

*micro*KEYER

*micro*HAM

fax. +421 2 4594 5100
e-mail : support@microham.com
homepage : www.microham.com



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1 - 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, TenTec, 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**

2 - IMPORTANT WARNINGS

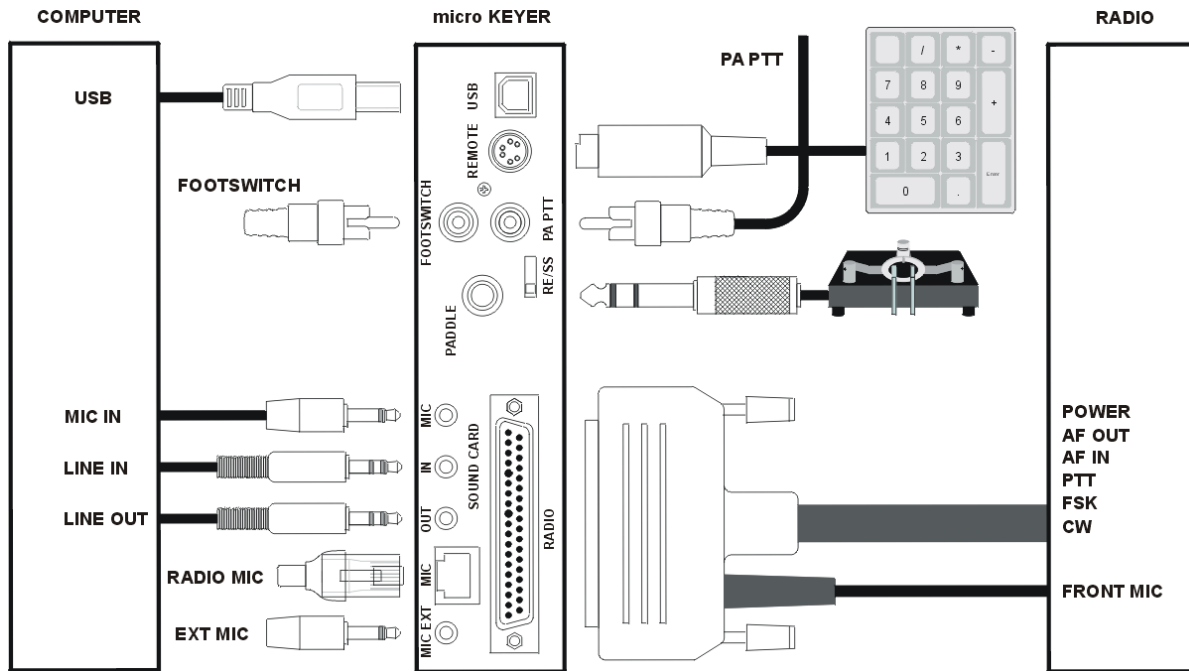
If you power *microKEYER* from an external power supply,
ALWAYS check the polarity of the 13.8 V power supply.

If you use *microKEYER* with more than one transceiver,
ALWAYS be sure the proper microphone is connected to the RJ45 jack
BEFORE connecting the DB37 RADIO cable.

If your radio includes upgradeable firmware,
DO NOT perform any upgrade through *microKEYER*.

3 – INTRODUCTION

microKEYER ("MK") is an all mode computer to transceiver interface.



The computer is connected to MK using three (3) standard audio cables and one A-B USB cable.

The transceiver and MK are connected by a single radio cable terminated on one side by a DB37M and on the other side by plugs appropriate for the specific transceiver. The cable carries power for MK, audio, CAT control and keying. A second 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 foot switch, paddle, microphone, and keypad.

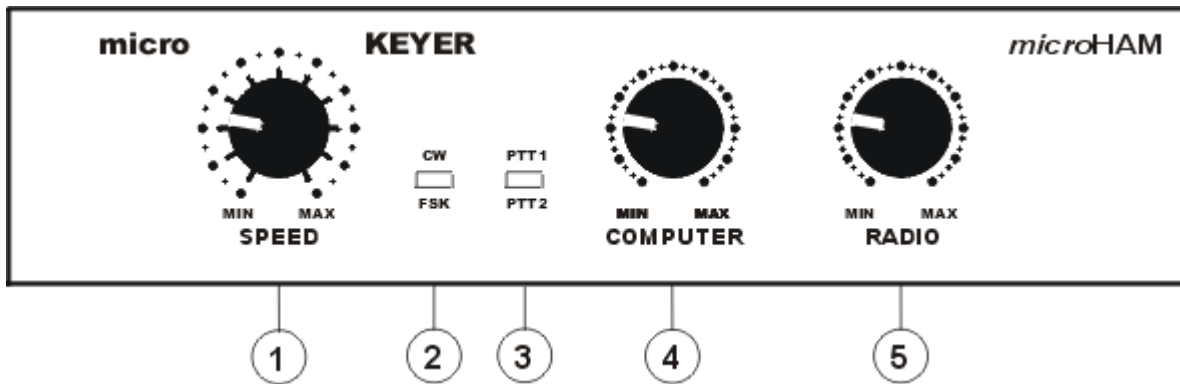
MK works with or without a computer. Switching between modes is fully automatic.

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 foot switch 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 computer applications between the computer and transceiver. Software compatibility is insured by using virtual serial ports. Router continuously monitors these virtual ports and transfers the data by USB to the MK. MK processes this data and sends it to the physical ports of transceiver as CAT, CW, FSK, and PTT functions.

4 - PANEL DESCRIPTION

Front Panel



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

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

RED color indicates the CW output is active
GREEN color indicates the FSK output is active

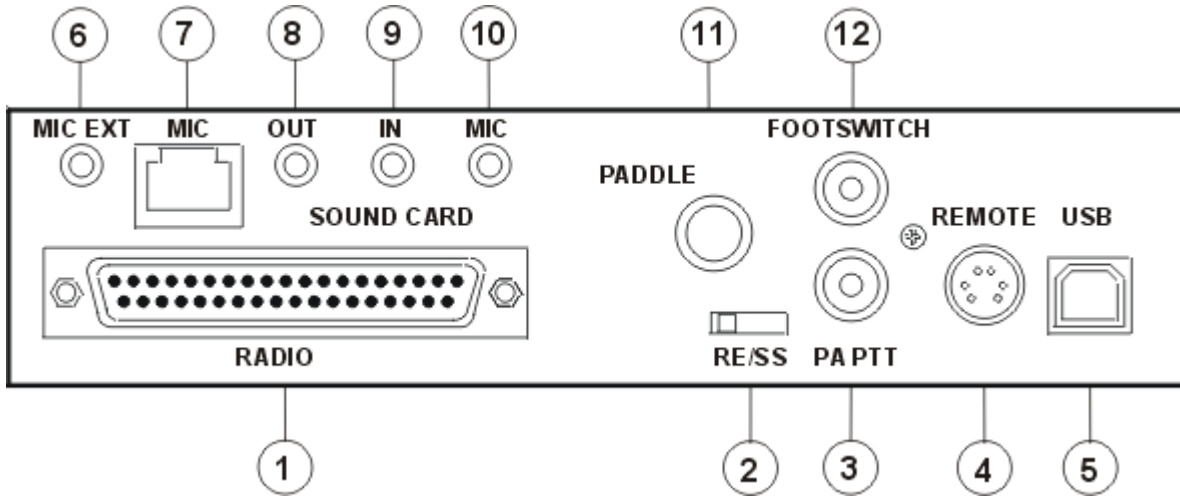
(3) - **PTT1/PTT2**

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:** Controls the audio level to the computer sound card LINE IN

(5) – **RADIO:** Adjusts the audio from the computer to the transceiver

Rear Panel



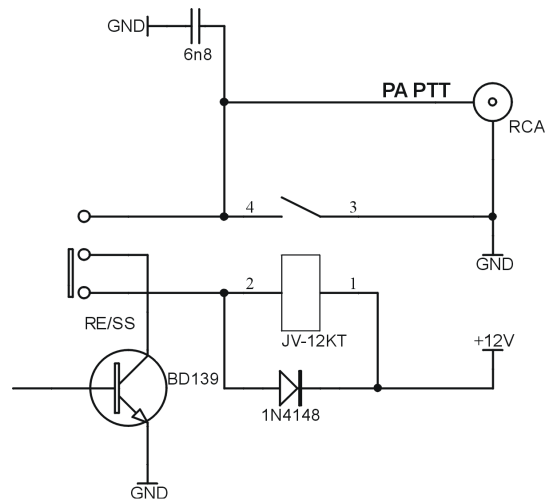
(1) – **RADIO**: DB37F connector for radio connection – a detailed description is in Appendix A

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

RE - Relay contact

SS - Transistor collector

If the slide switch is in the SS position, the switching transistor (open collector) is connected to the PAPT T jack. The transistor can switch up to 48V/0.8A. This position is appropriate for all modern Power Amplifiers with electronic keying. Check the manual of your amplifier to be sure the power requirements of the PTT circuit do not exceed transistor rating. If the power requirements exceed the transistor's capabilities, move the slide switch to the RE position. This position connects the relay to the PA PTT RCA. Maximum rating for the relay is: 48V AC/DC @ 1A.



TIP: If you are not sure about keying requirements 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.

(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 on the microphone connected to RJ45 (buttons, PTT) will operate normally.

(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 **computer Line Out**

TIP - Signal
RING - NC
SHELL - Signal Ground

(9) - LINE IN: 3.5mm (1/8") jack – connects to **computer Line In**

TIP - Signal
RING - NC
SHELL - Signal Ground

(10) - MIC IN: 3.5mm (1/8") jack – connects to **computer Mic In**

TIP, RING - Signal
SHELL - Signal Ground

WARNING: DO NOT use a mono cable between MIC IN and the computer Mic Input

(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

5 - INSTALLATION

Installing the *microKEYER* consists of several steps:

- 1) Prepare *microKEYER* to work with your transceiver.
- 2) Install the necessary driver software for your operating system.
- 3) Configure the driver and/or application software for your specific system
- 4) set the audio levels

Connecting *microKEYER*

1. **Turn off the radio** and make *microKEYER*'s rear panel accessible.
2. Plug the DB37M on the radio cable set into the RADIO connector on the rear panel of the *microKEYER*.
3. Connect ALL connectors from the cable set to the matching jacks on the rear panel of your transceiver. Each connector on the radio interface cable is marked same as the jack on your transceiver.

Use only a microphone designed for use with your radio. Using the wrong microphone can damage the microphone, the radio or microKEYER.

4. If the 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.
5. Connect your paddles to the **PADDLE** jack.
6. If you use a foot switch, connect it to the foot switch jack.
7. connect *microKEYER* to the sound card using the three supplied audio cables:

SOUNDCARD OUT:

connect to the Line Out of the sound card

SOUNDCARD IN:

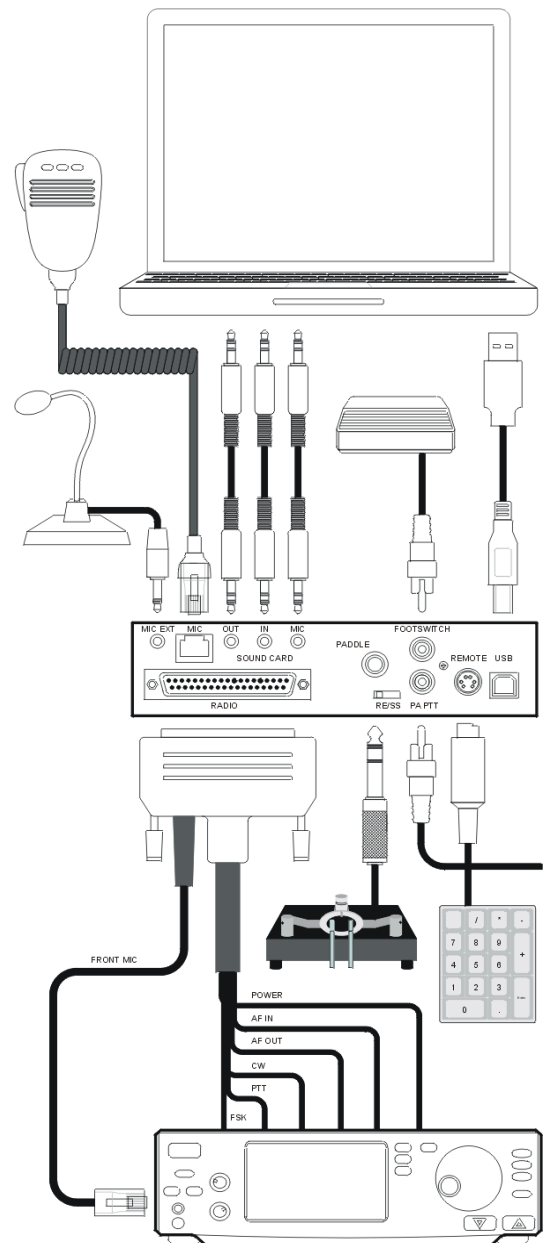
connect to the Line In of the sound card

SOUNDCARD MIC:

connect to the Mic input of the sound card

8. Locate but do not connect the USB cable from DIGIKEYER II to your computer.

NOTE: If you will be installing on a Windows computer, skip to "MICROSOFT WINDOWS INSTALLATION."



