

## OH2GAQ Microwave Transverter Controller V2.1

Version 2.1 of the Microwave Transverter Controller has similar but not identical functions to the Version 2 MTC, described in reference 9 below. The functions for the original MTC (Version 1) and their implementation are described also in reference 9 below. Version 2.1 is integrated into one box plus SBC (Single Board Computer, Linux based).

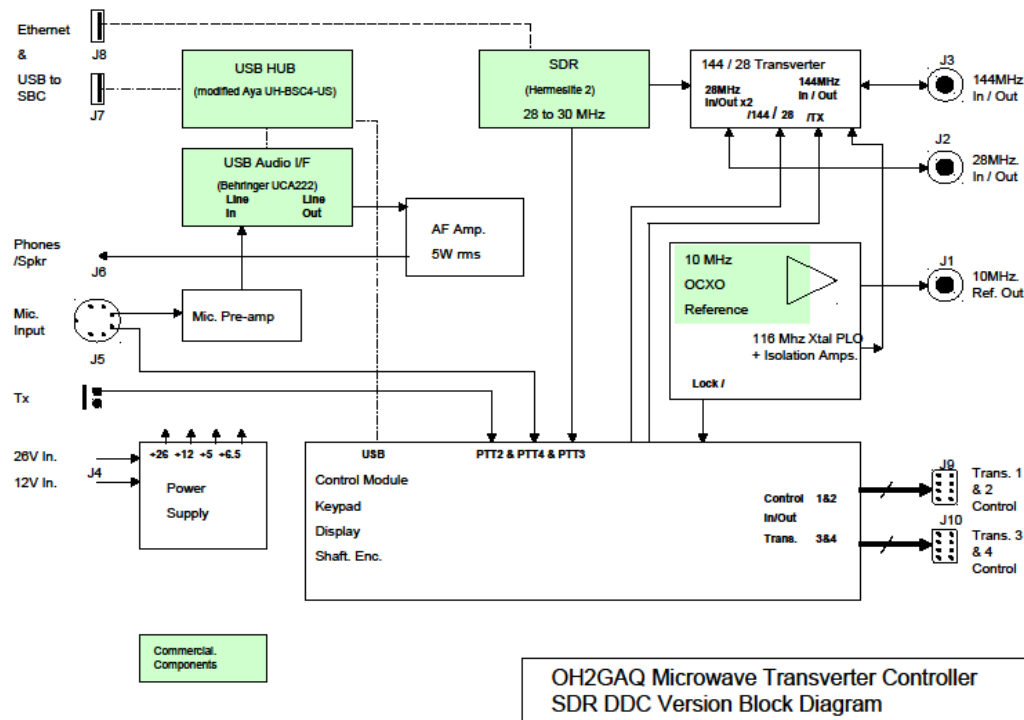


Figure 1. Functional Block Diagram of the MTC version 2.1

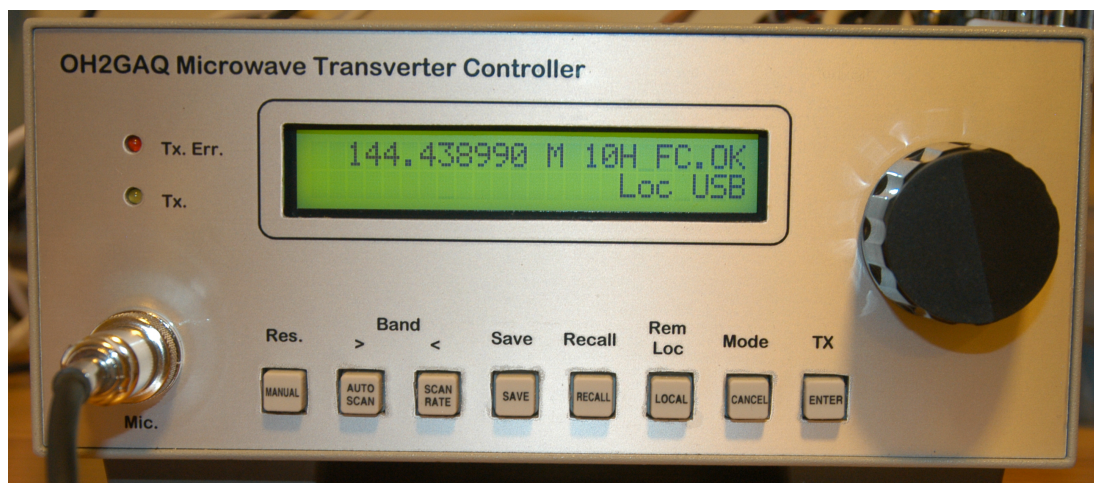


Figure 2. Front view of the MTC V2.1. The original HP pushbuttons and their PCB have been re-used. The legends on the panel indicate the current functions, and don't necessarily match the printed function on the buttons. A high-quality Optical encoder is used with the tuning

knob. The dial shows the tuned frequency, the tuning resolution selected, the status of the frequency control system, and the control state and operational mode. In version 2.1 a Hermeslite 2 DDC/DUC SDR is used, replacing the Peaberry SDR used in version 2.

As the MTC uses an SDR, an attached computer is required. This can be any Windows (at least W7 and W10) PC with a reasonable processor or a small SBC. One reasonable performance USB-2 interface and Ethernet interface is required in the PC/SBC. As an alternative a small SBC (Raspberry Pi 3 or Asus Tinkerboard S) can be used as the controlling computer. The Tinkerboard S is particularly useful as it seems to have enough capacity to run, for example, Quisk as the SDR controlling program and also FLDigi as an adjunct program to handle CW coding and decoding, or other digital mode coding and decoding.

