newsletter

wythall radio club

"having fun with rf"

wythall contest group

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Jan-Feb 2014

Wythall Radio Club meets from 8pm every Tuesday evening at Wythall House, Wythall Park, Silver Street, Wythall, B47 6LZ, near Birmingham. Visitors are very welcome. **Wythall Radio Club** is affiliated to the Radio Society of Great Britain. Contact g0eyo@blueyonder.co.uk

Colin M0GJM Silent Key

On 30th November 2013, the club heard the tragic news that Colin M0GJM had suddenly become silent key the previous day.

Earlier that week, on Monday 25th November, Colin had been buying a cabbage locally when he collapsed outside the shop, injuring himself badly on the pavement. Paramedics were called and he was admitted to Heartlands Hospital where he was diagnosed with an irregular heart rhythm.

Colin appeared to be making a recovery during the week – tests showed his heart rhythm was stabilising and the medical staff were considering fitting a pacemaker to help him. However on Friday evening the irregularities in his heart returned and despite treatment, a few hours later, in the very early hours of Saturday 30th November, he passed away. Colin leaves behind his wife, Jill, together with son Paul and daughter Melanie, both from his first marriage. He was also a stepfather to Jill's three children.

Colin had retired from his job in the engineering department at Birmingham Airport a few years earlier due to ill health. He was just 64 years old when he died. Perhaps the saddest aspect of his very untimely death was that daughter Melanie was expecting his first "blood" grandchild soon.

His interest in radio came at an early age when his father made him a crystal set. Later, as a teenager, he had great fun, along with millions of others, tuning into the Pirate radio stations transmitting from ships in the Thames estuary. He experimented with modifying a transistor radio to install a bigger capacity external battery to extend the operating life and trying to improve reception with a bigger antenna. His interest in radio waned until he changed jobs in 1981, when a colleague at work offered him a Black & Decker workmate and an AM CB radio. He bought both! The radio was quickly fitted to the car, with suitable CB aerial. Colin lived in Redditch at the time and each evening the channels were buzzing with CB traffic.

One of Colin's friends, to whom he showed the CB radio, was one Mike Goode, who some will remember as a founder member of Wythall Radio Club. Mike loved the CB radio idea and quickly went from a basic 40 channel AM rig onto one of the sets with hundreds of channels and sidebands. Mike himself became G4SMA, Secretary of Wythall Radio club. Colin however, with a young family and interests in golf and cricket, decided not to join Mike in pursuing his radio interests but kept in touch with Mike over the years and it was just a few years ago that Colin decided to resurrect his interest in radio.

He joined the ranks of Wythall Radio Club to undertake Foundation License training course in June 2006, (along with Mel M0MAJ, who served with Colin as Treasurer of the Club). 2008 saw Colin go for the Intermediate Exam, followed by success in the Advanced exam just a few months later. From December 2008, he was M0GJM to us!

Colin was a man who was much loved by all in the club, . He undertook the QSL Manager role for several years and eventually took on the role of Secretary of the Club for two years between 2010/2011. Colin admitted he wasn't a big radio user, he preferred playing with the technology of the hobby, especially making things and finding out how they worked. He also had an interest in anything to do with computers and engineering.

Colin was also a staunch supporter and later organiser of the club's annual clay pigeon shooting contest, where he was often accompanied by his brothers, Rob and Phil, but he will probably be most remembered for his enthusiasm for the Club Foxhunts, something that really grabbed Colin's attention, to the extent that he was working on various computerised systems for better tracking down the foxes! To celebrate Colin's love of this aspect of radio, the Club intends to have a memorial trophy in Colin's name for the winner of our annual Christmas Foxhunt.

Colin's funeral took place on Monday 16th December at the Robin Hood Crematorium with a wake at Shirley Golf Club afterwards.

He was indeed that rare person – a man of whom no-one said anything bad. He is already and will be for some time, very sadly missed…

Chris G0EYO (with assistance from Chris G7DDN)

Barry M0DGQ's Multi-band CW DDS Transceiver

This three band CW transceiver uses a cheap DDS (Ebay £3.50) for the VFO and a two pic DDS controller circuit. Primarily designed for holiday use this transceiver is small and light weight. Output power is 15 - 20 Watts on all bands (although this is variable using the power control), RX sensitivity is good for 1uV. Semi QSK is used, also a pic electronic keyer is included so a paddle can be used with the set.

The Pic controller circuit is by C.V. Niras (VU3CNS), all documentation including Pic source code is freely available on the Ham Radio India website. Version 4.1 is used in this build (two Pic chips). The controller circuit is very versatile and has many "deluxe" features, split VFO's, memories etc. and works extremely well - a credit to Mr Niras.

Likewise the Pic electronic keyer circuit is by DL4YHF, this can be omitted if you do not wish to use a paddle key.

The DDS controller circuit supports all amateur bands, although only three bands are utilised here due to space and complexity. The bands chosen for this set are 20m, 40m and 80m. Originally 10m was used, but i missed not having 80m so the build was modified for 80m. Any bands can be used, it is just a matter of using different component values for the band pass filters and the PA output filter.

