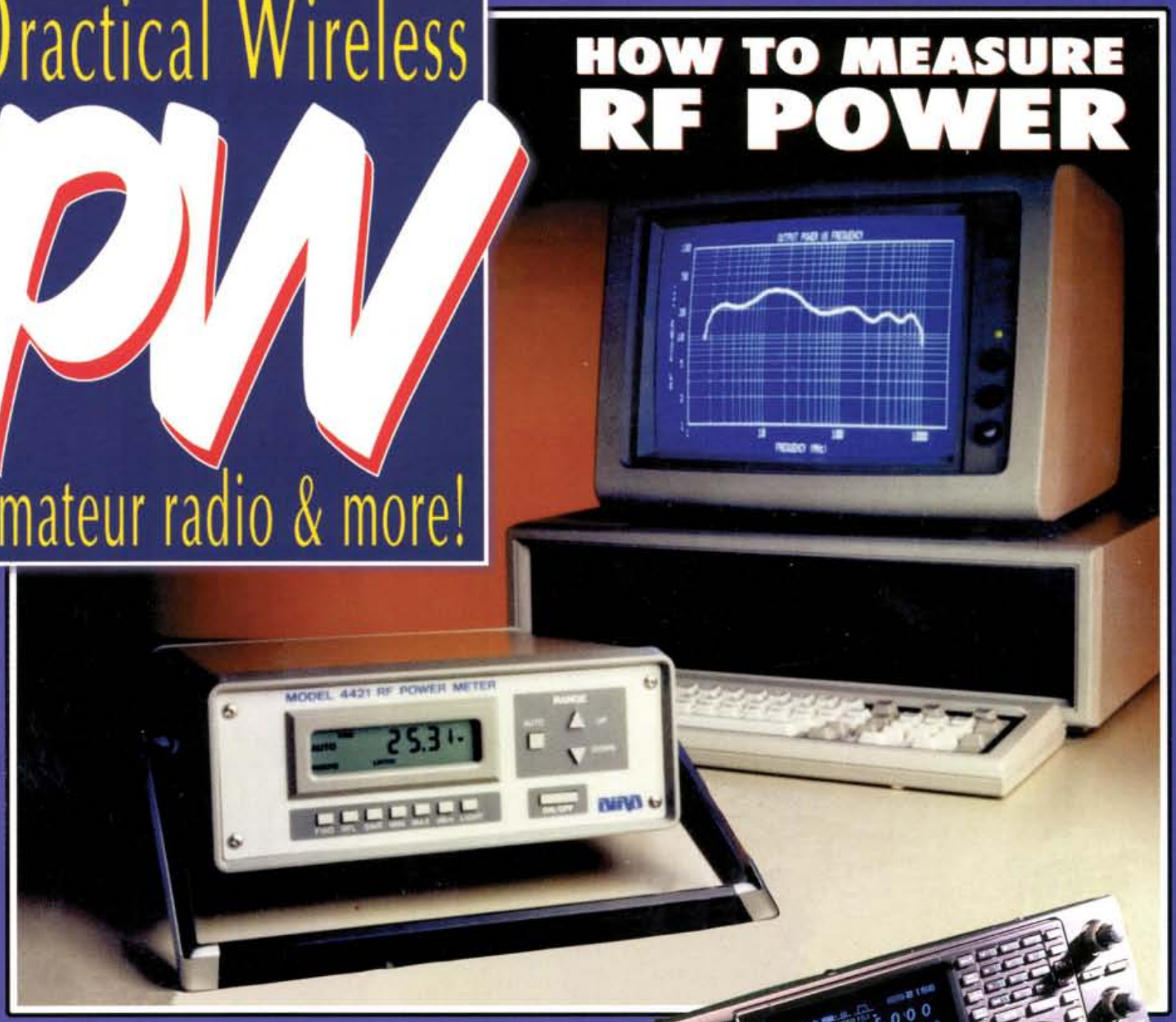
Practical Wireless
PW
amateur radio & more!

HOW TO MEASURE RF POWER



'WIN AN IC-756PRO' COMPETITION

See Page 11

THE SOLID & VERSATILE YAESU FT-2600

July 2000 £2.50

9 770141 085044 07>

FIRST IN Amateur Radio

Waters & Stanton PLC

Fax:01702 205843
Enquires:01702 206835
01702 204965

22 Main Road, Hockley, Essex, SS5 4QS

For the very best Bargains & Secondhand Listings,
Visit: Our large Web Site wsplc.com

Retail Mon-Sat 9.00 - 5.30pm
Secure e-mail order: Via our web site
General e-mail: Info@wsplc.demon.co.uk.

ISO 9002 REGISTERED FIRM

Orders only Low Carriage charges on web ordering
Freephone 0500 73 73 88
All OFFERS subject to availability

MasterCard VISA

Whatever way you look at it £799 You can't Ignore The Price

YAESU Choice of the World's top DX'ers

FT-100 160 - 70cm All Mode

You could spend this amount on a HF only transceiver. With the FT-100 deal you also get a powerful 100W all-mode on 6m, a full 50W all-mode on 2m and a useful 20W all-mode on 70cm.

You could of course wait around for next year's model and pay twice the price!

But you only get one chance at this price.

It's the small things that count and set it apart.

The only design of it's size that provides linear amplifier keying and ALC input. For digital modes there's a data socket. Bandwidths of 6kHz, 2.4kHz, 500Hz and 300Hz included as standard. Built-in keyer and CW reverse mode, plus DSP filtering down to 60Hz and audio peaking filter keeps the CW operator happy. And DSP also adds notch filtering and programmable microphone equaliser, whilst even more punch is achieved by the switch-able speech processor. Other features include Time-out, CW Ident, VSWR meter, ARTS, CTCSS, 1750Hz tone, 9600BPS, 300 Memories and Spectrum Scope. Finally, you also get a FREE 24-month warranty.

Modes:	SSB CW FM AM	Head Unit:	Remote option
Receive Range:	100kHz - 970MHz	Bandwidths:	6kHz to 60Hz
Power HF & 6m :	100 Watts	Output 1:	HF - 6m
Power:	2m 50 Watts	Output 2:	2m -70cm
Power:	70cm 20 Watts	Size:	160 x 54 x 205mm
Memories:	300	Weight:	3kg.

YAESU FT-840 160- 10m

A firm favourite, this 100W radio is an ideal rig for those on a budget. Impossible to fault, it just goes on and on!

24-Month FREE Warranty on Yaesu

YAESU FT-1000MP AC
160 - 10m All Mode

SAVE

19.4% APR Available

If you are looking for the rig with every feature including dual receive - then look no further!

It has stood the test of time and used by the worlds top DXers and DXepeditions. Its excellent receiver combined with its superior transmitted signal makes this a natural choice for the HF enthusiasts.

ICOM IC-746
160m - 2m All-mode

Your chance to purchase one of the most popular "all-band, all-mode" transceivers at a very competitive price. The IC-746 offers 100 Watts output on all bands and has a receiver performance to match.

ICOM IC-756PRO 1.8 - 52MHz 100W

You've read the rave reviews, and you have seen our recommendation on the web site. This radio with its amazing receiver and digital filtering, also includes auto ATU and real-time spectrum scope. A great DX rig.

YAESU FT- 920AF
HF 160m-6m-100w

SAVE

Includes full DSP and internal ATU. High tech receiver with dual tuning controls. Uses many of the FT1000 MP features but at a more attractive price. Full break-in on CW and includes a data port for TNC.

ICOM IC-706IIG 160 - 70cm All Mode

Still a firm favourite with mobile operators and those who want a compact all-mode, all-band station. Phone for latest leaflet.

YAESU FT-847

SAVE

160m - 70cm All Mode
£1329 with switch mode power supply

PRICE MATCH

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!!

KENWOOD TS-570DG
160 - 10m All Mode

19.4% APR Available

Probably the most underestimated transceiver on the market. Don't be fooled by the low price, the TS-570 has one of the best receivers around. One of the best buys if you want top HF performance on a budget.

We Will Match or BEAT Competitor's Prices

On genuine UK Stock

wsplc.com Go

ADI AT-600
Dual Bander Airband Rx

£199 Plus £6.00 Carr.

* 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

KENWOOD TM-700DE
2m / 70cm Data Mobile

£429 Plus £7.50 Carr.

SAVE

Just arriving, this new model has built-in TNC, port for GPS, Data connector for SSTV, RTTY etc., CTCSS/DCS, Switchable TX/RX deviation, Dual receive, Wide receive option, Detachable head unit, 50 Watts on 2m, 35 Watts on 70cm, 200 memories, Alpha tag memo capability and a lot more. And who has the best price? - look no further!

HOKA Software
The Secret's Out!

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

£349.95 Plus £6.00 Carr.

C-150 2m Handy

£99.95 Plus £6.00 Carr.

* 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.)

YAESU VX-5R

£269 Plus £6.00 Carr.

* 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

YAESU FT-50R

£199 Plus £6.00 Carr.

* 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 70cm Handy

£69.95 Plus £6.00 Carr. Previously £89.95

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

NEW

Optoelectronics
CD-100 MULTICOUNTER

Reads Frequency & Codes

Range: 10MHz -1GHz
Memory: 100 Channels
Decode:
CTCSS, DCS, DTMF, LTR.
Power: Internal ni-cad battery
Charger included

£379.95 Plus £6.00 Carr.

KENWOOD TH-D7E

£259 Plus £6.00 Carr.

* 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

YAESU FT-90R Can you believe the size?
2m/70cm Dual Band

SAVE

£309 Plus £7.50 Carr.

The tiny dimensions of the FT-90R from Yaesu, are hard to believe. Yet it produces 50W on 2m and 35W on 70cm. Auto repeater shift on UK channels and switched 12.5 / 25kHz deviation, make this a number one choice.

ADI AR-147

AM Airband Receive

£199 Plus £6.00 Carr.

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

GARMIN In-Car GPS Street Pilot

£419 Plus £6.00 Carr.

The complete car navigational system. Large screen with UK mapping and optional street level data cartridge - plus lots more! Designed for the driver with easy routing and special data screen for car use. Optional UK CD **£69.95**, memory storage card 8Mb **£64.95. With CD & card £539.**

GARMIN In-Car GPS-III Plus

£349 Plus £6.00 Carr.

Detailed maps of UK and Europe plus street data upload feature via PC. Great value. Sits easily on the dash board and gives extremely comprehensive data including GB national Grid. Powered by AA cells or external 13.8V.

ICOM IC-2800H
In Full Colour!

£310 Plus £7.50 Carr.

* 2m & 70cm Mobile
* Colour TV Screen
* Full CTCSS and 1750Hz Tone
* 50W 2m 35W 70cm

Includes FREE Remote head cable.

ICOM IC-207H

£245 Plus £7.50 Carr.

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

KENWOOD TM-G707E

£239 Plus £7.50 Carr.

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

YAESU FT-8100R

£349 Plus £7.50 Carr.

* 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.

KENWOOD TM-V7E

£299 Plus £7.50 Carr.

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

E & OE

Waters & Stanton

FREE MFJ Catalogue - Just Phone!
Beware of grey imports. All MFJ products should have serial numbers and UK Warranty cards issued by us.

MFJ
FREE CATALOGUE

Every Model Stocked

MFJ-969 300W ATU
£169.95 Plus £7.50 Carr.

160 - 6m Wire, Coax or Balanced

Includes VSWR / Power Meter, Ant. Selector, PEP feature, Roller Coaster Tuning

MFJ-949E 300W ATU
£139.95 Plus £6.00 Carr.

160 - 10m Wire, Coax or Balanced

Includes VSWR / Power Meter, Ant. Selector, PEP feature, Built-in Dummy Load

MFJ-948 300W ATU
£119.95 Plus £6.00 Carr.

160 - 10m Wire, Coax or Balanced

Includes VSWR / Power Meter, Ant. Selector, PEP feature, Built-in Balun, 12v Illumination

MFJ-901B 300W ATU
£75.95 Plus £6.00 Carr.

160 - 10m Wire, Coax or Balanced

MFJ-962D 1.5kW ATU
£239.95 Plus £7.50 Carr.

160 - 10m Wire, Coax or Balanced

Includes VSWR / Power Meter, Ant. Selector, PEP feature, Roller Coaster Tuning, T-Network

MFJ-986 3kW ATU
£289.95 Plus £7.50 Carr.

160 - 10m Wire, Coax or Balanced

Includes VSWR / Power Meter, Ant. Selector, PEP feature, Roller Coaster Tuning, Differential Tuning.

MFJ-989C 3kW ATU
£299.95 Plus £7.50 Carr.

160 - 10m Wire, Coax or Balanced

Includes VSWR / Power Meter, Ant. Selector, PEP feature, Roller Coaster Tuning, T-Network

MFJ-912 Ladder Feed Balun
£39.95 Plus £5.00 Carr.

Connect between ladder feeder and coax and enjoy very low loss and all-band operation (when used with manual atu).

WD- 25 Duplexer
£24.95 Plus £2.00 Carr.

- 1.3 - 35MHz 500W
- 50 - 225MHz 300W
- 350 - 540MHz 300W
- Insertion loss 0.2dB
- VSWR <1.2
- SO-239 Sockets
- Wall or mast mounting
- Mast size 58mm
- 98 x 35 x 70mm

This duplexer may be used both indoors or outdoors. It is supplied with mast mounting clamps and weatherproof shrouds for the coaxial plugs. The mast bracket can easily be removed, allowing the unit to be used for indoor use.

MFJ-269 Analyser

As Reviewed by RadCom

£299.95 Plus £6.00 Carr.

160m - 70cm Amazing Value

Imagine being able to plug into your antenna or feed line and make meaningful adjustments on site. Or be creative and turn hours into minutes and ideas into antennas! Read what RadCom says and make your own mind up. One of the best investments you will ever make!

MFJ-418 CW Tutor
£69.95 Plus £6.00 Carr.

The easy way to learn CW. Sends real QSOs or random characters. Clear LCD display

WATSON W-40SMV
Switch-Mode Power Supply
£149.95 Plus £7.50 Carr.

NEW

Specification

Output Voltage:	3 - 15V DC or 13 . 8V fixed
Output Current:	0 - 40 Amps
Dimensions:	220 x 110 x 300m
Weight:	3.5Kg Approx
Max.Continuous Current:	40A
Current rating:	60A

A 40Amp Power House Weighs just 3.5 Kg

The new Watson 40 Amp power supply features a light weight design using the latest switch-mode techniques with digital display of both current and voltage.

MFJ-259B Antenna Analyzer
£229.95 Plus £8.00 Carr.

This battery powered analyzer will check the resonance and impedance of your antenna system in seconds. Make adjustments and watch the changes. Saves hours of work.

MFJ-1026 Noise Phaser
£159.95 Plus £6.00 Carr.

Reduces local electrical noise by up to 3 S points

Simply insert between antenna and transceiver. Using a small "sniffer" antenna, just phase out the local noise to uncover the signals. Offered on our usual 10-day approval.

LINEAR AMP UK Amplifiers

£895 Plus £7.50 Carr.

UK Ranger 811H (illustrated)
* 1.8 - 30 MHz. 800 watts output
* Drive: - 10-100W * Built in Power Supply

UK Discovery-Two Amplifier £1395 Plus £7.50 Carr.
* 144 - 146MHz *400 - 1KW Output
* Drive:-10-25W *Built-in Power Supply

UK Explorer 1200 Amplifier £1595 Plus £7.50 Carr.
* 1.8-30MHz x 100W-1300W Output
* Drive:-10-120W *Built-in Power Supply

British made Amplifiers with a Pedigree

GREAT VALUE

Cushcraft

5 Band Compact Beam
NEW MA5B Mini - Beam
£289.95 Plus £7.50 Carr.

NEW

Regular HF Beams from Cushcraft

A3S	3 el 10,15,20m	£389.95
A3WS	3 el. 12 & 17m	£299.95
A4S	4 el. 10,15,20m	£469.95
X7	7 el. 10,15,20m	£549.95
Ten-3	3 el. 10m	£139.95
XM520	5 el. 20m	£529.95

Full Cushcraft range stocked - Check our Web Catalogue

Carolina Windoms

CW-80 Special

Just 66ft long yet covers 80m - 10m. It will out perform a G5RV and give lower angle of radiation because of the 10ft vertical section which is forced to radiate. It will handle 1.5kW

£84.95 Plus £7.50 Carr.

Just 66ft Long!

Other Models (all with low angle radiator stub)

CW-160	160 - 10m 171ft long	£109.95
CWS-160	160 - 10m 133ft long	£99.95
CW-80	80 - 10m 133ft long	£84.95
CW-40	40 - 10m 66ft long	£79.95
CW-20	20 - 10m 34ft long	£77.95

Plus £7.50 Carr.

PacComm TNCs from USA

Tiny-2 1200bps	£139.95
PicoPacket 1200bps	£139.95
Spirit-2 9600bps	£199.95

Plus £6.00 Carr.

The lovely little PicoPacket even permits APRS with your mobile transceiver. Phone for leaflet.

Power Supplies

£99.95 Plus £6.00 Carr.

SEC-1223
13.8V PSU
23 Amps - 3.2lbs!
Back In Stock

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

WATSON
UK's top selling power supplies.

£89.95 Plus £7.50 Carr.

Watson power supplies guarantee the very best performance and value for money. Tried and tested, they have been submitted for independent laboratory testing for safety and electrical performance.

W-3A	3 Amp fixed supply.	£22.95
W-5A	5 Amp fixed supply	£29.95
W-10AM	10 Amp variable supply	£59.95
W-25AM	25 Amp variable supply	£89.95
W-30AM	30 Amp variable supply	£119.95

Plus £6.00Carr. Plus £7.50 Carr.

Compact 10 Amp Switch Mode PSU

£49.95 Plus £6.00 Carr.

The W-10SM is small enough to fit in a brief case. Measuring just 230 x 100 x 65mm, it's ideal for 50 Watt mobile's etc. Over voltage and current protection.

PW

JULY 2000
(ON SALE JUNE 8)
VOL. 76 NO 7 ISSUE 1120
NEXT ISSUE (AUGUST)
ON SALE JULY 13 2000

EDITORIAL OFFICES
Practical Wireless
Arrowsmith Court, Station Approach
Broadstone, Dorset BH18 8PW

☎ (01202) 659910
(Out-of-hours service by answering machine)
FAX: (01202) 659950

Editor
Rob Mannion G3XFD
Technical Projects Sub-Editor
NG ("Tex") Swann G1TEX
News & Production Editor
Joanna Williams

ADVERTISEMENT DEPARTMENT
ADVERT SALES & PRODUCTION
(General Enquiries to Broadstone Office)
Chris Steadman MBIM (Sales)
Steve Hunt (Art Director)
John Kitching (Art Editor)
Peter Eldrett (Typesetting/Production)

☎ (01202) 659920
(9.30am - 5.30pm)
FAX: (01202) 659950

ADVERTISING MANAGER
Roger Hall G4TNT
PO Box 948, London SW6 2DS

☎ 020-7731 6222
FAX: 020-7384 1031
Mobile: (07885) 851385

BOOKS & SUBSCRIPTIONS
CREDIT CARD ORDERS
☎ (01202) 659930
(Out-of-hours service by answering machine)
FAX: (01202) 659950

E-MAIL
PW's Internet address is:
pwpublishing.ltd.uk
You can send mail to anyone at *PW*, just insert their name at the beginning of the address,
e.g. **rob@pwpublishing.ltd.uk**

JULY 2000 CONTENTS

Important Note:
Due to circumstances beyond our control (i.e. the British Postal Service), Charles Miller's 'Valve & Vintage' column has had to be held over until the October 2000 *PW*.

REGULARS

How to measure r.f. power... Page 16

How to erect an antenna abroad... Page 30

46 RadioScene

More regular reports from our reporters around the UK & the USA!

Published on the second Thursday of each month by PW Publishing Ltd., Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW. Tel: (01202) 659910. Printed in England by Southernprint (Web Offset) Ltd. Distributed by Seymour, 86 Newman Street, London , W1P 3LD, Tel: 0171-396 8000, Fax: 0171-306 8002, Web: http://www.seymour.co.uk. Sole Agents for Australia and New Zealand - Gordon and Gotch (Asia) Ltd.; South Africa - Central News Agency. Subscriptions INLAND £25, EUROPE £30, REST OF WORLD £32 (Airsaver), REST OF WORLD £37 (Airmail), payable to PRACTICAL WIRELESS, Subscription Department, PW Publishing Ltd., Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW. Tel: (01202) 659930. PRACTICAL WIRELESS is sold subject to the following conditions, namely that it shall not, without written consent of the publishers first having been given, be lent, re-sold, hired out or otherwise disposed of by way of trade at more than the recommended selling price shown on the cover, and that it shall not be lent, re-sold, hired out or otherwise disposed of in a mutilated condition or in any unauthorised cover by way of Trade, or affixed to or as part of any publication or advertising, literary or pictorial matter whatsoever. *Practical Wireless* is Published monthly for $50 per year by PW Publishing Ltd., Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW, Royal Mail International, c/o Yellowstone International, 87 Burlews Court, Hackensack, NJ 07601. UK Second Class Postage paid at South Hackensack. Send USA address changes to Royal Mail International, c/oYellowstone International, 2375 Pratt Boulevard, Elk Grove Village, IL 60007-5937. The USPS (United States Postal Service) number for Practical Wireless is: 007075.

In his letter under the heading of 'Severe Nostalgia' on page 8 of the June issue, **Tim Kearsley G4WFT** mentioned the legendary 'Dick & Smithy' characters featured in the fascinating 'In Your Workshop' articles from the (now ceased publication) *Radio Constructor (RC)* magazine. I had, if space permitted, intended to comment on my own 'Severe Nostalgia' on the same subject and mention to our readers my own scant knowledge of the author behind these truly amazing articles.

As it turned out, at the last minute I was forced to re-write the original comment to a 'coming soon' remark. Fortunately this worked to our advantage because it stirred **Mike Mills G3TEV** to write to me on the subject of The *Radio Constructor* and in particular 'In Your Workshop'.

Mike, who lives near Stroud in Gloucestershire, wrote a fascinating letter to me asking when I was planning to mention 'Dick & Smithy'. He also told me that he served with **J. R. Davies**, the author of the superbly researched and written narrative technical articles, in the Royal Air Force during the mid-1950s.

Although J. R. Davies died in 1981 (his obituary was published in the April issue of *RC*) Tim knows that he had connections with Taunton area and enough fascinating background information to provide the basis of an article for *PW* readers. **However, Tim would like some help from readers so that he can provide the best informed article he can. So, can you help?**

The (last known living) publisher of the much missed *RC* magazine was the late **Dr. Arthur Gee G2UK** and **as far as I know**, there's no-one else to contact. So, if you can help with any information on *RC*, the people behind 'Data Publications' (the publishers), etc., Tim would like to hear from you either directly (QTHR) or via the *PW* office.

Club Closures

The letter from **Sandy Pimlott G8IDE** referring to the closure of the Plymouth Amateur Radio Society highlights a growing problem. In recent months news of the closure of the Salisbury, Winchester and other clubs have come into the office.

The closures are very sad news I feel, but I think there's a common link in what seems to be a sudden 'rash' of club closures. The common link? Well, from what I see, hear and generally observe from my many club visits each year, the problem is a lack of support for the essential committee which forms the core of most clubs.

Most club closures I've heard of **have not come about because of lack of interest in the club and the radio hobby - but a lack of support to the committee by the input of new members putting themselves up for election**. The same people have often served for many years and want 'a rest' (this is the most often heard comment that comes my way when I visit clubs) and this can be patently obvious by the age of the various club officers I meet.

So, why not support your club by offering yourself as Secretary/Chairman, etc.? Very often the 'new blood' is there but they are often reticent about coming forward. How about trying some 'action' yourself?

If you have any further suggestions write in to me, or the 'Letters' page, you can be sure everyone will read your comments with interest. Perhaps you support the idea of combined electronics/Amateur Radio Clubs, or joining up with Universities and Colleges - if so ... write in and let's hear your opinion. After all I believe, **very strongly indeed**, that the future of our hobby lies very firmly in the local club. That first point of contact for beginners is so very important!

Finally on this topic, I must say that I'm looking forward to joining **John Densem G4KJV** (see letter page 7) at the Kemble site (I often pass by and have admired the aircraft John) when on enroute to a 'Club Visit'. However, while on the subject of 'Club Visits' I'd like to remind readers that I can often spare a short while on the return trip home following a visit to a club the previous evening. In fact, it could be over a picnic lunch (but be warned ... my home-made bread has quite a reputation!).

So, if anyone - or group - would like to meet me during the day as I return to Dorset my visits are planned for over a year ahead - so we could always fix a meeting point. Even if you've not got a retired aeroplane for us to meet in - we could still enjoy a chat somewhere interesting. How about a preserved railway signalbox? See you there perhaps?

'Radio Basics' & Editorial Criticisms

Judging by the large amount of correspondence I get involving 'Radio Basics' ('RB') in *PW* - the series is very popular. However, I do get some criticism from the more experienced constructors who are not 'happy' (to say the least in some cases!) with my 'simplistic' approach.

In reply to my critics, I ask them to bear in mind that the **basic idea** - and I choose the **'basic'** word carefully - behind the 'RB' series is to get anyone interested straight into action. Yes, I could add a few more components, and yes ... sometimes a different approach would work perhaps even better. But that's not the idea - instead I'm trying to encourage readers to build projects we've built, tried and tested - even if they are simplistic they **will work and readers will learn**.

Yes, I do make mistakes, sometimes they are silly mistakes such as forgetting that coil dimension details that were in text from previously published projects rather than a table, but very often I hear from readers who've then done a little research, a little 'guess-timation' and ended up with coils that worked. We strive to produce a monthly magazine on a very tight schedule and I get as frustrated as anyone else at mistakes. **Please accept my apologies**, but as long as I'm Editor we won't - for the sake of an error free magazine - drop technical and constructional articles. The hobby needs the 'discovery' element and I can tell readers, from personal experience, I've learnt much from mistakes in my life. Hopefully, you'll get some benefit too!

One last word on the subject: Although we strive to produce error-free magazines, whenever I read technical books (which have been in production for well over two years in some cases) with 'errata' and mistakes highlighted - I realise that we're not alone in having problems. However, in the case of *PW* we're certainly not on our own - we have the constructive support of readers.

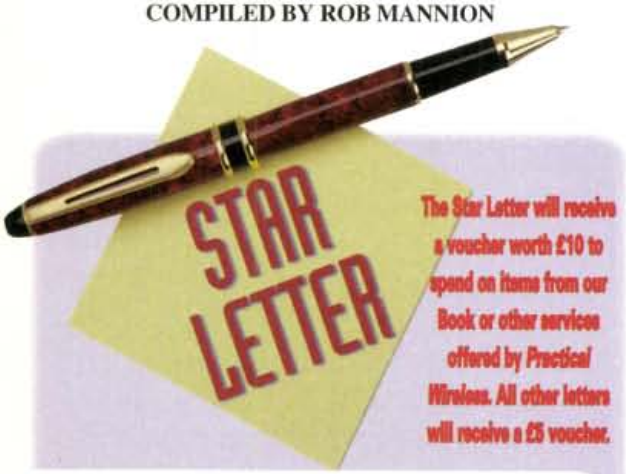
All your letters are read, and comments to authors are passed on. I practice what I preach - in that *PW* is an 'Open' magazine. **There's no 'censorship'** and I allow the most 'open forum' we can manage in the format we've got. We respond and really care for our valued readers. For example, in replying personally to the letter from **Brian Edwards G7FVF** ('Letters' this month) I've ended up with some lively correspondence and Brian calling himself New Malden's Victor Meldrew!

But I ask everyone to remember that when you do write into me personally - that I am the focal point for your letters and that your letter joins very many others landing on my desk. So, please be patient and don't take it as a personal 'slight' if I cannot reply to you directly - although I will try my best to do so!

Rob G3XFD

Letters

COMPILED BY ROB MANNION



The Icom IC-2800's 'Useful Extra'

Dear Sir

I read **Richard Newton G0RSN's** review of the Icom IC-2800 in the June issue of *PW* and was surprised that he struggled to think of a use for the PAL video display function of the colour screen. An Amateur TV (ATV) enthusiast would have to pay a minimum of £100 for a useful, small, flat colour video monitor for convenient static mobile use ... yet here we have Icom offering a radio with one built in. I would imagine ATVers will love it.

Local amateur **Colin G4FFU** also suggested that it could be used as a reversing aid in conjunction with one of the small, cheap printed circuit board mounted charge coupled device (CCD) cameras currently available at rallies.

Graham M0ADR
Newcastle

Editor's suggestion: The IC-2800's video input facility has created much interest. Icom (UK) have issued a challenge to *PW* readers, so I suggest you see the 'News' pages to join in the fun and perhaps get 'kitted out'.

Wireless Set 53

Dear Sir

It's a long time since the Editor and I last spoke. It was actually at Picketts Lock or similar, the last time being a brief discussion on Amateur Radio and diabetes! (Something we also share). My main reason for writing is to say that old photographs can produce a host of memories and even new photographs of older things can do the same. I was particularly interested to see the photograph on p.56 of *Practical Wireless* of the WS53 ('Valve & Vintage' by **Ben Nock G4BXD** in the May 2000 issue of *PW*).

When I re-enlisted in Royal Signals in the mid-1950s, I had already trained as an 'Operator Wireless and Line' and a 'Telegraph Mechanic'. I then opted for training as a Radio Mechanic and this was granted. I enjoyed the course at Catterick (although I can't say I enjoyed the three 45 minute PT Parades every week!) and at the end was told that I would be retained on Cadre, teaching others on a number of sets including WS19, WS62, WS88 among others and, of course, the WS53.

On return from end-of-course leave I was introduced to a classroom, with a couple of blackboards and lots of chalk and, standing serenely in the corner - a WS53. As training progressed, I managed to obtain some 'H' control units (H1 and H2, I think) and something which allowed the wiring of a number of Field Telephones at students' desks and allowing them to operate the 53 over remote lines.

I also 'found' a couple of 72ft masts with nothing to do and talked the antenna erection crews into putting them up for me. Coaxial cable wasn't available in sufficient 'spare' quantities, so it was an end-fed long wire that graced the antenna field.

Each week there was a training period for the 'familiarisation' when the students could 'look at' the set. I felt this was a bit of a waste and decided to operate the set as an amateur station for the 45 minute period.

I often wonder if there are any readers who remember me? Or more importantly perhaps, the WS53 classroom at No.2 Squadron, 1 Training Regiment, Royal Signals at Catterick in the mid-1950s?

Looking at the photograph in the article, I notice that the interlock isn't complete as the link from the master oscillator to the dummy load is missing as is the 'Coffin'. (This was the name given to a hollow metal box with lugs on each side which fitted over the strip from the p.a. to the dummy load - top left corner with fixing screws visible on either side. It was said that if you touched the strip when the set was on full power and the cover was off, all that remained of you would be put in the metal cover as a coffin!).

One memorable component cannot be seen in the photograph. This is the mains contactor relay, situated behind the front panel at the bottom right-hand corner. As I remember, this should close to provide mains to the equipment, but often wouldn't do so. When checking smaller sets one operated the 'Click and Blow' test. This consisted of clicking the pressed switch to hear if the send relay was going over and blowing into the microphone to see if the output meter indicated modulation.

With the 53 Set, the procedure became the 'Kick and Throw' test. If the contactor didn't go over, you gave it a smart kick with an ammunition boot on the right-hand side of the cabinet. This usually worked, but if it didn't, then you threw away the p.s.u. In fact the p.s.u. was too darned heavy to throw anywhere but the intention was there even if the action wasn't!

I don't remember the knobs as shown in the top left-hand corner being

My Icom IC-756PRO

Dear Sir

After owning an Icom IC-756 for two years I have just traded it in for the new IC-756PRO, so it was with particular interest that I read **Rob G3XFD's** review in the May *PW*.

What first caught my attention was the caution Rob was exercising in using it in the car and his concern about triggering off the air bags. For the last three years or so, I have been operating a Kenwood TS-50 in a Rover 416 SLi which was fitted with both driver and passenger air bags as well as other computer operated 'gizmos'! I never had any trouble. Last August I bought a new Rover 800 which appeared to have even more computer controlled devices and I was decidedly apprehensive about operating the TS-50.

I first fired it up at ten watts into my Moonraker Ampro whips for 1.8, 3.5, 7 & 14MHz) with no problem. I then raised the power to 50W again with no problem. I then tentatively raised the power to 100W and I was delighted to find that nothing blew up or broke down. I have to say that I carried out these tests at my QTH just in case anything went wrong and I would then be able to call out the garage if needed! I have since operated /P from my favourite piece of high ground near my home for many hours including working into VK on 14MHz when conditions were just right one day.

Finding earth points in modern cars is quite a problem with so much internal plastic trim but I did manage to earth the TS-50 to the floor by the front passenger seat and I think that earthing is an absolute **MUST DO**. Also, the feed to the whips is through 50Ω coaxial so r.f. voltages are of a low order. High r.f. voltages will only be found at the higher part of the whips where, fortunately, they seem to be less of a threat.

The car doesn't have an external car radio antenna and instead the rear screen heating element, fitted with an r.f. amplifier serves that purpose. I was concerned that r.f. from the whip which is on a three magnetic mount in the centre of the roof, would cause problems to this arrangement but this has been trouble-free also.

I think it is vitally important that r.f. levels **INSIDE** the vehicle are kept to the absolute minimum with good earthing and trouble can then be avoided. However, I notice Rob refers to using a long wire from your car. In that case as it would seem necessary to keep high r.f. voltage out of the interior, to place the a.t.u. outside the car!

When I bought the IC-756 I immediately fell in love with it and particularly liked the Spectrum Scope. Now, I like the 756PRO just as much and with its DSP facility, it is a winner, I have a good old faithful FT-101ZD which still works well but whenever I use it, I feel I am working blind, having got so used to not only hearing but **SEEING** the signals on the 756!

Congratulations on your new vehicle Rob which sounds ideal for your needs. But when your finances do recover, I do hope you get a 756PRO. It is the best piece of equipment I have owned in 52 years in this wonderful hobby of ours.

John Hoban G3EGC
Bolton

Editor's comment: There's already quite a party on the 'Keylines' page John! It'll continue next month, when I ask you to join me when I discuss the extremely important considerations on operating Amateur Radio from modern vehicles.

as in the photo, as I feel these controls were roller coasters but the years may have dimmed the memory.

The complete top unit was, I believe, an antenna coupling unit and dummy load. I remember an amateur friend in my Unit (I believe it was G3JNE) who, some time previously, had worked from Egypt to Cyprus on the dummy load, having forgotten to switch over: "Signals were a bit down", he said.

Please forgive me for rambling on, but as you are aware, old soldiers never die, they just spend their time boring others. Best wishes.

Jack Cooper G3DPS
Alton, Hants

Editor's comment: Not boring Jack - just fascinating! Does anyone remember attending the G3DPS 'classroom' - if so he'd like to hear from you!

Plymouth Club Closed

Dear Sir

I write regarding your 'Star Letter' in *PW* April, from Gary Taylor who lives in Plymouth. For his information, and for others, the Plymouth ARS has just been wound-up owing to lack of new blood. Their interests have been taken over by Plymouth University.

Now, by the word 'amateur' doesn't invite university attention. I suspect that the interest is in 'Basic Radio' no one can start to learn anything about any subject without starting on the bottom rung of the ladder.

With no excuses, may I mention when I received the spark which ignited my interest in Amateur Radio. Over 50 years ago I started at the Plymouth Junior Technical School, my Physics master was a Radio Amateur and he took a couple of new entrants to his home and introduced us to Amateur Radio via his shack and gear for about three weeks. Then he was called-up, never to be seen again - apparently he was seconded to the Special Operations Executive (SOE) and all his wife received was a paybook! After that is history - all hell broke loose.

But the spark that brave fellow lit in me remained. The war ended and I had to earn a living like Gary and bring up a family. The fire smouldered for years and didn't really catch fire until I was near retirement age.

Now I am still building little circuits and getting a great deal of pleasure from them (especially when they work)! I never etch board circuits, only little copper nails driven into soft wood and components and wires soldered directly on them or soldered into tobacco tins.

Without waffling on too much, may I add the observation that, over the years, receivers have got more sensitive and transmissions weaker making 'crystal sets' not very good for starters. May I suggest the use of an old car radio set to l.w. - 200kHz - as an i.f. and a good signal generator as an l.o. (just make-up a mixer circuit). Thanks for your 'Radio Basics' column.

Sandy Pimlott G8IDE
Devon

Editor's comment: Thanks Sandy, and I hope you continue to enjoy your 'basic radio' and my 'Radio Basics' column. Please see 'Keylines' for further comment on club closures, etc.

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 callsign along with your E-Mail hieroglyphics! All letters intended for publication on this page must be clearly marked 'For Publication' (on the letter itself). **Letters for possible publication are not normally acknowledged and we ask that wherever possible letters are not sent in by 'FAX'. Editor**

Britannia QTH At Kemble

Dear Sir

I have just been reading about the Editor's annual travels, about to start visiting various clubs. If he's ever passing this part of the world, maybe a couple of hours at Kemble would make a change. Having flown in the Britannia featured in the photograph (QSL card) when with 99 Squadron, 1965-1968, I have great fun operating from it again. Using an Icom IC-737 and an Icom AH-3 a.t.u., also the original long wire antennas. Enclosed are extra photos for your interest also my standard QSL/P, and I have used GB0NN, I wasn't allowed to use GB99SQN. Likewise GB0DXI instead of GB511SQN.

John Densem G4KJV
Cotswolds

Editor's comments: Thanks for the invitation John, please join me on the 'Keylines' page for further comment.

'Radio Basics' - Feedback & Comments

Dear Sir

Re: *PW* Magazine pages 16 & 17, 'Radio Basics'

There are a few details on the circuit diagram which I've added on my version of the 'Millennium Receiver':

1). You recommended DF91/IT4 valves, but DL92 is better for the audio output (different pin connections).
2). I've added 22μF electrolytic (100V working) on the HT+ line to chassis.
3). My biggest problem on first switching the receiver on, was an unstable r.f. amplifier! My layout was then changed - L1, L2 is now at right-angles to L3, L4 and a metal screen across the r.f. amplifier valve holder, separating input and output.
4). De-couple Pin 3 screen-grid of V2 to deck with a 22μF 50V electrolytic or other type capacitor.
5). R5 (4.7MΩ) increase to 10MΩ by adding another 4.7m or 5.6MΩ. This is more economical working bias, seeing that batteries are specified! HT+. Mine works well with two PP3 (+9V) in series!! Amazing! Only 18V!
6). For coverage, 40-60MHz, select a decent DF91 if possible. Coils L1 = 1.5 turns. L2 = 6T on 10mm. L3 = 6T on 10mm - tap 1.5T. L4 = 1.5T.

Thanks for an interesting project!

Best 73

Brian Williams
GW0GHF
Llandough

Editor: Thanks Brian, I'm getting a lot of useful feedback from the 'Radio Basics' valve projects!

And More Comments ...

Dear Sir

Does *Practical Wireless* have a policy of ignoring letters of a critical nature? I sent one letter, dated 11th February 2000 to the Editor of *PW*. My letter pointed out errors and contained what I think is reasonable criticism, but so far, no corrections have been published.

Re: the *PW* 'Millennium' valve receiver. The 1T4 valve has a maximum screen grid voltage rating of 67.5V, Pin 3 of V1 should go to the 90V h.t. via 15KΩ (minimum) value resistor. I suggest that the 90V line should have 100μF capacitor connected between the h.t. end of the output transformer and h.t. negative. Hoping that this letter gets past the censor.

George Fisk
Tyne & Wear

Editor's reply: The above letter is an extract of a longer letter sent to Tex G1TEX, passed on to me with relevant comments involving my work. (please see 'Keylines').

And even more!

Dear Sir

Re: *PW* May issue, 'Radio Basics'. Are readers to assume that coil former type and/or coil former diameter will be revealed in the June issue of *PW*?

Brian Edwards G7FVF
Surrey

Editor's comment: My apologies Brian and, yes, they were included and I hope you completed your version of the receiver.

News

COMPILED BY JOANNA WILLIAMS

Headline News

New Dealer For Scotland

Readers of *Practical Wireless* will be pleased to hear that the *PW* news desk received a rather interesting press release from a new antenna and radio dealer for the North and North East of Scotland. **Ultimate Aerials**, the press release states, is a new company that has recently started trading in the North, North East and North West of Scotland and are currently based near **Huntly, Aberdeenshire**.

Ultimate Aerials are now a local source of **antennas, radios, scanners and accessories** and have won the main dealerships for **Yaesu** and **Icom** radio equipment, the press release claims. Presently supplying a wide range of Radio Amateur, CB, leisure and business equipment, they say that they're currently keeping their costs competitive by offering a mail order service and not setting up shop premises.

For more information on Ultimate Aerials and to learn more about their range of products and services, please contact them on **Tel: (01464) 841263** or visit their **Web site: http://www.ultimateaerials.fsnet.co.uk**

We Have A Winner!

Practical Wireless are pleased to announce the winner of the **Alinco DX-70TH** competition (courtesy of **Nevada**) - congratulations go to **Peter Bonson G4FUY** who successfully completed the small quiz we published in the March 2000 *PW* and was picked out of the hat!

Mike Devereux G3SED of Nevada (right) presents one very happy Peter Bonson G4FUY (left) with his new Alinco DX-70TH. (Rob Mannion G3XFD is the man behind the camera and, as mentioned, Joanna was present but she chose the one photo which she doesn't appear in!).

The Editor of *PW*, **Rob Mannion G3XFD**, and News & Production Editor, **Joanna Williams**, travelled up to Nevada's new showrooms at Farlington, Portsmouth on a warm Friday afternoon to present the prize to Peter. Our thanks once again to Nevada for the donation of the DX-70TH and we hope that Peter has many memorable contacts with his new radio!

Nevada's Summer Morse Tests

News now from **Mike Devereux G3SED** of **Nevada** who tells us that they will be holding **Morse tests** and the **USA exam** on **Saturday 12th August** and **Saturday 9th December 2000**. On these dates there will also be Morse training available together with free coffee and biscuits.

The Morse tests will be conducted by **Paul Steed** and bookings for the test should be made to **Mick Honeywell G0ABB** at Nevada, either in person or by telephoning: **0239-231 3090**.

Mike G3SED has also informed us of the release of a **new micro-sized hand-held scanner** which won't be much bigger than a credit card. The **Alinco DJ-X2** will be released in **June 2000** and has the new 8.33kHz channel spacing for air band enthusiasts.

The DJ-X2 is expected to sell for just **£199** so keep your eyes peeled for more news of this scanner. Alternatively, why not visit the Nevada Web site for more information on Nevada's range of products: **www. nevada.co.uk**

Kenwood's Support For Special Events Group

David Wilkins G5HY at **Kenwood (UK) Ltd** has been in touch with the *Practical Wireless* news desk to tell us all about Kenwood's continued support for the activities of the **Scarborough Special Events Group**. Kenwood have loaned the group an h.f. station consisting of a **TS-570DG** transceiver and matching p.s.u. for the summer.

The Special Events Group will be on air using the equipment for various activities including the /MM operation of GB6SS at the end of May, GB0VIK 'Viking Week' in June and the annual 'Lighthouse On The Air' weekend. In addition, David G5HY tells us that the Scarborough Club are already using a Kenwood dual-band mobile rig for their Packet operations locally.

For further information, please contact **David Wilkins** direct at **Kenwood UK on (01923) 655284** or **E-mail: david.wilkins@kenwood-electronics.co.uk**

Halifax Radio Amateur Prosecuted

The **Radiocommunications Agency (RA)** have informed *PW* that **Gilbert Whiteley**, a licensed Radio Amateur has had £5000 worth of illegal radio equipment confiscated after he admitted offences under the Wireless Telegraphy Act. Officials from the RA raided a house in Spring Grove Cottages, Halifax, after complaints from neighbours about interference to televisions and radio receivers.

Halifax magistrates heard on the 5th of May, that Amateur Radio equipment modified to operate on frequencies outside the amateur bands was found under the possession of Mr Whiteley. He pleaded guilty to two charges of installation and use of illegal apparatus contrary to the Wireless Telegraphy Act 1949. He was given a 12 month conditional discharge for both summonses and ordered to pay £50 towards the costs of the prosecution.

Report prepared from RA press release dated 8th May 2000, issued on their behalf by the Central Office of Information (COI) Yorkshire & Humber.

Single Band 28MHz Equipment

Doug Raynes from the Radiocommunications Agency (RA) (Enforcement Policy Unit) has contacted *PW* stating that The Wireless Telegraphy (Citizens' Band and Amateur Apparatus) (Various Provisions) (Amendment) Order 2000 (SI 2000/1013) came into force on 1 May. The original order - designed to place restrictions on 27MHz CB equipment, also effectively restricts commercial manufacture and importation of otherwise legitimate Amateur Radio equipment for the 28 to 29.7MHz band.

The RA has chosen to introduce a deregulatory measure into the 2000 Order by removing the restriction on the manufacture and importation of single band 28 to 29.7MHz equipment. **This means that Radio Amateurs in the UK can now get access to commercially made '10 Metre' band equipment (mainly from the USA).**

For further information on this important deregulation, please contact Doug Raynes on 0207-211 0211, FAX: 0207-211 0507.

The 2000 PW QRP Contest - Important Notice to Novice Licensees

If you picked up a copy of last month's *PW* you would have seen the article on p.30 which contained the rules for the **18th Annual *PW* 144MHz QRP Contest**. In the article, contest adjudicator, **Neill Taylor G4HLX**, invited Novice Licence holders to enter the contest as a group.

Unfortunately, the Editorial staff at *PW* have since discovered that novices operating in a group could have serious legal implications as it has been pointed out to us that, under the terms and conditions of the Novice licence, **the station may be operated only by the licensee personally**. This effectively **prohibits multi-operator Novice stations**.

An individual Novice entering as a single operator may, of course, use his or her own callsign. But a group of Novices wishing to enter as a multi-operator station cannot do so under a Novice licence.

Novices may, however, enter under the licence of a Full Licence holder, using the Full Licence callsign and under the direct supervision of the Full Licence holder. Novice groups operating in this way are eligible to compete for the new Novice Trophy for the contest, provided that:

1) A note sent with the entry makes it clear that the station is an all-Novice group.
2) The supervising Full Licence holder doesn't operate the station, nor assist in any way with the setting up and running of the station (except any intervention required by their role as supervisor - any such intervention must be noted in the contest entry submitted).
3) The Full Licence holder signs a declaration to confirm this, sent with the contest entry.

***Practical Wireless* wish to encourage Novices to take part in this event, but stress that all operation must strictly be within the terms and conditions of the licence.**

If you would like a copy of the 18th Annual *PW* 144MHz QRP Contest rules for this year, you can order a back issue from us here for just the cover price of **£2.50**. Please **Tel: Shelagh or Jean on (01202) 659930** or write to them at **PW Publishing Ltd, Arrowsmith Court, Station Approach, Broadstone BH18 8PW** enclosing a cheque or postal order for £2.50. Alternatively, you can visit the Contest Web site at: **http://home.neill.org/contest**

'Spotlight' 2000!

It's time to turn the 'Club Spotlight' on again as we invite you to enter your club magazines into the first ***Practical Wireless* & Kenwood Club Spotlight Magazine Competition** of the new Century. **Local clubs** entering will be competing for the magnificent original trophy - kindly donated by Kenwood - and **'national' clubs** will be competing for the 'Bert's Bell' award, which was instituted in 1997 in tribute to the late **Bert Newman G2FIX**.

It's very simple to enter the Club Spotlight magazine competition and all you need to do is to send us the **three most recent copies** of your magazine along with a covering letter. The covering letter should make it clear **which category of club you would like to enter your magazines into**.

For example, the **Remote Imaging Group (RIG)**, winner of the 1999 national award - can only enter as a 'national' club' section, whereas the **Crowborough & District Amateur Radio Society** - last year's winners, now have to specify that they are a local club.

National Or Local

For either category (national or local) your covering letter should provide the following details: How many people there are on the Editorial team and the type of job they do/or did (if retired); how long the magazine has been established; how it's produced (on your computer or text supplied to 'outside' printer for professional printing, etc.) and whether or not the publication is 'sponsored', the number of copies printed and membership size of your club. It would also help the judging panel if you could provide some historical details on your club.

