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**Waters & Stanton**  
Radio Communications Catalogue

8 pages of

## antennas in action

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DAVID BUTLER G4ASR  
'DISCOVERS' VHF  
LINEARS

**FEATURES**  
'MAKING IT GO FURTHER'  
G4VFV LOOKS AT VHF  
DXING

**BUILD** TX ON  
THE GDP-430 HAND-  
HELD UHF  
TRANSCEIVER

# LEICESTER SHOW GUIDE

November 1997 £2.20

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### TOP HF Seller ICOM IC-706 MK II



£1049  
Price Match

or £1097 inc 5yr Wtty

160-6m 100W 2m 25W + + +

We are pleased to endorse the performance and design of the IC-706 Mk II transceiver as the best compact hf mobile bar none. It out performs and out specifies any other model. The only choice left is which dealer you buy it from! We offer you an unbeatable price and an unbeatable back-up service plus optional extended 5 year warranty for an extra £98!

### TOP 2m/70cm Mobile Yaesu FT-8100R



£449  
Price Match

or £467 inc 3yr Wtty.

Yaesu's new dual band mobile makes the competition look old and out-dated. You get a detachable head, 300 memories, true dual same band rx, CTCSS encode and the best display in the business. This is proving to be one of the best sellers ever - particularly at Our Price!

### TOP 2m/70cm Handy



W&S  
£279

ADi AT-600  
or £314 inc 3yr Wtty.

Reviewed  
PW August

PW says: "an incredibly well priced radio - amazingly sensitive - audio - worked very well with 12.5kHz channel spacing - An Absolute Cracker"

- \* CTCSS encode/decode
- \* Full DTMF + 1750Hz tone
- \* Alphanumeric memories
- \* Full duplex
- \* CTCSS tone reader
- \* 29 programmable features
- \* AM airband receiver
- \* Rx up to 990MHz
- \* Nicads and charger



### AR-146 2m 50W FM



FULL CTCSS

W&S  
£249

2 Years Warranty

ADi mobiles are outselling all others we stock. You won't find better value or a better engineered product. Take our advice - buy an ADi mobile and keep the change!!

### AR-446 70cm 35W



FULL CTCSS

W&S  
£269

3W Novice version available

### ADi AT-201 2m FM Handy



NEW

W&S  
£149

- \* 40 Channels
- \* CTCSS Encode
- \* CTCSS Decode
- \* DTMF
- \* Channel Reasout or
- \* Frequency Readout
- \* Set to Set Cloning

JUST ARRIVED  
Look at the Features  
Compare the Price

### ADi AT-400 70cm FM Handy



Value

W&S  
£169

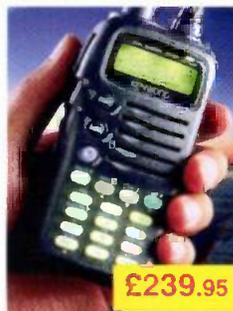
- \* 70cm FM Handy
- \* 2W output
- \* 5W on 13.8v
- \* 1750Hz tone
- \* Illuminated keypad
- \* Ultra sensitive
- \* Wideband Rx
- \* 20 memories
- \* Keypad entry
- \* DTMF
- \* Uses AA cells

Now the standard radio for Novice hams. It's sensitive, cost effective and was featured on Anglia TV

The Novice Rig

### NEW Kenwood THG71E

- \* Dual Band 2m/70cm
- \* 200 memories
- \* Alphanumeric Display
- \* Full CTCSS
- \* DTMF
- \* Up to 6W out
- \* Wideband Receive
- \* Illuminated Keypad
- \* PC Compatible
- \* Windows Programming



£239.95

Send For Brochure

### Alinco Discounts on Handys

#### DJ-C1E 2m



- 2m micro slim handheld 55x94x11mm.
- \* 300mW output \* 20mW audio to headphone
- \* 20 memories \* CTCSS
- \* Repeater shift \* telescopic antenna
- \* AC charger included.

£169.95

#### DJ-S11E 2m

- 2m mini handheld 55 x 100 x 28mm
- \* 340mW \* Built-in speaker \* CTCSS
- \* 3 x AA cells \* Folding antenna
- \* Repeater shift \* 1750Hz tone
- \* 20 memories

£99.95



### Yaesu FT-50R 2m/70cms



Our price goes up next month!

£289  
Price Match

- \* Wideband Rx (AM Airband)
- \* FM Broadcast receive
- \* CTCSS & 1750Hz
- \* 112 Alphanumeric Memories
- \* Dual Watch - Military rated
- \* 5W from 12v DC input
- \* Ni-cads and AC Charger
- \* One of our top 5 sellers!

CT-30 Mic Adaptor ----- £9.00  
CSC-69 Case (FNB-40 batt) --£15.00

UK's Top Dealer for YAESU, KENWOOD & ICOM

W&S

**Send for Brochure**



**505DSP**

Computer HF Transceiver

**Kachina 505DSP HF Rig**

The 506DSP transceiver is remotely controlled (up to 23m away - so no noise problem!) from your computer. Includes 100W transceiver module, operator control head and software. This has taken the USA by storm

- \* 100W all modes \* Runs under Windows 3.1 or 95
- \* Gen. cov. receiver \* Variable bandpass filters
- \* 1Hz tuning steps \* Antenna impedance chart \* RF speech processor \* SWR alarm \* Full DSP \* Full CW break-in \* Electronic keyer \* 100 memories \* Auto notch filter \* control head mounts in PC or on desk.

**Transceiver £1999.00 Available October**  
**Auto ATU £249.95**

**VHF & UHF Band Pass Filters**

Digital Communications

**2m & 70cm**



**NO MORE PAGER PROBLEMS**

We guarantee this will kill all QRM caused by strong out of band signals - - - or your money back!

**DCI-145 £89.95**

- Passband: 144 - 146MHz
- Loss: Less than 1 dB
- Selectivity: -68dB at 136MHz - 55dB at 155MHz
- Power: 200 Watts

**DCI-435 £119.95**

- Passband: 430 - 440MHz
- Loss: Less than 1 dB
- Selectivity: -47dB at 415MHz - 50dB at 455MHz
- Power: 200 Watts

**ICOM IC-207H 2m/70cm Mobile**



**£389 Price Match**

- \* 2m & 70cm
- \* 50W / 30W
- \* Detachable head
- \* Packet 9600 bps ready
- \* 180 Memory channels
- \* CTCSS & 1750Hz tone

**NEW KENWOOD RIG**

**Discount Price**



**W&S £499**  
**TM-V7E**

- \* 144 & 430MHz 50/35W
- \* Dual Rx on same band!
- \* 280 Memories
- \* Detachable front head
- \* CTCSS & 1750Hz Tone
- \* Large clear display

**New Batteries**



- \* Rechargeable Alkaline
- \* 1.5V cells
- \* No memory effects
- \* Charging mid cycle is OK
- \* 5 year charge shelf life
- \* 3 times capacity of ni-cads
- \* Very low cost

This is a brand new technology which has major advantages over ni-cads. Now you get a 1.5v cell that will hold its charge for up to 5 years and has 3 times the current capacity of normal ni-cads. We are offering these at a very special price direct from Canada. In stock now!

**Starter Kit:** Comprise 4 x AA cells and dedicated AC wall charger **£17.99 + £2 p&p**  
**4 x AA cell Packs:** Ready charged. **£4.99 + £1 p&p**

**Special Offer on DIAMOND**



**SX-2000 VSWR Meter**

- \* 1.8 - 200MHz
- \* Auto Ranging (12v)
- \* VSWR, Avge & PEP 5 - 200W

As well as offering normal manual control, the VSWR full scale setting can be achieved automatically when connected to external 12v.

£99.95  
**£75**  
Plus £4 postage

**1998 Catalogue**

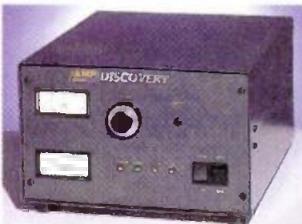


- \* Largest in Europe
- \* 176 Colour Pages
- \* 1000 Photographs
- \* 1400 Products
- \* Technical Specifications
- \* News Snippets

Now established as the foremost equipment guide this edition is completely new with every page in full colour and almost every item illustrated. For the cost of a magazine you can get the best guide ever.

**£2.95 plus £1 postage**

**Discovery 2m & 6m Linears**



**£1395**

Carriage Free

We are pleased to be able to offer these two high powered linears that will

appeal to the VHF DXers. Both are offered carriage free if ordered before end of November.

**2m & 6m Models.**

- \* Input 10 - 35W
- \* Output 400 - 1kW
- \* 3CX800 AT Triode
- \* Tuned cavity (2m model)
- \* Pi-Network (6m Model)
- \* Built-in AC Supply
- \* 3 min switch-on timer
- \* Fan cooled
- \* 330 x 220 x 410mm
- \* Weight 30kg.

**Yaesu FT-840 HF Rig**



**£749 Price Match**

We've purchased a quantity at this special price. You won't get a base station rig any cheaper!

**W-MM1 Multimode Modem**



**W&S £69.95**  
**NEW**

- \* Packet, AMTOR, CW
- \* SSTV, Fax, RTTY
- \* NAVTEX, SYNOP
- \* Transmit and receive
- \* Needs PC 286 or better
- \* Includes software
- \* No external power required
- \* Connects to RS-232

**Kenwood TS-50 HF Mobile**

**Discount Price**



**W&S £769**

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**TOP HF Base Station**

**NEW Yaesu FT-920**



**£1499 Price Match**

**5 Year Warranty £115**

**Yaesu FT-1000MP**



**£1999 Price Match**

**5 Year Warranty on FT-1000MPs £115**

FT-1000MP £2849 £2199  
FT-1000MPDC £2599 £1999

**ICOM IC-756 HF Rig**



**£1895 Price Match**

- \* 100W of pure Magic
- \* 160 - 6M
- \* SSB - CW - AM - FM
- \* Spectrum display
- \* Auto ATU
- \* Superb DSP built-in
- \* CW Memory keyer
- \* 100% duty cycle
- \* Keypad entry option
- \* DXers choice in the USA

**KENWOOD HF RIGS**

**NEW TS-570**



**W&S £1199**

**Price Match**

Kenwoods new transceiver that is earning a reputation for offering one of the best receivers in the business. If you are looking for a hot little number that is not too expensive (Radio we mean!), send for brochure.

**TOP VHF Base Station**

**ICOM IC-821H 2m/70cm**



**£1395 Price Match**

- \* 2m/70cm All Mode
- \* 45/40W adjustable
- \* Full duplex
- \* Satellite features
- \* 160 Memories
- \* 9600bps capability
- \* Electronic keyer
- \* IF shift, noise blanker

**Yaesu FT-736R 2m/70cm**



**Special £1429 Or Better! PHONE**

Offers even better value. The classic 2m/70cm base station that just goes on and on - plus the options of additional band modules.

# MFJ

## Ham Radio Accessories

ORDERS ONLY ON:  
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### MFJ-784B Filter

£239



- Works with any rx. or tcvr.
- DSP filter, fully programmable
- 16 Factory pre-sets
- Plugs directly into audio out
- Drives speaker or headset
- Requires 12v at approx 500mA

### MFJ-1278DSPX Data Unit

£399



- Multi-mode
- Packet
- Amtor
- Pactor
- Colour SSTV
- 10 Modes total
- DSP filtering
- Tuning scope
- Simple to us
- Software

### MFJ-948 HF ATU

£129



- 300 Watts PEP 150W CW
- 1.8 - 30MHz - with ease!
- Wire, coax or balanced line
- Balun included for best match
- 30 / 300W power meter - PEP / RMS
- Antenna selector, by-pass etc.

### MFJ-781 DSP Filter

£139



Just arrived, this new DSP filter that is specially designed for CW and data modes.

- Digital Audio Filter
- CW 50, 100, 200, 500Hz
- Amtor, fax, GTOR, PACTOR
- RTTY, SSTV, We-FAX

### MFJ-949 HF ATU

£149



- 160 to 10m 300W PEP 150W CW
- Wire, coax or balanced feed
- Built-in Dummy Load
- 30 / 300W power meter - PEP / RMS
- Antenna selector, by-pass etc.

### MFJ-914 Auto Match

£59.95



Your Auto ATU will now match any aerial when used with this.

**Auto-Tuner Extender**  
Connect between auto tuner and transceiver - no more problems with G5RVs and all those difficult antennas - 160 to 10 metres

### MFJ-812B 2m VSWR

£36.95



- 144 - 148MHz 30 / 300W
- Forward & Reflected Power
- Reads field strength
- Easy to use - convenient size
- Low cost - efficient accessory

### MFJ-921 2m ATU

£69.95



144MHz 200W antenna tuner that helps you get a perfect VSWR every time. Includes VSWR and power meter and fitted SO-239 sockets.

### MFJ-259 HF Analyser

£229



- 1.8MHz - 170MHz
- Digital Readout
- Resonance
- VSWR
- Impedance
- AA batteries or 12v external

Connect to aerial or coax and adjust it in seconds. Turns hours into minutes and ideas into antennast

### MFJ-864 160M to 70cm

£79.95



- All bands from 1.8MHz to 440MHz
- Cross needle meter - 30 / 300W
- Comprehensive user calibratable
- Separate HF and VHF/UHF sensors
- Illuminated meter (ext. 12V)
- Everything you need in one box. 185 x 65 x 75mm

### Ameritron 811 1kW

Price Down!



The only currently available HF linear to have passed a full lab. CE test

- 1 kW linear 9dB Gain
- Like a 5 element Monobander!
- Uses low cost 811A tubes
- Built-in rugged AC Supply
- Instant by-pass switch
- PA V/A meter + Grid meter
- Over rated variable capacitors
- Fan cooled for long life
- Very efficient - 600W output
- Easy to tune and connect
- Size 16" x 13.75" x 8"

160 to 10M of DX-Getting Power  
Perfectly matches all 100W rigs

£799

### MFJ-901B HF Atu

Price Down!

£69.95



### MFJ-941E Atu

Price Down!

£109



- 160m to 10m ATU - 300W
- Wires, Coax and Balanced Feed
- Cross Needle VSWR & Power
- 3-Way antenna selector
- By-pass position - Dummy load socket
- Internal Balun - 30 or 300W position
- 260 x 180 x 70mm

### MFJ-16010 Wire Tuner

£44.95



Covers 1.8MHz to 30MHz and matches any random wire to your hf transceiver. Handles 300 Watts and fitted SO-239. Ideal for portable work.

### MFJ-713 Intermod Filter

Price Down!

£64.95



A three section high-Q bandpass filter for 145MHz handhelds. Includes rf sensing.

- 144 - 148MHz
- Up 20 50dB rejection
- Defaults to "thru" when off
- Minimum rf T/R required: 50mW
- BNC termination
- Power: PP3 (not supplied)
- Size 70 x 50 x 45mm

### MFJ-250X 1kW load

Price Down!

£34.95



- 1kW Dummy Load
- Oil cooled design
- SO-239 socket
- Ideal for linears
- 1MHz to 400MHz

\* Oil is not supplied

### MFJ-260C 300W

£34.95



- Dummy Load
- 50 Ohm
- 300W
- OK to 450MHz
- Air cooled
- SO-239
- Totally enclosed
- Essential item

### MFJ-704 LPF Filter



- Low pass filter
- 1.8 - 30MHz
- Cleans up output
- Reduces TVI
- 1kW rating
- SO-239 sockets
- Fully shielded

### MFJ-418 CW Tutor

£79.95



This tutor has taken the USA market by storm. There has never been a better way or more convenient way to learn the code. Unlike other tutors this one not only sends random characters and groups, it also sends complete QSOs, just like the real test. And no QSO is ever the same!

- Displays words, letters and numbers
- 3 to 35WPM with natural CW note
- Various modes including Farnsworth
- Enormous vocabulary of words
- Actually sends complete QSO
- Characters or groups
- Headphone socket; Powered from PP3
- Sends text just like an actual test
- A tutor that displays what it sends.

### MFJ-9406 6M Trancvr.

£249



- 50 - 50.3MHz 10W SSB
- RF speech processing
- 10MHz xtal filter
- Super performance
- Ideal way to 6M DXing

# Waters & Stanton PLC

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# PRACTICAL Wireless

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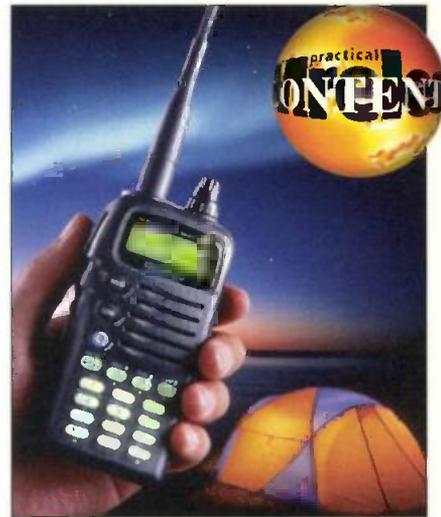
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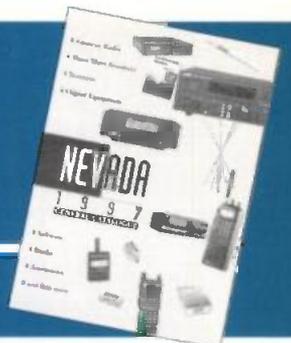


100 ADVERTISERS' INDEX

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**NEW 32 page  
AUTUMN catalogue  
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## ALINCO HOT PRODUCTS

### DX-70TH

HF Transceiver with 6 mtrs

**£775**  
£8 P&P

- All HF Bands 100W output
- 50MHz 100W output
- General coverage RX
- Remotable front panel
- Receiver pre-amp
- Filters fitted as standard
- Superb TX audio and RX
- Good RX sensitivity
- Full break in on CW
- Speech compressor
- 100 memory channels
- All modes: USB, LSB, CW, AM, FM
- All mode squelch
- CTCSS encoder
- Noise blanker
- Scan facilities
- Quick offset for DX pile-ups
- IF shift control
- Antenna sockets for HF and 6M

### DX-70T

100W HF + 10W 6mtr TX

**£695**  
£8 P&P

Alinco's 10W on 6mtrs version of the DX-70 TH above. Narrow receive filters and CTCSS fitted as standard.

### DR-M06TH

6mtr FM Mobile  
50-54MHz

**£249.95**  
£8 P&P

With the new 6 metre repeaters now up and running, this is the ideal radio for the Band. With an optimised receive front end, CTCSS and easy to use controls you will be amazed at the range achievable.

- Repeater shifts
- 100 memories
- CTCSS encoder
- Time-out-timer
- Output 20W

### DR-605E Dual Band Mobile

**£399.95**  
£8 P&P

Easy to use twin band mobile TX that delivers both high power and performance with user friendly features.

- 50W (2m)-35W (70cms)
- 100 memories
- Full Duplex
- CTCSS encoder fitted

### DR-610E Twin Band Mobile

**£499.95**  
£8 P&P

- 136-174/420-470MHz FM
- Channel Scope
- Full duplex
- CTCSS encoder
- AM Airband RX
- 120 memories
- VHF 50W/UHF 35W max

### DJ-G5EY Dual Band Handheld

A brilliant twin band handheld that does everything including spectrum display of adjacent channels. The RX has a superb front end that does not suffer with breakthrough like other handhelds & has CTCSS/DTMF built in as standard.

**£299.95**  
£8 P&P

- Spectrum channel display
- Optional extended receive including Airband 108-173.995MHz 400-511.995MHz 800-999.990MHz
- Full VHF/UHF Duplex
- Over air cloning • Cross band repeat
- Up to 5W RF output • 100 memories

### DJ-191E 2 Metre Handheld

A new slim line 2 metre handheld that's easy to use and has an enormous clear display.

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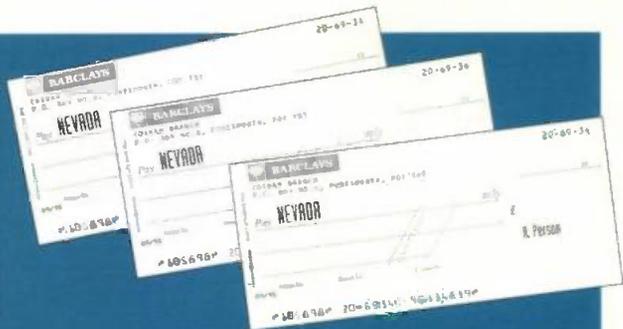
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- Built in 4:1 Balun for open wire feeders or balanced line fed antennas.
- Bypass position for quick straight through antenna connection but still with SWR/Power monitoring.
- 6 position antenna selector switching.
  - Direct coax 1, coax 2, bypass.
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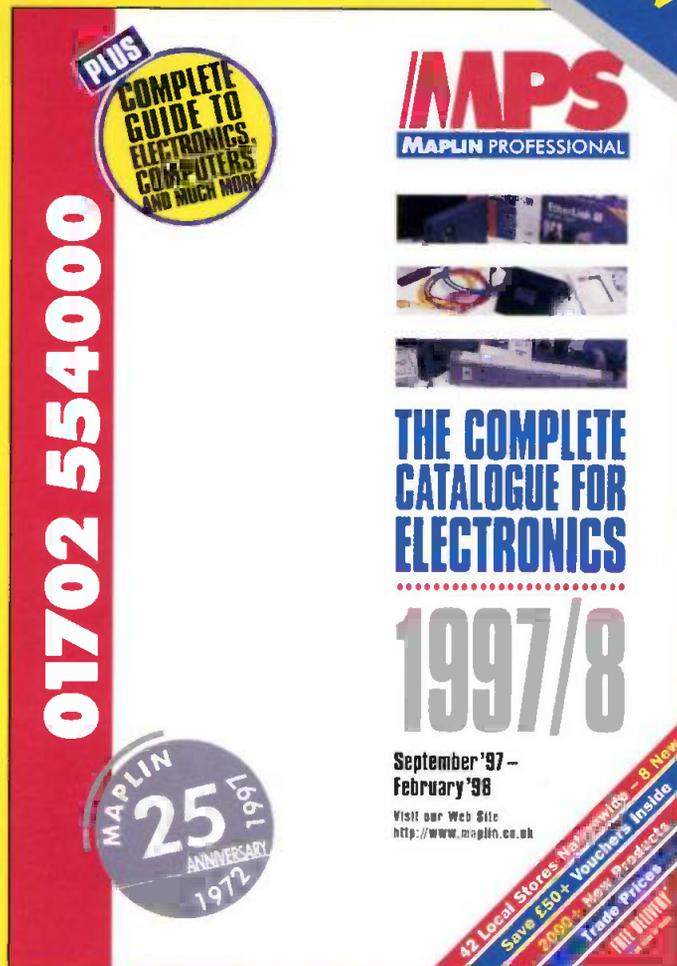
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# EDITOR'S Keylines

Rob Mannion's viewpoint on the World of Amateur Radio



As I write this edition of 'Keylines' I've just returned from a delightful short holiday in North Wales (yes you've guessed it...I was visiting the various Welsh Narrow Gauge railways!) and during my week's break I 'rediscovered' an aspect of Amateur Radio I've not really enjoyed properly for many years - operating *IP*.

Operating as a 'Stroke Portable' station used to be quite awkward years ago with valved equipment, yet despite the fact that modern rigs only require 12V, are small and easy to use...working *IP* does not seem to be all that popular. In fact, this point was brought home by several of my 3.5MHz contacts mentioning the fact that we don't hear people operating 'out and about' on h.f. very much nowadays.

During my week in Wales I had one particularly bad spell of rainy weather during one whole day...so I chose a nice lay-by right next to Lake Celyn (Llyn Celyn) near Bala and got soaking wet setting up my temporary wire antenna. It was worth it and I spent many hours on the air using 3.5, 7 and 14MHz chatting to friends old and new. I thoroughly enjoyed myself!

While on the air I disgusted a Dutch visitor who had come to watch what I was up to. This happened when I worked an Amateur in central Holland who reported bright sunshine and 25°C in Holland...my visitor was most disappointed (and got very wet) to hear the news!

I very nearly didn't take my Alinco DX-70 and bits and pieces...but I'm pleased I did because it was marvellous to sit back and chat on the air. And in fact I enjoyed it so much (particularly the next day when I operated *IP* a few feet from the narrow gauge track of the Bala Lake Railway, and within a few feet of the water) I'm going to design a much more convenient portable antenna system which I intend to share with readers in the hope that you'll join me on working *IP* from your own stations. It's just like discovering Amateur Radio all over again!

## My Mistake

Quite a few readers (some in the USA) have contacted *PW* to point out my mistake in the September issue of 'Keylines' regarding the American *Radio Amateur Call Book* and the separate ARRL publications. And I'm afraid to say that although of course I knew that the 'CallBook' is published by a separate organisation I wrote the comment in a confusing fashion. Sorry about that (Editor's mistakes are published for all to see!).

The correct information is that both the publishers mentioned have decided to place their important publications on CD ROM disk only. In the case of the 'Callbook', the publishers are discontinuing it in book form from next year. It's only going to be available on CD. So, if like me you think this is a mistake...write to them at **Radio Amateur Callbook, Watson-Gupthill Publications (A Division of BPI Communications Inc.), 1515 Broadway, New York 10036 USA.**

The ARRL also plan to discontinue their *ARRL Handbook For Radio Amateurs* as a book in the near future. This will then only be available as a CD ROM disk. Again if you want to register your dismay write directly to the **American Radio Relay League Inc., 225 Main Street, Newington, Connecticut 06111 USA.**

## Palstar Review

I'm sorry to say that the review of the Palstar KH-6 50MHz hand-held transceiver promoted in the 'Coming Next Month' section in the October issue, has had to be held over. Again, I apologise for this but the reviewing author **Richard Newton GORSN**

suffered an embarrassing computer 'crash'!

Computers 'go down' at the worst moment don't they? And what with the news coming directly after holidays (we shouldn't really take holidays in this job!). **Donna Vincent G7TZB** (the real day-to-day 'boss' as News & Production Editor) and I took the decision to hold the review over because this new transceiver needs and deserves the 'full' evaluation treatment. I feel sure you'll understand the reasons behind our decision.

## Out Of Production

Would you believe it...the *PW* integrated circuit 'curse' has struck again! This time it's the wonderfully versatile ZN414, ZN416 family of complete-radio-on-a-chip i.c.s that are no longer being made.

So, if you're intending building the 'Matchbox Midget Receiver' featured in October's issue - do so soon. Maplin Electronics confirm they still have ZN416E (the ZN414 with 18dB audio amplifier in an 8-pin DIL package) but supplies are limited as the series are no longer in production (what a shame!). If you know of a source of ZN414s or ZN416E chips, other than that mentioned please contact me at the *PW* office.

## RSGB Invitation To Editor

Some months ago I was approached by the RSGB to check whether or not I would accept an invitation to join a special Presidential Working Group. The Working Group is being formed to consider what the position of the Society should be in the light of the changes that have taken place in Amateur Radio over the last decade

and what changes may be expected in the next decade.

Writing to formally invite me to participate, the 1997 (and 1998 - see news pages) **RSGB President Ian Kyle G18AYZ/M10AYZ** (Yes - Ian has kept his famous G18 call too!) informs me that the remit from RSGB Council is wide but of course one of the main items will be the RSGB's stance in the lead-up to the forthcoming World Radio Conference in 1999.

On behalf of *PW* readers, I'm delighted to accept the offer from Ian Kyle and I have replied to the President in this respect. I will of course keep you all informed once I know the specific items the Working Group will be discussing before our report is presented in July 1998.

## Reader's Views

In the meantime, I have no doubt that many readers will continue to keep me informed of their views on the hobby. And now that I'm to be so closely involved with other people in looking forward to the future of our hobby - I've no doubt that the flow of comments will increase.

There are many advantages to the RSGB's 'open approach' with the new Working Group. They include useful new input from many new sources, ready access to publicising their activities on our behalf via my involvement and *PW*'s reporting and (hopefully) the final silencing of the 'them and us' fears and attitudes and the 'not invented here' syndrome I've often mentioned in connection with the Society.

Yes, I really think that by working together we can all ensure the future of our wonderful hobby. And you can be certain I'll keep you all fully informed of what's going on because it will be to the advantage of everyone involved in the hobby.

*Rob Mannion  
G3X7D*

The Star Letter will receive a voucher worth £10 to spend on items from our Book or other services offered by Practical Wireless. All other letters will receive a £5 voucher.

# RECEIVING You

PW's Postbag If your letter is published you'll win a prize.

## Letters Received Via The 'Internet'

Many letters intended for 'Receiving You' now arrive via the 'Internet'. And although there's no problem in general with E-Mail, many correspondents are forgetting to provide their postal address. I have to remind readers that although we will not publish a full postal address (unless we are asked to do so), we require it if the letter is to be considered. So, please don't forget to include your full postal address and call sign along with your E-Mail hieroglyphics! Editor

## This Month's Star Letter

### Helpful PW Reader

Dear Sir

Two years ago I was given a Cossor 501AX 'Melody Maker' domestic receiver from the 1950s. I managed to get it working and fully restored but was faced with the problem of cleaning the glass frequency scale panel which was badly stained.

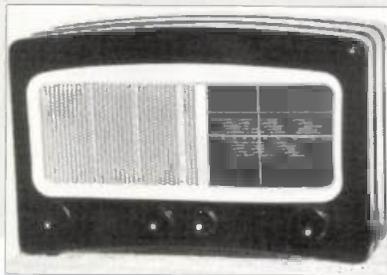
I took the normal precautions, like not rubbing or using detergents and just placed it under the cold water tap and run the water. Imagine my horror when all the printing just floated away down the plug hole! When I recovered from my shock, I wrote an 'SOS' to all the old radio dealers I could think of, but the months passed and I had no response.

Then I thought of 'Bargain Basement' and I wrote an appeal for inclusion in the 'Wanted' section, which was subsequently published in the July 1997 issue. It was a desperate shot in the dark and I honestly did not have much hope of getting any feedback.

I was pleasantly surprised and you can imagine my excitement when I received a reply from Mr A. P. Rice in Nottingham who provided me with the seemingly irreplaceable frequency scale, free of charge. Thanks to Mr Rice and Practical Wireless I was able to complete the restoration of this Grand British Radio.

E. Stagnetto ZB2FK  
Gibraltar

Editor's comment: Mr A. P. Rice of Nottingham stand up and be applauded in the name of the radio hobby Sir! And it was our pleasure to help you too Mr Stagnetto.



### USA Licence Classes

Dear Sir

I am licensed in both Canada and the USA. Several times in your magazine authors have made reference to the different American licence classes. In the last issue they said there were four and this is incorrect as there are six. They are: Novice, Technician, Technician Plus (technician with novice h.f. privileges), General, Advanced and Amateur Extra.

In another issue, there was reference made to the US call districts. The author wrote that New England was in the second call district and New York

the first. This too is incorrect. New England (Vermont, Massachusetts, New Hampshire, Connecticut, Maine, Rhode Island) are in the first call district, i.e. W1 and New York and New Jersey are in the second, i.e. W2.

I am sending this just to set the record straight and to help. I will be in London on September 8, 1997 using VE2SKA with the appropriate reciprocal suffix operating a 7MHz c.w. QRP radio and will try to work some Europeans and maybe even you!

I take your magazine with me always as I need the addresses of the various dealerships with me. That's all for now, the

magazine is great (especially 'HF Far & Wide').

Steven Kaufman  
VE2SKA  
Canada

Editor's reply: Sorry about our mistake Steve and thanks for your help and I hope you let 'HF Far & Wide' know how you got on with your QRP c.w. operations here in the UK during your visit!

### Anyone Out There?

Dear Sir

With regard to the mention, page 9 September issue of PW, of the 1898 enthusiast, a Mr M. J. C.

Dennis, reported as the very first Radio Amateur that ever was, the question arises: To whom did he call CQ for? Like walking on the moon and climbing Mount Everest, no one ever remembers the second one there!

Ben Nock G4BXD  
Worcestershire

Editor's reply: Okay Ben...you've made your point, and in reality of course it's a good one! But of course, in practice Mr Dennis was actually transmitting to himself! (to a test receiver a short distance away). All will be revealed eventually, but in the meantime keep listening on frequency please!

### Vintage Valve

Dear Sir

I am writing with reference to the very interesting item on page 60 of the July 97 issue. This was in 'Valve & Vintage' by Charles Miller. On the right-hand side of page 61 is the advert for the then early versions of the Two/Three pin valve of the day.

Upon looking through some of my valves, I found that I still have one of these. This is a Marconi 625, which was in a box with the name and address of The Radio Valve Co/Ltd Liverpool Road, Highbury, London N7. As a point of interest, my first valve was given to me by my then science/chemistry master at school.

At some risk, I would now like, if I may, to comment on a couple of points that have come to mind upon reading the very well prepared 'Restoring Valved & Vintage Memories' article

on page 36 of the Aug 1997 PW by Ian Liston-Smith G4JGT.

Since a number of the radios restored, were EKCO I wondered, if the author has come across any of the then very advanced automatic motor tuned sets, one of these as I recollect, was the PB 279, some of these were very ingenious. I think it could be of some considerable interest for people who are of like mind/restorers to learn of these.

One other point that I would like to mention is the following. Where possible, use a rubber mat on a stone or hard floor and if you have to hold a shaft without a knob attached, put one hand in your trouser pocket.

Also, it was common practice to put some bees wax into the grub screw holes, which held the knob onto a shaft. This was done to prevent any part of the hand coming into contact with a chassis which due to the mains being the incorrect way round which would cause a person being across the 240V mains.

In order to prevent the wax falling out, take a short length of tinned copper wire, about 18s.w.g., and wind about an inch around the iron bit, now bend the remainder of the wire down, and forward, use this to heat the wax so that it runs into the screw top. This can always be got out with a small grubscrew driver in order to remove the knobs.  
P. D. Balding  
Essex

Editor's comment: I once saw one of the magnificent motor-tuned radio receivers in action. (I seem to remember it

had a front panel rather like one of the Wurlitzer cinema console organs). Perhaps a reader has a photograph or memories of one of these magnificent creations?

## Old & Hoary?

Dear Sir

In the August 1997 issue, there were three letters discussing Morse, one touching on the December 1996 RAE and one commenting on the expense of radio today. Each of these subjects could be classed as 'Old' or even 'Hoary'. But they do keep reappearing.

Surely there are not **STILL** folk out there who feel that the Morse question needs sorting, or that our interest in limited to the rich? And that anyone would dare to question the wisdom of the 'Powers That Be' in setting the RAE surely only measures the intelligence of the inquirer?

After all, questioning such matters is rather like objecting to paying a profit on water or expecting folk to raise their young with some respect for the rest of society. It is out of fashion.

What does it matter if the older amongst us can't afford equipment, or lack the sharpness to pass the current qualification requirements? In the end, they will all disappear as so many have before them.

What does it matter if the younger amongst us lack the funds, jobs or education to deal with the same problems? After all, the current system is completely fair, is it not?

And in the end, it is clearly far more important that we maintain the oldest standard method of communication available. Morse, than worry our silly heads about real modern world-wide communications which all governments would

happily see removed anyway. Indeed, why not bring back Semaphore?  
**Dick Railton GW6RXA  
Wales**

## Broadcast Reader

Dear Sir

I am writing as a reader of *Practical Wireless* magazine and a short wave listener. I have just got round to reading the July issue of the magazine (I'm afraid I'm behind with my reading!) and would like to say how much I enjoy reading your 'Broadcast Round-Up' page.

I have noted your notes on the Voice of Russia summer schedule, and you wonder how well it can be received. On Tuesday 5 August 1997, I spent some time listening to this service and can say that the reception heard in Walsall us very good, quite clear and hardly any interference, some examples of the bands I received it on were the following: 1600-1700hrs on 9.765MHz and 2100-2200hrs on 9.775 and 11.840MHz.

The equipment I am using is a Yaesu FRG-8800 and 22m long wire. Hope this information is of use. I may say that I enjoy reading *Practical Wireless* and your sister magazine *Short Wave Magazine*. Best wishes to you and the magazines for the future.  
**Edward H. V. Harris  
West Midlands**

**Editor's comment: It's good to hear from you on this aspect of the hobby Edward. Keep listening, and we're passing your letter onto Peter Shore our broadcast bands specialist author.**

## Health Hazards

Dear Sir

**Gordon King G4VFV** does us a service by pointing out that much of the concern about the alleged hazards from power lines and other sources of electromagnetic radiation have been fuelled by media hype. We need to get the right perspective on the problem and this can be done by looking at mortality tables.

For instance, in 1990 (as published in *Whitaker's Almanack* 1993 edition) the leukaemia deaths for England and Wales were 3488 in a total number of deaths of 564,846 or 0.62% which represents .007% in a total population of 489,960,000! Other neoplasms of stomach, respiratory organs, breast and uterus are larger. No distinction is made on the possible causes, so if any are due to EM radiations they must be less.

The original Denver investigation is an example of a bad epidemiological conclusion. As I understand it, Wertheimer and Leeper noticed that a cluster of childhood leukaemia occurred in houses to which overhead power lines were connected but these could not have been the only houses so supplied.

From what I have read, nowhere do they refer to other possible causes of the condition such as radon gas emanating from the soil. Colorado state is high in the Rockies and is a considerable source of many minerals such as silver, lead and uranium.

Ionising radiations could be prevalent and could affect underground water supplies. I have never seen this possibility mentioned. Most lay people, including journalists, confuse the two types of radiation.

Having been one of several people, in my apprentice days, to have experienced full body heating from a 16kHz source, with no apparent ill effects some 60 years later, I am sceptical that the normal level of EM radiations that we experience in our daily lives do have any ill effect.

*The British Medical Journal* (2 February 1991) quotes parental smoking before conception and during pregnancy as causes of many childhood complaints including leukaemia and none of the classic Scandinavian reports mention that this factor was eliminated from their research. What one does show (*Lancet* November 20 1993) is that, although the use of electricity has increased many fold, the incidence of childhood cancers has remained stable.

A recent study (*Radio Science* January-February 1997) by extrapolating the 'safe' distance from 60Hz, 200/400kV, line of 50 metres, suggests that the safe distance from the United States Annapolis v.l.f. station is 46km. The three comparable stations in this country are well within that distance of resident populations and no high incidences of any problems in the several locations have been reported over the 70, 55 and 37 years, respectively, that they have been operating. This statement I would dismiss as poppycock!

When it comes to the alleged higher

than normal incidence of leukaemia amongst radio enthusiasts, I suggest that no controlled experiments have been conducted. If they were, they might find other causes equally to blame. For instance, how many shacks have adequate ventilation to remove soldering fumes? So, carry on 'hamming' boys and girls but fit a chimney above your soldering iron!

As regards proximity to electrified railway lines, the staff unions have no knowledge of any problems and this goes, too, for the continental lines which have been electrified for a longer period. On planning grounds an inspector overturned a refusal to build houses near a 400kV line in Alyn District and the High Court have turned down an objection to an underground super-grid line in North London.

So, at least one can say the case is not proven but until someone can produce impeccable evidence of causation, which eliminates all other possibilities, I remain an unbeliever.

**S. F. Brown G4LU  
Shropshire**

Dear Sir

I have just read the article 'Health Hazards - What Level Radiation?' in the September edition of *Practical Wireless*. I want to thank you for clearing up some of the ambiguity and confusion surrounding the subject that I pointed out in my letter (published July 1997). It's good to get some clear cut advice and information on the subject, although I still intended to 'play safe' with the radiation that I am responsible for myself, at least I know what I am dealing with.

Since I last wrote to you, I received my RAE pass slip and am now licensed as MMOB DK. I would like to thank all the local Radio Amateurs in my area who helped me towards my 'A' licence, so that I too can participate in this exciting hobby.

As far as rigs are concerned, I don't have anything for h.f. yet, (I may have to buy second-hand, depending on my budget!) but for v.h.f./u.h.f. I have an Alinco DJ-G5 hand-held. I am very impressed with its features, performance and size. It suits me well.

Thank you once again for helping to clear up the confusion over e.m.f. and keep up the good work with a great magazine!

**Iain Hutchinson MMOB DK  
Inverness**

**Editor's applause: Congratulations on getting your callsign Ian! I've no doubt you'll soon make your mark and will probably even commandeer the Kessock Bridge near Inverness and its towers for your antenna system. Or have you got your eyes on the Rosemaerkie TV/Radio broadcasting mast instead? And if you wish to borrow it, my KW2000A s.s.b./c.w. transceiver is available to get you on h.f. until you buy or build your own rig. Let me know if it's needed.**

Send your letters  
to the *PW*  
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it clearly for  
'Receiving You'



# NEWS

## 1997

Compiled by Donna Vincent G7TZB



### First In 47 Years

**Ian Kyle G18AYZ/M10AYZ** the 1997 President of the Radio Society of Great Britain is set to become the first RSGB President to serve a second 'follow-on' term since 1951. The last RSGB President who served consecutive terms was **William Scarf G2WS**, President in 1950 and 1951.

The 'new' President for 1998 was elected at a historic RSGB Council meeting on July 19. His second term of office 'follows' on in January as is usual.

I take the opportunity in wishing Ian Kyle the very best wishes for his second term of office from everyone at *PW*. He's going well prepared for a 'double' Presidential 'helping' as he's taking his two call signs with him! Good luck Mr President.

G3XFD

Left: Ian G18AYZ/M10AYZ addressing the Bangor Radio Society (photo courtesy of Stewart Mackay G14OCK).

draft proposals to be discussed at the meeting together with a map is available from the newly appointed WAB secretary **Graham Ridgeway G8UYD**, 6 Rosewood Avenue, Blackburn, Lancs BB1 9SZ.

Please note that the WAB Awards Manager has changed her address. **Kate Wragg G0FEX** has moved to 11a Fall Road, Heanor, Derbyshire DE75 7PQ and all correspondence should be addressed as such. Any mail sent to her previous QTH will be redirected.

### Buyer Beware!

If you're currently searching around radio rallies, car boot sales etc.. for Eddystone radios please take note of the following news we've received from **Graeme Wormald G3GGL** of the Eddystone User Group.

Around 1983 Eddystone Radio introduced their first microprocessor- controlled I.f.-h.f. communications receiver, the 1650/6. It was built to the highest professional standards and sold in many different versions, including the 1650/6, a special classified version for the British Government. The 1650 series went out of production a couple of years ago.

### Kanga Closures

Don't be misled by the heading of this story. Kanga Products of Seaview House, Crete Road East, Folkestone, Kent CT18 7EG are not closing down, just having a well deserved holiday! **Dick Pascoe G0BPS** has informed the Newsdesk that Kanga Products will be closed between 1st and 17th October and again between 21st and 29th October 1997. However, you can catch the Kanga team at the Rochdale QRP Convention on October 25.

### Sussex Communications

Bredhurst Electronics have recently relocated and changed their name. They are now known as **Sussex Communications** and are situated at 5a Hazelgrove Road, Haywards Heath, West Sussex RH16 3PH.

**Graeme Bowring** of Sussex Communications hopes the move has not inconvenienced their existing customers and looks forward to continuing to provide service to them and also to new customers in the area. To find out more about Sussex

Communications why not give them a call on (01444) 443440 or drop them a FAX on (01444) 443222.

### Extraordinary Meeting

The Worked All Britain Awards (WAB) Group will be holding an Extraordinary General Meeting on **Sunday 16 November 1997** at the **Chilwell Scout Hat**, Attenborough Road, Chilwell, Notts at 1pm.

The meeting has been called to discuss and vote on changes within the WAB. A copy of the

### New Communications Receiver

A new communications receiver has just been launched by **AKD** of Stevenage, Herts. The **HF3E** is the latest in the AKD range and is modelled on the already popular HF3 and HF3M receivers.

The HF3E has several visual differences from its stable mates, the main one being the change in case colour from grey to black, making this new model easy to distinguish and to present a sharper image. The buttons and display lens have also undergone changes and the unit also has a tilt foot that folds out from under the receiver to give a good display angle which clips out of the way when not required.

Other updates from previous models include the SO239 type antenna connection. A long wire antenna with phono connector is still provided and an SO239 to phono adaptor is included. There is also a data output socket which enables the unit to be connected to a computer.

The HF3E has a frequency range of 30kHz to 30MHz. The unit costs **£299 inc. VAT plus £6 P&P** and is supplied complete with: a long wire antenna, antenna adapter, data lead (25 way to 9 way), disk containing ©Receiver Control Software, Data lead 9 way to 3.5mm jack, Weatherfax Software (Tarfax), power supply and instruction manual.

The HF3E receiver is available now either direct from **AKD, Unit 5, Parsons Green Industrial Estate, Boulton Road, Stevenage, Herts SG1 5QG**. Tel: (01438) 351710 or FAX: (01438) 357591 or from any of their approved dealers. *Editorial Note: PW hopes to review the HF3E in next month's issue.*



A considerable number of the 1650/6s have found their way onto the surplus market and are being offered for a fraction of their original cost. This may appear to the buyer that they are picking up a bargain but in actual fact the 1650 model is so specialised it is in fact useless to the Radio Amateur. Many of the facilities such as mode selection, bandwidth selection, scanning and variable tuning are missing from the set.

The Eddystone Company are unable to supply information on how to convert the 1650 set into a standard model despite receiving various requests. Anyone buying a Eddystone 1650/6 should realise that they are purchasing a collectors' item rather than a general purpose receiver.

The asking price for a surplus 1650/s is in the region of £300, which is a lot of money for a non-starter, especially if you think you're getting a bargain. So, 'Buyer Beware'!

### Waters & Stanton Catalogue



By now you will no doubt have looked through your Free 16-page Waters & Stanton Catalogue and found it to be of interest. The free catalogue is a condensed version of their 176 page full colour catalogue, which contains in the region of 1000 photos.

Waters & Stanton believe their latest publication to be the largest and most comprehensive Amateur Radio catalogue in Europe. Contained within its pages are sections giving detailed information including technical specifications on antennas, kits, amplifiers, audio and accessories. So, if this month's free gift has whetted your appetite you'll no doubt be wondering how to get your hands on the full version.

Copies of the full Waters & Stanton Radio Communications Catalogue are available for **£2.95 plus £1 postage UK** (readers in mainland Europe add **£2.75 P&P, outside Europe add £5 P&P**). To order your copy contact Waters & Stanton at **22 Main Road, Hockley, Essex SS5 4QS. Tel: (01702) 206835, FAX: (01702) 205843.**

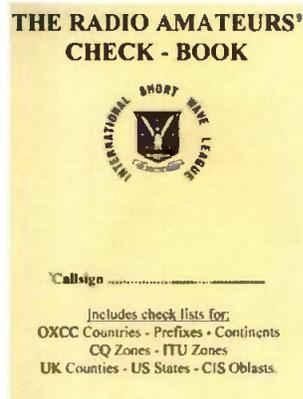
### Wireless Works

Jo Harris of the Wireless Works in Cornwall has recently informed the Newsdesk that they stock a wide selection of valves, (including EF91s), valve data and a variety of other components. In addition to this, the Wireless Works offer a restoration service for wireless, hi-fi and electrical equipment.

Jo and the 'team' also have a fully equipped p.c.b. prototyping facility, all they need is the artwork to produce your board. All p.c.b.s are supplied etched but undrilled at a cost of £11 for a single-sided board or £17 for a double-sided board plus the price of the blank p.c.b. Also offered is a p.c.b. design facility if required.

Everything from the Wireless Works is available mail order and on receipt of an s.a.e. they will send interested home-brewers a leaflet with details of all services offered. For more information contact The Wireless Works, 48A Fore Street, Bugle, Cornwall PL26 8PA. Tel: (01726) 852284.

### Amateurs' Check-Book



The International Short Wave League (ISWL) have just added a new publication to their comprehensive list. The *Radio Amateurs' Check-Book* has been produced from an idea originally thought of by Mike Newell G1GHD and is designed for use

### Packet Donation

BayCom is a group of German Amateurs who formed in 1991 to develop and market simple and cost effective solutions for Packet radio. They have designed and marketed a variety of hardware and software solutions and the proceeds from these have been used to finance further developments and to continue to establish an efficient Packet network in Southern Germany.

The North West Packet User Group (NWPUG) have been an authorised distributor of BayCom kits in the UK since 1993. This has helped to raise funds for the group and has meant that Packet enthusiasts in the UK and Eire have been able to obtain kits.

Earlier this year Johannes Kneip DG3RBU, a founder member of BayCom and designer approached the NWPUG with the offer of them making a hardware donation to a UK node project as a thank you for their support. So, at the Ham Radio '97 exhibition held in Friedrichshafen, Germany Andrew Sinclair G7HUD Chairman of the NWPUG was presented with the hardware donation which will be used to build a proposed 'SuperNode' at Winter Hill, Bolton.



Andy G7HUD (left) receives a hardware donation from Johannes DG3RBU of Baycom at Ham Radio '97 earlier this year.

by licensed amateurs and short wave listeners alike. (The book is prepared ready for the operator to fill in as they go, hence the name 'Check Book'.)

The A4 sized publication has check lists for DXCC Countries, Prefixes, Continents, CQ Zones, ITU Zones, UK Counties, US States and CIS Oblasts. All the lists are printed on colour coded pages for quick and easy reference.

The *Radio Amateurs' Check-Book* is only available from the ISWL for £4 inc. P&P UK and Europe, or £4.50 inc. P&P outside Europe. To order your copy contact the ISWL HQ at 3 Bromyard Drive, Chellaston, Derby DE73 1PF.

### Get Moving On 'Six'

Nevada have just added the new Alinco DR-MO6TH mobile transceiver to their range of products.

The DR-MO6TH is a 20W 50MHz (6m) transceiver which features built-in CTCSS. Features include 100 memories, time-out timer and 20W of output power.

With the introduction of the 50MHz repeater system in the UK, many radio amateurs will no doubt be looking for a way to 'get moving on six' and with a price tag of £249.95 the DR-MO6TH could be the answer. For more information contact Nevada at 189 London Road, North End, Portsmouth, Hants PO2 9AE. Tel: (01705) 662145/613900 or FAX: (017050) 690626.



