STATION MASTER

*micro*HAM

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TABLE OF CONTENTS

1 - FEATURES AND FUNCTIONS

General:
- Programmable Antenna, BPF, Rotor and PA controller
- Twenty (20) programmable relay outputs
- Integrated level converter for transceiver computer control port
- Decodes all frequencies of connected transceiver, including 75m, 6m, VHF and UHF
- Unlimited number of custom defined frequency segments "bands"
- Single USB connection to computer
- Stand alone operation
- Internal Rotator control
- Virtual Rotators function
- Separate RX/TX antenna support
- Automatic Antenna Scan function
- Separately programmable up to 20 outputs sequencer
- Automatic power amplifier support
- Fully compatible and simple integration with *micro*HAM "keyers" (*micro*KEYER, DigiKEYER, CW Keyer, microKEYER II, and MK2R).
- Proprietary SteppIR support with automatic tuning and protection
- Hot Switch protection with user defined timing
- TX Inhibit support for Yaesu, TenTec and Elecraft K3 transceivers
- Receive only antenna support
- Optical isolation from computer
- PS/2 keyboard or keypad with dual control of Station Master and *micro*HAM "keyer"
- Integrated chokes and filters for maximum RFI resistance
- Metal/Aluminum case, powder coated and silk screened
- Free, no time limit firmware/software upgrades via Internet

Radio control:
- Integrated level converter for CI-V, FIF-232, IF-232, or RS-232
- Up to 57600 Baud with fake handshake support
- Supports most Elecraft, Icom, Kenwood, TenTec, Yaesu and other radios

Antenna Control (Port A):
- Ten (10) programmable relay outputs
- Configurable common
    - ground
    - 13.8V positive
    - external power, max. + 24V
- Programmable break-before-make delay
- Compatible with all remote antenna switches using common ground or positive control

Additional Antennas or BPF Control (Port B):
- Six (6) programmable relay outputs
- Configurable common
    - ground
    - 13.8V positive
    - external power max. + 24V
- Compatible with all automatic BPF on the market

RX Antennas and TX Sequencer (Port B):
- Four (4) programmable relay outputs
- Both poles of relay contact available
- Independent settings of Lead and Tail delay for each sequencer output

Internal Rotator Control:
- Three (3) programmable relay outputs
- Both poles of relay contact available
- Configurable support for BRAKE or SPEED control
- Support for multi-turn rotators
- Support for rotators with analog (pot) or discrete (pulse) azimuth read back
- Programmable software limit switches
- Dead zone definition
- Target finding strategy selection for optimal handling
- Support for "slipping" rotators
- Four memories for most wanted azimuths
- Automatic azimuth control from logger

Virtual Rotator Control:
- Unlimited number of antennas can be joined to Virtual Rotator
- Programmable azimuth ranges for each Virtual Rotator antenna
- Automatic azimuth control from logger
- Unlimited number of Virtual Rotators per Band

Power Amplifier Control:
- Automatic tuning for CI-V controlled automatic amplifiers (Icom PW1, Expert SPE)
- Automatic band switching for BCD controlled amplifiers (Yaesu VL-1000, FL-7000)
- Support for QSK Power Amplifiers

2 - IMPORTANT WARNINGS

ALWAYS check the polarity of the 13.8 V power supply.

**If your radio includes upgradeable firmware
DO NOT perform any upgrade through Station Master.**

3 - PANEL DESCRIPTION
Front Panel
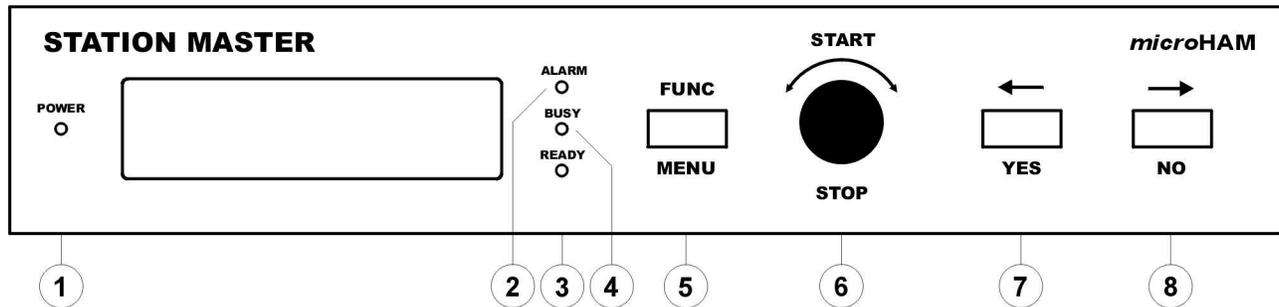
1. **POWER**
    LED lights when +13.8V is applied (power switch on).

2. **ALARM**
    LED lights when "ALARM" condition happens, transmission is allowed.
    LED flashes when "ALARM" condition happens, transmission is inhibited.

3. **READY**
    LED lights when transmission is allowed.
    LED flashes when transmit condition has been changed and will be applied on next transmission cycle.

4. **BUSY**
    LED lights when "BUSY" condition happens, transmission is allowed.
    LED flashes when "BUSY" condition happens, transmission is inhibited.

5. **FUNC/MENU**
    Short press and release opens "Function" list.
    Press and hold for more than one second opens "Menu" list.

6. **ENCODER**
   Rotary encoder with push button. Function vary on configuration and antenna selection.

7. **<-/YES**
    Button for browsing between available antennas backward and menu navigation.

8. **->/NO**
    Button for browsing between available antennas forward and menus navigation.

Rear Panel
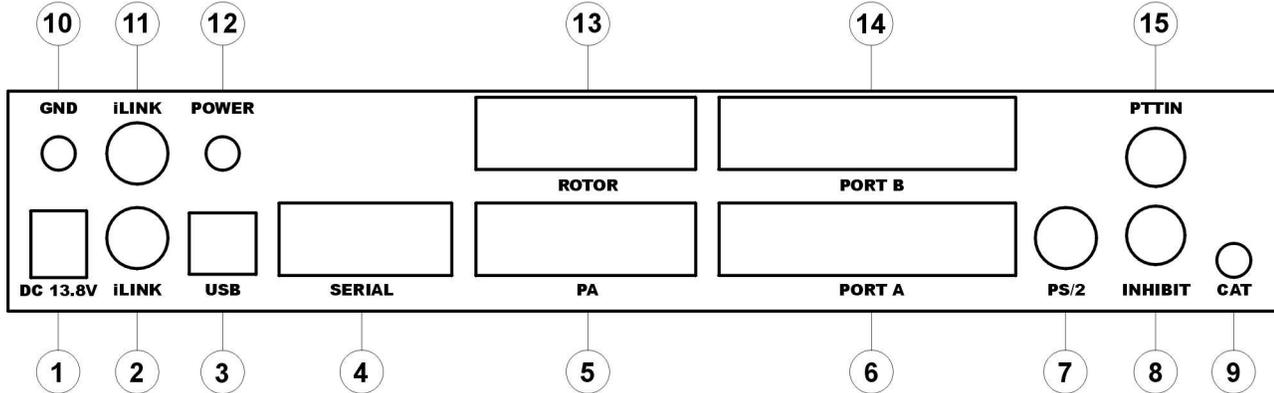
1. **DC 13.8V**
   Power Supply - 2.1 x 5.5 mm coaxial jack, center is positive (+).
   IMPORTANT: **Be sure to observe the proper polarity!**

2. **iLINK**
   MiniDIN-6 for connection with microHAM MKII, MK2R or function expansion module.

3. **USB**
   USB B connector for computer connection.
   Standard USB A-B cable.

4. **SERIAL**
   RS232 level serial port.
   DB9 female jack.
   See Appendix "Connectors" for details.

5. **PA**
   DB15 female jack for connection with Power Amplifier.
   Compatible with microHAM "CAT" cables
   See Appendix "Connectors" for details.

6. **PORT A**
   DB25 female jack for antenna switch connection.
   See Appendix "Connectors" for details.

7. **PS/2**
   MiniDIN6 for PS/2 keyboard or PS/2 keypad.

8. **INHIBIT**
   Power inhibit output for Yaesu transceivers.
   RCA jack TIP - Signal SHELL - GND

9. **CAT**
   4 pole 3.5mm phone jack for transceiver control. Compatible with microHAM "CAT" cables.

10. **GND**
    Terminal for connection to station ground.

11. ILINK
    MiniDIN-6 for connection with *micro*HAM *micro*KEYER II, MK2R of function expansion module.

12. POWER
    Power Switch

13. ROTOR
    DB15 female for connection with Antenna Rotator.
    See Appendix – Connectors for details

14. PORT B
    DB25 female for antenna switch, BPF and/or sequencer connection
   See Appendix – Connectors for details

15. PTTIN
    PTT input for connection with PTT output from transceiver or PATTT from microHAM "keyer"
    Active when grounded
    RCA jack: Tip – signal, Shell - ground

4 – Block Diagram
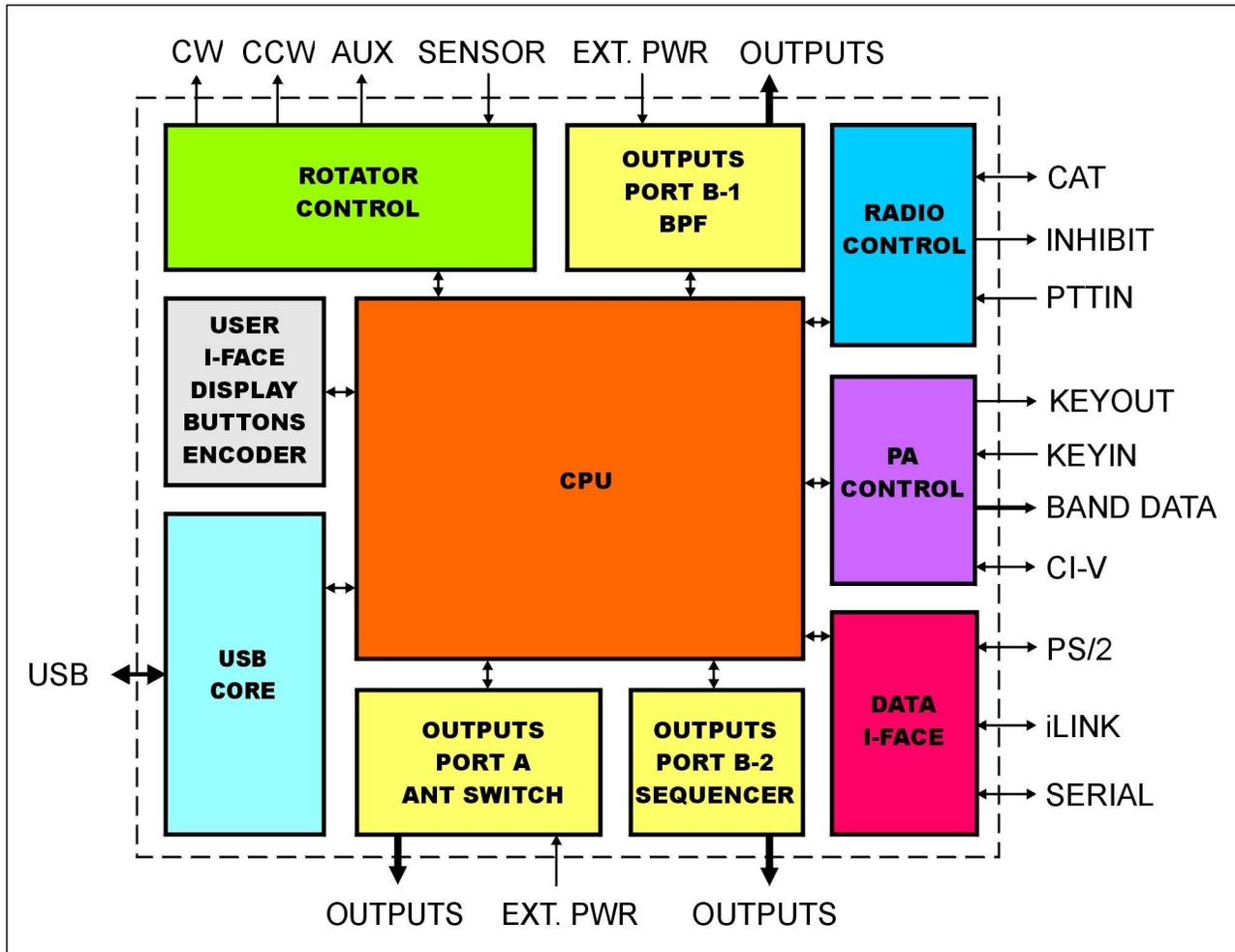
Station Master block diagram

5 - INSTALLATION

Installing Station Master consists of several steps:

1) prepare SM to work with your radios and microHAM keyer if present
2) install microHAM USB Device Router (the control and interface software)
3) **configure microHAM USB Device Router**

Preparing Station Master for Use

Connecting Station Master with *micro*HAM *micro*KEYER, DigiKEYER or CW KEYER:

1. If your station includes a *micro*HAM *micro*KEYER, DigiKEYER or CW KEYER disconnect the computer control lead (CAT) from the radio. Connect the appropriate CAT cable (optional accessory) for your radio to the CAT jack of SM and the computer control port of your radio.

2. Connect a RCA cable (supplied) from the PTTIN jack on Station Master to the PTT output of your transceiver. Refer to the Operator's Manual for your transceiver for the proper signal connection. PTT output is on the REMOTE DIN for Kenwood, the Band Data jack for Yaesu, and ACC2 (DIN 7) for Icom.

   If your transceiver does not have an RCA connector for PTT Output, it will be necessary to make the proper adapter.

   IMPORTANT: This connection is required for proper operation of Station Master with VOX.

3. Using an RCA "Y" cable (Radio Shack 274-881 or equivalent, not supplied), connect the PAPTT output of *micro*KEYER or DigiKEYER or the PTT output of CW Keyer to the PTT IN jack of Station Master.

4. If your transceiver has an INHIBIT input (Yaesu often labels INHIBIT "LINEAR" on the BAND DATA jack), connect inhibit input of your transceiver to the INHIBIT output jack of SM.

   IMPORTANT: Connecting INHIBIT is best way to prevent hot switching.

5. Remove the top cover from Station Master and set the CAT jumpers as shown in the following chart. The CAT interface jumpers must be configured to select the proper signal level for your transceiver.

   RS-232 levels:
   Elecraft: K2, K3, Icom: 7800, JRC: JST-245
   Kenwood: TS-480, 570, 870, 2000,
   TenTec: all radios with DB9 or DB25 connectors
   Yaesu: FT-450, FT-847, FT-920, FT-950, FT-1000MP, Mark V, Mark V Field, FT-2000, FT-9000
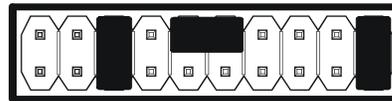

   RS232

   IF-232 levels:
   Kenwood: TS-140, 440, 450, 680, 690, 711, 790, 811, 850, 940, 950
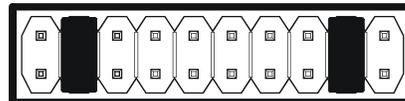
   IF232

   FIF-232 levels:
   Yaesu FT-100, 736, 747, 757GXII, 767, 817, 840, 857, 890, 897, 900, 980, 990, 1000, 1000D
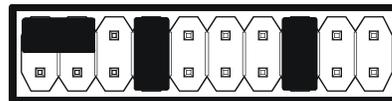
   FIF232

   CI-V levels:
   Icom: all radios except 7800 with RS-232
   TenTec: all radios with 3.5 mm connector
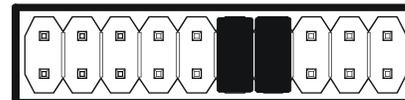
   CI-V

   NOTE: the CAT interface is not configured at the factory.

6. Connect a 13,8 to 16V DC supply to the **DC 13.8V** jack.
   Be sure to observe the proper polarity. Do not turn on Station Master at this time.

7. Locate the USB cable but **DO NOT** connect it to the USB jack of Station Master at this time.

Connecting Station Master with *micro*HAM *micro*KEYER II, MK2R or MK2R+

1. If your station includes a *micro*HAM *micro*KEYER II or MK2R or MK2R+, keep the computer control (CAT) connection from the *micro*HAM keyer connected to the radio. The Station Master CAT jack will not be used for radio control.

2. Connect the supplied 6 pin mini-DIN cable from one of the iLINK jacks (the jacks are identical) on Station Master to the iLINK jack of the keyer. If you are connecting two Station Masters units to a MK2R or MK2R+, connect an iLINK cable to each SM.

3. If your transceiver has an INHIBIT input (Yaesu often labels INHIBIT "LINEAR" on the BAND DATA jack), connect the inhibit input of your transceiver to the INHIBIT output jack of SM.

    If you are connecting two SM units to the MK2R or MK2R+, be careful to connect the INHIBIT line from from Radio1 to the SM associated with with Radio 1 and INHIBIT signal from of the Radio 2 to the SM associated with Radio 2.

    IMPORTANT: Connecting INHIBIT is best way to prevent hot switching.

4. Connect a 13.8 to 16V DC supply to the **DC 13.8V** jack.
    Be sure to observe the proper polarity. **Do not** turn on Station Master at this time.

5. Locate the USB cable but **DO NOT** connect it to the USB jack of Station Master at this time.

Connecting Station Master without a *micro*HAM "keyer"

1. If you don't have a *micro*HAM "keyer," connect the appropriate CAT cable (optional accessory) for your transceiver from the CAT jack of Station Master to the computer control port of your radio.

