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Bandmaster IV Universal Band Decoder



Using USB (RS232) or band data (BCD) information, the Bandmaster IV converts that frequency/band data to allow meaningful automated control of your station that incorporates Array Solutions / Hamation devices.

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Introduction

The **Bandmaster IV** universal band decoder is a highly integrated unit that not only decodes band information using **YAESU** "band data" (note 1), but can sense band information for all bands from 160M through 6M, including 160M, separate 80M and 75M, 60M, WARC bands and 6M by monitoring **CAT** (note 2) data going to and from the radio. The **Bandmaster IV** also contains all circuitry for level conversion thus eliminating the need for a separate **CAT** radio interface (note 3).

It supports radios from **ICOM**, **KENWOOD**, **YAESU** as well as other radios like the Elecraft **K3** or **TENTEC ORION** using CAT protocols from these manufacturers (note 4). You can even use the decoder as a stand-alone unit where it will monitor the **CAT** commands, **YAESU** "band data" (note 1) or **ICOM CI-V** data from the radio and automatically switch to the band being used at that time by the radio and this without any computers attached to the **Bandmaster III** or the radio! Or it can be connected to your computer and used with your favorite logging or radio control program as your CAT interface or level converter, thus replacing your existing converter (note 3) and antenna selector.

Using the **Bandmaster III** software you will also have the ability to configure the radio interface and set the frequency limits for each band, thus providing even a great deal more flexibility.

Note 1: **YAESU** BCD Band Data information does not support 75M and 60M.

Note 2: **CAT** = **C**omputer **A**ided **T**ransceiver, CAT is used to control your radio via computer based software, these are often stand alone software or can be integrated into logging software and/or satellite control software.

Note 3: **ICOM** CT-17 or **YAESU** FIF-232 or the **KENWOOD** IF10a/IF-232C.

Note 4: The **K2** uses **KENWOOD** protocol and some of the **TENTEC** emulates an **ICOM** IC-735, the K3 produces Yaesu Band-data.

1 Physical description

The **Bandmaster IV** is a fairly simple device. The front panel has power, network, and radio activity LEDs and 12 LEDs indicating the currently selected band. The back of the **Bandmaster IV** has five connectors (figure 1 below) used for the various connections;

1. The USB connector is used to connect the **Bandmaster IV** to your computer.
2. The CI-V connector is a 1/8" phone jack used for Icom radios. When using any radio type except Icom this connector will transmit a CI-V frequency data stream to allow automatic band switching of Icom amplifiers (notable exception: The PW-1 will not work) and other Icom accessories with non-Icom radios.
3. The Radio connector is a 9-pin D-sub male connector used to connect the **Bandmaster IV** to your radio (RS-232, TTL, BCD Band Data, etc).
4. The network connector (RJ14) is used to connect to the Hamation 4-Wire control network. Adapters to the larger, 4-wire "green" connectors are available.



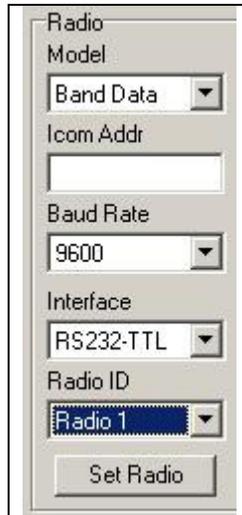
Figure 1 - Rear View
(Showing a K3BM [Elecraft K3 to BandMaster] cable and an RJ-14 network cable connected)

2 Bandmaster III Hardware Configuration

In this section we will look at configuring the **Bandmaster IV** hardware.

The unit must be configured via the **Bandmaster** software.

Band Data: Yaesu / Elecraft Band Data users will configure the Bandmaster III for “Band Data” as the Radio Model as shown in the following image (i.e.; Band Data should be chosen instead of the radio model):



The image shows a configuration dialog box for the Bandmaster software. It contains the following fields and controls:

- Radio Model:** A dropdown menu with "Band Data" selected.
- Icom Addr:** An empty text input field.
- Baud Rate:** A dropdown menu with "9600" selected.
- Interface:** A dropdown menu with "RS232-TTL" selected.
- Radio ID:** A dropdown menu with "Radio 1" selected.
- Set Radio:** A button at the bottom of the dialog.

