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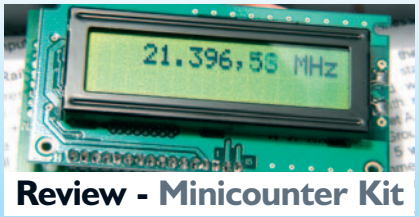


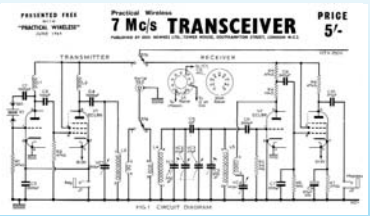
Review - Minicounter Kit

Build It!

The Euro Paddle

VINTAGE PROJECT

A Classic 7MHz Transmitter Receiver



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ICOM IC-756 PRO II £1899 C

Flagship of the Icom range of HF transceivers. HF & 50MHz, features large colour LCD with spectrum scope, auto ATU and 32-bit floating point DSP unit.

ICOM IC-7400 SPECIAL OFFER £1299 C

HF/VHF 100W transceiver. Features large LCD with spectrum scope, auto ATU and same DSP system as IC-756PRO II. **Comes with *FREE* SP-21 Speaker & SM-20 Desk mic.**

ICOM IC-706 IIG DSP £769 C

HF/VHF/UHF mobile DSP transceiver. Its relative small size not only makes it a great mobile rig but also for fixed station use as well. HF general coverage Rx and VHF & UHF.

ICOM IC-703 SPECIAL OFFER £589 C

HF/50MHz Transceiver 0.1-10W Portable, Mobile, Base Station. (9-15.87V DC) Designed especially for the Foundation Licence/QRP. Built-in features auto ATU, DSP memory keyer. (5W when using 9.6V batts)

***FREE!* Icom 703 Logbook - while stocks last**

ICOM IC-718 £449 C

HF 100W transceiver. Covers all HF bands plus wideband receive. C/w auto notch, dual VFO, SWR meter etc. Options include extnl ATU DSP & filters.

ICOM IC-910X with 23cm £1249 C

Icom's all mode VHF/UHF transceiver with 23cm. Large clear LCD with lots of facilities. 100W on VHF and 75W on UHF, 10W on 23cm. IC-910H version £1149

KENWOOD TS-2000 £1599 C

Top-of-the-range 100W Kenwood transceiver. HF/VHF/UHF or up to 23cm with the optional module. Built-in auto ATU, DSP and its unique TNC.

KENWOOD TS-870S DSP £1399 C

HF DSP 100W base station. Excellent all round rig great for DX working with its ability to winkle out weak stations using its true IF DSP. No filters to buy.

KENWOOD TS-570DGE £849 C

HF100W base station with built-in auto ATU. Very popular rig, excellent performance on SSB and CW. Two fitted antenna sockets - very handy.

YAESU FT-1000 MKV £2349 C

200W HF transceiver, EDSP, Collins filter, auto ATU, 220V AC PSU - Acknowledged as one of the finest DX rigs on the market. Superb tailored audio and the ability to select Class A bias for dramatic signal purity.

YAESU FT-1000 FIELD £1749 C

100W HF transceiver, EDSP, Collins filter, auto ATU, 220V AC / 13.8V DC - Building on the success of the FT-1000MkV, the Field has become a respected leader in its class.

YAESU FT-897 NEW £899 C

100W HF rig plus 2m and 70cms (50W/20W) 13.8V external supply / internal optional FP-30V AC power supply / self powered portable using optional Ni-MH pack at 20W output. Compatible with FC-30 auto ATU and ATAS 120/100 antennas. The "must have" radio for 2003.

YAESU FT-857 NEW £729 C

HF/50/144/430MHz Mobile Transceiver HF/6m 100W, 2m 50W, 70cm 20W. (13.8V DC) Developed on the FT-897 and FT-817 transceivers. Built-in features 32 colour display, spectrum scope, AM airband receive, built-in memory keyer, detachable front panel, DSP unit supplied.

YAESU FT-847 £1199 C

1.8 to 440MHz, this all-in-one transceiver offers unbeatable value. 100W on HF plus 6m, and 50W on 2m and 70cm. You get genuine RF clipping on SSB for up to 6dB gain and there are 4 seperate antenna sockets.

YAESU FT-817ND £499 C

bhi DSP Module now available!

160m - 70cms. Up to 5W output all modes. ***Now with Ni-MH battery, charger & DC lead.*** **£589 with DSP ready fitted.**

NEW DSP Module

There is NO new FT-817 DSP! The fact is that the UK manufacturers. **bhi**, (of whom we are their largest distributor), have produced a lovely 4-stage DSP module that can be fitted inside the FT-817. The module costs £89 plus a fitting charge of £25 for retro-fitting to existing models. This includes installing a mini switch and LED on top cover.

NEW FT-817 Clip on metal front support stand. In stock now £19.95 +£1 P&P

YAESU FT-7800 NEW £239 C

Yaesu's Powerful low cost answer!

* 2m/70cms Dual Band Mobile
* High power 50W 2m /40W 70cms
* Wide receive inc. civil & military airband
* CTCSS & DCS with direct keypad mic.
* Detachable front panel
* 1000 memories plus five one-touch

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carriage charges: A=£2.75, B=£6, C=£10

ICOM IC-2725E £269 C

The Icom IC-2725E dual band FM transceiver is proving very popular. Easy to install, the controller is separated from the main unit - great where space is limited.

ICOM IC-2100H £229 C

2m 55W FM mobile. Commercial grade, rugged construction. One piece die-cast aluminium chassis. Selectable green or amber display.

YAESU FT-8800E NEW £289 C

2m/70cm Mobile *144-146MHz,430-440MHz Tx *108-520MHz, 700-999MHz Rx * 512 memories per band * 6 Hyper memories* tuning steps: 5/10/12.5/15/20/25/50kHz * Audio: 2W output * Supply: 13.8V DC *Size: 140x41.5x168mm Weight:1kg

YAESU FT-8900R NEW £339 C

Want the best of all worlds then the FT-8900R is just the ticket! A rig with four of the most popular mobile bands - 10m/6m/2m & 70cm. Detachable head. Airband Receive.

YAESU FT-2800M £159 C

The FT-2800M 2m FM 65W High Power mobile transceiver. Rugged construction, excellent receiver performance and direct keypad entry.

ICOM IC-2200H NEW £199 B

The IC-2200H is the latest version of this popular high power 2m mobile rig. It has 207 memories inc 1 call channel & 6 scan edge memory channels.

*144 - 146MHz FM *65/25/10/5W RF o/p *CTCSS & DTCS *Green/amber display *Audio: 2.4W o/p *Tx 15A (65W) *Rx 1A (max audio) *Standby 0.8A *Power 13.8V DC *Size: 140x40x146mm

KENWOOD TMD-700E £449 C

Certainly the best dual band mobile transceiver with APRS. Does not need extra high cost boards to function. The only extra if required is a compatible GPS receiver.

KENWOOD TM-V7E £359 C

A lovely cool blue display, easy with 50/35W output. 50W/35W plus 280 memos and five storable operating profiles.

KENWOOD TM-G707E £289 C

If you are looking for simplicity and low cost, here's the answer. 2m & 70cms with detachable front panel and "Easy operation mode" GREAT!

IC-E208 NEW £279 B

VHF/UHF FM Dual Band Mobile Transceiver *Freq range 144-146MHz, 430-440MHz Tx *55/50W (3 pwr steps each band) *Wideband Rx 118-173, 230-549 & 810-999MHz *512 memories *FM narrow capability *104x2 DTCS, 50 CTCSS tone squelch *16 DTMF channels *HM-133 remote control mic *Packet ready for 9600/1200bps-mini DIN or 1200bps-mic socket *Supply 13.8V

YAESU VX-7R £299 B

6m/2m/70cm handie. The case, keypad, speaker and connectors are all sealed against water damage. Wide Frequency coverage from 500kHz to 900MHz. Easy-to-read 132x64 dot matrix display + plus pictorial graphics.

Available in Silver or Black

YAESU VX-2E NEW £169 B

Dual Band Ultra Compact FM Handie. The VX-2E is unbelievably small yet provides 1.5W on 144MHz and 1W on 430MHz (3/2W with external supply). General coverage receiver 0.5-999MHz, which includes AM mediumwave & FM broadcast bands plus AM aircraft & UHF TV bands.

YAESU VX-110 £119 B

Combining the ruggedness of the VX-150 with the simplicity of 8-Key operation, the VX-110 is a fully featured 2m handheld ideal for the most demanding of applications. It has a die-cast case, large speaker and illuminated keypad.

ICOM IC-E90 £269 B

The new E-90 offers triple band coverage of 6m, 2m and 70cms. Up to 5W output and rx coverage from 495kHz - 999MHz makes this a very attractive rig.

ICOM IC-T3H £129 B

The IC-T3H 2m handheld features tough quality but with slim looks. Its striking green polycarbonate case has been ergonomically designed. The rig is capable of providing a powerful 5.5W output with either Ni-Cad or Ni-MH battery packs. Supplied with charger and rechargeable battery.

KENWOOD TH-D7E £319 B

DATA COMMUNICATOR

One of the most successful handhelds over the past few years. It has a built-in TNC for Packet use. You can also use it for APRS operation in conjunction with an external GPS unit. Plus NMEA, 200 memos, and up to 5W output.

KENWOOD TH-F7E £249 B

WITH EXTRA WIDE RX COVERAGE

- 144-146MHz Tx/Rx: FM
- 430-440MHz Tx/Rx: FM

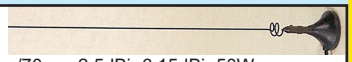
Up to 6W out with Li-ion battery and "scanner" style coverage from 100kHz to 1300MHz including SSB on receive! This is a great radio to have at all times when you are on your travels.

KENWOOD TH-G71E £199 B

If you want an excellent 2m/70cm dual-bander then you can't go wrong with the TH-G71. Fully functional with three power levels, 200 memories, CTCSS tone encoder/decoder, illuminated keypad and backlit LED.

MOBILE ANTENNAS

WATSON ANTENNAS (PL-259 base type)



Comes with coax & BNC

WSM-270. 2m/70cm, 2.5dBi, 6.15dBi, 50W max, micro-magnetic 29mm base, length 0.46m. **£19.95** A

W-2LE	2m quarter wave 2.1dBi 0.45m	**£9.95**	A
W-285S	2m 3.4dB 0.48m (fold over base)	**£14.95**	B
W-77LS	2m/70cm 0/2.5dB 0.42m	**£14.95**	B
W-770HB	2m/70cm 3/5.5dB 1.1m	**£24.95**	B
W-7900	2m/70cm 5.6/7.6dB	**£32.95**	B
W-627	6m/2m/70cm 2.15/4.8/7.2dB 1.6m	**£34.95**	B
WGM-270	2m/70cm On glass 3.7m coax 50W	**£29.95**	B

MOBILE BASES

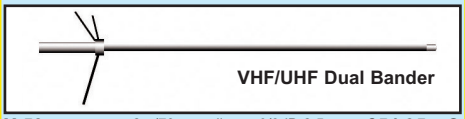
WATSON

WM-14B. Large diameter 14cm magnetic mount SO-239, c/w 5m RG-58 & PL-259

W-3HM	Adjustable hatch mount	**£14.95**	A
WM-08B	8cm mag mount, 5m cable PL-259	**£9.95**	A
WM-14B	14cm hvy duty mag mount+cable	**£12.95**	A
WSM-88V	BNC mag mount plus 3m cable	**£14.95**	A
W-3CK	5m 5D-FB cable assembly+pigtail	**£18.95**	A
W-ECH	5m standard cable kit assembly	**£12.95**	A

BASE STATION ANTENNAS

DIAMOND



VHF/UHF Dual Bander

X-50	2m/70cm colinear 6/8dB 2.5m	**£54.95**	C
X-50N	2m/70cm colinear 6.5/9dB 3.1m	**£59.95**	C
V-2000	6m/2m/70cm 2.15/6.2/8.4dB 2.5m	**£89.95**	C

CHECK OUR WEBSITE FOR FULL DIAMOND RANGE

WATSON

W-300. Very popular dualband base antenna. Supplied with u-bolts for mast fixing.

W-30	2m/70cm colinear 3/6dB 1.15m long	**£39.95**	C
W-50	2m/70cm colinear 4.5/7.2dB 1.8m long	**£49.95**	C
W-300	2m/70cm colinear 6.5/9dB 3.1m long	**£64.95**	C
W-2000	6m/2m/70cm 2.15/6.2/8.4dBi 2.5m	**£69.95**	C

WATSON W-25XM PSU NEW £99.95 B

A compact sized switch mode power supply that will run your base HF station with ease.

*Output Voltage 10 - 18V DC *Output Current 22A / 25A peak *Over current protected *Rubber Feet *Supply 230V / 115V AC 50/60Hz *Switchable dual voltage input *Size 220 x 180 x 73mm *Weight 1.8kg

WATSON W-25SM PSU £79.95 B

Very popular budget switch mode power supply. *Output voltage 13.8V DC *Output current of 22A (25A peak) *Front panel output terminals *Over current & voltage protection *Quiet operation

WATSON W-25AM PSU £89.95 C

DC power supply for the shack & esp. for use with 100W transceivers. Separate voltage and current meters. *Output voltage 0-15V DC *Output current of 25A (30A peak). *3 sets of output terminals *10A cigar socket. *Over current protection

CHECK OUR WEBSITE WWW.WSPLC.COM FOR MORE DETAILS OF THESE PRODUCTS

WATERS & STANTON

1973 WATERS & STANTON PLC 30th ANNIVERSARY 2003

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VERTICAL ANTENNAS

Hustler Mobiles

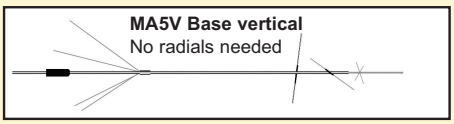
Get top performance when on the move. Purchase the **MO-3 base** (137cm) for **£24.95** or the **MO-4 base** (68cm) for **£22.95**. Then add the resonator of your choice. **RM-10, RM-12, RM-15**, all **£19.95** ea. **RM-17, RM-20 £24.95** ea. **RM-40 £26.95, RM-80 £29.95**

Resonator

Base section → MO-3 or MO-4

CUSHCRAFT BASE ANTENNAS

MA6V	20-17-15-12-10-6m 250W PEP	**£269.95**	C
MA5V	20-17-14-12-10m 250W PEP	**£239.95**	C



R8	40-30-20-17-15-12-10-6m 1.5kW	**£469.95**	C
R6000	20-17-15-12-10-6m 1.5kW PEP	**£329.95**	C

BUTTERNUT BASE ANTENNAS

HF9V-X	80-6m 7.9m 1kW PEP	**£349.95**	C
HF6V-X	80-40-30-20-15-10m 7.9m 2kW	**£299.95**	C
HF2V	80-40m 9.75m (160m opt) 1kW	**£229.95**	C

HY-GAIN BASE ANTENNAS

AV-640	40-6m 1.5kW, 300W 6m (PEP)	**£369.95**	C
AV-620	20-6m 1.5kW, 500W 6m (PEP)	**£279.95**	C
AV-14AVQ	40-20-15-10m 1.5kW PEP	**£169.95**	C
AV-12AVQ	20-15-10m 1.5kW PEP	**£139.95**	C
DX-88	80-10m 1.5kW, 250W 30m	**£369.95**	C

HARI High quality German traps. (Pairs)
200W 20m £44.95 40m £49.95 80m £53.95
1kW 20m £59.95 40m £64.95 80m £73.95

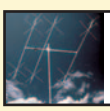
HARI High quality German Baluns SO-239
200W 1:1, 4:1 or 6:1 £25.95 ea.
1kw 1:1 £34.95 4:1 or 6:1 £41.95 ea

HORIZONTAL BEAMS & DIPOLES

CUSHCRAFT

Premier HF beam used around the world by serious DX'ers.

X-7	20/15/10m 7 el. Yagi 2kW	**£669.95**	D



Not got the space for a full sized HF beam antenna, then the mini beam MA-5B should be considered.

MA-5B	10-12-15-17-20m 4 el. Yagi 2kW	**£369.95**	C
A4-S	10-15 & 20m 4 el. Yagi 2kW	**£569.95**	D
A3-WS	12 & 17m 3 el. Yagi 2kW	**£379.95**	D
D-3	10-15-20m dipole element 2kW	**£249.95**	C

Don't want a wire antenna but can't fit a Yagi, then consider a rotatable dipole.

D-3W	12-17-30m dipole element 2kW	**£249.95**	C
D-4	10-40m dipole element 2kW	**£349.95**	C
D-40	40m dipole element 2kW	**£319.95**	C
TEN-3	10m 3 el. Yagi 2kW	**£229.95**	C
ASL-2010	13.5-32MHz 8 el. log periodic	**£749.95**	C

RADIO WORKS

A choice of quality wire antennas available to fit almost any circumstances.

CW-160	160-10m 76.8m long	**£129.95**	C
CWS-160	160-10m 40.5m long	**£119.95**	C
CW-80	80-10m 40.5m long	**£89.95**	C
CWS-80	80-10m 20.1m long	**£109.95**	C
CW-40	40-10m 20.1m long	**£84.95**	C
CW-20	20-10m 10.36m long	**£89.95**	C
CW-620	20-6m 9.7m (32ft) long	**£89.95**	C
G5RV PLUS	80-10m with balun 31m (102ft) long	**£59.95**	B

YUPITERU MVT-3300 SCANNER £129 B

The MVT-3300EU covers most of the useful bands in the VHF and UHF spectrum. It has 200 memories as standard with a range of band and security channels as well. It has functions normally associated with more expensive sets such as pre-setting the receiving mode and frequency step, Duplex reception with "One Touch" function, Auto-Write and Search-Pass memory functions. There is also a Decipherment function to receive certain scrambled communications.

WATSON FC-130 Frequency Counter £59.95 B

SPECIAL PRICE

The FC-130 is an ideal frequency counter for the shack, mobile or portable use. Supplied complete with Ni-Cads, charger and telescopic whip.

ICOM IC-R20 SCANNER NEW £429 B

- *Frequency coverage 150kHz - 3304.999MHz*
- *FM, WFM, AM, USB, LSB, CW*
- *14 Tuning steps 0.01 - 100kHz*
- *1,250 alphanumeric memories*
- *Bandscope (bandwidth 1 - 100kHz)*
- *CTCSS & DTCS tone squelch function*
- *Built-in 32MB IC recorder (up to 260 minutes)*
- *CI-V compatibility (option)*
- *Built-in ferrite bar antenna for AM broadcasts*
- *Built-in attenuator & RF control*
- *Noise blanker & Auto Noise Limiter*
- *120mW audio (8 Ohms)*
- *Supply 6.0V DC extl*
- *BP-206 or 3xAA alkaline cells*
- *Size 60 x 142 x 34.8mm • Weight 320g*

The IC-R20 wide-band, all mode communications receiver from Icom. It has wide frequency coverage all-modes, a real-time bandscope function as well as PC cloning capability.

MFJ-971 QRP Portable ATU £99.95 C

*1.8 - 30MHz *300W/30W/6W selectable *Cross needle meter *12V DC Ext. *SO-239 sockets *Tunes wire, coax, balanced line *Terminals & earth post *Size 160 x 150 x 60mm *Weight 870g

The MFJ-971 is the ideal QRP ATU to have on hand. It incorporates a cross needle SWR meter and displays forward or reflected power and SWR simultaneously.

HUSTLER ZERO SPACE DX ANTENNAS

The answer to your HF Antenna Problem

Run full legal power - 80m to 10m - with no masts or guys. Low VSWR 50 Ohm feed.

These HF verticals will take 1kW of power, work at ground level, and are self-supporting. A single earth rod will get you going. Add buried radials for even better results. These are rugged, well-built antennas that American hams have been using for years. Now they are available in the UK from our three stores.

4BTV
40-20-15-10m. 6.52m high. **£149.95 C**

5BTV
80-40-20-15-10m. 7.64m high. **£179.95 C**

6BTV
80-40-30-20-15-10m. 7.3m. **£209.95 C**

NOTE: 80m coverage limited to 100kHz on 5BTV & 6BTV

YAESU VR-120D £119 B

The VR-120D handheld scanning receiver covers from 100kHz to 1300MHz. AM/FM/WFM modes (inc. preprogrammed broadcast freqs). The VR-120D's small size and tough polycarbonate case allows you to take it anywhere -hiking, skiing or while walking around town.
Power is provided by 2 x AA batteries (not supplied). Ni-Cad batteries and charger are available as options.

RIGBLASTER-PLUS

The Adventure Begins!

~~Was £139.95!~~
£119.95
Order as RB/PL/C

New Low Price!! Explore all the new digital modes. All leads provided for computer and radio. Just connect between PC and transceiver. Plugs into 8-pin and RJ-45 radios. Internal jumpers to match your radio. Software on supplied disc for CW, RTTY, PSK-31, SSTV, Packet, AMTOR, DVkeyer, WSJT, Mic EQ, Rig CTL, EchoLink etc. Requires 12V DC

NOMIC Similar to above but no 8-pin front panel socket and no CW keyer function. Self-powered. **£59.95**
Code: RB/NO/8C for 8-pin rigs **RB/NO/RJ** for RJ-45 rigs

HEIL QUALITY MICROPHONES


HCL-5/4


GM-4/5


HST-817


PROSET +

Desk Microphones

HCL-5/4	Classic retro-look HC-5/4 desk mic	**£199.95**	B

Hand Microphones

GM-4/5	Goldline HC-4/HC-5 hand mic	**£109.95**	B

Headsets & Boom microphones

HST-YM	Traveler single side headset for FT-817	**£79.95**	B
HST-706	Traveler single side headset for IC-706	**£79.95**	B

Headphones & Boom Microphones

PRO-SET-PLUS	Large H/phones with HC-4 & HC-5	**£155.95**	B

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Cover subject

Cover Subject
Taking part in local events raises the profile of your Radio Club as shown in this month's cover photo taken at the Mayor of Poole's Charity Fayre. For the full story on how the event went see page 13, Enjoy this issue!
Design: Bob Kemp
Photograph: Courtesy of Poole Radio Society

July features


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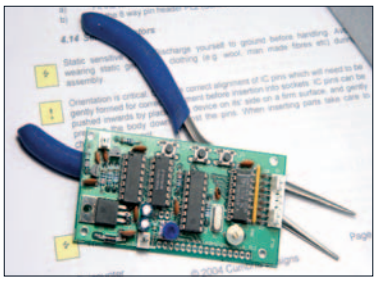
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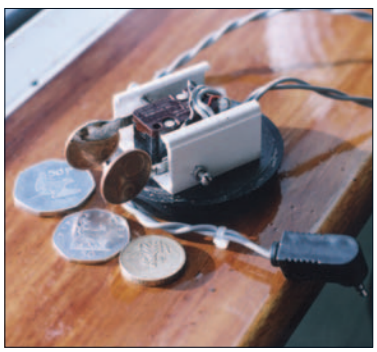
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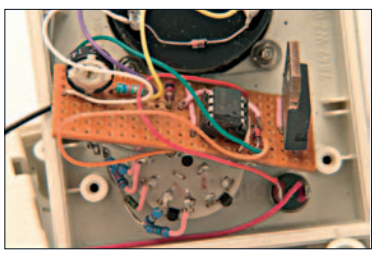
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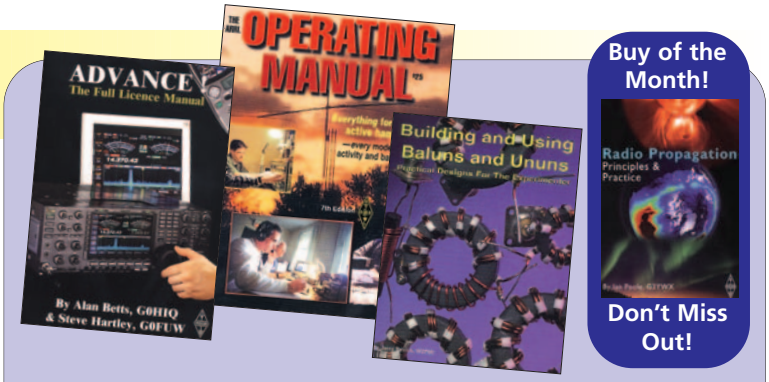

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rob mannion's keylines

Welcome to 'Keylines'! Each month Rob introduces topics of interest and comments on current news.

Every now and again we publish an article or mention a subject that really attracts readers' attention. On this occasion the article which pleased so many of you was Those Glorious Surplus Days. It looked back at the 1940/1950s when *PW* carried many Second World War surplus equipment adverts. The article was a pleasure for me to prepare because it reflected my own heritage as my very first 'proper' h.f. set was an 18 Set receiver.

The only problem was stopping myself from becoming totally absorbed reading the *PW* archives. Incidentally, while on the subject of archives - it was pleasing (especially for **Tex Swann G1TEX/M3NGS** who did all the hard work) to learn how many of you enjoyed reading the No.1 *PW* issue from 1932 on our recent CD ROM callsign directory. I hope to have some more news on the next CD ROM soon. Watch this space!

Another item which has attracted the attention of readers (from all over the world so it seems) is the proposed article on the EF50 valve. Thanks again, especially for all the useful references and suggestions, and because of this it's likely to be a two-part feature.

Incidentally, because of the great interest shown in the EF50 feature, I'm also preparing a similar article on the EF91 (this will certainly not appear in 2004, but is more likely to appear in early to mid 2005). The EF91, the Osram valve immediately to the right of the large 807 in the photo in **Fig. 1**, was a 'miniature classic' itself and I bought most of mine from Padgett's Radio Store, Old Town Hall, Cleckheaton in Yorkshire. Remember them?- they were experts at sending the valves safely for only 9d each in old money.

Fig. 1: The ECL86, EF91 and 807 valves photographed with other 'classics' thermionic devices including the famous 954 and 955 'Acorns'. Coincidentally, the ECL86 (left in photograph) features this month in the 7MHz valved transmitter-receiver on pages 42 to 45.

Finally, while in 'memory mode' I'm aware that the small number of valves shown in Fig. 1, will provide many a 'classic' article. The 954 and 955 types have an amazing history (if you can help provide more details please do!), and - by sheer chance - the valve on the left of the 807 is an ECL86, which features this month in the 'Classic Project feature on page 42 to 45. Enjoy!

Neill Taylor G4HLX

I'm pleased to pay a further tribute to **Dr. Neill Taylor G4HLX** - the *PW* 144MHz Contest originator and Adjudicator, by announcing he's also taken over the full administration of the event. Neill has very kindly agreed to take on the extra work - despite his own hectic work as a Nuclear Physicist - because I've proved inadequate in doing the job at the *PW* end.

Unfortunately, experience has proved - as Contest Trophy Winners have discovered - that because of editorial work I've been unable to efficiently organise trophies, engraving and presentations, etc. My apologies go to everyone effected by the delays, and I'm sure things will improve very much indeed. Thank you Neill, and if we manage to work each other on **Contest Day 13 June** - the Red Wine will accompany my QSL card!

Cybermen Take Over!

I'm finishing this month by sharing the story of how the 'Cybermen' have taken over the *PW/SWM* Editorial office! The 'Cybermen' term was suggested by **Donna G7TZB/M3TZB** because nowadays I enjoy listening to my classical music, etc., using Philips cordless u.h.f. (licence exempt) battery powered radio headphones. In effect it's a miniature broadcasting station.

Obviously I look like the proverbial Cyberman when wearing the (marvellous) headphones. I feed the audio into the transmitter unit from the CD player, video or DVD player. Radio programmes are recorded for my personal use via Terrestrial Digital TV (TDTV) at home ether on to eight hour VHS video tapes or increasingly on to DVDs with the audio fed straight to the ultra QRP (10mW!) transmitter.

The headphones are extremely useful at home and in the shack. But now **Bob Kemp** in the Art Department has a set of radio headphones (giving me another channel to listen into), and these join **Tex G1TEX's** infra-red linked version of the same headphones!

However, one of the staff in the Accounting Company in the same office complex (he has his own a set of the headphones) buttonholed me one lunchtime saying: "Dad's Army I like, there's no problem with BBC Radio 3 and Radio 4 drama either - but please...no Gregorian Chant music"!

So, I'm now thinking of making 'what's on' announcements via a tape. Best man to do it will be my friend **Jim Lee G4AEH** who works professionally on BBC R7 continuity announcements and also BBC Radio 4. A nice professional touch eh? Cheerio for now.

Rob G3XFD

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In general all components used in constructing *PW* projects are available from a variety of component suppliers. Where special, or difficult to obtain, components are specified, a supplier will be quoted in the article.

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We have a selection of back issues, covering the past three years of *PW*. If you are looking for an article or review that you missed first time around, we can help. If we don't have the whole issue we can always supply a photocopy of the article. See page 72 for details.

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We regret that due to Editorial time scales, replies to technical queries cannot be given over the telephone. Any technical queries by E-mail are very unlikely to receive immediate attention either. So, if you require help with problems relating to topics covered by *PW*, then please write to the Editorial Offices, we will do our best to help and reply by mail.

amateur radio waves

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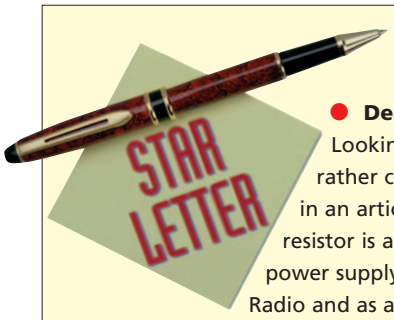


Cavalier Attitude?

● **Dear Sir**

Looking at a recent *PW* I noticed a rather cavalier attitude to decoupling in an article, indicating that a series resistor is an optional extra to reduce power supply ripple. A career in Amateur Radio and as a professional engineer has shown me countless circuits where this belief has needed a redesign, wasting time and money or resulted in a 'not quite' performance.

Yes, you can often get away with just a capacitor, but: (1) I remember a m.w. radio where the power supply electrolytic was all the decoupling there was, which was fine till it dried out a bit, when marked hum was soon followed by i.f. amplifier oscillation! This sort of thing still happens when a circuit, designed in isolation with a stabilised power supply, is used with other circuits sharing long power supply leads.

(2) There was the 5 band kit transmitter which suffered from marked lack of drive at 7MHz, (not 28 which might be expected). I traced this to the driver stage anode decoupling 0.01µF resonating with another 0.01µ on the supply rail and producing a high impedance in series with the normal anode load circuit at 7MHz so stealing output. A 1kΩ resistor in place of the few inches of wire connecting the capacitors was all it took to cure it.

For both amateurs and professionals decoupling needs both carrot and stick, i.e. the easy path via the capacitor *and* a resistor in an other path to make it hard. This is playing it safe, but a resistor is cheaper than a redesign even with the test gear available to find out what is wrong.

Barry Priestley BSc ex G3JGO
Portsmouth
Hampshire

Editor's Comment: Ignoring the requirements of decoupling is surely a recipe for disaster. It's especially important with high gain audio i.c.s which are so commonly used in home-brew projects. Thank you for your wise words Barry.

Those Glorious Surplus Days

● **Dear Sir**

I very much enjoyed the article Those Glorious Surplus Days, please let us have more of the same! In regard to the TR1196, if you look at **Figs. 1** and **2** you will see that they are one and the same units, only viewed from different angles.

The RAF system was to identify complete transmitter/receiver units with the 'TR' designation and the separate component units with 'T' for the transmitter and 'R' for the receiver. The exception to this was the 'TR' 1355 which was the receiver for the Gee system and the 'TR' designation was done in attempt to fool the Germans into thinking it was something else.

Of course many TR1355s were used as the receiver in the home-built television sets such as the one you described. I made one, but it was to the circuits given in the booklet called *Inexpensive Television* published by Data Publications Ltd. of *Radio Constructor* fame.

I was doing my National Service in the RAF at the time of the Coronation and after early morning parade at RAF Lyneham, I cycled 25 miles home and we watched the show on my VCR97 tubed TV set, but had to listen to the sound on my R1155 as I never did get round to making a sound receiver.

The units I used were the Indicator Unit 62 and the TR1355 - both being the constituent parts of the Gee navigation system, which incidentally was still in use at that time using those units.

As regards to Lisle Street, etc. that was always a first port of call for the Stroud contingent to the old RSGB Exhibitions that were held every year, but my most undying memory of surplus was of buying a T1154 transmitter from Charles Britain's establishment just off Trafalgar Square and carrying it across London to Paddington Station during the evening rush hour and then carrying it a mile home from the railway station. I was young and strong in those days - 52 years ago. Little did I think then that within a year I would be humping that transmitter around for real when I was in the RAF.

Incidentally, on that trip I bought an AYF Radio altimeter unit just to get the 'Acorn' valve base to use in my home-built Grid Dip meter, that equipment was still in use and was also one of the units I trained on during my course at RAF Yatesbury.

Incidentally the GDO is still in use after over 50 years and is much better than the Heathkit one I purchased a few years ago at a 'Silent Key' sale.

Mike Mills G3TEV
Stroud
Gloucestershire

Editor's comments: Thanks for the information and your memories Mike! A large number of readers wrote in with the same information but Mike's was the first received! Thank you everyone. According to the late Professor R. V. Jones in his book *Most Secret War* - he suggested the TR designation for the 1355. The idea worked too as I understand it. (Please see Keylines for further comments).

More Commercial Than Home-Brew?

● **Dear Sir**

My name is Joe and I have been interested in radio since a very young age, I am now 36 years old. I am not a regular reader of *Practical Wireless*, but I must say that today's *PW* is more complex in circuits. I remember a long time ago there were more circuits and constructional projects, these days circuits use i.c.s, but I think that *PW* should publish some of the old circuits using valves. These could include linear amplifiers or perhaps designs such as the 'HAC' radio or something similar, otherwise using valves will be a dying skill.

In my opinion Amateur Radio for the newcomer is an easy task today. Everything is ready made, so it's not so much a hobby and is more commercial.

Joe Camilleri 9H5CO
Gozo
Malta GC

Editor's reply: Amateur Radio is flexible Joe, you can mould it to your requirements and interests, building everything yourself, having a mixture of commercial and home-brew or choosing to own an entirely 'commercial' station. It depends entirely on your own preferences, abilities (and access to money of course!). Subsequent E-mails to Joe established he hadn't seen *PW* for a very long time until very recently and was not aware of the 'Classic' valved projects we've featured in 2004. However, now the Malta GC is in the EU hopefully *PW* will be cheaper in the Island state!

Topical Talk Feed-Back

Dear Sir

Re: Topical Talk and the letter from Ian Wilks in the May 2004 *PW* received today has prompted the writing of this letter. The EF50 has always been a favourite of mine and I am so pleased that an article on this fantastic valve is in the pipeline.

Two years ago a letter of mine was published in *SWM* requesting details of the receiver of Jack Hum as was published in *SWM* August 1946 as I wanted to build it. I never received a reply at the time, so when the details were published again, I hope you give it a go.

In my collection of data I have some articles on the EF50, so I will list them to enable you to look them up at your end. Including *SWM* of August 1946 they are:

1) *Radio Constructor*, October 1954 - general purpose circuit for the EF50.
2) *Radio Constructor*, September 1956 - simple EF50 tester.
3) *Radio Constructor*, December 1956 - letter re: 2 above.
4) *PW* September 1965 - The Versatile EF50.
5) *SWM* September 1991 - the fifty from the forties.
6) The DX Magnet Pre-amplifier Radio ZS (date unknown).

Your own records will turn up, the *PW* and *SWM* items, but if you require copies of the owners, please advise and I will post you copies.

Also, in the May edition, I was pleased to read the item on the Eddystone 940 as I have one in my collection. In the July, September and November 1988 *SWM* there was a series 'Restoring an Eddystone 940' receiver, which was very informative.

My collection of radio receivers is at present 200 plus, including over 40 communication receivers, which are packed away all over the house, garage (the car stays outside), storerooms, roof space, etc., of course, the family refers to its as Dad's Junk! They are all waiting for me to turn up my toes so the collection can be dumped!

The communication receivers comprise of the following makes: Eddystone, Marconi, Racal, Drake, Trio, Hallicrafters, Echophone, National Hammerlund, RCA, Heathkit, Western Electric, Meissner, Tobe Deutcheman (in pieces), EMI (who have no record of the particular model).

Domestic type receivers are of British, United States and Post War German makes. As I am to the best of my knowledge the only serious collector in East London, I feel very isolated, there are other collectors in other parts of South Africa, some of whom I have been in contact with, but have never been able to visit them.

My own collection also extends to include audio equipment, reel-to-reel tape recorders (including the old wire recorders), test equipment and anything else interesting relating to things electronic, books and 750 items, most British and American magazines since the 50s, plus odd items back to the 20s.

I started to read *Practical Wireless* in 1954, however, there are gaps since that date due at that time to no money and a growing family. Over the years I have kept my eyes open for missing magazines and have found them in second-hand shops, flea markets, auction sales, charity shops, etc., came across copies of early issues recently, its amazing just what comes to light from time to time here in darkest Africa!

As far as valves are concerned, years ago when firms were dumping stocks of valves, I grabbed all I could get, as a result when I need a spare for a repair or project, most times I have the item required. My stock is about 13000 in all, most of which I will never use in my lifetime. Some are salvaged which are checked and if below spec., are dumped. I got a lot recently from the family of a Silent Key and have found about 50% of them were useless.

At present, the local museum has a display of some of my items comprising of radios from the 1920s to the 1970s plus one display of different valves from the 'R' types, up until the Nuvistors and another display of components from the 20s and 30s. The display was all put together at very short notice as originally discussions took place in Oct/Nov last year for a display to be set-up in February 2004, then in December there was a change of plan. It then all had to be put in place within two weeks, so there was a mad flap in digging out suitable items and writing up the text for the displays.

The oldest items are an old wet cell from the 1880s, which I last used for my first radios in about 1946 (i.e. for filaments). There is also a GEC crystal receiver of 1923, Philips mains set of 1928, Eddystone receiver in diecast case (model no. unknown), probably from the late 20s or very early 30s. Home-made receiver (incomplete) looking like it was made in the late 20s (picked it up at auction for a few bob about 25 years ago).

The display will remain at the museum until the end of the year, it has now had added to it a display from one of the local radio stations who are having their 10th anniversary.

Referring back to *PW* of May again, and the Editor's article 'Radio Basics', I agree, a good set-up of equipment can be obtained at low cost. The older equipment I have collected does the job I need it for, and it hasn't cost me much at all.

I picked up an Avo model 8 as shown by you about a week ago at a cost of R50 (about £4 in real money) which was looking even more grubby then the one in your photograph. Mine too has the white lettering missing, and I have tried white wax crayon, not very good result, have also tried correcting fluid, which is a bit better, but not 100%. I have managed to overcome the problem of the 15V battery when I was given a number of 3V (new) lithium cells (the same type found on computer mother boards - and have found that in most cases the cells from scrapped boards are normally okay is therefore a source of supply on the cheap).

I have made up a plastic tube to hold the cells plus a thick washer/space of the same diameter as the cells placed at each end. I have bent the battery clips inwards, which locate onto the holes in the space/washers, works like a charm, have used it on another meter of mine and also an American made Weston multimeter.

Hope I haven't bored you to tears with this missive?

Neil Bousfield ZR2DR
East London
Republic of South Africa

Editor's comment: Bored Neil? Not a chance - a fascinating letter! I ask you to get busy, take some photographs of your collection and write an article to share your knowledge/collection and enthusiasm with other readers. A *PW Author's Guide* is on its way to you and I look forward to helping you prepare your - it's bound to be - fascinating article.

Amateur Radio In Athens

● **Dear Sir**
Every month I read carefully the readers' letters. In the April issue of *PW*, **Dr. P. Dostoevskii** wrote the star letter, I find it very interesting and I agree the need for a feature both written by and for young people. Our goal must be getting more young people into our hobby.

I wish Dr. Dostoevskii soon will succeed in getting the Licence. In order to encourage him, I can say that (I know very well since am 50 years old), the age of the student is not very important for taking the exams, especially in beginner categories.

As you may know, here in Greece we have two Radio Amateur categories, Category 1 with full access (prefix SV) and Category 2 with access to 144MHz and up (prefix SW). Last year I take the exams for category 2 and this year, with little more work I take the exams for category 1 (I do not know the results yet). So Dr. Dostoevskii, do not give up and get the license.
P. Dadis SV1GRN
Athens
Greece

Editor's congratulations: Thank you for your feedback and suggestions. Not long after Mr Dadis sent the original E-mail (he's a regular corespondent) he told me he had obtained the 'SV' prefix. I was delighted to alter the 'SW' to SV on his behalf. Congratulations!

National Vintage Comms Fair

● **Dear Sir**
The **National Vintage Communications Fair** was held at the NEC, Birmingham on the first Sunday in May. It was organised by the **British Vintage Wireless Society** and was a marvellous day out.

The **Eddystone User Group** had a stand and I admired an Eddystone model 770S. It has 30 valves and covers 500 to 100MHz. It was made from 1961 to 1966.

