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July—August 2013

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

GB1DGW on air from Avoncroft

On May 15th the club operated GB1DGW (Danzey Green Windmill) from the Avoncroft Buildings Museum where the mill is now located.

This was the second year we have operated a special event station from Avoncroft and some 21 club members turned out to lend a hand setting up and operating the station.

Courtesy of Callum M0MCX we had a QRO station on HF via multiband dipoles and a 2m FM station via a collinear. The radios were networked via N1MM software and over 260 QSOs were

made with stations on both HF and VHF. Jim 2E0BLP provided coffee, tea, bacon and sausage rolls throughout the day and this was much appreciated by all those attending. Several visitors to the museum came through the barn area and showed an interest in what we were doing. We managed to work a number of other “mills” stations in the UK and Holland.

Avoncroft is an excellent venue for special event stations. They have lots of visitors



MILLS ON AIR— DANZEY GREEN WINDMILL

GB1DGW

Special Event Station at Avoncroft Buildings Museum, Bromsgrove, on May 15th 2013

Run by Wythall Radio Club
QSL via bureau G4WAC



CQ Zone 14 - ITU Zone 27
IOTA Reference EU-005 Mainland Gt Britain IARU
Grid Locator IO82XH, WAB SO96



and there are various re-enactors (people dressed up in costumes doing strange things) most weekends and the museum management are very helpful. In recognition of their support the club made a £20 donation to the museum.

Good work team!



Two tone test generator

Described here is a audio two tone test generator. It is a invaluable tool for testing linearity of PA stages and Linear amplifiers also IMD products of SSB transmitters.

The outputs of two sine wave audio oscillators are mixed together to produce the two tone signal. It is important that the two audio tones are not harmonically related, here the oscillators produce frequencies of 700 Hz and 1900Hz.

Two audio phase shift oscillators are employed here using a couple of transistors and a handful of components, op amps could also be used but they need to be rail to rail types otherwise distortion of one of the half cycles will result. Being too mean to buy rail to rail op amps, ordinary transistors are used here.

The two audio sine waves are mixed together by Ic1a via individual level controls Vr1 and Vr2, these are used to produce equal amplitude tones, this is necessary if the generator is fed through the radio's microphone input as there will probably be some audio frequency equalisation in the sets mic preamp. Ic1a also introduces a small amount of gain (X 2.5).

The mixed tones are then fed to Ic1b via a master level control. Ic1b is configured as a buffer, thus the generators output impedance is low allowing it to feed most radio audio / microphone inputs. The generator produces approximately 4Vpp maximum output.

Photo 3 shows the RF spectrum produced by my homebrew SSB / CW transceiver using the two tone oscillator as the audio modulating source, the two largest amplitude peaks are the RF carriers on the 40m band. This was done using a rather old HP434 spectrum analyser. Prior to having the spectrum analyser the signals produced were rather embarrassingly "dirty" due to excessive RF clipping in the speech processor and too high LO drive level in the TX/RX mixer.

Photo 4 shows the RF output produced by my 400W valve linear (driven by the homebrew set) using the two tone generator as the modulating source, as can be seen the amplifier is biased correctly (good zero crossing waveform) and is not over driven (no flat topping of waveform). The two tone output power measured on a Bird meter is 250 Watts which is approximately 500 watts PEP .