3 Connections and cable configurations

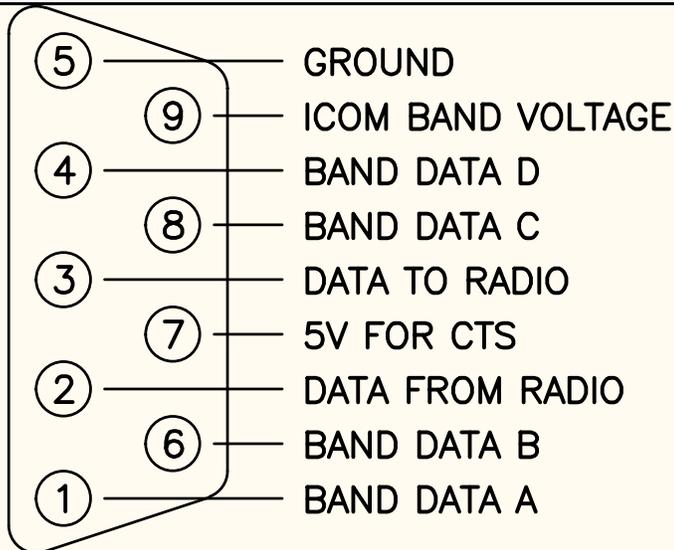
Using the **Bandmaster IV** via the **CAT** interface by far gives you the most out of your **Bandmaster IV**. But if for different reasons you cannot, the **Bandmaster IV** gives you the flexibility of monitoring **YAESU BCD "band data"** from the radio. In this section we will look at different ways of connecting your **Bandmaster IV** and how to make the cables to connect your radio to the decoder.

3.1 USB interface

A computer is not required for operation of the **Bandmaster IV** but the decoder is compatible with most logging/control software. Connecting the **Bandmaster IV** to a computer increases its flexibility. To do so, simply connect a standard USB cable between the **Bandmaster IV** USB connector and a USB port on your computer. The USB interface in the **Bandmaster IV** emulates a standard FTDI driver COM port and you must configure the radio control in your logging software to use this virtual COM port and set the baud rate to 9600 regardless of the radio baud rate. Any required baud rate conversions are done automatically in the decoder. No other special settings are required as the **Bandmaster IV** is transparent to the logging/control software.

3.2 Radio interface

The Radio connector on the back of the **Bandmaster IV** is used to interface the decoder to the radio, thus giving the possibility of the **Bandmaster IV** to be automatically controlled by the radio. The Radio connector is also used as the output of the computer radio interface toward the radio when using the **Bandmaster IV** as your computer interface.



VIEW FROM REAR
OF DECODER

Figure 5: Radio connector pinouts

3.2.1 ICOM CI-V

To make an **ICOM CI-V** connection to the **Bandmaster IV**, simply connect a cable with 1/8" phone plugs on each end between the Remote jack on the radio and the CI-V jack on the decoder.

When the **Bandmaster IV** is connected to an **ICOM** radio via a **CI-V** connection it replaces the functions of an ICOM CT-17 since the **Bandmaster IV** contains all the required interface circuitry. The **Bandmaster IV** then monitors all **CI-V** data from the radio for frequency or band changes and selects the appropriate band. The **Bandmaster IV** can be used autonomously without any computer attached. In this case, the radio still sends out commands indicating the frequency whenever you turn the VFO knob or change bands.

3.2.2 RS-232 connections

Manufacturers using direct RS232c DB9 connections can be attached to the **Bandmaster** via the RADIO connector and a specially designed cable.

3.2.3 TTL connections

Some older radios, such as Yaesu FT840 and FT890, use TTL signal levels (0-5V) instead of the standard bipolar RS-232 voltages. Both types of interfaces are supported by the **Bandmaster IV**.

Note: The pin out of the connector at the radio end may vary, check your radio reference manual for proper hook up.

RADIO	pin out
Pin 2	Send Data
Pin 3	Receive Data
Pin 5	CTS (Optional)
Pin 7	Ground

Table 2: RS232 cable configuration for Radio connector

3.2.4 YAESU BCD band selector

YAESU also offers BCD band data outputs on most models that can be used to control external devices. The **Bandmaster III** can, via the Radio connector and a specially designed cable, decode this information. The pins used on the Radio connector for this are;

Bandmaster	Radio pin out
Pin 1	Band Data A
Pin 6	Band Data B
Pin 8	Band Data C
Pin 4	Band Data D

Table 4: YAESU BCD input connections on the RADIO connector

Table 5 below shows the **YAESU** band data selection in BCD mode, note that in this mode 75M and 60M are not supported. This means that when you select 60m with your radio, the BandMaster IV will not be receiving any band data – so the antenna selected from the previous band will remain until the band master “times out”. If you have a K3, you may want to remove the 60m band from your normal band up and band down selections in order to avoid being on the wrong antenna when you go to 60m.

Band	Code
160m	0001
80m	0010
40m	0011
30m	0100
20m	0101
17m	0110
15m	0111
12m	1000
10m	1001
6m	1010

Table 5; **YAESU** BCD band selection.

4 Hooking up your Bandmaster IV

- 1 Verify your radio configuration as per your manufacturer's reference manual.
- 2 Configure the **Bandmaster IV** according to your radio as per section 2.
- 3 Make or obtain a proper cable for your radio as per section 3.
- 4 Connect your **Bandmaster IV** to your radio using the Radio connector (DB9M) according to the connection option you selected in section 3.2.
- 5 Connect your **Bandmaster IV** to your computer using the USB connector using a standard USB cable.
- 6 Connect **Bandmaster IV** to the 4-wire network for control of devices such as 8-Pak, FilterMax, Bandpasser, etc.
- 7 Connect the 12 Volt DC power to either the coaxial (2.1mm) jack or via the 4-wire network connector on the **Bandmaster IV**.
- 8 You should now be operational.