Mac OS X INSTALLATION

1. Insert the microHAM CD in your CDROM/DVD drive and navigate to Drivers/OS-X or use your web browser to go to <http://www.ftdichip.com/Drivers/VCP.htm> and download the latest driver image for OS-X.
2. Open FTDIUSBSerialDriver_v2_2_14.dmg by clicking on it.
3. For OS-X 10.4, 10.5 or 10.6 open FTDIUSBSerialDriver_10_4_10_5_10_6 and follow the instructions to install.
4. Plug in the USB cable
5. Turn on the radio or external power supply.
6. Follow the instructions for your software to configure the application to work with *microKEYER*.



NOTE: To access all the capabilities of *microKEYER*, your OS-X software must be written to use the *microHAM* Keyer Protocol or μ H Router by Kok Chen, W7AY.

MICROSOFT WINDOWS INSTALLATION

Installing *microHAM* USB Device Router



1. To install Router click on the **Install USB Device Router** link on the installation CD or download the most recent installation package from the web site: www.microHAM.com/downloads.html.
2. If you download an updated package, right click on "urouter_release_xx_xx.exe" (xx_xx is version) and choose "Run as administrator" to start the installation.



3. The Windows setup utility will start and ask into which folder Router and its supporting files should be installed. Note: unless you have a very strong reason to install Router elsewhere, please accept the default location.
4. When the Router installation is completed, plug in the USB cable when instructed, click "Finish" to launch Router for the first time and proceed to configuring Router for your station and software.

Configuring *microHAM* USB Device Router

The *microHAM* USB Device Router (Router) program provides a Windows compatible *configuration tool* for *microHAM* USB interfaces and *software interface* to other Windows applications (logging software, digital mode software, etc.). The software interface is provided as *Virtual Serial Ports*.

To configure and use *microKEYER* with Windows compatible application programs it is necessary to have installed the USB driver, started the Router, and applied power to *microKEYER* (turn on the radio). Router must then be configured to match the requirements of the application (logger or digital mode) software.

microKEYER Status



When the USB driver is installed correctly and *microKEYER* is turned on Router will show a device tab with a **GREEN** check beside the device name (*microKEYER*).



When Router shows a **YELLOW** "X" instead of a green ✓, it means the USB driver is correctly installed but *microKEYER* is not turned on.



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

installed.

Initial Setup



Router must be used to configure *microKEYER* for proper operation. The device configuration tabs (in the red rectangle) are used to setup each part of *microKEYER*.

Creating and Using Virtual Serial Ports

microHAM Router provides a set of virtual serial ports which allow Windows applications (loggers and digital software) to work with *microKEYER* just as they would work with "real" (hardware) serial ports.

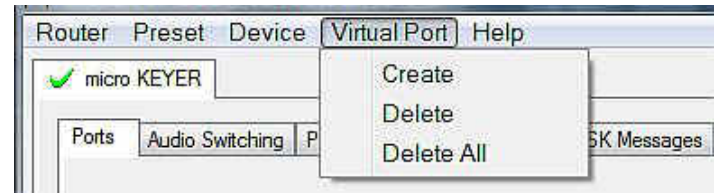
In order to use these virtual Ports, you must first create the ports and then assign each function you wish to use (radio control, PTT, CW, FSK, etc.) to each virtual port.

DO NOT define a port that is already in use (for example, COM1 or COM2 which are hardware ports on many motherboards) or a virtual port that is used by another USB device. Even though Router will not allow creating a virtual port on a COM port number which is already present in the system (like hardware COM ports or internal modems), sometimes these ports are hidden. If a device which also uses virtual serial ports (external USB devices, bluetooth devices, mobile phones, PDAs etc ...) is not connected to the computer when creating virtual ports in Router, the ports can overlap and will not work properly when you connect such device.

IMPORTANT WARNING: Before you start creating virtual COM ports, attach all external devices you use with the computer and allow them to connect to the system. Restart Router and then create the virtual COM ports.

Virtual ports are created from the Virtual Port menu.

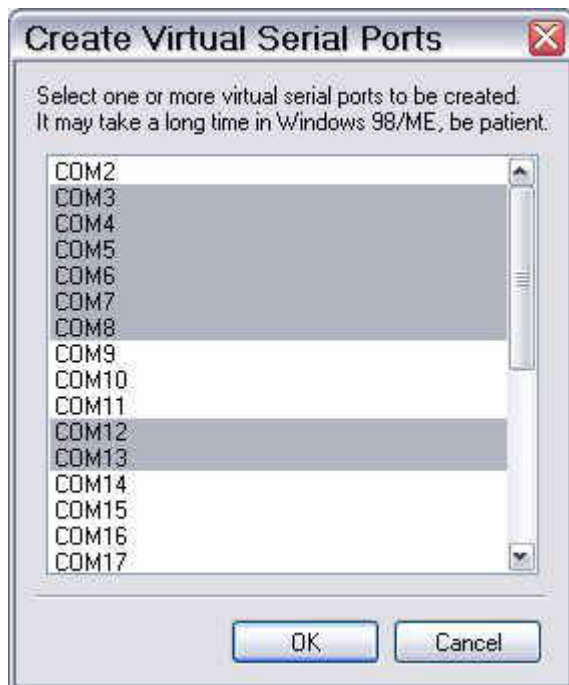
Create - Creates virtual COM ports. It is possible to select more than one port at a time by holding the *Ctrl* key on keyboard and clicking on COM port numbers. Creating virtual ports may take a long time (several tens of seconds), be patient.



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: It is possible to select multiple ports at one time by holding *Control* key on keyboard and clicking on the COM port numbers.



TIP: If you have removed another device which used virtual ports and Router does not offer the released COM port number, you will need to reset the virtual port bus. You can do this by deleting all virtual ports in Router at once. Select "Virtual Port | Delete All" then create the ports again. Any missing port number should appear.

6. microHAM USB DEVICE ROUTER

ROUTER MENU

Default Router Settings: used to completely reset Router to factory (default) settings.

"Default" removes all device tabs and deletes all stored configuration data, including all user presets. from the Windows Registry.



TIP: *microKEYER* can be reset to the factory configuration by selecting **Default Router Settings** followed by **Device | Store as Power-up Settings** to save the defaults to the keyer's memory.

Restore Router Settings: used to restore settings from a *urs* file created by the backup command.

A *urs* file can be used only with the device for which it was generated (the file contains the unit serial number) on a computer with same port assignments.

WARNING: Restoring a backup replaces all current Router settings including presets, **use it carefully!**

Backup Router Settings: used to create backup *urs* file.

This file contains Router settings (including Presets) for all devices defined in Router.

Options | General

- *Load Router on Start-up:* when checked, Router will start automatically each time the computer is started or rebooted.
- *Start Router Minimized:* when checked, Router will started minimized

Options | Band Map: (Not used with *microKEYER*)

Customizable band edge boundaries used to drive the band data output. BCD codes can be customized for driving antenna switches or bandpass filter control. This setting is not used with *microKEYER*.

Options | Digital Band Map: Customizable band limits for digital mode operation. This setting is used to automatically select VOICE or DIGITAL audio switching and the proper PTT output (PTT1/PTT2). The boundaries are necessary for transceivers which do not have a special mode for AFSK operation or do not provide this information via computer control. This primarily effects Kenwood and TenTec transceivers although it is also applicable to some older Icom and Yaesu radios.

Options | Audio Devices:

- *Don't use audio devices:* when checked, Router does not use audio devices and the settings on the Audio Mixer and DVK tabs have no effect.
- *Manually assign audio devices:* when checked, Router will allow the user to select audio devices (sound card) in the appropriate fields at Audio Mixer tab and will actively control the audio devices
- *Automatically assign microHAM audio devices:* when checked, Router will automatically assign proper audio device of the same name if multiple microHAM interfaces of the same kind are connected to the one computer. (Not used with *microKEYER*)

Options | DVK:

- *Voice message time limit:* maximum time for each voice message up to 120 seconds.
- *Sample rate:* sampling frequency used during recording and playback of voice messages.
- *Sample size:* sampling size used during recording of voice messages. Sampling size primarily effects audio quality of the messages. 16bit samples provide higher quality than 8bit.

NOTE: Select the same sample rate and size as used by your logger to avoid message distortion.

Options | USB:

- *Noise immunity:* selects how many times an undelivered USB packet will be repeated before the USB device is disconnected from the operating system.
- *Response time:* selects how long the USB chip in a device will wait for additional data before sending data to the operating system.

Minimize: Clicking this will minimize Router to the system tray at the bottom right corner of the Windows Taskbar (the "System Notification Area").



TIP: When Router is minimized you can restore it by double-clicking on the Router tray icon. You can also restore Router by double-clicking on the Router icon on the desktop or restarting Router from the Programs menu.

Exit: Clicking on this item will terminate Router.

NOTE: when Router is terminated the virtual ports will be closed and application software will be unable to communicate with *microKEYER* and the radio.

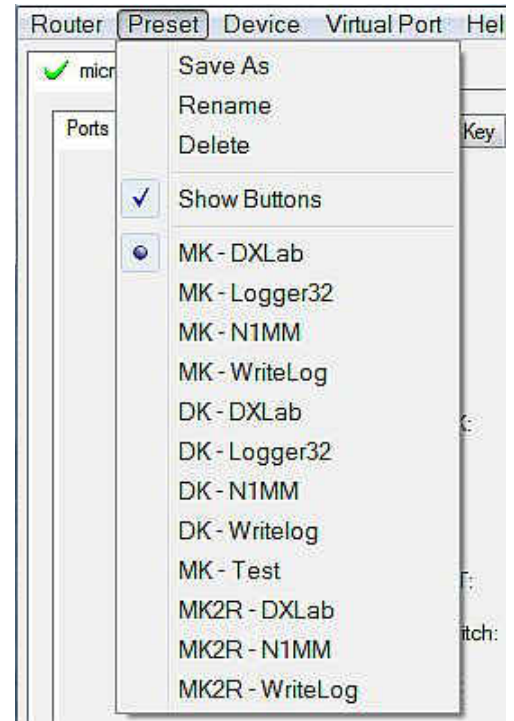
PRESET MENU

The requirements of each application (logging, control and digital mode programs) are different. Each program handles radio control, CW, FSK, PTT, and the sound card its own way. In some cases, what works for one application may not work properly with another. To get maximum performance from *microKEYER*, the user should create customized settings for each application used.

For easy switching among applications, Router supports up to 12 user definable **Presets**. Different configurations can be stored in these presets and recalled almost instantly simply by clicking on the preset button.

Each preset contains the settings for all devices connected to, and controlled by, Router. For example, if Router controls a *microKEYER*, a CW Keyer and a USB Interface, each preset remembers the settings for all devices including the assignment of COM ports and the contents of all sub-tabs except the FSK/CW Messages and DVK tabs.

NOTE: Presets for various loggers are not available until they have been saved by the user using **Preset | Save as**. For setup instructions for various loggers refer to Setup Guide documents available in Router Help menu (Use Help | Download Documents first if Help | Setup Guides are not available or incomplete).



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

1. Click on **Preset** and select 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 is on **ONLY** when all settings in Router are same as those stored in the preset.



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

The presets and the current router configuration are 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 checked, Router shows the preset buttons.

