

# RAT-Master Controller User's Manual

( [www.hamation.com](http://www.hamation.com) )



Front and Rear Views of the RatMaster controller.

## Features

- Jumper free configuration
- Intuitive configuration software
- RS-232, TTL and CI-V interfaces
- Automatically generates Icom CI-V data stream from non-Icom radios
- Configurable band limits
- Built-in USB interface
- Set default antenna per band
- Field upgradeable firmware
- Anodized aluminum case
- Laser engraved panels

## Installation

### Before you begin

Installing and configuring the Integrated Controller is a simple process which involve connecting the unit to your computer and the ShackLAN network, setting the radio configuration and then connecting the decoder to your radio and any logging software. Optionally, you can route the amplifier PTT line through the controller for amplifier protection if no antenna is connected. Please **DO NOT CONNECT YOUR RADIO to the unit until after the radio configuration has been done**. You must configure the decoder before connecting the radio. Due to the different voltages used by the various radio manufacturers your radio may be very unhappy if the proper interface is not selected before connecting the radio. Installation steps are listed below.



Rear view of the newer version of the RatMaster.

## Network and Power Connections

All units in the ShackLAN product line use the same connector and pinouts for their network connections. Older units, as well as antenna switches and controllers, network connections are made to a 4-pin removable terminal block using the diagram below. Only a single connection to a power source is required as power is distributed throughout the network. A good, inexpensive source for the network cable is standard CAT-5 network cable. Stranded cable is recommended as solid wire is prone to breaking under the screw connectors. A good source for stranded CAT-5 cable is Monoprice. Parallel three wires for the +12 V DC and three other wires for the Ground connections. Be sure you use one of the twisted pairs for the data connections. Only a single wire is needed for each of the data lines as they carry no current. When using CAT-5 cable, be sure to use the same parallel combinations on each unit in the system.

Newer ShackLAN products use a 6-pin "RJ-12" connector, also known as a modular telephone connector, for interconnecting the ShackLAN units. Connections from the antenna switch controllers to the antenna switch still use the 4-pin screw terminal connector. Many units have a pair of connectors to facilitate "daisy-chaining" of the units. Each unit is supplied with a 36 inch (91.44 cm) cable. Be aware that 6-conductor modular telephone cables are rare in your local variety store. Some may have 4 conductors and can be used if necessary but many of these "cheap" cables have only 2-conductors which will not work.

***Only one ShackLAN device should be connected to your power supply*** as power is distributed over the network. For early units with only the green 4-pin connector, connect the power to the +12 V DC and GND pins on only one unit. Later units have a separate power jack and a modular network connector. The power jack on the later units is a standard 2.1mm connector with center pin positive. Voltage should be between 12 V DC and 14 V DC. Do not exceed 15 V DC as each unit has spike and surge suppression that clamps at 16 volts. Current requirements depend on how many devices are on the network but supply of 1 amp is adequate for most systems. Those with multiple antenna switches should have at least 500 mA for each switch. A 36 inch (91.44 cm) power cable is supplied with each unit. The wire with the white tracer is positive and the solid black wire is ground.

## USB Connector

The USB connector is used to transfer data to and from the radio to your computer using a standard USB cable. It is also used to update the firmware. The USB driver should automatically install itself. If it does not, drivers can be downloaded here. At this time you should power up the controller and the LED test will light each LED in sequence. You are now ready to configure your decoder.

## Band Decoder and Integrated Controller Radio Configuration

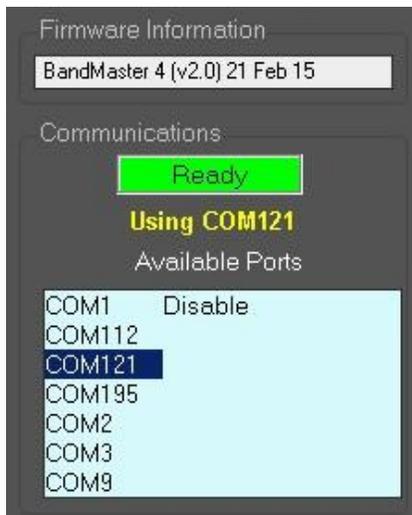
All ShackLAN compatible decoders and integrated controllers use the same [ShackLAN Band Decoder Configuration software](#) as well as a common radio configuration process. The software is a stand-alone EXE file and may be run from a CD or any location on a hard drive. No installation is required.

