot switch and do not have the ability to perform specific functions base on closing or releasing the foot switch, we have decided to implement this feature to the Router. Hopefully sometime soon applications will be able to detect the footswitch status and use this this information for configurable automated configurable functions like in the DOS based TRLog.

Router allows assigning a virtual serial port to footswitch channel and selecting one of four available input control lines (CTS, DCD, DSR or RING). The state of the signal represented on virtual serial port can be inverted by checking **inverted** box.

When a COM port is assigned to the footswitch channel in Router but not in the application (or no application is running), Router shows the channel as **closed**.

When an application opens the COM port (usually at start-up), Router shows channel as **open**.

When footswitch is closed, this state is indicated by a red arrow.



TIP: Do not assign same virtual serial port for the footswitch and radio control. Some application may use the control line assigned for footswitch to handshake and activating the footswitch can result in communications failure with the radio.

15.2 AUDIO

micro Keyer provides extensive and unique flexibility in routing audio among the computer sound card, transceiver, and the station microphone. This allows customizing the audio configuration to meet the needs of a specific software program (logger) and operator requirements (VOX, Footswitch) for particular operating mode. There are three distinct audio paths:

- from the transceiver to the sound card
- from the sound card to the transceiver
- from the station microphone to the transceiver or to the sound card

[From transceiver through micro KEYER to the computer sound card.](#)

micro Keyer always routes audio from the transceiver to the computer sound card, operation is "What you hear is what you get." Audio from the transceiver is always present at the sound card line in no matter what audio configuration (A, B, C) is selected of transceiver mode. Receive audio (including monitor audio or sidetone if the transceiver sends it to the same output) goes from the transceiver rear panel AF out jack (not the front panel headphone jack) to the computer sound card **LINE IN**. This allows real time decoding of digital modes (RTTY, PSK31, etc.) and/or recording the received audio directly to a computer file.

*Cable: An audio cable must be connected from the micro KEYER **SOUND CARD IN** jack to the computer **SOUND CARD LINE IN**. If the computer does not have a LINE input, the **MICROPHONE** input can be used but the micro KEYER end of the cable must remain plugged in to the **SOUND CARD IN** jack.*

[From computer sound card through micro KEYER to the transceiver.](#)

Audio generated by the computer can be used for several purposes - it can be used as a voice keyer in voice modes (SSB, AM, FM), or for modulating digital modes (AFSK-RTTY, PSK31, MFSK, etc.).

- **setting A:** disconnects the computer generated audio and connects the microphone directly to the transceiver microphone input.
- **setting B:** routes the audio generated by computer to the transceiver rear panel audio input (PKT, AUX, or ACC depending on manufacturer). This audio routing is dedicated for digital mode operation. Since the PKT or AUX input of most radios bypasses the radio internal microphone preamp and other audio processing stages which can distort digital modulation generated by the sound card, setting B is recommended for digital mode operation.
- **setting C:** routes the computer audio to the transceiver microphone input.

*Cable: An audio cable must be connected from the micro KEYER **SOUND CARD OUT** jack to the computer **SOUND CARD LINE OUT, HEADPHONES** or **SPEAKERS** jack..*

[From station microphone to the computer or to the transceiver.](#)

MK connects the microphone to the transceiver or to the sound card depending on the setting selected. To maintain galvanic isolation between radio and computer, prevent ground loops, and minimizing the effect of computer generated noise on the radio, both leads of the microphone (microphone signal and microphone ground) are switched to the radio or to the computer sound card. The microphone connection and settings are described in chapter 12.5 and 12.6

- **setting A:** connects the station microphone to the transceiver microphone jack.
- **setting B or C:** connects the station microphone to the computer sound card microphone jack.

*Cable: An audio cable must be connected from the micro KEYER **SOUND CARD MIC** jack to the computer **SOUND CARD MICROPHONE** jack*

15.2.1 AUDIO SWITCHING SETTINGS

MK recognizes three (3) states of the transceiver operation, Audio switching (routing) may be selected independently for each state.

