

# Practical Wireless



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## YAESU FT-90R REVIEWED

## 4m-A VERY FRIENDLY BAND

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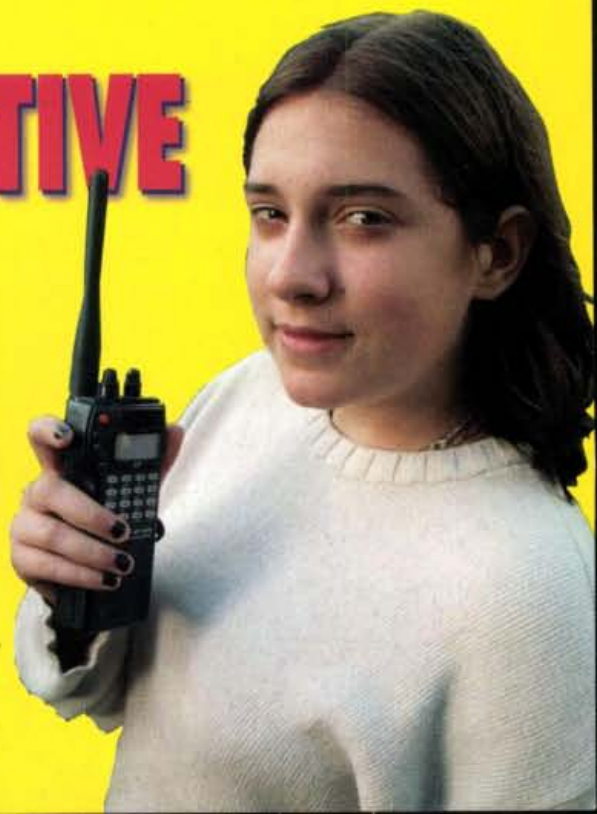


### CD ORDER FORM INSIDE

## A NOVICE'S PERSPECTIVE



January 2000 £2.50





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**YAESU**

**FT-90R Micro Commander**

**SAVE**  
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Yaesu's 2m/70cm Mobile  
World's Smallest Dual Bander  
100 x 30 x 138mm 50/35 Watts



**£359**

Next Day  
Delivery  
£7.00

or pay 10% Deposit and balance in 6 months Interest FREE



**SAVE** 70cms Handy

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Ideal for Rallies  
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Club Projects.

- PLL 10mW Output
  - 69 Channels
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  - Full CTCSS
  - 25kHz Steps
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- Batteries not included  
Carriage £5.00 (1 or 2 pcs).

**KENWOOD TS-570DG**  
160 - 10m All Mode

or pay 10% Deposit

and balance in 6 months Interest FREE

£989 with switch mode power supply & SP-23 Speaker

**£849**



SP-23 Option

**New IC-756 Pro**

1.8 - 52MHz 100W  
Auto ATU 51 Bandwidths  
Real-Time Spectrum Scope

New DX Rig  
5" Colour Screen  
32 Bit DSP  
51 Bandwidths  
RF Processing  
Voice Memory  
CW memory



Stock Now Arriving - Phone!

**YAESU**

**FT-1000MP**  
160 - 10m All Mode

**Super  
Discount  
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It has stood the test of  
time and used by the  
world's top DXers and  
DXexpeditions. Its excel-  
lent receiver combined  
with its superior transmit-

ted signal makes this a natural choice for the HF enthusiasts. AC and DC versions in stock.

**SAVE**

**ICOM**

**IC-706IIG**  
160 - 70cm All Mode

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and balance in 6 months Interest FREE

£1069 with switch mode power supply

**£989**

Next Day  
Delivery

**£7.00**



Shown above with PSU

The IC-706IIG is the latest model of this classic transceiver. Great for mobile, portable or base use. Its got a great pedigree and offers 100 Watts on all bands up to 50MHz with 50 Watts on 2m and 20 Watts on 70cm. CTCSS encode and a lovely display with removeable front panel.

**TUNE CONTROL** Plugs into back of your IC-706. Now when you press "tune" you get 10W of RF for tuning up via manual ATU etc. A lovely idea that costs you only **£29.95** post £2.00

**ICOM**

**SAVE**

**IC-Q7E**

Dual Bander  
Airband Receive!

Only 50pcs  
Available

- 2m & 70cm Handheld
- 300mW Output
- CTCSS Encoder
- Rx. 30kHz - 1309MHz FM / AM
- 200 Multifunction Memories
- LCD Backlight & Timer
- Runs from 2 x AA Cells

W&S Exclusive Deal

**£169**

**£119**



**YAESU**

**FT-847**

160 - 70cm All Mode

**SAVE**

or pay 10% Deposit

and balance in 6 months Interest FREE

£1379 with switch mode power supply

**£1295**

Next Day  
Delivery

**£7.00**



Remember - The best after-sales  
service comes from W & S

The FT-847 has firmly established itself as a true all-band, all-mode transceiver. Loved by the VHF & UHF operators, and superb for satellite operation, it also offers great HF performance. We have sold more than any other dealer, which says a lot about our reputation and our price. Phone for free leaflet today. And remember, our stock is genuine UK, not modified overseas models!!

**Price Increase** - We have had to increase the "847" price slightly. However, there is a further price increase likely - so now is the time to buy!! **BE WARNED**

**YAESU**

**FT-100**

160 - 70cm All Mode

See RadCom Review

**£1259**  
Phone



Now available  
from stock, this  
rig is now the  
smallest all-band-  
der available. We

have used it extensively and it is absolutely great. Read Radcom's in-depth review and then come to us for the best deal around.



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Over 200 pages in colour.  
Go to the section you need and Print It Out  
**GO NOW** [www.waters-and-stanton.co.uk](http://www.waters-and-stanton.co.uk)

## ADI AT-600 Dual Bander

Previously £249.00

### Airband Rx

- \* 2m & 70cm Handheld
- \* 5W Output on 13.8V DC
- \* Full CTCSS & 12.5/25kHz Steps
- \* 110 Alphanumeric Memories
- \* 29 Programmable Functions
- \* DTMF Keypad & AM Airband
- \* Ni-cads & AC charger

**£199**



## NEW Earpiece / Boom Mic

### WEP-501YS

Fits VX-1R, VX-5R, FT-50

This popular, light-weight earpiece and boom microphone makes for easy operation, and keeps the RF away from the head.



**£24.95**

## Clearance Items:

Alinco DR-130E	2m 50W Mobile	<del>£289</del>	£159
Yaesu FT-200	2m 50W Mobile	<del>£239</del>	£169
Yaesu FT-2500	2m 50W Mobile	<del>£289</del>	£169
Optotrakker	Multimode decoder	<del>£299</del>	£229
MFJ-422B	Electronic key + paddle	£145	£95
MFJ-1792	80m - 40m base vertical	£159	£109
Cushcraft AR-X6	6m Vertical	£199	£139
Tonna 209022	21 El. TV antenna	£69	£45

## Hoka Decoding Software

We are now the UK distributors. As used by governments, it can decode just about any form of data transmission. Simply connect between PC and Rx audio. Can be loaded on any number of PCs. This is a very advanced programme.



## C-150 2m Handy

- \* 2m Handheld
- \* 5W Output on 13.8V DC
- \* 1750Hz Tone Included
- \* 25 / 12.5kHz Steps
- \* 20 Memory Channels
- \* Wideband Receive
- \* Uses 6 x AA cells (not inc.)

**£99.95**



## YAESU VX-5R

- \* 6m / 2m / 70cm Handheld
- \* 5W Output on 13.8V DC
- \* CTCSS Encode / Decode
- \* 25 / 12.5kHz Steps
- \* Auto Repeater Shift
- \* AM Airband Receive
- \* Lithium Cells & Charger

**£220**



## YAESU FT-50R

- \* 2m / 70cm Handheld
- \* 5W Output on 13.8V DC
- \* CTCSS Encode / 1750Hz tone
- \* 25 / 12.5kHz Steps
- \* 30 Memory Channels
- \* AM Airband Receive
- \* Ni-cad Cells & Charger

## SAVE C-408 70cms Handy

Normally £89.95

**£69.95**



- CTCSS
- Repeater Shift
- Digital Display
- 12.5 / 25kHz Step
- 20 Memories
- 230mW Output
- Uses 2 x AA

**Offer Extended**

## ICOM IC-T8E

- \* 6m / 2m / 70cm Handheld
- \* 5W Output on 13.8V DC
- \* 25 / 12.5kHz Switchable
- \* 123 Multifunction Memories
- \* CTCSS & 1750Hz Tone
- \* Programmable Features
- \* Ni-cads & AC charger



## KENWOOD TH-D7E

- \* 2m & 70cm Handheld
- \* 6W Output on 13.8V DC
- \* CTCSS & 1750Hz Tone
- \* Built-in Packet Modem
- \* 200 Alphanumeric Memories
- \* DTMF Keypad & AM Airband
- \* Ni-cads & AC charger



## SEC-1223 13.8V PSU

**£89.95**



**23 Amps - 3.2lbs!**

## Introductory Offer

Lighter than an IC-706 and about the same size! The SEC-1223 switch mode power supply delivers 23 Amps at 13.8V Thermo fan cooled, it measures just 57 x 177 x 190mm. Will power all 100W rigs and can be changed for 115V AC

## ICOM IC-2800H

**£549**  
Phone



- \* 2m & 70cm Mobile
- \* Colour TV Screen
- \* Full CTCSS and 1750Hz Tone
- \* 50W 2m 35W 70cm & Remote Head Unit

## ICOM IC-207H

**£309**



- \* 2m / 70cm
- \* 50W / 35W
- \* 180 Memories and 7 Tuning Steps
- \* Detachable Head Unit / Clear Display
- \* Microphone, Mounting Bracket etc.

## KENWOOD TM-G707E

**£279**



- \* 2m and 70cm
- \* 50W and 35W
- \* Full CTCSS
- \* 180 Alphanumeric Memories
- \* Detachable Head with Amber Display

## YAESU FT-

**Phone**

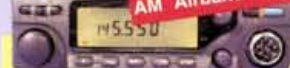


- \* 2m and 70cm
- \* 50W and 35W
- \* Wideband Rx AM & FM 208 Memories
- \* 7 Tuning Steps DTMF Remote Front panel
- \* Very compact, supplied with all hardware.

## ADI AR-147

AM Airband Receive

**£199**



- \* 2m 50 Watt Mobile Airband Receive
- \* Full CTCSS Encode / Decode
- \* 81 Memories 25 / 12.5kHz Steps
- \* Keypad microphone & Mounting Kit

## KENWOOD TM-V7E

**£369**



- \* 2m / 70cm Mobile
- \* 50W 2m, 35W 70cm
- \* Clear LCD Readout
- \* CTCSS & DTMF
- \* 8 Frequency Steps & 280 Memories
- \* Includes Microphone & Mounting Bracket

## YAESU FT-2600M

**NEW**

**£249**



- 2m Mobile
- 60 Watts
- Heavy Duty Design
- 24 Hour delivery £5.50



# Number ONE in Amateur Radio Waters & Stanton

Order Details on inside Front Cover

## Dual Band 2m/70cm

**WATSON**

Coming soon, this lovely engineered dual band Yagi. 5 el. on 2m, and 9 el. on 70cm. Adjustable dual gamma matching. This is a lesson in how antennas should be made!

**£79.00**



## RF Metering

### Avair AV-600 1.8 - 525MHz 400W

**£59.00**



VSWR and power meter. Reads RMS and PEP. The ideal all-band VSWR meter. Reads up to 400W (3 ranges)

### Avair AV-20 / AV-40 Cross Needle

Cross needle meters at a very attractive price. The AV-20 covers 1.8 - 150MHz and the AV-40 covers 140 - 525MHz. Both units have switched power levels of 0-15 / 0-150W. Available during June.



**£49.00**

### Watson VSWR / Power Meters.

**£49.00**



Measure VSWR and RMS or PEP power. Large easy to read meter. 3 ranges: 5W, 20W and 200W.

W-220	1.8 - 200MHz	£49.95
W-420	118 - 530MHz	£49.95
W-620	1.8 - 525MHz	£89.95

### Watson Off-Air Frequency Counters

**£59.00**



High quality units supplied with antennas, ni-cad packs and AC chargers. They are very sensitive and may be used for near-field checking.

Hunter - 10MHz - 3GHz	£59.95
FC-130 - 1MHz - 3GHz, switched gates, 16 segments.	£79.95
Super Hunter - 10Hz to 3GHz and with signal strength meter.	£149.95

## Antenna Rotators

### AR-300XL Lightweight

**£49.00**



Ideal for VHF and UHF systems of small to medium size. Includes control box, motor and Brackets. Support masts sizes can be up to 50mm

### YS-130 Medium Weight VHF

**£79.00**

Made in Japan, this rotator will support medium sized VHF arrays. The diecast motor housing will fit masts up to 40mm diameter. Includes motor, control box and brackets.



### New Create RC5-1 Rotator

We are pleased to be able to offer one of the most popular rotators from Japan. The RC5-1 will handle 3-4 element HF beams. It has a torque of 6kg (rotation) and 80kg braking. Uses 7-core cable.



**£299.00**

### Yaesu Rotators for HF Systems

G-450C	Smaller Tri-band Yagis etc.	£379.00
G-650C	Larger Tri-banders etc.	£499.00
G-1000C	4 element HF Yagis (cw with 25m cable)	£559.00
G-2800SDX	Really large HF Yagis	£1229.00
G-550	Elevation Rotator	£309.00
G-5500	Az/EI Rotator	£569.00

We have extensive stocks of tower mounts, bearings and rotator cables. Phone if you need advice. Leaflets available.

## 80/40/20m Dipole 50ft Long!

G3OJV 80-Plus-2

**SpaceSaver**

Approx 50ft long (Horizontal)

400 Watts PEP

Balun Matched

ATU not essential

50 Ohms Feed

**£79.00**

Ideal for the small garden. Linear loading means efficient radiation. Can also be used as horizontal

VSWR Typically 1.5:1  
Bandwidth (2.5:1)  
20m 350kHz, 40m 100kHz,  
80m 100kHz

Packed as a semi kit. No soldering, just assemble the elements, check the dimensions and fine tune per instructions. Unlike the G5RV, this antenna resonates with low VSWR on all three bands. A unique design that really works!

## MFJ's New MFJ-269

**£299**



### 1.8MHz to 70cms Antenna Analyser

#### Extra Features

Measures VSWR, Impedance, Reactance, Capacitance, Inductance, Coax losses, Velocity factor, Stub lengths, Even calculates length to fault on coax lines plus more!!

## GB Beams from Netherlands



### Dual Triple & Quad Bands!

GB-2 Dual band Yagi covering 2m & 70cm. Uses 4 elements of 2m and 5 elements on 70cm.  
GB-3 Tri-band design. 2 el 6m, 4 el 2m, and 5 el 70cm. Ideal as a compact system for VHF/UHF £129.95  
GB-4 Quad bander. 2 el 6m, 4 el 2m, 5 el 70cm and 10el 23cm. A complete system on one boom 199.95

## Telescopic Masts

We are now able to supply a range of telescopic tiltover masts, galvanised to BS729. Heights from 7.6m to 12m extended. Models for wall mounting or post mounting. Phone or write for information.



## VHF/UHF Antennas

### Base Station Fibre Glass

WVA-100	2m/70cm 2/4.5dB 1.09m	£29.95
W-30	2m/70cm 3/6dB 1.15m	£39.95
W-50	2m/70cm 4.5/7.2dB 1.8m	£49.95
W-300	2m/70cm 6.5/9dB 3.1m	£59.95
W-2000	6m/2m/70cm 2.5m	£69.95

### Mobile Antennas PL-259 bases

W-285	2m 5/8th foldover base	£14.95
W-77LS	2m/70cm 0.39m low profile	£18.95
W-770HB	2m/70cm 1.1m 3/5.5dB	£24.95
W-7900	2m/70cm 5/7.6dB 1.5m	£32.95
W-627	6m/2m/70cm 1.62m	£34.95

### Mounts

W-3HM	Hatch / Boot Mount	£14.95
W-3CK	5m low loss cable kit	£18.95
W-ECH	5m RG-58 standard cable	£12.95
WMM&	Magnetic mount	£10.95
WAM-2	BNC window mount	£12.95

## Tonna VHF/UHF

20505	6m 5 el 10dBi 3.45,	£82.95
20804	2m 4 el. 8/9dBi 0.93m	£44.95
20809	2m 9 el. 13.1dBi 3.47m	£52.95
20818	2m 9 el. 13.1dBi 3.47m	£10.00
20811	2M 11 EL. 14.1dBi 4.62M	£179.95
20822	2m 11 el. 14.1dBi 4.62m	£117.95
20817	2m 17 el. 15.3dBi 6.57m	£89.95
20909	70cm 9 el 13dBi 1.24m	£45.95
20919	70cm 19 el 16.2dBi 2.82m	£61.95
20623	23cm 23 el 17.9dBi 1.75m	£

Carriage £7.00 an y quantity of above Antenna

## Double Your Life Nexcell NiMH Cells



### AA-Size 1350mAh

Twice the capacity of normal ni-cad cells and no memory effect. Ideal for handhelds and digital cameras. As supplied to the police.

4 x AA cell pack	£9.95
4 x AAA cell pack	£9.95
AC charger (4 x cells)	£9.95
Postage £2.00 any quantity.	

## Heil Headsets In Stock

Hear the Difference!

A choice of normal or DX inserts are available when ordering.



Pro Headsets Ddial ear	£119.95	HM-10 Dual	£109.95
Pro 54 or 55 (Single ear)	£109.95	CC-1 Adaptor cables Y,I,K	£23.95
Pro Micro Dual ear	£99.95	FS-1 Foot switch	£29.95
AD-1 Adaptors Y, I, K.	£14.95	TB-1 Table stand	£22.95
HM-10 Hand Mic.	£69.95	HS-1 PTT switch	£26.95

## Motorola Talkabout 200

## PMR-446 New Low Price

446MHz 500mW Handy  
8 Channels  
38 CTCSS Tones  
3 Kilometres Range  
3 x AA Cells Req'd.

Now you can use a 446MHz handheld without a licence. Ideal for a wide range of uses. The package provides everything you need for personal communications. Just add 3 x AA cells and you are on the air!

**£149 pair**



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## 12 RADIO BASICS

Now that a replacement for the much lamented ZN414 'radio on a chip' is available, **Rob Mannion G3XFD** says it's arrived just in time for winter projects. Try your hand building one ... they're great fun!

## 14 WIN AN ALINCO DX-70TH!

Preparations for our special competition begin this month! Start collecting the 'corner flashes' which will appear now and in the February issue and you could win an Alinco DX-70TH (kindly donated by Nevada) in the March issue. So, see page 14 - and good luck to you!

## 16 CARRYING ON THE PRACTICAL WAY

In his first column for the new century's first issue, the **Rev. George Dobbs G3RJV** describes a 'booster amplifier' suitable for many smaller receivers and transceivers.

## 18 LOOKING AT

**Gordon King G4VEV** is back this month to bring you the second part of 'Looking at ... The IF Amplifier' in which he discusses its primary task, the Q-Factor and combined a.m./f.m. receivers.

## 22 YAESU FT-90R MICRO COMMANDER

**Richard Newton G0RSN** was given the opportunity to review the Yaesu FT-90R 'Micro Commander' and says that it "packs a mighty punch for one so small". Read the article and see what other surprises Richard uncovers.



## 26 SOME UHF/VHF TRANSCEIVERS A NOVICE'S PERSPECTIVE

Now that 144MHz is available to the Novice operators, **Katherine Taylor 2E1HFX**, a new Novice, was given the opportunity to review **SIX** pieces of equipment suitable for use by Novices from three different dealers - the **Alinco DJ-195**, the **Alinco DJ-V5**, the **Hora C-150**, the **Hora C-408**, the **ADI AT-600** and finally the **AKD-2001**.



## 28 FOUR METRES THE VERY FRIENDLY BAND!

**Derek Thom G3NKS** tells you how he enjoys working stations on the 70MHz band, a band which he says is "unique" and in this article he explains why. Why not take advantage of the **SPECIAL OFFER** on p.30 & have a go on 'Four' yourself?



## 4m The Very Friendly Band...

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## 32 MODIFYING MOVING COIL METERS

Ever practical - **Walter Farrar G3ESP** explains how you can modify moving coil meter movement. So, don't miss that meter bargain or bury them in the junk box - give them a new lease of life!

## 34 LET YOUR FINGERS DO THE TALKING!

**Peter Halls G4CRY** explains how he enjoys 'keyboard' Amateur Radio - and he has some suggestions as to how you too can enjoy keyboard operating.

## 36 ABSORPTION WAVEMETER

We all need (and should have access to) absorption wavemeters and to help you **Carmel Fenech 9H1AQ**, from her workshop on the beautiful Island of Malta GC, explains how you can build one for yourself.

## 40 CARLTON RECEIVER KIT REVIEW

**Rob Mannion G3XFD** reviews the Carlton Receiver Kit courtesy of Nottingham based **Lake Electronics**.



## 42 VALVE & VINTAGE

**Charles Miller** is looking after the vintage 'wireless 'shop' this month and he's in a reflective mood. This time he looks back on how he started off in wireless ... many years ago.

## 44 THE JAPANESE HENTENNA

**Dick Bird G4ZU** brings you his description of the Japanese Hentenna which, he says, has never been given the publicity that it deserves. Have you ever heard of it? No? Want to know more? Then this is the article for you!

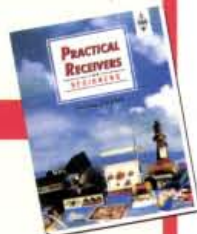
## 46 ANTENNAS-IN-ACTION

In this month's column, **Tex Swann G1TEX** brings you a few books, an unusual ring of an antenna, two requests for help and some comments about the v.p. antenna featured in the last 'A-i-A'.



## 49 ANTENNA WORKSHOP

Taking his place in the Antenna Workshop, **David Butler G4ASR** takes a look at how to use a coaxial transfer relay as part of an antenna system for use on the v.h.f., u.h.f. or microwave bands.



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## Charles Miller in reflective mood...

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# 54 RadioScene

**Ed NOED** discusses some ungentlemanly behaviour on the American Amateur Radio bands.



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**DECEMBER** Watch this internet page for details



## THE SMC SUPER INTERNET AUCTION

### CURRENT SPECIAL DEALS

#### Icom

IC756PRO HF/50	projected price £2000 to £2300
IC746 HF/VHF FREE 2 Mtr Handy	£1349
IC706MK2G HF/VHF/UHF FREE 2 Mtr Handy	£975
ICR2 Handy Receiver, FREE case and	reduced to £119
IC75E HF Receiver £699,	cash price £599
ICPCR100 was £199, bulk buy,	now only £169
AT180 (706 ATU) was £349,	now only £299

#### Yaesu

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# DECEMBER

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**A**s this issue of *PW* marks the start of my 11th year in the Editor's 'Chair' here at the offices in Broadstone, I was looking for something that could graphically illustrate my confidence in the future of our hobby to our readers. I was still looking when my good friend **Ian Brothwell G4EAN** sent me the ideal photograph!

Thank you Ian! And, in my opinion, although I can't remember the actual topic or statement I was making at the time - I think the photograph **really does** seem to reflect my optimism for the future, my enjoyment of our wonderful hobby and the delight I have to serve you, the reader, through *PW*.

Ian Brothwell is one of the **British Amateur Radio Teledata Group's** 'Stalwarts' and is a

dedicated Radio Amateur, a good friend and enthusiastic supporter of *PW*. He took the photograph of me (apparently 'preaching' from G3RJV's own lectern!) at St. Aidan's Church while giving - what has become - the annual *PW* talk at the G-QRP Club's Convention on Saturday October 23rd.

The annual talk (the Convention is a truly 'classic' older style rally/convention) has gradually developed into

a form of *PW* 'state of the nation' discussion and readers who come in to the church from the main meeting in the adjoining hall, to hear me 'preach' (I don't really!), pass on their comments and we discuss ideas for future items in the magazine. At the same time readers also give me much valuable 'feedback' on what's been published in the last year. So, you can realise just how much I value the 'Rochdale' trip every year!

### Confident Future

Ian Brothwell took quite a few photographs of the *PW* stand at the G-QRP Convention and it was particularly appropriate as the **Rev. George Dobbs G3RJV** and friends were celebrating the 25th Anniversary of the founding of the G-QRP Club. So, here I should also say 'Congratulations' to George and to the G-QRP Club from everyone here at *PW* and on behalf of readers too!

Whilst in a congratulatory mood, I should also like to

pass on my very best wishes to everyone in the Amateur Radio hobby on behalf of everyone here at *PW*. As the photograph clearly shows - I am confident that Amateur Radio has a good future ahead of it.

Our hobby has weathered initial 'official' reluctance to allow the hobby to start in the early 1900s, many wars, political conflicts and social changes. We may think that the hobby hasn't evolved as fast as technology, but in reality it has. Once seen as a hobby for the elite - it's now available to everyone.

It's our job here at *PW* to provide encouragement and support, via articles, ideas, practical projects and to report on what's happening. This - **with your support** - we will continue to do and, with confidence, a smile and optimism **we shall do it together** as we enter the new century.

Happy New Year everyone! May God bless your future and that of Amateur Radio too!

Rob G3XFD

ROB MANNION G3XFD SAYS THAT TOGETHER WE CAN LOOK FORWARD TO A BRIGHT FUTURE IN THE AMATEUR RADIO HOBBY!







COMPILED BY ROB MANNION



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.

## In Defence Of CB Radio

Dear Sir

With reference to Philip Pimblott's letter in the November 1999 issue of *PW* - I would like to put forward a positive aspect on the subject. I use CB everyday and have a Tandy 80 Channel hand-held in a car, powered from the cigarette lighter with a Magnetic Mount antenna. I have to use this quickly dismantled configuration as, in the course of my work, I go into oil refineries and chemical works and they do not allow you to have CBs (or any other type of radio) on these sites.

I do not use the CB at home, only in the car, and I find it invaluable as I do some 200-300 miles a day. If I arrive in a strange town I can immediately be directed to the door of my destination. I have the best traffic reports available from the 'Knights Of The Road' - the lorry drivers - and on a long journey enjoy conversations which can be anything from hilarious to educational.

Heavy haulage drivers on the whole are expressive in their language but not unduly foul-mouthed and if they are I put it down to traffic conditions. Let's face it, there cannot be many who don't drop the odd expletive when driving today!

I don't use a power amplifier and the use of CB radio saves me time and hassle. Using it reduces journey time and even if I do get stuck in a jam, I know what's going on and this alone makes the hold-up more palatable.

I suspect that Mr Pimblott is listening to CB

'Home Base' station operators, a minority who ruin things for the serious user. In the year I have had the unit in the car I have only found one instance of unjustifiable misuse by a mobile operator. Other mobiles have been polite and helpful. Maybe I have been lucky but I think a year's use allows me to speak with some authority.

If Mr Pimblott reported those who misuse the CBs in his area then he would be assisting the many users of CBs who use them in the manner that they were intended. I resent the fact that he infers that **all who use a CB are unskillful louts/morons.**

I am a Field Sales Engineer for a British company and I'm not going to list my qualifications here. But the systems I sell can cost between £50-500 000 each and I don't think my company would let me loose in the field if I was one of these.

The whole point of CB is that it's an easy-to-use communications method and the people who use them do so because they are that. We can't all be the same. Just because they don't have a 'full' licence doesn't make them any different from other users of radio, i.e. they want to communicate.

I myself am trying to study for my full amateur licence but am a bit frustrated as I spend every 2nd week away from home.

Perhaps Mr Pimblott would like to try and do something practical to improve the air waves for all of us and winkle out some of the miscreants.

**Jim Roberts**  
N Yorkshire

## Citizens' Band & The M5 Licence

Dear Sir

While I agree with some of Philip Pimblott G3XVP's views on Citizens' Band (*PW* November 1999), I was absolutely outraged by his ignorant comments on the A/B Licence. We M5s are neither 'half-interested' nor 'half-qualified'. My interest is surely proved by over 20 years as a dedicated s.w.l. As for qualifications, I worked very hard to pass the RAE and the same goes for the Morse. Finally, as a BBC-trained

professional broadcast technician, I am probably far more qualified to be on air than Philip V Pimblott will ever be!

**Jonathan Kempster**  
Milton Keynes

## Amateur Radio ... Not For Me!

Dear Sir

Philip Pimblott G3XVP's ('Letters' November *PW*) letter has single-handedly made me realise that Amateur Radio is definitely not the sort of hobby that I wish to be associated with (I was due to sit the RAE in December, but not now).

The letter has shown that anyone with an 'A' licence is narrow minded and arrogant. First of all not all CB operators are foul mouthed ... can you say that about Amateur Radio users? I think not. How many times have you heard someone tuning up over a QSO? To make matters worse, all you ever talk about is utter rubbish, i.e. the price of frozen chicken nowadays (listen on 3.5MHz any day of the week).

I also take offence at the remark about us all being IQ-zeros! Well, I for one have an HND in electronics and several more professional qualifications in computer related subjects, do you?

To sum up then, Morse is dead and, unless people like you buck up your ideas, so is Amateur Radio! Wake up and smell the coffee Mr. Pimblott because, as long as you and anyone like you are on the air, myself and countless others will not be sitting the RAE. Amateur Radio RIP!

**Neil Radley**  
Cardiff

**Editor's comment:** Naturally, I was most disturbed at Neil's reaction to another Amateur's opinion so I wrote to him to offer encouragement. The result is that (now he's cooled down a bit!) he'll continue his studies for the RAE. I also told him, although the Editorial team try to publish a 'balanced' number of opinions, that I refuse to be discouraged by some of the truly vitriolic letters arriving in the office for possible publication. I also ignore similar (sometimes personally directed at myself and/or

## Morse Letter Competition Winners!

As promised, we have pleasure in publishing the two winning letters in our 'Morse Letter' competition. Both winners, for the 'For Morse' and the 'Against Morse' category have been notified. Editor.

### For Morse

Dear Sir

I have heard many arguments for and against Morse code, or at least I would have heard them if I were not deaf. I receive code via a flashing light

connected to my rig and, being paraplegic, operate the key by blowing through a tube, but this has not prevented me from enjoying our hobby. Fortunately, Amateur Radio knows no boundaries.

I am lucky, my disabilities are fictitious, but I have friends who are so disabled. The importance of Morse in allowing people from all walks of life to communicate cannot be overstated.

Morse is self-regulating, who is going to reply to a code they cannot read? Abandoning Morse is defeatist. Encouragement should be the key word (no pun intended). A lower qualifying speed would mean more people on air, speed coming with practice.

Race, religion, sex and age are not barriers to our hobby, at present neither is language. Morse is

international, should we consider Esperanto as a replacement.

Morse allows communication between people in all countries. Radio Amateurs are ambassadors for international friendship. Let us remain so.

The interests of Amateur Radio must come before those of individual Radio Amateurs. We will all lose if Morse is abandoned.

**Stuart Constable M1BWU**  
East Sussex

### Against Morse

Dear Sir

Morse code is undoubtedly a wonderful means of communicating and I hope its use extends well into



my physical disabilities) comments on Amateur Radio 'Newsgroups' on the Internet. We must 'rise above' them all mustn't we?

### Amateur Radio and Pacemakers

Dear Sir

I was reading your 'Letters' page last night in the December issue which came yesterday. It was very interesting reading about the Pacemakers (letter from **Les Ward G4XGC**) and I have also written directly to Les.

For your information - you can publish the notes below for any other interested party. I had a pacemaker fitted in November 1988, it was a programmable dual chamber unit made by Genesis in USA. I had a new one in November 1997 (the batteries went down) and this one was made by Medtronic in USA (the information below came from them).

In October 1988, when I found out that I had to have these devices (I was in total heart block), I was naturally very apprehensive. So, I asked the cardiologist: "I'm a Radio Amateur ... what effect will my activities do to the pacemaker?"

I told him about the frequencies and power levels, and he replied with "No problem". I asked if I could get some samples, hang them on a line and 'zap' them with few kilowatts of r.f. and the one which doesn't smoke I'll have! (He had a good sense of humour).

