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DEM V/U XVERTER -VHF/UHF Multiband Transverter

Preliminary Information Updated July 29th, 2020
(Changes have been made in the complete document)

Description:

The DEM V/U XVERTER is a multiband transverter with six separate RX/TX ports covering up to 6 separate amateur radio bands between 4M and 23 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.

The standard transverter is configured with 5 separate bands 2M - 23 cm and with an AUX band operating at 2M. This AUX is to be utilized for additional external transverters. BUT-- this port has the option of being set up on any band between 4M and 23cm or if desired, a custom frequency to be utilized with additional microwave transverters. There is also an option to configure the AUX port to function on 13 cm. Then for those countries without 222 and 900 MHz privileges, other substitutions or duplications may be made within the frequency range of the transverter.

Shown operating on Band 6, the AUX position.

The transverter approximately measures 9.5"(24 cm) across the front (10.5 or 26.6 cm with the mounting flange option) and 4.75" (12 cm) in depth (including rear connectors) and 1.125" (2.85 cm) in height (less rubber feet).

Features:

The transverter may be operated with or without an external 10 MHz source and will automatically switched between them and 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 Q5 Signal DIGILO synthesizer. On the RF side of the mixer are individual SAW filters that are switched into the RF path (in conjunction with the frequency change of the synthesizer) by quality RF PIN diodes 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 TX and RX stages are connected with a Transmit/Receive PIN diode switch to individual low pass filtered antenna ports.

The IF side of the mixer has low pass filtering and optional gain stages for low level TX drive and long coax length remote location use on receive. 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 preventing mixer and RX IF stage damage.

View of standard connector layout.

Specific features of the V/U XVERTER are that the individual RF bands (ports shown above) are switched with standard band control data from certain HF transceivers, BCD interfaces, computer controlled programs, or a provided manual switch. When the bands are changed, separate PTT outputs follow to control any external auxiliary equipment such as a power amplifier, preamplifier, antenna switch or other individual band controls required per band in your system. The manual band switch will also provide the ability be to place the transverter in a remote location away from the operating position.

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. Basically, it would be operational on 13 cm with lower TX output and RX gain 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.

Availability / Production:

The DEM V/U XVERTER will be manufactured on a multilayer circuit board and all surface mount devices will be machine assembled. Because of issues related to the world's pandemic, (discussed on our webpage) the intended plan now is to offer an assembled transverter configured to the HF transceiver of choice sometime during the fourth quarter of 2020. Pricing is firmed up a bit more and we should be able to the hold the original pricing of $500 per unit but will not have an exact fixed price with option pricing until the first production of circuit boards are in house and tested for all functions.

This product description will contain more information as we get closer to production but for now, we have a large (for us) contact list of those interested and appreciate everyone that has an interest. And yes, this list is still open if you wish to be on it. Just e-mail us at:

info@downeastmicrowave.com

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.

Now, during what appeared to most as our idle time on this project, we have prototyped the first MICROVERTER and believe that we will be able to produce the envisioned companion 13 cm - 3 cm transverter soon after the production line of the V/U starts. The projected time would be 1st-2nd quarter of 2021 with specifications similar to our standard microwave transverters but all in one enclosure operating in harmony with the V/U VERTER. The design goal was to have a V/U VERTER in your system running and then drop in the MICROVERTER with minimum to no additional interfacing.

So, Pricing? all we can say now is it will be less than any two of our standard microwave transverters, so-- 4 bands for less than the price of two! Now, what does it look like and how does it interface? Next is a picture of a functional V/U-MICROVERTER combination as we intend to manufacture it.

The combination is shown operating on 10 GHz

This was a preliminary test to verify our various transceiver interfaces with band controlling and PTT functions. The test unit utilized the AUX port of the V/U set at 144 MHz and then controlled the MICROVERTER's TX/RX functions at basic RF levels. The MICROVERTER requires some refinements such as adding an AUX RF port for IF through put or to utilize a microwave frequency such as 1296 as an IF frequency for a higher frequency transverter. So-- there will be 5 positions on the MICROVERTER before a final design is settled on. But, all is in process. The goal was to verify that the MICROVERTER can be added to the V/U at anytime with minimal to no additional specialized interfacing. Just connect, plug in, and operate.

Band Switches, Decoders, and Cabling.

The standard interfacing is a manual switch control and will be utilized if you configure the transverters to a transceiver that doesn't have any type of band controlling or-- if you just feel comfortable with a manual switch in the palm of your hand as shown to the right. There are two additional positions that are user interface- able if you require or to operate all of your microwave equipment with one control. OR-- make your own band switching interface with the provided pin outs and information.

The V/U Xverter's control connection (a DB15HD) pin outs and description are listed next. The description column is of the standard transverter. Other versions will be specified in this column within the operation manual of the transverter. The Microverter will follow the same scheme except for Pins 1-5 and 9 will be related only to the Microverter's bands only and not overlap with the lower frequency BCD coding.

V/U Xverter Control Connection Pin out.

(The MICROVERTER will have the same pin out but on the higher frequencies)

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/Microverter

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**	
2304MHz	**0**	**1**	**1**	**0**	
3456 or 3400 MHz	**0**	**1**	**1**	**1**	
5760 MHz	**1**	**0**	**0**	**0**	
10368 MHz	**1**	**0**	**0**	**1**	

NOTE: Table above is the standard configuration with the integration of the Microverter. If 4M is required in the V/U Xverter the 222 or 900 MHz position will become the AUX frequency port to utilize with the Microverter or any other higher frequency transverter.

See our additional provided document for specific transceiver interfacing.