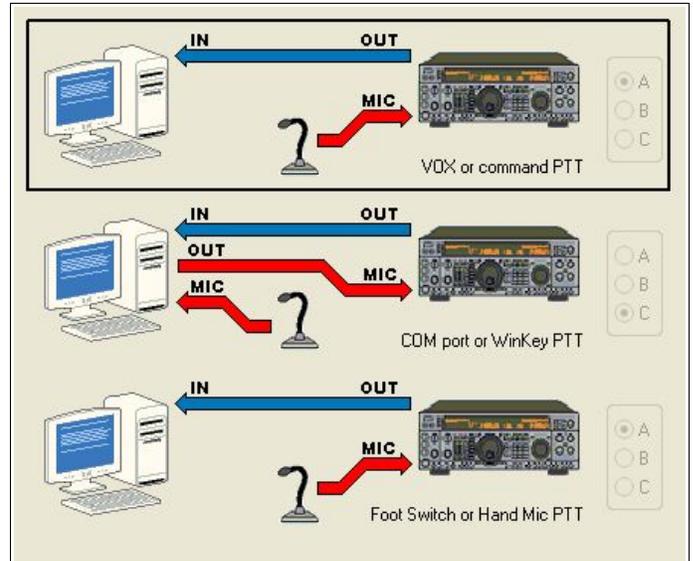
1. Transceiver in receive -or- in transmit activated by VOX/serial (CAT) command.

This setting is displayed in the TOP picture and indicated by the first letter in settings scheme (ACA). The current operating state is indicated by a large black frame around the switching scheme picture.

A: Computer audio is disconnected from the radio and the station microphone is connected directly to the transceiver front panel microphone jack. This setting is useful for those who operate SSB with VOX and do not want the transceiver triggered by sounds generated by the computer.

B: Computer generated audio is routed to the transceiver rear panel and the station microphone is connected to the sound card mic input. This setting is useful for those who operate digital modes with VOX control. Note: keep the Windows Sound Mixer (Recording Control) Microphone Channel MUTED.

C: Audio from the computer is routed to the transceiver microphone input and the station microphone is connected to the sound card mic input. This setting is useful for SSB operation using VOX or software (serial) PTT control with software which is able to control the Windows Sound Mixer and for recording voice messages. The microphone channel must NOT be MUTED in Windows Mixer.

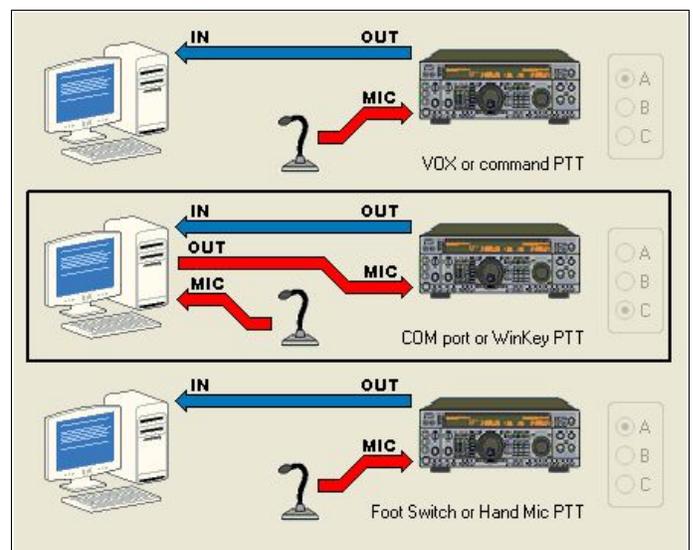


2. Transceiver is switched to transmit by computer generated serial PTT on virtual serial port PTT channel or by WinKey generated PTT.

This setting is displayed in the MIDDLE picture and indicated by the second letter in settings scheme (ACA). The current operating state is indicated by a large black frame around the switching scheme picture.

A: Computer audio is disconnected from the radio and the station microphone is connected directly to the transceiver front panel microphone jack. This setting can be used for CW or FSK mode and is useless for SSB or DIGITAL (AFSK) operation.

B: Computer generated audio is routed to the transceiver rear panel and the station microphone is connected to the sound card mic input. This is the preferred setting for digital mode operation (AFSK, PSK, etc.) when the computer generates a PTT keying signal on a COM port. Note: keep the Windows Sound Mixer (Playback and Recording Control) Microphone Channel MUTED to prevent “open mic syndrome.”



