

Amateur

RADIO

For all two-way radio enthusiasts

Before the Balloon Went Up Radio Technology in the 1930s

Construction: The MF88 Rx Antenna



On Test: the Yaesu FT-747GX Transceiver; the Kenwood TH-25E 144MHz Hand-held and Icom IC2GE 144MHz Hand-held Receivers

PROJECT BOOK

ELMASET INSTRUMENT CASE

300x133x217mm deep £10.00 ea (£2.20)

REGULATORS

LM317T Plastic TO220 variable £1
LM317 Metal £2
7812 Metal 12v 1A £1.00
CA3085 T099 Variable regulator £1
LM338 5A variable £5

COMPUTER ICS

8741 Micro Ex equipment £1.30
8039 Ex equipment £1.00
4164-15 Ex Eqpt. £1
27128 250n³ NEW £3.00
68008 Processor Ex-Equip £5
27256-30 ex-eqpt £3.00
2764-30 2176 USED £2
1702 EPROM ex equip £5.00
2732-452716 USED £2 100 + £1.80
2114 EX EQPT 60p 4116 EX EQPT 70p
4416 RAM £3.80
D446C (TC5517AP) £1.50
ZN427E-8 £4.00
ZN428E-8 £4.00

CRYSTAL OSCILLATOR

1.8342MHz 2/£1.50

SIL RESISTOR NETWORKS

8 pin 10K 22K 5/£1.00
9 pin 22K 5/£1.00
10 pin 68R 180R 22K 5/£1.00

SURFACE MOUNTED TRANSISTORS

BCW31 BCW72 NTAV70 152836 min S0/type 100/£2.50

TRANSISTORS

BC107 BCY70. Pre formed leads full spec 20/£1 100/£4 1000/£30

POWER TRANSISTORS

POWER FET IRF9531 8A 60V P channel to 220 2/£1
2N3055H RCA House numbered 5/£2
2SC1520 sim BF259 3/£1 100/£22
TIP141, 142/146, £1 ea, TIP110, 125, 42B 2/£1
TIP35B £1.30 TIP35C £1.80
SE9302 100V 10A DARL SIM TIP121 2/£1
2N3055 Ex eqpt tested 4/£1
Plastic 3055 or 2955 equiv 50p 100/£35
2N3773 NPN 25A 160V £1.80 10/£16
BD132 5/£1

QUARTZ HALOGEN LAMPS

A1/216 24v 150w £2.25
H1 12v 55w (car spot) £1.50

NICKEL CADMIUM BATTERIES

7.2 Volts 1.8 A/hr C Cells in packs of 6 £5 P&P £1

ZIF SOCKETS

TEXTTOOL single inline 32 way. Can be ganged for use with any dual inline devices 2/£1.50

MISCELLANEOUS

BNC to croc clips lead 1 metre £1 100/£50
Small Microwave Diodes AEI DC1028A 2/£1
Moulded inductor 470uH size of a 1 watt film resistor 5/£1
To - 220 Heat Sink sim RS 403-162 10/2.50
D.I.L. Switches 10 Way £1 8 Way 80p. 4/5/6 Way 50p
180 Volt 1 watt ZENERS ALSO 12V 20/£1
Olivetti logos calculator keyboard (27) key plus 12 Digit fluorescent display on driver board (ie calculator less case, transformer and printer) £1.30
Plastic Equipment case 9x6x1.25" with front and rear panels containing PCB with eeprom 2764 -30 and ICS 7417 LS30 LS32 LS74 LS367 LM311 7805 Reg, 9 way D plug, push button switch, din socket £1.90
VNIOLM 60V 1/2 50hm TO-92 mosfet 4/£1. 100/£20
MIN GLASS NEONS 10/£1
RELAY 5v 2 pole changeover looks like RS 355-741 marked STC 47WBO5T 2/£1
MINIATURE CO-AX FREE PLUG RS 456-071 2/£1
MINIATURE CO-AX FREE SKT RS 456-273 2/£1.50
STRAIN GAUGES 40 ohm Foil type polyester backed balco grid alloy £1.50 ea 10+ £1
DIL REED RELAY 2 POLE n/o CONTACTS £1
ELECTRET MICROPHONE INSERT £0.90
Linear Hall effect IC Micro Switch no 613 SS4 sim RS 304-267 £2.50 100 + £1.80
Hall Effect IC UGS3040 + MAGNET £1.00
OSCILLOSCOPE PROBE SWITCHED X1X10 £10

CHEAP PHONO PLUGS 100/£2 1000/£18

1 pole 12 way rotary switch 4/£1
AUDIO ICS LM380 LM386 £1 ea
555 Timer 5/£1 741 Op AMP 5/£1
COAX PLUGS nice ones 4/£1
4 x 4 MEMBRANE KEYBOARD £1.50
15,000uF 40V SPRAGUE £2.50 (£1.25)
INDUCTOR 20uH 1.5A 5/£1
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1.25" PANEL FUSEHOLDERS 5/£1
CHROMED HINGES 14.5 x 1" OPEN £1 ea
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THERMAL CUT OUTS 50 77 85 120C £1 ea
THERMAL FUSE 121C 240V 15A 5/£1
TRANSISTOR MOUNTING PADS TO-5/TO-18 £3/1000
TO-3 TRANSISTOR COVERS 10/£1
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TO-220 micas + bushes 10/50p 100/£2
TO-3 micas + bushes 20/£1
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CERAMIC FILTERS 6M/9M/10.7M 50p 100/£20
TOKIN MAINS RFI FILTER 250v 15A £3
IEC chassis plug rfi filter 10A £3
Potentiometers short spindles values 2k5 10k 25k 1M 2M5 new value 5/£1
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PLESSEY INVERTER TRANSFORMER 11.5-0-11.5V to 240v 200VA £6 (£3)

ZENERS

5.6V IW3 Semikron 50K available £25/1000
Suppressor OF606 120V BI Directional Zener in 3 amp W/E package 5/£1.00

DIODES & RECTIFIERS

BAW76 Equiv IN4148 £60/10,000.
IN4148 100/£1.50
1N4004/SD41A 300V 100/£3
1N5401 3A 100V 10/£1
BA158 1A 400V fast recovery 100/£3
BA159 1A 1000V fast recovery 100/£4
120v 35A stud 65p
12 FL10 12A 200V small stud 4/£1.50 100/£25
BY127 1200V 1.2A 10/£1
BY254 800V 3A 8/£1
BY255 1300V 3A 6/£1
6A 100V Similar MR751 4/£1
VM88 800mA 100VDIL b/REC. 5/£1
1A 800v bridge rectifier 4/£1
4A 100V bridge 3/£1
6A 100v bridge 50p
8A 200V Bridge 2/£1.25
10A 200v bridge £1.50
25A 200v bridge £2 ea 10/£18
25A 400v bridge £2.50 10/£22

SCRs

2P4M equiv C106D 3/£1 100/£20
MCR72-6 10A 600v SCR £1
35A 600v stud £2
TICV106D .8A 400v SCR 3/£1 100/£18
MEU21 Prog. unijunction 3/£1

TRIACS

NEC Triac ACO8F 600V TO 220 5/£2 100/£30
Diacs 4/£1
TXAL225 8A 400V 5mA gate 2/£1 100/£35
TRAL 2230D 30A 400V isolated stud £4 each

CONNECTORS

DIN 41612 96way socket (3row) right angle pcb pins £1.20 each
DIN 41612 64 way a/c plug right angle pcb pins £1.00 each
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Centronics 36way IDC plug £2.50
Centronics 36way IDC skt £4
Centronics 36way plug (solder type) £4
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37-way £2; 50-way £3.50; covers 50p ea

WIRE WOUND RESISTORS

W21 or Sim 2.5W 27R 10 of one value £1
R10 0R15 0R22 2R0 4R7 5R0 5R6 8R2 10R 12R 15R 18R 20R 22R 27R 33R 36R 47R 56R 62R 75R 3R9 91R 100R 120R 180R 390R 430R 470R 560R 680R 820R 910R 1K15 1K2 1K5 1K8 2K4 2K7 3K3 3K0 5K0 10K
R05 (80 milli-ohm) 1% 3W 4 for £1
W22 or Sim 6W 7 of one value £1
R47 1R0 1R5 3R3 6R8 9R1 10R 20R 27R 33R 51R 56R 62R 68R 100R 120R 180R 390R 500R 560R 620R 910R 1K0 1K2 1K5 1K8 2K7 3K3 3K9 4K7 10K
W23 or Sim 9W 6 of one value £1
R22 R47 1R0 1R1 15R 56R 62R 68R 100R 120R 180R 220R 300R 390R 680R 1K0 1K5 5K1 10K
W24 or Sim 12W 4 of one value £1
R50 1R0 2R0 6R8 9R1 10R 18R 22R 27R 56R 68R 75R 82R 100R 150R 200R 220R 270R 400R 620R 6K8 8K2 1K0 10K 15K

WIRE WOUND RESISTORS - BOLT ON HEATSINK TYPE

10 watt 39R, 180R 40p each
25 watt R33, 1R2, 1R5, 4R7, 25R, 100R 50p each
50 watt 3R3, 5R1, 18R, 27R 60p each

PHOTO DEVICES

BPW50 Infra red photo Diode 3/£1
Slotted opto-switch OPCOA OPB815 £1.30
2N5777 50p only
TIL81 T018 Photo transistor £1
TIL38 Infra red LED 5/£1
OPI2252 Opto isolator 50p
Photo diode 50p 6/£2
MEL12 (Photo darlington base n/c) 50p
RPY58A LDR 50p ORP12 LDR 70p
GREEN or YELLOW 3 or 5mm 10/£1 100/£6.50
FLASHING RED OR GREEN LED 5mm 50p 100/£35
LEDS assorted RD/GN/YW + INFRE/RED 200/£5

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2K 5K 10K 22K 50K 100K 200K 2K2 2K5 47K 500K 2M2

IC SOCKETS

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33n/47n 250V AC X rated rad 15mm 10/£1.00
1u 600V Mixed dielectric 50p ea

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G22 220R G13 1K G23 2K G54 50K G25 200K G16 1M Res@20°C directly heated type £1 each
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BA521	3.35	MC1496	1.75	STK146	11.90	TBA540Q	1.35	TD2140	3.95	UPC1182H	1.25
CA1352E	1.75	MC1732	0.50	STK163	9.95	TBA550Q	1.10	TD2150	3.95	UPC1182H	1.25
CA3086	0.40	MC1732	0.50	STK0015	7.95	TBA550Q	1.10	TD2150	3.95	UPC1182H	1.25
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FT-747GX MODIFICATION

Raycom Communications Systems, an authority on Yaesu equipment modifications, have come up with another 'world first'.

The FT-747GX budget HF transceiver offers very good value for money but in common with many synthesized HF sets it suffers from reciprocal mixing 'noise' which degrades its performance. Raycom have added a small printed circuit board employing computer-developed circuitry with surface mounted 'chip' components to the FT-747, improving the receiver performance by over 15dB when tuning around the bands.

This important modification is fitted at no extra cost to all FT-747GX sets supplied by Raycom. It is not available as a customer or dealer-fitted kit.

The modification means that the beginner on HF with a limited budget no longer has to suffer limited performance from his first rig.

Other Yaesu dealer-fitted modification kits available are the FT-767GX, FT-757GX MK1 and FRG9600 MK1/2/3/5. Raycom are no longer able to supply any earlier or end-user fitted kits due to the high level of support required.

Further information from Raycom Ltd. Tel: 021-544 6767.

DIGITAL STORAGE ADAPTORS

Instrumex has introduced the Thurlby DSA511 and DSA524 range of digital storage adaptors, which will convert any conventional oscilloscope into a digital storage oscilloscope.

Both of the DSAs are small, lightweight and link to an oscilloscope via one BNC cable. This allows the real-time applications of an existing oscilloscope to be retained.

Each adaptor is fully programmable. The RS-423 interface gives full control of front panel settings and enables bidirectional transfer of waveform data.

The DSA524 provides real-time sampling at up to 20MS/s

and has a maximum useful storage bandwidth of 5MHz for single-event signals. For repetitive signals, the rate is 2GS/s with a maximum storage bandwidth of 35MHz.

Corresponding figures for the DSA511 are: 10MS/s and 1MHz for single-event and IGS/s and 20MHz for repetitive signals.

4096 words per channel is offered on the DSA524 and 1024 words/channel on the DSA511. The vertical resolution for both instruments is 8 bits.

Data occurring before the trigger event can be captured using the pre-trigger function. A digital post-trigger delay system is also provided. The DSA524 features a trigger event delay which will allow a specified number of trigger events to occur before recording takes place.

The oscilloscope screen is automatically annotated with information such as trigger delay time, magnify position and plotter status. Any waveform section can be horizontally magnified ten times.

Each waveform can be placed into an indexed memory for either temporary or permanent storage. Battery back-up is provided so that the memory is maintained when the power is off.

Waveforms can be changed in amplitude, inverted and added, or subtracted to waveforms recalled from the indexed memory.

Hardcopy is available via a dot-matrix printer or a digital X-Y plotter using the RS 423 serial interface.

For further information contact: Instrumex UK, Dorcan House, Meadfield Road, Langley, Berkshire SL3 8AL. Tel: 0753 44878

PENRHYN CASTLE

The Dragon Amateur Radio Club will in association with Penrhyn Castle, Bangor Gwynedd, North Wales, hold a series of amateur radio events from 13 to 21 August 1988 (excluding Tuesday 16 August). In addition to operating a special event station, local amateurs hope to

demonstrate to the public other aspects of the hobby, such as RTTY, Pocket Radio, Slow Scan TV etc. An Amateur TV Station will be set up and operated from the 19 to 21 August. An exhibition of vintage radios and equipment will be set up for the event.

Admission to the House and Gardens is £2.20 for adults and £1.00 for children.

For further details: Dewi Roberts, GW0ABL. Tel: 0248 713647

DTI NEWS

The Radio Communications Division of the DTI produce a monthly report on the current status of all repeater/beacon applications submitted by the RSGB. To obtain a copy write to: Elaine Walter, DTI, Room 613, Waterloo Bridge House, Waterloo Road, London. Tel: 01-215-2263

CURRENT METER

Alternating currents of up to 200A are measured accurately and safely with the CT4200, a digital clamp-type meter.

The meter is a non-intrusive current sensing instrument that handles cable diameters of up to 23mm. The digital readout is a 3½ digit, 7mm high LCD that has a useful 'data hold' function. This locks the reading to allow measurement in awkward and confined spaces.

The double-ramp integration technique gives an accuracy of ±1.5%. Automatic out of range indication is provided and there is a low battery symbol on the display. Overload protection is standard, up to 500A for one minute.

The meter can be used in ambient temperatures from 0-+40=C. Two 1.5V batteries are used, with a typical life of 100 hours. Overall dimensions are 175 x 41 x 27mm and weighs 135g.

For further information, contact: Caroline Stewart, General Manager, Electronic and Computer Workshop Ltd. Tel: (0376) 517413

All the latest news, views, comment and developments on the amateur radio scene

PCB CONNECTOR

The latest addition to Klippon's range of PCB connectors is the SGE5 Series.

Developed to compliment the BL/SL and BLA/SLA ranges, these 2-part connectors accept conductors up to 2.5mm² and are designed and tested for compliance to BDE 0110 groups B and C.

Features include an operational current rating of 10A, and voltage ratings of 380V ac for the 5.08mm pitch version, or 500V ac for the 7.62mm type.

In addition, guide pins are provided to enable accurate mating and to allow access for test plugs. The series is offered with several accessories that include label marking systems; coding pins to ensure correct polarisation and end plates that permit modular assembly for custom requirements.

For further details, contact: *John Bauckham, Klippon, Power Station Road, Sheerness, Kent ME12 3AB. Tel: 0795 580999*

VHF TALK OF VIDEO

John Kelly, who runs an audio visual service in Matlock, recently made a video recording of G5UM delivering what he calls his 'standard talk about VHF, Then and Now'. The video was made at the G5UM QTH in Leicestershire and as its title suggests, is virtually a historical record of the development of metre-wave in the UK, over many decades up to the present day.

John will loan the video to clubs interested in seeing it. (It runs for just over an hour). The hire charge is £5.00.

For further details, contact: *John Kelly, G0HMZ, QTHR, 7 Collingwood Crescent, Matlock, Derbyshire*

INSTRUMENT RENTALS

Instrument Rentals are offering discount for first time users of test and measurement equipment. This makes the short-term hire of test equipment attractive when outright purchase

may not be justified.

This offer applies to Instrument Rentals' complete range of telecommunications and data-communications test equipment, computers, microprocessors, development equipment, frequency related instrumentation, data loggers and recorders, general purpose test equipment and industrial equipment.

The offer is only open to first-time customers of Instrument Rentals' and closes on 31 August 1988 (subject to product availability).

For further information, contact: *Instrumex (UK), Dorcan House, Meadfield Road, Langley, Slough SL3 8AL. Tel: (0953) 44878*

VERULAM RADIO CLUB

The Verulam Amateur Radio Club meets at the RAF Association Headquarters, New Kent Road, off Marlborough Road, St Albans on the second and fourth Tuesday each month.

On Tuesday 9 August, we have an 'Activity Evening' and on Tuesday 23 August at 7.30 for 8pm the Club will hold a 'Bring-and-Buy' sale. Visitors are welcome at all our Club meetings. For further information contact: *Hilary, G4JKS. Tel: St Albans 59318*

POCKET MULTIMETER

Electronic and Computer Workshops Ltd have launched the PAN 35 digital multimeter.

The PAN 35 is an auto-ranging, autopolarity meter that measures voltage and resistance, with a useful audible continuity test mode.

The display is a 3½ digit LCD with polarity, range and other useful indicators. Voltage measurement range spans from 2 to 400V full scale (ac and dc) and resistance can be measured in five ranges from 200 ohms to 2 Meg ohms.

Battery life is 100 hours. Two LR-44 cells are supplied with the PAN 35, which comes in a hard case wallet with test probes and full instructions. Overall dimensions of the

meter are 56 x 108 x 10mm. For further information, tel: *Jean Newman, Electronic & Computer Workshop Ltd. Tel: (0376) 517413*

LCD MODULES

A new intelligent illuminated LCD module, with one, two or four displayed lines. From 16 to 40 alpha-numeric characters per line, are now available.

They all feature a 96 ASCII character set, which can be supplemented by downloaded characters in a 5 x 8 matrix. A single +5V power supply is required and a parallel interface offers direct compatibility with microprocessor systems. Controllers are included in the modules.

There are three display modes: reflective, transmissive and transmissive. Reflective is for conventional, non-illuminated operation, while transmissive and transmissive types have integral backlights which are supplied complete with the necessary dc/ac converters for powering the backlight foils.

Transmissive gives a normal black-on-white appearance, while the transmissive shows blue-green characters against a black background.

For further information contact: *Caroline Stewart, General Manager, Electronic & Computer Workshop Ltd. Tel: (0376) 517413*

DPDT TRANSFER SWITCH SERIES 130

Wavecom's standard DPDT transfer switch, Series 130, now has its upper frequency limit extended from 18 to 24GHz.

Fitted with SMA connectors, the switch can be specified with an extensive range of options, including: TTL logic high or low, MOSFET driver, indicator circuit, suppression diodes and a self de-energising circuit.

With a bandwidth from 3 to 24GHz, the switch has a maximum VSWR from 1.2:1 to 1.6:1 and maximum insertion loss of 1.2 to 0.6dB. Isolation

(minimum) is quoted from 80 to 50dB. Switch time is lower than 15ms.

The Series 130 meets MIL-S-3928 and MIL-E-5400 specifications with a temperature range from -55 to +85°C. A guaranteed one million cycles per switch is specified.

For further information, contact: *Stan Cohen, Director, Anglia Microwaves Ltd. Tel: (0277) 630000*

STC ELECTRONICS

STC Electronic Services has introduced the VX range of 7 and 13-strand PVC twin cable for the most commonly used thermocouple - Type K.

VX compensating cable matches the temperatures coefficient of Type K thermocouples for ambient temperatures up to 80°C. The main advantage of using this cable is full compatibility with Type K thermocouples as well as Type K plugs and sockets. In addition, it provides a low-cost alternative to the use of Type K extension cable.

For the +leg, plain copper conductors are insulated with white PVC, whilst for the -leg, copper nickel (constantan) conductors are insulated with blue PVC. The conductors are laid in parallel and oversheathed in red PVC.

Loop resistance (ohms per combined meter) for the 7-strand version is 2.3 at 20°C whilst for the 13-strand version it is just 1.2 at 20°C.

For further details, contact: *The Cable and Wire Group, STC Electronic Services, Edinburgh Way, Harlow, Essex CM20 2DF. Tel: 0279 626777*

ARC APPOINTMENT

There has recently been a change of Secretary in the St Helens and District ARC. The new Club Secretary is: *Carol Wainwright, G0CXT, tel: Marshalls Cross (0744) 813589*

The Club meets weekly on Thursdays, 7.45pm (for 8pm start) at the Community Resource Centre, Old Central Secondary School, College Street, St Helens (opposite Main Police Station).

Before The Balloon Went Up

by David Lazell

German technology in the 1930s was working on cable TV throughout Europe, possibilities of satellite communication, even an economic Common Market. In Britain, a few blokes were figuring out how the ARP could use a rig. . .

After three or four years of trying to decide the merits of satellite communication, I have returned to my pre-war copies of Newne's *Popular Mechanics* – and find they make more sense. After all, any journal that tells you 'how to make a car for £200' can't be that bad! Of George Newne's wonderful radio journalism, more perhaps on another occasion.

As I was born in Mitcham, the home of Signor Marconi's radio beacons (for Croydon Aerodrome), it is hardly surprising that I grew up enthralled by the art. There are eerie echoes of the 1930s in the 1980s, not the least being the growing realisation that the Nazi dictators had very keen interest in the possibilities of satellite and cable communication. Ideas for a European Common Market were all part of the New Order too.

Much of the post-war *new* technology in rocketry, radio and certainly plastic tape recording came from the plunder gained by the winning side (us, if you remember that far back). In a strange way, Japan's post-war leadership in the electronics business sprang from the original German dedication to the cause. Meanwhile, in Britain, most MPs seemed to think that short wave was something that happened at low tide in Margate.

Today's gloomy prognostications on cable TV have some similarity to the sighs about a truly national TV service in the late 1930s: the government, as usual, was slow to act (although it talked, of course).

Before moving to that wonderful balloon that rose gracefully from the roof of Broadcasting House in the cause of short wave, it is timely to note the level of debate on radio communication. In July 1938, a contributor to *Practical and Amateur Wireless* (a weekly that covered short wave topics in detail), reported on the Parliamentary controversy regarding the fitting of radio in taxi cabs. This was presumably one-way, rather than two-way radio, since the 'wisers and betters' of the nation seemed to think that such an innovation would cause bedlam in the metropolis.

To avoid widespread public alarm, the Home Secretary announced that radio would *not* be allowed in taxi cabs, and that was that. Meanwhile, the Germans were planning to cable up Europe. 'Thermion', the writer in the magazine, must have contrasted the situation here and in Germany as he penned his piece:

'It would of course be much better to install wireless sets in the Houses of Parliament to keep the members awake. On the occasions I have been there, I have noticed many of them snoring, only to awake when someone shakes them by

the shoulders to tell them which way and how to vote.'

Maybe then, as now, the world was getting just too awful to contemplate, although Members do keep awake these days.

As the members mused on the horrible thought of radio equipment in taxi cabs, the popular radio press reported on planned death rays being developed by German scientists which were able to prevent the use of any petrol driven engine. Britain had an even better secret weapon: MPs able to prevent the use of any radio set in any taxi cab.

Gigantic con trick

In retrospect though, the proceedings seem part of a gigantic con trick played upon the Nazi leaders, since coincidentally with the daft debate on taxi cabs a tremendous move on radio was going ahead. Odd experiments and debates, likely to make anyone think that the British were barmy, were widely reported.

In majestic terms, the ascent of a small balloon from the roof of Broadcasting House was described as aiding short wave experiments. Using the 8.5MHz frequency, the transmitter fitted to the balloon was to clarify certain problems associated with the stratosphere. In the later 1930s, Britain seemed to undergo a sort of balloon mania as long retired generals suddenly remembered the damned Zeppelins of World War One.

As a native of south-east London at that time, I remember an otherwise very well informed relation cheering the shooting down of barrage balloons (by unkind men in Dorniers and Messerschmitts) under the impression that they were Zeppelins falling to earth. On the other hand, she was no radio ham. Had she been so, she would have got the message long since.

Radio hams seemed to be better informed than many politicians, but that was hardly surprising. Many local radio clubs organised trips during the later 1930s to radio-significant installations, no doubt being prepared for life in the Forces or the ARP (Air Raid Precautions, forerunner of Civil Defence).

One of the nation's best-known amateur clubs, The Slade Radio Club founded in the Midlands in 1927, organised a demonstration and discussion in July 1938 on the theme 'Radio in the Army'. It must have been a thinly disguised recruiting poster, as from early 1938, the authorities seemed to look for radio hams and other good blokes to get into military training as soon as possible, sometimes to help man embryonic radio-location (radar) facilities.

As radio hams went into the Forces, in advance of the outbreak of hostilities in Western Europe, new service-based clubs were formed, the best-known of these being the Royal Air Force Amateur Radio Society which started as

the result of a chance meeting of some former civvy hams at the RAF Training College at Cranwell. Assuming it was chance; there were a lot of odd happenings at that time. Look at club records for 1938 and 1939, and you will see that there were various visits to gas works, power stations, and other likely targets for bombers.

Few of these had any overt radio significance, although an antenna might have done well on top of the local gasometer. It seems that the club members were being given the once-over in terms of ARP patrol service. Yet, even here, the politicians seemed to know amazingly little of the actual technology involved (and one wonders how many who spoke so glowingly of the public flotation of British Telecom had any idea of what was going on in terms of actual business development in new forms of communication). Here again, the amateurs had to prod the 'wisers and betters' of Westminster and Whitehall. An amateur from Rossendale wrote in *Practical and Amateur Wireless* (29 April 1939):

'It is somewhat surprising to note that radio as a means of communication in ARP work has been relegated to the background by the authorities. The official communication system relies on the telephone network supplemented by messengers. As however telephone cables are often rendered inoperative by such disturbances as storms and floods, they are not likely to prove immune from modern high explosive bombs.

'In one or two districts, amateur transmitters are already co-operating with police radio and there seems no reason why the idea should not be carried further. Two of the amateur bands are adjacent to those used by the police, and in many cases, both the amateurs and the police are using similar apparatus.

'It would be useful too if the ARP wardens could be provided with portable transmitters which would enable them to communicate with their headquarters without reliance on other means of communication. By slight adjustment to the amateur transmitter's equipment, it would be possible for each local authority to broadcast information which could be picked up by each householder with a broadcast receiver.

'In view of the satisfactory response to the call for civilian wireless reserve recruits, I feel sure that there would be a similar response in the case of a similar scheme for ARP.'