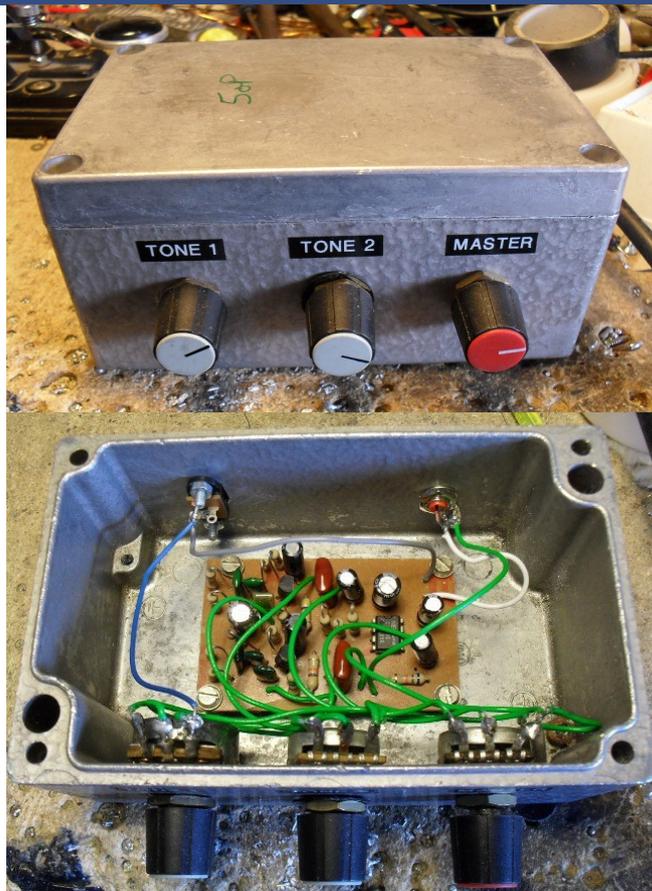
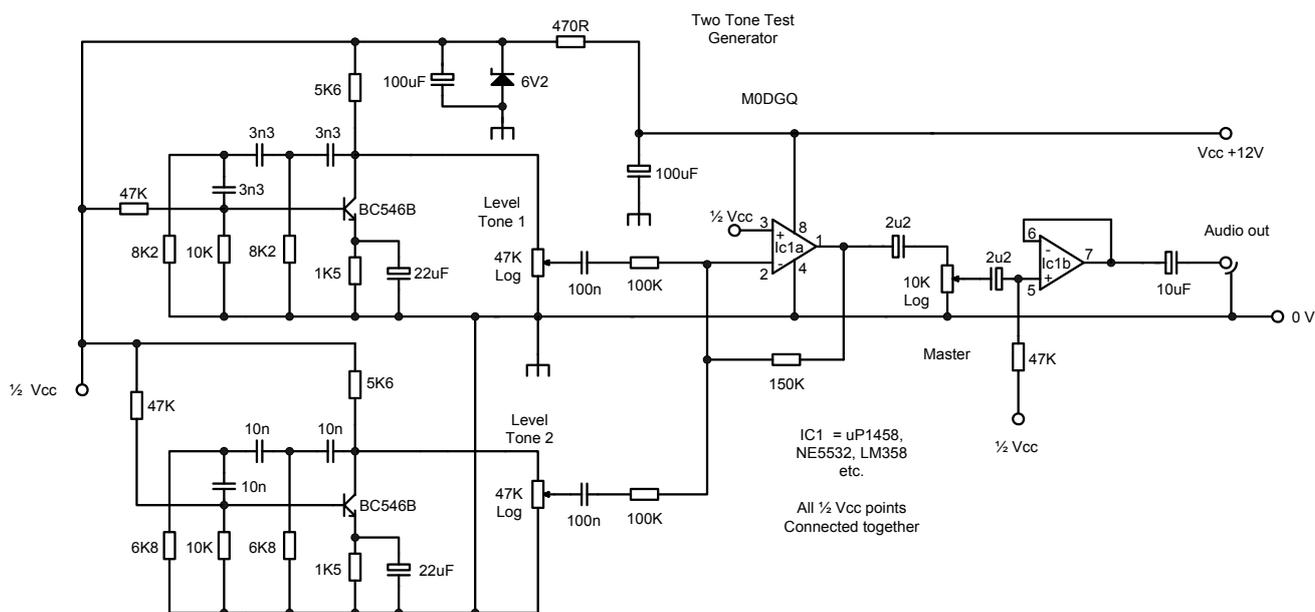


Photo 5 shows the result of 10dB of RF clipping, note the IMD products are still 35dB below the main carriers.