C: Audio from the computer is routed to the transceiver microphone input and the station microphone is connected to the sound card mic input. This setting is useful for SSB message playback (voice keyer) with software capable of providing a PTT signal on a serial port. This is the preferred setting for SSB contest operation using N1MM Free Contest Logger, WriteLog, or WinTest.

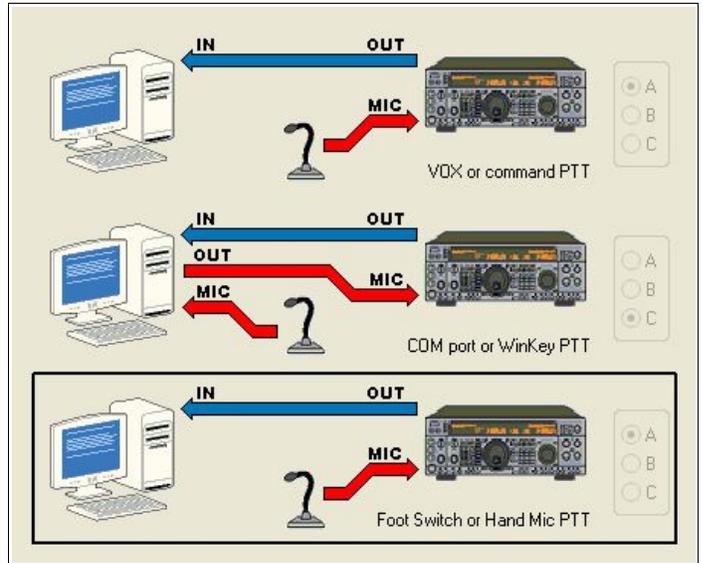
3. Transceiver is switched to transmit by footswitch or hand microphone PTT button.

This setting is displayed in the BOTTOM picture and indicated by the third letter in settings scheme (ACA). The current operating state is indicated by a large black frame around the switching picture.

A: Computer audio is disconnected from the radio and the station microphone is connected directly to the transceiver front panel microphone jack. This setting is very useful for SSB when the microphone must be connected directly to the transceiver. This setting allows interrupting a message in progress without using the keyboard <ESC> key. See: Sequencer settings.

B: Computer generated audio is routed to the transceiver rear panel and the station microphone is connected to the sound card mic input. This setting is useful for digital mode operation when the computer does not provide a PTT keying signal and/or you wish to have T/R switching fully under control by footswitch. Note: keep the Windows Sound Mixer (Playback and Recording Control) Microphone Channel MUTED to prevent “open mic syndrome.”

C: Audio from the computer is routed to the transceiver microphone input and the station microphone is connected to the sound card mic input. This setting is useful for SSB operation when computer does not generate a PTT keying signal and/or you wish to control T/R switching manually by footswitch or by microphone PTT button.



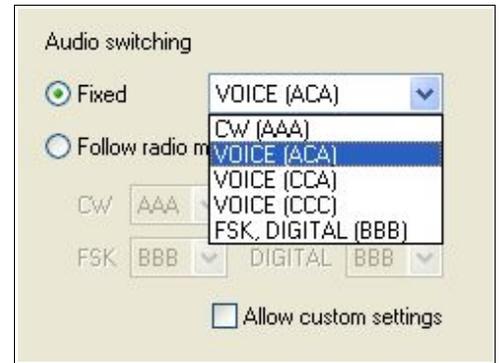
Router allows two modes of audio switching, **Fixed** and automatic - **Follow radio** mode.

TIP: Whenever possible, if Router supports your radio (defined in Ports | Set) use Follow radio mode. It will provide automatic selection of the appropriate audio configuration for each mode.

15.2.2 FIXED MODE AUDIO SETTINGS

When Router is unable to read the operating mode, chose **Fixed** audio switching. There are several optimized settings for each operating mode.

1. **VOICE (ACA)** – The station microphone is connected to the radio mic jack. When the computer generates PTT on the virtual port PTT channel, the sound card output is switched to radio mic jack. This setting works with in VOX or PTT button (footswitch) mode and allows playback of voice messages from the computer. This setting is recommended for general purpose voice operation.



VOICE (CCA) – The station microphone is connected to the sound card mic input except when footswitch or microphone PTT is pressed. When the microphone PTT or footswitch is pressed, the microphone is connected to the radio. This setting allows use of VOX or manual PTT, and allows playback or recording of voice messages with the computer. This setting is recommended only with applications that properly handle audio switching with the sound card.