The judging panel this year includes **Jim Bacon G3YLA**, **David Barlow G3PLE** (who of course first suggested the competition!), **Tex Swann G1TEX (*PW* Technical Projects Sub Editor)**, **David Wilkins G5HY** and **Rob Mannion G3XFD**. Additionally - and for entries in the **national category only** - the former Salisbury Club will be represented by one extra judge (Jamie Donaghy M0CLI) to decide the winner of the 'Bert's Bell' Trophy (Salisbury was of course Bert's Club).

Entry to the competition is open now and all entries should be at the *PW* offices in Broadstone no later than Monday 3rd July 2000. This is because the presentations are to be made at the Leicester Show in September and members of the judging panel live in places as far apart as Cornwall, East Anglia and Greater London, so it will not be possible to consider late entries!

So, make sure your club's entry reaches us in good time by sending it to **Joanna Williams, Club Spotlight Magazine Competition, Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW**.

The Editor's decision (as head of the adjudication panel) is final and no correspondence will be entered into. Good luck and we look forward to reading **YOUR** magazine!

Rob Mannion G3XFD

Lighthouse & Lightship Weekend

Mike Dalrymple GM4SUC has been in touch with *PW* to update us on this year's **International Lighthouse/Lightship Weekend** which is taking place from **0001UTC Saturday 19th August until 2359UTC Sunday 20th August 2000**.

Mike tells us that last year, 218 Amateur Radio stations were established at lighthouses and on lightships in 39 countries on six continents - that's quite an event! So far this year, another two countries have confirmed their participation - **Chile** and **Turkey**.

The up-to-date list of all stations which have so far confirmed their participation in the event can be found at **www.waterw.com/~weidner/LH-day-table.htm** This list is constantly updated, so if you would like to know more about who's taking part then why not take a look?

Low Power Web Site

The **Low Power Radio Association (LPRA)** have been in touch with *Practical Wireless* to tell us about their new Web site which can be found at: **www.lpra.org** If you would like to know more about the LPRA, their member companies, their exhibitions and conferences as well as 'What's New' in the low power sector, then this site is definitely worth a look

Discontinuing Of SA On GPS

Some important news came to the attention of the *PW* news desk when **Joanna Williams**, *PW* News & Production Editor, was talking to **Mike Haydon** of **Haydon Communications**. The United States of America have announced that they are to stop "the intentional degradation of the Global Positioning System (GPS) signals available to the public beginning at midnight tonight [May 1st 2000]".

The intentional degradation referred to in the announcement is known to the rest of us as **'Selective Availability'** or SA. So, what does the end of SA mean for the

everyday user of the GPS system?

Up until now, the GPS system hasn't always been that accurate, but now that the US have discontinued SA, the user will find that the system is much more responsive and "civilian users of GPS will be able to pinpoint locations up to ten times more accurately than they do now".

To view the statement from **President Bill Clinton** regarding the discontinuing of SA, please visit the White House Web site at: **www.navcen.uscg.mil/gps/policynotes/sa.htm**

New Book - Unique Perspective

Marconi My Beloved
Written by Maria Cristina Marconi
Published by Dante University Press priced £22.99

Rob Mannion G3XFD takes a look at yet another volume on Guglielmo Marconi's life and career - but this time it's a book with a unique perspective, providing a truly personal reflection on a great man.

When **Kathy Moore** - our **Book Service Manager** - brought this book up to the *PW* Editorial office I groaned inwardly at first. "Not another book on Marconi" I thought. "Small print, difficult to read and with old facts dressed up in other forms". **But - I quickly discovered I was wrong!**

So, I took the book home and read it from cover-to-cover in one evening (and half the night!). I don't sleep very well nowadays - and this book certainly made the insomnia much more enjoyable.

It's a fascinating publication and is so because it's written by Marconi's second wife **Cristina**. Married to him for only ten years or so, Cristina survived him for 57 years and has left us a wonderful legacy in the form of a truly fascinating book.

However, although I'm pleased she was able to finish it before her death in 1994, I think it's a great shame she wasn't to see it in print. The foreword by their daughter **Elettra** explains this, as she explains her mother's dedication to the task.

Incidentally, Elettra has included some first-time published photographs at the end of this book which I've no doubt will be of interest to students of Marconi's work.

I had previously seen the same book in Italian and, although I can read this language, it's far easier in my mother tongue, English. To this end it's an excellent translation and, provided you're prepared to ignore the occasional 'Americanisation' of our language (the publishers are based in Boston, Massachusetts) it's a superb read.

Additionally, I'm pleased to say that the type style and size makes for very 'comfortable' reading. It makes a nice change from some of the specialist books that come my way as an Editor!

My only adverse comment is with regard to the reproduction of the many (obviously mostly good quality) original photographs, drawings and documents - interesting they are - but well 'scanned in' and presented they're not!

Although the presentation of the many photographs doesn't actually detract from the excellent text of the book, I feel strongly that with more care the photographs (many of which I had not seen before because of their 'personal' nature) could have added significantly to the value of the book as a whole for the keen student of Marconi's pioneering work. In fact, I was at such a loss for suitable words to describe the 'lack lustre' photographs (even bearing in mind how old most of them are) that I consulted **John Kitchin** our Art Editor.

John quickly summed up the photograph situation and said **it wasn't the original photographs** that were at fault - just the preparation for printing. But, having said that, any reader will find them interesting - just look 'past' the mediocre reproduction and you'll get a new view on Marconi's fascinating life.

This book **is not a technical history** - but there are many technical descriptions and enough detail for the radio enthusiast. There's much about the man himself, his family, his dedication to his work and to his continuing achievements, right up until his death in 1937.

Finally, to give the potential reader my honest impression of the book as a whole, I must mention that I was given the book to read at 1500 on Thursday afternoon 11th of May and I finally finished reading it at 0300 on Friday 12th of May! I just couldn't put it down. What higher recommendation can I give it?

My congratulations go to the translator - but what a pity the publisher's Art Department didn't do an equally good job! **A highly recommended read, of great interest to any radio enthusiast interested in the history of radio communications.**
Rob Mannion G3XFD.

How Do You Use Your IC-2800 Video Input?

In response to the review of the **IC-2100** and **IC-2800** rigs published by *PW* in the June 2000 magazine, **Ian Lockyer**, Marketing Executive at **Icom (UK) Ltd**, has decided to invite *PW* readers to comment on their ideas and uses for the video input on the IC-2800 and, to use his words, "turn a negative into a positive".

Here's what Ian had to say: "My thanks to **Richard Newton GORSN** for pushing the IC-2100 and IC-2800 to its limits and providing *Practical Wireless* readers with a concise and well-balanced review. Everyone at Icom (UK) Ltd was very pleased with the favourable reviews that both products received in the June issue.

"In his review, Richard highlighted the superior set design and the easy-to-use features that make the IC-2800 such an incredible buy. However, there was one issue that Richard did point out about this dual-bander - and that was that he felt the product's video link didn't appear to have any real use.

"When the IC-2800 was launched at Picketts Lock last year it caused a great deal of excitement and interest. The idea of having a video link brought new opportunities to the Amateur Radio hobby and brought added value to this well organised dual-bander.

"Since its launch I have seen it used for many things including security and surveillance, reversing vehicles and displaying video games. After discussion with **Mark Jarvis**, Amateur Product Specialist at Icom (UK) Ltd, we agreed with Richard that the video link didn't have any **OBVIOUS** use but that it has **great potential to do some amazing things**!

"So, in response to the review I would like to offer you, the *PW* readers, an opportunity to write and tell us at Icom (UK) Ltd whether you use your IC-2800 video link for anything interesting or unusual. The **most original use of the IC-2800 video link will be highlighted in the October 2000 issue of *PW*** along with **a selection of the more interesting and unusual ideas - all published stories will receive items from Icom's latest range of exclusive corporate merchandise**".

Well, what an offer - and one not to be missed! The Editorial staff at *PW* think that it's an excellent idea, so please, if you use a video input option for anything interesting or unusual - the more unusual the better - then please send your entries to **Mark Jarvis at Icom (UK) Ltd, Sea Street, Herne Bay, Kent CT6 8LD. The closing date for all entries is the 31st July 2000.**

More News on page 54

ICOM

Practical Wireless & Icom (UK) Ltd present...

'Win An IC-756PRO'

Worth £2099

A new perspective on the bands - The IC-756PRO provides the operator with a new dimension and many exciting facilities.

You've heard the rumours, read the facts and scoured the reviews. You can't help but like everything you hear about the new **IC-756PRO** and you really, really want to own one ... let's face it, what Radio Amateur wouldn't?

So, *Practical Wireless*, in conjunction with **Icom (UK) Ltd**, would like to give you the opportunity to **WIN** the very latest **h.f. and 50MHz transceiver**.

You could be walking away with the very latest in h.f., DSP technology and as **Rob Mannion G3XFD** says in his review: *"The much improved spectrum 'scope, the excellent DSP and very many other facilities packed into a very reasonably-sized rig make the IC-756PRO **very desirable indeed**"*. So, if you would like the chance to win yourself this desirable IC-756PRO then you know what to do ...

Read the full review by Rob Mannion G3XFD in the May 2000 issue. Call (01202 659930) for your copy.

All **you** need to do is **collect the special corner flash** in the **July** and **August** issues of *PW* and answer the questions on the IC-756PRO which will be set on the combined final coupon/entry form to be published in the **September** issue.

'Looking in on frequency'. The main display on the Icom IC-756PRO provides a great deal of information plus a built in RTTY screen.

FM DETECTORS – PART 1

Gordon King G4VFV brings you part one of 'Looking At' f.m. detectors. First he takes a look at the f.m. waveform and modulation index, then he discusses Foster-Seeley's Phase Discriminator – interested? Then read on ...

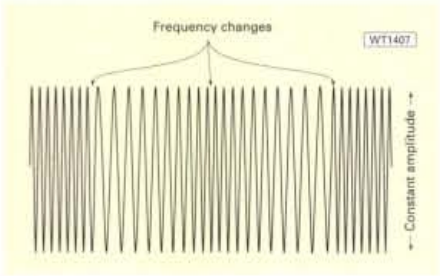
In the previous instalment I explained how simple it is to demodulate an a.m. signal with, basically, little more than a diode, load resistor and capacitor. Funnily enough, exactly the same circuit can be used to demodulate f.m., but it isn't a very efficient way of tackling the problem, as we shall see in a minute.

Let's look first at the f.m. waveform in **Fig. 1**. Here there's the carrier wave, but instead of it being of steady frequency, as with a.m., it's caused to vary above and below its nominal frequency at a **rate** corresponding to the **frequency** and by an **amount** corresponding to the **amplitude** of the modulation - these two parameters carry the f.m. information.

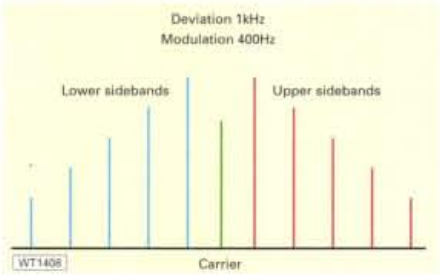
The amount by which the carrier frequency swings either side of its nominal frequency is known as the **deviation**, which is usually expressed in kilohertz (kHz). This is sometimes referred to on the amateur bands (colloquially – though not accurately) as modulation depth!

No intentional information is carried by amplitude variation of an f.m. carrier. In fact, in **modern circuit design**, f.m. has the advantage of not responding to a.m. disturbances, such as static, electrical interference, etc.

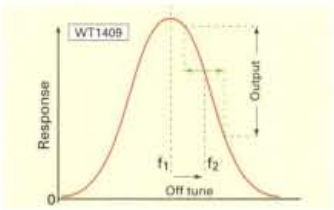
Instead of just a single pair of sidebands arising from pure tone modulation, as with a.m., f.m. produces a number of pairs of sidebands at one, two, three, etc., times the modulation frequency - the number increasing with the deviation. The sideband structure on speech and music, therefore, can be astonishingly complex.



● Fig. 1: The f.m. waveform. The louder the audio modulating signal, the greater the deviation of the carrier frequency and the higher the modulating frequency, the faster the rate of change of the carrier frequency, the carrier amplitude remaining constant.



● Fig. 2: Sideband structure of an f.m. signal with a modulation index of 2.5.



● Fig. 3: Showing how a mistuned a.m. receiver will demodulate, albeit, inefficiently, an f.m. signal by the signal deviating up and down the side skirt and thus being converted to a.m. for normal detection by the receiver.

Modulation Index

The number of pairs of sidebands produced depends upon the **modulation index**, which is the ratio of deviation to modulation, both expressed in frequency. For example, a modulation index of five would result from a deviation of 2500Hz (2.5kHz) and a modulating frequency of 500Hz (2500/500).

The number of sidebands **increases** with increasing deviation and reducing modulation frequency and **decreases** with reducing deviation and increasing modulation frequency. The diagram, **Fig. 2**, gives an impression of the sideband structure arising from a modulation index of 2.5.

An a.m. receiver tuned to an f.m. transmission should produce no output, that is, there should be no output when the receiver is spot on tune. An output would occur, however, were the receiver to be slightly detuned to represent the condition shown in **Fig. 3**. Here f_1 represents the centre frequency of the receiver's i.f. response and f_2 the nominal frequency of the slightly detuned f.m. signal.

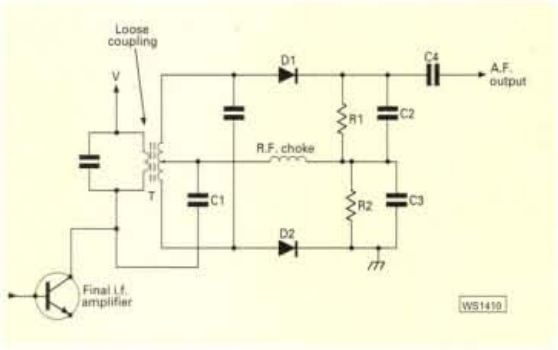
As f_2 swings up and down the side skirt with the deviation, represented by the arrowed line, the a.m. detector is 'fooled' into thinking it's receiving an input of changing amplitude and therefore produces an output! This really works and can be proved by tuning an f.m. signal on an a.m. receiver and slightly detuning either side of the correct tuning point.

When f.m. was initiated, some of the very early receivers adopted this, so-called, 'skirt tuning' (or 'scope) artifice. Although it worked, it didn't do justice to the interference defeating and audio quality attributes of the f.m. mode, owing to the limited linear bandwidth of the response characteristic.

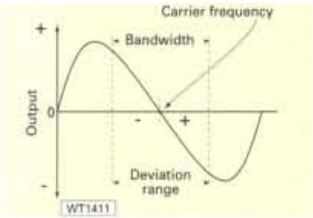
Foster-Seeley's Phase Discriminator

From these early beginnings evolved Foster-Seeley's phase discriminator or f.m. detector, which is still with us today, despite the incredible advance in phase-lock loop (p.l.l.) i.c. f.m. detectors in much of our hobby and home radio equipment. A circuit of this kind of f.m.detector is given in **Fig. 4**.

When the primary and secondary windings of the input transformer (T) are **very loosely coupled** and both are tuned to the nominal carrier of the f.m. signal at i.f., the voltages across the two windings are 90° (or 270°) out of phase with each other. The ends of the secondary winding are connected to diodes D1 and D2, which are loaded and bypassed respectively by R1/C2 and R2/C3.



● Fig. 4. Circuit of the Foster-Seeley f.m. discriminator (f.m. detector).



● Fig. 5. Idealised f.m. detector characteristic.

The common d.c. path for each diode is **via** the radio-frequency (r.f.) choke connected to the centre-tapping of the secondary winding. The primary voltage phase reference is also applied to this tapping through capacitor C1.

Since each diode is connected the same way round and the current passed by each is the same (in the absence of modulation) a steady voltage develops across each load resistor, positive at each diode cathode, which means that the sum of the load voltages, between the top of R1 and the bottom of R2, is zero. The circuit is then in its balanced or centre-frequency state.

Now, when the the signal deviates about its nominal frequency during modulation, the phase of the voltages at D1 and D2 anodes changes with respect to the phase of the primary voltage. This causes the circuit to tilt out of balance with the deviation, in one direction on positive frequency swings and in the opposite direction on negative swings.

The diode currents are then no longer equal, so neither are the voltages across R1 and R2. An audio voltage, corresponding to the original modulation, thus appears at the a.f. output, which is coupled to the a.f. stages of the receiver through C4. The idealised response characteristic of the circuit is given in **Fig. 5**.

That's all for this column this month. In the next instalment in my 'Looking At' series (which will appear in the September 2000 *PW*) will consider some more f.m. detector circuits.

So cheerio until then. *PW*

Radio Basics

This month Rob Mannion G3XFD finalises the 'Radio Basics' valved projects - for the time being anyway - by describing how you can achieve the best results from the simple equipment described in the last few months.

Hopefully, by now you will have successfully built your own simple valved receiver. If you have - I have no doubt that you'll be enjoying the experience (and considerable challenge!) in operating such a receiver on today's crowded Amateur Radio and broadcast bands!

One of the most difficult aspects of operating simple regenerative receivers is the constant need to re-adjust the 'reaction' (regeneration) control every time you change frequency. This can be annoying, but it's also part of the fun of using these receivers. Skill and patience is needed to get the best performance - and they can indeed provide superb performance bearing in mind their simplicity.

Once you've used either of the valved designs I've described in this series - one aimed at the short wave listener and another to tempt the transmitting Radio Amateur - you may well consider some small refinements. The specific refinements I'm going to describe will actually reward you for the time spent in making and fitting them by making operation and adjustment that much easier.

Reaction Control

With the experience I've gained over 40 years of 'home-brewing' simple radio receivers, particularly one-valve designs - I can tell you that reaction control (or the lack of it!) can be either the most frustrating or rewarding aspect. So, with this in mind, I suggest you consider fitting a 'slow motion' adjustment to the reaction controls in the 'Empire' or 'Millennium' receivers.

Both the projects featured in 'Radio Basics' (RB) in the May and June issue of *PW* used potentiometer reaction controls for convenience and simplicity. But for the purposes of this month's explanations I'll be taking a closer look at the 'Millennium' receiver featured in Fig. 1 on page 16 of the May issue (**please refer to this circuit**).

The original choice for the reaction control method was mine, as I specified to the authors of the original projects that in practice such resistive controls are easier to adjust smoothly in operation. Suitable good quality variable capacitors aren't cheap either!

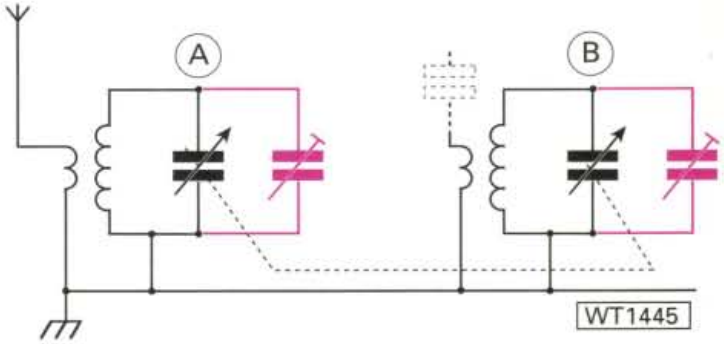
Easier to adjust **they may be**, but the potentiometer used for the control **must be of good quality**. There's nothing more frustrating than a 'noisy pot' used in this form of control!

So, be warned - get the best quality possible, 'budget' priced carbon-tracked potentiometers can get 'scratchy' very quickly indeed. Try to get hold of a wirewound 'pot' if you can. And, although very difficult to buy new, these can often be recovered from scrapped valved oscilloscopes (an absolute 'goldmine' of components providing you have the energy to get them home to break down for spares).

Another way to get around the need for a 50kΩ potentiometer (the value of R4, the regeneration control on V2 in Fig. 1 May *PW*) is to take advantage of the way the circuit operates. This will be possible because in practical terms the 'pot' will only need to be adjusted only over a relatively short section of its actual resistive track to control the reaction/regeneration.

What's Regeneration?

I've now reached the point where - for readers who're not sure of the process - I think that the process of 'regeneration' or 'reaction' (the traditional name) should be further explained. The explanation will also enable me to expand the explanation of the method we're using with V2, in Fig. 1 (May).



● Fig. 1: A simple ('skeletonised') 'bandspreading' circuit suitable for use with single valved and t.r.f. receivers (see text).

Personally, I think the term 'regeneration' is more descriptive of the process which is taking place in V2. The circuit around the valve is designed so that when the valve reaches a certain point of 'stage gain' (amplification of the incoming signal) it will 'feed back' to the input in the same way a microphone placed too close to the speaker output from its own amplifier.

With the microphone and amplifier, the result of uncontrolled audio 'feedback' is usually a very powerful (and painful!) whistling and howling. Very unpleasant, but with care we can use the same technique to great advantage.

You may notice with older (newer designs are specifically designed to avoid this problem) public address amplifiers, that **just before** the horrible shrieking and whistling takes place, the system **becomes remarkably sensitive.** It can be possible to pick out background noises that have previously been 'lost' in the amplifier circuitry, and in the same way we can use the tremendous increase in signal level amplification to advantage in a regenerative receiver.

Simply speaking, you can compare the 'threshold of oscillation' (when the 'feedback' turns into a howl) point to a spinning bicycle wheel which is being rotated at speed on its axle and is given momentum by a stick (in the same way as old fashioned hoops were propelled). With this method there will be a setting of the control (our electronic version of the 'stick') where the stick just cannot impart any more energy. This is the point we can regard as the 'threshold' (in the case of an amplitude modulated [a.m.] signal where the maximum gain is obtained).

Any further adjustment into the 'oscillation' (past the threshold) zone is only suitable for reception of c.w. (Morse) signals and single sideband, suppressed carrier (normally referred to as s.s.b.) transmissions. Here, usefully, the oscillation - on the same frequency you'll be listening on - is very helpful because it provides the necessary 'carrier re-insertion' for the s.s.b. signal.

Yes, s.s.b. reception **is possible** with a regenerative detector such as used in the 'Millennium' receiver. But you'll need lots of practice!

Incidentally, please remember that if you use a single valve regenerative detector (no r.f. stage) that you will in effect be radiating (transmitting!) a low power signal on the frequency you're listening on! They're quite capable of being heard for many miles - especially as they are usually connected to efficient antennas!

Anyone who remembers the early days of the broadcasting in the 1930s when regenerative detectors were very popular (as were long outside antennas) will also remember Captain Eckersley, the BBC's then Chief Engineer. He could be heard plaintively requesting listeners not to advance their receiver's 'reaction' controls past the 'threshold' because radiated signals interfered with neighbours' reception to the same frequency, especially as the antennas were often adjacent to each other. The plea was broadcast so often that Captain Eckersley became known as "Please don't do it"! Eckersley.

On the same note, I can report that I've suffered from regenerative detector type interference! It came about because a dedicated listener - who'd always used simple one-valved receivers - living only a mile or so away from me used to listen on 7MHz when I was operating on s.s.b. Thinking I was being pestered by one of the ubiquitous 'carrier swishers' who try - but don't succeed - to disrupt QSOs on the band, I was relieved to find out it was a nearby s.w.l. Of course, I didn't have the heart to tell him he was causing QRM - but proved it was him (he's a Silent Headphone now so I can't cause him

any embarrassment) by asking him to send reports in to me and I was able to confirm the times I'd heard the heterodynes with my own log book. They always coincided!

Alternative Potentiometers

Having digressed a little on to the important matter of regeneration, it's time now to look at the alternatives for the potentiometer in the 'Millennium' receiver. And, as I've said already, we can take advantage of the fact that only a small part of the resistive track on the potentiometer is used by using a lower value (in resistance terms) potentiometer, although keeping the 'wattage' - the power that can be safely dissipated - as high as convenient (a 1W component will be okay, 5W excellent if you can get hold of one).

With a little bit of experimentation you should be able to substitute various values for R4. For example, if you find you have, or can obtain, a 25kΩ component, you can experiment by placing a 12kΩ fixed resistance either side of the variable component. Additionally, you can also experiment with different values for R3, the 33kΩ fixed resistor.

My suggestions **are rather 'rule of thumb'** but I don't hesitate to suggest them to you. Experimentation is the name of the game - don't be worried about any damage you can do - it'll be minimal as, electrically speaking, valves are extremely rugged. Try this sort of thing with many semiconductor circuits and you'll lose quite a few individual transistors if you're not careful.

You may even find that it will be possible to make the regeneration control much easier to adjust by having a lower value potentiometer in circuit as suggested. This is because in effect you'll be providing another form of 'bandspreading' by making the adjustment over a wider physical movement but within the same resistance value range required for the valve's operation. Try it out and see - you'll enjoy the process and learn much at the same time!

Bandspreading Tuning

Now it's time to venture on to true 'bandspreading' tuning. Again, from my own experience, I can tell you that armed with the suggested fine adjustment on the regeneration control, together with 'bandspreading' the tuning you'll enjoy using your simple receiver much more.

The simple circuit in **Fig. 1**, shows 'skeletonised' suitable circuitry for simple bandspreading (compare Fig. 1 with the tuning circuits of the 'Empire' and 'Millennium' receivers to see how you can modify their tuning in a similar fashion). The additional 'bandspreading' components are shown in magenta colouring, to the right of the main tuning capacitors. The tuning circuit is 'skeletonised' so that you won't be confused by seeing too much circuitry - only the major components are shown.

Section A - the r.f. or 'input' stage of the receiver can be incorporated into a tuned radio frequency (t.r.f.) receiver or it could also be used in the 'mixer section of a simple superhet **Section B** would, in a simple superhet, be the local oscillator stage, and in a t.r.f. or single valved receiver it would be the detector stage). Note that in this circuit only the **main tuning capacitors** are 'ganged' together (i.e: they are mechanically linked so they move in and out of mesh together). This is indicated by the dotted line linking the two assemblies on the diagram.

Ideally, the extra 'bandspread' capacitors (marked as 'trimmers' - for convenience - as they've got the 'T' bar instead of the arrows) in Fig. 1 should be 'ganged' variable capacitors. However, **in practice** they can be individual low value 'trimmer' types. I suggest this because odd value - often between 20 to 50pF - single variable capacitors are much easier to obtain than 'ganged' types.

Additionally, for simpler receivers (particularly the t.r.f. type) it's very easy to just add the extra 'bandspread' into circuit. You then 'set' the main tuning (don't forget, you're **adding extra capacity**), with the result that with the 'bandspread' variable capacitor in circuit - the frequency coverage on the tuning range you're working on will be reduced.

In fact, with both main and 'bandspread' capacitors 'fully meshed' (maximum capacity) you will find your receiver's lowest tuning range with the coils (inductors) previously used. The same effect will also be noticed at the higher frequency end (with both main and 'bandspread' capacitors fully unmeshed minimum capacity) where'll the receiver will not tune as high up in frequency as before - but it's a small price to pay I can assure you!.

On The Air

In use and 'on the air', you'll find the best way to use 'bandspread' will be to 'set' the main tuning with the 'ganged' variable capacitors (with the 'bandspread' capacitor fully meshed) and then tune the receiver with the 'bandspread' capacitor on Section B. Here, I'm assuming that most of you will be using the 'Millennium' or 'Empire' receivers and will opt for single (non-ganged) 'bandspread' capacitors .

It's possible, in practice, to use just a single 'bandspread' capacitor (Section B in Fig. 1) and get good results. With this approach the tuning in Section A is actually working as a 'pre-set' input tuning stage and I'm confident that you'll get good results, as I've done so many times in the past.

However, by taking a little extra trouble you can add the second small variable capacitor in Section A. Once in circuit you can then tune in the signal you want on Section B's 'bandspread' capacitor and then use that in Section A to 'peak' reception Again, you'll find the results very effective indeed. Skill is needed - but again I'm confident you will find the effort worthwhile.

Once you've tried the technique yourself, you'll see what I mean because as you get more practice, it will prove possible to reduce interference from strong 'off frequency' transmissions by careful adjustment of Section A's bandspread capacitor.

Cheerio for now, let me know how you get on with your valve project. I enjoy hearing from you, both compliments and 'brickbats'! (All your letters are appreciated!). *PW*

Basics Board

Each month Rob G3XFD will use the 'Basics Board' to keep you informed of topical summaries, 'snippets' and technical jargon relevant to the main subject under discussion in the main article. The idea is that he'll provide the 'basic' explanation so that you can then 'read up' more on the subject in your own reference library.

Valve Characteristics: The conditions/parameters of a particular valve. The information provided by the manufacturer so that designers can efficiently incorporate the valve into a design. Basic details such as filament/heater voltage and current, control grid voltage, screen grid and anode voltages, anode current, etc., are normally specified. Readers particularly interested in valves are recommended to invest in as much information as possible. Recommended: *Radio Valve Guide Books Volume 1 to 5* (see Book Service pages).

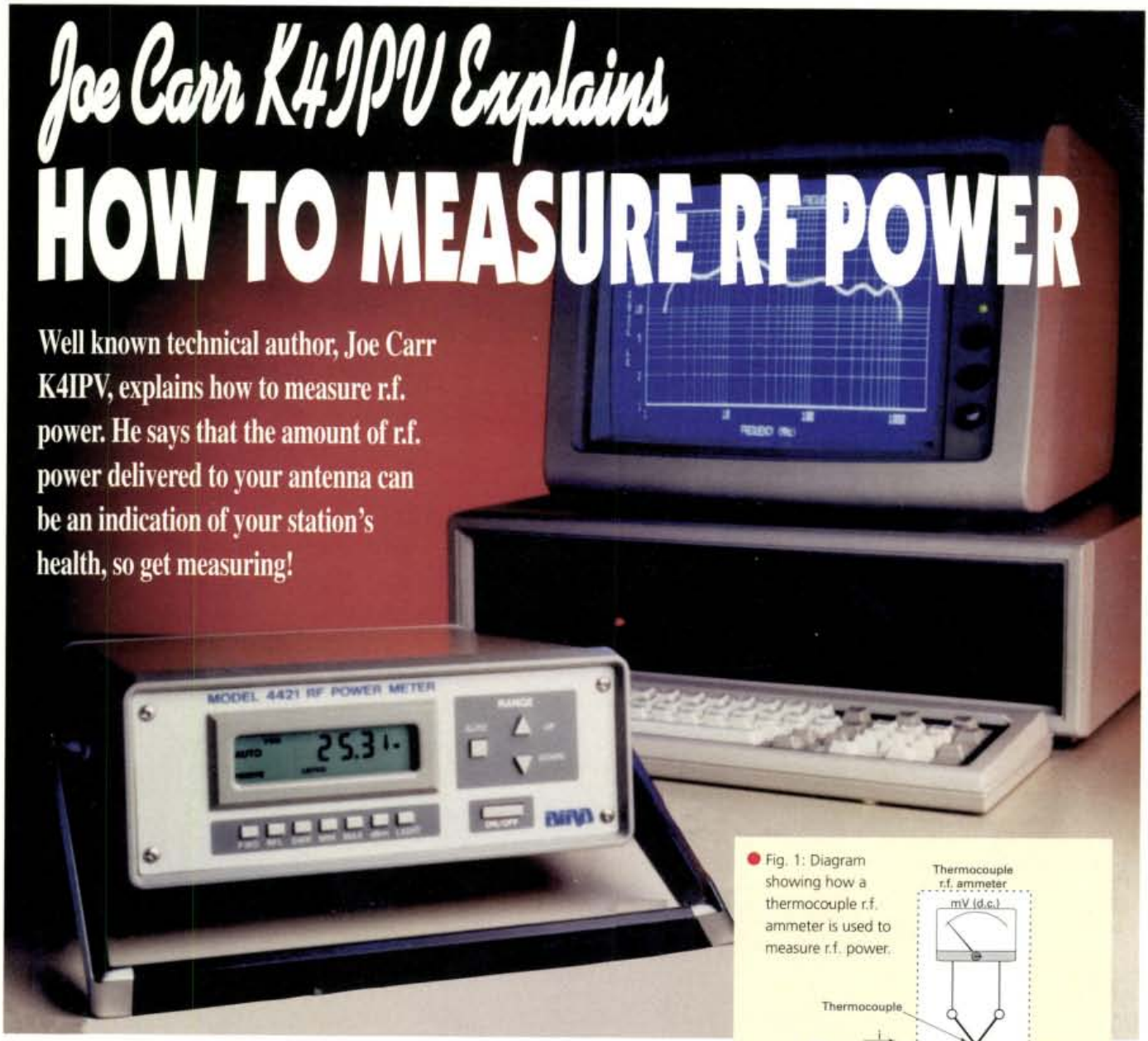
Grid Bias: For normal operation a valve requires a certain (negative with respect to the cathode) voltage on the control grid and is often referred to as 'grid bias'. This voltage (the essential information is provided in valve characteristics' books) assists in the valve operating in the most efficient manner for the purpose it's being used for. Suggested further reading - the 'Radio Basics' recommended reference/teaching book *Understanding Basic Electronics* (Published by the ARRL).

Valve Equivalents: Once 'armed' with a valve characteristics or data book the keen constructor using valves will soon find many direct or 'will work in circuit' alternative valves. Using 'equivalents' can extend the use of your valve box. Classic examples of multi-purpose equivalents are types such as the 6L6, 6V6, which can be used to replace each other for radio frequency (r.f.) transmitting purposes - even though they were originally used as audio frequency amplifier valves!

Joe Carr K4IPV Explains

HOW TO MEASURE RF POWER

Well known technical author, Joe Carr K4IPV, explains how to measure r.f. power. He says that the amount of r.f. power delivered to your antenna can be an indication of your station's health, so get measuring!



● Joe Carr K4IPV tells you all about how to measure r.f. power.

● Fig. 1: Diagram showing how a thermocouple r.f. ammeter is used to measure r.f. power.

One of the indications of your station's health is the amount of radio frequency (r.f.) power delivered to the antenna. In most cases, you will measure both the forward and reflected power levels, the idea being, of course, to deliver as much power to the load as possible while minimising reflected power. The amount of r.f. power reflected can be inferred from the **standing wave ratio** (s.w.r.), also called **voltage standing wave ratio** (v.s.w.r.).

The oldest form of r.f. power measurement is the thermocouple r.f. ammeter shown in **Fig. 1**. This type of instrument is an inherently r.m.s. reading device because it relies on **heating** a very low resistive value heating element (R).

By measuring the heating caused by the r.f. current, we can relate the temperature to current level. The r.f. power is then found from $\mathbf{P = I^2R}$. The temperature of the heating element is measured by a thermocouple (TC) device, which produces a voltage proportional to the temperature of the thermocouple junction.

A d.c. millivoltmeter is used to measure the thermocouple output potential, but its scale is calibrated in units of current (amperes, milliamperes). Neither the d.c. millivoltmeter nor the thermocouple are usually accessible from outside the meter case.

When the r.f. ammeter is in series with the transmission line from the transmitter to a resistive load (R_L) or a resonant antenna (which presents a resistive impedance), the r.m.s. r.f. power level can be calculated from $\mathbf{P_L = I^2 R_L}$.

An advantage of the thermocouple r.f. ammeter is that it is independent of load resistance. Certain other types of r.f. power meter are usually designed for a specific load resistance such as 50Ω.

The disadvantage of the r.f. thermocouple ammeter is that you need to make a calculation to find r.f. power value. These r.f. ammeters work well at low frequencies, up through the h.f. bands, but become less useful above some frequency in the 40 to 50MHz range.

Professional Grade

Many professional grade r.f. watt-meters work because the **temperature change in a resistive load is proportional to the r.m.s. value of the applied r.f. waveform. Fig. 2** shows a basic form of calorimeter or bolometer - a heat dissipating resistor with a resistance value equal to the desired load impedance which is enclosed in an assembly with some sort of temperature measurement device.

A friend of mine (**Silent Key K4NFU**) was fond of pointing out that you could put a big dummy load in a room and use a glass-mercury thermometer to measure the air temperature of the room before and after the power was turned on. Some real instruments do essentially the same thing by embedding a dummy load and a temperature sensor (thermistors and thermocouples are generally used) in a small assembly (Fig. 2), then the before and after temperature rise of the resistor can be measured.

The temperature method used to be limited to cases where a nomograph could be used to look up the temperature differences and relate them to power. Today, however, with microcontroller methods, it's easy to store the conversion tables in memory.

A low-cost instrument can be built using only the dummy load and Temperature Sensor No. 1, but that would ignore the problem that ambient temperature that would also affect the measurement sensor. It's usual to include a second sensor to measure ambient temperature, so that changes in ambient temperature can be cranked into the measurement and the resultant power can then be displayed on an analogue or digital meter.

Some calorimeter methods use two or three sensors (three are needed if ambient is accounted for) in a comparison measurement (**Fig. 3**). A low frequency (e.g. 50Hz) a.c. power source is used to drive one sensor/resistor, while the r.f. power is used to drive the other - a differential meter will show when the two output levels are the same.

At this point, the easily measured 60Hz* a.c. power level is equal to the applied r.f. power. If the third sensor is used to measure the ambient temperature, then it will be used to adjust the readings of the other two sensors.

Note: Joe Carr lives in the USA where 60Hz is the 'mains' frequency rather than the European 50Hz standard. Editor.

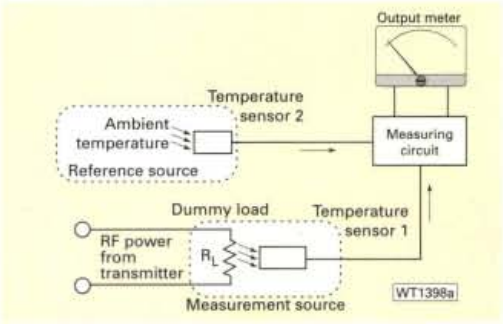
Diode Detector Circuit

A diode detector circuit such as **Fig. 4**, can be used to measure the r.f. power applied to a load. The diode is an envelope detector and produces a pulsating d.c. output from the r.f. voltage applied across the load (R_L). Capacitor C1 filters out the pulsating d.c. to nearly pure d.c. and the power can be inferred from $\mathbf{V_o^2/R_L}$.

The actual voltage applied to the diode is reduced by a resistive voltage divider (R1/R2), so it's only a fraction of the applied voltage. This allows higher power levels to be measured.

A diode such as a germanium 1N60, a silicon 1N914 or 1N4148, or a Schottky diode can be used for D1. Typical values for the circuit are R1 = 100kΩ, R2 = 1kΩ and C1 = 0.01μF to 0.05μF. The scheme shown in Fig. 4 was used on the Heathkit **Cantenna** dummy load that was popular some years ago and is still used on similar products today.

The diode detector circuit of Fig. 4 is popular because it's simple and easy to implement, but it suffers from the fact that it measures approximately the peak power. On a sine wave c.w. signal, the RMS power can be approximated by $\mathbf{(0.707 \times V_o^2)/R_L}$.

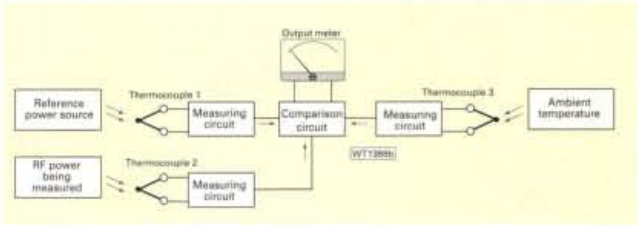


● Fig. 2: Diagram illustrating a basic form of the bolometer/calorimeter approach to measuring r.f. power.

Most Common Forms

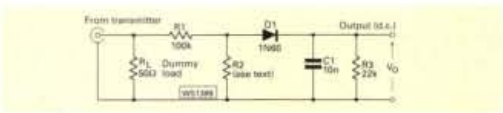
Perhaps the most common form of r.f. power meter is the in-line instrument. The instrument is inserted in the coaxial line between the transmitter and either the antenna or a dummy load (as in **Fig. 5**).

Instruments designed for use with an antenna often have the ability to measure the forward and reflected power, so they can also be used to determine the s.w.r. or v.s.w.r. Although you can use the actual power levels to calculate the v.s.w.r., it's also possible to calibrate the meters to provide direct reading of v.s.w.r..

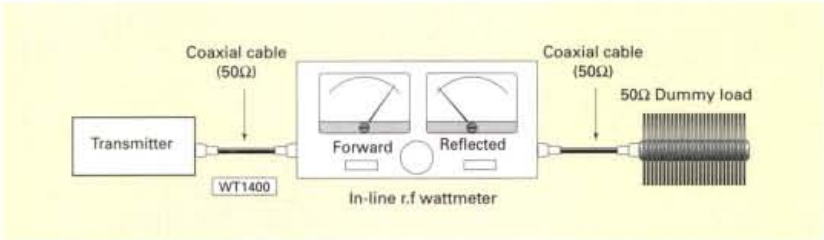


● Fig. 3: Three-sensor version of the bolometer/calorimeter approach.

The classic Wheatstone bridge can theoretically be used for making an in-line r.f. wattmeter, but that's not a practical approach. Such bridges are useful for making antenna impedance measurements at low power levels, but they can't be left in-line because of the huge insertion loss involved - other bridges, such as the micromatch bridge, are used instead.



● Fig. 4: Circuit of a diode detector r.f. wattmeter.



● Fig. 5: Diagram of an in-line r.f. wattmeter.

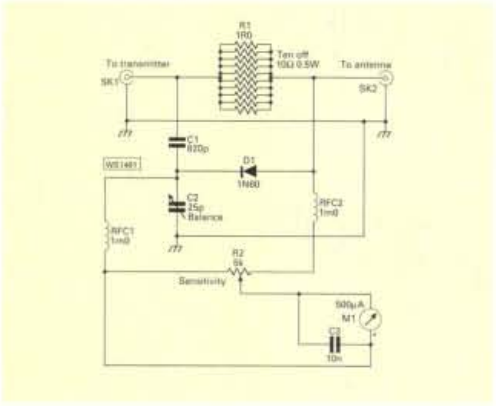
Micromatch Bridge Circuit

The drawing, **Fig. 6**, shows the basic capacitor-resistor **micromatch bridge** circuit. This circuit was once very popular and was used extensively in medium to high quality commercial r.f. power meters.

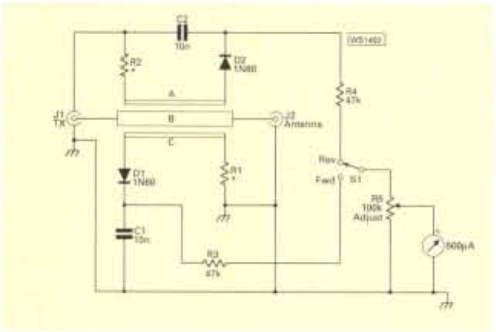
The micromatch is an improvement over conventional Wheatstone bridges because it only places a 1Ω resistor (R1) in series with the transmission line. This resistor dissipates considerably less power than the resistors typically used in Wheatstone bridges.

Because of the low value resistance we can leave the micromatch in the line while transmitting. For amateur power levels, the 1Ω resistor can be made from ten parallel 10-Ω resistors in parallel - up to 2W resistors can be used provided the particular resistors are non-inductive.

As with Wheatstone bridges, the ratio of the resistances and/or reactances in the arms must be



● Fig. 6: Circuit of a micromatch r.f. wattmeter.



● Fig. 7: Circuit drawing of a monomatch r.f. wattmeter

equal to create a null output to the meter. In this case, the ratio of capacitive reactances of C1 and C2 must match the ratio of R1 and the antenna or load resistance R_L.

For a 50Ω load, the R1/R2 ratio is 1/50, while for 75Ω loads it is 1/75. A compromise situation that yields a small error on both 50Ω and 75Ω systems is to use a 68Ω value for R_L, and make the ratio $\mathbf{X_{C1}/X_{C2} = 1/68}$. These ratios occur when C2 15pF for 50Ω systems, C2 10pF for 75Ω systems, or C2 12pF for the compromise 68Ω value.

The **sensitivity control** (R2) can be used to calibrate the meter and for fixed power meters this potentiometer is usually a trimmer type that is set when the meter is calibrated, then left alone. For multi-range instruments, each range has its own sensitivity control, while a 'master sensitivity control' might be used on the front panel to accommodate a relative power reading.

Monomatch Bridge

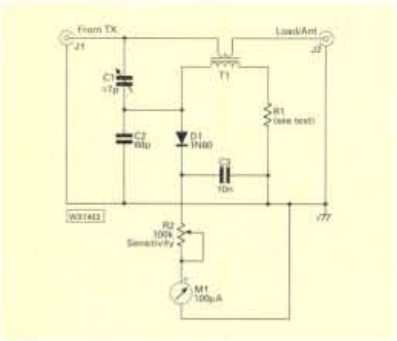
The **monomatch** bridge of **Fig. 7** is one of the 'instruments of choice' for 'Hams' in the h.f. and low v.h.f. ranges. It uses a transmission line segment with a pair of **directional couplers** to provide forward and reflected samples of the r.f. signal.

The transmission line is segment 'B', while the directional coupler transmission line segments are 'A' and 'B' and the directional coupler lines are used for sampling the forward and reverse r.f. signals. Although some instruments used modified coaxial transmission lines, later versions use printed circuit board (p.c.b.) elements for A, B and C.

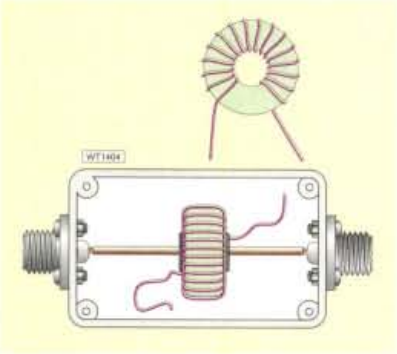
The sensor unit is basically a directional coupler with a diode detector element for both forward and reverse directions. For best accuracy, diodes D1 and D2 should be a matched pair, as should R1 and R2.

Matching is ideally done on a diode curve tracer, but for most practical situations matching the forward and reverse resistances of the two candidate diodes is sufficient. The resistance values of R1 and R2 should match the transmission line characteristic impedance, although in many cases 'Hams' use the 68Ω compromise in order to accommodate diverse antenna types.

The particular version shown in Fig. 7 uses a single d.c. meter movement to monitor r.f. power. With the addition of the switch and potentiometer (R5), the circuit becomes both a v.s.w.r. meter and a forward/reverse r.f. power meter. Many (maybe most) instruments sold today use two meter movements, one each for forward and reverse power.



● Fig. 8: A circuit of a toroid monomatch r.f. wattmeter



● Fig. 9: Diagram showing an r.f. sensor for a toroid monomatch r.f. wattmeter.

Another transmission line sensor is shown in **Fig. 8**, it uses a transmission line transformer based on a ferrite or powdered iron toroid transformer. The transmission line passing through the hole in the toroid 'doughnut' forms the primary winding of the transformer.

The secondary winding consists of 10 to 20 turns of small gauge enamelled wire and is connected to a measurement bridge circuit (C1, C2 plus the load) that produces a diode rectified output voltage.

Detail for the construction of the sensor assembly is shown in **Fig. 9**, the secondary winding is made of #24 to #30 standard wire gauge (s.w.g.) 0.56-0.315mm enamelled wire, which is wound as shown in Fig. 9. This has at least a 30° separation between the ends to minimised distributed capacitance and a rubber grommet is inserted into the hole of the toroid.

The primary winding is a single conductor passing through the hole in the grommet - it's common to find 3 to 6mm brass tubing used for the primary. **Note:** When counting turns on a toroidal transformer, each pass through the centre hole is a 'turn' - by passing a straight wire or tube through the toroid hole once counts as one turn.

The value of R1 (Fig. 8) should match the transmission line impedance, although as usual the 68Ω compromise is often seen. If you opt to use the exact value in any of these circuits then you can use either a single 51Ω resistor, or two 100Ω resistors in parallel. If you can find a precision 50Ω resistor, however, then use it (in standard carbon composition or metal film resistors, 51Ω is a standard value, but 50Ω is not).

Unkeyed CW Waveforms

Measuring the r.f. power of unkeyed c.w. waveforms is relatively easy, but when modulation is applied, many instruments will read incorrectly. **Table 1** shows some of the factors that compare the listed waveform's power, peak envelope voltage (p.e.v.), peak envelope power (p.e.p.) and equivalent thermal power with a 100W unmodulated, unkeyed c.w. carrier.

In conclusion then, at one time measuring r.f. power was a bit more difficult than it is today. Nowadays we have a number of options for both amateur and professional applications.