There were large numbers of domestic radios, components, gramophones, 78s, books and a lot of old telephones. My bargain of the day was a crystal set with the coil wound on a peanut butter jar! It has a dual gang capacitor and the spare gang will do for another set.

Again, a marvellous day out and I will definitely attend next year. Thank you for telling me about it and providing directions, etc., I thoroughly recommend attending.
Jonathan S. Jones-Robinson
London

Editor's comment: Glad you enjoyed it Jonathan, and I'm pleased you enquired about the show.

The EF50

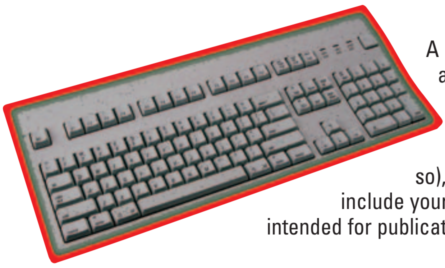
● **Dear Sir**
With regard to the EF50, there are several websites on the Internet relating to this valve and its development. I am probably one of the few still alive who actually built a television set in 1950. This had a stagger-tuned t.r.f. strip using 4 x 50s in cascade. At that time I lived just a mile east of Liverpool, but unfortunately the gain was insufficient to receive the Holme Moss transmission. However, I built a pre-amplifier using the superior EF54 and the set then worked, although the first picture was of the RMS *Queen Mary* although it was upside down!

The television pre-amp you show advertised by 'HP' of County Road, Liverpool is of interest. 'HP' was one Harry Panagaris who was quite a wealthy man. His first shop was in Mareberte street in Liverpool. This was demolished about 1930 to make the Liverpool opening of the Mersey Tunnel which opened in 1934. I recall that in the late 1940s the County Road shop had quite a lot of US/British surplus and many 'Command Sets' (BC453, etc.) were in stock then. I also remember that 'HP's daughter was a very beautiful girl who worked at the same hospital as I did, although 'things weren't to be'!

Getting back to the EF50 I recall that the Sylvania Red valves had the closest tolerances. Given the high cost of EF50s, variable capacitors, lighter voltage capacitors and power supplies, I'm doubtful about the virtue of construction articles of this age.
R. Williams
Dyserth
Denbighshire

● Keep your letters coming to fill *PW*'s postbag

Letters Received Via E-mail



A great deal of correspondence intended for 'letters' now arrives via E-mail, and although there's no problem in general, many correspondents are forgetting to provide their postal address. I have to remind readers that although we will not publish a full postal address (unless we are asked to do so), we require it if the letter is to be considered. So, please include your full postal address and callsign with your E-Mail. All letters intended for publication must be clearly marked 'For Publication'. **Editor**

amateur radio rallies

Radio rallies are held throughout the UK. They're hard work to organise so visit one soon and support your clubs and organisations.

June 13
The 35th Elvaston Castle National Radio Rally
Contact: Les Bagnall
Tel: (01332) 559965
E-mail: secretary@elvastonrally.co.uk
Takes place at the Elvaston Castle Country Park, near Derby. There will be all the usual traders, plus Bring & Buy, manufacturers marquee, entertainment, craft marquee, etc.

June 13
The East Suffolk Wireless Revival
Contact: John Quarmby G3XDY
Tel: (01473) 717830
Website: www.btinternet.com/~thomassg/eswr.htm
Takes place at the Suffolk Showground, Felixstowe Road, Ipswich. Doors open at 0930. There is ample car parking and the event is well signposted. The main attraction will be the radio car boot sale and in addition there will be a Bring & Buy, bookstall, Foundation Morse tests, h.f. station and local club stalls. Food and refreshments will also be available.

June 19
The Reddish Rally
Contact: John G4ILA
Tel: 0161-477 6702
E-mail: john@mckae.freeserve.co.uk
Takes place at St. Mary's Parish Hall, Reddish, Stockport, junction of Reddish Road/Broadstone Hall Road South. Admission just £1, talk-in on S22. Tables £10 each.

June 20
The Newbury & DARS's Amateur Radio Boot Sale
Website: www.nadars.org.uk
Held at Cold Ash, near Newbury. For more details, take a look at their website.

***June 27**
The West of England Radio Rally
Contact: Shaun O'Sullivan G8VPG
Tel: (01225) 873003
E-mail: rallymanager@westrally.org.uk
Website: www.westrally.org.uk
To be held at the 'Cheese & Grain', Market Yard, Frome, Somerset, from 1000 till 1600. There will be a large number of traders who supply Amateur Radio, electronics and home computer equipment, giving visitors the opportunity to view the latest communications technology before buying at competitive prices. Other features include plenty of hard surfaced parking (free on a Sunday!), licensed bar and cafe. Frome is a picturesque old town, with interesting shops and pubs nearby. Easy access for disabled visitors.

July 4
York Radio Rally
Contact: Alex Williamson
Tel: (01904) 423871 or **(01937) 832139**.
Held at York Racecourse. There will be free parking, refreshments, trade stands and lots more. Doors open 1015/1030.

July 4
The Milton Keynes Amateur Radio Society's Annual Rally
Contact: Malcolm Bay M0MBO
Tel: (01525) 874075
Website: www.mkars.org.uk
Held at St. Paul's School, Chaffron Way, Leadenhall, Milton Keynes. Doors open at 0900 and talk-in will be on 145.550 and 433.550MHz. The rally is located three miles from J14 on the M1 and a quarter of a mile from the local Maplin store.

*** PW Publishing Ltd. will be in attendance.**

If you're travelling a long distance to a rally, it could be worth 'phoning the contact number to check all is well, before setting off.

amateur radio news

A comprehensive look at what's new in our hobby this month.

Poole Radio Society

Exhibition Station

Poole Radio Society recently ran a very successful exhibition station in Poole Park on Sunday 2 May 2004 in conjuction with the Mayor's Charity Fayre.

Poole Radio Society aired **G4PRS** with stations on the h.f., v.h.f., u.h.f. and microwave bands. Contacts were made with stations in many countries, including Croatia, Poland, Italy, Spain and Lebanon.

Using the Foundation Licence Morse Assessment crib sheets, visitors were able to try their hand at sending Morse code using a Morse Oscillator and received a certificate to confirm that we had received their name correctly, which seemed very popular with the younger visitors.

Visitors came from far and wide - one was a Chinese visitor who works in broadcast radio in China, others included ex-military operators and many who just wanted to know a little more about hobby radio. There was also the opportunity for visitors to try their hand at operating and exchanging greeting messages under supervision.

At the first meeting after attending the event, the Society welcomed three newcomers directly as a result of them having seen the exhibition station. Poole Radio Society meets almost every Friday throughout the year. For more information, please contact:

Phil Mayer G0KKL
Tel: (01202) 700903
Website:
www.qsl.net/g4prs

Buyer Beware

"It's Another Silent Key Fraud"

"It's fraud" says Charles Miller, Editor of The Radiophile. In a letter to PW Charles - also one of our regular Valve & Vintage authors - draws attention to yet another fraud in connection with a 'Silent Key' sale. And although The Radiophile auctions are of course a commercial enterprise, Charles explains the honest, ethical and professional approach required at all times by specialist sales organisers.

Rob Mannion G3XFD writes; "Following the Treasure or Tip - Silent Key Sales article we published in January 2003, I'd hoped that more people would be aware of the possibility of deliberate fraud. In his letter however, Charles Miller reports a recent, serious problem:

"Sir, I very much regret having to report another case of the surviving partner in a Silent Key situation having been cheated over the disposal of valuable radio equipment by someone purporting to represent a certain association of collectors. This individual told the lady concerned that the equipment was little more than junk and then offered her a fraction of its worth, which in the apparent circumstances she accepted.

We at *The Radiophile* are well aware of the identity of the despicable individual who perpetuated this fraud and we shall be keeping a watchful eye on his future activities. Meanwhile, may I reiterate the advice I gave in a previous letter on this subject and warn anyone who is involved in a Silent Key situation never to allow anyone, however plausible, even to view radio equipment before having taken advice from an experienced person.

I ought to add that this also applies in the case of items of being placed in the hands of an auction house. Only this week - 12 May 2004 - I have seen a catalogue of a radio collection offered by a 'big name" auction firm which reveals that whoever drew it up had little or no idea of the value of what was involved. To give but two examples, a rare radio set worth in excess of £600 had been given a guide price of £60, and five items each worth between £50 and £100 had been lumped together as one lot with a guide price of £50. So many more instances of this misjudgement were to be found that it's difficult not to wonder if these people really do have the requisite knowledge of the vintage radio trade.

Incidentally, this particular firm came to my notice a few months ago when I was approached by a client who wished me to sell a valuable radio set that she had previously placed in its hands. The set had been offered but not sold, for which the firm charged her £180. She asked me what I would charge her should the set not sell in our next auction and I told her it would be the minimum commission on any lot - £1 (in the event, it was sold for £1,000).

So, please do take care when disposing of radio equipment - it really is a specialist job. Remember that a genuine professional will charge you nothing for good advice, although of course detailed valuations for insurance purposes will attract a fee.

I fear that we'll never be able to stamp out the flagrant cheating practised by a few 'rotten apples' in the radio game - but let's try to make it as difficult as possible for them.

Editor's note: Please see this month's Topical Talk on page 77.

Charles Miller
Editor *The Radiophile*.
Larkhill, Newport Road, Woodseaves , Stafford ST20 0NP. Tel: (01785) 284696

Licensee News

Passes for Dundee

Dundee Amateur Radio Club are pleased to announce that two of their club members have recently passed their Intermediate Radio Licence.

Stuart Higgins and **Jim Boag** successfully passed their Intermediate Radio Licence Exam on Tuesday 18 May 2004. They now hold the callsigns **GM3NHQ** and **MM3KKT** respectively. The club would like to thank **Tom Harrison GM3NHQ** for his tuition and to **Bob Ganson** for Invigilating the exam. Pictured here are (from the left) Tom Harrison GM3NHQ, Jim Boag MM3KKT, Stuart Higgins MM3GTR and Bob Ganson MMYBTD.

For more information on the Dundee Club activities please contact: **Martin Higgins MMYDUN**
Honorary Secretary
Dundee Amateur Radio Club
c/o 60 Duns Crescent
Dundee
DD4 0RZ
Website: www.dundee-amateur-radio.co.uk

Space Radio

AMSAT Symposium

AMSAT-UK will be holding a Space Symposium at the University of Surrey in Guildford from 30 July - 1 August.

The three day symposium event attracts Radio Amateurs from across Europe, as well as North America, Africa, Asia and the Pacific. In fact over a third of those attending are from outside the UK, providing a unique opportunity to 'rub shoulders' with the designers of the latest Amateur satellites.

As in previous years there will be special beginner's sessions to teach newcomers how to get started in the fascinating world of Amateur Radio Space communications. Did you know that with some satellites you can communicate using little more than a standard dual-band f.m. hand-held or that most of the Astronauts on-board the *International Space Station* are licenced Radio Amateurs and operate 144MHz f.m. when off-duty?

An antenna testing range will be also available so you can check out the gain of your latest antenna, not all commercial antennas perform as well as you think! There will be Microwave experts on-hand with test equipment covering up to 24GHz, so you can have your equipment tested and receive professional advice.

You'll have the chance to go on a guided tour of the Surrey Space Centre with the satellite mission control centre and the satellite assembly facility. These tours provide a unique opportunity to see satellites in various stages of construction.

There will be plenty to see and do throughout the event including a Bring & Buy stall and the chance to hear about the latest developments. The symposium is open to everyone, not just AMSAT-UK members, and new Foundation and Intermediate licensees as well as s.w.l.s are especially welcome.

A day pass for the event costs £10 and more extensive 2 or 3 day packages including meals and accommodation in the University grounds are available. For further information contact the secretary:
Jim Heck G3WGM
Tel: (01258) 453959
E-mail: g3wgm@amsat.org
Website: www.uk.amsat.org

Radios stolen from G3IUSS

Thieves Strike!

The home of former RSGB President Terry Barnes G3IUSS was burgled in March and some of his Amateur Radio equipment was taken, so if you are offered any of the following for sale please contact your local police station.

The items stolen from Terry G3IUSS were:

Type	Model	Serial Number
Alinco	DJ-F1E (144MHz)	0004222
Kenwood	TH-G71E	90900033
Standard	C1-56E (144MHz)	99E081286
Standard	C5-10E	not available
Hora	C150 (144MHz)	15A0026065

These are all hand-held radios complete with battery and antenna.

If you are offered any of the above please contact the Police and quote the reference number **0304/138767**.

Direction Finding Challenge

Wirral Wanderers in Wales

The Wirral and District Amateur Radio Club (WADARC) regularly hold 144MHz DF Challenges in the North Wales countryside - read on to find out more about these events and find out how you can get involved.

The WADARC began running their DF Challenges as an annual event eight years ago and such is its popularity, they're now held twice a year! The events are an open event to which all those who are interested in Direction Finding, whether first–timers or more seasoned campaigners,

Although a competitive atmosphere exists during the 'foxhunts', the social interaction and the sharing and testing of techniques and equipment are the main strengths. Participants from as far afield as Scotland and the Midlands join in and the club is particularly concerned to offer a friendly atmosphere where any Novice DF enthusiast will feel welcome, find help and advice from those with more experience and return home having enjoyed themselves.

The Challenges take place in a 130 square mile area west of Ruthin, North Wales where the DF Challenge takes place contains some of the most beautiful scenery in North Wales. The roads and forestry tracks provide an interesting search area and the hills and mountains can also provide some of the most frustrating and misleading bearings!

In order to cater for everyone's abilities, a single 'fox', approachable to within 100m in a saloon car, hides for the morning event in a location where all teams should (and usually do) find him within one to two hours. Following a good lunch in a local hostelry where tales and equipment malfunctions are swapped, the afternoon event starts.

The afternoon event is more challenging being three hours long with two foxes to find, which are approachable to within 500m in a saloon car.

The afternoon finishes in another local watering hole where participants have a last opportunity to exchange experiences before leaving for home.

The most recent WADARC DF Challenge took place on 25 April with the weather being very good for the eight teams taking part. The team consisting of **G4EWJ, M1EEV, G6NOI** and **M1EIV**, using a newly constructed 'passive' antenna, were the first to locate the morning warm up fox who was situated 13 miles from the start.

Rich G8ZHA, clocked up the fastest time finding the two afternoon foxes using his 'active' Doppler antenna system, followed closely by **Phil G0JSB** and XYL **Jan G6SNO**, who were the fastest using 'passive' gear. A full pictorial account of the day can be found at:
www.merseyworld.com/wadarc/df_2004.htm

The WADARC are planning their next event for Sunday 12 September 2004 so if you are interested in joining in or finding out more contact **Tom G4BKF** via E-mail at **secretary@wadarc.com**.

Station On-Air

G3SWM Portland Success!

The Short Wave Magazine club call G3SWM was back on the air on Bank Holiday Monday 3 May 2004.

The G3SWM station was on air in support of the second annual *SWM* listening contest. There was much activity with several 'pile-ups' encountered in the nine hour period of operation.

The station confined itself to single band s.s.b. operation only with most contacts being made on and around 7.070MHz. An APRS node was also on-air to beacon the station's presence and pass information to those interested in the event. Located on Dorset's southern-most 'Isle' of Portland in the rare WAB square SY77DOR, G3SWM operated between 0700 and 1600 hours

Short Wave Magazine Editor, **Kevin Nice G7TZC, M3SWM** commented that, "based on this year's superb event we are planning some enhancements for the 2005 contest activity. This will again be held on the May Bank Holiday with a slightly later start time. Everyone involved with the running of G3SWM enjoyed the experience."

Many thanks are due to the **Dorset Police Amateur Radio Society** (DPARS) for their invaluable help in organising the day's operating and providing the station accommodation. Great fun was had by all of those involved and next year's event is being eagerly anticipated.

Short Wave Magazine, Britain's best loved listening magazine is currently in its 67th year of publication. For more information either call **0870 224 7810** or visit **www.pwpublishing.ltd.uk/swm/**

● Busy on Air - G3SWM operating on Portland on 3 May 2004.

Update Your Records

New Lighthouse Representative

A new European Representative for the Amateur Radio Lighthouse Society (ARLHS) has been appointed.

Peter Leybourne MM5PSL has recently been appointed as the new European Representative of the Amateur Radio Lighthouse Society (ARLHS). If you have any queries, Peter can be contacted QTHR or via E-mail at: **mm5psl-@tiscali.co.uk** and will act as liaison to the European activities and members.

Other newly appointed representatives are **Claudio Sylwan LU7CC** for South America and **Kevin Mulcahy VK2CE** for Australia-Asia. For more details on the ARLHS take a look at their website at **www.arlhs.com**

British DX Club News

Broadcasts in English

The Summer 2004 edition of Broadcasts in English is available now from the British DX Club.

The 32-page *Broadcasts in English* booklet has been compiled by **Dave Kenny** and includes details of all known international broadcasts in English on short wave and medium wave for the Summer (A04) schedule period. The information is given in time order throughout and covers all target areas. Transmitter sites are also listed where known and a guide to DX and media programmes plus schedules for WorldSpace and World Radio Network for Europe is included.

Copies are available for £2 (inc. P&P) to UK customers or 6 International Reply Coupons; 5 Euros or 5 US Dollars for Overseas customers. UK cheques/Postal Orders should be payable to British DX Club. Payments in US dollars or Euros are only accepted in cash. All orders or enquiries to:
British DX Club
126 Bargery Road, Catford, London SE6 2LR. Website: **http://www.bdxc.org.uk**

Special Event

Full Steam Ahead

The Hoover Amateur Radio Club of Merthyr Tydfill are taking to the air with the special callsign GB2RTB, listen out for them.

Between 26 June and 23rd July the Hoover Amateur Radio Club (ARC) will commemorate the 200th Anniversary of Richard Trevithick's *Penydarren* Locomotive, which hauled ten tons of iron and passengers a distance of nine and a half miles in 1804. This journey, from Merthyr to Abercynon, was the first steam railway locomotive haulage to take place in the world.

In memory of the event the special callsign **GB2RTB** (Richard Trevithick Bicentenary) will be aired by the Hoover ARC shack at Hoover Ltd in Merthyr Tydfill. If you hear the station... make sure you work them!

Course News

Charlie Delta's First Success

The Charlie Delta Amateur Radio Club has recently run their first Intermediate Course with great success.

Ten candidates from the Charlie Delta Amateur Radio Club (ARC) all passed their Intermediate Course. All candidates wish to thank **Dave M0DCM** and his assistant **Dave G0MJY** for all their hard work in helping them pass and for putting up with them!

The Charlie Delta ARC will be running a Foundation Course on 22 June and are hoping to run another Intermediate Course for those who wish to take the next step.

Anyone wanting any information on the club, the courses being run, or Events taking place can go to **www.cqdx.co.uk** or contact M0DCM via E-mail at **m0dcm@blueyonder.co.uk** or **Tel: (01902) 635244**.

SALES 01908 281705

Postage & packing UK mainland just £6.00 max per order E&OE

MOUNTING HARDWARE ALL GALVANISED

6" Stand Off Bracket *(complete with U Bolts)*.....**£6.00**
9" Stand off bracket *(complete with U Bolts)*.....**£9.00**
12" Stand off bracket *(complete with U Bolts)*..**£12.00**
12" T & K Bracket *(complete with U Bolts)*.....**£11.95**
18" T & K Bracket *(complete with U Bolts)*.....**£17.95**
24" T & K Bracket *(complete with U Bolts)*.....**£19.95**
36" T & K Bracket *(complete with U Bolts)*.....**£29.95**
Chimney lashing kit.....**£12.95**
Double chimney lashing kit.....**£24.95**
3-Way Pole Spider for Guy Rope/ wire.....**£3.95**
4-Way Pole Spider for Guy Rope/wire 1" Mast Sleeve/Joiner.....**£6.95**
1.25" Mast Sleeve/Joiner.....**£7.95**
1.5" Mast Sleeve/Joiner.....**£8.95**
2" Mast Sleeve/Joiner.....**£9.95**
Earth rod including clamp (copper plated).....**£9.95**
Earth rod including clamp (solid copper).....**£14.95**
Pole to pole clamp 2"-2".....**£4.95**
Di-pole centre (for wire).....**£4.95**
Di-pole centre (for aluminium rod).....**£4.95**
Dog bone insulator.....**£1.00**
Dog bone insulator heavy duty.....**£2.00**

5ft POLES H/DUTY (SWAGED)

Heavy Duty Aluminium (1.2mm wall)
1 1/4" single 5' ali pole.....**£7.00**
1 1/4" set of four (20' total approx).....**£24.95**
1 1/2" single 5' ali pole.....**£10.00**
1 1/2" set of four (20' total approx).....**£34.95**
1 3/4" single 5' ali pole.....**£12.00**
1 3/4" set of four (20' total approx).....**£39.95**
2" single 5' ali pole.....**£15.00**
2" set of four (20' total approx).....**£49.95**
(All swaged poles have a push fit to give a very strong mast set)

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RG58 best quality standard per mt.....**35p**
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H100 best quality military coax cable per mt.....**£1.10**
3-core rotator cable per mt.....**45p**
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20 amp red/black cable 20 amp per mt.....**75p**
30 amp red/black cable 30 amp per mt.....**£1.25**
Please phone for special 100 metre discounted price

CONNECTORS & ADAPTERS

PL259/9 plug (Large entry).....**£0.75**
PL259 Reducer (For PL259/6 to conv to P1259/6).....**£0.25**
PL259/6 plug (Small entry).....**£0.75**
PL259/7 plug (For mini 8 cable).....**£1.00**
BNC Screw type plug (Small entry).....**£1.00**
BNC Solder type plug (Small entry).....**£1.00**
BNC Solder type plug (Large entry).....**£2.50**
N-Type plug (Small entry).....**£2.50**
N-Type plug (Large entry).....**£2.50**
SO239 Chassis socket (Round).....**£1.00**
SO239 Chassis socket (Square).....**£1.00**
N-Type Chassis scoket (Round).....**£2.50**
N-Type Chassis scoket (Square).....**£2.50**
SO239 Double female adapter.....**£1.00**
PL259 Double male adapter.....**£1.00**
N-Type Double female.....**£2.50**
SO239 to BNC adapter.....**£1.50**
SO239 to N-Type adapter.....**£3.00**
SO239 to PL259 adapter (Right angle).....**£2.50**
SO239 T-Piece adapter (2xPL 1XSO).....**£3.00**
N-Type to PL259 adapter (Female to male).....**£2.50**
BNC to PL259 adapter (Female to male).....**£2.00**
BNC to N-Type adapter (Female to male).....**£2.50**
BNC to N-Type adapter (Male to female).....**£2.50**
SMA to BNC adapter (Male to female).....**£3.95**
SMA to SO239 adapter (Male to SO239).....**£3.95**
SO239 to 3/8 adapter (For antennas).....**£3.95**
3/8 Whip stud (For 2.5mm whips).....**£2.95**
Please add just £2.00 P&P for connector only orders

10/11 METRE ANTENNAS

G.A.P.12 1/2 wave alumimum (length 18' approx).....**£24.95**
G.A.P.58 5/8 wave aluminium (length 21' approx).....**£29.95**
S27-3 3-element yagi. Freq: 27-28MHz. Length: 2.5mtrs. Gain: 8.5dB.....**£59.95**
S27-4 4-element yagi. Freq: 27-28MHz. Length: 3.8mtrs. Gain: 10.5dB.....**£69.95**

BALUNS

MB-1 1:1 Balun 400 watts power.....**£24.95**
MB-4 4:1 Balun 400 watts power.....**£24.95**
MB-6 6:1 Balun 400 watts power.....**£24.95**
MB-1X 1:1 Balun 1000 watts power.....**£29.95**
MB-4X 4:1 Balun 1000 watts power.....**£29.95**
MB-6X 6:1 Balun 1000 watts power.....**£29.95**
MB-Y2 Yagi Balun 1.5 to 50MHz 1kW.....**£24.95**

TRI/DUPLEXER & ANTENNA SWITCHES

MD-24 HF or VHF/UHF internal duplexer (1.3-225MHz) (350-540MHz) SO239/PL259 fittings.....**£22.95**
MD-24N same spec as MD-24 but "N-type" fittings.**£24.95**
MX2000 HF/VHF/UHF internal Tri-plexer (1.6-60MHz) (110-170MHz) (300-950MHz).....**£59.95**
CS201 Two-way di-cast antenna switch. Freq: 0-1000MHz max 2,500 watts SO239 fittings.....**£18.95**
CS201-N Same spec as CS201 but with N-type fittings.....**£28.95**
CS401 Same spec as CS201 but4-way.....**£49.95**

ANTENNA ROTATORS

AR-31050 Very light duty TV/UHF.....**£24.95**
AR-300XL Light duty UHF\VHF.....**£49.95**
YS-130 Medium duty VHF.....**£79.95**
RC5-1 Heavy duty HF.....**£349.95**
RG5-3 Heavy Duty HF inc pre set control box.....**£449.95**
AR26 Alignment Bearing for the AR300XL.....**£18.95**
RC26 Alignment Bearing for RC5-1/3.....**£49.95**

MOBILE MOUNTS

Turbo mag mount 7" 4mtrs coax/PL259 3/8 or SO239.....**£14.95**
Tri-mag mount 3 x 5" 4mtrs coax/PL259 3/8 or SO239.....**£39.95**
Hatch Back Mount (stainless steel) 4 mts coax/PL259 3/8 or SO239 fully adjustable with turn knob.....**£29.95**
Gutter Mount (same as above).....**£29.95**
Rail Mount (aluminium) 4mtrs coax/PL259 sutiable for up to 1inch roof bars or poles 3/8 fitting.....**£12.95**
SO259 fitting.....**£14.95**
Gutter Mount (cast aluminium) 4mtrs coax/PL259 3/8 fitting...**£9.95**
SO259 fitting.....**£12.95**
Hatch Back Mount 3/8 4mtrs coax/PL259.....**£12.95**
Roof stud Mount 4mts coax/PL259 3/8 or SO239 fitting.....**£12.95**

ANTENNA WIRE & RIBBON

Enamelled copper wire 16 gauge (50mtrs).....**£11.95**
Hard Drawn copper wire 16 gauge (50mtrs)..**£12.95**
Equipment wire Multi Stranded (50mtrs).....**£9.95**
Flexweave high quality (50mtrs).....**£27.95**
PVC Coated Flexweave high quality (50mtrs).....**£37.95**
300Ω Ladder Ribbon heavy duty USA imported (20mtrs).....**£15.00**
450Ω Ladder Ribbon heavy duty USA imported (20mtrs).....**£15.00**
(Other lengths available, please phone for details)

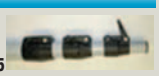
HF BALCONY ANTENNA

BAHF-4 FREQ:10-15-20-40 Mtrs LENGTH: 1.70m HEIGHT: 1.20m POWER: 300 Watts.....**£159.95**

MISCELLANEOUS ITEMS

CDX Lightening arrestor 500 watts.....**£19.95**
MDX Lightening arrestor 1000 watts.....**£24.95**
AKD TV1 filter.....**£9.95**
Amalgamating tape (10mtrs).....**£7.50**
Desoldering pump.....**£2.99**
Alignment 5pc kit.....**£1.99**

TELESCOPIC MASTS (aluminium & fibreglass options)



TMA-1 Aluminium mast ★ 4 sections 170cm each ★ 45mm to 30mm ★ Approx 20ft erect 6ft collapsed.....**£99.95**
TMA-2 Aluminium mast ★ 8 sections 170cm each ★ 65mm to 30mm ★ Approx 40ft erect 6ft collapsed.....**£189.95**
TMF-1 Fibreglass mast ★ 4 sections 160cm each ★ 50mm to 30mm ★ Approx 20ft erect 6ft collapsed.....**£99.95**
TMF-2 Fibreglass mast ★ 5 sections 240cm each ★ 60mm to 30mm ★Approx 40ft erect 9ft collapsed.....**£189.95**

HF YAGI

HBV-2 2 BAND 2 ELEMENT TRAPPED BEAM FREQ:20-40 Mtrs GAIN:4dBd BOOM:5.00m LONGEST ELEMENT:13.00m POWER:1600 Watts.....**£399.95**

ADEX-3300 3 BAND 3 ELEMENT TRAPPED BEAM
FREQ:10-15-20 Mtrs GAIN:8 dBd
BOOM:4.42m LONGEST ELE:8.46m
POWER:2000 Watts.....**£329.95**

ADEX-6400 6 BAND 4 ELEMENT TRAPPED BEAM FREQ:10-12-15-17-20-30 Mtrs GAIN:7.5 dBd BOOM:4.27m LONGEST ELE:10.00m
POWER:2000 Watts.....**£599.95**
40 Mtr RADIAL KIT FOR ABOVE.....**£99.00**

HF VERTICALS

VR3000 3 BAND VERTICAL
FREQ: 10-15-20 Mtrs
GAIN: 3.5dBi HEIGHT: 3.80m POWER: 2000 Watts (without radials)
POWER: 500 Watts (with optional radials).....**£99.95**
OPTIONAL 10-15-20mtr radial kit.....**£39.95**

VR5000 5 BAND VERTICAL FREQ:10-15-20-40-80 Mtrs GAIN: 3.5dBi HEIGHT: 4.00m RADIAL LENGTH: 2.30m (included). POWER: 500 Watts.....**£189.95**

EVX4000 4 BAND VERTICAL FREQ:10-15-20-40 Mtrs GAIN: 3.5dBi HEIGHT: 6.50m
POWER: 2000 Watts (without radials) POWER: 500 Watts (with optional radials).....**£119.95**
OPTIONAL 10-15-20mtr radial kit.....**£39.95**
OPTIONAL 40mtr radial kit.....**£14.95**

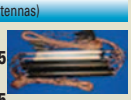
EVX5000 5 BAND VERTICAL FREQ:10-15-20-40-80 Mtrs GAIN: 3.5dBi HEIGHT: 7.30m POWER: 2000 Watts (without radials) POWER: 500 Watts (with optional radials).....**£169.95**
OPTIONAL 10-15-20mtr radial kit.....**£39.95**
OPTIONAL 40mtr radial kit.....**£14.95**
OPTIONAL 80mtr radial kit.....**£16.95**

EVX6000 6 BAND VERTICAL FREQ: 10-15-20-30-40-80 Mtrs GAIN: 3.5dBi HEIGHT: 5.00m RADIAL LENGTH: 1.70m(included) POWER: 800 Watts.....**£299.95**

EVX8000 8 BAND VERTICAL FREQ:10-12-15-17-20-30-40 Mtrs (80m optional) GAIN: 3.5dBi HEIGHT: 4.90m RADIAL LENGTH: 1.80m (included)
POWER: 2000 Watts.....**£319.95**
80 MTR RADIAL KIT FOR ABOVE.....**£89.00**
(All verticals require grounding if optional radials are not purchased to obtain a good VSWR)

TRAPPED WIRE DI-POLE ANTENNAS

(Hi Grade Heavy Duty Commercial Antennas)



UTD160 FREQ:160 Mtrs LENGTH:28m POWER:1000 Watts.....**£49.95**
MTD-1 (3 BAND) FREQ:10-15-20 Mtrs LENGTH:7.40 Mtrs POWER:1000 Watts..**£44.95**
MTD-2 (2 BAND) FREQ:40-80 Mtrs LENGTH: 20Mtrs POWER:1000 Watts.....**£49.95**
MTD-3 (3 BAND) FREQ:40-80-160 Mtrs LENGTH: 32.5m POWER: 1000 Watts.....**£89.95**
MTD-4 (3 BAND) FREQ: 12-17-30 Mtrs LENGTH: 10.5m POWER: 1000 Watts.....**£44.95**
MTD-5 (5 BAND) FREQ: 10-15-20-40-80 Mtrs LENGTH: 20m POWER:1000 Watts.....**£79.95**
(MTD-5 is a crossed di-pole with 4 legs)

PATCH LEADS

STANDARD LEADS
1mtr RG58 PL259 to PL259 lead.....**£3.95**
10mtr RG58 PL259 to PL259 lead.....**£7.95**
30mtr RG58 PL259 to PL259 lead.....**£14.95**

MILITARY SPECIFICATION LEADS
1mtr RG58 Mil spec PL259 to PL259 lead.....**£4.95**
10mtr RG58 Mil spec PL259 to PL259 lead.....**£10.95**
30mtr RG58 Mil spec PL259 to PL259 lead.....**£24.95**
1mtr RG213 Mil spec PL259 to PL259 lead.....**£4.95**
10mtr RG213 Mil spec PL259 to PL259 lead.....**£14.95**
30mtr RG213 Mil spec PL259 to PL259 lead.....**£29.95**
(All other leads and lengths available, ie. BNC to N-type, etc. Please phone for details)

SPX-100 'PLUG N GO'

Normally £49.95. This month **£39.95**!! Plus £6.00 P&P
6mtrs through to 80mtrs.
Change band by using a simple fly lead and socket at the base coil and fine tune with the adjustable telescopic whip.
Standard 3/8 thread 1.65mtrs fully extended.

ALL PICTURES ARE FOR REFERENCE ONLY

In Memory

Aviation world mourns Air Tattoo co-founder's death

Mr Paul Bowen, co-founder of the Royal International Air Tattoo – Europe's largest Airshow – died on Tuesday 18 May after a six-month battle with lung cancer.

Mr Bowen, 57, from Marston Meysey in Wiltshire, founded the Tattoo with his friend and colleague Tim Prince in 1971 whilst they both worked as air traffic controllers at the then A&AEE Boscombe Down. The Tattoo was held at North Weald airfield in aid of RAFA. From 1973 to 1985 the Tattoo took place at Greenham Common, near Newbury, moving to RAF Fairford in Gloucestershire in 1985 when a unique formation of Concorde flying with the Red Arrows celebrated the arrival of the Airshow at its new home.

A natural showman, Mr Bowen was the driving force behind its growth into the world's largest military airshow, last year attracting more than 160,000 spectators and in excess of 500 aircraft from around the globe. Paul Bowen motivated a team of 4,000 Tattoo volunteers - many former and serving RAF personnel and aviation professionals - to turn up each year and share his dream. In planning RIAT's annual flying programme, Paul often achieved the 'impossible' with aerial displays never before seen in Europe. Most memorable was RIAT's emotionally-charged VE-Day tribute in 1995 that involved more than 60 historic aircraft. Recently, even as his health began to fail, he was busy plotting something bigger and better than 2003's show-stopping joint flypast by the Red Arrows and a USAF F-117A stealth bomber.

Paul Bowen was born on 18 February 1947 in Bath, Somerset. He was a pupil of Forest School, Snaresbrook. From 1966 to 1969 he trained at the College of Air Traffic Control, and as an Air Traffic Control Officer Cadet with National Air Traffic Services, gaining all CAA ATC licences. He also obtained a Private Pilot's Licence after flying training at Marshall Aerospace of Cambridge. He worked with the National Air Traffic Services at A&AEE Boscombe Down from 1969 to 1978. Between 1976 and 1986 he held a commission with RAFVR (Intelligence Branch).

The Chief executive of RIAT Tim Prince said he had not only lost an inspirational colleague but a great friend. "Paul's energy and determination to succeed combined with his insatiable passion for aviation made the Royal International Air Tattoo what it has become today. He was quite simply the heart of the Tattoo. RIAT is very much a family affair – a 4,000-strong family of volunteers, supporters and staff who are committed to staging a world-class event each year, that family has lost its 'father'."

QSL News

RAFARS Bureau

Are you a member of the Royal Air Force Amateur Radio Society? Did you know that there is a QSL bureau for you to use? Read on to find out more.....

The aim of the Royal Air Force Amateur Radio Society (RAFARS) QSL Bureau is to organise the exchange of QSL Cards between RAFARS members as well as members of the Royal Naval Amateur Radio Society (RNARS) and the Royal Signals Amateur Radio Society. Last year the QSL Bureau handled over 2000 QSL cards!

If you are a member of the RAFARS and would like to know more about how the QSL bureau operates and how you can use it, you should contact **Andrew Humphriss** the Bureau Manager via E-mail at **andrewhumphriss@tinyworld.co.uk** or look at the RAFARS Website at **http://www.rafars.org/operating/bureau.html**

Rumours Crushed

Leicester Amateur Radio Show ON!

It has come to the notice of the Leicester Show organisers that rumours are circulating again saying that this year's show has been cancelled but this is not the case!

The Leicester Amateur Radio Show **is not cancelled** and the show dates of **1st and 2nd October**, which were previously publicised in the *PW* May 2004 News pages is correct. The date has been changed from previous years because the Exhibition Manager at Donington Park International Convention Centre did not want parking problems on the weekend of the SuperBikes event (17, 18 and 19th September). The Amateur Radio Show also had to fit in with the fact that the Exhibition Hall is used for car auctions during the week and therefore a small section of the car parking area has been fenced off as a secure compound for the car auction people.

The organisers apologise for any inconvenience caused by the date change and look forward to welcoming visitors and traders to this year's event. Further information regarding the event can be found at **www.lars.org.uk**

amateur radio clubs

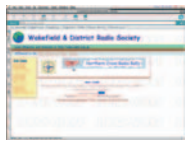
Keep up-to-date with your local club's activities and meet new friends by joining in!

DORSET
Bournemouth Radio Society
Contact: Chris Ellis M5AGG
Tel: (01202) 893126
Website: brswebsite.freeserve.co.uk
The Bournemouth Radio Society meet on the 1st & 3rd Fridays of the month at 1930 hours ready for meetings starting at 2000hours. The Society meet at Kinson Community Centre, Millhams Road, Kinson, Bournemouth. Forthcoming meetings include: **July 2: M5AGG** leads a discussion on "My Shack; **16th:** Members Summer Supper.

HERTFORDSHIRE
Verulm (St Albans) RC
Contact: Ralph G1BSZ
Tel: (01923) 265572
The Verulam (St Albans) Radio Club meetings are held at the Royal Air Force Association, New Kent Rd off Marlborough Road, St Albans, Hertfordshire. Doors open at 1930hours and more information is available from G1BSZ.

NORTHERN IRELAND
Bangor & District ARS
Contact: Mike GI4XSF
Tel: 0284 277 2383
Website: http://www.bdars.com
Bangor and District Amateur Radio Society meet on the first Wednesday of every month in *The Stables*, Groomsport, County Down at 2000hours. Visitors and new members are (as always) most welcome.

NORTH-EAST OF ENGLAND
Wakefield & DRS
Contact: Rick G4BLT
Tel: (01924) 255515
Website: www.wdrs.org.uk
The Wakefield & District Radio Society meet on Tuesdays at 2000hours and new members are always welcome. The programme of events includes: **June 15:** Wine/beer & Cheese evening, **22nd:** On-the-Air night, preceded by committee meeting & **29th**: Ten-Pin Bowling evening.



SCOTLAND
Falkirk & District ARS
Contact: **Brian Waddell GM4XQJ**
Tel: (07932) 188465
E-mail: gm4xqj@btinternet.com
Falkirk & District Amateur Radio Society meet on Monday evenings at 19.30hours in the 62nd Forth Valley Scouts Hall, Denny Road, Larbert Cross, Larbert. The Society recently held its AGM and the new committee is as follows..
Chairman: **Ron Watson GM0NJL**
Secretary: **Brian Waddell GM4XQJ**
Treasurer: **Andy McIntyre MM3USU**
Committee members **Colin McGowan MM0NDX, David Stevenson MM0RAM, Derek Green MM0VWR.**
Anyone requiring information about Amateur Radio is very welcome to come along for a chat and a coffee.

Keep those details coming in!

CUSHCRAFT BARGAINS

MA5B	Mini beam 10, 12, 15, 17, 20m	~~£389.00~~	£329.95
A3S	3 ele beam 10, 15, 20m	~~£499.95~~	£379.00
A4S	4 ele beam (10-20m)	~~£599.95~~	£449.99
R-6000	Vertical 6, 10, 12, 15, 17, 20m	~~£349.95~~	£315.95
R-8E	Vertical (40-10m) "special" SPECIAL	~~£499.95~~	£399.99

MOBILE PENETRATOR

1.8-30MHz (200W PEP) mobile antenna – no ATU required. Length 102" (52" collapsed). Fits 3/8 mount (SO239 feed point)
OUR PRICE **£139.95** delivery £10.00

New improved 'Wire Penetrator' 1.8-60MHz end-fed wire antenna (45ft long) £159.95

Q-TEK PENETRATOR

"We've sold 100s all over Europe"

★ 1.8 - 60MHz HF vertical ★ 15 foot high ★ No ATU or ground radials required ★ (200W PEP).
ONLY **£179.95** delivery £10

SEND SAE FOR LEAFLET

Q-TEK COLINEARS (VHF/UHF)

P&P £10.00

X-30 GF 144/70, 3/6dB (1.1m) glassfibre £39.95
X-50 GF 144/70, 4.5/7.2dB (1.7m) glassfibre £54.95
X-300 GF 144/70,6.5/9dB (3m) glassfibre £69.95
X-500 GF 144/70, 8.5/11dB (5.4m) glassfibre £149.95
X-627 GF 50/144/70, 2.15/6.2/8.4dBi (2.4m) £69.95

Q-TEK 6m end-fed half wave £49.95

Q-TEK YAGIS

Delivery £10.00

2m	5ele (boom 63"/10.5dBd)	£49.95
2m	8ele (boom 125"/13dBd)	£64.95
2m	11ele (boom 156"/13.5dBd)	£94.95
2m	5ele crossed (boom 64"/10.5dBd)	£79.95
2m	8ele crossed (boom 126"/13dBd)	£99.95
4m	3ele (boom 45"/8.5dBd)	£56.95
4m	5ele (boom 128"/11.5dBd)	£69.95
6m	3ele (boom 72"/8.5dBd)	£59.95
6m	5ele (boom 142"/11.5dBd)	£79.95
70cm	13ele (boom 76"/14.9dBd)	£46.95
70cm	13ele crossed (boom 83"/14.9dBd)	£79.95

DELUXE G5RV

P&P on either full/half size £6.50

Multi-stranded heavy duty flexweave wire. All parts replaceable. Stainless steel and galvanised fittings.