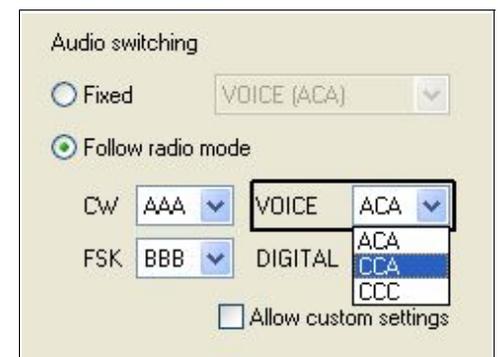
VOICE (CCC) – The station microphone is always connected to the sound card mic input. This setting will not work with VOX unless the sound card is “full duplex” and the application program (logging program) is able to control the sound card.

2. **FSK, DIGITAL (BBB)** – The station microphone is disconnected and the computer generated audio is transferred to the radio’s rear panel audio input. This setting is recommended for all digital modes operation regardless of keying type (FSK or AFSK).

3. **CW (AAA)** – The audio configuration is not important for CW operation. This choice has been included to maintain consistency with T/R keying (configured on the **PTT/SFK** tab) where it is important. **CW (AAA)** assures quiet audio switching and minimizes relay clicking.

15.2.3 FOLLOW RADIO MODE AUDIO SETTINGS

When Router is able to read the operating mode, **Follow Radio** provides the greatest flexibility and ease of operation. The same settings are available as in **Fixed Mode** but switching among them is automatic based on the operating mode (and, optionally, frequency). The current mode is displayed on **Ports** tab and this mode is translated to the VOICE, DIGITAL or CW choices. The automatically selected audio routing is indicated by black frame around the setting combo box.



- VOICE modes are: USB, LSB, AM and FM. The three standard audio configurations (ACA), (CCA), and (CCC) are described in section 15.2.2.
- DIGITAL modes are: PKT, DIG and DATA. Router also permits selecting DIGITAL settings for LSB, USB and FM if the operating frequency is in the “digital” portion of the band as defined in the Digital Band Map. See chapter 12.1 for more information.
- FSK modes are FSK, FSK-R, RTTY and RTTY-R. BBB is selected for FSK.
- CW modes are CW and CW-R. The audio setting is unimportant for CW as the microphone input is not used for transmit.

15.2.4 CUSTOM AUDIO SETTINGS

In addition to the standard audio settings, Router allows full customization of the audio switching for special operating requirements or to accommodate the special needs of an application program or sound card. Customized settings are available in both **Fixed** and **Follow Radio** modes.

To enable customization, check '**Allow custom settings.**'

Using custom settings is not recommended if you do not fully understand the audio switching principles described in sections 15.2 and 15.2.1.

Contact our support service at support@microham.com if you cannot find satisfactory settings.

15.3 PTT / FSK

In this tab you can configure how the PTT and FSK work. The virtual com port for these signals was defined on the Ports tab, here we defined the interaction of these signals with the footswitch and hand mic PTT.

15.3.1 PTT – T/R KEYING

MK has three (3) PTT outputs: PTT1, PTT2, and PA PTT. PTT1 and PTT2 are brought out to the DB37 Radio Port and switch the radio and linear amplifier to transmit.

PTT1 is always wired to the radio front panel mic jack and is "all time PTT" regardless of mode.

PTT2 is normally connected to the radio accessory jack and should be used as digital mode PTT. A key advantage of the rear panel PTT (PTT2) is the ability of Kenwood and Yaesu radios to automatically mute the front microphone input – useful to prevent "open mic" during digital mode and AFSK operation. On radios which do not support microphone muting, PTT2 can be used as a general purpose PTT output. Microphone muting can be assured by audio setting (BBB) and/or computer mic mute function if your software and sound card support it.