Lack of resources

In retrospect, it seems likely that the government had got the message, but did not have the resources to quickly develop a radio-equipped ARP. Ironically, when I did my own Civil Defence training more than twenty years after the Rossendale ham had penned his piece,

field-to-base communication was still primarily by field telephone. In Europe though, radio links were seen as increasingly important. In Prague a public radio transmission system set up for a major athletics festival in the summer of 1983 was not disbanded when the festival was over. It was retained, and linked to police and military services. Czechoslovakia, alas, has relatively few radio hams, though Germany was amazingly advanced in the recognition of short wave services.

Whilst we in Britain, provoked by a run of railway accidents in 1984, are wondering why railway guards or drivers are not yet equipped with short wave radio (as are railwaymen in the USA for example) Germany was developing radio use on the national rail network in the late 1930s. It seems a pity that electronic scanners were not around at the time, given all the interest.

Germans outside the Fatherland (some eighteen million or so, worldwide) kept in touch with their home country via the short wave transmission of Zeesen, a strong transmitter offering so clear a signal that it was much admired in the UK hobby interest press. Opened in 1933, the Zeesen station represented the listener-orientated service that had yet to develop in Britain. If you were on the station's mailing list, anywhere in the world, you received a monthly bulletin about the station and its programming. Unfavourable comments about develop-

ments in Germany printed in 'foreign newspapers' were countered by the Zeesen station.

Programming was imaginative enough, and included 'person-to-person comment', allowing citizens of the Fatherland to come to the microphone in order to send greetings to individual friends and relations overseas.

It seems a great pity that MPs in the 1930s did not read the short wave and hobby radio press. Had they done so they could not have failed to see the writing on the wall. They would have recognised that radio was going to be a major weapon in the inevitable conflict soon to come. But they had other things on their minds, and in any case, the dedication of 1930s hams provided a valuable resource of manpower. Makes you wonder how the Battle of Britain could have been won without them.

Clandestine radio

It was the late 1930s that saw the arrival of another form of radio which is now virtually worldwide; clandestine radio. Anti-government stations were set up by well-trained saboteurs, in various European countries soon to be invaded, to sap the desire to resist the 'friendly newcomers'.

Although the popular British press ran scare stories about the nation being gassed, it was in fact the news about radio that was far more significant. We're only just beginning to realise how

nearly we fumbled the opportunity to create our own new radio weaponry - in technology and styles of communication.

As the nation began to realise that the war could not be avoided, a few wags commented on the news from Westminster. Given the radio enthusiasms of the summer of 1939, one humorist suggested that the government was making a very large loudspeaker that would broadcast the variety shows and serve as an air raid shelter at the same time.

The war itself was a strange experience for hams in the western democracies. Some US radio hams were fined for (innocuously) communicating with foreign countries, whilst others joined the US Civilian Technical Corps, involved to some degree in training on radar. Films and radio programmes seemed to assume that everyone with a transceiver was bound to be a spy, which may account for the muting of discussions about short wave radio in the popular magazines. Odd to think that hams who had in 1937 been overjoyed to pick up a contact in Yonks or Yonkers were, in 1939, experiencing similar pleasure in getting a blip on the radar screen, somewhere in England.

None of us who lived through that period were really aware that, as the V2s hit London, we were at the same time seeing (and hearing) the birth of the satellite communication age. But that, as they say, is another story. And, in any case, taxis got their radios eventually.

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The MF88 Rx Antenna

by Richard Q Marris G2BZQ

During the last 20 years or so, the domestic Rx's compacted in-built antenna has consisted of a ferrite rod up to $\frac{3}{8}$ in in diameter and 8in in length, plus a winding. Those of us concerned with trying to improve long range VLF/LF/MF/HF reception, have resorted to end-fed long wires and framed loops or external loopsticks (or ferrite loops) for use with a communications type Rx, usually with a 50 ohm impedance coupling to the Rx antenna input.

At this QTH many experiments have taken place, from VLF to HF, using longer and longer rods, made by cementing standard 8in \times $\frac{3}{8}$ in diameter rods in tandem. Correctly designed windings and coupling arrangements have resulted in far greater sensitivity (ie signal pick-up range) and much improved directional properties or nulling.

The best was a 32in long \times $\frac{3}{8}$ in diameter rod (4 \times 8in in tandem). It was very successful, but unwieldy, and not a long term practical proposition.

Having apparently exhausted the very long rod idea, I decided to experiment with technically superior imported core materials of larger diameter. Samples were obtained from several manufacturers and suppliers abroad. One of the results of this experimentation has been this MF88 antenna, of 50 ohm terminating impedance, covering a major segment of the MF range. This includes the Amateur Top Band (160 metres); the MW AM broadcast band and that neglected portion between the LF end of the MW band and the HF end of the LW band. The final frequency range of the prototype was 2050kHz (146 metres) to 286kHz (1050 metres).

The ferrite rod used is 7.50in long \times 0.50in diameter, obtained from Amidon in California. The rod selected (type R61-050-750) is made from a nickel-zinc material with a permeability of 125, and offering temperature stability and high 'Q' from around 500kHz upwards in frequency, using a suitable winding.

Amidon advise that the best 'Q' will be obtained when this winding is in the centre of the rod; when there is a small space between coil wire turns and the wire and the core. This produced problems in practice as it is extremely difficult to space the large number of wire turns at MF frequencies. It also seemed to be impossible to locate thin wall snug-fitting coil former material, though this could have been solved with a few turns of paper over the rod.

Both problems were eventually solved by using 'jumper wire', which is a single wire conductor, insulated with PVC, with an overall outside diameter of 1mm. Closewound this gives just under 1mm between adjacent wire turns, with a small

interturn capacity (the PVC) and a small space between wire and core.

Construction

The front view of the MF88 can be seen in *Figure 1*, and the circuit in *Figure 2*. It consists of the 7.50in \times 0.50in diameter ferrite rod onto which is wound the antenna coil L1, which is overwound with the 50 ohms coupling coil L2. Both are located dead centre of the rod.

L1 is resonated by VC1, or VC1/VC2. The VC is a 2 gang, good quality, small-airspaced 500 pF per section variable capacitor. The postage stamp size padding trimmers were carefully removed. Two alternative coupling circuits (*Figures 2a and 2b*) can also be used.

The rod/coil assembly (*Figure 3*) is mounted by means of the two plastic coated terry clips at either end of a 7 $\frac{1}{2}$ in

\times 0.8in \times 0.4in strip of dry wood. The assembly is bolted onto the top of an inverted plastic box.

The coil L1 consists of 46 turns of the specified closewound jumper wire dead centre of the rod. The ends are taped (*Figure 3*). L2 is 6 further turns of the same wire, closewound over the centre of L1, with its ends pushed into a short length of heatshrink sleeving. The ends of L1/L2 are taken through holes drilled through the top of the base box.

The base box used is a rigid plastic microwave/freezer stone-grey box, with a semi-rigid snap-on lid. It is approximately 5in long \times 2.4in high \times 3.4in deep, with tapered sides and rounded edges. Any similar size plastic box would suffice. The box is used in an inverted position, with the snap-on lid as the base.

VC1/VC2 is mounted in the front of the box (*Figure 1*), and the coaxial socket (SKt) in the centre of the back. The whole is wired as *Figure 2A* and inverted. A maximum length of 36in RG58 feedline goes from the SKt to the 50 ohms Rx antenna input.

Testing/results

With the circuit in *Figure 2A* (without link) the antenna will cover from 2050kHz

Fig 1: Front view of the MF88

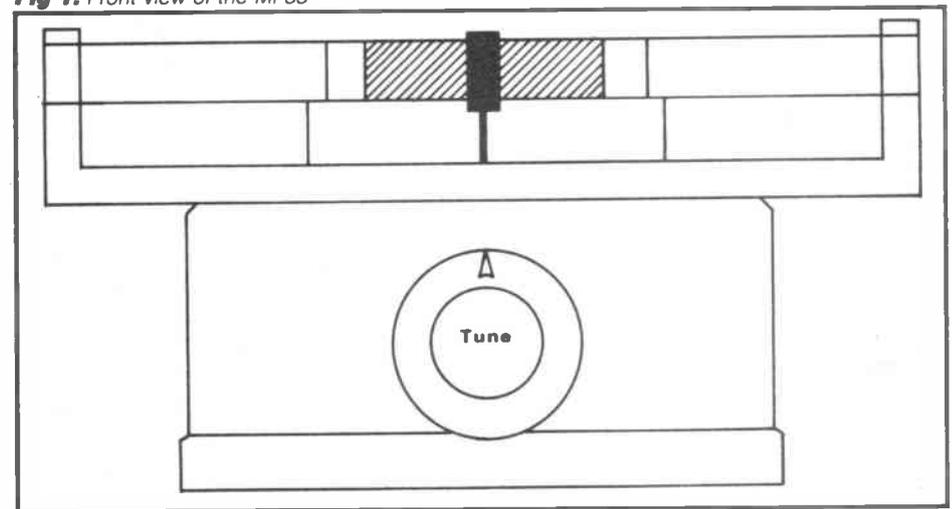
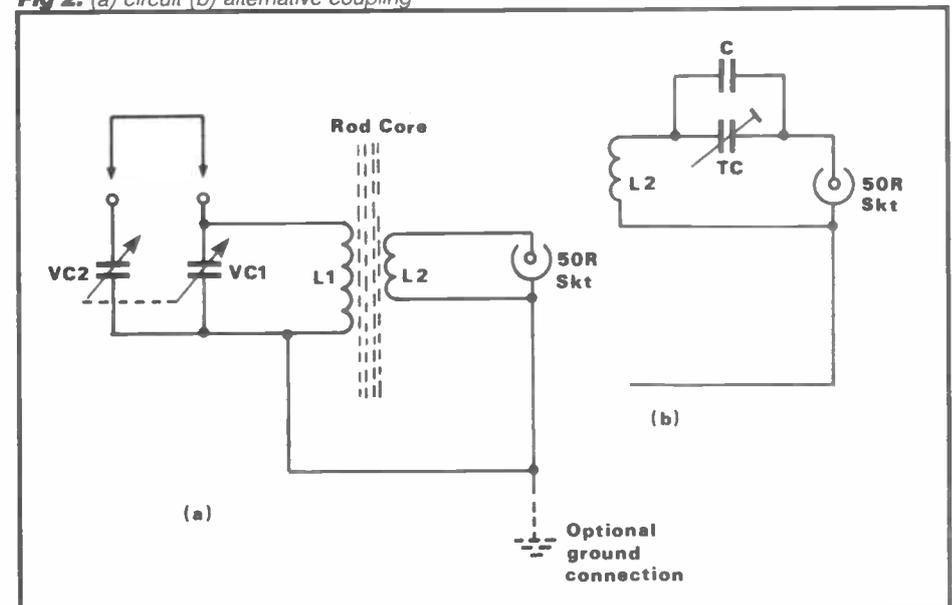


Fig 2: (a) circuit (b) alternative coupling



MF88 Rx ANTENNA

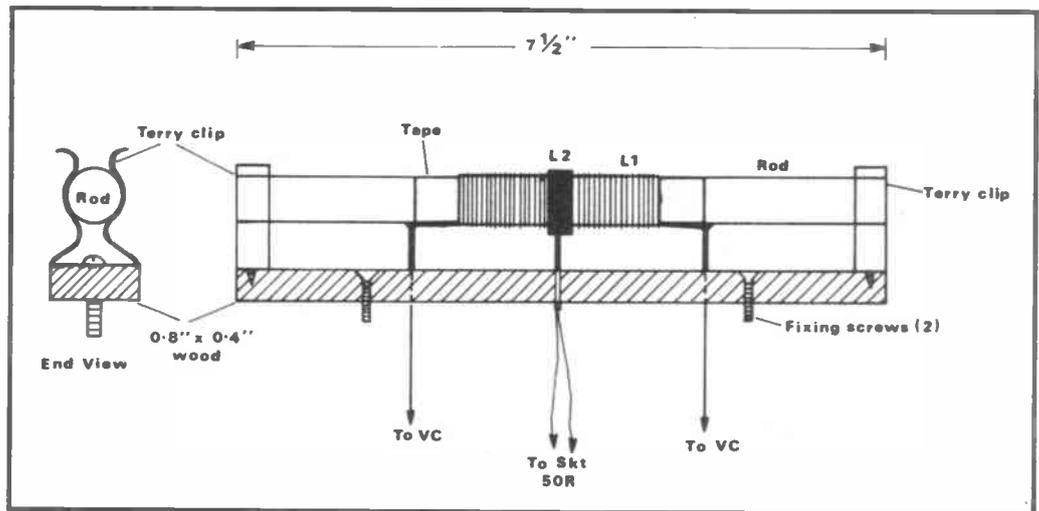


Fig 3: Coil/rod assembly

(146 metres) to 500kHz (600 metres). The maximum signal pick-up is off the long side of the coil/rod. The rod/coil should be rotated for maximum signal strength on the desired station. In the event of QRM/QRN try rotating the loop direction slightly to reduce/eliminate this interference.

For those who are also interested in the neglected MF segment between 500kHz (600 metres) and 286kHz (1050 metres) the link should be attached, putting VC1/VC2 in parallel, ie 1000pF. The range should now be 286kHz (1050 metres) to 1667kHz (180 metres).

Whichever frequency range is selected depends on individual interests and Rxs available. The link can either be soldered permanently, or clipped on as I did. The latter gives the full frequency range facilities of the antenna. The 50 ohm coupling coil L2 (Figure 2a) is a good compromise to cover the whole range from 2050kHz to 286kHz. However, for those only interested in part of the available frequency range (eg the MW band or Amateur Top Band) then the alternative coupling arrangement in Figure 2b should be tried. TC is a 500pF postage stamp trimmer, with a 500pF silver mica (C) in parallel. TC should be adjusted for best results.

It will be seen in Figure 2a that there is an optional ground (earth) connection.

This must not be connected to the ac mains supply earthing. Connection to a metal water pipe, or good outside ground earth may reduce the Rx noise level. It is worth trying, but isn't essential.

The inevitable question of an RF pre-amplifier arises. Well, at this QTH the Rxs have very high RF gain and a pre-amplifier is not needed with this antenna. However, if an external pre-amplifier is necessary it can be placed

between the MF88 and the Rx. There should also be room to build in a simple transistor amplifier, with battery, to the base box, or a slightly larger box.

Conclusion

The MF88 is an experimental, highly efficient, long-range loopstick (or ferrite loop) antenna. It has high sensitivity, and is directional with excellent QRM/QRN suppression facilities.

Parts List

VC1/VC2	2 gang 500pF, per section, Rx type small airspaced variable capacitor.
Rod	Amidon type R61-050-750, 7.50in long x 0.50in diameter obtainable from Amidon Associates Inc, 12033 Otsego Street, North Hollywood, CA 91607, USA. Cost, at time of writing, is \$3.50 each plus \$2.00 postage, per order, in USA and Canada, and \$4.00 overseas airmail.
Windings L1/L2	Jumper wire - single wire conductor - PVC covered approximately 1mm outside overall diameter.
Clips	2 x plastic coated terry clips with fixing screws.
Cable	Up to 36in 50 ohm coaxial feedline with suitable coaxial plugs.
Sundries	Knob, wood, screws and nuts, coaxial socket and tape.
Base/box	Rigid plastic box approximately 5in long x 2.4in high x 3.4in deep with semi-rigid snap-on lid.

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DX DIARY

News for HF operators compiled by Don Field G3XTT

Writing this at the end of June, the world is still waiting for the 4W0AE operation by the Lynx DX Group. There was some sort of hold-up with the visas, but the operators were confident of pulling off the operation in early July. Sadly, a pirate 4W0AE showed on the bands a few days ago, so there will be some poor souls who believe they have got a new one. It's always a pity when this happens, but the number of phoney ZA (Albanian) calls to have appeared over the years, for example, is legendary.

Afghanistan is another to attract the 'funnies', but there seems to be a glimmer of hope for this rare one now that the Russians are pulling out. Finland will be providing UN observers to oversee the USSR withdrawal and Martti, OH2BH, was working hard on getting some Finnish amateurs included in the group, with a view to some 4U activity from YA. Fingers very tightly crossed on this one!

The small countries

Not exactly rare, but FA1NLY and F6GMB should be active from Liechtenstein from 8-20th August on 80-10 metres, SSB and RTTY. PA2WJZ and PA0ONH are also due to operate from Liechtenstein, from 1st-17th August, in their case mainly on CW including the WARC bands. From personal experience I can testify that Liechtenstein is by no means the easiest country from which to put out a decent signal. Most of the land area is at the bottom of a steep-sided valley, bounded by mountains on both the Swiss and Austrian sides, which makes it difficult to get anything approximating to a clear take-off. Fortunately for us in the UK, that isn't too important as propagation will be at high angles.

When I was first licensed, countries like Liechtenstein, Monaco, Andorra, etc, were

quite rare. They still have a few resident amateurs, but in recent years have all become popular destinations for mini-DXpeditions, so there should be little problem in putting these small countries of Europe into your log on several different bands and modes.

Other DX news

K3TW, who has been active in recent years as VU2TJW, with side trips to Nepal and Sri Lanka, is now QRT. However, he will re-appear in September from Tanzania, possibly as 5H3TW, for a two-year tour of duty. His side trips this time may well include D6, 9X, 9U and 7Q. Also from Africa, 3C1JPF and 3X1SG, both Belgians, are now active. 3C1JPF is operating from Bioko Island and will be there until the end of August. 3X1SG will be QRV for two years. The Belgians are certainly making their contribution; ON5HT was due to operate as 9Q5HT from Zaire from 25th July until 5th September. And back in Europe, ON5JE will operate as YU2/ON5JE from Korcula Island (EU16 for Islands on the Air) until 3rd August.

Talking about Yugoslavian Islands, it is rumoured that a YU group will operate from Palagruza Island (EU90 for IOTA) from 1st to 5th September.

Further liberalisation of licensing is in the air in China. Individuals will be able to obtain licences, identifiable by the BG prefix. Foreign operators will be assigned BW calls, and NS7Z, who is a frequent visitor, already has the callsign BW1Z. Club stations will retain the BY prefix, and special event stations (such as the recent Mt Everest expeditions) will continue to use BT. These various changes could come into effect as early as this month.

At the time of writing, WB9VLV, AG9A and N9HIA were reported to be planning

an operation from FP (St Pierre and Miquelon) from 10-18th August, although another report gives the dates as being in September. Either way, FP seems almost local since FP/KA3B worked 143 G stations on 50MHz, but that's a story for G5KW's column! A Swedish group was planning to activate the Faeroe Islands from 10th to 21st August on both the HF and VHF bands. On the other side of the world, JG3LZG is reported to be wandering around various places in the Pacific during the course of the next few months.

Now one for prefix hunters. IU4BU (Celebrating the 900th anniversary of the University of Bologna) will be active 10-15th August, 10-15th September, 25-30th October and 25-30th November. JG1RVN recently went on what was supposed to be an RTTY DXpedition to Saipan (KH0), but ended up with quite a lot of damaged gear due to the local mains varying from 85 to 260 volts (its nominal voltage was 110). Being a glutton for punishment he plans to return during the first week of September, presumably with whatever it takes to smooth out the mains supply. Look for him on 14090 and 21090kHz.

USA '200'

Have you noticed all those special '200' callsigns springing up around the USA this year? These celebrate the 200th anniversary of the US constitution. However, rather than simply allow blanket use of the '200' prefix (W200, K200, etc) in place of the usual prefix, which would cause confusion, the use of this has been phased in around different states during the course of the year. It has also been restricted to pre-registered club stations. There are already some beautiful QSLs and awards in circulation for working these special event stations, and some have managed to operate from sites of

great historical interest, so if you hear one, it is well worth making the QSO.

US novices

Ever wanted to be DX yourself, without leaving home? American novice stations are restricted in power and frequency, and are usually delighted to be called by stations outside North America. They can be found mainly on 21100-21200 and 28100-28200 on CW, though expect to start hearing them on a new SSB allocation of 28300-28500kHz during the coming sunspot maximum.

What's been around

At this point, a brief review of what happened on the bands in June. The Trindade Island operation showed up but was a great disappointment considering all the advance publicity. However, a couple of new stations showed up from Easter Island (CE0). These two are reputed to be medical officers who are likely to be on the island for some time. Early in the month there were some late evening openings to New Zealand on 10 metres, and some G stations even worked ZK1 between 2230 and 2330. All this was happening at the same time that there was some strong sporadic E, extending up to 2 metres but producing lots of short skip for the 10m enthusiasts as well. And, much to my disgust (because I missed it, of course) even Alaska was reported on 10m in the guise of KL7TC, worked in the UK at 0950!

Honor Roll

Did you ever think that achievement of DXCC Honor Roll status was an impossible dream and only for the select few? Well, ponder this. The June issue of QST, the ARRL journal, lists over 2600 amateurs who have achieved Honor Roll, which represents about 10% of all participants



in the DXCC awards programme. The list includes 38 UK DXers. Congratulations are due particularly to Roger, G3KMA, who is the first UK amateur to make it on to the CW Honour Roll. By the way, don't forget that contacts on 24MHz now count towards DXCC.

LA DX Convention

I am particularly grateful to Andrew, G0HSD, for the first-hand account of the recent LA DX Convention, held to celebrate the 10th Anniversary of the LA DX Group. Andrew was the only UK amateur to attend, although there were visitors from nine countries including ON4UN, DJ0UJ (better known as TA2BK), K5TEA, TF3CW, and many famous Scandinavian DXers.

The programme at the Convention was a fascinating one, with presentations on 3Y, S0, the Pacific by OH1RY, and so on. ON4UN talked about LF DXing, and LA4LN about packet radio and about DXing from the Arctic. LA6WEA was

awarded 'Top DXer of the Year' for the highest number of countries worked in the previous year, including 196 on 80 metres. This despite having being laid up for six of the twelve months, having broken his back when he fell from his tower. These and many other memorable activities made for a thoroughly enjoyable weekend, which the Norwegians hope to repeat next year. All proceedings were in English for the benefit of visitors, so it might well be worth planning a family holiday to Norway next June! I'm sure Andrew will be happy to provide more information if you want it.

Incidentally, don't forget the RSGB's own HF Convention, to be held once again at the Belfry Hotel at Milton Common near Oxford on 25th September. F6EXV (of KH5 fame) and W0AIH will be among the distinguished visitors, and there is an excellent lecture programme lined up. I can provide further information on request.

Chiltern DX Club

The Chiltern DX Club held its annual meeting in May, and the new committee is looking forward to seeing CDXC continue to grow as the principal DX group in the UK. Indeed, CDXC already has several notable overseas DXers among its membership. The Club will be hosting a DXers' buffet following the HF Convention. If you are interested in becoming a member, contact the secretary, G4LJF, at his callbook address for more details.

Contests

The main contesting events of August are the Worked All Europe CW Contest on 13/14th (48 hours) and the All Asia CW Contest on 27/28th (also 48 hours). The SSB leg of the Worked All Europe Contest takes place over 10/11th September.

Shareware

Looking through a Shareware catalogue for the IBM PC (and clones) recently, I noted several ham radio programs of US origin which could be of interest to HF operators. These included CW and RTTY programs, beam heading and distance calculator, log book, QSL printing, grid locator conversions, sunrise and sunset time calculations, a complete listing on disc of all US counties and parishes, and much more. Now that the Amstrad PC-clones are becoming more common it's nice to see such a variety of useful software appearing on the market.

DXing the hard way

Finally, *DX News Sheet* recently carried a fascinating

account of DL2GAC's island hopping DXpedition to the Philippines and Malaya earlier this year. Bernard is an inveterate traveller who, for the past 15 years, has tried to combine his two hobbies of amateur radio and long distance travel. Since 1983 he has made four trips to the Philippines, totalling seven months of travelling around the various islands. When he discovered that several of the islands he had yet to visit would also count as new ones for the Islands on the Air award, the scene was set for another trip.

Most of the islands visited had intermittent or non-existent power supplies, so a car battery was pressed into service to run the FT757GX, the antenna being a 3-band groundplane. In some locations the locals were unfamiliar with amateur radio (difficult to believe, isn't it!), which led to the occasional confrontation with the local police. However, DL2GAC seems to have had the knack of making friends with the local VIPs and managed to get on the air as well as having an absolutely fascinating holiday. No doubt we will be hearing more of Bernard in future. Incidentally, I managed to work him from three of his six ports of call which, considering the limitations at his end, probably wasn't bad going.

That's it for another month. Don't forget to take advantage of the summer weather to put your antennas in order for the forthcoming season. The sunspots are still looking good and we could be in for some excellent propagation this autumn. 73 de Don.

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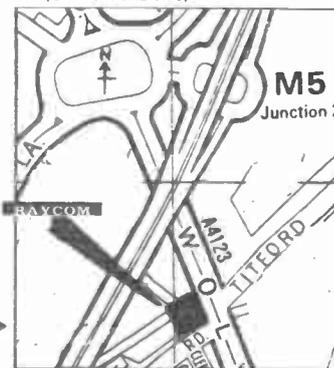
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ANGUS McKENZIE

TESTS



THE YAESU FT-747GX MOBILE HF TRANSCEIVER

A sociologist told me recently that it is a well known axiom in sociology that someone who has just purchased an item is not always the most rational when giving an opinion of the item's performance. A purchaser may well be very ready to sing the praises of a new rig, quite understandably, but just how frank will the purchaser be if after a short while disappointment is felt about the purchase? I admit to having been disappointed occasionally with the odd rig from Yaesu, Kenwood, Icom and many other makes, but I suggest that perusal of adverts of second-hand gear can be very illuminating, if you compare the age of the offered equipment with the price asked and the price paid; subject to reasonable inflation. It is fascinating to see how each rig has rather different second-hand values.

There is, of course, a deeply felt need for a budget rig which is simple to operate, which gives good transmitted quality as well as having a good basic receiver. I prefer as much price saving as possible by reducing the number of gizmos and gimmicks, rather than sacrificing important areas of receiver performance, such as the front-end performance and the sideband noise of the synthesizer. For Yaesu to introduce a complete HF transceiver capable of giving 100W output with multimode facilities, in addition to having general coverage on its receiver, for a price of £599 from ARE Communications, Hanger Lane, excluding mic, PSU and various options, is really astonishing. It works out at about half the price of a KW2000A of 25 years ago, taking inflation into account. As far as I know, it is the cheapest 100W HF transceiver on the UK market, yet it includes computer interfacing facilities and should be packet and Amtor compatible. It requires 13.8V dc and is specifically designed for mobile operation, as well as being suitable for a base station. It is one of the smallest and lightest HF rigs on the market as its case is plastic, rather than metal. This also includes the front and back panels. Therefore, the low weight of 3.3kg is not surprising. This does give it

quite an advantage if you are taking it in and out of the car.

Basic facilities

The receiver tunes from 100kHz to 30MHz in 25, or 2.5kHz steps on CW and SSB and 1 or 10kHz steps on AM. Unfortunately, you cannot switch to 9kHz channelling on MW. If you have the FM option which is provided for use on 10m, then you will get 5 or 12.5kHz steps. The rig transmits on all amateur bands from 1.8 to 28MHz, but is disabled from a Tx capability outside a 500kHz segment. It will thus transmit on 28MHz but not 27.999MHz! A see-saw switch selects LSB, USB, CW, AM or FM modes. A 'narrow' button can either select a normal bandwidth for AM or the SSB filter bandwidth, whilst on CW it selects either the SSB filter or a 500Hz CW one. The rig has two VFOs which retain frequency and mode and 20 memories which can also retain frequency and mode. The memory ergonomics are excellent, as you can very simply transfer from VFO to a chosen memory and back from memory to VFO, or you can select the memories with the use of the VFO knob.