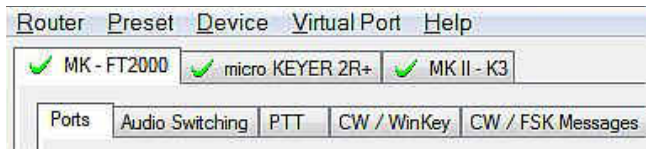
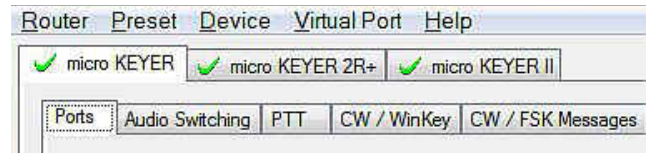


DEVICE MENU

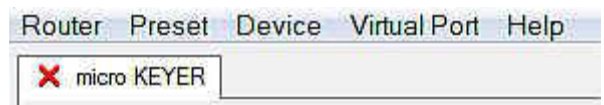
Router can control several devices. This allows configuring the settings for all (interfaces) connected to the computer at the same time using the Presets.

Each device has its own tab (page) in the main Router notebook. The content of each device tab depends on the type of device. Adding a device is automatic when Router detects a new device. Once detected, a device remains in Router even though device is disconnected. Each device is identified by 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 CW KEYER, micro Keyer and USB Interface II 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 a device from Router, unplug the USB cable from the computer or device.



Save Template - will save the current Router settings to template file.

When clicked, Router will open a standard File Save dialog window – the default location is *C:\Documents and Settings\All Users\Application Data\microHAM\cfg*. If a hypertext (*html*) or plain text (*txt*) documentation file of the same name as the template is present in the same directory, it will be associated with the template.

Load Template – will automatically configure Router from a template (*.*tpl* file).

When clicked, Router will open a standard File dialog – the default location is: *C:\Documents and Settings\All Users\Application Data\microHAM\cfg* - and the desired template can be chosen. When Router loads a template, it looks for an *html* or *txt* file with the same name as the template in the same directory. If such file is found, it is displayed.



TIP: Templates are a powerful tool for quickly configuring Router to work with a particular application. Template files are interchangeable between computers and ideal for cloning setups in multi-computer stations or for sharing configurations between users.

Store as Power-Up Settings: - will store the current settings of the Audio Switching, CW/WinKey, and PTT tabs to *microKEYER*'s EEPROM. If *microKEYER* is operated without connection to the computer it will use the settings stored in EEPROM. If *microKEYER* is connected to a computer running microHAM USB Device Router, Router's settings will be used but default settings will be retained in EEPROM.

Upload Firmware: *microHAM* will occasionally release updates to the firmware in *microKEYER*. The update may support new features in Router or improve application compatibility. The most recent public version of the firmware is always available from www.microHAM.com/downloads.html.

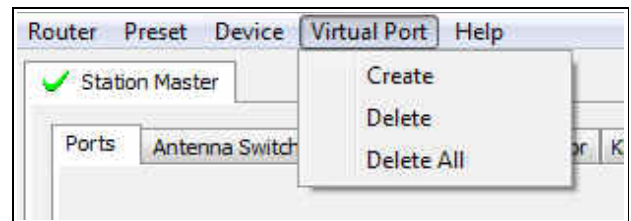
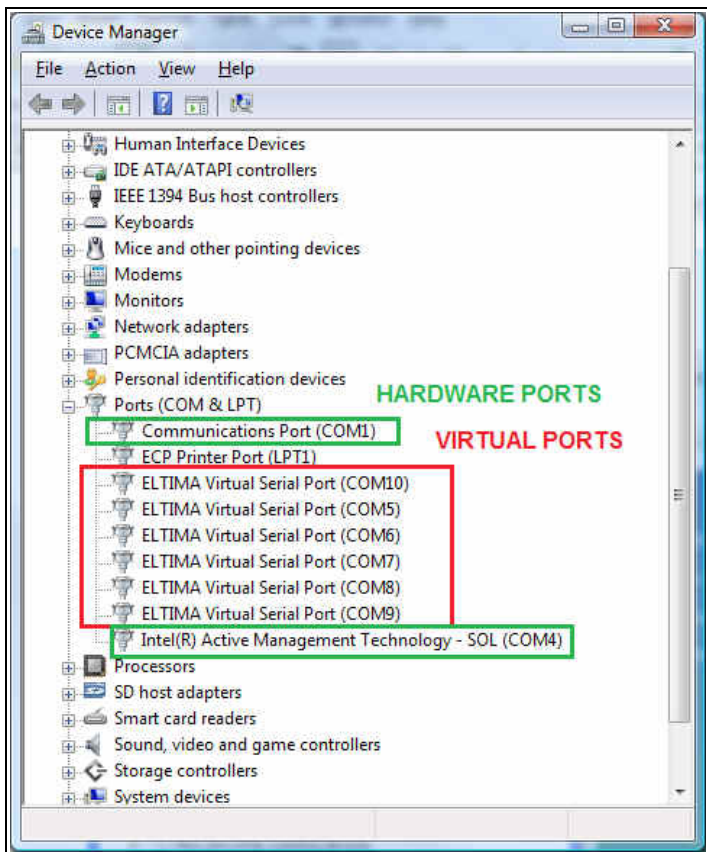
To update firmware, download the firmware file to your computer, then click on **Device | Upload Firmware**. A Windows file dialog will open, navigate to the directory in which you saved the new firmware file and select the file.



TIP: When you upgrade Router, the upgrade will include the latest firmware file. The new firmware will be automatically uploaded to *microKEYER* when the new version of Router connects for the first time, you have just to allow the upgrade when prompted.

VIRTUAL PORT MENU

It is necessary to create a number of virtual serial ports (COM ports) in order for a Windows application (logging, control or digital mode program) to access *microHAM* devices.



Create - Creates virtual COM ports. It is possible to select more ports at once by holding the *Control* key on the keyboard and clicking on COM port numbers. Creating a virtual port may take a while, be patient.

Delete - Deletes any single virtual port.

Delete All - Deletes all previously created virtual ports and resets Virtual Serial Port bus.

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

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

HELP MENU

Manuals: Link to microHAM manuals located on your system.

Setup Guides: Link to software configuration guides for many common applications.

Cable Schematics: Link to cable diagrams.

Download Documents: Downloads microHAM documentation including updated manuals and setup guides. You may specify the products for which you want documentation.

NOTE: Requires an Internet connection.

microHAM Home Page: Link to www.microHAM.com

microHAM Downloads Page: Link to www.microham.com/contents/en-us/d29.html

Show Tooltips: When checked, small, single line help is displayed below the mouse cursor.

Update Router: Download and install the most recent version of Router.

About: Shows the Router's internal version number

Change logs: Shows the Router and firmware changes.

DEVICE CONFIGURATION TABS

There are seven (7) tabs for configuring *microKEYER*. Each tab controls part of *microKEYER*'s functions. Except for the CW/FSK Messages tab, any change is applied immediately to *microKEYER*. Changes in the Messages are only applied in response to the **Store** or **Store All** buttons.



- **Ports** – used to assign virtual ports for use by application programs.
 - **Audio Switching** – used to configure microphone and sound card audio routing based on operator preference, application sound card handling and operating mode
 - **Audio Mixer** – used to set levels of each channel of the sound card
- NOTE:** The Audio Mixer is not available under Windows Vista or 7. Those operating systems do not allow an application like Router overall control of the sound device.
- **PTT** – used to configure T/R (PTT) keying, keying sequencer and footswitch operation.
 - **CW/WinKey** – used to configure the internal CW keyer when the application is not using WinKey.
 - **CW/FSK Messages** – used to configure internal CW and FSK messages
 - **DVK** – used to configure Router's Digital Voice Keyer
 - **Keyboard** – used to configure CW and FSK operation with the PS/2 keyboard or numeric keypad.

PORTS TAB

The virtual ports must be associated with a specific function or device channel (e.g., radio control, CW, PTT, etc.). These assignments should match that of the application. Ports should be assigned first in Router then in the application (e.g., logging or digital mode program).



Correct port assignment is critical for proper operation with application software.

microKEYER supports ten functions:

- **CAT** - CAT (uses RxD and TxD)
- **2nd CAT** (virtual “fork” for the main CAT channel)
- **FSK** (uses TxD for FSK and RTS for PTT if checked)
- **2nd FSK** (uses TxD for FSK and RTS for PTT if checked)
- **CW** (uses DTR or RTS)
- **PTT** (uses DTR or RTS)
- **2nd PTT** (uses DTR or RTS)
- **Foot Switch** (uses CTS, DCD, DSR or RING)
- **WinKey** (uses RxD and TxD)
- **Control** (uses RxD and TxD)

NOTE: Do not assign virtual ports for a channel (function) which is not used by the application. It is unnecessary and wastes resources.

CAT PORT & 2nd CAT PORT

The CAT channel is used by the application software to control transceiver frequency, mode, T/R switching and many other parameters. The application communicates with the radio using a serial protocol. Although most modern radios implement some form of serial control, nearly every radio implementation is different. The degree of control available for each radio depends on that radio and the application (logger or digital program).

NOTE: 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 a COM port is assigned in the Router but not in the application (or the application is not running) Router will indicate the channel is **closed**.

When an application opens the COM port assigned for control (usually at start-up), Router shows the channel as **open** and displays baud rate, data bits, parity and number of stop bits used by the application. For example, 4800 8N2 means: 4800 baud, 8 bits data length, parity = none, and two stop bits.

Data flowing thru the CAT channel is 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 radio control (CAT) turn this function OFF. PTT by CAT is not reliable because RFI can prevent the radio from switching back to receive. There is a dedicated T/R switching channel for this purpose called PTT.

NOTE: If your radio does not support handshake (most do not). Configure DTR and RTS settings in your application program (logger) for Always On or Always Off. Do not select "Handshake."

For Router to determine the operating frequency and mode, it must know what radio (CAT protocol) being used. To select the radio, click the **Set** button, choose your radio in the **Radio** combo box, select communication speed in the **Baud rate** box, and set the CI-V address for Icom and some TenTec radios.



TIP: Disable the Autobaud function in any Icom Radio used with Router. Configure the radio, Router, and your application software to operate at 9600 or 19200 baud.

Disable router queries – When this box checked, Router will not poll the radio for frequency and mode when that information is not available from the communication between the application and radio.

NOTE: "Disable router queries" disables Router polling only when the port has been opened by an application program. When the virtual port is closed, Router always polls the radio to support the automatic switching functions of *microKEYER*. If it is necessary to disable all polling, select one of the "none" options in the Radio box.

WARNING: DO NOT select "Disable Router queries" unless you have a specific reason to do so. Router only polls for information that is not requested by the logger and does not interfere with logger polling. Disabling Router queries may result in incorrect frequency and/or mode decoding and can have a serious impact on overall operation.

PW1 on radio bus – When this box checked, Router periodically generates an Icom "CI-VTransceive" broadcast to keep the PW1 synchronized.

NOTE: Check this box **only** if you have an IC-PW1 or other Icom compatible accessory physically connected in parallel with the transceiver.

Tracking: This function allows an external receiver to track the transceiver attached to *microKEYER*.

NOTE: For specific information, please refer to Appendix C.

The bottom two-thirds of the **Radio** window is a serial communication monitor. The monitor uses colors and tags to indicate which device is responsible for the data. Black queries (H1-TX or H2-TX) and grey radio responses (H1-RX or H2-RX) are from the "host" application (e.g., logger), H1 indicates the host application on the main CAT port, H2 is the host application on the 2nd CAT port. Green packets (R-TX and R-RX) are polls/responses from/to Router and not routed to the application.

Router monitors the communication when the host application performs control and polls the radio periodically for any missing information (VFO frequencies and mode). Because some applications do not poll the radio regularly or completely, Router must break this communication to update its internal state. In order to avoid confusing the application when Router polls the radio, data from the application is buffered and sent to the radio after Router receives a response to its query. If Router does not receive response to a poll within the time allowed or does not understand the response, it displays "oldest query discarded" but forwards all data to the virtual serial port to avoid confusing the application (logger).

Since USB transmits data in frames with a delay between frames, Router indicates frame boundaries with three dots (...). When a packet ends with three dots it means that the data continues in the next frame.

2nd CAT PORT

Beginning with version 7.0, Router provides unique control capability: the 2nd CAT Port is an intelligent data fork (software 'Y' connector) that allows a second application to share control of the radio. Router monitors when data is sent from each application and routes the radio's responses to the correct virtual port.

IMPORTANT: Both applications must use same communication parameters (baud rate, data length, parity and number of stopbits) for proper operation!