Barry M0DGQ



Two tone test generator cont'd

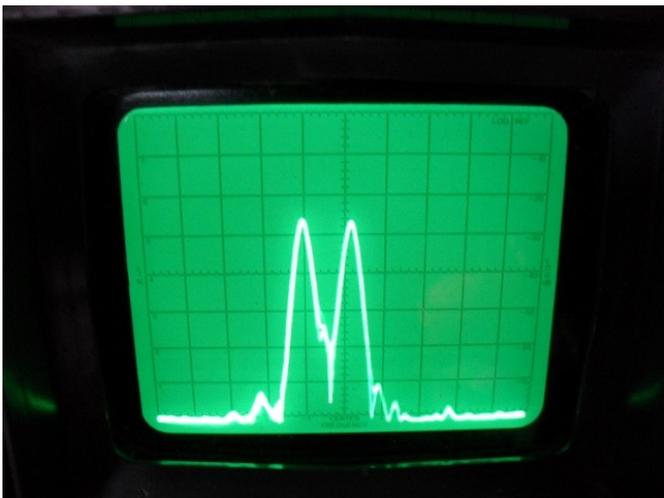


Fig 3 Two audio tones

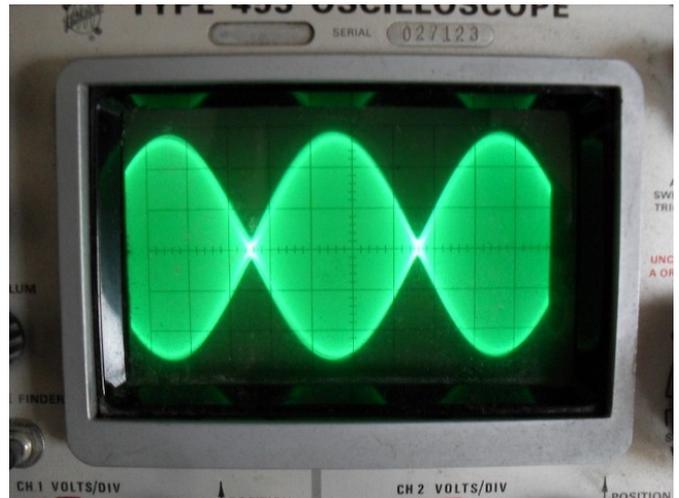


Fig 4: 400W RF output modulated by two tone generator

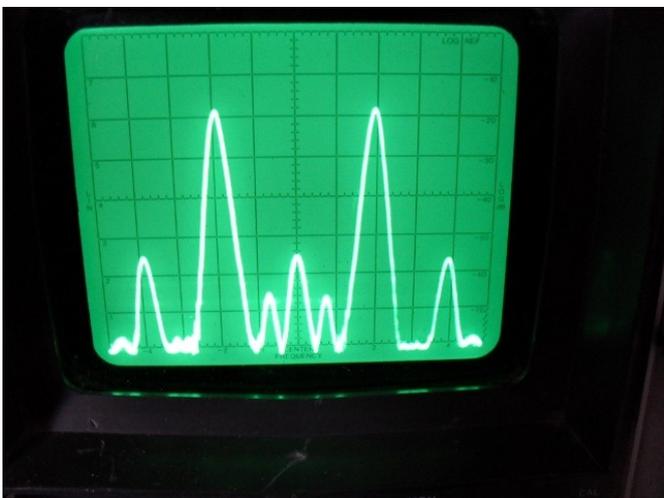


Fig 5: showing 10dB of RF Clipping



John G4OJL wins Lew Williams Shield

In honour of our late president, Lew Williams, who coached many senior members through the old 12 words per minute Morse test, we nominated each May as a month in which members can make a special effort to improve their code skills. We award a shield to the person who in the adjudicator's opinion has shown the most progress. It is not a competition, more of a nomination for progress. This Tuesday the results of the 2013 award were announced.

Two certificates of merit were awarded before the "Lew Williams Shield" was presented; John (no call-sign yet!) joined our club Morse class during 2013 as a precursor to getting a licence. His progress has been phenomenal and when he passes his license later this month, he will

be Wythall Radio Club's first ever Foundation Licensee to make his debut on air on CW!

Alf G1MJO is in his late 80s and never passed the old Morse test but has shown real stick-ability and persistence, even appearing on air and taking some faster Morse sent by other members with a very high level of accuracy.