Double size - 200ft (160-10m) £84.95
Full size - 102ft (80-10m) £42.95
Half size 51ft. (40-10m) £36.95

Choke Balun — Inline balun for G5RV ..... £24.95 P&P £3

STANDARD G5RV

Full size 102ft (now includes heavy duty 300Ω ribbon) ....£28.95 P&P £6
Half size 51ft (now includes heavy duty 300Ω ribbon) .....£24.95 P&P £6

Q-TEK INDUCTORS

80mtr inductors + wire to convert ½ size G5RV into full size. (Adds 8ft either end) .....£25.00 P&P £4.00 (a pair)

DIPOLE CENTRE PIECES

Open wire £5.99
SO-239 ..... £5.99

300Ω HEAVY DUTY FEEDER

5m length ..... £5.00 P&P £3.00
10m length ..... £10.00 P&P £3.00
300m roll "club special buy" ..... £135.00 P&P £10.00

BALUNS & TRAPS

1.1 Balun			£25.00 P&P £4
4.1 Balun			£25.00 P&P £4
6.1 Balun			£25.00 P&P £4
40 mtrs	Traps	(a pair)	£25.00 P&P £4
80 mtrs	Traps	(a pair)	£25.00 P&P £4
10 mtrs	Traps	(a pair)	£25.00 P&P £4
15 mtrs	Traps	(a pair)	£25.00 P&P £4
20 mtrs	Traps	(a pair)	£25.00 P&P £4
5.35MHz	Traps		£25.00 (a pair)

1kw Handling

REPLACEMENT POWER LEADS

DC-1 Standard 6-pin/20A fits most HF £20.00
DC-2 Standard 2-pin/15A fits most VHF/UHF £10.00

LOW LOSS PATCH LEADS

£2.50 P&P

Connectors	Length	Price
PL-259 - PL-259	0.6m	£5.99
PL-259 - PL-259	4m	£9.99
BNC - BNC	1m	£6.99
BNC - BNC	5m	£10.00

NISSEI PWR/SWR METERS

RS-502 1.8-525MHz (200W) ..... £79.95 P&P £5
RS-102 1.8-150MHz (200W) ..... £59.95 P&P £5
RS-402 125-525MHz (200W) ..... £59.95 P&P £5
RS-3000 1.8-60MHz (3kW) Incls mod meter £79.95 P&P £5
RS-40 144/430MHz Pocket PWR/SWR ..... £34.95 P&P £2
DL-30 diamond dummy load (100W max) ...£26.99 P&P £3

COAX SWITCHES

(P&P £4.50)

2 way CX-201 (0-1GHz) SO239 ..... £19.95
2 way CX-201 'N' (0-1GHz) 'N' £24.95
4 way CX-401 (0-500MHz) SO239 ..... £69.95
4 way CX-401 'N' (0-500MHz) 'N' £79.95

COAX BARGAINS

Genuine high quality coax
MILITARY SPEC

RG-213 Mil spec x 100m.
ONLY **£69.95** P&P £10
RG-58 Mil spec x 100m.
ONLY **£35.00** P&P £10.00
Coax stripping tool (for RG-58) £4.50

NEW NOISE FILTER!

A superb TDK 'snap fix' ferrite clamp for use in Radio/TV/ Mains/PC/Phone etc.
Simply close shut over cables and notice the difference! Will fit cables up to 13mm diameter. Ideal on power supply leads/mic leads/audio leads/phone leads.
On thin cable simply wind cable round clamp 1-to-2 times. Simple yet effective!
OUR PRICE: **2 for £10** (p&p £2.50)

DOUBLE THICK FERRITE RINGS

A superb quaility ferrite ring with increadible properties. Ideal for "R.F.I". Width 12mm/OD35mm.
6 for £12.00 12 for £20.00
P&P £3.50

COPPER ANTENNA WIRE ETC

Enamelled (50m roll)	£12.95 P&P £5
Hard drawn (50m roll)	£13.95 P&P £5
Multi-Stranded (Grey PVC) (50m roll)	£11.95 P&P £5
Flexweave (H/duty 50 mtrs)	£30.00 P&P £5
Flexweave H/duty (18 mtrs)	£15.95 P&P £5
Flexweave (PVC coated 18 mtrs)	£18.95 P&P £5
Flexweave (PVC coated 50 mtrs)	£40.00 P&P £6
Special 200mtr roll PVC coated flexweave	£99.00 P&P £10
Copper plated earth rod (4ft)	£13.00 P&P £6
Copper plated earth rod (4ft) + earth wire	£18.99 P&P £6
New RF grounding wire (10m pack) PVC coated	£12.50 P&P £5

CAROLINA WINDOM

CW-160S	(160-10m) 40m long	£129.95 P&P £8.50
CW-160	(160-10m) 80m long	£119.95 P&P £8.50
CW-80	(80-10m) 40m long	£89.95 P&P £8.50
CW-80S	(80-10m) 20m long	£109.95 P&P £8.50
CW-40	(40-10m) 20m long	£84.95 P&P £8.50

MOBILE ANTENNAS

P&P £8.50

DB-770M	2m/70cm (3.5 - 5.8dB) 1m PL-259	£24.95
DB-7900	2m/70cm (5.5 - 7.2dB) 1.6m PL-259	£39.95
PL-62M	6m + 2m (1.4m) PL-259	£19.99
PLT-20	20m mobile whip (56" long)	£24.95
PLT-40	40m mobile whip (64" long)	£24.95
PLT-80	80m mobile whip (64" long)	£24.95
PLT-259	PL-259 converter for above	£5.95

PHASING HARNESSES

A2 6m 2-way 6m	£25.00	A4 2m 4-way 2m	£30.00
A2 4m 2-way 4m	£25.00	A4 70cm 4-way 70cm	£30.00
A2 88MHz 2-way 88MHz	£20.00	A2 23cm 2-way 23cm	£30.00
A2 2m 2-way 2m	£25.00	A2 137MHz 2-way 137MHz	£20.00

NEW EASY FIT WALL PULLEY

Pulley will hang freely and take most rope up to 6mm. (Wall bracket not supplied).
PULLEY **£8.99** + P&P £2.50
Wall bracket, screws not supplied. Simply screw to outside wall and hang pulley on
WALL BRACKET **£2.99** P&P £1.00

MAST HEAD PULLEY

A simple to fit but very handy mast pulley with rope guides to avoid tangling. (Fits up to 2" mast).
£8.99 + P&P £2.50

30m pack nylon guy rope (4.4mm) £12.50
132m rol nylon guy rope (4.4mm) £40.00

ALUMINIUM POLES

All measurements approx

2" x 2.4m length — 2mm wall thickness ..... £19.99 P&P £10
2" x 20' — Collection only 2mm thick ....£39.99 P&P N/A

TELESCOPIC MASTS

Approx lengths

6 section telescopic masts. Starting at 2½" in diameter and finishing with a top section of 1¼" diameter we offer a 8 metre and a 12 metre version. Each mast is supplied with guy rings and steel pins for locking the sections when erected. The closed height of the 8 metre mast is just 5 feet and the 12 metre version at 8 feet. All sections are extruded aluminium tube with a 16 gauge wall thickness.
8 mtrs **£109.95** 12 mtrs **£149.95** *Carriage £12.00.*
Tripod for telescopic masts £89.95

CAR BOOT MAST SET

Once they've gone, they've gone! 5 section (15') 4.5m 1¼" slot together mast set. Collapsed length 0.92m (3') makes this ideal for travelling.
£24.95 Del £10.00

2 for £44.95 del £10.00 — 3 for £64.95 del £10.00

SWAGED MAST SET

4 x 5' lengths of approx 2" extruded (16 gauge) heavy duty aluminium, swaged at one end to give a very heavy duty mast set.
OUR PRICE **£44.95** Del £10

2 for £79.95 Del £12.50
3 for £109.95 Del £15.00

NEW 20' SLEEVED MAST SET

A heavy duty-sleeved, mast set that will tightly slot together. 4 x 5' (2" dia) 16 guage heavy duty aluminuim tubes. (Dimensions approx).
£49.99 Del £10.00.

YAESU REPLACEMENT MICS

MH-IC8 8 pin Yaesu mic (8-pin round) £22.50
MH-4 4 pin fits older HF, etc. (4-pin round) £15.00

METAL WORK & BITS

P&P available on request

2"	Mast base plate	£12.95 P&P £5
6"	Stand off	£6.95 P&P £5
9"	Stand off	£8.95 P&P £5
12"	T&K Brackets	£18.00 P&P £8
18"	T&K Brackets	£22.00 P&P £8
24"	T&K Brackets	£26.00 P&P £8

10mm fixing bolts (needs 8mm hole) ..... £1.40 each
U bolts (1½" or 2") ..... £1.20 each
8 nut universal clamp (2" - 2") £5.95
2" - 2" cross over plate £10.95
3-way guy ring £3.95
4-way guy ring £4.95
2" mast sleeve £9.95
1½" mast sleeve £8.95
Standard guy kits (with wire) ..... £24.95 P&P £6
Heavy duty guy kits (with wire) ..... £29.95 P&P £6
Ground fixing spikes (3 set) powdered coated £24.00 P&P £8
30m pack nylon guy 4.4mm/B/load 480kg ..... £12.50 P&P £3
132m roll nylon guy (4.4mm) ..... £40.00 P&P £7.50
Self amalgamating tape (roll) £6.50
'Nylon' dog bone insulators ..... £1.00 each
Chimney lashing kit £12.99

SHOWROOM & MAIL ORDER:
Unit 1, Thurrock Commercial Centre,
Purfleet Industrial Park,
Juliette Way, Aveley,
RM15 4YA

See previous page for West Midlands address

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Open: Mon-Fri, 8.30am-4.00pm.
Sat: 8.30am-12.00pm.

HAYDON Communications

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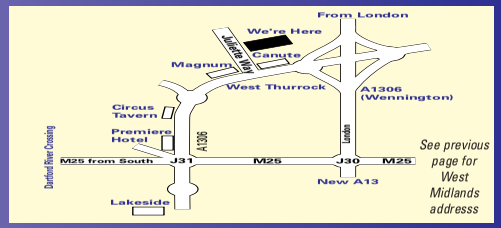
NEXT DAY DELIVERY TO MOST AREAS, £10.00



All items sold subject to our terms & conditions - available on request

PRICES SUBJECT TO CHANGE WITHOUT PRIOR NOTICE. PLEASE VERIFY BEFORE ORDERING. E&OE.

hf antennas – tuners & more

ATAS-120

Superb ready to use (with suitable Yaesu Tcvr) fully automatic antenna (40-70cm). No ATU needed - PL-259 fitting. Ideal mobile antenna (or base with counterpoise kit).

OUR PRICE **£229.00**

Counterpoise kit (for home use) £69.00
Universal boot mount.....£24.95

DIAMOND CP-6

A superb (diamond quality) 6 band trap verticle antenna with trap radials – unique trap system allows "flat wall" mounting. 80m/50m/20m/15m/10m/6m. 200W SSB, HT 4.6m

OUR PRICE **£219.00**

SEND SAE FOR DATA SHEET

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- VSWR
- 3-way antenna selector
- Internal balun

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40 amp version **£119.99**

Model	Input voltage	Output voltage	Output current	Dimensions (W x H x D)mm	Weight	Price
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Tx:- 2m/70cm.
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A-08	8 pin "Alinco" round	£9.95
K-08	8 pin "Kenwood" round	£9.95
I-08	8 pin "Icom" round	£9.95
IM-08	Modular phone "Icom"	£9.95
KM-08	Kenwood modular lead	£9.95

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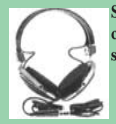

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887K (fits Kenwood) £24.95.
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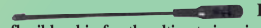

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BARGAIN PRICE

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★ Miniature portable all mode SW receiver ★ Station presets for 50 frequencies ★ Single side band system ★ Synchronous detector ★ Tuning in 100Hz + 1kHz steps ★ Includes compact antenna/stereo earphones/ carrying case.

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- Synchronous AM detection
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AOR AR-8600MkII	£589.00
Yaesu VR-5000	£535.00
GRE PSR-225	£199.99

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Alinco DJ-X10	£249.99
Alinco DJ-X3	£99.95
AOR AR-8200MkIII	£379.00
Yupiteru MVT-7100	£199.99
Icom R-5	£149.99

SECONDHAND SELECTION

Yaesu VR-5000	£399.00	Icom IC-R5	£129.00
Icom IC-R8500	£849.00	Yupiteru MVT-7100	£169.00
Yaesu FRG-100	£299.00	Icom IC-R3	£249.00
Icom IC-R72	£299.00	Alinco DJ-X2000	£349.00
Fairhaven RD-500VX	£599.00	Alinco DJ-X10	£199.00

radio basics

This month Rob Mannion G3XFD continues his theme of encouraging you to install an oscilloscope in your shack. And judging by the correspondence he's received from readers - many of you are already keen on the idea!

As regular readers will know, I've been running a little campaign in the Radio Basics (RB) pages for some years now - with the idea of encouraging everyone to either build (preferably) or buy a dip-meter. This is because I think such a basic instrument is supremely important in the workshop.

Recently, although still very keen to encourage RB readers to get a dip meter, I've changed tack a little. And this change is to encourage you to consider another item of extremely useful test equipment; the oscilloscope.

The response from readers regarding the possibilities of using oscilloscopes has been excellent, and I'm now getting as many E-mails and letters on the 'scope subject as I have done on Those Glorious Surplus Days - another article, which seems to have got even the most tardy of letter writers busy! (their terms - not mine!).

Incidentally, RB readers are sending in for the **Fred Judd G2BCX** article photocopies (see details last month) and **Clive G4SLU** in the *PW* Book Store is busy getting them out to you...but please be patient as he works hard to keep up with demand!

Interestingly, from the feedback I've received it's obvious that many of you - experienced Amateurs included - have often held back from buying what appears to be a bargain because of the possibilities of a breakdown. But what of it? If a 'scope which you only paid £30 for only lasts six months before it develops a fault (which you could repair, whether by yourself or with help from friends) surely the experience alone would have been worth it?

Don't forget also that if you need information on any item of test equipment you have, or which needs attention - *PW* readers around the world are waiting to help by responding to a 'Can You Help'? mention in the news or to a Bargain Basement wanted advert. We know from experience - it usually brings much needed assistance thanks to the goodwill of Amateur Radio and the friendship we share through *PW*.

Last month I briefly mentioned the venerable old 'scope I'd bought while still at school. The timebases struggled to reach above 1MHz - but it taught me a very great deal. It eventually passed on to a friend and no doubt it will still be with someone - probably in their museum collection!

Although I'm hesitant to type the next few words (remembering the results of a tongue-in-cheek editorial) I feel that many Radio Amateurs and enthusiasts hold tightly to their wallets! But before you get angry please 'hear me out'! Certainly I realise that many hobbyists (I'm not that far off retirement myself) work to a tight, fixed budget. Despite this, I notice that although a fairly modern rig is in many a shack - it's likely that any test equipment will be minimal, very old and totally inadequate.

Personally, I think it's a real shame that test equipment bargains, such as those in **Fig. 1** (taken at the recent Yeovil QRP Rally) are 'passed over'. This is because potential buyers are often not prepared to risk buying unfamiliar equipment, which might be likely to break down.

Certainly, and of course, equipment does break down and from correspondence I know there's always a degree of 'doubtful' selling of faulty equipment occurring. Fortunately, with the exception of the most up-to date instruments - test equipment such as oscilloscopes, signal generators, capacity/resistance/inductance bridges, etc., can be repaired very easily. This is also helped because the type of equipment which appears on sale is very unlikely to be less than 10 to 15 years old and unlikely to contain surface mount and other 'microscopically-sized' components.

I'm not advocating the non-specialist should buy a truly ancient 'scope. Instead, I am asking you to take a second and perhaps third look at what's on offer, such as those in Fig. 1. If you do buy, you'll end up with an item of equipment which will last you for many years, encourage further experimentation and construction and help you keep your other equipment in working order.

Making Friends!

As I promised last month, I'm going to spend some time suggesting how you can start 'making friends' with your new 'scope. And of course, the more familiar you become with your newly purchased instrument - the more you learn. Learning can be great fun and I'll provide some ideas for practical 'scope demonstrations which will both amuse and inform you.

Hopefully you'll have enjoyed tackling some of the suggested 'Further Reading'. By doing so you'll already know what a modern oscilloscope can do. Despite this, **there's no substitute for real 'hands on' experience**. So, for the purpose of this article I'll assume you've got yourself a working 'scope, and pass on practical advice on how to use it to advantage.

Note: The advice/instructions which follow are generalised. However, I'm sure you'll very soon relate my advice to the 'scope on the bench in front of you. So, off we go!

With the instrument switched on you should see a bright green spot or line. If your 'scope is a two channel (double trace) type - I suggest that you familiarise yourself using only one channel. To save confusion you can use Channel A/**Trace A (the terminology depends on the individual 'scope**) and adjust the second trace so it's not visible on screen.

Next, you should apply a suitable signal to the input of whatever input you're to use. This is where a portable cassette player comes in handy as you can feed the audio output (from the earpiece output using an old 1.5/3.5mm jack plug and lead, rescued from a discarded earpiece) into the 'scope input (this will be clearly labelled).

The braided wire (the screened/earthed wire) from the earpiece lead, goes to a chassis/Earth/Ground connection on the 'scope. If the trace is stationary (don't have it too bright if it is - as the phosphor can be damaged) when the cassette tape is playing you should see a vertical line which is discernibly moving up and down in time with the music/speech on the tape.

The next thing to do is to set the horizontal time base 'sweeping' from left to right, and removing the input signal should leave a flat green trace. Now apply the audio signal from the tape and you'll see the 'scope

reproduce the audio output as an oscilloscope waveform.

By adjusting the timebase controls you can make the sinusoidal type trace (the wave-like pattern) either spread out across the screen - with gentle curves to the wave tops, or 'squashed up' with very steep side to the waves and extremely narrow 'wave crests'. This type of test is actually best done with a continuous signal source, such as that offered by the RB 'Basi Probe' project from September 1999, *PW* see **Fig .2**. (Photocopies available from the *PW* Book Store).

Using the Basi Probe, the multivibrator signals will be seen across the screen. Helpfully, once you've familiarised yourself with the techniques you can even use the 'scope to provide an accurate frequency measurement of the waveform. (More of this later when I plan to discuss using crystal calibration oscillators).

If you've not got a Basi Probe multivibrator - you can use an audio source. This can include the noise from an electric fan, refrigerator, doorbell, etc.

All you have to do is to take your cassette recorder to the noise source and record it! When played back from the cassette into the 'scope - you'll be able to observe the audio waveform on the screen.

You'll be surprised at how 'dirty' the signal looks- as everything picked up by the recorder's microphone will be shown on the 'scope trace. Despite this, the waveform from your 'noise source' will be dominant.

The next stage of the learning process is equally fascinating because you'll 'see' just how little distortion and incidental 'noise' we actually notice when listening to an audio tape. To do this, it's best to record a continuous music-like tone.

To help, there are bound to be several large glass bowls in your home – whether they're for flowers or for cooking. Find one (don't forget to ask permission of the 'Catering Chief') which 'rings' when tapped gently with a wooden spoon. Of course if you have a regular electronic source (such as the sidetone note from a c.w. keyer or similar - use that instead. Generally speaking it will be easier and you're not likely to get into trouble!

Record the tone on to the tape and then play it back through the 'scope. You'll recognise the tone you record of course - but just look at the other spiky/'woolly' signals on the recording! Where are they coming from? The answer is that they're mostly from the tape recording system itself, the ultrasonic biasing circuitry which is placed onto the tape to orientate the magnetic particles in the same direction to enable a recording to be made by the influence of an external magnetic field. On top of that there's other problems - including irregularities of the magnetic tape coating, together with varying contact on the record/playback head, etc.

Some older recorders actually use a permanent magnet to produce bias and this leaves its mark on a tape which can be seen on the 'scope. One experiment you can do very easily is to play a blank tape (a brand new tape) and watch the signal it produces on your 'scope. Then, using the same tape, slowly wind it (held in your hand, using a pencil to turn the spools) with a ceramic magnet as close as possible to where the tape head will make contact. Take note of the signal produced on your 'scope when you play the tape - and you'll recognise the magnetic 'footprint' of a permanent magnetic bias device.

Fig. 1: These two 'Bargain' oscilloscopes were photographed by G3XFD during his visit to the Yeovil QRP Rally on 18 April. Both 'scopes were in working order and offered at a good price - the newer model (right) was on sale at £20! (see text)

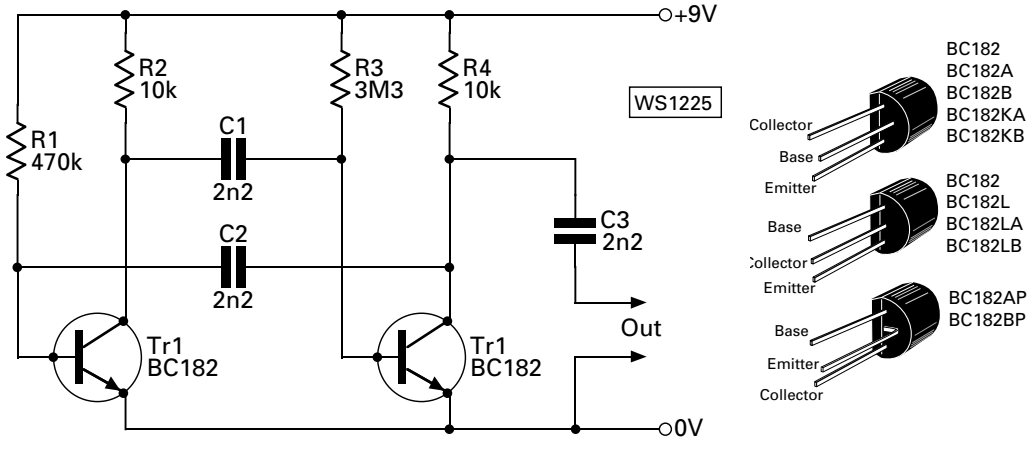


Fig. 2: The Basi Probe multivibrator circuit as published in the September 1999 issue of Radio Basics. Simple in concept, the article described mounting the project on to a simple p.c.b. with a built-in probe. It's ideal for fault finding, and the resultant waveform can be observed on an oscilloscope screen (see text).

Input & Output

Finally for this month, I strongly recommend that you directly compare the original signal source (from whatever you've decided to use) as applied to the tape recorder, and what comes out. If you've only have access to a single channel 'scope you'll have to do a 'before and after' test – but even so, it will be possible to see a noticeable difference between the signal applied to the recorder, and what is reproduced. On the 'scope screen it'll look dramatically different - but to you won't notice a great deal of difference listening to the sounds.

However, the most dramatic 'before and after' demonstration can be observed on a two channel 'scope. Here you can arrange to see the original tone on (let's say) Channel A, whilst playing back the tone you've pre-recorded on Channel B. That's when you'll see just how much distortion and alteration to the original sound our ears (and ultimately that marvellous filter system the brain) can cope with.

More about the 'scope in your workshop next month. In the meantime - good hunting for those bargain instruments!

PW

doing it by design

This month Tony Nailer G4CFY is taking a detailed look at tuned amplifiers and circuits. As usual Tony is also offering suitable kits so you can put theory into practice!

Welcome to the July Doing It By Design. This time, in order to continue with transistor amplifiers using tuned collector circuits, it's necessary to brush up on parallel tuned circuits and those with taps and secondary windings.

Let's first consider a simple single winding Toko coil type 100076 with an inductance of 0.21µH and a *Q* of 80 in parallel with a capacitor, for operation at 51MHz, as in **Fig. 1a** and **b**.

Remember f = 1/($2\pi\sqrt{LC}$)Hz. And if you know f and L and wish to find C you can use the formula transposed as C = $1/(4\pi^2 f^2 L)$ Farads, or C = $1/(39.5 \times f^2 L)$ Farads. This is accurate to within 0.1%. (Don't panic f^2 is simply f x f).

Also remember that;-

1MHz is 1,000,000Hz or 10^6 Hz.

1µH is 1/1,000,000H or 10^{-6} H.

1nF is 1/1,000,000,000 F or 10^{-9} F.

1pF is 1/1,000,000,000,000 F or 10^{-12} F

Don't panic if you're a little unsure of the maths, it's going to be okay. To help, I'll now remind you of the mathematical rules of powers of 10.

If two numbers with powers of 10 are added together and provided the powers of 10 are the same, just add the number in front of the 10.

Example; $(47 \times 10^{-12}) + (33 \times 10^{-12}) = 80 \times 10^{-12}$.

If two numbers with powers of 10 are multiplied, the numbers in front of the 10 are multiplied **and** the powers of 10 are added.

Example; $(47 \times 10^{-12}) \times (33 \times 10^{6}) = 47 \times 33 \times 10^{-12} \times 10^{6}) = 1551 \times 10^{-6}$.

Note here the power (or indice) -12 when added to +6 gives -6.

A power of 10 on the bottom of an equation can become a power of ten on the top of the equation if the polarity of the power is changed. And 10^6 on the bottom of an equation can become 10^{-6} on the top. Similarly 10^{-3} on the bottom becomes 10^3 on top.

Finally $10^3 = 1000$, $10^2 = 100$, $10^1 = 10$ and $10^0 = 1$.

With the last one; $(47 \times 10^6 \times 33\ 10^{-6}) = (1551 \times 10^{0}) = 1551 \times 1 = 1551$.

The Design

Continuing with the design of the tuned circuit I was originally dealing with, C = $1/(39.5 \times 51 \times 10^6 \times 51 \times 10^6 \times 0.21 \times 1^{-6})$ Farads.

C = $1/(39.5 \times 51 \times 51 \times 0.21 \times 10^{6+6-6}) = 1/(21575 \times 10^6)$ Farads.

Now 10^6 on the bottom of the equation becomes 10^{-6} on the top.

C = 0.0000463×10^{-6} Farads.

Multiplying the first number by 1 million and multiplying the power of 10 by 10^{-6} gives;

C = 46.3×10^{-12} Farads. (Use 47pF).

The condition of resonance is where the capacitive reactance is equal to the inductive reactance. Xc = $(1/2\pi FC)\ \Omega$ = XL = $(2\pi FL)\ \Omega$. The value in this case is;

Xc = $1/(2\pi 51 \times 10^6 \times 47 \times 10^{-12})\ \Omega$.

Xc = $1/(102 \times 47 \times \pi \times 10^{-6}) = 10^6/(102 \times 47 \times \pi) = 66.4\Omega$.

Tuned Circuit Q

The *Q* factor of a component is the ratio of its reactance to its series loss resistance, at a given frequency, *Q* = Xc/Rs. With a parallel tuned circuit it's the ratio of the effective dynamic resistance of the circuit to the reactance of either the capacitor or the inductor. (These being the same at resonance). *Q* = Rd/Xc. It's also a ratio of the centre frequency and the bandwidth, *Q* = f/BW.

The bandwidth is the frequency difference between the 'half power points' corresponds to where the voltage is 0.707 of the peak value either side of the resonant frequency, see **Fig. 2**. Similarly by transposition of formula BW = f/*Q*.

The tuned circuit of Fig1b with a centre frequency of 51MHz and a *Q* of 80 will have a

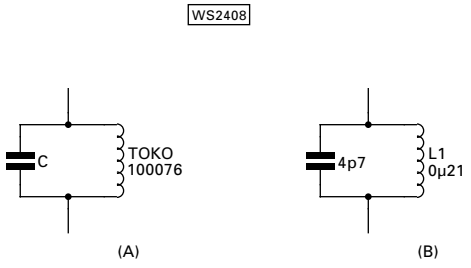


Fig. 1: (a) a simple single winding Toko coil type 100076 with an inductance of 0.21µH and a *Q* of 80 in parallel with a capacitor, for operation at 51MHz (b).

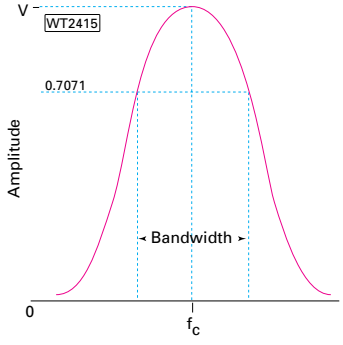


Fig. 2: The bandwidth is the frequency difference between the 'half power points' corresponds to where the voltage is 0.707 of the peak value either side of the resonant frequency (see text).

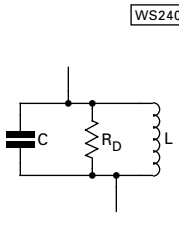


Fig. 3: Illustrating the use of a damping resistor, in the text G4CFY discusses how this is used at 50MHz (see text).

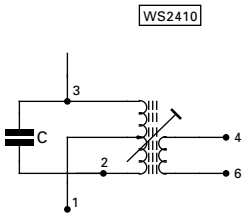


Fig. 4: Taking a closer look at i.f. transformers. The circuit of a Toko coil TKACS6184A. This is a parallel tuned circuit at 10.7MHz with an internal capacitor of 82pF, and a *Q* of 65 (see text).

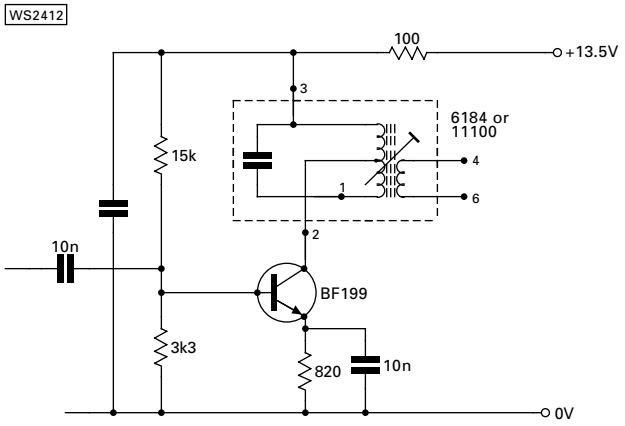


Fig. 5: As part of the design process, G4CFY built the circuit of a 10.7MHz i.f. amplifier, in breadboard form (see text).

dynamic resistance. This will be Rd = Xc x *Q* ohms. Rd = 66.4 x 80 = 5312Ω. Its bandwidth will be BW = 51MHz/80 = 0.6MHz. This is clearly too narrow for the 6 metre band and it would need to be broadened by damping with an external resistor, as shown in **Fig. 3**.

To achieve a fairly flat response across the 2MHz of the 6 metre band it will be necessary to achieve about 3MHz bandwidth at the half power points; *Q*t = f / BW = 51 / 3 = 27.

With a *Q*t of 27 the total parallel resistance of dynamic resistance and damping resistor needs to be Rt = Xc x *Q*t Ω = 66.4 x 27 = 1793Ω.

With resistors in parallel Rt = Rd x RD/(Rd - RD)Ω. Transposing this to make RD the subject of the formula is as follows;-

Rt x Rd + Rt x RD = Rd x RD

Rt x Rd = Rd x RD - Rt x RD

Rt x Rd = (Rd - Rt) RD

RD = Rt x Rd / (Rd - Rt) Ω

In this case Rt = 1793Ω, & Rd = 5312Ω, so;

RD = 1793 x 5312/(5312-1793) = 9524416/3519 = 2706Ω. (Use 2.7kΩ).

At low radio frequencies (r.f.) and intermediate frequencies (i.f.) it's often the case where bandwidths of just a few kilohertz are required. The problem then becomes preventing the transistors and biasing components from damping the *Q* of tuned circuit.

The IF Transformer

Now we'll move on to i.f. transformers and I'll examine a Toko coil TKACS6184A. This is a parallel tuned circuit at 10.7MHz with an internal capacitor of 82pF, and a *Q* of 65, see **Fig. 4**.

The capacitive reactance is Xc = 1/(2 πFC) = $1/(2\pi\ 10.7 \times 10^{6} \times 82 \times 10^{-12})$ ohms.

Xc = $1/(2\pi\ 10.7 \times 82 \times 10^{-6}) = 10^{6}/(2\pi\ 10.7 \times 82)$ = 181.4Ω.

The dynamic resistance will be; Rd = Xc x *Q* = 181.4 x 65Ω.

The impedance transformation from primary winding to secondary, or to the tap point, is the square of the turns ratio. Don't panic though! In this case the primary turns are 13 and the secondary turns 3. So the impedance step down will be $(3/13)^2 = 0.053$.

As the dynamic resistance was 11,791Ω on the primary side, it will be 11,791 x 0.053 = 628Ω on the secondary side.

The relationship between primary and secondary turns and primary and secondary impedance (or resistance) is;-

$(Tp/Ts)^2 = Rp/Rs$. Also $Rs = Rp\ (Ts/Tp)^2$ ohms. Also $Rp = Rs\ (Tp/Ts)^2$ ohms.

To find the impedance of the 10 turn section of the 6184 coil, where Rp is 11,791Ω, Ts is 10, and Tp is 13; $Rs = 11{,}791\ (10/13)^2$ohms = 6977Ω.

The resistance of the collector of a transistor is determined by several factors, including choice of quiescent current and the voltage swing required across the tuned circuit. However, it's altogether too complicated to be considered here and is also an unnecessary amount of effort.

If we assume the collector resistance at 10.7MHz is 10kΩ we could drive the 6184 coil between the tap point pin 2 and pin 3 (where the resistance was found to be 6977Ω) without heavily damping the tuned circuit.

Practical IF Amplifiers

Using the biasing I calculated for r.f. amplifiers (and used in the last article) together with results calculated in this article, the circuit of a 10.7MHz i.f. amplifier, **Fig. 5**, was constructed in breadboard form.

With a signal from a Hewlett Packard signal generator set at 10.7MHz the output was observed on a Tektronix 465B oscilloscope and the 6184 was peaked. The input was then set to a level of 100mV p-p and the output measured as 2.8V p-p across the secondary winding.

Now, as the voltage transformation is directly related to turns ratio, it means that the voltage swing at the collector is 2.8 x 10/3 = 9.33V. The voltage gain of the transistor is 9.33v/0.1V = 93.3 x, or (39dB). Overall gain from input to output is 2.8V/0.1V = 28x, (29dB).

A similar experiment was conducted using a Toko YHCS 11100AC2 460kHz i.f. transformer. Its turns were 1-2 104t, 2-3 36t, 4-6 20t.

With a signal 50mV p-p at 460kHz applied to the transistor input, the output measured across the secondary was 6.6V p-p. The collector swing was therefore 6.6 x 36/20 = 11.88V, and the voltage gain of the transistor 238x, (47dB). Overall gain from input to output is 6.6V/0.05V = 132x, (42dB).

We use the secondary winding to extract the signal to avoid the damping effect of the following stage which may only be 1 or 2kΩ. Stepping down in this manner reduces the voltage swing by the turns ratio but reduces the output impedance by the square of the turns ratio.

In the case of voltage amplifiers it's a good rule of thumb to have the following stage at about 10 times the impedance of the stage driving it. If this is done, the effects of damping can be considered negligible.

Tuned RF Amplifiers

The amplifiers being considered here are large signal voltage amplifiers as would be used in early stages of transmitters or transverters. They differ from i.f. amplifiers mainly in regard to the operational bandwidth which require *Q*s to be much lower.

To achieve a near flat response across a band the bandwidth is often chosen to be 50% greater than the width of the band. Example are 150kHz at 7MHz, 525kHz at 14MHz, 3MHz at 28MHz. These correspond to *Q*s 46.7, 26.6, & 9.3 respectively.

For 5 - 15MHz, collector coils with taps could be used such as the Toko BKANK3334R with an inductance of 5.5µH and winding of 1-2 7t, 2-3 11t, and 4-6 3t. *Q* = 85.

For 15 - 30MHz use BKANK3335R with

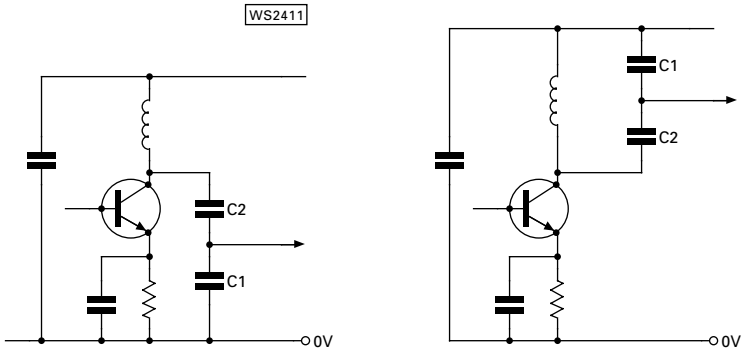


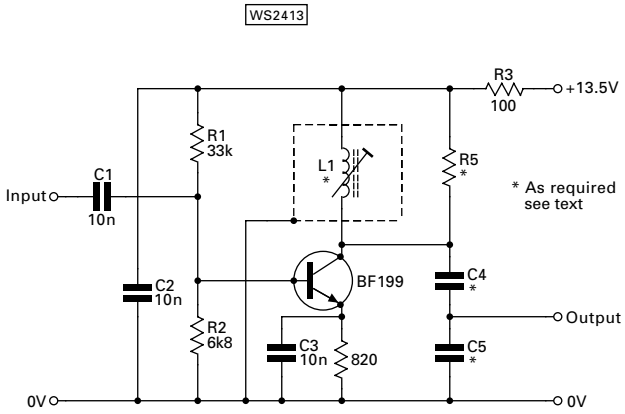
Fig 6: At frequencies where single section coils are used, it's common practice to employ capacitors in series to provide the required capacitance for resonance and to give impedance matching, 6a and 6b show two arrangements which are electrically the same (see text).

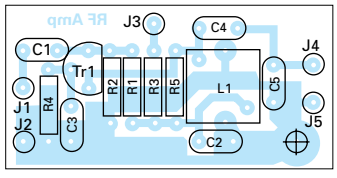
Parts availability

The p.c.b. for the IF AMP 460kHz - 15MHz £2. The p.c.b. and parts together cost £4 P&P 50p.

The p.c.b. for the RF AMP 15 - 150MHz costs £2. The p.c.b. and parts together cost £4. P&P 50p.

Please state board type and required operating centre frequency and bandwidth when ordering. Cheques payable to; **A.J. & J.R. Nailer, Spectrum Communications, 12 Weatherbury Way, Dorchester, Dorset DT1 2EF**.





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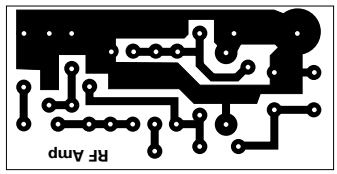


Fig. 7: Circuit of the complete r.f. amplifier project, with associated p.c.b. and component overlay (see separate panel for details on the kits).

an inductance of 1.2µH and windings of 1-2 4t, 2-3 4t, and 4-6 2t. *Q* = 85.

For 30 - 70MHz use a transformer without primary tap - type BKENK4028DZ - with an inductance of 0.4µH and windings of 1-3 6t and 4-6 1.5t. *Q* of 75. Or you can use a single section coil type 100076 with a *Q* of 80 at 50MHz.

For 70 - 150MHz use a single section coil type 100112 with a *Q* of 110 at 100MHz.

Common Practice

At frequencies where single section coils are used, it's common practice to employ capacitors in series to provide the required capacitance for resonance and to give impedance matching. The diagram, **Figs 6a** and **6b** show two arrangements which are electrically the same.

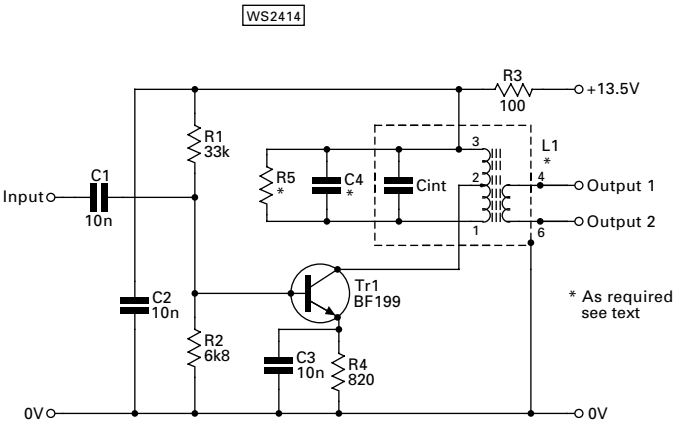
Like the inductor, the capacitive tap provides a voltage transformation equal to the ratio of the capacitance value. There's also an impedance transformation equal to the square of the capacitance value.