When I had the pacemaker fitted, the manufacturers provided a manual with the unit, describing what it does, etc., and (more importantly) what it will do for me. I also noticed on my card (which I have to keep with me), that I should get advice from the hospital prior to undergoing any Electrosurgery, or any Nuclear Magnetic Resonant Imaging (NRFI) or Ionising radiation investigations.

I have to go to the Hospital's Electrocardiography (ECG) Dept. for a check each year. It was there that I found out that the pacemaker has a built-in Log and they interrogate it to check if it has had any 'funny' events. To my surprise ... they said to me that I had a couple, with the day and time! (I don't know about 'spies in the sky', I have one inside of me!).

Since having the Pacemaker, having it

fitted it hasn't hampered any of my radio activities. But with my new found energy I did get some lead boots ... to stop me zooming around!

Here follows the information provided by the **American manufacturers** which may be of help to readers who have pacemakers fitted:

"We've researched the literature concerning the effects of Amateur Radio broadcasts and their potential effects on implanted pulse generators. Most articles concerning the effects of electromagnetic interference (EMI) on pulse generators touch very briefly on the effects of radio frequencies.

"We've done testing on types of interference most likely to be encountered by pacemaker patients. One category of interference we tested was radio frequency. This covers the h.f. and v.h.f. bands from 1-200MHz. Amateur Radio, broadcast a.m. and f.m., TV, two-way communications, short wave diathermy and CB radios are in this range.

"Many transmitters have large power capability. Radio Amateurs are allowed a one kilowatt input in eight bands, commercial short wave goes to 250kW, broadcast to 50kW, two-way radio in emergency short wave regularly uses 150W in mobile installations. Implantable pulse generators may be affected, depending on the details of shielding and filtering in the device and the modulation of the interference signal.

"Testing was performed on 106 pacemakers comprising 20 different models from various manufacturers. Testing was conducted at interference frequencies of 3.5, 7, 14, 21 and 28.6MHz. No effects on pacemaker operation were observed in the presence of field strengths less than 200 volts/metre. Field strengths of this magnitude are unlikely except in the immediate

world of radio. A multipart exam should be introduced with a set time period between each stage to enable the operator to gain the required operating skills.

This approach may well solve a lot of the current problems - there are no doubt many very capable amateurs wishing to gain an 'A' class license but are being held back by the present indefensible and frankly pointless Morse requirement.

**Dick King**  
Hertfordshire

*Thanks everyone for a good debate.*

**Rob Mannion G3XFD**

## Letters Received Via The 'Internet'



A great deal of correspondence intended for 'letters' now arrives 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! All letters intended for publication on this page must be clearly marked 'For Publication' (on the letter itself). **Editor**

### vicinity of a high power transmitting antenna.

"Overall, our testing indicates that pacemaker patients are very unlikely to encounter problems with radio frequency fields. Certainly we would recommend avoiding direct contact with the transmitting antenna".

Cheers for now, have a good day.  
Regards to everyone!

**Adrian Chamberlain**  
Coventry

**Editor's comment:** There was a tremendous response to Les G4XGC's original letter, directly to him and to the PW office. I thank everyone for assisting, but I also add that we should ALL avoid direct contact with transmitting antennas, whether or not we use pacemakers!

### Real Potato 'Chips'?

Dear Sir

I know bioelectronics are making great strides but when I saw a "Book Profile" (September PW) review for a "3-Tuber set" circuit in an American book title, I thought 'Murphy's Law' had struck!

Although a freshly cut potato can be used as a detector along with all sorts of other unlikely arrangements, I think the circuit actually uses valves, so my happy thoughts of detector chips faded.

Nevertheless there is one pest that attacks vegetable and radio tubers - the wireworm!

**Anthony Hopwood**  
Worcestershire

**Editor's comment:** I've also used potatoes to power ZN414 radio circuits Anthony, (a large fresh 'King Edward' with copper and zinc electrodes inserted at opposite ends will provide around 1.2V) but I find the inevitable 'frying' noise in the background very annoying!

the 21st Century. However, the ability to send Morse at 12 wpm is of little use in bringing sanity to today's h.f. bands.

If most amateurs were honest I am sure they would admit that the Morse test was an unpleasant hurdle to be cleared to allow access to the h.f. bands - once passed rarely to be used again. One only has to listen to the present mayhem on the 'phone bands compared with c.w. bands to realise that the Morse test has done little to improve standards.

By all means have stepped exams to limit access to the bands but make them relevant. At present one cannot drive a Heavy Goods Vehicle (HGV) unless an advanced driving test is taken - the same should be applied to the

A LETTER PUBLISHED IN PW WINS YOU A VOUCHER TO SPEND ON ANY PW SERVICE





COMPILED BY JOANNA WILLIAMS & ROB MANNION G3XFD

# Headline News

### Exclusive Agreement

News in from South Midlands Communications Ltd (SMC) states that a "co-operative agreement" has been negotiated between themselves and Fairhaven. This agreement gives SMC "exclusive manufacturing and distribution



rights to the Fairhaven RD500VX radio database wide band receiver".

The RD500VX, the press release states, has some "unique" features one of which is a "54 000 capacity scanning directory database" and will provide SMC with an "ideal partner" for popular Lowe HF-150 receiver - also manufactured and distributed "exclusively" by SMC.

The press release, which PW received via E-mail, states that Clive Buxton of Fairhaven will now be

concentrating on the development of new products "which will then be manufactured and distributed by SMC". Applications are welcomed from parties interested in dealerships for the Fairhaven and Lowe receivers, SMC state.

If you would like to know more then please contact SMC on Tel: 0238-024 6222, FAX: 0238-024 6206. SM House, School Close, Chandlers Ford Industrial Estate, Eastleigh, Hampshire



SO53 4BY and ask to speak to Colin Thomas (consumer products) or Bill Simons (commercial products). Alternatively you can E-mail: sales@smc-comms.com or visit their Web site: www.smc-comms.com

### New Ultra Low Power Hand-Held

Essex based company, Waters & Stanton PLC (W&S), has been in touch with PW to announce that they are now distributing the Maxon SR-214 u.h.f. ultra low powered transceiver. This 10mW u.h.f. hand-held covers the 433.075-434.775MHz frequencies and is powered by just 2 AA batteries (not supplied).

With 69 channels, 25kHz spacing and full CTCSS encode/decode, these little hand-helds will be very useful for rallies and events which require very local communication, Jeff Stanton states and, although they are very low power, you do need a licence to use

one in the UK.

Jeff goes on to say that, priced at only £29.95 including VAT (each), you could buy two and still pay less than you would for "any other comparable hand-held on the market". (PW have secured two Maxon SR-214s for review, so keep your eyes peeled for it in a future issue).

In the meantime, more information can be obtained from Waters & Stanton on Tel: (01702) 206835, FAX: (01702) 205843. Spa House, 22 Main



### Web Watch

SMC Ltd  
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www.smc-comms.com  
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Rd, Hockley, Essex SS5 4QS. Alternatively, you can E-mail W&S on: info@wsplc.demon.co.uk or visit their Web site on: www.waters-and-stanton.co.uk

### Grundig Arbitrary Function Generator

Vann Draper Electronics Ltd have yet another new Grundig product on sale - this time it's the Grundig AFG-100 Arbitrary Function Generator which provides a wide frequency range of 0.01Hz-12.5MHz and offers "beside standard wave shapes of Sine, Square, Triangle and Ramp, plus a full Arbitrary facility". The generator has a large backlit 16 x 2 liquid crystal display (l.c.d.) which gives you a concise readout of frequency and setting modes.

The arbitrary function, so Vann Draper say, has a sampling rate of 33Ms/s and comprises of a horizontal resolution of 8192 samples and a vertical resolution of 1024 "dots" (10 bit). The wave shape can be defined or downloaded from a digital oscilloscope or PC which makes it ideal, Vann Draper state, "for simulating or synthesising stimuli signals for a wide range of applications".

Please contact Vann Draper for further details: Tel: 0116-277 1400, FAX: 0116-277 3945. Unit 5, Premier Works, Canal Street, South Wigston, Leicester LE18 2PL. E-mail: sales@vanndraper.co.uk or visit their Web site: www.vanndraper.co.uk



"amaze" you, he says and there's no 'setting up' to worry about.

Alan thinks that this kit would be suitable for both young and old newcomers to the Amateur Radio hobby alike and meets the requirements for one of the practical projects in the Novice RAE Course. Priced at just £8 plus £1 P&P (same price as the other two kits in the Lake Electronics Novice range - the Short Wave Receiver kit and the Audio Amplifier kit), why not have a go?

Contact Lake Electronics on Tel: 0115-938 2509, 7 Middleton Close, Nuthall, Nottingham NG16 1BX. Or E-mail: radkit@compuserve.com for more information.

### Changing Reservations

Changes in the reservation of Amateur Radio callsigns have been announced by the Radiocommunications Agency (RA), with news that Subscriptions Services Ltd. (SSL) have been awarded a further contract to administer Amateur Radio and Citizens' Band licences on behalf of the RA for another two years.

The RA press release (dated 19 November) announces the withdrawal of the present reservation facility for callsigns and an important new concession (for new applications only). The change is due in April 2000 (but may start before) and new callsigns will then be available 'out of sequence' (provided they have not already been issued or reserved) up to 'ZZZ' of a series. Up-to-date 'callsigns issued' details are available from SSL on 0117-925 8333. Any other enquiries should be made to the RA office on 0171-211 0160.

### Novice Kit for MW Band

Lake Electronics have introduced a new simple receiver for radio enthusiasts, this time it is a receiver for the medium wave (m.w.) band. The new kit works along the same lines as their short wave receiver and comes with quality p.c.b. and all components including a tuning capacitor and a crystal earpiece.

Alan Lake at Lake Electronics says that you can build this kit in "an hour or so" then connect it up to a PP3 battery, a five or ten metre length of wire for an antenna and "you're away"! Its sensitivity and selectivity will

### A Heartening Donation

Bob Glasgow GM4UYZ of the Cockenzie & Port Seton ARC has been in touch with PW about the £986 which they raised for the British Heart Foundation (BHF) as a result of various club events which took place over this year. This year, Bob says, the club was presented with a certificate from the BHF in recognition of all its fundraising efforts over the years.

In the picture here, you can see (from left to right): Cambell Stevenson MM1AVA, Bob Glasgow GM4UYZ, Harry Waugh GM7PPN, Peter Easton



## Baird's Lost Letters - Ray Herbert G2KU Reports

In September 1996 at a small provincial town, 74 letters exchanged between John Logie Baird and Will Day, his financial backer, were put up for auction. The estimate of £50-£100 was exceeded by a large margin and the letters were purchased by a dealer in rare documents for £9000.

As a former staff member of Baird Television Ltd, I was asked to make an in-depth assessment of the correspondence and to provide a report drawing attention to items of particular significance prior to the letters being auctioned again, this time at Christie's in London.

The letters cover the period from April 1924 to December 1926 and provide a new and factual slant upon TV progress at that time. Baird wrote 26 letters to Day, many in pencil on scraps of paper! The problems and frustrations facing a man who is convinced that he is engaged upon a major discovery are clearly revealed.

Day, a hard-headed business man with a radio shop in Lisle Street, Soho, wanted rapid results. On the other hand Baird, the struggling inventor, was constantly under fire for requiring additional funds.

It's clear from this correspondence that Baird was further advanced in his quest for true TV than previous accounts had indicated. By June 1924, he had obtained photocells and could produce images using reflected light. This represented a major step forward from the silhouettes which he and other experimenters had employed up to that time.



John Logie Baird - Television Pioneer

1925, which were demonstrated to members of the Royal Institution in January 1926. This disc and the letters were put up for auction at Christie's in October. At the auction on October 20th 1999, the bids rose briskly from a start of £40 000 until finally 'Lot 82' was knocked down to the Hastings Museum for £70 000.

These letters provide a few clues to some puzzling aspects of Baird's activities at that time.

One of these relates to his reluctance to make an announcement to the press when he won the race for true TV by showing pictures with gradations of light and shade on 2nd October 1925.

There were two very strange aspects to the historic event. Baird, most uncharacteristically, made no announcement of his success. In fact, nothing was revealed to the press until three months later. Stranger still, Day, in a letter to Baird during November made no reference at all to this important milestone in TV progress; indeed not a word of congratulation to his fellow Director. He just confirmed his decision to sell out for £500.

### Withdrawing Support

It's highly improbable that Day would have contemplated withdrawing his support had he been aware of recent events and it seems that Baird purposely kept him in the dark. The reason is not hard to find!

The relationship had worsened to the point where Baird would have preferred an association with a less abrasive character. He did not wish to reveal the breakthrough in case Day decided to

change his mind and retain his financial interest.

Will Day resigned in December selling his holding to Baird's old friend, Oliver Hutchinson, who may well have been waiting in the wings for some time. Significantly, with Hutchinson safely installed by mid-December, Baird gave an interview to the *Daily Express* on the 8th January 1926, followed by a demonstration to members of the Royal Institution shortly afterwards.

### Unanswered Questions

In spite of this cache of correspondence, there are still unanswered questions. For example, the true nature of John Baird's light sensitive cell has never been established.

Writing in *Wireless World* in 1925, Baird described the device as "neither a photo-electronic nor a selenium cell, but a colloidal (fluid) cell of my own invention". A different article in December 1926 referred to a colloidal solution containing finely divided selenium.

Certainly, a glutinous concoction of ground-up selenium in a jam jar would be in keeping with Baird's reputation for improvisation! On the other hand, did he keep up the pretext of a special home-made cell as a means of leading his competitors into thinking that they were wasting their time using commercially available photocells?

A feature of the historic letters, now rescued from obscurity by Hastings Museum (Baird worked in the town from early 1923 until the end of 1924) is the complete absence of extravagant claims. John Baird sets out the problems and modestly hopes that they can be overcome.

Contrary to the impression occasionally given in some quarters, he was essentially a modest person - approachable, courteous and entirely dedicated to the progress of TV. Although the letters are difficult to reproduce in the magazine - it will be very worthwhile seeing the letters in the museum, and you'll then realise the debt we owe to this often under-rated television pioneer.

Ray Herbert G2KU.

### Scanning Disk

The owner of the letters acquired at a later date the 32 hole scanning disk which almost certainly produced the first true TV images on 2nd October

Communications celebrated the 100th anniversary of this event with a re-enactment.

The event took place at Woodlands Vale mansion on the Isle of Wight and was hosted by none other than Princess Elettra Marconi - Guglielmo Marconi's daughter - Marconi Communications tell *PW*. It included a transmission of the original news stories from Woodlands Vale to a Fred Olsen ocean liner, *The Black Prince*, situated in the Canaries where Marconi's grandson provided passengers with a reproduction of the first newspaper produced at sea.

The day before this event took place, Amateur Radio operators from the **West Wight Radio Society** on the Isle of Wight participated in their own special event and were in world-wide radio contact celebrating the

## Gordon Cullingham - Author Of The 'Practical Man'

Very many readers will know of **Gordon Cullingham** - author of *F. J. Camm - The Practical Man* - through reading their own copies of his excellent book describing the prodigious work of the founding Editor of *Practical Wireless* (and very many other publications). Gordon, who was the Honorary Archivist and President of the Windsor Local History Publications Group, died on Wednesday 3rd of November 1999 at the age of 84.

Whizzing around Windsor on his battery powered invalid 'battery buggy', Gordon was a powerhouse of activity - despite his years and frail health. His meticulous attention to detail and friendly approach endeared him to everyone he came across ... including myself.

Most (around 95% so Gordon told me) of the F. J. Camm books (out of print at the moment) were sold to *PW* readers because of the interest shown at my own copy of the book which accompanied me to 'Club Visits' and in fact, Gordon always said he could tell where I'd been because of the orders for the book from readers in that area!

The book was a joint effort between Gordon and his son Roger and it was a classic example of an excellent 'self published' specialist book. So, on behalf of *PW* readers and the Editorial team I take this opportunity to express our admiration and sympathies to Gordon Cullingham's family. The *F. J. Camm - The Practical Man* book is a most fitting tribute to a truly dedicated researcher and archivist. Windsor should be proud of Gordon Cullingham.

Rob Mannion G3XFD



GM1RCP, Jon Innes GM7OLQ, Iain Lewis (Director for Scotland for the BHF) and Bill Gordon MM0BXX.

The *PW* team would like to say "Well done Cockenzie & Port Seton ARC and keep up the good work!"

### Global Media Centenary

On the 15 November 1899, Guglielmo Marconi made the first radio transmission of breaking news from the Boer War to a ship in the Atlantic Ocean - initiating the beginning of a new global media era. On the **15 November 1999, Marconi**

same centenary when they received a surprise visit from Princess Elettra Marconi! **Ben Clegg G7RER**, Operations Director at the West Wight Radio Society, tells *PW*

that, after signing the visitor's book, the Princess left leaving operators "stunned but delighted and with a parting promise that she would return for a formal visit in the New Year".



# RADIO BASICS

Now that a replacement i.c. for the much lamented ZN414 'radio on a chip' is available, Rob Mannion G3XFD says it's arrived just in time for winter projects. Try your hand building one ... they're great fun!

Many readers will have seen the good news ('Fresh 'ZN414' Chips' From Kanga) on page 45 of the December 1999 PW. Indeed, Kanga immediately received orders from readers as soon as the news was published - including one keen constructor who ordered 50 of the replacement MK484 'radio on a chip' devices!

At £1 each the MK484 provides astounding value-for-money and the device can provide almost 'bomb proof' guaranteed success for even first time constructors. I speak from experience, because over 400 of my little original ZN414 projects, using the circuit in Fig. 1, were produced by youngsters (average age around 11 years) over a five year period at a school club I used to run.

In fact, my daughter Alex (now living and working in London for a sound recording company ... quite appropriate eh?) enjoyed listening to her little ZN414 radio which was built into a torch case! The torch body provided a convenient 'case' for the radio - with the slide switch operating the

fixed tuned radio (it was tuned to BBC Radio 4 on 198kHz).

In place of the torch bulb and reflector I fitted a 'dynamic' (balanced armature) telephone receiver earpiece which - by coincidence, seemed to fit all the small torch bodies I used! She could then listen to the radio after 'lights out' in the dormitory, even though radios were not encouraged - she could have a torch!

The audio output was more than adequate for use close to the ear in bed - and the 1.5V battery would run the radio for up to a year (hence the fact I've not included an on/off switch in Fig. 1!). The receiver could also be set to receive either medium wave stations or the famous BBC Droitwich (Wychbold Farm) Radio 4 transmitter in the English Midlands.

So, now that the MK484 is available, let's look at a project that could provide you - or someone you're to build it for - a great deal of fun and some experience in building a radio. And, unlike many projects - you'll be very unfortunate indeed if you do run into problems because this is a very reliable circuit as my own experience has shown.

## Replacement Device

The main difference in the MK484 and the original Ferranti ZN414 is the 'pin out' configuration as seen in the inset in Fig. 1. So, it's important that you follow the details provided in this article to complete a working radio. In all other respects, the MK484 is exactly the same - and works just as well.

To be honest, I think that the pin-out details for the MK484 (Japanese made I believe) device has a more logical lead lay-out than the original. In fact, when I built some test radios to check the replacement i.c., I found it much more easier to lay-out in prototype form.

So, let's now look at building the project. It's very simple and you have several choices - all of them very practical, as you'd expect of course!

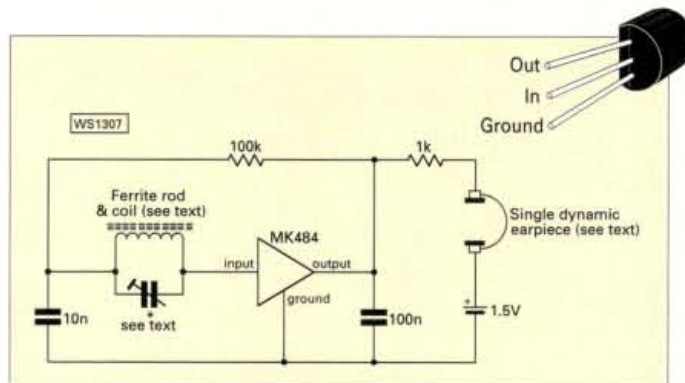


Fig. 1: The circuit for the MK484 radio project, with the pin-out diagram of the device inset. Please note that the pin-out details differ between the MK484 and the original ZN414 (see text).

## Building The Radio

If you're building the 'ZN414' type of circuit for the very first time I **strongly recommended** that you follow the lay-outs I suggest in the article. The radio will provide excellent results when built on the little 'components on the same side' printed circuit board (p.c.b.) design I've provided, Fig. 2, or the 'drawing pin' board lay-out in Fig. 3.

However, to avoid disappointment I **ask readers not to attempt** to build the project using Veroboard or any other form of parallel copper laminate track boards. I stress this point because **unless you are very experienced indeed you are unlikely to end up with a working radio on Veroboard!**

My warning about Veroboard is not because the matrix board design is faulty. Instead, it's because any problems or total failure will be directly due to the very high power gain (in the region of 70dB!) available from the

ten transistor tuned radio frequency (t.r.f.) receiver built into the integrated circuit.

'Cross coupling' and feedback pathways provided by the parallel copper tracks will almost certainly result in an efficient oscillator working on long, medium or even short waves ... rather than an effective receiver. Bear this in mind for this project and future high gain 'chip' based ideas!

## Important Earpiece

The circuit I'm providing this month will drive a single balanced armature surplus telephone earpiece very adequately. A single 'DLR' (I think this refers to the fact that the individual earphones are 'Dynamic Low Resistance') from an old pair of surplus headphones will also work well. But, although you'll be able to hear programmes by using portable cassette type headphones - these moving coil units are far less sensitive. So don't expect the same volume levels.

In the February issue of 'Radio Basics' I'll describe 'add on' amplifier ideas and show you how to use the 'Radio Basics' amplifier which featured in the series in 1999. Incidentally, with a good quality amplifier, the original ZN414 or the replacement MK484 will provide a good 'large speaker' portable set.

## Ferrite Rod Antenna

For best results, the ferrite rod antenna in Fig. 1 needs to be as long as possible. The longer the rod is - the better for reception! However, for local reception (regional medium wave services) I've had good results with ferrite rods as short as 40mm (diameter approx. 8mm).

The tuning capacitor - shown as a 'trimmer' in the circuit) is not critical in value. However, although most 'compression' trimmers seem to be in the range of (maximum value only quoted

## Component Suppliers

The MK484 t.r.f. radio i.c. is available for £1 (plus 50p P&P - any quantity) from **Kanga Products, Sandford Works, Cobden Street, Long Eaton, Nottingham NG10 1BL. Tel: 0115-967 0918, FAX 0870-056 8608.**

Ferric chloride (for p.c.b. etching) and other components are available from **Sycom at: PO Box 148, Leatherhead Surrey KT22 9YW. Tel: (01372) 372587.**

'Postage Stamp' type compression trimmers (500pF) are available for 50p (plus P&P) from **John Birkett, 25 The Strait, Lincoln LN2 1JF. Tel: (01522) 520767.**



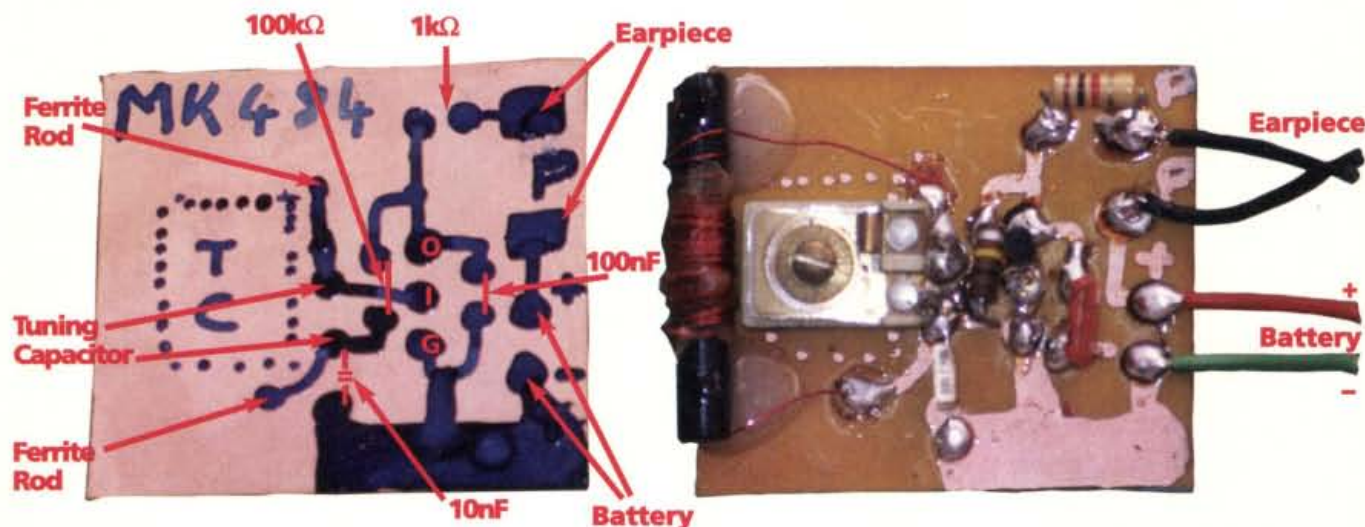


Fig. 2: Annotated 'components on the same side as the track' p.c.b. style design. The track design is marked with an etch-resist filled pen (left) with the resultant p.c.b. shown on the right. With a board size of 60 × 55mm either a polyvaricon tuning capacitor or trimmer (see text) can be used. The letters 'O', 'I', and 'G' on the p.c.b. pads represent the MK484 'Output', 'Input' and 'Ground' respectively.

as the lower values are debatable at best) 120 to 500pF, you can experiment with ferrite rod windings to achieve the coverage you require.

For long wave BBC Radio 4 (198kHz) reception, using a 250pF trimmer and 0.3mm diameter enamelled copper wire you'll need around 190 turns 'bunch' or 'pile wound' onto the centre of the ferrite rod. (Again, this is not critical, and I used a large variety of metric diameter wire (anything between 28 and 34s.w.g. will do, as you can experiment by rewinding, and it's very easily done for best results).

If, on testing the receiver you find the 198kHz signal can only be received by tightly 'screwing down' the trimmer - remove a dozen or so of the coil turns and try again. Conversely, if the Radio 4 transmissions can only be received with the trimmer fully 'unscrewed' - just add some turns

### Making Printed Circuit Boards

Never made your own simple printed circuit board? Don't worry - it's easy and great fun. Rob described the simple techniques in 'Radio Basics', July 1998. To encourage you to 'have a go' - back issues are available from the PW Book Service for the special price of £1 including P&P.

until it's comfortably in the middle of the range.

Medium wave coverage can be easily obtained by winding a coil (again it's 'pile' wound in the centre of the rod) of around 80 to 90 turns. You should aim to get BBC Radio 5 transmissions in the centre of the trimmer compression range (half 'screwed' in!).

You can use a 'polyvaricon' variable tuning capacitor - but if there's a limit to your budget or you like to 'make do and mend' like most of us - you can find a suitable bolt (not illustrated) which will pass through the trimmer body to permit 'tuning'

and enable a crude but effective 'tuning' knob to be attached to the far end. A very economical 'tuner' from the early transistor radio days!

### Constructional Considerations

Although straightforward to build - there are several constructional considerations to remember. Firstly, the 100nF (0.1μF) capacitor between the output and 'ground' is essential. Additionally, it's best to make the lead (and the 'path' to 'ground' as short as possible because it 'decouples' the

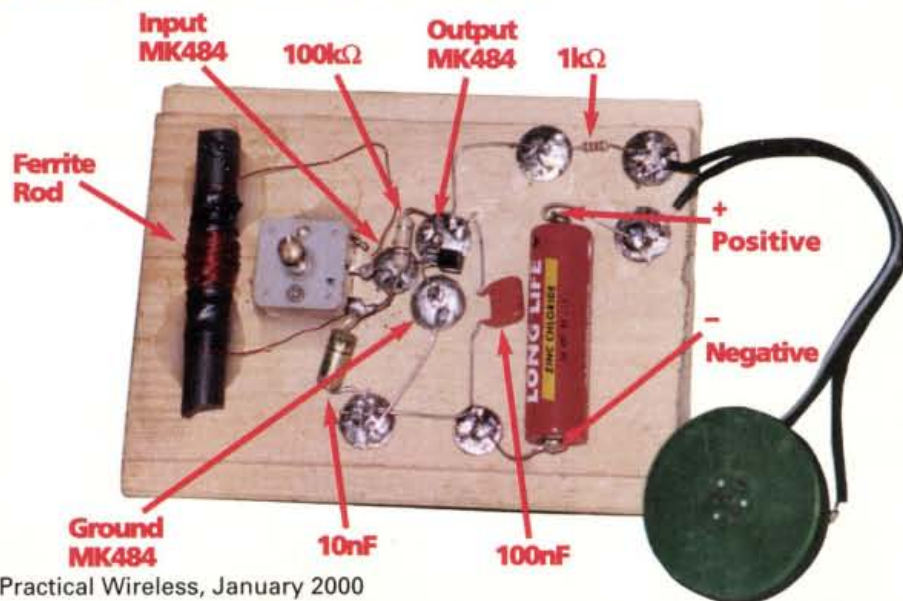
r.f. to 'ground' and helps stability, stops 'whistles and 'shrieks' in the earphone!).

The 10nF (.001μF) capacitor should also have as short leads as possible between it, the ferrite rod and 'ground'. Incidentally, please note that the trimmer capacitor (the 'tuner') is NOT connected to 'ground' directly.

The 1kΩ resistor (between the MK484 output and the earpiece and supply) is important. This has been selected to provide the best value for the automatic gain control (a.g.c.) level in the device. Without the resistor, or varying its value, can lead to distortion and overloading. Best to leave it as it is!

In the simplest version I've never bothered with an 'on off' switch. Connecting the earpiece automatically switches the receiver on. However, if you fit a jack socket, the act of plugging the earpiece lead plug into the socket will act as a switch. Remember - a standard 'AA' dry cell will run this receiver for up to a year continuously!

Fig. 3: Drawing pin-board layout for the MK484 radio. This is essentially the same as the p.c.b. lay-out in Fig. 2, except that the MK484 (although oriented in the same way) is connected to three drawing pins. Note that only two connecting tags are used on the polyvaricon tuning capacitor and that the plastic tuning knob/dial has been removed for photography.



### Build & Enjoy

So, off you go - 'Build & Enjoy'! Just be careful to 'heat shunt' the MK484 (protect it from the heat as you apply the soldering iron, by using needle-nose pliers on the leads) and follow the precautions I've mentioned and you'll really enjoy making the receiver.

At night, using a medium wave version a MK484 receiver I built to this circuit received 32 English language stations! However, the 'DX' (Asian Music and an Indian sub-continent language) I heard turned out to be from the English Midlands! Next month, I'll describe techniques and circuits for extending tuning coverage and increasing audio output levels. Cheerio until then!

PW



## COMPETITION

# Win

## An Alinco DX-70TH!

Yes ... you could win a brand new, fully featured **Alinco DX-70TH h.f. and 50MHz transceiver** (kindly donated by **Nevada**), currently worth **£599**, in our simple competition.



To enter the competition all you need to do is to **collect the special corner flash** in the **January** and **February** issues and then answer the questions on the Alinco DX-70TH which will be set on the combined final coupon/entry form to be published in the March issue of *Practical Wireless*. It's as simple as that!

Just imagine - you could enjoy working 'portable' or mobile in the same way Rob Mannion G3XFD does. "I wouldn't be without my two DX-70s" he says!

## RADIO DIARY

### 2000

**January 23:** The Lancastrian Rally will be taking place at Lancaster University. Routes from south - leave M6 off at J33, routes from north - leave M6 off at J34. Doors open at 1100, 1030 for disabled visitors. Entrance fee is £1.50. There will be a Bring & Buy, Morse tests on demand - two passport photos required. Licensed Café on site. For booking details contact (01772) 621954.