Most unusually for an HF rig, the VFO knob clicks round in discrete steps, rather than continuously. At first I was not happy with this, but I soon became used to it. It was useful for counting up and down the memories and for QSYing with the 'fast' button pressed, allowing you to jump in 2.5kHz steps on SSB. However, presumably for cosmetic reasons, Yaesu omits a finger hole. I have no doubt that the tuning mechanism is sufficiently easy to rotate, although a finger hole would be a great advantage over rolling your finger round the knob. However, the knob does have an easy to grip circumference which I liked. I know that many who have looked at the 747 have disliked the steps, but I think I had better remain neutral, as I can see both the advantages and disadvantages. The FT-747 includes a clarifier (RIT) which allows adjustment of the Rx frequency, only up to ± 10 kHz from the Tx frequency,

which remains static whilst the clarifier function is activated. A dial lock button is provided to lock the frequency, disabling both the stepping buttons on the mic and the tuning knob. This will be very useful for mobile working.

Other push buttons select Tx/Rx, 20dB RF front-end attenuator, noise blanker on/off, split operation using VFOs A and B, and priority selected memory channel monitoring (monitors the selected memory very briefly every four seconds). Two split concentric rotaries are provided for adjustment of Rx audio gain and squelch (all modes) and mic gain and carrier level. The mic gain is inoperative on FM unfortunately, but far more serious is the fact that the carrier level control is completely inactive on SSB. This means that you have to adjust maximum output power just by using the mic gain, or by adjusting your own voice level. If you can accurately adjust the peak level of your own voice to within a dB or two of 32W PEP on top band when the rig puts out 100W when raising your voice a bit, then you are a better operator than I am! I reckon that the majority of operators will be peaking up to a 100W most of the time, unless they are very carefully watching a true PEP meter.

On almost every other HF rig that I can remember testing, the carrier or drive control actually alters the maximum output PEP by increasing the ALC feedback level. I just cannot see what is behind Yaesu's philosophy here, for it means that on packet and Amtor, you will have to very carefully adjust audio gain and use a scope or expensive PEP meter to judge your output power accurately enough.

The band changing problem

When Fiona and I were first playing with this rig, I could not fathom out what was going on whilst attempting transfer from one band to another. The frequency display was changing OK, but the actual tuned frequency was static! Reference to the instruction book soon explained our confusion. What you have to do is press the band button first, click round

the VFO in 500kHz steps, and then press the band button again (within five seconds!). Whereupon, on the final push the actual tuned frequency changes to the displayed one. Just above the band button is the fast/slow tuning rate button and if this is left on fast, then you change bands by 5MHz at a time. It is my opinion that this form of band changing, having no audio feedback while turning the tuning knob in 500kHz chunks, is about the worst band changing ergonomics that I have ever encountered. As this is a mobile rig, it is all the more important for the driver to be able to change bands without looking at the frequency display all the time. The only way out would be for the user to put each band's preferred frequency and mode into the memories and use the memory to VFO function.

The front panel

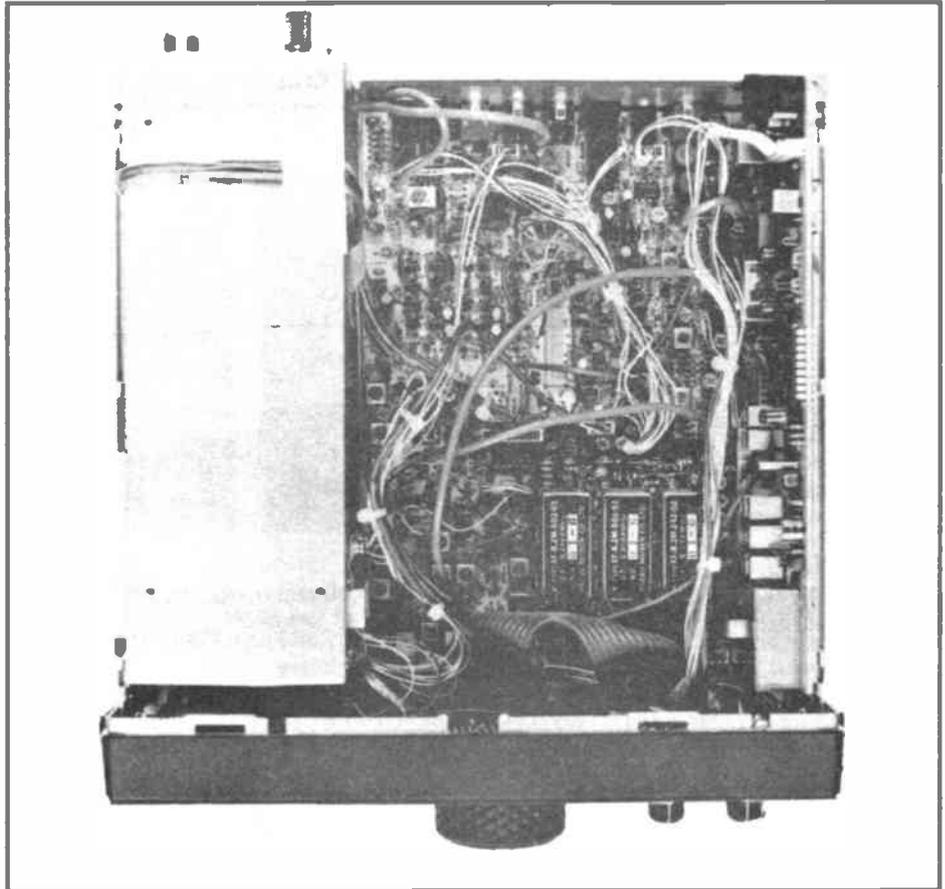
In addition to the button previously described, a second see-saw switch selects either memory recall at one end or VFO operation at the other end. Pressing the VFO end again changes from A to B or B to A. The display gives frequency with 100Hz resolution and all the normal basic status indications. These include the memory channel that is ready for use. The LCD is easy to read from different angles, and is fairly bright - black on yellow.

The standard eight pin mic socket includes PTT and both fast and slow up/down stepping lines, the nominal audio input being recommended for use with 600 ohm microphones, such as the Yaesu MH1B8 (£21). There is also a quarter inch headphone jack socket and a dc supply on/off push button.

The rear panel

On the rear is the 13.8V dc power input socket, which has four pins to interconnect with the long power lead supplied. This lead is fused in the positive as usual. The antenna socket is an SO239 and there is a separate earth terminal provided. A six pin DIN connector is fitted for computer interfacing, whilst another multi-pin socket is for direct connection to one of Yaesu's automatic ATUs. The interface provides band data. There is an audio output phono socket providing a fixed gain feed, peaking at around half a volt from the top of the gain control. This can be used with a load of not less than 10k ohms. This is most useful for interconnection with a cassette deck, but can also be used with data terminals. A 3.5mm jack socket provides a feed for external loudspeakers and there is a mono quarter inch jack for Morse key interconnection (13V dc when open circuit and up to 1mA current on short circuit). An external ALC input socket requires up to -5V for cutting back the drive level, whilst another phono type socket is for external PTT (5V dc open circuit, and 1mA max when short circuit).

There are three pre-set adjustments for setting the relative positions of the SSB passbands, with respect to the



carrier and the CW carrier level. Yaesu suggest that you should not touch these unless you have the relevant test equipment as they are factory pre-set.

There is also a fan which comes on to cool down the PA when necessary, but I should point out that I found it noisy and intrusively clattery when in operation, I dare say that others may also find it annoying.

The built-in speaker is mounted behind a grille on the front panel, thus throwing the sound forwards, which is basically a very good idea and fairly unusual. There is a bail-stand to lift the front of the rig up when using it as a base station.

Subjective tests

I have used the rig on various bands for many hours during the two weeks that I have been testing it, and the most important point that has hit me throughout is the poor ergonomics. I was continually disturbed by a rather nasty cabinet rattle even when listening to SSB at a modest volume, let alone at a louder level. This was so irritating that I have had to use an external speaker for all serious evaluation of the subjective performance. The rig does seem to be quite sensitive and the intercept point was satisfactory on the LF bands. I was pleased to see the addition of the 20dB antenna input attenuator, which particularly helped on top band at night. During the mornings, I found it necessary to use an external ATU, to keep out strong medium wave signals, as otherwise they caused overload of the front-

end. The AGC speed seemed a reasonable compromise for all purposes, although I would have personally preferred it slower for most of the time. I found that the factory settings of the passband tuning favoured the LF end of audio too much, and this would certainly have been quite a contributory factor of the loudspeaker rattle problem.

I am used to having more acoustic power available than this rig can give and under mobile conditions there may well be insufficient volume in heavy and noisy traffic.

The reciprocal mixing performance showed up on the lower frequency bands when trying to receive very weak stations close to very strong ones. However, if I restricted myself to average stations, I was not too disturbed by this problem. I think many will find the rig satisfactory as a mobile, provided an external speaker is used. Using the Yaesu hand mic supplied, I did receive quite a number of good audio reports on various bands and not one station criticised the audio. The rig seemed very stable indeed over long periods, even during all the output power tests.

The absence of peak power adjustment on SSB, will also make it awkward to use the rig with any transverters. I suppose it would be possible to extract a low power output from the rig if you have a lot of patience and know what you are doing, but I am hardly surprised that a transverter drive facility is omitted. Similarly, there is no conventional short on Tx relay socket for interconnection with a linear etc. You will have to use

other means for operating linears, although the rig should be compatible with recent Yaesu types.

CW keying seemed quite simple and there is a pot underneath to pre-set the side tone level. It was useful to have semi-break in keying when you switched to CW, together with a narrow CW filter facility. AM quality was acceptable for short wave listening purposes, apart from being muffled, but I don't think many users would want to switch to the very narrow SSB filter for AM. Selectivity on AM seemed to be quite good and the filters on CW and SSB seemed to have reasonably steep skirts. Although the SSB pass band was slightly wider than usual, which again tends to back up my feeling that the set is more likely to be used for working stronger stations than winking out weaker DX ones. Of course you can have strong DX and weak local stations, but that is another story!

Returning to the ergonomics; whilst hating the band changing and the requirement for looking at the displayed frequency and deciding where you want to be before pushing the band button again within five seconds, there were some good points. The actual layout of the front panel is quite well conceived and the use of silver, green and grey colouring for different rows of buttons is helpful, as it allows you to find what you want very quickly. The ease of using the memories for writing, reading and transferring information is a great advantage, as it took much less time than usual to get to know how to operate the rig. Bearing in mind the budget price, I am glad that Yaesu opted for 25Hz increments, rather than wider ones, for this step size is about the largest that I find reasonably acceptable when tuning in an SSB station. However, the actual tuning rate when 25Hz steps are selected is sickeningly slow at around 2kHz per revolution. This would not be so bad with a finger hole and with continuous tuning, as the rate is fairly similar to the average lcom rig, except the total number of steps per revolution is far fewer (approximately 80 instead of around 200). This is again partly a consequence of the click steps.

Laboratory tests

The RF input sensitivity on all modes (FM not tested, the option costing £39 extra) was very good up to 14MHz, but was not quite so good by the time the 28MHz band was reached, which is where you need a little more sensitivity. I don't think you are likely to complain about sensitivity because it was actually good enough, even on long and medium wave. The input intercept point measurements were very satisfactory for such an inexpensive rig, especially as it can be improved by using the 20dB attenuator when necessary. However, I am sorry to say that the reciprocal mixing performance is very poor, the figures being comparatively worse than many other rigs, even quite a long way out from the carrier, although it is only close in that it

Yaesu FT-747 Laboratory Tests

Receiver Tests

RF sensitivity 12dB sinad SSB

1.93MHz	-124dBm
3.75MHz	-124dBm
14.2MHz	-122dBm
21.2MHz	-122dBm
28.55MHz	-120dBm

RF input intercept point

100/200kHz spacing	
3.75MHz	11dBm
14.2MHz	14dBm
28.55MHz	10.5dBm

Reciprocal mixing ratios for various offsets at 28.55MHz

5kHz	69dB
10kHz	79dB
20kHz	87dB
50kHz	98dB
100kHz	106dB

Selectivity SSB bandwidth for given level drop

3dB	2.5kHz
6dB	2.6kHz
40dB	3.9kHz
60dB	8.5kHz (affected by RM)

Selectivity CW

6dB	500Hz
40dB	900Hz
60dB	4.3kHz (badly affected by RM)

S meter

S1	-100dBm	S9	-76dBm
S3	-93dBm	S9 + 20	-62dBm
S5	-86dBm	S9 + 40	-44dBm
S7	-81dBm	S9 + 60	-17dBm

Product detector distortion (1kHz) beat note) 1.1%

AM distortion 1kHz mod/90% between 4 and 5% THD

AM response ref 1kHz (wide filter)

100Hz	-6dB	2kHz	-9dB
500Hz	+2.4dB	3kHz	-16.5dB
1.4kHz	-3.5dB	5kHz	<-54dB

Maximum audio power output for 10% THD into 8 ohms 1.5W

AGC threshold level approx -101dBm (2µV emf/2)

Typical frequency tuning error 10Hz

Transmitter Tests

Typical maximum power output CW/SSB single tone 100W ±5% from 1.8 to 30MHz

Tx frequency accuracy within 10Hz at 14.2MHz

Alternate sideband rejection <-65dB

Carrier rejection -38dB

Dimensions 238W x 93H x 238D excluding knobs, Weight 3.3kg

is of prime importance. The poor RM performance caused the selectivity measurements to be poorer than they should have been as the filters were actually quite good on CW, SSB and AM,

although the SSB filter was unusually wide at the top. The S meter gave a useful 24dB difference between S1 and S9 and the meter was fairly logarithmic above this.

G3OSS TESTS

The product detector distortion was quite low, but the maximum available power output into 8 ohms was surprisingly limited at only 1.5W. The system's effective audio response seemed to show quite an appreciable HF roll-off; this perhaps leads to some of the tendency to pluminess in the reproduced quality noticed on both the internal and external speakers. This was very marked indeed when we measured the AM response with a wide filter (let alone the narrow one!). I rather baulk at 9dB down at 2kHz, but 16.5dB down at 3kHz is more than I can accept for sensible AM listening. It is more akin to a typical clothly tranny on medium wave, rather than a communications receiver which is usually quite good. Bass was fairly extended down to 100Hz or so. AM distortion was fairly high at high mod levels, but most will find it acceptable. Most commendable was the excellent frequency accuracy both on Rx and Tx.

Tx performance

The maximum power output on CW and single tone SSB was quite consistent at 100W throughout, two tone tests giving slightly higher maximum power at maximum. Intermodulation products were a little bit on the high side on 14MHz and high order products were also generally rather high; especially at low levels (compare plots 1 and 2 at 110W and 25W PEP respectively, noting the degradation of high order products at the lower power). Plots 3 and 4 show the difference between the noise sidebands near the carrier from the FT-747 as opposed to a crystal controlled generator. Plot 3 shows clear evidence of a very noisy synthesizer, whereas the noise on plot 4 is limited by the analyser performance! I was quite impressed with the generally very good RF harmonic filtering, second and third harmonics almost always being below -60dBC and 4th and 5th being below -80dB. We had a good look around for sprogs and spuri and did not note any. Thus, harmonic filtering was better than the Kenwood TS-140S in this respect.

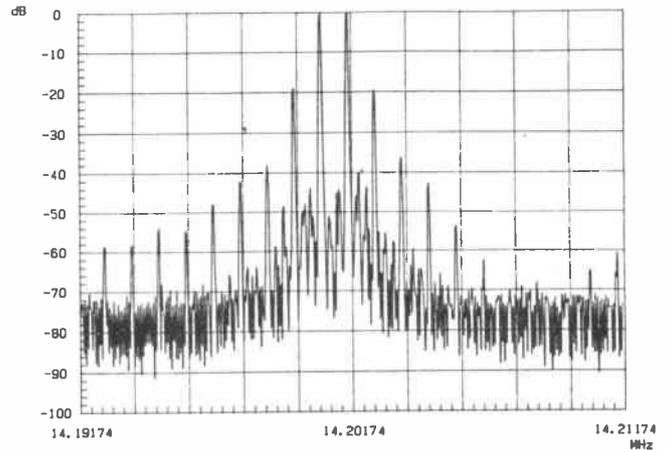
Alternate sideband rejection was excellent and carrier rejection adequate. Plot 5 shows the overall response from mic socket input to carrier out in the usual manner, from which you can see the characteristics of the IF filter as well as some audio response tailoring.

At full power the transmitter took typically around 17A, which is about average. The fan was quite effective and the rig did not get too hot.

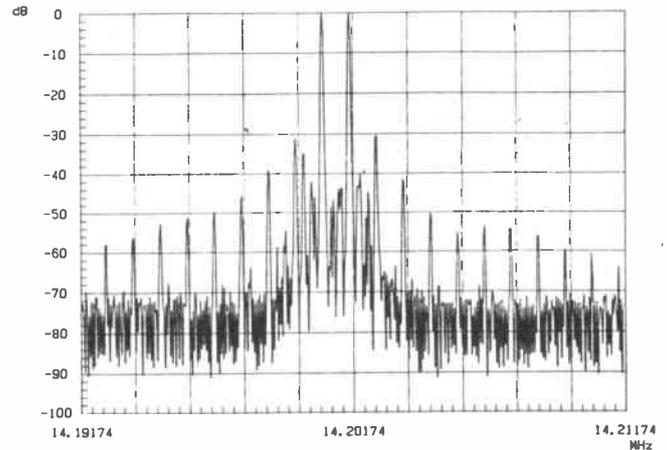
Conclusions

I have no doubt that Yaesu have packed in a lot of useful facilities for a remarkably low price and as a short wave listener's receiver alone, the rig might be considered by some to be good value, but when you realise that you have a 100W transmitter as well, complete with computer interfacing and multimode operation, it is a real bargain if you can accept some of the fairly serious

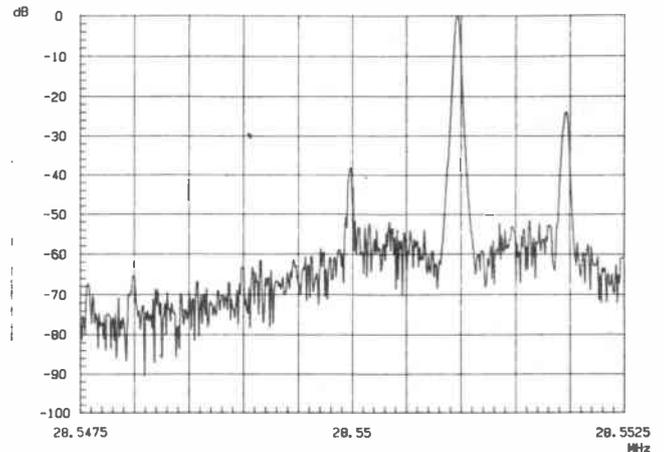
Plot 1: Yaesu FT-747 Tx two tone test. 700/1700Hz tones at approx 110W PEP. Resolution bandwidth: 30Hz. 2kHz per division



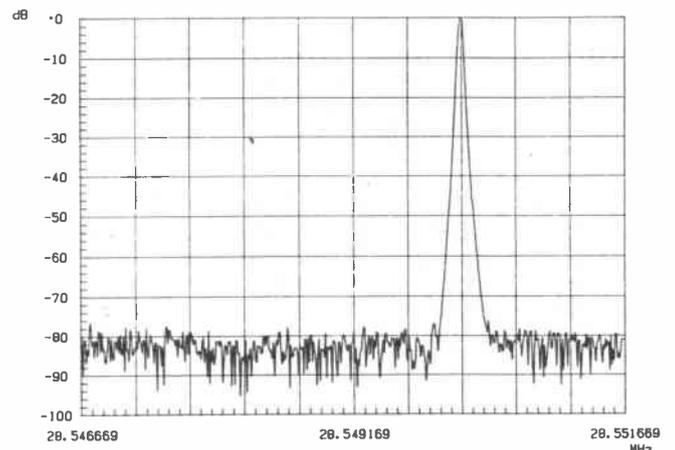
Plot 2: Yaesu FT-747 Tx two tone test. 700/1700Hz tones at approx 25W PEP. Resolution bandwidth: 30Hz. 2kHz per division



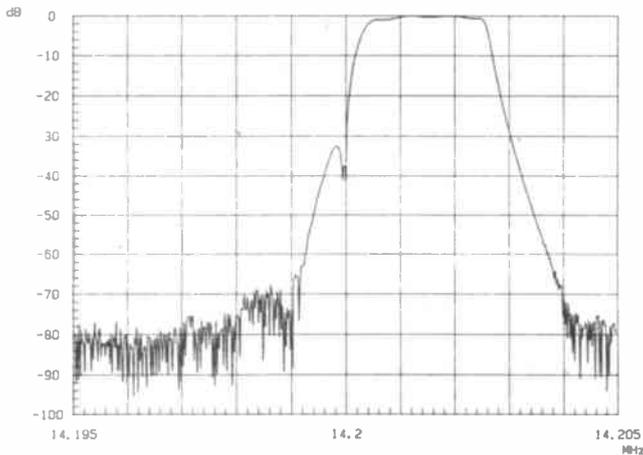
Plot 3: Yaesu FT-747 Tx carrier analysis. 1kHz audio tone producing 2nd HMNC and NB RM noise. Resolution: 30Hz. 500Hz per division



Plot 4: Yaesu FT-747 Tx carrier analysis. Mutek generator replaces rig NB lower noise. Resolution bandwidth: 30Hz. 500Hz per division



G3OSS TESTS



Plot 5: Yaesu FT-747 Tx AF/RF Tx response. Overall response taken at 10W maximum power USB. Resolution bandwidth 30Hz 1kHz per division

shortcomings.

To sum up, the awkward ergonomics, the very poor reciprocal mixing performance, combined with the poor HF audio response, the limited maximum audio power available and the loudspeaker rattle, have to be weighed up against the

budget price and the good subjective transmitted quality, as well as the useful facilities. The plastic box somehow does not inspire confidence in terms of long term reliability (the plastic case is coated internally with a screening compound, but I noted quite a lot of breakthrough

into the receiver when a dummy load was screwed on to the antenna socket).

It is going to be a difficult decision for some and my personal recommendation would be to consider purchasing a very good second-hand rig from a reputable source, rather than a new FT-747GX. What seems odd to me is that the reasons for my main criticisms are not monetary ones, for just a few components added to the synthesizer could have fixed it, whilst allowing some more treble through would have improved the audio and greatly reduced the rattle. Surely the band change programming could have been better without any additional expense, so let us not hear too much criticism that the rig was built down to a price. I hear rumours that one enterprising retailer in the Midlands has already designed a 'fix it' mod, which helps quite a lot.

I would like to thank ARE Communications Ltd of Hanger Lane, London, W5 for lending me the review sample at very short notice and Fiona for all her very hard work with the measurements.



THE KENWOOD TH-25E 144MHz FM HAND-HELD

Although this rig came out a few months ago, I did not actually come across it until I was shown one at Lowe Electronics' shop in Matlock. I realised it was an important addition to the Kenwood stable, as it has good ergonomics and provides many useful facilities.

The TH-25E feels fairly chunky with the PB6 nicad normally supplied, (7.2V 600mA/H, costing £26.96 for additional ones). If you plug on the PB5 nicad (7.2V, 200mA/H, costing £26.96), it sits even more easily in the hand and becomes better balanced. It feels quite rugged. Two other nicads are available, the PB7 also giving 7.2V, but with the enormous capacity of 1100mA/H, costing £41.53 and the PB8, giving 12V at 600mA/H and costing £38.64.

Other options include various soft cases, including a water-resistant bag, at around £8, while the speaker mic, SMC31, costs £29.79. A head set with boom mic, vox control and PTT switch (type HMC2) costs £34.25. The rig itself, complete with a PB6, rubber duck antenna, small trickle charger and manual, costs £258 including VAT. There is also a base charger suitable for all the batteries, type BC10, costing approximately £20. If you want to use the rig in the shack or car you will almost certainly want to power it from an external 13V dc source. The DC1 adaptor slides on the bottom of the rig like a battery, and accepts the external dc voltage. The DC1 costs £13.60; but you might prefer a battery box type BT6 which takes six AA cells and costs only £7.27.

The TH-25E's facilities

On the top of the set is a BNC socket for the rubber duck, mounted quite rigidly on the case work, in front of which is a mini dual concentric pot with separate adjustments for audio volume with on/off switch and squelch. Although small, these are easy to use. On the top right-hand side is a mini rotary click step control to tune through all the different VFO or memory channels. You can select either 12.5 or 5kHz steps by appropriate button pushing. In between the BNC socket and the tuning rotary is the LCD which gives status indications as well as frequency. The display is easier to see and read properly than the one on the IC-2GE. It is also easy to see in the dark if you push the lamp on/off button on the left side cheek, although the button is slightly awkward to find if you are in a hurry.

Along the front of the top panel are mini buttons for changing MHz, switching to VFO or to memory operation and for selecting a 1750Hz auto tone burst on or off. In between this last button and the tuning control is another mini button which can set up the alarm facility. This is most useful, as it causes the rig to emit very loud high pitched 'I's in CW continuously once the squelch is opened. You can easily hear this in the next room! When the alarm function is selected, the actual audio from the incoming station remains muted.

On the back panel are some additional switches. A side switch selects low or high power and there are four tiny

Laboratory Test Results Kenwood TH-25E

Receiver tests

RF sensitivity input level for 12dB sinad	144.025MHz 144.95MHz 145.975MHz	-125dBm -125.5dBm -125.5dBm
RF input intercept point	100/200kHz spacings 1/2MHz spacing 2/4MHz spacing	-45dBm -30dBm -28.5dBm
Selectivity	12.5kHz 25kHz	8.5dB avge 66dB avge
S meter		
S1	-118dBm	
S3	-112	
S5	-107	
S7	-103	
S9	-98	
S9+	-91	
Capture ratio	3.5dB	
Audio distortion/1kHz mod deviation		
1kHz	0.7% inc noise	
3kHz	0.35%	
5kHz	6.8% (output stage clipping at nominal gain position)	
Maximum audio output for 10% THD	8 ohms 4 ohms	0.32W 0.39W
Typical Rx current with mod	65mA	
Rx current (squelched)	56mA	
Rx current (battery save mode)	7.9mA	
Transmitter Tests		
Tx power at 144.95MHz/7.2V dc	3.3W	
Output on 13V dc	5.5W at 1.1A, low: 0.55W at 430mA	
Carrier frequency error	550Hz	
Absolute max speech deviation	5.2kHz	
Average speech peaks deviation	4.9kHz	
Dimensions with PB6 battery	68.5 W x 152 H x 34.5 D (mm)	

buttons with the following main functions: memory (puts VFO frequency into a required memory or transfers a memory to the VFO); CTCSS on/off (optional tone squelch unit is available); repeater shift +/- or simplex and reverse repeater enable. Various second functions are operated by pressing two or more buttons and these cover various operational changes that would only rarely be used, including tuning steps, for example. One extremely important feature is a beep that can be selected to come on when any control button is operated. It is particularly helpful that the pitch of the beep is different on many of the functions. For example if you press the shift button, you will hear one of three notes, the highest corresponding to the selection of plus shift, the lowest

with minus and the middle note for simplex. This is very helpful if you wish to operate in the dark, but is even more helpful, or course, for blind operators, who undoubtedly will find this a superb rig to use. As on many other Kenwood models, the tuning knob used for selecting memories, causes a beep to be emitted when memory 1 is reached from either direction. This then allows you to count your memories from this position, and know where you are, without even reading the frequency display. Having found a base frequency from memory, you can then shift up and down from it after pressing the memory button on the back, followed by the VFO access button on the front, within five seconds.