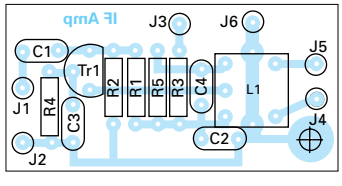
In Fig. 6, if the capacitors C1 and C2 have a ratio of 4 and the dynamic resistance of the tuned circuit is 5kΩ. The voltage at the output will be quarter of that at the collector and so the output impedance will be 5000/16 = 312Ω.

It is not necessary here to work out and build and test amplifiers for numerous different frequencies, but I have laid out two p.c.b.s, enabling readers to build their own. One is for use with tapped primary coils, with outputs from secondary windings, and with provision for a damping resistor. The other is for single section coils and capacitive tap output, with provision for a damping resistor.

I hope you enjoy building the r.f. and i.f. amplifier projects, **Figs. 7** and **8** (kits details in information panel). Cheerio for now, and I look forward to the next time in the Doing It By Design Workshop.

PW





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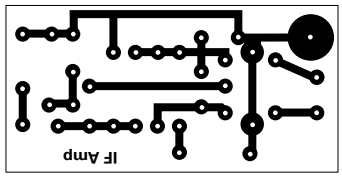

Fig. 8: Circuit and associated p.c.b. information for the complete i.f. amplifier project (see separate information panel).

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So, what are you waiting for? Get snapping and send your entry today - Good Luck!

The Rules

- The photo must be a good quality print measuring at least 7 x 5in (digital images are allowed but must be printed on photo quality paper - no disks please)
- You must ensure you have the negative or original jpeg file available (at least 300dpi) in case you are lucky enough to have your print used in a Yaesu promotion
- Your name, address, Amateur Radio callsign and daytime 'phone number must accompany your photo
- Age is no barrier neither is Licence class - this competition is open to **all**!
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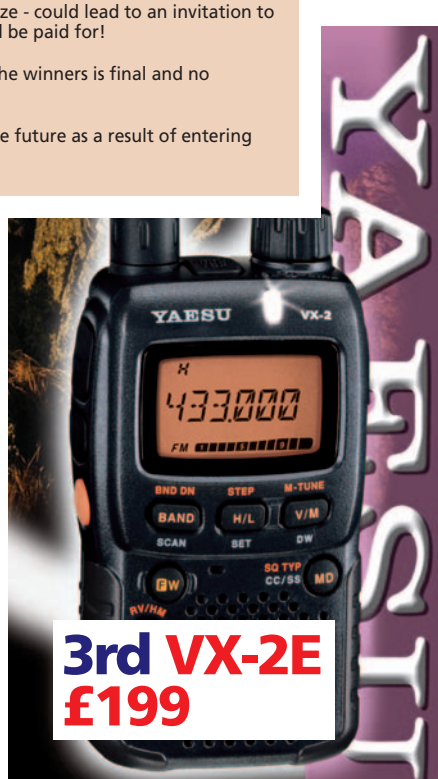
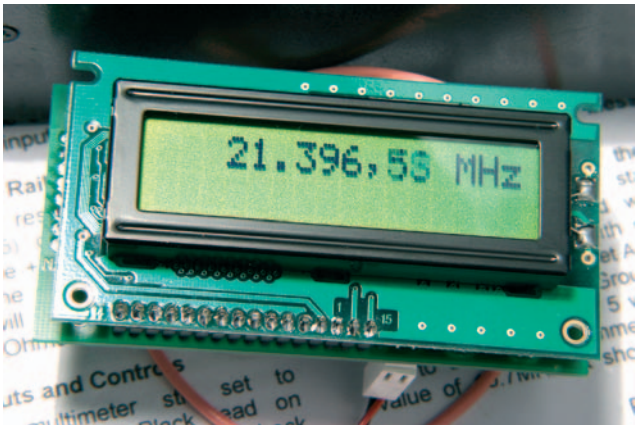
1st FT-817ND £599

2nd VX-7R £359



3rd VX-2E £199



Frequency Counting The Minimalist Way

Tex Swann G1TEX / M3NGS reviews the Minicounter Kit from Cumbria Designs. This kit is the smaller sibling to the FD-01 reviewed in the April issue of *PW*. Read on to see how this one compares!

Back in the April 2004 issue of *PW* I had the opportunity to describe my experience of building and 'playing with' the FD-01 versatile frequency and information display from Cumbria designs. Now I've had the opportunity to look at its 'smaller sibling', the Minicounter from Cumbria Designs. The minicounter is, as its name suggests, a smaller, less complex frequency display.

On opening the parcel containing the project I was as before, presented with a 16-page A4 sized set of instructions and a black conductive plastic bag containing all the other parts as shown separately in **Fig. 1**. The compact printed circuit board (p.c.b.) was of excellent quality with a heavy solder resist mask, and a silk-screen printed component place marking on the 'top side'.

Also in the kit was a strip of silicon diodes, the various other discrete semiconductors, and in another plastic bag the other passive components. The two final items were the display in its own padded envelope, and a 'tube' containing the various integrated circuits (i.c.s) and their sockets.

Recommended Tools

The tools that I'd recommend when building this, or any other kit, include a good soldering iron, side-cutters, pliers and screwdrivers. It's always worth buying the best quality tools that you can afford as they should keep in better 'fettle' throughout their life (which should also be longer than the cheaper versions).

The final item that I'd suggest having is a good illuminated magnifier. If you wear glasses and these are adequate for reading, then make sure you have a good source of light on the building bench at least. It will pay in the long run.

Let's now turn to the actual minicounter and the construction 'manual' themselves. As I mentioned earlier the p.c.b. is of the highest quality and is well laid out with clear component place legends. The same level of detail has been applied to the manual too, which is A4 sized, double-sided, and is very easy-to-read and has clear illustrations and colour pictures.

The manual is laid out in sections: **Introduction**, **Preparation**, **Circuit Description**, **Assembly**, **Testing**, **User Setup**, **Use** and a 'trouble shooting' appendix. Each section is dealt with in a manner that make them easy-to-read and follow. The circuit description allows even a newcomer to follow its action and understand it. This is followed by the construction section, which is probably the most important part for many constructors.

In section 4 of the manual, Assembly, each of the steps that need to be carried is described in a manner that's easy to follow. One nice touch, is when the fitting of the various resistors is described, each component reference is followed by its value and the colour coding in a manner that gives confidence that you've got the right component in place.

You continue to follow the instructions for the assembly of the main p.c.b. by fitting the the capacitors, i.c. sockets and other components. After populating the various i.c.s into their sockets you've completed the assembly of this board. I've shown the p.c.b.

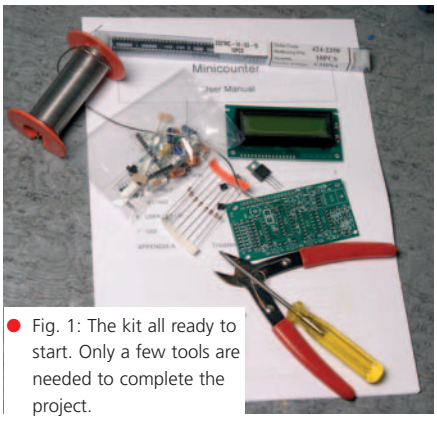


Fig. 1: The kit all ready to start. Only a few tools are needed to complete the project.

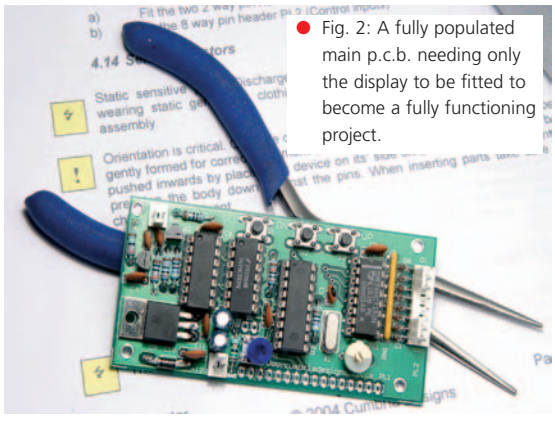


Fig. 2: A fully populated main p.c.b. needing only the display to be fitted to become a fully functioning project.

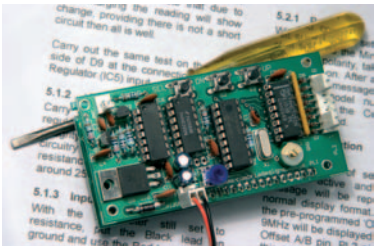


Fig. 3: The display is fitted and now to connect the various leads.

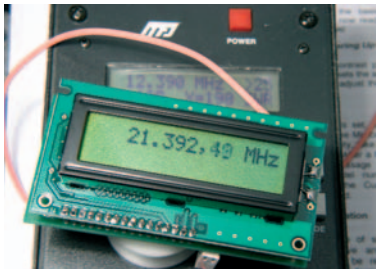


Fig. 4: Showing the 9MHz offset. Well almost, as I'd not calibrated the counter at this point.

at this stage in the photograph, **Fig. 2**, where you should be able to see the instructions with its highlighted 'notes' behind.

Adding The Display

After completing the main p.c.b. it remains only to add the two by 16 character liquid crystal display (l.c.d.). This is attached to the main p.c.b. via a row of pins and sockets. The completed display is designed to be fitted to the front panel of the project into which it's built. The four long bolts needed are supplied, along with the correct spacers to install the two boards very securely in place.

In the photograph, **Fig. 3,** there are two two-pin p.c.b. mounted plugs. The one shown connected, accepts a 12V supply, and the other provides an input for the signal to be measured. The eight-way plug at the right hand side of the p.c.b allows the various functions of the counter to be controlled via eight lines (which I'll describe later) that may be connected to 0V.

The construction is complete. All that remains to be done is to calibrate the counter. To start the process, couple a known accurate frequency into the counter and adjust the variable capacitor that can be seen on the lower right hand side of the p.c.b. in Fig. 3. The Minicounter is now almost ready for use.

As supplied, the unit comes with two count offsets set to ±9 or ±10.7MHz. If you intend using it to count the local oscillator and display the received signal frequency of a receiver where the local oscillator (l.o.) is 9MHz below the received frequency, then it's ready to go with no other inputs other than 12V and the l.o. signal.

Have a look at the photograph of **Fig. 4** where I've shown the counter attached to the output of my MFJ Antenna Analyser. The analyser was set to 12.39MHz and the Minicounter is displaying higher at 21.39249MHz. **Note:** It's not exactly 9MHz above as at that point I'd not calibrated the counter against a known frequency.

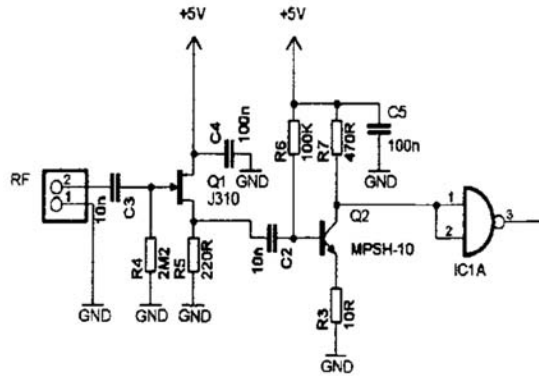


Fig. 5: A snippet of the project's circuit showing the area around the frequency input shaping.

In addition to a frequency, the display can show the following states depending on the settings of the first three of the control lines: **CW**, **LSB**, **USB**, **AM**, **FM**, **DSB**, **PSK** or nothing (blank). If there is a mode selected as above, then one line will show **RX** or **TX**.

Two of the other four control lines select one of the two offsets, and whether it's added or subtracted to create the displayed frequency. One line selects one of two multipliers (the default is ×1 for both) and the final line elects Normal or 'Delta' display mode. This mode displays a change in frequency as well as an actual one.

Offsets & Multipliers

To look now at offsets and multipliers. If neither of the two installed counter offset frequencies (9 and 10.7MHz) is suitable then, as the counter starts up, you have the opportunity to change them to whatever you want. If you have built yourself an i.f. system from commonly available 4.096MHz crystals, then this offset can replace one of the two. (Incidentally, an offset of 0MHz gives a direct count capability).

There are two 'Multiplier factors' that can also be set, with values between 1 and 99, enabling the display to show frequencies that differ markedly from the input. As a default Multiplier A and B are is set to 1.

Well! There you have it. Another splendid counter from Cumbria Designs. Now the only decision you need to make, is do you use the FD-01, or this equally effective but somewhat cheaper Minicounter.

PW

Product

Minicounter Kit

Company

Cumbria Designs
Tel: (07973) 894450

Price

£39.95 inc.VAT

Pros

At under £40 it's an effective display addition to any home-brew radio that can only make it better!

Cons

None that I can think of.

Summary

A excellent, professionally created kit and manual that's well illustrated and easy to follow. The project should be suitable for all but the absolute beginner and is at a price that is very affordable. My thanks go to Cumbria Designs, The Steading, Stainton, Penrith, Cumbria CA11 0ES for supplying the kit for review.

Modifications

Let's have a look at a few modifications that increase the frequency coverage of either the Minicounter or its bigger sibling the FD-01. These have been suggested on the Cumbria Designs' web site and so may be assumed to be 'official'.

Have a look at the circuit of the input circuitry, **Fig. 5**, that's common to both counter/displays. To improve the high frequency performance, reducing the 100k bias resistor R6 on the bipolar input stage to 68kΩ increases the reliable upper frequency performance to around 135MHz at 600mV r.m.s. (1.7Vp-p) input. On switch on the prototype test unit reaches 157MHz, reducing to 137MHz as the gate i.c. warms up and the bias point shifts. A value of 68kΩ seems to be optimum for maximum reliable frequency of about 135MHz limit from switch on. More drive would increase this by a few MHz.

Now to look at improving the low frequency performance. As the design stands with C2 at 10nF, the sensitivity limit was 10kHz at 850mV r.m.s. (2.4Vp-p). Increasing the value of C2 to 100nF allowed readings at 2kHz with only 200mVp-p. Readings could be taken at 100Hz but around 1.8Vp-p was needed at this frequency. (Note: As the input is high impedance, increasing the value of C3 will have negligible impact upon the low frequency performance)

The 10 Cent 'Euro-Paddle'

Tony Breathnach EI5EM - always on the lookout for a bargain - describes his 10 Cent 'Euro-Paddle'. It should make monetary sense for our keen c.w. operators as it should cost less than £10 to build!

This project started off with a visit to the Dayton HamVention. It all began when I was visiting relatives living near Lansing in Michigan; only a few hours' drive from Dayton Ohio, venue of the annual HamVention.

In May 2002 I holidayed in Michigan managing to take in the HamVention as well. Being a QRP c.w. fanatic, I couldn't resist treating myself to the Yaesu FT-817 at the special show discount price.

Although the FT-817 has an built-in iambic keyer I had no twin paddle key, so was unable to take advantage of this. I could, of course, have purchased one of the excellent commercial paddles available on the market. However, these can be quite expensive!

Instead, I decided to see what could be home-brewed. This article describes the construction of a cheap, efficient, low-tech, miniature twin paddle suitable for an iambic keyer. The only tools used were a soldering iron, junior hacksaw, side-cutters and small screwdriver.

Micro Switches

To start the project I found two identical micro-switches in my junk box. These had metal actuating levers approximately 35mm long.

Next, I lightly sanded one of the flat surfaces of each switch. Then, using rapid ('instant') setting cyanocrylic adhesive - there are many brands to choose from - I attached the two micro-switches together, one on top of the other. This was so that the actuating levers were on opposite sides when viewed from above, as in **Fig. 1**.

I cleaned the outer surface of each lever with fine sandpaper before tinning the end with solder. To avoid heat damage to the plastic plungers, I inserted a piece of cardboard between it and the lever as an insulator.

Two small 5 Cent (Euro) coins were used as the paddles, hence the name of the project. UK constructors, opposed to the Euro, could substitute sterling coins (1p perhaps). Suitably sized washers or small pieces of copper-clad board would also fit the bill. How about using two gold sovereigns for the luxury version?

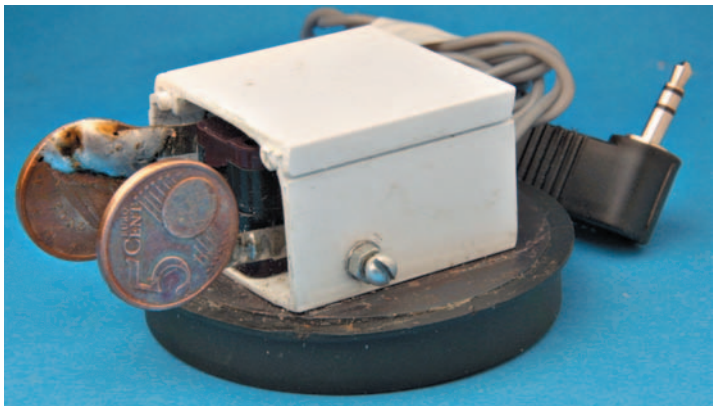
Preparing The Coins

Each coin was then prepared by filing half of one face to expose a semi-circle of bright metal. This was tinned with solder before soldering to the previously tinned surface of the lever. And yes, the modern coins are often magnetic as well as 'taking' solder easily.

The coins must be at equal height above the base of the assembly and also high enough to avoid snagging the base when attached later. I achieved this by soldering one coin with the tinned semi-circle uppermost and the other with the tinned semi-circle towards the bottom, making sure that the solder joints were mechanically sound. The protective cardboard was then removed.

I cut a 50mm length of rectangular 50 x 25mm (2 x 1in) plastic electrical trunking (with click-on lid) as an enclosure, as in the heading photograph. Of course, other types of enclosure could have been used, but as I had a few off-cuts of trunking, I decided to use one. I left both ends open to accommodate the paddles and wiring.

Next, I lightly sanded the inner and outer 50mm surfaces of the trunking and also the exposed flat surface of the lower switch to prepare for attachment. I then used the adhesive to attach the micro-switch assembly into the trunking, making sure to centre it correctly and allowing the paddles to protrude sufficiently. When the adhesive had set, I soldered the screened twin cable to the switch terminals as described in the next section.



With Tony EI5EM's 'Ten Cent' Euro-paddle idea you can make a small iambic c.w. keyer very cheaply with those spare coins lying around!

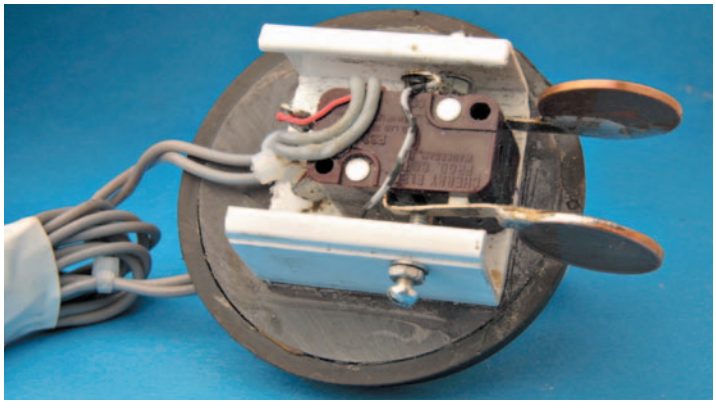


Fig. 1: The two separate microswitches are first attached together using rapid setting adhesives. The operating levers have the coins soldered to them to make a very neat little key (see text).

Change-over Type

Most micro-switches are of the change-over type and have three terminals marked COM, NO and NC. The COM (Common) terminal is the moving contact. At rest it's in contact with the NC (Normally Closed) terminal.

When the switch is operated the COM terminal switches from the NC terminal and connects to the NO (normally open) terminal. **Note:** In this project both NC terminals can be ignored. I recommend you use a length of screened twin cable for this project. However, I must admit that I used two parallel lengths of screened single cable to connect my rig to the paddle, as I had no twin screened to hand!

Next I soldered a piece of wire between both COM terminals shorting them. I then soldered the screen braid to one of the COM terminals and each of the centre wires to a NO switch terminal.

To keep things tidy I used some small cable ties to secure the cables, with the unused NC terminals of the micro-switches used as anchor points for the cable ties. Finally, I then soldered the other end of the cable to the 3.5mm stereo plug specified in the FT-817 user handbook

Use & Adjustments

When using an iambic keyer, the operator's thumb usually generates dits and the index finger the dahs. Pressing both simultaneously will result in dit-dah-dit-dah-dit-dah-dit-dah, etc. (Remember iambic pentameter from your school days?).

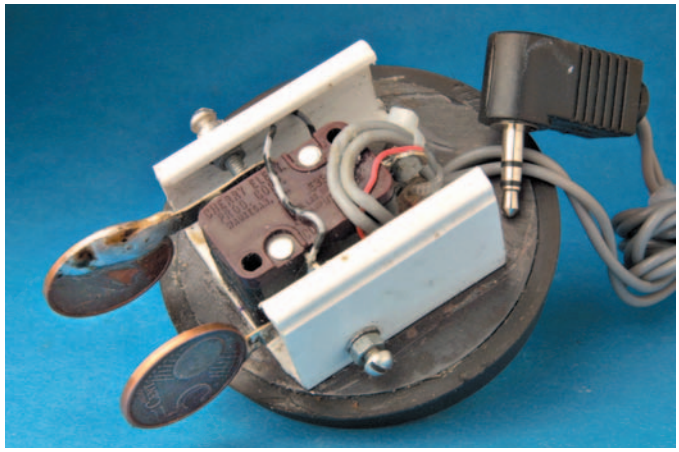
However, I found that the amount of lever travel before activating the switches was excessive. My solution was to drill a 2.5mm (approximate) hole through each side of the trunking to line up with the actuating lever.

Then I threaded a 3mm nut onto a 3mm (25mm long) bolt, so that the nut was nearest the head end. A small washer was put next to the nut. The bolt was then self-tapped into the smaller 2.5mm hole from the outside. Finally, a further washer and nut was then threaded onto the bolt from inside of the trunking, **Fig. 2**.

The amount of travel of the levers could then be adjusted by screwing the bolts in or out of the housing against the levers. When adjustment was finalised, the two nuts were tightened against each other to lock that setting. A further lock-nut could have been added to each bolt inside the trunking although I didn't find this necessary

Unfortunately, even after fitting the extra adjustment I found that there was still excessive movement of the levers once the switches had operated (listening for the click). To overcome this I carefully filed down the plastic actuating plungers (buttons) of each micro-switch and readjusted and locked the adjusting bolts.

Note: Another idea I had, but which I didn't need to use was to attach - using adhesive - small thin pieces of rubber or plastic between the body of the switches and the actuating levers to take up the slack. The photographs do not show the nuts and washers as described above. I simply self-tapped the bolts into the plastic trunking for the prototype. I found this quite satisfactory. You might also like to try this?



● Fig. 2: This photograph shows the lever adjustment system (using the nut and bolt seen mounted on the casing) which Tony EI5EM found to be necessary (see text).

● Fig. 3: A variety of coinage (an old Irish 50p coin, alongside a UK 50p and a £1 coin) show the relative size of the completed unit.

Cover In Place

The cover was then put in place, as in the heading photograph. The trunking was then attached (using impact adhesive) to a magnetic base. This had been removed from an ashtray-like magnetic bowl, which I had bought at a tool stall in a local market.

In use the unit is quite firm and stable when magnetically attached to my steel shack desk. Other suitable heavy materials could also have been used for a base (steel, marble, wood, etc.).

I found the spring tension provided by the internal springs to be quite adequate for me. If more tension is required, I'm sure that this could easily be achieved by hooking two small coiled springs between the actuating levers and small holes drilled in the sides of the plastic trunking.

A row of such holes on either side could permit different tension settings. I've not tried this myself, but see no reason why it would not work.

If you haven't got the parts in your junk box see the suggested parts list. (The Maplin order codes are in brackets).

The FT-817 uses a 3.5mm stereo jack plug and I have listed the Maplin code for this also. Consult your user handbook for the correct plug type and for details of the connections. The other miscellaneous bits and pieces should be easy enough to pick up, or else alternatives used.

Performed Very Well

On the air the unit performed very well, once I had practised and become familiar with it of course. When you come to use your own version...if you find that your thumb generates the dahs instead of dits, simply reverse the two centre connections at either the plug or at the micro-switches. Perhaps you'll prefer it that way?

If you have never used an iambic paddle before, you'll need to practice a little to get used to it. Once you are proficient you will find it a lot less tiring than a straight key. However as a traditionalist, I would urge you not to put the brass pounder away for good! Good luck with the project and I hope to work you on QRP c.w. **PW**

Parts List

(The references within the brackets are Maplin Codes)
Two x Micro switches (GW72P).
Two metres of screened twin cable (XR20W is the code per metre)., 1 x 3.5mm (if required) stereo plug (FA38R). Miscellaneous Parts: 2 x 3mm (25mm long) bolts, 2 x 3mm nuts, 2 x 3mm washers, 50mm length of 2x1 inch trunking (see text), suitable heavy base (see text), adhesive (see text), a few small cable ties.

The Vectis Run Part 7

By Rupert Templeman

It's January 1939. Travelling Wireless Technician-Salesman Alan Edwards visit to the Isle of Wight, 'The Vectis Run' has turned into a risky mission to protect a vitally important wireless system.

Following his instructions from the Secret Service Alan had set about visiting customers in Cowes the next morning. He felt very alone in his battered old van, but it was re-assuring that in an emergency the fixed frequency beacon transmitter could summon help.

'Mr Jones', in reality a high ranking officer in the Secret Service, had assured him that although they couldn't follow him on his visits without alerting the foreign agents, he'd be 'observed'. Although certain the 'Chief' agent was a German scientific officer, they had no idea what he'd learned or the plans for his mission. The intention was to draw him and whatever support he had out into the open with special 'bait'.

Alan Edwards in his battered old van was that 'bait'! And sitting alone in the threadbare driving seat he fully grasped the situation. He felt like the proverbial goat tethered for the tiger except that he was not in the middle of some Indian jungle, but driving from Newport to East Cowes.

Two smaller customers in Cowes were next on his list, the first was in East Cowes, close to the River *Medina*. The shop usually took h.t. batteries together with cheaper receivers. And, as usual he was in and out of the small, but very smart 'Medina Wireless' in less than hour. The shop catered for shipyard workers who produced the Royal Naval 'Greyhounds' - the sleek Destoyers he could see under construction.

Crossing over the river on the aptly named 'floating bridge' ferry which pulled itself across the narrow estuary by the use of chains, Alan made his way to 'Pelham Radio Services', a stone's throw from Mill Hill station on the railway linking Cowes with Newport and Ryde.

Still extremely wary, Alan made his way into the Shop. A welcome always awaited him here as Ivor Richards the proprietor was a cheery and knowledgeable man. Ivor used any excuse to retreat to the corner of the little sitting room behind the shop to talk endlessly about valves and improvements - while the ash from his cigarettes formed a small pile on the carpet under his chair. Alan never had any problem in spending hours with Ivor, but this time he knew he had to get on.

He left the shop after re-stocking Ivor with new batteries, valves and aluminium rod and strip. This was directly due to Ivor's interest in the new v.h.f. technology. He'd soon learned about the new Yagi-Uda arrays and with his exceptional lathe and engineering skills had provided many other shops – including Clarke's – with beautifully made high gain directional aerials.

Driving away from the neat Ewardian terraced street, Alan was left wondering; "Just why did the Island have so many clever, talented people like Ivor"? The question remained unanswered as the van passed the new airfield on the outskirts of Cowes, as he headed towards Newport.

Beautiful Downland

Rattling along the Northwood road, the County Asylum at Noke Common came into view. Behind it Alan could see the beautiful downland above Calbourne and towards the imposing Chillerton Down. Directly to his right lay an area of the Island he'd never visited – the countryside between Gurnard and Yarmouth. "Perhaps one day I'll get the chance"; he thought to himself.

Entering the outskirts of Newport, the Island's 'Capital', Alan passed the Army Barracks and the even more grim looking prison which dominated that side of town. There were only two more calls to make in Newport, before he could start heading to Freshwater and a pre-arranged overnight stay with Arthur and Freda Cotton.

The first Newport call was to Clarke's headquarters shop. However, glancing at his watch…Alan managed to make a small diversion to watch a two carriage train rumble across a high wooden drawbridge which allowed sailing barges and their tall masts access to a small inlet from the *Medina*.

The locomotive crew waved to him as they passed overhead – they immediately recognised the battered van. They also knew that its driver would be checking his watch as he had a better knowledge of the timetable than they did! Remembering this, the crew made sure the 1.12pm Newport to Sandown wasn't a moment later than they could make it, heading towards Shide, Merstone Junction and on to Sandown.

In a moment Alan drew up at the rear of Clarke's largest store, to be greeted by a relieved Mike Coley who had found an excuse to take some spares from Sandown to Newport. Although in truth it was arranged with the full authority of 'Mr Jones' and Lake.

"I've been worried about you Alan"; Mike said, his hands trembling slightly, making the *Woodbine* ash float gently down to his

Fascinated, he watched as an extremely unusual aircraft passed overhead. It was a Cierva Autogyro – an aircraft Alan was very familiar with, as he'd been a *Rupert Bear* fan when he was younger. However, this one was a two seat Royal Air Force machine.

shoes. "You're at least 15 minutes later than we expected"!

Alan grinned when he replied; "You can blame Ginger Minter and Frank Ashe, driver and fireman on the 1.12 to Sandown for that Mike"!

"I should have guessed that"…Mike replied as they entered the shop; "Mr Timetable I should call you"!

Mike passed on a message from Jones to re-assure Alan that his men had managed to keep him in view for most of the day, although at times it had been difficult. "They never know when you're coming out after you've got chatting Alan"!

"Part of my job Mike", Alan replied, with a slight hint of acid in his tone, which Mike put down to his normally placid friend getting worried. "But my last call is in Carisbrooke at 'Castle Wireless' and it shouldn't take long. His main business is selling batteries, and since the mains electric supply has reached the village I don't think he'll be open for much longer, his last order was very small".

Then Mike threw his bombshell into the conversation; "I want to come with you Alan", he said, stubbing out his *Woodbine*. "I know you don't like smoking in the van, so I won't. 'Mr Jones' doesn't know about this, but I think you mustn't be alone because something is sure to happen very soon"!

Turning to his friend, Alan had an unusually fiercely determined look in his eyes. The slightly gingery coloured eyebrows were raised – indicating defiance. "No Mike, you can't. If something does happen and we draw them out into the open I'll need you, Mr Reibach and Arthur Cotton to tune into the beacon and find me"!

"Don't forget the Secret Service are on the ball too"; Mike said...only half believing what his own lips had uttered.

An indeciphrable reply came over Alan's rapidly disappearing shoulder. The van was literally reversing out of the yard before Mike gathered his thoughts. "Call me from Arthur's place tonight won't you"?, he yelled.

The answer, although faint above the van's engine was clearly understood. "Seven o'clock at the very latest Mike"; and was accompanied by a 'thumbs up' gesture from the driver's window as the vehicle turned towards the Carisbrooke road.

Feeling extremely dejected, Mike watched the van as it disappeared. It was going to be a very long wait for the 7pm call. However, unknown to him – that call would never be made.

Unusual Aircraft

Alan was busily concentrating on his driving, intent on not missing the turning for Carisbrooke village which would take him off the main Calbourne and Freshwater Road. Then, just after having glimpsed the ancient ramparts of the famous castle above the village he heard the unmistakable sound of an aircraft engine. It was passing overhead, quite low and was making an unfamiliar noise.

Stopping the van with groaning, badly worn brake drums, Alan looked up. Fascinated, he watched as an extremely unusual aircraft passed overhead. It was an Avro 671 Rota, a British built version of the Cierva Autogyro – an aircraft Alan was very familiar with, as he'd been a *Rupert Bear* fan when he was younger. However, looking up he realised that it wasn't on a mission from Father Christmas – piloted by the Chief Imp who featured in his childhood *Rupert Bear Annuals* - but a two seat Royal Air Force machine.

The aircraft was only about three or four hundred feet up and Alan could clearly see two helmeted heads. He was sure that the aircraft gave a quick 'wiggle' of its wind-milling rotor blades and also saw an arm wave return his greeting…then it was gone. The throaty noise of its single engine fading as it headed towards Gatcombe, and Chillerton Down.

"That's funny", Alan said half aloud to himself; "I've seen one in the distance at Southampton, presumably flying to Calshot RAF station…but why's it here? There aren't any airfields in the direction of Ventnor"?

The puzzled thoughts were still coursing through his brain as he drew up outside the small house – literally on the approach road to Carisbrooke Castle. The strong smell from the freshly creosoted wooden poles outside the houses and overhead wires told him the mains electricity had reached this far at last. This was one small shop which wouldn't be lasting long!

Alan was only inside the 'shop' – which was in fact only a terraced house with an enlarged bay window - for a few minutes. The owner, who had originally started it as a bicycle hire shop in the 1920s, adding wireless sales and repairs in 1930, had decided to call it a day. In fact, he'd had 'the electricity' installed and didn't need his stock of high tension batteries. Alan was even on the defence as the owner had tried to sell him some unused low tension accumulators!

Crossing the shop off his list for good, Alan soon had the van heading south west towards Calbourne. This would be his last call of the day. But that RAF autogyro was still puzzling him. Why was it there? Chuckling to himself, he wondered if it was Rupert's friend the Chief Elf arriving one month too late for the Christmas festivities!

Travelling on the Freshwater road Alan hadn't seen another vehicle for some while, and almost under the long outline of Rowridge Down he was enjoying the view. There was a clear view on the right towards the mainland, looking out over Newtown Bay, the Solent and the New Forest. In fact, the view was so beautiful his worries slipped away for a fleeting moment.

The shouting voices and waving hands brought Alan to his senses. How he avoided the large furniture van stopped in the middle of the narrow road he didn't know, but he stopped and got out to see if he could help. What he took to be the driver looked up, and stopped examining the rear off-side tyre. The large vehicle was empty and the loading ramp lowered – presumably to allow access to the spare wheel.

Suddenly it became very dark. The sack enveloped Alan's head and shoulders. Enormously strong arms forced him to the ground. He was helpless. Next he heard his van's engine start and stop very quickly as it was driven inside the furniture van. The strong arms picked him up again, and he heard someone speaking in a foreign language obviously giving orders. A door slammed and still pinioned, Alan felt the large vehicle move off. It had only taken seconds….he was a prisoner! **To be continued….**

PW

A Wide Range Linear Ohmmeter

James Brett G0TFP had need of an Ohmmeter so, he set about building a simple, cheap yet versatile linear scaled model. And just look at the simply elegant solution he's created!

This simple design of ohmmeter will measure from less than one ohm up to 1MΩ in six linear ranges of decade steps. The six ranges are linear, which makes the scale easy read, or to estimate the actual value, should the needle come to rest between markings. The reading accuracy is a function of the meter scale and its size.

This Ohmmeter is also cheap to make! Most of the bits should be available in the 'average' junk-box. So that's the idea, now let's look at the circuit itself as shown in **Fig. 1**.

The circuit of the project is quite simple as you can see. It's built up from only a handful of resistors, a couple of diodes, one transistor, one integrated circuit (i.c.) amplifier and a meter. The box used to 'house' the project can be plastic or metal without changing the workings of the circuit.

How It Works

Let's start by looking at how the circuit works. To start the diode D1 is used to provide a stable reference voltage of approximately 0.7V. The actual value of reference voltage doesn't really matter, as long as it remains reasonably stable with current.

Resistor R1 limits the current passing through D1 to around 6-8mA over the working life of the battery, the state of which doesn't greatly affect the working or the overall accuracy of the unit. Additionally, the current passing through the meter will also flow through the diode D1.

The steady reference voltage is applied to the non inverting input of the operational amplifier (op-amp) IC1. The output current capability of the op-amp is boosted by the emitter follower transistor Tr1.

The output from Tr1 is fed to a bridge circuit formed with two arms. The reference arm of the bridge is formed from the meter and its associated resistors R9 and R2 and the reference diode itself. The other, measurement arm, is formed from the series combination of Rx, the resistor to be measured, and one of the reference resistors selected via switch S1.

To simplify the rest of the explanation, I shall assume that the reference resistor selected is R3. The junction of Rx and the reference resistor, R3, is coupled to the inverting input of the op-amp IC1.

As the open loop gain of an op-amp can be many thousands to one (in voltage terms), the difference in voltage between the inverting and non-inverting inputs of IC1, cause the circuit to settle to a steady state when the voltage created by the current flowing through R3 is the same as the reference voltage across D1.

Let's now assume that the resistor Rx is the same as R3 so, it's value is 10Ω and that the circuit output has stabilised. The measurement arm of the bridge is a potentiometer where the voltage across R3 is:

$$V_{R3} = \frac{R3}{R3 + Rx}$$

The circuit becomes a feedback amplifier whose gain is controlled by the ratio of the resistors Rx and the (selected) resistor R3 and the gain changes between one (when Rx is 0Ω) and two (when Rx=R3).

When the Rx=0Ω the output voltage at the emitter of Tr1 is the reference voltage. And when Rx=R3 the output has changed to twice the reference voltage. When Rx is 0Ω, the output voltage is the same as the reference voltage, so no voltage appears across the meter and R2/R9.

When the value of Rx is the same as R3 the output voltage across the meter and R2/R9 is 0.7 (the reference voltage). If variable resistor R9, in combination with R2, is adjusted to make the meter read full scale then it follows that this represents a value of resistance equal to R3.

When Rx is only half the value of R3, then the change in output voltage is half the reference voltage, and so, the meter reads half scale. With the value of reference resistance known we'll then have a direct linear indication of Rx over a range of (0 to R3)Ω.

Reference Resistor

As the reference resistance values have been picked in decade-stepped values, we have created an easy-to-read measurement of

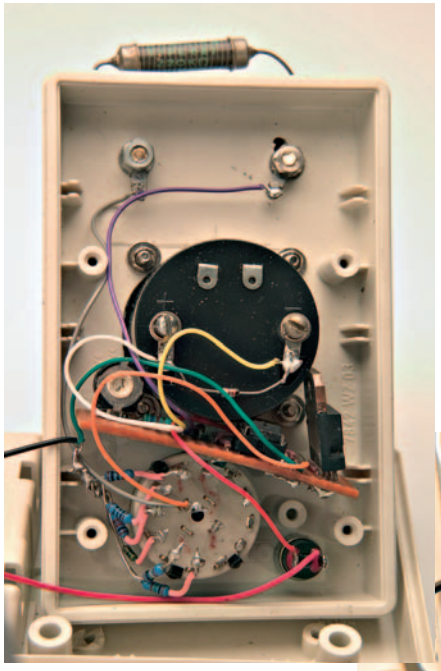


Fig. 2: Looking into the rear of the prototype and its simple building style.

unknown resistors Rx by means of an analogue meter. Now let's turn to the construction of the project and some ideas for modification or changes.

The choice of most components is relatively wide. The meter can be 100µA or 1mA and its associated diode D2, only has the purpose to protect the meter from serious overload. This diode is needed as should Rx happens to be open circuit in which case the

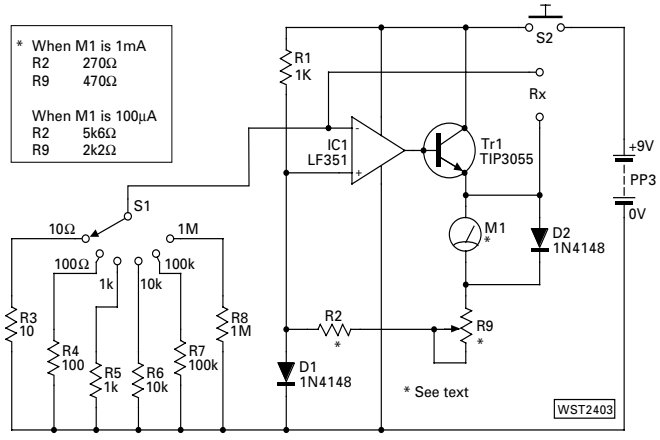


Fig. 1: The circuit of the Ohm-meter is deceptively simple and comprises of only a few components.

amplifier output level will rise to near the supply voltage.

The op-amp that you use for the project, can be any one that is specified for single supply 'rail' operation and has input and output levels that can swing between and the supply rail. The component list gives alternative integrated circuits.

When the lowest (10Ω) range is selected, the feedback circuit will draw some 70 milliamps plus the meter current. This is outside the range of most op-amps, as they usually have only a few milliamps current capability. So, the transistor Tr1 is in circuit to boost the current needed when the reference resistor is 10Ω.

Should you decide to forgo the pleasure of the 10Ω range then, transistor Tr1 can be omitted and the meter and feedback circuit connected directly to the op-amp output.