Circuit description

In receive the signal enters the RF band pass filters via the antenna changeover

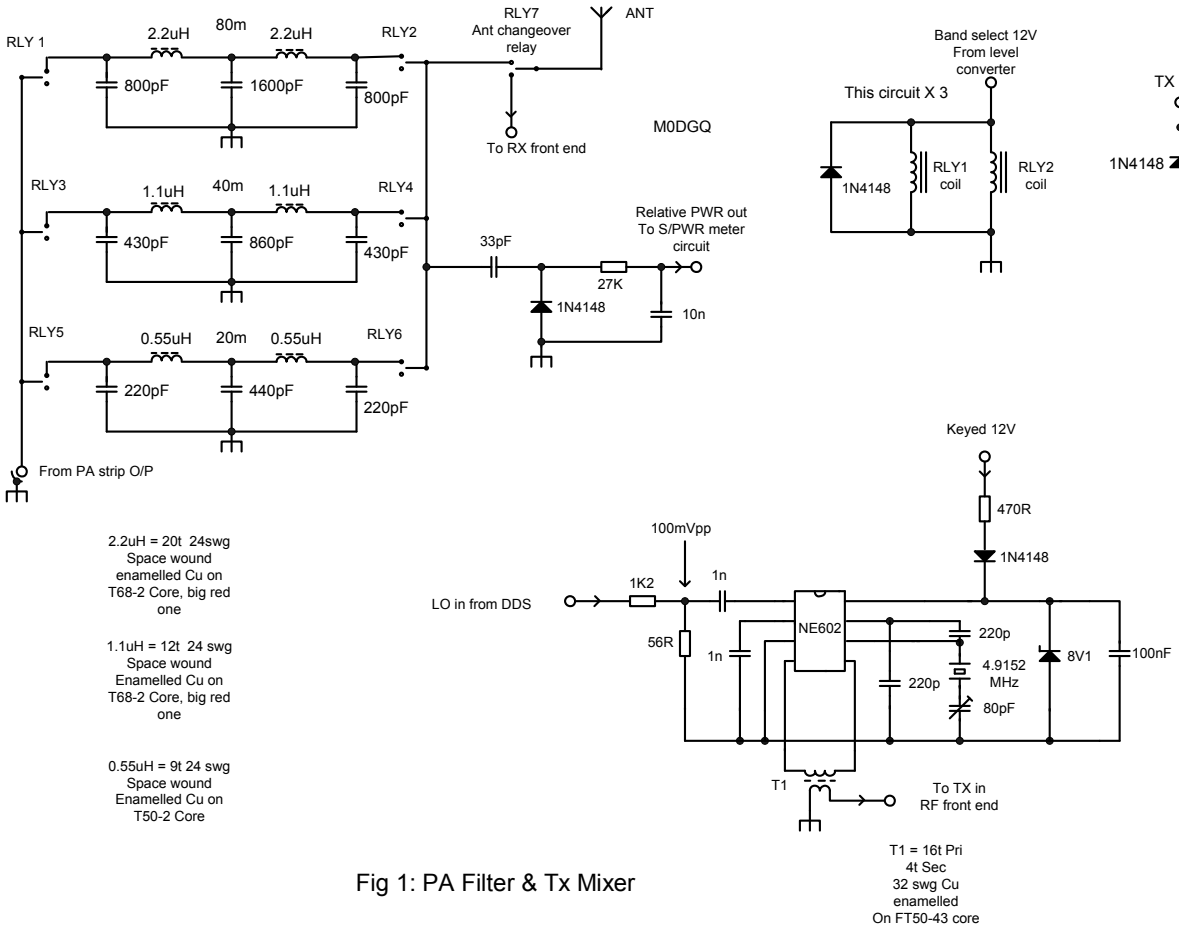
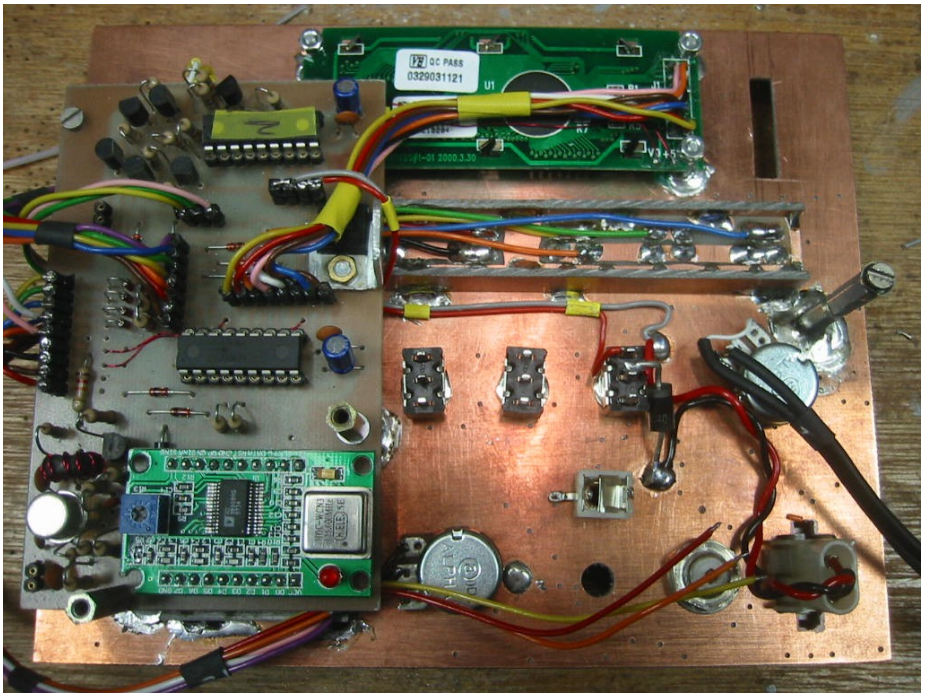


