GB7TD - A digital repeater

West Yorkshire engages MotoTRBO technology

Michael, G1XCC and Mick, M0LEV with the new repeater. The cabinet also contains 23cm, 2m and 6m boxes.

Motorola’s MotoTRBO technology and is connected to the DMR-MARC system, a network that already has close to two hundred internet linked DMR repeaters around the world and one that gets bigger by the week.

HOW DMR WORKS.

The DMR system and its network differ from D-Star in a number of ways. DMR is based on an open standard, which means that encode/decode software is available licence-free and this has resulted in equipment being produced across a number of manufacturers.

First used for commercial applications in 2005, the system was designed from the outset to comply with tight emissions specifications set by the European Telecommunication Standards Institute (ETSI) and Federal Communications Commission (FCC). Consequently, equipment is of commercial quality, but competition and sheer numbers make new and used gear available relatively inexpensively.

DMR employs Time Division Multiple Access (TDMA) that enables two discrete ‘Time Slots’ – effectively two separate voice channels within one 12.5kHz frequency allocation – so two QSOs are possible simultaneously. Additionally, these slots are software routed to various ‘Talk Groups’ that allows the user to make an area or group specific call. Talk groups are also stored within the preset memories so no re-programming is required in order to set up a QSO. Just select the appropriate preset, make the call and all repeaters on the same talk group will key up, worldwide.

In order to access the system, users first need to register online with DMR-MARC, who will provide a seven figure ID that should be programmed into the transceiver. The ID includes a country specific identifier, which is used by the system to route a contact to the desired talk-group, produce a ‘Last Heard’ log of on-air users and to compile system data.

THE GB7TD INSTALLATION.

Pretty much standard equipment for all DMR repeater installations is the Motorola DR3000 – standardisation aimed at maintaining optimum network compatibility. GB7TD has Tx/Rx on 439.1625MHz and 430.1625MHz respectively, feeding a custom manufactured end-fed dipole 10 metres above ground level. With the site at approximately 220 metres above sea-level, the combination gives excellent coverage throughout West Yorkshire. Add a mobile antenna – even a basic quarter wave – and, as you would anticipate, range increases dramatically with reports received as far away as Hull and North Yorkshire.

GB7TD’s network connectivity is achieved via a 3G router. A fixed broadband connection was considered, but the first few weeks using 3G have proved how frugal the system is in terms of data. Projections are that even with a significantly higher number of users, only around 1GB will be required per month.

The energy behind both the repeater group and the GB7TD project is repeater keeper Michael Lockwood, G1XCC. Michael has been licensed for some twenty five years and is a true higher frequency and repeater enthusiast. He was quickly convinced that, in addition to its other advantages, the DMR system addressed some of the limitations that D-Star can present, especially for mobile operation.

“We’d already looked at D-Star, which is great and connects thousands of amateurs around the world every day”, he said, “but we decided that with a pre-requisite for digital technology and a focus on safe mobile use, a superior system was available, hence our decision to go with DMR.”

“Setting up anything more than a local QSO from scratch on D-Star in a mobile situation is not easy. In contrast, the permanently linked network and preset nature of DMR equipment makes mobile use very simple and, more importantly, as safe as possible.”

“The configuration is also more user friendly for those who may be less technically minded and is especially suited,
for example, to the visually impaired.
Together with the commercial quality of the gear, the fantastic audio clarity and extended battery life on the HTs, we think we’ve found the perfect digital solution.”

Of course, professional opinion counts for a lot and the choice of digital system was made easier thanks to invaluable input from another of the group’s regulars. In common with many of those who set up and use the DMR network, Karl, G1YPQ, works with Motorola Solutions products and was able to share his knowledge and experience with the group. “I use all amateur modes, including D-Star and I work every day with Motorola equipment” he said, “given the brief for GB7TD, the MotoTRBO/DMR system was simply the best match – no question”.

Additional funding was provided by Mick, M0LEV who says his investment is already paying dividends. “I frequently spend time with my family forty odd miles away in East Yorkshire and I can access the system from there with just four watts on a handheld. I’m amazed by the coverage and the quality we’re getting. On top of that, battery life is brilliant – I recently went four days on one battery!”

Mike Swiatkowski, AA9VI, is an RF engineer based at Motorola HQ in Schaumburg, Illinois. He works on the design of MotoTRBO equipment and as a major contributor to the development of the DMR-MARC network, Mike provided invaluable input to GB7TD.

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