Construction & Enclosure

The actual construction that you can use, will depend on the enclosure used. My prototype was built into a small box measuring 110x70x35mm with a separate compartment for the PP3 battery. The construction and choice of components is not critical and d.c. supply range can be anywhere between five and 12V without recalibration,

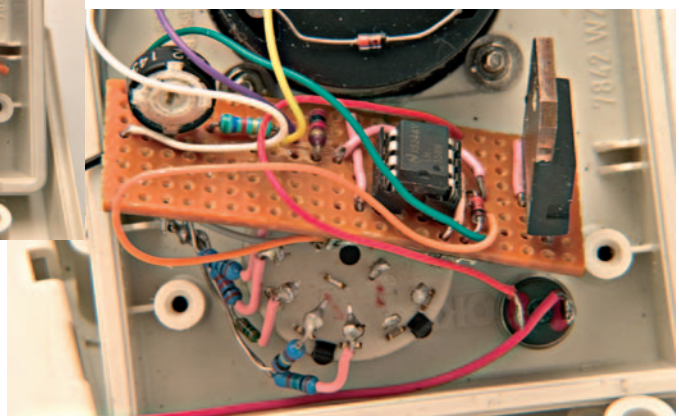


Fig. 3: A closer look at the strip-board with the few components, mounted on it. Only D2 and the reference resistors, R3 to R8, are mounted elsewhere.

which I'll deal with later.

The six resistors (R3 - R8) that set the full-scale reading, were mounted directly on to the selector switch S1. The protection diode, D2, is mounted directly across the meter. This left very few components to be fitted and wired to a small piece of strip board.

If a socket for the op-amp is used these components can even be wired 'ugly' fashion to a thin piece of rigid insulating sheet. In my prototype the circuit board 'jammed' in very nicely, but if necessary it could be retained with a blob of glue.

For calibration you'll need one extra 1% resistor ideally with a value of one, 10, or 100kΩ. Having carefully wire checked fit the extra resistor in to the Rx test terminals and set the selector switch S1 to the same range value as the test resistor. Close S2 and adjust R9 to give full scale on the meter. The instrument is now calibrated for all ranges.

In measuring resistors **always set to a higher range than expected** since if the resistor is high in value the meter will not be over driven unnecessarily. If the value of the resistor to be tested is totally unknown, then start at 1MΩ and work downwards. S1 can be switched safely with S2 closed as an open circuit at this point will only cause the meter to fall to zero.

A falling battery voltage is not a problem but a useful check can be made. In the 10Ω position the load on the battery is slightly above 70mA. By selecting a test resistor that's just below 10Ω, close S2 and watch to see if the meter reading starts to fall.

Well there you have it, a simple yet effective wide range ohm-meter. Having read about mine ... now you can build your own! **PW**

Shopping List

Resistors

Metal film 0.5W (tolerance as marked)

R1	1kΩ 5%
R2	5.6kΩ (M1 = 100µA)
	270Ω (M1 = 1mA)
R3	10Ω 1%
R4	100Ω 1%
R5	1kΩ 1%
R6	10kΩ 1%
R7	100kΩ 1%
R8	1MΩ 1%
R9	2.2kΩ (M1 = 100µA)
	470Ω (M1 = 1mA)

Semiconductors

D1 IN4148, or 1N914 (or any low power silicon rectifier)

D2 IN4148, or 1N914 (or any low power silicon rectifier)

IC1 LF351N (or any operational-amplifier that can operate with a single supply rail - could be half of an LM358)

Tr1 TIP3055 or BD135 (or any other 'plastic' *npn* power transistor)

Miscellaneous

A 100µA or 1mA meter, terminals, one six-position switch, one normally open push button, suitable (snap on) battery connectors, one PP3 (Alkaline) battery, one box and small piece stripboard or paxolin.

Does Your Club Really Offer a Welcome?

Editorial note: 'Steve Brown' first approached me regarding the idea for this article after his wife Sue had accompanied him to his local club in 2003. The visiting speaker didn't disappoint, although Sue was very embarrassed at the inappropriate 'welcome' extended to guests in general. For obvious reasons, and to avoid direct offence, I have allowed the author to use the name 'Steve Brown' as a pseudonym. **G3XFD**.

'Steve Brown' had a real surprise after his wife Sue joined him at his local radio club. Up until then he'd thought the club offered an adequate welcome to new members and visiting speakers - but Sue told him otherwise!

My job has taken me all over the UK and as a result I have been a member of clubs throughout England and Scotland, with a brief foray into Wales. Because of the nature of my engineering work the postings have never been much more than three or four years.

Although my work prevents me from getting too involved (becoming Secretary, etc.) I have always made a point of joining the local Amateur Radio Club and - up until my wife Sue joined me one evening at my present club - had thought we were really 'friendly' and offered a true 'Welcome'. However, my wife soon brought me down to earth after she joined me at the club to hear a visiting speaker. On the way home she soon told me she was "Embarrassed and concerned" at the 'non welcome' we offered.

After we arrived home Sue, who had been unusually quiet after expressing her concerns, compared the lack of social 'niceties' of my club. I listened and with a growing sense of embarrassment it became obvious that my club was sorely lacking in the 'social graces department'. Although presenting a visiting speaker with a bouquet of flowers - as her Church Group does - isn't appropriate - many other suggestions she made were certainly applicable.

However, I was then in a quandary. Knowing the problem was one thing - but how should it be overcome? It was only after I'd met *PW* Editor Rob G3XFD at the Yeovil QRP Convention in April that the idea began to gel. I'd first E-mailed Rob during 2003 and he agreed - for the sake of the hobby - to allow me to write under a pseudonym so that I could write to achieve full 'impact'. Rob, although stressing the marvellous welcome he usually receives from clubs, also provided several stories of his own in the hope it would help, rather than add further embarrassment. But I'll start with Sue's observations, which began the whole saga.

Visiting Speaker Expected?

My latest club - located in the historical region known as Wessex - was expecting a visiting speaker who had travelled some way to talk to us. There was a really good 'turn out', with over 30 members and their partners waiting for the speaker to arrive.

When the speaker did arrive, Sue commented that there was nobody to greet him, or to offer any form of help in setting up the overhead projector, etc. Eventually, several members helped and we were expecting the talk to get under way immediately.

Next, to Sue's toe-curling embarrassment, the Club Chairman then dealt with Club Matters and news. Rather than being briefly dealt with, this then turned into a long-winded affair finally ending up with 'Any Other Business', etc., delaying the speaker's talk by an extra half an hour.

Approximately 45 minutes after the visiting speaker arrived - he was able to start. We all enjoyed the talk until that is, in mid-flow, it was then interrupted by the raffle! This was done and a 'natural break' took place at the same time. Unfortunately, although the speaker was offered refreshments - he had to rush them because club members had 'kept him back' to chat after he'd collected them from the serving hatch.

Eventually the evening's talk

Obviously this is a scene from the 'Amateur Radio Club from Hell' as envisaged by our cartoonist John Worthington GW3COI. But even though your club is unlikely to be as unfriendly - 'Steve Brown' suggests you could really make your visitors and guest speakers feel truly welcome.

finished, although both Sue and I realised that the late start and interruptions had clearly interfered with the speaker's talk routine. Sue thought that the only redeeming factor was the resounding applause the speaker received before he left!

Another Approach

Once Sue had voiced her concerns I realised that similar problems had occurred at most clubs I had belonged to in our travels, although in my own ignorance I'd not noticed it! We've been married for over 30 years, and although not into Amateur Radio herself, Sue has occasionally joined me for 'social events' - and she agreed that my present club wasn't alone in not being fully 'socially aware'.

Sue explained that her Church Wives' Group appointed a member to 'meet and greet' visiting speakers and this person would look after every need of the visitor. The duration of the talk, and what was necessary for the evening was also made clear, along with expenses (if required), car parking, or other transport arrangements.

Whenever possible the visiting speaker would also be told of how the evening would be arranged. Finishing times were agreed, and if there were any possible clashes of timings - things could be re-arranged before the visit began.

Another member of Sue's group was appointed to look after visitors who turned up and who were obviously 'slightly lost' - possibly intending to join. A 'Welcome Pack' was also offered. In the case of an Amateur Radio Club Sue suggested this could be a copy of the club magazine/newsletter and a list of committee members, etc.

In Sue's group they of course offer a copy of the Parish Magazine, plus details on what goes on, and who to contact. Importantly - the 'New Visitor Welcomer' would find time to introduce the visitor to other members. Sue emphasised that they would avoid "Overwhelming" the newcomer while at the same time they made sure they weren't ignored either!

Major Differences

Obviously my wife knows that there are major differences between a Church Wives' Group and an Amateur Radio Club, which attracts people interested in a technology-based hobby. But even considering those differences there's still a great deal of social interchange...indeed she suggested there's a great deal of communication. **Or at least there should be!**

Having the chance to meet the *PW* Editor and get his opinion confirmed to Sue and I that she was correct - some clubs do have problems. Obviously, Rob G3XFD despite being well known for 'speaking his mind' wanted to avoid offence and was very careful in what he told me. But he did admit that sometimes (after perhaps driving 300 miles or so and staying overnight) after a club visit he could leave with a feeling of 'Why do I bother'?, hanging over him. **It's rare he told me** - but it does happen - although Rob says there's always something about such trips, which keep his effervescent enthusiasm topped up!

Some years ago Rob provided a *PW* 'Club Visit' to an Amateur Radio Society I belonged to in the Midlands. He left us roaring with laughter with one story he shared with us. The story took place during a club visit in the far north east of England. Having just arrived, he literally bumped into one of the locals who was on his way into the smoky room where the talk was to take place.

The grizzled old local was a retired steel worker and had just arrived on his bike saying: "Now Mister, I've come 12 miles to hear you speak" - his tone of voice inferred he didn't think it would be, "and I hope it is" he said without a hint of a smile as he removed his cycle clips.

Rob, intrigued replied; "Well, I've come almost 300 miles and I'd be happy if you'd let me know what you thought afterwards".

After the talk, which was held in a corner of what was in effect a large, noisy and smoke-filled social club bar Rob finished the talk. He then enjoyed chatting individually to club members when the old timer came up to him.

"Now Mister, I've come 12 miles to hear you speak"

"Well, I've come almost 300 miles..."

Rob said - with genuine interest - "Well, was it worth your 12 mile ride then" ?

The old chap - quick as a flash, despite his years answered; "It wasn't so bad young man", he said thoughtfully..."And yes, it was perhaps worth nine miles"!

Presentations & Raffles

While we were still laughing at Rob's story - which he assured us was true - we asked him to pick the raffle tickets from the proverbial hat. In doing so he told us another story - and behind it lay another message.

Rob told us of a visit he'd made to another club in the Midlands some time before. As he chose the tickets he realised the first was his (he'd been given a strip of tickets as the evening started). He then explained it was an ethical "Company Rule" that he couldn't accept prizes or personal rewards for attending clubs.

Noticing the rapidly drooping faces from nearby Committee Members - it was then the *PW* Editor learned it was a club tradition that the visiting speaker always won the raffle! Again, everyone enjoyed the story as Rob returned to drawing out the winners at our club. Discussing this at Yeovil, Rob said he never discovered how they rigged the raffle!

The moral of the raffle story has to be; check that the visiting speaker is prepared do the draw and present prizes or awards. There'll never be any problems whatsoever if you arrange it before the event.

Introductions & Greetings

I then asked Rob what was the most embarrassing occurrence for him during a club visit. The idea was not to further embarrass him, but to make sure any club I was involved with didn't repeat the same mistake.

Choosing his words very carefully Rob recalled one meeting- deep in the West Country at a club which has now disappeared. In sharing the story, the Editor highlighted one of my wife's concerns - that of the polite introduction of the visiting speaker.

Rob explained that after finding a place to park his car, he'd arrived in plenty of time. Making his way to the room where the talk was to take place he entered. Obviously, because of his work Rob's no stranger to many Amateurs and he was soon chatting to the small group already gathered. Time went by and Rob - sitting out in front - realised that neither the Club Chairman or Secretary were present. In fact, none of the committee were!

The audience - coming to the same conclusion - called out; "You'd better get on with it then Rob". He did, and everyone enjoyed the evening - including Rob. However, G3XFD tells me he never heard any more from the club's committee.

The moral here is - ensure your club meets, greets, and introduces a visiting speaker. Make them welcome and ensure you do so by appointing someone to do the job - providing a 'Stand-in' just in case of illness, etc.

Obviously in the specialised world of Amateur Radio it's unlikely that a total stranger will be invited to provide a 'Club Talk'. However, even though you may know the personality well - it will make the event complete when they're made to feel truly welcome.

Sue was with me when I was discussing the idea for this article with Rob - who by the way stresses the truly unwelcoming club is very rare. She's also promised the Editor she'll report back on how well I've put my newly-learned lessons into practice. She won't have long to wait...we've got a club 'Families Welcome' barbecue arranged for the summer. Guess who's the 'Head Chef' and 'charcoal stoker"?

With my supportive wife backing me up - it's bound to be a success. Perhaps she'll then join me at the club more often and I'll ensure she and any other visitor is made very welcome indeed.

PW

Arthur Moore -The Forgotten Spark

Leighton Smart GW0LBI remembers a fellow Welshman who, although relatively unknown, played a big part in early Amateur Radio developments.

In the early hours of 15 April 1912, in the loft of the 17th century Gelligroes Mill, a small whitewashed building nestling alongside a babbling stream at the bottom of a sleepy hollow in the Sirhowy valley in Wales, a young radio experimenter, using crude radio apparatus received a faint but terrifying signal in Morse Code: "CQD CQD SOS Titanic Position 41.44 N 50.24 W. Require immediate assistance. Come at once. We have struck an iceberg. Sinking.....We are putting the women off in the boats.....".

As time ticked slowly into the small hours, the experimenter continued to copy out the Morse signals he was receiving, probaby not quite believing what he was actually hearing: "We are putting passengers off in small boats". "Women and children in boats, can not last much longer.....Come as quickly as possible old man: our engine-room is filling up to the boilers".

Then, later, the stricken liner's final message came: "SOS SOS CQD CQD Titanic. We are sinking fast. Passengers are being put into boats. Titanic". The signals were transmitted from the ill-fated *RMS Titanic* and the name of the young radio experimenter was **Arthur (Artie) Moore**.

Artie breathlessly relayed the dreadful news to the locals and to the local constabulary, who didn't believe the incredible news that the 'unsinkable' *Titanic* had perished and were indeed extremely sceptical as to whether Artie had received the messages at all. Two days later both Artie and the locals received confirmation through the local and national Welsh press that it was indeed true and that over 1,500 poor souls has tragically perished in the icy waters of the north Atlantic.

The newspapers also confirmed - as Artie had indeed claimed - that the new 'SOS' distress signal had been used by the *Titanic* along with the usual 'CQD' signal, proving that Artie had indeed received the signals from the doomed liner.....

From Humble Beginnings

Artie Moore was born in 1887, the eldest son of a local miller, who upon reaching working age was employed (as so many in Wales were in those days) at the local coal mine. However, as far as can be ascertained at some point prior to the year 1909, Artie, a keen amateur engineer, using a hand-made lathe driven by the water wheel at the mill, built a working model of a horizontal steam engine. Working with his father he cast the brass with a blowpipe and a fire, drilled out the cylinder, and fitted the valves. He entered the model in a competition in *The Model Engineer*. This it seems was the turning point for the young would-be engineer, because he received as his prize a book by Sir Oliver Lodge entitled *Modern Views of Magnetism and Electricity.*

Artie eagerly 'digested' *Modern Views of Magnetism and Electricity,* which turned his attention from engineering to the new science of those days - wireless. This was the 'spark' for him (if you'll pardon the pun!) and working from the loft of the Gelligroes Mill in Pontllanfraith near Blackwood, Gwent he soon began erecting aerials and building his rudimentary radio station, consisting of a coherer-based receiver and a spark-gap transmitter. It was his not inconsiderable engineering spirit that enabled him to store electricity in his batteries via a home-made generator, which he coupled to the wheel of the mill itself.

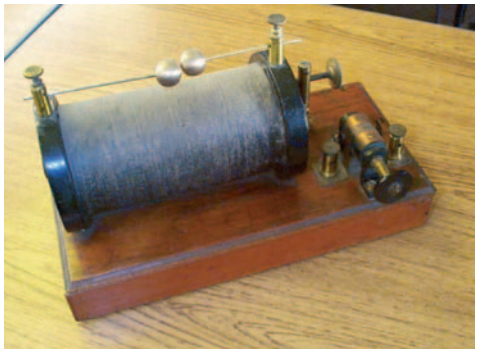
Using the contemporary spark-gap technology of the time Artie, together with a friend, Richard Jenkins, an electrical engineer at the local colliery, made what is quite possibly the first use in Wales of Amateur Radio or Amateur wireless as it was then known, for business purposes. Having set-up a second transmitting and receiving station at *Ty Llwyd* farm, owned by Richard's father, which was located approximately three and a half miles south of Gelligroes Mill at Ynysddu in the direction of Newport, Artie received an order over the air sent by Richard for grain from the mill to be delivered to the farm. This would have been around 1910, but you can't help wondering what they would have made of today's business radio or even ordering over the Internet!

Front Page News

A further exciting development took place when Artie made the front page of the *Daily Sketch*, the London newspaper after he intercepted the Italian government's declaration of war on Libya in 1911. However, nothing could have prepared him for the message he received from the largest ship in the world on that fateful night in 1912, or indeed where it was going to lead him.

By 1912, Artie was 26 years old and his construction skills had improved to the extent that he was able to build more sensitive receiving apparatus and therefore began to receive world news on a regular basis, often relaying the

A young Arthur Moore who, thanks to his enthusiam for science and wireless, became one of the early radio pioneers.



The original spark gap transmitter built by Arthur Moore is now kept at the Blackwood Amateur Radio Society.

information he received to the locals sometimes many days before it appeared in the national press.

But it was his reception of the *Titanic*'s distress call, which propelled Artie into a career that was to take him from that little mill in Wales on to greater things within the realms of early wireless development.

Enter Marconi

Artie's activities and the publicity surrounding him soon led to him coming to the attention of the then Monmouthshire Education Committee who offered him a scholarship to the British School of Telegraphy in Clapham, London. So he left the mining industry to embark on his studies in the world of wireless and science.

After studying for just three months, Artie was advised by the Principal to enter for a Government examination in Wireless Telegraphy and Morse Code, in which he was successful.

It was at this time that Artie's activities, not least his connection with the *Titanic*'s distress call, came to the attention of the Marconi Company itself. In late 1912 he was invited by the Marconi Company to join them as a draughtsman. (There have been claims that Guglielmo Marconi himself visited Artie at Gelligroes Mill with the intention of viewing Artie's apparatus, but I can find no substantive evidence of this).

By 1914 Artie was transferred to the Ship Equipment Department and on the outbreak of the First World War he was engaged as a technician in 'special Admiralty fittings' - working on the armed merchant vessels which operated clandestinely on the open seas and were known as 'Q ships'. Artie also supervised the installation of wireless equipment on the battleships HMS *Invincible* and HMS *Inflexible* as they steamed the 8,000 miles south to the Falkland Islands in 1914 to face an enemy naval threat to the South Atlantic islands.

Still connected with the Admiralty through the Marconi Company, Artie later became assistant to a Captain H. J. Round and he worked on the early development of the thermionic valve, without which advancements in radio could not have taken place. It was while Artie was involved in this research and development that he came into contact with Guglielmo Marconi himself.

Peace-time Activities

After the cessation of hostilities in November 1918, Artie Moore was appointed to the Marconi Company's Liverpool establishment. He took charge of the newly-formed Ship Equipment Department where many of the early transmitters were being fitted.

In 1922 Artie supervised the fitting of the first trawler to be equipped with wireless telegraphy apparatus. A year later he was transferred from the Marconi Wireless Telegraphy Company to the Marconi International Marine Communication Company and their establishment at Avonmouth where he was appointed Manager.

Not content simply to 'manage', Artie's innovative spirit led him to patent a basic version of sonar in 1922, and, as is quoted in the following excerpt from his obituary written by Councillor Richard Vines, Headmaster of Pontllanfraith Technical School in the *Merthyr Express* newspaper in January 1949:

".....his inventive mind gave to science many devices by which he will be remembered as one who succeeded through industry.....his Alvis car was fitted with an apparatus which would record on a dial the efficiency of petrol at varying speeds with varying loads through all gears....."

Again, you can't help but wonder what Artie would have made of today's computer controlled vehicles with their digital petrol consumption indicators - no dials, pointers or analogue scales - maybe that's another story.....!

Artie stayed at Marconi's Avonmouth establishment until his retirement in 1947, but by 1948, with his health failing, he moved to Jamaica to recuperate. After only six months he left for England and on Thursday 20 January 1949 died in a Bristol nursing home. He was 62, and would never return to Wales.

In 1949, Monmouthshire Councillor Richard Vine's public appreciation of Artie Moore concluded with the words:

Gelligroes Mill as it is today.

"Gelligroes has invariably been coupled with Islwyn the poet and philosopher, and now it also has associations with the world of science".

Modern Times

Despite contributing considerably to the advancement of radio, Artie Moore's pioneering efforts in wireless communications remain relatively little known, even within his own locality. However, the inspiration he gave to budding radio enthusiasts in his local area lead to the creation of the Blackwood Transmitters Club in 1927, which was the forerunner of the **Blackwood Amateur Radio Society**, which still exists today, as a very active club.

Today, Artie's former home, the 17th-century Gelligroes Mill, is marketed by the local authority, Caerphilly County Borough Council. They promote the mill as part of a local tourist attraction - a candle making workshop - where candles are made by hand in a building nearby and sold to visitors along with refreshments from the adjacent tea rooms.

I visited Gelligroes Mill, but alas, the loft of the mill remains dusty and empty. There is no indication whatsoever of any historical connection with either the *Titanic* or indeed with Artie Moore's wireless experiments there in the early part of the last century.

However, (and hope springs eternal as they say) a group of local Radio Amateurs, enamoured by the Artie Moore story are planning with the support of both The Friends Of The Mill group and the local authority, to bring wireless back to Gelligroes Mill in the form of an Amateur Radio group dedicated to the memory of Artie for historical 'wireless' and also modern Amateur Radio.

It's early days yet, but with luck (and a lot of hard work) it's hoped that Artie Moore's loft at Gelligroes Mill may once again, after nearly a hundred years, reverberate to the magical sound of the Morse Code. **PW**

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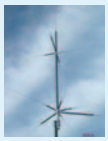

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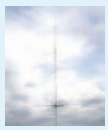

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Portable 7MHz Transmitter-Receiver

Building This Project

Despite the fact that the project featured this month was published in June 1964, in effect it's a classic pre-Second World War design up-dated to use the (then) modern glass based triode-pentode valves. I built one for use on 7MHz using a pair of ECL80s as I didn't have ECL86s.

The completed transmitter-receiver can be mains powered from its own p.s.u. and also operated using an inverter (these are becoming very cheap nowadays, for operating low power 'mains' equipment). Denco coils were used in the prototype but in all honesty - winding your own inductors for 7MHz is simplicity itself. Using your dip meter (my hobby horse again folks!) you'll make a set of coils and join in the fun on air.

Important operating notes: If you use this rig from your main station location or from a full size antenna it's essential to use a suitable antenna tuning unit, with a low pass filter in the antenna feed. This is because the crystal oscillator provides a rich source of harmonics, with possible TVI and BCI problems. If used with a mobile antenna assembly when operating /P, I found that the harmonics were usually greatly reduced. But, as always, take your passive wavemeter unit with you to check out for harmonics.

Netting: 'Netting' into the transmitter frequency with the simple regernative detector can be a tricky problem because of receiver 'blocking' and lack of selectivity. By doing so you'll get an idea of what the Radio Amateur of the 1930s encountered operating with really simple equipment. My advice is that for each crystal you have for the transmitter you calibrate the receiver tuning dial to the transmitter as closely as possible using your dip-meter. You should first use the dip meter in wavemeter mode to indicate the transmitter frequency, and then, without moving the tuning on the dip-meter, achieve as good a dip as you can by tuning the receiver. Then mark it up on the receiver's dial. It's never going to be 'spot on' due to unavoidable 'pulling' of the dip meter oscillator by mechanical movement, coupling effects, etc. but it'll be close enough for you to identify anyone responding to a "CQ" call. Good luck to - and if enough readers build their own version - perhaps we can arrange QSOs! **Editor**.

Note: An A3 sized photocopy of the original blueprint will be available from the *PW* Book Store. Please telephone **(0870) 224 7830** for details on price and postage.

Rob Mannion G3XFD writes: "This project - a semi-portable valved 7MHz transmitter-receiver-was first published in a free 'blueprint' given away with the June 1964 issue of *PW*. Although it uses triode-pentode valves, in practice it's possible to use a variety, including the ECL80 (please see Building This Project panel).

Original Text from *PW* June 1964
A 7MHz Transmitter-Receiver
By David Gibson

In the world of wireless, as in any other sphere of technical interest, there will always appear from time-to-time apparatus, which has a 'novelty' appeal. There are, no doubt, readers who are essentially very practically minded and who have no time for novelties, whereas some other readers will delight in such circuitry.

Any magazine or Editor, is faced with the constant and very difficult problem of trying to accommodate all tastes and in presenting this month's blueprint, it is felt that both these two groups will gain a measure of satisfaction.

The novelty enthusiasts, because they're shown how to build an Amateur transmitter-receiver on a chassis which measures only 3 7/8in x 2 3/8in x 9/16in complete with valves. This unit is thus small enough for the overcoat pocket and requires only a very modest power source to get on the air. Indeed, the power supply from the average domestic valve receiver will suffice.

The practically minded or the more serious reader will find this project of interest since it presents a transmitter and receiver which is efficient and will take up hardly any room at all. It can also be used as a standby rig.

Most QRO rigs for 3.5-28MHz present a problem when trying to use them on Top Band because a great deal of power has to be lost. If the big run runs 150W then some means of 'losing' 140W is required and the usual practice is to construct a separate TX for the Top Band. This article describes the construction of just such a rig with the minimum number of components consistent with reliability together with simple uncomplicated circuitry.

For others, this unit might prove very useful to take on holiday. In such an application as this, a companion midget power unit might be constructed using a TV pre-amplifier type double wound mains transformer together with a couple of silicon diodes.

Transmitter Section

The transmitter consists of a Pierce crystal oscillator operating on 7MHz, followed by a pentode power amplifier also tuned to 7MHz. This circuit configuration (see **Fig. 1**) is chosen so as to use the minimum number of components consistent with reliable performance.

Now to consider the circuit in some detail. The capacitor C1 is used mainly to isolate the crystal X1 from the h.t. line. Some constructors may point out that circuits do exist which do not use a capacitor at all in this position, but this would have meant that the crystal socket pins on the front panel were live with respect to the case and C1 was included to avoid this. The resistor, R1, provides the necessary bias for the triode portion of V1 and L1 is an r.f. choke anode load.

Capacitor C2 performs the usual role of coupling capacitor passing the generated signal to the grid of the p.a. stage. It also serves as a blocking capacitor.

Resistor R2 provides the necessary bias for the pentode section and the actual bias voltage is obtained from the signal itself. Using this method of biasing means that the p.a. must be keyed, otherwise when there is no signal there will be no bias and the p.a. will immediately start to draw excessive current.

It would, of course, be possible to place a resistor-capacitor combination in the cathode of the p.a. in order to limit the current under no-drive periods.

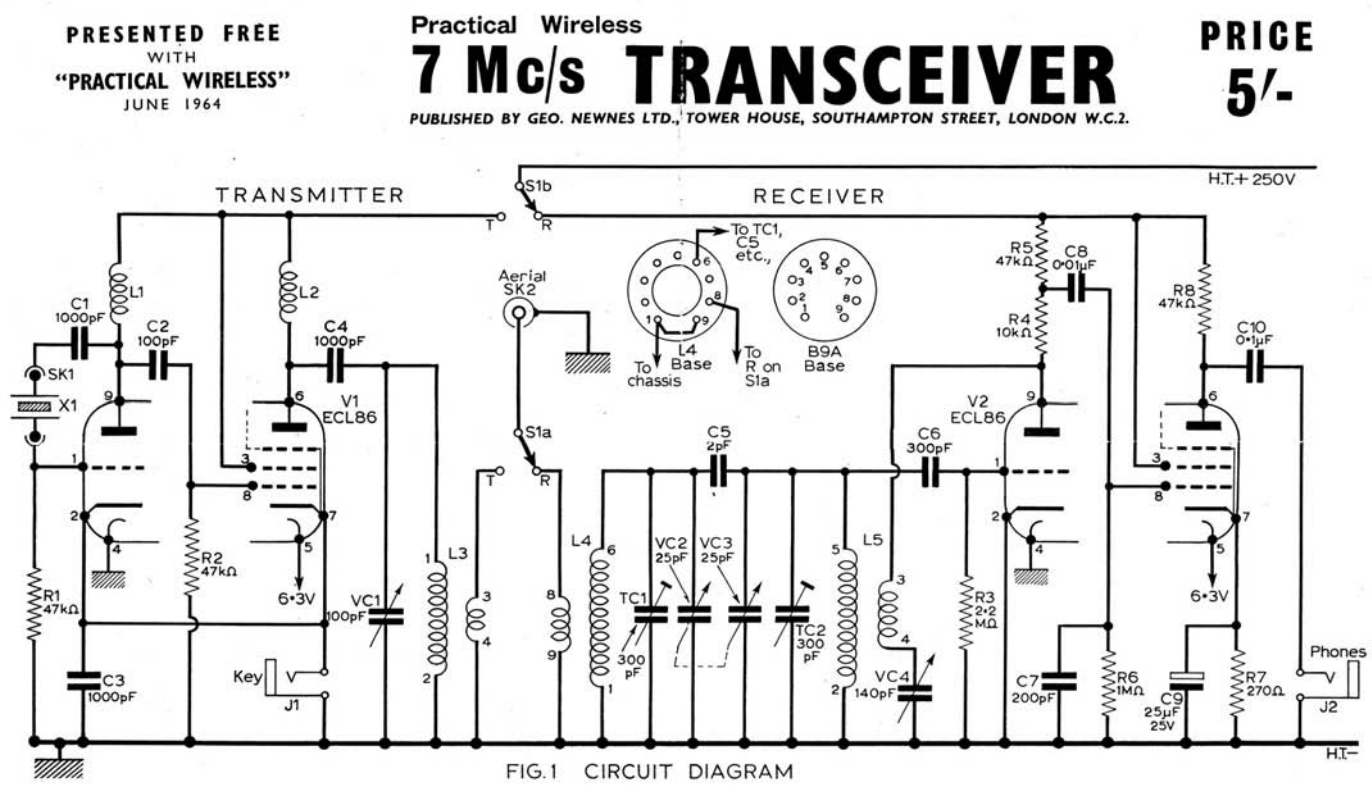


FIG.1 CIRCUIT DIAGRAM

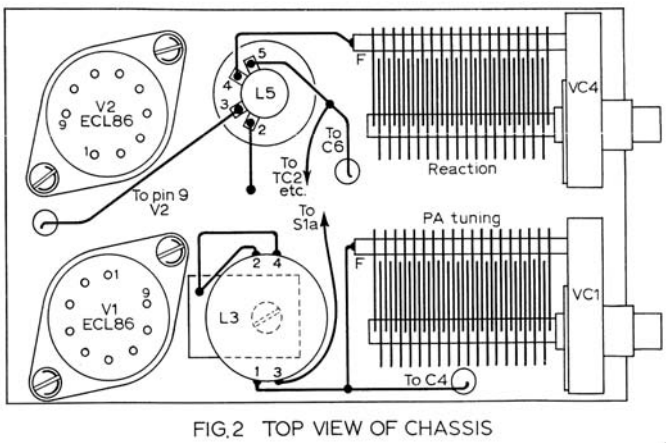


FIG.2 TOP VIEW OF CHASSIS

● Fig. 2: Top view of the chassis lay-out as built by the original author (see text). The inductor - L5 - was a Denco type (see text).

● Fig. 1: The original 7MHz transmitter-receiver project circuit diagram as published on the free 'blueprint' June 1964 (see text).

However, this would have meant two extra components plus a slight loss of power.

It was also necessary to key the crystal oscillator otherwise it would 'block' the receiver if left running (*See notes at heading of article. **Editor***). Since, however, the h.t. is switched from transmitter to receiver, it would be in order to take the cathode of V1 triode directly to earth and key only the pentode section if so desired. Should this be done, it might also be an idea to plug a modulator into the key socket thus using cathode modulation of the p.a. As this form of modulation is in the 'efficiency' class, only a very small amount of audio power would be required.

The inductor L2 functions as an r.f. choke and C4 as a blocking capacitor to prevent a short between h.t. positive and earth via L3. The variable capacitor, VC1, and L3 form a tuned circuit resonant at the transmitting frequency.

It would have been in order to place the tuned circuit in the anode lead to the p.a. thus eliminating C4. But the spindle of VC1 would then be at h.t. potential and this was considered undesirable.

Receiver Section

There is nothing startling or new about the receiver, indeed one 'old timer' on seeing it remarked that apart from the size, it was pretty much the same as his main station receiver back in the 1930s. However, with the use of modern high gain valves today's O-V-1 circuit can prove lively and efficient. The receiver, therefore, consists of a triode detector followed by a pentode audio amplifier.

The triode section is a regenerative detector, complete with the normal tuned grid circuit and grid leak R3, with VC4 acting as the regeneration control. Resistors R4 and 5 are anode load and decoupling resistors, the capacitor C8 passing on the signal to the pentode grid.

Capacitor C7 is used to provide an 'easy' path to earth for any residual r.f. which may have ventured thus far. The R7 and C9 combination provide the usual bias components common to many audio stages, and R8 forms the anode load of the pentode. The earphones are plugged into the jack socket J2 and the capacitor C10 provides the necessary isolation from the h.t.

***Modern note:** if at all possible, I would advise readers to use a small valve audio output transformer, rather than relying on the capacitor. Conveniently, such transformers provide a good match into modern low impedance headphones. **Editor**.*

Antenna Input Arrangement

The antenna input and tuned circuits may appear a little unusual, especially on the receiving side. One of the shortcomings of a regenerative detector is poor selectivity.

The circuit I've adopted helps to improve matters by providing an additional tuned circuit ahead of the usual one VC3, L5. These two tuned circuits are top coupled by the small capacitance of C5 and it's very important that this is the **only** coupling between the two.

If a suitable twin gang capacitor for VC2/VC3 is not to hand or proves difficult to obtain, then the circuit will continue to function well by omitting this first tuned circuit, ie. L4, TC1, VC2 and C5. The antenna input then goes to the spare winding on L5 (**see heading note**).

Some readers may prefer to ignore the coupling windings anyway and tap the antenna onto the grid end of the coil via a trimmer. This is a practical aid to help eliminate 'dead spots' and also to offer a much better match to certain types of antenna. Constructors who prefer this may do so with confidence and modify the circuit shown accordingly.

Also, with a regenerative circuit, there is always a possibility of radiating interference because of course in effect it's an oscillator, coupled to the antenna. So, with an extra tuned circuit between the regenerative detector and antenna this would obviously assist in

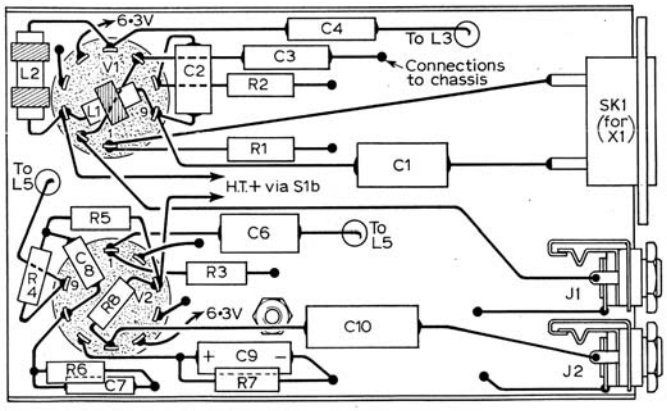


FIG.3 UNDERSIDE VIEW OF CHASSIS

Fig. 3: Underside view of the author's prototype chassis in 1964 (see text).

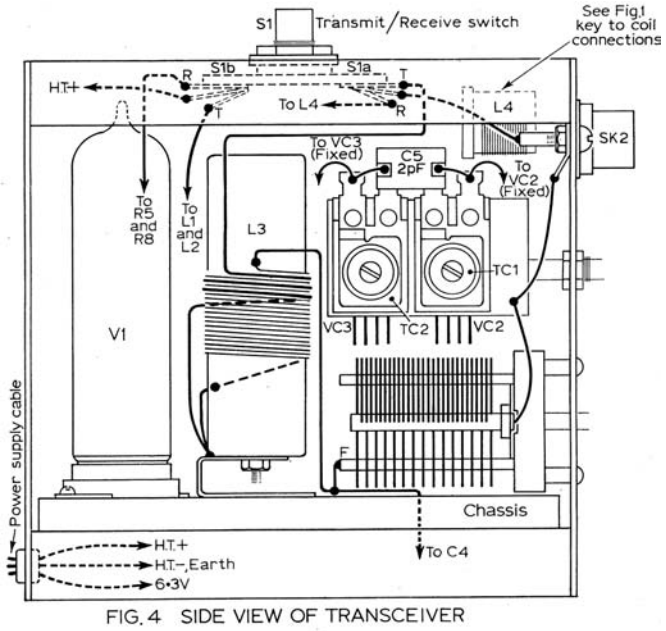


FIG.4 SIDE VIEW OF TRANSCEIVER

Fig. 4: Side view of the prototype - mounted in its case - as built by the author in 1964 (see text).

preventing unwanted radiation.

The main tuning, i.e. bandset, is centred on the band by the trimmers TC1 and TC2 and the variable then acts as a bandspread. I found very helpful on today's crowded bands. When adjusting the trimmers to centre the tuning, remember to set the bandspread to half mesh first.

Construction

I strongly advise that intending constructors should be in possession of all components, including chassis and case prior to commencing actual construction. This is very important, especially when working to close tolerances if you intend to mount the rig in a small case.

All parts should be measured carefully and holes drilled accordingly. There may well be slight differences between similar components and the drawings and layouts given should be used only as a guide.

As an example of the exactness of layout I had to adopt, the two capacitors VC1 and VC4 just fitted flush in the case specified. There was no room for any error at all, as they are already flush up against the sides of the case. In my prototype these components could be manipulated either way to correct for inaccuracies in holes already drilled.

Tinplate Chassis

The actual chassis was made from a piece of thin tinplate. I chose this material instead of the more usual aluminium because it can be cut to any shape or size with a pair of household scissors. It's also very easy to bend, while being already tinned, components requiring to be earthed can be soldered directly to it. If aluminium was used, nuts, bolts and tags would be required for chassis connections.

Note: do not make the chassis any deeper than 9/16in. If you do, the result will be a midget station with the only minor drawback that it will be impossible to plug in the valves. You have been warned!

The holes for the two B9A valve holders are cut first and a couple of holes drilled to allow leads to come up from below chassis. Next, complete all under chassis wiring prior to its insertion in the case, as I found that once this and the variable capacitors above chassis are wired, there's no way of getting at under chassis components again. That is without unsoldering all the variables and removing both them and the valves in order to lift out the chassis!

Base Plate

One interesting and very practical suggestion is that the bottom of the case should be removed and a small base plate fitted. This would make inspection and servicing very much simpler - not to mention ease of construction. This wasn't done in the prototype and there may be some, who, for various reasons, will not wish to cut a panel from the case.

First wire the whole chassis, all leads from below chassis, to anything above, i.e. p.a. tuning capacitor lead, etc. should be wired and a long floating lead pushed through the appropriate hole. The green coil with reaction winding - Denco Range 4 in the original (*please see heading notes regarding winding your own inductors. **Editor***) may either be mounted by drilling a hole and using the plastic locking nut supplied, or the method used in the original may appeal.

A small scrap of tinplate is cut (watch out for very sharp edges) to mount the coil onto. The core of the coil (Denco former) is removed and the thread for the plastic locking nut is cut off. The pointed end of the tinplate is then heated and pressed into the plastic end of the coil and allowed to cool and set. The coil can then be soldered via the piece of tinplate to the chassis. **Note:** the dust cores are removed from both coils.

Crystal & Jack Plugs

If you're building a miniature version, the crystal holder and the two jack plugs present a problem. This is because once the chassis is in place these three components are inside and have to be fixed from the outside.

The jack sockets are 'rescued' with a small piece of 18s.w.g. wire bent into a hook. This was inserted into the hole in the 'front panel', hooked onto the jack socket and pulled. This exposed the threaded collar of the jack socket and the locking nut was then screwed on with the other hand.

The crystal holder was a bigger problem, as there was no fixed threaded part which was itself connected to the component as in the case of the threaded collar on the jack sockets. In order to overcome this difficulty two bolts were inserted in the fixing holes in the crystal socket and were cemented in place with resin based adhesive.