There are a total of fourteen memories. Memories 13 and 14 can store separate

Tx and Rx frequencies for odd splits, whereas the remainder store simplex or repeater shifts, together with tone burst/tone squelch information. Scanning of the complete band, or of memory frequencies, is possible and a programmable lock-out is available for programming in.

On the left side cheek is a rather rubbery PTT button, which is not quite positive enough and a monitor button which opens the squelch when depressed. The latter is particularly useful if you are using the optional tone squelch system, as you can check if the channel is in use before transmission. On the right side cheek are mini jacks for an external headphone and mic, the loudspeaker mic accessory plugging in here. The battery slides on and off the bottom of the rig and is easy to change.

Some ergonomic points

The mini buttons on the back are not positive enough, and for this reason I would strongly advise you to switch the beep system on so that you have an immediate indication that you have accessed the required function. I found getting one finger on the correct mini button on the rear, followed by pressing the correct button on the front, within five seconds, was sometimes tricky, as was the access of one or two other dual button functions. Once accessed, all the functions worked very well, and at no time did I ever get lost! The alarm function is very much liked, and there are times when you don't want to carry the thing all the time, but leave the rig in a fairly central place. You will soon hear the alarm signal, but it shouldn't drive you too mad, as it stops sending double beeps after a few seconds.

There is a frequency lock-up/down slide switch on the left of the front panel, which will be found useful, so any accidental touching of the micro-processor controlled switches on the top and rear will not cause chaos.

Subjective tests

I have no doubt this is a remarkably sensitive rig and various repeaters seemed stronger than usual around the house. When I used the 12V PB8, local stations, including a mobile some miles away, thought I was putting out the best hand-held signal they had heard from me when I was standing on the landing (a spot I frequently use for assessing such rigs). Speech quality was well liked on transmit but the audio quality on the built-in speaker was not as clear as on the new Icom rig, since it was slightly coloured and somewhat peaky. However, the signal to noise ratio of the Kenwood was certainly better than that of the Icom.

When using the rig as a hand-held, I did not experience any front-end problems, but when I fed the rig from my Icom discone, the large number of signals on the band and either side of it, caused some build-up of background, burbling noises, some channels also being identi-

fied with IM products from known stations. There would not be any problem using the rig under mobile conditions, unless you were at the top of a big hill in an urban area, but this means I could only recommend the rig for its main intended purpose – as a basic good hand-held. Obviously, in a rural area it would be all right, and you could, most certainly, use its sensitivity under this condition.

I was pleased that Lowe Electronics sent me nearly all the available accessories and I liked the base charger which was easy to use, although it took up to eight hours to charge the average battery, and a lot longer than this is quoted for the PB7. The loudspeaker mic was easy to use, but is, perhaps, a little expensive. Some users will find the boom mic ideal for some purposes, but I found it rather uncomfortable and I tended to get tied up in knots with it! This accessory could most certainly be recommended for mobile use, although I have a personal hate for mini ear plug transducers.

The 12.5kHz channel selectivity was not good enough for serious use, but 25kHz selectivity was excellent. When using the set for accessing repeaters, I liked the auto tone burst feature, but the reverse repeater button was, again, rather difficult to get at in a hurry. As with the Icom unit, with the appropriate smallest battery, this model could be stowed away more easily in a pocket or handbag, than the large radios such as the FT727.

Laboratory tests

The RF sensitivity, measured by the sinad method, proved to be superlatively good across the whole band and, around 2.5dB better than much of the competition. This is useful if you are looking for stations, for having found one, you can easily move around to receive and transmit a useable signal. However, the set's RF input intercept point for fairly close spacing was poor, although there was a distinct improvement with measurements taken at 1MHz, let alone 2MHz, spacings. So, despite the set having a tuned front-end, whereas many other competing models have a wide open input, it will be in-band, or just out

of band, signals that might cause any blocking effects. Computerised measurements very close in intercept points, suggest the synthesizer local oscillator injection is not quite as clean as it might be, as the 50/100kHz radio frequency intermodulation performance actually gave computer readings which were better than the 100/200kHz ones. Synthesizer noise that covers up close-in signals in this test will give an artificially good result in this way, so are useful in showing up reciprocal mixing noise.

As noted in the subjective tests, 12.5kHz selectivity was not good enough, but 25kHz was good. The S meter actually gave a difference of 20dB between S1 and S9, so is much better than the somewhat ridiculous performance of the Icom's meter. Audio distortion was extremely low on the loudspeaker external drive socket, but unfortunately the maximum audio output level that could be achieved was quite limited. I felt that the built-in speaker was slightly inefficient as well, so clipping was noted on signals at average volume rather more readily than usual. This will not normally matter so much, because you can soon turn the wick down, but maximum volume might not be quite enough for you in a car, or during an aircraft fly past!

The set's response on the external speaker socket showed an extremely steep bass roll-off below 350Hz, which is excellent, but the treble end commenced rolling off from 2kHz, and so the reproduction was slightly lacking at HF. This would have contributed partly to the very good sensitivity measurement and I would have preferred the flat response continuing to 3kHz, followed by a steeper roll-off.

The receiver was precisely aligned in frequency, for no improvement to sensitivity could be gained by off-setting the signal generator. Capture ratio measured well and the limiting threshold was well below the level of the 12dB sinad point and so good. The typical current drawn by the receiver is 65mA with modulation, but this drops down to only 7.9mA with the battery, save automatic circuit in operation. This circuit comes in just ten seconds after squelch

has closed, provided no buttons have been touched. As with the Icom rig, an automatic circuit of this type makes an enormous difference to battery life.

When the rig was used with an external 13V dc source, we managed to get 5.5W output, which reduced by 10dB when the set was switched to the low power mode. The PB6 battery produced a maximum of 3.3W, which is a useful power for just 7.2V on the battery. Maximum battery current of 1.1A is, of course, very high but this has to be expected on modern handy talkies when giving their maximum power output of 5W or more.

A Tx frequency error of 550Hz was noted after warm-up. This is rather more than I would have expected from Kenwood, and while it is adequate for 25kHz channelling, it is on the verge of being just a little unsatisfactory if the set is used at closer channelling, as system sensitivity and quality could deteriorate a little. FM deviation was well controlled, normal peaks being at 4.9kHz and only the loudest ones on vowel sounds in the lower register would be likely to go marginally over 5kHz. The tone burst seemed to be accurate and at about the correct deviation.

Conclusion

I am not going to be rash enough to give any direct recommendation to purchase the Kenwood above the Icom (reviewed below) or vice versa, but I have no doubt that the TH-25E is a recommendable model. It does depend on exactly what you want, and I can only give a direct preference for the TH-25E for use by the blind, and some disabled people might well prefer the Icom, which requires less finger dexterity. I would advise able-bodied amateurs to look at both and make up their own minds.

There is one extremely important consideration, however, which may swing the balance – the Icom higher power batteries are not far off being twice as expensive as the Kenwood ones, and many of us like to have one or two spares.

Many thanks to Lowe Electronics for the loan of the review sample, and to Fiona, once again, for helping with all the measurements and word processing.

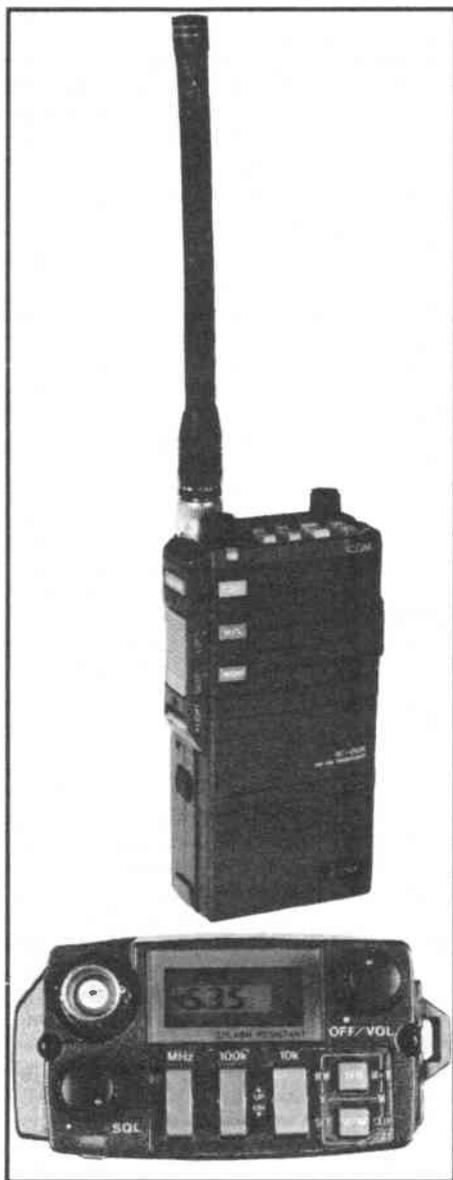
THE ICOM IC-2GE 144 MHz FM HAND-HELD

I was most surprised to receive yet another new hand-held from Icom recently and it was with pleasure that I put this new IC-2GE through its paces. I gave quite a welcoming review to the Icom Micro 2 earlier this year and I did not expect another one to follow so soon. This model incorporates many of the interesting features of the Micro 2 but is quite different. It is simple to use once

you are familiar with several second functions. The UK version can be switched, when in the 'set' mode, to tune in 12.5 or 25kHz steps. Three little tuning levers are provided to let you tune up or down in 1MHz, 100kHz or 12.5/25kHz steps. Two small buttons to the right of these select VFO or memory operation and memory write; return to normal operation; or provide a transfer of a

memory frequency into the VFO.

Also on the top panel are two small rotaries – Rx squelch and on/off/AF gain. A firmly mounted BNC socket is provided for antenna connection and a surprisingly flexible rubber duck type helical antenna is provided with the rig. On the left side cheek is a long, solid plastic PTT lever which only requires a slight touch for operation, which is very convenient, together with a light switch which causes the frequency and status display on the top panel to light up for about five seconds. Also on the side is the function button which is used to select second functions, including plus or minus repeater shift (with 1MHz toggle); memory scan skip or engage 'set' (V/M button);



Battery packs and accessories

In the UK, the IC-2GE is normally supplied with a rubber duck antenna, a BP3 nicad battery and a slow trickle charger. The BP3 is exactly the same as the battery for other models such as the IC-2E and 02E but different to the Micro 2 accessories. So the following batteries also apply to the IC-2GE - BP2 (7.2V 450mA/H £44.85), BP3 (8.4V 270mA/H £29.90), BP4, empty case for six AA cells at £9.20, BP5 (10.8V 450mA/H £60.95), BP5A, same as BP5 but having a socket for trickle charge, BP7 (13.2V 450mA/H £74.75) and BP8 (8.4V 800mA/H £70.15). Note that many of these batteries are

extremely expensive. This is because they are built to commercial specifications and are normally supplied with Icom's professional models. They can be fast charged with the BC35 charger costing £70.15. Also available is an external dc power adapter, AD12, which has reverse polarity protection. This allows the rig to be used with a cigar lighter socket supply, or, indeed, almost anything which provides adequate current from 7V up to an absolute maximum of 16V dc. This adapter costs £10. A loudspeaker microphone, type HM46, costs £23. Other accessories should follow in due course.

Laboratory Test Results Icom IC-2GE

Receiver tests

RF sensitivity input level for 12dB sinad	144.025MHz	-123dBm
	144.95MHz	-123dBm
	145.975MHz	-123.5dBm

RF input intercept point	100/200kHz spacings	-34dBm
	1/2MHz spacing	-21dBm
	2/4MHz spacing	-16.5dBm

Selectivity	12.5kHz	11dB avge
	25kHz	59dB

S meter

S1	-102dBm
S3	-100
S5	-99
S7	-98
S9	-97
S9+	-96

Capture ratio	4.1dB
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Audio distortion/1kHz mod deviation 1kHz	3.2% inc noise
3kHz	2.7%
5kHz	2.4%

Maximum audio output for 10% THD	8 ohms	0.6W
	4 ohms	0.7W

Typical Rx current with mod	70mA
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Rx current (squelched)	38mA
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Rx current (battery save mode)	4mA
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Transmitter Tests

Tx power at 144.95MHz	3.3W/940mA, low power 1W/570mA
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Output on 7.2V	1.8W/740mA
10.8V	5.1W/1.25A

Carrier frequency error	350Hz
-------------------------	-------

Absolute max speech deviation	5.8kHz
-------------------------------	--------

Average speech peaks deviation	5.3kHz
--------------------------------	--------

1750Hz tone burst deviation	3.7kHz
-----------------------------	--------

Tone burst frequency	within 0.1Hz nominal
----------------------	----------------------

Dimensions with BP3 battery	65 W x 130 H x 35 D (mm)
-----------------------------	--------------------------

lock settings (high/low power button) and beep tone on/off for many operations. The last one uses the 'moni' button which normally gives reverse repeater monitoring or opens squelch even when in a tone squelch operation. Another button also on the front panel selects a 1750Hz tone when depressed. On the right side cheek are miniature jack sockets for external mic and headphone connections.

The 'set' function is used in the European version either to change tuning steps or to set the lower and upper limits of a programmable scan. Access to programmable scanning again requires the use of the function key, this time followed by pushing the 10kHz button up or down. The set then scans within the programmed frequency limits quite rapidly and stops when a carrier is received which is strong enough to open the squelch. Scanning is resumed either fifteen seconds after the carrier has been found, or two seconds after it has been switched off. The scanning mode can be cancelled by touching any of the buttons on the top panel.

G3OSS TESTS

Subjective test

This rig has quite a chunky feel, although it is fairly small and I expect it would be harder to damage than the very small Micro 2. At £249 it is only £10 more than the Micro 2 but I think is a much better buy, especially as it uses accessories common with so many other Icom rigs. I was impressed with the up/down double ended keys which allowed a very quick QSY as well as highly convenient searching. The twenty memory channels retained shift parameters as well as frequency and were a delight to use. Icom have made it very simple, both to write a VFO frequency into a memory, and to transfer a memory back to VFO, but it is a pity there was no way to identify the memory other than a visual indication on the display which was not easy to see. Fiona found this display rather poor compared with that on many other rigs.

I must particularly commend the excellent PTT which was so easy to use, but the function button was sometimes rather awkward if you wanted to use the same hand to change one of the rockers. The battery pack was easy to slide on and off and I did not note any particular ergonomics problems.

The received audio quality was excellent for a walky talky and I felt there was more volume than on many of its competitors. High frequencies were clear, but the sensitivity seemed only average, with selectivity not really good enough for 12.5kHz channelling. Transmitted quality was excellent.

When I used the rig with an Icom discone antenna at around 40ft above ground level (quite a difficult test), I did not have any problems due to front-end blocking or intermodulation. This is most commendable in a walky talky, showing that the rig could be used as a very simple base station as well as under mobile conditions. In the latter case, however, you might find it does not have enough power in a noisy car.

Laboratory tests

The Rx input sensitivity was just average, the performance being similar across the band. The close in RF intercept point was not too good, but

once you moved out to 1 and 2MHz spacings, intermodulation improved rapidly to become better than many other walky talkies, explaining why I did not experience blocking problems when using a discone with it. Selectivity was clearly not good enough for 12.5kHz channelling, and 25kHz selectivity was not as good as I might have expected, although normally adequate. The S meter, two square blocks lighting up for each increase of two S points, was about the poorest yet tested, an increase of only 5dB being required to go from S1 to S9! This is completely ridiculous, as it will really only show you the presence of a signal. Capture ratio was adequate and discriminator distortion was just slightly high, but completely acceptable for a walky talky. Limiting was excellent, all signals reproducing at virtually the same level. A remarkable 0.6W was reached into 8 ohms for 10% overall distortion; this maximum audio power is quite a lot higher than usual. Just slightly more power was available into 4 ohms incidentally.

The audio response of the receiver was very flat within the range 400Hz to 3kHz, the response falling rapidly below 300Hz. The roll-off above 3kHz was fairly steep, to give a well controlled response which clearly contributed to the excellent speech quality.

A marginal improvement in front-end sensitivity was noted when we off-set the signal generator by around 1kHz and this also marginally improved distortion. The typical current drawn by the receiver was quite high at 70mA, but when squelched, this reduced to 38mA. If the power save circuit was selected, the consumption suddenly collapsed to the remarkably low level of 4mA after about thirty seconds from squelch closing, so the set can be left on for many hours to await a call, without significantly affecting battery life. I consider this to be an extremely important point in favour of this rig.

Unfortunately, the dc input socket on the BP3 battery supplied is only intended for trickle charging, the battery permanently being in circuit. The review sample was not provided with the external dc

power adapter so we had to hold wires on positive and negative connections while operating the PTT and measuring power, dc current and frequency! This was just about manageable. A maximum power output of 3.3W was obtained from 8.4V dc, the low power position giving 1W, the currents being 940/570mA respectively. When the voltage was reduced to 7.2, output power fell to 1.8W/740mA, but a voltage increase to 10.8 resulted in a power increase to 5.1W at 1.25A. I did not check the rig at 13.8V but quite clearly it would have given appreciably more power.

Maximum FM deviation from speech was noted at 5.8kHz, rather on the high side, with average speech peaks of 5.3kHz. The tone burst was accurate at within 0.1Hz of 1750Hz, the tone burst deviation being 3.7kHz. Frequencies averaged at around 350Hz low; quite satisfactory for a hand-held.

Conclusions

The IC-2E has probably been the most popular hand-held in many countries and almost every amateur knows immediately what is meant by a '2E'. Its successor, the IC-02E, was perhaps too complicated for some and I feel the IC-2GE should take the place of its earliest predecessor as it has some excellent points. The audio quality is good both on transmit and receive and you will almost certainly like the feel of the set as it sits quite neatly in one hand. If you bear in mind the original price of the 2E, the current price of the IC-2GE is about right, but note all the extra facilities you get for your money, considering inflation, when you compare it with the old 2E. A very recommendable rig, then, with a wide variety of applications. Many thanks to Icom UK for the loan of the review sample and to Fiona for helping with measurements.

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SHORT WAVE LISTENER

TREVOR MORGAN GW40XB

Last month I talked about the content of typical broadcast station programmes and how they are influenced by outside sources, political or religious. This does not mean that one should turn off at the mention of a political party or on hearing a sermon. Quite the contrary, in fact.

Radio stations go to a lot of trouble to find out just what their intended listening public wants from their programme. It's no good spending a fortune on high tech equipment to just send signals to a chosen few, although there are stations, particularly the 'hot gospel' stations in the USA, that do transmit purely to a specific audience.

Take two schedules

Station planners have to attract as wide a public as possible. Consequently, the programmes have to be varied in content, putting over the station's viewpoint without too much 'hard sell'. To give you an idea what I mean by this, let's take a look at a schedule from what we would consider, a 'hard line' country, the German Democratic Republic, and compare it with a more liberal regime in Japan.

For the former, there is a daily news bulletin followed by commentary and a current affairs item. The following programme varies daily. Monday has sport and the RBI DX club. Tuesday features science and technology, youth affairs and stamp corner. Wednesday has listeners' questions and the GDR pop music programme. Thursday has *The Land We Live In* and mid-week sport. Friday has *Life in the Socialist Countries* and odd items of general interest in *Did you Know?* Saturday is given over to the International Peace Movement and answers to topical questions. Sunday has the mailbag session and *weekend magazine*, a GDR feature programme.

OK, a little bit of everything there with some emphasis on Eastern politics, which one

would expect, but enough of the other items to interest most people.

Radio Japan offers the same format of news and news digest. Monday has *DX Corner* and *Meet the People*. Tuesday has *Japan Travelogue* and a chat programme, *Crosscurrent*. Wednesday offers *Asia Now* and *Let's Learn Japanese*. Thursday has *Radio Japan Journal* and *Japan Panorama*. Friday has *In Business* and *Asian Crossroads*. Saturday has a personality item and Japanese language, while Sunday has *This Week*, a general round-up.

Comparing the two schedules, you can see there is little to choose between the styles and content. While one has a little more on the socialist way of life, the other has similar leanings towards the traditional scene, but both cater for a fairly wide audience, so making a report on broadcast station transmissions is simple.

What a station wants to know is your personal view of the programme's content. Honesty is the best policy here and is appreciated by the planners. I once commented on the fact that a female announcer's voice did not carry well over the air. Much to my embarrassment, the young lady concerned read out my letter on a future programme, much to the amusement of her colleagues! However, it did prove that comments are read.

Where to start

So, let's take it that you have a receiver of sorts, are living in the UK and want to try logging a few stations. Where do you start? The obvious place would be at the beginning or, in radio terms, at the bottom end of the short wave bands. On the cheap receiver, this would mean starting on the 49 metre band. Together with the 41 and 31 metre bands, these frequencies are popular with European stations during the day, with

middle distance stations being received after dark. The 25 metre band can produce long distance reception even after dark, although local reception is limited.

The HF bands, 19, 16 and 13 metres, are the bands on which to look for long distance stations during daylight hours. During the summer months, these bands can be productive for most of the night but signals fade fast after dark during winter.

The 11m band is capable of good long distance reception under the right conditions. In the early 1980s, conditions in this region were such that CB enthusiasts were able to chat to the USA and even Australia with ease. However, such reception is only possible under very good conditions and then only during daylight hours usually, so, as with the 10m amateur band, stations tend to use 11m only sporadically.

Metres and megahertz

Perhaps you noticed the deliberate mistake earlier. Some receivers are marked with the metre bands on the tuning scale, whereas others are marked with the actual frequency in megahertz. Without being too technical, an aerial radiates energy in waves with peaks and troughs. The distance between the peaks is called the wavelength and the number of waves transmitted in one second is known as the frequency. One cycle per second is known as one 'hertz'. So, the low end of the bands is 49 metres or more and the frequency is 5MHz or less...confusing, isn't it?

Well, to the newcomer to radio, it is very awkward when confronted with receivers quoting different scales, but the schedules issued by the broadcast stations often quote both measurements, which is helpful. However, it is necessary to know the frequency a station is likely to be on rather than just the band. Receivers with the waveband marked on the

tuning scale often have a logging scale, or graduated line, underneath the waveband markings to assist with tuning to regular stations.

On 49m

So to the 49m band. At around 5.945MHz, you will find Radio Austria, easily identified by typically Tyrolean music, and Radio Moscow. At 5.965MHz, the BBC world service clashes with the Voice of America transmissions and those of Radio Berlin International. 5.970 MHz finds Radio Japan while 5.975 has Radio Beijing, China. Radio Deutsche Welle, West Germany, can be found on 6.000MHz and Radio Nederland, Holland, on 6.020MHz. Radio Sofia, Bulgaria, is on 6.035MHz and Radio Delhi on 6.045MHz. Station HCJB from Quito, Ecuador, is on 6050MHz sharing with RAI in Rome. Radio Prague, Czechoslovakia, is on 6055MHz, Radio Havana, Cuba, on 6060MHz and Radio Brazilia on 6065MHz. Radio Canada International can also be found on that frequency, while Radio Australia is on 6080MHz. 6085MHz has Radio Kabul, Afghanistan, and Radio Oman in the Middle East. Cambodia (Kampuchea) is on 6090MHz with Radio Warsaw on 6095MHz. Radio Belgrade, Yugoslavia, is on 6100MHz and Radio Turkey is on 6105MHz.

The stations mentioned in that brief excursion on the 49m band, took us from 50.46 metres to 49.14 metres, a minute portion of the radio spectrum, yet we found 24 countries, and bypassed at least twice that figure on the way, which gives you a rough idea of the sort of reception that is possible on even the simplest equipment (the receiver used in this case was the Vega 215 with frequency checks from the stations).

Language

The main problem with listening for broadcast stations is language. The major stations and many of the

smaller stations transmit in English at least once a day, so consult a published schedule to find out the time. Some stations do not transmit in English but, as there are many similarities in languages, most are possible to identify at the beginning or end of transmissions when station announcements are made.

Study of radio signals

There is a great deal of pleasure to be had in simply listening to overseas broadcasts, quite apart from the pure radio aspect. Many listeners are just interested in specific topics related to their own particular hobbies or musical tastes. However, the bona fide short wave listener's interest goes much deeper than this, and the study of the behaviour of radio signals and how they are affected by outside influences is a major part of the hobby.

In the next issue, we shall look at radio signals and what happens to them between the transmitter and the receiver and what you can do to make reception easier.

Awards

Award hunting is just one of the many facets of short wave listening. Awards are presented for logging numbers of broadcast or amateur stations over a given period or from a particular area. They are presented by societies as a fund raising project or part of club activity, by radio stations, for sending regular reports, or by national groups (such as the RSGB or ARRL), to promote the hobby itself.

Obtaining some of these awards (mainly certificates) can be expensive as, quite often, verification (QSL) cards are required to be sent with the claim. This can also mean a very long time before all the necessary cards are received by the listener for him to send them off. This is not so much the case with club awards as it is with national ones. Copies of the original loggings are often all that is required and these are checked against check logs held by the presenting club.

The Amateur Radio Prefix Awards are managed in this way, the idea being to log as many prefixes (the part of an amateur callsign denoting the location) as possible. Certificates are presented for

250 and 500, and small trophies for 1000 and 2000 prefixes (all different!). A list of the prefixes with time, date and frequency of reception, is all that is required plus, of course, a first class stamp.

Many readers who have claimed these awards and, indeed, other awards, have mentioned how their listening technique has been improved by the exercise. Also, stations that may otherwise have been missed all together, have been logged.

We have a good example of this from Palle Randlov of Denmark who claimed the Silver award way back in January 1987, but has still been plugging away and has finally managed the 1000 prefixes for the Gold award. Palle mentioned in particular EX0DR (a weather station on a drifting ice pack), H25MF (special call from the Republic of Cyprus), RS3X (launching of Russian satellite), VI88ABC (Australian bicentenary), C58UX (Air Portugal anniversary) and 1A0KM (Sovereign Order of the Knights of Malta). . . to name a few. Amongst the rest of the claim, BT0, BV2, FV8, JH8, JW5, LU-Z/JA7, S0RASD, T77, VC1, VP9, W200EAX, XJ3, YK9, ZP5, 5T5, 5W1, 8Q7 and 9V1 were worthy of note. Congratulations, Palle!

