

# BCD-10 Automatic Band Decoder User's Manual

**Revision 1.06  
December 2013**

## Specifications

Size 2.3" X 2.6"  
Input logic levels: 0/5V  
Output: 12V-24VDC, Open Collector (grounding), 500ma max  
Logic Power: 12V  
Relay Power 12-24 VDC

## Overview

The BCD-10 decodes the BCD (binary coded decimal) signals from the radio or computer to automatically select antennas, filters, etc.

The input signals are standard 5V TTL/CMOS and are compatible with certain Yaesu® radios and logging programs such as TR and NA. To provide maximum isolation between the radio or computer and the antenna switching system, the inputs are optically isolated from the decode logic and relay drivers and power supply.

The outputs are grounding type open collector. One output will be active, depending on the input signals. Outputs can be wired OR'd to select a single antenna for multiple bands. For example one relay may be used to select your tribander. With two jumpers on the BCD-10, the relay will be activated whenever your radio is set to 10, 15 or 20 meters.

The BCD-10 grounds the selected relay coil. This is known as low side switching. Some antenna and relay switches are designed for high side switching. With high side switching, each relay is grounded, and voltage is applied to the selected relay. You will need to build or buy a converter to use a high side switch. The Unified Microsystems HSD-9 is a transistorized module to perform this function.

## Power

The logic portion of the BCD-10 requires a nominal 12VDC (9.0V-14V). Power for the logic is applied through the pads GND and +12V at J4.

Power for the relays is applied to the pads GND and +VR at J3. This will be typically +12V or +24V, depending on the relays used in your system.

Note that there is a common ground for the logic and relay power. If you are using +12V for your relays, you can power both the relays and logic with the same power supply by installing a wire in jumper G1. The power can then be applied in either the logic or relay power pads at J3 or J4.

## Inputs

The inputs are 5V logic level compatible. This is compatible with Yaesu band outputs, and computer printer ports (LPT). Connect the computer or radio ground to the BCD-10 COMM pin, and the four signals to the inputs A-D located at J2. Input A is the least significant bit, and Input D is the most significant bit.

## Outputs

The output solder pads are located at J1. The outputs are grounding type open collector. They are rated at 50V, 0.5 A. In normal use the voltage will be 24V or less and the current will be less than 200ma, resulting in high reliability.

The standard band definitions are printed next to the output pad. The relay to select a given band is connected to the corresponding band pad. For convenience, relay power pads are available adjacent to the output pads. They are labeled +VR.

**Table 1. Input-Output Logic Table**

<b>D</b>	<b>C</b>	<b>B</b>	<b>A</b>	<b>Logic Value</b>	<b>Active Output</b>
0	0	0	0	0	AUX
0	0	0	1	1	160M
0	0	1	0	2	80M
0	0	1	1	3	40M
0	1	0	0	4	30M
0	1	0	1	5	20M
0	1	1	0	6	17M
0	1	1	1	7	15M
1	0	0	0	8	12M
1	0	0	1	9	10M
1	0	1	0	A	UNDEFINED
1	0	1	1	B	UNDEFINED
1	1	0	0	C	UNDEFINED
1	1	0	1	D	UNDEFINED
1	1	1	0	E	UNDEFINED
1	1	1	1	F	UNDEFINED

0 = 0V, 1 = 5V

Note that input values greater than 9 are undefined. Check your radio or computer program manual to see if these values are used for VHF bands or other purposes.

## Multi-band antenna configuration

Since the outputs are open collector, they can be wired OR'd. This allows using a single antenna selection on multiple bands. There are a series of solder pads next to the output pads. To combine multiple bands, simply jumper the corresponding configuration pads. Any number of bands may be combined. The relay to select a group of bands may be connected to any one of the combined band group pads.