PW

Table 1

Waveform (modulation)	PEV (V)	Veff (V)	PEP (W)	Thermal Power (W)
CW	100	70.71	100	100
AM (100%)	200	141.4	400	150
AM (73%)	173	122.4	300	127
SSB(1-tone)	100	70.7	100	100
SSB(2-tone)	100	70.71	100	50
Readings Based on 100W (effective) carrier (c.w.)				

● Table 1: The peak envelope voltage (p.e.v.) is the peak voltage measured with a simple diode sensing unit and V_{eff} is the notional r.m.s. value of the p.e.v. The peak envelope power (p.e.p.) is the value of power developed by V_{eff} in a 50Ω load.

HAYDON COMMUNICATIONS

MAIL ORDER: 01708 862524

NEXT DAY DELIVERY TO MOST AREAS, £10.00.

ALINCO DX-70TH

The DX-70TH packs a hefty 100W punch on all bands 1.8-50MHz. It is backed up by a superb receiver with narrow filters fitted as standard. Ideal for use at home or in the car for that portable DX expedition. Wideband transmit available for export customers.

NEW LOW PRICE **£599.00**

£99.00 DEPOSIT AND 10 PAYMENTS OF £50. ZERO% FINANCE.

ICOM IC-706MKIIG

Now on it's 3rd generation of the classic transceiver and still out selling it's competitors. Covers 160m - 70cm (all mode).

SPECIAL OFFER **£879.95**

ALSO AVAILABLE ON FINANCE. £79.00 DEPOSIT AND 12 PAYMENTS OF £73.33.

FINANCE EXAMPLE: £100.00. 12 MONTHLY INSTALMENTS OF £9.16. TOTAL AMOUNT PAYABLE £109.92. APR 19.5%.

ICOM AH-4

Automatic antenna tuner.
Covers 3.5-54MHz (100W).
SSP £339.00.

SPECIAL OFFER

£239.99

AT-180 Automatic tuner for HF, 6m ...£339.00
SGC-230 Automatic ATU 1.8-30MHz.....£299.00

ICOM IC-756PRO

Materialising techniques not previously achievable, the IC-756PRO and Icom will take you, your transceiver and operating capabilities into a new power performing dimension. Becoming the best of the best, the IC-756PRO stands second to none. ~~£2100.00~~.

WE WILL NOT BE BEATEN **£Phone**

IC-746 .....£1099.00
IC-8500 Wideband all mode receiver.....£999.00

KENWOOD TS-870S

★ 160m-10m amateur band operation, 100kHz-30MHz receive ★ IF-stage DSP ★ Speech processor ★ Built-in automatic antenna tuner ★ LF auto notch ★ Variable AGC circuit ★ 100W output.

SPECIAL OFFER **£1399.00**

Kenwood TS-570DG.....£795.00
Yaesu FT-920.....£899.95
Yaesu FT-847.....£1199.00
Yaesu FT-100.....£795.00

KENWOOD TM-G707E

Our best selling dual-band mobile with detachable head. (50/35W). Optional wideband Rx.

ONLY **£269.00**

IC-2800H 2m + 70cm mobile £335.00
IC-207H 2m + 70cm mobile £265.00
TM-V7E 2m + 70cm mobile £329.95
FT-8100R 2m + 70cm mobile £349.00
FT-90R Miniature 2m + 70cm mobile £309.00
DR-430 70cm FM mobile (35W) £199.95

YAESU VX-5R

Brilliant tri-band hand-held (6, 2, 70cm) with wideband receive. 5W output as standard.

ONLY **£269.00**

TM-G71 2m + 70cm hand-held £189.95
TH-D7E 2m + 70cm hand-held £259.00
DJ-G5 2m + 70cm hand-held £269.95
DJ-V5 2m + 70cm hand-held £179.95
IC-T81 6, 2, 70 + 23cm hand-held.....£239.95

AR108

Palm sized dedicated airband scanning receiver. Covers airband 108-136.975MHz VHF 136-180MHz with 99 memories.

ONLY **£59.95**

Optional batteries + charger £13.99.

MVT-7100 Wide band h/h scanner..£199.00
MVT-9000 Wide band h/h scanner..£329.00
AR8200 MkII Wide band h/h scanner..£399.00
IC-R2 Miniature h/h scanner ...£129.00

ICOM IC-8500

"Next generation" technology brings you super wide band, all mode coverage from 0.1-2GHz.

SALE PRICE **£999.00**

AR5000 Wideband all mode receiver ..£1269.00
Fairhaven RD-500VX Wideband all mode receiver .....special offer £799.99
Bearcat UBC-9000XLT 25-550/760-1300MHz base scanner.....special offer £219.00

REALISTIC DX-394

★ Superb performance SW receiver ★ True SSB ★ 0.2-30MHz (AM/SSB) ★ 240 or 12V ★ Attenuator ★ S-meter ★ Timer

S.S.P. ~~£249.95~~

SPECIAL OFFER **£149.95**

Yaesu FRG-100 Communications Rx £369.00
Icom IC-R75 Communications Rx £599.00

SONY SW-100E

Award winning miniature portable all mode SW receiver. ★ Station presets for 50 frequencies (with station names) ★ Single side band system ★ Multi-function LCD display ★ FM stereo via headphones ★ Synchronous detector ★ Sleep function ★ Short wave tuning in 5Hz & 1KHz steps ★ Includes compact antenna/stereo earphones/carrying case/comprehensive short wave handbook. Due to over stocking at Sony UK we are able to offer for a limited period the Sony SW-100E at £100 off retail price. RRP ~~£229.95~~.

SPECIAL OFFER **£129.95** P&P £10

Carrying On The Practical Way

This month the Rev. George Dobbs G3RJV 'travels back in time' to look more closely at the 'Supergainer' receiver techniques. And on the journey he's got some interesting little projects for you to try!

" As with those before you, your work trains your hands, expands your mind and stimulates your imagination, regardless of the simplicity of what you build. Do not let anyone, preaching mere modernity, talk you out of it"

C.F. Rockey,

"Secrets of Homebuilt Regenerative Receivers".

Why do some Amateur Radio constructors build old-fashioned circuits? Well, in this month's quotation **C.F. Rockey W9SCH**, has the answer - because they enjoy it! One of the joys of any hobby is doing **what you choose** because you have no-one else to please but yourself. Forget any nonsense about Amateur Radio pushing at the frontiers of technology. I doubt if it ever did, except perhaps in the very early days. **But it is about enjoyment and self-fulfilment**!

In the May 'Carrying on the Practical Way' (COTPW) column, I mentioned the 'Supergainer' receiver, a technique which is now over a half a century old. I described a regenerative receive module which could be used as a receiver in its own right or form the basis for a Supergainer receiver.

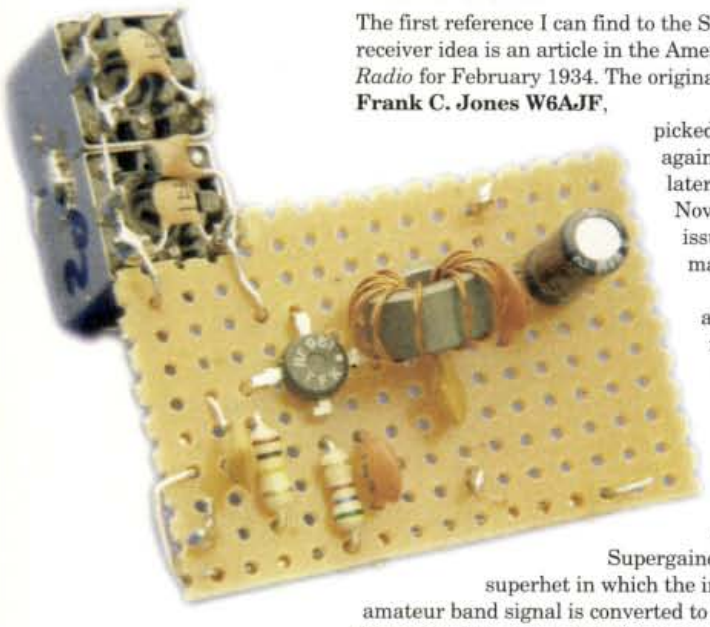
This month, I'm describing a converter module, which can be the front-end of such a Supergainer receiver. It may also be used ahead of other existing receivers to provide access to other bands.

First Reference?

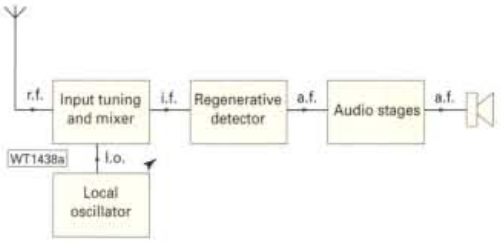
The first reference I can find to the Supergainer receiver idea is an article in the American magazine *Radio* for February 1934. The original author, **Frank C. Jones W6AJF**, picked up the idea again, some 20 years later in the November 1957 issue of *CQ* magazine.

The heart of a Supergainer receiver is an oscillating second detector that provides extra gain and selectivity. The Supergainer is a form of superhet in which the incoming amateur band signal is converted to an intermediate frequency (i.f.), from where it's converted to audio using the regenerative detector.

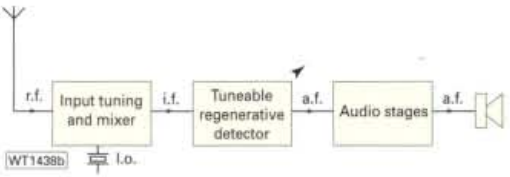
Little, or no, i.f. filtering or amplification is used. The regenerative detector provides most of the selectivity and extra gain. The result is a superhet mixer in front of a high-gain regenerative direct-conversion receiver. A simple block diagram for a Supergainer receiver is shown in **Fig. 1a.**



● Getting the most from a simple idea - the 'Supergainer' receiver features as this month's project.



● Fig. 1a: Block diagram of a simple 'Supergainer' receiver (see text).



● Fig. 1b: An alternative for the Supergainer arrangement. Here the first mixer, with its associated local oscillator, is replaced by a crystal controlled converter. A tuneable regenerative receiver follows the converter (see text).

The Supergainer idea seems to have been revived by *Practical Wireless* in the 1950s because in the RSGB's *Radio Communications* July 1987 'Technical Topics' column, **Pat Hawker G3VA** shows a valve Supergainer built by **M. Healey G3TNO**, who describes it as a receiver he built as a schoolboy from the pages of *PW*.

The G3TNO project was followed by yet another variant of the idea from G0FMT who used a m.o.s.f.e.t. mixer ahead of a direct conversion receiver. A further variant appeared in the February 1991 'Technical Topics' column from **Tony Langton, GM4HTU**.

The GM4HTU circuit used a mixer in front of a fixed-tuned version of a regenerative receiver circuit of **GI3XZM**. I described this receiver in the COTPW column for May of this year. This month I'm going to suggest another way of using the regenerative receiver module from that column in a form of Supergainer receiver.

Alternative Arrangement

The diagram, **Fig. 1b**, offers an alternative for the Supergainer arrangement. Here the first mixer, with its associated local oscillator, is replaced by a crystal controlled converter. A tuneable regenerative receiver follows the converter.

The concept of a tuneable i.f. has a long and noble Amateur Radio history. It formed the basis of several commercial receivers in the 1950s and 1960s.

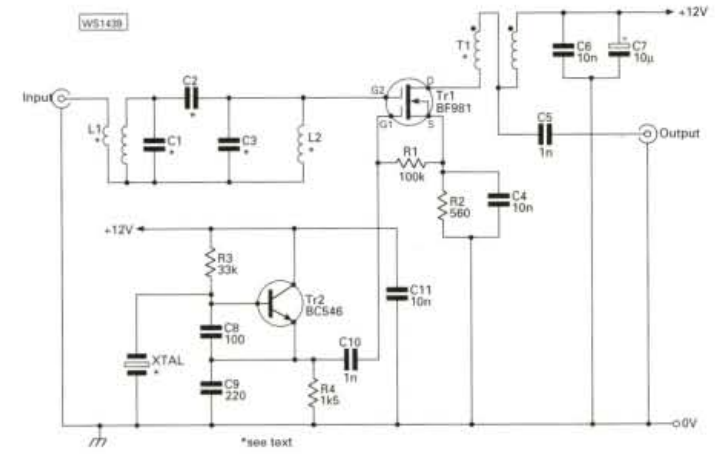
In the early days of G3RJV, I used a crystal controlled

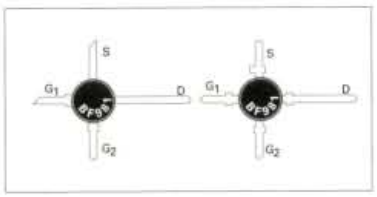
Table 1

Band (Mhz)	Tuning Range (MHz)		
	6.0-6.5	5.0-5.5	3.5-3.8
3.5	2.5	9.0	
7.0	1.0	12.5	10.7
10.1	4.0	5.0	
14.0	8.0	9.0	10.5
21.0	15.0	16.0	17.5

WT1438

● Converter crystal frequencies for five amateur bands with suggested tuneable i.f. ranges.





● Fig. 2: All that's needed to use the idea in Fig. 1b is a crystal controlled converter. The circuit shown here is based on a circuit by LZ1BB and is ideal for the project. The transformer (T1) is made up from 10 turns of 28s.w.g. on a FT-37-43 core (see text). The pin-out diagram for the BF981 is shown as an inset.

converter ahead of a 'Command Receiver' as a very effective amateur bands receiver. Most amateur bands have a relatively small frequency range and tuning the i.f. by this amount is viable.

The technique also has the advantage that the tuneable conversion takes place at a low frequency. Avid *PW* readers are over half way there! The May COTPW column described both the regenerative module and the audio module of Fig.1b.

All we need to add is a crystal controlled converter. A circuit for such a converter is shown in **Fig. 2**. which is based on a circuit by **LZ1BB** and the oscillator arrangements are shown in **Fig. 3a** & **Fig. 3b**.

Table 2

Band (MHz)	T1/T2 (KANK)	T1/T2 (µH)	C1/C3 (pF)	C2 (pF)
1.8	3333	45.0	150	12
3.5	3333	45.0	39	3.9
7.0	3334	5.5	100	8.2
10.1	3334	5.5	47	6.8
14.0	3334	5.5	22	3.3
18.07	3335	1.2	68	6.8
21.0	3335	1.2	47	4.7
24.89	3335	1.2	33	3.3
28.0	3335	1.2	22	3.3

WT1437

● Suggested bandpass filter values using Toko inductors.

The Converter

The converter is simple but effective. A bandpass filter for the desired amateur band selects the signals to be fed to one of the gates of a dual-gate m.o.s.f.e.t. mixer (Tr1).

Dual-gate m.o.s.f.e.t.s are becoming rare 'beasts', but the BF981 v.h.f. device is still readily available. Suitable values for a bandpass filter, using Toko inductors, for each amateur band are given in **Table 2**. ***Note:*** *The layout is a rather strange one with the roles of both gates swapped over, but with this device and this circuit, it seems to make little difference. This may not be the case with other devices.* **G3RJV**.

The table contains values for all the amateur h.f. allocations although I will only suggest conversions for a limited range of bands. The bandpass filter leading from the input to G2 of Tr1 suggest that bandpass filters may be switched if more than one band conversion is to be made.

The transistor, Tr2 is a bipolar crystal oscillator using a Colpitts configuration. Almost any common h.f. bipolar *npn* device would serve for this transistor.

Again, there's the possibility for switching of crystals for a multi-band version of the converter.

The output is taken from the emitter of Tr2 via C10 to the other gate of the m.o.s.f.e.t. mixer. The mixer is terminated with a bi-filar wound impedance matching transformer (T1) feeding the resultant signal to the regenerative detector module.

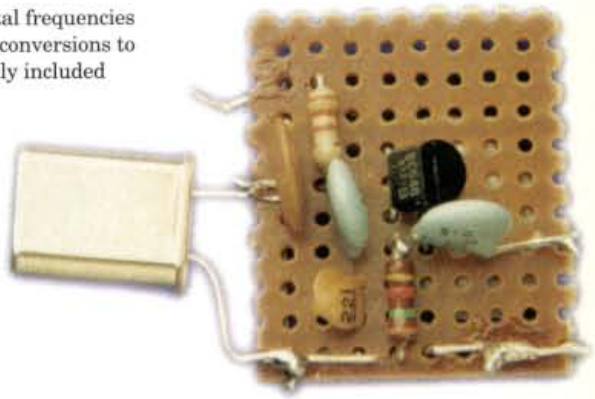
Suitable Intermediate Frequency

The requirement is to convert signals from an amateur band to a suitable i.f., where the tuning and detection can take place. I choose an i.f. of 6MHz upwards based upon work by **John Hey G3TDZ**.

In the Winter 1989/90 edition of the G-QRP Club Journal, *Sprat*, John G3TDZ first introduced his 'White Rose' Receiver project, which is a 6.0 to 6.5MHz direct conversion receiver with a series of amateur band plug-in converters. (The 6.0 to 6.5MHz range was used because off-the-shelf crystals can be used for all amateur band conversions).

Table 1 shows the crystal frequencies required for amateur band conversions to the 6 MHz range. I have only included the five most popular h.f. bands.

However, I've also included conversions to a tuning range of 5.0 to 5.5MHz, which has convenient crystals and 3.5 to 3.8MHz, should the constructor want to use this circuit to provide additional bands to an '80 metre' receiver.

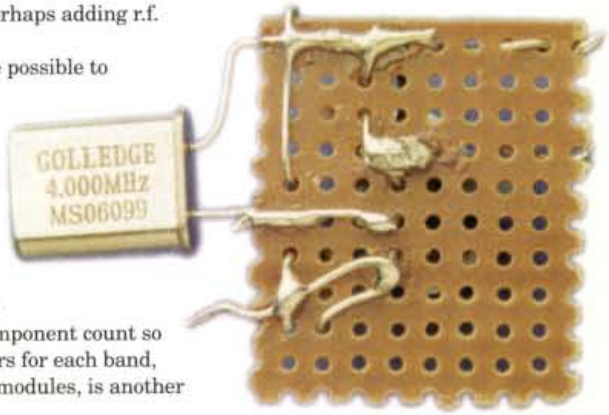


● Fig 3a: A crystal oscillator is needed for the 'converter' circuit. As usual G3RJV prefers his 'Perf' board method and the component side of his lay-out is shown here.

Very Effective

In use here in my workshop in Rochdale, the converter, described in the May issue, ahead of the regenerative receive module proved to be very effective. There can be some problems with strong broadcast signal breakthrough in the evenings but this can be greatly reduced by screening and perhaps adding r.f. attenuation.

It would also be possible to have switched bandpass filters and crystals in the converter to provide for several amateur bands. The circuit of the converter has a low and inexpensive component count so individual converters for each band, perhaps as plug-in modules, is another alternative.

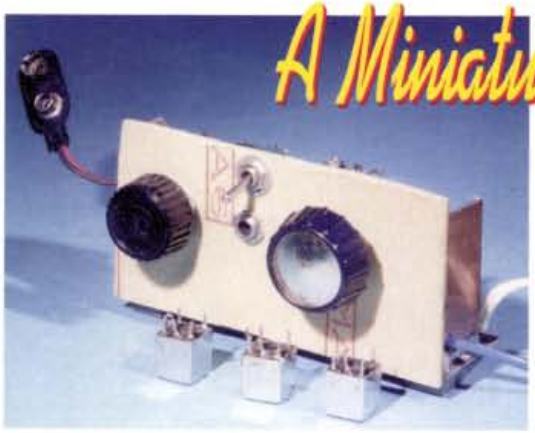


Have a go at the 'Supergainer'! Try travelling back in time yourself to some of the ideas of early Amateur Radio and be surprised at what simple receivers can achieve. *PW*

● Fig. 3b: The underside of the 'converter' circuit lay-out. (See text).

A Miniature Multi-Band

David Rowlands G6VEB describes a receiver covering the 3.5 to 10MHz bands. He says it proves you can go 'miniature & multi-band' and keep it simple at the same time!



This article describes the design of a small, multi-band receiver based on a design by **Chris Garland G3RJT** that appeared in *Sprat 73, Winter 1992/3**. In this circuit, **Fig. 1**, band changing is achieved by plugging in a different coil for each band, thus minimising board size and eliminating the need for a bulky switch.

Because in this design there is flexibility in the transistor types, there's a good chance that the junk box will yield these as well as most of the other parts for this little receiver. The set can of course be used by short wave listeners, but would also be ideal as a companion to a small crystal controlled QRP c.w. transmitter which could even be built into the same case.

In use, the receiver is quite stable and after initial 'warm up' doesn't seem to drift too badly. Usually voltage regulators such as the '317 series are specified for use in varicap tuned circuits for maximum stability, however, I've employed Zener diodes in this circuit to minimise size, cost and complexity.

The setting up as described is for the amateur bands. But those wishing to listen to other short wave frequencies will have no trouble in adjusting the coils to operate on the appropriate band.

How The Receiver Works

To understand how the receiver works, let's consider the circuitry from Tr2 onwards (we'll come back to the 'front end' in a while). Firstly, T1 plus a variable capacitance forms the tuned circuit plus antenna coupling on the gate of Tr2.

The transistor, Tr2, is a j.f.e.t. detector, with an infinite input impedance and some audio gain. This allows it to be connected directly across the tuned circuit, giving maximum signal at the input without damping or loading the tuned circuit (f.e.t.s such as 2N5459 or 2N3819 will both work here).

Next, Tr2 is followed by a simple audio frequency (a.f.) stage in the shape of Tr3 which provides a good audio level for high impedance headphones or a crystal earphone. There are many different transistors that will work well here.

The 'front end' transistor Tr1 and its associated components boosts the 'Q' of the tuned circuit to almost the loss-free ideal. In practice, R6 adjusts the gain of Tr1 and hence the 'reaction', by controlling the base bias. When losses are cancelled out, oscillation occurs.

The trimmer capacitor, C1, in the antenna input circuit is adjusted for optimum reception so that strong 'off frequency' signals are reduced as much possible. A high gain transistor should be used for Tr1. (I've tried BC169C, BC148 and 2N3711 types with good results).

Components R1, R2, D1, D2 and C2 effect the variable capacitance element of the tuned circuit formed with T1. The variable resistor R1 simply varies the voltage applied to the anode of the varicap diode pair D1/2, varying their capacitance and hence frequency of operation.The zener diodes stabilise the voltage to prevent drift. The voltage rating of the zener diode also controls the width of frequency coverage. A lower voltage zener (D4) is switched across at the higher frequencies, to prevent frequency coverage becoming too coarse.

A 10kΩ linear (preferably Cermet) band spread potentiometer could be added in series with the slider of the main tuning pot if required. You also have the choice here of including an extra zener with a switch, the band spread potentiometer, or both depending on how the set is to be used.

Smaller & Cheaper

Using a varicap diode for tuning enables the set to be built smaller and more cheaply than by using a variable capacitor, despite the greater parts count. The effects of stray capacitance are also virtually eliminated which permits the extremely basic, simple 'home-brewed' and 'open' construction I've adopted.

None of the wires running to the controls are connected directly to the tuned circuit. (This also helps reduce 'stray' capacitance). Band change is effected by plugging in different coils for T1 and of course this avoids the need for a multiway switch.

For use with a transmitter, a 47Ω resistor is added to match the input to the 50Ω (nominal) input and a 1nF capacitor is switched in parallel with the tuned circuit to detune it during transmit. This prevents the warm-up drift that would occur if the set was switched off during transmit (See **Fig. 2**).

One Coil Per Band

One Toko coil is required for each band. For 3.5MHz use KANK 3333 (red) and for 7 and 10MHz use KANK 3334 (yellow). The ferrite slug is of course

*Circuit reproduced with grateful acknowledgement and permission of Rev. George Dobbs G3RJV, Editor of *Sprat*. G3XFD.

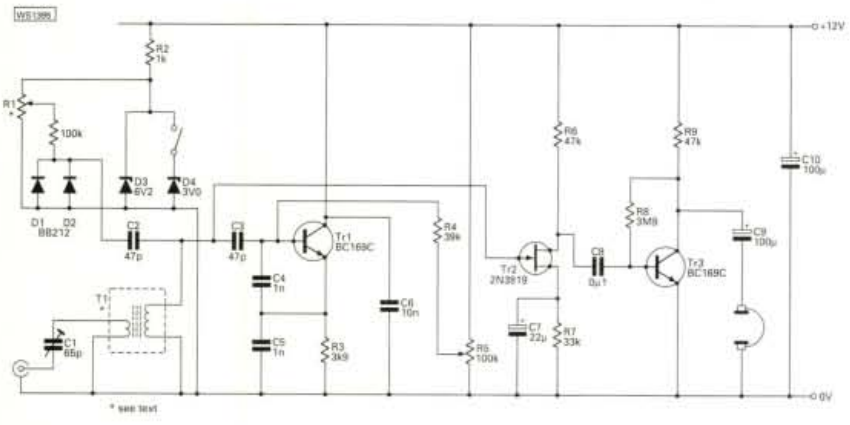


Fig. 1: The circuit of the receiver uses varicap tuning to achieve a physically small size.

Receiver

adjusted in each case for appropriate coverage.

The approximate coverage of the prototype using a 6.2V zener for 3.5MHz and switching a 3V in parallel for 7 and 10MHz is as follows:-

3.48 - 3.806MHz
6.995 - 7.105MHz
10 -10.250MHz

I designed the prototype to operate within the amateur bands from 3.5 to 10MHz. The frequency spread achieved by R1 is governed by the zener voltage - the higher the voltage, the greater the capacitance swing and therefore the coverage. Lowest capacitance (and therefore highest frequency) is attained at the high voltage end of R1.

As mentioned previously, there are choices available here. A higher voltage zener, let's say 9.1V, could be fitted along with a bandspread potentiometer. This would of course enable additional coverage outside the amateur bands. If only amateur band coverage is required, then a bandspread potentiometer is not necessary, although a slow motion drive is greatly recommended.

For 3.5MHz use, I suggest a 6.2V zener which could be mounted in the usual way on the board. A 3V is switched across it with a single pole single throw (s.p.s.t.) switch to cover 7 and 10MHz.

Top Band Coverage

'Top Band', 1.8MHz, coverage **is possible** using a KANK3333 inductor with this set but this is not without its difficulties. And I include the information here for those that like a challenge!

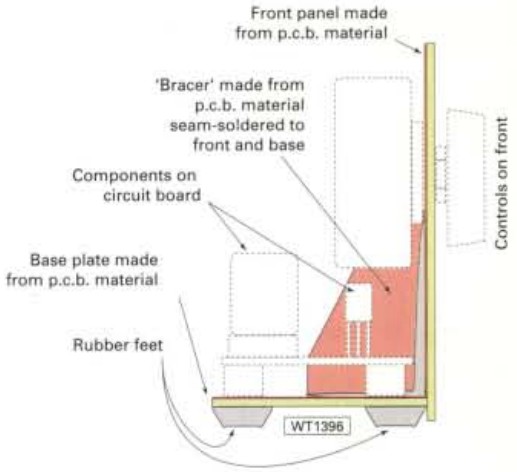
To start the 1.8MHz modifications, an extra capacitance of between 33pF and 68pF is required across the tuned circuit. Unfortunately, this was found to make adjustment for the other bands difficult!

The solution is to solder the capacitor onto the underside of the KANK3333 to be used for 1.8MHz. However, soldering the extra capacitor in place makes it difficult to get a good connection in the d.i.l. socket.

A zener diode of 9.1V or greater is also required to get a reasonable coverage on this band. The 9.1V varicap diode gives coverage of about 1.810 - 1.9MHz), so to provide the necessary capacitance 'swing' the receiver must therefore be operated on 12V.

A higher voltage zener, such as the suggested 12V version, is going to make tuning very coarse above 3.5MHz unless a 'bandspread' potentiometer is fitted as previously described. A slow motion drive as already suggested can be fitted to R1 which will help somewhat.

Another useful alternative is to fit a single-pole, double-throw (s.p.d.t.) switch with a centre-off position. The 9.1V zener would be fitted to the board, whilst the 3V and 6.2V are connected to the switch. The centre off position therefore gives 9.1V., etc., whilst the two 'on' positions give 3V and 6.2V required for 3.5 and 7MHz.



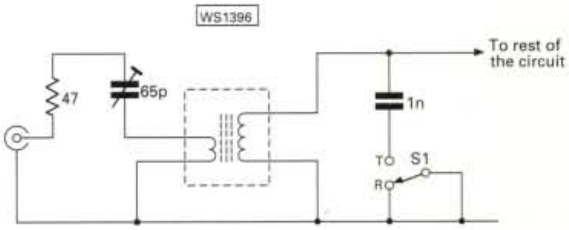
● Fig. 2: A skeletal sideview of the construction technique used for the project.

Start Building

Now let's start building! Construction is fairly straightforward, but I must remind you of the need to observe good r.f. practice in the tuned circuit area: In other words - keep connections as short as possible.

Actual layout is entirely down to the choice of the individual. Despite this, I suggest building the project as per the circuit diagram on matrix board, or better still on a printed circuit board (p.c.b.).

Choice of casing is also wide - but remember that you'll need to reach T1 to change bands. Whatever is decided upon, I suggest that the front panel controls are mounted on an earthed metal panel of some sort.



● Fig. 3: Two simple modifications if the receiver is to be used with a transmitter.

An open style of construction could be adopted (See heading photograph, etc.). The front and base panels being formed from sections of p.c.b. material, earthed to the negative supply line Fig. 2.

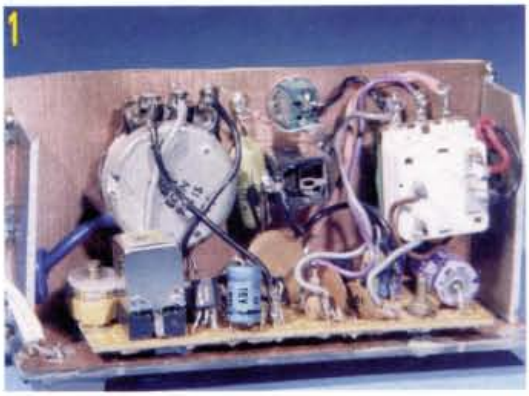
A small piece of p.c.b. should be used at each end of the front panel to act as corner braces. The receiver's main p.c.b. or matrix board would be screwed onto the base panel. Rubber feet should be placed at or near the corners of the base.

I've already suggested transistors for Tr1, 2 and 3. But please be sure to observe the correct lead configuration for your chosen transistors!

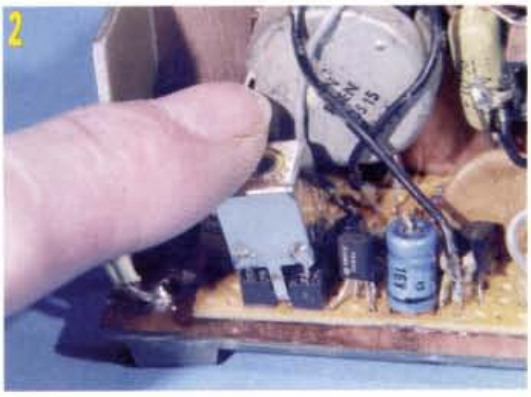
Plugged In

The inductor T1 is plugged into the circuit by means of an 8-pin d.i.l. socket. The centre pin will need to be carefully bent to line it up with the d.i.l. socket.

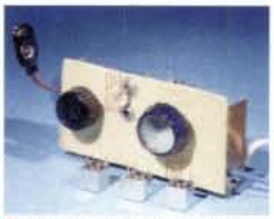
The three pins of the d.i.l. socket that are not connected to the inductor are removed from the



● Picture 1: A general view of the 'insides' of the receiver.



● Picture 2: A separate coil for each band, gently pushed into a modified d.i.l. socket, removes the need for band-switching.



Three bands and simplicity itself!

Shopping List

Resistors

Carbon film 5% 0.25W

1kΩ	1	R3
3.9kΩ	1	R4
33kΩ	1	R8
39kΩ	1	R5
47kΩ	2	R7, 10
100kΩ	1	R2
3.9MΩ	1	R9
Variable		
47kΩ	1	R1 (may range from 10 - 100kΩ)
100kΩ	1	R6

Capacitors

Min Polystyrene, Mylar or ceramic

47pF	2	C2, 3
1nF	2	C3, 5
10nF	1	C6
Min Ceramic		
100nF	1	C8
Electrolytic 16V working minimum		
22µF	1	C7
100µF	2	C9, 10
Variable		
65pF	1	C1

Semiconductors

2N3819	1	Tr1
BB212	1	D1/2 (a dual package with the common cathode on the centre pin)
BC169C	2	Tr2, 3
Zener Diodes (500mW dissipation)		
3V0	1	D4
6V2	1	D3 (9V1 as an optional variation)

Inductors

KANK3333	1
KANK3334	2

Miscellaneous

Battery clip and 9V battery, p.c.b. material, perf-board, 8-pin i.c. holder, Hi-Z earphones, hookup wire and a suitable antenna. Plugs and socket to suit.

socket. The pin that corresponds with the centre tap of the inductor is left in place to act as a marker. (This ensures that inductors are always plugged in the correct way around).

A very thin piece of copper wire should connect the earth pin of one of the windings to the metal screening can on each coil used. **Note**: This needs to be done very carefully, so that the coil will still fit into the socket. (Excess solder must therefore be removed). To help the solder to adhere to the screening can it's a good idea to roughen a small area (removing a little of the plating, to expose the 'solderable' metal underneath with a needle file, modelling knife, etc.

Setting up

Now, all being well, you should be able to start the setting up process. First, start by connecting a wire antenna of a few metres in length. Set the vanes of C1 to half mesh and if a volume control has been fitted, set this for maximum volume. Then set R6 to minimum, and R1 to maximum.

Now select a KANK 3333 inductor. Looking at it from the underside, adjust the ferrite slug to be level with the bottom of the former. (There is a raised moulding surrounding the hole for the ferrite slug, which should be adjusted to be level with this). Then place the inductor into the d.i.l. socket ensuring that it is correctly connected.

If using switched zener diodes, ensure that the 6.2V zener is selected. Connect the set to a 12V power source - preferably a battery. Next, gradually adjust R1 until some background signals are heard. Continue adjusting the control until oscillation is heard in the earphone*.

Editorial note:* *The audio output from this receiver is quite low and good quality high impedance headphones are required. However, readers who have built the 'Radio Basics' ('RB') simple amplifier circuit - using the LM386 audio integrated circuit - can use it to advantage with this receiver. Input connection (to the 'RB' amplifier, should be made on the headphones side of the capacitor, C9, or at the junction formed by R7 C8 and the 'Drain' of Tr2. Readers using an 'add on' amplifier should be aware that because of the high gain of the i.c. amplifiers - extra decoupling protection must be applied at the amplifier's input. In this case I strongly recommend a 10nF capacitor be connected between the + side of C9 and a small ferrite bead on the input lead to the 'RB' amplifier.* ***G3XFD*.

Next, you should either get a signal generator and frequency counter, or use another receiver. Using the signal generator, start at 5MHz and slowly sweep downwards until the signal is heard in the earphone.

Check the frequency with the counter. If using a receiver, set the test receiver for s.s.b./c.w. reception (if available) and monitor 3.8MHz. Then place the wire antenna as close as possible to that of the monitoring receiver. (Here we are using the fact that our simple receiver actually radiates a signal on the frequency it's receiving, to our advantage!). Then, adjust the tuning control (R1) slowly downwards until a signal is heard in the monitoring receiver.

It should be possible to reach 3.8MHz. If not, then try say 4 or 3.5MHz. Once 3.8MHz has been 'found' on the completed project, adjust the core of the inductor such that 3.8MHz falls just short of the maximum position of R1.

If using a signal generator, set R1 to minimum and sweep through with the signal generator and check the frequency with the counter. If using another receiver, set this to 3.5MHz and adjust R1 until the oscillations are once again heard in the monitoring receiver. If nothing is found at 3.5MHz, increase the frequency of the monitoring receiver.

If using a 9.1V zener, coverage will be very much wider than this. However, if using a 6.2V zener, the coverage is about right for the European 3.5MHz (the band is wider in coverage in the USA, etc.).

Setting up for the other bands can be done in exactly the same way with the appropriate coils. Mark each coil with a different coloured dab of enamel paint to identify its respective frequency range.

Operating Straightforward

Operating the receiver is fairly straightforward. Leave the vanes of C1 half way open. To listen to a.m. signals, set R6 just short of the point where oscillation (the 'threshold' as it's called) is heard in the earphone and tune in the desired signal. (It may be necessary to readjust R6 again once a signal is received. If the signal is very strong, then R6 can be backed off to reduce the receiver's gain and hence the volume.

To listen to s.s.b. or c.w. transmissions you should set R6 just past the point (the 'threshold') where oscillation can be heard. On amateur bands the setting of C1 is more important than with broadcast transmissions. As a rough guide, using about 7 metres of wire, on 3.5MHz, the vanes are between 3/4 and fully closed, whilst for 7 and 10MHz C1 is about 3/4 open.

Tune through the selected band, readjusting R6 as necessary to maintain oscillation. Check the frequency coverage on all of the bands, with the position of C1 optimised for best reception. Adjust the slugs in the Toko inductors if necessary to maintain correct coverage. The optimum position of C1 will (particularly on 7MHz) vary with the time of day.

Netting To Transmitter

When used in conjunction with a transmitter, the receiver should be 'netted on to' the transmitter by tuning into the transmitter's oscillator. (The transmit oscillator should be run without the power amplifier stage for this operation so that the receiver won't be 'overloaded or 'blocked').

During transmit the receiver's tuned circuit is detuned by means of a 1nF capacitor. The antenna input to C1 can also be 'grounded' ('Earthed)' out (see the circuit fragment of **Fig. 3**).

If the 1nF detuning capacitor is omitted, side tone would then be available through the receiver. However, I consider that because the transmitter's oscillator would have to be turned off during receive, only a crystal controlled transmitter would make a suitable companion for this receiver.

The set draws less than 15 mA at 12 volts and would be ideal for solar powered operation. It can also run on 9V on a PP3, but the set will not then work on 10MHz.

The current drain from the PP3 is about 8mA so you should get many hours listening for only a small outlay. Try the circuit for yourself -and enjoy real radio!

PW

Cost:	RRP £269 inc (VAT)
Company:	Yaesu UK Ltd
Contact:	Sales
Tel:	(01962) 866667
Web site:	www.yaesu.co.uk

The Solid & Versatile Yaesu FT-2600

With the summer on its way once again, you'll be wanting to get out and about and these days there's no reason why you shouldn't take your Amateur Radio hobby with you wherever you go. So, with this in mind, we asked Richard Newton G0RSN to review the Yaesu FT-2600 144MHz mobile transceiver.

The **Yaesu FT-2600** is a single band v.h.f. transceiver which covers the 144MHz amateur band. The radio has a multitude of features and boasts an impressive 60W of power output - apart from having a transceive capability over the 144MHz band, it also has an extended receive capability from 134MHz to 174MHz.

My first impressions of the Yaesu FT-2600 were that it looked somewhat unusual - I have chosen my words carefully here. To be honest, I thought it looked rather strange - but beauty is in the eye of the beholder and I am now very wary of judging a radio by its looks. (See **Fig. 1**).

Simple Look - Advanced Features

The FT-2600 has a simple look which underlines the ease with which the radio can be operated. On the other hand, it also belies the advanced features that this mobile rig has to offer.

The radio itself is finished in high impact plastic and has a **rather rugged and substantial feel** to it. It has **a good size display**, which has a **very effective back light** and two rotary controls. One of these is an **ON/OFF** and volume control and the other, larger one, tunes frequency and memory and gives access to the many functions selected by use of a multi-tiered menu system.

Don't be concerned at the mention of a menu-driven radio. Using the radio's own menu labels and the excellent handbook you will have no trouble getting to grips with the most complex of features.

In addition to the rotary controls, the front panel also has four multi-function push buttons. I liked the priorities given here, for example, you can check the reverse or input frequency of a repeater by one touch, tune in megahertz and switch to the alpha-numeric name given to a memory - these are all primary functions on this radio.

To access the secondary function of the keys all you have to do is press them in and hold momentarily. So, even the secondary functions are only one press of the button away.

The Yaesu FT-2600 has its internal speaker mounted on the front panel and I think it's this that gives the radio its slightly unusual look. It has the appearance and feel of being more akin to a private mobile radio (p.m.r.) than an amateur rig.

I have to say that the look of this mobile grew on me and the received audio from the speaker was to prove quite excellent. **I can see that having the speaker in this location would be of real benefit to a mobile operator**, I certainly found it to have **very good results both in the car and on the bench**.

The rear of the radio is just as uncluttered as the front panel and has a 3.5mm jack socket for an extension speaker and an SO239 connector for the antenna and the 12V d.c. power lead.

Also on the rear panel is a very convenient DSUB 9-pin data connector for connecting the radio to data accessories such as a Packet TNC. **The Yaesu FT-2600 supports both 1200 and 9600bps Packet**.

The **really good thing about this radio is that you can switch it on and use it**. It's as simple as that. As you get more confident you can configure the more advanced features and have lots of fun right from the start.

The Yaesu FT-2600 has four output power settings, 60, 25, 10 and 5W. I was impressed with the radio on transmit when using the high power setting of 60W.

Using a **Manson EP925 30 amplifier power supply** with a built-in ammeter I noted that the current drain was a little under ten amps, a good 'chin wag' got the radio warm but I never, at any point, felt that it was over heating. It seems to me that this Yaesu mobile is **quite efficient** and **the heat sink did a really good job**.

My observations on the efficiency of the Yaesu FT-2600 are just that - observations. I didn't have the 'where with all' (or the technology) to do any scientific tests, but I felt it worthy of a mention.

If, however, your 'rag chewing' exceeds even mine and the radio senses that it's just about to go into 'melt-down' mode, then it will warn you by displaying a message on the display, ignore this message at your peril! I'm delighted to say that I never saw the message while I was operating!

You may have noticed that I didn't mention squelch, which is actually controlled by a menu setting and isn't available as a primary function. This wasn't a problem and the auto setting for the squelch seemed to be quite adequate in 99% of cases.

However, there were a couple of occasions where I had to scroll quickly through the menu to disable the squelch in order to complete a QSO with a distant station. This was a minor point, the impact of which is dependent on how hard you want to work for a contact!

Richard Newton G0RSN has been writing reviews for *Practical Wireless* for eight years. He has been interested in Amateur Radio since he was little as his father was an Amateur. He specialises in h.f. mobile rigs.

Many Features

The Yaesu FT-2600 has many features that let you define how the radio looks and sounds. The audio beep that sounds as buttons are depressed can be turned on and off.

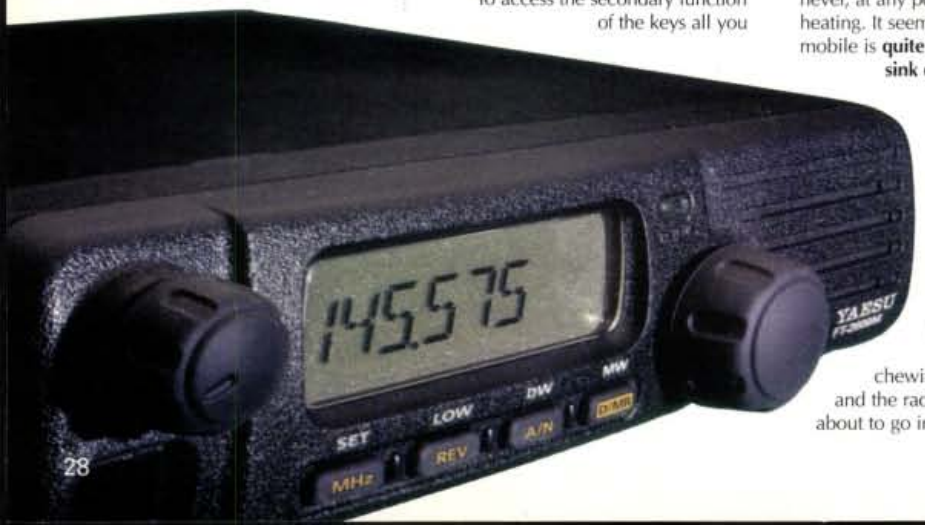
The display of the radio can be adjusted from off, through four different levels of brightness. There's a good selection of tuning steps as well as all the features you would expect to find on a modern rig.

The radio offers full DTMF, DCS and CTCSS options which is excellent, as this is so often an optional extra. The fact it offers full capability on both DTMF, CTCSS and DCS tone squelch means a full range of tone alert and radio paging facilities.

If you own another Yaesu radio fitted with the Auto Range Transpond System (ARTS) system, you can use it with Yaesu FT-2600. The ARTS is a system where two or more radios will 'poll' each other and bleep if still in range.

Automatic repeater shift is always a useful little thing to have, especially as a mobile operator and I'm delighted to say that the Yaesu FT-2600 includes this feature. Some radios on the market still only do this for their American versions, so well done to Yaesu for including it on ours as well!

The rig has 175 memories, all of which can store repeater shifts, odd repeater splits, CTCSS/DCS tones and eight character alphanumeric labels. Another useful feature that's common to many Yaesu radios is the Smart Search facility - I have enthused about this before. But if you haven't come across it before, it's basically where the radio can be set to sweep a band and load all active frequencies into a



The solid and versatile Yaesu FT-2600 mobile transceiver. Richard was very impressed by its advanced features despite its simple appearance.

Fig. 2: Internal view of the FT-2600. As Richard says, don't be fooled by its simple appearance, the FT-2600 offers full DTMF, DCS and CTCSS options and supports both 1200 and 9600bps Packet.

dedicated band of memories.

Smart Search is ideal for identifying active frequencies and local repeaters if you're visiting an area for the first time. I've used this feature before when reviewing other Yaesu rigs and I found it especially interesting when staying on a local rally site.

After spending a little time getting to know the Yaesu FT-2600, I decided that it was time to get on and use it. I decided to try out the extended receive coverage first and as I'm licensed on several p.m.r. frequencies I used the Yaesu FT-2600 to monitor those for a little while - the results were very encouraging indeed.

I then turned my interest to the Marine band and was very impressed with the sensitivity on this particular band. **The received audio was really very good**. I didn't have one bit of pager breakthrough either.

When the radio was on the bench I had a PC and laptop running very close by and suffered very little ill effects, what slight breakthrough there was seemed to be on a spot frequency and well within my personal toleration levels.

The time had come to talk to someone so I decided to connect the Yaesu FT-2600 to my **W2000 tri-band vertical antenna** and put it up to about six metres above ground level. My house is about 30 metres above sea level (a.s.l.).

First Contact

The first contact I had was with **Rex M1DLN** near Winchester. Rex was running an AKD 2001 and gave me a 5 and 7 report. He told me that my audio was "Nice and clear" and was of a quality that would "Cut through noise".

To illustrate how good it was, Rex taped me and then played me back to myself - a very sobering and somewhat eerie experience. I have to say though that, considering the fact that it was an audio tape being replayed over the air I was still impressed with what I heard - with the audio and not the sound of my own voice that is! This first contact was a trip of about 67km, not bad for the first contact.

The next taker to my CQ call was a good friend of mine, **Steve G1YNY**, who was mobile in the Bournemouth area not too far away from me. Steve said that the audio was "Very, very good and very, very clear".

A few days later I went on air and called and called when eventually **Dave G0AYD/P** was kind enough to put me out of my misery and answered my call. He was operating from a location in Middle Wallop (near Andover), a distance of about 62km away from me.

Dave was using a Yaesu FT-2200 with a 5λ/8 mobile whip perched on top of a nine metre chimney! He gave me a 5 and 5 report and said: "The rig sounds really good, no problems at all". Dave and I had a very enjoyable QSO that warmed the Yaesu FT-2600 quite nicely!

I then worked **GB2TWW** - a special event station being operated by **Mike G0WIL** a member of the **Itchen Valley Radio Club**. The station was being run for 'Mills On The Air' and was situated at Twyford Water Works, a Victorian steam-driven water-pumping station (near Winchester).

Fig. 1: Take a look at mobile operation from a new angle with the FT-2600. Here you can clearly see the extensive heatsink, as well as the microphone socket (left), power 'ON/OFF' rotary knob (top left) and main dial (far right). You can also just about see (above model name) where the speaker is mounted at the front of the radio.

Another operator also came on and said hello, this was **Paul G0TLG**. Paul and Mike gave me a 5 and 2 report and Mike said I was "Romping in"! I am not sure if that is a good thing or not! A very enjoyable and educational contact this proved to be.

The Best Yet

Then came the best yet, I have to confess that conditions were up but I was delighted when I got a contact with **Derek G6XJI** in Slough - a trip of about 158km. Derek and I had a very brief and difficult QSO, but a QSO nonetheless.