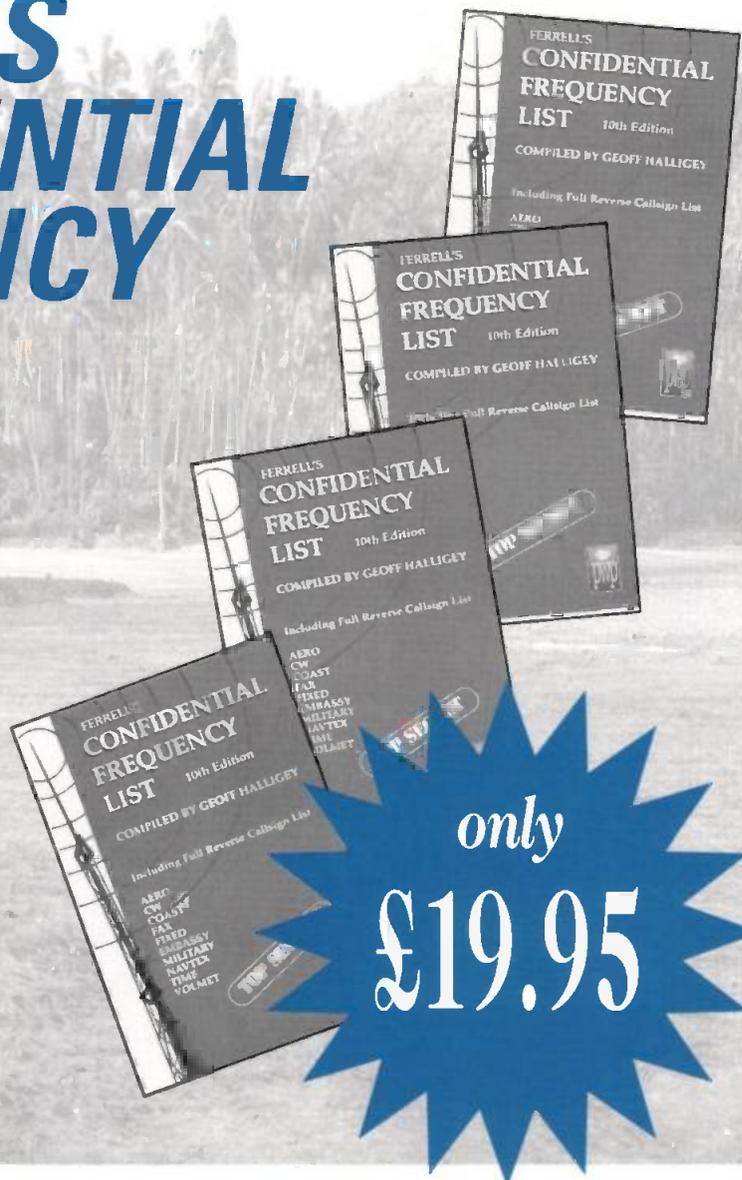


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 T7E  
**YAESU**  
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 FT225RD  
 FT51R  
 FT50R  
 FT530R

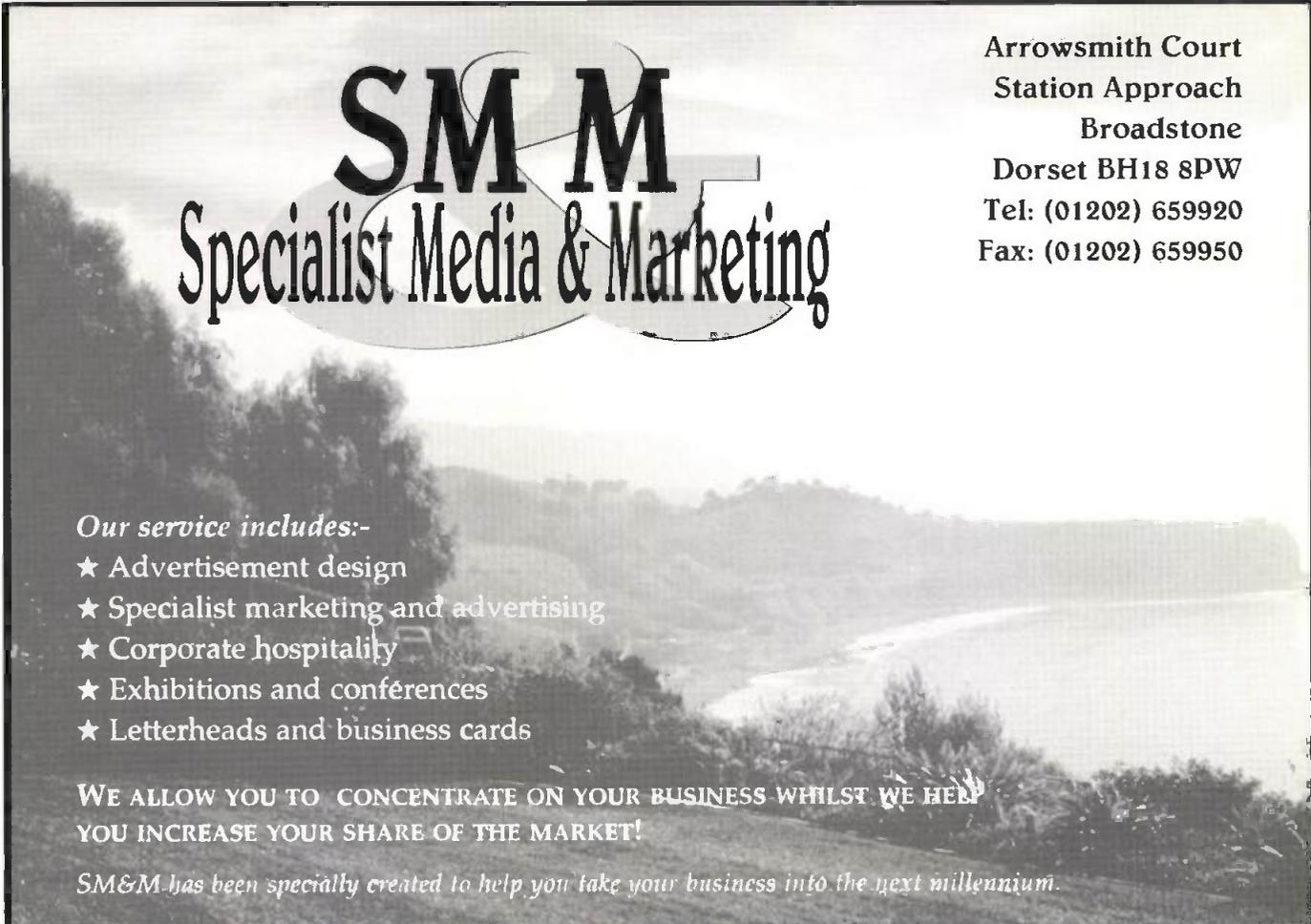
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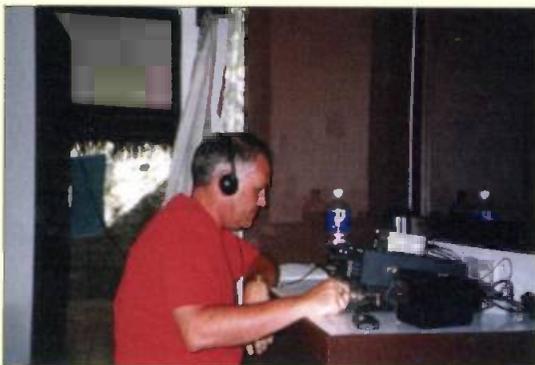
Zoë says:  
"Keep the News and  
those Club magazines  
coming!"

# CLUB Spotlight

Compiled by Zoë Crabb

## Maldives Radio

'Club Spotlight' has recently received a lovely letter from **Andy Stafford G4VPM/8Q7AS**, who is currently involved in a project to expand Amateur Radio activity in the Maldives (8Q7). Here, he tells us his fascinating story.



Andy Stafford operating from his holiday QTH on Kuredu Island.

In September 1996 I visited The Republic of Maldives for a holiday, actually staying on Kuredu Island in Lhaviyani Atoll. During my time there I did some operating using QRP on the h.f. bands with the callsign **8Q7AS**. Although I didn't make many contacts, the radio side of the trip was very enjoyable and it proved easy to obtain the necessary operating permissions and licence.

Also, during the visit, I was lucky enough to meet one of only two active radio amateurs in the Maldives, **Ibrahim Ahmed 8Q7QC**. Ibrahim showed me great kindness and hospitality while I was there and I am pleased to say I am able to return that kindness to him. He expressed a long felt desire to start up a radio club in the Maldivian capital Malé and to set-up a club station,

A club is no good without members and to encourage membership Ibrahim planned to train interested locals to become radio amateurs. His biggest problem was obtaining training materials and I promised I would help him to achieve this.

Due to personal circumstances, I had, until recently, been unable to do anything to fulfil this promise. Now, however, I have managed to set things in motion and have been in contact with various companies and organisations in an endeavour to obtain the kind of things needed by Ibrahim.

I'm pleased to say that the response so far has been magnificent and I already have a useful amount of stuff to send to the islands. Thanks so far go to **Icom (UK)**, **Yaesu (UK)**, the **G-QRP Club** and **Kanga Products**. *Practical Wireless* (thanks Rob and Editorial Team!) and the **RSGB** have also agreed to help and I hope to be able to send the first parcel over soon.

The more that can be provided the better and, accordingly, I would like to appeal to anyone who can help further by providing unwanted items to contact me. Basically, I'm looking for anything that would be useful to aspiring and new amateurs. I'm happy to pay the cost of transporting the items received to 8Q7 and would be very pleased to receive any contributions, all of which will be acknowledged.

For those of you who haven't worked the Maldives (and for those of you who have), you may be interested to know that I am currently involved, together with fellow members of the Central Arizona DX Association, in the planning stages of a DXpedition there scheduled (probably) for Spring 1998.

Anybody who can help, please contact me by telephoning (01256) 311334 during working hours, or E-mail at: [astaffor@de.ittind.com](mailto:astaffor@de.ittind.com)



Ibrahim 8Q7QC in his shack at his father's QTH on Naifaru Island (which is the capital of Lhaviyani Atoll).

## Special Event GB4JC

The **Ynys Mon Amateur Radio Users Group (YMARUG)** in conjunction with the **Marford ARS** and the **North Wales RRC** held a seven day 24hr Special Event Station at the Denbigh Show Ground, Denbigh, North Wales, with the 13th Welsh Scouts World Jamboree. Some 3500 Scouts and Rangers, plus their leaders, came from 14 different countries, some as far away as Australia, Russia, USA, Sweden, Africa and over 100 groups from all over the UK.

The event started at 8am on a wet Saturday morning, where there was a mix-up on where the four stations were to be set-up, two in the group's caravan and two in the main marquee, where there was no power for the equipment as promised. However, after a trip to see the people in charge of site allocations, things were soon worked out.

The groups then started to set-up all of the equipment with more than enough power for all their needs. By this time, the 60ft scaffold tower had come and was in the process of being erected.

The Scouts and Rangers were then all starting to arrive and the site was filling up very quickly. And as dinner time approached, one of the h.f. stations and a v.h.f. station was set-up in the YMARUG caravan and the antennas were quickly erected on the 60ft tower. The two other stations were set-up in the main activities marquee, one on a 40ft mobile tower and tribander and the other on a GSRV.

The weather soon brightened up and became very warm throughout the week. Many visitors from the Scouts and Rangers who were interested in taking their Communication Badges did so, with the help of some of the licensed Scout Leaders.

Over the week, 70 passed and some 700 contacts were made, although conditions were not at their best. The contacts were made on s.s.b., c.w., f.m. and Packet.

The YMARUG would like to give a special thanks to all the lads and lasses who came along and supported this event so well and also to the people who donated their valuable equipment.

## Club Reminders

The **Hoddesdon Radio Club** meet on alternate Thursdays at 8pm at the **Conservative Club, Rye Road, Hoddesdon**. Up and coming events include October 16 - Visit to Stanstead Airport (ATC), 24th - Club dinner.

More information from **Don G3JNJ** on 0181-292 3678.

Members of the **Isle of Man Amateur Radio Society** hold regular meetings on the first Monday of the month at **Transport House, Fort Street, Douglas** at 8pm for a formal meeting with a lecture or chaired discussion.

All other Mondays at the **Royal Naval Association, Regent Street, Douglas** (opposite main Post Office) at 8.30pm for an informal get together. The committee also meets on the first Friday of every month. More information from the Secretary **Vince Wilson MD0ADD** on 624889.

## Weekend On The Air

The Bury St. Edmunds Amateur Radio Society are once again indebted to The National Trust at Ickworth House, just outside Bury St. Edmunds, for providing the Society with an excellent venue for their annual Special Event Station, held over the weekend of 9/10th August 1997.

Back in 1995, the Society helped celebrate the National Trust Centenary with GB100NT. In 1996, they operated as GX2TO (the club callsign). This year, Derek Spender G4DHU, applied for the callsign GB2NTI and acted as Station Manager.

Chris Brown G0JRM kindly agreed to exhibit some of his collection of vintage wireless receivers and other radio nostalgia in the display cabinets, which lined one side of the Lecture Theatre, which was put at the Society's disposal. Liaison with the National Trust was in the hands of David Riches G0XEG, who happens to be a Volunteer Room Warden at Ickworth



On the Friday evening, a working party of members assembled to start putting Chris Brown's exhibits in place, unpack the club transceivers, put a rope from the top floor of the Rotunda and a large oak tree for the G5RV antenna, which they intended to use. All tasks were completed by the time it was getting dark, having started before 5.30pm!

Saturday dawned bright and sunny (fortunately!) with temperatures in the eighties, but the Lecture Theatre was nice and cool, and members were soon calling CQ on the FT-100 through the club-built a.t.u., but power output did not reach anywhere near the 100W that the FT-100 can produce. First thought was that they had too much feeder and really needed to move the antenna nearer the transmitter, but they would have to wait until the end of the day when there were no visitors.

The Society also have an FT-102 with matching a.t.u. and other accessories, but the a.t.u. will only cope with unbalanced antennas, so they decided that it might be worth trying to use the G5RV as a centre-fed dipole with one side tuned against the earth as they were using 300Ω twin right through. This in fact loaded well and members were able to work on 3.5, 7 and 14MHz, but, regrettably, only around Europe.

In the end, after investigating the home-brew a.t.u., the main cause of trouble was found, being a faulty contact strip on the moving vanes of the first variable capacitor! As it was not the sort of thing that could be replaced quickly, (they had to find one first!), it was not used again over the weekend. The antenna was moved on the Saturday evening, which gave more success on the Sunday. In spite of these setbacks, over 100 stations were worked in the end!

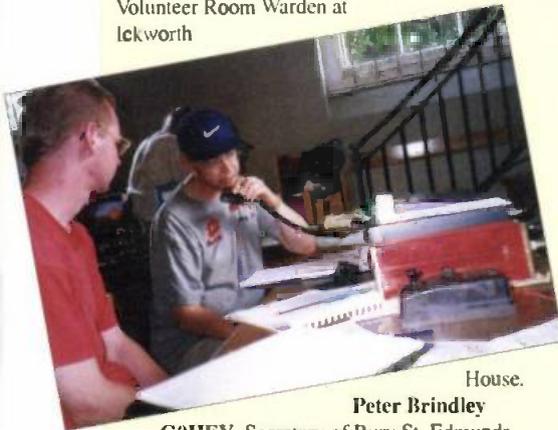
Darren G7SDC and Martin 2E1FZH helped the number of contacts by running a packet station on v.h.f. from a couple of laptops and a most impressive home-brew TNC and p.s.u. They even managed to enlist the help of the GB7TDG Sysop - John G4VEL - in getting an 'add' into the system telling people of the special event! They worked quite a few stations direct, as well as through the BBS. This evoked quite a bit of interest from the visitors, in spite of the l.c.d. screens being difficult to read.

With hindsight, the Bury Society felt that the visitors were more interest in the exhibition of old radios and packet than trying to understand the audio from s.s.b. signals, so when the society put on another station, they may now consider putting on some SSTV or even FSTV for the public benefit, whilst maintaining the Amateur Radio interested on air with a special event callsign and QSL card.

All in all, it was a good weekend, in spite of a smaller number of contacts. Everyone went home happy, even if hot and tired! The Bury Society would like to say thanks to Property Manager Kate Carver, the House Manager Maria Moffatt, the House Steward Eilidh Taylor and Paul Dickson, the Regional Public Affairs Manager from the National Trust, without whose help and co-operation, the event could not have taken place again this year.

Lastly, thanks to the members who helped plan and set-up, pack up and operate. Most members who attended have already asked about next year - but that's another story!

Further information from David Riches G0XEG, 92 Barons Road, Bury St. Edmunds, Suffolk IP33 2LY. Tel: (01284) 701034.



House.  
Peter Brindley

G0HEV, Secretary of Bury St. Edmunds ARS, handled all the publicity, and the National Trust kindly agreed to provide the Society with picture postcards of Ickworth House, which they were able to have overprinted with the callsign on the front and the usual details on the reverse.

Finally, the Chairman Kevin Waterson G1VGI and G0XEG did an interview for a magazine programme on BBC Radio Suffolk. So with all that under control, the society just needed fine weather and some help in getting the antennas up!

Meetings are held from 1930hrs on a Monday evening for construction, computers, operating and general chat, etc. at the Loughborough & District Amateur Radio Club in the Science Lab., Hind Leys Community College, Forest Street, Shepshed. All new members are most welcome.

Further information from Ian G8SNF on (01509) 218259.

The Mid-Warwickshire Amateur Radio Society meet on the 2nd and 4th Tuesdays in the month at 8pm at the Club HQ, 61 Enscombe Road, Warwick. All members and visitors are welcome.

Contact G8XDL on (01926) 498115 for further details.

Meetings are held on the last Tuesday in every month at 7 for a 7.30pm start for the RSGB Bristol Group at New Friends Hall, Purdown, Bell Hill, Stapleton,

Bristol. All are welcome, no need to belong to the RSGB.

Would you like to find out more, if so, please contact Robin Thompson G3TKF on (01225) 420442.

Members of the Salisbury Amateur Radio Club meet at 8pm on the second and fourth Tuesday of each month, at The Scout Hut, St Mark's Avenue,

Salisbury, Wiltshire. Prospective members and visitors are welcome and RAE tuition is available.

A club Net is held at 6.30pm daily, additionally 8.30pm on Fridays on S.16 (V32) 145.400MHz. For further details about the club activities, contact Jamie G7WAA on (01722) 334935 during office hours.

The Stockport Radio Society hold meetings on the 2nd and 4th Wednesday of each month at the Stockport Sea Cadet Corps HQ, Training Ship (TS)

Hawkins, Pear Mill Industrial Estate, Stockport Road West, Lower Bredbury at 1945 hrs.

New members are always made welcome, so if you fancy finding out more, why not contact David Simecock M1ANT, Hon. Sec., at 51 Broadway, Stockport SK2 5SF or alternatively, telephone on 285 0017.

Meetings are held at The Home Guard Club, Main Street, Tiddington, Stratford-upon-Avon at 7.30 for an 8pm start for the Stratford-upon-Avon & DRS. If you are interested about radio, you are very welcome to attend the meetings.

For more information about the Society, contact the Hon. Sec. J. Porter on (01789) 773286.



# RADIO DISCOVER THE BASICS

By Rob Mannion G3XFD

*Having explained the basics of generating an alternating current from a really simple alternator, Rob Mannion G3XFD demonstrates how the supply is changed into a supply suitable to power equipment.*

## Further Reading

*Understanding Basic Electronics* (Published by ARRL), read Unit 3 (Elementary AC Electronics). This book is the 'further reading' source I shall refer to in the series. In my opinion it's an excellent primary text book and reference source and is available from the PW Book Store.

G3XFD

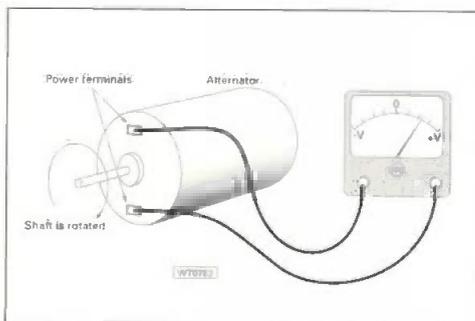


Fig. 1: The simple alternator connected to a centre '0' voltmeter. As current flows the meter (calibrated in volts) will deflect first one way and then the other (see text).

Last time in this column I explained the basics behind very simple alternators and demonstrated how you could make one for yourself. However, if you did make one and produced electricity it would not work your radio very effectively and could even damage it!

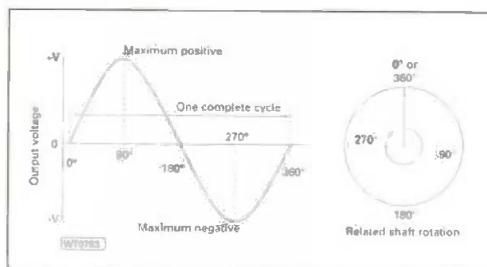
So - as the BBC's famous Chief Engineer Captain Eckersley said in the 1920s... 'please don't do it!' (he was actually asking listeners not to make their regenerative detectors oscillate thus causing interference!).

## Varying Output

The diagram, Fig. 1, shows a very simple alternator (although it has a drive shaft and is neat and tidy, it works exactly the same as the simple alternator I described last time). Connected to it is a voltmeter with a centre '0'.

When the alternator drive shaft is rotated, a current flow is produced and the meter needle (we'll take a look at how these work later in the series) will move away from the centre '0' (zero) to a maximum amount before dropping back to zero again and then pass through zero to maximum deflection on the other side. In other words, the current flow is alternating in direction and it's therefore called **alternating current**.

The diagram, Fig. 2, shows the output of the alternator in 'sinewave' form. And it takes little imagination to relate the 'humps and dips' of the sinewave to the rotation of the alternator drive shaft. This is your first introduction to looking at 'waveforms' and as



our science is very much involved with them...it's a good idea to do some further reading on the subject (see separate panel).

The simple alternator shown in the diagram is producing 10V at 50Hz (Hertz, named after Heinrich Hertz the physicist) represents the frequency or number of pulses per second. The old term used to be 'cycles per second', (in other words the number of pulses of current per second).

It's important to remember that with an a.c. output of 50Hz means that there's 100 pulses of current per second (50 in the positive direction and 50 in the negative direction, produced by the production of 50 complete cycles from the alternator at the speed which it's being rotated to generator. (For the purpose of this explanation the alternator in the diagram produces one positive pulse and one negative pulse per rotation and is being rotated at 50 times per second).

So, next time you hear an ordinary domestic mains power supply transformer (let's say a 250V a.c. to 12V d.c. supply) humming...remember it's 100Hz you're hearing not 50!

## Convenient & Efficient

Alternators provide a very convenient and efficient method of generating electricity. The a.c. generated can be stepped up or down (transformed via transformers) and 'transported' (Engineers refer to power lines as 'transmission lines') great distances at very high voltages.

However, there are disadvantages with a.c., especially for powering radio receivers! The alternating supply with its level starting from zero and rising

to a maximum positive before returning through zero to negative produces an annoying buzz. That's no good for us...so it has to be 'converted' or changed to a form that can be used and this is done by a device known as a rectifier.

The rectifier, Fig. 3, can be considered as an electronic equivalent to the ordinary bicycle tyre valve as it allows current to pass very easily in one direction, but not the other! The result from a single half-wave rectifier (so called because it only conducts - or 'passes' - one half of the complete cycle or 'wave') are the pulses shown in the diagram.

The output pulses (they can be negative or positive going) are 'smoothed' by using the storage abilities of capacitors. This is achieved because the capacitor discharges during the time the pulse is 'off' (absent). (Again, I'll be discussing this aspect later in the series).

## Try Some Experiments

But in the meantime why don't you try some experiments with your test meter and diodes and see just how effective at 'blocking' the current in one direction they can be? And at the same time you'll quickly learn that other factors (forward resistance for a start!) come into play!

Next time, I'm planning to demonstrate a really 'classic' use of the diode rectifier by using it to provide a really basic radio. You'll also be able to make your own 'rectifier' by using rusty metal and perhaps even lemon juice. They're very useful those lemons you know!

PW

Fig. 2: The output of the alternator shown in sinewave form. The additional associated illustration relates alternator shaft position to the out produced by the alternator (see text).

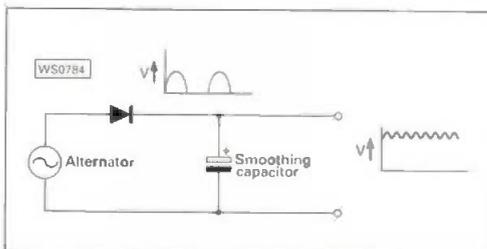


Fig. 3: What the rectifier does can be compared to a bicycle tyre valve! The tyre valve (should!) only allow air into the tyre and the diode rectifier only allows current to flow in one direction only. The resultant 'raw' pulses of d.c. produced are 'smoothed' (the 'gaps' are filled by the discharge of capacitors which 'empty' during the 'off' periods (see text)).

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Adrian Espin of Number One Systems has kindly donated a complete package for us to give away to one lucky *PW* reader this month. All you have to do is find the words in the wordsearch and answer the tie-breaker question based on Tex's review from last month. (If you haven't seen *PW* October back copies are available for £2.30 from the Book Store, Tel: (01202) 659930).

So, what are you waiting for get searching for those clues, answer that tie-breaker and who knows the next project you design could really be a 'number one' with the help of this comprehensive computer aided design package!



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.....

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.....

.....

Postcode .....

If you do not wish to receive future mailings as a result of entering this competition please indicate here.

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Entries to reach us by Friday 28 November 1997.

## Words To Find:

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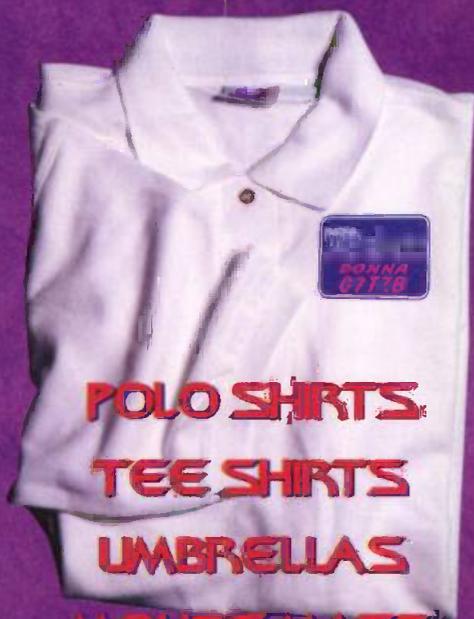
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# In Tune with Piccolo

By Malcolm McLeman F5VBU

*Malcolm McLeman F5VBU wonders why the Piccolo system never really caught on amongst the Amateur Radio fraternity and whilst doing so provides a potted history of what became the backbone of the Foreign & Commonwealth Offices' communications system.*

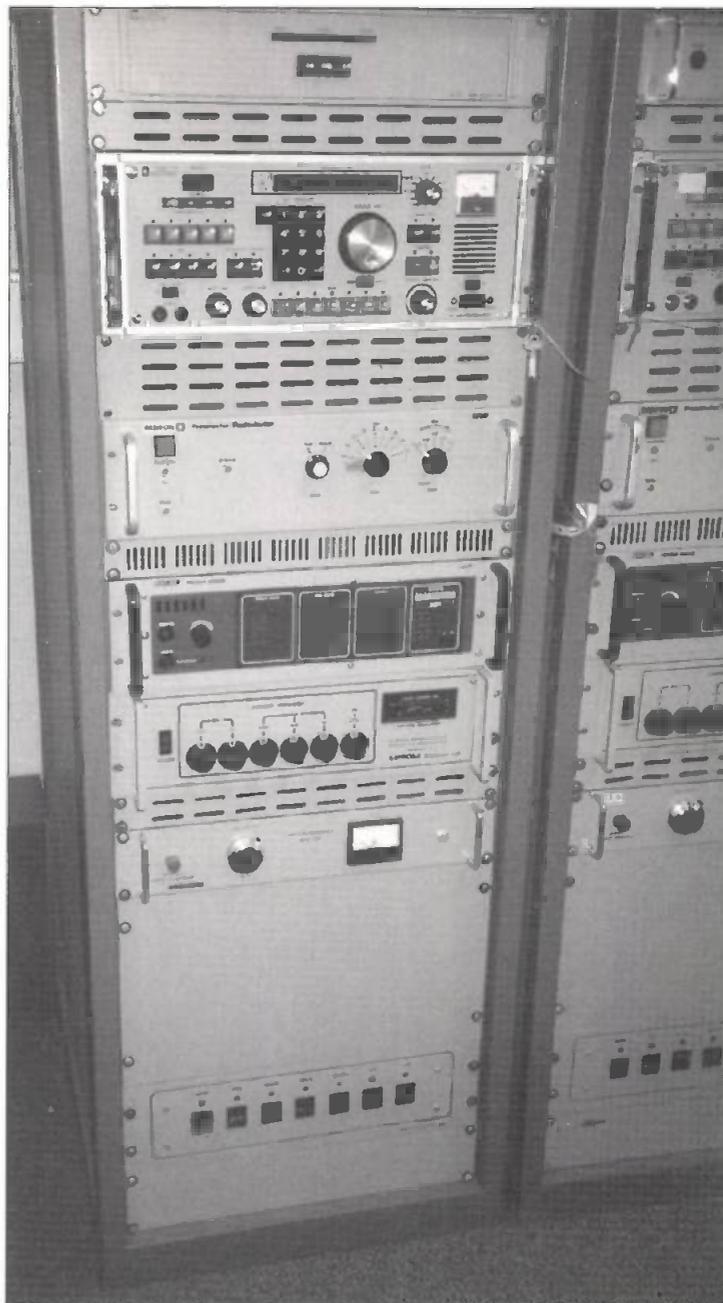
After eight years as a Marine Radio Officer I joined the GPO's Coastal Radio Service in the early 1960s. I trained at Highbridge, Somerset, the main UK ship-to-shore h.f. station, better known as Portishead Radio near Bristol, where the transmitting station and antennas are sited.

After Highbridge, I moved on to Cullercoats Radio (GCC) and then Stonehaven Radio (GND) near Aberdeen. After almost a year at Stonehaven, I spotted an advert in *Wireless World* that the Dipolomatic Wireless Service (DWS) was looking for Communications Officers. I duly applied and was accepted in November 1965.

After handling very little Morse traffic at GND and most of what I did was with trawlers on 2MHz, I suddenly found myself in what I can only describe as a 'Morse factory'. The main central receiving station at Hanslope Park (where I was based) was just one huge room.

The room was surrounded by bays each with two receivers, generally Eddystone 730s, an electronic Morse key plus a hand Morse key for those that were not so automatically inclined. Other operators used their own personal 'bug' keys.

There was also a socket on each bay to plug in the superb Scandinavian GNT (two unit)



An example of how a Mk F receiver cabinet 'A', would have been laid out. To the right is its companion cabinet 'B', which would have been identical in every way.

automatic tape Morse senders for longer messages, such as the daily 2000hrs world press from the Central Office of Information (COI). What a transformation from the Post Office, where automatic Morse was viewed with disgust!

Traffic was taken either on typewriter or even by hand and then passed to another section for forwarding to the Foreign & Commonwealth Office (FCO) in London by teleprinter. Thousands of groups were passed this way daily with speeds averaging between 25 and 30w.p.m. and sometimes the older hands could 'wind it up' to 35w.p.m. or more.

During international crises, such as the Indo/Pakistan war, the central

receiving station at Hanslope Park resembled a giant Bletchley Park Colossus with two unit tapes traversing the room bay to bay via the overhead central heating pipes. Around this period it was recognised by 'the powers that be' that the days of Morse were numbered and they had decided to move 'up a cog' to an automatic mode. Radio TeleTYpe (RTTY) had been used to pass the Far Eastern traffic directly into London from Singapore using high power transmitters, but on shorter hauls with standard equipment RTTY soon proved disappointing.

## *Christened Piccolo*

Development and production of the

Piccolo had begun before the use of RTTY on an in-house auto-mode using Multiple Frequency Shift Keying (MFSK). It was christened the Piccolo, which for almost the next 25 years was to be the backbone of the FCO's communications system. The basic principle behind the piccolo system is fairly simple using standard International Telecommunications Agency 2 (ITA2 Murray) code, ie. 32 characters at five (1 or 0) units or bits per character.

Each transmitted letter or character is converted into a single audio tone starting with 'A' at 320Hz and separated from the next by 20Hz, ie 'B' 340Hz and so on, ending with the 'all space or all blank' character at 640Hz. Circuit continuity was maintained during non traffic periods by a stand-by tone at 650Hz and circuit synchronisation was obtained by modulating the tones with a 10Hz square wave for comparison and re-adjustment when necessary at the receive station.

Piccolo operation was in duplex mode and the unit could either be keyed by five unit tape or by hand from a teleprinter keyboard. Character tone generation in Piccolo systems up until the final version was by a unique selection from a bank of 32 'high Q' LC oscillators every 100 milliseconds. Early transmission was amplitude modulated and required expensive high stability receivers, plus accurate hand tuning by the receiving operator.

With the arrival of Barlow Wadley and phased locked loop (p.l.l.) equipped receiver followed by frequency synthesis from Rhode and Schwartz the Piccolo moved to h.f. s.s.b. (l.s.b.) and with the exception of the units themselves, used standard commercial modulators, receivers and transmitters.

At the receive station, the signal was intercepted via two antennas and receivers. After demodulation the receive tones were presented via separate audio amplifiers and appropriate pass-band filters to two banks of oscillators each identical to that of the transmit station, (the additional receive oscillator bank facilitated diversity reception).

By virtue of their frequency the incoming tones 'rang' their equivalent in either the main or diversity bank or both. And whichever bank (by a system of strobing) gave the highest output produced a pulse, which when applied to a unique diode matrix for each character re-converted the tone back into conventional ITA2. To this was added 1½ bits for stop mark and one bit for start space to run a standard 75baud teleprinter.

WT0703		Second Tone					
Tone No.	N=3	4	5	6	7	8	
Freq. (3)	460	480	500	520	540	560	
Test PTS (4)	Fy	Fx	Ey	Ex	Dy	Dx	
First Tone	N=3	11110 T 5	11010 H £	11111 Blank	10111 Line Fd	10010 P 0	10110 L )
	4	11100 0 9	11000 M .	11011 Space	10011 I 8	10000 V ;	10110 G &
	5	11101 Carret	11001 N ,	* (Blank)	S/by Line Fd	10001 C :	10101 R 4
	6	01101 D \$	01001 F %	* (E)	* (A)	00001 K (	00101 J Bell
	7	01100 B ?	01000 X /	01011 S '	00011 U 7	00000 Letters	00100 Figures
	8	01110 Z "	01010 Y 6	01111 E 3	00111 A -	00010 Q 1	00110 W 2

\* The non-valid characters (5/5, 5/6 and 6/6) are never transmitted. But if received in error the character in brackets is output to the printer.

When a 'Stand-by' (S/by) is received, a 'Line feed' (Line Fd) character is generated internally, but a holding mark is output.

A Piccolo Mk F six-tone chart.

Signalling speed as previously mentioned was 100 milliseconds (ms) per character (75baud per second divided by 7½ bits per character equals a character period of 100ms). What is the advantage of this over good old RTTY I hear you say?

Radio TeleTYpe whether it be it frequency shift keying (f.s.k.) or automatic frequency shift keying (a.f.s.k.) requires a change of condition for every change in transmitted bit within the character period. And in long range h.f. (as is well known), any interference or fading can create havoc with this type of signal. Hence the take-over by SITOR with its Forward Error Correction (FEC) and Automatic ReQuest (ARQ) repeats during adverse conditions.

In Piccolo operations, the whole of the character information is contained in one single tone. Because of this during adverse conditions when only a small portion of the tone or character period is received (for example 10m/s instead of the full 100m/s) it still had the ability to 'ring' the appropriate receive oscillator and with its internal reconstitution back to standard ITA2 gave 100% copy. (I have personally watched a print out when I have hardly been able to hear the incoming signal on the receiver loudspeaker!).

The final (and some will say 'Rolls Royce') Mk F version of the Piccolo came out in the early 1980s once again designed in-house, this time completely solid state, but manufactured by Racal Electronics to try and stimulate (unsuccessfully) external interest. Instead of one tone

per character during the 100m/s period, there were two thus requiring only six instead of the original 33. Frequencies were 460, 480, 500, 520, 540, 560Hz to cover ITA2.

The non traffic or stand-by condition was 50m/s at 500Hz followed by 50m/s at 520Hz. Why six tones? Six to the power of two equals 36 giving more permutations than necessary for ITA2.

A 12 tone version was also planned to cover ASCII. Baud rates were from 50 to 300 for h.f. working. The diagram Fig. 1 shows a Mk F six-tone chart.

As with Morse, high speed satellite communications spelled the end of h.f. Piccolo, including the skilled operators needed to run this exclusive mode. Its advantages over FSK and AFSK are obvious and it amazes me that it never really caught on in the amateur world.

Earlier Piccolo models with their slow electro-mechanical synchronisation were admittedly impractical for simplex working but the final solid state version most definitely was at home in either duplex or simplex working. I believe that Bletchley Park Museum have two or three Mk F modems, perhaps they may consider resurrecting them to full 'on the air' working to keep this unique mode alive.

At the time of writing I am presently running a Clover system and until it arrived on the h.f. scene I don't think there was anything that could outclass the Piccolo. But there again perhaps I am slightly biased!

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## TWO GREAT SHOWS DURING OCTOBER AND NOVEMBER.

First and foremost my sincere condolences to Frank Elliot's family upon learning of his death at the beginning of September. Frank G4PDZ was instrumental in running the Leicester Amateur Radio Show for many years and will be sadly missed.

The great Leicester Show in Granby is in its last year. So successful has the show become that its moving to a new venue for 1998. If you've never been to Granby then make a date. All the main traders and 'specialist stands' will be there for two days. Hundreds of thousands of pounds worth of bargains are grabbed over Friday and Saturday, October 17th & 18th.

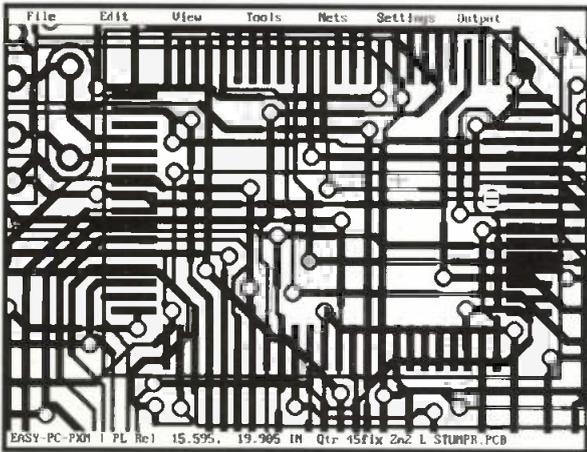
### Don't miss it!

The RadioSport Team appear to have scooped another important time of year in the busy rally calendar. November hosts the second 'Christmas Rally' (albeit a bit early!) and if last year is anything to go by, you cannot afford to miss it! Obviously, RadioSport, like the L.A.R.S. organisers take their events very seriously. Come along and see for yourself some of the largest trading halls in the country jammed packed with Amateur Radio, Computers and Electronics.

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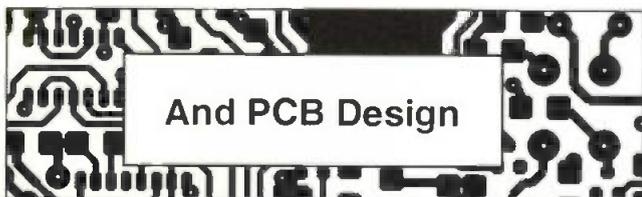
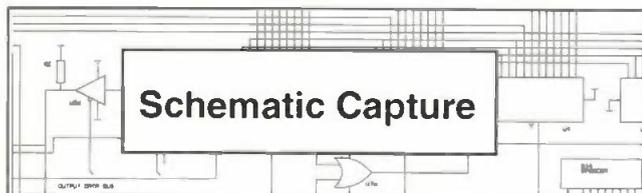
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If you wish to have your Rally featured in Radio Diary, all you have to do is to put together as much information about the Rally as possible, ie. date, location, time, who to contact, etc., and send it to Zoë Crabb at the PW Editorial Office.

# RADIO Diary

Compiled by Zoë Crabb

## 1997

\*Practical  
Wireless &  
SWM  
in attendance

**October 12:** Computercations 97 Computer/Radio Rally is to be held at Hillhear Camping, Kingswear Road, Hillhead, Brixham, Devon. There is overnight camping, trade stands, car boot sale, Bring & Buy, refreshments, unlimited free parking, talk-in on S22 by G7FDC, Special Events Station GB2CPU. Bill G6ZRM on (01803) 522216. E-mail: 106445.2574@compuserve.com

\***October 17/18:** The Leicester ARS is being held at Granby Halls, Leicester. Doors open at 10am each day (9.30am for disabled visitors). All major companies will be in attendance plus a large Bring & Buy stand run by the Leicester Radio Society. Morse tests will be available on demand, but two photographs plus proof of identity will be required. There are ample car parking facilities. Talk-in on S22 and SU22 callsign GB2GH. G4AFJ on (01455) 823344.

\***October 25:** The G-QRP Club Mini Convention is being held at St Aidans Hall, Sudden, Rochdale, Lancashire. Admission is £1 and doors open at 1000. Talk-in on S22. There is a large social area. Lectures on QRP subjects, Bring & Buy, surplus, junk, components, kit traders, food and drink all day. Rev. George Dobbs G3RJV on Tel/FAX: (01706) 631812.

**November 8:** AMS '97, Computer & Electronics Show, will take place at Bingley Hall, Stafford County Showground, Weston Road, Stafford. Admission is £3 for adults, children under 14 - 50p, concessions, OAPs, RSGB Members, Student Card, UB40 - £2. Contact the organisers Sharward Promotions, Knightsdale Business Centre, 30 Knightsdale Road, Ipswich IP1 4JJ. Tel: (01473) 741533, FAX: (01473) 741361.

**November 9:** The Midland Amateur Radio Society Birmingham 9th Radio & Computer Rally is being held at Stockland Green Leisure Centre, Slade Road, Erdington, Birmingham. Doors open 1000 to 1600 and admission is £1. There is a large free car park, free hamper draw, trade stands, local clubs, special interest exhibits. Trader details from Norman G8BHE on 0121-422 9787 or general information from Peter Haytor on 0121-443 1189.

**November 9:** The 7th Great Northern Hamfest (formerly the Bamsley Amateur Radio Rally) will take place at the Metrodome Leisure Complex in Bamsley Town Centre, less than two miles from junction 37 M1, five minutes walk for the train and bus station. Doors open at 1000. The venue is all on one level with two large halls,

with disabled facilities. The event will feature all the usual trade stands, covering amateur radio, computers (hardware and software), electronics components and kits and much, much more. This year, there will be Morse tests on demand from 1200 to 1500hrs (candidates must bring the appropriate documentation). Talk-in on S22, disabled car parking in leisure complex, all other parking in surrounding car parks, admission to Hamfest is £1.50. Ernie G4LUE on (01226) 716339 or mobile on (0836) 748958.

**November 23:** The Bishop Auckland Radio Amateurs Club (BARAC) Rally will take place at Spennymoor Leisure Centre, County Durham, a new venue. There will be the usual stalls, Bring & Buy, catering and bar facilities. The venue also boasts good parking with easy access to a large ground floor hall for disabled visitors and traders. There is lots to do for the family within the confines of the Leisure Centre for those of the family not quite so interested in radio. Doors open at 1100 (1030 for disabled visitors). Admission is £1 (under 14s free of charge with adult). Talk-in on S22. Mike G0PRQ on (01388) 766264.

**November 31:** The Portland Amateur Radio Club are holding their 3rd Annual Rally at the Burton Cliff Hotel, Burton Bradstock, Near Bridport, Dorset. Doors open at 11am. Attractions include well known amateur radio traders and dealers, crafts and hobby stalls, computer suppliers, local radio clubs, RAYNET display, raffle, Bring & Buy and an excellent choice of food with a bar open all day. Talk-in on S22 and SU22. Further information from: The Rally Organisation, 29 Court Barton, Weston, Portland, Dorset DT5 2HL or telephone on (01305) 823373.

**December 7:** The SDX Cluster Support Group & Scottish DX Convention are holding their 3rd SDX Glasgow Rally at the Maryhill Community Halls, Maryhill Road, Glasgow. There will be a variety of special interest groups with stands and displays and Morse test sessions will be available throughout the day. Once again, the famous Jackie & Sandra cafe will be open for business throughout the day, serving hot and cold snacks, tea, coffee and soft drinks. Doors open at 10.30 for Bring & Buy registration and the cafe is also open from this time. Adults - £3, Senior Citizens - £2 and children under 14 - free of charge with an adult. John Dundas GM0OPS on 0141-638 7670 or Packet @ GB7SAN/GB7SDX or E-mail: j.n.dundas@btinternet.com

**December 7:** The 40th Northern Mobile Rally (Harrogate) is to be held at the Flower Hall, Great Yorkshire Showground, Harrogate, North Yorkshire. Gerald Brady G0UFI, Rally Manager on (01765) 640229.

**December 14:** The Leeds & District Xmas Radio & Computer Rally is to be held at the Pudsey Civic Centre (Dawsons Corner). All the usual traders will be there, there will also be a talk-in, a licensed bar and disabled facilities, etc. Further information from John Mortimer on (01943) 287460 (Bookings Manager), Gordon Ryder on 0113-255 0626 (Rally Manager) or from Malcolm Robertson on 0113-225 3379 (Club Secretary).

\***December 14:** The Verulam Amateur Radio Club will hold its annual rally at the Watford Leisure Centre, Horseshoe Lane, Garston, Watford, Hertfordshire, from 1000 to 1600. The Leisure Centre is located off the A405 near junction 6 of the M1 and junction 21A of the M25. Attractions will include trade stands, Bring & Buy, grand raffle, cafe, licensed bar and free car parking. Morse tests will be available. For further details call (01923) 262180 or for trade information call (01923) 265572.

## 1998

**January 18:** The Oldham ARC Mobile Rally is to be held at the Queen Elizabeth Hall, Civic Centre, West Street, Oldham, Lancashire. Doors open at 1100 (1030 for disabled visitors). The event features all the usual traders plus a Bring & Buy stall. Morse tests are available on demand and there is a talk-in on S22 via GB4ORC, commencing at 0730. Mobile Contact prize up to 1400. There will be refreshments and free parking available. (01706) 846143 or 0161-652 4164.

**February 1:** The 13th South Essex Amateur Radio Society Radio Rally will take place at the Paddocks, Long Road, Canvey Island, Essex. This is one of the biggest and best rallies in Essex. (The Paddocks is situated at the end of the A130). Doors open at 1030. Features include amateur radio, computer and electronic component exhibitors, a Bring & Buy, RSGB Morse testing on demand (two passport photos required), home-made refreshments, free car parking with space outside main doors for any disabled visitors. Admission is £1. David G4UVJ on (01268) 697978.

**February 15:** Northern Cross Rally to be held at Thornes Park Athletics Stadium, Wakefield, South Yorkshire.

just out of town on the Horbury Road. Easy access from M1 junctions. 39 & 40. The even is well signposted and talk-in will be on 144 and 430MHz. Doors open at 1100 (1030 for disabled visitors and Bring & Buy). Details from Peter G0BQB on (01942) 379680 or mobile on (0976) 834938, Internet on rally@waveg.demon.co.uk. Web page at <http://www.waveg.demon.co.uk/rally/>

**March 7/8:** The London Amateur Radio & Computer Show will be held at Lee Valley Leisure Centre, Picketts Lock Lane, Edmonton, London, N9. Doors open 10am to 5pm each day. There will be trade stands with over 100 exhibitors, a Bring & Buy, RSGB committee and book stands, on-demand Morse tests, talk-in on 2m and 70cm, Special Interest Groups, disabled facilities, bars, catering, ample free parking and lectures. Adults £3, pensioners/under 14s, £2. (01923) 893929.

**March 29:** The Pontefract & District Amateur Radio Society Component Fair is to be held at Carlton High School. The venue is 300 yards from the Carlton Community Centre. Car parking will be at the school as usual. The venue will be signposted from the major roads. There will be a talk-in on 2m. For unlicensed visitors, Nigel Ferguson G0BPK can be contacted (900 to 1400 on (mobile) (0411) 420409 for directions. Doors to the fair open at 1100 (disabled visitors will be admitted at 1030). Once again all traders will be on the ground floor. The bar and tea room (tea room open for early visitors) will be on the first floor. Morse tests will be conducted. Admission will be by prize programme. Contact Nigel G0BPK on (01977) 616935 in the evening or on (01977) 606345 during the day, or E-mail at g0bpbk@aol.com Traders please contact Colin G0NQE on (01977) 677006.

**May 10:** The Drayton Manor Radio & Computer Rally will be held at Drayton Manor Park, Fazeley, Tamworth, Staffordshire on the A4091. Main traders are in four marquees, there will also be a large outside traders flea market, a Bring & Buy stall, local clubs and special interest stands. Doors open 1000 onwards. For Trader information call Norman on 0121-422 9787, for general enquires, call Peter G6DRN on 0121-443 1189, evenings please.

If you're travelling a long distance to a rally, it could be worth phoning the contact number to check all is well, before setting off. The Editorial Staff of PW cannot be held responsible for information on Rallies, as this is supplied by the organisers and is published in good faith as a service to readers. If you have any queries about a particular event, please contact the organisers direct. Editor

# Linear Discoveries

## Review - Discovery Linear Amplifiers For 50 & 144MHz

By David Butler G4ASR

*David Butler G4ASR, PW's v.h.f. columnist puts a pair of British made high power amplifiers to test.*

I was really pleased when *PW* asked me to review a pair of high power amplifiers for the 50 and 144MHz bands. As some of you may know, from reading my 'VHF Report' column, I am very active on many v.h.f. bands, having the facility to run high power into some large antennas on both 50 and 144MHz. I am therefore in a fortunate position to make practical comparisons and reasoned judgements in the operation and design of large v.h.f. amplifiers.

The linear amplifiers I'm reviewing here are manufactured by **Linear Amp UK**, previously known as Heatherlite Communications. Linear Amp UK are probably more well known for their h.f. amplifiers, the Hunter (600W c.w. output), the Explorer 1200 (1000W c.w. output) and the Challenger (1500W c.w. output).

Recently Peter Rodmell G3ZRS of Linear Amp has extended his range to include the 50 and 144MHz bands with the Discovery series of amplifiers. The two power amplifiers are both electrically and mechanically identical and are capable of generating the full UK legal limit with a generous reserve. (Incidentally, also under development is a 430MHz amplifier running 600W output which is expected to be available at the end of the year).

### **Amplifiers Necessary**

But before I get down to the review itself I should explain why high power amplifiers are sometimes necessary on the v.h.f. bands, their advantages and the circumstances in which they should be used.

Propagation on the v.h.f. bands is quite unlike that experienced in many other areas of the r.f. spectrum. Apart from the normal day-to-day contacts made via tropospheric refraction and ducting there also exists numerous ionospheric and scatter modes.