Fig 1: PA Filter & Tx Mixer

Multi-band CW DDS Transceiver.. contd



relay and attenuator pot. Diode switches select the required band pass filter. A dual gate mosfet serves as a RF preamplifier to which AGC is applied to gate two. In transmit, the band pass filter and RF preamp are also utilised thus saving on components. The gate two voltage is used as a power control during transmit.

Following the RF pre-amp, another dual gate mosfet is used as a receive mixer, the local oscillator from the DDS is injected into gate two. This is followed by a four pole crystal ladder filter. The crystals used in the filter are surplus CPU crystals, 4.9152 MHz and were selected for close matched parameters. Selectivity of the filter is very good indeed considering it has only four poles.

A two stage untuned cascode IF amplifier with AGC is used for IF amplification, IF output from this feeds a NE602 configured as a product detector. Demodulated audio is then fed to a buffer, audio band pass filter, another buffer and finally the audio PA using LM386. Sidetone is injected into the second audio buffer/mixer. Audio out from the first buffer is also fed to the AGC generator circuit.

Audio derived AGC is used here using full wave audio rectification thus halving the AGC time constant compared to half wave rectification. Although not as good as IF derived AGC, the AGC used here does work well.

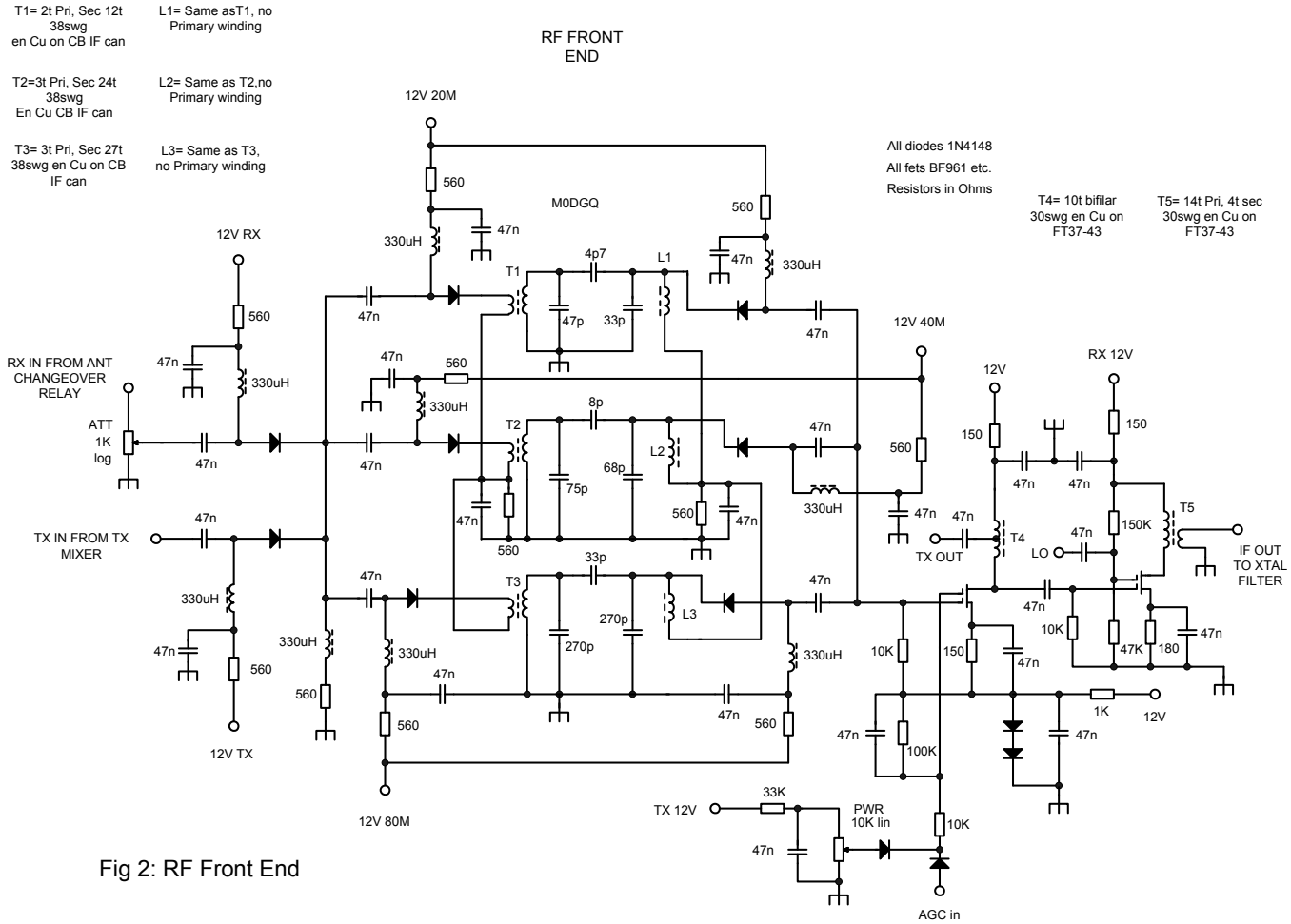


Fig 2: RF Front End

Multi-band CW DDS Transceiver... contd

A LED bar graph indicator is used for a S -meter and Pout indicator, A moving coil meter is preferable but none small enough were available at the time of build. No circuitry is shown here for this as it is pretty much a carbon copy of the manufactures data sheet (LM3914). If you have a suitable moving coil meter I would advise using this as it is more accurate.

The set has been in use for several months and also used on a recent holiday, performance is very good although it does not look very pretty!

Barry Zarucki M0DGQ

During transmit, another NE602 is used as a TX mixer, it's output is coupled to the required band pass filter by a step down RF transformer. Filtered and amplified TX signal is tapped off from the RF pre-amp and fed to the RF PA consisting of class A driver and two class AB push-pull stages. Up to 25 watts can be produced by this PA, although this is not recommended as the output devices will be operating at their limits. From here the signal is fed to the relevant low pass output filter via relays.