It was during this contact with Derek that the automatic squelch did prove to be a little bit of a nuisance as it took a little time to set the menu back to 'squelch off'. Nevertheless, I did it and got the contact - not bad at all and my thanks to Derek for his perseverance.

Last but by no means least was **James 2E1EMK** in Wilcot, Wiltshire, a distance of about 70km who gave me a favourable report but again the contact was a little up and down. We improved matters by going to horizontal beams pointed at each other.

When I told James what radio I was reviewing he said: "That's that funny looking one isn't it"? Just thought I'd put that in to show that I wasn't alone in my first impressions of how the radio looked - I was able to share all the good reports I had received with James. *PW*

Manufacturer's Specifications

General	
Frequency Range:	TX: 144-146 or 144-148MHz RX: 144-146MHz or 134-174MHz
Channel Steps:	5/10/12.5/15/20/25/50kHz
Frequency Stability:	Better than ±10ppm (-20 to +60˚C)
Mode of emission:	F3 (G3E)
Antenna impedance:	50Ω unbalanced
Supply voltage:	13.8V d.c. (±10%) negative ground
Current consumption (typical):	RX: less than 1A (max. signal) less than 0.4A (squelched) TX: 10A (60W)/6A (25W)/4A (10W)/3A (5W)
Operating temperature range:	-20˚C to +60˚C
Case size:	160(w) × 40(h) × 160(d)mm
Weight:	1.3kg
Transmitter	
Output power:	60W/25W/10W/5W
Modulation type:	Variable reactance
Maximum deviation:	±5kHz/±2.5kHz
Spurious radiation:	better than -60dB
Microphone impedance:	2kΩ
Receiver	
Circuit type:	double-conversion superheterodyne
Intermediate frequencies:	21.7MHz & 450kHz
Sensitivity (for 12dB SINAD):	better than 0.2µV @ 15kHz bandwidth
Selectivity (-6/-60dB):	12/30kHz or 10/24kHz
IF rejection:	better than 70dB
Image rejection:	better than 70dB
Maximum a.f. output:	3.5W into 4Ω @ 10% t.h.d.

Product

Yaesu FT-2600 144MHz mobile transceiver. Single band v.h.f. transceiver, covers the 144MHz amateur band, 60W power output.

Accessories

Microphone; MMB-48 mobile mounting bracket; d.c. power cord with fuse; spare 15A fuse.

Pros & Cons

Pros: Multitude of features; boasts a maximum 60W r.f. power output; good size display; effective back light; excellent received audio; the speaker is mounted in the front panel; 175 memories; CTCSS/DCS tones.

Cons: Automatic squelch proved to be a bit of a nuisance.

Summary

I can say without a doubt that I was impressed with how the Yaesu FT-2600 performed. Being able to put out 60W is all well and good as long as the radio can hear the stations that can hear it and my experience was that the Yaesu FT-2600 received stations very well.

I had some good simplex contacts and always received excellent reports of the transmitted audio. By and large **the radio is easy to use and performs very well indeed**. The Yaesu FT-2600 is a **solidly built, easy-to-use, versatile single-band radio** that has some **good features** and **packs a considerable punch to boot!**

My thanks go to:
Yaesu UK Ltd
Unit 12, Sun Valley Business Park
Winnall Trading Estate
Winchester
Hampshire SO23 0LB
E-mail: sales@yaesu.co.uk

RRP: £269.00 inc VAT

A Radio Amateur's Life Abroad

Tony Bevington G4ZUI relates the story of how, as a volunteer member of VSO, he was sent to Papua New Guinea to be an Agricultural Teacher/Farm Manager at a school in Gorokain. He describes how he managed to fit Amateur Radio into this completely different world and enlisted the local villagers to help.

The article by **Bruce Muscolino W6TOY/3** in the September 1997 issue of *PW* resurrected many memories for me, ones that I felt worth sharing. At this time I had a dairy farm in Cornwall and from 1984 onwards, my wife and I operated from there as 'A' class licence holders - G4ZUI and G0AVL.

It seemed an ideal Amateur Radio location - high up and looking down across the Lizard peninsula - and towers abounded at my site: giant Delta loops along with beams and verticals proliferated - at times there seemed more antennas than cattle! Then disaster struck when, in 1987, my wife unexpectedly died and not long after this, I sold the farm.

Inactivity is very boring and I was accepted by **Voluntary Service Overseas (VSO)** as a volunteer and was sent to Papua New Guinea. I was to be an Agricultural Teacher/Farm Manager for a remote school situated about 97km from a town called Gorokain.

The town was to be found in the mountains of the Eastern Highlands and was situated out in the bush in a valley of semi-tropical rain forest. Before leaving the capital for Gorokain, I was able to get a reciprocal licence and obtained the callsign **P29PB** and I took my Trio 430 and tuner out with me to Gorokain.

Gorokain is a rugged country - very volcanic and mountainous - and until contact with white people, each village had been isolated from the next and, consequently, there are more than 900 languages. A combination of Dutch, German and English is used as a 'Pidgin' for general communication (English in Government and Education).

Each village had retained much of their individual traditions and culture and there was a mixture of this and Western ways, side-by-side. Due to the nature of the terrain, there were few roads and movement was generally by plane with third level airlines covering the country, landing at times on some very dubious airstrips!

Luckily, I flew from Port Moresby (the capital) in a modern jet and on the plane, some of the passengers wore traditional clothes and their faces were covered in mud! What had I let myself in for? (I later found out that the mud on the face was an expression of mourning).

Hardest Things

Probably one of the hardest things about living abroad is acclimatising to different lifestyles and cultures, particularly those with alternative customs to our Western ones. I must admit to being very nervous and apprehensive and even getting used to new food can be traumatic, especially on an unsuspecting stomach!

● Fig. 1: Example of one of the better bridges in Gorokain.

I was met by the headmaster of the school I was to work at, my bags were loaded up into a rugged 'Land Cruiser' and we set off. The journey took us over bridges made of trees laid haphazardly across deep ravines (see **Fig. 1** and **Fig. 2**) which moved and vibrated as we crossed and by now my nerves were frayed and I sat tense, anxious and silent. The Head teacher was uncommunicative as well, except to suddenly comment that, in due course, I would be driving the lorry to town on this road when I took the students shopping - I was appalled!

The road was graded into a 'C' shape and it's sides were sloping steeply away. There was no kerb edge and no road surface either, just valleys that fell from the roadside into the depths. This harrowing journey ended at the school - my home and workplace for the next few years.

My house (see **Fig. 3**) was raised off the ground on short legs "to prevent earthquake damage", I was told. Later experience led me to believe that they also served to keep out the 'nasties'.

Basic but functional, to my eyes my accommodation was a bit short of furniture with only two easy chairs no bed and no table. I did, however, have a mattress on the floor for my whole stay.

● Fig. 2: Example of one of the more rickety bridges which "frightened the living daylights" out of Tony!

After travelling to the other side of the world to a different time zone, the heat and all the new and different things meant that I found it hard to settle, let alone sleep - which eluded me! Noises intruded, the mind whirled and every creak and rustle startled me.

One night I got up to go to the toilet at 0200UTC and stood on something that moved. Screaming, I hurled myself to one side, "where the hell was that light switch"? A waste of time anyhow, I realised, since our only source of electricity had been turned off some hours earlier!

Groping, I found my torch and discovered the still wriggling remains of a brown but crushed beetle. Then, to my horror, I realised it was a three and a half inch long cockroach.

I've heard it said that eventually one gets used to anything, perhaps it's true. I got used to those giant cockroaches, the huge spiders, the isolation and even the dietary changes. I found it a lot harder, however, to get used to the lifestyle and customs of the area.

One such custom which I found it hard to adjust to was that pigs were money (or the next best thing). They had a value and were used as money for important transactions like paying 'Bride Price'. To kill or injure one was serious and could result in a death if not sorted out quickly.

Death would be through the ancient custom of Tribal War and would only involve the parties in dispute, but spears and axes look awesome when being waved in anger. On one occasion, one such dispute swept through the campus and caused it to close for the day.

Setting Up My Station

So I eventually settled in, my thoughts now began to turn to the setting up of my station. The boys I taught were delighted to help and all claimed to be the best shot with their bow and arrows, there were also plenty of tall trees to hand for a long wire.

At about this time my thoughts went back to rally days with the Cornish Radio Club and the mast erection there. To shoot one arrow was said to be bad luck, so when the arrow with the string attached sailed into the air, it was followed by a swarm of others - God knows how we survived, but the wire went up and no one was hurt! (See **Fig. 4** and **Fig. 5**).

● Fig. 3: Tony Bevington's house in Gorokain, Papua New Guinea. Note the solar panel at the front centre of the house.

The long wire I used in Papua New Guinea was about 40m high with a centre feed point. Australia (VK) was particularly strong and over my time in Papua New Guinea I made many friends who were to follow me around the world to my other foreign postings.

Family hour was a big attraction and **Kerry VK4MZ** comes to mind as a regular contact - since he had worked in Papua New Guinea as well, we were able to chat on Pidgin. Signals from Japan was plentiful but there was a language problem.

The long wire I used didn't please me, however, it was inefficient - don't all antenna users claim that? I needed to put up a beam that was cluttering the bedroom.

I noticed a pole under some long grass at the edge of a field I was ploughing. Nearly covered by the 5m high 'Pit-Pit' or elephant grass was a flag-pole and its pivot post - perfect!

There was no shortage of willing helpers and by now the local village had become aware of my activities and usually I had an audience for a project. A large crowd of men, many with their weapons slung about their person, gathered and the pivot post was already secured in place.

I was going to use the tractor to pull the pole upright - I'm sure that the picture is becoming clear to those of you who have erected an antenna - but due to the mass of people milling about and the tall bamboo fence, my view was poor. But I drove off hoping to pull it off.

Stopping, I turned around and was both shocked and amused to see, hanging upside down by his ankle, a village man - nearly naked and screaming angrily. He'd somehow managed to get his leg caught in the loop of rope at the top of the pole, amid much laughter and teasing from his friends, I lowered him down. Subsequently, the beam made little improvement to my performance.

● Fig. 4: Tony, armed with bow and arrow, ready to put his long wire up one of the tall trees that surrounded his home.

It's strange that electronic equipment seems to attract insect life to them, this is especially so in the tropics and after a few unpleasant experiences, I learned to give any equipment a good spray with an insecticide before opening. As soon as the local community knew that I could repair their radios, I was inundated. The word in Pidgin for 'broken' is "Bugerup" - I must admit to being startled out of a doze when the Minister used that word in Church!

Solar Panel Power

I took a solar panel out to Papua New Guinea with me (it was invaluable with the school's generator only operating for a few hours daily). Going to bed early was a necessity and keeping food cool impossible, so I got hold of a lorry battery and a trickle charger for the periods when there was power.

With the solar panel connected, the battery remained charged which kept the charger topped up. I ran wires around the house (speaker cable was all I could get) and I got some headlight bulbs from derelict cars that littered the bush. These were soldered to the cable and I was the only house in the school with lights in the evening!

Having lights at night didn't prove to be such a good thing though, since everyone else came to my house in the evening, but it gave me power for the radio as well. I developed an ability to improvise and with the poorly stocked town 84km away, trips were infrequent, so scavenging became second nature.

● Fig. 5: It was considered unlucky to fire one arrow so the rest of the village volunteered their services. (See text).

Even when you did go to town, it could be disastrous - as soon as it rained, the roads became impassable and you had to remain where you were. The mountain roads were red clay which became very slippery when it rained and driving on these when wet was suicide!

More and more I ate the local foods, fruits of all sorts abounded - 23 types of banana, some of which could be cooked, paw-paw the size of rugby balls and pineapples were cheap and plentiful (I ate a lot of these - two or three a day!). The acid in the juice rotted my teeth and one day they all fell out! (See **Fig. 6**).

● Fig. 6: Tony, in his house, holding two of the offending pineapples!

Vegetables were also plentiful, sweet potato was the staple food with many types - one was 4% protein - tarot and yams were also eaten a lot. Meat was very rare and considered a luxury, so when I did go to town I tried to get a few treats.

With Christmas in mind, I bought a tin of curried chicken and hoarded it until Christmas when I cooked it - because the instructions were in Chinese, I had to make some educated guesses at this point! Drooling, I served it up and tucked in. Bah! It was disgusting and I had to spit it out - they must have sieved the chicken, bones and all, into the tin!

● Fig. 7: Three of Tony's students at the 'Sing-Sing'.

A party was called a 'Sing-Sing' (see **Fig. 7**) and I was invited to one for the New Year. The cooking was done with hot rocks in a hole in the ground and when water is poured onto them the steam that is produced cooks the food - called a 'Mu-Mu'.

When I arrived as Guest of Honour, I was given a pig's liver that had been briefly cooked - the outside was charcoal black but the inside was red raw (see **Fig. 8**). All I could think of was tape worm, but I had to eat it - everyone was watching me - but when the opportunity arose I slipped it to a passing dog.

Most people chewed something called a Betel nut - known locally as 'Buai' - and it is a narcotic nut which is chewed and mixed with a local leaf and lime powder to give extreme effects. The chewer also produces quantities of red saliva that has to be spat out.

● Fig. 8: The New Year's party (or 'Sing-Sing') - you can see the pig's liver (right) which was offered to Tony, 'cooking' in the 'Mu-Mu'.

The people were friendly and I learnt a lot from them - I became fluent in Pidgin and travelled a lot throughout the Highlands. I married one - a lady from Asaro, the 'Mudman' people and her father insisted on Bride Price payment as well - I had to give him my car since I had no pigs!

I never worked the UK on the radio, never even heard a station from there even, but then, with the locations that I worked from, it mattered not. Little did I know then that over the next few years I was to become an Amateur in a number of exotic and desirable locations.

PW

Antennas-in-Action

Hello and welcome to Antennas-in-Action (AiA) for July 2000. This session, I've had letters and E-mails to tell you about, the W3DZZ antenna, I've found a society for Slide-rule enthusiasts, due to a previous article on the DX-Edge and I've had an update to the antenna test range balun shown in the June 2000 issue of *PW*.

The W3DZZ - Revisited

I've had an E-mail from **Robert van der Zaal PA9RZ**, who wrote "Just read your March issue of AiA mentioning the problems **Dave G0MVX** seems to be experiencing, matching his W3DZZ on 14MHz. Dave probably doesn't realise that **W3DZZ** (and **G8KW** at the same time) merely designed a trap dipole for 40 and 80m. Due (thanks?) to inductive and capacitive effects of the specific L and C used to resonate on 7MHz, the antenna also showed a reasonable match (close to 50Ω) on the other bands.

"When the WARC bands were allocated to Radio Amateurs, the antenna even worked quite well on these bands too. So, using a choke balun and low loss cable gave acceptable results, at least good results in the age of valve final stages with π-match like output circuits that allowed non-exact 50Ω antenna systems to be matched to the output.

"But when using traps with different values of L and C (like Dave's coaxial ones) they change the effects on the antenna. The W3DZZ may become just a trapped dipole, and the reasonable match may disappear so, even classic rigs may not cope any longer. Modern rigs, without variable output matching that require a fairly exact match, means the use of an external matching box is almost compulsory.

A Good Match

"Only a few have the luck to see their 'W3DZZ' antenna with a good match both on 7MHz and a part of the 3.5MHz band. Most amateurs I know, who use a W3DZZ (including myself) need some sort of matching box. Fellow QRPer **Bob Hudson G4JFN** uses the alternative you show in your drawing (using open feeders rather than coaxial cable), but with an a.t.u., can be used on all h.f. bands.

"If Dave really wants to have a good s.w.r. on 14MHz without using an a.t.u., he should experiment with a half wave dipole for that band, parallel to his trap dipole (fed from the same feed point) at a distance of about 100mm (or more) from the original antenna. Time consuming setting it up, but it will work".

But in a subsequent E-mail Robert said "I used to use 300Ω slotted ribbon for my doublets. But the lines had to lay on the attic floor causing us to stumble over it so many times. Right now my W3DZZ is fed with about 25ft (sic. - *about eight metres* 'Tex') of 'Aircell' coaxial cable, very low loss! As the antenna has a fairly low impedance on most bands the coaxial cable, well hidden between roof boards and roof tiles, works even better than the slotted ribbon. And, no more accidents, due to the cable on the floor".

Robert actually gave dimensions in feet and inches but warned me not to change "about four inches into about 101.6 mm", before saying "besides, words like 'metre' and 'kilometre' don't fit in the English language anyway". (Point taken Robert, dimension changes can make some things look rather strange!).

The DX-Edge & Solariscope

I've had quite a bit of correspondence since we mentioned the DX-Edge and the Fisk Solariscope. The saga started in the March 2000 issue of *PW* when **Ray Fautley G3ASG** wrote in his 'Antenna Workshop' about the DX-edge 'Greyline' predictor. In a follow-up in the May 'Antennas-in-Action' (AiA), I reported that **Denzil G3KXF** felt the that the Fisk Solariscope predated the DX-edge, in that he had found an advert for the Fisk unit in a 1948 publication.

That mention of the Fisk Solariscope brought further memories from other readers, several of whom passed on copies of the user's manual to me. **Ian Moth M1BJA** said in an E-mail "... It appears to have been produced around the late '30s. The reason for saying that is, it goes onto to say that the last time the 10m band was as good as the 20m band was between 1935 & 1938".

Other readers who contacted me were **John G0CMM**, **David G4DMP** (formerly G3KEP), **Tony G0TPA**, **Len G3IGI**, **and R. Williams**. Another reader, **George Fisk** (no relation) said that at the price of 'one Guinea' in 1948 the Fisk Solariscope was 'over-priced' as, for the same amount you could buy 28 issues of *PW*, or 14 issues of *SWM*. In a photocopy of the 'World Of Wireless' from the December 1944 issue of *Wireless World* there was the notice of appointment of Sir Ernest Fisk ('the Australian wireless pioneer') to take up the position of managing director of EMI.

'Antenna Workshop' author **John Heys G3BDQ** 'phoned to give similar information, but added that **Sir Ernest Fisk** had, in 1946, presented a transmitter to the RSGB that transmitted a series of 'markers and pips' on 3.5MHz. This was to run 18 hours a day, from 0600 to midnight. The experiment didn't last long, John says, closing down in 1951 after it was found that the transmitter was causing TVI in Holborn, and the mechanical interrupter mechanism was disturbing people living in nearby flats. Another

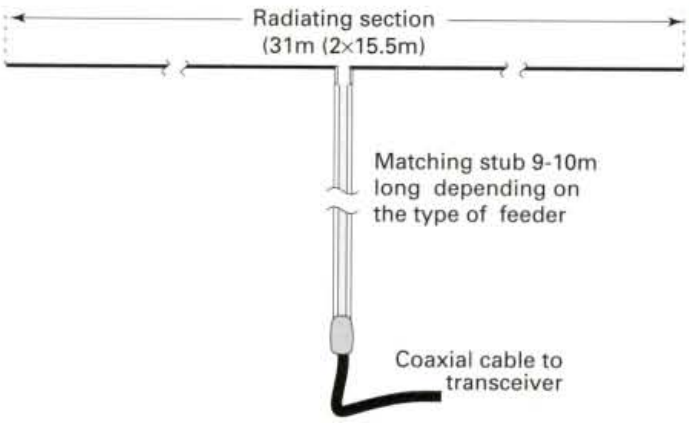


Fig. 1: Although not quite as it was designed by Louis Varney G5RV, the antenna design bearing his callsign follows this general layout in most commercial forms.

reader with a Solariscope, **Bob Daley** has returned his one to sit beside his Codar CR70A "where it belongs" he says "after returning to the radio hobby after many years".

Skidstick Newsletter

Another series of letters and E-mails, I've had about these two greyline predictors was from **Colin Barnes** who is editor of *Skidstick*, a newsletter for those interested in the history, investigation and preservation of all type of slide rules. A group of instruments, into which the DX-edge and the Solariscope both fall. I understand that a short report about both predictors is to appear in the next newsletter. From what I've seen of the newsletter, it's a newsletter well worth subscribing to. For more details about *Skidstick* contact Colin at **189 Mildenhall Road, Fordham, Ely, Cambs CB7 5NW**. Or if you have E-mail try **models@claranet.com**

In the May AiA Denzil also asked about computer software running under Windows 95/98 that would replicate the action of the Solariscope and DX-edge. At the time I mentioned *Geoclock* (and *Grayline* for the Macintosh fraternity). Now **Paul Hardcastle G7SLP/KD5CRJ**, chips in with ".... DX Edge software package for Win 95/98. Well, it depends exactly what you want. There is *GCM* for Windows. It is a Great Circle map of the world that can be set for any central location. It draws the Great Circle Map and puts the Sun on and draws a day/night terminator.

Paul said *"CGM* doesn't darken the night like *GeoClock*, but have a look and see if it's what you or Denzil (G3KXF) are looking for. It is available free from the homepage of **Roger Hedin SM3GSJ**. The URL is:- **http://hem.passagen.se/sm3gsj/gcm.htm**
Many thanks for that web address Paul and, although I found the pages easily enough, I didn't download the particular files, as I tend to run Macintosh computers most of the time.

Problem With A G5RV

Reader **Mal Broxton MW0CHI** has a problem with a G5RV antenna installation which he would like help with. But I'll let him explain: "Perhaps I should start at the beginning to give you an idea of what I have set up. I recently bought a G5RV and connected it up to my Yaesu FC-700 a.t.u. with a coaxial feed supply from the ribbon cable to the a.t.u. I found then that I could not tune any of the bands 80 - 10. The supplier stated that I would need a 1:4 balun plus a choke. I understand that I should not add length to the 300Ω cable.

"If I add a 1:4 balun this only brings down the impedance down to 75Ω? So am I right in thinking that I need to make up a balun to use outside to connect the feeder to my a.t.u. via coaxial cable? And do I also need to use a choke when using coaxial feeder into the shack? I have never made a balun before but would certainly like to try. Could you help in what construction is required for a choke and 1:4 balun if that's what I need. What I would like to know is what is the standard way to feed a G5RV? I would like to operate on most bands 80 - 10 and normally I use only 50W,but on occasions I increase to 100W".

Thanks for the E-mail Mal, but let me deal with the ideas in a rather different order. The original G5RV used high impedance (more like 600Ω rather than 300Ω) 'open' twin feeder lines which were feed from a balanced matching unit, and this is still the ideal method of use. The more usual commercially available G5RV has a length of 50Ω coaxial feeder to a junction with 300Ω twin feeder to the radiating elements themselves rather like **Fig. 1**. The feedline should drop down to the ground then run away to the transmitter at right angles to the run of the elements.

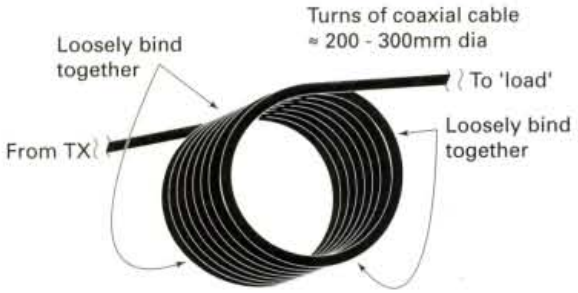


Fig. 2: A simple coiled balun can be made just by binding several turns of the coaxial feeder together, as near the antenna feedpoint as possible. It adds only the cost of the extra coaxial cable!

Normally Low

The impedance at the junction of the twin and the coaxial feeders is normally low, **but not 50Ω on all bands** (in fact it might not be 50Ω on any band). There will almost certainly be problems with mis-matching on some, or all bands, that will **benefit the transceiver** by going through an a.t.u. A choke put in the coaxial feeder, close to its junction with the twin feeder will probably help to improve matters. Such a choke may be formed from an extra length of coaxial cable formed into a six to eight turn coil (**Fig. 2**) about 200-300mm diameter coil, loosely bound together. It costs - just the extra length of cable needed.

A 1:4 balun will only change the impedance 'seen' through itself, and is not a 'magic bullet' for all problems experienced with balanced antennas and unbalanced coaxial feeders. If the impedance at the bottom of the 300Ω twin is a resistive 300Ω, then the balun would make the load at the coaxial side appear to be 75Ω resistive (300/4). This value is well within what most a.t.u. units will match into.

The problems with baluns occur when the load impedance is not resistive, but has considerable reactance (inductive or capacitive), then the 1:4 ratio does not always hold true. Worse than that, the balun adds 'its own' impedance to the pot as well, which could take the impedance to values that the a.t.u. cannot cope with. Considerable reactance values can 'appear' in the feeders, due to the transforming action of lengths of improperly matched feeder.

Over To You

Over to you now readers! I believe someone 'out there' has had a similar problem, and may have an answer. My immediate reply, albeit a little unhelpful I'm afraid, is to try a variety of possible solutions on each band of interest Mal, as I have no general solution myself!

In the June issue of *PW* **Dave Coomber G8UYZ** showed you how he had set up a small antenna 'test-range' in his back garden. On page 48 of the issue there was an illustration and explanation of a coaxial quarter-wave balun using a length of copper piping as well as a length of coaxial cable. In a letter from the wilds of Wales, **Wyn GW8AWT** (a retired BBC engineer) says that he has 'reservations' about the quarter-wave section, then went on to elaborate on a method that he recommends.

Wyn suggested a possible improvement in the balun action. You will need a section of the outer braiding from a length thicker coaxial cable and some polythene cable wrap. Strip the outer insulation from the original coaxial cable for the last quarter wave length and wind the cable wrap around the now 'nude' screen. Slip the new length of braid over the end of the coaxial cable, and a quarter-wave back from the end of the coaxial cable carefully solder (all around) the end of the new (larger) screen to the original cable screen. Trim the new screen to be no longer than the original screen. The original connections to the antenna elements are still used.

Thanks for your modification Wyn. And that has brought me to the end of the space that I have available this session I'm afraid. Not even space to tell you about any books, although I am reading the *Backyard Antennas* by **Peter Dodd G3LDO** and finding it fascinating reading!

Tex

Time for Six metres?

With spring behind us maybe we can start to look forward to the Six Metre Band opening up a little. Some of you have been calling telling me its over due but hey! I can fix most things but not the band conditions. Not yet anyway!

The Icom IC-746

For those of you into Six, have you considered the Icom IC-746 HF, 2M & 6M base? It offers 100 Watts on all of its bands, all mode and has that very important Auto ATU, left out by its closest competitor. A big mistake we think. Seems that Icom started the 'excellent value for money' pricing earlier this year and fortunately, targeted this excellent transceiver in its cost cutting exercise. It wasn't that long ago we were charging only £1695. Today the same radio from ML&S costs a mere £1099. Who said Ham Radio isn't cheap in the U.K.?

Looking for a new career?

Since the big three slashed prices to its dealers our retail and mail order is literally run off its feet. So much so, that we are desperate for more staff. If you think you could offer the very high level of service to a demanding customer base give me a call. You need to be articulate and able to communicate clearly with any one of our 30,000 strong customer base (yes really!) and of course, that is growing all the time.

And finally - that new Radio from Kenwood U.K?

By the time you read this, Kenwood will have announced their new 'toy' at Dayton. Once again, the Japanese Kenwood representatives chose ML&S to do a spot of fact finding on their recent trip to Europe. It is always a pleasure to assist in telling them that Ham Radio isn't dead and they have plenty of loyal customers just waiting for their new masterpiece. But could I draw them on the new HF-23cm radio? Could I hell. They just grinned in their amicable style and pretended they didnít understand a word and I was, in fact, a Martian. Perhaps next time I should point out there is only one 'A' in Martin.

Martin G4HKS

Keep giving us a call and keep your eye on our web site - www.hamradio.co.uk

Due to the variance of mark
the magazine and provided i

Call

T OUR WEB SITE OR PHONE FOR LATEST UPDATE

MC-60A DESK MIC SUITS ALL KENWOOD HF BASE TRANSCEIVERS. ONLY £99

SEE OUR WEB SITE OR PHONE FOR LATEST UPDATE

SM-8 DESK MIC SUI
ICOM HF BASE
TRANSCEIVERS
ONLY £99

SEE OUR WEB SITE OR PHONE FOR LA

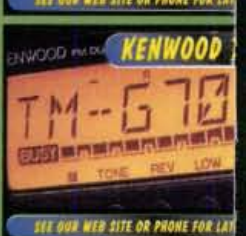
SEE OUR WEB SITE OR PHONE FOR LA

SEE OUR WEB SITE OR PHONE FOR LA

SEE OUR WEB SITE OR PHONE FOR LA

SEE OUR WEB SITE OR PHONE FOR LA

SEE OUR WEB SITE OR PHONE FOR LA



SEE OUR WEB SITE OR PHONE FOR LA

Remember! All equipment sold by ML&S is BRAND NEW, not dog-eared, shop soiled, opened, ex-demo, unwanted gift or returns. So there!

Full UK manufacturers warranty with all items sold.

OPEN SEVEN DAYS A WEEK:
MON - SAT 9.30 - 6.00,
SUNDAYS 10.00 - 4.00

● TEL: 0208 566 1120 ● FAX: 0208 566 1207 ● Web site: www.hamradio.co.uk ● e-ma

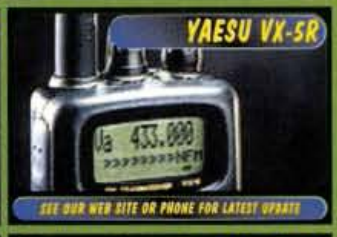
MARTIN LYNCH & SONS 140-142 NORTHFIELD AVENUE, EALING,

Martin Lynch can also offer finance terms up to 48 months with no deposit. We welcome your part exchange against any new (or used!) product, provided its clean and in good working order. Call th
protection is also available up to 36 months. All units are brand new and boxed and offered with full manufacturers RTB warranty. All prices quoted for cash/cheque or Switch/Delta card. No additio
is a licensed credit broker. Full written details are available on request. Finance is subject to status. E&OE. £10 p&p on all major items.

et prices at present we are unable to print any prices. Just find the LOWEST in
t's in stock we will try and match the price or even better it on the spot.

0208 566 1120 today...

STOP PRESS ALL TONNA NOW BACK IN STOCK



FINANCE EXAMPLE
All examples do not include P&P.

Cash Price	Deposit	PAID IN 6 MONTHS	APR
£299	NIL	£299	0%

OR

Cash Price	36 Payments of	Total Credit Price (T.A.P.)	APR
£299	£12.98	£467.28	26.9%

Written quotations available on request

Heil Sound

ML&S are the sole authorised retailers of this excellent range of TX/RX Audio products from the USA. As used by the 9M0C DXpedition last year, treat yourself to either the HC4 for DX or HC5 'full articulation' inserts.
The Pro Series Headsets are designed to meet the demands of top contesters and DX chasers. The light and comfortable headset combines with a flexible boom which houses either a HC4 DX or HC5 full "BBC quality" microphone insert.

Special package deal.

Proset 4 DX h/set + boom with FREE HC5 insert and lead for your rig.
Total RRP £172, **ML&S £159.95.**

Heil Proset *Professional Headset & Boom Microphone.*
HC-4 & HC-5 *Inserts.* **Foot Switch.**
Heil Pro Micro *Lightweight Headset & Boom Microphone*

Samlex SEC-1223 PSU

Around the same size as an IC-706, this fantastic new PSU is a must for the shack, IOTA use, or indeed anywhere small compact 13.8 is required. Ideal for use with the FT-100, FT-848, IC-706, IC-736 etc.

- Voltage out: 13.8 DC
- Current: 23-25amps
- Cooling: Internal heatsink & fan
- Input: 240V (or 110 with int.modification)
- Dimentions: 57 x 177 x 190mm
- Weight: 1.45kg

Only £99.95 inc. VAT

STOP PRESS ALL CUSHCRAFT NOW IN STOCK

The new Cushcraft Mini Beam

New from Cushcraft

MA5B Compact HF Multiband Beam Antenna

Cushcraft's newest compact multiband HF antenna provides 5-bands in a package small enough to mount onto a small mast. The MA5B is a design that does not sacrifice ruggedness, performance and power handling for its size and ease of installation. Lightweight rotator will easily turn assembly.

- Five HF bands
- 10, 12, 15, 20m
- Power rating 1.2kW
- Input impedance 50Ω
- Sidelobe att. 25dB
- VSWR 2:1
- Longest element 5.2m
- Tuning radius of 2.7m
- Boom length 2.2m
- Boom diameter 3.8cm
- Wind surface .3m²
- Weight 12kg

MA5B. 5-Band Multiband Beam Antenna £289.95

...or visit www.hamradio.co.uk

We are Authorised Dealers for these quality suppliers, and many more!

- ★ICOM
- ★YAESU
- ★KENWOOD
- ★CUSHCRAFT
- ★MFJ
- ★HEIL
- ★WATSON
- ★CUSHCRAFT
- ★TONNA
- ★AVAIR
- ★DIAMOND
- ★RADIOWORKS
- ★SGC
- ★SAMLEX
- ★ADONIS
- ★AMERITRON
- ★HIMOUND
- ★SSB ELECTRONICS

MyDEL Wire Antennas BACK IN STOCK!
Mydel Multitrap/megatrap

il: sales@MLandS.co.uk

LONDON W13 9SB

Sales Desk today. APR: 26.9%. Payment
al charges for credit cards. Martin Lynch

ML&S

Antenna Workshop

COMBINING ANTENNAS

David Butler G4ASR looks at the methods and techniques of combining v.h.f. and u.h.f. Yagi antennas to give more gain, better directivity or both.

Four years ago, in August 1996, I described in my 'Antenna Workshop' column how to correctly stack a variety of v.h.f. and u.h.f. Yagi antennas on the same mast to achieve the minimum of interaction between each beam. That article is probably worth another read as this time around I'm going to describe how to combine a pair of Yagis together and you may find some of the background material useful.

Weak Signals

Weak-signal DXing on the v.h.f. and u.h.f. bands is normally carried out using a single horizontally polarised Yagi antenna. However, to increase system performance, two antennas or more can be mounted one above each other (vertically) and this is often referred to as stacking. Similarly, the beams can be mounted side by side (horizontally) and this is called baying. An array of four antennas in a box configuration is of course a combination of both stacking and baying. Normally antennas are grouped in even multiples, two, four or eight and so on, although it is possible to have groups of three or six but this gives added matching and feeding complications. An important feature to note is that all antennas in the array must be of the same design, impedance and frequency band coverage.

Fig. 1: A four by two (stack and bay) set over a two by two set makes a reasonable e.m.e. set up on two bands.

There are a number of reasons why you may want to stack or bay antennas. To work consistent DX on the v.h.f. (or h.f.) bands requires an antenna with high gain and a low angle of radiation. The main advantage realised when grouping antennas together is both these requirements - additional forward gain and a reduction in beamwidth.

When two similar antennas are combined together the additional gain achieved is 3dB (a doubling of power). The total gain is **NOT the gain of each antenna added together** but the gain of the single antenna plus 3dB. So if you combine two beams each possessing a gain of 10dB, the resultant gain is 10 + 3 = 13dB. However, because of the losses in the combining system, the cables and connectors it means in practice that you'll be lucky to achieve no more than 2.5dB of extra gain. This may seem an insignificant increase compared to the time and money involved but it really will improve your station's capability.

Broad Pattern

Most medium boom length Yagi antennas have a fairly broad vertical pattern, some in excess of 30°. This means that much of your valuable power is simply being wasted. An easy solution to reducing the vertical radiation angle, is to vertically stack two Yagis together. This reduces the vertical beamwidth by approximately half, whilst at the same time maintaining the original horizontal beamwidth. You could conversely bay two Yagis side by side. This would reduce the horizontal beamwidth, again by half, whilst keeping the vertical beamwidth the same.

Depending on what you want to use the array for, the beamwidth can be adjusted by selecting a stacked or bayed arrangement. For normal v.h.f. DXing, a stacked arrangement is preferable for the reasons previously given. Some contest groups opt for a large vertical stack of v.h.f. Yagis, maybe four or even eight on the same mast. This really does concentrate your r.f. on the horizon where it's needed rather than squirting it up into space where there are no active operators! For contest purposes this arrangement is far superior than having an array of four antennas in a box configuration. That's because it doesn't reduce the horizontal beamwidth and therefore you're heard by more stations over a greater geographical arc.

Where side-by-side baying does come into its own is for specialist communication modes or for interference reduction purposes. 'Moonbounce' (e.m.e.) operation requires an array that can only see a specific point, the Moon. By carefully altering the horizontal (and vertical) spacing you can significantly alter the size and position of side lobes in the main radiation pattern. An e.m.e. array does not want to pick up thermal noise from the ground or other sources and a dual-set of bayed/stacked antennas, shown in the photograph, **Fig. 1**, will achieve this requirement and provide a great deal of forward gain. Baying of antennas can also be useful on point-to-point paths, such as packet radio links, where there may be a requirement to minimise radio interference to other users off the sides of the main radiation lobe.

Efficient Power Transfer

In order to efficiently transfer power from the transmitter to the antenna, or from the antenna to a receiver, it's essential that the impedances are matched. For example, a 50Ω antenna should be used with a 50Ω coaxial cable and 50Ω equipment. If a 50Ω antenna is used with 75Ω cable then a very poor v.s.w.r. will result. When the receiver or transmitter is not matched to the rest of the system, the v.s.w.r. will appear to be dependant on the cable length. When two or more antennas are connected simply together a mismatch will result due to a reduced load impedance.

For example, two 50Ω antennas connected in parallel will result in an impedance of 25Ω. It's essential therefore to use a device that matches the resulting antenna feed impedance to that of the coaxial feedline. There are two ways that you can achieve this, though both methods act as an impedance transformer. You can either use specific lengths of coaxial cable, sometimes called a phasing harness, or you use a 'mechanical' square-line power splitter.

Phasing Harness

Let's look at the phasing harness approach, as shown in the diagram, **Fig. 2**, first. This method assumes that both antennas possess an feed impedance of 50Ω. The

harness consists of two equal (odd multiples of λ/4) lengths of 75Ω transmission line from each driven element. Due to the 'transformer' action of each 75Ω line the feed impedance of each antenna seems to be 100Ω at the coaxial 'T' piece. When the two antenna feed lines are connected in parallel at the 'T' piece, the resulting impedance is close to 50Ω.
Each section of the 75Ω cable must be an odd multiple of a quarter wavelength at the working frequency. Allowance must also be made for the velocity factor (v_f) of the coaxial cable (polyethylene dielectric, $v_f = 0.66$). A suitable cable for this section could be CT125 (or CT100) satellite TV cable. It's the right impedance and has a loss (at 144MHz) of only 0.05dB per metre length. Now here's how to calculate the length of each section of 75Ω cable to combine two 144MHz Yagis together.

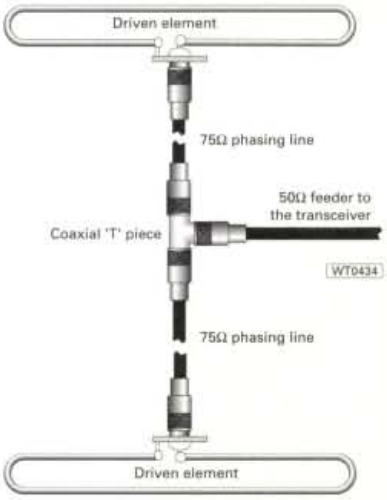
For a frequency of 144.300MHz the wavelength will be 300/144.3 = 2.08m. Divide by 4 to give a quarterwave = 520mm. Then multiply by the velocity factor, 520 * 0.66 = 343mm. This is the length of each individual section of the 75Ω phasing line. The number of odd λ/4 lengths is dependent on the stacking distance between the antennas. As an example the manufacturer recommends a stacking distance of 3.1m for a pair of 9-element Tonna antennas.

Clearly, the calculated phasing harness with a total length of 686mm (2 * 343mm) is insufficient to span the 3.1m recommended spacing. As each 75Ω cable section must be an odd multiple of a quarter wavelength a figure of 5λ/4 give 1.71m for each 'leg', giving a total phasing harness length of 3.43m that will be sufficient for our needs.

Accuracy is important when cutting phasing harness lines to length. Always use cable from the same batch as this will ensure impedance uniformity. I always measure with a 1mm accuracy and don't make additional allowances for the N-connectors. I've never had any apparent problems doing it this way. You could use a grid dip oscillator (g.d.o.) or antenna analyser (such as the MFJ-259) coupled to the phasing line to confirm the correct length although I've never found this necessary. Whatever method you use **it is vitally important to maintain the correct driven element polarity**. When viewing the Yagis (from the back or front, it doesn't matter) make sure that the centre conductors of both phasing cables go to the same side on each driven element. In other words, mount each Yagi the same way up on the mast. You may need to swap the lower boom support around though.

Power Splitter

The other method you can use for impedance transformation is the power splitter (sometimes called a combiner too!) and an example to match a pair of antennas is shown in the diagram, **Fig. 3**. The important difference to note is that unlike the coaxial phasing harness all feeder lines comprise of 50Ω coaxial cable. The feeder must be of the same impedance as the Yagi and cut to exactly the same length. However as the cable is not providing any impedance transformation, the length within reason is not critical. The two antennas connect to the end of the power splitter with the two 'N' sockets with equal lengths of 50Ω coaxial cable. The end that has the single connector goes to the transceiver, again with 50Ω cable.

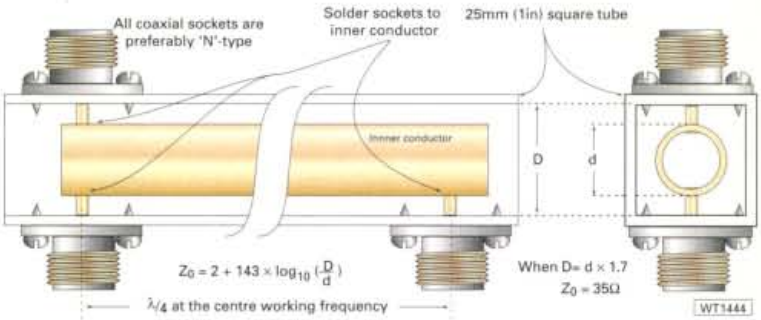


● Fig. 2: Two λ/4 phasing harnesses of 75Ω coaxial cable transform the 50Ω feedpoints of the antennas up to 100Ω which, in parallel at the 'T' piece, matches the 50Ω feed from the transceiver well. (See text for more detail).

Power splitters for outdoor use are most easily made from square tubing of copper, brass or aluminium. For the 144MHz band you can conveniently use 25.4mm (1in) square section tube as this allows the use of square flange N-type sockets. For the inner conductor a 12.7mm (0.5in) diameter tube made from copper or brass will be required. It is one quarter wavelength long and as it is in free air it will be 520mm long. The outer section needs to be longer than this to allow for the flange mount sockets and to put waterproof caps at each end of the tube. If you make a splitter like the one shown in Fig. 2, then you will have to drill a large hole at the centre so that you can solder the centre connector to the conductor. A 'blind' grommet can be used to weatherproof the assembly.

If you don't have the facilities to construct a power splitter yourself you can always obtain one from Yagi manufacturers such as Cushcraft, CueDee, Tonna, M2 or Vargarda. Remember that any power splitter or phasing harness will work with any antenna providing the impedance (normally 50Ω) and the frequency band is specified. So a 4-way splitter from Cushcraft will work perfectly satisfactorily with four Tonna Yagis.

● Fig. 3: A power 'splitter/combiner' is also a λ/4 transformer, but this time the 50Ω input (right) is matched through the 35Ω of the splitter to the 25Ω feedpoint impedance of two 50Ω lines in parallel. Half the power is available to each output socket (left). (See text for more detail).



Further Questions

That's it for this time. If you have any further questions about antenna techniques for any frequency above 30MHz please contact me at the address given in my monthly 'VHF Report' column.

73 David G4ASR

RADIOWORLD (WEST MIDLANDS)

42 BROOK LANE
GREAT WYRLEY, WALSALL
WEST MIDLANDS WS6 6BQ

Tel sales & service: 01922 414796
Fax: 01922 417829
Mobile tel: 0850 099244

WE ARE 5 MINS AWAY FROM J11 M6

Main dealers for Alinco, Icom, Yaesu & Kenwood

Manufacturers warranty on all new equipment

STOP PRESS: NEW FT-1000MP MkV-D

5 NEW FEATURES ON THIS NEW FLAGSHIP

1. IDIST-INTERLOCK DIGITAL BAND WIDTH TRACKING
2. VRF VARIABLE RF FRONT END FILTER
3. CLASS A FINAL OUTPUT
4. 200W OUTPUT
5. INTEGRATED SHUTTLE CONTROL

FIRST ORDERS AVAILABLE AT RADIOWORLD - TELEPHONE FOR DETAILS

SPECIAL OFFERS

ICOM

IC-756 PRO

Icom's flagship. Colour screen, 32 bit prosessor. Absolutly fabulous.
£2099.00

IC-746

HF/VHF all mode transceiver, 6m/2m, 100W with tuner built in. Also with free 2100H. 2 years warranty.
£1299.00

IC-706 MKII G

Smallest DSP radio on the market. HF, 6m/2m/70cm. Detachable front with T81-FRG. **£989.00**

IC-R8500

Probably the best wide band receiver available, coverage from 0.1-2GHz. Many 'top-end' features, 2 years warranty. **£999.00**

AH-3

ATU, external, waterproof. 0-160m. Normally £459.00.
SPECIAL OFFER **£249.00**

IC-2800

Dual band mobile, colour display. Full duplex, inc. CTCSS, 50W output. Detachable front. List price £449.00. OUR PRICE **£349.00**

KENWOOD

TS-870S

Kenwood's top HF radio, DSP & IF. No need for filters, transmit Tx audio, fully adjustable, broadcast audio on SSB. A CW's operators dream. Plus Rx antenna tuner.
BARGAIN AT **£1495.00**

TS-50S

The first and still one of the best little mobile radios, dedicated for HF users. Don't miss out! Brand new with UK warranty. **£599.00**

TS-570DG

Still the only HF monoband mobile radio with DSP and ATU built in for under £1000.00.
RADIOWORLD PRICE **£899.00**

TM-D700E

The latest dual bander, dual display, built-in TNC, APRS locating system, alpha-numeric. List price £519.00.
OUR PRICE **£459.00**

TM-V7E

Cool blue display, dualband, packet ready, detachable front. List price £419.00. OUR PRICE **£379.00**

TM-G707

Dual band, detachable front, clear display. No squinting! Bullet proof front end. List price £319.00.
OUR PRICE **£285.00**

TH-D7E

The world's first handie with built-in TNC, plus APRS, CTCSS searching system, metallic silver finish. List price £309.95.
OUR PRICE **£279.00**

TH-G71E

Dualband handie, reliable and rugged. List price £279.00.
OUR PRICE **£210.00**
while stocks last

★★★★STAR BUY★★★★

Rotator G-2800SDX

Heavy duty limited stock.

£995.00

★★★★★★★★★★★★★★★★

PRICE MATCH

Up to 5% extra discount may be available on selected items.

TELEPHONE SALES ON:

01 922 41 47 96

Ask for Dave (G1LBE)
Open Mon-Fri 9.30 - 6.00pm. Sat 9.30 - 4.00pm

WEB SITE
http://freespace.virgin.net/radio.world
E-mail
radio.world@virgin.net

There is NO CHARGE for using credit cards

WANTED USED EQUIPMENT

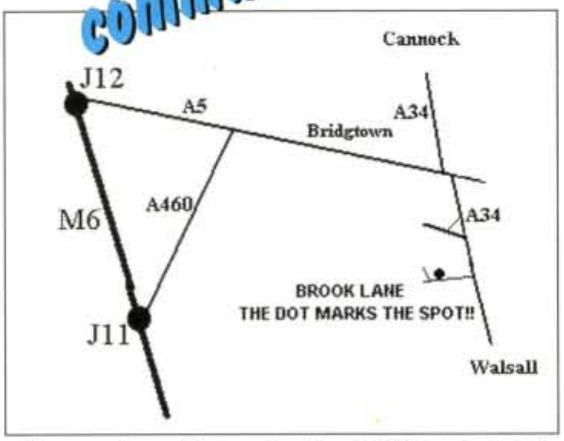
PX WELCOME

BEST PRICES PAID!

RADIOWORLD (WEST MIDLANDS)

your 1-stop communication shop

42 BROOK LANE, GREAT WYRLEY,
WALSALL, WEST MIDLANDS WS6 6BQ
SALES & SERVICE
TEL: 01922 414796
FAX: 01922 417829
WE ARE 5 MINS AWAY FROM J11 M6



Remember, if you don't need it, we wont sell it to you phone or visit us for friendly, impartial advice on ALL of your communications needs.