2. Connect an RCA cable (supplied) between the PTTIN jack on Station Master and the PTT output of your transceiver. Refer to the Operator's Manual for your transceiver for the proper connection.

3. If your transceiver does not have an RCA connector for PTT output, it will be necessary to build the proper adapter. PTT output is on the REMOTE DIN for Kenwood, the Band Data jack for Yaesu, and ACC2 (DIN 7) for Icom.

    IMPORTANT: This connection is required for proper operation of Station Master with VOX.

4. If your transceiver has an INHIBIT input (Yaesu often labels INHIBIT "LINEAR" on the BAND DATA jack), connect inhibit input of your transceiver to the INHIBIT output jack of SM.

    IMPORTANT: Connecting INHIBIT is best way to prevent hot switching.

5. Remove the top cover from the Station Master and set the CAT jumpers as shown in the chart in Item 6 on the previous page.

6. Connect a 13,8 to 16V DC supply to the **DC 13.8V** jack.
    Be sure to observe the proper polarity. **Do not** turn on Station Master at this time.

7. Locate the USB cable but **DO NOT** connect it to the USB jack of Station Master at this time.

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Installing *micro*HAM USB Device Router

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/contents/en-us/d29.html

If you download an updated package, click on "urouter_release_xx_xx.exe" (xx_xx is version) to start the installation.

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.

When the Router installation is completed, click "Finish" to launch Router for the first time.

Plug in the USB cable, turn ON Station Master and proceed to configuring Router for your station and software.

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Configuring *micro*HAM USB Device Router

The *micro*HAM USB Device Router (Router) program provides a Windows compatible *configuration tool* for *micro*HAM USB Devices *(*Station Master as well as microKEYER II, DIGI KEYER, *micro*KEYER, CW Keyer and USB Interfaces*)* and *software interface* to other Windows applications (logging software, digital mode software, etc.). The software interface is provided as *Virtual Serial Ports.*

In order to configure and use Station Master with Windows compatible application programs, you must be running Router and have turned on Station Master. Router is then configured as required by the application (logging, control or digital mode) software.

Station Master Status
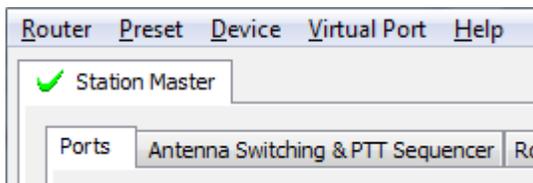
When the USB driver is installed correctly and Station Master is turned on Router will show a device tab with a **GREEN** ✔ beside the device name.
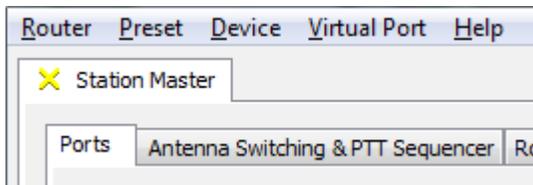
When Router shows a **YELLOW** "**X**" instead of a green ✔, it means the USB driver is correctly installed but Station Master is not turned on.

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

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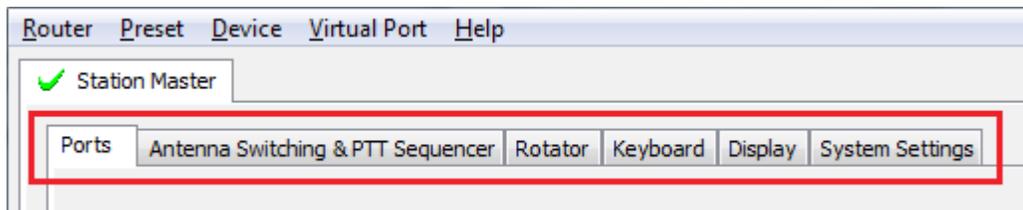
Router must be used to configure Station Master for proper operation. The device configuration tabs (in the red rectangle) are used to setup each part of the Station Master.

Creating and Using Virtual Serial Ports

*micro*HAM Router provides a set of virtual serial ports which allow Windows applications (logging or control software) to work with Station Master 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 a port to each function you wish to use (CAT radio control, Rotator, etc.).

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 another device that also uses virtual ports (external USB devices, bluetooth devices, mobile phones, PDAs etc.) is not connected when creating virtual ports in Router, the ports can overlap and will not work properly when you connect such device.

WARNING: Before you begin to create virtual ports, attach all external devices you are using with computer and allow them to connected to the system. Restart Router and then create virtual ports.

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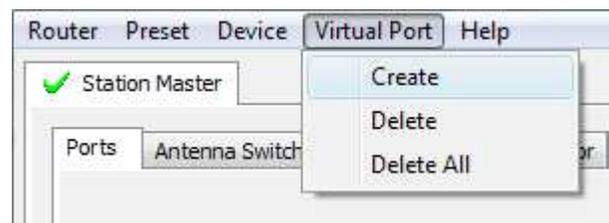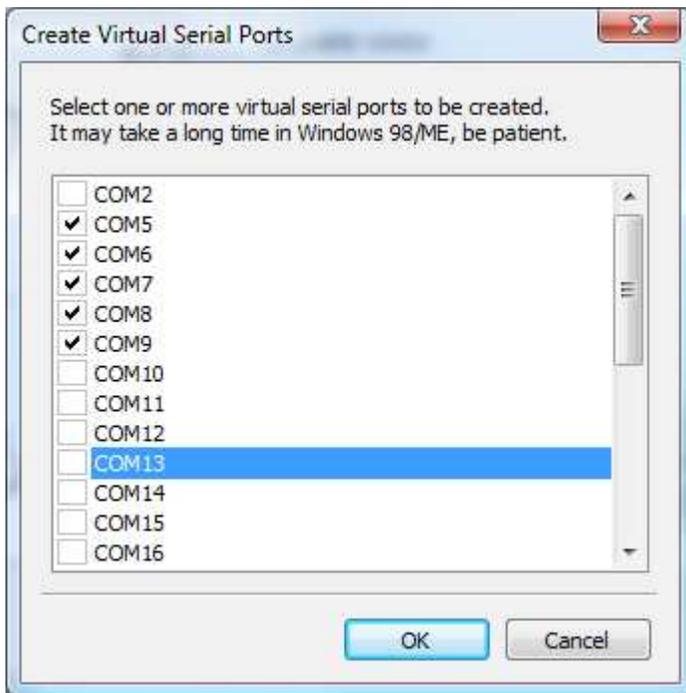
Create - Creates virtual COM ports. It is possible to select more than one port at a time by holding the *Ctrl* key on keyboard and clicking on COM port numbers. Creating virtual ports may take a long time (several tens of seconds), be patient.

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: If you have removed another device which used virtual ports and Router does not offer the released 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 COM port numbers should appear.

6 - *micro*HAM 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: Station Master 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 deletes 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 Station Master)**
Customizable band edge boundaries used to drive the band data output. BCD codes can be customized for driving antenna switches or bandpass filter control.

Options | Digital Band Map: **(Not used with Station Master)**

Options | Audio Devices: **(Not used with Station Master)**

Options | DVK: **(Not used with Station Master)**

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 interface 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 Task Bar (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 in 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 Station Master and the radio.

PRESET MENU

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 Station Master, *micro*KEYER II, and a USB Interface II, each preset remembers the settings for **ALL** devices including the assignment of COM ports and the contents of all sub-tabs except the FSK and CW Messages tabs.

NOTE: Presets for various loggers and Station Master 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).
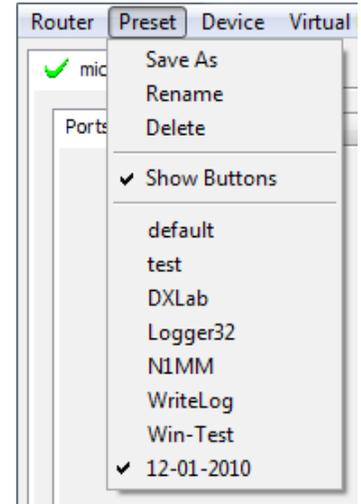
There are three ways to apply a preset once it is created:

   1. Click on **Preset** and select it 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.
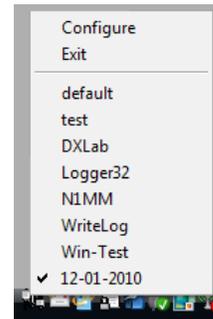
DEVICE MENU

Router can control several devices. This allows configuring the settings for all (interfaces) connected to the computer at the same time using the Presets.
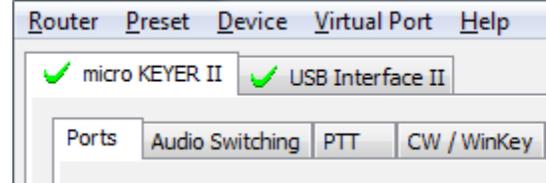
Each device has its own tab (page) in the main Router notebook. The content of each device tab depends on the type of device. Adding a device is automatic when Router detects a new device. Once detected, a device remains in Router even though device is disconnected. Each device is identified by a unique serial string.

> **NOTE:** Router supports all microHAM USB devices in a single instance by creating a separate root tab for each device. It is not necessary to run multiple instances of Router; a secondary instance can not be started.

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...
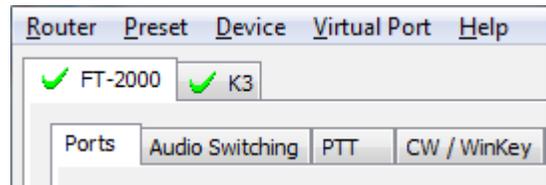
Delete - Removes a device from the Router. Only devices that have been disconnected (those with a **RED** **"X"** on device tab) can be removed. To disconnect a device from Router, unplug the USB cable.
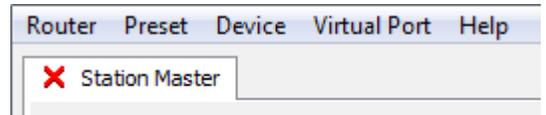
Save Template - will save the current Router settings to template file.
> When clicked, Router will open a standard File Save dialog window – the default location is *C:\Documents and Settings\All Users\Application Data\microHAM\cfg.* If a hypertext (*html)* or plain text (*txt)* documentation file of 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 Keyboard, Display and System tabs to the Station Master's EEPROM. If Station Master is operated without connection to the computer it will use the settings stored in EEPROM. If Station Master is connected to a computer running Router, the power-up settings will be overridden by the Router settings but the default settings are retained in EEPROM.

Upload Firmware: *micro*HAM will occasionally release updates to the firmware in Station Master. 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/contents/en-us/d29.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 into which you downloaded the firmware file and select the file.

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NOTE: When upgrading Router, the upgrade will include the latest firmware for Station Master.   If the firmware is newer than the currently installed firmware, Router will automatically ask for permission to update the installed firmware the first time it connects to Station Master.

NOTE: After a major version change, the Antenna Switching and Rotator configuration data in the Station Master EEPROM may need to be replaced due to changes in the organization and content of the configuration data.   After uploading firmware, Station Master will prompt you to clear the old configuration by pressing the FUNC button.   After clearing the memory, upload the Antenna Switching and the Rotator configuration data by by pressing the Store button on the appropriate tabs in Router.

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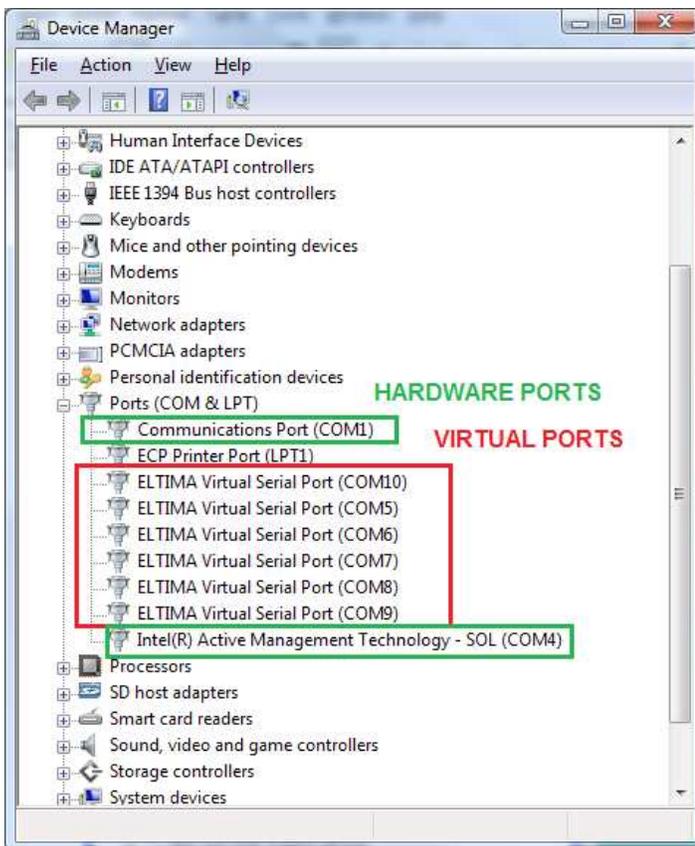
Create - Creates virtual COM ports. It is possible to select more ports at once by holding the *Control* key on the keyboard and clicking on COM port numbers. Creating a virtual port may take a while, be patient.

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. Documents must be installed from installation CD-ROM or downloaded by invoking Download Documents menu item.

Cable Schematics: Link to cable diagrams. Documents must be installed from installation CD-ROM or downloaded by invoking Download Documents menu item.

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 connections.

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.

> **IMPORTANT:** Whenever it is possible, always perform Router upgrade here!

About: Shows the Router's internal version number.

Change logs: Shows the Router and firmware changes.

DEVICE CONFIGURATION TABS

There are six (6) tabs for configuring Station Master. Each tab controls part of Station Master's functions. Except for Antenna Switching & PTT Sequencer and Rotator, any change is applied immediately.
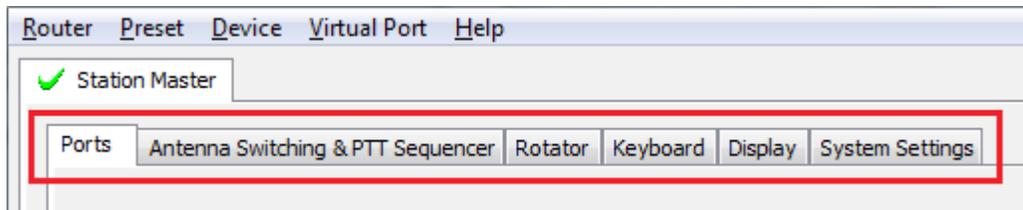
- ● **Ports:** assign virtual ports to the Station Master for use by applications

- ● **Antenna Switching & PTT Sequencer:** contains six sub-tabs for configuring antenna selections, antenna definitions, rotor, and sequencer operation.

- ● **Rotator:** configures internal Rotator controller parameters

- ● **Keyboard:** configures operation of PS/2 keyboard or keypad

- ● **Display:** configures operation of the LCD display.

- ● **System Settings:** configures power control and displays system power

PORTS TAB

Once the virtual ports have been created they must be associated with a specific function or device channel (e.g., CAT, Rotator, etc.). These assignments should correspond to settings of the application software and must be configured first in Router then in the application.

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

Station Master has six channels – each channel provides an indication of the settings applied by the application and current state (e.g., or or off):

- **CAT** (uses RxD and TxD)
- **2nd CAT** (virtual "fork" for the main CAT channel)
- **Rotator** (uses RxD and TxD)
- **2nd Rotator** (virtual "fork" for main Rotator channel)
- **Auxiliary** (uses RxD and TxD)
- **Control** (uses RxD and TxD)

NOTE: Do not assign virtual ports to the channels/functions that are not used by your applications. It is unnecessary and only consumes resources.

- **iLINK couple –** used to connect Station Master with a *micro*HAM keyer (*micro*KEYER II, MK2R, or MK2R+).

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CAT (RADIO) & 2nd CAT PORT

The CAT channel is used by the host application to control transceiver frequency, mode, 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 CAT (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, 9600 8N2 means: 9600 baud, 8 bits data length, parity = none, and two stop bits.

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

> **NOTE:** Station Master does not use handshaking signals. Configure DTR and RTS settings in your application program (logger) to OFF. Do not select "Handshake."

In order for Router to determine the operating frequency and mode, it must know what radio (CAT protocol) is being used. To select the radio, click the **Set** button. Choose your radio in the **Radio** combo box. Then select communication speed in the **Baud rate** box.

**IMPORTANT:** The baud rate must be supported by your radio.

> **TIP:** Disable **AUTOBAUD** in Icom transceivers. Set the radio, Router, and application software to operate at 9600 or 19200 baud.
>
> **NOTE:** The baud rate must match your radio. Icom and some TenTec radios require the correct **CI-V address**.
>
> If everything is configured properly, your radio's current operating frequency and mode should be displayed.
>
> **NOTE:** When Station Master is connected to microKEYER II, MK2R or MK2R+ via iLink, set to coupled (see the iLink chapter below) with a radio connected to the keyer configured for CAT decoding, there is no need to set up a radio in Station Master.