Neither CAT port has priority. Polls/commands from each application are processed alternately. In order to avoid collisions and avoid confusion due to unexpected data, responses from the radio are returned only to the application that generated the command. Unsolicited data from the radio such as automatic frequency/mode updates (Icom "transceive" packets or "Auto-information" data from Kenwood, Elecraft and recent Yaesu transceivers) are forwarded to both CAT ports.

Due to physical limitation of data channel throughput on radio and the controller capabilities in various transceivers, there are several important rules which must be observed.

- Total data throughput from both loggers must not exceed maximum throughput of the radio control port and transceiver controller. In other words, the polling rate from one application may need to be decreased to provide data space for the second application and vice versa.
- Applications must be tolerant of delayed responses from the radio. Each logger must wait patiently for radio response while another logger communicates with the radio.
- Due to protocol deficiencies in handling VFO split commands with many transceivers (particularly Icom), split mode must be initiated and ended by only one application and manual split control (from the front panel of the radio) should not be used.

NOTE: Despite extensive testing using various combinations of applications for the CAT and 2nd CAT ports, *microHAM* cannot guarantee proper operation with every potential combination of applications.

FSK & 2nd FSK PORTS

The FSK channel is used by the application program to send the 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 (On/Off) signal 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 an analog (audio) signal used to modulate the transceiver for digital modes as RTTY, PSK31, AMTOR etc. Computer sound card generated AFSK or PSK does not require special transceiver support and can be applied with LSB, USB or FM modes. Some radios have dedicated modes for AFSK (generally labeled PKT, DATA, LSB-D or USB-D) 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 transceivers 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).

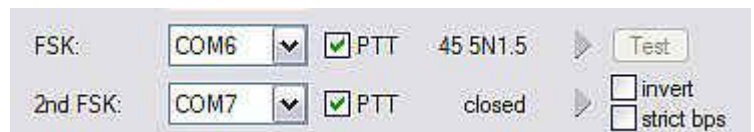
Edited by Geoff Anderson, G3NPA

If your transceiver supports FSK, use FSK for RTTY whenever possible. It's the only sure way to get a clean RTTY signal no matter the microphone gain or compressor (processor) settings on your radio.

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

When an application opens the COM port, Router will indicate the channel is **open** and display baud rate, number of data bits, parity and number of stop bits in use. For example, 45 5N1.5 means: 45 Baud, 5 data bits, no parity, 1.5 stop bits.

The second FSK port is useful when operating split with radios that have two receivers (e.g., FT-1000, FT-2000, FT-9000, K3, Orion or IC-7800). The second instance of the RTTY program should specify "right channel" for its audio source and should be configured to use the 2nd FSK port for its FSK output.



NOTE: microKEYER supports only one audio channel. There is no connection between the audio output from the second receiver and the sound card. To decode audio from the second receiver, it is necessary to build a small audio isolation network (transformer) and use custom audio connections.

Radios without a second receiver can use the 2nd FSK port for a second RTTY program with a different decoding algorithm to provide diversity decoding and transmit from either program.



TIP: If you see anything other than 45.5 baud (e.g., 4800 or 9600), the application is NOT configured correctly for FSK RTTY operation.

PTT: The virtual port used for FSK can also support PTT (required by MMTTY). When you use MMTTY, select the PTT box and RTS will be used for PTT. Do not use the FSK port for any other function.

Invert: Some transceivers lack the ability to set the sense of the FSK input. If you cannot set the proper sense, check the invert box. This is normally necessary only with the TenTec Omni V, Omni VI and Kenwood TS-940.

Strict bps: Some programs rely on the the FSK port for proper PTT timing; they drop PTT (unkey) when the FSK port buffer is empty. With virtual ports, this may cause PTT to drop before the contents of a message (macro) are complete. 'Strict bps' disables the virtual port buffering and transmits one character at a time to the output. Due to the additional overhead, FSK output will be slightly slower when strict bps is enabled but operation will be more reliable.

To test FSK operation from the computer to the radio, click on Test button with no port assigned or the port closed. The Test button will generate "RY" two times. The PTT box must be checked for the transceiver to switch to transmit.

CW PORT

By its very nature, USB is not well suited to transfer the real time events required for CW keying. In addition to the latency inherent in the USB protocol, delays due to CPU load, internal Windows message processing (inter-process communication) and data flow from other peripherals sharing same the USB root hub can result in transmitted characters that are garbled. To minimize these unwanted operating system effects Router uses a specially developed oversampling and prediction algorithm to assure the smoothest possible transfer of control signal events over USB. Using these techniques, 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.

Router allows assigning a virtual serial port for software CW using DTR or RTS signals. The DTR* and RTS* are identical to DTR/RTS except that the output is inhibited for one second after the COM port is opened. RTS*/DTR* should only be used with programs that cause unwanted key-ups during startup.



TIP: More applications use DTR for CW than RTS.

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

The state of the CW channel is indicated by a red arrow. The red arrow will light in time with the transmitted CW when the port is properly configured.



To test CW operation, click on the **Test** button with no port assigned or the port closed.

PTT & 2nd PTT PORTS

The PTT channels are used to control transmit/receive switching of the transceiver and power amplifier. An internal sequencer assures 100% protection against hot switching of the PA when the PTT channel is used. More information about T/R switching and the sequencer is provided under the PTT tab.

Router allows assigning virtual serial ports for PTT using the DTR or RTS signals. DTR* and RTS* are identical to DTR/RTS except that the output is inhibited for one second after the COM port is opened and should only be used with programs that cause unwanted key-ups during startup.



TIP: More applications use RTS for PTT than DTR.

The state of the PTT channel is indicated by a green arrow. If the port is opened, it does not mean it is properly configured. When the port is properly configured, the arrow will light during the entire transmission. To test PTT operation, click on the **Test** button with no port assigned or the port closed.



The 2nd PTT channel is identical to the primary PTT channel. 2nd PTT provides a way for a second application to key the radio if the primary application also controls PTT – for example, a logging program and CW reader/keyboard.



TIP: Always use serial PTT instead of the radio command PTT or VOX. It is the only way to assure proper sequencing of a Power Amplifier, LNA or receive antenna switch.

To test PTT, click on the **Test** button with no port assigned or the port closed.

NOTE: The test buttons do not activate the PTT outputs in VOICE modes.

FOOT SWITCH PORT

Even though many applications do not monitor the status of the foot switch and do not have the ability to perform specific functions based on operation of the foot switch, this capability has been implemented in Router. Hopefully sometime soon applications will be able to detect the footswitch status and use this information to automate user functions as was done in the DOS based TRLog.

Router allows assigning a virtual serial port to the footswitch channel and selecting one of four available input control lines (CTS, DSR, DCD, or RING). CTS is not available if foot switch is shared with the radio control port. The state of the signal can be inverted by checking the **inverted** box.

When a COM port is assigned in Router but the application does not support foot switch status (or no application is running), Router reports the channel as **closed**.

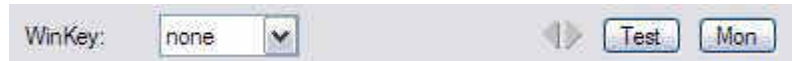


When foot switch is pressed, this state is indicated by a red arrow.

WinKey PORT

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 ASCII data from the computer to Morse characters. This unique property assures perfectly timed CW output from the computer regardless of OS load. More detailed instruction for configuring WinKey is found in the description of the CW/WinKey tab.

When a COM port is assigned to WinKey but not in the logger (or the logger is not running), Router will show the port **closed**. When a logger opens WinKey, Router displays the communications settings used to configure COM port.



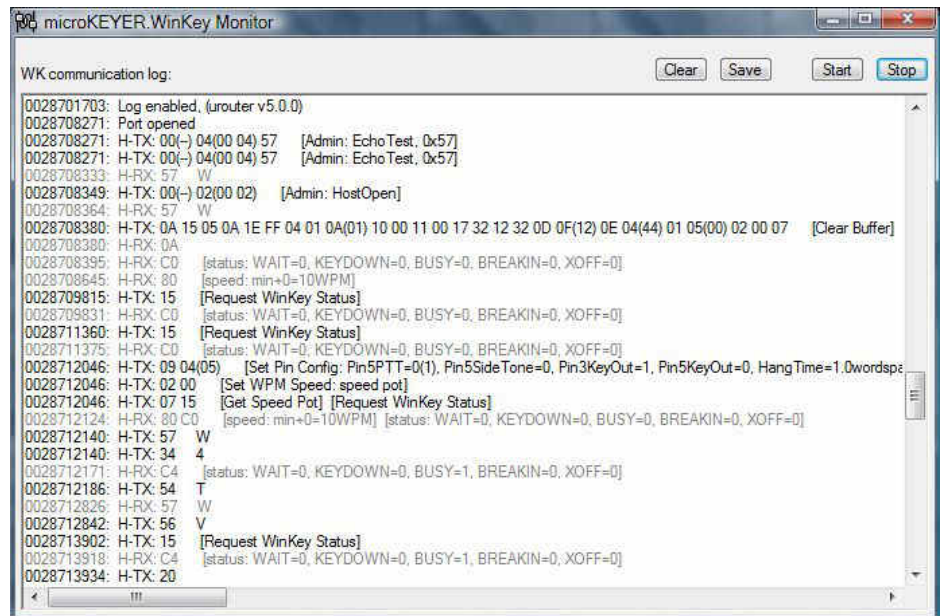
TIP: If you see settings other than 1200 8N1, the application is not configured correctly for WinKey.

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

To test WinKey, click the **Test** button with the channel unassigned or closed.

Mon: “WinKey Monitor” allows capturing communications between Router or the application and WinKey. Controls for the monitor include **Start**, **Stop**, **Clear** and **Save**.

WinKey Monitor should only be used to debug problems between WinKey and a logger. If there are problems, it may be useful to **Start** a capture and minimize the window. When a problem occurs, the window can be opened and the WinKey Monitor log **Saved** for analysis.

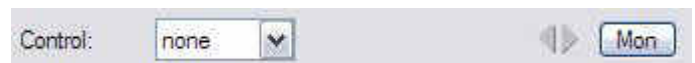


WinKey Monitor is circular – only the last 20 kilobytes or so will be saved in order to prevent creating very large files.

WK Monitor will display a description of each command from Router or the application and “decoded” response from WinKey. “ If a line ends in three dots (...) it means that the command or response has been broken across two USB packets.

CONTROL PORT

The Control Port allows an application program (logger) that implements the microHAM Control (SO2R) Protocol to use the Router DVK to record or playback voice messages and use the CW/FSK messages. This port should normally be set to "none."



AUDIO SWITCHING TAB

microKEYER allows customizing the audio configuration to meet the needs of a specific logging program or operating style (VOX, foot switch, computer generated transmit/receive switching, etc.) for each operating mode. Router recognizes four operating modes for the radio: CW, VOICE, DIGITAL and FSK. There are separate configurations for routing audio among the microphone, sound card and transceiver inputs for CW, Voice and FSK/DIGITAL. The microphone can be switched to either the sound card microphone input or the microphone input of the transceiver. Output from the sound card can be switched to the transceiver microphone jack (VOICE modes) or to the transceiver rear panel audio input (FSK and DIGITAL modes).

There are three audio configurations (settings):

- **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 (Packet, Auxiliary, or Accessory depending on manufacturer). This audio routing is used for digital mode operation. Since the PKT or AUX input of most radios bypasses the radio's internal microphone preamp and other audio processing stages which can distort digital modulation from the sound card, setting B is recommended for digital mode operation. In setting B, the microphone should be muted to avoid "hot mic" issues.
- **setting C:** routes the computer generated audio to the transceiver microphone input. This audio routing is used for VOICE modes and DVK operation.