**January 16:** Oldham ARC will be holding their rally at the Queen Elizabeth Hall, Civic Centre, West Street, Oldham, Lancashire. Doors open 1100, 1030 for disabled visitors. Event features the usual traders and a Bring & Buy stall, Morse tests available on demand. Talk-in on S22 via GB4ORC, commencing 0730. Refreshments and free parking will be available. Details: (01706) 367454, E-mail: [m1cvi@netcomuk.co.uk](mailto:m1cvi@netcomuk.co.uk)

**February 6:** The 15th South Essex Amateur Radio Society are holding their Radio & Computer Rally at the Paddocks, (situated at the end of the A130), Long Road, Canvey Island, Essex. Doors open from 1030 and features include Amateur Radio, Computer & Electronic components exhibitors, Bring & Buy, RSGB Morse testing on demand (two passport photos required). There will also be home-made refreshments, free car parking with space outside main doors for disabled visitors. Admission is just £1. More information from **Brian G7IIO** on (01268) 756331 before 2100 please.

**February 6:** Harwell Amateur Radio Society will be holding a Radio & Computing Rally at the Harwell Science & Engineering Centre located just off the A34 between Oxford & Newbury. Doors open 1030-1530. Signposted from A34. Talk-in on 145.550MHz. Further details from **Ann G8NVI** on (01235) 816379 or on <http://www.hamradio.harwell.com>

**February 13:** The Northern Cross Rally is to be held at Thornes Park Athletics Stadium, Wakefield, in one large hall, just out of town on the Horbury Road, easy access from M1 J39 & 40 - well signposted and with talk-in on 2m and 70cm. Doors open 1100 (1030 for disabled visitors and Bring & Buy). Details from **Roy G0TBY** on (01924) 893321 (combined telephone and FAX number).

**February 13:** Cambridge & District ARC are holding their annual club Rally and Car Boot Sale in the Ambulance station at Addenbrookes Hospital, Cambridge. Opens at 1000 to the

disabled visitors, 1030 to the general public. There will be a Bring & Buy, WC, Bar, Talk-in on S22, car park, adults £1.50, children free. For further information contact **John Bonner G0GKP**, 40 Lyles Rd, Cottenham, Cambridge CB4 4QR. Tel: (01954) 200072.

**March 12:** The Wythall Radio Club are holding their 15th Annual Radio & Computer Rally at Wythall Park, Silver Street, Wythall, near Birmingham. Doors open 1000 till 1600 and admission is only £1.50. Plenty of traders in three halls and a large marquee with bar and refreshment facilities on site plus a big Bring & Buy stand. Talk-in on S22. There will also be a unique free park and ride for easy and comfortable parking. Contact **Chris G0EYO** on 0121-246 7267 evenings, weekends for details, or FAX: 0121-246 7268 or E-mail [chris@g0eyo.freemove.co.uk](mailto:chris@g0eyo.freemove.co.uk)

**March 19:** The Norbreck Amateur Radio, Electronics and Computing Exhibition, organised by the Northern Amateur Radio Societies Association (NARSA) at the Norbreck Castle Exhibition Centre, Blackpool. Don't miss the largest single day exhibition in the country. **Peter Denton G6CGF** on 0151-630 5790.

**March 19:** Bournemouth Radio Society's 13th annual sale is to be held at Kinson Community Centre, Pelhams Park, Millhams Rd, Kinson, Bournemouth. Doors open 1030 and close at 1630. Talk-in from G1BRS on 2m/S22. Amateur Radio and computer traders, clubs and specialised groups, excellent refreshments, admission £1. Details from **Olive or Frank Goodger, 66 Selkirk Close, Merley, Wimborne, Dorset BH21 1TP** or telephone (01202) 887721.

**April 16:** Swansea ARS will be holding their annual show in the Swansea Leisure Centre on the A4067 Swansea-Mumbles coast road. Doors open 1030-1700 and attractions include: trade stands, Bring & Buy, local interest groups and full catering & licensed bar. Admission is only £1, children just 50p. Further details from **Roger Williams GW4HSH**, Show Secretary, on (01792) 404422.

**May 7:** The Drayton Manor Radio & Computer Rally will be taking place at Drayton Manor Park, Fazeley, Tamworth, Staffs on A4091. Main traders in four marquees, large outside traders flea market, Bring & Buy stall, local clubs and special interest stands. Opens 1000 onwards. Trade information from **Norman 0121-422 9787**, other information from **Peter G6DRN 0121-443 1189**, evenings please.

**July 9:** The 11th York Radio Rally will be held in the Knavesmire Building, York Racecourse, York. Doors will open at 1030 and admission is £2 - children accompanied by an adult will be admitted free. Ample free parking, Amateur Radio, electronics and computers, Morse tests and repeater groups, refreshments and licensed bar. Talk-in on S22. Further details from **Pat Trask G0DRF** on York (01904) 628036.

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 any 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



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5W CW RF output (adjustable) on 160 to 20M bands, about 1W on 10M. Plug-in band filter. Very clean signal. Use with Rx and linking module for transceiver. TX2000 Kit: £24.90 (with one band filter). Extra band filter kits: £6.90 each. HA23R hardware pack (pictured lower left): £16.90.

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Fits in receiver to link to transmitter. Side-tone, muting, IRT, CW filter. Kit: £16.30

Total to build this QRP Station: £99.90 (plus postage)



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AB118	118 to 137MHz Active Antenna	£18.80	SPA4	Scanner Preamp. 4 to 1300MHz	£15.90
AT160	80 & 160M AM/SSB/CW Transmitter	£39.90	ST2	Morse Side-tone/Practice Oscillator	£9.80
CSL4	Internal SSB & CW Filter for our RXs	£10.50	SWB30	SWR/Power Indicator, 30W 1-200MHz	£13.90
DCS2	"S Meter" for direct conversion RXs	£10.90	XM1	Crystal Calibrator, 8 intervals + ident	£16.90
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(optional hardware packs are available to suit many of the above kits, please enquire)



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73 from Dave G4KQH, Technical Manager.

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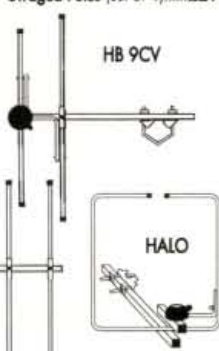
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# Carrying on the Practical Way

In his first column for the new century's first issue the Rev. George describes a 'booster amplifier' suitable for many receivers and transceivers. But first (of course) comes the usual 'appropriate' G3RJV quotation....

*"Take care of the sense and the sounds will take care of themselves."*

Alice in Wonderland - Lewis Carroll 1832-1889

One of the disappointing facets of many commercial Amateur Radio receivers and transceivers is the poor provision for audio amplification. I have seen some complex and more than technically 'respectable' Amateur Radio projects with the audio section terminating with an LM386. An 'ha'ppeney worth of tar' comes to mind!

(The LM386 is a grand little chip but more at home with the cheap and cheerful project than the expensive, complex, radio).

The same deficiency often applies to the loudspeakers installed in many worthy items of Amateur Radio equipment. What a shame to reduce performance for the sake of a little cost and a little trouble!

## Notable Exceptions

The notable exceptions to my criticism on the audio aspects are often found in amateur designed projects. For example, the 'Kitten', a multi-band transceiver designed in the 1980s by **Ian Keyser G3ROO** and the 'R2' phasing receiver designed by **Rick Campbell KK7B**, both used discrete component audio amplifiers configured for decent quality and output.

Both projects were not only well engineered but they also sounded very good. The policy of using the cheapest chip that will produce a sound is shortsighted design.

One specific item of Amateur Radio equipment which usually needs help in

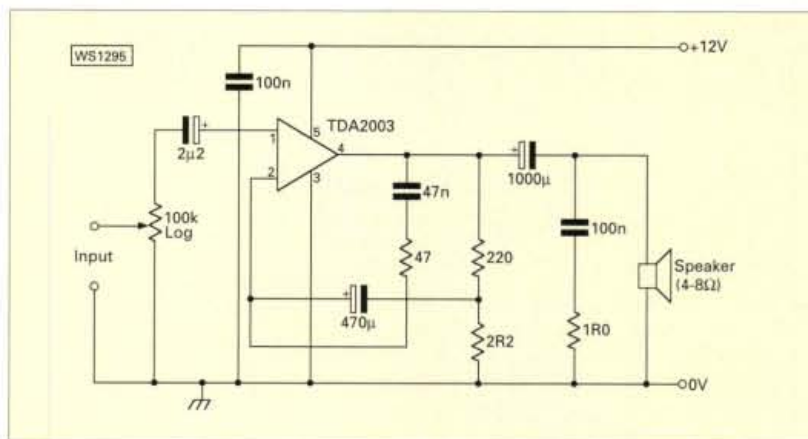


Fig. 1: The 'audio output booster' suggested by G3RJV (see text).

the audio department is the v.h.f. or u.h.f. hand-held transceiver. (I've usually had some kind of hand-held transceiver to give me coverage of the 144MHz band).

Because I'm not a keen v.h.f. operator, the hand-held transceivers have also had to serve as my base station and mobile transceiver. The main problem has been in the car, because of the increased engine, road noise, etc.

The amount of audio output and the speaker have rarely produced enough sound for the noisy environment. Because of this I've often been reduced to using a speaker-microphone and holding it close to my ear.

A very useful addition to using a hand-held transceiver for mobile working is an audio booster amplifier to plug into the headphone socket.

## Audio Booster

The circuit, **Fig. 1**, has worked well for me in the 'mobile hand-held' application. It uses the TDA2003, which is described as a "10 watt Car Radio Amplifier".

The TDA2003 is sold in two versions: vertical mounting (TDA2003V) and horizontal mounting (TDA2003H). It's designed to provide enough output, at good quality, for use in a car radio and uses relatively few external components to do the job. The chip is protected against d.c. and a.c. short circuit between all pins and ground, thermal over-range and voltage surge up to 40V.

I have used the TDA2003 in several applications and have found it stable and capable of good quality reproduction with relatively low internal noise. It also has the advantage of being inexpensive. I once built up a makeshift loudhailer for a church summer fair in about half an hour using the TDA2003!

The circuit in **Fig. 1** follows the convention suggested in the data sheet for the device. I trimmed the values slightly to match the parts I could find.

All audio amplifier chips provide a lot of gain in a confined space and can be prone to self-oscillation. I have found the TDA2003 less prone to this fault than many other audio chips I've used.



This month's project will provide better audio output for hand-held transceivers used in 'mobile mode' (particularly older models such as this Kenpro KT-22).



Self-oscillation can happen with the device especially if the circuit is laid out in a careless manner. If, after building the amplifier, it works **but appears to be too hot**, it may well be oscillating at some tens of kilohertz.

The problem can usually be cured with a little attention to the Zobel filter: that is the capacitor (100nF) and resistor (1 $\Omega$ ) wired across the output. Increasing the capacitor value, say to 220nF, will often provide a solution.

My version has little on the supply line, except for the 100nF decoupling capacitor. Some constructors might like to add better audio decoupling - say an electrolytic capacitor of some tens of  $\mu$ F. It may also be an advantage to add a series choke in the 12V line to reduce vehicle alternator whine (These can often be culled from defunct car radios).

I placed a 100k $\Omega$  volume control on the input of the amplifier. It may be better to provide a lower d.c. resistance to the amplifier output from the hand-held transceiver. (Most audio chips used in such transceivers continue to run without a low d.c. load but an option is to provide a 10 or 15 $\Omega$  loading for the transceiver's output.

## 'Ugly' Style

I built my booster amplifier 'ugly' style on a piece of small piece of printed circuit board material. The horizontal type TDA2003 is mounted on a wrap round heatsink which is directly bolted on to the board.

The wiring is point-to-point using close spacing with all the grounded component leads being soldered direct to the board. The layout follows the usual convention of keeping the input side remote from the output side of the circuit. (This is easy because of the convenient pin placements). The tab is common with pin 3, which is the ground, so no insulation is required between the device and the heatsink.

My amplifier board is bolted inside a car loudspeaker case. This was bought at a jumble sale\* which contains a 6in round loudspeaker.

**\*One of the advantages of being the Vicar! Editor.**

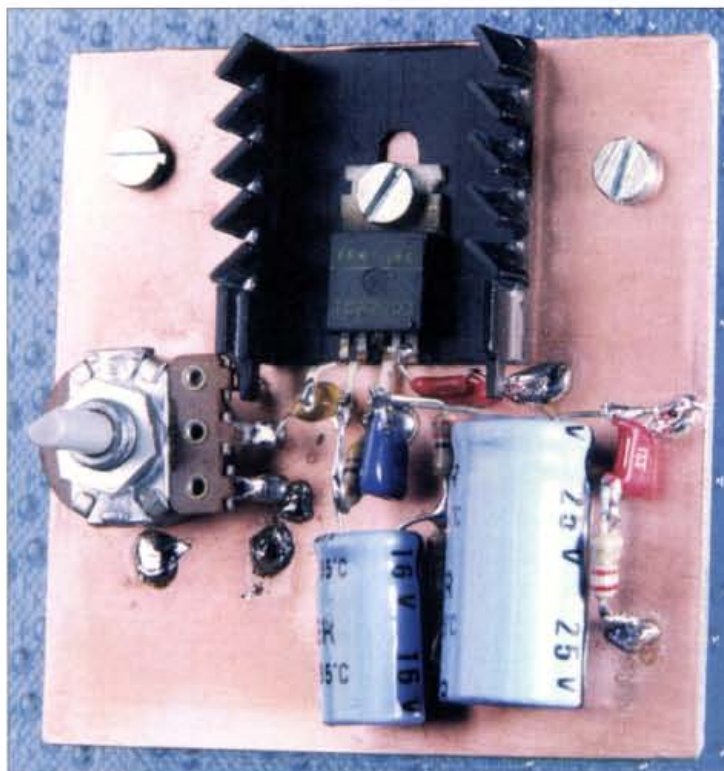
There are two volume control options, in the transceiver and in the amplifier. In practice, I found it better to keep the gain of the booster amplifier relatively high and the transceiver output low. This not only avoids over loading the TDA2003 but also the booster amplifier provides gain at better quality than the transceiver.

The gain control for the booster amplifier is inside the loudspeaker case and once it was set, I did not adjust it again. However, some constructors may like to have the volume control accessible from outside the case.

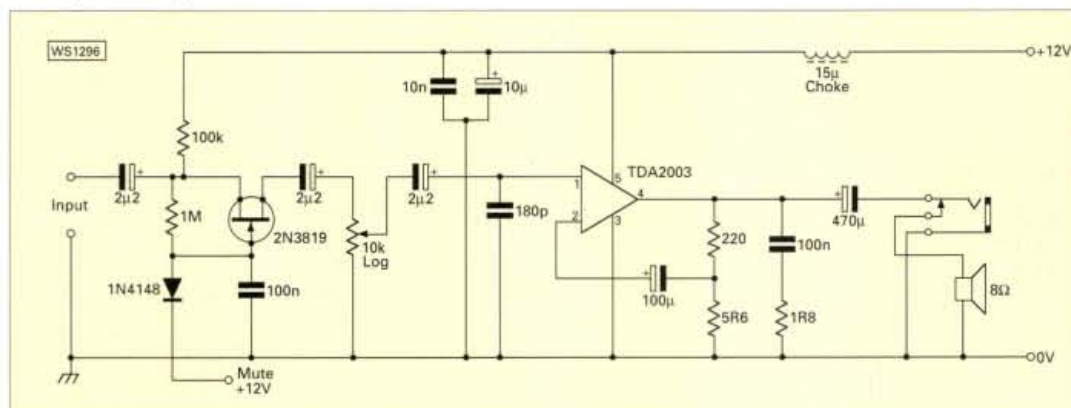
## Useful Device

The TDA2003 is also a very useful device for the audio stages of a homebuilt receiver or transceiver.

Practical Wireless, January 2000



This month's project is a booster amplifier suitable for many receivers and transceivers.



The diagram, **Fig. 2**, is an example of how it may be used in this application.

I've borrowed the circuit, with permission from **Sheldon Hands GW8ELR**, from the audio output stages of the Hands Electronics GQ-Plus Transceiver. (The GQ-Plus is a multiband Direct Digital Synthesis (DDS) controlled transceiver available in kit form). When I borrowed one for testing, I was quite impressed by the audio output and quality, and the circuit Fig. 2 is the same as that used in the GQ-Plus.

The TDA2003 is configured for a lower audio output and will run in this application without the use of a heatsink. The supply is better decoupled with a choke and two capacitors. (The 180pF capacitor across the input prevents stray r.f. signals entering the amplifier).

I've included the muting circuit, where the f.e.t. device is used as a d.c. switch to cut off the audio path when 12V is applied. (This mutes the amplifier during the transmit cycle of operation). This circuit offers a better alternative than many of more 'light-weight' circuits seen at the back end of homebuilt receivers. Try it for yourself ... you'll be pleased at the results!

**Fig. 2:** Suggested circuit for a receiver output stage, complete with f.e.t. 'muting' switching transistor. (Circuit reproduced with permission of GW8ELR, see text).

PW





# The IF Amplifier

## Part 2

Gordon King G4VFF is back this month to bring you the second part of 'Looking at ... The IF Amplifier' in which he discusses its primary task, the *Q*-Factor and combined a.m./f.m. receivers.

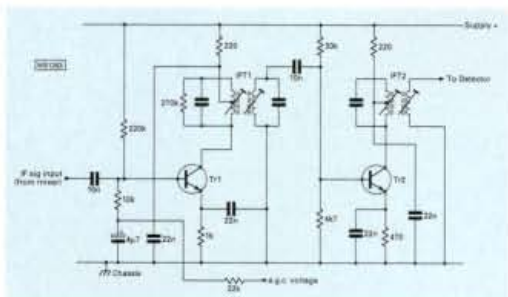


Fig. 1: Circuit diagram of a two-stage i.f. amplifier using npn transistors.

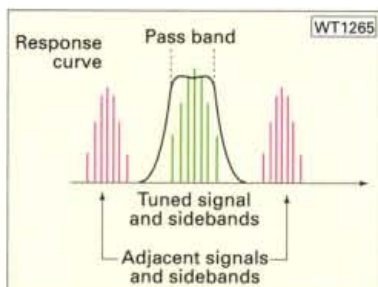


Fig. 2: A response curve like this would pass the wanted signal and its sidebands without clipping while rejecting unwanted adjacent signals.

With the advent of the superhet receiver, triode valves provided the i.f. amplification - but triodes operating in i.f. or r.f. mode encourage self oscillation. This is because the capacitance, which exists between the anode and grid electrodes, introduces a positive feedback path between the tuned circuits.

In the early days of wireless the feedback was defeated by neutralisation, which cancelled out or neutralised the coupling effect of the capacitance. The development of more sophisticated valves solved this problem with greater elegance.

Valves with additional grid-like electrodes,

interposed between the control grid and anode, combated the grid/anode capacitance and the potential instability, while improving the amplification

factor and other design requirements. The tetrode had one extra electrode and the pentode had two extra ones - screen and suppressor grids.

Such old time tricks are now essentially academic with the virtually exclusive takeover, by solid-state devices, in all the active parts of a radio receiver. The diagram, Fig. 1, shows the circuit of a two-stage transistor i.f. amplifier. Its earlier valve equivalent would have been remarkably similar, but using pentode valves instead of npn transistors.

## Primary Task

The primary task of the i.f. stage is to amplify the mixer signal to a level suitable for application to the detector. While at the same time it also ensures that all the appropriate sidebands of the wanted signal (but excluding unwanted adjacent signals and their sidebands) arrive at the detector without being clipped or distorted.

Transformers (IFT1 and IFT2) in the circuit couple the i.f. signal from the collector of Tr1 to the base of Tr2 and then from the collector of Tr2 to the detector stage. The transformers are resonated to the appropriate i.f. by parallel capacitors, tuning then being optimised by adjusting dust-iron cores in the coil formers. The plan, initially, is to get all the circuits on tune and then to slightly adjust the cores for the required response characteristic.

The response should be wide enough to allow the required signal and its sidebands to pass without undue restriction, but with skirts steep enough to attenuate adjacent signals and their sidebands. The ideal situation is shown by the response curve in Fig. 2.

Here the components of the wanted signal are nicely accommodated within the passband, while the unwanted signals either side fail to produce a response.

## Desirable *Q*-Factor

It's desirable for the transformer couplings to exhibit high *Q* factors, for it is then easier to tailor the circuit itself to yield the required bandpass characteristics. For example, to prevent the *Q*-factor of IFT1 from being unduly damped by the lowish collector impedance of Tr1, the voltage supply for the collector is connected to a tapping on the primary, rather than to the top of the winding.

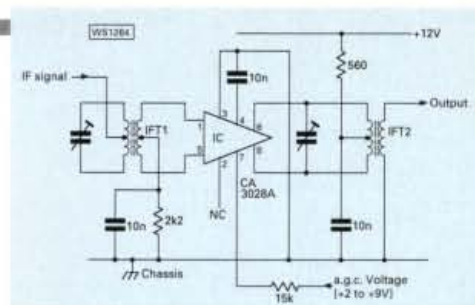


Fig. 3: An integrated circuit i.f. channel operating in balanced differential mode.

The *Q*-value required to provide the required passband can then be determined more precisely by resistive damping, such as by the 270kΩ resistor connected across IFT1 primary winding.

A similar supply tapping point is present on the primary winding of IFT2, but no further resistive damping is needed here because the damping by the detector across the secondary satisfies the requirement. For a similar reason there is no fixed capacitor across this winding.

## Combined Receivers

Combined a.m./f.m. broadcast receivers, using 'discrete' (non i.c.) circuitry, often avoid i.f. switching by having the primary and secondary windings of the 470kHz (a.m.) and the 10.7MHz (f.m.) i.f. transformers connected in series. This is possible owing to the difference between the inductive and capacitive reactances of the two series-connected tuned circuits at the different frequencies.

Hence, the a.m. i.f. transformer has little effect on the f.m. i.f. signal, while the f.m. i.f. transformer has little effect on a.m. i.f. signal, the transformers then behaving as though perfectly isolated in their respective a.m. or f.m. modes. The gain of the i.f. amplifier is adjusted automatically, depending on the signal strength, by the automatic gain control (a.g.c.). This then produces a voltage which rises with increase and falls with decrease in signal strength.

In Fig. 1, the a.g.c. 'control' voltage - which emanates from the detector - is applied to the base of Tr1 via the 10kΩ resistor. This resistor forms the bottom leg of the base potential divider, whose top leg is the 220kΩ resistor connected to the positive supply rail.

With a rise in signal strength, the a.g.c. causes the base bias to go less positive, which reduces the gain. Conversely, with a fall in signal strength, the a.g.c. causes the base bias to go more positive, which increases the gain. Hence, the level of i.f. signal applied to the detector holds reasonably constant despite variations in signal strength.

The speed at which the a.g.c. operates is determined by a resistive/capacitive (RC) time-constant, which is sometimes user adjustable. The a.g.c. is generally extended to the r.f. amplifier stage for enhanced control.

The drawing in Fig. 3 shows the circuit of an i.f. amplifier based on the CA3028A integrated circuit (i.c.). This operates as an a.c./d.c.-balanced differential amplifier. The amplifier is tuned to the required i.f. and response trimmed by preset capacitors, one across the primary winding of each transformer.

A decrease in signal strength increases the positive voltage from the a.g.c. source which increases the i.c. gain and, conversely, an increase in signal strength decreases the voltage and gain. Stage gain is around 100 times voltage (40dB) with 9V a.g.c. and falls as the potential drops.

The specialised i.c.s are extensively adopted in all stages of contemporary receivers and transceivers. Indeed, all the active elements of some broadcast receivers are now contained within a single chip!

Response tailoring is often handled by crystal and ceramic filters for the different bandwidth requirement, in addition to i.f. transformers, especially in communications receivers and transceivers. The response can also be sharpened by controlled positive feedback (*Q*-multiplication) in the i.f. channel, topics that will be looked at in a subsequent instalment. That's all for now, next time I will be looking at the a.m. detector.



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# YAESU FT-90R

## Micro Commander



Richard Newton GORSN was given the opportunity to review the Yaesu FT-90R 'Micro Commander' and says that it "packs a mighty punch for one so small". Read on and see what other surprises Richard uncovers.

It must be so difficult for manufacturers and their designers to come up with new ideas these days. Technology has been forging ahead at break neck speed over recent years and in the last ten years we have seen a huge difference in the equipment now available to us as amateurs.

It would seem that as a part of the mainstream manufacturers' bid to stay that one jump ahead has been miniaturisation. Yaesu appear to be attempting to establish themselves as being the company at the cutting edge of this phenomenon.

I was delighted when I was asked by PW (last year) to review Yaesu's ultra small dual-band hand-held - the Yaesu VX-1 - in the March 1998 PW. What a superb radio that was! Now I'm being given the opportunity to put the Yaesu FT-90R 'Micro Commander' through its paces.

The tiny FT-90R transceiver is an all-new, ultra compact, dual-band f.m. mobile rig and, although billed as a dual-band, the radio is what I would prefer to call a "twin-band" radio. It can only display one band at a time and it doesn't have a dual variable frequency oscillator (v.f.o.).

The FT-90R comes supplied with a power lead, mobile mount and an extensive handbook. The review model which I had came supplied with a normal fist microphone with four function keys.

My first impressions of the little rig were good. The unit is well made and tastefully finished in black metal panels and high impact plastic fascia. It has a reassuring weight to it and an N-type socket adorns the rear of the radio. (See Fig. 1).

I had been forewarned that this radio was small, yet nothing could have prepared me for what I saw when I opened the box! This little, and I mean little, radio measures only 100mm wide by 30mm high and 138mm deep (3.9 x 1.2 x 5.4 inches - not much wider than a 3.5 inch floppy disk!). Packed into this small case is a dual-band radio covering the 144 and 433MHz amateur bands.

### A Mighty Punch

The '90R packs a mighty punch for one so small, with variable output levels to a maximum of 50W on 144MHz and 35W on 433MHz! It also has an array of other features.

The heat sink on the FT-90R was much smaller than I

imagined it would be (see Fig. 1), which is due to the fact that the FT-90R has a fan inside the unit which is on all the time and varies in speed as and when required. You hardly know it's there and it seemed to do a very good job indeed. (See Fig. 2).

The fan can be set to operate in four separate ways by toggling through the menu for setting advanced options. You get to choose which one matches your operating style the best. Good eh? This little transceiver is almost entirely menu driven, which makes operating quite an art until you have begun to master the controls.

### Several Simple Tests

If you've read my reviews before, then you will know that I put the review radios through several simple tests. Basically, I'm interested in what the radio is like to use from a down-to-earth viewpoint and one of these simple 'tests' is to see if I can use a radio "out of the box", that is without having to read the manual inside and out. This, I feel, tests its user-friendly score.

As with other rigs which I have had for review, the FT-90R underwent this 'out of the box' test and I'm afraid to say that this tiny transceiver was the first radio to ever fail this test for me. It could be turned on and you could transmit but I'm afraid that almost every other function on the radio was a mystery to me until I read the book thoroughly.

At this point, I have to say that I realise that reading the manual is what you are supposed to do but I found that, during the six weeks in which I had the radio, I was having to take the handbook everywhere and I was constantly referring to it! I concede, with time (and as you get used to the radio), the need to constantly refer to the manual would pass but, I feel, that there seems to be a price to pay for miniaturisation.

I have a friend (yes I do - honest!), several in fact, one of whom is a guy called Hank K2HJB who lives in New Jersey, USA with his wife Jenine, son Matthew, and daughter Nicole. I E-mail Hank regularly and we occasionally speak on h.f. and in one of my numerous E-mails to Hank I mentioned the review and he informed me that he had just purchased a Yaesu FT-90R!

So, not letting a chance go by, I asked him for his comments and here's what my US correspondent has to say about his new radio:

"Hi Rich. The FT-90R is working out just fine. The only comment I have is that it's not a radio that you can use out of the box. The directions are a 'must read'. (At least for me!) Another thing about the FT-90R is the 'hair Trigger' on the 'mic'. I find myself sometimes keying up without knowing it. Maybe I'm nit-picking".

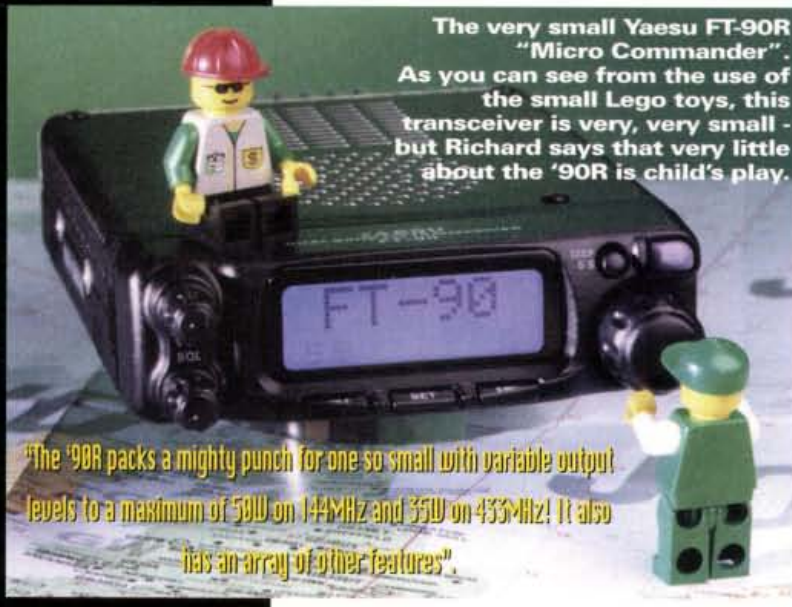
It was kind of Hank to take the time to comment and I've heard from him since and he is **delighted** with the FT-90R, he works at an airport and finds the air band receive very useful.

### Complex & Varied Nature

The controls on the FT-90R are few and belie the actual complex and varied nature of the radio's capabilities. The rig offers full DTMF, DCS and CTCSS which is excellent, as this is so often an optional extra. The fact that it offers **full capability on both DTMF, CTCSS and DCS tone squelch** means a **full range of tone alert and radio paging facilities**.

So, if you own another Yaesu radio fitted with the 'ARTS' system, then you can use it with the FT-90R. For those readers that don't know, ARTS is a system whereby two or more radios will 'poll' each other and bleep if still in range.

The FT-90R supports 1200 and 9600 b.p.s. Packet operation and has variable tuning steps. The rather impressive, blue





I.c.d. display can be backlit at varying degrees and I have to say that I think the display is excellent!

The frequency read out is very clear indeed and the display itself is uncluttered. Another nice touch which I noticed was the ability to reduce the microphone gain, which is done to assist with 12.5kHz spacing as it will reduce the deviation.

## Versatile Memory System

The FT-90R has a versatile memory system, which provides 180 standard memories and two pairs of band limit memories. As if that weren't enough, each of the two bands has been given a one-touch 'Home' channel and each memory can be given an alphanumeric designation.

I was impressed with the number of memories on the FT-90R, I was also impressed with what Yaesu call the 'Memory only' feature. This is where you can completely disable the v.f.o. and rely only on the memories programmed in. This little feature may be especially useful for some RAYNET exercises and certain club nights where you only want to use certain frequencies.

The Yaesu "Micro Commander" covers many frequencies which includes both air and marine bands. I enjoy listening to both of these from home which is quite handy really, as I live near to a small international airport and also very close to the busy shipping lanes of the English channel. The FT-90R did well on both bands but is obviously optimised for use on the amateur bands. This, I have to say, is the way I like it.

I also put the Yaesu '90R on my Tri-band W2000 antenna on my mast at home and got some good results on airband. The radio seemed to be almost as sensitive as my dedicated receiver. Marine band was perhaps a little down in comparison but still worked well.

## 'On Air'

I then decided to try the Yaesu FT-90R 'on air' and I put out a CQ call on 145.500MHz and got two replies! **Fred G0AQQ** in Southampton came back - he was running about 20W into a vertical antenna at about 29m (95ft) a.s.l.