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.
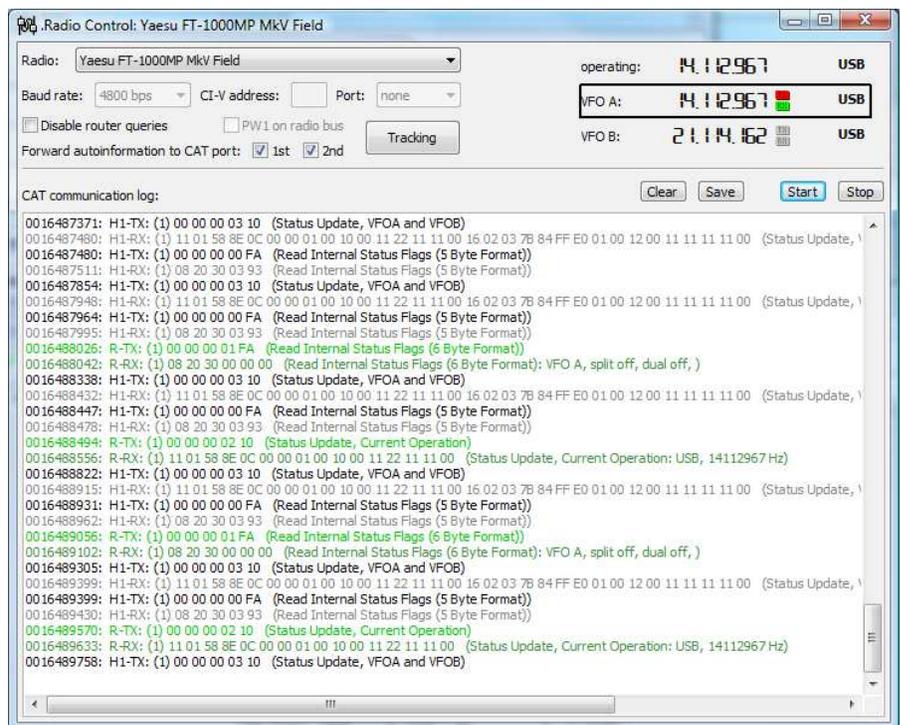
NOTE: "Disable router queries" disables Router polling only when the port has been opened by an application program. When the virtual port is closed, Router always polls the radio to support the automatic switching functions of Station Master. If it is necessary to disable all polling, select one of 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 decoding and can have a serious impact on overall operation.

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

> **NOTE:** Check this box if you have an IC-PW1 or other Icom compatible accessory physically connected (in parallel with the transceiver). Do not check this box if the only connection is to the transceiver and the PW1 or other other accessory is connected to the accessory CI-V PA port (described later).

Forward autoinformation to CAT port: When checked, all unsolicited packets (Icom "transceive" packets or "Auto-information" data from Kenwood, Elecraft and recent Yaesu transceivers), coming from the radio are transfered to the CAT port. Each CAT port has own check box.

Port: Defines a virtual or hardware serial port for an SDR radio used with the MKII. The CAT connection in Station Master is disabled. **This function is not currently supported.**

SDR Tracking:

> **Tracking:** This function allows an SDR to track the transceiver attached to the Station Master.

> > **NOTE:** The transceiver attached to Station Master must be properly interfaced and CAT must be functioning properly. SDR tracking does not work for "no radio" choices.

> **Radio:** Specifies SDR receiver model.

> **Source QRG:** Specifies whether the SDR will track the transceiver transmit or receive frequency. .

> **Port:** Specifies COM port used to communicate with the SDR.

> **Offset:** Enter integer frequency offset of SDR receiver against source frequency. Default is 0Hz, resolution is 1Hz.

> > **NOTE:** For specific SDR receiver configurations, please refer to Appendix . .

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-TX) 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).

USB transmits data in frames with a delay between frames. Router indicates frame boundaries with three dots (...) when a packet is split between frames.

IMPORTANT: If Station Master is to operate in stand alone mode (without Router), the settings must be saved as power-up defaults using "Device | Store as Power-Up Settings."

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 stop bits) 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) can be forwarded to both CAT ports individually when appropriate "Forward autoinformation to CAT port" box is checked.

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: Although Router has been tested extensively using many different applications for the CAT and 2nd CAT ports, *micro*HAM cannot guarantee proper operation with every possible combination of software.

Rotator & 2nd Rotator PORTS

The rotator and 2nd rotator channel are used by host applications to control the azimuth of the internal or virtual rotator. Both rotator channels are active when selected work in parallel in last one win logic. The protocol is **Hy-Gain DCU-1**, select this rotor model in your 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, 9600 8N2 means: 9600 baud, 8 bits data length, parity = none, and two stop bits.

Communication parameters on the two channels do not need to be same. The only requirement is 8 bit data.

NOTE: Rotator control is only active if an Antenna with Rotator flag or a Virtual Rotor group is selected for RX or TX. If both the selected RX and TX antennas are part of a Virtual Rotor group, both virtual rotors are controlled simultaneously.

Mon: Opens a "Rotator Protocol Monitor" window to capture data between the application and the Rotator control interface.   Controls for the monitor include **Start, Stop, Clear** and **Save**.

The Rotator Protocol Monitor should not be used under normal conditions. However, for debugging purposes, it may be useful to **Start** a capture and close the window. When a problem occurs, the window can be opened and the Rotator Port log **Saved** for analysis.

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

If a line ends in three dots (...) it means that the command or response has been broken across two USB packets.

AUXILIARY PORT

The Auxiliary Port allows an application program to control an auxiliary device attached to the SERIAL port on the rear panel of Station Master rear panel. Only serial in (RxD) and serial out (TxD) are supported.   To enable the Auxiliary port, set the "Serial port function" at the bottom of the Antenna Switching & PTT Sequencer Antenna sub-tab to **Auxiliary port.**

When an application opens the Auxiliary port, Router reports port as **open** and displays settings used to configure COM port.

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

Mon: Opens an "Auxiliary Serial Port Monitor" window to capture data between the application and auxiliary device. Controls for the monitor include **Start, Stop, Clear** and **Save**.

The Auxiliary Serial Port Monitor functions the same as the Rotor Port Monitors.

CONTROL PORT

The Control Port allows an application program (logger) that implements the microHAM Control Protocol to make use of Station Master's antenna switching control.

When an application opens the control port, Router reports port as **open** and displays settings used to configure the port.

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

Mon: Opens a "Control Protocol Monitor" window to capture microHAM Protocol communications between a logger and Router. Controls for the monitor include **Start, Stop, Clear** and **Save**.

The Control Protocol Monitor functions the same as the Rotor Port Monitors.

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iLINK couple

When Station Master is used with a *micro*HAM keyer and the two devices are connected using the iLINK port. The **iLINK couple** box specifies to which keyer is Station Master coupled.

Station Master can be coupled with *micro*KEYER II, MK2R and MK2R+. When coupled, all important data such as frequency, mode, keying, locks and native control data (Control Port) are transfered between Station Master and the keyer to synchronize operations.

> **NOTE:** If Station Master is not physically connected to a *micro*HAM keyer over iLINK port or coupling is unwanted even when the devices are physically connected, select **none** in the coupling box.

The CAT and 2nd CAT ports operate differently depending on the type of *micro*HAM interface being used.

Read carefully!

● When Station Master is used with *micro*KEYER, DigiKEYER or CW Keyer, the transceiver radio control port must be connected to the **Station Master.** The **KEYER** CAT connection will not be used. The CAT and 2nd CAT port settings on Ports tab for the **KEYER** are ignored.

  Use the Control port on the **KEYER** Ports tab for native control from applications that support the *micro*HAM Control protocol.

● When Station Master is coupled with microKEYER II, MK2R or MK2R+, the transceiver control port(s) must be connected to the **KEYER.** Station Master's CAT port will not used. The CAT and 2nd CAT port settings on Ports tab for **Station Master** are ignored.

  Use the Control port on the **KEYER** Ports tab for native control of both devices from applications that support the *micro*HAM Control protocol.

ANTENNA SWITCHING & PTT SEQUENCER TAB

The Antenna Switching & PTT Sequencer tab provides editor for "programming" the behavior of Station Master's outputs. It consist several sub-tabs that are used to defined the complex dependencies between operating frequency, peripheral control (antenna switch, bandpass filter, power amplifier etc.) and user interface. The settings on ALL sub-tabs can be manipulated at once using the four (4) buttons at the bottom of this tab.

| Get | Store | Load From File | Save To File |

Get: Retrieves the current settings from the Station Master memory and displays the values of those settings in the sub-tabs.

Store: Sends the settings of ALL sub tabs to the Station Master non-volatile memory.

> **NOTE:** The "Antenna Switching & PTT Sequencer" tab and sub-tabs are a visual editor. The configuration data must be written to the Station Master before can be used.

Load From File: Loads a settings file from the computer into the "Antenna Switching & PTT Sequencer" tab and sub-tabs. .

> **NOTE:** Loading a file only fills the sub-tabs and DOES NOT automatically store those settings to the Station Master. When you wish to configure Station Master from a file, you must load the file into Router and then Store the settings to Station Master.

Save To File: Saves the current settings displayed in "Antenna Switching & PTT Sequencer" to a file on the computer.

> **NOTE:** If you want to save Station Master's current operating configuration, click "Get" to retrieve the data into Router and then select "Save to File" to save the data to the computer.

OUTPUTS

Station Master provides twenty (20) relay outputs. They are physically located at two connectors on the rear panel, PORT A and PORT B. The connections are described in Appendix A - Connectors.

PORT A: had a common terminal and ten (10) relay outputs. The common terminal can be configured for internal or external power and source or sink by selecting the appropriate jumpers.

The **EXT** position connects the common terminal to the special "input" pin on the PORT A connector. This pin is used for a POSITIVE external control voltage.

The **INT** position connects the common terminal to the **SRC/SNK** jumper. In the **SRC** position, the common terminal is connected to Station Master's power supply (+13 Volts); in this configuration the outputs are voltage *sourcing.*   In the **SNK** position, the common terminal is connected to Station Master's ground; these outputs are *sinking (switch to ground).*
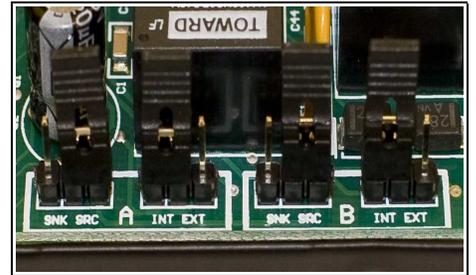
PORT B: Contains six (6) outputs with single common terminal (B1-B6) and four (4) outputs (B7B10) with isolated contacts. The common terminal of relays B1-B6 can be configured for internal or external power and source/sink operation by using the PORT B jumpers in the same manner as the PORT A jumpers.

> **NOTE:** Default factory settings for both PORT A and PORT B are INT / SRC (internal sourcing).
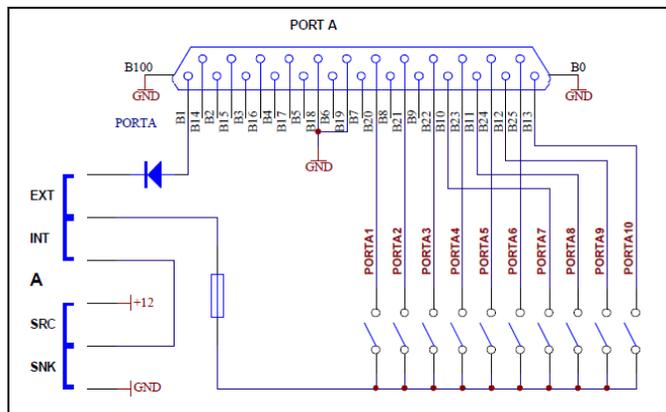
Simplified schematic of PORT A   *Simplified schematic of PORT B*
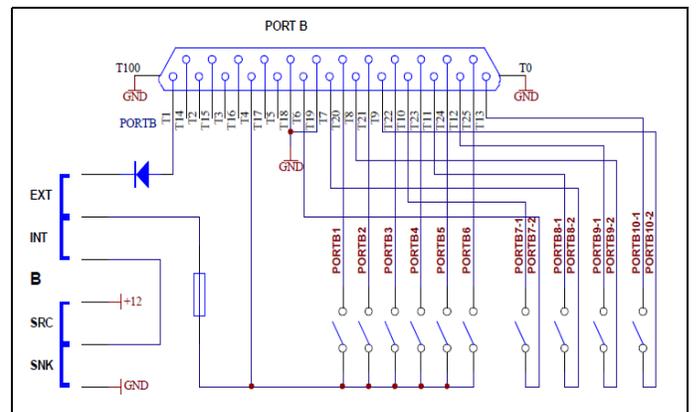
Before Station Master most band decoders simply accepted band data – either BCD data or an analog voltage representing the entire amateur band. Even those decoders that obtain frequency information from the radio's control (CAT) port simply determine the appropriate amateur band and selected one output for the entire band. Real world requirements are more complex than that - even a "simple" antenna system often contains several antennas capable of operation on a given band and antennas that can operate on more than one band. In addition, modern amateur stations may have selectable bandpass filters, stub filters and/or receive only antennas (with or without preamplifiers that must be protected during transmit).

To accomplish the many interrelated functions, Station Master divides the outputs into three functional classes. Each output on PORT A and PORT B can be individually assigned to one of these three functions.

Antenna class (ANT)

Outputs in this class are used mainly for controlling antenna switches and operate based on a combination of band, transmit/receive state and manual (front panel) inputs. One or more Antenna outputs are active for each antenna (single antenna, virtual rotator or antenna group) output.

Filter class (BPF)

BPF outputs operate based only on the operating frequency and are used primarily to control switchable (multiband) band pass filter or coaxial stub filters. A "BPF" output is active whenever the operating frequency falls within the defined band regardless of current antenna selection and/or transceiver RX/TX state.   Frequency segments (bands) and outputs are defined on the Bands tab.

Sequencer class (SEQ)

Operation of sequencer outputs depends on the currently selected antenna, the current band and transceiver RX/TX state. Sequencer outputs are used primarily for timed ON/OFF switching of receiving preamplifiers or power amplifiers. An output is active whenever the transceiver is in the transmit state **AND** the output is enabled for the current band.   The output polarity and switching times can be on the PA & Sequencer sub-tab; the bands of operation can be selected on the Bands sub-tab.

NOTE: For ANT and BPF switches, a break-before-make delay can be defined on the PA & Sequencer sub-tab.

TIP: If your station contains an antenna switch and band pass filter, use PORT A for the antenna switch and PORT B 1-6 for BPF control. B7-10 can be used for sequencer outputs if needed. This configuration provides separate drivers for BPF and antenna switch if one requires source and second sink drive.

ANTENNAS

All antennas and the the required output configuration (active outputs) are defined on the Antennas sub-tab.

The number of antennas is not limited. Antennas can be added using the **Add** button and old antennas can be deleted by selecting them (orange background) then clicking the **Remove** button.

To make the antenna list more readable, the selected antenna can be moved with the **Up/Down** buttons. The order of antennas is unimportant – it only makes the list easier to understand if antennas are grouped logically by band or function.

ANTENNA NAME	LABEL	A1	A2	A3	A4	A5	A6	A7	A8	A9	B7	B8	B9	B10	RX only	Stepper	ROTATOR (offset,deg)	PA ANT.NUMB.
Vertical	VERT	✓																1
Dipole SSB	DIP		✓					✓										2
Dipole CW	DIP		✓															3
4SQ-SE	TX SE			✓														4
4SQ-SW	TX SW			✓							✓							5
4SQ-NW	TX NW			✓								✓						6
4SQ-NE	TX NE			✓							✓	✓						7
INV Vee	VEE				✓													2
Yagi 3el	3-EL					✓											✓ -90	3
SteppIR	StIR						✓									✓	✓ 0	2
Yagi 5el	5-EL							✓									✓ 90	3
RX 4SQ-SW	RX SW							✓							✓			0
RX 4SQ-NW	RX NW								✓				✓		✓			0
RX 4SQ-NE	RX NE							✓				✓			✓			0
RX 4SQ-SE	RX SE							✓					✓	✓	✓			0

Each line in this tab represents a separate antenna. For every antenna there are several fields.

ANTENNA NAME: Full name of the antenna up to 10 characters long used for SM display and for further configuration.

LABEL: Short antenna abbreviation up to 5 characters long for SM display in compressed mode.

A1-10, B1-B10: The outputs from PORT A and/or PORT B defined as ANT outputs on the Outputs tab are shown here in columns automatically sorted from A1 to A10, B1 to B10. Only ANT class outputs are shown. Select those outputs that must be active when particular antenna is chosen.

RX only: Flag for any antenna which is "receive only." SM will not allow transmitting into this antenna.

Stepper: This flag indicates that this antenna is a automatic antenna **AND** is controlled from the Station Master serial port using the antenna's native protocol. Do not check this box if the antenna is controlled using Icom CI-V protocol .

ROTATOR: This flag indicates this antenna is tuned by a rotor controlled by Station Master's internal rotor controller. Do not check if the antenna is on a rotor not controlled by this Station Master.

Offset: Number which defines antenna azimuth offset against 0 deg of the internal rotator controller calibration. Offset range is -180 to +180 deg. Negative value mean counter clockwise offset, absolute azimuth in range 180-360 deg. Offset is used by the antenna direction control to show and work with proper absolute azimuth of the antenna – for example when using a 40 meter antenna that is mounted at right angles to a triband antenna. Offset control works only with SM internal rotator controller.

PA ANT NUMB: When Station Master is used with an automatic power amplifier with antenna presets, this number determines which preset is to be used when this particular antenna is selected for TX.