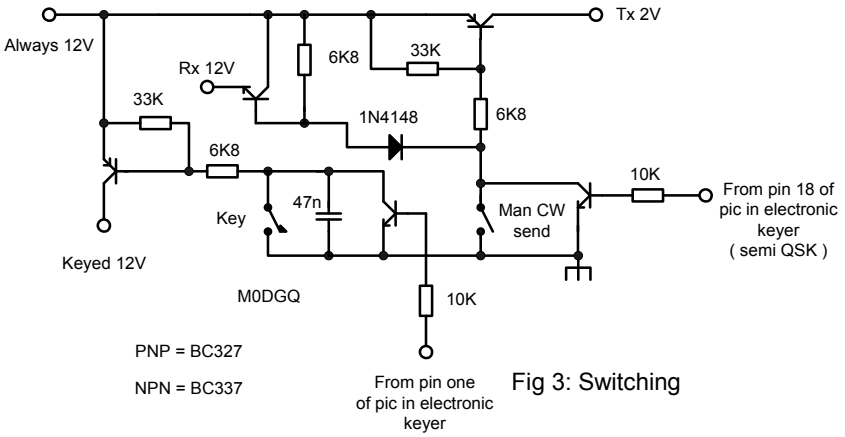


Fig 3: Switching

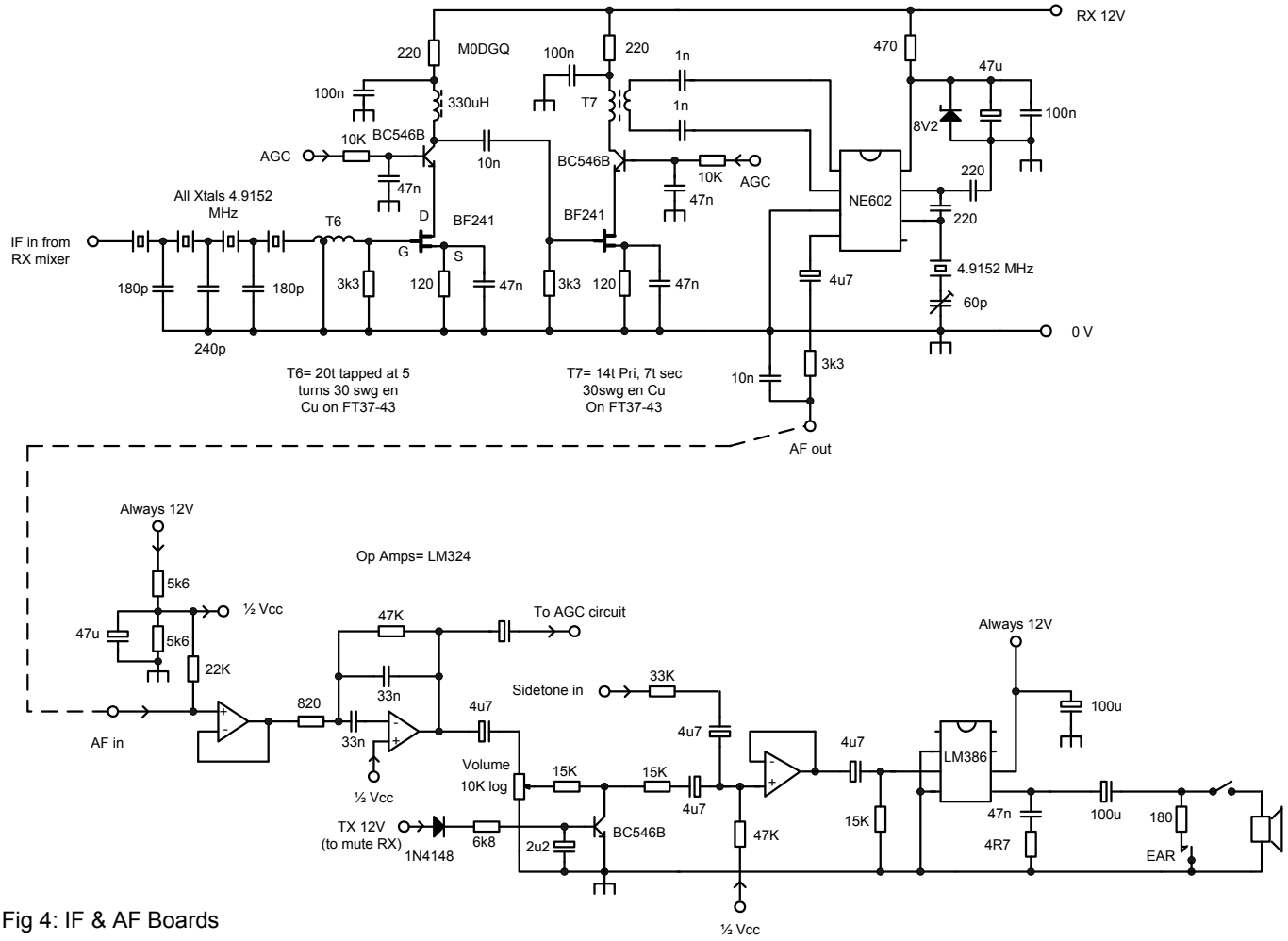