We gave each other good reports, although there was some noise on the signal both ends and when asked to report on my audio quality, Fred said: "Sounds great"! Fred's location is about 56km (35 miles) away from me along the South coast.

The other station to reply to my call was **Lou G1ULZ** who lives a lot closer to me in an area called West Moors, a distance of about 8km (5 miles). He kindly gave me a good report on the audio quality of the FT-90R. He said: "It's very good indeed, you were instantly recognisable".

Lou then followed me to 433MHz to help out with some tests. He connected his Kenwood TH-79E hand-held to a half wave antenna and reduced his power to see just how the FT-90R would cope with receiving a low power signal.

Lou dropped to 500mW and I could still receive him quite well and, when he dropped to 30mW, the FT-90R could only receive him after I backed off the squelch, still pretty good I thought!

After this, I also had some other very interesting contacts on 145MHz. **Derek M1EGW** from Gillingham in Dorset called me. This time it was a trip of about 56km (35 miles) across country from the southern to the northern tip of Dorset.

Derek was a very good signal with me and he gave me a 5 and 6 report. He remarked on the transmitted audio from the FT-90R saying: "It's very, very clear, just as if you were in the same room".

Then, **Bernard G0FIR** called me from Shalfleet on the Isle of White and

Shalfleet is about 40km (25 miles) from me - as the crow flies. The signal also has to negotiate most of the Bournemouth/Christchurch conurbation so when Bernard told me he was operating 10W into a desktop antenna inside his house I was just a little impressed! Bernard told me that I was a "Nice signal" with "crystal clear audio".

All in all the FT-90R gave a good account of itself on air. It performed well and seemed to pull in the low signals and it didn't suffer from outside interference, despite being next to the computer in the shack and me living within a few miles of an awesome pager nest.

One thing which I did find a little frustrating was the fact that there is no visible indication that repeater offset has been enabled. The radio has automatic repeater shift but you can't tell when the repeater shift is in as there is no clue on the display until you transmit and the TX frequency is shown on screen. I was, however, pleased - in fact delighted - to see that at the press of a single button, I could easily monitor the reverse frequency.

## Main Strengths

The main strengths of the Yaesu FT-90R have to be its size, the build quality and sheer innovation of getting so much into such a tiny space. The radio is only about twice the size of the supplied microphone!

If you have a space problem in your modern car, I'm sure the FT-90R could find a home somewhere, especially if you utilise the detachable head and use the optional extra connection cable. The Yaesu FT-90R has all the functions you

would both expect and probably want to find on a modern transceiver. It is so gorgeously small! If you are partial to the miniature side of the Amateur Radio market then this is the radio for you!

PW

My thanks go to Yaesu UK Ltd for supplying the Yaesu FT-90R used for this review. They can be contacted on Tel: (01962) 866667, Unit 12, Sun Valley Business Park, Winnall Trading Estate, Winchester, Hampshire SO23 0LB.

The FT-90R "Micro Commander" costs £419 (RRP).

## Yaesu FT-90R Specifications

### General

Frequency ranges:

Receive:

100-230MHz, 300-530MHz, 810-999.975MHz (cellular and digital phone reception disabled)

144-146MHz, 430-440MHz

5/10/12.5/15/20/25/50kHz

F3, F2, F1

Transceive:

Channel select:

Emission type:

Antenna Impedance:

Frequency stability:

Operating Temp range:

Supply voltage:

Current consumption (approx):

50Ω unbalanced (antenna duplexer built-in)

±5 p.p.m. (-5°C - +60°C)

-20°C to +60°C

d.c. 13.8V ±15% negative ground

350mA (receive, squelched)

9.5A (TX, 144MHz)

8.5A (TX, 430MHz)

640g

Weight:

### Transmitter

Power output:

144MHz 50/20/10/5W

430MHz 35/20/10/5W

variable reactance

±5kHz

Modulation type:

Max. Deviation:

Spurious Emissions:

Microphone Impedance:

at least 60dB below fundamental

2kΩ

### Receiver

Circuit type:

Intermediate frequencies:

Sensitivity:

Selectivity:

AF output:

AF output impedance:

Double-conversion superheterodyne

45.05MHz and 455kHz

0.18µV @ 12dB SINAD

12/24kHz (-6dB/-60dB)

2W @ 8Ω for 10% THD

4Ω - 16Ω



Fig. 1: The rear of the FT-90R. Here you can see the N-type socket (bottom of picture) which Richard mentions in text along with the heat-sink (which is assisted by an internal fan), external speaker socket (top of picture) and power lead.



Fig. 2: Inside the top of the Yaesu FT-90R. Here you can see the internal fan (right) which can be "set to operate in four separate ways by toggling through the menu for setting advanced options". You can also see the internal speaker (left).



Fig. 3: Right-hand side of the FT-90R. Here you can see the microphone socket.



Fig. 4: The inside of the underneath of the Yaesu FT-90R "Micro Commander" - always remembering, of course, that this little rig is barely bigger than the size of a 3.5 inch floppy disk!





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ALINCO	DR-M06 6M FM 25W	£175.00	KENWOOD	TS 930 SAT	£600.00
ALINCO	DJX-10E HANDIE SCANNER	£200.00	KENWOOD	TS 180S	£295.00
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AOR	5000 BASE	£1,099.00	KENWOOD	TM-251E 2M FM	£195.00
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AOR	3030 RECEIVER	£395.00	KENWOOD	R-5000 HF 0-30	£550.00
AOR	8000 HANDIE SCANNER	£200.00	LINEARAMP	RANGER 811H	£650.00
CUSHCRAFT	R7000 ANTENNA 10 - 40M	£240.00	MFJ	986 A.T.U.	£160.00
CUSHCRAFT	X9 9 ELEMENT TRI-BANDER	£500.00	PAC COMM	TINY 2 TNC	£99.00
FAIRHAVEN	RD500 + KEYBOARD	£699.00	RACAL	RA 1772 RECEIVER	£550.00
ICOM	IC-275E 25W MULTI/MODE	£550.00	REALISTIC	DX-394 AS NEW HF	£90.00
ICOM	IC-471E 70 WATT 70CM	£450.00	TOKYO	HL-130M 180W 70CM ANP	£200.00
ICOM	IC-706 Mk1	£499.00	TOKYO	HL-63 70CM AMP 60W	£100.00
ICOM	IC-706MK 11 DSP TRANSCEIVER	£599.00	TOKYO	HL-60M 70CM AMP 50W	£100.00
ICOM	IC-725 TRANSCEIVER PLUS FM	£450.00	TRIDENT	TRX-100XLT AM/FM SCANNER	£200.00
ICOM	IC-726 HF / 6M/ MULTI MODE	£500.00	UNIVERSAL	M-8000 TERMINAL	£500.00
ICOM	IC-735 TRANSCEIVER	£450.00	YAESU	FT-10 HANDIE 2M	£100.00
ICOM	IC-737 BASE, INC TUNER 0-30MHz	£600.00	YAESU	FT-1000MP AC	£1,599.00
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KENWOOD	TS-430 HF 0-30MHz 100W	£350.00	YUPITERU	MVT- 7100 SCANNER	£150.00
KENWOOD	TS-440 SAT TRANSCEIVER	£525.00	YUPITERU	MVT-9000 SCANNER	£225.00



# Some UHF/VHF Transceivers A Novice's Perspective

Now that 144MHz is available to the Novice operators, Katherine Taylor 2E1HFX, a new Novice, was given the opportunity to review SIX pieces of equipment suitable for use by Novices from three different manufacturers. On these two pages are her thoughts on the Alinco DJ-195, the Alinco DJ-V5, the Hora C-150, the Hora C-408, the ADI AT-600 and finally the AKD-2001.

Now novices are allowed on the 2m (144MHz) band, there is a wider range of v.h.f. and u.h.f. transceivers that the new Novice might consider buying. Because there is more activity on 144MHz than there is on 430MHz, I think that a 144MHz transceiver will give a better chance of making more contacts - at least where I live! Calling CQ for hours on 430MHz is a disheartening experience!

For most young Novices, a transceiver needs to be an inexpensive one. So, *Practical Wireless*



The reviewer herself, Katherine Taylor 2E1HFX, with one of the hand-holds which she reviewed for *Practical Wireless*.

(Photograph courtesy of Dad, Neill Taylor G4HLX - adjudicator of the PW 144MHz QRP Contest!)

asked me if I would have a look at some of the lower cost models on the market - for both v.h.f., u.h.f. and also dual-band.

One thing that became clear to me was that, in general, the more you spend on a radio the better its performance, facilities and features. But while the rigs I tried had features varying from a broad-band scanning receiver to a mosquito repellent, what I was really interested in was ease of use and the ability to make contacts.

All but one of the rigs I had for review were hand-holds. The exception was the **AKD-2001** - a simple, no frills 144MHz base station which was very easy to use. However, it had to be switched to low power (5W) for Novices, the high power (25W) being too high.

Two of the hand-holds were for use on the 144MHz band: the **Alinco DJ-195** and **Hora C-150**, two were dual-band: the **Alinco DJ-V5** and the **ADI AT-600**. Finally, the very tiny **Hora C-408** is meant for use on the 432MHz band only.

## Alinco DJ-195 144MHz - £159

### Things I liked:

- ✓ It's smart and its appearance isn't too complicated.
- ✓ The audio is perfect - crisp, solid, smooth and clear.
- ✓ Its configuring features like repeater offset, tone burst, etc. was extremely easy (I managed without a manual which arrived a few days later than the transceiver for review).
- ✓ The receiver seemed quite sensitive.
- ✓ Very easy to operate - simple.

### Things I didn't like:

- ✗ I found it rather easy to activate the tone burst by accident because the button is too close to the PTT.

### Verdict:

I loved this hand-held and I think that it's perfect for 144MHz use. I'm not sure about the mosquito repellent though! As you can see I found that there were five good things about the Alinco DJ-195 and only the one bad point.

The Alinco DJ-195 is available from most local dealers or direct from **Nevada on Tel: 0239-266 2145, FAX: 0239-269 0626 or write to them at 189 London Rd, North End, Portsmouth PO2 9AE.**



## Alinco DJ-V5 144/432MHz - £229.95

### Things I liked:

- ✓ It looks really smart and the display and buttons have a nice back-light.
- ✓ The audio is very crisp, solid and smooth.
- ✓ Its configuring features such as repeater offset, tone burst, etc., were relatively easy to operate.
- ✓ The broad band scanning receiver receives everything including air band and my favourite f.m. broadcast station!
- ✓ It's easy to use and wasn't at all complicated.

### Things I didn't like:

- ✗ The size of the DJ-V5 was clumpy and too thick (mainly because of the battery pack) which made it hard to hold.
- ✗ Although it was dual-band you couldn't hear both bands at once.
- ✗ It has an SMA antenna connector instead of the more standard BNC (luckily my Dad had an adapter!)

### Verdict:

Fully featured, the Alinco DJ-V5 works very well and is great if you can afford it and want a dual-band transceiver. As you can see, it's good points outnumbered its bad ones.

The Alinco DJ-V5 is available from most local dealers or direct from **Nevada on Tel: 0239-266 2145, FAX: 0239-269 0626 or write to them at 189 London Rd, North End, Portsmouth PO2 9AE.**





## Flexibility & Portability

Hand-helds give flexibility and portability of course, however, all could use external loudspeakers and microphones so that they could also be used as a base station with an external antenna. For fixed station use, you may want to consider a suitable power supply, although the hand-helds which come with rechargeable batteries are each supplied with a charger.

When I tried using the hand-helds at a hill-top site with an antenna on a mast, I found that - **without exception** - on 144MHz, the receivers were overloaded by interference from a nearby commercial antenna mast. At home this was not a problem, but maybe it shows that there are limits to what you can use a hand-held for.

You can see what I thought about each of the transceivers in the notes here. If, like me, you're a Novice looking to buy your first transceiver, then any of the radios I tried would be a good buy. (With the exception of the Hora C-408 with it is a 430MHz band transceiver only and too low power).

## Final Thoughts

My final thoughts on the six pieces of equipment which I was lucky enough to be asked to

## Hora C-408 432MHz - £89.95

### Things I liked:

- ✓ The instruction manual is very clear and easy to understand - uses layman's terms but not in a patronising way.
- ✓ It's easy to use and not confusing.
- ✓ It has a simple design and the basics are all there.
- ✓ Configuring features like repeater offset, etc., were easy to use.

### Things I didn't like:

- ✗ It takes two AA cells which aren't provided and you would probably want to get rechargeable cells and a charger.
- ✗ It's too small to hold comfortably.
- ✗ The audio is a little foggy and the loudspeaker is buzzy.
- ✗ Power is too low (230mW) to be generally useful, which is only sufficient to get into your local repeater, if you have one.

### Verdict:

The Hora C-408 hand-held is, I feel, far too small and not powerful enough for serious use, unless you happen to live close to a 432MHz repeater.

For more details on the Hora C-408, please contact **Waters & Stanton on Tel: (01702) 206835, FAX: (01702) 205843 or write to them at Spa House, 22 Main Rd, Hockley, Essex SS5 4QS.**



## ADI AT-600 144/432MHz - £229

### Things I liked:

- ✓ The audio is clear and sharp.
- ✓ You can hear both bands at once.

### Things I didn't like:

- ✗ Doing things like sending a tone burst was quite complicated.
- ✗ It is quite heavy.
- ✗ Although I like the fact that you can hear both bands at once it can get confusing if you don't know what band someone is transmitting on.

### Verdict:

The ADI AT-600 is a good, true dual-band transceiver. It includes all the basics and many extra features.

For more details on the ADI AT-600, please contact **Waters & Stanton on Tel: (01702) 206835, FAX: (01702) 205843 or write to them at Spa House, 22 Main Rd, Hockley, Essex SS5 4QS.**



review are as follows. If you want 430MHz as well as 144MHz, then the dual-band transceivers are well worth the extra expense. In any case, as I expected, **the more you're prepared to spend on the radio the better it is.**

If portability isn't important to you, then the **AKD-2001** provides an easy-to-use base station. My personal favourites are both of the Alinco models: the DJ-195 will certainly be on my list of things I ask from Santa Claus this year!

PW

## Hora C-150 144MHz - £99.95

### Things I liked:

- ✓ Easy to operate.
- ✓ Configuring features like repeater offset, tone burst etc. was easy.

### Things I didn't like:

- ✗ It doesn't look very stylish and the appearance of the controls is rather confusing.
- ✗ The buttons are small and stiff.
- ✗ The manual appears easy to understand but didn't fully describe some of its features.
- ✗ CTCSS isn't fitted as standard - it's an option which costs more.
- ✗ The audio isn't very sharp.
- ✗ The receiver seemed (maybe) less sensitive than others.
- ✗ No rechargeable batteries supplied so buying these and a charger would be an extra cost (it takes either four or six AA cells).

### Verdict:

The Hora C-150 is a basic transceiver which, I feel, lacks advanced features. But, despite my niggles, it works OK and represents good value for money.

For more details on the Hora C-150, please contact **Waters & Stanton on Tel: (01702) 206835, FAX: (01702) 205843 or write to them at Spa House, 22 Main Rd, Hockley, Essex SS5 4QS.**



## AKD-2001 144MHz - £193.74 plus £6 P&P

### Things I liked:

- ✓ It's a simple, straightforward transceiver.
- ✓ The audio is really good - it is strong and sharp.
- ✓ Repeater offset, etc., is already programmed in.

### Things I didn't like:

- ✗ The instruction manual was a little confusing.
- ✗ All frequencies are already programmed in - the display shows channel number not frequency so you have to look up in the manual to find the channel for the frequency you want, which can take ages at first.
- ✗ It's a fixed transceiver - not hand-held, so you can't carry it around with you.
- ✗ You need a power supply which will be an additional expense.

### Verdict:

The AKD-2001 is a very simple, no frills, fixed transceiver which works well and is fine for your first base station.

For more details on the AKD-2001, please contact **AKD on Tel: (01438) 351710 or write to them at Unit 5 Parsons Green Estate, Boulton Rd, Stevenage, Herts SG1 4QG.**



HATHERINE ZEINER TAKES A BRIEF LOOK AT SIX UHF/VHF TRANSCEIVERS FROM THE VIEWPOINT OF THE NOVICE.



# Four Metres

## A Very Friendly Band!



The author, Derek Thom G3NKS, in his shack.

Derek Thom G3NKS tells you how he enjoys working stations on the 70MHz band, a band which he says is "unique" and in this article he explains why. He looks at equipment and antennas as well as describing his own station and why you too should try 4m!

**F**our metres is a unique band and one for which many, including me, have a special affection. But why is this? What are its attractions? I hope this article will provide some answers - but note the title above for a clue! This article is also, in part, my 4m story. The 4m (70MHz) band is unique because, until recently, it has been essentially a British Isles only band. The principal countries with long standing 70MHz amateur allocations are Ireland, the UK, the Channel Islands and the Isle of Man. Cyprus and Gibraltar also have allocations (but with little, if any, activity lately) and the Slovenians were granted the band in 1998.

### The Origins

Let's take a look at the origins of 'Four' metres. In March 1949 the old 56-60MHz allocation was withdrawn in the UK on the start of Band I TV transmissions. The 5m band was much missed by v.h.f. enthusiasts and so the RSGB suggested to the Post Office (which was then in charge of radio licensing) that a narrow frequency allocation be made available between the top of Band I TV and the bottom of 'low-band' p.m.r. (private mobile radio).

Several years of negotiations followed apparently involving the military, who then 'owned' that bit of the spectrum. Eventually, in November 1956, the Post Office announced that "70.2 to 70.4Mc/s was being made available to UK amateurs" and so the 4m band was born. For some years afterwards the band was subject to withdrawal at short notice, presumably in case the military wanted it back in a hurry!

### Early Days On Four

An early G3NKS log book reveals that I first appeared on 'four' in 1964. I was then living in Redhill, Surrey, with my parents (my father was Denis G3NKT) and my transmitter was home-built.

A crystal oscillator was followed by two frequency-triplers and a QQV03-20A p.a. amplitude modulated by a pair of EL34s.

The d.c. input to the p.a. stage (this was the way transmitter power was measured then) was 40W. On the receive side, a home-brew converter fed a CR-100 and outside I had a 4-element Jaybeam Yagi on a pole which could be rotated by the 'Armstrong' method from my bedroom/shack window.

My first QSO on 4m was with **Colin G3MOT** near Uxbridge on 14th August 1964. Colin now sports the callsign **G3TA**, is still active on 4m and lives near Cirencester. Other stations worked during my first months and who are still QRV on the band include **Heath G3HWR** now **GW3HWR**, **Ken G3LVP**, **Roger G3MEH**, **Tony G3SKR** and **Phil G3TCU**.

In the 1960s, 4m was very popular - activity was widespread and many nets could be found in towns and cities. Ken G3LVP tells how, during a trip to Portpatrick, Scotland, he spent an enjoyable evening working a long string of GIs. At that time, Japanese rigs had yet to appear and, partly thanks to the B44 and early ex-p.m.r. sets, there was more activity on 4m than there was on 2m (144MHz)!



See page 30 for a very special offer on this whip to get you going on 70MHz.



Fig. 1: A B44 military transceiver - ideal for 70MHz operation which was very popular in the early days. (Courtesy of Ben Nock G4BXD - PW 'Valve & Vintage' author).



Fig. 2: A Pye Cambridge mobile (bottom) and a Europa mobile commonly used on 70MHz. (Courtesy of Ben Nock G4BXD - PW 'Valve & Vintage' author).



## Home-Brewed Equipment

Home-brewed a.m./c.w. transmitters were the norm in the 1960s but, by the middle of the decade, the ex-military B44 had become popular on the 4m band (see Fig. 1), both as a base station rig and for mobile operation. The B44 was a single channel v.h.f. transceiver which produced 4W of a.m. The use of 70.26MHz as the first calling and working channel came about, apparently because a readily available crystal put the B44 onto this frequency.

By 1970, ex-p.m.r. sets such as the Pye Ranger had mostly taken over from the B44 but, being all valve, the current consumption at 12V was still heavy. These in turn were replaced by Cambridges (see Fig. 2), Westminsters and other partly solid-state radios - in both a.m. and f.m. varieties.

In the early 1970s, s.s.b. was establishing itself as the predominant voice mode, due largely to the arrival of affordable equipment from Japan. The first s.s.b. radios were for h.f. only, so transverters were used to get onto 4m (or other v.h.f./u.h.f. bands). Transverters were the best means of acquiring an effective and top-notch, v.h.f. capability.

The popular AKD-4001 f.m. transceiver appeared some years ago. In the absence of suitable commercial equipment, transverters remained popular for s.s.b./c.w. It wasn't until the appearance of the Yaesu FT-847 in 1998 that an all-mode rig which transmitted at 70MHz could be bought off the shelf.

Transverters and linear amplifiers for 70MHz were available from several suppliers but, regrettably, most have now ceased production. The only 70MHz high power amplifiers currently being marketed seem to be the TE range sold by Vine Antenna Products. There are still some 4m kits available, e.g. from **Hands Electronics, Sequence and Spectrum**. The private advertisements in *Practical Wireless* and elsewhere are a good source of second-hand gear.

Home-brew gear has always featured prominently with transverters and amplifiers and even complete transceivers still being built to designs published in *Practical Wireless* and RSGB handbooks. Modified ex-p.m.r. rigs are still popular, especially for local nets and they are, at least, cheap.

## Yagi Antennas

In the early days, a four-element Yagi antenna was state-of-the-art and on field days four-over-four stacked Yagis were sometimes employed. An enterprising group of Gs who visited Alderney regularly erected a stack of four 4-element Yagis - that was really something then!

Today, 6-elements on a 5m boom are probably the norm for a well equipped station, but eight, ten and even 12-elements are not unknown. "Top-gun" portables sometimes use huge arrays, such as stacked 10-element Yagis on 10m booms - but don't be put off by this! Smaller antennas are still popular and effective and long haul QSOs are readily achievable running low power and short Yagis.

For instance, until 1999, **Malcolm GM3TAL** in **Rosyth** (only 30m a.s.l.) ran 20W to 4-elements and regularly worked in to the Midlands and beyond. I've worked several stations in Yorkshire who were running just a few watts to a dipole.

## Tropospheric Propagation

Tropospheric propagation is the predominant mode on 4m but is subject to deep and slow QSB and signals from over the horizon often fade several S-points and more. When a signal fades into the noise, the best technique is to call the other station briefly at frequent intervals until contact is re-established.

Other modes usable include auroral reflections, meteor scatter, Sporadic-E (Sp-E) and, but only at the peak of the solar cycle, F-layer reflections. Sp-E is common during the summer, but not as prevalent as at 50MHz because a higher degree of ionisation is required. When Sp-E is present signals can be very strong and several S5 stations that I've worked were running less than 10W to simple antennas!

## My Station

At my station I use a Kenwood TS-120V h.f. transceiver driving a transverter and a BNOS 100W amplifier - the whole lot runs from 12V and can be used portable. On the tower is an Eagle 6-element Yagi at 12m a.g.l. (above ground level). For f.m. I have an ex-p.m.r. Yaesu VX-1000 which runs 20W to a Chelcom half-wave vertical at 13m a.g.l.

My QTH in Cheltenham is 100m a.s.l. and overlooks the town to the north, so the take-off in that direction is very good. On s.s.b./c.w. I can work up the western side of England usually with no difficulty. I used to talk regularly with **Mike G3FDW** in Cumbria until he became a Silent Key in April 1999.

Additionally, QSOs with GMs are not unusual and **Stewart GM4AFF**, near Montrose at 552km, is often workable. But to the south the ground rises 250m within a kilometre and, therefore (unfortunately), contacts with the Channel Islands and much of southern and south-eastern England are not easy. But when 'Four' is open via Sp-E, the hill doesn't prevent two-way QSOs with S5 or 50MHz cross-band QSOs with other countries.

On f.m. I often chat to **Mike GW1SXT** near Pontypool over a distance of 75km. I have worked mobiles, like **Ross G0WJR/M** who was on the M5 (well past Worcester and almost into Birmingham), say 50km away - I can't do that on 144MHz fm!

## The Band Today

The current UK 4m allocation is 70.0-70.5MHz and **Table 1** shows the latest recommended band plan and, (unlike elsewhere) on 4m, c.w. and s.s.b. have long shared the same calling frequency - 70.2MHz - and have happily co-existed in the sub-band either side.

Several advantages arise from this, not least of which is that in order to monitor activity I only need to tune to just one frequency!

The Irish allocation is 70.125-70.450MHz, which explains why the EI4RF beacon is on 70.130MHz and not at the bottom of the UK band along with most other beacons. The Slovenian allocation is 70.0-70.5MHz.

On the s.s.b. mode activity levels vary - on f.m. this seems less so, but is more patchy perhaps because of the shorter distances normally workable. Perseverance is the name of the game on the 4m band - call CQ frequently and monitor regularly!

The hour and the half-hour are good times to call. Weekends usually see the highest activity and Tuesday evening is 'Four Metres Activity Evening'! Also, you'll find that contests bring many stations onto the band.

(MHz)		WT1299a
70.000	Beacons	
70.030	Morse & SSB	
70.250	All modes	
70.300	FM, RTTY & Data	
70.500	@12.5kHz spacing	

Table 1a: The latest RSGB recommended band plan.

(MHz)		WT1299b
70.030	Personal beacons	
70.150	Meteor scatter	
70.185	Cross-band activity centre	
70.200	Morse/SSB calling	
70.260	AM/FM calling (mainly a.m.)	
70.300	RTTY / FAX	
70.325	Digital Modes	
70.350	Emergency Comms priority	
70.375	Emergency Comms priority	
70.400	Emergency Comms priority	
70.425	Used by GB2RS	
70.450	FM Calling	

Table 1b: Frequencies for specific purposes. These 12.5kHz channels are recommended for digital modes:  
70.3125,  
70.3375,  
70.3625,  
70.3875,  
70.4125,  
70.4375,  
70.4625,  
70.4875MHz.

70MHz Beacons			WT1300
70.000	GB38UX	Buxton	IO93BF
70.005	ZS5MTL		KG50IG
70.010	GB3REB	QRT (awaiting new site)	
70.020	GB3ANG	Angus	IO86MN
70.025	GB3MCB	Cornwall	IO70OJ
70.114	5B4CY	Cyprus	KM64PR
70.130	EI4RF	Co. Wicklow	IO63WD

Table 2: The 70MHz beacons.





Fig. 3: Derek's microwave module transverter (28-70MHz) can be seen here on the left of the picture with his microwave module 70MHz 100W amplifier (on the right).

## The Future

The future looks good as South African stations are due on about now, hence the exciting prospect of QSOs with ZS on 4m at the solar cycle maximum via the F-layer and within Europe a CEPT committee has recommended a 100kHz minimum band centred on 70.2MHz. This aim is a long term one as other services, including broadcast in Eastern Europe, will have to move elsewhere first.

Hopefully, as more countries follow Slovenia's lead and grant allocations sooner rather than later, there will be some good DX - **hopefully!**

## Why Work 4m?

So, why work on 4m? Although activity is confined mostly to the British Isles, the 4m band is very rewarding and great fun. It is a band where everyone is made welcome, where long-term friendships develop, where interesting QSOs are to be had and where rubber-stamp QSOs are the exception.

Locator square chasing is popular, but rag-chewing is much more so. Portable operation is another favourite, with people like **David GM4WLL/P** often activating rare squares or giving away points in contests.

The contests on 4m are fun and the pace is often leisurely as participants pause to exchange greetings or even chat! The quantity of QSOs on 4m may not be high, but the quality certainly is!

So, on that note, why not try the band? You'll receive a very warm and very friendly welcome! **PW**



Fig. 4: Derek uses a Tait T199 (made in New Zealand) low-band ex-p.m.r. set for his contacts on the 4m band. He says that these are available from as little as £5 (less crystals) and are easy to modify for 70MHz.

Join Derek Thom G3NKS on the 70MHz band with this month's special offer!

You can buy yourself an **AKD-4001 70MHz Transceiver** for just **£169.95** (RRP £193.75) plus **£5 P&P** - an overall saving of **£18.80!** (UK only - overseas prices on application).

Also on offer this month are two 70MHz antennas from **Sandpiper**. Take advantage of this offer and buy yourself a **1/4 Mag Mount mobile antenna** for just **£15** plus **£5 P&P** (UK only - overseas prices on application). Or you can treat yourself to a **70MHz 5 1/8 base antenna** for a mere **£40** plus **£10 P&P**. If you would like both the Mag Mount mobile **and** the 5 1/8 base then you will only pay **£10 P&P!** (UK only - overseas prices on application).

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ECP80	1.50	PY508A	3.00	6C4	2.00	805	45.00
ECH35	3.50	PY800/801	1.50	6CB6A	3.00	807	7.50
ECH42	3.50	QDV02-E	12.00	6CD6G	5.00	811A	7.50
ECH81	3.00	QDV03-10	5.00	6CL6	3.00	812A	55.00
ECL82	5.00	QDV03-20A	10.00	6CG7	7.50	813	27.50
ECL86	5.00	QDV06-40A	12.00	6CH6	3.00	833A	85.00
ECL800	25.00	U19	8.00	6CW4	6.00	866A	20.00
EF37A	3.50	UABC80	1.50	6DQ5	17.50	872A	30.00
EF39	2.75	UCH42	5.50	6DQ6B	10.00	931A	25.00
EF40	4.00	UCL82	2.00	6F6G	6.00	2050A	12.50
EF86	5.00	UCL83	2.00	6FD7	7.50	5687WB	6.00
EF91	2.00	UF89	4.00	6GK6	4.00	5751	6.00
EF183/4	2.00	UL41	12.00	6J5G	6.00	5763	6.00
EL32	15.00	UL84	3.00	6J5M	4.00	5814A	5.00
EL34	5.00	UY41	4.00	6J7	3.00	5842	12.00
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EM81/4/7	5.00	5R4GY	7.50	6SA7	3.00	7027A	25.00
EN91	7.50	5U4G	10.00	6SC7	3.00	7360	25.00
E280/81	5.00	5U4GB	10.00	6SG7	3.00	7581A	15.00
G232	8.50	5V4G	4.00	6SJ7	3.00	7586	15.00
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# 'New Lamps For Old'!

## Modifying Moving Coil Meters

The ever-practical Walter Farrar G3ESP describes how he sets about modifying surplus and unusually-scaled moving coil meters. So, don't throw that old meter in the rubbish tray - modify it the ESP way!



Fig. 1: A 'new lamp' for 'old'! This '5A' full scale deflection (f.s.d.) meter is in fact a 1mA f.s.d. instrument fitted with a 'shunt'. Find out how you can modify moving coil meters yourself, by the use of simple mathematics and a little skill and patience!



Fig. 2: Once the outer casing has been (carefully!) removed, the meter movement can be seen to advantage. In this example the calibrated scale has also been removed. The magnet can be seen immediately above the 'moving coil' movement, with the (very delicate) aluminium 'needle' pointing towards '10 o'clock'.

**M**oving-coil meters are useful devices because, whatever markings may be on the scale (volts, milliamperes, temperature, humidity, etc.), they are all basically alike inside. And they come in many different sizes!

The illustrations, Figs. 1, 2, 3, and 4 show a selection of meters after the 'ESP' treatment and what you can expect to see inside the instruments. The 'movement' which makes up the 'meter', when subject to a small direct current, from a few microamperes to 1 milliampere or more, will give a full-scale deflection (f.s.d.). This current passes through a coil of fine wire, pivoted so that it can rotate.

The current produces magnetism, which reacts with a fixed magnet, causing the coil to turn and move a pointer across a scale. The meter has an internal resistance which can be from 100Ω or less, to 1000Ω plus.

### Internal Resistance

The lower the f.s.d., the higher the internal resistance, as a rough guide. This can be easily measured using an electronic digital multimeter, but NOT an older pointer-across-a-scale-model, as this could wreck your meter movement.

