DATV Down Under - Part 2

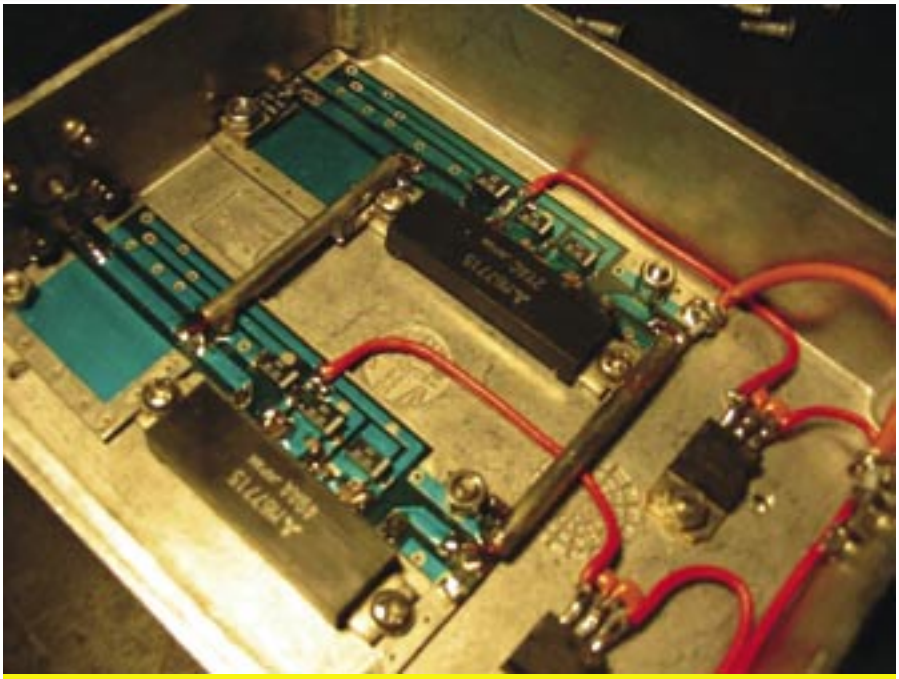
By Richard L. Carden VK4XRL

With reference to my earlier article in CQ-TV 202, further tests have been carried out on 13cm and new power amplifier for 23cm and finally a digital receiver have been placed in the repeater VK4RKC to further educate and provide information on propagation due to changing weather conditions.

Repeater Operation

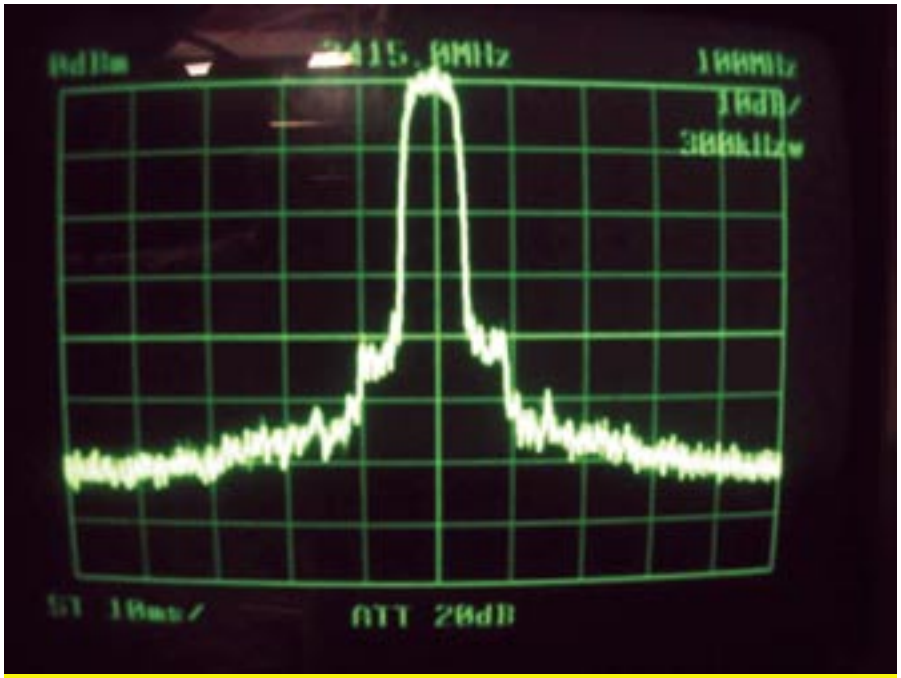
The repeater VK4RKC is situated some 54km north west of my QTH and overlooks most of Brisbane and Sunshine Coast. It's an ideal site as we don't need to rotate the receiver antenna and the transmitter antenna is a sixteen-element phased array.