Many of these modes, such as field aligned irregularities (f.a.i.), auroral backscatter, meteor scatter (m.s.), troposcatter, ionoscatter and moonbounce are conducted over non-optimum paths and as a consequence the received signals are normally extremely weak. To make contacts via these modes requires the use of very high power. It is simply a necessity, not a luxury. Contest stations wishing to do exceedingly well will also wish to run the full legal limit into very large antenna groups.

Finally there are DXers who claim that life is far too short to run QRP! In



principal there's nothing wrong with that. I think in a pile-up situation there may actually be less QRM caused by a high power station who is able to work the wanted station immediately.

But why buy an amplifier capable of generating 1000W output when the UK limit is only 400W? Actually the answer to that is really quite simple.

The power limit in the UK is specified to be right at the driven element of the antenna not at the output connector of the amplifier. It's not unusual for feeder runs to be fairly long and losses especially at v.h.f. can be quite high.

Typically a 40m length of RG213/U (1/2in cable) at 144MHz equates to 2.8dB of loss. Add in the odd connector or two and losses will easily amount to 3dB or higher. Even with a conservative 3dB feeder loss it means that the amplifier must be capable of providing 800W output in the shack to give 400W at the antenna.

High power amplifiers capable of outputs well in excess of the UK limit also have a number of other advantages. First and foremost they idle along at reduced output and the life of the valve is considerably increased.

The amplifier will probably run much cooler putting far less stress on power supply and control board components. Distortion products may be reduced (but not necessarily always) at lower levels of output thus producing a cleaner signal.

I have for many years maintained that a clean 400W of 'valve' power will always be better than, for example, an over-driven 30W transistorised amplifier.

And there's lots of those around! Operators who use very high speed c.w. (for meteor scatter operation with 2.5 minute transmit periods) or RTTY enthusiasts often find they need to de-rate the output power to prevent overheating the p.a. during the high duty-cycle transmit period.

Peter G3ZRS informs me that 60% of his amplifiers are exported abroad. Some countries allow considerably higher output powers than authorised in the UK.

In Denmark for example, 1000W output can be used on the 50 and 144MHz bands while in the USA some licence classes are allowed up to 1500W output. And of course even in the UK it's permissible to apply (via the RSCB Licensing Advisory Committee) for a special research permit (s.r.p.) allowing powers of up to 1000W output.

And now a word of caution. If you live in the middle of a urban conurbation I would think very carefully about running very high power on the v.h.f. bands unless you are prepared to endure the wrath of all the neighbours whose televisions and radios get overloaded.

Having the 'legal' right to run QRO doesn't absolve you from having a social responsibility to your neighbours. Indeed the Radiocommunication Agency have the authority to reduce your output power to acceptable levels if interference is created by continual high power operation. However, it is possible for high power operation to co-exist with your immediate neighbours provided you site your antenna in a favourable location and you are, at times, prepared to accept some form of restricted operation.

## Triode Valve

The Discovery linear amplifier is capable of providing up to 1000W output and has a nominal gain of about 16dB. Thus 10W drive will give around 400W output and correspondingly 20W drive will give around 800W output power.

The amplifiers use a ceramic 3CX800A7 triode and although relatively expensive (about £300) it is an ideal choice. It has an anode dissipation of 800W requiring low drive and operates well into the v.h.f. region.

A valve amplifier is also a good choice when considering linearity and low distortion. Although it's possible to build a solid-state high power amplifier it's difficult to beat a well chosen valve because of its overall cost effectiveness and ease of equipment design.

The 3CX800A7 is used in grounded grid, cathode-driven configuration with tuned input and output circuits. This type of design is inherently very stable and easy to set up.

The amplifiers are fan cooled enabling them to operate at full output power for some considerable time. Self-contained power supplies (or power conditioning as it is now known) provide e.h.t. (2300V), heater voltage (13.8V a.c.) and a control supply (12V d.c.). An internal board controls the status of amplifier and provides a number of protection circuits to protect the valve and the p.s.u. components.

The Discovery is built using heavy gauge steel for the chassis, cabinet and internal compartments. All are welded for additional strength making the entire assembly exceptionally strong, ideal for use at home or on a portable field-day site.

The wrap-round top and base panels of the cabinet are neatly held by six dome-headed bolts, making removal very easy. The case measures 330mm wide, 220mm high and 410mm deep and weighs in at a whopping 25kg.

The front panel is pleasingly laid out with two flush mounted meters and two large switches controlling the mains power On/Off and amplifier Standby/Transmit modes. A row of four coloured l.e.d. status lights depict the operational function of the amplifier.

The Tune and Load controls coupled to epicyclic slow motion gearing provide very easy tuning. At the rear of the amplifier are located two N-type sockets, one connecting to the transmitter and the other to the antenna.

There's also a phono socket for press to talk (p.t.t.) control and a 10A IEC socket for the 240V a.c. mains cable. Supplied with the amplifier is a mains lead, phono plug, spare fuses and an operating manual.

When you buy a high power linear amplifier it's usually considered as a life-time investment and you rightly expect it to last for decades. That's why I think it is

very important to confirm in this review that correct components are used in critical areas associated with the extra high tension (e.h.t.) supply, p.a. protection circuits and valve cooling. So, now it's time to take the lid off the amplifier and have a look at those important areas.

## Custom Made

At the rear of the chassis is bolted a large toroidal transformer, this is custom made by ILP, a well known and reputable manufacturer. It provides both the low voltage for the heater supply and high voltage for the anode supply.

A separate printed circuit board is located alongside the transformer to produce the e.h.t. supply. It uses a full wave voltage-doubler circuit to provide a nominal voltage of 2300V at around 800mA current rating.

The diode string uses 1N4007 diodes in each half of the doubler circuit. The current rating of these is only 1A and they have a poor surge performance. A better option here might be the readily available 1N5408 diode which is rated at 3A and is altogether a much superior device.

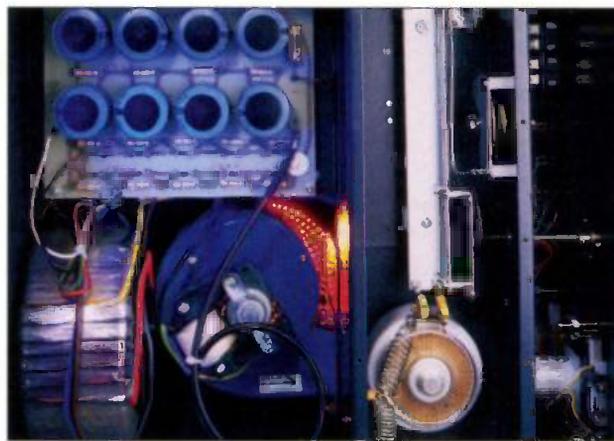
It's very important to choose the correct type of smoothing capacitor and I was pleased to note that high ripple-current electrolytic capacitors manufactured by CDE (USA) are being used. What I wasn't pleased to see in both amplifiers was a 3.15A (250V a.c. max.) glass bodied anti-surge fuse fitted in the negative line of the 2300V e.h.t. supply.

There is little advantage in fitting a fuse in the e.h.t. output supply and even then you would need to use a specialised high-voltage high rupture capacity (h.r.c.) type with a ceramic body filled with sand or similar quenching material. You should never fit a glass bodied fuse in an e.h.t. supply and whether it's in the positive or negative side makes no difference.

Assuming the 3.15A anti-surge fuse would blow (which it won't!) the result will probably be a whitish-blue arc inside the fuse, but it wouldn't be a proper open circuit that the p.s.u. components require. A second or so later the fuse may explode having by that time taken out all the rectifier diodes. In my opinion (and as the primary side of the e.h.t. transformer is correctly fused) it would be far better to dispense with the e.h.t. fuse totally.

While on the subject of the e.h.t. supply it's worth considering the warning label fixed to the p.a. anode compartment lid. Quite rightly it states... "Danger - isolate mains supply before removing cover". However, it surely defeats the object by having an exposed +2300V terminal literally 30mm away!

In my opinion I would expect to see some form of shrouding above the e.h.t. board. It would be a simple matter to extend the four p.c.b. fixing bolts and affix a small sheet of Perspex across the top of the supply.



## Amplifier Protection

Protection of various power supply and amplifier circuitry is provided by a dedicated control board. The amplifier wisely uses a soft-start system to protect the toroidal transformer from mechanical and electrical stress.

When the amplifier is initially switched on the protection circuit briefly connects a low value resistor into the primary circuit of the power transformer. Because the 'in-rush' current has been limited to a low value a 10A quick blow fuse has been correctly fitted into the primary circuit. This provides protection to the transformer and other p.s.u. components.

Additionally a large high wattage resistor has been fitted in the negative side of the e.h.t. supply to limit the worst-case short-circuit current until the mains input fuse blows. (This is another reason why the e.h.t. fuse is unnecessary.)

The control grid of the 3CX800A7 is a delicate structure, carefully aligned and closely spaced to the cathode electrode. To avoid destruction of the valve the specified maximum grid dissipation (60mA) must not be exceeded even for a millisecond.

The control board monitors the grid current and if it approaches approximately 50mA a yellow l.e.d. on the front panel begins to flicker and an audible 'clicking' sound is heard. At that point it's not possible to key the amplifier and it will be necessary to reduce the p.a. loading until normal grid current is achieved.

If excessive grid current is reached the amplifier will lock out and the yellow l.e.d. will remain on. However, the amplifier can easily be reset by use of the Standby/Transmit control switch.

The indirectly heated 3CX800A7 triode requires a warm-up period to avoid damaging the delicate cathode. A delay circuit is incorporated which keeps the amplifier in stand-by mode for nominally three minutes. (I measured a delay of 2½ minutes on the 144MHz amplifier, an eternity if a Sporadic-E opening suddenly occurred!).

Although not really protection in the strict sense of the word, metering has been provided to monitor both the anode

The two amplifiers (they are virtually the same externally) incorporate rugged toroidal transformers and substantial cabinets.



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current and grid current to ensure that the amplifier is functioning correctly. Apart from the e.h.t. fuse I was pleased with the overall level of protection provided for the amplifier.

### Forced-Air Cooled

Now I'll take a look at the important aspect of how to keep the amplifier cool. The 3CX800A7 valve is forced-air cooled by a fan which draws air up through the base of the amplifier and exhausts it from the anode compartment.

Foam rubber had been secured internally around the outlet to ensure that no hot air is re-circulated back into the fan input. The fan, a type 33BTFL, is obtained from Airflow Development Ltd., an established and competent UK fan manufacturer.

A 3CX800A7 valve at 800W output requires a minimum air flow of 19 cubic feet per minute (c.f.m.) at  $\frac{1}{2}$ in back pressure to adequately cool the valve. The 33BTFL fan has a static fan pressure of 64 c.f.m. (dropping to approximately 24 c.f.m. at  $\frac{1}{2}$ in back pressure) and thus comfortably meets this requirement.

The noise is relatively unobtrusive but it must be remembered that if you can't hear any fan noise then it's not doing what it's intended to do! A point to note is that unlike other amplifiers in the Linear Amp UK range, the fan does not have any airflow sensing.

### Screened Compartments

The amplifier r.f. circuitry is based around two separate screened compartments. This arrangement is very good and ensures excellent isolation between input and output circuits.

The grid/cathode compartment consists of an air-tight box into which the forced-air supply is blown. Both the 50 and 144MHz amplifiers use a Pi-L input circuit tuned with a variable capacitor. This is pre-set in the factory and presents a 50 $\Omega$  match across the band.

I was a little concerned to see a normal d.c. switching relay being used to provide input switching. Indeed in the 144MHz amplifier the relay was covered in sticky-backed aluminium foil to provide some form of screening. However, I measured the worse-case input voltage standing wave ratio (v.s.w.r.) at only 1.3:1 so it must be doing its job.

I also checked the through-path insertion loss and this measured a meagre 0.18dB across the 144MHz band. This is a good figure when you consider it's measured from the input N-connector through the (d.c. type) switching relay, then through the output relay contacts and finally to the output N-connector.

However, I still think it's bad practice to use a d.c. relay at v.h.f. My personal choice would be to use a low cost 900MHz flat-pack relay specifically designed for v.h.f. switching.

Turning now to the anode

compartment. A Pi-L network is used on the 50MHz band and a quarter-wave strip line with coupling loop is used on the 144MHz band.

The tuning capacitor is quite substantial with wide spacing. A loading capacitor is used for both amplifiers although in the 144MHz version this is pre-set in the factory and does not extend to the front panel.

The generated r.f. output exits the p.a. compartment via an S0239 socket for the 50MHz version and via an N-type socket for the 144MHz version. A short length of RG213/U feeder then takes the r.f. to the CX600(N) coaxial output relay. This is a very good device, rated to 1.5GHz, fitted with N-type connectors and able to withstand a through-power of 1000W at 30MHz. Before replacing the lid I confirmed that all r.f. connectors were done up very tightly.

By now it was almost time for me to switch on the amplifier but first I decided to thoroughly read the 10-page operating manual. It adequately covers what the connections are, how to set up and tune the amplifier and the correct operation.

Wisely the manual cautions about the dangerously high voltages contained within and emphasises this on a number of occasions throughout the manual. Although the manual does not presently contain circuit diagrams, Linear Amp UK have agreed to provide them later this year.

Connecting up the amplifier is extremely easy. Two leads with N-type plugs are required.

One lead connects to the driving transceiver and the other to the antenna via a suitable power meter. This latter item is essential as it's virtually impossible to correctly tune and load the amplifier without it.

It may also be useful to provide a power meter on the input side if you are unsure of your drive power. Apart from plugging in the mains lead the only other connection required is the p.t.t. line from the driving transceiver. The Discovery, in common with virtually all amplifiers, simply requires an 'earth on transmit' connection to key the amplifier.

### Initial Measurements

I always think it's preferable to use a dummy load instead of an antenna when learning how to drive a new amplifier and making initial measurements. I therefore connected the amplifier to a large oil cooled v.h.f. dummy load suitably rated to handle up to 1000W of r.f. power.

Having switched on and waited the obligatory three minutes for the cathode to warm up I was now ready to check the operation of the 50MHz amplifier. With no r.f. drive applied I keyed the amplifier to check the standing anode current. This was set up correctly at 80mA.

Applying a few watts of r.f. drive I adjusted the Tune and Load controls for maximum output on the power meter. The controls were very smooth in operation and

there was no signs of instability from the amplifier.

Increasing the drive level to 10W I measured nearly 400W output thus confirming the nominal amplifier gain of 16dB. With approximately 25W of drive I measured a peak output of 900W.

Even at this power output the grid current remained quite low measuring about 28mA. The amplifier appeared very docile and there were no signs of distress.

Next it was time to check out the 144MHz amplifier. Only the Tune control requires adjustment on this model as the Load has been pre-set in the factory. (It's set to give maximum output at the 1000W level). Results were much the same as the 50MHz version although I did need a slightly higher drive level to achieve similar results.

For example 10W of r.f. input gave 300W output indicating a nominal stage gain of 15dB. I required 13W to give 400W output and 30W to deliver 1000W peak into the dummy load. Again I had no concerns about the amplifier. Tuning was extremely simple and at no time did the amplifier give me any cause for concern.

Then it was time to disconnect the dummy load and connect each amplifier up to an appropriate antenna. At this point I should mention some words of advice.

Check that your antenna v.s.w.r. is low and ensure that the coaxial feeder and antenna connections can handle the stress of very high power. Running hundreds of watts is a completely different ball-game from using a low power transceiver!

Operating with the Discovery amplifier I made a number of s.s.b. and c.w. contacts on both bands, including some via moonbounce and meteor scatter. I also made some contacts in the September 144MHz contest and at no time did I receive an adverse report of poor signal quality. When asked, stations reported an increase of between 2 to 3 S-points when the amplifier was switched into circuit.

### Overall Performance

I was pleased with the overall look and performance of the Discovery amplifiers. Both models produced up to 1000W of output power effortlessly.

Tuning was very easy and they were very stable in operation. The level of protection is good and sufficient air cooling is provided to ensure long valve life.

With a little bit more attention given to the e.h.t. power supply I would have the confidence that these amplifiers really will last a lifetime. The price of the Discovery for either the 50 or 144MHz band is **£1395 inc. VAT plus £15 carriage**. This compares very favourably indeed with similar amplifiers of this type and of course it's made in Great Britain.

My thanks go to Peter Rodmell G3ZRS of Linear Amp UK, Field Head, Leconfield Road, Leconfield, Beverley, East Yorks HU17 7LU, Tel: (01964) 550921 for the loan of both models.

PW

**After seeing a copy of David G4ASR's review Peter Rodmell G3ZRS sent us the following comments:**

I should like to thank David Butler for reviewing the 2m and 6m Discovery amplifiers in very good detail. As a company we are always aware of criticism and suggestions for improvements, hence we have taken up the point of fitting e.h.t. fusing. Though it has not caused us any problems in the past, we are now fitting a 3A high rupture capacity fuse to the e.h.t. board.

Regarding the 1N4007 diodes we have always found these to be quite adequate. As there are 10 in series, each with a working voltage of 1.2kV, there is a very adequate margin for voltage. Also the amplifier only draws an average current of 500mA (800mA max) on s.s.b. or c.w. the 1A rating of the diode is quite sufficient. However, should any customer really specify their need for a higher rated diode then we should be only too happy to comply with their wishes.

**Peter Rodmell  
G3ZRS**

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G5RV	Half Size	40/20/15/10m	51' long	£24.95	4.95

### Shortened Dipole Antennas\* SO239 TERMINATION

SLS-40K	40m	38' long	£66.95	5.95 p&p
SLS-80K	80m	69' long	£77.95	5.95
SLS-160K	160m	100' long	£83.95	5.95

### Receiving Dipole SO239 TERMINATION

SRD	46' long	£49.95	4.95 p&p
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### Trapped Dipole Antennas\* SO239 TERMINATION

SD-32	20/15/10m	2 Trap	27' long	£33.95	p&p 5.95
SD-34	20/15/10m	4 Trap	24' long	£142.95	7.95
SD-42	40/20/15/10m	2 Trap	55' long	£88.95	5.95
SD-44	40/20/15/10m	4 Trap	47' long	£147.95	7.95
SD-52	80/40/20/15/10m	2 Trap	105' long	£103.95	7.95
SD-54	80/40/20/15/10m	4 Trap	97' long	£161.95	7.95
SD-56	80/40/20/15/10m	6 Trap	86' long	£219.95	9.00
SD-68	160/80/40/20/15/10m	8 Trap	154' long	£297.95	10.00
SD-618	160/80/40/20/15/10m	10 Trap	148' long	£349.95	10.00
SD-162	160/80m	2 Trap	208' long	£125.95	7.95
SDW-36W	30/17/12m	4 Trap	32' long	£139.95	7.95
SDW-46W	40/30/17/12m	6 Trap	46' long	£189.95	9.00
SDW-56W	80/40/30/17/12m	8 Trap	85' long	£274.95	9.00
SDW-610W	160/80/40/30/17/12m	10 Trap	152' long	£315.95	10.00

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SVS-41	40/20/15/10m	1 Trap	28' long	£52.95	5.95
SVS-42	40/20/15/10m	2 Trap	24' long	£81.95	5.95
SVS-51	80/40/20/15/10m	1 Trap	53' long	£59.95	5.95
SVS-52	80/40/20/15/10m	2 Trap	49' long	£88.95	5.95
SVS-53	80/40/20/15/10m	3 Trap	44' long	£118.95	7.95
SVS-64	160/80/40/20/15/10m	4 Trap	77' long	£156.95	7.95
SVS-65	160/80/40/20/15/10m	5 Trap	73' long	£189.95	7.95
SVS-161	160/80m	1 Trap	105' long	£76.95	5.95

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These heavy duty deluxe 600W traps are housed in weatherproof enclosures. No soldering or jumper wires are required. Use 2 traps for a dipole, or 1 trap for a vertical sloper.

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ST-10	28MHz trap	£29.95 each	p&p £4.95
ST-12	24MHz trap	£29.95 each	£4.95
ST-15	21MHz trap	£29.95 each	£4.95
ST-17	18MHz trap	£29.95 each	£4.95
ST-20	14MHz trap	£29.95 each	£4.95
ST-30	10MHz trap	£31.95 each	£4.95
ST-40	7MHz trap	£31.95 each	£4.95
ST-80	3.5MHz trap	£31.95 each	£4.95

Antenna 'Shorteners' are excellent where installation space is limited. Housed inside weatherproof, sealed enclosures, so no periodic cleaning is required. Two are needed for a dipole, one for a vertical sloper.

SLC-40	Shorten a 40m Dipole to 38'	£19.95 each	p&p £2.75
SLC-80	Shorten a 80m Dipole to 69'	£21.95 each	£4.95
SLC-160	Shorten a 160m Dipole to 100'	£21.95 each	£4.95

### Baluns & Centre Connectors

Lightweight, sealed, weatherproof, with Solid Brass rustproof terminals. Jumper wires not needed. Soldering of antenna wire not necessary. DC grounded for lightning protection. SO239 Connector. Stainless Support Hook (except SCE-1/S).

SPB-1 Pro-Balun	1:1 impedance ratio "voltage" Balun that matches 50-75 ohm coax to 50-75 ohm load. 3 - 35MHz, 1.5kW.	£29.95	p&p £4.95
SPB-1-C Pro-Balun	1:1 impedance ratio "current type" balun that matches 50-75 ohm coax to 50-75 ohm load. 1.5 - 60MHz, 3kW.	£32.95	p&p £4.95
SPB-4 Pro-Balun	4:1 impedance ratio "voltage" balun that matches 50-75 ohm coax to 200-300 ohm load. 3 - 35MHz, 1.5kW.	£32.95	p&p £4.95
SCE-1	1kW centre connector for a dipole antenna.	£14.95	p&p £2.75
SCE-1/S	1kW connector for a vertical sloper antenna.	£14.95	p&p £2.75

Anti-Corrosion Compound for Copper Wire Antennas: ACJ-1 Sachet £7.95 p&p £1.95

### All Band SA-10 450Ω TERMINATION

SA10 operates on all bands 160m - 10m. It can be installed as a flat top, sloper, or inverted 'V'. The top is 135ft/41.15m of heavy duty stranded copper wire, with low loss and insulators. A centre insulator is fed with 100ft/30.48m of 450Ω heavy duty twin ribbon feeder. It will work well from the balanced line output of your antenna tuner. **£59.95 p&p £10**

### All Band Limited Space SAS-2 450Ω TERMINATION

SAS-2 will operate on all bands 160m - 10m. It can be installed as a flat top, sloper, or inverted 'V'. The top is of heavy duty stranded copper wire, and provides 135ft/41.15m electrical length, with a physical length of only 70ft/21.34m through the use of antenna shorteners. The centre insulator is fed with 100ft/30.48m of 450Ω heavy duty twin ribbon feeder. This antenna will work well from the balanced line output of your antenna tuner. **£89.95 p&p £10**

### Off Centre Fed Dipoles SO239 TERMINATION

OCF Full Size	80/40/20/17/12/10m	135' long	£65.95	5.95 p&p
OCF Half Size	40/20/10m	68' long	£50.95	5.95

## AUTEK RF ANTENNA ANALYSERS

RF1 HF £159.95 P&P 7.95

RF5 VHF/UHF £289.95 P&P 10.00

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RF1

The RF1 adjusts antennas, feedlines, and RF networks, from 1.2 to 35MHz in 5 bands. It measures RF values of true impedance (0-2000Ω), SWR (1 to 15.1), C (0-999pF) and L (<0.04 to 300μH). It instantly reads out impedance and SWR. Feedline loss and phasing, Q, tuned-circuit resonance can be accurately measured and adjusted. L and C are measured at the RF frequency of interest, not at 1kHz or 100kHz as with other L/C meters.

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W450	140-170,400-470MHz	0-150W	£34.95



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STANDARD SERIES	Model	Frequency	Elements	Price	Carr. £10	
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	TA32JRN	10/15/20M	2 EL	£299	£10	
	TA33JRN	10/15/20M	3 EL	£349	£10	
	TA33JRN WARC	10/12/15/17/20M	4 EL	£499	£10	
HEAVY DUTY SERIES	TA31MP	10/15/20M	1 EL	£229	£10	
	TA32MP	10/15/20M	2 EL	£399	£10	
	TA33M	10/15/20M	3 EL	£509	£15	
	TA33M WARC	10/12/15/17/20M	4 EL	£659	£15	
	TA34XL	10/15/20M	4 EL	£809	£15	
	TA34XL WARC	10/12/15/17/20M	5 EL	£899	£15	
	TW33	12/17/30M	3 EL	£389	£15	
	TA53M WARC	10/12/15/17/20M	4 EL	£769	£15	
	HEAVY DUTY COMPACT SERIES	CL33M	10/15/20M	3 EL	£679	£15
		CL33M WARC	10/12/15/17/20M	4 EL	£799	£15
CL36M		10/15/20M	6 EL	£989	£15	
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	PRO67C	10/12/15/17/20/40M	7 EL	£1599	£20	
	PRO77A	10/12/15/17/20/30/40M	7 EL	£1399	£20	
	PRO95	10/12/15/17/20M	9 EL	£2199	£20	
	PRO96	10/12/15/17/20/40M	9 EL	£2699	£20	
	MV2W	12/17M	Vertical	£139	£10	
	RV4C	10/15/20/40M	Vertical	£269	£10	
	RV9C WARC	10/12/15/17/20/40M	Vertical	£359	£10	
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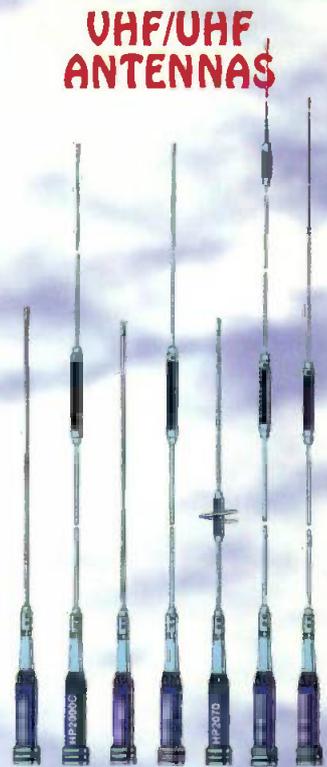


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430-440MHz		5.35dB	0.42m
HP7000C	2x5/8λ	100W	£36.95
430-440MHz		7.15dB	0.73m
HP2070	1/4+5/8λ	150W	£29.95
140-150,430-440MHz		2.15/5.35dB	0.45m
HP2070H	1/2+2x5/8λ	150W	£39.95
142-148,430-440MHz		5.15/8.15dB	1.05m
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142-148MHz		7.15dB	2.7m
SA70SN	3x5/8λ	200W	£59.95
430-440MHz		8.15dB	1.8m
SA70SN	5x5/8λ	200W	£79.95
430-440MHz		10.15dB	2.8m
SA270SN	1/2λ, 2x5/8λ	200W	£59.95
142-148,430-440MHz		5.15/7.15dB	1.3m
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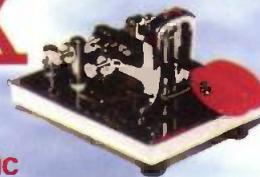
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# DELTA ENGINEERING

## LOW PASS & BANDPASS FILTERS, COAXIAL EMP SUPPRESSORS

### SUPPRESSORS

Delta suppressors protect coaxial line centre conductors from DC and low frequency AC voltage/current transients. Delta suppressors deliver as much current to ground as the centre conductor of the coaxial line can. The circuit, active at all times, neutralizes minute transients which often cause receiver noise. Direct hits can be handled, but not under all conditions.

301/U	1.5 - 200MHz	1kW	SO239	£44.95
302/U	30-500MHz	1kW	SO239	£49.95
302/N	30-500MHz	1kW	N	£46.95

P&P £4.95 each suppressor

### LOW PASS FILTERS

Lowpass filters are commonly made from thin lightweight materials, assembled with pop rivets, and not even any earth terminals! Their performance is, at the least, poor. Delta Filters are tough construction, with attenuation slopes avalanching down immediately after transmitting frequency range. Heavily built deep notching Chebyshev designs, prevent interference from harmonic or spurious emissions - a must for good operating. Low power models use silver-mica capacitors and phenolic connectors. High power

models use thick teflon TFE insulation sheet, brass or copper capacitor plates, all connections soldered.

420	50Ω	600W	30MHz	SO239	£59.95
421	50Ω	8kW	30MHz	SO239	£89.95
425	50Ω	600W	56MHz	SO239	£59.95
426	50Ω	3kW	54MHz	SO239	£79.95

P&P £5.95 each filter

### TRANSCIVING BANDPASS FILTERS

	250W	50Ω		
412	50-50.5MHz	SO239	£69.95	
413	144-148MHz	SO239	£69.95	

These Bandpass transceiving filters are designed to lessen or eliminate interference from nearby transmitters operating in close proximity to transceivers. As they are transceive style, they will also effectively reduce any transmitted spurious and harmonic emissions from your transmitter. The 412 and 413 are two stage, parallel resonant circuit, top-coupled designs. Each unit will pass the listed band of frequencies, and attenuate or block all frequencies above and below that band segment. The filters are connected between the transceiver output and the antenna.

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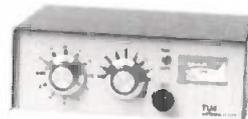
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# Tackling QRM - The Active Way

By Adrian Knott G6KSN

*Adrian Knott G6KSN describes a practical and easy-to-build s.s.b./c.w. filter unit to help you cut through the QRM on the busy h.f. bands*



If you are trying to chase elusive DX with amidst strong local signals and interference (QRM) then this filter circuit will help to improve the signal to noise ratio of any speech, data or c.w. signal. The design I've used is equally suitable for use with any communications type receiver.

The human hearing range is generally thought to extend from 20Hz to 20kHz although this does vary from person to person and also deteriorates with age. And nowadays a good hi-fi systems will handle these frequencies with ease.

## Fairly Narrow Band

However, the majority of the energy associated with a speech signal lies within a fairly narrow band of frequencies. These lie between about 300 and 3000Hz so it's an advantage when dealing with communications type speech signals to filter out frequencies above and below these values.

The filtering (or processing) will help to maximise the signal to noise ratio and hence intelligibility of the audio signal. With this in mind, I eventually decided to use four order of active high-pass filtering and twelfth order of active low-pass filtering offering ultimate rejection rates of 24dB per octave and 72dB per octave respectively.

When you're attempting to receive Morse code signals on the h.f. band there are usually additional problems to overcome. A c.w. (Morse) signal has a bandwidth of only a few Hertz and many such signals can simultaneously occupy a very small segment of the radio spectrum (one of the advantages of the mode...but it can lead to 'overcrowding').

The problem is designing a receiver with a sufficiently narrow bandwidth to 'pick out' just one such signal. And that of course was my design objective.

## Can Work Wonders

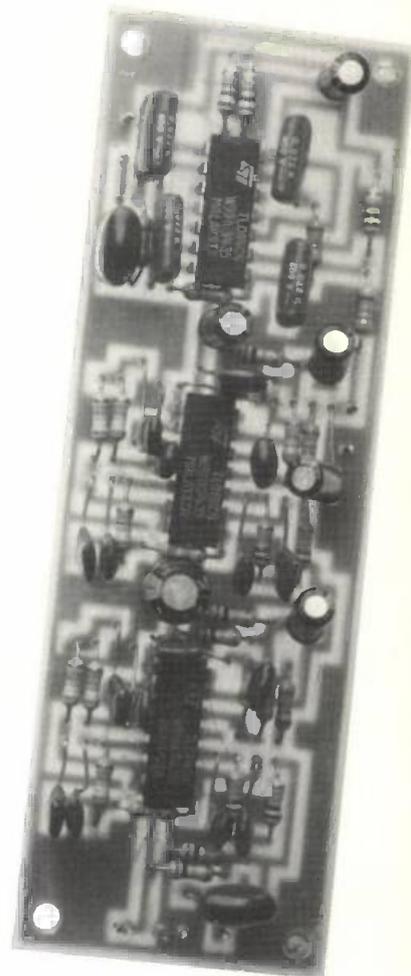
Many commercial communication type receivers are often lacking a good c.w. filter and an external audio filter can often work wonders. But there are various import considerations to bear in mind.

The filter must not 'ring' (i.e. have too high a Q factor) because this will tend to make all the 'dits' and 'dahs' merge together. In practice I found a good compromise for the bandwidth of the c.w. filter was found to be around 200Hz.

The c.w. filter consists of two cascaded parallel resonant active filters. They each have a 'Q' of 7 and a centre frequency of around 1kHz. I've illustrated the frequency the graphs in Fig. 1, and my actual measurements are provided in Tables 1 & 2.

## The Circuit

Now let's start by looking at the circuit, which is shown in Fig. 2.



incoming audio from the receiver at line level is fed to C1, which acts as a d.c. 'blocking' capacitor and then to IC1, a quad operational amplifier.

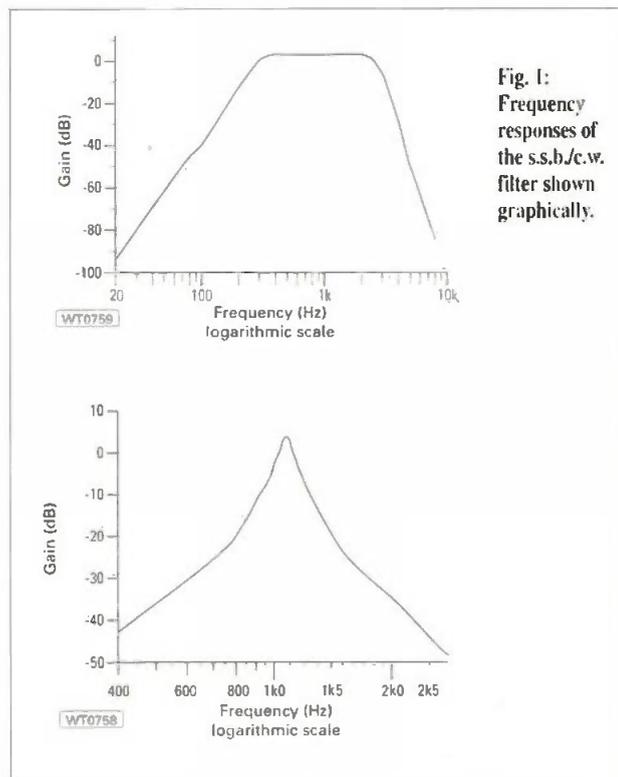
The resistors, R1 and R2 bias the op-amp, and R3, R4, C2 and C3 in conjunction with IC1a, the first op-amp, form a second order low-pass filter. Similarly, R5 to R8 and C4 to C7 do the same with IC1b and IC1c, the second and third op-amps respectively.

Integrated circuit IC1d is configured as a two-pole high-pass filter with R9, R10, C8 and C9 setting the cut-off frequency and 'Q'. The resistors R11, R12 and C10 act as a source of bias for IC1d.

The i.c., IC2, is configured in exactly the same manner as IC1 and the input of IC2a is connected to the output of IC1d. This is so that the overall filter cut off rates will be doubled.

Integrated circuit IC3 forms the c.w. filter with IC3a forming the first parallel resonant circuit, with IC3b forming the second.

If you wish to change the centre frequency, this can be done without affecting gain or 'Q' by changing C20 to C24. Frequency varies as the reciprocal of C, so doubling the value



# TUNING IN

ISSUE NO.1

**“The one stop radio enthusiasts solution. . .”**



South Midlands House, Chandlers Ford

**A**s you may have heard we've recently made some sweeping changes at SMC many of which, we are delighted to report, have already resulted in a healthy upturn in Sales on the Amateur Radio front.

## NEW LOOK SHOWROOM

Recent building work has including the addition of a coffee area and two dedicated radio shacks EXCLUSIVELY for customer use, one for general radio and one exclusively data. You can choose a radio from our wide range of new and secondhand equipment and use it in the shack. In the Data shack you'll see live demos of the popular Siskin Multicat C.A.T. controller and the excellent WINPAK program written by Roger Barker G4IDE which amongst other things "speaks" DX Cluster announcements using a PC sound card. (Incidentally, this program is available free of charge to



personal callers, you don't have to spend any money with us.).

For personal callers we'll do our best not to "rush" you into a purchase, feel free to take your time and browse (many visitors spend a whole afternoon in the Showroom making comparisons and trying rigs out on air rather than just trusting brochure and some hi-power sales patter). In fact for those that are interested we can even arrange a factory tour, SMC is quite a big gun in the commercial radio and antenna market place.

We've also changed our approach to the way we deal with customer queries by adding dedicated tele-sales staff and extending our opening hours from 8.30am to 5.45pm weekdays plus Saturday mornings. We hope you'll receive a quicker and more informative response than in the past although once in a while when the whole world decides to call us, there might be a delay, but we'll try our up most to take your call as soon as possible.

## WEB PAGES

Net News .....<http://www.smc-comms.com>

For those of you using the ever growing Internet we have completely re-vamped our Internet web site not

just with product information but with information about other areas of our business including our pump up mast division (Hilomast), our commercial and PMR departments and our new on-line Newsletter "Tuning in with SMC". We have also put on the pages the secondhand list from our three branches. If you need any further information on any of the radios give us a ring. For those who like to prod and poke there's even a "Secret" page where you could win a £10 SMC gift voucher! You can even place an order on-line with simple to use fill in boxes.

## MAJOR REFIT at SMC AXMINSTER

We've decided to bite the bullet and completely revamp our Axminster Branch. Not long after you read this Rodney Bill and Mandy will have

moved into new premises just a few doors down the road but with lots more space and comfort. The new look shop offers a wider range of equipment and much better viewing and demonstration facilities, including a radio shack similar to our HQ. Although the branch has done exceptionally well over the years we thought it was time to get it ready for the Year 2,000 by which time Yaesu and no doubt Icom will have a wrist watch HF rig and Kenwood rigs will include a built-in car audio system, food mixer and dishwasher!

## CUT PRICE...or COMMON SENSE?

SMC has been in the Amateur world for over 39 years so we've seen a few dealers fall by the wayside, usually because of absurd discounting. We'll always do our best to match a competitive price but we really can't see any sense in selling equipment at BELOW cost price. Whilst on the face of it this may seem like great news for you the customer just wait and see what happens if heaven forbid things go wrong, and occasionally as with any product they do! Dealers need to make a modest margin to be in a position to offer YOU the customer ongoing support and service. Most of the dealers you'll see advertised in these pages ARE sensible, one or two are just plain daft and probably will not be around by the year 2000.

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Where we will try to help you get the best deal is by offering additional accessories on many radios for example:

- FT-920 with a FREE FM board and HF3VNB Antenna.
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EXTREMELY comprehensive user manual which offers lots of useful tips about starting out in the hobby. The numerous features include:

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Available exclusively from SMC the AR8000 MCO Enhanced is supplied ready to use with the Optoelectronics Scout and the Siskin Multicat.

Plus lots more, phone or write for a glossy, or better still call in and try one out, it's fun!

AR8000MCO Enhanced - £324.95

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We have recently launched the Siskin Multidata PC add-on for decoding High resolution fax, Slow Scan TV, RTTY, AmTOR and Morse code. This little unit simply plugs into your

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What is all this C.A.T. stuff everybody is on about these days? Well, many modern receivers (most Icom, Yaesu FRG100, Kenwood R5000, AOR AR8000 etc.) have an extra computer control socket allowing a PC to control mode, frequency and memory functions. Whilst you could buy an RS-232 interface from the various manufacturers invariably they are specific to just that one radio. A couple of years ago we launched the Siskin Multicat which revolutionised C.A.T. control. At last, one interface that works with ALL Icom, Kenwood and Yaesu C.A.T. radios and Scanners such as the AR8000MCO Enhanced and the Optoelectronics Scout..



Siskin Multicat CAT Interface

Unlike other controllers the Multicat IS CE approved, DOES come with ready-made computer and radio cables, IS supplied with Windows and DOS software, DOESN'T need to be traded in when you change radios and... it's less expensive too! £69.95 incl. Cables and software.

## SHORT RANGE BUSINESS RADIO...

Many businesses have an ongoing need for reliable professional quality



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two-way radio at affordable prices, i.e. farmers, businesses with several offices in a nearby town etc. where conventional telephone lines would be

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## WWW'ERS READ ON....

If you have an Internet account and PC or Mac try logging on to: <http://www.policescanner.com>. Amongst other things you'll hear LIVE radio traffic from New York Police Department, and, as far as we know it's actually done with the full blessing of New York Police department. Their site also allows Real Audio links to Air Traffic and Fire Brigade Radio Systems. Whatever next?...

## AIRBAND TRANSCEIVER

We are pleased to announce the new SMC JHP200 Airband Transceiver, the ideal companion for Light Aircraft and Microlight Pilots. This rugged handheld offers a host of features including:



JHP 200 Airband Transceiver

Full 108 - 137MHz coverage \* VOR mode allows the angle of approach to be displayed in their LCD \* Easy to read LCD display \* Scans COM & NAV bands \* Wide range of optional accessories.

## NEW FOR AMATEUR CUSTOMERS...

By the time you read this we should have stocks of the new Yaesu VX1R, perhaps the world's smallest dual band transceiver? The VX1R is the ideal companion if you're also keen on scanning the Air & Marine bands, + FM Radio Broadcasts (it will even receive TV sound!). It measures only 81 x 47 x 25mm.

Features include:  
2M + 70CM TX, 500kHz-999 MHz (with gaps) RX \* 290 Memory channels \* CTCSS encode/decode \* backlit LCD & Keypad display \* Lithium Iron Battery. Plus lots lots more. RRP around £269!

## OUR FUN DAY...

In case you didn't make it, our Fun Day on August 16th was a rip roaring success! We were well supported with representatives from Icom UK, AOR, Yaesu, Venus Electronics, the Camel Trophy Comms. Team and the Cable & Wireless Emergency Response Unit! Profits from the bar and refreshments raised over £200 for Leukaemia Research. Our twice hourly free draw proved popular with all visitors and our thanks go to Kenwood UK and ICOM UK who very kindly provided a wide selection of prizes. Please call us for any further information on our product range, new equipment and our monthly special offers.

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# Tackling QRM - The Active Way

Continued from page 33

Fig. 2: Circuit of the s.s.b./c.w. filter designed by G6KSN (see text).

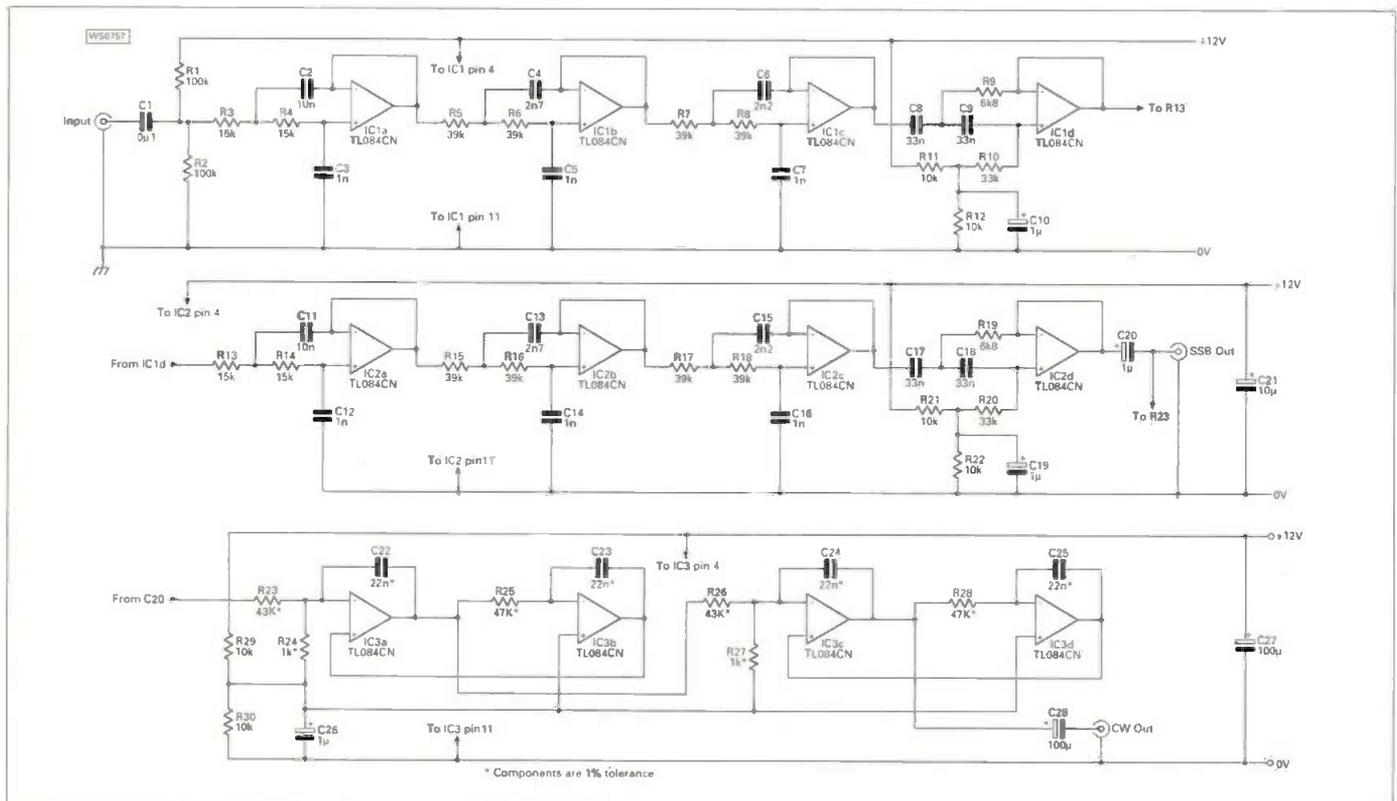


Fig. 3: The p.c.b. design and associated component overlay for the G6KSN filter project.

of the four capacitors will halve the resonant frequency or 'sweet spot' of the filter.

### Smooth Supply

The unit requires a fairly smooth supply of between 9 and 15V. If the

electrolytic capacitors are upgraded to higher voltages then there's no reason why the unit should not operate at up to 30V.

Current consumption is around 40mA and if you intend to use the unit on batteries I would suggest changing IC1, 2 and 3 to TL064s.

(This is the low power version of the TL084).

### Accomplished Easily

Construction of the circuit can be accomplished quite easily on the custom designed p.c.b. which is shown in Fig. 3. The off-board interconnections required are shown in Fig. 4.

The circuit could also be built using Veroboard if required. (No problems should be encountered using matrix board since the circuit is only processing low frequencies and input/output impedances are low.

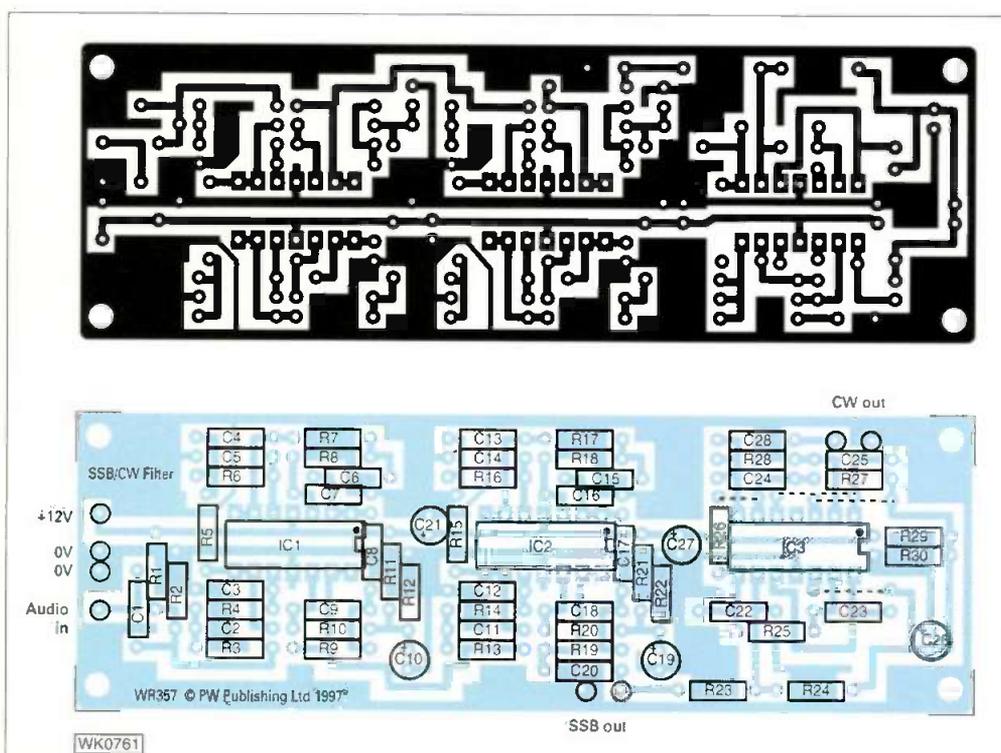
If the high performance of the filter is to be maintained in a Veroboard version I suggest that tracks are cut to the minimum length required. You should also ensure that all unused tracks are connected to 0V.

### Testing & Checking

When the unit is built then testing can begin, and you should start checking the board for obvious shorts. If all is well then power the unit up and measure the voltages on pins 1, 7, 8 and 14 of the 3 op-amps.

The test points suggested should all read within half a volt of the supply voltage. If this is not the case then a fault is present and must be found.

If everything is okay and a signal generator and oscilloscope is



available then the frequency response of the filter can be checked. If not, then it's simply a matter of connecting the unit to the receiver at line level.

The filter needs to be connected between the audio pre-amplifier and power amplifiers in the communications receiver. (You can often be accomplish this by connection to the facilities socket present on many sets).

If there's not a 'facilities' socket, then the audio path can be broken by disconnecting the feed to the receiver's volume control. The signal is then routed through the audio filter and then re-routing the processed audio back to the volume control.

Incidentally, the unit could probably also take its power supply feed from a suitable regulated supply rail in the communications receiver. (Obviously this will more difficult with older valved equipment and of course you should take great care when working with mains operated equipment).

### Filter Installed

With the filter built, checked and okay it can now be installed. And when switched to s.s.b. a great improvement should immediately be obvious.

However, when you switch to c.w. you'll notice that speech is no longer intelligible because of the very narrow bandwidth of the filter. Tune to a c.w. transmission and note that the tuning is critical for best results.

Note also that if there are two c.w. stations close together it is now a simple matter of tuning to the one of interest and the other one will be attenuated to a large degree. Weak DX can now be copied even if there are strong signals on adjacent frequencies and QRM will be attenuated also.

So, in conclusion, I hope you'll have fun building and operating the s.s.b./c.w. filter. It should certainly give you the edge for weak signal work, especially when used in conjunction with those 'not quite so expensive' communications receivers where a very worthwhile improvement will be evident.