Terry Lincoln, ILA 225, claimed his Gold award for 20m only, and has been scanning 15 for a change, where he has logged plenty of new ones. Being retired helps when it comes to being on the rig to hear rare ones. Some nice stuff on the 20m claim, though, with 4S7, 5R8, 9X5, BT9, C2S, DD0, H44, J0, JY1, KP4, P29, T77, VS6, ZP5 and Z21 all nice catches. Hope you've got fan cooling on the 8800, Terry!

Continental

A slightly different award this time, in the 'Continental' awards presented by the ILA as part of their awards programme. These certificates are presented for logging 100 amateur or broadcast stations in one continent.

Joan Slater, ILA 185, of Matlock started to write out a band report when she realised she almost had enough for an award claim, so she carried on collecting and submitted claims for Asia and South America. The Asians included 4S7NMR, A61AB,

A92BE, BT0ML, HL9CU, KC3RE/TA3, OD5BT, VU2XX, YB3KW and EQ7NT (QSL via J11DBQ). South America came up with HP3XUH, J6LB, J88AQ, K2NJ/PJ4, P43ARC, OA4AAW, TG9MBS, V31PC and WB5YWU/P/HR1 amongst the bunch. Seems the HF125 is doing nicely thank you and Joan is giving the lads a run for their money!

Meanwhile, Ian Baxter, ILA 322, of Blackburn has been burning the midnight oil again (you really must get electricity put in, Ian) and has managed to claim for North and South America. The pick of the northerners were OX3SG, VE7VK, AL7BL, VX3XN, K6ZXS and VP9JY, while the south offered 8R1RPN, 8P6BC, ZP3FI, FY5AN, CP6XH, HK3CZH, VP2ML, J87CD, I8CZW/VP2M, HH2BB, CV0PJP and J37LC. Well done, Ian!

Listener/operator Kurt Brauer, ILA 355 of Switzerland, has been catching the sharp end of the DX pile-ups as well as the sun during his holiday in Indonesia. Latest gems included VK8YT on Cocos Island, 4K0E, P29HS and CP8PAX, while a stint on 21060 caught VE3EZP with 4W on the key. Late last year, Kurt wrote to Radio South Africa about pen-pals and, since then, he has had over thirty letters. Trouble is, many of them were from young ladies looking for husbands. . . Kurt only wanted stamps! Pass 'em on, mate, pass 'em on!

Installing a quad loop

Propagation conditions, at the moment, are still showing a steady climb towards the sunspot peak in a few years' time. Although there have been 'off days', there have also been some very good periods when excellent DX has been logged by our listeners. At times 15 and 10m have been excellent, with plenty to be heard well into the dark hours.

This, of course, is the time to look at the possibility of installing a quad loop or beam for the higher frequencies, as sizes are so much easier to accommodate with a 10m quad only having sides of just over 9ft. I was lucky to come across some fibreglass fishing rods (the roach pole type without any rings) which were about 10ft long. Four for twenty quid, a friendly engineer to make a mast

plate, a roll of copper wire (I knew that rally purchase would be handy) and I have a nice light loop that will stand a gale and doesn't look like a carpenter's nightmare!

Getting fruitful

Some nice stuff to be found on 10m, especially late afternoon. Amongst the loggings are 9Y4DG, LU5DO, ZC4AP, EL2ED, YB0WR, KA4AAV, W5PNB, FE1HJW/P, PT8ZCB and PY5TT. Fifteen is getting very fruitful and the logs include YC7JK, 5T5DX, S0RASD, EQ7MT, VP2EZ, PY2BDY, HZ1AB, 5N0WRE, JA7UNF, VP5SL and HL5FEE. There are some very nice stations to be found on 20m, including T5GG, OA4OS, AL7HK, ZP5FGS, KP2AD, YB3KW, FY0EK, HK1LDG, HC8VB (QSL via KT1N), HP1XOR, 6W7OG, F8CZW/P/VP2M (QSL via I88DOI), CE2GQB, 4K0DX (QSL via VE3CDX. . . home or via Box 88 Moscow), TF5BW (QTH Akureyri. . . QSL bur or direct), J37AH, C18C (Resoluté Bay), HY7FIT (QSL F1GNY), V85WS (Shah, Box 247, Mora, Brunei 4002), CF8JH (Cornwallis Is QSL via VE3CKF) and EX0VE from North Pole (QSL via UK3KP).

On 40m there has been some DX amongst the noise with CE5NCX, YV4DPS, PT2JW, XE1ND, HI3JH (QSL via F6FNU), HK2IWI, and the I8CZW/P/VP2M still hanging in there. On 80m there are still some interesting stations to be found like TF3TF, CM6DD, VP2VM (Tortola Is), PY0FFYV-2BYT and even I8CZW/P/VP2M. Meanwhile, on top band, 4U1ITU was the only odd one found.

The WARC bands definitely do not seem to be attracting the sport they should. It can't be the Morse only rule as other bands are full, and it can't be the old type rigs after all this time. A lonely KV4AD was logged at 1315 one day, on 24MHz, but no takers. Wrong aftershave? Our thanks to Joan Slater for the band round-up.

Well, it's on the up and up, folks, so send the XYL or OM round to the in-laws with the kids and spend a pleasant few hours finding the exotic ones. Meanwhile, I am off to the River Thames with the XYL and the kids for a couple of weeks (yes, I've packed the QRP Tx, Rx, key, log and headphones!).

ICOM

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SECOND-HAND

by HUGH ALLISON G3XSE

BATC

The British Amateur Television Club 'bash' at Crick was, once again, amazing. Free entrance and parking, reasonable access for wheelchair bound visitors and stacks of interesting rubbish to boot. Sure there is, say, 25% more TV orientated junk than you might expect to find at an average rally, but even that still leaves a lot more normal amateur equipment available. I also like the way that some people just 'set up stall' by displaying a few bits and pieces on the grass around them. It isn't clear if this is allowed or not, but it goes on and isn't stopped and these mini-stalls really produce the goodies. Would you believe a 15MHz portable scope, working with fitted Nicads, for just a tenner? Another interesting 'bargain' was a stall selling stacks of portable video electronic viewfinders. These are things you attach to the top of your portable video camera and look into via an eyepiece. The thing is a mini 625 line monitor (about 1in diagonal tube) which allows you to see what you are recording and/or playing back to make sure it is what you want. The whole thing is about the size of a fag packet and 12V powered at 50mA to boot. What are its uses? Well, my home-built slow scan TV converter has been needing a built-in monitor for ages and it fitted a treat. Other eager buyers were getting them for portable amateur TV monitors etc. One bloke even wanted one to use on top of his portable video camera so he could see what he was recording! The seller boasted a garage full of them and said he would be at all the major rallies. A fiver definitely seemed reasonable, and my dusty but obviously unused example worked a treat. Do note that if you remove the eyepiece assembly, the scan coils need reverse connecting or else the picture will be back to front.

And now the bad news

When I was a poor apprentice I once splashed out two weeks' wages (£25!) on a very second-hand Bird Thru-line plus a big bag full of plug-in elements. The seller was an old ex-sea going radio engineer, who was retiring to the country to grow flowers. Although a lot of money to me then, that £25 has probably been a reasonable investment over the years. A rough 'Bird' will nowadays cost you £75 and a good clean example £100, maybe even £125. The plug-ins are £10 to £25, depending more on how desperate the buyer is to obtain that particular power/frequency element than anything else.

In a way it could be argued that this sort of money is an awful lot to spend on what is only, after all, a glorified SWR and power meter. Its only defence is that it is accurate, versatile and reliable. Well,

reliable until last week. Must have had mine nigh on twenty years and it's as much a part of the workbench as the legs on the table. In comes an FDK multi something or another, usual fault, duff PA module. I confirmed the owner's diagnosis, typical symptoms: no power out, low current consumption on Tx, drive up the module and volts across it. I took out the module and dropped it off at a friend's, who repaired it for me as the owner couldn't afford a new one. A couple of days later, I picked up the repaired module and shoe-horned it back into the set.

Odd, front panel meter now showing power out, and variable at that, power supply now being sucked out of five amps, RF load getting warm but no RF showing on the Bird.

Since it was inconceivable to me that the Bird could have died, I wasted ten minutes changing leads etc. It was only when I put another SWR meter in 'twix rig and load, which displayed the expected 25W, that I took a screwdriver to the thru-line.

About half the owners of Birds don't realise that the RF bit can be unscrewed from the meter housing and used remotely, connected to the meter by a coax cable. The coax is terminated in a weird connector. Mine was full of a blue gungy growth that read an ohm on the avo. A quick wash out with solvent and all was well.

VHF Convention, Sandown Park

What would you think of an event where the talk-in said there was a bring and buy area and car boot sale, yet there wasn't? Does your heart go out to the dozens of people walking about looking for the advised areas, humping heavy junk, all in vain? RSGB organised. Say no more.

The real shame is that Sandown Park is, to many people, just that, Sandown Park. They don't realise that the BARTG (British Amateur Teleprinter mob) also hold *their* 'do' there. The people walking about saying 'I shall not waste a quid to get in here again' may well miss the well organised friendly teleprinter event (with car boot sale), having confused it with the RSGB shambles. Most of the stuff on display was over-priced, £65 for a Mohican, though to be fair there were one or two bargains. I only spent a tenth of my normal rally money there, and probably shall not bother to go again.

National NC105

From the people who brought you the HRO. This is a 550kHz to 30MHz receiver, probably 1960 vintage.

First things first, lots were 110V (American) only. Be careful before plugging one in!

Second; the valve line-up. The really bad news is the audio output valve is a 6AW8. Not mega easy to obtain. For some reason this valve seems prone to shedding flakes of cathode off with disastrous results to loudspeaker matching transformers and power supply resistors etc. One valve in one set was so bad that it reminded me of one of those falling snow ornaments. Although it is sometimes possible to tap the flakes down to the bottom of the valve, this is only really a bodge, especially if the set is going to be moved a lot, so replacement is the only cure. When my stocks of this valve ran out, I re-wired the base in a set to take an ECL80. Apart from the heaters, every pin different, but not too hard a job. Why an ECL80? Well, it was to hand... Other common faults are open circuit 'S' meters and, of course, cracked IF cores.

The rest of the heater line-up is 6BE6 as mixer oscillator, two off 6BA6 (EF93) as IF, then a 6T8A as all sorts of things. You will note the lack of RF stage.

Performance wise, not brilliant. On the top range 10µV for 15dB sig noise seems typical (a bit deaf) and second channel 10dB down (you find strong stations twice). Selectivity can be sharpened up by a kind of built-in 'Q' multiplier. Really the thing is crying out for an RF amplifier (pre-selector). Wop a Codar or similar in front and you have a reasonable set up.

Price wise, it's a good looking solid little set with built in PSU, but even at £45 tops, £40 is more like it. I hadn't seen any for sale for years. Suddenly, they are all over the place. Duff ones (mainly dead audio valves) seem to be about £10. Plenty of room to work in and a logical layout, so kitchen table repairs ought to be possible if you are competent. A grubby one will come up like new with a lot of determination and a little 'Jif'.

Broken cores, again

In comes a valve receiver. Ten seconds finds the original fault, an open circuit anode resistor in the audio pre-output triode. Unfortunately, the owner had decided to tweak the IF cores, with a pick axe I think, in an attempt to repair it. He had removed the heads of both cores and it took me a second or two with a torch to work out what he had done, the remaining cores in the coils looked so shiny they appeared to have been made like that.

Out with the coil, which was a 'twin stacker' wound with litz (multi-strand wire). The core had jammed an eighth of an inch from the end of the former. I cut the end of this away down to the core (the coil was half an inch down the former) and gripped the core with pliers to remove it. It was then possible to get an adjusting tool onto the inside head of the other core and remove that. The cores

SECOND-HAND

were then reinserted the other way up (to expose fresh slots) and the coil refitted. After a re-alignment the set was returned. Probably not an economic job in terms of time, but definitely a satisfying repair.

How I managed to electrocute myself

Portable telly on bench. Good healthy whistle, tube heater lighting up. Thinks, no EHT? In with positive avo probe onto EHT cap and clip it on, avo suitably fitted with range multiplier. Nothing. Black, negative, lead of avo noticed swinging in breeze. Who picked up the lead of the avo with set still switched on?

Another use for a CB set

A very dead (on transmit) Heathkit HF transceiver was up-ended in a friend's shack. He was attempting to get the more usual 100 watts or so out of it than the half watt or so that it was producing. The trouble was, he was not exactly knee deep in scopes, signal generators and the like, just a dodgy cheap plastic multimeter of dubious calibration. He couldn't make up his mind if the problem was lack of drive or low gain in the power amplifier stages, which was the usual driver then two bottles in the PA. I espied a CB set in the corner. He looked on in amazement, as I wound a four turn coupling coil round the 10m coil feeding

the grid of the driver. This temporary coil was connected to the CB set via coax, 10m selected, then both CB and Heathkit turned onto transmit.

The power meter showed 50W, thus the power amplifier was proved innocent. I would now like to relate a tale of how my excellent fault finding practices quickly lead to the cause of the trouble. Unfortunately, as I was removing my temporary coil, I accidentally disturbed a dc isolating capacitor and the wire came clean out of the end of it. In with a substitute and the set was as good as new. It's a useful trick to bear in mind, 4W of CB will normally drive a valve rig up to several tens of watts output if you select 10m.

TV cameras

Question. What's the connection between Pye Lynxs, ITC, National Panasonic, Sony and Sanyo television cameras? Answer. Dozens of each on the workbench during the last month or two, all with the same symptoms. Good syncs coming out, video amplifier stages working, no picture. Solution, every single one had the high value resistor (2.2 meg ohm or greater) that constitutes the target load go open circuit. Every resistor has been the brown bodied type and they all look like the same manufacturer made 'em all. Suspicious.

It's normally quite easy to confirm the fault by the way. Remove the camera lens and it should be possible to see the target connection at the side of the end of the tube. The connection is normally two fingers pressing against the tube. With your avo on the 1kV range, there should be hundreds of volts or so to deck. If not, there are not too many 1 meg ohm or above resistors in a camera to find and check.

Crystal can capacitors

At the magnificent Cambridge rally (0.8 on the Old Warden scale, Old Warden car boot sale = Heaven) I bought a circuit board covered in 2N3866 transistors for 10p. Also on the board were 10 crystal cans, marked with interesting numbers like 100, 1000, 10,000 etc. Intrigued, I traced out the circuit and couldn't work out what they were, there was no way you would design in a crystal where they resided. A very vague bell had me thumbing through a fairly recent capacitor catalogue, and there they were. They are extremely long term stability silver mica capacitors. The idea is that the sealed can creates a much better controlled environment for the mica than the more normal coatings. The next 'crystal' oscillator that you build from a scrap rock may well contain mica rather than quartz!

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BITS TO BUILD

'... full of sound and fury, signifying nothing'

Could it be that Shakespeare had been listening on the HF Bands when writing *Macbeth*? Perhaps not, but it does often seem that way, even when listening to the bands on the most sophisticated receiver. Usually they are overcrowded and an inadequate receiver will produce a result which is indeed 'full of sound and fury'.

A direct conversion receiver has the problem of having to process most of the signal at audio frequencies. The tuned input filter provides some of the required selectivity and the product detector (mixer) may have some gain but the bulk of the gain (sensitivity) and the selectivity (separation of signals) is performed at audio frequencies. So the audio stages have the responsibility of amplifying and processing the signals to acceptable and readable standards.

These are simple receivers and constructors may tend to think that if the audio stages offer ample overall gain (say 60 to 100dB) then that is enough. The problem is that an inferior audio section can ruin the efforts of even the best designed front-end and mixer stages. The audio stages need to be able to offer low distortion amplification and at least some signal processing. The audio amplifier board of the Jandek Receiver does give reasonable and clean amplification but the receiver requires further pre-amplification of the audio signals and some audio shaping.

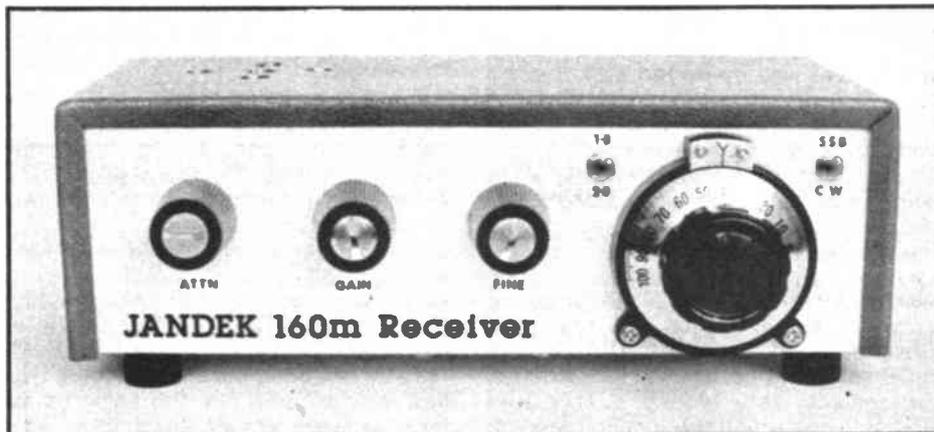
Audio shaping is tailoring the frequency response of the signal to suit the types of signal being received. We only want the amplifier to pass those frequencies that are useful for communication. For a single sideband (SSB) signal, the useful range of frequencies is around 300 to 3,000Hz. Reception of amateur Morse (CW) signals can be received in a very narrow frequency window centred on the preferred beat note, usually around 650 to 800Hz. Ideally all frequencies above and below these ranges should be rolled off. They do not contain useful information and can only interfere with the required signal. This audio shaping provides the receiver with its selectivity.

Audio filtering

Even the simplest direct conversion receivers will provide plenty of signals on the amateur bands, but our poor old ears can only stand so much interference. During periods of high activity, and most amateurs with normal working hours use these periods, the signals

THE JANDEK RECEIVER

Part 3



The Jandek receiver

really do need processing to aid selectivity. In direct conversion receiver design it is usual to add audio filtering to tailor the signals in the manner described above. The favourite method is to have a low noise audio pre-amplifier after the mixer and then insert an audio filter before the final audio amplification.

This audio filtering can be provided by either a passive or an active audio filter. The passive filter usually consists of inductors and capacitors tuned to the required audio frequencies and offers no gain. The active filter uses active devices, transistor amplifiers or more commonly integrated circuit operational amplifiers (op-amps) which have feedback networks around them to shape their audio response. One problem with active filters is that they can add noise to the overall problems of the receiver. In fact some op-amps are well known for the noise and 'hash' that they generate. This may be solved, or at least eased, by using the newer op-amps which contain FET (Field Effect Transistor) inputs.

The Jandek audio filter board

Figure 1 shows the circuit of the low-pass audio filter board designed for use in the Jandek receiver. Naturally it could be used with other receiver designs, but more of that later. The design is based around a TL074 quad operational amplifier. That is four operational amplifiers contained in one IC package.

The circuit shows all four op-amps configured as low-pass filters but in the final version the first op-amp (IC1a) is

used as an audio pre-amplifier. R4 is replaced with a wire link (shorted out) and C2 is omitted (open circuit). The feedback resistor, R7, sets the gain of amplifier. This resistor may require adjustment when the board is used in a receiver. The remaining three op-amps (IC1b, c, and d) form a six pole low-pass filter. So the whole board provides audio pre-amplification up to 46dB (200 times) and audio filtering of the signal to suit either CW or SSB signals.

The circuit is the same for either the CW or SSB filter options but the frequency response components around IC1b, c, and d are set according to the mode required. The Parts List shows the values of the components used in the circuit. At the bottom of that list in two columns are the values for the filtering components: R9, R12, R13, R16, R17, C5, C6, C8, C9, C11 and C12. These are chosen to suit filtering for SSB or CW signals.

The simplified graphs in Figure 2 show frequency response for both options measured on a prototype filter board. The frequency response curve shows the typical steep cut-off characteristic of a low-pass filter: the steep line to the right of the graph. It also shows the useful low frequency roll-off offered by the filter: the downward curve to the left of the graph. The flat plateau at the top of the graph shows the range of frequencies not attenuated (reduced) by the filter. On the SSB filter curve (Figure 2a) the -3dB points occur at 250Hz and 2,500Hz representing a -3dB bandwidth of

BITS TO BUILD

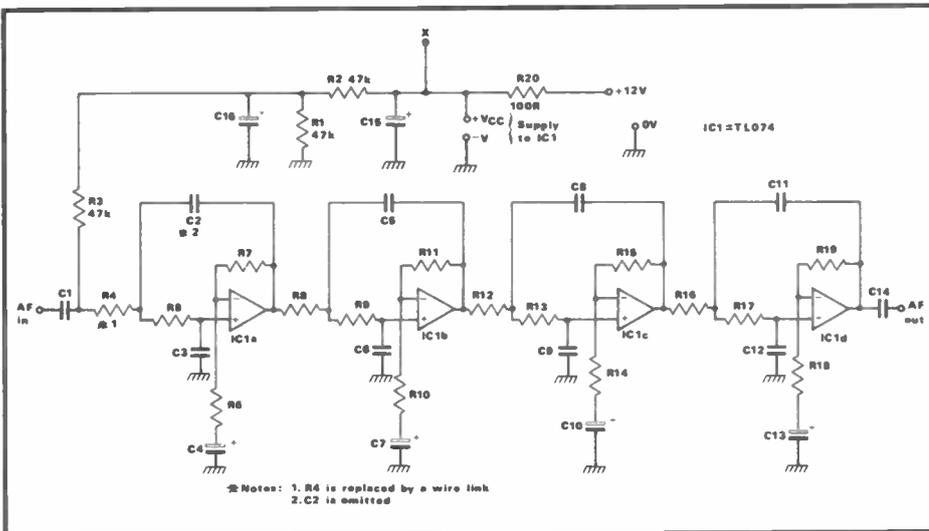


Fig 1: Low pass audio filter board circuit diagram

2,250Hz. This is wide enough to contain all the useful information on an SSB signal with reduction of unwanted frequencies outside this range. The filter has little effect on audio frequencies in the 'window' from 250Hz to 2,500Hz but reduces frequencies outside this range.

The CW response curve (Figure 2b) shows -3dB points at 210Hz and 1,120Hz. Notice the narrower window of unaffected frequencies for the smaller frequency range required to listen to CW signals. The -3dB bandwidth is 910Hz which is plenty for CW signals but would chop up an SSB signal. In fact a smaller bandwidth could be used but there are limitations because reducing the bandwidth too much can cause the filter to ring. This produces an unpleasant ringing or echo sound on the signals which is uncomfortable to listen to for any length of time.

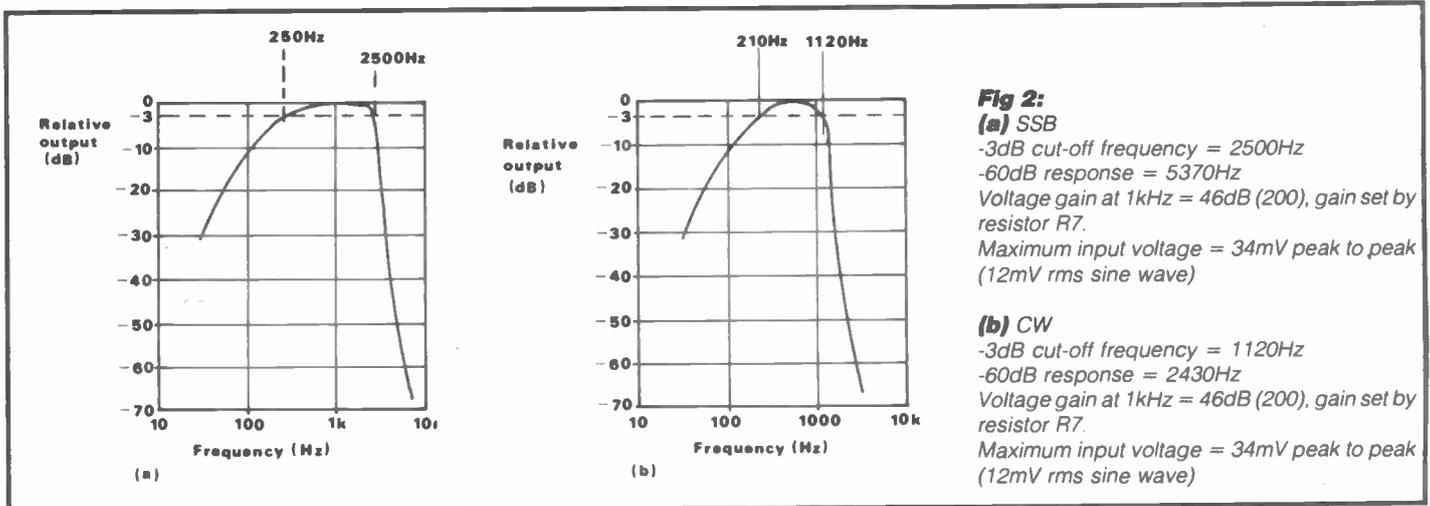
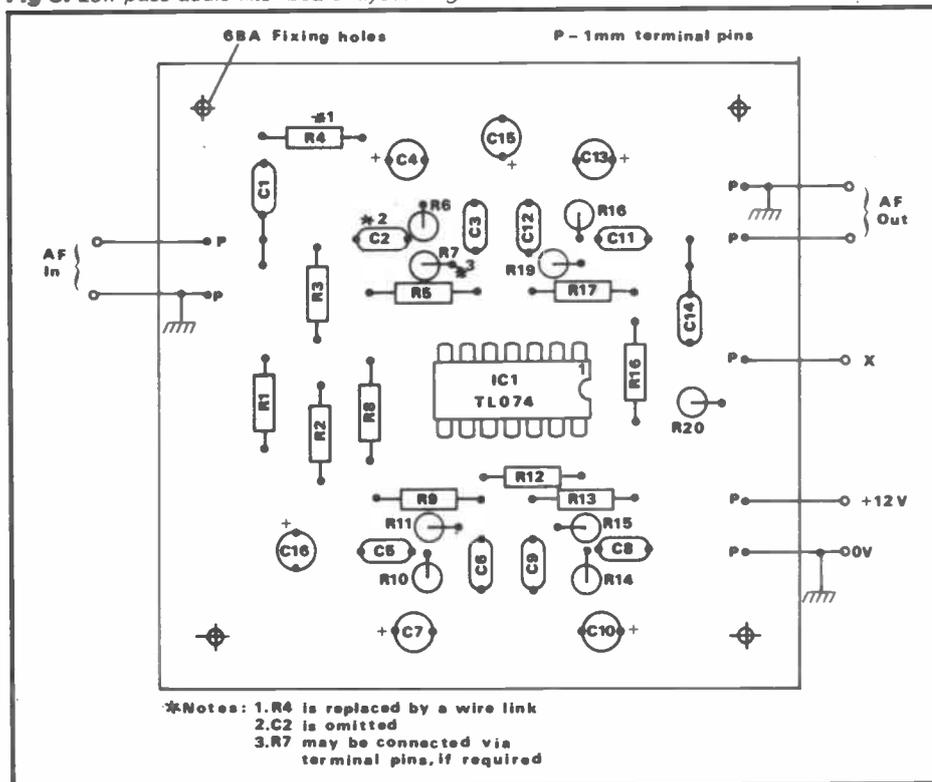


Fig 2:

- (a) SSB**
 -3dB cut-off frequency = 2500Hz
 -60dB response = 5370Hz
 Voltage gain at 1kHz = 46dB (200), gain set by resistor R7.
 Maximum input voltage = 34mV peak to peak (12mV rms sine wave)
- (b) CW**
 -3dB cut-off frequency = 1120Hz
 -60dB response = 2430Hz
 Voltage gain at 1kHz = 46dB (200), gain set by resistor R7.
 Maximum input voltage = 34mV peak to peak (12mV rms sine wave)

Fig 3: Low pass audio filter board layout diagram



This is quite a versatile board which, by changing component values can be a filter for SSB or CW signals and a pre-amplifier, the overall gain of which can be altered by changing the value of one resistor. Jandek supply the printed circuit board and components for either the SSB version (JD002-S) or the CW version (JD002-C).