To measure higher currents, the surplus current must be 'routed round the meter', rather like a by-pass round a village street. If you want to measure up to 100mA (milliamperes) say and your basic meter has f.s.d. 1mA, with an internal resistance of 100Ω, the circuit would be as in Fig. 5.

In Fig. 5, 99mA goes on the 'bypass' and through the 'shunt'  $R_s$ , while 1mA goes through the meter. The ratio of the currents is 1:99, so the ratio of  $R_s$  to  $R_m$  must also be 1:99. So the shunt resistance must be one 99th of the meter resistance, thus a tiny



Fig. 3: Close-up of the moving coil meter movement. The parallel 'slotted bar' below the movement is for needle 'zeroing' (this is achieved via an externally adjusted screw-slot mechanism).



Fig. 4: A selection of member movements after the 'ESP' treatment. Truly 'New lamps for old'!

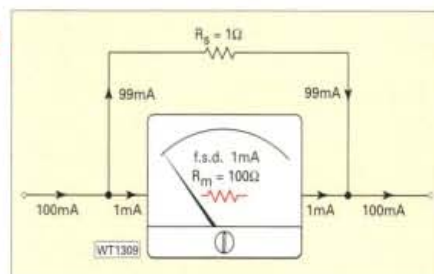


Fig. 5: If you want to measure up to 100mA (milliamperes), say and your basic meter has f.s.d. 1mA, with an internal resistance of 100Ω, the circuit would be as shown here.

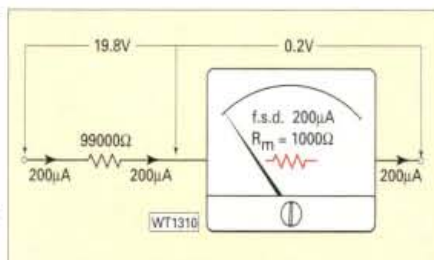


Fig. 6: If you wish to read 20V on this meter movement the total resistance will be  $20(V) \times 5000(\Omega/V) = 100000\Omega$ . As the meter itself has a resistance of 1000Ω, the series resistance will need to be 99000Ω. In practical terms a selected 100kΩ resistor should suit - see text)

fraction over 1Ω. (In practical terms a selected 1Ω 1% resistor will do).

For 500mA the shunt takes 499mA, so the shunt resistance will be  $1 \div 499 \times 100 = 0.2\Omega$  (near enough in practical terms).

### Resistance In Series

To measure voltage you need a high resistance in series with the basic meter. A voltmeter is given an 'ohms per volt' rating. A 1mA meter is rated as 1000Ω/V; a 200μA (0.2mA) meter is rated at 5000Ω/V; A 50μA (0.05mA) meter is rated at 20000Ω/V. Have you got the idea?

The best voltmeter will have the highest ohms-per-volt rating, so that application to a circuit causes minimum disturbance. Take, for example, a 200μA meter with a resistance of 1000Ω.

You wish (let's say for example) to read 20V. Therefore the total resistance will be  $20(V) \times 5000(\Omega/V) = 100000\Omega$ . But the meter itself has 1000Ω, so the series resistance will need to be 99000Ω (see Fig. 6). Again, in practical terms a selected 100kΩ resistor should suit.

### Rescaling Your Meter

To begin rescaling your meter you must first (carefully) open the housing. Square or round meters (usually with an outer casing made of black Bakelite) have three or four tiny screws to be removed, once you've done this, the case can be gently pulled apart. (Be aware that some 'Oriental' meter movements which I've seen were held together by 'Sellotape'!).

The exposed scale is held in place by two set screws. On removing these, the scale must be very carefully pulled out, avoiding damage to the delicately 'poised' pointer.

The old scale can now be covered with a self-adhesive label, trimmed to size. The new scale can be carefully drawn in black ink and calibrated as required. Re-assembly is the reverse of the dismantling process. It is 'fiddly', but it can be done!

I shall be happy to answer any queries on meter conversions on receipt of a stamped envelope (QTHR in any callbook). Good luck in making your own 'new lamps from old'!

PW



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# Let Your Fingers Do The Talking!

Peter Halls  
G4CRY explains  
how he enjoys  
'keyboard'  
Amateur Radio -  
and he has some  
suggestions as to  
how you too can  
enjoy keyboard  
operating.



**Peter Halls G4CRY -  
A Tribute**

I'm sorry to say that Peter Halls G4CRY passed away not long after he submitted this article. He was a great character and often had letters published in 'Receiving You' and latterly in the renamed 'Letters' page. Although suffering from advanced cancer he never lost his impish sense of humour - and it was a pleasure to know him.

Peter's wife and family wished the article to be published and we do so as a tribute to a courageous and friendly man. Thank you Peter - and it was a pleasure to let my few remaining fingers 'do the talking' in your memory!

**Rob Mannion G3XFD.**

**H**aving bought a computer, it makes sense to make good use of it and there are lots of possibilities in the shack. Many people use a logging package of some sort - I often use mine to write letters and I also confess to spending a lot of time on the Internet.

Most interesting of all, though, are the transmitting modes which actually require the use of the keyboard. I'm thinking especially of RTTY, although I suspect that many people equip themselves for RTTY only to give up because they find typing awkward.

All this is great in theory but, unfortunately, typing is not easy and many get no further than the two fingered 'hunt and peck' style. You can get away with this for typing documents because there's no time pressure but for a RTTY QSOs, there's a need for speed! If you're keen then you can enrol in a typing night class. In fact, if you want to be a professional typist, this is the only way. If you don't fancy that but are still determined to type, stick with me and I'll try to help you.

## The Problem

First, let's clarify the problem we're trying to solve. If you use your two index fingers only, then every time you want to type a character you have to move a finger to the key and press it. If you look at the keyboard and imagine you have just pressed 'W' and then want 'O', the thought process is quite complex.

First you have to find the 'O', then decide which finger to use, move the chosen finger to the 'O' and finally press the key. All that thinking and moving fingers takes up the time and if you want a 'shifted' character it's a lot worse. So the problem seems to be in two parts. First find the key you want and second move your finger to it.

## The Solution

Now we know what the problem is, we're in a position to work out a solution. To begin with, find a good chair of the correct height so that, with your hands on the keys, your forearms are level.

Now, if you spread both hands loosely over the keys, you can see that no key is more than an inch or so from a finger. Instead of using just two fingers for all the keys, give each finger a small group of keys to press.

Since you're teaching yourself, there are no rules about exactly which finger presses which key. You needn't even be totally rigid about it.

## The Deep End

To start with, put the two thumbs on the space bar and the right little finger on the RETURN key. Then, it's in at the deep end, start typing - this is a practical magazine after all.

Press each key gently, avoid pounding the keys. To make it simpler, just type a simple phrase. Try "Of all the fishes in the sea, the mermaid is the one for me". It's not very long and does not contain all the letters of the alphabet but it's a beginning.

Remember not to move your hands, only your fingers. It's very important not to try for speed at this stage. Go for accuracy and the speed will come later by itself.

You'll find it helpful to build up a steady rhythm and if you have one, a musician's metronome is just the thing - press the keys to the click of the metronome. Repeat the phrase of your choice over and over, remembering to use all of your fingers. Stay with the one phrase till you can type it in your sleep! You're building up a so called 'muscle memory'.

Think up other phrases to exercise other letters and if you want one with a 'Z' in it, try "Daddy's taking us to the zoo tomorrow" and don't forget to use the right little finger to press the single quote key. Make up other phrases for yourself!

## Final Tip

The final tip is to practice. It's always the way with these sorts of things but a little effort every day will work wonders. It does seem hard to begin with, but using only those two fingers is what is really holding you back! With your new found speed, you'll look forward to using the keyboard instead of dreading it.

I know I'm biased, but a very good way to practice is to use RTTY. To show that teaching yourself in this way works, I can now type much faster than my wife who used to be a secretary whose job depended on her typing and shorthand skills.

To summarise then:

- 1). Use all your fingers from the beginning;
- 2). Begin slowly then build up speed using 'jingles';
- 3). Press the keys gently rather than hammer them;
- 4). Borrow a musician's metronome to help develop a good rhythm;
- 5). Practice for about 15 minutes each day at least, but be determined to use all your fingers all of the time from now on whenever you use a keyboard.

Good luck with your new skill. Don't give up and keep practising.

**PW**

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# An Absorbing Project ... Building A Wavemeter

Carmel Fenech 9H1AQ, from Malta GC, describes how she tackles building one of the simplest - and most useful items of test equipment ... an absorption wavemeter

**A**s every licensed Radio Amateur knows, an absorption wavemeter is essential. This simple instrument, which doesn't in itself generate harmonics, is always used during the first tests on home-made transmitters ... or perhaps should be!

In Fig. 1 is a circuit of the wave meter in its simplest form. And I hope if you've not got one in your shack ... the situation will soon be remedied!

The principle of operation of a wave meter is as follows. If a coil (L1) is coupled to the power amplifier or transmitter and C1 adjusted until the circuit is resonated to the same frequency as the transmitter, then power will be absorbed by the wavemeter tuned circuit (L1, C1). This will cause a current to flow in the circuit so that Lamp LP1 will glow and the maximum brightness will be obtained when the wave meter is tuned to the same frequency as the transmitter.

There is, however, one disadvantage with the circuit in Fig. 1, this is because it's not very sensitive. Therefore it can only be used for checking the output of the power amplifier and the higher power stages in the exciter. (The power absorbed from the low power stages may not be sufficient to make the lamp glow).

The wavemeter could be made much more sensitive by modifying the circuit to the one shown in Fig. 2. In this circuit, if switch S2 is in the 'off' position, the damping effect the lamp has on the whole circuit is removed and the wave meter becomes a sensitive diode detector or demodulator. The output of which is fed to the meter which will act as a sensitive indicator, allowing a comparative reading to be taken.

The circuit can be used in other ways too. This is achieved by removing the meter and inserting a pair of high impedance headphones instead, enabling amplitude modulation (a.m.) signals to be monitored.

## Simple Techniques

I build my wavemeters using the following simple techniques: Coil L1 is wound on a 60mm long and 250mm diameter Paxolin (or other phenolic resin-impregnated cloth or paper tubing), or any stout cardboard tube of these dimensions.

The wire used is 30s.w.g. enamelled copper and the coil is secured to the chassis by means of

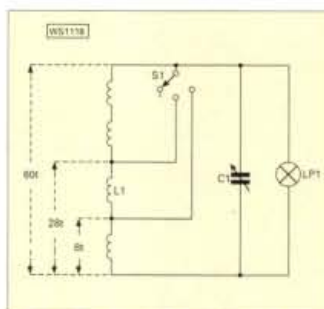


Fig. 1: The basic wavemeter circuit (see text).

'L' brackets. These can be made from pieces of brass or aluminium, or by means of a bolt and nut as shown in Fig. 3 a&b.

It's important that the coil is mounted with the smallest windings (the 6 turn tap) furthest from the chassis. The wavemeter is then housed in a box, the dimensions of the prototype are shown in Fig. 4.

Although dimensions are given in the diagram, these depend very much on the size of the components used. (i.e. the size of the variable capacitor, the wafer switch and the diameter of the meter used).

The calibration may be carried out with a calibrated oscillator, a dip meter, or a calibrated receiver. As most amateur stations these days have an accurately calibrated receiver, I'll describe the latter method.

With the receiver switched on and the antenna connected, a signal is tuned in at the low frequency end of the band to be calibrated. A coupling coil consisting of a few turns of sufficient diameter to slide over the wave meter tuning coil is then connected in series with the antenna.

The receiver's S-meter should be observed, while the wavemeter is slowly tuned. At one point, the reading of the S-meter will decrease ('dip') significantly indicating that energy is being absorbed from the signal frequency. This point can be marked on the prepared dial of the wavemeter.

The receiver is tuned to the next higher frequency and the process repeated until the whole dial is calibrated. It's as simple as that!

I hope you enjoy making your own absorption wavemeter. It's a useful 'tool' in the shack and there's something very satisfying when you build something that's so simple but which at the same time is very effective!

PW



Fig. 4: Dimension for the bracket - which can be formed from aluminium sheet (see text).

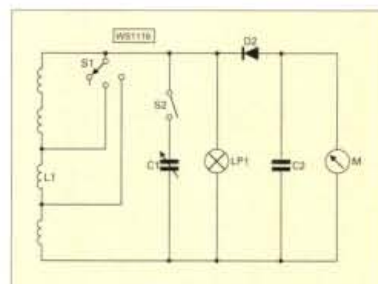


Fig. 2: A more 'sensitive' wavemeter circuit. **Diode polarity is not important (some diodes 'cathode' markings can be very difficult to identify) but is the meter pointer moves in the wrong direction you can easily reverse connections on the meter or the diode itself (see text).**



Fig. 3a & b: Coil winding details for the wavemeter project (see text).



The simple absorption wavemeter project described by Carmel 9H1AQ.



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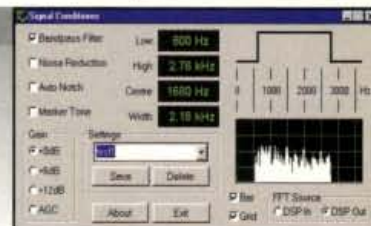
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### Model Name/Number

#### Construction of internals

#### Construction of externals

#### Frequency range

#### Modes

#### Tuning step size

#### IF bandwidths

#### Receiver type

#### Scanning speed

#### Audio output on card

#### Max on one motherboard

#### Dynamic range

#### IF shift (passband tuning)

#### DSP in hardware

#### IRQ required

#### Spectrum Scope

#### Visitone

#### Published software API

#### Internal ISA cards

#### External units

### WR-1000

### WR-1500

### WR-3100

WR-1000i/WR-1500i-3100iDSP- Internal full length ISA cards

WR-1000e/WR-1500e - 3100e - external RS232/PCMCIA (optional)

0.5-1300 MHz

AM,SSB,CW,FM-N,FM-W

100 Hz (5 Hz BFO)

6 kHz (AM/SSB),

17 kHz (FM-N), 230 kHz (W)

PLL-based triple-conv. superhet

10 ch/sec (AM), 50 ch/sec (FM)

200mW

8 cards

65 dB

no

no - use optional DS software

no

yes

yes

yes

yes

£299 inc vat

£359 inc vat

0.15-1500 MHz

AM,LSB,USB,CW,FM-N,FM-W

100 Hz (1 Hz for SSB and CW)

2.5 kHz(SSB/CW), 9 kHz (AM)

17 kHz (FM-N), 230 kHz (W)

200mW

8 cards

65 dB

±2 kHz

YES (ISA card ONLY)

no

yes

yes

yes

£369 inc vat

£429 inc vat

0.15-1500 MHz

AM,LSB,USB,CW,FM-N,FM-W

100 Hz (1 Hz for SSB and CW)

2.5 kHz(SSB/CW), 9 kHz (AM)

17 kHz (FM-N), 230 kHz (W)

200mW

3-8 cards (pse ask)

85dB

±2 kHz

yes (for ISA card)

yes

yes

yes

yes (also DSP)

£1169.13 inc

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RRP £1699 Transceiver only

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- MD-100 Desk Mic
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# The Carlton Experience

## Building A Kit Receiver

Although he now admits to using a magnifying lens when using smaller components - Rob Mannion G3XFD, with the able assistance of Tex Swann G1TEX - built a three band kit receiver. And by his own account - Rob enjoyed the experience!

As the really dark nights of winter are now here again (up here in the Northern Hemisphere anyway!) I had the idea of tackling a kit suitable for the average Radio Amateur listener to try out. I also considered that the idea of a kit might encourage one or two readers to try building something for themselves, perhaps for the first time.

I chose a kit from **Alan Lake of Lake Electronics** because I've never tried to build one of his well known 'Kits With All The Bits' before. My choice was the 'Carlton', one of Alan's long established kits. The Carlton is a three band (3.5, 7 and 14MHz) direct conversion (DC) receiver and is suitable for c.w. and s.s.b. reception.

Just in case you're not familiar with DC receivers, perhaps a few words on the technique will help. The technique of 'direct conversion' goes right back to the very early days of 'wireless' and although many people don't realise it - they are in fact 'superhet' receivers!

However, the main difference between DC receivers and the now standard superhet receiver is that, whereas the superhet version 'superheterodynes' the incoming tuned signal to a (either fixed or variable tuned) **radio frequency intermediate frequency** (i.f.) - where most of the amplification and signal 'processing' takes place - the DC receiver 'superheterodynes' (you can also use the term 'mixes' or 'changes') the incoming signal directly to audio frequency. And, in fact, the resultant audio frequency is the intermediate frequency of course.

The advantages of the DC technique are relative simplicity and a remarkably effective receiver. The disadvantages are numerous - the main drawback being that it's not possible to achieve 'single signal' selectivity. However, bearing in mind that most of the receiver gain is at audio frequency, with careful design and good quality audio filtering, DC receivers can be extremely effective!

In 1970 I built a Heathkit HW-7 DC transceiver which covered 7, 14 and 21MHz. One of the very first stations I worked with the HW-7 was on 7MHz and it turned out to be **Pat Hawker G3VA** who'd had (then) just recently written about the revival of DC in his justly famous 'Technical Topics' column in the RSGB's journal *Radio Communications (RadCom)*.

With a maximum transmitter output of 3W from the HW-7 and a (dreadfully!) 'microphonic' receiver (the slightest vibration on the casing made it 'ring' in my headphones!) I 'worked the world' including Australia and



The Lake Electronics  
Carlton Kit Receiver.

New Zealand. And the receiver on the HW-7 was nowhere as good as that on the Carlton!

I wasn't disappointed by my choice of Carlton kit, and even though working with small components and toroidal coils (more about this later) is not easy for me nowadays - I thoroughly enjoyed the project.

Because my main workshop and 'office' are packed away pending a move to a new home, I'm left with very basic workshop facilities. So, to help get over the problems associated with

metal work, cutting and drilling of chassis, etc., *PW*'s Technical Projects Sub-editor **'Tex' Swann G1TEX** volunteered (with only the slightest hint from me!) to look after that aspect of the kit project.

So, after the kit arrived in the *PW* offices - it was straight on with the job. And I've never known a weekend go by so quickly!

### With All The Bits

The Lake Electronics kits are promoted as 'The Kits With All The Bits' - and true to the slogan, I found everything I needed. All the constructor has to do is follow Alan's simple, straightforward A4 photocopied sheets - plenty of time and patience - and success should be easily attainable. However, if you do run into problems, Alan provides a full 'back up' service to anyone who builds his kits. Although you may never need it - it's there if you do!

All the components are good quality, everything is neatly packed and meticulously checked and you're also provided with 'three way' comparison lists and component position/identification/location diagrams. And although the Lake kit does not come into the old 'Heathkit' step-by-step category approach (I would not suggest this kit for the absolute beginner) the documentation is very good (I'm going to try a Lake DTR-7 kit for 7MHz next!).

In common with most UK manufactured kits with p.c.b.s., the Carlton kit boards were not provided with over-printed component overlay placements. However, the well-prepared and produced boards were easy to assemble thanks to the equally carefully prepared notes, identification sheets and component placement locator diagrams.

Like many other older Radio Amateurs (perhaps?) I still get confused between picofarads, microfarads and the more modern techniques and numbering systems used to identify capacitors such as '104' and 'nF', etc. So, to help 'dinosaurs' like me, Alan Lake has provided component identification lists where in straightforward terms he describes what you're likely to find marked on the component you need to identify.

Despite all Alan Lake's preparation and

**Rob G3XFD says**  
**"On the air the**  
**Carlton receiver**  
**works**  
**remarkably**  
**well indeed"**



previous work developing the kit though - I feel there's one omission ... and that's a magnifying lens! Joking apart, I really do think that if you're at the 'bifocal' stage of life (I am!) that you should ensure you have a magnifying lens to hand as it will help confirm the incredibly small printed markings and numerals on some of the smaller components.

## Building The Boards

I spent most of a Friday evening and the next day building the main boards. It was an enjoyable job and an interesting change building a kit - rather than building something 'from scratch' as I normally do.

It's my practice to use 'building block' circuits that I've got to know over the years, and this is basically the same approach adopted by Alan Lake as he takes you through 'stage-by-stage'.



Fig. 1: Everything arrives neatly prepared in easily identifiable sub-section packages.

Two of the boards were 'plain sailing' and were soon completed. However, when I came to the variable frequency oscillator (v.f.o.) board ... I ran into problems!

The problems with the v.f.o. board were **not due to the kit, or lack of forethought from the designer** - just the difficulty this kit-builder had with winding toroidal cored coils! And to be quite

frank, winding the toroids turned out to be the only really difficult job for me to do.

At this point, just in case you are not aware of the fact - it's important that I mention that I've have only one arm. This adds a few complications to my everyday life and obviously makes the job of winding toroids longer than it would do for anyone with the 'regulation' two thumbs and eight fingers!

The most difficult toroid to wind turned out to be that for 3.5MHz. Alan Lake's guide notes helped a great deal - but care, time and patience is needed for success. However, after taking well over an hour and a half to wind (with much undoing and rewinding!) the 3.5MHz toroid I can now confidently say that I'll be less concerned about winding them in future. It was an interesting and helpful learning process!

Testing the v.f.o. and audio boards was simple. In the case of the v.f.o. board the temporary wiring connections (to the variable capacitor for tuning) and to the power supply, etc., was very useful. Other section, including the product detector, are best checked 'on air'.

## Mechanical Assembly

As previously explained, I had recruited Tex G1TEX to help with the mechanical assembly work. However, I should point out that he'd assumed that he would be helping anyway! Thank you Tex!

Generally Tex did not come across any problems while assembling the chassis, case and preparing the sub-section interconnection wiring. The one small problem he came across (involving the adhesive backing on the 'stick on' white backing behind the tuning dial) was easily resolved. (On

talking to Alan Lake about it, Alan said he had come across the problem before but it was a very rare occurrence).

Like myself, Tex has limited access to metal-working tools but he does recommend that you practice a little on some scrap aluminium before having a go at the Carlton chassis and case. "I particularly recommended the use of a hole reamer tool - available from good tool shops or car accessory dealers" he told me.

From experience, both Tex and I can confidently tell you to expect the preparation of the chassis, case and final inter-connection wiring to take twice as long as preparing the p.c.b.s! This, of course, is because you'll take more time because you know that any slip or other mechanical mistake could spoil the look of the job.

But however long it takes you - you'll be proud to show the finished receiver off. "Look ... I made this myself" you'll say with justifiable pride.

## Start To Finish

From start to finish I've estimated the time for construction, final assembly, setting up and alignment to be around 25 hours. (That's the total time for G1TEX and my work).

'On the air' the Carlton receiver works remarkably well indeed. On the 7MHz band (a great favourite of mine) I found that despite its simplicity, the set enabled me to listen in on c.w. with ease. (There was minimum 'drift and warble' whenever I touched the tuning knob). The v.f.o. is very stable and, although I prefer to 'lock' the coils/toroids in

place with adhesive, the nylon cable-ties Alan Lake provides do the job adequately).

On s.s.b. I found the selectivity and performance of the Carlton to be very good for such a simple receiver. In fact (bearing in mind my experience with the old Heathkit HW-7) I was surprised at how well it could cope with 'splattery' signals, crowded bands, etc. I also found out (to my very great surprise) just how little microphony I could generate by gently tapping the case and in particular the tuning knob).

On all bands, but particularly 14MHz, I found the s.s.b. amateur transmissions easy to tune into, and the sensitivity was also adequate. However, as with any DC receiver, I strongly

recommend the use of a good antenna tuning unit (a.t.u.). This will provide better antenna matching and help decrease 'out of band' signals (particularly broadcast stations).

So, in summing up - what did I think of the kit and final project? In answer I have to say it was very enjoyable to build and if I'd only learned one thing - it was not to be frightened of toroids! Although one of Alan's older kits - it's still a very good buy for the money and a very enjoyable exercise - ending up with a useful little receiver and if you're anything like me - you'll be keen to have a go at another kit soon!

My thanks go to Alan Lake of Lake Electronics for supplying the Carlton kit which costs £69.50 plus £4 P&P. Further details from him at: Lake Electronics, 7 Middleton Close, Nuthall, Nottinghamshire NG16 1BX. Tel: 0115-938 2509.

PW



Fig. 3: The Carlton receiver's three-band v.f.o. printed circuit board incorporates toroidal cores, for 3.5, 7 and 14MHz. And although G3XFD says that winding the toroids may provide a challenge, he managed to complete the job!

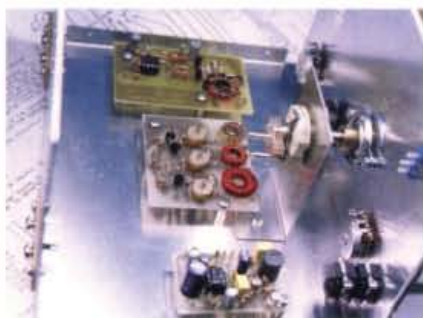


Fig. 2: Construction of the Carlton receiver kit is centred around three main printed circuit boards. These (shown completed and mounted within the main case) are the Product Detector (top), three-band v.f.o. board (centre) and audio amplifier board (bottom, immediately adjacent to the headphone jack socket).

ROB MANNION G3XFD HAS A GO AT BUILDING A 'HIT WITH ALL THE BITS'

"A very good buy for the money and a very enjoyable exercise"





The polished wooden cabinets, the smell of hot valves and Bakelite tells us that Charles Miller is looking after the vintage 'wireless shop' this month. In a reflective mood, Charles looks back on how he started off in wireless ... many years ago.

I'm frequently asked how I started out in radio and the answer is simple ... being that it was in the same way as most enthusiasts of my generation: by building simple receivers and then working my way up. This was during the Second World War, when the artificially high price of valves in Britain, as discussed in previous 'V&V' articles, was a sore handicap, especially because cheap foreign alternatives were unobtainable. Thus, the most you could aspire to was a one valve set employing a battery triode.

Although the battery triode was the cheapest type of valve on the market, it still cost around five shillings, which may not sound much if you convert it directly to 25p in modern money. However, when you consider that a motorist could have bought nearly three gallons of petrol for that amount you can see how difficult it was for a schoolboy to raise the necessary cash on the equivalent of about 5p a week pocket money!

Even if you could manage to raise the money, there was still the problem of the necessary batteries, which explains why so many of us started out by building crystal receivers. Not only did they need no power to make them work, you could aim to scrounge or make the components required.

### Toilet Roll Tuning

In theory the tuning coil was the easiest part to make because the established method was to wind 'x' number of turns of wire on the cardboard tube from a toilet roll and every house had one of these readily available, didn't it? Well, no, actually, because the less well-off families often had an outside 'privy' wherein hung a bundle of half pages torn from *The Daily Herald*, *Daily Sketch* or *Daily Mirror*, threaded on to a length of string.

A few years ago there was a joke going the rounds about a market researcher asking an old man, "as a lifetime reader of *The Daily ???*, which of its features do you most appreciate?" to which the ancient replied: "its texture". Believe me, this is a prime example of many a true word being spoken in jest!

You couldn't even be sure of being able to pinch a suitable toilet roll from the school 'bogs'. This was because thrifty Governors tended to favour an inexpensive brand called Izal, which came as single interleaved sheets in a little rectangular cardboard box!

There was an even cheaper alternative brand called Bronco which had the abrasive qualities of coarse sandpaper. But this brand at least did come on a roll and spared you the ultimate indignity of having to scavenge from middleclass dustbins! Fortunately

though ... all toilet roll formers look the same disgusting colour when they have been treated with shellac varnish to provide insulation!

### Wire Supply

As for the wire for the coil, our sole source of supply was to find something from which we could strip it, such as the bobbins from an old electric bell. Regarding the gauge, it mattered not that F. J. Camm or some other technical writer might specify 18 or 44s.w.g., because we just used what was to hand.

The same sort of luck of the draw applied to the value of the associated tuning condenser, because, again, we were limited to what could be acquired by fair means or foul. With hindsight, this was probably the reason for many of our sets being either grossly inefficient or covering any wavelength but what we wanted.

However, by the law of averages, we were almost certain at some time to hit on a combination of the correct gauge and number of turns for the coil and the correct value of the condenser. The receiver would thus be able to cover the medium wave band, on which the BBC Home and Forces programmes and, more importantly, the American Forces Network were broadcast.

Next, the keen constructors needed a crystal detector, a pair of earphones and a small fixed condenser to be shunted across the last. And remember ... all of this had (somehow) to be scrounged!

Fortunately, there must have been an awful lot of redundant radio bits lying around in attics and cellars, because we always seemed to find everything. Oh, yes, there was one other thing required ... some kind of cabinet in which to house the collection of hard-won components.

### Cigar Box

I seem to remember 'purloining' a rather nice little cedarwood cigar box, from my father and which he prized greatly. (Not that he ever smoked cigars. No, it was used as a receptacle for things like broken collar studs and old razor blades, which made it 'fair game' in my eyes).

Against all odds, these 'codged up' crystal sets actually worked, although tuning them was impossible in the accepted sense of the operation. You normally received only one station right across the band, the role of the variable condenser being restricted to adjusting for maximum signal.

I remember taking a crystal set with me on a week's visit to an aunt who lived near Folkestone, Kent and being chagrined to find that all I could hear were high-powered broadcasts in various foreign languages. I wasn't to know, of course, that aunty's house lay in a direct line only about 40 miles from the highest power speech transmitter in Britain, the 600kW 'Aspidistra' station at Crowborough, in East Sussex.

Hidden underground in Ashdown Forest, 'Aspidistra' was employed to pump out 'Black' propaganda to occupied Europe. That was in the days when 'We told Them' what to do, but I'd better not get myself started on that subject!

### Gleaming New HL2

Eventually, however, came the great day when you could afford to go to the local radio shop and return home with a gleaming new HL2 triode. (I'm willing to bet that if you asked everyone who started building one-valvers in the 1940s what they used, 99% of them would give the name of this celebrated Marconi/Osram valve).

The HL2 had its equivalents, of course, such as the



Cossor 210HL or the Mullard PM2HL. But somehow these didn't have the same charisma as the good old HL2.

Finding suitable circuits for 'one-valvers' was no problem at all, because they had been appearing in virtually every issue of every radio magazine since about 1922. All the circuits were more or less identical ... despite the frequent claims that such and such a one could knock spots off all others!

The source of filament voltage was usually a 'superannuated' accumulator. This would just about give enough voltage and current to run an HL2 for an hour or two on a charge without the slightest danger of over-running the valve.

The h.t. supply came from the same sort of source, old discarded batteries which were baked in the fireside oven in attempts to rejuvenate them. (By all the laws of chemistry this shouldn't have worked, but it really did appear to give them a bit of extra life).

Normally you adapted your existing crystal set coil by putting on another winding for reaction, after which you needed another small variable condenser for controlling the latter. Then all you had to find was a grid condenser and leak and maybe an h.f. choke and you were in business.

Crude as they undoubtedly were, these little one-valvers transformed our radio listening. After straining to hear a one-station crystal set it was magical to be able actually to choose what programme you wanted and to receive it at ample headphone strength.

Predictably, though, after the novelty had worn off we hankered after loudspeaker reception, which again put the finances under severe strain. Apart from the loudspeaker itself, what worried us was getting hold of a 'power' valve and upgrading the l.t. and h.t. supplies to run the receiver.

We could always hope that we might qualify for an increase in pocket money. Another possibility was that our parents, astonished and gratified at our success, might be moved to encourage us financially!

In my case I actually had graduated to receiving a weekly half-crown 2/6d (12.5 pence), on which all things were possible because there was a fortnightly local auction. There you could buy complete old 1920s receivers for a shilling to provide a source of everything needed for a two-valve, then a three-valve and even a four-valve set.

(How many, potentially, extremely valuable antique receivers were destroyed in the process, I hate to think. It just didn't occur to us to try to get them to work instead of stripping them for parts).

## Problem Power Supplies

The problem of l.t. and h.t. power supplies seemed likely to be eventually solved, in my case, when the war ended and the possibility of obtaining a mains electricity supply materialised. This was because in 1940 we'd moved from the South-East to a safer location in the Midlands and even though our new house-cum-shop was gaslit, there was a mains supply box in the corner of the shop, reputed at one time to have powered shoe repairing machines.