The main award however went to John G4OJL who was a founder member of the club in the early 1980's. He re-joined us last autumn, having never used CW on air, indeed he was not on air for nearly 30 years! Returning to the club, he found a new love for radio and espe-



cially learning the code and has spent every day (bar one!) since last autumn doing 30 minutes of practice a day! Now he is exclusively a Morse Man on HF.

Chris G7DDN

How I found PSK31 and radio happiness

I had had my radio set up for some years. Yaesu FT847 with FC20 Auto ATU run off a Yaesu PSU and a BHP DSP Loudspeaker to get rid of background noise. This gave me HF + 4m + 6m + 2m + 70cms. Antenna was Cushcraft vertical for HF and beams for 2m and 6m. I bought the radio gear from Lynchies at one of Elevaston rallies and it was in the first year of the radio's introduction to the UK.



I found it a bit overwhelming and didn't really understand the protocols of the QSO exchange. I picked up the interest again at Xmas 2012, when Stuart M0NYP showed Jim, 2E0BLP how to use it and so I delved a bit deeper into DM780 which is part of the Ham Radio Deluxe suite of programmes.

You need an interface unit to go between the radio and the PC. It takes audio from the radio speaker output and feeds via the

Having previously had multiple radios this "shack in a box" was ideal and meant that I could set up my shack in the conservatory instead of being stuck in the black hole at the side of my house usually known as "The Store". Only problem was I hardly ever used it, except for the occasional contest.

Last year, with help from club members, I took down the SCAM mast that held up my beams and installed an 80m dipole. For VHF I satisfied myself with a homebrew Slim-Jim just above the back door. For some time I had wanted to run the FT847 from my computer using Ham Radio Deluxe. I had tried in on my FT817 and liked the look of it. Not only that but it would also give me the chance to try the new data modes package DM780. However when Yaesu designed the FT847 and FC20 Auto ATU they didn't consider remote operation so the computer (CAT) socket on the back of the radio was used to control the FC20 ATU.

This year, following the Xmas Contest and the newly introduced activity log, I decided to re-arrange the radio equipment to enable me use HRD. I already had an underused Tigertronics Signal Link SL1 interface. So I purchased a new Kenwood VM71E dual band FM rig and a dual band collinear. I ran the Kenwood off a ex-club faulty Marston PSU that I repaired and purchased from the club for about half the price of a new one. This meant that I could use the

FT847 primarily for HF with a choice of Vertical (high bands) or 80m dipole (low bands) antennas. I bought a new LDG auto ATU which doesn't require a control connection to the radio. This meant I could use the radios CAT port to control the radio via HRD.

A second hand laptop courtesy of my daughter solved the problems I had had with its successor, an old valve driven laptop of some 10 years longevity, which rather like myself, found any request to do anything physical or useful, met with the occasional blank refusal. I completed the set up with a second 24 inch Samsung LCD screen that I had repaired having rescued it from my daughters' take to the dump box". Running two screens with HRD is great. I have the radio control and log book on the large screen and the DM780 data screen on the lap top. I can automatically add QSO's to the log when I run PSK and connect to the dx cluster when chasing DX.

I am now an avid PSK fan and have also tried other data modes and the weak signal JT655 software. I have a "Altron" look-a-like wind up tower at the bottom of the garden which I might refurbish and erect with some VHF beams on this year (or next).

PSK modes

I was first introduced to PSK modes by Callum M0MCX at Xmas 2011, however

interface to the mic input on the PC. The audio generated by the PC soundcard when transmitting is fed via the PC speaker output via the interface to the mic audio input on the radio. The interface unit will also generate a PTT command when transmitting. Mine goes in via the mic socket and I have a changeover switch to select between digital mode and microphone mode. Other interface units actually have soundcards in them and they can work via the PC USB socket and the radio data socket. (Block diagram)

With everything connected up and the radio switched on and set to a data frequency (see below) and USB mode (to give you the 2.7kHz of bandwidth) you load up the DM780 software and you see the screen below. The screen is split into three; the top half is the decoded text that you are receiving and the middle screen is the text you will transmit and the bottom screen is the waterfall that shows the data signals in the 2.7kHz of bandwidth. PSK31 signals are about 20Hz wide so you can usually see quite a few in the waterfall. You click on one of the data signals with your mouse and the software decodes the signal for you to read in

| DATA FREQS | |
|------------|---------|
| Band | kHz |
| 160m | 1838 |
| 80m | 3580 |
| 40m | 7040 |
| 30m | 10138 |
| 20m | 14070 |
| 17m | 18100 |
| 15m | 21070 |
| 12m | no data |
| 10m | 28120 |
| 6m | 50250 |

PSK continued....

the receive part of the screen. The PSK signal is a constant amplitude signal (like CW) so you set your power level to about 20W. You don't need high power to make world-wide contacts. That is its beauty.

