DEM BCD-KX3

HF or VHF - Microwave Band Controller

Preliminary: During the design process of our Multiband transverters, it became obvious that special interfacing with transceivers that enable band controlling functions would be required. During the design process of the KX3 interface, it was realized that both a VHF and a HF band controller would be of use to KX3 owners to utilize with other systems. Our DEM BCD is the result of a collaboration between WW2R/G4FRE and Down East Microwave producing a simple to use universal interface nestled within a 2.6" x 1.5" x .875" machined aluminum enclosure that would be a useful addition to anyone's KX3 system operation.

Design Description: The KX3 has two I/O control ports that utilize a 3.5-mm and 2.5-mm jacks. The 2.5-mm jack (ACC2) is multi-tasked with GPIO and the Keyline output depending how it is set in the menu. The GPIO was designed to operate the Elecraft line of transverters sending band data information using the Elecraft proprietary "auxBus protocol" isolating it from the rest of the worlds equipment. Therefore, the ACC2 has no other purpose but to deliver a PTT output signal to key any external equipment as most KX3 users have found out. So, the ACC1 is then chosen for controlling any external device because standard TX and RX serial data will flow between the KX3 and any external device connected such as a computer, band controller, or transverter.

As noted in the provided schematic on the last page, the DEM BDC-KX3 contains two I/O connections. One is connected to ACC2 connection of the KX3. When the Band UP/DOWN button is pressed , the KX3 will send serial data to the BCD-KX3 interface where is it is received by a standard 8 bit CMOS microcontroller (PIC16F688) with programming to convert the data received into standard universal BCD outputs enabling it to control any external BCD devices. The second I/O port on the interface can then be connected to a control device such as a logging computer

through the USB or RS232 type adapter cable supplied with the KX3 to complete the system. This provides to means of band control. When a band change is indicated by the logging program, it signals the KX3 and in turn theKX3 sends the data to the interface to change bands of the BCD device. This also works with the KX3 band UP/DOWN where both the interface and computer will follow the indicated band of the KX3.

The added special feature with this interface is that it has the option to provide BCD information to control the HF bands, 160M - 6M with standard BCD or the VHF bands 2M and up by utilizing a simple jumper connection to ground to enable. This allows us the provide this interface to any KX3 owner to be utilized for various use for any band control situation.

Operation: The device is simple to use. The most complicated part of the set up is deciding what you desire the device to do. After receiving your DEM BCD KX3, it will be set for either HF or VHF and above frequency operation. First make the necessary menu settings in the KX3, (follow the Elecraft manual) and then connect the BCD-KX3 using a standard 3.5 mm connector cable. With that completed, depending on your use (HF or Higher bands) the BCD signals can be tested after a voltage between +7 and +28 VDC is applied to the Red wire of the output cable. The BCD-KX3 interface requires this voltage to operate since it is not supplied through the 3.5mm cables. The rest of the connections and their outputs are listed below.

Wire Color	Signal Name	Notes
RED	**+DC Voltage In**	**+7- +28 VDC**
ORANGE	**Band "A"**	**+5 VDC @ 20mA when active**
YELLOW	**Band "B"**	**+5 VDC @ 20mA when active**
GREEN	**Band "C"**	**+5 VDC @ 20mA when active**
BLUE	**Band "D"**	**+5 VDC @ 20mA when active**
WHITE	**Enable**	**+5 VDC @ 20mA (see note below)**
VIOLET	**Ground**	
BLACK	**Ground**	
SHIELD	**Ground**	**(See Note Below)**

The high signal on the white wire is only active when the KX3 is in the frequency range (VHF or HF) selected for the DEM BCD-KX3. If the BCD is set for HF operation, all five +5VDC outputs will be disabled during VHF and above frequency use. The same applies in reverse for VHF use.