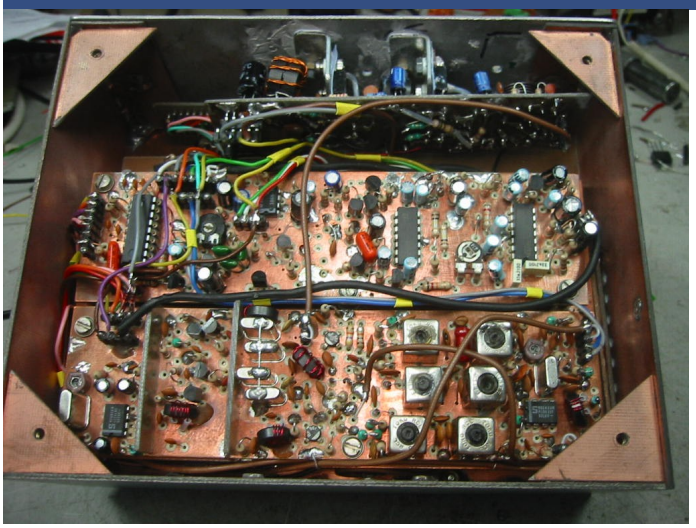
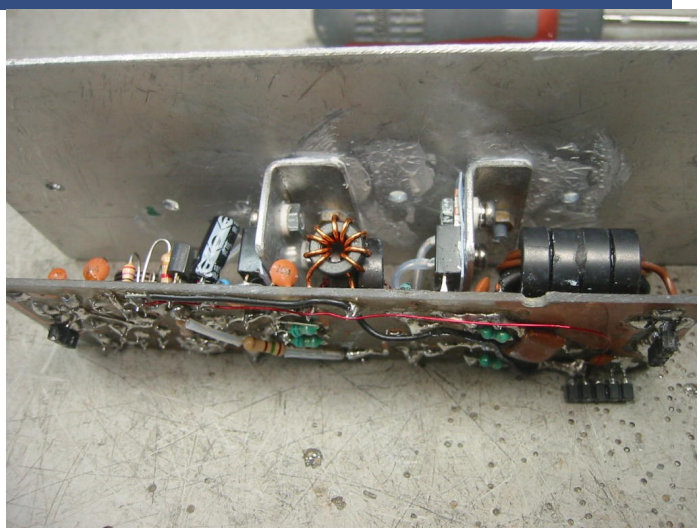
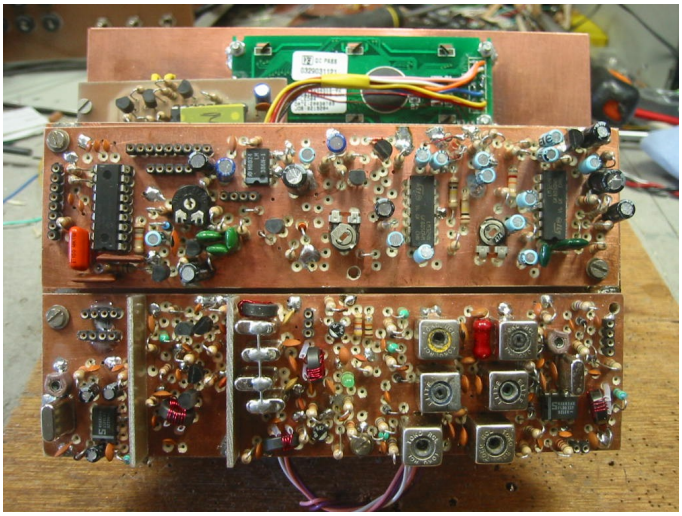