With the return of peace my father applied to the local council applying for a licence to wire the premises. This having been granted, a friend of his who was an electrician in a local factory was enlisted to do the work, with my assistance.

The first thing our electrical expert did was to open the supply box in the shop with a view to checking if it was 'live'. To this end he applied to it (with a couple of lengths of flex one in each hand) a test lamp in a brass holder. The result was, to say the least, spectacular!

The lamp went off like a bomb and the holder

disintegrated, showering the shop with bits of molten brass. At the same time our expert was hurled backwards into a heap on the floor.

What he hadn't reckoned on was that, since it had been intended to run machinery, the supply voltage was 420V, and d.c. at that. I was sure he'd killed himself but, incredibly, he just sat up, shook himself and smiled in a puzzled sort of way. The incident taught me a



"...the tuning coil was the easiest part to make because the established method was to wind 'x' number of turns of wire on the cardboard tube from a toilet roll, and every house had one of these readily available, didn't it?"

lifetime lesson about the potential dangers of electricity.

My own downfall - literally - came a couple of days later when I entered the bedroom over the shop to feed some cables under the floorboards. I was aware that some of these had been taken up at intervals and I needed to tread carefully. However, what I didn't know was that at one point the rolled up lino had sprung back into position to form a trap for the unwary. The result, again, was spectacular.

My surprise at suddenly shooting through the bedroom floor was more than matched by that of my mother and a lady customer who were in the shop below. The legs that suddenly appeared above them also brought down a large section of the ceiling and with it, a prodigious amount of plaster and dust!

The fall itself didn't hurt me a bit; it was hitting the floor at the end of it that did the damage to my legs. Meanwhile my mother and her customer, coughing and spluttering, were doing a creditable impersonation of two snowmen in a dirty snowdrift.

There wasn't a square inch in that shop that wasn't covered with filth and we were still brushing it up weeks later. Ever after a large plywood patch in the ceiling remained to remind me of the event and to warn me to be more careful in future.

In spite of everything, the wiring was eventually completed and passed as safe by the Council's Electricity Department and we received a 210V d.c. supply with the negative pole earthed. No one who hasn't had the benefit of such a supply will be able to conceive how much that meant to a young radio enthusiast with a roomful of battery powered equipment.

Making an eliminator to give the h.t. was simplicity itself, because it required only two or three dropping resistors and some 1µF decoupling condensers. Charging my accumulators was easy now because I could do it myself by simply wiring them in series with the 100W light bulb in my bedroom, so that they received a 500mA charge.

PW

## Health & Safety?

No doubt the modern health and safety 'police' would be horrified by a schoolboy doing the sort of thing I've recalled this month. But in those days we were taught to be self-reliant and to take necessary precautions on our own account.

If d.c. mains supplies still existed, I bet that there would be a million EEC rules as to what you must or must not do with them in your own home and I would take the greatest pleasure in breaking every last one of them. But, please, don't get me onto that subject (or tell the EU Commissioners) either!

CHARLES MILLER'S IN THE VINTAGE 'SHOP' & THIS MONTH HE TELLS YOU ALL ABOUT TOILET ROLL TUNING!



# Have You Ever Heard Of... The Japanese Hentenna?

Dick Bird G4ZU brings you his description of the Japanese Hentenna which, he says, has never been given the publicity that it deserves. Have you ever heard of it? No? Want to know more? Then this is the article for you!

Fig. 2: "It's a real puzzle!"



Japan now has one million licensed Radio Amateurs (more than all the rest of the world put together) and their leading Radio Amateur journal, *CQ Ham Radio*, runs each month to more than 500 pages! With such a massive home market, amateur equipment can be mass produced at very competitive prices, and names such as Yaesu, Icom, Kenwood, etc., are well known all over the World.

Just like the UK and the USA, Japan also has a number of leading antenna experts, but most of their papers are written in Japanese and translations are not readily available in English speaking countries. The names of Dr. Yagi and Dr. Uda may be familiar to us, but have we ever read any of their papers?

Looking at the other side of the coin, a Japanese Radio Amateur asked quite recently whether someone could explain to him the principles of the 'Half-G5RV' antenna, which seems to be very popular in the United Kingdom. For some months, I wrote a monthly antenna column for Japanese consumption and I've decided that, just for a change, I ought to let readers know something about what is going on in Japan.

So, as a first move in that direction, I am pleased to give you, in this article, my description of the Japanese 'HENTENNA'.

## Publicity It Deserves

The Japanese Hentenna was developed more than 15 years ago by the Japanese Radio Amateur - JE1DEU - but it seems that it has never been given the publicity which it deserves, either in North America or in Europe. It's a loop-type structure, similar in many ways to the well-known Cubical Quad, or some of the more recent versions of the 'Birdcage', but numerous independent measurements have shown that it outperforms both of these antennas by at least 2dB!

These measurements suggest that a two element Hentenna will have about the same gain as a 3-element Quad or a four element Yagi, while occupying very much less space. Japanese antenna experts were, at first, somewhat at a loss to explain the superior performance of this rather unusual antenna. Because 'Hen', in Japanese, signifies puzzling, or curious, the structure was popularly referred to as the Hentenna.

A normal Quad loop can be regarded as a pair of half-wave dipoles, stacked one above the other at quarter-wave vertical separation, with the ends folded at right angles to form a square.

At half-wave vertical separation, a pair of dipoles can give a gain of 4dB (6.15dB), but when the spacing is reduced to a quarter

of a wavelength, the gain falls to around 1.5dB. With a Quad loop, this nominal 1.5dB gain will be reduced to about 1dB, because the ends of the dipoles are folded over at right-angles.

Most v.h.f. operators are well aware that with multi-element stacked arrays, a vertical separation of at least half a wavelength is required to avoid overlap of individual 'capture areas'. Similar limitations apply when a Quad loop is used with a parasitic reflector. In ref. 1, Moxon has pointed out that, under such circumstances, nearly all of the theoretical 1.5dB 'stacking gain' will be lost.

One quite obvious solution to this problem I be to stretch out the loops in the vertical plane so as to approach half-wave separation. I (and also VK2OM), have tried this approach and there is a gain improvement of almost exactly 1dB. The feed impedance, when used with a similar shaped reflector, falls from 120Ω down to a convenient 50Ω, which obviates any need for a quarter-wave matching stub at the feed-point.

## Computer Analysis

Computer analysis indicates that, due to the lower impedance, the current in the upper and lower horizontal sections will be more than doubled and this very largely compensates for their reduced physical dimensions in the horizontal plane. It will be noticed that the dimensions are very similar to Bill Sykes G2HCG's 'Skeleton Slot', which used dimensions of around 0.2 by 0.5 of a wavelength.

The 'Skeleton Slot' is still used quite extensively by v.h.f./u.h.f. operators as the radiator section of 'Quagi' type arrays, because the increased vertical separation reduces the loss of 'stacking gain', which could result from overlap of the upper and lower capture areas. With the Hentenna, **Fig. 1**, this approach is taken even further and the loop dimensions are increased to 0.2 by 0.6 of a wavelength.

It will be observed that, from the two feed-points 'x' and 'y', the current flows in opposite directions and this helps to cancel out vertical radiation from the sides. Plot number 3 shows that the free space gain of a single Hentenna loop is 3dB relative to a dipole and 2dB higher than a conventional Quad loop.

Up until now, we've been comparing these various antennas on a 'free space' basis, but perhaps we should come down from the clouds and examine some of the more practical aspects. Because of the limited width, the 'slot' and the Hentenna are particularly well suited for use as fixed arrays, suspended from convenient tree branches.

The material cost is negligible and, with a little ingenuity, the direction of fire can be made reversible. The antenna will also be practically invisible, because wire of 1-1.5mm diameter is more than adequate.

At my own QTH I've mounted concentric 'slots' for the 14 and 21MHz bands, with little indication of harmful interaction. Recent correspondence in *RadCom* has suggested that it is rather misleading to compare the gain of an antenna close to ground with that of a dipole in free space and that the isotropic radiator is a much more realistic standard of reference, so the final plot, Number 4, shows the gain in dBi and vertical radiation pattern of my present 'two slot' antenna.

To approach such a gain with normal Quad loops, one would be obliged to use at least three elements, with quite a long and massive boom!

PW

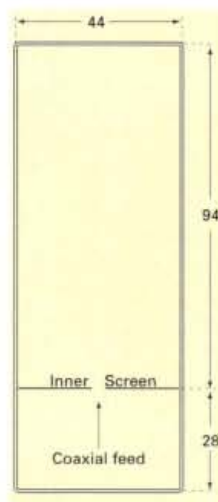


Fig. 1: Diagram of a Japanese Hentenna designed for 1.2GHz.



# Trader's Table

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Realistic Pro-26 25-1300MHz AM/FM/WFM 200Ch	£149
Realistic Pro-43 x5 68-999MHz (with gaps) AM/FM 200Ch	£99
RadioShack Pro-60 30-512.760-999MHz AM, FM, WFM 200Ch	£125
Realistic Pro-62 68-960MHz (with gaps) AM/FM 200Ch, Hyperscan	£139
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Albrecht AE-2850 40ch 4w CEPT Hand Held	£75
Maycom EM-27 80ch 4w UK/CEPT CB Mobile	£79
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# antennas in action

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

## welcome to AiA!



Hello and welcome to the first Tex Topics of the year 2000 volume of *PW*, although it's still firmly 1999 as I write (no wonder I become confused at times). In this month's column, you will find a few books, an unusual ring of an antenna, two requests for help and some comments about the v.p. antenna featured in the last 'A-i-A'.

G17EX

### Brand New Book

Let me start with several books that I have for your consideration and the first one and for me the most

interesting book is the brand new *Antenna Compendium Vol 6* from the ARRL. I mentioned this book in last November's 'Tex Topics' as having over 40 new previously unpublished antenna related articles, and I have

to say I'm impressed with the new articles.

Although the majority of the authors are American, two stalwarts of *PW* appear in the list. **Richard Marris G2BZQ**, who describes a ferrite rod antenna design for 'Top-band', and **Peter Dodd G3LDO**, who presents an h.f. skeleton slot antenna for 10-28MHz. Another UK callsign appears, that of **Les Moxon G6XN** albeit only as a reference to an antenna type, but the design (for 28MHz) has much to offer. Each of the 11 sections has between one (Antenna Modelling) and six new articles to show (most have four or five articles).

The new volume, with over 240 pages, is broken down into several

sections, these being: '10 Meter (sic) Antennas', 40, 80 and 160 Meter (sic) Antennas', Antenna Modelling,

'Measurements and Computations', Multiband Antennas', Propagation And Ground Effect', 'Quad Antennas', Special Antennas', 'Towers and Practical Tips', Tuners And Transmission Lines', Vertical Antennas' with the final 'chapter' titled 'VHF/UHF Antenna'.

A CDROM accompanies the new *Antenna Compendium Vol 6* on which may be found the electronic models of most of the antennas to be found within its pages. There are other files in '.PDF', the 'portable document format' for which there are free 'readers available from Adobe (to be found on the *PW* Callsign CDROM too). Although there is only the one article, the small section on antenna modelling commanders most of the space on the CDROM with data.

Many of the computer models of the various antennas are in the EZNEC format. (a 'shareware' antenna element analyser). So, if you do not have a copy of this programs you should try and get hold of it now to increase the usefulness of this CDROM and its information. *Antenna Compendium Vol 6* is an excellent choice for your library shelf!

### Right Antenna

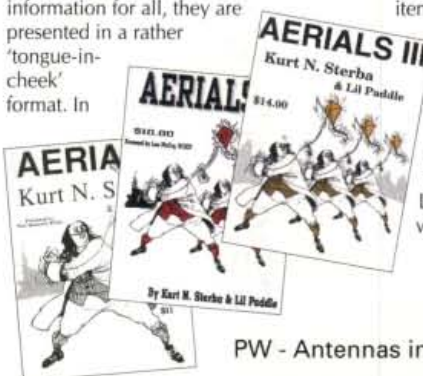
The second book I have for you is called *The Right Antenna*. 'How To Select And Install Antennas For Entertainment & Communications Devices' is how *The Right Antenna* is subtitled, and it lives up to the subtitle very well. This is another American book, but it contains many, many pages of ideas and good sense for anyone with a wide ranging interest in antennas of all descriptions.



Each of the 12 'chapters' covers different aspects of antennas, from a little light theory to very practical fitting instructions. There are sections on TV, Satellite (dishes mainly) broadcast f.m., CB, shortwave and v.h.f./u.h.f. antennas. The book is copiously illustrated, as are many similar books, making the information contained within it easy to understand and digest. Excellent information about antennas and their installation, suitable for all levels of Knowledge!

### Final Three

My final three books are part of a series and difficult to put into any category. So, I won't try to! *Aerials*, *Aerials II* and *Aerials III* are presented in the form of letters, or of conversations. Although all three books contain useful information for all, they are presented in a rather 'tongue-in-cheek' format. In



fact, the pen-names themselves should provide an insight into that, as they're purportedly written by 'Kurt N. Sterba' and 'Lil Paddle'.

For the younger readers among you (i.e. those under 50 years old) one of the earliest effective (in terms of real estate use as well) broadcast stations antennas was the 'Sterba Curtain' antenna, from which the pen name has been taken. Although there is a disclaimer in *Aerials* that says "This book is sold only for its entertainment or amusement value. The publisher makes no guarantee as to the technical merit of any article. In fact it doubts that any antenna described by the author will work any better than a fifty-ohm resistor dunked in transformer oil, at the bottom of an elevator shaft".

In fact having read *Aerials* several years ago, and having looked at and read many pages from the later two book, they may be entertaining but they are also informative, with small snippets of information and ideas spread around every page. Once you start reading, it's difficult to put any of these books down. Almost completely without diagrams, these books still contain much information, but may not suit anyone unable to appreciate the humour with which they're written.

### Club Meeting

At a recent radio club meeting (Poole Radio Society) I was given what looked like a flattened bowler hat or a black flying saucer. The item was about 165mm in diameter and about 25mm thick, it seemed to be a thick plastic 'dish' covering something on a rubber covered aluminium plate. "It's an antenna - I think" said **Graham G7TCS**. Looking underneath there was a BNC socket and what

Continued  
on page 48...



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GM3HAT

### CFA INVENTORS EXPLAIN THEIR PATENT

Since the April National Association of Broadcasters Convention in Las Vegas, interest in the Crossed Field Antenna has snowballed. The USA magazine *RADIO WORLD* put on their web site in October '99 a five page interview with our Dr. Brian Stewart, GM1DVD [www.rwonline.com/readingroom/rf-cfa.html](http://www.rwonline.com/readingroom/rf-cfa.html)

Or, look back to the 3-page feature article in *RADIO TODAY* October '99. Of course, at HAT we are still pressing forward, exploiting new aspects of the CFA technique and Poynting Vector Synthesis. As most readers will know, we sell the smallest antennas ever designed using two-wire loops only 1% of a wavelength in diameter. The conductors carry currents 270 degrees out of phase. One current places charge and thus creates E Field; the other causes magnetism and the cross product creates the complete radiation field S=EXH.

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Bottom Connector

which accepts a standard PL259 connector.

Antenna

tuners are usually

never required

It is advisable to use Copper based Anti Corrosion Compound No. 1 on all connections.

These vertical slopers are fed at ground level with the 'cold' side of the bottom connector connected to a ground stake.

Layout of 4 trap sloper

Coax Feed

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SVS-32	20/15/10m	2 Trap	13ft	£87.45
SVS-41	40/20/15/10m	1 Trap	28ft	£60.45
SVS-42	40/20/15/10m	2 Trap	24ft	£89.45
SVS-51	80/40/20/15/10m	1 Trap	53ft	£67.45
SVS-52	80/40/20/15/10m	2 Trap	49ft	£96.45
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SVSW-21/12-17W	12/17m	1 Trap	12ft	£54.70
SVSW-21/17-30W	17/30m	1 Trap	21ft	£53.70
SVSW-21/30-40W	30/40m	1 Trap	31ft	£62.45
SVSW-21/30-80W	30/80m	1 Trap	51ft	£67.45
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**Fig. 2:** The feedpoint (on the left) is straight from the BNC plug below. The 'earth' return to the right forms the matching network for the antenna. See text for more detail.

looked like a tuning screw. To my eyes, it looked like a commercial low profile antenna I know as a DDRR (see later).

I explained the type of antenna I thought the covering hid. However, what I found, shown in Fig. 1 and Fig. 2, when I opened the unit up was a complete ring of very heavy copper some six millimetre thick. The inner diameter was 68mm and the outer diameter was 86mm. I established, using the MFJ-269 Antenna Analyser, that it was resonant and matched (as I received it) around 455MHz. Could it be retuned to be useful on the 430MHz band though?

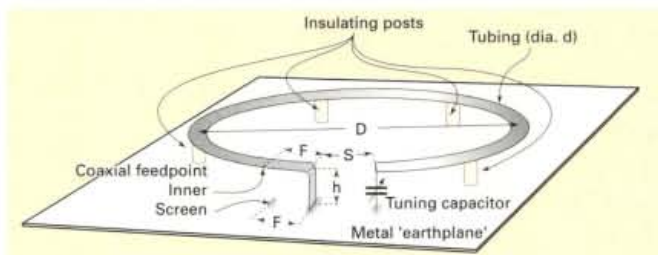
Using the MFJ-269 Antenna Analyser, I noted that I could easily find a low s.w.r. reading, over the range of 415-465MHz. But the lowest s.w.r. though, came at the original point of tuning. However, at around 433MHz, the indicated s.w.r. was as low as 1.3:1, but the bandwidth wasn't too clever though at about  $\pm 1.5$ MHz for a 2.5:1 standing wave ratio. By choosing to set the best tuning as 434MHz I could get a reasonably useful antenna. It was however, difficult to be absolutely sure of the exact s.w.r., as objects approaching the aluminium plate caused a shift in tuning and matching.

## The DDRR

The Directional Discontinuity Ring Radiator (DDRR) is a very low profile antenna that, in spite of the fact that even though the main element is horizontal, it produces vertically polarised signals. Made in the form of an incomplete ring, with a nominal diameter of 0.078 $\lambda$ , above a large earth plane, the element is less than a quarter wavelength long and tuned to resonance with a capacitor.

It's an antenna type that's rarely seen, even though it is small in all dimensions. There's a description of an h.f. DDRR in the *ARRL Antenna Book*, with dimensions for bands from 1.8 to 144MHz. The general shape is shown in the drawing of

**Fig. 1:** An extremely heavy copper ring was what I found inside the 'flattened bowler' antenna that I was given at a recent club meeting. The Teflon body of the tuning capacitor is just visible behind the shaft of the scalpel. See text for more detail.



**Fig. 3:** A DDRR antenna which has vertical polarisation in spite of the almost completely horizontal element. Table 1 gives dimensions for three popular bands.

Dimension	Nominal	28MHz	50MHz	144MHz
Ring height (h)	0.0069 $\lambda$	75mm	37mm	25mm
End gap (S)		50mm	37mm	25mm
Feedpoint (F)		75mm	25mm	12mm
Ring Dia. (D)	0.078 $\lambda$	710mm	410mm	150mm
Tube width (d)		19mm	12mm	6mm
Tuning Capacitor		15p	10p	5p

**Table 1:** The (approximate) dimensions for making your own DDRR antenna for three popular amateur bands. The 'earth' plane should be at least 25% larger than the diameter of the ring element. See text for more details.

Fig. 3, and from the description in the *ARRL Antenna Book* the various dimensions for three popular bands are as shown in Table 1.

## Help Needed

I've had a letter from Peter Neave G4DAN asking for some help with sourcing spares for a Mosely TA33 antenna. In his letter Pete says "Following the article by Derek Holmes GW3JSV on converting a Mosely TA33 antenna for the WARC bands, I decided to overhaul my own TA33 .... I wrote to Mosely UK asking for the supply of new end seals, only to receive a reply saying that they (Mosely UK) had ceased trading on April 1997. I was unaware of this so, where did Derek GW3JSV obtain his new end seals?"

So, on behalf of Pete G4DAN, who now has his antenna disassembled waiting for spares, does anyone know where, or how to get hold of

Mosely antenna spares in the UK? For those of you who would like to look up the original article, Derek Holmes' article was titled 'A Practical Beam From Bits' and appeared on pages 38, 39 and 54 of the April 1999 issue of PW.

## Analyser Decision

Another letter, this time from Bill GM0KMG who also needs a little help and advice. The advice that Bill is looking for, is whether to buy the MFJ-269 Antenna Analyser (reviewed pages 50 and 51 in November 1999 issue of PW) or to plump for the new Autek VA1 as available from EastComm (and others)?

Everyone had different ideas of what constitutes the 'perfect' piece of equipment. The Autek is much smaller and more 'automated', but doesn't have the twin impedance & s.w.r. meters of the larger and manually driven MFJ-269 (along

with its forebears). How about some readers, who have used both, or readers that have used or own any of the Autek range of s.w.r. and antenna analysers. Comments please to me at the editorial address and I'll collate them and pass them on.

## VPA Comments

Antenna Workshop author John Heys G3BDQ has written in with his comments about Peter Buchan G3INR's project 'The Voltage Probe Antenna' (v.p.a.) that was featured in the November 1999 'Antennas in Action' column. As many of you may know John has an interest in antennas for all bands, and the v.p.a. was suggested as being suitable for receiving 136kHz band signals.

John says that when you bear in mind that an antenna of 35 or even 50m represents only a small portion of the wavelength at this frequency ( $0.016\lambda$  -  $0.023\lambda$ ) the attachment of such a short length (about 100mm or so) of 'antenna' on the v.p.a. is 'really small'. John also mentions the very high gain circuit could be prone to local electrical QRM. And as to the very tiny 'capacity hat' of the tin lid!

I have no answer to the tiny capacity hat, but I can say though that, when I tried out the antenna in my very (electrically) noisy shack I did not hear very many 'whistles, bangs, and cracks'. I did however, hear good clean long and medium wave signals - I heard some short wave signals up to around 7MHz, but that might have been more a function of the coaxial feeder, than of the v.p.a. itself.

John's suggestion for a suitable antenna for the 136kHz band (and John has been successful on this band) would be a 20-50m length of wire in series with a fixed low-loss inductor of around 5mH and a variable capacitor of around 1000pF connected to the 'antenna' connector of the v.l.f. receiver. The 'earth' return side of the antenna input being taken to a good 'real' earth point.

*Once again, unfortunately I've run out of space again this month so, keep those letters coming in with your comments, suggestions and the occasional complaint (they keep me 'on my toes').*

*A Happy New Year to you all.*

*917EX*

## Club Webwatch

Has your radio club got an internet web page presence? You can publish the address here!

Poole Radio Society (G4PRS)

<http://www.pawns.demon.co.uk/PRAS/prs-start.html>



# Antenna Workshop



Fig 1: One type of four-port transfer relay.

## Coaxial Transfer Relays

In one of my 'VHF Report' columns (September 1999), I briefly described how I make use of a coaxial transfer relay to provide antenna switching. And from letters I've subsequently received, it's obvious that many of you are unfamiliar with this type of switch. So with this 'Antenna Workshop', I'll try to describe them and what they do - and how they can improve your station.

The photograph of Fig. 1 and Fig. 2, shows a number of different types of transfer relays. But one common feature that you will notice is that each relay has 4-ports (or connections) as opposed to the more familiar 3-port variety. The transfer relay though rather peculiar at first sight, is very versatile and provides more functionality than a conventional 3-port coaxial relay.

In circuit diagrams it's drawn as shown in the diagram Fig. 3, providing two separate r.f. signal paths, from port A to port B and from C-D. When switched, the contacts change over, giving signal paths from port A to port D and from port B to port C instead.

Transfer relays, in common with other coaxial relays, are available with a variety of r.f. connectors to suit most applications. Those with BNC connectors are most suitable for h.f. and v.h.f. switching applications including transverter drive systems.

Transfer relays using N-type connectors are often designed to work up into the s.h.f. region but it's always best to measure the individual performance of each port array before using them at these frequencies.

### High Power VHF

I've used N-type transfer relays to switch high power v.h.f. and u.h.f. signals for many years without any obvious signs of distress. The final common type found, relays with SMA connectors are ideal for use on the 10GHz band and some may even be used on higher frequencies.

One way of using a transfer relay is the r.f. switching system shown in the diagram, Fig. 2. In this example it allows you to connect a load and termination to both transmitter and receiver so that both are left neither open or short circuited. In the transmit position shown, the power amplifier (p.a.) is connected to the antenna and the pre-amplifier is

connected to a 50Ω termination, thus improving its immunity to r.f. overload. In the receive position the p.a. is now connected to the 50Ω load and the antenna connected to the pre-amplifier.

Many of the surplus transfer relays I've seen for sale (at various rallies and microwave events) have 'tell-back' contacts. These tell-back contacts are additional (simple) relay contacts that can be used to switch external equipment. In the example shown I use these to provide simple but effective sequential switching. The press to talk (p.t.t.) line from the transceiver controls the switching of the transfer relay.

Once the transfer relay has moved into the transmit position (connecting the antenna to the p.a.), a set of simple d.c. contacts then switches the amplifier itself into transmit mode. If it were needed you can use another set of d.c. contacts to disconnect the power supply from the pre-amplifier but I haven't found this to be necessary.

### Electrically activated

In addition to electrically activated switching some types of transfer relay also allow manual switch-over as

Taking his place in the Antenna Workshop, David Butler G4ASR takes a look at how to use a coaxial transfer relay as part of an antenna system for use on the v.h.f., u.h.f. or microwave bands.

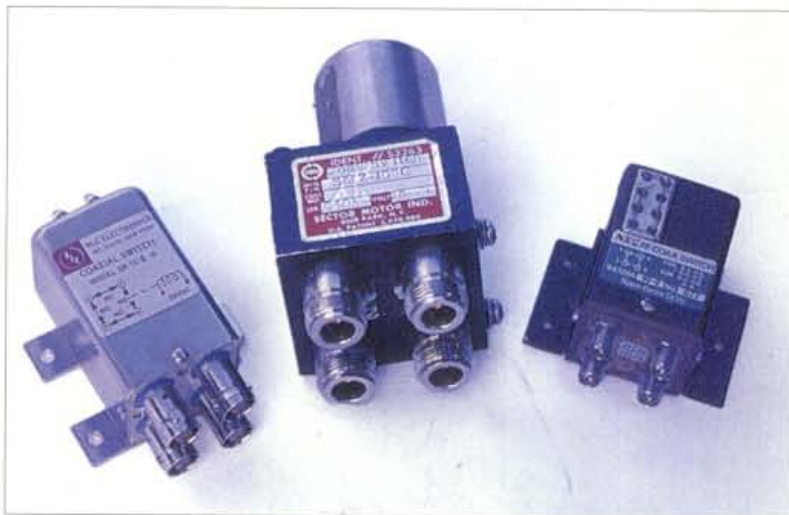


Fig. 2: Three other types of four-port transfer relay.



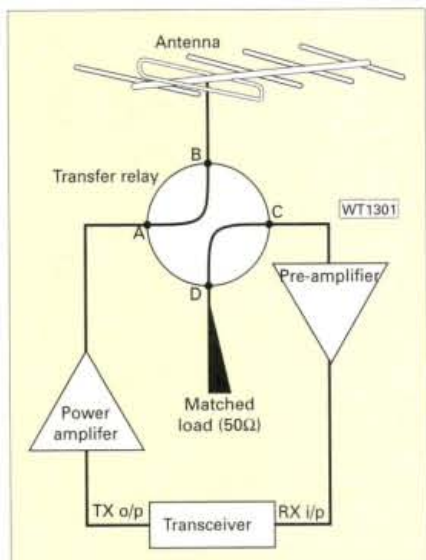


Fig. 3: The simple layout of a 'weak-signal' v.h.f. station, the transfer relay (or manual switch) is the heart of the transmitter / receiver switching.

well. The relay shown in Fig. 1, using N-connectors is one example of dual switching. There are some advantages in using this type of relay for the antenna switching system just described. During periods of lightning, rain or snow static it is wise to terminate the pre-amplifier (or any receiver input for that matter) into a load rather than expose it to potentially damaging voltages.

Manual switching capability also allows you to switch between the antenna and the 50Ω termination to make sun - sky

noise temperature comparisons. As a guide, a reasonable 144MHz system configured for weak-signal DX work should be able to see 1-2dB of sun noise and the equivalent 430MHz system somewhat more, because the sky temperature is less at higher frequencies. You can then relate any subsequent system changes, antenna, feeder, pre-amplifier, to see if improvements (or long term degradations) have occurred.

The sun - sky noise figures obtained can relate to a quiet sun so you need to make several measurements over a number of days. Don't get excited though if your receiving system suddenly appears to have improved by many dB. It's probably just a temporary increase in solar flux - so keep a look out for aurora or ionospheric DX!

## Select The Sense

Another suggested use of the four-port transfer relay can be for selecting the sense of a circularly polarised antenna. The diagram, Fig. 4, shows a dual-polarised v.h.f. (or u.h.f.) antenna connected to the transfer relay with two equal lengths of feeder. The remaining ports of the transfer relay then connect to a two-way power divider. However one of these cables must be one quarter wavelength longer (at the frequency in use) than the other coaxial feeder to the transfer relay.

The v.h.f. transceiver is connected to the input of the power divider, a device sometimes called a combiner. One or more of these are often used to phase two (or more) antennas together. Whatever, divider or combiner, it doesn't matter what you call it, being bi-directional it depends from which way you view it. The transfer relay is then used as

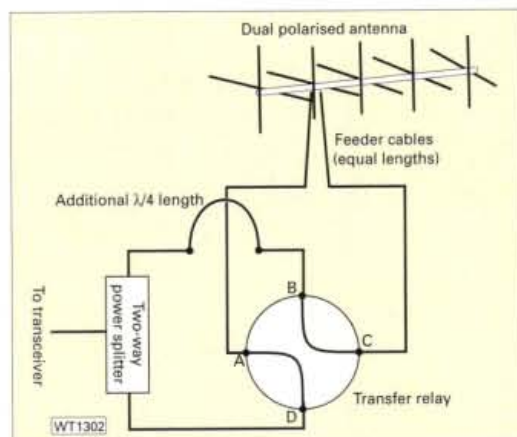


Fig. 4: Using a transfer relay (or manual switch), two crossed Yagi antennas can be made to have either left - or right hand circular polarisation. See the text for more detail.

a polarisation switch, selecting either clockwise or anti-clockwise circular polarisation. Instead of using a relay you could usefully substitute a manual 4-pole transfer switch.

## Practical Disadvantage

The only practical disadvantage that I've encountered with this type of relay is that they normally need a 24V source to energise the coil. This isn't a major problem as a simple power supply (or 12V to 24V converter) can be built to suit. As with most relays switch-over is accomplished by applying a continuous d.c. voltage to the solenoid.

However some transfer switches use a latching arrangement and remain in a selected position without a continuous control current. These normally have two coils, usually connected together so that there are three coil terminals on the switch casing. You'll also find transfer relays that use a solenoid operated 'stepper motor', sometimes known as a 'Ledex'. In operation either of the two latching types of transfer relay only require a momentary voltage pulse to initiate switch-over and with some ingenuity the relay tell-back contacts can be used to control and provide this function.

## Easy Cleaning

Whilst on the subject of relays here's a tip for easily cleaning the r.f. contacts of relays with negligible throw (there's no 'wiping' and consequent cleaning of the contacts by the flexing of the armature). I've found that connecting a 12V a.c. supply (not d.c.) in series with a car bulb and the contacts of the relay, then cycling the relay half a dozen times will clean the contacts. Carry out this procedure for both sets of contacts, the relay will be now as good as new. The cleaning is accomplished by the high a.c. current - a.c. being necessary to extinguish the resulting arcs during cycling. Try it - it really works!