Serial port functions

Station Master contains one RS232 port that can be used for for control of a SteppIR antenna, provide support for Icom compatible accessories, or be used as a general purpose serial port.

General purpose, Auxiliary serial port: When Serial port function is set to Auxiliary port, data is transferred between the "Auxiliary" virtual port defined on Ports tab and the SERIAL port without modification. Maximum data rate is 19,200 baud. There is no relationship between transferred data and SM functions.

CAT input: When the Serial port function is set to CAT input, a remote program can control the radio via the serial port. This is useful, for example, for standalone remote operation of radio without a local computer with running Router. CAT data is routed from a remote control application (e.g. via some sort of WAN/LAN-to-serial converter) to the serial port. A valid CAT setting has to be present on PORT tab, and this setting has to be saved as default prior using this option.

This replicates a similar functionality of the microHAM Band Decoder.

CI-V port: When Serial port function is set to CI-V, SM simulates Icom's *CI-V transceive* function and broadcasts the chosen frequency in Icom format (at RS232 levels) even when the transceiver connected to to the Station Master isn't an Icom radio. The CI-V address and baud rate of simulated radio is set in appropriate field.

There are five types of frequencies which can be sent: RX frequency, TX frequency, Operating frequency, VFO A frequency or VFO B frequency. In practice, operation of each setting depends on the transceiver and its CAT protocol. All settings may not work with some radios.

Acom2000: When the Serial port function is set to Acom2000, SM controls an Acom 2000 amplifier connected to serial port. SM automatically presets the Acom 2000 to settings defined according to the PA ANT NUB index. In other words, SM tunes the Acom for the selected antenna before transmitting. PA ANT NUMB could be unique for each antenna per band, but reserve should skip indexes of multiband antennas, Acom 2000 supports ten memory slots for each operating frequency segment.

Best explanation is by example. The picture on the previous page shows the index settings for the following antenna farm:

- 160 to 10m Vertical
- 80/75m CW/SSB dipole
- 80m four square (4SQ)
- 40m Inverted V for CW usable in range 7.000 to 7.100
- 40m 3el Yagi (whole band) on the rotator but offset 90 degrees CCW from SteppIR
- 20m to 6m 3el SteppIR, antenna is on rotator
- 12m 5el Yagi, antenna is on rotator but offset 90 degrees CW from SteppIR
- 160m to 40m receiving four square with preamplifiers

Available antennas by band:

- 160m – Vertical, RX4SQ
- 80/75m – Vertical, CW dipole, SSB dipole, TX4SQ, RX4SQ
- 40m – Vertical, Inverted V, 3-el Yagi
- 30m – Vertical
- 20m – Vertical, SteppIR
- 17m – Vertical, SteppIR
- 15m – Vertical, SteppIR
- 12m – Vertical, SteppIR, 5-el Yagi
- 10m – Vertical, SteppIR
- 6m – Vertical, SteppIR

Vertical is index 1. RX4SQ is a receive only antenna and has no PA index

CW dipole is index 2, because index 1 is the vertical which can be used on 80m

SSB dipole is index 3, because indexes 1 and 2 are already used on on 80m

TX4SQ is indexes 4, 5, 6, 7 because the amplifier tunes differently in each direction.
Indexes 1, 2, 3 are already used on 80/75m band.

INV Vee is index 2, because index 1 is the vertical which can be used on 40m

3-el Yagi is index 3, because indexes 1 (vertical) and 2 (inverted V) are already used on 40m

SteppIR is index 2, because index 1 is already used for the vertical

5-el Yagi is index 3. It is usable only on 12m band where the Vertical is index 1 and SteppIR index 2

NOTE: The Acom 2000 must auto-tune each antenna on each band segment before first use. Try to avoid changing the **PA ANT NUMB** indexes to avoid the need to perform the set-up process again. Even when adding or deleting antennas, try to use a new index for any new antenna.

Antenna Control: SM can control SteppIR and Ultra Beam antennas using the antenna's native protocol. For connection information see your antenna's manual.

Native mode control has some advantages over control based on transceiver frequency only.

- SM protects the antenna while elements are moving (retuning). Transmission can not be initiated using PTT while the antenna is retuning. When using VOX, SM will not activate Keyout to prevent a power amplifier from operating the automatic antenna when is tuning.

- When operating in split frequency mode, the transmit frequency is sent to the automatic antenna to prevent retuning between transmit and receive when operating with wide splits.

- Station Master adjusts the automatic antenna only when that antenna is selected. This means that when you jump from one band to another but you have selected the automatic antenna for use on only one band (or not at all) the automatic antenna elements stay on last used frequency and do not move unnecessarily. This saves antenna wear and decreases the "ready to operate" time to zero.

NOTE: This function does not replace the OEM controller, the original controller is still used.

IMPORTANT: The original SteppIR controller MUST be switched into the GENERAL mode. Manual band changes on controller front panel are disabled. Autotrack must be turned on with the SDA-100. Use 9,600 bps or lower for reliability. Station Master's SERIAL port must be connected with the SteppIR DATA OUT port using a cross-wired ("null modem") DB9F/DB9M cable. Only three wires are used: pin 2 to pin 3, pin 3 to pin 2 and pin 5 to pin 5. DO NOT use standard null modem cables which connects all pins.

Due to software issues with early versions of the SteppIR transceiver interface, it is not possible to always keep Station Master and the SteppIR controller in sync if changes are made using the SteppIR local controls. If you make changes using the SteppIR controller, it will be necessary to "undo" the function (¾, wave, bi-dir, 180, band change, etc.) on the SteppIR controller. If the SteppIR controller is connected and communicating with Router, the version number of the transceiver interface is displayed next to the serial port functions settings.

All SteppIR functions are also available on a PS/2 keypad attached to Station Master. Using the keypad allows manual control while keeping Station Master and SteppIR in sync.

IMPORTANT: Baud rate must be set to 19200 bps for Ultra Beam. A special DB9M-DB9M adapter must be used between the Station Master serial port and antenna controller. Cable connects pins 2-2, 3-3, 5-5 from end to end and a jumper between pins 4 (DTR) and 8 (CTS) on the Ultra Beam end.

NOTE: Station Master can control only **one** automatic antenna.

VIRTUAL ROTATORS

A unique feature of Station Master is the ability to combine several fixed antennas in a "virtual rotator." This allows automatic direction selection under application control just as if the group of fixed antennas was single antenna turned by a conventional rotator. The virtual rotator function can also be used to control a "Four Square" or similar phased array.
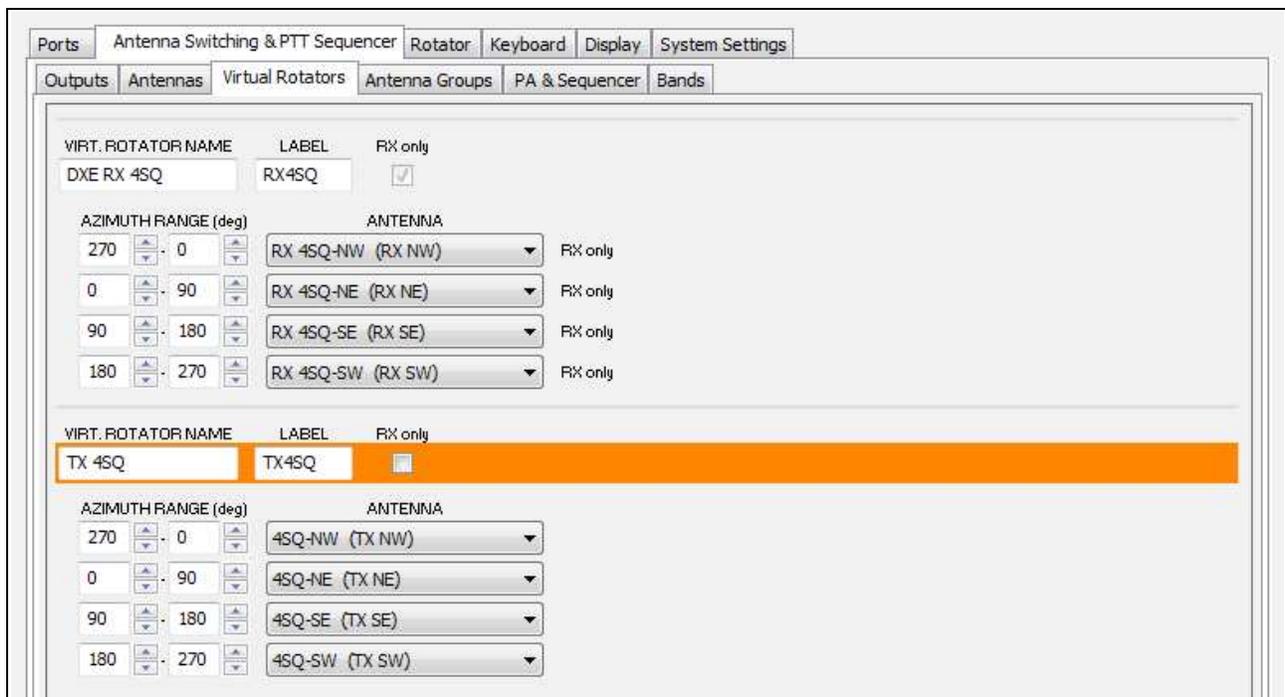
The number of virtual rotators is not limited; a new Virtual Rotator (VR) can be added by **Add** button or a virtual rotor can be deleted by selecting it (orange background) and clicking the **Remove** button.

When a new VR is added, Router automatically adds first antenna from the Antennas list to the VR. Another antennas can be added or removed by selecting an antenna line inside VR and clicking the Add/Remove button.

The order of antennas can be changed with Up/Down buttons.

Each main line (orange background) in this tab represents a separate VR. For every VR there are several fields.

VIRT. ROTATOR NAME: Full name of the virtual rotator up to 10 characters long used to identify the rotator for display and configuration.

LABEL: Short abbreviation up to 5 characters long used for compressed displays.

RX only: Flag for any antenna which is "receive only." Station Master will not allow transmitting into this antenna. If all antennas of a virtual rotator are set as RX only, the entire virtual rotator is automatically RX only.

Each line in the virtual rotator list represents a specific antenna; the number of antennas is not limited. A new antenna can be added to the list using the **Add** button. An antenna can be removed from the list by selecting it (blue background) and clicking the **Remove** button. The antenna order can changed selecting an antenna and clicking **Up/Down.**   Antennas (dipoles or other bidirectional antennas) can be repeated in the list with different azimuth ranges.

AZIMUTH RANGE: Defines the azimuth coverage for a particular antenna. The appropriate antenna is chosen when required azimuth from logger or Station Master's front panel is within the range defined for the antenna.

ANTENNA: Select the antenna to be used.   All antennas previously defined on the Antennas Tab are available.

IMPORTANT: Azimuths for the antennas must be sequential and must cover the full 360 degrees without holes or overlaps.

ANTENNA GROUPS
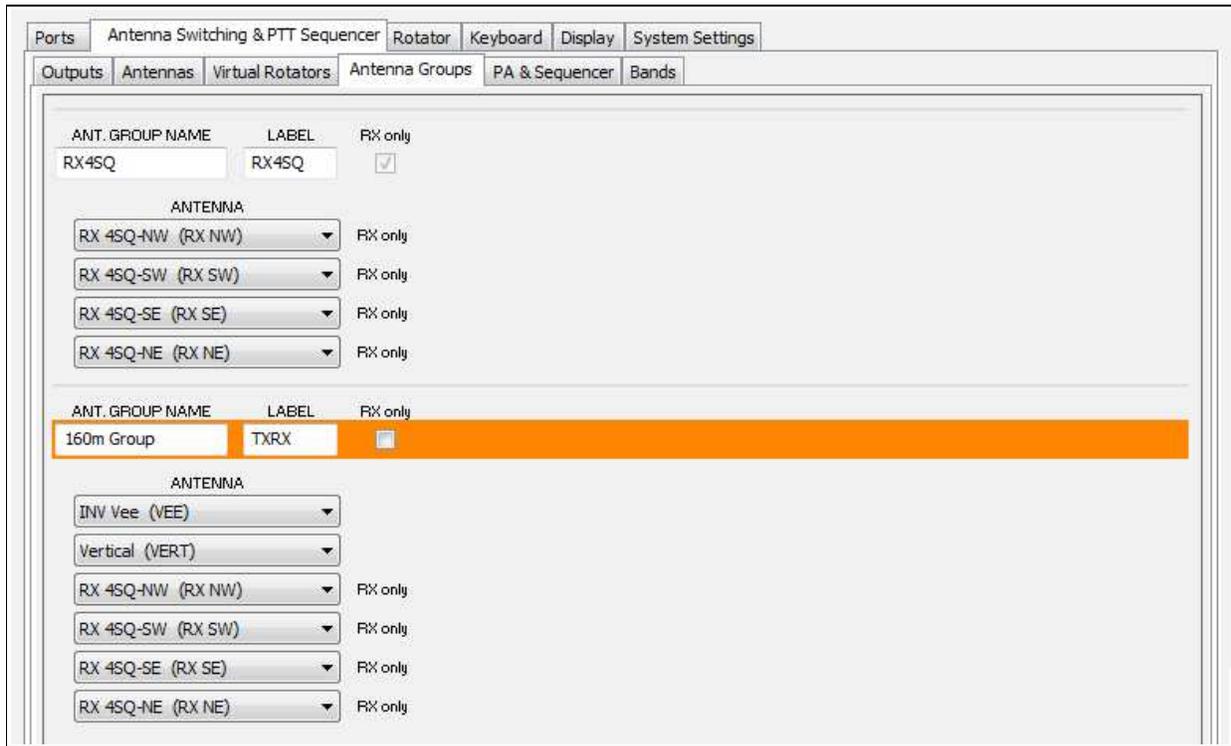
This tab allows joining several antennas into a group. There are uses for "antenna groups." First, antennas in a group can be selected manually using the rotary encoder on the front panel of Station Master. Second, antennas in a group can be automatically scanned (switched) during receive.

Just like Virtual Rotors, the number of antenna groups is not limited. A new Group (GRP) can be added using the **Add** button and a group can be deleted by selecting it (orange background) and clicking the **Remove** button.

When new group is created, Router automatically adds first antenna from the Antennas list to the group. Other antennas can be added or removed by selecting an antenna (blue background) inside the group and clicking the Add or Remove buttons. The order of antennas can be changed with Up/Down buttons.

Each main line (orange background) in this tab represents a separate group. For every group there are several fields.

ANT. GROUP NAME: Full name of the group up to 10 characters long used for SM display and configuration.

LABEL: Short group abbreviation up to 5 characters long used for SM display in compressed mode.

RX only: Defines the group as receive only. Station Master will not allow transmitting on a receive only antenna group. If all antennas in a group have been defined as RX only, the group is automatically RX only.

Each line (blue background) within a group represents one antenna.   The number of antennas in a group is not limited. New antennas can be added to a group by clicking the **Add** button. Antennas can be removed from a group by selecting the antenna (orange background) and clicking **Remove.** The order of antennas inside the group can be changed by selecting a particular antenna and clicking the **Up/Down** buttons.

> **NOTE:** The order of antennas in the group is the order they will appear on the rotary encoder and in the automatic scan.

PA & SEQUENCER

All of the power amplifier settings and timing relationships for sequential keying are defined on this tab.

Read this section carefully. The settings on this tab are important to prevent hot switching.

Power Amplifier:
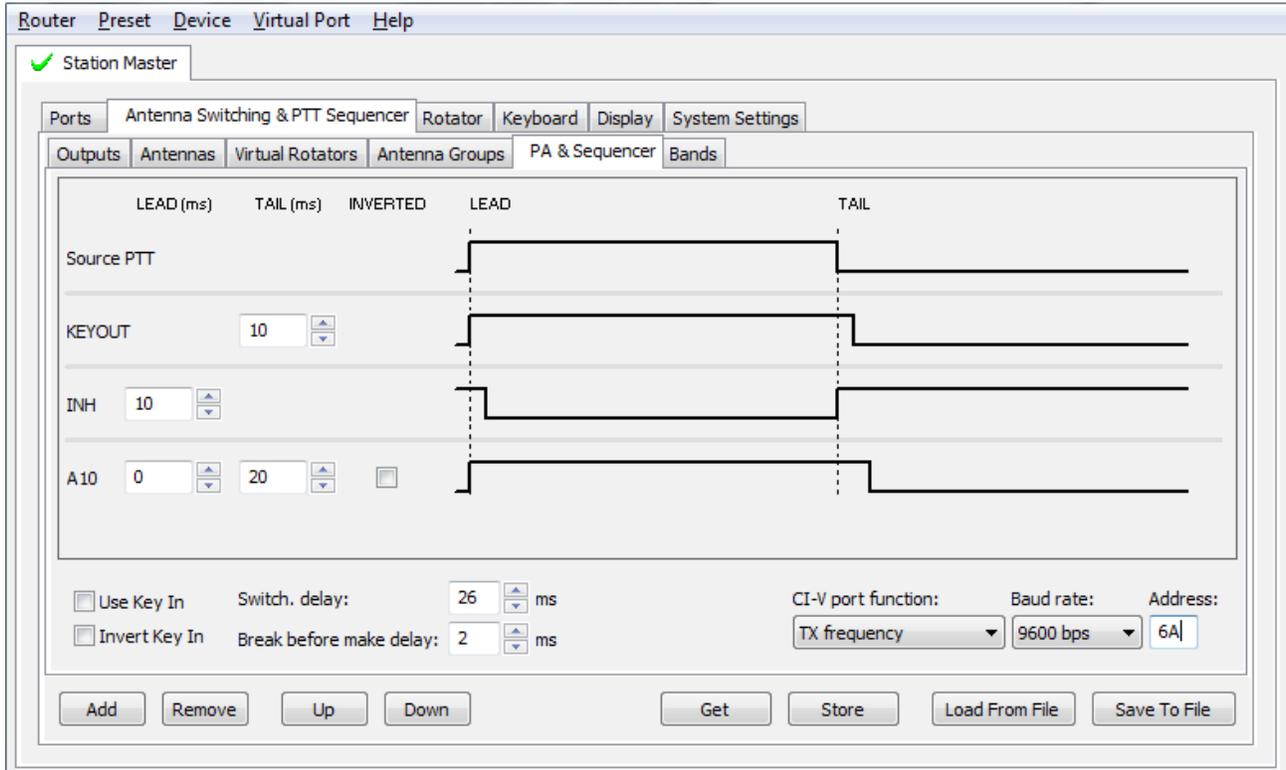
If you are using a power amplifier, is necessary to control it from the Station Master PA port and not directly from the transceiver. Pin assignments for the signals at the PA connector are in Appendix A.
The Power Amplifier port contains several signals:

KEYOUT (pin 7): Output for PTT keying to the amplifier.