The layout of the board is shown in Figure 3. The filter board is very simple to build although the capacitors for the CW version only just fit into the provided spaces. They are vertically mounted, so try them either way round for the best fit in the space provided. When building the board remember to add a wire link for R4 and to leave empty holes in the board for C2. Ensure that the TL074 IC is mounted the correct way round on the board. An IC holder is provided, so this helps by allowing a second (or third) check before power is applied. There are six electrolytic capacitors (C4, 7, 10, 13, 14 and 15) which must be mounted using the correct polarity, the + sign on the layout drawing to the + lead on the component. It might be useful to use the spare 1mm terminal pins provided to mount R7 rather than solder it directly into the board as it may require changing when wired into the receiver.

BITS TO BUILD

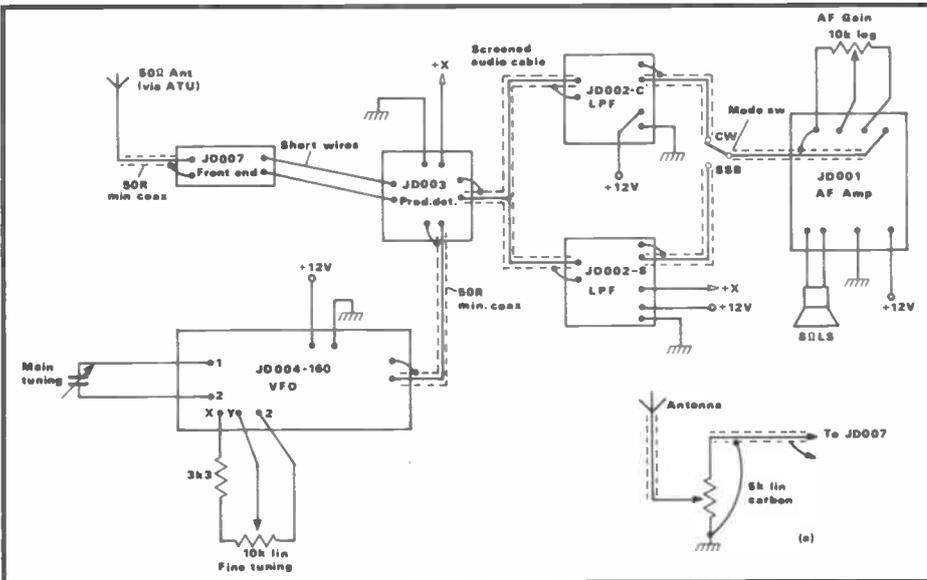


Fig 4: Completed 160m receiver using the Jandek modules
4 (a): Optional antenna attenuator

Completing the Jandek 160m receiver

In the first two parts of this article I described how the front-end board, product detector board, VFO board and audio amplifier board could be interconnected to make a basic receiver. However, this version of the receiver had no audio filtering and really required more audio amplification. Adding one or both of the filter boards will provide the additional pre-amplification and audio filtering. If only one filter option is to be used to receive both SSB and CW then the obvious choice is the SSB option. The CW filter will render SSB signals very difficult to read. *Figure 4* shows a complete board layout for a 160m

receiver using both filters.

The layout diagram in *Figure 4* shows how the boards are interconnected. In this drawing both the SSB and CW audio filters are used with a single pole change-over switch acting as a SSB/CW mode switch. The signal connections use screened leads. Miniature 50 ohm coaxial cable is the correct wire to use but, in practice, cheap microphone screened lead will serve the purpose over such short runs of cable.

My prototype receiver has an extra front panel control. This is the antenna attenuator shown in *Figure 4*. 160m is very close to the AM Broadcast Band and direct conversion receivers are prone to broadcast station breakthrough. Anti-

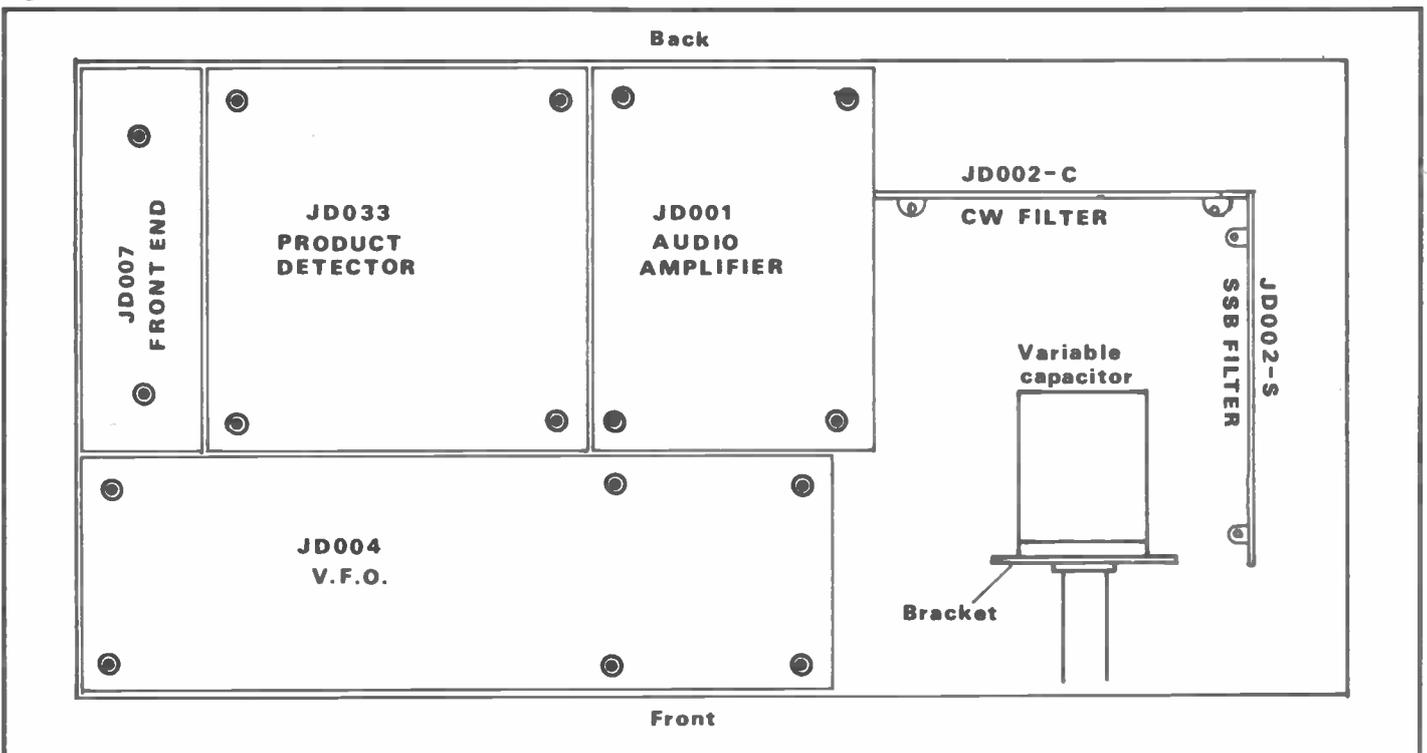
icipating the problem, I added the simple circuit of *Figure 4a*. In fact, there was very little broadcast breakthrough at all in the completed receiver. The only time it occurred was when a high long wire was put directly into the front-end without matching. When the receiver was presented with a 50 ohm impedance match from my ATU, no breakthrough was evident. The individual constructor can decide to include it or not. Broadcast breakthrough might be more of a problem in some areas and perhaps it is worth the small cost of one extra potentiometer to have a belt and braces input.

The case

When the modules are all completed it is probably worth trying a hook-up version of the receiver on the bench, but the complete receiver requires a case and some hardware. I built my version in a Minfordd Engineering Equipment Case Type J8. This inexpensive, but attractive case measures 8in wide x 4in deep x 2½in high. The receiver is a tight fit and this is probably about the smallest case that could be used. My usual practice is to mount a VFO into its own box inside a receiver but in this case the VFO is not screened. Even without screening it was stable but it might be that a higher frequency version of the receiver, say on 20m, would be better with internal screening for the VFO.

The layout inside the case is shown in *Figure 5*. The VFO board is mounted to front left-hand side of the case with the front-end board, the product detector board and the audio amplifier board just fitting behind it. All boards are fitted to the bottom of the case with 6BA nuts and bolts and held clear of the case with

Fig 5: Jandek 160m receiver mounted in the J8 case



BITS TO BUILD

stand-off pillars. The tightest area inside the case is the right-hand portion which contains the filter boards and the variable capacitor for the main tuning control.

The tuning capacitor requires a slow motion drive. I used a medium sized Vernier Dial and Drive unit sold by Maplin as RX40T. A cheaper alternative would be to use an inline epicyclic reduction drive and fabricate a dial. The variable capacitor is mounted on an L shaped bracket of aluminium bolted to the bottom of the case. The shaft of the variable capacitor must be accurately aligned with the drive to ensure a smooth tuning action. The variable capacitor is placed midway between the VFO board and the right-hand side of the case.

The only way to get the filter boards into the remaining space is to mount them vertically. The CW filter is behind the variable capacitor with its components as close to the back of the case as possible and the SSB filter mounted close to the edge of the right-hand side of the case. Bare wires bent over vertically mounted components on the boards must not touch the sides of the case; perhaps adding a piece of paper or

thin plastic sheet between the components and the side of the case would be a good idea.

I had doubts about mounting the underside of the boards so close to the variable capacitor in the VFO circuit and made two small screens. These were made from unetched blank printed circuit board cut slightly smaller than the size of the filter boards. These small screens were mounted close to the base of the filter boards using U shaped pieces of bare wire soldered between the ground plane of the filter boards and the PCB screens. In practice, the receiver functioned just as well with or without these screens so perhaps this is another belt and braces job. The two filter boards can be mounted to the bottom of the case with L shaped brackets to the two lower mounting holes on the printed circuit board. An easier way – and I confess, my way, is to use solder tags. Solder two tags either end of the side of the board to go at the bottom of the case. Bend the 'rings' of the solder tags at 90 degrees and use these to take the two mounting bolts for the boards.

The front panel controls from left to

right are the main tuning, fine tuning, volume and attenuator with the 1.8/1.9MHz range switch and the SSB/CW mode switches either side of the tuning dial. The antenna and 12V supply come into the case via sockets on the back panel. There is plenty of space to mount a 3in internal speaker in the lid of the case to the left-hand side.

When the receiver has been wired into the case, the final adjustments can be made. The VFO coverage may be set by using the two trimmer capacitors on the VFO range switch. It may be that the value of R7 on the filter boards will require adjustment. I found that the value of 4.7k gave too much overall audio gain and the audio amplifier began to oscillate at the highest settings of the volume control. Decreasing the value of R7 reduces the gain and the best level can be found by experimentation. If the audio amplifier board (JD001) is run from its own supply then you may not need to reduce the overall gain to stop oscillation.

The receiver performed as well as any direct conversion receiver I have built. It has little internal noise and in a bench test it detected a signal of about half a micro-volt. The SSB and CW filters certainly help with QRM and band noise. Remember that the front-end is designed for a 50 ohm input impedance. So, unless you are lucky enough to have a 160 metre dipole in your back yard, an ATU will be required to match the antenna to the input.

The filters alone

Obviously the filter boards could be used with another receiver. They do have a high input and output impedance so have to be connected to an appropriate point in the receiver. Usually filters are added early in the audio amplification stages. Try breaking the leads to the receiver volume control and inserting the filter at that point. It is possible, but less satisfactory, to add the filters at an external speaker socket on a receiver. In this case a small transistor output transformer will be required (say the LT700) used 'in reverse' to match from the 8 ohm output for the speaker to the filter. The output of the filter could drive another transformer to give 8 ohms out or the filter might be built into a box with the JD001 audio amplifier. Such an arrangement would look like the portion of *Figure 5* after the product detector. The two filters plus the audio amplifier would be a useful 'back-end' to any receiver.

Sources:

JD002-S SSB Low Pass Filter costs £4.45 as does JD002-C CW Low Pass Filter. Add £1 postage and packing. They are available from Jandek, 6 Fellows Ave, Kingswinford, West Midlands DY7 9ET. Tel: (0384) 288900 (evenings).

J8 Equipment Case costs £2.30 (plus 80p p+p) from Minfordd Engineering, Sun Street, Ffestiniog, Gwynedd. Tel: (076-676) 2572.

LOW PASS AUDIO FILTERS PARTS LIST

Resistors (all 0.25W):

R1 47k	R2 47k	R3 47k	R4 link	R5 27k
R6 220R	R7 47k	R8 47k	R9 *	R10 24k
R11 13k	R12 *	R13 *	R14 27k	R15 39k
R16 *	R17 *	R18 18k	R19 33k	R20 100R

Capacitors:

C1 100n polyester	C2 omitted
C3 1n0 polystyrene	C4 4u7 63V electrolytic
C5 * polystyrene	C6 * polystyrene
C7 4u7 63V electrolytic	C8 * polystyrene
C9 * polystyrene	C10 4u7 63V electrolytic
C11 * polystyrene	C12 100n polyester
C13 4u7 63V electrolytic	C16 4u7 64V electrolytic
C15 220u 25V electrolytic	* SEE LIST FOR SSB/CW

Miscellaneous:

TL074 quad operational amplifier (or equivalent)
14 pin DIL socket
9 1mm terminal pins
printed circuit board

SSB filter parts:

R9 68K
R12 43K
R13 43K
R16 27K
R17 18K

CW filter parts

R9 47K
R12 24K
R13 24K
R16 27K
R17 27K

C5 2n2
C6 2n2
C8 1n8
C9 1n8
C11 3n3
C12 3n3

C5 8n2
C6 8n2
C8 8n2
C9 8n2
C11 5n6
C12 5n6

NB: Adjust R7 to suit the gain of the pre-amplifier
R4 is a wire link (short circuit) in the Jandek Receiver
C2 is omitted (open circuit) in the Jandek Receiver



News and comment from Glen Ross G8MWR

The sporadics

So far, at least up to the time of writing, the sporadic E season seems to have got away to a rather dull start as far as 2m is concerned. There have been one or two small openings into the Continent but nothing yet on the grand scale we all hope to get into. The only thing to do is to keep looking. The scene on 6m has been much better, as one would expect; on most days the band fills up with all sorts of odd TV type noises.

Nice work

There has been some nice DX to be had with OH1ZAA on the south west coast of Finland, providing an enormous signal for hours on end. He has been in great demand and reports working over 200 British stations in one day. The fact that he runs 40W to a pair of stacked five element yagis at around one hundred feet AGL does no harm at all. That, plus starting out with a clear path in our direction for many miles over the sea, has made him the first DX station in a lot of people's log books. The ungentlemanly behaviour and downright bad mannered operating practices of those trying to attract his attention are, perhaps, best left unmentioned.

What else?

Some nice contacts into Norway have been available and there has been a fair sprinkling of the recently granted PAO licensees to be heard. CT1WW in Portugal, has been an enormous signal at times and if you run across a carrier that seems to belong to an unsuspected local – check on it; these DX stations really are endstopping. On a sour note, there are too many people talking to unlicensed French stations. Many of these are simply signing themselves F1, or something similar, which is a clear indication of someone doing a bit of piracy.

Official warning

Remember that your licence puts the onus of establishing the legality of the station you are working, on *your* shoulders. Now we all realise, as does the DTI,

that it is not always easy to determine the truth and that you have to have a certain amount of trust in the other operator. However, when you hear French stations on 6m signing simply F1, or similar, it does not take a genius to come to the fairly obvious conclusion that you have run up against a pirate station. The same sort of thing is starting to happen as unlicensed German stations start to put out a few tentative signals on the band. Higher authorities have asked us to remind you of the risk you run, please listen; they are!

Transatlantic

Some of our more enquiring readers have written to comment on the remark I made as to the possibility of working across the Atlantic on 2m, using sporadic E propagation. They say, correctly, that the normal range of sporadic E is about 2000km (exceptionally up to 3000) and that this is not enough to get across the pond. Fortunately, there are mechanisms which can at least double these distances. The opportunity to make the path depends on the possibility of double hop sporadic. Put simply, this means that there are two areas of sporadic activity centred at the right places to give you a double bounce. This is a fairly long shot but it could happen.

Extra length

Another possibility and one which is perhaps more likely to happen, is if there is extended tropospheric propagation at both ends of the path, with a single sporadic region doing its stuff at the centre of the path. There is little doubt that it is only a matter of time before the path is worked. In fact, there is a chance that it has nearly been worked already.

Back in the 1950s, a well known Welsh DX man claimed to have a 'W' callsign on 2m. Checks were made and the Stateside station was on the band at the time and beaming the right way. The general propagation features at the time were favourable but there was no definite proof of reception; a tape recording would have been nice. I am not going to

give the GW station's callsign, because it was thought to be an impossible path to work; he suffered enough ridicule at the time without dragging it all up again.

The GHz end

This year's 10GHz cumulative contests are producing some scores that would previously have been thought to be unattainable. With three contests gone and three to come, the leading scorer is G8KQW, with the massive score of 7641 points. This compares with the usual contest total of around 3000 points in previous years. His best contact in the contest so far, was over a distance of 283km, with Ian located at Start Point in Devon and G8CUX at Beachy Head. Some of this contact was made while G8CUX had the dish disconnected and running open waveguide as aerial. Other high scorers, with the best DX in km and in brackets: G3ZME with 4347 points (161), G4EML with 4180 (220), G3PHO on 2960 (148), G8AGN with 2482 (146) and GW3ATM sitting on 2072 with a best distance of 148km.

Wanting skeds

News arrives from G3UKV that the Telford Microwave Group will be travelling to the Isle of Man for the August cumulative. In fact, they will be available on the island from the 4th to the 8th of August. They will be operating mainly from near the summit of Snaefell, but are also game to try some super-refraction paths from sea level. The idea here is that with suitable temperature conditions, you find that the first couple of feet above the sea acts as though it was a waveguide; if you can get your signal into this it will travel a long way. The record path from South Africa to Italy was done using this method. I suppose it is rather like the ducting or hosepipe effect that we have all experienced at some time on 2m; it just happens at very low altitudes. If you want to make a sked to get in on the action, please call Martyn, tel: (0952) 255416.

Yet more

Also in the August cumulative Ian, G8KQW, will be operating from St Mary's on the Isles of Scilly and there could be some very long paths worked from there. I wonder if Ian could make it to Dave Cossor up in south west Scotland? That would be one for the book. Another station to look for will be G6XM, a long time exponent of the GHz bands, who will be operating portable from a good site on Dartmoor.

Moving on up to 24GHz, there are several stations to look out for. The Isle of Man foray will have 24 available. G3PHO may be active from Merryton Low, while G8AGN is likely to be operating from Shining Tor in Derbyshire. G3UYM, G0DJA and myself will all be active from various sites around the Midlands basin.

Talkback

The date for all this activity is August 10th and if you want to know what is going on then listen around the talkback frequencies of 144.175 over most of the

country and 144.33 in the South and East. You may wonder why there are two talkback frequencies depending on what part of the country you are in. The official RSGB microwave committee designated one is 144.175, this being the one in general use. Operators along the South Coast have a problem in that they manage a fair number of contacts into France while the French operators stick to 144.33. This makes them very reluctant to move, and one can have a certain amount of sympathy for them. The whole thing has now got a bit messy and certainly the virtual refusal of many southern operators, even to listen on the lower frequency, is not helping to make long distance inter-G contacts any easier. Just to confuse things even more, some operators who only have FM for talkback are settling on 144.525MHz.

Software

A couple of readers' letters have enquiries as to where it is possible to get amateur radio related software, other than the usual RTTY and packet. There has always been plenty of amateur radio software around for such machines as the BBC and the Spectrum and this is fairly easy to get hold of. A lot of amateurs now have the Amstrad machines or other IBM clones and, whilst it is possible to get the usual RTTY and similar programs, things of more immedi-

ate interest to the VHF and microwave man are hard to find. Over the last year or so, I have written a large collection of amateur radio programs for these machines and if you would like details of what is available please drop me an SAE c/o *Amateur Radio Magazine*. To save you time and postage they will only run on machines capable of using MX-DOS 2.1 or above. Perhaps even more importantly, I would like to hear from you if you have any programs which could be added to the collection.

The awards

There are only a couple of awards to mention this month. The first one goes to Colin, 'zero' who wades straight in at the deep end and collects a 144MHz Gold award. Colin is the Harbour Master at St Mary's in the Isles of Scilly and this probably helps to explain his best DX of 2561kms to EA8XS, way down in the Canary Islands. I think this is the greatest distance yet claimed for any of our awards.

A special class award goes to Paul, G6MEN, for some excellent contacts using simple gear on 10GHz. He also keeps me informed of his 50-28MHz crossband activities, where he now has a tally of 21 countries and 48 squares worked. He also mentions some nice contacts into the States; real mouth-watering stuff.

Beacons

The GB3FM 23cm repeater, near Farnham, is now in service from the same site as GB3FN; the 7cm repeater. It can be found on 1297.05 where it runs about 10W ERP to omni-directional aerials, the site being 187m above sea level. When it is not in use as a repeater, it goes into a beacon mode to enable propagation checks. It also has a few more tricks up its sleeve in that it can also measure your signal strength and deviation. This is achieved by sending various tone burst combinations to it. It is easier to use than to explain.

If you want more information about how to get the best out of it, please contact G4EPX who is QTHR. He would also be pleased to get reports on the coverage area of the beacon.

Sign off

Once again it is time to close for the month. This time, however, it marks the completion of five years of *On the Beam*. Lots of things in the VHF and microwave world have changed dramatically in that time and I am confident that great advances are still to come.

Let me once again thank you for all your letters and the interest you take. Keep it coming to me at 81, Ringwood Highway, Coventry; or use Prestel on 203616941. Until next month, happy hunting.

C.M.HOWES COMMUNICATIONS



Eydon, Daventry,
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80 and 40M QRP CW TRANSMITTERS

The HOWES CTX80 and CTX40 QRP transmitters have established themselves as two of the most popular little transmitters available. Tune around the QRP frequencies on 80M at almost any time and you will hear them being used to make contacts over quite surprising distances. Low power is no barrier to enjoying yourself on the air. In fact many QRP operators will tell you that it is one of the MOST enjoyable facets of amateur radio. Undoubtedly there is more challenge in building your own station, and operating at low power levels, than simply using factory built equipment. The benefit of lower cost is simply a bonus! If you fancy the challenge of some QRP work, may we suggest you consider adding a HOWES CTX transmitter to your station?

- ★ Adjustable power output up to 5W with CTX80 or 3W with CTX40.
- ★ Nominal 13.8V DC operation.
- ★ One crystal included, with provision on board for two more and for VFO use with the HOWES CVF80 or CVF40 VFO kits.
- ★ Can form part of a transceiver using HOWES DcRx receiver and CVF kits.
- ★ Five element output filter, full key clock suppression. Excellent note.

CTX80 or CTX40 kit: £13.80 **Assembled PCB module: £19.90**

DIRECT CONVERSION COMMUNICATIONS RECEIVERS

The HOWES DcRx series of receiver kits offer amazingly good performance for simple equipment. This is achieved by avoiding the "all singing, all dancing" approach, and optimising each version for a single amateur band. In this way complexity and expense are avoided, whilst giving a receiver that gives very pleasing results. Compare one with an expensive set, you will be surprised! The addition of the CSL4 dual bandwidth filter (£9.90 for the kit) gives this little set sharper selectivity than many expensive oriental imports! If you would like further embellishment, then we have a signal indicator kit (DCS2 at £6.60) to add some extra visual attraction to the front panel of your project. As HOWES kits form an interlinking range, you can add a transmitter, or an ATU, crystal calibrator, etc as you wish to build up your station. The HOWES DcRx receiver is available in 160, 80, 40 and 20/30 metre band versions. A case and a couple of tuning capacitors are the only major parts you need to add. We have suitable capacitors for all but the 160M version at £1.50 each while stocks last. The DcRx kits are easy to build, and make an excellent project for beginners, RAE students etc., as well as the experienced operator building a holiday rig or QRP station.

DcRx Kit: £15.60 **Assembled PCB module: £21.50**

CVF20, CVF40 and CVF80 VFOs FOR TRANSMIT/RECEIVE

Full featured VFO units with stable FET oscillator, dual buffered outputs, IFT, voltage regulator etc. Suitable tuning capacitor available at £1.50.

CVF kits for £20, 40 or 80M: £10.40 **Assembled PCB module: £16.90**

HC220 and HC280 20M or 80M TRANSVERTERS FOR 2M RIG

10W RF output, fully filtered with good receive performance from a balanced mixer, 13.8V DC operation for home/mobile/holiday use. A more advanced kit.

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All bands 160 to 2M. 30W rating for SWR/Power, but can be used for ATU adjustment with 100W rigs, providing the rig can give reduced tuning signal. A smart looking, custom made, moving coil meter is included.

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Improve the selectivity of your radio! 300Hz (-6dB) CW bandwidth, and extra sharp roll off for speech modes. Fits inline with external 'speaker' or 'phones'. A performance improvement for virtually every receiver/transceiver.

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You can add coverage of the 2M or 6M VHF bands to your 20M shortwave receiver with one of these kits. Straightforward construction, good performance.

CV220 or CV620 kit: £17.50 **Assembled PCB module: £23.90**

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50MHz

by Ken Ellis G5KW

Last month I reported from various sources that Cycle 22 should have an earlier and higher peak than was originally predicted due to the rapid rise of the sunspot numbers and solar flux. This condition has been maintained and accelerated. In consequence propagation and contact with distant stations have been the best since the peak of Cycle 22, with the prospect of better things to come.

Pleasant surprises

The end of May and beginning of June provided several SIDs with abnormal propagation conditions; alerting the regular observers to a probable imminent major opening. On 4th and 5th June, widespread Es provided openings to Portugal, Spain, Gibraltar, Malta, Greece and Scandinavia. Many cross-band contacts were made with European countries.

First QSOs with America this year

On 6th June at approx 1515z, Ted Collins G4UPS had a two-way QSO with WD4KPD in North Carolina on 50MHz, the first transatlantic QSO recorded this year. He alerted G4ASR, G5KW and others, and many of us made it. This period lasted for about two hours with many QSOs taking place. As the Ws faded out, a surprising change in conditions took place.