73

David G4ASR

PW - Antennas in Action, January 2000



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# RadioScene

## VHF REPORT

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THIS MONTH DAVID BUTLER  
G4ASR HAS REPORTS OF DX  
ON THE 50 AND 144MHZ  
BANDS. HE ALSO BRINGS YOU  
DETAILS FROM THE IARU  
CONFERENCE IN NORWAY.

Last month I gave details of what is probably the longest two-way contact on the 144MHz band via tropospheric ducting anywhere in the world. The contact between the stations of W1LP/MM and KH6EME was over a 4754km path across the Pacific Ocean.

I also reported that Steve K0XP suggests that there are equivalent tropospheric ducts spanning the Atlantic Ocean from Spain and Portugal across to Bermuda and other Caribbean islands. He also mentioned that there's a north-south marine duct along the North American east coast and south-east to Bermuda caused by the weather system termed the 'Bermuda High'.

Richard Harrison KB5WZI has written to agree that, out of all the marine paths, the most surprising he has experienced is with the Bermuda duct. He mentions that with a u.h.f. cell-

phone (with its small integral antenna) he can regularly hear cell-sites over 200 nautical miles away with solid signals.

When sailing in the Caribbean Sea, both f.m. broadcast and TV stations are routinely heard and seen, many over paths of 100 nautical miles or more. He reports that on a routine basis he can expect to contact other vessels up to 100 nautical miles away when using a 30W v.h.f. marine transceiver and a 6dB collinear antenna on top of his cargo ship. Richard has come to the conclusion that the "4/3 earth radius" radio horizon formula mentioned in theoretical texts needs a bit of revision.

On the v.h.f. DX E-mail reflector, Ian White G3SEK agrees that there's certainly no sharp cut-off at the visual horizon for v.h.f. and u.h.f. signals. The so-called "4/3 earth radius" formula is a simplistic way to express the idea that the "radio horizon" is further away than the visual horizon. However, the mechanisms involved are much more complex and variable than any simple 'fudge-factor' can express.

Over large bodies of water, there's a natural tendency to create a refractive duct due to the changes in moisture and temperature at the water/atmosphere interface. The duct may not always be very sharply defined, but it's usually enough to help boost signals beyond line of sight.

The mechanism works best under calm conditions and disappears in rough weather when the atmosphere is strongly mixed. Also, in any kind of reasonable weather, you'll get scattering from irregularities of refractive index in the lower atmosphere which progressively carry the signal around the curvature of the earth.

The final variable is how determined you are to get a signal through. In situations where you demand 100% service at a high signal/noise ratio you can reasonably talk about "radio horizons" and "limits of range".

On the other hand, distances

of several hundred kilometres are workable at almost any time by v.h.f. and u.h.f. DXers using c.w. or s.s.b. and weak-signal operating techniques. For this kind of operation the concept of a "radio horizon" is a total fallacy.

Emil Pocock W3EP confirms that this is true as under normal conditions radio waves don't travel in straight lines through the Earth's atmosphere. They are actually refracted downward slightly so the horizon for radio waves is about a third farther away than for light. This refraction is caused by the normal variation of the air itself caused by the decreases in temperature, humidity and pressure at increasing altitudes.

The refraction of radio waves is simply a very subtle form of the same phenomenon that makes a pencil, placed half way in a glass of water appear bent at its intersection with the air. Even so, this normal tropospheric refraction can only account for a very small extension of v.h.f. radio paths beyond line of sight.

Some unusual weather conditions can refract radio waves even more, extending the effective radio line of sight even farther. Under super-refracting conditions radio waves can be bent back toward Earth. A tropospheric duct is formed when this takes place continuously over long distances. Ducted signals can be amazingly strong over distances of 1000km or more but these are unusual circumstances.

Super refraction still doesn't explain what causes radio waves to go well beyond the horizon under ordinary conditions. To explain, ordinary conditions - the mechanism of scattering needs to be considered.

## SCATTERED SIGNALS

When radio signals encounter objects that are about a wavelength in size a small portion of the signal may be scattered away from the main signal direction. In the lowest weather-producing part of the atmosphere, known as the troposphere, the wavelength-sized objects are naturally occurring blobs of air with subtle variations in density and water vapour content.

A radio signal encounters so many irregularities as it traverses the troposphere that it is constantly being subjected to scattering and re-scattering. A small portion of these signals are ultimately scattered in directions that complete useful, beyond-the-horizon, communications paths.

Radio signals that arrive via tropospheric scatter are thus much weaker than signals that arrive by a line of sight, ducting or via the ionosphere. Indeed, scattering is among the least efficient ways to propagate radio signals but in many day-to-day situations it is the only way signals can arrive from beyond the horizon especially on the frequencies above 50MHz.

## THE IARU CONFERENCE

During September 1999 the International Amateur Radio Union (IARU) held its tri-annual conference in Lillehammer, Norway and, as a member of the RSGB VHF Committee I was one of the UK delegation (shown in the photograph Fig. 1) who attended the week long conference. As I specialise in v.h.f., I was a member of Committee C5 - the IARU Region 1 group, dealing with v.h.f./u.h.f. and microwave matters.

Many papers from national radio societies throughout Region 1 (Europe, Africa and parts of Asia) were discussed and recommendations made. Politically, this can be rather difficult at times. For example, the requirements for a harmonised 144MHz band plan or specific allocations that suit operators in Germany, Oman and South Africa may be rather difficult to achieve.

Over the next few months I'll be taking a brief look (more in depth if band conditions are poor!) at some of the papers and decisions made. One such paper, submitted by the South African Radio League (SARL), was making proposals regarding the frequency requirements for manned space



Fig. 1: (Left to Right) Ian Cornes G4OUT (RSGB VHF Manager), David Butler G4ASR, Mike Dixon G3PFR (RSGB Microwave Manager), Graham Shirville G3VZV.



Fig. 2: QSL card from the island of Fernando De Noronha from ZW0F.



operation. The objective was the allocation of specific channel frequencies to be used aboard the **International Space Station (ISS)**.

The SARL proposed that 144.450, 144.470 and 144.490MHz be used in addition to 145.800MHz already allocated to space operation. Furthermore, they requested a review of the 144-145MHz band plan to accommodate these channels, a review of the beacon band allocation in which these channels were to be allocated and the rescinding of the policy that no channelised operation takes place below 145MHz.

The South African society also put forward the argument that Amateur Radio aboard the International Space Station (referred to as ARISS) boosts the promotion of space operation to young people and it suggested that the 144MHz band attracts far greater participation, especially among newer amateurs and in developing countries, than those in the 430MHz and higher frequency bands.

They (SARL) also mentioned that it was essential that a set of frequencies is made available that could be used world-wide. The society said that Region 2 had already allocated 144.450, 144.470 and 144.490MHz in addition to 145.800MHz, all of which had been agreed to by NASA. (It was unclear if Region 2 actually meant the IARU or AMSAT-NA).

The SARL paper acknowledged the usefulness of beacons but that their operation is mainly focused on western European countries and to some small extent in South Africa.

**John Fielding ZS5JF** said that the ARISS team has a logistical problem with other receive frequencies and that only those mentioned (144.450, 144.470 and 144.490MHz) had been deemed suitable for use on the ISS.

There then followed a lively discussion in which one delegate noted that when groups in North America get together they unfortunately tend to forget the band plan allocations in the rest of the world. **Hans van de Groenendaal ZS5AKV** (IARU satellite adviser) agreed that not enough liaison had been carried out earlier on in the process. Hans mentioned that it is now 'fait accompli', the frequencies having already been agreed by NASA.

Many delegates voiced opposition to the proposals insofar that major changes have recently been made to the 144-145MHz band plan and that a considerable number of beacon units have changed frequency to

the new beacon sub-band in 1999. A number of societies suggested the use of dual-band duplex using 145.800MHz and frequencies in the 430MHz band.

Another delegate displayed a transparency showing all satellite activity in the 145.800-146.000MHz satellite band and proposed that 145.200MHz be used for uplinking and 145.800MHz for downlinking from the ISS. The frequency 145.800MHz could not be used as an uplink because it will interfere with the receivers in other satellites. He also suggested using frequencies in the 435-436MHz and 438MHz region as a duplex pair.

At the end of a lengthy discussion the proposals were put to the vote by all societies present. The use of 144.450MHz, 144.470MHz and 144.490MHz were overwhelmingly rejected and the issue regarding reviews of the 144-145MHz band plan and beacon band allocations and rescinding of no-channelised operation below 145MHz were also voted on.

Not surprisingly, there was very little support for any of these proposals. However, as previously mentioned, the allocation of frequencies on board the ISS has already been agreed with NASA. There appears to be little that can be done at this stage especially as the initial Amateur Radio hardware has already been delivered to NASA. Watch this space!

### SURGE IN SOLAR FLUX

Conditions on the 50MHz band during October were very good and indicative of the surge in solar flux as we head towards the peak of the sunspot cycle. DX stations mainly in southern Africa and South America was reported by many UK operators.

The station of TZ6VV (Mali) had a number of openings into the UK during October, all between 1600-1800UTC. South African stations, in the ZS6 call area, were also worked throughout the month as were the stations of TR8CA (Gabon), 3C5I (Equatorial Guinea), 5R8GJ (Madagascar), 9J2BO (Zambia) and 9U5D (Burundi). There was an excellent opening into South America on October 12 with contacts being made into LU (Argentina), PY (Brazil) and ZP (Paraguay).

The station of PY1VOY (GG86) reported making 122 contacts with Europe, 62 of them with UK stations. He mentioned that it was the best opening he had ever experienced on the 50MHz band. Seven new

countries G, GD, GI, GW, SM, PA and ZF (Cayman Islands) were worked bringing his total up to 63 countries.

**Alan Doherty G10TC** (IO65) reported catching a late night opening between 2225-2318UTC on October 17 in which he worked the stations of PP1CZ, PY2PA (on s.s.b.), PY2RO, PY2VA and PY2XB. Peter PY5CC was active as PY0FM from the rare island (and DXCC country) of Fernando De Noronha between October 16 to November 1.

On October 21 at 1430UTC he had an excellent opening into Europe working a total 105 stations in CT, EA, F, G, GJ, GU and GW. I missed that opening but fortunately I contacted the island of Fernando De Noronha a decade ago, as shown in the QSL card, **Fig. 2**.

Another rare one was the station of J79AND (Dominica) who worked a few stations in southern England during an opening October 28. This is just a small sample of what the 50MHz band will be like over the coming months. Don't say you haven't been warned!

**John M5ABS** (JO01) reports that, although this is his first report to the column, he was an active reader of *Practical Wireless* whilst living in South Africa. He has now moved to the UK and recently upgraded his call sign having been licensed as M1CUU.

John is now active on the 144MHz band using a Kenwood TS-780 transceiver driving a Microwave Modules solid-state 50W amplifier into a 12-element DL6WU Yagi. He mentions working the Italian station I8MPO on s.s.b. during a brief opening in the summer and that he is looking forward to more Sporadic-E (Sp-E) events in 2000.

**Colin Smith GM0CLN** (IO85) writes to say that following a house move he is again active on the 144MHz band. He's running 100W into a 14-element Yagi and enjoys operating with both c.w. and s.s.b. Colin is particularly active during auroral openings and meteor showers.

Speaking of meteor showers, I've just taken a look at details of last year's Quadrantids meteor stream. Maximum activity was observed on January 3 1999 between 1830-2130UTC. Therefore by adding one year six hours the peak next year (2000) should be on Tuesday January 4 between 0030-0330UTC. During these times, the best paths from the UK will lie in the quadrant between east through to south.

**Colin Campbell GM1LUZ** has sent me an E-mail reporting that he has recently written a

spectrum analyser program for the Yaesu FT-920 transceiver. The program is freeware and allows frequency scans of any two portions of the spectrum covered by the FT-920. He finds it invaluable for checking 28MHz and 50MHz band openings.

The Web page for the screenshot and program download can be found at: <http://www.campbell84.freesev.e.co.uk> Colin mentions that he is waiting to see what the feedback is like with other FT-920 owners before adding more transceivers or features.

### DEADLINES

That's it again for another month. Thanks to everyone who contributed to the column during the year and I'm particularly grateful to those who sent in photographs - they're always welcome.

Please forward any news, views, comments or photographs to the address and by the date given at the top of the column. Have a very Happy Christmas 1999 and a prosperous New Year!

**GOOD LUCK WITH VHF DX IN THE NEW MILLENNIUM!**

**73 DAVID G4ASR**

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**THIS MONTH LEIGHTON SMART GW0LBI HAS GOOD NEWS IN THE FORM OF BETTER PROPAGATION CONDITIONS ON THE HF BANDS AND LOOKS FORWARD TO A BUSY CHRISTMAS AND NEW YEAR SPENT HUNTING DOWN THAT DX!**

As we enter into Autumn, there have been a few signs that propagation conditions on the h.f. bands is beginning to improve - despite periods when signals have been poor. This month our reporters say that they've had some nice DX contacts, although at other times it has felt more like a sunspot minimum!

Nevertheless, that long range stuff, called DX, is out there and lately even 28MHz has been carrying some decent



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Yaesu FT-920AF	Boxed, mint.....£965

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# RadioScene

DX traffic - even if the openings have been sporadic and short lived. Signs of better times to come, we hope!

However, for some h.f. operators, patchy conditions don't necessarily mean that it's time to switch off the rig. On the contrary, it's then the time that the 'hunting' instinct comes out in us and this makes us all the more determined to catch our 'prey'! When it's 'in the bag', so to speak, the catch becomes even better than the chase, eh?

One person who has given the h.f. bands a miss for a few months is **John Heys G3BDQ** of Hastings, who seems to have 'migrated' to the experimental 136kHz band. At first he used 30W and hooked up with **Mal G3KEV** in Scarborough - quite a long haul from Hastings on such a very low frequency!

However, since then John has persevered and now runs 100W into a 80m long end fed wire, reaching out to Belgium, Wales and the Netherlands. He's heard stations from as far as Luxembourg, Switzerland, Italy and Germany and no doubt he'll work them too, given the right conditions.

John welcomes s.w.l. reports from further than 200km distant and, if you can help, these can be sent to him at: **'Whitefriars', Friars Hill, Guestling, Nr Hastings TN35 4EP, England.**

## MASON MANAGER MISTAKE

It seems that one of our regular reporters, **Carl Mason GW0VSW**, has been mistakenly named as the QSL manager for **MJ0AGC** and, as a result, is receiving QSL cards by the handful for this particular call sign.

Carl has tried in vain to contact the owner of **MJ0AGC** as their address is not in the Callbook, so he asks that if the owner should read this, could he or she get in touch via Carl at **12 Lwyn Y Bryn, Crymlyn Parc, Skewen, Nr Neath, SA10 6DZ Wales** or via E-mail: **carl@gw0vsw.freemove.co.uk** Thank you!

## PROPAGATION REPORT

Over now to **Don McLean G3NOF** of Yeovil in Somerset for his regular h.f. 'Propagation

Report'. Don says: "Over the past month I've found conditions to have been pretty inconsistent and it seems that there were a series of solar events, resulting in dead conditions on the 21-28MHz bands.

"On 14MHz I found long path openings to Australia and New Zealand at 0730-0900UTC, while the short path to Asia was often open between 1600 and 1900UTC. North America was heard almost all day and the band closed mostly after midnight.

"As far as 18MHz was concerned, the band doesn't open generally until 1000UTC, there were a few openings over the North Pole to the Pacific area from 0700-0900UTC and a few African countries were heard during the afternoons. North Americans came in from 1200UTC until the band closed, usually around 2000UTC.

"There have also been a few short path openings on the 21MHz band to Asia from 0900-1700UTC as well as a few Australians heard via the short path between 1100 and 1600UTC. Africa was heard between 1500 and 1800UTC, while North America came in from 1300-2100UTC when the band usually closed.

"However, conditions on the 24MHz band were very up and down to say the least. Short path openings to Asia were apparent between 0900 and 1600UTC, while some African stations were heard around 1600-1800UTC. North Americans were heard most afternoons up to 2000UTC when the band closed.

"The 28MHz band saw a few good days with the band open on the short path to Asia at around 0900-1200UTC. African stations were heard between 1600 and 1800UTC, whilst North America came in from 1400UTC into the evenings. On some days West Coast American stations were still being heard at 2000UTC and the band closed at varying times".

## YOUR REPORTS

On to your reports now and this month we start with 1.8 and 3.5MHz bands and the log from **Carl Mason GW0VSW** of Skewen in West Glamorgan. He lists two 80W c.w. contacts on

**Leighton Smart GW0LBI** himself. He asks please can 'HF Far & Wide' reporters keep sending in photographs of themselves for the column?

1.8MHz in the form of **LA8CW** (Norway) and yours truly, **GW0LBI**, both at around 2130UTC.

Meanwhile, on the 3.5MHz band, the 30W from **Sean Gilbert G4UCJ** in Milton Keynes brought him contacts with **OJ0/K7BV** (Market Reef) at 2346UTC and **OX/OZ8AE** (Greenland) at 2200UTC. As for myself, well I heard **VE1ZZ** storming through on 1.8MHz at 0014UTC but, alas, he couldn't hear my QRP!

## THE 7 & 10MHz BANDS

Staying with **Sean G4UCJ** for his report on the 7 and 10MHz bands, he lists 7MHz c.w. contacts with **EL2WW** (Liberia), **V44KJ** (St. Kitts Island) and **R1AND** (Antarctica) all at around 2330UTC using an indoor dipole in the loft. On the 10MHz band, **Eric Masters G0KRT** in Worcester Park, Surrey, hooked up with **S51WO** (Slovenia) using 100W c.w. at 1929UTC using a modified **W3EDP** antenna roughly 25m long.

While using QRP on the 7MHz band, **Carl GW0VSW** lists an s.s.b. contact with **9H3EQ** (Malta) at 2358UTC, QSL via **PA0RDY**, as well as working **YL2EC** (Latvia) and **SM5CBC/QRP** (Sweden) both contacts on c.w. at around 0710UTC.

## THE 14MHz BAND

On to '20m' - the 14MHz band - now and down to Yeovil where **Don McLean G3NOF** has his log of s.s.b. DX. Amongst those listed on 14MHz are **HS0ZBS** (Thailand), **JT1BG** (Mongolia) and **V44BGS** (St Kitts Island). While **Ted Trowell G2HKU** on the Isle of Sheppey in Kent used 70W of c.w. to hook up with **OX/OZ8AE** (Greenland), **3B9FR** and (Rodriguez Island), both at around 1800UTC.

Low power was the order of the day on 14MHz for **Eric G0KRT**, who lists 5W c.w. contacts with **IK4MED** (Italy) at 1941UTC, **HB9AJK/QRP** (Switzerland) at 1351UTC and **UR4MWN** (Ukraine) at 1930UTC.

Another reporter who stuck to his 'QRP guns' this time around was **Carl GW0VSW** who worked, in his own words: "My



best QRP s.s.b. DX so far". This came in the form of **VK5RN** (Australia) at 0747UTC, with just 3W p.e.p., receiving a 5/5 report!

Other microphone contacts at this power level included **HB0/IV3UHL** (Principality of Liechtenstein) at 1159UTC, as well as **CQ9DIG/P** (Madeira Island) at 1733UTC. A switch to QRP c.w. brought him contacts with **EA6BB** (Balearic Islands) at 0657UTC, **UT5FB/MM** off the Greek coast at 1338UTC and finally **VE1ALZ** (Canada) at 1651UTC.

## THE 18MHz BAND

The 18MHz band - and above - was where **Don G3NOF** had quite a productive time this month judging by his all-s.s.b. loggings. It's on 18MHz in particular where he lists contacts with **BY4ED/4** (China), **FO5QB** (French Polynesia), a string of Japanese and Australian stations, **OJ0VR** (Market Reef), as well as **SI9AM** (Swedish Market Reef), **3C0R** (Annobon Island), **3W7IK** (Vietnam) and **9G1MR** (Ghana).

One person who thinks that conditions are definitely on the up is **Sean G4UCJ** who says his list of 'QRP countries' has grown immensely this month. Well, on 18MHz he certainly worked a couple of gems with his low power, including **KL7J** (Alaska) at 0930UTC, **VP5/HB9CYV** (Turks & Caicos Islands) at 1300UTC, while 1600UTC brought in **YN6HM** (Nicaragua) and around the same time he hooked up with **9M2TO** (Malaysia).

## THE 21MHz BAND

The 21MHz allocation is one band where our reporters seemed to spend a great deal of their radio time this month.

**Robin Trebilcock GW3ZCF** from Bishopston near Swansea used around 50W of s.s.b. and a vertical antenna to work **JY9NX** (Jordan) and **EX2M**



(Kyrgyzstan), both at around 1100UTC, while LU9AY (Argentina) was hooked at 1932UTC.

Also, while out working portable in Pembroke, Robin experimented on 21MHz with a 40m horizontal loop up at just 3m above ground and, using this, made a solid contact with 9J2BO (Zambia) at 1700UTC.

Using the key, as usual, was Ted G2HKU, who lists his 70W contacts with C56HP (Gambia), HL2AQAN and (South Korea) at 1000UTC, plus VQ9QM (Chagos Island), 5N3CPR (Nigeria) and W0ZP (Colorado, USA) at 1500UTC.

Using a 3-element beam on the 21MHz band, Don G3NOF snagged a bagful which included BA4DX (China), HS9IFG (Thailand), TU5IJ (Ivory Coast), V44NK (St. Kitts Island), XW2A (Lao Peoples' Democratic Republic), YC4WIO (Indonesia), 3C0R (Equatorial Guinea) and 8J1RL (Japanese base in Antarctica), all contacts were made using s.s.b.

Once again, low power was used on the 21MHz band by Eric G0KRT and switching to s.s.b. this time, he logged contacts with UT0H (Ukraine) at 0800UTC, N4UH (USA) at 1405UTC and LZ1B (Bulgaria) at 1151UTC.

## THE 24 & 28MHz BANDS

One of the signs that h.f. propagation is improving is the number of reports for the 24MHz and 28MHz bands! On 24MHz Carl GW0VSW reports working EZ8AQ (Turkmenistan) at 1132UTC, P5/P3AXH (North Korea) at 1550UTC and 9H1AL (Malta) at 1100UTC with 80W c.w., while Robin GW3ZCF lists a single s.s.b. contact in the form of C56/G0SAM (Gambia) at 1910UTC.

Ted G2HKU stuck to the key and using 70W into a vertical worked PY2NHK (Brazil) at 0900UTC, 9K2MU (Kuwait), VQ9QM (Chagos Island) and 5N3CPR (Nigeria) at 1500UTC later snagging YB0AVK (Indonesia) at 1600UTC.

Don G3NOF, on the other hand, used s.s.b. to hook up with a long string of Japanese stations as well as N2KK/6 (West Coast USA), TU5IJ (Ivory Coast) and 3C0R (Equatorial Guinea). Last - but not least - for 24MHz, Eric G0KRT used c.w. to hook up with FY5HY (French Guiana) at 1714UTC and OX/OZ8AE (Greenland) at 1600UTC.

Finally we come to '10m' (28MHz) which has certainly been showing some of its former promise lately. A warm welcome to new reporter **Jayne Richardson 2E0ASR** of Milton Keynes, (the XYL of regular

## PW Listening & Operating Watch List

(all times are in UTC):

**Charlie Blake M0AIJ** listens and operates:

0500-0700 on 7.061MHz s.s.b. with an NRD-525 receiver & Sloping Wire antenna and is also busy with his mobile rig.

**John Heys G3BDQ** operates:

Mainly weekends during daylight hours on the 136kHz band using 100W and an end-fed wire.

**George Woods G3LPT** (Suffolk) operates:

An open net on 29.630 f.m. every weekday morning except Monday at 0930 local time.

**Don McLean G3NOF** operates:

1030 Saturdays on 3.685MHz on the ISWL Net or 1030 Sundays on the Yeovil ARC Net on 3.665MHz s.s.b. using a Kenwood TS-950 & trapped dipole antenna.

**John Wheeler G0IUE** monitors:

28.600 n.b.f.m. every evening between 1730 and 2230, regardless of conditions, using a Yaesu FT-920 running 100W and a 2-element t.e.t. Tri-band beam antenna/half-wave vertical antenna.

**Leighton Smart GW0LBI** operates:

On 1.949MHz s.s.b. and around 1.820-1.836MHz c.w. on weekday evenings between 1900 and 2230 using a Yaesu FT-747G QRP transceiver at 5W maximum and a 60m long wire Marconi antenna.

**Rob Mannion G3XFD:**

Is QRT from home at the moment due to a pending move to a new QTH soon. However, he'll continue to try to get on h.f. (also v.h.f.) from his car. Normal service will be resumed as soon as possible!

**Sean Gilbert G4UCJ** operates:

Around 0700-1100 and 2100-0000 seven days a week on 14 and 7MHz using an FT-307 and an Alinco DX-70 transceiver at

reporter Sean G4UCJ), who had a great time on 28MHz over the past four weeks.

Using nothing but 3W QRP s.s.b. and indoor antennas, Jayne's low power reached out to VP5/HB9CYN (Turks & Caicos Islands) at 1839UTC, RA6Z (Russia) at 1250UTC, UR4QR (Ukraine) at 1200UTC and a very nice one in the shape of Z21CS (Zimbabwe) at 1409UTC. Nice to have some Novice reports for the column Jayne. Keep up the good work!

Another single-band report comes from **Jon Wheeler G0IUE** of Melksham in Wiltshire, who reports a surge in activity on the 28MHz band. "At last!" he says and I'm sure we all agree on that!

Jon's 28MHz lists shows his 100W s.s.b. contacts with S79CI (Seychelles Islands) at 1700UTC, ET3KV (Ethiopia) at 1320UTC, YB0DX (Indonesia) at 1500UTC, E41/OK1DTP (Palestine) at 0822UTC, DU9RG (Philippines) at 1200UTC, as well as HK6DOS (Colombia) at 1943UTC and PP5BRV (St. Catarina Island) at 1954UTC. He also tried the 29MHz n.b.f.m. section and hooked up with

VE3PTC/Mobile (Canada) at 2025UTC and another nice one in KC5AXW (Texas) at 1930UTC.

Not bad for a band which, only a couple of months ago, was as flat as a pancake! Certainly one to keep our ears open for over the Christmas period!

## SEE YOU NEXT CENTURY!

Well, as the end of this millennium and the beginning of the next finally approaches, I wonder what the next Century will bring? Will Amateur Radio be a thing of the past as computers take over more and more of our daily lives, or will rapidly advancing technology give our hobby a new lease of life?

Only time will tell, I suppose but, whatever happens, I'm sure that the Radio Amateurs of the future will be much the same as those of the past, always experimenting in one way or another and always seeking to learn more about the magical mysteries of radio, simply for the pure love of it and nothing else!

For now though, I'll just wish our intrepid reporters and

all readers a very Merry Christmas and a Happy New Year, Nadolig Llawen ar Blwyddyn Newydd Dda! See you in the next century folks!

THANKS TO ALL REPORTERS FOR THEIR VALUABLE TIME AND EFFORT. KEEP UP THE GOOD WORK! AS USUAL, REPORTS AND INFORMATION (AND PHOTOS AS I'M STILL LOOKING FOR PHOTOGRAPHS OF OUR REPORTERS!) BY THE 15th OF EACH MONTH. DETAILS AT THE TOP OF THE COLUMN.

73 LEIGHTON

## SCENE USA

PLEASE SEND ME REPORTS AND INFORMATION FOR THE APRIL COLUMN BY JANUARY 15th.

ED TAYLOR N0ED  
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COLORADO 80226  
USA

E-MAIL: N0ED@qsl.net

IT'S NO SECRET THAT SOME OF OUR FELLOW RADIO AMATEURS ARE UNPLEASANT PEOPLE. THEY BREAK THE RULES, THEY ABUSE THEIR FELLOW 'HAMS' AND THEY MISUSE REPEATERS. THE SAME APPLIES IN THE USA, BUT SOMETHING IS NOW BEING DONE. ED EXPLAINS RECENT HAPPENINGS IN AMERICAN LICENCE ENFORCEMENT AND DRAWS PARALLELS WITH THE UK.

**Y**ou don't have to be on the air for long to discover that not everyone has the same ideas about the Amateur Radio 'spirit' that you do. For example, you've asked a couple of times if the frequency is in use and then you transmit a CQ.

Out of the blue, someone comes back and says he's been on the frequency for two hours and why don't you listen, you '\*\*\*\* imbecile'! You say that nobody appeared to be there and you're sorry. In response, the existence of your licence is questioned and you're invited to perform a questionable procedure upon yourself!

Only in the USA? I'm afraid not: it happens everywhere. The best thing to do is just shrug and pity the stress that must exist in some people's lives. Move on and find another frequency. It's like road rage - better to take a deep breath and calm down -



# RadioScene

retaliation is not a wise response.

But I suppose that a few insults from one 'Ham' to another are inevitable. It might be only a hobby, but some people can get very serious. We become over-excited and there are limited resources available.

We don't have enough bandwidth (at least, in the place we need it), we don't have a big enough station and we don't have enough time to use it. Perhaps we're trying to beat somebody else with similar goals to ourselves?

## MISBEHAVIOUR LIMITED?

If the level of misbehaviour was limited to occasional instances of grumbling and insults, we could probably accept it. However, in the last few years, the situation in the USA has become quite a lot worse.

My statement is not just true for f.m. repeaters, but also on the h.f. bands. It's unfortunate that the US experience is reflected in many other places and is typical of what we've all come across from time to time.

In the UK, we're probably most familiar with abuse of repeaters on v.h.f. and u.h.f. and this has been an American problem as well, although I think it might be less so than in Britain. Because the US bands are wider and communities are more spread out, there are many more repeaters and they're not in such constant use.

If someone starts being a nuisance on one, you can perhaps change to another. Since those who misuse these facilities require an audience for their 'fun', they will sometimes stop if genuine users disappear and ignore them.

Many of the complaints from amateurs in the USA have concerned h.f. operation and there has been widespread concern about some of the nets on '75m', the top end of 80m (3.5-4MHz in North America).

Amateurs have been holding discussions about subjects which would be unusual in the UK (and probably not permitted). These include topics such as religion, politics and current affairs. These are not banned in the USA, but they are very likely to stray into forbidden areas, including business matters and indecency.

There have also been cases of amateurs carrying out

'broadcasting' where operators will send out music or ramblings on any subject that takes their fancy, without talking to any other particular station. This is forbidden in the USA, just as elsewhere.

It's hard to see what particular pleasure the perpetrators take in this activity, as it's with repeater jamming, but it was becoming more widespread. In the evenings, '75m' coverage includes large chunks of the USA and everyone could hear what was going on.

## ANNOYANCE BECAME ANGER

When such activities started to take place on 14MHz, things became considerably worse and annoyance became anger. Now the rest of the world could sometimes hear what was happening in the USA.

It's true that Americans have a wide tolerance for 'free speech' - they accept people's right to say what they think, even if it is offensive to someone else. But there are limits as to what is acceptable and other countries were also starting to shake their heads over the offensive material emanating from the USA.

There were several features of this which created annoyance among the amateur community and which eventually led to anger. One point was that the whole amateur community was suffering because of the activities of a couple of dozen individuals.

The good aspects of Amateur Radio, which involve hundreds of thousands of US 'Hams' - experimentation, technical expertise, international goodwill and so on, were being negated by a handful of others. Never mind that they were usually licensed amateurs themselves: the rotten apples were creating an impression of indiscipline which reflected badly on everyone else.

It got to the stage where some amateurs were reluctant to let

young people, or even newcomers in general, tune around the bands 'unchaperoned'. There was concern that they could too easily eavesdrop on an outpouring of obscenity or racial abuse, which would cause them to drop the hobby.

Perhaps we've become inured to such things, particularly if we have ever heard what can sometimes be heard on Citizen Band radio. But most amateurs thought that they ought not be compared with CB operators and the worst of it was that it didn't look as though anything could be done.

The crux of the matter was that the licensing authorities were ignoring illegalities, saying that there just wasn't the personnel to enforce the rules. The **Federal Communications Commission (FCC)** was certainly understaffed and they had plenty of work on their plates, including regulating the telephone system, cable TV, Internet services and a myriad of other tasks. Even when amateurs presented 'open and shut' cases, there was nobody available to take action.