There are also other forms of data transmission which the software is capable of decoding. PSK63 and PSK125 occupy a wider bandwidth and process data faster which is why PSK63 is often used in data contesting.

You set up a series of default replies to make a QSO easy. By highlighting certain parts of the received message you can save the other op's callsign, name and qth for you to refer to in your response.

A QSO would typically be;

Him) CQ CQ de EA1ABC EA1ABC pse k

Your reply) EA1ABC de G0EYO, G0EYO pse k

Him) G0EYO de EA1ABC tks for call. Your report 599 599. Name is Jose, Jose, QTH Madrid, Madrid.JO05AA JO05AA. So BTU G0EYO de EA1ABC k

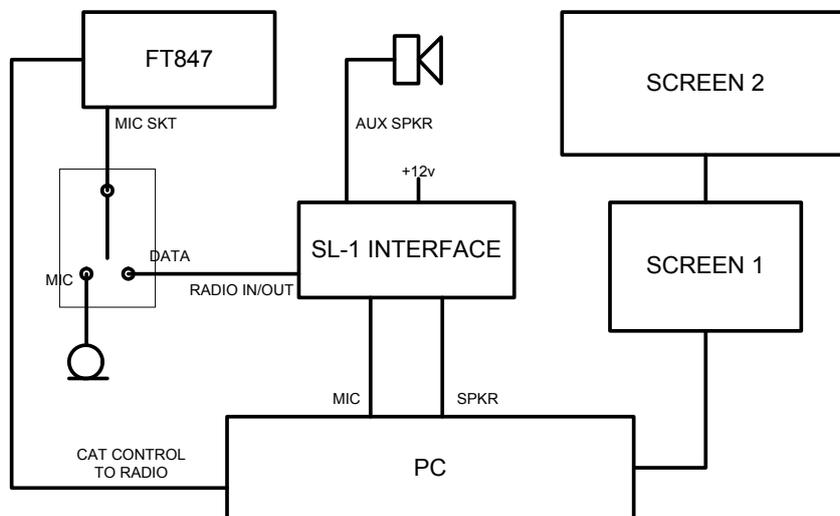
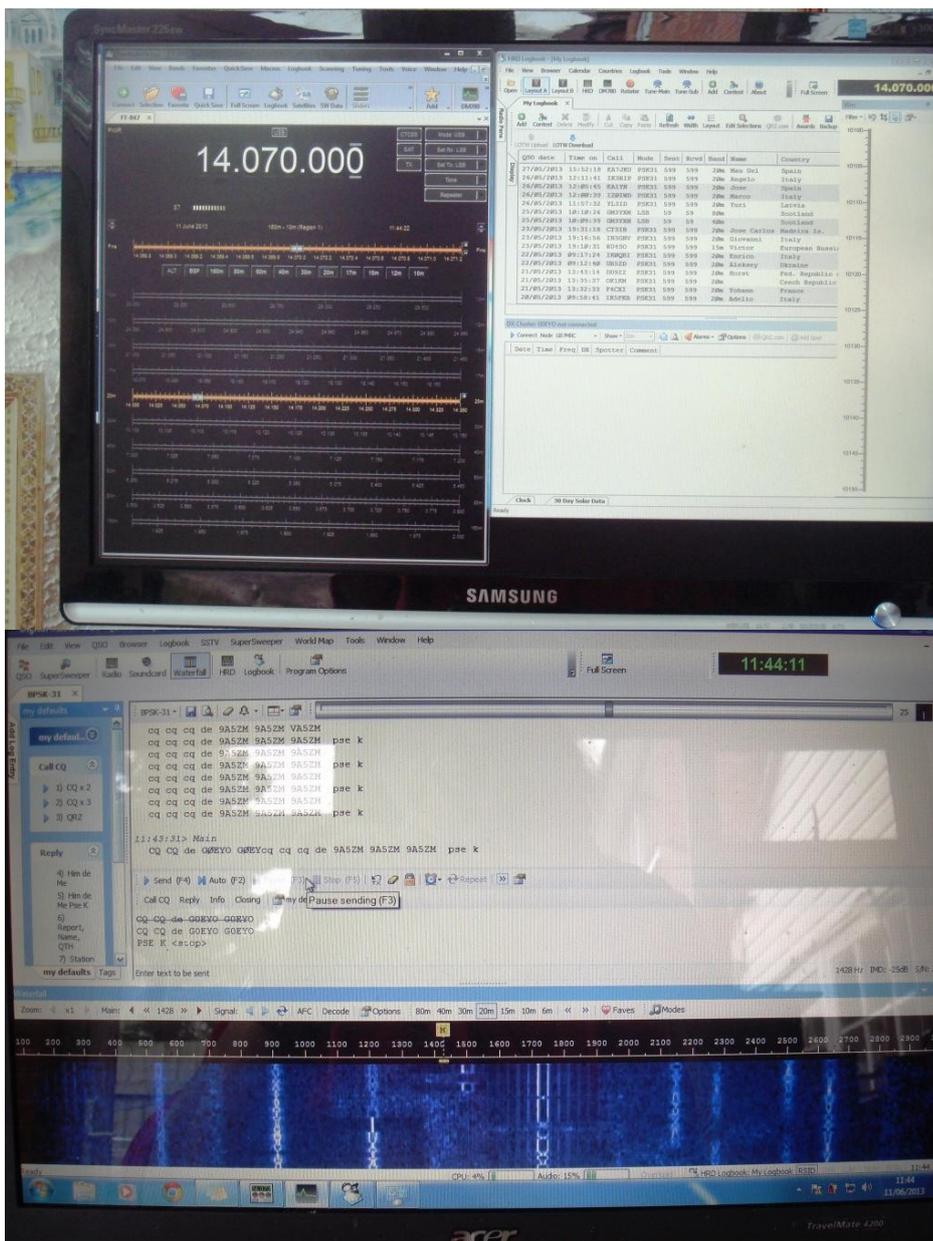
Your report) EA1ABC de G0EYO. All copied Jose. Your report 599, 599. Name is Chris, Chris. QTH Hollywood, Hollywood IO92BJ IO92BJ. So BTU. EA1ABC de G0EYO k