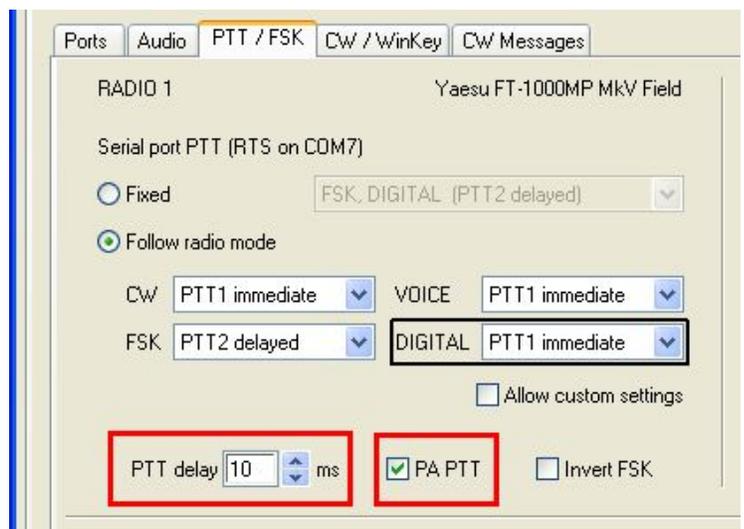
PA PTT is present at the MK rear panel RCA and is designed for power amplifier switching. Generation of PA keying signal can be enabled by checking **PA PTT** box.

MK uses four inputs to control the PTT outputs:

- Serial port PTT, generated by the application on the virtual COM port RTS or DTR
- Foot switch attached to the MK rear panel RCA jack
- Hand microphone PTT button
- WinKey PTT (often called 'pin.5')

The hand mic PTT and footswitch behave identically and always key PTT1 output (and PA PTT output if it is enabled). To assure that the connected amplifier is protected from hot switching the PAPT output signal is activated before PTT1 (radio) is activated. The delay between PAPT and PTT1 is defined by **PTT delay**

and should be little bit larger (several milliseconds) than the T/R delay of the amplifier.



The footswitch (and hand mic PTT) can control advanced "sequencer" functions described later in this section.

WinKey always generates PTT1 but it can be disabled on the WinKey tab.

Serial port PTT operation is most important for interfacing with application software. MK PTT generation can operate in two modes: **Fixed** or **Follow Radio**.

TIP: Whenever possible, if Router supports your radio (defined in Ports | Set) use Follow Radio described below. It will provide automatic selection of the best PTT settings for each operating mode.

15.3.2 FIXED MODE SERIAL PTT SETTINGS

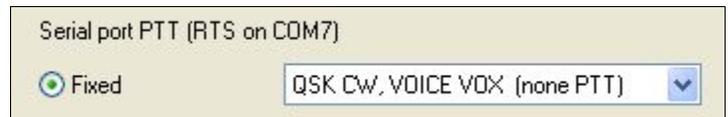
When Router is unable to determine the operating mode, used the **Fixed** PTT setting. There are several options based on operating style:

1. CW, VOICE (PTT1 immediate).

PTT1 (and **PAPTT**, if enabled) are activated immediately. Additional delay is not necessary if the application's internal timing provides some delay between PTT and start of message. Don't forget to set this delay in the application set-up.

2. QSK CW, VOICE VOX (none PTT)

PTT1 and **PAPTT** are disabled. The power amplifier must be keyed from the radio because only the radio can provide the proper timing to prevent hot switching in these modes.



3. FSK, DIGITAL (PTT2 delayed)

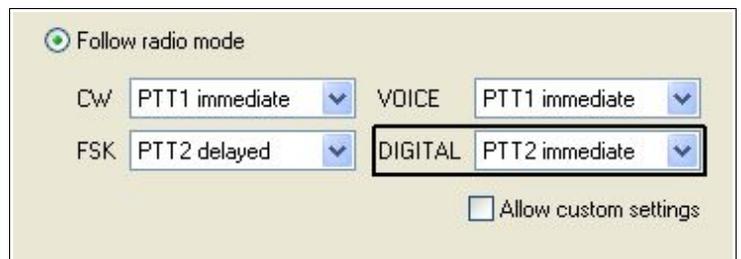
PAPTT will be activated immediately and **PTT2** will be activated with the delay defined in **PTT delay**. This unique feature of MK prevents hot switching during FSK operation. Because a radio in FSK operation begins to produce RF as soon as it enters the transmit mode, the application program cannot guard against hot switching.