One of the problems that faced us during the planning stages was how to recognise the digital signal; this is due to the receiver giving out the dreaded blue screen effect. After trying a number of receivers, a digital receiver type ELSat-ZDX 9111E appeared across the desk. This receiver had a red LED that switched on when a digital signal was being received; also it was a no frills receiver that suited installation in a repeater. Another nice feature was that the received test picture produced by the DATV transmitter remained locked most of the time.



110-1067 module

An interface board was duly built which switched a relay from the LED circuit, therefore the relay contacts could then be utilised for any requirement that may arise. In order to keep the analogue operation, in parallel with the digital operation a separate interfaced stereo audio and video switcher was also duly built. It was designed using relays and its rest position was across the analogue signal. This now allows us to see the difference between the received analogue and digital signals, even though we are transmitting back on 426.25MHz AM. This situation may not be for long as the bottom part of the 70cm band 420 – 430MHz may be removed for other services.



DATV 2415 Modulator Output

13cm Operation

The required software changes were duly made and down loaded to the DATV unit. The frequency was set to 2415MHz, all other parameters being left at 6000SBR, ¾FEC and 5500 video bit rate. The output from the DATV unit produced a carrier at an output level of 0dbm and the shoulders were at –42dbc.

The power amplifier used was a local unit from Mini-kits here in South Australia. It is a nominal 2 watt unit, running class 'A' and the part number being EME91B, as shown below.

This unit worked very well with the FM modules producing the full 2watt output. Once connected the system produced an output of +26dbm with shoulders at –30dbc.

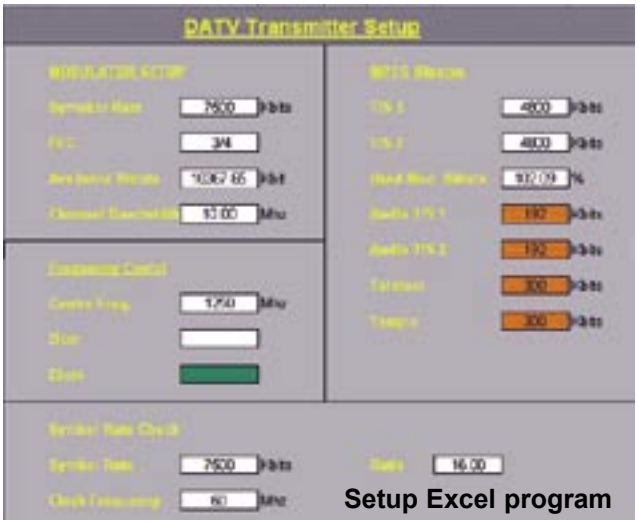
23cm Operation – New power amplifier.

One of the main problems has been to raise the power level up to at least half the analogue power level. In my situation I use around 2W on FM to operate the repeater; we know that +25dbm can access the repeater also. However due to weather conditions this could be subject to the cliff effect. What I wanted was at least 1watt; therefore

an amplifier was constructed using dual power modules type M67715. Two 3 db couplers were made using hard line with the centre removed and replaced with a twisted pair of enamel covered wire, each wire representing 100 ohm impedance. With two 100 ohm lines in parallel the required impedance of 50 ohms is achieved. I made up an Excel program to calculate the required lengths for the 3db couplers.