## Step 1 - Preparing for Configuration

First apply power to the unit and unplug the USB cable from the decoder/controller if it is connected. Now run the configuration software to begin the configuration process.

## Step 2 - Establish USB Connection

Now connect the USB cable between the decoder and computer. Your computer should install a new virtual COM port and add it to the list in the software. If your computer does not load the USB driver automatically you can get it from the link on the [Downloads page](#) and manually install it. Select the newly installed COM port and the Communications Status Bar should turn green and indicate Ready. The current product and firmware information should also be displayed. You are now ready to configure the decoder to match your radio.



Establishing USB connection

## Step 3 - Configure the Radio Interface

Select your radio model from the drop-down list. If you wish to use the band data outputs from either a Yaesu radio or Elecraft K3 select Band Data as the radio model. Newer Yaesu models introduced since the FT-2000 all use the same protocol so select FT-2000 as the model. The Elecraft K2 and K3 use the Kenwood protocol. The default baud rate and interface type will be automatically selected for that radio model. If these are not correct you may change them after selecting the radio model.

If you are using an Icom radio you must also enter the CI-V address. You can find this number in the radio manual or from the radio's menus. Enter only two characters for the address. Do not include the 'h' that is displayed on the radio menu. Valid characters are 0 thru 9 and A thru F.

When using more than one radio on the ShackLAN network you must to set the Radio ID accordingly. **Each radio MUST have a different Radio ID or the antenna switches and relay controllers will not work correctly.**

The image shows a configuration window titled "Radio". It contains the following fields and options:

- Model: Icom (dropdown menu)
- Icom Addr: 50 (text input)
- Baud Rate: 9600 (dropdown menu)
- Interface: CI-V (dropdown menu)
- Radio ID: Radio 1 (dropdown menu)
- Disable Polling
- Enable Multi-Select (Int Cntrl)
- Set Radio (button)

### Configuring the radio interface

#### Step 4 - Disable Polling Option

This option will prevent the decoder from polling the radio (asking the radio for data). You must have logging or radio control software connected to the decoder if polling is disabled or no data will be sent by the radio to the decoder and no bands will be selected. This option is used primarily for Icom radios. The Icom CI/V system uses a bi-directional bus to send and receive data. It is possible for multiple devices to send data at the same time thus creating a data collision. Unfortunately, the CI/V protocol has no facility to detect corrupted data (Checksum or CRC) and these collisions may result in occasional errors in the decoded band. If you see this happened enable this option. This option has no effect when using Band Data from the radio.

#### Step 5 - Enable Multi-Select Option

The Multi-Select option applies only to the Integrated Controller for the 8-Pak series of antenna switches. When enabled, it allows you to select multiple antennas at the same time. Most users will leave this option disabled.

#### Step 6 - Save the Configuration

When finished, click on the Set Radio button. The Communication Status indicator will show Updating and return to Ready when complete. You may now connect your radio to the decoder and verify that the proper bands are being selected. This completes the configuration process for most users. If you wish to enter custom band segments or have more than one antenna on a band continue to the next steps.

**NOTE:** If something is not working correctly, click on the Set Defaults button and try configuring the radio settings again.

#### Step 7 - Default Antennas

All ShackLAN decoders can control ShackLAN equipped antenna switches (2x8 and 4x8) as well as the hardwired Six-Pak and Rat-Pak switch controllers. Select your antenna switch in the Switch Type box. NOTE: This setting is only used to set the antenna selection limits in the software and is not saved in the decoder.