15.3.3 FOLLOW RADIO MODE SERIAL PTT SETTINGS

When Router is able to detect the radio mode, use **Follow Radio**. The same settings are available as in **Fixed** mode but switching between them is automatic based on the radio mode. The operating mode detected mode is displayed on the **Ports** tab and classified VOICE, DIGITAL, FSK or CW. The chosen switching is indicated by black frame around the selected mode.

– VOICE modes are: USB, LSB, AM and FM. Two choices are available, (PTT1 immediate) and (none PTT). PTT1 Immediate is recommended. (none PTT) is suitable only in VOX mode.

– DIGITAL modes are: PKT, DIG and DATA. There are four available settings: **PTT2 Immediate** is appropriate for applications which provide for setting a PTT lead time. **PTT2 delayed** should be used with applications which do not permit setting a PTT delay. **PTT1 immediate** should be used when radio does not have a dedicated digital mode input and you must use the microphone (or Patch) input.



(**No PTT**) is suitable only for testing purposes.

- FSK modes are: FSK, FSK-R, RTTY and RTTY-R. Three PTT modes are available. Of the three, **PTT2 delayed** is strongly recommended when using a power amplifier to prevent hot switching.
- CW modes are: CW and CW-R. The two choices are (PTT1 immediate) and (none PTT). **No PTT** should be used for QSK keying.

Checking the PA PTT box will cause PA PTT to activate in response to any PTT event.

15.3.4 CUSTOM PTT SETTINGS

A PTT input event can be generated by PTT from serial port, PTT from foot switch (or hand mic), or PTT from WinKey. Router permits the user to determine which PTT output will be activated in response to a PTT event. It is possible to select PTT1, PTT2, or no PTT in both **Fixed** and **Follow Radio** mode. To enable customization check **Allow custom settings** box.

The use of custom settings is not recommended unless you full understand how your radio responds to each PTT input.

15.3.5 FOOT SWITCH SEQUENCER SETTINGS

Additional functions can be associated with the footswitch (or hand mic PTT). MK recognizes two states: footswitch closed (pressed) and footswitch open (released). MK can manipulate CW, FSK, PTT and audio routing differently if the footswitch is open or closed.

When foot switch is pressed	When foot switch is released
<input checked="" type="checkbox"/> Mute serial CW	<input checked="" type="checkbox"/> Restore serial PTT and audio routing
<input checked="" type="checkbox"/> Mute serial FSK	<input type="checkbox"/> Restore serial CW
	<input type="checkbox"/> Restore serial FSK

Mute serial CW - if checked, virtual port CW (DTR or RTS) generated by an application program will be muted while the footswitch is pressed. If **Restore serial CW** is checked, CW will resume when the footswitch is released (if it has not already ended). If **Restore serial CW** is not checked, application generated CW be suppressed until the application releases PTT.

Mute serial FSK - if checked, FSK generated by an application will be suppressed while the footswitch is pressed. If **Restore serial FSK** is checked, FSK will continue when the footswitch is released (if it has not already completed). If **Restore serial FSK** is not checked, FSK will be suppressed until the application releases PTT.

Restore serial PTT and audio - if checked, application generated serial PTT will be restored and audio routing will return to the "serial PTT" setting when the footswitch is released. If **Restore serial PTT and audio** is not checked, audio will only return after the application releases PTT.

15.3.6 FSK SETTINGS

Unlike AFSK, an FSK signal cannot be inverted by most application programs because the UART used in a real serial port lacks that capability. Because MK is a software defined interface, it can invert the FSK signal. When the **Invert FSK** box is checked, MK changes the "at rest" state of the front panel FSK light. FSK green led will light continuously and go off when FSK signal is present. If your radio requires inverted FSK keying, your first choice should be to use the radio's menu, not MK. The "Setup Hints" widow (Ports | Set) describes the menu item for changing FSK polarity for all supported radios. **Invert FSK** should be checked only for radios which do not provide this support.

If an external PS/2 keyboard is attached to the MK, Router supports additional settings for FSK.

Diddle LETTERS will generate the "LETTERS" character if nothing is being typed and **UOS** automatically generates the "Unshift on Space" function when checked.



15.4 CW / WINKEY

This tab provides the configuration for the internal, K1EL WinKey based, CW keyer. Thanks to Steve Elliott, K1EL for this great product. A complete WinKey manual can be downloaded from: <http://k1el.tripod.com/wkinfo.html>.