MAIL ORDER IS AVAILABLE ON ANY ITEMS FROM THE BELOW LIST; NEXT-DAY DELIVERY IS USUAL.

ADI, Adonis, AKD, Alinco, Albrecht, Ameritron, AOR, Baygen, Barker & amp; Williamson, Comet, Creative Design, Cushcraft, Datong, DCI, Diamond, Diawi, Fairhaven, & G.B., Garmin GPS, Grundig, Hari, Heil, Hi-Mound, Hora, Howes kits, Icom, JPS, JRC, Kachina, Kantronics, Kent, Kenwood, Kuranishi, Lake, Linear Amp, Lowes, Maspro, Maxon, MFJ, Microset, Mirage, Mizuho, Motorola, Optoelectronics, Oregon Scientific, PRO-AM, Radio Works, Ramsey, Revex, Roberts, Sagant, SGC, Siskin, Sony, SSB, Steepletone, Tasco, 'Ten-Tec' kits, Tonna, Uniden-Bearcat, Vectronics, Watson, Welz, Yaesu, Yupiteru

AND THEN SOME MORE!!

FINANCE NOW AVAILABLE. PHONE DAVE FOR DETAILS!

USED EQUIPMENT PRICE LIST

MAKE	MODEL	PRICE
ALINCO	DJ-X10 RECEIVER	£220.00
ALINCO	DR-112 2M FM	£110.00
ALINCO	DR-510E DUAL BANDER	£195.00
ALINCO	DR-605 DUAL BANDER	£250.00
ALINCO	DX-70T 6M HF	£499.00
AMERITRON	AL-811E BOXED	£450.00
AOR	AR 2002 SCANNER	£199.00
AOR	AR-3000 BASE SCANNER	£395.00
AOR	AR-3000A MINT!	£495.00
AOR	AR-5000 TOP RECEIVER	£999.00
AOR	AR-7030 Inc REMOTE 0-30MHz	£550.00
AOR	AR-8000 SCANNER	£199.00
AOR	AR-8100 SCANNER	£280.00
DRAKE	R8E RECEIVER	£575.00
HI MOUND	KEY HK-702 NICE!	£40.00
ICOM	AT-150 AUTO ATU FOR THE IC-735	£175.00
ICOM	AT-500 ATU	£295.00
ICOM	AT-500 ATU 500w	£295.00
ICOM	IC 706 Mk1	£599.00
ICOM	IC-229H 2M FM	£165.00
ICOM	IC-706MK 11 DSP TRANSCEIVER	£650.00
ICOM	IC-706MK11 SUPER TRANSCEIVER!	£599.00
ICOM	IC-706MK11G LATEST!	£850.00
ICOM	IC-720A ALL MODE + FM 100 Watts	£350.00
ICOM	IC-725 TRANSCEIVER PLUS FM	£450.00
ICOM	IC-730 100w SOLID STATE	£250.00
ICOM	IC735 General Coverage	£425.00
ICOM	IC-735 TRANSCEIVER	£450.00
ICOM	IC-737 BASE TRANS, INC TUNER 0-30MHz	£600.00
ICOM	IC-745 0-30MHz	£500.00
ICOM	IC-746 HF/VHF	£999.00
ICOM	IC-751A 0-30MHz	£595.00
ICOM	IC-821H DUAL BAND BASE	£895.00
ICOM	IC-8500 TOP RECEIVER!	£1,199.00
ICOM	IC-970H 2m 70cm BASE TOP RADIO!	£1,299.00
ICOM	IC-970H P/S WIDE RECEIVE 900MHZ	£1,495.00
ICOM	IC-R10 HAND RECEIVER	£225.00
ICOM	IC-T8E 2 m 70m & 6m HANDIE	£230.00
ICOM	P21ET HANDY 2M SMALL	£100.00
ICOM	PCR-1000 PLUS DSP	£285.00
ICOM	PS-15 PSU 20 amp	£120.00
KENWOOD	D7E DUAL BANDER	£225.00
KENWOOD	MC-60A DESK MIC	£70.00
KENWOOD	MC-85 DESK MIC	£90.00
KENWOOD	PS-20 SUITS 9130 etc	£50.00
KENWOOD	PS-33 MATCHES 450 etc	£130.00
KENWOOD	PS-50 HEAVY DUTY	£150.00
KENWOOD	R-5000 0-30MHz	£500.00
KENWOOD	R-5000 0-30MHz + CONVERTER	£650.00
KENWOOD	THE-79E DUAL BANDER	£195.00
KENWOOD	TH-G71 LATEST DUAL BAND HANDIE	£200.00
KENWOOD	TM-221E 25w FM	£125.00
KENWOOD	TM-441E 70cm MOBILE	£120.00
KENWOOD	TS-140S HF/0-30MHz TRANSCEIVER	£400.00
KENWOOD	TS-180S SOLID STATE BASE STATION	£295.00
KENWOOD	TS-450 SAT 100w	£595.00
KENWOOD	TS-530S HF	£200.00
KENWOOD	TS-570DG SPECIFICATION	£695.00
KENWOOD	TS-711E 2M Multimode BASE	£400.00
KENWOOD	TS-850 TRANSCEIVER 0-30MHz	£695.00
KENWOOD	TS-850SAT TRANSCEIVER 0-30MHz	£895.00
KENWOOD	TS-870 SAT 0-30 DSP	£1,200.00
KENWOOD	TS-950SD 150 Watt BASE STATION	£1,395.00
KENWOOD	TS-950SDX 150 Watt BASE STATION	£1,799.00
KENWOOD	VC-H1 VISUAL COMMANDER	£225.00
KW	1000 AMP	£400.00
LOWE	HF-125 0-30 MHz RECEIVER	£195.00
MFJ	986D 3KW ATU	£190.00
MFJ	989C 3KW ATU	£250.00
SEM	TRANSMATCH	£80.00
TENTEC	PSU	£85.00
TOKYO	HL-60U 70cm	£85.00
TRIO	TL-911 AMP NEW VALVES	£400.00
UNIDEN	XLT 860 BEARCAT AS NEW!	£99.00
YAESU	FC-757 AUTO ATU	£175.00
YAESU	FRG-100 FM KEY PAD	£350.00
YAESU	FT 290R 2m Multi Mode	£195.00
YAESU	FT 290R MK11 INC AMPLIFIER 25WATTS	£325.00
YAESU	FT 890 HF Gen "as new"	£600.00
YAESU	FT-10 HANDIE 2M	£100.00
YAESU	FT-11 HANDIE 2M	£100.00
YAESU	FT-3000M 2 METER 70W	£200.00
YAESU	FT-730R 70cm 10w	£120.00
YAESU	FT-736 2/70 AC TRANSCEIVER	£695.00
YAESU	FT-747 TRANSCEIVER	£350.00
YAESU	FT-757GXMK11 TRANSCEIVER	£450.00
YAESU	FT-790R 70CM TRANSCEIVER	£200.00
YAESU	FT-8100 USED	£275.00
YAESU	FT-840 0-30MHz TRANSCEIVER	£495.00
YAESU	FT-920 AF TRANSCEIVER	£999.00
YAESU	FT-990AC	£895.00
YAESU	MD-1 DESK MIC	£60.00
YAESU	FC-102 IN ANT SWITCH	£175.00
YAESU	FC-902	£140.00
YAESU	FL-110 100w ALL BAND AMP HF	£150.00
YAESU	FP-707 PSU	£100.00
YAESU	FP-757 GX PSU HEAVY DUTY	£150.00
YAESU	FT ONE BASE 0-30MHz	£495.00
YAESU	FT-1000MP AC TOP RADIO!	£1,599.00
YAESU	FT-107m 100w BASE HF	£325.00
YAESU	FT-2500M 50w	£225.00
YAESU	FT-480R 2m Multimode	£225.00
YAESU	FT-650 100w 6m Multimode	£595.00
YAESU	FT-726 2/70/6M/ SAT	£599.00
YAESU	FT-757GXMK1 TRANSCEIVER	£400.00
YAESU	FT-790 MULTIMODE 70cm	£175.00
YAESU	FT-890 0-30MHz	£575.00
YAESU	FT-990 AC	£895.00
YAESU	FT-990 DC	£795.00
YAESU	SP-901	£30.00
YAESU	YO 100 SCOPE 101 SERIES	£70.00
YUPITERU	MTV-9000 AM/FM/USB/LSB/CW SCANNER	£245.00
YUPITERU	MVT-7100	£150.00

June 18: The Norfolk Amateur Radio Club will be holding the Barford Rally & Electronics Car Boot Sale at Barford Village, located 14km west of Norwich, off the B1108, signposted. Open for traders from 0900, and for buyers from 1000. Local repeater and packet groups will be represented and Novice licence stand. There is ample car parking, a Bring & Buy, RAYNET supplies, refreshments and a raffle. Entry is **free**. **John G0VZD** on **(01953) 604769** or **Peter** on **(01603) 415992**.

June 18: The Newbury & DARS will be holding their 14th annual Amateur Radio Car Boot Sale at Cold Ash playing field near Newbury, Berkshire. Sellers/traders should arrive at 0800 and the sale will be open from 0900-1500. Sellers/traders don't need to pre-book and the charge is £9 per normal size pitch. Any telephone enquiries should be made to **George Cook** on **(01488) 682814**.

June 25: The Bangor & DARS (Northern Ireland) are holding their Summer Radio & Computer Rally at the Clandeboye Lodge Hotel, Bangor. There will be a good selection of traders attending, plus there is the always excellent Bring & Buy, with the addition of a new computer section. Doors open 12 noon and admission is just £2. Further details from the club Web site at **http://welcome.to/bdars** or from **Mark MI1DRU** on **0289-058 6515** or E-mail: **mildru@amrad.net**

June 25: The Longleat Rally will be taking place at Longleat House near Warminster, Wiltshire on Sunday 25th June 2000 - all the usual attractions. Please contact **Ron Ford G4GTD** on Tel: **0117-985 6253**.

July 8: The Cornish Radio Amateur Club are holding their 37th Cornish Mobile Rally at Penair School, Truro. **Ken Tarry G0FIC** on **(01209) 821073** or E-mail: **ken@jtarry.freeserve.co.uk**

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 **(01904) 628036**.

July 9: The Sussex Amateur Radio and Computer Fair is celebrating its 20th annual event with refurbished facilities at the Brighton Race Course where the new owners have spent over £3million on improving the Grandstand and Exhibition halls, including the refreshment and bar areas. Doors are open from 0930-1600 with all the usual traders and club stands with the very popular Bring & Buy hall. Entrance fee will be £2.50 with free on-site parking. For further information, please phone: **(01424) 428064**.

July 16: The McMichael Rally and Car Boot Sale takes place at the Haymill Youth Community Centre, 112 Burnham Lane, Slough. This is its regular venue, close to J7 on the M4. This is Berkshire's premier event with many traders present sand the ever popular car boot sale, it makes it a good rally to visit. Various local radio clubs and organisations also have stands at the rally. Bar, food and refreshments will also be available. Talk in on S22 (145.550MHz). Rally opens at 0930 and admission is just £1.50. Further information from **Dave Chislett G4XDU** on **(01628) 625720**, E-mail: **g4xdu@amsat.org** or for trade enquiries and bookings, contact **Min Standon G0JMS** on **0118-972 3504**, E-mail: **mins@mstanden.freeserve.co.uk** You can also visit the McMichael 2000 **web site at http://come.to/mmr99**

July 23: The Colchester Radio Amateurs large Radio & Computer Rally is to be held at St Helena School, Sheepen Road, Colchester from 1000 till 1600. Admission is just £1.50. There will be three large halls, large outside boot sale, Bring & Buy, refreshments, talk-in on S22, disabled access and free parking. For further details go to their web site at **http://www.g3co.ccom.co.uk** for full info. and map.

August 13: The 11th Great Eastern Radio & Computer Rally is to be held at the Park High, Queen Mary Rd, Gaywood, Kings Lynn, Norfolk. Refreshments will be available all day. Talk-in on S22, free parking, Bring & Buy and lots more. Contact telephone number is **(01553) 841189**. For latest, please see **www.qsl.net/G3XYZ**

August 20: The Leeds & District ARS are holding the second of their twice yearly car boot sales on Sunday 20th August at the Yarnbury Rugby Club, Brownberrie Lane, Horsforth, Leeds. Please contact **J. A. Mortimer M1CAI** on **(01943) 874650** for details. It will be a general car boot sale but with Amateur Radio, electronics and computer sections. Sellers cars (inc. small trailer) will be £5 with vans/large trailers being charged £10. Refreshments and plenty of free parking will also be available.

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

August 27: The Milton Keynes ARS will be holding their 14th fayre and car boot at Bletchley Park Museum. Open to Traders from 0700, £7 in advance, £10 on the day. Doors open to buyers at 0900 and entrance is just £1. Talk-in on 154.550/433.550MHz, refreshments, Morse tests, museum open. For more details please contact **Dave G3ZPA** on **(01908) 501310** or E-mail: **m0bzk@bletchley.madasafish.com**

August 28: Huntingdonshire Amateur Radio Rally will take place at Ernulf Community School, St. Neots, Cambridgeshire (near Tesco Superstore on A428). 1000-1400, admission £1.50. Hot and cold refreshments available, features hall and car boot sale on hardstanding. Talk-in on S22. Details from **David Leech G7DIU** on **(01480) 431333** (between 0900-2100).

September 3: The Andover Radio Amateurs Radio Rally takes place at the Middle Wallop Airfield, near Andover. More information from **Jack G0UJW** on **(01264) 391383**.

September 3: The Bristol Computer & Radio Rally will take place at the Brunel Centre, Temple Meads Station, Bristol. Doors open 1030 (disabled from 1015) and close at 1600. Admission is £1.50, accompanied children under 12 free. There will be 250+ tables, table hire at £15 each, large Bring & Buy, under £30 Bring & Buy and refreshments. More details from **Muriel Baker, 62 Court Farm Road, Whitchurch, Bristol BS14 0EG** or Tel: **(01275) 834282** (24-hour answerphone).

September 10: The Lincoln Short Wave Club are holding their Lincoln Hamfest at the Lincolnshire Show Ground, on the A15, five miles north of Lincoln. There will be extensive parking, talk-in on 2m, catering and refreshments, trade stands, Bring & Buy, car boot sale, flea market, Morse tests and other attractions. Admission is £2 per person (under 14s free). Contact **John G8VGF** on **(01522) 525760**

September 10: The Telford Radio Rally moves to a new unique location at RAF Museum Cosford, Shropshire - 3.2km south on A41 off J3 M54, 32km NW Birmingham. Buy, sell and browse amongst the aircraft. Traders, Bring & Buy, flea market, Morse tests, RSGB & Special Interest Groups, refreshments, disabled facilities, Talk-in on S22. Further details from **Bob M5BWQ (01952) 770922** or E-mail: **bob@somrob.u-net.com** Traders enquiries to **Jim G8UGL (01952) 684173** or E-mail: **jim@tweedale5.freeserve.co.uk** or visit their Web site at: **www.telford-rally.co.uk**

October 1: The Great Lumley Amateur Radio & Electronics Society are holding their rally at the Great Lumley Community Centre, Front Street, Great Lumley, near Chester le Street, County Durham, just off the A1(M). There will be free parking, plus easy access, good, inexpensive food and drink, radio, hobbies, electronics, computer, satellite and component stalls, Bring & Buy in two sections - junk and good buys. Doors open 1100 (1030 for disabled visitors). Admission is £1, free of charge to under 14s accompanied by an adult. Talk-in. Further details on **0191-384 2803** or **020-8937 2772** or from Rally Organiser **Nancy Bone G7UUR, 49 South Street, Durham City DH1 4QP**.

October 15: The Blackwood Radio, Computer & Electronics Rally is to be held again at the Newport Centre, Newport, South Wales, which is about 2km from J25A on the M4. Opens at 1030/1100, there will be a Bring & Buy, Talk-in, car parks, trade stands, special interest groups, licensed bar, catering, disabled facilities and family attractions. Further information can be obtained from **Stuart Instone GW0NPL** on **(01495) 240260/(07970) 777756** (combined telephone/FAX number) or E-mail: **fireham@aol.com**

October 15th: The Hornsea Amateur Radio Club Rally will be taking place on this day. For more details on where it is and what will be taking place, please contact **Duncan G3TLI** on Tel: **(01964) 532588**.

Morse & The Digital Age

Henri Walser, a retired Swiss Merchant Navy radio officer, writes about the various advantages of Morse and discusses the pitfalls of new technology. As he explains, he's not adverse to new technology, he just feels that new shouldn't necessarily REPLACE old.

During the past two decades much has been said and written about the relative merits or disadvantages of the Morse code compared with modern digital communication methods. The euphoria among the ranks of countless digital or computer 'freaks' seems boundless. They talk about the "Age of Communication" or the "Age of Information" which will help to shape a better world. For them, the defenders of the Morse code as a means for communication are hopelessly old-fashioned 'crackpots' who have lost touch with reality.

The reality is, I feel, that most of the ardent defenders of the Morse code (c.w.) know very well what they are talking about. Quite often they use sophisticated "hi-tech" equipment in their daily work or in their hobby. Amateurs have embraced all the most modern digital communication methods with enthusiasm - as I write, there are more than 25 amateur satellites in orbit.

However, there are also many groups devoted to the advancement of Morse, in practically every country there's at least one c.w. club and in Europe, more than 26 clubs are members of the 'European CW Association' with headquarters in Belgium.

MV *Allobrogia*/HBFH general cargo carrier, 10 000 dead weight tons world-wide time charters, built in 1952 at Flensburg, Germany. Henri Walser spent many years on ships like her.

No Turning Around

Even for Morse enthusiasts, it's quite clear that there's no turning around. In many respects, the new communication methods are superior to Morse. However, that doesn't mean that Morse code should now hastily be abandoned before the proper and reliable operation of the new systems has been assured.

I've always believed that an open mind for all new developments is important but, on the other hand, one should not prematurely forget the techniques and procedures which have proved their value and reliability over some length of time.

The word new is not a qualifier, if something is 'new', this doesn't automatically mean that it's good, or even better than the thing it replaces. However, this insight is lost on most people and they react to the word 'new' in a very irrational manner, hence the excessive use of it in advertising.

Fig. 1: Radio station of MV *Allobrogia*/HBFH 1952, showing main transmitters, m.w. and s.w., 4-22MHz c.w. and voice, each 400W, also 2MHz 'phone band (100W).

A heavily praised feature of digital communication technology is its ability to transfer huge amounts of data. One result of this development, I feel, is that we are all swamped in meaningless data and pseudo information, a kind of entropy in communication - however, quantity never replaces quality.

It is generally agreed that changes are considered necessary to achieve progress - whatever that's supposed to be. However, changes purely for the sake of change achieve nothing, they only help to deepen the confusion.

For instance, the switch from GMT (Greenwich Mean Time) to the awkward UTC (Universal Time, Co-ordinated) just for the sake of a "politically correct language" doesn't make much sense. (To avoid using GMT for any reason, you can always use the Time Zone designator 'Z' = Zulu).

All At Sea

I worked at sea as a Radio Officer (**Fig. 1**) for more than 12 years on eight different cargo ships engaged in world-wide trade and based on my practical experience, I would say that Morse has some definite advantages. A c.w. transmission occupies an extremely narrow slot (around 100Hz) of the frequency spectrum.

On the other hand an s.s.b. channel is 3kHz wide, an f.m. broadcast transmitter occupies 150kHz and a TV channel 5MHz or more. Therefore, about 30 Morse transmitters could be accommodated on one s.s.b. channel, however, I feel that there's more to it than that. As a rule, receiver sensitivity is inversely proportional to the bandwidth employed. This is because narrowing the bandwidth considerably reduces noise.

Let's assume that all other parameters are kept constant except the bandwidth, which is lowered by a factor of ten, e.g. from 2500Hz to 250Hz. The increase in sensitivity, and therefore range, is then equal to the square root of ten, or 3.16. This is one of the reasons why Morse is often capable of penetrating interference where voice transmission would be unreadable.

Another forgotten advantage of Morse code is the fact that you can 'talk' quite efficiently with people whose language you don't know. The easy-to-learn abbreviations enable anybody to converse with an operator whose mother tongue may be Chinese, Russian, Somalian, Finnish, Tagalog or anything else. For a ship's Radio Operator, this is, of course, especially valuable.

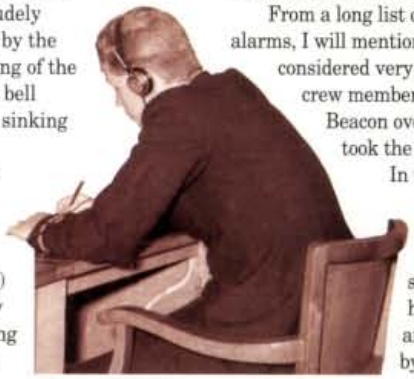
The replacement of the traditional ships radio equipment (**Fig. 1, 2** and **3**) and Radio Officer ('Sparks') by complicated and expensive new technology is at least a premature (and possibly also unnecessary) change. Consider the new Global Marine Distress and Safety System

Fig. 2: Radio station of MV *Henri G*/5LUR, 1959, showing main and standby receivers, part of emergency transmitter.

(GMDSS) which so far has been proven to be unreliable and ineffective. Proponents of GMDSS argue that the old system "is too slow" and "has insufficient range" - I don't agree.

Gulf Of Mexico

The following incident is typical of many which I have experienced. I was in the Gulf of Mexico on course to Galveston/Houston in Texas. At 0130 ship's time, my sleep was rudely interrupted by the shrill clanging of the Auto-Alarm bell which was caused, indirectly, by a ship sinking near the Azores!



Apparently the ship's operator had trouble with the 500kHz transmitter and sent his SOS message to WSL (Amagansett Radio) on h.f. This Mackay coast-station on Long Island, NY relayed the message on 500kHz, preceded by the Auto Alarm Signal.

Fig. 3: Radio station of MV *Henri G*/5LUR, 1959, showing main transmitters: 2MHz 'phone band (100W) m.w. (400W), s.w. 4-22MHz (400W), c.w. and voice.

The 'old' traditional method for rescuing crew members and passengers from a ship in trouble, depends upon another ship being close enough to receive a 500kHz distress call. The maximum distance covered by a transmission on 500kHz depends on a variety of factors.

During daylight the maximum range can be around 600nm or more (one nautical mile = 1.8km) and at night several thousands of miles. A former operator at Capetown Radio ZSC told me that, at night, they could regularly hear and work Rio de Janeiro Radio PPR on 500kHz. The distance is roughly 3000nm. There are also dedicated emergency frequencies on h.f. (2182 and 8264kHz) and on v.h.f.

Fig. 4: Radio station of MV *Henri G*/5LUR, 1959, showing main receiver, auto alarm receiver and antenna switch.

When the Italian cruise ship ***Achille Lauro*** burned and sank off the **Somalia Coast**, all of the (roughly) 1000 passengers and crew members were saved during an eight hour rescue operation. Even though the *Achille Lauro* had the most modern GMDSS equipment on board it was not used. Instead they used v.h.f. to inform the nearby *MV Fidalio*/*HSDL* which then relayed the SOS call in Morse on 500kHz.

The Morse transmission triggered the rescue chain. Finally the rescue effort was then "remote-controlled" from the Rescue Co-ordination Centre (RCC) **Stavanger in Norway!**.

Some GMDSS equipment has up to 200 knobs and buttons, many of them multi-functional. Some have to be activated in a strict sequence or simultaneously.

A few years ago *QST*, the magazine of the American Radio Relay League (ARRL) published a letter from an amateur who suggested the introduction of a new Q-Code like QXX, followed by two numbers e.g. 48/6. This means: "My rig has 48 knobs and I know the function of six of them". Now this was, of course, a harmless hoax, but a system that is supposed to save lives should work correctly right from the beginning.

False Distress Calls

Official sources in the UK and the USA report that false distress calls and alarms in the GMDSS system account for 96% or more of all cases. A BBC World Service report stated that unnecessary search actions of the British Search and Rescue units caused by false GMDSS alarms cost the British taxpayers several millions of pounds per year.

From a long list of causes which have lead to false alarms, I will mention only one incident here, which is considered very typical. The alarm was triggered when crew members unwittingly threw the Emergency Beacon over board together with the garbage! It took the Coast Guard days to find that ship.

In theory, the Rescue Co-ordination Centres (RCC) know the position of all vessels in the area around the distressed ship and will then alert the ships that are close enough to be of any help. However, if there's no ship in the area, the GMDSS cannot put one there by some magic either.

The shipping lanes from the Magellan Straits to South Africa cross one of the loneliest stretches of ocean. From my own experience I know that chances to find another ship in that immense stretch of water are very slim indeed. However, on 500kHz (or h.f.) you could always reach Capetown Radio ZSC.

Traditional Method

The 'traditional method' of communication between ships at sea and the shore requires relatively simple equipment but also requires trained operators on both sides. The new "hi-tech" methods require complicated and expensive equipment and operators pushing buttons without any idea what they are doing.

If something goes wrong or doesn't work, the crew won't know how to fix the problem. Maybe with the passage of time the GMDSS performance will improve. But an uneasy feeling remains that it is just a theoretical construction only vaguely related to reality.

I don't believe that Morse will vanish from one day to the other in 1999, 2000 or 2001 ... not even in International Shipping. There are many countries that cannot afford a complete switch over for some time. Many countries, especially in the East, have developed highly efficient c.w. systems and there are many more which will continue to use Morse.

At some time in the future, c.w. will become a rarity. Not because it's not capable of providing satisfactory service, but because it is simple, reliable, cheap, straightforward and therefore not fashionable whereas digital data communication promises to make much more money for providers and manufacturers.

During the last 20-30 years there has been a furtive but continuous eroding of standards in ship building, crewing and operation. There is also no effective enforcement of the internationally accepted laws of the sea. All this contributes to a considerable lowering of safety at sea even without the addition of GMDSS.

No new laws are actually required, all that is necessary is adherence to the existing laws. However, the rules and regulations of the Safety of Life at Sea Conventions (SOLAS) seem to be nothing more than recommendations. Some member countries have not yet ratified conventions and amendments which have been put into force 20 years ago and some ignore the ones they already ratified. *PW*

RadioScene

VHF REPORT

REPORTS & INFORMATION BY THE LAST SATURDAY OF EACH MONTH:

DAVID BUTLER G4ASR
YEW TREE COTTAGE
LOWER MAESCOED
HEREFORDSHIRE HR2 0HP

TEL: (01873) 860679

E-MAIL: g4asr@btinternet.com

DAVID BUTLER G4ASR BRINGS YOU NEWS OF THE LARGEST AURORAL OPENING TO OCCUR IN THE LAST 11 YEARS!

THIS MONTH DAVID BUTLER G4ASR HAS REPORTS OF CONTACTS MADE DURING THE LARGEST AURORAL OPENING TO OCCUR IN THE LAST 11 YEARS.

Every 11 years, the Sun cycles through a period of increased activity called solar maximum and the latest solar cycle is well under way with the peak expected this year. Most effects will be felt during the summer and autumn with a gradual reduction over the next two years.

The increasing number of sunspots brings with it a new season of unstable solar magnetic fields and huge arcs of material and radiation that spiral out from the Sun. A solar event, such as a **coronal mass ejection (c.m.e.)** can inject billions of tons of material into space.

The matter ejected from the Sun only reaches Earth under the most 'favourable' circumstances and the majority of this ejected material misses Earth altogether. In order to affect Earth, events must occur at the proper location on the Sun, the rotation of the Sun must align the ejected matter perfectly and the Earth's magnetic field must funnel the material into the upper reaches of our atmosphere ... as complicated as it sounds these events are fairly common.

An aurora is caused by interaction between the Earth's magnetic field and the solar wind, a mix of charged particles blowing away from the sun. During solar storms, enough of these charged particles make it through to the Earth's upper atmosphere that they interact with the earth's natural magnetic field lines.

When enough of the particles collide, energy is released in the form of auroral light and, in addition to creating a visual light show, radio signals scatter off these particles. This series of events allows contacts on the v.h.f. bands to be made with stations up to 2000km away.

INTERPLANETARY SHOCK

An interplanetary shock wave hit the Earth's magnetosphere on April 6 2000, triggering a major geomagnetic storm and a dazzling auroral display. It all started at 1600UTC on April 6, when the NASA *ACE* spacecraft detected the shock wave heading towards Earth.

About an hour after the shock wave passed the *ACE* satellite, it reached our planet. The material in the shock front had actually left the Sun two days earlier.

The **Solar and Heliospheric Observatory (SOHO)** satellite captured pictures of a c.m.e. event at 1541UTC on April 4 2000. As fast-moving material from a c.m.e. flows away from the Sun, it piles up against slower-moving gas that had been ejected earlier. This produces a sharp, dense shock front like the one *ACE* detected on April 6.

The shock wave from the ejection on April 4 travelled two days through interplanetary space before reaching Earth at 1640UTC on April 6. An hour later at 1745UTC, the first auroral backscatter contacts were being made in Europe.

The event then continued for eight hours, finally petering out around 0145UTC on April 7, during which time the auroral activity waxed and waned in intensity. In my opinion, the best time for DX contacts was in the period 2330-0030UTC which also coincided with the best visual display in the UK.

THE 50MHz BAND

According to the DX Cluster, there were at least 21 European countries worked from the UK on the 50MHz band. Contacts ranged from Ireland in the west, all of the UK prefixes, Scandinavia, the Baltic States and central Europe to as far east as Poland, Austria and Croatia.

Wow! "So that's what an aurora sounds like", exclaimed **James 2E1EMK**, this was his first experience of an auroral backscatter opening and although no great distances were worked, James was very pleased to contact three new countries and a few new squares.

Running 10W from a Yaesu FT-650 transceiver into a home-made 3-element Yagi, James contacted ten s.s.b. stations on the 50MHz band. Operating between 2215-0110UTC he worked the stations of EI7GL (IO51), ON1DIB (JO20), GM0EFT (IO86) and MM0AMW (IO75).

Other contacts made with s.s.b. included G0RUZ (IO93), G1YLE (JO02), G3ZVW (IO91), G4DEZ (JO01), G4HBA (IO80) and G7OEC (JO01). James also mentioned that he recently contacted PY0FM (Fernando de Norohna), PY5CC (Brazil) and TZ6VV (Mali) via trans-equatorial propagation (t.e.p.) and was very pleased to have received QSL cards from all stations.

James' success shows how effective low power can be on the lower v.h.f. bands. However, it gets a little more difficult trying to make low power, weak-signal contacts on higher frequencies such as the 144MHz band.

On 144MHz, James uses a Trio TR-9130 transceiver running 10W into an 9-element F9FT Yagi at 10m above ground level (a.g.l.). During the opening on April 6 he tried to make auroral contacts with that equipment but failed to get any replies.

Although there's no hard and fast rule regarding the minimum power level required to make successful auroral backscatter contacts, in my opinion it should be no less than 50W at the antenna. The use of c.w. will also be much more effective than s.s.b.

Mark Procter G1PIE (IO83) reports that he had just come home from a meeting of the **Preston Radio Club** when he discovered the auroral activity on the 50MHz band and he said that this was the best opening he had experienced via this propagation mode. He uses a Yaesu FT-920 transceiver running 100W into a 3-element Yagi and made many s.s.b. contacts including the stations of DL6AMI (JO50), EI7GL, GM7WLE (IO88), MM0AMW and ON1DIB.

Another station active on the 50MHz band was **Andy Durrant G7OEC** (JO01) who reports that the opening at his QTH commenced around 1830UTC on April 6 and was still going strong at 0100UTC on the following morning. He runs a Yaesu FT-650 transceiver, 400W and a Cushcraft 6-element wide spaced Yagi at 18m a.g.l. - with that sort of equipment he is guaranteed to have good results.

During the evening, Andy made 53 s.s.b. contacts with stations in 15 countries. His tally included contacts with Denmark (OZ), Estonia (ES), Luxembourg (LX), Norway (LC), Poland (SP) and Sweden (SM) as well as numerous QSO's in DL, EI, G, GI, GM, GU, GW, ON and PA.

Two new countries (GU and LX) were worked as were 11 new squares bringing his total up to 270 since becoming active on the 50MHz band a few years ago. During the auroral opening Andy noted that it seemed to make little difference which side of north he pointed the antenna, beaming either at 330° or 30° worked very well bringing in stations from Eire to Estonia.

Finally, Andy reports that during the latter part of March and early April he has been enjoying many t.e.p. openings to Africa on the 50MHz band. These have generally occurred between 1200-1400UTC, with stations from Equatorial Guinea (3C), Gabon (TR), Malawi (7Q), Namibia (V5) and South Africa (ZS). Recent midday contacts have included the stations of TR8CA (JJ40), V51KC (JG88) and ZR6JRN (KG33).

THE 144MHz BAND

Now I'll take a look at what was happening on the 144MHz band during the auroral opening on April 6. During large-scale events such as this one there's always some good DX to be found on this v.h.f. band. This opening was no exception and from information received there were around 27 countries worked from the UK during the evening.

The countries worked on 144MHz were similar to those worked on the 50MHz band, with the addition of stations from the Czech Republic, Hungary, Italy, Slovakia and Ukraine. A few stations reported making contacts in the range 1800-1900km - not bad for a line-of-sight band!

An interesting catch for a few alert operators was the station of **Andy Adams G0KZG/MM**. During the aurora he was active from 'wet' square IO74, a location some 350km north-west of Ireland on board RRS *Challenger*.

Andy mentions that one of the many problems of operating on a ship is that there's no access to propagation information (other than weather charts) that might give a clue as to enhanced propagation. On April 6 at 1745UTC he was making his usual meteor scatter contacts on 144.125MHz when Peter PA3BIY warned him of an impending auroral event on the satellite 'phone.

Andy was totally unprepared when, at 1800UTC while calling CQ UR (UR is the 'old' locator designation for IO74), the normal m.s. replies suddenly turned auroral. It took a while to get organised and shift the meteor scatter equipment (laptop computer, etc.) out of the way and find the Morse key.

Unfortunately, Andy hadn't used the Yaesu FT-847 transceiver on c.w. for some time and the TX/RX sequencing wasn't set up correctly. (It appears that he was using r.f. switching, which is definitely not recommended when using a high

Fig. 1: A QSL card confirming a QSO with UB5KY (KO31) on the 144MHz band over a path of 2029km - a c.w. contact David G4ASR made during the last great aurora 11 years ago on 13 March 1989.

power amplifier and an external low-noise amplifier).

Despite setting the FT-847 changeover time to maximum, the amplifier was still tripping in and out, eventually causing the e.h.t. fuse to blow. This then involved a dash down to the engine room for a replacement fuse, a pair of insulated pliers and a pair of high voltage switchboard gloves - all at a most inopportune moment during the auroral opening!

Andy also found it very difficult to work stations due to the vast numbers of people calling. Auroral c.w. signals sound just like keyed white noise and if you get more than one station calling it gets very difficult to differentiate between individual stations - get half a dozen calling and it really is mayhem!

Between 1806-1934UTC, Andy made 19 c.w. contacts on the 144MHz band with G0CUZ, G0EVT, G3IMV, G3NVO, G4ASR, G7RAU, GM3TKV, GM4XVF, GW4FRX, GM4ILS and GM4JJJ. He also worked stations in Germany, Ireland, Netherlands and Norway, his best DX being two German operators in JO54 around 1400km and LA2PH at 1090km.

So, was your favourite v.h.f. columnist on the air? Yes, I certainly was and I'm pleased to report that I was active right from the start of the opening. My first contact on the 144MHz band was with G0KZG/MM (IO74) at 1820UTC, although I had detected auroral sounding TV signals in the 49MHz region at 1755UTC.

When I first heard G0KZG/MM calling CQ, I thought it very strange that I was beaming at 280° (almost directly west) from my QTH - I've never detected auroral reflections in this direction before. Yes, I know there's very little activity to the west of the UK, but normally I beam between 340° and 20° (either side of north) to work EI and GI stations.

A little later in the evening I could literally see the reason why this had occurred - my QTH (IO81) is located in the countryside with absolutely no lights visible over the entire 360° arc. Under clear sky conditions, which this night was, any unusual events are clearly seen.

A large beetroot-red cloud was visible both to the west and east of my QTH. A huge band of similarly coloured ionised cloud joined these overhead. What I found amazing was that this arc was also stretching quite a long way to the south of my QTH.

Directly to the north of my QTH, the sky was a pale green colour with what looked like white searchlights or streamers of light, it was relatively static although at times the patches would fade up and down in intensity. In total I made 45 c.w. contacts on the 144MHz band with stations located in Austria (OE), Belgium (ON), Croatia (9A), Czech Republic (OK), Germany (DL), Hungary (HA), Italy (I), Luxembourg (LX), Netherlands (PA), Poland (SP) and Yugoslavia (YT).

Some of the more distant contacts included the stations of HA6NQ and HA6NY (different stations, both in JO98), I1JTQ and IK1MTZ (both in JN35), OE1SOW (JN88), OK1DIG (JO60), OK1FID (JO80), SP4MPB (KO03) and 9A1CAL (JN86). Best DX of the event was made at 0025UTC with YT1VV (JN94) at 1850km.

Incidentally, the QSL card, shown in **Fig. 1**, is for a c.w. contact I made during the last great aurora 11 years ago on 13 March 1989. It was confirming a QSO with UB5KY (KO31) on the 144MHz band over a path of 2029km.

Dave Edwards G7RAU (IO90) uses a Yaesu FT-757GX2 h.f. transceiver, Mutek transverter and a Henry 2002 amplifier running 400W into a pair of 9-element Vargarda Yagis. On the 144MHz band he contacted a total of 58 stations with his best c.w. contact being the station of UR5BAE (KN29) in the Ukraine at a distance of 1907km - the furthest distance I've had reported during this auroral opening. Does anyone know if this distance was bettered?

It wasn't until he took his dog, Max, out for a walk at 0030UTC that **Ray James GM4CXM** realised that there was a major auroral opening in progress. He mentioned that he'd never seen a visual aurora from his QTH (IO75) before and that it was really impressive. This surprised me as I thought **everyone** in Scotland had seen an aurora.

Having been exercised, Max returned Ray back to the shack and in a 40-minute session between 0103-0143UTC he made 24 c.w. contacts on the 144MHz band with stations located in DL, OK, ON, OZ, PA and 9A. Contacts were also made into the UK with G0NFA, G0RRJ and G7RAU.

The best DX during Ray's short spell of operation was with the station of 9A1CAL (JN86) over a path greater than 1778km. I say 'greater than' because although the direct path from IO75 to JN86 is 1778km, in reality it's greater than this because the signals actually travel the path from Scotland up to the reflecting auroral zone and then back down to Croatia and that path will be much further of course.

All of Ray's c.w. contacts were made running 400W into a 9-element Vargarda Yagi at ten metres above ground. You can see more of Ray (and Max) on his Web site at **http://www.abbey99.freeserve.co.uk**

Although it's preferable to use c.w. to make auroral backscatter contacts, it's not absolutely vital. **Pascal F1ORL** (JN08), located 50km south-west of Paris, used s.s.b. to make 11 short-distance contacts. Running 100W into a crossed 10-element Yagi set up for circular polarisation, he contacted G4PBP (IO82), G8XVJ (IO83), GW8IZR/P (IO73) his best DX at 677km and other stations in DL and PA.

Although I've mentioned that you need a reasonable amount of power and a good Yagi to make auroral backscatter contacts, there are always exceptions to the rule. **Tom DL2IAN** (JN49) mentions that he has just moved QTH and was only using a Yaesu FT-221R transceiver running 10W into a 9-element Yagi fixed under the roof of his house.

Although Tom had no Morse keyer, he was able to make five c.w. contacts by using his voice beep on m.c.w. His contacts on the 144MHz band were with the stations of G7RAU, DL1EJA, DF8IK, PA2DWH and PA3BIY.

Another station who has recently moved QTH is **Bernd DF2ZC** (JO30) and running 750W into a recently installed 17-element F9FT Yagi he made 33 c.w. contacts with stations in 13 countries. Among the UK stations worked were G0CUZ, G0NFA, G0RRJ, G3UTS, G3YVR, G4AJC, G4ASR, G7RAU, GM4CXM, GM4YXI and GW4FRX.

Bernd's longest distance contacts on the 144MHz band were with LY2MW (KO24) 1284km and YL3AG (KO26) at 1295km. The UK beacons GB3MCB (IO70), GB3NGI (IO65) and GB3VHF (JO01) were also heard with signals peaking around 55A.

THE 430MHz BAND

Moving on to the 430MHz band now. During reasonably large events the ionised auroral curtain is able to support communication in the u.h.f. region.

The station of **Simon Freeman G3LQR** (JO02) made c.w. contacts with stations in DL and PA, the best DX contacts being with DL1SUZ (JO53) and DJ4TC (JO63) around 750km - a doppler shift of 4kHz was noted on the signal from DL1SUZ. (Note what I've previously reported about so-called top-of-the-range v.h.f. transceivers with a r.i.t. range of only 2kHz!) .

Peter DJ4TC (JO63) was active during the aurora on three bands 50, 144 and 430MHz. On the 50MHz band he runs 7W into a 4-element Yagi and made 16 contacts with stations in DL, ES, GM, ON, SM, SP, YL and 9A and his best DX on this band was GM3POI (IO88) at 1145km.

A total of 41 c.w. QSOs were made on the 144MHz band including the stations of G0NFA, G4AJC and G7RAU. On this band he runs 300W into a pair of 11-element Yagis and found that the strongest signals were heard when the antennas were elevated up at 20°.

The situation on 144MHz was mirrored on the 430MHz band, where c.w. contacts were made with G3LQR (JO02) and PA0WWM (JO22). Peter runs 600W on this band into a pair of 26-element Yagis and he also heard the stations of DL1SUZ and PA3DZL.

DEADLINES

That's it again for another month. Please forward any news, views, comments or photographs to the address and by the date given at the top of the column.

Don't forget that the ***PW* 144MHz QRP Contest** is being held on **Sunday June 18 between 0900-1600UTC**. The rules were published in *Practical Wireless* June 2000.

THANKS FOR YOUR LETTERS AND GOOD LUCK WITH THE DX. SEE YOU AGAIN NEXT MONTH.

73 David G4ASR

HF FAR & WIDE

CARL MASON GW0VSW
12 LLWYN Y BRYN
CRYMLYN PARC
SKEWEN
WEST GLAMORGAN
SA10 6DZ

Tel: (01792) 817321

E-MAIL:
carl@gw0vsw.freeserve.co.uk

CARL MASON GW0VSW IS BACK FOR HIS SECOND 'HF FAR & WIDE' COLUMN SINCE TAKING OVER FROM LEIGHTON SMART GW0LBI AND HE'S DOING A FINE JOB. THIS MONTH HE HAS LOADS OF HF NEWS FOR YOU, INCLUDING SOME GOOD ADVICE ON HOW TO USE THOSE QSL CARDS TO CHECK YOUR LOG!

CARL MASON GW0VSW IS BACK FOR HIS SECOND 'HF FAR & WIDE' COLUMN & HE HAS LOADS OF HF NEWS FOR YOU

This month started off well as I was pleased to have a flying visit from **Rob Mannion G3FXD**, who called in on his way to

Ireland for a week's holiday and enjoy a well-earned break away from the office. Rob got held up in traffic following a 'wide load' on the M4 and just had time to grab a quick drink before racing off to catch the afternoon ferry at Pembroke Dock. I hope we get a little more time to chat next time Rob!

However, I will remember April for some time but for another reason - I was pulling my youngest son along on his toy tractor when I suffered a collapsed lung. This resulted in a short stay in hospital and a few 'enforced' weeks off work to recover. Looking on the bright side, it has enabled me to catch up on all my QSL cards, update my computer log and apply for a few awards.

OVERHEARD CONVERSATION

Last month I overheard a conversation between two amateurs who were discussing QSL cards, especially those from receiving stations. Both said that they didn't respond to the cards from these short wave listeners (s.w.l.s) and just threw them away - I think that this is a shame, because accurate information in their reports can tell you a lot about your station and how well it is performing.

Recently, a batch of QSL cards arrived here from the bureau and amongst these were a few cards from s.w.l.s. This isn't unusual, but several of the cards were for QSOs that I couldn't find in my logbook.

On further investigation I discovered that over 200 contacts were missing from the log which I traced to last year's **CQ WPX CW Contest**. My log has now been corrected.

If it hadn't been for the s.w.l. reports it would've been some time before I discovered this error! So, the next time you receive such a QSL card, spend a little time reading it, you might be surprised at what you find!

MAJOR DXPEDITION

As I write this, we're just a few days away from one of this year's major DXpeditions which will be operating from Bhutan (Prefix A5). Bhutan is number two on the world's most wanted country list and the 15 operators from Belgium, Finland, Japan, Russia, Senegal and the USA will have their hands full coping with the huge demand for this very rare country.

Operation will be on all bands using s.s.b. and c.w. with RTTY on 14, 21 and 28MHz, power output will be limited to just 100W. A Web site is available at **http:\\www.qsl.net\bhutan2000** and for those readers lucky enough to work them, your QSL card should go to **Glenn Johnson W0GJ, 14164 Irvine, Bemidji, MN 56601, USA**. Thanks to **Tedd Mirgliotta KB8NW** and the **OPDX bulletin** for this information.

PROPAGATION REPORT

Now over to **Don McLean G3NOF** in Yeovil now for his regular h.f. 'Propagation Report'. Don says: "Conditions have been very good at times, but at other times the bands have been almost dead.

"There have been some solar flares and solar storms this month and 14MHz has been open day and night with long path openings to VK/ZL from 0600UTC until 1000UTC and the short path from 1500UTC onwards. Pacific stations were heard over the North Pole between 0900 and 1000UTC with strong signals from stations in Asia over the short path from 1600UTC until late in the evening. North America could be heard at all times through out the day and night.

"The 18 and 21MHz bands had similar conditions with good signals heard from VK/ZL most days from 0700UTC until late morning and Asian stations strongest around 0830UTC. African stations could be heard later in the afternoons around 1600UTC.

"Unlike the other bands, 24MHz was very poor although some good DX openings did occur around lunch time. The 28MHz band, however, had some very good days with the short path to Asia opening up in the mornings from 0900UTC. North America was particularly loud from late afternoon until 2200UTC and a few stations could still being copied around midnight".

YOUR REPORTS

Moving swiftly on to your reports now and first off this month is **Sean Gilbert G4UCJ** in Milton Keynes who was pleased to rack up a few new QRP countries to make his new total 157. Sean says: "It's getting very difficult to get new countries using QRP but occasionally a new one just pops up out of nowhere begging to be answered.

"I still get amazed at some of the signal reports I receive when running just 3W"! Sean made quite a number of contacts on 7MHz including PJ4/K2NG (Netherlands Antilles) ZF2NT (Cayman Islands), DL7DF/HI (Dominican Republic) and a single QRP c.w. contact G3XTT/VP9 (Bermuda) all around 2400UTC.

On 10MHz, contacts included ZP6CW (Paraguay) at 2250UTC QSL via POB 73, Caapupe, J3/VE3EBN (Grenada) at 0019UTC, J6/K4WA (St. Lucia) at 0217UTC and VP6BR (Pitcairn Island) at 0437UTC. When do you find the time to sleep Sean?

THE 14MHz BAND

On to the 14MHz band and c.w. operator **Ted Trowell G2HKU** on the Isle of Sheppey who used his Ten Tec Omni V and G5RV to work TX0DX (New Caledonia) at 1800UTC and 8Q7KK (Maldives) QSL via HA2SX at 2300UTC.

Over now to **Robin Trebilcock GW3ZCF** from Bishopston near Swansea who used his 40m (7MHz) horizontal loop and 100W of s.s.b. to work VK6MV (Australia) at 0902UTC and VK6WT on the key at 0907UTC.

The large log from Sean G4UCJ lists QRP contacts with ZL6QH (New Zealand) at 0828UTC, E21EJC (Thailand) at 2006UTC, VU2WAP (India), HF0POL (South Shetlands) and J68AS (St. Lucia) all around 2350UTC. His 30W contacts included 3W50K (Vietnam) at 1913UTC and TI2/DL8UD (Costa Rica) at 2200UTC.

Fig. 1: Some examples of the QSL cards which Carl GW0VSW received from some s.w.l.s which made him double-check his log!