This amplifier via an external 3db pad produced an output of +30dbm max with shoulders sitting at –30dbc. Second harmonic was at –40dbc and noted spurs at 340 to 710 MHz were at –50dbc. When first use,d with the repeater the transmitted signal interfered with the received signal from the repeater; the FM transmitter was clean in this regard. The output from the DATV transmitter was then checked more thoroughly this time. Second harmonic was at –30dbc and noted spurs at –46dbc. An inter-digital filter which I had on hand was then inserted between the DATV output and the amplifier input; the output signal was now clean with spurs >-70dbc and the second harmonic was now at -50dbc.

The next step was to add an extra encoder board to the system. This was duly purchased and the video bit rate set to 2300k. Little information could be found on the web re the requirements in setting up the system for two encoders. One cannot arbitrarily set the SR and hope it works. To this end an Excel spreadsheet can be found on the S5-DATV- ATVS Slovenian ATV site which works out the SR for different overall bit rates at ¾ FEC.



Setup Excel program

Armed with this information a small Excel program was made to determine the allowed bit rates for both encoders, taking into account the two audio streams at 192k, the teletext at 300k and the test picture, which was set at 300k (couldn't find any real figures for this one).

This screen shoot of the Excel Program goes some way in setting the bitrate parameters. As you can see we opted for an SR of 7500 which gives a signal bandwidth of 10MHz.

Conclusions

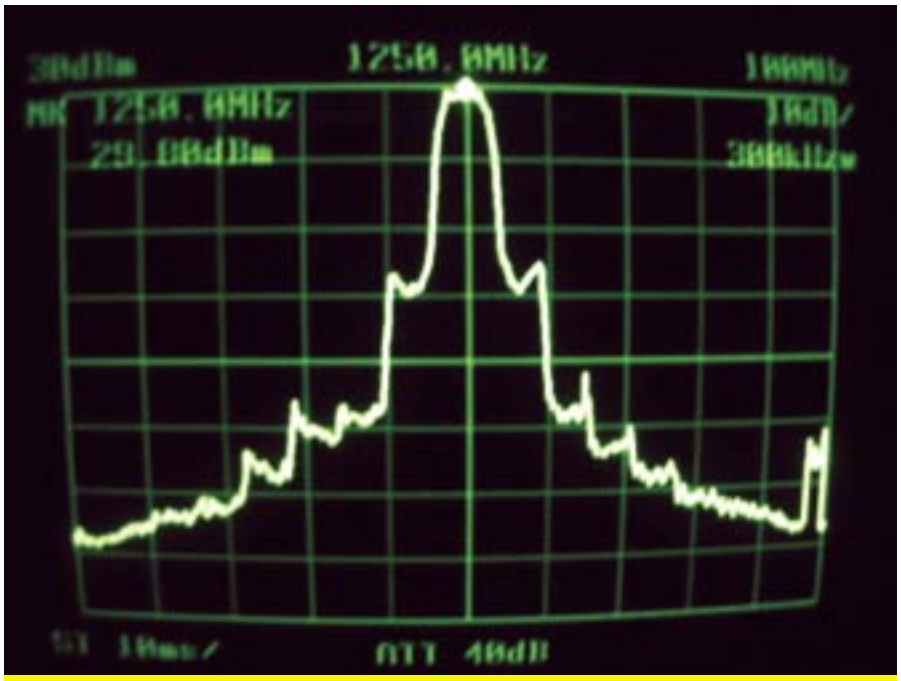
The system works very well and a second digital receiver will be placed at the repeater site in due course. Also we have now access to a 2.4GHz transmitter which can take either analogue or digital. Unfortunately the IF is around 36MHz and was used for MDS. Since a lot of receiving equipment has come onto the market we may at this stage opt for VSB.

It may be possible at a later stage to try dual 2W amplifiers at 13cm as per the 23cm unit. Also note that the M67715 is becoming obsolete and is being replaced with a MOSFET unit type RA18H1213G. It is hoped totry these out as soon as we can lay our hands on them.

Another development that is worthy of a second look is the Dutch DATV system and I would like to thank Henk for his continued feedback on its development. I would also like to thank Mark VK5EME of Minikits for his support.

References

www.minikits.com.au
www.d-atv.com
http://lea.hamradiosi/~s51kq/S5-DATV.HTM



Output from the Dual Amp