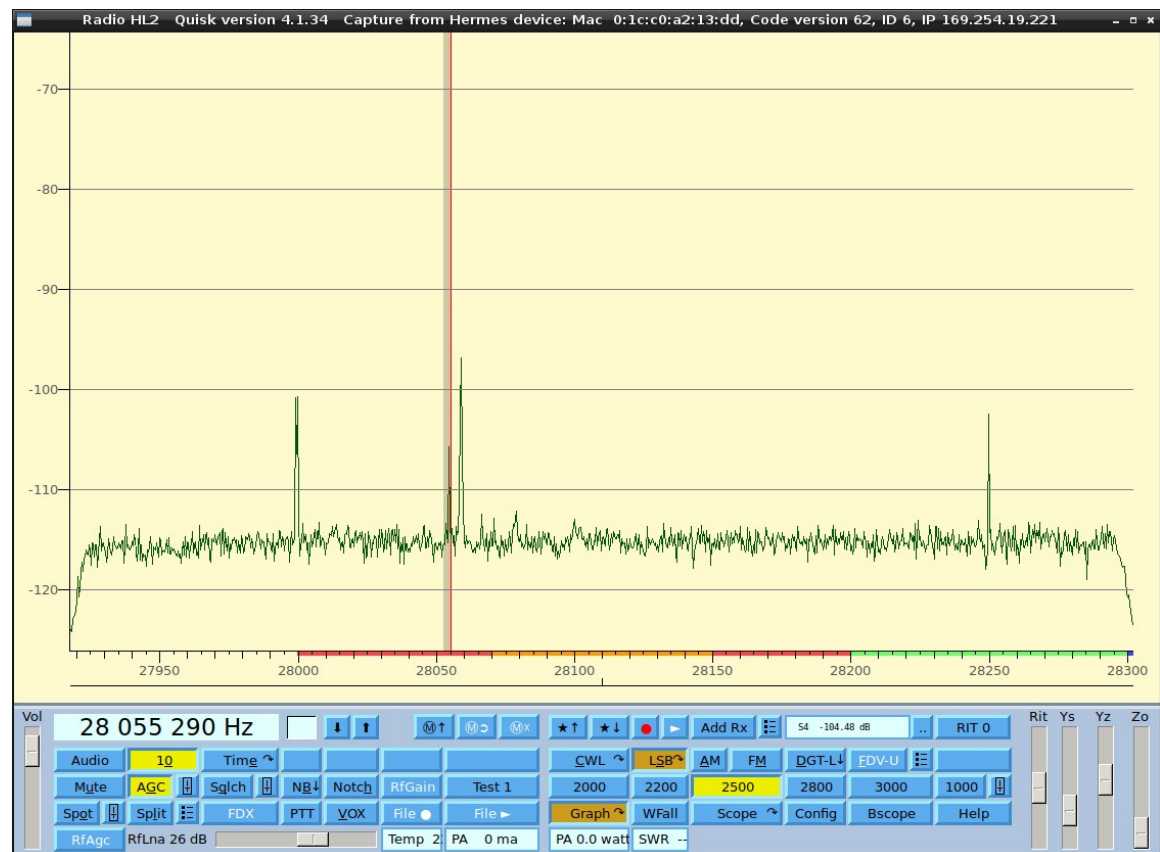


Figure 3. MTC version 2.1 receiving the Oscar 100 Narrow Band segment at 10 GHz, showing the band edge beacons (28.000 MHz and 28.250 MHz) and showing one main SSB signal, with several lower level signals. Note the transverter system is reverse tuning, so the low edge is at 28.250 MHz, and LSB must be selected to receive USB signals. SW is Quisk.

## Acknowledgements and References

There are many hams and others who have, generally unknowingly, contributed to the design and implementation of this system. The many excellent websites maintained by hams who wish to share their ideas and/or kits with others are too numerous to mention. More details of the implementation of some parts of the controller, such as the PLL oscillator, are contained on the authors web site.

Websites continually change. Documents cannot be kept up-to-date. If a link does not work, please try your favorite search engine to find any reference that seems to be missing.

References:

1. John Stephensen, KD6OZH, "A Stable, Low-Noise Crystal Oscillator for Microwave and Millimeter-Wave Transverters", QEX, Nov/Dec 1999.
2. John Hazel, G8ACE, "Constructional Notes for G8ACE MKII OCXO Sept2010 V2", Available from G8ACE website: <http://www.microwaves.dsl.pipex.com/>
3. Analog Devices Data Sheet for ADF411x RF PLL Frequency Synthesizers.
4. Analog Devices ADIsimPLL version 3.30
5. W6PQL website: <http://www.w6pql.com/>  
Several excellent articles covering microwave transverters and useful sub-systems as well as actual kits for many items.
6. KO4BB website: <http://www.ko4bb.com/>  
Time and frequency control, measuring equipment and generally useful microwave related material.
7. KE5FX website: <http://www.thegleam.com/ke5fx/>  
Time and frequency control, measuring equipment and generally useful microwave related material.
8. Systronix RAD51 website: <http://www.systronix.com/RAD51/RAD51.htm>  
Rapid Application Development Environment for 8051 family processors. Assembler language only.
9. OHGAQ website: Here you can find a re-print of the article published in QEX for July/August 2013 covering version 1 of the Microwave Transverter Controller and also version 2 of the MTC and various microwave amplifier and transverter projects.
10. Hermeslite 2 Project website. <http://www.hermeslite.com/>
11. Quisk SW website. <http://james.ahlstrom.name/quisk/>