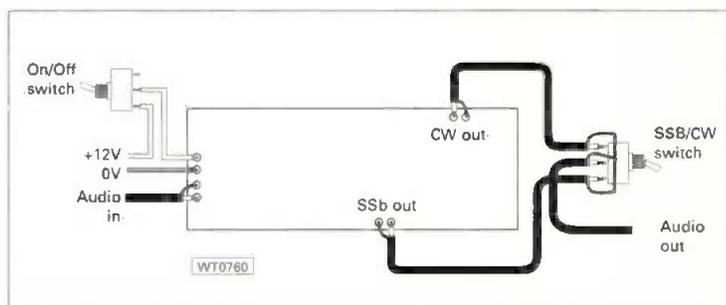


Fig. 4 Interconnections from p.c.b. (see text for suggestions on installation procedure for receiver to be used).

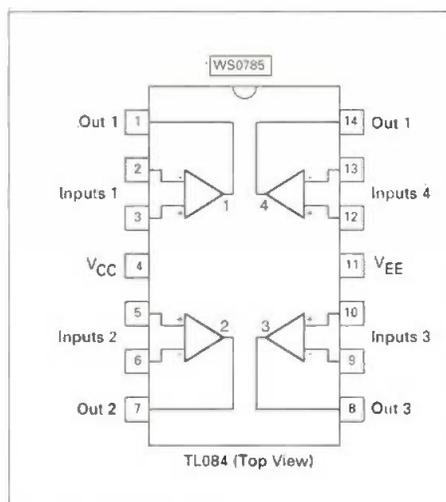


Fig. 5: Pin-out details of the TL084CN i.c. used for the project.

PW

Table 1:

### Frequency response of s.s.b. filter

Note: The s.s.b. filter has an 'in band' ripple of 3dB which G6KSN considers as acceptable. The frequency response  $\pm 3$ dB is 270Hz to 2.8kHz.

Frequency (in Hz)	Gain (in dB)
20	-95
40	-70
80	-46
100	-40
200	-13
300	+00
400	+03
800	+02.4
1000	+02.4
2000	+03
2500	+00
2800	-03
3000	-08.4
4000	-28.6
5000	-50
8000	-85

Table 2:

### Frequency response of c.w. filter.

The c.w. filter has a measured resonant frequency of 1.1kHz and 6dB bandwidth of 250kHz.

Frequency (in Hz)	Gain (in dB)
20	Unmeasurable
40	Unmeasurable
80	Unmeasurable
100	Unmeasurable
200	-73
400	-43
800	-20.6
900	-12.6
950	-7.6
1000	-1.6
1050	2.1
1100	2.4
1150	-2.6
1200	-7.4
1500	-23.6
2000	-34
2800	-48
4000	-81.6
8000	Unmeasurable

### Shopping List

#### Resistors

Metal film miniature 0.25W 1%

1k $\Omega$	2	R24, 27
43k $\Omega$	2	R23, 26
47k $\Omega$	2	R25, 28

Metal film miniature 0.25W 5%

6.8k $\Omega$	2	R9, 19
10k $\Omega$	6	R11, 12, 21, 22, 29 & 30
15k $\Omega$	4	R3, 4, 13, 14
33k $\Omega$	2	R10, 20
39k $\Omega$	8	R5, 6, 7, 8, 15, 16, 17, 18
100k $\Omega$	2	R1, 2

#### Capacitors

Polyester layer, (16V or voltage to suit, see text)

1nF	6	3, 5, 7, 12, 14, 16
2.2nF	2	C6, 15
2.7nF	2	C4, 13
10nF	2	C2, 11
22nF	4	C22, 23, 24, 25
33nF	4	C8, 9, 17, 18
0.1 $\mu$ F	1	C1

Electrolytics (16V or voltage to suit, see text)

1 $\mu$ F	4	C10, 19, 20, 26
10 $\mu$ F	1	C21
100 $\mu$ F	2	C27, 28

Integrated circuits

TL084CN	3	IC1, 2 and 3
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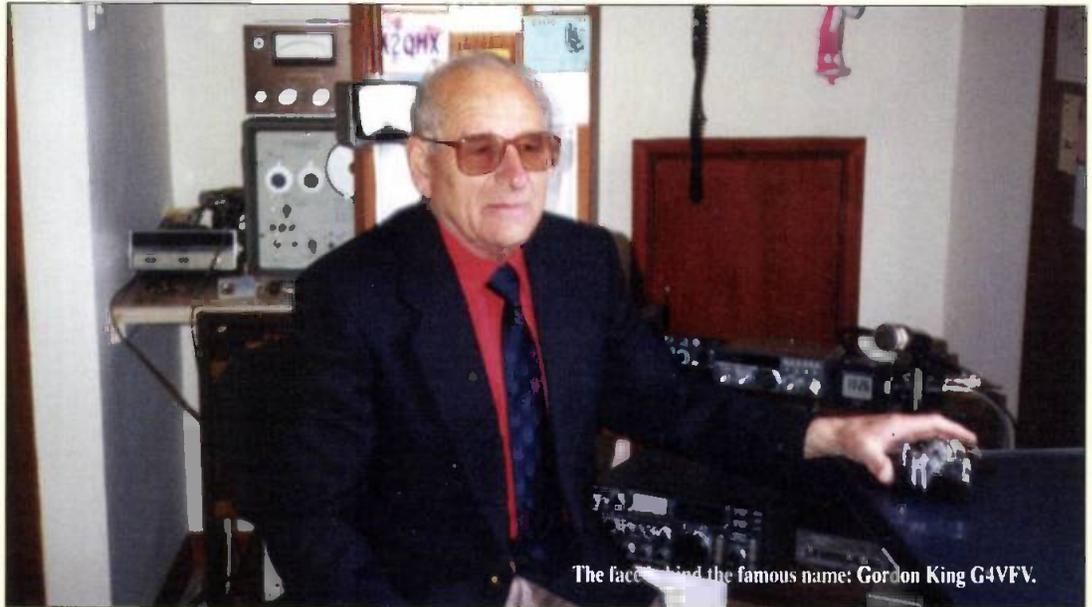
#### Miscellaneous

Veroboard or p.c.b., single pole double-throw switch, DIN or Phono sockets to suit, case to suit needs.

# Making It Go

By Gordon King G4VFV

*Gordon King G4VFV is internationally known for his straightforward approach to explaining complex subjects through his articles and books. Here Gordon takes the opportunity to explain just how those v.h.f. and above signals can travel so far on occasions.*



The face behind the famous name: Gordon King G4VFV.

Radio waves above approximately 30MHz (start of the v.h.f. segment) are progressively more influenced by the structure of and changes in the earth's local atmosphere, called the troposphere. With increasing frequency, these waves behave more like light rays and follow similar laws.

The v.h.f. waves are essentially unaffected by the ionised upper layers. So communication doesn't have the advantage of the distance provided by the reflecting ionised layers to waves of lower frequency. At v.h.f. and above, the ionosphere is virtually transparent, because of this the waves pass through the layers into outer space.

Communication, therefore, relies particularly on earth-bound waves radiated directly from the transmitting antenna to the receiving antenna. These so-called space waves consist of two component waves, the direct wave and the ground reflected wave, as shown in Fig. 1.

## **Two Waves**

The signal field at the receiving point is the sum of the two waves whose strengths are approximately equal. But even though the reflected wave undergoes an almost complete phase reversal due to the reflection they do not cancel each other because the

direct and reflected waves have different path lengths.

If it wasn't for the ground reflected wave, the only attenuation with distance would be that caused by normal spreading or dissipation. (As happens with the direct wave, where the field strength is inversely proportional to distance, so that each time the distance is doubled, the strength falls by half).

For space wave contacts however, the reflected wave detracts from the direct wave in such a way that the strength at the receiving point is reduced. The attenuation is then inversely proportional to the square of the distance, so that each time the distance is doubled, the strength falls by four times.

As the height of either or both antennas is increased, the space wave field strength becomes closer to that of the direct wave (the strength increasing directly with height). And this is particularly valid into the 'far field'.

Fairly close to the transmitting antenna, the field strength goes through a series of maxima and minima. And with increasing distance, the difference in path length between the direct and reflected wave swings between full and half wavelengths until it settles down to the steady rate of attenuation with distance.

## **Antennas High**

A primary requirement for longer distance v.h.f./u.h.f. working, therefore, is for the antennas to be as high as possible. The ideal situation is for each antenna to be sited on high ground and elevated on tower or mast with minimal intervening obstruction!

It's also worth remembering that the field strength is not directly proportional to an increase in power. Indeed, the strength increases by the square root of the increase in transmitter power.

For example: if the transmitter power is doubled, the signal strength at the receiver will increase by only 40%, not two times, in terms of signal voltage. A two fold increase can be achieved at a given power by doubling the height of the antenna!

Another interesting point is that as the wavelength is reduced, so the field strength increases, other factors remaining the same. This means that 10W on 430MHz will sometimes yield getting on for three times more signal field than the same power on 144MHz (assuming antennas of equivalent gain and height).

However, at the receiving end, the apparent advantage is cancelled. This is because here the received signal is directly proportional to the wavelength.

# Further!

For instance, a 430MHz dipole will abstract (or 'capture') only about 35% of the signal of a 144MHz dipole in the appropriate bands. And although v.h.f./u.h.f. waves possess some of the features of light rays (this being more apparent with increasing frequency), the DX operator can happily retain communication over paths in excess of the geometric horizon distance as indicated by path AB at (a) in Fig. 2.

## Marconi's Revelations

It's interesting to note that until Marconi's revelations in 1932 proved that significantly greater path distances on v.h.f. were possible, distances greater than geometric communication range was considered impossible! And an article under this title would barely be viable were it not possible to achieve contact when the direct path falls below the horizon as at CD in the diagram Fig. 2.

The diagram (B) in Fig. 2 gives an impression of what happens. The part of the troposphere just above the earth's surface has the effect of 'bending' the wave so that it tends to follow the curvature over a somewhat limited distance.

The extra distance over that dictated by the earth's geometry is generally given by assuming that the radius of the earth is increased by a factor of 4/3 or 133%. It depends on just how much the troposphere at any given time is 'bending' or refracting the wave.

Anyway, based on the 33% increase over the geometric range works it out to some 15%. The basic range, therefore, is the distance to the horizon of the transmitting antenna plus the distance to the horizon of the receiving antenna (antenna heights again playing a major role) times the refraction factor of the troposphere which, at 15% is 1.15, often called the 'k' factor.

As the distance continues to exceed the basic range, the signal doesn't suddenly vanish altogether (not very often, anyway!) but communications becomes less reliable and is affected by fading. Nevertheless, good contacts are still perfectly feasible well in advance of the basic range as we shall see, which makes v.h.f./u.h.f. working so interesting and often exciting!

## Tropospheric Height

The troposphere extends above the earth to a height of about 10km. Under normal or 'flat' conditions, the temperature normally falls with height at the rate of around 6°C per km.

The change happens because the temperature of the lower air is raised by convection currents generated by the heated earth, while the progressive fall in temperature results from adiabatic expansion of the upper air as its pressure decreases with height. This leads to a linear decrease in the refractive index of the troposphere over the first km or so.

## Refraction Of Waves

Refraction of v.h.f./u.h.f. waves, which plays such an important part of longer distance working on v.h.f./u.h.f. is similar to that of light where the rays are bent towards the normal on entering a more dense medium, Fig. 3.

It's because of the falling density (and hence the reducing refractive index of the troposphere with elevation) that the waves travel a slightly greater distance than that given by the geometric horizon between the two antennas.

Like light rays, v.h.f. and higher frequency waves are also affected by diffraction, reflection and absorption. So, over a complex path, all these factors might well come into play, making it almost impossible to forecast the sort of contact you're going to achieve beyond the basic radio horizon distance!

## Path Conditions

As the range is increased, the field strength tends to decrease with increasing frequency owing to the increasing attenuating influence of buildings, trees, hills and terrain irregularities. Absorption also becomes increasingly important as the frequency is raised (wavelength decreased).

For example, if a roof space antenna must be used, more signal will get out of the building on 144 than on 430MHz or higher frequencies. Into the super high-frequency (s.h.f.) region and above the absorption of brickwork and roofs demands that the antenna be mounted

outside, well in the clear for serious work.

On the 144MHz band though, a well positioned attic antenna can perform remarkably well, often providing very interesting, long distance contacts. When carefully located, the absorption attenuation need not be all that high and can often be countered by slightly extra antenna gain!

From my home QTH in Brixham overlooking Torbay, I have been using experimental 144MHz antennas in my roof space for many years. And I have experienced numerous interesting contacts over paths of 1000km or more well into the northern regions of the UK and into Europe under a variety of 'lift' conditions!

The position of my QTH (not to scale) is shown in Fig. 4. It's some

No it's not Gordon's library...but just a selection of some of the books he's written on radio and electronics!



Fig. 1: Field at the receiving point is the resultant of the direct and ground reflected waves. In the far field signal at the receiving point rises as the height is increased. Relatively close to the transmitting antenna the field strength goes through a series of maxima and minima levels with distance until it settles down to the steady rate of attenuation with distance.

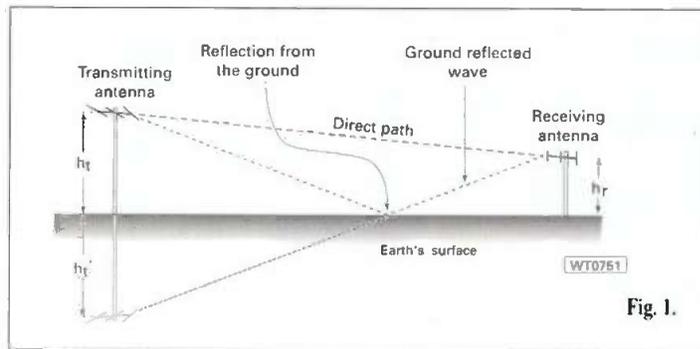


Fig. 1.

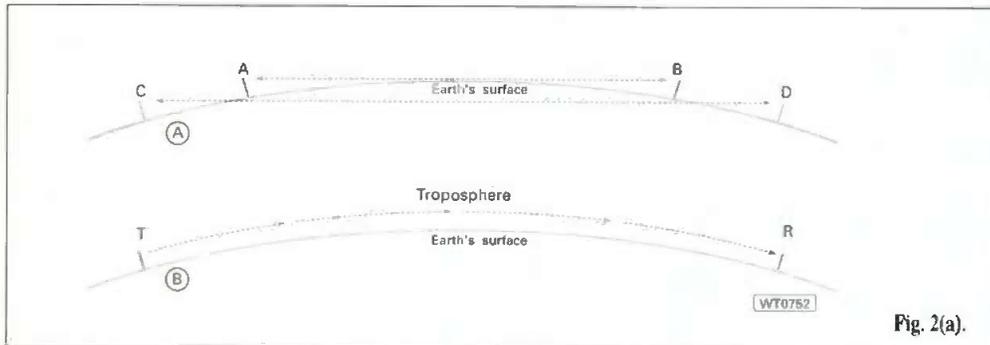


Fig. 2(a).

Fig. 2(a): The geometric horizon path AB and the radio horizon distance CD, where the wave follows the curved path of the earth owing to tropospheric refraction (shown at b).

1.6km from the sea and about 100m up with rising ground behind peaking to about 150m. I find that this high hill backing tends to enhance my output in a north-easterly direction, where most of the activity lies.

To work southerly, however, I need to employ the h.f. bands because the hill is too close to my QTH to provide a diffractive path. I work essentially Morse, especially on h.f. and QRP with rarely more than 5W.

### Obstructed Pathway

You shouldn't always consider it impossible to establish a contact when an obstructed pathway is present (as illustrated in the pathway shown in Fig. 5). In fact, under conditions like this it may be possible to obtain field strength greater than provided by relatively flat terrain.

Communication may be possible because the small hill or ridge tends to eliminate the attenuating influence of the ground reflected wave, while still allowing the direct wave to pass over the top by refraction and possible diffraction. This effect can also occur at higher frequencies over

hilly or irregular terrain, but the path effects are complex and not easy to forecast.

Although tropospheric effects are less apparent at lower v.h.f. (from 30 to, let's say 150MHz) they still influence propagation along the lines already discussed, becoming more significant on the two, four and six metre bands than on 10m.

In fact, maximum useable frequencies (m.u.f.s) have seemingly supported F2 propagation at the peaks of some particularly active sun spot cycles on the 50 and 70MHz bands. However, for most normal v.h.f. working, the upper ionised layers have little reflective and hence distance enhancing influence.

There are times though, when the lower E layer becomes highly ionised. This can happen to the extent that it has a reflective effect on signals in the 28, 50, and 70MHz bands - extending to the 144MHz band for shorter duration openings.

### Sporadic-E

Owing to the densely ionised regions being in motion Sporadic E (Es) form of propagation is not consistent. It's accompanied by deep fading, where one minute the signal may be S5 plus and the next minute zero - that's why it's called Sporadic-E!

As reported by David Butler G4ASR in PW's 'VHF Report' Sporadic-E peaks around the months of May, June and July, especially in mid-morning and early evening. It can occur again towards the end of the year, but it may appear at any time. The propagation can be easily

exploited with the simplest of kit.

I use a converted CB transceiver (DNT M40FM) running in monitor mode while I'm in the shack from its own L-shaped dipole also in the roof space. The f.m. calling frequency is 29.6MHz and any Es activity is dramatically apparent by this part of the spectrum becoming incredibly lively!

The intensity of activity gives a good clue as to the likelihood of activity higher up the v.h.f. region. First skip distance can be as great as 2000km, while multiple hop can double this. The signals are strong owing to the use of the direct wave without the destructive effect of the ground reflected wave.

Often, the signal can well exceed the 'basic' range by the mechanism shown in Fig. 6. Here the direct wave is scattered by the effects of irregularities in temperature, moisture and pressure in the upper troposphere.

The diagram in Fig. 7, illustrates how a sharp discontinuity in the linear decrease in refractive index can reflect the signals back to earth over relatively long distances. This is something like the skip produced by the ionosphere to h.f. signals, but because of the lower elevation of the troposphere, the ranges are less.

### Layer Entrapped

The signals are sometimes 'layer entrapped' and may then travel as in a waveguide ('Ducting') for many kilometres with the least attenuation. This mode occurs more readily at u.h.f. than v.h.f. With all the tropospheric modes, the weather plays a major part.

Co-channel interference on television gives a good clue as to the likelihood of a v.h.f./u.h.f. 'lift'. You should also keep a look out for longer distance working conditions at the end of a fine run of weather.

(At the time when I was writing this article, there was a particularly cold morning with ground mist. This upset the normal temperature decrease with height and produced some interesting contacts up to about lunch time when the mist dispersed).

For serious v.h.f./u.h.f. DXing Radio Amateurs need to use a reflecting medium significantly higher than the troposphere. This is where moon bounce, meteor scatter, satellites and aurora come into their own. Path attenuation is less than terrestrial because it is the direct wave which supports the contact.

With moon bounce, for instance, you have to consider the earth-to-moon distances which are around 385,000km times two. So, even with an effective radiated power of 10kW

Fig. 3: Refraction of a ray of light. The effect is similar for a v.h.f./u.h.f. radio wave.

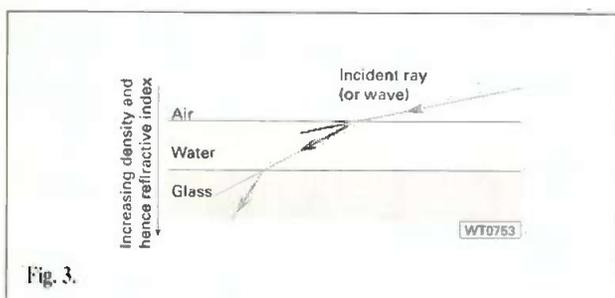


Fig. 3.

(maximum legal power plus antenna gain of 14dB) and a fairly reflective moon. Even then the returned signal at the receiver would possibly be barely more than a microvolt. The same applies to the other exotic modes.

### Best Noise Figure

For the lowest level of useable signal, a receiver with the best possible noise figure is essential. Most hiss ('pink' noise!) stems from the first r.f. stage, so this should be designed and adjusted for the lowest noise figure rather than the highest gain.

Using a dedicated low noise preamplifier at the antenna before the feeder to the rig (masthead amplifier) ensures that the strongest possible signal gets to the first stage of the receiver. (This is really very important for long distance working).

If, for example, the receiver has a noise figure of 2.5dB while the preamplifier has a noise figure of 1.5dB and a gain of 12dB, the overall noise figure would be around 1.64dB - much better than the rig alone and nearly as good as the preamplifier itself. This could well make the difference between reading a weak signal and an aborted QSO.

### Noise Power Bandwidth

Noise power bandwidth of the particular mode is another factor of importance. This is because the smaller the bandwidth required by the signal, the less receiver noise

### The Mathematics

For those of you who like to get to grips with the nuts and bolts of things, the following gives the relevant mathematics on which I've based this article.

The field strength in volts per metre (V/m) of the direct wave is given by  $(7\sqrt{W})/d$ , and that of the space wave, after having taken account of the destructive ground reflected wave, by  $(88\sqrt{W})(h_t h_r)/\lambda d^2$ . Where  $W$  is the effective radiated power in watts,  $h_t$  and  $h_r$  are the heights of the transmitting and receiving antennas respectively,  $d$  is the path distance and  $\lambda$  is the wavelength in metres.

The signal potential difference (p.d.) at the receiver ( $V_r$ ) when the antenna lies in a given field strength, properly polarised and orientated correctly matched to the feeder and receiver is given by:  $(\lambda G_a A_f E)/2\pi$ . Where  $G_a$  is the gain of the antenna and  $A_f$  is the attenuation of the feeder (both in direct ratios - not in decibels),  $E$  is the field strength in V/m and  $\pi$  is 3.14.

Several expressions relate to the horizon distance, but that from which the others are derived is:  $\sqrt{(2r_e h)}$ . Where  $r_e$  is the radius of the earth (6 357 245.5m) and  $h$  the height in metres. Another is  $3.57(\sqrt{h_t}) + \sqrt{h_r}$ , where  $h_t$  and  $h_r$  are in metres and the distance between them is in kilometres. This is the path distance AB in Fig. 2a. A simple one to remember is  $\sqrt{(1.5h)}$  where the distance is in miles and the height is in feet.

The basic radio horizon distance (b) in Fig. 2 is the product of the geometric distance and 1.15, which takes account of the tropospheric refraction. This is contained in  $\sqrt{(2h)}$  where, again, distance is in miles and height is in feet.

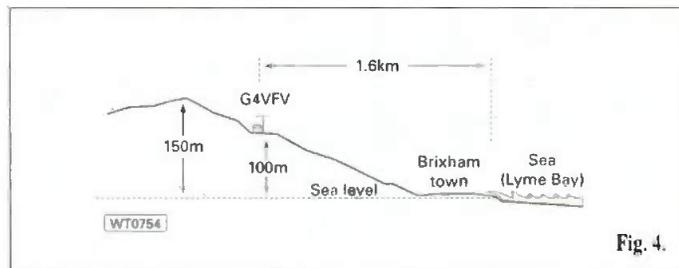


Fig. 4.

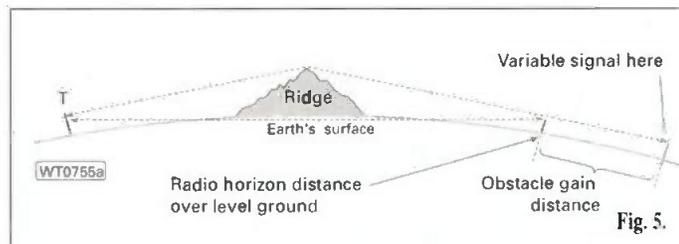


Fig. 5.

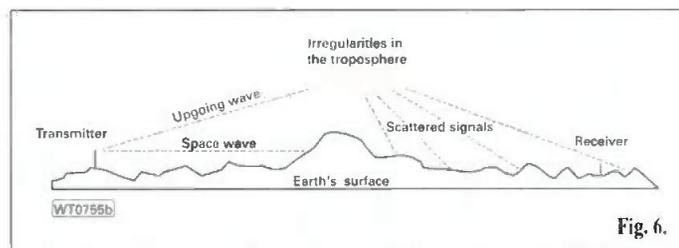


Fig. 6.

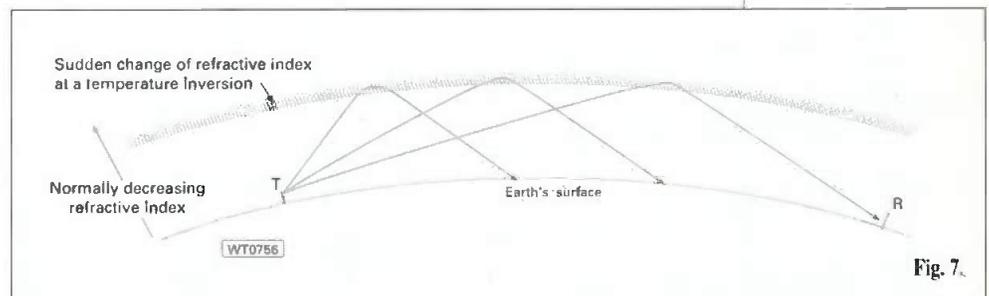


Fig. 7.

Fig. 4: Position of G4VFB's QTH in Brixham, overlooking Torbay where experimental roof-space antennas are employed and enhancement is provided in a north easterly direction by the backing rising ground.

Fig. 5: A single ridge in the signal path can sometimes enhance the signal field at the receiving point by reducing the destructive effect of the ground reflected wave.

Fig. 6: Irregularity in the refractive index of the troposphere can result in scattering of the direct wave and propagate v.h.f./u.h.f. signals over a greater than normal range.

there will be to mask it! This is why Morse, which can operate within a few tens of Hz bandwidth is better than 'phone.

Sometimes, there's a tendency for long distance paths to 'twist' the signals...causing the polarisation to change. So, having an antenna with switched vertical/horizontal polarisation can prove this point, but to save switching circular polarisation can prove useful and reduce fading caused by polarisation changes.

Long distance v.h.f./u.h.f. working is a very interesting aspect of our hobby and often provides a great challenge. And like our weather...you really don't know what's going to happen day-to-day...that's why it's such an enjoyable aspect of our hobby!

PW

Fig. 7: At the boundary of a temperature inversion effect in the troposphere v.h.f./u.h.f. signals are reflected back to earth over greater than normal distances. Fading occurs owing to the subtraction and addition of other reflections with phase changes.

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This month we've selected a variety of titles to suit all aspects of the radio hobby, that you may like to consider as Christmas presents for a fellow radio amateur or indeed as a treat for yourself. All prices quoted this month include the postage (UK readers only, overseas please add £2). So, what are you waiting for? - Order today!

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# CHRISTMAS

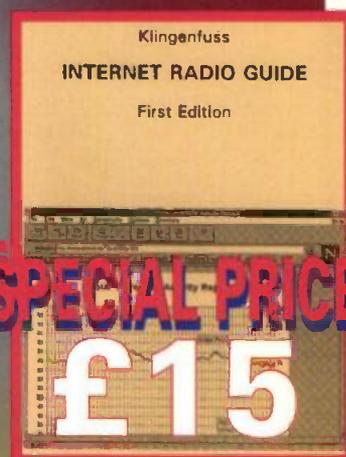


## Internet Radio Guide - 1st Edition - Joerg Klingenfuss

This 488 page paperback book provides a wealth of information that should be of use to any radio enthusiast who has access to the Internet. Samples are given of screen dumps from various home pages, making it easy to see if a site is going to be of interest to you and therefore worth a visit.

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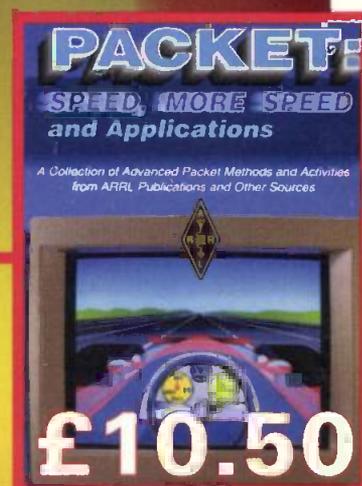
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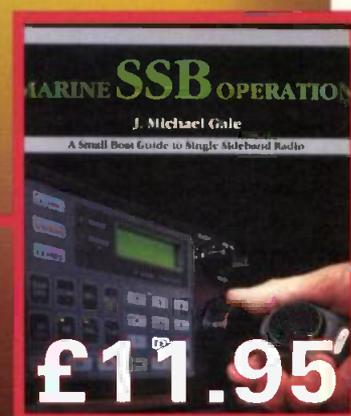


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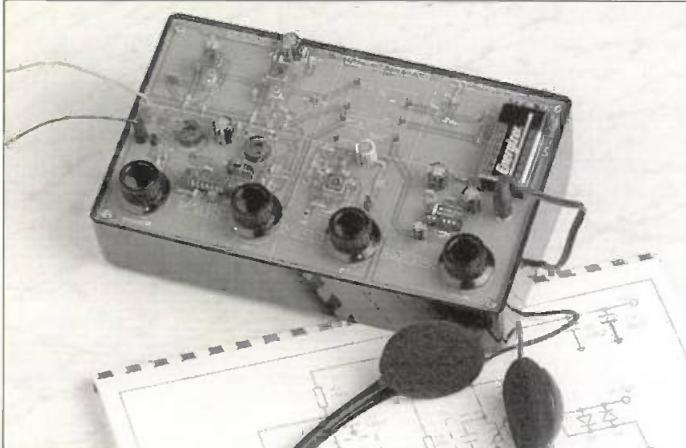


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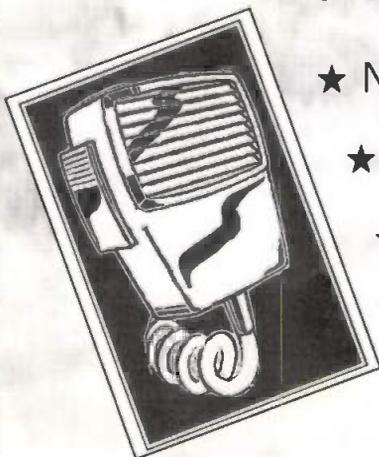
**Friday & Saturday  
17th & 18th October, 1997**

**Friday 10.00am - 6.00pm. Saturday 10.00am - 5.00pm**

**Admission: Adults £2.00**  
**Concessions for Children and O.A.P.s**

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- ★ MORE THAN A HUNDRED EXHIBITORS
- ★ BRING & BUY

**Enquiries to Geoff Dover  
on: 01455 823344**





This year's Leicester Show, which takes place on October 17 & 18th, will be the last one to take place at the Granby Halls in Leicester. However, this is not deterring the exhibitors from offering a vast range of products. This selection of news is just a 'taster' of who and what you will find at the show and if you can't make it to the Granby Halls, it will give you an idea of what you can expect to find on the dealers shelves after the show.

## Eastern Communications - E14



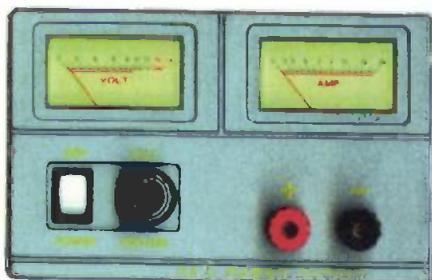
Tricia G1ANZ, Tim G4CTT and Denise G8GGZ will be 'manning' the Eastern Stand and will have much to offer the show visitor. Firstly from the Vibroplex stable there will be a range of straight, paddle and iambic keys including the new iambic double key. Next comes the inclusion of 12 new models from the Sigma antenna range which are split into six multi-band trapped dipoles and six multi-band trapped vertical slopers.

Delta Engineering have recently introduced two transceiving band-pass filters for 50 and 144MHz work. These filters will be displayed on the stand as will the new deluxe 25A power supplies which are fully stabilised and protected.

Potential customers will be also able to see established product

lines from the Mosley, Autek, Icom, Kenwood and Yaesu range, as well as the popular personalised callsign clocks.

Eastern Communications normally reside at Cavendish House, Happisburgh, Norfolk NR12 0RU. Tel: (01692) 650077.



## The QRP Component Company - S22a

Chris Rees G3TUX who can normally be found at Haslemere, Surrey, Tel: (01428) 661501 will be setting-up his stand to offer a varied range of Morse keys, kits and other QRP equipment. There will also be bargains to be had on end of line kits from manufacturers such as Howes, Wood & Douglas and Oak Hills Research.

In addition to this, Chris will be launching his range of CWare for the Morse enthusiast which includes T-shirts like the one shown here. If you visit Chris's stand he will be happy for you to evaluate any of the keys on sale before you part with your money! So, what are you waiting for - when the doors open head for The QRP Component Company stand.



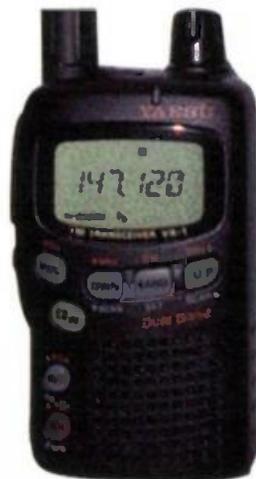
## Yaesu UK - E17

Among the comprehensive range of Yaesu products on display will be the recently introduced VX-1R. This is an ultra-compact dual-band transceiver with wide-band receive coverage.

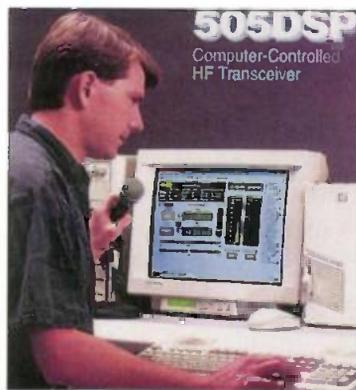
The VX-1R has a frequency coverage of 76 to 999MHz, with facilities for a.m., f.m. Broadcast, Airband, v.h.f./u.h.f. TV as well as full transmit and receive capability on the 144/440MHz amateur bands. Features include encode and decode facilities for CTCSS and DCS, 290 memory channels in nine banks, Windows PC Programmable software, back-lit Keyboard and I.c.d.

The VX-1R has retail price of £269 and is supplied with a rechargeable Lithium Ion Battery, a.c. Adapter/Rapid Charger, flexible antenna, belt clip and hand strap.

The Yaesu team will be waiting to welcome you and will be happy to give working demonstrations of any of their products. For more information on any of the Yaesu product range contact them on 0181-814 2001.



## Waters & Stanton Electronics - S16



The Waters & Stanton stand will, as usual, offer the visitor a wealth of products. Among the new items available will be the Kachina 505 DSP computer controlled h.f. transceiver. This was first seen at the Dayton HamVention earlier this year and will be making its UK debut at Leicester together with a full range of accessories.

Other products will include the SG 2020 QRP h.f. transceiver, which is based on the popular index

Laboratories rig, and the first production models of two multi-band h.f. beam antennas manufactured by the Cushcraft Corporation.

On offer from the Optoelectronics range will be the new micro DTMF decoder priced at £89.95 and the R11 test receiver which covers 30MHz to 2GHz and is designed to interface with and reaction tune the Scout frequency recorder.

In addition to this Waters & Stanton (who claim to have the largest stand in the Sales Hall) will be displaying new products from ADI, AKD, Ameritron, AOR, Diamond, MFJ, Microset and Watson. All in all the Waters & Stanton stand will have a lot to offer so why not stop and browse, you never know you may find a bargain!

You can contact Waters & Stanton Electronics at 22 Main Road, Hockley, Essex SS5 4QS. Tel: (01702) 206835.

## Kenwood Electronics UK Limited - E13

Samples of the new TH-G71E are expected to be on display for the first time at the Leicester show. The TH-G71E is a dual-band hand-held transceiver which has been designed to replace the TH-79E and is built to US Mil standard 810E for water resistance.

Features of the TH-G71E include a maximum of 6W of RF output, 200 memory channels, multiple scan function, built-in CTCSS encoder/decoder and full DTMF remote control. A full range of optional accessories are available and the retail price is expected to be in the region of £269.

In addition to this Dave Wilkins G5HY will be on hand to give working demonstrations of any of the Kenwood radios on display. He'll also be delighted to discuss individual requirements and answer your queries.



## Nevada - S35

The product range on offer from Mike Devereux and the Nevada 'team' will include the Alinco DJ-X10 a wide-band receiver, the Outbacker h.f. multi-band mobile antenna. This is designed for use between 3.5 and 28MHz and splits into three 2ft sections for easy transportation as well as a range of Cushcraft antennas.

A new name to the UK amateur market is that of Palstar and Nevada are planning to launch a large number of products with their new trade mark in the next six months. The Leicester show will see the Palstar AT1500 a.t.u. making its debut. The AT1500 uses a 'beefed-up' roller coaster with 10 gauge silver plated wire and features a built-in 4:1 balun and slow motion drive controls.

There will of course be lots more in addition to the products mentioned here. And, we've no doubt that the showroom and warehouse at 189 London Road, North End, Portsmouth, Hants PO2 9AE will be scoured for bargains and special offer items for show visitors.



## Wilson Valves - S32a

Jim Fish G4MH will be selling a variety of valves including the Cetron 572B p.a. valve, which he has recently added to his range after securing a deal with an American company. Also on offer will be the 6146W General Electric valve designed to the USA military specification, and the 3-500 ZG valve which is manufactured by Amperex.

If you stop-by the Wilson Valves stand you will be able to pick-up a free list of all the valves that Jim stocks. Enquiries from the trade are also welcomed.

## Martin Lynch & Son - S24/25

Martin, Jenny, 'Micro' Henry and the rest of the 'Lynch Mob' are planning to mark the occasion of the last Leicester show to be held at the Granby Halls by going out with a 'bang'. Martin has been exhibiting at the 'Halls' for over 20 years and says that he still gets a 'kick' out of seeing the place heaving with fellow amateurs.

Martin will be offering a range of products from Yaesu, Icom, Alinco, Standard, JRC and Kenwood. In particular, you should look out for the new JRC JST-245 h.f. and 50MHz transceiver together with the Standard C5900D triple-band f.m. transceiver and the new VX-1R from Yaesu.

There will also be a good selection of used equipment and accessories. When not travelling round radio rallies Martin can be found at 141-142 Northfield Avenue, Ealing, London W13 4SB. Tel: 0181-566 1120.

## Icom (UK) Ltd - E2

The Icom team will be on hand to 'show off' their full product range from receivers through amateur equipment to accessories. The team will be waiting to welcome you to their stand and to discuss with you the various facilities on offer from the different radios in the Icom range.

There will also be the opportunity to be see demonstrations of exactly what the equipment can do. There may even be news of what we can expect to see emerging from the Icom stables in the near future. So, go along, have a chat and view the Icom range, who knows you may be steered towards making a purchase from one of the many dealers attending the show.

## Lowe Electronics - E16

The Lowe Electronics stand will be easy to find, as it's situated in the exhibition hall, right in front of you as you walk in through the main entrance.

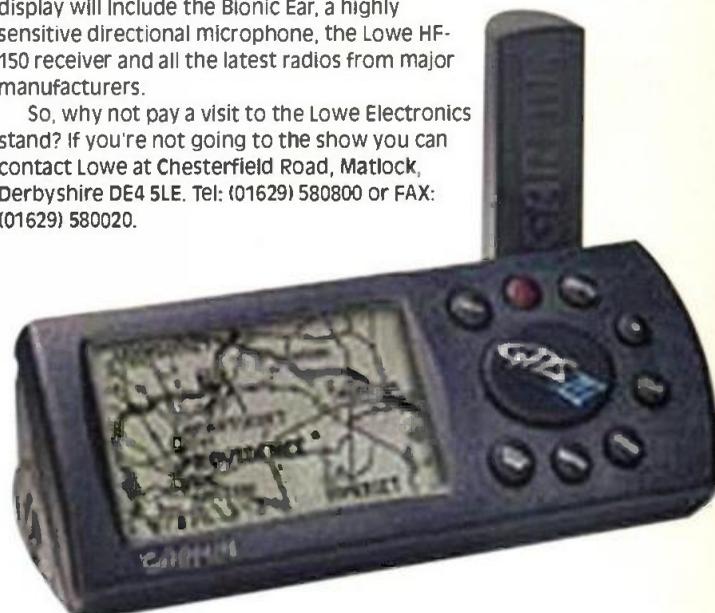
Among the items on show will be several new products.

For GPS enthusiasts, Lowe will be launching the new product from Garmin. The GPS III has a complete moving map database covering all of Europe and North Africa, showing main roads, towns, cities, rivers, railways, coastlines, etc., stored in it.

A high definition screen allows you to pinpoint your position to a few yards anywhere in Europe and provides a complete moving map satellite navigation system in a box which you can be held in one hand.

The Lowe 'team' will also be launching the latest version of RCON, a comprehensive receiver control software programme, and a new version of their ACARS decoding programme, AIRMASTER 2000 which now runs under Windows. Other products on display will include the Bionic Ear, a highly sensitive directional microphone, the Lowe HF-150 receiver and all the latest radios from major manufacturers.

So, why not pay a visit to the Lowe Electronics stand? If you're not going to the show you can contact Lowe at Chesterfield Road, Matlock, Derbyshire DE4 5LE. Tel: (01629) 580800 or FAX: (01629) 580020.





## Mr 'Leicester Show'

### A Tribute To Frank Elliott G4PDZ 1928-1997

Rob Mannion G3XFD pays tribute to Frank Elliott G4PDZ who over the years became 'Mr Leicester Show' to the many people who came into contact with the gentleman wearing the familiar maroon blazer and relaxed smile.

By the time our November issue is published, many readers will have heard that Frank Elliott G4PDZ died in September. Frank suffered an immediately fatal heart attack on Wednesday 3rd of September, he was 68 years old.

Many Radio Amateurs and other enthusiasts knew Frank from his shop - Elliott Electronics - in Leicester itself, but following the death of his wife and his daughter, Frank closed the shop in recent years so he could concentrate on his other jobs. And these jobs offered a great deal of variety and in themselves tell of the amazing person behind the relaxed exterior.

### Fascinating Life

Frank had led a fascinating life and it was interesting to hear him talk about the various aircraft he flew (totally alone...including Mosquitos and the larger bombers) on delivery to airfields as part of his work as a Pilot with the Air Transport Auxillary in the Second World War. It's not an aspect of his work he talked about much, neither did he mention much about the 'parascending' (using towed parachutes to go up instead of down!) he and his late wife took up in the 1980s!

Public service was always a part of G4PDZ's life and it turns out he was also a Special Constable in the Leicestershire Force for 19 years. (Perhaps that explains why I never got a parking ticket when I visited the shop!).

Another aspect of his 'public service' was Frank's voluntary work helping a local 'special needs' school catering for disabled children. 'Grandpa Fixit' (as he was known to his 'adopted' grandchildren) assisted the school in many ways and he apparently enjoyed his last job - fitting a new 'clanger' in the school bell!

Associated with the East Midlands as long as he was, many people will be surprised to read that Frank was born in Callington in Cornwall. But he spent most of his adult life making his mark in the Midlands and he was particularly proud of the generations of 'Amateur Radio Family' he produced...namely his son Paul G4MQS and grandson Scott 2E1FJB who continue the link with the hobby.

### Esteem & Respect

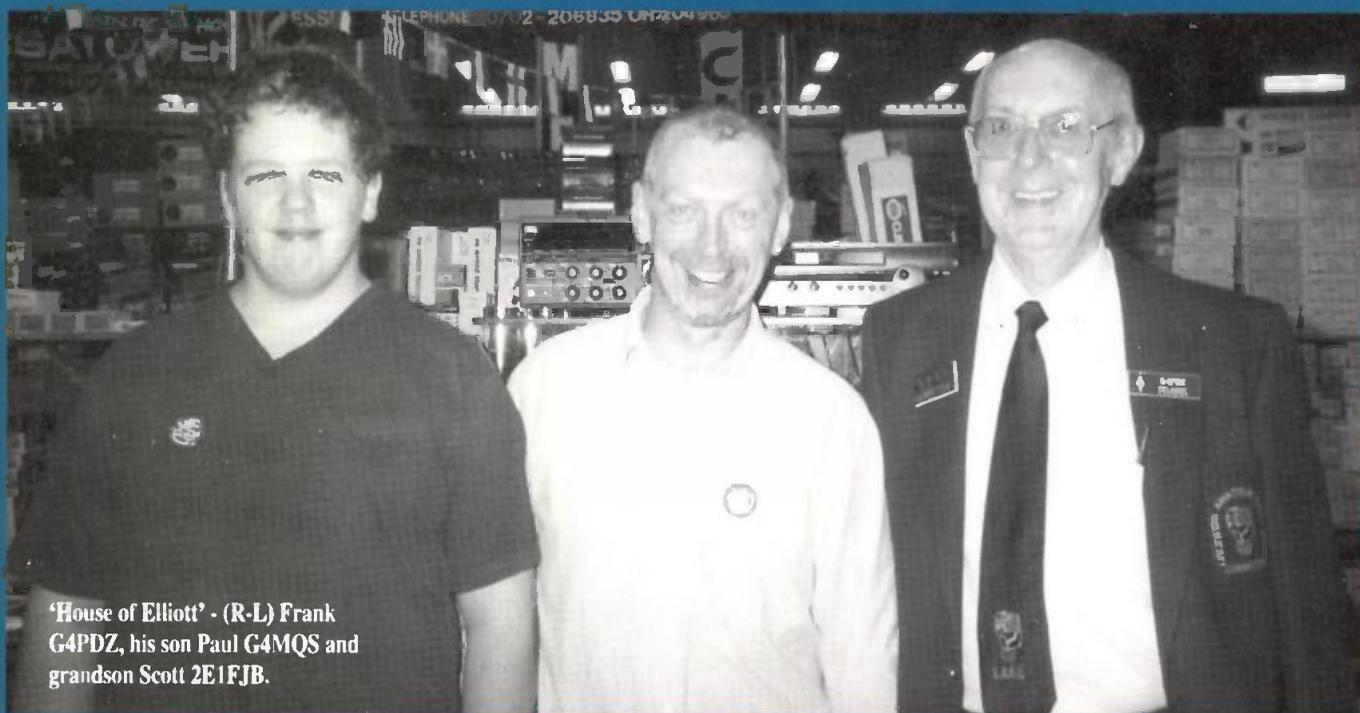
As a mark of the esteem and respect in which we held Frank G4PDZ, both Dick Ganderton G8VFN, the Editor of *Short Wave Magazine* and I were due to attend the funeral in Leicester on Tuesday 9th September. However, due to an unfortunate accident at home I was unable to be present and in the end Dick represented us both and PW Publishing Ltd.

Right up to the very end of his life Frank was working hard towards the future of the Leicester Show and we were in regular contact. In return, it's my pleasure and duty to write this short tribute in the sure knowledge it's going to be only a small part of the legacy Frank has left for us.

The major part of the G4PDZ legacy is the continuing Leicester Show, his family, his many friends and the new venue we're all looking forward to in 1998. We certainly won't forget 'Mr Leicester Show' in future years.

My best wishes go to Frank's family and his friend and partner Sylvia Grassby. We've all lost someone special but as Frank always quietly insisted...the 'show' in all meanings of the word will go on!

G3XFD



'House of Elliott' - (R-L) Frank G4PDZ, his son Paul G4MQS and grandson Scott 2E1FJB.

# looking back

## Changing Times, Faces & Places

### Looking At Leicester Over The Years

Rob Mannion G3XFD has enjoyed attending the Leicester show over the years and has only missed two events. Rob takes this opportunity to look at the show, the changing faces and the future when the show moves to a new venue and date in September 1998.

Like many other radio enthusiasts I've seen many great changes to the Amateur Radio scene in the past 35 years or so. I attended the very first Leicester Show and saw it firmly establish itself over the years. It was only ill-health that kept me from attending the show in 1987 and 1988.

And looking back...what tremendous changes there have been for us all, the show itself and the hobby! Since the first show my family have grown up, I'm now a Grandfather and have passed from being an armchair reader to the Editor's 'chair' here at *PW*.

In fact, there have been some tremendous changes to the Leicester Show, *PW* and our hobby. For example: in the early days there was very little computer equipment to be seen on offer. And boy oh boy....that's changed nowadays hasn't it?

I remember some of the equipment on show in the mid 1970s at Leicester and I even went back to my (then) Hampshire home carrying a very large (and extremely heavy) parcel. What was in the parcel? - an Eddystone 888A that I bought from an Amateur radio dealer who had not long started in business: The name? - Waters & Stanton of Hockley near Southend!

Over the 26 years of the Leicester Show I've only ever travelled there by train twice (once from the South and once from Scotland) and anyone who has ever owned an Eddystone 888A will tell you...it's not pleasant to carry them very far (especially if you've only got one arm!). But that's just what I did, and after carrying the Eddystone receiver to Leicester station I sat back and slept all the way to London before carrying the receiver across to Waterloo and on to Winchester to what was then my home in Chandler's Ford.

My wife Carol wasn't that impressed with my 'star' purchase and even less with the damage I'd caused by overstraining my arm carrying it home. But you live and learn don't you? I won't get the chance to do it again. (The postscript is that the 888A provided good service and I only sold it in 1996!).

### Biggest Change

Personally, I think the biggest change I've witnessed on the Amateur Radio 'scene' is the gradual disappearance of many of the smaller shops and dealers. And although many of the specialised advertisers who appeared regularly in *PW* did not attend the Leicester Show officially...they certainly came along to see and meet their friends.

The smaller business selling radio components, 'bits & pieces' and the surplus dealer is fast disappearing. And although you will meet some at Leicester and rallies, they don't advertise their presence very much at all which is a very great shame (especially if you're a keen 'homebrewer' and can't get to rallies very often!).

In fact, one of the last 'traditional' *PW* advertisers of this type must surely be John Birkett G8OPP, based very close to Lincoln Cathedral in the quaintly named 'Straits'.

I remember that well before the Leicester Show arrived on the scene that John Birkett was selling 28MHz crystals in B7G glass based holders. These kept me busy for a long time and at five shillings each (25p) they provided quick access onto '10' metres, especially as they provide two crystals in one unit. They were old radar crystal units and provided me (and many others) with a great bargain and great fun.



The Yaesu Musen FRG-7, first commonly available in the early 1970s has become a 'classic' of its time. Costing around £200 or so in the 1970s, they created a lot of interest at Leicester and many are still in use.