Router allows configuring the Audio Switching based on the three sources of transmit control (VOX or software command, Serial port or WinKey PTT, and foot switch or hand mic PTT). Each PTT source can select a different audio configuration:

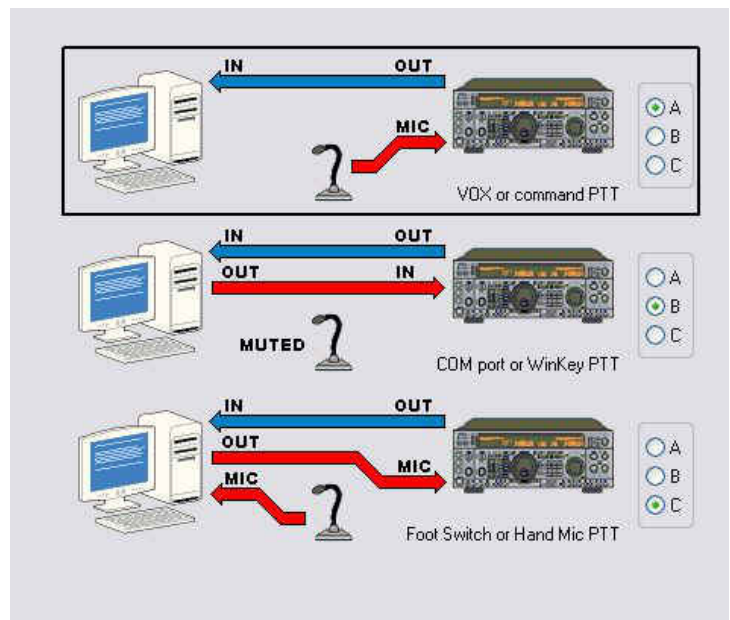
1. The transceiver is switched to transmit by VOX or serial (CAT) command from logger.

This setting is displayed in the TOP picture and indicated by the first letter in settings scheme (ABC). 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 for those who prefer VOX operation in SSB.

B: Computer generated audio is routed to the transceiver rear panel and the station microphone is muted. This is the preferred setting for digital mode operation (AFSK, PSK, etc.) when the computer generates a PTT keying signal on a virtual port.

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 basically same as A but the microphone signal goes through the sound card.



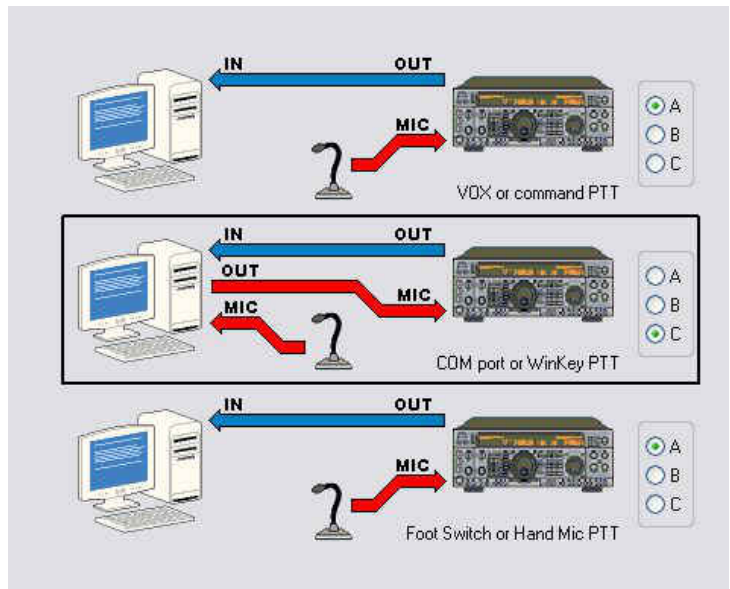
2. The transceiver is switched to transmit by PTT on virtual serial port or by WinKey generated PTT.

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 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 for those who prefer VOX operation in SSB.

B: Computer generated audio is routed to the transceiver rear panel and the station microphone is muted. This is the preferred setting for digital mode operation (AFSK, PSK, etc.) when the computer generates a PTT keying signal on a virtual port.

C: The station microphone is connected to the sound card mic input and audio from the sound card is routed to the transceiver microphone input. This setting is useful for SSB message playback (DVK). This configuration is useful for voice keyer operation (DVK) and is the preferred setting with N1MM Logger, Win-Test, or WriteLog.



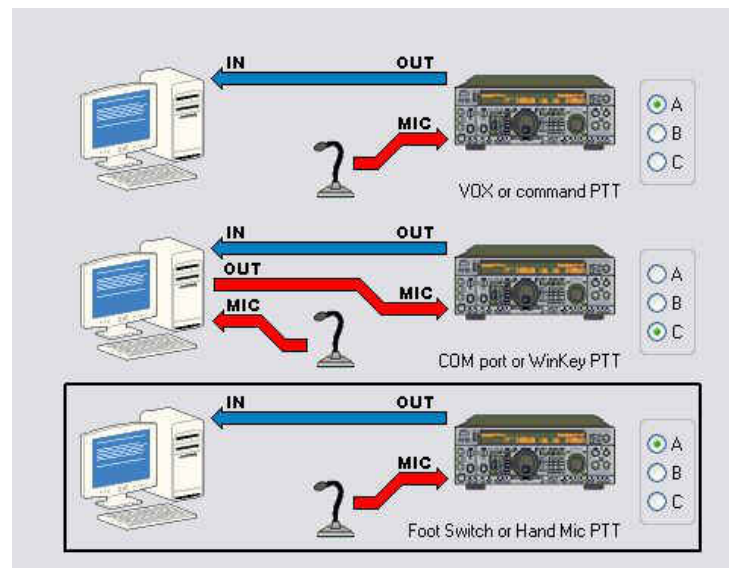
3. Transceiver is switched to transmit by footswitch or hand microphone PTT button.

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 generated audio is disconnected from the radio and the station microphone is connected directly to the transceiver front panel microphone jack. This setting is for SSB when the microphone should be connected directly to the transceiver.

B: Computer generated audio is routed to the transceiver rear panel and the station microphone is muted. This is the preferred setting for digital mode operation (AFSK, PSK, etc.) when the computer generates a PTT keying signal on a COM port.

C: The station microphone is connected to the sound card mic input and audio from the sound card is routed to the transceiver microphone input. This setting is useful for SSB message playback (DVK). This configuration is useful for voice keyer operation (DVK) and is the preferred setting with N1MM Logger, Win-Test, or WriteLog.



Audio Switching

Router generally selects the proper audio configuration based on the mode, and optionally frequency, reported by the transceiver in response to polling by the application (logger) and/or Router. If Router is not able to read the operating mode from your radio (radio does not have computer control port or does not report usable mode information), you can select one of four fixed “no radio” modes or one “no radio” mode with manual (keyboard/keypad) mode selection.

There are several optimized settings for each operating mode.

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 tab) where it is important. CW (AAA) assures quiet audio switching and minimizes relay clicking.

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 VOX or PTT (foot switch) mode, allows DVK playback, supports input switching for SSTV, and allows interrupting playback of a recorded message by pressing the microphone PTT or foot switch. When a DVK message or SSTV image is being transmitted, the station mic is muted and the computer audio is applied to the transceiver microphone input. With this setting, DVK messages must be recorded in the “on air” mode. This setting is recommended for general VOICE use.

VOICE (CCA) – The station microphone is connected to the sound card mic input except when the foot switch or microphone PTT is pressed. When the microphone PTT or foot switch is pressed, the microphone is connected to the radio. This setting allows use of VOX or manual PTT, off air recording of voice messages, and allows interrupting playback of a recorded message by pressing the microphone PTT or foot switch.

VOICE (CCC) – The station microphone is always connected to the sound card mic input. This is the same as above but when the foot switch or hand mic PTT is pressed, the microphone remains connected to the sound card.

VOICE (CBA) – Special setting for radios which use the rear panel audio input for DVK input during voice operation (N1MM Logger with TenTec Orion or Orion II). Do not use with other loggers or radios.

VOICE (ABA) – Special setting for SSTV mode. The microphone is connected to the radio microphone jack and allows VOX or foot switch VOICE operation. When an image is being transmitted, the sound card audio is connected to the transceiver rear audio input (Kenwood, TenTec, and Icom transceivers) and the mic is disconnected. This setting is not recommended for DVK operation with Icom transceivers.

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

FSK/DIGITAL (CCC) – The computer generated audio is connected to connected to the radio front panel mic jack and the sound card microphone input is muted. This setting is recommended ONLY for older radios and the Elecraft K2 that do not have rear panel audio input for digital modes.

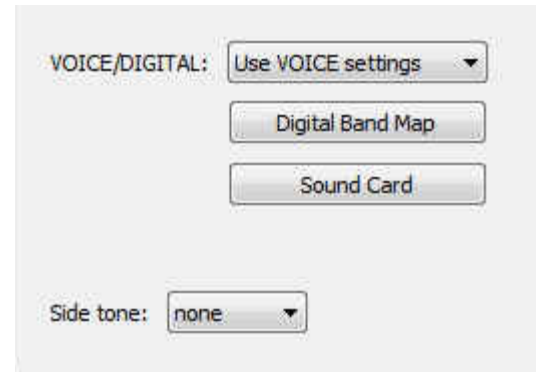
Router will show a black box around the selected mode/audio configuration.

Many radios fail to provide a separate mode for digital operation or the serial control protocol implemented by the radio does not report the digital mode when operating AFSK, PSK or other audio based digital modes. This is true for all Kenwood transceivers, most TenTec transceivers, most older Icom transceivers and the Elecraft K2. With those radios, digital operation (except for FSK) must be done using voice modes (USB or LSB).

The traditional method – feed the microphone jack from the sound card output through a transformer – is not optimum for many reasons: you need to remember to turn off any speech compressor and EDSP or other signal processing when using digital modulation operating using in digital modes. In addition, the microphone amplifier in the radio can cause distortion because it is optimized for voice and its frequency response is often not as flat as necessary for digital modulating signals.

The proper method is to feed sound card audio to the microphone jack only for voice modes (SSB, AM, FM) and to the jack designed for digital modes - generally on the transceiver's rear panel – when using sound card based digital modes.

Even though the radio may not report a unique DIGITAL mode, Router can make an intelligent choice and apply the DIGITAL or VOICE configuration for Audio and PTT based on the operating frequency from the radio. The **VOICE/DIGITAL** combo box is used to control automatic switching when the operating frequency is in the "Digital Band" as defined in the Digital Band Map and the transceiver is in USB, LSB or FM mode.



Always VOICE: VOICE settings will be used regardless of detected frequency. This should be used with most Yaesu transceivers, late model Icom transceivers that support USB-D and LSB-D and Elecraft K3.

Always DIGITAL: DIGITAL settings will be used regardless of detected frequency.

Select by frequency: Router will select DIGITAL settings when detecting a frequency inside the "Digital Mode" boundaries. These boundaries can be fully customized in the Band Map by clicking the Digital Band Map button.

Sound Card: is only visible with Windows Vista. It displays the Mixer ID, Wave In ID and Wave Out ID for each input/output.

Side Tone: *microKEYER* includes an internal piezo speaker for sidetone. The sidetone frequency is selectable from 338, 450, 675 and 1350 Hz. Side tone can be disabled by selecting "none."

PTT TAB

The PTT tab allows configuring PTT operation.

PTT INPUTS:

microKEYER has five PTT inputs:

- PTT generated by the logging program on the virtual COM port RTS or DTR
- 2nd PTT generated by a second application on the virtual COM port RTS or DTR
PTT and 2nd PTT behave the same and generate the same **Serial PTT** input.
- A foot switch attached to the microKEYER rear panel RCA jack.
- The PTT switch of the microphone connected to the RJ45 MIC jack.
This input is connected in parallel with the foot switch input.
- WinKey generated PTT: The WinKey PTT output (pin 5) is connected by a jumper (SO1R/SO2R) to PTT1 or pin 6 of the REMOTE jack.

PTT OUTPUTS

microKEYER has three PTT outputs: PTT1, PTT2, and PAPTT. PTT1 and PTT2 are brought out to the DB37 Radio connector. PAPTT is an RCA jack for connecting to external devices.

