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.

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

Note 2: **CAT** = **Computer Aided Transceiver**, **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):
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.

![Radio connector pinouts](image-url)
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.

<table>
<thead>
<tr>
<th>RADIO</th>
<th>pin out</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pin 2</td>
<td>Send Data</td>
</tr>
<tr>
<td>Pin 3</td>
<td>Receive Data</td>
</tr>
<tr>
<td>Pin 5</td>
<td>CTS (Optional)</td>
</tr>
<tr>
<td>Pin 7</td>
<td>Ground</td>
</tr>
</tbody>
</table>

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:

<table>
<thead>
<tr>
<th>Bandmaster</th>
<th>Radio pin out</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pin 1</td>
<td>Band Data A</td>
</tr>
<tr>
<td>Pin 6</td>
<td>Band Data B</td>
</tr>
<tr>
<td>Pin 8</td>
<td>Band Data C</td>
</tr>
<tr>
<td>Pin 4</td>
<td>Band Data D</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Band</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>160m</td>
<td>0001</td>
</tr>
<tr>
<td>80m</td>
<td>0010</td>
</tr>
<tr>
<td>40m</td>
<td>0011</td>
</tr>
<tr>
<td>30m</td>
<td>0100</td>
</tr>
<tr>
<td>20m</td>
<td>0101</td>
</tr>
<tr>
<td>17m</td>
<td>0110</td>
</tr>
<tr>
<td>15m</td>
<td>0111</td>
</tr>
<tr>
<td>12m</td>
<td>1000</td>
</tr>
<tr>
<td>10m</td>
<td>1001</td>
</tr>
<tr>
<td>6m</td>
<td>1010</td>
</tr>
</tbody>
</table>

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 if 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 Communications 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.

**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.
Default Antennas (Optional *)

* Please note that this option is not available without additional hardware. Please leave ALL of these default antenna settings to “1” unless you are sure you have the additional hardware required to allow selection of other than the default antenna per band as identified in your 8-pak or 4x8-pak switch.

If you have more than one antenna on a band the decoder gives you the ability to select which antenna will be selected by default when the 4-Wire Control Center software is not running. Simply select which antenna you wish as the default for that band. If only a single antenna is available for a band leave the setting at 1. Click on the Set button when finished and the new settings will be stored in the decoder.

This completes the configuration process. You may now close the decoder software and start your logging program and connect to your radio.