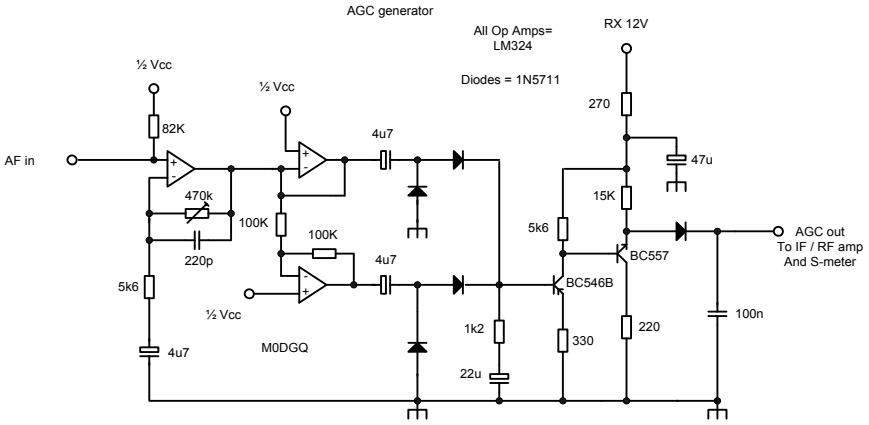
Fig 4: IF & AF Boards

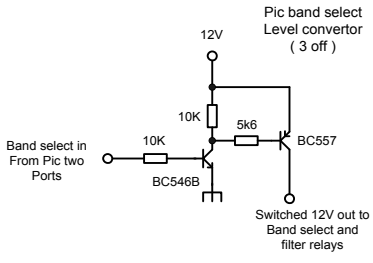
Multi-band CW DDS Transceiver.. contd











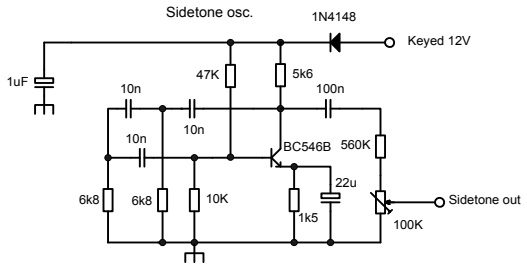
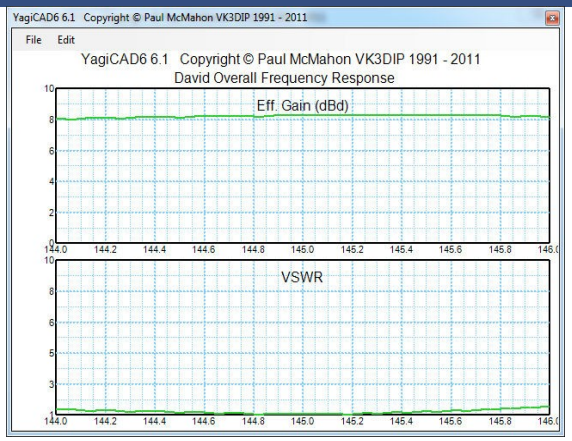
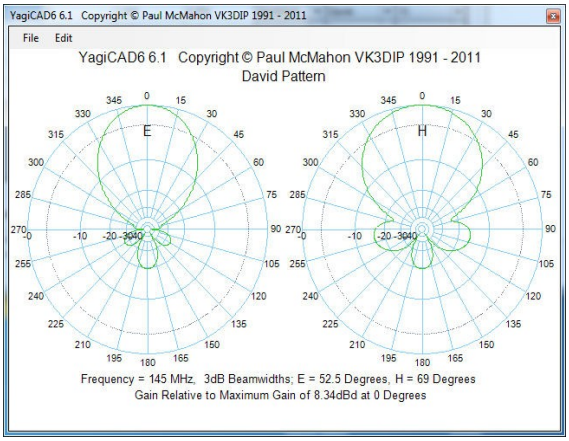


Fig 5: AGC, sidetone & level convertor

Fun building a YAGI

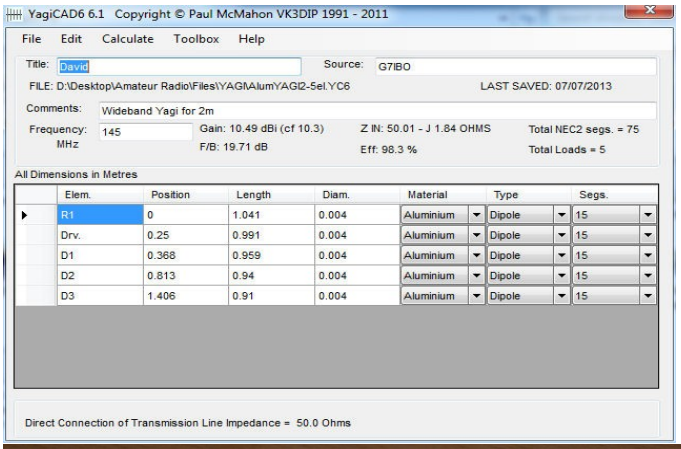
I was keen to participate in the last fox hunt so decided to have a go at designing and building a 2m YAGI for the purpose. There are many designs available on the net and with a little research I designed and built one. I wanted it to be easily dismantled, portable and light. Unfortunately, I did not really achieve the latter, nor did I manage to get to the foxhunt. However, I did learn a great deal from the attempt and discovered a fantastic piece of software to model the development of small/medium YAGI beams.