The system of 'self policing' has its limitations. Nobody expects motorists to make each other stop at red lights and drive on the correct side of the road. Similarly, amateurs did what they could, but ultimately expected proper law enforcement.

It didn't help that the Radio Amateur Licence in the USA was free - 'Hams' couldn't say they



**Fig. 1:** 'Rule Enforcer', Riley Hollingsworth K4ZDH, is presented with a "Riley Rules" T-shirt at the Dayton Hamvention.



**Fig. 2.**

Dave Griffiths GW0UJ is a member of the Pontypridd Male Voice Choir, which toured the USA last summer. One of the stops was Denver and, after the Choir's fine performance, Ed NOED (left) and Dave got together to discuss Amateur Radio and music.

wanted value for money! In fact, many amateurs said they would be willing to pay if they could ensure their dollars were spent on finding and punishing miscreants.

## DRAMATIC CHANGE

A dramatic change has occurred in the implementation of Amateur Radio regulations. The FCC decided to respond to criticism and centralised compliance operations in one office. In particular, they made one person responsible for enforcement and announced that a crackdown was about to begin. The results have been more than most US 'Hams' had hoped for.

**Riley Hollingsworth K4ZDH** is the FCC man who is charged with enforcing the rules - see Fig. 1. In the year or so since he took on the job, he has shown what can be done and given amateurs a sense that the 'bad guys' won't always win.

Note the significance of the appointment of a licensed amateur to this position. This reinforces the authority's determination to assign the role to a person who is knowledgeable about 'Ham' radio matters.

Riley K4ZDH began by admitting that the FCC's efforts had been dismal. He asked amateurs to telephone a special hotline when they had a serious infraction to report. There was immediate action against a licensed amateur in New Jersey for rebroadcasting, wilful interference and failing to identify. As well as modifying his licence, the FCC used its power to levy a summary fine of US\$7500 - an amount of money that would make other violators think twice!

After a few months, Riley had already cleaned things up significantly and was planning the next stage of his enforcement campaign. He said that on the h.f. bands there was a "specific group of jammers, who enjoy disrupting as much amateur communication as possible. Enforcement action against this group is long overdue".

He compiled a 'top 10' of those who continued to flout the law and added, "We are not going to stand for the Amateur Service to be further degraded - they are an international embarrassment".

## FORMAL AND INFORMAL APPROACH

The FCC has since been using several methods to reinforce its efforts - both formal and informal. In the first instance, Riley will send a warning letter saying that complaints have been received about an operator (or



someone using the operator's call sign) and asking recipients to contact the FCC. This seems to have the desired effect in many cases and the problems have reduced dramatically simply because it's becoming known that someone is listening.

Another unusual method that Riley used to issue informal warnings was to go on the air himself! He intervened in an argument on 75m and asked the participants to calm down and comply with the rules.

On another occasion, he confronted a 'Ham' he had already been in correspondence with about misbehaviour on the air. As an amateur himself, Riley stressed that inappropriate activity, if not stopped, could eventually threaten the hobby's h.f. allocations.

These efforts have been combined with a more formal approach to offenders. Unannounced visits have been made, with police officers, to inspect various Amateur Radio stations. Needless to say, tactics such as these have a salutary effect on perpetrators of wrongdoing!

The fines have continued - in the summer of 1999, a US\$20 000 fine was levied after a Radio Amateur was warned about illegalities, but refused to cease interfering operations. Licences continue to be rescinded and modified and Riley Hollingsworth says that a good start has been made.

Other aspects of Amateur Radio operation are starting to get more emphasis from the FCC. There have been a few cases of licence fraud, where candidates for the Morse and technical examinations were apparently 'helped' with the right answers. These are now being investigated more thoroughly. Individuals have had their licences withdrawn and some have been required to re-take the tests.

**Now the incursion of unlicensed operators into the lower part of 28MHz is being investigated.** This is a particular problem as the band becomes open more frequently. In much of the USA, a.m. signals from South and Central America are heard throughout the day in the c.w. section of 10m. Of course, illegal operators from the US are also guilty of using these frequencies, although some are unaware that modification of CB rigs into the 'freeband' section is not permitted.

### FOCAL POINT FOR ACTION

There's no doubt that the US experience of better enforcement has had a major effect. The bands have been cleaned up and violators are thinking twice

before they start transmitting.

There has also been an improvement in the way that ordinary amateurs feel about their hobby. They've stopped thinking there's nothing they can do about bad behaviour. The fact that the authorities are taking action makes everyone a little bit more cheerful about the future of Amateur Radio.

Would the US experience translate to other jurisdictions? I think it might. Of course, we have seen a very American response to the situation - a good guy comes on the scene at the last minute and saves the day!

A more British way might be to work quietly behind the scenes and gradually bring about improvement. But a single person who gets things done creates a lot of goodwill and perhaps acts as a focal point for action. Most people would agree there's plenty of enforcement work needed in the UK as well!

**MATERIAL FOR THIS COLUMN CAME PARTLY FROM THE AMERICAN RADIO RELAY LEAGUE (ARRL) NEWS REPORTS - MANY THANKS. PLEASE KEEP WRITING AND I WISH YOU ALL THE COMPLIMENTS OF THE SEASON AND A HAPPY 2000!**

**73 Ed NOED**

## DATA SCAPE

**NEWS, VIEWS & PICTURES TO:**

**ROGER COOKE G3LDI**

**TEL: (01508) 570278**

**E-MAIL:**  
**rcooke@g3ldi.freemove.co.uk**

**PACKET: G3LDI @ GB7LDI**

**ROGER COOKE G3LDI BRINGS NEWS THIS MONTH OF A BATTLE BEING FOUGHT IN THE MICROPROCESSOR MARKET. HE ALSO HAS NEWS OF A SUFFOLK DATA GROUP & AN AUSTRALIAN PACKET NEWSLETTER.**

**W**elcome to the new millennium! It's great to still be around in a new century with the 'Data Scape' column. I hope that we can all see exciting new things happening on the data 'scene'. A national trunk high-speed network should be our goal, in the order of Mb/s.

The advent of the Internet has taken its toll on the Packet network and the same has happened on the Satellite Gateway. Some amateurs denigrate the amateur system

and shout the virtues of E-mail but they seem to forget that the amateur network is purely an 'ad hoc' system and relies heavily on individual efforts, not to mention the financial outlay.

The Internet has become cheaper over the last few years - with the advent of free ISPs and the possibility of free local telephone calls - if this happened, you could connect to the Internet and stay there all day without cost. You'd even save on electricity costs which you occur when using Amateur Radio!

However, the Internet doesn't have the same magic that Amateur Radio still has. But even that is only in the mind of "wrinklies" such as myself, having got into the hobby in early youth and thinking how wonderful it was to be able to talk to somebody in Australia!

Making a telephone call to Australia was extremely expensive when I was younger and something to avoid! Visiting the country was merely a dream, only realised by a few.

The world has become smaller, travel and communications much cheaper and radio itself has lost some of its appeal. However, we should nurture the network and keep amateur traffic to the amateur bands. If we don't then this wonderful communications hobby might eventually disappear, and that would be a tragedy.

### CONTACT TIMEWAVE

Following several E-mails to me regarding the **PK232 DSP filters**, here's how you can contact **Timewave Technology Inc., 58 E. Plato Blvd, St. Paul MN 55107 USA. Tel: 651-222-4858 or FAX: 651-222-4861. You can also E-mail Timewave on: sales@timewave.com or visit their Web site: www.timewave.com**

The UK distributor for Timewave is **Nevada** and they can be reached on **Tel: 0239-266 2145, FAX: 0239-269 0626, 189 London Rd, North End, Portsmouth PO2 9AE.**

### BATTLE LINES

The battle lines are still drawn in the field of microprocessors. Just as **Intel** seem to have the market all to themselves with the new Pentium III, **AMD** have come along with the launch of the Athlon processor, previously code-named the K7. They've dropped the old socket 7 design of motherboard to use Slot-A technology. It looks very similar to the Slot-1 technology Intel uses in its Pentium II and III range.

The 'Slot A' means that the Athlon comes as a black cartridge that simply slots into the correct style of motherboard. It also means that you need an entirely different type of motherboard for the processor to work. The Athlon is the world's first seventh-generation processor, which puts it one step up the evolutionary ladder from the Pentium II and III range.

A cache has a very fast memory that stores recently fetched data or instructions - the level one cache sits directly on the processor running at core speed, while level two cache sits off the CPU and runs at the speed of the motherboard's front side bus.

The caches are an important feature, as anything inside the cache saves on making another slower operation to retrieve information from where it is stored. This frees the processor more quickly and allows it to run faster.

It would seem obvious to include more cache on the CPU as this allows faster operation and AMD have taken this approach and the Athlon has 128Kb of level one cache, which is divided neatly in half with 64Kb serving as an instruction cache and 64Kb serving as a data cache. The Pentium III has just 32Kb of level one cache, giving the Athlon a clear advantage.

The CPU is governed by clock speed and for every clock cycle, the CPU is capable of a set number of operations. The higher the number of operations that the CPU can perform, the fewer clock cycles it takes to perform a task and the quicker the result of the calculation.

The makers of Athlon have managed to push the throughput of the Athlon up to a very impressive nine operations per clock cycle. Again, comparing it to the Pentium III, this can only manage six operations. This boost has been achieved by the use of a new copper-based 0.18 micron manufacturing process, allowing AMD to build more intricate and heat-producing chips.

### PROCESSOR INSTRUCTIONS

A processor has a fixed number of instructions programmed into it and all operations are carried out through a combination of the available instructions. These instructions would include tasks such as adding two numbers together, or performing a subtraction.

For an instruction to be executed, it must first be decoded into its component parts. The faster you can do this, the quicker the processor will be.



# RadioScene



**Fig. 1: Home page of the Suffolk Data group's Web site which can be found at: [www.g1yre.freemove.co.uk](http://www.g1yre.freemove.co.uk)**



**Fig. 2: Jo Harris, Secretary of the Australian Amateur Packet Radio Association (AAPRA).**



**Fig. 3: David Ramsay, President of the AAPRA.**



**Fig. 4: Home page of the AAPRA Web site which can be found at: [www.aapra.org.au](http://www.aapra.org.au)**



**Fig. 5: The 'Galaxies' screen saver which can be found at: [www.geocities.com/sunsetstrip/villa/7632/galaxiesscreensaver.htm](http://www.geocities.com/sunsetstrip/villa/7632/galaxiesscreensaver.htm)**

The approach of AMD is to have multiple x86 (the Intel instruction set, required for compatibility with existing programs) instruction decoders on the unit.

(Multiple decodes allow multiple instructions to be

decoded at the same time, which means that when the processor has finished executing one instruction, the next will be ready that much quicker. This is used to great effect as the processor is superscalar, which means it can perform multiple instructions per clock cycle, due to multiple instruction pipelines operating in parallel).

The system bus is based on Compaq's Alpha EV6 bus architecture. Bus speed has been increased in the Athlon to 200MHz, which means a higher data bandwidth of 1.6Gbps. It all operates under a Packet-based protocol, compared with the pipelined approach of the previous generation.

The Packet-based approach has two major advantages. First, it optimises bandwidth use and second it allows a greater number of outstanding transactions (up to 24), so the processor rarely needs to wait for crucial system data.

Tests performed at VNU Labs have shown that running the industry-recognised Sysmark 98 from BAPCo against an equivalently clocked Pentium III system has given the Athlon up to a 10% performance advantage and Sysmark 98 doesn't use software optimised for the Athlon. Switch to a graphics testing tool such as the superb 32Mark 99 Max and the performance gap is increased as the Athlon storms into the lead.

Having just written about the Athlon - and not to be outdone in the market-place - Intel have just announced

the launch of its 700MHz-plus Coppermine Pentium III processor. Coppermine consists of 15 processors, uses an L2 cache - a quick short-term memory on the chip itself and runs at the full 700MHz speed of



**Fig. 6: The 'Sky Screen Saver' can be viewed at: [www.fourmilab.ch/](http://www.fourmilab.ch/)**



**Fig. 7: Front page of the Marchsearch Search Engine which can be found at: [www.marchsearch.com](http://www.marchsearch.com)**

the chip.

The news comes just one month after the launch of the Athlon so, as you see, it really is difficult to maintain any real current up-to-date news. By the time you read this, there will probably be something else coming along!

I've stopped trying to keep up with the latest and greatest. There really is no need these days. Running a BBS on a 486 is plenty fast enough and these motherboards are quite cheap to buy.

## SUFFOLK DATA GROUP

The Suffolk Data Group produce a quite impressive Newsletter which sports colour pictures. Running to 13 pages, it has some very interesting articles, including one called 'Ramblings of a Geriatric Aerial Farmer', (snippets from the Snug of the Twig and Whistle). This is an amusingly written piece containing some sound antenna theory and reminds me of the column in the AAPRA Newsletter from 'Aunt Harriet'.

A three-page item on PSK31, taken from the Internet PSK31 Homepage, should encourage some extra converts to that mode. The treasurers report mentions gaining 40 new subscriptions at the local rally! Who says Packet is dying?

The chairman of the Suffolk Data group is Andy G3ZYP, Steve G1YRE is the Secretary and the Editor is M1ADT. They have their own Web site, written by Steve G1YRE which can be found at: [www.g1yre.freemove.co.uk](http://www.g1yre.freemove.co.uk) Check it out and let Steve know you visited. See Fig. 1 for a picture of the committee, downloaded from the Web site.

## AUSTRALIAN BULLETIN

In the latest Australian Amateur Packet Radio Association (AAPRA) bulletin, there is a very informative article on setting the TNC's audio drive level. This is

something that a lot of amateurs would do well to read and it just shows

that, when setting up a Packet station, there's more to it than just connecting up the leads.

The bulletin also has pictures, albeit mono and this quarter the repeater at VK2RNS is shown. Situated at Asquith, this links to VK2RND in Newcastle, VK2ROT in Sydney that eventually links to Perth and VK2RHR at Mittagong.

'Aunt Harriet' is also reporting a downturn in Packet activity, mainly due to the drift away from Amateur Radio and onto the landlines in the form of E-mail. The Secretary of AAPRA is Jo Harris, shown in Fig. 2, a very keen lady who came to the UK a couple of years ago and was well reported at the time. Some of you will remember seeing the news of her visit in print.

The President is David Ramsay, shown in Fig. 3, with the home page in Fig. 4. The Web site is [www.aapra.org.au](http://www.aapra.org.au) There is a lot of information on the site and it's well worth a visit.

## SCREEN SAVERS

For those interested in outer space, a couple of screen savers are well worth having. In fact, you can spend more time looking at the screen saver than doing the work! The first Screen Saver which I found is called 'Galaxies' and can be found at: [www.geocities.com/sunsetstrip/villa/7632/galaxiesscreensaver.htm](http://www.geocities.com/sunsetstrip/villa/7632/galaxiesscreensaver.htm)

The screen savers are a large file and can be used as a stand-alone program as it is so interesting. However, used as a screen saver it can also generate a lot of pleasure. (See Fig. 5).

The second one is The 'Sky Screen Saver' by John Walker. Look at [www.fourmilab.ch/](http://www.fourmilab.ch/) (See Fig. 6 for a small sample). This is also designed for those interested in space, in the sample, it shows the main constellations. This type of screen saver also has an educational value and could be useful to use where children will see it frequently.



## Web Watch

Timewave: [www.timewave.com](http://www.timewave.com)  
 Suffolk Data Group: [www.g1tyre.freemove.co.uk](http://www.g1tyre.freemove.co.uk)  
 Australian Amateur Packet Radio Association (AAPRA):  
[www.aapra.org.au](http://www.aapra.org.au)  
 'Galaxies' Screen Saver: [www.geocities.com/sunsetstrip/villa/7632/galaxiesscreensaver.htm](http://www.geocities.com/sunsetstrip/villa/7632/galaxiesscreensaver.htm)  
 'Sky Screen Saver': [www.fourmilab.ch/](http://www.fourmilab.ch/)  
 Marchsearch Search Engine: [www.marchsearch.com](http://www.marchsearch.com)

### PARTICIPATE WITH PSK31

I received the following message regarding the use of PSK31 software. If you're interested in participating, please contact Derek via E-mail in the first instance:

"Derek Billingham  
 <djb@omega216.freemove.co.uk>  
 Subject: Re: PSK31 Skeds  
 A few people locally in West Midlands have been using PSK31 on h.f. for a while and we are very impressed with its S/N properties and low power needs. As these properties improve DX performance at v.h.f. I would be interested to hear from anyone at 'DX' distances interested in assessing the performance of the mode at 2m who is willing to maintain a sked for a few weeks. Do you know of any comparable

interest?"

Obviously the interest in PSK31 is growing and if anybody is keen enough to try a few tests with Derek, I'm sure it would be worthwhile.

### ANOTHER SEARCH ENGINE

Marchsearch is another search engine that you can try. Look at [www.marchsearch.com](http://www.marchsearch.com). Their front page is shown in Fig. 7. There are numerous search engines to use and this one has a newsletter and updating service.

Marchsearch also has specific country search facilities and lots more. It is a good idea to try several different search engines when looking for something as results can vary from search engine to search engine. The one I use most of the time is Google and I find that very quick and quite accurate.

## Further Reading

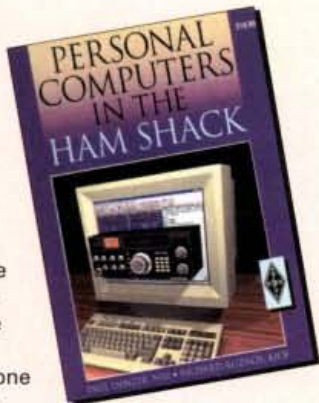
### PERSONAL COMPUTERS IN THE HAM SHACK

If you are interested in knowing more about the use of computers in the shack then this could be the book for you. Or maybe you know someone who would like to know more about how the use of computers can enhance their Amateur Radio hobby - well, *Personal Computers In The Ham Shack* would make a wonderful Christmas present!

The book claims to explore the many ways of enhancing your Amateur Radio hobby with the addition of a computer and, from this book, you'll learn how to choose the right computer system for your needs, operate digital modes, log and contest, design a circuit, test new antennas as well as learn how to use the Internet to the advancement of your hobby.

It seems that we can no longer ignore the growing popularity of computers and the amount of people 'logging on' to the Internet grows by the day. Having a computer in your shack will broaden your Amateur Radio hobby in such a way that you'll never look back!

*Personal Computers In The Ham Shack* costs just **£10 INCLUDING P&P** (normally £11.50). To order, please use the Order Form in this issue or Tel: **Michael or Shelagh** on (01202) 659930.



That's all for this month - the first in the new millennium. Hope that you're all enjoying the column. Don't forget, please let me know of anything new or interesting which you would like mentioned in the column.

NEWS, VIEWS & PICTURES TO ME PLEASE AT THE ADDRESS SHOWN IN THE CALLBOOK. UNTIL NEXT MONTH,

73 ROGER

## BROADCAST

REPORTS & INFORMATION TO ME PLEASE:

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PETER SHORE BRINGS READERS NEWS OF A POSSIBLE RETURN TO BROADCASTING BY RADIO LUXEMBOURG AS WELL AS A BRAND NEW PROGRAM FROM WORLD RADIO NETWORK. HE ALSO GIVES YOU SOME MORE PROGRAM NEWS TO GET YOU THROUGH THE WINTER PERIOD.

Do you remember the sound of Radio Luxembourg? Broadcasting from the Grand Duchy across Europe every evening on 208m m.w., the station was a "must listen" for millions of people for generations until it stopped broadcasting in English a few years ago.

Well, now there may be a chance that 208 will come back on the air, this time operated by Briton, Eric Wiltshire. Eric was involved with Merlin Network One, the station operated by Merlin Communications International, which folded last year, but now plans to go into mainstream broadcasting using m.w. as the prime means of getting programmes out.

Studios of the new Radio Luxembourg will be in London and the Grand Duchy, and, in addition to the high power m.w. transmitter, 'Luxie' will be

available on satellite and the Internet. Partners in the venture are CLT-UFA, the giant media conglomerate that still owns the Luxembourg transmitter:

"We look forward to working closely with CLT-UFA to ensure that the return of Radio Luxembourg offers a style and sound that is 100% 'Radio Luxembourg'", says Wiltshire. "Audiences across Europe will once again be able to enjoy a unique blend of music from golden oldies to the latest releases, done the Luxembourg way with a dedicated team of presenters".

But the station was due to launch at the start of November and as this edition of PW goes to press, Radio Luxembourg was not to be heard - 1440kHz m.w. in the European evening was carrying RTL Radio, a German-language service. Watch this column for more news about 208.

The Radio Luxembourg signal is immensely powerful, emanating from a 1200kW transmitter and covers much of north-west Europe. But power does not necessarily guarantee that you reach everyone, as listeners to BBC Radio Four in Scandinavia have discovered recently. Polish Radio has reactivated its 198kHz l.w. assignment, the same channel used by the BBC for national l.w. and night time pan-European coverage.



Fig. 2: A Radio Netherlands (RN) sticker.



Fig. 1: Sticker which came from Radio Vlaanderen International (RVI).

PETER SHORE BRINGS NEWS OF A POSSIBLE RETURN TO BROADCASTING BY RADIO LUXEMBOURG



# RadioScene

## DISAPPOINTED FANS

Disappointed BBC Radio Four fans in southern Sweden, Denmark and northern Germany have been dismayed to discover Polish-language programmes instead of English from London, but Poland used 198kHz, and before that 200kHz, to cover Poland from Warsaw with its Radio Three programme. Have any UK listeners suffered interference this winter on the long wave Radio Four channel?

More successful pan-European broadcasting may be on the cards for this New Year with the launch on 18th January of **Euromax Deutsch**, the second of **World Radio Network's** new continent wide channels in its European Radio Network. Euromax will eventually have three channels - in English, French and German - complementing Euromix, the multi-lingual service launched at the beginning of December.

Euromax is available via satellite and plans to be on a good many other platforms according to Chantal Cooke, ERN Project Manager:

"We're looking at satellite, local cable systems, local f.m. and a.m. stations and, because we're determined to be innovative, digital radio too",

says Cooke. "There's a fresh sound to Euromax and Euromix that makes the stations sound different to WRN's existing channels".

You can hear Euromax and Euromix on satellite and via the Internet at present. Check out [www.wrn.org](http://www.wrn.org) for more information.

## WHAT'S HAPPENING ON THE BANDS

With winter well and truly surrounding us here in the cold Northern Hemisphere, it's a good time to stay in with your short wave receiver and check out what's happening on the bands.

**Israel Radio** in Jerusalem broadcasts in English and 13 other languages. Check out English at (all times are in UTC): 0500-0515 on 17.715, 11.605, 9.435MHz; 1130-1135 on 17.535, 15.65MHz; 1500-1530 on 17.535, 15.65MHz; 2000-2025 on 15.65, 15.64, 11.605, 9.435MHz; Hebrew is at: 0000-0500 on 9.39MHz 0430-0600 on 11.59MHz 0500-1900 on 15.615MHz 0600-1900 on 17.545MHz 1700-1900 on 11.59MHz 1900-1945 on 15.65MHz

1900-2200 on 9.39MHz  
1900-2300 on 13.80MHz  
1900-0430 on 11.585MHz  
2200-2400 on 9.395MHz  
2300-0600 on 7.545MHz

The Hebrew broadcasts from **Kol Israel** include a relay of the TV Channel 1 news bulletin at 1900-1950UTC - this is the only case I know of where a national television programme is relayed world-wide on short wave.

**Radio Vlaanderen Internationaal (RVI)** from Brussels broadcasts in English (all times are in UTC): 0400-0430 on 11.98MHz 0800-0830 on 5.985MHz 1230-1300 on 9.925MHz 1830-1900 on 5.91, 9.925, 13.60 and 17.695MHz plus 1512kHz m.w.; 2030-2100 on 1512kHz 2230-2300 on 13.67MHz

Neighbouring **Radio Netherlands (RN)** has a continuing range of interesting feature programmes to complement its news and current affairs coverage (Newsline is now under the editorship of Paul Kirby, late of BBC Radio Five Live). This month there's "Ice Through the Ages" looking at how ice has been kept, used and transported since the earliest civilisations.

"The Science and Art of Dr Sylvius" looks at the father of the 17th century iatrochemical school of medicine, which held that all phenomena of life and disease are based on chemical action.

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**Africa:** 1730-1830 on 11.655, 6.02MHz; 1830-2030 on 17.605, 13.70, 9.895, 11.655, 6.02MHz

The international service of **Radio Belarus** broadcasts in English on certain days of the week (all times are in UTC): 0300-0330 on 6.070, 7.210MHz (not Tuesday or Thursday) 2030-2100 on 7.105, 7.210MHz (Tuesday and Thursday) 2130-2200 on 7.105, 7.210MHz (Tuesday and Thursday)

That's all for this month. I hope that your receivers are still functioning after the changeover to the year 2000 and I hope that broadcasters around the world are still able to make programmes and get them out to us!

**IF YOU NOTED ANY ANOMOLIES OVER THE NEW YEAR PERIOD, PLEASE LET ME KNOW. UNTIL NEXT MONTH, GOOD LISTENING!**

73 PETER

## Put An End To The Hunt For That Review!

Every month, from now until the December 2000 issue, we will be offering you the chance to order a photocopy of that review which you've been on the look out for!

This month we would like to offer *PW* readers the chance to order a photocopy of the review of their favourite **AOR** rig for just **£1 each!** Orders for these AOR reviews will need to be in by **29 February 2000.**

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AOR AR-3030 Receiver Preview .....	January 1994
<b>AOR AR-3030</b> .....	<b>September 1994</b>
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<b>AOR AR-7030 Communications Receiver</b> .....	<b>March 1996</b>
AOR AR-8000 Wide Band Receiver .....	September 1994
<b>AOR AR-8200</b> .....	<b>June 1998</b>
AOR DDS-2a .....	October 1996
<b>AOR LA-320 Active Antenna</b> .....	<b>October 1993</b>
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With Christmas now in sight, the PW Editorial team have some excellent reading suggestions with which to fill the Radio Amateur's stocking this year. Alternatively, if this has been a long year for some of you and you've had little time to really enjoy your hobby then why not refresh yourself with these 'Book Profiles'? You might just discover a new aspect to the hobby with which to kick start the new century!

TELEPHONE, FAX, E-MAIL OR USE THE ORDER FORM ON PAGE 74

# Book Telephone PROFILES

## Your VHF Companion Steve Ford WBSIMY

This handy little American paperback would be of benefit to those Radio Amateurs among you who would like to turn your hand to something a little different. In fact, the book itself states that it would be of use to newly licensed amateurs whose main interests lie in the v.h.f. band as well as being of interest to "a veteran in search of something new".

Your VHF Companion probably has everything you require if you need to know a little of everything about the v.h.f. bands. It has chapters on Repeaters - what they are and what you can expect to find when working across one. There is also a very useful chapter on Packet radio, what it is and how to set up your own Packet station. This book also covers c.w. and s.s.b. operating on the v.h.f. bands, satellite communications, Amateur TV (ATV) and transmitter hunting.

Your VHF Companion is a good book which tells you a little bit about everything and once you've decided which part of v.h.f. operation you like best then you can concentrate on just that! **Highly Recommended.**

## Practical Receivers For Beginners John Case GW4HWR

*Practical Receivers For Beginners* claims to be a book aimed at "anyone who is building receivers for the first time or who is considering moving up to microwaves". It contains a selection of "easy-to-build" receiver for amateur bands - including microwaves, as well as a few "fun" projects and test equipment.

In the Preface to the book the author, John Case GW4HWR, states that *Practical Receivers For Beginners* is in the form of an autobiography. He has "spent many hours as a short wave listener as well as making receivers of all kinds" and some of the chapters in this book include a look at the basic requirements of receivers, different types of

receivers (i.e. crystal, t.r.f., the heterodyne, direct conversion receiver and the superheterodyne).

Some of the projects in *Practical Receivers For Beginners* include a direct conversion receiver for the 3.5 and 14MHz bands, an Amateur Radio direction finding receiver for top band, an f.m. receiver for the 50MHz band, the 'Super-7' - a simple receiver for the 7MHz band, as well as a chapter on receivers for the Novice microwave bands. This book comes **Recommended.**

## Antenna Toolkit - Including CDROM Joe Carr K41PV

Intended for the radio enthusiast, if you want to build and use antennas, then this book would be an adequate information source for you - with the added bonus of a CDROM. There's no doubt that you'll recognise the name, because this now famous American author, **Joe Carr K41PV**, has written many definitive books on antennas and this one is his latest.

All of the antennas in this book are wire antennas which are "easy to install", "easy to get working properly" and they are "cheap".

There's quite a bit of technical material to wade through, as Joe Carr readily admits, but unless you wish to become a professional antenna engineer, you will only need to follow a few of the simple guidelines in the book to get good results.

The free CDROM with this book is Microsoft Windows-based antenna software and will calculate the critical lengths and other parameters of the antennas described in the book when the user selects the antenna type and sets the frequency. Also included is a Windows freeware package from the 'Voice Of America' organisation called VOACAP, which is an h.f. propagation predictor. **Recommended.**

## Transmitter Hunting - Radio Direction Finding Simplified Joseph D Moell KO0V & Thomas N Curlee WB6UZZ

*Transmitter Hunting - Radio Direction Finding Simplified* claims to have "All the information you need to set up for and perform radio direction finding on h.f. and v.h.f. bands". There's an interesting chapter entitled 'RDF Is Born' in which the authors discuss the origins of direction finding - from the First World War, through the Second World War, up until the present day.

In Chapter One, ('RDF Is Born') the authors of this American book say: "Ask five people the uses of RDF and you'll probably get many different answers. The average person most likely thinks about locating spies with clandestine transmitters. Hams and CBers may think of the FCC van loaded with radio gear, looking for illegal or bootleg operators. The pilot or boater knows that he can be found in time of trouble with RDF".

So, if you didn't know anything about transmitter hunting before reading this book, then you certainly will after you have read it! Radio Direction Finding is an interesting subject and the book covers it well. **Highly Recommended.**

## The 2000 ARRL Handbook For Radio Amateurs

*The 2000 ARRL Handbook For Radio Amateurs* is the latest copy of this well-known book to hit the market. The American Radio Relay League (ARRL) handbooks are very popular and the 2000 edition contains some interesting new items.

These new items include 'A 1500W linear amplifier for 6m using the 4CX1600B tetrode' by W1QWJ, 'An extremely versatile two-radio computer-controlled switchbox' by N6BV, 'Sophisticated output filters for power amplifiers' by W3NQN and W0IYH, 'An expanded section on h.f. mobile antennas' by KE2QJ, 'Solid coverage of PSK31' and a clever home-brew 'vacuum' operated pick-and-place SMD component handler.

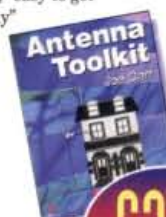
If you are in need of a handbook for the start of the next century then this is as good a place to start as any. Or, you might know someone who needs one and, if that's the case then *The 2000 ARRL Handbook For Radio Amateurs* would make an excellent Christmas present. **Recommended.**



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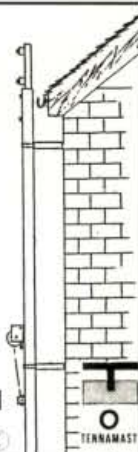
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**Murphy Navy receivers**, cased with power supplies, good condition. B41 15kHz-700kHz, also AP100335, same as p.38 Nov 1999 *PW*, offers, buyer collects: north Devon. Tel: G2CVY (QTHR) on Barnstaple (01271) 343355, evenings.

**Navico AMR-1000S** f.m., with s.w.r. tuner, both mint condition, bargain at £120, no offers. Tiny-2 Packet radio plus cables, £50. BNOS p.s.u., 13.8V, can deliver 50 mile radius, £40. Tel: Alan on Royston, Herts (01763) 262443.

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**B.B. Jan 2000**

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