Shortly after 2000z several Scottish stations were contacted by southern stations at signal strengths of S9+ each way. Turning the beam made little difference, the signals were coming in at a very high angle. As the GMs faded out, the East Coast Americans came back in and stayed until well after midnight. Several UK stations had well over 100 two-way QSOs with North America. From my QTH in Folkestone, Kent, I had 22. My last was at 0015z with KC2TJ who was 59+20dB. The band was still wide open. After a few hours' sleep I returned. At 0645z I had a QSO with 9H1FL 59ew, followed by two LAs. I then had to close down for the day; so missed out on the exciting DX that followed.

Last month I referred to two stations operating from Greece – status not known. It has now been cleared up via Hal Lund ZS6WB; Mike SV0FE and John SV1DO in Athens have both received permission to operate on 6m. The permits are valid for a period of two years. Greece is of course in Europe and not Asia as I stated last month. The nearest country to count as Asia is Cyprus.

No 6m permits for Belgium

I have received a reply to my letter to

Belgium regarding the rumours that the Belgian authorities were granting permits. Walter Emstem ON4ZN (the UBA VHF manager) gives in detail the current position regarding 6m in Belgium. Briefly the position is as follows: 'At the Cefalu Conference in 1984, I told the meeting that in Belgium the band was still used for TV (Channel 2 in Antwerp, and 3 in Liege, by BRT and RTBF). So it was very unrealistic [to suppose] that our PTT would allow us to use 50MHz. We regret to inform you that the situation hasn't changed in the past years. Both Antwerp-100W vision, vertically polarised – and Liege are still in use daily. Since our members would like to get an allocation on 50MHz our administrator, R Cornu ON4IS, in charge of PTT liaison, asked me to get in touch with BRT officials. The head of the study group confirmed what I already knew. "BRT and TRBF will not give up TV Channels 2/3 shortly. As regards Antwerp (C2) the transmitter is relatively new and may easily last until the mid-nineties." Later talks with PTT (NCS) officials revealed that the armed forces were also interested! So we very much regret to say that our negotiations are probably at a dead end.'

Regional permits

At long last we are getting some positive information from France. Some regional permits have been issued in the Bordeaux area and others are being processed and will probably have been issued by the time this article appears in print. However, it is not clear yet who is and who isn't in possession of a permit.

Finnish amateurs operational on 50MHz

By the 21st June many contacts on 6m had taken place with authorised OH amateurs. There was a two-hour opening on 25th June to N America. G3XBY worked a station in Nebraska. On 26th June at 0645z I was in QSO with Joe 9H1CG when G4UPS phoned me with the news that LA6HL/TF was on 50.200 – the same frequency as 9H1CG. I had already worked Iceland some time ago, but like many others never got confirmation, so we were all very pleased to QSO. On 1st July BBC TV news reported that the Major Proton Flare a few days earlier had badly affected the earth's magnetic field. Thousands of pigeons on a marathon from central Europe to the north of England had lost their sense of direction and some had landed in Newfoundland. Radio conditions were also affected with a complete blackout.

From the mailbag

The major openings from the UK to

North America, and other DX locations provided a very welcome increase in your letters. I very much regret that due to pressure on space it is not possible to do them justice. They will be forwarded to the RSGB Propagation Studies Group for analysis. Please keep sending them in.

Geoff Brown GJ4ICD, from St Helier, Jersey, sent a four page print-out of his operations. On 6th June his beacon was heard in W at 2200z. At the time of writing he had two-way contacts with 25 countries and 89 squares to his credit. During the peak period to W/VE on 6th and 7th June, no North American stations were heard on 28MHz; one of those '50MHz only type Es'. Geoff was one of the lucky ones to work FP/KA3B for a new country, and also KP4EIT – first KP/GJ at 1150z on 7th June. Other firsts were GJ3YHU – FP/KA3B at 2336z on 6th June; GJ4ICD – PA00OS at 1719z on 3rd June and GJ4ICD – SV0FE at 1700z on 4th June.

Paul Turner G4IJE, from Bishops Cleeve, is well known for his successes on meteor scatter. He writes, 'Enclosed as promised is my list of all Es' observations for 1988. All-time countries worked two-way on 6m are: G, GM, GW, GI, GD, GJ, GU, EI, LA, PA, CT, F, EA, OH, 9H1, ZB2, C3O, 5B4, TF, SV, W, VE, YV0, V2A, FP and KP4. The total is 26. My all-time squares total (in band only) is now 129 and I have about 35 confirmed since 1st June last year. I have just received confirmation from Jack Hum G5UM that my claim for the 50MHz award (25 confirmed) is OK and he will be sending a certificate as soon as they are printed. I still enjoy MS very much and have completed 823 MS contacts on 6m. Random activity is expected on 50.350MHz from 2100z on 12th August to 0100z on 13th August and then again from 0900z to 1300z on 13th August owing to the Perseids Shower. Some extra activity from GM, GI or EI would be especially welcome'.

Countries worked two-way on 6m

For some months now I have been hoping and trying to get a 'countries worked' list going. The main problem has been deciding which countries have official legal status. The list sent by Paul G4IJE is a starting point; one or two of his at the time had doubtful status and there are about three not on his list that others have contacted. I would like, with your help, to produce an 'all time list' next month. Later for awards purposes the time scale may be modified to suit rules, but I think it desirable and historically important that a record is kept, as complete as possible. Your co-operation would be much appreciated.

Via the grapevine others believed to be near the top of the list include GW3MHW, GW3LDH, G3CCH, G4GLT, G2AOK, G4UPS, G5KW. These are all in the 20-26 bracket. Details please. Recent additions bring the total of countries possible to over 30.

Harry Schools KA3B reports the following beacon up-date. From San Jose, Costa Rica, Eric ROY TI2NA's beacon operates on 50.078, grid square EK70, power 20W dipole North/South. Eric listens every day on 50.110MHz. Tony KP4EKG also monitors 50.110, 2100-0400z daily. His beacon on 50.099 operates 2100-0500z daily, weekends and holidays - 1000-0500z. Ted G4UPS was one of the successful operators during the opening on the 6th and 7th June, working into 15 states. His best DX was K9LCR EN62 I11. His log included FP/KA3B and KP4EIT.

Bill G2ANT who probably spends more hours on 6m than anyone else, also had a field day - or night(!) during the big opening on 6th and 7th June.

He took part in the unusual GM opening, working four of them, all 59+ including GM4ISM in the Orkneys. His N American list includes 3 Virginia, 1 Tennessee, 1 Georgia and 1 Ohio, plus FP/KA3B. WA4NJP in Georgia was still 59 and working Gs at 0300z. Bill queries the propagation method.

The East coast stations had died out and WA4NJP was about 1000km farther west. Is it significant that the first station to be heard/worked was WD4KPD at 1513 on 6th June, before any East Coast Stations were heard/worked? Only dedicated operation will help the propagation experts to look into and solve these matters.

GW3ENY/A from Anglesey, reports that the face of the sun looks like a black pudding. The solar flux on 1st July was 184 with A index 20, the highest figures so far during Cycle 22. This confirms earlier reports. Steve G4JCC is back in the South of France for his annual visit; look for his cross-band 10/6.

Working locator squares

A recent new interest has developed on VHF - working the new Maidenhead squares which now seem to be accepted internationally, despite the early opposition. During the recent DX openings considerable interest was shown in exchanging locator square numbers. Space permitting, I hope to develop this in a later issue. In the meantime I have included a diagram reprinted from ARRL of the USA East coast area. The numbered squares will help readers to locate the North American stations they contact. Please give your own locator number to stations you contact to help them qualify for the ARRL awards. This has given a boost to the exchanging of QSL cards. Many UK stations have already received QSLs with reply coupons by air mail. Good hunting!

Next month I hope to deal with the autumn transequatorial path to South Africa, and report a 27-day cycle return of the excellent conditions during June.

ARRL Grid Locator for North America

This ARRL Grid Locator map is based on the worldwide Maidenhead system. The first two characters (letters) constitute the 2° x 2° grid field. This is followed by two numbers designating the 2 x 2 x 1 square. Fourth character location may be present. No and 8th characters (digits) are used to indicate the 5 x 2 x 1 sub-square. More information on grid location and the ARRL VHF UHF Emergency Club Awards (based on contacting 100 grid squares) can be obtained from the Headquarters of the American Radio Relay League, 221 Main Street, Newington, CT 06111 USA.

Legend:
 - Field boundary
 - Section boundary
 - International boundary
 - State and Provincial boundary

6 METER BEACONS: EASTERN UNITED STATES

50.060 MHz	WA8ONQ	EM 79	(OH)	(C)
50.060 MHz	K4TQR	EM 63	(AL)	(C)
50.061 MHz	K1NFE	FN 31	(CT)	(C)
50.062 MHz	W3VD	FM 19	(MD)	(C)
50.063 MHz	N4PZ	EL 87	(FL)	(C)
50.064 MHz	W5VAS	EL 59	(LA)	(C)
50.067 MHz	W4RFR	EM 66	(TN)	(C)
50.067 MHz	WB8IGY	EM 79	(OH)	(C)
50.069 MHz	W4HHK	EM 55	(TN)	(C)
50.070 MHz	WB4GJG	FM 06	(VA)	(I)
50.070 MHz	KØHTF	EN 31	(IA)	(C)
50.070 MHz	KA4VEY	EM 64	(AL)	(C)
50.070 MHz	KB4UPI	EM 63	(AL)	(C)
50.070 MHz	W2CAP	FN 41	(MA)	(C)
50.070 MHz	N4LTA	EM 94	(SC)	(C)
50.072 MHz	WA2YTM	FN 12	(NY)	(C)
50.077 MHz	N5JM	EL 49	(LA)	(I)
50.080 MHz	WB400J	EL 87	(FL)	(C)
50.080 MHz	W1AW	FN 31	(CT)	(I)
50.092 MHz	W5GTP	EM 40	(LA)	(I)

6 METER BEACONS: EASTERN CANADA

50.086 MHz	VE2STL	FN 46	(QUE)	(I)
50.088 MHz	VE1SIX	FN 65	(NB)	(C)

(I) INTERMITTENT OPERATION
(C) CONTINUOUS OPERATION

THE PROJECT BOOK

by
Martin Williams

Last month we looked into the requirements for various types of filter and found that there was one type which could give the pass band characteristics which we needed without the use of inductances. This is a great advantage because although the traditional LC type filters are very flexible, the values required are usually so far removed from standard values that, particularly in the case of the coils, the components need to be hand-made. Or at least labouriously built up using various combinations of standard values to achieve the desired result. The types of circuit which do not require the use of inductors are known as active filters and are conveniently built using our ubiquitous friend the 741 op-amp integrated circuit.

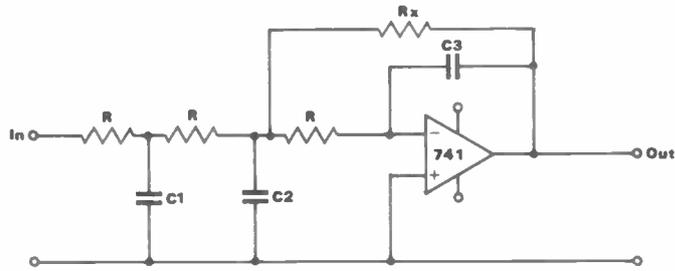
Filter types

The filters are available in three types, low pass which is shown in Figure 1, high pass as shown in Figure 2 and band pass. The circuit and values for the last one are not given because there are several factors such as stage gain and operating 'Q' which make a simple listing of values unavailable. However, the bandpass type can be easily simulated by simply cascading a suitable high and low pass type, with the cut-off frequencies selected to give the band pass frequencies required.

Construction

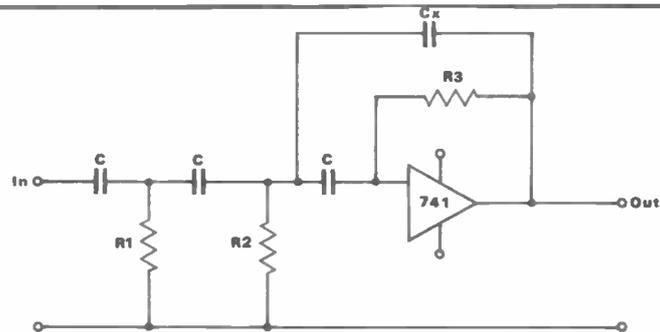
There is nothing at all fussy about the circuit layouts for these filters and the units may be built on a small area of Veroboard. Two points to note are that in the low pass circuit the value of R_X is double that of R and in the high pass unit the value of C_X is half the value of C . The values of the resistors in the high pass circuit can be made up from standard values. A better way may be to use a preset of the next higher value and set it exactly using an ohm meter.

**September issue
of Amateur Radio is
on sale
25 August 1988**



Freq. Hz	R (K Ω)	C1 (μ F)	C2 (μ F)	C3 (pF)
100	10	.39	.33	30700
200	3.9	.5	.43	39400
300	12	.1	.1	8500
400	8.2	.12	.1	9370
500	2.2	.35	.3	27900
600	6.8	.1	.08	7530
700	10	.05	.047	4390
800	2.2	.22	.2	17400
900	2.2	.2	.17	15500
1000	3.9	.1	.08	7880
1500	2.2	.12	.1	9300
2000	3.9	.05	.04	3940
2500	3.9	.04	.033	3150
3000	12	.01	.01	850
4000	8.2	.011	.01	940
5000	3.3	.023	.02	1860
6000	5.6	.011	.01	910
7000	4.7	.011	.01	930
8000	8.2	.005	.005	470
10000	10	.003	.003	300
15000	6.8	.003	.003	300
20000	5.6	.003	.002	275

Figure 1



Freq. Hz	C (nF)	R1 (Ω)	R2 (Ω)	R3 (Ω)
100	68	9535	17400	122000
200	68	4700	8700	60600
300	100	2200	3950	27640
400	47	3500	6300	43800
500	47	2760	5000	35000
600	47	2300	4200	29200
700	22	4210	7690	53500
800	15	5400	9870	68650
900	22	3275	5980	41600
1000	15	3400	7900	54900
1500	47	920	1680	11690
2000	47	690	1260	8750
2500	22	1180	2150	15000
3000	22	980	1800	12500
4000	15	1000	2000	13750
5000	22	580	1068	7490
6000	10	1100	2000	13700
7000	10	926	1700	11770
8000	15	540	987	10200
10000	10	648	1184	8239
15000	10	432	790	5500
20000	15	220	390	4200

Figure 2

NEXT MONTH

Amateur **RADIO**

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A DIP IN THE OUSE

by Steve Anderson GØEAT

Campaigners seeking to legalise CB radio a few years ago were forever stressing its potential value in case of an emergency. But, as we report here, the amateur bands can be just as useful.

A West Riding radio amateur on his way home from work transmitted a dramatic message one foggy night late last year.

Mr Geoff Cowling G8ERX, the service manager of a television rental company at Kingston-upon-Hull, called me up on two metres that the mist was troubling him. 'If you hear a splash', he said, 'you'll know I've gone into the dyke.' Seconds later he shouted, 'You'd better ring the police. The car in front's just disappeared into the dyke.'

Plea for help

Geoff made his plea for help while driving along the Swinefleet to Reedness road, south of the port of Goole. He was in contact with myself, (Steve

Anderson, GØEAT) while I had been extolling the virtues of VHF propagation that particular evening. However, Geoff was more concerned about the ever-worsening visibility as he neared his home alongside the River Ouse at Reedness.

'It's really bad here,' came the reply. Then Geoff asked me to make a 999 call.

Geoff had seen the car in front, a Peugeot 104, leave the road and nose-dive into a water-filled ditch. But he was relieved when the two young occupants clambered out unhurt.

While I was at home in Holme-on-Spalding Moor, I raised the alarm by telephone, convincing the police that I was genuinely wishing to report an accident that had happened 16 miles away. Geoff, meanwhile, remained at the scene until a patrol car arrived within a matter of minutes.

'Fortunately, the police officer knew a

little about amateur radio and the use of call signs and I didn't need to prove that I wasn't a citizens' band enthusiast! Geoff said later. 'It was a good job I had the lcom rig in the car with me because not many vehicles use that particular stretch of road and the couple in the car could have been seriously injured.'

'Steve kept in touch with me throughout the drama so I felt I could seek further assistance if it was needed. But I'd better be careful what I say on the air in future. The accident gave me quite a shock.'

Delayed by the fog and not over-anxious to brave the conditions again to attend a meeting of the Goole Radio and Electronics Society, Geoff was content to stay at home with his wife, Stephanie, and to search for a new square of his own. But he steered well clear of the Raynet frequencies and hidden dykes during foggy nights!

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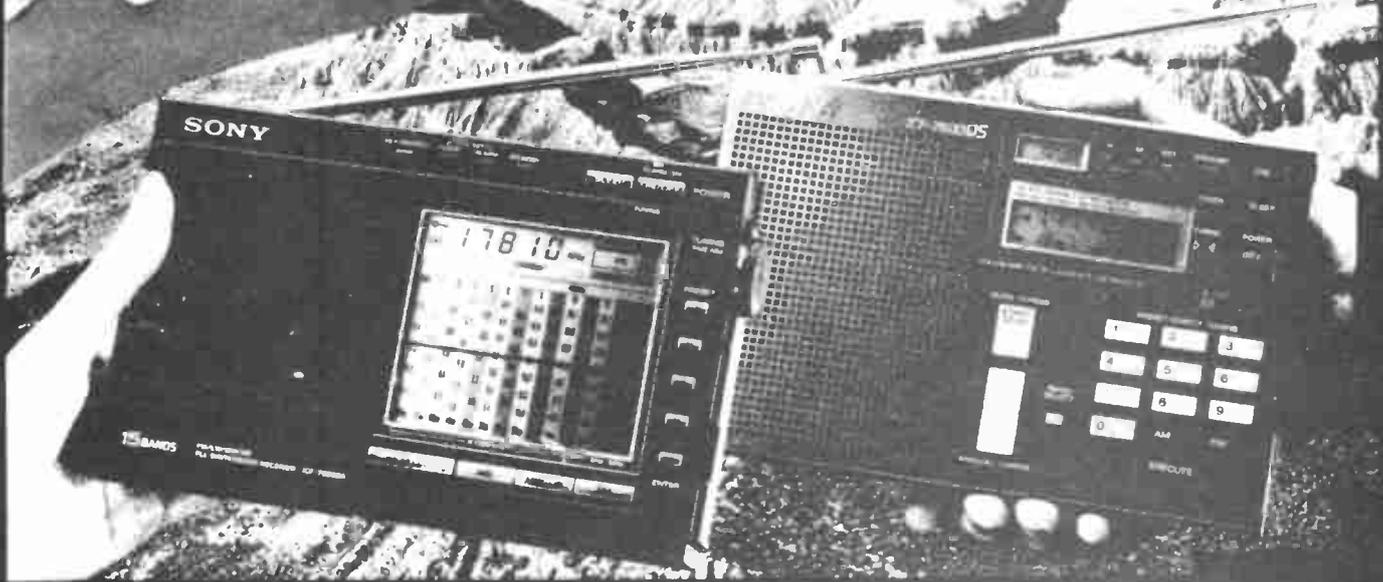
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DXpeditions on 50MHz

by Ken Ellis G5KW

DXpeditions to Gibraltar

In the May 1988 issue of *Amateur Radio Magazine* (page 46) advance details were given of two DXpeditions planned for June – the peak of the Es season. We are now able to give details of these well organised and successful operations.

Those of us who have undertaken these ventures, are familiar with the hazards and problems involved and all credit is due to those concerned. It is gratifying to know that QSL cards are being processed and in both cases this is a major and expensive exercise. So, many thanks are due to all those concerned.

ZB2IQ: Gibraltar May 31-June 14

This report was compiled by Tim Kirby, G4VXE, dated June 25 1988. QTH 'R'. 'We saw Jimmy Bruzen, ZB2BL, keeper of beacon ZB2VHF. He has installed the beacon at its new location in Gibraltar, as the rock-top site has been abandoned (the beacon is now fully operational and being received regularly in various parts of the UK). ZB2BL has an antenna which is now operational from his flat. The night ZB2VHF was tested, it was heard all over the UK. We may hear Jimmy on Six again before long. I hope so, as I must be one of the few Gs who still need ZB2!

The QSL cards are being printed at present, so we'll get them into the bureau just as soon as we can. Direct QSLs can go to: PO Box 136, Cardiff CF4 6YL, or in case of urgency: G4VXE, 29 Tivoli Road, Cheltenham, Gloucestershire.'

GL50 2TD

Because of the non existent take-off to the west from ZB2IQ, it was impossible to work into the USA. On June 7 we became tired of hearing about the wonderful opening between the UK and North America. It seemed to Jon, GW4LX0 and I, that conditions were right for a Transatlantic opening on Six. We gathered up the portable gear, an IC505, a 50W PA and a wire dipole, and headed up to the west side of the rock.

Once we arrived, David, G8ROU, set about organising the station. Richard, GW8TVX, meanwhile, erected the antenna with the aid of a 'No waiting' sign, a bush and a sharp knife! Soon we were listening, all was quiet, then at 1845 we heard FP/KA3B. It was weak to start with, but began peaking to S9 when the beam was on us. I shall always remember that particular QSO as one of my most exciting. We signed with Harry and shortly after, we heard WA1OUB.

It was not until 2039 that we had our next QSO with VE1BNN. Now we could hear a number of stations. We carried on to work K4CKS (Georgia) VE1YX, WA1OUB, KA1PE, K1TOL, K1GPJ and K1IKN. Those heard but not worked were: WA1VRH, KB4CSE and WA1VCU.

The opening closed about 2200 res,

what an evening! What made it more enjoyable was the simplicity of the gear, although it must be said that the North American operators had to turn up the volume at times.

7 June 1988: countries – FP, W, VE, ZB2, Grids: 9. QSOs: 12.

More QSOs

ZB2IQ Summary May 31-June 13 1988:
Number of 50MHz QSOs: approx 1750.

Countries worked: G, GW, GJ, GU, 9H1, PA, F, YU, LA, CT, EA, EI, GM, GD, SV, ZB2, DL.

Crossband: I, HB9, EA, DL, LX, OZ, SM, OH, 4X.

Firsts: 9H1FL 1755z May 31, PA3AMF 1945 31 May, F5GZ 0938 June 1, YU50MHZ 0950 1 June, LA6QBA 1212 June 1, GM4DGT 1448 June 3, GD4HOX 1441 June 4, SV0FE 0834 June 5, ZB2BL 1240 June 5. Grids worked – 92.

Notes

The equipment included an FT726 and a 4 element MET. The first opening on May 31 was most exciting. We had assembled the antenna and attached some feeder. I retreated to a bedroom to check the match. I turned the rig on to 50.165 and put some carrier on. VSWR=3:1. What's this? G2ANT calling at 599+. Total panic ensues as the microphone and key had not yet been

unpacked! Five minutes later, they come to light and we made our first QSO – GW4HBK. We didn't bother to adjust the match or increase power, until the opening was over and the first 180 stations were logged.

Crossband operation was sometimes very difficult due to QRM from other ZB stations. To those who called on 28.885 and couldn't raise us, I really am sorry. Apparently, OH9NLO in KP26 was calling us on ten, without success. That would have been an amazing distance. 9H1SIX beacon was heard, suggesting a double hop path. The 5B4CY beacon was heard most mornings, often when other DX paths were noted. ZD8VHF was heard at 0715z on June 9. The beacon was heard only once for about 20 seconds. This surprised and disappointed me. Despite Mike, ZD8MB and ourselves checking the path, no QSO was made. On June 5 at 1855z, I heard 'CQ DX de LU'... then disappointingly the signal faded!

Pile-ups

The pile-ups necessitated very rapid QSOs. Some people seemed upset that we were not giving our names etc. To those I would say 'It is better to have a short QSO than none at all'. But it was a pleasure to make each and every contact, no matter how brief!

Many thanks are due to: Alan Kelly for

FP/KA3B, ST PIERRE AND MIQUELEN 50MHz DXPEDITION SUMMARY

Number of Different Stations Worked: W1 (115), W2 (112), W3 (90), W4 (74), W5 (17), W6 (0), W7 (0), W8 (9), W9 (0), W0 (1), VE3 (6), G (143), GM (26), GW (9), GI (5), GJ (2), EI (2), CT (2), LA (2), DL (1), ZB2 (1), VP5 (1), PA (2), OX (1).

Stateside: 418 Canada: 6 Europe: 196 Other DX: 1 Total: 621 Stations

Number of Different Grid Squares Worked (by field): EL (8), EM (23), EN (3), FM (11), FN (26), FL (1), GP (1), IM (1), IN (3), IO; (22), JO (5).

North America: 71 Caribbean: 1 Europe: 32 Total: 104 grid squares

LIST OF FIRST STATIONS CONTACTED FOR EACH NEW COUNTRY WORKED

United States	K2YOF	6-6-88	1938 UTC	Bud
Greenland	OX3LX	6-6-88	2118 UTC	Bo
Northern Ireland	G18YDZ	6-6-88	2129 UTC	Alan
Scotland	GM8COX	6-6-88	2139 UTC	
England	G4GLT	6-6-88	2143 UTC	
Wales	GW4EAI	6-6-88	2205 UTC	
Norway	LA3EQ	6-6-88	2225 UTC	
Ireland	EI8EF	6-6-88	2324 UTC	Ed
Jersey	GJ3YHU	6-6-88	2346 UTC	
West Germany	DL0SIX	6-7-88	0033 UTC	
Netherlands	PE1LCH	6-7-88	0054 UTC	
Portugal	CT1WW	6-7-88	1110 UTC	Tiago
Canada	VE3KKL	6-7-88	1216 UTC	Gord
Gibraltar	ZB2/G4VXE	6-7-88	2053 UTC	Tim
Turks & Caicos Is	VP5D	6-9-88	1419 UTC	Bob
United Nations HQ	4U1UN	6-12-88	0005 UTC	

TOTAL: 16 Countries

supplying the antennas. SMC for the loan of an HF rig and PSU for Crossband. Dewsbury Electronics for the memory keyer (invaluable). BNOS for supplying us with copious VHF amplifiers and power supplies. Thanks also to the Gibraltar Beach Hotel for putting up with us. ZB2BL, ZB2IP, ZB0D and ZB0F for making us feel so welcome. Particular thanks should go to G0AZ who due to business commitments could not be with us, but had put in an enormous amount of work for us. Thanks go to G6CMV, who ran the Information Line so admirably.

St Pierre and Miquelen DXpedition

The equipment used on this expedition consisted of an Icom IC-551D running 80W and a Mini-Products HQ1 Mini-Quad. The 6m beam which was brought along could not be used at my operating site (the Hotel Robért) due to mounting problems and cable routing difficulties. However, I felt that the Mini-Quad performed surprisingly well for a low gain, 2 element antenna. Unfortunately, my receiving situation was not at its best.