His final) G0EYO de EA1ABC. All copied Chris. Tks fer nice QSO on PSK31 my best 73s to you and your family and look forward to next time G0EYO de EA1ABC k

Your final) EA1ABC de G0EYO 73s Jose. My best to you and your family. Tks for QSO Best wishes for 2013. EA1ABC de G0EYO

With HRD you automatically log the QSO details in its logger programme and there are lots of nice features such as whether you have worked the callsign before on that band or any other.

Chris G0EYO



The H.R.O.5: My experience with this American Receiver

The National Vintage Communications Fair was bursting at the seams this year with a really good selection of Eddystone Receivers, vintage Ham Radio Gear including the early offerings from Yaesu, R L Drake, Swan, and Heathkit. Several good examples of the 1155 receiver and other "classic" receivers of their time were on offer although the prices asked and the entrance fees do reflect the International flavour and overheads of this event. With

Seeing he was on to a loser with it, he offered it for a really silly price and I still managed to get a further reduction. The deal was done and I popped it into the car boot without anything else dropping off.

The National HRO or just the HRO as they are usually

known by were a series of receivers manufactured by the National Company Inc, Malden, Massachusetts. At least 10 different versions were produced and this article details the electrical restoration of a HRO 5 series using International Octal valves.

There are many websites detailing the HRO, it's development and history including variances and valve line-ups. One of the best is the Western Historic Radio Museum site.