### Bring & Buy

For many years the major attraction at rallies and shows for bargain hunters has been the 'Bring & Buy' stall and the Leicester 'B&B' is very popular - so much so you can't get through the crush at times! And personally speaking I think this aspect of the hobby is all-important. Because without a thriving 'second user' (or 'pre-owned' to borrow a phrase from the 'used car' world) market, the radio hobby would struggle.

Yes, we've got to face facts. Although many of us do still like to build projects, there are very few people who don't have some commercially made equipment in the shack. So, while we carry on building and enjoying the hobby, there's nothing wrong in buying a good new or second-hand rig to keep on 'stand-by' or for use purely as an operational station. When the novelty has worn off...it can join the other equipment at the next club or show junk sale.

Over the years I've noted with very great interest at just how busy the 'Bring & Buy' stalls at the major shows can be. They've helped many of us get started and they've also helped us raise cash for the latest import from the Far East. That's how I started and that's the way I intend to finish...although that time is a long way off I hope!

Guessing the future of our hobby is risky but I'm prepared to chance my remaining arm! With rallies and shows like Leicester we have much to enjoy here and in the future. It brings us together, we swop ideas, but & sell and enjoy each other's company, to see what's new and explore the fascinating science we enjoy as a hobby.

Here's to the future of the Leicester Show, our wonderful hobby and the friendships we all share. Let's look forward together to the last show at Granby Halls in 1997 and to the new venue at Donington Park in September 1998 just a short distance up the M1 from Leicester. I hope to see you there!

PW



The Icom IC-2E is often said to have started the 144 and 430MHz 'hand-held' revolution. Many years later transceivers such as the Kenpro KT-44 share many of the features of the original Icom unit including the 'thumbwheel' switch-controlled synthesiser frequency selection and top mounted controls. Still viable, both G1TEX and G3XFD at *PW* use similar transceivers today.

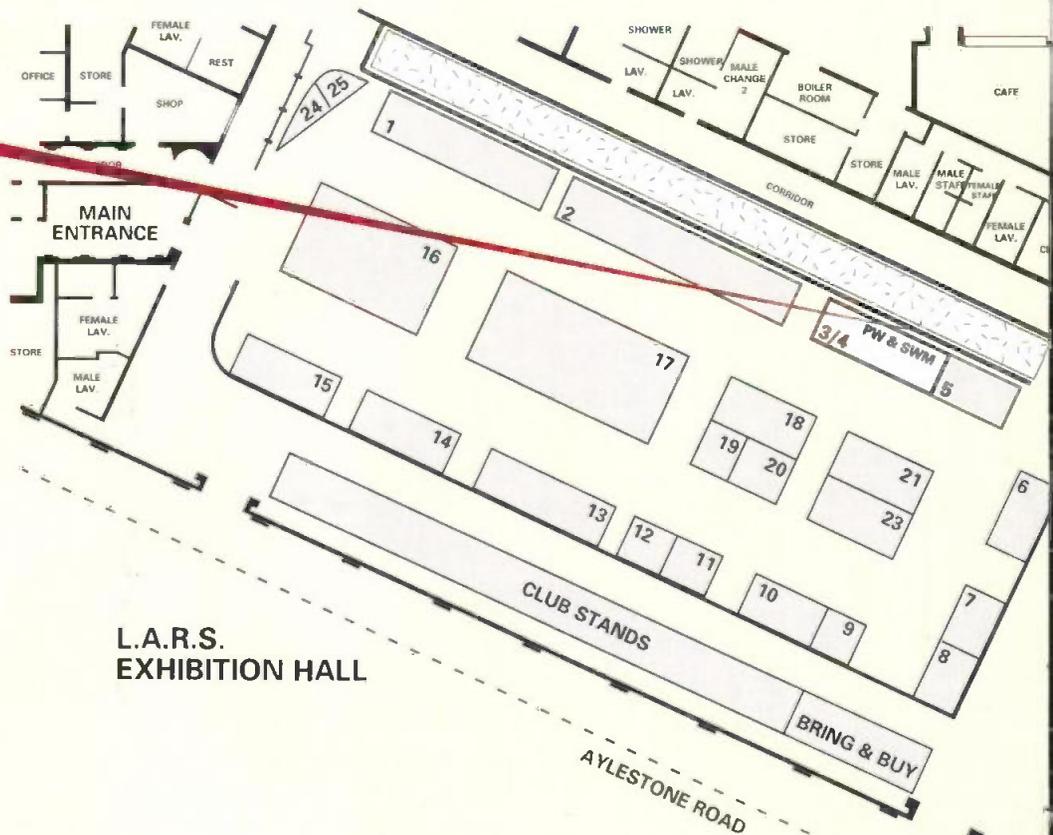


# Leicester Amateur

## 17 & 18th October 1997 Granby Halls, Leicester

### Exhibition Hall

- 1 RSGB
- 2 Icom (UK)
- 3/4 **Practical Wireless & Short Wave Magazine**
- 5 Linear Amp UK
- 6 Haydon Communications
- 6a R&D Electronics
- 7 2J Sounds
- 8 \*
- 9 Venus Electronics
- 10 AOR (UK) Ltd
- 10a A1 Electronics
- 11 Howes Communications
- 12 Poole Logic
- 13 Trio-Kenwood
- 14 Eastern Communications
- 15 Videoquip
- 16 Lowe Electronics
- 17 Yaesu
- 18 \*
- 19 Field Electrics
- 20 R.A. Kent
- 31 Microgenesis
- 22 \*
- 23 Rich Electronics
- 24 UBM
- 25 UBM



L.A.R.S.  
EXHIBITION HALL

## FORTE Posthouse



Leicester

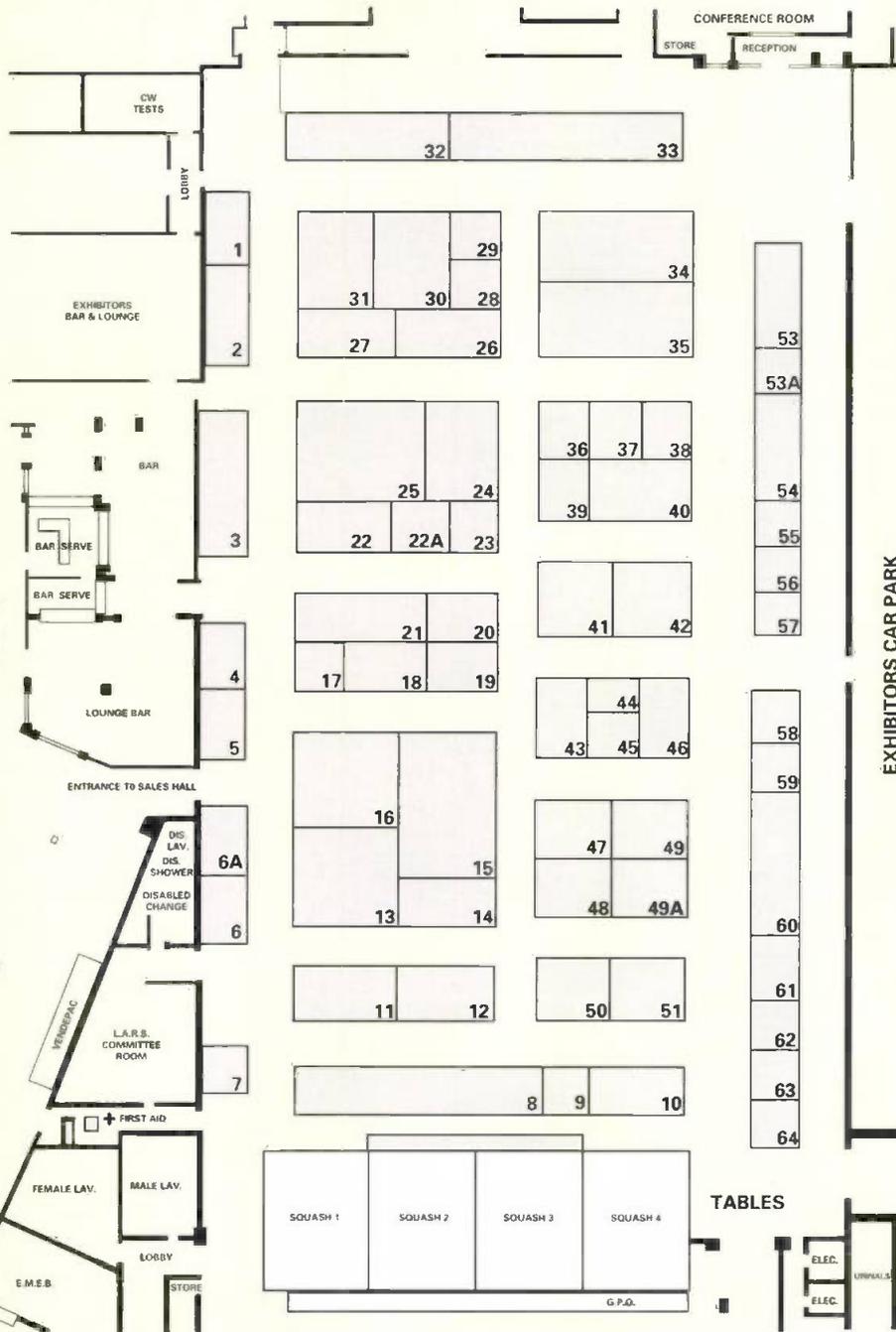
★ 171 En suite bedrooms ★ Large restaurant ★ Lounge and bar ★ Free car parking

The Posthouse offers a great location, close to the motorway network and  
only two miles from Granby Halls.

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# Radio Exhibition 1997

## L.A.R.S. SALES HALL



## Sales Hall

- 1/2 Gemini Electronics
- 3 Taurus Electronics
- 4 Harwood Trading
- 5 Amstrutt
- 6 L.M.W. Electronics
- 6a Lake Electronics
- 7 K.M. Publications
- 8 South Midlands Communications
- 9 JPE
- 10 Timestep
- 11 Sandpiper Communications
- 12 Ham Radio Today
- 13 Display Electronics
- 14 Strumech Engineering
- 15 Combtek
- 16 Waters & Stanton
- 17 Mutek
- 18/19 JMG Electronics
- 20 Office Land
- 21 J.A.B. Electronics
- 22 \*
- 22a QRP Components
- 23 H. Morgan Smith
- 24 Martin Lynch
- 25 Martin Lynch
- 26 Barenco
- 27 J. Birkett
- 28/29 R.J. Holderness
- 30 Syon Trading
- 31 Capital Products
- 32 Moonraker
- 32a Wilson Valves
- 33 Mainline Electronics
- 33a Satellite Surplus
- 34 G.S. Electronics
- 35 Nevada
- 36 \*
- 37 Microsolve Electronics
- 38 Festival Computing
- 39 G.C. Arnold & Partners
- 40 M&B Radio
- 41 \*
- 42 S.G.S. Electronics
- 43 Brial Services
- 44 Coltec Electronics
- 45 \*
- 46 A.J. Paddon
- 47 R.A.S. (Nottingham)
- 48 Computer Junk Shop
- 49 Oasis Computers
- 49a Manhattan Computers
- 50 Westlake
- 51 Radiotronics
- 52 Tables
- 53 Mirage Designs
- 53a Strikalite
- 54 Eagle Antenna Co
- 54a \*
- 55 S.E.M.
- 56 J & J Associates
- 57 Badger Boards
- 58 RN Electronics
- 59/60 Multicomm 2000
- 61 \*
- 61a Belcyber Ltd
- 62 Loutronics
- 63 \*
- 64 Bonex

\* Stand allocated but not confirmed  
 All details correct at time of going to press.

### Tables

- HRP Shareware
- T.K. Electronics
- T & M Milman
- NonutsPRS Marketing
- Agile Tools



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## Alinco (New low prices)

From 1.8-50MHz



**Alinco DX-70T** (with CTCSS). 100W HF, 100W 6m, all mode. C/W SX-20C 3.5-30/50-54/130-150SWR/power meter.

**£695.00** carr FREE

**Alinco DX-70TH**, 100W HF, 100W 6m, all mode C/W SX-20C 3.5-30/50-54/130-150 SWR/power meter.

**£775.00** carr FREE

**PACKAGE 1.** Alinco DX-70TH, 100W HF, 100W 6m, c/w 25 amp PSU, VK5JR HF multiband vertical, VC-6 6m V dipole. (5 year warranty on DX-70).

**PA price £1261.95**

DEPOSIT £150.95, 24 PAYMENTS OF £58.74.

COST OF LOAN, £298.76.

**PACKAGE 2.** Alinco DX-70TH, 100W HF, 100W 6m, c/w SG-230 Smarttuner ATU, HFM-1 3.5-30MHz mobile antenna and PRO-AM 6m mobile antenna. (5 year warranty on DX-70).

**PA price £1250.90**

DEPOSIT £150.90, 24 PAYMENTS OF £58.16.

COST OF LOAN, £295.89.

## YAESU FT-920 HF Transceiver



**NEW**

The new FT-920 has been released and offers some great features at a great price. 1.8MHz to 54MHz plus wideband receive. 33MPS digital signal processor, digital IF shift, auto notch filter, dual VFOs, 100 memories, band stacking VFO system, break-in CW with electronic keyer, TNC interfacing, digital voice recorder, 13.8V DC operation.

**Yaesu FT-920 (5 year warranty)**, c/w 25 amp PSU & FM board.

**PA price £1752.95**

DEPOSIT £175.95, 36 PAYMENTS OF £61.87.

COST OF LOAN, £650.32.



## P-2512M

25-30 amp power supply with variable volts (3-15). Dual meters (VS + amps) and over voltage protected.

**£89.95** carr £10

**SAVE £10**

## IC-706MkII PACKAGE DEALS

IC-706MKII (£1095.00) Carr £10.00

**PACKAGE 1.** IC-706MkII c/w SG-230 Smarttuner auto ATU, HFM-1 3.5-30MHz mobile antenna.

(5 year warranty on IC-706).

**PA price £1449.95**

DEPOSIT £150.95, 24 PAYMENTS OF £68.68.

COST OF LOAN, £349.32.

**PACKAGE 2.** IC-706MkII c/w Comet CAHV HF+6m+2m mobile antenna, c/w Icom IC AT-180 Auto ATU. (5 year warranty on IC-706).

**PA price £1500.95**

DEPOSIT £160.95, 24 PAYMENTS OF £70.85. COST OF LOAN, £360.40.

**PACKAGE 3.** IC-706MkII c/w 25 amp PSU, VK5JR HF multiband vertical & TSB3608 6/2/70cms base antenna. (5 year warranty on IC-706).

**PA price £1500.95**

DEPOSIT £160.95, 24 PAYMENTS OF £70.85. COST OF LOAN, £360.40.



## SG-230 Smarttuner®

Antenna Coupler SSB, AM, CW & DATA

(SG-230 special offer £299.00)

Carr £10.00

You can't buy a smarter tuner than this. An automatic antenna coupler so intelligent it precisely tunes any length antenna - 8 to 80ft - in the HF band.

The Smarttuner® automatically evaluates and switches 64 input and 32 output capacitance combinations, plus 256 inductance combinations in a "pi" network. The amazing result is over a half-million different ways to ensure a perfect match for your transceiver. And the most intelligent feature of all is that the Smarttuner® remembers the chosen frequency and tuning values, and will automatically reselect those values - in less than 10ms, each time you transmit on that frequency.

The SG-230 Smarttuner®. Buy Smart.



SMARTTUNER  
INSIDE

## ICOM IC-207H 2m/70cm Mobile



- 2m & 70cm
- 50W/30W
- Detachable head
- Packet 9600 bps ready ● 180

memory channels ● CTCSS & 1750Hz tone.

**£389.00**

IC-207H Deposit £40, 12 payments of £33.00.

Cost of loan £47.00

## ICOM IC-821H



2m/70cms base station (5 year warranty) c/w UT-84 CTCSS, AG-25 2m mast head amp, AG-35

70cms mast head amp & 25 amp PSU.

**PA price £1823.95.** Deposit £190.95, 36

payments of £64.06. Cost of loan £673.16

## KENWOOD TM-V7E



- 144 & 430MHz
- 50/35W ● Dual Rx on same band
- 280 memories
- Detachable front head
- CTCSS & 1750Hz tone

● Large clear display. **£499.00**

TM-V7E Deposit £50, 24 payments of £23.74.

Cost of loan £120.76

## KENWOOD TS-570D

Setting the standard in performance

# KENWOOD

### Kenwood TS-570D

(5 year warranty), c/w 25 amp PSU, VK5JR HF multiband vertical, VC-6 6m V dipole.

**PA price £1699.00**

DEPOSIT £170.00.

36 PAYMENTS OF £59.99.

COST OF LOAN, £630.64.



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# SUBSCRIPTION OFFER!

## LEICESTER AMATEUR RADIO SHOW

Friday 17 & Saturday 18th October 1997

Take out a subscription to *Practical Wireless* or *Short Wave Magazine* at this year's Leicester Show and we'll give you **£5 off any book** purchased, from the PWP stand, during the show!

So, why not come along to the PWP Stand, meet the 'team', browse through our selection of books and order that subscription you've been promising yourself?

### Subs rates (1 year):

PW	SWM	
£25	£30	(UK)
£30	£35	(Europe 1st Class)
£32	£38	(Rest of Wold Aisaver)
£37	£45	(Rest of World Airmail)



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# WIN!



In *Practical Wireless* June 1997 (back copies available for £2.30 from the Book Store) Richard Newton GORSN

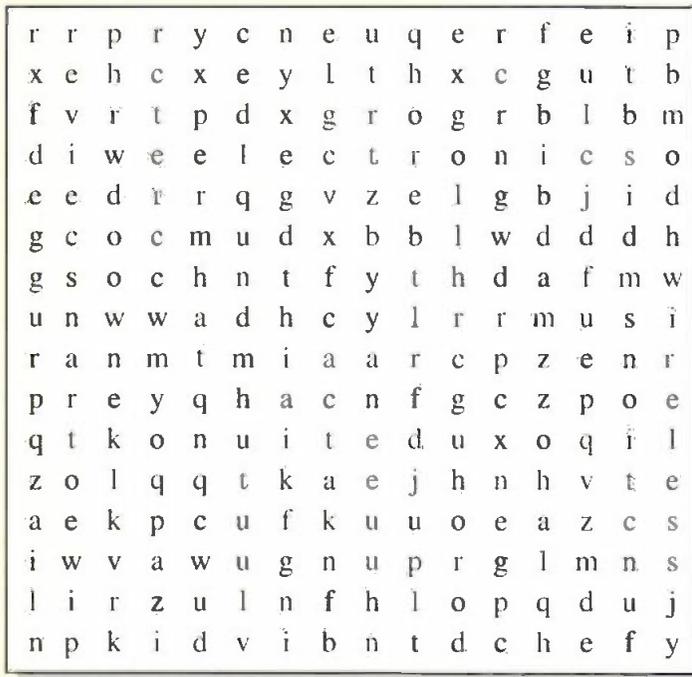
reviewed the TH-235 from the Kenwood stables and found it to be a "Hard Hitting Practical

Radio". If you liked the sound of this 'back-to-basics', rugged and well manufactured radio, here's your chance to win one!

All you have to do is find the words hidden in the wordsearch and then send your entry to Kenwood Competition, Practical Wireless, PW Publishing Ltd., Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW. Editor's decision on the winner is final and no correspondence will be entered into. Please do not include other correspondence in with your entry (photocopies are acceptable).

## A Kenwood TH-235 Hand-Held 144MHz Transceiver

Donated by David Wilkins G5HY of Kenwood Electronics UK Ltd.



### Words To Find:

- Amateur Electronics Frequency Functions
- Handheld Kenwood Manufacturer Practical
- Radio Rugged Transceiver Wireless

Name .....

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If you do not wish to receive future mailings as a result of entering this competition please indicate here.

Entries to reach us by Friday 28 November 1997.



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Practical Wireless, November 1997



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**DL-60** ★ Dummy load ★ DC-500MHz ★ 60W max  
★ PL-259 fitting **£16.99** P&P £1

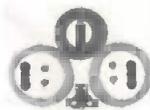
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ONLY

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2m/70cm/23cm (2/3/5.5dB) flexible antenna with wideband receive (14" long BNC).

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70cm FM mobile transceiver. 35W.

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## COMMUNICATION RECEIVERS



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Award winning wide band communication receiver. Covers 10kHz-2600MHz (all mode)

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An amazing receiver with coverage from 25-1300MHz. 500 memories give ample storage along with auto store, selectable mode, turbo scan (100 channels per sec) alpha numeric facility and much more. RRP ~~£329~~

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FT-790R	70cm all mode	£249.95
FT-290R	2m all mode	£179.95
P-2512M	PSU	£59.95
VJ-G5	Dualband h/held as new	£259.95

## OPTOELECTRONICS



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Opto Cub .....Our price **£99.95**  
Opto Explorer.....Our price **£795.95**  
Opto Lynx.....Our price **£129.95**  
Micro DTMF decoder.....Our price **£89.95**

## S.W. RECEIVERS



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Brilliant new all made short wave receiver with synchronous AM + remote control. RRP ~~£799~~

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### YAESU FRG-100

UK's best selling SW receiver. It outperforms any other receiver below £600.

OUR PRICE **£449.00**



### TARGET HF-3

Communication receiver covers 30kHz-30MHz. Complete with power supply and long wire aerial.

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ORDER YOURS TODAY AND CLAIM FREE P&P.



### SONY SW-100E

Award winning miniature portable SW receiver. Its performance is brilliant for its size. The best shortwave receiver for under £250.

RRP ~~£220~~ SALE PRICE **£149.95**

## SANGEAN

### ATS-818

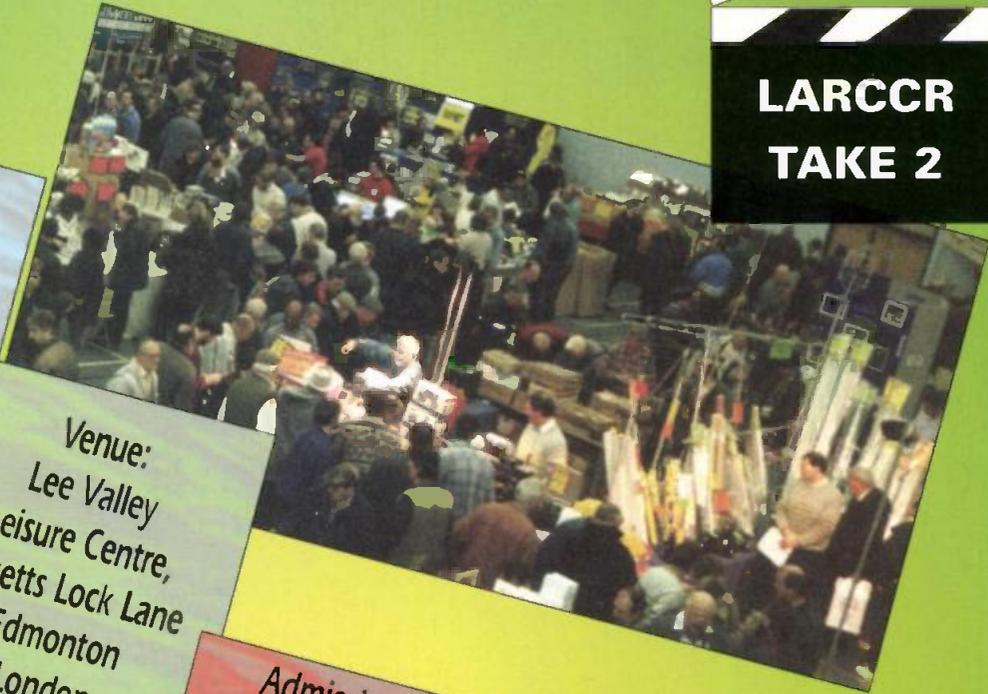
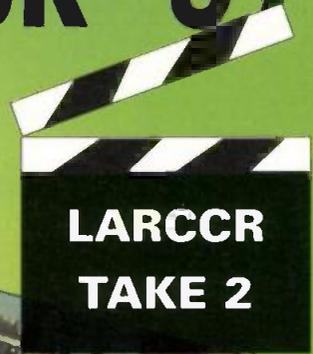
Award winning portable SW receiver. (All made 0-30MHz)

RRP £169.95.

OUR PRICE **£139.00**

Roberts R-681.....OUR PRICE **£169.95**

# Picketts Lock '97



**Saturday  
November 15th  
& Sunday  
November 16th**  
10am - 5pm  
each day

**Venue:**  
Lee Valley  
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**Admission:**  
Adults  
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**Now  
with the  
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Japanese  
importers!**

Last year RadioSport introduced their all-new LONDON AMATEUR RADIO & COMPUTER CHRISTMAS RALLY, a traditionally styled event with bargains galore.

This year, by popular demand, the event is being expanded to two days.

With around 100 exhibitors, special interest groups, a huge Bring & Buy stand disabled facilities, bars and restaurants, it's the event with something to interest every radio and computing enthusiast.

What's more, you could bring the family and leave them at the 12 screen cinema while you look around.

As those of you who have been to Picketts Lock before know, there's something about the events which take place here that just feels good.

If you're only going to visit one rally this Christmas, make sure it's this one.

# antennas in action

NEWS & PRODUCTS ■ QUESTIONS & ANSWERS ■ ANTENNA WORKSHOP ■ REVIEWS ■

## New Distributors

Cushcraft antennas of the USA have appointed Nevada Communications as a distributor of the Cushcraft range of antennas. To show the quality of the Cushcraft range here are two high performance h.f. beams in the guise of the X7, a seven element beam, and the X9 a nine element beam.

Both the X7 and X9 antennas are designed to withstand winds in excess of 100 miles an hour (160kph) but, in spite of the ruggedness they have trapless driven elements and, have been computer optimised to give maximum gain with a clean radiation pattern at high powers. For more details of these antennas, or any other in the Cushcraft range, send an s.a.e. to Nevada Communications, 189 London Road, North End, Portsmouth, Hants PO2 9AE. Tel: (01705) 662145, FAX: (01705) 690626.

## B&W At Syon

The excellent range of Barker & Williams antennas are now being stocked by Syon Trading of Leatherhead. End-fed 'Ve'es', dipoles, both trapped and folded, baluns and coaxial switches with power handling capabilities up to 2kW are available. A window, or portable antenna, (the AP-10) would make an ideal

travelling companion and Syon Trading have donated one of these for one lucky reader to win (see the questionnaire on page 64 of this issue). For details of the complete range of B&W products contact Syon Trading at 16 The Ridgeway, Fetcham, Leatherhead, Surrey KT22 9AZ. Tel: (01372) 372587.

## Armstrong's Handful

Armstrong Communications can now supply the entire CHELCOM AERIALS range of h.f., v.h.f., u.h.f. and CB vertical antennas, 2 element h.f. quad antenna. The Chelcom range of verticals are all manufactured from polyurethane coated fibre-glass, stainless steel and heavily chromed brass to withstand the worst of the British weather. If you wish to construct your own then Armstrong can supply the parts too.

Armstrong Communications are provisionally attending the following radio rallies Nov. 9: MARS Birmingham Radio & Computer Rally, Nov. 15/16: London Amateur Radio & Computer Rally, Nov. 23: Bridgend and DARC Radio and Computer Rally, Dec. 14: Verulam ARC Annual Rally.

Contact Armstrong Communications.

## Armstrong Communications

44 Armstrong Road, Barnwood, Gloucester GL2 0SJ, England. Tel: (01452) 531648 or via email at mark@armstrong.demon.co.uk or point your web-browser at <http://www.armstrong.demon.co.uk>

## Haydon's Triple

Haydon Communications can now supply the Comet CFX-514 three-band triplexer to compliment the Serene TSB-3608 antenna that was the subject of a special offer on p33 of the September issue of PW. Covering 50, 144 and 430MHz the Serene antenna is the ideal candidate for the Comet CFX-514 Triplexer, allowing a transceiver such as the FT-736 or three separate transceivers to share the same antenna. The Comet CFX-514 would also make an ideal splitter to feed three separate receivers

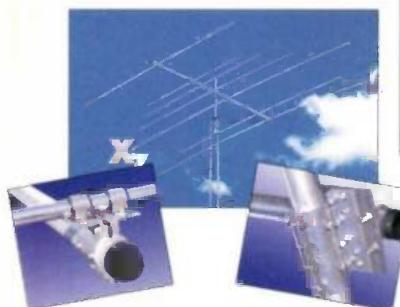
from one wide-band active antenna.

The Comet CFX-514 triplexer costs £56.95 + P&P from Haydon Communications, 132 High Street, Edgware, Middlesex HA8 7EL. Tel: 0181-951 5781/2 or 07000-HAYDON.

## Mobile Watsons

Designed to suit the latest dual v.h.f./u.h.f. mobile rigs the Watson W7900 antenna is available from Waters & Stanton Electronics. Fitted with a fold over base so, there's no need to dismantle the antenna when parking your car in the garage, the antenna boasts 5dB gain on 144MHz and

7.6dB on 430MHz. The W-7900 costs £34.95 +P&P from Waters & Stanton Electronics, Spa House, 22 Main Road, Hockley, Essex SS5 4QS. Tel: (01702) 205843.



## welcome to AiA!



Welcome to the final 'Antennas in Action' for 1997, and what a year it has been for me, hard work - but very enjoyable. Now it's time for you to play your part again and win a B&W antenna, the AP-10 windows antenna worth almost £90,

donated by Syon Trading, a one year's subs to PW or a copy of the 18th Edition of The ARRL Antenna Book. See the questionnaire on page 64 of this issue for details of how you can win one of these prizes. Don't forget, to keep your A-i-A successful we need ideas so, please take a little of your precious time to complete and send in the questionnaire.

G1TEX

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John Heys G3BDQ	
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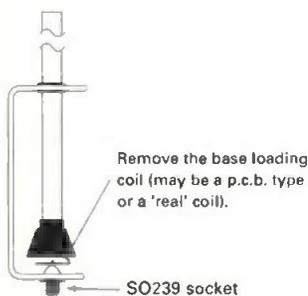
8 pages of  
antennas

# 20 to 2 antenna

Many of us are a little stuck for space when it comes to antennas. Often you reach a compromise where you'll have, for example, a 144MHz vertical on the chimney, and for h.f., the best you can do, which usually involves a length of wire as high as possible. This is usually fed via the a.t.u. against the best earth we can manage.

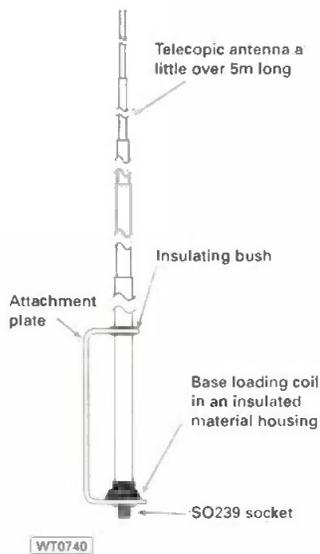
The system works okay, but such a compromise can lose the DX. Often you can hear other stations handing exchanging large signal reports with DX stations that are barely audible to you. It's when we think 'one day I'll get that new QTH and the beam antenna, and then I'll be in business'. The antenna I'm going to describe here may not be as effective as a beam on a tall tower, but it has opened the bands from 14 to 28MHz, allowing me to exchange calls with JA, VK, ZL to name but a few. Using only 100W s.s.b. reports from 55 to 59 have been the most common. The antenna has also cracked a few pile ups!

There's also the added benefit of operation on 144MHz, with a bit of theoretical gain. You've probably seen the type of end-fed half-wave antenna, usually sold for CB users, sold with such names as GP-27 or Silver Rod, and a basic layout is shown in Fig. 1. I know that many radio amateurs use this type of antenna on 28MHz, shortening the tubular aluminium element to tune it within the 28MHz band. If you have space for this type of antenna and an a.t.u., you're in business.



**Fig. 2: The base loading coil is usually hidden in the plastic base of the antenna.**

## Perry Mountstevens GOIF1 demonstrates how to make a single band h.f. vertical antenna work on more bands.....including v.h.f.!



**Fig. 1: There are many suitable antennas, designed originally for CB, that are of this general layout.**

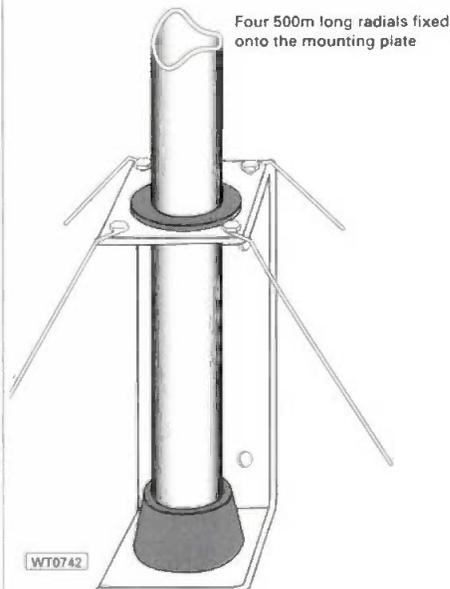
### Here's How

Here's how I achieved it. The antenna I used was sold under the name of GP-27, and it cost me £19 when I purchased it a few years ago from a local CB stockist. When I realised that the telescopic aluminium element was around a  $\lambda/4$  on 14MHz, I began to get ideas. I also realised that the length could be adjusted to be an odd multiple of quarter wavelengths on 144MHz so I set to work.

The first job was to get rid of the tuning stub at the base of the antenna, the position of this coil is shown in Fig. 2. On the GP-27 that I had, the plastic shroud covering the tuning stub was secured by nuts and bolts. But I've seen others where the shroud is secured by pop-rivets (if this is the case, you'll have to drill them out and replace with nuts and bolts later). Having removed the nuts and bolts or rivets, you should now find that the shroud will move upwards, exposing the coil stub.

For the purposes of this design, the tuning stub is extraneous so, you'll need to snip that out and simply solder a wire from the centre of the SO239 connector to the connector that is used to connect onto the radiator. When that's done, bolt the plastic shroud back into place. I used some silicon bathroom-type sealant at the base of the shroud to keep moisture out.

You should now have continuity between the centre conductor of the SO239 socket and the radiating element of the antenna. To work more effectively on 144MHz we need some radials for the antenna to work against. I found that 500mm lengths of steel fencing wire worked quite well. I looped each of the four radials around the bolts that secure that plastic insulator to the top of the mounting bracket. I then bent them down at an angle of about 45°. (Have a look at the illustration of Fig. 3 for the general look of the base).



**Fig. 3: Radials for 144MHz should be fitted to the top of the support plate.**

Now, take a length of 50 $\Omega$  coaxial cable with a PL259 connector either end. Mount the fully extended antenna on a temporary pole. I found that a short alloy pole about a metre long hammered into the ground worked quite well, but mount the antenna as you can manage. Now you need to find the radiator length that gives the lowest s.w.r. on 144MHz (as shown in Fig. 4).

Connect the antenna to your 144MHz rig via an s.w.r. meter. You'll find there are several points of length adjustment that show a good or reasonable s.w.r. In my case, it came out very well at about 11 quarter wavelengths long (about 5.5m depending on the frequency you chose). This length of radiator suggests an antenna arrangement with a degree of gain and the real plus point was that the s.w.r. reading I had was almost perfect.

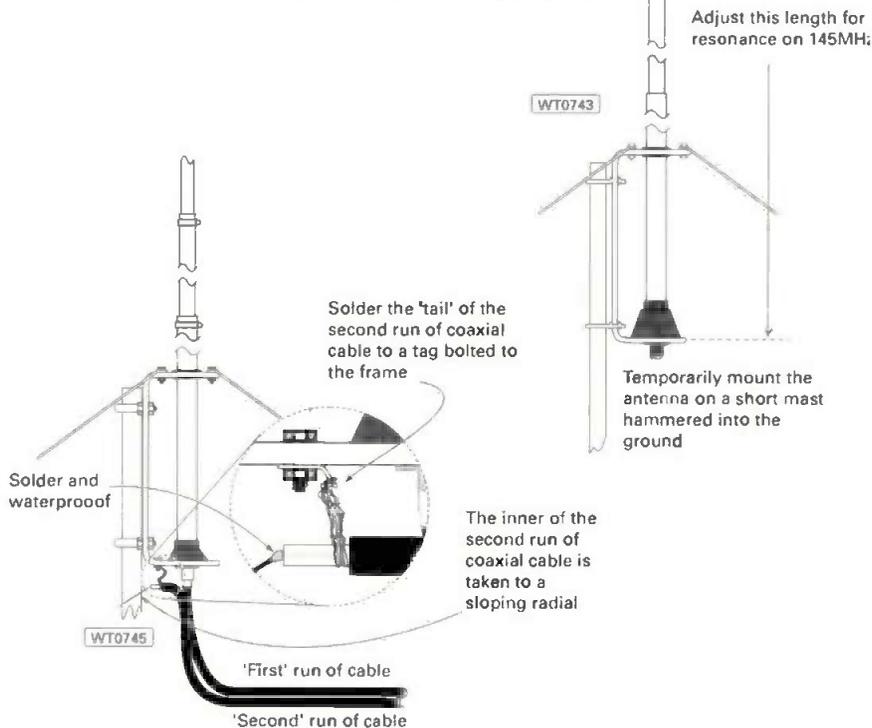
One point to remember, if you intend using the antenna on h.f., is that the element ideally shouldn't be less than  $\lambda/4$  on 14MHz. Right! At least you should now have a nice, effective and reasonably priced antenna for 144MHz. To use the same antenna on h.f. you will need a counterpoise and a second

length of 50 $\Omega$  coaxial cable.

The second length of coaxial cable should be the same type and, as near as possible, exactly the same length as the one you already have. Its length of cable is taped alongside the existing one, right along the length. The aim is to make a screened twin 100 $\Omega$  feeder. This impedance value should be within the range of most a.t.u.s.

At the antenna end, connect the braid of your second run of

**Fig. 4:** Mounted on a short pole, the antenna may be adjusted to resonance on the 144MHz band. The prototype was a nominal  $11\frac{1}{4}$  (about 5.5m) long.



**Fig. 5:** A little more detail of how the second coaxial cable is attached. The connection within the dotted circle should be completely waterproofed with a bath sealant or similar.

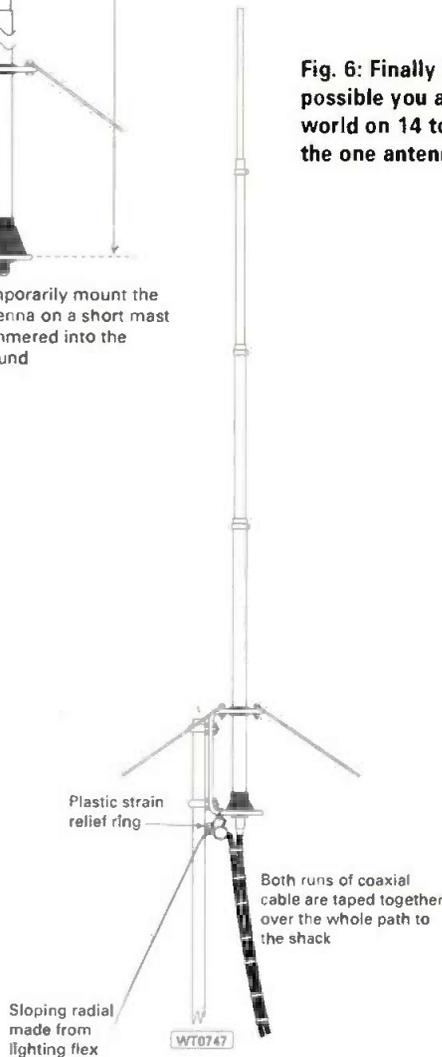
coaxial cable to the bracket of the antenna. I've shown the basic layout of the base of the antenna in Fig. 5 so that you can see how the two sections of coaxial cable are attached to feed the antenna. How you do this is up to you, but remember that if you connect copper (the braid) directly to alloy (the bracket) it will corrode in no time at all. I drilled a small hole in the bracket of mine and connected a large solder-tag with a small nut and bolt, then soldered the braid to the tag.

Next, cut a length of thickish wire (I used lighting flex) to the same length as the vertical element of the antenna. The centre conductor of the second coaxial cable is connected to one end of this. I used this arrangement. Now,

assuming you haven't done so already, you need to get the thing up in the air. My version here is on a four metre alloy pole, secured to the side of the house by brackets.

The counterpoise can be taken out to any available support, but it must be insulated at the far end of course. Take the feeders into the shack, to connect to the a.t.u.. The prototype tuned to unity s.w.r. quite easily on 14, 18, 21, 24 and 28MHz. At this point in the sunspot cycle, activity is low on the bands (21MHz and up), but I tuned up on 14MHz. Imagine my surprise when a W3 station replied to my first CQ call and gave me a 58 report.

Encouraged by the success, I tried a



CQ call on 18MHz, and after two calls, I worked Neal K1NDF, in Boston, who told me I had one of the best signals from Europe. On 18MHz there isn't too much competition as many people don't have dedicated beams for this band, but I still felt heartened by a report like that! The next morning I worked VK and ZL on 14MHz, JA on 18 and WD1Y/MM (the Greenpeace organisation ship) on 14MHz in the afternoon.

**Fig. 6:** Finally mounted as high as possible you are ready to work the world on 14 to 144MHz with just the one antenna.

The magic of the vertical, when compared to a 'random length' horizontal wire, became apparent. The results on 144MHz were far and away much better than those using a  $3\lambda/4$  vertical at about the same height. I've made good QSOs on all bands, 14MHz through 144MHz with this antenna and I feel it'll improve the prospects of many

people who can't manage a beam. I realise that there will be some aspects of this idea that won't seem technically correct to some people. But the fact is, it works! And works very well.

So, become a bigger station, without upsetting the neighbours, all for the price of a cheap CB antenna and a couple of hours work. Good luck and CU in the pile up!



## Further Reading

On the Antenna Reference Data Chart, which was presented free with the May 1996 issue of *PW* there is information about the various a.t.u.s because you will need one with a balanced output for the h.f. bands. There's also information about how to wire up two types of PL259 plugs to coaxial cable.

In 'Antenna Workshop' in the August 1997 issue of *PW* the article 'Balanced Feeding' by Peter Brent G4LEG gives a little more useful information about using two runs of coaxial cable when feeding a balanced antenna.

win..win..

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Welcome to this issue of A-i-A. And, as space is a little tight this month - down to business! Back in the March issue of A-i-A we were discussing power splitters and their uses. A little while later a rather heavy parcel arrived on my desk from **Stuart Newsham G7KKC**. Stuart has a rather interesting array of antennas from the former East Germany. They were obviously used for point-to-point communications, but what I found most baffling is that the power splitter feeds a pair of log periodic antennas!

From dimensions given by Stuart, the inner of the leg of the 'T' is some 240mm long, that would indicate a design frequency of about 310MHz. Using the formula for finding the characteristic impedance of coaxial feeder (of  $Z_0 = 138 \times \log_{10}(D/d)$ , where  $D/d$  is the ratio of the diameters of the outer and inner conductors respectively) I came up with a  $Z_0$  figure of about 41.5Ω for the leg. This figure would be about right if it were a power splitter to drive a 35Ω load (two 70Ω antenna loads in parallel) from a 50Ω feeder.

Now I'd always assumed that log periodic antennas were to cover a wide band of frequencies and the median frequency of the antennas is about the 290-320MHz. So what were these systems? As they are painted in drab green - were they of military origin? To modify them for u.h.f. (430MHz) use would take rather a lot of work and may



**Fig. 1: Dual log periodic antennas fed from a power splitter/combiner.**

**Fig. 3: A heavily silvered centre conductor.**

LOADING COILS, LOOP ANTENNAS, REQUESTS FOR HELP AND MINI-REVIEWS FEATURE THIS MONTH

# tex topics

not be that effective when done though. Can any reader throw a light of what these were used for? I've shown some of the photographs in **Figs 1 - 4** so that you can get a good idea of what the system looks like.

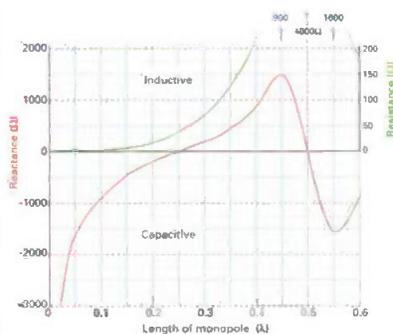
## Short Verticals

On the subject of the short vertical antennas and the value of the base loading coil needed to bring the antenna to resonance **Walter Farrar G3ESP** says, "...some 35 years ago I had a 'M' antenna for 160m (1.8MHz). Memory tells me it was about eight foot (2.5m) long with a centre loading coil (wound on a solid beechwood cylinder about two inches (50mm) diameter and a circular capacity hat of maybe 15 inches (380mm) diameter. I don't know how I arrived at the coil size, but I believe it must have been 'cut-and-try' But it certainly worked". Walter went on to describe a 'Tavasú' antenna by the 'father and son' team of **G3TAV** and **G8ASU**. This antenna was also a mobile antenna that could be made to cover the bands of 3.5, 7, 14 and 21MHz. He suggests that if either of them read *PW* they might like to let the readers know how they calculated the loading coils needed for short antennas.

And on that same subject of short antennas, I've had a message from **Ray Fautley G3ASG**. Ray says that in one of his notebooks (he never throws them out - they contain all the ideas he's collected together) he came across the values shown in **Table 1**. The origin of the table he couldn't quite call to mind but he'd had it a long time and it seemed to work. I've translated the table into a graph in **Fig. 5**, but note there are two scales to be used. On the left is the reactance scale, with capacitive reactance below, and inductive reactance above the zero line. The resistive (or real) part of the

L(λ)	R(Ω)	X(Ω)	L(λ)	R(Ω)	X(Ω)	L(λ)	R(Ω)	X(Ω)
0.01	1.0	-6000	0.21	28	-160	0.41	340	+900
0.02	1.3	-3500	0.22	35	-100	0.42	390	+1000
0.03	1.6	-2500	0.23	37	-75	0.43	470	+1200
0.04	1.8	-1900	0.24	39	-35	0.44	700	+1300
0.05	2.0	-1600	0.25	40	0	0.45	900	+1500
0.06	2.5	-1300	0.26	45	+45	0.46	1200	+1500
0.07	3.0	-1150	0.27	47	+80	0.47	2000	+1200
0.08	3.5	-1000	0.28	50	+125	0.48	2750	+800
0.09	4.0	-950	0.29	65	+170	0.49	3500	+300
0.10	4.5	-900	0.30	70	+200	0.50	4000	0
0.11	5.5	-770	0.31	75	+250	0.51	3500	-150
0.12	6.0	-650	0.32	80	+300	0.52	3000	-250
0.13	8.0	-550	0.33	90	+380	0.53	2000	-700
0.14	9.0	-470	0.34	110	+400	0.54	1300	-1300
0.15	10.0	-400	0.35	130	+450	0.55	850	-1600
0.16	12.0	-340	0.36	150	+475	0.56	700	-1500
0.17	14.0	-290	0.37	180	+600	0.57	400	-1300
0.18	16.0	-250	0.38	200	+700	0.58	300	-1200
0.19	19.0	-220	0.39	250	+750	0.59	200	-900
0.20	20.0	-200	0.40	300	+800	0.60	180	-800

**Table 1: Ray Fautley cannot remember where these figures came from, but they do seem to work!**



**Fig. 5: The figures of Table 1 converted into a graph.**

impedance may be read off from the right hand scale

A capacitive (or short) antenna needs a series inductance (loading coil) to bring it (down) to resonance and an inductive (long) antenna needs a series capacitor to bring the antenna (up) onto tune. The reason I say 'up' and 'down' to resonance is that a short antenna is resonant above the desired frequency, and a long antenna is resonant below the desired point. If you need some help about how to use the Table and graph, I'd recommend that you read the article 'Maths - No Real Problem' by **Ray Fautley G3ASG**, in the October issue of *PW*.

## More Correspondence

I've had some more correspondence on the subject of the 'Ewe' antenna, or 'U' as **John Heys G3BDQ** called his version of the **WA2WVL 'EWE'** in the May 1997 issue of *A-i-A*. In the September 1997 issue of *A-i-A* **Peter Welch G3OFX** suggested using the antenna for transmitting as well ('*Tex Topics*' pages 28/29). John seems to think that the idea is

basically a non-starter as the efficiency is very low, as he says "The antenna is a non-resonant design - aperiodic and its small dimensions mean that on receive there is a 27dBd loss in signal strength. This 27dBd will in evidence if transmitting which would mean putting 400W in and getting about a watt out".

John went on to say that on the one occasion that he accidentally put 5W of 'Top-band' r.f. into the loop his signal was only just heard some two miles away - a pip squeak in fact! He restated that the 'Ewe' antenna



**Fig. 2: The power splitter/combiner is extremely well built.**



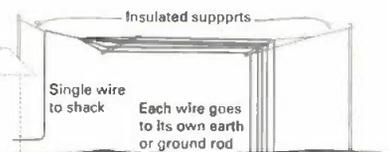
**Fig. 4: Looking into one of the antenna connector points.**



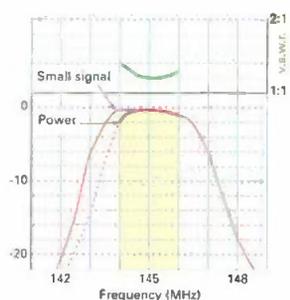
**Fig. 9: The connectors from three types of 'choc-block' electrical connectors.**



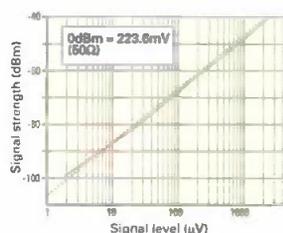
# antennas in action



**Fig. 6: Can you remember seeing an antenna like this one? See text for more details.**



**Fig. 7: Out of band rejection and s.w.r. curves for the DC1-145-2H filter.**



**Fig. 8: The linearity and sensitivity of the MFJ-224. The actual reading of the unit (red line) compares very well with the calculated value (dotted line).**

was a low-noise (also read 'gain' here. Ed.) design to help improve the signal to noise ratio on what can be a very noisy band. John also suggested that a good a.t.u. and a one metre length of brass curtain rod would probably prove to be as good an antenna as far as transmitting is concerned.

## Looking For Help

An avowed delta loop fan Tim Cattlely G0CWZ is looking for some help with a design for his garden. Tim says "I have

three 50ft (16m) tall Sycamore trees in the garden which are spaced around 120ft (38m) apart in an almost perfect equilateral triangle. What's more the house is located in the centre of this triangle". Tim goes on to mention the many experiments with vertical and G5RV antennas that all gave good results - but he wants to use a delta loop for use on all h.f. bands. Can any readers help with ideas?