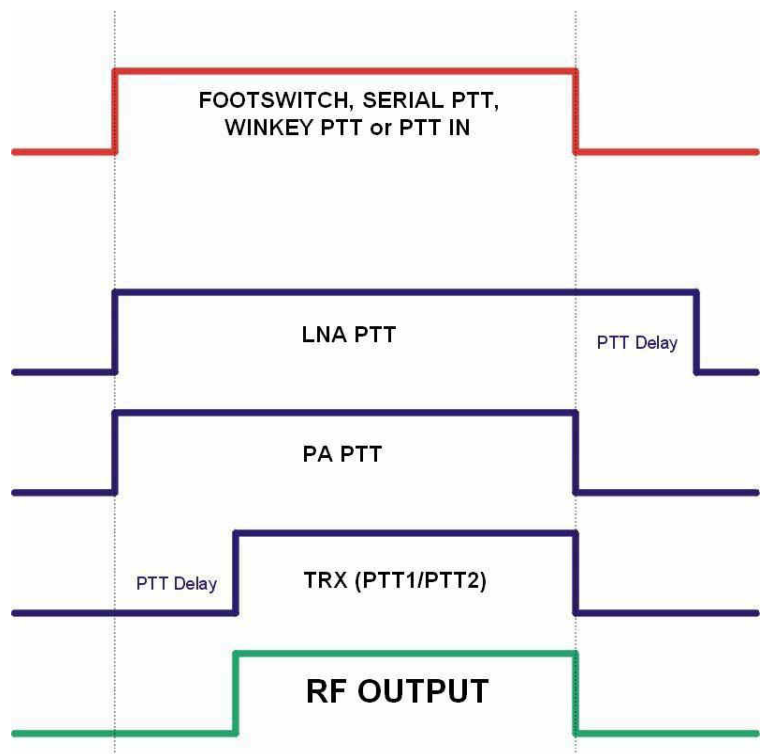
PTT1 is wired to the radio microphone jack and is generally used for VOICE modes.

PTT2 is wired to the radio Accessory jack and is used to switch the radio into transmit in DIGITAL and FSK modes.

Note: PTT2 or "rear panel" PTT is used by some radios to automatically mute the microphone and disable microphone processing circuits (audio equalizers, transmit DSP, clipping, etc.) that can distort digital modulation.

PA PTT is available on the microKEYER rear panel RCA jack and is designed for switching a power amplifier. PA PTT is enabled by checking the **PA PTT** box. PA PTT will delay the transceiver PTT by the **PTT Delay** value.

Note: PTT delay should be a few milliseconds longer than the relay activation time of the amplifier.



LNA PTT is an optional timing sequence designed for bypassing a low noise preamplifier (LNA) or disabling receive antennas during transmit. The option is enabled by checking the **LNA PTT** box. LNA PTT will cause the PA PTT output to remain closed by the **PTT Delay** value after the transceiver PTT is released.

microKEYER can select the PTT output based on the mode, and optionally frequency, reported by the transceiver in response to polling by the application (logger) and/or Router. If Router is not able to read the operating mode from your radio (radio does not have computer control port or does not report usable mode information), you can select one of four fixed “no radio” modes or one “no radio” mode with manual (keyboard/keypad) mode selection.

Router recognizes four operating modes for the radio: CW, VOICE, DIGITAL and FSK (RTTY) with three selections for PTT: CW, Voice and FSK/DIGITAL.

CW: Options are - PTT1 (microphone jack), QSK (no PTT) and PTT2 (rear panel jack).

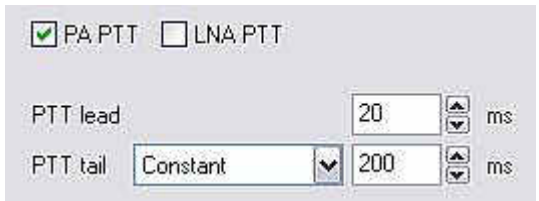
VOICE: Options are – PTT1 (microphone jack) and PTT2 (rear panel jack).

FSK/DIGITAL: Options are – PTT1 (microphone jack), PTT2 (rear panel jack), and PTT1 & PTT2 (both jacks).

PA PTT or **LNA PTT** timing can be specified for the PA PTT output. Checking either box enables the PA PTT.

PTT Lead can be specified in 10 millisecond increments. Minimum lead is 0 ms, maximum delay is 2500 ms.

PTT tail specifies the length of time the PTT will remain closed following the last CW character. WinKey has a minimum tail of one word space (6 elements). PTT tail applies an additional delay that can be set for a “constant” 10 to 2500 milliseconds in 10 ms steps or an additional one word space (12 elements total), 1.33 word space (14 elements), 1.66 word space (16 elements) or two word spaces (18 elements).

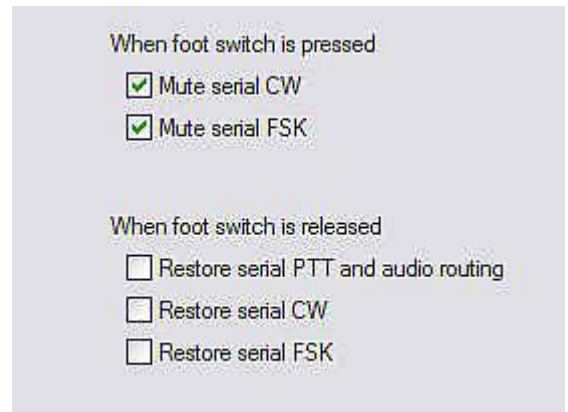
FOOTSWITCH SEQUENCER

Additional functions can be associated with the footswitch (or hand mic PTT). *microKEYER* recognizes when the footswitch is closed (pressed) or open (released) and can manipulate CW, FSK, PTT and audio routing when the footswitch is closed or opened.

Mute serial CW - if checked, serial CW 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 will remain suppressed until the application releases PTT.

Mute serial FSK - if checked, the FSK ports will be blocked while the footswitch is pressed. If **Restore serial FSK** is checked, FSK will resume when the footswitch is released (if it has not already completed). If **Restore serial FSK** is not checked, FSK will remain 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 resume only after the application releases PTT.



CW/WinKey Tab

This tab provides the configuration for the internal, WinKey based, CW keyer. A complete WinKey manual can be downloaded from: [HTTP://k1el.tripod.com/docfiles.html](http://k1el.tripod.com/docfiles.html). Thanks to Steve Elliott, K1EL for this great product.

WinKey can be controlled by a logging program or operate in stand alone mode controlled by Router. Router controls the speed range, Paddle mode and other timing characteristics of Winkey. When an application opens WinKey, all buffer handling and speed changes are strictly under application control.

When the port is closed, the WinKey operating parameters can be changed from this tab. Every change is applied immediately.

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 pin 6 of the REMOTE jack.

Paddle Mode

- Iambic A (Curtis)
- Iambic B (Accu-keyer)
- Ultimatic (Single lever)
- Bug Keyer
(Vibroplex emulation)

Priority – Ultimatic mode offers a choice if DIT or DAH priority for dual lever paddles. If no priority is selected, the keyer works in a "last paddle wins" mode.

The screenshot shows the configuration interface for the CW/WinKey tab. It is divided into two columns of settings. The left column contains:

- Paddle mode:** A dropdown menu currently set to 'Iambic B (Accu-keyer)'.
- Priority:** Two radio buttons, 'dit' and 'dah', both of which are currently unselected.
- Paddle setpoint:** A numeric input field set to '50' with a '%' symbol to its right.
- Disable paddle memory:** An unchecked checkbox.
- Swap paddles:** An unchecked checkbox.
- Auto space:** An unchecked checkbox.
- CT space:** An unchecked checkbox.

 The right column contains:

- Speed pot min:** A numeric input field set to '10' with 'WPM' to its right.
- Speed pot max:** A numeric input field set to '40' with 'WPM' to its right.
- Farnsworth speed:** A numeric input field set to '0' with 'WPM' to its right.
- DIT / DAH = 100 / :** A numeric input field set to '300' with a '%' symbol to its right.
- Weighting:** A numeric input field set to '50' with a '%' symbol to its right.
- 1st extension:** A numeric input field set to '0' with 'ms' to its right.
- Keying compensation:** A numeric input field set to '0' with 'ms' to its right.

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 in range 5 to 99 WPM.

Farnsworth speed – Sets the Farnsworth keying speed (10 to 99 WPM range, 0 disables this feature).

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).

CW/FSK MESSAGES TAB

On this tab you can define nine messages of up to 50 characters each which are stored in EEPROM. Each message may repeat (loop) or call another message after a programmable delay.

Message content	Jump to	Delay [s]	Test on CW	
1 W4TV	-	0	Test	Store
2 DE W4TV	-	0	Test	Store
3 TU 5NN	-	0	Test	Store
4 CQ TEST DE W4TV W4TV	-	0	Test	Store
5 55N	-	0	Test	Store
6 5NN	-	0	Test	Store
7 CQ CQ DE W4TV W4TV	-	0	Test	Store
8	-	0	Test	Store
9	-	0	Test	Store

Par. 5
Merge
Cancel WPM
Set WPM 05
Set Key 05
Set Wait 05
Store All

CR & LF
Figure
Letter
Blank
BEL

Load from File
Save to File

Commands which may be included in a memory are:

- Merge;** merge two characters without a letter space – [M]AS will sound AS .-...
- Cancel WPM:** restore speed set by the Speed pot.
- Set WPM:** force speed to the selected value regardless of position of speed knob.
- Set Key:** close CW output for selected time in seconds.
- Set Wait:** wait selected seconds during playback.
- CR & LF:** Insert Carriage Return/Line Feed
- Figure:** Insert special Figure character
- Letter:** Insert special Letter character
- Blank:** Insert special Blank character
- Bell:** Insert special Bell character
- Jump to:** used for looping a message or calling another message
- Delay:** sets the delay in seconds before looping or calling another message
- Test:** plays a message without storing it (CW Only)
- Store:** saves one message to *microKEYER* memory
- Store All:** saves all messages to *microKEYER* memory
- Load from File:** loads all messages from file
- Save to File:** saves all messages to file

Messages can also be saved and replayed using an external keyboard or numeric keypad attached to the PS/2 jack. See: Chapter - External Keyboard.

NOTE: Messages are not saved or loaded with Presets

DVK TAB

microKEYER allows recording and playing nine voice messages per bank and an unlimited number of banks (limited only by the capacity of the computer hard disk). Banks can be managed with Rename, Add and Remove buttons. **Rename** to rename the current bank, **Add** to create a new bank, and **Remove** to delete the current bank. Bank selection is provided by **Bank** box.

Each memory may repeat with a programmable delay (loop) or can be chained with another memory using external keyboard or keypad.

While a DVK message is recorded or played, Router uses the DVK mixer settings. When recording or playback is finished, the settings in the Audio Mixer are restored. DVK mixer settings are not stored with presets but in the message banks. This means each bank can have its own levels (slider position). It also allows each bank to be configured for the voice of a different operator if *microKEYER* is used in a club station or other multi-operator situation. .

DVK memories can be played back using microHAM Control Protocol if your logging program supports it.

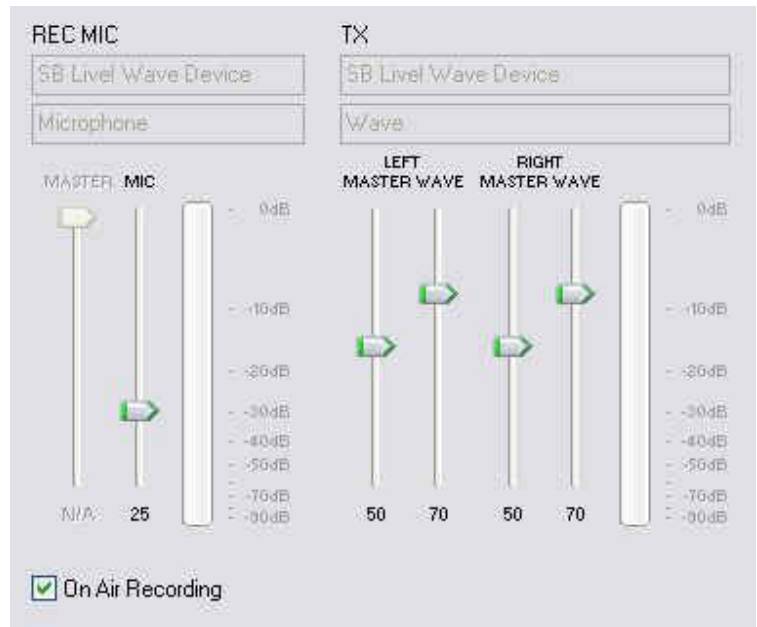


Under Windows 2000 or XP, Router uses the sound card selected on the Audio Mixer Tab. With Vista, the input and output sound cards are selected on the DVK tab.

REC MIC slider adjusts microphone level during message recording.

TX LEFT (and **RIGHT** if "Stereo" operation is selected on the Audio Mixer Tab – Win 2K and XP only) are separate level controls with same function as the TX VOICE/DIGIAL controls on the Audio Mixer tab.

If the "**On Air Recording**" box is checked, the microphone signal is automatically forwarded to the transceiver and PTT activated when a message is being recorded. On Air Recording is not available under Windows Vista.