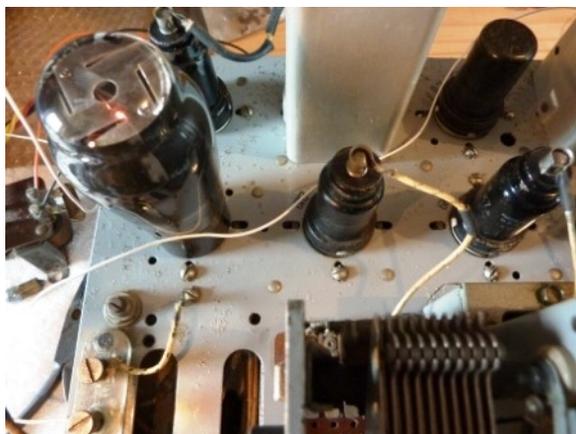
www.radioblvd.com/National_HRO.htm



over 250 traders, there was a lot to look at and rummage through.

A rather lonely looking National HRO together with a tatty cardboard box of 4 plug in coil boxes was on offer at one of the poorer stocked trader tables. The asking price was a bargain when set against some of the other HRO receivers elsewhere in the hall, but as it was still there at 2pm I formed the opinion it probably was a bit of a dogs breakfast. It did look quite reasonable actually and the seller had added a note to say it was "working" which of course is open to all sorts of interpretation. I wandered by the stand and noticed he had managed to sell a rather nice pair of High impedance BBC headphones which I had previously established were open circuit but the poor HRO was still sitting there.

Let's show some interest, not too much mind, and ask a few basic questions. Actually the guy was great to talk to, he said it had been re-capped and was working although would benefit from some more attention. I picked it up and the bottom panel fell off together with a couple of replacement capacitors.....not a good start in my book.



The receiver covers 50kcs to 30mcs in 9 bands selected by plug in coil boxes and in addition to a long wire or doublet antenna, requires 6.3v AC at 3.4A and 240v DC HT and a separate speaker with matching transformer. It does have on the rear panel two terminals which interrupt the HT supply to mute the receiver when used with



a transmitter. The separate mains power unit consisted of a no frills transformer derived LT and HT supply, the HT from the standard valve and resistor/capacitor smoothing arrangement whilst the LT was fed directly from a 6.3v winding. Any suitable supply would do with the HT current draw at 70mA.

Briefly the circuit comprises 9 valves arranged thus:

- 2 Tuned RF stages
- Tuned 1st Detector
- HF Oscillator
- 1st IF employing a crystal filter
- 2nd IF at 456Kcs
- Combined detector and audio pre-amp
- Audio output
- BFO for CW operation

Designed for stable RF performance, the receiver suffers very little in the way of frequency drift and boasts a effective tuning scale length of twelve feet divided in to 500 individual parts. The four gang tuning capacitor is dial driven via a 20:1 backlash free worm drive arrangement.

The moment of truth....

I did a few basic checks and found a rather low resistance reading across the HT connections. There are no electrolytic caps and nothing was obvious so



The H.R.O.5



The operating manual describes each component's function and with the resistors it states the manufacturer as Speer. Cheapo or what! Every one measured at least 50% high but while I had the "bonnet up" it made sense to dive in and change them so in fact the receiver will have most of the passive components changed. I guess the original capacitors must have showed signs of electrical leakage.

Work progressed in a logical sequence using little hand made "Quigs" to join in the new components where I did not want to

turbed so time to get the RF signal generator out!

So was it a bargain or a dogs breakfast?. At about 1/5th of the price of a couple of the other HRO's which were for sale complete with manuals but without power supply, I think I did well. A couple of hours work replacing the components and perhaps two afternoons preparing and refinishing the front panel will get it presentable.

The plug in coil packs which are individually aligned for each HRO need a bit of cleaning. The fact that the coil packs are individually aligned for the receiver may account for the less than sparkling performance on some bands if the packs are not original to this receiver. So work in progress but great fun to do and rewarding to bring this old boat anchor back to some form of life.

Since preparing this article I have cleaned and brought the black crackle finish back to decent condition on a coil pack. The plastic "windows" has yellowed and bowed so these were replaced with appropriate clear plastic panels. I intend to restore the other coil packs in a similar way, a rub over of the crackle finish with WD40 works wonders to restore a tired finish, but the front panel was just too far gone.

as my power supply is metered for both voltage and current I connected up a suitable speaker arrangement and showed it some volts.