It seems that an airline (which will remain unnamed) lost my luggage which included my 50MHz pre-amplifier and memory keyer. I look back in retrospect, wondering how many more stations I

could have worked, if higher power along with a better antenna and receiving system were utilised. I offer my sincerest apologies to anyone who called me (especially some of the QRP'ers) but weren't worked. However, let it be known that a few QRP'ers in Europe were worked, including one fellow using an indoor dipole with only 2W of power!

Although 621 stations were worked, I was very disappointed as I had set a goal of making contact with 1,500 stations on 6m. I did experience a brief half hour of double hop E skip propagation into the USA which allowed me to work W4s in Southern Florida and W5s in Texas, Arkansas, Mississippi and Louisiana. However, hardly anything was worked in the Midwest.

The only W0 contacted was W0JRP in Missouri with no W6s, W7s, or W9s heard. This proved to be a major disappointment! To top this off, only 18 stations were worked during the ARRL June VHF Contest Weekend, during a very brief 15 minute E skip opening. Because of such terrible contest conditions, I may have to return to FP in the near future and try it again.

Along these lines, I had an opportunity to meet with Henri LaFitte, FP5HL, who is one of St Pierre's few active hams. He

has a Swan 250C and a 6 element beam handy and he has promised me that by next year he will be active on Six from his summer QTH; once he gets electricity running at that location. He can't get on 50MHz at the present time since he is located one block from the local TV station and has caused severe TVI in the past.

In lieu of all the contacts which were made on 6m, my most exciting moment occurred when I began hearing the ZD8VHF beacon from Ascension Island on June 6, just after I had worked ZB2/G4VXE in Gibraltar. The 10m ZD8HF beacon was almost at S9 and the 6m beacon was audible for just over 5 minutes at a strength of S2.

I called frantically on 50.110 and 28.885MHz for Mike ZD8MB, however, he was not to be found.

On a final note, it was good to see stations on both sides of the Atlantic spread out during the massive 4 hour opening of June 6/7. I was up on 50.252MHz for a good length of time and had no difficulty in attracting attention. I think most of us are finally using common sense and are utilising our vast 50MHz spectrum much better than a few years back. All in all, this DXpedition was enjoyed by everyone.

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■ Yaesu FRG7000 general coverage receiver. Excellent condition, boxed, £175 ono or p/ex for R/C VHS video recorder. Also Turner +3B desk mic, £15. Also two PCB assembly jigs, £35 each. Tel: (0532) 663814 or 443558

■ CBM64, 154, C2N, plus books, 70 blank disks and approx £600 software, £325. Leader LSG16 signal generator, £35. Tatung Einstein (TM01), £100. Prefer buyers collect or pay carriage. Tel: Ron 061-437 0916

■ Drae 3A PSU, as new £20 ono. Lafayette multi-mode 1200 FM converted to 10m USB LSB AM/FM. Works well, £100 ono. Icom IC-H10 fist scanning mike £5. Kenwood YK88S filter for 120S 130S 430S series £20, postage extra. If req YK88SN. Tel: (0782) 395017

■ Brand new 27MHz Tagra RT122 CB aerial, horizontal and vertical with aerial matcher for

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■ FT102 CW/SSB/AM/FM. Fitted with wide AM filter narrow SSB, and narrow CW filters £600 ono. FC102 antenna tuner £150 ono. Also HF balun 1:1 3.5MHz to 30MHz £7.50. 7MHz traps £5.00, 144MHz 1/2over 1/2 colinear aerial £15. Tel: Telford (0952) 255225

■ Trio TM-201A FM mobile transceiver. 25W output, £125 no offers. Tel: (0706) 624601

■ Belcom LS102L Tx, 28 to 30MHz, CW/FM/USB/LSB/AM. Complete with mic and mobile mount, manual, boxed, never used, mobile, mint cond, £180. Also Wood and Douglas 2m linear 25W, £20. Mark McIntyre. Tel: Belfast 795783

■ Katsumi FK150 electronic keyer, vgc, £50. Zetagi BV130 linear amp, £45. Yaesu FT202 6 ch 2m h/h NiCads charger, £75. Yaesu FT780R 70cm multi-mode, £325. Microwave Modules 2m to 70cm tvtr, £80. New DNT CB on cept freq, £75. FT709R 70cm h/h case man spk/mike, NiCad charge, £175. All items onvo or will consider part ex. Martyn Bolt. Tel: (0924) 495916

■ CBM 128, as new, £175. CBM 1541 drive, £125. C2N cass rec, £25. C64 soft and hardware, see for list. MFJ 1274 packet tnc, new, £175. Com-in 64 multi-mode interface with manual, £100. Pye A200 low band amp, will suit 50 or 70MHz, £40. Yaesu mikes for £10 each. All items are ono. Will take good part ex. Martyn Bolt. Tel: (0924) 495916

■ AR2002 scanning receiver. 25 to 550MHz, 800 to 1300MHz, in good condition. PSU in original packing. £360 ono, buyer to collect. Tel: 061-797 1384 (North Manchester area). Genuine enquiries only please

■ Yaesu FT102 HF trans, all bands WARC, fitted CW filter, FM board, mic, as new boxed, £550 ono. Will part exchange for TS120V, TS130V, Argosy, etc. FT708 70cm FM h/held trans, vgc, £130. Yaesu CP2500 2m FM mobile trans, keyboard mic, vgc, £130. Tel: (0305) 813202

■ I have got four used, but believed working, ex-MOD 4CX250B valves. Metal bases of valves slightly rusty in places, but all pins ok. £5 each or £17 for all four. Gareth Doyle. Tel: (0730) 64181 after 6pm

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■ Sony ICF5W15 AC301 power adaptor, AN10 active antenna etc, brand new, £225 or (part) exchange. Good quality Yaesu/Kenwood/Icom receiver. Tel: 01-623 3160 (day), (0732) 453085 (evenings)

■ Exchange Microwave Modules MM2000 RTTY to TV converter 45.5, 50, 75, auto, Ascii, auto control, normal/reverse shift, vgc, for Quasar ME780 56 channel marine radio or similar. Tel: Ian, (0692) 82075 daytime only. Similar radio would be Nasa marine Stingray 5600 or WHY?

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■ CTE international stabilised dc power supply 8-10 amps 1.36V. Cost £50, sell for £20 inc postage. Tel: (0227) 711261

■ Yaesu FT290 mk1, as new with soft case and new set NiCads £250. Tel: St Helens 20370

■ Fox Tango Club newsletter, full of user reports, tips etc for Yaesu owners. Covers FT1 101/ZD 200 901/2 107 227 and more years 1982 1983, £8. Tel: Paul (0920) 871639 anytime

■ Yaesu FT209RH, immaculate condition. Must be seen with all extras. Hardly used and still boxed. Offers around £220. Tel: (0296) 87837 evenings

■ Vintage items - rare 1930s no17 military wireless transceiver in mint condition with original packing and manual, £145. Marconi TF801A RF/AF sig gen, £60. Marconi TF4288/1, (WD4188) and Furzehill V200A valve voltmeters, £25 each. Early radar receivers R1124 c/d and R1466, £30 each. Old unused NU4 (ESU208) and NT39 (Act36) Tx valves in original packing, £20 each. Big PT25 RF/AF screen grid bottles, £10 each. Unused MU12/14 rectifiers, £4 each. All vgc. Tel: Bookham (0372) 52569

■ Trio R2000 communications receiver, hardly used, still in box. £395 ono. Tel: Majeed, (0642) 826281

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■ FT757, FP757, FC757 or similar. Also need G5RV commercial grads antenna. Tel: Dennis, (0305) 814196 evenings and weekends

■ 934, any make considered if in perfect condition. Nato or Belcom scanner Realistic also required. Tel: (0283) 221870

■ Novus model 650 electronic calculator, with LED display, on sale in UK in November 1974. It has six digits and uses PP3 batteries, must be marked Novus 650. Wanted to replace stolen original of sentimental value. Would also like to purchase a low-cost LED-display (not LCD-display) electronic calculator. Write, with price wanted to: David Knight, 2 The Croft, Putnoe, Bedford

■ Military radios and bits, any condition, WW2 to 1960. Such as BC348, R216, R109, R209, R308 and R1155. Tel: A Howard (0908) 73114

■ Pair of IF transformers and manual for Eddystone 840C. Also need AF gain knob. Tel: Tony Howard, (0908) 73114

■ Yaesu FT757 mk2 wanted, must be mint, cash waiting. Also Yaesu FT726 wanted. Tel: (0294) 217611

■ KW2000B, good condx, essential: I also want a VFO4B, will collect. Tel: (0332) 515212

■ Wanted for Spectrum: Light Pen, rom cartridges for interface 2 and instructions for VU file. Write to: J Brown, 45 Marlborough Avenue, Falmouth, Cornwall TR11 4HS

■ WW2 German ex-service equipment, parts, literature, for museum purpose - any condition acceptable. Also wanted: WS11, WS65, WS66, T1190, AD67, 52ERT, 4Q, 5G, RG37, H2S modules, suitcase radio. Will collect, cash or swap. WHY? Rag Otterstad OZ8RO, Vejdammen 5, DK-2840 Holte, Denmark. Tel: 010-452 801875

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■ Eddystone 940 receiver, must be in mint condition. Will collect for cash, Southern England, or pay carriage elsewhere. Tel: L Rogers, (07356) 2476

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■ Disc drive and/or printer to suit Commodore 64, will exchange for an oscilloscope, cash adjustment or buy for the right price. Tel: David Forward, (0666) 823490

■ Early radio communications handbook, 1938 to 1960. Other old radio books considered and any literature on valve regenerative receivers. Tel: Mr Andrew Davies, (0766) 780043

■ Hewlett Packard RF power meter 431B. Service information required, manual or photocopy, buy or loan. Mr S A Brown. Tel: (0280) 703512

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- BD45 1 24hr time switch, ex-Electricity Board, automatically adjust for lengthening and shortening day. original cost £40 each.
- BD49 10 Neon valves, with series resistor, these make good night lights
- BD56 1 Mini unselector, one use is for an electric jigsaw puzzle, we give circuit diagram for this. One pulse into motor, moves switch through one pole.
- BD59 2 Flat solenoids you could make your multi-tester read AC amps with this.
- BD67 1 Suck or blow operated pressure switch, or it can be operated by any low pressure variation such as water level in water tanks
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- BD128 10 Very fine drills for pcb boards etc. Normal cost about 80p each.
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- BD148 4 Reed relay kits, you get 16 reed switches and 4 coil sets with notes on making c/o relays and other gadgets.
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- BD268 1 Mini 1 watt amp for record player. Will also change speed of record player motor.
- BD275 1 Guitar mic clip-on type suits most amps.
- BD283 3 Mild steel boxes approx 3in x 3in x 1in deep - standard electrical.
- BD293 50 Mixed silicon diodes
- BD296 3 Car plugs with lead, fit into lighter socket
- BD305 1 Tubular dynamic mic with optional table rest.

5A BATTERY CHARGER KIT

All parts, including case. Only £5 plus £1 postage

OVER 400 GIFTS YOU CAN CHOOSE FROM

There is a total of over 400 packs in our Baker's Dozen range and you become entitled to a free gift with each dozen packs. A classified list of these packs and our latest 'News Letter' will be enclosed with your goods, and you will automatically receive our next news letter.



F.D.D. BARGAIN

3 1/2in Floppy Disc Drive, made by the Chison Company of Japan. Beautifully made and probably the most compact device of its kind as it weighs only 880g and measures only 104mm wide, 162mm deep and has a height of only 32mm. Other features are 80 track, high precision head positioning, single push loading and eject, direct drive brushless motor. Sharp compatible interface standard connections, interchangeable with most other 3 1/2 and 5 1/4 drives. Brand new with copy of maker's manual. Offered this month at £28.50 post and VAT included.

CASE adaptable for 3 1/2" FDD, has room for power supply components. Price only £4 includes circuit of PSU. Our Ref 4P7

POWER SUPPLY FOR FDD 5V and 12V voltage regulated outputs, complete kit of parts will fit into case 4P7 price £8 or with case E11. Our ref 11P2

9" MONITOR

Ideal to work with computer or video camera uses Philips black and white tube ref M24306W. Which tube is implosion and X-ray radiation protected. VDU is brand new and has a time base and EHT circuitry. Requires only a 16V dc supply to set it going. It's made up in a lacquered metal framework but has open sides so should be cased. Offered at a lot less than some firms are asking for the tube alone, only £16 plus £5 post.

CASE FOR 9" MONITOR

We have arranged with a metal worker to make cases for the 9" Monitor. Delivery promised for the end of May and the price £12 plus £2 post. The case will be made from coated sheet steel, overall size approx 10in x 10in x 7in high which will give ample space for the Power Supply and external controls if you fit them.

PROBLEM SOLVED!

We have obtained from the manufacturers of the 9" Monitor, the TTL converter which makes it composite input suitable to work with any computer. We have had the printed circuit board made and have all the components and can supply this converter in kit form price £6. Our ref 6P4

AN ALLADIN'S CAVE

We have opened another shop in Hove, the address is number 12 Boundary Road which is between Hove and Portside fairly close to the seafront. When you want to see before you buy and when you want to browse around the special bargains available, this is where you should make for as the Portland Road shop in future will be just mail order. You can of course collect from Portland Road but you should bring in an order complete with reference numbers so that the stores can attend to it easily.

MINI MONO AMP

on p.c.b. size 4" x 2" (zpp)
Fitted volume control and a hole for a tone control should you require it. The amplifier has three transistors and we estimate the output to be 3W rms. More technical data will be included with the amp. Brand new, perfect condition, offered at the very low price of £1.15 each, or £13 for 12.



THIS MONTH'S SNIP

ACORN COMPUTER DATA RECORDER (CASSETTE) This is a mono data recorder with switchable motor control intended for use with the Acorn Electron or BBC computers but also functions with almost any other computer and can be used for normal record and play-back of music and speech.

Six key controls give 'PAUSE', 'STOP' and 'EJECT', 'CUE/FAST FORWARD', 'REVIEW/REWIND' and 'RECORD', last forward and rewind (100 seconds for C90). Also tape counter with reset button. Input signal range 5mV to 500mV, input impedance 40k ohm. Can be battery operated but is supplied with a mains adaptor. Brand new still in manufacturer's wrapping. £8. Order Ref. BP18 add £2 postage.

VENNER TIME SWITCH

Mains operated with 20 amp switch, one on and one off per 24 hrs, repeats daily automatically correcting for the lengthening or shortening day. An expensive time switch but you can have it for only £2.95 without case, metal case - £2.95, adaptor kit to convert this into a normal 24hr time switch but with the added advantage of up to 12 on/off's per 24hrs. This makes an ideal controller for the immersion heater. Price of the adaptor kit is £2.30.



Ex-Electricity Board. Guaranteed 12 months.

AKAI RV-UM300 MIDI-RACK

Is a really excellent piece of furniture, ideal for holding your computer or audio equipment. Has three shelves in the upper section and a hinged glass fronted lower section. Height approximately 3ft, width 13 1/2in, depth 14in, on castors, dark walnut veneer finish. £15 plus £8 for Securacord delivery. Order Ref. 15P11

MULLARD UNILEX AMPLIFIERS

We are probably the only firm in the country with these now in stock. Although only four watts per channel, these give superb reproduction. We now offer the 4 Mullard modules - i.e. Mains power unit (EP9002) Pre-amp module (EP9001) and two amplifier modules (EP9000) all for £6.00 plus £2 postage. For prices of modules bought separately see TWO POUNDERS.

ZSA ELECTRICAL PROGRAMMER

Learn in your sleep. Have radio playing and kettle boiling as you wake - switch on lights to warn off intruders - have a warm house to come home to. You can do all these and more. By a famous maker with 25 amp on/off switch. A beautiful unit at £2.50.



POWERFUL IONISER

Generates approx 10 times more IONS than the ET1 and similar circuits. Will refresh your home, office, workroom etc. Makes you feel better and work harder - a complete mains operated kit, case included. £11.50 + £3 P&P

J & N BULL ELECTRICAL

Dept AR, 250 PORTLAND ROAD, HOVE BRIGHTON, SUSSEX BN3 5QT
MAIL ORDER TERMS: Cash, PO or cheque with order. Orders under £20 add £1.50 service charge. Monthly account orders accepted from schools and public companies. Access and B/card orders accepted. Brighton (0273) 734648 or 283580

NEW ITEMS

Some of the many items described in our current list which you will receive with your parcel

POWERFUL 12V MOTOR was intended for Sinclair Electric Car rating approx 1/2HP. Price £15 plus £2 post.
3 INCH FDD Hitachi ref HFD 3055XA. Ideal replacement or second drive in most computers, especially Amstrad 6128, etc. Price £30 plus £3 post.

SOLAR POWERED NI-CAD CHARGER 4 Ni-Cad batteries AA (HP7) charged in eight hours or two in only 4 hours (It is a complete, boxed ready to use unit. Price £6. Our ref 6P3)

50V 20A TRANSFORMER 'C' Core construction so quite easy to adapt for other outputs. Tapped mains input. Only £25 but very heavy so please add £5 if not collecting. Order Ref 25P4

FREE POWER! Can be yours if you use our solar cells. Sturdily made modules with new system bubble magnifiers to concentrate the light and so eliminate the need for actual sunshine. They work just as well in bright light. Voltage input is 45, you join in series to get desired voltage and in parallel for more amps. **Module A** gives 100mA, Price £1. Our ref. B0631. **Module C** gives 400mA, Price £2. Our ref. 2P199. **Module D** gives 700mA, Price £3. Our ref. 3P42

SWITCH AC LOADS WITH YOUR COMPUTER This is easy and reliable if you use our solid state relay. This has no moving parts, has high input resistance and acts as a noise barrier and provides 4kW isolation between logic terminals. The turn on voltage is not critical, anything between 3 and 30V, internal resistance is about 1K ohm. AC loads up to 10A can be switched. Price is £2 each. Ref 2P183

METAL PROJECT BOX Ideal size for battery charger, power supply etc., sprayed grey, size 8in x 4 1/4in x 4in high, ends are louvred for ventilation other sides are flat and undrilled. Order Ref 2P191. Price £2

BIG SMOOTHING CAPACITOR Sprague powerlytic 39,000uF at 50V. £3. Our ref 3P41

4-CORE FLEX CABLE Cores separately insulated and grey PVC covered overall. Each copper core size 7/0 2mm. Ideal for long telephone runs or similar applications even at mains voltage. 20 metres £2. Our ref 2P196 or 100 metres coil £8. Order ref 8P19

TWIN GANG TUNING CAPACITOR Each section is 0.005uF with trimmers and good length 1/4in spindle. Old but unused and in very good condition. £1 each. Our ref BD630

13A PLUGS Good British make complete with fuse, parcel of 5 for £2. Order ref 2P185

13A ADAPTERS Takes 2 13A plugs, packet of 3 for £2. Order ref 2P187

20V-0-20V Mains transformers 2 1/2 amp (100 watt) loading, tapped primary 200-245 upright mountings £4. Order ref 4P24

BENCH ISOLATION TRANSFORMERS 250 watt 230V in and out with plenty of tappings to give exact volts. £5 plus £2. Order ref 5P5

BURGLAR ALARM BELL 6" gong OK for outside use if protected from rain. 12V battery operated. Price £8. Ref 8P2

24 HOUR TIME SWITCH 16A changeover contacts, up to 6 on/off's per day. Nicely cased, intended for wall mounting. Price £8. Ref 8P6

CAPACITOR BARGAIN axial ended, 4700uF at 25V. Jap made, normally 50p each, you get 4 for £1. Our ref 613

CLEANING FLUID Extra good quality intended for video and tape heads. Regular price £1.50 per spray can. Our price 2 cans for £1. Ref. BD604

PIEZO ELECTRIC FAN An unusual fan, more like the one used by Madame Butterfly than the conventional type, it does not rotate. The air movement is caused by two vibrating arms. It is American made, mains operated, very economical and causes no interference, so is ideal for computer and instrument cooling. Price is only £1 each. Ref. BD605

SPRING LOADED TEST PRODS Heavy duty, made by the famous Bulgin company very good quality. Price 4 for £1. Ref. BD599

CURLY LEAD Four core, standard replacement for telephone handset, extends to nearly 2 metres. Price £1 each. Ref. BD599

TELEPHONE BELLS These will work off our standard mains through a transformer, but to sound exactly like a telephone, they then must be fed with 25Hz 50V. So with these bells we give a circuit for a suitable power supply. Price 2 bells for £1. Ref. BD600

ASTEC P.S.U. Switch mode type. Input set for +230V. Output 3.5 amps at +5V, 1.5 amps at +12V, and 3 amps at +5V. Should be OK for floppy disc drives. Regular price £30. Our price only £10. Ref. 10T34. Brand new and unused.

APPLIANCE THERMOSTATS Spindle adjust type suitable for convector heaters or similar. Price 2 for £1. Ref. BD582

3-CORE FLEX BARGAIN No. 1 Core size 5mm so ideal for long extension leads carrying up to 5 amps or short leads up to 10 amps. 15mm for £2. Ref. 2P189

3-CORE FLEX BARGAIN No. 2 Core size 1.25mm so suitable for long extension leads carrying up to 13 amps, or short leads up to 25A. 10m for £2. Ref. 2P190

CASE WITH 13A PRONGS To go into 13A socket, nice size and suitable for plenty of projects such as battery trickle charger, speed controller, time switch, night light, noise suppressor, dimmers etc. Price 2 for £1. Ref. B0565

ALPHA NUMERIC KEYBOARD This keyboard has 73 keys giving trouble free life and no contact bounce. The keys are arranged in two groups, the main area is a QWERTY array and on the right is a 15 key number pad, board size is approx 13" x 4" brand new but offered at only a fraction of its cost, namely £3, plus £1 post. Ref 3P27

TELEPHONE EXTENSIONS It is now legal for you to undertake the wiring of telephone extensions. For this we can supply 4 core telephone cable, 100m coil £8.50. Extension BT sockets £2.95. Packet of 50 plastic headed staples £2. Dual adaptor for taking two appliances from one socket £3.95. Leads with BT plug for changing old phones, 3 for £2.

WIRE BARGAIN 500 metres, 0.7mm solid copper tinned and pvc covered. Only £3 plus £1 post. Ref 3P31 that's well under 1p per metre, and this wire is ideal for push on connections.

INTERRUPTED BEAM KIT This kit enables you to make a switch that will trigger when a steady beam of infra-red or ordinary light is broken. Main components: relay, photo transistor, resistors and caps. etc. Circuit diagram but no case. Price £2. Ref. 2P15

3-30V VARIABLE VOLTAGE POWER SUPPLY UNIT with 1 amp DC output. Intended for use on the bench for experimenters, students, inventors, service engineers etc. This is probably the most important piece of equipment you can own (after a multi range test meter) it gives a variable output from 3-30 volts and has an automatic short circuit and overload protection, which operates at 1.1 amp approximately. Other features are very low ripple output, a typical ripple is 3mV pk-pk, 1mV rms. Mounted in a metal fronted plastic case, this has a voltmeter on the front panel in addition to the output control knob and the output terminals. Price for complete kit with full instructions is £15. Ref. 15P7

TRANSMITTER SURVEILLANCE (BUG) Tiny, easily hidden, but which will enable conversation to be picked up with FM radio. Can be housed in a matchbox, all electronic parts and circuit. Price £2. Ref. 2P52

- ★ 2m/70cm
- ★ 25 Watts output
- ★ Full duplex operation
- ★ 21 Memories
- ★ 2 Call channels
- ★ Priority channel
- ★ Dual VFO's
- ★ 12.5 & 25kHz steps
- ★ Memory Scan
- ★ Programme Scan
- ★ Memory Skip

£449 inc vat

ALD-24E

ALINCO DUAL BANDER



This transceiver could transform your operating habits! It contains completely separate 2m and 70cms transceivers, permitting full duplex operation. To the un-initiated, this means you can transmit on 2m whilst receiving on 70cms, or vice versa. The built-in duplexer means a single antenna socket with a full 25 watts output on both bands. Measuring only 5.5"x2"x6.5" it is the ideal mobile rig. Its comprehensive memory and scanning facilities provide rapid access to both

simplex and repeater channels on 2m & 70cms. Using the dual VFO's you can instantly switch between 2m & 70cm and the single knob tuning provides simple and quick frequency selection. The large LCD readout incorporates an S-meter and is back lighted. If you are looking for a completely self contained 2m & 70cm station, then look no further. At this price it has to be a bargain. For further details of this amazing transceiver, send today for the full colour brochure.

OUR FAMOUS FREQUENCY MANUALS!

UK LISTENERS CONFIDENTIAL FREQUENCY LIST 5th EDITION

This publication has now sold well over 3500 copies since it was advertised only a few months ago. Now the recent updated version is selling even better. No self respecting listener should be without a copy. If you enjoy exploring the short wave bands then this publication will add to your enjoyment. It covers the hf spectrum from 2 to 30 mHz and gives details of transmissions outside the amateur bands. Specially designed for the UK and European listener it sets out in a very easy way a comprehensive list of hundreds of interesting transmissions that will keep you occupied for days on end! Only a fraction of the cost of other similar publications it contains details of Marine, Air, Military, Embassy, Press and News agencies. Many listings have time schedules included together with comprehensive RTTY details. It tells you the frequencies used by civil and military aircraft whilst flying the Atlantic, when and where to pick up the press bulletins, long distance marine traffic etc and much more. Send today for your copy of this worthwhile publication.

NEW 1988 EDITION £6.95 p&p 90p

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This frequency manual is without doubt the most comprehensive list of VHF/UHF aircraft listings available in the UK. Of vital importance to the airband enthusiast or indeed any keen VHF/UHF listener it sets out in a very easy to follow manner full details of a whole host of stations. Every known UK airfield frequencies, etc. Included are Civil, RAF, USAF, MOD, Naval fields on both VHF and UHF bands. There are also air to air frequencies, the Red Arrows frequency, and much more. Send today for your copy and find out just how much you have been missing!

£5.95 p&p 90p

THE COMPLETE UHF-VHF FREQUENCY GUIDE 26-2000 mHz

New 1988 Edition. Many listeners have asked for a guide to the wide VHF/UHF spectrum and to meet this request we have recently published this frequency manual. It covers the range 26 to 2000 mHz and has been specially prepared for the UK listener. Anybody who has used a scanning receiver will know that the wide frequency range involved means that it is difficult to know exactly where to listen. This guide takes all the guessing out of monitoring. It lists all the services throughout the spectrum together with both simplex and duplex frequency splits. If you've spent your hard earned money on a scanning receiver or are considering buying one you'll find that this publication contains a wealth of information that has previously remained un-published!

£5.95 p&p 75p

HF OCEANIC AIRBAND COMMUNICATIONS 1988 EDITION.

Prepared in response to many requests for more information about the air traffic on the hf bands this little guide sets out to explain to the beginner how the hf band works in relation to air traffic. It contains full details of the world aircraft frequency bands in the range 2 to 23 mHz together with control frequencies and those commonly used for Oceanic control. Also included are many VOLMET frequencies, the Search and Rescue frequencies used by RAF helicopters and Nimrods, the Hf RT network, London Company frequencies, European control centres etc. An ideal companion for the hf airband listener. Send today for your copy.

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