



DEM V/U XVERTER -VHF/UHF Multiband Transverter

Preliminary Information Modified Mar 4th, 2020
(Changes have been made to the complete document)

Description:

The DEM V/U XVERTER is a multiband transverter with six separate I/O ports covering up to 6 separate amateur radio bands between 4M and 13 cm. All frequencies convert to/from 28/29 MHz. only. The transmit output level will be guaranteed at 1/2 watt and will exhibit better than a 3 dB noise figure with greater than 15 dB gain on all bands except for being de-rated on 13 cm. The Transverter has a couple of I/O port options. It may be configured with 6 separate bands or have one duplicate band that may be utilized as an AUX RF port for connection to a higher frequency transverter such as our future DEM MICROVERTER . As an option, the AUX port could be configured as a 4M, 13 cm, or any other frequency within the range of the transverter. Other special options will be covered in detail later in this product description.



The transverter measures 9.5" across the front (10.5 with the mounting flange option) 4.75" in depth (including rear connectors) and 1.125" in height (less rubber feet)

Features:

Specific features of the V/U XVERTER are individual RF ports per band that are switched via a BCD control from HF transceivers, BCD interface, Computer control or optional manual switch. With this band switching, there are separate PTT output circuits that follow to control any external auxiliary equipment such as a power amplifier, preamplifier, or other individual band controls required per band in your system. The optional manual band switch will also provide the ability be to place the transverter in a remote location away from the operating position.

The transverter may be operated with or without an external 10 MHz source and will be indicated by the color of the ON/LOC LED. Standard IF drive levels of -20dBm through 10 watts are acceptable but will require a basic configuration for its operating range depending on the transceiver utilized. As found in all DEMI transverters, an adjustable TXIF and RXIF control will be provided to set and "Trim" the desired TX and RX levels of the transverter.



Technically, the V/U XVERTER is comprised of a high level Mixer driven by a multi frequency DIGILO synthesizer produced by Q5 Signal. On the RF side of the mixer are individual SAW filters that are switched into the RF path by quality RF PIN diodes (in conjunction with the frequency change of the



synthesizer) providing a narrow band response covering the weak signal portions of each Amateur band ONLY! Depending on the mode TX or RX, these signals then pass through a wide band TX amplifier or arrive from the RX gain stage. Both stages are connected to the individual low pass filters and antenna ports through a PIN diode TR switch.

The IF side of the mixer has filtering and a optional gain stages on TX for low drive levels along with the option of separate RXIF and TXIF ports for certain transceivers. As mentioned, the transverter may be driven with up to 10 watts and has a safety switch built in to prevent transmitting a high level into the RX path to prevent mixer damage.

Availability / Production:

The DEM V/U XVERTER will be manufactured on a multilayer circuit board and all surface mount devices will be machine assembled. The initial plan is to offer an assembled transverter only configured to the HF transceiver of choice. First production is delayed to the second quarter of 2020. We are attempting to hold the pricing to around \$500 per unit but will not have a fixed price until the first production of circuit boards are in house and tested for all functions. Option types, pricing, and final specifications will also be decided then.

As we get closer to full production, this product description will contain more information to help you make your decision. We will start a contact list of those interested. Please e-mail us to info@downeastmicrowave.com to get your call sign on the list. You will then be notified by the order of the list to verify your specific configuration when a DEM V/U XVERTER is ready for your purchase.

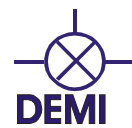
Addendum #1:

Band Decoders and Cabling:

We plan to manufacture Band switching interface cables for major brand transceivers that offer this function through an external connection. You may also decide to band switch utilizing a standard logging programs and we will offer a standard serial com port connection. With some transceivers, complete VHF/UHF and Microwave Band data outputs are not available and therefore we will offer an optional manual band switch and this may be utilized remotely. We will be making a list of directly interfaced transceivers and known logging programs that provide the required band data outputs. We are still researching this so it will be updated as time progresses. And -- because there are those of you that desire a custom interface to your rig, computer or complete system, we will publish a Band Data truth table within this document to help with interfacing.

Operational Bands:

The transverter's bands of operation are limited by the Filtering installed into each position (6 total). Our standard transverter will offer 5 bands, (2M, 1.25cm, 70cm, 33 cm, and 23 cm) with an auxiliary band normally configured for the 2M band. This auxiliary band may be configured for any band already utilized in the transverter. As an example, someone may require to operate their higher frequency microwave transverters with a 70cm IF. The AUX port of the V/U XVERTER can then have the 70cm band operational in the AUX position. Any existing band may be substituted to suit the user's requirements. This will be done at no addition cost except for the 4M band and a special part number will be assigned to eliminate confusion during time of order.



Now, it is understood that in some areas of the world some standard Region 2 bands such as 222 and 900 MHz found in our standard V/U XVERT transverter may not be legally utilized. For this reason, we plan to offer some "operational band options". A standard export version of the V/U XVERT could include the 4M band of operation. This filter would be installed in the AUX position. Then the 222 and 900 MHz positions could be changed to 2M or any other band that would be desirable and become the new AUX position. Also understand that the 13 cm band may be utilized in any of these positions at reduced ratings from its nominal specifications. All of these options along with pricing will have specific part numbers specified after complete final production run testing is complete. A list and description will be produced for easy ordering

Also understand that any position's filter can be bypassed permanently and a custom frequency created with the synthesizer to allow a specialized IF frequency for your higher frequency microwave equipment. Depending on the final frequency, we may or may not be able to provide adequate filtering and you will be expected to provide your own filtering. Also understand that the V/U XVERT operating on a specialized frequency may or may not meet its nominal specifications of output power, gain and Noise figure. Any specialized frequency of operation will be priced at the time of order.