5 Operations

Once your radio is cabled correctly, apply power to the **Bandmaster IV**. The Bandmaster IV will go through a self-test procedure every time you power it up. When it completes the self-test, you can begin to verify that it is working properly. As you switch bands on your radio or logging/control software, the **Bandmaster** will switch to your band of choice within .25 to .5 seconds. This delay ignores transients and false signals from the radio which can cause unwanted problems.

If using computer logging/control programs, the application should be configured to the computer emulated COM port where the **Bandmaster IV** is connected and **be sure the radio baud rate is set to 9600**. The Logging/control programs will use the **Bandmaster IV** as the **CAT** level converter interface thus making the **Bandmaster IV** transparent to the application.

*Note: you can not run the **Bandmaster** configuration application at the same time as a logging/control program because you can not have two applications accessing the same serial port. Thus, make certain that your **Bandmaster IV** configuration application is closed *before* running any other application using your **Bandmaster IV**.*

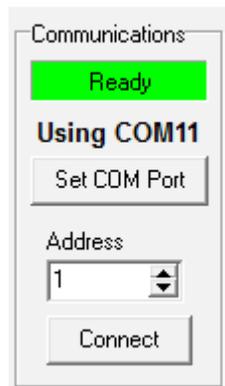
6 Bandmaster Configuration Software

The **Bandmaster** also includes a software utility that can be used to customize the band segments, set the radio type, interface type, baud rate and radio number.

Run the software utility and select the proper COM port. You may now customize the band segments by clicking on the band you wish to change. The radio configuration is set by selecting the desired entries in the radio fields. Click on the Set button to save your changes to the Bandmaster III.

Establish Communications

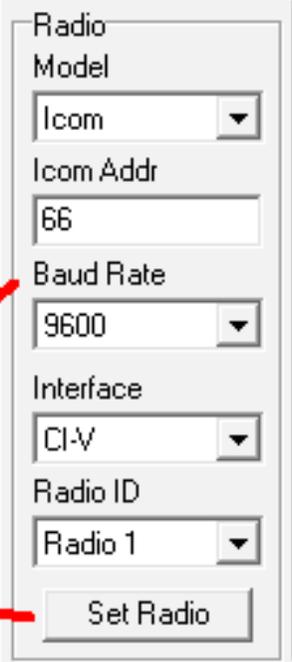
It is recommended that you unplug the USB cable from the decoder before running the configuration software. This makes it a simple process to identify which COM port the USB driver assigns to the decoder. Apply power to the decoder and run the configuration software. Click on the Set COM Port button to open the Com Ports window. Now plug the USB cable into the decoder and the assigned COM port should appear in the COM Port block. If it does not, you may click on the Manual button and enter the port number. Click on the appropriate port to select it and then click on the OK button. Select the 4-wire network address of the decoder. This is #1 for most users. Now click on the Connect button. If successful, the current configuration will be loaded and the Communicatinos indicator will show Ready. You are now ready to begin the configuration process.



Radio Configuration

Select your radio model* from the drop-down list and the default baud rate and interface type will be automatically selected. If these are not correct you may change them after selecting the radio model. If you are using an Icom radio you must enter the CI-V address also. You can find this number in the radio manual or from the radio's menus. When using more than one radio on the 4-Wire network you will need to set the Radio ID accordingly. When finished, click on the Set Radio button. The link 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 will complete 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 you are using band data, select **Band Data** as your radio model.



The image shows a 'Radio Configuration' dialog box with the following fields: 'Radio Model' (dropdown menu showing 'Icom'), 'Icom Addr' (text box with '66'), 'Baud Rate' (dropdown menu showing '9600'), 'Interface' (dropdown menu showing 'CI-V'), and 'Radio ID' (dropdown menu showing 'Radio 1'). A 'Set Radio' button is at the bottom. A red arrow points from the text 'Radio Options' to the 'Radio Model' dropdown. Another red arrow points from the text 'Click here when finished' to the 'Set Radio' button.

Band Limits (Optional)

For most users the default band segments will work just fine. If you wish to change any of the band segments, such as the border frequency between 80M and 75M, click on the frequencies you wish to change and enter the upper frequency limit when prompted. To change the lower frequency limit you must change the upper frequency of the preceding band. The only limit on how you configure the band segments is they must go in ascending order. The new settings are automatically saved when you enter the new upper frequency.

	Frequency Limits (KHz)
160M	1 to 2499
80M	2500 to 3750
75M	3751 to 5000
60M	5001 to 6000
40M	6001 to 8500
30M	8501 to 12000
20M	12001 to 16000
17M	16001 to 19900
15M	19901 to 23000
12M	23001 to 25500
10M	25501 to 40000
6M	40001 to 125000

Click on frequencies to change segments