Most of us will have heard of the SOTAbeam. This is a small lightweight 2m/70cm beam which can be carried in a backpack and set up on the summits. I purchased one of these and it works very well. And what a brilliant design! I wondered if I could use similar techniques to produce a homebrew version, but I didn't see the point in reproducing the same product. As it would be traveling in the boot of my car rather than on my back I could make it bigger - longer beam length, more elements, more gain! But it still had to be light enough to be used on an extendible fibreglass fishing pole. So, plastic piping for the beam, aluminium rods for the elements, and some kind of screw mechanism to connect the two. B&Q here I come! (Actually Wickes is better, and cheaper)

Having viewed the available materials I thought I had better go home and actually figure out what I needed. As mentioned previously, I had discovered a wonderful piece of FREE software called YagiCAD produced by Paul McMahon (VK3DIP). It allows the design of a YAGI either from scratch or from examples, altering beam length, number of elements, materials, and various matching options. It can use various algorithms to then optimise your design and calculate gain, front/back ratio, vswr, impedence etc. It produces graphs of these values for the required frequency range of your antenna, as well as radiation patterns (see below). My immediate thoughts were "This is all very well but can these numbers be reproduced in the real world?"



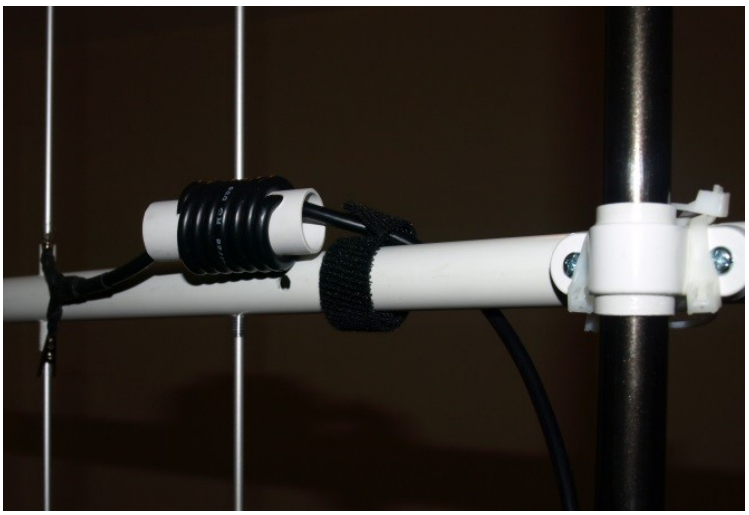
I decided that I would use 15mm plastic piping and 4mm aluminium rods. If I limited the piping to 1.5m in length then it would remain relatively straight without support wires and would allow me to produce a 5 element beam for 2m, and a 7 element beam for 70cm. It would also still be light enough to be used with the extendible fibreglass fishing rod (I hoped!).

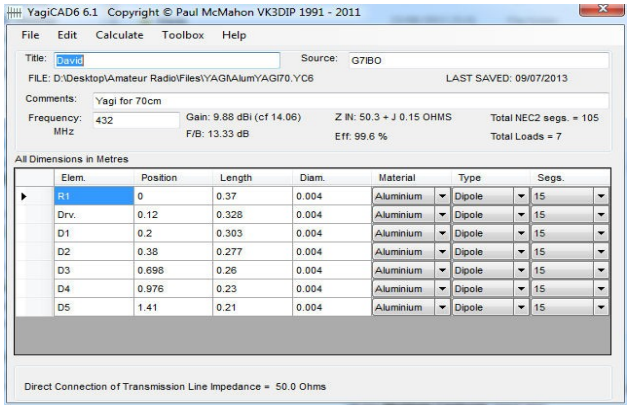
The first problem was that the aluminium rods came in 100cm lengths. The 2m reflector was 104.1cm. I solved this by splitting a rod and using a 6mm diameter aluminium tube 7cm long I screwed the two lengths into either end with a 4.1cm gap in the middle of the tube. I had the required length of reflector. I also had a bulge in the middle of the tube which I realised could be used to reproduce the screw fit mechanism used in the SOTAbeam. I had been given a tap and die set as a birthday present and this was the perfect opportunity to use it. Firstly for making the long rod, and then for producing the thread on the 'bulge'. For each of the *directors* I produced a 'bulge' by enlarging the diameter of a small piece tubing to 4mm and slipping the tube to the centre of the rods (about 4cm long). A dab of superglue held them in place. Each 'bulge' was partially threaded using a suitable die and the rods were complete. The *driven element* was a special case in that each half had to be insulated from the other. I used rigid plastic tubing in this instance leaving a gap of 2mm between the rods that were inserted into the tubing.