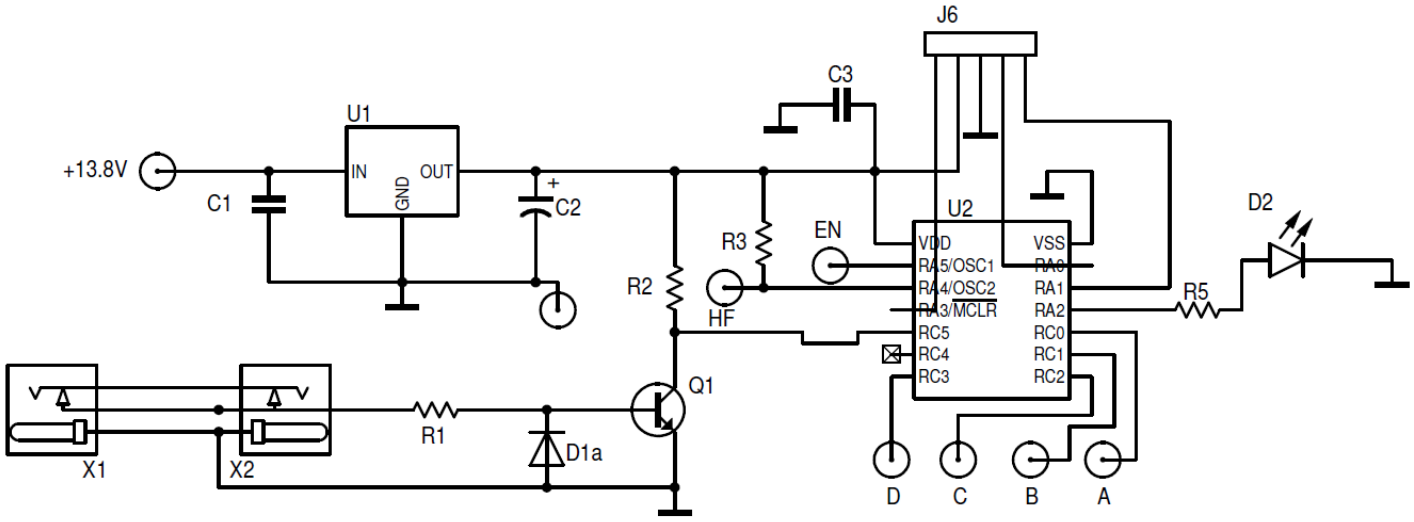
Shielding is most likely not necessary but included with the cable. It does not require connection at the pig tail end if not desired.

The Enable and BAND outputs will come alive when the bands desired for use are selected. Most operational issues occur within the KX3 menu settings. If you are able to control the KX3 with a computer interface through the supplied KX3 serial connection, the BCD-KX3 interface should operate normally. There is a Red LED that will blink with a band change. It may occasionally blink when the VFO is adjusted on the KX3 to indicate updates and serial data changes. Rolling the

VFO to the next band will also change the BDC-KX3 band output. The Serial Data of the KX3 will provide 9 different bands in both the HF and VHF-Microwave range if desired.

The range of operation is determined by placing a jumper to ground from the "HF" via or eliminating the jumper for VHF and above operation. Understand that the same type of signaling of the Band "A" through Band "D" outputs are duplicated in each range setting but will not operate as a single interface. Two units may be “Daisy Chained" through the Data I/O connections to make a complete BCD 160M through 10GHz if desired.

The Basic Schematic is shown below with all connections indicated.



KX3 DECODER

Transverter Output Band Decoder Truth Table

Active Band	D	C	B	A	Comments
None or 6M	0	0	0	0	Standard HF transceiver operation
TRN 1	0	0	0	1	144 MHz
TRN 2	0	0	1	0	222MHz
TRN 3	0	0	1	1	432 MHz
TRN 4	0	1	0	0	902/903 MHz
TRN 5	0	1	0	1	1296 MHz
TRN 6	0	1	1	0	2304MHz
TRN 7	0	1	1	1	3456 or 3400 MHz
TRN 8	1	0	0	0	5760 MHz
TRN 9	1	0	0	1	10368 MHz