When the adhesive was cured (24 hours to be certain) the socket was then wired into circuit and the chassis placed in the case. The jack sockets were then bought out as per the instructions given above. A pair of long nosed pliers were then inserted into the actual crystal sockets and the whole assembly was pulled **gently** into position. I then screwed the two nuts on with my free hand.

No definite dimensions are given for the shield and mounting for the variable bandspread capacitor since these will vary depending on the component used. If a single capacitor is used instead of the bandpass arrangement shown, then the screen will not be necessary.

In the prototype, the two bandset 300pF trimmers are mounted on one tinplate shield and the aerial coil on the other. This latter coil is held in position by a piece of 18s.w.g. wire from pins 1 and 9 (Denco pin numbers) and are earthed anyway. The coil and the trimmer or trimmers are wired up complete with tinplate screen and the bandspread capacitors as one unit, prior to inserting the whole in the case.

Power Supply

On the 'roof 'of the case in my prototype is a switch marked transmit/receive. It's either a single-pole two-way or a two-pole two-way.

One pole switches the antenna to either the transmitter p.a. coil or to the receiver input, the use of the other pole is optional. If a midget power unit is constructed using a TV pre-amplifier type transformer it must be noted that the maximum rating of these transformers is somewhere around 30mA. With both transmitter and receiver

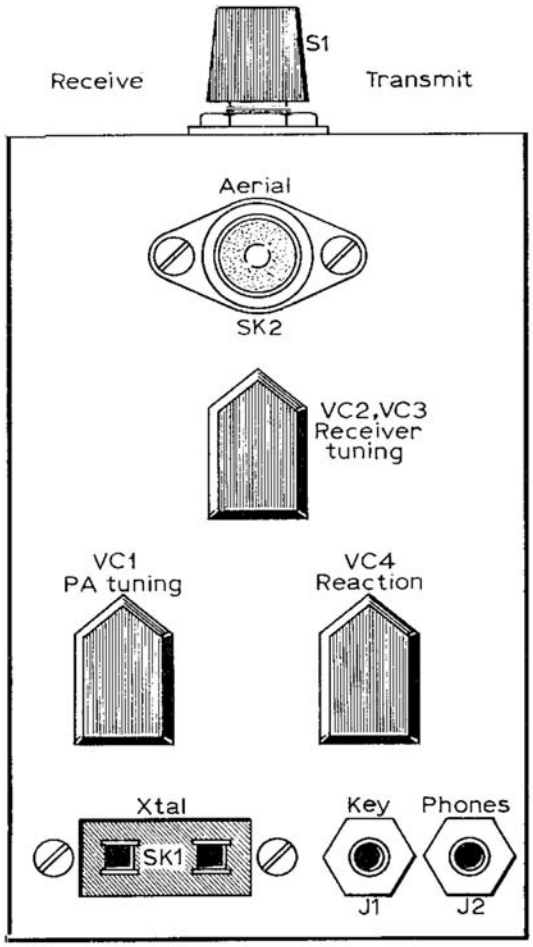


FIG.5 FRONT PANEL

● Fig. 5: Front panel lay-out as used in 1964 prototype (see text). The 1964 shopping list is shown below.

COMPONENTS LIST

INDUCTORS

L1 R.F. choke
L2 R.F. choke (see text)
L3 25 turns of 26 swg enamelled wire on 3/4 in. diameter ceramic former 3 turns wound over end of winding as coupling.
L4 Signal grid coil with aerial coupling winding. Denco miniature type: Blue, Range 4 (20–60 metres).
L5 Grid coil with reaction winding. Denco miniature type: Green, Range 4 (20–60 metres).

RESISTORS

R1....47kΩ R2...47kΩ R3...2·2MΩ R4...10kΩ
R5...47kΩ R6...1MΩ R7...270Ω R8...47kΩ

CAPACITORS

C1 1000 pF ceramic or mica
C2 100 pF ceramic or mica
C3 1000 pF ceramic or mica
C4 1000 pF ceramic or mica
C5 2pF mica
C6 300 pF ceramic or mica
C7 200 pF ceramic or mica
C8 0·01 µF paper 350V
C9 25µF electrolytic 25V
C10 0·1µF paper 400V
TC1 300pF compression type trimmer
TC2 300 pF compression type trimmer
VC1 100 pF variable
VC2 VC3 25 + 25µF twin-gang variable
VC4 140 pF variable

MISCELLANEOUS

J1, J2 Miniature jack socket
SK1.... Two-way socket for 10 x J crystal
SK2.. .Coaxial socket (Belling Lee L604 S CD)
S1..... Single wafer rotary switch, two-pole, two-way.
V1. .... ECL86 V2..... ECL86
X1.....Crystal (see text)
Four small knobs. Two B9A valveholders. Instrument case 4 in. x 4 in. x 2½ in. (Teleradio Ltd., 189 Edgware Rd., London W.2.)
Tinplate sheet for chassis and mounting brackets. 6BA screws and nuts.

running, the drain on such a p.s.u. might well prove too great for the particular transformer and in such a case the other pole S1b can be used to switch the h.t. to either valve, thus saving power. The power supply used on the original was capable of supplying 150mA and the necessity did not arise.

Incidentally, the average domestic valve radio will supply a convenient form of power, if a suitable plug or adapter is made. **Important:** If you do use the power supply of a domestic receiver, first check that the heater voltage is suitable, some radio sets have series connected heaters, etc. **So, it's essential to check that the set is NOT an a.c./d.c. type, ie with mains directly connecting to one side of the chassis**. It's equally important that if a midget p.s.u. is made that this is not an a.c./d.c type. One glance at the blueprint circuit, Fig. 1, will show that the headphones would then be connected to one side of the mains as would the entire case, and this would be very dangerous.

Chokes & Jacks

The two r.f. chokes in the transmitter circuit can be small standard components of any type that will fit in your project.

The two midget jack plugs and sockets again originally favourites for transistor work appear to stand up satisfactorily to the tasks allotted them in the present design.

Transmitter Antenna Circuits

The p.a. coil will present no problems, being merely a length of wire wound on a 3/4in diameter former. The actual former used in the prototype was a pill bottle with a plastic top bolted to a piece of tinplate which was soldered directly to the chassis.

However, 3/4in diameter formers (preferably ceramic) are available, which will save would-be constructors touring chemist shops with a ruler! The method of feeding the antenna from this coil is a matter of choice and will rather depend upon the type to be used.

If a dipole is available, then a link winding of some three turns should prove satisfactory. It's then only necessary to adjust their position on the tank coil for correct loading and maximum output.

If, on the other hand, a random length of wire, let's say an end-fed type, is to be loaded up then it's possible to achieve this by tapping directly on the p.a. coil. The tap can then be tried in varied positions up or down until a good match is secured. Once the correct tap has been located for a particular crystal and length of antenna it will not need to be varied very much.

Change Of Frequency?

A change of frequency, i.e. plugging in another crystal, will mean a change of tapping point on the p.a. coil. However, if two or three crystals are to be used and their frequencies are close together, then the same tap might be used with only slight loss of efficiency.

The 7MHz band is only 100kHz wide (*This is due to change soon - watch out for announcements. **Editor***) and the lower end of the band are usually used for c.w. - i.e. 7.035MHz and below. Suitable crystals for 7MHz are often available at rallies, shows and junk sales.

Transmitter Tuning

The transmitter may be tuned in a number of ways. By far the best method is to use a standing wave ratio (s.w.r.) meter to ensure that the last watt goes up the spout!

For those not so equipped, the usual method of tuning for a dip on a meter in the p.a. anode may be used. Here the mA meter may conveniently be plugged into the jack socket in place of the key for initial tuning up.

Note: Please bear in mind that the power input cannot be exactly calculated from this, because the meter will read not only the p.a. anode current, but p.a. screen and triode current as well. However, with the suggested valve and h.t. used it's doubtful if one could violate the terms of transmitting licence and exceed the permitted 150W for 7MHz!

Receiver Tuning

The usual tuning procedure for regenerative circuit is used. For amplitude modulation (a.m.) signals the regeneration control is advanced to the point just before the detector starts to oscillate. For c.w. and s.s.b. reception, the control is adjusted just to the point of oscillation (the 'threshold'), turning it any further may result in lowered sensitivity.

Final Remarks

The case is a steel case and perhaps aluminium would be a more suitable choice. The steel case was a 'standard' line, easily obtainable and was, therefore, chosen. Those who prefer aluminium could, perhaps, get a case made specially to their desired dimensions. (***Note:** back in the 1970s I built my version into a tin-plate tea caddy! **Editor***).

In my prototype, there is no form of ventilation and in view of the bulb temperature attained by miniature glass valves, I suggest that a number of small holes, grouped in a neat pattern, be drilled in strategic places. These can be in the case, at the rear of the valves, low down near their bases, and immediately above to keep them cool.

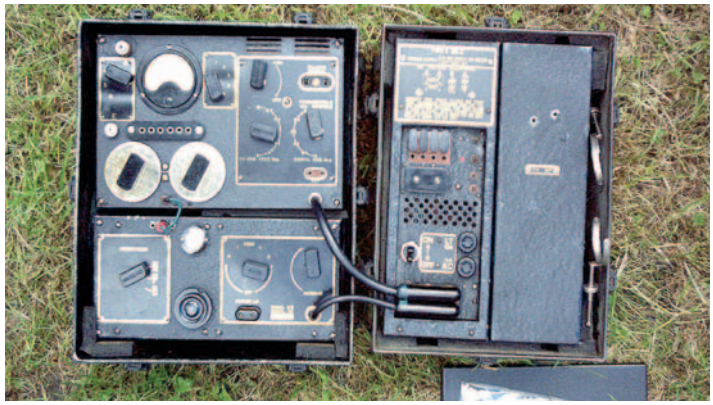
To use the station for other bands, the appropriate coils in the Denco range should be used in place of those shown. The p.a. coil in the transmitter would require the number of turns to be varied accordingly.

Suggested lines for experiments would be 45 turns for 3.5MHz and 95 turns for 1.8MHz (fine wire). I don't recommend that the station be used on the higher bands due to the efficiency of the receiver decreasing with increased frequency.

PW

The B2 Suitcase Transmitter-Receiver

Ross Bradshaw G4DTT takes a look at the famous B2 'Clandestine' transmitter and receiver. It's got quite a history and if you're lucky enough to find one - Ross can help you get it on the air with some helpful advice and information.



The B2 'Clandestine' transmitter-receiver- one of the most famous Second World War transmitter-receivers. Although few Amateurs owned complete B2 sets, many separate B2 receivers (see Figs. 1,4 and 5, were available on the surplus market. Complete, un-modified B2s command very high prices on the rare occasions they are sold. This example is from Ben Nock G4BXD's collection.

This photograph (copyright protected) courtesy G4BXD

From various branches of the forces, many Amateurs have memories of certain radio equipment from long ago. A soldier would remember the Number 19 set, the sailor the B28 receiver whilst the RAF operators might remember the 1154/1155 combination. And for a former Merchant Navy Radio Officer like myself the *Oceanspan* transmitter and the *Atalanta* receiver spring to mind.

However, from such organisations as **Government Communications Headquarters** (GCHQ) and the **Diplomatic Wireless Service** (DWS) we can expect deafening silence or selective amnesia should one mention the Racal RA17 or the Mark 123! That brings me to the wartime **Special Operations Executive** (SOE).

Linked with SOE is the well known B2 'Clandestine' transmitter-receiver or, to give it its proper name the Type 3 Mark 2. So what is this B2 we hear about and how can we use it today?

The B2's Original Role

Let's now take a look at the B2's original role. Firstly, what many don't take into account is that the B2 and the later Mark 123 were never intended to provide communication at the distances that the Radio Amateur often does.

The type A Mark 3 with its 5W r.f. output was usually used from France to England. Nowadays of course, 5W is often around the level modern QRP operators use.

For more reliable contacts the B2 with its 20W (some say 30W on some frequencies) was used. In fact **Len Key MBE, G0FQX** used a B2 in 1944 to work from Yugoslavia to Brindisi, a distance of some 640km or so (400 miles).

The B2 usually came in a small suitcase, inside which were four metal boxes, see **Fig. 1**. One contained the power supply unit (p.s.u.), another the receiver, and the third the transmitter with its built-in antenna tuning unit (a.t.u.).

The fourth box contained spares, including with valves, antenna wire, earth wire and Morse key. There were also headphones, plug in tank coils for the transmitter and various mains plug adapters. All this was (laughingly) called a portable set, but at 13.6kg (30lbs) it **was** a bit heavy! In comparison my own Mark 123 only weighs 3.6kg (8lbs) in total.

The p.s.u. would work on a.c. mains supply from 97 to 140V and 190 to 250V. Also built into the p.s.u. was an electro-mechanical vibrator, the forerunner of the modern inverter so the p.s.u. could be run from a 6V car battery. Incidentally the p.s.u. alone weighed 5.4kg (12lbs) of the total 13.6kg!

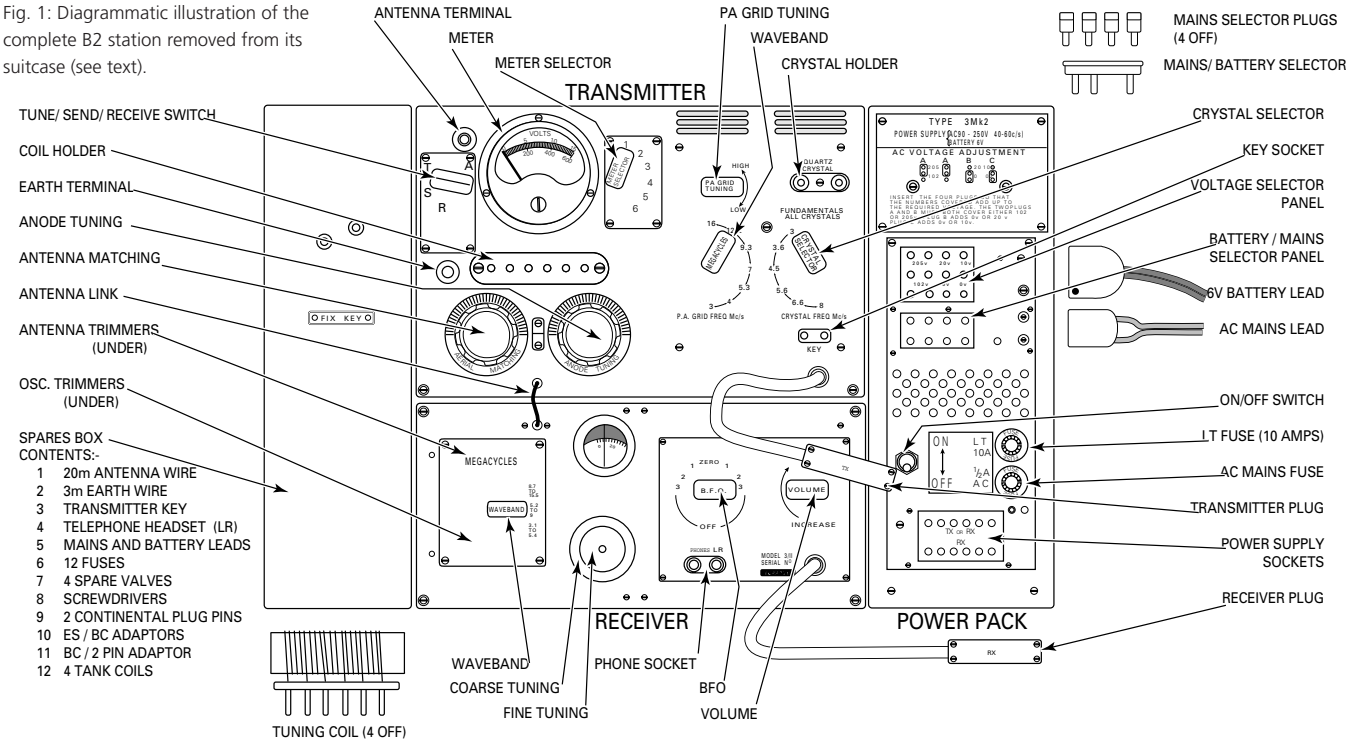
Circuit & Switching

The (simplified) circuit of the B2 is shown in **Fig. 2** and the p.s.u. in **Fig. 3**. The switching of various voltage from the p.s.u. are controlled by the **Tune/Send/Receive** (TSR) switch, which is sited on the transmitter, top left in Fig. 1. While the TSR is switched to receive, a 500V h.t. supply is still applied to the transmitter. However, 250V is routed back out of the transmitter by the TSR switch for the receiver h.t. supply.

The p.s.u. also provides a negative 'grid bias' supply for use on the volume control of the receiver. This again is taken in and out of the transmitter and fed into the receiver, together with the 6.3V for valve heaters and an earth return line.

Whilst in the receive mode the built-in meter on the transmitter, top left Fig. 1, is used to monitor three receiver voltages. The six-position selector switch is immediately to the right of the meter.

Position 1: 250V receiver h.t.
Position 2: 500V still applied to



● Fig. 1: Diagrammatic illustration of the complete B2 station removed from its suitcase (see text).

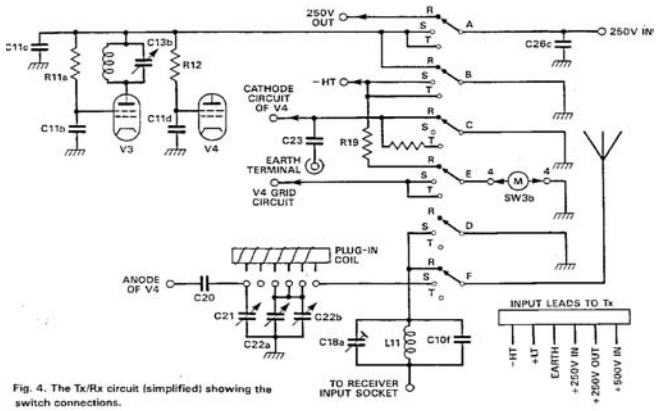
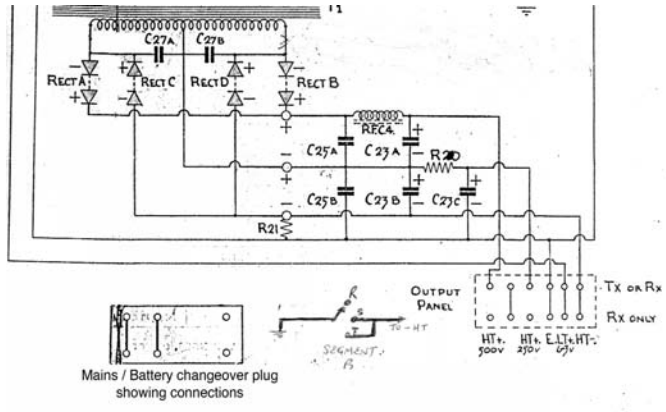


Fig. 4. The Tx/Rx circuit (simplified) showing the switch connections.

● Fig. 2: Diagram showing (simplified) circuit and switching arrangements. The transmitter is very basic and reliable using a crystal-oscillator/amplifier, fed to a p.a. stage (see text).



● Fig. 3: Circuit of the B2 power supply (see text).

(but not used) by the transmitter.
Position 3: (used in transmit mode only).
Position 4: The negative supply for receiver grid bias. Note: Altering the volume control doesn't alter the negative h.t. voltage as it is metered before it's fed to the receiver.
Position 5: Not used
Position 6: (see transmit).

Switched To Transmit

When switched to transmit the 500V supply is as already mentioned, still applied to the anode of the power amplifier valve. The 250V is then removed from the receiver and fed via R12 to the screen grid of the p.a. valve. It's also fed to the screen grid of the oscillator valve via R11a, as well as to the anode of the oscillator valve via L9 and L7/L8.

When Tune or Transmit is selected it's possible to monitor the following with the built-in meter.
Position 1: 250V, which is now applied as described.
Position 2: 500 volts applied to the anode of the p.a. valve.
Position 3: Monitors the grid current drive (this is drive applied to input of the p.a.)
Position 4: Oscillator valve crystal current
Position 5: Not used
Position 6: The p.a. valve current (only when on key down).

The operator would use **Position 4** to see if the crystal was working or not. **Position 3** is used only when tuning up to see the correct amount of drive is being applied to the power amplifier.

The Transmitter

The transmitter is shown at the top centre of the diagram in Fig. 1. From left to right you'll see the following:
Antenna Terminal: This is for a long wire end fed antenna (The wire supplied with the B2 was usually 18m (60ft) long.
TSR Switch: This is the Tune/Send/Receive switch.
Earth Terminal: A 3m (10ft) length of wire was supplied to connect to earth properly, a water pipe or a counterpoise earth.
Tank Coil Socket: Four tank coils could be used in two configurations per coil, (plug in one way or reverse for another).

The coils provide coverage of:

L1A	3 to 4MHz
L1B	3.75 to 5.25MHz
L2A	4.5 to 6.25MHz
L2B	5.5 to 7.5MHz
L3A	6.5 to 9MHz
L3B	7 to 10MHz
L4A	9 to 13MHz
L4B	12 to 16MHz

Note: There is an overlap of frequency for the tank coils. This was so that if the operator reached zero (0) on either of the tuning controls whilst tuning, then they could use a higher frequency coil. For example, if L3A was used and tuning reached 0 on one of the controls coil L3B could be used, but if tuning reached 10 on L3A, L2B would be used.

Meter: This is a moving coil meter to monitor the various voltages and currents as already described. The meter shunts are sited just behind the meter inside the transmitter.

Meter Selector: This, as I've described is used to select various voltage/currents in the receiver of transmitter depending if in receive or transmit mode.

Power amplifier (p.a.) grid tuning: In the anode of the oscillator valve is a tuned circuit comprising two coils L7 and L8 and a capacitor C13B. The shaft of C13B is the p.a. grid tuning knob. When tuning this control the operator is adjusting drive into the input grid of the p.a. valve.

In practice, I've found that if you tune for maximum drive then back off slightly, there's less chance of transmitting harmonics of the desired frequency. If you tune to the maximum only, then you stand a chance of going out on two frequencies at once.

Crystal Socket: Crystals used are of the 10X base type but by using an adapter, type FT 243 crystals can also be used.

Crystal Frequency Control: This is in the cathode circuit of the oscillator valve, and in the circuit this control is SW2A and SW2B. (Its use is explained later).

● Fig. 5: The B2 receiver as restored (to full working order) by G4BXD. Photo courtesy G4BXD

Waveband: This taps certain segments of the coils L7 and L8 by using SW2C and SW2D that are in the anode circuit of the oscillator. Basically, the two segments SW2A and SW2B (in the cathode circuit of the oscillator valve) select the fundamental frequency or the second harmonic of the fundamental frequency. The output frequency to be transmitted is then determined by the settings of SW2C and SW2D, which tap the coils L7 and L8 in the anode circuit.

Additionally (and in conjunction with) the plug in tank coil and the tuning capacitors, C21 and C22, form a Pi circuit to attenuate any unwanted harmonics from being transmitted. So, in effect, the tank coils and the tuning capacitors form a built-in a.t.u..

The Receiver

The receiver unit is shown in the lower centre section of Fig. 1 (and Figs. 4 & 5). Again, starting from the left side can be found;

The waveband switch: The coverage of the receiver (3.1 to 15.5MHz) is split into three wavebands. The switch selects one of the three bands.

Antenna Link: The antenna is fed into the transmitter and via the TSR switch and (when in receive mode) is then sent onwards from the transmitter and onto the receiver.

Coarse/Fine Tune: This is the tuning control for the receiver, tune to the required frequency and fine tune with the 50-to-one geared down fine tune on this concentric control.

Tuning Scale: A magnifying lens is mounted directly over the miniature tuning scale. The scale itself is calibrated from zero to 180. A chart was supplied with the B2 carrying a scale of dial graduations relating to frequency in graph form. However, I've found that by using a small solid state battery powered oscillator, calibration is easily done. All I have to do is plug the transmit crystal into the hand held oscillator and insert the signal into the antenna socket of the receiver. I then tune the receiver until 'zero beat' is the achieved; the receiver is then 'netted' to my transmit frequency.

Headphones: The B2 used low impedance headphones.

Beat Frequency oscillator (b.f.o.): This provides a swing of ±3kHz each side of the intermediate frequency of 470kHz. To switch off the b.f.o. to receive amplitude modulated (a.m.) signals the control is rotated to the **Off** position when the blades of the b.f.o. tuning capacitor are 'shorted out'.

There's no r.f. amplifier stage in the B2 receiver, and the signal input is to a frequency changer. This is followed by two i.f stages at the previously mentioned frequency of 470kHz, a b.f.o., detector and a.f. stage. (All done with just four valves).

● Fig. 4: Many Radio Amateurs were able to use the B2 receiver that was available on the surplus market. This (rather battered) example, before careful restoration by Ben Nock G4BXD was purchased for 50p (then 10 shillings) by G3XFD at the Southampton RSGB Group in the mid-1950s. Photo courtesy G4BXD

In the original documentation the B2's receive sensitivity was quoted as 1-3µV to give 10mW audio output at 1kHz. Selectivity was quoted as kHz at the 3dB point. These figures are sadly lacking when coping with the modern crowded Amateur bands. As for the transmitter, two valves were used, an EL32 used as a tri-tet oscillator and a 6L6 used as a Class C power amplifier.

One Crystal - Three Bands

It's possible to use one crystal on three bands. For example, you can use a 3.509MHz crystal on the 3.5 and 7 and 14MHz bands. **Note:** for the unwary, if you don't tune correctly you can inadvertently transmit on 10.527MHz!) To use this one crystal you would set the controls up as follows:

Output Frequency	Crystal Selector	Waveband	Plug-in tank coil
3.509	Fundamental	3—4	L1A
7.018	3—-3.6	7—9	L3B
14.036	3—3.6	12.2—16	L4B

The crystal selector is set either to the fundamental frequency of the crystal or to what the crystal is cut for, in this case 3.509MHz.

The waveband and the selection of the tank coil will give you what frequency you actually want to transmit

Safety note: If you ever have to work on the B2 transmitter with the power on (for fault finding) there is a tag board just above the two valves, next to the front panel of the transmit case. Apart from the 6.3V heater supply, all supplies come into the transmitter, up to the tag board, to the meter and its shunts, back to the tag board and down into the depths of the transmitter.

So, you can have 250V incoming on one finger, 250V outgoing an another finger and 500V on yet another finger, all on the one hand. Not nice. When using the Morse key avid the brass key contacts...500V at 60m.a. will give you an unpleasant wake up.

On The Air?

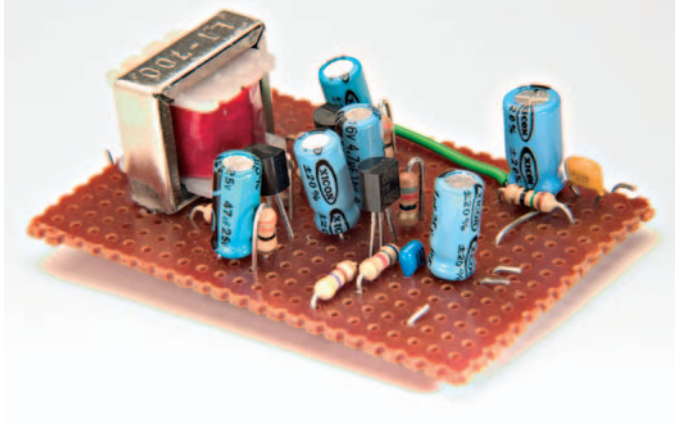
As you'll realise from my brief outline of the B2, it's possible with the required crystals to transmit in the 3.5, 7, 10, and 14MHz bands. Although I consider that the receiver lacks the selectivity needed on today's bands.

However, by looking at the voltage switching in the B2 transmitter it's possible to dispense with the B2 receiver and use (let's say) either an FRG-7 or R 600 receiver in its place. That is how I consider you could use your B2 transmitter today but with a modern receiver assuming, of course, you're fortunate enough to own such a prized item of radio history! **PW**

practical way

"Be discreet in all things, and so render it unnecessary to be mysterious".
Arthur Wellesley 1769-1852 (1st Duke of Wellington)

This month the Rev. George Dobbs G3RJV is being discrete! In fact he's quietly confident that some special readers will enjoy this month's theme...after reading the quotation of course!



● This month's project - a discrete audio amplifier. More complex than an i.c. amplifier but "fun to build" says G3RJV.

I know that some readers of this column are happier using discrete circuits (circuits with individual components) rather than using integrated circuits (i.c.s) or 'chips'. I'm not quite sure why, although I have heard the complaint that some chips are difficult to obtain.

However, I can't recall having used any especially obscure chips on these pages and sometimes individual transistors are as difficult to source as integrated circuit chips! Despite this, I concede that there's a certain amount of satisfaction to be had in cooking from 'raw ingredients' so I won't be discreet about using discrete components!

It's many years since I wrote an article using a discrete component audio amplifier. The reason is simple enough...there are a variety of inexpensive, easy to obtain, audio amplifier chips.

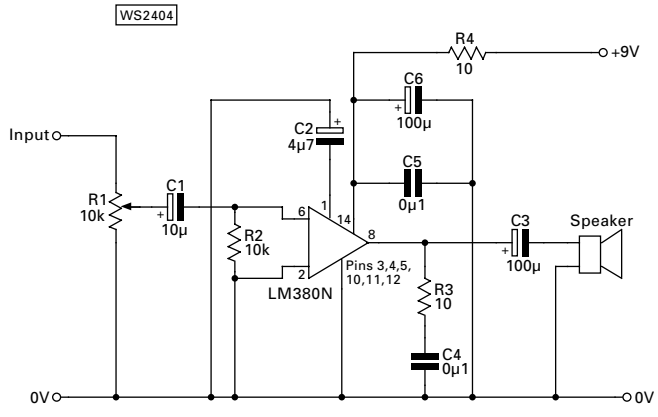
Some of the available devices require very few external parts to complete a worthwhile audio amplifier. A good example is the LM380 audio amplifier. The LM380 is an audio power amplifier most commonly available in the 14-pin DIL package.

The LM380 has a very useful internally fixed gain at 50 (34dB) and can be a.c. coupled or referenced to ground. The 14-pin version is capable of dissipating up to 8W, when provided with suitable heat sinking.

George's Recipe

My usual circuit 'recipe' for the LM380 is shown in **Fig. 1**, and delightfully simple it is too. The whole circuit is the chip itself with only 10 extra components plus the speaker of course!

Conveniently the middle three pins on each side of the chip (pins 3, 4, 5 and 10, 11, 12) are connected as a heat sink. These can be connected directly to a copper ground-plane to help dissipate the heat. Perhaps this is why it's one of my favourite audio chips because it lends itself so well to 'ugly construction'.

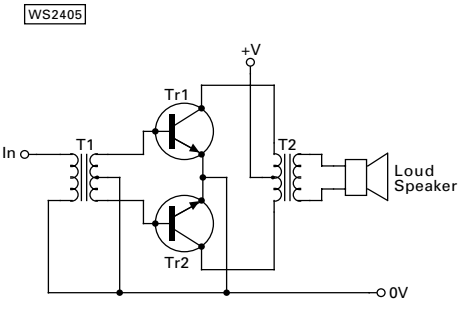


● Fig,. 1: The 'standard' circuit for using the LM380N integrated circuit (i.c.) audio amplifier (see text).

The amplifier is easy to build ugly-style on a piece of copper clad board. The grounded pins in the centre of each side are soldered directly to the copper board and the other pins are splayed out to accept directly wired connections. The previous statements represents many good reasons why I've used the LM380 in many of my simple receiver projects.

And of course - for obvious reasons the LM386 has also featured frequently in these columns but I have found it a little more prone to instability problems. I recall having a lot of unintentional 'fun' with an LM386 which oscillated*(**see note**) right in the middle of the 14MHz amateur band!

Note:* *Adequate decoupling is essential with the i.c.s., as George sensibly mentions. It's entirely possible (I've experienced the problem myself) to have an i.c. acting as an effective oscillator right up into u.h.f. and above - rather than as an amplifier. Please follow the decoupling guidelines - you'll save yourself a great deal of frustration. That 'steady carrier' on 145MHz - only varying in frequency when you adjust the volume could be your audio stages!* ***Editor*.



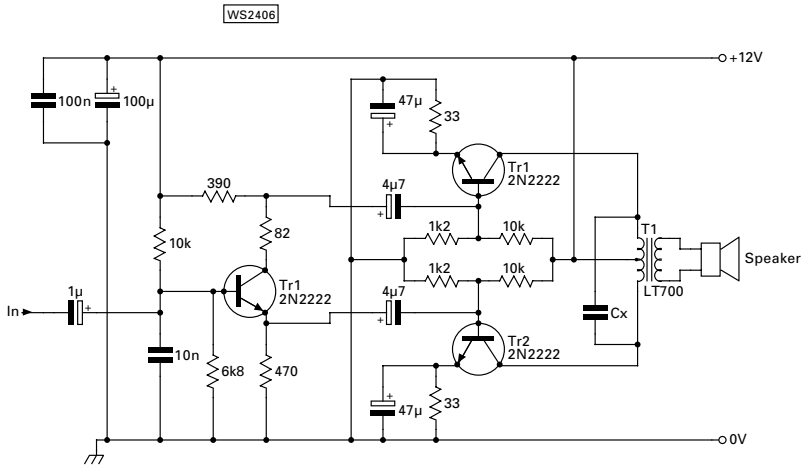
● Fig. 2: Something from the 'early days' of transistorised receiver the now not so common push-pull audio output circuit (see text).

Similar Discrete Circuit

Probably a similar circuit in a discrete format would be rather like the amplifiers used in the earlier designs of transistor radio. These were usually push-pull designs using a couple of audio transformers; a driver transformer and an output transformer. The elements of a push-pull circuit are shown in **Fig. 2**.

In Fig. 2 the transformer T1 feeds the two transistors out of phase that are operated as opposite halves of a symmetrical circuit. One transistor conducts for one half of each cycle and the other transistor conducts for the other half of the cycle.

The signal combines in the output transformer (T2) to drive the loudspeaker from a secondary winding. It's a neat



● Fig. 3: Circuit using modern (almost) transformerless push-pull output circuitry. This circuit is based on the work of Jim Kortge K8IQY (see text).

circuit idea in which each half is a mirror image of the other.

Each transistor is utilised for only half of the time and when no signal is received neither transistor is conducting. Not only does it save power...it also reduces the heat developed in the circuit.

Although the circuit I've just described is ideal for what we want...there's a problem! Where do we get the transformers for a modern push-pull circuit?

To answer the question I suggest that the more frugal reader may like to hunt out a transistor radio and cull the transformers from the printed circuit board (p.c.b.). A good solution perhaps, but it's only for those who want that bother or can find such a radio in the junk box.

The driver transformer can be eliminated by using a transistor as a phase splitter to drive the two output transistors but we still need an output transformer. The classic output transformer I used in the 1980s was the Eagle LT700 but I have not been able to find them for some time. At least not until I notice that they were stocked by **Bowood Electronics** (see advert in this issue).

The LT700 is listed as SOP056 in Bowood's latest catalogue. They can be found at Bowood Electronics Ltd., **7 Bakewell Road, Baslow, Derbyshire DE45 1RE** and at **www.bowood-electronics.co.uk**

I notice the LT700 is also available from **Partridge Electronics, 54-56 Fleet Road, Benfleet, Essex SS7 5JN** or **www.partridgeelectronics.co.uk**

The LT700 has a 1.2kΩ, centre tapped primary with a 4Ω output winding. It's designed as a transistor push-pull amplifier output transformer.

Kit Demonstrator

I hadn't built a push-pull amplifier for many years until I received a kit to demonstrate the **New Jersey QRP Club's** 'Island Cutter'. This is a diamond tipped mill designed to cut small round 'islands' in p.c.b. material as a method of construction.

The 'example project' kit for this method was a small push-pull amplifier designed by **Jim Kortge K8IQY**. The amplifier to be described is based on Jim's design and is built from easily available parts. I used 2N2222 transistors in my prototype but any generic *npn* would do the job.

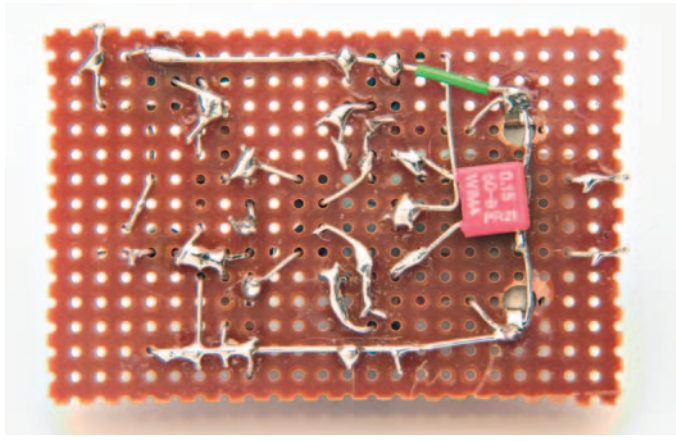
The reader could try the popular BC107 or the 2N3904. The only specialist part is the output transformer. I used the LT700 described above but readers could glean a push-pull output transformer for an old transistor radio. I have thrown out dozens of them; perhaps *PW* readers have been more careful and frugal?

The Circuit

The circuit of the complete push-pull amplifier is shown in **Fig. 3**. The first transistor, Tr1, serves as a phase splitter. It's biased so that the emitter is a few volts above ground and the collector about the same voltage below the supply voltage.

Two outputs, 180° out of phase, can be taken from the emitter and collector. These signals are fed to the delightfully symmetrical output arrangement.

The second pair of transistors are used as a class AB audio amplifier; the load for both transistors being T1. The low impedance winding on T1 drives a loudspeaker.



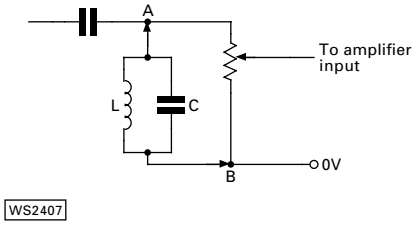
● Fig. 5: Photograph showing the completed discrete component audio amplifier built using G3RJV's preferred style for larger projects - using 'Perf' board (see text).

Note: Take note of the capacitor (Cx) mounted across the primary of T1. This serves two purposes. It rolls off the high frequency response of the amplifier, cutting off a lot of the background hiss. It also forms a tuned circuit with the inductance of T1 so a value can be chosen which will resonate at a suitable 'communications frequency'.

Tuned Audio Circuits

Incidentally, from time-to-time I've used tuned circuits at audio frequencies to improve the audio response of amplifiers in simple communications receivers. And a very simple method successfully used in the past is shown in **Fig. 4**.

In the configuration shown, a single tuned circuit is added across a volume control potentiometer. I've sometimes used the surplus 88mH telephone line loading coils. These are no longer easy to find but a Toko 82mH moulded choke is readily available. This value together with a 0.47µF (470nF) capacitor tunes near enough to 800Hz.



● Fig. 4: The simple circuit used by G3RJV to provide 'tuned audio circuits' for communications. Although deceptively simple - George says it works well (see text).

Mounting the simple tuned circuit between A and B (across the volume control) of an existing audio amplifier in a receiver offers simple, and useful, filtering. Try it out for yourself!

I measured the inductance of the LT700 primary as 260mH. A desirable frequency would be 800Hz and a quick calculation showed a suitable value for Cx would be 0.15µF (150nF). This appears to have the desired effect although the resonance peak is very broad. However, the reduction of the higher frequency hiss is very noticeable and the addition is Cx is obviously worthwhile if the amplifier is to be used in a short wave receiver.

So for those who eschew integrated circuit chips, we have a small audio amplifier for their simple receiver projects. And although more complex than using an LM380 or LM386, it was fun to build! **PW**

Antenna Workshop

David Butler G4ASR comes to the Antenna Workshop with a two-element delta loop beam antenna for the 50MHz band. Now you've no excuse, so build one for yourself!

This time I'm going to describe a two-element delta loop antenna for the 50MHz band. To start, we'll look at the beam antenna shown in the diagram, **Fig. 1** consists of a driven element and a reflector element mounted on a short boom. The elements used in the delta loop beam are approximately one wavelength long, approximately λ/3 on each side.

As you know, loop antennas can take many shapes - so why not make it a triangle? The answer is, that this shape is ideal for a beam with full-wave elements. Additionally, it has all the features of a quad loop antenna as well as some significant advantages.

The first advantage is that the entire antenna is above the boom. Secondly, the antenna is often primarily constructed of aluminium tubing that provides extra strength compared with wire elements often used for quad loop antennas. For this antenna, I've used a 'plumbers delight' type of construction. **Note:** With this method of construction, all the elements are completely metal and are mounted directly onto a metal boom.

In this design, though the horizontal part of the loop is made from wire stretched between the two inclined vertical sections. The forward, or driven element, is then fed with 50Ω coaxial cable to allow a good match to the ubiquitous coaxial cable feeder.

To achieve a 50Ω impedance feedpoint, there is a gamma matching arm running along a loop arm.