**Table 2. Wiring Input and output definitions**

<b>Name</b>	<b>Type</b>	<b>Definition</b>
COMM (J2)	Input	Decode control signal ground
A (J2)	Input	Decode control signal, binary value 1
B (J2)	Input	Decode control signal, binary value 2
C (J2)	Input	Decode control signal, binary value 4
D (J2)	Input	Decode control signal, binary value 8
GND (J3 & J4)	Ground	Logic and relay power ground
+12V (J4)	Power	Logic power
+VR (J3)	Power	Relay Power
AUX (J1)	Output	Not normally used
160 (J1)	Output	160M band select
800 (J1)	Output	80M band select
40 (J1)	Output	40M band select
30 (J1)	Output	30M band select
20 (J1)	Output	20M band select
17 (J1)	Output	17M band select
15 (J1)	Output	15M band select
12 (J1)	Output	12M band select
10 (J1)	Output	10M band select

Figure 1. shows typical configuration for the BC-10.

### **Testing and Help**

Note that the BCD-10 has open collector outputs. You can't just hook up power and the inputs and measure output voltages with a voltmeter. If you want to test your circuit before connecting the relays, connect a 1K pull up resistor between the output and +12V. You can then check the outputs with a voltmeter or oscilloscope.

If you have questions or need help, email [w9xt@unifiedmicro.com](mailto:w9xt@unifiedmicro.com). Please put "BCD" in the subject line for fastest response.

### **Warranty Information**

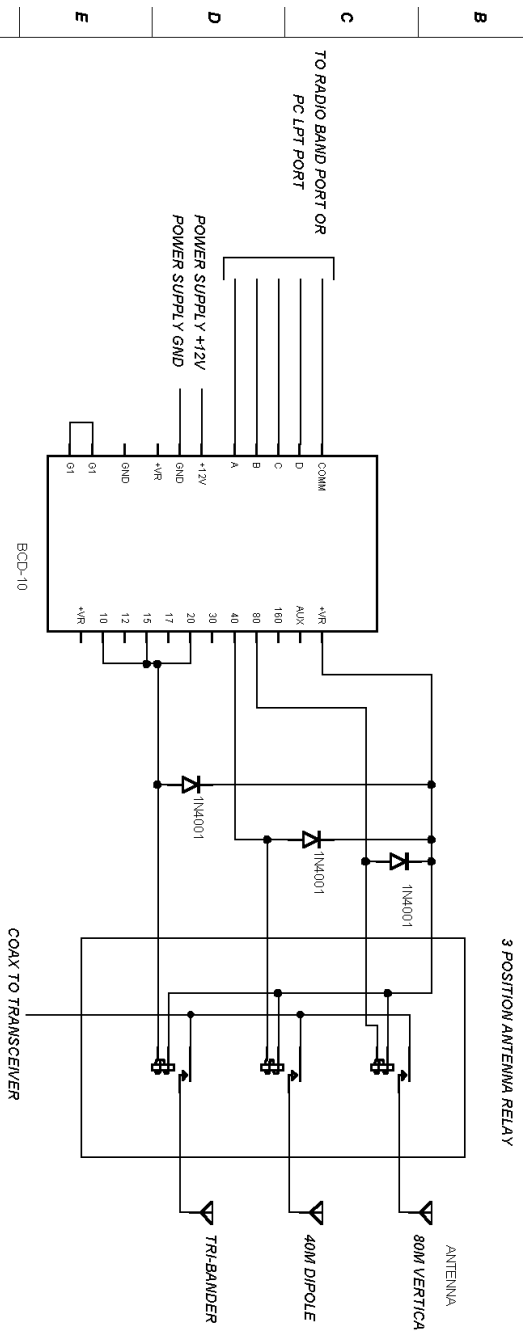
Unified Microsystems warrants the components workmanship of the BCD-10 for a period of 1 year from the date of purchase. A copy of the receipt must be included with any units returned for warranty repairs.

Unified Microsystems will, at its option, repair or replace defective units returned during the warranty period. Unified Microsystems reserves the right to change specifications of its products at any time without notice.