To record, Audio Switching must be set to "CCA." **DO NOT** use the footswitch or microphone PTT when recording – even with On Air Recording.

KEYBOARD TAB

The Keyboard Tab controls the operation of a PS/2 keyboard or numeric keypad connected to the Remote jack.

General:

QWERTZ layout – configures the keyboard for a QWERTZ layout.

FSK from keyboard:

Diddle LETTERS: send the LETTERS character whenever there is nothing in the transmit buffer.

UOS: shift back to LETTERS case whenever a space is encountered in the transmit data.

Type ahead: enables type ahead when using a PS/2 keyboard. Characters are transmitted after a **space** (word mode) or when the buffer has reached its limit (16 characters).

FSK from keyboard:

- Diddle LETTERS
- UOS
- Type ahead

CW from keyboard:

Type ahead: enables type ahead when using a PS/2 keyboard. Characters are transmitted after a **space** (word mode). or when the buffer has reached its limit (16 characters).

Speed Step: set the amount by which the Up/Down or NUM +/- keys change the CW speed.

CW from keyboard:

- Type ahead
- Speed step:
 WPM

Auto numbering:

Leading zero as T: sends leading zeros in contest report as T. For example 001 will be send as TT1.

Zero as T: sends all "zeros" in contest report as T. For example number 100 will be send as 1TT.

One as A: sends all "ones" in contest report as A. For example number 101 will be send as AOA.

Nine as N: sends all "nines" in contest report as N. For example number 199 will be send as 1NN.

Report 5NN: send 5NN before contest serial number.

Auto numbering:

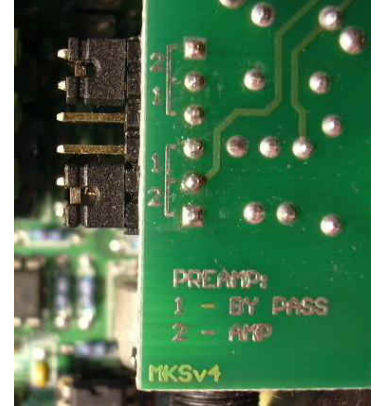
- Leading zero as T
- Zero as T
- One as A
- Nine as N
- Report 5NN

7 - SETTING AUDIO LEVELS

For optimum operation in Voice and AFSK Digital modes, the audio levels must be set properly. The function of each control was explained in detail in AUDIO SWITCHING, AUDIO MIXER and DVK TAB sections. Following a step-by-step approach will help you to set proper levels.

Configuring *microKEYER* for your radio:

1. Open *microKEYER* and check the jumpers for the sound card preamplifier. The preamplifier is used ONLY in the microphone audio feeding the sound card ("C" audio settings). This preamplifier makes the relatively low level output of dynamic microphones, including Heil HC-4 or HC-5 elements and most amateur hand mics, compatible with the mic input level of most sound cards. By default (factory setting) this preamp is bypassed.
2. To enable the preamplifier move the **two** internal jumpers to the positions marked as **(2-2)** on board. The preamplifier is powered from the bias voltage presented at the microphone jack of the sound card.



TIP: Turn on this preamplifier if you are attaching a dynamic microphone to either the RJ45 or Ext MIC jack.

WARNING: Never mix types of microphone attached to the *microKEYER* RJ45 and Ext Mic jack. Plugging a microphone into the Ext Mic jack will automatically disconnect the mic attached to the RJ-45 jack.

NOTE: The microphone is normally connected directly to the transceiver mic input ("A" Audio settings). If your transceiver uses an electret mic (Icom transceivers), you must use an electret mic with *microKEYER*. If your transceiver uses a dynamic mic (all other manufacturers), you must use a dynamic mic with *microKEYER*. **DO NOT** mix microphones or use a microphone with switchable elements where one element is electret and one is dynamic.

3. Connect the original microphone for your transceiver directly to the RJ-45 jack on *microKEYER*.
4. Set the microphone trimmer (adjustment hole in the right side of MK) to the midpoint.
5. Set front panel RADIO control to 3 o'clock.
6. On the Audio Switching tab, set VOICE to: ACA.
7. On the PTT tab, set VOICE to: PTT1 (microphone jack).
8. Set your radio for USB or LSB, connect it to a dummy load, turn off any compression and switch to transmit. With the MIC GAIN control on the radio, set the proper drive level while speaking into the microphone (this should be your normal operating level).

Do not adjust the Mic Gain again.

Setting Audio Levels:

1. Open Router's Audio Switching tab, set the VOICE switching to CCA and the FSK/DIGITAL switching to BBB.
2. Select Router's Audio Switching tab and click the "Sound Card" button.
3. Select the sound card connected to microKEYER in the Mixer and WaveOut boxes.
4. Click the TX Mixer button. If the Mixer does not appear, open the Windows Sound Control Panel and select the "Playback" tab.
5. Click the "Test Signal" button on the Audio Devices screen and verify that the VU Meter for "Speakers" or "Headphones" for your sound card reaches maximum. If not, turn off the Test Signal, restart Router and return to step 2. Turn off the Test Signal.
6. Select the "Playback" tab in the Sound Control Panel.
 - double click "Speakers" for your sound card.
 - click Levels tab and unmute both Speakers and Microphone
 - click Balance and set LEFT and RIGHT to 70%, then click OK
 - set the Microphone level to 70% and click OK
7. Select the "Recording" tab in the Sound Control Panel
 - double click "Microphone" for your sound card.
 - click Levels tab and unmute the Microphone
 - Preset the Microphone level to 70% and click OK
8. Select an AFSK mode on RADIO. (PKT, DIG or DATA for Yaesu, LSB-D or USB-D for current Icom transceivers, RTTY or RTTY-R on K2, and USB or LSB for Kenwood, TenTec and old Icom transceivers). Do not select RTTY or FSK; those modes do not use the audio input.
9. Select the "Playback" tab in the Sound Control Panel, double click "Speakers" for your sound card and click on the Levels tab.
10. Click the "Test Signal" button on the Audio Devices window and adjust the "Speakers" level for normal (rated) output on your transceiver while keeping the ALC meter as low as possible.

NOTE: For the Elecraft K3 only: Do not adjust the Speakers level. Instead, adjust the Line In level (Mic Gain) until the ALC shows five (5) bars.
11. Switch your radio to USB or LSB and make sure any compression is turned off. Click the "Test Signal" button and adjust the microphone trimmer (right side of *microKEYER*) for normal transmitter output (drive level).
12. Switch to the "Recording" Tab in the Sound Control panel, double click on the "Microphone" for your sound card and select the Levels tab. While speaking into the microphone (do not press PTT), adjust the Microphone level until you see the top green bar light on the VU meter then click "OK."
13. Return to the "Playback" tab, double click "Speakers," select the Levels tab and preset the microphone to the same level you set in the previous step.
14. Turn on VOX, speak into the microphone and adjust the microphone level on the "Playback" tab to set the same drive level as you set in step 12 on page 40 - do not adjust the MIC GAIN on the radio.

NOTE: To make fine adjustments, you can compare levels for the direct ("A") connection and through the sound card ("C") by pressing the footswitch or hand mic PTT. When the radio is keyed by VOX or MOX, the microphone audio is passing through the sound card. When the radio is keyed by the footswitch or hand mic PTT, the microphone is connected directly to the radio.

15. Switch to the DVK tab in Router. Set REC MIC to the microphone of your sound card and set TX to the speakers or headphone of your sound card. Select the default bank and preset REC MIC and TX to 70%.
16. Press the "Record" button and adjust the REC MIC so that signal peaks as high as possible in the yellow without going into the red.
17. Press the "Play" button and check that the drive level is same as you set in step 14. If not, adjust the TX level.

NOTE: DVK levels are separate from those set by other applications. DVK level settings are stored with the message banks.

8 - SYSTEM CONSIDERATIONS

microKEYER can be used with a wide variety of software. The capabilities of those packages will have large influence on the level of computing power needed to utilize *microKEYER*.

When used with Windows based contest logging applications like N1MM Logger Plus, Win-Test, and WriteLog or Windows based general logging applications like DXBase, DXLab Suite, DX4Win, Logger 32 and others, the microHAM control and interface application "*microHAM Router*" must run with the application. Since both the logging program and *microHAM Router* are real-time applications, system performance will be dependent on both CPU speed and the amount of available RAM.

While *microHAM Router* may run on slower computers, the minimum tested system is a 1.8 GHz Core2Duo processor, Windows 7, 1 GB RAM, CD-ROM, and USB 1.1 port. Whether Router can run as designed on slower machines with less memory and leave enough resources for application programs has not been determined. *microHAM Router* is not supported on any 16 bit version of Windows (95, 98, ME, SE).

In order to provide sufficient performance for simultaneous operation of *microHAM Router*, a logging application, Internet connectivity and other accessory programs, the recommended system is a 2 GHz or faster multi-core CPU with Windows 8.1 or later, 4 GB RAM, CD-ROM, root USB 2.0 port, and a transceiver with supported control protocol and logger, control, or digital mode software.

9 - EXTERNAL KEYBOARD/KEYPAD

NOTE: The keyboard/keypad must be PS/2. A USB device and PS/2 adapter will not work.

microKEYER includes the ability to generate FSK or CW signals and play or record CW, VOICE or FSK messages using a PS/2 keyboard or numeric keypad connected to the REMOTE jack. A numeric key pad is sufficient to record and play CW and DVK messages, control CW speed (WPM) or play a serial number message. "Live" CW or FSK (RTTY) requires a full keyboard.

Switching modes:

The keyboard or keypad mode will follow the radio mode. If the transceiver is not computer controllable or its control protocol is not supported, the keyboard or keypad can be used to switch Router's operating mode if the "radio" selection is "no radio (mode selected manually)."

Key	Function
*1	switch next mode (CAPS)
*2	switch to CW mode
*3	switch to VOICE mode
*4	switch to FSK mode
*5	switch to DIGITAL mode
*6	n/a
*7	n/a
*8	n/a
*9	enable/disable PA/LNA PTT

STATUS INDICATION				
NUM	CAPS	SCROLL	play/rec	mode
OFF	x	x	playback	
ON	x	x	recording	
x	OFF	OFF		CW
x	OFF	ON		DIGITAL
x	ON	OFF		FSK
x	ON	ON		VOICE

Playing messages:

A message is started by pressing F1-F9 on the keyboard or 1-9 on the number pad. A message can be aborted with the ESC key or the zero key on the number pad. Messages may be made to repeat (loop) by pressing DEL (period) on the number pad while the message is playing. The default (minimum) wait time after ending a message and starting again is one second. The pause time may be set from 1 to 9 seconds by entering the desired delay immediately after pressing DEL. For example, 1 5 will start message number 1 and cause it to repeat with five a second delay. Pressing zero (0) will terminate a message loop.

Recording messages:

Recording is started (and stopped) by pressing NUM LOCK. To start recording, press NUM LOCK followed by the number of the message to be recorded. To abort a message without saving, press zero on the number pad or Escape. To end recording and save the message press NUM LOCK.

In CW, microKEYER stores characters as they are echoed by WinKey which means only those characters actually transmitted are stored. CW messages may be recorded from either paddles or keyboard. The gap "]" and other WinKey commands cannot be entered from the keyboard but may be used in messages loaded from Router's CW/FSK Messages tab.

In FSK, all characters entered are stored.