WinKey can be controlled by a host application or operate in stand alone mode controlled by Router. Switching between these two modes is fully automatic based on state of the virtual port assigned to WinKey on the **Ports** tab.

When an application opens the WinKey port this port, Router becomes fully transparent and provides only USB bridge to the WinKey. All settings and functionality of the WinKey are under host control. Router does not affect communication and does not force any setting. When this happens, settings are greyed out and only settings not related to WinKey can be changed.

When the port is closed WinKey parameters can be changed from this tab and every change is applied immediately. If **Overwrite host settings** is checked, Router will restore the parameters set on the WinKey tab when an application closes (releases) the WinKey port. If **Overwrite host settings** is not checked, WinKey will retain the last used settings until a change is made on the WinKey tab.

The WinKey CW output (pin 3) is wired in parallel with the serial CW output from MK. The WinKey PTT output (pin 5) is connected by a jumper (SO1R/SO2R) to PTT1 or the REMOTE jack.

TIP: Application programs should not configure pin 5 for sidetone: only None, PTT or 2nd CW are allowed. Side tone is generated internally in MK and can be changed or turned off regardless of pin 5 function.

Mode - WinKey mode, Iambic A, Iambic B, Ultimatic and Bug Keyer.

Priority – In Ultimatic mode one can choose DIT or DAH priority for dual lever paddles. If no priority is selected, keyer works in "last one win" mode.

Paddle set point - controls when WinKey begins looking for a new paddle press after sensing the current one. The default value is one dit time (50) and is adjustable in percent of a dit time.

Disable paddle memory – When checked, DIT (or DAH) insertion is disabled.

Swap paddles - Reverse paddle sense for left handed operation or improperly wired paddle.

Auto space - Keyer generates automatic character space.

CT space - Selects "contest" word space (six dits long instead of seven).

Speed pot min/max - Min/Max value of the front panel speed knob (5 to 99 WPM range).

Farnsworth speed - Definition of Farnsworth speed keying (10 to 99 WPM range).

DIT / DAH - DIT/DAH ratio from 1:2 to 1:4 in hundreds. Accepted numbers are from 200 to 400.

Weighting - Weighting in percentage (from 10 to 90%).

1st extension - Extension of the first dit or dah in milliseconds (usable for QSK only).

Keying compensation - Extension of each dit and dah in milliseconds (usable for QSK only).

Generate PTT1 - Enables generation of PTT (pin 5 PTT).

PTT lead in/tail - Lead and tail delays of PTT. **Generate PTT1** must be checked.

Hang Time - When Tail delay is 0, hang time is time is proportional to current CW speed. Options are: 1.00, 1.33, 1.66 or 2.00 wordspace units (requires WinKey version 9 or later)

Side Tone - 1350, 675, 450, 388 Hz or OFF. The *volume is not adjustable*.

Note: Side tone is generated by the micro KEYER CPU, not by pin.5 of WinKey. Pin 5 is reserved for the PTT or for CW output to a second radio. (Used with a future SO2R Extension box).

Speed Step - defines the steps (in WPM) by which the +/- keys on the optional keypad will change the speed. The enter key restores the speed set by the Speed pot.

Other WinKey functions can be controlled by an external PS2 keyboard or keypad. See: Chapter 15.6 - External Keyboard.

15.5 CW MESSAGES

In this tab you can define nine memories of up to 50 characters each which are stored in the MK non-volatile memory. Each memory may have a programmable repeat delay and/or call another memory.

Commands which may be included in a memory are:

Set PTT - close WinKey PTT.

Clear PTT - release WinKey PTT.

Merge - merge two characters without a letter space - [M]AS will sound AS .-...

Set WPM - force WPM to selected speed regardless of position of speed knob.

Cancel WPM - restore speed set by the Speed pot.

Set Key - close CW output for selected time in seconds.

Set Wait - wait selected seconds during playback.