IMPORTANT: The KEYOUT line is an open collector circuit capable of 45V @ 800mA maximum. If the open circuit voltage is more than 48 volts or negative, a keying buffer must be used between Station Master and the amplifier. All modern amplifiers including all solid state power amplifiers can be switched directly without a buffer.

KEYIN (pin 6): Input from PA, which switches low (close to ground) when the amplifier is ready for RF. If your amplifier supports such output, always connect it to KEYIN and check the **Key In** flag at the bottom of this tab. If the amplifier output is active high (e.g., SPE Expert), check the **Invert Key In** flag .

POWER SW (pin 9): Some amplifiers can be turned on and off remotely by applying +12V to a remote input. Station Master supports this function and provides switched +12V output on POWER SW pin. This output is frequency dependent; Station Master permits selecting which power amplifier operation on a per-band basis.   PA On is set on the Bands tab.

CI-V (pin 5): Icom format and level compatible output signal for automatic control of a power amplifier or antenna tuner using the Icom interface. The proper **Baud Rate** and CI-V **Address** for the amplifier or tuner should be set at the bottom of this tab (see your amplifier or tuner manual for the proper parameters).   The CI-V port supports the same functions as the Antenna tab serial port. For transmitting devices (amplifier or tuner), **TX frequency** recommended.

BCD BAND DATA (pins 1-4): TTL Band Data in Yaesu format for automatic band switching of amplifiers or turners that use the Yaesu interface. The BCD code for each band can be defined on the Bands tab.

microHAM provides optional PA cables for most modern automatic and solid state amplifiers currently available on the market. Check your vendor's website or www.microham.com for cable diagrams, availability and price.

Antenna Switch:

To safely switch between transmit and receive antennas, Station Master must know how long it takes your antenna switch to operate in order to prevent power output by keeping INHIBIT active until the switch settles. The data should be entered in the **Switch Delay** field. For all *micro*HAM antenna switches, 26ms is a safe time. Contact the manufacturer or vendor of your antenna switch to obtain the delay value if you are using a switch from another manufacturer.

A **Break-before-make delay** can be set, for antenna (ANT) and band-dependent (BPF) switches that may require it.

Sequencer:

Source PTT:
> The first line, labeled **Source PTT,** shows the behavior of the PTT control signal. Source PTT represents any PTT that can indicate to Station Master that the transceiver is being, or has been switched into transmit and Station Master should take the appropriate action.

KEYOUT output:
> The second line shows operation and timing of the KEYOUT output used to key power amplifier.

INHIBIT output:
> The third line shows operation and timing of the INHIBIT (INH) output used to prevent the radio from generating power. When the INH output is low, the radio is allowed to generate RF power. The INH time should always be **larger** than the lead time setting of any sequencer output, the Antenna Switch and BPF switching delay plus the break-before-make delay, and/or PA switching delay.

IMPORTANT: Setting the correct INH time is critical for proper, hot switch free control of all devices connected to the Station Master.

Sequenced outputs:
> All other lines describe the timing of the sequencer outputs. These are any of the outputs defined as SEQ class outputs on Outputs tab. The lead time (operate delay), tail time (release delay) and output polarity can be set independently for each output.

Sequencer output level and polarity

- A **LOW** output indicates that the relay contact is **OPEN**.

- A **HIGH** output indicates that the relay contact is **CLOSED**.

- When the polarity of a sequencer output is normal (the INVERTED box is not checked), the output is **LOW** whenever it is disabled for particular band (on the Bands tab) or the transceiver is in receive mode. When the radio is switched to transmit, the sequencer output goes **HIGH** after the selected LEAD delay and remains **HIGH** until the transceiver returns to receive. When the transceiver returns to receive mode, the sequencer output goes **LOW** after the tail delay.

- When the polarity of a sequencer output is inverted (the INVERTED box is checked), the sequencer output is LOW whenever it is disabled for particular band. When the sequencer output is enabled and the transceiver is in receive the output is HIGH.   When the radio is switched to transmit, sequencer output will go LOW following the LEAD delay and remains LOW until the radio returns to the receive state. When the transceiver returns to receive, the output will go HIGH state following the tail delay.

Important considerations:

Station Master is used with *micro*HAM keyers:
**   *micro*KEYER, *micro*KEYER II, DigiKEYER, CW Keyer, MK2R, or MK2R+**

With *micro*HAM keyers, Station Master or the keyer monitors both PTT output of the radio and the PAPTT signal from the keyer. However, with VOX operation or FSK operation using MOX the radio can switch to transmit and generate power before Station Master is able to switch all of the connected devices.

- be sure that Station Master is connected according to the installation instructions

- set the INHIBIT (INH) time slightly longer than the Switch Delay, any T/R delay in your power amplifier, and/or longest sequencer lead delay.

- make the PTT lead time in the KEYER equal to the INH time in Station Master. If your transceiver does not have an inhibit input, make the PTT lead time slightly longer than the longest Switch Delay, T/R delay or sequencer lead time.

WARNING: If your transceiver does not have an INHIBIT input or the INHIBIT is not connected, the sequencer can not protect your devices and prevent hot switching. Using VOX or FSK with MOX can result in switching antennas with power applied when different TX and RX antennas are used. We strongly recommend that you NOT use sequencer outputs or split TX/RX antennas without an INHIBIT connection!!!

Station Master is used without a *micro*HAM keyer:

Station Master monitors the PTT output of the transceiver. This means that the radio has already switched to transmit and can be generating power before Station Master has switched receive to transmit.

- be sure that the SM is connected according to the installation instructions.

- use zero (0) lead time for all sequencer outputs

- set the INHIBIT (INH) time slightly longer that Switch Delay or any T/R delay in your power amplifier.

WARNING: If your transceiver does not have an INHIBIT input or INHIBIT is not connected, the sequencer can not protect your devices and prevent hot switching. Antennas can be switched with power applied when separate TX and RX antennas are used. We strongly recommend that you NOT rely on Station Master to bypass receive devices or use split TX/RX antennas without an INHIBIT connection when using a power amplifier!!!

TIP: If your radio does not have an INHIBIT input you may be able to use Station Master to bypass receive devices or for split TX/RX antennas. To do so, the transceiver PTT must be controlled entirely by footswitch or computer generated PTT; VOX, MOX and QSK can not be used.

Connect the footswitch and computer PTT output to Station Master's PTT IN connection in parallel. Set the Lead time of one sequencer output slightly longer than any other lead time, Switch Delay and/or the T/R delay in your power amplifier and connect this sequencer output to the PTT input of your transceiver. The sequencer output used should be configured for common ground (sink) or be one of the isolated relay outputs B7-B10.

BANDS

The Bands tab is used to select available antennas, bandpass filters, PA On, and Sequencer outputs by frequency.

> **NOTE:** On this tab, *band* does not refer to a specific amateur radio band (i.e. 20m, 15m), but a range of frequencies (e.g., 3,500 to 3,600 KHz).   The minimum (starting) frequency is included in the "band" but the maximum (ending) frequency is not. For a band 3,500 – 3,600 KHz, the lowest frequency in the band is 3,500,000 Hz and the highest frequency is 3,599,999 Hz.

There is no limit to the number of bands that can be defined but the bands can not overlap. New bands can be created using the **Add** button and existing bands can be deleted by selecting the desired band (orange background) and clicking the **Remove** button.

The minimum and maximum frequencies of previously defined bands can be edited by double clicking on the frequency field. Bands are automatically sorted by ascending frequency.

When new band is added, Router automatically adds first antenna from the Antennas list as an Antenna Selection for this band. Antennas can be added or removed by selecting the antenna line (blue background) inside the band and clicking the Add/Remove button. The antenna order can be changed with Up/Down buttons.

> **NOTE:** The order of Antennas within a band is the order in which they will appear on the front panel of Station Master. The antenna number shown with an # may be used for direct selection of the antenna with the keypad or computer.

Each main line (orange background) in this tab represents a separate band (frequency range). For every band there are several fields.

FREQUENCY RANGE: Minimum and maximum frequency of particular band in kHz. Frequencies can be edited by double clicking.

BAND: Custom name of the band up to 10 characters - used for Station Master display. .

CODE: Decimal number (0-15) which is translated to BCD output (TTL level) on the PA port. The correct code is determined by the amplifier being used.   Zero (0) generally means "not used."

Default codes for Yaesu amplifiers are: 1 = 160m, 2 = 80/75m, 3 = 40m, 4 = 30m, 5 = 20m, 6 = 17m, 7 = 15m, 8 = 12m, 9 = 10m, 10 = 6m. Values above 10 are undefined.

Default codes for the TenTec Hercules and Ameritron ALS-500M/600 amplifiers are: 1 = 160m, 2 = 80/75m, 3 = 40m, 5 = 20/30m, 7 = 15/17m, 9 = 10/12m. Other values are not defined. Hercules and ALS-600 require a one of six decoder and source driver to supply +12V for the selected band. microHAM does not currently offer an interface for the Hercules and ALS-600.

Default codes for the Icom IC2KL and IC4KL are: 1 = 160m, 2 = 80/75m, 3 = 40m, 4= 30m, 5 = 20m, 7 = 15/17m, 9 = 10/12m. Other values are not defined. The IC-2KL and IC4-KL require a 1 of 10 BCD decoder and voltage converter to supply the correct "Band Select voltage" for each band. microHAM does not currently offer an interface for the Icom IC-2KL and IC-4KL.

PA: When checked, the POWER SW signal on PA port is active (sourcing 12V). Used for automatic PA ON/OFF. Note, that this setting can be overridden from FUNC menu.

KEYOUT: When checked, SM generates KEYOUT signal on this band for Power Amplifier keying. Note, that this setting can be overridden from FUNC menu.

BPF: Selects which lines defined as BPF outputs are selected on this band.

SEQ: Selects which lines defined as SEQUENCER outputs are active on this band.

Each line (blue background) inside the band represents one antenna. The number of antennas per band is not limited. Antennas can be added or deleted by selecting the antenna and clicking the Add or Remove buttons. The antenna order can be changed using the Up/Down buttons.

Each antenna can be defined as receive only by checking the RX Only box. Receive only antennas are not used for transmitting on a particular band. If an antenna has been already defined as RX only on the Antennas tab, the RX only flag is checked automatically and cannot be changed.

To the right of the RX only flag is a status display for all 20 SM outputs. Outputs marked in green are marked outputs are the selected Antenna outputs. Outputs marked in Red are the selected BPF outputs. Outputs marked in Yellow are the active Sequencer outputs.

ROTATOR TAB

The Rotator tab allows configuring the internal rotator control interface for your particular rotor hardware.

To the left side of the Rotator tab is an azimuth circle with direction needle and orange line around the circle. The orange line displays the operating range of the rotor; the black areas at the ends of the *spiral* are the portion of the operating range that is protected by the software limits.   The black circle on the spiral shows the current azimuth in relation to the full operating range. The picture below demonstrates a rotor with multi-turn capability – in this case slightly over three turns.

The current azimuth is displayed numerically in upper left corner and indicated by the black needed. The "target" azimuth is displayed in the upper right corner and indicated by the gray needle. When the rotor reaches the target value, the current and target values will be the same and the black needle will cover the gray one.

The right side of the Rotator tab contains controls for configuring the rotor interface and controlling its operation.

Rotator control parameters

ENABLE ROTATOR: enables the rotor interface.

ROTATOR CONTROL ALWAYS ACTIVE: enables control of rotator, even if none is present on the current band. See description of this feature in OPERATING STATION MASTER chapter, under Antennas with Rotator heading.

SENSOR: displays the type of position feedback sensor. Options are: **Analog** if the position feedback is a potentiometer or variable voltage position signal or **Pulse** for pulse (magnetic/reed switch) feedback. The sensor type is chosen during the calibration process and can not be changed directly. The sensor must be connected as described in the "Connecting the Rotator" section of this manual.

AUX OUTPUT: displays the function of the AUX relay. Options are **Speed, Brake,** or **None.** Aux relay function is set during the calibration process and can not be changed directly.   When set to **Speed,** the rotor interface energizes the the Aux relay once the antenna has moved a preset distance and releases the relay a predetermined distance before the target. When set to **Brake,** the rotor interface energizes the Aux relay before the rotor stats its movement and holds the relay for the "Brake tail" period after the antenna reaches its target.

SPAN: The total range of the rotor in degrees. This value is calculated automatically in the calibration process and can not be changed directly.

LIMITS: Software limit switch which sets a "safe zone" for stopping the rotor before it reaches the end of travel. Five (5) degrees means the rotor will stop five degrees before reaching the physical limit. The value same value is used at both ends the rotation and applies to both manual and automatic operation. The limits are represented by the black zones on the ends of the orange operational zone.

STRATEGY: The rotor interface implements one of two strategies for reaching the target azimuth: **Accuracy** moves the antenna to the selected azimuth using the "shortest way around." When the target azimuth is outside the rotor limits (for example, a side mount rotor with a span less than 360 degrees), the rotor will not start. **Speed** moves the antenna to the target by the shortest route as with accuracy but if the shortest route to the destination is across the limits, the rotor can turn into the limits if the limit is within the "compromise" angle.

COMPROMISE: Angle value in degrees used by SPEED strategy.

SENSOR TIMEOUT: Defines value in seconds until sensor must change when rotor is in move. Serves as a protection against broken sensor or broken sensor wires.

REV. DIR. DELAY: Sets time delay which prevents new rotator movement after the target has been reached. If BRAKE is used, the brake delay should be longer than reverse/forward delay to prevent unnecessary brake operation.

TRAIL: This parameter should be set to the appropriate value if the rotator coasts after the CW or CCW relay is released and overshoots the target. The controller will turn off the motor early to allow the rotor to coast to the target.

DEAD ZONE: Sets the value in degrees by which a new azimuth must differ from the current heading before the controller will move the antenna.   If the current azimuth is 270 degrees and the dead zone is 10 degrees a new heading must be greater than 280 degrees or less than 260 degrees before the rotor will be commanded to the new azimuth. If the dead zone is changed, press and release the encoder to update the azimuth.

FULL SPAN KNOB: If checked, Station Master's rotary encoder can set an absolute azimuth withing the full span of the rotor. Otherwise the encoder operates only in the 0 – 359 degree range.

SLIP CONTROL: If rotor being controlled is prone to slipping (for example in high wind), Station Master can "hold" the antenna in position if the position sensor follows the antenna slip and the slip control is enabled.   The slip control range is the same as the Dead Zone.

Rotator control from Router

Antenna azimuth can be controlled from Router using these controls:

CW: Rotator moves clockwise while this button is held.

CCW: Rotator moves counter clockwise while this button is held.

START: Rotator moves to the entered azimuth in range from 0 - 359 deg after clicking on this button. While rotator is moving, clicking the **Stop** button will stop the movement immediately.

STOP: Stops rotator movement.

MEMORY buttons: Four memory buttons can be used for quick azimuth selection. Each button can be set to a custom azimuth and identified with a label up to 4 characters long. Once memories are defined and stored to Station Master, they can be recalled with the rotary encoder or a PS/2 keypad attached to the PS/2 jack..

IMPORTANT: Any parameter change is not active until it has been stored in Station Master's EEPROM with the **STORE** button. Multiple parameters can be changed at once and stored with a single click on the Store button. To update the Rotator tab with the with the current values in Station Master, click the **Get** button.

GET: Retrieves all parameters and and azimuth memories from Station Master and displays the values on the Rotator tab.

STORE: Writes the parameters and the azimuth memories displayed on this tab to Station Master's internal memory (EEPROM).

LOAD FROM FILE: Retrieves a file containing all parameters and azimuth memories from the computer and displays the values.

IMPORTANT: Loading a file only fills the Rotator tab and DOES NOT store settings into the Station Master.   To load settings from file and store them to the Station Master, click the Store button after settings are loaded to the Router.

SAVE TO FILE: Saves all parameters to the file on computer.

Connecting Rotator

The ROTOR port connects to external rotator hardware. There are three (3) SPDT relay contacts for controlling CW and CCW direction and AUX for custom purpose (BRAKE or SPEED). Than analog pot or pulse contact input, reference output for pot and solid 12V output for external power relays.

> **NOTE:** The Rotor port does not provide power for the motor. With commercial rotators, the original controller or a replacement power supply is still needed.