Another reader Brian Lowe VE3TJE is looking for an article on a particular antenna system. I've shown a rough idea of what Brian has in mind in Fig. 6, but he cannot remember where and when it was published. I'll admit it looks a bit like the WA2WVL 'EWE' antenna and I assume that the return is through the ground and the earth terminal of the rig. Can any other reader help us find the original article, or something like it, for Brian?

## My Playings

I've been playing with a few items these last few weeks and I think I've found some excellent ideas for the Christmas wish-list. Yes I know it's a couple of months away, but now's the time to start telling yourself what you'd like. One of the problems we're beset with here in the office is a wide area paging site just a little over 150m away, and this as you might imagine makes life hell when carrying out tests on rigs. The DC1-145-2H four-chamber band-pass filter is a very useful device to have.

I first saw this filter and its 430MHz companion at the Waters & Stanton open day, and I have to say I was very impressed with the 'internals' of the 144MHz version (I haven't seen inside the 430MHz version yet). A helical wound coil just fits inside each chamber, and has just sufficient 'stray' capacitance to resonate on 145MHz. Made in the USA; these filters seem very effective at reducing out-of-band signals both ways. At home I have two p.m.r. base stations not far way. On fitting the filter to my set (admittedly an older one) used for monitoring various f.m. channels, I noted

no more interference from the base stations. So, the DC1-145-2H is at least effective on receive.

Then I did a little work in the labs and ran some tests on the filter. The results are to be found in Fig. 7. The DC1-145-2H filter also dramatically reduces any 'sprogies' on your outgoing signal making for a much cleaner less TVI prone signal from your set. A very useful addition to the shack that kills out-of-band signals both ways available from Waters & Stanton.

Also from W&S, but this time from the MFJ line of products, is the MFJ-224 FM Analyser. The name doesn't do it justice because it is really a field strength meter tuning from 144-148MHz, although the unit I had wouldn't tune below 144.1 or above 147.9MHz. With a dynamic range of 60dB, covering -100 to -40dBm (not dBµV as I mentioned in the news last issue of A-i-A). The figure of 0dBm is equivalent to 224mV of r.f. in a 50Ω load so, the range of this unit is from 2.23mV down to a very creditable 2.23µV of r.f. signal at the antenna.

The hand-held MFJ unit can make setting up or testing 144MHz antenna very easy. Using a small crystal oscillator producing one or two milliwatts as a signal source, you can set an antenna up for forward gain or front-to-back ratio very easily. With the MFJ-244 you can in fact create your own 144MHz antenna range. If you're into 'Fox-hunting' on 144MHz then this is an ideal receiver to use, the signal strength may be read off quite quickly. I put the meter through the labs here, the unit was reasonably accurate in terms of signal level, and was quite consistent and linear over the designated range.

The sensitivity results are shown in Fig. 8 and in real terms it's sensitive enough to use off-air with a reasonable distance between the source and the receiving station. You can also monitor the audio of the received station, and check the deviation level although I found this seemed to under-read somewhat by

about 15%. But, it was more than adequate to set deviation level for the new channel spacing on the 144MHz band.

I could certainly find a place in my shack for this item even in spite of one niggle. I've found that the items from MFJ are innovative but can be improved somewhat. If I had to say what I thought could be improved on the MFJ-244, then it would have to be that changing the small 9V battery is a pain. To gain access to the battery the complete back has to be taken off the unit and, like the MFJ Antenna Analyser, has eight screws. If a replaceable battery must be used, can we (please!) have a single-screw battery compartment! However, this is my only moan, I still think it's another useful addition to the shack!

## Sliding Taps

Just recently I've been playing with sliding taps on coils, antennas and feeders. When dealing with aluminium wire and tubing it's just not feasible to solder a lead on when and where you want one. I think I've found at least one answer to this problem. Have a look at the photograph Fig. 9. I've shown a variety of connectors. The source of these useful pieces of hardware is the 'choc-block' electrical connectors, that are available to cope with currents from 5-30A and may be used on items up to 5mm diameter.

By soldering the brass blocks together with a short length of brass or copper strip (available from good model shops) you can make an easily adjustable shunting block for tuning lines or tapping points for feeders. If you have differing sizes of conductor to connect together (such as the feed lines on an HB9CV antenna) then two dissimilar connector may be soldered together to do the job. Just one word of warning though - don't be too enthusiastic when clamping to a section of aluminium tubing. If you severely distort the tube wall then there's a good chance that it'll be weakened and then bend out of shape, or even break at this point.

That's it for this month, I've run out of space again so, I'll see you in the January 1998 issue.



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# questionnaire

I've had the pleasure of editing six issues of A-i-A and I've had very good post bags on all subjects - thank you all who have taken the trouble to write in for whatever reason. For those of you who haven't received a personal answer to your question or comment, please accept my apologies. I am interested to know if you find this section of the magazine of interest. Should it be changed? Is it too technical? Should it be less technical? Like a collective 'Mystery tour' the direction we explore is up to you, the reader...because in this case you're the 'drivers'.

Now it's time for you, the majority of readers, to do your part with a chance of a prize. From **Syon Trading**, who are the agents for the excellent Barker And Williams range of antennas, I've been given one of their antennas to give away to a lucky reader. The B&W AP-10 portable antenna is a combination of a strong aluminium frame clamp and a heavy duty telescopic section. To use the antenna, select the separate coil that's also the base loading coil and adjust the length of the counterpoise wire. It's simple and easy and to win this portable antenna all you have to do is to send in your completed questionnaire.

A photocopy of this page is acceptable however, to be in with a chance of winning the B&W portable antenna the corner flash must be returned fixed to the photocopy. I wish you the very best of luck in the draw which will take place **Monday November 24**. So, whoever wins the antenna will have it in time for Christmas. And there will be two runners up in the draw, as the next two completed questionnaires pulled out of the editorial hat will receive either: a one year subscription to *PW* or a copy of the 18th edition of the *ARRL Antenna Handbook*.

Do you think the number of pages in A-i-A is:  
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**Antenna Workshop**

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*Thank you for taking the time to fill in this questionnaire. 'Tex'*

# antenna workshop

A couple of years ago I acquired a very basic u.h.f. 430MHz hand-held transceiver which although effective when outdoors with its small 'rubber duck' antenna was not so good inside the house where it proved difficult to access my local repeater. Putting a ground plane antenna up in the loft would have involved yet another length of coaxial cable descending to the shack. I also wished to have reliable communications from other rooms in the house where any kind of wire or tube dipole would most certainly provoke reactions from my XYL.

Some time ago a local amateur showed me a simple flat antenna that he'd devised. Made from kitchen foil and cardboard, it was for his TV set and was essentially a broadband full-wave quad antenna pinned to the wall above his TV set. The antenna worked remarkably well and a memory of this device led me to design and make a small and unobtrusive 'bent dipole' antenna, which when suitably disguised, could grace any room.

A dipole design is smaller than a quad and if made broadband should perform well across the whole 430MHz band. I decided that cardboard was unsuitable as a backing material for the foil radiator for it absorbs and holds considerable moisture. Instead, I plumped for a flat sheet of polystyrene. Other materials such as pvc, acetate, Perspex or even Formica will be suitable. Glass would be an ideal material, but unfortunately it is not easily drilled.

## John Heys G3BDQ describes easily-made low cost antennas for the u.h.f. or the v.h.f. band.

A piece of polystyrene that measures 200 x 120mm will be big enough. The dipole antenna is in two 'L' shaped sections and its dimensions are shown in Fig. 1. The radiator is made from aluminium kitchen foil which is cut out to make a pair of 7mm wide quarter wave elements. The outside edge measurement for each quarter-wave section is 166mm. This is correct for resonance at the l.f. band edge. But the inside measurement is 152mm which will be resonant somewhat higher than the upper band edge. Using a flat strip radiator in this way means that the antenna s.w.r. and performance will be about the same, right across the useful section of the u.h.f. band.

### Material Method

Kitchen foil is not an easy material to cut to shape, but I hit upon a straightforward method. Using thin card (about the thickness of a postcard), the 'L' shape of one of the quarter-wave

sections was drawn accurately and the shape then cut out. Scissors, or a straight edge and a sharp knife may be

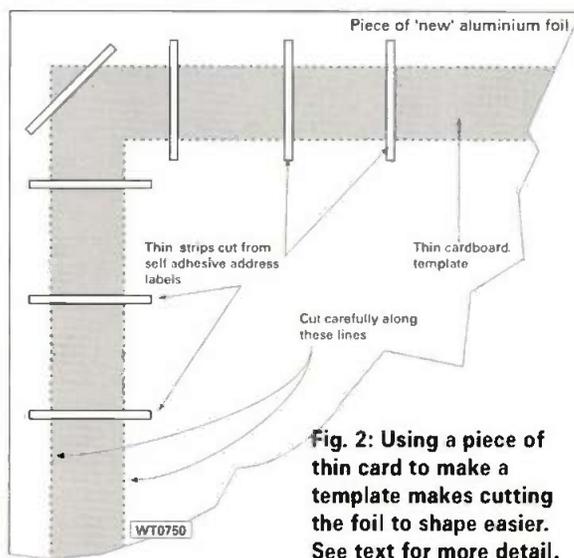


Fig. 2: Using a piece of thin card to make a template makes cutting the foil to shape easier. See text for more detail.

used to do this. Only one piece of card is required for it can be turned over to give its mirror image.

A pristine and flat sheet of kitchen foil is laid flat on a smooth surface and the card template put down onto it. The template must be temporarily fixed to the foil and this is best done by using thin strips of self adhesive address label, Fig. 2, arranged across the card. Nothing sticky comes into contact with the wanted 'L' shaped piece of foil which can then be carefully cut out with sharp scissors. Reverse the template and repeat the procedure for the second quarter wave section.

The two foil elements are then placed in

position on the rectangular plastic backing sheet with a 5mm gap between the two sections. To hold the foil permanently in place, I used clear 'Duck Tape'. This is a strong sticky and waterproof clear tape which adheres firmly to most materials and can be bought in many hardware stores. An older product called 'Sylglass' may also be used if you have some to hand. **DO NOT** use ordinary clear sticky tape.

It soon degenerates into a peeling brown mess.

Now use some 50Ω impedance coaxial cable, I used RG58U, to connect to the two quarter wave sections at the points marked in Fig. 1. A balun is needed if the feeder is more than about three metres long. One can easily be devised by coiling the feeder into a 60mm diameter four turn 'inductor' close to the feed point.

The most tricky operation is in arranging the connections to the coaxial cable. Very careful drilling through the foil and the

plastic backing must be done to allow the use of brass 6BA bolts. Aluminium or brass washers and soldering tags are needed. Do not use steel washers or bolts for corrosion might develop. After soldering the cable to the tags, a good smear of silicon rubber sealant may be applied to the connections. The coaxial cable must be held securely to prevent any strain upon the connections, I've found a couple of holes through the plastic backing to take a nylon tie will hold the cable in place.

### Like A Picture

The finished flat antenna assembly can be hung up against a wall like a picture. For general f.m. and repeater work, the dipole centre sections must be vertical. A wall or window facing the wanted stations is best, but the antenna may be moved around to discover a position where the wanted signals are strongest. Upstairs rooms will obviously have an advantage over those nearer the ground but even when located downstairs, the

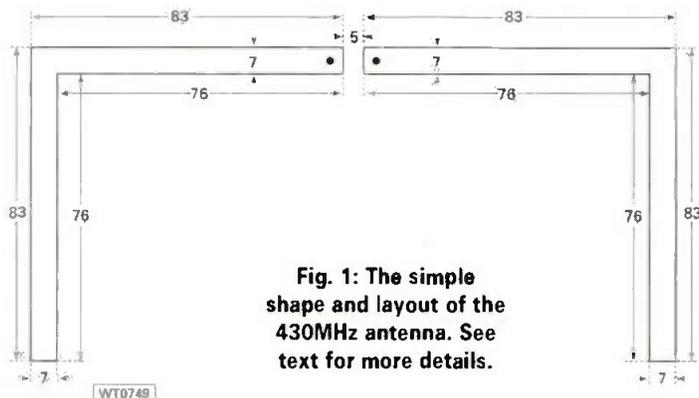


Fig. 1: The simple shape and layout of the 430MHz antenna. See text for more details.

# antennas in action

antenna let me work through two repeaters, my local one and another in the next county.

The antenna can be hidden behind a curtain or disguised. If it's mounted in a conventional picture frame (non-metallic), a second thin piece of plastic can go in front of the antenna and onto which a picture could be fixed. You would then have a normal wall picture with a thin(ish) lead coming down from it.

## Other Bands

The antenna style I've described can be used for other bands and recently I made a successful 'Hang-on-the-Wall' antenna for the 144MHz band. The legs of each 'L' section were not equal in my design and its measurements were: outer lengths 300mm, inner lengths 185mm, width of elements 15mm (see Fig. 1). It does however, need a large sheet of plastic backing material and (for instance) my own

measures 1000 by 250mm. When hanging in the shack, the v.h.f. version worked almost as well as my loft mounted quarter wave antenna. Keen short wave listeners could make their own versions of the antenna to cover their favourite frequency bands. The outside length of the foil of each quarter wave section may be deduced from  $143/2f$  where  $f$  is the lowest frequency (in MHz) to be used.

In general the wider the foil strip the

wider becomes the antenna bandwidth and, if suitably weatherproofed these flat antennas could be used out of doors. But, I must admit that I feel that the more usual rugged tubing designs cannot be beaten for outside work.

That's all I have time for this session. See you all in the next issue of A-i-A.

aa

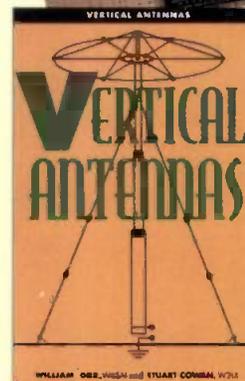
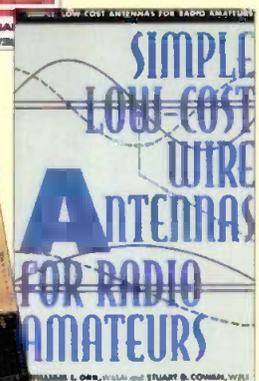
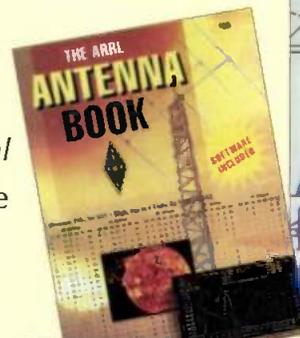
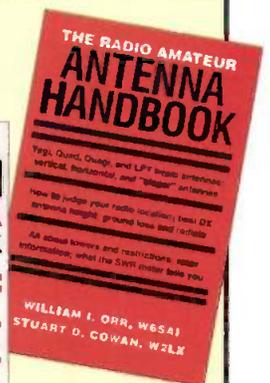
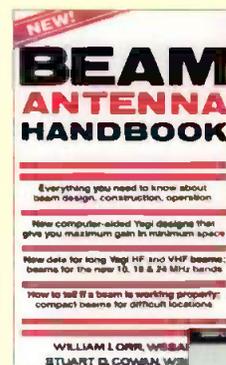
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# The GDP-430 Hand-Held UHF Transceiver *Part 1*

*In this, the first part of his article, Geoff Pike G10GDP describes a simple but effective crystal controlled hand-held transceiver for the 430MHz (70cm) u.h.f. band.*

By Geoff Pike G10GDP

The project I'm describing evolved because for some time I needed to be able to monitor the local repeater here in Country Antrim while not tying up the main station radio, a FT-790R. I required something else as I use the main rig almost exclusively for s.s.b. work.

My home is 12km or so from the local repeater GB3UL on RB2, and any transceiver idea I came up with didn't need to have spectacular performance with regard to output power and sensitivity. To that end, the final project, the GDP-430, only produces 250mW, and the receiver sensitivity is only -120dBm for -12dB SINAD.

However, in practice, the specifications I've outlined are more than enough for good results. It would be possible to increase the output power, but at the expense of a decent output transistor. And receiver sensitivity can be enhanced by the use of a GaAsfet as the first stage r.f. amplifier. However, the design presented here uses something a little less exotic and cheaper.

So, those are the reasons behind the project. Now let's get down to business!

## Circuitry & Design

Let's start by looking at the circuitry and design. In the receiver section, Fig. 1a, after passing through the antenna change-over relay the signal is presented to a cascaded pre-amplifier consisting of Tr101 and Tr102. Initial selectivity is provided by the tuned circuit of L101/C101.

Both Tr101 and Tr102 use sliding d.c. bias to stabilise their operating point with approximately 5mA collector current in each. This provides an approximate 50Ω input

impedance. This being based on Wes Hayward W7ZOI's thumb rule of  $R_{in} = (26 \times B) / I_c \text{ mA}$

The figure  $B = F_1 / F_{op} = 5000 / 432 = 11.5$ ; where  $F_1$  is the unity gain frequency of the transistor from the data chart, and  $F_{op}$  is the operating frequency. So, in this case  $R_{in} = (26 \times 11.5) / 6 = 50\Omega$ .

The noise and gain figures of the BFR90-91 family are at an optimum with 5-10mA collector current, typically being 2dB noise factor (n.f.) and 13-16dB gain at 500MHz. However, I doubt that this arrangement gives even 20dB gain and allowing for 5dB loss in the helical filter, F102 would result in 15dB pre mixer gain.

The mixer I used is a very simple bipolar type, Tr103, chosen for the least local oscillator power requirement. Its overload capability is very poor and impedance mismatch into the helical filter is evident (on paper anyway!) but in practice, the filter will tune quite sharply.

## Crystal Or Ceramic

The output of the mixer at 10.7MHz is tuned by T102 and presented to the roofing filter FL103, which can either be a crystal or ceramic type. (The impedance mismatch with the 50kHz ceramic filter not being a problem).

The situation is not ideal, but can of course be corrected with a similar i.f. transformer to transform the impedance from 330 to 2060Ω, which is close enough to the input impedance of the following stage. Finally, the n.b.f.m. detector is provided by an MC3359/UJN3859 integrated circuit, IC101 in Fig. 1b.

The i.c. circuitry here follows a conventional layout. However, this version of the MC3357 still has a

poor temperature dependent squelch control. Selectivity is provided by FL101, which is (typically) of 15kHz bandwidth.

The internal non inverting op amp provides a noise squelch system. It extracts the noise when a signal is not present and rectifying it by D101, threshold being set by the squelch pot R115.

The unit is stable enough not to need automatic frequency control (a.f.c.). But if you wished to incorporate it, you would have to change crystal XL101 to 11.155MHz. This change of oscillator frequency is to correct the a.f.c. 'sense' and to allow correct operation.

Scan control is used to inhibit the auto tone burst when a repeater is opened, thus preventing unnecessary



The GDP-430 Hand-held takes the mystery out of 'black boxes'!



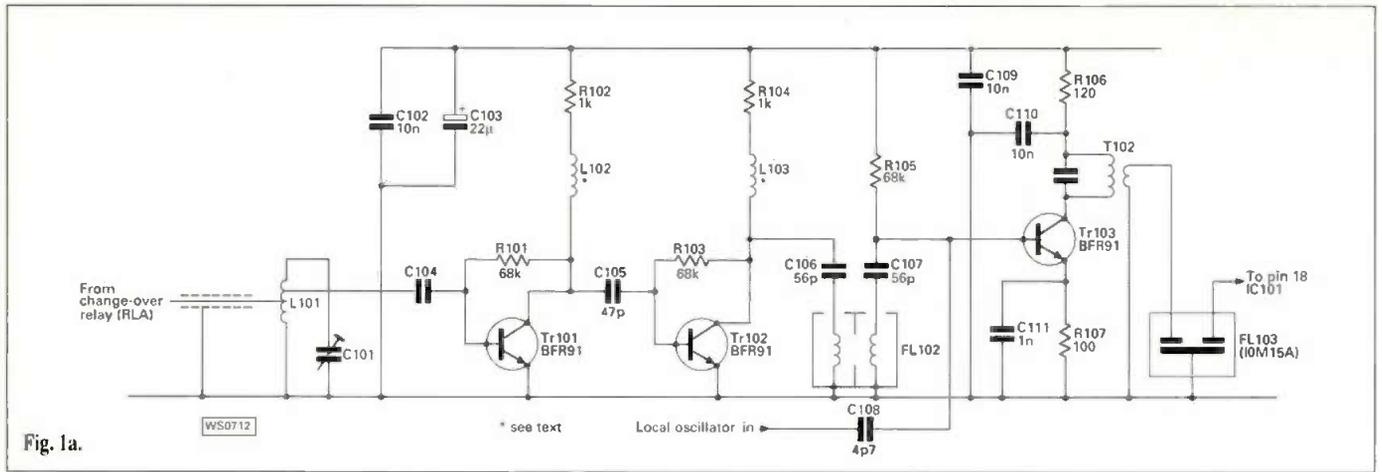


Fig. 1a.

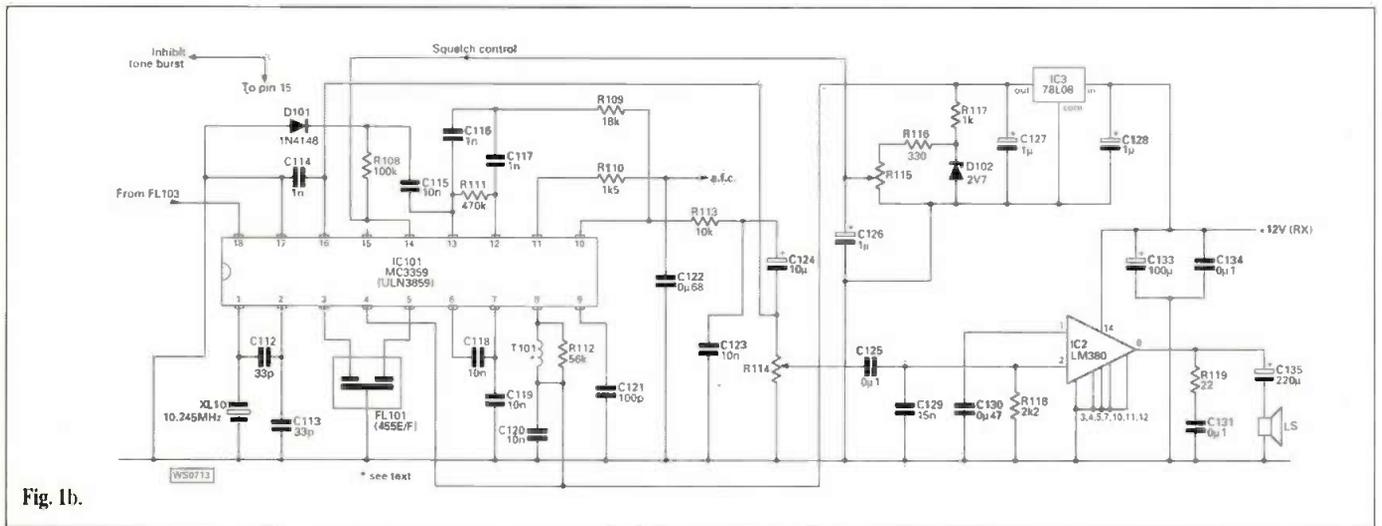


Fig. 1b.

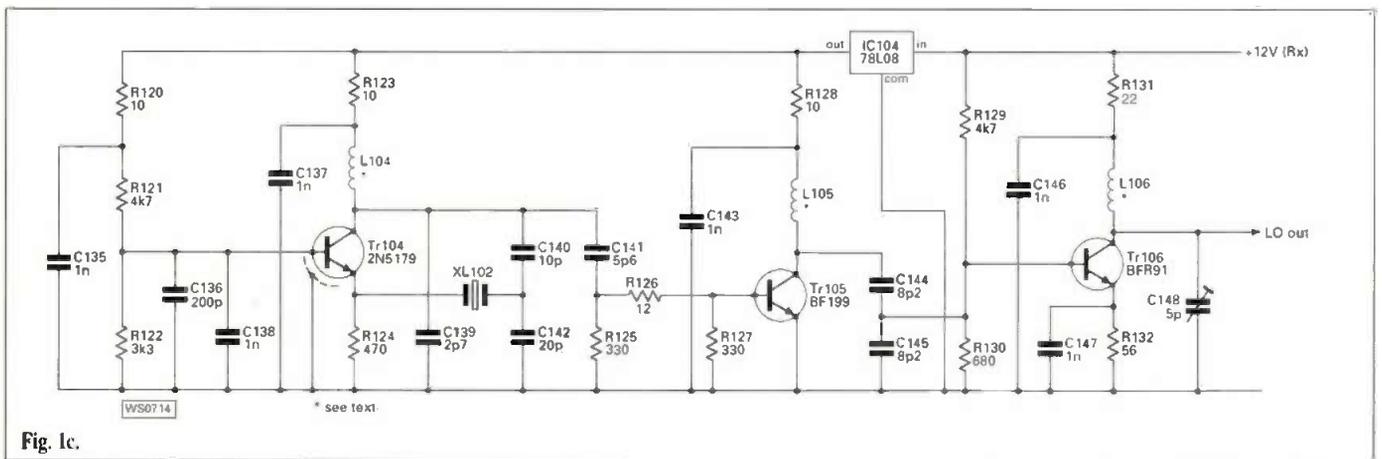


Fig. 1c.

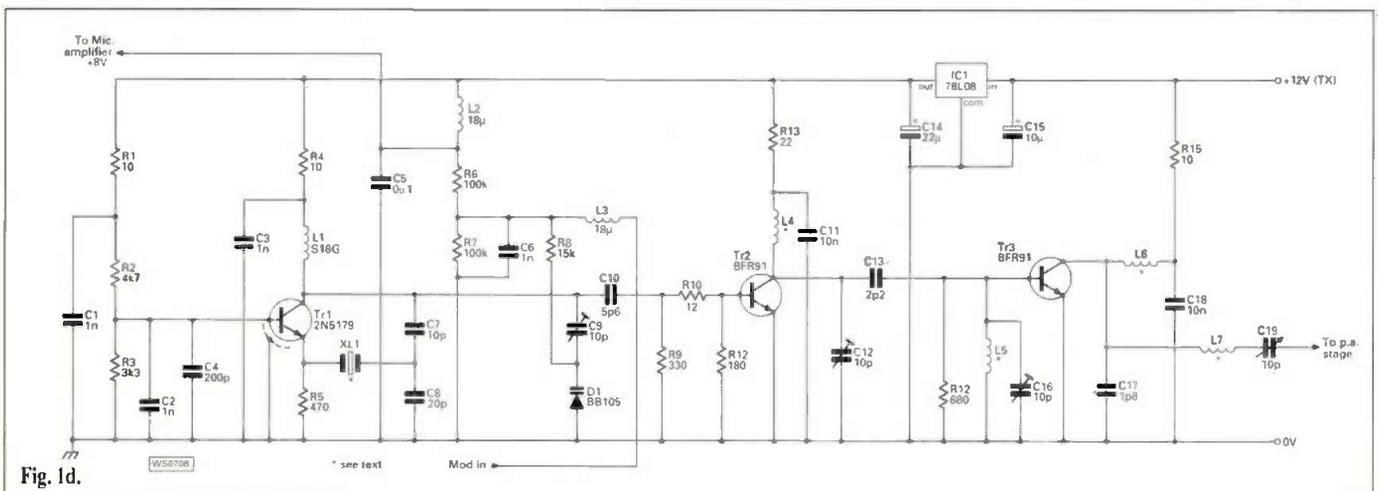


Fig. 1d.

tone bursts. Audio output is provided by an LM380, with extra de-emphasis provided by C28.

### Receive Oscillator

The receiver local oscillator (l.o.), Tr104 in Fig. 1c, employs a 2N5179 and is based on a Lane overtone oscillator configuration. The crystal is a third overtone type and its frequency is calculated as follows:  $(F_{rx} - 10.7)/6$  MHz

Where  $F_{rx}$  is the received frequency, and 10.7 is the i.f. used. For example to receive a signal on 433.05MHz:  $(433.05 - 10.7)/6 = 70.3917$ MHz

The l.o. output is buffered from the doubler input (Tr105) by a 3dB pad.

Tripling and final output is from the collector of Tr106. This oscillator is well known for not producing maximum output when trimmed onto crystal frequency. (Don't worry...this is not a problem here!).

The oscillator and the doubler are feed from an 78L08 regulator to give a stabilised rail.

### Transmitter Section

So, now let's look at the transmitter section in detail starting with the circuit of Fig. 1d. This uses the same oscillator as the receiver, a 3rd overtone Lane configuration. The oscillator is modulated by D1 a varicap diode.

The output signal from this oscillator is passed by a 3dB pad to the doubler formed by Tr2 and then to the tripler Tr3 (this is another BFR91). Both stages are stabilised by an 78L08 regulator. Tuning of the driver chain is accomplished by C12 and C16. Matching to the paralleled transistor p.a. is by capacitor C19.

The output stage, Fig. 1e, has parallel transistors Tr4/5 that are biased for a small standing current in each. They are matched into the helical filter by L9/C24. With current balance enhanced by using separate emitter resistors R18/R20 adjustment of the helical filter will be needed for maximum output power, which is in the order of 250-350mW. For repeater operation, the tone

burst, produced by the circuit of Fig 1f is provided by a 3.579MHz crystal oscillator Tr12 and divided by 2048 using a MC4020 binary divider.

This circuit produces a tone very close to 1750Hz, the duration being set by R40/C42. Shaping is provided by an R/C network (R41/C43 and R42) and applied to the microphone input.

### Microphone Amplifier

The microphone amplifier circuit of Fig. 1g, is formed by Tr6 to Tr8. Deviation control is controlled by the preset R28 and is adjusted for a total of 7-8kHz deviation.

The varicap D1 (in Fig. 1d) has its centre voltage set by R6 and R7. The voltage swing at the collector of Tr8 is 4V peak-to-peak. Moulded chokes L2, L3 (in the modulator circuit) and L10 prevent r.f. feedback from entering into the microphone amplifier.

The microphone amplifier will directly handle moving coil 600Ω dynamic units. However, in the case of speaker/microphones with electret inserts additional circuitry to provide a d.c. biasing supply is needed. This supply is taken care of by R34/35.

The same two resistors R34 and 35 also double as the sensing line of the p.t.t. circuit feeding transistors Tr9 to Tr11. The Darlington pair (Tr9/Tr10) 'sense' the current in a 'swamp' resistor (R34) flowing through the microphone insert (of whatever type).

This sensed current is amplified and used to energise RLA which switches both the antenna to receiver or transmitter and 12V to the relevant module.

Power for both sections is derived from 10 x AA NiCad cells, which nominally produces 12V. This is protected by a 500mA fuse.

So, there it is...a basic and easy-to-build transceiver which can get you on to '70' on a tight budget. It will provide a useful little unit and a great experience in 'home-brewing'.

Next time I'll describe the constructional stages, and provide the component list and the p.c.b. designs. In the meantime...get prepared!

Fig. 1a: Receiver input, front end and mixer circuitry.

Fig. 1b: Main receiver circuitry, based around the MC3359 integrated circuit. Also shown are the associated power supply regulator (IC3) and the audio output stage employing the well known LM380.

Fig. 1c: Receiver local oscillator and multiplier stages.

Fig. 1d: Transmitter oscillator, modulation and multiplier stages

Fig. 1e: The 'QRP' p.a. stage circuitry.

Fig. 1f: The 'tone burst' circuitry.

Fig. 1g: Transmitter microphone and modulation amplifier stages (left) with the electronic switching circuitry on the right.

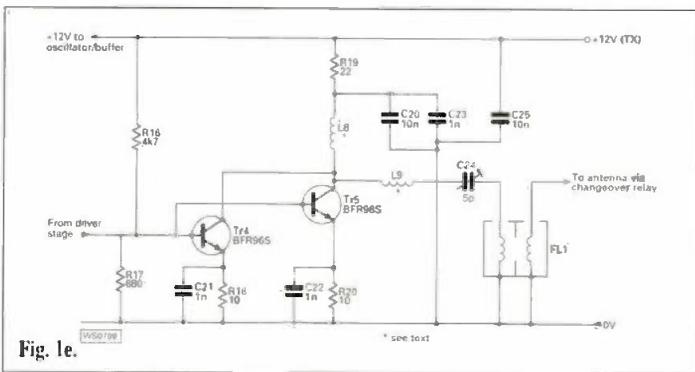


Fig. 1e.

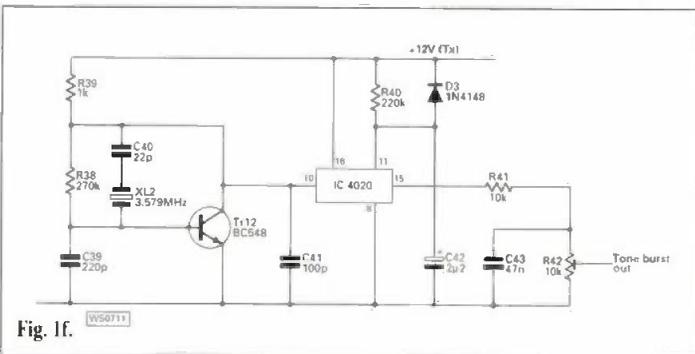


Fig. 1f.

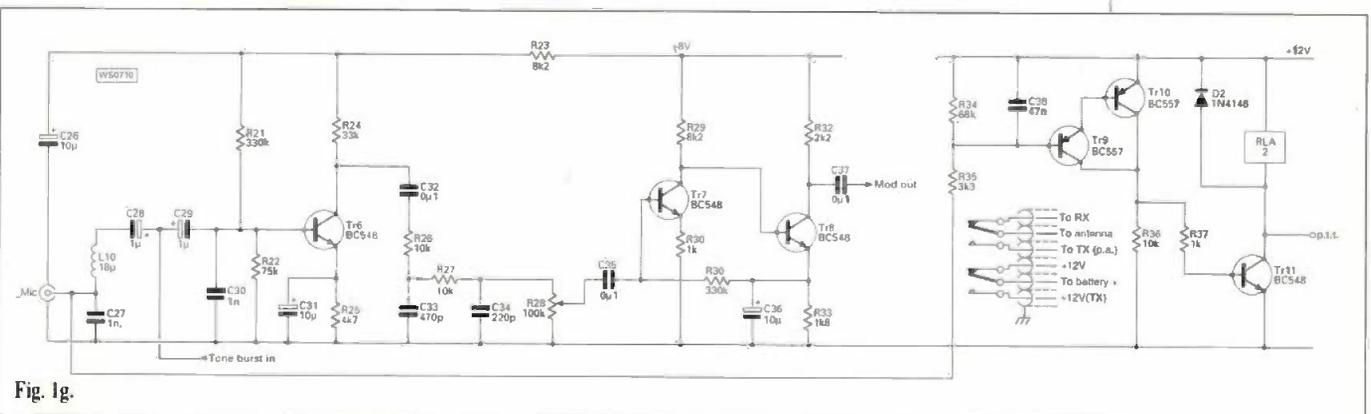


Fig. 1g.

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# Carrying on the Practical Way

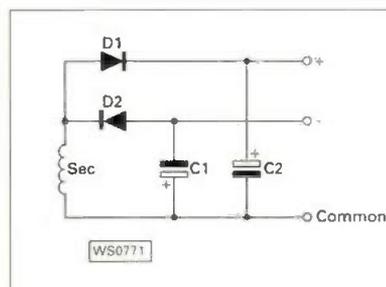
By George Dobbs G3RJV



*The Rev. George Dobbs G3RJV, having encouraged readers to try working on 'islands' is now suggesting 'alternative islands' and 'postage label p.c.b.s'...Puzzled?... find the answer by reading on!*

Fig. 1: You can do a lot with this one basic p.c.b. design. It's a full-size drawing and can be used for all the projects described (see text).

Fig. 2: The dual output supply project circuit and the associated p.c.b. lay-out (see text).



In last month's *PW*, I described the making of simple circuit boards using an 'Island' principle. Small pieces of printed circuit board material were glued to a groundplane of similar material to provide the connecting pads for the components.

All the components were surface mounted by soldering their leads to the island pads. This method provides a simple and versatile method of building one-off circuit boards without having to etch or drill copper clad p.c.b. material.

## The Drawbacks

The method I described in October's *PW* does have its drawbacks: not least of which is having to contend with cutting and placing tiny pieces of p.c.b. material.

The island pads also have a habit of coming unstuck when a hot soldering iron is applied. The idea of using island pads with surface mounted parts is a sound enough technique but it's probably better using etched islands.

Etching p.c.b.s is really a simple process. The usual chemical, Ferric Chloride, may well be an anti-social substance but, handled with care, the processes are



George Dobbs G3RJV invites you to explore another type of 'island' which offers a useful constructional technique.

quite within the capabilities of the home constructor.

Some years ago Adrian Weiss WORSP, was the QRP Editor and column writer for the American *CQ* magazine. He published several quite complex designs using what he called his 'Postal Label Boards'.

With his method, Adrian covered a piece of un-etched p.c.b. material with

*"Remember that the most beautiful things in the world are the most useless"*  
John Ruskin  
1819-1900

adhesive postal labels until the copper was masked. He then mapped out the circuit on the board.

Next, Adrian located the components in place to check the gaps and sketched in a series of pads which were to form the connecting places for the components. (Exactly like the 'Island' method described in my last column).

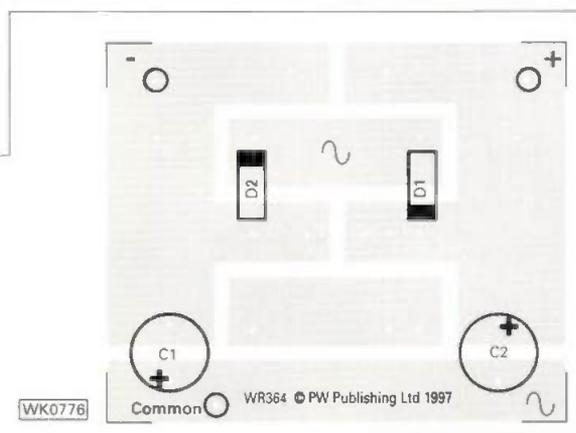
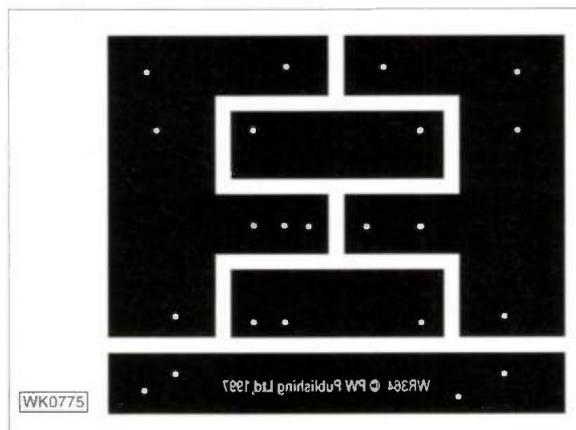
When the 'map' of the pads was completed, the shapes were 'tidied up' and more clearly marked on the surface of the covering labels. Then, using a modelling knife, he cut away the portions between the islands. (These are the places where the etchant has to remove the copper).

The board was then etched in Ferric Chloride in the usual manner producing the pattern of island pads for the circuit. And it provides a very simple and effective method of producing a circuit board which I have used many times in the past.

## Practical Example

When deciding to share Adrian's method of construction with *PW* readers, I fished around for a circuit idea to use as a practical example. Then I recalled a very simple little idea in the Australian QRP Club magazine, *Lo-Key*, by P. Anderson VK2GPT.

The idea from VK2GPT was to provide a 'universal' board that could provide many of the common configurations used to build a power supply. However, it is only concerned with the area around the



rectification and filtering but it can provide four different types of power supply.

The board is shown in Fig. 1. (This is a full sized drawing of the board which can be used for all the circuits described).

My layout is designed to make use of whatever components are to hand. And to that end, the space allowed for the smoothing capacitors is large. (This approach allows the use of either radial (both leads from one end) or axial (a lead from each end) electrolytic capacitors).

In practice, the horizontally mounted axial types take up a lot more space on the board than the vertically mounted radial types.

Each circuit board contains the diode and capacitor arrangement required to produce a specified type of power supply from an appropriate transformer. The rating of the diodes should be well within the required voltage and current and the value of the smoothing capacitors will depend upon the current being drawn.

### Dual Output Supply

The diagrams in Fig. 2, show the circuit for a dual output supply. This can be a useful circuit when a positive and negative voltage is required either side of a common line.

A single winding from a transformer provides the required a.c. voltage. Diode D1 provides a halfwave rectified positive voltage and diode D2 provides the negative voltage while C1 smooths the negative line and C2 smooths the positive line.

The p.c.b. layout of the dual output supply is also shown in Fig. 2. This layout shows clearly how the radial capacitors used for C1 and C2 only occupy a small part of the board.

If axial capacitors are used these would lie alongside either edge of the full board. Don't forget...it's vital to observe the correct polarity for the diodes and capacitors.

### Voltage Doubler

A voltage doubler circuit is shown in the diagrams in Fig. 3. It's similar to Fig. 2. In this circuit D3 provides the positive side of the circuit and D4 the negative side. The capacitors are in series across the total voltage.

The 'doubler' is a useful circuit for gaining a higher voltage from a transformer. But remember the current output is reduced to somewhat less than half that available when using the normal voltage. "You don't get owt for nowt" as Newton correctly suggested!

My p.c.b. layout also shown in Fig. 3, follows that of Fig. 2, except for the

output method. Here it's important that both C3 and C4 should be capable of handling the output voltage and correct polarity is essential.

### Full-Wave

The diagrams in Fig. 4, show the circuit for a full-wave rectified power supply. It uses a centre tapped transformer with two diodes, D5 and D6 connected to the output.

In the circuit, the transformer outputs to D5 and D6 are 180° out of phase giving an additive effect on the positive cycles of the output. The capacitors C5 and C6 are in parallel to produce the necessary smoothing capacitance.

The layout of the board is also shown in Fig. 4. Here the three connections from the transformer output should be self evident. (Most power supply transformers clearly show the centre tap with the ends of the winding either side).

### Full Bridge Recommended

A full bridge rectification circuit is recommended for the basis of a 'ripple' free power supply. The classic full bridge circuit is shown in Fig. 5.

In the full wave 'bridge' rectifier four diodes produce outputs from both the positive and negative cycles of the transformer output. Care must be taken to observe the correct polarity of these diodes and as in Fig. 4, both capacitors are connected in parallel.

The p.c.b. layout also in Fig. 4, is shown using radial capacitors for C7 and C8. It may appear that the capacitor in the centre of the board could only a radial type. (But, as in all the other boards, axial capacitors could be used).

The capacitor can also be connected, in the axial form, across the top of the board, roughly where the + and - symbols appear. Also note that there is a wire link on the board.

So there you are...another form of 'island for you to 'explore'! Keep busy and make sure your soldering iron stays hot.

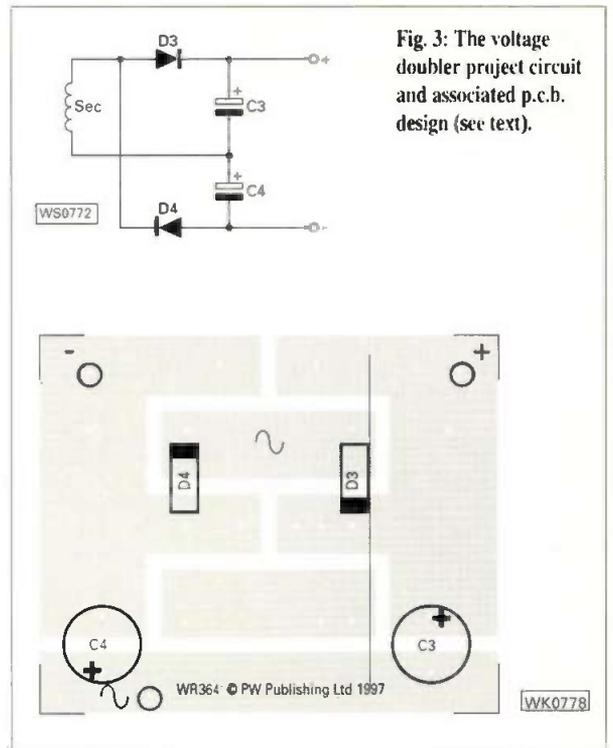


Fig. 3: The voltage doubler project circuit and associated p.c.b. design (see text).

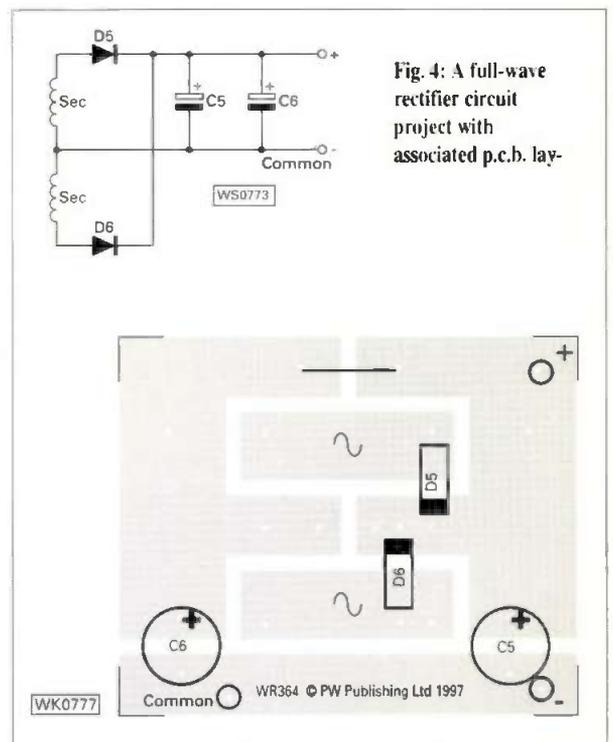


Fig. 4: A full-wave rectifier circuit project with associated p.c.b. lay-

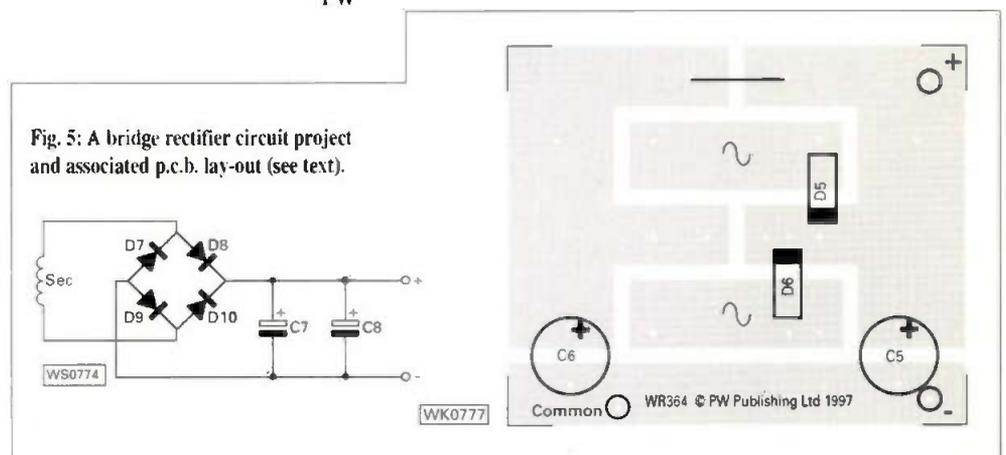


Fig. 5: A bridge rectifier circuit project and associated p.c.b. lay-out (see text).

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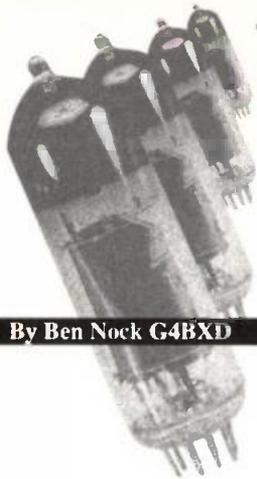
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# Valve & Vintage

By Ben Nock G4BXD

*What's this then! Ben Nock G4BXD appears to be out of military uniform this month and into 'civvies' (for the most part anyway) while he takes a look at some interesting older professional British equipment.*

Hello again and a slight deviation this time from the normal valve theme. Although I'm keeping the vintage tag, in a certain dim light in the *PW* vintage wireless 'shop'!

In response to requests for me to look at more recent sets, I'm going to describe a couple of newer units. Despite being more modern though, they're still outdated, having been made in the 1960s and 1970s.

## Racal Syncal 30

I'm starting off with the Racal Syncal 30 transceiver. And in fact, the Syncal 30 badge covers several transceivers including the later 'frequency hopping' types.

Designated the TRA.931 this text will describe the TRA.931X version (the XH being the hopping variety).

The 931X manpack provides coverage of 1.6 to 29.999MHz in 28,400 channels (now that is some CB rig!). The channels are spaced 1kHz apart and a fine tune control, designated 'search', allows the operator to fill in the gap smoothly.

The set provides l.s.b. and u.s.b. with a.m. and c.w. It runs at a nominal 20W on high power and

as a charging source for the batteries. A complete manpack, set, haversack, battery, whip antenna and headset, brings the all-up weight of the set to 11kg (24lbs).

## Two Units

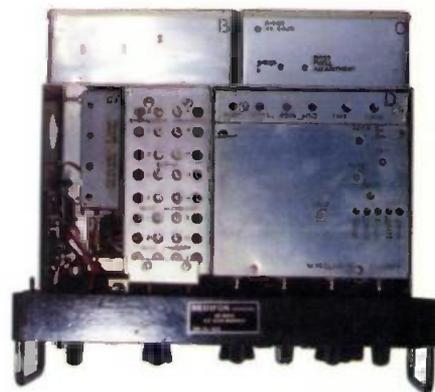
The Syncal 30 type X consists of two units. They comprise of the transceiver unit - designated the MA.930X - and the synthesiser unit - designated MA.925.

The transceiver unit includes the front panel with all the operating controls and input/output plugs and sockets. Two microphone/headset sockets are provided.

A main whip antenna mounting socket is also provided along with 4 BNC sockets that allow either other antennas or tuners to be used with the set.

The microphone/headphone sockets have pins A to F wired in parallel, pin G on socket 1 is used in conjunction with a remote a.t.u. The pin G on socket 2 supplies a fixed audio output for use in vehicle systems.

The internal construction of the transceiver unit is on two main printed circuit boards with two



No it's not up-side down! It's easier to illustrate the various sub-units of the GR-345 this way and you can see the extensive screening used in the design.



Again...the GR-345 is not really 'standing on its head'! This photograph shows the various unit interconnections and how small gold-plated plug and sockets route the r.f. signal through the various units.

smaller p.c.b.s being used for switching and a.t.u. functions. The design incorporates extensive internal screening.