Jump to - used for looping a message or calling another message

Delay - sets the delay in seconds before looping or calling another message

Test - will play a message without storing it

Store - saves one message to MK memory

Store All - saves all messages to MK memory

Load from File - loads all messages from file

Save to File - saves all messages to file

Messages can also be saved and replayed also using an external keyboard or keypad. (1-9 keys on numerical keyboard or F1 - F9) attached to the **Remote** jack. See chapter 15.6 - External Keyboard

Note: Messages are not saved or loaded with Presets

15.6 EXTERNAL KEYBOARD

MK supports generating FSK and CW signals from a PS2 keyboard attached to the **Remote** jack. A numeric PS/2 keypad may also be used to record and play back CW messages (memory keyer).

TIP: The keyboard or keypad must be PS/2. A USB keyboard or Keypad with PS/2 adapter will not function properly.

Keyboard input has two modes, CW and RTTY. Power up default mode is CW. The CAPS LOCK selects mode.

CW mode allows keyboard transmission, storing or playing messages to/from memory, setting speed, side tone and tune mode. During recording mode it is possible to record characters written on the keyboard or played on the paddle.

PLAY mode:

Num Lock - Start CW recording mode

DEL (.) - Repeat message. Default is 1 second and can be changed by pressing a number key following the **DEL** key.

[1 - 9] - Play message stored in memory #. If number is followed by the **DEL (.)** key, the message will loop. For example: entering **1.3** will cause message 1 to repeat with a three second delay.

Num + Increase WPM speed

Num - Decrease WPM speed

Enter - Retrieve WPM speed from speed pot

Num * - Tune (can be canceled by keys **NUM 0** or **ESC**, also by paddle)

Num / - Switch function of **Num + Num -** and **Enter** between speed/numbers control (firmware2.0)

Num 0 - The same as ESC

Esc - Aborts message (clears buffer)

F1 – F9 - The same as Num 1 - Num 9

F10 - manual T/R toggle switching

Caps Lock – Select RTTY mode (Caps Lock OFF)

RECORD mode:

Num Lock - Stop CW recording mode and store the message to memory

Num [1 - 9] - Set memory index (used when memory is stored at the end of recording mode)

Num 0 - The same as ESC

Esc - Abort recording mode without storing the message

F1 – F9 - The same as Num 1 - Num 9

Caps Lock - Start RTTY mode (Caps Lock ON)

APPENDIX A - DB37 RADIO CONNECTOR

Pin #	Label	Description
1	Power +13.5V	12 - 16V DC input
20	RS232 RTS	RS232 radio port RTS output
2	RS232 CTS	RS232 radio port CTS input
21	IF-FIF	iface matrix*
3	IF IN	iface matrix*
22	FIF IN	iface matrix*
4	RS-TTL OUT	iface matrix*
23	FILTER OUT	iface matrix*
5	CI-V IN	iface matrix*
24	RS232 IN	iface matrix*
6	CI-V OUT	CI-V bus output "open collector"
25	RS232 OUT	RS232 TXD output
7	FIF OUT	FIF-232 TXD output "TTL"
26	IF OUT	IF-232 TXD output "TTL"
8	FILTER IN	RXD input for all interfaces
27	PTT1	PTT1 output "open collector" generally used as all mode front panel MIC PTT
9	PTT2	PTT2 output "open collector" generally used as rear panel digital modes PTT
28	CW OUT	CW output "open collector"
10	PULL UP	+5V through a 10K resistor
29	FSK OUT	FSK output "open collector"
11	FSW IN	Hand Mic PTT input
30	MIC #1	RJ45 Microphone jack pin #1
12	MIC #2	RJ45 Microphone jack pin #2
31	MIC #3	RJ45 Microphone jack pin #3
13	MIC #4	RJ45 Microphone jack pin #4
32	MIC #5	RJ45 Microphone jack pin #5
14	MIC #6	RJ45 Microphone jack pin #6
33	MIC #7	RJ45 Microphone jack pin #7
15	MIC #8	RJ45 Microphone jack pin #8
34	MIC GND	Microphone ground
16	MIC	Microphone signal
35	RADIO MIC IN GND	Radio MIC ground
17	RADIO MIC IN	Radio MIC signal
36	RADIO AF IN GND	Radio AUDIO input ground
18	RADIO AF IN	Radio AUDIO input signal
37	RADIO AF OUT GND	Radio AUDIO output ground
19	RADIO AF OUT	Radio AUDIO output signal
SHELL	GND	Radio and power GND

iface matrix* - used for cross wiring desired levels for radio CAT interface.