IMPORTANT: Maximum rating for the CW, CCW and AUX relay contacts is 24V AC/DC, 3A. If greater capacity is required, use external 12V DC relays. Pin 1 supplies +12V DC which can be used to power external relays.
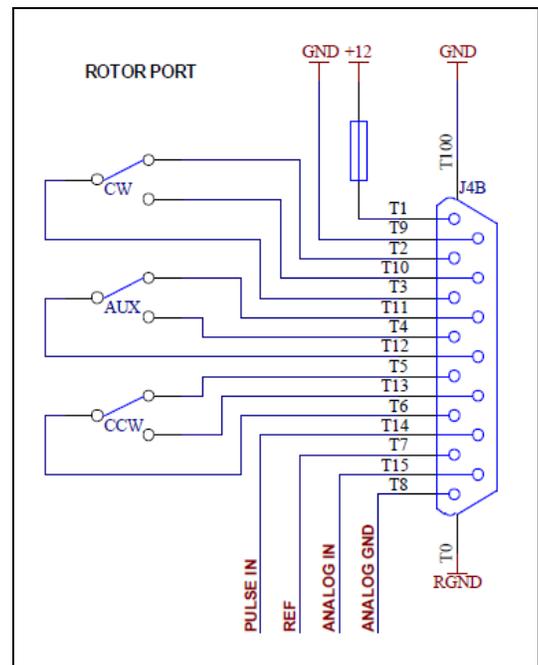
Simplified schematic of ROTOR port

40
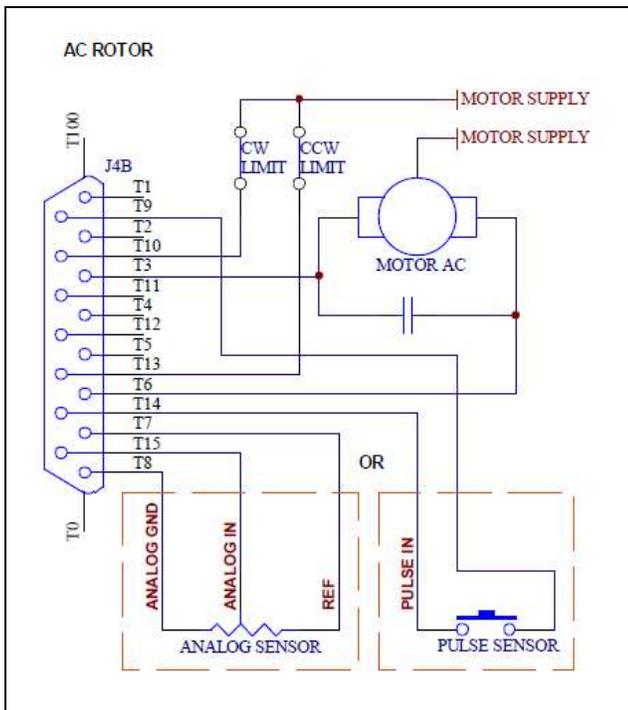
Typical connection for an AC motor
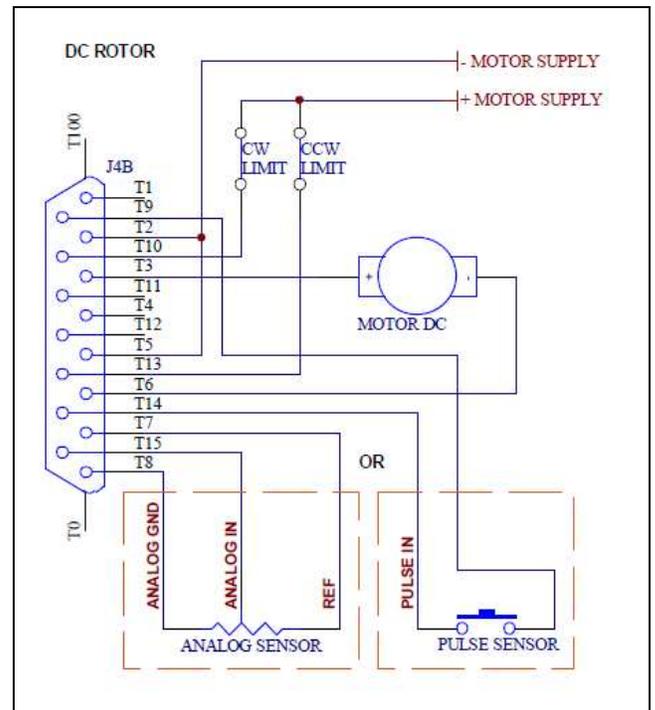
Typical connection for a DC motor

Pictures above show connection of home brew AC and DC motors. Only one type of position sensor is needed. If a potentiometer is used, the optimum value is 500 ohm which properly loads analog line and provides the best immunity to RFI. However, any value from 500 to 5K ohm is acceptable.

IMPORTANT: Don't forget to protect motor supply with fuse! The fuse will protect relays contacts as well.

Commercial rotators can be connected two ways. Rotators with external control port as Yaesu DXA or DXC series can be connected as shown here.

Commercial rotators without external control ports will require connections inside original controller. Please refer to the manual of your rotator or ask us for help.
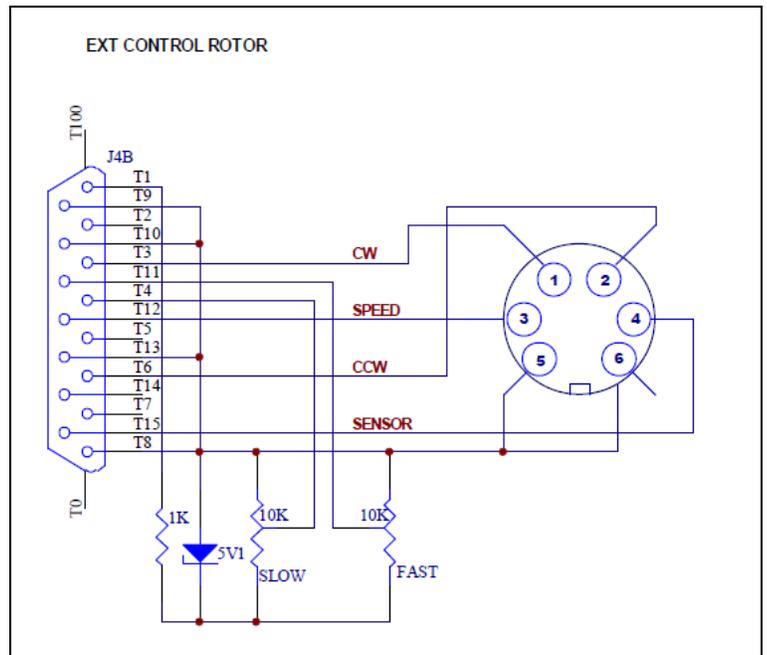
Connection to Yaesu DXA/DXC rotator series.

Rotator Calibration

The calibration process is absolutely necessary for proper rotator control and consist of two parts: setting rotation limits and calibrating the position indicator. Both calibrations are done simultaneously.

IMPORTANT: During calibration the previously defined parameters are not used. Clicking Cancel during the calibration will abort the process and retain the old values.

1. Properly connect the rotator controller to the ROTOR port and remove Station Master's top cover.

2. Click Calibrate button.

3. Select Sensor type, ANALOG for potentiometer sensor or voltage feedback, PULSE for pulse sensor.

4. If your rotor uses BRAKE, set AUX relay for BRAKE function. During calibration AUX will be activated when the rotator moves, but will be deactivated if rotator is idle for more than 15 sec, to prevent overheating the brake or power supply. If your rotator uses SPEED control, set AUX for SPEED function. During calibration AUX will be activated to set the rotator speed to slow.

5. Turn rotator fully counter clockwise (CCW). If rotator turns in the opposite direction, check the "Reverse direction" box. If your rotator does not have hardware limits, turn the rotator to the desired maximum counter-clockwise position.

6. If rotator has an ANALOG sensor, adjust the OFFSET trimer in Station Master until the sensor value shows 0002 (is in range 0001-0003) and click next.

    If rotator has PULSE sensor, click next step.

7. Turn the rotator fully clockwise (CW). If your rotator does not have hardware limits, turn it to the desired maximum clockwise. If your rotator uses pulse counting, do not turn it CCW at all as this will result in an inaccurate pulse count and effect the calibration.

8. If rotator has an ANALOG sensor set SCALE trimer in Station Master until sensor value shows 1021 (between 1020-1022) and click next.

    If value cannot be set with SCALE trimmer and remains unchanged, click "Reverse Sensor", and set OFFSET trimmer until sensor value shows 0002 (between 0001-0003).

    If rotator has PULSE sensor, check if sensor value is non zero, click next and skip to step 13. If sensor value is zero or has very low number (below 20), check the sensor connection and repeat calibration.

    Turn rotator fully counter clockwise (CCW) or to desired maximum CCW position.

9. Slightly readjust OFFSET for improved accuracy until sensor value shows 0002 (between 0001-0003) and click next.

    If "Reverse Sensor" was checked in previous step, set SCALE trimmer until sensor value shows 1021 (is in range 1020-1022) and click next.

10. Turn rotator fully counter clockwise (CW) or to desired exact final CW position.

11. Slightly readjust SCALE trimmer for improved accuracy until sensor value shows 1021 (between 1020-1022) and click next.

    If "Reverse Sensor" was checked, readjust OFFSET trimer for improved accuracy until sensor value shows 0002 (between 0001-0003) and click next.
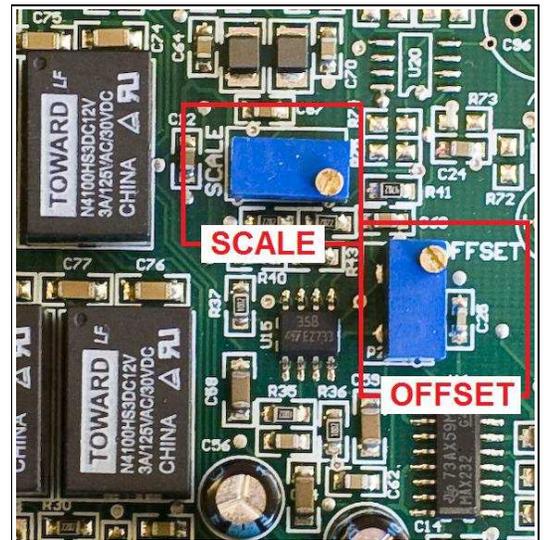
12. The span of the rotator has now been calibrated. To calibrate the absolute azimuth, it is necessary to enter two points as far apart as possible but at least 30 degrees from the limits on each end of the rotation.

13. Start with the rotator at the CW limit and turn the rotator counter clockwise (CCW), at least 30 deg from the clockwise limit. Enter the azimuth of the rotator as accurately as possible into the entry field.

14. Turn rotator at least 90 degrees further counter clockwise (CCW), but not within 30 degrees of the counter clockwise limit. Enter the angle through which you turned rotator counter clock wise from previous calibration point as accurately as possible.

    If you have multi turn rotator and you turned the rotator more than 360 deg, you must enter cumulative angle value. For example, if you turned rotator exactly one and half turns counter clockwise, enter 540 deg (180+360).

15. Click Finish. The new calibration values are automatically stored to Station Master.

Rotator Quick Calibration

Due to their nature, PULSE sensor rotators need occasional recalibration. In these cases it is only necessary reset the current heading.

IMPORTANT: Quick Recalibration cannot be used before performing a full calibration and is available only for PULSE sensor rotators.

    NOTE: The previously defined parameters and delays are used during Quick calibration.

1. Click Adjust button.

2. Set antenna to a known azimuth.

3. Enter value of this azimuth to the entry field.

4. Click OK. New calibration values are automatically stored into Station Master.

KEYBOARD TAB

The Keyboard Tab controls the operation of a PS/2 keyboard or numeric keypad connected to the PS/2 jack. It is also possible to define control functions for the numeric keypad.

The PS/2 and FH-2 sub tabs allow assigning control functions to PS/2 and FH-2 style keypads. When a PS/2 keyboard is attached to Station Master, all keys except those on numeric keypad are forwarded to the attached keyer. Checking **Forward numpad keys to keyer,** will cause the numeric keypad keys on the keyboard or all keys on a separate numeric keypad to be forwarded to the keyer connected via iLink.
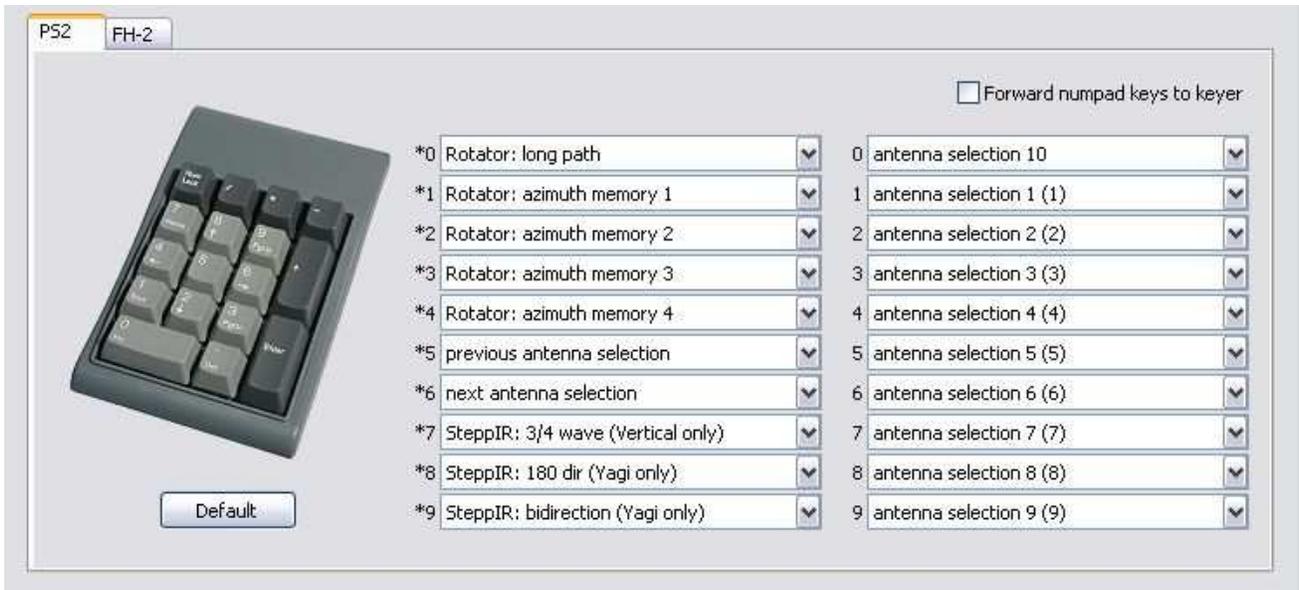
Default key assignments:

NumLock: toggle to enable/disable separate TX and RX antennas. When split is enabled, NumLock on the keypad will light on keypads with a NumLock LED.

/:   / followed by three digits enters rotator target azimuth. To cancel entry press /.

+, -, Enter: these keys have the same function as rotary encoder on SM front panel. + is one step CW, - one step CCW and Enter replaces an encoder push.

Keys 0-9 on numeric keypad, and additional *shift* functions, are user configurable. The * key is used as a shift key. Individual keys can be configured to be forwarded to Keyer connected via iLink.

When using an FH-2 style keypad all keys are user configurable. FH-2 keys cannot be shifted.

The FH-2 keypad must be connected to the PS/2 jack of SM using a special adapter.

> **NOTE:** The FH-2 cannot control Station Master and a transceiver at the same time. FH-2 can only be connected to Station Master or the transceiver.

IMPORTANT: The settings on this tab are valid only when Station Master is connected to *micro*HAM Router. In order to function in stand alone mode, the settings must be saved to Station Master as power-up defaults using "Device | Store as Power-Up Settings."

DISPLAY TAB

The display tab provides controls for configuring the SM display.

Each line can display one of eight default (background) functions and any of "temporary" status reports. The "background" functions are those that appear at idle. The status messages appear depending on operating status.

Contrast: controls the LCD contrast

Light: sets the LCD backlight brightness

Report time: sets the length of time that transient (status change) reports remain visible

Set Strings: set the "Welcome Message" to be displayed when SM is initialized.

Set Defaults: returns the display to factory settings

IMPORTANT: The settings on this tab are valid only when Station Master is connected to *micro*HAM Router. In order to function in stand alone mode, the settings must be saved to Station Master as power-up defaults using "Device | Store as Power-Up Settings."

SYSTEM SETTINGS TAB

System Power: displays the source voltage for PORT A and PORT B separately. If the jumpers are configured for INT/SRC, the voltage displayed will be approximately .3V less than the power supply voltage.

Acceptable voltage range is +11 to 24V.
If the voltage is less that 11V, UNDERVOLTAGE will be displayed.
If the voltage is more than 24V, OVERVOLTAGE will be displayed.

Enable sleep mode: If Station Master is connected to a microKEYER II it will follow the MK II sleep status.

> **NOTE:** Sleep control has no function if Station Master is not used with an MKII.

Enable button beep: When checked, SM will generate short beeps on each button press.

System power		✓ Enable sleep mode
Port A: 13.7 V OK		
Port B: 13.8 V OK		✓ Enable button beep
		✓ Enable alarm beep

Enable alarm beep: When checked, SM will generate three short beeps in an alarm condition.