THE 18 & 21MHz BANDS

Where the 18 & 21MHz bands were concerned this month, Ted G2HKU enjoyed himself on 18MHz working JR4GPA (Japan), 3V8BB (Tunisia), JY8FX (Jordan) QSL via DL6FCK and 3B8MM (Mauritius) QSL via DL6UAA all between 1700 and 2100UTC. Meanwhile Robin GW3ZCF used c.w. again to work YV6AZC (Venezuela) at 0700UTC. QSL via PO Box 348, Barquismeto, Lara 3001.

Don McLean G3NOF in Yeovil has also been very active on 18MHz this month. His s.s.b. reached out to CE0Z/OH2MXS (Juan Fernandez), FY5HY (French Guyana), FO5NL (French Polynesia), JW5QFA (Svalbard), R1ANZ (Antartica) QSL via UW1ZC, V31GI (Belize), VP6BR (Pitcairn Island).

Finally, Roy W6UKX/KH6 (Hawaii) who was operating from his bedroom using an IC-706 and 100W to a small mobile antenna. All these contacts were made between 0900 and 1030UTC.

Over to 21MHz now and **John Heys G3BDQ** in Guestling near Hastings. John used his rotary tri-band dipole and c.w. to work BV6ES (Taiwan), DU1TXU (Philippines), FK8GJ (New Caledonia) QSL via M. Bourez, BP 8690, F-98800, Noumea Sud, France, E4/G3WQU (Palestine), VR2GY (Hong Kong) and KH8/N5OLS (American Samoa).

In his letter, John asked if more QSL information could be given especially for DXpeditions because he says "I am sure I am not the only DXer without a computer and access to the Internet"! We will do our best John.

Next off is **Brian Parsons GW0KZK** in Skewen who used his FT-1000MP and 200W of s.s.b. to work 4W6HM (Yemen) and VE3ODC (Canada) both around 1600UTC.

THE 28MHz BAND

All of our reporters this month spent a good deal of their time on the 28MHz band. I was pleased to receive a report from **Jayne Richardson 2E0ASR** in Milton Keynes.

Jayne managed to rack up over 70 North Americans this month together with countries like Canada, Brazil and Jordan using an Alinco DX-70, loft-mounted G5RV and just 3W of s.s.b. Jayne says "The Americans seem to have a lot of trouble with the 2E0 prefix. It is totally alien to them and one station even asked me what country I was in"!

Jayne worked VP5DX (Turks & Caicos Islands), 8P2K (Barbados) both around midday, P40V (Aruba) at 1653UTC, QSL via AI6V and

HD8Z (Galapagos Islands) at 2112UTC. I'm happy to say that Jayne has now passed the RAE and becomes **M5ASR**. Well done Jayne!

On to **John Wheeler G0IUE** of Melksham in Wiltshire who found conditions on 28MHz very good. John used 200W and a 2-element tri-bander to catch a new country HL1KTX (South Korea), 3V8BT (Tunisia), HC1HC (Ecuador), VU2XO (India) and YY50HM (Venezuala), SM0FLY (Sweden) and K7PVZ (USA) between 1100 and 2000UTC.

Ted G2HKU had all c.w. contacts with UA0SR (Asiatic Russia), OA7/DL3GA (Peru), ZS6AL (South Africa), V51AS (Namibia) QSL via F. Steinhauser, PO Box 2516, Swakopmund and KP2/K3VA (Virgin Islands). Don G3NOF was also very busy on this band and worked C6AJZ (Bahamas), TZ6DX (Mali), V31JP (Belize) QSL via K8JP, V47KP (St. Kitts) QSL via K2SB, XX9TRR (Macao) and finally YI9OM (Iraq) all between 1700 and 2130UTC.

Sean G4UCJ lists A45XR (Oman) QSL via K.Dabrowski, Muscat Pharmacy, Siemans Medical Division, P Muscat PC-113 at 0806UTC, 5Z4WI (Kenya) at 1049UTC QSL via G3SWH, 9G5VJ (Ghana) at 1723UTC QSL via G4ZVJ and HF0POL (South Shetland Island) at 1921UTC QSL via SP3WVL.

Finally, John G3BDQ, working around 1100 to 1700UTC was pleased to bag S79MX (Seychelles) QSL via HB9MX, 3W2GAX (Vietnam) QSL via JA7GAX, 6W4RK (Senegal) and FO0AAA (French Polynesia) QSL via N7CQQ to take his all time country total to 319.

FAREWELL TO PORTISHEAD RADIO

Now for a farewell to Portishead Radio, due to the historic and imminent closure of the BT Maritime HF Radio Service, special permission was granted by the Radio Communications Agency (RA) for UK Radio Amateurs, using only Morse code, to contact Portishead Radio on Saturday 29th April.

The cross band event generated enormous interest from amateur stations around the world as well as Coastguard and military operators. Stations from VK (Australia), ZL (New Zealand), E4 (Palestine) and 9V (Singapore) were all heard in the pile-ups on the five bands used: 3, 7, 14, 17 & 21MHz.

Radio Officers operated four consoles using the callsigns GKB2, 4, 5, 6 and 7 from 0700-1900 UTC and did their best to work as many stations as possible in the allotted time. Over 3000 QSOs were made to well over 100 DXCC countries including contacts with maritime mobile stations, a Coastguard cutter and one submarine!

A QSL card is available for those who made a QSO or sent in an s.w.l. report. These are available from **David Barlow G3PLE, PO Box 50, Helston, Cornwall, TR12 7YQ**.

WRAP UP TIME

Well, that about wraps it up for this month. Despite the mixed conditions, our reporters have certainly found lots of DX to work from all parts of the world. Long may it continue!

Thanks to you all for your input to the 'HF Far & Wide' column. Your letters, telephone calls and E-mails are most welcome!

AS USUAL REPORTS, INFORMATION AND PHOTOGRAPHS PLEASE TO ME BY THE 15TH OF THE MONTH.

Carl GW0VSW

SCENE USA

PLEASE SEND ME REPORTS & INFORMATION FOR THE OCTOBER COLUMN BY JULY 15TH.

ED TAYLOR N0ED
PO BOX 261304
DENVER
COLORADO 80226, USA

E-MAIL: N0ED@qsl.net

VISITORS OFTEN GET THEIR IDEAS OF WHAT THE USA IS LIKE FROM TV. THIS MONTH, WE LOOK AT OTHER SOURCES OF BROADCAST INFORMATION AND BACKGROUND & THEN WE FIND OUT WHAT WE MIGHT SEE AND HEAR WHEN IN AMERICA.

THIS MONTH ED TAYLOR N0ED TAKES A LOOK AT OTHER SOURCES OF BROADCAST INFORMATION IN THE USA

It's fun to take Amateur Radio equipment when going to another country - you can find out about radio conditions in the area, meet the locals and (sometimes) be a DX station for a while. I recommend it! But it's not always that easy and you may want to be a tourist rather than a radio 'Ham'.

Even without a rig, we can learn a lot from US radio and TV programmes. Most hotel rooms have TV and a portable a.m./f.m. receiver is easily carried. In addition, rental cars invariably contain radios - useful for the long journeys that are often characteristic of American travel.

Of course, the universality of American popular culture means that we probably already have ideas about what we will find before getting to the USA. Everyone must have seen an American TV program and formed an opinion about what the country is like and because of the shared language and history, many news stories travel to the UK across the Atlantic.

TWO MAIN TOPICS

I'll be covering two main topics in this column - first, I want to explain how you can use broadcasts to delve a little bit deeper into the American way of life before you arrive. Then I would like to help you make your way around the TV and radio spectrum when you are in the USA.

So let's start by considering what we can learn from American TV and radio programmes. We're most familiar with TV series on our national channels, you will have to make your own judgement as to whether popular shows from across the pond represent mainstream American life. Most people would say they give you a distorted picture at best!

If you can receive CNN, or one of the other US news channels, you'll learn more. Reporting of major events is usually very good and it can be beneficial that the channel is devoted entirely to news - a story is covered until it is over.

It's clear that the concerns of the American public are fairly insular, still, the interests of a news-hungry public are similar everywhere. Disasters, crime, taxes, war and politics are staples. But the shorter news items will also give insights, which are interesting to observe.

AMERICAN RADIO PROGRAMMES

American radio programmes are not normally distributed elsewhere, so you'll need short wave or satellite to get a flavour of US radio broadcasting. The closest you get to the BBC's World Service is the **Voice of America (VOA)**.

The VOA is a chain of radio stations which broadcast on behalf of the US government. They have a mission to tell the world about America and to provide balanced reporting on news events.

The VOA's output is generally considered rather stodgy. This is

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 and sloping wire antenna and is also busy with his mobile rig.

Sean Gilburt G4UJC operates:
around 0700-1100 and 2100-0000 seven days a week on all bands using an FT-307 and Alinco DX-70 tranceivers at 3/30W into a loft-mounted G5RV dipole antenna.

Rob Mannion G3FXD listens and operates:
weekdays and weekends, 1800-1830 on 3.7MHz with 100W s.s.b. and 3.530 or 3.560MHz and 18.105MHz QRP c.w. using an Alinco DX-70 transceiver and a long wire or mobile whips on the way home between 1700-1800 weekdays.

Don McLean G3NOF operates:
1030 Saturdays on 3.685MHz on the ISWL Net or 1030 Sundays on the Yeovil ARC Net on 3.665MHz using a Kenwood TS-950 and trapped dipole antenna.

Leighton Smart GW0LBI operates:
on 1.949MHZ s.s.b. and 1.820 to 1.836MHZ c.w. weekday evenings between 1900 and 2230 using a Yaesu FT-747G QRP transceiver and 5W into a 60m long wire Marconi antenna.

George Woods G3LPT operates:
an open net on 29.630 n.b.f.m. 0830 Tuesday to Friday.

John Wheeler G0IUE monitors:
28.600 n.b.f.m. every evening between 1730 and 2230 regardless of conditions using a Yaesu FT-920 transceiver running 100W and 2-element tri-band beam.

Brian Parsons GW0KZK listens and operates:
on 14.250MHZ 1000-12000 and 1400-1600 most days using an Yaesu FT-1000MP and 100W into a 4 element Mosely beam.

because it's constrained by strict laws about balance and fairness, so it takes few risks and presents a bland face to the world.

The easiest way to hear VOA is on short wave, where there are regular broadcasts in English and other languages. I won't try to list frequencies for the VOA, because they change seasonally. However, why not visit the VOA Web site at **http://www.voa.gov/** Another useful site is a useful Web site for frequency information is: **www.earthsignals.com/swfreqs.html**

Other stations, privately funded, broadcast on short wave from North America, some of them with very definite viewpoints. Several are religious, usually with a decidedly right-wing bias and others try to present a 'variety' format, which can be entertaining.

For a different and (in my view) more intriguing approach, listen to the **Canadian Broadcasting Corporation**, which will disabuse you of the idea that Canada is really just like the USA, but colder!

Editorial comment: *Ed's suggestion is an excellent idea.* ***Radio Canada International (RCI)*** *- which I regularly listen to on the 49m (6MHz) band is received well on my bedside Roberts Radio RC-828 set-top whip in the late evenings here in Dorset. Including much of the 'domestic' programmes (as it now does) in its international service - RCI provides a fascinating insight into the daily life of our Commonwealth friends in Canada.* ***Highly recommended listening! Editor.***

BROADCASTING IN THE USA

Let's turn to broadcasting in the USA itself, starting with TV. From the technical point of view, American TV is a curious mixture, it uses an older standard, developed before other countries, which works better than you might expect.

There are 525 lines and the definition isn't quite as good as the 625 lines in Europe. The colour system is called NTSC, for National Television Standards Committee, although some say NTSC actually stands for 'Never Twice the Same Colour'!

Broadcasting is both on v.h.f. and u.h.f., as it was in Britain until recently and one of the reception problems is that you need an antenna which covers a huge frequency range: 55 to 900MHz. This is hard to do effectively and many viewers accept the fact that some channels will have poor pictures.

Matters are made worse because not all the signals come from the same place and you may have to compromise on the direction to point your antenna.

Partly as a result, cable TV is very popular and available to almost everyone in cities and towns and in addition, satellite TV is becoming more available and is particularly

Fig. 1: The Voice of America (VOA) Web site can be found at http://www.voa.gov/

valuable in rural areas. Developments in digital TV mean that reception problems will eventually be reduced, with better pictures and sound.

I won't take too much space to discuss the quality of American TV programmes, you will have to judge for yourself. Remember that very few TV networks are creating programmes for public enrichment - they're all in it for the money!

When you've watched for a while, see if you agree with this: in 1961, the Chairman of the **Federal Communications Commission (FCC)**, which regulates broadcasting in the USA, told TV executives that they had created a "vast wasteland".

Perhaps things have improved, the **Public Broadcasting System (PBS)** carries a number of good programmes, some from the UK, and specialist cable TV stations such as the History Channel are an antidote to otherwise unexciting fare.

Anyone who is desperate for some soccer while in the USA could tune to one of the Spanish-language stations, available almost everywhere. Still, I can't help agreeing that the high hopes of the people who invented TV have been dashed - there are hundreds of channels with little to watch!

One final point on this subject: most TV stations broadcasting with radio waves (i.e. not on cable) are local in character - they may belong to a national network, but still retain an outlook based on their own city. Consequently, news broadcasts appear to a European eye to be remarkably parochial.

In an half-hour newscast, perhaps 20 minutes will be concerned with city and state matters, there might be five minutes of national news then, if time permits, an international story or two. This can change when a national story becomes prominent but, by and large, news coverage is oriented towards the immediate community.

FREQUENT QUESTION

A frequent question from British visitors to the United States is: "What's the equivalent of Radio 4"? The answer is that there's nothing that really comes close, in fact, because of the circumstances under which radio was developed, there's little funding for the 'speech-based' sorts of programme that we're familiar with in the UK.

Let's go back to the beginnings of radio in the USA - broadcasting wasn't distinguished from Amateur Radio for quite a while. Amateurs shared the same wavelengths and were allowed to transmit music, news and so on, while doing their experiments. It didn't take long for large companies to realise that this was something they could use to make money.

By contrast, in Britain during the 1920s, the government was creating the BBC, which had a monopoly of radio (and then TV) for over 30 years. Radio was seen as a service to be managed in the public interest.

Development of American broadcasting took a very different turn, for the most part because it was thought that the government should stay out of things. Instead, the marketplace could decide who the broadcasters were and what material they should use.

Other factors were important, principally related to the distances involved. It was clear that one transmitter couldn't possibly cover the whole United States, although this is possible in a smaller area such as the British Isles.

Operation was in the medium wave (m.w.) band (500 - 1600kHz), where a day time transmitter could reasonably encompass a city, with the fairly primitive receivers then in use.

Thus, radio stations used relatively low power by European standards. Even today, the highest power normally encountered for a US radio broadcast station is 50kW.

In the early 1930s, there was confusion on m.w. in the USA, the lax regulation led to a free-for-all where interference between stations was common. The FCC was given power to regulate matters and still has jurisdiction over communications affairs, including Amateur Radio.

Long wave (l.w.) was never used, mainly because it was impossible to allocate this limited spectrum fairly to commercial entities. Thus, radio has stayed a medium where most stations are local and there is little networking of programmes from any central point.

More recently, the a.m. band has become larger - note that the term a.m. (amplitude modulation) is generally used for m.w., even though this is technically inaccurate.

The high frequency end has expanded from 1605 to 1705kHz which was made possible because shipping and other services had moved to v.h.f. and satellite. If there's still a demand for it, expect the top end to creep up towards our 160m (1.8MHz) band and the bottom end to stretch below 500kHz.

At present, there are cordless phones and baby monitors using 1.7 - 1.8MHz, with some shipping and aircraft services below 500kHz, but this could change.

By the way, be aware of this technical point if you bring a digitally-tuned radio to the USA. Channel spacing on a.m. is 10kHz, whereas it's 9kHz in Europe. Many radios can be switched over, but some can't and you may be unable to tune in accurately.

AMERICAN ALLOCATION ON VHF

The American allocation on v.h.f. (88 - 108MHz), usually known as f.m. (frequency modulation), is the same as in Europe. Stations in the US are local and may be owned by the same company as a.m. and other f.m. stations.

In recent years, f.m. channels have become much sought-after, particularly in the larger cities. Commercial stations may be bought and sold and amounts in the region of $20 million and more have changed hands.

I haven't said much about the content you can find on a.m. and f.m. radio in the USA. After the introduction of TV in the 1940s, radio programming suffered a gradual decline, from which it has never really recovered.

It seems as though the subsidy from licence fees is the only way to ensure diversity and this has never been the American way. Now, with a few exceptions, you can tune across the radio broadcast bands and find a depressing uniformity - it's usually hard to tell which station you're tuned to, because they really do sound much the same.

On f.m., the higher sound quality means that music is the favoured format. In large conurbations, there will usually be a dozen stations playing similar rock music, selected from a chart playlist.

There will perhaps be a jazz or classical music station somewhere, with probably a religious station and a non-English language station (usually Spanish). The greying of the population has caused some stations to switch to 'oldies', also found on a.m.

The f.m. segment from 88 - 92MHz is allocated to non-profit

organisations and this is frequently the most interesting section. Of particular note is the network of stations affiliated with 'National Public Radio' who broadcast morning and evening news programmes comparable to 'Today' and 'PM' and are exceptional in being less parochial in outlook.

The content on a.m. is generally a mixture of stations featuring talk, news, religion and sport. Suffice it to say that 'talk' generally means phone-ins and 'news' is usually a repeated 20 minute segment of short items.

If you ever find yourself driving across the plains of the mid-west, take some good cassettes. In an area where only a.m. penetrates, your company on the radio is likely to be a preacher or a telephone discussion of the latest baseball news!

THAT'S ALL

That's all for this month, I hope you've enjoyed this mini-tour of American broadcasting. There's radio outside the amateur bands and it's sometimes interesting to find out what's being said!

I HOPE TO CONTACT MANY OF YOU IN THE RSGB'S 'ISLANDS ON THE AIR' CONTEST (July 29-30), WHERE I PLAN TO BE OPERATING AS TF/N0ED.

73 Ed N0ED

DATA SCAPE

NEWS, VIEWS & PICTURES TO ME PLEASE:

ROGER COOKE G3LDI

TEL: (01508) 570278

PACKET: G3LDI @ GB7LDI

E-MAIL: rcooke@g3ldi.freeserve.co.uk

ROGER COOKE G3LDI HAS SOME MORE DATA SNIPPETS FOR YOU THIS MONTH. HE HAS NEWS OF IOMEGA'S NEW ZipCD, TOSHIBA'S NEW COMBO DRIVE AS WELL AS UPDATES ON THE FIREWALL PROGRAM - WHAT MORE COULD TODAY'S DATA ENTHUSIAST WANT?

First off is just a quick reminder that there will be **no BARTG rally this year**. The venue (Sandown Park) was becoming too expensive and the selected date also clashed with other rallies - what date doesn't clash these days! However, BARTG will be present at more rallies due to the freeing of resources so it's not all bad news.

If you wish to join BARTG, **Bill McGill G0DXB** is the Membership Secretary and he can be reached at **BARTG, Freepost NEA8763, Rotherham, S66 7BR**. Bill is also on Packet at **G0DXB@GB7WRG** or E-mail at: **members@bartg.demon.co.uk** Incidentally, the UK price is still £12 per annum and good value at that.

ROGER G3LDI HAS MORE DATA-RELATED AMATEUR RADIO NEWS FOR YOU THIS MONTH & REMINDS YOU THAT THERE'S NO BARTG RALLY THIS YEAR

Fig. 1: Dimension 4: an easy way for you to maintain atomic clock accuracy on your PC. Go to www.thinkman.com

OPEN SOURCE CODE

Linux has been open source code since inception and is rapidly gaining in popularity, not only among individuals, who prefer the operating system to Windows, but to the commercial organisations and it's in danger of breaking up into competing variations that will be incompatible. Programmers can do what they like with the code and as a result, it's inevitable that there will be versions that are incompatible with others.

Developers are contractually obliged to make the system open source and code changes have to go back to the public domain. It would be difficult for anyone to hijack Linux into a totally separate product for their own use. However, users should be aware of this and look for the warnings that will accompany the software.

BACK IN DECEMBER

Back in the December 1999 'Data Scape' column, I mentioned the new *LookC* security system from **ATM**. With the new high bandwidth mobile phone, called G3, due for release in the UK within 12 months, ATM have some ideas. With the new system, it will be possible to have such things as video conferencing, browsing the Internet, etc. Other options from the LookC technology will be your home or office CCTV security information - *LookC* will interface directly to your G3 in order to alert you when something is happening which shouldn't be. You'll be able to answer calls at the front door and see who is letting them in, so no more days off work to wait for courier deliveries or workmen, you can watch them from the comfort of the office Web browser or on the G3 mobile when on the move.

The *LookC* home security server is just one of the formats which the *LookC* technology will take in the coming six months in order to make life easier and safer for the user. We're not talking about a software and hardware add-on to your home PC, but a full security CCTV system designed and built to surpass the specification for alarm systems.

People won't be able to tamper with the *LookC* system and if the power goes off then it will keep on running and serving your CCTV information for a whole eight hours, alerting you if it suspects a break-in is in progress. Like its *LookC* brother and sister products, already available, it will copy images of suspect villains to the secure server on the Internet at **www.LookC.co.uk** so that if the worst happens and the *LookC* server is knocked out, you will still have the visual evidence in your account of the secure server.

The *LookC* home security server will also take over the roles of router, home file server, home Web server, .ftp server and firewall. You don't have to think about where it fits in with other Web products in the home, it **is** the Web in the home.

For more details visit ATM's Web site: **www.atmltd.co.uk** or E-mail them direct on **bob@ATMltd.co.uk** Technology is improving all the time and with these sophisticated security systems available now, our property is becoming more secure by the day.

BACK UP YOUR FILES

You **DID** back up your files last night didn't you? Well, I wonder how many of us really do a regular back-up? Using floppy disks can be a real pain, so I would think that the answer to that question is not very many!

However, the cost of writable CD drives and recordable CD media has been falling for several years. This fall in price has accelerated even further in the last year as DVD (Digital Video Disk) has taken a quicker than expected hold and CDROM drives finally begin to hit the ceiling of usable read speeds.

The advent of the sub-£100 CD-R drive has also helped to depress prices even further. This, combined with the bulk prices of CD-R and CD-RW media (which can be cheaper than bulk floppy disks even in small quantities), this finally makes CD a viable option for both back-up storage and floppy disk replacement.

UNPARALLELED SUCCESS

Iomega achieved unparalleled success with the Zip drive - a 100Mb external cartridge drive that immediately won the hearts and minds of many users, who were desperate to replace the floppy drive. It's now working to retain its user base by offering larger, more robust removable storage in the same user-friendly style.

The **ZipCD** is an external CD-RW drive, using the universal serial bus (USB) for connection rather than the traditional parallel or SCSI interfaces it favoured for its original drives. The USB interface allows quick and easy installation.

As USB supports 'plug and play', drivers can be loaded up on demand and because USB is "hot-swappable" you can attach and disconnect the drive from your machine while it is running. In addition, USB-enabled peripherals also support faster data transfers, which allow video and audio files to be compiled more rapidly than parallel port-based drives. However, the current USB offering is still not as fast as the majority of SCSI implementations.

The ZipCD follows the design of the original Zip and Jaz drives, the unit is contained in a heavy blue plastic case, which is capable of withstanding rough handling. At the back of the case is a single USB lead socket, two phono audio outputs and a socket for the power supply and once plugged into the computer with the drivers installed for the first time, the device immediately gels into place among your available drives under Windows 9x, NT or MacOS.

Unfortunately, the ZipCD comes bundled with the abysmal Adaptec Easy CD Creator, a tool designed for the totally hapless user. While this is fine for the Novice, someone with even the most limited PC experience will soon become irritated by its inflexible user interface and painfully sparse lack of options.

On the other hand, Adaptecs' rather good Direct CD software for data copying is also included, which at least partially solves the problem, although it doesn't offer anything like the functionality of VOB, Gear Pro or CeQuadrant WinCD. However, there's also a warning not to use Direct CD because of a known problem with the drive that will cause the

occasional write failure.

There's one drawback with the ZipCD and that is the fact that the speed limitations of USB artificially cap the read speed of the drive to 6x (900k/sec) while the write and re-write speeds remain at a more acceptable 4x (600k/sec). The planned USB2 specification will allow for much faster devices, although for mastering and copying these speeds are perfectly adequate.

FIRMLY ESTABLISHED

Toshiba started out in the DVD market a while ago and it has firmly established itself as one of the leading developers of PC and stand-alone DVDROM drives and DVDRAM recordable units. It's decided to combine this knowledge with a low-cost CD-RW drive mechanism, creating the **SD-R1002** drive - also known as the **Combo drive**.

The Combo is essentially a CD-RW rewritable drive with built-in DVDROM support. It allows users to access both CD and DVDROM disks and master CD disks of their own in a device the size of a single CD drive.

Until now, this would've needed a separate DVDROM drive and CD-RW drive. To achieve this, Toshiba has developed a new high-performance pick-up head that allows it to read and write CD-R and CD-RW as well as reading DVDROM and DVD-Video using a single mechanism.

Using the drive for both types of media is very simple. Both 650Mb (74 minutes) and 700Mb (80 minute) CD-R and CD-RW media are supported by the drive, along with all other common CD formats and major DVD formats, including DVD-R.

The Combo drive isn't the fastest CD-RW drive on the market (8x and 10x drives are now becoming common), but it's fast enough to be usable in backing up and floppy-replacement. Writing both CD-R and CD-RW it can manage 4x transfer and, when reading, the transfer speed varies between 8x and 20x (1.2Mb/sec and 3Mb/sec) for CD-R and CD-RW media.

For mass recorded CDROMS it achieves between 10.3x and 24x (1.55Mb/sec and 3.6Mb/sec). For DVDROM access, the drive achieves between 1.7x and 4x (2.3Mb/sec and 5.4Mb/sec). Speeds vary on fast units depending on the position of the head at the time of reading and can also be affected by processor speed and other devices on the same IDE interface channel.

Included in the package is an impressive software bundle. CD writing software comes in the form of VOB Instant CD and the VOB software supports all CD Formats, MP3 recording, plus Packet writing and Video CD creation.

While not quite as fully featured as, for example, Gear Pro, the Combo makes up for it with its intuitive user interface. *WinDVD 2000* provides software DVD decoding and copes well even on a minimum specification Pentium II 350MHz processor.

The Combo is IDE-based, which makes sense given that nearly all PC motherboards have on-board EIDE interfaces, however, it's not as fast or resistant to priority conflict as SCSI is. This is only likely to cause a problem is it is used with an old non-direct memory access device such as a hard drive. A further benefit of having a combination drive is that it only takes up one 5.25 inch bay and one EIDE channel.

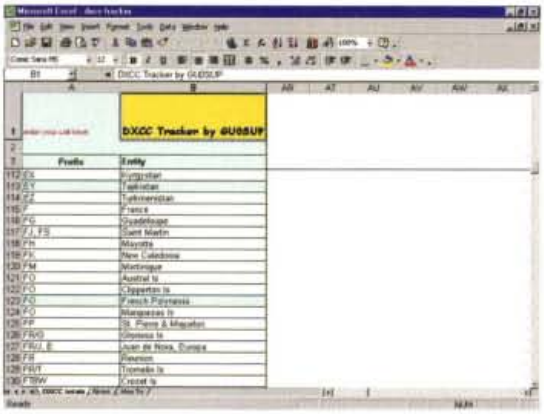


Fig. 2: DX-tracker an Excel spreadsheet created to track what you've worked, confirmed or accepted for RTTY DXCC. Go to www.guernsey.net/~pcooper

ATOMIC CLOCK ACCURACY

Here's an easy way for you to maintain atomic clock accuracy on your PC. If you connect to the Internet or your ISP (Internet Service Provider) every day, then this TSR program is just the job. I run it here and it maintains my PC clock very accurately.

The program is called *Dimension 4* and is available from **www.thinkman.com** (see **Fig. 1**). The file you require is called **D4TIME43.EXE** and when you've downloaded it, just run it and it will self-install as a TSR.

Running minimised, the program corrects your clock every time you connect to the Internet and you can set various parameters in the main screen, and also chose the site from which you get the updates. Very useful, pity it doesn't work across the network, then I could keep the BBS and Satgate machines accurate.

INTERNET PRIVACY UPDATE

I covered ***ZoneAlarm***, an Internet privacy program, in the May 2000 'Data Scape' column and now run this Firewall myself. **Steve Gibson**, the author of this security program, offers updates and news and you can subscribe to receive these. His Web site is **http://grc.com/**

The **FREE** ZoneAlarm Firewall is evolving nicely, Version 2.1 is currently in beta testing and is really working VERY well. It adds the significant new feature of "event logging" so that a record of blocked Internet traffic is preserved.

ZoneLabs version 2.1 beta page, where you can download and experiment with this very nicely developing free personal firewall: **http://www.zonelabs.com**

'SPY' SCARE

Several weeks ago a 'spy' scare swept through the Internet community regarding alleged Internet 'spying' being done by a very popular advertising system known as Aureate (now renamed to 'Radiate'). Since the Aureate system is 'carried' into the user's PC by more than 400 popular freeware programs (*Go!Zilla, GetRight, CuteFTP* and others) and is currently installed and running in over **22 million PCs**, the threat that this software is 'spying' on its users is of great and immediate concern.

The system is secretly running as a 'parasite' on your Netscape or Microsoft Web browser, using your browser's Internet connection to communicate with Aureate servers in the background without the user's knowledge or explicit permission! This meant that the Aureate software was running and communicating over the Internet even when the hosting 'carrier' freeware, which brought it into the system, wasn't running!

The browser 'parasite' had also been implicated in frequent crashes of those browsers. Even after the 'freeware' which brought this parasitic software into the user's machine had been completely removed, **the Aureate system remained installed and operating secretly**!

Steve decided to create an easy-to-use tool to check for the presence of known 'baddies' and - optionally - remove them from the computer for the user. The program is called ***OptOut*** because it allows users to 'opt out' of the use of unwanted advertising software on their machines.

Please take a look at the new *OptOut* page on the **grc.com** Web site for more information and news about Aureate and *OptOut*. You can download it from there too: **http://grc.com/optout.htm**

TRACK WHAT YOU'VE WORKED

If anyone's interested in an *Excel* spreadsheet created to track what you've worked, confirmed or accepted for RTTY DXCC, then ***DX-tracker*** will be very handy. Written by **Phil GU0SUP**, it's the current DXCC listing, including the two latest additions, with columns for the various bands.

For 'Worked' or 'Confirmed', you enter a 'W' or a 'C' and for 'Accepted', you enter an 'A'. There are spaces to enter callsigns that you've not yet had confirmed (i.e. still chasing the card!) and for the callsigns on the cards accepted by DXCC.

Phil will gladly E-mail you a copy and he's also open to suggestions for improvements. **E-mail: pcooper@guernsey.net** or visit the Web site **www.guernsey.net/~pcooper** (See **Fig. 2**).

AND FINALLY...

And finally ... a man attempting to set up his new printer called the printer's technical support number, complaining about the error message: "Can't find the printer". On the telephone, the man said he even held the printer up in front of the screen, but the computer still couldn't find it!

THAT'S ALL FOR THIS MONTH, I'LL HAVE MORE DATA-RELATED NEWS FOR YOU IN MY NEXT COLUMN. UNTIL THEN, KEEP BUSY ...

Roger

Web Watch:

***LookC* Security System: www.LookC.co.uk and also www.atmltd.co.uk**

***Dimension 4* Atomic Clock: www.thinkman.com**

***ZoneAlarm* Internet privacy program: http://grc.com/**

***ZoneLabs* version 2.1: http://www.zonelabs.com**

New *OptOut* page: http://grc.com/optout.htm

***DX-tracker* : www.guernsey.net/~pcooper**

BROADCAST

REPORTS & INFORMATION TO ME PLEASE:

PETER SHORE
C/O *PW* EDITORIAL OFFICES
ARROWSMITH COURT
STATION APPROACH
BROADSTONE
DORSET BH18 8PW

E-MAIL:
petershore@pwpublishing.ltd.uk

THIS MONTH PETER SHORE HAS MORE SCHEDULE NEWS FOR YOU, AS WELL AS NEWS OF THE FIRE WHICH SWEPT THROUGH RADIO NETHERLANDS' BONAIRE RELAY STATION. IF YOU WANT TO KNOW WHERE & WHEN TO LISTEN FOR THAT CERTAIN RADIO STATION THEN THIS COLUMN IS A 'MUST READ'!

PETER SHORE IS BACK AGAIN THIS MONTH WITH MORE FREQUENCY NEWS FOR YOU.

Fire is a problem in any environment and millions are spent each year on fire prevention. But even the most protected operations can be caught out and that's what happened to the **Radio Netherlands** relay station in Bonaire, over the Easter weekend in late April (See **Figs. 1, 2, 3, 4 & 5**).

The Bonaire transmitting station is an important one for Radio Netherlands as it sends programmes to North and to South America - and the Spanish-language service is one of the most popular international radio stations in many Latin American countries. The station also carries programmes to the Pacific and to West Africa and relays **Deutsche Welle (DW)** and **Radio Vlaanderen Internationaal (RVI)**.

Damage was extensive, although thankfully no-one was injured in the blaze that broke out in the generator room. International broadcasters rallied round and a significant proportion of Radio Netherlands' Bonaire transmissions were accommodated on transmitters in Antigua, Ascension Island, Cypress Creek in the USA, Jülich in Germany and Komsomolsk-Amur in Russia. Radio Netherlands' Flevo site in Holland also picked up some of the transmissions.

After the fire had been extinguished, the station's staff worked round the clock to get it back on the air. Two new high power generators were installed to run the transmitters and a smaller one was put in place to provide general supply to the offices.

Don't forget that high frequency transmitters burn up enormous amounts of power. The Bonaire site has two 250kW transmitters and when both are on the air it's broadly equivalent to the power consumed by 500 one bar electric fires!

Because of this enormous power consumption, many transmitting stations are fitted with sophisticated power management systems that cut the amount of power used when there are silences in the programme output - even if only for a matter of a second or two. This has a significant impact on the power bills which tend to be much higher in areas where there is no national grid and broadcasters have to generate their own power - international broadcasting is not a cheap business to be in!

PROPOSED LW STATION

From the Netherlands itself, there's news about the proposed long wave (l.w.) station that I've been reporting on for some time. Regular readers may recall that a consortium put together a proposal for **Delta Radio** that's to beam music programmes to the UK.

There's US funding behind the project and because of environmental objections, the owners said that they'd like to put the transmitting station some way offshore,

feeding the enormous transmitters with power from the mainland through what can only be described as the strongest armoured cable ever seen!

Now, though, a Dutch court has approved plans to site the l.w. station at the old short wave (s.w.) site of Kootwijk. Undoubtedly there will be more protests from local environmentalists and it could be the end of the year before a final decision is made.

Meanwhile, the short list of potential builders and operators of the l.w. station has been narrowed and may well be a British firm that has many years experience in operating high power long wave facilities.

Some more slightly offshore news now: **Radio Northsea International** is on the Internet at **www.rni.org.uk** and **Radio Caroline**, who celebrated its 36th birthday in April, is on the web at **www.radio-caroline.nl**

CURRENT SCHEDULES

Here's the current schedule for English from **Radio Sweden**, with the most recent frequency change to counteract interference in the 16m band (all times are in UTC): 0130-0200 on 13.625MHz; 0230-0300 on 9.495MHz; 0330-0400 on 9.495MHz; 1130-1200 on 18.96MHz; 1230-1300 on 17.505, 18.96, 21.81MHz; 1330-1400 on 17.505MHz; 1430-1500 on 18.96MHz; 1730-1800 on 1179 m.w. (except Sunday), 6.065 (except Sunday), 13.80MHz (Sunday only); 1930-2000 on 1179 m.w., 6.065MHz; 2130-2200 on 1179 m.w., 6.065, 9.435, 15.255MHz.

Sri Lanka has been making the news over the past few weeks as Tamil Tigers moved towards the city of Jaffna that they regard as the capital of a future Tamil state. The **Sri Lanka Broadcasting Corporation's international English** service is on the air (all times are in UTC): 0025-0430 on 6.075, 9.73 and 15.425MHz; 1030-1130 on 11.835 and 17.85MHz; 1225-1600 on 6.005 or 6.075, plus 9.735 and 15.425MHz; 1830-2130 on 6.005MHz; 1900-2000 on 6.01MHz (Saturday only). There's a web site at **www.infolanka.com/people/sisira/slbc.html**

Another war-torn part of the world is the Horn of Africa where Ethiopia and Eritrea are engaged in what must be one of the most pointless conflicts in history. It's possible to listen to the news every day from Addis Ababa, capital of Ethiopia, on s.w. at 1600UTC for an hour on 7.165 and 9.560MHz.

USEFUL SCHEDULE INFORMATION

Terence James in Newport, South Wales, has sent me some useful schedule information, including **China Radio International** in English **to North America** (all times are in UTC):
2300-2400on 5.99MHz;
0100-0200 on 9.57MHz;
0300-0400 on 9.69MHz;
0400-0500 on 9.73MHz;
1300-1400 on 9.57 and 7.405MHz
to Europe: 2000-2200 on 11.79 and 15.11MHz;
2200-2300 on 9.88MHz
to East and South Africa: 1400-1600 on 13.685 and 15.125MHz;
1600-1700 on 7.190 and 9.565MHz;
1700-1800 on 9.57, 13.70 and 11.91MHz;
2000-2100 on 9.695 and 9.67MHz;
2100-2130 on 11.735 and 13.64MHz
to West and North Africa: 1600-1700 on 9.565 and 9.87MHz;
1700-1800 on 9.67MHz;
1900-2000 on 9.44, 9.595 and 11.75MHz;
2000-2100 on 9.44MHz;

Radio New Zealand International (RNZI) (all times are in UTC):
1800-0705 on 17.675MHz;
0705-1000 on 15.115MHz

Terence reports that RNZI is heard with excellent signals most days on his Roberts R881 using the built-in telescopic whip antenna.

Deutsche Welle at 0800 to 1000UTC on 6.14MHz, is also received with excellent signals and Terence says that this is a new service for Europe. Thanks for your frequency information.

If Terence's results are anything to go by, even if it's baking hot, using the radio in the garden without anything more than a telescopic antenna gives good listening opportunities. So let me know what you receive as you sunbathe in the UK or on any foreign holidays you might be taking!

THAT WRAPS UP THIS MONTH'S BROADCAST COLUMN IN *PW*. UNTIL NEXT MONTH. SO LONG!

Peter

Fig.1, 2, 3, 4 & 5: Some pictures showing the devastation caused by the fire which swept through Radio Netherlands' Bonaire Relay Station.

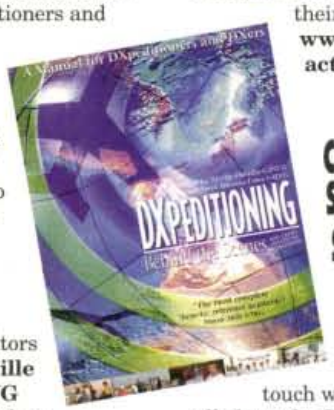
Web Watch:

Radio Northsea International: www.rni.org.uk
Radio Caroline: www.radio-caroline.nl
Sri Lanka: www.infolanka.com/people/sisira/slbc.html

extra News

A Manual For DXpeditioners

The Editorial team here at *PW* have put their hands on a new book for DXpeditioners and DXers alike. Published by **RadioActive Publications**, ***DXpeditioning - Behind The Scenes*** claims to be for amateurs world-wide and focuses on "all aspects of DXpeditioning".



The joint editors of the book, **Neville Cheadle G3NUG** and **Steve Telenius-Lowe G4JVG** state that "We learnt so much from the Spratly Island (9M0C) and other DXpeditions that we wanted to share these experiences with the world-wide DX community". However, they do go on to state that the book doesn't only cater for the DXpeditioner as "there is also a great deal to interest all DXers".

The book contains chapters on all aspects of the DXpedition and DXing, from 'Project Plan', 'Marketing & Public Relations', 'Sponsorship' and 'Licensing & Permits' to 'Equipment', 'Logistics', 'RF Matters' and 'Technology'. This is a well-illustrated and easy-to-read book and if you're a keen DX chaser or DXpeditioner then this book would be an invaluable addition to your book shelf!

For more details, please contact RadioActive Publications direct at **189 London Rd, North End, Portsmouth PO2 9AE** or visit their Web site: **www.radio-active.co.uk**

Cowes Week Special Event Station

The **Brickfields Amateur Radio Society** has been in touch with *PW* to tell us all about the Special Event station **GB4CW** which will be 'on air' during the period **8th July to the 4th August 2000** to mark Cowes Week. Shown here (top right) is one of the 400 QSL cards which they will be sending out to stations providing signal reports.

For more information on this event or for a better idea of what else the Brickfields ARS have planned for this year, please contact the Chairman, **Alan Gardner, Newnham Road, Binstead, Ryde, Isle of Wight PO33 3TH**.

Rebrov Takes Radio To A New Pitch

Readers of *PW* might like to hear that the Amateur Radio hobby has recently made the news in the form of a full page article in the *London Evening Standard* - and it's all thanks to the signing of **Sergei Rebrov**, the Dynamo Kiev striker, by Tottenham Hotspur FC. Sergei is a licensed amateur and carries the callsign **UT5UDX** and has worked **over 300 DXCC countries**.

As a keen participator in the odd Amateur Radio contest, Sergei UT5UDX won the single-operator section of the IOTA contest in 1997 and in a recent contact on 21MHz, the GB2RS News Broadcast announced, he told the RSGB that he was looking forward to coming over to the UK and operating from here. Let's hope that the hobby gets more of the same positive publicity!

New RSGB VHF Manager

The RSGB have a new RSGB VHF Manager - **David Butler G4ASR**. You may recognise his name from the pages of *PW* - he's **our regular 'VHF Report' columnist**.

David pointed out to *PW* that he has previously held the position of VHF Manager for some years before handing it over to **Ian Cornes G4OUT** who carried it out for two years. Unfortunately, due to the pressure of work, Ian is unable to continue and David has picked up the position again due to his experience in **International Amateur Radio Union (IARU)** matters.

The responsibilities of the RSGB VHF Manager are mainly to ensure international liaison within the IARU Region 1, David tells us. He is also a member of the RSGB VHF Committee, the RSGB IARU Committee and the IARU Region 1 Committee as well as the RSGB UK VHF Beacon Co-ordinator and Project Leader for the UK 144MHz Transatlantic Beacon Project!

If you need to contact David Butler G4ASR, his address is correct in the callbook and his daytime telephone number is **(01432) 372737**. You can also E-mail him on: **vhf.manager@rsgb.org.uk**

COMING NEXT MONTH - ANOTHER READER COMPETITION!

New 'Wave' In Licence Free Market

Hertfordshire-based communications company, **Entel UK Ltd**, have been in touch with the *Practical Wireless* news desk to tell us all about the brand new **Euro-Wave PMR446 transceiver** which, the promotional literature states, weighs just 124g and features a large l.c.d. with simple menu-driven options (see their advert on p.63).

"Ease of operation is assured" they tell us and some of the Euro-Wave's features include eight channels, all CTCSS and DCS tones, scan and priority scan modes, 'battery low' indicator and a keypad lock. These new PMR446 radios come in three different colours: black, yellow and blue and come supplied with a non-removable antenna and rear clip, carry strap and user manual.

Entel have very kindly donated two of these tiny radios (a black one and a blue one) as a **competition prize** which we will be running in next month's *PW* (August 2000). **We will also be reviewing the two Euro-Wave PMR446 radios** alongside the competition next month, so if you would like to know more about what they have to offer then pick up a copy of the August 2000 *PW*.

Alternatively, contact Entel UK Ltd direct on **Tel: 0208-236 0032, 3rd Floor, Ridgehill House, 12 Elstree Way, Borehamwood, Hertfordshire WD6 1JL**. Their Web site can be found at: **www.entel.co.uk**

SEND YOUR ADVERT TO PRACTICAL WIRELESS, BARGAIN BASEMENT, ARROWSMITH COURT, STATION APPROACH, BROADSTONE, DORSET BH18 8PW

Bargain Basement

For your FREE ADVERT in Bargain Basement please remember to include your dated, coloured corner flash from this page along with your entry. (Subscribers may quote subs No. instead of flash).

Advertisements from traders or for equipment that is illegal to possess, use or which cannot be licensed in the UK, will not be accepted. **No responsibility will be taken for errors.**

You should state clearly in your advert whether the equipment is professionally built, home-brewed or modified.

The Publishers of *Practical Wireless* also wish to point out that it is the responsibilty of the buyer to ascertain the suitability of goods offered for purchase.

Your Attention Please!

Clarity & Length Of Adverts

Please help us to help you by preparing your advert carefully. Any advert on these pages which contains bold **??** marks indicates that the Editorial staff could not read/interpret the wording.

Some reader's adverts are becoming very long! To be fair to all readers, so that everyone has a fair chance, we must limit the amount of to 30 - please try to keep to this length. If you have an advert of 50 words or more please submit two adverts (the current month and a previous month's 'corner flash' will be accepted) and - space permitting - we will include the second advert the same month. In future, any advert that's considered to be too long will be edited to suit or 'held over'. **Thank you for your co-operation. Editor.**

For Sale

Alinco DJ-X10 hand-held scanner 0-2000MHz, £160 pair. Tandy T500 short range business radios, u.h.f., £60. Eurosonic 80 channel CB hand-held, £45. Magellan GPS300, £60, all as new, boxed. Tel: Worcestershire 0152-789 2282, after 6pm.

Alinco DR-590 v.h.f./u.h.f. twin band mobile, CTCSS and 12.5kHz bandwidth fitted, detachable front panel plus remote cable fittings, boxed with manual, £250. Tel: Tom on Derby (01332) 767960.

Antenna insulators, various sizes, ideal for QRP station, all brand new marine porcelain and includes through deck types, please ring for details. Tel: Pete on Bristol (01454) 882465.

AOR AR3030 receiver, 30kHz-30MHz, 100 presets, six modes, b.f.o., Collins inside signal strength meter, £205. Heathkit five band valve receiver m.w. and s.w. manual tuning b.f.o., £45. Tel: Richard nr South Petherton, Somerset, (01460) 240528.

AVO 8 MkIII, excellent condition, complete with new leads, prods, leather case and spare batteries, £23. Tel: John G4UBB on Pinner 0208-868 7684.

Box of crystal controlled hand-held TX/RX, mostly Yaesu plus spares, £100. Alpha 20m (14MHz) transceiver, no transmit, £30. Redifone 551N receiver, g.w.o. plus spares, £175. Tel: Alan on Romsey (01794) 501551.

Butternut HF5 plus counterpoise five band vertical, four months old, cost £389, boxed, bargain, £150. Kenwood TM-231E 2m (144MHz) f.m. 50W mobile, as new, £125. Kenwood TM-221E 2m f.m. 50W mobile with base unit, mint condition, £99. Kenwood TM-733E dual-band, boxed, as new, detachable front panel, £200. Icom IC-229E 2m 50W mobile, boxed, as new, £75. Alinco DR-599 dual-band top end f.m. mobile, mint, boxed, as new, £125. Kenwood TM-732 dual-band 50/35W f.m. mobile, boxed, as new, £135. Icom IC-2100H 50W, 2m f.m. mobile, four weeks old, boxed, mint, £120. Realistic DX-394 short wave receiver, hardly used, boxed, mint, £49. Tel: Des on Bedford (01234) 216932.

Collector's item: very rare FT-150 transceiver, 80/10m (3.5/28MHz), g.w.o., spare valves, £150 o.n.o. FRG-7700 receiver, g.w.o., £150. Standard C528 hand-held transceiver, 144/430MHz, spare NiCads, g.w.o., £100. Buyers to inspect and collect. Tel: Jock on Chorley, Lancs (01257) 792070.

CX201 two-way coaxial switch (new), £9. Random wire balun (new), both plus postage. Tel: (01902) 785150.

Eddystone 888A receiver, nice condition, works well, 12 valve crystal calibrator, £150, no offers. Tel: Staffs (01543) 685694, anytime.

Ferguson all wave 8 valve mains radio in original cabinet 1937 model working, £50. Tel: G3ASV QTHR 0208-455 2437.