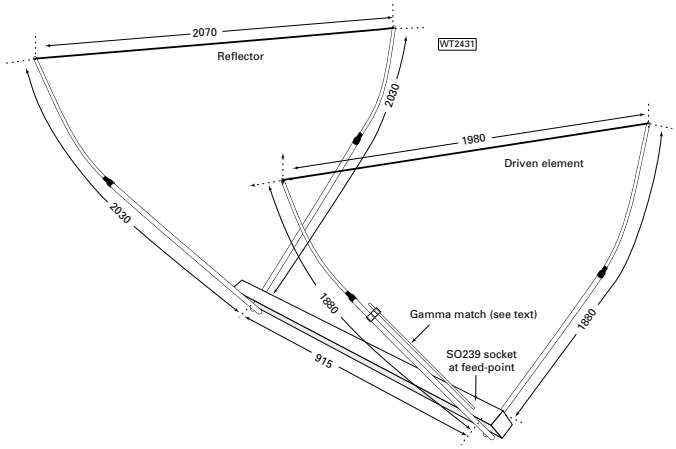


Fig. 1: Line drawing showing showing dimensions of elements and the overall shape.

The two-element beam described here has been dimensioned for 50.500MHz and has a very flat v.s.w.r. across the band. It has an estimated forward gain of about 7dBd, a gain figure that is equivalent to that of a three-element Yagi-Uda antenna array.

Two Hour Construction

Construction of the the delta loop is quite easy and took me less than two hours. First cut the 25mm (1in) square boom to the size shown in the diagram, Fig. 1. Then mark out and drill holes spaced 915mm apart for the four element to boom clamps. Note that each set of element clamps are in contact with each other but spaced 90° apart as shown in the photograph, **Fig. 2**. Next cut four lengths of 15mm (5/8in) tubing to 700mm long and drill a hole for the element mounting bolt in one end of each piece. Finally mount the 15mm element sections to the main boom using the element clamps.

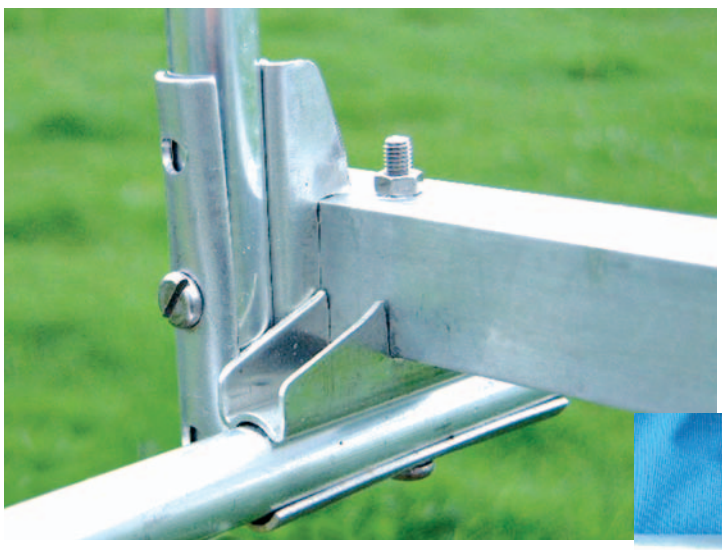


Fig. 2: (above) Element clamps hold the elements to the boom. See text for more detail.

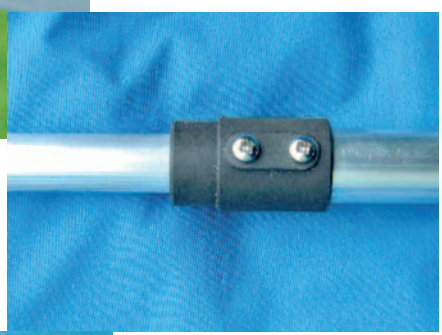


Fig. 3: (right) Element telescopic clamp makes a clean looking join that is easier to weatherproof.

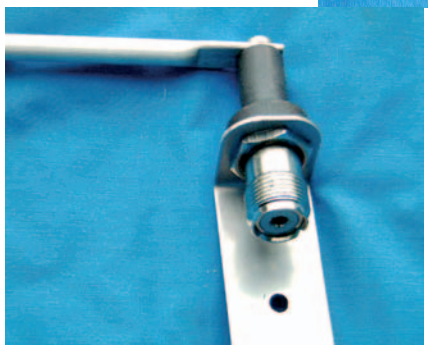


Fig. 4 (left): The Gamma match rod attaches to a moulded SO239 socket, making construction easier and no soldering is needed.

The next job is to cut four lengths of 12mm (1/2in) tubing to 1500mm long and then drill a hole in the end of each piece to enable the solder-tag and

wire to be fixed by a nut and bolt at the end of the elements. Insert these into the 15mm tubing, adjusting each element side to the length shown in the diagram Fig. 1. You can then fix the tubing with plastic adjustment pieces as shown in the photograph, **Fig. 3**.

Cut the wire to the dimensions shown in the diagram, Fig. 1 and solder the tags on each end. Include the length of the tag when cutting the wire to this dimension. Bolt the wire between the ends of the elements to close the loop. Both elements will bow inwards but this is intentional. **Note:** It will be prudent to recheck all dimensions now before fitting the gamma match.

The driven element is matched to the 50Ω coaxial cable by a gamma matching system shown in the photographs, **Fig. 4** and **Fig. 5**. The gamma element is in effect a variable capacitor (about 35pF) connected in series between the inner of the coaxial cable to a matching point on the driven element.

To provide the necessary series capacitance a length of 3mm (1/8in) diameter rod is partly telescoped inside a 6mm (1/4in) diameter tube. The tube is lined with ptfe sleeving which acts as a dielectric and provides a sliding fit. Insert 85mm of the gamma rod into the tube as shown in the diagram, **Fig. 6**. The end of the gamma rod is then clamped to the driven element 585mm from the centre line of the main boom.

Fig 5: Another look along the Gamma match and driven element arms.

The spacing between the rod and the driven element is set at 40mm both by the shorting clamp and the moulded SO239 antenna socket assembly. This is then fixed onto the main boom.

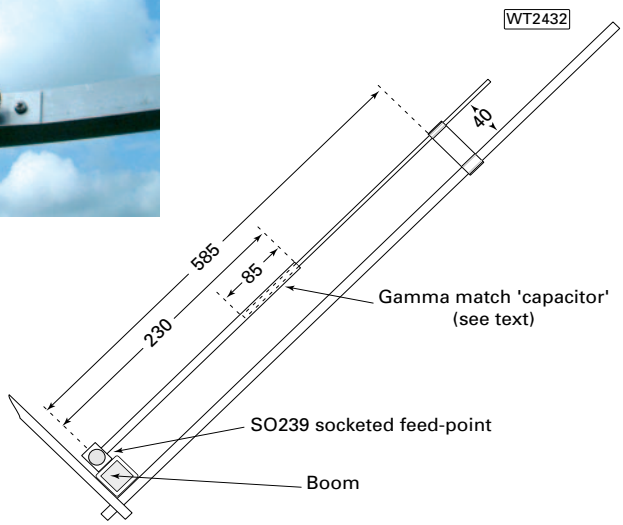


Fig 6: Details of the Gamma matching to achieve a 50Ω feed-point impedance. See text for more detail.

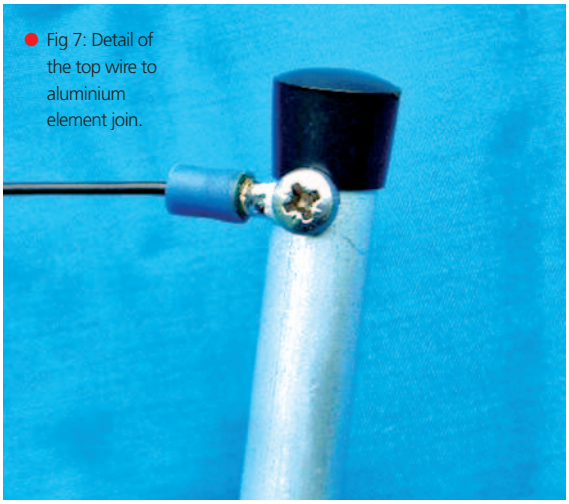


Fig 7: Detail of the top wire to aluminium element join.

Shopping List

Boom & Elements

1	Length (1m) of 25mm (1in) square aluminium tubing
4	Lengths (700mm) of 15mm (5/8in) aluminium tubing
4	Lengths (1.5m) of 12mm (1/2in) diameter aluminium tubing
4.1m	Plastic coated multi-strand wire

Gamma Match

1	230mm length of 6mm (1/4in) diameter aluminium tubing
1	450mm length of 3mm (1/8in) diameter rod
1	Moulded SO-239 socket and L-shaped fixing bracket

Clamps

1	Gamma shorting clamp
4	Element to boom clamps
1	Boom to mast clamp

Matching Errors

In order to avoid matching errors the gamma match should be adjusted with the s.w.r. bridge right at the antenna. Connect 50Ω coaxial cable from the bridge to the 50MHz transmitter and check that the v.s.w.r. is less than 1.2:1 across the band.

If the match is not sufficiently low, adjust the s.w.r. by sliding the 3mm rod in, or out, until a good setting is found. If one cannot be obtained slightly reposition the shorting clamp a short distance (one way or the other to suit) and repeat the procedure until the lowest reflected power is obtained.

Once the antenna is matched the coaxial cable can be attached to the feed point and the gamma match taped to prevent moisture getting into the tube. To complete the job fit plastic caps to the ends of the boom and the antenna elements.

With a suitable boom clamp attach the antenna to the main mast so that the triangular shaped loops are vertical. Being held vertically, ensures that the polarisation of radiation from this antenna is horizontally polarised.

If this is the first time you've used a beam antenna you may be in for a surprise. You have to point the antenna in the direction of the wanted station and as the antenna is very light a small TV type rotator can be used for this purpose. You can now turn on the transceiver and discover why 50MHz is called the 'Magic Band'. **PW**

A complete kit of parts for this antenna including the boom/mast clamp may be obtained from Sandpiper Aerial Technology, who can supply more bits for antennas than you will need for this particular project. The cost is £40 inclusive of postage and packing. Alternatively Sandpiper can supply element fixing clamps, aluminium tubing, gamma match assemblies and other antenna mechanical items.

Sandpiper Aerial Technology (www.sandpiperaerials.co.uk) of **Unit 5, Enterprise House, Cwmbach Industrial Estate, Aberdare CF44 0AE. Tel: (01685) 87042.** Please check with **Chris**, **Jane** or **Mark** for prices and availability of individual antenna items.

valve & vintage

Charles Miller is in charge of the *PW* vintage 'wireless shop' this month. Among other things - he looks back at the impact of the arrival of 405-line v.h.f. TV in the English Midlands and the eventual demise of truly British TV and radio manufacturing.

When the BBC started full-scale transmissions from Sutton Coldfield in December of 1949, see **Fig. 1**, the effect on radio sales and repairs was not immediately very marked. Apart from the relatively high cost of television receivers - and even a small 9inch set might cost the equivalent of eight to ten week's wages for a lot of people - the transmission hours were limited to a few hours per day so radio remained the much greater provider of home entertainment.

It's probably impossible for anyone raised in the era of 24-hour multi-channel television to appreciate that back in the early 1950s that the BBC was only providing perhaps a couple of hours in the mid-afternoon and about three in the evenings, starting at 8pm. Oh, and there was, of course, the one-hour 'trade transmission' on weekday mornings which featured filmed short excerpts from pre - and post - war programmes, interspersed with test card 'C', during which recorded music was played.

Willing to Bet!

I'm willing to bet that anyone engaged in the TV trade in those days will be able to recall only too well those films and tunes, repeated day after day for year after year. Before long 'rain' became apparent on the test card, giving rise to the suspicion that the 'Beeb' had simply pointed a movie camera at one and had filmed it for a whole reel, which was then spliced into the rest of the film snippets.

Curiously enough, many years later I went to a cinema in a nearby town and during the usual commercial break I thought I saw a flash of test card 'C', so brief as to be almost subliminal. It seemed to me to be such an unlikely event that I began to wonder if I had imagined it, until a few days later I happened to be in the right place at the right time to find, on the cinema forecourt, a short length of 35mm film containing about a dozen frames showing the test card. Presumably the projectionist had cut it out and thrown away. Despite many enquiries, I've never been able to discover any explanation for its presence amongst the cinema adverts and I would welcome any suggestions from readers.

Coronation Turning Point

The coronation of our Queen in 1953 is always quoted by the BBC as the turning point for television, when it really began to grip the nation and to take over from radio. Well, if you like that kind of thing I suppose that Coronations are good audience-pullers.

The Coronation of King George VI had done TV a bit of good back in 1937. But they don't happen all that often and for the 'Beeb' still to be banging on about it suggests a certain amount of desperation.

In reality, lots of people went into neighbours' houses to watch the event and doubtless it did boost sales of sets, but radio was by no means down and out. Its next big challenge was the introduction of

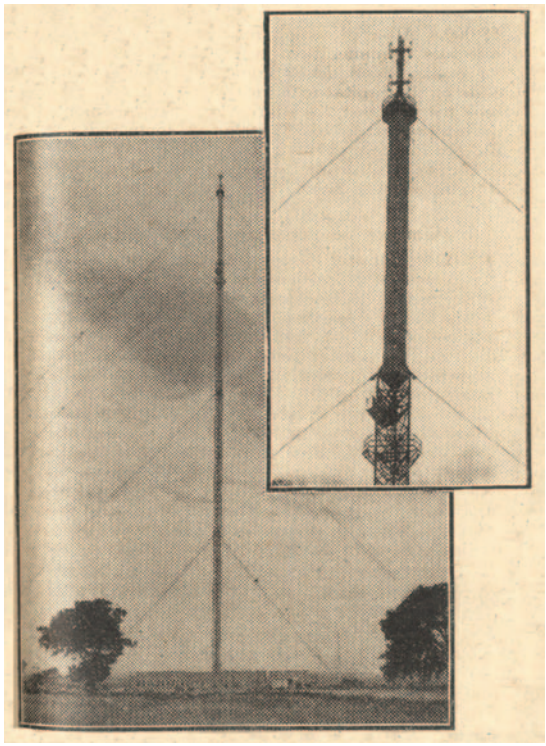


Fig. 1: Not a good quality reproduction, but it is 55 years old! This news item featuring Sutton Coldfield - a photo only story - appeared in the December 1949 *PW*.

Independent Television (ITV).

The competition to the BBC from ITV was much needed and did an immense amount of good for television equipment sales. Despite this, the then highly popular television programmes are now all but forgotten whilst radio shows such as *Take It From Here*, *Round the Horne*, *Hancock's Half-hour* and even *Housewife's Choice* are remembered with fondness.

Then, of course, there was the apocalyptic *Goon Show*, at the mere mention of which middle-aged and advanced-aged gentlemen will immediately launch into imitations of Eccles, Bluebottle and Colonel Bloodnock. Come to that, you may still occasionally hear catch-phrases from ITMA being bandied about, such as...*"after you, Claude! - No, after you Cecil"* or...*"I don't mind if I do"*! When did you ever hear anyone imitating characters in TV shows?

Radio Going Strongly

So radio and the Radio Trade were still going strongly in the 1950s, thank goodness. You could carry on selling and repairing radio sets all day, all week, instead of being confined to only those few hours a day in which television sets could be tested or installed.

Better still, really good pre-Second World War radio sets were becoming available on the part exchange market. And as an instance I was able to acquire one of those excellent motor-tuned Ekco receivers of 1938 for literally a few shillings. The PB199, **Fig. 2**, must have been the apotheosis of the Southend firm, for nothing before or after it came near to its technical innovation or excellence.

Seven years earlier the top of the range Ekco had been a four-valve plus rectifier tuned radio frequency (t.r.f.) set covering medium and long waves; now it was an eight-valve plus rectifier superhet covering short waves as well, with an r.f. amplifier, automatic frequency control (a.f.c.) for the motorised tuning and a 'magic eye' indicator for manual tuning.

The intermediate frequency (i.f.) selectivity could be varied for either high quality reception or maximum selectivity. There was also a highly effective tone control network employing negative feed-back from the output stage. I sometimes wonder what the old-time service engineers who had been in the Trade since crystal set days made of all this!

Another fine pre-war set that came my way was the most expensive version of the Philips 'Monoknob' series of models, **Fig. 3**. The basic idea was to have all the control functions - tuning, waveband switching, volume, and tone - carried out by one central knob instead of four separate controls.

The idea was ingenious and it very nearly came off...but not quite! This is because the large central control featured in these sets was actually made up of two mounted concentrically.

The smaller central knob was turned for tuning, moved up and down for volume and moved from side to side for tone. the larger rear knob was used for band switching and on/off.

Unfortunately, the receiver must have cost a fortune in development costs and in labour-intensive production. But it seemed that in those days Philips still had the Victorian 'can-do' ethic whereby difficulties existed only to be overcome. Someone in the firm must have dreamed up the idea and the command went out that it should be realised 'come what may'.

● Fig. 2: The PB199, must have been the apotheosis of the Southend firm, for nothing before or after it came near to its technical innovation or excellence.

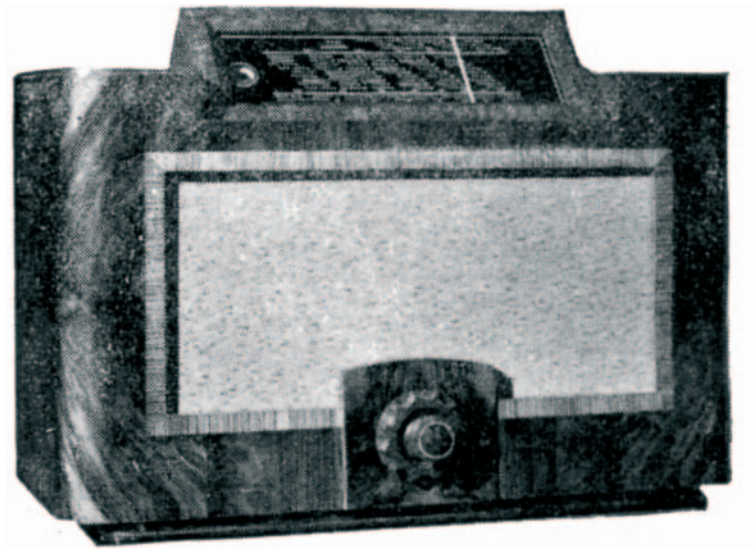
The 785AX also had variable i.f. selectivity, and a 'magic eye' tuning indicator. It was also provided with a high-quality tone-controlled output stage employing negative feedback which earned high praise from reviewers.

In 1937 the 785AX cost 18 Guineas (£18.18s.0d.) which equated to four or five weeks' wages for most ordinary folk. I blush to think what I paid for mine. Its owner asked me to quote a part-exchange price against a TV set and since I didn't particularly want it I jokingly replied "fourpence".

To my utter astonishment he took this seriously and accepted on the spot. Presumably his objective was merely to get rid of the Philips and money did not really come into it. So, I had sold another TV set...and unwittingly did my little bit to bring about the destruction of the British Radio Industry.

Golden Egg TV

In the early 1950s television was expected to be its 'goose that would lay golden eggs', but they turned out to be rotten. Few of the big radio firms - Plessey was the honourable exception - seemed to be capable of producing straightforward, reliable and easily serviced TV receivers.



● Fig. 3: Another fine pre-war set that came my way was the most expensive version of the Philips 'Monoknob' series of models. The basic idea was to have all the control functions - tuning, waveband switching, volume, and tone - carried out by one central knob instead of four separate controls.

Even the once mighty EMI, joint developer of 405-line television with Marconi, was brought down by a lamentable series of models that went from bad to worse. By 1956 EMI was ready to throw in the towel in a bizarre parallel to what had happened 30 years before to the original Marconi Company, which had introduced radio transmission to Britain but couldn't manage to make successful receivers.

Three decades back, RCA-Victor had engineered an amalgamation of Marconi's domestic radio business with its existing Gramophone Company and the previously independent Columbia Gramophone Company to form Electric and Musical Industries (EMI). Then, 30 years on EMI sold off its domestic radio and TV interests to **Sir Jules Thorn** and henceforth sets marketed under the HMV, Marconiphone and Columbia labels would be badge-engineered Ferguson products.

The re-arrangements caused a shock wave to pass through the other big radio firms. And, against all the lessons of business history, a series of other amalgamations began to take place, such as Ferranti and then Dynatron to Ekco and subsequently the latter to Pye.

All this history brings me to **C. O. Stanley**, who almost single-handedly brought about the demolition of the radio industry in Britain. This once brilliant businessman got it into his head in the late 1950s that if Britain adopted the continental 625-line TV system it would open the way for UK firms (notably Pye, of course) to export sets to Europe and make them rich. To this end he instituted a massive pressure campaign which regrettably succeeded.

What the poor sap didn't seem to realise was that at the same time it would make possible imports in the opposite direction, which is exactly what happened. All the time that Britain retained the 405-line TV system it wasn't profitable for European - and later Japanese - manufacturers to turn out sets specially made for such a limited market.

However, once we had gone over to 625-lines the floodgates were opened. Within a few years of the introduction of BBC2 on 625 lines u.h.f. Pye was swallowed by Philips and the rest of the UK radio industry was played out. Well done, C.O!

PW

VHF DXER

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REPORTS & INFORMATION BY THE LAST SATURDAY OF EACH MONTH.

THIS MONTH DAVID BUTLER G4ASR HAS REPORTS OF SPORADIC-E OPENINGS ON THE VHF BANDS

After a fairly dismal winter season the propagation on the v.h.f. bands has finally taken a turn for the better. The summer Sporadic-E (Sp-E) season has started and if you're near the shack I suggest you put down the magazine and take a quick listen just in case there's an opening right now!

During the last two weeks of April openings via Sp-E propagation were reported every day on the 50MHz band with a few reaching as high as the 70MHz band. Propagation to southern Africa was reported on four days during April, all of these 50MHz openings being a mixed-mode path consisting of Sp-E coupling into the more southerly trans-equatorial path.

At the beginning of the month a coronal mass ejection (c.m.e.) triggered an auroral opening with contacts being reported on the 50, 70 and 144MHz bands. An Auroral-E opening was also noted on the 50MHz band during this event. Daily meteor scatter contacts were reported by stations active on the 50 and 144MHz bands, this activity being enhanced by the *Lyrid* meteor shower between 19-24 April. On the other hand tropospheric conditions on the 144MHz and higher bands were fairly poor during April with no sustained openings being reported.

SPORADIC-E OPENINGS

The first v.h.f. Sp-E opening to be reported in the UK occurred on 18 April between 1130-1230UTC. It reached the 50MHz band with s.s.b. contacts being made with stations in Croatia (9A), Italy (I) and Slovenia (S5). The season usually gets off to a slow start with sporadic (not unsurprisingly!) openings occurring every few days or so.

However, further openings continued on a daily basis right through to the end of the month. Events were mostly recorded in the time frame from 1200 to 1600UTC although two openings on 23-24 April continued beyond 1900UTC. As is typical of early season Sp-E propagation, all of the contacts made were in the single-hop range of between 1000-2000km.

Many stations were contacted from all regions of the UK during April including those of CT1ILT (Portugal), DL1ANA (Germany), EH3LL (Spain), EH6VQ (Balearic Islands), F5JKK (France), IW3HWT (Italy), LZ1JH (Bulgaria), OE3XLB (Austria), OK2DW (Czech Republic), SP9DSD (Poland), S51DI (Slovenia), YO2IS (Romania), 4N1NB (Yugoslavia) and 9A8A (Croatia).

During two of the 50MHz openings the ionisation intensified sufficiently to allow the maximum usable frequency (m.u.f.) to rise up to the 70MHz region. On 23 April the station of 9A3PR (JN86) was heard calling CQ on 70.100MHz and, around the same time at 1625UTC, the beacon S55ZMB (JN76) was heard very strongly on 70.029MHz.

The second opening occurred around 1315UTC on 27 April with the station of S51DI hearing the Cornish beacon **GB3MCB** on 70.025MHz and minutes later the c.w. station of 9A3AB (JN75) was heard briefly on 70.200MHz in southern England.

When Sp-E clouds form (the precise nature of which is not completely understood) the level of ionisation steadily increases. At first it effects frequencies at the lower end of the h.f. spectrum, but as the ionisation increases, so does the m.u.f. which can be reflected. The 28MHz band is often effected as is the 50MHz band.

During the peak of the summer Sp-E season the m.u.f. will often rise above the 70MHz band and occasionally as high as the 144MHz band. Openings as high as this are considerably less frequent and do not last as long as those experienced down on the 50MHz band.

If you want to become active on the Six Metre band do it right now! Even if you've only got a small antenna you will find that signals are very strong and it's easy to make dozens of c.w. and s.s.b. contacts during June and July. Contacts may even be made with f.m. equipment but most DX operators use narrowband modulation modes.

Although propagation will vary daily, sometimes on an hourly basis, you can easily ascertain the best direction for v.h.f. signal paths by monitoring lower frequencies first. For example, if you hear many Italian stations on the 28MHz band, then there's a very high probability that the 50MHz band will open up in that general direction at some time or other.

Similarly if you hear strong Italian stations on the 50MHz band, move up to the 70MHz band and you may hear stations in nearby Croatia (9A) and Slovenia (S5). **Colin Fallaize MU0FAL** (Jersey IN79) mentions that he monitors television transmissions on 49 and 53MHz. He has listened for many years to a TV station in Sicily which operates on 53.762MHz and finds that this provides a good indication of Mediterranean area openings. That's because the TV transmit power is much higher than Amateur Radio power levels and the path often opens well before signals appear on the 50MHz band.

Likewise television signals in the 48-49MHz band will provide warning indicators in other directions. For example, if you hear a raspy TV carrier on 48.250MHz when beaming to the south it is probably a station located in Equatorial Guinea (3C). At times it can prove a good indicator of a mixed-mode propagation path into southern Africa.

To monitor TV video carriers you must have a radio capable of resolving c.w. and s.s.b. transmissions. Simply switch a suitable receiver to either of these modes and then wait for the Sp-E propagation to take over. More often than not you'll hear intermittent pings of signals that are being reflected from ionised meteor trails.

However when Sp-E propagation exists the signals will become extremely loud and constant. Many operators also monitor the f.m. broadcast band 88-108MHz for DX stations. So if you hear a Spanish broadcast station on 107MHz make sure you turn your v.h.f. antennas to the south and then listen for a possible 144MHz Sp-E opening to Spain (EA), Gibraltar (ZB) or maybe even Morocco (CN).

One of the most exciting openings on the 50MHz band is the transatlantic path to North America. These events normally occur between 1800-2200UTC. Again it's very useful to monitor the 28MHz band to see if any east coast USA stations can be heard. Sometimes though the 50MHz band can be

open to the States without anything being heard on lower frequencies so it really pays to be in the shack at peak times.

Listening to the strength and direction of DX stations on the 50, 70 and 88MHz (broadcast) bands will help you catch those more elusive openings that occur on the 144MHz band. The peak month for Sp-E propagation on this band is right now in June. Openings peak between 0800-0900, 1200-1400 and 1600-2000UTC and it's been found that if an event occurs around midday there's a good chance of another opening occurring later in the day.

In the UK the majority of 144MHz openings lie on a bearing of between 90 to 190°. As a starting point I usually keep my antenna beaming towards the Adriatic Sea, in the region between Croatia and Italy.

If you keep your receiver tuned to the s.s.b. calling frequency on 144.300MHz you'll soon know when a Sp-E opening occurs. It's bedlam! Simply move from the calling frequency and call CQ on a more appropriate part of the band away from the main centres of activity. DX stations will always find you when the band is open.

Whenever a Sp-E opening (or any propagation event for that matter) occurs always try to find time to listen on other bands to see what indicators exist. Note them down and over a period of a few seasons you'll be able to recognise the signs of impending openings and become your own propagation 'expert'.

PROPAGATION MODES

Apart from Sp-E some other modes such as Trans-Equatorial Propagation, Aurora, Auroral-E and meteor scatter were reported during April, which enabled UK operators to make DX contacts on the v.h.f. bands. There were four rather brief t.e.p. type openings during the month and all coincided with European Sp-E openings. They occurred on 12 April at 1435UTC to ZS6WB (South Africa) operating with JT6M data mode on 50.235MHz, on 17 April at 1720UTC to 9J2HK (Zambia) on 50.110MHz c.w., on 21 April between 1650-1625UTC to ZS6NK on 50.110MHz s.s.b., ZS6TBW on 50.105MHz c.w. and to the 7Q7SIX beacon on 50.002MHz.

Incidentally, prior to this opening at 1500UTC, the Equatorial Guinea TV carrier on 48.250MHz was peaking 559 in southern England. On 27 April at 1340UTC the ZS6TWB beacon (KG46) operating on 50.045MHz was heard peaking 559 in south-east England, but no other DX stations were reported at this time.

A coronal mass ejection (c.m.e.) triggered an auroral opening on 3 April in which a number of c.w. and s.s.b. contacts were made on the 50, 70 and 144MHz bands. Back-scatter signals with the characteristic 'hissing' sound were first detected within the 48-49MHz TV band around 1545UTC.

By 1615UTC the auroral propagation had reached the 50MHz band and within 30 minutes UK stations reported activity on the 144MHz band. The opening waxed and waned in intensity for approximately eight hours before fading out around 0045UTC the following morning. The opening wasn't a large scale European event, but nevertheless it did provide a reasonable amount of inter-UK traffic on all three bands and with Scandinavian stations in Denmark (OZ), Finland (OH), Norway (LA) and Sweden (SM).

● The 144MHz antennas at the QTH of ON4MU.

There were also a good number of 50MHz stations active from Scotland including those of GM0HTT (IO89), MM0AMW (IO75), MM0BSM (IO86), MM0CWJ (IO67), GM3YZU (IO87), GM4ILS (IO87), GM4WJA (IO87), GM6VXB (IO97), GM7PBB (IO68) and GM8LFB (IO88). An Auroral-E opening was also noted during the 50MHz event but only the beacon stations of OH9SIX (Finland) on 50.067MHz and TF3SIX (Iceland) on 50.057MHz were heard with pure 'T9' signals.

Comparatively little activity was reported on the 70MHz band although the station of GM6VXB was reported to have made a number of s.s.b. contacts with stations in southern England. Activity was much higher on the 144MHz band with c.w. and s.s.b. contacts being made with stations in Belgium (ON), Germany (DL), Netherlands (PA) and to OH6QU (Finland), OZ8FR (Denmark), SM1SBI, SK4BX and SM6ENG (Sweden).

Another auroral opening was reported on 5 April between 1700-1900UTC but this was a much weaker event with only short-haul continental or inter-UK traffic being reported on the 50 and 144MHz bands.

METEOR SCATTER

The use of JT6M (50MHz) and FSK441 (144MHz) data modes are rapidly gaining in popularity and are now one of the most consistent ways of working DX on the v.h.f. bands. These machine generated modes (m.g.m.) are specifically tailored to make use of very brief meteor trails (pings) rather than the more lengthy burst associated with meteor showers.

The months of June and July are very good for meteor scatter propagation. The sporadic meteor count (that is the daily input of random meteoric material) reaches a peak during June and in this period there are also a number of minor shower streams. The *Arietids* meteor shower occurs between 13 May to 18 June peaking around 8 June. The shower rises at 0300UTC and sets at 1600UTC.

From the UK the best direction will be north-east at 0700UTC, east at 0900UTC and south-east at 1100UTC. The *Zeta Perseids* run between 1-16 June peaking on 8 June, the same day as the *Arietids* shower, the June *Lyrids* occur between 10-21 June peaking on 15 June, the June *Perseids* are active between 22-30 June peaking on 16 June and the *Nu Geminids* will be encountered between 9-15 July peaking on 12 July.

Activity will be found on high speed c.w. around 144.100MHz, on s.s.b. around 144.200MHz, on FSK441 around 144.370MHz and on JT6M around 50.230MHz.

DEADLINES

That's it again for another month. Good luck with making any Sporadic-E contacts and please let me know what you managed to work on the v.h.f. bands. Send your reports or news, preferably by E-mail, to reach me by the last weekend of the month.

73, David G4ASR

HF HIGHLIGHTS

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REPORTS, INFORMATION AND PHOTOGRAPHS TO ME PLEASE BY THE 15TH OF EACH MONTH.

SPECIAL EVENTS, A QUEBEC QSO PARTY & LOTS MORE NEWS. TAKE IT AWAY CARL...

National Science Week 2004 finished a short while ago and **Dennis Egan GW4XKE**, Secretary of the Prudential Amateur Radio Society, had a special event station running during the week from Stanwell School in Penarth, **Fig. 1**, South Wales. The callsign used was **GB4SSP** and the aim was 'to increase the awareness of and foster a better understanding of our cultural, economic and social life'.

After setting-up the radio station and erecting a full size G5RV, operations commenced and most of the week was a 'solo' effort! Dennis was very pleased to welcome **Ken Eaton GW1FKY** of the Barry ARS who popped in for a short while to give him a welcome break from all the operating. During this time **Syd Richards GW0PPG** also attended and gave a Lecture and Demonstration to the school which was arranged with the help of Head Master **Malcolm Parker**. This was also supported by Councillor **Anthony Ernest GW3LQE**, who is also one of the School Governors and by the Vale of Glamorgan Council.

It was a very busy week with many pupils and several science classes attending. By the time the station closed down, some 288 stations were contacted world-wide though 7MHz gave a better demonstration of Amateur Radio and some of the pupils were able to have a few words with many of the 'G' stations worked. Over 300 Special QSL cards were sent out via the RSGB and Service bureaus with many more given away with other items supplied by the RSGB and the British Association for Science & Technology.

By the time everything was packed up Dennis was completely shattered! He would like to thank all the School Staff who gave their assistance and helped provide a very nice 'shack' overlooking the school playing fields.

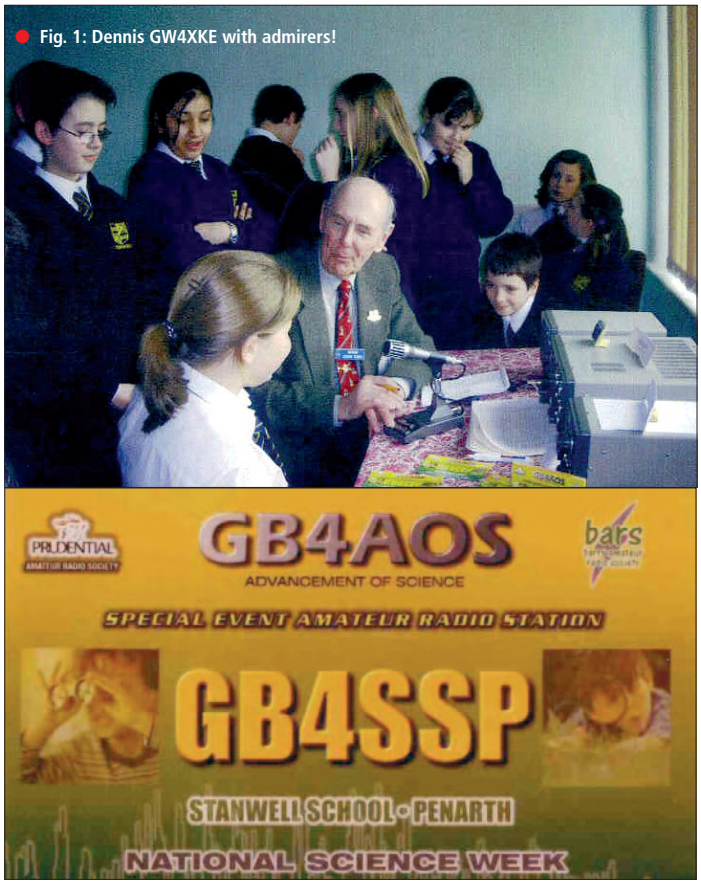

Fig. 1: Dennis GW4XKE with admirers!

PORTUGUESE HISTORICAL COLLECTION

Your help is needed by **Carlos Nora CT1END** who is involved in an organisation which is devoted to documenting and preserving the history of Amateur Radio in Portugal from the early days to the present time. If you have Portuguese QSL cards prior to 1960, Portuguese QSL cards from DXpeditions or special event stations or even Portuguese DX Magazines they would appreciate receiving them as a donation to their collection.

A digital image of a QSL card would also be accepted as an alternative. The website of the '**Historical Archive of the Portuguese Amateur Radio**' can be viewed at **http://ahrap.sytes.net** If you can help, then please send an E-mail to **ahrap@cbnora.no-ip.com** or letter to **Carlos at Praceta D Mecia 15 2 Dto, Massama Norte, 2605-010 Belas, Portugal.**

DX NEWS

On to the DX News now and I will begin with some special calls from Sweden. SC0AG, SC1AG (Gotland Island EU-020), SC2AG, SC3AG, SC4AG, SC5AG, SC6AG and SC7AG will be aired throughout the year to celebrate the 30th Anniversary of the **Scandinavian CW Activity Group** (SCAG). The route for QSLs will be via the operator's instructions and activity can be expected on all bands. A special award will be issued for contacts with these stations and further information will be available at **http://www.scag.se**

In Angola (D2) where **Joao CT1BFL** and **Durval CU3BW** will be working in Luanda the capital city, for the next five months. They are active as **D2U** and **D2DB** respectively and have been using a G5RV on most bands. However, by the time you all read this they should have a tribander up and running for 14, 21 and 28MHz. Joao will operate on all modes including p.s.k., RTTY and SSTV and Durval will operate on all modes excluding c.w.

You can QSL via their manager **Rodrigo Herrera EA7JX, PO Box. 47, 41310, Brenes, Sevilla, Spain**, who also happens to handle cards for LW9EOC (L59EOC), LU5FF (LQ0F, L45FF, AY5FF, L24FF, L73F), YV1DIG (YW1D, YX1DIG), CO3JO, YN9HAU, VK3FY/DU8, VK3FY and YW6P.

QUEBEC QSO PARTY

Over to Canada now where **Radio Amateurs du Quebec Inc.**, the provincial organisation of Amateur Radio operators has announced the

creation of the **Quebec QSO Party**. This will be held every summer on the Saturday immediately preceding the 24 June and aims to promote Amateur Radio activity world-wide while promoting better knowledge of Quebec's culture and geography in a relaxed and fun atmosphere.

This year's event will take place from 1700UTC on the 19 June to 0300UTC the following day. For the rules and other related information in PDF format in both English and French look at the website **www.raqi.ca/qqp** or write to **Guy Lamoureux VE2LGL, 1075 Tsse Douville, Longueuil, Quebec J4L 2Y3, Canada**. All Amateur Radio operators are welcome to participate and join in the fun!

ANTARCTIC BASES

There must be many readers who have worked stations in Antarctica and would be interested to know a little more about these operations. A useful reference source is the **WABA Directory 2003** which is the official source of information for the IOTA Programme on Antarctic Base stations. It acts as an extension of the IOTA Directory, providing the island reference number as well as a wealth of detailed historical information on each Antarctic base. The Directory is downloadable from the 425 DX News website at **http://www.425dxn.org**

YOUR REPORTS

Onto your reports now and it was nice to hear from **John Heys G3BDQ** in Guestling, Hastings who has been taking things a little easier for the past few months. The 3B9C DXpedition to Rodriguez Island AF-017 had inspired John to operate once again and he was pleased to work then on 'all' nine h.f. bands.

John said "after the 1.8MHz contact I felt ten years younger and was very pleased at how well my 76.2m (250 foot long) wire antenna had worked. 3B9C was often a very strong signal here and the operating was just superb!". The end of John's wire antenna drops down 10.6m (35ft) and is connected to a very good earth system. The station equipment includes a Kenwood TS-870 connected to a linear amplifier.

I am pleased to say that **Ted Trowell G2HKU** has recovered from his fall and his multi coloured chest has returned to normal just in time for his 81st Birthday! Now using his straight key once again Ted found the 7MHz band 'noisey' but still managed to work VP9/G3TXF (Bermuda) NA-005, 5B4AGC (Cyprus) AS-004, ZB2FX (Gibraltar), ZD7BG (St. Helena) AF-022 and 3B9C (Rodriguez Island) using a G5RV at his home on the Isle of Sheppy in Kent.

THE 14 & 18MHz BANDS

Welcome now to new reporter **Paul Stanton-Hobbs M0DBP** who has been using a mobile ground plane, a Fiat *Cinquecento* car, Yaesu FT-817 and Hustler mobile whip for his 14MHz operating. From a high point between Priddy and Wookey Hole village in Somerset Paul was pleased to work VK5CRS (Australia) at 1005UTC. Incidentally, this is an old coastal radio station located near Mclaren Vale, South of Adelaide.

Paul says "after losing the initial contact, I persevered for a while and eventually had a five minute QSO with the operator Norman. He was using 400W and had a 5/8 signal with me where as my 5W signal was 4/1 with him and I am glad Norman was extremely patient when working such a low power station"!

Onto **Ian O'Donnell M3IOD** in Sunderland who has been using a Icom IC-746 with a dipole cut for the band. Voice contacts this month include CN8NK (Morocco) 0649, T77EB (San Marino) 0814, VK3CML (Australia) in Stawell, Victoria at 0815 followed later by K3LR (USA) in West Middlesex, Pennsylvania 1520 and ZA/Z35M (Albania) at 1832UTC.