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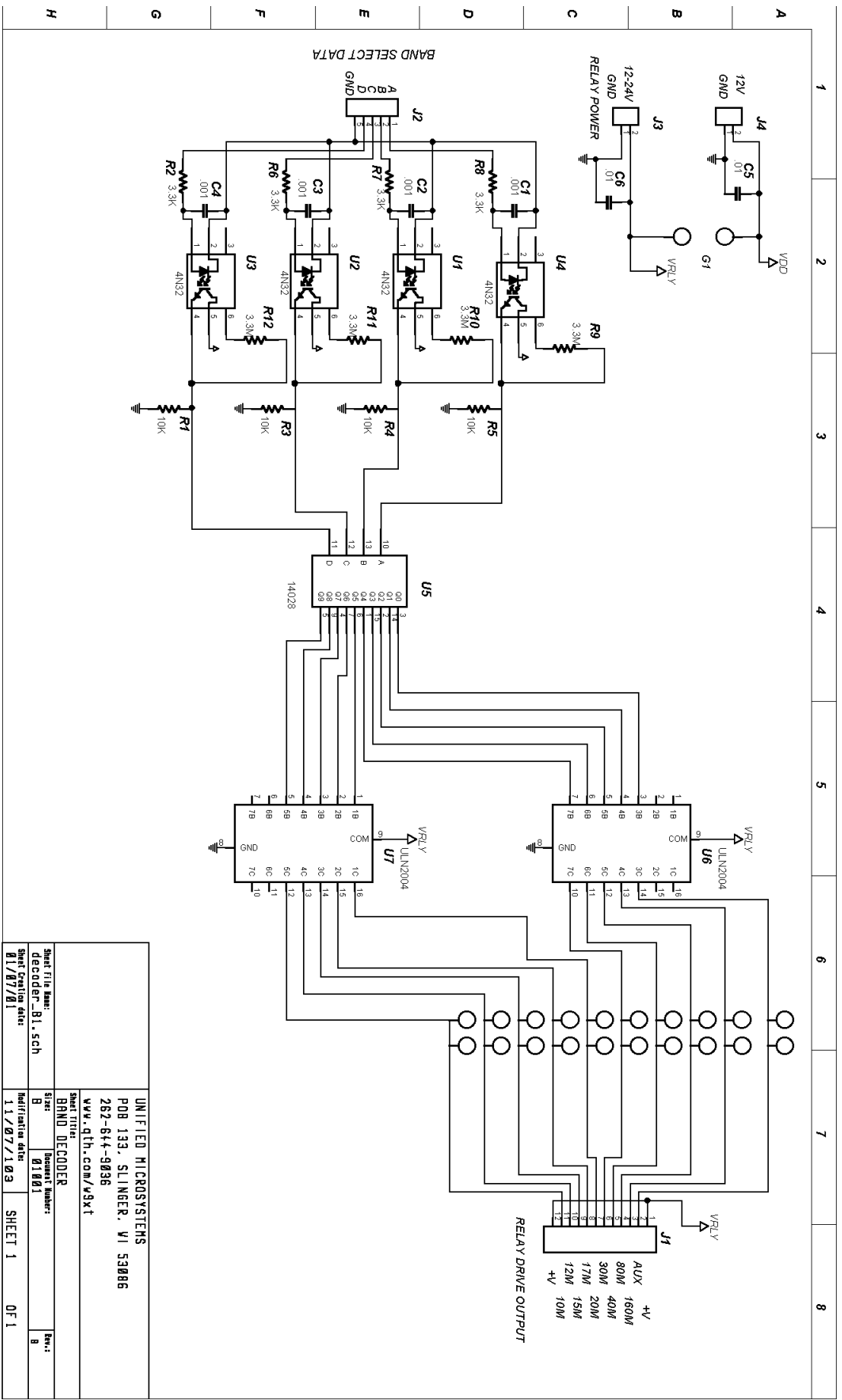
Placing diodes from the relay lines to the positive voltage is recommended to improve reliability. They should be placed as close to the relay coils as possible.



**F** BCD-10 Typical configuration. This system has 3 antennas, a tri-bander, a 40M dipole and an 80M vertical. It uses a three position antenna relay running from a single 12 volt power supply. Jumper G1 is inserted to allow the same 12V to both the BCD-10 PCB and the antenna relay. The outputs for 10, 15 and 20 meters are jumpered together so that the tribander will be selected whenever the radio is on one of these bands. This drawing shows the three outputs connected together off the board, but they can also be jumpered on the pads on the BCD-10 circuit board.

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