IMPORTANT: The settings on this tab are valid only when Station Master is connected to *micro*HAM Router. In order to function in stand alone mode, the settings must be saved to Station Master as power-up defaults using "Device | Store as Power-Up Settings."

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7 – OPERATING STATION MASTER

Operation of Station Master depends the configuration stored by Router. Once the configuration data has been stored in Station Master's memory, the front panel buttons, encoder, LCD display and LEDs provide a real-time user interface.

Antenna Selection Controls

One of most important capabilities of Station Master is ability to select one of several available antennas on each band. When Station Master is properly configured antenna selection is easy.

Basic antenna selections

Antennas can be selected using the left (YES) and right (NO) buttons. In receive mode all antennas enabled for the current band are available. If the left or right button is pressed during transmit, the new antenna will be selected when the transceiver returns to receive.

Antenna selections with Antenna SPLIT (different antenna for RX and TX)

When the Split **FUNC**tion is enabled, there are two ways an antenna selection can be changed.

1. While transmitting a new TX antenna can be selected using the left right buttons. The new selection will be applied on the next transmission.

2. Push and hold (but do not rotate) the encoder while receiving and select the transmit antenna using the left/right buttons. The new antenna selection will become effective on the next transmission.

When a new TX antenna is selected but not yet applied, the selected antenna is displayed with REQ: prefix.

> **NOTE:** RX antennas may selected during transmit the same as TX antennas selected during receive by pressing the knob.

When a RX only antenna selection is selected, a negative R or T with black background is shown on the LCD.

Antennas with a rotator

When the current band includes an antenna with rotator flag, turning the rotary encoder clockwise or counter clockwise will set the azimuth. However, the encoder provides access to several other features.

- **Dynamic control**
  If the encoder is turned slowly, the azimuth is set in one degree steps. If the encoder is turned quickly the azimuth is adjusted in 10 degree steps. This allows making large changes in azimuth with less movement of the encoder.

- **Quick Start, Immediate Stop**
  When the azimuth is set to a value larger than the "dead zone," the rotator will begin turning one second after the encoder last moves. If the encoder knob is pressed and released after setting a new azimuth the rotator will begin moving immediately. If the encoder is pressed while the rotator is turning, it will stop but the target azimuth is retained and rotation can be resumed by pressing and releasing the encoder or a new target may be set by rotating the encoder.

- **Memory Jump**
  The four programmable memory positions may be recalled by pressing and holding the encoder and rotating clockwise. The rotator will start moving when the knob is released.

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- **Position Jump**
  If the encoder knob is depressed and held while the knob is rotated counter clockwise the azimuth can be set in 45 degree increments. The first position is [LP] which will turn the antenna 180 degrees from its current heading. The other positions are show in compass mode.

  NOTE: if the selected antenna is a SteppIR Yagi controlled from the serial port, selecting [LP] will command the SteppIR into 180 degree mode to save time – the rotator will not turn.

Control of unselected Antenna Rotator

If Rotator control always active is enabled in Rotator tab in Router, two consecutive short presses on the FUNC button within half a second (a "doubleclick") will toggle unconditional control of rotator by encoder, even if there is no antenna with rotator flag set on the current band. If sounds are enabled, an ascending or descending tune indicates, whether this feature is being turned on or off. Note, that if this feature is turned on, encoder controls rotator even if a Virtual rotator or Group is selected.

Antenna selections with Virtual Rotator

When antenna selection defined as a Virtual Rotator is selected, the rotary encoder may be used for azimuth control. Turning the encoder CW and CCW sets the antenna azimuth.

VR: or **V** centered vertically on the LCD indicates that a virtual rotator or an antenna from the virtual rotator is being used.

Don't forget: Computer control of the azimuth is active only if the selected antenna has the rotator flag set or the selected antenna is part of a Virtual Rotor. If separate RX and TX antennas are selected and both antennas have the Rotator flag set, the azimuth of both rotors are controlled simultaneously.

Antenna selections with Groups

When an antenna selection defined as a Group is selected, the rotary encoder is used for quick antenna switching. Turning the encoder CW or CCW selects the antenna, every step is different antenna from the group.

GRP: or **G** centered vertically on the LCD indicates that an antenna group or antenna from a group is used.

The unique feature of antenna groups is automatic antenna scan.

- **Scan Start/Stop**
  Knob is used to start/stop automatic antenna scan.

- **Scan time**
  Push and turn the encoder knob to set the Dwell time (time on each antenna).

Automatic antenna scan and its features can be enabled/disabled via FUNCtion menu.

FUNC button

A short push of the FUNC button will call the FUNCtion menu. The function number is displayed on the top line in square brackets followed by the function name.   The function can be enabled or disabled using the left (Yes) and right (No) buttons. The rotary encoder is used to scroll through the functions. Changes in status are applied immediately and the values are retained even when Station Master is turned off.

[f1]Split Ena: Enable/Disable split TX/RX antenna switching. The split enable status is stored separately for each band.

[f2]Scan Ena: Enable/Disable automatic antenna scanning within a group. Scan is automatically stopped while the transceiver transmitting.

[f3]Scan Rst: When YES, scan will start always from antenna #1 whenever a scan is initiated or the transceiver switches to receive from transmit. When NO, scan will resume from the current antenna.

[f4]Sc.PTT Stop: When YES, scanning will not resume after transmitting. When used with microKEYER II or MK2R, scanning will only be canceled if the transmission was the result of a footswitch (or hand mic) PTT.

[f5]PA standby: When YES, KeyOut is not generated, and Key in is ignored, regardless of the flags set in Router

[f6]PA OFF: When YES, POWER SW output on PA connector is kept off regardless of the (per band) PA flag settings in Router; and KeyIn input is ignored.

> **NOTE:** If Rotator control always active is enabled in Router, two consecutive short presses on the FUNC button within half a second (a "doubleclick") will toggle this function, rather than enter the FUNC menu.

MENU button

Pushing the MENU button for more than one second will invoke MENU mode. The menu number is displayed on the top line followed by the menu name. Item values can be changed using the Left (Yes) and Right (No) buttons. The rotary encoder is used to scroll through the items. Changes in status are applied immediately and persist through power cycles.

IMPORTANT:
*** CAT *** must be selected for [m1] to enable automatic antenna switching.

[m1]Select band: selects one of the defined bands (band segments) or automatic band decoding (CAT).

[m2]Rota Ena: enables/disables internal rotator controller.

Lights

There are four light on front panel, POWER, ALARM, BUSY and READY.

POWER: Indicates power status of the Station Master.

- Off: main power is off

- On: normal operation

- Slow blinking: sleep mode .

- Fast blinking: Input power (+13.8V, Port A or Port B) is out of range (high or low)

ALARM: Indicates an alarm condition. Alarms are those problems that require operator action.

Pressing the FUNC button will display the reason for the alarm on on the LCD display. If there are multiple alarms, the left and right buttons will step through the list.

- **NO TX ANTENNA:** A Receive Only antenna has been selected for transmit. The problem can be resolved by selecting a valid transmit antenna.

- **NO BAND DATA:** The alarm LED will flash if there is a loss of internally decoded band data, data from Router or data from a *micro*HAM keyer. The alarm LED will be on if band data is not available at start-up. Transmitting is not restricted but changing antennas is not allowed. Band can be selected manually trough the menu until the problem is fixed.

- **ROTATOR FAULT:** Rotator's Sensor timeout; most likely cause is a defective sensor or broken connection. Motor power is disabled but transmitting is not inhibited. SM turns down motor power. Transmitting is not restricted. Rotator controller can be disabled in menu until problem is fixed.

- **OUT OF BANDS:** Operating frequency is outside any defined band. Transmitting is not allowed but antenna selections can be changed.

- **NO ANTENNA:** A virtual rotator is set to an azimuth for which no antenna is defined. The virtual router definition must be fixed in Router.

- **iLink DOWN:** a *micro*HAM keyer connected to the iLINK port is not responding.

BUSY: Indicates various busy conditions. Busy conditions are usually conditions which inhibit transmission for a given period of the time and Station Master expects them to clear automatically. Busy conditions can not be cleared manually and must expire.

- On during sequencer operation. Sequenced switching is in progress and switch delay or lead delay has not timed out. Light lit while sequencer switching is in progress and switch delay not timeouts. Also on if connected keyer or serial device like SteppIR is responding busy. Transmitting is inhibited while busy.

- Flashing when band data does not appear after startup.

READY: Indicates ready to transmit.

- On – Station Master is operating normally.

- Off - transmitting is not allowed. If ALARM and BUSY are off, a receive only antenna has been selected.

- Flashing – a new antenna was selected during transmit. The new antenna will become active when the transceiver returns to receive.

8 – EXAMPLE CONFIGURATION

This configuration provides one example of the Router configuration process. It shows the interaction between Station Master and Router with a moderately advanced antenna farm capable of exploiting most of the Station Master capabilities.

Antenna farm:
- 160 to 10m trapped vertical
- 80m CW/SSB dipole. Dipole has a separate relay for tuning to 75m/SSB.
- 80m four square (4SQ)
- 40m Inverted V for CW usable in range 7.000 to 7.100
- 40m 3el Yagi covering whole 40m band, antenna is on rotator but offset 90 degrees CCW from SteppIR
- 20m to 6m 3el SteppIR, antenna is on rotator
- 12m 5el Yagi, antenna is on rotator but offset 90 degrees CW from SteppIR
- 160m to 40m receiving four square with preamplifiers

The antenna farm has eight feedlines and requires an eight port antenna switch. Two outputs are needed to control the 80m 4SQ. Two outputs are needed to control the receive 4SQ and one sequencer output is needed for controlling the receive preamplifier.   Six additional outputs are used for controlling a six-band bandpass filter. The Station Master is configured to support these requirements.

Outputs tab

These feedlines are connected to the antenna switch:
> Port 1 – Vertical
> Port 2 – 80m Dipole
> Port 3 – 80m 4SQ
> Port 4 – 40m Inverted V
> Port 5 – 40m 3el Yagi
> Port 6 – SteppIR
> Port 7 – 12m 5el Yagi
> Port 8 – Receiving 4SQ

The antenna switch requires 12V to select an antenna (common ground). The 80m dipole requires a source of 12V to select 75m/SSB and the receiving 4SQ requires +12V to enable the preamplifier. These functions will be controlled by Port A – configured as voltage sourcing using internal power (default INT/SRC jumpers).

> A1 – A8: microHAM Ten Switch
> A9:   80m dipole relay control
> A10:   receive 4SQ preamp control

Band Pass filters (ICE419) requires switch closure to ground and both 4SQ antennas requires +12V to switch. For proper BPF operation the jumpers of PORT B must be set to INT/SNK (outputs B1-B6). Outputs B7-B10 have isolated contact outputs; pins 6,7,8,9 are connected together and +12V is applied.

> B1 – B6: ICE419 filter selection
> B7, B8:   80m 4SQ
> B9, B10: receive 4SQ

The outputs are configured on the Outputs tab. All three types of output are used.

The ANT class is appropriate for the antenna switch, 80m dipole relay and both 4SQ controls because these outputs must be set to select a specific antenna.

Band pass filters have to be activated when the operating frequency is within selected filter pass band regardless of which antenna is selected. To accomplish this the filters must be controlled with BPF class outputs.

The preamplifier in the receive four square must be turned off during while transmitting and when operating on bands above 40m. To do this, the preamplifer power should be controlled by a SEQ output.

A1	ANT		B1	BPF
A2	ANT		B2	BPF
A3	ANT		B3	BPF
A4	ANT		B4	BPF
A5	ANT		B5	BPF
A6	ANT		B6	BPF
A7	ANT		B7	ANT
A8	ANT		B8	ANT
A9	ANT		B9	ANT
A10	SEQ		B10	ANT

Antennas tab

Once output classes have been determined, specific outputs can be assigned on ANTENNAS TAB.

ANTENNA NAME	LABEL	A1	A2	A3	A4	A5	A6	A7	A8	A9	B7	B8	B9	B10	RX only	SteppIR	ROTATOR	(offset,deg)
Vertical	VERT	✓																
Dipole SSB	DIP		✓					✓										
Dipole CW	DIP		✓															
4SQ-SE	TX SE			✓														
4SQ-SW	TX SW			✓						✓								
4SQ-NW	TX NW			✓					✓									
4SQ-NE	TX NE			✓						✓	✓							
INV Vee	VEE				✓													
Yagi 3el	3-EL					✓											✓	0
SteppIR	StIR						✓									✓	✓	0
Yagi 5el	5-EL							✓									✓	90
RX 4SQ-SW	RX SW								✓						✓			
RX 4SQ-NW	RX NW									✓				✓	✓			
RX 4SQ-NE	RX NE								✓			✓			✓			
RX 4SQ-SE	RX SE									✓			✓	✓	✓			

Serial port function: SteppIR: Yagi ▼   Baud rate: 9600 bps ▼   Address: 00

| Add | Remove | Up | Down | | Get | Store | Load From File | Save To File |

For each antenna assign a name, label and check which output or outputs are active when the antenna is selected.

IMPORTANT: Antennas with multiple options must be defined separately for each option. The 80/75m dipole and both four squares are "multiple option" antennas.

The 80/75m dipole has only one feedline connected to the switch but has a relay which must be turned OFF for the CW part of 80 meters to bypass the matching circuit for SSB. The relay must then be turned on for the antenna to be matched on 75m. For operator the same antenna is used in both parts of the band but for Station Master the dipole looks like two different antennas because the outputs are different. The dipole is defined two times - in both cases A2 is activated to select the proper feedline but A9 is only activated on 75m/SSB to select the matching network.

The same logic is applied for the 80m four square. There is only one feedline but relays are activated in the phasing network to switch the antenna pattern in four directions. Switching is provided by two 12V control lines in BCD code (4 combinations). No matter which direction has been chosen, A3 is always activated to select the proper feedline while B7 and B8 control the direction. The 4SQ is defined four times – once for each direction - with different settings for B7 and B8.

Controls for the receive 4SQ are identical to the 80m 4SQ other that using outputs A8, B9 and B10 instead of A3, B6 and B7.   Because this antenna is receive only and it can not be used for transmitting, all four entries are marked as **RX ONLY** and Station Master will not allow it to be used for transmitting.   In addition, the receive 4SQ includes a preamplifier to compensate for its reduced signal output – the preamplifier must be turned off when transmitting on nearby antennas or when it is not used (operation on other bands). The is accomplished using A10 and will be described in the sequencer section.

Additional settings

The 3el 40m Yagi, 5el 12m Yagi and SteppIR Yagi are located on same tower and their azimuth is controlled by a single rotator connected to Station Master's rotator controller.   The ROTATOR check boxes must be checked for all these three antennas. Because the 3el is turned 90deg counter clockwise and the 5el Yagi is turned 90deg clockwise compared to SteppIR, a -90deg azimuth offset must be set for the 3el Yagi and a +90deg offset set for the 5el Yagi. The SteppIR has no offset. Setting the offsets corrects the azimuth reading on the LCD and for computer control straight.

For advanced SteppIR support from Station Master, the SteppIR controller must be connected to the serial port, the SteppIR box must be checked, the Serial port function must be set for the proper SteppIR model and the correct baud rate must be set.

Virtual Rotators tab

Because the antenna farm contains several antennas with directional pattern but fixed direction for a particular band (the four squares in this example), these antennas can be connected with a Virtual Rotator which makes them into a single rotary beam that can be controlled manually or by logger.

In this example, each 4SQ has been defined as separate Virtual Rotator and because the receiving 4SQ antennas were previously marked RX Only, the RX4SQ virtual rotator was automatically set as RX only. .

The antennas making up each virtual rotator are added one by one and their operating azimuth adjusted based on their location, directional pattern and known performance. The NW azimuth for the 80m 4SQ has been extended slightly (260 – 0 deg) to cover Caribbean and Central America with a single NW beam from central EU.

Antenna Groups tab

In order to take advantage of the automatic receive scan, For use of special advantage of the grouped antennas as automatic receive scan has been created two groups of antennas, one for 160m and second for 80m CW.

The 160m group is intended for use in contest when responses to a CQ can arrive from any direction (local stations are much stronger on vertical), but it is also possible to be called by DX which must be received on the 4SQ. The vertical antenna has been assigned twice at the top of the group to extend the initial receive time on vertical. The same technique can be used for any antenna in group if unequal times are required for the antennas.

The 80m CW group is intended primarily for DX in the NW direction. Again, the receive 4SQ has priority and is doubled because most stations are heard on this antenna. However, when the band is closing the low dipole generates a stronger signal so it is also scanned.

Antenna groups are most useful in receive with split RX/TX configurations.

PA & Sequencer tab

The power amplifier in use is capable of automatic control using Icom CI-V data, has an output that provides confirmation that it is ready for RF and operates with a T/R delay of 10ms unless the frequency has changed and it must retune.

To support this amplifier, the **KEYIN** box has been checked, the PA port CI-V function has been set to generate **TX frequency** at **9600 baud**, simulating Icom radio with **6A** CI-V address.

The **INH**ibit signal is set for a **30ms** delay to provide a small margin of safety and prevent the transceiver from generating any RF during the **SWITCHING DELAY** of the antenna switch which uses relays specified for **26ms** switching times.

Output A10 controls preamplifier power for the receive 4SQ. It is set to **0ms LEAD** time in order to disable the preamplifier any delay. The **TAIL** delay has been set to a safe **20ms** to guarantee that RF power has been removed from the feedline before the preamplifier is turned on.

In order to use power sourced from A10 directly and to insure that the preamplifier will be OFF when not operating on 160, 80 or 40m, the **INVERTED** box is checked for A10.