Addendum #2:

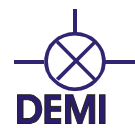
V/U Xverter Control connection (DB 15 HD) pin out and description of connections for the V/U Xverter. The description column is of the standard transverter. Other versions will be specified in this column within the operation manual of the transverter.

Pin #	Input / Output	Description	Maximum Ratings
1	Output 1	144 MHz Band PTT to Ground (P144)	Sink 50ma@ 15 VDC
2	Output 2	432MHz Band PTT to Ground (P432)	Sink 50ma@ 15 VDC
3	Output 3	902/903 MHz Band PTT to Ground (P900)	Sink 50ma@ 15 VDC
4	Output 4	222 MHz Band PTT to Ground (P222)	Sink 50ma@ 15 VDC
5	Output 5	1296 MHz Band PTT to Ground (P1296)	Sink 50ma@ 15 VDC
6	Input	Power On (Enable with positive voltage)	Sink 10 ma@ 1.5-15VDC
7	Input	Band Decoder "B"	Sink 10 ma@ 3 - 5VDC
8	Input	Band Decoder "D"	Sink 10 ma@ 3 - 5VDC
9	Output 6	AUX MHz Band PTT to Ground (PAUX)	Sink 50ma@ 15 VDC
10	Input	Positive 13.8VDC	Sink 1.0 A @ 15 VDC
11	-----	Negative DC Ground	GND
12	Input	TX Enable (PTT to GND)	Source 5VDC @ 10 ma
13	Input	Band Decoder "C"	Sink 10 ma@ 3 - 5VDC
14	Input	Band Decoder "A"	Sink 10 ma@ 3 - 5VDC
15	-----	Negative DC Ground	GND

All ratings are conservative.

PTT Outputs are only active during transmit and on the single band that is active.

Band decoder inputs A-D operate well below their maximums.



Band Decoder Truth Tables for V/U Xverter

Active Band	D	C	B	A	Comments
None	0	0	0	0	Standard HF transceiver operation
144 MHz	0	0	0	1	
222MHz	0	0	1	0	
432 MHz	0	0	1	1	
902/903 MHz	0	1	0	0	
1296 MHz	0	1	0	1	
AUX Band	0	1	1	0	13 cm in Microverter or used for 4M band
AUX Band	0	1	1	1	9 cm in Microverter only
AUX Band	1	0	0	0	5 cm in Microverter only
AUX Band	1	0	0	1	3 cm in Microverter only

NOTE: Table above is the standard configuration. For future integration of the Microverter with the V/U Xverter, the V/U Xverter is required to remain on the AUX frequency band. The AUX band port can be any band between 4 M and 13 cm or a custom frequency within the V/U transverter's range selected as an option. The standard band will be 2M.

If 4M is required in the V/U Xverter then the position for either 222 or 900 MHz will become the AUX frequency port to utilize with the future Microverter or any other higher frequency transverter.

Tentative Model numbers

Model Number	Description
V/U- X	Standard 5 bands, 2M -1296 with 2M as AUX band
V/U- X70	Standard 5 bands, 2M -1296 with 70cm as AUX band
V/U- X23	Standard 5 bands, 2M -1296 with 23 cm as AUX band
V/U- X13	Standard 5 bands, 2M -1296 with 13 as AUX band
V/U- XCUS	Standard 5 bands, 2M -1296 with Custom AUX band frequency
V/U- X4	4M, 2M, 70cm, 23 cm, 13cm with 2M as AUX band
V/U- X470	4M, 2M, 70cm, 23 cm, 13cm with 70cm as AUX band
V/U- X423	4M, 2M, 70cm, 23 cm, 13cm with 23cm as AUX band
V/U- X413	4M, 2M, 70cm, 23 cm, 13cm with 13cm as AUX band
V/U- X4CUS	4M, 2M, 70cm, 23 cm, 13cm with Custom AUX band frequency



Addendum #3:

We will be manufacturing interface cables for the following Transceivers along with providing interfacing details and Pin Outs to manufacture homebrew cabling. If your transceiver is not on the list below, a manual rotary switch in a handheld or mountable enclosure will be provided as the band changing device.

Flex Radio 6000 series
Flex Radio 5000, 3000, and 1500 series
Elecraft K3 and K3S
Elecraft KX3
Elecraft K2 with KRC2 interface
Apache Labs ANAN series with HPSDR

We will also make available standard interfacing cables for COM and LPT ports to use with computer logging programs . This list will grow as more information becomes available.

Addendum #4:

Further testing of complete circuit prototype units has made the following changes to the performance specifications:

1. The maximum output level has been lowered to a guaranteed 1/2 watt output on all bands. This is because of the extensive filtering on the 2M band, and the actual level generated on 23cm. The other bands have gain adjustments to provide equal receive and transmit performance. It is of DEMI's opinion that this level is more than adequate to drive external power amplifiers that exist on the market to provide excellent system performance.
2. An additional receive gain stage has been added to the RX path with the option of the user to bypass it if an external Low Noise amplifier is utilized in the system. This with the adjustable gain control, a optimized level may be preset before any level adjustments are required by the utilized transceiver.
3. Friendly user feedback suggested "Band Indicators" within the transverter. The indication will be provided with LED s and the final mechanical enclosure designed has been modified to provide it. A final product picture will replace the one in this document when available. The prototype unit with these changes is functional but--- not pretty! So please wait for the final product picture.
4. Because of circuit changes and re-tooling of our PCB manufacture, actual product manufacturing will be pushed out to the June/July time frame.
5. We will continue developing transceiver interfacing and provide the information and apparatus for interfacing to external equipment to provide everyone with exactly what they will need to build a complete transverter system and having the provisions that include the future DEM Microverter.