Keyboard	numeric keypad	Function	CW	FSK	Voice
	NUM LOCK	start/stop recording of message (recording is indicated by NUM LED)	✓	✓	✓
	NUM *	Tune (can be canceled by keys NUM 0 or ESC, or by the paddle)	✓		
ESC	NUM 0	playback: stop transmitting (message or any characters in buffer)	✓	✓	✓
		recording: abort recording without storing the message			
F1-F9	NUM 1 – NUM 9	playback: start message playback	✓	✓	✓
		recording: set message number			
	NUM DEL	playback: periodically repeat last message (default interval is 1 second, it can be changed by pressing the number on numeric keypad)	✓	✓	✓
		recording: no function			
	NUM /	Switch between "speed control mode" and "serial number mode" (serial number mode is indicated by SCROLL LED, if present)	✓		
ALT		When held allows setting the serial number			
PG UP	NUM +	WPM control	Increase CW speed (step defined by configuration)	✓	
UP		S/N mode	Increment number by one without transmitting	✓	
PG DN	NUM -	WPM control	Decrease CW speed (step defined by configuration)	✓	
DN		S/N mode	Decrement number by one	✓	
HOME	NUM ENTER	WPM control	Reset CW speed to pot (knob) value	✓	
ENTER		S/N mode	Transmit number with optional report and increase number by one (format defined by configuration)	✓	
ENTER		transmit CR and LF characters		✓	
F10		Toggle PTT – alternative to foot switch	✓	✓	
CAPS LOCK		Switch among CW, VOICE, FSK and DIGITAL mode (FSK mode is indicated by CAPS LED, DIGITAL mode by SCROLL LED, and VOICE mode by both CAPS LED and SCROLL LED)	✓	✓	✓
SPACE		transmit space (if "type ahead" mode is active all buffered characters are transmitted before this space)	✓	✓	
		transmit gap (half dit delay time), this character cannot be recorded to message from keyboard – it may only be entered from router	✓		
0-9 A-Z "#\$%&'()*+,-./:;<=>?@\		transmit character, if "CW type ahead" mode is active character is pushed to type ahead buffer to be transmitted after next space. Note: some special characters are mapped to standard prosigns (see WinKey manual)	✓		
0-9 A-Z !"#\$%&'()*+,-./:;<=>?@\		transmit character, if "FSK type ahead" mode is active character is pushed to type ahead buffer to be transmitted after next space		✓	

10 - Hardware Specifications

USB: USB 2.0 Full speed , USB 1.1 compatible

Power consumption:

USB – less than 100mA;

Transceiver – 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 Baud

PTT1: open collector, max 30V/100mA

PTT2: open collector, max 30V/400mA

PA PTT: selectable by rear panel switch

Open collector, max. 48V/0.8A

Relay contact, max. 48V AC/DC @ 1 A

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 typical

Computer LINE OUT: 600 Ohm, max 1Vpp

3dB bandwidth: 0.2 - 6KHz typical

Insertion loss: 3dB typical (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 other control wires are routed from RJ45 to the radio microphone input. All functions of the OEM microphone are supported as if it were connected directly to the radio. .

Dimensions: H 44mm (1.73") x W 175mm (6.89") x D 85mm (3.35")

Weight: 1100g (2.43lbs)

11 - PACKAGE CONTENTS

The product includes *microKEYER*™, USB cable, sound card cables (3), microHAM USB Device Router program and documentation on 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

12 - WARRANTY

microHAM warrants this product for three (3) years. The product must not be modified in any way or the warranty is voided. Cables are warranted against defects in materials and workmanship for a period of 60 days.

What is covered: During the warranty, *microHAM*, s.r.o., will repair or replace defective product at their sole discretion. You must send the unit postpaid with a copy of the original invoice to the distributor from whom you purchased the product. *microHAM* will pay return shipping.

What is not covered: This Limited Warranty does not cover (1) correction of installation or software errors in the user's computer(s), (2) damage caused by misuse, negligence, user modifications or failure to follow the user manual, (3) connection to improper or excessive voltage or voltage surges, (4) the incorrect installation of any cables connected to the device by the user or (5) weather related storm, lightning or electrostatic discharge damage.

microHAM USB Device Router (the software) is provided "as is" without guarantee of compatibility with any specific operating system, computer, peripheral or accessory.

microHAM assumes no liability or responsibility for damage 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, all associated documents and accessories in the original unopened package, prepaid, to microHAM or to your supplier for refund less shipping and a restocking fee.

DECLARATION OF CONFORMITY



Federal Communications Commission Statement (USA)

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.



European Union Declaration of Conformity

microHAM, s.r.o. declares that the products:

Product Name: *microKEYER*

Conforms to the following Product Specifications:

EN 55022: 1998 Class B following the provisions of the Electromagnetic Compatibility Directive 89/336/EEC

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 - used for configuring desired levels for radio control interface
3	IF IN	iface matrix - used for configuring desired levels for radio control interface
22	FIF IN	iface matrix - used for configuring desired levels for radio control interface
4	RS-TTL OUT	iface matrix - used for configuring desired levels for radio control interface
23	FILTER OUT	iface matrix - used for configuring desired levels for radio control interface
5	CI-V IN	iface matrix - used for configuring desired levels for radio control interface
24	RS232 IN	iface matrix - used for configuring desired levels for radio control interface
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

APPENDIX B – RFI Considerations

A few guidelines to eliminate problems caused by RFI:

1. Proper grounding of all electronic equipment is critical. A modern station contains many, diverse, types of interconnected and interrelated equipment: transceiver, power amplifier, computer, control boxes, switch boxes, and power supplies. Each of these must be individually grounded with a separate connection to a single common ground point, thus forming a star ground connection.

Proper grounding of computers, both "desktop" and laptop is often overlooked. A separate ground connection should be run from the computer to the station common ground point. The best place to ground a computer is a screw with a good connection to the case. On a laptop, this is often the retaining screw on a D-sub connector (e.g, VGA output); on a "desktop" it is often the screws holding the power supply.

It is absolutely important to prevent ground currents from flowing to the common ground point by way of the signal cable. If you use a microHAM "keyer," a good test is to remove the DB15/DB37 connector and USB cable from the keyer and measure the resistance from the shell of the DB15/DB37 to the shell of the USB cable. There should be NO MORE than FIVE (5) Ohms (and preferably less than TWO Ohms) between them.

Note: many PC manufacturers fail to provide an adequate connection between the shell of the USB connector and the PC case. If this is the case, a connection can be established by bridging a folded piece of aluminum foil between the shell of the USB connector and the PC case.

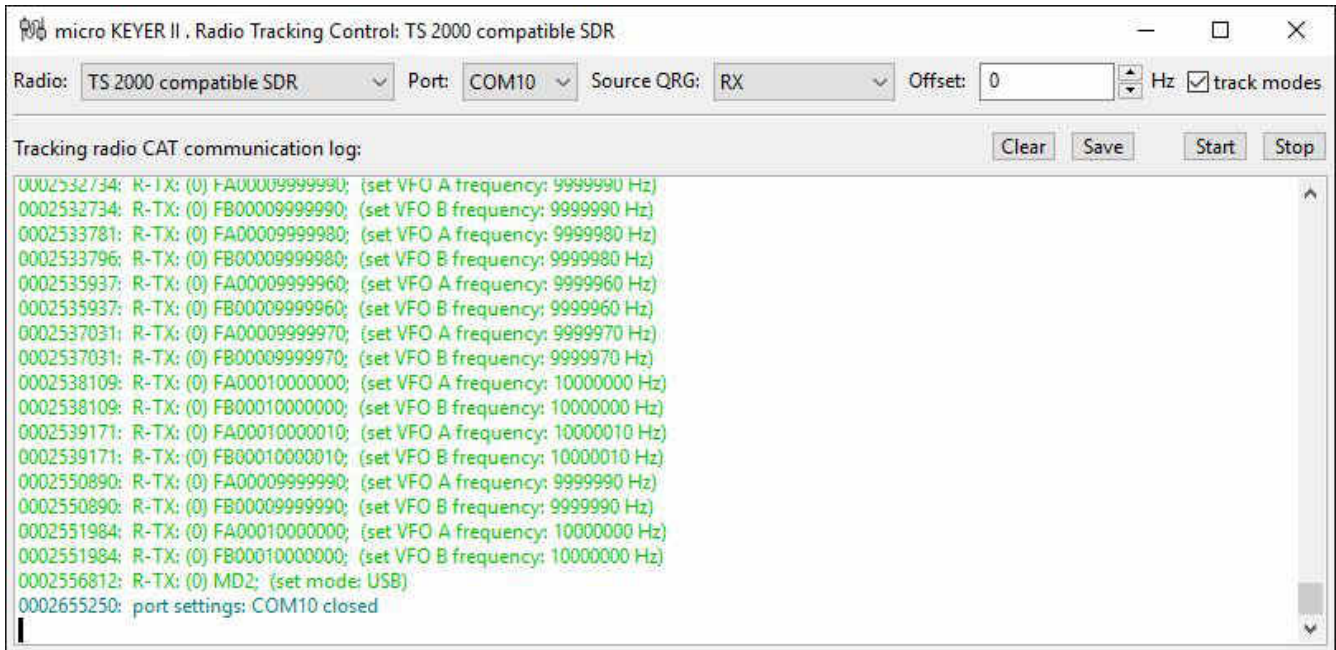
2. Power all your equipment from a single wall outlet. The "safety ground" often exhibits excessive noise between power outlets - sometimes often due to other equipment powered from the same branch circuit. It is always better to avoid this source of noise/interference. It is also a good idea to check the power distribution for loose connections, reversed neutral/ground, open ground and other wiring problems.
3. Sometimes, the USB cable can be a source of RF interference - the cable might have inadequate shielding or the transceivers in PC might be improperly designed causing data flowing inside the cable to be reflected as a common mode current on the shield of the cable. This common mode current can radiate a significant "digital noise." If this is the source of your problems, it can be significantly reduced or eliminated using ferrite chokes on both ends of the cable. Two or three turns through a #31 mix FT240 toroid are better than the common snap-on ferrites of unknown mix.
4. Often, another cause of RFI problems is a common mode current flowing along the antenna feedline into the shack. It is a common misconception that the only thing required of a feedline is that it have low SWR. Unfortunately, a low SWR does not guarantee low common mode current. These common mode currents are conducted into the shack where they can radiate from the feedline, induce currents in any nearby metal object, and/or be conducted into the interconnected equipment. Common mode currents on a feedline are indicated by problems that differ in intensity from one band to another or from one end of the band to another, by problems that change when a feedline is moved or its length changed, where the problem moves from one piece of equipment to another based on band, and/or where the severity changes with transmit power level. The solution is to use common mode chokes to prevent the current from entering the shack. This topic has been given thorough treatment in recent works by W1HIS and K9YC.

W1HIS: <http://www.yccc.org/Articles/W1HIS/CommonModeChokesW1HIS2006Apr06.pdf>

K9YC: <http://www.audiosystemsgroup.com/RFI-Ham.pdf>

APPENDIX C – Tracking

NOTE: Tracking is experimental code for linking the transceiver frequency to a tracking receiver begun in Router 7.5.0. Bidirectional frequency tracking is not supported.



Radio: Specifies SDR receiver model. Current choices are Perseus and TS-2000 Compatible.

Port: Specifies COM port used to communicate with the SDR. Must be COM 10 for Perseus. The port must be defined as a “virtual serial port for router interface”.

Source QRG: Specifies the frequency for the SDR to track. Where two sources are shown (e.g., VFO A, VFO B) the first source will be sent to the SDR in Receive and the second source in Transmit.

Offset: Frequency offset between the transceiver frequency and the frequency sent to the SDR. This is useful when the transceiver is used as an IF with a transverter. Default is 0Hz, resolution is 1Hz.

Track modes: Send mode as well as frequency to the SDR software.

The bottom two-thirds of the window is a serial communication monitor which displays the data sent to the SDR for diagnostic purposes. The log is a circular buffer; the size is set in Router | General.

APPENDIX D – Cables and Bridges

Cables and Bridges are an experimental capability – *microHAM* provides no support or warranty for the Cables and Bridges capability. These features are undocumented but relatively self-explanatory.

Cables (cross wired, aka “null modem” cable) create interconnected virtual ports which can be configured as a bus, point to point pair like com0com, or point to multi-point (star, splitter or combiner) - like VSPE. Applications may connect to each other using cables. For example, the Secondary CAT Serial Port in DXLab Suite's Commander may connect to one end of a cable and a software panadapter might connect to the other end of the cable. There is one exception, cables ***can not*** connect to any port used in Router's Ports tab.

The TX check box designates the port as a bidirectional port – the TxD line is active/connected. If the TX box is unchecked, the port is a “receive only” (listen) port like the “listen” leg of the “Y” cable used between a computer serial port and transceiver for devices like a SteppIR controller, “AT-Auto” tuner or some automatic power amplifiers.

Bridges (straight “extender” cable) allow connecting any two (existing) ports - serial port to serial port, serial port to virtual port (cable), or virtual port (cable) to virtual port (cable) but, again, Bridges ***can not*** connect to any port used in Router's Ports tab.

The only purpose of cables and bridges is to replace third party software serial splitters or software null modem connections like Com0com, DDutil, LP-Bridge, VSPE, etc. that may conflict with the Eltima VSPAX drivers used by *microHAM* USB Device Router. In this regard, *microHAM* USB Device Router provides a means to enable and configure the capabilities that exist in the Eltima VSPAX product.