For sale: 12m Tennamast with ground post stub mast, three wall brackets, cost new £480, will accept £200 o.n.o. MD-100 desk microphone, swap for Icom SM8 or sell, £70. Yaesu FC-20 a.t.u., boxed, sell for £140. Tel: Mike (01226) 742971, after 6.30pm or E-mail: mike.m1key@virginnet.co.uk

FT-101ZD amateur bands transceiver, WARC bands, f.m. board fitted, complete with microphone and manual, £225 or near offer. Tel: Wigan (01942) 211397.

FT-290R MkII 2m (144MHz) multi-mode, one year old, hardly used, mint, boxed, £235, post free. Tel: 0207-771 0309 or (01273) 880287 or E-mail: michael@windle35.freeserve.co.uk

FT-8100R v.h.f./u.h.f. with extended receive, mint, £240 o.n.o. FT-290, tatty but works OK, £90 o.n.o. Alinco DJ-G5 extended receive plus £80 of accessories, £170 o.n.o. MFJ-784B DSP filter, £60 o.n.o. Tel: Andy G0FVI on Nottingham 0115-940 4535.

Howes CTU30 a.t.u., £26. MFJ-401C Econo Keyer, £30. RS battery charger, 2-12V @ 1A**??**, £32. Lake p.s.u. 13.8V @ 1A**??**, £26. Jupiter signal generator, 0-500kHz, £62. All excellent condition and o.n.o. Tel: Phil on West Midlands (01902) 843447.

HRO coils all reconditioned and tested in an HRO MX, also two 32ft antenna masts, one 8 x 4ft alloy sections, £65. Another Clark pump-up, unused, cost £469, will accept £250. Tel: (01872) 862291.

HRO coils, full set, nine tropicalised, v.g.c. (no dents), £90. Osmor 'Q' coil packs, five valve superhet (used) three valve TRF (unused), boxed, £5 each. Tuning unit TU5B, complete, v.g.c., £25, collect. Tel: Eric G3LPS (QTHR) on Blackburn (01254) 812797.

IC-275H 2m (144MHz) all mode transceiver, 100W, mint condition with SM8 desk microphone, £350. Tel: (01895) 230006.

Icom IC-706MkII DSP, mint condition with p.s.u., £525 o.n.o. Kenwood TS-930S h.f. rig, g.c., £375 o.n.o. Trio 2300 comp**??**, £45 o.n.o. FT-50 g.c., £95, FT-101ZD, mint condition, £275 o.n.o. Tel: Martyn (01422) 251520.

Icom IC-706MkII h.f./v.h.f. base/mobile, excellent condition, boxed with manual, £550 o.n.o. Tel: John on Eastbourne (01323) 769849.

Icom IC-740 h.f. transceiver, not been used much, good condition, £350. Tel: Dave on Herts (01582) 766410.

Icom IC-820H 144/430MHz, all mode satellite, lightweight, compact, dual v.f.o.s, 60 memory channels, base or mobile, Icom checked, mint condition, boxed, £495 or exchange for IC-725 or IC-726. Tel: nr Harlow in Essex (01279) 731070.

Icom SM6 desk microphone, v.g.c., boxed, £29, collect or will mail free. Contact: T Chapman G0MKA, 17 Trevor Rd, Swinton, Manchester M27 0YH.

Kenwood 440S, a little jewel and a bargain to get you on h.f., a.m./s.s.b./f.m., 1.8-30MHz, 100W, internal tuner, filters, leads, MC60 stand microphone, easily portable, £429. Tel: Gillingham (01634) 379140.

Kenwood R2000 receiver and momentum MCL1100 easy reader, £300 o.n.o. plus monitor. Tel: Sittingbourne (01795) 436243.

Kenwood TS-255E 2m (144MHz) is all you need, boxed, as new plus leads and microphone, 5 or 50W, s.s.b. plus f.m., a base station, easily portable. Tel: Gillingham (01634) 379140.

Kenwood TS-950S/SD service manual, v.g.c., £15 plus P&P. Tel: Max on Ware (Herts) (01920) 463564.

Long wire trapped dipole, £20 plus P&P or could be free to OAP or club. Tel: (01647) 281631.

Lowe radio receiver HF-150, £195. Black Star Meteor 100, 5Hz-100MHz frequency counter, £60. Eddystone 640 communications receiver, £35. Also have other items. Tel: Mr Bell 0191-237 7123.

Marine d/f audio/visual with gyro repeater motor. Plath SFP 700/2 with p.u.**??** Plath N-701/3, 220VAC, manuals, German/English,, v.g.w.o. and condition, sensible offers and carriage at cost. Tel: Tony Bull (01635) 864345, FAX: (01635) 872762, write to 91 Lower Way, Thatcham RG19 3RS or E-mail: tonybull@g3icb.freeserve.co.uk

Maycom AR-108 pocket hand-held scanner, air band, 108-137MHz, 100 memories, scan, v.h.f band 136-180MHz, manual, boxed, complete with NiCads, charger and extension speaker, new, only £60. Tel: (01608) 662488.

Meade 6inch Starfinder astronomical telescope, motorised drive, little use, sell £350 o.v.n.o. or will exchange for h.f. transceiver with g.c. cash adjustment. Tel: Ron on Swindon (01793) 331585.

Mirage linear amplifier B108, 80W output, f.m., s.s.b. plus pre-amplifier, £80 o.n.o. Mutek masthead pre-amplifier for 2m (144MHz), £50 o.n.o. Kantronics KPC-3 Packet modem Version 6.0, all leads and manual, £75 o.n.o. PRO-AM top band mobile whip, new, unused, £35. Tel: (01509) 672758.

Mosley 2-element h.f. beam with nearly new heavy duty driving element, £95. Tel: Vic on Poole (01202) 741430.

Netset PRO44 scanner, 50 memories, manual, charger/p.s.u./NiCads, £60. Diamond 2/70 antenna base required. Tel: GW1SXN (01286) 675468 or E-mail: gw1sxn@psilink.co.uk

Phillips PRM 8020 synthesised PMR mobile, programmed with all the 2m (144MHz) frequencies, also scan and 1750 tone burst, £150 complete. Also 60ft Versatower wall mount, heavy duty, with winch, £200. Tel: John M1EGO on Cheshire (01625) 533380.

Racal RA17L plus MA168 diversity unit, £160. HR-26 dual-band RS232/TTL/tone input, 25/50/250 baud. Telegraphic converter, £80. ED4 dual telegraphic converter, £40. INU-264 Timeflex/TAC4 unit, £30. Buyers to collect please. Tel: Norman on Staffs area (01782) 550684.

Realistic DX-394 receiver, bought new, very little used, boxed, manual, as new condition, no modifications, Internet has information and modifications, see Haydon's ad p.20, May issue *SWM*, £85 o.v.n.o. Tel: Wayne on Hampshire (01256) 465340, not after 9pm please.

Sailor synthesised marine transmitter/receiver, g.c. a.m./c.w. receiver, exciter power amplifier and power supply in table rack, £300. Tel: Tony on Worcester (01905) 641759.

FREE ADVERTS

Now's your chance to send in a photograph of your equipment (a good idea if it's really unusual) to accompany your advert. Please note that **all photos** will only be **published at our discretion** and are **non-returnable.**

When sending in your advert, please write **clearly** in **BLOCK CAPITALS** up to a maximum of 30 words, plus state your contact details. Please use the order form provided.

Bargain Basement

Sangean ATS 803A world band portable receiver, good condition, £50. Grundig YB500 world band portable receiver, good condition, £50, both include postage. Tel: (01902) 790260.

Ships radio R1120 synthesiser receiver S1301 exciter T1127L, 400/800W transmit, H1201 a.t.u., N1401 a/c p.s.u., N1400 d.c. p.s.u., cable, manuals, as new, offers or exchange for h.f. transceiver/receiver solid state, WHY? Tel: Ray Hill G0IMV, QTHR, (01989) 762839.

TCS valve receiver, 1.5-12MHz, g.w.o. with information, £75. AR88LF, 75kHz-30MHz, tidy, g.w.o., £85. Hallicrafters HT41, vintage linear valve amplifier (h.f.) large, quality unit, in table top cabinet, £135. Also modern Racal MA1953 controller for RX/TX/a.t.u. switching, mint, £55. Tel: Yorkshire (01482) 887938.

Ten-Tec Argosy h.f. transceiver, 5/50W, digital readout with matching power supply, good clean condition with manuals, £225. Tel: John G4KKG on Yeovil (01935) 425327 or E-mail: joor@talk21.com

Three new boxed GEC TT21 valves, £50. Also high voltage paper caps. Telephone or write for details. Tel: Syd Fenwick (01892) 822836, 28 Gimble Way, Pembury, Kent TN2 4BX.

'Tono' 430MHz linear amplifier with GaAsf.e.t. pre-amplifier - 60W output, s.s.b./f.m., £65. 'N' socket in SO259 out. Tel: GW0GHF 0292-070 3429.

Trio R820 receiver with c.w. filters, handbook, v.g.c., £375. NRD-525 receiver with 1kHz optional filters, handbook and service manual, £450 Drake R4A, £175. Eddystone 5640, £70. Tel: (01245) 381961.

Trio TS-430 transceiver with scanning microphone and manual, £400 o.n.o. PS430 p.s.u. for above, £100 o.n.o. TH-77E dual-bander plus charger and manual, £180 o.n.o. All boxed and mint condition. Tel: Dave G0IBW on Cleveland (01287) 633816.

Trio TS-770E 2m/70cm (144/430MHz) multi-mode base/mobile transceiver, boxed with manual, £295 o.n.o. 70cm TV transceiver, £85 o.n.o. Four 23cm (1296MHz) 28-element quad loop Yagis with power combiner, £95 o.n.o. Tel: Nick G4NKV on Selby, North Yorkshire, (01757) 618358.

Trio TS-830S plus Trio desk microphone, g.w.o., clean, £300. Heathkit 'scope, 10-12µ??, large, not working, 'cheap', Heathkit signal tracer. Taylor 68A signal generator (p.s.u. secondary u/s), 100kHz-240MHz, Hi-Mound HK707, £20. Tel: Norm G3NSI, QTHR, on Peterlee 0191-586 5259.

Two Icom U16 hand-held, two fast chargers, eight batteries and extras, all in working order, £85. Tel: (01792) 416089, after 5pm please.

Two metre (144MHz) linear amplifier, 8-12W input, 80W output, excellent condition, £70 or swap for a 6m (50MHz) transverter, 28MHz i.f. Tel: M1EOM 0151-521 2714 or E-mail: m1eom@yahoo.co.uk

Valves: RCA 2A3, STC 4304CB, GEC KT66, Mullard ECC32, RCA 76, RCA 806, Osram CV1040, MOV NT40, Mullard EM34, 866A Caps: IMFD 1500V d.c. relay, Pye 596 H II?? Please write. Contact: Peter Fernando, 67 Church Road, Kandana, Sri Lanka.

Yaesu FRG-7000 digital communications receiver, 250Hz-30MHz, a.m./c.w./s.s.b., good condition, £95 o.n.o. Well made home-brew a.t.u., £10, buyer to collect. Tel: Laurie G3XPX on Tunbridge Wells (01892) 548575.

Yaesu FRG-8800 all mode receiver, Yaesu FRA-7700 active antenna, Yaesu FRT-7700 a.t.u., Netset PRO-44 50 channel scanner to include speaker, cables, books, etc., mostly still boxed, £450 the lot. Tel: Croydon 0208-651 2725, evenings only.

Yaesu FRG-9600 all mode v.h.f./u.h.f. receiver, 60/900MHz p.s.u., £200 o.n.o. Kenwood TM-441E, 70cm (430MHz) 35W mobile transceiver, microphone, handbook, £200 o.n.o. Tel: Peter G3UXH (01634) 250562.

Yaesu FT-1000 many extras including bandpass filter for sub receiver, workshop manual, SP5 speaker, desk microphone, hand microphone, Heil headset, showroom condition, boxed, price Sterling £1800 or Irish £2400, delivery included. Tel: Bill on Cork (Ireland) 00 352 21 4546373.

Yaesu FT-101ZD plus FT-101Z internal v.f.o. plus FC901 a.t.u. plus MD1 desk microphone, all manuals and hand microphone, £250. Tel: GM0LYH, QTHR, (01294) 554141, evenings.

Yaesu FT-707 with matching FP-707 p.s.u., FC-7070 a.t.u., FV-707DM digital v.f.o. mobile, desk mount bracket plus manuals, immaculate condition, £395 o.v.n.o. Cushcraft AV5 five band vertical, as new, £125 o.n.o. Tel: GW3YAF on W Wales (01269) 870076.

Yaesu FT-840 100W h.f. transceiver, as new, boxed, £430. Metered p.s.u. 25A, £70. All one year old. Tel: 0230-828 3305.

Exchange

Exchange Century 22 transceiver, working, for 2m (144MHz) hand-held plus charger, etc., no rubbish please. Durham city area, must collect. Tel: 0191-378 3203, evenings only.

R1155 stored for years, no p.s.u., untested but appears intact and front panel is unmodified, will exchange for best scanner offered. Tel: Ron (01793) 331585.

Yaesu FT-101ZD f.m., v.g.c. plus Yaesu FT-101ZD a.m., v.g.c. K2000 plus p.s.u., manual, v.g.c. TS-515 plus p.s.u., v.g.c. - swap all for TS-930S or FT-0NE, may include TS-75E if pristine. Tel: Notts/Derby 0115-917 5728.

Wanted

2m?? (144MHz) transceiver/receiver, model Clegg FM88 for spare parts working or faulty, would appreciate information. Tel: Sean Melvin on Kilkerrin, Eire 00 353 934 5872.

Can you help? Looking for dead or scrap Yaesu FT-726R for spares, plus manual. Tel: Clive on Birmingham 0121-608 3188, anytime.

CRT required for pre-war Ekco TV, 7inch tube type CRM-71 or any 7inch tube narrow neck. Tel: Geoff (01339) 882979.

Eddystone EC958/7 in good condition, would consider the 7E version or the EC958 (analogue read out) model. Tel: Tony G0LGT on Chesham (01494) 778352.

Handbooks wanted for FSK test oscilloscope CT368, FSK terminal unit CG3C and any ATE?? made equipment, including ATE baud rate converter TCA40X all expenses paid. Tel: (01482) 887938.

Has anyone got a dead or scrap Yaesu FT-725R for spares or knows of someone who has? Tel: Clive 0121-608 3188.

Manual or photocopy of the Tono 5000E Amtor/RTTY computer, all expenses paid, would consider buying whole unit for spares. Tel: John Lee G4WSQ (01202) 488570.

MFJ-901B a.t.u., Lake TU4 a.t.u. Exchange Hi-Gain telex DX77 40-10m (7-28MHz) vertical antenna, new WHY? or sell. Tel: G3NQX (01772) 703957.

Operator's manual for a Talco radio CS3 series transceiver, will pay the cost. Contact C M Smith, 48 Sherbourne Cres, Coundon, Coventry CV5 8LE.

Second World War spy radio sets - AMK3, B2, MR3, MCR1, BP3, BP3, BP4, BP5, OP3, I am also interested in the more recent MK123, MK119 Mk301, etc., cash waiting. Tel: Bill on East London 0208-505 0838.

Signal generator, Heathkit RFI, Advance Taylor or similar. Tel: G1CMH on Gloucester (01452) 855850.

Sony ICF-2001 receiver operating manual wanted, original or copy, any expenses incurred will be reimbursed. Tel: George G7OAM on Wiltshire (01722) 329398.

Trio R2000 manual/copy, modifications for a DX-394. Tel: Jeff (01656) 744892.

Wanted please: Oak hills research QRP Spirit for 80/40/30/15m (3.5/7/10/21MHz) in g.w.o. Tel: Jim G0NTR, QTHR, (07713) 926255 (mobile) in Peterborough.

Yaesu FT-470 f.m. handle transceiver, display screen. Tel: Newcastle Upon Tyne (07989) 902299 or E-mail: nievesmunoz@yahoo.es

Yaesu XF-30C 600Hz c.w. filter for Yaesu 101E. Transmitting p.c.b. final unit assembly for TS-830S unit X56-1380-00, new/mint condition both. Tel: Burghead (01343) 835635, after 7pm.

BARGAIN BASEMENT ORDER FORM

Please insert this advertisement in the next available issue of *Practical Wireless*.

❑ FOR SALE ❑ WANTED ❑ EXCHANGE

DON'T FORGET THE CORNER FLASH!!

Name .....

Address .....

.....

.....

Telephone Number .....

My Subs Number is .....

please write in block capitals

CONTACT DETAILS FOR ADVERT.

Please only write in the contact details you wish to be published with your advert, ie. do you want your name & address, or just your telephone number?

Your advert, you decide!

	(30)		

			(12)

Please photocopy the form to send in your advert or write it neatly on a postcard, but always include the corner flash!

Book Profiles

This month, the Editorial department here at Practical Wireless would like to share six more books from the PW Book Store with you. This month we have six books related to some of the topics covered in this month's PW, including a book on radio frequency (r.f.) transistors, radio receiver projects, a book on electronics plus two books on the use of Amateur Radio on boats.

So, if you would like to know more about Radio Receiver Projects, Radio Frequency Transistors, Practical Electronics Handbook, Electronics Afloat, Simple Electronic Navigation or The Right Antenna then these 'Book Profiles' are a great place to start.

Telephone (01202) 659930

TELEPHONE, FAX, E-MAIL OR USE THE ORDER FORM ON PAGE 66

Radio Frequency Transistors

Norm Dye & Helge Granberg

Carrying the sub-title **'Principles and Practical Applications'**, *Radio Frequency Transistors* claims to be a "Complete 'Tool Kit' for Successful RF Circuit Design"! Published by **Butterworth & Heinemann**, it carries a fairly hefty price tag but, being a well-illustrated and extensive hardback book, the price isn't unreasonable.

"Written by experienced r.f. design engineers from Motorola's Semiconductors Product Section ...", *Radio Frequency Transistors* covers many aspects of r.f. transistors. These include "specific design examples of circuits such as amplifiers, oscillators, switches, pulsed power and modular systems wiring state of the art devices and design techniques".

The book states that "This book is not theoretical. It is intended to be practical as the name implies. Some mathematics are encountered during the course of the book but it is not rigorous". If you want a practical approach to the subject of r.f. transistors, then this could be a good place to start, but it is fairly hard going - not for the faint-hearted.

Some of the chapters include 'Understanding RF Data Sheet Parameters', 'RF Transistor Fundamentals', 'FETs and BJTs: Comparison of Parameters and Circuitry', 'Other Factors Affecting Amplifier Design', Construction Techniques' and many, many more. *Radio Frequency Transistors* comes **Recommended**.

Radio Receiver Projects You Can Build

Homer L. Davidson

If your main interest in Amateur Radio lies in construction and electronics then this book is worth taking a look at. *Radio Receiver Projects You Can Build* focuses on how you can "Build your own radio receivers and tune in to broadcasts from near and far"!

Chapter One of this book takes a broad look at "Building simple radios" and includes aspects such as radio circuits, pictorial diagrams, tools, obtaining parts, winding your own coils, "PC boards or perfboards", antenna requirements and a lot more. So, as the back of the book claims, if you want to build any of the projects in this book, then "no experience [is] necessary".

The book concentrates on the following projects: 'Crystal radio projects' and 'AM radio projects'. In the chapter on crystal radios, the book looks at a "simple" crystal radio, the "spider-web special" radio, the "deluxe TRF" radio and much more. In the a.m. radio section the books concentrates on the "linear IC AM" radio, the "breadboard AM" radio, the "solar IC AM" radio and more.

If you want an easy going approach to radio projects then this book comes **Recommended**.

Simple Electronic Navigation

Mik Chinery

Simple Electronic Navigation claims that: "Every boat owner can now afford a simple electronic navigation system: indeed electronic navigators are fast becoming an essential you can't afford to be without".

This book claims to "... explain in simple terms how to get the best from your equipment: how to install and program the system, how to use it to the best advantage on a trip and how to use the additional features incorporated within your set". Systems covered in this book are the **Decca**, **Loran C**, **Transit** and **GPS**.

Once again, the author of this book, **Mik Chinery**, is an RYA Yachtmaster instructor and has been using electronic navigation systems for the last two decades and the book states, "... has logged over 50 000 sea miles for pleasure and business in small boats all over the world ..." so is well qualified to inform on the uses of

electrical navigation systems.

Some of the chapters in this book include 'Choosing a set', 'Installation: Decca and Loran C', 'Installation: Transit and GPS', 'Initial Programming', 'Waypoint Sailing', 'Advanced Functions' and more. *Simple Electronic Navigation* comes **Recommended**.

Electronics Afloat

Tim Bartlett

The complete title of this book is: *A Small Boat Guide To Electronics Afloat* and claims to cover issues relevant to the use of electronics on board boats: "... how accurate are these [electronic] systems? How do they work, and what do you need to know to get the best out of them?"

Many more questions on electrical devices are asked and answered in this book and, as an ex-officer in the Royal Navy, a practising yachtsman and a navigation instructor, **Tim Bartlett** (the author of this book) "... has had ample opportunity to get to grips with all manner of electronic devices aboard all types of vessels".

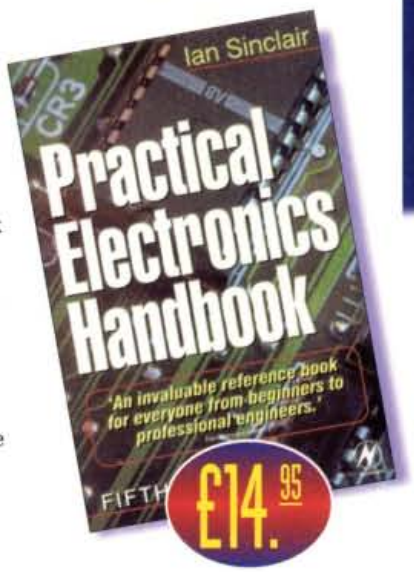
This book claims to cover the following: Electronic navigators: GPS, Transit, Loran, Decca; Chart Plotters; Depth Sounders; Flux-gate compasses; Logs and wind indicators; Autopilots; Interfacing; Performance computers and Power supplies and installation.

Examples of some of the chapters in this book include 'Satellite navigation', 'Hyperbolic systems', 'The navigator's computer', 'Accuracy', 'Navigating with electronics', 'Charts and plotters', 'Electronic compasses' and more.

Electronics Afloat also comes **Recommended**.

Practical Electronics Handbook - Fifth Edition

Ian Sinclair



"Ian Sinclair's *Practical Electronics Handbook* is one of the most widely used reference texts in the business" so the book claims. The rear cover of the book sports many quotes (from various sources, including *Electronics and Beyond* and *Elektor Electronics*) all stating how good the book is.

Published by **Newnes**, you can almost guarantee that *Practical Electronics Handbook* (Fifth Edition) is well worth a second glance. Ian Sinclair states in the Preface to this book that "This book, now in its fifth edition, has been designed to include within a reasonable space most of the information that is useful in day-to-day electronics together with brief explanations which are intended to serve as reminders rather than full descriptions".

Some of the topics covered in this book include 'Passive Components' (resistors, capacitors, thermistors, inductors), 'Active Discrete Components' (diodes, transistors), 'Circuits', 'Linear ICs', 'Digital ICs', 'Microprocessors and Microprocessor Systems', 'Digital - Analogue Conversions', 'Computer Assistance in Electronics', 'Digital Broadcasting' and many more.

This well-illustrated book is a very reasonable price considering the wealth of information to be found within its covers and if you're a beginner or an old hand, this book will be a useful addition to your bookshelf. *Practical Electronics Handbook* comes **Highly Recommended**.

The Right Antenna - Second Edition

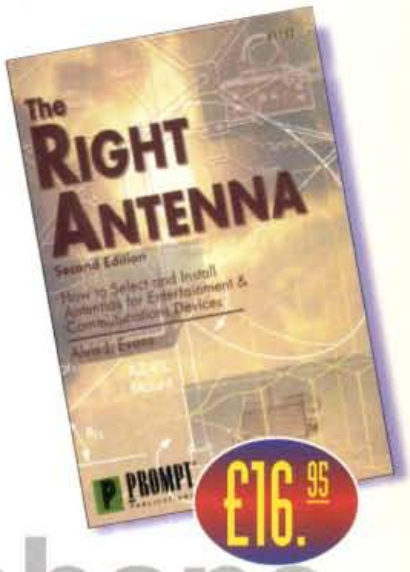
Alvis J. Evans

Sub-titled 'How to Select and Install Antennas for Entertainment & Communications Devices', *The Right Antenna* certainly lives up to the title. It covers all sorts of antennas from the best designs to receive TV, f.m., CB, cellular phone, satellite to short wave (s.w.). This new second edition, includes a look at "DSS, other satellite antennas and TV and amplifier antennas".

This American book 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.

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 and is suitable for all levels of knowledge!

Some of the chapters to be found in *The Right Antenna* include 'How Antennas Work', 'TV Antennas - General', 'DSS Satellite Television Antennas', 'Fringe Area and MATV Antennas', 'TV and FM Noise and Interference', 'Antenna Installation', 'New Trends in TV Antennas & Amplifiers' and many more. *The Right Antenna* comes **Highly Recommended**.



Trader's Table

THE SHORTWAVE SHOP
01202 490099

HF TRANSCEIVERS.

ICOM IC706 Mk1 HF/6/2Meters £399
ICOM IC706 Mk2. HF/6/2Meters £499
KENWOOD TS570 DSP HF+Gen Rx £499
YEASU FT707 HF Ham Bands £150
YEASU FT747GX HF+ Gen Rx £345
KENWOOD TS530S HF Ham Bands £295
KENWOOD TS830S HF Ham Bands £350
KENWOOD TS 950 HF High Spec Tcvr £695
KENWOOD TS 50 HF Mobile Tcvr £395

VHF/UHF TRANSCEIVERS.

KENWOOD TH235E VHF Wide Band Tcvr... £135
KENWOOD TH79E VHF/UHF h/h Tcvr £145
YAESU FT290R VHF MULTIMODE £155
YEASU FT708R UHF 70cm HANDIE £65
AKD 7003 70cm FM TRANSCEIVER £95
FDK Multi 700E FM TRANSCEIVER £75
KDK FM2030 VHF 25w FM transceiver £75
ALINCO DJ120 VHF Handheld with S/Mic £95
KENWOOD TS811E VHF All Mode Base £495
YAESU FT470 VHF/UHF Handie + Base £135
KENWOOD TH205E VHF Handie £85
ICOM IC02E VHF FM Handie £75
PALSTAR KH6 50mhz FM Handie £55
KENWOOD TR7625 VHF Tcvr. £95

RECEIVERS and SCANNERS.

ICOM IC8500 Wide Band Receiver £849
ICOM R75 DSP. Ex Demo Mint £575
ICOM R70E HF Receiver £350
ICOM R71E High Spec HF Receiver £379
YAESU FRG9600 VHF/UHF all Mode Rx. £195
YAESU FRG 7700M HF Receiver £175
LOWE HF 125 HF Rx. SYNC AM/FM £165
LOWE HF 150 Compact HF Rx. £249
AKD HF3 Shortwave Receiver £95
KENWOOD/TRIO R1000 HF Rx. £225
SIGNAL R532 Airband Receiver £85
DRAKE R4B Shortwave Receiver £295
AOR 2002 VHF/UHF Receiver £135
AOR 3000 Wide Band Receiver £335
AOR AR8200 Wide Band Handheld Rcvr. £199
ICOM R1 Handheld Wideband Receiver £135
FAIRMATE HP100 VHF/UHF Scanner £95
YAESU FRG9600 VHF/UHF Base £185
PRO2042 VHF/UHF Base Scanner £145
YUPITERU VT125Mk2. Air Scanner £85

ACCESSORIES.

MICROSET R432-90 UHF Lin Amp £199
MICROWAVE MOD. 100LS Lin Amp £125
GLOBAL AT2000 SWL ATU. £60
TOKYO HL110 VHF 100W. Amp. £125
SOTA 50W UHF Linear Amp. £85
M/M 100/LS VHF AMP. 1-3in- 100W out £80
YAESU FRT7700 HF ATU for 7700/8800 ..... £49
DATONG ASP Auto Speech Processor £65
YAESU FRV7700 VHF Converter £49
DATONG D70 Morse Tutor £45
SEM TRANSMATCH ANTENNA TUNER £85
DATONG FL3 Active Filter £65
KENWOOD AT230 ANTENNA TUNER £135
KENWOOD PS 430 20A PSU for HF Tcvr. £95
YAESU FP12 POWER SUPPLY-SPEAKER £60

Call for our latest Second Hand Items or visit our Website www.shortwave.co.uk

NEVADA
023-9231 3090

TRANSCEIVERS HF

ICOM IC-729 HF 100W TRANSCEIVER £499
ICOM IC-745 100W HF + GENERAL RX £425
ICOM IC-756 HF + 6M 100W TRANSCEIVER £1199
KENWOOD TS-450S 100W HF - VERY CLEAN £499
TRIO TS520 100W HF TRANSCEIVER £189
TRIO TS-940S 100W HF TRANSCEIVER £795
YAESU FT920AF HF + 6M 100W TRANSCEIVER £999

TRANSCEIVERS VHF/UHF

ALINCO DR-MO6DX 6M FM 20W MOBILE £189
ALINCO DR-510E 2M/70CM MOBILE TRANSCEIVER £179
ALINCO DR-610 2M/70CM TWINBANDER £275
ICOM IC-260E 2M MULTIMODE £239
KENWOOD TM-733E 2M/70CM MOBILE TRANSCEIVER £295
SOMMERCAMP TS28 CHEAP 2M FM £85
STANDARD C-8900 2M MOBILE £185
TRIO TR-2200 GX 2MTR PORTABLE £59
TRIO TS-700G 2M MULTIMODE £225
TRIO TR-751E 5/25W 2M MULTIMODE £325
YAESU FT-290 I 2M ALL MODE ..... Choice from - £185
YAESU FT-290R 2M MULTIMODE + ACCESSORIES £195
YAESU FT-5200 2M/70CM TWINBANDER £299
YAESU FT-690 II 6M ALL MODE PORTABLE £325
YAESU FT-726R 2M/70CM/HF MULTIMODE BASE £549
YAESU FT-726R HF/2M/70CMS BASE TX £599
YAESU FT-770RH 7CM FM MOBILE £125

RECEIVERS

AOR 5000 WIDEBAND COVERAGE RECEIVER £799
AKD TARGET HF35 BUDGET HF RX £129
BEARCAT UBC 860XLT BASE SCANNER £105
COMMTEL 510 WIDEBAND HANDIE RECEIVER £145
ICOM PCR1000 COMPUTER BASED RECEIVER £229
ICOM IC-R7100 WIDEBAND RECEIVER £599
ICOM IC-R1E HANDHELD SCANNER £150
ICOM R72 HF RECEIVER £399
ICOM R75 + DSP HF RECEIVER £625
JRC 535 TOP QUALITY HF RX BASE £799
KENWOOD R5000/VHF HF RECEIVER + VHF + FILTERS ETC £699
REALISTIC PRO 2026 COMPACT BASE SCANNER £125
SONY ICFSW100E SHORTWAVE RECEIVER £129
YUPITERU MVT 9000 VHF/UHF HANDIE SCANNER £249

HANDHELDS

ADI AT400 70CM HANDI TRANSCEIVER £79
ALINCO ALM-203E 2M H/HELD TX £99
ALINCO DJ-180EB 2M HANDIE - EX DEMO. £129
ALINCO DJ-C1 2M POCKET HANDI £79
ALINCO DJ-C5 2M/70CM POCKET HANDI £125
ALINCO DJ-G5EY 2M/70CM HANDHELD £195
ALINCO DJ-S41E 70CM HANDIE £75
ICOM IC-T8E TRI BAND HANDIE £225
YAESU FT-23R 2M HANDIE £89
YAESU FT-51R TWINBANDER £225
YAESU FT-411 2M HANDIE £125

MISCELLANEOUS EQUIPMENT

AEA PK80 PACKET TNC £49
AEA SWR121 HF ANTENNA ANALYSER £199
AMDAT ADC-60 FREQUENCY STANDARD CLOCK £99
DATONG ASP AUTOMATIC SPEECH PROCESSOR £49
DATONG FL3 AUDIO FILTER £59
DATONG PC1 HF CONVERTER £59
DRAE 24 AMP 24 AMP POWER SUPPLY £75
ICOM AT160 AUTOMATIC ATU £159
ICOM SM6 BASE MIC £45
KANTRONICS KPC3 1200 BAUD PACKET TNC £99
LESON BASE MIC DESK MIC £29
MW MODULES MML432/50 432/50 70CMS AMP £99
MW MODULES MM-4000KB RTTY TRANSCEIVER INTERFACE £49
PALSTAR AT 1500 3KW COASTER ATU £239
PALSTAR PS04 2/4 AMP POWER SUPPLY £14
SISKIN MULTICAT COMPUTER INTERFACE £39
STAR MASTER KEYER DEWSBURY KEYER £45
SYMEK TNC 2H + RF UNIT ..9K6 TNC + G3 RUH MODED 70CM TX £179
TOKYO HL7006B 600W HF AMP 12V DC £595
TOKYO HL700B AMP 100W 21 - 28MHz FOR FT726 (HF) £129
TONO Q550 DATA TERMINAL £125
TRIO VB-2200GX 10WATT AMP FOR 2200GX £39
VECTRONICS 300 DLP 300W ATU £115
VECTRONICS HFT 1500 3KW COASTER ATU + SEM £245
YAESU YM48A 8 PIN DTMF MIC £19.95
YAESU PA-3 MOBILE ADAPTOR FT-208, 209 ETC £12

SOUTH EAST COMMUNICATIONS
00353 51 871278

STATION ACCESSORIES

Datong multimode filter FL3 ..... £99
Garmin GPS 45XL handheld GPS £149
Diamond SX100 SWR/PWR meter 3kw £65
Uniden 360 lazer radar speed detector £159
Yaesu FRT7700 short-wave A.T.U. £29
Watson 25amp P.S.U. Demo model £79
Yaesu FC-20 auto atu for FT847 ..... £169
Kenwood PS-52 PSU for TS850-etc. £169
Mirage 2 meter amp 5 to 8 watts in 100watts out £149
MFJ-451 CW sender with keyboard £89
MFJ-207 HF SWR analyzer £49
Yaesu YD148 desk mic. £49
Ameritron AL-811X 600watt HF amp £495
Revex WS40 2m/70cm SWR/PWR meter £49
Garmin GPS 2 plus £149
Garmin GPS 3 road map £249

VHF/UHF TRANSCEIVERS

Yaesu FT50R mint 2m/70cms £169
Icom IC-P2ET 2m handi inc charger £119
Kenwood THG7E 2m/70cm £189
Yaesu FT767GX HF+6+2+70 built in ATU, PSU all mode, bargain £799
Icom IC-2350 dualband mobile 50watt wide RX £275
Kenwood TS790E 2m/70cm base, multimode £799
Alinco DJG5E 2m/70cm with drop in charger £189
Alinco DJ580 2m/70cm dual RX crossband repeat £179
Alinco DJ191 2m handheld nicad charger keypad £119
Alinco DR605 2m/70cm 50/45watts as new £229
Yaesu VX-1R 2m/70cm £149
Alinco DJV5 2/70cm handheld with charger £179

HF TRANSCEIVERS

Icom IC775 DSP 200watt,fully filtered mint £1999
Kenwood TS850SAT auto ATU 100watts £799
Kenwood TS440SAT HF transceiver with ATU £499
Yaesu FT847 boxed and mint £1149
Yaesu FT990DC auto ATU 100watts £799
Icom IC707 0-30mhz. £399
Icom IC746 HF+6m+2m ATU demo £1099
Kenwood TS140S 0-30mhz all mode 100watts £399
Yaesu FT767GX HF+6m+2m+70cm,ATU,PSU £799
Icom IC706mk2 HF+6m+2m boxed and mint £599

SHORTWAVE RECEIVERS

Yaesu FRG-7 ..... £109
Lowe HF225 0-30mhz all mode £225
Lowe HF150 0-30mhz with keypad £199
Sangean ATS803A portable receiver SSB etc £89
Sony SW55 HF and VHF £199
Sony 2001D HF+VHF airband £169

SCANNERS BASE/MOBILES

Yaesu VR500 latest H/H 0-1300mhz all mode £219
AOR 8000 0-1900mhz 1000mems all mode £199
Icom ICR10 all mode with case £199
Icom IC7100 25-2000mhz base receiver 1000mem £699
Bearcat 3000XLT 25-1300mhz 400mems £149
Yupiteru MVT7100 0-1650mhz charger nicads etc £149
Realistic Pro2042 1000 memories base new £199
AOR5000 0-2600mhz all mode boxed and mint £799
Icom IC8500 0-2000mhz all mode £875

All prices in Sterling

WATERS & STANTON
01702 206835

HF TRANSCEIVERS

Alinco DX-77E Base Transceiver with Gen.Cov. 100W 12V £595
Icom IC-725 Base Transceiver with Gen.Cov. 100W 12V £449
Icom IC-761 Base Transceiver with Gen.Cov. Mains £699
Tm-Tec 556 Argo QRP HF TX, 40m Module Inc. £299
Tokyo HT-180 80m SSB/CW Transceiver 20W £129
Yaesu FT-757GX II Base Transceiver with Gen.Cov. 12V £579

VHF/UHF BASE/MOBILE TRANSCEIVER

Alinco DR-M06SX x2 6m FM Mobile 10W £159
Alinco DR-M06T 6m FM Mobile 10W CTCSS £159
Icom IC-255E 2m FM Mobile / Base 25W 12V £149
Kenwood TM-451E 70cm FM Mobile 35W 2m RX, Full Duplex £299
Kenwood TM-732E x2 2m,70cm FM Mobile 50W,35W £225
Kenwood TM-733E x2 2m,70cm FM Mobile 50W,35W Full Duplex £325
Trio TS-700 2m All Mode Base Transceiver 10W £249
Yaesu FT-690R 6m All Mode Portable 2.5W £225
Yaesu FT-736R 2m,70cm All Mode Base Transceiver mains £775
Yaesu FT-8100R 2m,70cm FM Mobile 50W,35W (Remote Head) £299

VHF/UHF HAND HELD TRANSCEIVER

ADI AT-600 2m,70cm FM H/Held,Wide RX,Full Duplex £175
Alinco DJ-160 x2 2m FM H/Held £99
Alinco DJ-180 2m FM H/Held with sp.mic,DC lead,Batt box £79
Alinco DJ-191 2m FM H/Held £119
Alinco DJ-560 x2 2m/70cm FM H/Held £149
Alinco DJ-F1E x3 2m FM Mini H/Held £99
Alinco DJ-G5 2m/70cm FM with wide RX £169
Delcom VHF 2m FM Handy £69
Icom IC-04E 70cm FM H/Held with Case £99
Icom IC-2SET x3 2m FM H/Held £149
Icom IC-2GXET 2m FM H/Held £119
Icom IC-32E 2m/70cm FM H/Held with Full Duplex £179
Icom IC-P2E 2m FM H/Held £100
Icom IC-P4E 70cm FM H/Held £125
Icom IC-U16T x2 70cm H/Held. 16 Channels £60
Icom IC-W2E x2 2m/70cm FM H/Held (with sp. mic) £145
Icom IC-W21E x2 2m/70cm FM H/Held £199
Icom IC-W21ET 2m/70cm FM H/Held £149
Kenwood TH-25E 2m FM H/Held £100
Kenwood TH-26E 2m FM H/Held £99
Kenwood TH-42E 70cm FM H/Held £109
Kenwood TH-46E 70cm FM H/Held £190
Kenwood TH-75E 2m / 70cm H/Held £149
Kenwood TH-77E 2m/70cm FM H/Held with Sp.mic Full Duplex £225
Kenwood TH-78E x2 2m/70cm FM H/Held with Full Duplex £249
Kenwood TH-215E 2m FM H/Held £95
Standard C-156 2m FM H/Held £99
Standard C-528 x2 2m/70cm FM dual watch, full duplex+desk charger £199
Yaesu FT-23R 2m FM H/Held £115
Yaesu FT-41R 70cm FM Handy with Wide RX £130
Yaesu FT-50R 2m/70cm FM Dual Display Wide RX £169
Yaesu FT-70R 70cm H/Held £119
Yaesu FT-530 x2 2m,70cm FM Handy with Full Duplex £195
Yaesu FT-811 70cm FM H/Held with DC adapter £129

SHORTWAVE RECEIVERS

AKD HF-3 x2 Target 0-30MHz 12V Receiver £99
Grundig Yb-206 Portable Receiver with FM £69
Grundig Yb-400PE Portable Receiver with FM stereo and SSB £89
Grundig Yb-930 x2 0.15-30MHz Portable with SSB + FM Stereo. RDS £130
Icom IC-R71 100kHz-30MHz All Mode Receiver Mains £399
Icom IC-R72 x2 Base Station Receiver £449
Icom IC-R72 DC 100kHz-30MHz AM,CW,SSB 12V with PSU £449
Kenwood R-5000 100kHz-30MHz All Mode Receiver Mains £549
Lowe HF-150 x2 30kHz-30MHz All Mode 12V with Keypad,PSU £249
Lowe HF-225 x6 30kHz-30MHz All Mode Receiver 12V £299
Lowe HF-250 x2 30kHz-30MHz Receiver 12V PC Compatable £399
Lowe SRX-30 x2 Portable Receiver with AM & FM £19
Matsui MR-4099 Portable Receiver with FM stereo and SSB £79
Realistic DX-394 150kHz-30MHz AM,CW,SSB 160Ch. Mains/12V £99
Roberts R-809 Portable 153kHz-30MHz AM,FM stereo £69
Sony ICF-SW1 Portable Receiver with AM & FM £129
Sony ICF-SW55 x4 Portable Receiver with FM stereo and SSB £189
Sony ICF-SW100E x2 Pocket Receiver with FM stereo and SSB £139
Sony ICF-SW7600 x2 Portable Receiver with FM stereo and SSB £119
Sony ICF-SW7600G x3 Portable Receiver with FM stereo and SSB £135
Stereotone Regent MW,LW,SW with FM Portable/Mains £15

SCANNERS MOBILE/BASE

AOR AR-3000 100kHz-2036MHz All Mode Receiver 400Ch. 12V £449
JIL SX-400 26-520MHz AM,FM,WFM 20Ch. 12V £225
Realistic Pro-2014 68-512MHz (with gaps) FM Receiver 50Ch. 12V £85

SCANNERS HAND HELD

Alinco DJ-X1 x3 100kHz-1300MHz AM,FM,WFM 100Ch. £139
AOR AR-900 108-950MHz (with gaps) AM,FM,WFM 100Ch. £99
Black Jaguar BJ-200MKII 26-520MHz AM,FM,WFM £69
Commtel Com-510 500kHz-1300MHz AM,FM,WFM 400Ch. £135
Icom IC-R1 x3 0.1 - 1300MHz AM/FM/WFM 100Ch. £199
Netsat Pro-44 x3 68-88,108-174,380-512MHz AM,FM 50Ch. £75
RadioShack Pro-60 30-512,760-999MHz AM,FM,WFM 200Ch. £109
Realistic Pro-62 68-960MHz (with gaps) AM,FM 200Ch. Hyperscan £139
Welz WS-1000 x3 500kHz-1300MHz AM,FM,WFM 400Ch. £145
Yupiteru MVT-3300 66-1000MHz (with gaps) AM,FM 200Ch. £99
Yupiteru VT-150 x2 142-170MHz FM, Marine Band, 30Ch. £99
Yupiteru VT-225 108-142,150-160,220-391MHz AM,FM 100Ch. £159

STATION ACCESSORIES

Aphadelta VBC DSP Filtered Speaker £125
Avair AV-610 1.8-525MHZ SWR,PWR meter 400W £39
BN26 LP50-3-50 fm Linear Amp 3W in . 50W out with Preamp £125
Datong ASP Auto Speech Processor £23
Icom SP-3 Matching Extension Speaker £39
Lowe Modernaster Version 1 Software for Receivers £69
MFJ MFJ-462B RTTY,ASCII,CW,AMTOR Reader with Display £119
MFJ MFJ-492 Menu Driven Memo Keyer & CW Tutor £75
MFJ MFJ-784B Tunable DSP Audio Filter £139
MFJ MFJ-906 6m 200W PWR / SWR meter £49
MFJ MFJ-949E 1.8-30MHz 300W ATU with Dummy Load £89
MFJ MFJ-1278B Multimode 10 mode Data Controller with Pactor £175
MFJ MFJ-1610 Tipony Tutor (Novice) £5
Microset R-25 2m 1-4W in,30W out all mode + GaAsFET Pre-amp £40
Microset RU-432-95 70cm 5-25W in,95W out Linear with Preamp £149
M.Modules MML-50-100 6m 1-10W in, 100W out Linear with Preamp £139
M.Modules MML 144/30-LS 2m 1-3W in, 30W out Linear with Preamp £69
M.Modules MML 144/100-LS 2m 1-5W in, 100W out Linear with Preamp £139
Opto 2600HA x3 1MHz-2.6GHz Frequency Counter £135

To advertise on this page see the booking form below.

Classified Ads

DISCLAIMER

Some of the products offered for sale in advertisements in this magazine may have been obtained from abroad or from unauthorised sources. *Practical Wireless* advises readers contemplating mail order to enquire whether the products are suitable for use in the UK and have full after-sales back-up available. The publishers of *Practical Wireless* wish to point out that it is the responsibility of readers to ascertain the legality or otherwise of items offered for sale by advertisers in this magazine.

Whilst prices of goods shown in advertisements are correct at the time of going to press, readers are advised to check both prices and availability of goods with the advertiser before ordering from non-current issues of the magazine.

For Sale

TECHNICAL MANUALS, AR88, CR100, R210, HR0. £5 each. Circuits £1.50. Hundreds available. SAE list. Bentley, 27 De Vere Gardens, Ilford, Essex IG1 3EB. Tel: 0181-554 6631.

VINTAGE SERVICE DATA. Radio, Audio, Electrical, TV & Cimema - 1900 to 1970s. Complimentary Newsheet. 50 Meddon St, Bideford, Devon, EX39 2EQ. Tel/Fax 01237 424280. E-mail: savoy.hill@virgin.net Web Site: http//freespace.virgin.net/tudor.gwilliam-rees Visa & Mastercard.

THE RF-KIT CATALOGUE. send 2x 2nd class stamps or browse www.rf-kits.demon.co.uk Hands Electronics, Tegryn, Llanfyrnach, Pembs SA35 OBL. Tel 01239 698427.

QUARTZ CRYSTALS 1kHz-250-MHz, >20,000 stocked. 32.768kHz/£1.65, 38kHz/£1.65, 400kHz/£3.95, 455.2kHz/£1.50, 3.2768MHz/£1.95. 7.03MHz/£3.95, 10.106MHz/£3.50, 10.7MHz/£1.75, 11.0592MHz/£1.60, 21.06MHz/£3.95 etc. SPXO/TCXO/VCXO devices from £2.50. Ceramic filters & oscillators. 26 page list. Circuits & applications booklet/£5.00. Q-Electonic Design. Tel: 0181-391 0545. Fax/Msge 0181-391 5258.

Aerials

E-TYPE DIPOLE 10-160m fits 28ft garden. Full sized anti-TVI models, traps, baluns. Info SAE, Aerial Guide £2. G2 DYM, R Holman, Uplowman, Devon EX16 7PH. Tel: 01398 361215 anytime.

Holidays

NORTH WALES HOLIDAYS – Caravan - bunkhouse - camping. Elevated rural site, two miles from beach, use of shack and antennas, open all year. Tynrhos, Mynytho, Pwllheli. Tel: 01758 740712. Packet address: GW4VAG@GB7BAY#55.GBR.EU

Wanted

WANTED FOR CASH Valve or solid state communication receivers Pre-1980. Preferably working and in good condition. Non working sets considered also domestic valve radios. Items of Government surplus wireless equipment and obsolete test equipment. Pre-1965 wireless and audio components and accessories. Pre-1975 wireless and TV books and magazines. Also, most valves wanted for cash. Must be unused and boxed. CBS, 157 Dickson Road, Blackpool, FY1 2EU. Tel: (01253) 751858 or Fax: (01253) 302979. E-mail: chevet@globalnet.co.uk

AVO VCM163 or AVO Mk4 valve testers by valve enthusiast. Excellent price paid. Please phone 01302 761058.