Bands tab

Once the antenna and sequencer configurations have been established, the frequency relationships can be defined. This is done by creating several bands, primarily based on the operating bandwidth of the antennas.

160 Meters:

The frequency range is 1.820-2.000 MHz with four antennas selections: the vertical for transmit, the receive 4SQ, the previously defined 160m group and the 80m dipole as an "extra" receive only antenna. The PA BCD code is set to 1 even though it is not required. Remote PA and KEYOUT are enabled, the 160 M BPF is selected (B1) and the sequencer output is enabled for the 4SQ preamplifier.

80 Meter CW:

The frequency range is defined as 3.500-3.680 MHz (based on the bandwidth of the dipole) and five antennas are added: the vertical, CW dipole, transmit 4SQ with virtual rotator, receive 4SQ with virtual rotator, and a special 80m group. The PA BCD code has been set to 2, remote PA and KEYOUT are enabled, the 80m BPF output (B2) is selected and the sequencer output (preamplifier power) enabled.

80 Meter SSB:

The frequency range is defined as 3.680-4.000 MHz (to match the dipole with 75m matching network) and four antennas have been added: Vertical, transmit 4SQ with virtual rotator, and receive 4SQ with virtual rotator. The PA BCD code is again set to 2, remote PA and KEYOUT are enabled, the 80m BPF (B2) is selected, and the sequencer output (preamplifier power) enabled.

60 Meters:

The frequency range is defined as 5.330-5.404 MHz and two antennas are selected: the vertical and receive 4SQ with virtual rotator. PA BCD code has been set for 0, remote PA and KEYOUT are **DISABLED**, the BPF outputs are cleared to bypass the BPF, and NOT allowed on 60m, BPF outputs cleared to bypass BPF, and the sequencer output (preamplifier power) enabled.

40 Meters (EU band):

The frequency range is defined as 7.000-7.100 MHz because of SWR on the inverted V and four antennas are added: 3el Yagi, Vertical, receiving 4SQ with virtual rotator and Inverted V. The PA BCD code is set to 3, Remote PA and KEYOUT are enabled, the 40m BPF (B3) is selected, and the sequencer output (preamplifier power) enabled.

40 Meters (US band):

The frequency range is defined as 7.100-7.300 MHz and three antennas are added: 3el Yagi, Vertical, and receiving 4SQ with virtual rotator. The PA BCD code is set to 3, Remote PA and KEYOUT are enabled, the 40m BPF (B3) is selected, and the sequencer output (preamplifier power) enabled.

30 Meters:

The frequency range is defined as 10.100-10.150 MHz and one antenna is added: the vertical. The PA BCD code is set to 4, Remote PA and KEYOUT are **DISABLED**, the BPF outputs are cleared to bypass BPF, and the sequencer output is disabled (RX 4SQ preamplifier OFF all the time).

20 Meters:

The frequency range is defined as 14.000-14.350 MHz and two antennas are added: Vertical and SteppIR. The PA BCD code is set to 5, Remote PA and KEYOUT are enabled, the 20m BPF (B4) is selected, and the sequencer output is disabled (RX 4SQ preamplifier OFF all the time).

17 Meters:

The frequency range is defined as 18.060-18.170 MHz and two antennas are added: Vertical and SteppIR. The PA BCD code is set to 6, Remote PA and KEYOUT are enabled, the BPF outputs are cleared to bypass the BPF, and the sequencer output is disabled (RX 4SQ preamplifier OFF all the time).

15 Meters:

The frequency range is defined as 21.000-21.450 MHz and two antennas are added: Vertical and SteppIR. The PA BCD code is set to 7, Remote PA and KEYOUT are enabled, the 15m BPF (B5) is selected, and the sequencer output is disabled (RX 4SQ preamplifier OFF all the time).

12 Meters:

The frequency range is defined as 24.890-24.990 MHz and three antennas are added: Vertical, SteppIR, and 5el Yagi. The PA BCD code is set to 8, Remote PA and KEYOUT are enabled, the BPF outputs are cleared to bypass the BPF, and the sequencer output is disabled (RX 4SQ preamplifier OFF all the time).

10 Meters:

The frequency range is defined as 28.000-29.700 MHz and two antennas are added: Vertical and SteppIR. The PA BCD code is set to 9, Remote PA and KEYOUT are enabled, the 10m BPF (B6) is selected, and the sequencer output is disabled (RX 4SQ preamplifier OFF all the time).

6 Meters:

The frequency range is defined as 50.000-54.000 MHz with one antenna selection: the SteppIR. The PA BCD code is set to 10, Remote PA and KEYOUT are **DISABLED**, the BPF outputs are cleared to bypass the BPF, and the sequencer output is disabled (RX 4SQ preamplifier OFF all the time).

VHF, UHF and SHF bands are not been defined because antennas for these bands are not available.

After the configuration is complete, settings should be stored to the Station Master and saved to a file. An example file is distributed with the Router release and can be used as a starting place for your configuration by loading "example.uas".

9 – SYSTEM CONSIDERATIONS

Station Master can be used in a with variety of configurations. Your ability to use Station Master's advanced features will be determined entirely by the capability of your station hardware. *micro*HAM have attempted to implement these features in a way that they can be used in most installations. However, some transceivers lack the capacity (e.g., an inhibit input or "early" PTT) to safely use some of the more advanced capabilities.

The application software used with Station Master will be the primary factor in determining the minimum computer configuration needed with Station Master. When used with Windows based contest software like CTWin, N1MM Logger, Win-Test, and WriteLog or Windows based general purpose loggers like DXBase 2007, DXLab Suite, DX4WIN, Logger 32 and others, the *micro*HAM control and interface application "*micro*HAM Router" must run along side the application program. Since both the logging programs and microHAM Router are real-time applications, system performance will be dependent on CPU speed, the amount of available RAM, and any other programs running at the same time.

While *micro*HAM Router will run on slower computers, the minimum tested system is a 1.6 GHz Pentium IV, Windows 2000, 512 MB 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. *micro*HAM 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 *micro*HAM Router, a logging application, Internet connectivity and other accessory programs, the recommended system is at least a 1.6 GHz PC compatible computer with Windows XP Home or higher, 512 MB RAM, CD-ROM, root USB 2.0 port, transceiver with supported control protocol and logging and/or control program.

Station Master can be used in stand-alone mode (without a connected computer or logging software) but a computer running *micro*HAM Router will be required to configure **Station Master** for proper operation.

10 - HARDWARE SPECIFICATIONS

USB: USB 2.0 Full speed, USB 1.1 compatible

Power consumption: USB – less than 100mA
                               Power supply – max.1.8A at +13.8V (max. +16V)

CAT: RxD, TxD – max. 57600 Baud, RTS fixed level output max.1mA
                               Levels: TTL, inverted TTL, open collector bus, RS232

Serial: RS232 levels, RTS fixed level output max.1mA, up to 9600 baud

PA CI-V: open collector bus max.40mA, up to 9600 baud

All relay outputs: 30VDC, 48VAC, max.2A

External PORT A power: max. +24V/1.3A

External PORT B power: max. +24V/1.3A

PS/2 consumption: max. 200mA at +5V

Rotator analog input: 10K ohm, max. +/-12V

Rotator pulse input: active when grounded, max.+24V/5mA

Rotator reference output: 9V, max.20mA

PA Keying output: open collector, max.+45V/800mA

PA Keying input: active when grounded, max.+24V/5mA

PA ON/OFF control: +12V, max.100mA

Dimensions: **W** 230mm (9") x **H** 44mm (1.73") x **D** 160mm (6.3")

Weight: 1.3 kg (1.875 lbs.)

11 - PACKAGE CONTENTS

The product includes STATION MASTER, USB cable, miniDIN 6 to miniDIN 6 cable, RCA to RCA cable, coaxial 2.1mm/5.5mm power plug and CD-ROM containing the microHAM USB Device Router program and documentation.

If the shipment is incomplete, please contact your supplier or 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, *micro*HAM, 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. *micro*HAM 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.

***micro*HAM 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

*micro*HAM, s.r.o. declares that the products:

Product Name: STATION MASTER

Conforms to the following Product Specifications:

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

APPENDIX A – CONNECTORS

PORT A, DB25F

Pin #	Label	Description
1	EXT PWR IN	External power input for PORT A, max. +24V*
2	NC	Not connected
3	NC	Not connected
4	NC	Not connected
5	NC	Not connected
6	NC	Not connected
7	NC	Not connected
8	NC	Not connected
9	NC	Not connected
10	PORT A7	PORT A7 output
11	PORT A8	PORT A8 output
12	PORT A9	PORT A9 output
13	PORT A10	PORT A10 output
14	NC	Not connected
15	NC	Not connected
16	NC	Not connected
17	NC	Not connected
18	EXT PWR GND	Power ground. Connect return of external PORT A common power to this pin.*
19	CONTROL GND	Power ground. Connect control cable shield to this pin.
20	PORT A1	PORT A1 output
21	PORT A2	PORT A2 output
22	PORT A3	PORT A3 output
23	PORT A4	PORT A4 output
24	PORT A5	PORT A5 output
25	PORT A6	PORT A6 output
SHELL	GND	Connected to the system ground and case.

* When using an external power supply, connect the positive terminal to pin 1, the negative terminal to pin 18 and move the Port A jumpers to EXT/SRC.   Never exceed +24V and do not reverse polarity!

PORT B, DB25F

Pin #	Label	Description
1	EXT PWR IN	External power input for PORT B, max. +24V*
2	NC	Not connected
3	NC	Not connected
4	COM	Common output. Output depends on jumpers configuration.
5	NC	Not connected
6	PORT B7-COM	PORT B7 common**
7	PORT B8-COM	PORT B8 common**
8	PORT B9-COM	PORT B9 common**
9	PORT B10-COM	PORT B10 common**
10	PORT B7-NO	PORT B7 output, Normally Open
11	PORT B8-NO	PORT B8 output, Normally Open
12	PORT B9-NO	PORT B9 output, Normally Open
13	PORT B10-NO	PORT B10 output, Normally Open
14	NC	Not connected
15	NC	Not connected
16	NC	Not connected
17	NC	Not connected
18	EXT PWR GND	Power ground. Connect return of external PORT B common power to this pin.*
19	CONTROL GND	Power ground. Connect control cable shield to this pin.
20	PORT B1	PORT B1 output
21	PORT B2	PORT B2 output
22	PORT B3	PORT B3 output
23	PORT B4	PORT B4 output
24	PORT B5	PORT B5 output
25	PORT B6	PORT B6 output
SHELL	GND	Connected to the system ground and case.

* When using an external power supply, connect the positive terminal to pin 1, the negative terminal to pin 18 and move the Port B jumpers to EXT/SRC.   Never exceed +24V and do not reverse polarity!

** If PORTs 7-10 need to share a common with PORTs 1-6, connect this pin to pin 4.

PA, DB15F

Pin #	Label	Description
1	BAND DATA A	TTL level BCD band data output bit 0
2	BAND DATA B	TTL level BCD band data output bit 1
3	BAND DATA C	TTL level BCD band data output bit 2
4	BAND DATA D	TTL level BCD band data output bit 3
5	CI-V	CI-V port
6	KEYIN	Keying Input, connect to the PA KEY Output
7	KEYOUT	Keying Output, max.+45V/800mA
8	+12 OUT	+12V output, max.200mA. Output depends on main SM power
9	POWER SW	+12V output, max.100mA. Output for remote PA ON/OFF control
10	NC	Not connected
11	GND	Connected to the system ground and case.
12	GND	Connected to the system ground and case.
13	GND	Connected to the system ground and case.
14	GND	Connected to the system ground and case.
15	GND	Connected to the system ground and case.
SHELL	GND	Connected to the system ground and case.

ROTOR, DB15F

Pin #	Label	Description
1	+12 OUT	+12V output, max.200mA. Output depends on main SM power.
2	CW-NC	Relay output for CW direction, normally closed
3	CW-COM	Relay output for CW direction, common
4	AUX-NO	Relay output for AUX output, normally open
5	CCW-NC	Relay output for CCW direction, normally closed
6	CCW-COM	Relay output for CCW direction, common
7	REF	+9V reference output, max. 20mA (450 ohm)
8	ANALOG GND	Analog return for ANALOG IN input
9	GND	Connected to the system ground and case.
10	CW-NO	Relay output for CW direction, normally open
11	AUX-NC	Relay output for AUX output, normally closed
12	AUX-COM	Relay output for AUX output, common
13	CCW-NO	Relay output for CCW direction, normally open
14	PULSE IN	Discrete input, max.5V/5mA
15	ANALOG IN	Analog input, Rin = 10K ohm, max +/-12V
SHELL	GND	Connected to the system ground and case.

IMPORTANT: The CW, CCW and AUX relays are rated at 24V AC/DC, 3A maximum. If your rotator will exceed these values, use external 12V power relays. Power for these relays can be supplied from pin 1, +12V OUT.

SERIAL, DB9F

Pin #	Label	Description
1	NC	Not connected
2	RXD	RS232 level data input to SM
3	TXD	RS232 level data output from SM
4	NC	Not connected
5	GND	Connected to the system ground and case.
6	NC	Not connected
7	RTS	+12V output, max.1mA. Connected to input power via 10K ohm resistor.
8	NC	Not connected
9	NC	Not connected
SHELL	GND	Connected to the system ground and case.

iLINK, MINIDIN6

Pin #	Label	Description
1	DATA	TTL iLINK DATA line
2	IC	Internally connected to pin.2 of another iLINK jack
3	GND	Connected to the system ground and case.
4	+5V OUT	+5V output, max.200mA.
5	CLOCK	TTL iLINK CLOCK line
6	IC	Internally connected to pin.6 of another iLINK jack
SHELL	GND	Connected to the system ground and case.

PS/2, MINIDIN6

Pin #	Label	Description
1	DATA	TTL PS/2 DATA line
2	RESPAD	Input for resistive keypad, max.+5V/1mA
3	GND	Connected to the system ground and case.
4	+5V OUT	+5V output, max.200mA.
5	CLOCK	TTL PS/2 CLOCK line
6	NC	Not connected
SHELL	GND	Connected to the system ground and case.

CAT, 4 pole 3.5mm phone jack

Pin #	Label	Description
TIP	TXD	CAT DATA output from SM
RING1	RXD	CAT DATA input to SM
RING2	RTS	+12V output, max.1mA. Connected to input power via 10K ohm resistor.
SLEEVE	GND	Connected to the system ground and case.

IMPORTANT: Don't forget to configure the CAT jumper matrix as required for your transceiver.

APPENDIX B – Tracking

NOTE: Tracking is experimental code for linking the transceiver frequency to a tracking receiver. Mode linking and bidirectional frequency tracking are not currently supported.

microHAM will be expanding features and adding support for additional radios in the future. The initial version has been tested with Perseus SDR only.
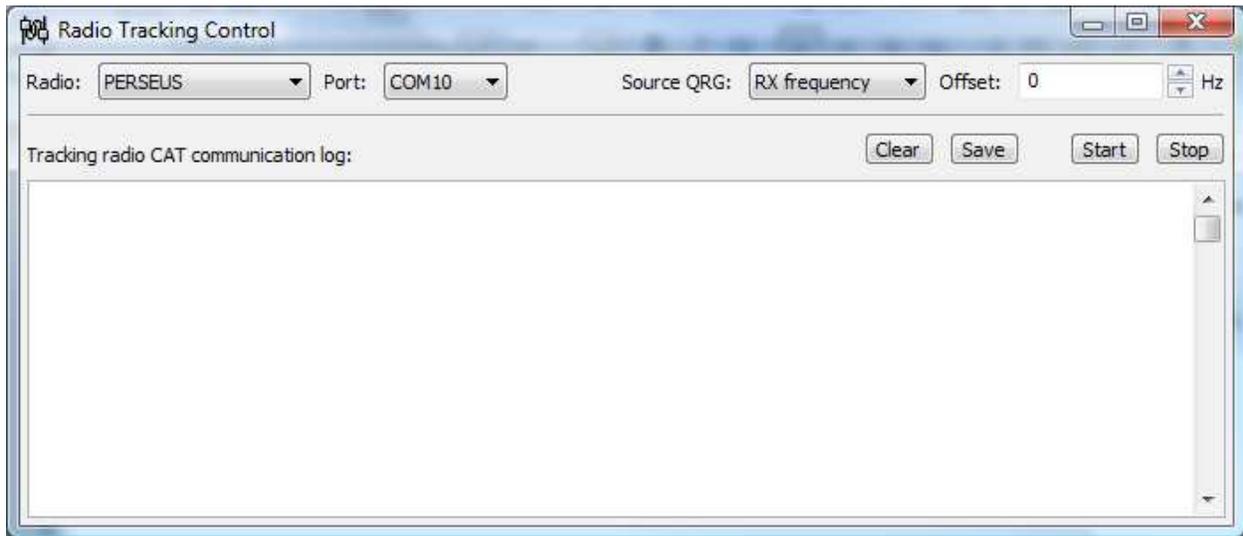
PERSEUS

Radio: PERSEUS

Port: COM10

Source QRG: Defines which frequency will be used for SDR tracking

Offset: Specifies frequency offset from tracking frequency send to SDR for tracking.

NOTE: COM10 is the default COM port for PERSEUS can only be changed in the Windows registry (refer to the Perseus manual). Make sure that the COM10 is not used by any other device in PC. Then create virtual COM10 in Router and do not use this COM port number for any purpose other than tracking.