A meter on the front panel shows battery state in the receive mode and r.f. output in the transmit mode. Two small l.e.d.s inside the meter case provide indications as to the direction



The Racal Syncal 30 connected to the Redifon amplifier. The large knob on the lower right of the Syncal 30 is the control for the internal 'Roller Coaster' type antenna tuning unit.

some 5W on the low power setting. There are two headphone/microphone sockets on the front panel, and an intercom facility between operators is also provided.

When used in the general backpack role, the transceiver is powered from an attached 24V pack although an external supply can be used, both as main power source and



The Redifon GR-345 connected to the GA-480 amplifier and the ACU9 antenna tuning unit. (The loudspeaker on top has been borrowed from the GRC-9 radio).

the internal a.t.u. tuning coil needs to be adjusted for maximum output.

### Synthesiser Unit

The synthesiser unit provides a variable frequency output in the range 37 to 65.399MHz, along with fixed reference frequency outputs of 1MHz and also 34MHz. The decade controls on the front panel program a divider circuit, and the output of this is compared to an internal standard to derive a 'locked' condition.

The basic operation of the transceiver is that the audio from the microphone is modulated at 1.4MHz, passed through the required filter, mixed with 34MHz reference signal, then further mixed with the synthesiser output to arrive at the required transmit frequency.

On receive, the reverse of the transmit procedure takes place. Here the antenna signal is mixed with the synthesiser output to give a first i.f. of 35.5MHz, then mixed with the 34MHz reference signal to give the second i.f. of 1.4MHz where all the filtering and demodulating takes place.

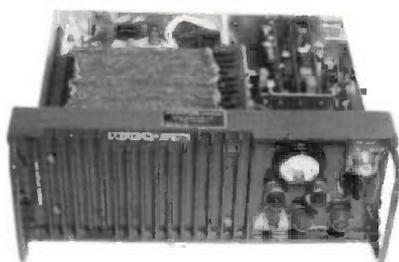
Receiver sensitivity is quoted at 1 $\mu$ V for 10mW audio output, with a bandwidth 2kHz for 6dB on s.s.b., and 8kHz on a.m. Image and i.f. rejection is stated as being better than 60dB. On transmit, carrier suppression is quoted as being down 40dB, and intermodulation distortion as -25dB with spurious emissions -40dB relative to p.e.p. into a 50 $\Omega$  load with an a.t.u.

### Redifon GR-345D

The Redifon GR-345D transceiver along with its matching amplifier, the GA-480, a.t.u. and power supply, make up the radio station GR-479. This is a 100W r.f. output station covering 2 to 12MHz and providing s.s.b. (u.s.b. only), c.w. and a.m. modes. (Typical of many military single sideband sets, the unit is normally used on u.s.b., although the filter can be changed to give l.s.b. output).

Also a synthesised set, the GR-345D generates a 1.75MHz l.s.b. carrier which is then mixed with the output of the synthesiser. This is set on the high side of the signal, to give the required output frequency when providing upper sideband output.

The driver unit is again typical of the latter day military sets.



Photograph showing the front and partial view inside of the GA-480 amplifier. The control and pre-amplifier p.c.b.s are to the rear on the right with the main power amplifier block at the front on the left. (The strips of braid on top (left) help with heat dissipation towards the outer case of the unit).

Four knobs allow the frequency to be 'dialed' up, with a clarifier control to tune the slight gap. The four knobs adjust the MHz range, the 100kHz range, the 10 and 1kHz range. (The clarifier range is quoted as  $\pm$ 1kHz normal shift).

After mixing and filtering, the output of the GR-345D is a mere 100mW. A battery pack of 24V is used, but the entire set, except for the main transmit/receive switching relay, runs from an internally regulated 12V line.

The receive sensitivity is quoted as being 1.55 $\mu$ V for 10dB S/N ratio on s.s.b. and c.w. and 6.2 $\mu$ V on a.m. The i.f. rejection is quoted as being better than 70dB, with image rejection better than 50dB. On transmit, unwanted sideband suppression is quoted as -40dB, with intermodulation products are at -35dB and carrier suppression -40dB.

A small 'button' sized meter on the front panel provides a battery state indication on receive and an r.f. output indication on transmit. There's also an r.f. gain control and an audio gain control. Also provided is a pre-selector knob which tunes the band-pass stages to the desired receive/transmit frequency.

A 24 to 28V supply is normally used. Power consumption on receive is 4W and on transmit it is approximately 16W, so less than 1A is need to run this set. The transceiver measures 320mm deep by 310mm wide by 100mm high and weighs in at 10kg.

### The GA-480A

The GA-480A unit is a solid state amplifier which delivers 100W of r.f. output for an input of between 100mW and 12W. (An internal alteration has to be made on the control board, setting the input power either: at not greater than 200mW, or not greater than 16W).

The input impedance is selectable at either 50 or 75 $\Omega$ , while the output impedance is fixed at 75 $\Omega$  nominal. The supply needed is 24V with 12A being

consumed at full power output.

In the off mode and during standby the antenna is switched directly through the unit to the driver. The front panel also carries an ammeter which measures the current being taken by the p.a. stages.

No provision for r.f. switching is included, the amplifier being controlled from the GR-345 p.t.t. controls by means of a connecting lead. This connecting lead also carries the keying line, the audio and microphone lines which means that the headset/key, etc., can be plugged into either the transceiver or the amplifier. Three parallel sockets are supplied on the driver set with another two sockets on the amplifier.

Two front panel lamps give an indication of d.c. 'power on' to the unit with a second lamp indicating that the internal temperature is low enough to use the unit. The second lamp will go out if the p.a. temperature is exceeded.

The amplifier measurements are: 260mm deep, 310mm wide and 120mm high. On the scales it weighs in at 7.3kg.

The flexibility of the GA-40A amplifier means it can be used with other sets, the Syncal 30 for instance. And even older sets such as the 19, 22, or 62 could be used.

The matching a.t.u., the ACU9 is designed to match either a dipole, whip or an end-fed wire antenna through the range 2 to 14MHz. The roller coaster type coil which is employed means that a good match can be obtained on a wide range of antennas.

An r.f. detector and front panel meter provide a tuning indication of output. Antenna connections are via a BNC socket on the front, going to the set, and three screw terminals on the rear, providing connections for 'whip', 'dipole' and 'ground'.

### Mail Bag

It's time to look into the mail bag now and I've received a very interesting E-mail from Ron Wilson G3DSV. He told me

about his start in wireless back in 1938 and his stint as a Royal Navy Petty Officer Radio/Radar Mechanic from 1943 onwards where he encountered many of the sets mentioned in my last column.

Ron also mentioned the 5G transmitter, a fairly basic crystal controlled crystal oscillator/p.a. stage rig running about 40W with a Pi tuned 'tank' coil for the p.a. which most operators connected directly to the longest bit of wire they could set up. He also mentioned that the 5G was a 'Diplomatic Bag' transmitter which was held by many UK Embassies abroad as a standby unit.

Richard Milewski, from, Philadelphia, USA, has contacted me as he wants any information, circuit, etc., on Receiver Type R1147A. And Mario Mateus CTIAHM, of S. Martinho do Bispo needs similar information on a PRC-216 and PRC-119.

Another letter came from Michael VE3PRW who wrote "At a Hamfest last year I was able to buy a Model 40 Avometer. As you well know this is the Rolls-Royce of multimeters.

Unfortunately it doesn't work. The problem is that some of the wire wound resistors seem to be deficient. Also two batteries are required of unknown voltages. I suppose that they are only needed for measuring resistances".

(And I'm still in need of a circuit for the PRC-368 and PRC-320). So, if anyone has information on the above sets, or the circuit of the AVO 40, send it to me and I'll pass it on.

And finally, readers may have noticed the absence of the RAS receiver photograph in my last column, despite being mentioned in the text. (*This had to be deleted because of lack of space. Editor*).

Finally, my thanks go to Tom Bryan of Silver Springs in the USA for supplying the 931X details. I can be contacted at the usual locations. Please write to me at 62 Cobden Street, Kidderminster, Worcestershire DY11 6RP, (please enclose a s.a.e.), or you can send E-mail to G4BXD@compuserve.com or packet to GB7GLO.

73 to you all.

Cheerio from Ben, see you in February.

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## HF FAR &amp; WIDE

Leighton Smart GWOLBI presents the monthly report on YOUR activities on the h.f. bands.

Leighton says your 'input' is important...so get reading the 'latest' news before sending your contribution to South Wales!

As I write this (in late August of course) the month of has been 'quite reasonable' for the time of year according to our reporters this time around. I think it's now generally accepted that h.f. conditions in general have been improving over the past few months, although the next sunspot peak is still a couple of years away.

A number of correspondents report hearing and working a few south American stations on the 28MHz band, indicating that 'F' layer propagation has been apparent on the highest of our h.f. allocations, along with the usual summer Sporadic-E short skip propagation of course.

The American National Oceanic and Atmospheric Administration, located in Boulder, Colorado predicted, that sunspot numbers would be somewhere in the region of 80 on August the 21st, with a monthly average of 70 over the rest of the month. So let's hope that the improving conditions continue on into the autumn and winter months.

Perhaps we'll soon begin to see regular contacts with the Americas on both our lowest (apart from 73KHz, that is!) and our highest h.f. allocations on a regular basis. Things really are 'looking up' you know!

### Practical Wireless Visit

One highlight of the month for amateurs in my own particular locality was a visit to the Merthyr Tydfil & District Amateur Radio Society by our very own Rob Mannion G3XFD. (See Fig. 1). The Merthyr club is based at the 'Hoover' plant just outside the town of Merthyr Tydfil, and includes amateurs from three or four valleys in the area.

After a brief introduction about himself, Rob gave a talk on the history of *Practical Wireless*, from its earliest days right through the Second World War, the 'transistorised 1960s' up to the present moment. It came as a great surprise to all gathered there that *PW* was once published WEEKLY!

How hard they must have worked in those days to fill the magazine every seven days! Then again, there were no such thing as

computers, television, hang gliding, and a myriad other hobbies to compete against! I suppose!

The well attended visit took place on a warm summer evening, and was thoroughly enjoyed by all. After a buffet had been consumed, farewells were said. Then Rob, who after being on the road for the biggest part of the day, made his lonely way back home, although he was accompanied as ever by his four legged friend Mandy the Labrador, so perhaps the journey wasn't so lonely after all, Rob!

The club members have asked me to pass on their grateful thanks to Rob for visiting the club, and entertaining everybody with his informative and often amusing, talk on the history of *Practical Wireless* magazine.

*Editorial comment: It was my pleasure to be amongst so many friends Leighton! (There's always a warm welcome in the valleys!).*

### The DX News

On to the DX news now...with information culled from the RSGB's *DX Newsheet*. An amazing 10,000 contacts were made over a three day operating period by 9M600 operated by Jani YB0US, Bob N200, and Bob N0RN from Spratly Island. Any QSLs should be sent via N200.

In the Maldiv Islands 8Q7PV is operational on 14MHz s.s.b. and 18MHz c.w. with QSLs to be sent to RU3FM, whilst 8Q7QH is active between 1500-1600 on 14.260MHz s.s.b. with QSLs to be sent to AC4BD.

In Cuba, Fernando CL3FL is active daily between 28.800-28.900MHz from the rare third call area. While in Chad, Jim WA4KKY is operating as TT8JWM. (QSLs to his home call).

### Your Reports

I'll delve into your reports now, beginning with the 3.5MHz band. Eric Masters G0KRT in Worcester Park, Surrey, operated from the Wimbledon & District ARS Summer Camp at Telegraph Hill, Chessington, as GX3WIM this month, using a FT-757 rig, hooking up with RU4AA (Russia) at 0004, EA1UL (Spain) at 0117, OK2BNG (Czech Republic) at 0022, and EA6ABN (Balearic Islands) at 0034, all on s.s.b.



Fig. 1: The 'Big One' visits the Hoover Club in Merthyr Tydfil. Rob G3XFD hoped his car would get 'Hoovered' while he was there...but he was not so lucky! (Note Rob's captive audience!)

Meanwhile, John Constance G0VGD in Aylesford, Kent, used s.s.b. mostly. He made contact with PA3DGH (Netherlands) at 1414, GJ0MEU (Jersey) at 2111, and M7W in England at 1832UTC.

### The 7MHz Band

A little more activity amongst our reporters on the 7MHz band this month (as compared to 3.5MHz!). Indeed, some very nice DX has been heard and worked on '40', often using simple antennas, such as dipoles and random-length wires with 50W or so 'up the spout' so to speak.

One thing I don't really care for on the 7MHz band though is the terrible congestion during peak hours. It really is a drawback to what's a really exciting band. Still, it's well worth listening through the babble for the juicy long distance stuff, as our reporters repeatedly show, month after month!

Ted Trowell G2HKU (see Fig. 2) has been quite busy on 7MHz. He lists (all c.w.) contacts with KP2/KD4D (Puerto Rico), P40XM (Aruba Island, Netherlands Antilles), LU1FC (Argentina), TK/F5LGF (Corsica), CO2VQ (Cuba), VK4EXA (Australia), and ZL2AGY (New Zealand), all at around 0600.

Later operation at 1900 brought Ted contacts with VK3AJJ in Australia and CP6IB (Bolivia). He reports conditions as generally good, and has enclosed his photo for our 'HF Far & Wide 'Rogues Gallery' (Ted's words, not mine!) Nice to put a face to the well known callsign Ted!

Next comes Charlie Blake M0AIJ in Milton Keynes, who has been on the transmit side a little

more often of late. His transmit log includes s.s.b. contacts with GM3PPG/P on South Uist in the Scottish Outer Hebridean Islands, and DJ8NY/M (Germany) while for a mobile to mobile QSO, as well as CT1/ON5NT/P (Portugal).

Charlie's receiving log shows reception of VK2EPT (Australia) working F6CUK at 0507, T14CF (Costa Rica) working Gil G0AOR at 0505, VE3BIE (Canada) in contact with G3RPC at 0602. Also logged were ZL4ND (New Zealand) working DJ8QP in Germany at 0510, HC1NG (Ecuador) in contact with IK2VFW at 0515, as well as 8P6DA (Barbados) working DJ8QP in Germany at 0517UTC.

Staying in Milton Keynes, our other regular reporter is Sean Gilbert G4UCJ, who has recently moved to a new QTH, and is off the air for the moment. His move to the new house was not without its moments however, as just a while after he moved in, the house next door was gutted by fire, and Sean had to be evacuated until all was safe! (Well that's a good start Sean, but all that counts is that you're all safe and well!).

Sean's log for 7MHz this month includes all c.w. contacts with FG/F2HE (Guadeloupe Island) at 2326, WA2FCF (USA) at 0051, EA8ASJ (Canary Islands) at 0047, EX0V (Khirgistan) at 0024. He also worked our very own *PW* cartoonist John Worthington GW3COI at 1330, as well as OY/DL1MBG (Faroe Islands) at 2211, and OX/DL6QK (Greenland) at 2115UTC.

### The 14MHz Band

The 14MHz band is 'where it was at' this month for our reporters it seems.

Most of the DX traffic reported this month is on 14MHz, which has proved to be a good 'all year round' band for many amateurs. A dipole for this band will fit in even the smallest urban gardens, so maybe that could be one reason why it's so popular with newly licensed amateurs.

In his monthly propagation report, **Don McLean G3NOF** of Yeovil says that he found conditions similar to last month on the 14-28MHz bands. "There has again been a lot of short skip" says Don "with G stations coming in at S9 at times...14MHz has been the best band once again, with good conditions on the short path to Asia around 1500-1900. Some Africans were heard between 1700 and 1900, while north and south America came in during the late evenings and often through the night. West coast American stations on some days were apparent with good signal strengths around 1400 to 1500".

Once again, Don has supplied a huge list, which includes his s.s.b. contacts with AP50WAP (Pakistan) at 1709 QSL via IK4ZGY, BV7GA (Taiwan) at 1637, FG5HR (Guadeloupe Island) at 2251, while FS5PL (St Martin Island) came in at 2344UTC.

Other contacts Don logged included HZ1CCA (Saudi Arabia) at 1738, JT1BG (Mongolia) at 1740, along with VU2AU (India) at 1732, T14CF (Costa Rica) at 2224 (QSL via T12CF). He also worked YB2PBX (Indonesia) at 1655, Y11US (Iraq) at 1909 QSL via WA3HUP, 9K6PDW (Kuwait) at 1721, and 5X4F (Uganda) at 1857, with ZD7HI (St. Helena Island) coming in at 1815UTC.

The 14MHz band was the only band this month for **Carl Mason GW0WSW** of Skewen in West Glamorgan as he's been pretty busy with work this month. Nevertheless, he managed, with 70W of c.w. and a simple dipole to hook up with 5X1Z (Uganda) at 1826, 9H3JR (Malta) at 0755 (QSL via DJ0QJ), EA8CF (Canary Islands) at 1830. Also logged were VO1VK (Newfoundland) at 1841, FY5YE (French Guyana) at 1937, W7HS (USA) at 1757, and 5B4/G3LNS (Cyprus) at 1933.UTC

Also having some success on 14MHz was 'our Ted' **G2HKU**, who, once again on the key, 'ragchewed' with 3V8BB, (Tunisia), OY7A (Faroe Islands), JA11DY (Japan), Y19SK (Iraq) QSL via HA0HW and SV1CIF/8 (Kastos Island). Next into the log were JY8WA (Jordan) at around 1500, while operation around 1900 bagged him 4X1FC (Israel) OJ0/N4GN (Market Reef) and J41WCA (Greece) - (QSL via SV1CX).

Before moving home, Sean **G4UCJ** managed to get a bit of time in on 14MHz s.s.b. and lists his contacts here with JH3CNM (Japan) at 2141, EG97CMC (Spanish North Africa) at 2157, ZB2AZ (Gibraltar) at 1025. Also worked were CN8MC (Morocco) at 0923, SX2THE (Greece) at 1949, with QRP station KP4DRJ/QRP coming in at 2217, and

## PW Listening & Operating Watch List (All times in UTC)

**Charlie Blake M0AIJ** listens and operates: 0500-0700 on 7.061MHz s.s.b. with an NRD-525 receiver and sloping wire antenna.

**Steve Locke GW0SGL** operates: 1100-1500 most days around 14.180MHz s.s.b. using a Kenwood TS-940 & TH7 beam antenna, normally beaming to other continents.

**George Woods G3LPT (Suffolk)** operates: an open net on 29.570MHz f.m. every weekday morning (except Monday) at 0830.

**Don McLean G3NOF** operates: 1030 Saturdays on 3.685MHz during the ISWL Net or 1030 Sundays on the Yeovil ARC Net 3.665MHz s.s.b. using a Kenwood TS-950 & Trap Dipole antenna.

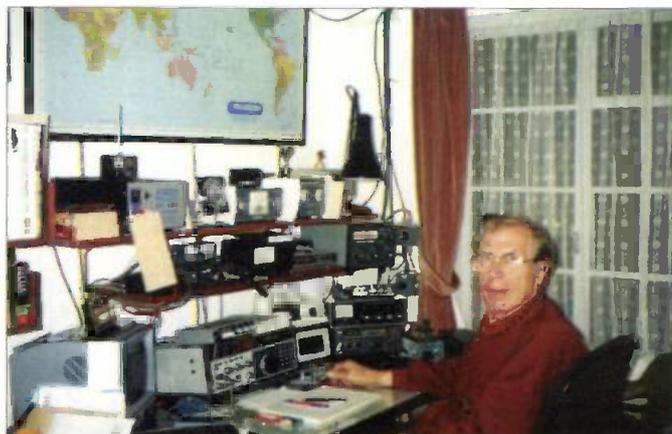
**John Wheeler G0IUE** monitors: 28.5000MHz s.s.b. every evening between 1700 and 2200 regardless of conditions using an Icom IC-706 and a 2-element TET tri-band beam antenna.

**Leighton Smart GW0LBI** operates: Most Sundays (and some weekday evenings) at around 1000 - 1300 on 1.933 or 1.949MHz s.s.b. using a FT-747 transceiver and a long wire Marconi antenna.

**Rob Mannion G3XFD** listens and operates: (weekdays & weekends) 1800-1830 3.7MHz 100W s.s.b., & 3.530MHz QRP c.w. using an Alinco DX-70 transceiver or Kenwood TS-870 and trapped dipole/long wire antennas. When PW schedule permits also active on 3.702MHz (s.s.b.) from 2100-2200 in QSO with EI4EK and friends. Also possibly on at 2300 on either 3.530, 7.025MHz (c.w.).

**Sean Gilbert G4UCJ** operates: around 1030 to 0200 (on and off) most weekdays and weekends on 7 and 14MHz, using a FT-307 transceiver at 70W maximum and a G5RV dipole antenna.

**Terry Ibbitson G0VTI** operates: each evening between 1900-2000 on or around 7.020MHz c.w., or 14.035MHz c.w. using a Ten-Tec Scout at 50W.



**Fig. 2: The face behind the well known and active callsign - Ted Trowell G2HKU shown in his well-equipped shack on the Isle of Sheppey in Kent.**

EA8AJ0 (Canary Islands) romping in at around 2200UTC.

John **G0VGD** meanwhile, concentrated on European traffic on 14MHz for the most part, but further afield he did snag FS5PL St. Martin Island at 2240, VO1SA (Newfoundland) at 2231, and CQ2I (Azores Islands) at 2324 on s.s.b. While a crack at c.w. gave him contacts with W4IMI, KD3TL, and K1IED (all USA) around midnight.

### The 18 & 21MHz Bands

Don **G3NOF** says that conditions have been patchy on 18MHz this month, with little heard from the African continent this time around. Although there was plenty to be found from elsewhere.

Busy **G3NOF** logged s.s.b. contacts with A41LZ (Oman) at 1649, C6AGR (Bahamas) at 2233, HK3GX1 (Colombia) at 2113, and OY3JE (Faroe Islands) at 0908. Also worked were Y19VK (Iraq) at 1702 QSL via HA0HW, 5X1T (Uganda) at 1413, and OD5NJ

(Lebanon) at 1813UTC.

On 21MHz Eric **Masters G0KRT**, operating as **GX3WIM**, used QRP s.s.b. to work EA3AUM (Spain) at 1719, and high power (not usually Eric's forte!) to hook up with GM4JAE in Scotland via some very short skip (probably single-hop Sporadic-E), while Ted **G2HKU** lists just a single contact on 21MHz with LT1F (Argentina) at 1400UTC.

John **G0VGD** didn't spend much time on 21MHz this month, but he did manage to hook up with S50D (Slovenia) at 1108, UT7W (Ukraine Republic) at 1101, and DL1RWN (Germany) at 1102UTC.

### The 28MHz Bands

Up to the 28MHz band now, where there are signs that conditions on 'ten' are improving, albeit too slowly for many amateurs' liking! However, Sean **G4UCJ** made the most of his operating here, using f.m. on the 29MHz section of the band to hook up with EA6XQ (Balearic Islands) at

0859, OM2DX (Slovakia) at 0914, HG5BGP/QRP (Hungary) at 0946, and DF4CL/P (Germany) at 1329UTC.

Ted **G2HKU** offers just a single c.w. contact here, in the shape of OY6A (Faroe Islands) at 1400. And **G0VGD** worked OH1LEG in Finland using s.s.b. at 1116UTC.

Using QRP s.s.b. (10W p.e.p.) on 28MHz, Eric **G0KRT** worked EA7GR (Spain), OE8PPK (Austria), and 9A1CCY (Croatia) all at around 1000UTC. Don **G3NOF** offers a single 28MHz contact with VO1TMB (Newfoundland) at 2218UTC.

Finally I've received a brief letter from new addition to the *PW* Listening Watch, **Jon Wheeler G0IUE** in Melksham, Wiltshire. Jon being a 28MHz enthusiast reports that he's worked all over south America over the past few months. No doubt Jon always seems to be in the right place at the right time on the 28MHz band!

### Signing-Off

Well that's it for this month folks...it's signing-off time! Thanks once more for your support for the column, it's good to read about your daring exploits on h.f. every month, as I'm sure that many of our readers are new to h.f. operating, or are interested in getting onto the bands.

Your words and achievements are certainly a great incentive to them, I have no doubt, so keep up the good work, and good operating! As usual, reports and information (and photos!) by the 15th of each month to: **Leighton Smart GW0LBI**, 33 Nant Gwyn, Trelewis, Mid-Glamorgan CF46 6DB, Wales. Tel: (01443) 710749, FAX: (01443) 710789 (9am - 6pm).

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ECC81	3.00	PL81	2.00	6BR8	4.00	12DW7	15.00
ECC82	3.50	PL504	3.00	6BW6	4.00	12E1	10.00
ECC83	5.00	PL508	3.00	6BW7	3.00	13E1	85.00
ECC85	3.50	PL509/519	10.00	6BZ6	3.00	572B	95.00
ECC88	6.00	PL802	4.00	6C4	2.00	805	45.00
ECC808	15.00	PY500A	3.00	6CB6A	3.00	807	7.50
ECP80	1.50	PY800/801	1.50	6CD6G	5.00	811A	25.00
ECH35	3.50	QV02-6	12.00	6CL6	3.00	812A	55.00
ECH42	3.50	QV03-10	5.00	6CG7	7.50	813	27.50
ECH81	3.00	QV03-20A	10.00	6CH6	3.00	833A	85.00
ECL82	3.50	QV06-40A	12.00	6CWA	6.00	866A	20.00
ECL86	3.50	U19	8.00	6D05	17.50	872A	30.00
ECLL800	25.00	UABC80	1.50	6DQ6B	10.00	931A	25.00
EF37A	3.50	UCH42	5.50	6F6G	6.00	2050A	12.50
EF39	2.75	UCL82	2.00	6FQ7	7.50	5751	6.00
EF40	4.00	UCL83	2.00	6GK6	4.00	5763	6.00
EF86	10.00	UF89	4.00	6J5G	6.00	5814A	5.00
EF91	2.00	UL41	12.00	6J5M	4.00	5842	12.00
EF183/4	2.00	UL94	3.00	6J7	3.00	6072A	6.00
EL33	15.00	UY41	4.00	6J96A	27.50	6090	6.00
EL34	8.00	UY85	2.00	6JEEC	27.50	6146B	15.00
EL34G	6.00	VR105/30	3.00	6J56C	27.50	6201	8.50
EL36	5.00	VR150/30	3.00	6K6GT	4.00	6336A	35.00
EL41	3.50	Z759	10.00	6L6G	15.00	6550A	25.00
EL84	2.25	Z803U	15.00	6L6GC	15.00	6883B	15.00
EL95	2.00	Z021	3.50	6LW6B	10.00	7025	7.50
EL360	15.00	3828	12.00	6Q7	7.00	7027A	25.00
EL509/519	12.00	4CX250B	45.00	6SA7	3.00	7199	15.00
EM34	15.00	5R4G	7.50	6SC7	3.00	7360	25.00
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## VHF REPORT

*David Butler G4ASR has details of Sporadic-E and Auroral-E openings to North America on 50MHz. There's also details of a major meteor shower that may provide tremendous DX opportunities on the 144MHz band.*

As a generalisation, propagation on the v.h.f., u.h.f. and microwave bands was quite good during the month of August. On the v.h.f. bands (50, 70 and 144MHz) there were openings via Sporadic-E (Sp-E), Auroral-E (Au-E), Aurora, Field Aligned Irregularities (f.a.i.) and meteor scatter (m.s.). Conditions on the u.h.f. and microwave bands (430MHz and up) were also good with lengthy periods of tropospheric enhancements.

Sp-E openings were still very prevalent on the 50MHz band during August, although it was noticeable that the duration and strength of these events was declining. Openings on a few days, particularly in the period August 16-22, were very patchy and for the first time in months there were days when no openings were reported at all (August 6-7 and 18-19).

However, according to your reports there were a total of 47 DXCC countries in three continents worked on the 50MHz band from the UK during August. The countries were CN, CT, DL, EH, EI, ER, ES, F, G, GD, GI, GJ, GM, GU, GW, HB9, HBO, I, IS0, JW, LA, LX, LY, LZ, OE, OH, OHO, OK, OM, ON, OY, OZ, PA, SM, SP, SV, S5, TF, T7, VE, W, YL, YO, YU, ZA, 9A, 9H. And if you know of any more, please let me know.

As reported last month, **Mike K5KWG** is now active as **ZA1MH** (Albania). In addition to the 50MHz band he is also QRV from 1.8MHz through to 144MHz, using c.w., s.s.b. and RTTY. He is operating from a remote village where he is working as a missionary setting up radio communications.

**Andy Markham G8RZA** (J001) has reported some of the DX worked from his QTH during July and August. Using an Icom IC-202 and RN Electronics transverter, 25W and an HB9CV beam at 10m above ground level (a.g.l.) his contacts have included the stations of EH8BPX (IL18), ER5AA (KN45), LZ2FO (KN13), YL2JN (KO16), YM7PA (KN91), YO7BSN (KN15), 9A2YD/P (JN74) and 9H5EE (JM75).

Not everyone is fortunate to be able to operate from home even with a small antenna so other alternatives must be found. **Eric Moger G7VDF** frequently operates mobile from his car on both the 50 and 144MHz bands.

Normally Eric is content to contact local stations on the 50MHz band, but on August 12 he worked a few Italian stations and 9A3HZ whilst mobile in the Forest of Dean (IO81). Eric runs an FT-290 transceiver, 10W into a quarter-wave vertical antenna.

An unusual opening on the 50MHz band occurred during the evening of August 24. At 1820UTC following reception of some weak Norwegian television carriers **Ken Osborne G4IG0** (IO80) heard the beacon JW7SIX (50.047MHz) located on Svalbard.

Ken then telephoned the beacon keeper **Ola JW8GV** who kindly switched off the transceiver that was running in beacon mode. A two-way c.w. contact was then made but as the transmitter only runs 15W into a 4-element Yagi signals over the 3173km path were quite weak, peaking 549.

Following that contact, another c.w. QSO was then attempted by **JW8GV** (JQ78) with the station of **Roger Horne G4HBA** (IO80) but signals faded out rapidly. Hearing nothing else on the band, Ola then returned the system into beacon mode at 1900UTC.

Later in the evening around 2030UTC the beacon was heard again at the QTH of G4HBA but this time very much stronger. Roger then telephoned JW8GV who was pleased to make his second confirmed c.w. contact of the evening.

The beacon was then re-activated but at 2145UTC it was heard again, this time at the QTH of **Brian Booth G3SYC** (IO93). Such is the camaraderie of fellow DXers that Ola didn't mind being telephoned for the third time that evening!

Following the c.w. contact with G3SYC, a number of other stations called JW8GV on c.w. but their speed was too fast for Ola to copy. In a further telephone conversation Ola explained that his c.w. is very slow (about six words per minute) and that stations calling him should have transmitted at the speed he was transmitting at. However, he reports that he was very pleased to make his first contacts from JW on the 50MHz band. By the way, on the following evening, August 25, JW8GV (home call LA8GV) also managed to work stations of G3HBR (IO93) and G4IFX. Unfortunately, Ola mentioned

that he will be leaving Svalbard this Christmas. I suggest therefore that you pay special attention to his working frequency 50.047MHz for the next few months in case you hear the beacon. If you do hear him, don't forget to send your c.w. very slowly. Oh, and of course find out what his telephone number is!

### Transatlantic Opening

Although somewhat late in the season, two transatlantic openings on the 50MHz band occurred during August. The openings between the UK and North America took place on August 4 and 12.

Additionally, there was also one opening on August 2 when the station of **G3FPQ** (IO91) briefly heard **WB9AHM**. The US station was calling CQ on 50.110MHz at 2115UTC but he faded out before contact could be confirmed.

The opening on August 4 was quite an unusual event and occurred co-incidentally the day after a good auroral opening (of which more later). It commenced during the evening of August 4 from 1700-2000UTC with a Sp-E opening to EH, I and IS0. During this event, a northerly path also opened up to Scandinavia (LA, OH and SM).

Around 2030UTC some stations in southern England reported hearing television stations to the north-east with a 'ringing' sound indicative of some form of field aligned (f.a.i.) propagation. Almost at the same time it became apparent that some form of auroral ionisation was developing to the north-west.

Stations in the southern part of the UK (IO70, IO80, IO90), whilst beaming at 290°, could hear ON and PA stations fully auroral. At times, various European television stations could also be detected via auroral back-scatter.

At 2100UTC stations in ON and PA were heard via the aurora working North American stations in the W1 and W3 call areas but nothing was heard of the DX in southern England at this time. (Although it must be recorded that the station of **G6YIN** (IO93) did report hearing **KM1H** (FN42) earlier at 2020UTC).

The ON/PA stations were giving T9 reports to the US stations, indicating that the propagation may possibly have been via Au-E. Around

2130UTC, stations in southern England started to hear the US stations, **Ken G4IG0** for example working **W1RA**, **W1VHF**, **KA1MFA**, **WA1VTA**, **WA2BPE**, **K2MUB** and **WA3TBG**. He also heard **VE2FIT**, **W1TDA** and an unidentified **WA2T?** station. Unlike other openings the event was a rather patchy affair, signals waxing and waning throughout the evening until approximately 2330UTC.

All stations worked exhibited a pure T9 note with no indication of auroral roughness. Ken suggests that this opening was not via the normal summer time multi-hop Sp-E or E-layer propagation mode. He thinks that it was a major single-hop Au-E event. However, others think otherwise.

**Iain Philipps G0RDI** (IO91) made the following observations whilst beaming north-west from the UK. The station of **PA2VST** heard aurorally at 52A followed by **ON4KST** at 59 (perfectly T9 and nothing heard on the correct beam-heading). This was followed by the auroral reception of **VE9AA** peaking 52A and then **F6IFR** (59), pure tone and nothing on the correct beam heading.

Finally, **KM1H** (579) and **W1RA** (539) sounding like meteor scatter, with no auroral tone. Iain agrees that although auroral propagation was prevalent the path to North America was probably made possible via some form of mixed-mode propagation.

**Steve Reed G0AEV** wonders whether it was aurora at all as the magnetic K-index was quite low at the time. He suggests that it could have been f.a.i. propagation which can at times sound very auroral. Whatever it was, it clearly was an unusual event.

The other transatlantic opening, which occurred on August 12, was a regular multi-hop event, probably the last of this year's summer Sp-E season. It commenced around 1330UTC with the reception of Icelandic television on Ch3, 55MHz.

At 1350UTC the station of **TF3VET** (HP94) became audible on the 50MHz band and made a number of s.s.b. contacts throughout G, ON and PA. The only other station that appeared to have been worked at this time was the ideally located station of **VE1PZ** (FN85). He was

being worked until the band faded out around 1430UTC.

## Auroral Opening

A reasonably good auroral opening took place during the early evening of Sunday August 3 allowing DX contacts to be made on both the 50 and 144MHz bands. It was first detected in the UK around 1730UTC and continued for about two hours.

On the 50MHz band, Steve Jones **GW0GEI** (I073) found the stations of **ES1CW** (K029), **MM0AMW** (I075), **OY9JD** (IP62) and **SP4POB** (JP70). It seemed to be even better on the 144MHz band with the station of John Regnault **G4SWX** (J002) catching **ES2RJ/8** (K028), **ES5PC** (K038), **SM5MIX** (J078), **YL2AJ** (K016) and **YL3AG** (K026).

At the QTH of Dick **PA3FJY** (J032) c.w. contacts on the 144MHz band were made with **GM4ILS** and **GM4YXI** (both in I087), **SM0ELV**, **SM5BSZ**, **SM5PRE**, **SK6HD** and **YL3AG**. He also heard **LA0BY**, **LA8WF**, **SM5HJZ**, **SM6MNH**, **SM7SJR** and **YL2AJ**. By the way, Dick runs 250W into a single 9-element **OZ5HF** Yagi.

Auroral activity will be increasing over the next few years and you can look forward to some excellent DX openings via this mode soon.

## Late Opening

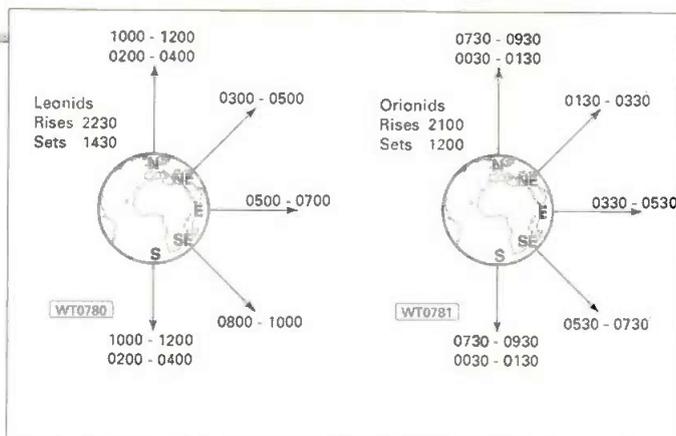
An unusually late (although not totally unexpected) Sp-E opening occurred on the 144MHz band on August 14. Around 1500UTC the maximum usable frequency (m.u.f.) which had been hovering around the 60MHz region suddenly shot up to over 108MHz allowing the reception of Italian and Spanish f.m. broadcast stations in many areas of central England.

At 1610UTC the m.u.f. reached the 144MHz band allowing operators in central and southern England to make contacts with stations situated in I, IT9, LZ, YU and 9A. The opening lasted for nearly one hour fading out around 1710UTC.

Lee Adams **G4RKY** (J001) seemed to be in the right place making s.s.b. contacts with **HA7UL**, **LZ1KOP**, **LZ1KWT**, **YU1BW**, **YU1EV**, **YU110**, **9A3GL** and **9A4EW**. Ela Martyr **G6HKM** (J001) was also in the right place contacting **LZ1KWT** (KN21) and **LZ1UF** (KN12).

However, Andy **G8RZA** only a few km away reported that the signals sounded more like meteor scatter as the signals were only coming in via bursts of up to seven seconds at a time. Using an Icom IC-202 and a 4-element Yagi at 8m a.g.l. he heard **HA7UL**, **LZ1UF** and **9A3RU** but made no contacts.

Stations in other locations worked into different areas, **G4VPD** (I092) for example contacting **I8MPO** and **IT9IPQ/9**. Further to the east the station of **PA3CEE** (J033) also worked **I8MPO** and **IT9IPQ/9** as well as contacting **IK7MOI/P** and **IK7XWJ**. He also heard **EA3TI**, **IK6ZGF** (Balearic Islands) and **I7CSB**.



**Fig. 1: Leonids Meteor Shower Monday 17 November 1997.**

**Fig. 2: Orionids Meteor Shower Wednesday 22 October 1997.**

Zoran Obradovic **YU7ON** (KN04) reports that between 1631-1652UTC he made s.s.b. contacts with **GW4UWR**, **GW4ZQV** and **GW8JLY** in locator square I081, **G0FIG** in I090 and **G0GMS**, **G0KAS**, **G3JHM** and **G3YVR** in I091. Zoran also worked **F1DBN** (J000), **ON4KST** (J020), **ON4YZ** (J020) and **ON5PJ** (J010). The station at **YU7ON** runs only 25W from a Trio TR-751E into two **YU0B** long Yagis.

## Meteor Showers

One of the major meteor showers, the Perseids, was encountered during the period mid-July to mid-August, with maximum activity occurring between August 9-12. It provided an excellent opportunity to make both scheduled and unscheduled (random) contacts with like-minded DX stations up to 2000km away.

In my opinion it's very difficult to be absolutely sure that propagation on the 50MHz band during the Perseids shower is m.s. rather than Sp-E. This is because it's possible for continuous m.s. bursts to ionise the E-layer (at this low frequency) for some considerable time, maybe 30 minutes or longer.

Also the summer Sp-E season extends well into August and beyond. Hence the difficulty in differentiating between the two modes. However, up on the 144MHz band the situation is very different and it's much easier to determine which propagation mode is occurring.

Therefore I'll concentrate on results on the 144MHz v.h.f. band. Although the Perseids shower is very predictable some years are better than others. Conditions this year seemed to be quite good with some reasonably long bursts being recorded, some in excess of 40 seconds. To the uninitiated that's more than enough time to make three or four valid s.s.b. contacts.

There were two periods when maximum meteoric activity were noted, around 0600 and 1800UTC on August 12. Many c.w. operators were active around the calling frequency 144.100MHz and there was lots of activity on and around

144.200MHz, the s.s.b. calling frequency. At times, numerous stations were causing QRM to each other and it's unfortunate that many (if not all) didn't realise that the alternative s.s.b. meteor scatter sub-band between 144.390 to 144.400MHz can still be used.

A DXpedition station **EW5M** (K022), operated by **DL2SDQ**, **SP9LCV**, **SP9TCE** and **SP9WZF** was active from Belarus during the shower. They were using an Icom IC-730 transceiver, transverter and a 200W amplifier feeding a **DJ9BV** long Yagi.

To decode the high speed c.w. a **DF7KF** DTR-MS digital recorder was used whilst the transmitted c.w. was produced using a **386SX33** PC with **OH5IY** software running up to 4000 l.p.m. (that's 800w.p.m.!). The group completed 135 m.s. contacts in 71 locator squares and included the stations of **G0CUZ**, **G0FIG**, **G0KAS** and **G1HWY**. Unfortunately their power amplifier went faulty during the evening of August 11 so they were unable to be active during the peak of the shower.

Among the many contacts made by Lee **G4RKY** during the main shower period were the stations of **ES2RJ/8**, **HG7P/0**, **LA0BY/P**, **LZ1KWT**, **OH3AWW**, **RW1AW**, **SM0KAK/0**, **SP2DFW**, **S51MQ**, **YL/DJ5CL**, **4N7AX** (KN05) and **9A4NF**. Other DXCC countries known to have been active included the stations of **EA3TI**, **EU1AA**, **I8MPO**, **LY2MW**, **OK2ZZ**, **OM3LQ**, **RU1AA**, **Y02IS** and **9H1GB**. This shows the type of c.w. and s.s.b. QSOs that can be accomplished via m.s. on the 144MHz band.

Results on the 432MHz band are very difficult to achieve. In a two hour schedule between **DL4MEA** (JN58) and **SM3AKW** (JP52) only six 'pings' were recorded at the QTH of **DL4MEA** and two small 'bursts' of signals at **SM3AKW**. However, **Y02IS** (KN05) did manage to make a QSO with **LY2WR** (K024). At the QTH of **Y02IS** a total of two pings and four bursts of signals were received including one at S9 of 5 seconds duration.

Although the Perseids shower is regarded as the 'big one' other major showers should not be disregarded.

Indeed it is expected that the Leonids shower in November may be as good if not better than the Perseids.

The Leonids shower occurs each year between November 15-19 with maximum activity on November 17. Past observations show that approximately every 33 years the shower reaches storm proportions. The last peak was in 1966 when an estimated 10,000 to 150,000 meteors per hour were observed. Although the next intense peak should be in two years time, conditions last year were excellent.

A number of stations reported bursts on the 144MHz band of up to two minutes duration and some reports mentioned that for an hour or so the band sounded as if a Sp-E opening was in progress. The shower is not visible at all times as it 'dips' below the horizon (in Europe) between 1400-2300UTC. Therefore the shower can only be used from approximately midnight through to 2pm in the afternoon.

If you look at the diagram, **Fig. 1**, you will see the best times for certain beam-headings. Note also that the predicted maximum of the shower should take place within the period 0800-1200UTC on Monday November 17.

If you don't have the equipment (or lack confidence) for making contacts on the 144MHz band then why don't you try making some s.s.b. contacts on the 50MHz band? Low power gives very good results and the band should be open for lengthy periods allowing 'normal' contacts to be made.

For good measure I've also included details of the Orionids shower in the diagram, **Fig. 2**. This is also a major shower, with maximum activity on Wednesday October 22.

If you need any advise on how to start on this exciting mode you can always telephone or E-mail me (details below). Good luck and please let me know if you made any contacts.

## Deadlines

That's it again for another month. Don't forget to send me your list of locator squares, counties and countries worked for the 1997 table. Forward any news, views, comments or photographs to reach me no later than **Saturday November 1**.

Send them to me at **Yew Tree Cottage, Lower Maescoed, Herefordshire HR2 0HP**. You can also contact me via Packet radio @ **GB7MAD**, the UK DX Cluster @ **GB7DXC** or E-mail via **davebu@mdlhr1.agw.bt.co.uk**. Alternatively you can telephone me on **(01873) 860679**.

**END**

# BITS & BYTES

Mike Richards G4WNC has some useful tips on what to look for when buying from radio rallies, as well as an update on the DSP Blaster program.

Why not pay a visit to Mike G4WNC's Web Site?



As this issue of *PW* coincides with the Leicester Amateur Radio Show I thought it might be rather timely to run through a few hints and tips on how to make the most of the computing bargains that are to be had at most radio rallies. Let's start with a word of warning that's best summed-up in the expression - buyer beware!

When you go around any show, whether it be a computer, sports equipment show or a radio rally, the traders are primarily there to tempt you to part with your money, so they can earn a living. This is a perfectly fair and normal way of going about life but don't be fooled into thinking that traders are going to offer goods at greatly reduced rates simply to do you a favour!

Having said that, there are some genuinely attractive bargains to be had if you know what to look for. If you're looking to spend a lot of money on the latest all singing and dancing Pentium based PC you need to be very careful indeed, as this market is really very competitive and any PC that is significantly cheaper than similar models advertised through the computing press must be viewed with suspicion.

Because the computer market is so competitive, the large mail order companies usually offer the best prices. They are able to do this because they buy huge quantities of the components and therefore get the best discounts and then sell on the final product with a very small profit margin. So, if you find a PC at a significantly lower price, there's probably a catch somewhere, so beware!

If you're seriously after bargains it's wise to keep well away from all the latest products and look at those that have been superseded by later models. If you're in the market for a PC you should find some very good bargains in 486 based units.

Although overtaken by Pentium a good 486DX/266 or DX4 machine can usually make a pretty good job of all the radio software that's around these days. If you're interested in a more modest specification you should be able to pick-up 486SXs very cheaply.

However, I would think twice before going for any of the slower processors i.e. 386 or 286 as you may have problems finding suitable software. If you have enough

computing knowledge to fit your own components such as CD-ROMs and disk drives, you really can do well at a rally. This is again especially true if you keep away from the latest releases, i.e. 4x and 6x drives are often much better value than 8x.

However, if you only use a CD-ROM very occasionally you should be able to get a 2x drive extremely cheaply. When buying any drive you do need to be careful that you either have an appropriate interface already installed or can easily (and cheaply) get hold of one. There's not much point in getting yourself a bargain CD-ROM if you have to pay full whack for the interface!

Another point to watch is the interface for the many high capacity hard disk drives that are on the market. There's no point in getting one of these unless your hard disk controller supports the EIDE or appropriate SCSI interface.

## Danger Areas

Computer software is another area that has its own bargain and danger areas. As with hardware, the best chances are with the outdated versions of popular software.

For example, if you want a wordprocessor, you'll find that you can easily pick-up early versions of *Microsoft Word* and other industry standard programs. You do need to make sure that the program's not too old though.

I've been caught-out before with old versions of programs that were written for Windows 3.0. Whilst many are okay you can get mysterious crashes with some. You can easily check before you buy by reading the systems' requirements on the side of the box - it will say if it's been designed for Windows 3.0.

If you really want to get smart

## Special Offers

If you'd like a copy of Hamcomm/JVFX, etc. I've arranged a very special offer with the **Public Domain and Shareware Library (PDSL)**. They have put together a library set of all five disks for just £12, all inclusive.

Using PDSL also makes ordering simpler as they accept all the usual credit cards so you can order by 'phone - you don't even have to write a letter. Please direct all orders and enquiries about this disk set to **PDSL, Winscombe House, Beacon Road, Crowborough, Sussex TN6 1UL Tel: (01892) 663298** and request library volume: **M008739abcde**.

The software is only available as a set of five disks as follows: IBM PC Software (1.44Mb disks): **Disk A - JVFX 7.1, HAMCOMM 3.1 and WAFX 3.2; Disk B - DSP Starter plus Texas device selection software; Disk C - NuMorse 1.3; Disk D - UltraPak 4.0 and Disk E - Mscan 1.3 and 2.0.**

with software you can use a rally to get the latest software at a discount price. The trick is to use the upgrade system that most of the major manufacturers offer. This is where they offer programs at a much reduced rate if you can prove that you have an earlier version.

All you have to do is find a qualifying early version of the program at the right price and you're in business. Not only do you get the latest software but you also get the manufacturers full support facilities!

To make best use of upgrading software you do need to do some research before you go to the rally. The most important points are to know what versions of the program qualify for the upgrade deal and what you have to send to prove ownership.

Some programs check for the presence of an early version during installation whereas other companies just require you to send the front cover of the old manual. In this latter case you naturally need to ensure that your bargain software comes complete with the necessary manual and the page you need is still there!

Now this may all sound very daunting, but there really are some great bargains to be had - you just need to think carefully before you buy - remember buyer beware. Good hunting and why not drop me a line telling me about your best catches?

## Web Site

Thanks for all your kind comments about my web site. However, several readers have pointed-out that the Web site address printed at the foot of the column has had an error for several months - sorry!

I've now corrected the address and updated the site as well! - So, why not pay me a 'visit'?

## DSP Blaster Update

The *DSP Blaster* program has caused quite a stir since I first mentioned it a couple of months ago and I know many readers without Internet access are struggling to get hold of a copy. Thanks to an E-mail from **Mike Le Ves Conte** this is now possible.

Mike has been authorised by the author, **Brian Beezley**, to distribute copies of the demo version of *DSP Blaster* and has supplied details of how to get a fully registered version for the US. If this is your first encounter with the program, I suggest you take a look at the last couple of 'Bits & Bytes' to see just how good it is.

Basically, if you have a PC and a SoundBlaster card you really ought to give it a try. You will get a fully configurable DSP filter that can run in the background whilst you use the PC for other Decoding tasks. The program is really very good.

To get a demo version of *DSP Blaster* just send a formatted 1.44Mb 3.5in disk with a pre-paid reply envelope to: **Mike Le Ves Conts, 28 Woodlands, Paddock Wood, Kent TN12 6AR**. Registering for a full version can be done through the author **Brian Beezley** and costs \$125 or equivalent.

Brian supplies the program on disk and he accepts payment via MasterCard, Visa, Discover, International Money orders, cheques drawn on US banks or cash in a registered letter. You should post your orders to **Brian Beezley, 3532 Linda Vista Drive, San Marcos, CA 92069 USA**. If you'd rather pay by 'phone, Brian can be contacted during the hours of 1400-0100UTC on 001 760 599 4962. My thanks to Mike for supplying this information.