Valves

VALVES GALORE Most valves available from stock. Otherwise obtained quickly. Please send SAE stating requirements or telephone. **VALVE & ELECTRONIC SUPPLIES** Chevet Books, 157 Dickson Road, Blackpool FY1 2EU. Tel: (01253) 751858 or Fax: (01253) 302979. E-mail: chevet@globalnet.co.uk

VALVES:- OVER 50000 STOCKED Ham, Vintage, Military, Audio. SAE for FREE list to: Wilson Valves, (Jim Fish G4MH), 28 Banks Ave., Golcar, Huddersfield, West Yorks HD7 4LZ. Tel: 01484 654650. Fax: 01484 655699. E-mail: wilsonvalves@surflink.co.uk Visa etc. Fast & personal service.

CASH FOR VALVES. ECC32 £10. ECC33/35 £6. ECC83/EF86 £3.50. KT66 £35. KT88 £55. EL34 £20. EL37 £18. PX4 £70. PX25 £130. GZ34 £8. GZ32 £8. DA100 £150. 4212E £150. PT15 £10. Ask for free wanted list. Colomor (Electronics) Ltd, Unit 5, Huffwood Trading Estate, Bookers Road, Billinghurst, W. Sussex RH14 9RZ. Tel: 01403 786559. Fax: 01403 786560. E-mail: giacomelli@colomor.demon.co.uk

VALVE ENTHUSIASTS: Capacitors and other parts at attractive prices! Ring for free list. Geoff Davies (Radio). Tel: (01788) 574774.

VALVES WANTED FOR CASH ECC83, KT88, PX25, valve tester VCM163. All types considered – ask for wanted list. Also, we stock **one million valves** - 4CX250B, 4CX1000A, 6C33CB, 300B, 6156, CV2131 – please ask for free catalogue. Billington Export Ltd., Units E1 & E2, Gillmans Trading Estate, Billingshurst, Sussex RH14 9EZ. Tel: 01403 784961 or Fax: 01403 783519. E-mail:- billingtonexportltd@btinternet.com Visitors please phone for appointment.

TOP PRICES PAID

for all your valves, tubes, semi-conductors and ICs.

Langrex Supplies Ltd.
1 Mayo Road, Croydon Surrey CR0 2QP.
TEL: 0181-684 1166. FAX: 0181-684 3056.

Exchange

ICOM IC-Q7E Unused exchange for good condition Icom IC-2SET. Telephone Peter, Leamington Spa 01926 421028.

Miscellaneous

I BUY, SELL & P/EXCHANGE Amateur radios old or new. Cash waiting 9am - 8pm daily. Phone Dave G3RCQ on 01708 374043 or E-mail g3rcq@easynet.co.uk Please visit my web site www.g3rcq.co.uk for further information, or write to G3RCQ, 9 Troopers Drive, Harold Hill, Romford, Essex RM3 9DE.

INTERESTED IN VINTAGE TECHNOLOGY? Send 2 x 1st class stamps for catalogue of books, bits & pieces, etc. Old Time Supplies, P.O. Box 209, Banbury, Oxon OX16 7GR.

Job Vacancies

WANTED!

Full and Part Time Sales and Administration Staff

Sales

The likely candidate must be confident, smart and customer focused, already working in a sales environment. An abundance of energy and the ability to offer a high level of service are pre-requisite.

Administration

To assist sales and workshops, the individual must be accurate and organised and be able to cope with a busy schedule. Some Customer support involvement will be required.

Excellent remuneration is on offer for either full or part time positions.

Martin Lynch & Sons

CV to: Martin Lynch, ML&S - Martin Lynch & Sons, 140-142 Northfield Ave., Ealing W13 9SB. Or e-mail martin@MlandS.co.uk

ORDER FORM FOR CLASSIFIED ADS

Please photocopy this form if you prefer

PLEASE WRITE IN BLOCK CAPITALS

The prepaid rate for classified advertisements is 42 pence per word (minimum 12 words), box number 70p extra. Semi-display setting £13.90 per single column centimetre (minimum 3cm). Please add 17.5% VAT to the total. All cheques, postal orders, etc., to be made payable to PW Publishing Ltd. Advertisements, together with remittance, should be sent to the Classified Advertisement Dept., Practical Wireless, Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW. Tel: (01202) 659920, Fax: (01202) 659950

Please insert this advertisement in the ..... issue of Practical Wireless (if you do not specify an issue we will insert it in the next available issue of PW) for ..... insertion/s. I enclose Cheque/P.O. for £..... (42p per word, 12 minimum, please add 17.5% VAT to total).

Name: .....

Address: .....

.....

.....

Telephone No.: .....

Box Number @ 70p: Tick if appropriate ☐

Category heading: .....

EURO-WAVE™

PMR 446 TRANSCEIVER

A professional tool for connecting people

- **No line rental**
- **No call charges**
- **Up to 3km range**
- **Ultra compact**
- **Ultra-clear audio**

Actual size, choice of 3 colours

An essential communications tool for action sports, special events, the construction industry, warehouse stock control and family security.

Weighing just 124 grams, innovative *EURO-WAVE* features large LCD display with menu-driven options. Ease of operation assured.

Tough rubberised case available in three colours:

servicable black

high-visibility yellow

distinctive blue

www.entel.co.uk

Entel UK Ltd
3rd Floor, Ridgehill House
12 Elstree Way, Borehamwood
Hertfordshire WD6 1JL
Tel: +44 (0)20 8236 0032
Fax: +44 (0)20 8236 0082

THE BOOKS LISTED HAVE BEEN SELECTED AS BEING OF SPECIAL INTEREST TO OUR READERS. THEY ARE SUPPLIED DIRECT TO YOUR DOOR. MANY TITLES ARE OVERSEAS IN ORIGIN.

Book Store

BUY of the MONTH

Binders

Put your *Practical Wireless* magazines in order with one of our *PW* Binders.

This month *Practical Wireless* are offering readers that perfect solution to the heap of *PW* magazines which seem to keep on piling up on the coffee table! The solution is really quite simple - and it comes in the form of a *PW* binder.

These very special binders are produced in heavy duty card, coloured in a smart navy blue with the *PW* logo printed in gold lettering on both the front and on the spine. Each one comes complete with a set of year labels and binding bars and will comfortably hold a years worth of your favourite Amateur Radio magazine.

A *PW* binder costs just **£6.50** plus **£1.25 P&P for one binder**, **£2.50 P&P for two or more** (**UK only**, for overseas P&P see the Order Form on p.66).

To order either use the form on page 66 or please call Shelagh or Jean on (01202) 659930 and quote *PW* 7

	Pages	Price

LISTENING GUIDES

Airband

Abc AIRBAND RADIO GUIDE 4th Edition	96	£7.99
Abc BRITISH AIRPORTS (6th Edition) A. Wright	112	£8.99
Abc CIVIL AIRLINER RECOGNITION 6th Edition. Peter R. March	128	£9.99
AIR BAND RADIO HANDBOOK 6th Edition. David J. Smith	192	£9.99
AIR TRAFFIC CONTROL 7th Edition. Graham Duke	112	£8.99
AIRWAVES 2000	134	£9.95
CALLSIGN 2000	168	£9.95
FLIGHT ROUTINGS 1999. Williams	160	O/P
NORTH ATLANTIC FLIGHT COMMUNICATIONS 2nd Edition (Inc. software)	172	£16.50
UNDERSTANDING ACARS 3rd Edition. Aircraft Communications Addressing and Reporting System. Ed Flynn.	80	£9.95
WORLD AIRLINE FLEET & SELCAL DIRECTORY	300	£16.00
WORLDWIDE AERONAUTICAL COMMUNICATIONS FREQUENCY DIRECTORY 2nd Edition. Robert E. Evans	260	£19.95

Datamodes

FAX & RTTY WEATHER REPORTS. Philip Mitchell	88	£11.50
GUIDE TO WORLDWIDE WEATHERFAX SERVICES. 18th Edition Joerg Klingenfuss	436	£23.00
WEATHER REPORTS FROM RADIO SOURCES. Philip Mitchell	32	£7.50
RADIO DATA CODE MANUAL. 16th Edition. Joerg Klingenfuss	788	£30.00
RADIOTELEX MESSAGES (25 Years of Monitoring Global Teleprinter & Data Communications, 1st Edition	568	£20.00

DXTV

DXTV FOR BEGINNERS. Simon Hamer	31	£3.95
GUIDE TO DXTV. Keith Hamer & Garry Smith	36	£3.95
GUIDE TO WORLDWIDE TV TEST CARDS	60	£4.95
MASTS - PRACTICAL IDEAS FOR THE DXER. Hamer/Smith	36	£4.95
THIS IS BBC TV - FIRST 30YRS OF TV GRAPHICS. Keith Hamer & Garry Smith	38	£4.95
THE FIRST 30 YEARS OF BBC-2. Keith Hamer & Garry Smith	60	£4.95

Frequency Guides

2000 SUPER FREQUENCY LIST on CDROM. Joerg Klingenfuss	n/a	£23.00
FERRELL'S CONFIDENTIAL FREQUENCY LIST NEW 11th Edition.	450	£19.95
GLOBAL RADIO GUIDE 2000	32	£3.95
GUIDE TO UTILITY RADIO STATIONS 2000. 18th Edition. Joerg Klingenfuss	580	£30.00
PASSPORT TO WORLD BAND RADIO 2000.	528	£15.50
RADIO LISTENERS GUIDE 2000	128	£4.95
SHORTWAVE FREQUENCY GUIDE 2000. Joerg Klingenfuss	564	£23.00
SHORTWAVE INTERNATIONAL FREQUENCY GUIDE	176	£12.95
WORLD RADIO TV HANDBOOK 2000.	640	£19.95

General

BUYING A USED SHORT WAVE RECEIVER NEW 4th Edition. F. Osterman	78	£5.95
GETTING ON TRACK WITH APRS. Stan Horzepa WA1LOU	165	£11.50
POP WENT THE PIRATES. Keith Skues	568	£16.95
RADIO COMMUNICATIONS HANDBOOK. New 7th Edition. Dick Biddulph/Chris Lorek	580	£28.00
RADIO SCIENCE OBSERVATION Volume 1 (inc. CD-ROM). Joe Carr	414	£26.95
SHORT WAVE COMMUNICATIONS. Peter Rouse GU1DKD.	187	£4.50
SHORT WAVE EAVESDROPPER CD-ROM	n/a	£16.50
SHORT WAVE RADIO LISTENING FOR BEGINNERS	174	£14.95
SHORTWAVE RECEIVERS PAST & PRESENT (NEW 3rd Edition)	450	£25.95
SHORTWAVE LISTENER'S GUIDE. Ian Poole	192	£15.95
THE COMPLETE SHORT WAVE LISTENER'S HANDBOOK New 5th Edition Andrew Yoder.	410	£19.95

Maritime

ELECTRONICS AFLOAT. Tim Bartlett	92	£8.95
GMDSS FOR SMALL CRAFT. Alan Clemmetsen	94	£11.95
RADAR FOR SMALL CRAFT. Tim Bartlett	96	£11.95
SCANNING THE MARITIME BANDS. 2nd Edition	158	£9.75
SHORTWAVE MARITIME COMMUNICATIONS. B.E. Richardson	195	£16.50
THE VHF GMDSS HANDBOOK, New Edition, Michael Gale	64	£8.95
WATCHERS OF THE WAVES. Brian Faulkner	118	£13.50

Satellite

AN INTRODUCTION TO SATELLITE COMMUNICATIONS BP326.F.A. Wilson	230	£5.95
ARRL SATELLITE ANTHOLOGY 5th Edition	150	£11.50
NEWNES GUIDE TO SATELLITE TV. Derek Stephenson	371	£19.95
SATELLITE HANDBOOK (ARRL) New Edition Martin Davidoff K2UBC	370	£15.50
SATELLITE PROJECTS HANDBOOK. Lawrence Harris	174	£14.99
SATELLITE TELEVISION. A layman's guide. Peter Pearson	73	£1.00
WEATHER SATELLITE HANDBOOK. 5th Edition. Dr Ralph E. Taggart WB8DQT	192	£15.50

Scanning

AN INTRODUCTION TO SCANNERS AND SCANNING BP311. I.D. Poole	152	£4.99
SCANNER BUSTERS 2. D.C. Poole	100	£6.00
SCANNERS 2 INTERNATIONAL. Peter Rouse GU1DKD.	261	£12.95
SCANNERS 3 PUTTING SCANNERS INTO PRACTICE. 4th Revision. Peter Rouse.	271	£10.95
SCANNERS 4 SCANNING INTO THE FUTURE. Bill Robertson	245	£10.95
SCANNING SECRETS. Mark Francis.	280	£16.95
UK SCANNING DIRECTORY New 7th Edition	604	£19.50
ULTIMATE SCANNING GUIDE. Richard Allport	640	£19.99

AMATEUR RADIO

Amateur Television

AN INTRODUCTION TO AMATEUR TELEVISION. Mike Wooding G6IQM & Trevor Brown G8CJS.	156	£5.00
THE AMATEUR TV COMPENDIUM. Mike Wooding G6IQM	104	£3.50

Antennas & Transmission Lines

25 SIMPLE AMATEUR BAND AERIALS BP125. E.M. Noll	63	£1.95
25 SIMPLE INDOOR AND WINDOW AERIALS BP136. E.M. Noll.	50	£1.75
25 SIMPLE TROPICAL AND MW BAND AERIALS BP145. E.M. Noll.	54	£1.75
ANTENNA IMPEDANCE MATCHING (ARRL). Wilfred N. Caron.	195	£15.50
ANTENNA TOOLKIT (inc. CD-ROM). Joseph J. Carr	214	£25.00
ARRL ANTENNA BOOK 18th Edition	732	£24.00
ARRL ANTENNA BOOK ON CD-ROM	n/a	£28.00
ARRL ANTENNA COMPENDIUM Volume One.	175	£10.50
ARRL ANTENNA COMPENDIUM Volume Two.	208	£10.50
ARRL ANTENNA COMPENDIUM Volume Three. Edited by Jerry Hall K1TD.	236	£11.50
ARRL ANTENNA COMPENDIUM Volume Four.	204	£16.50
ARRL ANTENNA COMPENDIUM Volume Five.	200	£16.50
ARRL ANTENNA COMPENDIUM Volume Six (inc CDROM)	200	£18.50
BEAM ANTENNA HANDBOOK. W.I. Orr W6SAI & S.D. Cowan W2LX	268	£8.95
BUILDING & USING BALUNS. Jerry Sevick	125	£18.95
CUBICAL QUAD ANTENNAS 3rd Edition. William Orr W6SAI and Stuart Cowan W2LX.	110	£8.95
EXPERIMENTAL ANTENNA TOPICS BP278. H.C. Wright.	70	£3.50
G-QRP CLUB ANTENNA HANDBOOK. Compiled and edited by P. Linsley G3PDL & T. Nicholson KA9WRI/GW0LNQ.	155	£7.25
HF ANTENNA COLLECTION (RSGB). Edited by Erwin David G4LQI.	233	£10.99
HF ANTENNAS FOR ALL LOCATIONS (RSGB) . Les Moxon G6XN	322	£14.65
MORE OUT OF THIN AIR (PWP).	112	£6.95
"ON4UN'S" LOW BAND DXING (ARRL). J Devoldere	330	£23.00
PHYSICAL DESIGN OF YAGI ANTENNAS (ARRL)	270	£15.50
PRACTICAL ANTENNAS FOR NOVICES. John Heys G3BDQ	52	£6.30
PRACTICAL ANTENNA HANDBOOK 3rd Edition. (inc. software) Joseph J. Carr	580	£33.45
PRACTICAL WIRE ANTENNAS RSGB. John Heys G3BDQ	100	£8.95
RADIO ANTENNAS & PROPAGATION. William Gosling	260	£19.99
RADIO AMATEUR ANTENNA HANDBOOK. W.I. Orr W6SAI & S.D. Cowan W2LX	188	£8.95
RECEIVING ANTENNA HANDBOOK. Joe Carr	189	£17.50
SIMPLE, LOW-COST WIRE ANTENNAS FOR RADIO AMATEURS.	224	£8.95
THE RIGHT ANTENNA. How To Select & Install Antennas For Entertainment & Communication Devices. 2nd Edition. Alvis J. Evans	78	£16.95
THE TRUTH ABOUT CB ANTENNAS. (Orr & Cowan) W.I. Orr W6SAI & S.D. Cowan W2LX.	188	£8.95
VERTICAL ANTENNAS. W.I. Orr W6SAI & S.D. Cowan W2LX	192	£8.95
VERTICAL ANTENNA CLASSICS (ARRL). R Schetsen	123	£11.50
W1FB'S ANTENNA NOTEBOOK (ARRL). Doug DeMaw W1FB.	123	£8.00
WIRE ANTENNA CLASSICS (ARRL)	144	£11.50
YOUR ANTENNA COMPANION. Paul Danzer	130	£7.50

Beginners (inc RAE)

AN INTRODUCTION TO AMATEUR RADIO - New Edition. Ian Poole G3YWX	150	£4.99
BASIC RADIO PRINCIPLES & TECHNOLOGY. Ian Poole G3YWX	262	£14.99
BASIC RADIO & ELECTRONIC CALCULATIONS. Ray Petri G0OAT	160	£13.95
AN RAE STUDENTS NOTEBOOK. Bob Griffiths G7NHB	76	£6.95
PRACTICAL RECEIVERS FOR BEGINNERS (RSGB). John Case GW4HWR.	165	£14.50
PRACTICAL TRANSMITTERS FOR NOVICES. John Case GW4HWR.	126	£12.50
RADIO AMATEURS EXAMINATION/END OF COURSE TEST PAPERS. Ray Petri G0OAT	104	£13.95
RAE MANUAL (RSGB). New Revised Edition.	127	£15.00
THE NOVICE LICENCE STUDENT'S NOTEBOOK. John Case GW4HWR.	124	£6.00
THE NOVICE RADIO AMATEURS EXAMINATION HANDBOOK (BP375) Ian Poole G3YWX	150	£4.95
THE RADIO AMATEURS' QUESTION & ANSWER REFERENCE MANUAL. Fifth Edition. Ray Petri G0OAT.	208	£13.95
TRAINING FOR THE NOVICE LICENCE A MANUAL FOR THE INSTRUCTOR (RSGB) John Case GW4HWR.	101	£6.75
YOUR FIRST AMATEUR STATION. (RSGB) Colin Redwood G6MXL	120	£5.75

Callbooks

JOINT INTERNATIONAL & NORTH AMERICAN CALLBOOK (CD-ROM)	n/a	£30.00
PW UK & EIRE AMATEUR CALLSIGN (CD-ROM)	n/a	£7.50
RSGB YEARBOOK 2000 EDITION	432	£15.00

Computing

AN INTRODUCTION TO THE WORLDWIDE WEB FOR PC AND MAC USERS. (BP390) D.C & O. Bishop	148	£6.99
ELECTRONIC PROJECTS FOR YOUR PC BP320. R.A. Penfold.	102	£3.99
GETTING THE MOST FROM YOUR PC HARD DISK BP280	90	£3.95
HOW TO EXPAND & UPGRADE YOUR PC BP450 R. A. Penfold.	170	£6.99
INTERFACING PCs AND COMPATIBLES BP272. R. A. Penfold.	86	£4.99
MS-OFFICE ONE STEP AT A TIME (BP402).	77	£5.95
NEWNES COMPUTER ENGINEER'S POCKET BOOK Third Edition. Michael Tooley	256	£12.95
PERSONAL COMPUTERS IN THE HAM SHACK (ARRL).	284	£11.50
THE INTERNET AND WORLD WIDE WEB EXPLAINED. J. Shelley.	130	£5.95
WINDOWS '98 ASSISTANT (BP454) I. Sinclair.	160	£6.99

	Pages	Price
WINDOWS '98 EXPLAINED (BP456). N. Kantaris & P. Oliver	160	£6.99
WINDOWS '98 - HARD DISK & FILE MANAGEMENT. (BP455) J. Gatendy	160	£6.99

EMC

ARRL RFI BOOK (Practical Cures For Radio Frequency Interference)	316	£15.50
INTERFERENCE HANDBOOK. William R. Nelson WA6FQG.	250	£9.50
RSGB GUIDE TO EMC. 2nd Edition. Robin Page-Jones G3JWI.	204	£18.50

Historical

100 RADIO HOOK UPS. 2nd Edition (reprinted)	48	£3.35
1934 OFFICIAL SHORT WAVE RADIO MANUAL. Edited by Hugo Gernsback.	260	£11.85
COLLECTOR'S GUIDE TO TRANSISTOR RADIOS (2nd Edition). Marty & Sue Bunis	320	£16.95
COMMUNICATIONS RECEIVERS - THE VACUUM TUBE ERA. R.S. Moore	141	£17.95
GUIDE TO OLD RADIOS, POINTERS, PICTURES, PRICES. David & Betty Johnson	278	£19.95
HENLEYS 222 RADIO CIRCUIT DIAGRAMS (1924)	271	£9.45
HOW TO BUILD THE TWINPLEX REGENERATIVE RECEIVER. Lindsay	63	£5.75
HOW TO BUILD YOUR FIRST VACUUM TUBE REGENERATIVE RECEIVER. T.J. Lindsay	127	£7.30
HOW TO BUILD YOUR RADIO RECEIVER (A4) (Popular Radio Handbook No. 1)	100	£6.95
HOW TO MAKE A NEUTRODYNE RECEIVER. Webb	63	£5.00
OLD TIME RADIOS - RESTORATION & REPAIR. J. Carr.	256	£20.95
SECRETS OF HOMEBUILT REGENERATIVE RECEIVERS (Rockey)	127	£7.95
SEEING BY WIRELESS - THE STORY OF BAIRD TELEVISION. Ray Herbert	27	£4.95
THOSE GREAT OLD HANDBOOK RECEIVERS (1929 + 1934)	94	£6.95
TRANSISTOR RADIO! - A COLLECTOR'S ENCYCLOPEDIA & PRICE GUIDE. David & Robert Lane	170	£19.95
VISION BY RADIO (1925) (Jenkin)	140	£7.85
DOUBLE TESLA-OUDIN COIL	24	£3.95
RADIO TESLA - THE SECRET'S OF TESLA'S RADIO AND WIRELESS POWER	36	£5.30
TESLA COIL	24	£3.95
TESLA - THE LOST INVENTIONS	32	£4.75
TESLA - THE TRUE WIRELESS	16	£3.95
THE MAN WHO INVENTED THE TWENTIETH CENTURY: NIKOLA TESLA, FORGOTTEN GENIUS OF ELECTRICITY	245	£12.99
THE TESLA HIGH FREQUENCY COIL (1910)	120	£6.95

Crystal Set Books (Xtal Set Society)

THE XTAL SET SOCIETY NEWSLETTER. Volume 1 & 2 Combined. Phil Anderson W0XI	96	£14.00
THE CRYSTAL SET HANDBOOK & VOL. 3 XTAL SET SOCIETY NEWSLETTER. Phil Anderson W0XI	134	£8.00
THE XTAL SET SOCIETY NEWSLETTER. Volume 4. Phil Anderson W0XI	88	£7.00
CRYSTAL SETS. The Xtal Set Society Newsletter, Volume 5. Phil Anderson W0XI	88	£7.00
CRYSTAL SET BUILDING & MORE (Vol 6 & 7 of Xtal Set Society Newsletter)	168	£11.00
CRYSTAL RADIO HISTORY, FUNDAMENTALS AND DESIGN. P.A. Kinzie	122	£8.00
CRYSTAL SET PROJECTS - 15 RADIO PROJECTS YOU CAN BUILD. Phil Anderson	160	£10.00
CRYSTAL SET LOOPERS, A3 TUBER & MORE. Volume 8 Xtal Set Society Newsletter	128	£10.50

Maps & Log Books

AMATEUR RADIO LOGBOOK (RSGB)	50	£3.75
AMATEUR RADIO WORLD ATLAS (A4 SIZE)	20	£8.00
GREAT CIRCLE MAP 600mm x 600mm	n/a	£1.50
NORTH ATLANTIC ROUTE CHART	740 x 520mm	£9.00
QTH LOCATOR MAP OF EUROPE. New Edition	1080 x 680mm	£7.00
RADIO AMATEURS MAP OF THE WORLD. New Edition	980 x 680mm	£7.00
RECEIVING STATION LOG BOOK (RSGB).	60	£3.75
RSGB 1998 PREFIX GUIDE.	32	£6.95

Morse

SECRETS OF LEARNING MORSE CODE Mark Francis	84	£6.95

Microwaves

AN INTRODUCTION TO MICROWAVES (BP312). F.A. Wilson	134	£3.95
ARRL UHF/MICROWAVE EXPERIMENTER'S MANUAL. Various Authors.	446	£15.50
ARRL UHF/MICROWAVE PROJECT MANUAL VOL 2.	160	£11.50
ARRL UHF/MICROWAVES PROJECT MANUAL (ARRL)	352	£15.50
MICROWAVE & WIRELESS COMMUNICATIONS TECHNOLOGY. Joseph J. Carr	436	£27.50
MICROWAVE HANDBOOK - COMPONENTS & OPERATING VOL 1 (RSGB)	110	£12.00
MICROWAVE HANDBOOK - CONSTRUCTION & TESTING VOL 2 (RSGB)	120	£18.50
MICROWAVE HANDBOOK - BANDS & EQUIPMENT VOL 3 (RSGB)	140	£18.50

Operating & Handbooks

ALL ABOUT HAM RADIO. Harry Helms	290	£16.50
ARRL HANDBOOK 2000 76th Edition	380	£24.00
ARRL HANDBOOK 2000 ON CDROM	n/a	£33.00
ARRL OPERATING MANUAL NEW EDITION.	420	£18.50
ARRL RADIO BUYERS SOURCEBOOK VOL1 1 (QST Reviews 1981-1991)	280	£11.50
ARRL RADIO BUYERS SOURCEBOOK VOL1 2 (QST Reviews 1991-1993)	240	£11.50
ARRL VHF/UHF RADIO BUYER'S SOURCEBOOK	120	£11.50
COMPLETE DX'ER. Bob Locher.	204	£9.50
DISCOVERING DXING (2nd Edition). John Zondlo	90	£7.50
HAM RADIO MADE EASY (ARRL). Steve Ford.	204	£11.50
HINTS AND KINKS FOR THE RADIO AMATEUR. Edited by Charles L. Hutchinson and David Newkirk	129	£9.50
LOW PROFILE AMATEUR RADIO (ARRL). Jim Kearman KR1S	124	£7.50
SETTING UP AN AMATEUR RADIO STATION BP300. I.D. Poole.	81	£3.95
TRANSMITTER HUNTING - RADIO DIRECTION FINDING SIMPLIFIED. Joseph D. Moell & Thomas N. Curlee.	325	£24.95

Packet

HF DIGITAL COMPANION. Steve Ford	120	£7.50
NOS INTRO: TCP/IP OVER PACKET RADIO. Ian Wade G3NRW	356	£11.50
PACKET RADIO PRIMER (RSGB). Dave Comber G8UYZ & Martyn Corft G8NZU.	266	£8.95
PACKET, SPEED & MORE SPEED APPLICATIONS (ARRL)	148	£10.50
PRACTICAL PACKET RADIO. Stan Horzepa	140	£10.50
YOUR PACKET COMPANION. Steve Ford WB8IMY.	170	£7.50

Propagation

AN INTRODUCTION TO RADIO WAVE PROPAGATION BP293. J.G. Lee	116	£3.95
YOUR GUIDE TO PROPAGATION (RSGB) Ian Poole	88	£6.95

QRP

ARRL LOWER POWER COMMUNICATIONS - THE ART & SCIENCE OF QRP. Richard Arland K7SZ	204	£11.50
QRP POWER (ARRL)	188	£11.50
G-QRP CLUB CIRCUIT HANDBOOK. Edited by Rev. G. Dobbs G3RJV	96	£9.00
INTRODUCING QRP. Dick Pascoe G0BPS	48	£6.95
W1FB's QRP NOTEBOOK (ARRL). 2nd Edition. Doug DeMaw W1FB	175	£8.00

Test Equipment

AN INTRODUCTION TO THE ELECTROMAGNETIC WAVE BP315. F.A. Wilson.	122	£4.95
BUILD YOUR OWN TEST EQUIPMENT. Davidson.	285	£19.95
GETTING THE MOST FROM YOUR MULTIMETER BP239. R.A. Penfold.	102	£2.95
HANDS-ON GUIDE TO OSCILLOSCOPES. Barry Ross.	228	£20.95
HOW TO USE OSCILLOSCOPES & OTHER TEST EQUIPMENT BP267. R.A. Penfold.	104	£3.50
MORE ADVANCED USES OF THE MULTIMETER BP265. R.A. Penfold.	96	£2.95
OSCILLOSCOPES - HOW TO USE THEM/HOW THEY WORK. 4th edition. Ian Hickman	259	£17.99
TEST EQUIPMENT CONSTRUCTION BP248. R.A. Penfold.	104	£3.99
TEST EQUIPMENT FOR THE RADIO AMATEUR. Clive Smith G4FZH	170	£10.95

VHF

ALL ABOUT VHF AMATEUR RADIO. W. I. Orr W6SAI.	163	£8.95
VHF/UHF HANDBOOK (RSGB). Dick Biddulph G8PDS	180	£22.00
YOUR MOBILE COMPANION. Roger Butch	190	£8.50
YOUR VHF COMPANION. Steve Ford	230	£7.50

ELECTRONICS

General

BEGINNERS GUIDE TO MODERN ELECTRONIC COMPONENTS BP285	166	£4.99
CIRCUIT SOURCE BOOK 1 - BP321. R.A. Penfold.	182	£4.95
CIRCUIT SOURCE BOOK 2 - BP322. R.A. Penfold.	214	£4.95
DIGITAL ELECTRONICS (CD-ROM). Mike Tooley	n/a	£45.00
ELECTRONIC PROJECT BUILDING FOR BEGINNERS. R. Penfold. (BP392)	110	£4.95
ENCYCLOPEDIA OF ELECTRONIC CIRCUITS Vol. 7	1128	£32.95
FAULT FINDING ELECTRONIC PROJECTS BP391	133	£4.99
GETTING STARTED IN PRACTICAL ELECTRONICS BP345. Owen Bishop.	198	£4.95
HOW ELECTRONIC THINGS WORK ... AND WHAT TO DO WHEN THEY DON'T, Goodman	390	£16.95
HOW TO TEST ALMOST EVERYTHING ELECTRONIC	326	£16.95
LADDER CRYSTAL FILTERS. John Pivnichny N2DCH	134	£14.95
NEWNES AUDIO AND HI-FI ENGINEER'S POCKET BOOK 3rd Edition. Vivian Capel.	210	£14.95
PARTS GALLERY & ELECTRONICS CIRCUITS & COMPONENTS (CD-ROM). Mike Tooley	n/a	£35.00
PICTUTOR (CD-ROM). John Decker	n/a	£45.00
POWER SUPPLY PROJECTS BP76. R.A. Penfold.	89	£3.99
PRACTICAL DIGITAL ELECTRONICS FOR TECHNICIANS. Will Kimber	262	£12.99
PRACTICAL ELECTRONIC FILTERS BP299. Owen Bishop.	89	£4.95
PRACTICAL ELECTRONICS HANDBOOK. Ian Sinclair.	439	£14.95
PRACTICAL OSCILLATOR CIRCUITS BP393. A. Flind.	136	£4.99
RADIO ENGINEERS FACTFINDER FOR WINDOWS (Floppy Disk) John Davies	n/a	£18.00
RADIO FREQUENCY TRANSISTORS, PRINCIPLES & PRACTICAL APPLICATIONS Dye/Granberg (Motorola). Hardback	235	£39.95
SCROGGIES - FOUNDATIONS OF WIRELESS & ELECTRONICS. 11th Edition	292	£19.99
TECHNICAL TOPICS SCRAPBOOK (RSGB). 1990-94. Pat Hawker	310	£13.50
THE ART OF SOLDERING BP324. R. Brewster	84	£3.99
UNDERSTANDING BASIC ELECTRONICS (ARRL).	314	£15.50
UNDERSTANDING DIGITAL TECHNOLOGY. F. Wilson. (BP376)	110	£4.95
W1FB's DESIGN NOTEBOOK (ARRL). Doug DeMaw W1FB.	195	£8.00

Data

ARRL ELECTRONICS DATA BOOK. Doug DeMaw W1FB.	260	£8.95
ELECTRONIC HOBBYIST DATA BOOK BP396. R.A. Penfold.	242	£5.95
LF SOURCE BOOK (RSGB) 2nd Edition. Peter Dodd.	130	£8.00
PRACTICAL ELECTRONIC DESIGN DATA BP316. Owen Bishop.	327	£5.99
PRACTICAL RF HANDBOOK (2nd Edition). Ian Hickman.	302	£19.99
RF CIRCUIT DESIGNS. Chris Bowick	176	£18.99
SECRETS OF RF CIRCUIT DESIGN. New Edition (Hardback) Joseph Carr	405	£41.95
SOLID STATE DESIGN FOR THE RADIO AMATEUR (ARRL) Les Hayward W7ZOI & Doug DeMaw W1FB	256	£11.50
SPREAD SPECTRUM SOURCE BOOK	320	£15.50
TOWERS INTERNATIONAL MOSPOWER & OTHER FET SELECTOR	140	£19.95
TOWERS INTERNATIONAL TRANSISTOR SELECTOR - UPDATE 5	476	£24.95
TRANSISTOR DATA TABLES (BP401)	178	£5.95

Projects

33 SIMPLE WEEKEND PROJECTS/CQ	68	£7.95
35 OPTO-DISPLAY TERMINAL BLOCK PROJECTS BP140	104	£4.99
BUILD YOUR OWN INTELLIGENT AMATEUR RADIO TRANSCEIVER. Randy L. Henderson.	350	£25.95
COIL DESIGN & CONSTRUCTION MANUAL BP160. B.B. Babani	106	£3.95
HOW TO DESIGN & MAKE YOUR OWN PCBs BP121. R.A. Penfold.	66	£3.99
MORE ADVANCED POWER SUPPLY PROJECTS BP192. R.A. Penfold	92	£2.95
POWER SUPPLY PROJECTS (A collection of innovative and practical design projects). Newnes	170	£10.95
PROJECTS FOR RADIO AMATEURS & SWLs BP304. R.A. Penfold	92	£3.95
RADIO RECEIVER PROJECTS YOU CAN BUILD.	312	£20.95
SIMPLE SHORT WAVE RECEIVER CONSTRUCTION BP275. R.A. Penfold.	88	£3.95

Valves/Tubes

ELECTRON TUBE LOCATOR. George H. Fathauer	350	£21.95
ESSENTIAL CHARACTERISTICS (TUBES & TRANSISTORS) (Original publishers General Electric) Re-published by Antique Electronic Supply (Arizona)	475	£10.50
HANDBOOK OF RADIO, TV, INDUSTRIAL & TRANSMITTING TUBE & VALVE EQUIVALENTS	60	£2.95
RADIO VALVE GUIDE BOOK VOL 1.	54	£2.95
RADIO VALVE GUIDE BOOK VOL 2.	42	£2.95
RADIO VALVE GUIDE BOOK VOL 3.	40	£2.95
RADIO VALVE GUIDE BOOK VOL 4.	48	£2.95
RADIO VALVE GUIDE BOOK VOL 5.	44	£2.95
MASTER INDEX TO VALVE TYPES, BOOKS 1-5	40	£1.50
RCA RECEIVING TUBE MANUAL (Original Publishers Radio Corporation Of America). Re-published by Antique Electronic Supply (Arizona)	384	£10.50
RCA TRANSMITTING TUBES (Original Publisher Radio Corporation of America) Re-published by Antique Electronic Supply (Arizona)	318	£10.50
TUBE SUBSTITUTION HANDBOOK.	150	£15.50
VALVE AMPLIFIERS. Morgan Jones.	374	£25.00
VALVE & TRANSISTOR AUDIO AMPLIFIERS. John Lindsay Hood	310	£19.95

Order Form

Photocopies of this page are acceptable

Check out our Web Pages at:
http://www.pwpublishing.ltd.uk

FOR ALL MAIL ORDER PURCHASES IN *PRACTICAL WIRELESS*

SUBSCRIPTION RATES

Practical Wireless – 1 year.

- ❑ £28 (UK)
- ❑ £35 (Europe Airmail)
- ❑ £38 (Rest of World Airsaver)
- ❑ £45 (Rest of World Airmail)

Special joint subscription with *Short Wave Magazine* – 1 year.

- ❑ £55 (UK)
- ❑ £68 (Europe Airmail)
- ❑ £74 (Rest of World Airsaver)
- ❑ £85 (Rest of World Airmail)

PLEASE START MY SUBSCRIPTION WITH

THE.....ISSUE.

Monitoring Times – 1 year (12 issues).

- ❑ £38 (UK)
- ❑ £43 (Europe Airmail)
- ❑ £49 (Rest of World Airmail)

BINDERS

❑ Please send me.....*PW binders* for **£6.50** plus **£1.25 P&P** for one, **£2.50 for two or more** (UK only, overseas prices, see below 'Postal Charges')

£ .....

Book Orders

..... **£** .....
..... **£** .....
..... **£** .....
..... **£** .....
..... **£** .....
..... **£** .....
..... **£** .....
..... **£** .....

Postal charges:
£1.25 for one, **£2.50** for two or more binders (UK)
£2.50 per book or **£4** for two books Three or more books an additional 50p per item (overseas surface)

NEW FASTER NEXT DAY SERVICE (UK MAINLAND ONLY)
£4.50 per parcel (orders must be placed by 12 noon)

GRAND TOTAL ..... **£** .....

Thank you for using PW for your purchases

PAYMENT DETAILS

CREDIT CARD ORDERS TAKEN ON (01202) 659930
between the hours of 9.00am - 5.00pm. Outside these hours your order will be recorded on an answering machine.

FAX ORDERS TAKEN ON (01202) 659950
or please fill in the details ticking the relevant boxes, a photocopy will be acceptable to save you cutting your beloved copy!

To: PW Publishing Ltd., FREEPOST, Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW

Name .....

Address .....

.....

..... **Postcode** .....

Telephone number .....

I enclose cheque/PO
Payable to PW Publishing Ltd.) **£**.....

Charge to my Access/Visa card the sum of **£**.....

Card number

Valid from ..... to .....

Signature .....

Telephone number .....

Orders are normally despatched by return of post but please allow 28 days for delivery.
Prices correct at time of going to press.

Please note:
ALL PAYMENTS MUST BE MADE IN STERLING, CASH NOT ACCEPTED WITH MAIL ORDER.

CREDIT CARD ORDERS TAKEN ON (01202) 659930
FAX ORDERS TAKEN ON (01202) 659950

YOUR LOCAL DEALERS

Index to Advertisers

WiNRADiO®

TAKiNG THE EUROPEAN RADiO MARKET BY STORM

FREEPHONE 0800 0746263 TO PLACE A CREDiTCARD ORDER

*Receive a FREE Mini-Cone Antenna With Every WR-3100 order!**

JOiN THE TRUNKED RADiO REVOLUTiON WITH YOUR WiNRADiO RECEiVER!

1. Enjoy multiple, major trunk tracking modes
2. Automatic traffic following & sophisticated control panel
3. Take comfort in the automatic volume control
4. Single & dual receiver modes
5. Convenient inbuilt electronic logger and database
6. Comes complete with an inbuilt traffic recorder
7. Full XRS™ - compliant technology

The WiNRADiO Trunking Option*

Trunking systems are used by public safety, transportation, business, law enforcement, government, military and other organisations. This software includes major trunking modes: Motorola SmartNet® and MPT1327.

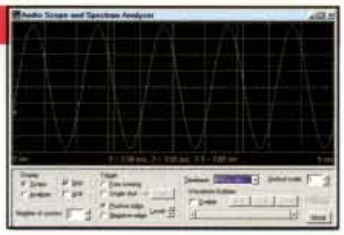
ONLY £81.07 inc vat

TAKE A LOOK AT WiNRADiO's DIGITAL SUITE

1. WEFAX / HF Fax
2. Packet Radio for HF and VHF
3. Aircraft Addressing and Reporting System (ACARS)
4. Audio Oscilloscope, real time Spectrum Analyzer with calibration cursors
5. Squelch-controlled AF Recorder
6. DTMF, CTSS decode and analyse

The DSP applet provided with the WR3100i spectrum monitor ISA card (£995+VAT) allows continuous control of audio bandwidth and other signal conditioning functions.

ONLY £81.07 inc vat
(requires SoundBlaster 16 compatible sound card)



WiNRADiO® PC RECEIVERS

Available as either an internal ISA card that slips inside your PC, or as an external (portable) unit. WiNRADiO combines the power of your PC with the very latest in synthesised receivers.

YOU CAN USE WiNRADiO™ SCANNiNG PC COMMUNiCATiON RECEiVERS FOR:

Broadcast, media monitoring, professional & amateur radio communications, scanning, spot frequency, whole spectrum monitoring, instrumentation surveillance and recording.

If you're after the ultimate receiver-in-a-PC with full DSP then smile and say, "Hello" to the new **WR3100i-DSP** with its hardware for real-time recording, signal conditioning and decoding applications. It's all you need.

NEW EXTERNAL MODELS

EXTERNAL WiNRADiO™

We are now able to offer you a complete range of stand-alone WiNRADiO comms systems:

- **WR1000e - £359 INC VAT**
- **WR1550e - £429 INC VAT**
- **WR3100e - £1169 INC VAT**

Each stand-alone unit connects to your PC through either the basic RS232, or through an optional PCMCIA adapter (for high speed control).

The units are powered through either your existing 12v supply, or through an (optional) NiMH rechargeable 12v battery pack.

"It's software is excellent.. more versatile and less idiosyncratic than that of the Icom IC-PCR1000"
WRTH 1999 Review

"Five stars for its mechanical design"
WRTH 1999 Review

"Most Innovative Receiver"
WRTH 1998 Awards

Model Name/Number	WR-1000i & WR-1000e	WR-1550i & WR-1550e	WR-3100i & WR-3100e
Construction of internals	WR-1000i/WR-1550i-3100iDSP- Internal full length ISA cards		
Construction of externals	WR-1000e/WR-1550e - 3100e - external RS232/PCMCIA (optional)		
Frequency range	0.5-1300 MHz	0.15-1500 MHz	0.15-1500 MHz
Modes	AM,SSB/CW,FM-N,FM-W	AM,LSB,USB,CW,FM-N,FM-W	AM,LSB,USB,CW,FM-N,FM-W
Tuning resolution	100 Hz (5 Hz BFO)	10 Hz (1Hz for SSB and CW)	10 Hz (1Hz for SSB and CW)
IF bandwidths	6 kHz (AM/SSB), 17 kHz (FM-N), 230 kHz (W)	2.5 kHz(SSB/CW), 6 kHz (AM) 17 kHz (FM-N), 230 kHz (W)	2.5 kHz(SSB/CW), 6 kHz (AM) 17 kHz (FM-N), 230 kHz (W)
Receiver type	PLL-based triple-conv. superhet		
Scanning speed	10 ch/sec (AM), 50 ch/sec (FM)		
Audio output on card	200mW	200mW	200mW
Max on one motherboard	8 cards	8 cards	6-8 cards (please ask)
Dynamic range	65 dB	70 dB	85dB
IF shift (passband tuning)	no	±2 kHz	±2 kHz
DSP in hardware	no - use optional DS software		YES (ISA card ONLY)
IRQ required	no	no	yes (for ISA card)
Spectrum Scope	yes	yes	yes
Visitune	yes	yes	yes
Published software API	yes	yes	yes (also DSP)
Internal ISA cards	£299 inc vat	£369 inc vat	£1169.13 inc
External units	£359 inc vat	£429 inc vat	£1169.13 inc (hardware DSP only internal)

PCMCIA Adapter (external):	£69.00 inc vat when bought with 'e' series unit (otherwise: £99 inc vat)
PPS NiMH 12v Battery Pack & Chrgr:	£99 inc vat when purchased with 'e' series unit (otherwise: £139 inc vat)
The WiNRADiO Digital Suite:	£74.99 inc vat when purchased with a WiNRADiO receiver (otherwise: £81.05 inc vat)

For your free (no obligation) info pack & WiNRADiO demo disk go to: http://www.broadercasting.com. If you don't have access to the internet then by all means feel free to phone/fax us. *Trunked radio transmissions should only be received & decoded with permission of the originator of the transmission.

Please send all your enquiries to: info@broadercasting.com or Telephone: 0800 0746 263 or +44 (0)1245 348000 - Fax: +44 (0)1245 287057
Broadercasting Communication Systems, Unit B, Chelford Court, Robjohns Road, Chelmsford, Essex, CM1 3AG, United Kingdom

All-Mode HF Transceiver FT-1000MP

The year was 1956. Electronic communication throughout the world was on the threshold of significant and remarkable change. Intrigued by the development of single-sideband radio theory, a young engineer and amateur radio experimenter painstakingly assembled an SSB transmitter. Word of his successful efforts spread quickly among his friends, and soon radio amateurs from all over the country were requesting transmitters just like it. Thus was born the first invention of JA1MP, founder of Yaesu. Though his key is now silent, in tribute to his leadership and exceptional contributions to the radio art, the FT-1000MP carries the memory of his call sign.

An HF Masterpiece, Combining the Best of Digital and RF design technology. The FT-1000MP.

Specifications

- EDSP (Enhanced Digital Signal Processing)
- Shuttle-jog Rapid Tuning Enhancement
- Directional Tuning Scale for CW/Digital mode and clarifier offset display
- Dual In-Band Receive w/Separate S-Meters
- Selectable Antenna Jacks
- Collins SSB Mechanical Filter built-in, 500 Hz CW Collins filter plug-in, optional
- Selectable Cascaded Crystal and Mechanical IF Filtering (2nd and 3rd IF Filters)
- User-Programmable Tuning Steps w/0.625 Hz High Resolution Low-Noise DDS Circuit
- Custom Feature Set-up via New Menu System
- Adjustable TX Output Power: 5-100W(5-25W AM)
- True Base Station: Both 100-117 or 200-234 ± VAC 10% 50/60 Hz and 13.5 VDC Power Inputs

Blending digital and RF technology, the FT-1000MP features a Yaesu exclusive: Enhanced Digital Signal Processing (EDSP). Beginning on the receive side with Yaesu's industry-standard high-intercept front end design, the RF signal is then fed to the IF stages, where an impressive array of 8.2 MHz and 455 kHz IF filters (including a built-in Collins SSB Mechanical Filter) establish the tight shape factor so important in obtaining high dynamic range and low noise figure. Finally, the EDSP system provides specially-designed filter selections and response contours for maximum intelligence recovery.

Only with this combination of EDSP, independently selectable 8.2 MHz and 455 kHz IF filters, and a low-noise DDS local oscillator system can receiver performance without compromise be obtained. You can customize your FT-1000MP by choosing from 2.0 kHz, 500 Hz, and 250 Hz optional, cascaded IF filters, then zero in on weak signals using Yaesu's exclusive Shuttle-jog Rapid Tuning Enhancement and high-resolution (0.625 Hz) DDS VFO. Without question, the FT-1000MP is the most technologically advanced HF rig today.

EDSP operates in both transmit *and* receive modes. On receive, the EDSP produces enhanced signal-to-noise ratio and significantly improved intelligence recovery during difficult situations involving noise and/or interference. The result of hundreds of hours of laboratory and real-world experimentation, EDSP's 4 preset random noise reduction protocols and 4 digital filtering selections are controlled by easy-to-use concentric controls on the front panel of the transceiver. High, low, and mid-range cuts for voice work are teamed with razor-sharp CW bandpass filters and an automatic notch filter which identifies and attenuates undesired carriers or heterodynes. Also operational in the transmit mode, EDSP provides 4 performance-enhancement pattern selections for different operating circumstances, ensuring best readability of *your* signal on the other end of the path.

Once again, Yaesu's engineers have reaffirmed the vision and dedication of JA1MP which began nearly 40 years ago. See the incomparable FT-1000MP today.

The FT-1000D continues to offer unsurpassed performance for the serious Dx'er who requires a full 200 Watt Power output packaged with full Cross-Band Dual Receiver Capability

The Best of the Best

YAESU

Choice of the World's top DX'ers

http://www.yaesu.co.uk

YAESU UK LTD. Unit 12, Sun Valley Business Park, Winnall Close Winchester, Hampshire, SO23 0LB, U.K.

Specifications Subject to change without notice. Specifications guaranteed only within amateur bands. Some accessories and/or options are standard in certain areas. Check with your local Yaesu dealer for specific details. Collins is a trademark of Rockwell International Corporation