Band Configuration		
	Frequency Limits (KHz)	Default Antenna
160M	1 to 2750	1
80M	2751 to 3750	1
75M	3751 to 5000	1
60M	5001 to 6000	1
40M	6001 to 8500	1
30M	8501 to 12000	1
20M	12001 to 16000	1
17M	16001 to 19900	1
15M	19901 to 23000	1
12M	23001 to 26000	1
10M	26001 to 40000	1
6M	40001 to 125000	1
	RX Antenna	1
Switch Type		Set
<input type="radio"/> 8-Pak (2x8) <input checked="" type="radio"/> 6-Pak/Rat-Pak		

Default Antennas Dialog window

### Optional for 2x8Pak and 4x8Pak switches

The 8-Pak 2x8 and 4x8 antenna switches are controlled via the ShackLAN network which uses a virtual antenna system that provides up to 8 antenna selections per band. These default antenna selections are only used when the ShackLAN Control Center software is not running. Most users of these switches should set all the default antennas to #1. **Please note that this selects virtual antenna #1 for that band and does not select the physical antenna connected to port #1 on the switch.** Only if you have multiple antennas for a band should this be changed to a value other than #1. For example, you have 4 antennas for 20M and you wish the 20M #3 antenna to be the default you would set the default selection to #3. Also note that these defaults only apply when the ShackLAN Control Center is not running. Click on the Set button to write your selections to the decoder.

### Required for 6-Pak and RatPak switches

The 6-Pak and Rat-Pak switches are hardwired and antennas are directly selected by the decoder or switch controller. For these switches the default antenna selections correspond directly to the antenna selected on the switch. The antenna selection for unused bands may set to #0 which will result in no antenna selected for that band. (Not recommended). Click on the Set button to write your selections to the switch.

### Step 8 - Radio configuration complete

This completes the decoder configuration process except for the Bandmaster IV-XR and you can proceed to the next section, Band Decoder Operation. For the Bandmaser IV-XR you are now ready to configure the relay outputs.

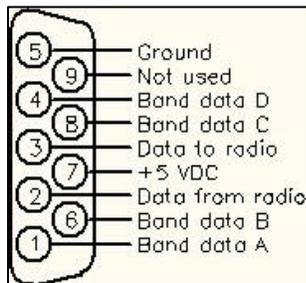
**WARNING:** Proceed with the following connections *after* you have completed the configuration process.

## CI/V Connector

This connector is used to interface to Icom radios. It uses the standard 1/8" phone plug used on all Icom radios for computer control. It should be connected to the REMOTE jack on Icom radios. It is not used for other makes of radios.

## Radio Connector

This connector is used to interface to all radios except Icom. You can use the same cable you would normally connect between the radio and a computer except when using the band data outputs from Yaesu and K3 radios. It is preferred that you use the RS-232 data from the radio and not the band data outputs otherwise there will be reduced functionality. If you still wish to use the band data outputs, you will need to make your own interface cable or purchase a custom cable. Band data signals are labeled A, B, C, D in most radio manuals but may be designated as 1, 2, 3, 4 or 1, 2, 4, 8. Pinouts for the radio connector are shown in the diagram to the right. Consult your radio manual for pinouts on the radio connector.



## Amplifier PTT

The IC-8 Integrated Controller has a built-in amplifier protection system that opens the PTT path between the radio and amplifier when no antennas are connected. This system is automatic and no configuration is required. All that is required is connect a cable from the IN connector to the amplifier keying output on the radio and another cable from the OUT connector to the PTT input on the amplifier. The protection system uses a relay contact so there is no worry about keying voltage, current, etc.

## Band Decoder / Integrated Controller Operation

Once the decoder has been configured it is mostly a set and forget device. The only operational item you need to remember is all communications with your computer is at 9600 baud. **Always set your logging software for 9600 baud.** If your radio operates at other than 9600 baud the speed conversion is done automatically in the decoder. Nothing else needs to be done and you now have automatic antenna switching.

**IMPORTANT NOTE:** If you are using the USB port on the decoder for radio control and you want to use the ShackLAN Control Center software for antenna switching you cannot use the USB on the decoder for both applications at the same time. You must add a second USB connection for the Control Center to one of our switch controllers or the ShackLAN <--> USB interface.