That's all I have room for this time so until next month, cheerio and please keep your news and views coming to me **Mike Richards G4WNC** at **PO Box 1863, Ringwood, Hants BH24 2ZD** or via E-mail to: **mike.richards@dial.pipex.com** My Web site address is **http://dialspace.dial.pipex.com/mike.richards/**

**END**

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## BROADCAST

## ROUND-UP

*As well as lots of station news and activity, Peter Shore explains how the world was united as never before back on the 6th September.*

Edward Harris, a reader near Walsall in the West Midlands, responded to my question asking how well the **Voice of Russia** can be heard these days on short wave. He reports that the station comes in very well with hardly any interference, and notes reception in August particularly at 1600UTC on 9.765MHz and 2100UTC on both 9.775 and 11.84MHz.

Edward uses a Yaesu FRG-8800 with a 22m long wire antenna. Thanks for your report, Edward, and the nice comments about *PW* and my column. Please let me know of other interesting things you hear on the short wave bands with your nice receiving set-up, so that I can pass the details on to other readers.

### Unusual Languages

If you like finding unusual languages on the short wave dial, tune to 9.69MHz at 0800UTC. There you may discover **Radio Tatarstan** with programmes in Tatar and Russian. The new service has been on the air since the beginning of August, and is beamed from the republic of Kazan to north-west Europe.

### Audio Site

**Radio Korea International** in Seoul has launched an Internet audio site which carries its English service in parallel with existing short wave transmissions. Listen out for English at 0200-0300 and 1900-2000 at [www.kbs.co.kr](http://www.kbs.co.kr)

The presenters of the regular *Short Wave Feedback* show on Radio Korea have asked listeners, since the station is heard globally by Internet as well as short wave, whether the programme title should be changed.

If you think it does deserve a new name, or if you believe the current name is suitable, write to co-presenters **Han Hee-Joo** and **Andy Jordan** at **Radio Korea International**, 18 Yoido-dong, Youngdungpo-gu, Seoul 150-790, Korea.

### Financial Troubles

If you read this column regularly you will know that the Belgian **Radio Vlaanderen Internationaal** service is one of several stations that have financial troubles. From the start of the new winter season which came into effect at the end of October,

Spanish and Arabic language programmes have been suspended, and German and French reduced to weekends only. English is least affected, with a reduction from six to five daily transmissions.

**China Radio International** has stopped broadcasting via its relay station in the African country of Mali. The Chinese station has not been heard on the African frequencies since mid-summer, and the station's English-language frequency announcements no longer include reference to the Mali relays.

The Mali relay station was refurbished by the Chinese authorities some years ago. And until this summer broadcast programmes in African languages like Hausa and Swahili and European services such as Serbo-Croat and Spanish.

The English service of China Radio International is on the air to Europe at: 2100-2200 on 5.22, 6.95 and 9.92MHz; 2100-2130 on 3.985 (via Switzerland) 2200-2300 on 7.11 and 7.17MHz.

### Iraq Activity

There has been more activity from Iraq, with a number of short wave frequencies active at different times of day. Check out the main Arabic domestic service between 0900 and 1200UTC on 11.785MHz (variable); 1400-1600UTC on 9.715MHz and 1900-2300UTC on 9.755 and out-of-band 11.292MHz.

The 41m band channel of 9.715MHz is also on the air from just after 0600UTC until 0900 with another Arabic service. The external service, **Radio Iraq International**, is on the air using the variable channel of 11.785MHz with English twice daily at 0300 and 2230, plus French at 2200UTC.

### Station News

The embattled **Radio Australia** has a new head, with a new title. **Jean-Gabriel Manguy** is the Melbourne-based station's Chief Executive and he has the task of trying to steer Radio Australia through the serious budget cuts which have left programme production and transmission a shadow of its former self.

More than half the station's staff have been lost. Manguy has had a long career in international broadcasting, including posts in Radio Australia's English and French services.

The new IBC Tamil-language radio service that has been running on the Astra satellite since June has been heard testing on short wave beamed towards South Asia from 1300UTC. The transmission is beamed from Georgia on a 100kW transmitter and uses either 12.12 or 15.075MHz.

**Voice of Tibet**, a station funded by human rights organisations in Norway, has added a second transmission. This is on 7.12MHz at 2230UTC for 30 minutes; the original broadcast at 1225UTC on 11.57MHz continues to be heard.

Remember the Christian Science Monitor Radio transmitters at Scott's Corner, Maine? They were sold to WVHA, an Adventist radio station, which used the facility for a while.



### World United

On Saturday 6th September the world was united as never before through radio and television as almost every broadcasting network relayed pictures and sounds from London. The occasion was not one of celebration, but of mourning - the funeral of Diana, Princess of Wales.

It is estimated that an audience of perhaps 2.5 billion tuned to the ceremony in Westminster Abbey. The emotion-charged funeral was carried live and simultaneously on all of the BBC's radio and television services in Britain, and internationally on **BBC World Service** radio and BBC World television.

The previous Sunday when the news of Diana's death was being broadcast world-wide, the satellite broadcast communications network in Europe collapsed under the strain of almost every television and radio station across the continent wanting lines to and from London. The German public-service television station ZDF had to cancel a live television programme from London at 1830 local time because of the chaotic communications situation.

It is unlikely that there will be another event in our lifetime which attracts such an audience, unites the world in such a way and causes the same sounds and images to be carried on almost every broadcasting frequency in the ether.

**That's all for this time, so, until next month, happy listening and don't forget to keep your broadcast news coming via the *PW* offices.**

**END**

## DATA DIARY

Roger Cooke G3LDI has more news, hints and tips from the world of data modes.

Fig. 1: Jo Harris VK2KAA unveiling the bronze statue, representing Mercury (see text).



In the July issue, I reported on the visit of Jo Harris VK2KAA, to present a monument, a replica of the one in Wairoonga, New South Wales, Australia, to the **Dragon Amateur Radio Club**, in Waunfawr, Wales. Prior to the presentation, Jo was guest of honour at a dinner arranged by the Dragon club, in conjunction with the Community Councils of Llanrug and Waunfawr. Councillor **Russell Holly** of the Australian High Commission was also present.

Welcomed after dinner by the Dragon ARC Chairman, **Dewi GW0ABL**, Jo gave a talk to the attendees and was presented with a framed illuminated poem recording the event and the bond that exists with the Wairoonga Association.

The actual presentation took place the following day with about 60 people in attendance, including Waunfawr community members, Councillor **Russell Holly**, together with several civic dignitaries from the area. Several speeches were made, commemorating past events, and Marconi's original speech, given at the unveiling of the original statue in Wairoonga, in 1935, was re-played.

The presentation has produced a permanent bond between Wales and Australia. And no doubt Packet messages will be winging their way back and forth via Satellite, to keep those involved in touch.

The photo, Fig. 1, shows Jo Harris unveiling the statue, a bronze figure of Mercury standing on a globe, mounted on a plinth, and Fig. 2 shows (from L-R) Councillor **G. Williams**, Jo Harris, VK2KAA, Dewi Roberts GW0ABL and Russell Holly, from the Australian High Commission.

### Carbon Server

**Andy G3ZYP** has sent in news of an RTTY Carbon Server which is in operation at GB7MXM for the distribution and sharing of information relative to RTTY. If you're interested in RTTY or want to learn more about RTTY activity or you want to share some of your RTTY experiences/problems with others. Then why not join those already on the list of stations receiving messages from the GB7MXM Carbon Server?

Callsigns already on the GB7MXM RTTY Carbon Server distribution list are: G0ARF, G0NUP, G0VSS, G0WVK, G3DKO, G3GOT, G3LDI, G3NUE, G3NXT, G3XVF, G3ZYP, G4IPN, G8BZJ, G8CDW, GU0SUP, HA5BSW, LZ2XA, M0AHA and ON7BW.

To have your callsign added, just send a short message to G3ZYP and ask to be added to the list. All requests to join will be acknowledged.

So, what do you get for being on the Carbon Server list? From time-to-time messages will be sent to the server advising of RTTY contest information, RTTY contest Calendar and availability of RTTY Contest Rules (a complete set of RTTY contest rules is kept at GB7MXM). RTTY activity information, RTTY program information, etc. One regular and very useful input is a weekly list of RTTY spots and information sent to the RTTY Carbon Server by **Bob G0ARF**.

### Commodore Owners

Another older computer which is very adequate for Packet use and quite cheap to buy, is the Commodore C64 or the C128. These can be bought from all sorts of places such as club sales, small ads in the papers, and even at car boot sales.

One of my 'locals' uses the C64 and it works very well for him. I have been asked not to publish his call, as he does not wish to be inundated with mail!

However, Tony is my Librarian for the BBS and uses the following software. The program he uses is Digidom version 4.07 which uses a

modem connected between the rig and computer.

Unlike a TNC, all the parameters are stored on the disk and are loaded in each time the program is run. You may have up to nine sets of different parameters, which you can load or alter whilst the program is running.

For example, you will need a different set of parameters for h.f. to those used for v.h.f. A PMS is also built in, mail and files can be easily saved and read and transmitted. A printer for hard copy can also be switched on and off from within the program.

There are no problems with compressed text either. In fact you have four separate screens which you can access using the function keys.

Screen 1 is divided horizontally into two sections, the top for transmit typing and issuing instructions to the system. The bottom half of the screen shows the received text. Screen 2 shows all text received and transmitted, whether connected or not. Screen 3 shows all old text, received and transmitted for reference. There are also four separate ports which can be accessed by a control key plus port number, so it is possible to have four separate stations connected

simultaneously.

The modem is readily available, both built and in kit form, and with the Commodore computers will provide a very cheap way to get onto Packet. The C128 is a better computer to aim for, as this will run true 80 column display.

A disk drive is essential and with luck there will be one with the computer. Apparently, these can be picked up at car boot sales etc., for as little as £20 so it pays to shop around!

Try a wanted advert in the local *Yellow Pages Free-Ads*. That won't cost you anything and you might strike it lucky first time!

Tony says that there are two groups for Commodore users. These are the **Commodore Users Group (CRUG)**, and **DIGICOM**, which handles the software, so it would be worth making some enquiries.

That's all I have room for now, so until next time cheerio and don't forget to keep me updated with all your data news. Send any news to me via the Internet at [mtaylor@uk.md.is.comor](mailto:mtaylor@uk.md.is.comor) QTHR or by calling me on (01508) 570278.



Fig. 2: L/R, Councillor G Williams, Jo Harris VK2KAA, Dewi Roberts GW0ABL, Russell Holly from the Australian High Commission.

END

Advertisements from traders or for equipment that is illegal to possess, use or which cannot be licensed in the UK, will not be accepted. No responsibility will be taken for errors.

You should state clearly in your advert whether the equipment is professionally built, home-brewed or modified.

The Publishers of *Practical Wireless* also wish to point out that it is the responsibility of the buyer to ascertain the suitability of goods offered for purchase.

# BARGAIN

b a s e m e n t

Compiled by Zoë Crabb

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**AR88D**, £65, R107, £65, R209, £50, Eddystone EB35, £70, Eddystone 870A, mint, boxed, £80. All above can be seen working and are in nice condition, Jim, Sheffield. Tel: 0114-237 3330.

**Attention v.l.f. fans!** McMichael marine receiver assembly, covers 10-200kHz, Hybrid design, working, £50. NB. Heavy! Price includes American CEI 357 v.l.f. RX, 1-600kHz for spares or rebuild, buyer collects. Neil GBLIU, Middlesex. Tel: (01895) 230006.

**Brand new Mirage D3010 70cm (430MHz) 100W linear**, £250. Mosley Elan 3-element 21/28MHz beam, £65. Buyer collects. Roger G3LDI on (01508) 570278.

**Collins 1943 TCS10 transmitter**, receiver power supply dynamotor, only used for receive, will transmit, original handbook, spare valves, audio amplifier, very heavy, room needed, sell £400, buyer collects or postage extra. Tel: 0121-520 9686.

**Collins KWM-2A**, 'The Classic' transceiver, handbook, £450. Hallicrafters 1/2kW linear h.f. amp, £225. Racal RA17L receiver, handbook, £140. Early Roberts radio valve portable, £110. PCR Military valve receiver, £65. Scarce KW103 s.w.r. meter, £55. Tel: Yorkshire (01482) 869682.

**Complete 2m (144MHz) station**, multi-700EX, 5-25W power supply, 13.8, 5 to 7A, new, 2m (144MHz) antenna, all v.g.c., £150 the lot. Tel: (01246) 236496.

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101DM ext. v.f.o., FTV-901R tvtr, SP901 spkr. scope T02, Lafayette 600 communications receiver, CodeMaster c.w./RTTY, all boxed, books, AR88 + new valves and speaker, c.w. foot switch, no splits, £800 o.v.n.o. Tel: Dunstable (01582) 867135.

**Drake RX/TX T-4XB R-4B**, g.w.o. with manuals, plus spare 6JB6A of valves, £300 o.v.n.o. Peter on (01493) 780044.

**DX394 comm receiver**, as new, l.w., m.w., s.w. radio shack, 150kHz to 30MHz, £110, with manual. Tel: Andover (01264) 363481.

**Eddystone 770R**, Hallicraft S120, Lafayette f.m. com. rec., v.h.f., sig. gen. v.h.f., v.h.f. monitor rec., 12 channel, 144 ditto, 6 channel MHS, a.m. 10W, 7MHz TX valve, xtal set complete with phones. Tel: (01827) 65641.

**Eddystone receiver**, model 40A, mains or battery, 8WB, g.w.o., weight 10kg, fitted in glass fibre cabinet, £150. Tel: Coventry (01203) 440637.

**FT-102**, excellent condition, 120+W, complete with J-beam vertical antenna, £350 o.n.o. Dave G7SRB on (01993) 846975, could deliver.

**FT-6901I**, 50MHz all-mode, BNOS, 50W amp with Gaslet pre-amp, FTS7A CTCSS encode/decode board, MMB31 mobile mount, portable antenna, battery box, etc., all boxed as new, base unused, only, £425. Tel: Watton (01953) 884305.

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**Grundig Satellit radio**, 3-400 for sale, full working order, with all information, buyer collects owing to size and weight, £250. Tel: 0151-648 3031.

**Hallicrafters S36A**, BC787B v.h.f. receiver, offers, HRO coils (8), include 80m (3.5MHz), 40m (7MHz) bandspread, £10 each or offer for the lot! Digicom packet modem, Conimodore 64, monitor, disk drive, printer, £150. Ian G7BZH, Cumbria. Tel: (01229) 582867.

**Henry 2K ultra linear**, grounded grid triodes, conductively cooled with fan back-up, 75W drive, weight p.s.u. 68lbs, amplifier 22lbs, with shipping boxes, no offers, buyer meets P&P, £1150. Dave, Aberdeenshire. Tel: (01569) 765224 after 6pm or answerphone during daytime.

**HF mini beam**, 10-15-20m (14.21, 28MHz) made TET with details, as new, £80. Diawa heavy duty rotator, £80, v.g.c. Sell pair for £150. MFJ-901B h.f. a.t.u., brand new, £45. Paul Jnr, Notts. Tel: (01623) 722300.

**IC-725**, as new, Mizuho SB2M 2m (144MHz) s.s.b./c.w. tvtr linear, Trio PS30, Codar AT5 plus suitable RX, HB s.w.r. meter, DL100+ valves, old domestic v.h.f. valve RX, all working, offers, Eric Gray G3CPS, Eastbourne. Tel: (01323) 643172.

**Icom 290 MkII all-mode 144MHz**, hardly used, v.g.c., boxed, as new, £300. Tel: (01603) 501097.

**Icom 575A 28/50MHz multi-mode**, built-in 240V supply, CTCSS encoder, HNB mic., Tokyo Hypower HL66V 60W amp, £475. Yaesu 747GX fitted with f.m., TXLO includes MDI desk mic., MH1B hand mic., mobile mount, £475. All mint. GODKM, Weston-Super-Mare. Tel: (01934) 815239 after 6pm.

**Icom 706 MkII**, new, £800 o.n.o. Icom AT180 auto tuner, unused, £250 o.n.o. Outbacker mobile h.f. antenna Perth plus 3.5-144MHz, £160. Above sold as new, with boxes and manuals etc., complete £1150 or will split. Paul Jnr, Notts. Tel: (01623) 722300.

**Icom IC-271E 2m (144MHz) multi-mode** MuTek front-end, optional pre-amp built-in, plus mic. leads and manual, all in excellent condition, £425 o.n.o. Yaesu MD-1 base microphone, £45 or exchange, Tony M0BCY, Dartford. Tel: (01322) 337681 anytime.

**Icom IC-706 MkII**, mint, £850. Marconi Apollo RXs, £150 for two. ITT STR1680 1kW valve TX, £300. ITT STR950 solid state 800W TX/RX, £400. FT-767 plus 6m (50MHz) module, £800. Pete, Bristol. Tel: (01454) 887461.

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**Multi 2700 144MHz f.m., s.s.b., c.w., a.m., Oscar 29MHz v.f.o.** synthesised transceiver with mic., £350. Buyer collects, weighs 14kilos with manual. Tel: Mr Drury on (01767) 677070 after 6pm.

**Philips VR2020 2000 format VCR**, working order, original instructions, service manual, 15 tapes, rarely for collector, offer or will swap radio gear, etc., hours of entertainment. Peter on (01282) 439275.

**Pre-selector Watson WPR-2** 500kHz-30MHz, as new, £25. Also Simba long wire balun, as new, £12. Tel: Essex (01708) 866993 (home), (0402) 236043 (mobile), ask for Mick.

**Pye MX294**, 40 channel converted to 2m (144MHz) with toneburst, £65 o.n.o. Also Pye MX294 40 channel converted to 2m (144MHz) without toneburst, £55 o.n.o. Plus £5 each P&P. Both with speaker and mic., v.g.c. Bill, Hants. Tel: (01730) 263104.

**Q-Tek HF-30 compact h.f. antenna**, unused, bought as part of package deal and surplus to requirements, £50. Amstrad PCW10 word processor and printer, used twice only, mint condition, £150. Tel: (01902) 785150.

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**Test equipment**: Wetz SP-420 s.w.r. meter, £70. Black Star 'Meteor' 600MHz frequency counter, £60. Jupiter function generator, £60. Call for full list. Tel: Henel Hempstead (01442) 394758.

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**Trio 9130 all-mode transceiver**, complete with mobile mount and 13.8V 8A power pack, buyer collects, £250 o.n.o. Tel: Flintshire (01352) 780694.

**Trio R1001**, mark on top of case, hence, £150. Katsumi EK150 electronic keyer, £50. Timewave DSP9 Plus, £150. Vectronics VC300DLP a.t.u., £125. All includes postage. Tel: Isle of Lewis (01851) 810899.

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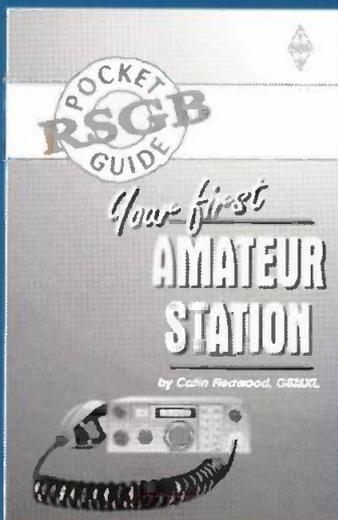
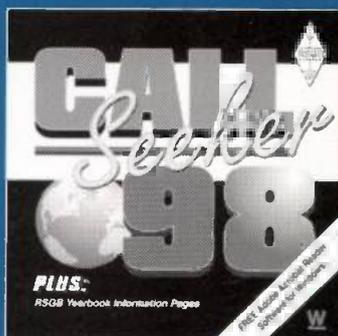
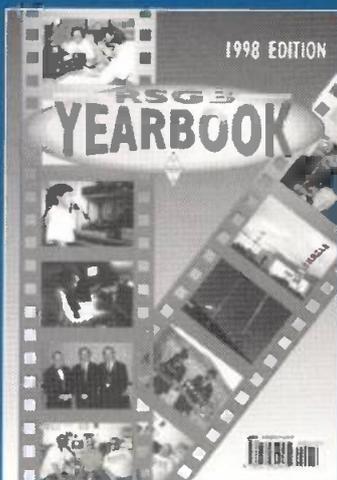
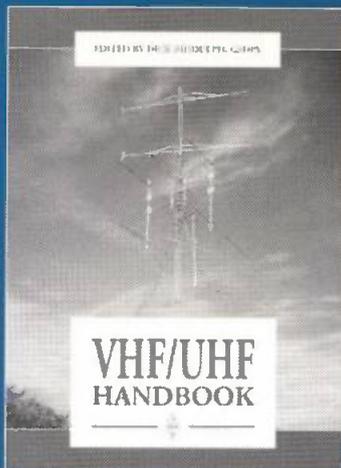
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**Yaesu FT-747GX** h.f. TX/RX general coverage, manuals, boxed, £375. AOR 1000 hand-held scanner, NiCads, charger, manuals, boxed, £125. Jim GM0BVF, Lockerbie. Tel: (01576) 300869.

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**121, 122, 124 Spy Sets**, AMK III, MK119, WS301, OP3, NP3, AP4, BP3, 51/1TX, 53RX, Delco 5300, AN/PRC64, AN/PRC70, AN/PRC74, also any accessories for any of the above details, W. J. MacDonald, 40 Latchett Road, London E18 1DJ.

**All early wireless gear**, crystal sets, valves, horn speakers, top prices paid for items made by Marconi, Burndep, Pye, BTH, Gecophone, Ericsson, serious collector, will pay well and collect any area. Jim Taylor G4ERU, 5 Luther Road, Winton, Bourne mouth BH9 1LH. Tel/FAX: (01202) 510400.

**Circuit diagrams, manuals** for Marconi signal generator, model TF2015 and digital synchroniser TF2171, G3B1K, QTHR. Tel: (01670) 513994.

**Codar AT5 transmitter**, circuit diagram and manual required, your copying and postage expenses refunded, or will buy, Alex GM4TAL, QTHR. Tel: (01875) 853144.

**CRT for telequipment S61 scope** or faulty scope with good tube, data for EC1000 valves, your price paid. John GM8MLH, QTHR. Tel: (01838) 200304.

**Datong FL3 multi-mode filter**, £60. Datong ANF notch filter, £30. Wanted Sony ICF-6800W receiver, orange badged front panel only, in good condition and full working order. Tel: (01772) 704009 after 6pm.

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**RA17 receiver**, A3WS beam, 6146B valve, 12BY7A valve, 6KD6 valve, 6GK6 valve, Eddystone receiver, FL50B TX, HRO RX, linear amp, please write to Ed Kelly E15DR, Cregganavar, Breaffry, Castlebar, Co Mayo, Eire.

**Radio Amateurs Conversation Guide** by OH1BR or similar, Dave Morgan, N. Wales. Tel: (01766) 590341.

**Rotator**, medium duty, must be in good condition, reputable make, complete with control box, GW4DTQ on (01745) 857119.

**Shure 201 microphone** or Shure 444 also required, Racal I.f. converter RA237 or RA337, C. M. Duncan, Roadside Cottage, Hoswick, Sandwick, Shetland Isles. Tel: (01950) 431405.

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**Wanted desperately for disabled s.w.l. Racal RA1792 receiver** in not working or damaged condition, as I can't afford a working one, and I have some spares with which I can hopefully get it going. Also copy of manuals/instructions for same. Tel: (01554) 775790 or E-mail daingood@aol.com

**Woden mains transformer**, type SRS/152T secondary 670-0-670AT, 160mA wanted to repair old power supply. Denis G3UVR, Wirral. Tel: 0151-652 7454 day or 0151-342 7880 evenings.

**WS18, WS38 and Fullerphone**, all complete please. Dave Logan G4EFZ, 27 Shaw Street, Mottram, Hyde, Cheshire. Tel: (01457) 762799.

**Yaesu FRG-9600 h.f. converter plug-in module**, also circuit diagram with any alignment or service info., your price paid plus costs, thank you! B. D. Williams GW0GHE, QTHR. Tel: (01222) 703429.

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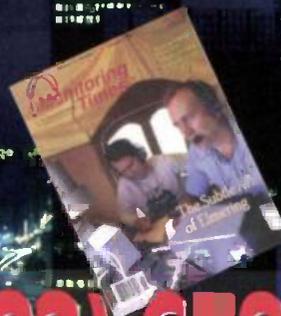
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Due to the fast turn around of popular secondhand items, readers should check on availability of advertised stock. In other words...if you spot something you fancy...don't delay or you could miss it!

# Traders

## YOUR GUIDE TO SECOND-HAND EQUIPMENT

### WATERS & STANTON

01702 206835

PLEASE NOTE SECONDHAND ITEMS COME WITH FULL 3 MONTH PARTS & LABOUR GUARANTEE. FOR MORE INFORMATION PHONE ANDY THETLEN 01702-206835 OR FAX 01702-205843.

**HF TRANSCIEVERS**  
ICOM IC-725 HF base station transceiver £549  
TRIO TS-940SAT HF base station Inc built in ATU £1199  
YAESU FT-767GX HF base station £849  
YAESU FT-747GX HF base station transceiver £449

**VHF/UHF TRANSCIEVERS MOBILE /BASE STATION**  
ALINCO DR-108 2m programmable mobile transceiver £99  
AKD 2001 2m 25 Watt FM mobile transceiver £129  
ICOM IC-3200E 2m/70cms mobile transceiver £199  
KENWOOD TM-451E 70cms mobile transceiver £279  
TRIO TR-9000 2m all mode mobile transceiver £199  
YAESU FT-8500 2m/70cms mobile transceiver £499

**VHF/UHF TRANSCIEVERS HANDHELD**  
ALINCO DJ-180x2 2m handheld £99  
ALINCO DJ-F1E X2 2m handheld £119  
ICOM IC-2E 2m handheld £99  
ICOM IC-742E 70cms handheld £189  
ICOM IC-P4E 70cms handheld £169  
ICOM IC-M11 VHF Marine handheld £219  
KENWOOD TH-28E 2m handheld £199  
STANDARD C-528 2m/70cms handheld transceiver £199  
YAESU FT-411 2m handheld £109

**SHORTWAVE RECEIVER**  
DRAKE R8E Base station receiver (PSALE) £695  
ICOM IC-R72x2 Base station receiver 100kHz-30MHz £999

ICOM IC-R71x4 Base station receiver with remote control £999  
ICOM IC-R70 Base station receiver £449  
KENWOOD R-5000x2 Base station receiver with VHF converter £749  
LOWE HF-150 HF receiver + keypad £299  
LOWE HF-250x2 High specification HF receiver £449  
LOWE HF-225 High specification HF receiver (PSALE) £650  
LOWE HF-225x2 High specification HF receiver £349

PANASONIC RFB-65 Portable shortwave receiver with 5SB £109  
SANGEAN ATS-803A Portable shortwave receiver £79  
SONY ICF-SW55 Portable shortwave receiver £189  
SONY ICF-7600DS Portable digital shortwave receiver £79  
SONY ICF-SW100E2 Portable shortwave receiver inc 5SB + FM stereo £149  
YAESU FRG-7 Base station HF receiver £139  
YAESU FRG-700x1 Base station HF receiver with memory unit £329  
YAESU FRG-700x2 Base station HF receiver without memory unit £279

**SCANNERS MOBILE / BASE**  
AOR AR-3002 25-55MHz, 800-1300MHz Base scanner (PSALE) £189  
COMDEX Scanner 1 Mobile scanner with gaps £99  
RADIO SHACK DX-394 Base station scanner 150kHz-30MHz £149  
REALISTIC PRO-2039 66-88, 108-174, 380-512, 806-960MHz £129

### LOWE ELECTRONICS

01629 580800

**HF TRANSCIEVERS**  
Icom IC 706 Mk1 HF transceiver with 2m and 6m £650  
Icom IC 728 HF transceiver £550  
JST135 HF Transceiver £975  
Kenwood TS50 Mobile HF Transceiver £550  
Kenwood TS530S HF Transceiver £495  
Kenwood TS820 HF Transceiver £395  
Yaesu FT747GX HF Transceiver £401

**DATACOMMS**  
Kantronics KAM Multimode TNC £185

**VHF/UHF TRANSCIEVERS**  
Alinco DJ500E Dual Band Handheld £249  
Alinco DJ560 Dual Band Handheld £199.00  
Alinco DR599 Dual Band Mobile £425.00  
Icom IC24ET Dual Band Handheld £269  
Icom ICW2E Dual Band Handheld £249  
Kenwood TH205E 2m Handheld £159  
Kenwood TH178E Dual Band Handheld £290  
Kenwood TM732E Dual Band Mobile / detachable front panel £380  
Kenwood TR2500 2m Handheld £140

Yaesu FT290R 2m Multimode £250.00  
Yaesu FT470R Dual Band Handheld £259  
Yaesu FT2200 2m FM Mobile £289  
Yaesu FT4700RH Dual Band Mobile with detachable front £375

**HF RECEIVERS**  
Lowe HF225 HF Receiver with all accessories £345  
Lowe HF225 Europa HF Receiver £450  
Sony ICF5555 World band Portable £229  
Lowe HF150 Portable HF Receiver £295  
GrundigYB217 Portable receiver £95

**SCANNERS**  
AOR AR1000 Handheld £169  
AOR AR2001 Base Scanner without PSU £159  
AOR AR2700 Handheld Scanner £160  
AOR AR2800 Base Scanner with SSB £195  
Icom ICR1 Handheld Scanner £199  
Yupiter MVT7000 Handheld Scanner £200  
Yupiter MVT7100 Handheld Scanner £225  
Yupiter VT225 Airband Scanner £180  
Yupiter VT125 Airband Scanner £150  
Yupiter MVT5000 Handheld Scanner £180

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### SOUTH EAST COMMUNICATIONS

(REP OF IRELAND)  
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**HF TRANSCIEVERS**  
Yaesu FT920 latest HF+6m base £1249  
Yaesu FT990AC, Built in PSU, Mint £1299  
Yaesu FT1000 MPAC as new save 600 £1999  
Kenwood TS440 auto ATU £799  
Kenwood TS940S Built in PSU ATU ect £1099  
Alinco DX-70 £629

**VHF/UHF TRANSCIEVERS**  
Alinco DR590E 2m/70cm mobile £249  
Alinco DJ191 2m handi, spare batt, case and mic £149  
Alinco DR130 2m mobile, wide TX and 50 wats £199  
Alinco DR140 2m mobile, wide TX and 50 wats £199  
Yaesu FT-3000M 70 watt mobile £275  
Yaesu FT736R 2m/70cm multimode base station £899  
Yaesu FT51R Top of the range h/h £299  
Yaesu FT50R 2m/70cms h/h £199  
Icom IC260a 2m multimode 10 wats £225  
Kenwood TM-733e 2m/70cm dualband mobile £375  
Kenwood TM-702E 2m/70cms dualband mobile £299

**SHORT WAVE RECEIVERS**  
AOR 3000a 0-2036mhz £599  
Icom 8500 0-2000 mhz all mode RX £1099  
Lowe HF150 with key pad £299  
Yaesu FRG7700 0-30mhz £299  
Realistic DX 394 boxed with manuals ect £189

**SCANNERS BASE/MOBILE**  
Realistic PRO2006 25 to 1300mhz £199  
Yupiter MVT8000 2 to 1300mhz £249  
Icom ICR7000 0 to 2000mhz £699  
Bearcat 3000XLT 25 to 1300mhz £249  
Bearcat 860XLT 66 to 956mhz £109

**SCANNERS HANDHELD**  
Yupiter MVT7100 0 to 1650mhz £199  
Yupiter MV7000 8 to 1300mhz £189  
Bearcat 3000XLT 25 to 1300mhz £179  
Bearcat 220XLT 66 to 956mhz £129  
AOR8000 0 to 1900mhz £249  
Bearcat 100XLT 29 to 512mhz £99

**STATION ACCESSORIES**  
Daiwa PS304 25amp power supply £109  
Watson PS1220 20amp power supply £65  
Vectronics 300watt tuner with dummy load £99  
MFJ 949e 300watt tuner with dummy load £109  
Kenwood MC85 desk mic with 2 leads £89  
Icom PS55 20amp power supply £149  
Diawa FRV7700 VHF converter £65  
Daiwa LA2080 2m 80watt amp £69  
Mirage 160watt 2m amp 10watt input £229  
Opto 3300 frequency finder £99  
Timewave DSP 59 plus £179  
AEA PK-232MBX packet tnc and decoder £199  
Wavecom W4010 data decoder £349

### NEVADA

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AMP UK HUNTER 600W £925  
ALINCO DJ-S41C - 70cms £89  
AOR 3000 £495  
AOR 3000A £575  
AOR SDU 5000 £495  
AOR 7030 £599  
DAIWA PS304 II - PSU £99  
DRAE 24A PSU £79  
DRAKE R8A £825  
DRAKE R8E £750  
ICOM IC-725 £595  
ICOM IC-W2E £199  
ICOM IC-706 £675  
ICOM IC-728 £629  
ICOM R-71 + HF £575  
ICOM R-71 + RCONTROL £545  
ICOM R-72 £675  
ICOM IC-2400 TWINBAND £335  
ICOM IC-7000 £595  
JIL 400 BASE £185  
JST 100 COMPLETE £499  
KENWOOD R5000 FLOADED £850  
KENWOOD TH-78E £225  
KENWOOD TH-215E £145  
KENWOOD TM-241E £225  
KENWOOD TM-451E £299  
KENWOOD TR-751E £4250  
KENWOOD R-Z1 £245  
KENWOOD TS-930 BASE £599  
KENWOOD TS-430S £499  
KENWOOD TS-940S £899  
KENWOOD TS-950S DIGITAL £1795  
KENWOOD TS-850 SAT £2199  
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SENTEC 20M HANDIE £195  
STANDARD C8800 £189  
TARGET HF3 RX £130  
TEN TEC OMNI VI S.O.B £1999  
TOKYO HC-200 ATU £99  
TOKYO HL-1KXG AMP £799  
TOKYO HL-130U 70cms £299  
TOKYO HL-180V 2m £259  
TRIO AT-300 ATU £175  
TRIO AT-230 ATU £189  
W9-GR DSP II £185  
YAESU FL-7000 £1025  
YAESU FP-707 20A PSU £139  
YAESU FRG 9600 £379  
YAESU FT-1 £599  
YAESU FT-107 £499  
YAESU FT-11R £169  
YAESU FT-50 + EXTRAS £275  
YAESU FT-308 + EXTRAS £179  
YAESU FT-221R 2m BASE £299  
YAESU FT-290 I £245  
YAESU FT-290 II £325  
YAESU FT-411 + EXTRAS £189  
YAESU FT-470 + ACCS £225  
YAESU FT-650 24-54MHZ £699  
YAESU FT-707 £349  
YAESU FT-727 £169  
YAESU FT-757 AT £225  
YAESU FT-990 AC £1399  
YAESU FT-990 AT £825  
YAESU FT-990 DC as new £1249  
YAESU FT-5100 £345  
YUPITERU MVT 7100 £215

### MULTICOMM 2000

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**HF TRANSCIEVERS**  
ICOM IC-720A + PSU £399  
ICOM IC-726 HF + 6 METERS £575  
ICOM IC-745 + SSB FILTER £499  
KENWOOD TS-430S + FM + FILTERS £425  
KENWOOD TS-440 SAT (GOOD CONDITION) £649  
DRAE 24A PSU £79  
DRAKE R8A £825  
DRAKE R8E £750  
ICOM IC-725 £595  
ICOM IC-W2E £199  
ICOM IC-706 £675  
ICOM IC-728 £629  
ICOM R-71 + HF £575  
ICOM R-71 + RCONTROL £545  
ICOM R-72 £675  
ICOM IC-2400 TWINBAND £335  
ICOM IC-7000 £595  
JIL 400 BASE £185  
JST 100 COMPLETE £499  
KENWOOD R5000 FLOADED £850  
KENWOOD TH-78E £225  
KENWOOD TH-215E £145  
KENWOOD TM-241E £225  
KENWOOD TM-451E £299  
KENWOOD TR-751E £4250  
KENWOOD R-Z1 £245  
KENWOOD TS-930 BASE £599  
KENWOOD TS-430S £499  
KENWOOD TS-940S £899  
KENWOOD TS-950S DIGITAL £1795  
KENWOOD TS-850 SAT £2199  
LOWE AP 150 £155  
MFI 784 DSP £175  
MIRAGE B3016 2M AMP £245  
N.A.G. 144 XL AMP £345  
RACAL RA17 £139  
REALISTIC 2036 £179  
REALISTIC PRO-50 £69  
SANGEAN ATS-803A £85  
SATCOM P40 (PAIR) £149  
SENTEC 20M HANDIE £195  
STANDARD C8800 £189  
TARGET HF3 RX £130  
TEN TEC OMNI VI S.O.B £1999  
TOKYO HC-200 ATU £99  
TOKYO HL-1KXG AMP £799  
TOKYO HL-130U 70cms £299  
TOKYO HL-180V 2m £259  
TRIO AT-300 ATU £175  
TRIO AT-230 ATU £189  
W9-GR DSP II £185  
YAESU FL-7000 £1025  
YAESU FP-707 20A PSU £139  
YAESU FRG 9600 £379  
YAESU FT-1 £599  
YAESU FT-107 £499  
YAESU FT-11R £169  
YAESU FT-50 + EXTRAS £275  
YAESU FT-308 + EXTRAS £179  
YAESU FT-221R 2m BASE £299  
YAESU FT-290 I £245  
YAESU FT-290 II £325  
YAESU FT-411 + EXTRAS £189  
YAESU FT-470 + ACCS £225  
YAESU FT-650 24-54MHZ £699  
YAESU FT-707 £349  
YAESU FT-727 £169  
YAESU FT-757 AT £225  
YAESU FT-990 AC £1399  
YAESU FT-990 AT £825  
YAESU FT-990 DC as new £1249  
YAESU FT-5100 £345  
YUPITERU MVT 7100 £215

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# Traders' Table

## YOUR GUIDE TO SECOND-HAND EQUIPMENT

### ARC EARLESTOWN 01925 229881

HF TRANSCEIVERS	
Yaesu FT-900AT - boxed.....	£950
2 x Icom IC-765 plus speaker.....	from £1500
Kenwood TS-430.....	£675
Yaesu FT-757GX1 + boxed.....	£TEL
Yaesu FT-980.....	£799
Icom IC-730 - boxed.....	£399
Yaesu FT-102.....	£475
Yaesu FT-767 + 2/6/70cms boxed.....	£TEL
Yaesu FT-840 + FM/FIF-232C.....	£TEL
Yaesu FT-701ZD MkIII + FC-902/FCV-901R inc)	
2m/6m.....	£799
Icom IC-735 boxed.....	£525
Icom IC-728 boxed.....	£550
Yaesu FT-902DM + SP-901/SPC-300 ATU.....	£499

MOBILE/BASE VHF/UHF TRANSCEIVERS	
Kenwood TS-700S.....	£450
Kenwood TM-742 + 10m module as new.....	£625
Icom IC-229 - boxed.....	£225
Icom IC-2900.....	£300
Yaesu FT-736 + Mutek boxed.....	£TEL
Yaesu FT-290R Mark II.....	£350
Kenwood TM-255E boxed VGC.....	£TEL
Yaesu FT-230.....	£175
Kenwood TW-4000 boxed.....	£250
Icom IC-271H +100W internal PSU.....	£550
Icom IC-2410H boxed.....	£TEL
Yaesu FT-790R + linear.....	£260

RECEIVERS/SCANNERS	
Icom IC-R7000.....	£700
ICOM IC-R71E boxed.....	£599
2 x Kenwood R-1000 boxed.....	£250
Regency MX-7000.....	£TEL
AR-2500.....	£275
Drake R-8E.....	£699
AOR AR7030 mini condition.....	£600
2 x Lowe HF-225.....	from £275
Sony PRO-80.....	£150
Yaesu FRG-9600 - HF converter.....	£350
Yaesu FRG-7.....	£140
Yaesu FRG-8800 + FIF-232.....	£TEL
AOR AR3000.....	£450
Icom IC-R7100 boxed.....	£TEL

HANDHELDS	
Kenpro KT-22.....	£80
Alinco DJ-160.....	£150
Kenwood TH-79E + extras.....	£TEL
Kenwood TH-21.....	£99
Icom IC-U16 - mini condition.....	£TEL
Icom IC-4E.....	£15

MISC.	
SDU-5000 Spectrum Display Unit - as new.....	£599
AT-230 - box.....	£175
MJF-1278 Packet Unit + Software.....	£225
Datong ASP (wired for Yaesu).....	£55
Datong ASP (wired for Kenwood).....	£50
MML-144 - 100-3 + boxed.....	£TEL
ERA Microreader + RS-232 display.....	£199
Tokyo HL-160V linear.....	£175

### SHORTWAVE SHOP 01202 490099

HF TRANSCEIVERS	
Icom IC751 - 100W H/F.....	£545
Icom IC725, Inc AT150 - VGC.....	£625
Kenwood TS680S - HF & 6M.....	£695
Kenwood TS140S - 100W HF.....	£525
Kenwood TS120S - 100W HF.....	£295
Trio TS120V - 10W HF - Ideal Novice Set.....	£275
Trio TS530SP - 100W HF.....	£375
Trio TS530SP - 100W HF Narrow CW Filter.....	£395
Yaesu FT990 - AC PSU & ATU.....	£1,150
Yaesu FT101EE.....	£185

VHF/UHF	
Alinco DR510 - 2M/70cms Mobile LED Display.....	£275
Icom IC9701H - ULTIMATE Satellite Set + SP150 2M/70cm/23cm/Wide Band RX - MINT - (£4K+).....	£1,995
Icom IC551D - 6M Hi-Power Multimode Base.....	£495
Icom IC2E - 2M Thumbwheel H/Held.....	£275
Icom IC02A - No 1750Hz.....	£85
Kenwood TH22E - 2M H/Held.....	£150
Kenwood TS711E - 2M Multimode Base.....	£525
Kenwood TM 733 - 2M/70cms Mobile.....	£399
Kenwood TS811E - 70cms Multimode Base.....	£525
Navico AMR1000 - 2M Mobile.....	£125
Trio TR9130 - 2M Multimode Boxed.....	£350
Trio TR9500 - 70cms Multimode Boxed.....	£350
Yaesu FT8000R - Hi Power 2M/70cms Ex Demo.....	£395
Yaesu FT290R11 - 2M M/mode Mobile.....	£325
Yaesu FT203 - 2M H/Held & Charger.....	£135

RECEIVERS	
AOR 7030 Acclaimed HF RX - Ex Demo.....	£645
AOR 3000 - 100Khz - 2GHz Base Scanner.....	£450
Heathkit HR10B Ham Band RX - Mini.....	£65
Icom R71E - General Coverage Receiver.....	£495
Icom R71E - All options fitted - Mini.....	£545
Icom ICR72 - General Coverage RX.....	£595
JL SX400 - Base Scanner - Mini.....	£165
JRC NRD 525 with VHF and UHF.....	£595
Lowe HF125 - HF Gen Cov RX (Choice of 1/2).....	From £225
Lowe HF150 - HF Gen Cov RX - Mini.....	£325
Realistic Pro-34 - H/Held Scanner.....	£110
Sony Air7 Air + Marine Rev - Mini.....	£195
Sony ICF Pro80 - SW and FM Broadcast.....	£135
Uniden Beocat UBC120XLT - 100ch H/H Scanner.....	£98
Yaesu FRG700 - General Coverage RX.....	£295

MISCELLANEOUS	
Burns Electronics TC101 - Wavemeter.....	£25
Daiong PC1 HF to VHF Convtr.....	£75
Diawa CNA1001 - Auto ATU.....	£145
Global AT2000 - RX ATU - Ex Demo.....	£85
Heathkit SB200 - 500W HF Linear Amp.....	£225
Icom PS15 - Matching PSU (IC745, IC751 etc).....	£125
Kantronics KAM - Multimode TNC.....	£165
MJF 1701 - 6 Way HF Coax Switch.....	£25
MJF 407B - Keyer.....	£49

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RECEIVERS	
Yaesu FRG-7 Receiver.....	£110.00
NRD-525 Receiver.....	£599.00
Lowe HF-250 Receiver c/w FM/AMS & speaker.....	£399.00
AOR-3030 Receiver.....	£425.00
Kenwood R5000 Receiver.....	£575.00
Realistic DX-394 Receiver.....	£189.00
Icom IC-R70 Receiver.....	£429.00
Lowe HF-225 Receiver.....	£329.00

SCANNERS	
AOR-3000 wideband scanner.....	£499.00
Icom IC-R7100 wideband receiver.....	£799.00
AOR-1500 Handheld scanner.....	£169.00

HF TRANSCEIVERS	
Kenwood TS-850S.....	£949.00
Icom IC-720A c/w PSU.....	£479.00
Yaesu FT-890AT.....	£639.00
Yaesu FT-102.....	£399.00
Icom IC-735.....	£549.00
Icom IC-745.....	£450.00
Icom IC-751.....	£589.00
Yaesu FT-757GX.....	£499.00
Icom IC-725.....	£499.00
Kenwood TS-680S HF + 6M.....	£649.00
Icom IC-745 (mains powered).....	£489.00

VHF/UHF	
Yaesu FT-4700 dualband mobile.....	£279.00
Kenwood TM-733E dualband mobile.....	£399.00
Kenwood TM-701 dualband mobile.....	£299.00
Kenwood TM-255E 2m multimode.....	£599.00
Alinco DJ-580E Dualband handheld.....	£239.00
Kenwood TH-28E 2m handheld.....	£149.00
Alinco DJ-1 2M handheld.....	£159.00
Alinco ALM-203E 2M handheld.....	£50.00
Kenwood TH-75E 2m/70cms handheld.....	£229.00

### SMC GROUP 01703 251549

HF TRANSCEIVERS	
PX TS450SAT Kenwood HF 100W.....	£899
PX HL7000B Tokyo HF L/amp.....	£899
PX FT747GX Yaesu HF 100W.....	£425
PX FC700 Yaesu Man ATU.....	£109
PX FT767GX Yaesu HF 2+6mtr.....	£1099
PX FT102 Yaesu HF 100W.....	£425
PX IC737 Icom HF 100W.....	£1060
LX FTONE Yaesu HF 100W.....	£675
LX FT890AT Yaesu HF 100W.....	£1250
LX IC-706 Icom HF + 2/6m.....	£779
LX FT7B Yaesu HF 50W.....	£235
AX FT990 Yaesu HF 100W.....	£1650
AX IC765 Icom HF 100W.....	£1699
RX FT980 Yaesu HF 100W.....	£625
RX FT101 Yaesu HF Valve.....	£260
RX FT757GX Yaesu HF 100W.....	£495
RX FT747 Yaesu HF Mobile.....	£450
RX FT107M Yaesu HF 100W.....	£275
RX TS520 Kenwood HF 100W.....	£260
RX TS440SAT Kenwood HF 100W.....	£750
RX IC726 Icom HF 100W.....	£850
RX IC761 Icom HF 100W.....	£995

VHF/UHF TRANSCEIVERS	
PX FT4700 Yaesu 2mtr/70cm.....	£329
PX FT2700 Yaesu 2mtr/70cm.....	£279
PX FT290R11 Yaesu 2mtr port.....	£375
PX FT736R Yaesu 2mtr/70cm.....	£1299
PX FT51R Yaesu 2mtr/70cm.....	£325
PX IC3201E Icom 2mtr/70cm.....	£309
PX C5800 Standard 2mtr m/mode.....	£259
LX DJ580E Alinco 2mtr/70cm.....	£245
LX TH21E Kenwood 2mtr port.....	£100
AX FT790R Yaesu UHF port.....	£310
AX TM-732E Kenwood 2mtr/70cm.....	£525
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RX FT8500R Yaesu 2mtr/70cm.....	£575
RX FT212RH Yaesu 2mtr FM.....	£175

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PX FRG7700 Yaesu HF Gen RX.....	£295
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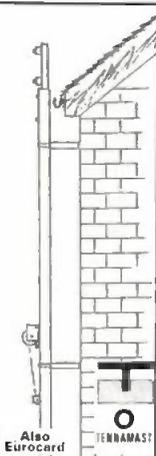
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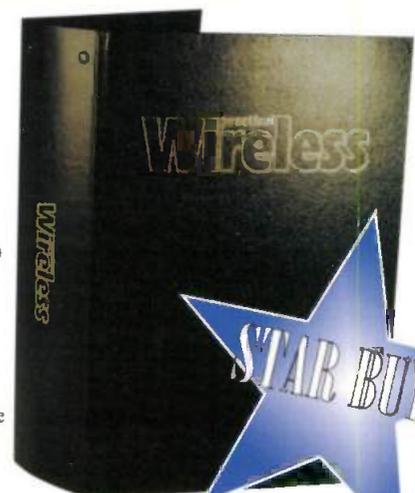
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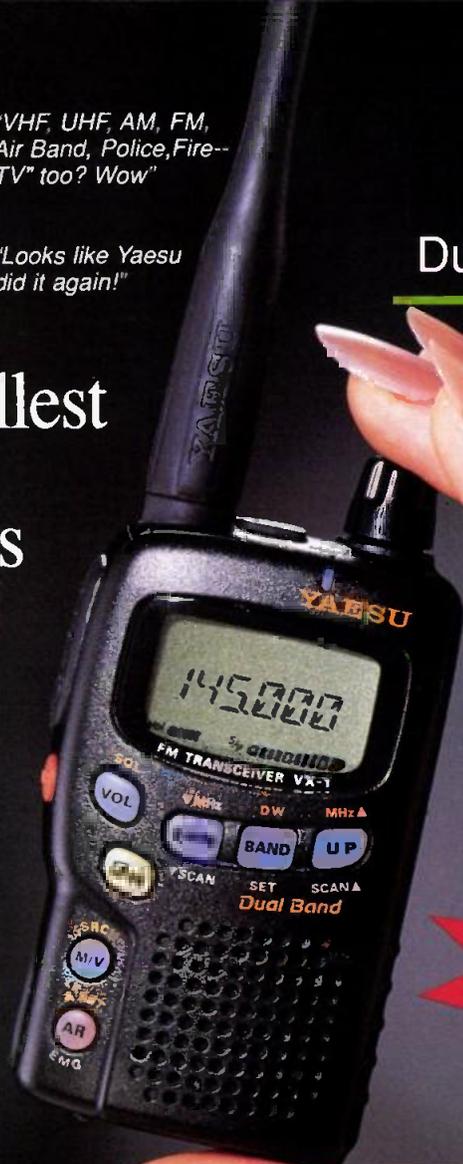


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  - AM Aircraft/Public Safety Receive
  - CTCSS Encode/Decode
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Dual Band  
Handheld



FT-51R  
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