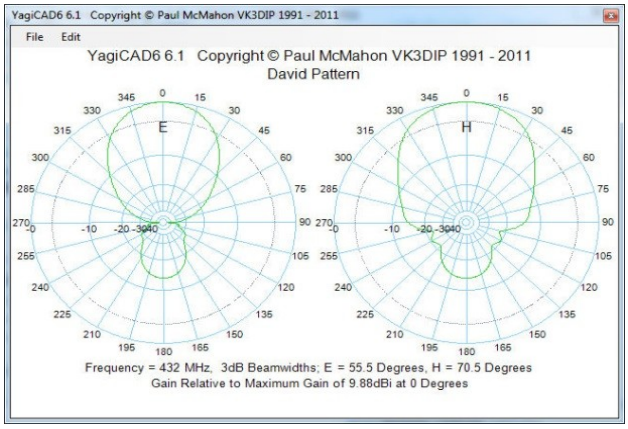
Next came the beam. I thought this would be straightforward but I was so wrong – this was the most difficult part. Firstly, getting the measurements right is critical. Ac-

Fun building a YAGI

curacy to the nearest mm is required (use the software to see what happens otherwise). This was relatively easy with the aluminium rods but drilling accurate holes into a 150cm length of plastic tube is much harder. Measuring the distance is one thing but then drilling in the place you marked, in the centre of the tube, at 90degrees to the tube, is just about impossible without a bench drill. You may think it possible, with care, but a very small deviation can lead to the elements being far from parallel when inserted. It is necessary to ensure that the tube is not twisted as each hole is drilled or the elements will not align vertically (or horizontally for SSB). I discovered that fitting the *reflector* prior to drilling the rest of the holes allowed me to maintain verticality. It was easy to align the drill with the *reflector*. The holes need to be drilled to 4mm, one side is then tapped to take the screw end of the 'bulge' and the other side enlarged to just bigger than the screw. The rod is inserted into the enlarged side of the beam (screw end first) and screwed into the opposite tapped hole so that each side of the elements are equal in length.







I repeated this process for the both the 2m and 70cm elements orientating them at 90 degrees to each other on the beam i.e. if 2m was horizontal the 70cm was vertical.

The next stage was to make the feeder. Again, I used the same direct method as with the SOTAbeam. Two crocodile clips on the end of some RG58 connect to the driven element close to the beam. A choke balun is created using seven turns of coax around a small piece of 15mm plastic piping (see picture). I fitted a BNC connector to the other end of the coax.

All that was left was to fit a holder (20mm Spacer Bar Saddle) to the beam to sit it on the fibre-glass pole. I used cable ties (tight) to secure it to the beam. This did allow me to turn from vertical to horizontal polarisation as desired. Note the small piece of 15mm tubing glued into the fitting – this makes a more secure fit onto the fishing pole so that the beam follows when the pole is twisted to change the direction of the beam (otherwise it just slips). And that's it!

And does it work?

I took it to the field day having just completed the final element. It had never been tested. I put it up, attached it to the antenna analyser and much to my astonishment (and to John (G4OJL) and Phil (2EOWTH)) it gave an SWR of 1.1 throughout its range (2m only at that point). I then proceeded to make half a dozen contacts at hitherto unheard of distances. I added the 70cm elements and it seems almost as good although positioning the feeder wire is more critical. All the elements fit inside the beam for easy transport and it has become a welcome addition to my 'go kit'. It will certainly encourage me to participate in more field day fun.

I love building things related to amateur radio, especially when they work, and are useful. Many thanks to those who encouraged me to write this article (my first) and I hope it may encourage others to have a go at building something useful – and maybe telling us all about it?

David G7IBO

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Xmas Party 2013– Great time had by all.

The club's Xmas Party was held in the Britannia Room at Wythall House on Saturday 14th December. A large number of club members and their families turned out for the event. Stew M0NYP set it all up, Callum M0MCX organised a Xmas Quiz and Chris G7DDN provided some light entertainment. Plenty of food was brought by members for an American style supper and there were the usual raffles and stand-up bingo. Rumours that a Zebra had escaped from Twycross Zoo were found to be groundless when it was discovered that Anita had forgotten to change out of her onesie!.

Training News

Four of our five students took the Advanced Exam on Friday 6th December. Their post exam thoughts that this was a tough paper was born out by the fact that nationally the number of passes of this exam was down by 8%. As a result, of our four candidates, only Tom (now M0RMY) and Roger (no callsign yet) passed. Darren 2E0LPD and Howard 2E0KWH didn't and will be looking to take a re-sit in the new year.

A Foundation Course will start on Monday 27th January and for the following six Mondays plus a Saturday to do the practicals. Quite a number of people have expressed interest in this course so if you know anyone who is looking for a course let me know urgently.

We will also be Beta testing an on-line Foundation course using a VLE (virtual learning experience) software called Edmodo, in January with a view to running our first course in tandem with the classroom course as it may help if there are more students than we can cope with in the classroom.

Chris G0EYO

Tom, Roger, Darren, Howard and Terry about to do their mock Advanced exam.

The next issue of the Wythall Radio Club Newsletter will be published at the beginning of March 2014

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