It worked!

Perhaps the bits that fell out were surplus to requirements but their connecting wires clearly were formed as if they had wrapped around a tag strip or similar and even without a close inspection, the re-capping was untidy and poor soldering was evident.



disturb the original soldering. Quigs are very convenient and so much easier than trying to unwrap connections from tag strips especially where a mechanical connection has been made prior to soldering.

All done, time for a final test... All OK, better than before but I feel it is not quite on song.

Turning to the mechanical restoration now, the front panel needs re-finishing with black crinkle finish paint, indeed the panel is made from copper sheet for better RF immunity so stripping the old paint is the next task. The tuning worm drive is very hard to turn, indicating the grease within the housing has hardened. A common issue which can be solved with careful dismantling and cleaning.

I am sure a full alignment will peak up the signals nicely but I am not convinced that the crystal filter and selectivity circuits are working properly. None of the IF trimmers seem to have been dis-



Stripping the front panel of original crackle paint was a tedious and messy task, but overall the application of crackle paint by a sponge roller worked satisfactorily and although not perfect does look presentable.

Ian M0IDR



I decided to re-make any solder joint that had been disturbed and as work progressed I accumulated an ever growing mass of surplus solder removed from the previously remade joints. Some more components were only held on by mechanical means with no soldering and it was at that point I thought I would check the resistors for value. I wish I hadn't but of course to do the job properly and stand any chance of proper operation, it was a necessary evil.

VHF NFD 6th/7th July weekend

The club will be entering VVHF NFD entry from Wythall Park over the 6/7th July weekend. The plan is to operate

50MHz: G4WAC/P Restricted Section on Saturday 6th

70MHz: G7WAC/P Restricted Section on Sunday 7th

144MHz: G1WAC/P Open Section and 432MHz: G0WRC/P Open Section over the weekend.

The Contest runs from 3pm BST Saturday to 3pm Sunday and there will be a BBQ in the evening for club members and their families.

VHF NFD has been an established part of the club's calendar for many years and a lot of fun can be had from building and operating the stations. It is also an opportunity to do a bit of experimenting with HF on a plug and play basis when not working on the VHF station. All it needs is good weather to make this a fantastic weekend for all those taking part.



Training News

Six of our foundation students took their exam on the 24th and I am glad to say that 5 passed. Tony will be doing a re-test having missed by one just one mark. Dawn will be taking her exam on 1st July when she returns from holiday. So congratulations are in order for, (l-r) Andy B, John, Kevin, Andy W and George. We expect to learn what their callsigns will be shortly and hopefully work them on the air.

Thanks to Peter G4LWF and David G3YXM for helping out with the teaching and Barry M0DGQ for the morse assessment. Also thanks to David G0ICJ and Colin for invigilating the exam.

The next course will be the club's annual Advanced course. This will be 17 sessions over 14 weeks starting on Monday 2nd September. The exam will take place on Friday 6th December at 6.30pm. The course is held on a Monday evening from 8pm to 10pm except for a couple of Saturday morning sessions which we use for practical demonstrations and revision. We had seven candidates pass their Intermediate in March so hopefully some of those

will want to go further. We also have a number of other 2E0 callsigns in the club and it is probably about time some of them had a go at moving on to advanced. So if you are interested or know of others who may wish to do the course get them to contact Chris G0EYO g0eyo@blueyonder.co.uk.

From July 30th this year the RSGB will be changing the arrangements for conducting examinations. The main change will be moving from paper marking to optical marking using the new computerised examination administration system. Local exam centres will still be able to mark papers at Foundation and Intermediate level and give candidates indication that they have passed

subject to Optical Marking Sheet (OMS) confirming the mark. At Advanced level no local marking will take place as now and candidates will complete the OCR marking sheet which will be sent off to RSGB for computerised marking. The OMS is completed by blacking in, in ink, a rectangle against the chosen answer for each question. The Advanced exam in December will be our first chance to use this new system.
Chris G0EYO



The next issue of the Wythall Radio Club Newsletter will be published at the beginning of Sept 2013

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