Meanwhile **Martyn Medcalf M3VAM** operated on 18MHz at 1400UTC working EW3EW (Belarus), T93M (Bosnia-Herzegovina), W2QN (USA) in West Cornwall, Connecticut and TK5IH (Corsica). The equipment was a Yaesu FT-897 and Buddipole antenna located at his home in Chelmsford, Essex.

The s.s.b. of **Steve Gillespie MI3ATK** in Londonderry, Northern Ireland worked ZB2/G0SGB/P (Gibraltar) and several Russian stations including RN6BY (European Russia) around 1245UTC using a Kenwood TS-850SAT and 5-band vertical antenna.

Also in Northern Ireland is **Peter Lowrie MI5JYK** in Newtonabbey, who has finally got his quarter wave vertical 'tweaked' and has marked it for use on 18 and the 21MHz bands by lowering or removing sections. It needed to be 'tested' and surprise, surprise it just happened to be the weekend of the CQ WPX contest!

Peter said "I'm still having to work /P as I am in between masts at the moment, so the usual /P site in my garden was used complete with all the hardships like hot meals, drinks and access to a TV for the rugby internationals. I made a couple of hundred QSOs over the weekend with over 30 countries making the log. I used the MFJ 9420 on 14MHz and the FT-817 on 21MHz but didn't stay too long on that band as 14MHz seemed to be much more 'fun' with it being completely full of stations from Europe, Asia and North America. The plan was to prise out the DX in 'Kilowatt Alley' and that's just what I did! The FT-817 is a superb rig, but it doesn't hold a candle to the MFJ9420 which is a proverbial wolf in sheep's clothing. Okay it's not an all singing all dancing rig and only covers the US part of the band, but it's a dream to use in the field or the shack and I wish MFJ would do a 21MHz version".

Peter's 14MHz contacts included US8U (Ukraine), ER0FEL (Moldavia), CT9A (Madeira Island) AF-014, Z33AA (Macedonia), VP51V (Turks & Caicos Island) NA-002, A61AJ (United Arab Emirates) and PJ4P (Netherland Antilles) SA-006 between 10.32 and 1135UTC.

THE 21 & 24MHz BANDS

On the 21MHz band Peter found YO3CZW (Romania), MI6X (Northern Island) EU-115, UA9AYA (Asiatic Russia), IQ8PD (Italy), ER1Q (Moldovia) and RK4FF (European Russia) between 10.55 and 1245UTC. Quite a selection with QRP!

Rob Hastings M3AHH in Chelmsford, Essex uses a Kenwood TS-50S, MFJ-945E tuner and 10W s.s.b. into an inverted Carolina Windom 80 Special for most of his h.f. work and found PA3GIO/HI9 (Dominican Republic) at 1603 followed by UR9IDX and UU5JFZ (Ukraine) around 1625UTC.

Also on 21MHz was **Owen Williams G0PHY** in Biggleswade, Bedfordshire who found the band conditions to be 'rather poor this month' although there has been the odd bit of DX to dig out. Obviously the big thing this month was the 3B9C expedition but there was also the R1FJ expedition and the CQ SSB WPX contest. There were good openings to the Pacific on the band during the WPX contest but alas I didn't work anything. Using 100 watts and a dipole s.s.b. calls include HF0POL (South Shetland Island) AN-010 at 1903 and VP8DIJ (Falkland Islands) SA-002 at 1940UTC.

Onto 24MHz and just the one report from **Jim Pedley GM7TUD** in Dumfries who logged s.s.b. contacts with 5V7C (Togo) 0907, YA1RS (Afghanistan) 0914 and then switched to c.w. working 3B9C at 1035 and TJ3G (Cameroon) at 1158UTC using a G5RV antenna.

THE 28MHz BAND

Finally, on 28MHz Jim found s.s.b. stations 5V7C (Togo) 1137 and VU2XO (India) at 1335, 3B9C on the key at 1213 and later using f.m. at 1356 and then back to s.s.b. working P40RH (Aruba) SA-036 at 1504 and finally ZD9BV (Tristan Da Cunha) AF-029 at 1654.

SIGNING OFF

That's it for another month and what a busy one it has been! I hope I managed to squeeze you all in? My thanks go to all our reporters and to **Mauro Pregliasco I1JQJ** Editor of the *425 DX News Sheet* for the DX information. Until next time have a good DX filled month.

73. Carl GW0VSW

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SA3 3BA
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E-MAIL: robin2@clara.co.uk

ROBIN GW3ZCF LOOKS AT RST, KEEPING IN TIME AND PROPAGATION PREDICTIONS

The sharp-eyed amongst you will have noticed that I have abandoned the gw3zcf@qsl.net E-mail address. I have used this for a number of years and the beauty of it was that it was simply a redirection address - you could change your ISP and arrange for qsl.net to forward your mail to the new location, without the need to notify your contacts of the change.

In recent months, however, it has become increasingly abused by the virus merchants and I have received as many as 20 E-mails in a day containing viruses. I was very sad to break the connection as qsl.net is a service provided free of charge to amateurs by **Al Waller K3TKJ** and Al provides a huge range of specialist web pages (which can still be used without risk). But as far as the E-mail redirection service is concerned, the crunch came when after a couple of weeks holiday I returned to find about 160 E-mails, most of which were infected with viruses.

I was very glad that I have an up-to-date anti-virus program on my computers. I have always used the subscription service from Norton and found it very satisfactory. However, those of you who want to avoid the annual cost of £15 - £20 per machine might be interested in the free anti-virus program *AVG* from Grisoft. My XYL has it on her laptop and it seems to be very effective.

Grisoft is a commercial organisation which makes its living selling anti-virus solutions to businesses, but the free edition is available to home users and has regular updates available on the web to cope with new threats. Whilst having fewer 'bells and whistles' than the commercial edition, *AVG Free* has the same anti-virus engine and should meet the needs of most home users.

REPORTING RST

The familiar RST code was originally developed for reporting the quality of received c.w. signals, but I wonder, when sending reports, how many operators stop to think about the true meaning of the numbers given. I'm not talking about the routine 599 reports sent during contests or rare DX 'pile-ups', where logging is generally performed automatically by computer software and anything other than 599 causes delays because it needs operator intervention.

The readability, ranging from unreadable (1) to perfectly readable (5) and signal strength (1=faint, barely perceptible to 9=extremely strong) are probably still valid, but even for c.w. that can not be said for the Tone report. How many people realise, for example, that T2 means "very rough a.c. note, no trace of musicality", or T7 "near d.c. note, smooth ripple"? Such tone reports might be more appropriate to the days of spark transmitters than to modern-day transmitting equipment.

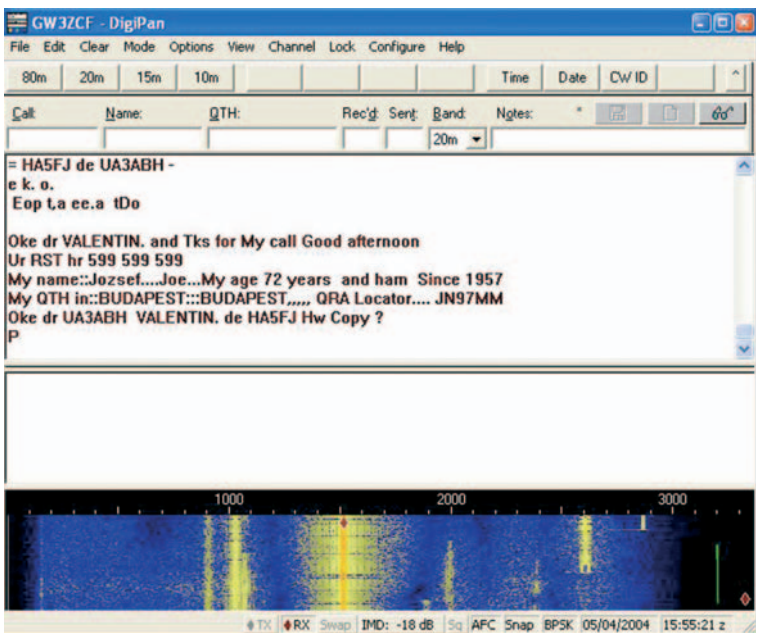
But if RST reports are something of an anachronism for c.w. in the 21st century, they are even less appropriate for some of the new digital modes, for example, PSK31. For a start, S-meter reports are unreliable for most rigs because the receiver bandwidth generally includes a large number of signals and the S-meter is showing the cumulative effect of all of them.

For my own PSK31 contacts I generally use an Icom IC-756PRO transceiver with the bandwidth closed down to 100Hz, so I often only see one signal in the pass-band which, although producing a very good trace, may only be moving the S-meter to S2. The other station is often slightly offended to receive such a signal strength report!

With the thoughts in mind a group of Amateurs, led by **Graeme VK3BGH**, are seeking to introduce a new system tailored to the requirements of digital modes. Originally dubbed the PSB code (Print, Strength, Bandwidth) they are now favouring the title RSQ (Readability, Strength, Quality), which does not seem such a radical departure from the familiar RST.

The readability report is based on the percentage of text printed accurately. A report of R5 would indicate more than 95% correct, R4 would be 80% and so on. Signal strength is not based on the S-meter, but on the strength of the trace on the waterfall (or, if like me you prefer the spectrum display available on many PSK programs, on the peak height on the screen). A report of S9 would be given for a very strong trace, down to S1 for a trace which is barely perceptible on the screen (which can nevertheless often give quite good copy!).

It is the final letter of the code, Q for Quality, which is the most radical departure. A Q9 report would be given for a clean p.s.k. signal with no visible sidebands (corresponding to an IMD of better than -25db). A barely visible set of sidebands produces a Q7 report and so on, whilst a signal splattering right across the band is awarded a resounding Q1. Unfortunately, such signals are all too common. **Fig. 1** shows a QSO I saw as I was writing this column – the multiple sidebands would warrant a Q3 report on



● Fig. 1

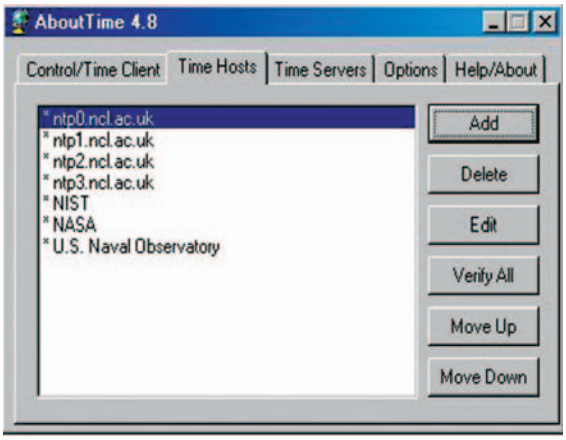


Fig. 2

the proposed scheme. The full descriptors are listed in **Table 1**.

Graeme has opened an information page on the web and that also provides links to the p.s.k. discussion group run by Yahoo. It will be interesting to see if the new scheme catches on.

COMPUTER CLOCK CORRECTION

Over a period of time the clock in your computer will drift away from the correct value. Particularly if you use one of the automatic computer logging programs, it is important that it is regularly corrected. If you have *Windows XP* as your operating system, this correction takes place automatically whenever you connect to the internet, but this was not a feature of earlier Windows versions.

My attention has been drawn to *About Time*, a very simple free program, which will correct the clock for any version of Windows. It will connect you, either automatically or manually, to one of the standard atomic clocks, which can be accessed via the Internet. By default the software comes with three USA laboratories as Time Hosts, but the URLs seem to be out-of-date and none of them worked on my computer!

All is not lost though, because you can add your own Time Hosts. Press Add and type the URL of the required host in the box, which appears. I used four UK hosts by typing in ntp*.ncl.ac.uk (where * is 0, 1, 2 or 3 for the four addresses). When connected to the Internet you must then press Verify and you are ready to go.

For a manual time correction press the tab Control/Time Client and the job is done. Alternatively, under Options, you can choose various types of automatic correction, **Fig. 2** shows the program set up – it's very simple to use and does the job perfectly. You only need to enter the Time Host addresses once – when you next open the program they are there ready so you can simply press Control/Time Client.

It should also be noted that certain other programs I have previously mentioned in this column also have a time correction feature. Two which come to mind are *Logger32* (now available in beta 4 version) and *DX Monitor*.

PROPAGATION PREDICTION

We seem to be well past the sunspot peak now, and although there have been a few days when the bands have come alive, DX has been much harder to come by this winter. Under these conditions we need all the help we can get and an excellent pair of free programs from the DXLab suite by **Dave AA6YQ**, can prove very useful.

The first of these, *DXView*, is basically a world map, which enables you to identify the position, distance and bearing of a station which you can enter by callsign, grid locator or by clicking on the map. In the screenshot shown in **Fig. 3** I typed in an imaginary callsign VK3GH (sorry VK3GH if you really exist!) and the details in all the other boxes populate automatically. You will see that the station is shown as being 10635 miles from my QTH on a short path bearing of 67° (the blue line is the great circle path).

An associated program *PropView* works automatically in tandem with *DXView*. First you have to enter the current Solar Flux Index (SFI), which you can easily get from the DX Cluster websites that I have mentioned in previous Data Burst columns. You also have to enter the take off angle of your antenna (try playing with different values until you seem to be getting predictions which correspond with what you can hear and work) and transmitter power.

For the exercise I entered SFI=75, Take Off =120°, Power=100W. Then you press a button marked Predict and after a second or so of calculation the PropView screen at the bottom right of Fig. 3 appears, which shows a 24-hour prediction of propagation conditions between your QTH and that selected in *DXView*. The black line represents the lowest usable frequency (LUF) and where this lies above the band in question a QSO is unlikely, where it is below you stand a sporting chance. Horizontal lines against each band show open periods.

For the example shown, 3.5 and 7MHz should be open for short path to VK3 from about 0100 to 0400, 10MHz shows a brief opening at about 2100, whilst 14MHz might be usable from 1400 to 1900hours. The different coloured lines represent different probabilities of openings – it's all explained very clearly by pressing the Help button.

I've found the predictions to be reasonably useful and the two programs work together flawlessly. Whilst not infallible, the program does give you a steer as to when and where to look for DX. I recommend you to go to the *DXLab* website to explore Dave's useful free programs.

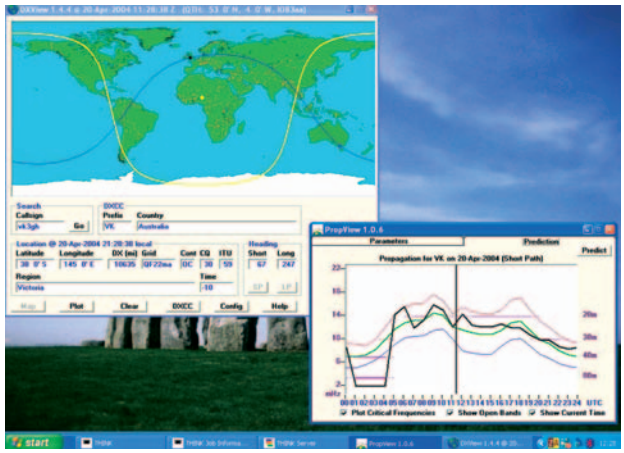


Fig. 3

Well, that's it for this month. I'm off to EA6 next week for a dose of spring sunshine (no radio by order of my XYL!) and hope to have acquired a tan by the time these words appear in print.

73 Robin GW3ZCF

Featured URLs

Program	Address
AVG Free	http:/www.grisoft.com/us/us_dwnl_free.php
RSQ (or PSB) information page	http://www.psb-info.net
About Time	http://www.arachnoid.com/abouttime/index.html
DXLab Download page	http://www.qsl.net/dxlab/download.htm

Table 1 RSQ (or PSB) code

R5 >95% error free	S9 Very strong trace	Q9 clean signal, no unwanted side-bands
R4 80% error free	S7 Strong trace	Q7 one barely visible pair of sidebands
R3 40% error free	S5 Moderate trace	Q5 one easily visible pair
R2 20% error free	S3 Weak trace	Q3 multiple visible pairs
R1 indecipherable	S1 Barely perceptible	Q1 splatter over much of the spectrum

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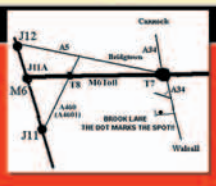

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Drake DL1000 1KW Dummy Load £60.00
Drake MS7 Speaker £60.00
Drake MS-8 Speaker £89.00
Drake R8 Receiver £450.00
Drake R8A Receiver+Converter £499.00
Drake RV7 Remote VFO £100.00
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Drake TR7+PSU HF Base £500.00
Drake Tuner ATU £275.00
Fairhaven RD-500 Communications Rx £500.00
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FDK Multi-750 2m Multimode Transceiver £129.00
Heil HMM-K Hand Mic £30.00
Icom 451E 70cms Multimode Transceiver £250.00
Icom AT160 ATU and Artificial Ground £175.00
Icom IC-2100H 2m FM Mobile Transceiver £150.00
Icom IC-2710H Dual Band Mobile £225.00
Icom IC-471E 70cms Multimode Transceiver £299.00
Icom IC-490E 70cms Mobile Transceiver £250.00
Icom IC703 HF/6M £450.00
Icom IC-706mk I Hf Mobile/Base £399.00
Icom IC706MK2G HF/6/2/70 Moble £675.00
Icom IC-718 Hf Mobile/Base £389.00
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Kenwood TH78E 2/70 Handie £150.00
Kenwood TH-79E 2m / 70cms Handheld Tx £175.00
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Kenwood TL-120 Low Drive Line 100W HF £150.00
Kenwood TL-922 HF 1KW HF Amp £899.00
Kenwood TMV7E 2/70 Cool Blue £275.00
Kenwood TR-751E 2m Multimode Tx £250.00
Kenwood TR-9000 2m Multimode £220.00
Kenwood TS-570S Mobile / Base HF + 6m £825.00
Kenwood TS-790E Dual Band - All Mode £750.00
Kenwood TS-850SAT HF Base Station ATU £699.00
Kenwood TS-950SD HF 150W DSP £1,200.00
LDG LDG-897 897 Tuner £140.00
Linear Amp UK 1200 Explorer 1.2Kw HF £899.00
Linear Amp UK Challenger II 1.5Kw HF £1,395.00
Lowe HF-225 HF Receiver £175.00
Maplin YN48C Dip Meter £50.00
MFJ MFJ1112 DC Outlet £25.00
MFJ MFJ-1272B TNC / Mic Switch £20.00
MFJ MFJ-1278 TNC All Mode £175.00
MFJ MFJ259B Ant Analyser £165.00
MFJ MFJ-414 Morse Tutor £129.00
MFJ MFJ-616 Speech Intel Enhancer £99.00
MFJ MFJ-722 CW / SSB Filter with 5 Watts £59.00
MFJ MFJ-784DSP DSP Filter £140.00
MFJ MFJ-921 VHF 200 Watt ATU £50.00
MFJ MFJ-986 1.5Kw Tuner £250.00
MICROSET RU-432 70CMS Amp 100W £150.00
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RevCo RS-2000 60 - 519 MHz Scanner £79.00
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Rexon RL-501 Dualband Handheld £99.00
RigBlaster Rigblaster PRO Interface £159.00
Roberts R-9914 Receiver £69.00
SCS PTC II DSP TNC DSP £195.00
SGC SG-231 Smart Tuner £275.00
Sony AIR7 Airband RX £79.00
Sony CV-21 World band Receiver £950.00
Sony ICF-SW7600GR World band Receiver £99.00
Standard C-156E 2m Handheld Transceiver £125.00
Symek TNC3Stnc TNC £130.00
TenTec 2KW ATU High Power Tuner £120.00
Tentec Paragon Inc. Speaker £700.00
TenTec RX-350 HF Receiver £999.00
Timewave DSP9+ External DSP Unit £99.00
Timewave PK-12 PACKET £99.00
Tokyo AT2000 ATU £199.00
Tokyo HL-160Y25 2m 180w Amp £175.00
Uniden UBC-780XLT Scanner with Trunking £249.00
Watson W25AM 25A PSU £70.00
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Yaesu FT-290RmkII 2m Multimode Mobile Tx £225.00
Yaesu FT-41R Handheld Transceiver £120.00
Yaesu FT4700RH 2m/70cms £120.00
Yaesu FT-470R Dual Band Handheld £129.00
Yaesu FT-480R 2m Multi-mode 10W out put £250.00
Yaesu FT-5100 Dual Band Transceiver £199.00
Yaesu FT-690R 6m Multimode Mobile Tx £199.00
Yaesu FT-7100M 2m / 70cms Mobile Tx £220.00
Yaesu FT736R 2/70 Base £550.00
Yaesu FT736R 2/70/6 Base £750.00
Yaesu FT-76R 70 cms Handheld Transceiver £99.00
Yaesu FT-790R 70cms Multimode Tx £175.00
Yaesu FT-8100R 2m / 70cms Mobile Tx £220.00
Yaesu FT-817 Mobile HF, VHF, UHF Tx £399.00
Yaesu FT-847 HF/6/2/70 BASE £899.00
Yaesu FT-897 Multiband Transceiver £850.00
Yaesu FT-900AT Yaesu HF Tx with ATU £599.00
Yaesu FT-900AT HF Tx £499.00
Yaesu FT-920AF HF / 6M Base Transceiver £899.00
Yaesu FT-990AC BASE 100W + PSU £699.00
Yaesu FT-990DC BASE 100W £599.00
Yaesu FTV-1000 200 W Transverter £475.00
Yaesu FTV-101Z External VFO £99.00
Yaesu G-450 Rotator £220.00
Yaesu MD-1 Base Mic £75.00
Yaesu MD100 Base Monitor £75.00
Yaesu MW-1 Remote Control Mic & Infra-Red £60.00
Yaesu NC70 Battery Charger £60.00
Yaesu Quadra 1KW Amp + PSU £2,750.00
Yaesu SM-230 Station Mon £499.00
Yaesu SP767 767 Matching Speaker £60.00
Yaesu VR-500 Yaesu Handheld Scanner £149.00
Yaesu VR-5000 Top Class Base Scanner £450.00
Yaesu VX-5R Triband Handheld £220.00
Yaesu VX-7R Triband Handheld £240.00
Yaesu XF-114SN 2KHz SSB Filter £60.00
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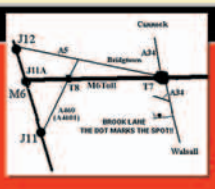

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Trader's Table

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THE SHORTWAVE SHOP

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ICOM IC 735 HF TRANSCEIVER £395
ICOM IC 756 HF/50Mhz TRANSCEIVER £795
ICOM IC471E UHF MULTIMODE TCVR £425
YAESU FT690R MK2 VHF TRANSCEIVER £185
YAESU FT790R MK2 UHF TRANSCEIVER £185
YAESU FT 847 HF/V-UHF TRANSCEIVER £799
YEASU FT1000MP MK5 TRANSCEIVER £1395
YEASU FT290R MK1 VHF MULTIMODE £145
KENWOOD TS850S HF TRANSCEIVER £650
KENWOOD TS140S HF TRANSCEIVER £299
KENWOOD TS2000B HF/50/144/4340 ..... £999
YAESU FT51 VHF/UHF TRANSCEIVER £135
YAESU VX7R 6M/VHF/UHF HANDIE TCVR £199
KENWOOD TR9130 VHF MULTIMODE £195
ALINCO DX77 HF TRANSCEIVER £350
ALINCO DX70 MOBILE HF/50Mhz TCVR £399
ALINCO DJ G5 VHF/UHF HANDIE TCVR £145

RECEIVERS

TEN TEC RD350 HF RECEIVER £599
ICOM ICR 8500 HF/ VHF/UHF RECEIVER £795
FAIRHAVEN RD500 WIDE BAND RCVR £495
ICOM IC-R5 H/H RECEIVER £99
JRC NRD 535 HF RECEIVER £575
KENWOOD R5000 HF+VHF RECEIVER £495
KENWOOD R1000 HF RECEIVER £165
REALISTIC PRO 2042 BASE SCANNER £159
REALISIC DX394 HF RECEIVER £99
BEARCAT 9000XLT BASE SCANNER £165
AOR AR8200 WIDE BAND H/H RCVR £225
AOR AR1500 WIDE BAND H/H RCVR £125
YUPITERU MVT7300 H/H RCVR £135
YUPITERU MVT9000 H/H RECEIVER £265
YAESU FRG100 RECEIVER inc PSU £295
YAESU VR5000 WIDE BAND RCVR £350
YEASU FRG 7700 HF RECEIVER £175
YAESU FRG 7 HF RECEIVER £99
YEASU FRG 8800 RECEIVER £225
BEARCAT 860 XLT BASE SCANNER £95
BEARCAT 280 XLT. H/H SCANNER £95

ACCESSORIES

KENWOOD BC15A CHARGER/TH28/78 ..... £39
KENWOOD SP430 SPEAKER £35
KENWOOD PS31 PSU 850/870 ..... £99
YAESU FP1030A H/DUTY PSU UNIT £99
AOR SDU 5500 DISPLAY UNIT £495
PICO PACKET TERMINAL £99
YEASU FL2100Z HF AMPLIFIER £225
TIMEWAVE DSP59PLUS DSP UNIT £199
DRAE SLOW SCAN TV UNIT £85
TIMEWAVE DSP599 DSP UNIT £89
KANTRONICS KPC4 TNC £95
YAESU FT100 FM UNIT £30
TINY 2 PACKET TNC £95
1296Mhz MODULE FOR KWOOD TS2000 ..... £235
NRD RTTY BOARD FOR NRD 525/535 ..... £65
NRD RTTY TUNING INDICATOR UNIT £35

Visit www.shortwave.co.uk for latest list.

NEVADA

023-9231 3090

ADI AR-146 2m VHF Mobile £90
Alinco DJC5 Microsize 2m/70cms Handy Transceiver £129
Alinco DJSR1 PMR 446 Transceiver £50
Alinco DR140 2m FM 50w Transceiver w/wideband RX £129
Alinco DR150 2m 50w Mobile Transceiver (wide RX) £129
Alinco DR430 UHF Mobile Transceiver £179
Alinco DR590E 2m/70cms Mobile Antenna + EDC20 Remote Kit £185
Alinco DR605 Twinband FM Mobile Transceiver £190
Icom ICT8E 6M/2M/70CM Handi £199
Kenwood TMG707e 2m/70cms Mobile Transceiver £199
Kenwood TMV7E 2/70cms Mobile w/DFK-4C & PG5A Cable £259
Kenwood TR7730 2m FM 25w Transceiver £89
MFJ 9402X 7w SSB 2m Transceiver £149
Trio TS700s 10w All mode 2m Base Tx with Ext VFO £299
Yaesu FT5100 2M/70CM Mobile Transceiver £199
Yaesu FT726R 6M/2M/70CM Base Transceiver £499
Yaesu FT8900 2/6/10/70 Transceiver £289
Yaesu FTL2014 VHF PMR Transceiver £50
Yaesu VX5R+ACC 6M/0CM Handi + VC25 Case Mic £249
Alinco DJX3 Handheld Scanner c/w accessories & book £159
AOR AR8000 Wideband Scanning Receiver £185
AOR AR8200 MK II Wideband Handheld Scanner £225
AOR AR8200 MK III Handheld Scanning Receiver £299
AOR AR8600 Mk II Wideband Base Receiver £485
Icom R2 Wideband Handheld Scanner £99
Realistic PRO 2006 Base Scanner 25-1300Mhz £129
Yaesu VR120D Handheld Scanning Receiver £120
Yupiteru MVT7100 Wideband Handheld Scanner £159
Yupiteru MVT9000 MK I Handheld Scanning Receiver £225
Icom ICR71E HF Receiver £425
Icom R75 Base Receiver c/w Filters & DSP £599
Icom R75 Base Receiver £499
Roberts 9914 FM/MW/LW/SW Receiver £65
Sony ICFSW07 All mode s/w receiver & Active Loop Antenna £159
Sony SW55 Portable Shortwave Radio £125
Videologic DRX601ES DAB Tuner £159
Yaesu FRG8800 General Coverage Receiver £299
Yaesu FRG8800V HF Receiver + VHF Converter £325
Yaesu FRG9600 All Mode Wideband Base Receiver £259
Icom 725 100W HF Transceiver with Power Supply £399
Icom 756 Pro HF + 6M Base Transceiver £1195
Icom IC7400 HF/6M/2M100W Transceiver £1095
Kenwood TS440S HF Base Transceiver 100w w/built in ATU £399
Kewnood DS570DG 100w DSP HF Transceiver with Auto Tuner £649
Trio SP530 100W HF Base Station Transceiver £199
Yaesu FT1000MP Mk V HF Base c/w TXCO/INRAD/2 Filters £1899
Yaesu FT107m 100W HF Base Station Transceiver £299
Yaesu FT847 HF/6M/2M/70cms 100w Transceiver £899
Yaesu FT920AF HF Transceiver with filters £999
Skipmaster SK45000 Base Microphone (CB) £45
Zetagi HP202 CB SWR/Power Meter £20
Amdat ADC60 Frequency Standard Clock £99
Cobra CA79 Handheld Echo Microphone £29
CTE HQ30 4 Amp Power Supply £30
Daiwa 403g 70cms Preamplifier £22
Dewsbury S/TUNER Super Tuner £25
Global AT1000 Receiver Tuner £69
Hansen FS302m 50/150Mhz 20/200 Meter £30
Heil G/L Pro/Boom High Quality Microphone & Boom £129.95
Hitachi KH-YG1 Worldspace Yagi Kit £39
Icom AT150 Auto Antenna Tuner £130
Icom AT160 Coaxial Auto ATU £179
Kent Brass Key Brass Key £49.95
Kenwood MC60A Base Mic for most 8 Pin Kenwood models £99
Keyer (Spanish) Twin Paddle Keyer £30
MFJ 949e Versa Tuner II - 1-30Mhz Antenna Tuner £119
Miracle Whip All band portable antenna for FT817 ..... £99
MM 144 30LS 2m Amplifier £59
MML144/40 2M 40W Amplifier & PreAmp £59
NAG 2200 2m Amplifier £299
Palstar AT1500 1.5kV Roler Coaster Tuner £299
Palstar PS50 40-50A Power Supply £119
Tokyo Hy Power HL200 200W HF Mobile Amp & Fan Kit £299
Tono Q-550 Data Terminal £69
Trio TL922 HF Amplifier £895
TSA Duplexer 1-30 / 350-540 Duplexer £14
Vectronics VC300DLP Antenna Tuning Unit £99
Yaesu FC107C Antenna Tuning Unit £175
Yaesu MD1B8 Yaesu Desk Microphone £79
Yaesu SP767 External Speaker £49
Yaesu YM38 Base Microphone £49

Check our web site for latest Items available.
E&OE
Prices quoted are in pounds sterling and exclude carriage.

SOUTH EAST COMMUNICATIONS

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STATION ACCESSORIES

Ameritron AL-800XCE 1.25kw amp save £750, now.... £1249
Kenwood SP23 matching speaker for TS570 ..... £69
Global AT2000 SWL ATU £79
Paccomm Spirit2 9600 baud TNC £99
Garmin Street pilot mint european base maps £299
Watson 30-35amp PSU with meters £89
Datong FL-3 multimode filter £99
MFJ949E 300watt tuner with dummy load £125
Kenwood SP-23 matching speaker for TS570D £55
Heil HM-10 dual insert studio quality mic £99
Watson WMM-3 multimode data decoder £45
Kenwood desk mic MC80 ..... £60

VHF/UHF TRANSCEIVERS

Yaesu FT2600 65watt 2meter mobile £139
Yaesu FT8800 2m/70cm latest dualband mobile £279
Kenwood TMV7E blue display 2m/70cm mobile £299
Yaesu VX5R 6M,2M,70CM handi, last new unit £249
Kenwood TM255E 2m 45watt multimode,mint £399
Kenwood TR751E 2m 25watt multimode mobile £349
Icom ICT8E 6m,2m,70cm tri-band handi,nicads £199

HF TRANSCEIVERS

Yaesu FT1000MP auto ATU,DSP mint £1349
Yaesu FT890 auto ATU,100watt £499
Yaesu FT817 portable HF,6,2,70cm charger etc £399
Yaesu FT857 HF to 70cms Demo model £599
Alinco DX77E 0-30mhz 100 watt mint £399
President Lincoln 10m Amateur transceiver new £199
Kenwood TS480SAT demo HF,6 auto ATU £949
Yaesu FT-900AT 100watt all mode detachable head £549
Yaesu FT767GX HF,6,2m fitted auto ATU AC £599
Icom IC728 0-30mhz FM board fitted boxed £449
Kenwood TS440SAT 100watt 100mem auto ATU £499
Yaesu FT1000 MKV field auto ATU,DSP,AC £1449
Icom IC706 MK2 DSP,HF,6,2m boxed £499
Icom IC756Pro HF,6m DSP, auto ATU, mint £1299

SHORTWAVE RECEIVERS

Lowe HF250E remote control £339
Lowe HF225 0-30mhz keypad option bowed mint £269
Sony SW55 portable receiver all mode 0-30mhz £199
AOR3000A 0-2036mhz AM,FM,LSB,USB mint £599
Sony SW100E Tiny Shortwave 0-30mhz+VHF £119
JRC NRD525 Top class 0-30mhz receiver £499

SCANNERS BASE/MOBILES

Uniden Bearcat 220XLT 66-956mhz £99
AOR5000 0-2600mhz all mode, boxed £1099
AOR3000A 0-2036mhz all mode 400 mems,mint £599
Yaesu VR5000 0-2600mhz all mode £499
Bearcat 780XLT 25-1300mhz trunk tracker Demo £279
Alinco DX10E 1000 channels 0-2000mhz handheld £225
Bearcat UBC278cxl base scanner 100mems demo £139
AOR 8600 0-2040mhz £455
Yupiteru MVT7100 0-1650mhz nicads etc £169

All prices in Sterling

WATERS & STANTON

01702 206835

HF Transceivers

Alinco DR-M03SX 10m FM Mobile 28-29.7MHz 10W £159
Kenwood TS-50S HF Mobile/Base Transceiver with Gen.Cov £499
SGC SG-2020 QRP Transceiver SSB,CW 20W 12V £449
Yaesu FT-920 HF,6m All Mode Base with Gen.Cov. 100W 12v £829

VHF/UHF Base/Mobile Transceiver

ADI AR-147 2m FM Mobile 50W CTCSS 40Ch. £149
AKD 6001 6m FM Mobile Channelised 25W £99
Icom IC-207H 2m,70cm FM Mobile 50W, 35W (Remote Head) £189
Icom IC-229E 2m FM Mobile 25W £149
Icom IC-229H 2m FM Mobile 50W with 20Ch. £199
Icom IC-2100H 2m FM Mobile 55W 113ch. + CTCSS £169
Icom IC-2725E 2m,70cm FM 50W, 35W Full Duplex + Remote Head £215
Kenwood TM-451E x2 70cm FM Mobile 35W 2m RX, Full Duplex £249
Yaesu FT-8500 2m,70cm FM 50W,35W,Remote Head,Full Duplex £299

VHF/UHF Hand Held Transceiver

Alinco DJ-491T 70cm FM H/Held 40ch. + DTMF keypad & CTCSS £115
Alinco DJ-G5 2m/70cm FM + Wide RX, DTMF keypad & CTCSS £189
Icom IC-32E 2m/70cm FM H/Held, Full Duplex + DTMF keypad £129
Kenwood TH-79E 2m/70cm FM H/Held + DTMF keypad £149

Shortwave Receivers

AOR AR-7030 0-32MHz All Mode Receiver 12V with PSU £449
Kenwood R-5000 100kHz-30MHz All Mode + 108-174MHz & VS-1 ..... £499
Lowe HF-225 30kHz-30MHz All Mode Receiver 12V £249
Lowe HF-250 30kHz-30MHz Receiver 12V PC Compatable £329
Roberts R-861 x2 Portable 150kHz-30MHz SSB , FM stereo RDS £139
Sony ICF-SW07 Mini Receiver + FM stereo, SSB & "One Touch" tuning.... £169
Sony ICF-SW55 Portable Receiver with FM stereo and SSB £179
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Icom IC-706 MkIIG hi-stab TCXO, 500Hz c.w. filter, remote mount cable (long), mobile bracket, £625. Rob G0UOO, Folkestone. Tel: (01303) 863326.

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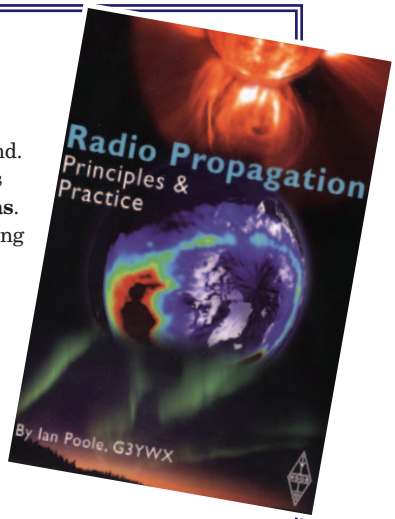

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topical talk — Silent Key Sales

This month Rob Mannion G3XFD has some more suggestions to avoid potential fraud in connection with Silent Key sales. It may help you avoid meeting the man with the swag bag!

● You never know - he might be waiting to pounce on the unsuspecting family of a Silent Key. However, some simple precautions can make life very difficult for this unpleasant individual!

A letter from **Charles Miller**, Editor of *The Radiophile*, regarding potential fraud in connection with Silent Key sales has - yet again - raised some unpleasant memories for me (see News pages). However, at this point I must say that in general fraud involving the disposal of Silent Key (SK) radio collections is relatively rare. If it wasn't I'm sure there would have been at least one 'factual exposé' type story on TV.

So, as the presenters of BBC1's monthly *Crimewatch* programme regularly tell us - don't worry too much and you'll avoid nightmares! However, despite this re-assuring 'sign off' I think we should all be aware, without over-reacting.

As it's now almost 18 months since the article Treasure or Tip - Silent Key Sales, appeared in the January 2003 *PW*, I consider it's worthwhile passing on some advice received from clubs who have organised SK sales. Additionally, bearing in mind that the Topical Talk page always seems to generate much appreciated feed-back and letters from readers I await your own valuable comments on this sensitive subject.

Chosen Group

The letter from Charles Miller has also reminded me of a particularly unpleasant incident at a local club, when a member (now an ex-member) side-stepped the club and purchased an entire collection extremely cheaply. His action led to the members adopting the 'Chosen Group' system for organising SK disposals.

The 'chosen' term refers to the fact that a group of people are chosen by club members for their experience, knowledge and integrity. From then onwards, they are the only people permitted by the club to sort, evaluate and liaise with the bereaved family.

Basically the idea of the Chosen Group (CG) is extremely simple as it means that it shouldn't be possible for a single person from the club to negotiate a 'deal' with the family. Of course when the CG is set up, the bereaved family will be informed that they - as a group - will be the only people dealing with the evaluation, sale and possible disposal of equipment.

There are some disadvantages with the CG system - such as the inconvenience of ensuring everyone is available at specific times. Despite this, the advantages seem to far outweigh any organisational problems. This is because it can effectively make it very difficult for any possible rogue bargain hunter/avaricious collector/profiteer (call them what you will) to pounce.

Unfortunately, as experience has demonstrated...when suddenly faced with the chance of a quick profit - or the opportunity to add an extremely rare item to a collection - common decency can literally be thrown to the wind. Sadly, I've found this can happen to otherwise decent, honest people, so it's best in my opinion to reduce the opportunities.

Never Again!

Some years ago my family and I together with a number of colleagues from PW Publishing - gave up much time to organise a SK sale but the after effects left me firmly resolving to say "Never Again"! Despite the heroic efforts of my colleagues and my family which resulted in an extremely financially successful sale - I was left with an unpleasantly sour taste in my mouth.

Although I won't go into much details I think the lack of trust (from the SK family) to my colleagues and family - was clearly demonstrated by the positioning of one of the relatives directly behind my wife **Carol** as she collected the money, logged the cash and issued receipts. The observer was there to ensure Carol didn't pocket any money. It was fortunate indeed that I wasn't told about the 'observer' at the time because if I had known - without a moment's hesitation I would have asked all the volunteers to leave.

So, in summing up my advice to anyone who may be involved in a SK sale or evaluation - I urge you to firstly gain the full trust of relatives in any way you can. They may be complete strangers, and also be vulnerable. You can help by ensuring that any request for help is answered by the friendly, calm and helpful Chosen Group.

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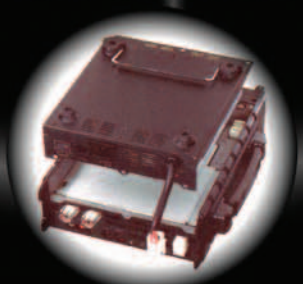

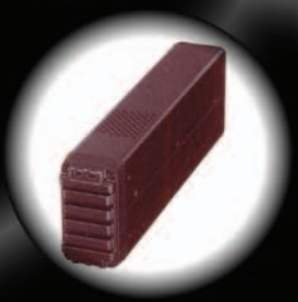

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